



RADIO TEST REPORT

Test Report No. : 27IE0024-HO-A

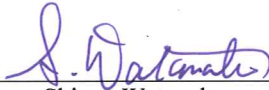
Applicant : Nagano Japan Radio Co., Ltd.
Type of Equipment : Wireless LAN Module
Model No. : NJT-511
FCC ID : D7LNJT511
Test standard : FCC Part 15 Subpart C 2007
Section 15.207, Section 15.247
Test Result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested 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:

August 3 to September 15, 2007

Tested by:



Shinya Watanabe
EMC Services

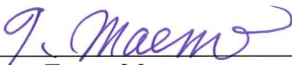


Takahiro Hatakeda
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Approved by :



Tetsuo Maeno
Site Manager of EMC Services



NVLAP LAB CODE: 200572-0

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MF060b (18.06.07)

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SECTION 1: Client information

Company Name : Nagano Japan Radio Co., Ltd.
Address : 1163 Inasato-machi, Nagano City 381-2288 Japan
Telephone Number : +81-26-285-1093
Facsimile Number : +81-26-285-1037
Contact Person : Takaaki Fukaya

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

2.1 Identification of E.U.T.

Type of Equipment : Wireless LAN Module
Model No. : NJT-511
Serial No. : 0013E0999BA0 for Antenna Terminal Conducted test
0013E0999F133 for Conducted and Radiated Emission test
Country of Manufacture : JAPAN
Rating : DC3.3V
Receipt Date of Sample : July 2, 2007
Condition of EUT : Production Prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No modification by this test lab

2.2 Product Description

Model No: NJT-511, referred as the EUT in this report, is the Wireless LAN Module.
It is integrated into a Barcode Handy Terminal.
Clock Frequency : 38.4MHz

Equipment Type	Transceiver	
Frequency band	Lower limit	2400MHz
	Upper limit	2483.5MHz
Frequency of Operation	2412-2462MHz	
Bandwidth & Channel spacing	20MHz & 5MHz	
Type of Modulation	DSSS (DBPSK, DQPSK, CCK) OFDM (BPSK, QPSK, 16QAM, 64QAM)	
Antenna Type	Chip Antenna	
Antenna Connector Type	W. FL Plug	
Antenna Gain	2.14dBi max	
ITU code	G1D / D1D	
Power Supply	DC 3.3V	

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part15 Subpart C: 2007
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz

FCC 15.31 (e)

As this EUT does not have a regulator, the supplied voltage depends on the installed device. Therefore the certification is limited only for the device which can provide voltage(DC3.3V) constantly.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of Handheld Terminal in which the EUT is installed. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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3.2 Procedures and results

[DSSS and other forms of modulation]

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	20.3dB 24.95230MHz, AV, L 24.98034MHz, AV, L	Complied
2	6dB Bandwidth	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: RSS-Gen 4.6.2	FCC: Section 15.247(a)(2) IC: RSS-210 A8.2(a)	Conducted	N/A	See data.	Complied
3	Maximum Peak Output Power	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: RSS-Gen 4.8	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(b)	Conducted	N/A		Complied
6	Spurious Emission	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: RSS-Gen 4.9 RSS-Gen 4.10	FCC: Section 15.247(d) IC: RSS-210 A8.5 RSS-Gen 7.2.1 and 7.2.3	Conducted/ Radiated	N/A		[Tx] 7.9dB 24120.0MHz, AV, Hori., Vert. [Rx] 11.4dB 9748.0MHz, AV, Hori., Vert.

Note: UL Japan, Inc.'s EMI Work Procedures No.QPM05 and QPM15.

*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 4.6.1	RSS-Gen 4.6.1	Conducted	N/A	N/A	N/A

3.4 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Conducted Emission

The measurement uncertainty for this test is ± 2.66 dB.

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

Spurious Emission (Radiated)

The measurement uncertainty for this test using Biconical antenna is ± 4.59 dB(3m).

The measurement uncertainty for this test using Logperiodic antenna is ± 4.62 dB(3m).

The measurement uncertainty for this test using Horn antenna is ± 5.27 dB.

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 for this test is ± 3.0 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	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 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.3 and No.4 shielded rooms.

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

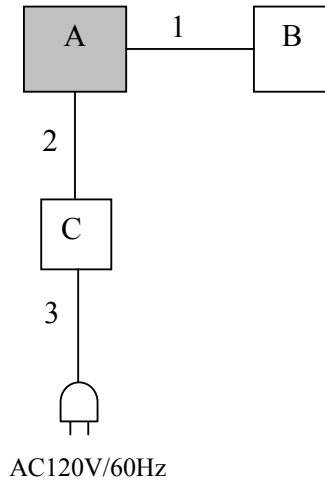
The mode used for test:

Test	Mode	Tested frequency
Conducted emission Spurious Emission	IEEE802.11b Transmitting (Tx), 11Mbps	2412MHz
	IEEE802.11g Transmitting (Tx), 9Mbps	2437MHz
	----- IEEE802.11b/g Receiving (Rx)	2462MHz ----- 2437MHz
6dB Bandwidth Maximum Peak Output Power Power Density 99% Occupied Bandwidth	IEEE802.11b Transmitting (Tx), 11Mbps	2412MHz
	IEEE802.11g Transmitting (Tx), 9Mbps	2437MHz
		2462MHz
Restricted Band Edge	IEEE802.11b Transmitting (Tx), 11Mbps	2412MHz
	IEEE802.11g Transmitting (Tx), 9Mbps	2462MHz
Transmitting duty was 100% on all tests.		

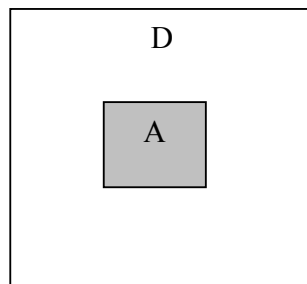
*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum rated power.

4.2 Configuration and peripherals

[Conducted/Radiated emission]



[Antenna Terminal Conducted test]



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Wireless LAN Module	NJT-511	0013E0999BA0 *1) 0013E0999F133 *2)	Nagano Japan Radio Co., Ltd.	EUT
B	Antenna Board	496351-2420 TPB-H. VO	2	Nagano Japan Radio Co., Ltd.	-
C	DC Power Supply	PW18-1.3AT	0816530	KENWOOD	-
D	Barcode Handy Terminal	BHT-300BW	5496310377700019	DENSO WAVE	-

*1) Used for Antenna Terminal Conducted test.

*2) Used for Conducted and Radiated Emission test.

List of cables used

No.	Name	Length (m)	Shield (Cable)	Shield (Connector)
1	Antenna Cable	0.1	Unshielded	Unshielded
2	DC Cable	1.6	Unshielded	Unshielded
3	AC Cable	2.0	Unshielded	Unshielded

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SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0m by 0.5m, 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 itself (as a stand alone equipment)

Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN /(AMN) to the input power source.

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

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

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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, 1.0m by 0.5m, 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 / Table 2 of RSS-210 2.7 (IC) and outside the restricted band of FCC15.205 / Table 1 of RSS-210 2.7 (IC).

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

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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.

It was measured based on "Power Output Option 1" of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247".

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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