



Test report No. : 10229872S-A
Page : 1 of 47
Issued date : May 14, 2014
Revised date : June 19, 2014
FCC ID : OCS-MT1000A

SAR TEST REPORT

Test Report No.: 10229872S-A

Applicant : Anritsu Corporation.
Type of Equipment : Network Master Pro
Model No. : MT1000A
FCC ID : OCS-MT1000A
Test Standard : FCC 47CFR §2.1093
Test Result : Complied

Highest Reported SAR(1g) Value	Remarks
1.19 W/kg	(DTS) 2462MHz, IEEE 802.11b, (1Mbps, DBPSK/DSSS) *. This was a highest measured SAR(1g) value: 0.939 W/kg (output power: 9.47dBm)

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3. This sample tested is in compliance with the limits of the above regulation.
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Date of test: April 8, 2014

Test engineer: T. Sato
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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".



13-EM-F0429

REVISION HISTORY

Revision	Test report No.	Date	Page revised	Contents
Original	10229872S-A	May 14, 2014	-	
1	10229872S-A	June 19, 2014	11, 12, 14	Page 11: Correction of 7.1, Page 12: Correction of Appendix 1-1, Page 14: Add image.

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

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SECTION 1: Customer information

Company Name	Anritsu Corporation.
Brand Name	Anritsu
Address	5-1-1 Onna, Atsugi-shi, Kanagawa, 243-8555 Japan
Telephone Number	+81-46-296-6669
Facsimile Number	+81-46-225-8380
Contact Person	Yasuyuki Oishi

SECTION 2: Equipment under test (EUT)**2.1 Identification of EUT**

Type of Equipment	Network Master Pro
Model Number	MT1000A
Serial Number	708336014
Condition of EUT	Production prototype (*: Not for sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample	February 24, 2014
Modification of EUT	No modification by the test lab.
Country of Mass-production	Denmark
Category Identified	Portable device *: Since EUT may contact and/or very close to a human body during Wi-Fi operation, the partial-body SAR (1g) shall be observed.
Rating	DC10.8V(Rechargeable Li-Ion Battery)
SAR Accessory	None

2.2 Product Description

Equipment type	Transceiver
Frequency of operation	2412-2462MHz (11b, 11g, 11n(20HT)) 2402-2480MHz (Bluetooth)
Channel spacing	5MHz (11b, 11g, 11n(20HT)) 1MHz (Bluetooth)
Bandwidth	20MHz(11b, 11g, 11n(20HT)) 1MHz(Bluetooth)
Type of modulation	DSSS(11b): CCK, DQPSK, DBPSK OFDM(11g, 11n(20HT)): 64QAM, 16QAM, QPSK, BPSK FHSS(Bluetooth): GFSK, $\pi/4$ DQPSK, 8DPSK
Q'ty of Antenna	1 pc.
Antenna type	Dipole
Antenna gain (peak)	3.0dBi
Transmit power and tolerance (Manufacture variation)	11b: 10.5dBm
	11g: 10.5dBm
	11n(20HT): 10.5dBm
	Bluetooth DH5: 10dBm
Maximum output power which may possible (*1)	Bluetooth 2DH5: 10dBm
	Bluetooth 3DH5: 10dBm
	*. Refer to clause 2.3 for more detail.
	*. The measured Tx output power (conducted) refers to section 6 in this report.
Operation temperature range	11b: 10.5dBm
	11g: 10.5dBm
	11n(20HT): 10.5dBm
	Bluetooth DH5: 10dBm
	Bluetooth 2DH5: 10dBm
	Bluetooth 3DH5: 10dBm
	*. Refer to clause 2.4 for more detail.
	*. The measured Tx output power (conducted) refers to section 6 in this report.

*1. The EUT does not necessarily guarantee that this power can be outputted. This is the worst value that may come out by product variation.

*. The EUT do not use the special transmitting technique such as "beam-forming" and "time-space code diversity."

2.3 Tx output power specification (antenna port terminal conducted)

		Target Power [dBm] (average)																											
		11b				11g								11n(20HT)															
[MHz]	CH	1	2	5.5	11	6	9	12	18	24	36	48	54	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11	MCS12	MCS13	MCS14	MCS15
2412	1	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-	-
2417	2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-	-
2422	3	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-	-
2427	4	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-	-
2432	5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-	-
2437	6	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-	-
2442	7	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-	-
2447	8	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-	-
2452	9	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-	-
2457	10	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-	-
2462	11	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-	-

		Target Power [dBm] (average)		
		Bluetooth		
[MHz]	CH	DH5	2DH5	3DH5
2402-2480	1-79	10	10	10

2.4. Maximum output power which may possible

		Target Power [dBm] (average)																												
		11b				11g								11n(20HT)																
[MHz]	CH	1	2	5.5	11	6	9	12	18	24	36	48	54	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11	MCS12	MCS13	MCS14	MCS15	
2412	1	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-	-	-
2417	2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-	-
2422	3	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-	-
2427	4	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-
2432	5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-
2437	6	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-
2442	7	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-
2447	8	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-
2452	9	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-
2457	10	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-
2462	11	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	-	-	-	-	-	-	-

		Target Power [dBm] (average)		
		Bluetooth		
[MHz]	CH	DH5	2DH5	3DH5
2402-2480	1-79	10	10	10

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

	Wireless LAN(2.4GHz band)	Bluetooth
Test Procedure	SAR measurement; KDB 447498, KDB 248227, KDB 865664, IEEE Std.1528	SAR measurement; KDB 447498, IEEE Std.1528
Category	FCC 47CFR §2.1093 (Portable device)	FCC 47CFR §2.1093 (Portable device)
Results (SAR(1g))	Complied	Complied
Reported SAR value (*. Scaled)	1.19 W/kg	0.65 W/kg
Measured SAR value	0.939 W/kg	0.493 W/kg
Operation mode, channel	11b, 1Mbps, 2462MHz (11ch)	Bluetooth, DH5, 2402MHz (1ch)
Power measured/max. (scaled factor)	9.47 dBm/10.5dBm (×1.27)	8.79 dBm/10Bm (×1.32)

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 tests

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 when it was set the rated power. (Clause 4.1, KDB447498 D01(v05))

Step.1 Check the power by data rate and operation channel

The data rate check was measured for all modes in one of default channel. For the SAR test reference, the average output power was measured on the low/middle/high channels with the worst data rate condition in.

11b		11g		11n(20HT)		
Modulation	Data rate [Mbps]	Modulation	Data rate [Mbps]	MCS Index	Spatial Stream	Modulation
DBPSK/DSSS	1	BPSK/OFDM	6	MCS0	1	BPSK/OFDM
DQPSK/DSSS	2	BPSK/OFDM	9	MCS1	1	QPSK/OFDM
CCK/DSSS	5.5	QPSK/OFDM	12	MCS2	1	QPSK/OFDM
CCK/DSSS	11	QPSK/OFDM	18	MCS3	1	16QAM/OFDM
		16QAM/OFDM	24	MCS4	1	16QAM/OFDM
		16QAM/OFDM	36	MCS5	1	64QAM/OFDM
		64QAM/OFDM	48	MCS6	1	64QAM/OFDM
		64QAM/OFDM	54	MCS7	1	64QAM/OFDM

Bluetooth	
Modulation	Data rate
GFSK/FHSS	DH5
$\pi/4$ DQ/FHSS	2DH5
8DPSK/FHSS	3DH5

Step.2 Consideration of SAR test channel

The following operation mode, data rate and channels were determined to apply SAR test by SAR reference power measured.

Mode	MHz	Channel	default	SAR Tested/Reduced			Remarks
			11b/g/n(20HT)	11b	11g	11n(20HT)	
802.11 b/g/n	2412	1 (*1)	√	Tested	Reduced (*2)	Reduced (*2)	SAR test were applied to 11b mode, in lowest data rate. (*3)
	2437	6	√	Tested	Reduced (*2)	Reduced (*2)	
	2462	11 (*1)	√	Tested	Reduced (*2)	Reduced (*2)	

√ = "default test channels of requested by KDB248227"

*1. Any output power reducing for channel 1 and 11 to meet restricted band requirements was not observed. Therefore channel 1 and 11 was selected for the default channels of power measurement and SAR test plan.

*2. (KDB248227) Since the average power of 11g and 11n(20HT) mode were less than 0.25dB higher than the 11b mode, SAR test were only applied to the 11b mode. (Refer to Section 6.)

Mode	MHz	Channel	SAR Tested/Reduced			Remarks
			DH5	2DH5	3DH5	
Bluetooth	2402	1 (low)	Tested	Reduced (*2)	Reduced (*2)	SAR test were applied to DH5 mode, in lowest data rate. (*3)
	2441	39 (middle)	Reduced (*2)	Reduced (*2)	Reduced (*2)	
	2480	79 (high)	Reduced (*2)	Reduced (*2)	Reduced (*2)	

3.5.2 Stand-alone SAR and simultaneous transmission SAR

No.	Capable Tx configurations	Head SAR	Body SAR	Remarks
1	Wireless LAN(2.4GHz band)	-	Tested	-
2	Bluetooth	-	Tested	-
3	Wireless LAN(2.4GHz band) + Bluetooth	-	-	*1

*1. EUT has no simultaneous transmission.

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3.6 Confirmation after SAR testing

It was checked that the power drift [W] is within $\pm 5\%$ 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] = $20\log(E_a)/(E_b)$ (where, Before SAR testing: E_b [V/m] / After SAR testing: E_a [V/m])
Limit of power drift[W] = $\pm 5\%$
Power drift limit (X) [dB] = $10\log(P_drift) = 10\log(1.05/1) = 10\log(1.05) - 10\log(1) = 0.21\text{dB}$
from E-filed relations with power.
 $S = E \times H = E^2 / \eta = P / (4 \times \pi \times r^2)$ (η : Space impedance) $\rightarrow P = (E^2 \times 4 \times \pi \times r^2) / \eta$
Therefore, The correlation of power and the E-filed
Power drift limit (X) dB = $10\log(P_drift) = 10\log(E_drift^2) = 20\log(E_drift)$
From the above mentioned, the calculated power drift of DASY5 system must be the less than $\pm 0.21\text{dB}$.

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 distance [mm]	(*1) SAR Tested /Reduced	SAR type
Top	The top surface of EUT was touched to the Flat phantom.	33	Tested	Body (touch)
Front	The front section (LCD side) of EUT was touched to the Flat phantom.	5	Tested	
Rear	The rear section (back side of LCD side) of EUT was touched to the Flat phantom.	63	Reduced	
Left	The left surface of platform was touched to the Flat phantom.	59	Reduced	
Right	The right surface of platform was touched to the Flat phantom.	150	Reduced	
Bottom	The bottom flat surface of platform was touched to the Flat phantom.	158	Reduced	

- *. Antenna distance: this means the distance from the EUT(+ support equipment) antenna inside a platform to the outer surface of platform which an operator may touch.
*. Size of EUT: 257mm (width) $\times$ 43.5mm (depth) $\times$ 164mm max (height)
*. Size of support equipment: 257mm (width) $\times$ 38.5mm (depth) $\times$ 164mm max (height)
*. Size of EUT+support equipment(tested in this condition): 257mm (width) $\times$ 77mm (depth) $\times$ 164mm max (height)
*. SAR test reduction consideration
KDB 447498 D01 (v05) was taken into consideration as other approaches to reduce SAR test.
Parenthesis 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 $\leq 50\text{mm}$.
 $[(\text{max power of channel, including tune-up tolerance, mW}) / (\text{min.test separation distance, mm})] \times [\sqrt{f}(\text{GHz})] \leq 3.0$ (for SAR(1g)).....(formula (1))
If power is calculated from the upper formula (1);
 $[\text{SAR}(1\text{g}) \text{ test exclusion thresholds, mW}] = 3 \times [\text{test separation distance, mm}] / [\sqrt{f}(\text{GHz})]$(formula (2))
Parenthesis 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 $> 50\text{mm}$.
 $[\text{test exclusion thresholds, mW}] = [(\text{Power allowed at numeric threshold for } 50\text{mm in formula (1)})] + [(\text{test separation distance, mm}) - (50\text{mm})] \times 10$(formula (3))

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

SAR(1g) test exclusion thresholds [mW]		
Frequency [GHz]	Antenna separation distance [mm]	
	5	6
2.462	10 (10dBm)	11.22 (10.5dBm)
SAR(1g) test exclusion thresholds [mW]		
Frequency [GHz]	Antenna separation distance [mm]	
	5	6
2.480	10 (10dBm)	10 (10dBm)

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

Since the maximum power (including tune-up tolerance) of EUT is 10.5dBm(IEEE 802.11b/g/n(20HT)) and 10dBm(Bluetooth), SAR test may exclude with the test separation distance of more greatly than about 6mm.

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

Step 1	Change the setup positions.
Step 2	Change the channel. *1
Step 3	Repeat measurement of worst mode. *2

- *. During SAR test, the radiated power is always monitored by Spectrum Analyzer.
*1. Other channel was not required since maximum average output channel SAR value is less than 0.8W/kg.
*2. Repeated measurement is not required when the original highest measured SAR is $< 0.8\text{W/kg}$. When the original highest measured SAR is $\geq 0.8\text{W/kg}$, repeat that measurement once. Perform a second repeated measurement only if the ratio of largest to smaller SAR for the original and first repeated measurement is > 1.2 or when the original or repeated measurement is $\geq 1.45\text{W/kg}$ ($\sim 10\%$ from the 1g SAR limit).

SECTION 4: Operation of EUT during testing

4.1 Operating modes for SAR testing

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

Operation mode	11b	11g	11n(20HT)
Tx frequency band	2412-2462MHz		
Tested frequency	2412, 2437, 2462MHz	Reduced (*1)	Reduced (*1)
Modulation	DBPSK/DSSS	-	-
Data rate	1Mbps (*2)	-	-
Crest factor	1.0	-	-
Controlled software	"Tera-Term" (*. Power setting (for power measurement and SAR test): 12500(11b, 11g, 11n(20HT))		

- *1. Since the target average power of 11g and 11n(20HT) mode were less than 0.25dB higher than the 11b mode, SAR test was only applied to the 11b mode. (KDB248227)
*2. Since the average powers of higher data rate were less than 0.25dB higher than the lowest data rate, SAR test was only applied to the lowest data rate. (KDB248227)

Operation mode	Bluetooth DH5	Bluetooth 2DH5	Bluetooth 3DH5
Tx frequency band	2402-2480MHz		
Tested frequency	2412MHz	Reduced (*1)	Reduced (*1)
Modulation	GFSK/FHSS	-	-
Data rate	-	-	-
Crest factor	1.0	-	-
Controlled software	"Tera-Term" (*. Power setting (for power measurement and SAR test): 15(Bluetooth)		

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	±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), IEC 62209-2(2010) 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.

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 [MHz]	Data rate [Mbps]	Cable Loss [dB]	Attenuator [dB]	Duty factor [dB]	Average power			PAR [dB]	Power tolerance & correction				SAR Tested/ Reduced	Remarks
						P/M Reading [dBm]	Result			Target & (+)tolerance [dBm]	Deviation from max. [dB]	Scaled Factor [-]	≤ 2 dB from max.?		
							[dBm]	[mW]							
11b	2412	1	1.53	10.02	0.50	-1.93	10.12	10.29	2.59	10.5	-0.38	x1.09	Yes	Tested	Highest power Ch.(11b)
	2412	2	1.53	10.02	0.96	-2.44	10.07	10.17	2.99	10.5	-0.43	x1.10	Yes	-	-
	2412	5.5	1.53	10.02	1.94	-3.57	9.92	9.82	4.00	10.5	-0.58	x1.14	Yes	-	-
	2412	11	1.53	10.02	3.29	-4.79	10.06	10.13	5.14	10.5	-0.44	x1.11	Yes	-	-
	2437	1	1.53	10.02	0.50	-2.25	9.80	9.56	2.55	10.5	-0.70	x1.17	Yes	Tested	-
	2462	1	1.53	10.02	0.50	-2.58	9.47	8.86	2.57	10.5	-1.03	x1.27	Yes	Tested	-
11g	2412	6	1.53	10.02	1.39	-2.93	10.02	10.04	11.78	10.5	-0.48	x1.12	Yes	Reduced(*1)	Highest power Ch.(11g)
	2412	9	1.53	10.02	1.67	-3.55	9.68	9.28	12.77	10.5	-0.82	x1.21	Yes	-	-
	2412	12	1.53	10.02	2.42	-3.99	9.99	9.97	13.58	10.5	-0.51	x1.13	Yes	-	-
	2412	18	1.53	10.02	3.17	-4.74	9.98	9.96	13.50	10.5	-0.52	x1.13	Yes	-	-
	2412	24	1.53	10.02	3.91	-5.48	9.99	9.97	13.54	10.5	-0.51	x1.13	Yes	-	-
	2412	36	1.53	10.02	4.97	-6.67	9.85	9.67	15.00	10.5	-0.65	x1.16	No	-	-
	2412	48	1.53	10.02	5.88	-7.69	9.74	9.42	15.83	10.5	-0.76	x1.19	No	-	-
	2412	56	1.53	10.02	6.32	-7.98	9.89	9.75	16.15	10.5	-0.61	x1.15	No	-	-
	2437	6	1.53	10.02	1.39	-3.28	9.67	9.26	12.30	10.5	-0.83	x1.21	Yes	Reduced(*1)	-
	2462	6	1.53	10.02	1.39	-3.61	9.34	8.58	11.46	10.5	-1.16	x1.31	Yes	Reduced(*1)	-
11n (20HT)	2412	MCS0	1.53	10.02	1.29	-2.84	10.00	10.01	11.45	10.5	-0.50	x1.12	Yes	Reduced(*1)	Highest power Ch.(11n20HT)
	2412	MCS1	1.53	10.02	1.78	-3.79	9.54	9.00	12.22	10.5	-0.96	x1.25	Yes	-	-
	2412	MCS2	1.53	10.02	2.91	-4.62	9.85	9.65	13.21	10.5	-0.65	x1.16	Yes	-	-
	2412	MCS3	1.53	10.02	3.57	-5.18	9.94	9.87	14.04	10.5	-0.56	x1.14	Yes	-	-
	2412	MCS4	1.53	10.02	4.66	-6.28	9.93	9.84	14.71	10.5	-0.57	x1.14	Yes	-	-
	2412	MCS5	1.53	10.02	5.47	-7.13	9.89	9.75	15.29	10.5	-0.61	x1.15	Yes	-	-
	2412	MCS6	1.53	10.02	5.76	-7.49	9.83	9.61	16.52	10.5	-0.67	x1.17	Yes	-	-
	2412	MCS7	1.53	10.02	6.09	-7.77	9.87	9.71	16.96	10.5	-0.63	x1.16	Yes	-	-
	2437	MCS0	1.53	10.02	1.29	-3.24	9.60	9.13	11.69	10.5	-0.90	x1.23	Yes	Reduced(*1)	-
	2462	MCS0	1.53	10.02	1.29	-3.59	9.25	8.42	11.84	10.5	-1.25	x1.33	Yes	Reduced(*1)	-

*1. Since the target average power of 11g and 11n(20HT) mode were less than 0.25dB higher than the 11b mode, SAR test was only applied to the 11b mode. (KDB248227)

Mode	Frequency [MHz]	Data rate [Mbps]	Cable Loss [dB]	Attenuator [dB]	Duty factor [dB]	Average power			PAR [dB]	Power tolerance & correction				SAR Tested/ Reduced	Remarks
						P/M Reading [dBm]	Result			Target & (+)tolerance [dB]	Deviation from max. [dB]	Scaled Factor [-]	≤2 dB from max.?		
							[dBm]	[mW]							
DH5	2402	-	1.53	10.02	1.16	-3.92	8.79	7.58	1.23	10	-1.21	x1.32	Yes	Tested	Highest power Ch.(Bluetooth)
	2441	-	1.53	10.02	1.18	-4.16	8.57	7.20	1.22	10	-1.43	x1.39	Yes	Reduced(*1)	-
	2480	-	1.53	10.02	1.14	-4.46	8.24	6.67	1.26	10	-1.76	X1.50	Yes	Reduced(*1)	-
2DH5	2402	-	1.53	10.02	1.15	-5.62	7.08	5.10	3.02	10	-2.92	x1.96	No	Reduced(*1)	-
	2441	-	1.53	10.02	1.14	-5.41	7.29	5.36	2.72	10	-2.71	x1.87	No	Reduced(*1)	-
	2480	-	1.53	10.02	1.14	-6.87	5.83	3.83	3.88	10	-4.17	x2.61	No	Reduced(*1)	-
3DH5	2402	-	1.53	10.02	1.15	-6.58	6.12	4.09	4.02	10	-3.88	x2.44	No	Reduced(*1)	-
	2441	-	1.53	10.02	1.14	-6.98	5.72	3.73	4.20	10	-4.28	x2.68	No	Reduced(*1)	-
	2480	-	1.53	10.02	1.14	-7.48	5.22	3.33	4.42	10	-4.78	x3.01	No	Reduced(*1)	-

*. Duty Factor: 0dB=100% duty cycle, P/M: Power Meter, PAR: Peak average ratio ("Peak power"/"Average power", in dBm), Ch: channel, D/R: Data Rate.

*. Calculating formula: Results (Ave, dBm) = (P/M Reading) + (Cable loss) + (Attenuator) + (duty factor), where (duty factor, dBm) = $10 \times \log(100(\text{duty cycle}, \%))$

Deviation from max.: (Power deviation, dB) = (results power (average, dBm)) - (Max.-specification output power (average, dBm))

Scaled Factor: Power scaled factor for obtained SAR value, Scaled Factor [-] = $1 / (10^{(Deviation from max. / 10)})$

*. SAR reference; Date measured April 8, 2014 / measured by: Tomochika Sato / 24deg.C/45%RH (at preparation room of No.7 shielded room)

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

6.2 Comparison of power of EUT with the past tested

	EMC test (WLAN)	SAR test (WLAN)	EMC test (Bluetooth)	SAR test (Bluetooth)
	-	EUT	-	EUT
EUT Model No.	MT1000A	MT1000A	MT1000A	MT1000A
Serial No.	708230036	708336014	708230036	708336014
Date power measured	March 27, 2014	April 8, 2014	March 27, 2014	April 8, 2014
Reference report#	10229869S-B	This report.	10229869S-A	This report.
Tx operation mode	11b	11b	Bluetooth	Bluetooth
Data rate [Mbps]	1	1	DH5	DH5
Average power [dBm]	Low Ch	8.84	9.62	7.55*
	Middle Ch	9.13*	9.30	7.35
	High Ch	8.32	8.97	7.29

*. Since the deviation of the maximum output average power between EMC sample and SAR sample was less than 0.5dB, it was judged that the EUT was equivalent.

*. Duty factor is not included in the formula.

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SECTION 7: Measurement results

7.1 SAR test results of EUT (model: MT1000A)

Measurement date: April 8, 2014

Measurement by: Tomochika Sato

[Liquid measurement]

Target Frequency [MHz]	Liquid type	Liquid parameters (*a)						ASAR Coefficients (*b)		Remarks / Environment
		Permittivity (εr) [-]		Conductivity [S/m]		Temp. [deg.C.]	Depth [mm]	ASAR (1g) [%]	Correction required?	
		Target	Measured (Δεr)	Target	Measured (Δσ)					
2402	Body	52.76	52.191 ± -1.09%	1.904	1.9058 ± +0.09%	21.6	153	+0.2891	not required.	April 8, 2014, before SAR test /ambient; 22.5 deg.C., 47%RH
2412		52.75	52.147 ± -1.15%	1.914	1.9227 ± +0.47%			+0.4884	not required.	
2437		52.72	52.082 ± -1.20%	1.938	1.9620 ± +1.26%			+0.8786	not required.	
2462		52.68	51.922 ± -1.45%	1.967	1.9885 ± +1.09%			+0.8466	not required.	

[SAR measurement results (Partial-Body)]

SAR measurement results (Body simulated tissue)											Reported SAR		Remarks	
Mode	[MHz] (CH)	Modulation /Data rate	EUT setup conditions		Liquid temp. [deg.C.]		Power drift [dB]	SAR (1g) [W/kg]			Data# in Appendix 2-2	SAR (1g) [W/kg]		
			Position	Gap [mm]	Before	After		maximum value of multi-peak				Scaled factor		tune-up SAR
								Observed	ASAR [%]	ASAR corrected				
Step 1: Change the setup positions														
11b (*1)	2412(1)	DBPSK-DSSS /1Mbps	Top	0	21.7	21.8	-0.12	0.540	+0.49	-(*)b	Plot 1-1	×1.09	0.59	-
			Front	0	21.8	21.8	-0.07	0.110	+0.49	-(*)b	Plot 1-2	×1.09	0.12	-
Step 2: Change the channel														
11b (*1)	2437(6)	DBPSK-DSSS /1Mbps	Top	0	21.8	21.8	-0.10	0.751	+0.88	-(*)b	Plot 2-1	×1.17	0.88	-
	2462(11)			0	21.8	21.8	0.01	0.939	+0.85	-(*)b	Plot 2-2	×1.27	1.19	⇒Highest SAR.
Step 3: Repeat measurement of worst mode														
11b (*1)	2462(11)	DBPSK-DSSS /1Mbps	Top	0	21.8	21.8	-0.07	0.917	+0.85	-(*)b	Plot 3-1	×1.27	1.16	-

SAR measurement results (Body simulated tissue)											Reported SAR		Remarks	
Mode	[MHz] (CH)	Modulation /Data rate	EUT setup conditions		Liquid temp. [deg.C.]		Power drift [dB]	SAR (1g) [W/kg]			Data# in Appendix 2-2	SAR (1g) [W/kg]		
			Position	Gap [mm]	Before	After		maximum value of multi-peak				Scaled factor		tune-up SAR
								Observed	ΔSAR [%]	ΔSAR corrected				
Step 1: Change the setup positions and channels														
DH5	2402(1)	GFSK-DSSS /-	Top	0	21.8	21.8	-0.06	0.493	+0.49	-(*)b	Plot 4-1	×1.32	0.65	-
			Front	0	21.8	21.8	-0.06	0.117	+0.49	-(*)b	Plot 4-2	×1.32	0.15	-

Notes:

*1. Since the target average power of 11g and 11n(20HT) mode were less than 0.25dB higher than the 11b mode, SAR test was only applied to the 11b mode. (KDB248227)

*3. Since the SAR Test Exclusion Threshold condition was satisfied, the SAR evaluation was not applied. (Refer to clause 3.7 in this report.)

*. Gap: It is the separation distance between the nearest position of EUT outer surface and the bottom outer surface of phantom; n/a: not applied.

*. During test, the EUT was operated with full-charged battery and without all signal interface cables.

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

SAR test frequency	Probe calibration frequency	Validity	Conversion factor	Uncertainty
2402, 2412, 2437, 2462MHz	2450MHz	within ±50MHz of calibration frequency	6.82	±12.0%

*. 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 (v01r01), the dielectric parameters suggested for head and body tissue simulating liquid are given at 2000, 2450 and 3000MHz. As an intermediate solution, dielectric parameters for the frequencies between 2000 to 3000 MHz were obtained using linear interpolation. (Refer to Appendix 3-4)

*b. The coefficients are parameters defined in Annex F, IEC 62209-2:2010. 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 (v01r01)). In addition, in accordance with clause 6.1.1 of IEC62209-2; "If the correction ΔSAR has a negative sign, the measured SAR results shall not be corrected", the calculated ΔSAR values of the tested liquid had shown negative correction. Therefore the measured SAR was not required ΔSAR correction.

$$\Delta SAR(1g) = C_{\epsilon r} \times \Delta \epsilon r + C_{\sigma} \times \Delta \sigma, C_{\epsilon r} = -7.854E-4 \times f^3 + 9.402E-3 \times f^2 - 2.742E-2 \times f + 0.2026 / C_{\sigma} = 9.804E-3 \times f^3 - 8.661E-2 \times f^2 + 2.981E-2 \times f + 0.7829$$