SAR TEST REPORT

Test Report No. : 31IE0027-HO-01-E-R1

Applicant	:	**Nikon Corporation**
Type of Equipment	:	**Wireless Transmitter**
Model No.	:	**WT-5A**
FCC ID	:	**CGJ1148EA**
Test regulation	:	**FCC47CFR 2.1093** **FCC OET BULLETIN 65, SUPPLEMENT C (EDITION 01-01)**
Test Result	:	**Complied**

Max SAR Measured

IEEE802.11a (5180MHz-5320MHz)	:	**0.517W/kg (5240MHz)**
IEEE802.11a (5745MHz-5825MHz)	:	**0.291W/kg (5745MHz)**
IEEE802.11b (2412MHz-2462MHz)	:	**0.787W/kg (2412MHz)**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6 This report is a revised version of 31IE0027-HO-01-E. 31IE0027-HO-01-E is replaced with this report.

Date of test: July 4 to 8, 2011

Representative test engineer:

Hisayoshi Sato
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UL Verification Service

Approved by :

Mitsuru Fujimura
Leader of WiSE Japan
UL Verification Service

NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

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SECTION 1: Customer information

Company Name	:	Nikon Corporation
Address	:	6-3, Nishi-ohi 1-chome, Shinagawa-ku, Tokyo, 140-8601, Japan
Telephone Number	:	+81-(0)3-3773-8542
Facsimile Number	:	+81-(0)3-3773-1246
Contact Person	:	Okuemon Oyama

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	Wireless Transmitter
Model No.	:	WT-5A
Serial No.	:	15800105S
Rating	:	DC 5.0V
Country of Mass-production	:	Japan
Receipt Date of Sample	:	May 20, 2011
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No modification by the test lab.

2.2 Product Description

-The wireless LAN unit (built-in antenna) compatible with the IEEE802.11a/b/g/n standard.
-EUT has 2 colors of LED and a connector for expansion terminal connections for camera (Model No.: D4).
-Power supply and the wireless LAN unit are controlled on the camera side via an expansion terminal.

General Specification

Clock frequency(ies) in the system : 38.4MHz

Specification of WLAN (IEEE802.11a/b/g)

Type of radio	Wireless LAN (IEEE802.11a)	Wireless LAN (IEEE802.11b/g)
Equipment Type	Transceiver	
Frequency of Operation	5180MHz - 5320MHz 5745MHz - 5825MHz	2412MHz - 2462MHz
Bandwidth & Channel spacing	Bandwidth : 20MHz Ch spacing : 20MHz	Bandwidth : 20MHz Ch spacing : 5MHz
Type of Modulation	OFDM	11b: DSSS 11g: OFDM
Antenna Type	Pattern antenna (Inverted L type)	
Antenna Gain	5180-5320MHz: -0.43dBi	2412MHz - 2462MHz: 1.55dBi
	5745-5825MHz: -1.87dBi	
Power Supply	DC 3.3V / 1.8V	
Operating temperature range	0 to +40 deg. C.	

Specification of WLAN (IEEE802.11n)

Type of radio	Wireless LAN (IEEE802.11n)			
	2.4G Band SISO (20M Band)	2.4G Band SISO (40M Band)	5G Band SISO (20M Band)	5G Band SISO (40M Band)
Equipment Type	Transceiver			
Frequency of Operation	2412MHz - 2462MHz	2422MHz - 2452MHz	5180MHz - 5320MHz 5745MHz - 5825MHz	5190MHz - 5310MHz 5755MHz - 5795MHz
Bandwidth & Channel spacing	Bandwidth : 20MHz Ch spacing : 5MHz	Bandwidth : 40MHz Ch spacing : 5MHz	Bandwidth : 20MHz Ch spacing : 20MHz	Bandwidth : 40MHz Ch spacing : 40MHz
Type of Modulation	OFDM			
Antenna Type	Pattern antenna (Inverted L type)			
Antenna Gain	2412MHz - 2462MHz: 1.55dBi		5180-5320MHz: -0.43dBi	
			5745-5825MHz: -1.87dBi	
Power Supply	DC 3.3V / 1.8V			
Operating temperature range	0 to +40 deg. C.			

SECTION 3 : Test standard information

3.1 Requirements for compliance testing defined by the FCC

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. According to the Supplement C of OET Bulletin 65 “Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, 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.

1 Specific Absorption Rate (SAR) is a measure of the rate of energy absorption due to exposure to an RF transmitting source (wireless portable device).
2 IEEE/ANSI Std. C95.1-1992 limits are used to determine compliance with FCC ET Docket 93-62.

Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01):

Supplement C (Edition 01-01) - Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions
OET Bulletin 65 (Edition 97-01) - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

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 Supplement C

In additions;

KDB 447498 D01(v04):	Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
KDB 248227 (rev.1.2):	SAR Measurement Procedures for 802.11a//b/g Transmitters

3.2 Procedure and result

TEST Outline
The procedure of SAR was measured according to the KDB447498 2).
The EUT is installed at the Digital camerra. For the details, refer to the Appendix.1

No.	Item	Test Procedure	Limit	Remarks	Exclusion	Result
1	Human Exposure	FCC OET BULLETIN 65, SUPPLEMENT C	FCC47CFR 2.1093	SAR Measurement	N/A	Complied
Note: UL Japan, Inc. 's SAR Work Procedures 13-EM-W0429 and 13-EM-W0430						

Stand-alone SAR result
Maximum 1g SAR

Mode	1g SAR [W/kg]
IEEE802.11a (5180MHz-5320MHz)	0.517W/kg (5240MHz)
IEEE802.11a (5745MHz-5825MHz)	0.291W/kg (5745MHz)
IEEE802.11b (2412MHz-2462MHz)	0.787W/kg (2412MHz)

The 1g SAR was <0.8W/kg for all configurations.
Therefore according to the KDB447498 D01, the EUT was approved for used in multiple host platforms.

3.3 Exposure limit

(A) Limits for Occupational/Controlled Exposure (W/kg)

Spatial Average (averaged over the whole body)	Spatial Peak (averaged over any 1g of tissue)	Spatial Peak (hands/wrists/feet/ankles averaged over 10g)
0.4	8.0	20.0

(B) Limits for General population/Uncontrolled Exposure (W/kg)

Spatial Average (averaged over the whole body	Spatial Peak (averaged over any 1g of tissue)	Spatial Peak (hands/wrists/feet/ankles averaged over 10g)
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.

NOTE:GENERAL POPULATION/UNCONTROLLED EXPOSURE
SPATIAL PEAK(averaged over any 1g of tissue) LIMIT
1.6 W/kg

3.4 Test Location

*Shielded room for SAR testings
UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

SECTION 4 : Description of the operating mode

4.1 Operating modes

Mode	Duty cycle or Multi class(GSM)	Packet DATA	Testing item
IEEE 802.11b	100%	PN9	Power , SAR
IEEE 802.11a	100%	PN9	Power , SAR
WLAN			
*EUT has the power settings by the software as follows; Power settings: 2.4G (11b/g/11n-20) Band: 15dBm 2.4G (11n-40) Band: 12dBm 5G Band: 12dBm Software name & version: Dut Bridge Labtool Version 1.0.5.38 * This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.			

4.2 SAR testing operating modes

The frequency band and the modulation used in this test are shown as a following.

1. IEEE 802.11a (5180MHz-5320MHz)

Tx frequency band : 5180MHz-5320MHz
Channel : 36ch(5180MHz),48ch(5240MHz),56ch(5280MHz),64ch(5320MHz)
Modulation : BPSK(6Mbps)
Crest factor : 1

*The SAR is not required for 11n mode because the maximum average output power for 11a mode is less than 1/4dB higher than that measured 11n mode.

[IEEE802.11a 5180-5320MHz band] Rate Check

Rate [Mbps]	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
6.0	5240	-0.53	1.48	10.03	10.98	12.53
9.0	5240	-0.67	1.48	10.03	10.84	12.13
12.0	5240	-0.58	1.48	10.03	10.93	12.39
18.0	5240	-0.63	1.48	10.03	10.88	12.25
24.0	5240	-0.64	1.48	10.03	10.87	12.22
36.0	5240	-0.74	1.48	10.03	10.77	11.94
48.0	5240	-0.67	1.48	10.03	10.84	12.13
54.0	5240	-0.72	1.48	10.03	10.79	11.99

: Worst data rate

IEEE802.11a 5180-5320MHz band 6Mbps

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
36	5180	-0.90	1.48	10.03	10.61	11.51
40	5200	-0.95	1.48	10.03	10.56	11.38
44	5220	-0.56	1.48	10.03	10.95	12.45
48	5240	-0.53	1.48	10.03	10.98	12.53
52	5260	-0.68	1.48	10.03	10.83	12.11
56	5280*	-0.67	1.48	10.03	10.84	12.13
60	5300	-0.84	1.48	10.03	10.67	11.67
64	5320	-0.81	1.48	10.03	10.70	11.75

Sample Calculation: Result = Reading + Cable Loss + Attenuator

* : This channel was tested instead of an adjacent"default test channel".

[IEEE802.11n-20 5180-5320MHz band] Rate Check

Rate	Freq.	P/M Reading [dBm]	Cable Loss	Atten.	Result	
					[dBm]	[mW]
[Mbps]	[MHz]	AVG	[dB]	[dB]	AVG	AVG
MCS0	5240	-0.56	1.48	10.03	10.95	12.45
MCS1	5240	-0.66	1.48	10.03	10.85	12.16
MCS2	5240	-0.61	1.48	10.03	10.90	12.30
MCS3	5240	-0.61	1.48	10.03	10.90	12.30
MCS4	5240	-0.59	1.48	10.03	10.92	12.36
MCS5	5240	-0.54	1.48	10.03	10.97	12.50
MCS6	5240	-0.56	1.48	10.03	10.95	12.45
MCS7	5240	-0.55	1.48	10.03	10.96	12.47

: Worst data rate

IEEE802.11n-20 5180-5320MHz band MCS5

Ch	Freq.	P/M Reading [dBm]	Cable Loss	Atten.	Result	
					[dBm]	[mW]
	[MHz]	AVG	[dB]	[dB]	AVG	AVG
36	5180	-0.87	1.48	10.03	10.64	11.59
40	5200	-0.90	1.48	10.03	10.61	11.51
44	5220	-0.62	1.48	10.03	10.89	12.27
48	5240	-0.54	1.48	10.03	10.97	12.50
52	5260	-0.74	1.48	10.03	10.77	11.94
56	5280	-0.72	1.48	10.03	10.79	11.99
60	5300	-0.87	1.48	10.03	10.64	11.59
64	5320	-0.84	1.48	10.03	10.67	11.67

Sample Calculation: Result = Reading + Cable Loss + Attenuator

[IEEE802.11n-40 5190-5310MHz band] Rate Check

Rate	Freq.	P/M Reading [dBm]	Cable Loss	Atten.	Result	
					[dBm]	[mW]
[Mbps]	[MHz]	AVG	[dB]	[dB]	AVG	AVG
MCS0	5230	-0.62	1.48	10.03	10.89	12.27
MCS1	5230	-0.63	1.48	10.03	10.88	12.25
MCS2	5230	-0.59	1.48	10.03	10.92	12.36
MCS3	5230	-0.55	1.48	10.03	10.96	12.47
MCS4	5230	-0.58	1.48	10.03	10.93	12.39
MCS5	5230	-0.54	1.48	10.03	10.97	12.50
MCS6	5230	-0.56	1.48	10.03	10.95	12.45
MCS7	5230	-0.60	1.48	10.03	10.91	12.33

: Worst data rate

IEEE802.11n-40 5190-5310MHz band MCS5

Ch	Freq.	P/M Reading [dBm]	Cable Loss	Atten.	Result	
					[dBm]	[mW]
	[MHz]	AVG	[dB]	[dB]	AVG	AVG
36	5190	-0.89	1.48	10.03	10.62	11.53
48	5230	-0.54	1.48	10.03	10.97	12.50
56	5270	-0.70	1.48	10.03	10.81	12.05
64	5310	-0.98	1.48	10.03	10.53	11.30

Sample Calculation: Result = Reading + Cable Loss + Attenuator

2. IEEE 802.11a (5745MHz-5825MHz)
Tx frequency band : 5745MHz-5825MHz
Channel : 149ch(5745MHz),157ch(5785MHz),165ch(5825MHz)
Modulation : BPSK(6Mbps)
Crest factor : 1

*The 11n 40M band MCS5 mode was maximum average power. However, the SAR is not required for 11n mode because the maximum average output power for 11a mode is less than 1/4dB higher than that measured 11n mode.

[IEEE802.11a 5745-5825MHz band] Rate Check

Rate [Mbps]	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
6.0	5785.0	0.24	1.53	10.03	11.80	15.14
9.0	5785.0	0.23	1.53	10.03	11.79	15.10
12.0	5785.0	0.22	1.53	10.03	11.78	15.07
18.0	5785.0	0.20	1.53	10.03	11.76	15.00
24.0	5785.0	0.20	1.53	10.03	11.76	15.00
36.0	5785.0	0.21	1.53	10.03	11.77	15.03
48.0	5785.0	0.19	1.53	10.03	11.75	14.96
54.0	5785.0	0.22	1.53	10.03	11.78	15.07

: Worst data rate

IEEE802.11a 5745-5825MHz band 6Mbps

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
149	5745.0	0.22	1.53	10.03	11.78	15.07
153	5765.0	0.20	1.53	10.03	11.76	15.00
157	5785.0	0.24	1.53	10.03	11.80	15.14
161	5805.0	0.19	1.54	10.04	11.77	15.03
165	5825.0	0.21	1.54	10.04	11.79	15.10

: Channel of SAR testing
Sample Calculation: Result = Reading + Cable Loss + Attenuator

[IEEE802.11n-20 5745-5825MHz band] Rate Check

Rate	Freq.	P/M Reading [dBm]	Cable Loss	Atten.	Result	
					[dBm]	[mW]
[Mbps]	[MHz]	AVG	[dB]	[dB]	AVG	AVG
MCS0	5785.0	0.26	1.53	10.03	11.82	15.21
MCS1	5785.0	0.23	1.53	10.03	11.79	15.10
MCS2	5785.0	0.25	1.53	10.03	11.81	15.17
MCS3	5785.0	0.24	1.53	10.03	11.80	15.14
MCS4	5785.0	0.25	1.53	10.03	11.81	15.17
MCS5	5785.0	0.23	1.53	10.03	11.79	15.10
MCS6	5785.0	0.20	1.53	10.03	11.76	15.00
MCS7	5785.0	0.22	1.53	10.03	11.78	15.07

: Worst data rate

IEEE802.11n-20 5745-5825MHz band MCS0

Ch	Freq.	P/M Reading [dBm]	Cable Loss	Atten.	Result	
					[dBm]	[mW]
	[MHz]	AVG	[dB]	[dB]	AVG	AVG
149	5745.0	0.23	1.53	10.03	11.79	15.10
153	5765.0	0.22	1.53	10.03	11.78	15.07
157	5785.0	0.26	1.53	10.03	11.82	15.21
161	5805.0	0.20	1.54	10.04	11.78	15.07
165	5825.0	0.23	1.54	10.04	11.81	15.17

Sample Calculation: Result = Reading + Cable Loss + Attenuator

[IEEE802.11n-40 5755-5795MHz band] Rate Check

Rate	Freq.	P/M Reading [dBm]	Cable Loss	Atten.	Result	
					[dBm]	[mW]
[Mbps]	[MHz]	AVG	[dB]	[dB]	AVG	AVG
MCS0	5755.0	0.41	1.53	10.03	11.97	15.74
MCS1	5755.0	0.35	1.53	10.03	11.91	15.52
MCS2	5755.0	0.40	1.53	10.03	11.96	15.70
MCS3	5755.0	0.34	1.53	10.03	11.90	15.49
MCS4	5755.0	0.35	1.53	10.03	11.91	15.52
MCS5	5755.0	0.43	1.53	10.03	11.99	15.81
MCS6	5755.0	0.38	1.53	10.03	11.94	15.63
MCS7	5755.0	0.31	1.53	10.03	11.87	15.38

: Worst data rate

IEEE802.11n-40 5755-5795MHz band MCS5

Ch	Freq.	P/M Reading [dBm]	Cable Loss	Atten.	Result	
					[dBm]	[mW]
	[MHz]	AVG	[dB]	[dB]	AVG	AVG
149	5755.0	0.43	1.53	10.03	11.99	15.81
165	5795.0	0.40	1.54	10.04	11.98	15.78

Sample Calculation: Result = Reading + Cable Loss + Attenuator

3. IEEE 802.11b mode
Tx frequency band : 2412-2462MHz
Channel : 1ch(2412MHz),6ch(2437MHz),11ch(2462MHz)
Modulation : DBPSK(1Mbps),CCK(5.5Mbps)
Crest factor : 1

* The 11n 20M band MCS4 mode was maximum average power. However, the SAR is not required for 11g/n mode because the maximum average output power for 11b mode is less than 1/4dB higher than that measured 11g/n mode.

[IEEE802.11b] Rate Check

Rate [Mbps]	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
1.0	2437	1.42	1.00	9.99	12.41	17.42
2.0	2437	1.41	1.00	9.99	12.40	17.38
5.5	2437	1.45	1.00	9.99	12.44	17.54
11.0	2437	1.44	1.00	9.99	12.43	17.50

: Worst data rate

IEEE802.11b 5.5Mbps

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
1	2412	1.67	0.99	9.99	12.65	18.41
6	2437	1.45	1.00	9.99	12.44	17.54
11	2462	1.65	1.01	9.99	12.65	18.41

IEEE802.11b 1Mbps

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
1	2412	1.62	0.99	9.99	12.60	18.20
6	2437	1.42	1.00	9.99	12.41	17.42
11	2462	1.59	1.01	9.99	12.59	18.16

Sample Calculation: Result = Reading + Cable Loss + Attenuator

[IEEE802.11g] Rate Check

Rate [Mbps]	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
6.0	2437	1.41	1.00	9.99	12.40	17.38
9.0	2437	1.40	1.00	9.99	12.39	17.34
12.0	2437	1.42	1.00	9.99	12.41	17.42
18.0	2437	1.38	1.00	9.99	12.37	17.26
24.0	2437	1.43	1.00	9.99	12.42	17.46
36.0	2437	1.31	1.00	9.99	12.30	16.98
48.0	2437	1.27	1.00	9.99	12.26	16.83
54.0	2437	1.36	1.00	9.99	12.35	17.18

: Worst data rate

IEEE802.11g 24Mbps

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
1	2412	1.60	0.99	9.99	12.58	18.11
6	2442	1.43	1.00	9.99	12.42	17.46
11	2462	1.65	1.01	9.99	12.65	18.41

IEEE802.11g 6Mbps

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
1	2412	1.55	0.99	9.99	12.53	17.91
6	2442	1.41	1.00	9.99	12.40	17.38
11	2462	1.64	1.01	9.99	12.64	18.37

Sample Calculation: Result = Reading + Cable Loss + Attenuator

[IEEE802.11n-20] Rate Check

Rate [Mbps]	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
MCS0	2437	1.58	1.00	9.99	12.57	18.07
MCS1	2437	1.53	1.00	9.99	12.52	17.86
MCS2	2437	1.57	1.00	9.99	12.56	18.03
MCS3	2437	1.53	1.00	9.99	12.52	17.86
MCS4	2437	1.61	1.00	9.99	12.60	18.20
MCS5	2437	1.54	1.00	9.99	12.53	17.91
MCS6	2437	1.60	1.00	9.99	12.59	18.16
MCS7	2437	1.53	1.00	9.99	12.52	17.86

: Worst data rate

IEEE802.11n-20 MCS4

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result [dBm] AVG	Result [mW] AVG
1	2412	1.65	0.99	9.99	12.63	18.32
6	2437	1.61	1.00	9.99	12.60	18.20
11	2462	1.71	1.01	9.99	12.71	18.66

Sample Calculation: Result = Reading + Cable Loss + Attenuator

[IEEE802.11n-40] Rate Check

Rate	Freq.	P/M Reading [dBm]	Cable Loss	Atten.	Result	
					[dBm]	[mW]
[Mbps]	[MHz]	AVG	[dB]	[dB]	AVG	AVG
MCS0	2437	1.51	1.00	9.99	12.50	17.78
MCS1	2437	1.58	1.00	9.99	12.57	18.07
MCS2	2437	1.48	1.00	9.99	12.47	17.66
MCS3	2437	1.39	1.00	9.99	12.38	17.30
MCS4	2437	1.38	1.00	9.99	12.37	17.26
MCS5	2437	1.35	1.00	9.99	12.34	17.14
MCS6	2437	1.50	1.00	9.99	12.49	17.74
MCS7	2437	1.41	1.00	9.99	12.40	17.38

: Worst data rate

IEEE802.11n-40 MCS1

Ch	Freq.	P/M Reading [dBm]	Cable Loss	Atten.	Result	
					[dBm]	[mW]
	[MHz]	AVG	[dB]	[dB]	AVG	AVG
1	2412	1.48	0.99	9.99	12.46	17.62
6	2437	1.58	1.00	9.99	12.57	18.07
11	2462	1.69	1.00	9.99	12.68	18.54

Sample Calculation: Result = Reading + Cable Loss + Attenuator

4.3 Confirmation before SAR testing

Correlation of Output Power between EMC and SAR tests
It was checked that the antenna port power was correlated within 0~+5% (FCC requirements)
SAR power is equal to Data of EMC test based on the following reason.

- EMC and SAR tests are performed with the same test sample (S/N: 15800105S) under the same condition.
- EMC and SAR tests are performed at the same laboratory.

4.4 Confirmation after SAR testing

It was checked that the power drift [W] is within +/-5%.The verification of power drift during the SAR test is that DASY5 system calculates the power drift by measureing the e-filed at the same location at beginning and the end of the scan measurement for each test position.

DASY5 system calucation Power drift value[dB] =20log(Ea)/(Eb)
Before SAR testing : Eb[V/m]
After SAR testing : Ea[V/m]

Limit of power drift[W] =+/-5%
X[dB]=10log[P]=10log(1.05/1)=10log(1.05)-10log(1)=0.212dB

from E-filed relations with power.
p=E^2/η=E^2/
Therefore, The correlation of power and the E-filed
XdB=10log(P)=10log(E)^2=20log(E)

Therefore,
The calculated power drift of DASY5 System must be the less than +/-0.212dB.

SECTION 5 : Description of the Body setup

The EUT (Wireless Transmitter) is attached in the digital camera.
For the details, refer to the Appendix.1

i) Test position

(1) Camera Front :
The measurement was performed at touch the front of Digital Camera to Flat Phantom.

(2) Camera Rear :
The measurement was performed at touch the rear of Digital Camera to Flat Phantom.

(3) Camera Side :
The measurement was performed at touch the left side of Digital Camera to Flat Phantom.

(4) Camera Top
The measurement was performed at touch the top of Digital Camera to Flat Phantom.

(5) Camera Bottom:
The measurement was performed at touch the bottom of Digital Camera to Flat Phantom.

Refer to the Appendix 1.

SECTION 6 : Test surrounding

6.1 Measurement uncertainty

The uncertainty budget has been determined for the DASY5 measurement system according to the SPEAG documents[6] and is given in the following Table.

Error Description	Uncertainty value ± %	Probability distribution	divisor	(ci) 1g	Standard Uncertainty (1g)	vi or veff
Measurement System						
Probe calibration	±6.55	Normal	1	1	±6.55	∞
Axial isotropy of the probe	±4.7	Rectangular	√3	0.7	±1.9	∞
Spherical isotropy of the probe	±9.6	Rectangular	√3	0.7	±3.9	∞
Boundary effects	±2.0	Rectangular	√3	1	±1.2	∞
Probe linearity	±4.7	Rectangular	√3	1	±2.7	∞
Detection limit	±1.0	Rectangular	√3	1	±0.6	∞
Readout electronics	±0.3	Normal	1	1	±0.3	∞
Response time	±0.8	Rectangular	√3	1	±0.5	∞
Integration time	±2.6	Rectangular	√3	1	±1.5	∞
RF ambient Noise	±3.0	Rectangular	√3	1	±1.7	∞
RF ambient Reflections	±3.0	Rectangular	√3	1	±1.7	∞
Probe Positioner	±0.8	Rectangular	√3	1	±0.5	∞
Probe positioning	±9.9	Rectangular	√3	1	±5.7	∞
Max.SAR Eval.	±4.0	Rectangular	√3	1	±2.3	∞
Test Sample Related						
Device positioning	±2.9	Normal	1	1	±2.9	26
Device holder uncertainty	±3.6	Normal	1	1	±3.6	6
Power drift	±5.0	Rectangular	√3	1	±2.9	∞
Phantom and Setup						
Phantom uncertainty	±4.0	Rectangular	√3	1	±2.3	∞
Liquid conductivity (target)	±5.0	Rectangular	√3	0.64	±1.8	∞
Liquid conductivity (meas.)	±5.0	Rectangular	1	0.64	±3.2	∞
Liquid permittivity (target)	±5.0	Rectangular	√3	0.6	±1.7	∞
Liquid permittivity (meas.)	±5.0	Rectangular	1	0.6	±3.0	∞
Combined Standard Uncertainty					**±13.356**	
Expanded Uncertainty (k=2)					**±26.7**	

SECTION 7 : Measurement results

7.1 5.2GHz measurement procedure

Step1. The searching for the worst position

The 11a (OFDM) mode test was performed on the BPSK[6Mbps] modulation, because it was the maximum average power. This test was performed at the 11a mode.

Step2. Change the channel

This test was performed at the worst condition of Step 1.

Note:
The SAR is not required for 11n mode because the maximum average output power for 11a mode is less than 1/4dB higher than that measured 11n mode.

7.2 5.2GHz SAR measurement result

Model	:	**WT-5A**	Measured By	:	**Hisayoshi Sato**
Serial No.	:	**15800105S**	Liquid Depth (cm)	:	**15.0**
Modulation	:	**OFDM (BPSK)**	Crest factor	:	**1**

Date	:	**July 5 2011**
Parameters	:	ε_r =**46.6**, σ =**5.26 (5200MHz)**
		ε_r =**46.5**, σ =**5.40 (5300MHz)**
Ambient temperature (deg.c.)	:	**25.0**
Relative Humidity (%)	:	**47**

SAR RESULT							
Frequency		Modulation	Phantom Section	EUT Set-up Conditions			SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Maximum value of multi-peak
Step 1. Search for the worst position 11a							
48	5240	BPSK(6Mbps)	Flat	Fixed	Camera Front	0	**0.167**
48	5240	BPSK(6Mbps)	Flat	Fixed	Camera Rear	0	**0.170**
48	5240	BPSK(6Mbps)	Flat	Fixed	Camera Side	0	**0.517**
48	5240	BPSK(6Mbps)	Flat	Fixed	Camera Top	0	**0.106**
48	5240	BPSK(6Mbps)	Flat	Fixed	Camera Bottom	0	**0.171**
Step 2. Change to the channels							
36	5180	BPSK(6Mbps)	Flat	Fixed	Camera Side	0	**0.475**
56	5280	BPSK(6Mbps)	Flat	Fixed	Camera Side	0	**0.487**
64	5320	BPSK(6Mbps)	Flat	Fixed	Camera Side	0	**0.488**

Note: Calibration frequency of probe (Conversion factor)

SAR measurement frequency [MHz]	Calibration frequency [MHz] +/- validity[MHz]	Used conversion factor +/- uncertainty
5180	5200+/-50	4.36 +/- 13.1%(k=2)
5240	5200+/-50	4.36 +/- 13.1%(k=2)
5280	5300+/-50	4.17 +/- 13.1%(k=2)
5320	5300+/-50	4.17 +/- 13.1%(k=2)

7.3 5.8GHz measurement procedure

Step1. The searching for the worst position

The 11a (OFDM) mode test was performed on the BPSK[6Mbps] modulation, because it was the maximum average power. This test was performed at the 11a mode.

Step2. Change the channel

This test was performed at the worst condition of Step 1.

Note:
The SAR is not required for 11n mode because the maximum average output power for 11a mode is less than 1/4dB higher than that measured 11n mode.

7.4 5.8GHz SAR measurement result

Model	:	**WT-5A**	Measured By	:	**Hisaoshi Sato**
Serial No.	:	**15800105S**	Liquid Depth (cm)	:	**15.0**
Modulation	:	**OFDM (BPSK)**	Crest factor	:	**1**

Date	:	**July 8, 2011**
Parameters	:	ε_r =**46.0**, σ =**6.28 (5800MHz)**
Ambient temperature (deg.c.)	:	**25.0**
Relative Humidity (%)	:	**44**

SAR RESULT							
Frequency		Modulation	Phantom Section	EUT Set-up Conditions			SAR(10g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]	Maximum value of multi-peak
Step 1. Search for the worst position							
157	5785	BPSK(6Mbps)	Flat	Fixed	Camera Front	0	**0.053**
157	5785	BPSK(6Mbps)	Flat	Fixed	Camera Rear	0	**0.061**
157	5785	BPSK(6Mbps)	Flat	Fixed	Camera Side	0	**0.272**
157	5785	BPSK(6Mbps)	Flat	Fixed	Camera Top	0	**0.241**
157	5785	BPSK(6Mbps)	Flat	Fixed	Camera Bottom	0	**0.221**
Step 2. Change to the channels							
149	5745	BPSK(6Mbps)	Flat	Fixed	Camera Side	0	**0.291**
165	5825	BPSK(6Mbps)	Flat	Fixed	Camera Side	0	**0.264**

Note: Calibration frequency of probe (Conversion factor)

SAR measurement frequency [MHz]	**Calibration frequency [MHz] +/- validity[MHz]**	**Used conversion factor +/- uncertainty**
5745	5800+/-100*	3.69 +/- 13.1%(k=2)
5785	5800+/-50	3.69 +/- 13.1%(k=2)
5825	5800+/-50	3.69 +/- 13.1%(k=2)

*The validity of +/-100MHz was expanded by the calibration uncertainty (k=2)< 15% according to the KDB865664 (SAR Measurement Procedures for 3-6GHz) and by the DASY v4.4 and higher according to the manufacture's request.

7.5 2.4GHz measurement procedure

Step1. The searching for the modulation
The 11b(DSSS) mode test was performed on the DBPSK(1Mbps) and CCK (5.5Mbps) modulations because the CCK(5.5Mbps) was maximum average power.

Step2. The searching for the worst position
The 11b (DSSS) mode test was performed on the DBPSK[1Mbps] modulation, because this test was performed at the worst modulation of Step1

Step3. Change the channel
This test was performed at the worst condition of Step 1 and Step2

Note:
The SAR is not required for 11g/n mode because the maximum average output power for 11b mode is less than 1/4dB higher than that measured 11g/n mode.

7.6 2.4GHz SAR measurement result

Model	:	**WT-5A**	Measured By	:	**Hisayoshi Sato**
Serial No.	:	**15800105S**	Liquid Depth (cm)	:	**15.0**
Modulation	:	**DSSS(DBPSK, CCK)**	Crest factor	:	**1**

Date	:	**July 4, 2011**
Parameters	:	ε_r =**50.7**, σ =**1.96** **(2412MHz)**
		ε_r =**50.5**, σ =**2.01** **(2437MHz)**
		ε_r =**50.3**, σ =**2.04** **(2462MHz)**
Ambient temperature (deg.c.)	:	**25.0**
Relative Humidity (%)	:	**45**

SAR RESULT							
Frequency		Modulation	Phantom Section	EUT Set-up Conditions			SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separatio [mm]	Maximum value of multi-peak
Step 1. The searching for the modulation							
6	2437	DBPSK(1Mbps)	Flat	Fixed	Camera Side	0	**0.742**
6	2437	CCK(5.5Mbps)	Flat	Fixed	Camera Side	0	**0.697**
Step 2. Search for the worst position							
6	2437	DBPSK(1Mbps)	Flat	Fixed	Camera Front	0	**0.347**
6	2437	DBPSK(1Mbps)	Flat	Fixed	Camera Rear	0	**0.280**
6	2437	DBPSK(1Mbps)	Flat	Fixed	Camera Top	0	**0.365**
6	2437	DBPSK(1Mbps)	Flat	Fixed	Camera Bottom	0	**0.310**
Step 3. Change to the channels							
1	2412	DBPSK(1Mbps)	Flat	Fixed	Camera Side	0	**0.787**
11	2462	DBPSK(1Mbps)	Flat	Fixed	Camera Side	0	**0.694**

7.7 Separation change

It was performed to confirm of the separation testing.

Step1. Change to the separation
The device is moved away from the phantom in 5mm increments from the touching.
A single-point SAR is measured until the SAR is less than 50% of that measured at the touching position.

A single- point SAR evaluation was evaluated by the peak SAR (Extrapolated).
As the result, a single-point SAR at 5mm separation position is checked that it was less than 50% from SAR at the touching position

BODY SAR MEASUREMENT RESULTS								
Frequency		Modulation	Phantom	EUT Set-up Conditions			Single-SAR [W/kg]	SAR(1g) [W/kg]
Channel	[MHz]			Antenna	Position	Separation [mm]		
Step.1 Change to the separation (11a)								
48	5240	11a BPSK	Flat	Fixed	Camera Side	0	**2.396**	**0.517**
48	5240	11a BPSK	Flat	Fixed	Camera Side	5	**0.407**	**0.116**
48	5240	11a BPSK	Flat	Fixed	Camera Side	10	**0.172**	**0.046**
Step.1 Change to the separation (11b)								
1	2412	11b DBPSK	Flat	Fixed	Camera Side	0	**1.471**	**0.787**
1	2412	11b DBPSK	Flat	Fixed	Camera Side	5	**0.506**	**0.272**
1	2412	11b DBPSK	Flat	Fixed	Camera Side	10	**0.365**	**0.197**