SAR TEST REPORT

Test Report No. : 27AE0229-HO-C-1

Applicant	:	**Nikon Corporation**
Type of Equipment	:	**Wireless LAN Module**
Model No.	:	**GC-131**
FCC ID	:	**CGJ3143EB**
Test standard	:	**FCC47CFR 2.1093** **FCC OET Bulletin 65, Supplement C**
Test Result	:	**Complied**
Max. SAR Measured	:	**0.282W/kg (Body, 2462MHz)**

1. This test report shall not be reproduced except full or partial, without the written approval of UL Apex Co., Ltd.
2. The results in this report apply only to the sample tested.
3. This equipment is in compliance with the above standard. We hereby certify that the data contain a true representation of the SAR profile.
4. The test results in this test report are traceable to the national or international standards.

Date of test : October 10-11, 2006

Tested by : Miyo Ikuta
EMC Services

Approved by : Hironobu Shimoji
Group Leader of EMC Services

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://ulapex.jp/emc/nvlap.htm

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SECTION 1 : Client information

Company Name	Nikon Corporation
Brand name	NIKON
Address	6-3, Nishi-ohi 1-chome, Shinagawa-ku, Tokyo 140-8601, Japan
Telephone Number	+81-3-3773-8395
Facsimile Number	+81-3-3773-1842
Contact Person	Kenji Ishizuki

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

2.1 Identification of E.U.T.

Type of Equipment	Wireless LAN Module
Model No.	GC-131
Serial No.	412A1
Rating	DC3.3V / 1.8V
Country of Manufacture	Japan
Condition of EUT	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample	September 5, 2006
Modification of EUT	No modification by the test lab.
Category Identified	Portable device

2.2 Product Description

Model No: GC-131 (referred to as the EUT in this report) is the Wireless LAN Module.

Clock frequency in the system	38.4MHz
Equipment Type	Transceiver
Frequency of Operation	2412-2462 MHz
Bandwidth & Channel spacing	20MHz / 5MHz
Type of Modulation	DSSS / OFDM
ITU code	G1D, D1D
Max. power tested	Peak power : 20.98.dBm (125.31mW)
Antenna type	C coupled Inverted F Type
Antenna Gain	-0.4dBi

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.

3.2 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

SECTION 4 : Test result

4.1 Outline of test

The EUT was manufactured by Nikon Corporation and will be installed into only digital camera which is manufactured by Nikon Corporation.
The detail of host device was shown in the Appendix 1.

4.2 Result of Max. SAR value

Max. SAR Measured (IEEE 802.11b) : 0.282 W/kg (Body, 2462MHz)

4.3 Test Location

UL Apex Co., Ltd. Head Office EMC Lab.
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Telephone : +81 596 24 8116
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SECTION 5 : Operation of E.U.T. during testing

5.1 Confirmation before SAR testing

Correlation of EMC power and SAR power

Peak Power test

It was checked that the antenna port power was correlated within 0~+5% (FCC requirements) at EMC test result.(September 6 2006).

The result is shown in Clause 7.1.

5.2 Confirmation after SAR testing

It was checked that the power drift was within ±10% in the evaluation procedure of SAR testing.
The result is shown in Appendx 2.
In addition the conducted power over time was checked.
The result is shown in section 7.2.

5.3 Operating modes for SAR testing

5.3.1 Setting of EUT

1. IEEE 802.11b mode

Tx frequency band : 2412-2462MHz
Channel : 1ch(2412MHz),6ch(2437MHz),11ch(2462MHz)
Modulation : DSSS (DBPSK,DQPSK,CCK)
Crest factor : 1

2. IEEE 802.11g mode

Tx frequency band : 2412-2462MHz
Channel : 1ch(2412MHz),6ch(2437MHz),11ch(2462MHz)
Modulation : OFDM (BPSK, QPSK, 16QAM, 64QAM)
Crest factor : 1

5.3.2 Body SAR Measurement (Radiated power is always monitored by Spectrum Analyzer.)

IEEE 802.11b
The 11b (DSSS) mode test was performed on the CCK[11Mbps] modulation, because it was the highest peak power and data rate.

Step1. The searching for the worst position

Step2. The changing to the Low and High channels
This test was performed at the worst conditions of Step 1

IEEE 802.11g

Step3. The seaching for the worst modulation.
The data rate in the higher antenna port power each modulation was decided*[1], then the worst modulation was searched in the SAR testing.

Step4. The searching for the worst position
This test was performed at the worst modulation of Step3.

Step5. The changing to the Low and High channels
This test was performed at the worst conditions of Step 4.

Change distance between host device and SAM Twin Phantom
Step6. The measurement was performed with the distance, 5mm,10mm and 15mm to check if the shortest distance may not have the worst value at the conditions of the highest SAR value. As a result, the shortest distance had the worst value.

*[1] Refer to the antenna port power data in the section 7.1.2.

5.3.3 Head SAR measurement

Head SAR measurement is only for reference.

5.4 Test setup of EUT

When users operate or carry the host device (Camera), it could be considered to touch or get close to their bodies. In order to assume this situation, we performed the test at the following positions. Please refer to "Appendix 1" for more details.

(1) Front:
The test was performed in touch with Front surface of the host device to the flat section of SAM Twin phantom.

(2) Rear :
The test was performed in touch with Rear of the host device to the flat section of SAM Twin phantom.

(3) Left Side :
The test was performed in touch with Left Side surface of the host device to the flat section of SAM Twin phantom.

(4) Right Side :
The test was performed in touch with Right Side surface of the host device to the flat section of SAM Twin phantom.

(5) Top :
The test was performed in touch with Top surface of the host device to the flat section of SAM Twin phantom.

(6) Bottom :
The test was performed in touch with Bottom surface of the host device to the flat section of SAM Twin phantom.

(7) Left Side (5mm) :
The measurement opened 5mm distance between host device and flat section of SAM Twin Phantom.

(8) Left Side (10mm) :
The measurement opened 10mm distance between host device and flat section of SAM Twin Phantom.

(9) Left Side (15mm) :
The measurement opened 15mm distance between host device and flat section of SAM Twin Phantom.

*The test setup photograph is put on appendix 1.

SECTION 6 : Test surrounding

6.1 Measurement uncertainty

The uncertainty budget has been determined for the DASY4 measurement system according to the SPEAG documents[6][7] 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	±6.8	Normal	1	1	±6.8	∞
Axial isotropy of the probe	±4.7	Rectangular	√3	$(1-c_p)^{1/2}$	±1.9	∞
Spherical isotropy of the probe	±9.6	Rectangular	√3	$(c_p)^{1/2}$	±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	40
Device holder uncertainty	±3.6	Normal	1	1	±3.6	8
Power drift	±10.0	Rectangular	√3	1	±5.8	∞
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					**±14.360**	
Expanded Uncertainty (k=2)					**±28.7**	

The test result shows that the power drift exceeded ±5%. Therefore, the uncertainty of power drift expanded to ±10%. However, the extended uncertainty (k= 2) of a test is less than 30%.

SECTION 7 : Confirmation before/after testing

7.1 Conducted power before

7.1.1 Correlation of EMC power and SAR power

SAR Power

The antenna port peak power was correlated within 0~+5% of EMC test result.(September 6 2006).

Date of test: October 10, 2006

[IEEE802.11b]

Ch	Freq. [MHz]	P/M PK Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
Low	2412.0	3.30	0.30	10.00	13.60	22.91
Mid	2437.0	3.33	0.30	10.00	13.63	23.07
High	2462.0	3.39	0.30	10.00	13.69	23.39

[IEEE802.11g]

Ch	Freq. [MHz]	P/M PK Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
Low	2412.0	10.43	0.30	10.00	20.73	118.30
Mid	2437.0	10.68	0.30	10.00	20.98	125.31
High	2462.0	10.51	0.30	10.00	20.81	120.50

Sample Calculation:
Result = Reading + Cable Loss (supplied by customer) + Attenuator

EMC Power

This data is reference data of EMC test. (Report No. 27AE0229-HO-A)

Date of test: September 6, 2006

[IEEE802.11b]

Ch	Freq. [MHz]	P/M PK Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
Low	2412.0	3.04	0.30	10.22	13.56	22.70
Mid	2437.0	3.09	0.30	10.22	13.61	22.96
High	2462.0	2.98	0.30	10.22	13.50	22.39

[IEEE802.11g]

Ch	Freq. [MHz]	P/M PK Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
Low	2412.0	10.02	0.30	10.22	20.54	113.24
Mid	2437.0	10.44	0.30	10.22	20.96	124.74
High	2462.0	10.09	0.30	10.22	20.61	115.08

Sample Calculation:
Result = Reading + Cable Loss (supplied by customer) + Attenuator

7.1.2 Reference data of SAR test (Data rate determing)

Date of test: October 10, 2006

[IEEE802.11b] Rate Check

Rate [Mbps]	Freq. [MHz]	PM PK Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
1.0	2437.0	3.04	0.30	10.00	13.34	21.58
2.0	2437.0	2.54	0.30	10.00	12.84	19.23
5.5	2437.0	2.99	0.30	10.00	13.29	21.33
11.0	2437.0	3.33	0.30	10.00	13.63	23.07

[IEEE802.11g] Rate Check

Rate [Mbps]	Freq. [MHz]	PM PK Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
6.0	2437.0	10.28	0.30	10.00	20.58	114.29
9.0	2437.0	10.35	0.30	10.00	20.65	116.14
12.0	2437.0	9.90	0.30	10.00	20.20	104.71
18.0	2437.0	10.39	0.30	10.00	20.69	117.22
24.0	2437.0	10.22	0.30	10.00	20.52	112.72
36.0	2437.0	9.97	0.30	10.00	20.27	106.41
48.0	2437.0	10.41	0.30	10.00	20.71	117.76
54.0	2437.0	10.68	0.30	10.00	20.98	125.31

7.2 Conducted power after

We performed the measurement of conducted power elapse time.(After 15 minutes and 30minutes)
The result is shown as follows. “Diviation” in the table is deviation from the first power (“Before”).
As a result, the maximum deviation was –9.64%.

Date of test: October 11, 2006

[IEEE802.11b 2462MHz 11Mbps]

Time	PM AVG Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]	Diviation [%]
Before	3.39	0.30	10.00	13.69	23.39	-
After 15 minues	3.05	0.30	10.00	13.35	21.63	-7.53
After 30 minues	2.95	0.30	10.00	13.25	21.13	-9.64

SECTION 8 : Measurement results

8.1 Body SAR 2450MHz

Liquid Depth (cm)	:	**15.0**	Model	:	**GC-131**
Parameters	:	ε_r **=50.1**, σ **=2.00**	Serial No.	:	**412A1**
Ambient temperature (deg.c.)	:	**25.0**	Modulation	:	**DSSS,OFDM**
Relative Humidity (%)	:	**52**	Crest factor	:	**1**
Date	:	**October 11, 2006**	Measured By	:	**Miyo Ikuta**

BODY SAR MEASUREMENT RESULTS

Frequency			Modulation	Phantom Section	EUT Set-up Conditions			Liquid Temp.[deg.c]		SAR(1g) [W/kg]
Mode	Channel	[MHz]			Antenna	Position	Separation [mm]	Before	After	Maximum value of multi-peak
11b	**Step1. Position search**									
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Front	0	24.0	24.0	**0.091**
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Rear	0	24.0	24.0	**0.195**
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Left side	0	24.0	24.0	**0.233**
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Right side	0	24.0	24.2	**0.017**
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Top	0	24.2	24.2	**0.141**
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Bottom	0	24.2	24.2	**0.030**
	Step2. Frequency Change									
	1	2412.0	CCK(11Mbps)	Flat	Fixed	Left side	0	24.2	24.3	**0.219**
	11	2462.0	CCK(11Mbps)	Flat	Fixed	Left side	0	24.3	24.3	**0.282**
11g	**Step3. Moduration Change**									
	6	2437.0	BPSK(9Mbps)	Flat	Fixed	Left side	0	24.5	24.5	**0.221**
	6	2437.0	QPSK(18Mbps)	Flat	Fixed	Left side	0	24.5	24.5	**0.196**
	6	2437.0	16QAM(24Mbps	Flat	Fixed	Left side	0	24.5	24.5	**0.221**
	6	2437.0	64QAM(54Mbps	Flat	Fixed	Left side	0	24.5	24.5	**0.184**
	Step 4. Position search									
	6	2437.0	BPSK(9Mbps)	Flat	Fixed	Front	0	24.5	24.5	**0.084**
	6	2437.0	BPSK(9Mbps)	Flat	Fixed	Rear	0	24.5	24.6	**0.149**
	6	2437.0	BPSK(9Mbps)	Flat	Fixed	Right side	0	24.6	24.6	**0.015**
	6	2437.0	BPSK(9Mbps)	Flat	Fixed	Top	0	24.6	24.6	**0.134**
	6	2437.0	BPSK(9Mbps)	Flat	Fixed	Bottom	0	24.6	24.6	**0.043**
	Step5. Frequency Change									
	1	2412.0	BPSK(9Mbps)	Flat	Fixed	Left side	0	24.6	24.5	**0.205**
	11	2462.0	BPSK(9Mbps)	Flat	Fixed	Left side	0	24.5	24.5	**0.264**
11b	**Step6.Separation Change**									
	11	2462.0	CCK(11Mbps)	Flat	Fixed	Left side	5	24.5	24.5	**0.117**
	11	2462.0	CCK(11Mbps)	Flat	Fixed	Left side	10	24.5	24.5	**0.082**
	11	2462.0	CCK(11Mbps)	Flat	Fixed	Left side	15	24.5	24.5	**0.022**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population								**Body SAR: 1.6 W/kg (averaged over 1 gram)**		

8.2 Reference Head SAR 2450MHz

Liquid Depth (cm)	:	**15.0**	Model	:	**GC-131**
Parameters	:	ε_r =**37.3**, σ =**1.89**	Serial No.	:	**412A1**
Ambient temperature (deg.c.)	:	**25.0**	Modulation	:	**DSSS,OFDM**
Relative Humidity (%)	:	**60**	Crest factor	:	**1**
Date	:	**October 10, 2006**	Measured By	:	**Miyo Ikuta**

HEAD SAR MEASUREMENT RESULTS

Frequency			Modulation	Phantom Section	EUT Set-up Conditions			Liquid Temp.[deg.c]		SAR(1g) [W/kg]
Mode	Channel	[MHz]			Antenna	Position	Separation [mm]	Before	After	Maximum value of multi-peak
11b	**Step1. Position search**									
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Front	0	24.5	24.5	**0.088**
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Rear	0	24.5	24.5	**0.190**
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Left side	0	24.5	24.5	**0.260**
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Right side	0	24.5	24.6	**0.019**
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Top	0	24.6	24.6	**0.161**
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Bottom	0	24.6	24.8	**0.047**
	Step2. Frequency Change									
	1	2412.0	CCK(11Mbps)	Flat	Fixed	Left side	0	24.8	24.8	**0.371**
	11	2462.0	CCK(11Mbps)	Flat	Fixed	Left side	0	24.8	24.8	**0.376**
11g	**Step3. Moduration Change**									
	6	2437.0	BPSK(9Mbps)	Flat	Fixed	Left side	0	24.8	24.8	**0.286**
	6	2437.0	QPSK(18Mbps)	Flat	Fixed	Left side	0	24.8	24.8	**0.325**
	6	2437.0	16QAM(24Mbps	Flat	Fixed	Left side	0	24.8	24.8	**0.211**
	6	2437.0	64QAM(54Mbps	Flat	Fixed	Left side	0	24.8	24.8	**0.285**
	Step 4. Position search									
	6	2437.0	QPSK(18Mbps)	Flat	Fixed	Front	0	24.8	24.8	**0.079**
	6	2437.0	QPSK(18Mbps)	Flat	Fixed	Rear	0	24.8	24.8	**0.192**
	6	2437.0	QPSK(18Mbps)	Flat	Fixed	Right side	0	24.8	24.8	**0.014**
	6	2437.0	QPSK(18Mbps)	Flat	Fixed	Top	0	24.8	24.8	**0.141**
	6	2437.0	QPSK(18Mbps)	Flat	Fixed	Bottom	0	24.8	24.8	**0.037**
	Step5. Frequency Change									
	1	2412.0	QPSK(18Mbps)	Flat	Fixed	Left side	0	24.8	24.5	**0.274**
	11	2462.0	QPSK(18Mbps)	Flat	Fixed	Left side	0	24.5	24.5	**0.298**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population								**Head SAR: 1.6 W/kg (averaged over 1 gram)**		