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NEAR-FIELD POWER DENSITY EVALUATION REPORT

Applicant Name: **SAMSUNG Electronics Co., Ltd.** 129, Samsung-ro, Yeongtong-gu, Suwon-Si, Gyeonggi-do, 16677 Rep. of Korea	**Date of Issue: Oct**.16, 2023 **Test Report No.:** HCT-SR-2310-FC002 **Test Site: HCT CO., LTD.**

FCC ID: A3LSMS926U

Equipment Type:	**Mobile Phone**
Application Type	**Certification**
FCC Rule Part(s):	**CFR §2.1093**
Model Name:	**SM-S926U**
Additional Model Name	**SM-S926U1**
Date of Test:	**Sep. 20, 2023 ~ Sep. 30, 2023**

Band & Mode	Tx. Frequency	Measured psPD	Reported psPD
	MHz	mW/cm²	mW/cm²
5G NR - n258	24 250 MHz ~ 24 450 MHz, 24 750 MHz ~ 25 250 MHz	0.585	0.871
5G NR - n260	37 000 MHz – 40 000 MHz	0.524	0.871
5G NR - n261	27 500 MHz – 28 350 MHz	0.634	0.871
Total Exposure Ratio		0.984	

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested By

Da-Sol Lee
Test Engineer
SAR Team
Certification Division

Reviewed By

Yun-Jeang, Heo
Technical Manager
SAR Team
Certification Division

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REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	Oct. 16, 2023	Initial Release

CONTENTS

1. Test Location 4
2. Information of the EUT 5
3. Description of test equipment 8
4. RF Exposure Limits 10
5. Input Power Specifications 11
6. System Verification 18
7. Power Density Data Summary 20
8. Combined Power Density Verification 24
9. The Total Exposure Ratio 25
10. Measurement Uncertainty 37
11. Power Density Test Equipment 38
12. Conclusion 39
13. References 40
Appendix A. – DUT Ant. Information & SETUP PHOTO 41
Appendix B _Power Density Test Plots
Appendix C _ System Check Plots
Appendix D _ Probe Calibration Data
Appendix E _ Verification source Calibration Data

1. Test Location

1.1 Test Laboratory

Company Name	HCT Co., Ltd.
Address	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
Telephone	031-645-6300
Fax.	031-645-6401

1.2 Test Facilities

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

Korea	National Radio Research Agency (Designation No. KR0032)
	KOLAS (Testing No. KT197)

2. Information of the EUT

Model Name	SM-S926U
Additional Model Name	SM-S926U1
Equipment Type	Mobile Phone
FCC ID	A3LSMS926U
Application Type	Certification
Applicant	SAMSUNG Electronics Co., Ltd.

2.1 5G mmWave NR Device Description.

Item.		Description
Frequency Range	NR Band n258	24 250 MHz ~ 24 450 MHz; 24 750 MHz ~ 25 250 MHz
	NR Band n260	37 000 MHz – 40 000 MHz
	NR Band n261	27 000 MHz – 28 500 MHz
Channel Bandwidths	NR Band n258	50 MHz, 100 MHz
	NR Band n260	50 MHz, 100 MHz
	NR Band n261	50 MHz, 100 MHz

Ch. No.& Freq		Low channel		Middle channel		High Channel	
		Channel	Frequency	Channel	Frequency	Channel	Frequency
NR Band n261	100 MHz	2071667	27550.08	2077915	27924.96	2084165	28299.96
	50 MHz	2071249	27525	2077915	27924.96	2084581	28324.92
NR Band n260	100 MHz	2229999	37050	2254165	38499.96	2278331	39949.92
	50 MHz	2229853	37025.04	2254165	38499.96	2278749	39975
NR Band n258	100 MHz	2018333	24350.04	2025833	24800.04	2032499	25200
	50 MHz	2018333	24350.04	2025417	24775.08	2032915	25224.96

Subcarrier Spacing (kHz)	120
Total Number of Supported Uplink CCs (SISO)	4 (DFT-s-OFDM, CP-OFDM)
Total Number of Supported Uplink CCs (MIMO)	4 (DFT-s-OFDM, CP-OFDM)
Total Number of Supported DL CCs	4 (CP-OFDM)
Modulations Supported in UL	DFT-S-OFDM:Pi/2 BPSK, QPSK,16QAM, 64QAM CP-OFDM: QPSK, 16QAM, 64QAM
LTE Anchor Bands (n260)	LTE Band 2/5/12/13/14/30/48/66
LTE Anchor Bands (n261)	LTE Band 2/5/12/13/48/66
LTE Anchor Bands (n258)	LTE Band 2/5/12/66/71
NR FR1 Anchor Bands (n258)	NR Band n2/12/25/41/66/77
NR FR1 Anchor Bands (n260)	NR Band n2/5/12/25/30/41/48/66/77
NR FR1 Anchor Bands (n261)	NR Band n2/5/25/41/48/66/77
Duplex Type (mmWave)	TDD
Device Serial Numbers	WCK0881M, R32W3001R8J : PD#2 WCK0891M R32W3001RDN :PD#3

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

2.2 Time-Averaging Algorithm for RF Exposure Compliance

The device is enabled with Qualcomm® Smart Transmit (GEN2) feature. This feature performs time averaging algorithm in real time to control and manage transmitting power and ensure the time-averaged RF exposure is in compliance with FCC requirements all the time.

The Smart Transmit algorithm maintains the time-averaged transmit power, in turn, time-averaged RF exposure of SAR_design_target or PD_design_target, below the predefined time-averaged power limit (i.e., Plimit for sub-6 radio, and input.power.limit for 5G mmW NR), for each characterized technology and band (see Part 0 Test Report). Smart Transmit allows the device to transmit at higher power instantaneously when needed, but manages power limiting to maintain time-averaged transmit power to input.power.limit.
The purpose of this report (Part 1 test) is to demonstrate that the EUT meets FCC PD limits when transmitting in static transmission scenario at maximum allowable time-averaged power level given by input.power.limit

Power density Design Target and Uncertainty	
PD_design_target (mW/m²)	0.631
Design Related Total Uncertainty (dB)	1.4

2.3 Test Regulations

November 2017, October 2018, April 2019, November 2019 TCBC Workshop Notes
SPEAG DASY6 System Handbook (September 2019)
IEC TR 63170:2018
FCC KDB 865664 D02 v01r02
FCC KDB 447498 D01 v06

2.4 DUT Antenna Locations

The device has 2 patch antenna arrays (M Patch, N Patch) . Tablebelow indicates the surfaces evaluated for part 1 near field power density evaluation.

5G mmWave NR Device Surfaces

Band	Antenna	Rear(S2)	Front(S1)	Left(S3)	Right(S4)	Bottom(S6)	Top(S5)
5G NR Band n261	Patch M(1)	Yes	No	Yes	No	No	No
	Patch N(0)	Yes	Yes	No	Yes	No	No
5G NR Band n260	Patch M(1)	Yes	No	Yes	No	No	No
	Patch N(0)	Yes	Yes	No	Yes	No	No
5G NR Band n258	Patch M(1)	Yes	No	Yes	No	No	No
	Patch N(0)	Yes	Yes	No	Yes	No	No

Note:
1. All test configurations are based on front position view.
2. Additional surfaces were evaluated for simultaneous transmission analysis.

2.5 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D01v06, transmitters are considered to be operating simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds.
This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v06 4.3.2 procedures.

5G mmWave NR Simultaneous Transmission Scenarios			
Applicable Combination	**Head**	**Wireless Router**	**Phablet**
LTE + 5G NR FR2	Yes	N/A	Yes
LTE + 2.4 GHz WI-FI + 5G FR2	Yes	Yes	Yes
LTE + 5 GHz WI-FI + 5G NR FR2	Yes	Yes	Yes
LTE + 6 GHz WI-FI + 5G NR FR2	Yes	N/A	Yes
LTE + 2.4 GHz Bluetooth + 5G NR FR2	Yes^	Yes^	Yes
LTE + 2.4 GHz Bluetooth + 5 GHz WI-FI + 5G NR FR2	Yes^	N/A	Yes
LTE + 2.4 GHz Bluetooth + 6 GHz WI-FI + 5G NR FR2	Yes^	Yes	Yes
LTE + 2.4 GHz WI-FI + 5 GHz WI-FI + 5G NR FR2	Yes	Yes	Yes
LTE + 2.4 GHz WI-FI + 6 GHz WI-FI + 5G NR FR2	Yes	N/A	Yes
LTE + 2.4 GHz Bluetooth + 5 GHz WI-FI + 5G NR FR2	Yes^	Yes^	Yes
LTE + 2.4 GHz Bluetooth + 6 GHz WI-FI + 5G NR FR2	Yes^	N/A	Yes
5G NR FR1 + 5G NR FR2	Yes	N/A	Yes
5G NR FR1 + 2.4 GHz WI-FI + 5G FR2	Yes	Yes	Yes
5G NR FR1 + 5 GHz WI-FI + 5G NR FR2	Yes	Yes	Yes
5G NR FR1 + 6 GHz WI-FI + 5G NR FR2	Yes	N/A	Yes
5G NR FR1 + 2.4 GHz Bluetooth + 5G NR FR2	Yes^	Yes^	Yes
5G NR FR1 + 2.4 GHz Bluetooth + 5 GHz WI-FI + 5G NR FR2	Yes^	Yes^	Yes
5G NR FR1 + 2.4 GHz Bluetooth + 6 GHz WI-FI + 5G NR FR2	Yes^	N/A	Yes
5G NR FR1 + 2.4 GHz WI-FI + 5 GHz WI-FI + 5G NR FR2	Yes	Yes	Yes
5G NR FR1 + 2.4 GHz WI-FI + 6 GHz WI-FI + 5G NR FR2	Yes	Yes	Yes

Note:

1. 5G NR Operations are limited to Non-Standalone (EN-DC) operations only.
2. NR mmWave antenna arrays cannot transmit simultaneously.
3. LTE + 5G NR FR2 and 5G NR FR1 + 5G NR FR2 Scenarios are limited to EN-DC combinations with anchor bands as shown in the NR FR2 checklists
4. 2.4 GHz WLAN, and 2.4 GHz Bluetooth share the same antenna path and cannot transmit simultaneously
5. This device supports time averaging smart transmit algorithm in WWAN and WLAN. Smart transmit adds directly the time-averaged RF exposure from 4G/5G NR FR1/WLAN and time-averaged RF exposure from 5G mmW NR FR2 to ensure that the normalized RF exposure from both 4G/5G NR FR1/WLAN and 5G mmW NR FR2 does not exceed FCC limit.
7. ^ Bluetooth Tethering is considered

3. Description of test equipment

3.1 MEASUREMENT SETUP

Peak spatially averaged power density (psPD) measurements for mmWave frequencies were performed using the DASY6 with cDASY6 5G module.
The DASY6 is made by Schmid & Partner Engineering AG (SPEAG) in Zurich,Switzerland and consists of a high precisi on robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the 5G phantom. The robot is a six-axis industrial robot, performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF)

3.2 SPEAG EUmmWV3 Probe / E-Field 5G Probe

The EUmmWV3 probe consists of two dipoles optimally arranged to obtain pseudo-vector information.

Frequency Range	750 MHz – 110 GHz
Dynamic Range	< 20 V/m – 10,000 V/m with PRE-10 (min < 50 V/m – 3,000 V/m)
Position Precision	< 0.2 mm (cDASY6)
Dimensions	Probe Overall Length: 320 mm Probe Body Diameter: 8 mm Probe Tip Length: 23 mm Probe Tip Diameter: Encapsulation 8 mm Distance from Probe Tip to Sensor X Calibration Point: 1.5 mm Distance from Probe Tip to Sensor Y Calibration Point: 1.5 mm
Applications	E-field measurements of 5G devices and other mm-wave transmitters operating above 10 GHz in < 2 mm distance from device (free-space) Power density, H-field and far-field analysis using total field reconstruction
Compatibility	cDASY6 + 5G-Module SW2.0.2.34

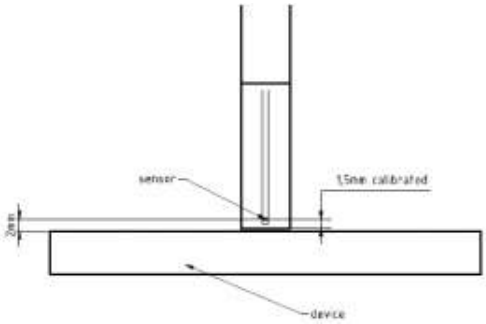


Figure 1. **EUmmWV3 Probe**

3.3 Peak Spatially Averaged Power Density Assessment Based on E-fieldMeasurements

Within a short distance from the transmitting source, power density was determined based on both electric and magnetic fields. Generally, the magnitude and phase of two components of either the E-field or H-field were needed on a sufficiently large surface to fully characterize the total E-field and H-field distributions. Nevertheless, solutions based on direct measurement of E-field and H-field can be used to compute power density. The general measurement approach used for this device was:

a)The local E field on the measurement surface was measured at a reference location where the field is well above the noise level. This reference level was used at the end of this procedure to assess output power drift of the DUT during the measurement.

b)The electric field on the measurement surface was scanned. Measurements are conducted according to the instructions provided by the measurement system manufacturer. Measurement spatial resolution can depend on the measured field characteristic and measurement methodology used by the system. The planar scan step size was configured at λ/4.

c)For cDASY6, H-field was calculated from the measured E-field using a reconstruction algorithm. As the power density calculation requires knowledge of both amplitude and phase, reconstruction algorithms can also be used to obtain field information from the measured E-field data (e.g. the phase from the amplitude if only the amplitude is measured). H-field and phase data was reconstructed from repeated measurements (three per measurement point) on two measurement planes separated by λ/4.

d)The total Peak spatially averaged power density (psPD) distribution on the evaluation surface is determined per the below equation. The spatial averaging area, *A*, is specified by the applicable exposure limits or regulatory requirements. A circular shape was used.

$$psPD = \frac{1}{2A_{av}} \iint_{A_{av}} \| Re\{E \times H^*\} \| dA$$

f) The local E field reference value, at the same location as step 2, was re-measured after the scan was complete to calculate the power drift. If the drift deviated by more than 5%, the power density test and drift measurements were repeated.

3.4 Reconstruction Algorithm

Computation of the power density in general requires measurement information from the both E-field and H-field amplitudes and phases in the plane of incidence. Reconstruction of these quantities from pseudo-vector E-field measurements is feasible according to the manufacturer, as they are determined via Maxwell's equations. As such, the SPEAG reconstruction approach was based on the Gerchberg-Saxton algorithm, which benefits from the availability of the E-field polarization ellipse information obtained with the EUmmWV3 probe.

4. RF Exposure Limits

Per §1.1310 (d)(3), the MPE limits are applied for frequencies above 6 GHz. Power Density is expressed in unitsof W/m^2 or mW/cm^2.
Peak Spatially Averaged Power Density was evaluated over a circular area of 4 cm^2 per interim FCC Guidance
For near-field power density evaluations per October 2018 TCB Workshop notes.

HUMAN EXPOSURE	Limits For Occupational / Controlled Environments	Limits For General Population / Uncontrolled Environments
Frequency Range[MHz]	1,500 – 100,000	1,500 – 100,000
Power Density[mW/㎠]	5.0	1.0
Average Time[Minutes]	6	30

NOTES: 1.0 mW/cm^{2}is 10 W/m^2

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

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

5. Input Power Specifications

All power density measurements for this device were performed at the input.power.limit given in below tables.

Table 5-1 5G NR n258 M Patch input.power.limit

Antenna	Beam ID_1	Beam ID_2	Input.power.limit(dBm)
M Patch	0		**12.2**
	2		**11.4**
	4		**10.8**
	6		**10.9**
	8		**11.3**
	10		**8.2**
	11		**7.1**
	12		**7.4**
	13		**8.8**
	18		**8.1**
	19		**9.4**
	20		**9.0**
	24		**5.2**
	25		**4.6**
	26		**3.8**
	27		**4.3**
	28		**5.0**
	34		**5.1**
	35		**4.0**
	36		**3.8**
	37		**4.6**
	256		**10.8**
	258		**9.6**
	260		**9.6**
	262		**9.6**
	264		**9.9**
	266		**6.9**
	267		**6.1**
	268		**6.1**
	269		**7.6**
	274		**6.4**
	275		**5.9**
	276		**6.2**
	280		**2.4**
	281		**2.8**
	282		**2.8**
	283		**2.4**
	284		**1.7**
	290		**2.3**
	291		**2.7**
	292		**2.6**
	293		**2.0**
	0	256	**8.3**
	2	258	**7.2**
	4	260	**7.0**
	6	262	**6.9**
	8	264	**7.1**
	10	266	**4.0**
	11	267	**3.7**
	12	268	**3.3**
	13	269	**4.9**
	18	274	**3.5**
	19	275	**3.9**
	20	276	**3.9**
	24	280	**-0.7**
	25	281	**0.0**
	26	282	**0.1**
	27	283	**-0.2**
	28	284	**-0.8**
	34	290	**-0.4**
	35	291	**0.0**
	36	292	**-0.2**
	37	293	**-0.5**

Table 5-2 5G NR n258 N Patch input.power.limit

Antenna	Beam ID_1	Beam ID_2	Input.power.limit(dBm)
N Patch	1		**10.3**
	3		**9.3**
	5		**9.5**
	7		**9.5**
	9		**10.6**
	14		**6.1**
	15		**5.4**
	16		**6.6**
	17		**7.9**
	21		**5.6**
	22		**6.6**
	23		**8.0**
	29		**2.0**
	30		**1.6**
	31		**1.8**
	32		**2.5**
	33		**3.4**
	38		**1.7**
	39		**1.6**
	40		**2.1**
	41		**2.8**
	257		**12.7**
	259		**13.2**
	261		**13.1**
	263		**13.0**
	265		**12.6**
	270		**9.2**
	271		**8.7**
	272		**9.8**
	273		**11.8**
	277		**8.8**
	278		**8.8**
	279		**10.5**
	285		**4.9**
	286		**4.5**
	287		**4.9**
	288		**5.5**
	289		**6.7**
	294		**4.6**
	295		**4.9**
	296		**5.1**
	297		**6.1**
	1	257	**7.6**
	3	259	**7.0**
	5	261	**7.0**
	7	263	**6.9**
	9	265	**7.7**
	14	270	**4.5**
	15	271	**3.1**
	16	272	**4.1**
	17	273	**6.0**
	21	277	**3.4**
	22	278	**5.1**
	23	279	**6.4**
	29	285	**-0.6**
	30	286	**-1.2**
	31	287	**-0.7**
	32	288	**0.1**
	33	289	**1.3**
	38	294	**-1.1**
	39	295	**-1.0**
	40	296	**-0.5**
	41	297	**0.7**

Table 5-3 5G NR n261 M Patch input.power.limit

Antenna	Beam ID_1	Beam ID_2	Input.power.limit(dBm)
M Patch	0		**11.4**
	2		**11.2**
	4		**10.8**
	6		**10.2**
	8		**10.8**
	10		**10.0**
	11		**6.8**
	12		**7.8**
	13		**8.6**
	18		**6.7**
	19		**6.9**
	20		**8.1**
	24		**4.8**
	25		**3.7**
	26		**3.4**
	27		**3.6**
	28		**5.2**
	34		**4.5**
	35		**3.4**
	36		**3.4**
	37		**4.3**
	256		**10.3**
	258		**9.4**
	260		**9.5**
	262		**9.1**
	264		**10.0**
	266		**6.7**
	267		**6.2**
	268		**6.1**
	269		**6.2**
	274		**6.2**
	275		**6.0**
	276		**6.3**
	280		**1.9**
	281		**2.6**
	282		**2.7**
	283		**2.4**
	284		**2.2**
	290		**2.2**
	291		**2.9**
	292		**2.7**
	293		**1.8**
	0	256	**7.5**
	2	258	**6.7**
	4	260	**7.2**
	6	262	**6.3**
	8	264	**7.3**
	10	266	**4.6**
	11	267	**3.5**
	12	268	**3.6**
	13	269	**4.2**
	18	274	**4.0**
	19	275	**3.8**
	20	276	**4.4**
	24	280	**-0.5**
	25	281	**-0.2**
	26	282	**-0.1**
	27	283	**-0.3**
	28	284	**-0.1**
	34	290	**-0.3**
	35	291	**-0.2**
	36	292	**-0.1**

	37	293	**-0.5**

Table 5-4 5G NR n261 N Patch input.power.limit

Antenna	Beam ID_1	Beam ID_2	Input.power.limit(dBm)
N Patch	1		**10.4**
	3		**10.0**
	5		**10.1**
	7		**9.9**
	9		**9.9**
	14		**7.4**
	15		**6.5**
	16		**6.5**
	17		**7.2**
	21		**7.0**
	22		**6.2**
	23		**7.8**
	29		**2.6**
	30		**2.3**
	31		**2.4**
	32		**2.3**
	33		**2.8**
	38		**2.5**
	39		**2.4**
	40		**2.4**
	41		**2.3**
	257		**11.5**
	259		**10.7**
	261		**10.6**
	263		**10.7**
	265		**11.7**
	270		**8.0**
	271		**6.9**
	272		**7.3**
	273		**8.0**
	277		**7.6**
	278		**6.6**
	279		**7.0**
	285		**3.6**
	286		**2.9**
	287		**3.0**
	288		**3.0**
	289		**3.8**
	294		**3.2**
	295		**2.9**
	296		**2.9**
	297		**3.3**
	1	257	**7.4**
	3	259	**6.7**
	5	261	**6.9**
	7	263	**6.7**
	9	265	**7.0**
	14	270	**4.2**
	15	271	**3.2**
	16	272	**4.5**
	17	273	**5.0**
	21	277	**3.6**
	22	278	**2.9**
	23	279	**4.0**
	29	285	**-0.5**
	30	286	**-1.0**
	31	287	**-0.8**
	32	288	**-1.0**
	33	289	**-0.5**
	38	294	**-0.8**
	39	295	**-0.8**

	40	296	**-0.9**
	41	297	**-1.0**

Table 5-3 5G NR n260 M Patch input.power.limit

Antenna	Beam ID_1	Beam ID_2	Input.power.limit(dBm)
M Patch	0		**12.7**
	2		**12.3**
	4		**11.8**
	6		**11.9**
	8		**13.0**
	10		**8.8**
	11		**10.2**
	12		**9.9**
	13		**8.7**
	18		**8.9**
	19		**9.6**
	20		**8.4**
	24		**5.1**
	25		**7.1**
	26		**6.2**
	27		**5.7**
	28		**4.5**
	34		**6.3**
	35		**7.3**
	36		**6.0**
	37		**5.2**
	256		**12.1**
	258		**11.0**
	260		**10.4**
	262		**11.1**
	264		**11.9**
	266		**7.7**
	267		**8.6**
	268		**8.1**
	269		**8.4**
	274		**7.8**
	275		**8.2**
	276		**7.4**
	280		**5.1**
	281		**4.8**
	282		**5.1**
	283		**4.2**
	284		**5.1**
	290		**4.6**
	291		**4.7**
	292		**4.7**
	293		**4.2**
	0	256	**9.0**
	2	258	**8.4**
	4	260	**7.7**
	6	262	**8.2**
	8	264	**9.3**
	10	266	**4.6**
	11	267	**6.2**
	12	268	**6.0**
	13	269	**5.2**
	18	274	**5.5**
	19	275	**5.4**
	20	276	**4.6**
	24	280	**1.7**
	25	281	**2.2**
	26	282	**2.6**
	27	283	**1.4**
	28	284	**1.6**
	34	290	**1.8**

	35	291	**2.3**
	36	292	**1.9**
	37	293	**1.4**

Table 5-4 5G NR n260 N Patch input.power.limit

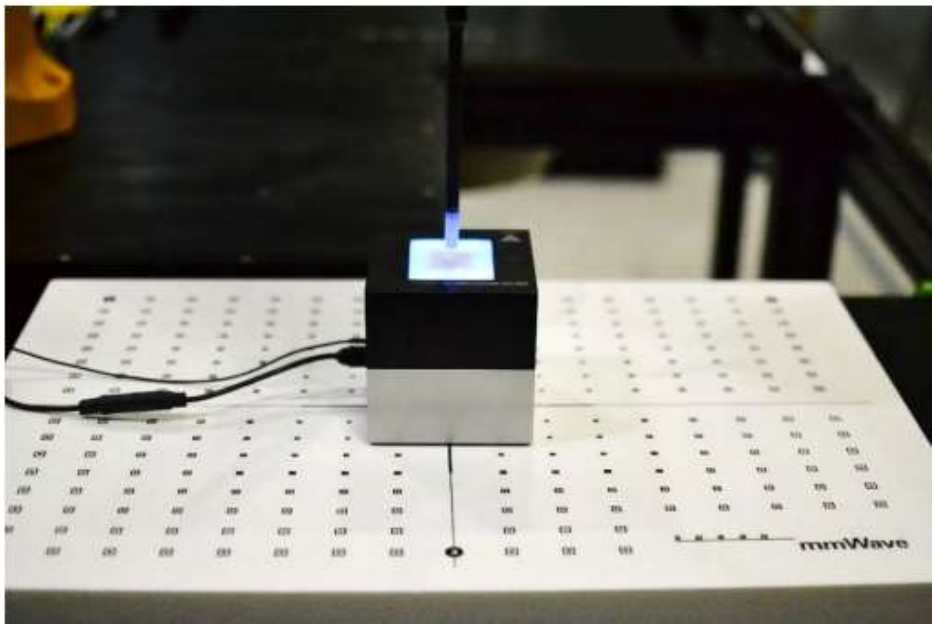
Antenna	Beam ID_1	Beam ID_2	Input.power.limit(dBm)
N Patch	1		**8.7**
	3		**8.4**
	5		**8.2**
	7		**8.6**
	9		**9.4**
	14		**5.5**
	15		**6.8**
	16		**5.7**
	17		**5.4**
	21		**6.0**
	22		**6.2**
	23		**4.8**
	29		**1.6**
	30		**2.9**
	31		**3.3**
	32		**2.2**
	33		**1.4**
	38		**2.3**
	39		**3.0**
	40		**3.4**
	41		**1.5**
	257		**9.8**
	259		**9.4**
	261		**8.9**
	263		**8.9**
	265		**9.4**
	270		**6.6**
	271		**6.4**
	272		**6.2**
	273		**6.4**
	277		**6.4**
	278		**6.0**
	279		**5.9**
	285		**3.4**
	286		**2.3**
	287		**2.5**
	288		**3.7**
	289		**3.8**
	294		**2.6**
	295		**2.4**
	296		**3.2**
	297		**3.8**
	1	257	**5.8**
	3	259	**5.4**
	5	261	**5.0**
	7	263	**5.2**
	9	265	**6.1**
	14	270	**2.4**
	15	271	**2.8**
	16	272	**2.7**
	17	273	**2.5**
	21	277	**2.7**
	22	278	**3.3**
	23	279	**2.0**
	29	285	**-1.1**
	30	286	**-0.8**
	31	287	**-0.8**
	32	288	**-0.5**
	33	289	**-1.0**

	38	294	**-1.0**
	39	295	**-0.8**
	40	296	**-0.5**
	41	297	**-0.8**

6. System Verification

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.



System Verification Setup Photo

6.1 System Check Results

System Verification									
Freq. (GHz)	Date	Source	Probe SN	Normal psPD (W/m² over 4 cm²)		Deviation (dB)	Total psPD (W/m² over 4 cm²)		Deviation (dB)
		S/N		measured	target		measured	target	
30	09/20/2023	1011	9486	13.6	14.6	- 0.31	13.8	14.8	- 0.30
30	09/21/2023	1011	9486	13.6	14.6	- 0.31	13.7	14.8	- 0.34
30	09/22/2023	1011	9486	13.6	14.6	- 0.31	13.8	14.8	- 0.30
30	09/23/2023	1011	9486	13.5	14.6	- 0.34	13.7	14.8	- 0.34
30	09/24/2023	1011	9486	13.7	14.6	- 0.28	13.8	14.8	- 0.30
30	09/25/2023	1011	9486	13.6	14.6	- 0.31	13.8	14.8	- 0.30
30	09/26/2023	1011	9486	13.6	14.6	- 0.31	13.8	14.8	- 0.30
30	09/27/2023	1011	9486	13.6	14.6	- 0.31	13.8	14.8	- 0.30
30	09/28/2023	1011	9486	13.7	14.6	- 0.28	13.9	14.8	- 0.27
30	09/29/2023	1011	9486	13.5	14.6	- 0.34	13.7	14.8	- 0.34
30	09/30/2023	1011	9486	13.7	14.6	- 0.28	13.9	14.8	- 0.27

Note: A **10 mm distance spacing** was used from the reference horn antenna aperture to the probe element.
This includes 4.45 mm from the reference antenna horn aperture to the surface of the verification source plus5.55 mm from the surface to the probe. The SPEAG software requires a setting of “5.55 mm” for the correct setup.

7. Power Density Data Summary

7.1 Power Density Results

Power density measurements were performed with DUT transmitting at input.power.limit for one single beam for each polarization (H&V) and one beam pair, for each antenna on each worst surfaces

NR Band n258												
Frequency		Ant.	Beam ID1	Beam ID2	Input.power	Ant	Test Position	Distance	Power Drift	Normal psPD	Total psPD	Plot No.
MHz	Ch.		V	H	(dBm)			(mm)	(dB)	(mW/cm²)	(mW/cm²)	
25200	2032499	M Patch	36	-	3.8	SISO	Rear	2	0.15	0.292	0.407	-
25200	2032499		35	-	4.0	SISO	Left	2	-0.13	0.118	0.165	-
25200	2032499		-	284	1.7	SISO	Rear	2	0.05	0.277	**0.585**	1
24800.04	2025833		-	284	1.7	SISO	Left	2	-0.03	0.194	0.233	-
24800.04	2025833		28	284	-0.8	MIMO	Rear	2	0.13	0.272	0.525	-
25200	2032499		24	280	-0.7	MIMO	Left	2	-0.12	0.0831	0.0954	
25200	2032499	N Patch	40	-	2.1	SISO	Rear	2	-0.15	0.185	0.250	-
2435.04	2018333		39	-	1.6	SISO	Front	2	-0.09	0.0442	0.0700	-
25200	2032499		39	-	1.6	SISO	Right	2	-0.10	0.225	0.309	-
25200	2032499		-	288	5.5	SISO	Rear	2	0.09	0.209	0.274	-
24350.04	2018333		-	286	4.5	SISO	Front	2	0.18	0.137	0.162	-
25200	2032499		-	286	4.5	SISO	Right	2	0.14	0.418	**0.450**	2
24350.04	2018333		40	296	-0.5	MIMO	Rear	2	0.10	0.120	0.157	-
24350.04	2018333		30	286	-1.2	MIMO	Front	2	-0.11	0.103	0.019	-
25200	2032499		30	286	-1.2	MIMO	Right	2	0.17	0.236	0.296	-
47 CFR §1.1310 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/ General Population							Power Density 1 mW/cm² Averaged over 4 cm²					

NR Band n260												
Frequency		Ant.	Beam ID1	Beam ID2	Input.power	Ant	Test Position	Distance	Power Drift	Normal psPD	Total psPD	Plot No.
MHz	Ch.		V	H	(dBm)			(mm)	dB	(mW/cm²)	(mW/cm²)	
38499.96	2254165	M Patch	28	-	4.5	SISO	Rear	2	0.05	0.206	0.374	-
39949.92	2278331		28	-	4.5	SISO	Left	2	0.16	0.222	0.241	-
39949.92	2278331		-	283	4.2	SISO	Rear	2	0.13	0.344	0.491	-
38499.96	2254165		-	281	4.8	SISO	Left	2	0.17	0.145	0.260	-
39949.92	2278331		37	293	1.4	MIMO	Rear	2	0.12	0.329	**0.524**	3
39949.92	2278331		24	280	1.7	MIMO	Left	2	-0.12	0.134	0.161	
39949.92	2278331	N Patch	29	-	1.6	SISO	Rear	2	0.00	0.127	0.139	-
39949.92	2278331		39	-	3.0	SISO	Front	2	0.12	0.170	0.206	-
38499.96	2254165		33	-	1.4	SISO	Right	2	0.15	0.241	0.389	4
37050	2229999		-	295	2.4	SISO	Rear	2	-0.11	0.0907	0.222	-
38499.96	2254165		-	286	2.3	SISO	Front	2	-0.12	0.120	0.180	-
38499.96	2254165		-	286	2.3	SISO	Right	2	0.14	0.250	0.344	-
39949.92	2278331		29	285	-1.1	MIMO	Rear	2	0.07	0.114	0.123	-
39949.92	2278331		30	286	-0.8	MIMO	Front	2	0.06	0.158	0.175	-
39949.92	2278331		29	285	-1.1	MIMO	Right	2	0.16	0.239	0.350	-
47 CFR §1.1310 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/ General Population							Power Density 1 mW/cm² Averaged over 4 cm²					

NR Band n261												
Frequency		Ant.	Beam ID1	Beam ID2	Input.power	Ant	Test Position	Distance	Power Drift	Normal psPD	Total psPD	Plot No.
MHz	Ch.		V	H	(dBm)			(mm)	dB	(mW/cm²)	(mW/cm²)	
27550.08	2071667	M Patch	35	-	3.4	SISO	Rear	2	0.10	0.364	0.478	-
28299.96	2084165		35	-	3.4	SISO	Left	2	-0.16	0.0987	0.175	-
27550.08	2071667		-	293	1.8	SISO	Rear	2	-0.06	0.421	**0.634**	5
28299.96	2084165		-	293	1.8	SISO	Left	2	-0.02	0.225	0.249	-
27550.08	2071667		37	293	-0.5	MIMO	Rear	2	0.01	0.408	0.573	-
27550.08	2071667		37	293	-0.5	MIMO	Left	2	-0.07	0.222	0.253	
27550.08	2071667	N Patch	39	-	2.4	SISO	Rear	2	-0.10	0.106	0.154	-
28299.96	2084165		30	-	2.3	SISO	Front	2	0.05	0.110	0.139	-
27550.08	2071667		32	-	2.3	SISO	Right	2	0.13	0.252	0.322	-
28299.96	2084165		-	289	3.8	SISO	Rear	2	-0.14	0.195	0.214	-
28299.96	2084165		-	295	2.9	SISO	Front	2	0.11	0.299	0.311	-
28299.96	2084165		-	295	2.9	SISO	Right	2	-0.02	0.590	0.628	6
27924.96	2077915		30	286	-1.0	MIMO	Rear	2	0.19	0.123	0.147	-
27550.08	2071667		30	286	-1.0	MIMO	Front	2	0.15	0.126	0.166	-
27550.08	2071667		32	288	-1.0	MIMO	Right	2	0.10	0.280	0.365	-
47 CFR §1.1310 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/ General Population							Power Density 1 mW/cm² Averaged over 4 cm²					

5G mmWaveNR Band n258 Additional Surface											
Frequency		Mode/ Ant.	Beam ID1	Beam ID2	Input power	Ant	Test Position	Distance	Normal psPD	Total psPD	Plot No.
MHz	Ch.		V	H	(dBm)			(mm)	(mW/cm²)	(mW/cm²)	
24800.04	2025833	M Patch	34	-	5.0	SISO	Front	2	0.0507	0.0546	-
24800.04	2025833		24	-	5.2	SISO	Top	2	0.150	0.161	-
24800.04	2025833	N Patch	17	-	7.9	SISO	Bottom	2	0.0156	0.018	-
47 CFR §1.1310 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/ General Population							Power Density 1 mW/cm² Averaged over 4 cm²				

5G mmWaveNR Band n260Additional Surface											
Frequency		Mode/ Ant.	Beam ID1	Beam ID2	Input power	Ant	Test Position	Distance	Normal psPD	Total psPD	Plot No.
MHz	Ch.		V	H	(dBm)			(mm)	(mW/cm²)	(mW/cm²)	
38499.96	2254165	M Patch	35	-	7.3	SISO	Front	2	0.017	0.0196	-
38499.96	2254165		24	-	5.1	SISO	Top	2	0.0921	0.102	-
38499.96	2254165	N Patch	-	295	2.3	SISO	Front	2	0.0231	0.0266	-
38499.96	2254165		32	-	2.1	SISO	Bottom	2	0.0373	0.0382	
47 CFR §1.1310 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/ General Population							Power Density 1 mW/cm² Averaged over 4 cm²				

5G mmWaveNR Band n261 Additional Surface											
Frequency		Mode/ Ant.	Beam ID1	Beam ID2	Input power	Ant	Test Position	Distance	Normal psPD	Total psPD	Plot No.
MHz	Ch.		V	H	(dBm)			(mm)	(mW/cm²)	(mW/cm²)	
27924.96	2077915	M Patch	0	-	11.3	SISO	Front	2	0.0495	0.0519	-
27924.96	2077915		-	280	1.9	SISO	Top	2	0.0386	0.0498	-
27924.96	2077915	N Patch	-	286	2.9	SISO	Front	2	0.147	0.153	-
27924.96	2077915		17	-	7.2	SISO	Bottom	2	0.0128	0.0142	
47 CFR §1.1310 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/ General Population							Power Density 1 mW/cm² Averaged over 4 cm²				

7.2 Power density Test Notes

General Notes:

1. The manufacturer has confirmed that the devices tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
2. Batteries are fully charged at the beginning of the measurements. The DUT was connected to a wall charger for some measurements due to the test duration. It was confirmed that the charger plugged into this DUT did not impact the near-field PD test results.
3. Power density was calculated by repeated E-field measurements on two measurement planes separated by λ/4. Please see Section 3.3 for more details of the evaluation process.
4. DUT was configured to transmit with a manufacturer provided test software to control specific antenna(s), Beam ID(s), and signal type to ensure the test configurations constant for the entire evaluation.
5. This device utilizes power reduction for some WLAN wireless modes and technologies for simultaneous transmission compliance. These mechanisms are assessed in the Part 1 SAR Test Report.
6. Per FCC TCBC Workshop Notes Apr.2020, When the device is using the Qualcomm-based method already approved by FCC there is no need to submit a pre-submission (pre-TCB) KDB to have the test plan approved
7. PD_design_target of 0.6166 mW/cm^2 was used with mmW device design related uncertainty of 1.4 dB.
8. Input.power.limit parameter for 5G mmW NR radio was calculated in Part 0 Power Density Char. Report.
9. This device is enabled with Qualcomm® Smart Transmit feature to control and manage transmitting power in real time and to ensure that the time-averaged RF exposure from WWAN is in compliance with FCC requirements. Per FCC guidance for devices enabled with Qualcomm® Smart Transmit feature, 4G LTE and 5G mmW NR simultaneous transmission scenario does not need to be evaluated under Total Exposure Ratio (TER). The validation of the time-averaging algorithm and compliance under the Tx varying transmission scenario for WWAN technologies are reported in Part 2 report
10. Per FCC guidance for devices enabled with Qualcomm® Smart Transmit feature, simultaneous transmission analysis is evaluated by combining the exposure from each WWAN and WLAN antenna. 5G mmW NR and WLAN simultaneous transmission scenario is evaluated under the Total Exposure Ratio (TER) in Section 8.
11. The Beam ID with one of the highest initial simulated power density for that surface and distance was selected for Part 1 Power Density measurements.
12. The device was configured to transmit CW wave signal for testing. Per FCC guidance for devices enabled with Qualcomm® Smart Transmit feature, additional testing was not required for different modulations (CP-OFDM QPSK, CP-OFDM 16QAM, CP-OFDM 64QAM, DFT-S-OFDM:PI/2BPSK,DFT-s-OFDMQPSK, DFT-s-OFDM 16QAM, DFT-s-OFDM 64QAM), RB configurations, component carriers, channel configurations (low channel, mid channel, high channel) since the smart transmit algorithm monitors powers on a per symbol basis, whichis independent of these signal characteristics.
13. The device was configured to MIMO configuration with H and V polarization beams transmitting together, as indicated in Section 7.1.
14. In some cases, the simulation vs. measurement for some surfaces can exceed the device's total uncertainty. Therefore, some additional tests were performed to support simultaneous transmission analysis. See Section 8.

8. Combined Power Density Verification

This device supports GEN2 Smart Transmit. The following verifications were performed per 80-w2112-4.

Measured psPD results in the below verifications were measured at a reduced power level as per the manufacturer. All psPD values were scaled to reflect the original input.power.limit (before permanent back-off applied) corresponding to the PD_design_target. The permanent back-off values are included in the Part 0 test report.

8.1 Verification Criteria 1 (Power Density per beam):

The measured psPD results from the previous section are confirmed to meet:

$$Measured\ \ psPD\ \ \leq\ \left(b_j * PD_{design_{target}} + total\ \ uncertainty\right) < FCC\ \ psPD\ \ limit$$

Table 8-1
Power Density Per Beam

PD_design_target			0.631						
Total uncertainty (dB)			1.4						
Band	Antenna	Antenna Type	Printed backoff value bj	BeamID 1	BeamID 2	Measured psPD	psPD scaled to input.power.limit without permanent back off	bj*PD_design_target+ total uncertainty	FCC psPD Limit
n258	M	Patch	0.955		293	0.634	0.688	0.955	1
n258	N	Patch	0.912		295	0.628	0.682	0.912	1
n261	M	Patch	0.955	37	293	0.524	0.569	0.955	1
n261	N	Patch	0.912	33		0.389	0.422	0.912	1
n260	M	Patch	0.955		284	0.585	0.635	0.955	1
n260	N	Patch	0.912		286	0.45	0.489	0.912	1

9. The Total Exposure Ratio

EFS version GEN V21 of Qualcomm Smart Transmit of this model is applied in Unified Mode with mmW and sub6 antenna grouping.
TER was evaluated according to document 80-W2112-4 Rev. K of YG [TER based Antenna Grouping Evaluation for Radios under Smart Transmit]

The applied antenna groups are shown in the table below.

Head DSI AGs	Antenna
Antenna Group 0[Lower position]	Main 1 , Main 2, Main 3 ,Main 4 ,M Module, N Module
Antenna Group 1[Upper position]	Sub 1,Sub 2, Sub 4 , Sub 5 ,Sub 6, M Module, N Module

Non Head DSI AGs	Antenna
Antenna Group 0[Lower position]	Main 1 , Main 2, Main 3 ,Main 4 ,N Module
Antenna Group 1[Upper position]	Sub 1,Sub 2, Sub 4 , Sub 5 ,Sub 6, M Module

TER based mmW & sub6 Antenna Grouping

Given all radios under Smart Transmit, the combined exposure (comb.exp) for n antennas belonging to antenna group k : AGk= $exp1\ (x, y, z) + exp2\ (x, y, z) + \cdots + expn(x, y, z)$

• Total normalized exposure margin to all antennas within AG_k ≤ 100% enforced by Smart Transmit, thus,

comb.exp$AGk\ x, y, z = p1 * exp1\ x, y, z + p2 * exp2\ x, y, z + \cdots + pn * expn\ x, y, z$, here, 0 ≤ pi ≤ 1 & p1 + p2 +….+pn = 1 ≤ $p1 * max\ expi\ x, y, z + p2 * max\ expi\ x, y, z + \cdots + pn * max\ expi\ x, y, z$, ∀ i = 1, 2,….n ⇒ comb.exp$AGk\ x, y, z$ ≤ max{$expi\ x, y, z$, ∀ i = 1, 2, … . n ϵAGk }

• From the above equation, it is evident that the combined exposure of AG at each point in space is captured by evaluating each individual antenna exposure distribution within the AG. Therefore, evaluating TER between antenna groups for all points in space can be demonstrated by performing TER evaluation between individual antenna pairs.

Composite SAR Exposure Distribution:

Workflow to obtain composite SAR map at surface n for ant $_{AG1}$(i) :

1. Obtain SAR distributions at surface n for radio configurations supported by ant$_{AG1}$(i):
   For all techs/bands (radio configurations) supported by ant$_{AG1}$(i) and tested in Part 1, perform 'Fast Volume Scan' to obtain 1g- or 10g-SAR distribution at surface n for each radio_configuration(k), where k = 1, 2, ….

2. Scale the amplitude for each SAR distribution:
   a) Export the 1g- or 10g-SAR distribution from the 'Fast Volume Scan' and divide it by the maximum value in the distribution to obtain normalized 1gSAR or 10gSAR distribution.

   b) Scale the resulted 1gSAR or 10gSAR distribution with <u>the adjusted SAR value</u> to obtain the scaled 1g- or 10g-SAR distribution for surface n and radio configuration k:
   1g_10g_SAR_ ant$_{AG1}$(i)_S_n (x,y,z)_radio_configuration(k)

   Here, <u>adjusted SAR value</u> = scale the SAR value (obtained from standard 'zoom scan' SAR test in Part 1) to correspond to EFS Plimit + device uncertainty if EFS Plimit < NV setting Pmax, else, it corresponds to maximum{EFS Plimit, NV setting Pmax + device uncertainty}

3. Generate Composite normalized SAR exposure distribution at surface n
   Composite SAR exposure distribution at surface n for $ant_{AG1}(i)$ given by maximum exposure distribution out of all measured radio configurations at each point in space:
   Comp.norm.exp.$ant_{AG1}(i).S_n$ (x, y, z) = max{1g_10g_SAR_ $ant_{AG1}(i)$_ S_n(x,y,z)_radio_configuration(k), k=1,2,…} / regulatory limit

Composite PD Exposure Distribution:
Workflow to obtain composite PD map at surface n for $ant_{AG1}(i)$:

1. Obtain PD distributions at surface n for radio configurations supported by antAG1(i): For all bands/beams (radio configurations) supported by $ant_{AG1}(i)$, obtain the 4cm²PD distribution for each radio configuration using validated simulation results described in Section 4.4 of Part 0 80-W2112-2 report.

2. Scale the amplitude for each PD distribution:
   a) Export the 4cm²PD distribution from simulation and divide it by the maximum value in the distribution to obtain normalized 4cm²PD distribution
   b) Scale the resulted 4cm²PD distribution with the adjusted PD value to obtain the scaled 4cm²PD distribution for surface n and radio configuration k

   4cm²_PD_ $ant_{AG1}(i)$_S_n (x,y,z)_radio_configuration(k)

   Here, adjusted PD value = in such way that the worst case 4cm²PD value (i.e., PD on the dominant surface) corresponds to PD_design_target + device uncertainty if at least one beam has input.power.limit < NV setting Pmax, else, it corresponds PD_design_target

3. Generate composite normalized PD exposure distribution at surface n
   Composite normalized PD exposure distribution at surface n for $ant_{AG1}(i)$ given by maximum exposure distribution out of all supported radio configurations at each point in space:

   Comp.norm.exp.$ant_{AG1}(i).S_n$ (x, y, z) = max{4cm²_PD _ $ant_{AG1}(i)$_ S_n (x,y,z)_radio_configuration(k), k=1,2,…} / regulatory limit.

For 5G mmW NR, since there is total design-related uncertainty arising from TxAGC and device-to-device variation, the worst-case RF exposure should be determined by accounting for this device uncertainty of 1.4 dB.
Due to the application of smart transmit EFS version 21 , it can provide maximum PD exposure up to 87%. For more information, please refer to the simulation report.

Reported_psPD = PD_Design_Target + 1.4dB = 0.87 mW/cm²

This DUT is equipped with Qualcomm WWAN band mmWave band and WLAN/BT mode with Smart Transmit EFS version 21, and the TER is evaluated according to the contents of document No. 80-W2112-4 Rev. YG.
If WLAN/BT are selected to be under Smart Transmit control in EFS version 21, then RF exposure from WLAN and BT radios are managed by Smart Transmit in the same way as WWAN radios exposure. No additional TER analysis is needed if there are no other external radios outside Smart Transmit other than WWAN/WLAN/BT as TER is covered in Part 2 testing

Simultaneous Transmission Scenarios	**Evaluation Report**
4G LTE WWAN + 5G mmW NR WWAN+ WLAN	Part2 RF Exposure Report

Simultaneous Transmission Summation Scenario with 5G mmW NR psPD – 2mm							
Antenna Module	Configuration	Evaluation Distance	Adjustment Factor due to Simulation	Adjusted Reported psPD	Measured Total psPD	Measured Total psPD x 0.871	Final Reported psPD
				(mW/cm2)	(mW/cm2)	(mW/cm2)	(mW/cm2)
M	Rear	2 mm	1	0.871	0.634	0.552	0.871
	Front	2 mm	0.204	0.178	0.0519	0.045	0.178
	Left	2 mm	0.737	0.642	0.260	0.226	0.642
	Right	2 mm	0.071	0.062	-	-	0.062
	Top	2 mm	0.270	0.235	0.150	0.131	0.235
	Bottom	2 mm	0.033	0.029	-	-	0.029
N	Rear	2 mm	1	0.871	0.274	0.239	0.871
	Front	2 mm	0.801	0.698	0.311	0.271	0.698
	Left	2 mm	0.054	0.047	-	-	0.047
	Right	2 mm	1	0.871	0.628	0.547	0.871
	Top	2 mm	0.034	0.030	-	-	0.030
	Bottom	2 mm	0.110	0.096	0.0382	0.033	0.096

Simultaneous Transmission Summation Scenario with 5G mmW NR psPD – 10mm							
Antenna Module	Configuration	Evaluation Distance	Adjustment Factor due to Simulation	Adjusted Reported psPD	Measured Total psPD	Measured Total psPD x 0.871	Final Reported psPD
				(mW/cm2)	(mW/cm2)	(mW/cm2)	(mW/cm2)
M	Rear	10 mm	0.677	0.590	0.481	0.376	0.590
	Front	10 mm	0.076	0.066	-	-	0.066
	Left	10 mm	0.385	0.335	0.202	0.158	0.335
	Right	10 mm	0.063	0.055	-	-	0.055
	Top	10 mm	0.190	0.165	-	-	0.165
	Bottom	10 mm	0.026	0.023	-	-	0.023
N	Rear	10 mm	0.544	0.474	0.104	0.081	0.474
	Front	10 mm	0.470	0.409	0.143	0.112	0.409
	Left	10 mm	0.025	0.022	-	-	0.022
	Right	10 mm	0.697	0.607	0.379	0.296	0.607
	Top	10 mm	0.031	0.027	-	-	0.027
	Bottom	10 mm	0.086	0.075	-	-	0.075

9.1 Total Exposure Ratio for each exposure condition

Table 9-1
5G mmwave NR Head Total Exposure Ratio

	Left Touch	Left Tilt	Right Touch	Right Tilt	Module M	Module N	Max
AG0 Reported SAR Max	0.294	0.117	0.143	0.180			
Ratio to Limit	0.184	0.073	0.089	0.113	0.178	0.698	0.698
AG1 Reported SAR Max	0.954	0.963	1.194	1.155			
Ratio to Limit	0.596	0.602	0.746	0.722	0.178	0.698	0.746

Table 9-2
5G mmWave NR Body/Hotspot Total Exposure Ratio

	Rear	Front	Left	Right	Top	Bottom
AG1 Reported SAR Max	0.797	0.687	0.726	0.668	0.96	
Ratio to limit	0.498	0.429	0.454	0.418	0.600	
Module N	0.474	0.409	0.022	0.607	0.027	0.075
TER	0.972	0.838	0.476	See Sec. 9.2.1	0.627	0.075

	Rear	Front	Left	Right	Top	Bottom
AG0 Reported SAR Max	1.003	0.648	0.733	0.34		1.141
Ratio to limit	0.627	0.405	0.458	0.213		0.713
Module M	0.590	0.066	0.335	0.055	0.165	0.023
TER	See Sec. 9.2.1	0.471	0.793	0.268	0.165	0.736

	Rear	Front	Left	Right	Top	Bottom
AG0 Reported SAR Max	1.003	0.648	0.733	0.34		1.141
Ratio to limit	0.627	0.405	0.458	0.213		0.713
AG1 Reported SAR Max	1.021	0.971	0.726	0.943	1.051	
Ratio to limit	0.638	0.607	0.454	0.589	0.657	
TER	See Sec. 9.2.1	0.471	0.793	0.268	0.165	0.736

Table 9-3
5G mmWave NR Phablet Total Exposure Ratio

	Rear	Front	Left	Right	Top	Bottom
AG1 Reported SAR Max	1.310	0.626	2.377	0.063	0.23	
Ratio to limit	0.328	0.157	0.594	0.016	0.058	
Module N	0.871	0.698	0.047	0.871	0.030	0.096
ER(NFC+UWB)	0.029	0.001	0.002		0.002	
Ratio to limit	0.007	0.000	0.001		0.001	
TER	See Sec. 9.2.2	0.855	0.642	0.887	0.089	0.096

9.2 Antenna Group in Each band

9.2.1 Body/Hotspot Total Exposure Ratio

AG0 Antenna Reported SAR Value & Normalized SAR

AG0		Scaled SAR	Normalized SAR	PD M	Summation
		Rear	Rear	Rear	Rear
Main 1 A	GSM 850	0.334	0.209	0.590	0.824
	GSM 1900	0.582	0.364	0.590	0.954
	UMTS 5	0.331	0.207	0.590	0.883
	UMTS 4	0.663	0.414	0.590	See Sec.9.3.1
	UMTS 2	0.422	0.264	0.590	0.854
	LTE 12	0.299	0.187	0.590	0.924
	LTE 13	0.334	0.209	0.590	0.963
	LTE 14	0.289	0.181	0.590	0.951
	LTE 25	0.398	0.249	0.590	0.839
	LTE 26	0.503	0.314	0.590	See Sec.9.3.1
	LTE 30	0.248	0.155	0.590	0.745
	LTE 66	0.586	0.366	0.590	0.956
	LTE 71	0.306	0.191	0.590	0.910
	NR n12	0.193	0.121	0.590	0.781
	NR n25	0.444	0.278	0.590	0.868
	NR n26	0.504	0.315	0.590	See Sec.9.3.1
	NR n30	0.211	0.132	0.590	0.722
	NR n66	0.723	0.452	0.590	See Sec.9.3.1
	NR n70	0.613	0.383	0.590	0.973
	NR n71	0.175	0.109	0.590	0.739
Main 2 B	LTE 7	0.511	0.319	0.590	0.909
	LTE 41	0.438	0.274	0.590	0.864
	NR n7	0.489	0.306	0.590	0.896
	NR n41	0.455	0.284	0.590	See Sec.9.3.1
Main 3 C	NR n48	0.338	0.211	0.590	0.758
	NR n77	0.389	0.243	0.590	0.833
Main 4 D	NR n41	0.126	0.079	0.590	0.673
	NR n48	0.791	0.494	0.590	See Sec.9.3.1
	NR n77	0.839	0.524	0.590	See Sec.9.3.1

AG1		Scaled SAR	Normalized SAR	PD N	Summation
		Right	Right	Right	Right
Sub1 E	GSM 850	0.486	0.304	0.607	0.911
	UMTS 5	0.376	0.235	0.607	0.842
	LTE 12	0.303	0.189	0.607	0.796
	LTE 13	0.648	0.405	0.607	See Sec.9.3.1
	LTE 14	0.668	0.418	0.607	See Sec.9.3.1
	LTE 26	0.243	0.152	0.607	0.759
	LTE 71	0.213	0.133	0.607	0.740
	NR n12	0.283	0.177	0.607	0.784
	NR n26	0.247	0.154	0.607	0.761
	NR n41	0.026	0.016	0.607	0.623
	NR n71	0.294	0.184	0.607	0.791
	WLAN 5G	0.046	0.029	0.607	0.636
Sub6 J	WLAN 2G	0.073	0.046	0.607	0.653
	BT	0.048	0.030	0.607	0.637

			Sub 1 ant.E						
		AG0	GSM 850	UMTS 5	LTE 12	LTE 13	LTE 14	LTE 26	LTE 71
		Rear	Rear	Rear	Rear	Rear	Rear	Rear	Rear
Main 1 ant.A	GSM 850	0.234	0.733	0.553	0.522	0.683	0.663	0.434	0.464
	GSM 1900	0.364	0.862	0.682	0.651	0.813	0.793	0.564	0.593
	UMTS 5	0.293	0.791	0.611	0.580	0.741	0.722	0.493	0.522
	UMTS 4	0.414	0.913	0.733	0.702	0.863	0.843	0.614	0.644
	UMTS 2	0.264	0.762	0.582	0.551	0.713	0.693	0.464	0.493
	LTE 12	0.334	0.832	0.652	0.621	0.783	0.763	0.534	0.563
	LTE 13	0.373	0.871	0.691	0.660	0.821	0.802	0.573	0.602
	LTE 14	0.361	0.859	0.679	0.648	0.809	0.790	0.561	0.590
	LTE 25	0.249	0.747	0.567	0.536	0.698	0.678	0.449	0.478
	LTE 26	0.627	See Sec9.3.1	0.945	0.914	See Sec9.3.1	See Sec9.3.1	0.827	0.856
	LTE 30	0.155	0.653	0.473	0.443	0.604	0.584	0.355	0.384
	LTE 66	0.366	0.864	0.684	0.654	0.815	0.795	0.566	0.596
	LTE 71	0.320	0.818	0.638	0.608	0.769	0.749	0.520	0.549
	NR n12	0.191	0.689	0.509	0.479	0.640	0.620	0.391	0.421
	NR n25	0.278	0.776	0.596	0.565	0.726	0.707	0.478	0.507
	NR n26	0.499	0.997	0.817	0.786	0.948	0.928	0.699	0.728
	NR n30	0.132	0.630	0.450	0.419	0.581	0.561	0.332	0.361
	NR n66	0.452	0.950	0.770	0.739	0.901	0.881	0.652	0.681
	NR n70	0.383	0.881	0.701	0.671	0.832	0.812	0.583	0.613
	NR n71	0.149	0.648	0.468	0.437	0.598	0.578	0.349	0.379
Main 2 ant.B	LTE 7	0.319	0.818	0.638	0.607	0.768	0.748	0.519	0.549
	LTE 41	0.274	0.772	0.592	0.561	0.723	0.703	0.474	0.503
	NR n7	0.306	0.804	0.624	0.593	0.754	0.735	0.506	0.535
	NR n41	0.419	0.918	0.738	0.707	0.868	0.848	0.619	0.649
Main 3 ant.C	NR n48	0.168	0.666	0.486	0.455	0.616	0.597	0.368	0.397
	NR n77	0.243	0.741	0.561	0.531	0.692	0.672	0.443	0.473
Main 4 ant.D	NR n41	0.083	0.581	0.401	0.370	0.531	0.512	0.283	0.312
	NR n48	0.494	0.993	0.813	0.782	0.943	0.923	0.694	0.724
	NR n77	0.524	See Sec9.3.1	0.843	0.812	0.973	0.953	0.724	0.754

			Sub 1 ant.E					
		AG0	NR n12	NR n26	NR n41	NR n71	WLAN 5G	WLAN 6G
		Rear	Rear	Rear	Rear	Rear	Rear	Rear
Main 1 ant.A	GSM 850	0.234	0.479	0.468	0.248	0.462	0.517	0.234
	GSM 1900	0.364	0.608	0.597	0.377	0.591	0.646	0.364
	UMTS 5	0.293	0.537	0.526	0.306	0.520	0.575	0.293
	UMTS 4	0.414	0.659	0.648	0.428	0.642	0.697	0.414
	UMTS 2	0.264	0.508	0.497	0.277	0.491	0.546	0.264
	LTE 12	0.334	0.578	0.567	0.347	0.561	0.616	0.334
	LTE 13	0.373	0.617	0.606	0.386	0.600	0.655	0.373
	LTE 14	0.361	0.605	0.594	0.374	0.588	0.643	0.361
	LTE 25	0.249	0.493	0.482	0.262	0.476	0.531	0.249
	LTE 26	0.627	0.871	0.860	0.640	0.854	0.909	0.627
	LTE 30	0.155	0.399	0.388	0.168	0.383	0.438	0.155
	LTE 66	0.366	0.611	0.599	0.379	0.594	0.649	0.366
	LTE 71	0.320	0.564	0.553	0.333	0.548	0.603	0.320
	NR n12	0.191	0.436	0.424	0.204	0.419	0.474	0.191
	NR n25	0.278	0.522	0.511	0.291	0.505	0.560	0.278
	NR n26	0.499	0.743	0.732	0.512	0.726	0.781	0.499
	NR n30	0.132	0.376	0.365	0.145	0.359	0.414	0.132
	NR n66	0.452	0.696	0.685	0.465	0.679	0.734	0.452
	NR n70	0.383	0.628	0.616	0.396	0.611	0.666	0.383
	NR n71	0.149	0.394	0.383	0.163	0.377	0.432	0.149
Main 2 ant.B	LTE 7	0.319	0.564	0.553	0.333	0.547	0.602	0.319
	LTE 41	0.274	0.518	0.507	0.287	0.501	0.556	0.274
	NR n7	0.306	0.550	0.539	0.319	0.533	0.588	0.306
	NR n41	0.419	0.664	0.653	0.433	0.647	0.702	0.419
Main 3 ant.C	NR n48	0.168	0.412	0.401	0.181	0.395	0.450	0.168
	NR n77	0.243	0.488	0.476	0.256	0.471	0.526	0.243
Main 4 ant.D	NR n41	0.083	0.327	0.316	0.096	0.310	0.365	0.083
	NR n48	0.494	0.739	0.728	0.508	0.722	0.777	0.494
	NR n77	0.524	0.769	0.758	0.538	0.752	0.807	0.524

			Sub 2 ant.F						
		AG0	LTE 7	LTE 25	LTE 30	LTE 38	LTE 41	LTE 48	LTE 66
		Rear	Rear	Rear	Rear	Rear	Rear	Rear	Rear
Main 1 ant.A	GSM 850	0.234	0.528	0.474	0.631	0.453	0.379	0.496	0.486
	GSM 1900	0.364	0.657	0.603	0.761	0.582	0.509	0.626	0.615
	UMTS 5	0.293	0.586	0.532	0.689	0.511	0.438	0.554	0.544
	UMTS 4	0.414	0.708	0.654	0.811	0.633	0.559	0.676	0.666
	UMTS 2	0.264	0.557	0.503	0.661	0.482	0.409	0.526	0.515
	LTE 12	0.334	0.627	0.573	0.731	0.552	0.479	0.596	0.585
	LTE 13	0.373	0.666	0.612	0.769	0.591	0.518	0.634	0.624
	LTE 14	0.361	0.654	0.600	0.758	0.579	0.506	0.623	0.612
	LTE 25	0.249	0.542	0.488	0.646	0.467	0.394	0.511	0.500
	LTE 26	0.627	0.920	0.866	See Sec9.3.1	0.845	0.772	0.889	0.878
	LTE 30	0.155	0.448	0.394	0.552	0.373	0.300	0.417	0.406
	LTE 66	0.366	0.659	0.606	0.763	0.584	0.511	0.628	0.618
	LTE 71	0.320	0.613	0.559	0.717	0.538	0.465	0.582	0.571
	NR n12	0.191	0.484	0.431	0.588	0.409	0.336	0.453	0.443
	NR n25	0.278	0.571	0.517	0.674	0.496	0.423	0.539	0.529
	NR n26	0.499	0.792	0.738	0.896	0.717	0.644	0.761	0.750
	NR n30	0.132	0.425	0.371	0.529	0.350	0.277	0.394	0.383
	NR n66	0.452	0.745	0.691	0.849	0.670	0.597	0.714	0.703
	NR n70	0.383	0.676	0.623	0.780	0.601	0.528	0.645	0.634
	NR n71	0.149	0.443	0.389	0.546	0.368	0.294	0.411	0.401
Main 2 ant.B	LTE 7	0.319	0.613	0.559	0.716	0.538	0.464	0.581	0.571
	LTE 41	0.274	0.567	0.513	0.671	0.492	0.419	0.536	0.525
	NR n7	0.306	0.599	0.545	0.703	0.524	0.451	0.568	0.557
	NR n41	0.419	0.713	0.659	0.816	0.638	0.564	0.681	0.671
Main 3 ant.C	NR n48	0.168	0.461	0.407	0.564	0.386	0.313	0.429	0.419
	NR n77	0.243	0.536	0.483	0.640	0.461	0.388	0.505	0.494
Main 4 ant.D	NR n41	0.083	0.376	0.322	0.479	0.301	0.228	0.344	0.334
	NR n48	0.494	0.788	0.734	0.891	0.713	0.639	0.756	0.746
	NR n77	0.524	0.818	0.764	0.921	0.743	0.669	0.786	0.776

			Sub 2 ant.F								
		AG0	NR n7	NR n25	NR n30	NR n41	NR n48	NR n66	NR n70	NR n77	NR n78
		Rear	Rear	Rear	Rear	Rear	Rear	Rear	Rear	Rear	Rear
Main 1 ant.A	GSM 850	0.234	0.677	0.417	0.506	0.560	0.468	0.553	0.554	0.406	0.540
	GSM 1900	0.364	0.806	0.546	0.636	0.689	0.597	0.682	0.684	0.536	0.669
	UMTS 5	0.293	0.735	0.475	0.564	0.618	0.526	0.611	0.613	0.464	0.598
	UMTS 4	0.414	0.857	0.597	0.686	0.740	0.648	0.733	0.734	0.586	0.720
	UMTS 2	0.264	0.706	0.446	0.536	0.589	0.497	0.582	0.584	0.436	0.569
	LTE 12	0.334	0.776	0.516	0.606	0.659	0.567	0.652	0.654	0.506	0.639
	LTE 13	0.373	0.815	0.555	0.644	0.698	0.606	0.691	0.693	0.544	0.678
	LTE 14	0.361	0.803	0.543	0.633	0.686	0.594	0.679	0.681	0.533	0.666
	LTE 25	0.249	0.691	0.431	0.521	0.574	0.482	0.567	0.569	0.421	0.554
	LTE 26	0.627	See Sec9.3.1	0.809	0.899	0.953	0.860	0.945	0.947	0.799	0.933
	LTE 30	0.155	0.598	0.338	0.427	0.481	0.388	0.473	0.475	0.327	0.461
	LTE 66	0.366	0.809	0.549	0.638	0.692	0.599	0.684	0.686	0.538	0.672
	LTE 71	0.320	0.763	0.503	0.592	0.646	0.553	0.638	0.640	0.492	0.626
	NR n12	0.191	0.634	0.374	0.463	0.517	0.424	0.509	0.511	0.363	0.497
	NR n25	0.278	0.720	0.460	0.549	0.603	0.511	0.596	0.598	0.449	0.583
	NR n26	0.499	0.941	0.681	0.771	0.824	0.732	0.817	0.819	0.671	0.804
	NR n30	0.132	0.574	0.314	0.404	0.458	0.365	0.450	0.452	0.304	0.438
	NR n66	0.452	0.894	0.634	0.724	0.778	0.685	0.770	0.772	0.624	0.758
	NR n70	0.383	0.826	0.566	0.655	0.709	0.616	0.701	0.703	0.555	0.689
	NR n71	0.149	0.592	0.332	0.421	0.475	0.383	0.468	0.469	0.321	0.455
Main 2 ant.B	LTE 7	0.319	0.762	0.502	0.591	0.645	0.553	0.638	0.639	0.491	0.625
	LTE 41	0.274	0.716	0.456	0.546	0.599	0.507	0.592	0.594	0.446	0.579
	NR n7	0.306	0.748	0.488	0.578	0.631	0.539	0.624	0.626	0.478	0.611
	NR n41	0.419	0.862	0.602	0.691	0.745	0.653	0.738	0.739	0.591	0.725
Main 3 ant.C	NR n48	0.168	0.610	0.350	0.439	0.493	0.401	0.486	0.488	0.339	0.473
	NR n77	0.243	0.686	0.426	0.515	0.569	0.476	0.561	0.563	0.415	0.549
Main 4 ant.D	NR n41	0.083	0.525	0.265	0.354	0.408	0.316	0.401	0.403	0.254	0.388
	NR n48	0.494	0.937	0.677	0.766	0.820	0.728	0.813	0.814	0.666	0.800
	NR n77	0.524	0.967	0.707	0.796	0.850	0.758	0.843	0.844	0.696	0.830

			Sub 4 ant.H				Sub 5 ant.I		Sub 6 ant.J	
		AG0	WLAN2.4G	WLAN 5G	WLAN 6G	BT	NR n48	NR n77	WLAN 2.4G	BT
		Rear	Rear	Rear	Rear	Rear	Rear	Rear	Rear	Rear
Main 1 ant.A	GSM 850	0.234	0.511	0.438	0.554	0.544	0.735	0.475	0.564	0.618
	GSM 1900	0.364	0.633	0.559	0.676	0.666	0.857	0.597	0.686	0.740
	UMTS 5	0.293	0.482	0.409	0.526	0.515	0.706	0.446	0.536	0.589
	UMTS 4	0.414	0.552	0.479	0.596	0.585	0.776	0.516	0.606	0.659
	UMTS 2	0.264	0.591	0.518	0.634	0.624	0.815	0.555	0.644	0.698
	LTE 12	0.334	0.579	0.506	0.623	0.612	0.803	0.543	0.633	0.686
	LTE 13	0.373	0.467	0.394	0.511	0.500	0.691	0.431	0.521	0.574
	LTE 14	0.361	0.845	0.772	0.889	0.878	See Sec9.3.1	0.809	0.899	0.953
	LTE 25	0.249	0.373	0.300	0.417	0.406	0.598	0.338	0.427	0.481
	LTE 26	0.627	0.584	0.511	0.628	0.618	0.809	0.549	0.638	0.692
	LTE 30	0.155	0.538	0.465	0.582	0.571	0.763	0.503	0.592	0.646
	LTE 66	0.366	0.409	0.336	0.453	0.443	0.634	0.374	0.463	0.517
	LTE 71	0.320	0.496	0.423	0.539	0.529	0.720	0.460	0.549	0.603
	NR n12	0.191	0.717	0.644	0.761	0.750	0.941	0.681	0.771	0.824
	NR n25	0.278	0.350	0.277	0.394	0.383	0.574	0.314	0.404	0.458
	NR n26	0.499	0.670	0.597	0.714	0.703	0.894	0.634	0.724	0.778
	NR n30	0.132	0.601	0.528	0.645	0.634	0.826	0.566	0.655	0.709
	NR n66	0.452	0.368	0.294	0.411	0.401	0.592	0.332	0.421	0.475
	NR n70	0.383	0.538	0.464	0.581	0.571	0.762	0.502	0.591	0.645
	NR n71	0.149	0.492	0.419	0.536	0.525	0.716	0.456	0.546	0.599
Main 2 ant.B	LTE 7	0.319	0.524	0.451	0.568	0.557	0.748	0.488	0.578	0.631
	LTE 41	0.274	0.638	0.564	0.681	0.671	0.862	0.602	0.691	0.745
	NR n7	0.306	0.386	0.313	0.429	0.419	0.610	0.350	0.439	0.493
	NR n41	0.419	0.461	0.388	0.505	0.494	0.686	0.426	0.515	0.569
Main 3 ant.C	NR n48	0.168	0.301	0.228	0.344	0.334	0.525	0.265	0.354	0.408
	NR n77	0.243	0.713	0.639	0.756	0.746	0.937	0.677	0.766	0.820
Main 4 ant.D	NR n41	0.083	0.743	0.669	0.786	0.776	0.967	0.707	0.796	0.850
	NR n48	0.494	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	NR n77	0.524	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

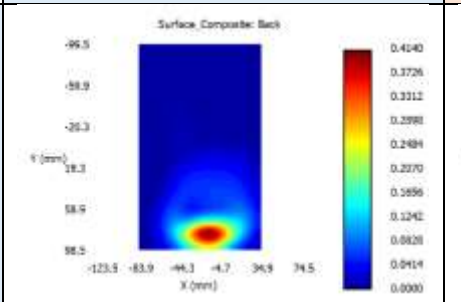
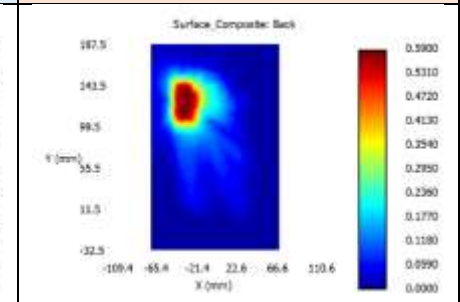
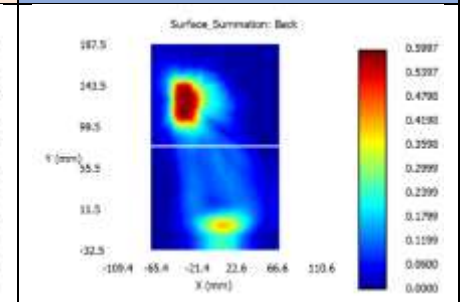
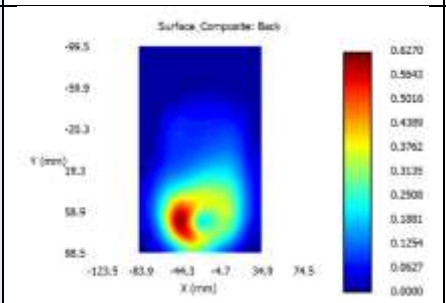
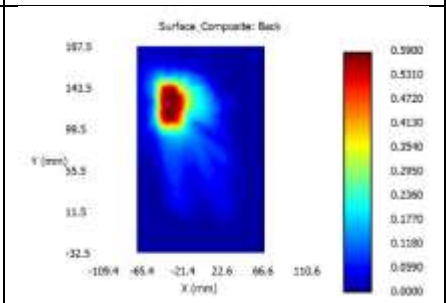
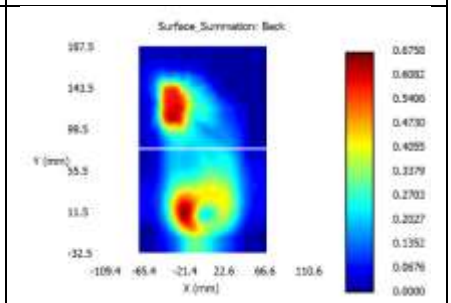
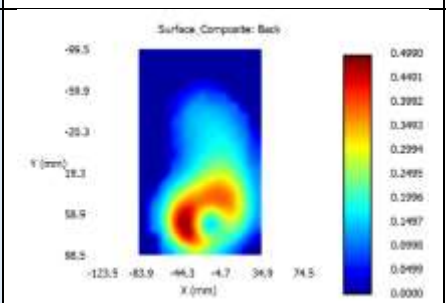
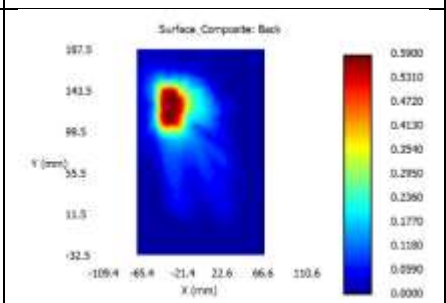
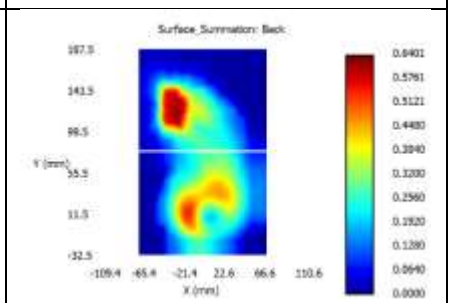
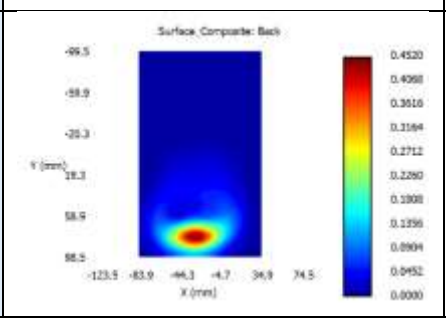
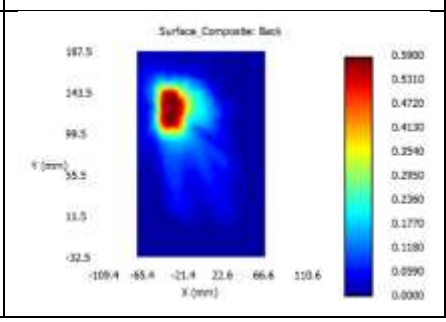
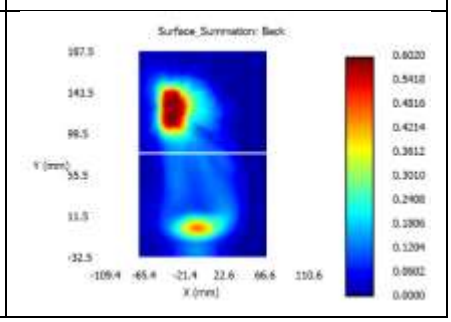
9.2.2 Phablet Total Exposure Ratio

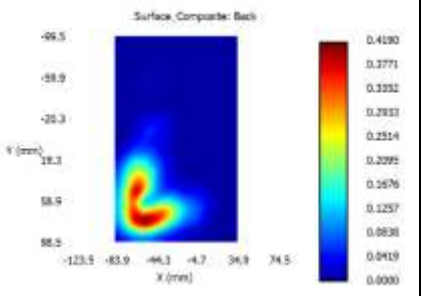
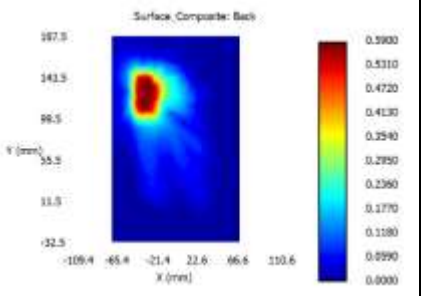
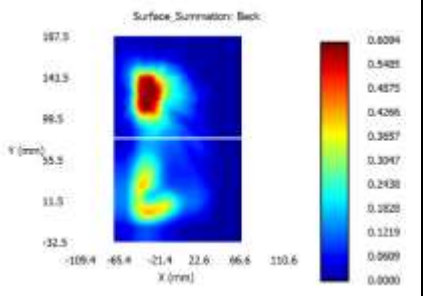
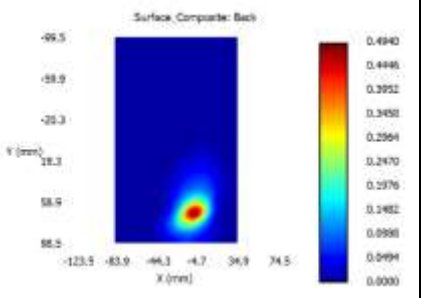
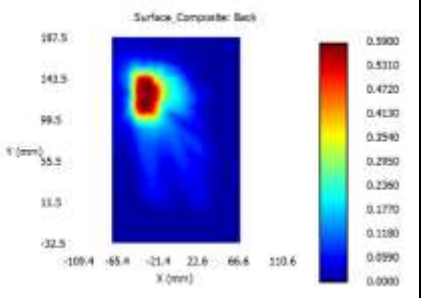
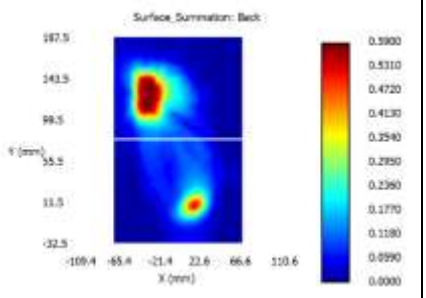
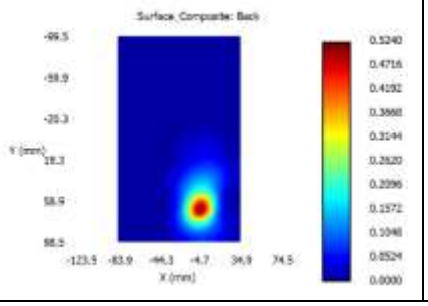
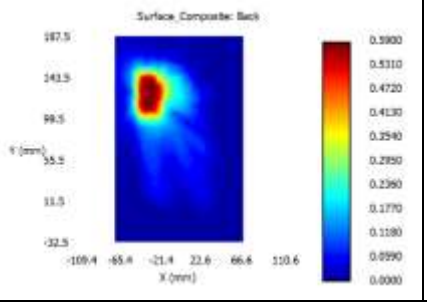
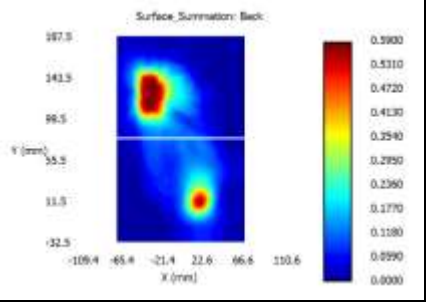
AG1 Antenna Reported SAR Value & Normalized SAR

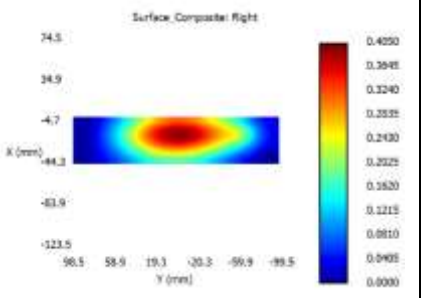
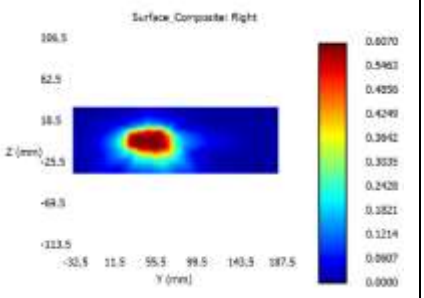
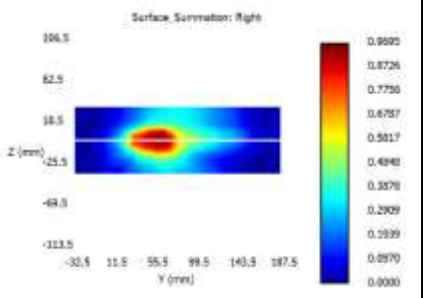
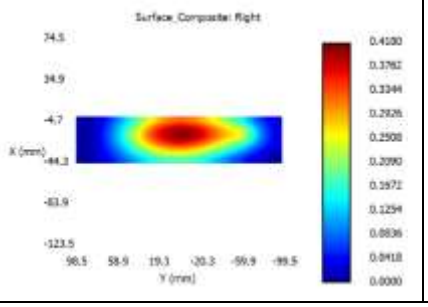
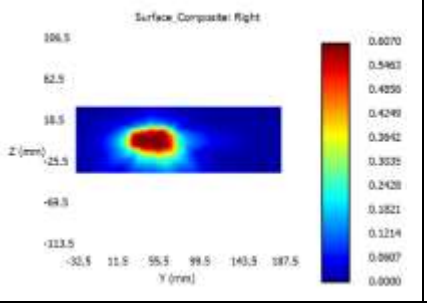
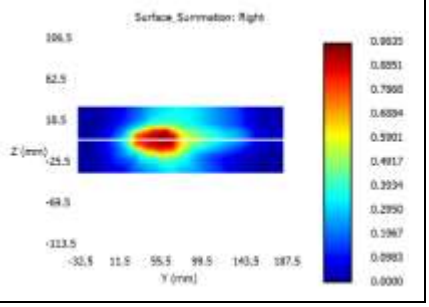
AG1		Scaled SAR	Normalized SAR	Normalized PD[N]	Summation
		Rear	Rear	Rear	Rear
Sub1	WLAN 5G	1.310	0.328	0.871	Sec.9.3.2
E	WLAN 6G	0.176	0.044	0.871	0.915
Sub4	WLAN 5G	0.847	0.212	0.871	Sec.9.3.2
H	WLAN 6G	0.089	0.022	0.871	0.893

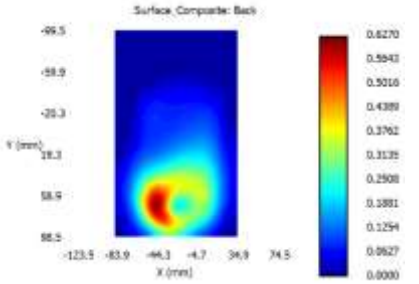
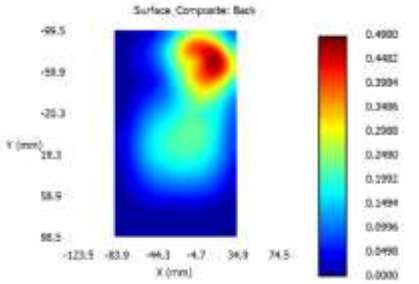
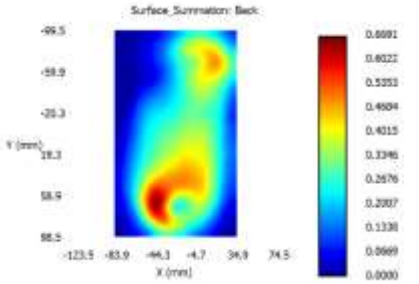
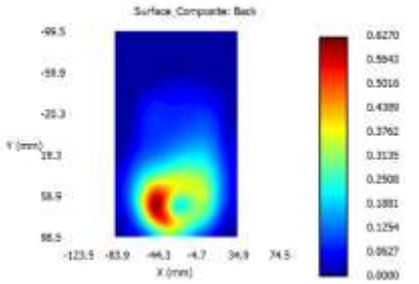
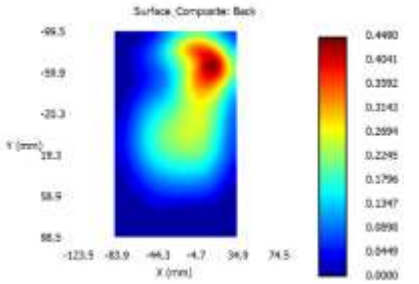
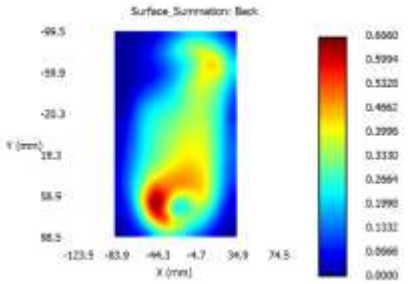
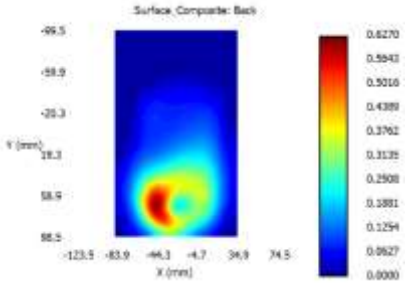
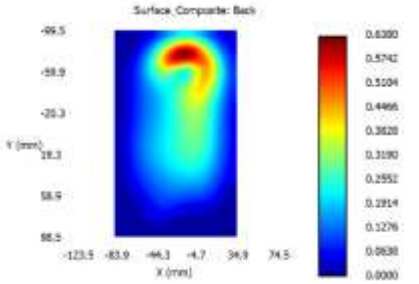
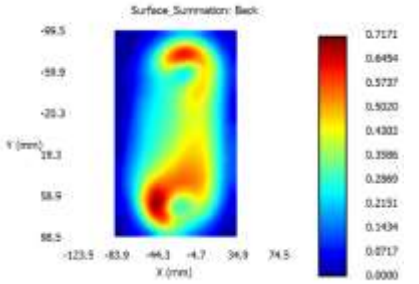
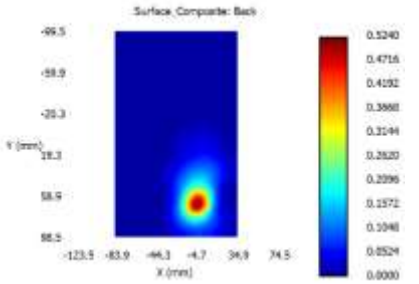
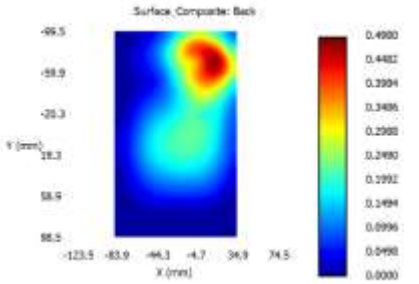
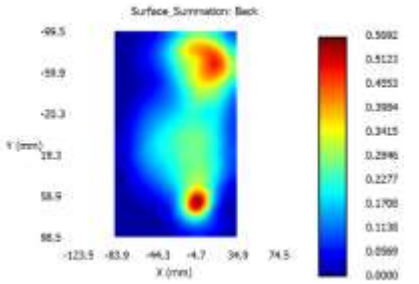
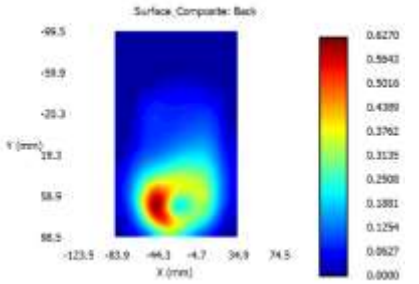
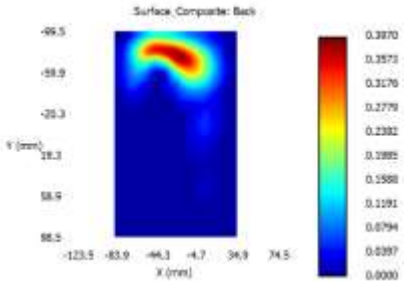
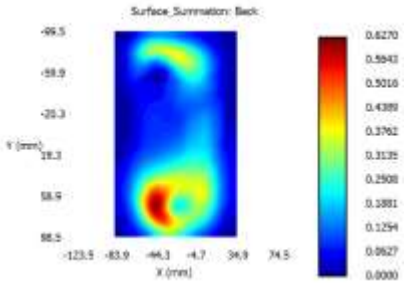
9.3 Summation composite map

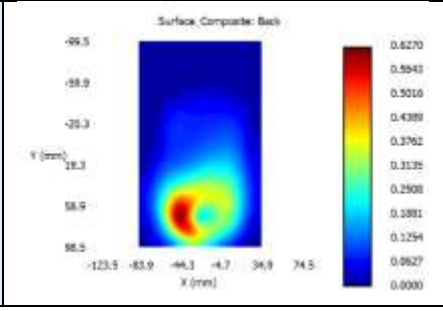
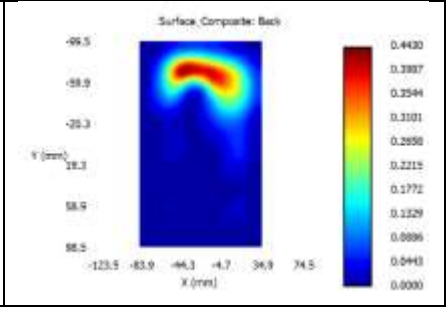
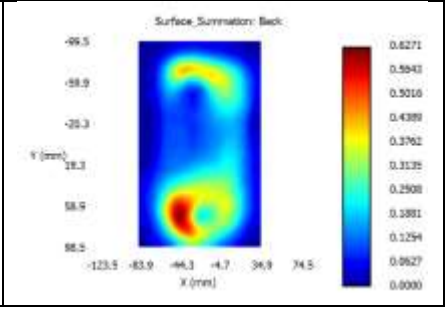
9.3.1 Summation Body/Hotspot composite map(Front View)

REAR	AG0	Module M	Summation
UMTS 4 Main1 Ant A SUM=0.5997			
LTE 26 Main1 Ant A SUM=0.6758			
NR n26 Main1 Ant A SUM=0.6401			
NR n66 Main1 Ant A SUM=0.590			

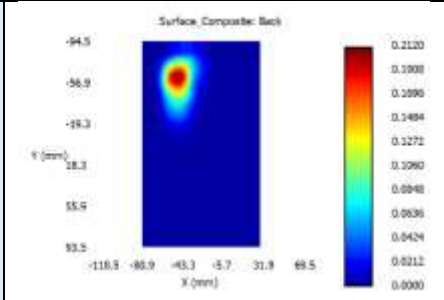
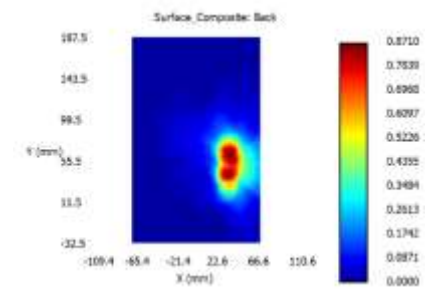
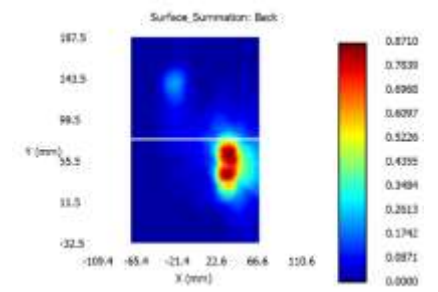
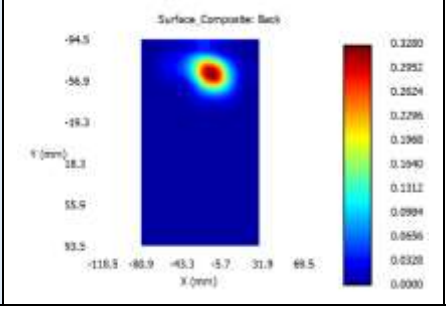
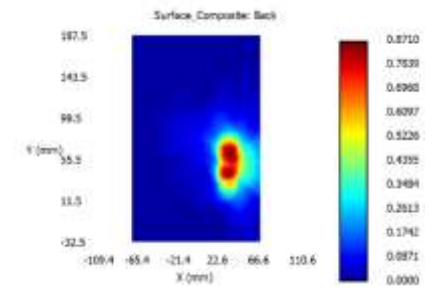
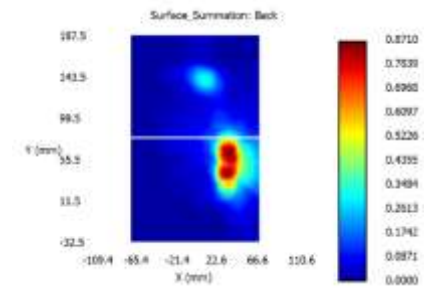
REAR	AG0	Module M	Summation
NR n41 Main2 Ant B SUM=0.6094			
NR n48 Main4 Ant D SUM=0.590			
NR n77 Main4 Ant D SUM=0.590			

RIGHT	AG1	Module N	Summation
LTE 13 Sub1 Ant.E SUM=0.9795			
LTE 14 Sub1 Ant.E SUM=0.9835			

REAR	AG0	AG1	Summation
LTE 26 Main1 ant A GSM850 Sub1 Ant.E SUM=0.6691			
LTE 26 Main1 ant A LTE 13 Sub1 Ant.E SUM=0.6660			
LTE 26 Main1 ant A LTE 14 Sub1 Ant.E SUM=0.7171			
NR n77 Main4 ant D GSM850 Sub1 Ant.E SUM=0.5692			
LTE 26 Main1 ant A LTE30 Sub2 Ant.F SUM=0.6270			

REAR	AG0	AG1	Summation
LTE 26 Main1 ant A NRn7 Sub2 Ant.F SUM=0.6271			

9.3.2 Summation Phablet composite map(Front view)

	AG1	Module N	Summation
WLAN 5G Sub4 Ant H SUM=0.871			
WLAN 5G Sub1 Ant E SUM=0.871			

Note:
1. Worst case Power density results for each test configuration among all antenna arrays and among all supported bands were considered for TER Analysis.
2.For Power density measurements, a test separation distance of 2mm was used for phablet configuration due to mmWave probe restraints.
3.Worst case front side reported psPD was considered for Head TER
4. The worst-case between Adjusted_Reported_psPD and measured Total psPD was chosen for TER analysis.
The above numerical summed PD and SAR for all the worst case simultaneous transmission conditions were Total Exposure Ratio.
Therefore, the above analysis is sufficient to determine no further test cases are required and that simultaneous transmission is compliant to the FCC RF exposure limit.

10. Measurement Uncertainty

Measurement Uncertainty for CDASY6 mmWave module						
a	*b*	*c*	*d*	*e*	*f = b x e / d*	*g*
Source of uncertainty	**Uncertainty Value (± dB)**	**Probability distribution**	**Div.**	**c_i**	**Standard Uncertainty (± dB)**	**v_i**
Probe calibration	0.49	N	1	1	0.49	∞
Probe correction	0.00	R	1.73	1	0.00	∞
Frequency Response(BW≤ 1GHz)	0.20	R	1.73	1	0.12	∞
Sensor cross coupling	0.00	R	1.73	1	0.00	∞
Istropy	0.50	R	1.73	1	0.29	∞
Linearity	0.20	R	1.73	1	0.12	∞
Probe scattering	0.00	R	1.73	1	0.00	∞
Probe positioning offset	0.30	R	1.73	1	0.17	∞
Probe positioning Repeatability	0.04	R	1.73	1	0.02	∞
Probe spatial Resolution	0.00	R	1.73	1	0.00	∞
Field Impedence Dependence	0.00	R	1.73	1	0.00	∞
Sensor Mechanical Offset	0.00	R	1.73	1	0.00	∞
Amplitude and Phase drift	0.00	R	1.73	1	0.00	∞
Amplitude and Phase noise	0.04	R	1.73	1	0.02	∞
Measurement area truncation	0.00	R	1.73	1	0.00	∞
System Detection Limit	0.04	R	1.73	1	0.02	∞
Data acquisition	0.03	N	1	1	0.03	∞
Field Reconstruction	0.60	R	1.73	1	0.35	∞
Forward Transformation	0.00	R	1.73	1	0.00	∞
Power density Scailing	0.00	R	1.73	1	0.00	∞
Spatial Averaging	0.10	R	1.73	1	0.06	∞
Test sample and Environmental Factors						
Probe coupling with DUT	0.00	R	1.73	1	0.00	∞
Modulation Response	0.40	R	1.73	1	0.23	∞
Integration time	0.00	R	1.73	1	0.00	∞
Response time	0.00	R	1.73	1	0.00	∞
Device holder influence	0.10	R	1.73	1	0.06	∞
DUT alignment	0.00	R	1.73	1	0.00	∞
RF Ambient Conditions	0.04	R	1.73	1	0.02	∞
RF ambient - reflections	0.04	R	1.73	1	0.02	∞
Immunity/Secondary Reception	0.00	R	1.73	1	0.00	∞
Power Drif of DUT	0.22	R	1.73	1	0.13	∞
Combined standard uncertainty (k = 1)		RSS			0.76	∞
Expanded uncertainty (95% confidence level)		*k = 2*			**1.52**	

11. Power Density Test Equipment

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
SPEAG	5G Module Phantom	-	N/A	N/A	N/A
HP	SAR System Control PC	-	N/A	N/A	N/A
Staubli	TX90 XLspeag	F17/ 59RAA1/ A/ 01	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	011578	N/A	N/A	N/A
SPEAG	DAE4	780	07/04/2023	Annual	07/04/2024
SPEAG	E-Field Probe EUmmWV3	9486	06/19/2023	Annual	06/19/2024
SPEAG	Dipole 5G Verification Source 30 GHz	1011	07/13/2023	Annual	07/13/2024
TESTO	175-H1/Thermometer	40331922309	12/29/2022	Annual	12/29/2023

12. Conclusion

The power density measurements and total exposure ratio analysis indicate that the DUT complies with the RF radiation exposure limits of the FCC, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the RF Exposure and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.

13. References

[1]ANSI/IEEE C95.1-1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, Sept. 1992.

[2]IEC TR 63170:2018, Measurement Procedure for the Evaluation of Power Density Related to Human Exposure to Radiofrequency Fields from Wireless Communication Devices Operating between 6 GHz and 100 GHz.

[3] IEC TR 62630 : 2010, Guidance for Evaluating Exposure from Multiple Electromagnetic Sources

[4] K. Pokovic, T. Schmid, J. Frohlich, and N. Kuster. Novel Probes and Evaluation Procedures to Assess Field Magnitude and Polarization. IEEE Transactions on Electromagnetic Compatibility 42(2): 240 -244, 2000

[5] R. W. Gerchberg and W. O. Saxton. A Practical Algorithm for the Determination of Phase from Image and Diffraction Plane Pictures. Optik 35(2): 237 – 246, 1972.

[6] A. P. Anderson and S. Sali. New Possibilities for Phaseless Microwave Diagnostics. Part 1: Error Reduction Techniques. IEE Proceedings H – Microwaves, Antennas and Propagation 132(5): 290 – 298, 1985

[7] FCC KDB 865664 D02 v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz. Federal Communications Commission – Office of Engineering and Technology, Laboratory Division.

[8] FCC KDB 447498 D01 v02r01: RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices. Federal Communications Commission – Office of Engineering and Technology, Laboratory Division.

[9] November 2017 Telecommunications Certification Body Council (TCBC) Workshop Notes

[10] October 2018 Telecommunications Certification Body Council (TCBC) Workshop Notes

[11] April 2019 Telecommunications Certification Body Council (TCBC) Workshop Notes

[12] November 2019 Telecommunications Certification Body Council (TCBC) Workshop Notes

[13] SPEAG DASY6 System Handbook (September 2019)

Appendix A. – DUT Ant. Information & SETUP PHOTO

Please refer to test DUT Ant. Information &setup photo file no. as follows:

Report No.
HCT-SR-2310-FC002-P