FCC SAR TEST REPORT

Application No.:	SZCR2505002214WM
Applicant:	Sonim Technologies, Inc.
Manufacturer:	Sonim Technologies, Inc.
EUT Description:	smartphone
Model No.:	X800
Type No.:	S6002
Trade Mark:	Sonim
FCC ID:	WYPS6002
Standards:	FCC 47CFR §2.1093
Date of Receipt:	2024/07/01
Date of Test:	2024/07/04 to 2024/07/30 (for original report SZCR240300076714) 2025-06-04 to 2025-06-10 (for new report SZCR250500221411)
Date of Issue:	2025-06-16
Test Result :	**PASS ***

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Keny Xu
EMC Laboratory Manager

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch Testing Center EMC Laboratory
检验检测专用章 Inspection & Testing Services

Revision Record				
Version	*Chapter*	*Date*	*Modifier*	*Remark*
01		*2025-06-16*		*Original*

Authorized for issue by:				
		Calvin Weng		
		Calvin Weng/Project Engineer		
		Eric Fu		
		Eric Fu/Reviewer		

Test Summary

Frequency Band	Maximum Reported SAR(W/kg)		
	Head	Body worn&Hotspot	Product specific 10g SAR
GSM850	1.18	0.58	/
GSM1900	0.91	0.73	/
WCDMA Band II	0.91	0.92	/
WCDMA Band IV	1.03	0.89	/
WCDMA Band V	0.64	0.69	/
LTE Band 7	1.00	0.77	**2.05**
LTE Band 12	0.67	0.29	/
LTE Band 13	0.71	0.50	/
LTE Band 14	0.71	0.53	/
LTE Band 25/2	0.96	1.10	1.77
LTE Band 26/5	0.71	0.67	/
LTE Band 30	0.77	0.55	/
LTE Band 41/38	0.83	0.66	1.25
LTE Band 42	0.81	0.79	/
LTE Band 48	0.86	0.71	/
LTE Band 66/4	1.04	1.00	/
LTE Band 71	0.72	0.24	/
NR Band n7	0.85	0.63	1.71
NR Band n14	0.86	0.53	/
NR Band n25/2	0.79	0.85	/
NR Band n26/5	0.98	0.89	/
NR Band n30	1.13	0.35	/
NR Band n41/38	0.79	0.95	1.72
NR Band n48	0.80	0.80	/
NR Band n66	1.04	0.93	/
NR Band n70	0.40	0.75	/
NR Band n71	0.84	0.36	/
NR Band n77	**1.20**	**1.20**	/
NR Band n78	0.79	0.97	/
WI-FI (2.4GHz)	0.63	0.79	/
WI-FI (5GHz)	0.95	0.77	1.32
WI-FI 6E	0.52	0.54	0.88
BT	0.47	0.18	/
SAR Limited(W/kg)	1.6		4.0
Maximum Simultaneous Transmission SAR (W/kg)			
Scenario	Head	Body worn&Hotspot	Product specific 10g SAR
Sum SAR	1.57	1.59	2.90
SPLSR	/	/	/
SPLSR Limited	0.04		0.1

1) The Simultaneous transmission SAR is the same test position of the WWAN antenna + WiFi/BT antenna.
2) According to TCB workshop (Overlapping LTE Bands): SAR in LTE band 2 (frequency range: 1850-1910 MHz) is covered by LTE band 25 (frequency range: 1930-1990MHz).SAR in LTE band 4 (frequency range: 1710-1755 MHz) is covered by LTE band 66 (frequency range: 1710-1780 MHz). SAR in LTE band 5 (frequency range: 824-849 MHz) are covered by LTE band 26 (frequency range: 814-849 MHz). The SAR in LTE band 38 (frequency range: 2570-2620 MHz) is covered by LTE band 41 (frequency range: 2496-2690 MHz). SAR in NR N2 (frequency range: 1850-1910 MHz) is covered by NR N25 (frequency range: 1930-1990MHz). SAR in NR N5 (frequency range: 824-849 MHz) are covered by NR N26 (frequency range: 814-849 MHz). The SAR in NR N38 (frequency range: 2570-2620 MHz) is covered by NR N41 (frequency range: 2496-2690 MHz). The SAR in NR N78 (frequency range: 3450-3550 MHz) is covered by NR N77 (frequency range: 3450-3550 MHz). The SAR in NR N78 (frequency range: 3700-3800 MHz) is covered by NR N77 (frequency range: 3700-3980 MHz). Because the frequency range is similar, the maximum tuning limit is the same, and the channel bandwidth and other operating parameters for the smaller band is fully supported by the larger band.

Frequency Band	Report Power Density (W/m^2)
WIFI 6E	8.86
PD Limited(W/m^2)	10.0

Remark:

Model No.: X800

This report was an additional report copied from the report SZCR240300076714, just added an alternative battery and LCD.

Considering to the difference, pre-scan were performed on the sample in this report to find the items which can be influential to the result in the original test report for fully retest.

Therefore in this report the worst case were retested on model and shown the data in this report, other tests were keep in this report.

Contents

1 General Information

1.1 Details of Client

Applicant:	Sonim Technologies, Inc.
Address of Applicant:	4445 Eastgate Mall, Suite 200, San Diego, CA 92121, USA
Manufacturer:	Sonim Technologies, Inc.
Address of Manufacturer:	4445 Eastgate Mall, Suite 200, San Diego, CA 92121, USA

1.2 Test Location

Company:	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Address:	No. 1 Workshop, M-10, Middle section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China
Post code:	518057
Test engineer:	Claire Shen, Charley Yi, Mike Li, Durant Lin, Bernie Zhuang, Messi Chen, James Zheng, Ethan Li

1.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI (Member No. 1937)**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1336**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

1.4 General Description of EUT

Product Name:	smartphone		
Model No.:	X800		
Trade Mark:	Sonim		
Product Phase:	production unit		
Device Type:	portable device		
Exposure Category:	uncontrolled environment / general population		
IMEI:	351348280016666, 351348280016500, 351348280016849 351348280016443, 351348280016633		
Hardware Version:	V1.0		
Software Version:	X80.0-06-14.0-19.50.00		
Antenna Type:	PIFA Antenna		
Device Operating Configurations:			
Modulation Mode:	**GSM**:GMSK,8PSK; **WCDMA**:QPSK,16QAM **LTE**:QPSK,16QAM,64QAM,256QAM **5G NR**:DFT-s-OFDM(PI/2 BPSK,QPSK,16QAM,64QAM,256QAM) CP-OFDM(QPSK,16QAM,64QAM,256QAM) **WIFI**:DSSS,OFDM,OFDMA; **BT**:GFSK, π/4DQPSK,8DPSK		
Device Class:	B		
GPRS Multi-slots Class:	33	EGPRS Multi-slots Class:	33
HSDPA UE Category:	10	HSUPA UE Category:	6
HSPA+:	14		
Power Class:	4, tested with power level 5(GSM850)		
	1, tested with power level 0(GSM1900)		
	3, tested with power control “all 1”(WCDMA Band)		
	3, tested with power control “max power”(LTE Band)		

Frequency Bands:	Band	Tx(MHz)	Rx(MHz)
	GSM850	824~849	869~894
	GSM1900	1850~1910	1930~1990
	WCDMA Band II	1850~1910	1930~1990
	WCDMA Band IV	1710~1755	2110~2155
	WCDMA Band V	824~849	869~894
	LTE Band 2	1850 ~1910	1930 ~1990
	LTE Band 4	1710~1755	2110~2155

	LTE Band 5	824~849	869-894
	LTE Band 7	2500~2570	2620~2690
	LTE Band 12	699~716	729~746
	LTE Band 13	777~787	746~756
	LTE Band 14	788~798	758~768
	LTE Band 25	1850~1915	1930~1995
	LTE Band 26	814~849	859~894
	LTE Band 30	2305~2315	2350~2360
	LTE Band 38	2570~2620	2570~2620
	LTE Band 41	2496~2690	2496~2690
	LTE Band 42	3450~3550	3450~3550
	LTE Band 48	3550~3700	3550~3700
	LTE Band 66	1710~1780	2110~2200
	LTE Band 71	663~698	617~652
	NR Band n2	1850 ~1910	1930 ~1990
	NR Band n5	824~849	869-894
	NR Band n7	2500~2570	2620~2690
	NR Band n14	788~798	758~768
	NR Band n25	1850~1915	1930~1995
	NR Band n26	814~849	859~894
	NR Band n30	2305~2315	2350~2360
	NR Band n38	2570~2620	2570~2620
	NR Band n41 (Class 2/3)	2496~2690	2496~2690
	NR Band n48	3550~3700	3550~3700
	NR Band n66	1710~1780	2110~2200
	NR Band n70	1695~1710	1995~2020
	NR Band n71	663~698	617~652
	NR Band n77(Class 2/3)	3450~3550	3450~3550
		3700~3980	3700~3980
	NR Band n78(Class 2/3)	3450~3550	3450~3550
		3700~3800	3700~3800
	WIFI 2.4G	2412~2462	2412~2462
	WIFI 5G	5150~5350	5150~5350

		5470~5600	5470~5600
		5650~5725	5650~5725
		5725~5850	5725~5850
	WIFI 6E	5925~6425	5925~6425
		6425~6525	6425~6525
		6525~6875	6525~6875
		6875~7125	6875~7125
	BT	2402~2480	2402~2480
	NFC	13.56	13.56
RF Cable:	☒Provided by applicant ☐Provided by the laboratory		
Battery Information 1#:	Model:	BAT-05000-21S	
	Normal Voltage:	3.87V	
	Rated capacity:	5000mAh	
	Manufacturer:	Shenzhen Aerospace Electronic Co., Ltd.	
Battery Information 2#:	Model:	BAT-05000-21S	
	Normal Voltage:	3.87V	
	Rated capacity:	5000mAh	
	Manufacturer:	Tianjin Lishen Juyuan New Energy Technology Co., Ltd.	

Note: *Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information , SGS is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.

Remark:

As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

1.4.1 DUT Antenna Locations (Back View)

The DUT Antenna Locations can be referred to Appendix F

Note:

1) The test device is a smart phone. The overall diagonal dimension of this device is 175mm. Per KDB 648474 D04, because the diagonal distance of this device is ≥160mm, so it is a phablet.

According to the distance between NR/LTE/WCDMA/GSM/WIFI/BT antennas and the sides of the EUT we can draw the conclusion that:

Distance of the Antenna to the EUT surface/edge						
Mode	Front	Back	Left	Right	Top	Bottom
Ant1	≤25mm	≤25mm	≤25mm	≤25mm	≤25mm	>25mm
Ant2	≤25mm	≤25mm	≤25mm	>25mm	≤25mm	>25mm
Ant3	≤25mm	≤25mm	≤25mm	>25mm	>25mm	>25mm
Ant5	≤25mm	≤25mm	≤25mm	>25mm	>25mm	≤25mm
Ant7	≤25mm	≤25mm	>25mm	≤25mm	>25mm	>25mm
Ant9	≤25mm	≤25mm	>25mm	≤25mm	≤25mm	>25mm
Ant10	≤25mm	≤25mm	>25mm	≤25mm	≤25mm	>25mm

Table 1： Distance of the Antenna to the EUT surface/edge

Note:

1) When the antenna-to-edge distance is greater than 25mm, such position does not need to be tested.

1.4.2 Smart Transmit feature for RF Exposure compliance

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

The patameters obtained form SAR characterization(referred to as SAR char, respectively) will be used as input for Smart Transmit. SAR char will be entered via the Embedded File System(EFS) to enable the Smart Transmit Feature.

<Terminologies in this report>

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

<SAR Characterization>

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

SAR_design_target and Uncertainty

SAR_design_target is determined by ensuring that it is less than FCC SAR limit after accounting for total device designed related uncertainties specified by the manufacturer.

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

Exposure position	Frequency band	SAR Regulatory Limit W/kg(1g)	SAR design target W/kg(1g)
Head	WWAN	1.6	0.8
Body worn/Hotspot	WWAN	1.6	0.8
Exposure position	**Frequency band**	**SAR Regulatory Limit W/kg(10g)**	**SAR design target W/kg(10g)**
Limbs	WWAN	4.0	2.3
Exposure position	**Frequency band**	**PD Regulatory Limit $W/m^2(4cm^2)$**	**PD design target $W/m^2(4cm^2)$**
Power Density	NR FR2	10.0	6.0

The Smart Transmit algorithm maintains the time-averaged transmit power, in turn, time-averaged RF exposure of SAR_design_target, below the predefined time-averaged power limit, for each characterized technology and band.
Smart Transmit allows the device to transmit at higher power instantaneously, as high as Pmax, when needed, but enforces power limiting to maintain time-averaged transmit power to Plimit. Below table shows Plimit EFS settings and maximum tune up output power Pmax configured for this EUT for various transmit conditions (DSI: Device State Index).

P_{limt} for supported technologies and bands (actual EFS settings)

Band	Mode	Antenna	P_{max*}	Uncertainty	P_{limit} (average)		
					Head	Sensor on	Sensor off&Receive off
					DSI4	DSI1	DSI0
GSM	GSM850 2TS	ANT1	23.0	2.0	21.0	23.0	23.0
GSM	GSM1900 4TS	ANT2	21.0	2.0	17.0	21.0	21.0
WCDMA	WB2	ANT2	23.0	1.5	16.5	22.0	22.0
WCDMA	WB4	ANT2	23.0	1.5	17.0	22.5	23.0
WCDMA	WB5	ANT1	24.0	1.0	20.0	24.0	24.0
LTE	B2	ANT2	23.0	1.5	17.0	22.0	22.0
LTE	B2	ANT5	24.0	1.0	24.0	24.0	24.0
LTE	B4	ANT2	23.0	1.5	17.0	23.0	23.0
LTE	B4	ANT5	24.0	1.0	24.0	24.0	24.0
LTE	B5	ANT1	24.0	1.0	20.0	24.0	24.0
LTE	B7	ANT2	23.5	1.0	18.0	21.0	23.5
LTE	B7	ANT5	24.0	1.0	24.0	24.0	24.0
LTE	B12	ANT1	24.0	1.0	23.0	24.0	24.0
LTE	B13	ANT1	24.0	1.0	21.5	24.0	24.0
LTE	B14	ANT1	24.0	1.0	21.5	24.0	24.0
LTE	B25	ANT2	23.0	1.5	17.0	22.0	22.0
LTE	B25	ANT5	24.0	1.0	24.0	23.0	24.0
LTE	B26	ANT1	24.0	1.0	20.0	24.0	24.0
LTE	B30	ANT2	23.0	1.5	19.5	23.0	23.0
LTE	B38	ANT2	22.0	1.0	16.5	18.5	22.0
LTE	B41 PC2	ANT2	22.4	1.0	16.9	18.4	22.4

LTE	B41 PC3	ANT2	22.0	1.0	16.5	18.0	22.0
LTE	B42	ANT3	21.5	1.0	18.0	21.0	21.0
LTE	B48	ANT3	20.0	2.0	16.5	20.0	20.0
LTE	B66	ANT2	23.0	1.5	17.0	23.0	23.0
LTE	B66	ANT5	24.0	1.0	24.0	24.0	24.0
LTE	B71	ANT1	24.0	1.0	22.5	24.0	24.0
NR	N2	ANT2	23.0	2.0	15.5	20.5	20.5
NR	N5	ANT1	23.0	2.0	19.0	23.0	23.0
NR	N7	ANT2	23.0	2.0	15.5	19.5	23.0
NR	N7	ANT5	23.0	2.0	23.0	23.0	23.0
NR	N14	ANT1	23.0	2.0	20.5	23.0	23.0
NR	N25	ANT2	23.0	2.0	15.5	20.5	20.5
NR	N26	ANT1	23.0	2.0	19.0	23.0	23.0
NR	N30	ANT2	23.5	2.0	20.0	23.5	23.5
NR	N38	ANT2	23.0	2.0	14.0	18.0	23.0
NR	N41 PC2	ANT2	26.0	2.0	15.5	19.5	23.5
NR	N41 PC3	ANT2	24.0	2.0	15.5	19.5	23.5
NR	N48	ANT3	22.0	2.0	18.5	22.0	22.0
NR	N66	ANT2	23.0	2.0	16.5	21.5	21.5
NR	N70	ANT5	22.0	2.0	22.0	22.0	22.0
NR	N71	ANT1	23.0	2.0	21.5	23.0	23.0
NR	N77_3450-3550 PC2	ANT3	25.0	2.0	18.5	22.0	22.0
NR	N77_3450-3550 PC3	ANT3	23.0	2.0	18.5	22.0	22.0
NR	N77_3700-3980 PC2	ANT3	25.0	2.0	19.0	22.5	22.5
NR	N77_3700-3980 PC3	ANT3	23.0	2.0	19.0	22.5	22.5
NR	N78_3450-3550 PC2	ANT3	25.0	2.0	18.0	21.5	21.5
NR	N78_3450-3550 PC3	ANT3	23.0	2.0	18.0	21.5	21.5
NR	N78_3700-3800 PC2	ANT3	26.0	2.0	18.5	21.0	21.0
NR	N78_3700-3800 PC3	ANT3	24.0	2.0	18.5	21.0	21.0
NR	N77_3450-3550 PC2	ANT7	26.0	2.0	18.0	21.0	21.0
NR	N77_3450-3550 PC3	ANT7	24.0	2.0	18.0	21.0	21.0
NR	N77_3700-3980 PC2	ANT7	25.0	2.0	22.0	23.5	23.5
NR	N77_3700-3980 PC3	ANT7	23.0	2.0	22.0	23.0	23.0
NR	N78_3450-3550 PC2	ANT7	26.0	2.0	19.0	21.5	21.5
NR	N78_3450-3550 PC3	ANT7	24.0	2.0	19.0	21.5	21.5
NR	N78_3700-3800 PC2	ANT7	26.0	2.0	21.0	23.0	23.0
NR	N78_3700-3800 PC3	ANT7	24.0	2.0	21.0	23.0	23.0

Note:
1) *Pmax is used for RF tune up procedure. The maximum allowed output power is equal to Pmax + Total uncertainty.
2) The max allowed output power is the Plimit + Total uncertainty, and if Plimit is higher than Pmax, the device output power will be Pmax instead.
3) Note that WLAN operations are not enabled with Smart Transmit.

The purpose of this report (Part 1 test) is to demonstrate that the EUT meets FCC SAR limits when transmitting in static transmission scenario at maximum allowable time-averaged power levels.

1.4.3 Power reduction specification

This device uses a single fixed level of power reduction through static table look-up for SAR compliance and it is triggered by a single event or operation:

1) This device uses the receiver to indicate whether the user is making a voice call in head scenario or not. The selection between head and body power levels is based on the receiver detection mechanism. A fixed level power reduction is applied for some frequency bands when the audio receiver is on.

2) A fixed level power reduction is applied for some frequency bands when simultaneously transmitting with the other antennas in certain simultaneous transmission conditions.

3) The proximity sensor is used to indicate when the device is held close to a user's body exposure condition. It utilizes the proximity sensor to reduce the output power in specific wireless and operating modes of main antenna to ensure SAR compliance (Refer to section 5.4 for detailed proximity Sensor information and validation data per KDB 616217).

The detailed power reduction information can be referred to Appendix E Conducted RF Output Power.

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国・广东・深圳市南山区科技园中区M-10栋1号厂房 邮编:518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

1.5 Test Specification

Identity	Document Title
FCC 47CFR §2.1093	Radio frequency Radiation Exposure Evaluation: Portable Devices
ANSI/IEEE C95.1-1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.
IEEE 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
IEC/IEEE 62209-1528:2020	Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Part 1528: Human models, instrumentation, and procedures(Frequency range of 4 MHz to 10 GHz)
IEC/IEEE 63195-1:2022	Assessment of power density of human exposure to radio frequency fields from wireless devices in close proximity to the head and body (frequency range of 6 GHz to 300 GHz) – Part 1: Measurement procedure
KDB 941225 D01	3G SAR Measurement Procedures v03r01
KDB 941225 D05	SAR for LTE Devices v02r05
KDB 941225 D05A	LTE Rel.10 KDB Inquiry Sheet v01r02
KDB 941225 D06	Hotspot Mode SAR v02r01
KDB 248227 D01	SAR Guidance for IEEE 802 11 Wi-Fi SAR v02r02
KDB 648474 D04	Handset SAR v01r03
KDB 447498 D04	Interim General RF Exposure Guidance v01
KDB 865664 D01	SAR Measurement 100 MHz to 6 GHz v01r04
KDB 865664 D02	RF Exposure Reporting v01r02
KDB 690783 D01	SAR Listings on Grants v01r03
KDB 616217 D04	SAR for laptop and tablets v01r02

1.6 RF exposure limits for SAR

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR* (Brain*Trunk)	1.60 mW/g	8.00 mW/g
Spatial Average SAR** (Whole Body)	0.08 mW/g	0.40 mW/g
Spatial Peak SAR*** (Hands/Feet/Ankle/Wrist)	4.00 mW/g	20.00 mW/g

Notes:

* The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time

** The Spatial Average value of the SAR averaged over the whole body.

*** The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation.)

1.7 RF exposure limits for above 6GHz

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Peak Spatially Averaged Power Density was evaluated over a circular area of 4cm2 per interim FCC Guidance for near-field power density evaluations per October 2018 TCB Workshop notes

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f2)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

Note: 1.0 mW/cm^2 is equal to 10 W/m^2

2 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

Table 2： The Ambient Conditions

3 Measurements System Configuraion

3.1 The SAR Measurement System

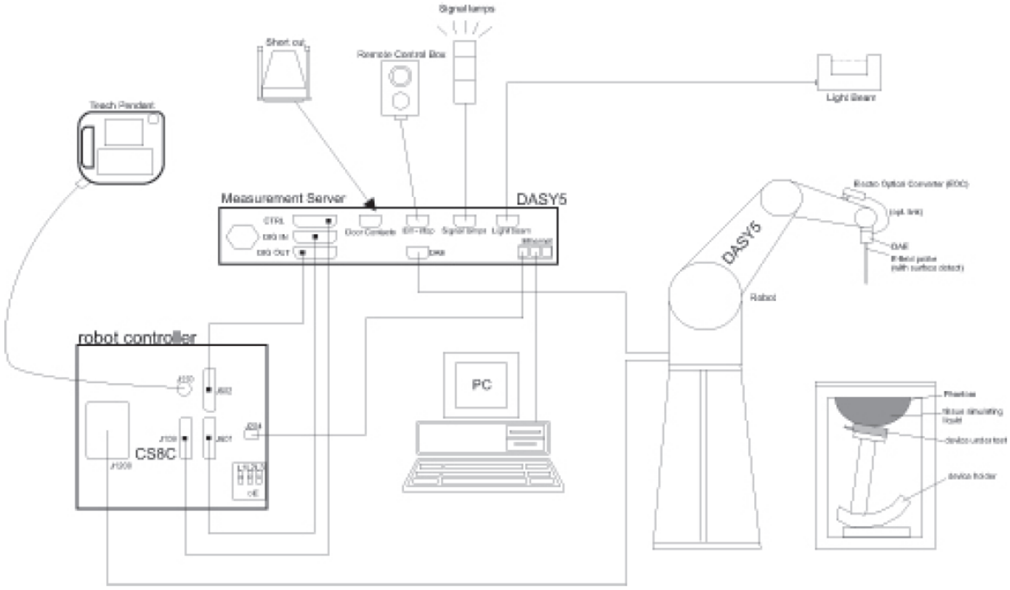
This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY professional system). A E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ (|Ei|2)/ ρ where σ and ρ are the conductivity and mass density of the tissue-Simulate.

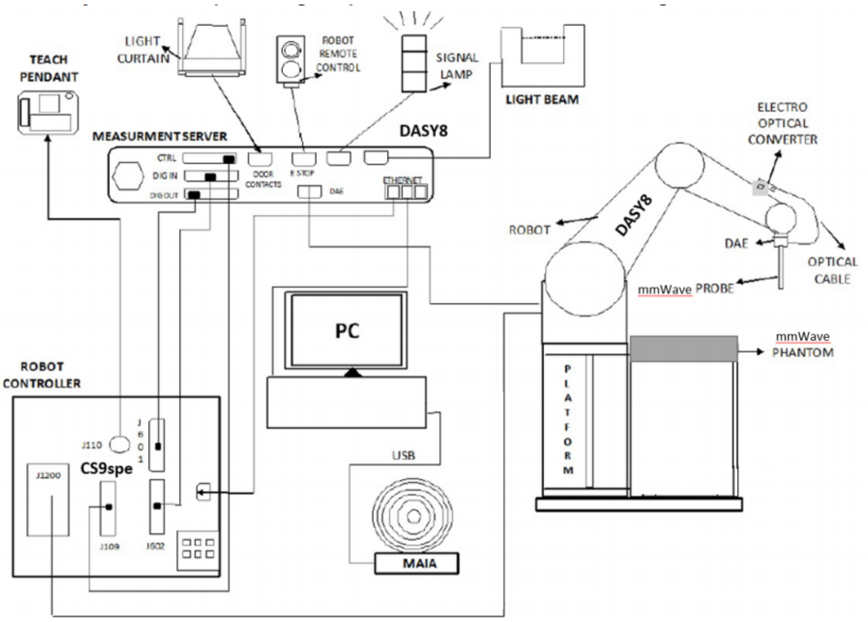
The DASY system for performing compliance tests consists of the following items:
A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software. An arm extension for accommodation the data acquisition electronics (DAE).

A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.





F-1. SAR Measurement System Configuration

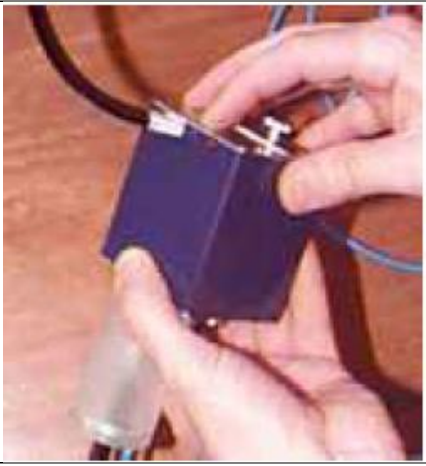
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows system.
- DASY software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand, right-hand and Body Worn usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validating the proper functioning of the system.

3.2 Isotropic E-field Proble EX3DV4

	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 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
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

3.3 Data Acquisition Electronics (DAE)

Model	DAE
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY4/5 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 f A
Dimensions	60 x 60 x 68 mm



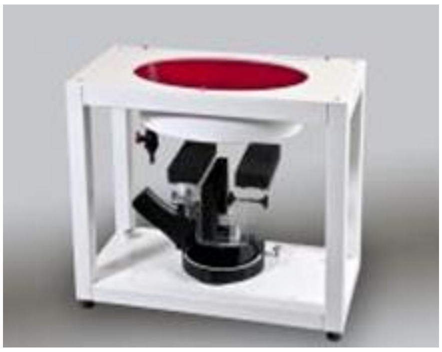
3.4 SAM Twin Phantom

Material	Vinylester, glass fiber reinforced (VE-GF)
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)
Dimensions (incl. Wooden Support)	Length: 1000 mm Width: 500 mm Height: adjustable feet
Filling Volume	pprox.. 25 liters
Wooden Support	SPEAG standard phantom table

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 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.
Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0, but has reinforced top structure.

3.5 ELI Phantom

Material	Vinylester, glass fiber reinforced (VE-GF)
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
Shell Thickness	2.0 ± 0.2 mm(bottom plate)
Dimensions	Major axis: 600 mm Minor axis: 400 mm
Filling Volume	pprox.. 30 liters
Wooden Support	SPEAG standard phantom table



Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.
ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4 but has reinforced top structure.

3.6 Device Holder for Transmitters

F-2. Device Holder for Transmitters

- The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centres for both scales are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

- The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity ε=3 and loss tangent δ=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

3.7 SAR Measurement Procedure

3.7.1 Scanning procedure

Step 1: Power reference measurement

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure.

Step 2: Area scan

The SAR distribution at the exposed side of the head was measured at a distance of 4mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm*15mm or 12mm*12mm or 10mm*10mm.Based on the area scan data, the area of the maximum absorption was determined by spline interpolation.

Step 3: Zoom scan

Around this point, a volume of 32mm*32mm*30mm (f≤2GHz), 30mm*30mm*30mm (f for 2-3GHz) and 24mm*24mm*22mm (f for 5-6GHz) was assessed by measuring 5x5x7 points (f≤2GHz), 7x7x7 points (f for 2-3GHz) and 7x7x12 points (f for 5-6GHz). On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

The data at the surface was extrapolated, since the centre of the dipoles is 2.0mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. (This can be variable. Refer to the probe specification).The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The volume was integrated with the trapezoidal algorithm. One thousand points were interpolated to calculate the average. All neighbouring volumes were evaluated until no neighboring volume with a higher average value was found.

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in 62209-1528.

Parameter	DUT transmit frequency being tested	
	$f \leq 3$ GHz	3 GHz < $f \leq 10$ GHz
Maximum distance between the measured points (geometric centre of the sensors) and the inner phantom surface (z_{M1} in Figure 20 in mm)	5 ± 1	δ ln(2)/2 ± 0,5 [a]
Maximum spacing between adjacent measured points in mm (see O.8.3.1)[b]	20, or half of the corresponding zoom scan length, whichever is smaller	60 / f, or half of the corresponding zoom scan length, whichever is smaller
Maximum angle between the probe axis and the phantom surface normal (α in Figure 20)[c]	5° (flat phantom only) 30° (other phantoms)	5° (flat phantom only) 20° (other phantoms)
Tolerance in the probe angle	1°	1°

[a] δ is the penetration depth for a plane-wave incident normally on a planar half-space.

[b] See Clause O.8 on how Δx and Δy may be selected for individual area scan requirements.

[c] The probe angle relative to the phantom surface normal is restricted due to the degradation in the measurement accuracy in fields with steep spatial gradients. The measurement accuracy decreases with increasing probe angle and increasing frequency. This is the reason for the tighter probe angle restriction at frequencies above 3 GHz.

Parameter	DUT transmit frequency being tested	
	$f \leq 3$ GHz	3 GHz < $f \leq 10$ GHz
Maximum distance between the closest measured points and the phantom surface (z_{M1} in Figure 20 and Table 3, in mm)	5	δ ln(2)/2 [a]
Maximum angle between the probe axis and the phantom surface normal (α in Figure 20)	5° (flat phantom only) 30° (other phantoms)	5° (flat phantom only) 20° (other phantoms)
Maximum spacing between measured points in the x- and y-directions (Δx and Δy, in mm)	8	24 / f [b]
For uniform grids: Maximum spacing between measured points in the direction normal to the phantom shell (Δz_1 in Figure 20, in mm)	5	10 / (f − 1)
For graded grids: Maximum spacing between the two closest measured points in the direction normal to the phantom shell (Δz_1 in Figure 20, in mm)	4	12 / f
For graded grids: Maximum incremental increase in the spacing between measured points in the direction normal to the phantom shell ($R_z = \Delta z_2/\Delta z_1$ in Figure 20)	1,5	1,5
Minimum edge length of the zoom scan volume in the x- and y-directions (L_z in O.8.3.2, in mm)	30	22
Minimum edge length of the zoom scan volume in the direction normal to the phantom shell (L_h in O.8.3.2 in mm)	30	22
Tolerance in the probe angle	1°	1°

[a] δ is the penetration depth for a plane-wave incident normally on a planar half-space.

[b] This is the maximum spacing allowed, which might not work for all circumstances.

Step 4: Power reference measurement (drift)

The Power Drift Measurement job measures the field at the same location as the most recent power reference measurement job within the same procedure, and with the same settings. The indicated drift is mainly the variation of the DUT's output power and should vary max. ± 5 %

3.7.2 Data storage

The DASY software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension "DAE". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated. The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [m W/g], [m W/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

3.7.3 Data Evaluation by SEMCAD

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

Probe parameters: - Sensitivity Normi, ai0, ai1, ai2
- Conversion factor ConvFi
- Diode compression point Dcpi
Device parameters: - Frequency f
- Crest factor cf
Media parameters: - Conductivity ε
- Density ρ

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

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

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

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

With Vi = compensated signal of channel I (I = x, y, z)
Ui = input signal of channel I (I = x, y, z)

cf = crest factor of exciting field (DASY parameter)
dcp I = diode compression point (DASY parameter)

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

$$E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$$

H-field probes:

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

With Vi = compensated signal of channel I (I = x, y, z)
Normi = sensor sensitivity of channel I (I = x, y, z)
[mV/(V/m)2] for E-field Probes
ConvF = sensitivity enhancement in solution
aij = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
Ei = electric field strength of channel I in V/m
Hi = magnetic field strength of channel I in A/m

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

$$E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}$$

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

$$SAR = (Etot^2 \cdot \sigma) / (\varepsilon \cdot 1000)$$

with SAR = local specific absorption rate in mW/g
Etot = total field strength in V/m
σ= conductivity in [mho/m] or [Siemens/m]
ε= equivalent tissue density in g/cm3

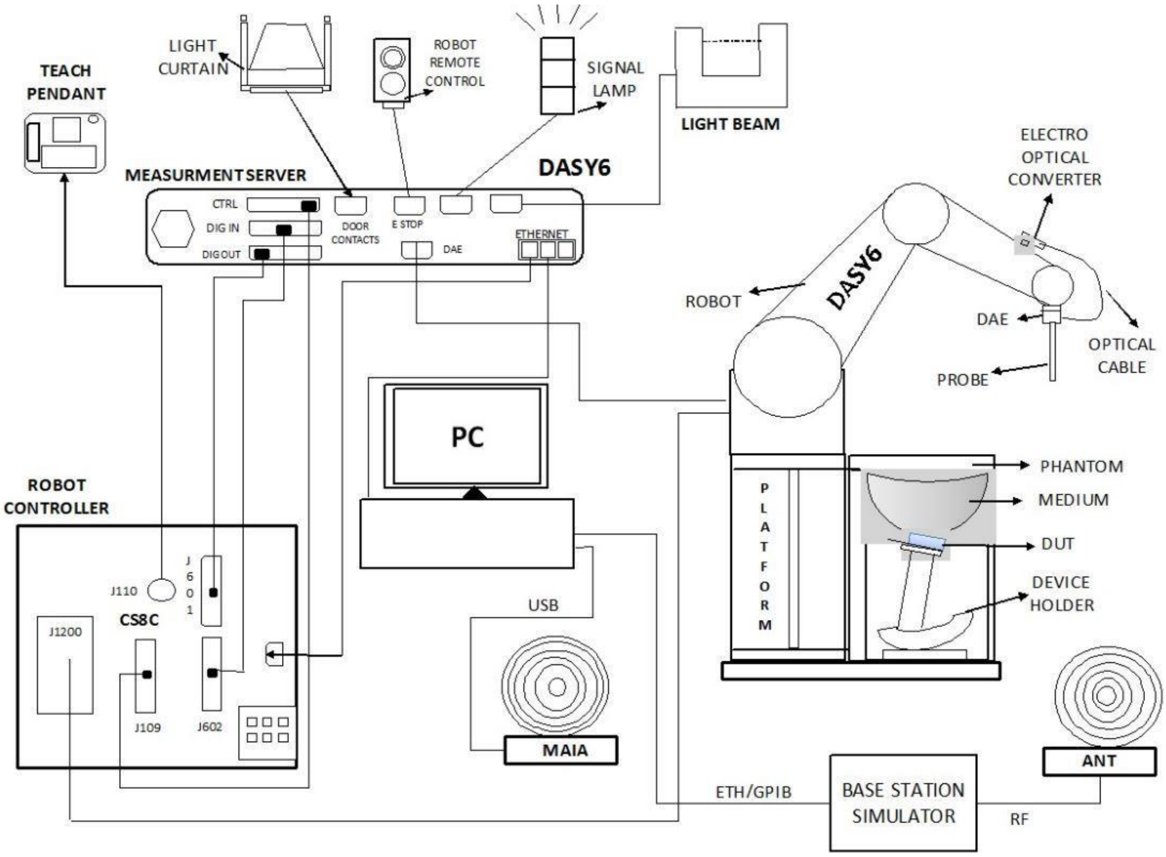
Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

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

with Ppwe = equivalent power density of a plane wave in mW/cm2
Etot = total electric field strength in V/m
Htot = total magnetic field strength in A/m

3.8 Power density measurement system

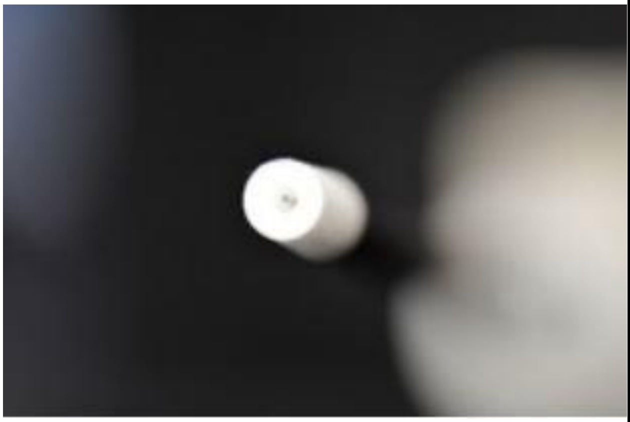
Power density measurements for mmWave frequencies were performed using SPEAG DASY6 with cDASY6 5G module. The DASY6 included a high precision robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the 5G phantom cover.

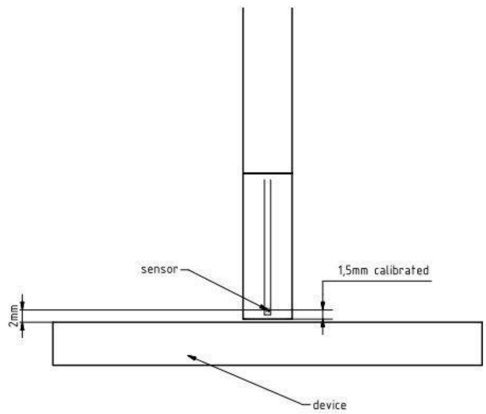


Measurement System Configuration

3.9 EUmmWaVe probe

Frequency	750 MHz – 110 GHz
Probe Overall Length	320 mm
Probe Body Diameter	8.0 mm
Tip Length	23.0 mm
Tip Diameter	8.0 mm
Probe's two dipoles length	0.9 mm – Diode loaded
Dynamic Range	< 20 V/m - 10000 V/m with PRE-10 (min < 50 V/m - 3000 V/m)
Position Precision	< 0.2 mm
Distance between diode sensors and probe's tip	1.5 mm
Minimum Mechanical separation between probe tip and a Surface	0.5 mm
Applications	E-field measurements of 5G devices and other mm-wave transmitters operating above 10GHz in < 2 mm distance from device (free-space) Power density, H-field and far-field analysis using total field reconstruction.
Compatibility	cDASY6 + 5G-Module SW1.0 and higher





The EUmmWaVe probe is based on the pseudo-vector probe design, which not only measures the field magnitude but also derives its polarization ellipse. The design entails two small 0.8mm dipole sensors mechanically protected by high-density foam, printed on both sides of a 0.9mm wide and 0.12mm thick glass substrate. The body of the probe is specifically constructed to minimize distortion by the scattered fields. The probe consists of two sensors with different angles (1 and 2) arranged in the same plane in the probe axis. Three or more measurements of the two sensors are taken for different probe rotational angles to derive the amplitude and polarization information. The probe design allows measurements at distances as small as 2mm from the sensors to the surface of the device under test (DUT). The typical sensor to probe tip distance is 1.5 mm. The exact distance is calibrated.

4 Measurement variability and uncertainty

4.1 SAR measurement variability

Per KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

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

4.2 SAR measurement uncertainty

Measurements and results are all in compliance with the standards listed. All measurements and results are recorded and maintained at the laboratory performing the tests and measurement uncertainties are taken into account when comparing measurements to pass/ fail criteria. The expanded uncertainty (95% CONFIDENCE INTERVAL) is **28.50%**.

IEC/IEEE 62209-1528:2020 Input quantity X_i (source of uncertainty)	**Unc. (±)**	**Prob. Dist. PDF_i**	**Unc. $a(x_i)$**	**c_i (1g)**	**c_i (10g)**	**u_i (1g) (%)**	**u_i (10g) (%)**
Probe calibration	18.6	N (k = 2)	2	1	1	9.3	9.3
Probe calibration drift	1.7	R	√3	1	1	1.0	1.0
Probe linearity and detection limit	0.6	R	√3	1	1	0.3	0.3
Broadband signal	0.5	R	√3	1	1	0.3	0.3
Probe isotropy	2.6	R	√3	1	1	1.5	1.5
Other probe and data acquisition errors	0.6	N	1	1	1	0.6	0.6
RF ambient and noise	3.0	R	√3	1	1	1.7	1.7
Probe positioning errors	0.5	N	1	0.33	0.33	0.2	0.2
Data processing errors	4.0	R	√3	1	1	2.3	2.3
Measurement of phantom conductivity(σ)	2.5	N	1	0.78	0.71	2.0	1.8
Temperature effects (medium)	2.7	R	√3	0.78	0.71	1.2	1.1
Shell permittivity	14.0	R	√3	0.5	0.5	4.0	4.0
Distance between the radiating element of the DUT and the phantom medium	2.0	N	1	2	2	4.0	4.0
Repeatability of positioning the DUT or source against the phantom	2.9	N	1	1	1	2.9	2.9
Device holder effects	3.6	N	1	1	1	3.6	3.6
Effect of operating mode on probe sensitivity	2.4	R	√3	1	1	1.4	1.4
Time-average SAR	0.0	R	√3	1	1	0.0	0.0
Variation in SAR due to drift in output of DUT	2.5	N	1	1	1	2.5	2.5
Validation antenna uncertainty (validation measurement only)	0.0	N	1	1	1	0.0	0.0
Uncertainty in accepted power (validation measurement only)	0.0	N	1	1	1	0.0	0.0
Phantom deviation from target (ε',σ)	1.9	N	1	1	0.84	1.9	1.6
SAR scaling	0.0	R	√3	1	1	0.0	0.0
Combined uncertainty	\					14.25	14.15
Expanded uncertainty and effective degrees of freedom （k = 2）	\					28.50	28.30

Table 3： Measurement Uncertainty

4.3 PD measurement uncertainty

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

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

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

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience and knowle dge of the behavior and properties of relevant materials and instruments, manufacture's specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtai ned from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangu lar distributions indicated in t able below.

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi plying Factor(a)	1/k(b)	1/√3	1/√6	1/√2

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

(b) κ is the coverage factor

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

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

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined s
The judgment of conformity in thereport is based on the measurement results excluding the measurement uncertainty.

a	b	c	d	e	f=b*e/d	g
Error Description	**Uncertainty Value (±dB)**	**Probability**	**Div.**	**Ci**	**Standard Uncertainty (±dB)**	**Vi (Veff)**
Probe Calibration	0.49	N	1	1	0.49	∞
Probe correction	0.00	R	1.732	1	0.00	∞
Frequency response (BW ≤1 GHz)	0.20	R	1.732	1	0.12	∞
Sensor cross coupling	0.00	R	1.732	1	0.00	∞
Isotropy	0.50	R	1.732	1	0.29	∞
Linearity	0.20	R	1.732	1	0.12	∞
Probe scattering	0.00	R	1.732	1	0.00	∞
Probe positioning offset	0.30	R	1.732	1	0.17	∞
Probe positioning repeatability	0.04	R	1.732	1	0.02	∞
Sensor mechanical offset	0.00	R	1.732	1	0.00	∞
Probe spatial resolution	0.00	R	1.732	1	0.00	∞
Field impedance dependance	0.00	R	1.732	1	0.00	∞
Amplitude and phase drift	0.00	R	1.732	1	0.00	∞
Amplitude and phase noise	0.04	R	1.732	1	0.02	∞
Measurement area truncation	0.00	R	1.732	1	0.00	∞
Data acquisition	0.03	N	1	1	0.03	∞
Sampling	0.00	R	1.732	1	0.00	∞
Field reconstruction	2.00	R	1.732	1	1.15	∞
Forward transformation	0.00	R	1.732	1	0.00	∞
Power density scaling	0.00	R	1.732	1	0.00	∞
Spatial averaging	0.10	R	1.732	1	0.06	∞
System detection limit	0.04	R	1.732	1	0.02	∞
Probe coupling with DUT	0.00	R	1.732	1	0.00	∞
Modulation response	0.40	R	1.732	1	0.23	∞
Integration time	0.00	R	1.732	1	0.00	∞
Response time	0.00	R	1.732	1	0.00	∞
Device holder influence	0.10	R	1.732	1	0.06	∞
DUT alignment	0.00	R	1.732	1	0.00	∞
RF ambient conditions	0.04	R	1.732	1	0.02	∞
Ambient reflections	0.04	R	1.732	1	0.02	∞
Immunity / secondary reception	0.00	R	1.732	1	0.00	∞
Drift of the DUT		R	1.732	1	0.00	∞
Combined Std. Uncertainty					1.33	
Expanded STD Uncertainty (95%)，K=2					2.67	

5 Desciption of Test Position

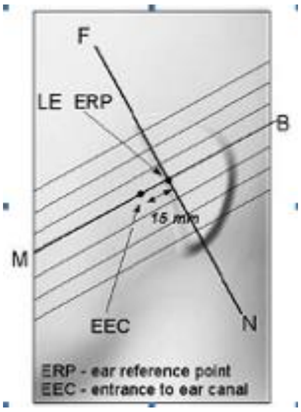
5.1 The Head Test Position

5.1.1 SAM Phantom Shape

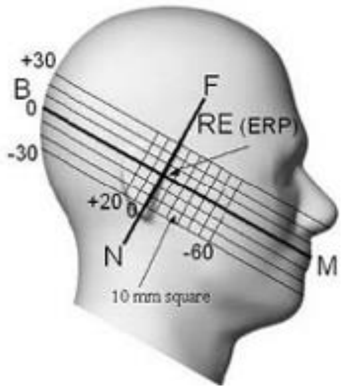
F-3. Front, back, and side views of SAM (model for the phantom shell). Full-head model is for illustration purposes only-procedures in this recommended practice are intended primarily for the phantom setup.

Note: The centre strip including the nose region has a different thickness tolerance.

F-4. Sagittally bisected phantom with extended perimeter (shown placed on its side as used for SAR measurements)

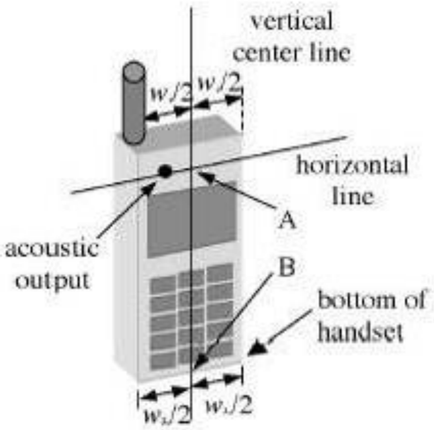


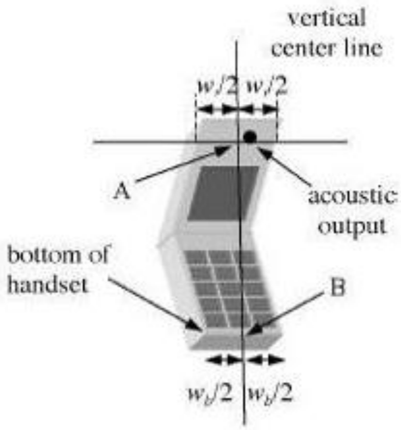
F-5. Close-up side view of phantom, showing the ear region, N-F and B-M lines, and seven cross-sectional plane locations



F-6.Side view of the phantom showing relevant markings and seven cross-sectional plane locations

5.1.2 EUT constructions





F-7. Handset vertical and horizontal reference lines- “fixed case”

F-8.Handset vertical and horizontal reference lines- “clam-shell case”

5.1.3 Definition of the “check” position

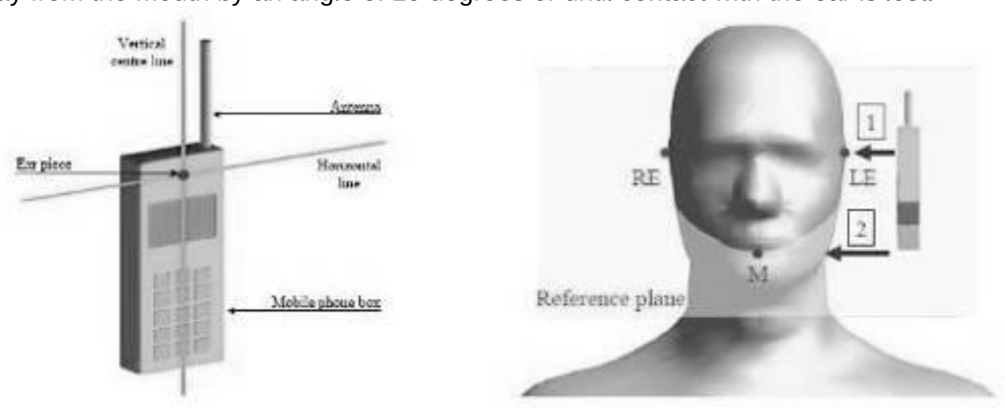
a) Position the device with the vertical centre line of the body of the device and the horizontal line crossing the centre of the ear piece in a plane parallel to the sagittal plane of the phantom (“initial position”). While maintaining the device in this plane, align the vertical centre line with the reference plane containing the three ear and mouth reference points (M, RE and LE) and align the centre of the ear piece with the line RE-LE.

b) Translate the mobile phone box towards the phantom with the ear piece aligned with the line LE-RE until telephone touches the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the box until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost.

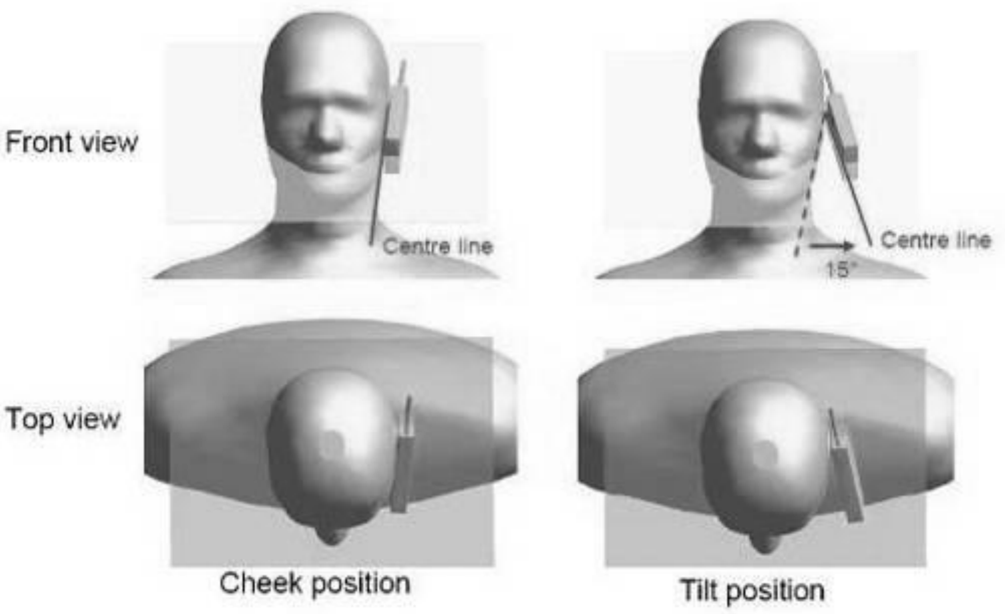
5.1.4 Definition of the “tilted” position

a) Position the device in the “cheek” position described above.

b) While maintaining the device in the reference plane described above and pivoting against the ear, move it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost.



F-9.Definition of the reference lines and points, on the phone and on the phantom and initial position



F-10. “Cheek” and “tilt” positions of the mobile phone on the left side

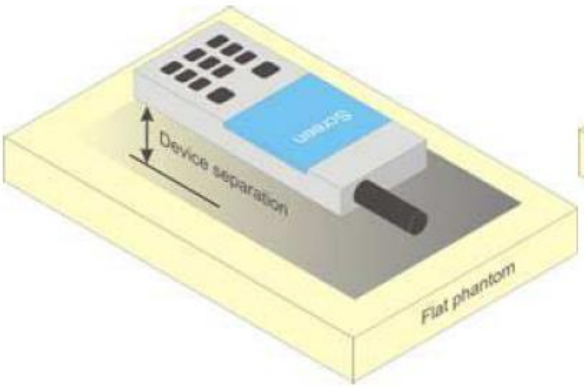
5.2 The Body Test Position

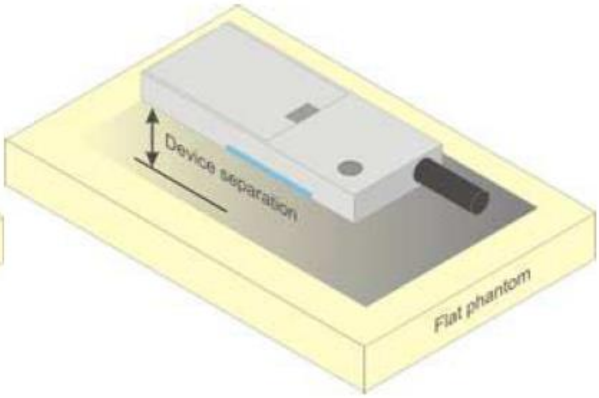
5.2.1 Body-worn accessory exposure conditions

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations.
Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. Per FCC KDB Publication 648474 D04, 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 FCC KDB Publication 447498 D04 should be 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 applicable. 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.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented. Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.





F-11.Test positions for body-worn devices

5.2.2 Wireless Router exposure conditions

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC 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 2.5 cm of their edges, determined from general mixed-use conditions for this type of devices. For devices with form factors smaller than 9 cm x 5 cm, a test separation distance of 5 mm is required.

5.3 Extremity exposure conditions

Per FCC KDB 648474D04, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, the device is marketed as “Phablet”.
The UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge, in direct contact with a flat phantom, for Product Specific 10-g SAR according to the body-equivalent tissue dielectric parameters in KDB 865664 to address interactive hand use exposure conditions. The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, Product Specific 10-g SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg; however, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold.

Due to the SAR result, only the following frequency bands need to test with 0mm for the Product Specific 10-g SAR, the others are not required.

LTE Band 7 SAR Test Record												
Ant 2 Test Record												
Test position	BW.	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Product Specific 10-g SAR Exclusion
Body worn&Hotspot Test data (Separate 10mm 1RB) Sensor on DSI1												
Front side	20	QPSK 1_50	21350/2560	1:1	0.428	0.198	-0.17	21.51	24.50	1.991	0.852	Yes
Back side	20	QPSK 1_50	21350/2560	1:1	0.352	0.168	0.04	21.51	24.50	1.991	0.701	Yes
Left side	20	QPSK 1_50	21350/2560	1:1	0.686	0.303	0.07	21.51	24.50	1.991	**1.366**	No
Top side	20	QPSK 1_50	21350/2560	1:1	0.075	0.038	0.16	21.51	24.50	1.991	0.149	Yes
Left side	20	QPSK 1_0	20850/2510	1:1	0.523	0.248	-0.14	21.46	24.50	2.014	1.053	Yes
Left side	20	QPSK 1_50	21100/2535	1:1	0.529	0.225	0.04	21.44	24.50	2.023	1.070	Yes
Body worn&Hotspot Test data (Separate 10mm 50%RB) Sensor on DSI1												
Front side	20	QPSK 50_25	21350/2560	1:1	0.415	0.189	-0.11	21.72	24.50	1.897	0.787	Yes
Back side	20	QPSK 50_25	21350/2560	1:1	0.375	0.173	-0.06	21.72	24.50	1.897	0.711	Yes
Left side	20	QPSK 50_25	21350/2560	1:1	0.688	0.296	0.15	21.72	24.50	1.897	1.305	No
Top side	20	QPSK 50_25	21350/2560	1:1	0.073	0.036	0.10	21.72	24.50	1.897	0.138	Yes
Left side	20	QPSK 50_50	20850/2510	1:1	0.435	0.188	0.05	21.55	24.50	1.972	0.858	Yes
Left side	20	QPSK 50_25	21100/2535	1:1	0.544	0.236	-0.06	21.52	24.50	1.986	1.080	Yes
Body worn&Hotspot Test data (Separate 10mm 100%RB) Sensor on DSI1												
Left side	20	QPSK 100_0	21350/2560	1:1	0.687	0.297	-0.16	21.63	24.50	1.936	1.330	No

LTE Band 25 SAR Test Record												
Ant 5 Test Record												
Test position	BW.	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Product Specific 10-g SAR Exclusion
Body worn&Hotspot Test data (Separate 10mm 1RB) Sensor on DSI1												
Front side	20	QPSK 1_0	26590/1905	1:1	0.441	0.266	0.00	22.79	25.00	1.750	0.772	Yes
Back side	20	QPSK 1_0	26590/1905	1:1	0.650	0.374	-0.19	22.79	25.00	1.750	1.138	Yes
Left side	20	QPSK 1_0	26590/1905	1:1	0.688	0.381	-0.13	22.79	25.00	1.750	**1.204**	No
Bottom side	20	QPSK 1_0	26590/1905	1:1	0.177	0.100	0.19	22.79	25.00	1.750	0.310	Yes
Body worn&Hotspot Test data (Separate 10mm 50%RB) Sensor on DSI1												
Front side	20	QPSK 50_25	26590/1905	1:1	0.486	0.286	0.02	22.92	25.00	1.614	0.785	Yes
Back side	20	QPSK 50_25	26590/1905	1:1	0.654	0.374	0.16	22.92	25.00	1.614	1.056	Yes
Left side	20	QPSK 50_25	26590/1905	1:1	0.682	0.385	-0.19	22.92	25.00	1.614	1.101	Yes
Bottom side	20	QPSK 50_25	26590/1905	1:1	0.174	0.098	0.06	22.92	25.00	1.614	0.281	Yes

LTE Band 38 SAR Test Record												
Ant 2 Test Record												
Test position	BW.	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Product Specific 10-g SAR Exclusion
Body worn&Hotspot Test data (Separate 10mm 1RB) Sensor on DSI1												
Front side	20	QPSK 1_50	38150/2610	1:1.58	0.324	0.145	-0.17	21.26	25.00	2.366	0.767	Yes
Back side	20	QPSK 1_50	38150/2610	1:1.58	0.348	0.159	0.09	21.26	25.00	2.366	0.823	Yes
Left side	20	QPSK 1_50	38150/2610	1:1.58	0.575	0.252	0.11	21.26	25.00	2.366	**1.360**	No
Top side	20	QPSK 1_50	38150/2610	1:1.58	0.046	0.025	0.05	21.26	25.00	2.366	0.109	Yes
Body worn&Hotspot Test data (Separate 10mm 50%RB) Sensor on DSI1												
Front side	20	QPSK 50_25	38000/2595	1:1.58	0.272	0.127	0.10	21.34	25.00	2.323	0.632	Yes
Back side	20	QPSK 50_25	38000/2595	1:1.58	0.316	0.146	-0.01	21.34	25.00	2.323	0.734	Yes
Left side	20	QPSK 50_25	38000/2595	1:1.58	0.585	0.254	0.18	21.34	25.00	2.323	1.359	No
Top side	20	QPSK 50_25	38000/2595	1:1.58	0.045	0.025	0.13	21.34	25.00	2.323	0.105	Yes

LTE Band 41 SAR Test Record												
Ant 2 Test Record												
Test position	BW.	Test mode	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Product Specific 10-g SAR Exclusion
Body worn&Hotspot Test data (Separate 10mm 1RB) Sensor on DSI1												
Front side	20	QPSK 1_50	41490/2680	1:1.58	0.158	0.072	-0.02	20.51	25.00	2.812	0.444	Yes
Back side	20	QPSK 1_50	41490/2680	1:1.58	0.287	0.133	-0.15	20.51	25.00	2.812	0.807	Yes
Left side	20	QPSK 1_50	41490/2680	1:1.58	0.593	0.259	-0.02	20.51	25.00	2.812	**1.667**	No
Top side	20	QPSK 1_50	41490/2680	1:1.58	0.037	0.021	0.00	20.51	25.00	2.812	0.104	Yes
Left side	20	QPSK 1_99	39750/2506	1:1.58	0.229	0.099	-0.09	20.27	25.00	2.972	0.681	Yes
Left side	20	QPSK 1_50	40185/2549.5	1:1.58	0.321	0.137	-0.12	20.28	25.00	2.965	0.952	Yes
Left side	20	QPSK 1_50	40620/2593	1:1.58	0.486	0.208	0.17	20.49	25.00	2.825	1.373	No
Left side	20	QPSK 1_99	41055/2636.5	1:1.58	0.317	0.140	0.14	20.44	25.00	2.858	0.906	Yes
Body worn&Hotspot Test data (Separate 10mm 50%RB) Sensor on DSI1												
Front side	20	QPSK 50_25	41490/2680	1:1.58	0.163	0.075	-0.18	20.49	25.00	2.825	0.460	Yes
Back side	20	QPSK 50_25	41490/2680	1:1.58	0.280	0.131	0.17	20.49	25.00	2.825	0.791	Yes
Left side	20	QPSK 50_25	41490/2680	1:1.58	0.565	0.244	-0.03	20.49	25.00	2.825	1.596	No
Top side	20	QPSK 50_25	41490/2680	1:1.58	0.042	0.022	-0.11	20.49	25.00	2.825	0.119	Yes
Left side	20	QPSK 50_50	39750/2506	1:1.58	0.221	0.095	0.12	20.30	25.00	2.951	0.652	Yes
Left side	20	QPSK 50_50	40185/2549.5	1:1.58	0.337	0.144	0.06	20.28	25.00	2.965	0.999	Yes
Left side	20	QPSK 50_0	40620/2593	1:1.58	0.473	0.201	0.02	20.47	25.00	2.838	1.342	No
Left side	20	QPSK 50_0	41055/2636.5	1:1.58	0.575	0.255	-0.12	20.44	25.00	2.858	1.643	No

SA N7 SAR Test Record												
Ant2 Test Record												
Test position	BW.	Modulation	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Product Specific 10-g SAR Exclusion
Body worn&Hotspot Test data (Separate 10mm 1RB) Sensor on DSI1												
Front side	20	QPSK 1_104	507000/2535	100%	0.379	0.173	-0.10	20.85	25.00	2.600	0.985	Yes
Back side	20	QPSK 1_104	507000/2535	100%	0.354	0.170	-0.06	20.85	25.00	2.600	0.920	Yes
Left side	20	QPSK 1_104	507000/2535	100%	0.466	0.213	-0.03	20.85	25.00	2.600	**1.212**	No
Top side	20	QPSK 1_104	507000/2535	100%	0.076	0.038	0.14	20.85	25.00	2.600	0.198	Yes
Body worn&Hotspot Test data (Separate 10mm 50%RB) Sensor on DSI1												
Front side	20	QPSK 50_28	502000/2510	100%	0.267	0.127	0.03	20.95	25.00	2.541	0.678	Yes
Back side	20	QPSK 50_28	502000/2510	100%	0.273	0.128	0.15	20.95	25.00	2.541	0.694	Yes
Left side	20	QPSK 50_28	502000/2510	100%	0.447	0.191	0.02	20.95	25.00	2.541	1.136	Yes
Top side	20	QPSK 50_28	502000/2510	100%	0.090	0.046	0.01	20.95	25.00	2.541	0.229	Yes

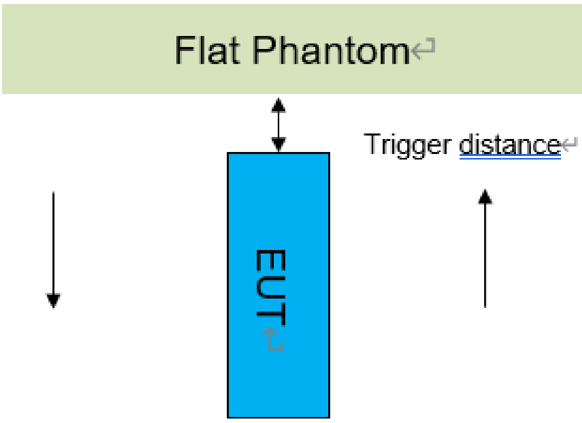
SA N41 SAR Test Record												
Ant2 Test Record												
Test position	BW.	Modulation	Test ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	SAR (W/kg) 10-g	Power drift (dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Product Specific 10-g SAR Exclusion
Body worn&Hotspot Test data (Separate 10mm 1RB) Sensor on DSI1												
Front side	100	QPSK 1_271	528000/2640	100%	0.282	0.128	-0.13	20.91	25.50	2.877	0.811	Yes
Back side	100	QPSK 1_271	528000/2640	100%	0.386	0.184	0.00	20.91	25.50	2.877	1.111	Yes
Left side	100	QPSK 1_271	528000/2640	100%	0.605	0.265	-0.08	20.91	25.50	2.877	1.741	No
Top side	100	QPSK 1_271	528000/2640	100%	0.054	0.029	-0.01	20.91	25.50	2.877	0.155	Yes
Left side	100	QPSK 1_271	509202/2546.01	100%	0.576	0.261	-0.07	19.81	25.50	3.707	**2.135**	No
Left side	100	QPSK 1_271	513900/2569.5	100%	0.658	0.288	0.10	20.77	25.50	2.972	1.955	No
Left side	100	QPSK 1_137	518598/2592.99	100%	0.614	0.260	-0.02	20.80	25.50	2.951	1.812	No
Left side	100	QPSK 1_137	523302/2616.51	100%	0.680	0.297	0.04	20.80	25.50	2.951	2.007	No
Body worn&Hotspot Test data (Separate 10mm 50%RB) Sensor on DSI1												
Front side	100	QPSK 135_69	523302/2616.51	100%	0.382	0.177	0.05	20.77	25.50	2.972	1.135	Yes
Back side	100	QPSK 135_69	523302/2616.51	100%	0.398	0.203	0.01	20.77	25.50	2.972	1.183	Yes
Left side	100	QPSK 135_69	523302/2616.51	100%	0.581	0.260	-0.07	20.77	25.50	2.972	1.727	No
Top side	100	QPSK 135_69	523302/2616.51	100%	0.064	0.026	-0.12	20.77	25.50	2.972	0.190	Yes
Left side	100	QPSK 135_69	509202/2546.01	100%	0.519	0.221	-0.08	19.88	25.50	3.648	1.893	No
Left side	100	QPSK 135_69	513900/2569.5	100%	0.500	0.212	-0.01	20.72	25.50	3.006	1.503	No

Left side	100	QPSK 135_69	518598/2592.99	100%	0.599	0.254	-0.12	20.71	25.50	3.013	1.805	No
Left side	100	QPSK 135_69	528000/2640	100%	0.698	0.296	0.15	20.73	25.50	2.999	2.093	No
Body worn&Hotspot Test data (Separate 10mm 100%RB) Sensor on DSI1												
Left side	100	QPSK 270_0	513900/2569.5	100%	0.522	0.221	-0.16	19.73	25.50	3.776	1.971	No

5.4 Proximity Sensor Triggering Test

Proximity sensor triggering distances:

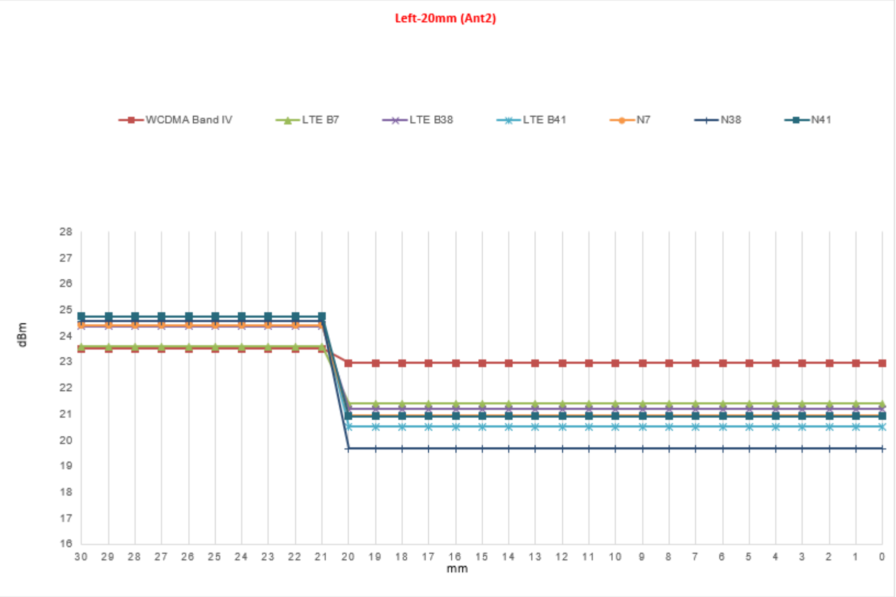
The Proximity sensor triggering was applied to WWAN antenna. Proximity sensor triggering distance testing was performed according to the procedures outlined in KDB 616217 D04 section 6.2, and EUT moving further away from the flat phantom and EUT moving toward the flat phantom were both assessed.

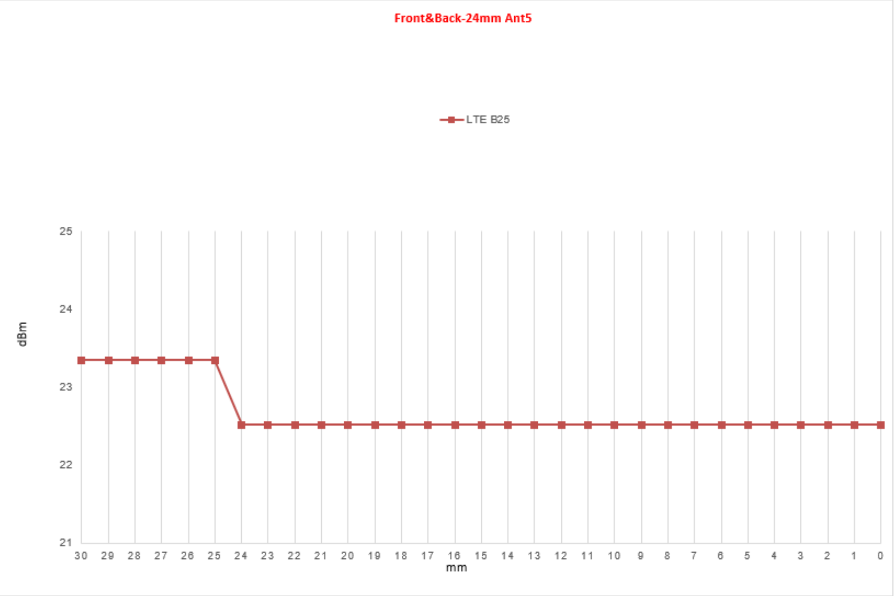


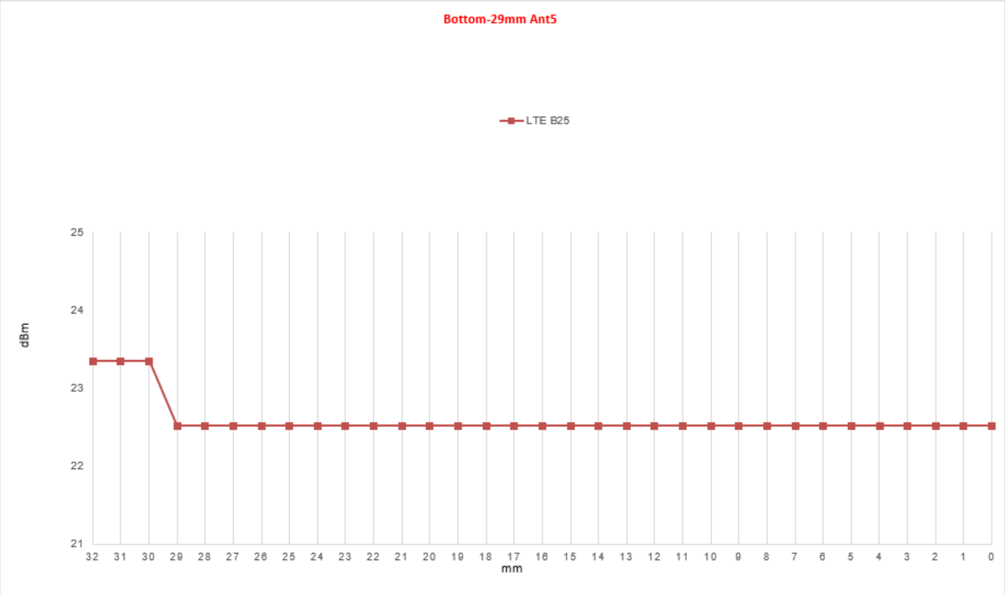
Proximity Sensor Triggering Distance(mm)		
Ant No.	Ant2	Ant5
Band	WCDMA Band IV LTE Band7/B38/B41 NR N7/38/41	LTE Band25
Position	Front Side 16mm Back Side 16mm Left Side 20mm Top Side 11mm	Front Side 24mm Back Side 24mm Left Side 20mm Bottom Side 29mm

Note:
SAR tests with proximity sensor power reduction are only required for the sides of frequency bands in the table above. For the other sides or other frequency bands of the device, SAR is still tested at the maximum power level with sensor off.

- DUT Moving Toward(Trigger)the Phantom

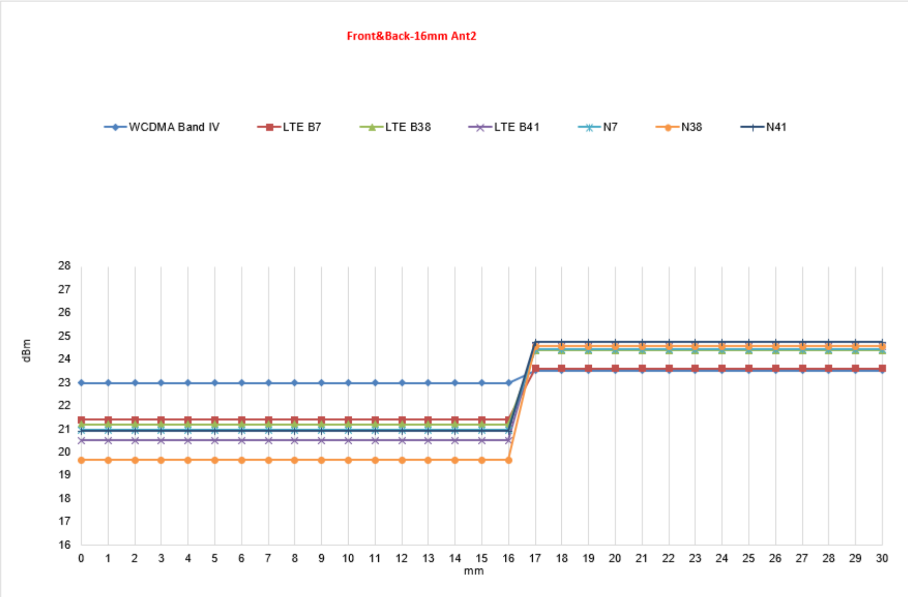

Left-20mm (Ant2)
WCDMA Band IV
LTE B7
LTE B38
LTE B41
N7
N38
N41
dBm
mm

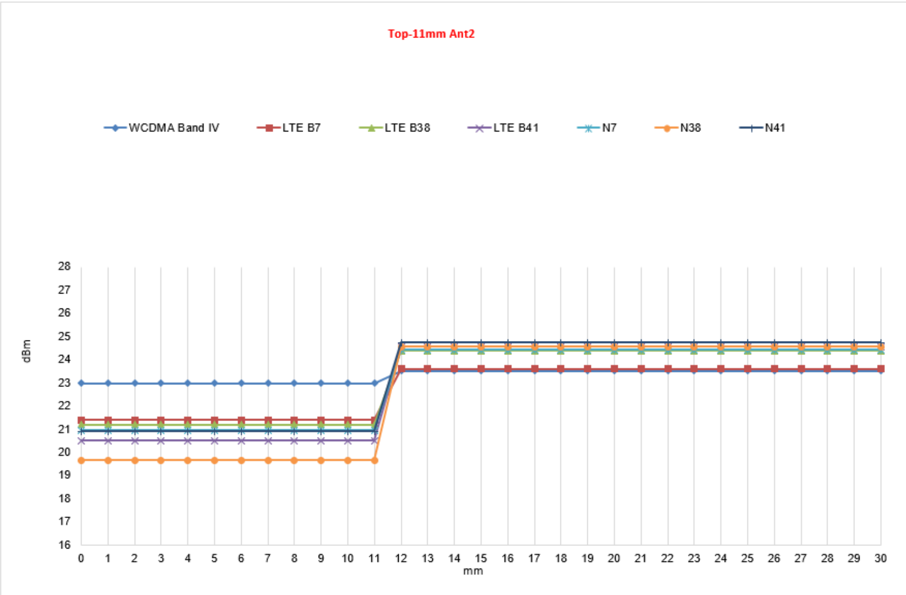

Front&Back-24mm Ant5
LTE B25
dBm
mm


Bottom-29mm Ant5
LTE B25
dBm
mm

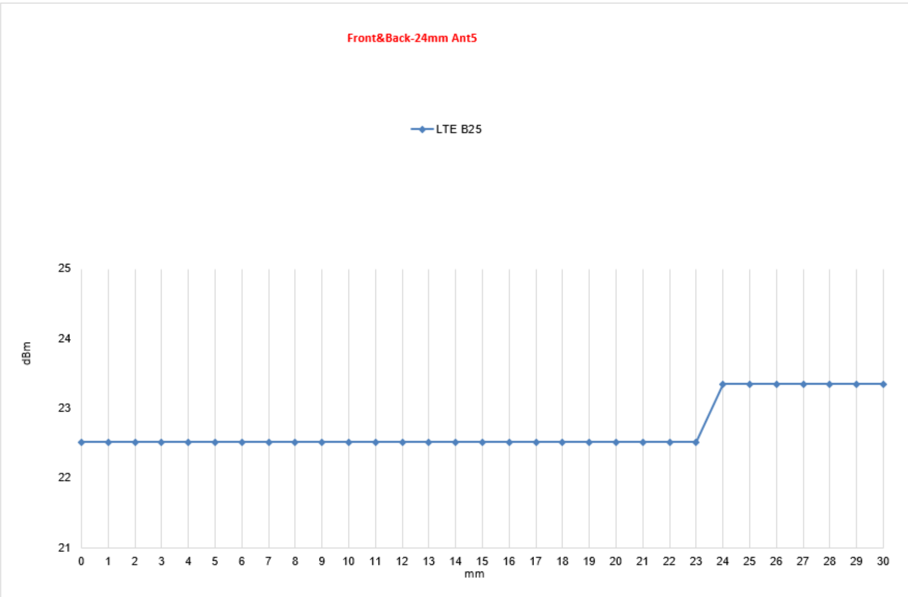

Left-20mm Ant5
LTE B25
dBm
mm

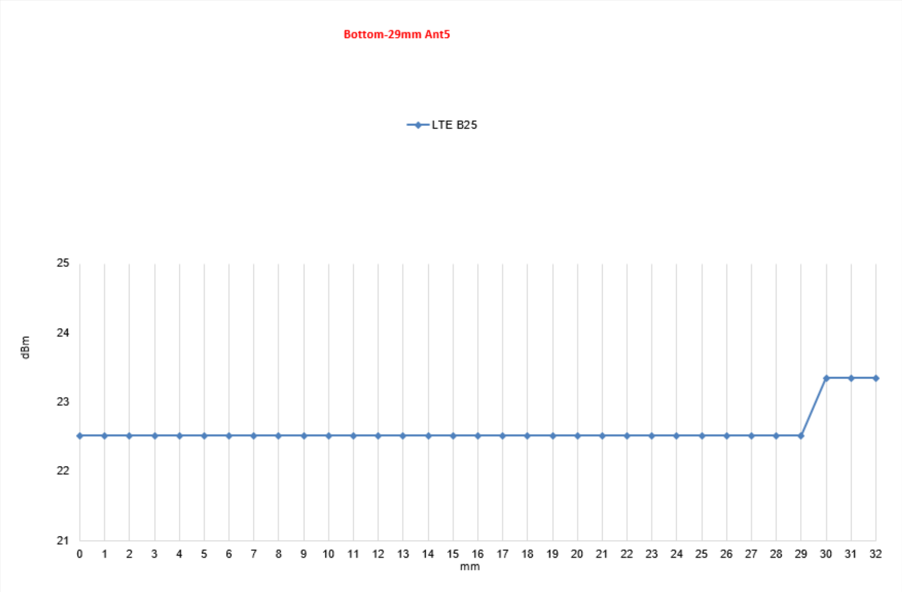
- DUT Moving Away(Release) from the Phantom

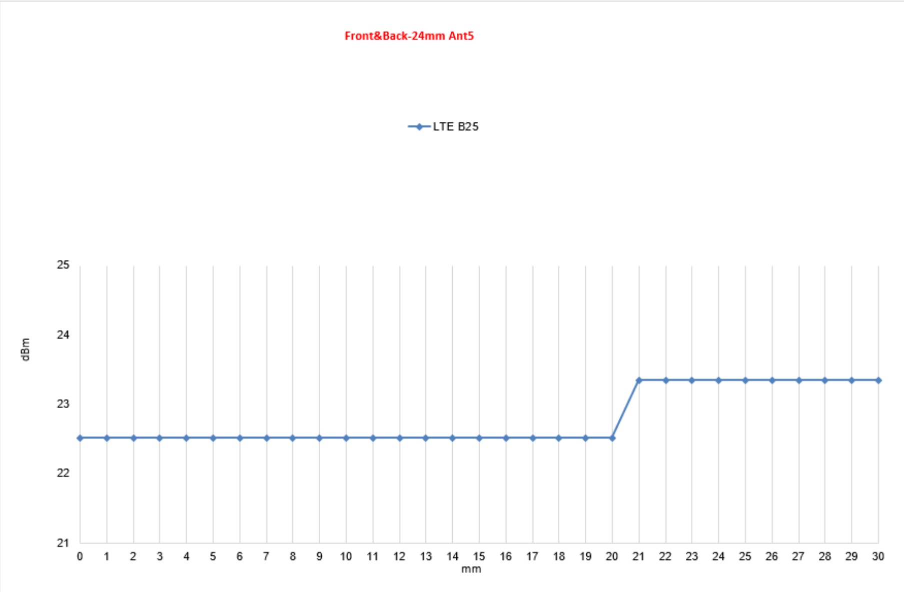





Left-20mm (Ant2)
WCDMA Band IV
LTE B7
LTE B38
LTE B41
N7
N38
N41
dBm
mm


Front&Back-24mm Ant5
LTE B25
dBm
mm





Proximity sensor coverage

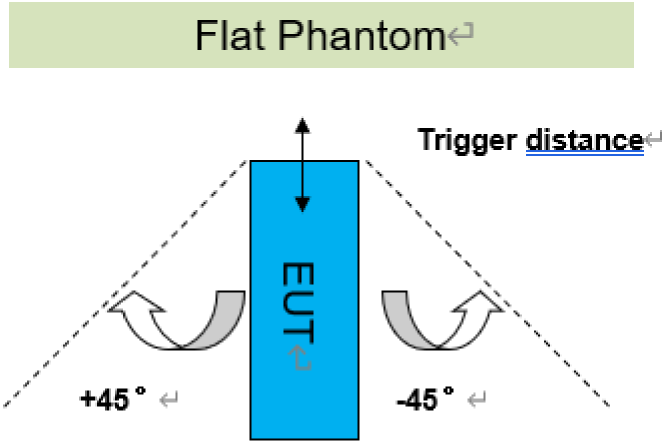
If a sensor is spatially offset from the antenna(s), it is necessary to verify sensor triggering for conditions where the antenna is next to the user, but the sensor is laterally further away to ensure sensor coverage is sufficient for reducing the power to maintain compliance. For p-sensor coverage testing, the device is moved and “along the direction of maximum antenna and sensor offset”.

The proximity sensor and main antenna use same metallic electrode, so there is no spatial offset.

Device tilt angle influences on proximity sensor triggering

The influence of device tilt angles to proximity sensor triggering was determined by positioning each tablet edge that contains a transmitting antenna, perpendicular to the flat phantom.

Rotating the tablet around the edge next to the phantom in ≤ 10° increments until the tablet is ± 45° from the vertical position at 0°, and the maximum output power remains in the reduced mode.



Summary of Tablet Tilt Angle Influence on Proximity Sensor Triggering for Edge Side													
Band (MHz)	Minimum trigger distance Per KDB616217§6.2	Minimum trigger distance at which power reduction was maintained over ±45°	Power Reduction Status										
			-45°	-35°	-25°	-15°	-5°	0°	5°	15°	25°	35°	45°
Ant2: WCDMA Band IV LTE Band7/B38/B41 NR N7/38/41	Left Side 20mm Top Side 11mm	Left Side 20mm Top Side 11mm	on	on	on	on	on	on	on	on	on	on	on
Ant5: LTE Band25	Left Side 20mm Bottom Side 29mm	Left Side 20mm Bottom Side 29mm	on	on	on	on	on	on	on	on	on	on	on

6 SAR System Verificaion Procedure

6.1 Tissue Simulate Liquid

6.1.1 Recipes for Tissue Simulate Liquid

The bellowing tables give the recipes for tissue simulating liquids to be used in different frequency bands:

Ingredients (% by weight)	Frequency (MHz)				
	450	700-1000	1700-2000	2300-2500	2500-2700
Water	38.56	40.30	55.24	55.00	54.92
Salt (NaCl)	3.95	1.38	0.31	0.2	0.23
Sucrose	56.32	57.90	0	0	0
HEC	0.98	0.24	0	0	0
Bactericide	0.19	0.18	0	0	0
Tween	0	0	44.45	44.80	44.85

Salt: 99+% Pure Sodium Chloride
Sucrose: 98+% Pure Sucrose
Water: De-ionized, 16 MΩ+ resistivity
HEC: Hydroxyethyl Cellulose
Tween: Polyoxyethylene (20) sorbitan monolaurate

HSL5GHz is composed of the following ingredients: (Manufactured by SPEAG)
Water: 50-65%
Mineral oil: 10-30%
Emulsifiers: 8-25%
Sodium salt: 0-1.5%

Table 4： Recipe of Tissue Simulate Liquid

6.1.2 Measurement for Tissue Simulate Liquid

The Conductivity (σ) and Permittivity (εr) are listed in Table 2. For the SAR measurement given in this report.

The temperature variation of the Tissue Simulate Liquids was 22±2°C.

Measurement for Tissue Simulate Liquid									
Tissue Type	Measured Frequency （MHz）	Measured Tissue		Target Tissue (±5%)		Deviation (Within ±5%)		Liquid Temp. (℃)	Test Date
		ε_r	σ(S/m)	ε_r	σ(S/m)	ε_r	σ(S/m)		
750 Head	750	42.721	0.876	41.90	0.89	1.96%	-1.57%	22.0	2024/7/18
750 Head	750	42.544	0.855	41.90	0.89	1.54%	-3.93%	22.2	2024/7/19
750 Head	750	41.649	0.895	41.90	0.89	-0.60%	0.56%	22.1	2024/7/22
835 Head	835	41.930	0.907	41.50	0.90	1.04%	0.78%	22.0	2024/7/17
835 Head	835	42.484	0.926	41.50	0.90	2.37%	2.89%	22.3	2024/7/20
1750 Head	1750	39.159	1.332	40.10	1.37	-2.35%	-2.77%	22.5	2024/7/21
1750 Head	1750	39.047	1.321	40.10	1.37	-2.63%	-3.58%	22.3	2024/7/22
1900 Head	1900	39.676	1.426	40.00	1.40	-0.81%	1.86%	21.8	2024/7/20
1900 Head	1900	40.564	1.414	40.00	1.40	1.41%	1.00%	21.9	2024/7/23
2300 Head	2300	38.782	1.649	39.50	1.67	-1.82%	-1.26%	22.2	2024/7/22
2450 Head	2450	38.200	1.880	39.20	1.80	-2.55%	4.44%	22.0	2024/7/5
2450 Head	2450	38.166	1.813	39.20	1.80	-2.64%	0.72%	22.1	2024/7/25
2600 Head	2600	37.722	1.968	39.00	1.96	-3.28%	0.41%	22.3	2024/7/19
2600 Head	2600	37.676	1.982	39.00	1.96	-3.39%	1.12%	22.1	2024/7/23
2600 Head	2600	37.661	1.979	39.00	1.96	-3.43%	0.97%	22.1	2024/7/24
3500 Head	3500	37.500	2.840	37.90	2.91	-1.06%	-2.41%	22.1	2024/7/24
3500 Head	3500	37.700	2.830	37.90	2.91	-0.53%	-2.75%	22.4	2024/7/26
3500 Head	3500	37.800	2.860	37.90	2.91	-0.26%	-1.72%	22.1	2024/7/27
3500 Head	3500	37.600	2.840	37.90	2.91	-0.79%	-2.41%	22.4	2024/7/29
3700 Head	3700	37.100	3.050	37.70	3.12	-1.59%	-2.24%	22.4	2024/7/23
3700 Head	3700	37.000	3.020	37.70	3.12	-1.86%	-3.21%	22.4	2024/7/26
3700 Head	3700	36.800	3.030	37.70	3.12	-2.39%	-2.88%	22.4	2024/7/28
3900 Head	3900	36.400	3.270	37.50	3.32	-2.93%	-1.51%	22.4	2024/7/25
5250 Head	5250	35.901	4.738	35.90	4.66	0.00%	1.67%	22.2	2024/7/8
5250 Head	5250	36.661	4.861	35.90	4.66	2.12%	4.31%	22.3	2024/7/10
5600 Head	5600	35.793	5.254	35.50	5.07	0.83%	3.63%	22.5	2024/7/12
5750 Head	5750	35.612	5.451	35.40	5.22	0.60%	4.43%	22.1	2024/7/8
6500 Head	6500	34.000	6.220	34.50	6.07	-1.45%	2.47%	22.1	2024/7/9

(for original report SZCR240300076714)

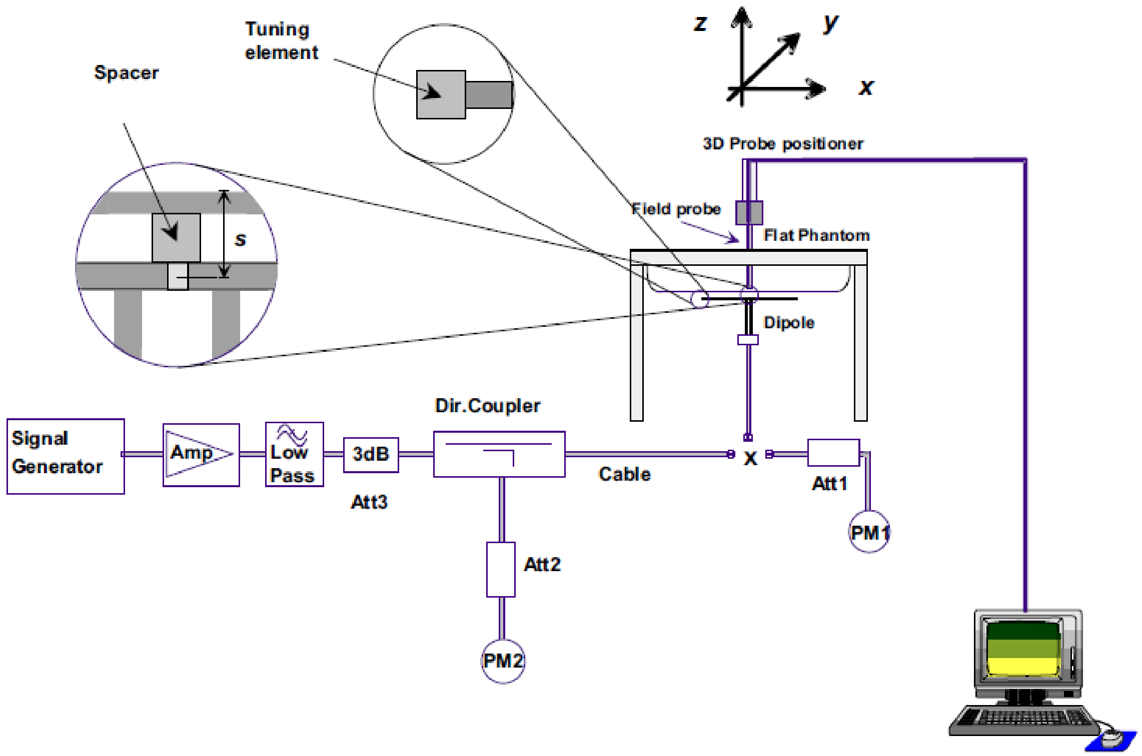
Tissue Type	Measured Frequency (MHz)	Measured Tissue		Target Tissue (±5%)		Deviation (Within ±5%)		Liquid Temp. (℃)	Test Date
		ε_r	σ(S/m)	ε_r	σ(S/m)	ε_r	σ(S/m)		
835 Head	835	40.192	0.930	41.50	0.90	-3.15%	3.34%	22.1	2025/6/4
1750 Head	1750	40.799	1.347	40.10	1.37	1.74%	-1.66%	22.0	2025/6/5
1950 Head	1950	40.196	1.432	40.00	1.40	0.49%	2.26%	21.9	2025/6/5
2450 Head	2450	38.477	1.795	39.20	1.80	-1.85%	-0.25%	22.5	2025/6/6
2600 Head	2600	38.328	1.892	39.00	1.96	-1.72%	-3.47%	22.4	2025/6/7
3700 Head	3700	37.280	3.085	37.70	3.12	-1.12%	-1.12%	23.0	2025/6/8
3900 Head	3900	36.514	3.281	37.50	3.32	-2.63%	-1.17%	22.2	2025/6/9
5250 Head	5250	36.912	4.864	35.90	4.71	2.82%	3.27%	22.1	2025/6/10
5600 Head	5600	36.008	5.282	35.50	5.07	1.43%	4.17%	21.9	2025/6/10
5750 Head	5750	35.582	5.446	35.40	5.22	0.51%	4.32%	22.6	2025/6/10

(for new report SZCR250500221411)

Table 5： Measurement result of Tissue electric parameters

6.2 SAR System Check

The microwave circuit arrangement for system Check is sketched in F-12. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the following table (A power level of 250mW (below 3GHz) or 100mW (3-6GHz) was input to the dipole antenna). During the tests, the ambient temperature of the laboratory was in the range 22±2°C, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15±0.5 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



F-12.The microwave circuit arrangement used for SAR system Check

6.2.1 Justification for Extended SAR Dipole Calibrations

1) Instead of the typical annual calibration recommended by measurement standards, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.

a) There is no physical damage on the dipole;

b) System check with specific dipole is within 10% of calibrated value;

c) Return-loss is within 20% of calibrated measurement;

d) Impedance is within 5Ω from the previous measurement.

2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

6.2.2 Summary System Check Result(s)

Validation Kit		Measured SAR 250mW	Measured SAR 250mW	Measured SAR (normalized to 1W)	Measured SAR (normalized to 1W)	Target SAR (normalized to 1W)	Target SAR (normalized to 1W)	Deviation (Within ±10%)		Liquid Temp. (℃)	Test Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)	1-g(W/kg)	10-g(W/kg)		
D750V3	Head	1.91	1.27	7.64	5.08	8.37	5.53	-8.72%	-8.14%	22.0	2024/7/18
D750V3	Head	1.95	1.29	7.80	5.16	8.37	5.53	-6.81%	-6.69%	22.2	2024/7/19
D750V3	Head	1.96	1.31	7.84	5.24	8.37	5.53	-6.33%	-5.24%	22.1	2024/7/22
D835V2	Head	2.39	1.57	9.56	6.28	9.53	6.29	0.31%	-0.16%	22.0	2024/7/17
D835V2	Head	2.37	1.56	9.48	6.24	9.53	6.29	-0.52%	-0.79%	22.3	2024/7/20
D1750V2	Head	9.35	5.00	37.40	20.00	36.60	19.30	2.19%	3.63%	22.5	2024/7/21
D1750V2	Head	8.88	4.75	35.52	19.00	36.60	19.30	-2.95%	-1.55%	22.3	2024/7/22
D1900V2	Head	10	5.13	40.00	20.52	39.50	20.60	1.27%	-0.39%	21.8	2024/7/20
D1900V2	Head	10.1	5.17	40.40	20.68	39.50	20.60	2.28%	0.39%	21.9	2024/7/23
D2300V2	Head	12.80	6.16	51.20	24.64	48.70	23.30	5.13%	5.75%	22.2	2024/7/22
D2450V2	Head	13.80	6.34	55.20	25.36	52.20	24.30	5.75%	4.36%	22.0	2024/7/5
D2450V2	Head	12.10	5.78	48.40	23.12	52.20	24.30	-7.28%	-4.86%	22.1	2024/7/25
D2600V2	Head	15.50	7.02	62.00	28.08	57.70	25.80	7.45%	8.84%	22.3	2024/7/19
D2600V2	Head	15.40	6.96	61.60	27.84	57.70	25.80	6.76%	7.91%	22.1	2024/7/23
D2600V2	Head	15.80	7.05	63.20	28.20	57.70	25.80	9.53%	9.30%	22.1	2024/7/24
Validation Kit		Measured SAR 100mW	Measured SAR 100mW	Measured SAR (normalized to 1W)	Measured SAR (normalized to 1W)	Target SAR (normalized to 1W)	Target SAR (normalized to 1W)	Deviation (Within ±10%)		Liquid Temp. (℃)	Test Date
		1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)	1-g(W/kg)	10-g(W/kg)		
D3500V2	Head(3.5GHz)	6.36	2.52	63.60	25.20	65.80	25.70	-3.34%	-1.95%	22.1	2024/7/24
	Head(3.5GHz)	7.07	2.80	70.70	28.00	65.80	25.70	7.45%	8.95%	22.4	2024/7/26
	Head(3.5GHz)	6.09	2.41	60.90	24.10	65.80	25.70	-7.45%	-6.23%	22.1	2024/7/27
	Head(3.5GHz)	6.50	2.57	65.00	25.70	65.80	25.70	-1.22%	0.00%	22.4	2024/7/29
D3700V2	Head(3.7GHz)	6.18	2.37	61.80	23.70	66.10	24.70	-6.51%	-4.05%	22.1	2024/7/23
	Head(3.7GHz)	6.20	2.40	62.00	24.00	66.10	24.70	-6.20%	-2.83%	22.4	2024/7/26
	Head(3.7GHz)	6.93	2.67	69.30	26.70	66.10	24.70	4.84%	8.10%	22.4	2024/7/28
D3900V2	Head(3.9GHz)	6.78	2.48	67.80	24.80	66.70	23.80	1.65%	4.20%	22.4	2024/7/25
D5GHzV2	Head(5.25GHz)	7.96	2.25	79.60	22.50	77.30	22.10	2.98%	1.81%	22.2	2024/7/8
	Head(5.25GHz)	7.51	2.17	75.10	21.70	77.30	22.10	-2.85%	-1.81%	22.3	2024/7/10
	Head(5.6GHz)	7.71	2.20	77.10	22.00	81.30	23.10	-5.17%	-4.76%	22.5	2024/7/12
	Head(5.75GHz)	8.08	2.31	80.80	23.10	77.10	21.30	4.80%	8.45%	22.1	2024/7/8
D6500V2	Head(6.5GHz)	28.90	5.48	289.00	54.80	291.00	53.90	-0.69%	1.67%	22.1	2024/7/9

(for original report SZCR240300076714)

Validation Kit	Measured SAR 250mW	Measured SAR 250mW	Measured SAR (normalized to 1W)	Measured SAR (normalized to 1W)	Target SAR (normalized to 1W)	Target SAR (normalized to 1W)	Deviation (Within ±10%)		Liquid Temp. (℃)	Test Date
	1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)	1-g(W/kg)	10-g(W/kg)		
D835V2_Head	2.39	1.57	9.56	6.28	9.53	6.29	0.31%	-0.16%	22.1	2025/6/4
D1750V2_Head	9.04	5.01	36.16	20.04	36.60	19.30	-1.20%	3.83%	22.0	2025/6/5
D1950V3_Head	10.30	5.49	41.20	21.96	40.50	20.80	1.73%	5.58%	21.9	2025/6/5
D2450V2_Head	13.80	6.43	55.20	25.72	52.20	24.30	5.75%	5.84%	22.5	2025/6/6
D2600V2_Head	13.70	6.55	54.80	26.20	57.70	25.80	-5.03%	1.55%	22.4	2025/6/7
Validation Kit	Measured SAR 100mW	Measured SAR 100mW	Measured SAR (normalized to 1W)	Measured SAR (normalized to 1W)	Target SAR (normalized to 1W)	Target SAR (normalized to 1W)	Deviation (Within ±10%)		Liquid Temp. (℃)	Test Date
	1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1-g(W/kg)	10-g(W/kg)	1-g(W/kg)	10-g(W/kg)		
D3700V2_Head	6.35	2.52	63.50	25.20	66.10	24.70	-3.93%	2.02%	23.0	2025/6/8
D3900V2_3.9GHz_Head	6.65	2.41	66.50	24.10	66.70	23.80	-0.30%	1.26%	22.2	2025/6/9
D5GHzV2_5.25G_Head	7.49	2.18	74.90	21.80	77.30	22.10	-3.10%	-1.36%	22.1	2025/6/10
D5GHzV2_5.6G_Head	8.33	2.36	83.30	23.60	81.30	23.10	2.46%	2.16%	21.9	2025/6/10
D5GHzV2_5.75G_Head	7.47	2.15	74.70	21.50	77.10	21.30	-3.11%	0.94%	22.6	2025/6/10

(for new report SZCR250500221411)

Table 6： SAR System Check Result

6.2.3 Detailed System Check Results

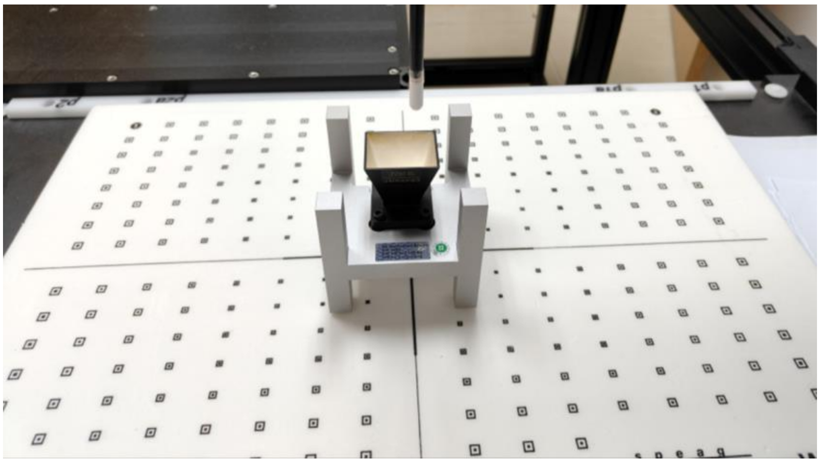
Please see the Appendix A

7 PD System Check

The system was verified to be within ±0.66 dB of the power density targets on the calibration certificate according to the test system specification in the user's manual and calibration facility recommendation. The 0.66 dB deviation threshold represents the expanded uncertainty for system performance checks using SPEAG's mmWave verification sources. The same spatial resolution and measurement region used in the source calibration was applied during the system check. The measured power density distribution of verification source was also confirmed through visual inspection to have no noticeable differences, both spatially (shape) and numerically (level) from the distribution provided by the manufacturer, per November 2017 TCBC Workshop Notes.

Frequent	Measured PD W/m²	Target PD W/m²	Circular Deviation (Within ±0.66dB)	Test Date
	4cm²	4cm²	4cm²	
10GHz Source	195	174	0.49	2024/7/22
10GHz Source	183	174	0.22	2024/7/24

Note: 1. Measured PD after normalized to Pard power with DASY Calibration Certificate in Appendix A.



System Verification Setup Photo

8 Test Configuration

8.1 3G SAR Test Reduction Procedure

According to KDB 941225D01, in the following procedures, the mode tested for SAR is referred to as the primary mode. The equivalent modes considered for SAR test reduction are denoted as secondary modes. Both primary and secondary modes must be in the same frequency band. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode. This is referred to as the 3G SAR test reduction procedure in the following SAR test guidance, where the primary mode is identified in the applicable wireless mode test procedures and the secondary mode is wireless mode being considered for SAR test reduction by that procedure. When the 3G SAR test reduction procedure is not satisfied, it is identified as “otherwise” in the applicable procedures; SAR measurement is required for the secondary mode.

8.2 Operation Configurations

8.2.1 GSM Test Configuration

SAR tests for GSM 850 and GSM 1900, a communication link is set up with a base station by air link. Using Radio Communication Analyzer, the power lever is set to “5”and “0” in SAR of GSM 850 and GSM 1900. The tests in the band of GSM 850 and GSM 1900 are performed in the mode of GPRS/EGPRS function. Since the GPRS class is 33 for this EUT, it has at most 4 timeslots in uplink and at most 5 timeslots in downlink, the maximum total timeslot is 6. The EGPRS class is 33 for this EUT, it has at most 4 timeslots in uplink, and at most 5 timeslots in downlink, the maximum total timeslot is 6.

SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units. 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, the higher number time-slot configuration should be tested.

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

The 3G SAR test reduction procedure is applied to 8-PSK EDGE with GMSK GPRS/EDGE as the primary mode.

8.2.2 WCDMA Test Configuration

1）. Output Power Verification

Maximum output power is verified on the high, middle and low channels according to procedures described in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all “1’s” for WCDMA/HSDPA or by 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, DPDCHn and spreading codes, HSDPA, HSPA) are required in the SAR report. All configurations that are not supported by the handset or cannot be measured due to technical or equipment limitations must be clearly identified.

2）. 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.

3）. Body SAR

SAR for body 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 DPDCHn 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 spreaing code or DPDCHn, for the highest reported body-worn accessory exposure SAR configuration in 12.2 kbps RMC. When more than 2 DPDCHn are supported by the handset, it may be necessary to configure additional DPDCHn using FTM (Factory Test Mode) or other chipset based test approaches with parameters similar to those used in 384 kbps and 768 kbps RMC.

4）. HSDPA / HSUPA

RMC 12.2kbps setting is used to evaluate SAR. If the maximum output power for production units in HSDPA / HSUPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest measured SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power of HSDPA / HSUPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.5 W/kg, SAR measurement is not required for HSDPA / HSUPA.

a) 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 (ΔACK, ΔNACK, ΔCQI) are set according to values indicated in the following table 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	βc	Bd	βd(SF)	βc/βd	βhs	CM(dB)	MPR (dB)
1	2/15	15/15	64	2/15	4/15	0.0	0
2	12/15(3)	15/15(3)	64	12/15(3)	24/15	1.0	0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5
Note1: △ACK, △NACK and △CQI= 8 Ahs = βhs/βc=30/15 βhs=30/15*βc Note2: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 5.13.1.A,and HSDPA EVM with phase discontinuity in clause 5.13.1AA, △ACK and △NACK= 8 (Ahs=30/15) with βhs=30/15*βc,and △CQI= 7 (Ahs=24/15) with βhs=24/15*βc. Note3: CM=1 forβc/βd =12/15, βhs/βc=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.							

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

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

Table 7： settings of required H-Set 1 QPSK acc. to 3GPP 34.121

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

Table 8： HSDPA UE category

b) HSUPA

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ec} (SF)	β_{ed} (code)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}:47/15 β_{ed2}:47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ ACK, Δ NACK and Δ CQI = 8 $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$

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

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

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

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

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

Table 9： Subtests for UMTS Release 6 HSUPA

UE E-DCH Category	Maximum E-DCH Codes Transmitted	Number of HARQ Processes	E-DCH TTI(ms)	Minimum Speading Factor	Maximum E-DCH Transport Block Bits	Max Rate (Mbps)
1	1	4	10	4	7110	0.7296
2	2	8	2	4	2798	1.4592
	2	4	10	4	14484	
3	2	4	10	4	14484	1.4592
4	2	8	2	2	5772	2.9185
	2	4	10	2	20000	2.00
5	2	4	10	2	20000	2.00
6 (No DPDCH)	4	8	10	2SF2&2SF4	11484	5.76
	4	4	2		20000	2.00
7 (No DPDCH)	4	8	2	2SF2&2SF4	22996	?
	4	4	10		20000	?
NOTE: When 4 codes are transmitted in parallel, two codes shall be transmitted with SF2 and two with SF4.UE categories 1 to 6 support QPSK only. UE category 7 supports QPSK and 16QAM.(TS25.306-7.3.0).						

Table 10：HSUPA UE category

c) HSPA+

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

- **Table C.11.1.4: β values for transmitter characteristics tests with HS-DPCCH and E-DCH with 16QAM**

Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 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} can not 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 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.

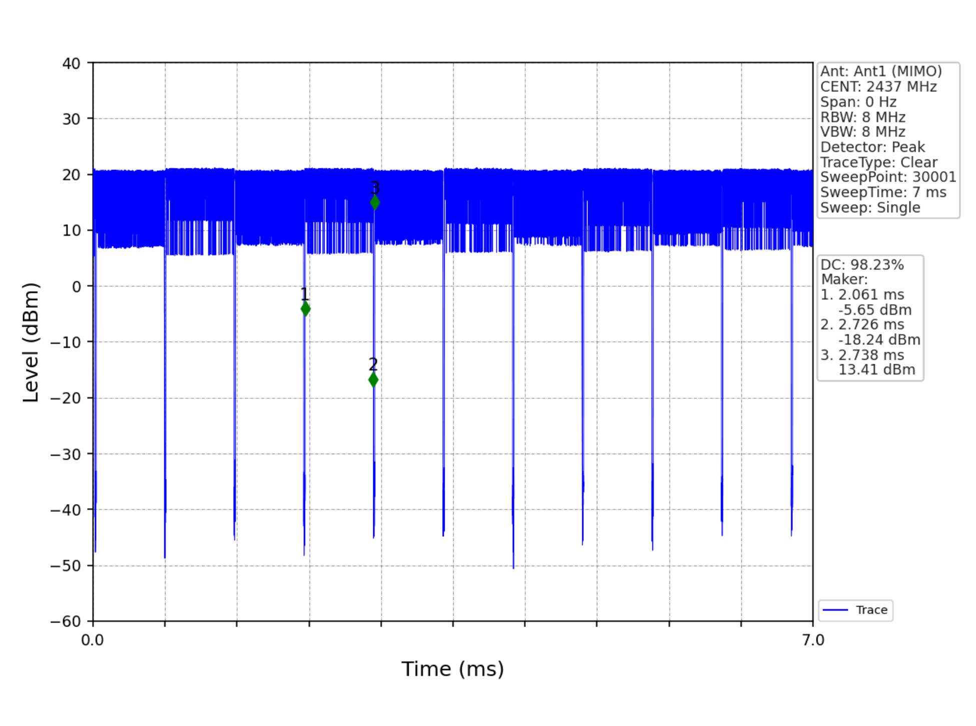
8.2.3 WIFI Test Configuration

A Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement.

8.2.3.1 Duty cycle

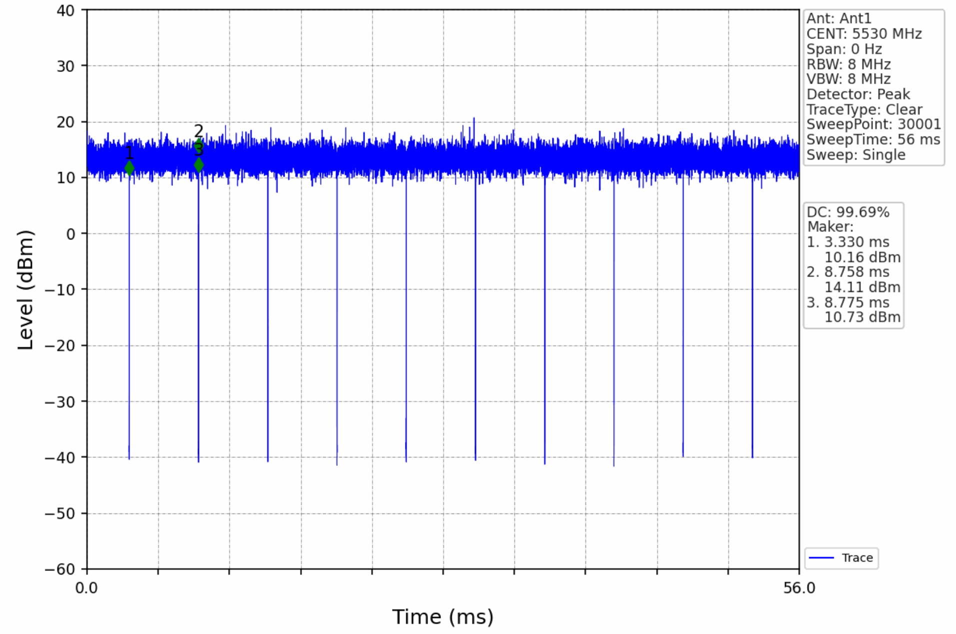
1) Wi-Fi 2.4GHz 802.11b:

Duty cycle=98.23%



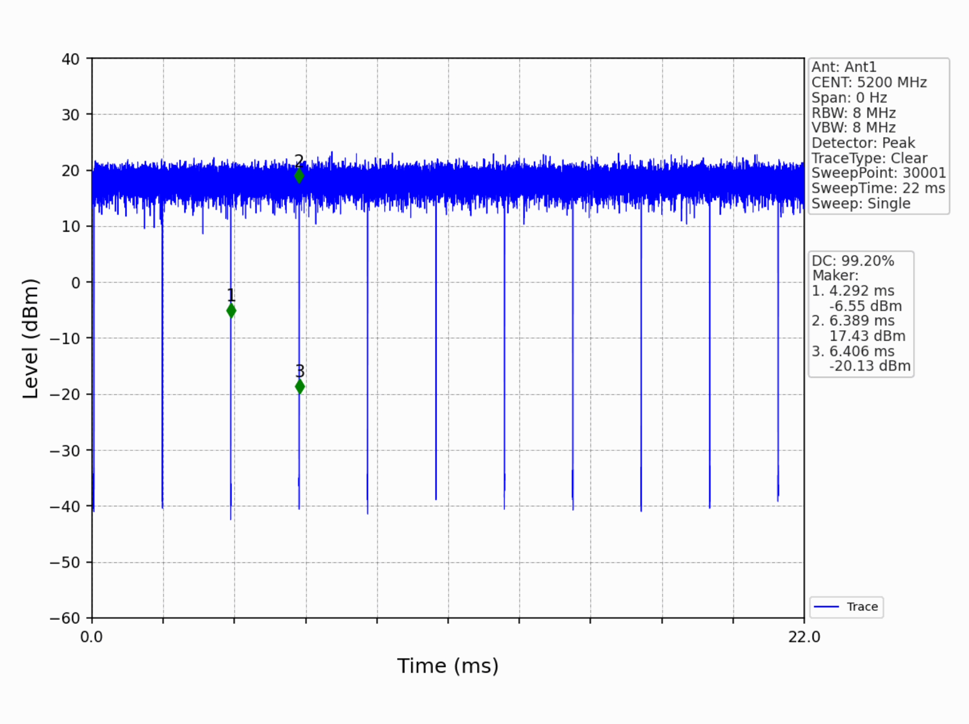
2) Wi-Fi 5GHz 802.11n40:

Duty cycle=99.69%



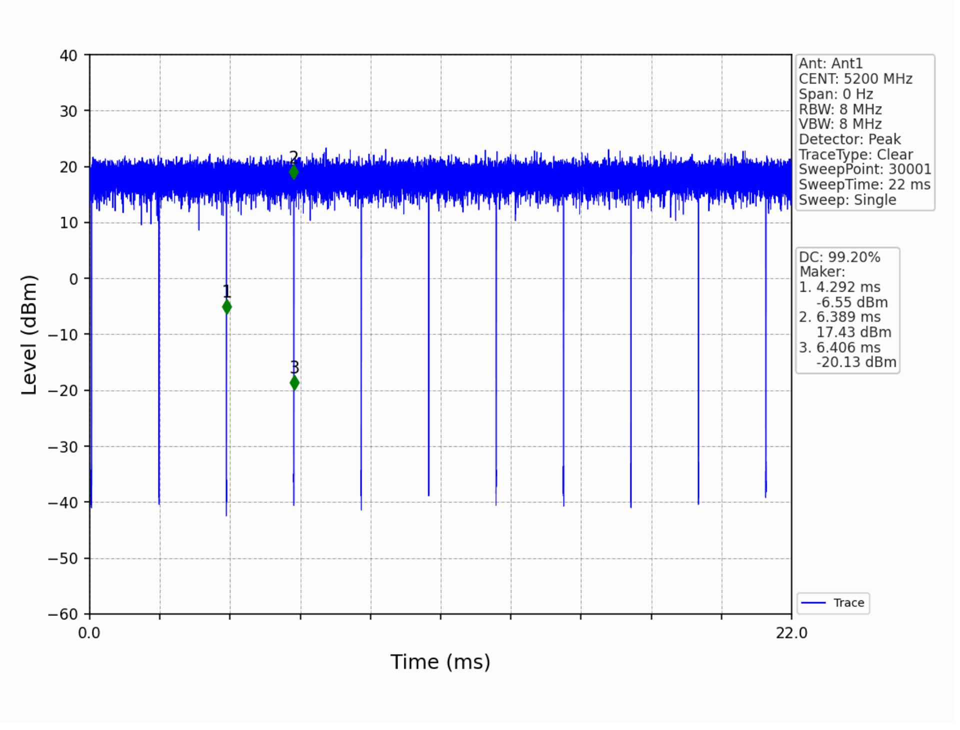
3) Wi-Fi 5GHz 802.11ac80:

Duty cycle=99.69%



4) Wi-Fi 5GHz 802.11a:

Duty cycle=99.20%



8.2.3.2 Initial Test Position SAR Test Reduction Procedure

DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures. The initial test position procedure is described in the following:

1）. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other (remaining) test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band. SAR is also not required for that exposure configuration in the subsequent test configuration(s).

2）. When the reported SAR of the initial test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position using subsequent highest extrapolated or estimated 1-g SAR conditions determined by area scans or next closest/smallest test separation distance and maximum RF coupling test positions based on manufacturer justification, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg or all required test positions (left, right, touch, tilt or subsequent surfaces and edges) are tested.

3）. For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested. a) Additional power measurements may be required for this step, which should be limited to those necessary for identifying the subsequent highest output power channels.

8.2.3.3 Subsequent Test Configuration Procedures

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units. The initial test position procedure is applied to next to the ear, UMPC mini-tablet and hotspot mode configurations. When the same maximum output power is specified for multiple transmission modes, additional power measurements may be required to determine if SAR measurements are required for subsequent highest output power channels in a subsequent test configuration. The subsequent test configuration and SAR measurement procedures are described in the following.

1）. When SAR test exclusion provisions of KDB Publication 447498 are applicable and SAR measurement is not required for the initial test configuration, SAR is also not required for the next highest maximum output power transmission mode subsequent test configuration(s) in that frequency band or aggregated band and exposure configuration.

2）. When the highest reported SAR for the initial test configuration (when applicable, include subsequent highest output channels), according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for that subsequent test configuration.

3）. The number of channels in the initial test configuration and subsequent test configuration can be different due to differences in channel bandwidth. When SAR measurement is required for a subsequent test configuration and the channel bandwidth is smaller than that in the initial test configuration, all channels in the subsequent test configuration that overlap with the larger bandwidth channel tested in the initial test configuration should be used to determine the highest maximum output power channel. This step requires additional power measurement to identify the highest maximum output power channel in the subsequent test configuration to determine SAR test reduction.

a) SAR should first be measured for the channel with highest measured output power in the subsequent test configuration.

b) SAR for subsequent highest measured maximum output power channels in the subsequent test configuration is required only when the reported SAR of the preceding higher maximum output power channel(s) in the subsequent test configuration is > 1.2 W/kg or until all required channels are tested. i) For channels with the same measured maximum output power, SAR should be measured using the channel closest to the center frequency of the larger channel bandwidth channel in the initial test configuration.

4）. SAR measurements for the remaining highest specified maximum output power OFDM transmission mode configurations that have not been tested in the initial test configuration (highest maximum output) or subsequent test configuration(s) (subsequent next highest maximum output power) is determined by recursively applying the subsequent test configuration procedures in this section to the remaining configurations according to the following:

a) replace “subsequent test configuration” with “next subsequent test configuration” (i.e., subsequent next highest specified maximum output power configuration)

b) replace “initial test configuration” with “all tested higher output power configurations”

8.2.3.4 2.4 GHz WiFi SAR Procedures

Separate SAR procedures are applied to DSSS and OFDM configurations in the 2.4 GHz band to simplify DSSS test requirements. For 802.11b DSSS SAR measurements, DSSS SAR procedure applies to fixed exposure test position and initial test position procedure applies to multiple exposure test positions. When SAR measurement is required for an OFDM configuration, the initial test configuration, subsequent test configuration and initial test position procedures are applied. The SAR test exclusion requirements for 802.11g/n OFDM configurations are described in following.

- **802.11b DSSS SAR Test Requirements**

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

1）. When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

2）. When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

- **2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements**

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied (section 5.3, including sub-sections). SAR is not required for the following 2.4 GHz OFDM conditions.

1）. When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.

2）. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

- **SAR Test Requirements for OFDM configurations**

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

8.2.3.5 5 GHz WiFi SAR Procedures

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

  For devices that operate in only one of the U-NII-1 and U-NII-2A bands, the normally required SAR procedures for OFDM configurations are applied. For devices that operate in both U-NII bands using the same transmitter and antenna(s), SAR test reduction is determined according to the following：

1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, both bands are tested independently for SAR.
2) When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, both bands are tested independently for SAR.
3) The two U-NII bands may be aggregated to support a 160 MHz channel on channel number 50. Without additional testing, the maximum output power for this is limited to the lower of the maximum output power certified for the two bands. When SAR measurement is required for at least one of the bands and the highest reported SAR adjusted by the ratio of specified maximum output power of aggregated to standalone band is > 1.2 W/kg, SAR is required for the 160 MHz channel. This procedure does not apply to an aggregated band with maximum output higher than the standalone band(s); the aggregated band must be tested independently for SAR. SAR is not required when the 160 MHz channel is operating at a reduced maximum power and also qualifies for SAR test exclusion.

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

  The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. when Terminal Doppler Weather Radar (TDWR) restriction applies, all channels that operate at 5.60 – 5.65 GHz must be included to apply the SAR test reduction and measurement procedures.

  When the same transmitter and antenna(s) are used for U-NII-2C band and U-NII-3 band or 5.8 GHz band of §15.247, the bands may be aggregated to enable additional channels with 20, 40 or 80 MHz bandwidth to span across the band gap, as illustrated in Appendix B. The maximum output power for the additional band gap channels is limited to the lower of those certified for the bands. Unless band gap channels are permanently disabled, they must be considered for SAR testing. The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. To maintain SAR measurement accuracy and to facilitate test reduction, the channels in U-NII-2C band above 5.65 GHz may be grouped with the 5.8 GHz channels in U-NII-3 or §15.247 band to enable two SAR probe calibration frequency points to cover the bands, including the band gap channels. When band gap channels are supported and the bands are not aggregated for SAR testing, band gap channels must be considered independently in each band according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

OFDM Transmission Mode SAR Test Configuration and Channel Selection Requirements

The initial test configuration for 5 GHz OFDM transmission modes is determined by the 802.11 configuration with the highest maximum output power specified for production units, including tune-up tolerance, in each standalone and aggregated frequency band. SAR for the initial test configuration is measured using the highest maximum output power channel determined by the default power measurement procedures. When multiple configurations in a frequency band have the same specified maximum output power, the initial test configuration is determined according to the following steps applied sequentially.

1) The largest channel bandwidth configuration is selected among the multiple configurations with the same specified maximum output power.
2) If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.
3) If multiple configurations have the same specified maximum output power, largest channel bandwidth and lowest order modulation, the lowest data rate configuration among these configurations is selected.
4) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n. After an initial test configuration is determined, if multiple test channels have the same measured maximum output power, the channel chosen for SAR measurement is determined according to the following. These channel selection procedures apply to both the initial test configuration and subsequent test configuration(s), with respect to the default power measurement procedures or additional power measurements required for further SAR test reduction. The same procedures also apply to subsequent highest output power channel(s) selection.
   a) The channel closest to mid-band frequency is selected for SAR measurement.
   b) For channels with equal separation from mid-band frequency; for example, high and low channels or two mid-band channels, the higher frequency (number) channel is selected for SAR measurement.

- **SAR Test Requirements for OFDM configurations**

When SAR measurement is required for 802.11 a/n/ac OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. When the same transmitter and antenna(s) are used for U-NII-1 and U-NII-2A bands, additional SAR test reduction applies. When band gap channels between U-NII-2C band and 5.8 GHz U-NII-3 or §15.247 band are supported, the highest maximum output power transmission mode configuration and maximum output power channel across the bands must be used to determine SAR test reduction, according to the initial test configuration and subsequent test configuration requirements. In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.

8.2.3.6 5 GHz WiFi PD Procedures

Power Density General Notes:

1. The manufacturer has confirmed that the devices tested have the same physical, mechanical and thermalcharacteristics and are within operational tolerances expected for production units.

2. Batteries are fully charged at the beginning of the measurements.

3. Absorbed power density (APD) using a 4cm^2 averaging area is reported based on SAR measurements.

4. Power density was calculated by repeated E-field measurements on two measurement planes separatedby λ/4.

5. The device was configured to transmit continuously at the required data rate, channel bandwidth andsignal modulation, using the highest transmission duty factor supported by the test mode tools.

6. Per FCC guidance and equipment manufacturer guidance, power density results were scaled accordingto IEC 62479:2010 for the portion of the measurement uncertainty > 30%. Total expanded uncertainty of2.67 dB (84.9%) was used to determine the psPD measurement scaling factor.

7. Per April 2021 TCB Workshop, For the highest SAR test configurations also measure incident PD (total) usingpower-density reconstruction methodin 2 mm closest measurement plane.

8. Since this device is considered a phablet and there is no different PD limit ondifferent exposure conditions, therefore select highestphablet SAR at 0 mm test distance and configurations evaluate power density. Since there is no different PD limit on different exposure conditions, therefore the PD test was performed of a 2mm separation between Probe sensor and EUT surface to cover all exposure conditions of phablet.

9. IPD is measured for all edges and surfaces of the device with a transmitting antenna located within 25 mm from that surface or edge.

10. Per October 2020 TCB Workshop,PTP-PR algorithm was used during psPD measurement and calculations.

11. The measurement procedure consists of measuring the PDinc at two different distances: 2 mm (compliance distance) and λ/5. Thegrid extents should be large enough to fully capture the transmitted energy. The grid step should be fine enough to demonstrate that the integrated Power Density iPDn fulfill the criterion described below. Since iPD ratio between the two distances is⩾-1dB, the grid step (0.0625) was sufficient for determining compliance at d=2mm.

$$10*\log_{10}\frac{\mathrm{iPDn}(2mm)}{\mathrm{iPDn}(\lambda/5)} \geq -1$$

Wi-Fi 6E PD Test Record Ant9

Test position	Test mode	Test ch./Freq.	Distance (mm)	Grid Step (λ)	Duty Cycle	Duty Cycle Scaled factor	iPDn	iPD ratio	Measured PD 4cm^2 (W/m^2)	Power drift (dB)
Power Density Test DATA										
Right side	802.11ax 160M	47/6185	2	0.0625	99.71%	1.003	44.10	0.93	2.07	0.01
Right side	802.11ax 160M	47/6185	9.7	0.0625	99.71%	1.003	35.60		0.75	0.08

Wi-Fi 6E PD Test Record Ant10

Test position	Test mode	Test ch./Freq.	Distance (mm)	Grid Step (λ)	Duty Cycle	Duty Cycle Scaled factor	iPDn	iPD ratio	Measured PD 4cm^2 (W/m^2)	Power drift (dB)
Power Density Test DATA										
Back side	802.11ax 160M	143/6665	2	0.0625	99.71%	1.003	44.50	0.61	3.11	-0.19
Back side	802.11ax 160M	143/6665	9.0	0.0625	99.71%	1.003	38.70		1.15	0.08

Wi-Fi 6E PD Test Record MIMO

Test position	Test mode	Test ch./Freq.	Distance (mm)	Grid Step (λ)	Duty Cycle	Duty Cycle Scaled factor	iPDn	iPD ratio	Measured PD 4cm^2 (W/m^2)	Power drift (dB)
Power Density Test DATA										
Right side	802.11ax 160M	47/6185	2	0.0625	99.71%	1.003	44.80	0.55	4.35	0.19
Right side	802.11ax 160M	47/6185	9.7	0.0625	99.71%	1.003	39.50		1.45	0.07

8.2.4 LTE Test Configuration

LTE modes were tested according to FCC KDB 941225 D05 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The Radio Communication Analyzer was used for LTE output power measurements and SAR testing. Max power control was used so the UE transmits with maximum output power during SAR testing. SAR must be measured with the maximum TTI (transmit time interval) supported by the device in each LTE configuration.

TDD LTE test consideration

For Time-Division Duplex (TDD) systems, SAR 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 LTE TDD configurations.

SAR was tested with the highest transmission duty factor (63.33%) using Uplink-downlink configuration 0 and Special subframe configuration 7.

LTE TDD Band support 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations and Table 4.2-1 for Special subframe configurations.

Frame structure type 2:

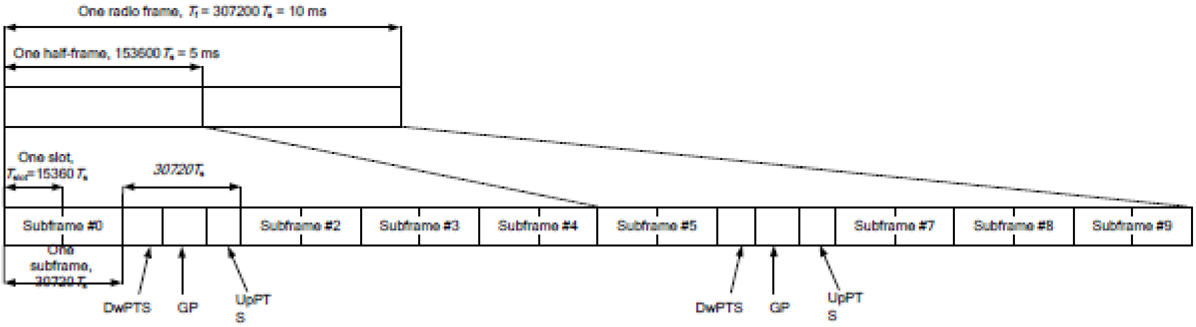


Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS).

<table>
<tr><th rowspan="3">Special subframe configuration</th><th colspan="3">Normal cyclic prefix in downlink</th><th colspan="3">Extended cyclic prefix in downlink</th></tr>
<tr><th rowspan="2">DwPTS</th><th colspan="2">UpPTS</th><th rowspan="2">DwPTS</th><th colspan="2">UpPTS</th></tr>
<tr><th>Normal cyclic prefix in uplink</th><th>Extended cyclic prefix in uplink</th><th>Normal cyclic prefix in uplink</th><th>Extended cyclic prefix in uplink</th></tr>
<tr><td>0</td><td>6592.Ts</td><td rowspan="5">2192.Ts</td><td rowspan="5">2560.Ts</td><td>7680.Ts</td><td rowspan="4">2192.Ts</td><td rowspan="4">2560.Ts</td></tr>
<tr><td>1</td><td>19760.Ts</td><td>20480.Ts</td></tr>
<tr><td>2</td><td>21952.Ts</td><td>23040.Ts</td></tr>
<tr><td>3</td><td>24144.Ts</td><td>25600.Ts</td></tr>
<tr><td>4</td><td>26336.Ts</td><td>7680.Ts</td><td rowspan="2">4384.Ts</td><td rowspan="2">5120.Ts</td></tr>
<tr><td>5</td><td>6592.Ts</td><td>4384.Ts</td><td>5120.Ts</td><td>20480.Ts</td></tr>
</table>

6	19760.Ts			23040.Ts		
7	21952.Ts			25600.Ts		
8	24144.Ts			-	-	-
9	13168.Ts			-	-	-

Table 4.2-2: Uplink-downlink configurations.

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

Calculated Duty Cycle=[Extended cyclic prefix in uplink x (Ts) x # of S + # of U]/10ms

Uplink-Downlink Configuration	Downlink-to-Uplink Switch-point Periodicity	Subframe Number										Calculated 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

A) Spectrum Plots for RB Configurations

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

B) MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

Modulation	Channel bandwidth/Transmission bandwidth						MPR (dB)
	1.4	3	5	10	15	20	

	MHz	MHz	MHz	MHz	MHz	MHz	
QPSK	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	0
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

C) A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

D) Largest channel bandwidth standalone SAR test requirements

1) QPSK with 1 RB allocation

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ⩽ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

2) QPSK with 50% RB allocation

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

3) QPSK with 100% RB allocation

For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in 1) and 2) 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) Higher order modulations

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

E) Other channel bandwidth standalone SAR test requirements

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

F) LTE CA additional specification

The device supports intra-band contiguous and inter-band discontinuous uplink and downlink LTE Carrier Aggregation (CA). When carrier aggregation applies, implementation and measurement details for the following are necessary.

a) Intra-band carrier aggregation requirements for uplink.

b) Intra-band and inter-band carrier aggregation requirements for downlink.

The possible downlink and uplink LTE CA combinations supported by this device are as below tables per 3GPP TS 36.101 V15.4.0. The conducted power measurement results of downlink and uplink LTE CA are provided in Appendix E (Conducted RF Output Power). The downlink LTE CA SAR test is not required since the maximum output power for downlink LTE CA was not more than 0.25dB higher than the maximum output power for without downlink LTE CA.

2DL		3DL		4DL		5DL	
Combination	Exclusion	Combination	Exclusion	Combination	Exclusion	Combination	Exclusion
CA_2A-12A	Yes	CA_2A-12A-30A	No				
		CA_2A-12A-66A	Yes	CA_2A-12A-66A-66A	Yes		
CA_2A-13A	Yes	CA_2A-13A-48A	Yes	CA_2A-13A-48C	Yes	CA_2A-13A-48D	No
		CA_2A-13A-66A	Yes	CA_2A-13A-66B	Yes		
				CA_2A-13A-66C	Yes		
				CA_2A-13A-66A-66A	Yes		
CA_2A-14A	Yes	CA_2A-14A-30A	Yes	CA_2A-14A-66A-66A	Yes		
		CA_2A-14A-66A	Yes				
CA_2A-2A	Yes	CA_2A-2A-12A	Yes	CA_2A-2A-12A-30A	No	CA_2A-2A-12A-66A-66A	No
				CA_2A-2A-12A-66A	Yes		
		CA_2A-2A-13A	Yes	CA_2A-2A-13A-66A	Yes	CA_2A-2A-13A-66A-66A	No
		CA_2A-2A-14A	Yes	CA_2A-2A-14A-66A	Yes	CA_2A-2A-14A-66A-66A	No
				CA_2A-2A-30A-66A	No		
		CA_2A-2A-4A	Yes	CA_2A-2A-4A-4A	No		
				CA_2A-2A-4A-5A	No		
		CA_2A-2A-5A	Yes	CA_2A-2A-5A-30A	No		
				CA_2A-2A-5A-66A	Yes	CA_2A-2A-5A-66A-66A	No
						CA_2A-2A-5A-66B	No
						CA_2A-2A-5A-66C	No
		CA_2A-2A-66A	Yes	CA_2A-2A-66A-66A	Yes		
				CA_2A-2A-66B	Yes		
				CA_2A-2A-66C	Yes		
CA_2A-30A	Yes	CA_2A-30A-66A	Yes	CA_2A-30A-66A-66A	No		
CA_2A-48A	Yes	CA_2A-48A-66A	Yes	CA_2A-48C-66A	Yes	CA_2A-48D-66A	No
		CA_2A-48C	Yes	CA_2A-48D	Yes	CA_2A-48E	No
CA_2A-4A	Yes	CA_2A-4A-13A	No				
		CA_2A-4A-4A	Yes	CA_2A-4A-4A-5A	No		
		CA_2A-4A-5A	Yes				
CA_2A-5A	Yes	CA_2A-5A-30A	No				
		CA_2A-5A-48A	Yes	CA_2A-5A-48C	No		
		CA_2A-5A-66A	Yes	CA_2A-5A-66A-66A	Yes		
				CA_2A-5A-66B	Yes		
				CA_2A-5A-66C	Yes		
CA_2A-66A	Yes	CA_2A-66A-66A	Yes	CA_2A-66A-66A-66A	No		
		CA_2A-66B	Yes				
CA_4A-12A	Yes	CA_4A-12A-30A	No				
CA_4A-13A	Yes						
CA_4A-30A	Yes						
CA_4A-48A	Yes	CA_4A-48C	Yes	CA_4A-48D	Yes	CA_4A-48E	No
CA_4A-4A	Yes	CA_4A-4A-12A	No				
		CA_4A-4A-13A	No				
		CA_4A-4A-5A	No				
CA_4A-5A	Yes	CA_4A-5A-30A	No				
CA_5A-30A	Yes	CA_5A-30A-66A	Yes	CA_5A-30A-66A-66A	No		
CA_5A-48A	Yes	CA_5A-48A-66A	Yes	CA_5A-48D	No		
		CA_5A-48C	Yes	CA_5A-48C-66A	No		
CA_5A-66A	Yes	CA_5A-66A-66A	Yes				
		CA_5A-66B	Yes				
		CA_5A-66C	Yes				
CA_12A-30A	Yes	CA_12A-30A-66A	Yes	CA_12A-30A-66A-66A	No		