



SAR TEST REPORT

Test Report No.: 10318894S-C

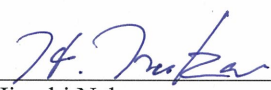
Applicant : FUJIFILM Corporation
Type of Equipment : Flat Panel Sensor
Model No. : DR-ID1201SE (*. With built-in wireless LAN module)
FCC ID : W2Z-01000006
Test Standard : FCC 47CFR §2.1093
Test Result : Complied

Highest Reported SAR(1g) Value	Operation Band	Remarks
< 0.10 W/kg	2412-2472MHz	(DTS) Antenna#0, 2417MHz, 11n(20HT)(MCS0), Output power: 15.00dBm, Measured SAR(1g)=0.022W/kg.
0.17 W/kg	5180-5320MHz	(UNII) Antenna#0, 5260MHz, 11a (6Mbps), Output power: 13.29dBm, Measured SAR(1g)=0.113W/kg.
0.20 W/kg	5500-5700MHz	(UNII) Antenna#0, 5680MHz, 11a (6Mbps), Output power: 16.01dBm, Measured SAR(1g)=0.14W/kg.
0.20 W/kg	5745-5825MHz	(UNII) Antenna#0, 5745MHz, 11a (6Mbps), Output power: 16.18dBm, Measured SAR(1g)=0.134W/kg.

- *. **The highest reported SAR (1g) value across all exposure condition is "0.20 W/kg" = grant listing.**
- *. **Co-location was not considered, because the SLLSR (SAR to peak location separation ratio) was smaller than 0.04.**

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Date of test: September 8-12 and 16, 2014

Test engineer: 
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Engineer, Consumer Technology Division

Approved by: 
Toyokazu Imamura
Leader, Consumer Technology Division

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- There is no testing item of "Non-accreditation".



REVISION HISTORY

Revision	Test report No.	Date	Page revised	Contents
Original	10318894S-C	October 9, 2014	-	-
-r01	10318894S-C	December 2, 2014	p1,2,6	w58 band: DTS->UNII.
-r02	10318894S-C	December 10, 2014	p1,2,3, p6,16,17	Operation temperature range is deleted. Correction of erroneous description.
-r03	10318894S-C	December 12, 2014	P6,16	Operation temperature range is deleted. Correction of erroneous description.
-r04	10318894S-C	December 12, 2014	P17	Operation temperature range is deleted. Correction of erroneous description.

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

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SECTION 1: Customer information

Company Name	FUJIFILM Corporation
Brand Name	FUJIFILM
Address	2-26-30 Nishiazabu Minatoku Tokyo 106-8620, Japan
Telephone Number	81-3-6271-1975
Facsimile Number	81-3-6271-1189
Contact Person	Mitsuyuki Komiya

SECTION 2: Equipment under test (EUT)

2.1 Identification of EUT

Type of Equipment	Flat Panel Sensor
Model Number	DR-ID1201SE
Serial Number	N120002
Condition of EUT	Engineering prototype (*. Not for sale. This sample is equivalent to mass-production items)
Receipt Date of Sample	August 4, 2014 (*. No modification by the Lab.)
Country of Mass-production	Japan
Rating	DC8V
Category Identified	Portable device (*. Since EUT may contact and/or very close to a human body and head during Wi-Fi operation, the partial-body SAR (1g) shall be observed.)
SAR Accessory	Any body-worn accessory was not applied.
Feature of EUT, SAR tested consideration	Model: DR-ID1201SE (referred to as the EUT in this report) is a Flat Panel Sensor with a wireless function and used in the hospitality environment. Since this EUT is the medical device, the EUT is only used under the guidance of a doctor or a qualified person. The possibility of the maximum RF human exposure is only a body/head of the patient who comes in contact directly on the front surface side (patient side) of the EUT. Therefore, the SAR test was only applied to the front surface side (patient side) of the EUT.

*. DR-ID1201SE: Flat Panel Sensor has the series model: DR-ID1211SE.
DR-ID1211SE is the same mechanically and electrically as DR-ID1201SE, except X ray detection component. This difference doesn't influence the characteristic of wireless LAN applications. Therefore, DR-ID1201SE was tested representatively.

	DR-ID1201SE	DE-ID1211SE
Size of panel (mm)	393.8×459.8×16.0	393.8×459.8×16.0
X ray detection component (scintillator)	GOS (Gd ₂ O ₃ :Tb, oxysulfide gadolinium)	CsI (cesium iodide)

2.2 Product Description (Wireless LAN module, antenna)

Equipment type	Transceiver				
Model	SX-PCEAN(FF-E)				
Frequency band	2.4GHz band		5GHz band		
Frequency of operation (MHz) (*.ch.: channel)	11b,g, n(20HT): 2412-2462 (*.ch.1-11) n(40HT): 2422-2452 (*.ch.3-9)	11a, n(20HT): 5180-5320 (*.ch.36-64) n(40HT): 5190-5310 (*.ch.38-62)	5500-5700 (*.ch.100-140) 5510-5670 (*.ch.102-134)	5745-5825 (*.ch.149-165) 5755, 5795 (*.ch.151,159)	
Channel spacing (MHz)	5 (11b,g,n(20HT),n(40HT))		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, maximum channel and data rate) and tolerance (as manufacture variation) (dBm) (*.ch.: channel)	11b 13.5±2.5 (*.ch.1-11, 1-11Mbps) 17.0±2.5 (*.ch.2, 6-36Mbps) n(20HT): 14.5±2.5 (*.ch.2, MCS0-4/8-12) n(40HT): 13.5±2.5 (*.ch.4, MCS0-4/8-12)	11a: 12.5±2.5 (*.ch.36-64, 6-54Mbps) n(20HT): 11.0±2.5 (*.ch.36-64, MCS0-6/8-14) n(40HT): 11.0±2.5 (*.ch.46-54, MCS0-7/8-15)	15.0±2.5 (*.ch.100-140, 6-48Mbps) 13.5±2.5 (*.ch.100-140, MCS0-4/8-12) 11.0±2.5 (*.ch.102-134, MCS0-5/8-13)	15.0±2.5 (*.ch.149-165, 6-48Mbps) 13.5±2.5 (*.ch.149-165, MCS0-4/8-12) 11.0±2.5 (*.ch.151,159, MCS0-5/8-13)	
*. The value in a table shows the maximum power conditions of typical on each antenna. * 3dBm is added to MIMO power. *. Refer to clause 2.3 for more detail. Refer to clause 2.4 for the maximum output power which may possible. *. The measured Tx output power (conducted) refers to section 6 in this report.					
Power supply	DC 3.3V (*. DC3.3V is supplied from the main unit via constant voltage circuit.)				

SECTION 3: Test specification, procedures and results

3.1 Test specification

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 (v05r02):** General RF exposure guidance
KDB 248227 D01 (v01r02): SAR Measurement Procedures for 802.11a/b/g Transmitters
KDB 865664 D01 (v01r03): SAR measurement 100MHz to 6GHz
IEEE Std. 1528-2003: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
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.
(*. The reference for Uncertainty in SAR correction for deviations in permittivity and conductivity, in clause E.3.2.)

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

	Wi-Fi (DTS) (2412-2462MHz)		Wi-Fi (UNII) (5180-5320MHz)		Wi-Fi (UNII) (5500-5700MHz)		Wi-Fi (UNII) (5745-5825MHz)	
Test Procedure	SAR measurement; KDB 447498, KDB 248227, KDB 865664, IEEE Std.1528							
Category	FCC 47CFR §2.1093							
Results (SAR(1g))	Complied		Complied		Complied		Complied	
Antenna	ant#0	ant#1	ant#0	ant#1	ant#0	ant#1	ant#0	ant#1
Liquid type	Body liquid							
Reported SAR value (*. Scaled)	0.04 W/kg	0.03 W/kg	0.17 W/kg	0.13 W/kg	0.20 W/kg	0.16 W/kg	0.20 W/kg	0.14 W/kg
Measured SAR value	0.021 W/kg	0.022W/kg	0.113 W/kg	0.098 W/kg	0.14 W/kg	0.128 W/kg	0.134 W/kg	0.10 W/kg
Operation mode, frequency[MHz] (ch.)	n20, MCS0, 2417 (2ch)	n20, MCS0, 2417 (2ch)	11a, 6Mbps, 5260 (52ch)	11a, 6Mbps, 5300 (60ch)	11a, 6Mbps, 5680 (136ch)	11a, 6Mbps, 5680 (136ch)	11a, 6Mbps, 5805 (161ch)	11a, 6Mbps, 5745 (149ch)
Output power (max. power[dBm], scaled factor)	15.00dBm (17.0, ×1.58)	15.76dBm (17.0, ×1.33)	13.29dBm (15.0, ×1.48)	13.94dBm (15.0, ×1.28)	16.01dBm (17.5, ×1.41)	16.53dBm (17.5, ×1.25)	15.73dBm (17.5, ×1.50)	16.19dBm (17.5, ×1.35)
Liquid type	Head liquid (by Flat phantom)							
Reported SAR value (*. Scaled)	0.03 W/kg	0.03 W/kg	0.08 W/kg	0.07 W/kg	0.10 W/kg	0.09 W/kg	0.11 W/kg	0.09 W/kg
Measured SAR value	0.018 W/kg	0.018W/kg	0.057 W/kg	0.058 W/kg	0.071 W/kg	0.075 W/kg	0.071 W/kg	0.063W/kg
Operation mode, frequency[MHz] (ch.)	n20, MCS0, 2417 (2ch)	11g, 6Mbps, 2417 (2ch)	11a, 6Mbps, 5260 (52ch)	11a, 6Mbps, 5300 (60ch)	11a, 6Mbps, 5680 (136ch)	11a, 6Mbps, 5680 (136ch)	11a, 6Mbps, 5805 (161ch)	11a, 6Mbps, 5745 (149ch)
Output power (max. power[dBm], scaled factor)	15.00dBm (17.0, ×1.58)	18.08dBm (19.5, ×1.39)	13.62dBm (15.0, ×1.37)	13.94dBm (15.0, ×1.28)	16.01dBm (17.5, ×1.41)	16.53dBm (17.5, ×1.25)	15.73dBm (17.5, ×1.50)	16.19dBm (17.5, ×1.35)

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

3.4 Test Location

No.7 shielded room (2.76m (Width) × 3.76m (Depth) × 2.4m (Height)) for SAR testing.

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3.5 Confirmation before SAR testing

3.5.1 Average power for SAR test

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.

Step.1 Data rate check

The data rate check was measurement on one of the channel for 802.11b,g,a,n(20HT) and n(40HT) at each frequency band.

11b		11g		11a		11n(20HT)						11n(40HT)						
Mod (DSSS)	Data rate	Mod (OFDM)	Data rate	Mod (OFDM)	Data rate	MCS Index	Spatial Stream	Mod (OFDM)	MCS Index	Spatial Stream	Mod (OFDM)	MCS Index	Spatial Stream	Mod (OFDM)	MCS Index	Spatial Stream	Mod (OFDM)	
DBPSK	1 Mbps	BPSK	6 Mbps	BPSK	6 Mbps	MCS0	1	BPSK	MCS8	2	BPSK	MCS0	1	BPSK	MCS8	2	BPSK	MCS8
DQPSK	2 Mbps	BPSK	9 Mbps	BPSK	9 Mbps	MCS1	1	QPSK	MCS9	2	QPSK	MCS1	1	QPSK	MCS9	2	QPSK	MCS9
CCK	5.5 Mbps	QPSK	12 Mbps	QPSK	12 Mbps	MCS2	1	QPSK	MCS10	2	QPSK	MCS2	1	QPSK	MCS10	2	QPSK	MCS10
CCK	11 Mbps	QPSK	18 Mbps	QPSK	18 Mbps	MCS3	1	16QAM	MCS11	2	16QAM	MCS3	1	16QAM	MCS11	2	16QAM	MCS11
*Mod; Modulation	16QAM	24 Mbps	16QAM	24 Mbps	MCS4	1	16QAM	MCS12	2	16QAM	MCS4	1	16QAM	MCS12	2	16QAM	MCS12	2
	16QAM	36 Mbps	16QAM	36 Mbps	MCS5	1	64QAM	MCS13	2	64QAM	MCS5	1	64QAM	MCS13	2	64QAM	MCS13	2
	64QAM	48 Mbps	64QAM	48 Mbps	MCS6	1	64QAM	MCS14	2	64QAM	MCS6	1	64QAM	MCS14	2	64QAM	MCS14	2
	64QAM	54 Mbps	64QAM	54 Mbps	MCS7	1	64QAM	MCS15	2	64QAM	MCS7	1	64QAM	MCS15	2	64QAM	MCS15	2

*. The average power related with the data rate was measured on one of the channel for 802.11b/g/a/n(20HT)/n(40HT) modes.

Step.2 Decision of SAR test channel

The following operation mode, data rate and channels were determined by the SAR reference power measured. (Refer to Section 6.)

(default: KDB248227->)		default		SAR tested channel (1Tx)				SAR tested channel (2Tx)		Remarks (KDB248227)
Mode	MHz	Channel	b/g/n(20HT)	b	g	n(20HT)	n(40HT)	n(20HT)	n(40HT)	
11 b/g/n	2412	1	√	#(ant#0#1)	n/a(*1)	n/a(*1)	-	n/a(*4)	-	*1. Since the extrapolated maximum peak SAR for the maximum output channel was ≤1.6W/kg and the 1g averaged SAR was ≤0.8W/kg, the testing for other channels were omitted.
	2417	2	√	#(ant#0#1)	#(ant#0#1)	#(ant#0#1)	(2427MHz) #(ant#0#1)	n/a(*4)	(2422MHz) n/a(*4)	
	2437	6	√	n/a(*1)	n/a(*1)	n/a(*1)	n/a(*1)	n/a(*4)	n/a(*4)	
	2462	11	√	n/a(*1)	n/a(*1)	n/a(*1)	(2452MHz) n/a(*1)	n/a(*4)	(2452MHz) n/a(*4)	
11 a/n	5180	36	√	-	n/a(*1)	n/a(*3)	(5190MHz) n/a(*1)	n/a(*4)	(5190MHz) n/a(*4)	*2. Since the typical average power of n(40HT) was smaller than the corresponded 11a mode power and measured SAR(1g) of 11a mode was very small, SAR test of n(40HT) was only considered for the worst SAR antenna of 11a mode with highest power channel. *3. Since the average power of n(20HT) was smaller than the corresponded 11a power, SAR test was not applied to n(20HT) mode. *4. Since SPLSR (SAR to peak location separation ratio) was enough smaller than 0.04, SAR test of MIMO mode was reduced. (KDB447498)
	5200	40	√	-	-	-	-	-	-	
	5220	44	√	-	-	-	-	-	-	
	5240	48	√	-	n/a(*1)	n/a(*3)	(5230MHz) #(ant#0)	n/a(*4)	(5230MHz) n/a(*4)	
	5260	52	√	-	#(ant#0)	n/a(*3)	(5270MHz) n/a(*1)	n/a(*4)	(5270MHz) n/a(*4)	
	5280	56	√	-	-	-	-	-	-	
	5300	60	√	-	#(ant#1)	-	-	-	-	
	5320	64	√	-	-	n/a(*3)	(5310MHz) n/a(*1)	n/a(*4)	(5310MHz) n/a(*4)	
	5500	100	√	-	-	-	(5510MHz) n/a(*2)	n/a(*4)	(5510MHz) n/a(*4)	
	5520	104	√	-	n/a(*1)	n/a(*3)	-	n/a(*4)	-	
	5540	108	√	-	-	-	(5550MHz) #(ant#0)	-	(5550MHz) n/a(*4)	
	5560	112	√	-	-	-	-	-	-	
	5580	116	√	-	n/a(*1)	n/a(*3)	(5590MHz) n/a(*2)	n/a(*4)	(5590MHz) n/a(*4)	
	5600	120	√	-	-	-	-	-	-	
	5620	124	√	-	n/a(*1)	n/a(*3)	(5630MHz) n/a(*2)	n/a(*4)	(5630MHz) n/a(*4)	
	5640	128	√	-	-	-	-	-	-	
	5660	132	√	-	-	-	(5670MHz) n/a(*2)	-	(5670MHz) n/a(*4)	
	5680	136	√	-	#(ant#0#1)	n/a(*3)	-	n/a(*4)	-	
	5700	140	√	-	-	-	-	-	-	
	5745	149	√	-	#(ant#1)	n/a(*3)	(5755MHz) #(ant#0)	n/a(*4)	(5755MHz) n/a(*4)	
5765	153	√	-	-	-	-	-	-		
5785	157	√	-	n/a(*1)	n/a(*3)	(5795MHz) n/a(*2)	n/a(*4)	(5795MHz) n/a(*4)		
5805	161	√	-	#(ant#0)	-	-	-	-		
5825	165	√	-	n/a(*1)	n/a(*3)	-	n/a(*4)	-		

√ = "default test channels of requested by KDB248227", n/a = SAR test was not applied, # = SAR test was applied (max. power channel).

* = Possible 802.11a channels with maximum average output > the "default test channels"

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 = E² / η = P / (4 × π × r²) (η: Space impedance) → P = (E² × 4 × π × r²) / 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

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

Setup	Explanation of EUT setup position (* . Refer to Appendix 1 for test setup photographs.)	antenna #0		antenna #1	
		Antenna distance	SAR Tested /Reduced	Antenna distance	SAR Tested /Reduced
Front	The front surface (patient side) of EUT was touched to the Flat phantom.	10mm	Tested (*2)	10mm	Tested (*2)
Back-tilt (antenna#0)	The EUT was set tilt and the back surface (operator side) which was near antenna#0 was touched to the Flat phantom.	1.6mm	Reduced (*1)		
Back-tilt (antenna#1)	The EUT was set tilt and the back surface (operator side) which was near antenna#1 was touched to the Flat phantom.			1.6mm	Reduced (*1)
Back-flat	The middle of back surface (operator side) of EUT was touched to the Flat phantom.	4mm	Reduced (*1)	4mm	Reduced (*1)
Long side (antenna#0)	The long side edge surface (near antenna #0 side) of EUT was touched to the Flat phantom.	11mm	Reduced (*1)	289mm	Reduced (*1)
Long side	The long side edge surface (opposite to antenna#0) of EUT was touched to the Flat phantom.	370mm	Reduced (*1)	62mm	Reduced (*1)
Short side (antenna#1)	The short side edge surface (near antenna #1 side) of EUT was touched to the Flat phantom.	343mm	Reduced (*1)	11mm	Reduced (*1)
Short side	The short side edge surface (opposite to antenna#1) of EUT was touched to the Flat phantom.	84mm	Reduced (*1)	445m	Reduced (*1)

*. Antenna distance: this means the distance from the antenna inside a EUT to the outer surface of EUT form which an operator may touch.
*. Size of EUT: 383.5 × 459.8 × 15 (thickness) [mm]

*1. Since this EUT is the medical device, the EUT is only used under the guidance of a doctor or a qualified person. The possibility of the maximum RF human exposure is only a body/head of the patient who comes in contact directly on the front surface side (patient side) of the EUT. Therefore, the SAR test was only applied to the front surface side (patient side) of the EUT.

*2. SAR test reduction consideration

KDB 447498 D01 (v05) was taken into consideration as other approaches to reduce SAR test.
<Standalone SAR estimation>

Mode	Band	Position	Minimum distance	Upper frequency	Max. power (with tune-up tolerance)	Estimate SAR(1g) (standalone)	Remarks
11g	2.4GHz	Front (Patient side)	10mm	2.462 GHz	19.5 dBm (89 mW)	1.86 W/kg	>0.4W/kg, SAR test is required.
11a	W52/53			5.32 GHz	15.0 dBm (32 mW)	0.98 W/kg	>0.4W/kg, SAR test is required.
11a	W56			5.7 GHz	17.5 dBm (56 mW)	1.78 W/kg	>0.4W/kg, SAR test is required.
11a	W58			5.825 GHz	17.5 dBm (56 mW)	1.80 W/kg	>0.4W/kg, SAR test is required.

Calculating formula: Estimate standalone SAR(1g) = [(max.power, mW) / (min.test separation distance, mm)] × [√f(GHz)] / [7.5]

Paraphrasing 1), Clause 4.3.1, KDB 447498 D01 (v05) gives the following formula to calculate the SAR(1g) test exclusion thresholds for 100MHz-6GHz at test separation distance ≤50mm.

$$[(\text{max.power of channel, including tune-up tolerance, mW}) / (\text{min.test separation distance, mm})] \times [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ (for SAR(1g))} \dots \dots \dots \text{(formula (1))}$$

If power is calculated from the upper formula (1);

$$[\text{SAR(1g) test exclusion thresholds, mW}] = 3 \times [\text{test separation distance, mm}] / [\sqrt{f(\text{GHz})}] \dots \dots \dots \text{(formula (2))}$$

Paraphrasing 2), Clause 4.3.1, KDB 447498 D01 (v05) gives the following formula to calculate the SAR(1g) test exclusion thresholds for 1.5-6GHz at test separation distance >50mm.

$$[\text{test exclusion thresholds, mW}] = [(Power allowed at numeric threshold for 50mm in formula (1))] + [(test separation distance, mm) - (50mm)] \times 10 \cdot \text{(formula (3))}$$

According to this formula, the calculated results in typical antenna distance of platform are shown in the following table.

Upper frequency in band [GHz]	SAR(1g) test exclusion thresholds [mW]					EUT's maximum power [mW] (including tune-up tolerance)
	5	10	25	46	47	
2.462	10 (9.8dBm)	19 (12.8dBm)	-	-	90 (19.5dBm)	89 (19.5dBm)
5.32	7 (8.1dBm)	13 (11.1dBm)	33 (15.1dBm)	-	-	32 (15.0dBm)
5.7	6 (8.0dBm)	13 (11.0dBm)	-	58 (17.6dBm)	-	56 (17.5dBm)
5.825	6 (7.9dBm)	12 (10.9dBm)	-	57 (17.6dBm)	-	56 (17.5dBm)

*. The measured average power of EUT was shown in Section 6: Confirmation before SAR testing.

* Simultaneous transmission evaluation

Paraphrasing 2) and 3), Clause 4.3.2, KDB 447498 D01 (v05) gives the following formula to calculate the simultaneous transmission SAR test exclusion limit. (SPLSR: SAR to peak location separation ratio must be ≤ 0.04 for antenna pair.)

Mode	Data rate	Band	Position	Minimum distance	Upper frequency	Max. power (with tune-up tolerance)	Estimate SAR(1g)			ant#0<->#1 distance	SPLSR	SAR test apply?
							Ant#0	Ant#1	Ant#0+#1			
n20	MCS8	2.4GHz	Front (Patient side)	10mm	2.462GHz	17.0dBm (50mW)	1.05 W/kg	1.05 W/kg	2.1 W/kg	417mm	0.0050	Reduced, <0.04(SPLSR)
n20	MCS8	W52/53			5.32GHz	13.5dBm (22mW)	0.68 W/kg	0.68 W/kg	1.36 W/kg	417mm	0.0033	
n20	MCS8	W56			5.7GHz	16.0dBm (40mW)	1.27 W/kg	1.27 W/kg	2.54 W/kg	417mm	0.0061	
n20	MCS8	W58			5.825GHz	16.0dBm (40mW)	1.29 W/kg	1.29 W/kg	2.58 W/kg	417mm	0.0062	

*. Calculating formula: Estimate standalone SAR(1g) = [(max.power, mW) / (min.test separation distance, mm)] × [√f(GHz)] / [7.5]

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

Step 1	Change the operation mode on each antenna independently with highest output power channel.
Step 2	Repeat Step1 for other frequency band.

*. 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

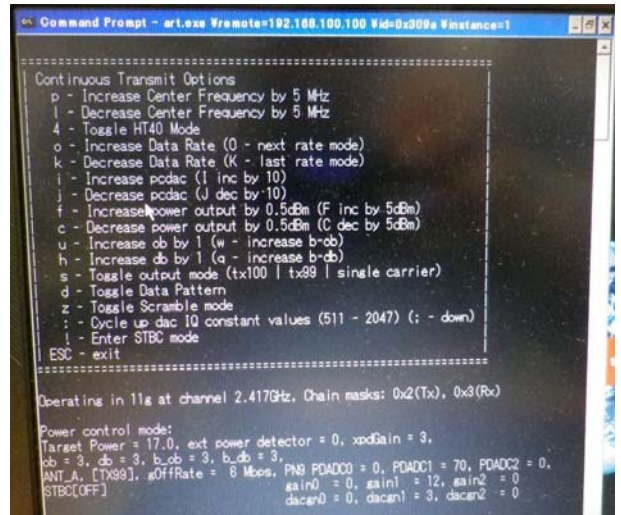
This EUT has IEEE.802.11b,g,a,11n(20HT) and 11n(40HT) continuous transmitting modes. The frequency and the operation mode which carried out the SAR test are shown below.

Operation mode	11b	11g	11n(20HT)		11n(40HT)		11a	11n(20HT)		11n(40HT)		
			(1xSS)	(2xSS)	(1xSS)	(2xSS)		(1xSS)	(2xSS)	(1xSS)	(2xSS)	
Tx frequency band	2412-2472MHz				2412-2462MHz		W52/53: 5180-5320MHz				5190-5310MHz	
Bandwidth [MHz]	20	20	20	20	40	40	20	20	20	40	40	
SAR Tested/Reduced?	Tested	Tested	Tested	Reduced(*4)	Tested	Reduced(*4)	Tested	Reduced(*3)	Reduced(*4)	Tested	Reduced(*4)	
Tested frequency [MHz]	ant.#0	2412(*1)	2417(*1)	2417(*1)	-	2427(*1)	-	5260(*1)	-	-	5230(*1)	
	ant.#1	2412(*1)	2417(*1)	2417(*1)		2427(*1)		5300(*1)	-	-	-(*2)	-
Highest power condition	Modulation	DBPSK /DSSS	BPSK /OFDM	BPSK /OFDM	-	BPSK /OFDM	-	BPSK /OFDM	-	-	BPSK /OFDM	
	Data rate	1Mbps	6Mbps	MCS0	-	MCS0	-	MCS0	-	-	MCS0	

Operation mode	11a	11n(20HT)		11n(40HT)		11a	11n(20HT)		11n(40HT)			
		(1xSS)	(2xSS)	(1xSS)	(2xSS)		(1xSS)	(2xSS)	(1xSS)	(2xSS)		
Tx frequency band	W56: 5500-5700MHz				5510-5670MHz		W58: 5745-5825MHz				5755, 5795MHz	
Bandwidth [MHz]	20	20	20	40	40	20	20	20	40	40		
SAR Tested/Reduced?	Tested	Reduced(*3)	Reduced(*4)	Tested	Reduced(*4)	Tested	Reduced(*3)	Reduced(*4)	Tested	Reduced(*4)		
Tested frequency [MHz]	ant.#0	5680(*1)	-	5550(*1)	-	5805(*1)	-	-	5755(*1)	-		
	ant.#1	5680(*1)	-	-(*2)	-	5745(*1)	-	-	-(*2)	-		
Highest power condition	Modulation	BPSK /OFDM	-	BPSK /OFDM	-	BPSK /OFDM	-	-	BPSK /OFDM	-		
	Data rate	6Mbps	-	-	MCS0	6Mbps	-	-	MCS0	-		

Tx Controlled software: ART v09 (Build 34)
Mode: Continuous transmit mode.
Tx antenna chain: Ant#0=100, Ant#0=010, Ant#0+Ant#1(MIMO)=110.
Frequency: Selected the target frequency. / Data Rate: Selected the target data rate.
HT40: Selected when 11n(40HT) was tested.
Setting target power: The default power value was used.
*: As for parameters other than the above, the initial value was used.

- *. SS: Spatial Stream
- *1. (KDB248227) Since the extrapolated maximum peak SAR for the maximum output channel was $\leq 1.6W/kg$ and the 1g averaged SAR was $\leq 0.8W/kg$, the testing for other channels were omitted.
- *2. Since the typical average power of n(40HT) was smaller than the corresponded 11a mode power and measured SAR(1g) of 11a mode was very small, SAR test of n(40HT) was only considered for the worst SAR antenna of 11a mode with highest power channel.
- *3. (KDB248227) Since the average power of n(20HT) was smaller than the corresponded 11a power, SAR test was not applied to n(20HT) mode.
- *4. (KDB447498) Since SPLSR (SAR to peak location separation ratio) was enough smaller than 0.04, SAR test of MIMO mode was reduced.



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) (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 %	

*. 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 SAR Measurement 100 MHz to 6 GHz v01r01 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.

6.1.3 5500-5700MHz: W56 band (cont'd)

Mode	Freq. [MHz]	Data rate [Mbps]	Power spec.		Duty factor Meas. [dB]	Standalone: Antenna #0 (chain #0)					Standalone: Antenna #1 (chain #1)					MIMO Ant.#0+Ant.#1					Power Tune-up
			Typ. target [dBm]	Max. [dBm]		Set pwr. [dB]	Ave. [dBm]	Δ target [dB]	Δ Max. [dB]	Apply SAR test?	Set pwr. [dBm]	Ave. [dBm]	Δ target [dB]	Δ Max. [dB]	Apply SAR test?	MIMO target [dBm]	MIMO max. [dBm]	SUM Ave. [dBm]	Δ target [dB]	Δ Max. [dB]	
11n (20HT) (2Tx)	5500	MCS8	13.5	16.0	0.04	13.5	13.98	0.48	-2.02	-	13.5	13.74	0.24	-2.26	-	16.5	19.0	16.87	0.37	-2.13	default
	5500	MCS9	13.5	16.0	0.12	13.5	13.95	0.45	-2.05	-	13.5	13.75	0.25	-2.25	-	16.5	19.0	16.86	0.36	-2.14	default
	5500	MCS11	13.5	16.0	0.15	13.5	13.98	0.48	-2.02	-	13.5	13.83	0.33	-2.17	-	16.5	19.0	16.92	0.42	-2.08	default
	5500	MCS12	13.5	16.0	0.22	13.5	14.05	0.53	-1.97	-	13.5	13.79	0.29	-2.21	-	16.5	19.0	16.92	0.42	-2.08	default
	5500	MCS13	12.5	15.0	0.28	12.5	13.19	0.69	-1.81	-	12.5	12.45	-0.05	-2.55	-	15.5	18.0	15.85	0.35	-2.15	default
	5500	MCS14	10.5	13.0	0.31	10.5	11.42	0.92	-1.58	-	10.5	10.50	0.00	-2.50	-	13.5	16.0	14.00	0.50	-2.00	default
	5500	MCS15	8.5	11.0	0.33	8.5	9.44	0.94	-1.56	-	8.5	8.78	0.28	-2.22	-	11.5	14.0	12.13	0.63	-1.87	default
	5520	MCS8	13.5	16.0	0.04	13.5	13.99	0.49	-2.01	-	13.5	13.80	0.30	-2.20	-	16.5	19.0	16.91	0.41	-2.09	default
	5540	MCS8	13.5	16.0	0.04	13.5	14.04	0.54	-1.96	-	13.5	13.93	0.43	-2.07	-	16.5	19.0	17.00	0.50	-2.00	default
	5560	MCS8	13.5	16.0	0.04	13.5	14.01	0.51	-1.99	-	13.5	14.00	0.50	-2.00	-	16.5	19.0	17.02	0.52	-1.98	default
	5580	MCS8	13.5	16.0	0.04	13.5	14.01	0.51	-1.99	-	13.5	14.17	0.67	-1.83	-	16.5	19.0	17.10	0.60	-1.90	default
	5600	MCS8	13.5	16.0	0.04	13.5	13.98	0.48	-2.02	-	13.5	14.07	0.57	-1.93	-	16.5	19.0	17.04	0.54	-1.96	default
	5620	MCS8	13.5	16.0	0.04	13.5	13.96	0.46	-2.04	-	13.5	14.13	0.63	-1.87	-	16.5	19.0	17.06	0.56	-1.94	default
	5640	MCS8	13.5	16.0	0.04	13.5	13.98	0.48	-2.02	-	13.5	14.02	0.52	-1.98	-	16.5	19.0	17.01	0.51	-1.99	default
	5660	MCS8	13.5	16.0	0.04	13.5	14.00	0.50	-2.00	-	13.5	14.02	0.52	-1.98	-	16.5	19.0	17.02	0.52	-1.98	default
	5680	MCS8	13.5	16.0	0.04	13.5	14.20	0.70	-1.80	-	13.5	14.20	0.70	-1.80	-	16.5	19.0	17.21	0.71	-1.79	default
	5700	MCS8	13.5	16.0	0.04	13.5	13.97	0.47	-2.03	-	13.5	13.89	0.39	-2.11	-	16.5	19.0	16.94	0.44	-2.06	default
	5520	MCS8	13.5	16.0	0.04	14.0	14.44	0.94	-1.56	no(*)	14.0	14.31	0.81	-1.69	no(*)	16.5	19.0	17.39	0.89	-1.61	tune-up
	5580	MCS8	13.5	16.0	0.04	14.0	14.45	0.95	-1.55	no(*)	14.0	14.71	1.21	-1.29	no(*)	16.5	19.0	17.59	1.09	-1.41	tune-up
	5620	MCS8	13.5	16.0	0.04	14.0	14.52	1.02	-1.48	no(*)	14.0	14.65	1.15	-1.35	no(*)	16.5	19.0	17.60	1.10	-1.40	tune-up
5680	MCS8	13.5	16.0	0.04	14.0	14.72	1.22	-1.28	no(*)	14.0	14.76	1.26	-1.24	no(*)	16.5	19.0	17.75	1.25	-1.25	tune-up	
11n (40HT) (2Tx)	5510	MCS8	11.0	13.5	0.08	11.0	11.80	0.80	-1.70	-	11.0	11.23	0.23	-2.27	-	14.0	16.5	14.53	0.53	-1.97	default
	5510	MCS9	11.0	13.5	0.15	11.0	11.70	0.70	-1.80	-	11.0	11.17	0.17	-2.33	-	14.0	16.5	14.45	0.45	-2.05	default
	5510	MCS10	11.0	13.5	0.22	11.0	11.75	0.75	-1.75	-	11.0	11.21	0.21	-2.29	-	14.0	16.5	14.50	0.50	-2.00	default
	5510	MCS11	11.0	13.5	0.27	11.0	11.78	0.78	-1.72	-	11.0	11.20	0.20	-2.30	-	14.0	16.5	14.51	0.51	-1.99	default
	5510	MCS12	11.0	13.5	0.38	11.0	11.75	0.75	-1.75	-	11.0	11.15	0.15	-2.35	-	14.0	16.5	14.47	0.47	-2.03	default
	5510	MCS13	11.0	13.5	0.45	11.0	11.75	0.75	-1.75	-	11.0	11.17	0.17	-2.33	-	14.0	16.5	14.48	0.48	-2.02	default
	5510	MCS14	10.0	12.5	0.48	11.0	10.82	0.82	-1.68	-	11.0	10.00	0.00	-2.50	-	14.0	16.5	13.44	0.44	-2.06	default
	5510	MCS15	8.0	10.5	0.51	11.0	9.02	1.02	-1.48	-	11.0	8.57	0.57	-2.13	-	14.0	16.5	11.72	0.72	-1.78	default
	5550	MCS8	11.0	13.5	0.08	11.0	11.84	0.84	-1.66	-	11.0	11.45	0.45	-2.05	-	14.0	16.5	14.66	0.66	-1.84	default
	5590	MCS8	11.0	13.5	0.08	11.0	11.75	0.75	-1.75	-	11.0	11.50	0.50	-2.00	-	14.0	16.5	14.64	0.64	-1.86	default
	5630	MCS8	11.0	13.5	0.08	11.0	11.73	0.73	-1.77	-	11.0	11.55	0.55	-1.95	-	14.0	16.5	14.65	0.65	-1.85	default
	5670	MCS8	11.0	13.5	0.08	11.0	11.66	0.66	-1.84	-	11.0	11.61	0.61	-1.89	-	14.0	16.5	14.65	0.65	-1.85	default
	5510	MCS8	11.0	13.5	0.08	12.0	12.83	1.83	-0.67	no(*)	12.0	12.28	1.28	-1.22	no(*)	14.0	16.5	15.57	1.57	-0.93	tune-up
	5550	MCS8	11.0	13.5	0.08	12.0	12.78	1.78	-0.72	no(*)	12.0	12.43	1.43	-1.07	no(*)	14.0	16.5	15.62	1.62	-0.88	tune-up
	5670	MCS8	11.0	13.5	0.08	12.0	12.69	1.69	-0.81	no(*)	12.0	12.70	1.70	-0.80	no(*)	14.0	16.5	15.71	1.71	-0.79	tune-up

*. SAR test was applied.

(for table of 6.1.3: 5500-5700MHz)

- *1. (KDB248227) Since the extrapolated maximum peak SAR for the maximum output channel was ≤1.6W/kg and the 1g averaged SAR was ≤0.8W/kg, the testing for other channels were omitted. (By Clause 4.3.3 of KDB447498 D01, 1g averaged SAR (reported) was ≤0.4W/kg, when the Tx band is ≥ 200MHz.)
- *2. (KDB248227) Since the average power of 11n(20HT)(SISO)(typical=13.5dBm) and 11n(40HT)(SISO)(typical=11.0dBm) were enough lower than the corresponded 11a power (typical=15.0dBm) and measured SAR(1g) of 11a mode was very small, SAR test was reduced for 11n(20HT)(SISO) mode and SAR test of n(40HT) was only considered for the worst SAR antenna of 11a mode with highest power channel.
- *3. (KDB447498) Since SPLSR (SAR to peak location separation ratio) was enough smaller than 0.04, SAR test of MIMO mode was reduced.

*. Freq.: Frequency, Typ.: Typical, Max.: Maximum, Power spec.: Power specification, Set pwr.: Setting power for the measurement, Ave.: Average

*. Calculating formula: Δ target(dB)= (measured power, dBm) - (Typ.target power, dBm); Δ Max.(dB)= (measured power, dBm) - (Max. specification power, dBm)
Results (Ave, dBm) = (P/M Reading, dBm)+(Cable loss, dBm)+(Attenuator, dBm)+(duty factor, dBm), where (duty factor, dBm)=10 × log (100/(duty cycle, %))

*. Date measured May 7, 8, 9 and 20, 2014 / measured by: T. Arai, H. Shirasawa, S. Takano, H. Naka (23~27deg C./37~50%RH, at M/R#1 and Pre-S/R#7)

*. Uncertainty of antenna port conducted test; Power measurement uncertainty above 1GHz for this test was: (±) 1.5dB

6.1.4 5745-5825MHz: W58 band

Mode	Freq. [MHz]	Data rate [Mbps]	Power spec.		Duty factor Meas. [dB]	Standalone: Antenna #0 (chain #0)					Standalone: Antenna #1 (chain #1)					MIMO Ant.#0+Ant.#1					Power Tune-up		
			Typ. target [dBm]	Max. [dBm]		Set pwr. [dB]	Ave. [dBm]	Δ target [dB]	Δ Max. [dB]	Apply SAR test?	Set pwr. [dBm]	Ave. [dBm]	Δ target [dB]	Δ Max. [dB]	Apply SAR test?	MIMO target [dBm]	MIMO max. [dBm]	SUM Ave. [dBm]	Δ target [dB]	Δ Max. [dB]			
11a	5745	6	15.0	17.5	0.02	15.0	15.56	0.56	-1.94	no(*1)	15.0	15.17	0.17	-2.33	-	-	-	-	-	-	default		
	5765	6	15.0	17.5	0.02	15.0	15.62	0.62	-1.88	no(*1)	15.0	15.08	0.08	-2.42	-	-	-	-	-	-	default		
	5785	6	15.0	17.5	0.02	15.0	15.70	0.70	-1.80	no(*1)	15.0	14.90	-0.10	-2.60	-	-	-	-	-	-	default		
	5805	6	15.0	17.5	0.02	15.0	15.73	0.73	-1.77	Yes	15.0	15.09	0.09	-2.41	-	-	-	-	-	-	default		
	5825	6	15.0	17.5	0.02	15.0	15.66	0.66	-1.84	-	15.0	15.16	0.16	-2.34	-	-	-	-	-	-	default		
	5745	6	15.0	17.5	0.02	-	-	-	-	-	16.0	16.19	1.19	-1.31	Yes	-	-	-	-	-	-	tune-up	
	5765	6	15.0	17.5	0.02	-	-	-	-	-	16.0	15.90	0.90	-1.60	-	-	-	-	-	-	-	tune-up	
	5785	6	15.0	17.5	0.02	-	-	-	-	-	16.0	15.91	0.91	-1.59	no(*1)	-	-	-	-	-	-	tune-up	
	5805	6	15.0	17.5	0.02	-	-	-	-	-	16.0	15.83	0.83	-1.67	-	-	-	-	-	-	-	tune-up	
	5825	6	15.0	17.5	0.02	-	-	-	-	-	16.0	15.97	0.97	-1.53	no(*1)	-	-	-	-	-	-	tune-up	
11n (20HT) (1Tx)	5745	MCS0	13.5	16.0	0.02	13.5	14.07	0.57	-1.93	no(*2)	13.5	13.64	0.14	-2.36	no(*2)	-	-	-	-	-	-	default	
	5765	MCS0	13.5	16.0	0.02	13.5	14.28	0.78	-1.72	no(*2)	13.5	13.49	-0.01	-2.51	-	-	-	-	-	-	-	default	
	5785	MCS0	13.5	16.0	0.02	13.5	14.00	0.50	-2.00	-	13.5	13.20	-0.30	-2.80	no(*2)	-	-	-	-	-	-	default	
	5805	MCS0	13.5	16.0	0.02	13.5	14.13	0.63	-1.87	-	13.5	13.24	-0.26	-2.76	-	-	-	-	-	-	-	default	
	5825	MCS0	13.5	16.0	0.02	13.5	14.12	0.62	-1.88	no(*2)	13.5	13.34	-0.16	-2.66	no(*2)	-	-	-	-	-	-	default	
11n (40HT) (1Tx)	5755	MCS0	11.0	13.5	0.05	11.0	11.61	0.61	-1.89	-	11.0	10.93	-0.07	-2.57	-	-	-	-	-	-	-	default	
	5795	MCS0	11.0	13.5	0.05	11.0	11.35	0.35	-2.15	-	11.0	10.40	-0.60	-3.10	-	-	-	-	-	-	-	default	
	5795	MCS0	11.0	13.5	0.05	11.5	12.15	1.15	-1.35	Yes	12.5	12.43	1.43	-1.07	no(*2)	-	-	-	-	-	-	tune-up	
11n (20HT) (2Tx)	5745	MCS8	13.5	16.0	0.04	13.5	14.02	0.52	-1.98	-	13.5	13.56	0.06	-2.44	-	-	16.5	19.0	16.81	0.31	-2.19	default	
	5765	MCS8	13.5	16.0	0.04	13.5	14.08	0.58	-1.92	-	13.5	13.43	-0.07	-2.57	-	-	16.5	19.0	16.78	0.28	-2.22	default	
	5785	MCS8	13.5	16.0	0.04	13.5	14.04	0.54	-1.96	-	13.5	13.26	-0.24	-2.74	-	-	16.5	19.0	16.68	0.18	-2.32	default	
	5805	MCS8	13.5	16.0	0.04	13.5	14.14	0.64	-1.86	-	13.5	13.26	-0.24	-2.74	-	-	16.5	19.0	16.73	0.23	-2.27	default	
	5825	MCS8	13.5	16.0	0.04	13.5	14.16	0.66	-1.84	-	13.5	13.34	-0.16	-2.66	-	-	16.5	19.0	16.78	0.28	-2.22	default	
	5745	MCS8	13.5	16.0	0.04	14.5	14.86	1.36	-1.14	no(*3)	14.5	14.43	0.93	-1.57	no(*3)	-	-	16.5	19.0	17.66	1.16	-1.34	tune-up
	5785	MCS8	13.5	16.0	0.04	14.5	15.06	1.56	-0.94	no(*3)	14.5	14.31	0.81	-1.69	no(*3)	-	-	16.5	19.0	17.71	1.21	-1.29	tune-up
	5825	MCS8	13.5	16.0	0.04	14.5	15.22	1.72	-0.78	no(*3)	14.5	14.49	0.99	-1.51	no(*3)	-	-	16.5	19.0	17.88	1.38	-1.12	tune-up
	11n (40HT) (2Tx)	5755	MCS8	11.0	13.5	0.08	11.0	11.64	0.64	-1.86	-	11.0	10.98	-0.02	-2.52	-	-	14.0	16.5	14.33	0.33	-2.17	default
		5795	MCS8	11.0	13.5	0.08	11.0	11.35	0.35	-2.15	-	11.0	10.38	-0.62	-3.12	-	-	14.0	16.5	13.90	-0.10	-2.60	default
5755		MCS8	11.0	13.5	0.08	12.5	13.15	2.15	-0.35	no(*3)	12.5	12.74	1.74	-0.76	no(*3)	-	-	14.0	16.5	15.96	1.96	-0.54	tune-up
5795	MCS8	11.0	13.5	0.08	12.5	12.94	1.94	-0.56	no(*3)	12.5	12.00	1.00	-1.50	no(*3)	-	-	14.0	16.5	15.51	1.51	-0.99	tune-up	

*. SAR test was applied.

- (KDB248227) Since the extrapolated maximum peak SAR for the maximum output channel was $\leq 1.6W/kg$ and the 1g averaged SAR was $\leq 0.8W/kg$, the testing for other channels were omitted. (* By Clause 4.3.3 of KDB447498 D01, 1g averaged SAR (reported) was $\leq 0.8W/kg$, when the Tx band is $\leq 100MHz$.)
- (KDB248227) Since the average power of 11n(20HT)(SISO)(typical=13.5dBm) and 11n(40HT)(SISO) (typical=11.0dBm) were enough lower than the corresponded 11a power(typical=15.0dBm) and measured SAR(1g) of 11a mode was very small, SAR test was reduced for 11n(20HT)(SISO) mode and SAR test of n(40HT) was only considered for the worst SAR antenna of 11a mode with highest power channel.
- (KDB447498) Since SPLSR (SAR to peak location separation ratio) was enough smaller than 0.04, SAR test of MIMO mode was reduced.

*. Freq.: Frequency, Typ.: Typical, Max.: Maximum, Power spec.: Power specification, Set pwr.: Setting power for the measurement, Ave.: Average
*. Calculating formula: Δ target(dB)=(measured power, dBm) - (Typ.target power, dBm); Δ Max.(dB)=(measured power, dBm) - (Max. specification power, dBm)
Results (Ave, dBm) = (P/M Reading, dBm)+(Cable loss, dBm)+(Attenuator, dBm)+(duty factor, dBm), where (duty factor, dBm)= $10 \times \log(100/(\text{duty cycle, \%}))$
*. Date measured May 7, 8, 9 and 20, 2014 / measured by: T. Arai, H. Shirasawa, S. Takano, H. Naka (23~27deg C./37~50%RH, at M/R#1 and Pre-S/R#7)
*. Uncertainty of antenna port conducted test; Power measurement uncertainty above 1GHz for this test was: (\pm) 1.5dB

SECTION 7: Measurement results

7.1 SAR test results (Body)

Target Frequency [MHz]	Liquid type	Liquid parameters (Body liquid) (*a)						ASAR Coefficients (*c)		Date measured				
		Permittivity (εr) [-]			Conductivity [S/m]			Temp. [deg.C]	Depth [mm]					
		Target	Measured		Limit (*b)	Target	Measured				Limit (*b)			
2412	Body	52.75	50.74	-3.8	-5% ≤ εr-meas ≤ 0%	1.914	1.917	+0.9	0% ≤ σ-meas ≤ +5%	22.2	155	+0.94	not required.	September 12, 2014 before SAR test
2417		52.74	50.70	-3.9		1.918	1.925	+1.0		+1.04	not required.			
2427		52.73	50.70	-3.9		1.928	1.949	+1.1		+1.41	not required.			
5230		48.97	47.69	-2.6		5.334	5.471	+2.6		+0.45	not required.			
5260		48.93	47.59	-2.7		5.369	5.527	+2.9		+0.46	not required.			
5300		48.88	47.62	-2.6		5.416	5.543	+2.3		+0.44	not required.			
5550		48.54	47.07	-3.0		5.708	5.898	+3.3		+0.46	not required.			
5680		48.36	47.00	-2.8		5.860	6.073	+3.6		+0.39	not required.			
5745		48.27	46.78	-3.1		5.936	6.148	+3.6		+0.45	not required.			
5755		48.26	46.96	-2.7		5.947	6.182	+3.9		+0.36	not required.			
5805	48.19	46.76	-3.0	6.006	6.264	+4.3	+0.40	not required.	22.8	135	+0.46	not required.	September 9, 2014 before SAR test	
										22.8	136	+0.39	not required.	September 8, 2014 before SAR test

SAR measurement results (Body simulated tissue)													Reported SAR (1g) [W/kg]				
Mode	[MHz] (CH) (*1)	Data rate	EUT setup conditions				Liquid temp. [deg.C.]	Power drift [dB]	SAR (1g) [W/kg]			SAR plot # in Appendix 2-2	Reported SAR (1g) [W/kg]				
			Antenna * SAR measured.	Setup	Gap [mm]	Battery ID			maximum value of multi-peak	Measured	ASAR [%]		ASAR corrected	Average power [dBm]	Max. power [dBm]	Scaled factor	Tuned-up SAR (*d)
11b	2412(1)	1Mbps	ant.#0	Front (Patient side)	0	#3	22.3/22.4	-0.10	0.023	+0.94	n/a (*c)	Plot 1-1	14.47	16.0	×1.42	0.033	
11g	2417(2)	6Mbps			0	#3	22.4/22.5	0.04	0.023	+1.04	n/a (*c)	Plot 1-2	17.77	19.5	×1.49	0.034	
n(20)(1Tx)	2417(2)	MCS0			0	#2	22.5/22.6	0.18	0.022	+1.04	n/a (*c)	Plot 1-3	15.00	17.0	×1.58	0.035	
n(40)(1Tx)	2427(4)	MCS0			0	#3	22.6/22.6	-0.04	0.0097	+1.41	n/a (*c)	Plot 1-4	14.19	16.0	×1.52	0.015	
11b	2412(1)	1Mbps	ant.#1	Front (Patient side)	0	#2	22.6/22.7	0.03	0.021	+0.94	n/a (*c)	Plot 1-5	15.17	16.0	×1.21	0.025	
11g	2417(2)	6Mbps			0	#3	22.7/22.7	0.20	0.021	+1.04	n/a (*c)	Plot 1-6	18.08	19.5	×1.39	0.029	
n(20)(1Tx)	2417(2)	MCS0			0	#3	22.7/22.7	0.01	0.021	+1.04	n/a (*c)	Plot 1-7	15.76	17.0	×1.33	0.028	
n(40)(1Tx)	2427(4)	MCS0			0	#2	22.7/22.7	0.20	0.0061	+1.41	n/a (*c)	Plot 1-8	14.76	16.0	×1.33	0.008	
11a	5260(52)	6Mbps	ant.#0	Front (Patient side)	0	#2	23.0/23.1	0.05	0.113	+0.46	n/a (*c)	Plot 2-1	13.29	15.0	×1.48	0.17	
n(40)(1Tx)	5230(46)	MCS0			0	#3	23.1/23.1	0.12	0.083	+0.45	n/a (*c)	Plot 2-2	11.97	13.5	×1.42	0.12	
11a	5300(60)	6Mbps	ant.#1	Front (Patient side)	0	#2	22.9/23.1	0.01	0.098	+0.44	n/a (*c)	Plot 2-3	13.94	15.0	×1.28	0.13	
11a	5680(136)	6Mbps	ant.#0	Front (Patient side)	0	#2	22.9/23.0	-0.15	0.140	+0.39	n/a (*c)	Plot 2-4	16.01	17.5	×1.41	0.20	
n(40)(1Tx)	5550(110)	MCS0			0	#3	23.0/23.0	0.03	0.095	+0.46	n/a (*c)	Plot 2-5	11.83	13.5	×1.47	0.14	
11a	5680(136)	6Mbps	ant.#1	Front (Patient side)	0	#2	22.9/22.9	-0.10	0.124	+0.39	n/a (*c)	Plot 2-6	16.53	17.5	×1.25	0.16	
11a	5805(161)	6Mbps	ant.#0	Front (Patient side)	0	#3	22.8/22.9	-0.20	0.134	+0.40	n/a (*c)	Plot 2-7	15.73	17.5	×1.50	0.20	
n(40)(1Tx)	5755(151)	MCS0			0	#2	23.0/23.0	0.10	0.095	+0.36	n/a (*c)	Plot 2-8	12.15	13.5	×1.36	0.13	
11a	5745(149)	6Mbps	ant.#1	Front (Patient side)	0	#3	23.0/23.1	0.05	0.100	+0.45	n/a (*c)	Plot 2-9	16.19	17.5	×1.35	0.14	

*. Since this EUT is the medical device, the EUT is only used under the guidance of a doctor or a qualified person. The possibility of the maximum RF human exposure is only a body/head of the patient who comes in contact directly on the front surface side (patient side) of the EUT. Therefore, the SAR test was only applied to the front surface side (patient side) of the EUT.

- Notes: *1. At the highest output power channel, since the extrapolated maximum peak SAR for the maximum output channel was ≤1.6W/kg and the 1g averaged SAR was ≤0.8W/kg, the testing for other channels were omitted. (KDB248227)
- *. Gap: It is the separation distance between the nearest position of platform outer surface and the bottom outer surface of phantom; n/a: not applied.
- *. Battery No. #2 and #3 were same model. Refer to Appendix 1 for more details.
- *. During test, the EUT was operated without all signal interface cables (except LAN cable for the Tx control) and with a full-charged battery.
- *. Calibration frequency of the SAR measurement probe (and used conversion factors)

SAR test frequency	Probe calibration frequency	Validity	Conversion factor	Uncertainty
2412, 2417, 2427MHz	2450MHz	within ±50MHz of calibration frequency	6.88	±12.0%
5230MHz	5200MHz	within ±50MHz of calibration frequency	4.35	±13.1%
5260, 5300MHz	5300MHz	within ±50MHz of calibration frequency	4.18	±13.1%
5550, 5680MHz	5600MHz	within ±110MHz of calibration frequency	3.81	±13.1%
5745, 5805MHz	5800MHz	within ±110MHz of calibration frequency	4.05	±13.1%

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

- *a. The target value is a parameter defined in Appendix A of KDB865664 D01, the dielectric parameters suggested for head and body tissue simulating liquid are given at 2000, 2450, 3000 and 5800MHz. Parameters for the frequencies 2000-3000, 3000-5800MHz were obtained using linear interpolation, for above 5800MHz were obtained using linear extrapolation (Refer to appendix 3-4)
- *b. Refer to KDB865664 D01, item 2), Clause 2.6; "When nominal tissue dielectric parameters are recorded in the probe calibration data; for example, only target values and tolerance are reported, the measured εr and σ of the liquid used in routine measurements must be: ≤ the target εr and ≥ the target σ values and also within 5% of the required target dielectric parameters."
- *c. The coefficients are parameters defined in clause E.3.3.2, IEEE Std 1528(2013). Since the measured liquid parameters were ≤ the target εr and ≥ the target σ values and also within 5% of the required target dielectric parameters, the measured SAR was not compensated by ΔSAR coefficients (* Clause 2) of 2.6, KDB865664 D01).
 $\Delta SAR(1g) = C_{\epsilon r} \times \Delta \epsilon_r + C_{\sigma} \times \Delta \sigma$, $C_{\epsilon r} = -7.854E-4 \times \epsilon_r^2 + 9.402E-3 \times \epsilon_r - 2.742E-2 \times \epsilon_r + 0.2026$ / $C_{\sigma} = 9.804E-3 \times \sigma^2 - 8.661E-2 \times \sigma + 2.981E-2 \times \sigma + 0.7829$
- *d. Tuned-up SAR by scaled factor: Accordance with KDB 447498 D01; "When SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance (clause 4, 4.1, 4)".
- *. Calculating formula: $\Delta SAR \text{ corrected SAR (1g) (W/kg)} = (\text{Observed SAR (1g) (W/kg)}) \times (100 - (\Delta SAR(\%) / 100)$
 $\text{Reported SAR (1g)} (= \text{Tuned-up SAR}) \text{ (W/kg)} = (\text{Observed SAR (1g) (W/kg)}) \times (\text{Scaled factor})$

7.2 SAR test results (Head)

Target Frequency [MHz]	Liquid type	Liquid parameters (Head liquid) (*a)							ASAR Coefficients (*c)		Date measured					
		Permittivity (εr) [-]				Conductivity [S/m]			Temp. [deg.C.]	Depth [mm]		ASAR (I _g) [%]	Correction required?			
		Target	Measured		Limit (*b)	Target	Measured	Limit (*b)								
2412	Head	39.27	38.42	-2.2	-5% ≤	1.766	1.803	+2.1	0% ≤	23.8	155	+1.52	not required.	September 16, 2014 before SAR test		
2417		39.26	38.40	-2.2	εr-meas. ≤ 0%	1.771	1.815	+2.5	σ-meas. ≤ +5%			+1.71	not required.			
2427		39.24	38.35	-2.3	≤ 0%	1.780	1.821	+2.4	≤ +5%			+1.65	not required.			
5260		35.92	35.71	-0.6%	-5% ≤	4.717	4.525	-4.1%	-5% ≤	21.9	154	+0.24	not required(*b).		September 11, 2014 before SAR test	
5300		35.87	35.58	-0.8%	εr-meas. ≤ +5%	4.758	4.534	-4.7%	σ-meas. ≤ +5%			+0.31	not required(*b).			
5680		35.44	34.96	-1.3%	≤ +5%	5.147	4.961	-3.6%	≤ +5%			+0.43	not required(*b).			
5745		35.36	34.99	-1.1%	≤ +5%	5.214	5.011	-3.9%	≤ +5%	21.9	154	+0.39	not required(*b).			September 10, 2014 before SAR test
5805		35.29	34.77	-1.5%	≤ +5%	5.275	5.038	-4.5%	≤ +5%			+0.49	not required(*b).			

SAR measurement results (Head simulated tissue)												Reported SAR (I _g) [W/kg]				
Mode	[MHz] (CH) (*1)	Data rate	EUT setup conditions				Liquid temp. [deg.C.] Before/After	Power drift [dB]	SAR (I _g) [W/kg]			SAR plot # in Appendix 2-2	Reported SAR (I _g) [W/kg]			
			Antenna *SAR measured.	Setup	Gap [mm]	Battery ID			maximum value of multi-peak	ASAR [%]	ASAR corrected		Average power [dBm]	Max. power [dBm]	Scaled factor	Tuned-up SAR (*d)
11b	2412(1)	1Mbps	ant.#0	Front (Patient side)	0	#2	23.8/23.8	-0.20	0.019	+1.52	n/a (*c)	Plot 3-1	14.47	16.0	×1.42	0.027
11g	2417(2)	6Mbps			0	#2	23.8/23.8	-0.08	0.017	+1.71	n/a (*c)	Plot 3-2	17.77	19.5	×1.49	0.025
n(20)(1Tx)	2417(2)	MCS0			0	#3	23.8/23.8	0.03	0.018	+1.71	n/a (*c)	Plot 3-3	15.00	17.0	×1.58	0.028
n(40)(1Tx)	2427(4)	MCS0			0	#3	23.9/23.9	-0.16	0.017	+1.65	n/a (*c)	Plot 3-4	14.19	16.0	×1.52	0.026
11b	2412(1)	1Mbps	ant.#1	Front (Patient side)	0	#3	23.8/23.8	-0.04	0.018	+1.52	n/a (*c)	Plot 3-5	15.17	16.0	×1.21	0.022
11g	2417(2)	6Mbps			0	#2	23.8/23.9	-0.11	0.018	+1.71	n/a (*c)	Plot 3-6	18.08	19.5	×1.39	0.025
n(20)(1Tx)	2417(2)	MCS0			0	#2	23.9/24.0	0.17	0.018	+1.71	n/a (*c)	Plot 3-7	15.76	17.0	×1.33	0.024
n(40)(1Tx)	2427(4)	MCS0			0	#3	23.9/23.9	0.01	0.017	+1.65	n/a (*c)	Plot 3-8	14.76	16.0	×1.33	0.023
11a	5260(52)	6Mbps	ant.#0	Front (Patient side)	0	#3	22.4/22.5	-0.09	0.057	+0.24	n/a (*c)	Plot 4-1	13.29	15.0	×1.48	0.08
11a	5300(60)	6Mbps	ant.#1	Front (Patient side)	0	#3	22.1/22.3	-0.18	0.058	+0.31	n/a (*c)	Plot 4-2	13.94	15.0	×1.28	0.07
11a	5680(136)	6Mbps	ant.#0	Front (Patient side)	0	#2	22.3/22.4	0.01	0.071	+0.43	n/a (*c)	Plot 4-3	16.01	17.5	×1.41	0.10
11a	5680(136)	6Mbps	ant.#1	Front (Patient side)	0	#3	22.0/22.1	-0.01	0.075	+0.43	n/a (*c)	Plot 4-4	16.53	17.5	×1.25	0.09
11a	5805(161)	6Mbps	ant.#0	Front (Patient side)	0	#2	22.0/22.3	0.20	0.071	+0.49	n/a (*c)	Plot 4-5	15.73	17.5	×1.50	0.11
11a	5745(149)	6Mbps	ant.#1	Front (Patient side)	0	#2	22.5/22.6	0.18	0.063	+0.39	n/a (*c)	Plot 4-6	16.19	17.5	×1.35	0.09

*. Since this EUT is the medical device, the EUT is only used under the guidance of a doctor or a qualified person. The possibility of the maximum RF human exposure is only a body/head of the patient who comes in contact directly on the front surface side (patient side) of the EUT. Therefore, the SAR test was only applied to the front surface side (patient side) of the EUT.

- Notes: *1. At the highest output power channel, since the extrapolated maximum peak SAR for the maximum output channel was ≤1.6W/kg and the I_g averaged SAR was ≤0.8W/kg, the testing for other channels were omitted. (KDB248227)
- * Gap: It is the separation distance between the nearest position of platform outer surface and the bottom outer surface of phantom; n/a: not applied.
 - * Battery No. #2 and #3 were same model. Refer to Appendix 1 for more details.
 - * During test, the EUT was operated without all signal interface cables (except LAN cable for the Tx control) and with a full-charged battery.
 - * Calibration frequency of the SAR measurement probe (and used conversion factors)

SAR test frequency	Probe calibration frequency	Validity	Conversion factor	Uncertainty
2412, 2417, 2427MHz	2450MHz	within ±50MHz of calibration frequency	6.94	±12.0%
5260, 5300MHz	5300MHz	within ±110MHz of calibration frequency	4.77	±13.1%
5680MHz	5600MHz	within ±110MHz of calibration frequency	4.42	±13.1%
5745, 5805MHz	5800MHz	within ±110MHz of calibration frequency	4.41	±13.1%

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

- *a. The target value is a parameter defined in Appendix A of KDB865664 D01, the dielectric parameters suggested for head and body tissue simulating liquid are given at 2000, 2450, 3000 and 5800MHz. Parameters for the frequencies 2000-3000, 3000-5800MHz were obtained using linear interpolation, for above 5800MHz were obtained using linear extrapolation (Refer to appendix 3-4.)
- *b. Refer to KDB865664 D01, item 2), Clause 2.6; "When nominal tissue dielectric parameters are recorded in the probe calibration data; for example, only target values and tolerance are reported, the measured εr and σ of the liquid used in routine measurements must be: (for 2.4GHz band) ≤ the target εr and ≥ the target σ values and also within 5% of the required target dielectric parameters." (for 5GHz band) must be: within +5% and -10% of the target εr, and also within -5% and +10% of the target σ values, when the measured SAR is compensated for tissue dielectric deviations." **Since ΔSAR correction value becomes smaller than measured value, compensation is not carried out.**
- *c. The coefficients are parameters defined in clause E.3.3.2, IEEE Std 1528(2013). Since the measured liquid parameters were ≤ the target εr and ≥ the target σ values and also within 5% of the required target dielectric parameters, the measured SAR was not compensated by ΔSAR coefficients (* Clause 2) of 2.6, KDB865664 D01. $\Delta SAR(I_g) = C_{\epsilon r} \times \Delta \epsilon_r + C_{\sigma} \times \Delta \sigma$, $C_{\epsilon r} = 7.854E-4 \times f^3 + 9.402E-3 \times f^2 - 2.742E-2 \times f + 0.2026$ / $C_{\sigma} = 9.804E-3 \times f^3 - 8.661E-2 \times f^2 + 2.981E-2 \times f + 0.7829$
- *d. Tuned-up SAR by scaled factor: Accordance with KDB 447498 D01; "When SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance (clause 4, 4.1, 4)".
- *. Calculating formula: $\Delta SAR \text{ corrected SAR (I}_g\text{) (W/kg)} = (\text{Observed SAR (I}_g\text{) (W/kg)}) \times (100 - (\Delta SAR(\%) / 100)$
 $\text{Reported SAR (I}_g\text{) (=Tuned-up SAR) (W/kg)} = (\text{Observed SAR (I}_g\text{) (W/kg)}) \times (\text{Scaled factor})$