



RADIO TEST REPORT

Test Report No. : 27AE0229-HO-A

Applicant : **Nikon Corporation**
Type of Equipment : **Wireless LAN Module**
Model No. : **GC-131**
FCC ID : **CGJ3143EB**
Test standard : **FCC Part 15 Subpart C**
Section 15.207, Section 15.247: 2006
Test Result : **Complied**

1. This test report shall not be reproduced in 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 regulation.
4. The test results in this report are traceable to the national or international standards.

Date of test:

September 6 to 12, 2006

Tested by:


Hiroka Umeyama
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Approved by :


Naoki Sakamoto
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
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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.	:	411D4 (Used for Conducted and Radiated Emission tests) 412A1 (Used for Antenna Terminal Conducted test)
Rating	:	DC3.3V / 1.8V
Country of Manufacture	:	Japan
Receipt Date of Sample	:	September 5, 2006
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

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	:	2412-2462MHz
Bandwidth & Channel spacing	:	20MHz & 5MHz
Modulation	:	DSSS, OFDM
ITU code	:	G1D, D1D
Antenna Type	:	C coupled Inverted F Type
Antenna Gain	:	-0.4dBi

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part15 Subpart C : 2006

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits : 2006
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz : 2006

FCC 15.31 (e)

The EUT is constantly provided the stable voltage (DC3.3V/1.8V) from the host device. Therefore, the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

The antenna is not removable from the EUT. Therefore, the EUT complies with the antenna requirement of Section 15.203.

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted emission	FCC: ANSI C63.4:2003 7. AC powerline conducted emission measurements IC: RSS-Gen 7.2.2	FCC: Section 15.207 IC: RSS-Gen 7.2.2	-	N/A	3.3dB 0.77150MHz AV, L	Complied
2	6dB Bandwidth	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: RSS-Gen 4.4.2	FCC: Section 15.247(a)(2) IC: RSS-210 A8.2(1)	Conducted	N/A	See data.	Complied
3	Maximum Peak Output Power	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: RSS-Gen 4.6	FCC: Section 15.247(b)(3) IC: RSS-210 A8.4(4)	Conducted	N/A		Complied
4	Restricted Band Edges	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: -	FCC: Section 15.247 (d) IC: RSS-210 A8.5	Conducted/ Radiated	N/A		Complied
5	Power Density	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: -	FCC: Section 15.247 (e) IC: RSS-210 A8.2(2)	Conducted	N/A		Complied
6	Spurious Emission	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: RSS-Gen 4.7 RSS-Gen 4.8	FCC: Section 15.247(d) IC: RSS-210 A8.5 RSS-Gen 7.2.1 and 7.2.3	Conducted/ Radiated	N/A	[Tx] 0.3dB 2390.0MHz, 2483.5MHz Horizontal, AV [Rx] 14.1dB 115.200MHz Vertical QP	Complied

Note: UL Apex's EMI Work Procedures No.QPM05 and QPM15.

*0) The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.

*These tests were also referred to "Guidance on Measurement of Digital Transmission Systems Operating under Section 15.247".

*These tests were performed without any deviations from test procedure except for additions or exclusions.

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3.3 Addition to standards

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-Gen 4.4.1	-	Conducted	N/A	N/A	N/A

3.4 Uncertainty

Conducted Emission

The measurement uncertainty (with a 95% confidence level) for this test is $\pm 2.66\text{dB}$.
The data listed in this test report has enough margin, more than the site margin.

Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is $\pm 4.59\text{dB}(3\text{m})/\pm 4.58\text{dB}(10\text{m})$.

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is $\pm 4.62\text{dB}(3\text{m})/\pm 4.60\text{dB}(10\text{m})$.

The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is $\pm 5.27\text{dB}$.

[Tx] The data listed in this report meets the limits unless the uncertainty is taken into consideration.

[Rx] The data listed in this test report has enough margin, more than the site margin.

Other test except Conducted Emission and Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test is $\pm 3.0\text{dB}$.

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3.5 Test Location

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	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	IC4247A	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	655103	IC4247A-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	IC4247A-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	IC4247A-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	-
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	N/A	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	2.0 x 2.0 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 5.4 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3 and No.4 semi-anechoic chambers and No.7 shielded room.

3.6 Test set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

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

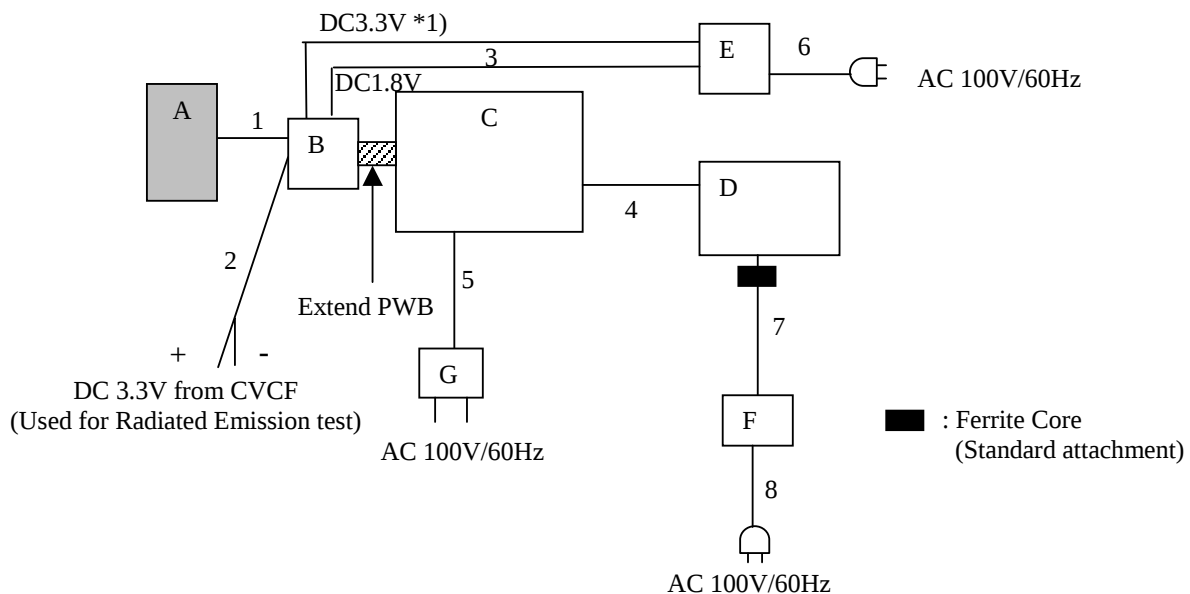
4.1 Operating Modes

The mode used for test :

- Transmitting mode 11b (CCK 11Mbps (Worst), Packet type: Maximum, Payload: PN9)
 - Low Channel : 2412MHz(Ch1)
 - Mid Channel : 2437MHz(Ch6)
 - High Channel : 2462MHz(Ch11)
- Transmitting mode 11g (OFDM 54Mbps (Worst), Packet type: Maximum, Payload: PN9)
 - Low Channel : 2412MHz(Ch1)
 - Mid Channel : 2437MHz(Ch6)
 - High Channel : 2462MHz(Ch11)
- Receiving mode 11b/11g
 - Mid Channel : 2437MHz(Ch6)

*The test was made with the above modes which had the worst case.

4.2 Configuration and peripherals



* Cabling and setup were taken into consideration and test data was taken under worse case conditions.

*1) Used for all the tests except for Radiated Emission test

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Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Wireless LAN Module	GC-131	411D4 *1) 412A1 *2)	NIKON	EUT
B	SD Extender	-	-	NIKON	-
C	SDIO Platform	P201-1014	131	NIKON	-
D	PC	PP17L	36277826469	DELL	-
E	DC Power Supply	PW8-3ATP *3)	09067054	KENWOOD	-
		PMC-352A *4)	13090501	KIKUSUI	
F	AC Adapter	AA22850-L	CN-ou7088- 16293-55G-031L	DELL	-
G	AC Adapter	DSA-009F-05A	4003	DVE	-

*1) Used for Conducted and Radiated Emission tests

*2) Used for Antenna Terminal Conducted test

*3) Used for Conducted Emission test

*4) Used for other tests than Conducted Emission test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	FPC Cable	0.04	Unshielded	Unshielded	-
2	DC Power Cable	2.9	Unshielded	Unshielded	-
3	DC Power Cable	1.0	Unshielded	Unshielded	-
4	Serial I/F Cable	1.5	Shielded	Shielded	-
5	DC Power Cable	1.8	Unshielded	Unshielded	-
6	AC Power Cable	2.0	Unshielded	Unshielded	-
7	DC Power Cable	1.9	Shielded	Shielded	One Ferrite Core
8	AC Power Cable	0.9	Unshielded	Unshielded	-

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SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)

I/O cable and AC cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber or a Measurement Room.

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

Detector	: CISPR quasi-peak and average detector (IF BW 9 kHz)
Measurement range	: 0.15-30MHz
Test data	: APPENDIX 2
Test result	: Pass

Date: September 11, 2006

Test engineer: Hiroka Umeyama

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SECTION 6: Spurious Emission

[Conducted]

Test Procedure

The Out of Band Emission was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2

Test result : Pass

[Radiated]

Test Procedure

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 80cm above the conducting ground plane. The Radiated Electric Field Strength intensity has been measured in a Semi Anechoic Chamber with a ground plane and at a distance of 3m(Below 10GHz) and 1m(Upper 10GHz).

The height of the measuring varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20dBc was applied to the frequency over the limit of FCC 15.209 and outside the restricted band of FCC15.205.

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver / Spectrum Analyzer	Spectrum Analyzer
Detector	QP: BW 120kHz(T/R)	PK: RBW:1MHz/VBW: 1MHz
IF Bandwidth	20dBc : RBW: 100kHz VBW: 300kHz (S/A)	AV: RBW:1MHz/VBW:10Hz 20dBc : RBW:100kHz/VBW:300kHz

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Test data : APPENDIX 2

Test result : Pass

Date: September 6 and 7, 2006
September 11, 2006

Test engineer: Yasuyuki Fukui
Hiroka Umeyama

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SECTION 7: Bandwidth

Test Procedure

The bandwidth was measured with a spectrum analyzer connected to the antenna port.

Test data	: APPENDIX 2
Test result	: Pass

SECTION 8: Maximum Peak Output Power

Test Procedure

The Maximum Peak Output Power was measured with a power meter (tested bandwidth: 50MHz) connected to the antenna port.

Test data	: APPENDIX 2
Test result	: Pass

SECTION 9: Peak Power Density

[Conducted]

Test Procedure

The Peak Power Density was measured with a spectrum analyzer connected to the antenna port.
It was measured based on "PSD option 1" of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247".

Test data	: APPENDIX 2
Test result	: Pass

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