



SAR TEST REPORT

Test Report No. : 26LE0212-HO-A-2

Applicant : CANON INC.
Type of Equipment : WLAN MODULE UNIT
Model No. : CH91108
FCC ID : AZDCH91108
Test standard : FCC47CFR 2.1093
FCC OET Bulletin 65, Supplement C
Test Result : Complied
Max. SAR Measured : 0.433W/kg (Head, 2412MHz)

1. This test report shall not be reproduced except 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 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.

Date of test : October 23-25, 2006

Tested by :

Miyo Ikuta
EMC Services

Approved by :

Tetsuo Maeno
Site Manager 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	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.	00008593C007
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	October 23, 2006
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 : 23.16dBm (207.01mW)
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 Appendix1.

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.

3.2 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.

<p style="text-align: center;">NOTE:GENERAL POPULATION/UNCONTROLLED EXPOSURE SPATIAL PEAK(averaged over any 1g of tissue) LIMIT 1.6 W/kg</p>

SECTION 4 : Test result

4.1 Outline of test

This EUT is built into the limited transmitter which used with the limited digital camera of similar composition (variant model).

3-host test are excluded because the EUT is used in specific hosts.

Therefore the SAR test was performed with the limited transmitter and digital camera as a host device because the power source of transmitter is supplied from the digital camera

The details of limited transmitter and digital camera were shown in the Appendix 1.

4.1 Result of Max. SAR value

Max. SAR Measured (IEEE 802.11b) : 0.433 W/kg (Head, 2412MHz)

4.2 Test Location

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SECTION 5 : Operation of E.U.T. during testing

5.1 Confirmation before SAR testing

Correlation of EMC power and SAR power

Peak Power test

As for the peak power, the data of EMC test (October 3, 2006) is shown as a reference data.
The result is shown in Section 7.1.

Average Power test

It was checked that the antenna port power is correlated within 0~+5% (FCC requirements) at EMC test result (October 03, 2006).
The tested mode was performed at the worst data rate of middle channel(2437MHz).
The result is shown in lause 7.1.

5.2 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.

5.3 Operating modes for SAR testing

5.3.1 Setting of EUT

1. IEEE 802.11b mode

Tx frequency band : 2412-2462MHz
Channel : 1ch(2412MHz),6ch(2437MHz),11ch(2462MHz)
Modulation : DSSS (DBPSK,DQPSK,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

5.3.2 SAR Measurement (Radiated power is always monitored by Spectrum Analyzer.)

IEEE 802.11b

The 11b (DSSS) mode test was performed on the CCK[11Mbps] modulation, because it was the highest average power and data rate*¹.

Step1. The searching for the worst position

Step2. The changing to the Low and High channels

This test was performed at the worst conditions of Step 1

IEEE 802.11g

Step3. The searching for the worst modulation.

The data rate in the higher average power 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 Step3.

Step5. The changing to the Low and High channels

This test was performed at the worst conditions of Step 4.

Change distance between EUT and SAM Twin Phantom

Step6. 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. As a result, the shortest distance had the worst value.

*¹ Refer to the antenna port power data in the section 7.2.

5.4 Test setup of EUT

When users operate or carry the camera with transmitter, 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) Left Side :

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

(2) Top :

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

(3) Rear :

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

(4) Left Side (5mm) :

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

(5) Left Side (10mm) :

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

(6) Left Side (15mm) :

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

SECTION 6 : Test surrounding

6.1 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	28
Device holder uncertainty	± 3.6	Normal	1	1	± 3.6	5
Power drift	± 5.0	Rectangular	$\sqrt{3}$	1	± 2.9	∞
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					± 13.453	
Expanded Uncertainty (k=2)					± 26.9	

SECTION 7 : Confirmation before/after testing

7.1 Conducted power before

EMC power

This data is 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 [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
					[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 [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
					[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

Average power (Reference data for SAR testing)[Port 2]

Mode	Freq. [MHz]	P/M AVG Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
					[dBm]	[mW]
11b (11Mbps)	2437.0	5.21	0.50	10.21	15.92	39.08
11g (54Mbps)	2437.0	4.60	0.50	10.21	15.31	33.96

Sample Calculation:

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

SAR power

Date of test: October 23, 2006

Power data for SAR testing [Port 2]

Mode	Freq. [MHz]	P/M AVG Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
					[dBm]	[mW]
11b (11Mbps)	2437.0	4.62	1.10	10.21	15.93	39.17
11g (54Mbps)	2437.0	4.15	1.10	10.21	15.46	35.16

Sample Calculation:

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

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7.2 Reference data of SAR test (Data rate determining)

Date of test: October 23, 2006

[IEEE802.11b] Rate Check [Port 2]

Rate [Mbps]	Freq. [MHz]	PM AVG Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
					[dBm]	[mW]
1.0	2437.0	4.38	1.10	10.21	15.69	37.07
2.0	2437.0	3.80	1.10	10.21	15.11	32.43
5.5	2437.0	4.23	1.10	10.21	15.54	35.81
11.0	2437.0	4.62	1.10	10.21	15.93	39.17

[IEEE802.11g] Rate Check [Port 2]

Rate [Mbps]	Freq. [MHz]	PM AVG Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
					[dBm]	[mW]
6.0	2437.0	4.09	1.10	10.21	15.40	34.67
9.0	2437.0	4.13	1.10	10.21	15.44	34.99
12.0	2437.0	4.06	1.10	10.21	15.37	34.43
18.0	2437.0	3.98	1.10	10.21	15.29	33.81
24.0	2437.0	3.92	1.10	10.21	15.23	33.34
36.0	2437.0	4.02	1.10	10.21	15.33	34.12
48.0	2437.0	4.09	1.10	10.21	15.40	34.67
54.0	2437.0	4.15	1.10	10.21	15.46	35.16

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SECTION 8 : Measurement results

8.1 Body SAR 2450MHz

Date : **October 23, 2006** Measured By : **Miyo Ikuta**
Liquid Depth (cm) : **15.0** Model : **CH91108**
Parameters : $\epsilon_r = 50.4, \sigma = 2.00$ Serial No. : **00008593C007**
Ambient temperature (deg.c.) : **24.5** Modulation : **DSSS(11b)**
Relative Humidity (%) : **65** Crest factor : **1**

Date : **October 24, 2006** Measured By : **Miyo Ikuta**
Liquid Depth (cm) : **15.0** Model : **CH91108**
Parameters : $\epsilon_r = 50.4, \sigma = 1.95$ Serial No. : **00008593C007**
Ambient temperature (deg.c.) : **25.0** Modulation : **OFDM(11g)**
Relative Humidity (%) : **62** Crest factor : **1**

BODY SAR MEASUREMENT RESULTS										
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	Step1. Position search									
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Left side	0	24.0	24.0	0.285
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Top	0	24.0	24.0	0.336
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Rear	0	24.0	24.0	0.167
	Step2. Frequency Change									
	1	2412.0	CCK(11Mbps)	Flat	Fixed	Top	0	24.0	24.0	0.283
	11	2462.0	CCK(11Mbps)	Flat	Fixed	Top	0	24.0	24.0	0.348
11g	Step3. Moduration Change									
	6	2437.0	BPSK(9Mbps)	Flat	Fixed	Top	0	24.8	24.8	0.293
	6	2437.0	QPSK(12Mbps)	Flat	Fixed	Top	0	24.8	24.8	0.325
	6	2437.0	16QAM(36Mbps)	Flat	Fixed	Top	0	24.8	24.8	0.329
	6	2437.0	64QAM(54Mbps)	Flat	Fixed	Top	0	24.8	24.8	0.266
	Step 4. Position search									
	6	2437.0	16QAM(36Mbps)	Flat	Fixed	Left side	0	24.8	24.9	0.247
	6	2437.0	16QAM(36Mbps)	Flat	Fixed	Rear	0	24.9	24.9	0.147
	Step5. Frequency Change									
	1	2412.0	16QAM(36Mbps)	Flat	Fixed	Top	0	24.9	24.9	0.297
	11	2462.0	16QAM(36Mbps)	Flat	Fixed	Top	0	24.9	24.9	0.340
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population								Body SAR: 1.6 W/kg (averaged over 1 gram)		

8.2 Head SAR 2450MHz

Date : **October 24, 2006** Measured By : **Miyo Ikuta**
Liquid Depth (cm) : **15.0** Model : **CH91108**
Parameters : $\epsilon_r = 37.4, \sigma = 1.86$ Serial No. : **00008593C007**
Ambient temperature (deg.c.) : **25.0** Modulation : **DSSS(11b)**
Relative Humidity (%) : **62** Crest factor : **1**

Date : **October 25, 2006** Measured By : **Miyo Ikuta**
Liquid Depth (cm) : **15.0** Model : **CH91108**
Parameters : $\epsilon_r = 37.3, \sigma = 1.86$ Serial No. : **00008593C007**
Ambient temperature (deg.c.) : **25.0** Modulation : **OFDM(11g)**
Relative Humidity (%) : **55** Crest factor : **1**

HEAD SAR MEASUREMENT RESULTS										
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	Step1. Position search									
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Left side	0	24.5	24.5	0.295
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Top	0	24.5	24.5	0.325
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Rear	0	24.5	24.5	0.182
	Step2. Frequency Change									
	1	2412.0	CCK(11Mbps)	Flat	Fixed	Top	0	24.5	24.5	0.433
11	2462.0	CCK(11Mbps)	Flat	Fixed	Top	0	24.5	24.5	0.361	
11g	Step3. Moduration Change									
	6	2437.0	BPSK(9Mbps)	Flat	Fixed	Top	0	23.8	23.8	0.330
	6	2437.0	QPSK(12Mbps)	Flat	Fixed	Top	0	23.8	23.8	0.311
	6	2437.0	16QAM(36Mbps)	Flat	Fixed	Top	0	23.8	23.8	0.376
	6	2437.0	64QAM(54Mbps)	Flat	Fixed	Top	0	23.8	23.9	0.309
	Step 4. Position search									
	6	2437.0	16QAM(36Mbps)	Flat	Fixed	Left side	0	23.9	23.9	0.236
	6	2437.0	16QAM(36Mbps)	Flat	Fixed	Rear	0	23.9	24.0	0.169
	Step5. Frequency Change									
	1	2412.0	16QAM(36Mbps)	Flat	Fixed	Top	0	24.0	24.2	0.338
11	2462.0	16QAM(36Mbps)	Flat	Fixed	Top	0	24.2	24.2	0.400	
11b	Step6. Separation Change									
	1	2412.0	CCK(11Mbps)	Flat	Fixed	Top	5	24.1	24.1	0.173
	1	2412.0	CCK(11Mbps)	Flat	Fixed	Top	10	24.1	24.1	0.073
1	2412.0	CCK(11Mbps)	Flat	Fixed	Top	15	24.1	24.1	0.041	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population								Head SAR: 1.6 W/kg (averaged over 1 gram)		

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