



RADIO TEST REPORT

Test Report No. : 29EE0246-HO-01-C

Applicant : Canon Inc.
Type of Equipment : WLAN Module
Model No. : CH9-1161
FCC ID : AZD161
Test regulation : FCC Part 15 Subpart E: 2009
Section 15.407
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with above regulation.
4. The test results in this 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.

Date of test:

March 26 to May 2, 2009

Tested by:

K. Kawamura

Keisuke Kawamura
EMC Services

T. Nakagawa

Tomohisa Nakagawa
EMC Services

H. Ohnishi

Hironobu Ohnishi
EMC Services

T. Shimada

Takumi Shimada
EMC Services

Approved by :

T. Maeno

Tetsuo Maeno
Site Manager of EMC Services



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UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

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SECTION 1: Customer information

Company Name : Canon Inc.
Address : 30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo, 146-8501, Japan
Telephone Number : +81-3757-6798
Facsimile Number : +81-3757-8431
Contact Person : Kiyoshi Sahoyama

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

2.1 Identification of E.U.T.

Type of Equipment : WLAN Module
Model No. : CH9-1161
Serial No. : ES7004, ES7005, ES7006
Rating : DC3.3V
Receipt Date of Sample : March 18, 2009
Country of Mass-production : Japan
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: CH9-1161 (referred to as the EUT in this report) is the WLAN Module.

Equipment Type : Transceiver
Clock frequency : 38.4MHz
Method of Frequency Generation : Crystal
Operating voltage (inner) : DC1.8V, DC2.85V
Operating temperature range : -10 to +60 deg. C.

	IEEE802.11b	IEEE802.11g	IEEE802.11a
Frequency of operation	2412-2462MHz	2412-2462MHz	5180-5240MHz (W52) 5260-5320MHz (W53) 5500-5700MHz (W56) *1) 5745-5825MHz (W58)
Type of modulation	DSSS	OFDM	OFDM
Channel spacing	5MHz	5MHz	20MHz
ITU Code	G1D	D1D	D1D
Antenna type	Planar Inverted F antenna	Planar Inverted F antenna	Planar Inverted F antenna
Antenna Gain	-2.18dBi	-2.18dBi	1.85dBi (W52/W53) 2.62dBi (W56) 1.50dBi (W58)

*1) Frequency range of 5580-5660MHz is not used in Canada.

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part15 Subpart E: 2009, final revised on February 27, 2009
Title : FCC 47CFR Part15 Radio Frequency Device
Subpart E Unlicensed National Information Infrastructure Devices
Section 15.407 General technical requirements

FCC 15.31 (e)

The RF Module has own regulator.

The RF Module is constantly provided voltage (DC1.8 / 2.85V) through own regulator regardless of input voltage.

Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

The EUT has a unique coupling/antenna connector (UFL). Therefore the equipment complies with the requirement of 15.203/212.

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted Emission	FCC :ANSI C63.4:2003	FCC: 15.407(b)(6) / 15.207	Conducted	N/A	[QP] 17.5dB, 0.20291MHz, L [AV] 14.7dB, 0.53885MHz, L	Complied
		IC: RSS-Gen 7.2.2	IC: RSS-Gen 7.2.2				
2	26dB Emission Bandwidth	FCC :ANSI C63.4:2003 IC: -	FCC : 15.407(a)(1)(2) IC: RSS-210 A9.2 (1)(2)	Conducted	N/A	See data	N/A
3	Maximum Peak Output Power	FCC :ANSI C63.4:2003, FCC Public Notice DA 02-2138A1 IC: -	FCC : 15.407(a) (1)(2) IC: RSS-210 A9.2 (1)(2)	Conducted	N/A		Complied
4	Peak Power Spectral Density	FCC :ANSI C63.4:2003, FCC Public Notice DA 02-2138A1 IC: -	FCC : 15.407(a) (1)(2) IC: RSS-210 A9.2 (1)(2)	Conducted	N/A		Complied
5	Peak Excursion Ratio	FCC :ANSI C63.4:2003, FCC Public Notice DA 02-2138A1 IC: -	FCC : 15.407(a)(6) IC: -	Conducted	N/A		Complied
6	Spurious Emission	FCC: ANSI C63.4:2003	FCC : 15.407(b) (1)(2)(3), 15.205and15.209	Conducted / Radiated	N/A	[Tx] 9.0dB, 5725.00MHz, Horizontal, PK [Rx] 9.0dB, 11120.00MHz, Horizontal, AV	Complied
		IC: -	IC: RSS-210 A.9.3 (1)(2)(3)				
7	Band Edge Compliance	FCC :ANSI C63.4:2003	FCC : 15.407(b) (1)(2)(3) (5), 15.205and15.209	Conducted / Radiated	N/A	See data	Complied
		IC: -	IC: RSS-210 A.9.3 (1)(2)(3)				

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

*These tests were also referred to FCC Public Notice DA 02-2138A1 "Measurement Procedure Updated for Peak Transmit Power in the Unlicensed National Information Infrastructure (U-NII) Bands".

3.3 Addition to standard

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

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI

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

Test room	Conducted emission	Radiated emission (10m*)			Radiated emission (3m*)			Radiated emission (3m*)	
	150kHz-30MHz	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	1GHz-18GHz	18GHz-40GHz
No.1 semi-anechoic Chamber (±)	3.7dB	3.1dB	4.4dB	4.2dB	3.2dB	3.8dB	3.9dB	5.9dB	6.1dB
No.2 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	4.4dB	4.0dB	5.9dB	6.1dB
No.3 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	4.6dB	4.0dB	5.9dB	6.1dB
No.4 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	3.9dB	3.9dB	5.9dB	6.1dB

*10m/3m = Measurement distance

Conducted emission test

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

Radiated emission test(3m)

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 ±3.0dB.

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

3.5 Test Location

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

	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	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
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	6.0 x 6.0m	-
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	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* 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, Data of EMI, and Test instruments

Refer to APPENDIX 1 to 3.

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

4.1 Operating Modes

Test Item	Test mode	Test frequency	Channel
Conducted Emission Spurious Emission	-IEEE802.11a Transmitting (Tx), 24Mbps, Payload: PN9	5180MHz(L)	36
		5220MHz(M)	44
		5240MHz(H)	48
		5260MHz(L)	52
		5300MHz(M)	60
		5320MHz(H)	64
		5500MHz(L)	100
		5600MHz(M)	120
		5700MHz(H)	140
	-IEEE802.11a Receiving (Rx)	5220MHz(M)	44
26dB Emission Bandwidth Maximum Peak Output Power Peak Power Spectral Density Peak Excursion Ratio 99% Occupied Bandwidth	-IEEE802.11a Transmitting (Tx), 24Mbps, Payload: PN9	5300MHz(M)	60
		5600MHz(M)	120
		5180MHz(L)	36
		5220MHz(M)	44
		5240MHz(H)	48
		5260MHz(L)	52
		5300MHz(M)	60
		5320MHz(H)	64
		5500MHz(L)	100
		5600MHz(M)	120
		5700MHz(H)	140

As a result of preliminary test, the formal test was performed with the above modes, which had the maximum power. Transmitting duty was 100% on all the tests.

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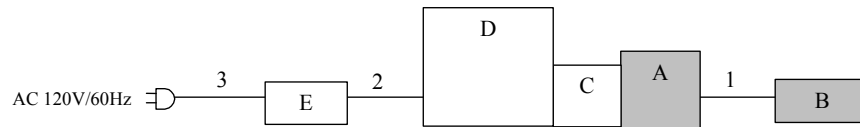
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

4.2 Configuration and peripherals

[Conducted emission and Antenna Terminal Conducted tests]



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

Description of EUT and Support equipment

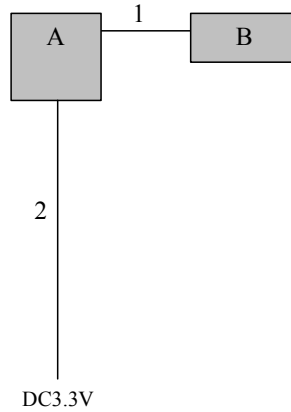
No.	Item	Model number	Serial number	Manufacturer	Remarks
A	WLAN Module	CH9-1161	ES7004* ES7005*	Canon Inc.	EUT
B	Antenna	TE 2069856-1	01	Canon Inc.	EUT
C	Jig Board	-	-	Canon Inc.	-
D	Note PC	PORTE6ER500 Series	88091989H	TOSHIBA	-
E	AC Adapter	PA3241U-2ACA	G71C00062310	TOSHIBA	-

* Please refer to Appendix 2: Data of EMI test.

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Antenna Cable	0.15	Shielded	Shielded	-
2	DC Cable	1.8	Unshielded	Unshielded	-
3	AC Cable	1.8	Unshielded	Unshielded	-

[Radiated emission test]



* Cabling and setup(s) 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	Remarks
A	WLAN Module	CH9-1161	ES7004* ES7006*	Canon Inc.	EUT
B	Antenna	TE 2069856-1	01	Canon Inc.	EUT

* Please refer to Appendix 2: Data of EMI test.

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Antenna Cable	0.15	Shielded	Shielded	-
2	DC Cable	3.0	Unshielded	Unshielded	-

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 5: Conducted Emission

Test Procedure

EUT was placed on a urethane platform of nominal size, 1.0m by 0.5m, raised 0.8m 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	: 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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Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 6: Spurious Emission and Band Edge Compliance

[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 0.8m 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) , 1m(10-26.5GHz, Distance Factor : $20\log(3[m]/1[m])$) and 0.5m(Upper 26.5GHz, Distance Factor : $20\log(3[m]/0.5[m])$).

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.

Below 1GHz

The result also satisfied with the general limits specified in section 15.209(a).

Above 1GHz

Inside of the restricted bands (Section 15.205): Apply to limit in the Section 15.209(a)

Outside of the restricted bands (Section 15.407): Limit -27dBm EIRP

Frequency	Below 1GHz	Above 1GHz (Inside of the restricted bands)	Above 1GHz (Outside of the restricted bands)
Instrument use	Test Receiver	Spectrum Analyzer	Spectrum Analyzer
Detector	QP: BW 120kHz	PK: RBW:1MHz/VBW: 1MHz	RBW:1MHz/VBW: 1MHz
IF Bandwidth		AV *1): RBW:1MHz/VBW: 10Hz	

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

Test data : APPENDIX 2

Test result : Pass

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

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 7: Bandwidth

26dB Bandwidth

Test Procedure

The bandwidth was measured with a spectrum analyzer connected to the antenna port.
The following spectrum analyzer setting was used:

- Span: Enough width to display Bandwidth
- RBW: as close to 1% of EBW
- VBW: Three times of RBW
- Sweep: Auto
- Detector: Peak
- Trace: Clear Write

Test data : APPENDIX 2
Test result : Pass

99% Occupied Bandwidth

Test Procedure

The bandwidth was measured with a spectrum analyzer connected to the antenna port.
The following spectrum analyzer setting was used:

- Span: Enough width to display Bandwidth
- RBW: as close to 1% of the Span as is possible without being below 1%
- VBW: Three times of RBW
- Sweep: Auto
- Detector: Peak
- Trace: Max Hold

Test data : APPENDIX 2
Test result : Pass

SECTION 8: Maximum Peak Output Power

Test Procedure

The Peak Transmit Power was measured with a spectrum analyzer connected to the antenna port.
The test was made with the spectrum analyzer that has a function of channel-power measurement.
We followed the method 1 specified in DA-02-2138A1.

Test data : APPENDIX 2
Test result : Pass

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 9: Peak Power Spectral Density

Test Procedure

The Peak Power Spectral Density was measured with a spectrum analyzer connected to the antenna port.
We followed the method 2 specified in DA-02-2138A1.

Test data	: APPENDIX 2
Test result	: Pass

SECTION 10: Peak Excursion Ratio

Test Procedure

The Peak Excursion Ratio was measured with a spectrum analyzer connected to the antenna port.
The second sweep was measured based on method 1 (Maximum Peak Output Power) specified in DA-02-2138A1.

Test data	: APPENDIX 2
Test result	: Pass