FCC 47 CFR § 2.1093
IEC TR 63170-2018

POWER DENSITY EVALUATION REPORT
(Part 1 : Test in Static Transmission Condition)

For

GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC

MODEL NUMBER: SM-A716V

FCC ID: A3LSMA716V

REPORT NUMBER: 4789424849-S4V2

ISSUE DATE: 6/5/2020

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Revision History

Rev.	Date	Revisions	Revised By
V1	6/1/2020	Initial Issue	--
V2	6/5/2020	Revised typo in Sec.8.4	Jeongyeon Won

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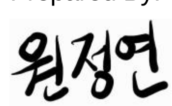
1. Attestation of Test Results

Applicant Name	SAMSUNG ELECTRONICS CO.,LTD.	
FCC ID	A3LSMA716V	
Model Name	SM-A716V	
Applicable Standards	FCC 47 CFR § 2.1093 IEC TR 63170-2018	
Exposure Category	RADIOFREQUENCY RADIATION EXPOSURE (above 6GHz)	
	Power density Uncontrol (mW/cm^2 over 4cm^2) for 30min average	
fGeneral population / Uncontrolled exposure	1.0	
Applicable limit	☒ Uncontrol	
	Measured psPD	Reported psPD
n261 Result (mW/cm^2 over 4cm^2)	0.50	0.75
n260 Result (mW/cm^2 over 4cm^2)	0.57	0.75
Simultaneous TX	0.99	
Date Tested	5/8/2020 to 5/29/2020	
Test Results	Pass	

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government. This report is written to support regulatory compliance of the applicable standards stated above.

Approved & Released By:	Prepared By:
	
Justin Park Operations Leader UL Korea, Ltd. Suwon Laboratory	Jeongyeon Won Laboratory Technician UL Korea, Ltd. Suwon Laboratory

2. Terms, Definitions, Symbols and Abbreviated terms

2.1. Terms, Definitions

device under test (DUT)
device that is tested according to the approaches described in this document to determine the power density

spatial-average power density (Sav)
energy per unit time and unit area crossing a surface of area *A* characterized by the normal unit vector ˆ**n** and averaging time.

$$S_{av} = \frac{1}{AT} \int\int (\mathbf{E} \times \mathbf{H}) \cdot \hat{\boldsymbol{n}} \mathrm{d}A\mathrm{d}T$$

2.2. Symbols

Symbol	Quantity	Unit	Dimensions
E	Electric field	volt per meter	V/m
f	Frequency	hertz	Hz
H	Magnetic field	ampere per meter	A/m
λ	Wavelength	meter	m
S	Local power density	watt per square meter	W/m2
*S*av	Spatial-average power density	watt per square meter	W/m2

2.3. Abbreviated terms and Check mark

BS base station
CW continuous wave
DUT device under test
EMF electromagnetic field
ER exposure ratio
NR new radio
PD power density
RF radio frequency
TER total exposure ratio
|Re(S)| average total power density
$\vec{n}$ Re(S) average incident power density
☒ applicable.
☐ NOT applicable.

3. Test Specification, Methods and Procedures

Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, the following FCC Published RF exposure KDB procedures:

- 447498 D01 General RF Exposure Guidance v06
- 447498 D03 Supplement C Cross-Reference v01
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02
- SPEAG, 5G Module V1.2 Application Note: 5G Compliance Testing, August 2018
- IEC TR 63170 Edition 1.0 2018-08

In addition to the above, TCB workshop information was used.

- TCB workshop November, 2017; Page 19 - 25, RF Exposure Procedures (Power Density Evaluation)
- TCB workshop October, 2018; Page 3, RF Exposure Procedures (Millimeter Wave Assessment)
- TCB workshop October, 2018; Page 5, RF Exposure Procedures (Millimeter Wave Measurement)
- TCB workshop April, 2019; Page 3, RF Exposure Procedures (Millimeter Wave RF Exposure Evaluation)
- TCB workshop November, 2019; Page 14, RF Exposure Procedures (Millimeter Wave Scan Requirements)

4. Facilities and Accreditation

The test sites and measurement facilities used to collect data are located at

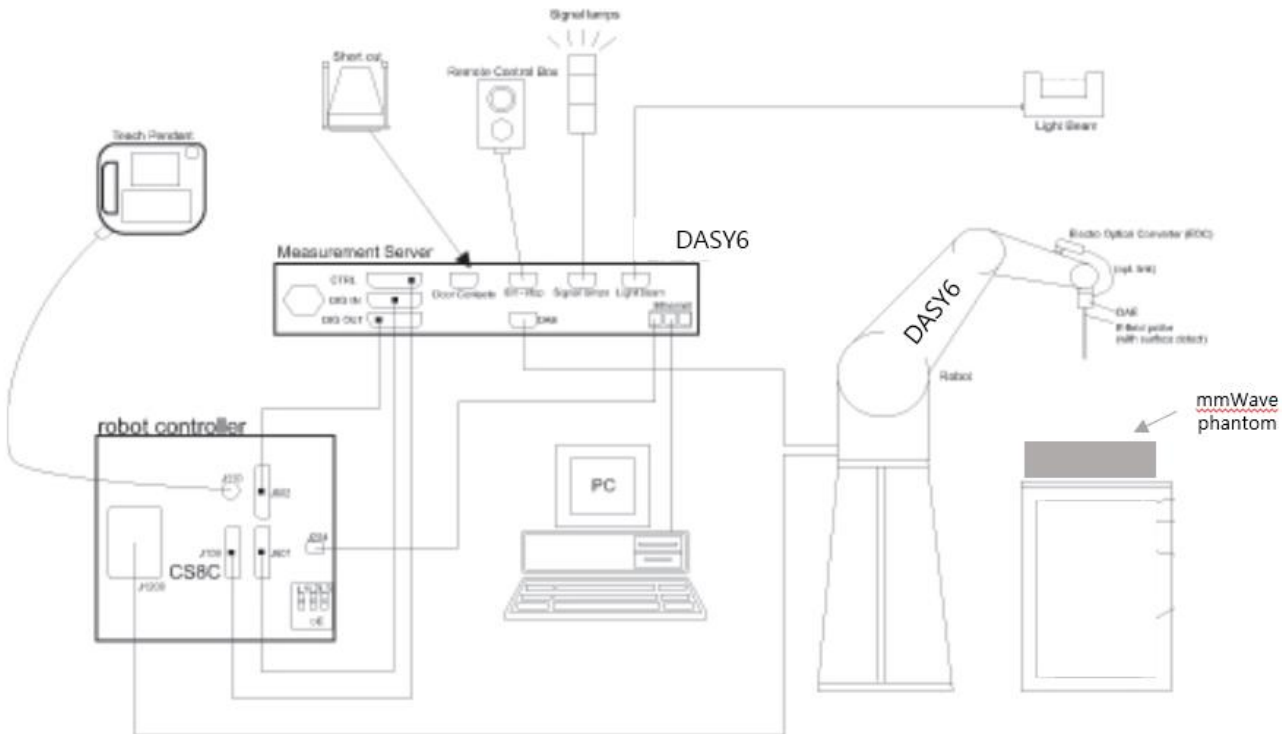
Suwon
SAR 1

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637.
The full scope of accreditation can be viewed at https://www.iasonline.org/wp-content/uploads/2017/05/TL-637 -cert-New.pdf.

5. Measurement System & Test Equipment

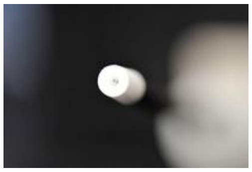
5.1. Measurement System

The DASY6 system used for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- The EUmmWVx probe is based on the pseudo-vector probe design, which not only measures the field magnitude but also derives its polarization ellipse.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win10 and the DASY6 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom which is specialized for 5G other accessories according to the targeted measurement.

5.2. EUmmWVx / 5G Probe
E-Field mm-Wave Probe for General Near-Field Measurements



Two dipoles optimally arranged to obtain pseudo-vector information
Minimum 3 measurements/point, 120º rotated around probe axis
Sensors (0.8mm length) printed on glass substrate protected by high density foam
Low perturbation of the measured field
Requires positioner which can do accurate probe rotation

Frequency Range	750 MHz – 110 GHz
Dynamic Range	< 20 V/m - 10'000 V/m with PRE-10 (min < 50 V/m - 3000 V/m)
Position Precision	< 0.2 mm (DASY6)
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: encapsulation 8 mm (internal sensor < 1mm) Distance from probe tip to dipole centers: < 2 mm Sensor displacement to probe's calibration point: < 0.3 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 (cDASY6 5G or ICEy-mmW module required)
Compatibility	cDASY6 + 5G-Module SW1.0 and higher

5.3. Data Acquisition Electronics(DAE)

Serial optical link for communication with DASY4/5 embedded system (fully remote controlled) Two-step probe touch detector for mechanical surface detection and emergency robsot stop

Measurement Range	−100 – +300 mV (16 bit resolution and two range settings: 4 mV, 400 mV)
Input Offset Voltage	<5 µV (with auto zero)
Input Resistance	200 Mohm
Input Bias Current	<50 fA
Battery Power	>10 hours of operation (with two 9.6 V NiMH batteries)
Dimensions (L × W × H)	60 × 60 × 68 mm

6. Measurement Procedures

6.1. System Verification Scan Procedures

cDASY6 5G Module V1.2 supports “5G Scan”, a fine resolution scan performed on two different planes which is used to reconstruct the E- and H-fields as well as the power density; the average power density is derived from this measurement.

Step 1: Power Reference Measurement
The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to devise under test.

Step 2: 5G Scan
The steps in the X, Y, and Z directions are specified in terms of fractions of the signal wavelength ,lambda.
Area Scan Parameters extracted from SPEAG, 5G Module V1.2 Application Note.

Recommended settings for measurement of verification sources

Frequency [GHz]	Grid step	Grid extent X/Y [mm]	Measurement points
10	0.25 ($\frac{\lambda}{4}$)	120/120	16 × 16
30	0.25 ($\frac{\lambda}{4}$)	60/60	24 × 24
60	0.25 ($\frac{\lambda}{4}$)	31/31	26 × 26
90	0.25 ($\frac{\lambda}{4}$)	29/29	35 × 35

The minimum distance of probe sensors to verification source surface, horn antenna, is 10 mm.
In other case, distance is determined as λ / 5, details are shown in section 6.3.

Step 3: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.
When the drift is larger than ± 5 %, test is repeated from step1.

6.2. Scan Procedures

Step 1: Power Reference Measurement
Same as System Verification Scan Procedures step 1.

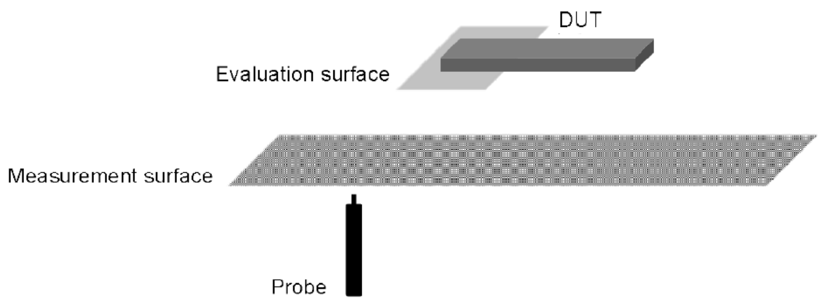
Step 2: 5G Scan
Same as System Verification Scan Procedures step 2. But measurement area is defined based on TCB workshop “A sufficiently large measurement region and proper measurement spatial resolution are required to maintain field reconstruction accuracy”.

Step 3: Power drift measurement
Same as System Verification Scan Procedures step 3.
When the drift is smaller than ± 5 %, it is considered in the uncertainty budget if drifts larger than 5%, uncertainty is re-calculate.

6.3. Total Field and Power Flux Density Reconstruction(measurement distance)

Reconstruction algorithms are used to project or transform the measured fields from the measurement surface to the evaluation surface (below fig) in order to determine power density or to compute spatial-average and/or local power density with known uncertainty.

Manufacture has developed a reconstruction approach based on the Gerchberg-Saxton algorithm, which benefits from the availability of the E-field polarization ellipse information obtained with the EUmmWVx probe. This reconstruction algorithm, together with the ability of the probe to measure extremely close to the source without perturbing the field, permits reconstruction of the E- and H-fields, as well as of the power density, on measurement planes located as near as λ / 5 away.



6.4. Test Equipment

The measuring equipment used to perform the tests documented in this report has been calibrated in accordance with the manufacturers' recommendations, and is traceable to recognized national standards.

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
30GHz System Verification Source Antenna	SPEAG	5G Verification Source 30GHz	1047	2-26-2021

Lab Equipment

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
E-Field mm-Wave Probe	SPEAG	EUmmWV4	9431	2-26-2021
E-Field mm-Wave Probe	SPEAG	EUmmWV3	9400	11-25-2020
E-Field mm-Wave Probe	SPEAG	EUmmWV3	9450	9-13-2020
Data Acquisition Electronics (SAR1)	SPEAG	DAE4	1494	7-18-2020

7. Measurement Uncertainty

Measurement Uncertainty for cDASY6 Module mmWave

Error Description	Uncertainty value (±dB)	Probe Dist.	Divisor	(Ci)	Std. Unc. (±dB)	(Vi)
Uncertainty terms dependent on the measurement system						
Calibration	**0.49**	Normal	1	1	0.49	Infinity
Probe correction	**0.00**	Rectangular	1.73	1	0.00	Infinity
Frequency response (BW =< 1 GHz)	**0.20**	Rectangular	1.73	1	0.12	Infinity
Sensor cross coupling	**0.00**	Rectangular	1.73	1	0.00	Infinity
Isotropy	**0.50**	Rectangular	1.73	1	0.29	Infinity
Linearity	**0.20**	Rectangular	1.73	1	0.12	Infinity
Probe scattering	**0.00**	Rectangular	1.73	1	0.00	Infinity
Probe positioning offset	**0.30**	Rectangular	1.73	1	0.17	Infinity
Probe positioning repeatability	**0.04**	Rectangular	1.73	1	0.02	Infinity
Sensor mechanical offset	**0.00**	Rectangular	1.73	1	0.00	Infinity
Probe spatial resolution	**0.00**	Rectangular	1.73	1	0.00	Infinity
Field impedance dependance	**0.00**	Rectangular	1.73	1	0.00	Infinity
Amplitude and phase drift	**0.00**	Rectangular	1.73	1	0.00	Infinity
Amplitude and phase noise	**0.04**	Rectangular	1.73	1	0.02	Infinity
Measurement area truncation	**0.10**	Rectangular	1.73	1	0.06	Infinity
Data acquisition	**0.03**	Normal	1.00	1	0.03	Infinity
Sampling	**0.00**	Rectangular	1.73	1	0.00	Infinity
Field reconstruction	**0.60**	Rectangular	1.73	1	0.35	Infinity
Forward transformation	**0.00**	Rectangular	1.73	1	0.00	Infinity
Power density scaling	**-**	Rectangular	1.73	1	-	Infinity
Spatial averaging	**0.10**	Rectangular	1.73	1	0.06	Infinity
System detection limit	**0.04**	Rectangular	1.73	1	0.02	Infinity
Uncertainty terms dependent on the DUT and environmental factors						
Probe coupling with DUT	**0.00**	Rectangular	1.73	1	0.00	Infinity
Modulation response	**0.40**	Rectangular	1.73	1	0.23	Infinity
Integration time	**0.00**	Rectangular	1.73	1	0.00	Infinity
Response time	**0.00**	Rectangular	1.73	1	0.00	Infinity
Device holder influence	**0.10**	Rectangular	1.73	1	0.06	Infinity
DUT alignment	**0.00**	Rectangular	1.73	1	0.00	Infinity
RF ambient conditions	**0.04**	Rectangular	1.73	1	0.02	Infinity
Ambient reflections	**0.04**	Rectangular	1.73	1	0.02	Infinity
Immunity / secondary reception	**0.00**	Rectangular	1.73	1	0.00	Infinity
Drift of the DUT	**0.22**	Rectangular	1.73	1	0.13	Infinity
Combined Std. Uncertainty					0.76	Infinity
Expanded Standard Uncertainty (95%)					**1.53**	

7.1. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 1, Clause 4.4.2 in IEC Guide 115:2007.

8. DUT Information

8.1. DUT Description

Device Dimension	Refer to Appendix A.
Back Cover	The Back Cover is not removable
Battery Options	The rechargeable battery is not user accessible.
Test sample information	**No.** **S/N** **Notes** 1 R3CN20P2NHP mmWave Radiated 2 R3CN20P2LHK mmWave Radiated

8.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode	Duty Cycle used for SAR testing
5G NR mmW	NR Band 261 (50MHz & 100MHz) NR Band 260 (50MHz & 100MHz)	DFT-s-ODFM : QPSK, 16QAM, 64QAM CP-ODFM : QPSK, 16QAM, 64QAM	100%

8.3. 5G NR mmWave Test and Reporting Considerations

Item	Description		
Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 261	Frequency range: 27500 – 28350 MHz	
		Channel Bandwidth	
		100MHz	50MHz
	Low	2071821 / 27559.3	2071413 / 27534.8
	Mid	2077891 / 27923.5	2077891 / 27923.5
	High	2084035 / 28292.2	2084491 / 28319.5
	Band 260	Frequency range: 37000 – 40000 MHz	
		Channel Bandwidth	
		100MHz	50MHz
	Low	2230029 / 37051.8	2229621 / 37027.3
	Mid	2253331 / 38449.9	2253331 / 38449.9
	High	2278331 / 39949.9	2278603 / 39966.2
LTE Anchor Bands (n261)	LTE B2/5/13/66		
LTE Anchor Bands (n260)	LTE B2/5/13/66		
Duplex Type (mmWave)	TDD		

8.4. Time-Averaging Algorithm for RF Exposure Compliance

The equipment under test(EUT) are supporting 2G/3G/4G/5G NR technologies through Qualcomm@ modem. Qualcomm@ modem is enabled with Qualcomm@ Smart Transmit 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. Refer to Compliance Summary document for detailed description of Qualcomm@ Smart Transmit feature.

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., P_{limit} for sub-6 radio, and *input.power.limit* for 5G mmW NR), for each characterized technology and band. 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* listed in Section 8.5.

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.*

8.5. Input Power Limit

All power density measurements for this device were performed at the *input.power.limit* given in below tables. Input power is per antenna element and polarization for each antenna module. When input power limit is calculated to be above the maximum input power, the device is limited to the maximum input power.

5G NR n261 L Patch Input Power Limit

Antenna	Beam ID_1	Beam ID_2	input.power.limit (dBm)
L patch	0		**10.2**
	2		**6.5**
	3		**7.1**
	4		**7.6**
	8		**7.5**
	9		**7.0**
	12		**3.8**
	13		**3.8**
	14		**3.6**
	15		**3.9**
	16		**5.9**
	22		**4.1**
	23		**3.6**
	24		**3.5**
	25		**4.7**
		128	**9.5**
		130	**7.6**
		131	**5.8**
		132	**6.6**
		136	**5.6**
		137	**6.3**
		140	**3.6**
		141	**3.5**
		142	**3.7**
		143	**4.0**
		144	**3.2**
		150	**3.4**
		151	**3.5**
		152	**4.0**
		153	**3.4**
	0	128	**5.9**
	2	130	**3.3**
	3	131	**2.2**
	4	132	**3.5**
	8	136	**2.5**
	9	137	**2.7**
	12	153	**1.7**
	13	150	**-0.6**
	14	151	**-0.4**
	15	152	**0.2**
	16	144	**0.3**
	22	140	**-0.2**
	23	141	**-0.4**
	24	142	**-0.4**
	25	143	**0.3**

5G NR n261 K Patch Input Power Limit

Antenna	Beam ID_1	Beam ID_2	input.power.limit (dBm)
K patch	1		10.0
	5		6.6
	6		6.4
	7		8.9
	10		6.3
	11		7.1
	17		4.3
	18		3.7
	19		4.0
	20		4.9
	21		5.0
	26		3.7
	27		4.0
	28		3.8
	29		5.0
		129	8.4
		133	4.9
		134	5.5
		135	6.9
		138	5.0
		139	6.2
		145	3.4
		146	3.2
		147	4.2
		148	4.4
		149	3.8
		154	3.2
		155	3.7
		156	4.2
		157	4.2
	1	129	7.1
	5	135	3.1
	6	134	2.2
	7	138	2.8
	10	139	2.5
	11	133	2.2
	17	157	-0.1
	18	156	0.1
	19	154	-0.1
	20	145	0.0
	21	149	1.4
	26	148	0.2
	27	155	0.5
	28	146	-0.3
	29	147	1.4

5G NR n260 L Patch Input Power Limit

Antenna	Beam ID_1	Beam ID_2	input.power.limit (dBm)
L patch	0		**11.4 -> 11.0**
	2		**8.3**
	3		**8.9**
	4		**7.6**
	8		**9.1**
	9		**7.8**
	12		**5.9**
	13		**5.3**
	14		**5.6**
	15		**4.6**
	16		**5.0**
	22		**5.3**
	23		**6.7**
	24		**5.3**
	25		**4.6**
		128	**10.8**
		130	**7.8**
		131	**8.0**
		132	**8.6**
		136	**8.5**
		137	**7.6**
		140	**4.7**
		141	**6.4**
		142	**5.7**
		143	**4.5**
		144	**6.4**
		150	**6.6**
		151	**6.5**
		152	**5.3**
		153	**5.2**
	0	128	**6.9**
	2	137	**4.0**
	3	136	**4.0**
	4	130	**5.1**
	8	131	**4.3**
	9	132	**5.4**
	12	152	**1.7**
	13	141	**2.3**
	14	150	**1.4**
	15	140	**1.2**
	16	153	**2.6**
	22	142	**1.9**
	23	151	**1.9**
	24	144	**1.4**
	25	143	**1.3**

5G NR n260 K Patch Input Power Limit

Antenna	Beam ID_1	Beam ID_2	input.power.limit (dBm)
K patch	1		9.6
	5		5.6
	6		6.7
	7		6.0
	10		7.6
	11		5.4
	17		3.4
	18		4.9
	19		4.2
	20		3.4
	21		4.6
	26		4.0
	27		4.6
	28		3.7
	29		3.6
		129	10.5
		133	6.3
		134	7.2
		135	6.8
		138	7.4
		139	6.3
		145	3.7
		146	5.8
		147	5.3
		148	3.3
		149	4.1
		154	5.8
		155	5.9
		156	4.4
		157	3.6
	1	129	7.9
	5	139	2.6
	6	138	2.5
	7	133	2.6
	10	134	2.8
	11	135	3.6
	17	148	0.0
	18	147	0.9
	19	154	0.8
	20	157	0.0
	21	146	1.9
	26	156	0.7
	27	155	1.0
	28	149	0.5
	29	145	0.8

9. RF Exposure Conditions (Test Configurations)

9.1. Operating mode(s)

DUTs can transmit in operating modes and frequency bands using different signal characteristics (e.g. modulation, source coding, channel bandwidth, etc.) that require power density tests. The appropriate operating modes should be selected for testing taking into consideration differences in maximum output power and production variations, to ensure maximum power density is assessed.

Supported mode:

☒ CW
☐ AM
☐ FMCW
☐ FM
☐ pi/2-BPSK
☐ pi/2-QPSK
☐ D-QPSK
☐ QPSK
☐ Up to 16QAM
☐ Up to 64QAM
☐ Up to 256QAM
☐ pi/2-16QAM

9.2. Measurement position(s)

Power density evaluated at worst-surfaces according to test results of Power density Part.0 report.

Band	Antenna	Rear	Front	Edge1 (Top)	Edge2 (Right)	Edge3 (Bottom)	Edge4 (Left)
5G NR Band n260	L Patch	Yes	No	No	Yes	No	No
	K Patch	Yes	No	No	No	No	Yes
5G NR Band n261	L Patch	Yes	No	No	Yes	No	No
	K Patch	Yes	No	No	No	No	Yes

Please refer to Appendix A for Antenna's location.

10. Dielectric Property & System Check

10.1. Dielectric Property

Media is air so Relative Permittivity (ϵr) and Conductivity (σ) is 1.

10.2. System Check

Per Nov 2017,TCB Workshop

System validation is required before a system is deployed for measurement
System check is also required before each series of continuous measurement and, as applicable, repeated at least weekly
Peak and spatially averaged power density at the peak location(s) must be compared to calibrated results according to the defined test conditions

- the same spatial resolution and measurement region used in the waveguide calibration should be applied to system validation and system check
- 1 cm2 and 4 cm2 spatial averaging have been recommended in the AHG10 draft TR with reference targets available for specific waveguide
- power density distribution should also be verified, both spatially (shape) and numerically (level) through visual inspection for noticeable differences
- the measured results should be within 10% of the calibrated targets

SAR Lab	Date	Sorce SN	Sorce Cal. Due Data	Measured Results for 1cm^2	**Target (Ref. Value)**	**Delta ±10 %**	Measured Results for 4cm^2	**Target (Ref. Value)**	**Delta ±10 %**	visual inspection	Plot No.
SAR 1	5-8-2020	1047	2-26-2021	76.3	75.9	0.53	67.3	66.7	0.90	confirmed	
SAR 1	5-10-2020	1047	2-26-2021	72.7	75.9	-4.22	64.3	66.7	-3.60	confirmed	
SAR 1	5-11-2020	1047	2-26-2021	72.8	75.9	-4.08	64.1	66.7	-3.90	confirmed	1
SAR 1	5-12-2020	1047	2-26-2021	75.3	75.9	-0.79	66.8	66.7	0.15	confirmed	
SAR 1	5-13-2020	1047	2-26-2021	73.6	75.9	-3.03	64.3	66.7	-3.60	confirmed	
SAR 1	5-14-2020	1047	2-26-2021	73.2	75.9	-3.56	64.7	66.7	-3.00	confirmed	
SAR 1	5-15-2020	1047	2-26-2021	72.1	75.9	-5.01	62.8	66.7	-5.85	confirmed	2
SAR 1	5-17-2020	1047	2-26-2021	74.3	75.9	-2.11	64.2	66.7	-3.75	confirmed	
SAR 1	5-18-2020	1047	2-26-2021	74.9	75.9	-1.32	64.4	66.7	-3.45	confirmed	
SAR 1	5-19-2020	1047	2-26-2021	74.1	75.9	-2.37	64.0	66.7	-4.05	confirmed	
SAR 1	5-20-2020	1047	2-26-2021	75.1	75.9	-1.05	65.0	66.7	-2.55	confirmed	
SAR 1	5-21-2020	1047	2-26-2021	73.0	75.9	-3.82	63.1	66.7	-5.40	confirmed	
SAR 1	5-28-2020	1047	2-26-2021	70.8	75.9	-6.72	61.1	66.7	-8.40	confirmed	3
SAR 1	5-29-2020	1047	2-26-2021	71.3	75.9	-6.06	61.9	66.7	-7.20	confirmed	

11. Measured and Reported (Scaled) Results

Per TCB workshop October 2018, 4 cm^2 averaging area is considered.

11.1. NR Band n261 Test Results

Antenna	Dist. (mm)	Test Position	Freq. (MHz)	Ch.	Beam ID1	Beam ID2	input.power.limit (dBm)	Tested Signal	Duty Cycle	Power Drift	Incident power (mW/cm^2)	Total power (mW/cm^2)	Plot No.
					V	H					Meas.	Meas.	
L patch	2 mm	Rear	27559.3	Low	14	-	3.6	CW	100.0%	-0.03	0.304	0.406	
	2 mm	Right	27559.3	Low	24	-	3.5	CW	100.0%	0.06	0.332	0.413	
	2 mm	Rear	27559.3	Low	-	144	3.2	CW	100.0%	-0.14	0.320	0.408	
	2 mm	Right	27559.3	Low	-	150	3.4	CW	100.0%	0.03	0.390	0.453	1
	2 mm	Rear	27559.3	Low	13	150	-0.6	CW	100.0%	-0.08	0.124	0.180	
	2 mm	Right	27559.3	Low	13	150	-0.6	CW	100.0%	-0.05	0.199	0.244	
k patch	2 mm	Rear	27559.3	Low	18	-	3.7	CW	100.0%	-0.12	0.332	0.398	
	2 mm	Left	27559.3	Low	18	-	3.7	CW	100.0%	0.16	0.397	0.453	
	2 mm	Rear	27559.3	Low	-	154	3.2	CW	100.0%	-0.08	0.281	0.382	
	2 mm	Left	27559.3	Low	-	154	3.2	CW	100.0%	0.04	0.419	0.500	2
	2 mm	Rear	27559.3	Low	28	146	-0.3	CW	100.0%	-0.07	0.241	0.270	
	2 mm	Left	27559.3	Low	28	146	-0.3	CW	100.0%	-0.12	0.307	0.355	

NR Band n261 Additional Surfaces

Antenna	Dist. (mm)	Test Position	Freq. (MHz)	Ch.	Beam ID1	Beam ID2	input.power.limit (dBm)	Tested Signal	Duty Cycle	Power Drift	Incident power (mW/cm^2)	Total power (mW/cm^2)	Plot No.
					V	H					Meas.	Meas.	
L patch	10 mm	Rear	27923.5	Mid	8	136	2.5	CW	100.0%	-0.1	0.093	0.102	

Note(s):

1. This device utilizes power reduction for some WLAN wireless modes and technologies for simultaneous transmission compliance. These mechanisms are assessed In the SAR Test Report.
2. *PD_design_target* of 0.6166 mW/cm^2 was used with mmW device design related uncertainty of 2.1 dB.
3. *Input.power.limit* parameter for 5G mmW NR radio was calculated in RF Exposure Part 0 test report.
4. 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.
5. The device was configured to transmit CW wave signal for testing. Additional testing was not evaluated for different modulations, RB configurations, component carriers, channel configurations since the smart transmit algorithm monitors powers on a per symbol basis, which is independent of these signal characteristics.

11.2. NR Band n260 Test Results

Antenna	Dist. (mm)	Test Position	Freq. (MHz)	Ch.	Beam ID1	Beam ID2	input.power.limit (dBm)	Tested Signal	Duty Cycle	Power Drift	Incident power (mW/cm^2)	Total power (mW/cm^2)	Plot No.
					V	H					Meas.	Meas.	
L patch	2 mm	Rear	37051.8	Low	25	-	4.6	CW	100.0%	-0.08	0.434	0.523	
	2 mm	Right	37051.8	Low	15	-	4.6	CW	100.0%	-0.12	0.408	0.566	3
	2 mm	Rear	37051.8	Low	-	143	4.5	CW	100.0%	0.09	0.284	0.388	
	2 mm	Right	37051.8	Low	-	140	4.7	CW	100.0%	-0.01	0.263	0.403	
	2 mm	Rear	37051.8	Low	15	140	1.2	CW	100.0%	0.04	0.264	0.343	
	2 mm	Right	37051.8	Low	24	144	1.4	CW	100.0%	-0.11	0.131	0.176	
k patch	2 mm	Rear	37051.8	Low	29	-	3.6	CW	100.0%	0.17	0.244	0.350	
	2 mm	Left	38449.9	High	20	-	3.4	CW	100.0%	0.06	0.347	0.436	4
	2 mm	Rear	37051.8	Low	-	157	3.6	CW	100.0%	-0.18	0.207	0.254	
	2 mm	Left	38449.9	High	-	148	3.3	CW	100.0%	-0.03	0.349	0.435	
	2 mm	Rear	38449.9	High	17	148	0.0	CW	100.0%	0.02	0.080	0.090	
	2 mm	Left	38449.9	High	20	157	0.0	CW	100.0%	0.00	0.105	0.128	

NR Band n260 Additional Surfaces

Antenna	Dist. (mm)	Test Position	Freq. (MHz)	Ch.	Beam ID1	Beam ID2	input.power.limit (dBm)	Tested Signal	Duty Cycle	Power Drift	Incident power (mW/cm^2)	Total power (mW/cm^2)	Plot No.
					V	H					Meas.	Meas.	
L patch	10 mm	Rear	37051.8	Low	14	150	1.4	CW	100.0%	0.1	0.126	0.131	

Note(s):

1. This device utilizes power reduction for some WLAN wireless modes and technologies for simultaneous transmission compliance. These mechanisms are assessed In the SAR Test Report.
2. *PD_design_target* of 0.6166 mW/cm^2 was used with mmW device design related uncertainty of 2.1 dB.
3. *Input.power.limit* parameter for 5G mmW NR radio was calculated in RF Exposure Part 0 test report.
4. 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.
5. 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, RB configurations, component carriers, channel configurations since the smart transmit algorithm monitors powers on a per symbol basis, which is independent of these signal characteristics.

12. Simultaneous Transmission Conditions

Total exposure ratio calculated by taking ratio of reported SAR divided by SAR limit and adding it to measured power density divided by power density limit. Numerical sum of the two ratios should be less than 1

$$TER = \sum_{a=1}^{A} \frac{SAR_a}{SAR_a, limit} + \sum_{b=1}^{B} \frac{psPD_b}{psPD_b, limit} < 1$$

The Total exposure ratio shall be less than unity to ensure compliance with the limits.

$$\sum_{n=1}^{N} \frac{4G\ SAR_n}{4G\ SAR_n, limit} + \sum_{m=1}^{M} \frac{5G\ mmW\ NR\ psPD_m}{5G\ mmW\ NR\ psPD_m, limit} + \sum_{p=1}^{P} \frac{WLAN\ SAR_p}{WLAN\ SAR_p, limit} < 1$$

Qualcomm Smart Transmit algorithm for WWAN adds directly the time-averaged RF exposure from 4G and time-averaged RF exposure from 5G mmW NR. Smart Transmit algorithm controls the total RF exposure from both 4G and 5G mmW NR to not exceed FCC limit. Therefore, per FCC guidance, Total Exposure Ratio does not need to be evaluated directly for the 4G and 5G simultaneous compliance via summation. The validation of the time-averaging algorithm and compliance under the Tx varying transmission scenario for WWAN technologies are reported in Part 2 report.

$$\sum_{n=1}^{N} \frac{4G\ SAR_n}{4G\ SAR_n, limit} + \sum_{p=1}^{P} \frac{WLAN\ SAR_p}{WLAN\ SAR_p, limit} < 1$$

$$\sum_{m=1}^{M} \frac{5G\ mmW\ NR\ psPD_m}{5G\ mmW\ NR\ psPD_m, limit} + \sum_{p=1}^{P} \frac{WLAN\ SAR_p}{WLAN\ SAR_p, limit} < 1$$

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 2.1 dB. Smart Transmit algorithm limits PD exposure to 75% of maximum to provide at least 25% margin allocated for 4G LTE anchor due to the 3 dB reserve power margin used in the device/ Therefore, 5G mmW NR RF exposure for this DUT is evaluated by reported psPD calculated as;

$$reported\_psPD = 75\% \times PD\_design\_target + 2.1\ dB = 7.5\ W/m^2$$

The compliance analysis for simultaneous transmission scenarios of WWAN with Smart Transmit and 4G & WLAN can be found in two reports indicated in the table below.

	Simultaneous Scenario	Evaluation Report
1.	4G LTE WWAN + WLAN	FCC SAR Evaluation Report (Part 1)
2.	4G LTE WWAN + 5G mmW NR WWAN	RF Exposure Part 2 Test Report

Simultaneous Transmission Condition

RF Exposure Condition	Item	Capable Transmit Configurations				
Head & Body-worn & Hotspot & Phablet-10g	1	psPD	+	DTS_Ant.1	+	DTS_Ant.2
	2	psPD	+	U-NII_Ant.1	+	U-NII_Ant.2
	3	psPD	+	BT		
	4	psPD	+	***RSDB scenarios***		
	5	psPD	+	DTS_Ant.1	+	DTS_Ant.2
	6	psPD	+	U-NII_Ant.1	+	U-NII_Ant.2
	7	psPD	+	BT		
	8	psPD	+	***RSDB scenarios***		

Notes:

1. DTS supports Wi-Fi Direct, Hotspot and VoIP.
2. U-NII supports Wi-Fi Direct, Hotspot and VoIP.
3. DTS Radio cannot transmit simultaneously with Bluetooth Radio.
4. DTS Radio can only transmit simultaneously with U-NII Radio in RSDB scenarios.
5. DTS and UNII Radio can operating both SISO and MIMO modes.
6. BT tethering is consider about each RF exposure conditions

RSDB scenarios

Mode	Scenario	# of TX	5GHz		2.4GHz	
			Ant1	Ant2	Ant1	Ant2
2.4GHz+5GHz RSDB Only	1	2	-	On	On	-

12.1. 5G mmW NR psPD for TER Ratio analysis

NR Band	Surface	Evaluation Distance (mm)	Adjustment Factor due to Simulation	Adjusted Reported psPD (mW/cm2)	Measured Total psPD (mW/cm2)	Measured Total psPD x 0.75 (mW/cm2)	Final Reported psPD (mW/cm2)
n261	Back	2	1.000	0.750	0.408	0.306	**0.750**
n261	Front	2	0.345	0.259	0.103	0.077	**0.259**
n261	Top	2	0.109	0.082	-	-	**0.082**
n261	Bottom	2	0.074	0.056	-	-	**0.056**
n261	Right	2	1.000	0.750	0.453	0.340	**0.750**
n261	Left	2	1.000	0.750	0.500	0.375	**0.750**
n260	Back	2	1.000	0.750	0.523	0.392	**0.750**
n260	Front	2	0.544	0.408	0.112	0.084	**0.408**
n260	Top	2	0.238	0.179	-	-	**0.179**
n260	Bottom	2	0.079	0.059	-	-	**0.059**
n260	Right	2	1.000	0.750	0.566	0.425	**0.750**
n260	Left	2	1.000	0.750	0.436	0.327	**0.750**
n261	Back	10	0.552	0.414	0.102	0.077	**0.414**
n260	Back	10	0.543	0.407	0.131	0.098	**0.407**

Note(s):

1. Adjusted factor is (simulated PD on desired exposure plane)/(PD on worst-surface at 2mm evaluation distance) out of all beams and out of all channels. See Power Density Simulation Report.
2. Worst-case power density results for each test configuration among all antenna arrays and among all supported bands were considered for Total Exposure Ratio analysis.
3. For test positions that were not required to be evaluated for WLAN SAR per FCC KDB publication 248227, the worst-case WLAN SAR result for the applicable exposure conditions was used for simultaneous transmission analysis, as indicated in the above table in blue.
4. For front side, top edge, left edge, and right edge, power density results at 2 mm were considered as a more conservative evaluation for 10 mm hotspot.
5. The bands/modes that are not required to be evaluated for Phablet SAR are not considered for Total Exposure Ratio analysis.
6. For power density measurements, a test separation distance of 2 mm was used for phablet configuration due to probe restraints.
7. Worst-case front side reported psPD was considered for Head Total Exposure Ratio analysis.
8. The worst-case between Adjusted Reported_psPD and Measured Total psPD x 0.75 was chosen for TER analysis.

12.2. 5G mmW NR Head Total Exposure Ratio

		psPD	2.4GHz Ant1 Reported SAR	2.4GHz Ant2 Reported SAR	2.4GHz MIMO Reported SAR	5GHz Ant1 Reported SAR	5Hz Ant2 Reported SAR	5Hz MIMO Reported SAR	Bluetooth Reported SAR	psPD+2.4GHz Ant1 Reported SAR	psPD+2.4GHz Ant2 Reported SAR	psPD+2.4GHz MIMO Reported SAR	psPD+5GHz Ant1 Reported SAR	psPD+5GHz Ant2 Reported SAR	psPD+5GHz MIMO Reported SAR	psPD+Bluetooth Reported SAR	psPD+2.4GHz Ant1 Reported SAR+5GHz Ant2 Reported SAR
		mW/cm^2	W/kg	W/kg	W/kg	W/kg	W/kg	W/kg	W/kg								
		1	2	3	4	5	6	7	8	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+2+6
Applicable Limit		1.0	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Front Side	Reproted Value	0.408	0.313	0.025	0.338	0.129	0.498	0.627	0.373	[redacted]							
	Ratio to Limit	0.408	0.200	0.016	0.211	0.081	0.311	0.392	0.233	0.608	0.424	0.619	0.489	0.719	0.800	0.641	0.919

12.3. 5G mmW NR Body-worn Total Exposure Ratio

		psPD	2.4GHz Ant1 Reported SAR	2.4GHz Ant2 Reported SAR	2.4GHz MIMO Reported SAR	5GHz Ant1 Reported SAR	5Hz Ant2 Reported SAR	5Hz MIMO Reported SAR	Bluetooth Reported SAR	psPD+2.4GHz Ant1 Reported SAR	psPD+2.4GHz Ant2 Reported SAR	psPD+2.4GHz MIMO Reported SAR	psPD+5GHz Ant1 Reported SAR	psPD+5GHz Ant2 Reported SAR	psPD+5GHz MIMO Reported SAR	psPD+Bluetooth Reported SAR	psPD+2.4GHz Ant1 Reported SAR+5GHz Ant2 Reported SAR
		mW/cm^2	W/kg	W/kg	W/kg	W/kg	W/kg	W/kg	W/kg								
		1	2	3	4	5	6	7	8	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+2+6
Applicable Limit		1.0	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Back Side	Reproted Value	0.414	0.111	0.018	0.129	0.316	0.158	0.474	0.055	[redacted]							
	Ratio to Limit	0.414	0.069	0.011	0.081	0.198	0.099	0.296	0.034	0.483	0.425	0.495	0.612	0.513	0.710	0.448	0.582

12.4. 5G mmW NR Hotspot Total Exposure Ratio

		psPD	2.4GHz Ant1 Reported SAR	2.4GHz Ant2 Reported SAR	2.4GHz MIMO Reported SAR	5GHz Ant1 Reported SAR	5Hz Ant2 Reported SAR	5Hz MIMO Reported SAR	Bluetooth Reported SAR	psPD+2.4GHz Ant1 Reported SAR	psPD+2.4GHz Ant2 Reported SAR	psPD+2.4GHz MIMO Reported SAR	psPD+5GHz Ant1 Reported SAR	psPD+5GHz Ant2 Reported SAR	psPD+5GHz MIMO Reported SAR	psPD+Bluetooth Reported SAR	psPD+2.4GHz Ant1 Reported SAR+5GHz Ant2 Reported SAR
		mW/cm²	W/kg	W/kg	W/kg	W/kg	W/kg	W/kg	W/kg								
		1	2	3	4	5	6	7	8	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+2+6
Applicable Limit		1.0	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Back Side	Reproted Value	0.414	0.186	0.047	0.166	0.501	0.181	0.383	0.081								
	Ratio to Limit	0.414	0.116	0.029	0.104	0.313	0.113	0.071	0.051	0.530	0.443	0.518	0.727	0.527	0.485	0.465	0.643
Front Side	Reproted Value	0.408	0.405	0.047	0.102	0.501	0.181	0.383	0.052								
	Ratio to Limit	0.408	0.068	0.029	0.064	0.313	0.113	0.071	0.033	0.476	0.437	0.472	0.721	0.521	0.479	0.441	0.589
Top Side	Reproted Value	0.179	0.405	0.047	0.264	0.501	0.181	0.383	0.152								
	Ratio to Limit	0.179	0.253	0.029	0.165	0.313	0.113	0.071	0.095	0.432	0.208	0.344	0.492	0.292	0.250	0.274	0.545
Bottom Side	Reproted Value	0.059	0.000	0.000	0.000	0.000	0.000	0.000	0.000								
	Ratio to Limit	0.059	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
Right Side	Reproted Value	0.750	0.000	0.000	0.000	0.000	0.000	0.000	0.000								
	Ratio to Limit	0.750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750
Left Side	Reproted Value	0.750	0.021	0.047	0.072	0.283	0.095	0.383	0.007								
	Ratio to Limit	0.750	0.013	0.029	0.045	0.177	0.059	0.037	0.004	0.763	0.779	0.795	0.927	0.809	0.787	0.754	0.823

12.5. 5G mmW NR Phablet Total Exposure Ratio

		psPD	5GHz Ant1 Reported SAR	5Hz Ant2 Reported SAR	5Hz MIMO Reported SAR	psPD+5GHz Ant1 Reported SAR	psPD+5GHz Ant2 Reported SAR	psPD+5GHz MIMO Reported SAR
		mW/cm²	W/kg	W/kg	W/kg			
		1	2	3	4	1+2	1+3	1+4
Applicable Limit		1.0	4.0	4.0	4.0	1.0	1.0	1.0
Back Side	Reproted Value	0.750	0.613	0.245	0.858			
	Ratio to Limit	0.750	0.153	0.061	0.215	0.903	0.811	0.965
Front Side	Reproted Value	0.408	0.613	0.596	1.209			
	Ratio to Limit	0.408	0.153	0.149	0.302	0.561	0.557	0.710
Top Side	Reproted Value	0.179	0.613	0.596	1.209			
	Ratio to Limit	0.179	0.153	0.149	0.302	0.332	0.328	0.481
Bottom Side	Reproted Value	0.059	0.000	0.000	0.000			
	Ratio to Limit	0.059	0.000	0.000	0.000	0.059	0.059	0.059
Right Side	Reproted Value	0.750	0.000	0.000	0.000			
	Ratio to Limit	0.750	0.000	0.000	0.000	0.750	0.750	0.750
Left Side	Reproted Value	0.750	0.355	0.596	0.951			
	Ratio to Limit	0.750	0.089	0.149	0.238	0.839	0.899	**0.988**

Conclusion:

Total Exposure Ratio (TER) is less than 1 in RF exposure conditions.

12.6. Mathematical Derivation of TER Compliance

$$Total\ Normalized\ RFx = Normalized\ RFx_{Time\ Averaged\ WWAN} + Normalized\ RFx_{WLAN} \leq 1.0 \quad (1)$$

Since WWAN Smart Transmit algorithm adds directly the time-averaged RF exposure from 4G and time-averaged RF exposure from 5G mmW NR, per chipset manufacturer's guidance, Normalized RF exposure from 4G and from 5G mmW NR could be assumed as

$$Normalized\ RFx_{Time\ Averaged\ WWAN} = \frac{4G\ SAR}{4G\ SAR\ Limit} + \frac{5G\ mmW\ NR\ psPD}{5G\ mmW\ NR\ psPD\ Limit} \leq 1.0 \quad (2)$$

Smart Transmit algorithm assumes that 4G and 5G mmW NR hotspots are co-located and therefore:

$$Time\ Averaged\ WWAN = [\,x(t) \times A] + [(1\text{-}x(t)) \times B] \leq 1.0\ Normalized\ Limit \quad (3)$$

A = Max normalized time-averaged SAR exposure from 4G
B = Max normalized time-averaged PD exposure from 5G mmW NR

x(t) = Ranges between [0,1]
x(t) × A = Percentage of normalized time-averaged RF exposure from 4G
(1-x(t)) × B = Remaining percentage of RF exposure contribution from 5G mmW NR

Smart Transmit controls "x" in real time such that the sum of these exposures never exceeds 1.0 Normalized Limit. If the equations below (4a, 4b) are proven, then, mathematically equation (5) would be proven.

$$A + norm.\ SAR\ from\ WLAN \leq 1.0\ normalized\ limit \quad (4a)$$

$$B + norm.\ SAR\ from\ WLAN \leq 1.0\ normalized\ limit \quad (4b)$$

$$[x(t) \times A] + [(1 - x(t)) \times B] + norm.\ SAR\ from\ WLAN \leq 1.0\ normalized\ limit \quad (5)$$

Without 5G mmW NR, Smart Transmit limits the maximum RF exposure contributed from 4G to 100% normalized exposure. With 5G mmW NR, Smart Transmit limits the maximum RF exposure contributed from 5G mmW NR to 75% normalized exposure to guarantee at least 25% margin allocated to 4G LTE anchor to maintain the link. therefore:

$$Smart\ Tx\ WWAN{:}\ A = max\ (normalized\ SAR\ exposure\ from\ 4G) \leq 1.0\ normalized\ limit \quad (6a)$$

$$Smart\ Tx\ WWAN{:}\ B = 0.75 \times max\ (normalized\ PD\ exposure\ from\ 5G\ mmW\ NR) \leq 1.0\ normalized\ limit \quad (6b)$$

To demonstrate simultaneous transmission compliance in equation (1), below equations (7a & 7b) obtained by combining equations (4a & 4b) and (6a & 6b), should be proven for simultaneous transmission compliance:

$$Total\ Normalized\ RFx = Normalized\ SAR_{4G\ WWAN} + Normalized\ SAR_{WLAN} < 1.0 \quad (7a)$$

$$Total\ Normalized\ RFx = 0.75 \times Normalized\ psPD_{5G\ mmW\ NR\ WWAN} + Normalized\ SAR_{WLAN} < 1.0 \quad (7b)$$

Which are re-written as:

$$Total\ Normalized\ RFx = \frac{4G\ SAR}{4G\ SAR\ Limit} + \frac{WLAN\ SAR}{WLAN\ SAR\ Limit} < 1 \quad (8a)$$

$$Total\ Normalized\ RFx = 0.75 * \frac{5G\ mmW\ NR\ psPD}{5G\ mmW\ NR\ psPD\ Limit} + \frac{WLAN\ SAR}{WLAN\ SAR\ Limit} < 1 \quad (8b)$$

Analysis for equation (8a) is performed in Section 13 of FCC SAR Evaluation Report (Part 1). Analysis for equation (8b) is performed in this Sec 12.

Appendixes

Refer to separated files for the following appendixes.

4789424849-S4V2 FCC Report PD Appendix A: Setup Photos

4789424849-S4V2 FCC Report PD Appendix B: System Check Plots

4789424849-S4V2 FCC Report PD Appendix C: Highest Test Plots

4789424849-S4V2 FCC Report PD Appendix D: Probe Calibration Certificates

4789424849-S4V2 FCC Report PD Appendix E: Verification source Calibration Certificates

END OF REPORT