SAR EVALUATION REPORT

FCC 47 CFR § 2.1093
IEEE Std. 1528-2013
IEC/EN 62209-2:2010+A1:2019

For

S700

FCC ID: : 2A2ES-STR70

Model: S700

Report Number: 4790587088-SAR-1

Issue Date: Jan 5, 2023

Prepared for

Stripe, Inc.
354 Oyster Point Blvd, South San Francisco, CA 94080, USA

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	5/1/2023	Initial Issue	

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

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1. Attestation of Test Results

Applicant Name	Stripe, Inc.		
Address	354 Oyster Point Blvd, South San Francisco, CA 94080, USA		
Manufacturer	Stripe, Inc.		
Address	354 Oyster Point Blvd, South San Francisco, CA 94080, USA		
EUT Name	S700		
Model	S700		
Sample Status	Normal		
Sample Received Date	Nov 21, 2022		
Date of Tested	Nov 28, 2022 ~ Nov 30, 2022		
Applicable Standards	FCC 47 CFR § 2.1093 IEEE Std. 1528-2013 KDB publication IEC/EN 62209-2:2010+A1:2019		
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**		
	DTS	**U-NII**	**DSS**
Head(1-g)	/	/	/
Body-worn (1-g)	0.420	1.187	0.146
Simultaneous Transmission: Head(1-g)	/		
Simultaneous Transmission: Body-worn (1-g)	/		
Test Results	Pass		
Prepared By: Burt Hu Laboratory Engineer	Reviewed By: Denny Huang Senior Project Engineer	Approved By: 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
- 447498 D01 General RF Exposure Guidance
- 690783 D01 SAR Listings on Grants
- 865664 D01 SAR measurement 100 MHz to 6 GHz
- 865664 D02 RF Exposure Reporting
- 941225 D07 UMPC Mini Tablet v01r02

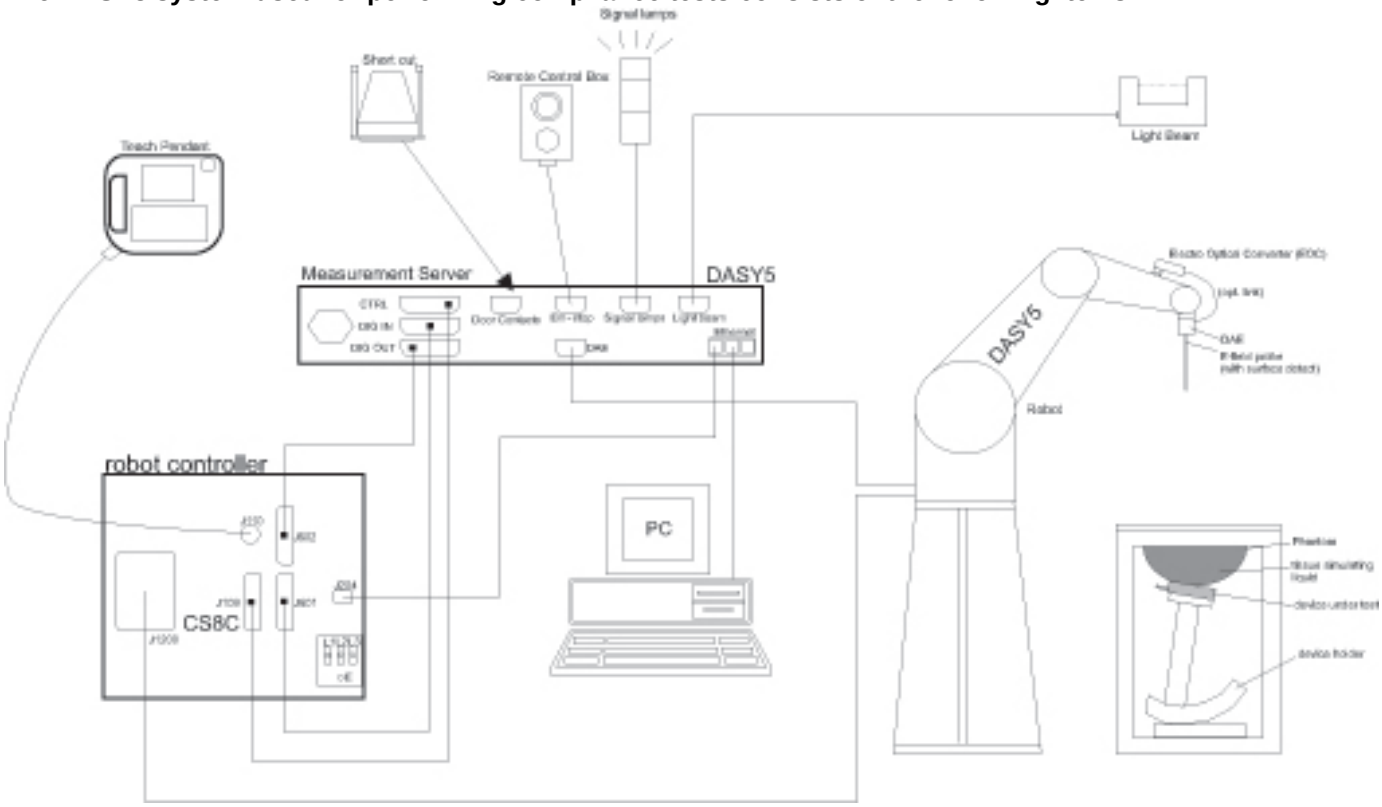
3. Facilities and Accreditation

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 Recognized 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 Declaration of Conformity (DoC) and Certification rules **IC(Company No.: 21320)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch has been registered and fully described in a report filed with Industry Canada. The Company Number is 21320. **VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011)** 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-20019 and R-20004 Shielding Room B , the VCCI registration No. is C-20012 and T-20011
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 DASY8 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 Win10 and the DASY8 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 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·δ·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 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 larger 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	2023.10.16
Dielectric Probe kit	SPEAG	SM DAK 040 SA	1155	2025.02.27
DC power supply	Keysight	E36103A	MY55350020	2023.10.16
Signal Generator	Rohde & Schwarz	SME06	837633\001	2023.08.14
BI-Directional Coupler	KRYTAR	1850	54733	2023.10.16
Peak and Average Power Sensor	Keysight	E9325A	MY62220002	2023.10.25
Peak and Average Power Sensor	Keysight	E9325A	MY62220003	2023.10.25
Dual Channel PK Power Meter	Keysight	N1912A	MY55416024	2023.10.16
Amplifier	CORAD TECHNOLOGY LTD	AMF-4D-00400600-50-30P	1983561	NCR
Dosimetric E-Field Probe	SPEAG	EX3DV4	7733	2023.08.01
Data Acquisition Electronic	SPEAG	DAE4	1739	2023.07.28
Dipole Kit 2450 MHz	SPEAG	D2450V2	977	2024.12.16
Dipole Kit 5 GHz	SPEAG	D5GHzV2	1231	2024.12.15
Software	SPEAG	DASY8	N/A	NCR
ELI Phantom	SPEAG	ELI V8.0	2178	NCR
Thermometer	/	GX-138	150709653	2023.10.21
Thermometer	VICTOR	ITHX-SD-5	18470005	2023.10.21

Note:

1) Per KDB865664D01 v01r04 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) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

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, the extensive SAR measurement uncertainty analysis described in IEEE Std. 1528-2013 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.

6. Device Under Test (DUT) Information

6.1. DUT Description

EUT is an intelligent mini payment terminal with IEEE 802.11A/B/G/N/AC, Bluetooth, and NFC wireless technology	
Dimension	Overall (Length x Width x Height): 141.75 mm x 73.9 mm x 21.1 mm
Accessory	None

Note:
NFC RF exposure testing is categorically excluded.

6.2. Wireless Technology

Wireless technology	Frequency band
Bluetooth	2.4 GHz
Wi-Fi	2.4 GHz
Wi-Fi	5 GHz
NFC	13.56 MHz

6.3. Antenna Gain

Antenna type	Band	Gain(dBi)
FPC	2.4 GHz	-2.63
FPC	5 GHz	1.14
Coil	13.56 MHz	0

7. Conducted Output Power Measurement and tune-up tolerance

7.1. 2.4GHz Wi-Fi DTS Band

Band	Mode	Date Rate	Ch.#	Freq. (MHz)	Ant1	
					Avg. Pwr. (dBm)	Tune-up (dBm)
2.4GHz	802.11b	1Mbps	1	2412	16.31	17.0
			6	2437	16.62	17.0
			11	2462	16.76	17.0
	802.11g	6Mbps	1	2412	Not Required	16.5
			6	2437	Not Required	16.5
			11	2462	Not Required	16.5
	802.11n HT20	HT0	1	2412	Not Required	13.5
			6	2437	Not Required	13.5
			11	2462	Not Required	13.5
	802.11n HT40	HT0	3	2422	Not Required	17.5
			6	2437	Not Required	17.5
			9	2452	Not Required	17.5

Note:
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.

7.2. 5GHz Wi-Fi U-NII Band

Band	Mode	BW (MHz)	Ch.#	Freq. (MHz)	Ant1	
					Avg. Pwr. (dBm)	Tune-up (dBm)
5.3 GHz	802.11a 6Mbps	20	36	5180	18.15	18.5
			40	5200	17.94	18.5
			44	5220	17.88	18.5
			48	5240	17.01	18.5
			52	5260	Not Required	17.0
			56	5280	Not Required	17.0
			60	5300	Not Required	17.0
			64	5320	Not Required	17.0
	802.11n HT0	20	36	5180	Not Required	18.0
			40	5200	Not Required	18.0
			44	5220	Not Required	18.0
			48	5240	Not Required	18.0
			52	5260	Not Required	17.0
			56	5280	Not Required	17.0
			60	5300	Not Required	17.0
			64	5320	Not Required	17.0
	802.11ac VHT0	20	36	5180	Not Required	18.0
			40	5200	Not Required	18.0
			44	5220	Not Required	18.0
			48	5240	Not Required	18.0
			52	5260	Not Required	17.0

			56	5280	Not Required	17.0
			60	5300	Not Required	17.0
			64	5320	Not Required	17.0
	802.11n HT0	40	38	5190	Not Required	16.0
			46	5230	Not Required	16.0
			54	5270	Not Required	17.5
			62	5310	Not Required	17.5
	802.11ac VHT0	40	38	5190	Not Required	16.0
			46	5230	Not Required	16.0
			54	5270	Not Required	17.5
			62	5310	Not Required	17.5
	802.11ac VHT0	80	42	5210	Not Required	15.5
			58	5290	Not Required	17.0

Note:
The mode with highest tune up, largest bandwidth and lowest order is select to perform SAR evaluation.

Band	Mode	BW (MHz)	Ch.#	Freq. (MHz)	Ant1	
					Avg. Pwr. (dBm)	Tune-up (dBm)
5.6 GHz	802.11a 6Mbps	20	100	5500	18.66	19.6
			104	5520	19.05	19.6
			108	5540	19.11	19.6
			112	5560	19.28	19.6
			116	5580	19.52	19.6
			120	5600	19.51	19.6
			124	5620	19.52	19.6
			128	5640	19.50	19.6
			132	5660	19.47	19.6
			136	5680	19.45	19.6
			140	5700	18.16	18.2
			144	5720	17.67	17.8
	802.11n HT0	20	100	5500	Not Required	19.5
			104	5520	Not Required	19.5
			108	5540	Not Required	19.5
			112	5560	Not Required	19.5
			116	5580	Not Required	19.5
			120	5600	Not Required	19.5
			124	5620	Not Required	19.5
			128	5640	Not Required	19.5
			132	5660	Not Required	19.5
			136	5680	Not Required	19.5
			140	5700	Not Required	19.5
			144	5720	Not Required	17.7
	802.11ac VHT0	20	100	5500	Not Required	19.5
			104	5520	Not Required	19.5

			108	5540	Not Required	19.5
			112	5560	Not Required	19.5
			116	5580	Not Required	19.5
			120	5600	Not Required	19.5
			124	5620	Not Required	19.5
			128	5640	Not Required	19.5
			132	5660	Not Required	19.5
			136	5680	Not Required	19.5
			140	5700	Not Required	19.5
			144	5720	Not Required	17.7
	802.11n HT0	40	102	5510	Not Required	16.5
			110	5550	Not Required	16.5
			118	5590	Not Required	16.5
			126	5630	Not Required	16.5
			134	5670	Not Required	16.5
			142	5710	Not Required	16.5
	802.11ac VHT0	40	102	5510	Not Required	16.5
			110	5550	Not Required	16.5
			118	5590	Not Required	16.5
			126	5630	Not Required	16.5
			134	5670	Not Required	16.5
			142	5710	Not Required	16.5
	802.11ac VHT0	80	106	5530	Not Required	17.5
			122	5610	Not Required	17.5
			138	5690	Not Required	15.6

Note:
The mode with highest tune up, largest bandwidth and lowest order is select to perform SAR evaluation

Band	Mode	BW (MHz)	Ch.#	Freq. (MHz)	Ant1	
					Avg. Pwr. (dBm)	Tune-up (dBm)
5.8GHz	802.11a 6Mbps	20	149	5745	Not Required	17.5
			153	5765	Not Required	17.5
			157	5785	Not Required	17.5
			161	5805	Not Required	17.5
			165	5825	Not Required	17.5
	802.11n HT0	20	149	5745	Not Required	17.5
			153	5765	Not Required	17.5
			157	5785	Not Required	17.5
			161	5805	Not Required	17.5
			165	5825	Not Required	17.5
	802.11ac VHT0	20	149	5745	Not Required	17.5
			153	5765	Not Required	17.5
			157	5785	Not Required	17.5
			161	5805	Not Required	17.5
			165	5825	Not Required	17.5
	802.11n	40	151	5755	17.88	18.0

	HT0		159	5795	17.79	18.0
	802.11ac VHT0	40	151	5755	Not Required	18.0
			159	5795	Not Required	18.0
	802.11ac VHT0	80	155	5775	Not Required	17.5

Note:
The mode with highest tune up, largest bandwidth and lowest order is select to perform SAR evaluation

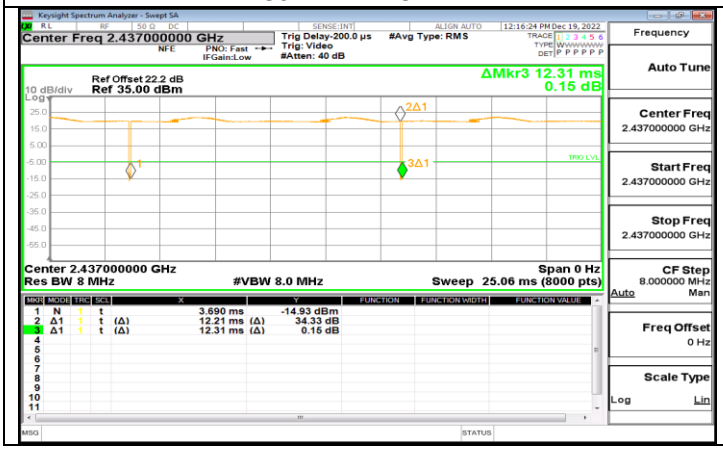
7.3. Power measurement result Bluetooth

Test Mode	Channel	Average Conducted Power (dBm)	Tune-up(dBm)	Duty Cycle (%)
DH5	0	6.50	8.5	76.80
	39	6.82		
	78	8.43		
3DH5	0	Not Required	7.0	Not Required
	39			
	78			
BLE_1M	0	Not Required	8.0	Not Required
	19			
	39			
BLE_2M	0	Not Required	8.0	Not Required
	19			
	39			

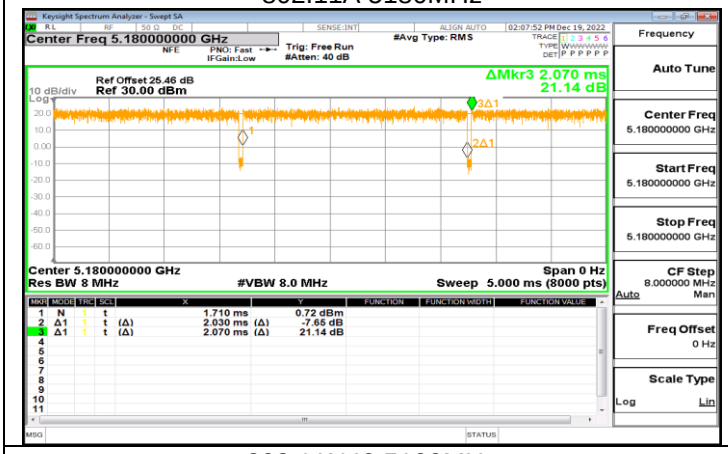
7.4. Duty cycle

Test Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)
11b	12.21	12.31	0.9919	99.19
11a	2.03	2.07	0.9807	98.07
11n40	8.37	8.73	0.9587	95.87
DH5	2.88	3.75	0.7680	76.80

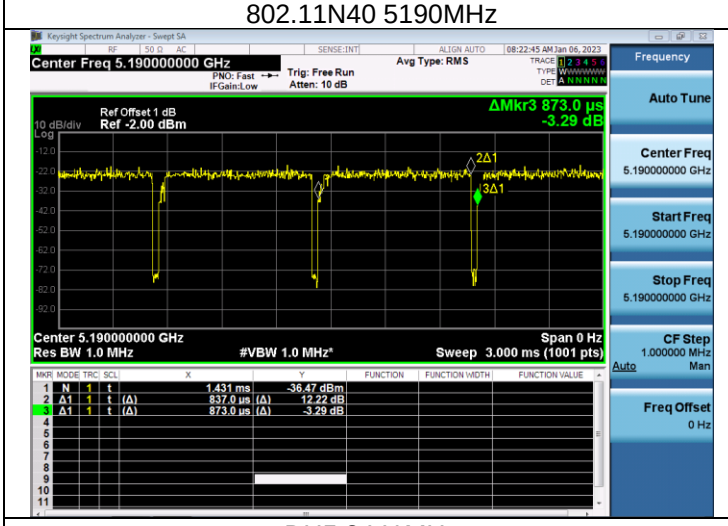
802.11B 2437MHz



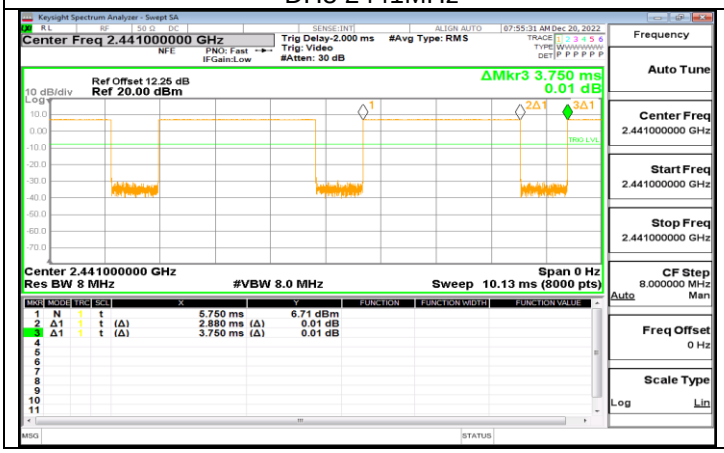
802.11A 5180MHz



802.11N40 5190MHz



DH5 2441MHz



7.5. NFC power analysis

The maximum field strength of NFC is 17.11 dBμV/m (this data is referenced from report NO.: 4790587088-RF-5), an equivalent EIRP of 0.0002mW is derived from (EIRP[dBm] = E[dBμV/m] - 95.2) + 40, the antenna gain is 0 dBi. As per appendix C of KDB 447498 D01 General RF Exposure Guidance v06, the power is less than 474mW, so NFC is qualified for SAR exclusion.

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	

8. Test Configuration

8.1. 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 each test frequency channel, the EUT is operated at the RF continuous emission mode. The test procedures in KDB 248227D01 are applied.

8.1.1. 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.

8.1.2. 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.

8.1.3. Sub Test Configuration Procedure

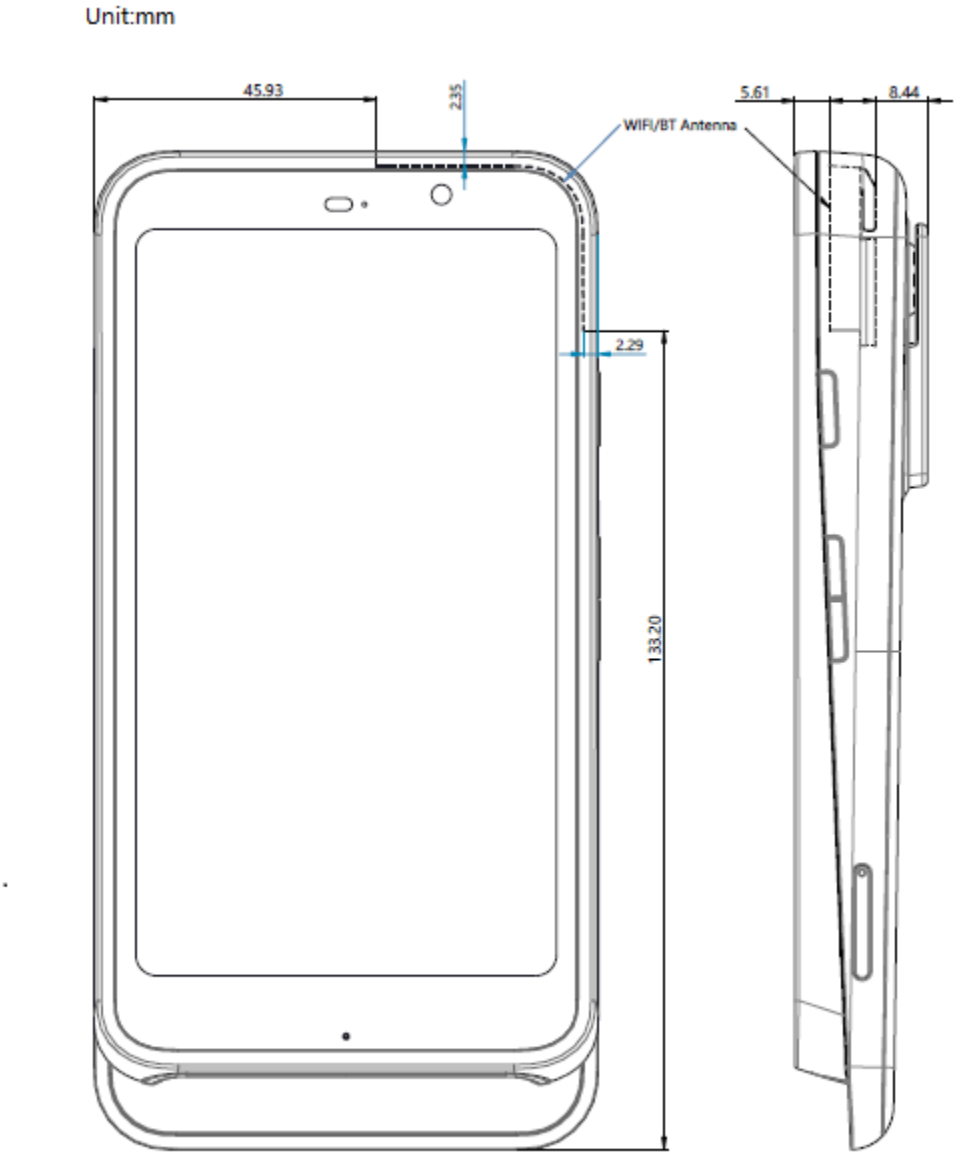
SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for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

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 diagram



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

10. Dielectric Property Measurements & System Check

10.1. 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				Delta(%)		Limit (%)	Temp. (℃)	Test Date
		Measured		Target						
		ε_r	σ	ε_r	σ	ε_r	σ			
Head 2450	2360	40.30	1.76	39.36	1.72	2.39	2.33	±5	22.3	2022.12.28
	2450	40.20	1.87	39.20	1.80	2.55	3.89	±5		
	2540	39.80	1.98	39.09	1.90	1.82	4.21	±5		
Head 5250	5160	35.30	4.50	36.03	4.61	-2.03	-2.39	±5	22.3	2022.12.28
	5250	35.20	4.58	35.93	4.71	-2.03	-2.76	±5		
	5340	35.00	4.67	35.83	4.80	-2.32	-2.71	±5		
Head 5600	5500	35.90	5.09	35.64	4.96	0.73	2.62	±5	22.3	2022.12.28
	5600	35.90	5.20	35.53	5.07	1.04	2.56	±5		
	5700	35.90	5.30	35.41	5.17	1.38	2.51	±5		
Head 5750	5660	35.50	4.97	35.46	5.13	0.11	-3.12	±5	21.9	2022.12.29
	5750	35.40	5.04	35.36	5.22	0.11	-3.45	±5		
	5840	35.30	5.15	35.27	5.30	0.09	-2.83	±5		

10.2. 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		Measured Results		Target (Ref. value)	Delta (%)	Limit (%)	Temp. (℃)	Test Date
		Zoom Scan (W/Kg)	Normalize to 1W (W/Kg)					
Head 2450	1-g	12.500	50.00	53.20	-6.02	±10	22.3	2022.12.28
	10-g	5.940	23.76	24.20	-1.82	±10		
Head 5250	1-g	8.010	80.10	77.90	2.82	±10	22.3	2022.12.28
	10-g	2.350	23.50	22.60	3.98	±10		
Head 5600	1-g	7.660	76.60	80.90	-5.32	±10	21.9	2022.12.29
	10-g	2.220	22.20	23.30	-4.72	±10		
Head 5750	1-g	7.610	76.10	78.30	-2.81	±10	21.4	2022.12.30
	10-g	2.190	21.90	22.40	-2.23	±10		

11. Measured and Reported (Scaled) SAR Results

General Notes:

1) Same mode and same distance is selected to conduct SAR evaluation for body-worn and hotspot scenario.
2) As per KDB447498 D01, all SAR measurement results are scaled to the maximum tune-up tolerance limit to demonstrate SAR compliance.
3) 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.
4) 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.
5) As per KDB648474 D04, SAR is evaluated without a headset connected to the device. When the standalone reported body-worn SAR is ≤1.2 W/kg, no additional SAR evaluations using a headset are required.
6) 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).
7) 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.
8) 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.
9) Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 5 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.

11.1. SAR Test Results of 2.4GHz Wi-Fi.

Scenario and Distance (Body Worn 5mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (W/Kg)			
Back surface	11b	2462	17.0	16.76	0.222	-0.02	99.19	0.237
Front surface	11b	2462	17.0	16.76	0.331	-0.05	99.19	0.353
Right Edge	11b	2462	17.0	16.76	0.188	-0.07	99.19	0.200
Top Edge	11b	2462	17.0	16.76	0.079	-0.08	99.19	0.084
Front surface	11b	2412	17.0	16.31	0.289	-0.05	99.19	0.342
Front surface	11b	2437	17.0	16.62	0.382	-0.03	99.19	0.420

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	50.12	0.420	\	\
802.11g	16.5	44.67	\	0.374	Excluded
802.11n20	13.5	22.39	\	0.188	Excluded
802.11n40	17.5	56.23	\	0.471	Excluded

Note:

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

11.2. SAR Test Results of 5GHz Wi-Fi.

Scenario and Distance (Body Worn 5mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (W/Kg)			
U-NII-1								
Back surface	11a	5180	18.5	18.15	0.343	-0.15	98.07	0.379
Front surface	11a	5180	18.5	18.15	0.108	-0.07	98.07	0.119
Right Edge	11a	5180	18.5	18.15	0.501	-0.01	98.07	0.554
Top Edge	11a	5180	18.5	18.15	0.774	-0.11	98.07	0.855
Top Edge	11a	5200	18.5	17.94	0.668	0.01	98.07	0.775
Top Edge	11a	5240	18.5	17.01	0.528	-0.03	98.07	0.759
U-NII-2C								
Back surface	11a	5580	19.6	19.52	0.541	-0.11	98.07	0.562
Front surface	11a	5580	19.6	19.52	0.126	0.05	98.07	0.131
Right Edge	11a	5580	19.6	19.52	0.762	-0.06	98.07	0.791
Top Edge	11a	5580	19.6	19.52	1.010	-0.01	98.07	1.049
Top Edge	11a	5500	19.6	18.66	0.868	-0.01	98.07	1.099
Top Edge	11a	5520	19.6	19.05	0.889	0.00	98.07	1.029
Top Edge	11a	5540	19.6	19.11	0.924	0.00	98.07	1.055
Top Edge	11a	5560	19.6	19.28	0.972	-0.01	98.07	1.067
Top Edge	11a	5600	19.6	19.51	1.040	0.00	98.07	1.083
Top Edge	11a	5620	19.6	19.52	1.050	-0.01	98.07	1.091
Top Edge	11a	5640	19.6	19.50	1.040	-0.03	98.07	1.085

Top Edge	11a	5660	19.6	19.47	1.070	0.00	98.07	1.124
Top Edge	11a	5680	19.6	19.45	1.090	-0.01	98.07	1.151
Top Edge	11a	5700	18.2	18.16	1.150	0.02	98.07	1.183
Top Edge	11a	5720	17.8	17.67	1.130	0.00	98.07	1.187
Worst Case repeated								
Top Edge	11a	5700	18.2	18.16	1.150	0.01	98.07	1.183
U-NII-3								
Back surface	11n40	5755	18.0	17.88	0.411	-0.08	95.51	0.442
Front surface	11n40	5755	18.0	17.88	0.134	-0.09	95.51	0.144
Right Edge	11n40	5755	18.0	17.88	0.540	-0.05	95.51	0.581
Top Edge	11n40	5755	18.0	17.88	1.050	-0.02	95.51	1.130
Front surface	11n40	5795	18.0	17.79	1.040	-0.07	95.51	1.143
Worst Case repeated								
Top Edge	11n40	5755	18.0	17.88	1.050	0.00	95.51	1.130

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.

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

Mode	Tune-up (dBm)	Tune-up (mW)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11a	18.5	70.79	0.855	\	\
802.11n 20M	18	63.10	\	0.762	Excluded
802.11ac 20M	18	63.10	\	0.762	Excluded
802.11n 40M	18	63.10	\	0.762	Excluded
802.11ac 40M	18	63.10	\	0.762	Excluded
802.11ac 80M	16	39.81	\	0.481	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	19.6	91.20	1.187	\	\
802.11n 20M	19.5	89.13	\	1.160	Excluded
802.11ac 20M	19.5	89.13	\	1.160	Excluded
802.11n 40M	16.5	44.67	\	0.581	Excluded
802.11ac 40M	16.5	44.67	\	0.581	Excluded
802.11ac 80M	17.5	56.23	\	0.732	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-3 band

Mode	Tune-up (dBm)	Tune-up (mW)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11n 40M	18	63.10	1.143	\	\
802.11a	17.5	56.23	\	1.019	Excluded
802.11n 20M	17.5	56.23	\	1.019	Excluded
802.11ac 20M	17.5	56.23	\	1.019	Excluded
802.11ac 40M	18	63.10	\	1.143	Excluded
802.11ac 80M	17.5	56.23	\	1.019	Excluded

Note:

2) The 802.11n40 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.

11.3. SAR Test Results of Bluetooth.

Scenario and Distance (Body Worn 5mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (W/Kg)			
Back surface	BT DH5	2480	8.5	8.43	0.034	-0.17	76.80	0.045
Front surface	BT DH5	2480	8.5	8.43	0.053	-0.02	76.80	0.070
Right Edge	BT DH5	2480	8.5	8.43	0.031	-0.12	76.80	0.041
Top Edge	BT DH5	2480	8.5	8.43	<0.01	0.19	76.80	<0.01
Front surface	BT DH5	2402	8.5	6.50	0.065	-0.05	76.80	0.134
Front surface	BT DH5	2441	8.5	6.82	0.076	0.00	76.80	0.146

12. Simultaneous Transmission SAR Analysis

Per KDB 447498D01, SAR compliance for simultaneous transmission must be considered when the maximum duration of overlapping transmissions, including network hand-offs, is greater than 30 seconds. This device could not contain multiple transmitters that may operate simultaneously, and therefore no requires a simultaneous transmission analysis.

Appendixes

Refer to separated files for the following appendixes.

4790587088-SAR-1 App A Photo

4790587088-SAR-1 App B Highest Test Plots

4790587088-SAR-1 App C System Check Plots

4790587088-SAR-1 App D Cal. Certificates

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