SAR EVALUATION REPORT

FCC 47 CFR § 2.1093
IEEE Std. 1528-2013

For
Mobile Payment Terminal

FCC ID: V5PD195

Model: D195

Report Number: 4791059475-SAR-1

Issue Date: February 2, 2024

Prepared for
PAX Technology Limited
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Prepared by
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Revision History

Rev.	Date	Revisions	Revised By
V1.0	Dec. 23, 2023	Initial Issue	\
V1.1	February 2, 2024	Updated the address of manufacturer	

Note:

1. The Measurement result for the sample received is<Pass> according to < IEEE Std. 1528-2013> when <Accuracy Method> decision rule is applied.
2. This report is only published to and used by the applicant, and it is not for evidence purpose in China.

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1. Attestation of Test Results

Applicant Name	PAX Technology Limited			
Address	Room 2416, 24/F., Sun Hung Kai Centre, 30 Harbour Road, Wanchai, Hong Kong			
Manufacturer	PAX Computer Technology (Shenzhen) Co., Ltd.			
Address	Room 701, PAX Technology Building, Shanxia Community, Pinghu Sub-district, Longgang District, Shenzhen, China			
EUT Name	Mobile Payment Terminal			
Model	D195			
Sample Status	Normal			
Sample Received Date	Nov.2, 2023			
Date of Tested	Dec.14,2023~ Dec.22,2023			
Applicable Standards	FCC 47 CFR § 2.1093 IEEE Std. 1528-2013 KDB publication			
SAR Limits (W/Kg)				
Exposure Category	Peak spatial-average (1g of tissue)		Extremities (hands, wrists, ankles, etc.) (10g of tissue)	
General population / Uncontrolled exposure	1.6		4	
The Highest Reported SAR (W/kg)				
RF Exposure Conditions	**Equipment Class**			
	PCB	**DTS**	**NII**	**DSS**
Body 1-g (5mm)	0.770	0.468	0.762	<0.01
Simultaneous Transmission (1-g)	0.770			
Test Results	Pass			

Prepared By:	Reviewed By:	Approved By:
Burt Hu	Denny Huang	Stephen Guo
Burt Hu Laboratory Engineer	Denny Huang Senior Project Engineer	Stephen Guo Laboratory Manager

2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with IEEE Std.1528-2013 the following FCC Published RF exposure KDB procedures:

- 248227 D01 802.11 Wi-Fi SAR v02r02
- 447498 D01 General RF Exposure Guidance or v06
- 690783 D01 SAR Listings on Grants v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02
- 941225 D05 SAR for LTE Devices v02r05
- 941225 D07 UMPC Mini Tablet v01r02

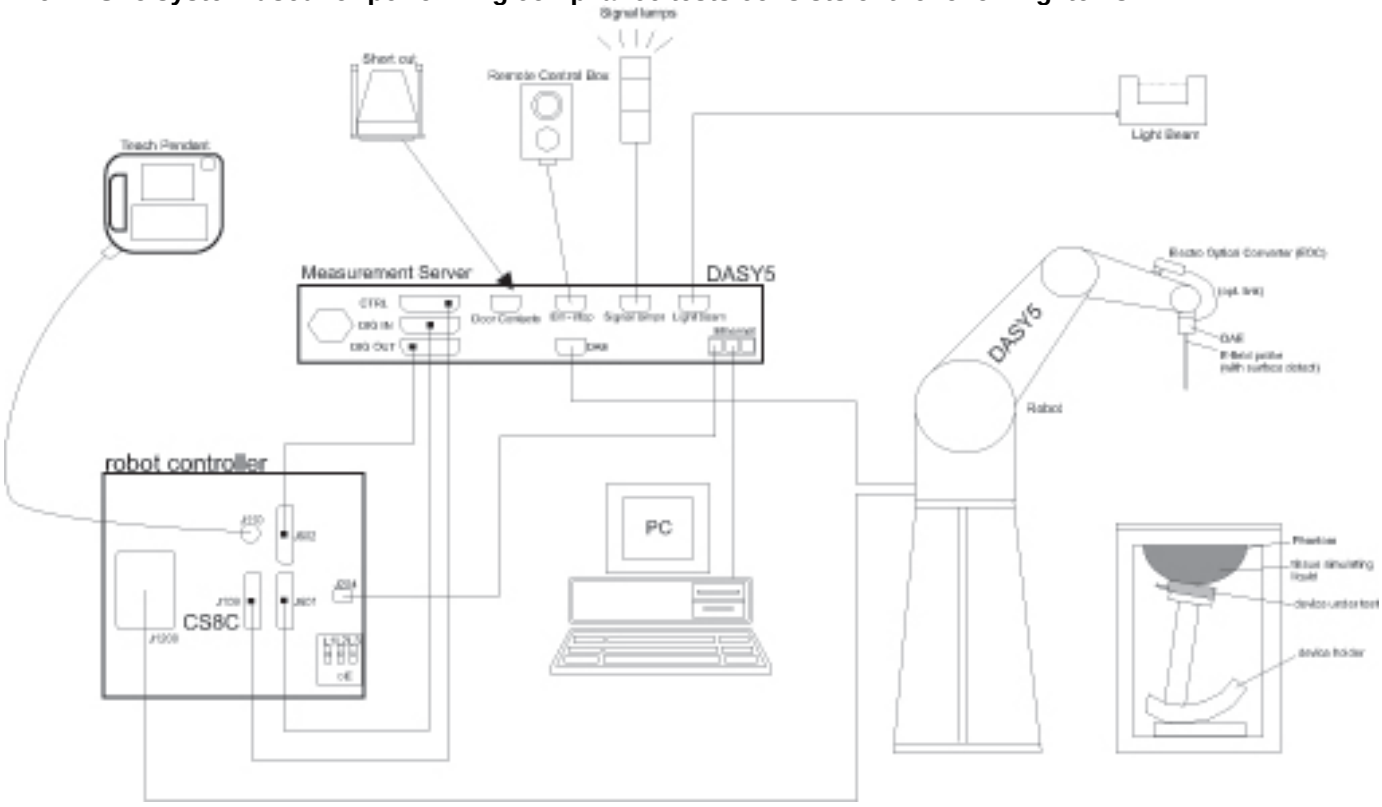
3. Facilities and Accreditation

Test Location	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.
Address	Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China
Accreditation Certificate	**A2LA (Certificate No.: 4102.01)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA. **FCC (FCC Designation No.: CN1187)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Delcaration of Conformity (DoC) and Certification rules **ISED (Company No.: 21320)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320 and the test lab Conformity Assessment Body Identifier (CABID) is CN0046. **VCCI (Registration No.: G-20192, C-20153, T-20155 and R-20202)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793. Facility Name: Chamber D, the VCCI registration No. is G-20192 and R-20202 Shielding Room B, the VCCI registration No. is C-20153 and T-20155
Description	All measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China

4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

The DASY5 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).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win7 and the DASY52 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

4.2. SAR Scan Procedures

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 phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE Standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Area Scan Parameters extracted from KDB 865664 D01 v01r04 SAR Measurement 100 MHz to 6 GHz

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

Step 3: Zoom Scan

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

Zoom Scan Parameters extracted from KDB 865664 D01 v01r04 SAR Measurement 100 MHz to 6 GHz

Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$ mm	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Step 4: Power drift measurement

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

Step 5: Z-Scan (FCC only)

The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation the extrapolated distance should not be greater than the step size in Z-direction.

4.3. 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.

Name of equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
ENA Network Analyzer	Keysight	E5080A	MY55100583	2024.10.11
Dielectric Probe kit	SPEAG	SM DAK 040 SA	1155	2025.02.27
DC power supply	Keysight	E36103A	MY55350020	2024.10.11
Signal Generator	Rohde & Schwarz	SME06	837633\001	2024.08.06
BI-Directional Coupler	KRYTAR	1850	54733	2024.10.11
Peak and Average Power Sensor	Keysight	E9325A	MY62220002	2024.10.11
Peak and Average Power Sensor	Keysight	E9325A	MY62220003	2024.10.11
Dual Channel PK Power Meter	Keysight	N1912A	MY55416024	2024.10.11
Amplifier	CORAD TECHNOLOGY LTD	AMF-4D-00400600-50-30P	1983561	NCR
Dosimetric E-Field Probe	SPEAG	EX3DV4	7383	2024.06.04
Data Acquisition Electronic	SPEAG	DAE3	427	2024.05.16
Dipole Kit 835 MHz	SPEAG	D835V2	4d206	2024.12.16
Dipole Kit 1800 MHz	SPEAG	D1800V2	2d212	2024.12.20
Dipole Kit 1900 MHz	SPEAG	D1900V2	5d212	2024.12.19
Dipole Kit 750 MHz	SPEAG	D750V3	1153	2024.12.14
Dipole Kit 2450 MHz	SPEAG	D2450V2	977	2024.12.16
Dipole Kit 5 GHz	SPEAG	D5GHzV2	1231	2024.12.15
Software	SPEAG	DASY52	N/A	NCR
Twin Phantom	SPEAG	SAM 5.0	1805	NCR
Thermometer	/	GX-138	150709653	2024.10.18
Thermometer	VICTOR	ITHX-SD-5	18470005	2024.10.18

Note:

1) As per KDB865664D01 requirements for dipole calibration, the test laboratory has adopted three-year extended calibration interval. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.
   a) There is no physical damage on the dipole;
   b) System check with specific dipole is within 10% of calibrated value;
   c) The most recent return-loss result, measured at least annually, deviates by no more than 20% from the previous measurement.
   d) The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5Ω from the previous measurement.
2) Dielectric assessment kit is calibrated against air, distilled water and a shorting block performed before measuring liquid parameters.
3) NCR is short for "No Calibration Requirement".

5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k =2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std. 1528-2013 is not required in SAR reports submitted for equipment approval.
Therefore, the measurement uncertainty is not required.

6. Device Under Test (DUT) Information

6.1. DUT Description

EUT is a Mobile Payment Terminal with LTE/NFC radio, IEEE 802.11a/ b/g/n/ac and Bluetooth radio	
Dimension	Overall (Length x Width x Height): 130 mm x 71 mm x 17.6 mm
Accessory	None

6.2. Wireless Technology

Wireless technologies	Frequency bands	Operating mode
LTE	FDD B2 FDD B4 FDD B5 FDD B12 FDD B13 FDD B17 FDD B66	QPSK 16QAM Duty cycle: 100% ☒ Rel. 10 Does not support Carrier Aggregation (CA) ☐ Rel. 10 Carrier Aggregation (Downlink only) ☐ Rel. 11 Carrier Aggregation (2 Uplink and 2 Downlinks)
Wi-Fi	2.4GHz	802.11b 802.11g 802.11n (HT20) 802.11n (HT40)
Wi-Fi	5GHz	802.11a 802.11n (HT20) 802.11n (HT40) 802.11ac (VHT20) 802.11ac (VHT40) 802.11ac (VHT80)
BT/BLE	2.4GHz	V5.1
NFC	13.56MHz	ASK

7. Conducted Output Power Measurement and tune-up tolerance

7.1. Power measurement result of LTE

LTE FDD B2			Conducted Power(dBm)				Tune up
Bandwidth	Modulation	RB size	RB offset	Channel 18607	Channel 18900	Channel 19193	
1.4MHz	QPSK	1	0	22.30	22.79	22.19	23
		1	2	22.26	22.78	22.45	23
		1	5	22.24	22.84	22.50	23
		3	0	22.22	22.65	22.15	23
		3	1	22.19	22.59	22.16	23
		3	3	22.19	22.67	22.12	23
		6	0	21.33	21.63	21.07	23
	16QAM	1	0	21.26	21.77	21.34	22
		1	2	21.48	21.98	21.40	22
		1	5	21.67	21.73	21.25	22
		3	0	21.40	21.47	21.27	22
		3	1	21.38	21.48	21.25	22
		3	3	21.40	21.50	20.88	22
		6	0	20.18	20.56	20.17	22
Bandwidth	Modulation	RB size	RB offset	Channel 18615	Channel 18900	Channel 19185	Tune up
3MHz	QPSK	1	0	22.31	22.70	22.03	23
		1	8	22.06	22.61	21.87	23
		1	14	22.33	22.71	22.08	23
		8	0	21.34	21.56	20.99	22
		8	4	21.23	21.58	20.95	22
		8	7	21.35	21.57	21.14	22
		15	0	21.42	21.58	21.10	22
	16QAM	1	0	21.58	21.11	21.31	22
		1	8	20.96	21.18	21.30	22
		1	14	21.31	21.62	21.21	22
		8	0	20.50	20.65	20.26	22
		8	4	20.52	20.67	20.08	22
		8	7	20.58	20.66	20.26	22
		15	0	20.31	20.82	20.19	22
Bandwidth	Modulation	RB size	RB offset	Channel 18625	Channel 18900	Channel 19175	Tune up
5MHz	QPSK	1	0	22.31	22.61	21.93	23
		1	12	22.20	22.45	22.06	23
		1	24	22.02	22.58	22.13	23
		12	0	21.16	21.46	20.95	22

		12	6	21.16	21.39	20.94	22
		12	13	21.30	21.52	21.05	22
		25	0	21.20	21.48	20.97	22
	16QAM	1	0	21.22	20.97	20.84	22.5
		1	12	21.10	21.42	21.25	22.5
		1	24	21.11	22.10	21.34	22.5
		12	0	20.07	20.47	20.06	22
		12	6	20.23	20.27	20.08	22
		12	13	19.96	20.56	20.10	21
		25	0	20.35	20.55	20.07	21
Bandwidth	Modulation	RB size	RB offset	Channel 18650	Channel 18900	Channel 19150	Tune up
10MHz	QPSK	1	0	22.18	22.43	21.84	23
		1	24	22.14	22.48	22.25	23
		1	49	22.03	22.59	21.84	23
		25	0	21.36	21.63	20.91	22
		25	12	21.17	21.56	20.96	22
		25	25	21.26	21.54	21.07	22
		50	0	21.30	21.51	21.08	22
	16QAM	1	0				
		1	24				
		1	49				
		25	0				
		25	12				
		25	25				
		50	0				
Bandwidth	Modulation	RB size	RB offset	Channel 18675	Channel 18900	Channel 19125	Tune up
15MHz	QPSK	1	0	21.88	22.28	22.35	23
		1	38	22.05	22.54	21.73	23
		1	74	22.07	22.27	21.96	23
		36	0	21.22	21.52	21.06	22
		36	18	21.16	21.43	21.04	22
		36	37	21.25	21.42	21.05	22
		75	0	21.30	21.56	21.12	22
	16QAM	1	0				
		1	38				
		1	74				
		36	0				
		36	18				
		36	37				
		75	0				

Bandwidth	Modulation	RB size	RB offset	Channel 18700	Channel 18900	Channel 19100	Tune up
20MHz	QPSK	1	0	22.43	22.36	22.03	23
		1	49	22.37	22.27	22.01	23
		1	99	22.19	22.29	22.00	23
		50	0	21.37	21.45	21.07	22
		50	25	21.44	21.47	21.17	22
		50	50	21.30	21.50	20.91	22
		100	0	21.45	21.32	21.07	22
	16QAM	1	0				
		1	49				
		1	99				
		50	0				
		50	25				
		50	50				
		100	0				

Note:
1) As per KDB 447498 D01 sec.4.1.d at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.
2) All power is the frame-averaged power.

LTE FDD B4			Conducted Power(dBm)				Tune up
Bandwidth	Modulation	RB size	RB offset	Channel 19957	Channel 20175	Channel 20393	
1.4MHz	QPSK	1	0	21.46	22.85	22.41	23
		1	2	22.65	22.85	22.84	23
		1	5	22.58	22.65	22.78	23
		3	0	22.33	22.61	22.69	23
		3	1	22.58	22.64	22.26	23
		3	3	22.36	22.61	22.39	23
		6	0	21.26	21.57	21.52	23
	16QAM	1	0	21.81	21.72	22.03	22.5
		1	2	21.68	22.00	22.02	22.5
		1	5	21.34	21.68	22.05	22.5
		3	0	20.84	21.51	20.92	22
		3	1	21.35	21.44	21.08	22
		3	3	21.67	21.42	21.26	22
		6	0	20.26	20.78	20.59	22
Bandwidth	Modulation	RB size	RB offset	Channel 19965	Channel 20175	Channel 20385	Tune up
3MHz	QPSK	1	0	22.33	22.55	22.45	23

		1	8	22.60	22.19	22.68	23
		1	14	22.44	22.72	22.58	23
		8	0	21.43	21.61	21.53	22
		8	4	21.50	21.68	21.55	22
		8	7	21.50	21.48	21.41	22
		15	0	21.44	21.60	21.38	22
	16QAM	1	0	21.41	21.54	21.23	22.5
		1	8	20.93	21.60	21.35	22.5
		1	14	21.38	22.27	21.56	22.5
		8	0	20.54	20.90	20.57	22
		8	4	20.54	20.79	20.67	22
		8	7	20.52	20.57	20.63	22
		15	0	20.63	20.56	20.58	22
Bandwidth	Modulation	RB size	RB offset	Channel 19975	Channel 20175	Channel 20375	Tune up
5MHz	QPSK	1	0	22.21	22.52	22.38	23
		1	12	22.85	22.44	22.57	23
		1	24	22.42	22.51	22.69	23
		12	0	21.30	21.77	21.36	22
		12	6	21.45	21.70	21.38	22
		12	13	21.39	21.55	21.80	22
		25	0	21.40	21.64	21.56	22
	16QAM	1	0	21.26	21.56	21.23	22
		1	12	20.81	21.50	20.90	22
		1	24	20.77	21.47	21.61	22
		12	0	20.51	20.51	20.43	22
		12	6	20.35	20.79	20.25	22
		12	13	20.45	20.63	20.51	22
		25	0	20.30	20.71	20.63	22
Bandwidth	Modulation	RB size	RB offset	Channel 20000	Channel 20175	Channel 20350	Tune up
10MHz	QPSK	1	0	21.52	22.52	22.54	23
		1	24	22.34	22.60	22.82	23
		1	49	22.22	22.73	22.85	23
		25	0	21.78	21.48	21.69	22
		25	12	21.93	21.98	21.57	22
		25	25	21.52	21.68	21.75	22
		50	0	21.56	21.62	21.54	22
	16QAM	1	0				
		1	24				
		1	49				
		25	0				
		25	12				
		25	25				

		50	0				
Bandwidth	Modulation	RB size	RB offset	Channel 20025	Channel 20175	Channel 20325	Tune up
15MHz	QPSK	1	0	22.34	22.40	22.66	23
		1	38	22.30	22.38	22.23	23
		1	74	22.41	22.55	22.60	23
		36	0	21.29	21.66	20.87	22
		36	18	21.26	21.29	21.29	22
		36	37	21.45	21.14	21.63	22
		75	0	21.41	21.52	21.24	22
	16QAM	1	0				
		1	38				
		1	74				
		36	0				
		36	18				
		36	37				
		75	0				
Bandwidth	Modulation	RB size	RB offset	Channel 20050	Channel 20175	Channel 20300	Tune up
20MHz	QPSK	1	0	22.51	22.29	22.79	23
		1	49	22.27	22.46	22.69	23
		1	99	22.92	22.54	22.69	23
		50	0	21.38	21.62	21.54	22
		50	25	21.36	21.69	21.59	22
		50	50	21.64	21.29	21.30	22
		100	0	21.51	21.50	21.43	22
	16QAM	1	0				
		1	49				
		1	99				
		50	0				
		50	25				
		50	50				
		100	0				

Note:
1) As per KDB 447498 D01 sec.4.1.d at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.
2) All power is the frame-averaged power.

LTE FDD B5			Conducted Power(dBm)				Tune up
Bandwidth	Modulation	RB size	RB offset	Channel 20407	Channel 20525	Channel 20643	
1.4MHz	QPSK	1	0	23.00	23.07	23.23	24
		1	2	23.02	23.09	23.34	24
		1	5	22.93	23.14	23.26	24
		3	0	22.89	23.03	23.03	23.5
		3	1	22.83	22.93	23.03	23.5
		3	3	22.87	22.94	22.97	23.5
		6	0	21.76	22.15	21.94	23
	16QAM	1	0	22.18	22.08	22.35	23
		1	2	22.48	22.33	22.66	23
		1	5	22.16	22.12	22.28	23
		3	0	21.61	22.19	21.96	22.5
		3	1	21.62	22.02	21.96	22.5
		3	3	21.81	22.24	21.97	22.5
		6	0	20.86	20.91	21.26	22
Bandwidth	Modulation	RB size	RB offset	Channel 20415	Channel 20525	Channel 20635	Tune up
3MHz	QPSK	1	0	22.78	23.19	22.83	24
		1	8	22.68	22.98	22.82	24
		1	14	22.88	23.23	22.79	24
		8	0	21.98	22.13	22.11	23
		8	4	22.00	22.06	22.12	23
		8	7	21.91	22.20	22.10	23
		15	0	22.07	22.12	22.01	23
	16QAM	1	0	22.03	22.46	22.13	23
		1	8	21.92	22.00	22.24	23
		1	14	22.02	22.57	22.49	23
		8	0	20.78	21.00	21.13	22
		8	4	20.91	21.30	21.04	22
		8	7	21.00	21.26	21.18	22
		15	0	21.13	21.11	21.08	22
Bandwidth	Modulation	RB size	RB offset	Channel 20425	Channel 20525	Channel 20625	Tune up
5MHz	QPSK	1	0	22.78	22.66	23.03	24
		1	12	22.72	23.07	22.97	24
		1	24	22.80	23.45	22.73	24
		12	0	22.02	21.91	22.18	23
		12	6	21.95	21.98	22.19	23
		12	13	21.87	22.19	22.04	23
		25	0	21.97	22.11	22.13	23

	16QAM	1	0	21.95	22.34	22.00	23
		1	12	21.81	22.10	21.53	23
		1	24	21.82	22.53	21.79	23
		12	0	21.06	21.08	21.06	22
		12	6	20.98	20.99	20.96	22
		12	13	21.01	21.20	21.09	22
		25	0	21.10	21.23	21.14	22
Bandwidth	Modulation	RB size	RB offset	Channel 20450	Channel 20525	Channel 20600	Tune up
10MHz	QPSK	1	0	22.66	22.96	23.33	24
		1	24	22.93	22.96	23.05	24
		1	49	22.95	23.21	23.39	24
		25	0	22.13	21.98	22.19	23
		25	12	22.06	22.09	22.24	23
		25	25	22.00	22.29	22.12	23
		50	0	22.07	22.19	22.34	23
	16QAM	1	0				
		1	24				
		1	49				
		25	0				
		25	12				
		25	25				
		50	0				

Note:
1) As per KDB 447498 D01 sec.4.1.d at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.
2) All power is the frame-averaged power.

LTE FDD B12				**Conducted Power(dBm)**			Tune up
Bandwidth	Modulation	RB size	RB offset	Channel 23017	Channel 23095	Channel 23173	
1.4MHz	QPSK	1	0	23.51	23.13	23.37	24
		1	2	23.57	23.49	23.24	24
		1	5	23.38	23.38	23.29	24
		3	0	23.26	23.22	23.22	23.5
		3	1	23.24	23.22	23.29	23.5
		3	3	23.28	23.25	23.20	23.5
		6	0	22.20	22.16	22.34	23
	16QAM	1	0	22.51	22.58	22.70	23
		1	2	22.74	22.77	22.61	23

		1	5	22.42	22.45	22.43	23
		3	0	22.18	22.11	22.52	23
		3	1	22.13	22.10	22.35	23
		3	3	22.26	22.13	22.30	23
		6	0	21.42	21.56	21.24	23
Bandwidth	Modulation	RB size	RB offset	Channel 23025	Channel 23095	Channel 23165	Tune up
3MHz	QPSK	1	0	23.20	23.63	23.41	24
		1	8	23.31	23.17	23.14	24
		1	14	23.19	23.81	23.22	24
		8	0	22.32	22.16	22.44	23
		8	4	22.32	22.46	22.41	23
		8	7	22.34	22.28	22.34	23
		15	0	22.30	22.24	22.50	23
	16QAM	1	0	22.12	22.64	22.48	23
		1	8	21.82	22.21	22.46	23
		1	14	22.27	22.56	22.43	23
		8	0	21.40	21.53	21.72	23
		8	4	21.40	21.25	21.35	23
		8	7	21.42	21.35	21.58	23
		15	0	21.29	21.21	21.50	23
Bandwidth	Modulation	RB size	RB offset	Channel 23035	Channel 23095	Channel 23155	Tune up
5MHz	QPSK	1	0	23.33	23.32	23.42	24
		1	12	23.05	23.03	23.05	24
		1	24	23.10	23.39	23.26	24
		12	0	22.23	22.15	22.38	23
		12	6	22.25	22.16	22.41	23
		12	13	22.25	22.35	22.35	23
		25	0	22.27	22.26	22.26	23
	16QAM	1	0	22.11	22.46	22.41	23
		1	12	22.19	22.15	22.36	23
		1	24	22.08	22.39	22.47	23
		12	0	21.30	21.37	21.10	23
		12	6	21.31	21.37	21.20	23
		12	13	21.28	21.19	21.24	23
		25	0	21.22	21.31	21.35	23
Bandwidth	Modulation	RB size	RB offset	Channel 23060	Channel 23095	Channel 23130	Tune up
10MHz	QPSK	1	0	23.31	23.55	23.04	24
		1	24	23.15	23.08	23.45	24
		1	49	23.02	23.41	23.09	24
		25	0	22.25	22.09	22.12	23

		25	12	22.29	22.08	22.21	23
		25	25	22.10	22.33	22.29	23
		50	0	22.25	22.10	22.26	23
	16QAM	1	0				
		1	24				
		1	49				
		25	0				
		25	12				
		25	25				
		50	0				

Note:
1) As per KDB 447498 D01 sec.4.1.d at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.
2) All power is the frame-averaged power.

LTE FDD B13			Conducted Power(dBm)				Tune up
Bandwidth	Modulation	RB size	RB offset	Channel 23205	Channel 23230	Channel 23255	
5MHz	QPSK	1	0	23.07	23.26	23.18	24
		1	12	23.00	22.92	23.06	24
		1	24	22.88	23.00	23.19	24
		12	0	22.16	22.17	22.12	23
		12	6	22.14	22.17	22.06	23
		12	13	22.07	22.20	22.24	23
		25	0	22.10	22.19	22.06	23
	16QAM	1	0	22.33	22.45	21.97	23
		1	12	22.04	22.45	21.77	23
		1	24	22.05	22.26	22.50	23
		12	0	21.04	21.13	21.17	23
		12	6	21.23	21.13	21.08	23
		12	13	21.15	21.15	21.26	23
		25	0	21.03	21.14	21.12	23
Bandwidth	Modulation	RB size	RB offset	Channel 23230	Channel	Channel	Tune up
10MHz	QPSK	1	0	23.05			24
		1	24	23.06			24
		1	49	22.97			24
		25	0	22.00			23
		25	12	22.01			23
		25	25	22.17			23
		50	0	22.12			23
	16QAM	1	0				
		1	24				
		1	49				

		25	0				
		25	12				
		25	25				
		50	0				

Note:
1) As per KDB 447498 D01 sec.4.1.d at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.
2) All power is the frame-averaged power.

LTE FDD B17			Conducted Power(dBm)				Tune up
Bandwidth	Modulation	RB size	RB offset	Channel 23755	Channel 23790	Channel 23825	
5MHz	QPSK	1	0	22.95	23.42	23.24	24
		1	12	23.11	23.22	23.15	24
		1	24	23.23	23.26	23.20	24
		12	0	22.22	22.29	22.33	23
		12	6	22.23	22.20	22.27	23
		12	13	22.30	22.32	22.22	23
		25	0	22.24	22.26	22.25	23
	16QAM	1	0	21.99	22.67	22.51	23
		1	12	21.74	22.49	22.26	23
		1	24	21.68	22.53	22.50	23
		12	0	21.20	21.19	21.12	23
		12	6	21.21	21.19	21.29	23
		12	13	21.26	21.41	21.22	23
		25	0	21.31	21.29	21.10	23
Bandwidth	Modulation	RB size	RB offset	Channel 23780	Channel 23790	Channel 23800	Tune up
10MHz	QPSK	1	0	23.22	23.25	23.25	24
		1	24	23.12	23.49	23.54	24
		1	49	23.21	22.91	23.05	24
		25	0	22.22	22.18	22.20	23
		25	12	22.46	22.16	22.19	23
		25	25	22.39	22.27	22.27	23
		50	0	22.21	22.21	22.24	23
	16QAM	1	0				
		1	24				
		1	49				
		25	0				
		25	12				

		25	25				
		50	0				

Note:
1) As per KDB 447498 D01 sec.4.1.d at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.
2) All power is the frame-averaged power.

LTE FDD B66			Conducted Power(dBm)				Tune up
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	
				131979	132322	132665	
1.4MHz	QPSK	1	0	22.63	22.15	22.05	23.5
		1	2	22.40	22.29	22.04	23.5
		1	5	22.30	22.09	21.89	23.5
		3	0	22.21	22.16	21.79	22.5
		3	1	22.20	22.11	21.80	22.5
		3	3	22.09	22.03	21.75	22.5
		6	0	21.03	20.90	20.65	22
	16QAM	1	0	21.45	20.86	20.99	22
		1	2	21.45	21.34	21.18	22
		1	5	21.23	21.17	21.09	22
		3	0	20.97	21.08	20.39	22
		3	1	20.97	21.07	20.39	22
		3	3	21.03	21.08	20.68	22
		6	0	20.20	19.94	19.96	21
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel	Tune up
				191987	132322	132657	
3MHz	QPSK	1	0	21.87	22.26	22.05	23
		1	8	22.04	21.95	21.59	23
		1	14	21.85	22.34	21.70	23
		8	0	20.91	21.22	20.96	22
		8	4	20.91	21.28	21.11	22
		8	7	20.98	21.35	20.82	22
		15	0	20.96	21.45	20.99	22
	16QAM	1	0	21.00	21.12	20.98	22
		1	8	20.49	20.71	20.86	22
		1	14	21.07	21.27	21.12	22
		8	0	19.78	20.46	20.13	21
		8	4	20.13	20.31	20.19	21
		8	7	19.83	20.53	20.07	21
		15	0	20.14	20.55	19.98	21

Bandwidth	Modulation	RB size	RB offset	Channel 131997	Channel 132322	Channel 132647	Tune up
5MHz	QPSK	1	0	22.34	22.29	22.06	23.5
		1	12	21.97	22.33	21.76	23.5
		1	24	22.10	22.36	22.13	23.5
		12	0	21.44	21.60	21.00	22
		12	6	21.28	21.44	21.00	22
		12	13	21.15	21.46	20.98	22
		25	0	21.26	21.38	20.96	22
	16QAM	1	0	21.19	21.35	21.02	22
		1	12	20.76	21.02	20.32	22
		1	24	21.61	21.34	20.99	22
		12	0	20.32	20.38	20.07	22
		12	6	20.28	20.45	20.03	22
		12	13	20.25	20.42	20.11	22
		25	0	20.17	20.39	19.98	21
Bandwidth	Modulation	RB size	RB offset	Channel 132022	Channel 132322	Channel 132622	Tune up
10MHz	QPSK	1	0	22.33	22.38	22.30	23.5
		1	24	22.18	22.52	21.86	23.5
		1	49	22.25	22.43	21.97	23.5
		25	0	21.31	21.37	21.12	22
		25	12	21.27	21.37	21.13	22
		25	25	21.35	21.55	20.92	22
		50	0	21.24	21.60	21.01	22
	16QAM	1	0				
		1	24				
		1	49				
		25	0				
		25	12				
		25	25				
		50	0				
Bandwidth	Modulation	RB size	RB offset	Channel 132047	Channel 132322	Channel 132597	Tune up
15MHz	QPSK	1	0	22.33	22.50	22.33	23.5
		1	38	22.44	22.42	21.88	23.5
		1	74	22.64	23.25	21.94	23.5
		36	0	21.37	21.59	21.32	22
		36	18	21.34	21.21	21.23	22
		36	37	21.32	21.43	21.32	22
		75	0	21.47	21.55	21.19	22
	16QAM	1	0				
		1	38				
		1	74				

		36	0				
		36	18				
		36	37				
		75	0				
Bandwidth	Modulation	RB size	RB offset	Channel 132072	Channel 132322	Channel 132572	Tune up
20MHz	QPSK	1	0	22.64	22.64	22.50	23.5
		1	49	22.11	22.57	21.92	23.5
		1	99	22.69	22.63	21.58	23.5
		50	0	21.16	21.33	21.01	22.5
		50	25	21.14	21.38	21.00	22.5
		50	50	21.44	21.36	20.73	22.5
		100	0	21.48	21.23	20.89	22.5
	16QAM	1	0				
		1	49				
		1	99				
		50	0				
		50	25				
		50	50				
		100	0				

Note:
1) As per KDB 447498 D01 sec.4.1.d at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.
2) All power is the frame-averaged power

7.2. Power measurement result of 2.4G Wi-Fi

Mode	Date Rate	Ch.#	Freq. (MHz)	Ant 1		Duty Cycle (%)
				Avg. Pwr. (dBm)	Tune-up (dBm)	
802.11b	1Mbps	1	2412	17.28	17.5	92.05
		6	2437	16.83		
		11	2462	16.84		
802.11g	6Mbps	1	2412	Not Required	16.0	/
		6	2437			
		11	2462			
802.11n (20M)	HT0	1	2412		14.5	/
		6	2437			
		11	2462			
802.11n (40M)	HT0	3	2422		15.0	/
		6	2437			
		9	2452			

Note:
1) As per KDB 447498 D01 sec.4.1.d at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.

7.3. Power measurement result of 5G Wi-Fi

Band	Mode Data Rate	BW[MHz]	Channel	Freq[MHz]	Ant 1		Duty Cycle (%)
					Avg Pwr(dBm)	Tune-up (dBm)	
5.3GHz	802.11a 6Mbps	20M	36	5180	Not Required	13.0	/
			40	5200			
			44	5220			
			48	5240			
			52	5260	12.52	13.0	92.30
			56	5280	12.41		
			60	5300	12.13		
			64	5320	12.77		
	802.11n HT0	20M	36	5180	Not Required	12.0	/
			40	5200			
			44	5220			
			48	5240			
			52	5260			
			56	5280			
			60	5300			
			64	5320			
	802.11ac VHT0	20M	36	5180		12.0	
			40	5200			
			44	5220			

			48	5240			
			52	5260			
			56	5280			
			60	5300			
			64	5320			
	802.11n HT0	40M	38	5190		12.0	
			46	5230			
			54	5270			
			62	5310			
	802.11ac VHT0	40M	38	5190		12.0	
			46	5230			
			54	5270			
			62	5310			
	802.11ac VHT0	80M	42	5210		11.0	
			58	5290			

Note:
1) As per KDB 447498 D01 sec.4.1.d at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.

Band	Mode Data Rate	BW[MHz]	Channel	Freq[MHz]	Ant 1		Duty Cycle (%)
					Avg Pwr(dBm)	Tune-up (dBm)	
5.6GHz	802.11a 6Mbps	20M	100	5500	11.93	13.5	92.30
			104	5520	11.69		
			108	5540	11.84		
			112	5560	12.01		
			116	5580	12.49		
			120	5600	12.23		
			124	5620	12.15		
			128	5640	12.01		
			132	5660	11.98		
			136	5680	11.78		
			140	5700	13.02		
			144	5720	11.32	11.5	
	802.11n HT0	20M	100	5500	Not Required	12.0	/
			104	5520			
			108	5540			
			112	5560			
			116	5580			
			120	5600			
			124	5620			
			128	5640			
			132	5660			
			136	5680			

			140	5700			
			144	5720		10.0	
	802.11ac VHT0	20M	100	5500		12.0	
			104	5520			
			108	5540			
			112	5560			
			116	5580			
			120	5600			
			124	5620			
			128	5640			
			132	5660			
			136	5680			
			140	5700			
			144	5720		10.0	
	802.11n HT0	40M	102	5510	Not Required	11.5	
			110	5550			
			118	5590			
			126	5630			
			134	5670			
			142	5710			
	802.11ac VHT0	40M	102	5510		11.5	
			110	5550			
			118	5590			
			126	5630			
			134	5670			
			142	5710			
	802.11ac VHT0	80M	106	5530		8.5	
			122	5610			
			138	5690			

Note:
1) As per KDB 447498 D01 sec.4.1.d at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.

Band	Mode Data Rate	BW[MHz]	CH	Freq[MHz]	Ant 1		Duty Cycle (%)
					Avg Pwr(dBm)	Tune-up (dBm)	
5.8G	802.11a 6Mbps	20	149	5745	12.23	12.5	92.30
			153	5765	12.03		
			157	5785	11.52		
			161	5805	11.45		
			165	5825	12.32		
	802.11n20 HT0		149	5745	Not Required	12.0	/
			153	5765			
			157	5785			
			161	5805			

			165	5825			
	802.11ac20 VHT0		149	5745		12.0	
			153	5765			
			157	5785			
			161	5805			
			165	5825			
	802.11n40 HT0	40	151	5755		12.0	
			159	5795			
	802.11ac40 VHT0		151	5755		12.0	
			159	5795			
	802.11ac80 VHT0	80	155	5775		10.0	

Note:
1) As per KDB 447498 D01 sec.4.1.d at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.

7.4. Power measurement result of Bluetooth

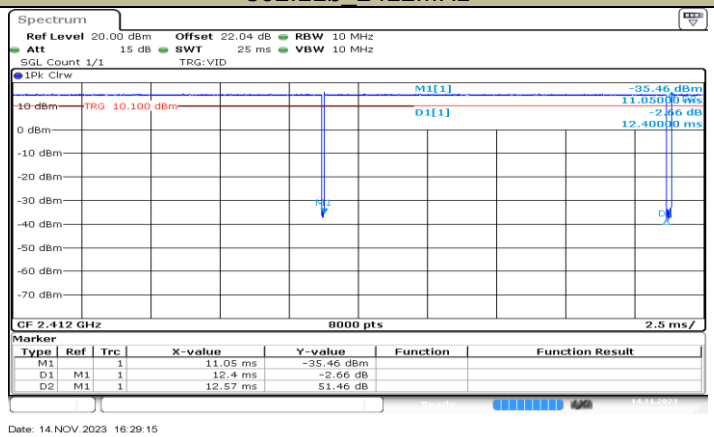
Mode	Test Mode	Ch.#	Freq. (MHz)	Ant 1		Duty Cycle (%)
				Avg. Pwr. (dBm)	Tune-up (dBm)	
BT	DH5	0	2402	Not Required	7.0	/
		39	2441			
		78	2480			
BT	3DH5	0	2402	7.21	7.5	76.13
		39	2441	7.01		
		78	2480	6.56		
BLE	1M	0	2402	Not Required	5.0	/
		19	2440			
		39	2480			

Note:
1) As per KDB 447498 D01 sec.4.1.d at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.
2) The maximum output power mode BT 3DH5 was selected as the primary mode to test SAR for Bluetooth mode. SAR measurement is not required for the other modes, when the secondary mode is ≤0.25 dB higher than the primary mode.

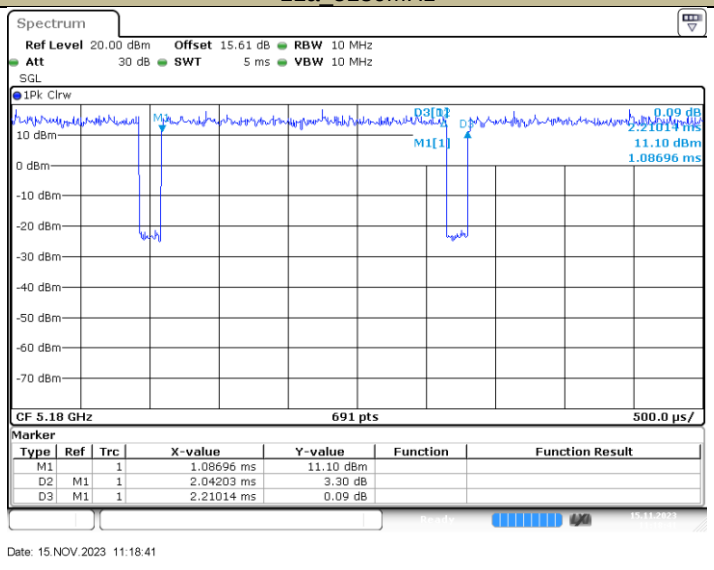
7.5. Duty Cycle

Test Mode	Duty Cycle (%)
11b	98.65
11a	92.30
BT 3DH5	76.13

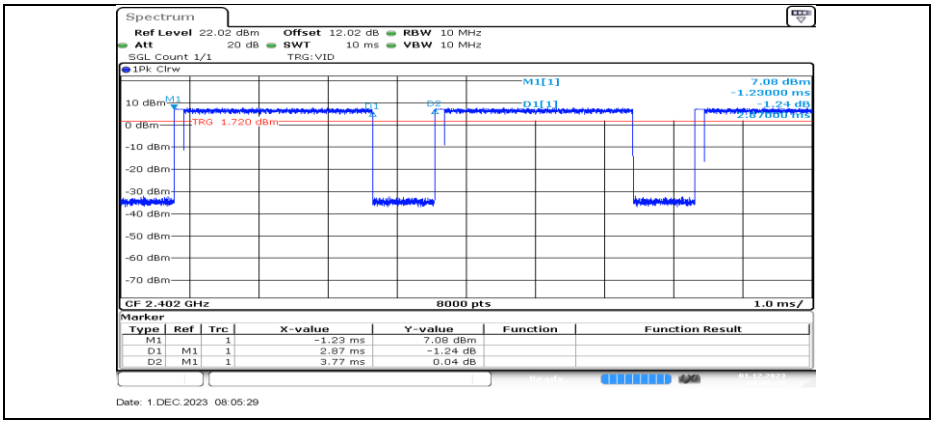
802.11b_2412MHz



11a_5180MHz



BT 3DH5_2402MHz



8. Test Configuration

8.1. LTE Test Configuration

Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR. The R&S CMW500 was used for LTE output power measurements and SAR testing. Max power control was used so the UE transmits with maximum output power during SAR testing. SAR must be measured with the maximum TTI (transmit time interval) supported by the device in each LTE configuration.

1) Spectrum Plots for RB configurations

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

2) MPR

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

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

3) A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by using Network Signaling Value of “NS=01”on the base station simulator.

4) SAR test requirements

A) Largest channel bandwidth standalone SAR test requirements

i) QPSK with 1 RB allocation

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

ii) QPSK with 50% RB allocation

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

iii) QPSK with 100% RB allocation

For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in i) and ii) are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.

iv) Higher order modulations

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

B) Other channel bandwidth standalone SAR test requirements

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

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

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

Table 4.2-2: Uplink-downlink configurations

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

According to Figure 4.2-1, one radio frame is configured by 10 subframes, which consist of Uplink-subframe, Downlink-subframe and Special subframe. For TDD-LTE, the Duty Cycle should be calculated on Uplink-subframes and Special subframes, due to Special subframe containing both Uplink transmissions. So for one radio frame, Duty Cycle can be calculated with formula as below. The count of Uplink subframes are according to Table 4.2-2:

Duty cycle =(30720Ts*Ups+Uplink Component*Specials)/(307200Ts)

About the uplink component of Special subframes, we can figure out by Table 4.2-1:

Uplink Component=UpPTS

In conclusion, for the TDD LTE Band, Duty Cycle can be calculated with formula as below .all these sets are ok when we test, or we can set as below.

Duty cycle =[(30720Ts*Ups)+ UpPTS *Specials]/(307200Ts)

And we can get different Duty cycles under different configurations:

Uplink-downlink configuratin	Subframe number			Configuration of special subframe							
				Normal cyclic prefix in downlink				Extended cyclic prefix in downlink			
				Normal cyclic prefix in uplink		Extended cyclic prefix in uplink		Normal cyclic prefix in uplink		Extended cyclic prefix in uplink	
	D	S	U	configuration 0-4	configuration 5-9	configuration 0-4	configuration 5-9	configuration 0-3	configuration 4-7	configuration 0-3	configuration
0	2	2	6	61.43%	62.85%	61.67%	63.33%	61.43%	62.85%	61.67%	63.33%
1	4	2	4	41.43%	42.85%	41.67%	43.33%	41.43%	42.85%	41.67%	43.33%
2	6	2	2	21.43%	22.85%	21.67%	23.33%	21.43%	22.85%	21.67%	23.33%
3	6	1	3	30.71%	31.43%	30.83%	31.67%	30.71%	31.43%	30.83%	31.67%
4	7	1	2	20.71%	21.43%	20.83%	21.67%	20.71%	21.43%	20.83%	21.67%
5	8	1	1	10.71%	11.43%	10.83%	11.67%	10.71%	11.43%	10.83%	11.67%
6	3	2	5	51.43%	52.85%	51.67%	53.33%	51.43%	52.85%	51.67%	53.33%

For TDD LTE, SAR should be tested with the highest transmission duty factor (63.33%) using Uplink-downlink configuration 0 and Special subframe configuration 7 for Frame structure type 2.

For TDD LTE B40, SAR should be tested with the highest transmission duty factor (31.67%) using Uplink-downlink configuration 3 and Special subframe configuration 3 for Frame structure type 2.

8.2. 2.4GHz BT/BLE SAR Test Requirements

2.4GHz BT operating modes are tested independently according to the service requirements in each frequency band for each antenna. DH5 / 3DH5 / 1M SISO modes are tested on the maximum average output power mode.

8.3. Wi-Fi Test Configuration

For Wi-Fi SAR testing, a communication link is set up with the testing software for Wi-Fi mode test. During the test, at the each test frequency channel, the EUT is operated at the RF continuous emission mode. The test procedures in KDB 248227D01 are applied.

8.3.1. Initial Test Position Procedure

For exposure condition with multiple test position, such as handsets operating next to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all position in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4W/kg, no additional testing for the remaining test position is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR position until the reported SAR result is ≤ 0.8W/kg or all test position are measured. For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

8.3.2. Initial Test Configuration Procedure

An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. SAR is measured using the highest measured maximum output power channel. For configurations with the same specified or measured maximum output power, additional transmission mode and test channel selection procedures are required (see section 5.3.2 of KDB 248227D01). SAR test reduction of subsequent highest output test channels is based on the reported SAR of the initial test configuration.

For next to the ear, hotspot mode and UMC mini-tablet exposure configurations where multiple test positions are required, the initial test position procedure is applied to minimize the number of test positions required for SAR measurement using the initial test configuration transmission mode. For fixed exposure conditions that do not have multiple SAR test positions, SAR is measured in the transmission mode determined by the initial test configuration.

When the reported SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for the subsequent next highest measured output power channel(s) in the initial test configuration until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

8.3.3. Sub Test Configuration Procedure

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units.

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

8.3.4. 2.4GHz Wi-Fi SAR Test Procedures

Separate SAR procedures are applied to DSSS and OFDM configurations in the 2.4 GHz band to simplify DSSS test requirements. For 802.11b DSSS SAR measurements, DSSS SAR procedure applies to fixed exposure test position and initial test position procedure applies to multiple exposure test positions.

A) 802.11b DSSS SAR Test Requirements

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

1) When the reported SAR of the highest measured maximum output power channel (section 3.1 of KDB 248227D01) for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
2) When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

B) 2.4GHz 802.11g/n OFDM SAR Test Exclusion Requirements

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied (section 5.3 of KDB 248227D01). SAR is not required for the following 2.4 GHz OFDM conditions.

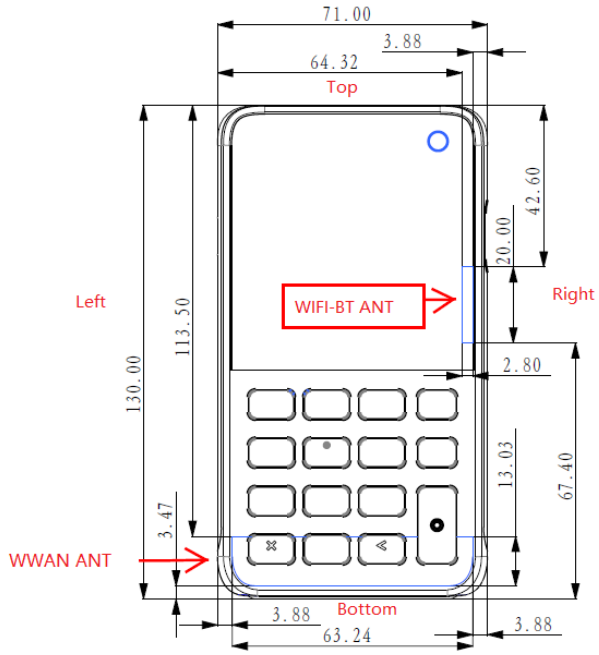
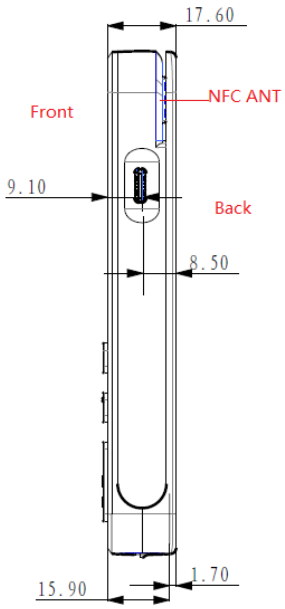
1) When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.
2) When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

C) SAR Test Requirements for OFDM configurations

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

9. RF Exposure Conditions

Refer to the diagram inside the device which attached below for the specific details of the antenna-to-edges distances. As per KDB 941225 D06, when the antenna to-edge-distance is greater than 2.5 cm, SAR evaluation is not required for the corresponding position.

Antenna location map	
Front Review	Right Review
	

Note:

1) The EUT doesn't support operating next to the ear, so head SAR evaluation isn't considered.

WWAN Ant	Test Position	antenna to-edge-distance	Test required
	Front Edge	<25mm	Yes
	Back Edge	<25mm	Yes
	Left Edge	<25mm	Yes
	Right Edge	<25mm	Yes
	Top Edge	>25mm	No
	Bottom Edge	<25mm	Yes

Wi-Fi/BT Ant	Test Position	antenna to-edge-distance	Test required
	Front Edge	<25mm	Yes
	Back Edge	<25mm	Yes
	Left Edge	>25mm	No
	Right Edge	<25mm	Yes
	Top Edge	>25mm	No
	Bottom Edge	>25mm	No

9.1. Evaluation For NFC

Appendix C

SAR Test Exclusion Thresholds for < 100 MHz and < 200 mm

Approximate SAR test exclusion power thresholds at selected frequencies and test separation distances are illustrated in the following table. The equation and threshold in 4.3.1 must be applied to determine SAR test exclusion.

MHz	< 50	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	mm
100	237	474	481	487	494	501	507	514	521	527	534	541	547	554	561	567	
50	308	617	625	634	643	651	660	669	677	686	695	703	712	721	729	738	
10	474	948	961	975	988	1001	1015	1028	1041	1055	1068	1081	1095	1108	1121	1135	
1	711	1422	1442	1462	1482	1502	1522	1542	1562	1582	1602	1622	1642	1662	1682	1702	mW
0.1	948	1896	1923	1949	1976	2003	2029	2056	2083	2109	2136	2163	2189	2216	2243	2269	
0.05	1019	2039	2067	2096	2125	2153	2182	2211	2239	2268	2297	2325	2354	2383	2411	2440	
0.01	1185	2370	2403	2437	2470	2503	2537	2570	2603	2637	2670	2703	2737	2770	2803	2837	

For 13.56MHz NFC 1-g SAR

Frequency (MHz)	(dBμV/m)	Power (dBm)
13.56	15.94	-81.41

Position	Frequency (MHz)	Power (dBm)	Power (mW)	Separation Distance (mm)	Threshold (mW)	SAR Test
Front surface	13.56	-81.41	0.00	5	459.2	Excluded
Back surface	13.56	-81.41	0.00	5	459.2	Excluded
Left edge	13.56	-81.41	0.00	5	459.2	Excluded
Right edge	13.56	-81.41	0.00	5	459.2	Excluded
Top edge	13.56	-81.41	0.00	5	459.2	Excluded
Bottom edge	13.56	-81.41	0.00	5	459.2	Excluded

Note:
1) NFC antenna guide edge distance is evaluated with the worst case.
2) The threshold is calculated according to FCC KDB 447498 D01 Appendix C.

10. SAR Test Configuration

EUT is a Mobile Payment Terminal that can be used very close to the human body, so consider 1g body SAR (5mm) assessment.

Note:

1) The EUT is a portable POS machine with a diagonal of less than 20CM, which is applicable to FCC KDB 941225 D07 regulations. According to KDB regulations, when testing 1 g SAR at 5 mm, it is not necessary to use 10 g SAR.

11. Dielectric Property Measurements & System Check

11.1. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 2°C of the temperature when the tissue parameters are characterized.
The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.
Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.

Tissue Dielectric Parameters

FCC KDB 865664 D01 v01r04 SAR Measurement 100 MHz to 6 GHz

Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5000	36.2	4.45	49.3	5.07
5100	36.1	4.55	49.1	5.18
5200	36.0	4.66	49.0	5.30
5300	35.9	4.76	48.9	5.42
5400	35.8	4.86	48.7	5.53
5500	35.6	4.96	48.6	5.65
5600	35.5	5.07	48.5	5.77
5700	35.4	5.17	48.3	5.88
5800	35.3	5.27	48.2	6.00

IEEE Std 1528-2013
Refer to Table 3 within the IEEE Std 1528-2013

Dielectric Property Measurements Results:

Liquid	Freq.	Liquid Parameters				Deviation(%)		Limit (%)	Temp. (℃)	Test Date
		Measured		Target						
		ε_r	σ	ε_r	σ	ε_r	σ			
Head 1800	1720	41.11	1.32	40.13	1.35	2.44	-2.22	±5	21.2	2023.12.14
	1760	40.97	1.34	40.06	1.38	2.27	-2.90			
	1800	41.20	1.35	40.00	1.40	3.00	-3.57			
	1880	41.01	1.39	41.3	1.4	-0.70	-0.71			
Head 1900	1900	40.85	1.35	40.00	1.40	2.13	-3.57	±5	22.6	2023.12.14
	1950	40.86	1.37	40.00	1.40	2.15	-2.14			
	2000	40.60	1.40	40.00	1.40	1.50	0.00			
Head 750	680	41.69	0.85	42.31	0.89	-1.47	-4.49	±5	21.2	2023.12.16
	750	42.03	0.91	41.94	0.89	0.21	2.25			
	790	42.02	0.89	41.73	0.90	0.69	-1.11			
Head 835	800	41.88	0.90	41.68	0.90	0.48	0.00	±5	21.6	2023.12.20

	835	41.76	0.89	41.50	0.90	0.63	-1.11			
	880	41.91	0.94	41.50	0.96	0.99	-2.08			
Head 2450	2360	40.47	1.67	39.36	1.72	2.82	-2.91	±5	22.7	2023.12.21
	2450	39.92	1.83	39.20	1.80	1.84	1.67			
	2540	40.20	1.88	39.09	1.90	2.84	-1.05			
Head 5250	5160	36.96	4.45	36.03	4.61	2.58	-3.47	±5	22.7	2023.12.21
	5250	36.53	4.48	35.93	4.71	1.67	-4.88			
	5360	36.58	4.58	35.80	4.82	2.18	-4.98			
Head 5600	5500	36.23	4.72	35.64	4.96	1.66	-4.84	±5	22.1	2023.12.22
	5600	36.00	4.85	35.53	5.07	1.32	-4.34			
	5720	35.79	4.99	35.39	5.19	1.13	-3.85			
Head 5750	5700	35.92	4.94	35.41	5.17	1.44	-4.45	±5	22.1	2023.12.22
	5750	35.23	4.97	35.36	5.22	-0.37	-4.79			
	5850	35.55	5.16	35.24	5.32	0.88	-3.01			

11.2. System Check

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are re-measured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

System Performance Check Measurement Conditions:

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ±0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥ 10.0 cm for measurements > 3 GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10mm (above 1GHZ) and 15mm (below 1GHz) from dipole center to the simulating liquid surface.
- For area scan, standard grid spacing for head measurements is 15 mm in x- and y- dimension(≤2GHz), 12 mm in x- and y-dimension(2-4 GHz) and 10mm in x- and y- dimension(4-6GHz).
- For zoom scan, Δ x_{zoom}, Δ y_{zoom}≤ 2GHz - ≤8mm, 2-4GHz - ≤5 mm and 4-6 GHz-≤4mm; Δ z_{zoom} ≤3GHz - ≤5 mm, 3-4 GHz- ≤4mm and 4-6GHz-≤2mm.
- Distance between probe sensors and phantom surface was set to 3 mm except for 5 GHz band. For 5GHz band, Distance between probe sensors and phantom surface was set to 2.5 mm

- The dipole input power (forward power) was set to 100 mW or 250 mW depend on the certificate of the dipoles.
- The results are normalized to 1 W input power.

System Check Results
The 1-g and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within 10% of the manufacturer calibrated dipole SAR target.

T.S. Liquid		Messured Results		Target (Ref. value)	Delta (%)	Limit (%)	Temp. (℃)	Test Date
		Zoom Scan (W/Kg)	Normalize to 1W (W/Kg)					
Head 1900	1-g	9.120	36.48	39.60	-7.88	±10	22.6	2023.12.14
	10-g	4.720	18.88	20.20	-6.53			
Head 1800	1-g	8.970	35.88	38.70	-7.29	±10	21.2	2023.12.14
	10-g	4.700	18.80	19.90	-5.53			
Head 750	1-g	2.120	8.48	8.50	-0.24	±10	21.2	2023.12.16
	10-g	1.350	5.40	5.61	-3.74			
Head 835	1-g	2.280	9.12	9.64	-5.39	±10	21.6	2023.12.20
	10-g	1.440	5.76	6.26	-7.99			
Head 2450	1-g	13.400	53.60	53.20	0.75	±10	22.7	2023.12.21
	10-g	6.170	24.68	24.20	1.98			
Head 5250	1-g	8.030	80.30	77.90	3.08	±10	22.7	2023.12.21
	10-g	2.330	23.30	22.60	3.10			
Head 5600	1-g	8.600	86.00	80.90	6.30	±10	22.1	2023.12.22
	10-g	2.470	24.70	23.30	6.01			
Head 5750	1-g	7.700	77.00	78.30	-1.66	±10	22.1	2023.12.22
	10-g	2.220	22.20	22.40	-0.89			

12. Measured and Reported (Scaled) SAR Results

General Notes:

1) As per KDB447498 D01, all SAR measurement results are scaled to the maximum tune-up tolerance limit to demonstrate SAR compliance.
2) As per KDB447498 D01, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:
   ● ≤ 0.8W/kg for 1-g or 2.0W/kg for 10-g respectively, when the transmission band is ≤ 100MHz.
   ● ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz.
   ● ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz.
   When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.
3) As per KDB865664 D01 for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/Kg; if the deviation among the repeated measurement is ≤20%, and the measured SAR <1.45W/Kg, only one repeated measurement is required.
4) As per KDB865664 D02, SAR plot is only required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination; Plots are also required when the measured SAR is > 1.5 W/kg, or > 7.0 W/kg for occupational exposure. The published RF exposure KDB procedures may require additional plots; for example, to support SAR to peak location separation ratio test exclusion and/or volume scan post-processing (Refer to appendix B for detailed SAR plots).
5) Additional SAR tests in simultaneous transmission fixed power reduction scenario are also tested in some frequency bands and required test positions for the SAR worst case, which are only used to ensure simultaneous transmission SAR test exclusion. The standalone SAR compliance still uses the SAR results tested at the maximum output power level.
6) As per KDB 648474 D04, Phones with built-in NFC functions do not require separate SAR testing and can generally be tested according to the SAR measurement procedures normally required for the phone. Influences of the hardware introduced by the built-in NFC functions are inherently considered through testing of the other transmitters that require SAR.

LTE Notes:

1) The LTE test configurations are determined according to KDB941225 D05. The general test procedures used for SAR testing can be found in Section 8.3.
2) A-MPR was disabled for all SAR test by setting NS_01 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames(maximum TTI)

Wi-Fi Notes:

As per KDB248227 D01:

1) When reported SAR for the initial test position is ≤ 0.4W/kg, no additional testing for the remaining test position is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR position until the reported SAR result is ≤ 0.8W/kg or all test position are measured. For all positions/configurations tested using the initial test position and subsequent test positions, when the *reported* SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the *reported* SAR is ≤ 1.2 W/kg or all required channels are tested.
2) The highest SAR measured for the initial test position or initial test configuration should be used to determine SAR test exclusion according to the sum of 1-g SAR and SAR peak to location ratio provisions in KDB 447498. In addition, a test lab may also choose to perform standalone SAR measurements for test positions and 802.11 configurations that are not required by the initial test position or initial test configuration procedures and apply the results to determine simultaneous transmission SAR test exclusion, according to sum of 1-g and SAR peak to location ratio requirements to reduce the number of simultaneous transmission SAR measurements.
3) When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is ≤ 1.2 W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.

12.1. SAR Test Results of LTE B2 (20MHz Bandwidth)

Scenario and Distance (Body 5mm)	Test Mode	Channel	Power (dBm)		Measure SAR Value	Power Drift	Scaled (W/Kg)	Plot No.
			Tune-up	Meas.	1g (W/Kg)			
1RB								
Front Surface	20M QPSK 1RB#0	18700	23.00	22.43	0.216	-0.01	0.246	/
Back Surface	20M QPSK 1RB#0	18700	23.00	22.43	0.585	-0.02	0.667	/
Left Edge	20M QPSK 1RB#0	18700	23.00	22.43	0.243	-0.01	0.277	/
Right Edge	20M QPSK 1RB#0	18700	23.00	22.43	0.107	0.00	0.122	/
Bottom Edge	20M QPSK 1RB#0	18700	23.00	22.43	0.517	-0.03	0.590	/
Back Surface	20M QPSK 1RB#0	18900	23.00	22.36	0.600	-0.05	0.695	/
Back Surface	20M QPSK 1RB#0	19100	22.50	22.03	0.691	0.04	0.770	5
50% RB								
Front Surface	20M QPSK 50RB#25	18900	22.00	21.47	0.196	-0.11	0.221	/
Back Surface	20M QPSK 50RB#25	18900	22.00	21.47	0.664	-0.01	0.750	/
Left Edge	20M QPSK 50RB#25	18900	22.00	21.47	0.248	0.00	0.280	/
Right Edge	20M QPSK 50RB#25	18900	22.00	21.47	0.130	0.02	0.147	/
Bottom Edge	20M QPSK 50RB#25	18900	22.00	21.47	0.583	-0.01	0.659	/
Back Surface	20M QPSK 50RB#25	18700	22.00	21.44	0.433	-0.02	0.493	/
Back Surface	20M QPSK 50RB#25	19100	22.00	21.17	0.612	0.04	0.741	/

Note:
The SAR testing was set to transmit at maximum power for all tests.

12.2. SAR Test Results of LTE B4 (20MHz Bandwidth)

Scenario and Distance (Body 5mm)	Test Mode	Channel	Power (dBm)		Measure SAR Value	Power Drift	Scaled (W/Kg)	Plot No.
			Tune-up	Meas.	1g (W/Kg)			
1RB								
Front Surface	20M QPSK 1RB#99	20050	23.00	22.92	0.191	-0.01	0.195	/
Back Surface	20M QPSK 1RB#99	20050	23.00	22.92	0.583	-0.09	0.594	/
Left Edge	20M QPSK 1RB#99	20050	23.00	22.92	0.217	-0.02	0.221	/
Right Edge	20M QPSK 1RB#99	20050	23.00	22.92	0.059	-0.04	0.060	/
Bottom Edge	20M QPSK 1RB#99	20050	23.00	22.92	0.266	-0.13	0.271	/
Back Surface	20M QPSK 1RB#99	20175	23.00	22.54	0.556	-0.01	0.618	/
Back Surface	20M QPSK 1RB#0	20300	23.00	22.79	0.598	-0.03	0.628	6
50% RB								
Front Surface	20M QPSK 50RB#25	20175	22.00	21.69	0.156	-0.01	0.168	/
Back Surface	20M QPSK 50RB#25	20175	22.00	21.69	0.445	-0.01	0.478	/
Left Edge	20M QPSK 50RB#25	20175	22.00	21.69	0.168	-0.08	0.180	/
Right Edge	20M QPSK 50RB#25	20175	22.00	21.69	0.043	0.03	0.046	/
Bottom Edge	20M QPSK 50RB#25	20175	22.00	21.69	0.251	0.00	0.270	/
Back Surface	20M QPSK 50RB#50	20050	22.00	21.64	0.441	-0.02	0.479	/
Back Surface	20M QPSK 50RB#25	20300	22.00	21.59	0.453	-0.19	0.498	/

Note:
The SAR testing was set to transmit at maximum power for all tests.

12.3. SAR Test Results of LTE B5 (10MHz Bandwidth)

Scenario and Distance (Body 5mm)	Test Mode	Channel	Power (dBm)		Measure SAR Value	Power Drift	Scaled (W/Kg)	Plot No.
			Tune-up	Meas.	1g (W/Kg)			
1RB								
Front Surface	10M QPSK 1RB#49	20600	24.00	23.39	0.069	-0.02	0.079	/
Back Surface	10M QPSK 1RB#49	20600	24.00	23.39	0.371	0.07	0.427	/
Left Edge	10M QPSK 1RB#49	20600	24.00	23.39	0.256	0.16	0.295	/
Right Edge	10M QPSK 1RB#49	20600	24.00	23.39	0.275	-0.03	0.316	/
Bottom Edge	10M QPSK 1RB#49	20600	24.00	23.39	0.103	0.00	0.119	/
Back Surface	10M QPSK 1RB#49	20450	24.00	22.95	0.374	-0.06	0.476	7
Back Surface	10M QPSK 1RB#49	20525	24.00	23.21	0.372	-0.19	0.446	/
50% RB								
Front Surface	10M QPSK 25RB#12	20600	23.00	22.24	0.054	0.02	0.065	/
Back Surface	10M QPSK 25RB#12	20600	23.00	22.24	0.289	-0.01	0.344	/
Left Edge	10M QPSK 25RB#12	20600	23.00	22.24	0.211	0.18	0.251	/
Right Edge	10M QPSK 25RB#12	20600	23.00	22.24	0.219	-0.05	0.261	/
Bottom Edge	10M QPSK 25RB#12	20600	23.00	22.24	0.081	-0.05	0.097	/
Back Surface	10M QPSK 25RB#12	20450	23.00	22.06	0.282	0.00	0.350	/
Back Surface	10M QPSK 25RB#12	20525	23.00	22.29	0.283	0.00	0.333	/

Note:
The SAR testing was set to transmit at maximum power for all tests.

12.4. SAR Test Results of LTE B12 (10MHz Bandwidth)

Scenario and Distance (Body 5mm)	Test Mode	Channel	Power (dBm)		Measure SAR Value	Power Drift	Scaled (W/Kg)	Plot No.
			Tune-up	Meas.	1g (W/Kg)			
1RB								
Front Surface	10M QPSK 1RB#0	23095	24.00	23.55	0.064	-0.01	0.071	/
Back Surface	10M QPSK 1RB#0	23095	24.00	23.55	0.390	0.17	0.433	8
Left Edge	10M QPSK 1RB#0	23095	24.00	23.55	0.098	-0.17	0.108	/
Right Edge	10M QPSK 1RB#0	23095	24.00	23.55	0.135	-0.05	0.150	/
Bottom Edge	10M QPSK 1RB#0	23095	24.00	23.55	0.060	-0.06	0.066	/
Back Surface	10M QPSK 1RB#0	23060	24.00	23.31	0.385	-0.11	0.451	/
Back Surface	10M QPSK 1RB#24	23130	24.00	23.45	0.383	-0.18	0.435	/
50% RB								
Front Surface	10M QPSK 25RB#25	23095	23.00	22.33	0.048	0.18	0.056	/
Back Surface	10M QPSK 25RB#25	23095	23.00	22.33	0.287	0.06	0.335	/
Left Edge	10M QPSK 25RB#25	23095	23.00	22.33	0.119	-0.05	0.139	/
Right Edge	10M QPSK 25RB#25	23095	23.00	22.33	0.111	-0.18	0.130	/
Bottom Edge	10M QPSK 25RB#25	23095	23.00	22.33	0.061	0.00	0.072	/
Back Surface	10M QPSK 25RB#12	23060	23.00	22.29	0.295	-0.01	0.347	/
Back Surface	10M QPSK 25RB#25	23130	23.00	22.29	0.309	-0.14	0.364	/

Note:
The SAR testing was set to transmit at maximum power for all tests.

12.5. SAR Test Results of LTE B13 (10MHz Bandwidth)

Scenario and Distance (Body 5mm)	Test Mode	Channel	Power (dBm)		Measure SAR Value	Power Drift	Scaled (W/Kg)	Plot No.
			Tune-up	Meas.	1g (W/Kg)			
1RB								
Front Surface	10M QPSK 1RB#24	23230	24.00	23.06	0.043	-0.08	0.053	/
Back Surface	10M QPSK 1RB#24	23230	24.00	23.06	0.306	-0.08	0.380	9
Left Edge	10M QPSK 1RB#24	23230	24.00	23.06	0.059	-0.02	0.073	/
Right Edge	10M QPSK 1RB#24	23230	24.00	23.06	0.217	0.11	0.269	/
Bottom Edge	10M QPSK 1RB#24	23230	24.00	23.06	0.266	-0.02	0.330	/
50% RB								
Front Surface	10M QPSK 25RB#25	23230	23.00	22.17	0.035	0.07	0.042	/
Back Surface	10M QPSK 25RB#25	23230	23.00	22.17	0.250	0.02	0.303	/
Left Edge	10M QPSK 25RB#25	23230	23.00	22.17	0.043	-0.01	0.052	/
Right Edge	10M QPSK 25RB#25	23230	23.00	22.17	0.168	-0.13	0.203	/
Bottom Edge	10M QPSK 25RB#25	23230	23.00	22.17	0.251	0.00	0.304	/

Note:
The SAR testing was set to transmit at maximum power for all tests.

12.6. SAR Test Results of LTE B17 (10MHz Bandwidth)

Scenario and Distance (Body 5mm)	Test Mode	Channel	Power (dBm)		Measure SAR Value	Power Drift	Scaled (W/Kg)	Plot No.
			Tune-up	Meas.	1g (W/Kg)			
1RB								
Front Surface	10M QPSK 1RB#24	23800	24.00	23.54	0.064	-0.05	0.071	/
Back Surface	10M QPSK 1RB#24	23800	24.00	23.54	0.397	0.02	0.441	/
Left Edge	10M QPSK 1RB#24	23800	24.00	23.54	0.162	-0.13	0.180	/
Right Edge	10M QPSK 1RB#24	23800	24.00	23.54	0.143	-0.20	0.159	/
Bottom Edge	10M QPSK 1RB#24	23800	24.00	23.54	0.067	-0.01	0.075	/
Back Surface	10M QPSK 1RB#0	23780	24.00	23.22	0.410	-0.19	0.491	10
Back Surface	10M QPSK 1RB#24	23790	24.00	23.49	0.385	-0.02	0.433	/
50% RB								
Front Surface	10M QPSK 25RB#12	23780	23.00	22.46	0.051	0.09	0.058	/
Back Surface	10M QPSK 25RB#12	23780	23.00	22.46	0.318	-0.01	0.360	/
Left Edge	10M QPSK 25RB#12	23780	23.00	22.46	0.123	0.00	0.139	/
Right Edge	10M QPSK 25RB#12	23780	23.00	22.46	0.116	-0.03	0.131	/
Bottom Edge	10M QPSK 25RB#12	23780	23.00	22.46	0.056	-0.02	0.063	/
Back Surface	10M QPSK 25RB#25	23790	23.00	22.27	0.304	-0.03	0.360	/
Back Surface	10M QPSK 25RB#25	23800	23.00	22.27	0.302	0.00	0.357	/

Note:
The SAR testing was set to transmit at maximum power for all tests.

12.7. SAR Test Results of LTE B66 (20MHz Bandwidth)

Scenario and Distance (Body 5mm)	Test Mode	Channel	Power (dBm)		Measure SAR Value	Power Drift	Scaled (W/Kg)	Plot No.
			Tune-up	Meas.	1g (W/Kg)			
1RB								
Front Surface	20M QPSK 1RB#99	132072	23.50	22.69	0.182	-0.03	0.219	/
Back Surface	20M QPSK 1RB#99	132072	23.50	22.69	0.509	0.05	0.613	/
Left Edge	20M QPSK 1RB#99	132072	23.50	22.69	0.067	-0.02	0.081	/
Right Edge	20M QPSK 1RB#99	132072	23.50	22.69	0.169	-0.16	0.203	/
Bottom Edge	20M QPSK 1RB#99	132072	23.50	22.69	0.312	-0.09	0.376	/
Back Surface	20M QPSK 1RB#0	132322	23.50	22.64	0.515	-0.19	0.628	/
Back Surface	20M QPSK 1RB#0	132572	23.50	22.50	0.529	-0.08	0.666	11
50% RB								
Front Surface	20M QPSK 50RB#50	132072	22.50	22.44	0.138	-0.06	0.140	/
Back Surface	20M QPSK 50RB#50	132072	22.50	22.44	0.381	0.00	0.386	/
Left Edge	20M QPSK 50RB#50	132072	22.50	22.44	0.059	-0.09	0.060	/
Right Edge	20M QPSK 50RB#50	132072	22.50	22.44	0.015	-0.08	0.015	/
Bottom Edge	20M QPSK 50RB#50	132072	22.50	22.44	0.025	-0.04	0.025	/
Bottom Edge	20M QPSK 50RB#25	132322	22.50	21.38	0.391	0.06	0.506	/
Bottom Edge	20M QPSK 50RB#0	132572	22.50	21.01	0.401	0.03	0.565	/

Note:
The SAR testing was set to transmit at maximum power for all tests.

12.8. SAR Test Results of 2.4GHz Wi-Fi (DTS Band)

Scenario and Distance (Body 5mm)	Test Mode	Channel	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)	Plot No.
			Tune-up	Meas.	1-g (W/Kg)				
Front Surface	11g	1	17.5	17.28	0.093	-0.03	98.65	0.099	/
Back Surface	11g	1	17.5	17.28	0.183	-0.07	98.65	0.195	/
Right Edge	11g	1	17.5	17.28	0.232	-0.05	98.65	0.247	/
Right Edge	11g	6	17.5	16.83	0.318	0.19	98.65	0.376	/
Right Edge	11g	11	17.5	16.84	0.397	0.03	98.65	0.468	1

Note:
The SAR testing was set to transmit at maximum power for all tests.

OFDM mode SAR evaluation exclusion analysis

Mode	Tune-up (dBm)	Tune-up (mW)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11b	17.5	56.23	0.468	\	\
802.11g	16.0	39.81	\	0.331	Excluded
802.11n (20M)	14.5	28.18	\	0.235	Excluded
802.11n (40M)	15.0	31.62	\	0.263	Excluded

Note:
1) The highest reported SAR for OFDM adjusted by the ratio of OFDM 802.11n to OFDM specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, so SAR evaluation for 802.11n is not required.

12.9. SAR Test Results of 5GHz Wi-Fi (U-NII Band)

Scenario and Distance (Body 5mm)	Test Mode	Channel/ Frequency	Power (dBm)		Measured SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)	Plot No.
			Tune-up	Meas.	1-g (W/Kg)				
5.3G									
Front Surface	11a	64	13.0	12.77	0.044	-0.02	92.30	0.050	/
Back Surface	11a	64	13.0	12.77	0.140	-0.07	92.30	0.160	/
Right Edge	11a	64	13.0	12.77	0.304	0.00	92.30	0.347	/
Right Edge	11a	52	13.0	12.52	0.442	-0.07	92.30	0.535	2
Right Edge	11a	56	13.0	12.41	0.442	-0.12	92.30	0.549	/
5.6G									
Front Surface	11a	140	13.5	13.02	0.022	0.00	92.30	0.027	/
Back Surface	11a	140	13.5	13.02	0.053	-0.01	92.30	0.064	/
Right Edge	11a	140	13.5	13.02	0.191	-0.03	92.30	0.231	/
Right Edge	11a	100	13.5	11.93	0.490	-0.12	92.30	0.762	3
Right Edge	11a	116	13.5	12.49	0.295	-0.03	92.30	0.403	/
5.8G									
Front Surface	11a	165	12.5	12.32	0.015	-0.02	92.30	0.016	/
Back Surface	11a	165	12.5	12.32	0.011	0.00	92.30	0.012	/
Right Edge	11a	165	12.5	12.32	0.176	0.13	92.30	0.199	4
Right Edge	11a	149	12.5	12.23	0.128	-0.03	92.30	0.148	/
Right Edge	11a	157	12.5	11.52	0.112	-0.02	92.30	0.152	/

Note:

1) When the reported SAR of the initial test configuration is ＞0.8W/kg, SAR measurement is required for subsequent nest highest measured output power channel(s) in the initial test configuration until reported SAR is ≤1.2 W/kg or all required channels are tested.
2) The SAR testing was set to transmit at maximum power for all tests.

Subsequent test configuration SAR evaluation exclusion analysis for U-NII-2A band

Mode	Tune-up (dBm)	Tune-up (mW)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11a	13	19.95	0.549	\	\
802.11n 20M	12	15.85	\	0.436	Excluded
802.11n 40M	12	15.85	\	0.436	Excluded
802.11ac 20M	12	15.85	\	0.436	Excluded
802.11ac 40M	12	15.85	\	0.436	Excluded
802.11ac 80M	11	12.59	\	0.346	Excluded

Note:

1) The 802.11a mode is selected as Initial Test Configuration for SAR test according to the specified maximum output power. As the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes is not required.

Subsequent test configuration SAR evaluation exclusion analysis for U-NII-2C band

Mode	Tune-up (dBm)	Tune-up (mW)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11a	13.5	22.39	0.762	\	\
802.11n 20M	12	15.85	\	0.539	Excluded
802.11n 40M	11.5	14.13	\	0.481	Excluded
802.11ac 20M	12	15.85	\	0.539	Excluded
802.11ac 40M	11.5	14.13	\	0.481	Excluded
802.11ac 80M	8.5	7.08	\	0.241	Excluded

Note:

2) The 802.11a mode is selected as Initial Test Configuration for SAR test according to the specified maximum output power. As the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes is not required.

Subsequent test configuration SAR evaluation exclusion analysis for U-NII-3 band

Mode	Tune-up (dBm)	Tune-up (mW)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11a	12.5	17.78	0.199	\	\
802.11n 20M	12	15.85	\	0.177	Excluded
802.11n 40M	12	15.85	\	0.177	Excluded
802.11ac 20M	12	15.85	\	0.177	Excluded
802.11ac 40M	12	15.85	\	0.177	Excluded
802.11ac 80M	10	10.00	\	0.112	Excluded

Note:

1) The 802.11a mode is selected as Initial Test Configuration for SAR test according to the specified maximum output power. As the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes is not required.

12.10. SAR Test Results of Bluetooth

Scenario and Distance (Body 5mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)	Plot No.
			Tune-up	Meas.	1-g (W/Kg)				
Front Surface	BT 3DH5	0	7.5	7.21	<0.01	0.00	76.13	<0.01	/
Back Surface	BT 3DH5	0	7.5	7.21	<0.01	0.00	76.13	<0.01	/
Right Edge	BT 3DH5	0	7.5	7.21	<0.01	0.00	76.13	<0.01	/
Right Edge	BT 3DH5	39	7.5	7.01	<0.01	0.00	76.13	<0.01	/
Right Edge	BT 3DH5	78	7.5	6.56	<0.01	0.00	76.13	<0.01	/

Note:
The SAR testing was set to transmit at maximum power for all tests.

13. Simultaneous Transmission SAR Analysis

The EUT Simultaneous Transmission combination as below:

Condition	Technology	
1	NFC	BT
2	NFC	BLE
3	NFC	WIFI2.4G
3	NFC	WIFI5G
4	NFC	LTE

13.1. Simultaneous Transmission calculation

As per KDB 447498 D01 v06

b) When an antenna qualifies for the standalone SAR test exclusion of 4.3.1 and also transmits simultaneously with other antennas, the standalone SAR value must be estimated according to the following to determine the simultaneous transmission SAR test exclusion criteria:36

1) [(*max. power of channel, including tune-up tolerance, mW*) / (*min. test separation distance, mm*)]·[√f(GHz)/*x*] W/kg, for *test separation distances* ≤ 50 mm;
where *x* = 7.5 for 1-g SAR and *x* = 18.75 for 10-g SAR.
1) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the *test separation distance* is > 50 mm.37

This SAR estimation formula has been considered in conjunction with the *SAR Test Exclusion Thresholds* to result in substantially conservative SAR values of ≤ 0.4 W/kg. When SAR is estimated, the peak SAR location is assumed to be at the feed-point or geometric center of the antenna, whichever provides a smaller antenna separation distance, and this location must be clearly identified in test reports. The estimated SAR is used only to determine simultaneous transmission SAR test exclusion; it should not be reported as the standalone SAR. When SAR is estimated, it must be applied to determine the sum of 1-g SAR test exclusion. When SAR to peak location separation ratio test exclusion is applied, the highest reported SAR for simultaneous transmission can be an estimated standalone SAR if the estimated SAR is the highest among the simultaneously transmitting antennas (see also KDB Publication 690783 D01). For situations where the estimated SAR is overly conservative for certain conditions, the test lab may choose to perform standalone SAR measurements, then use the measured SAR to determine simultaneous transmission SAR test exclusion. Estimated SAR values at selected frequencies, distances, and power levels are illustrated in Appendix D.

For NFC 1-g SAR

Test separation distances ≤ 50 mm(1g-SAR)				
Frequency (MHz)	Power (dBm)	Power (mW)	Separation Distance (mm)	Estimate 1g SAR (W/Kg)
13.56	-81.41	0.00	5	0.000

Note

1) Since the 1g SAR value estimated by NFC is 0 W/Kg, the single point SAR value is also the simultaneous interpreting SAR value, so no calculation is required.

Appendixes

Refer to separated files for the following appendixes.

4791059475-SAR-1_App A Photo

4791059475-SAR-1_App B System Check Plots

4791059475-SAR-1_App C Highest Test Plots

4791059475-SAR-1_App D Cal. Certificates

---------End of Report---------