



# Test Report

Test Report No. IE1803-025T4  
Date of Issue: 24<sup>th</sup> April, 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)	:	3 CMOS LINE SCAN CAMERA
Model Number	:	SW-4000TMCL
Serial Number	:	ES0007
EUT Condition	:	Pre-Production

Date of Test : 2<sup>nd</sup>, 4<sup>th</sup> April, 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

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## 1. Summary of Test

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### 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. 3.01 IT04-P009 Rev. 4.01

## 2. Equipment under Test

### 2.1. EUT Information

No.	EUT	Manufacturer	Model No.	Serial No.	FCC ID / DoC
A	3 CMOS LINE SCAN CAMERA	JAI CORPORATION	SW-4000T-MCL	ES0007	None

Note : The EUT was tested as tabletop.

Internal Max. Frequency : 400 MHz

EUT Clock Frequency	Oscillator	Clock Frequency	Name of Board	Note
	50MHz	400MHz	Main Board	--
	60MHz	85MHz	Main Board	--

Power Rating :

Input DC 12 V, 1200 mA

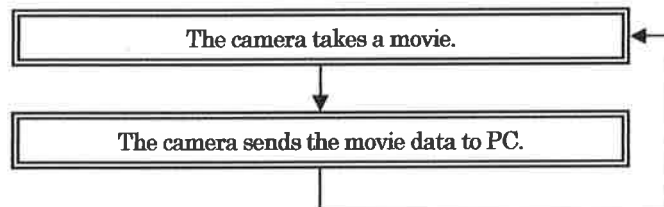
Port(s)	Connector Type	Connector Pin
Mini Camera Link Connector	SDR	26 Pins

Dimensions of the EUT	Width (mm)	Depth (mm)	Height (mm)
	90	90	90

Weight of the EUT	Weight (kg)
	0.765

### 2.2. Operating Mode

#### • Continuous Mode



### 3. Configuration of Equipment

#### 3.1. Peripherals used

No.	Equipment	Manufacturer	Model No.	Serial No.	FCC ID / DoC
B	LENS	Bluevision Ltd., Japan	BV-L1035-F	V10352182	None
C	LCD MONITOR	DELL	E2417H	CN-0VJ9GK-74261-68M-1FTU-A00B0-120	DoC
D	Personal Computer	DELL	Precision Tower 5810	GRCPB22	DoC
E	KEYBOARD	DELL	KB212-B	CN-0N290F-71581-5A9-07J2-A01	DoC
F	MOUSE	HP Japan Inc.	M-U0034-O	672652-001	DoC
G	Frame Grabber Board	Teledyne DALSA	OR-Y4C0-XPX00	S0058007	None
H	Conversion fixture	JAI	None	None	None
I	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
1	AC Power Cable for LCD MONITOR	1.5	Unshielded	None	—
2	AC Power Cable for Personal Computer	1.5	Unshielded	None	—
9	AC Power Cable for DC POWER SUPPLY	1.5	Unshielded	Removable × 3	Refer to Note

##### DC Power Cable

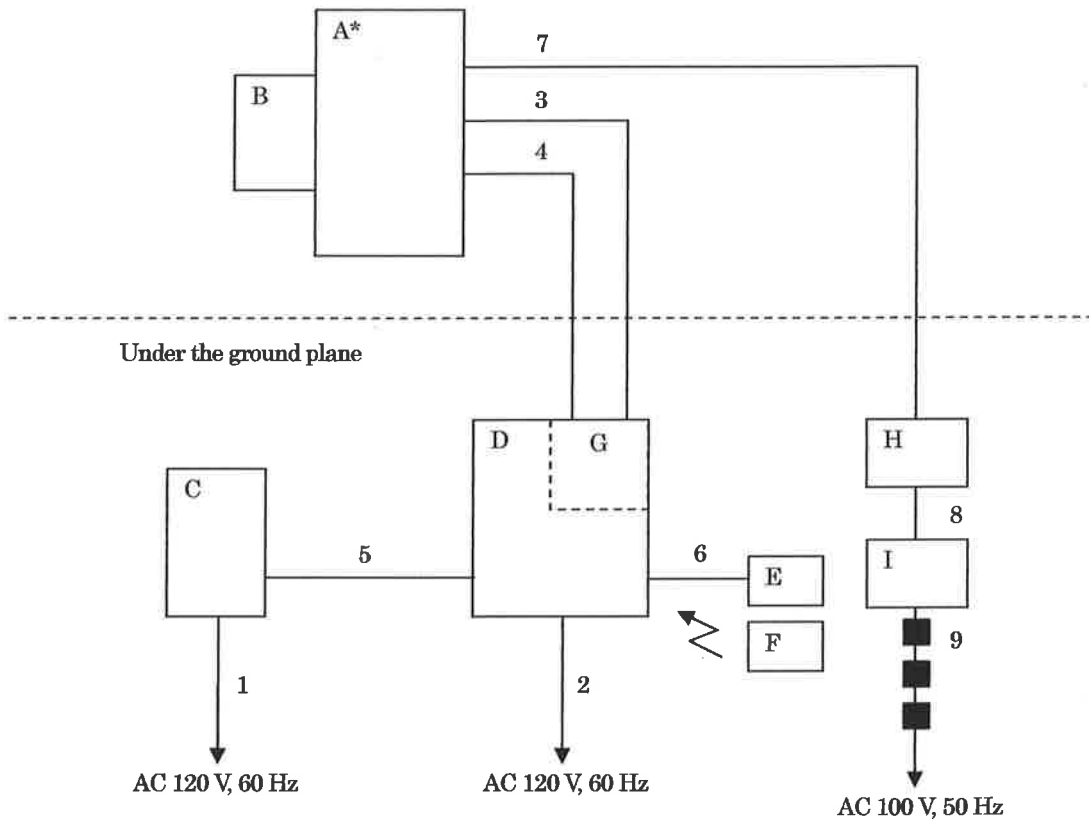
No.	Cable(s) Name	Length (m)	Shielding	Ferrite Core	Comment
7	DC Power Cable for 3 CMOS LINE SCAN CAMERA	10.0	Shielded	None	—
8	DC Power Cable for Conversion fixture	0.36	Unshielded	None	—

##### Interface Cable

No.	Cable(s) Name	Length (m)	Shielding	Ferrite Core	Comment
3	Camera Link PoCL Mini Cable (1SB26-L120-00C-A00 120921K)	10.0	Shielded	None	—
4	Camera Link PoCL Mini Cable (1SB26-L120-00C-A00 120921K)	10.0	Shielded	None	—
5	LCD MONITOR Cable	1.7	Shielded	None	—
6	KEYBOARD Cable	2.0	Shielded	None	—

Note: 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 – 2000 MHz

#### 4.1.3. Measuring Distance

3 m

#### 4.1.4. Turn Table

Rotated 0 to 360 degrees

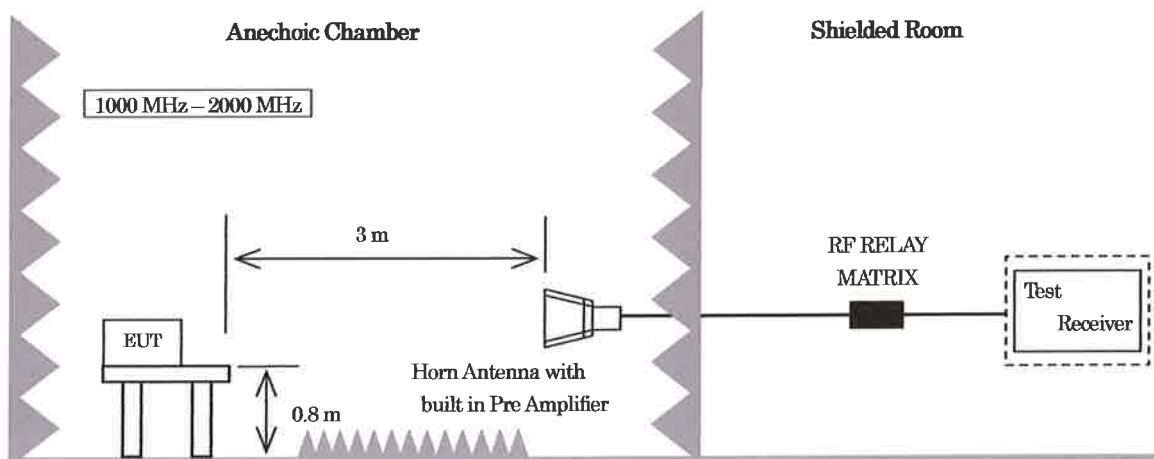
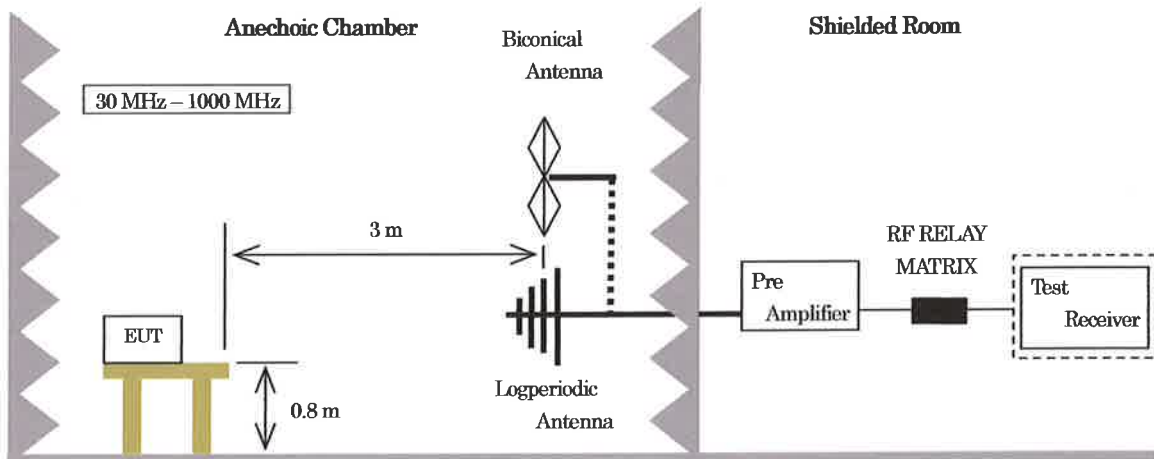
#### 4.1.5. Antenna Position

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



#### 4.2. Test Equipment

Equipment	Manufacturer	Model No.	Serial or ID No.	Calibration Due
Test Receiver	Rohde & Schwarz	ESU26	100299	Apr-2018
Pre Amplifier	Sonoma	310N	243232	Aug-2018
RF RELAY MATRIX	tsj	RFMI2A2M	03153	Aug-2018
Biconical Antenna	Schwarzbeck	BBA9106(VHA9103)	91032277	Feb-2019
Logperiodic Antenna	Schwarzbeck	UHALP9108A	0720	Feb-2019
Horn Antenna	EMCO	3115	8912-3303	Dec-2018
Pre Amplifier for Horn Antenna	tsj	MLA-0108AD-39	005	Dec-2018
Attenuator	SUHNER	6803.17.A	003	Aug-2018
Attenuator	SUHNER	6803.17.A	004	Aug-2018
Coaxial Cable (1)	SUHNER	RG400	259	Aug-2018
Coaxial Cable (2)	SUHNER	RG400	260	Aug-2018
Coaxial Cable (3)	SUHNER	S04272B	612	Aug-2018
Coaxial Cable (4)	SUHNER	S04272B	376	Aug-2018
Coaxial Cable (5)	SUHNER	SF106	32550/6	Aug-2018
Coaxial Cable (6)	SUHNER	SF104EA	MY4490/4EA	Aug-2018
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 @ 340.002 MHz for Continuous Mode

$$\begin{array}{rcl}
 \text{Disturbance Level} & = & \text{Reading} & 43.3 \text{ dBuV} \\
 & + & \text{Correction Factor*} & -7.2 \text{ dB/m} \\
 & & & \hline
 & & = & 36.1 \text{ dBuV/m}
 \end{array}$$

$$\begin{array}{rcl}
 \text{Margin} & = & \text{Limit} & 46.0 \text{ dBuV/m} \\
 & - & \text{Disturbance Level} & 36.1 \text{ dBuV/m} \\
 & & & \hline
 & & = & 9.9 \text{ dB}
 \end{array}$$

\*: 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.

### 4.4. Uncertainty

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

• 30 MHz – 1000 MHz

+3.48 dB / -3.02 dB
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• 1000 MHz – 8000 MHz

+3.73 dB / -3.80 dB
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4.5. Test Data

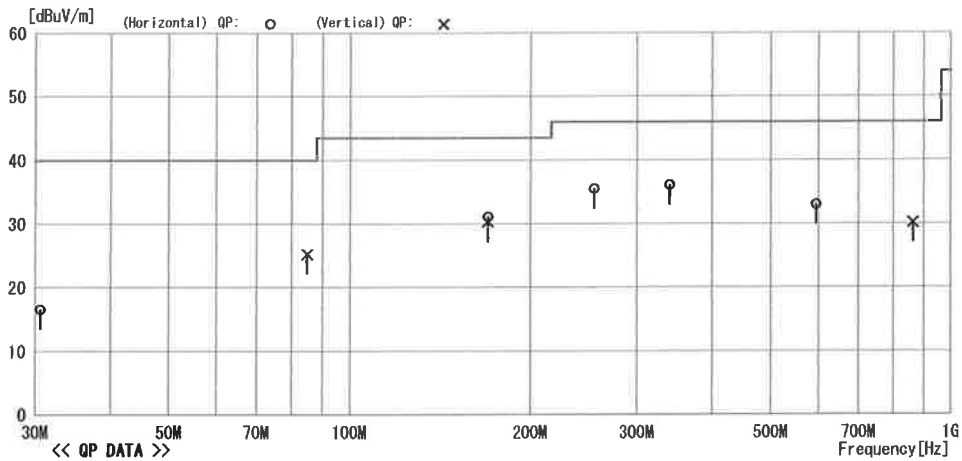
Radiated Emission

10m A/C  
Date : 2018/04/02 15:52

Model Name : 3 CMOS LINE SCAN CAMERA  
Model No. : SW-4000T-MCL  
Serial No. : ES0007  
Test Condition : Continuous Mode  
Data No. : IE1803-025A-10  
Power Supply : DC 12V  
Temp./Humi. : 20°C / 45%  
Operator : T. Kofudo

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	30.640	23.2	17.7	7.4	31.7	16.6	40.0	23.4	Hori.	100	0	B1C
2	85.000	41.3	7.4	8.2	31.6	25.3	40.0	14.7	Vert.	100	343	B1C
3	170.001	37.2	15.7	9.0	31.6	30.3	43.5	13.2	Vert.	160	180	B1C
4	170.001	38.0	15.7	9.0	31.6	31.1	43.5	12.4	Hori.	180	84	B1C
5	255.001	39.9	17.4	9.7	31.5	35.5	46.0	10.5	Hori.	133	266	B1C
6	340.002	43.3	14.1	10.2	31.5	36.1	46.0	9.9	Hori.	100	102	LPD
7	595.003	34.5	18.6	11.6	31.7	33.0	46.0	13.0	Hori.	180	67	LPD
8	864.290	27.6	21.3	12.7	31.4	30.2	46.0	15.8	Vert.	100	0	LPD

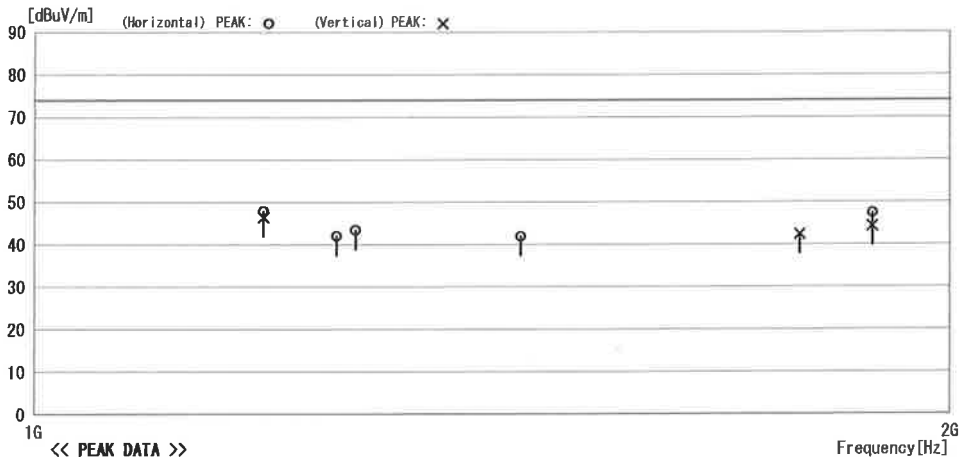
## Radiated Emission

10m A/C  
 Date : 2018/04/04 09:55

Model Name : 3 CMOS LINE SCAN CAMERA	Data No. : IE1803-025A-33
Model No. : SW-4000T-MCL	Power Supply : DC 12V
Serial No. : ES0007	Temp/Humi : 22°C / 48%
Test Condition : Continuous Mode	Operator : T. Kofudo

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	1190.004	56.7	26.2	6.5	41.5	47.9	74.0	26.1	Hori.	120	240	HOR
2	1190.007	55.3	26.2	6.5	41.5	46.5	74.0	27.5	Vert.	200	0	HOR
3	1257.151	50.8	26.1	6.7	41.6	42.0	74.0	32.0	Hori.	127	276	HOR
4	1275.006	52.2	26.1	6.7	41.6	43.4	74.0	30.6	Hori.	100	252	HOR
5	1445.007	50.5	26.0	7.2	41.8	41.9	74.0	32.1	Hori.	220	276	HOR
6	1785.009	49.3	27.2	8.0	42.1	42.4	74.0	31.6	Vert.	239	0	HOR
7	1885.723	53.8	27.6	8.2	42.2	47.4	74.0	26.6	Hori.	223	40	HOR
8	1885.725	50.7	27.6	8.2	42.2	44.3	74.0	29.7	Vert.	100	28	HOR

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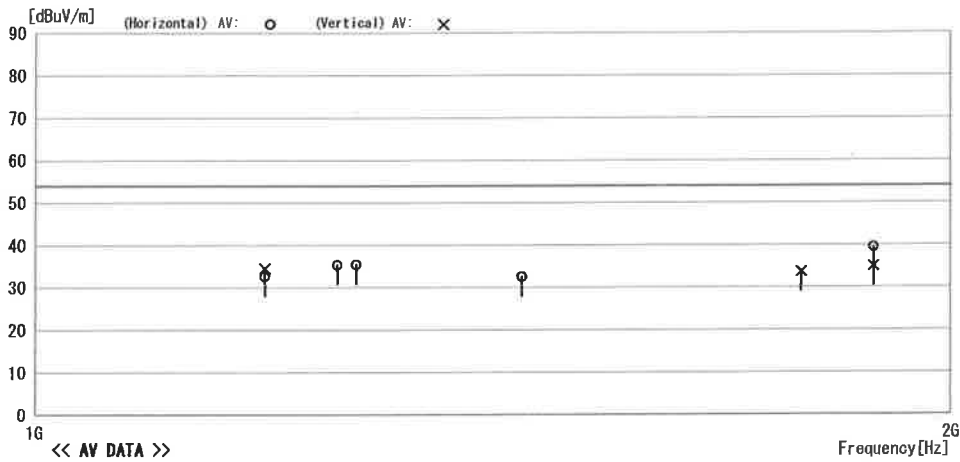
## Radiated Emission

10m A/C  
Date : 2018/04/04 09:55

Model Name : 3 CMOS LINE SCAN CAMERA	Data No. : IE1803-025A-34
Model No. : SW-4000T-MCL	Power Supply : DC 12V
Serial No. : ES0007	Temp/Humi : 22°C / 48%
Test Condition : Continuous Mode	Operator : T. Kofudo

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	1190.004	41.4	26.2	6.5	41.5	32.6	54.0	21.4	Hori.	120	240	HOR
2	1190.007	43.3	26.2	6.5	41.5	34.5	54.0	19.5	Vert.	200	0	HOR
3	1257.151	44.1	26.1	6.7	41.6	35.3	54.0	18.7	Hori.	127	276	HOR
4	1275.006	44.2	26.1	6.7	41.6	35.4	54.0	18.6	Hori.	100	252	HOR
5	1445.007	41.1	26.0	7.2	41.8	32.5	54.0	21.5	Hori.	220	276	HOR
6	1785.009	40.6	27.2	8.0	42.1	33.7	54.0	20.3	Vert.	239	0	HOR
7	1885.723	45.8	27.6	8.2	42.2	39.4	54.0	14.6	Hori.	223	40	HOR
8	1885.725	41.4	27.6	8.2	42.2	35.0	54.0	19.0	Vert.	100	28	HOR

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## 5. Photographs

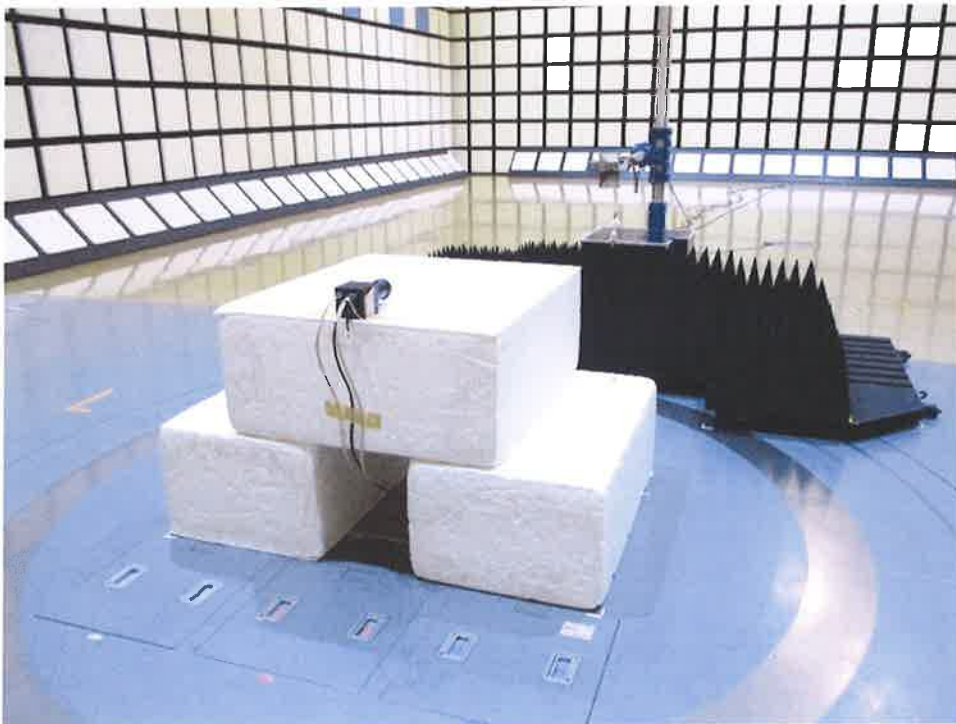
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### 5.1. Radiated Emission

• 30 MHz – 1000 MHz



• 1000 MHz – 2000 MHz



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## 6. Laboratory Description

### 6.1. Location

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### 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	UA50060145-0013	June 1, 2018

#### 6.3.5. Industry Canada site filing pursuant to RSS-Gen

Site Name	File No.	Expiry Date
10m Anechoic chamber	5804A-1	August 19, 2018
3m Anechoic chamber	5804A-2	August 19, 2018