



Test Report

Test Report No. IE1411-015T2
Date of Issue: 9th January, 2015

FCC Part 15 Subpart B

Radio Frequency Devices

Applicant Information

Name of Applicant	:	JAI CORPORATION
Address	:	10-35 Sakae-Chou, Kanagawa-Ku, Yokohama, Kanagawa, 221-0052 Japan
Telephone	:	+81 45-440-0165
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Equipment under Test (EUT)	:	CMOS CAMERA
Model Number	:	SP-5000M-CXP4
Serial Number	:	850018
EUT Condition (s)	:	Pre-Production

Date of Test : 13th December, 2014

Test Result : **PASS**

- The results in this report are applicable only to the equipment tested.
- This report shall not be reproduced except in full without written acceptance of ISHIKAWA Co., Ltd.

Signature: _____

Kazuo Okada

Technical Group Manager



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1. Summary of Test

1.1. Test Standard

FCC Part15 SubpartB (§ 15.107, § 15.109) ClassB

1.2. List of Applied Test to the EUT

Test Item	Test Method	Test
Conducted Emission at Mains Port	ANSI C63.4:2003	Applied
Radiated Emission	ANSI C63.4:2003	Applied

1.3. Test Procedure

Test Item	Test Procedure	Internal Test Procedure
Conducted Emission at Mains Port	ANSI C63.4:2003 / Clause 7	IT04-P005 Rev. 3.06
Radiated Emission	ANSI C63.4:2003 / Clause 8	IT04-P007 Rev. 2.06 IT04-P009 Rev. 3.07

2. Equipment under Test

2.1. EUT Information

No.	EUT	Manufacturer	Model No.	Serial No.	FCC ID / DoC
A	CMOS CAMERA	JAI CORPORATION	SP-5000M-CXP4	β 50018	None

Note : The EUT was tested as tabletop.

Internal Max. Frequency : 3125.0 MHz

EUT Clock Frequency	CPU Oscillator	Clock Frequency	Name of Board	Note
	19.2 MHz	3125.0 MHz	I/F Board	—

Power Rating	
	DC 24 V, 1 A

Dimensions of the EUT	Width (mm)	Depth (mm)	Height (mm)
	62	48	62

Weight of the EUT	Weight (g)
	260

2.2. Operating Mode

• Continuous Mode

Continuous Mode

3. Configuration of Equipment

3.1. Peripheral(s) used

No.	Equipment	Manufacturer	Model No.	Serial No.	FCC ID / DoC
B	LENS	RICOH	FL-BC1214D-VG	None	None
C	LCD MONITOR	DELL	U2311Hb	J89C0121H	DoC
D	Personal Computer	DELL	T3500	7M1DTBX	DoC
E	Frame Grabber Board	AVAL DATA	APX-3664	5130005033	None
F	KEYBOARD	DELL	SK-8175	CN-OW213F-71616-13H-08Y2-A00	DoC
G	MOUSE	DELL	K251D	None	DoC
H	Conversion Box	JAI CORPORATION	NONE	None	None

3.2. Cable(s) used

AC Power Cable

No.	Cable(s) Name	Length (m)	Shielding	Ferrite Core	Comment
5	AC Power Cable for Personal Computer	1.5	Unshielded	None	—
6	AC Power Cable for LCD MONITOR	1.5	Unshielded	None	—

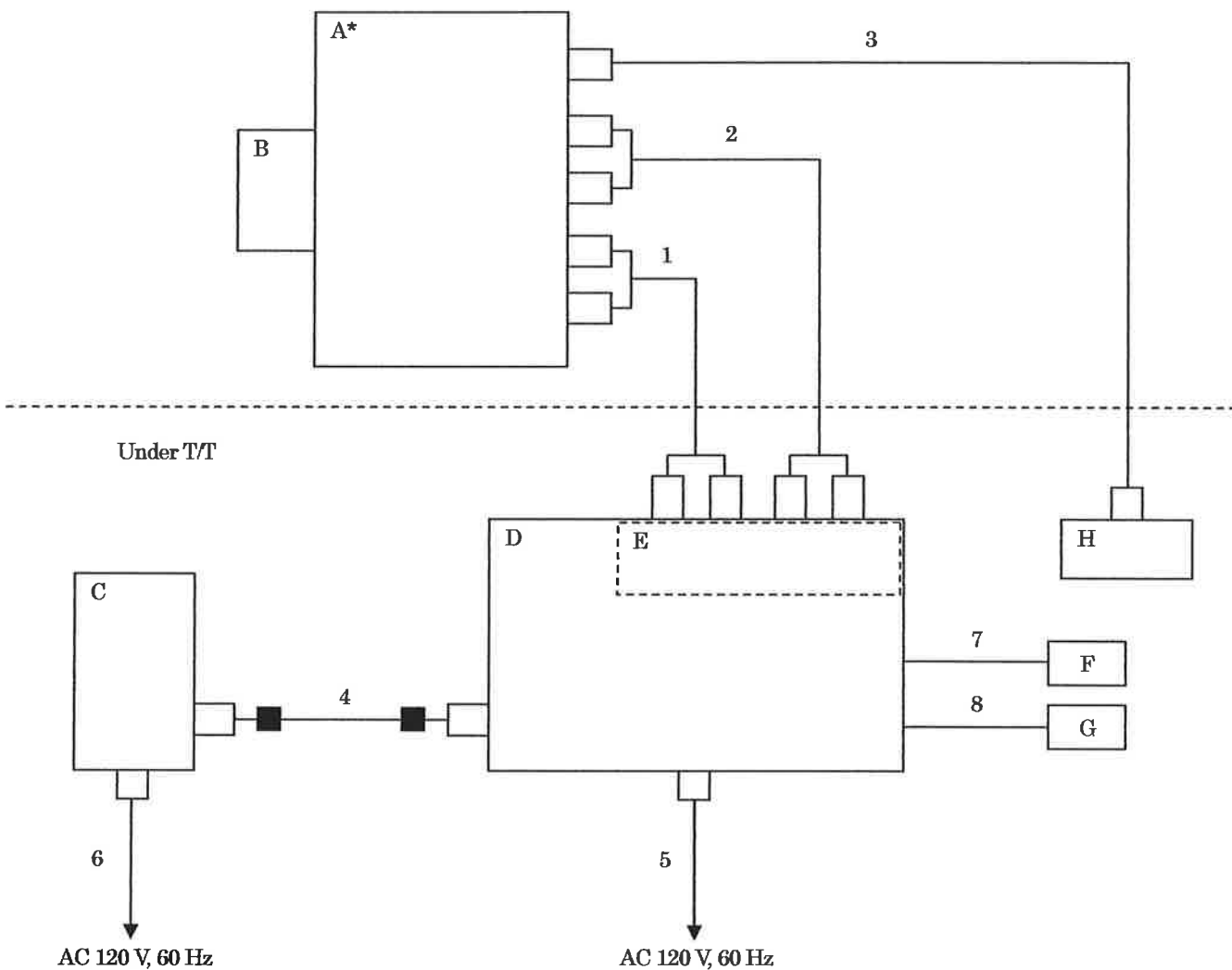
Interface Cable

No.	Cable(s) Name	Length (m)	Shielding	Ferrite Core	Comment
1	CoaXPress cable(CX-32-4-32-10M)	10.0	Shielded	None	—
2	CoaXPress cable(CX-32-4-32-10M)	10.0	Shielded	None	—
3	KC-340	10.0	Shielded	None	—
4	LCD MONITOR cable	1.0	Shielded	Fixed ×2	Refer to Note
7	KEYBOARD cable	1.4	Shielded	None	—
8	MOUSE cable	1.4	Shielded	None	—

Note : The removable ferrite core is attached to the peripheral.



3.3. System Configuration



*: EUT

■: Ferrite Core

4. Conducted Emission at Mains Port

4.1. Measurement Procedure

4.1.1. Test Receiver Condition

Detector: Quasi-peak and Average
Bandwidth: 9 kHz

4.1.2. Frequency range

0.15 MHz – 30 MHz

4.1.3. Vertical Metal Reference Plane

The plane was placed 0.4 m horizontally away from the EUT.

4.1.4. Line Impedance Stabilizing Network (LISN)

50 Ω / 50 μ H

LISN for the EUT was placed 0.8 m away from the EUT.

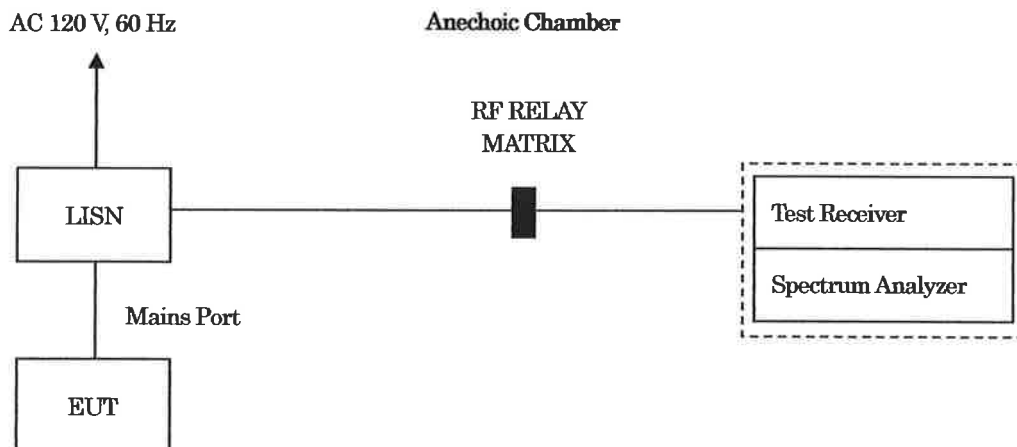
LISN for the peripherals was terminated in 50 Ω .

4.1.5. Reported Emissions

At least the 6 points corresponding to the highest disturbance are reported.

A preliminary test was carried out while varying cable positions within typical arrangements to determine the maximum or near-maximum emission level.

4.1.6. Test Configuration



4.2. Test Equipment

Equipment	Manufacturer	Model No.	Serial or ID No.	Calibration Due
Test Receiver	Rohde & Schwarz	ESU26	100299	May-2015
RF RELAY MATRIX	tsj	RFMI2A2M	03153	Aug-2015
LISN for EUT	Kyoritsu	KNW-242C	8-1673-1	Feb-2015
LISN for peripheral(s)	Kyoritsu	KNW-407	8-901-12	Jan-2015
Terminator for LISN	JFW	50T-001-BNC	151	Jun-2015
Coaxial Cable (1)	SUHNER	RG400	258	Aug-2015
Coaxial Cable (2)	SUHNER	S04272B	376	Aug-2015
Coaxial Cable (3)	SUHNER	RG214HF	615	Aug-2015
Coaxial Cable (4)	SUHNER	SF106	32551/6	Aug-2015
Software	tsj	TEPTO-DV/CE	v1.90.0098	N/A

Note 1: All testing equipment is calibrated with measuring equipment which are traceable to national or international standards.

4.3. Sample Calculation

Conducted Emission at Mains Port Class B Limit*

Frequency Range (MHz)	Limit (dBuV)	
	QP	AV
0.15 – 0.5	66 – 56**	56 – 46**
0.5 – 5	56	46
5 – 30	60	50

*: The lower limit shall apply at the transition frequency.

**: The limit decreases linearly with the logarithm of the frequency.

• Example @ 4.70673 MHz for Continuous Mode

$$\begin{array}{rcl}
 \text{Disturbance Level} & = & \text{Reading} & 32.5 \text{ dBuV} \\
 + & & \text{Correction Factor*} & 10.4 \text{ dB} \\
 & & & \hline
 & = & & 42.9 \text{ dBuV}
 \end{array}$$

$$\begin{array}{rcl}
 \text{Margin} & = & \text{Limit} & 46.0 \text{ dBuV} \\
 - & & \text{Disturbance Level} & 42.9 \text{ dBuV} \\
 & & & \hline
 & = & & 3.1 \text{ dB}
 \end{array}$$

*: Correction Factor = Cable Loss (dB) + LISN Factor (dB)

Note: The sample calculation above is the minimum margin at the measuring frequency.

4.4. Uncertainty

Expanded uncertainties were calculated with a coverage factor k = 2 for Conducted Emission.

+ 2.49 dB / - 2.56 dB

4.5. Test Data

Conducted Emission

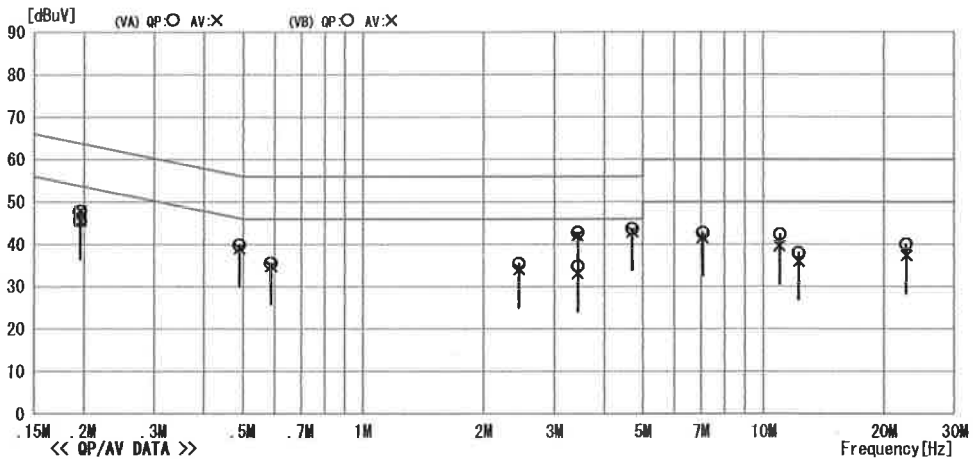
10m A/C
 Date : 2014/12/13 19:08

Model Name : CMOS CAMERA
 Model No. : SP-5000M-CXP4
 Serial No. : β 50018
 Test Condition : Continuous Mode

Data No. : IE1411-015A-19
 Power Supply : AC 120V, 60Hz
 Temp./Humi. : 18°C / 30%
 Operator : J. Takayama

Memo :

LIMIT : FCC Part15 SubpartB ClassB (QP)
 FCC Part15 SubpartB ClassB (AV)



No	Freq. [MHz]	Reading Level		C. Fac	Results		Limit		Margin		Phase
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]			
1	0.19610	35.4	35.4	10.1	45.5	45.5	63.8	53.8	18.3	8.3	VB
2	0.19612	37.7	37.8	10.1	47.8	47.9	63.8	53.8	16.0	5.9	VA
3	0.49028	29.6	28.8	10.2	39.8	39.0	56.2	46.2	16.4	7.2	VA
4	0.58834	25.4	24.7	10.1	35.5	34.8	56.0	46.0	20.5	11.2	VB
5	2.45144	25.1	23.8	10.3	35.4	34.1	56.0	46.0	20.6	11.9	VB
6	3.43192	32.3	31.6	10.4	42.7	42.0	56.0	46.0	13.3	4.0	VA
7	3.43216	24.4	22.7	10.4	34.8	33.1	56.0	46.0	21.2	12.9	VB
8	4.70673	33.2	32.5	10.4	43.6	42.9	56.0	46.0	12.4	3.1	VA
9	7.06024	32.1	31.0	10.5	42.6	41.5	60.0	50.0	17.4	8.5	VA
10	10.98233	31.5	28.8	10.8	42.3	39.6	60.0	50.0	17.7	10.4	VA
11	12.25705	27.2	25.2	10.7	37.9	35.9	60.0	50.0	22.1	14.1	VB
12	22.74815	28.9	26.3	11.0	39.9	37.3	60.0	50.0	20.1	12.7	VB

5. Radiated Emission

5.1. Measurement Procedure

5.1.1. Test Receiver Condition

Below 1000 MHz:	Detector: Quasi-peak Bandwidth: 120 kHz
Above 1000 MHz:	Detector: Average, Peak Bandwidth: 1 MHz

5.1.2. Frequency Range

30 MHz – 16000 MHz

5.1.3. Measuring Distance

3 m

5.1.4. Turn Table

Rotated 0 to 360 degrees

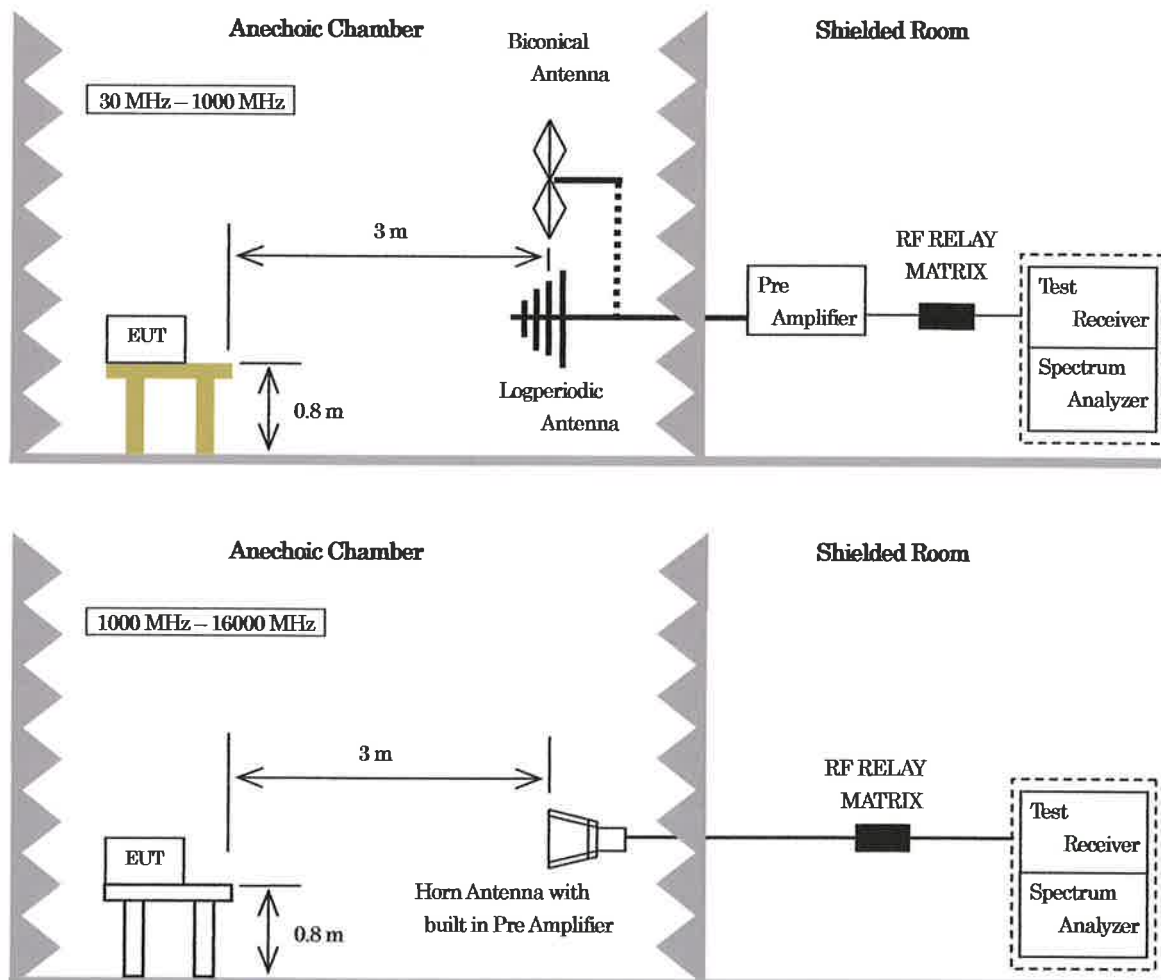
5.1.5. Antenna Position

Antenna height:	1 m to 4 m
Polarization	Horizontal and Vertical

5.1.6. Reported Emissions

At least the 6 points corresponding to the highest disturbance are reported.

5.1.7. Test Configuration



5.2. Test Equipment

Equipment	Manufacturer	Model No.	Serial or ID No.	Calibration Due
Test Receiver	Rohde & Schwarz	ESU26	100299	May-2015
Pre Amplifier	Sonoma	310N	243232	Aug-2015
RF RELAY MATRIX	tsj	RFMI2A2M	03153	Aug-2015
Biconical Antenna	Schwarzbeck	BBA9106(VHA9103)	91032277	Feb-2015
Logperiodic Antenna	Schwarzbeck	UHALP9108A	0720	Feb-2015
Horn Antenna	EMCO	3115	8912-3303	Dec-2015
Pre Amplifier for Horn Antenna	tsj	MLA-0108AD-39	005	Dec-2015
Horn Antenna with built in Pre Amplifier	ETS-LINDGREN	3161-04EJ338	00040843	Jan-2015
Coaxial Cable (1)	SUHNER	RG400	259	Aug-2015
Coaxial Cable (2)	SUHNER	RG400	260	Aug-2015
Coaxial Cable (3)	SUHNER	S04272B	612	Aug-2015
Coaxial Cable (4)	SUHNER	S04272B	376	Aug-2015
Coaxial Cable (5)	SUHNER	SF106	32550/6	Aug-2015
Coaxial Cable (6)	SUHNER	SF104EA	15250/4EA	Aug-2015
Coaxial Cable (7)	SUHNER	SF104EA	10450/4EA	Aug-2015
Software	tsj	TEPTO-DV/RE	v1.90.0098	N/A

Note 1: All testing equipment is calibrated with measuring equipment which are traceable to national or international standards.

Note 2: The pre-amplifier is connected to the horn antenna. (3115)

5.3. Sample Calculation

Radiated Emission Class B Limit*

Frequency Range (MHz)	Limit(dBuV/m)
	Quasi Peak
30 – 88	40.0
88 – 216	43.5
216 – 960	46.0
960 – 1000	54.0

*: The lower limit shall apply at the transition frequency.

Radiated Emission Class B Limit

Frequency range (MHz)	Limit(dBuV/m)	
	Average	Peak
Above 1000	54.0	74.0

• Example @ 2812.501 MHz for Continuous Mode

Disturbance Level	=	Reading		47.8	dBuV
	+	Correction Factor*		-2.0	dB/m
			=	45.8	dBuV/m
Margin	=	Limit		54.0	dBuV/m
	-	Disturbance Level		45.8	dBuV/m
			=	8.2	dB

*: Correction Factor = Antenna Factor (dB/m) + Cable Loss (dB) [include 3dB attenuator×2] – Pre Amplifier Gain (dB)
 Note: The sample calculation above is the minimum margin at the measuring frequency.

5.4. Uncertainty

Expanded uncertainties were calculated with a coverage factor k = 2 for Radiated Emission.

+3.81 dB / -3.34 dB

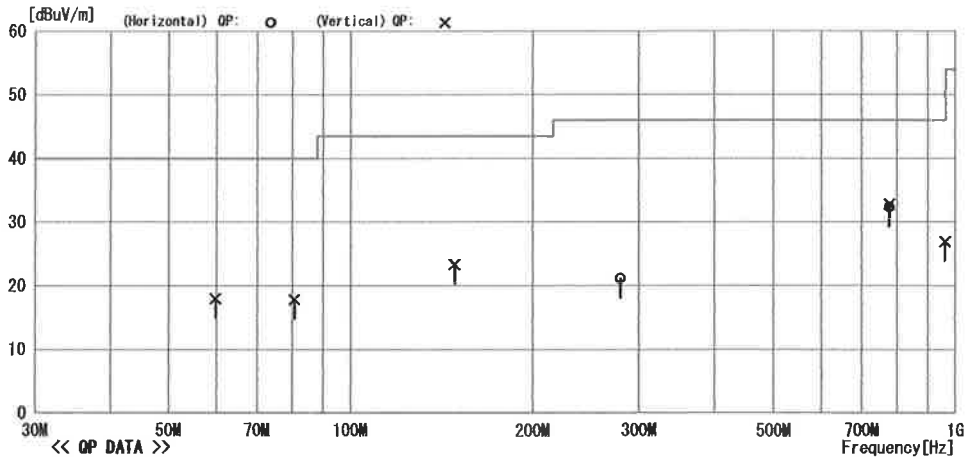
5.5. Test Data

Radiated Emission

10m A/C
 Date : 2014/12/13 12:16

Model Name : CMOS CAMERA
 Model No. : SP-5000M-CXP4
 Serial No. : β 50018
 Test Condition : Continuous Mode
 Memo :
 Data No. : IE1411-015A-05
 Power Supply : DC 24V, 1A
 Temp./Humi. : 18°C / 30%
 Operator : J. Takayama

LIMIT : FCC Part15 SubpartB ClassB(3m)



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type
1	59.700	34.0	8.5	7.2	31.7	18.0	40.0	22.0	Vert.	100	286	BIC
2	80.700	35.6	6.5	7.4	31.7	17.8	40.0	22.2	Vert.	100	358	BIC
3	148.501	32.2	14.7	8.2	31.8	23.3	43.5	20.2	Vert.	100	215	BIC
4	280.035	25.1	18.5	9.2	31.7	21.1	46.0	24.9	Hori.	400	264	BIC
5	777.601	32.3	20.8	11.7	32.0	32.8	46.0	13.2	Vert.	100	0	LPD
6	777.601	31.8	20.8	11.7	32.0	32.3	46.0	13.7	Hori.	133	242	LPD
7	959.540	22.9	22.8	12.3	31.1	26.9	46.0	19.1	Vert.	100	0	LPD

Radiated Emission

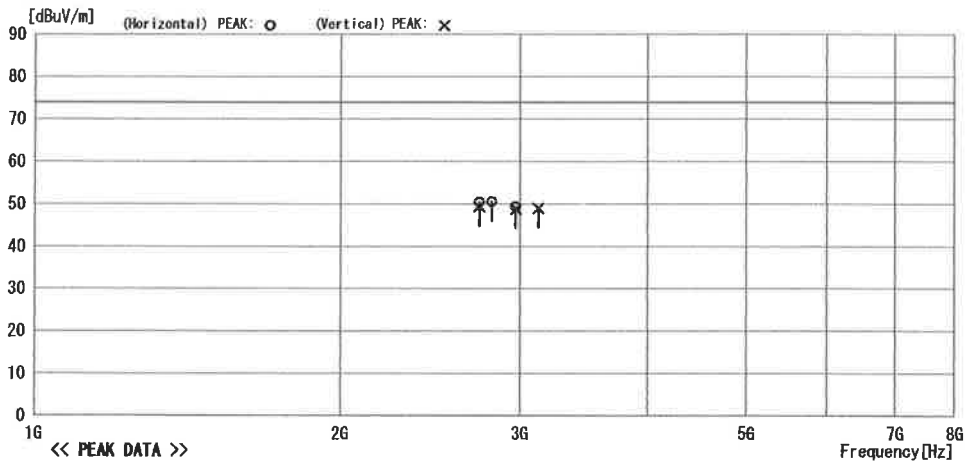
10m A/C
 Date : 2014/12/13 14:29

Model Name : CMOS CAMERA
 Model No. : SP-5000M-CXP4
 Serial No. : β 50018
 Test Condition : Continuous Mode

Data No. : IE1411-015A-09
 Power Supply : DC 24V, 1A
 Temp/Humi : 18°C / 30%
 Operator : J. Takayama

Memo :

LIMIT : FCC Part15 SubpartB ClassB(3m)Peak



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type
1	2734.376	52.7	29.2	9.9	41.4	50.4	74.0	23.6	Hori.	100	145	HOR
2	2734.376	51.6	29.2	9.9	41.4	49.3	74.0	24.7	Vert.	100	233	HOR
3	2812.501	52.5	29.4	10.0	41.4	50.5	74.0	23.5	Hori.	100	145	HOR
4	2968.751	50.8	29.9	10.4	41.8	49.3	74.0	24.7	Hori.	100	146	HOR
5	2968.751	50.2	29.9	10.4	41.8	48.7	74.0	25.3	Vert.	100	206	HOR
6	3125.000	49.6	30.4	10.7	41.8	48.9	74.0	25.1	Vert.	100	215	HOR

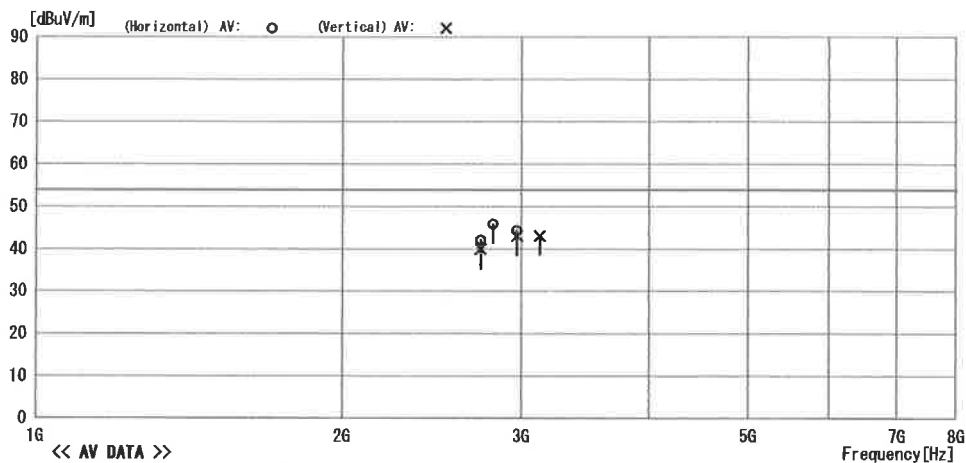
Radiated Emission

10m A/C
 Date : 2014/12/13 14:29

Model Name : CMOS CAMERA	Data No. : IE1411-015A-10
Model No. : SP-5000M-CXP4	Power Supply : DC 24V, 1A
Serial No. : β 50018	Temp/Humi : 18°C / 30%
Test Condition : Continuous Mode	Operator : J. Takayama

Memo :

LIMIT : FCC Part15 SubpartB ClassB (3m)



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Typo
1	2734.376	44.3	29.2	9.9	41.4	42.0	54.0	12.0	Hori.	100	145	HOR
2	2734.376	42.2	29.2	9.9	41.4	39.9	54.0	14.1	Vert.	100	233	HOR
3	2812.501	47.8	29.4	10.0	41.4	45.8	54.0	8.2	Hori.	100	145	HOR
4	2968.751	45.7	29.9	10.4	41.8	44.2	54.0	9.8	Hori.	100	146	HOR
5	2968.751	44.5	29.9	10.4	41.8	43.0	54.0	11.0	Vert.	100	205	HOR
6	3125.000	43.8	30.4	10.7	41.8	43.1	54.0	10.9	Vert.	100	215	HOR

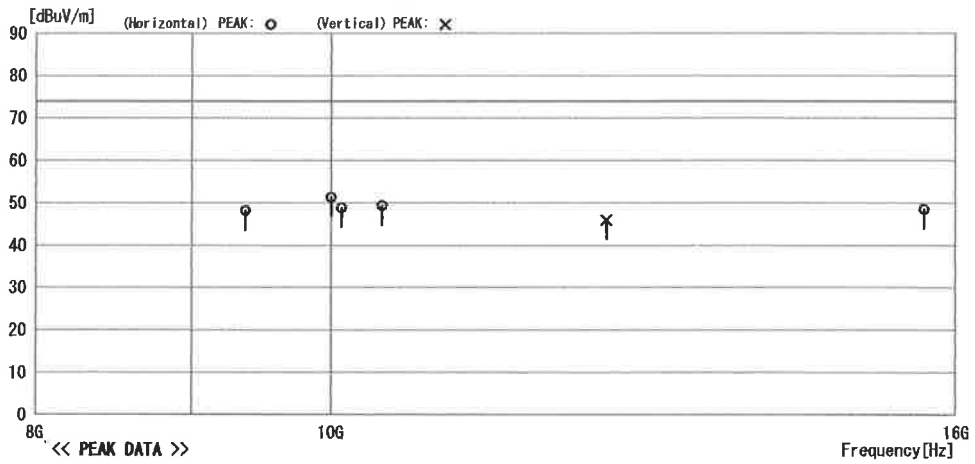
Radiated Emission

10m A/C
 Date : 2014/12/13 18:20

Model Name : CMOS CAMERA	Data No. : IE1411-015A-17
Model No. : SP-5000M-CXP4	Power Supply : DC 24V, 1A
Serial No. : β 50018	Temp/Humi : 18°C / 30%
Test Condition : Continuous Mode	Operator : J. Takayama

Memo :

LIMIT : FCC Part15 SubpartB ClassB(3m) Peak



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant
	[Hz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type
1	9375.009	45.4	-1.7	4.4	0.0	48.1	74.0	25.9	Hori.	102	183	HOR
2	10000.010	48.1	-1.4	4.6	0.0	51.3	74.0	22.7	Hori.	109	186	HOR
3	10078.140	45.7	-1.5	4.6	0.0	48.8	74.0	25.2	Hori.	100	186	HOR
4	10390.630	46.9	-2.3	4.7	0.0	49.3	74.0	24.7	Hori.	100	182	HOR
5	12306.400	42.1	-1.4	5.2	0.0	45.9	74.0	28.1	Vert.	100	0	HOR
6	15625.020	42.2	0.4	5.8	0.0	48.4	74.0	25.6	Hori.	100	181	HOR

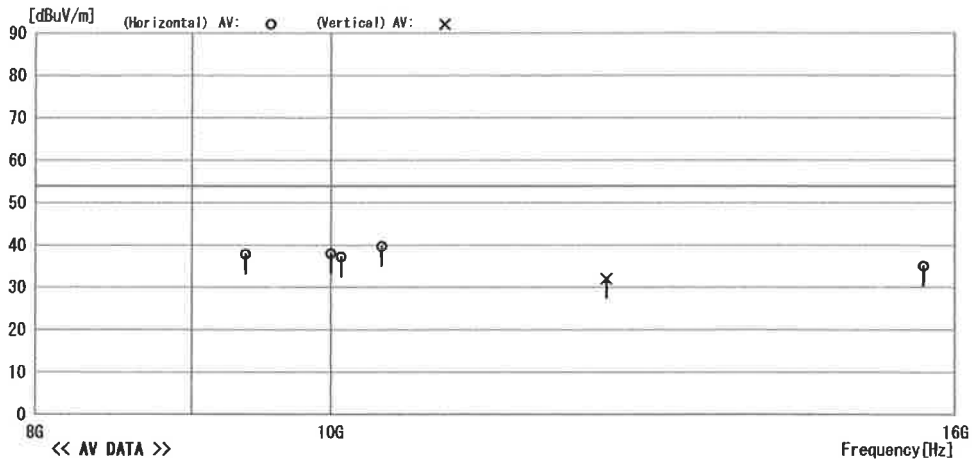
Radiated Emission

10m A/C
 Date : 2014/12/13 18:20

Model Name : CMOS CAMERA	Data No. : IE1411-015A-18
Model No. : SP-5000M-CXP4	Power Supply : DC 24V, 1A
Serial No. : β 50018	Temp/Humi : 18°C / 30%
Test Condition : Continuous Mode	Operator : J. Takayama

Memo :

LIMIT : FCC Part15 SubpartB ClassB(3m)



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type
1	9375.009	35.1	-1.7	4.4	0.0	37.8	54.0	16.2	Hori.	102	183	HOR
2	10000.010	34.7	-1.4	4.6	0.0	37.9	54.0	16.1	Hori.	109	186	HOR
3	10078.140	34.0	-1.5	4.6	0.0	37.1	54.0	16.9	Hori.	100	186	HOR
4	10390.630	37.2	-2.3	4.7	0.0	39.6	54.0	14.4	Hori.	100	182	HOR
5	12306.400	28.2	-1.4	5.2	0.0	32.0	54.0	22.0	Vert.	100	0	HOR
6	15625.020	28.8	0.4	5.8	0.0	35.0	54.0	19.0	Hori.	100	181	HOR

6. Photographs

6.1. Conducted Emission at Mains Port



6.2. Radiated Emission

- 30 MHz – 1000 MHz





• 1000 MHz – 8000 MHz





• 8000 MHz – 16000 MHz



7. Laboratory Description

7.1. Location

ISHIKAWA Co., Ltd. EMC Laboratory
2-3-18, Namamugi, Tsurumi-ku, Yokohama, Kanagawa 230-0052 Japan
TEL: +81 45-500-2255 FAX: +81 45-500-2256

7.2. Laboratory Equipment

Site Name	Shielded room Volume	Turn table	Weight-proof
Shielded room No. 1	4.9m × 2.9m × 2.8m	-----	-----
Shielded room No. 2	8m × 5m × 2.8m	-----	-----
10m Anechoic chamber	21.5m × 13.5m × 8.9m	4m diameter	3,000 kg
3m Anechoic chamber	9m × 6m × 5.7m	2m diameter	500 kg

7.3. Laboratory Filing or Certificate Information

7.3.1. VCCI Site Registration pursuant to V-5

Site Name	Registration No.	Expiry Date
ISHIKAWA Co., Ltd.	A-0105	July 14, 2015

7.3.2. FCC Site Filing pursuant to CFR 47 § 2.948

Site Name	Test Firm Registration No.	Expiry Date
ISHIKAWA Co., Ltd.	743690	July 10, 2015

7.3.3. VLAC Accreditation

Site Name	Accreditation No.	Expiry Date
ISHIKAWA Co., Ltd. EMC Laboratory	VLAC-025	July 14, 2015

7.3.4. TÜV Rheinland Certificate of Appointment Laboratory

Site Name	Registration No.	Expiry Date
ISHIKAWA Co., Ltd. EMC Laboratory	UA50060145-0010	May 28, 2015

7.3.5. Industry Canada site filing pursuant to RSS-Gen

Site Name	File No.	Expiry Date
10m Anechoic chamber	5804A-1	September 07, 2015
3m Anechoic chamber	5804A-2	September 07, 2015