



Test Report

Test Report No. IE1809-031T2
Date of Issue: 18th October, 2018

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
Facsimile	:	+81 45-440-0167
Equipment under Test (EUT)	:	CMOS AREA SCAN CAMERA
Model Number	:	SP-12401C-USB
Serial Number	:	ES0006
EUT Condition	:	Pre-Production

Date of Test : 3rd October, 2018

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



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

Table of Contents

1. Summary of Test	3
2. Equipment under Test.....	4
3. Configuration of Equipment	5
4. Radiated Emission	7
5. Photographs.....	16
6. Laboratory Description.....	19

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 C63.4:2014	N/A*
Radiated Emission	ANSI C63.4:2014	Applied

*: This test is not applicable as per customer's request.

1.3. Test Procedure

Test Item	Test Procedure	Internal Test Procedure
Radiated Emission	ANSI C63.4:2014 / Clause 8	IT04-P007 Rev. 3.02 IT04-P009 Rev. 4.02

2. Equipment under Test

2.1. EUT Information

No.	EUT	Manufacturer	Model No.	Serial No.	FCC ID / DoC
A	CMOS AREA SCAN CAMERA	JAI CORPORATION	SP-12401C-USB	ES0006	None

Note : The EUT was tested as tabletop.

Internal Max. Frequency : 2500 MHz

EUT Clock Frequency	Oscillator	Clock Frequency	Name of Board	Note
	74.25 MHz	297 MHz	Main Board	—
	19.20 MHz	2500 MHz	Main Board	—

Power Rating	
	DC 12-24 V, 420 mA

Port(s)	Connector Type	Connector Pin
USB	USB3.0 micro-B	9 Pins

Dimensions of the EUT	Width (mm)	Depth (mm)	Height (mm)
	44	44	44

Weight of the EUT	Weight (kg)
	0.125

2.2. Variation of the product family

The model SP-12401C-USB has a variation of the product family.

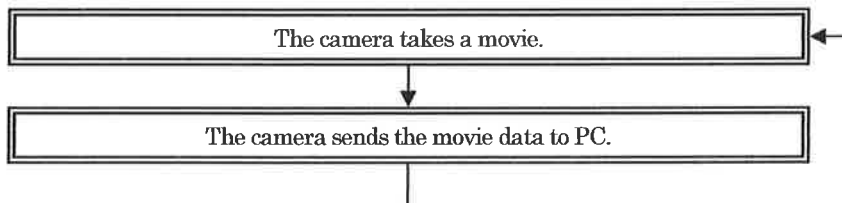
The model SP-12401M-USB is one of the product families of SP-12401C-USB.

The model SP-12401C-USB and SP-12401M-USB are identical except for the image sensor type(Color or Monochrome).

Therefore, only SP-12401C-USB has been tested.

2.3. Operating Mode

• Continuous Mode



3. Configuration of Equipment

3.1. Peripherals used

No.	Equipment	Manufacturer	Model No.	Serial No.	FCC ID / DoC
B	LENS	Myutron	HF1618V-2	None	None
C	LCD MONITOR	DELL	E2009Wt	CN-0X553D-74445-932-922L	DoC
D	Personal Computer	DELL	D06S001	CN-0YV6K5-7016334O-00XF-A00	DoC
E	KEYBOARD	DELL	KB212-B	CN-0N290F-71581-5A9-07J2-A01	DoC
F	MOUSE	DELL	MS-111-L	CN-09RRC7-48729-54S-0RKM	DoC
G	DC POWER SUPPLY	TAKASAGO	TM018-3	28387152	None

3.2. Cables used

AC Power Cable

No.	Cable(s) Name	Length (m)	Shielding	Ferrite Core	Comment
6	AC Power Cable for LCD MONITOR	1.5	Unshielded	None	--
7	AC Power Cable for Personal Computer	1.5	Unshielded	None	--
8	AC Power Cable for DC Power Supply	1.5	Unshielded	Removable × 4	Refer to Note 2

DC Power Cable

No.	Cable(s) Name	Length (m)	Shielding	Ferrite Core	Comment
1	DC Power Cable for CAMERA	10.0	Shielded	None	--

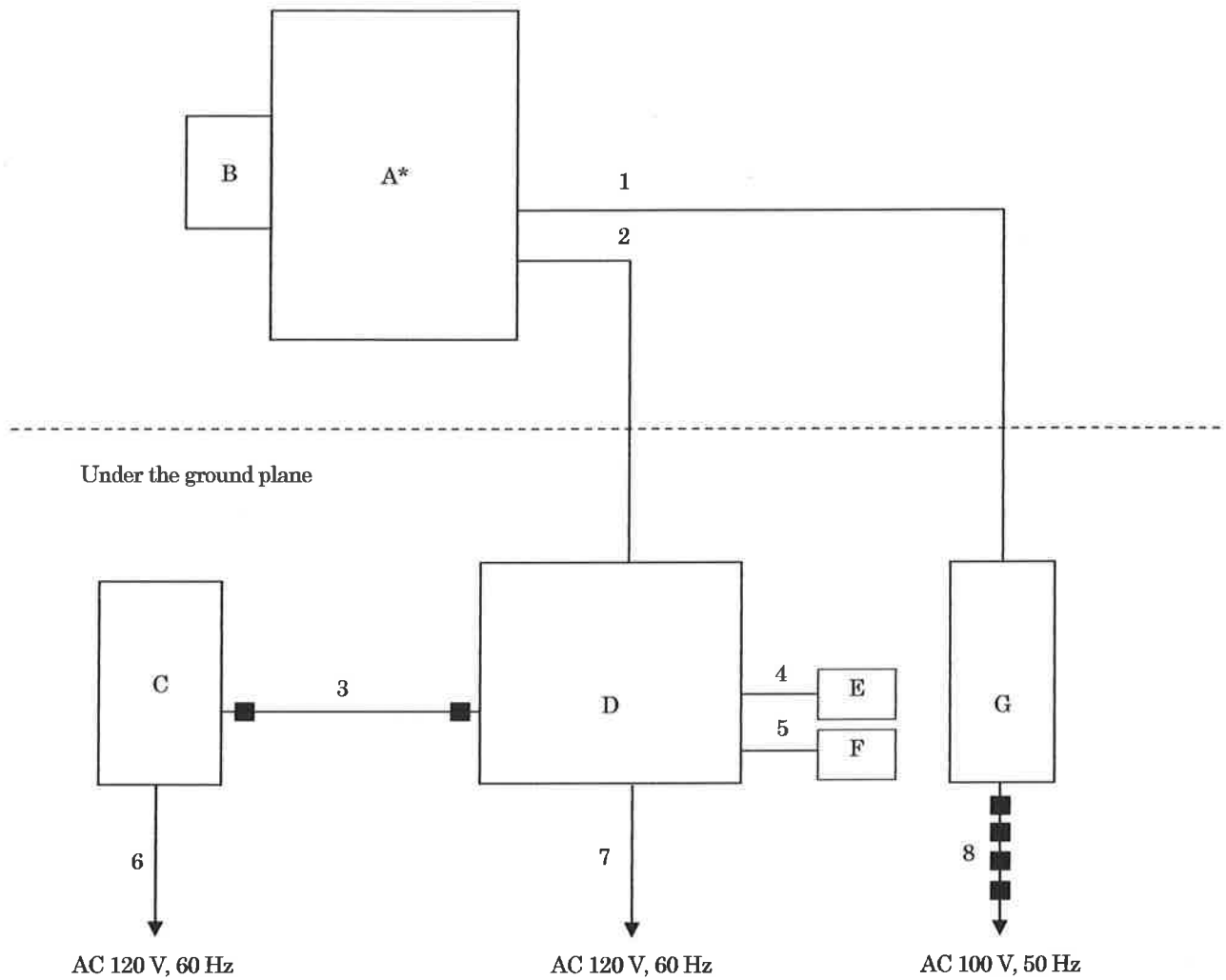
Interface Cable

No.	Cable(s) Name	Length (m)	Shielding	Ferrite Core	Comment
2	USB Cable	5.0	Shielded	None	--
3	LCD MONITOR Cable	1.5	Unshielded	Fixed × 2	Refer to Note 1
4	KEYBOARD Cable	2.0	Unshielded	None	--
5	MOUSE Cable	1.5	Unshielded	None	--

Note 1: The fixed ferrite core is attached to the peripheral.

Note 2: The removable ferrite core is attached to the peripheral.

3.3. System Configuration



* : EUT
■ : Ferrite Core

4. Radiated Emission

4.1. Measurement Procedure

4.1.1. Test Receiver Condition

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

4.1.2. Frequency Range

30 MHz – 12500 MHz

4.1.3. Measuring Distance

3 m

4.1.4. Turn Table

Rotated 0 to 360 degrees

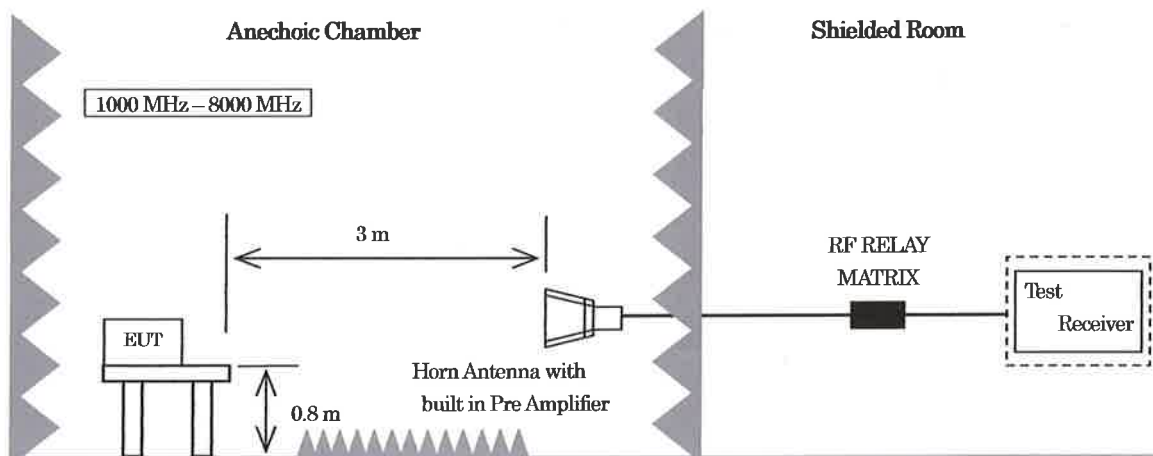
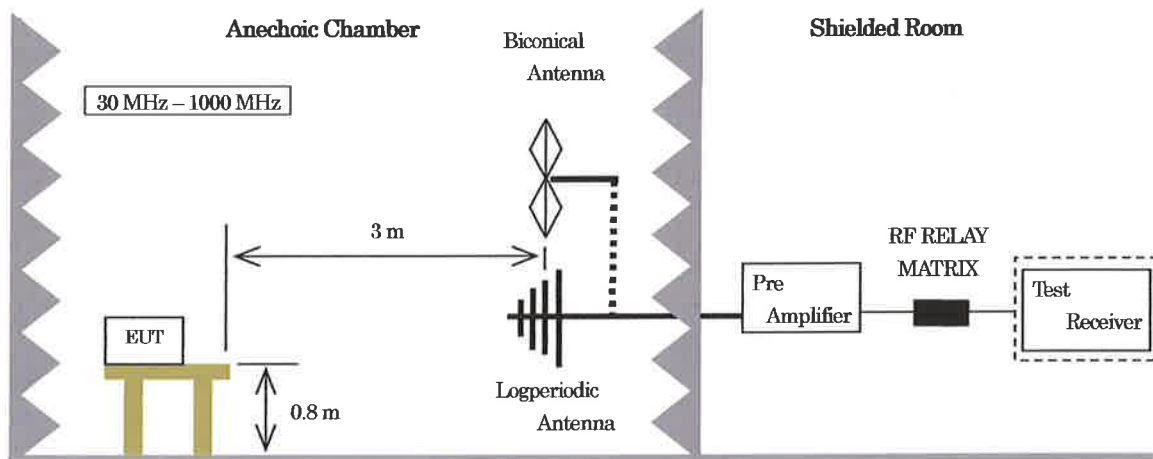
4.1.5. Antenna Position

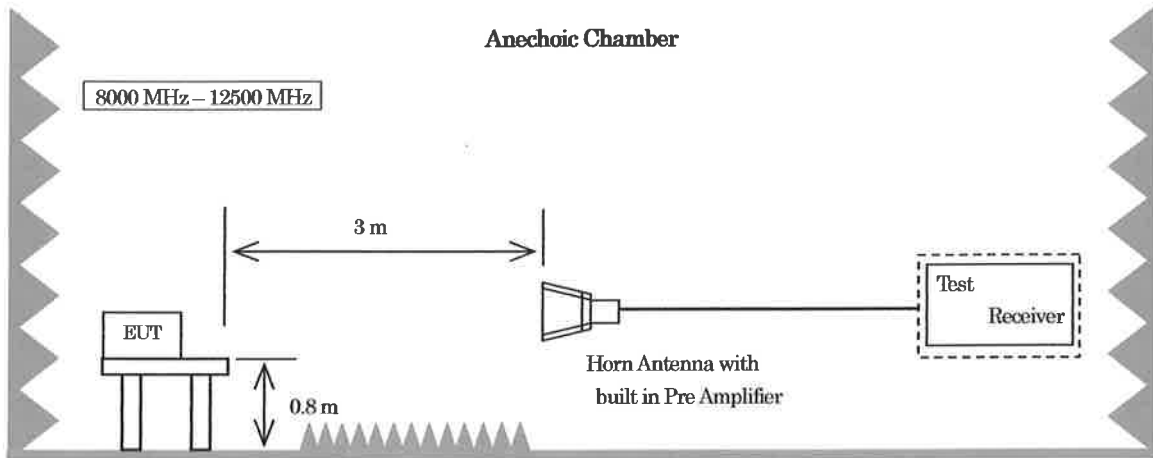
Antenna height:	1 m to 4 m
Polarization	Horizontal and Vertical

4.1.6. Reported Emissions

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

4.1.7. Test Configuration





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

4.2. Test Equipment

Equipment	Manufacturer	Model No.	Serial or ID No.	Calibration Due
Test Receiver	Rohde & Schwarz	ESU26	100299	May-2019
Pre Amplifier	Sonoma	310N	243232	Aug-2019
RF RELAY MATRIX	tsj	RFMI2A2M	03153	Aug-2019
Biconical Antenna	Schwarzbeck	BBA9106(VHA9103)	91032277	Feb-2019
Logperiodic Antenna	Schwarzbeck	UHALP9108A	0720	Feb-2019
Horn Antenna	EMCO	3115	8912-3303	July-2019
Pre Amplifier for Horn Antenna	tsj	MLA-0108AD-39	005	Aug-2019
Horn Antenna with built in Pre Amplifier	ETS·LINDGREN	3161-04EJ338	00040843	May-2020
Attenuator	SUHNER	6803.17.A	003	Aug-2019
Attenuator	SUHNER	6803.17.A	004	Aug-2019
Coaxial Cable (1)	SUHNER	RG400	259	Aug-2019
Coaxial Cable (2)	SUHNER	RG400	260	Aug-2019
Coaxial Cable (3)	SUHNER	S04272B	612	Aug-2019
Coaxial Cable (4)	SUHNER	S04272B	376	Aug-2019
Coaxial Cable (5)	SUHNER	SF106	32550/6	Aug-2019
Coaxial Cable (6)	SUHNER	SF104EA	MY4490/4EA	Aug-2019
Coaxial Cable (7)	SUHNER	SF104EA	10450/4EA	Aug-2019
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)

4.3. 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 limits 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 @ 2491.403 MHz for Continuous Mode

Disturbance Level	=	Reading	72.6	dBuV
	+	Correction Factor*	-4.6	dB/m
			=	68.0 dBuV/m
Margin	=	Limit	74.0	dBuV/m
	-	Disturbance Level	68.0	dBuV/m
			=	6.0 dB

*: Correction Factor = Antenna Factor (dB/m) + Cable Loss (dB) – Pre Amplifier Gain (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 Radiated Emission.

• 30 MHz – 1000 MHz

+3.91 dB / -3.18 dB

• 1000 MHz – 18000 MHz

+4.35 dB / -4.27 dB

4.5. Test Data

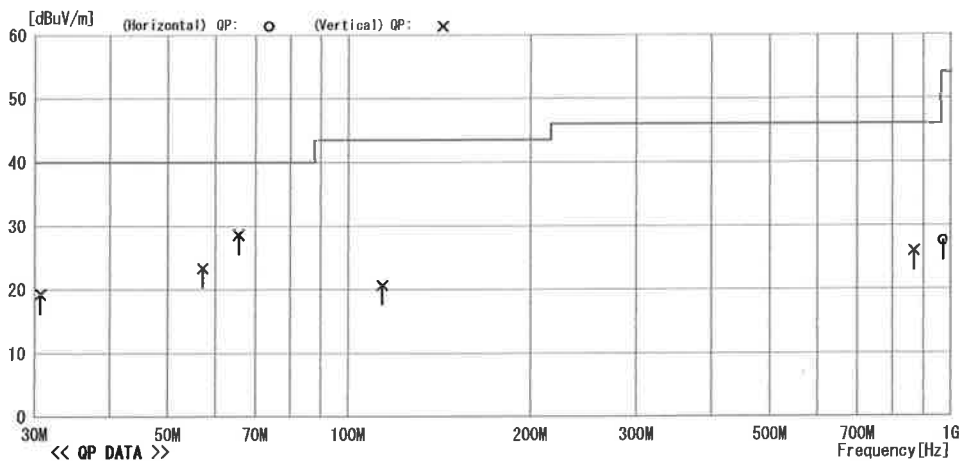
Radiated Emission

10m A/C
 Date : 2018/10/03 12:03

Model Name : CMOS AREA SCAN CAMERA
 Model No. : SP-12401C-USB
 Serial No. : ES0006
 Test Condition : Continuous Mode
 Data No. : IE1809-031A-04
 Power Supply : DC 12V
 Temp./Humi. : 23°C / 48%
 Operator : T. Akiyama

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	30.702	25.7	17.7	7.4	31.5	19.3	40.0	20.7	Vert.	150	78	B1C
2	57.204	38.6	8.6	7.8	31.6	23.4	40.0	16.6	Vert.	100	181	B1C
3	65.640	45.9	6.5	7.9	31.6	28.7	40.0	11.3	Vert.	100	215	B1C
4	113.784	31.8	11.9	8.5	31.5	20.7	43.5	22.8	Vert.	100	148	B1C
5	867.449	23.3	21.4	12.7	31.4	26.0	46.0	20.0	Vert.	150	180	LPD
6	967.310	23.2	22.1	13.1	30.8	27.6	54.0	26.4	Hori.	150	206	LPD

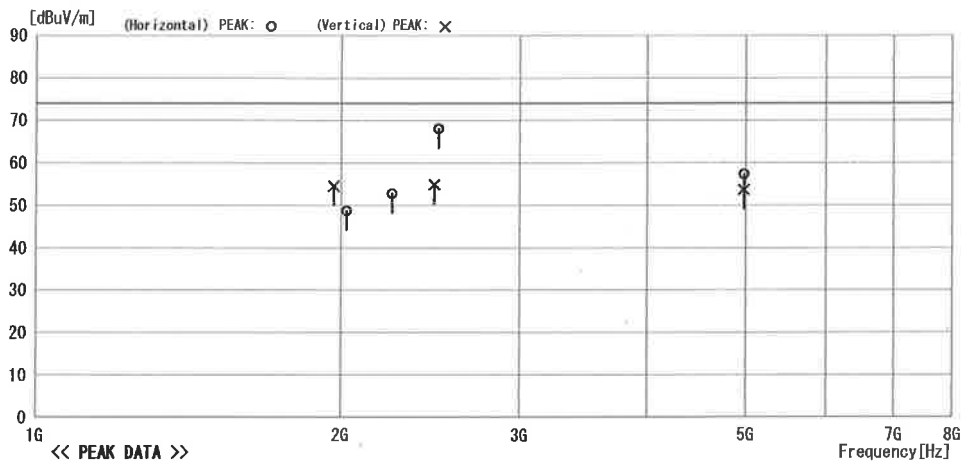
Radiated Emission

10m A/C
 Date : 2018/10/03 13:25

Model Name : CMOS AREA SCAN CAMERA	Data No. : IE1809-031A-05
Model No. : SP-12401C-USB	Power Supply : DC 12V
Serial No. : ES0006	Temp/Humi : 23°C / 48%
Test Condition : Continuous Mode	Operator : T. Akiyama

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	1966.309	61.0	27.6	8.3	42.4	54.5	74.0	19.5	Vert.	111	10	HOR
2	2025.167	55.1	27.7	8.4	42.5	48.7	74.0	25.3	Hori.	100	108	HOR
3	2242.932	58.7	27.7	8.9	42.6	52.7	74.0	21.3	Hori.	106	20	HOR
4	2467.000	59.5	28.5	9.4	42.5	54.9	74.0	19.1	Vert.	250	19	HOR
5	2491.403	72.6	28.6	9.4	42.6	68.0	74.0	6.0	Hori.	217	29	HOR
6	4977.355	51.7	33.1	13.8	41.3	57.3	74.0	16.7	Hori.	100	119	HOR
7	4977.836	48.0	33.1	13.8	41.3	53.6	74.0	20.4	Vert.	100	169	HOR

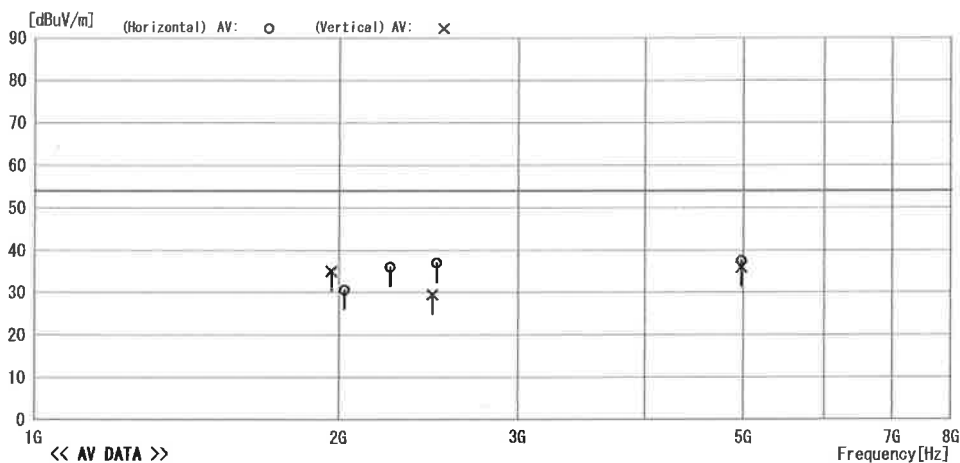
Radiated Emission

10m A/C
 Date : 2018/10/03 13:25

Model Name : CMOS AREA SCAN CAMERA	Data No. : IE1809-031A-06
Model No. : SP-12401C-USB	Power Supply : DC 12V
Serial No. : ES0006	Temp/Humi : 23°C / 48%
Test Condition : Continuous Mode	Operator : T. Akiyama

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	1966.309	41.4	27.6	8.3	42.4	34.9	54.0	19.1	Vert.	111	10	HOR
2	2025.167	37.0	27.7	8.4	42.5	30.6	54.0	23.4	Hori.	100	108	HOR
3	2242.932	41.9	27.7	8.9	42.6	35.9	54.0	18.1	Hori.	106	20	HOR
4	2467.000	34.1	28.5	9.4	42.5	29.5	54.0	24.5	Vert.	250	19	HOR
5	2491.403	41.4	28.6	9.4	42.6	36.8	54.0	17.2	Hori.	217	29	HOR
6	4977.355	31.9	33.1	13.8	41.3	37.5	54.0	16.5	Hori.	100	119	HOR
7	4977.836	30.3	33.1	13.8	41.3	35.9	54.0	18.1	Vert.	100	169	HOR

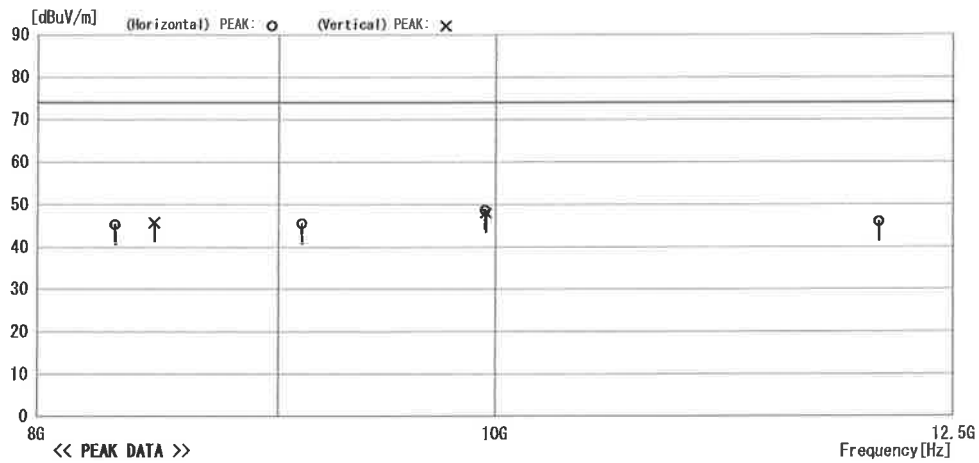
Radiated Emission

10m A/C
 Date : 2018/10/03 15:52

Model Name : CMOS AREA SCAN CAMERA	Data No. : IE1809-031A-11
Model No. : SP-12401C-USB	Power Supply : DC 12V
Serial No. : ES0006	Temp/Humi : 23°C / 48%
Test Condition : Continuous Mode	Operator : T. Akiyama

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	8307.850	42.2	-1.5	4.4	0.0	45.1	74.0	28.9	Hori.	100	121	HOR
2	8468.389	42.7	-1.5	4.4	0.0	45.6	74.0	28.4	Vert.	200	319	HOR
3	9103.647	41.8	-1.2	4.7	0.0	45.3	74.0	28.7	Hori.	100	67	HOR
4	9949.951	44.9	-1.1	4.8	0.0	48.6	74.0	25.4	Hori.	100	156	HOR
5	9953.509	44.2	-1.1	4.8	0.0	47.9	74.0	26.1	Vert.	119	169	HOR
6	12050.850	41.7	-1.3	5.4	0.0	45.8	74.0	28.2	Hori.	200	249	HOR

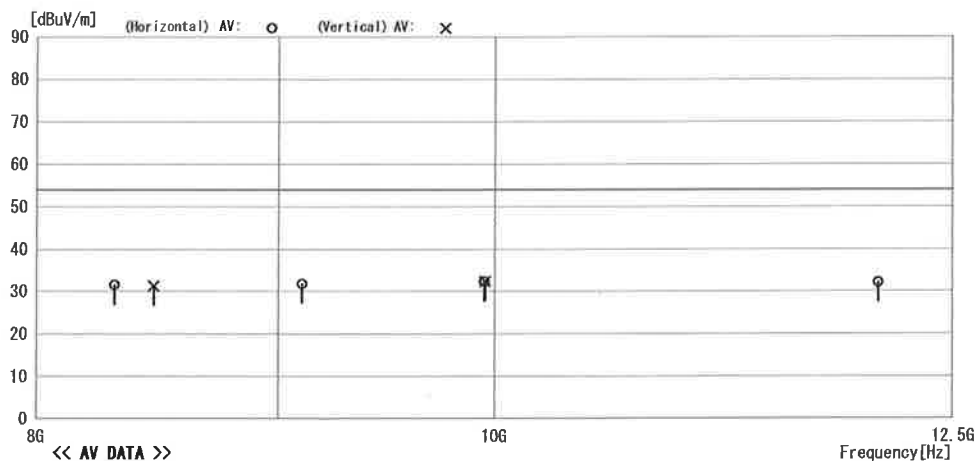
Radiated Emission

10m A/C
 Date : 2018/10/03 15:52

Model Name : CMOS AREA SCAN CAMERA	Data No. : IE1809-031A-12
Model No. : SP-12401C-USB	Power Supply : DC 12V
Serial No. : ES0006	Temp/Humi : 23°C / 48%
Test Condition : Continuous Mode	Operator : T. Akiyama

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	8307.850	28.6	-1.5	4.4	0.0	31.5	54.0	22.5	Hori.	100	121	HOR
2	8468.389	28.4	-1.5	4.4	0.0	31.3	54.0	22.7	Vert.	200	319	HOR
3	9103.647	28.3	-1.2	4.7	0.0	31.8	54.0	22.2	Hori.	100	67	HOR
4	9949.951	28.6	-1.1	4.8	0.0	32.3	54.0	21.7	Hori.	100	156	HOR
5	9953.509	28.7	-1.1	4.8	0.0	32.4	54.0	21.6	Vert.	119	169	HOR
6	12050.850	28.0	-1.3	5.4	0.0	32.1	54.0	21.9	Hori.	200	249	HOR



5. Photographs

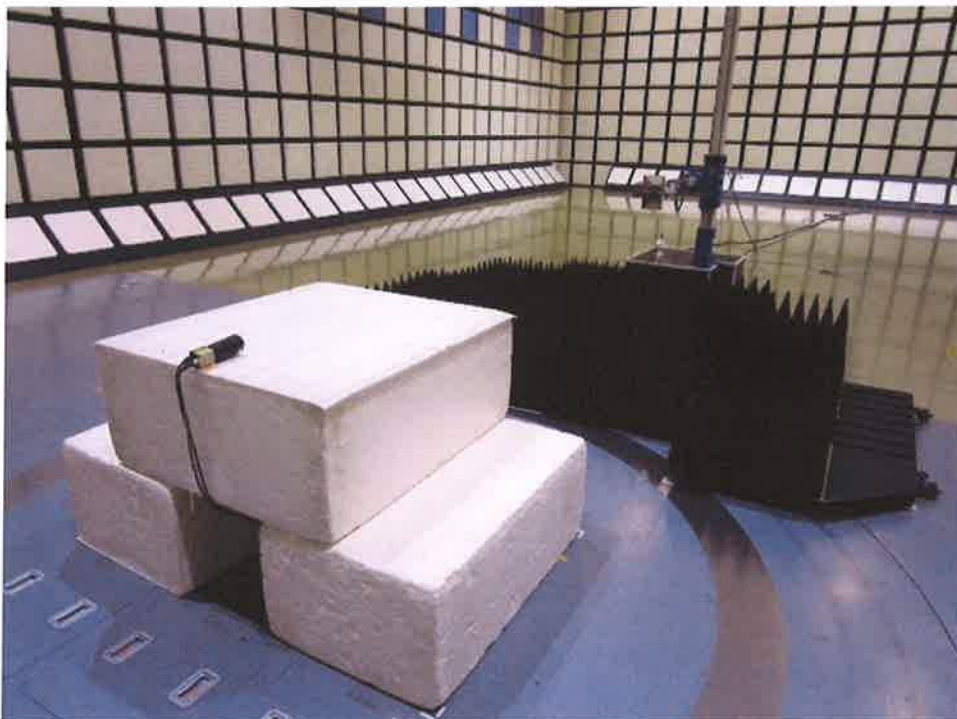
5.1. Radiated Emission

- 30 MHz – 1000 MHz





• 1000 MHz – 8000 MHz





• 8000 MHz – 12500 MHz



6. Laboratory Description

6.1. 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

6.2. 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

6.3. Laboratory Filing or Certificate Information

6.3.1. VCCI Site Registration pursuant to V-5 & VCCI 32-2

Site Name	Registration No.	Expiry Date
ISHIKAWA Co., Ltd.	A-0105	July 14, 2019

6.3.2. FCC Site Filing pursuant to CFR 47 § 2.948

Site Name	Test Firm Registration No.	Expiry Date
ISHIKAWA Co., Ltd.	743690	July 14, 2019

6.3.3. VLAC Accreditation

Site Name	Accreditation No.	Expiry Date
ISHIKAWA Co., Ltd. EMC Laboratory	VLAC-025	July 14, 2019

6.3.4. TÜV Rheinland Certificate of Appointment Laboratory

Site Name	Registration No.	Expiry Date
ISHIKAWA Co., Ltd. EMC Laboratory	UA50060145-0014	June 1, 2019