



SAR TEST REPORT

Test Report No. : 28IE0157-HO-A

Applicant : CANON INC.
Type of Equipment : WLAN MODULE UNIT
Model No. : CH91108
FCC ID : AZDCH91108
Test regulation : FCC47CFR 2.1093
FCC OET Bulletin 65, Supplement C
Test Result : Complied
Max. SAR Measured : 0.268W/kg (Head, 2412MHz)

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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.
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June 18 to 20, 2008

Tested by:

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SECTION 1: Customer information

Company Name	CANON INC.
Brand name	CANON
Address	30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo 146-8501, Japan
Telephone Number	+81-3-2757-6798
Facsimile Number	+81-3-3757-8431
Contact Person	Kuniaki Tanaka

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

2.1 Identification of E.U.T.

Type of Equipment	WLAN MODULE UNIT
Model No.	CH91108
Serial No.	00008593C028
Rating	DC3.3V
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 18, 2008
Modification of EUT	No modification by the test lab.
Category Identified	Portable device

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2.2 Product Description

Model No: CH91108 (referred to as the EUT in this report) is the Wireless LAN Module.

Clock frequency in the system	40MHz
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 EMC : 23.16dBm (207.01mW) SAR : 23.17dBm (207.49mW)
Antenna type * ¹	Ant.1: PCB Antenna / Ant.2: Film Antenna
Antenna Gain * ¹	Ant.1: 2.2dBi / Ant.2: 1.7dBi

*¹ The SAR test was performed in the Ant.1 (PCB Antenna). Refer to the Appendix 1.

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

<Outline of test>

This EUT is built into the limited transmitter which used with the limited digital camera of similar composition (variant model). Therefore the SAR test was performed with the limited transmitter and digital camera as a host device. The details of limited transmitter and digital camera were 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 =0.268W/kg
Note: UL Japan, Inc. 's SAR Work Procedures QPM46 and QPM47						

Result of Max. SAR value

Max. SAR Value (IEEE 802.11b/g): 0.268W/kg (Head 2412MHz)

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

It was checked that the antenna port 1 power was correlated within 0~+5% (FCC requirements)

The result is shown in Section 6.1.

- Peak power at EMC test (S/N: 55).
EMC power was measured for EMC test on October 3, 2006
- Peak power at SAR test (S/N: 00008593C028).
SAR power was measured for SAR test on June 19, 2008

Confirmation of Data rate

- Average power at SAR test (S/N: 00008593C028).
The average power by the data rate was checked in the middle channel (2437 MHz.)
The result is shown in section 6.2.

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

1. IEEE 802.11b

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

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 searching 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.

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 Test setup of EUT

When users operate or carry the EUT, it could be considered to touch or get close to their bodies. In order to assume this situation, we performed the test at the following positions. Please refer to "APPENDIX 1" for more details.

(1) Front:

The test was performed in touch with front surface of the camera & transmitter to the flat section of SAM Twin phantom.

(2) Rear:

The test was performed in touch with rear surface of the camera & transmitter to the flat section of SAM Twin phantom.

(3) Bottom:

The test was performed in touch with bottom surface of the camera & transmitter to the flat section of SAM Twin phantom.

(4) Right Side :

The test was performed in touch with right side surface of the camera & transmitter to the flat section of SAM Twin phantom.

(5) Front (5mm) :

The measurement separated 5mm distance between camera & transmitter and flat section of SAM Twin Phantom.

(6) Front (10mm) :

The measurement separated 10mm distance between camera & transmitter and flat section of SAM Twin Phantom.

(7) Front (15mm) :

The measurement separated 15mm distance between camera & transmitter and flat section of SAM Twin Phantom.

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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 frequency band and the modulation used in the testing of IEEE.802.11b/g is shown as a following.

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, QPSK, 16QAM, 64QAM)
Crest factor : 1

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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	$\sqrt{3}$	$(1-cp)^{1/2}$	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	$\sqrt{3}$	$(cp)^{1/2}$	± 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	35
Device holder uncertainty	± 3.6	Normal	1	1	± 3.6	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/after testing

6.1 Correlation of EMC power and SAR power

EMC power

This data are reference data of EMC test. (Report No. 27BE0338-HO-A-2)

Date of test: October 3, 2006

FCC 15.247 Peak power [IEEE802.11b 11Mbps][Port 1]

Ch	Freq. [MHz]	P/M PK Reading	Cable Loss [dB]	Atten. [dB]	Result	
		[dBm]			[dBm]	[mW]
Low	2412.0	7.76	0.50	10.21	18.47	70.31
Mid	2437.0	7.69	0.50	10.21	18.40	69.18
High	2462.0	7.85	0.50	10.21	18.56	71.78

Sample Calculation:

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

FCC 15.247 Peak power [IEEE802.11g 54Mbps][Port 1]

Ch	Freq. [MHz]	P/M PK Reading	Cable Loss [dB]	Atten. [dB]	Result	
		[dBm]			[dBm]	[mW]
Low	2412.0	12.02	0.50	10.21	22.73	187.50
Mid	2437.0	12.19	0.50	10.21	22.90	194.98
High	2462.0	12.45	0.50	10.21	23.16	207.01

Sample Calculation:

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

SAR power

Date of test: June 18, 2008

Peak power [IEEE802.11b 11Mbps][Port 1]

Ch	Freq. [MHz]	P/M PK Reading	Cable Loss [dB]	Atten. [dB]	Result	
		[dBm]			[dBm]	[mW]
Low	2412.0	7.79	0.60	10.09	18.48	70.47
Mid	2437.0	7.71	0.60	10.09	18.40	69.18
High	2462.0	8.01	0.60	10.09	18.70	74.13

Sample Calculation:

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

Peak power [IEEE802.11g 54Mbps][Port 1]

Ch	Freq. [MHz]	P/M PK Reading	Cable Loss [dB]	Atten. [dB]	Result	
		[dBm]			[dBm]	[mW]
Low	2412.0	12.17	0.60	10.09	22.86	193.20
Mid	2437.0	12.35	0.60	10.09	23.04	201.37
High	2462.0	12.48	0.60	10.09	23.17	207.49

Sample Calculation:

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

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6.2 Reference data of SAR test (Data rate determination)

Date of test: June 18, 2008

[IEEE802.11b] Rate check(Average power) [Port 1]

Modulation	Data rate	Freq. [MHz]	P/M Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
						[dBm]	[mW]
DBPSK	1	2437.0	4.22	0.60	10.09	14.91	30.97
DQPSK	2	2437.0	4.62	0.60	10.09	15.31	33.96
CCK	5.5	2437.0	4.70	0.60	10.09	15.39	34.59
	11	2437.0	4.74	0.60	10.09	15.43	34.91

[IEEE802.11g] Rate check(Average power) [Port 1]

Modulation	Data rate	Freq. [MHz]	P/M Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
						[dBm]	[mW]
BPSK	6	2437.0	4.16	0.60	10.09	14.85	30.55
	9	2437.0	3.78	0.60	10.09	14.47	27.99
QPSK	12	2437.0	4.51	0.60	10.09	15.20	33.11
	18	2437.0	3.89	0.60	10.09	14.58	28.71
16QAM	24	2437.0	3.73	0.60	10.09	14.42	27.67
	36	2437.0	3.67	0.60	10.09	14.36	27.29
64QAM	48	2437.0	4.50	0.60	10.09	15.19	33.04
	54	2437.0	4.51	0.60	10.09	15.20	33.11

Sample Calculation:

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

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SECTION 7 : Measurement results

7.1 Body SAR 2450MHz

Liquid Depth (cm) : 15.0
Parameters : $\epsilon_r = 50.4$, $\sigma = 1.96$
Ambient temperature(deg.c.) : 24.5
Relative Humidity (%) : 48
Date : June 18, 2008

Model : CH91108
Serial No. : 00008593C028
Modulation : DSSS, OFDM
Crest factor : 1
Measured By : Miyo Kishimoto

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 value of multi-peak
11b	Step 1. Search for the worst position									
	6	2437	CCK(11Mbps)	Flat	Fixed	Front	0	24.0	24.0	0.158
	6	2437	CCK(11Mbps)	Flat	Fixed	Rear	0	23.6	23.6	0.054
	6	2437	CCK(11Mbps)	Flat	Fixed	Bottom	0	23.8	23.6	0.054
	6	2437	CCK(11Mbps)	Flat	Fixed	Rightside	0	23.9	23.8	0.096
	Step 2. Change to the channels									
	1	2412	CCK(11Mbps)	Flat	Fixed	Front	0	23.6	23.7	0.209
	11	2462	CCK(11Mbps)	Flat	Fixed	Front	0	23.7	23.7	0.187
11g	Step 3. Search for the worst modulation									
	6	2437	BPSK(6Mbps)	Flat	Fixed	Front	0	23.7	23.7	0.154
	6	2437	QPSK(12Mbps)	Flat	Fixed	Front	0	23.7	23.7	0.154
	6	2437	16QAM(24Mbps)	Flat	Fixed	Front	0	23.7	23.7	0.171
	6	2437	64QAM(54Mbps)	Flat	Fixed	Front	0	23.7	23.7	0.164
	Step 4. Search for the worst position									
	6	2437	16QAM(24Mbps)	Flat	Fixed	Rear	0	23.7	23.7	0.029
	6	2437	16QAM(24Mbps)	Flat	Fixed	Bottom	0	23.7	23.9	0.044
	6	2437	16QAM(24Mbps)	Flat	Fixed	Right side	0	23.7	23.7	0.107
	Step 5. Change to the channels									
	1	2412	16QAM(24Mbps)	Flat	Fixed	Front	0	23.9	24.2	0.202
	11	2462	16QAM(24Mbps)	Flat	Fixed	Front	0	24.2	24.2	0.199
11b	Step 6. Change to the separation									
	1	2412	CCK(11Mbps)	Flat	Fixed	Front	5	24.0	24.0	0.101
	1	2412	CCK(11Mbps)	Flat	Fixed	Front	10	24.0	24.0	0.046
	1	2412	CCK(11Mbps)	Flat	Fixed	Front	15	24.1	24.1	0.024

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7.2 Head SAR 2450MHz

Liquid Depth (cm) : 15.0
Parameters : $\epsilon_r = 37.3$, $\sigma = 1.87$
Ambient temperature(deg.c.) : 24.5
Relative Humidity (%) : 48
Date : June 20 2008

Model : CH91108
Serial No. : 00008593C028
Modulation : DSSS, OFDM
Crest factor : 1
Measured By : Hisayoshi Sato

HEAD 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
11b	Step 1. Search for the worst position									
	6	2437	CCK(11Mbps)	Flat	Fixed	Front	0	23.6	23.6	0.198
	6	2437	CCK(11Mbps)	Flat	Fixed	Rear	0	23.6	23.6	0.037
	6	2437	CCK(11Mbps)	Flat	Fixed	Bottom	0	23.7	23.7	0.066
	6	2437	CCK(11Mbps)	Flat	Fixed	Rightside	0	23.7	23.7	0.155
	Step 2. Change to the channels									
	1	2412	CCK(11Mbps)	Flat	Fixed	Front	0	23.8	23.8	0.268
	11	2462	CCK(11Mbps)	Flat	Fixed	Front	0	23.8	23.8	0.238
11g	Step 3. Search for the worst modulation									
	6	2437	BPSK(6Mbps)	Flat	Fixed	Front	0	24.0	24.0	0.205
	6	2437	QPSK(12Mbps)	Flat	Fixed	Front	0	24.0	24.0	0.176
	6	2437	16QAM(24Mbps)	Flat	Fixed	Front	0	23.9	23.9	0.200
	6	2437	64QAM(54Mbps)	Flat	Fixed	Front	0	23.9	23.9	0.200
	Step 4. Search for the worst position									
	6	2437	BPSK(6Mbps)	Flat	Fixed	Rear	0	23.8	23.8	0.038
	6	2437	BPSK(6Mbps)	Flat	Fixed	Bottom	0	23.8	23.8	0.057
	6	2437	BPSK(6Mbps)	Flat	Fixed	Right side	0	23.8	23.8	0.113
	Step 5. Change to the channels									
1	2412	BPSK(6Mbps)	Flat	Fixed	Front	0	23.7	23.7	0.223	
11	2462	BPSK(6Mbps)	Flat	Fixed	Front	0	23.7	23.7	0.196	
11b	Step 6. Change to the separation									
	1	2412	CCK(11Mbps)	Flat	Fixed	Front	5	23.8	23.8	0.133
	1	2412	CCK(11Mbps)	Flat	Fixed	Front	10	23.9	23.9	0.061
	1	2412	CCK(11Mbps)	Flat	Fixed	Front	15	23.9	23.9	0.037