



SAR TEST REPORT

Test Report No. : 28GE0092-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) : 0.719 W/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 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.
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 28GE0092-HO-A

Date of test : March 1, 2008

Tested by : 
Miyo Kishimoto
EMC Services

Approved by : 
Tetsuo Maeno
Site Manager of EMC Services



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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	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.	A97676
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	February 14, 2008
Modification of EUT	No modification by the test lab.
Category Identified	Portable device

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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: 20.99dBm(125.60mW)
Antenna type	C coupled Inverted F Type
Antenna Gain	-0.4dBi

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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.

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3.2 Procedure and result

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 = 0.719 W/kg
Note: UL Japan, Inc. 's SAR Work Procedures QPM46 and QPM47						

Result of Max. SAR value

Max. SAR Value (IEEE 802.11b/g) : 0.719 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**

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3.4 Test Location

*Shielded room for SAR testings

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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: March 1, 2008)
SAR power was measured for SAR test sample (S/N: A97676).

3.6 Confirmation after SAR testing

It was checked that the power drift is within $\pm 5\%$ in the evaluation procedure of SAR testing.

The result is shown in APPENDIX 2.

3.7 Measurement procedure

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

The test was performed at Low, Mid and High channels of each 11b and 11g band in the worst setup of EUT.

3.8 Test setup of EUT

The setup of EUT was tested in the worst position according to the original report*¹ and change application report*².

(1) Left Side :

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

*¹ : Original test report number of this EUT is 27AE0229-HO-C-1.

*² : Change application report number of this EUT is 27IE0187-HO-A-R1.

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.

The modulation setting was tested referring to the original report*¹ and change application report*².

1. IEEE 802.11b mode

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

2. IEEE 802.11g mode

Tx frequency band : 2412-2462MHz
Channel : 1ch(2412MHz),6ch(2437MHz),11ch(2462MHz)
Modulation : OFDM (BPSK<Original>/QPSK< Change application >)
Crest factor : 1

*¹ : Original test report number of this EUT is 27AE0229-HO-C-1.

*² : Change application report number of this EUT is 27IE0187-HO-A-R1.

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 $\pm$ %	Probability distribution	divisor	(ci) 1g	Standard Uncertainty (1g)	vi or v _{eff}
Measurement System						
Probe calibration	± 6.8	Normal	1	1	± 6.8	∞
Axial isotropy of the probe	± 4.7	Rectangular	$\sqrt{3}$	$(1-c_p)^{1/2}$	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	$\sqrt{3}$	$(c_p)^{1/2}$	± 3.9	∞
Boundary effects	± 2.0	Rectangular	$\sqrt{3}$	1	± 1.2	∞
Probe linearity	± 4.7	Rectangular	$\sqrt{3}$	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	$\sqrt{3}$	1	± 0.6	∞
Readout electronics	± 0.3	Normal	1	1	± 0.3	∞
Response time	± 0.8	Rectangular	$\sqrt{3}$	1	± 0.5	∞
Integration time	± 2.6	Rectangular	$\sqrt{3}$	1	± 1.5	∞
RF ambient Noise	± 3.0	Rectangular	$\sqrt{3}$	1	± 1.7	∞
RF ambient Reflections	± 3.0	Rectangular	$\sqrt{3}$	1	± 1.7	∞
Probe Positioner	± 0.8	Rectangular	$\sqrt{3}$	1	± 0.5	∞
Probe positioning	± 9.9	Rectangular	$\sqrt{3}$	1	± 5.7	∞
Max.SAR Eval.	± 4.0	Rectangular	$\sqrt{3}$	1	± 2.3	∞
Test Sample Related						
Device positioning	± 2.9	Normal	1	1	± 2.9	6
Device holder uncertainty	± 3.6	Normal	1	1	± 3.6	-
Power drift	± 5.0	Rectangular	$\sqrt{3}$	1	± 5.8	∞
Phantom and Setup						
Phantom uncertainty	± 4.0	Rectangular	$\sqrt{3}$	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	Rectangular	$\sqrt{3}$	0.64	± 1.8	∞
Liquid conductivity (meas.)	± 5.0	Rectangular	1	0.64	± 3.2	∞
Liquid permittivity (target)	± 5.0	Rectangular	$\sqrt{3}$	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	

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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]	[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]	[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: March 1, 2008

[IEEE802.11b]

Ch	Freq. [MHz]	P/M PK Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
					[dBm]	[mW]
Low	2412.0	3.21	0.30	10.24	13.75	23.71
Mid	2437.0	3.10	0.30	10.24	13.64	23.12
High	2462.0	3.04	0.30	10.24	13.58	22.80

[IEEE802.11g]

Ch	Freq. [MHz]	P/M PK Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
				10.24	[dBm]	[mW]
Low	2412.0	10.12	0.30	10.24	20.66	116.41
Mid	2437.0	10.45	0.30	10.24	20.99	125.60
High	2462.0	10.15	0.30	10.24	20.69	117.22

Sample Calculation:

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

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SECTION 7 : Measurement results

7.1 Body SAR 2450MHz

Date : **March 1, 2008** Measured By : **Miyo Kishimoto**
Liquid Depth (cm) : **15.0** Model : **GC-131**
Parameters : **$\epsilon_r = 50.2$, $\sigma = 1.95$** Serial No. : **A97676**
Ambient temperature (deg.c.) : **24.5** Modulation : **DSSS(11b), OFDM(11g)**
Relative Humidity (%) : **35** Crest factor : **1**

BODY SAR RESULT										
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	1	2412	CCK(11Mbps)	Flat	Fixed	Left side	0	23.5	23.5	0.635
	6	2437	CCK(11Mbps)	Flat	Fixed	Left side	0	23.5	23.5	0.479
	11	2462	CCK(11Mbps)	Flat	Fixed	Left side	0	23.5	23.5	0.719
11g	Step1. Moduration Change									
	6	2437	BPSK(9Mbps)	Flat	Fixed	Left side	0	23.5	23.5	0.654
	6	2437	QPSK(12Mbps)	Flat	Fixed	Left side	0	23.5	23.5	0.680
	Step2. Frequency Change									
	1	2412	QPSK(12Mbps)	Flat	Fixed	Left side	0	23.5	23.5	0.518
	11	2462	QPSK(12Mbps)	Flat	Fixed	Left side	0	23.5	23.5	0.659

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