SAR TEST REPORT

Test Report No.: 12812927S-A

Applicant : **Canon Inc.**
Type of Equipment : **Wireless LAN module in Flat Panel Detector**
Model No. : **BM72065 (Wireless LAN module)** (*. Installed into the platform (5))
FCC ID : **AZDBM72065**
Test Standard : **FCC 47CFR §2.1093**
Test Result : **Complied (Refer to Section 3.5)**

Highest Reported SAR [W/kg]						Platform			-	Remarks (DTS)				Remarks (U-NII)				Reference SAR test report
Body-touch		Next-of-head		Hand		No.	Type	Model		Output power (Burst ave.) [dBm]				Output power (Burst ave.) [dBm]				
Limit: 1.6 (1g)		Limit: 1.6 (1g)		Limit: 4 (10g)														
DTS	U-NII	DTS	U-NII	DTS	U-NII					[MHz]	Mode	Measured	Max.	[MHz]	Mode	Measured	Max	
0.31	**1.09**	**0.32**	**1.07**	*. Evaluated by SAR (1g)		5	Flat Panel Detector	WM5A15	Body	2412	b	13.06	14	5825	n20	11.37	13	12812927S-A (This report)
									Head	2412	b	13.06	14	5825	a	11.40	13	
*. This Wireless LAN Module had installed into the following platforms.																		
0.32	**0.67**	**0.35**	**0.66**	**0.62**	**0.91**	1	Digital Radiography	CXDI-710C Wireless (WM5A11)	Body	2462	b	12.07	14	5825	n20	11.74	13	11355753S-A
									Head	2462	b	12.07	14	5825	n20	11.74	13	
									Hand	2462	g	12.03	14	5240	a	11.78	13	
0.28	**0.40**	**0.34**	**0.45**	**0.54**	**1.02**	2	Digital Radiography	CXDI-810C Wireless (WM5A12)	Body	2462	b	12.12	14	5180	a	11.33	13	11528791S-A
									Head	2462	n20	12.10	14	5190	n40	11.42	13	
									Hand	2462	g	12.12	14	5500	a	11.90	13	
0.32	**0.54**	**0.34**	**0.63**	**0.55**	**0.97**	3	Digital Radiography	CXDI-410C Wireless (WM5A13)	Body	2462	n20	12.98	14	5825	a	12.06	13	11528792S-A
									Head	2462	n20	12.98	14	5825	a	12.06	13	
									Hand	2462	b	13.02	14	5320	n20	11.67	13	
0.23	**0.99**	**0.28**	**1.02**	*. Evaluated by SAR (1g)		4	Flat Panel Detector	WM5A14	Body	2412	b	13.09	14	5500	n20	11.45	13	12812914S-A
									Head	2412	g	12.94	14	5500	n20	11.45	13	

*. **Highest reported SAR of all test configurations and in this platform for body-worn and next-of-head are 1.09 W/kg and 1.07 W/kg, respectively.**
*. Since highest reported SAR (1g) on this platform obtained in accordance with KDB447498 D01 (v06) was kept under 1.2 W/kg, the EUT was approved to operate single platform. The platform "Digital Radiography" and "Flat Panel Detector" are "flat panel type product" series with the same outward appearance.
*. Max.:Maximum, (Mode) b: IEEE 802.11b, g: IEEE 802.11g, a: IEEE 802.11a, n20: IEEE 802.11n(20HT), n40: IEEE 802.11n(40HT).

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3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. This test report covers Radio technical requirements.
   It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.

Date of test: July 17 ~ July 26, 2019

Test engineer: H. Naka
Hiroshi Naka
Engineer, Consumer Technology Division

Approved by: T. Imamura
Toyokazu Imamura
Leader, Consumer Technology Division

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

ACCREDITED
CERTIFICATE 1266.03

REVISION HISTORY

Revision	Test report No.	Date	Page revised	Contents
Original	12812927S-A	August 22, 2019	-	-

*. By issue of new revision report, the report of an old revision becomes invalid.

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Contents of appendixes

SECTION 1: Customer information

Company Name	Canon Inc.
Address	9-1, Imaikamicho, Nakahara-ku, Kawasaki, Kanagawa 211-8501, Japan
Telephone Number	+81-3-3758-2111
Contact Person	Tatsuya Yamazaki

The information provided from the customer is as follows;
- Applicant, Type of Equipment, Model No., FCC ID on the cover and other relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (EUT)
- SECTION 4: Operation of EUT during testing
- Appendix 1: The part of Antenna location information, Description of EUT and Support Equipment

* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2, SECTION 4 and Appendix 1.

SECTION 2: Equipment under test (EUT)

2.1 Identification of EUT

	EUT	Platform
Type of Equipment	Wireless LAN Module	BM72065's Platform (5): Flat Panel Detector
Model Number	BM72065	WM5A15
Serial Number	f48139ff8b6d	19MED-0124
Condition of EUT	Engineering prototype	Engineering prototype
	(*. Not for sale: These samples are equivalent to mass-produced items.)	
Receipt Date of Sample	July 2, 2019 (*. No modification by the Lab.)	
Country of Mass-production	Japan	Japan
Category Identified	Portable device	
Rating	DC3.3V supplied form the platform *. The EUT is installed into the specified the platform that was operated by the re-chargeable Li-ion battery. Therefore, each SAR test, the platform which had built-in EUT was operated with full-charged battery.	
Feature of EUT	The EUT is a Wireless LAN Module, model: BM72065 which installs into the specified platform: Digital Radiography and Flat Panel Detector. (*. The platform "Digital Radiography" and "Flat Panel Detector" are flat panel type product series with the same outward appearance.)	
SAR Accessory	None	

2.2 Product Description (Wireless LAN Module: BM72065)

Frequency band	**2.4GHz band**		**5GHz band**				
			-	**U-NII-1 (W52)**	**U-NII-2A (W53)**	**U-NII-2C (W56)**	**U-NII-3 (W58)**
Frequency of operation (MHz) (*.ch.: channel)	b,g, n(20HT)	2412~2462 (ch.1~11)	a, n(20HT)	5180~5240 (ch.36~48)	5260~5320 (ch.52~64)	5500~5580, 5660~5700 (ch.100~116, 132~140)	5745~5825 (ch.149~165)
	n(40HT)	2422~2452 (ch3~9)	n(40HT)	5190,5230 (ch.38,46)	5270,5310 (ch.54,62)	5510, 5550, 5670 (ch.102,110,134)	5755, 5795 (ch.151,159)
Channel spacing (MHz)	5 (11b,g,n(20HT))		20 (11b,g,n(20HT)) / 40 (11n(40HT))				
Bandwidth (MHz)	20 (11b,g,n(20HT)) / 40 (11n(40HT))		20 (11b,g,n(20HT)) / 40 (11n(40HT))				
Type of modulation	DSSS: DBPSK, DQPSK, CCK (11b), OFDM: BPSK, QPSK, 16QAM, 64QAM (11g,a,n(20HT),n(40HT))						
Transmit power (typical and tolerance (as manufacture variation))(dBm)	b	12.0 ±2 (ch.1~11, 1~11Mbps)	a:	11.0 ±2 (ch.36~48, 6~54Mbps)	11.0 ±2 (ch.52~64, 6~54Mbps)	11.0 ±2 (ch.100~140, 6~54Mbps)	11.0 ±2 (ch.149~165, 6~54Mbps)
	g, n(20HT)	12.0 ±2 (ch1~11, 6~54Mbps, MCS0~7)	n(20HT)	11.0 ±2 (ch.36~48, MCS0~7)	11.0 ±2 (ch.52~64, MCS0~7)	11.0 ±2 (ch.100~140, MCS0~7)	11.0 ±2 (ch.149~165, MCS0~7)
	n(40HT)	11.0 ±2 (ch.3~9, MCS0~7)	n(40HT)	11.0 ±2 (ch.38,46, MCS0~7)	11.0 ±2 (ch.54,62, MCS0~7)	11.0 ±2 (ch.102~134, MCS0~7)	11.0 ±2 (ch.151,159, MCS0~7)
	*. The measured Tx output power (conducted) refers to Section 6 in this report.						
Power supply	DC 3.3V *.The dc power of BM72065 is supplied from the constant voltage circuit of the platform.						
Radio type	Transceiver						
Antenna quantity / model	1 pc.	146153-100 (cable length: 100 mm) <molex>					
Antenna type / connector type	Pattern antenna (34.9mm × 9mm) / Connector; RF module side: U-FL connector compatible, Antenna side: soldered						
Antenna gain (max.peak)	3.0 dBi (2.4GHz ~ 2.5 GHz) / 4.5 dBi (5.15GHz ~ 5.85 GHz), *.including cable loss.						

*. ch: channel; (Mode) b: IEEE 802.11b, g: IEEE 802.11g, a: IEEE 802.11a, n20: IEEE 802.11n(20HT), n40: IEEE 802.11n(40HT).
*. The EUT do not use the special transmitting technique such as "beam-forming" and "time-space code diversity."
*. Maximum tune-up tolerance limit is conducted burst average power and is defined by a customer as Duty cycle 100% (continuous transmitting).

SECTION 3: Test specification, procedures and results

3.1 Test specification

FCC47CFR §2.1093: Radiofrequency radiation exposure evaluation: portable devices.

The US Federal Communications Commission has released the report and order "Guidelines for Evaluating the Environmental Effects of RF Radiation", ET Docket No. 93-62 in August 1996. The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g for an uncontrolled environment and 8.0 mW/g for an occupational/controlled environment as recommended by the ANSI/IEEE standard C95.1-1992. The device should be evaluated at maximum output power (radiated from the antenna) under "worst-case" conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling in accordance with the following measurement procedures.

The tests documented in this report were performed in accordance with FCC 47 CFR Parts 2, IEEE Std.1528-2013 (latest), the following FCC Published RF exposure KDB procedures, and TCB workshop updates.

KDB 447498 D01 (v06):	General RF exposure guidance
KDB 248227 D01 (v02r02):	SAR Guidance for IEEE 802.11 (Wi-Fi) transmitters
KDB 865664 D01 (v01r04):	SAR measurement 100MHz to 6GHz
IEEE Std. 1528-2013:	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

3.2 Exposure limit

Environments of exposure limit	Whole-Body (averaged over the entire body)	Partial-Body (averaged over any 1g of tissue)	Hands, Wrists, Feet and Ankles (averaged over any 10g of tissue)
(A) Limits for Occupational /Controlled Exposure (W/kg)	0.4	8.0	20.0
(B) Limits for General population /Uncontrolled Exposure (W/kg)	0.08	1.6	4.0

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

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

The limit applied in this test report is;

General population / Uncontrolled exposure, Partial-Body (averaged over any 1g of tissue) limit: 1.6 W/kg (Partial-Body)

3.3 Addition, deviation and exclusion to the test procedure

No addition, exclusion nor deviation has been made from the test procedure.

3.4 Test Location

UL Japan, Inc., Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN
Telephone number: +81 463 50 6400 / Facsimile number: +81 463 50 6401
A2LA Certificate Number: 1266.03 (FCC Test Firm Registration Number: 626366, ISED Lab Company Number: 2973D)

Used?	Place	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
☐	No.1 Semi-anechoic chamber	20.6 × 11.3 × 7.65	20.6 × 11.3	10 m
☐	No.2 Semi-anechoic chamber	20.6 × 11.3 × 7.65	20.6 × 11.3	10 m
☐	No.3 Semi-anechoic chamber	12.7 × 7.7 × 5.35	12.7 × 7.7	5 m
☐	No.4 Semi-anechoic chamber	8.1 × 5.1 × 3.55	8.1 × 5.1	-
☐	No.1 Shielded room	6.8 × 4.1 × 2.7	6.8 × 4.1	-
☐	No.2 Shielded room	6.8 × 4.1 × 2.7	6.8 × 4.1	-
☐	No.3 Shielded room	6.3 × 4.7 × 2.7	6.3 × 4.7	-
☐	No.4 Shielded room	4.4 × 4.7 × 2.7	4.4 × 4.7	-
☐	No.5 Shielded room	7.8 × 6.4 × 2.7	7.8 × 6.4	-
☐	No.6 Shielded room	7.8 × 6.4 × 2.7	7.8 × 6.4	-
☒	**No.7 Shielded room**	**2.76 × 3.76 × 2.4**	**2.76 × 3.76**	-
☐	No.8 Shielded room	3.45 × 5.5 × 2.4	3.45 × 5.5	-
☐	No.1 Measurement room	2.55 × 4.1 × 2.5	2.55 × 4.1	-

3.5 Procedures and Results

Test Procedure	SAR measurement: KDB 447498 D01, KDB 248227 D01, KDB 865664 D01, IEC Std. 1528		
Category	FCC 47CFR §2.1093 (Portable device)	SAR type	Partial-Body

Band	Wi-Fi (DTS)		Wi-Fi (U-NII-1)		Wi-Fi (U-NII-2A)		Wi-Fi (U-NII-2C)		Wi-Fi (U-NII-3)	
Operation frequency [MHz]	2412~2462		5180~5240		5260~5320		5500~5700		5745~5825	
Results	Complied (Refer to Section 7.2)		Complied (Refer to Section 7.3)		Complied (Refer to Section 7.3)		Complied (Refer to Section 7.4)		Complied (Refer to Section 7.5)	
SAR limit [W/kg]	1.6 W/kg (1g)		1.6 W/kg (1g)		1.6 W/kg (1g)		1.6 W/kg (1g)		1.6 W/kg (1g)	
SAR type	Body touch	Next of head	Body touch	Next of head	Body touch	Next of head	Body touch	Next of head	Body touch	Next of head
Liquid type tested	Body	Head	Body	Head	Body	Head	Body	Head	Body	Head
Reported SAR (1g) [W/kg]	**0.309**	**0.319**	**0.775**	**0.734**	**0.824**	**0.769**	**1.015**	**0.969**	**1.094**	**1.069**
Measured SAR (1g) [W/kg]	0.249	0.257	0.651	0.617	0.659	0.610	0.695	0.664	0.749	0.737
Mode (Data rate)	b (1Mbps)	b (1Mbps)	a(6Mbps)	n20(MCS0)	n40(MCS0)	n20(MCS0)	n20(MCS0)	n20(MCS0)	n20(MCS0)	a(6Mbps)
Frequency [MHz]	2412	2412	5180	5180	5310	5320	5500	5500	5825	5825
Burst average power [dBm]	13.06	13.06	12.26	12.26	12.02	11.99	11.37	11.37	11.37	11.40
Tune-up limit [dBm]	14.0	14.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Tune-up factor [-]	1.24	1.24	1.19	1.19	1.25	1.26	1.46	1.46	1.46	1.45
Duty cycle [%]	100	100	100	100	100	100	100	100	100	100
Duty scaled factor [-]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Note: UL Japan's SAR Work Procedures No.13-EM-W0429 and 13-EM-W0430. No addition, deviation nor exclusion has been made from standards
*. SAR test was applied to U-NII-1 band, even though the reported SAR 1g of U-NII-2A was enough lower than 1.2 W/kg.
*. Since Wii-Fi of 2.4GHz and Wi-Fi of 5GHz are used a same antenna, DTS band and UNII band do not transmit simultaneously.
*. (Calculating formula)
Corrected SAR to max.power (*. Reported SAR) (W/kg) = (Measured SAR (W/kg)) × (Duty scaled factor) × (Tune-up factor)
where; Tune-up factor [-] = 1 / (10 ^ ("Δmax (max.power - burst average power), dB" / 10)), Duty scaled factor [-] = 100(%) / (duty cycle, %)
*. (Mode) b: IEEE 802.11b, g: IEEE 802.11g, a: IEEE 802.11a, n20: IEEE 802.11n(20HT), n40: IEEE 802.11n(40HT), n/a: Not applicable.
*. "yellow marker" in the table; The highest reported SAR(1g) of each operation band (DTS, U-NII) is shaded with yellow marker.

Test outline: Where the EUT (model: BM72065) is built into a new platform (5), it was verified whether multiplatform conditions can be suited in according with section 2) of 5.2.2 in KDB447498 D01 (v06).

Consideration of the test results: **The highest reported SAR (1g) of this platform (5) was kept; ≤ 1.2 W/kg (SAR(1g))**
Since highest reported SAR (1g) on this platform (5) obtained in accordance with KDB447498 D01 (v06) was kept under 1.2 W/kg, the EUT was approved to operate single platform (Flat Panel type product series).

3.6 SAR measurement procedure

3.6.1 Normal SAR measurement procedure

Step 1: Confirmation before SAR testing
Before SAR test, the RF wiring for the sample had been switched to the antenna conducted power measurement line from the antenna line and the average power was measured. The SAR test reference power measurement and the SAR test were proceeded with the lowest data rate (which has the higher time-based average power typically) on each operation mode. Therefore, the average output power was measured on the lower, middle (or near middle), upper and specified channels with the lowest data rate of each operation mode. The power of other data rate was also measured to confirm the time-base average power and when it's required. The power measurement result is shown in Section 6.

*. The EUT transmission power was verified that it was within 2dB lower than the maximum tune-up tolerance limit when it was set the rated power. (Clause 4.1, KDB447498 D01 (v06))

Step 2: Power reference measurement
Measurement of the E-field at a fixed location above the central position of flat phantom (or/and furthermore an interpolated peak SAR location of area scan in step 2) was used as a reference value for assessing the power drop.

Step 3: Area Scan (Area scan parameters: KDB 865664 D01 (v01r04).)
The SAR distribution at the exposed side of head or body position was measured at a distance of each device from the inner surface of the shell. The area covered the entire dimension of the antenna of EUT and suitable horizontal grid spacing of EUT. Based on these data, the area of the maximum absorption was determined by splines interpolation.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 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 4: Zoom Scan and post-processing (Zoom scan parameters: KDB 865664 D01 (v01r04).)
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.
A volume of 30 mm (X) × 30 mm (Y) × 30 mm (Z) (or more) was assessed by measuring 7×7×7 points (or more), ≤ 3GHz.
A volume of 28 mm (X) × 28 mm (Y) × 24mm (Z) (or more) was assessed by measuring 8×8×7 points (or more) (by "Ratio step" method (*1)), > 3 GHz.
When the SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are proceeded for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.

			≤ 3 GHz	> 3 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·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. * When zoom scan is required and the *reported* SAR from the area scan based *1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

Step 5: 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 2. It was checked that the power drift is within ±5% in the evaluation procedure of SAR testing. The verification of power drift during the SAR test is that DASY system calculates the power drift by measuring the e-filed at the same location at beginning and the end of the scan measurement for each test position. The result is shown in SAR plot data of APPENDIX 2.

*. DASY system calculation Power drift value[dB] =20log(Ea)/(Eb) (where, Before SAR testing: Eb[V/m] / After SAR testing: Ea[V/m])
Limit of power drift[W] = ±5%; Power drift limit (X) [dB] = 10log(P_drift)=10log(1.05/1) = 10log(1.05)-10log(1) = 0.21dB
from E-filed relations with power; S=E×H=E^2/η=P/(4×π×r^2) (η: Space impedance) → P=(E^2×4×π×r^2)/η
Therefore, The correlation of power and the E-filed
Power drift limit (X) dB=10log(P_drift) = 10log(E_drift)^2=20log(E_drift)
From the above mentioned, **the calculated power drift of DASY system must be the less than (±) 0.21dB.**

Step 5: Z-Scan
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.

*. The all SAR tests were conservatively performed with test separation distance 0 mm. The phantom bottom thickness is approx. 2mm. Typical distance from probe tip to dipole centers is 1mm. The distance between the SAR probe tip to the surface of test device which is touched the bottom surface of the phantom is approx. 3 mm for 2.4GHz band and 2.4 mm for 5GHz band.

*1. "Ratio step" method parameters used; the first measurement point: "1.4mm" from the phantom surface, the initial z grid separation: "1.4mm", subsequent graded grid ratio: "1.4". These parameters comply with the requirement of KDB 865664 D01and recommended by Schmid & Partner Engineering AG (DASY5 manual).

SECTION 4: Operation of EUT during testing

4.1 Operating modes for SAR testing

The EUT has IEEE 802.11b, 11g, 11a, 11n(20HT) and 11n(40HT) continuous transmitting modes. The frequency and the modulation used in the SAR testing are shown as a following.

Operation mode			b	g	n20	n40	a	n20	n40	a	n20	n40	a	n20	n40	a	n20	n40
band			DTS				U-NII-1			U-NII-2A			U-NII-2C			U-NII-3		
Tx band [MHz]			2412~2462			2422 ~2452	5180~5240		5190, 5230	5260~5320		5270, 5310	5500~5580, 5660~5700		5510, 5550, 5670	5745~5825		5755, 5795
Bandwidth [MHz]			20	20	20	40	20	20	40	20	20	40	20	20	40	20	20	40
Max.power [dBm]			14	14	14	13	13	13	13	13	13	13	13	13	13	13	13	13
Modulation			DSSS	OFDM	OFDM	OFDM	OFDM	OFDM	OFDM	OFDM	OFDM	OFDM	OFDM	OFDM	OFDM	OFDM	OFDM	OFDM
Data rate [Mbps]			1	6	MCS0	MCS0	6	MCS0	MCS0	6	MCS0	MCS0	6	MCS0	MCS0	6	MCS0	MCS0
Frequency tested [MHz]	SAR type	Body, SAR1g	2412, 2437, 2462	2412, 2437, 2462	2412, 2437, 2462	2437 (*1)	5180, 5220, 5240	5180, 5220, 5240	5190, 5230	5260, 5300, 5320	5260, 5300, 5320	5270, 5310	5500, 5580, 5700	5500, 5580, 5700	5510, 5550, 5670	5745, 5785, 5825	5745, 5785, 5825	5755, 5795
		Head, SAR1g	2412, 2437, 2462	2412, 2437, 2462	2412, 2437, 2462	2437 (*1)	5180, 5220, 5240	5180, 5220, 5240	5190, 5230	5260, 5300, 5320	5260, 5300, 5320	5270, 5310	5500, 5580, 5700	5500, 5580, 5700	5510, 5550, 5670	5745, 5785, 5825	5745, 5785, 5825	5755, 5795

Controlled software	**"rftest" mode** (for the power measurement and the SAR test) Set Tx parameters which includes; "antenna# (1)", "channel", "BW(0:20MHz, 1:40MHz)", "Power(dBm, 12 or 11)", "data rate (0: 1Mbps, 5: 6Mbps, 14: MCS0)", "on/off (2:on/18:off)" by host PC via LAN cable.

*1. Since reported SAR(1g) values of DSSS channel which has highest tune-up limit power were shown lower than 0.8 W/kg, SAR test of OFDM mode (which has same power or smaller power) was omitted.

*. (mode) b: IEEE 802.11b, g: IEEE 802.11g, a: IEEE 802.11a, n20: IEEE 802.11n (20HT), n40: IEEE 802.11n(40HT).

4.2 RF exposure conditions

After considering the outline of Flat Panel Sensor, the SAR test was carried out on the following setup conditions.

Setup	Explanation of platform setup position (*. Refer to Appendix 1 for test setup photographs.)	Antenna separation [mm]	SAR Tested /Reduced	SAR type
Back	**(*. Initial setup)** The back surface (operator side, metal plate with the antenna radiated slit) of platform was touched to the Flat phantom.	**5.8**	**Tested**	Body /Head touch
Front	The front surface (patient side, metal plate) of platform was touched to the Flat phantom.	**9.7**	**Tested**	
Right	The right edge surface (near an antenna side) of platform was touched to the Flat phantom.	**22**	**Tested**	
Left	The left side edge surface of platform was touched to the Flat phantom.	**403**	Reduced (≥ 200 mm)	
Top	The top side edge surface of platform was touched to the Flat phantom.	**133.4**	Reduced	
Bottom	The bottom side edge surface of platform was touched to the Flat phantom.	**317.6**	Reduced (≥ 200 mm)	

*. **Separation:** Antenna separation distance. It is the distance from the antenna to the outer surface of platform which a human may touch.

. Size of platform: 460 (W) × 460 (D) × 15.7 (thickness) [mm] (. Size of EUT: 28 (W) × 32 (D) × 2.8 (thickness) [mm])

*. Refer to Appendix 1 for the antenna location and the test setup photographs which had been tested.

4.3 SAR test exclusion considerations accordance to KDB 447498 D01

The following is based on KDB447498D01;

Step 1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max.power of channel, including tune-up tolerance, mW) / (min.test separation distance, mm)] × [√f(GHz)] ≤ 3.0 (for SAR(1g)), 7.5(for SAR(10g)) ····· formula (1)
If power is calculated from the upper formula (1);
[SAR(1g) test exclusion thresholds, mW] = 3 × [test separation distance, mm] / [√f(GHz)] ····· formula (2)
1. The upper frequency of the frequency band was used in order to calculate standalone SAR test exclusion considerations.
2. Power and distance are rounded to the nearest mW and mm before calculation
3. The result is rounded to one decimal place for comparison
4. The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

When the calculated threshold value by a numerical formula above-mentioned in the following table is 3.0 or less, SAR test can be excluded.

Step 2) At 1500 MHz to 6 GHz and for test separation distances > 50 mm, the SAR test exclusion threshold is determined according to the following,
[test exclusion thresholds, mW] = [(Power allowed at numeric threshold for 50mm in formula (1))] + [(test separation distance, mm) - (50mm)] × 10 ····· formula (3)
1. The upper frequency of the frequency band was used in order to calculate standalone SAR test exclusion considerations.
2. Power and distance are rounded to the nearest mW and mm before calculation

When output power is less than the calculated threshold value by a numerical formula above-mentioned in the following table, SAR test is excluded.

[SAR exclusion calculations for step 1) antenna ≤50mm from the user, and for step 2) antenna > 50mm from the user.]

					Step 1) SAR exclusion calculations for antenna ≤50mm from the user.				Step 2) > 50mm from the user
Band	Tx mode	Upper Frequency [MHz]	Max. output power conducted [dBm]	[mW]	Calculated threshold value Setup	Back	Front	Right	Top, Bottom, Left
					D[mm]	6	10	22	> 133
2.4GHz	b,g,n20	2462	14	25	Judge	**6.5, Measure**	**3.9, Measure**	1.8, Reduce	≥ 926mW (133mm), Reduce
2.4GHz	n40	2452	13	20	Judge	**5.2, Measure**	**3.1, Measure**	1.4, Reduce	≥ 926mW (133mm), Reduce
U-NII-1	a,n20/40	5240	13	20	Judge	**7.6, Measure**	**4.6, Measure**	2.1, Reduce	≥ 896 mW(133mm), Reduce
U-NII-2A	a,n20/40	5320	13	20	Judge	**7.7, Measure**	**4.6, Measure**	2.1, Reduce	≥ 895 mW(133mm), Reduce
U-NII-2C	a,n20/40	5700	13	20	Judge	**8.0, Measure**	**4.8, Measure**	2.2, Reduce	≥ 893 mW(133mm), Reduce
U-NII-3	a,n20/40	5825	13	20	Judge	**8.0, Measure**	**4.8, Measure**	2.2, Reduce	≥ 892 mW(133mm), Reduce

*. D: Antenna separation distance, Max.: Maximum, (mode) b: IEEE 802.11b, g: IEEE 802.11g, a: IEEE 802.11a, n20: IEEE 802.11n(20HT), n40: IEEE 802.11n(40HT).
Notes: 1. Power and distance are rounded to the nearest mW and mm before calculation.

<Conclusion for consideration for SAR test reduction>

1) The setup of "Back", "Front" and "Right" are evaluated for body-touch SAR by using body-liquid and head-touch SAR by using head-liquid. The SAR test of other surfaces ("Top", "Bottom" and "Left" setups) are reduced because the SAR test exclusion judge value (exclusion power) shows "SAR test can be reduced".
2) The all SAR tests were conservatively performed with test separation distance 0mm.

By the determined test setup shown above, the SAR test was applied in the following procedures.

Step 1	On 2.4GHz band, In body liquid, worst SAR search (for body-touch SAR) by DSSS mode with a highest measurement output power channel. Add test for OFDM mode, if it's necessary. In head liquid, worst SAR search (for head-touch SAR) by DSSS mode with a highest measurement output power channel. Add test for OFDM mode, if it's necessary.
Step 2	On 5 GHz band, In body liquid, worst SAR search (for body-touch SAR) by BW40MHz mode with a highest measurement output power channel. Add test to BW20MHz mode to check SAR of Low/Middle/High channels on each operation band. In head liquid, worst SAR search (for head-touch SAR) by BW40MHz mode with a highest measurement output power channel. Add test to BW20MHz mode to check SAR of Low/Middle/High channels on each operation band, if it's necessary.

*. During SAR test, the radiated power is always monitored by Spectrum Analyzer.

SECTION 5: Uncertainty Assessment (SAR measurement/Daily check)

*. Although this standard determines only the limit value of uncertainty, there is no applicable rule of uncertainty in this. Therefore, the following results are derived depending on whether or not laboratory uncertainty is applied. Table of uncertainties are listed for ISO/IEC 17025.

Uncertainty of SAR measurement (2.4-6GHz) (*.ε&σ: ≤ ± 5%, DAK3.5, Tx: ≈100% duty cycle) (v08)	**1g SAR**	**10g SAR**
Combined measurement uncertainty of the measurement system (k=1)	**± 13.7%**	**± 13.6%**
Expanded uncertainty (k=2)	**± 27.4%**	**± 27.2%**

	Error Description (2.4-6GHz) (v08)	Uncertainty Value	Probability distribution	Divisor	ci (1g)	ci (10g)	ui (1g) (std. uncertainty)	ui (10g) (std. uncertainty)	Vi, veff
A	**Measurement System** (DASY5)								
1	Probe Calibration Error	±6.55 %	Normal	1	1	1	±6.55 %	±6.55 %	∞
2	Axial isotropy Error	±4.7 %	Rectangular	√3	√0.5	√0.5	±1.9 %	±1.9 %	∞
3	Hemispherical isotropy Error	±9.6 %	Rectangular	√3	√0.5	√0.5	±3.9 %	±3.9 %	∞
4	Linearity Error	±4.7 %	Rectangular	√3	1	1	±2.7 %	±2.7 %	∞
5	Probe modulation response	±2.4 %	Rectangular	√3	1	1	±1.4 %	±1.4 %	∞
6	Sensitivity Error (detection limit)	±1.0 %	Rectangular	√3	1	1	±0.6 %	±0.6 %	∞
7	Boundary effects Error	±4.3%	Rectangular	√3	1	1	±2.5 %	±2.5 %	∞
8	Readout Electronics Error(DAE)	±0.3 %	Rectangular	√3	1	1	±0.3 %	±0.3 %	∞
9	Response Time Error	±0.8 %	Normal	1	1	1	±0.8 %	±0.8 %	∞
10	Integration Time Error (≈100% duty cycle)	±0 %	Rectangular	√3	1	1	0 %	0 %	∞
11	RF ambient conditions-noise	±3.0 %	Rectangular	√3	1	1	±1.7 %	±1.7 %	∞
12	RF ambient conditions-reflections	±3.0 %	Rectangular	√3	1	1	±1.7 %	±1.7 %	∞
13	Probe positioner mechanical tolerance	±3.3 %	Rectangular	√3	1	1	±1.9 %	±1.9 %	∞
14	Probe Positioning with respect to phantom shell	±6.7 %	Rectangular	√3	1	1	±3.9 %	±3.9 %	∞
15	Max. SAR evaluation (Post-processing)	±4.0 %	Rectangular	√3	1	1	±2.3 %	±2.3 %	∞
B	**Test Sample Related**								
16	Device Holder or Positioner Tolerance	±3.6 %	Normal	1	1	1	±3.6 %	±3.6 %	5
17	Test Sample Positioning Error	±5.0 %	Normal	1	1	1	±5.0 %	±5.0 %	145
18	Power scaling	±0%	Rectangular	√3	1	1	±0 %	±0 %	∞
19	Drift of output power (measured, <0.2dB)	±2.3%	Rectangular	√3	1	1	±2.9 %	±2.9 %	∞
C	**Phantom and Setup**								
20	Phantom uncertainty (shape, thickness tolerances)	±7.5 %	Rectangular	√3	1	1	±4.3 %	±4.3 %	∞
21	Algorithm for correcting SAR (ε',σ: ≤5%)	±1.2 %	Normal	1	1	0.84	±1.2 %	±0.97 %	∞
22	Measurement Liquid Conductivity Error (DAK3.5)	±3.0 %	Normal	1	0.78	0.71	±2.3 %	±2.1 %	7
23	Measurement Liquid Permittivity Error (DAK3.5)	±3.1 %	Normal	1	0.23	0.26	±0.7 %	±0.8 %	7
24	Liquid Conductivity-temp.uncertainty (≤2deg.C.)	±5.3 %	Rectangular	√3	0.78	0.71	±2.4 %	±2.2 %	∞
25	Liquid Permittivity-temp.uncertainty (≤2deg.C.)	±0.9 %	Rectangular	√3	0.23	0.26	±0.1 %	±0.1 %	∞
	Combined Standard Uncertainty						**±13.7** %	**±13.6** %	733
	Expanded Uncertainty (k=2)						**±27.4 %**	**±27.2 %**	

*. This measurement uncertainty budget is suggested by IEEE Std.1528(2013) and determined by Schmid & Partner Engineering AG (DASY5 Uncertainty Budget). Per KDB 865664 D01 (v01r04) SAR Measurement 100 MHz to 6 GHz, Section 2.8.1., when the highest measured SAR(1g) within a frequency band is < 1.5W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std.1528 (2013) is not required in SAR reports submitted for equipment approval.

Uncertainty of daily check (2.4~6GHz) (*.ε&σ tolerance: ≤ ±5%, DAK3.5, CW) (v08)	**1g SAR**	**10g SAR**
Combined measurement uncertainty of the measurement system (k=1)	**± 11.0 %**	**± 10.9 %**
Expanded uncertainty (k=2)	**± 22.1 %**	**± 21.8 %**

	Error Description (v08)	Uncertainty Value	Probability distribution	Divisor	ci (1g)	ci (10g)	ui (1g) (std. uncertainty)	ui (10g) (std. uncertainty)	Vi, veff
A	**Measurement System** (DASY5)								
1	Probe Calibration Error	±6.55 %	Normal	1	1	1	±6.55 %	±6.55 %	∞
2	Axial isotropy error	±4.7 %	Rectangular	√3	√0.5	√0.5	±1.9 %	±1.9 %	∞
3	Hemispherical isotropy error	±9.6 %	Rectangular	√3	0	0	0 %	0 %	∞
4	Probe linearity	±4.7 %	Rectangular	√3	1	1	±2.7 %	±2.7 %	∞
5	Probe modulation response (CW)	±0.0 %	Rectangular	√3	1	1	0 %	0 %	∞
6	System detection limit	±1.0 %	Rectangular	√3	1	1	±0.6 %	±0.6 %	∞
7	Boundary effects	±4.8 %	Rectangular	√3	1	1	±2.8 %	±2.8 %	∞
8	System readout electronics (DAE)	±0.3 %	Normal	1	1	1	±0.3 %	±0.3 %	∞
9	Response Time Error (<5ms/100ms wait)	±0.0 %	Rectangular	√3	1	1	0 %	0 %	∞
10	Integration Time Error (CW)	±0.0 %	Rectangular	√3	1	1	0 %	0 %	∞
11	RF ambient conditions-noise	±3.0 %	Rectangular	√3	1	1	±1.7 %	±1.7 %	∞
12	RF ambient conditions-reflections	±3.0 %	Rectangular	√3	1	1	±1.7 %	±1.7 %	∞
13	Probe positioner mechanical tolerance	±3.3 %	Rectangular	√3	1	1	±1.9 %	±1.9 %	∞
14	Probe positioning with respect to phantom shell	±6.7 %	Rectangular	√3	1	1	±3.9 %	±3.9 %	∞
15	Max. SAR evaluation (Post-processing)	±4.0 %	Rectangular	√3	1	1	±2.3 %	±2.3 %	∞
B	**Test Sample Related**								
16	Deviation of the experimental source	±3.5 %	Normal	1	1	1	±3.5 %	±3.5 %	∞
17	Dipole to liquid distance (10mm±0.2mm,<2deg.)	±2.0 %	Rectangular	√3	1	1	±1.2 %	±1.2 %	∞
18	Drift of output power (measured, <0.2dB)	±2.3 %	Rectangular	√3	1	1	±1.3 %	±1.3 %	∞
C	**Phantom and Setup**								
19	Phantom uncertainty	±2.0 %	Rectangular	√3	1	1	±1.2 %	±1.2%	∞
20	Algorithm for correcting SAR (ε',σ: ≤5%)	±1.2 %	Normal	1	1	0.84	±1.2 %	±0.97 %	∞
21	Liquid conductivity (meas.) (DAK3.5)	±3.0 %	Normal	1	0.78	0.71	±2.3 %	±2.1 %	∞
22	Liquid permittivity (meas.) (DAK3.5)	±3.1 %	Normal	1	0.23	0.26	±0.7 %	±0.8 %	∞
23	Liquid Conductivity-temp.uncertainty (≤2deg.C.)	±5.3 %	Rectangular	√3	0.78	0.71	±2.4 %	±2.2 %	∞
24	Liquid Permittivity-temp.uncertainty (≤2deg.C.)	±0.9 %	Rectangular	√3	0.23	0.26	±0.1 %	±0.1 %	∞
	Combined Standard Uncertainty						**±11.0** %	**±10.9** %	
	Expanded Uncertainty (k=2)						**±22.1** %	**±21.8** %	

*. This measurement uncertainty budget is suggested by IEEE Std. 1528(2013) and determined by Schmid & Partner Engineering AG (DASY5 Uncertainty Budget).

SECTION 6: Confirmation before testing

6.1 SAR reference power measurement (antenna terminal conducted average power of EUT) - Worst data rate/channel determination

Mode	Frequency		Data rate	Power Setting (software)	Duty cycle	Duty factor	Duty scaled factor	Measurement Result				Power correction				Power Tune-up?	Remarks
								Time average power (*. equal to Burst power)		Burst power		Typical power	Max. power	Δ from max.	Tune-up factor		
	[MHz]	CH	[Mbps]	[-]	[%]	[dB]	[-]	[dBm]	[mW]	[dBm]	[mW]	[dBm]	[dBm]	[dB]	[-]		
b	2412	1	1	12	100	0.00	1.00	**13.06**	20.23	13.06	20.23	12	14	-0.94	1.24	no (typical)	-
	2437	6	1	12	100	0.00	1.00	**13.11**	20.46	13.11	20.46	12	14	-0.89	1.23	no (typical)	*.Initial test CH.
	2462	11	1	12	100	0.00	1.00	**13.01**	20.00	13.01	20.00	12	14	-0.99	1.26	no (typical)	-
g	2412	1	6	12	100	0.00	1.00	**13.04**	20.14	13.04	20.14	12	14	-0.96	1.25	no (typical)	-
	2437	6	6	12	100	0.00	1.00	**13.09**	20.37	13.09	20.37	12	14	-0.91	1.23	no (typical)	-
	2462	11	6	12	100	0.00	1.00	**12.94**	19.68	12.94	19.68	12	14	-1.06	1.28	no (typical)	-
n20	2412	1	MCS0	12	100	0.00	1.00	**13.02**	20.04	13.02	20.04	12	14	-0.98	1.25	no (typical)	-
	2437	6	MCS0	12	100	0.00	1.00	**13.16**	20.70	13.16	20.70	12	14	-0.84	1.21	no (typical)	-
	2462	11	MCS0	12	100	0.00	1.00	**12.96**	19.77	12.96	19.77	12	14	-1.04	1.27	no (typical)	-
n40	2422	3	MCS0	11	100	0.00	1.00	**12.32**	17.06	12.32	17.06	11	13	-0.68	1.17	no (typical)	-
	2437	6	MCS0	11	100	0.00	1.00	**12.62**	18.28	12.62	18.28	11	13	-0.38	1.09	no (typical)	-
	2452	9	MCS0	11	100	0.00	1.00	**12.32**	17.06	12.32	17.06	11	13	-0.68	1.17	no (typical)	-
a	5180	36	6	11	100	0.00	1.00	**12.26**	16.83	12.26	16.83	11	13	-0.74	1.19	no (typical)	-
	5200	40	6	11	100	0.00	1.00	**12.14**	16.37	12.14	16.37	11	13	-0.86	1.22	no (typical)	-
	5220	44	6	11	100	0.00	1.00	**12.42**	17.46	12.42	17.46	11	13	-0.58	1.14	no (typical)	-
	5240	48	6	11	100	0.00	1.00	**12.24**	16.75	12.24	16.75	11	13	-0.76	1.19	no (typical)	-
	5260	52	6	11	100	0.00	1.00	**12.47**	17.66	12.47	17.66	11	13	-0.53	1.13	no (typical)	-
	5280	56	6	11	100	0.00	1.00	**12.19**	16.56	12.19	16.56	11	13	-0.81	1.21	no (typical)	-
	5300	60	6	11	100	0.00	1.00	**12.37**	17.26	12.37	17.26	11	13	-0.63	1.16	no (typical)	-
	5320	64	6	11	100	0.00	1.00	**12.05**	16.03	12.05	16.03	11	13	-0.95	1.24	no (typical)	-
	5500	100	6	11	100	0.00	1.00	**11.39**	13.77	11.39	13.77	11	13	-1.61	1.45	no (typical)	-
	5580	116	6	11	100	0.00	1.00	**12.12**	16.29	12.12	16.29	11	13	-0.88	1.22	no (typical)	-
	5700	140	6	11	100	0.00	1.00	**11.76**	15.00	11.76	15.00	11	13	-1.24	1.33	no (typical)	-
	5745	149	6	11	100	0.00	1.00	**11.54**	14.26	11.54	14.26	11	13	-1.46	1.40	no (typical)	-
	5785	157	6	11	100	0.00	1.00	**11.40**	13.80	11.40	13.80	11	13	-1.60	1.45	no (typical)	-
	5825	185	6	11	100	0.00	1.00	**11.40**	13.80	11.40	13.80	11	13	-1.60	1.45	no (typical)	-
n20	5180	36	MCS0	11	100	0.00	1.00	**12.26**	16.83	12.26	16.83	11	13	-0.74	1.19	no (typical)	-
	5200	40	MCS0	11	100	0.00	1.00	**12.10**	16.22	12.10	16.22	11	13	-0.90	1.23	no (typical)	-
	5220	44	MCS0	11	100	0.00	1.00	**12.45**	17.58	12.45	17.58	11	13	-0.55	1.14	no (typical)	-
	5240	48	MCS0	11	100	0.00	1.00	**12.25**	16.79	12.25	16.79	11	13	-0.75	1.19	no (typical)	-
	5260	52	MCS0	11	100	0.00	1.00	**12.53**	17.91	12.53	17.91	11	13	-0.47	1.11	no (typical)	-
	5280	56	MCS0	11	100	0.00	1.00	**12.18**	16.52	12.18	16.52	11	13	-0.82	1.21	no (typical)	-
	5300	60	MCS0	11	100	0.00	1.00	**12.34**	17.14	12.34	17.14	11	13	-0.66	1.16	no (typical)	-
	5320	64	MCS0	11	100	0.00	1.00	**11.99**	15.81	11.99	15.81	11	13	-1.01	1.26	no (typical)	-
	5500	100	MCS0	11	100	0.00	1.00	**11.37**	13.71	11.37	13.71	11	13	-1.63	1.46	no (typical)	-
	5580	116	MCS0	11	100	0.00	1.00	**12.03**	15.96	12.03	15.96	11	13	-0.97	1.25	no (typical)	-
	5700	140	MCS0	11	100	0.00	1.00	**11.87**	15.38	11.87	15.38	11	13	-1.13	1.30	no (typical)	-
	5745	149	MCS0	11	100	0.00	1.00	**11.54**	14.26	11.54	14.26	11	13	-1.46	1.40	no (typical)	-
	5785	157	MCS0	11	100	0.00	1.00	**11.43**	13.90	11.43	13.90	11	13	-1.57	1.44	no (typical)	-
	5825	185	MCS0	11	100	0.00	1.00	**11.37**	13.71	11.37	13.71	11	13	-1.63	1.46	no (typical)	-
n40	5190	38	MCS0	11	100	0.00	1.00	**12.25**	16.79	12.25	16.79	11	13	-0.75	1.19	no (typical)	*.Initial test CH.
	5230	46	MCS0	11	100	0.00	1.00	**12.19**	16.56	12.19	16.56	11	13	-0.81	1.21	no (typical)	-
	5270	54	MCS0	11	100	0.00	1.00	**12.25**	16.79	12.25	16.79	11	13	-0.75	1.19	no (typical)	*.Initial test CH.
	5310	62	MCS0	11	100	0.00	1.00	**12.02**	15.92	12.02	15.92	11	13	-0.98	1.25	no (typical)	-
	5510	102	MCS0	11	100	0.00	1.00	**11.35**	13.65	11.35	13.65	11	13	-1.65	1.46	no (typical)	-
	5550	110	MCS0	11	100	0.00	1.00	**11.68**	14.72	11.68	14.72	11	13	-1.32	1.36	no (typical)	-
	5670	134	MCS0	11	100	0.00	1.00	**11.86**	15.35	11.86	15.35	11	13	-1.14	1.30	no (typical)	*.Initial test CH.
	5755	151	MCS0	11	100	0.00	1.00	**11.39**	13.77	11.39	13.77	11	13	-1.61	1.45	no (typical)	*.Initial test CH.
	5795	159	MCS0	11	100	0.00	1.00	**11.21**	13.21	11.21	13.21	11	13	-1.79	1.51	no (typical)	-

*. The SAR test powers by setting typical power were not more than 2dB lower than maximum tune-up power (KDB 447498 D01 (v06) requirement).
*. CH: Channel; Max: Maximum; D/R: Data Rate; b: IEEE 802.11b, g: IEEE 802.11g, a: IEEE 802.11a, n20: IEEE 802.11n(20HT), n40: IEEE 802.11n(40HT).
*. Initial SAR test channel was chosen. (shaded yellow marker) This mode has the highest tune-up power, highest duty cycle and lowest modulation.
*. According to KDB248227 D01, SAR is required for g, n20 and n40 channels 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.
*. When the same transmission mode configurations have the same maximum output power on the same channel for the a/n/ac modes, the channel with the largest bandwidth and the lowest data rate is selected.
*. When the specified maximum output power is the same for both U-NII-1 band and U-NII-2A band, begin SAR measurement in U-NII-2A band, and if the highest reported SAR for U-NII-2A band is; ≤ 1.2 W/kg, SAR is not required for U-NII-1 band / > 1.2 W/kg, both bands should be tested independently for SAR.

*. Calculating formula: Burst power (dBm) = (P/M Reading, dBm)+(Cable loss, dB)+(Attenuator, dB)+(duty factor, dB)
Duty cycle: (duty cycle, %) = (Tx on time, ms) / (1 cycle time, ms) × 100, where Duty factor (dBm) = 10 × log (100/(duty cycle, %))
Duty cycle scaled factor: Duty cycle correction factor for obtained SAR value, Duty scaled factor [-] = 100(%) / (duty cycle, %)
ΔMax. (Deviation form maximum power, dB) = (Burst power measured (average, dBm)) - (Max.tune-up limit power (average, dBm))
Tune-up factor: Power tune-up factor for obtained SAR value, Tune-up factor [-] = 1 / (10 ^ ("Deviation from max., dB" / 10))
*. Date measured: July 16, 2019 / Measured by: H. Naka/ Place: Preparation room of No. 7 shield room. ((24~25) deg.C./ (55~60) %RH)
*. Uncertainty of antenna port conducted test; (±) 0.81 dB (Average power).

*. Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test in following tables.

Data rate (D/R) vs Time average power (dBm) (*. Duty cycle of all modes = 100%)																								
b, 2412MHz		g, 2412MHz				n20, 2412MHz				n40, 2422MHz				a, 5500MHz				n20, 5500MHz				n40, 5510MHz			
Max.:14 dBm		Max.:14 dBm				Max.:14 dBm				Max.:13 dBm				Max.:13 dBm				Max.:13 dBm				Max.:13 dBm			
D/R	Power	D/R	Power	D/R	Power	D/R	Power	D/R	Power	D/R	Power	D/R	Power	D/R	Power	D/R	Power	D/R	Power	D/R	Power	D/R	Power	D/R	Power
[Mbps]	[dBm]	[Mbps]	[dBm]	[Mbps]	[dBm]	**MCS**	[dBm]	**MCS**	[dBm]	**MCS**	[dBm]	**MCS**	[dBm]	[Mbps]	[dBm]	[Mbps]	[dBm]	**MCS**	[dBm]	**MCS**	[dBm]	**MCS**	[dBm]	**MCS**	[dBm]
1	**13.06**	**6**	**13.04**	24	12.94	**0**	**13.02**	4	13.01	**0**	**12.32**	4	12.24	**6**	**11.39**	24	11.36	**0**	**11.37**	4	11.30	**0**	**11.35**	4	11.28
2	13.02	9	13.02	36	12.97	1	12.99	**5**	**13.02**	**1**	**12.32**	5	12.20	9	11.28	36	11.25	1	11.35	5	11.35	1	11.28	5	11.30
5.5	**13.06**	12	13.00	48	12.93	2	12.99	**6**	**13.02**	2	12.28	6	12.26	12	11.31	48	11.31	**2**	11.36	6	11.36	2	11.33	6	11.30
11	**13.06**	18	13.03	56	12.93	3	13.01	**7**	**13.02**	3	12.22	7	12.23	18	11.35	56	11.34	3	11.36	7	11.33	3	11.28	7	11.24

6.2 Comparison of power of EMC sample

	RF serial No.	Date power measured	Reference report#	Average power [dBm] ("Bold letter": Highest) (D/R: Data rate [Mbps])														
				11b: Max.power=14dBm				11a: Max.power=13dBm										
				D/R	2412	2437	2462	D/R	5180	5260	5320	5500	5580	5700	5745	5785	5825
EMC (Ref.)	60128BCC1E18	Sep. 20, 2016	11355752S-N,-P.	11	**12.45**	12.26	12.20	9	11.92	11.91	**11.95**	12.16	12.24	**12.49**	**12.38**	**12.38**	12.23
SAR test (1)	60128BCC1DCA	Sep. 30, 2016	11355753S-A	1	**12.50**	12.30	12.07	6	11.86	11.89	**12.00**	12.60	12.68	**12.84**	**12.26**	11.84	11.76
SAR test (2)	60128BCC1E6A	Dec.. 19, 2016	11528791S-A	1	**12.19**	12.02	12.12	6	11.33	**11.48**	11.37	11.90	**12.34**	11.70	11.75	11.59	**11.89**
SAR test (3)	60128BCC1E10	Dec.. 19, 2016	11528792S-A	1	12.93	12.80	**13.02**	6	11.54	11.52	**11.67**	12.01	**12.19**	11.89	11.83	11.60	**12.05**
					***. tuned**													
SAR test (4)	f48139ff8b65	June 27, 2019	12812914S-A	1	13.09	**13.12**	13.01	6	11.88	**12.45**	12.23	**11.61**	11.36	11.32	**11.49**	11.22	11.05
SAR test (5)	f48139ff8b6d	July 16, 2019	12812927S-A	1	13.06	**13.11**	13.01	6	12.26	**12.47**	12.05	11.39	**12.12**	11.76	**11.54**	11.40	11.40

SECTION 7: SAR Measurement results

7.1 Liquid parameters

Liquid type	Frequency [MHz]	Liquid parameters (*a)								Temp. [deg.C.]	Depth [mm]	ΔSAR Coefficients(*b)			Date measured
		Permittivity (εr) [-]				Conductivity [S/m]						ΔSAR [%]		Correction required? (*c)	
		Target	Measured Value	Measured Δεr [%]	Limit [%]	Target	Measured Value	Measured Δσ [%]	Limit [%]			(1g)	(10g)		
Head	5745	35.36	34.69	-1.9	±5	5.214	5.032	-3.5	±5	22.1	149	+0.54	-	Not Required.	July 17, 2019, before SAR test.
	5755	35.35	34.67	-1.9		5.224	5.047	-3.4				+0.54	-	Not Required.	
	5785	35.32	34.67	-1.8		5.255	5.071	-3.5				+0.52	-	Not Required.	
	5795	35.31	34.64	-1.97		5.265	5.094	-3.2				+0.52	-	Not Required.	
	5825	35.27	34.60	-1.9		5.296	5.111	-3.5				+0.54	-	Not Required.	
Head	5500	35.64	35.02	-1.8	±5	4.963	4.781	-3.7	±5	22.1	149	+0.50	-	Not Required.	July 18, 2019, before SAR test.
	5510	35.63	34.98	-1.8		4.973	4.792	-3.6				+0.52	-	Not Required.	
	5550	35.59	34.92	-1.9		5.014	4.830	-3.7				+0.53	-	Not Required.	
	5580	35.55	34.91	-1.8		5.045	4.862	-3.6				+0.52	-	Not Required.	
	5670	35.45	34.78	-1.9		5.137	4.964	-3.4				+0.53	-	Not Required.	
	5700	35.41	34.75	-1.9		5.168	4.985	-3.5				+0.53	-	Not Required.	
Head	5180	36.01	35.40	-1.7	±5	4.635	4.465	-3.7	±5	22.1	149	+0.43	-	Not Required.	July 19, 2019, before SAR test.
	5190	36.00	35.40	-1.7		4.645	4.472	-3.7				+0.42	-	Not Required.	
	5220	35.96	35.35	-1.7		4.676	4.503	-3.7				+0.44	-	Not Required.	
	5230	35.95	35.37	-1.6		4.686	4.522	-3.5				+0.42	-	Not Required.	
	5240	35.94	35.34	-1.7		4.696	4.522	-3.7				+0.44	-	Not Required.	
	5260	35.92	35.31	-1.7		4.717	4.547	-3.6				+0.45	-	Not Required.	
	5270	35.91	35.29	-1.7		4.727	4.555	-3.6				+0.46	-	Not Required.	
	5300	35.87	35.22	-1.8		4.758	4.588	-3.6				+0.48	-	Not Required.	
	5310	35.86	35.23	-1.8		4.768	4.595	-3.6				+0.47	-	Not Required.	
	5320	35.85	35.22	-1.8		4.778	4.599	-3.8				+0.48	-	Not Required.	
Body	5745	48.27	46.21	-4.3	±5	5.936	6.062	+2.1	±5	23.0	149	+0.75	-	Not Required.	July 22, 2019, before SAR test.
	5755	48.26	46.21	-4.3		5.947	6.064	+2.0				+0.76	-	Not Required.	
	5785	48.22	46.21	-4.2		5.982	6.117	+2.2				+0.73	-	Not Required.	
	5795	48.21	46.19	-4.2		5.994	6.131	+2.3				+0.73	-	Not Required.	
	5825	48.17	46.12	-4.3		6.029	6.160	+2.2				+0.75	-	Not Required.	
Body	5500	48.61	46.63	-4.1	±5	5.650	5.717	+1.2	±5	23.0	149	+0.76	-	Not Required.	July 23, 2019, before SAR test.
	5510	48.59	46.64	-4.0		5.661	5.736	+1.3				+0.75	-	Not Required.	
	5550	48.54	46.53	-4.1		5.708	5.788	+1.4				+0.77	-	Not Required.	
	5580	48.50	46.50	-4.1		5.743	5.836	+1.6				+0.75	-	Not Required.	
	5670	48.38	46.32	-4.3		5.848	5.970	+2.1				+0.75	-	Not Required.	
	5700	48.34	46.32	-4.2		5.883	5.995	+1.9				+0.74	-	Not Required.	
Body	5180	49.04	47.16	-3.8	±5	5.276	5.310	+0.7	±5	23.0	149	+0.76	-	Not Required.	July 24, 2019, before SAR test.
	5190	49.03	47.14	-3.9		5.288	5.317	+0.6				+0.76	-	Not Required.	
	5220	48.99	47.11	-3.8		5.323	5.363	+0.8				+0.75	-	Not Required.	
	5230	48.97	47.05	-3.9		5.334	5.364	+0.6				+0.77	-	Not Required.	
	5240	48.96	47.08	-3.8		5.346	5.385	+0.7				+0.75	-	Not Required.	
	5260	48.93	47.02	-3.9		5.369	5.417	+0.9				+0.76	-	Not Required.	
	5270	48.92	47.03	-3.9		5.381	5.430	+0.9				+0.75	-	Not Required.	
	5300	48.88	46.96	-3.9		5.416	5.465	+0.9				+0.76	-	Not Required.	
	5310	48.87	46.94	-3.9		5.428	5.474	+0.9				+0.76	-	Not Required.	
	5320	48.85	46.93	-3.9		5.439	5.491	+1.0				+0.76	-	Not Required.	
Head	2412	39.27	37.89	-3.5	±5	1.766	1.809	+2.4	±5	24.0	150	+1.98	-	Not Required.	July 25, 2019, before SAR test.
	2437	39.22	37.79	-3.7		1.788	1.840	+2.9				+2.21	-	Not Required.	
	2462	39.18	37.69	-3.8		1.813	1.866	+2.9				+2.24	-	Not Required.	
Body	2412	52.75	50.74	-3.8	±5	1.914	1.952	+2.0	±5	22.3	150	+1.83	-	Not Required.	July 26, 2019, before SAR test.
	2437	52.72	50.63	-4.0		1.938	1.985	+2.4				+2.06	-	Not Required.	
	2462	52.68	50.54	-4.1		1.967	2.018	+2.6				+2.15	-	Not Required.	

*a. The target values of (2000, 2450, 3000 and 5800) MHz are parameters defined in Appendix A of KDB 865664 D01. For other frequencies, the target nominal dielectric values shall be obtained by linear interpolation between the higher and lower tabulated figures. Above 5800MHz were obtained using linear extrapolation.

*b. Calculating formula: $\Delta SAR(1g) = C\varepsilon r \times \Delta\varepsilon r + C\sigma \times \Delta\sigma$, $C\varepsilon r = -7.854E\text{-}4 \times f^3 + 9.402E\text{-}3 \times f^2 - 2.742E\text{-}2 \times f + 0.2026$ / $C\sigma = 9.804E\text{-}3 \times f^3 - 8.661E\text{-}2 \times f^2 + 2.981E\text{-}2 \times f + 0.7829$

*c. Since the calculated ΔSAR values of the tested liquid had shown positive correction, the measured SAR was not converted by ΔSAR correction.
Calculating formula: ΔSAR corrected SAR (W/kg) = (Measured SAR (W/kg)) × (100 - (ΔSAR(%)) / 100

*. Calibration frequency of the SAR measurement probe (and used conversion factors)
The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Liquid	SAR test frequency	Probe calibration frequency	Validity	Conversion factor	Uncertainty
Body	(2412, 2437, 2462) MHz	2450 MHz	within ±50MHz of calibration frequency	7.37	± 12.0 %
Body	(5180, 5190, 5220, 5230, 5240, 5260, 5270, 5300, 5310, 5320) MHz	5250 MHz	within ±110 MHz of calibration frequency	4.42	± 13.1 %
Body	(5500, 5510, 5550, 5580, 5670, 5700) MHz	5600 MHz	within ±110 MHz of calibration frequency	3.83	± 13.1 %
Body	(5745, 5755, 5785, 5795, 5825) MHz	5750 MHz	within ±110 MHz of calibration frequency	4.01	± 13.1 %
Head	(2412, 2437, 2462) MHz	2450 MHz	within ±50MHz of calibration frequency	7.23	± 12.0 %
Head	(5180, 5190, 5220, 5230, 5240, 5260, 5270, 5300, 5310, 5320) MHz	5250 MHz	within ±110 MHz of calibration frequency	5.17	± 13.1 %
Head	(5500, 5510, 5550, 5580, 5670, 5700) MHz	5600 MHz	within ±110 MHz of calibration frequency	4.59	± 13.1 %
Head	(5745, 5755, 5785, 5795, 5825) MHz	5800 MHz	within ±110 MHz of calibration frequency	4.65	± 13.1 %

7.2 SAR results: 2.4 GHz band

[SAR measurement results (2.4GHz band)]

SAR (1g) measurement results										Reported SAR (1g) [W/kg]						
Test setup			Mode "*": Initial mode.	Frequency [MHz] (Channel) "*": Initial ch.	Data rate [Mbps], [MCS#]	Measured SAR [W/kg] Max.value of multi-peak			SAR plot # in Appendix 2-2	Duty cycle correction		Output burst average power correction			SAR Corrected (*a)	Remarks
Position "*": Initial setup	Gap [mm]	Battery ID				Measured	ΔSAR sign	ΔSAR corrected		Duty [%]	Duty scaled	Measured. [dBm].	Max. [dBm]	Tune-up factor		
Step 1a: 2.4GHz Band / Body-SAR(1g), by body liquid																
Back* (Initial setup)	0	#11	b*	2412(1)	1	**0.249**	Positive	n/a	1a-1	100	×1.00	13.06	14.0	×1.24	**0.309**	*.Higher, body, 2.4GHz
	0	#11		2437(6)*		**0.216**	Positive	n/a	1a-2	100	×1.00	13.11	14.0	×1.23	**0.266**	-
	0	#11		2462(11)		**0.181**	Positive	n/a	1a-3	100	×1.00	13.01	14.0	×1.26	**0.228**	-
	0	#11	g	2412(1)	6	**0.241**	Positive	n/a	1a-4	100	×1.00	13.04	14.0	×1.25	**0.301**	-
	0	#11		2437(6)*		**0.210**	Positive	n/a	1a-5	100	×1.00	13.09	14.0	×1.23	**0.258**	-
	0	#11		2462(11)		**0.158**	Positive	n/a	1a-6	100	×1.00	12.94	14.0	×1.28	**0.202**	-
	0	-	n20	2412(1)	MCS0	**0.242**	Positive	n/a	1a-7	100	×1.00	13.02	14.0	×1.25	**0.303**	-
	0	#11		2437(6)*		**0.211**	Positive	n/a	1a-8	100	×1.00	13.16	14.0	×1.21	**0.255**	-
	0	-		2462(11)		**0.158**	Positive	n/a	1a-9	100	×1.00	12.96	14.0	×1.27	**0.201**	-
	0	-	n40	2422(3)	MCS0	**n/a**	Positive	n/a	-	100	×1.00	12.32	13.0	×1.17	**n/a**	-
	0	#11		2437(6)*		**0.188**	Positive	n/a	1a-10	100	×1.00	12.62	13.0	×1.09	**0.205**	*.lower power than b,g.
	0	-		2452(9)		**n/a**	Positive	n/a	-	100	×1.00	12.32	13.0	×1.17	**n/a**	-
Front	0	-	b*	2412(1)	1	**n/a**	Positive	n/a	-	100	×1.00	13.06	14.0	×1.24	**n/a**	-
	0	#14		2437(6)*		**0.00332**	Positive	n/a	1a-11	100	×1.00	13.11	14.0	×1.23	**0.004**	*. Small enough (< 0.1 W/kg)
	0	-		2462(11)		**n/a**	Positive	n/a	-	100	×1.00	13.01	14.0	×1.26	**n/a**	-
Right	0	-	b*	2412(1)	1	**n/a**	Positive	n/a	-	100	×1.00	13.06	14.0	×1.24	**n/a**	-
	0	#14		2437(6)*		**0.00773**	Positive	n/a	1a-12	100	×1.00	13.11	14.0	×1.23	**0.010**	*. Small enough (< 0.1 W/kg)
	0	-		2462(11)		**n/a**	Positive	n/a	-	100	×1.00	13.01	14.0	×1.26	**n/a**	-
Step 1b: 2.4GHz Band / Head-SAR(1g), by head liquid																
Back* (Initial setup)	0	#11	b*	2412(1)	1	**0.257**	Positive	n/a	1b-1	100	×1.00	13.06	14.0	×1.24	**0.319**	*.Higher, head, 2.4GHz
	0	#11		2437(6)*		**0.199**	Positive	n/a	1b-2	100	×1.00	13.11	14.0	×1.23	**0.245**	-
	0	#11		2462(11)		**0.187**	Positive	n/a	1b-3	100	×1.00	13.01	14.0	×1.26	**0.236**	-
	0	#11	g	2412(1)	6	**0.253**	Positive	n/a	1b-4	100	×1.00	13.04	14.0	×1.25	**0.316**	-
	0	#11		2437(6)*		**0.218**	Positive	n/a	1b-5	100	×1.00	13.09	14.0	×1.23	**0.268**	-
	0	#14		2462(11)		**0.164**	Positive	n/a	1b-6	100	×1.00	12.94	14.0	×1.28	**0.210**	-
	0	#11	n20	2412(1)	MCS0	**0.251**	Positive	n/a	1b-7	100	×1.00	13.02	14.0	×1.25	**0.314**	-
	0	#11		2437(6)*		**0.218**	Positive	n/a	1b-8	100	×1.00	13.16	14.0	×1.21	**0.264**	-
	0	#14		2462(11)		**0.184**	Positive	n/a	1b-9	100	×1.00	12.96	14.0	×1.27	**0.234**	-
	0	-	n40	2422(3)	MCS0	**n/a**	Positive	n/a	-	100	×1.00	12.32	13.0	×1.17	**n/a**	-
	0	#14		2437(6)*		**0.195**	Positive	n/a	1b-10	100	×1.00	12.62	13.0	×1.09	**0.213**	*.lower power than b,g.
	0	-		2452(9)		**n/a**	Positive	n/a	-	100	×1.00	12.32	13.0	×1.17	**n/a**	-
Front	0	-	b*	2412(1)	1	**n/a**	Positive	n/a	-	100	×1.00	13.06	14.0	×1.24	**n/a**	-
	0	#11		2437(6)*		**0.0021**	Positive	n/a	1b-11	100	×1.00	13.11	14.0	×1.23	**0.003**	*. Small enough (< 0.1 W/kg)
	0	-		2462(11)		**n/a**	Positive	n/a	-	100	×1.00	13.01	14.0	×1.26	**n/a**	-
Right	0	-	b*	2412(1)	1	**n/a**	Positive	n/a	-	100	×1.00	13.06	14.0	×1.24	**n/a**	-
	0	#11		2437(6)*		**0.0105**	Positive	n/a	1b-12	100	×1.00	13.11	14.0	×1.23	**0.013**	*. Small enough (< 0.1 W/kg)
	0	-		2462(11)		**n/a**	Positive	n/a	-	100	×1.00	13.01	14.0	×1.26	**n/a**	-

Notes: *. The higher reported SAR on each configuration in this operation band is marked (shaded yellow marker).
*. (mode) b: IEEE 802.11b, g: IEEE 802.11g, n20: IEEE 802.11n(20HT), n40: IEEE 802.11n(40HT); Max.: maximum.; n/a: not applied.
*. Gap: It is the separation distance between the platform surface and the bottom outer surface of phantom; Battery ID: Refer to Appendix 1. During test, the EUT was operated with full charged battery and connected to the host PC via a I/F cable.

*a. Calculating formula: Reported SAR (W/kg) = (Measured SAR (W/kg)) × (Duty scaled) × (Tune-up factor)
Duty scaled = Duty scaled factor: Duty cycle correction factor for obtained SAR value, Duty scaled factor [-] = 100(%) / (duty cycle, %)
Tune-up factor: Power tune-up factor for obtained SAR value, Tune-up factor [-] = 1 / (10 ^ ("Deviation from max., dB" / 10))

(Clause 5.2, 2.4GHz SAR Procedures, in KDB248227 D01 (v02r02))

5.2.1 802.11b 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) 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.

5.2.2 2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements

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

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

*. SAR test of OFDM mode was reduced, because the estimate reported SAR of OFDM mode was ≤ 1.2 W/kg by using the highest reported SAR of DSSS mode.

OFDM mode	Maximum tune-up tolerance limit				OFDM scaled factor [-]	DSSS reported SAR value			**Estimated SAR value: OFDM [W/kg]**	Exclusion limit [W/kg]	Standalone SAR test require?
	DSSS		OFDM								
	[dBm]	[mW] (a)	[dBm]	[mW] (b)	(b)/(a)×100	SAR type	Setup	[W/kg]			
g, n20	14.0	25	14.0	25	1.00	Body	Back	0.309	**0.309**	**≤ 1.2**	**No**
n40	14.0	25	13.0	20	0.80	Body	Back	0.309	**0.247**	**≤ 1.2**	**No**
g, n20	14.0	25	14.0	25	1.00	Head	Back	0.319	**0.319**	**≤ 1.2**	**No**
n40	14.0	25	13.0	20	0.80	Head	Back	0.319	**0.255**	**≤ 1.2**	**No**

7.3 SAR results: U-NII-2A (& U-NII-1) band

[SAR measurement results (U-NII-2A (& U-NII-1) band)]

SAR (1g) measurement results											Reported SAR (1g) [W/kg]						
Test setup			Mode "*": Initial mode.	Frequency [MHz] (Channel) "*": Initial ch.	Data rate [Mbps], [MCS#]	Measured SAR [W/kg] Max.value of multi-peak			SAR plot # in Appendix 2-2	Duty cycle correction		Output burst average power correction			SAR Corrected (*a)	Remarks
Position "*": Initial setup	Gap [mm]	Battery ID				Measured	ΔSAR sign	ΔSAR corrected		Duty [%]	Duty scaled	Measured. [dBm].	Max. [dBm]	Tune-up factor		
Step 2a: U-NII-2A (and U-NII-1) Band / Body-SAR(1g), by body liquid																
Back* (Initial setup)	0	#11	n40*	5270(54)*	MCS0	**0.684**	Positive	n/a	2a-2	100	×1.00	12.25	13.0	×1.19	**0.814**	-
	0	#11		5310(62)		**0.659**	Positive	n/a	**2a-1**	100	×1.00	12.02	13.0	×1.25	**0.824**	*.Higher, body, U-NII-2A *. < 1.2 W/kg, U-NII-2A.
	0	#14		5190(38)*		**0.627**	Positive	n/a	2a-3	100	×1.00	12.25	13.0	×1.19	**0.746**	-
	0	#14		5230(46)		**0.597**	Positive	n/a	2a-5	100	×1.00	12.19	13.0	×1.21	**0.722**	-
	0	#11	a	5260(52)*	6	**0.701**	Positive	n/a	2a-4	100	×1.00	12.47	13.0	×1.13	**0.792**	-
	0	#11		5300(60)		**0.688**	Positive	n/a	2a-6	100	×1.00	12.37	13.0	×1.16	**0.798**	-
	0	#11		5320(64)		**0.645**	Positive	n/a	2a-7	100	×1.00	12.05	13.0	×1.24	**0.800**	
	0	#14		5180(36)		**0.651**	Positive	n/a	2a-8	100	×1.00	12.26	13.0	×1.19	**0.775**	*.Higher, body, U-NII-1
	0	#11		5220(44)*		**0.595**	Positive	n/a	2a-9	100	×1.00	12.42	13.0	×1.14	**0.678**	-
	0	#11		5240(48)		**0.576**	Positive	n/a	2a-10	100	×1.00	12.24	13.0	×1.19	**0.685**	-
	0	#11	n20	5260(52)*	MCS0	**0.701**	Positive	n/a	2a-11	100	×1.00	12.53	13.0	×1.11	**0.778**	-
	0	#11		5300(60)		**0.687**	Positive	n/a	2a-12	100	×1.00	12.34	13.0	×1.16	**0.797**	-
	0	#14		5320(64)		**0.640**	Positive	n/a	2a-13	100	×1.00	11.99	13.0	×1.26	**0.806**	-
	0	#14		5180(36)		**0.649**	Positive	n/a	2a-14	100	×1.00	12.26	13.0	×1.19	**0.772**	
	0	#11		5220(44)*		**0.598**	Positive	n/a	2a-15	100	×1.00	12.45	13.0	×1.14	**0.682**	-
	0	#11		5240(48)		**0.567**	Positive	n/a	2a-16	100	×1.00	12.25	13.0	×1.19	**0.675**	-
Front	0	-	n40*	5270(54)*	MCS0	**n/a**	Positive	n/a	-	100	×1.00	12.25	13.0	×1.19	**n/a**	-
	0	#14		5310(62)		**0.00621**	Positive	n/a	2a-17	100	×1.00	12.02	13.0	×1.25	**0.008**	*. Small enough (< 0.1 W/kg)
Right	0	-	n40*	5270(54)*	MCS0	**n/a**	Positive	n/a	-	100	×1.00	12.25	13.0	×1.19	**n/a**	-
	0	#11		5310(62)		**0.027**	Positive	n/a	2a-18	100	×1.00	12.02	13.0	×1.25	**0.034**	*. Small enough (< 0.1 W/kg)
Step 2b: U-NII-2A (and U-NII-1) Band / Head-SAR(1g), by head liquid																
Back* (Initial setup)	0	#11	n40*	5270(54)*	MCS0	**0.618**	Positive	n/a	2b-2	100	×1.00	12.25	13.0	×1.19	**0.735**	-
	0	#11		5310(62)		**0.610**	Positive	n/a	2b-3	100	×1.00	12.02	13.0	×1.25	**0.763**	*. < 1.2 W/kg, U-NII-2A.
	0	#11		5190(38)*		**0.584**	Positive	n/a	2b-4	100	×1.00	12.25	13.0	×1.19	**0.695**	-
	0	#11		5230(46)		**0.554**	Positive	n/a	2b-5	100	×1.00	12.19	13.0	×1.21	**0.670**	-
	0	#11	a	5260(52)*	6	**0.668**	Positive	n/a	2b-6	100	×1.00	12.47	13.0	×1.13	**0.755**	-
	0	#14		5300(60)		**0.570**	Positive	n/a	2b-7	100	×1.00	12.37	13.0	×1.16	**0.661**	-
	0	#11		5320(64)		**0.607**	Positive	n/a	2b-8	100	×1.00	12.05	13.0	×1.24	**0.753**	-
	0	#11		5180(36)		**0.611**	Positive	n/a	2b-9	100	×1.00	12.26	13.0	×1.19	**0.727**	-
	0	#11		5220(44)*		**0.568**	Positive	n/a	2b-10	100	×1.00	12.42	13.0	×1.14	**0.648**	-
	0	#11		5240(48)		**0.601**	Positive	n/a	2b-11	100	×1.00	12.24	13.0	×1.19	**0.715**	-
	0	#14	n20	5260(52)*	MCS0	**0.638**	Positive	n/a	2b-12	100	×1.00	12.53	13.0	×1.11	**0.708**	-
	0	#14		5300(60)		**0.562**	Positive	n/a	2b-13	100	×1.00	12.34	13.0	×1.16	**0.652**	-
	0	#11		5320(64)		**0.610**	Positive	n/a	**2b-1**	100	×1.00	11.99	13.0	×1.26	**0.769**	*.Higher, head, U-NII-2A
	0	#14		5180(36)		**0.617**	Positive	n/a	2b-14	100	×1.00	12.26	13.0	×1.19	**0.734**	*.Higher, head, U-NII-1
	0	#11		5220(44)*		**0.561**	Positive	n/a	2b-15	100	×1.00	12.45	13.0	×1.14	**0.640**	-
	0	#11		5240(48)		**0.598**	Positive	n/a	2b-16	100	×1.00	12.25	13.0	×1.19	**0.712**	-
Front	0	-	n40*	5270(54)*	MCS0	**n/a**	Positive	n/a	-	100	×1.00	12.25	13.0	×1.19	**n/a**	-
	0	#14		5310(62)		**0.00857**	Positive	n/a	2b-17	100	×1.00	12.02	13.0	×1.25	**0.011**	*. Small enough (< 0.1 W/kg)
Right	0	-	n40*	5270(54)*	MCS0	**n/a**	Positive	n/a	-	100	×1.00	12.25	13.0	×1.19	**n/a**	-
	0	#11		5310(62)		**0.027**	Positive	n/a	2b-18	100	×1.00	12.02	13.0	×1.25	**0.034**	*. Small enough (< 0.1 W/kg)

Notes: *. The higher reported SAR on each configuration in this operation band is marked (shaded yellow marker).
*. (mode) a: IEEE 802.11a, n20: IEEE 802.11n(20HT), n40: IEEE 802.11n(40HT); Max.: maximum.; n/a: not applied.
*. Gap: It is the separation distance between the platform surface and the bottom outer surface of phantom; Battery ID: Refer to Appendix 1. During test, the EUT was operated with full charged battery and connected to the host PC via a I/F cable.

*a. Calculating formula: Reported SAR (W/kg) = (Measured SAR (W/kg)) × (Duty scaled) × (Tune-up factor)
Duty scaled = Duty scaled factor: Duty cycle correction factor for obtained SAR value, Duty scaled factor [-] = 100(%) / (duty cycle, %)
Tune-up factor: Power tune-up factor for obtained SAR value, Tune-up factor [-] = 1 / (10 ^ ("Deviation from max., dB" / 10))

*. **Initial Test Position SAR Test Reduction Procedure. According to KDB248227D01**
1) Highest reported SAR(1g) is ≤ 0.4 W/kg . Therefore, further SAR measurements within this exposure condition are not required.
2) Highest reported SAR(1g) is > 0.4 W/kg . Due to the highest reported SAR for this test position, other test positions in standalone exposure condition were evaluated until a SAR(1g) ≤ 0.8 W/kg was reported.
3) For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR(1g) is > 0.8 W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR(1g) is ≤ 1.2 W/kg or all required test channels are considered.

7.4 SAR results: U-NII-2C band

[SAR measurement results (U-NII-2C band)]

SAR (1g) measurement results																	Reported SAR (1g) [W/kg]						Remarks
Test setup			Mode "*": Initial mode.	Frequency [MHz] (Channel) "*": Initial ch.	Data rate [Mbps], [MCS#]	Measured SAR [W/kg] Max.value of multi-peak			SAR plot # in Appendix 2-2	Duty cycle correction		Output burst average power correction			SAR Corrected (*a)							
Position "*": Initial setup	Gap [mm]	Battery ID				Measured	ΔSAR sign	ΔSAR corrected		Duty [%]	Duty scaled	Measured. [dBm].	Max. [dBm]	Tune-up factor								
Step 3a: U-NII-2C Band / Body-SAR(1g), by body liquid																							
Back* (Initial setup)	0	#14	n40*	5510(102)	MCS0	**0.673**	Positive	n/a	3a-2	100	×1.00	11.35	13.0	×1.46	**0.983**	*.Higher SAR CH.
	0	#14		5550(110)		**0.648**	Positive	n/a	3a-3	100	×1.00	11.68	13.0	×1.36	**0.881**	-
	0	#14		5670(134)*		**0.434**	Positive	n/a	3a-4	100	×1.00	11.86	13.0	×1.30	**0.564**	-
	0	#14	a	5500(100)	6	**0.698**	Positive	n/a	3a-5	100	×1.00	11.39	13.0	×1.45	**1.012**	-
	0	#11		5580(116)*		**0.619**	Positive	n/a	3a-6	100	×1.00	12.12	13.0	×1.22	**0.755**	-
	0	#11		5700(140)		**0.435**	Positive	n/a	3a-7	100	×1.00	11.76	13.0	×1.33	**0.579**	-
	0	#14	n20	5500(100)	MCS0	**0.695**	Positive	n/a	**3a-1**	100	×1.00	11.37	13.0	×1.46	**1.015**	*.Higher, body, U-NII-2C
	0	#11		5580(116)*		**0.619**	Positive	n/a	3a-8	100	×1.00	12.03	13.0	×1.25	**0.774**	-
	0	#11		5700(140)		**0.439**	Positive	n/a	3a-9	100	×1.00	11.87	13.0	×1.30	**0.571**	-
Front	0	#14	n40*	5510(102)	MCS0	**0.00492**	Positive	n/a	3a-10	100	×1.00	11.35	13.0	×1.46	**0.007**	*. Small enough (< 0.1 W/kg)
	0	-		5550(110)		**n/a**	Positive	n/a	-	100	×1.00	11.68	13.0	×1.36	**n/a**	-
	0	-		5670(134)*		**n/a**	Positive	n/a	-	100	×1.00	11.86	13.0	×1.30	**n/a**	-
Right	0	#11	n40*	5510(102)	MCS0	**0.036**	Positive	n/a	3a-11	100	×1.00	11.35	13.0	×1.46	**0.053**	*. Small enough (< 0.1 W/kg)
	0	-		5550(110)		**n/a**	Positive	n/a	-	100	×1.00	11.68	13.0	×1.36	**n/a**	-
	0	-		5670(134)*		**n/a**	Positive	n/a	-	100	×1.00	11.86	13.0	×1.30	**n/a**	-
Step 3b: U-NII-2C Band / Head-SAR(1g), by head liquid																							
Back* (Initial setup)	0	#14	n40*	5510(102)	MCS0	**0.643**	Positive	n/a	3b-2	100	×1.00	11.35	13.0	×1.46	**0.939**	*.Higher SAR CH.
	0	#14		5550(110)		**0.611**	Positive	n/a	3b-3	100	×1.00	11.68	13.0	×1.36	**0.831**	-
	0	#14		5670(134)*		**0.404**	Positive	n/a	3b-4	100	×1.00	11.86	13.0	×1.30	**0.525**	-
	0	#11	a	5500(100)	6	**0.656**	Positive	n/a	3b-5	100	×1.00	11.39	13.0	×1.45	**0.951**	-
	0	#11		5580(116)*		**0.596**	Positive	n/a	3b-6	100	×1.00	12.12	13.0	×1.22	**0.727**	-
	0	#14		5700(140)		**0.460**	Positive	n/a	3b-7	100	×1.00	11.76	13.0	×1.33	**0.612**	-
	0	#14	n20	5500(100)	MCS0	**0.664**	Positive	n/a	**3b-1**	100	×1.00	11.37	13.0	×1.46	**0.969**	*.Higher, head, U-NII-2C
	0	#11		5580(116)*		**0.590**	Positive	n/a	3b-8	100	×1.00	12.03	13.0	×1.25	**0.738**	-
	0	#11		5700(140)		**0.418**	Positive	n/a	3b-9	100	×1.00	11.87	13.0	×1.30	**0.543**	-
Front	0	#14	n40*	5510(102)	MCS0	**0.011**	Positive	n/a	3b-10	100	×1.00	11.35	13.0	×1.46	**0.016**	*. Small enough (< 0.1 W/kg)
	0	-		5550(110)		**n/a**	Positive	n/a	-	100	×1.00	11.68	13.0	×1.36	**n/a**	-
	0	-		5670(134)*		**n/a**	Positive	n/a	-	100	×1.00	11.86	13.0	×1.30	**n/a**	-
Right	0	#11	n40*	5510(102)	MCS0	**0.037**	Positive	n/a	3b-11	100	×1.00	11.35	13.0	×1.46	**0.054**	*. Small enough (< 0.1 W/kg)
	0	-		5550(110)		**n/a**	Positive	n/a	-	100	×1.00	11.68	13.0	×1.36	**n/a**	-
	0	-		5670(134)*		**n/a**	Positive	n/a	-	100	×1.00	11.86	13.0	×1.30	**n/a**	-

Notes: *. The higher reported SAR on each configuration in this operation band is marked (shaded yellow marker).
*. (mode) a: IEEE 802.11a, n20: IEEE 802.11n(20HT), n40: IEEE 802.11n(40HT); Max.: maximum.; n/a: not applied.
*. Gap: It is the separation distance between the platform surface and the bottom outer surface of phantom; Battery ID: Refer to Appendix 1. During test, the EUT was operated with full charged battery and connected to the host PC via a I/F cable.

*a. Calculating formula: Reported SAR (W/kg) = (Measured SAR (W/kg)) × (Duty scaled) × (Tune-up factor)
Duty scaled = Duty scaled factor: Duty cycle correction factor for obtained SAR value, Duty scaled factor [-] = 100(%) / (duty cycle, %)
Tune-up factor: Power tune-up factor for obtained SAR value, Tune-up factor [-] = 1 / (10 ^ ("Deviation from max., dB" / 10))

***. Initial Test Position SAR Test Reduction Procedure. According to KDB248227D01**

1) Highest reported SAR(1g) is ≤ 0.4 W/kg . Therefore, further SAR measurements within this exposure condition are not required.
2) Highest reported SAR(1g) is > 0.4 W/kg . Due to the highest reported SAR for this test position, other test positions in standalone exposure condition were evaluated until a SAR(1g) ≤ 0.8 W/kg was reported.
3) For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR(1g) is > 0.8 W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR(1g) is ≤ 1.2 W/kg or all required test channels are considered.

7.5 SAR results: U-NII-3 band

[SAR measurement results (U-NII-3 band)]

SAR (1g) measurement results											Reported SAR (1g) [W/kg]						
Test setup			Mode "*": Initial mode.	Frequency [MHz] (Channel) "*": Initial ch.	Data rate [Mbps], [MCS#]	Measured SAR [W/kg] Max.value of multi-peak			SAR plot # in Appendix 2-2	Duty cycle correction		Output burst average power correction			SAR Corrected (*a)	Remarks
Position "*": Initial setup	Gap [mm]	Battery ID				Measured	ΔSAR sign	ΔSAR corrected		Duty [%]	Duty scaled	Measured. [dBm].	Max. [dBm]	Tune-up factor		
Step 4a: U-NII-3 Band / Body-SAR(1g), by body liquid																
Back* (Initial setup)	0	#11	n40*	5755(151)*	MCS0	**0.472**	Positive	n/a	4a-2	100	×1.00	11.39	13.0	×1.45	**0.684**	-
	0	#11		5795(159)		**0.607**	Positive	n/a	4a-3	100	×1.00	11.21	13.0	×1.51	**0.917**	*.Higher SAR CH.
	0	#11	a	5745(149)*	6	**0.451**	Positive	n/a	4a-4	100	×1.00	11.54	13.0	×1.40	**0.631**	-
	0	#11		5785(157)		**0.580**	Positive	n/a	4a-5	100	×1.00	11.40	13.0	×1.45	**0.841**	-
	0	#11		5825(165)		**0.748**	Positive	n/a	4a-6	100	×1.00	11.40	13.0	×1.45	**1.085**	-
	0	#11	n20	5745(149)*	MCS0	**0.449**	Positive	n/a	4a-7	100	×1.00	11.54	13.0	×1.40	**0.629**	-
	0	#11		5785(157)		**0.519**	Positive	n/a	4a-8	100	×1.00	11.43	13.0	×1.44	**0.747**	-
	0	#11		5825(165)		**0.749**	Positive	n/a	**4a-1**	100	×1.00	11.37	13.0	×1.46	**1.094**	*.Higher, body, U-NII-3.
Front	0	-	n40*	5755(151)*	MCS0	**n/a**	Positive	n/a	-	100	×1.00	11.39	13.0	×1.45	**n/a**	-
	0	#14		5795(159)		**0.00736**	Positive	n/a	4a-9	100	×1.00	11.21	13.0	×1.51	**0.011**	*. Small enough (< 0.1 W/kg)
Right	0	-	n40*	5755(151)*	MCS0	**n/a**	Positive	n/a	-	100	×1.00	11.39	13.0	×1.45	**n/a**	-
	0	#11		5795(159)		**0.056**	Positive	n/a	4a-10	100	×1.00	11.21	13.0	×1.51	**0.085**	*. Small enough (< 0.1 W/kg)
Step 3b: U-NII-3 Band / Head-SAR(1g), by head liquid																
Back* (Initial setup)	0	#11	n40*	5755(151)*	MCS0	**0.509**	Positive	n/a	4b-2	100	×1.00	11.39	13.0	×1.45	**0.738**	-
	0	#11		5795(159)		**0.583**	Positive	n/a	4b-3	100	×1.00	11.21	13.0	×1.51	**0.880**	*.Higher SAR CH.
	0	#11	a	5745(149)*	6	**0.437**	Positive	n/a	4b-4	100	×1.00	11.54	13.0	×1.40	**0.612**	-
	0	#11		5785(157)		**0.551**	Positive	n/a	4b-5	100	×1.00	11.40	13.0	×1.45	**0.799**	-
	0	#14		5825(165)		**0.737**	Positive	n/a	**4b-1**	100	×1.00	11.40	13.0	×1.45	**1.0687**	*.Higher, head, U-NII-3.
	0	#11	n20	5745(149)*	MCS0	**0.433**	Positive	n/a	4b-6	100	×1.00	11.54	13.0	×1.40	**0.606**	-
	0	#11		5785(157)		**0.556**	Positive	n/a	4b-7	100	×1.00	11.43	13.0	×1.44	**0.801**	-
	0	#11		5825(165)		**0.732**	Positive	n/a	4b-8	100	×1.00	11.37	13.0	×1.46	**1.0687**	-
Front	0	-	n40*	5755(151)*	MCS0	**n/a**	Positive	n/a	-	100	×1.00	11.39	13.0	×1.45	**n/a**	-
	0	#14		5795(159)		**0.00282**	+	n/a	4b-9	100	×1.00	11.21	13.0	×1.51	**0.004**	*. Small enough (< 0.1 W/kg)
Right	0	-	n40*	5755(151)*	MCS0	**n/a**	Positive	n/a	-	100	×1.00	11.39	13.0	×1.45	**n/a**	-
	0	#11		5795(159)		**0.045**	+	n/a	4b-10	100	×1.00	11.21	13.0	×1.51	**0.068**	*. Small enough (< 0.2 W/kg)

Notes: *. The higher reported SAR on each configuration in this operation band is marked (shaded yellow marker).
*. (mode) a: IEEE 802.11a, n20: IEEE 802.11n(20HT), n40: IEEE 802.11n(40HT); Max.: maximum.; n/a: not applied.
*. Gap: It is the separation distance between the platform surface and the bottom outer surface of phantom; Battery ID: Refer to Appendix 1. During test, the EUT was operated with full charged battery and connected to the host PC via a I/F cable.

*a. Calculating formula: Reported SAR (W/kg) = (Measured SAR (W/kg)) × (Duty scaled) × (Tune-up factor)
Duty scaled = Duty scaled factor: Duty cycle correction factor for obtained SAR value, Duty scaled factor [-] = 100(%) / (duty cycle, %)
Tune-up factor: Power tune-up factor for obtained SAR value, Tune-up factor [-] = 1 / (10 ^ ("Deviation from max., dB" / 10))

***. Initial Test Position SAR Test Reduction Procedure. According to KDB248227D01**

1) Highest reported SAR(1g) is ≤ 0.4 W/kg . Therefore, further SAR measurements within this exposure condition are not required.
2) Highest reported SAR(1g) is > 0.4 W/kg . Due to the highest reported SAR for this test position, other test positions in standalone exposure condition were evaluated until a SAR(1g) ≤ 0.8 W/kg was reported.
3) For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR(1g) is > 0.8 W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR(1g) is ≤ 1.2 W/kg or all required test channels are considered.