SAR TEST REPORT

Test Report No.: 12004126S

Applicant : **Sony Corporation**

Type of Equipment : **Helmet Mounted Wireless Headset**

Model No. : **NYSNO-10**

FCC ID : **AK8NYSNO10**

Test Standard : **FCC 47CFR §2.1093**

Test Result : **Complied**

Highest Reported SAR(1g) [W/kg]			Frequency	Mode	Duty cycle	Output power (average)	
2.4GHz band	Type	Limit			[%]	Measured	Max.
1.13 (Measured: 0.733)	**Top-of-head**	**1.6**	2441 MHz	EDR (2DH5)	78.7	15.69 dBm	16.5 dBm

***. Highest reported SAR of this device for top-of-head is "1.13 W/kg".**

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Date of test: November 10 and 14, 2017

Test engineer: H. Naka
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Leader, Consumer Technology Division

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ilac-MRA LAB JAB Testing RTL02610

REVISION HISTORY

Revision	Test report No.	Date	Page revised	Contents
Original	12004126S	November 16, 2017	-	-
-r01	12004126S	November 27, 2017	p1,2,3	(p3) Error correcting.

*. 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	Sony Corporation
Brand Name	SONY
Address	1-7-1 Konan, Minato-ku, Tokyo 108-0075, Japan

SECTION 2: Equipment under test (EUT)

2.1 Identification of EUT

Type of Equipment	Helmet Mounted Wireless Headset
Model Number	NYSNO-10
Serial Number	5002401
Condition of EUT	Production prototype (Not for sale: This samples is equivalent to mass-produced items.)
Receipt Date of Sample	October 18, 2017 (*. EUT for power measurement and SAR test) *. No modification by the Lab.
Country of Mass-production	Malaysia
Category Identified	Portable device *. Since EUT may use very close to a human head during Bluetooth operation, the partial-body SAR (1g) shall be observed.
Rating	DC 3.6V (*. The EUT was operated by the build-in re-chargeable Li-ion battery.)
Feature of EUT	Model: NYSNO-10 (referred to as the EUT in this report) is a Helmet Mounted Wireless Headset which supports Bluetooth 4.1. The EUT has following features; • Group-talk by using a connected microphone with another NYSNO-10. • Hand-free communication with a smart-phone. • Playing music of the media player (e.g. smart-phone).
SAR Accessory	• Helmet mounting jig • Microphone

2.2 Product Description (Bluetooth Module)

Transmit average power (*1)	Mode		Number of channel	Operation frequency [MHz]	Data rate [Mbps]	Modulation	Channel spacing [MHz]	Band width [MHz]	Average power [dBm]		
									Minimum	**Typical**	**Maximum**
	Bluetooth (Ver.4.1)	**BDR/**	79	2402~2480	1	FHSS	1	1	**11.5**	**13.5**	**16.5**
		EDR	79	2402~2480	2~3	FHSS	1	1	**11.5**	**13.5**	**16.5**
		Low energy	40	2402~2480	1	FHSS	2	2	**-1.0**	**1.0**	**3.0**
	(*. The measured Tx output power (antenna terminal conducted) refers to section 6 in this report.)										
Equipment type	Transceiver										
Type of modulation	GFSK (BDR); GFSK and π/4-DQPSK, 8DPSK (EDR); GFSK (BLE)										
Power supply	DC 3.6 V (*. This power is supplied via constant voltage circuit of EUT.)										

Quantity of Antenna	1 piece		
Antenna type	Reverse F type	Antenna connector type	Not applicable (soldered)
Antenna gain (Peak)	+3.5dBi		

*1. The measured transmit average power (conducted) refers to section 6 in this report.
*. These transmitters do not use the special transmitting technique such as "beam-forming" and "time-space code diversity."

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.

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

3.3 Procedures and Results

Test Procedure	SAR measurement: IEC Std. 1528, IEC 62209-2, KDB 447498, KDB 248227, KDB 865664		
Category	FCC 47CFR §2.1093 (Portable device)	**SAR type**	Top-of-head with a helmet

Mode / Band (Operation frequency)	**Bluetooth** ((2402-2480)MHz)		
Results (Reported SAR(1g))	**Complied (measured)**	**SAR (1g) Limit [W/kg]**	**1.6**
Reported SAR(1g) value	**1.13 W/kg**		
Measured SAR value	0.733 W/kg		
Mode, frequency[MHz]	EDR, 2DH5 (2 Mbps), 2441 MHz		
Duty cycle [%]	78.7 (Duty scaled factor: ×1.27) (*1)		
Output burst average power [dBm]	15.69 (maximum: 16.5 dBm, Scaled factor: ×1.21)		

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

*. The sample used by the SAR test is not more than 2 dB lower than the maximum tune-up tolerance limit. That is, measured power is included the tune-up tolerance range.

*. (Calculating formula) Corrected SAR to max.power (W/kg) = (Measured SAR (W/kg)) × (Duty scaled) × (Tune-up factor)
where; Tune-up factor [-] = 1 / (10 ^ ("Δmax (max.power - burst average power), dB" / 10)), Duty scaled factor [-] = 100(%) / (duty cycle, %)

*1. The measured duty cycle number of Bluetooth test operation was nearly equal to highest theory duty cycle, even if it was lower than 80%..

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
JAB Accreditation No. RTL02610
FCC Test Firm Registration Number: 839876

Used?	Place	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
☐	No.1 Semi-anechoic chamber	2973D-1	20.6 × 11.3 × 7.65	20.6 × 11.3	10 m
☐	No.2 Semi-anechoic chamber	2973D-2	20.6 × 11.3 × 7.65	20.6 × 11.3	10 m
☐	No.3 Semi-anechoic chamber	2973D-3	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 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 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. (Clause 4.1, KDB447498 D01 (v06))

Step.1 Data rate check (*. The EUT supported the following data rate in each operation mode.**)**

Bluetooth											
Type	**Modulation**	**Packet type**	**Type**	**Modulation**	**Packet type**	**Type**	**Modulation**	**Packet type**	**Type**	**Modulation**	**Packet type**
BLE	GFSK/FHSS	BLE (1Mbps)	BDR	GFSK/FHSS	DH1 (1Mbps)	EDR2	π/4-DQPSK/FHSS	2-DH1 (2Mbps)	EDR3	8DPSK/FSSS	3-DH1 (3Mbps)
			BDR	GFSK/FHSS	DH3 (1Mbps)	EDR2	π/4-DQPSK/FHSS	2-DH3 (2Mbps)	EDR3	8DPSK/FSSS	3-DH3 (3Mbps)
			BDR	GFSK/FHSS	DH5 (1Mbps)	EDR2	π/4-DQPSK/FHSS	2-DH5 (2Mbps)	EDR3	8DPSK/FSSS	3-DH5 (3Mbps)

Step.2 Consideration of SAR test channel

For the SAR test reference, the average output power was measured on the low/middle/upper channels with the worst data rate condition in step 1 in the above.

3.6 Confirmation after SAR testing

It was checked that the power drift [W] is within ±5% in the evaluation procedure of SAR testing. The verification of power drift during the SAR test is that DASY5 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 APPENDIX 2.

*. DASY5 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 DASY5 system must be the less than ±0.21dB.**

3.7 Test setup of EUT and SAR measurement procedure

Antenna separation distances in each test setup plan are shown as follows.

Setup plan	Explanation of SAR test setup plan (*. Refer to Appendix 1 for test setup photographs)	D [mm]	Pre-SAR Tested /Reduced (*1)	SAR type
Back	The back surface (head mounting jig side) of EUT was touched to Left of SAM phantom by tilt.	**≈3**	**Tested**	Top-of -head
Top	The top surface (near antenna side) of EUT was touched to Flat section of SAM phantom.	**3.68**	**Tested**	
Front-tilt	The front surface (SONY logo side) of EUT is touched to Flat section of SAM phantom by tilt.	**≈9**	**Tested**	
Left	The left surface (near antenna side) of EUT was touched to Flat section of SAM phantom.	**≈14**	**Tested**	
Bottom	(When test is required,) the bottom surface of EUT is touched to Flat of SAM phantom.	**≈30**	**Reduced**	
Right	(When test is required,) the right surface of EUT is touched to Flat of SAM phantom	**≈105**	**Reduced**	

*. **D:** Antenna separation distance. It is the distance from the antenna to the outer surface of EUT which an operator may touch.
*. Size of EUT: 143 mm (width) × 48.4 mm (height) × 30.8 mm (depth).

***. Consideration for SAR evaluation exemption**

SAR test exclusion considerations according to KDB447498 D01
The following is based on KDB447498D01.

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)
[SAR(1g) test exclusion thresholds, mW] = 3 × 50 / SQRT(2.462) = 96mW, where test separation distance=50mm
   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.
   5. "N/A" displayed on below exclusion calculation means not applicable this formula since distance between antenna and surface is > 50 mm.

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.

[SAR exclusion calculations for antenna ≤50mm from the user.]

Antenna	Tx interface	Upper frequency	Maximum output power		Calculated threshold value								
					Setup	Back	Top	Front-tilt	Left	Bottom	Right		
		[MHz]	[dBm]	[mW]	D[mm]	≤5 (≤ 3)	≤5 (3.68)	9	14	30	105		
Main	BDR	2480	16.5	45	Judge	14.2, Tested	14.2, Tested	7.9, Tested	5.1, Tested	2.4, Reduce	N/A		
Main	EDR	2480	16.5	45	Judge	14.2, Tested	14.2, Tested	7.9, Tested	5.1, Tested	2.4, Reduce	N/A		
Main	LE	2480	3.0	2	Judge	0.6, Reduce	0.6 Reduce	0.3, Reduce	0.2, Reduce	0.1, Reduce	N/A		

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
   3. "N/A" displayed on below exclusion calculation means not applicable this formula since distance between antenna and surface is ≤ 50 mm.

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 antenna > 50mm from the user.]

Antenna	Tx interface	Upper frequency	Maximum output power		Calculated threshold value								
					Setup	Back	Top	Front-tilt	Left	Bottom	Right		
		[MHz]	[dBm]	[mW]	D[mm]	≤5 (≤ 3)	≤5 (3.68)	9	14	30	105		
Main	BDR	2480	16.5	45	Judge	N/A	N/A	N/A	N/A	N/A	645.3mW, Reduce		
Main	EDR	2480	16.5	45	Judge	N/A	N/A	N/A	N/A	N/A	645.3mW, Reduce		
Main	LE	2480	3.0	2	Judge	N/A	N/A	N/A	N/A	N/A	645.3mW, Reduce		

<Conclusion for consideration for SAR test reduction>

1) The SAR setups of the near antenna which includes "Back", "Top", "Front-tilt" and "Left" are applied the SAR test in head-liquid.
2) The SAR tests of "Bottom" and "Right" setup are reduced, because the SAR test exclusion judge value are smaller than "3" and these setups have enough antenna separation distance.

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

Worst SAR search by a specified mode with a highest measurement output power channel.
Change channel and verify the SAR for all test requirement channels (lower/middle/upper) and other operation mode if it's necessary.

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

SECTION 4: Operation of EUT during testing

4.1 Operation mode for SAR testing

The EUT has Bluetooth (BDR, EDR, Low energy) continuous transmitting modes. The frequency and the modulation used in the SAR testing are shown as a following.

Operation mode	BDR	EDR		BLE (Low energy)
Tx band [MHz]	2402~2480			
Bandwidth [MHz]	1	1		2
Max.power [dBm]	16.5	16.5		3
Modulation	FHSS	FHSS		FHSS
Data Rate	DH5 (1 Mbps)	2DH5 (2 Mbps)	3DH5 (3 Mbps)	1 Mbps
Frequency tested [MHz]	2441	2402. 2441, 2480	2441	*.SAR test was reduced
Controlled software	CSR Bluetest 3 (Version2.5.0.93) The tuned-up power table of "Power62.psr" file was used and saved to the EUT for the power measurement and SAR test. The other setting parameters refer to Section 6.			

SECTION 5: Uncertainty Assessment (SAR measurement)

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)	ui (10g)	Vi, veff
A	**Measurement System** (DASY5)						(std. uncertainty)	(std. uncertainty)	
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 (*1) (≤ 20°)	±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 %**	

*. Table of uncertainties are listed for ISO/IEC 17025.
*. 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.
*1. The axis of the probe was deviated less than 30 degrees from the normal surface orientation when the SAM left-head phantom was used.

SECTION 6: Confirmation before testing

6.1 SAR reference power measurement (*. Antenna terminal conducted average power of EUT)

*. Antenna gain (peak): 3.5 dBi

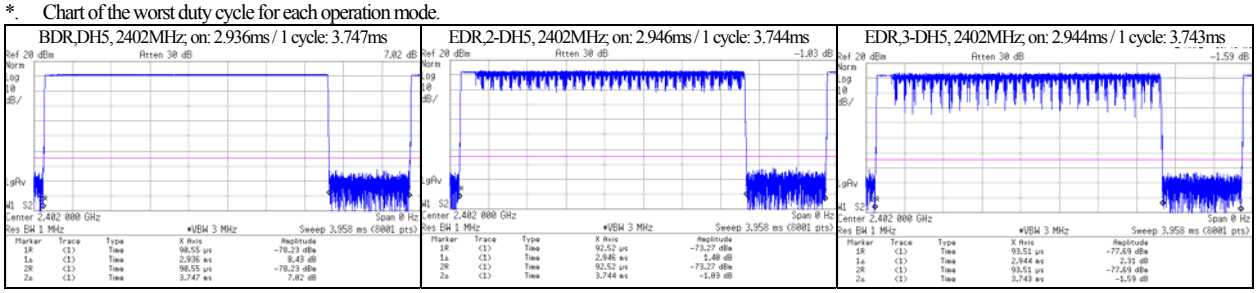
Mode	Frequency		Data rate	Power Setting (software)	Duty cycle (*1)	Duty factor	Duty scaled factor	Measurement Result				Power correction			Power Tune-up?	Remarks
								Time average power		Burst power		Max. power	Δ from max.	Tune-up factor		
	[MHz]	CH	[Mbps]	[-]	[%]	[dB]	[-]	[dBm]	[mW]	[dBm]	[mW]	[dBm]	[dB]	[-]		
BLE	2402	0	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3	n/a	n/a	n/a	*. Since BLE power is enough lower than BDR/EDR mode, test of BLE is reduced.
	2440	19		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3	n/a	n/a	n/a	
	2480	39		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3	n/a	n/a	n/a	
BT, BDR	2402	0	1 (DH5)	14 (62)	78.4	1.06	×1.28	14.22	26.42	**15.28**	33.73	16.5	-1.22	×1.32	Applied(*2)	Setting parameters; Tx/Rx Int (us)= 3750 Packet Type=15 Packet Size= 339
	2441	39		14 (62)	78.4	1.06	×1.28	14.71	29.58	**15.77**	37.76	16.5	-0.73	×1.18	Applied(*2)	
	2480	78		14 (62)	78.4	1.06	×1.28	13.45	22.13	**14.51**	28.25	16.5	-1.99	×1.58	Applied(*2)	
BT, EDR	2402	0	2 (2-DH5)	14 (62)	78.7	1.04	×1.27	14.37	27.35	**15.41**	34.75	16.5	-1.09	×1.29	Applied(*2)	Setting parameters; Tx/Rx Int (us)= 3750 Packet Type=30 Packet Size= 679
	2441	39		14 (62)	78.7	1.04	×1.27	14.65	29.17	**15.69**	37.07	16.5	-0.81	×1.21	Applied(*2)	
	2480	78		14 (62)	78.7	1.04	×1.27	13.51	22.44	**14.55**	28.51	16.5	-1.95	×1.57	Applied(*2)	
BT, EDR	2402	0	3 (3-DH5)	14 (62)	78.7	1.04	×1.27	14.41	27.61	**15.45**	35.08	16.5	-1.05	×1.27	Applied(*2)	Setting parameters; Tx/Rx Int (us)= 3750 Packet Type= 31 Packet Size= 1021
	2441	39		14 (62)	78.7	1.04	×1.27	14.75	29.85	**15.79**	37.93	16.5	-0.71	×1.18	Applied(*2)	
	2480	78		14 (62)	78.7	1.04	×1.27	13.53	22.54	**14.57**	28.64	16.5	-1.93	×1.56	Applied(*2)	

*. : SAR test was applied. *. xx.xx highlight is shown the higher measured output power in each operation mode, in each band. n/a: not applied

*1. The measured duty cycle number of BDR and EDR was nearly equal to highest theory duty cycle and it was used for the SAR test, even if it was lower than 80%.

*2. The tuned-up power table of "Power62.psr" file was used and saved to the EUT for the power measurement and SAR test.

*. Chart of the worst duty cycle for each operation mode.



*. CH: channel, Max: Maximum.

*. Calculating formula: Result-Time average power (dBm) = (P/M Reading, dBm)+(Cable loss, dB)+(Attenuator, dB)
Result-Burst power (dBm) (*.equal to 100% duty cycle) = (P/M Reading, dBm)+(Cable loss, dB)+(Attenuator, dB)+(duty factor, dB)
Duty cycle (%) = 100 × (on-time) / (1cycle time); Duty factor (dBm) = 10 × log (100/(duty cycle, %))
Δ form max. (dB) = (Results-Burst power (average, dBm)) - (Max.-specification output power (average, dBm))
Duty scaled factor (Duty cycle correction factor for obtained SAR value) (unit: (-)) = 100(%) / (duty cycle, %)
Tune-up factor (Power tune-up factor for obtained SAR value) (unit: (-)) = 1 / (10 ^ ("Deviation from max., dB" / 10))

*. Date measured: October 26, 2017 / Measured by: Hiroshi Naka / Place: preparation room of No. 7 shielded room. (25 deg.C. / 46 %RH)

*. Uncertainty of antenna port conducted test; Power measurement uncertainty above 1GHz for this test was: (±) 0.72 dB(Average)/(±) 0.85 dB(Peak).

*. Uncertainty of antenna port conducted test; Duty cycle and time measurement: (±) 0.012 %.

SECTION 7: SAR Measurement results (Pre-check SAR test)

7.1 SAR measurement results

Measurement date: November 10 and 14, 2017 Measurement by: Hiroshi Naka

[Liquid measurement]

Frequency [MHz]	Liquid type	Liquid parameters (*a)								Temp. [deg.C.]	Depth [mm]	ΔSAR Coefficients(*b)		Date measured
		Permittivity (εr) [-]				Conductivity [S/m]						ΔSAR		
		Target	Measured		Limit	Target	Measured		Limit			1g {%}	Correction required?	
			Meas.	Δεr [%]			Meas.	Δσ [%]						
2402	Head	***39.29***	38.07	-3.1	-5% ≤ εr-meas. ≤ 0%	***1.757***	1.793	+2.0	0% ≤ σ-meas. ≤ +5%	24.0	183 (SAM-Flat) 153 (SAM-left ERP)	+1.68	not required.	November 10, 2017, before SAR test
2441		***39.22***	37.89	-3.4		***1.792***	1.842	+2.8				+2.11	not required.	
2480		***39.16***	37.75	-3.6		***1.833***	1.879	+2.6				+2.02	not required.	
2402	Head	***39.29***	37.77	-3.9	-5% ≤ εr-meas. ≤ 0%	***1.757***	1.795	+2.2	0% ≤ σ-meas. ≤ +5%	24.0	183 (SAM-Flat) 150 (SAM-left ERP)	+1.92	not required.	November 14, 2017, before SAR test
2441		***39.22***	37.60	-4.1		***1.792***	1.847	+3.1				+2.41	not required.	
2480		***39.16***	37.42	-4.4		***1.833***	1.894	+3.3				+2.58	not required.	

[Measured and Reported (Scaled) SAR results]

Mode	Frequency [MHz]	Data rate [Mbps]	SAR measurement results: EUT setup: Position	Gap [mm]	Phantom position	SAR (1g) [W/kg]: Max. value of multi-peak: Meas.	ΔSAR [%]	ΔSAR corrected	SAR plot # in Appendix 2-2	Reported SAR (1g) [W/kg]: Duty cycle correction: Duty [%]	Duty scaled	Output average power correction: Meas. [dBm].	Max. [dBm]	Tune-up factor	SAR Corrected (Scaled) (*d)	Remarks
With an accessary (*. It was connected a microphone with EUT).																
EDR	2441	3(3DH5)	Back	0	SAM-Left	**0.524**	+2.11	n/a (*c)	Plot 2-1	78.7	×1.27	15.79	16.5	×1.18	**0.785**	-
BDR	2441	1(DH5)		0	SAM-Left	**0.495**	+2.11	n/a (*c)	Plot 2-2	78.4	×1.28	15.77	16.5	×1.18	**0.748**	-
EDR	2441	2(2DH5)		0	SAM-Left	**0.614**	+2.11	n/a (*c)	Plot 1-2	78.7	×1.27	15.69	16.5	×1.21	**0.944**	*. Higher, with mic.
	2402			0	SAM-Left	**0.393**	+1.68	n/a (*c)	Plot 2-3	78.7	×1.27	15.41	16.5	×1.29	**0.644**	-
	2480			0	SAM-Left	**0.298**	+2.02	n/a (*c)	Plot 2-4	78.7	×1.27	14.55	16.5	×1.57	**0.594**	-
EDR	2441	3(3DH5)	Front -tilt	0	SAM-Flat	**0.522**	+2.11	n/a (*c)	Plot 2-5	78.7	×1.27	15.79	16.5	×1.18	**0.782**	-
BDR	2441	1(DH5)		0	SAM-Flat	**0.509**	+2.11	n/a (*c)	Plot 2-6	78.4	×1.28	15.77	16.5	×1.18	**0.769**	-
EDR	2441	2(2DH5)		0	SAM-Flat	**0.521**	+2.11	n/a (*c)	Plot 2-7	78.7	×1.27	15.69	16.5	×1.21	**0.801**	-
	2402			0	SAM-Flat	**0.420**	+1.68	n/a (*c)	Plot 2-8	78.7	×1.27	15.41	16.5	×1.29	**0.688**	-
	2480			0	SAM-Flat	**0.300**	+2.02	n/a (*c)	Plot 2-9	78.7	×1.27	14.55	16.5	×1.57	**0.598**	-
	2441		Top	0	SAM-Flat	**0.134**	+2.11	n/a (*c)	Plot 2-10	78.7	×1.27	15.69	16.5	×1.21	**0.206**	-
No accessary (*. It was removed a microphone from EUT).																
EDR	2441	3(3DH5)	Back	0	SAM-Left	**0.639**	+2.41	n/a (*c)	Plot 3-1	78.7	×1.27	15.79	16.5	×1.18	**0.958**	-
BDR	2441	1(DH5)		0	SAM-Left	**0.596**	+2.41	n/a (*c)	Plot 3-2	78.4	×1.28	15.77	16.5	×1.18	**0.900**	-
EDR	2441	2(2DH5)		0	SAM-Left	**0.679**	+2.41	n/a (*c)	Plot 3-3	78.7	×1.27	15.69	16.5	×1.21	**1.043**	-
	2402			0	SAM-Left	**0.490**	+1.92	n/a (*c)	Plot 3-4	78.7	×1.27	15.41	16.5	×1.29	**0.803**	-
	2480			0	SAM-Left	**0.374**	+2.58	n/a (*c)	Plot 3-5	78.7	×1.27	14.55	16.5	×1.57	**0.746**	-
EDR	2441	3(3DH5)	Front -tilt	0	SAM-Flat	**0.733**	+2.41	n/a (*-+c)	Plot 3-6	78.7	×1.27	15.79	16.5	×1.18	**1.098**	
BDR	2441	1(DH5)		0	SAM-Flat	**0.717**	+2.41	n/a (*c)	Plot 3-7	78.4	×1.28	15.77	16.5	×1.18	**1.083**	-
EDR	2441	2(2DH5)		0	SAM-Flat	**0.733**	+2.41	n/a (*c)	Plot 1-1	78.7	×1.27	15.69	16.5	×1.21	**1.126**	*. Higher, without mic.
	2402			0	SAM-Flat	**0.564**	+1.92	n/a (*c)	Plot 3-8	78.7	×1.27	15.41	16.5	×1.29	**0.924**	-
	2480			0	SAM-Flat	**0.439**	+2.58	n/a (*c)	Plot 3-9	78.7	×1.27	14.55	16.5	×1.57	**0.875**	-
	2441		Top	0	SAM-Flat	**0.205**	+2.41	n/a (*c)	Plot 3-10	78.7	×1.27	15.69	16.5	×1.21	**0.315**	-
	2441	2(2DH5)	Left	0	SAM-Flat	**0.356**	+2.11	n/a (*c)	Plot 3-11	78.7	×1.27	15.69	16.5	×1.21	**0.547**	-

Notes:

*. Gap: It is the separation distance between the EUT outer surface and the bottom outer surface of phantom;
Max.: Maximum; Meas.: Measured value; n/a: not applied;

*. Calibration frequency of the SAR measurement probe (and used conversion factors)

Liquid	SAR test frequency	Probe calibration frequency	Validity	Conversion factor	Uncertainty
Head	2402, 2441, 2480 MHz	2450 MHz	within ±50 MHz of calibration frequency	7.37	±12.0 %

*. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Memo1:

*a. The target value is a parameter defined in Appendix A of KDB865664 D01 (v01r04), the dielectric parameters suggested are given at 2000, 2450, 3000 and 5800MHz. Parameters for the frequencies between (2000~3000) MHz and (3000~5800) MHz were obtained using linear interpolation.

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

*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) = (Meas. SAR (W/kg)) × (100 - (ΔSAR(%)) / 100

*d. 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))