SAR TEST REPORT

Test Report No. : 28JE0064-HO-A-R1

Applicant	:	**Nikon Corporation**
Type of Equipment	:	**Wireless LAN Module**
Model No.	:	**GC-131**
FCC ID	:	**CGJ3143EB**
Test regulation	:	**FCC47CFR 2.1093** **FCC OET Bulletin 65, Supplement C**
Test Result	:	**Complied**
Max. SAR Value(IEEE802.11b/g)	:	**0.250W/kg (Body/2462MHz)**

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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 test 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. Original test report number of this report is 28JE0064-HO-A.

June 30, 2008

Tested by:

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Approved by :

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NVLAP LAB CODE: 200572-0

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SECTION 1 : Customer 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	Yoshiaki Harada

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.	B7E095
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	June 03, 2008
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)	FCC15.247 test: 20.96dBm (124.74mW) SAR test: 21.12dBm(129.42mW)
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 Procedure and result

<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.

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 Max.SAR = 0.250W/kg
Note: UL Japan, Inc. 's SAR Work Procedures QPM46 and QPM47						

Result of Max. SAR value

Max. SAR Value (IEEE 802.11b/g) : 0.250 W/kg (Body/11b/2462MHz)

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

3.5 Confirmation before SAR testing

Correlation of Output Power between EMC and SAR tests (WLAN IEEE802.11b/g)
It was checked that the antenna port power was correlated within 0~+5% (FCC requirements)
The result is shown in Section 6.1.

- Peak power at EMC test (Date: September 6, 2006)
  EMC power was measured for EMC test sample (S/N: 412A1).
- Peak power at SAR test (Date: June 30, 2008)
  SAR power was measured for SAR test sample (S/N: B7E095).

3.6 Confirmation after SAR testing

It was checked that the power drift is within ±5% in the evaluation procedure of SAR testing.
The result is shown in APPENDIX 2.

3.7 Measurement procedure (Body SAR measurement)

1. IEEE 802.11b(Radiated power is always monitored by Spectrum Analyzer.)
The 11b (DSSS) mode test was performed on the CCK[11Mbps] modulation, because it was the highest average power and data rate.

Step1. The searching for the worst position
The tests were performed at the three positions of the distance between cabinet and antenna was less than 10mm. Refer to the Appendix1.

Step2. Change to the Low and High channels
This test was performed at the worst position of Step 1.

2. IEEE 802.11g
IEEE 802.11g(Radiated power is always monitored by Spectrum Analyzer.)

Step3. The seaching for the worst modulation.
The data rate in the higher average power*[1] each modulation was decided, 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 Step 3 and at the three positions in the same 11b mode (Step1).

Step5. Change to the Low and High channels
This test was performed at the worst position of Step 4.

Change distance between Host device and SAM Twin Phantom
Step6. Change to the separation
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.

*[1] Refer to the antenna port power data in the section 6.2.

3.8 Measurement procedure (Head SAR measurement)
Head SAR measurement is only for reference.

IEEE 802.11b/g (Radiated power is always monitored by Spectrum Analyzer.)

The 11b (DSSS) mode test was performed on the CCK[11Mbps] and the 11g (OFDM) mode test was performed on the 64QAM[54Mbps], because it was the worst SAR rate in the Body SAR measurements.

Step7. The searching for the worst position.

Step8. Change to the Low and High channels
This test was performed at the worst position of Step 1.

3.9 Test setup of EUT

(1) Left side :
The test was performed in touch with Left Side surface of the EUT to the flat section of SAM Twin phantom.

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

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

(4) Left side (5mm) :
The measurement opened 5mm distance between the EUT and flat section of SAM Twin Phantom.

(5) Left side (10mm) :
The measurement opened 10mm distance between the EUT and flat section of SAM Twin Phantom.

(6) Left side (15mm) :
The measurement opened 15mm distance between the EUT and flat section of SAM Twin Phantom.

SECTION 4 : Operation of E.U.T. during testing

4.1 Operating modes for SAR testing

4.1.1 Setting of EUT

This EUT has IEEE.802.11b/g continuous transmitting modes.

1. IEEE 802.11b mode

Tx frequency band : 2412-2462MHz
Channel : 1ch(2412MHz),6ch(2437MHz),11ch(2462MHz)
Modulation : DSSS (CCK)
Crest factor : 1
Test data : Pseudo Random Pattern (PN)

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
Test data : Pseudo Random Pattern (PN)

SECTION 5 : Test surrounding

5.1 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	39
Device holder uncertainty	±3.6	Normal	1	1	±3.6	5
Power drift	±5.0	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**	

SECTION 6 : Confirmation before SAR testing

6.1 EMC power and SAR power(WLAN IEEE802.11b/g)

EMC power

FCC15.247 Maximum Peak Output Power

This data is reference data of EMC test. (Original 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

SAR power

Date of test: June 30, 2008

[IEEE802.11b]

Ch	Freq. [MHz]	P/M PK Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
Low	2412.0	2.85	0.70	10.20	13.75	23.71
Mid	2437.0	2.91	0.70	10.20	13.81	24.04
High	2462.0	2.78	0.70	10.20	13.68	23.33

[IEEE802.11g]

Ch	Freq. [MHz]	P/M PK Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
Low	2412.0	9.81	0.70	10.20	20.71	117.76
Mid	2437.0	10.22	0.70	10.20	21.12	129.42
High	2462.0	9.89	0.70	10.20	20.79	119.95

Sample Calculation:

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

6.2 Reference data of SAR test (Data rate determination)

Date of test: June 30, 2008

Rate [Mbps]	Freq. [MHz]	PM PK Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]
1.0	2437.0	2.90	0.70	10.20	13.80	23.99
2.0	2437.0	2.71	0.70	10.20	13.61	22.96
5.5	2437.0	2.87	0.70	10.20	13.77	23.82
11.0	2437.0	2.91	0.70	10.20	13.81	24.04

[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	10.15	0.70	10.20	21.05	127.35
9.0	2437.0	10.16	0.70	10.20	21.06	127.64
12.0	2437.0	10.04	0.70	10.20	20.94	124.17
18.0	2437.0	10.05	0.70	10.20	20.95	124.45
24.0	2437.0	10.21	0.70	10.20	21.11	129.12
36.0	2437.0	10.21	0.70	10.20	21.11	129.12
48.0	2437.0	10.04	0.70	10.20	20.94	124.17
54.0	2437.0	10.22	0.70	10.20	21.12	129.42

SECTION 7 : Measurement results

7.1 Body SAR 2450MHz

Date	:	**June 30, 2008**	Measured By	:	**Miyo Kishimoto**
Liquid Depth (cm)	:	**15.0**	Model	:	**GC-131**
Parameters	:	**ε_r =50.1, σ =2.02**	Serial No.	:	**B7E095**
Ambient temperature (deg.c.)	:	**24.5**	Modulation	:	**DSSS(11b), OFDM(11g)**
Relative Humidity (%)	:	**54**	Crest factor	:	**1**

BODY SAR MEASUREMENT RESULTS

Frequency			Modulation	Phantom Section	EUT Set-up Conditions			Liquid Temp.[deg.c		SAR(1g) [W/kg]
Band	Channel	[MHz]			Antenna	Position	Separation [mm]	Before	After	Maximum of multi-peak
	Step 1. Search for the worst position									
	6	2437	CCK(11Mbps)	Flat	Fixed	Left side	0	23.5	23.5	**0.129**
	6	2437	CCK(11Mbps)	Flat	Fixed	Rear	0	23.5	23.5	**0.015**
11b	6	2437	CCK(11Mbps)	Flat	Fixed	Top	0	23.5	23.5	**0.020**
	Step 2. Change to the channels									
	1	2412	CCK(11Mbps)	Flat	Fixed	Left side	0	23.5	23.5	**0.163**
	11	2462	CCK(11Mbps)	Flat	Fixed	Left side	0	23.5	23.5	**0.250**
	Step 3. Search for the worst modulation									
	6	2437	BPSK(9Mbps)	Flat	Fixed	Left side	0	23.5	23.5	**0.207**
	6	2437	QPSK(18Mbps)	Flat	Fixed	Left side	0	23.5	23.5	**0.136**
	6	2437	16QAM(24Mbps)	Flat	Fixed	Left side	0	23.5	23.5	**0.151**
	6	2437	64QAM(54Mbps)	Flat	Fixed	Left side	0	23.5	23.5	**0.235**
11g	**Step 4. Search for the worst position**									
	6	2437	64QAM(54Mbps)	Flat	Fixed	Rear	0	23.5	23.7	**0.028**
	6	2437	64QAM(54Mbps)	Flat	Fixed	Top	0	23.7	23.7	**0.033**
	Step 5. Change to the channels									
	1	2412	64QAM(54Mbps)	Flat	Fixed	Left side	0	23.7	23.7	**0.136**
	11	2462	64QAM(54Mbps)	Flat	Fixed	Left side	0	23.7	23.7	**0.181**
	Step 6. Change to the Separation									
11b	11	2462	CCK(11Mbps)	Flat	Fixed	Left side	5	23.7	23.7	**0.079**
	11	2462	CCK(11Mbps)	Flat	Fixed	Left side	10	23.8	23.8	**0.026**
	11	2462	CCK(11Mbps)	Flat	Fixed	Left side	15	23.8	23.8	**0.00976**

7.2 Reference Head SAR 2450MHz

Date	:	**June 30, 2008**	Measured By	:	**Hisayoshi Sato**
Liquid Depth (cm)	:	**15.0**	Model	:	**GC-131**
Parameters	:	**ε_r =37.8, σ =1.85**	Serial No.	:	**B7E095**
Ambient temperature (deg.c.)	:	**24.5**	Modulation	:	**DSSS(11b), OFDM(11g)**
Relative Humidity (%)	:	**54**	Crest factor	:	**1**

HEADSAR MEASUREMENT RESULTS

Frequency			Modulation	Phantom Section	EUT Set-up Conditions			Liquid Temp.[deg.c		SAR(1g) [W/kg]
Band	Channel	[MHz]			Antenna	Position	Separation [mm]	Before	After	Maximum of multi-peak
11b	**Step 7. Search for the worst position**									
	6	2437	CCK(11Mbps)	Flat	Fixed	Left side	0	23.5	23.5	**0.229**
	6	2437	CCK(11Mbps)	Flat	Fixed	Rear	0	23.5	23.5	**0.044**
	Step 8. Change to the channels									
	1	2412	CCK(11Mbps)	Flat	Fixed	Left side	0	23.6	23.6	**0.150**
	11	2462	CCK(11Mbps)	Flat	Fixed	Left side	0	23.6	23.6	**0.306**
11g	**Step 7. Search for the worst position**									
	6	2437	64QAM(54Mbps)	Flat	Fixed	Left side	0	23.6	23.6	**0.132**
	6	2437	64QAM(54Mbps)	Flat	Fixed	Rear	0	23.7	23.7	**0.044**
	Step 8. Change to the channels									
	1	2412	64QAM(54Mbps)	Flat	Fixed	Left side	0	23.7	23.7	**0.103**
	11	2462	64QAM(54Mbps)	Flat	Fixed	Left side	0	23.7	23.7	**0.175**