



SAR TEST REPORT

Test Report No. : 27CE0023-HO

Applicant : Sony Corporation
Type of Equipment : Digital Still Camera
Model No. : DSC-G1
FCC ID : AK8DSCG1
Test standard : FCC47CFR 2.1093
FCC OET Bulletin 65, Supplement C
Test Result : Complied
Max. SAR Measured : 0.072W/kg (Body, 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 12-13, 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	Sony Corporation
Brand name	SONY
Address	6-7-35 Kitashinagawa, Shinagawa-ku, Tokyo 141-0001, Japan
Telephone Number	+81-564-62-6649
Facsimile Number	+81-564-62-6762
Contact Person	Hirofumi Tsutsui

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

2.1 Identification of E.U.T.

Type of Equipment	Digital Still Camera		
Model No.	DSC-G1		
Serial No.	140		
Rating	AC Adapter	Model Name :	AC-LS5
		Rating:	Input 100-240V 50/60Hz , Output DC4.2V
	Battery	Type :	Li-ion Battery
		Model Name :	NP-FR1
		Rating :	DC3.6V/ 4.4Wh
		Manufacturer	SONY
		Option Battery	N/A
Accessories	Typical earphone		
Size of EUT	71.7mm(H)*113.8mm(W)*24.75mm(D)		
Country of Manufacture	Japan		
Condition of EUT	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)		
Receipt Date of Sample	October 10, 2006		
Modification of EUT	No modification by the test lab.		
Category Identified	Portable device		

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2.2 Product Description

Clock frequency in the system	40MHz, 32.768kHz
Equipment Type	Transceiver
Frequency of Operation	2412-2462 MHz
Bandwidth & Channel spacing	20MHz / 5MHz
Type of Modulation	DSSS / OFDM
Max. power tested	Peak power : 16.35.dBm (43.15mW)
Antenna type	Chip Antenna
Antenna Connector Type	HSC (Murata)
Antenna Gain	-8dBi

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.

**NOTE:GENERAL POPULATION/UNCONTROLLED EXPOSURE
SPATIAL PEAK(averaged over any 1g of tissue) LIMIT
1.6 W/kg**

SECTION 4 : Test result

4.1 Result of Max. SAR value

Max. SAR Measured (IEEE 802.11b) : 0.072 W/kg (Body, 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

Average Power test

The average power of EUT was confirmed before SAR testing.

It was checked that the antenna port power was correlated within 0~+5% (FCC requirements) at EMC test result.(October 10, 2006).

The result is shown in Clause 7.1.

5.2 Confirmation after SAR testing

It was checked that the power drift was 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 Body 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 peak power and data rate.

Step1. The searching for the worst position in the EUT with closed the cover.

Step2. The searching for the worst position in the EUT with opened the cover.

Step3. The changing to the Low and High channels

This test was performed at the worst conditions of Step 1 and Step 2.

IEEE 802.11g

Step 4. The seaching for the worst modulation.

The data rate in the higher antenna port power each modulation was decided*¹, then the worst modulation was searched at the at the worst position of Step 1 and Step 2.

Step 5. The searching for the worst position

This test was compared to worst position and the second worst position in the worst modulation of step 4.

Step 6 .The changing to the Low and High channels

This test was performed at the worst conditions of Step 5.

Change distance between EUT and SAM Twin Phantom

Step7. The measurement was performed with the distance 5mm 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 7.1.2.

5.3.3 Head SAR measurement

Head SAR measurement is only for reference.

5.4 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 (Closed / Opened):

The test was performed in touch with Front surface of the EUT that was closed the cover or opened to the flat section of SAM Twin phantom.

(2) Rear (Closed / Opened*¹):

The test was performed in touch with Rear of the EUT that was closed the cover or opened to the flat section of SAM Twin phantom.

(3) Left Side (Closed) :

The test was performed in touch with Left Side surface of the EUT that was closed the cover to the flat section of SAM Twin phantom.

(4) Right Side (Closed) :

The test was performed in touch with Right Side surface of the EUT that was closed the cover to the flat section of SAM Twin phantom.

(5) Top (Closed / Opened):

The test was performed in touch with Top surface of the EUT that was closed the cover or opened to the flat section of SAM Twin phantom.

(6) Bottom (Closed):

The test was performed in touch with Bottom surface of the EUT that was closed the cover to the flat section of SAM Twin phantom.

(7) Front(Closed) (5mm) :

The measurement opened 5mm distance between EUT that was closed the cover and flat section of SAM Twin Phantom.

Note:

*¹ Reference Head SAR

*² The test was performed in the EUT with accessory. (Typical earphone)

*³ The test setup photograph is put on appendix 1.

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	40
Device holder uncertainty	± 3.6	Normal	1	1	± 3.6	8
Power drift	± 10.0	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	

The test result shows that the power drift exceeded $\pm 5\%$. Therefore, the uncertainty of power drift expanded to $\pm 10\%$. However, the extended uncertainty (k= 2) of a test is less than 30%.

SECTION 7 : Confirmation before/after testing

7.1 Conducted power before

7.1.1 Correlation of EMC power and SAR power

SAR Power

The antenna port peak power was correlated within 0~+5% of EMC test result.

Date of test: October 12, 2006

Mode	Freq. [MHz]	PM AVG Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
					[dBm]	[mW]
11b (11Mbps)	2437.0	-2.68	0.20	10.00	7.52	5.65
11g (54Mbps)	2437.0	-2.63	0.20	10.00	7.57	5.71

Sample Calculation:

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

EMC Power

This data is reference data of EMC test. (Report No. 26LE0231-HO-A)

Date of test: October 10, 2006

Reference average power data for SAR testing

Mode	Freq. [MHz]	PM AVG Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
					[dBm]	[mW]
11b (11Mbps)	2437.0	-2.68	0.20	10.00	7.52	5.65
11g (54Mbps)	2437.0	-2.65	0.20	10.00	7.55	5.69

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7.1.2 Reference data of SAR test (Data rate determining)

Date of test: October 10, 2006

[IEEE802.11b] Rate Check

Rate [Mbps]	Freq. [MHz]	PM PK Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
					[dBm]	[mW]
1.0	2437.0	-0.26	0.20	10.00	9.94	9.86
2.0	2437.0	-0.26	0.20	10.00	9.94	9.86
5.5	2437.0	-0.61	0.20	10.00	9.59	9.10
11.0	2437.0	-0.26	0.20	10.00	9.94	9.86

[IEEE802.11g] Rate Check

Rate [Mbps]	Freq. [MHz]	PM PK Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
					[dBm]	[mW]
6.0	2437.0	5.20	0.20	10.00	15.40	34.67
9.0	2437.0	5.21	0.20	10.00	15.41	34.75
12.0	2437.0	5.24	0.20	10.00	15.44	34.99
18.0	2437.0	5.35	0.20	10.00	15.55	35.89
24.0	2437.0	5.94	0.20	10.00	16.14	41.11
36.0	2437.0	5.93	0.20	10.00	16.13	41.02
48.0	2437.0	5.75	0.20	10.00	15.95	39.36
54.0	2437.0	6.03	0.20	10.00	16.23	41.98

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SECTION 8 : Measurement results

8.1 Body SAR 2450MHz

Liquid Depth (cm) : 15.0 Model : DSC-G1
Parameters : $\epsilon_r = 50.2$, $\sigma = 2.03$ Serial No. : 140
Ambient temperature (deg.c.) : 25.0 Modulation : DSSS,OFDM
Relative Humidity (%) : 52 Crest factor : 1
Date : October 12, 2006 Measured By : Miyo Ikuta

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 (Closed Cover)									
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Front (Closed)	0	23.5	23.5	0.063
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Rear (Closed)	0	23.5	23.6	0.000209
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Left side (Closed)	0	23.6	23.6	0.00482
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Right side (Closed)	0	23.6	23.8	0.000468
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Top (Closed)	0	24.0	24.0	0.041
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Bottom (Closed)	0	24.0	24.0	0.0021
	Step2. Position search (Opened Cover)									
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Front (Opened)	0	24.0	24.0	0.039
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Top (Opened)	0	24.0	24.0	0.061
	Step3. Frequency Change									
	1	2412.0	CCK(11Mbps)	Flat	Fixed	Front (Closed)	0	24.0	24.0	0.072
	11	2462.0	CCK(11Mbps)	Flat	Fixed	Front (Closed)	0	24.0	24.0	0.060
11g	Step4. Moduration Change									
	6	2437.0	BPSK(9Mbps)	Flat	Fixed	Front (Closed)	0	24.5	24.5	0.054
	6	2437.0	QPSK(18Mbps)	Flat	Fixed	Front (Closed)	0	24.5	24.4	0.059
	6	2437.0	16QAM(24Mbps)	Flat	Fixed	Front (Closed)	0	24.4	24.4	0.046
	6	2437.0	64QAM(54Mbps)	Flat	Fixed	Front (Closed)	0	24.4	24.4	0.057
	Step5. Position search									
	6	2437.0	QPSK(18Mbps)	Flat	Fixed	Top (Opened)	0	24.4	24.4	0.053
	Step6. Frequency Change									
	1	2412.0	QPSK(18Mbps)	Flat	Fixed	Front (Closed)	0	24.4	24.4	0.053
	11	2462.0	QPSK(18Mbps)	Flat	Fixed	Front (Closed)	0	24.4	24.4	0.049
11b	Step7. Separation Change									
	1	2412.0	CCK(11Mbps)	Flat	Fixed	Front (Closed)	5	24.4	24.4	0.020
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population								Body SAR: 1.6 W/kg (averaged over 1 gram)		

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8.2 Reference Head SAR 2450MHz

Liquid Depth (cm) : 15.0 Model : DSC-G1
Parameters : $\epsilon_r = 37.7, \sigma = 1.89$ Serial No. : 140
Ambient temperature (deg.c.) : 25.0 Modulation : DSSS
Relative Humidity (%) : 44 Crest factor : 1
Date : October 13, 2006 Measured By : Miyo Ikuta

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 (Closed Cover)									
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Front (Closed)	0	24.0	24.0	0.069
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Rear (Closed)	0	24.0	24.0	0.00012
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Left side (Closed)	0	24.0	24.2	0.016
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Right side	0	24.2	24.2	0.0000101
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Top (Closed)	0	24.0	24.0	0.044
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Bottom (Closed)	0	24.2	24.2	0.00344
	Step2. Position search (Opened Cover)									
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Front (Opened)	0	24.0	24.0	0.045
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Rear (Opened)	0	24.0	24.0	0.00166
	6	2437.0	CCK(11Mbps)	Flat	Fixed	Top(Opened)	0	24.3	24.3	0.075
	Step3. Frequency Change									
	1	2412.0	CCK(11Mbps)	Flat	Fixed	Top(Opened)	0	24.5	24.5	0.087
	11	2462.0	CCK(11Mbps)	Flat	Fixed	Top(Opened)	0	24.5	24.7	0.084
11g	Step4. Moduration Change									
	6	2437.0	BPSK(9Mbps)	Flat	Fixed	Top(Opened)	0	24.7	24.7	0.072
	6	2437.0	QPSK(18Mbps)	Flat	Fixed	Top(Opened)	0	24.7	24.7	0.076
	6	2437.0	16QAM(24Mbps)	Flat	Fixed	Top(Opened)	0	24.7	24.7	0.087
	6	2437.0	64QAM(54Mbps)	Flat	Fixed	Top(Opened)	0	24.7	24.5	0.084
	Step5. Position search									
	6	2437.0	16QAM(24Mbps)	Flat	Fixed	Front (Closed)	0	24.5	24.5	0.070
	Step6. Frequency Change									
	1	2412.0	16QAM(24Mbps)	Flat	Fixed	Top(Opened)	0	24.5	24.5	0.089
	11	2462.0	16QAM(24Mbps)	Flat	Fixed	Top(Opened)	0	24.5	24.5	0.080
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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