RADIO TEST REPORT

Test Report No. : 26IE0327-HO-A

Applicant	:	**RICOH COMPANY, LTD.**
Type of Equipment	:	**Digital Camera**
Model No.	:	**Caplio 500SE-W**
FCC ID	:	**T9F500SEW1**
Test standard	:	**FCC Part 15 Subpart C Section 15.207, Section 15.247: 2006**
Test Result	:	**Complied**

1. This test report shall not be reproduced in 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 regulation.
4. The test results in this report are traceable to the national or international standards.

Date of test:

October 13 to 23, 2006

Tested by:

Shinya Watanabe, EMC Services

Norihisa Hashimoto, EMC Services

Hiroka Umeyama, 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

CONTENTS **PAGE**

SECTION 1: Client information

Company Name	:	RICOH COMPANY, LTD.
Brand name	:	RICOH
Address	:	3-2-3, Shin-yokohama Kohoku-ku, Yokohama-shi, Japan
Telephone Number	:	+81-45-475-7421
Facsimile Number	:	+81-45-477-2799
Contact Person	:	Tomoyuki Kuniyori

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

2.1 Identification of E.U.T.

Type of Equipment	:	Digital Camera
Model No.	:	Caplio 500SE-W
Serial No.	:	00010047
Country of Manufacture	:	China
Rating	:	Battery: DC3.7V AC Adaptor: DC3.8V (AC120V/60Hz)
Receipt Date of Sample	:	October 10, 2006
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: Caplio 500SE-W (referred to as the EUT in this report) is the Digital Camera that contains IEEE802.11b/g WLAN and Bluetooth modules.
Bluetooth module is granted by FCC (FCC ID: RYYEYXFDC), and thus this test report refers to IEEE802.11b/g WLAN part only.
IEEE802.11b/g WLAN and Bluetooth modules do not transmit simultaneously.

IEEE802.11b/g WLAN

Equipment Type	Transceiver
Frequency of Operation	2412-2462MHz
Type of Modulation	11b DSSS: DBPSK/DQPSK/CCK 11g OFDM: BPSK/QPSK/16QAM/64QAM
Bandwidth & Channel spacing	20MHz & 5MHz
Power Supply (inner)	DC 3.3V/DC1.8V(inner)
Antenna Type	Integral Chip Antenna
Antenna Gain	2.0 dBi

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part15 Subpart C: 2006
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted limits : 2006 Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz : 2006

FCC 15.31 (e)
The EUT provides stable voltage (DC3.3V) constantly to RF Module regardless of input voltage. Therefore, the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement
It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the EUT complies with the antenna requirement of Section 15.203.

3.2 Procedures and results

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	11.5dB 0.41095MHz AV, N (11b, Ch: Low)	Complied
2	6dB Bandwidth	**FCC:** ANSI C63.4:2003 13. Measurement of intentional radiators **IC:** RSS-Gen 4.4.2	**FCC:** Section 15.247(a)(2) **IC:** RSS-210 A8.2(1)	Conducted	N/A	See data	Complied
3	Maximum Peak Output Power	**FCC:** ANSI C63.4:2003 13. Measurement of intentional radiators **IC:** RSS-Gen 4.6	**FCC:** Section 15.247(b)(3) **IC:** RSS-210 A8.4(4)	Conducted	N/A	12.72dB (11g, Ch: Low)	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	See data	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(2)	Conducted	N/A	13.0dB (11b, Ch: High)	Complied
6	Spurious Emission	**FCC:** ANSI C63.4:2003 13. Measurement of intentional radiators **IC:** RSS-Gen 4.7 RSS-Gen 4.8	**FCC:** Section15.247(d) **IC:** RSS-210 A8.5 RSS-Gen 7.2.1 and 7.2.3	Conducted/ Radiated	N/A	**[Tx]** 5.1dB 388.794MHz (11b,Ch: Low) 388.795MHz(11g, Ch: Low) Hori, QP **[Rx]** 6.1dB 388.795MHz, Ver QP 526.491MHz, Hor, QP (11g, Ch: Mid)	Complied

Note: UL Apex's EMI Work Procedures No.QPM05 and QPM15.
*0) The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.

*These tests were also referred to "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247".
*These tests were performed without any deviations from test procedure except for additions or exclusions.

3.3 Addition to standards

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-Gen 4.4.1	RSS-Gen 4.4.1	Conducted	N/A	N/A	Complied

3.4 Uncertainty

Conducted Emission
The measurement uncertainty (with a 95% confidence level) for this test is ±2.66dB.
The data listed in this test report has enough margin, more than the site margin.

Spurious Emission (Radiated)
The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ±4.59dB(3m).
The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ±4.62dB(3m).
The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is ±5.27dB.
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 (with a 95% confidence level) for this test is ±3.0dB.

3.5 Test Location

UL Apex Co., Ltd. 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	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	2.0 x 2.0 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 5.4 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.7 shielded room.

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 :

1. Conducted Emission / Radiated Emission

Transmitting mode 11b (CCK 11Mbps (max power rate), Packet type: Maximum, Payload: PN9)
- Low Channel : 2412MHz (Ch 1)
- Mid Channel : 2437MHz (Ch 6)
- High Channel : 2462MHz (Ch 11)

Transmitting mode 11g (OFDM 54Mbps (max power rate), Packet type: Maximum, Payload: PN9)
- Low Channel : 2412MHz (Ch 1)
- Mid Channel : 2437MHz (Ch 6)
- High Channel : 2462MHz (Ch 11)

Receiving mode: 11b
- Mid Channel : 2437MHz (Ch 6)

Receiving mode: 11g
- Mid Channel : 2437MHz (Ch 6)

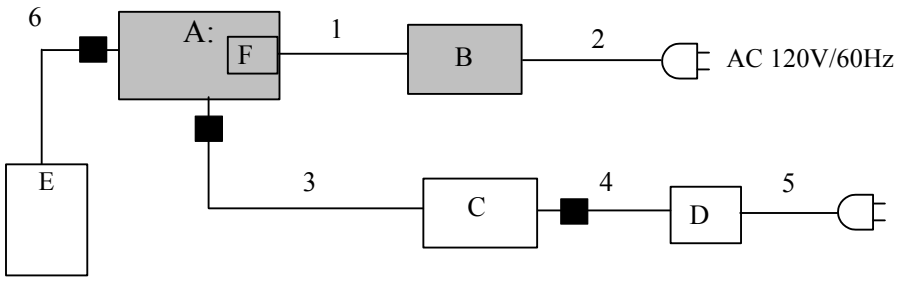
2. Antenna Terminal Conducted test

Transmitting mode 11b (CCK 11Mbps (max power rate), Packet type: Maximum, Payload: PN9)
- Low Channel : 2412MHz (Ch 1)
- Mid Channel : 2437MHz (Ch 6)
- High Channel : 2462MHz (Ch 11)

Transmitting mode 11g (OFDM 9Mbps (max power rate), Packet type: Maximum, Payload: PN9)
- Low Channel : 2412MHz (Ch 1)
- Mid Channel : 2437MHz (Ch 6)
- High Channel : 2462MHz (Ch 11)

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

4.2 Configuration and peripherals



■ : Ferrite Core (standard attachment)

* 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	Remarks
A	Digital Camera	Caplio 500SE-W	00010047	RICOH	EUT
B	AC Adaptor	AC-4	0602C0070579G	RICOH	EUT
C	Note PC	CF-L1EA	ODKSB09673	Panasonic	-
D	AC Adaptor	CF-AA1639	000451726 A	Panasonic	-
E	Video Camera Recorder	CCD-TR55	2102510	SONY	-
F	AC Adaptor Converter	CN-1	-	RICOH	EUT

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.8	Unshielded	Unshielded	-
2	AC Cable	1.2	Unshielded	Unshielded	-
3	USB Cable	1.0	Unshielded	Unshielded	One ferrite core (standard attachment)
4	DC Cable	1.8	Unshielded	Unshielded	One ferrite core (standard attachment)
5	AC Cable	1.8	Unshielded	Unshielded	-
6	Audio Cable	1.2	Unshielded	Unshielded	One ferrite core (standard attachment)

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0 m 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 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 : CISPR quasi-peak and average detector (IF BW 9 kHz)
Measurement range : 0.15-30MHz
Test data : APPENDIX 2
Test result : Pass

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, 1.0 m 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), 1m(Upper 10GHz) and 0.5m(Upper 18GHz).
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.

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

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
Detector IF Bandwidth	QP: BW 120kHz	PK: RBW:1MHz/VBW: 1MHz AV: RBW:1MHz/VBW:10Hz

- 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

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.

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**