SAR Evaluation Report for FCC

Applicant Name	:	**Smart Gadgets Global, LLC**
Applicant Address	:	**2637 North 400 East #127, North Ogden, Utah, 84414, USA**
Product Name	:	**Smart Phone**
Brand Name	:	**T1**
Model Number	:	**SGG-06**
FCC ID	:	**2BSZG-SGG06SM8661**

Report Number	:	**USSC25O135001**
Compliant Standards	:	**FCC 47 CFR §2.1093**
Sample Received Date	:	**Oct. 13, 2025**
Date of Testing	:	**Oct. 18, 2025 ~ Nov. 12, 2025**
Report Issued Date	:	**Jan. 07, 2026**

The above equipment has been tested by ***Eurofins E&E Wireless Taiwan Co., Ltd.****, and found compliance with the requirement of the above standards. The test record, data evaluation & Device Under Test (DUT) configurations represented herein are true and accurate accounts of the measurements of the sample's characteristics under the conditions specified in this report.*

Note:

1. *The test results are valid only for samples provided by customers and under the test conditions described in this report.*
2. *This report shall not be reproduced except in full, without the written approval of Eurofins E&E Wireless Taiwan Co., Ltd.*
3. *The relevant information is provided by customers in this test report. According to the correctness, appropriateness or completeness of the information provided by the customer, if there is any doubt or error in the information which affects the validity of the test results, the laboratory does not take the responsibility.*

Approved By ：

Roy Wu / SAR Technical Director

Testing Laboratory
1330

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Revision History

Rev.	Issued Date	Description	Revised by
00	Jan. 07, 2026	Initial Issue	Rowan Hsieh

1. Compliance Statement

This device (FCC ID: ***2BSZG-SGG06SM8661***) has been tested by ***Eurofins E&E Wireless Taiwan Co., Ltd.*** in accordance with the measurement procedures specified in FCC KDB procedures, and the results shown in below are capable of demonstrating compliance for localized specific absorption rate (SAR) for general population / uncontrolled environment exposure limits specified in *FCC 47 CFR §1.1310*.

Highest Reported SAR					
Equipment Class	Mode	Exposure Condition			
		Head (Separation: 0 mm) 1g SAR (W/kg)	Body-worn (Separation: 10 mm) 1g SAR (W/kg)	Hotspot (Separation: 10 mm) 1g SAR (W/kg)	Product Specific (Separation: 0 mm) 10g SAR (W/kg)
Licensed	GSM850	0.23	0.20	0.15	N/A
	GSM1900	0.79	0.77	0.79	N/A
	WCDMA II	1.18	0.69	0.79	2.77
	WCDMA IV	1.19	0.79	0.79	2.74
	WCDMA V	0.06	0.20	0.34	N/A
	LTE B12	0.35	0.76	0.79	N/A
	LTE B13	0.29	0.71	0.79	N/A
	LTE B25 / B2	1.18	1.04	0.74	2.79
	LTE B26 / B5	0.31	0.71	0.63	N/A
	LTE B41	1.19	0.73	0.79	2.79
	LTE B48	1.17	0.78	0.78	N/A
	LTE B66 / B4	1.18	0.78	0.76	2.82
	LTE B71	0.36	0.79	0.69	N/A
	5GNR n5	0.25	0.50	0.32	N/A
	5GNR n25 / n2	1.00	0.78	0.76	2.81
	5GNR n41	1.18	0.77	0.79	2.80
	5GNR n48	1.19	1.01	0.78	1.20
	5GNR n66	1.12	0.79	0.77	2.82
	5GNR n71	0.32	0.76	0.76	N/A
	5GNR n77	1.12	1.19	0.78	2.13
DTS	WLAN 2.4 GHz	1.13	0.78	0.79	N/A
NII	WLAN 5 GHz	1.19	0.68	0.70	1.15
DSS / DTS	Bluetooth	0.32	0.19	0.19	N/A
DXX	NFC	N/A	N/A	N/A	0.02
Simultaneous SAR per KDB 690783		1.52	1.57	1.58	3.99
SAR Limits		1.60			4.00

2. Test Regulations

2.1. Reference Standard and Guidance

The Specific Absorption Rate (SAR) testing documented in this report were performed in accordance with following FCC published KDB guidance and standard：

KDB Publication 248227 D01 – IEEE 802.11 Wi-Fi SAR v02r02
KDB Publication 447498 D01 – General RF Exposure Guidance v06
KDB Publication 447498 D03 – Supplement C Cross-Reference v01
KDB Publication 447498 D04 – Interim General RF Exposure Guidance v01
KDB Publication 648474 D04 – Handset SAR v01r03
KDB Publication 865664 D01 – SAR measurement 100 MHz to 6 GHz v01r04
KDB Publication 865664 D02 – RF Exposure Reporting v01r02
KDB Publication 941225 D01 – 3G SAR Procedures v03r01
KDB Publication 941225 D05 – SAR for LTE Devices v02r05
KDB Publication 941225 D05A – LTE Rel.10 KDB Inquiry Sheet v01r02
KDB Publication 941225 D06 – Hotspot Mode v02r01
IEEE Std 1528-2013

In addition to the above, the following guideline was used：

TCB Workshop Oct 2013 – Guidelines for GPRS Testing Considerations
TCB Workshop Oct 2014 – Guidelines for Other LTE Considerations
TCB Workshop Apr 2015 – Guidelines for Overlapping LTE Bands
TCB Workshop Oct 2015 – Guidelines for KDB 941225 D05A
TCB Workshop Apr 2016 – Guidelines for LTE DL Carrier Aggregation
TCB Workshop Oct 2016 – Guidelines for LTE UL Carrier Aggregation
TCB Workshop Oct 2016 – Guidelines for Bluetooth Duty Factor
TCB Workshop Oct 2016 – Guidelines for DUT Holder Perturbations
TCB Workshop May 2017 – Guidelines for Broadband Liquid Above 3 GHz
TCB Workshop May 2017 – Guidelines for LTE Band 41 Power Class 2
TCB Workshop May 2017 – Guidelines for LTE Test Conditions
TCB Workshop Nov 2017 – Guidelines for LTE UL/DL Carrier Aggregation SAR
TCB Workshop Apr 2018 – Guidelines for LTE DL CA SAR Test Exclusion
TCB Workshop Oct 2018 – Guidelines for LTE Inter-Band Uplink Carrier Aggregation
TCB Workshop Apr 2019 – Guidelines for Tissue Simulating Liquids (TSL)
TCB Workshop Apr 2019 – Guidelines for IEEE 802.11ax SAR Testing
TCB Workshop Nov 2019 – Guidelines for 5G NR FR1 NSA EN-DC SAR Evaluations
TCB Workshop Oct 2020 – Guidelines for Intra-band and Inter-band NSA EN-DC Evaluation
TCB Workshop Oct 2022 – Guidelines for SAR test frequencies in multi-rule

2.2. RF Exposure Limits

Population / Uncontrolled Environments: 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.

Occupational / Controlled Environments: 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. This 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.

The Radiofrequency Radiation Exposure Limits Specified in FCC 47 CFR §1.1310

Exposure Scenario	Frequency Range	Local Head/Body SAR (1g-SAR, W/kg)	Local Extremity SAR (10g-SAR, W/kg)	Local Power Density (4 cm^2, mW/cm^2)
Population / Uncontrolled	100 kHz to 6 GHz	1.6	4.0	
	1.5 GHz to 100 GHz			1.0
Occupational / Controlled	100 kHz to 6 GHz	8.0	20.0	
	1.5 GHz to 100 GHz			5.0

3. Information of Testing Laboratory

Test Facilities

Company Name: Eurofins E&E Wireless Taiwan Co., Ltd.
Address No.: 140-1, Changan Street, Bade District, Taoyuan City, Taiwan
Website: https://www.eurofins.tw/
Telephone: +886-3-271-0188
Fax: +886-3-271-0190
E-mail: infoEETW@eurofins.com

Test Site Location

☐ No. 140-1, Changan Street, Bade District, Taoyuan City, Taiwan
☑ No. 2, Wuquan 5th Rd. Wugu Dist., New Taipei City, Taiwan

Laboratory Accreditation

Location	TAF	FCC	ISED
No. 140-1, Changan Street, Bade District, Taoyuan City, Taiwan	Accreditation No.: 1330	Designation No.: TW0010	Company No.: 7381A CAB ID: TW1330
No. 2, Wuquan 5th Rd. Wugu Dist., New Taipei City, Taiwan	Accreditation No.: 1330	Designation No.: TW0034	Company No.: 28922 CAB ID: TW1330

4. DUT (Device Under Test) Information

4.1. Device Overview

Product Name	Smart Phone	
Brand Name	T1	
Model Name	SGG-06	
FCC ID	2BSZG-SGG06SM8661	
Testing Sample No.	C25O135_A010, C25O135_A11, C25O135_A12, C25O135_A13, C25O135_A14, C25O135_A15	
Supported Wireless Technologies	**Tx Frequency (MHz)**	**Operating Mode**
	GSM 850 : 824.2 ~ 848.8 1900 : 1850.2 ~ 1909.8	Voice : GMSK GPRS : GMSK EDGE : 8PSK
	WCDMA Band 2 : 1852.4 ~ 1907.6 Band 4 : 1712.4 ~ 1752.6 Band 5 : 826.4 ~ 846.6	UMTS Rel. 99 (Voice / Data) HSDPA (Rel. 5) HSUPA (Rel. 6) HSPA+ (Rel. 7) DC-HSDPA (Rel. 8)
	LTE Band 2 : 1850.7 ~ 1909.3 Band 4 : 1710.7 ~ 1754.3 Band 5 : 824.7 ~ 848.3 Band 12 : 699.7 ~ 715.3 Band 13 : 779.5 ~ 784.5 Band 25 : 1850.7 ~ 1914.3 Band 26 : 814.7 ~ 848.3 Band 41 : 2498.5 ~ 2687.5 Band 48 : 3552.5 ~ 3697.5 Band 66 : 1710.7 ~ 1779.3 Band 71 : 665.5 ~ 695.5	QPSK, 16QAM, 64QAM, 256QAM Carrier Aggregation (UL: 2CC)
	5G NR FR1 n2 : 1852.5 ~ 1907.5 n5 : 826.5 ~ 846.5 n25 : 1852.5 ~ 1912.5 n41 : 2506.02 ~ 2679.99 n48 : 3560 ~ 3690 n66 : 1712.5 ~ 1777.5 n71 : 665.5 ~ 695.5 n77 : 3460.02 ~ 3540, 3710.01 ~ 3969.99	**DFT-s-OFDM：** π/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM **CP-OFDM：** QPSK, 16QAM, 64QAM, 256QAM
	WLAN 2.4G : 2412 ~ 2462 5G : 5180 ~ 5240, 5260 ~ 5320, 5500 ~ 5720, 5745 ~ 5825	2.4G : 802.11b/g/n/ax 5G : 802.11a/n/ac/ax
	Bluetooth 2402 ~ 2480	BR, EDR, LE
	NFC 13.56	ASK

Note:

The above DUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

4.2. General Information for LTE

Supported Band, Frequency Range, Channel Bandwidth, Channel Number and Frequency	***LTE Band 2***						
	BW	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
	Low Ch.	18607 / 1850.7	18615 / 1851.5	18625 / 1852.5	18650 / 1855.0	18675 / 1857.5	18700 / 1860.0
	Mid Ch.	18900 / 1880.0	18900 / 1880.0	18900 / 1880.0	18900 / 1880.0	18900 / 1880.0	18900 / 1880.0
	High Ch.	19193 / 1909.3	19185 / 1908.5	19175 / 1907.5	19150 / 1905.0	19125 / 1902.5	19100 / 1900.0
	LTE Band 4						
	BW	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
	Low Ch.	19957 / 1710.7	19965 / 1711.5	19975 / 1712.5	20000 / 1715.0	20025 / 1717.5	20050 / 1720.0
	Mid Ch.	20175 / 1732.5	20175 / 1732.5	20175 / 1732.5	20175 / 1732.5	20175 / 1732.5	20175 / 1732.5
	High Ch.	20393 / 1754.3	20385 / 1753.5	20375 / 1752.5	20350 / 1750.0	20325 / 1747.5	20300 / 1745.0
	LTE Band 5						
	BW	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**		
	Low Ch.	20407 / 824.7	20415 / 825.5	20425 / 826.5	20450 / 829.0		
	Mid Ch.	20525 / 836.5	20525 / 836.5	20525 / 836.5	20525 / 836.5		
	High Ch.	20643 / 848.3	20635 / 847.5	20625 / 846.5	20600 / 844.0		
	LTE Band 12						
	BW	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**		
	Low Ch.	23017 / 699.7	23025 / 700.5	23035 / 701.5	23060 / 704.0		
	Mid Ch.	23095 / 707.5	23095 / 707.5	23095 / 707.5	23095 / 707.5		
	High Ch.	23173 / 715.3	23165 / 714.5	23155 / 713.5	23130 / 711.0		
	LTE Band 13						
	BW			**5 MHz**	**10 MHz**		
	Low Ch.			23205 / 779.5			
	Mid Ch.			23230 / 782.0	23230 / 782.0		
	High Ch.			23255 / 784.5			
	LTE Band 25						
	BW	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
	Low Ch.	26047 / 1850.7	26055 / 1851.5	26065 / 1852.5	26090 / 1855.0	26115 / 1857.5	26140 / 1860.0
	Mid Ch.	26340 / 1880.0	26340 / 1880.0	26340 / 1880.0	26340 / 1880.0	26340 / 1880.0	26340 / 1880.0
	High Ch.	26683 / 1914.3	26675 / 1913.5	26665 / 1912.5	26640 / 1910.0	26615 / 1907.5	26590 / 1905.0
	LTE Band 26						
	BW	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	
	Low Ch.	26697 / 814.7	26705 / 815.5	26715 / 816.5	26740 / 819.0	26765 / 821.5	
	Mid Ch.	26865 / 831.5	26865 / 831.5	26865 / 831.5	26865 / 831.5	26865 / 831.5	
	High Ch.	27033 / 848.3	27025 / 847.5	27015 / 846.5	26990 / 844.0	26965 / 841.5	
	LTE Band 41						
	BW			**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
	Low Ch.			39675 / 2498.5	39700 / 2501.0	39725 / 2503.5	39750 / 2506.0
	Mid-Low Ch.			40148 / 2545.8	40160 / 2547.0	40173 / 2548.3	40185 / 2549.5
	Mid Ch.			40620 / 2593.0	40620 / 2593.0	40620 / 2593.0	40620 / 2593.0
	Mid-High Ch.			41093 / 2640.3	41080 / 2639.0	41068 / 2637.8	41055 / 2636.5
	High Ch.			41565 / 2687.5	41540 / 2685.0	41515 / 2682.5	41490 / 2680.0
	LTE Band 48						
	BW			**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
	Low Ch.			55265 / 3552.5	55290 / 3555.0	55315 / 3557.5	55340 / 3560.0
	Mid-Low Ch.			55810 / 3607.0	55815 / 3607.5	55820 / 3608.0	55830 / 3609.0
	Mid-High Ch.			56170 / 3643.0	56165 / 3642.5	56160 / 3642.0	56150 / 3641.0
	High Ch.			56715 / 3697.5	56690 / 3695.0	56665 / 3692.5	56640 / 3690.0
	LTE Band 66						
	BW	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
	Low Ch.	131979 / 1710.7	131987 / 1711.5	131997 / 1712.5	132022 / 1715.0	132047 / 1717.5	132072 / 1720.0
	Mid Ch.	132322 / 1745.0	132322 / 1745.0	132322 / 1745.0	132322 / 1745.0	132322 / 1745.0	132322 / 1745.0
	High Ch.	132665 / 1779.3	132657 / 1778.5	132647 / 1777.5	132622 / 1775.0	132597 / 1772.5	132572 / 1770.0
	LTE Band 71						
	BW			**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
	Low Ch.			133147 / 665.5	133172 / 668.0	133197 / 670.5	133222 / 673.0
	Mid Ch.			133297 / 680.5	133297 / 680.5	133297 / 680.5	133297 / 680.5
	High Ch.			133447 / 695.5	133422 / 693.0	133397 / 690.5	133372 / 688.0
Modulations Supported in Uplink	QPSK / 16QAM / 64QAM / 256QAM						
LTE MPR Permanently Implemented per 3GPP TS 36.101 section 6.2.3~6.2.5?	Yes						
A-MPR (Additional MPR) Disabled for SAR Testing?	Yes						
LTE Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations						
LTE Additional Information	This device does not support full CA features on 3GPP Release 16. It supports carrier aggregation, downlink MIMO, LAA features as shown in the RF Conducted Powers section of this report and the Downlink LTE CA RF Conducted Powers Appendix. All uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC. The following LTE Release 16 features are not supported: Relay, HetNet, Enhanced MIMO, eICIC, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.						

4.3. General Information for 5G NR FR1

Supported Band, Frequency Range, Channel Bandwidth, Channel Number and Frequency

NR Band n2

BW	5 MHz	10 MHz	15 MHz	20 MHz									
Low Ch.	370500 1852.5	371000 1855.0	371500 1857.5	372000 1860.0									
Mid Ch.	376000 1880.0	376000 1880.0	376000 1880.0	376000 1880.0									
High Ch.	381500 1907.5	381000 1905.0	380500 1902.5	380000 1900.0									

NR Band n5

BW	5 MHz	10 MHz	15 MHz	20 MHz									
Low Ch.	165300 826.5	165800 829.0	166300 831.5	166800 834.0									
Mid Ch.	167300 836.5	167300 836.5	167300 836.5	167300 836.5									
High Ch.	169300 846.5	168800 844.0	168300 841.5	167800 839.0									

NR Band n25

BW	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz							
Low Ch.	370500 1852.5	371000 1855.0	371500 1857.5	372000 1860.0	372500 1862.5	373000 1865.0							
Mid Ch.	376500 1882.5	376500 1882.5	376500 1882.5	376500 1882.5	376500 1882.5	376500 1882.5							
High Ch.	382500 1912.5	382000 1910.0	381500 1907.5	381000 1905.0	380500 1902.5	380000 1900.0							

NR Band n41

BW				20 MHz		30 MHz	40 MHz	50 MHz	60 MHz	70 MHz	80 MHz	90 MHz	100 MHz
Low Ch.				501204 2506.02		502200 2511.00	503202 2516.01	504204 2521.02	505200 2526.00	506202 2531.01	507204 2536.02	508200 2541.00	509202 2546.01
Mid-Low Ch.				509898 2549.49		510402 2552.01	513468 2567.34						
Mid Ch.				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
Mid-High Ch.				527298 2636.49		526800 2634.00	523734 2618.67						
High Ch.				535998 2679.99		534996 2674.98	534000 2670.00	532998 2664.99	531996 2659.98	531000 2655.00	529998 2649.99	528996 2644.98	528000 2640.00

NR Band n48

BW				20 MHz									
Low Ch.				637334 3560									
Mid-Low Ch.				640222 3603.33									
Mid Ch.													
Mid-High Ch.				643112 3646.68									
High Ch.				646000 3690.00									

NR Band n66

BW	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz							
Low Ch.	342500 1712.5	343000 1715.0	343500 1717.5	344000 1720.0	344500 1722.5	345000 1725.0							
Mid Ch.	349000 1745.0	349000 1745.0	349000 1745.0	349000 1745.0	349000 1745.0	349000 1745.0							
High Ch.	355500 1777.5	355000 1775.0	354500 1772.5	354000 1770.0	353500 1767.5	353000 1765.0							

NR Band n71

BW	5 MHz	10 MHz	15 MHz	20 MHz									
Low Ch.	133100 665.5	133600 668.0	134100 670.5	134600 673.0									
Mid Ch.	136100 680.5	136100 680.5	136100 680.5	136100 680.5									
High Ch.	139100 695.5	138600 693.0	138100 690.5	137600 688.0									

NR Band n77_DoD

BW				20 MHz		30 MHz	40 MHz		60 MHz		80 MHz		100 MHz
Low Ch.				630668 3460.02		631000 3465.00	631334 3470.01		632000 3480.00		632668 3490.02		
Mid Ch.				633334 3500.01		633334 3500.01	633334 3500.01		633334 3500.01		633334 3500.01		633334 3500.01
High Ch.				63600 3540.00		635666 3534.99	635332 3529.98		634332 3514.98		634000 3510.00		

NR Band n77

BW				20 MHz		30 MHz	40 MHz		60 MHz		80 MHz		100 MHz
Low Ch.				647334 3710.01		647668 3715.02	648000 3720.00		648668 3730.02		649334 3740.01		650000 3750.00
Mid-Low Ch.				650800 3762.00		651000 3765.00	651200 3768.00		653556 3803.34				
Mid Ch.				654266 3813.99		654334 3815.01	654400 3816.00		656000 3840.00		656000 3840.00		656000 3840.00
Mid Ch.				657734 3866.01		657666 3864.99	657600 3864.00						
Mid-High Ch.				661200 3918.00		661000 3915.00	660800 3912.00		658444 3876.66				
High Ch.				664666 3969.99		664332 3964.98	664000 3960.00		663332 3949.98		662666 3939.99		662000 3930.00

SCS	FDD：15 kHz; TDD：30 kHz
Modulations Supported in Uplink	DFT-s-OFDM：π/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM CP-OFDM：QPSK, 16QAM, 64QAM, 256QAM
A-MPR (Additional MPR) Disabled for SAR Testing?	Yes
EN-DC Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations
LTE Anchor Bands for NR n2	LTE Band 5, 12, 13, 48, 66, 71
LTE Anchor Bands for NR n5	LTE Band 2, 66
LTE Anchor Bands for NR n25	LTE Band 12, 66
LTE Anchor Bands for NR n41	LTE Band 2, 66
LTE Anchor Bands for NR n66	LTE Band 2, 5, 12, 13, 48, 71
LTE Anchor Bands for NR n71	LTE Band 2, 48, 66
LTE Anchor Bands for NR n77	LTE Band 2, 5, 12, 13, 66

4.4. DSI (Device State Index) Scenarios

This device uses different Device State Index (DSI) to configure different power levels based on exposure scenarios. Below table lists the DSI and RF exposure condition for various transmit conditions.

<WWAN>

State	Trigger Condition	Application Scenarios
DSI 1	Receiver Off, WIFI Off, SAR Sensor On	Body-worn / Extremity, Tx Standalone
DSI 3	Receiver Off, WIFI On, SAR Sensor On	Body-worn / Extremity, Tx Simultaneous Transmission
DSI 4	Receiver On, WIFI Off	Head, Tx Standalone
DSI 5	Receiver On, WIFI On	Head, Tx Simultaneous Transmission
DSI 6	Hotspot On	Hotspot
DSI 7	Receiver Off, WIFI Off, SAR Sensor Off	Body-worn / Extremity, Tx Standalone

<WLAN / Bluetooth>

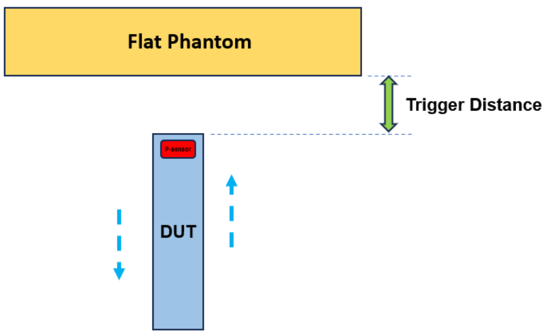
State	Trigger Condition	Application Scenarios
Set 1	Receiver Off, WWAN Off	Body-worn / Extremity, Tx Standalone
Set 3	Receiver Off, WWAN On	Body-worn / Extremity, Tx Simultaneous Transmission
Set 4	Receiver On, WWAN Off	Head, Tx Standalone
Set 5	Receiver On, WWAN On	Head, Tx Simultaneous Transmission
Set 6	Hotspot On	Hotspot

4.5. Proximity Sensor and Power Verification

This device implemented with proximity sensor used to trigger power reduction for RF exposure compliance. Per KDB Publication 616217 D04, the triggering conditions for both normal maximum output power and reduced maximum output power must be confirmed for the sensor and antenna combinations to verify proper triggering at the specified triggering distances. The smallest separation distance determined by the sensor triggering and sensor coverage for normal and tilt positions in KDB Publication 616217 D04 §6.2, §6.3 and §6.4 for surfaces and/or edges triggering conditions, minus 1 mm, must be used as the test separation distance for SAR testing.

Testing for Determining Proximity Sensor Triggering Distances per KDB 616217 D04 §6.2

Per KDB Publication 616217 D04 §6.2, the proximity sensor of the DUT was moved toward the flat phantom to determine the trigger distance for enabling power reduction and moved away from the flat phantom to determine the trigger distance for resuming full power. The DUT featured a visual indicator on its display screen that showed the status of the proximity sensor (triggered or not triggered). This was used to determine the status of the sensor during the proximity sensor assessment.



The proximity sensor triggering distance was determined per KDB Publication 616217 for rear face and applicable edge. Summary for power verification per distance was tabulated in the below table.

<ANT 1>

Output Power Verification in dBm for DUT Rear Face											
Distance (mm)	12	13	14	15	16	17	18	19	20	21	22
WCDMA II	22.2	22.1	22.3	22.3	22.0	22.0	23.3	22.9	23.0	23.2	23.0
WCDMA IV	22.1	22.1	22.0	21.9	21.9	22.3	23.3	23.3	23.0	23.2	22.9
LTE B25	22.0	22.5	22.3	22.1	22.1	22.0	23.5	23.7	23.6	23.7	23.4
LTE B66	22.3	22.2	22.1	21.9	22.3	22.3	23.2	23.4	23.4	23.4	23.4
5GNR n25	21.7	21.8	22.2	22.0	21.8	21.9	23.0	23.3	23.1	23.1	23.2
5GNR n66	22.4	22.6	22.3	22.6	22.5	22.4	23.0	22.9	23.1	23.0	23.1
5GNR n41 (PC2)	25.8	25.6	25.9	25.8	25.6	25.8	26.6	26.4	26.8	26.8	26.6

Output Power Verification in dBm for DUT Top Edge										
Distance (mm)	0	1	2	3	4	5	6	7	8	9
WCDMA II	21.8	22.2	21.9	21.9	22.2	23.3	23.0	23.0	23.1	23.4
WCDMA IV	22.4	22.2	22.0	22.1	21.9	23.2	23.2	23.4	22.9	23.1
LTE B25	22.4	22.0	22.4	22.2	22.3	23.5	23.4	23.8	23.8	23.6
LTE B66	22.2	22.1	22.3	22.0	22.3	22.9	23.2	23.0	23.2	23.1
5GNR n25	22.8	22.6	22.7	22.5	22.6	22.9	22.9	23.4	23.0	22.9
5GNR n66	22.7	22.5	22.8	22.3	22.5	22.7	22.7	22.9	22.6	23.0
5GNR n41 (PC2)	25.9	25.7	25.9	25.7	25.7	26.3	26.3	26.7	26.3	26.8

<ANT 3>

Output Power Verification in dBm for DUT Rear Face											
Distance (mm)	9	10	11	12	13	14	15	16	17	18	19
LTE B25	22.8	23.3	23.2	23.3	22.8	23.0	24.6	24.6	24.1	24.2	24.4
LTE B66	23.1	23.1	23.2	23.1	23.4	23.5	24.7	24.4	24.6	24.4	24.5

Output Power Verification in dBm for DUT Right Edge									
Distance (mm)	0	1	2	3	4	5	6	7	8
LTE B25	23.3	23.2	23.2	23.2	24.3	24.2	24.2	24.2	24.2
LTE B66	23.3	23.0	23.2	23.1	24.4	24.7	24.3	24.8	24.6

<ANT 6>

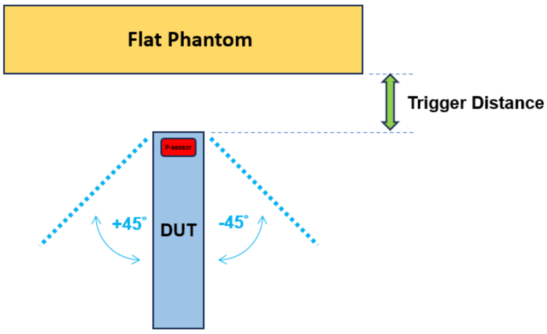
Output Power Verification in dBm for DUT Rear Face											
Distance (mm)	15	16	17	18	19	20	21	22	23	24	25
5GNR n77 (PC2)	23.3	23.3	23.5	23.3	23.3	23.5	26.5	26.7	26.4	26.6	26.8

Testing for Determining Proximity Sensor Coverage per KDB 616217 D04 §6.3

Per KDB Publication 616217 D04 §6.3, the proximity sensor coverage evaluation is not required for this device because the proximity sensor is collocated with antenna in one component as there is no spatial offset between the sensor element and antenna, and the peak SAR location was overlapping with the sensor.

Testing for Determining Proximity Sensor Tilt Angle Influences per KDB 616217 D04 §6.4

Per KDB Publication 616217 D04 §6.4, the proximity sensor tilt angle influence was determined for applicable edges and the DUT was positioned below the flat phantom at the minimum triggering distance and rotated for angles up to ±45°. Summary for proximity sensor tilt angle influence is shown in below table.



<ANT 1>

Orientation	Separation Distance (mm)	Tilt Angle										
		-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
Back Surface	17	On	On	On	On	On	On	On	On	On	On	On
Top Edge	4	On	On	On	On	On	On	On	On	On	On	On

<ANT 3>

Orientation	Separation Distance (mm)	Tilt Angle										
		-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
Back Surface	14	On	On	On	On	On	On	On	On	On	On	On
Right Side	3	On	On	On	On	On	On	On	On	On	On	On

<ANT 6>

Orientation	Separation Distance (mm)	Tilt Angle										
		-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
Back Surface	20	On	On	On	On	On	On	On	On	On	On	On

5. Measurement System Description

5.1. SAR Definition

The Specific Absorption Rate (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. The SAR is defined as 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*) as shown in the following equation:

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

The SAR is expressed in units of watts per kilogram (W/kg) or equivalently milliwatts per gram (mW/g), and it is related to the E-field at a point by the following equation:

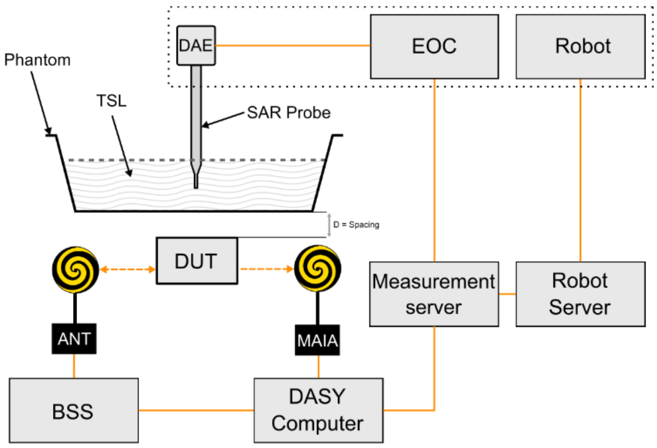
$$SAR = \frac{\sigma |E|^2}{\rho}$$

Where:
σ = conductivity of the tissue (S/m)
ρ = mass density of the tissue (kg/m^3)
E = RMS electrical field strength (V/m)

5.2. SAR Measurement Setup

The SAR measurements are performed using Dosimetric Assessment System (DASY) made by Schmid & Partner Engineering AG, which is a robot-based high precision electromagnetic (EM) near-field scanning platform. The DASY system measures the precise locations of the near-field radiators of highly non-isotropic fields. A sophisticated measurement system with a variety of probes (SAR, E-field, H-field etc.) combined with a high-precision 6-axis robot positioner allows for completely automated measurement scans and evaluations with both field and position information, e.g., volume averages, peak search, and extrapolations.

SPEAG DASY8 SAR Measurement System Setup



The DASY8 system for SAR measurements consists of:

- 6-axis robotic arm (Stäubli TX2-90XL) for positioning the probe.
- Mounting Platform for keeping the phantoms at a fixed location relative to the robot.
- Measurement Server for handling all time-critical tasks, such as measurement data acquisition and supervision of safety features.
- EOC (Electrical to Optical Converter) for converting the optical signal from the DAE to electrical before being transmitted to the measurement server.
- LB (Light-Beam unit) for probe alignment (measurement of the exact probe length and eccentricity).
- SAR probe (EX3D, ES3D probes) for measuring the E-field distribution in the phantom. The SAR distribution and the psSAR (peak spatial averaged SAR) are derived from the E-field measurement.
- SAR phantom that represents a physical model with an equivalent human anatomy. A Specific Anthropomorphic Mannequin (SAM) head is usually used for handheld devices, and a Flat phantom is used for body-worn devices. Specific phantoms are available if the Device Under Test (DUT) is intended for operation on different parts of the body other than the head or torso (e.g., the wrist).
- TSL (Tissue Simulating Liquid) representing the dielectric properties of used tissue.
- DAE (Data Acquisition Electronics) for reading the probe voltages and transmitting it to the DASY8 control PC.
- Device Holder for positioning the DUT beneath the phantom.
- MAIA (Modulation and Interference Analyzer) for confirming the accuracy of the probe linearization parameters.
- ANT (wide-band Antenna) for broadcasting the downlink signals emitted by base station simulators to the DUT.
- Control PC for running the DASY8 software to define/execute the measurements.
- System validation kits for system check / validation purposes.

5.2.1 E-Field Probes

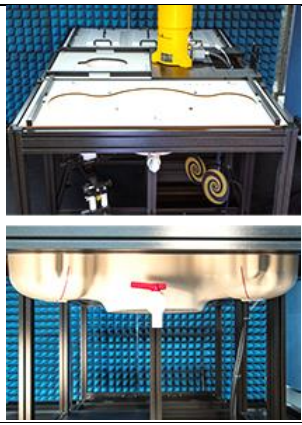
Model	EX3DV4
Construction	Symmetrical design with triangular core. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE).
Frequency	4 MHz to 10 GHz Linearity: ± 0.2 dB
Directivity	± 0.1 dB in TSL (rotation around probe axis) ± 0.3 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 μW/g to 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

5.2.2 Data Acquisition Electronics (DAE)

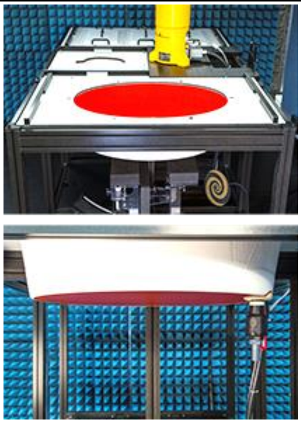
Model	DAE3, DAE4
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.
Measurement Range	-100 to +300 mV (16-bit resolution and two range settings: 4mV, 400mV)
Input Offset Voltage	< 5μV (with auto zero)
Input Bias Current	< 50 fA
Dimensions	60 x 60 x 68 mm

5.2.3 Phantoms

Model	SAM-Twin Phantom
Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE Std 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body-mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.
Material	Vinylester, fiberglass reinforced (VE-GF)
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)
Dimensions	Length: 1000 mm Width: 500 mm Height: adjustable feet
Filling Volume	approx. 25 liters



Model	ELI
Construction	The ELI phantom is used for compliance testing of handheld and body-mounted wireless devices. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.
Material	Vinylester, fiberglass reinforced (VE-GF)
Shell Thickness	2.0 ± 0.2 mm (bottom plate)
Dimensions	Major axis: 600 mm Minor axis: 400 mm
Filling Volume	approx. 30 liters



5.2.4 Device Holder

Model	MD4HHTV5 - Mounting Device for Hand-Held Transmitters
Construction	In combination with the Twin SAM 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).
Material	Polyoxymethylene (POM)

Model	MDA4WTV5 - Mounting Device Adaptor for Ultra-Wide Transmitters
Construction	An 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.
Material	Polyoxymethylene (POM)

Model	MDA4SPV6 - Mounting Device Adaptor for Smart Phones
Construction	The solid low-density MDA4SPV6 adaptor assuring no impact on the DUT radiation performance and is conform with any DUT design and shape.
Material	ROHACELL

Model	MD4LAPV5 - Mounting Device for Laptops and other Body-Worn Transmitters
Construction	In combination with the Twin SAM or ELI phantoms, the Mounting Device (Body-Worn) enables testing of transmitter devices according to IEC 62209-2 specifications. The device holder can be locked for positioning at a flat phantom section.
Material	Polyoxymethylene (POM), PET-G, Foam

5.2.5 Power Source

Model	Powersource1
Signal Type	Continuous Wave
Operating Frequencies	600 MHz to 5850 MHz
Output Power	-5.0 dBm to +17.0 dBm
Power Supply	5V DC, via USB jack
Power Consumption	<3 W
Applications	System performance check and validation with a CW signal.

5.2.6 System Validation Dipoles

Model	D-Serial
Construction	Symmetrical dipole with l/4 balun. Enables measurement of feed point impedance with NWA. Matched for use near flat phantoms filled with tissue simulating solutions.
Frequency	750 MHz to 5800 MHz
Return Loss	> 20 dB
Power Capability	> 100 W (f < 1GHz), > 40 W (f > 1GHz)

5.2.7 Tissue Simulating Liquids

The dielectric properties of the tissue simulating liquids are referred to KDB 865664 D01, IEEE Std 1528 and IEC/IEEE 62209-1528. For SAR measurement of the field distribution inside the phantom, the phantom has been filled with head tissue-equivalent medium. To minimize reflections within the phantom, the depth of the homogeneous medium is greater than or equal to 15 cm. For head SAR testing, the liquid height was measured from the phantom ear reference point (ERP) to the top surface of the tissue simulating liquid. For body and extremity SAR testing, the liquid height was measured from the center of the flat phantom to the top surface of the tissue simulating liquid.

The following table gives the recipes for tissue simulating liquids.

Tissue Type	Water	Tween 20	Oxidized Mineral Oil	Diethylenglycol Monohexylether	Triton X-100	NaCl
835	50.36 %	48.39 %				1.25 %
900	50.31 %	48.34 %				1.35 %
1800	56.00 %		44.00 %			
2450	56.00 %		44.00 %			
4000	56.00 %		44.00 %			
5000	56.00 %		44.00 %			
5200	65.53 %			17.24 %	17.24 %	
5800	65.53 %			17.24 %	17.24 %	
6000	56.00 %		44.00 %			
8000	67.80 %	31.10 %				
10000	66.00 %	33.00 %				

Before SAR measurement, the dielectric properties of the tissue simulating liquid were verified using a dielectric assessment kit and a network analyzer. Since the range of ±10 % of the required target values is used to measure relative permittivity and conductivity, the SAR correction procedure is applied to correct measured SAR for the deviations in permittivity and conductivity. Only positive correction has been used to scale up the measured SAR, and SAR result would not be corrected if the correction ΔSAR has a negative sign. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 10 % are listed in below.

Frequency (MHz)	Target Permittivity	±10 % Range of Permittivity	Target Conductivity	±10 % Range of Conductivity
750	41.9	37.7 ~ 46.1	0.89	0.80 ~ 0.98
835	41.5	37.4 ~ 45.7	0.90	0.81 ~ 0.99
900	41.5	37.4 ~ 45.7	0.97	0.87 ~ 1.07
1450	40.5	36.5 ~ 44.6	1.20	1.08 ~ 1.32
1800	40.0	36.0 ~ 44.0	1.40	1.26 ~ 1.54
1900	40.0	36.0 ~ 44.0	1.40	1.26 ~ 1.54
1950	40.0	36.0 ~ 44.0	1.40	1.26 ~ 1.54
2000	40.0	36.0 ~ 44.0	1.40	1.26 ~ 1.54
2100	39.8	35.8 ~ 43.8	1.49	1.34 ~ 1.64
2450	39.2	35.3 ~ 43.1	1.80	1.62 ~ 1.98
2600	39.0	35.1 ~ 42.9	1.96	1.76 ~ 2.16
3000	38.5	34.7 ~ 42.4	2.40	2.16 ~ 2.64
3500	37.9	34.1 ~ 41.7	2.91	2.62 ~ 3.20
4000	37.4	33.7 ~ 41.1	3.43	3.09 ~ 3.77
4500	36.8	33.1 ~ 40.5	3.94	3.55 ~ 4.33
5000	36.2	32.6 ~ 39.8	4.45	4.01 ~ 4.90
5200	36.0	32.4 ~ 39.6	4.66	4.19 ~ 5.13
5400	35.8	32.2 ~ 39.4	4.86	4.37 ~ 5.35
5600	35.5	32.0 ~ 39.1	5.07	4.56 ~ 5.58
5800	35.3	31.8 ~ 38.8	5.27	4.74 ~ 5.80
6000	35.1	31.6 ~ 38.6	5.48	4.93 ~ 6.03
6500	34.5	31.1 ~ 38.0	6.07	5.46 ~ 6.68
7000	33.9	30.5 ~ 37.3	6.65	5.99 ~ 7.32
7500	33.3	30.0 ~ 36.6	7.24	6.52 ~ 7.96
8000	32.7	29.4 ~ 36.0	7.84	7.06 ~ 8.62
8500	32.1	28.9 ~ 35.3	8.46	7.61 ~ 9.31
9000	31.6	28.4 ~ 34.8	9.08	8.17 ~ 9.99
9500	31.0	27.9 ~ 34.1	9.71	8.74 ~ 10.68
10000	30.4	27.4 ~ 33.4	10.40	9.36 ~ 11.44

5.3. SAR Test Procedures

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

[1] Power Reference measurement
[2] Area Scan
[3] Zoom Scan
[4] Power Drift measurement

5.3.1 Power Reference Measurement

The Power Reference measurement and Power Drift measurement are for monitoring the power drift of the DUT in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

5.3.2 Area Scan Measurement

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 locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEC/IEEE 62209-1528. 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. Following table provides the measurement parameters required for the area scan.

Parameter	f ≤ 3 GHz	f > 3 GHz
Maximum distance from closest measurement point 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 6 ~ 7 GHz：≤ 7.5 mm

From the scanned SAR distribution, identify the position of the maximum SAR value, in addition identify the positions of any local maxima with SAR values within 2 dB of the maximum value that will not be within the zoom scan of other peaks. Additional peaks shall be measured only when the primary peak is within 2 dB of the SAR compliance limit (e.g., 1.0 W/kg for 1.6 W/kg 1g SAR limit; or 1.26 W/kg for 2.0 W/kg 10g SAR limit).

5.3.3 Zoom Scan Measurement

The Zoom Scan are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures points (refer to table below) within a cube whose 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 g and 10 g and displays these values next to the job’s label.

The Zoom Scan (three-dimensional SAR distribution) is performed at the local maxima locations identified in previous area scan procedure. The zoom scan volume must be larger than the required minimum dimensions. When graded grids are used, which only applies in the direction normal to the phantom surface, the initial grid separation closest to the phantom surface and subsequent graded grid increment ratios must satisfy the required protocols. The 1 g SAR averaging volume must be fully contained within the zoom scan measurement volume boundaries; otherwise, the measurement must be repeated by shifting or expanding the zoom scan volume. The similar requirements also apply to 10 g SAR measurements. Following table provides the measurement parameters required for the zoom scan.

<table>
<tr><th colspan="2">Parameter</th><th>f ≤ 3 GHz</th><th>f > 3 GHz</th></tr>
<tr><td colspan="2">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz : ≤ 8 mm
2 ~ 3 GHz : ≤ 5 mm</td><td>3 ~ 4 GHz : ≤ 5.0 mm
4 ~ 6 GHz : ≤ 4.0 mm
6 ~ 7 GHz : ≤ 3.4 mm</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td>uniform grid : $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 ~ 4 GHz : ≤ 4.0 mm
4 ~ 5 GHz : ≤ 3.0 mm
5 ~ 7 GHz : ≤ 2.0 mm</td></tr>
<tr><td>graded grids :
$\Delta z_{Zoom}(1)$</td><td>≤ 4 mm</td><td>3 ~ 4 GHz : ≤ 3.0 mm
4 ~ 5 GHz : ≤ 2.5 mm
5 ~ 6 GHz : ≤ 2.0 mm
6 ~ 7 GHz : ≤ 1.7 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$</td><td colspan="2">≤ 1.5·$\Delta z_{Zoom}(n-1)$ mm</td></tr>
<tr><td colspan="2">Minimum zoom scan volume (x, y, z)</td><td>≥ 30 mm</td><td>3 ~ 4 GHz : ≥ 28 mm
4 ~ 5 GHz : ≥ 25 mm
5 ~ 7 GHz : ≥ 22 mm</td></tr>
</table>

Per IEC 62209-2 AMD1, the successively higher resolution zoom scan is required if the zoom scan measured as defined above complies with both of the following criteria, or if the peak spatial-average SAR is below 0.1 W/kg, no additional measurements are needed:

[1] The smallest horizontal distance from the local SAR peaks to all points 3 dB below the SAR peak shall be larger than the horizontal grid steps in both x and y directions (Δx, Δy). This shall be checked for the measured zoom scan plane conformal to the phantom at the distance zM1.

[2] The ratio of the SAR at the second measured point (M2) to the SAR at the closest measured point (M1) at the x-y location of the measured maximum SAR value shall be at least 30 %.

If one or both of the above criteria are not met, the zoom scan measurement shall be repeated using a finer resolution. New horizontal and vertical grid steps shall be determined from the measured SAR distribution so that the above criteria are met. Compliance with the above two criteria shall be demonstrated for the new measured zoom scan.

5.3.4 Power Drift Measurement

The Power Drift measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift measurement gives the field difference in dB from the reading conducted within the last Power Reference measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Power Reference measurement. If the power drift more than 5 %, the SAR measurement will be retested.

5.3.5 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1 g and 10 g, 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 1 g and 10 g 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 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

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

5.3.6 SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1 % for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

5.3.7 Volume Scan Measurement

The volume scan is used for assessing 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 DUT remain in the same test position for all measurements and all volume scans use the same spatial resolution and grid spacing. When all volume scans were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

5.3.8 Absorbed Power Density Conversion

The Absorbed Power Density (APD) will be derived from the measured SAR values. According to SPEAG application note and DASY8 manual, the APD is evaluated numerically using the FDTD method of Sim4Life software and averaged over square surface areas of 1 cm^2 and 4 cm^2 in the lowermost voxel layer of a flat phantom at a frequency of 6.5 GHz. The phantom consists of a dielectric shell of 2 mm thickness and a relative permittivity 3.7.

6. System Verification

6.1. SAR Tissue Simulating Liquid Verification

The tissue dielectric parameters of tissue-equivalent media used for SAR measurements must be characterized within a temperature range of 18 °C to 25 °C, 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 °C to 25 °C and within ±2 °C 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 parameters should be re-measured after each 3 ~ 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.

The dielectric constant (*εr*) and conductivity (*σ*) of typical tissue-equivalent media recipes are expected to be within ±5 % of the required target values; but for SAR measurement systems that have implemented the SAR error compensation algorithms documented in IEEE Std 1528-2013, to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, the tolerance for *εr* and *σ* can be relaxed to ±10 %.

<TSL Test Result for Head Exposure Condition>

Test Date	Frequency (MHz)	Tissue Temp. (°C)	Measured Permittivity (εr)	Measured Conductivity (σ)	Target Permittivity (εr)	Target Conductivity (σ)	εr Delta (±10 %)	σ Delta (±10 %)
Oct. 20, 2025	750	22.5	40.0	0.925	41.9	0.89	-4.53	3.93
Oct. 21, 2025	750	22.3	41.2	0.880	41.9	0.89	-1.67	-1.12
Oct. 19, 2025	835	22.7	42.2	0.860	41.5	0.90	1.69	-4.44
Oct. 21, 2025	835	22.3	40.9	0.902	41.5	0.90	-1.45	0.22
Oct. 18, 2025	1800	22.4	40.3	1.280	40.0	1.40	0.75	-8.57
Oct. 20, 2025	1800	22.5	39.8	1.340	40.0	1.40	-0.50	-4.29
Oct. 21, 2025	1800	22.3	39.3	1.330	40.0	1.40	-1.75	-5.00
Oct. 23, 2025	1800	22.5	39.3	1.320	40.0	1.40	-1.75	-5.71
Oct. 18, 2025	1900	22.4	40.1	1.340	40.0	1.40	0.25	-4.29
Oct. 20, 2025	1900	22.7	39.1	1.390	40.0	1.40	-2.25	-0.71
Oct. 23, 2025	1900	22.3	40.2	1.280	40.0	1.40	0.50	-8.57
Oct. 18, 2025	2450	21.4	41.4	1.830	39.2	1.80	5.59	1.67
Oct. 27, 2025	2450	21.6	37.9	1.780	39.2	1.80	-3.32	-1.11
Oct. 19, 2025	2600	22.7	39.2	1.790	39.0	1.96	0.51	-8.67
Oct. 22, 2025	2600	22.3	38.9	1.890	39.0	1.96	-0.26	-3.57
Oct. 18, 2025	3500	22.4	36.9	2.620	37.9	2.91	-2.64	-9.97
Oct. 21, 2025	3500	22.3	37.7	2.740	37.9	2.91	-0.53	-5.84
Oct. 23, 2025	3500	22.3	37.7	2.740	37.9	2.91	-0.53	-5.84
Oct. 18, 2025	3700	22.4	36.6	2.880	37.7	3.12	-2.92	-7.69
Oct. 21, 2025	3700	22.3	37.4	2.910	37.7	3.12	-0.80	-6.73
Oct. 23, 2025	3700	22.3	37.4	2.880	37.7	3.12	-0.80	-7.69
Oct. 18, 2025	3900	22.4	36.4	3.210	37.5	3.32	-2.93	-3.31
Oct. 20, 2025	5250	21.7	36.6	4.620	35.9	4.71	2.01	-1.91
Oct. 28, 2025	5250	21.5	33.8	4.460	35.9	4.71	-5.85	-5.31
Oct. 21, 2025	5600	21.3	36.0	5.030	35.5	5.07	1.41	-0.79
Oct. 29, 2025	5600	21.5	33.2	4.820	35.5	5.07	-6.48	-4.93
Oct. 22, 2025	5800	21.4	35.7	5.280	35.3	5.27	0.99	0.19
Oct. 30, 2025	5800	21.8	32.9	5.040	35.3	5.27	-6.80	-4.36

<TSL Test Result for Body-worn and Extremity Exposure Condition>

Test Date	Frequency (MHz)	Tissue Temp. (°C)	Measured Permittivity (εr)	Measured Conductivity (σ)	Target Permittivity (εr)	Target Conductivity (σ)	εr Delta (±10 %)	σ Delta (±10 %)
Nov. 12, 2025	13	21.5	52.9	0.753	55.0	0.75	-3.82	0.40
Nov. 01, 2025	750	22.0	41.4	0.881	41.9	0.89	-1.19	-1.01
Nov. 01, 2025	835	22.0	41.1	0.916	41.5	0.90	-0.96	1.78
Oct. 28, 2025	1800	22.2	40.7	1.350	40.0	1.40	1.75	-3.57
Oct. 29, 2025	1800	22.2	40.1	1.370	40.0	1.40	0.25	-2.14
Nov. 03, 2025	1800	22.4	40.4	1.380	40.0	1.40	1.00	-1.43
Oct. 30, 2025	1900	22.1	39.9	1.440	40.0	1.40	-0.25	2.86
Oct. 31, 2025	1900	22.1	39.8	1.470	40.0	1.40	-0.50	5.00
Nov. 02, 2025	1900	22.1	39.9	1.420	40.0	1.40	-0.25	1.43
Nov. 10, 2025	2450	22.4	38.0	1.800	39.2	1.80	-3.06	0.00
Nov. 05, 2025	2600	22.3	38.1	1.940	39.0	1.96	-2.31	-1.02
Nov. 11, 2025	2600	22.3	40.2	2.060	39.0	1.96	3.08	5.10
Oct. 26, 2025	3500	22.1	37.0	2.670	37.9	2.91	-2.37	-8.25
Nov. 06, 2025	3500	22.2	36.7	2.720	37.9	2.91	-3.17	-6.53
Nov. 08, 2025	3500	22.2	37.8	2.820	37.9	2.91	-0.26	-3.09
Nov. 09, 2025	3500	22.3	37.0	2.730	37.9	2.91	-2.37	-6.19
Oct. 26, 2025	3700	22.1	36.7	2.840	37.7	3.12	-2.65	-8.97
Nov. 06, 2025	3700	22.2	36.3	2.900	37.7	3.12	-3.71	-7.05
Nov. 08, 2025	3700	22.2	37.5	3.010	37.7	3.12	-0.53	-3.53
Nov. 09, 2025	3700	22.2	36.6	2.910	37.7	3.12	-2.92	-6.73
Nov. 08, 2025	3900	22.2	37.2	3.200	37.5	3.32	-0.80	-3.61
Nov. 09, 2025	3900	22.3	36.3	3.100	37.5	3.32	-3.20	-6.63
Nov. 04, 2025	5250	22.0	34.3	4.430	35.9	4.71	-4.46	-5.94
Nov. 07, 2025	5250	21.9	35.1	4.680	35.9	4.71	-2.23	-0.64
Nov. 04, 2025	5600	22.0	34.3	4.920	35.5	5.07	-3.38	-2.96
Nov. 11, 2025	5600	21.9	34.1	5.050	35.5	5.07	-3.94	-0.39
Nov. 04, 2025	5800	22.0	34.0	5.140	35.3	5.27	-3.68	-2.47

<TSL Test Result for Hotspot Exposure Condition>

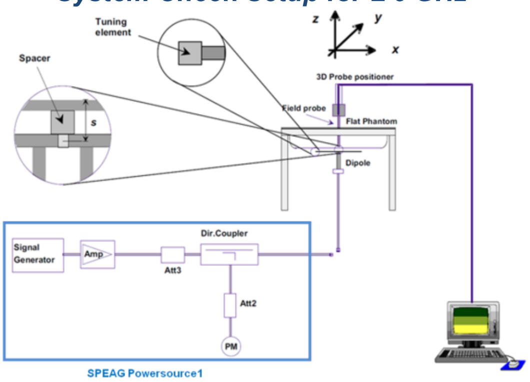
Test Date	Frequency (MHz)	Tissue Temp. (°C)	Measured Permittivity (εr)	Measured Conductivity (σ)	Target Permittivity (εr)	Target Conductivity (σ)	εr Delta (±10 %)	σ Delta (±10 %)
Oct. 31, 2025	750	21.9	42.100	0.893	41.9	0.89	0.48	0.34
Nov. 01, 2025	750	22.1	42.500	0.891	41.9	0.89	1.43	0.11
Oct. 25, 2025	835	22.0	41.900	0.944	41.5	0.90	0.96	4.89
Oct. 29, 2025	1800	22.3	39.400	1.360	40.0	1.40	-1.50	-2.86
Oct. 30, 2025	1800	22.3	40.700	1.390	40.0	1.40	1.75	-0.71
Oct. 27, 2025	1900	22.2	40.100	1.450	40.0	1.40	0.25	3.57
Oct. 28, 2025	1900	22.1	39.700	1.460	40.0	1.40	-0.75	4.29
Oct. 24, 2025	2450	22.1	37.700	1.810	39.2	1.80	-3.83	0.56
Nov. 03, 2025	2600	21.8	38.400	1.910	39.0	1.96	-1.54	-2.55
Nov. 06, 2025	3500	22.2	36.700	2.720	37.9	2.91	-3.17	-6.53
Nov. 08, 2025	3500	22.2	37.800	2.820	37.9	2.91	-0.26	-3.09
Nov. 06, 2025	3700	22.2	36.300	2.900	37.7	3.12	-3.71	-7.05
Nov. 08, 2025	3700	22.2	37.500	3.010	37.7	3.12	-0.53	-3.53
Nov. 08, 2025	3900	22.2	37.200	3.200	37.5	3.32	-0.80	-3.61
Nov. 04, 2025	5250	22.0	34.300	4.430	35.9	4.71	-4.46	-5.94
Nov. 04, 2025	5800	22.0	34.000	5.140	35.3	5.27	-3.68	-2.47

6.2. SAR Test System Verification

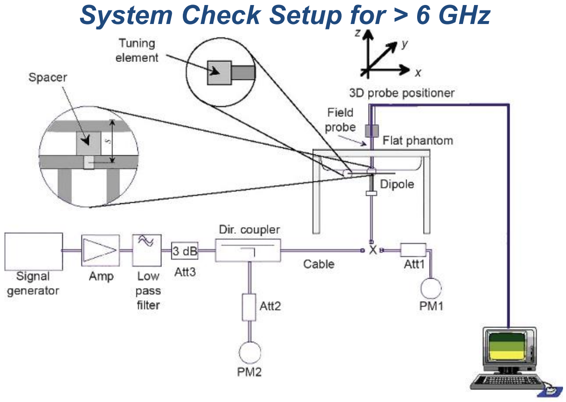
The SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium.

The system check verifies that the system operates within its specifications. It is performed daily or before every SAR measurement. The system check uses normal SAR measurements in the flat section of the phantom with a matched dipole at a specified distance. For frequency ≤ 6 GHz, the SPEAG Powersource1 is used as signal source. For frequency > 6 GHz, the signal generator is used as signal source. The Powersource1 is a portable and very stable RF source providing a continuous wave (CW) signal. It is designed for conducting system checks and system validation and is compatible with international standards, and has been calibrated by SPEAG's ISO 17025 accredited calibration center. When using Powersource1, the setup can be simplified. The signal purity is warranted by design. Since the Powersource1 is calibrated, no additional equipment is needed and the Powersource1 can directly be connected to the SMA connector of the dipole without a cable as all separate components (signal generator, amplifier, coupler and power meter) are built into the unit. The system verification setup is shown as below.

System Check Setup for ≤ 6 GHz



System Check Setup for > 6 GHz



The validation dipole is placed beneath the flat phantom with the specific spacer in place. The distance spacer is touched the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. Before the system check testing, the Powersource1 will be adjusted for the desired forward power of 17 dBm (50 mW) or the signal generator will be adjusted for desired forward power of 20 dBm (100 mW) at the dipole connector and the RF output power would be turned on. After system check testing, the SAR result will be normalized to 1 W forward input power and compared with the reference SAR value derived from validation dipole certificate report. The deviation of system check should be within 10 %.

<System Check for Head Exposure Condition>

Teste Date	Dipole S/N	Probe S/N	DAE S/N	Frequency (MHz)	Input Power (dBm)	1W Target 1g SAR (W/kg)	Measured 1g SAR (W/kg)	1W Normalized 1g SAR (W/kg)	1g SAR Delta (±10 %)
Oct. 20, 2025	1222	7650	1669	750	17	8.76	0.424	8.46	-3.43
Oct. 21, 2025	1222	7650	1669	750	17	8.76	0.430	8.58	-2.06
Oct. 19, 2025	4d291	7650	1669	835	17	9.59	0.472	9.42	-1.80
Oct. 21, 2025	4d291	7650	1669	835	17	9.59	0.508	10.14	5.69
Oct. 18, 2025	2d167	7650	1669	1800	17	38.3	1.86	37.11	-3.10
Oct. 20, 2025	2d167	7650	1669	1800	17	38.3	1.89	37.71	-1.54
Oct. 21, 2025	2d167	7650	1669	1800	17	38.3	1.87	37.31	-2.58
Oct. 23, 2025	2d167	7650	1669	1800	17	38.3	1.86	37.11	-3.10
Oct. 18, 2025	5d111	7650	1669	1900	17	39.6	1.91	38.11	-3.76
Oct. 20, 2025	5d111	7650	1669	1900	17	39.6	1.95	38.91	-1.75
Oct. 23, 2025	5d111	7650	1669	1900	17	39.6	1.89	37.71	-4.77
Oct. 18, 2025	1087	7757	1743	2450	17	53.3	2.81	56.07	5.19
Oct. 27, 2025	1087	7757	1743	2450	17	53.3	2.76	55.07	3.32
Oct. 19, 2025	1197	7650	1669	2600	17	56.5	2.71	54.07	-4.30
Oct. 22, 2025	1197	7650	1669	2600	17	56.5	2.59	51.68	-8.54
Oct. 18, 2025	1013	7650	1669	3500	17	65.4	3.22	64.25	-1.76
Oct. 21, 2025	1013	7650	1669	3500	17	65.4	3.26	65.05	-0.54
Oct. 23, 2025	1013	7650	1669	3500	17	65.4	3.22	64.25	-1.76
Oct. 18, 2025	1034	7650	1669	3700	17	67.7	3.21	64.05	-5.39
Oct. 21, 2025	1034	7650	1669	3700	17	67.7	3.28	65.44	-3.33
Oct. 23, 2025	1034	7650	1669	3700	17	67.7	3.21	64.05	-5.39
Oct. 18, 2025	1014	7650	1669	3900	17	69.8	3.28	65.44	-6.24
Oct. 20, 2025	1358	7757	1743	5250	17	80.2	3.67	73.23	-8.70
Oct. 28, 2025	1358	7757	1743	5250	17	80.2	3.62	72.23	-9.94
Oct. 21, 2025	1358	7757	1743	5600	17	82.6	3.99	79.61	-3.62
Oct. 29, 2025	1358	7757	1743	5600	17	82.6	3.97	79.21	-4.10
Oct. 22, 2025	1358	7757	1743	5800	17	81.6	3.87	77.22	-5.37
Oct. 30, 2025	1358	7757	1743	5800	17	81.6	3.81	76.02	-6.84

<System Check for Body-worn and Extremity Exposure Condition>

Teste Date	Dipole S/N	Probe S/N	DAE S/N	Frequency (MHz)	Input Power (dBm)	1W Target 1g SAR (W/kg)	Measured 1g SAR (W/kg)	1W Normalized 1g SAR (W/kg)	1g SAR Delta (±10 %)	1W Target 10g SAR (W/kg)	Measured 10g SAR (W/kg)	1W Normalized 10g SAR (W/kg)	10g SAR Delta (±10 %)
Nov. 12, 2025	1047	7650	1669	13	30	0.525	0.533	0.53	1.52	0.326	0.327	0.33	0.31
Nov. 01, 2025	1222	3847	1741	750	17	8.76	0.396	7.90	-9.80	5.69	0.264	5.27	-7.43
Nov. 01, 2025	4d291	3847	1741	835	17	9.59	0.465	9.28	-3.25	6.29	0.308	6.15	-2.30
Oct. 28, 2025	2d167	3847	1741	1800	17	38.3	1.88	37.51	-2.06	20.2	0.997	19.89	-1.52
Oct. 29, 2025	2d167	3847	1741	1800	17	38.3	1.88	37.51	-2.06	20.2	1.00	19.95	-1.22
Nov. 03, 2025	2d167	3847	1741	1800	17	38.3	1.89	37.71	-1.54	20.2	1.01	20.15	-0.24
Oct. 30, 2025	5d111	3847	1741	1900	17	39.6	1.94	38.71	-2.25	21	1.03	20.55	-2.14
Oct. 31, 2025	5d111	3847	1741	1900	17	39.6	1.98	39.51	-0.24	21	1.05	20.95	-0.24
Nov. 02, 2025	5d111	3847	1741	1900	17	39.6	1.91	38.11	-3.76	21	1.01	20.15	-4.04
Nov. 10, 2025	1087	3847	1741	2450	17	53.3	2.49	49.68	-6.79	25.1	1.18	23.54	-6.20
Nov. 05, 2025	1197	3847	1741	2600	17	56.5	2.77	55.27	-2.18	25.4	1.26	25.14	-1.02
Nov. 11, 2025	1197	3847	1741	2600	17	56.5	2.94	58.66	3.82	25.4	1.34	26.74	5.26
Oct. 26, 2025	1013	3847	1741	3500	17	65.4	3.16	63.05	-3.59	25	1.21	24.14	-3.43
Nov. 06, 2025	1013	3847	1741	3500	17	65.4	3.15	62.85	-3.90	25	1.22	24.34	-2.63
Nov. 08, 2025	1013	3847	1741	3500	17	65.4	3.26	65.05	-0.54	25	1.27	25.34	1.36
Nov. 09, 2025	1013	3847	1741	3500	17	65.4	3.16	63.05	-3.59	25	1.22	24.34	-2.63
Oct. 26, 2025	1034	3847	1741	3700	17	67.7	3.18	63.45	-6.28	25	1.17	23.34	-6.62
Nov. 06, 2025	1034	3847	1741	3700	17	67.7	3.06	61.06	-9.82	25	1.13	22.55	-9.81
Nov. 08, 2025	1034	3847	1741	3700	17	67.7	3.09	61.65	-8.93	25	1.15	22.95	-8.22
Nov. 09, 2025	1034	3847	1741	3700	17	67.7	3.14	62.65	-7.46	25	1.17	23.34	-6.62
Nov. 08, 2025	1014	3847	1741	3900	17	69.8	3.15	62.85	-9.96	24.6	1.14	22.75	-7.54
Nov. 09, 2025	1014	3847	1741	3900	17	69.8	3.19	63.65	-8.81	24.6	1.17	23.34	-5.10
Nov. 04, 2025	1358	3847	1741	5250	17	80.2	3.76	75.02	-6.46	23	1.09	21.75	-5.44
Nov. 07, 2025	1358	3847	1741	5250	17	80.2	3.79	75.62	-5.71	23	1.11	22.15	-3.71
Nov. 04, 2025	1358	3847	1741	5600	17	82.6	3.8	75.82	-8.21	23.8	1.09	21.75	-8.62
Nov. 11, 2025	1358	3847	1741	5600	17	82.6	3.85	76.82	-7.00	23.8	1.11	22.15	-6.94
Nov. 04, 2025	1358	3847	1741	5800	17	81.6	4.06	81.01	-0.73	23.3	1.16	23.15	-0.67

<System Check for Hotspot Exposure Condition>

Teste Date	Dipole S/N	Probe S/N	DAE S/N	Frequency (MHz)	Input Power (dBm)	1W Target 1g SAR (W/kg)	Measured 1g SAR (W/kg)	1W Normalized 1g SAR (W/kg)	1g SAR Delta (±10 %)
Oct. 31, 2025	1222	7650	1742	750	17	8.76	0.403	8.04	-8.21
Nov. 01, 2025	1222	7650	1742	750	17	8.76	0.401	8.00	-8.66
Oct. 25, 2025	4d291	7650	1742	835	17	9.59	0.475	9.48	-1.17
Oct. 29, 2025	2d167	7650	1742	1800	17	38.3	1.90	37.91	-1.02
Oct. 30, 2025	2d167	7650	1742	1800	17	38.3	1.96	39.11	2.11
Oct. 27, 2025	5d111	7650	1742	1900	17	39.6	2.02	40.30	1.78
Oct. 28, 2025	5d111	7650	1742	1900	17	39.6	1.92	38.31	-3.26
Oct. 24, 2025	1087	7650	1742	2450	17	53.3	2.55	50.88	-4.54
Nov. 03, 2025	1197	7650	1742	2600	17	56.5	3.11	62.05	9.83
Nov. 06, 2025	1013	3847	1741	3500	17	65.4	3.15	62.85	-3.90
Nov. 08, 2025	1013	3847	1741	3500	17	65.4	3.26	65.05	-0.54
Nov. 06, 2025	1034	3847	1741	3700	17	67.7	3.06	61.06	-9.82
Nov. 08, 2025	1034	3847	1741	3700	17	67.7	3.09	61.65	-8.93
Nov. 08, 2025	1014	3847	1741	3900	17	69.8	3.15	62.85	-9.96
Nov. 04, 2025	1358	3847	1741	5250	17	80.2	3.76	75.02	-6.46
Nov. 04, 2025	1358	3847	1741	5800	17	81.6	4.06	81.01	-0.73

7. Test Configurations

7.1. Description of Test Position

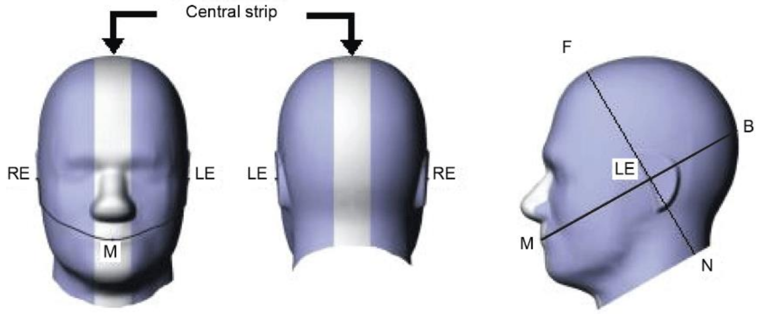
According to KDB 648474 D04, handsets are tested for SAR compliance in head, body-worn accessory and other use configurations described in the following subsections.

7.1.1 Head Exposure Conditions

EAR Reference Point

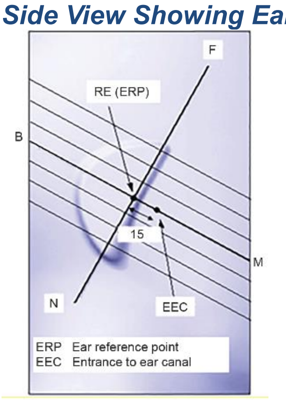
Below Figure shows the front, back, and side views of the SAM phantom. The center-of-mouth reference point is labeled “M”, the left ear reference point (ERP) is marked “LE”, and the right ERP is marked “RE”.

Front, Back and Side View of SAM Twin Phantom

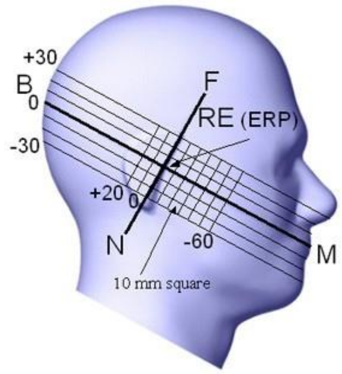


Each ERP is on the B-M (back-mouth) line located 15 mm behind the entrance-to-ear-canal (EEC) point, as shown in Figure 5. The Reference Plane is defined as passing through the two ear reference points and point M. The line N-F (neck-front), also called the reference pivoting line, is along the front truncated edge of the ear spacer (see Figure 6). The N-F line is not perpendicular to the Reference Plane because the N-F edge of the ear spacer is at a slight angle to the Reference Plane when conforming to the contour of SAM at this location. Both N-F and B-M lines should be marked on the exterior of the phantom shell to facilitate handset positioning. Posterior to the N-F line the ear shape is a flat surface with 6 mm thickness at each ERP, and forward of the N-F line the ear is truncated, as illustrated in Figure 5. The ear truncation is introduced to preclude the ear lobe from interfering with handset positioning in the cheek position, which could lead to unstable positioning at the cheek.

Close-up Side View Showing Ear Region



Side View of the Phantom

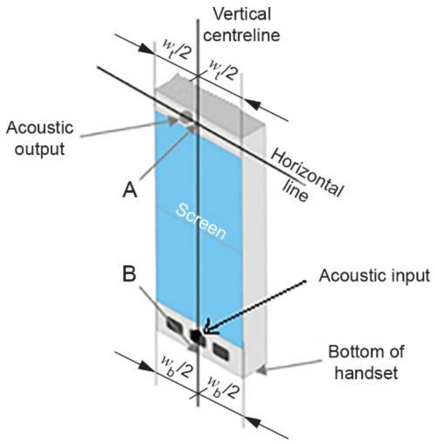


Definition of the Cheek Position

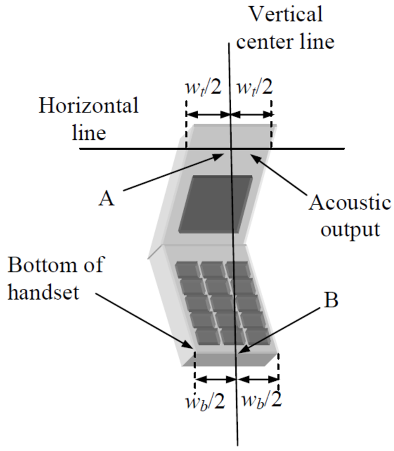
[1] Configure the DUT for voice operation, if necessary. For example, for a DUT with a flip, swivel, or slide cover piece, open the cover if this is consistent with voice operation. If the DUT can also be used with the cover closed, both configurations shall be tested.

[2] Define two imaginary lines on the DUT, the vertical centerline and the horizontal line, relative to the DUT in vertical orientation as shown in below Figure. The vertical centerline passes through two points on the front side of the DUT: the midpoint of the width w_t of the DUT at the level of the acoustic output (Point A), and the midpoint of the width w_b at the bottom of the DUT (Point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The two lines intersect at Point A. Note that for many DUTs, Point A coincides with the center of the acoustic output. However, the acoustic output could be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the DUT, especially for clamshell DUTs, DUTs with flip cover pieces, and other irregularly shaped DUTs.

Vertical & Horizontal Lines – Bar Type Case



Vertical & Horizontal Lines – Clamshell Type Case



[3] Position the DUT close to the surface of the phantom such that Point A is on the (virtual) extension of the line passing through points RE (right-ear ear reference point) and LE (left-ear ear reference point) on the phantom (see below Figure). The plane determined by the vertical centerline and the horizontal line of the DUT shall be parallel to the sagittal plane of the phantom.

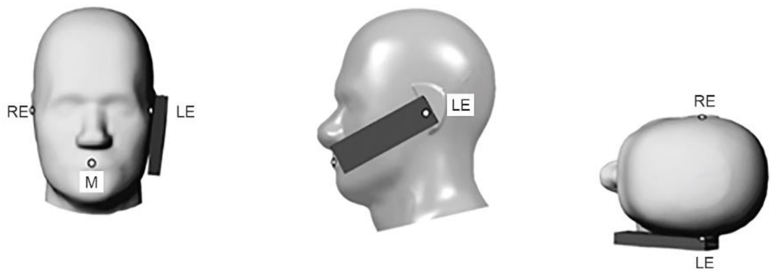
[4] Translate the DUT towards the phantom along the line passing through RE and LE until the DUT touches the ear.

[5] Rotate the DUT around the (virtual) LE-RE Line until the DUT vertical centerline is in the reference plane.

[6] Rotate the DUT around its vertical centerline until the plane established by the DUT vertical centerline and horizontal line is parallel to the N-F line, and then translate the DUT towards the phantom along the LE-RE line until DUT Point A touches the ear at the ERP (ear reference point).

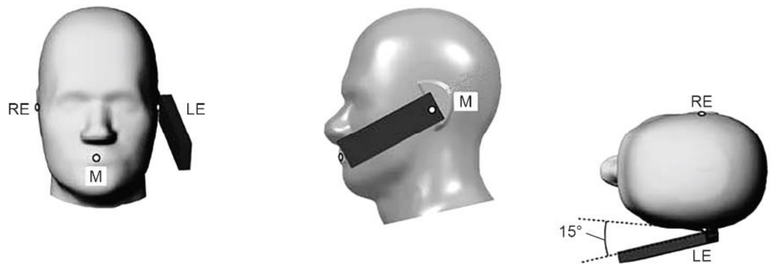
[7] While keeping Point A on the line passing through RE and LE and maintaining the DUT in contact with the pinna, rotate the DUT about the N-F line until any point on the DUT is in contact with a phantom point below the pinna (cheek). The physical angles of rotation shall be documented.

[8] While keeping DUT Point A in contact with the ERP, rotate the DUT around a line perpendicular to the plane established by the DUT vertical centerline and horizontal line and passing through DUT Point A, until the DUT vertical centerline is in the reference plane.



Definition of the Tilt Position

1. To position the DUT in the “cheek” position described above.
2. While maintaining the orientation of the DUT, move the DUT away from the pinna along the line passing through RE and LE far enough to allow a rotation of the DUT away from the cheek by 15°.
3. Rotate the DUT around the horizontal line by 15° (see below Figure).
4. While maintaining the orientation of the DUT, move the DUT towards the phantom on a line passing through RE and LE until any part of the DUT touches the ear. The tilt position is obtained when the contact is on the pinna. If the contact is at any location other than the pinna, e.g., an extended antenna in contact with the back of the head phantom, the angle of the DUT shall be reduced. In this case, the tilt position is obtained if any part of the DUT is in contact with the pinna and a second point on the DUT is in contact with the phantom, e.g., the antenna in contact with the back of the head.



7.1.2 Body-worn Exposure Conditions

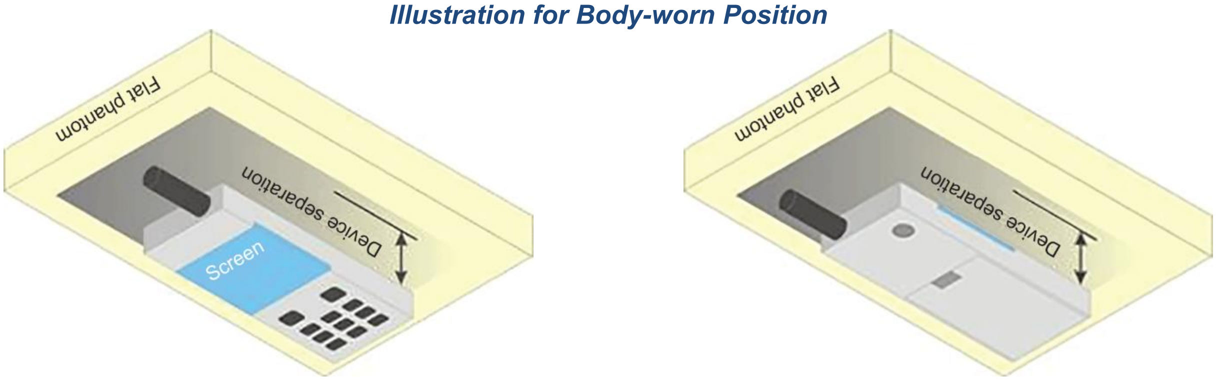
Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB Publication 447498 D01 are used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

Body-worn accessories that do not contain metallic or conductive components may be tested according to worst-case exposure configurations, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics. All body-worn accessories containing metallic components are tested in conjunction with the host device.

Body-worn accessory SAR compliance is based on a single minimum test separation distance for all wireless and operating modes applicable to each body-worn accessory used by the host, and according to the relevant voice and/or data mode transmissions and operations. If a body-worn accessory supports voice only operations in its normal and expected use conditions, testing of data mode for body-worn compliance is not required.

A conservative minimum test separation distance for supporting off-the-shelf body-worn accessories that may be acquired by users of consumer handsets is used to test for body-worn accessory SAR compliance. This distance is determined by the handset manufacturer. Devices that are designed to operate on the body of users using lanyards and straps, or without requiring additional body-worn accessories, will be tested using a conservative minimum test separation distance ≤ 5 mm to support compliance.

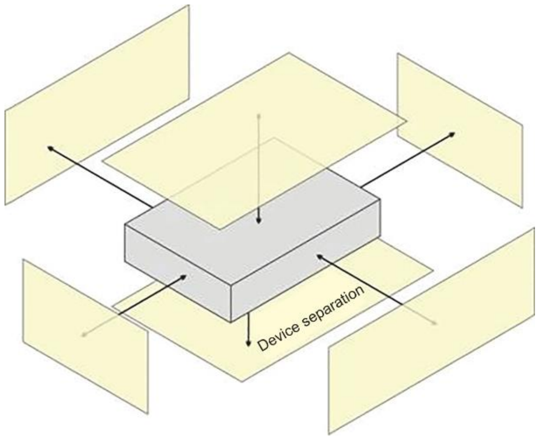
Illustration for Body-worn Position



7.1.3 Wireless Router Exposure Conditions

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of Wi-Fi simultaneously with a separate licensed transmitter. The FCC has provided guidance in KDB Publication 941225 D06 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device containing transmitting antennas within 25 mm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the Wi-Fi transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the Wi-Fi transmitter according to KDB Publication 447498 D01 procedures. The “Portable Hotspot” feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.



7.1.4 Product Specific (Phablet) Exposure Conditions

For smart phones with a display diagonal dimension > 15 cm or an overall diagonal dimension > 16 cm, that can provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets and support voice calls next to the ear, the Phablet procedures outlined in KDB Publication 648474 D04 should be applied to evaluate SAR compliance. A device marketed as Phablets, regardless of form factors and operating characteristics must be tested as a Phablet to determine SAR compliance.

In addition to the normally required head and body-worn accessory SAR test procedures required for handsets, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna ≤ 25 mm from that surface or edge, in direct contact with the flat phantom for 10 g extremity SAR. The UMPC mini-tablet 1 g SAR at 5 mm is not required. When hotspot mode applies, 10 g SAR is required only for the surfaces and edges with hotspot mode 1 g SAR > 1.2 W/kg.

7.2. Standalone SAR Test Exclusion Considerations

A diagram showing the location of the device antennas can be found in DUT Antenna Diagram and SAR Test Setup Photographs Appendix. The overall dimensions of this device are > 9 x 5 cm. Since the diagonal dimension of this device is > 160 mm and < 200 mm, it is considered a "Phablet" and operates similar to a traditional portable handset.

Particular DUT edges were not required to be evaluated for Hotspot SAR or Phablet SAR if the edges were > 25 mm from the transmitting antenna according to KDB Publication 648474 D04 and KDB Publication 941225 D06. The distances between the transmit antennas and the edges of the device are included in the filing. When wireless router mode is enabled, U-NII-2A and U-NII-2C operations are disabled.

Positions for SAR Testing:

Tx Antenna	DUT Front Face	DUT Rear Face	DUT Top Edge	DUT Right Edge	DUT Bottom Edge	DUT Left Edge
ANT 0	YES	YES	No	No	No	YES
ANT 1	YES	YES	YES	No	No	YES
ANT 3	YES	YES	No	YES	YES	No
ANT 6	YES	YES	YES	YES	No	No
ANT 8	YES	YES	YES	No	No	YES
ANT 9	YES	YES	YES	YES	No	No
ANT 10	YES	YES	YES	YES	No	No
ANT NFC	YES	YES	YES	YES	No	No

7.3. FCC General Test Procedures

7.3.1 Measured and Reported SAR

Per KDB Publication 447498 D01, when SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as reported SAR. The highest reported SAR results are identified on the grant of equipment authorization according to procedures in KDB Publication 690783 D01.

7.3.2 3G SAR Test Reduction Procedure

In KDB Publication 941225 D01, certain transmission modes within a frequency band and wireless mode evaluated for SAR are defined as primary modes. The equivalent modes considered for SAR test reduction are denoted as secondary modes. When the maximum output power including tune-up tolerance specified for production units in a secondary mode is ≤ 0.25 dB higher than the primary mode or when the highest reported SAR of the primary mode, scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode, is ≤ 1.2 W/kg, SAR measurements are not required for the secondary mode. When the 3G SAR test reduction procedure is not satisfied, SAR measurements are additionally required for the secondary mode.

7.3.3 Test Reduction Consideration for GSM / GPRS / EDGE / DTM

Per KDB Publication 941225 D01, SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.

SAR may be evaluated for DTM with the device operating in DTM using one CS plus the number of PS time-slots that result in the highest source-based time-averaged maximum output or by summing the single time-slot CS and highest maximum output multi-slot PS SAR. When different maximum output power applies to GSM voice or GPRS / EDGE time slots, GSM voice and GPRS / EDGE time slots should be tested separately to determine compliance by summing the corresponding reported SAR.

The GMSK EDGE configurations are grouped with GPRS and considered with respect to time-averaged maximum output power to determine compliance.

7.3.4 Measurement Condition for WCDMA

Output Power Verification

Maximum output power is verified on the high, middle and low channels according to the general descriptions in section 5.2 of 3GPP TS 34.121, using the appropriate RMC with TPC (transmit power control) set to all “1s” or applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, $DPDCH_n$ and spreading codes, HSDPA, DSPA) are tabulated in this test report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations are identified.

Head SAR

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

Body SAR

SAR for body-worn configurations is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to other spreading codes and multiple $DPDCH_n$ configurations supported by the handset with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured using an applicable RMC configuration with the corresponding spreading code or $DPDCH_n$, for the highest reported SAR configuration in 12.2 kbps RMC.

Handsets with Release 5 HSDPA

The 3G SAR test reduction procedure is applied to HSDPA body configurations with 12.2 kbps RMC as the primary mode. Otherwise, body SAR is measured for HSDPA using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, for the highest reported SAR configuration in 12.2 kbps RMC without HSDPA. Handsets with both HSDPA and HSUPA are tested according to Release 6 HSPA test procedures.

Handsets with Release 6 HSUPA

The 3G SAR test reduction procedure is applied to HSPA (HSUPA / HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 and power control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA. When VOIP applies to head exposure, the 3G SAR test reduction procedure is applied with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body SAR measurements are applied to head exposure testing.

Release 5 HSDPA Data Devices

The 3G SAR test reduction procedure is applied to body SAR with 12.2 kbps RMC as the primary mode. Otherwise, body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, for the highest reported SAR configuration in 12.2 kbps RMC without HSDPA.HSDPA is configured according to the applicable UE category of a test device. The number of HS-DSCH / HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms and a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors (βc, βd), and HS-DPCCH power offset parameters (Δ_{ACK}, Δ_{NACK}, Δ_{CQI}) are set according to values indicated in below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

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

Note 1： Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{HS} = 30/15*β_c.
Note 2： For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with β_{HS} = 30/15*β_c, and Δ_{CQI} = 24/15 with β_{HS} = 24/15*β_c.
Note 3： CM = 1 for β_c/β_d = 12/15, β_{HS}/β_c = 24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.
Note 4： For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

Release 6 HSUPA Data Devices

The 3G SAR test reduction procedure is applied to body SAR with 12.2 kbps RMC as the primary mode. Otherwise, body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 and power control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA. When VOIP applies to head exposure, the 3G SAR test reduction procedure is applied with 12.2 kbps RMC as the primary mode. Otherwise, the same HSPA configuration used for body SAR measurements are applied to head exposure testing. Due to inner loop power control requirements in HSPA, a communication test set is required for output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSPA are configured according to the β values indicated in below.

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

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

HSPA+ SAR Guidance

The 3G SAR test reduction procedure is applied to HSPA+ (uplink) with 12.2 kbps RMC as the primary mode. Otherwise, when SAR is required for Rel. 6 HSPA, SAR is required for Rel. 7 HSPA+. Power is measured for HSPA+ that supports uplink 16QAM according to configurations in Table C.11.1.4 of 3GPP TS 34.121-1 to determine SAR test reduction.

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

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

DC-HSDPA SAR Guidance

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

7.3.5 Measurement Condition for LTE

Per KDB Publication 941225 D05, LTE establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR. The Anritsu MT8821C or MT8000 simulators are used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

The LTE Maximum Power Reduction (MPR) in accordance with 3GPP TS 36.101 is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. The MPR is enabled for this device and the allowed MPR is specified in below.

Modulation	Channel Bandwidth / Transmission Bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
256QAM	≥ 1						≤ 5

The device is compliant with Additional Maximum Power Reduction (A-MPR) requirements defined in 3GPP TS 36.101 section 6.2.4 that has been disabled for all SAR tests by setting “NS=01” on the base station simulator.

LTE SAR Test Requirement

[1] Start SAR testing for QPSK with 1 RB allocation with the largest bandwidth using offset and required channel combination with the highest maximum output power. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.

[2] For QPSK with 50% RB allocation, the 1 RB allocation procedures in step 1 are applied to measure the SAR.

[3] 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.

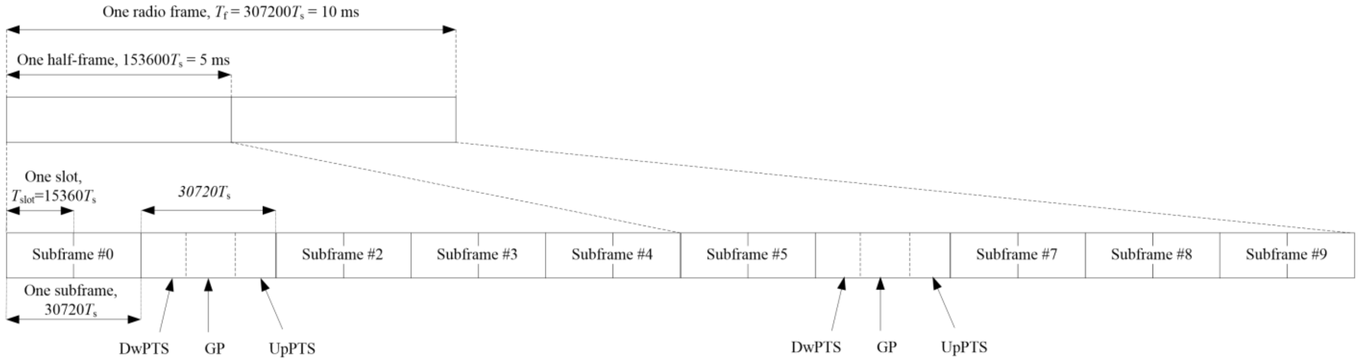
[4] For higher order modulations and lower bandwidths configurations, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > 0.5 dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

[5] Per KDB Publication 941225 D05, 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.

TDD-LTE Considerations

According to KDB Publication 941225 D05, SAR testing for TDD-LTE device must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP TDD-LTE configurations. The TDD-LTE of this device supports frame structure type 2 defined in 3GPP TS 36.211 section 4.2, and the frame structure configuration can be referred to below.

3GPP TS 36.211 Figure 4.2-1: Frame Structure Type 2



3GPP TS 36.211 Table 4.2-1: Configuration of Special Subframe

Special Subframe Configuration	Normal Cyclic Prefix in Downlink			Extended Cyclic Prefix in Downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal Cyclic Prefix in Uplink	Extended Cyclic Prefix in Uplink		Normal Cyclic Prefix in Uplink	Extended Cyclic Prefix in Uplink
0	6592 • T_s	(1+X) • 2192 • T_s	(1+X) • 2560 • T_s	7680 • Ts	(1+X) • 2192 • T_s	(1+X) • 2560 • T_s
1	19760 • T_s			20480 • Ts		
2	21952 • T_s			23040 • Ts		
3	24144 • T_s			25600 • Ts		
4	26336 • T_s			7680 • Ts	(2+X) • 2192 • T_s	(2+X) • 2560 • T_s
5	6592 • T_s	(2+X) • 2192 • T_s	(2+X) • 2560 • T_s	20480 • Ts		
6	19760 • T_s			23040 • Ts		
7	21952 • T_s			12800 • Ts		
8	24144 • T_s			-	-	-
9	13168 • T_s			-	-	-
10	13168 • T_s	13152 • T_s	12800 • T_s	-	-	-

3GPP TS 36.211 Table 4.2-2: Uplink-Downlink Configurations

UL-DL Configuration	DL-to-UL Switch Point Periodicity	Subframe Number										Duty Cycle (%)
		0	1	2	3	4	5	6	7	8	9	
0	5 ms	D	S	U	U	U	D	S	U	U	U	63.33
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.33
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.33
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.67
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.67
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.67
6	5 ms	D	S	U	U	U	D	S	U	U	D	53.33

Note: Calculated Duty Cycle = Extended cyclic prefix in UL * (T_s) * # of S + # of U / period

Considering the highest transmission duty cycle, TDD-LTE was tested using Uplink-Downlink Configuration 0 with 6 uplink subframe and 2 special subframe. The special subframe was set to special subframe configuration 7 using extended cyclic prefix uplink. Therefore, SAR testing for TDD-LTE was performed at the maximum output power with highest transmission duty cycle of 63.33 %.

LTE Downlink Carrier Aggregation (CA) Consideration

Conducted power measurements with LTE Carrier Aggregation (CA) (downlink only) active are made in according to KDB Publication 941225 D05A. The RRC connection is only handled by one cell, the primary component carrier (PCC) for downlink and uplink communications. After making a data connection to the PCC, the UE device adds secondary component carrier(s) (SCC) on the downlink only. All uplink communications and acknowledgements remain identical to specifications when downlink carrier aggregation is inactive on the PCC. Additional conducted output powers are measured with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band. Per KDB Publication 941225 D05A, no SAR measurements are required for downlink only carrier aggregation configurations when the average output power with downlink only carrier aggregation active is not more than 0.25 dB higher than the average output power with downlink only carrier aggregation inactive.

LTE Uplink Carrier Aggregation (CA) Consideration

<LTE Intra-Band Contiguous Carrier Aggregation>

UL CA shall be tested based on the worst-case SAR configuration determined from non-CA SAR testing result. The channel BW, channel number, RB allocation, etc. would be selected to allow contiguous CA of PCC and SCC. Uplink output power for UL CA is the total power measured across the PCC and SCC. UL CA power measurements were performed for each antenna at with QPSK modulation based on the worst-case standalone SAR.

The UL CA mode power measurements represent the total power across both carriers. Measurements were made for all supported PCC bandwidths using the channel / RB combination resulting in the highest standalone output power at the least MPR (0 dB). SCCs were set to use configurations similar to the PCC to establish conservative or worst-case equivalent SAR test conditions (highest maximum output power with MPR of 0 dB and RB allocation setting).

Per November 2017 TCB Workshop, Uplink CA SAR test guidance as follows:

[1] When the maximum output power for UL CA is ≤ standalone LTE mode (without CA),
   - PCC is configured according to the highest standalone SAR configuration tested.
   - SCC and subsequent CCs are configured according to procedures used for power measurement and parameters (BW, RB etc.) similar to that used for the PCC.

[2] When the Reported SAR for UL CA configuration, described above, is > 1.2 W/kg, UL CA SAR is also required for all required test channels (PCC based).

[3] UL CA SAR is also required for standalone SAR configurations > 1.2 W/kg when they are scaled to the UL CA power level.

<LTE Inter-Band Carrier Aggregation>

Per October 2018 TCB Workshop, Uplink CA SAR test guidance as follows:

[1] Provide the single uplink SAR values you have obtained for the relevant SAR configurations and frequency bands that employ inter-band uplink carrier aggregation.

[2] If the single uplink 1g SAR values for each band are both less than 0.8 W/kg and the algebraic summation of the 1g SAR values are less than 1.45 W/kg, no additional measurements need to be performed.

[3] If one of the single Uplink 1g SAR values is greater than 0.8 W/kg, instead of algebraically summing the 1g SAR values, sum up the SAR distributions, similar to the enlarged zoom scan (volume scan) procedures found in KDB Publication 865664 D01.

[4] If the algebraic sum of the 1g SAR values is > 1.45 W/kg, additional measurements may have to be made. Submit a KDB inquiry for additional guidance.

Maximum Output Power (Tune-up Limit) and SAR Test Exemption for LTE UL Carrier Aggregation

The maximum UL CA transmit power is reduced by 3 dB from the standalone values for both carriers therefore SAR will be reduced accordingly.

The reported 1g SAR for any standalone LTE configuration does not exceed 1.2 W/kg. The worst-case UL CA SAR per band will therefore be < 0.6 W/kg. As the SAR for each individual band is < 0.6 W/kg and the algebraic summation cannot exceed 1.2 W/kg no further measurements are needed.

The combined SAR contribution cannot exceed the highest standalone SAR：

$$(SAR_{LTE1} / 2 + SAR_{LTE2} / 2 \leq Max\ (SAR_{LTE1}, SAR_{LTE2})$$

Therefore, simultaneous transmission analysis of UL CA and WLAN / BT transmitters can be done using either of the standalone LTE SAR values alone.

7.3.6 Measurement Condition for 5G NR FR1

[1] Per October 2020 TCB Workshop guidance, 5G NR FR1 SAR evaluations are being generally based on adapting the existing LTE SAR procedures (KDB Publication 941225 D05).

[2] Start SAR testing for π/2 BPSK with 1 RB allocation with the largest bandwidth using offset and required channel combination with the highest maximum output power. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.

[3] For π/2 BPSK with 50% RB allocation, the 1 RB allocation procedures in step 1 are applied to measure the SAR.

[4] For π/2 BPSK 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.

[5] For higher order modulations and lower bandwidths configurations, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > 0.5 dB higher than the same configuration in π/2 BPSK or when the reported SAR for the π/2 BPSK configuration is > 1.45 W/kg.

[6] Per KDB Publication 941225 D05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

7.3.7 Measurement Condition for Wi-Fi

General Considerations

The normal network operating configurations of 802.11 transmitters are not suitable for SAR measurements. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. Various vendor specific external test software and chipset based internal test modes are typically used for SAR measurement. Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 ~ 96 % is typically achievable in most test mode configurations. A minimum transmission duty factor of 85 % is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. In addition, a periodic transmission duty factor is required for current generation SAR systems to measure SAR correctly. The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

According to KDB Publication 248227 D01, this device has installed WLAN engineering testing software which can provide continuous transmitting RF signal. During WLAN SAR testing, this device was operated to transmit continuously at the maximum transmission duty with specified transmission mode, operating frequency, lowest data rate, and maximum output power.

2.4 GHz Band

SAR is measured for 2.4 GHz 802.11b DSSS using either a fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

a) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
b) When the reported SAR is > 0.8 W/kg, SAR is required for that position using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

2.4 GHz 802.11 g/n/ax OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is > 1.2 W/kg. When SAR is required for OFDM modes in 2.4 GHz band, the Initial Test Configuration Procedures should be followed. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

U-NII-1 and U-NII-2A Bands

For devices that operate in both U-NII-1 and U-NII-2A bands, when the same maximum output power is specified for both bands, SAR measurement using OFDM SAR test procedures is not required for U-NII-1 unless the highest reported SAR for U-NII-2A is > 1.2 W/kg. When different maximum output powers are specified for the bands, SAR measurement for the U-NII band with the lower maximum output power is not required unless the highest reported SAR for the U-NII band with the higher maximum output power, adjusted by the ratio of lower to higher specified maximum output power for the two bands, is > 1.2 W/kg. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

U-NII-2C and U-NII-3 Bands

The frequency range covered by U-NII-2C and U-NII-3 is 380 MHz (5.47 ~ 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 ~ 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification. Unless band gap channels are permanently disabled, SAR must be considered for these channels. Each band is tested independently according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

Initial Test Position SAR Test Reduction Procedure

For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are tested. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

OFDM Transmission Mode SAR Test and Channel Selection

When the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11ac or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.e., 802.11a, then 802.11n and 802.11ac or 802.11g then 802.11n, is used for SAR measurement. Per April 2019 TCB Workshop guidance, 802.11ax was considered the highest order 802.11 mode. When the maximum output power is the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

Initial Test Configuration Procedure

For OFDM, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order IEEE 802.11 mode. The channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤ 1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

Subsequent Test Configuration Procedure

For OFDM configurations in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position procedure. When the highest reported SAR (for the initial test configuration), adjusted by the ratio of the specified maximum output power of the subsequent test configuration to initial test configuration, is ≤ 1.2 W/kg, no additional SAR tests for the subsequent test configurations are required. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

MIMO SAR considerations

Per KDB Publication 248227 D01, the simultaneous SAR provisions in KDB Publication 447498 D01 should be applied to determine simultaneous transmission SAR test exclusion for Wi-Fi MIMO. If the sum of 1g single transmission chain SAR measurements is < 1.6 W/kg, no additional SAR measurements for MIMO are required. Alternatively, SAR for MIMO can be measured with all antennas transmitting simultaneously at the specified maximum output power of MIMO operation. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

SAR Test Exclusion for IEEE 802.11ax

To make the most efficient use of the additional available subcarriers (data tones), IEEE 802.11ax can utilize Orthogonal Frequency-Division Multiple Access (OFDMA) which divides the existing 802.11 channels into smaller subchannels called Resource Units (RUs). Possible RU sizes are: 26T, 52T, 106T, 242T, 484T, 996T and 996Tx2.

Per FCC Guidance, 802.11ax was considered a higher order 802.11 mode when compared to a/b/g/n/ac to apply KDB Publication 248227 D01 for OFDM mode selection. Therefore, SAR tests were not required for 802.11ax based on the maximum allowed output powers of OFDM modes and the reported SAR values. Per FCC Guidance, maximum conducted powers were performed for each RU size to demonstrate that the output powers would not be higher than the other OFDM 802.11 modes.

When SAR testing for 802.11ax is required, the following procedures are applied to measure the SAR.

- If the maximum output power is highest for OFDMA scenarios, choose the tone size with the maximum number of tones and the highest maximum output power.
- Otherwise, consider the fully allocated channel for SAR testing.
- When SAR testing is required on RU sizes less than the fully allocated channel, use the RU number closest to the middle of the channel, choosing the higher RU number when two RUs are equidistant to the middle of the channel.

8. RF Output Power Specification and Measurement

8.1. Nominal and Maximum Output Power Specifications

GSM Bands			Maximum Tune-up Power (dBm)					
Band	Tx Antenna	Mode	DSI 7 (Body-worn / Extremity, Standalone, Sensor Off)	DSI 1 (Body-worn / Extremity, Standalone Sensor On)	DSI 3 (Body-worn / Extremity, Simul. Transmission Sensor On)	DSI 4 (Head, Standalone)	DSI 5 (Head, Simul. Transmission)	DSI 6 (Hotspot)
GSM850	ANT 0	GSM	32.5	32.5	32.5	32.5	32.5	32.5
		GPRS 1TX	32.5	32.5	32.5	32.5	32.5	32.5
		GPRS 2TX	29.0	29.0	29.0	29.0	29.0	29.0
		GPRS 3TX	27.0	27.0	27.0	27.0	27.0	27.0
		GPRS 4TX	26.0	26.0	26.0	26.0	26.0	26.0
		EGPRS 1TX	27.0	27.0	27.0	27.0	27.0	27.0
		EGPRS 2TX	26.0	26.0	26.0	26.0	26.0	26.0
		EGPRS 3TX	22.5	22.5	22.5	22.5	22.5	22.5
		EGPRS 4TX	20.5	20.5	20.5	20.5	20.5	20.5
GSM1900	ANT 1	GSM	29.5	29.5	29.5	29.5	29.5	29.5
		GPRS 1TX	29.5	29.5	29.5	29.5	29.5	29.5
		GPRS 2TX	29.0	29.0	29.0	29.0	29.0	29.0
		GPRS 3TX	27.5	27.5	27.5	27.5	27.5	27.5
		GPRS 4TX	26.5	26.5	26.5	26.5	26.5	26.5
		EGPRS 1TX	25.5	25.5	25.5	25.5	25.5	25.5
		EGPRS 2TX	24.5	24.5	24.5	24.5	24.5	25.0
		EGPRS 3TX	23.5	23.5	23.5	23.5	23.5	25.0
		EGPRS 4TX	22.5	22.5	22.5	22.5	22.5	25.0

WCDMA Bands			Maximum Tune-up Power (dBm)					
Band	Tx Antenna	Mode	DSI 7 (Body-worn / Extremity, Standalone, Sensor Off)	DSI 1 (Body-worn / Extremity, Standalone Sensor On)	DSI 3 (Body-worn / Extremity, Simul. Transmission Sensor On)	DSI 4 (Head, Standalone)	DSI 5 (Head, Simul. Transmission)	DSI 6 (Hotspot)
WCDMA II	ANT 1	AMR RMC12.2K	23.8	22.5	22.5	21.5	19.5	21.5
		HSDPA DC-HSDPA	23.8	22.5	22.5	21.5	19.5	21.5
		HSUPA HSPA+	22.8	21.5	21.5	20.5	18.5	20.5
WCDMA IV	ANT 1	AMR RMC12.2K	23.8	22.5	22.5	21.5	19.5	22.5
		HSDPA DC-HSDPA	23.8	22.5	22.5	21.5	19.5	22.5
		HSUPA HSPA+	22.8	21.5	21.5	20.5	18.5	21.5
WCDMA V	ANT 0	AMR RMC12.2K	23.8	23.8	23.8	23.8	23.8	23.8
		HSDPA DC-HSDPA	23.8	23.8	23.8	23.8	23.8	23.8
		HSUPA HSPA+	22.8	22.8	22.8	22.8	22.8	22.8

LTE Bands			Maximum Tune-up Power (dBm)					
Band	Tx Antenna	Mode	DSI 7 (Body-worn / Extremity, Standalone, Sensor Off)	DSI 1 (Body-worn / Extremity, Standalone Sensor On)	DSI 3 (Body-worn / Extremity, Simul. Transmission Sensor On)	DSI 4 (Head, Standalone)	DSI 5 (Head, Simul. Transmission)	DSI 6 (Hotspot)
LTE 2	ANT 1	FDD	24.6	22.5	21.5	21.5	19.5	21.5
LTE 2	ANT 3	FDD	24.6	23.5	23.5	24.6	24.6	21.5
LTE 4	ANT 1	FDD	24.8	22.5	22.5	20.5	18.5	22.5
LTE 4	ANT 3	FDD	24.8	23.5	23.5	24.8	24.8	23.5
LTE 5	ANT 0	FDD	24.8	24.8	24.8	24.8	24.8	24.8
LTE 12	ANT 0	FDD	24.8	24.8	24.8	24.8	24.8	24.8
LTE 13	ANT 0	FDD	24.3	24.3	24.3	24.3	24.3	24.3
LTE 25	ANT 1	FDD	24.6	22.5	21.5	21.5	19.5	21.5
LTE 25	ANT 3	FDD	24.6	23.5	23.5	24.6	24.6	21.5
LTE 26	ANT 0	FDD	24.8	24.8	24.8	24.8	24.8	24.8
LTE 41 (PC2)	ANT 1	TDD	26.8	26.8	26.8	22.5	20.5	26.0
LTE 41 (PC3)	ANT 1	TDD	24.3	24.3	24.3	20.0	18.0	23.5
LTE 48	ANT 8	TDD	24.3	24.3	24.3	20.0	16.5	24.3
LTE 66	ANT 1	FDD	24.8	22.5	22.5	20.5	18.5	22.5
LTE 66	ANT 3	FDD	24.8	23.5	23.5	24.8	24.8	23.5
LTE 71	ANT 0	FDD	24.8	24.8	24.8	24.8	24.8	24.8

NR Bands			Maximum Tune-up Power (dBm)					
Band	Tx Antenna	Mode	DSI 7 (Body-worn / Extremity, Standalone, Sensor Off)	DSI 1 (Body-worn / Extremity, Standalone Sensor On)	DSI 3 (Body-worn / Extremity, Simul. Transmission Sensor On)	DSI 4 (Head, Standalone)	DSI 5 (Head, Simul. Transmission)	DSI 6 (Hotspot)
5GNR n2	ANT 1	FDD	23.8	22.5	22.5	20.5	18.5	21.5
5GNR n2	ANT 3	FDD	23.8	23.8	23.8	23.8	23.8	21.5
5GNR n5	ANT 0	FDD	23.8	23.8	23.8	23.8	23.8	23.8
5GNR n25	ANT 1	FDD	23.8	22.5	22.5	20.5	18.5	21.5
5GNR n25	ANT 3	FDD	23.8	23.8	23.8	23.8	23.8	21.5
5GNR n41 (PC2)	ANT 1	TDD	26.8	26.0	26.0	21.0	19.0	24.5
5GNR n41 (PC3)	ANT 1	TDD	23.8	23.8	23.8	21.0	19.0	23.8
5GNR n48	ANT 6	TDD	22.5	22.5	21.5	22.5	22.5	21.5
5GNR n48	ANT 8	TDD	22.5	22.5	22.5	19.5	17.5	22.5
5GNR n66	ANT 1	FDD	23.8	23.0	23.0	20.5	19.0	22.0
5GNR n66	ANT 3	FDD	23.8	23.8	23.8	23.8	23.8	23.0
5GNR n71	ANT 0	FDD	23.8	23.8	23.8	23.8	23.8	23.8
5GNR n77 (PC2)	ANT 6	TDD	26.8	23.8	21.0	26.8	26.8	21.0
5GNR n77 (PC2)	ANT 8	TDD	24.5	24.5	24.5	18.0	16.5	24.5
5GNR n77 (PC3)	ANT 6	TDD	23.8	23.8	21.0	23.8	23.8	21.0
5GNR n77 (PC3)	ANT 8	TDD	23.8	23.8	23.8	18.0	16.5	23.8

Maximum Tune-up Power (dBm) for WLAN 2.4 GHz with Power Set 1 / Set 3 / Set 6					
Mode	Channel	Frequency (MHz)	SISO ANT 9	SISO ANT 10	MIMO ANT 9+10
802.11b	1	2412	19.50	19.50	22.50
	6	2437	19.50	19.50	22.50
	11	2462	19.50	19.50	22.50
802.11g	1	2412	17.50	17.50	20.50
	6	2437	17.50	17.50	20.50
	11	2462	16.00	16.00	19.00
802.11n HT20	1	2412	15.50	15.50	18.50
	6	2437	17.00	17.00	20.00
	11	2462	15.00	15.00	18.00
802.11n HT40	3	2422	14.50	14.50	17.50
	6	2437	15.50	15.50	18.50
	9	2452	13.50	13.50	16.50
802.11ax HE20	1	2412	13.50	13.50	16.50
	6	2437	13.50	13.50	16.50
	11	2462	13.50	13.50	16.50
802.11ax HE40	3	2422	11.00	11.00	14.00
	6	2437	11.00	11.00	14.00
	9	2452	11.00	11.00	14.00

Maximum Tune-up Power (dBm) for WLAN 5.2 GHz with Power Set 1 / Set 3 / Set 6					
Mode	Channel	Frequency (MHz)	SISO ANT 9	SISO ANT 10	MIMO ANT 9+10
802.11a	36	5180	19.00	19.00	22.00
	40	5200	19.00	19.00	22.00
	44	5220	19.00	19.00	22.00
	48	5240	19.00	19.00	22.00
802.11n HT20	36	5180	18.50	18.50	21.50
	40	5200	18.50	18.50	21.50
	44	5220	18.50	18.50	21.50
	48	5240	18.50	18.50	21.50
802.11n HT40	38	5190	17.50	17.50	20.50
	46	5230	17.50	17.50	20.50
802.11ac VHT20	36	5180	18.50	18.50	21.50
	40	5200	18.50	18.50	21.50
	44	5220	18.50	18.50	21.50
	48	5240	18.50	18.50	21.50
802.11ac VHT40	38	5190	17.50	17.50	20.50
	46	5230	17.50	17.50	20.50
802.11ac VHT80	42	5210	15.50	15.50	18.50
802.11ax HE20	36	5180	14.50	14.50	17.50
	40	5200	14.50	14.50	17.50
	44	5220	14.50	14.50	17.50
	48	5240	14.50	14.50	17.50
802.11ax HE40	38	5190	14.50	14.50	17.50
	46	5230	14.50	14.50	17.50
802.11ax HE80	42	5210	15.50	15.50	18.50

Maximum Tune-up Power (dBm) for WLAN 5.3 GHz with Power Set 1 / Set 3 / Set 6					
Mode	Channel	Frequency (MHz)	SISO ANT 9	SISO ANT 10	MIMO ANT 9+10
802.11a	52	5260	19.00	19.00	22.00
	56	5280	19.00	19.00	22.00
	60	5300	19.00	19.00	22.00
	64	5320	19.00	19.00	22.00
802.11n HT20	52	5260	18.50	18.50	21.50
	56	5280	18.50	18.50	21.50
	60	5300	18.50	18.50	21.50
	64	5320	18.50	18.50	21.50
802.11n HT40	54	5270	17.50	17.50	20.50
	62	5310	17.50	17.50	20.50
802.11ac VHT20	52	5260	18.50	18.50	21.50
	56	5280	18.50	18.50	21.50
	60	5300	18.50	18.50	21.50
	64	5320	18.50	18.50	21.50
802.11ac VHT40	54	5270	17.50	17.50	20.50
	62	5310	17.50	17.50	20.50
802.11ac VHT80	58	5290	15.00	15.00	18.00
802.11ac VHT160	50	5250	15.50	15.50	18.50
802.11ax HE20	52	5260	14.50	14.50	17.50
	56	5280	14.50	14.50	17.50
	60	5300	14.50	14.50	17.50
	64	5320	14.50	14.50	17.50
802.11ax HE40	54	5270	15.00	15.00	18.00
	62	5310	15.00	15.00	18.00
802.11ax HE80	58	5290	15.00	15.00	18.00
802.11ax HE160	50	5250	15.50	15.50	18.50

Maximum Tune-up Power (dBm) for WLAN 5.6 GHz with Power Set 1 / Set 3 / Set 6					
Mode	Channel	Frequency (MHz)	SISO ANT 9	SISO ANT 10	MIMO ANT 9+10
802.11a	100	5500	18.00	18.00	21.00
	116	5580	18.00	18.00	21.00
	124	5620	18.00	18.00	21.00
	132	5660	18.00	18.00	21.00
	140	5700	18.00	18.00	21.00
	144	5720	18.00	18.00	21.00
802.11n HT20	100	5500	17.50	17.50	20.50
	116	5580	17.50	17.50	20.50
	124	5620	17.50	17.50	20.50
	132	5660	17.50	17.50	20.50
	140	5700	17.50	17.50	20.50
	144	5720	17.50	17.50	20.50
802.11n HT40	102	5510	17.00	17.00	20.00
	110	5550	17.00	17.00	20.00
	126	5630	17.00	17.00	20.00
	134	5670	17.00	17.00	20.00
	142	5710	17.00	17.00	20.00
802.11ac VHT20	100	5500	17.50	17.50	20.50
	116	5580	17.50	17.50	20.50
	124	5620	17.50	17.50	20.50
	132	5660	17.50	17.50	20.50
	140	5700	17.50	17.50	20.50
	144	5720	17.50	17.50	20.50
802.11ac VHT40	102	5510	17.00	17.00	20.00
	110	5550	17.00	17.00	20.00
	126	5630	17.00	17.00	20.00
	134	5670	17.00	17.00	20.00
	142	5710	17.00	17.00	20.00
802.11ac VHT80	106	5530	14.00	14.00	17.00
	122	5610	14.00	14.00	17.00
	138	5690	14.00	14.00	17.00
802.11ac VHT160	114	5570	14.50	14.50	17.50
802.11ax HE20	100	5500	13.50	13.50	16.50
	116	5580	13.50	13.50	16.50
	124	5620	13.50	13.50	16.50
	132	5660	13.50	13.50	16.50
	140	5700	13.50	13.50	16.50
	144	5720	13.50	13.50	16.50
802.11ax HE40	102	5510	13.50	13.50	16.50
	110	5550	13.50	13.50	16.50
	126	5630	13.50	13.50	16.50
	134	5670	13.50	13.50	16.50
	142	5710	13.50	13.50	16.50
802.11ax HE80	106	5530	14.00	14.00	17.00
	122	5610	14.00	14.00	17.00
	138	5690	14.00	14.00	17.00
802.11ax HE160	114	5570	14.50	14.50	17.50

Maximum Tune-up Power (dBm) for WLAN 5.8 GHz with Power Set 1 / Set 3 / Set 6					
Mode	Channel	Frequency (MHz)	SISO ANT 9	SISO ANT 10	MIMO ANT 9+10
802.11a	149	5745	18.50	18.50	21.50
	157	5785	18.50	18.50	21.50
	165	5825	18.50	18.50	21.50
802.11n HT20	149	5745	18.00	18.00	21.00
	157	5785	18.00	18.00	21.00
	165	5825	18.00	18.00	21.00
802.11n HT40	151	5755	17.00	17.00	20.00
	159	5795	17.00	17.00	20.00
802.11ac VHT20	149	5745	17.00	17.00	20.00
	157	5785	17.00	17.00	20.00
	165	5825	17.00	17.00	20.00
802.11ac VHT40	151	5755	17.00	17.00	20.00
	159	5795	17.00	17.00	20.00
802.11ac VHT80	155	5775	14.50	14.50	17.50
802.11ax HE20	149	5745	14.00	14.00	17.00
	157	5785	14.00	14.00	17.00
	165	5825	14.00	14.00	17.00
802.11ax HE40	151	5755	13.50	13.50	16.50
	159	5795	13.50	13.50	16.50
802.11ax HE80	155	5775	14.50	14.50	17.50

Maximum Tune-up Power (dBm) for WLAN 2.4 GHz with Power Set 4					
Mode	Channel	Frequency (MHz)	SISO ANT 9	SISO ANT 10	MIMO ANT 9+10
802.11b	1	2412	17.50	17.50	20.50
	6	2437	17.50	17.50	20.50
	11	2462	17.50	17.50	20.50
802.11g	1	2412	16.00	16.00	19.00
	6	2437	16.00	16.00	19.00
	11	2462	16.00	16.00	19.00
802.11n HT20	1	2412	15.50	15.50	18.50
	6	2437	15.50	15.50	18.50
	11	2462	15.00	15.00	18.00
802.11n HT40	3	2422	14.50	14.50	17.50
	6	2437	15.50	15.50	18.50
	9	2452	13.50	13.50	16.50
802.11ax HE20	1	2412	12.00	12.00	15.00
	6	2437	12.00	12.00	15.00
	11	2462	12.00	12.00	15.00
802.11ax HE40	3	2422	9.50	9.50	12.50
	6	2437	9.50	9.50	12.50
	9	2452	9.50	9.50	12.50

Maximum Tune-up Power (dBm) for WLAN 5.2 GHz with Power Set 4					
Mode	Channel	Frequency (MHz)	SISO ANT 9	SISO ANT 10	MIMO ANT 9+10
802.11a	36	5180	17.50	17.50	20.50
	40	5200	17.50	17.50	20.50
	44	5220	17.50	17.50	20.50
	48	5240	17.50	17.50	20.50
802.11n HT20	36	5180	17.00	17.00	20.00
	40	5200	17.00	17.00	20.00
	44	5220	17.00	17.00	20.00
	48	5240	17.00	17.00	20.00
802.11n HT40	38	5190	13.00	13.00	16.00
	46	5230	13.00	13.00	16.00
802.11ac VHT20	36	5180	16.00	16.00	19.00
	40	5200	16.00	16.00	19.00
	44	5220	16.00	16.00	19.00
	48	5240	16.00	16.00	19.00
802.11ac VHT40	38	5190	13.00	13.00	16.00
	46	5230	13.00	13.00	16.00
802.11ac VHT80	42	5210	13.00	13.00	16.00
802.11ax HE20	36	5180	13.00	13.00	16.00
	40	5200	13.00	13.00	16.00
	44	5220	13.00	13.00	16.00
	48	5240	13.00	13.00	16.00
802.11ax HE40	38	5190	13.00	13.00	16.00
	46	5230	13.00	13.00	16.00
802.11ax HE80	42	5210	13.00	13.00	16.00

Maximum Tune-up Power (dBm) for WLAN 5.3 GHz with Power Set 4					
Mode	Channel	Frequency (MHz)	SISO ANT 9	SISO ANT 10	MIMO ANT 9+10
802.11a	52	5260	17.50	17.50	20.50
	56	5280	17.50	17.50	20.50
	60	5300	17.50	17.50	20.50
	64	5320	17.50	17.50	20.50
802.11n HT20	52	5260	17.00	17.00	20.00
	56	5280	17.00	17.00	20.00
	60	5300	17.00	17.00	20.00
	64	5320	17.00	17.00	20.00
802.11n HT40	54	5270	16.00	16.00	19.00
	62	5310	16.00	16.00	19.00
802.11ac VHT20	52	5260	16.00	16.00	19.00
	56	5280	16.00	16.00	19.00
	60	5300	16.00	16.00	19.00
	64	5320	16.00	16.00	19.00
802.11ac VHT40	54	5270	16.00	16.00	19.00
	62	5310	16.00	16.00	19.00
802.11ac VHT80	58	5290	13.00	13.00	16.00
802.11ac VHT160	50	5250	13.00	13.00	16.00
802.11ax HE20	52	5260	13.00	13.00	16.00
	56	5280	13.00	13.00	16.00
	60	5300	13.00	13.00	16.00
	64	5320	13.00	13.00	16.00
802.11ax HE40	54	5270	13.00	13.00	16.00
	62	5310	13.00	13.00	16.00
802.11ax HE80	58	5290	13.00	13.00	16.00
802.11ax HE160	50	5250	13.00	13.00	16.00

Maximum Tune-up Power (dBm) for WLAN 5.6 GHz with Power Set 4					
Mode	Channel	Frequency (MHz)	SISO ANT 9	SISO ANT 10	MIMO ANT 9+10
802.11a	100	5500	17.50	17.50	20.50
	116	5580	17.50	17.50	20.50
	132	5660	17.50	17.50	20.50
	140	5700	17.50	17.50	20.50
	144	5720	17.50	17.50	20.50
802.11n HT20	100	5500	17.00	17.00	20.00
	116	5580	17.00	17.00	20.00
	132	5660	17.00	17.00	20.00
	140	5700	17.00	17.00	20.00
	144	5720	17.00	17.00	20.00
802.11n HT40	102	5510	16.00	16.00	19.00
	110	5550	16.00	16.00	19.00
	134	5670	16.00	16.00	19.00
	142	5710	16.00	16.00	19.00
802.11ac VHT20	100	5500	16.00	16.00	19.00
	116	5580	16.00	16.00	19.00
	132	5660	16.00	16.00	19.00
	140	5700	16.00	16.00	19.00
	144	5720	16.00	16.00	19.00
802.11ac VHT40	102	5510	16.00	16.00	19.00
	110	5550	16.00	16.00	19.00
	134	5670	16.00	16.00	19.00
	142	5710	16.00	16.00	19.00
802.11ac VHT80	106	5530	13.00	13.00	16.00
	138	5690	13.00	13.00	16.00
802.11ac VHT160	114	5570	13.00	13.00	16.00
802.11ax HE20	100	5500	13.00	13.00	16.00
	116	5580	13.00	13.00	16.00
	132	5660	13.00	13.00	16.00
	140	5700	13.00	13.00	16.00
	144	5720	13.00	13.00	16.00
802.11ax HE40	102	5510	13.00	13.00	16.00
	110	5550	13.00	13.00	16.00
	134	5670	13.00	13.00	16.00
	142	5710	13.00	13.00	16.00
802.11ax HE80	106	5530	13.00	13.00	16.00
	138	5690	13.00	13.00	16.00
802.11ax HE160	114	5570	13.00	13.00	16.00

Maximum Tune-up Power (dBm) for WLAN 5.8 GHz with Power Set 4					
Mode	Channel	Frequency (MHz)	SISO ANT 9	SISO ANT 10	MIMO ANT 9+10
802.11a	149	5745	17.50	17.50	20.50
	157	5785	17.50	17.50	20.50
	165	5825	17.50	17.50	20.50
802.11n HT20	149	5745	17.00	17.00	20.00
	157	5785	17.00	17.00	20.00
	165	5825	17.00	17.00	20.00
802.11n HT40	151	5755	16.00	16.00	19.00
	159	5795	16.00	16.00	19.00
802.11ac VHT20	149	5745	16.00	16.00	19.00
	157	5785	16.00	16.00	19.00
	165	5825	16.00	16.00	19.00
802.11ac VHT40	151	5755	16.00	16.00	19.00
	159	5795	16.00	16.00	19.00
802.11ac VHT80	155	5775	13.00	13.00	16.00
802.11ax HE20	149	5745	13.00	13.00	16.00
	157	5785	13.00	13.00	16.00
	165	5825	13.00	13.00	16.00
802.11ax HE40	151	5755	13.00	13.00	16.00
	159	5795	13.00	13.00	16.00
802.11ax HE80	155	5775	13.00	13.00	16.00

Maximum Tune-up Power (dBm) for WLAN 2.4 GHz with Power Set 5					
Mode	Channel	Frequency (MHz)	SISO ANT 9	SISO ANT 10	MIMO ANT 9+10
802.11b	1	2412	16.50	16.50	19.50
	6	2437	16.50	16.50	19.50
	11	2462	16.50	16.50	19.50
802.11g	1	2412	15.00	15.00	18.00
	6	2437	15.00	15.00	18.00
	11	2462	15.00	15.00	18.00
802.11n HT20	1	2412	14.50	14.50	17.50
	6	2437	14.50	14.50	17.50
	11	2462	14.50	14.50	17.50
802.11n HT40	3	2422	14.50	14.50	17.50
	6	2437	14.50	14.50	17.50
	9	2452	13.50	13.50	16.50
802.11ax HE20	1	2412	11.00	11.00	14.00
	6	2437	11.00	11.00	14.00
	11	2462	11.00	11.00	14.00
802.11ax HE40	3	2422	8.50	8.50	11.50
	6	2437	8.50	8.50	11.50
	9	2452	8.50	8.50	11.50

Maximum Tune-up Power (dBm) for WLAN 5.2 GHz with Power Set 5					
Mode	Channel	Frequency (MHz)	SISO ANT 9	SISO ANT 10	MIMO ANT 9+10
802.11a	36	5180	16.00	16.00	19.00
	40	5200	16.00	16.00	19.00
	44	5220	16.00	16.00	19.00
	48	5240	16.00	16.00	19.00
802.11n HT20	36	5180	15.50	15.50	18.50
	40	5200	15.50	15.50	18.50
	44	5220	15.50	15.50	18.50
	48	5240	15.50	15.50	18.50
802.11n HT40	38	5190	11.50	11.50	14.50
	46	5230	11.50	11.50	14.50
802.11ac VHT20	36	5180	14.50	14.50	17.50
	40	5200	14.50	14.50	17.50
	44	5220	14.50	14.50	17.50
	48	5240	14.50	14.50	17.50
802.11ac VHT40	38	5190	11.50	11.50	14.50
	46	5230	11.50	11.50	14.50
802.11ac VHT80	42	5210	11.50	11.50	14.50
802.11ax HE20	36	5180	11.50	11.50	14.50
	40	5200	11.50	11.50	14.50
	44	5220	11.50	11.50	14.50
	48	5240	11.50	11.50	14.50
802.11ax HE40	38	5190	11.50	11.50	14.50
	46	5230	11.50	11.50	14.50
802.11ax HE80	42	5210	11.50	11.50	14.50

Maximum Tune-up Power (dBm) for WLAN 5.3 GHz with Power Set 5					
Mode	Channel	Frequency (MHz)	SISO ANT 9	SISO ANT 10	MIMO ANT 9+10
802.11a	52	5260	16.00	16.00	19.00
	56	5280	16.00	16.00	19.00
	60	5300	16.00	16.00	19.00
	64	5320	16.00	16.00	19.00
802.11n HT20	52	5260	15.50	15.50	18.50
	56	5280	15.50	15.50	18.50
	60	5300	15.50	15.50	18.50
	64	5320	15.50	15.50	18.50
802.11n HT40	54	5270	14.50	14.50	17.50
	62	5310	14.50	14.50	17.50
802.11ac VHT20	52	5260	14.50	14.50	17.50
	56	5280	14.50	14.50	17.50
	60	5300	14.50	14.50	17.50
	64	5320	14.50	14.50	17.50
802.11ac VHT40	54	5270	14.50	14.50	17.50
	62	5310	14.50	14.50	17.50
802.11ac VHT80	58	5290	11.50	11.50	14.50
802.11ac VHT160	50	5250	11.50	11.50	14.50
802.11ax HE20	52	5260	11.50	11.50	14.50
	56	5280	11.50	11.50	14.50
	60	5300	11.50	11.50	14.50
	64	5320	11.50	11.50	14.50
802.11ax HE40	54	5270	11.50	11.50	14.50
	62	5310	11.50	11.50	14.50
802.11ax HE80	58	5290	11.50	11.50	14.50
802.11ax HE160	50	5250	11.50	11.50	14.50

Maximum Tune-up Power (dBm) for WLAN 5.6 GHz with Power Set 5					
Mode	Channel	Frequency (MHz)	SISO ANT 9	SISO ANT 10	MIMO ANT 9+10
802.11a	100	5500	15.50	15.50	18.50
	116	5580	15.50	15.50	18.50
	132	5660	15.50	15.50	18.50
	140	5700	15.50	15.50	18.50
	144	5720	15.50	15.50	18.50
802.11n HT20	100	5500	15.00	15.00	18.00
	116	5580	15.00	15.00	18.00
	132	5660	15.00	15.00	18.00
	140	5700	15.00	15.00	18.00
	144	5720	15.00	15.00	18.00
802.11n HT40	102	5510	14.00	14.00	17.00
	110	5550	14.00	14.00	17.00
	134	5670	14.00	14.00	17.00
	142	5710	14.00	14.00	17.00
802.11ac VHT20	100	5500	14.00	14.00	17.00
	116	5580	14.00	14.00	17.00
	132	5660	14.00	14.00	17.00
	140	5700	14.00	14.00	17.00
	144	5720	14.00	14.00	17.00
802.11ac VHT40	102	5510	14.00	14.00	17.00
	110	5550	14.00	14.00	17.00
	134	5670	14.00	14.00	17.00
	142	5710	14.00	14.00	17.00
802.11ac VHT80	106	5530	11.00	11.00	14.00
	138	5690	11.00	11.00	14.00
802.11ac VHT160	114	5570	11.00	11.00	14.00
802.11ax HE20	100	5500	11.00	11.00	14.00
	116	5580	11.00	11.00	14.00
	132	5660	11.00	11.00	14.00
	140	5700	11.00	11.00	14.00
	144	5720	11.00	11.00	14.00
802.11ax HE40	102	5510	11.00	11.00	14.00
	110	5550	11.00	11.00	14.00
	134	5670	11.00	11.00	14.00
	142	5710	11.00	11.00	14.00
802.11ax HE80	106	5530	11.00	11.00	14.00
	138	5690	11.00	11.00	14.00
802.11ax HE160	114	5570	11.00	11.00	14.00

Maximum Tune-up Power (dBm) for WLAN 5.8 GHz with Power Set 5					
Mode	Channel	Frequency (MHz)	SISO ANT 9	SISO ANT 10	MIMO ANT 9+10
802.11a	149	5745	16.00	16.00	19.00
	157	5785	16.00	16.00	19.00
	165	5825	16.00	16.00	19.00
802.11n HT20	149	5745	15.50	15.50	18.50
	157	5785	15.50	15.50	18.50
	165	5825	15.50	15.50	18.50
802.11n HT40	151	5755	14.50	14.50	17.50
	159	5795	14.50	14.50	17.50
802.11ac VHT20	149	5745	14.50	14.50	17.50
	157	5785	14.50	14.50	17.50
	165	5825	14.50	14.50	17.50
802.11ac VHT40	151	5755	14.50	14.50	17.50
	159	5795	14.50	14.50	17.50
802.11ac VHT80	155	5775	11.50	11.50	14.50
802.11ax HE20	149	5745	11.50	11.50	14.50
	157	5785	11.50	11.50	14.50
	165	5825	11.50	11.50	14.50
802.11ax HE40	151	5755	11.50	11.50	14.50
	159	5795	11.50	11.50	14.50
802.11ax HE80	155	5775	11.50	11.50	14.50

Maximum Tune-up Power (dBm) for Bluetooth with Power Set 1 / Set 3 / Set 6					
Mode		Channel	Frequency (MHz)	ANT 9	ANT 10
BR / EDR	1Mbps (GFSK)	0	2402	14.00	12.50
		39	2441	14.00	12.50
		78	2480	14.00	12.50
	2Mbps (π/4 DQPSK)	0	2402	11.00	9.50
		39	2441	11.00	9.50
		78	2480	11.00	9.50
LE	1Mbps (GFSK)	0	2402	10.00	8.50
		19	2440	10.00	8.50
		39	2480	10.00	8.50
	2Mbps (π/4 DQPSK)	0	2402	10.00	8.50
		19	2440	10.00	8.50
		39	2480	10.00	8.50
	Coded PHY(S=8)	0	2402	10.00	8.50
		19	2440	10.00	8.50
		39	2480	10.00	8.50
	Coded PHY(S=2)	0	2402	10.00	8.50
		19	2440	10.00	8.50
		39	2480	10.00	8.50

Maximum Tune-up Power (dBm) for Bluetooth with Power Set 4					
Mode		Channel	Frequency (MHz)	ANT 9	ANT 10
BR / EDR	1Mbps (GFSK)	0	2402	14.00	12.50
		39	2441	14.00	12.50
		78	2480	14.00	12.50
	2Mbps (π/4 DQPSK)	0	2402	11.00	9.50
		39	2441	11.00	9.50
		78	2480	11.00	9.50
LE	1Mbps (GFSK)	0	2402	10.00	8.50
		19	2440	10.00	8.50
		39	2480	10.00	8.50
	2Mbps (π/4 DQPSK)	0	2402	10.00	8.50
		19	2440	10.00	8.50
		39	2480	10.00	8.50
	Coded PHY(S=8)	0	2402	10.00	8.50
		19	2440	10.00	8.50
		39	2480	10.00	8.50
	Coded PHY(S=2)	0	2402	10.00	8.50
		19	2440	10.00	8.50
		39	2480	10.00	8.50

Maximum Tune-up Power (dBm) for Bluetooth with Power Set 5					
Mode		Channel	Frequency (MHz)	ANT 9	ANT 10
BR / EDR	1Mbps (GFSK)	0	2402	14.00	12.50
		39	2441	14.00	12.50
		78	2480	14.00	12.50
	2Mbps (π/4 DQPSK)	0	2402	11.00	9.50
		39	2441	11.00	9.50
		78	2480	11.00	9.50
LE	1Mbps (GFSK)	0	2402	10.00	8.50
		19	2440	10.00	8.50
		39	2480	10.00	8.50
	2Mbps (π/4 DQPSK)	0	2402	10.00	8.50
		19	2440	10.00	8.50
		39	2480	10.00	8.50
	Coded PHY(S=8)	0	2402	10.00	8.50
		19	2440	10.00	8.50
		39	2480	10.00	8.50
	Coded PHY(S=2)	0	2402	10.00	8.50
		19	2440	10.00	8.50
		39	2480	10.00	8.50

8.2. Measured Conducted Power Results for GSM

Test Notes:

[1] The device supports GSM Class: B, GPRS Multi-slot class: 33 (Max 4 Tx uplink slots), EDGE Multi-slot class: 33 (Max 4 Tx uplink slots), DTM Multi-slot Class: N/A.

[2] Both burst-averaged and calculated frame-averaged powers are included. Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots.

[3] GPRS / EDGE (GMSK) output powers were measured with coding scheme setting of 1 (CS1) on the base station simulator. CS1 was configured to measure GPRS output power measurements and SAR to ensure GMSK modulation in the signal. Our Investigation has shown that CS1 ~ CS4 settings do not have any impact on the output levels or modulation in the GPRS modes.

[4] EDGE (8PSK) output powers were measured with MCS7 on the base station simulator. MCS7 coding scheme was used to measure the output powers for EDGE since investigation has shown that choosing MCS7 coding scheme will ensure 8PSK modulation. It has been shown that MCS levels that produce 8PSK modulation do not have an impact on output power.

GSM850 – ANT 0 for All DSI	Burst-Averaged Power (dBm)			Max Tune-up Power (dBm)
Tx Channel	128	189	251	
Frequency (MHz)	824.2	836.4	848.8	
GSM	32.43	32.38	32.30	32.5
GPRS/EDGE (GMSK, 1 Tx Slot)	32.43	32.42	32.28	32.5
GPRS/EDGE (GMSK ,2 Tx Slot)	28.79	28.97	28.98	29.0
GPRS/EDGE (GMSK, 3 Tx Slot)	26.66	26.65	26.73	27.0
GPRS/EDGE (GMSK, 4 Tx Slot)	25.37	25.60	25.43	26.0
EDGE (8PSK, 1 Tx Slot)	26.21	26.25	26.13	27.0
EDGE (8PSK, 2 Tx Slot)	24.49	24.28	24.28	26.0
EDGE (8PSK, 3 Tx Slot)	22.46	22.36	22.37	22.5
EDGE (8PSK, 4 Tx Slot)	20.47	20.39	20.19	20.5

GSM850 – ANT 0 for All DSI	Frame-Averaged Power (dBm)			Max Tune-up Power (dBm)
Tx Channel	128	189	251	
Frequency (MHz)	824.2	836.4	848.8	
GSM	23.43	23.38	23.30	23.5
GPRS/EDGE (GMSK, 1 Tx Slot)	23.43	23.42	23.28	23.5
GPRS/EDGE (GMSK ,2 Tx Slot)	22.79	22.97	22.98	23.0
GPRS/EDGE (GMSK, 3 Tx Slot)	22.40	22.39	22.47	22.74
GPRS/EDGE (GMSK, 4 Tx Slot)	22.37	22.60	22.43	23.0
EDGE (8PSK, 1 Tx Slot)	17.21	17.25	17.13	18.0
EDGE (8PSK, 2 Tx Slot)	18.49	18.28	18.28	20.0
EDGE (8PSK, 3 Tx Slot)	18.20	18.10	18.11	18.24
EDGE (8PSK, 4 Tx Slot)	17.47	17.39	17.19	17.5

GSM1900 – ANT 1 for All DSI	Burst-Averaged Power (dBm)			Max Tune-up Power (dBm)
Tx Channel	512	661	810	
Frequency (MHz)	1850.2	1880	1909.8	
GSM	29.15	29.33	29.27	29.5
GPRS/EDGE (GMSK, 1 Tx Slot)	29.11	29.44	29.05	29.5
GPRS/EDGE (GMSK ,2 Tx Slot)	27.96	28.33	28.34	29.0
GPRS/EDGE (GMSK, 3 Tx Slot)	25.75	26.38	26.29	27.5
GPRS/EDGE (GMSK, 4 Tx Slot)	25.16	25.41	25.34	26.5
EDGE (8PSK, 1 Tx Slot)	25.44	25.35	25.41	25.5
EDGE (8PSK, 2 Tx Slot)	24.41	24.23	24.03	24.5
EDGE (8PSK, 3 Tx Slot)	22.39	22.33	22.42	23.5
EDGE (8PSK, 4 Tx Slot)	21.15	21.23	21.34	22.5

GSM1900 – ANT 1 for All DSI	Frame-Averaged Power (dBm)			Max Tune-up Power (dBm)
Tx Channel	512	661	810	
Frequency (MHz)	1850.2	1880	1909.8	
GSM	20.15	20.33	20.27	20.5
GPRS/EDGE (GMSK, 1 Tx Slot)	20.11	20.44	20.05	20.5
GPRS/EDGE (GMSK ,2 Tx Slot)	21.96	22.33	22.34	23.0
GPRS/EDGE (GMSK, 3 Tx Slot)	21.49	22.12	22.03	23.24
GPRS/EDGE (GMSK, 4 Tx Slot)	22.16	22.41	22.34	23.5
EDGE (8PSK, 1 Tx Slot)	16.44	16.35	16.41	16.5
EDGE (8PSK, 2 Tx Slot)	18.41	18.23	18.03	18.5
EDGE (8PSK, 3 Tx Slot)	18.13	18.07	18.16	19.24
EDGE (8PSK, 4 Tx Slot)	18.15	18.23	18.34	19.5

8.3. Measured Conducted Power Results for WCDMA

Test Notes:

[1] Per KDB Publication 941225 D01, W-CDMA maximum output power is verified on the high, middle and low channels and using the appropriate 12.2 kbps RMC with TPC (transmit power control) set to all "1's".

[2] For Release 99 Setup Procedures used to establish the test signals, the following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS 34.121-1. A summary of these settings is illustrated below:

Mode	Subtest	Rel. 99
WCDMA General Settings	Loopback Mode	Test Mode 2
	Rel.99 RMC	12.2 kbps RMC
	Power Control Algorithm	Algorithm 2
	βc / βd	8/15

Band	WCDMA II – ANT 1 for DSI 7			Max Tune-up Power (dBm)	3GPP MPR (dB)
Tx Channel	9262	9400	9538		
Frequency (MHz)	1852.4	1880.0	1907.6		
RMC 12.2Kbps	23.26	23.35	23.29	23.8	N/A
AMR 12.2kbps	23.24	23.25	23.20	23.8	N/A
HSDPA Subtest 1	23.29	23.27	23.22	23.8	0
HSDPA Subtest 2	23.24	23.20	23.21	23.8	0
HSDPA Subtest 3	22.72	22.80	22.67	23.3	0.5
HSDPA Subtest 4	22.60	22.70	22.66	23.3	0.5
HSUPA Subtest 1	22.15	22.06	22.11	22.8	0
HSUPA Subtest 2	20.25	20.24	20.25	20.8	2
HSUPA Subtest 3	21.23	21.24	21.20	21.8	1
HSUPA Subtest 4	20.21	20.22	20.19	20.8	2
HSUPA Subtest 5	22.11	22.23	22.11	22.8	0
DC-HSDPA Subtest 1	23.12	23.09	23.23	23.8	0
DC-HSDPA Subtest 2	23.12	23.21	23.10	23.8	0
DC-HSDPA Subtest 3	22.71	22.76	22.70	23.3	0.5
DC-HSDPA Subtest 4	22.58	22.68	22.63	23.3	0.5
HSPA+ Subtest 1	19.71	19.68	19.68	20.3	2.5

Band	WCDMA II – ANT 1 for DSI 1 / 3			Max Tune-up Power (dBm)	3GPP MPR (dB)
Tx Channel	9262	9400	9538		
Frequency (MHz)	1852.4	1880.0	1907.6		
RMC 12.2Kbps	22.23	22.29	22.21	22.5	N/A
AMR 12.2kbps	22.14	22.09	22.19	22.5	N/A
HSDPA Subtest 1	22.13	22.16	22.09	22.5	0
HSDPA Subtest 2	22.08	22.15	22.15	22.5	0
HSDPA Subtest 3	21.65	21.69	21.71	22.0	0.5
HSDPA Subtest 4	21.67	21.74	21.58	22.0	0.5
HSUPA Subtest 1	21.34	21.21	21.30	21.5	0
HSUPA Subtest 2	19.20	19.24	19.34	19.5	2
HSUPA Subtest 3	20.25	20.27	20.29	20.5	1
HSUPA Subtest 4	19.07	19.21	19.28	19.5	2
HSUPA Subtest 5	21.30	21.08	21.08	21.5	0
DC-HSDPA Subtest 1	22.18	22.28	22.21	22.5	0
DC-HSDPA Subtest 2	22.11	21.96	22.19	22.5	0
DC-HSDPA Subtest 3	21.91	21.69	21.81	22.0	0.5
DC-HSDPA Subtest 4	21.70	21.81	21.83	22.0	0.5
HSPA+ Subtest 1	18.51	18.77	18.82	19.0	2.5

Band	WCDMA II – ANT 1 for DSI 4			Max Tune-up Power (dBm)	3GPP MPR (dB)
Tx Channel	9262	9400	9538		
Frequency (MHz)	1852.4	1880.0	1907.6		
RMC 12.2Kbps	21.22	21.42	21.32	21.5	N/A
AMR 12.2kbps	21.10	21.31	21.21	21.5	N/A
HSDPA Subtest 1	21.01	20.99	20.94	21.5	0
HSDPA Subtest 2	20.92	20.91	20.93	21.5	0
HSDPA Subtest 3	20.44	20.52	20.39	21.0	0.5
HSDPA Subtest 4	20.32	20.42	20.38	21.0	0.5
HSUPA Subtest 1	19.87	19.78	19.83	20.5	0
HSUPA Subtest 2	17.97	17.92	17.97	19.5	2
HSUPA Subtest 3	18.95	18.96	18.92	20.5	1
HSUPA Subtest 4	17.93	17.94	17.91	19.5	2
HSUPA Subtest 5	19.81	19.89	19.87	20.5	0
DC-HSDPA Subtest 1	20.84	20.81	20.95	21.5	0
DC-HSDPA Subtest 2	20.83	20.93	20.81	21.5	0
DC-HSDPA Subtest 3	20.43	20.48	20.42	21.0	0.5
DC-HSDPA Subtest 4	20.25	20.35	20.35	21.0	0.5
HSPA+ Subtest 1	17.42	17.41	17.40	17.5	2.5

Band	WCDMA II – ANT 1 for DSI 5			Max Tune-up Power (dBm)	3GPP MPR (dB)
Tx Channel	9262	9400	9538		
Frequency (MHz)	1852.4	1880.0	1907.6		
RMC 12.2Kbps	19.32	19.44	19.35	19.5	N/A
AMR 12.2kbps	19.31	19.41	19.34	19.5	N/A
HSDPA Subtest 1	19.05	19.03	18.98	19.5	0
HSDPA Subtest 2	18.96	18.95	18.97	19.5	0
HSDPA Subtest 3	18.48	18.52	18.41	19.0	0.5
HSDPA Subtest 4	18.36	18.46	18.42	19.0	0.5
HSUPA Subtest 1	17.91	17.82	17.87	18.5	0
HSUPA Subtest 2	16.01	15.82	16.18	17.5	2
HSUPA Subtest 3	16.99	17.00	16.96	18.5	1
HSUPA Subtest 4	15.97	15.98	15.95	17.5	2
HSUPA Subtest 5	17.85	17.92	17.92	18.5	0
DC-HSDPA Subtest 1	18.88	18.85	18.99	19.5	0
DC-HSDPA Subtest 2	18.85	18.97	18.75	19.5	0
DC-HSDPA Subtest 3	18.47	18.51	18.46	19.0	0.5
DC-HSDPA Subtest 4	18.25	18.33	18.39	19.0	0.5
HSPA+ Subtest 1	15.46	15.45	15.44	17.0	2.5

Band	WCDMA II – ANT 1 for DSI 6			Max Tune-up Power (dBm)	3GPP MPR (dB)
Tx Channel	9262	9400	9538		
Frequency (MHz)	1852.4	1880.0	1907.6		
RMC 12.2Kbps	21.25	21.29	21.16	21.5	N/A
AMR 12.2kbps	21.05	21.12	21.05	21.5	N/A
HSDPA Subtest 1	21.09	21.13	21.09	21.5	0
HSDPA Subtest 2	21.09	21.11	21.14	21.5	0
HSDPA Subtest 3	20.59	20.65	20.52	21.0	0.5
HSDPA Subtest 4	20.58	20.64	20.59	21.0	0.5
HSUPA Subtest 1	20.03	20.13	20.07	20.5	0
HSUPA Subtest 2	18.07	18.12	18.04	18.5	2
HSUPA Subtest 3	19.13	19.14	19.14	19.5	1
HSUPA Subtest 4	18.13	18.13	18.06	18.5	2
HSUPA Subtest 5	20.06	20.12	20.03	20.5	0
DC-HSDPA Subtest 1	21.12	21.16	21.05	21.5	0
DC-HSDPA Subtest 2	21.02	21.01	21.14	21.5	0
DC-HSDPA Subtest 3	20.52	20.54	20.50	21.0	0.5
DC-HSDPA Subtest 4	20.49	20.55	20.62	21.0	0.5
HSPA+ Subtest 1	17.62	17.63	17.58	18.0	2.5

Band	WCDMA IV – ANT 1 for DSI 7			Max Tune-up Power (dBm)	3GPP MPR (dB)
Tx Channel	1312	1413	1513		
Frequency (MHz)	1712.4	1732.6	1752.6		
RMC 12.2Kbps	23.29	23.37	23.31	23.8	N/A
AMR 12.2kbps	23.24	23.25	23.20	23.8	N/A
HSDPA Subtest 1	23.25	23.26	23.25	23.8	0
HSDPA Subtest 2	23.18	23.16	23.24	23.8	0
HSDPA Subtest 3	22.72	22.76	22.70	23.3	0.5
HSDPA Subtest 4	22.64	22.70	22.62	23.3	0.5
HSUPA Subtest 1	22.11	22.06	22.10	22.8	0
HSUPA Subtest 2	20.20	20.22	20.23	20.8	2
HSUPA Subtest 3	21.28	21.23	21.25	21.8	1
HSUPA Subtest 4	20.17	20.22	20.21	20.8	2
HSUPA Subtest 5	22.13	22.19	22.16	22.8	0
DC-HSDPA Subtest 1	23.15	23.11	23.21	23.8	0
DC-HSDPA Subtest 2	23.14	23.19	23.08	23.8	0
DC-HSDPA Subtest 3	22.72	22.82	22.67	23.3	0.5
DC-HSDPA Subtest 4	22.60	22.62	22.63	23.3	0.5
HSPA+ Subtest 1	19.70	19.70	19.71	20.3	2.5

Band	WCDMA IV – ANT 1 for DSI 1 / 3 / 6			Max Tune-up Power (dBm)	3GPP MPR (dB)
Tx Channel	1312	1413	1513		
Frequency (MHz)	1712.4	1732.6	1752.6		
RMC 12.2Kbps	22.43	22.44	22.28	22.5	N/A
AMR 12.2kbps	22.30	22.12	22.15	22.5	N/A
HSDPA Subtest 1	22.16	22.27	22.09	22.5	0
HSDPA Subtest 2	22.37	22.27	22.14	22.5	0
HSDPA Subtest 3	21.87	21.89	21.73	22.0	0.5
HSDPA Subtest 4	21.85	21.82	21.66	22.0	0.5
HSUPA Subtest 1	21.25	21.34	21.26	21.5	0
HSUPA Subtest 2	19.29	19.15	19.08	19.5	2
HSUPA Subtest 3	20.24	20.08	20.23	20.5	1
HSUPA Subtest 4	19.29	19.27	19.17	19.5	2
HSUPA Subtest 5	21.36	21.37	21.20	21.5	0
DC-HSDPA Subtest 1	22.29	22.30	22.16	22.5	0
DC-HSDPA Subtest 2	22.32	22.19	22.18	22.5	0
DC-HSDPA Subtest 3	21.80	21.81	21.63	22.0	0.5
DC-HSDPA Subtest 4	21.81	21.92	21.62	22.0	0.5
HSPA+ Subtest 1	18.77	18.70	18.57	19.0	2.5

Band	WCDMA IV – ANT 1 for DSI 4			Max Tune-up Power (dBm)	3GPP MPR (dB)
Tx Channel	1312	1413	1513		
Frequency (MHz)	1712.4	1732.6	1752.6		
RMC 12.2Kbps	21.39	21.48	21.45	21.5	N/A
AMR 12.2kbps	21.32	21.41	21.38	21.5	N/A
HSDPA Subtest 1	20.98	20.98	20.99	21.5	0
HSDPA Subtest 2	20.91	20.89	20.98	21.5	0
HSDPA Subtest 3	20.45	20.45	20.44	21.0	0.5
HSDPA Subtest 4	20.35	20.43	20.32	21.0	0.5
HSUPA Subtest 1	19.84	19.78	19.83	20.5	0
HSUPA Subtest 2	17.91	17.95	17.96	19.5	2
HSUPA Subtest 3	19.01	18.88	18.98	20.5	1
HSUPA Subtest 4	17.89	17.95	17.94	19.5	2
HSUPA Subtest 5	19.86	19.91	19.89	20.5	0
DC-HSDPA Subtest 1	20.88	20.84	20.94	21.5	0
DC-HSDPA Subtest 2	20.87	20.91	20.81	21.5	0
DC-HSDPA Subtest 3	20.45	20.55	20.40	21.0	0.5
DC-HSDPA Subtest 4	20.32	20.33	20.36	21.0	0.5
HSPA+ Subtest 1	17.41	17.43	17.45	19.0	2.5

Band	WCDMA IV – ANT 1 for DSI 5			Max Tune-up Power (dBm)	3GPP MPR (dB)
Tx Channel	1312	1413	1513		
Frequency (MHz)	1712.4	1732.6	1752.6		
RMC 12.2Kbps	19.38	19.41	19.35	19.5	N/A
AMR 12.2kbps	19.37	19.39	19.33	19.5	N/A
HSDPA Subtest 1	18.98	18.98	18.99	19.5	0
HSDPA Subtest 2	18.88	18.89	18.98	19.5	0
HSDPA Subtest 3	18.45	18.42	18.44	19.0	0.5
HSDPA Subtest 4	18.35	18.43	18.30	19.0	0.5
HSUPA Subtest 1	17.84	17.75	17.83	18.5	0
HSUPA Subtest 2	15.90	15.95	15.96	17.5	2
HSUPA Subtest 3	17.01	16.88	16.98	18.5	1
HSUPA Subtest 4	15.90	15.95	15.91	17.5	2
HSUPA Subtest 5	17.86	17.91	17.89	18.5	0
DC-HSDPA Subtest 1	18.88	18.82	18.94	19.5	0
DC-HSDPA Subtest 2	18.87	18.91	18.81	19.5	0
DC-HSDPA Subtest 3	18.45	18.54	18.40	19.0	0.5
DC-HSDPA Subtest 4	18.32	18.33	18.36	19.0	0.5
HSPA+ Subtest 1	15.33	15.44	15.45	17.0	2.5

Band	WCDMA V – ANT 0 for All DSI			Max Tune-up Power (dBm)	3GPP MPR (dB)
Tx Channel	4132	4182	4233		
Frequency (MHz)	826.4	836.4	846.6		
RMC 12.2Kbps	23.73	23.74	23.71	23.8	N/A
AMR 12.2kbps	23.66	23.69	23.65	23.8	N/A
HSDPA Subtest 1	23.70	23.73	23.71	23.8	0
HSDPA Subtest 2	23.65	23.65	23.64	23.8	0
HSDPA Subtest 3	23.20	23.20	23.12	23.3	0.5
HSDPA Subtest 4	23.09	23.18	23.10	23.3	0.5
HSUPA Subtest 1	22.61	22.56	22.56	22.8	0
HSUPA Subtest 2	20.67	20.64	20.65	20.8	2
HSUPA Subtest 3	21.70	21.70	21.68	21.8	1
HSUPA Subtest 4	20.64	20.63	20.63	20.8	2
HSUPA Subtest 5	22.57	22.63	22.60	22.8	0
DC-HSDPA Subtest 1	23.58	23.59	23.63	23.8	0
DC-HSDPA Subtest 2	23.57	23.61	23.56	23.8	0
DC-HSDPA Subtest 3	23.19	23.24	23.13	23.3	0.5
DC-HSDPA Subtest 4	23.08	23.10	23.07	23.3	0.5
HSPA+ Subtest 1	20.17	20.18	20.15	20.3	2.5

8.4. Measured Conducted Power Results for LTE

Test Notes:

[1] Per 3GPP standard, LTE QPSK configuration has the highest maximum average output power.

[2] The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS 36.101 specification.

- UE Power Class: 3 (23 ±2 dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS 36.101.
- The allowed A-MPR values specified below in Table 6.2.4-1 of 3GPP TS 36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of “NS_01”.

[3] According to April 2015 TCB workshop, SAR test exclusion can be applied for testing overlapping LTE bands as follows:
LTE Band 2 (1860 ~ 1900 MHz) is covered by LTE Band 25 (1860 ~ 1905 MHz)
LTE Band 4 (1720 ~ 1745 MHz) is covered by LTE Band 66 (1720 ~ 1770 MHz)
LTE Band 5 (829 ~ 844 MHz) is covered by LTE Band 26 (821.5 ~ 841.5 MHz)

[4] Some LTE bands do not support three non-overlapping channels. Per KDB Publication 941225 D05, 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.

[5] The measured conducted power of highest bandwidth has been listed in below, and the measured conducted power for other bandwidth can be found in LTE and NR Lower Bandwidth Conducted Power Appendix.

Band					LTE B2 – ANT 1 for DSI 7			
BW (MHz)	Modulation	RB Size	RB Offset	3GPP MPR (dB)	18700	18900	19100	Tune-up Limit (dBm)
					1860.0	1880.0	1900.0	
20	QPSK	1	0	0	23.17	23.22	23.19	24.6
		1	49	0	23.12	23.17	23.11	24.6
		1	99	0	23.04	23.11	22.95	24.6
		50	0	1	22.19	22.26	22.22	23.6
		50	25	1	22.13	22.12	22.11	23.6
		50	50	1	22.12	22.02	22.02	23.6
		100	0	1	21.97	21.99	21.93	23.6
	16QAM	1	0	1	21.91	21.84	21.91	23.6
		1	49	1	21.84	21.82	21.83	23.6
		1	99	1	21.75	21.71	21.72	23.6
		50	0	2	21.21	21.21	21.17	22.6
		50	25	2	21.21	21.12	21.21	22.6
		50	50	2	21.20	21.13	21.13	22.6
		100	0	2	21.22	21.21	21.22	22.6
	64QAM	1	0	2	21.14	21.04	21.04	22.6
		1	49	2	21.16	21.11	21.16	22.6
		1	99	2	21.11	21.03	21.10	22.6
		50	0	3	20.06	19.96	20.05	21.6
		50	25	3	19.94	19.84	19.87	21.6
		50	50	3	19.99	19.93	19.97	21.6
		100	0	3	19.97	19.95	19.91	21.6
	256QAM	1	0	5	18.09	18.07	18.00	19.6
		1	49	5	18.06	17.98	17.99	19.6
		1	99	5	18.07	18.04	18.02	19.6
		50	0	5	18.05	18.04	18.03	19.6
		50	25	5	17.99	17.94	17.96	19.6
		50	50	5	17.94	17.86	17.94	19.6
		100	0	5	17.95	17.89	17.92	19.6

Band					LTE B2 – ANT 1 for DSI 1			
BW (MHz)	Modulation	RB Size	RB Offset	3GPP MPR (dB)	18700 / 1860.0	18900 / 1880.0	19100 / 1900.0	Tune-up Limit (dBm)
20	QPSK	1	0	0	22.28	22.33	22.25	22.5
		1	49	0	21.77	22.05	21.88	22.5
		1	99	0	21.99	22.14	21.96	22.5
		50	0	1	21.22	21.24	21.21	21.5
		50	25	1	21.11	21.01	21.17	21.5
		50	50	1	21.12	21.21	21.13	21.5
		100	0	1	21.15	21.28	21.09	21.5
	16QAM	1	0	1	20.94	21.12	20.97	21.5
		1	49	1	20.83	21.00	20.81	21.5
		1	99	1	20.91	21.10	20.86	21.5
		50	0	2	20.13	20.22	20.21	20.5
		50	25	2	20.08	20.03	20.16	20.5
		50	50	2	20.09	20.14	20.06	20.5
		100	0	2	20.11	20.11	19.95	20.5
	64QAM	1	0	2	19.98	20.13	19.93	20.5
		1	49	2	19.76	19.98	19.80	20.5
		1	99	2	19.89	20.04	19.91	20.5
		50	0	3	19.01	19.18	19.25	19.5
		50	25	3	19.10	18.97	19.16	19.5
		50	50	3	19.10	19.20	18.97	19.5
		100	0	3	19.06	19.01	19.01	19.5
	256QAM	1	0	5	16.99	17.06	16.90	17.5
		1	49	5	16.71	17.04	16.73	17.5
		1	99	5	16.95	17.12	16.90	17.5
		50	0	5	17.09	17.28	17.14	17.5
		50	25	5	17.05	16.99	17.22	17.5
		50	50	5	17.00	17.10	17.08	17.5
		100	0	5	17.14	17.15	17.01	17.5

Band					LTE B2 – ANT 1 for DSI 3			
BW (MHz)	Modulation	RB Size	RB Offset	3GPP MPR (dB)	18700 / 1860.0	18900 / 1880.0	19100 / 1900.0	Tune-up Limit (dBm)
20	QPSK	1	0	0	21.26	21.40	21.18	21.5
		1	49	0	20.99	21.20	21.07	21.5
		1	99	0	21.19	21.31	21.16	21.5
		50	0	1	20.36	20.48	20.46	20.5
		50	25	1	20.31	20.26	20.42	20.5
		50	50	1	20.34	20.39	20.31	20.5
		100	0	1	20.37	20.38	20.24	20.5
	16QAM	1	0	1	20.17	20.31	20.16	20.5
		1	49	1	19.98	20.20	20.06	20.5
		1	99	1	20.14	20.29	20.06	20.5
		50	0	2	19.29	19.47	19.37	19.5
		50	25	2	19.24	19.18	19.34	19.5
		50	50	2	19.27	19.31	19.28	19.5
		100	0	2	19.32	19.28	19.20	19.5
	64QAM	1	0	2	19.20	19.33	19.16	19.5
		1	49	2	18.98	19.16	19.01	19.5
		1	99	2	19.14	19.26	19.09	19.5
		50	0	3	18.26	18.38	18.43	18.5
		50	25	3	18.25	18.19	18.39	18.5
		50	50	3	18.32	18.38	18.21	18.5
		100	0	3	18.27	18.21	18.24	18.5
	256QAM	1	0	5	16.23	16.31	16.11	16.5
		1	49	5	15.93	16.19	15.98	16.5
		1	99	5	16.14	16.30	16.14	16.5
		50	0	5	16.34	16.47	16.36	16.5
		50	25	5	16.30	16.22	16.41	16.5
		50	50	5	16.24	16.35	16.23	16.5
		100	0	5	16.33	16.30	16.20	16.5

Band					LTE B2 – ANT 1 for DSI 6			
BW (MHz)	Modulation	RB Size	RB Offset	3GPP MPR (dB)	18700 1860.0	18900 1880.0	19100 1900.0	Tune-up Limit (dBm)
20	QPSK	1	0	0	21.26	21.40	21.18	21.5
		1	49	0	20.99	21.20	21.07	21.5
		1	99	0	21.19	21.31	21.16	21.5
		50	0	1	20.36	20.48	20.46	20.5
		50	25	1	20.31	20.26	20.42	20.5
		50	50	1	20.34	20.39	20.31	20.5
		100	0	1	20.37	20.38	20.24	20.5
	16QAM	1	0	1	20.17	20.31	20.16	20.5
		1	49	1	19.98	20.20	20.06	20.5
		1	99	1	20.14	20.29	20.06	20.5
		50	0	2	19.29	19.47	19.37	19.5
		50	25	2	19.24	19.18	19.34	19.5
		50	50	2	19.27	19.31	19.28	19.5
		100	0	2	19.32	19.28	19.20	19.5
	64QAM	1	0	2	19.20	19.33	19.16	19.5
		1	49	2	18.98	19.16	19.01	19.5
		1	99	2	19.14	19.26	19.09	19.5
		50	0	3	18.26	18.38	18.43	18.5
		50	25	3	18.25	18.19	18.39	18.5
		50	50	3	18.32	18.38	18.21	18.5
		100	0	3	18.27	18.21	18.24	18.5
	256QAM	1	0	5	16.23	16.31	16.11	16.5
		1	49	5	15.93	16.19	15.98	16.5
		1	99	5	16.14	16.30	16.14	16.5
		50	0	5	16.34	16.47	16.36	16.5
		50	25	5	16.30	16.22	16.41	16.5
		50	50	5	16.24	16.35	16.23	16.5
		100	0	5	16.33	16.30	16.20	16.5

Band					LTE B2 – ANT 3 for DSI 7 / 4 / 5			
BW (MHz)	Modulation	RB Size	RB Offset	3GPP MPR (dB)	18700 1860.0	18900 1880.0	19100 1900.0	Tune-up Limit (dBm)
20	QPSK	1	0	0	24.12	24.51	24.01	24.6
		1	49	0	24.11	24.48	23.93	24.6
		1	99	0	24.05	24.43	23.86	24.6
		50	0	1	22.70	23.04	22.57	23.6
		50	25	1	22.75	23.02	22.46	23.6
		50	50	1	22.74	22.94	22.40	23.6
		100	0	1	23.02	22.85	22.53	23.6
	16QAM	1	0	1	22.71	22.85	22.35	23.6
		1	49	1	22.55	22.78	22.19	23.6
		1	99	1	22.62	22.80	22.22	23.6
		50	0	2	22.10	22.38	22.09	22.6
		50	25	2	22.12	22.39	22.10	22.6
		50	50	2	22.17	22.35	21.93	22.6
		100	0	2	22.18	22.36	22.05	22.6
	64QAM	1	0	2	22.16	22.39	21.83	22.6
		1	49	2	22.12	22.39	21.87	22.6
		1	99	2	22.06	22.22	22.05	22.6
		50	0	3	21.03	21.17	21.01	21.6
		50	25	3	21.00	21.14	20.76	21.6
		50	50	3	20.91	21.21	20.76	21.6
		100	0	3	20.94	21.24	20.82	21.6
	256QAM	1	0	5	19.13	19.36	19.04	19.6
		1	49	5	19.12	19.21	18.99	19.6
		1	99	5	19.10	19.32	18.92	19.6
		50	0	5	19.01	19.33	18.78	19.6
		50	25	5	18.97	19.24	18.83	19.6
		50	50	5	19.11	19.20	18.91	19.6
		100	0	5	18.97	19.23	18.88	19.6

Band					LTE B2 – ANT 3 for DSI 6			
BW (MHz)	Modulation	RB Size	RB Offset	3GPP MPR (dB)	18700	18900	19100	Tune-up Limit (dBm)
					1860.0	1880.0	1900.0	
20	QPSK	1	0	0	21.48	21.49	21.46	21.5
		1	49	0	21.12	21.04	21.06	21.5
		1	99	0	21.15	21.20	21.09	21.5
		50	0	1	20.45	20.48	20.42	20.5
		50	25	1	20.08	20.20	20.11	20.5
		50	50	1	20.27	20.35	20.30	20.5
		100	0	1	20.18	20.13	20.26	20.5
	16QAM	1	0	1	20.14	20.15	20.35	20.5
		1	49	1	20.32	20.18	20.15	20.5
		1	99	1	20.10	20.30	20.08	20.5
		50	0	2	19.19	19.20	19.04	19.5
		50	25	2	19.18	19.16	19.05	19.5
		50	50	2	19.28	19.22	19.36	19.5
		100	0	2	19.27	19.05	19.32	19.5
	64QAM	1	0	2	19.07	19.30	19.36	19.5
		1	49	2	19.11	19.31	19.06	19.5
		1	99	2	19.19	19.07	19.25	19.5
		50	0	3	18.21	18.11	18.16	18.5
		50	25	3	18.18	18.13	18.20	18.5
		50	50	3	18.31	18.17	18.18	18.5
		100	0	3	18.06	18.31	18.14	18.5
	256QAM	1	0	5	16.04	16.34	16.14	16.5
		1	49	5	16.19	16.28	16.22	16.5
		1	99	5	16.26	16.12	16.32	16.5
		50	0	5	16.09	16.19	16.18	16.5
		50	25	5	16.27	16.31	16.17	16.5
		50	50	5	16.23	16.10	16.26	16.5
		100	0	5	16.27	16.25	16.14	16.5

Band					LTE B4 – ANT 1 for DSI 7			
BW (MHz)	Modulation	RB Size	RB Offset	3GPP MPR (dB)	20050	20175	20300	Tune-up Limit (dBm)
					1720.0	1732.5	1745.0	
20	QPSK	1	0	0	23.21	23.33	23.27	24.8
		1	49	0	23.15	23.29	23.16	24.8
		1	99	0	23.14	23.25	23.11	24.8
		50	0	1	22.31	22.39	22.34	23.8
		50	25	1	22.06	22.09	22.07	23.8
		50	50	1	22.10	21.97	21.94	23.8
		100	0	1	21.91	21.99	21.86	23.8
	16QAM	1	0	1	21.88	21.84	21.84	23.8
		1	49	1	21.86	21.84	21.81	23.8
		1	99	1	21.82	21.81	21.85	23.8
		50	0	2	21.16	21.21	21.16	22.8
		50	25	2	21.20	21.03	21.13	22.8
		50	50	2	21.17	21.08	21.03	22.8
		100	0	2	21.17	21.13	21.21	22.8
	64QAM	1	0	2	21.08	20.99	20.97	22.8
		1	49	2	21.14	21.02	21.07	22.8
		1	99	2	21.06	21.01	21.03	22.8
		50	0	3	20.05	19.96	19.98	21.8
		50	25	3	19.89	19.87	19.88	21.8
		50	50	3	19.99	19.83	19.91	21.8
		100	0	3	19.92	19.92	19.89	21.8
	256QAM	1	0	5	18.02	17.98	17.95	19.8
		1	49	5	17.96	17.97	17.89	19.8
		1	99	5	18.05	17.95	17.96	19.8
		50	0	5	17.96	17.94	17.97	19.8
		50	25	5	17.95	17.85	17.90	19.8
		50	50	5	17.85	17.83	17.86	19.8
		100	0	5	17.89	17.87	17.84	19.8

Band					LTE B4 – ANT 1 for DSI 1 / 3 / 6			
BW (MHz)	Modulation	RB Size	RB Offset	3GPP MPR (dB)	20050	20175	20300	Tune-up Limit (dBm)
					1720.0	1732.5	1745.0	
20	QPSK	1	0	0	22.25	22.31	22.28	22.5
		1	49	0	22.13	22.21	22.19	22.5
		1	99	0	22.19	22.14	22.25	22.5
		50	0	1	21.22	21.29	21.25	21.5
		50	25	1	21.11	21.21	21.24	21.5
		50	50	1	21.08	21.15	21.19	21.5
		100	0	1	21.22	21.33	21.09	21.5
	16QAM	1	0	1	21.18	21.25	21.23	21.5
		1	49	1	21.09	21.13	21.12	21.5
		1	99	1	21.23	21.07	21.28	21.5
		50	0	2	20.13	20.27	20.16	20.5
		50	25	2	20.10	20.14	20.16	20.5
		50	50	2	20.00	20.08	20.13	20.5
		100	0	2	20.20	20.07	20.07	20.5
	64QAM	1	0	2	20.14	20.27	20.22	20.5
		1	49	2	20.03	20.16	20.16	20.5
		1	99	2	20.17	20.07	20.27	20.5
		50	0	3	19.19	19.20	19.24	19.5
		50	25	3	19.07	19.20	19.25	19.5
		50	50	3	19.04	19.07	19.19	19.5
		100	0	3	19.19	19.10	18.99	19.5
	256QAM	1	0	5	17.18	17.22	17.18	17.5
		1	49	5	17.06	17.15	17.10	17.5
		1	99	5	17.16	17.11	17.21	17.5
		50	0	5	17.21	17.23	17.18	17.5
		50	25	5	17.05	17.13	17.15	17.5
		50	50	5	17.01	17.12	17.17	17.5
		100	0	5	17.13	17.08	17.07	17.5

Band					LTE B4 – ANT 3 for DSI 7 / 4 / 5			
BW (MHz)	Modulation	RB Size	RB Offset	3GPP MPR (dB)	20050	20175	20300	Tune-up Limit (dBm)
					1720.0	1732.5	1745.0	
20	QPSK	1	0	0	24.57	24.44	24.66	24.8
		1	49	0	24.51	24.54	24.61	24.8
		1	99	0	24.45	24.51	24.57	24.8
		50	0	1	23.28	23.27	23.38	23.8
		50	25	1	23.21	23.18	23.32	23.8
		50	50	1	23.14	23.11	23.31	23.8
		100	0	1	23.35	23.06	23.42	23.8
	16QAM	1	0	1	23.21	23.07	23.25	23.8
		1	49	1	23.03	23.01	23.09	23.8
		1	99	1	23.02	22.99	23.07	23.8
		50	0	2	22.72	22.79	22.59	22.8
		50	25	2	22.68	22.71	22.58	22.8
		50	50	2	22.60	22.67	22.40	22.8
		100	0	2	22.66	22.60	22.53	22.8
	64QAM	1	0	2	22.57	22.66	22.32	22.8
		1	49	2	22.54	22.64	22.42	22.8
		1	99	2	22.54	22.50	22.51	22.8
		50	0	3	21.52	21.46	21.47	21.8
		50	25	3	21.46	21.34	21.29	21.8
		50	50	3	21.40	21.41	21.25	21.8
		100	0	3	21.39	21.44	21.29	21.8
	256QAM	1	0	5	19.61	19.60	19.53	19.8
		1	49	5	19.58	19.50	19.47	19.8
		1	99	5	19.52	19.54	19.41	19.8
		50	0	5	19.48	19.55	19.32	19.8
		50	25	5	19.42	19.44	19.34	19.8
		50	50	5	19.54	19.41	19.41	19.8
		100	0	5	19.40	19.46	19.37	19.8