EMI TEST REPORT

Test Report No. : 10005715S

Applicant: JAI Corporation

Type of Equipment: CCD Camera

Model No.: SP-5000M-CXP2

Test regulation: FCC Part 15 Subpart B:2012 Class A
ICES-003 Issue 5:2012 Class A

Test result: Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
7. The test was performed in accordance with FCC regulation, as an alternative arrangement of ICES-003.

Date of test:
March 7, 2013

Representative test engineer:
Takahiro Suzuki
Engineer of WiSE Japan, UL Verification Service

Approved by:
Ichiro Isozaki
Leader of WiSE Japan, UL Verification Service

RTL02610

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN
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REVISION HISTORY

Original Test Report No.: 10005715S

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10005715S	March 18, 2013	-	-

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Section 1 : Customer information

Company Name	:	JAI Corporation
Brand Name	:	JAI
Address	:	10-35 Sakae-chou Kanagawa-ku, Yokohama, Kanagawa, 221-0052, Japan
Telephone Number	:	+81-45-440-0165
Facsimile Number	:	+81-45-440-0167
Contact Person	:	Hiroshi Uehara

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

2.1 Identification of E.U.T.

Type of equipment	:	CCD Camera
Trade name	:	JAI
Model No.	:	SP-5000M-CXP2
Serial No.	:	1
Rating	:	DC12V
Country of Mass-production	:	Japan
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Size	:	62(W)×62(H)×50(D)mm, ≤215g
Modification of EUT	:	No modification by the test lab.
Receipt Date of Sample	:	March 7, 2013

2.2 Product description

Model: SP-5000M-CXP2 (referred to as the EUT in this report) is a CCD Camera.
The clock frequencies used in the EUT: 3.125GHz

Section 3 : Test specification, procedures and results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart B: 2012, final revised on December 27, 2012 and effective January 28, 2013
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart B Unintentional Radiators
Test Specification	:	ICES-003 Issue 5:2012
Title	:	Spectrum Management and Telecommunications Interference-Causing Equipment Standard Information Technology Equipment (ITE) – Limits and methods of measurement

* The test was performed in accordance with FCC regulation, as an alternative arrangement.

3.2 Procedures & results

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	ANSI C63.4:2009 7. AC powerline conducted emission measurements	Class A	N/A *1)	11.4dB (12.97392MHz, AV, L1)	Complied
Radiated emission	ANSI C63.4:2009 8. Radiated emission measurements	Class A	N/A	11.2dB (859.375MHz, QP, Horizontal)	Complied
*1) The calibration of test receiver contains CISPR 16-1-1 requirements. Note: UL Japan's EMI Work Procedures 13-EM-W0420.					

3.3 Addition to standard

No addition, exclusion nor deviation has been made from the standard.

3.4 Confirmation

UL Japan, Inc. hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC Part15 Subpart B: 2012 Class A and ICES-003 Issue 5:2012 Class A.

3.5 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Item	Frequency range	No.1 SAC*1/SR*2 (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Conducted emission (AC Mains) LISN	150kHz-30MHz	3.6 dB	3.6 dB	3.5 dB
Radiated emission (Measurement distance: 3m)	30MHz-300MHz	4.9 dB	5.1 dB	4.9 dB
	300MHz-1GHz	5.0 dB	5.2 dB	4.9 dB
	1GHz-18GHz	4.8 dB	4.8 dB	4.9 dB

*1: SAC=Semi-Anechoic Chamber
*2: SR= Shielded Room is applied besides radiated emission
*3: Value of Antenna Terminal Voltage measurement is also applies to the No.5 and No.6 Shielded Room.

Conducted emission test

The data listed in this test report has enough margin, more than the site margin.

Radiated emission test

The data listed in this test report has enough margin, more than the site margin.

3.6 Test Location

UL Japan, Inc. Shonan EMC Lab.
1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN
Telephone number : +81 463 50 6400
Facsimile number : +81 463 50 6401
JAB Accreditation No. : RTL02610

	FCC Registration No.	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
☒ No.1 Semi-anechoic	697847	2973D-1	20.6 x 11.3 x	20.6 x 11.3	10m
☐ No.2 Semi-anechoic	697847	2973D-2	20.6 x 11.3 x	20.6 x 11.3	10m
☐ No.3 Semi-anechoic	697847	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
☐ No.4 Semi-anechoic	-	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
☒ No.1 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.2 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.3 shielded room	-	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
☐ No.4 shielded room	-	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
☐ No.5 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☐ No.6 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-

3.7 Test setup, Data of EMI & Test instruments

Refer to Appendix 1 to 3.

Section 4 : Operation of E.U.T. during testing

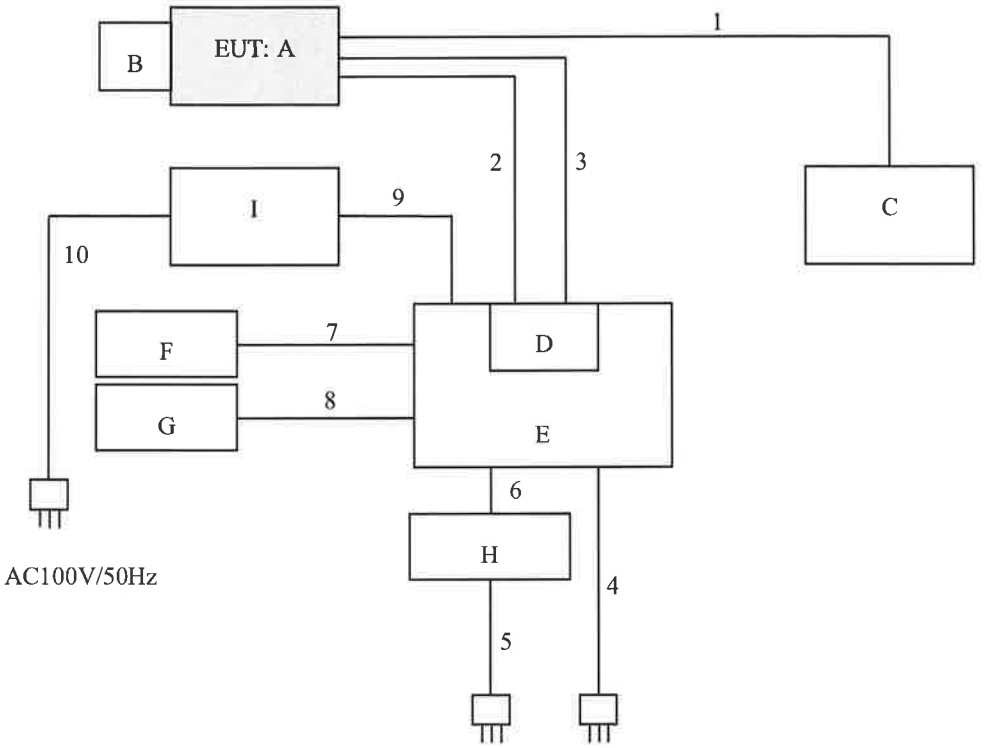
4.1 Operating modes

The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test sequence is used: Continuous mode

Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals



*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	FCC ID	Remark
A	CCD Camera	SP-5000M-CXP2	1	JAI Corporation	-	EUT
B	Lens	AF NIKKOR 35-F1.2	-	NIKON	-	-
C	Conversion Box	None	0001	JAI Corporation	-	-
D	Camera Link I/F	Xcelera-CL PX8	-	Teledyne DALSA	-	-
E	Personal Computer	T3500	5M836BX	DELL	-	-
F	Keyboard	SK-8175	OW213F	DELL	-	-
G	Mouse	MX500	LZB33351434	DELL	-	-
H	LCD Monitor	S2243W	36965080	NANAO	-	-
I	Printer	MD-5000	J89C0121H	ALPS	-	-

List of cables used

No.	Name	Length (m)	Cable Shield	Connector Shield	Remark
1	DC Power	10.0	Shielded	Shielded	For CCD Camera
2	CoaXPress	10.0	Shielded	Shielded	-
3	CoaXPress	10.0	Shielded	Shielded	-
4	AC Power	2.0	Unshielded	Unshielded	For Personal Computer
5	AC Power	2.0	Unshielded	Unshielded	For LCD Monitor
6	LCD DVI	1.5	Shielded	Shielded	-
7	Keyboard	1.4	Shielded	Shielded	-
8	Mouse	1.4	Shielded	Shielded	-
9	Printer	1.8	Shielded	Shielded	-
10	AC Power	2.0	Unshielded	Unshielded	For Printer

Section 5 : Conducted emission

5.1 Operating environment

The test was carried out in shielded room.
Temperature : Refer to data
Humidity : Refer to data

5.2 Test configuration

The EUT was placed on a platform of nominal size, 1.0m by 2.0m, raised 0.8m above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals was aligned and was flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. The EUT was located 0.8m from Line Impedance Stabilization Network (LISN) and excess AC Cable was bundled in center. I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 0.3m to 0.4m long. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through an LISN to the input power source. All unused 50ohm connectors of the LISN were resistively terminated in 50ohm when not connected to the measuring equipment.

5.3 Test conditions

Frequency range : 0.15 - 30 MHz
EUT position : Table top

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT in shielded room.
The EUT was connected to a Line Impedance Stabilization Network (LISN).
An overview sweep with peak detection has been performed.
The measurements had been performed with a quasi-peak detector and if required, with a CISPR average detector (CAV).
The conducted disturbance measurements were made with the following detector function of the test receiver.
Detector Type : QP / CAV
IF Bandwidth : 9kHz / 9kHz

5.5 Results

Summary of the test results: Pass

Section 6 : Radiated emission

6.1 Operating environment

This test was carried out in semi-anechoic chamber.

Temperature : Refer to data
Humidity : Refer to data

6.2 Test configuration

The EUT was placed on a platform of nominal size, 1.0m by 1.5m, raised 80cm above the conducting ground plane.
The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity.
The rear of EUT, including its peripherals was aligned and flushed with rear of tabletop.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
Photographs of the set up are shown in Appendix 1.

6.3 Test conditions

Frequency range : 30 - 15625 MHz
Test distance : 10m(30-1000MHz)
3m(1000-15625MHz)
EUT position : Table top

6.4 Test procedure

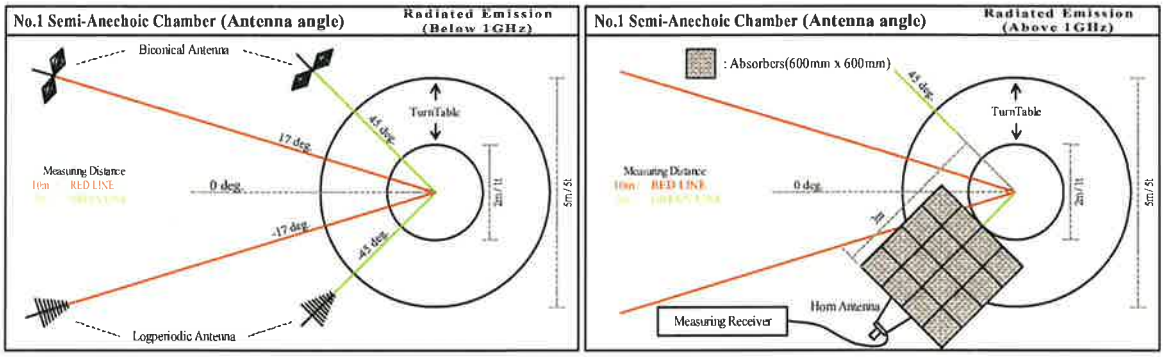
The Radiated Electric Field Strength intensity has been measured on a Semi-Anechoic Chamber with a ground plane at a distance of 10m and 3m.
The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed for vertical or horizontal antenna polarization or both as necessary.
The radiated emission measurements were made with the following detector function of the test receiver and spectrum analyzer.

		30-1000 MHz (Test receiver)	1000-15625 MHz (Spectrum analyzer)	
Detector Type:	:	QP	AV *1)	PK
IF Band width:	:	120 kHz	RBW 1MHz/ VBW 10 Hz	RBW 1MHz/ VBW 3 MHz

*1) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

6.5 Results

Summary of the test results: Pass



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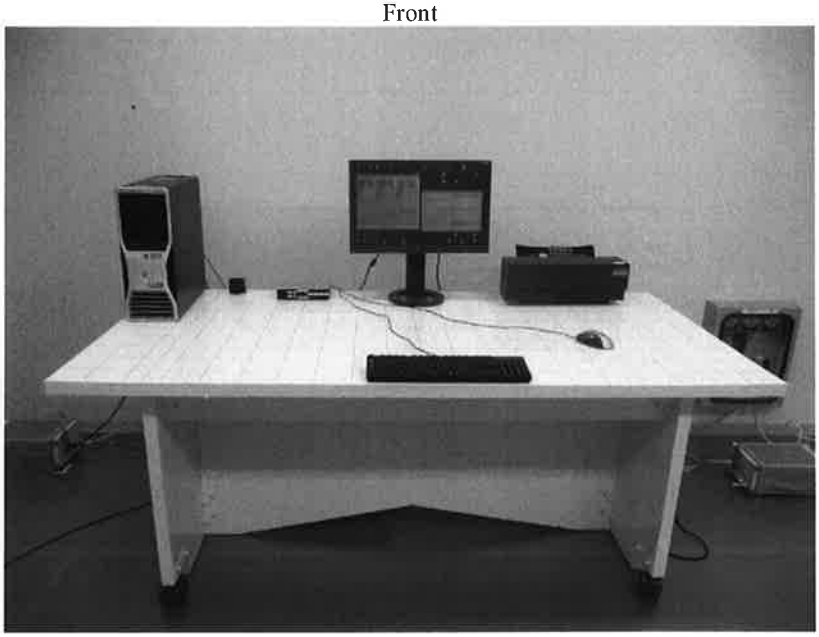
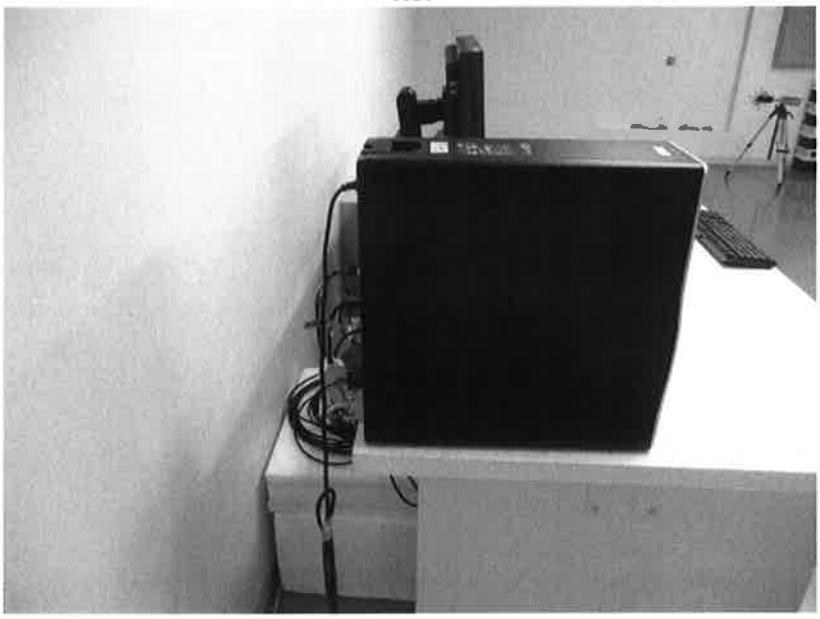
Appendix 1: Photographs of test setup

Conducted emission

Front



Side



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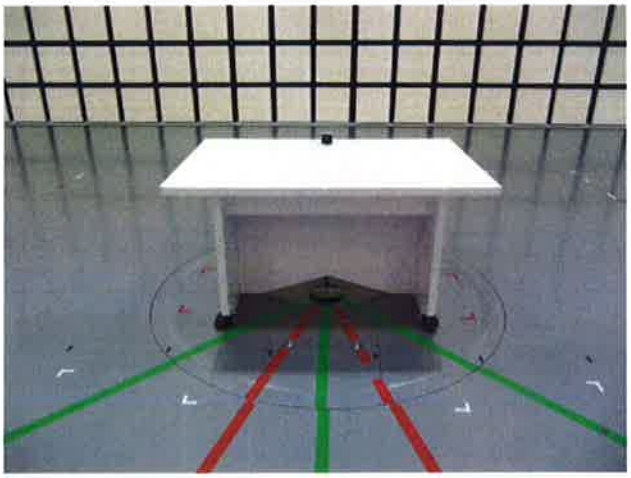
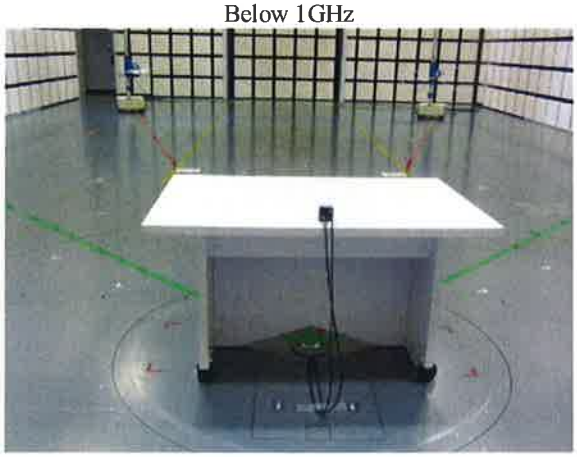
Radiated emission

Front



Rear

Below 1GHz



Above 1GHz

AE

DATA OF CONDUCTED EMISSION TEST

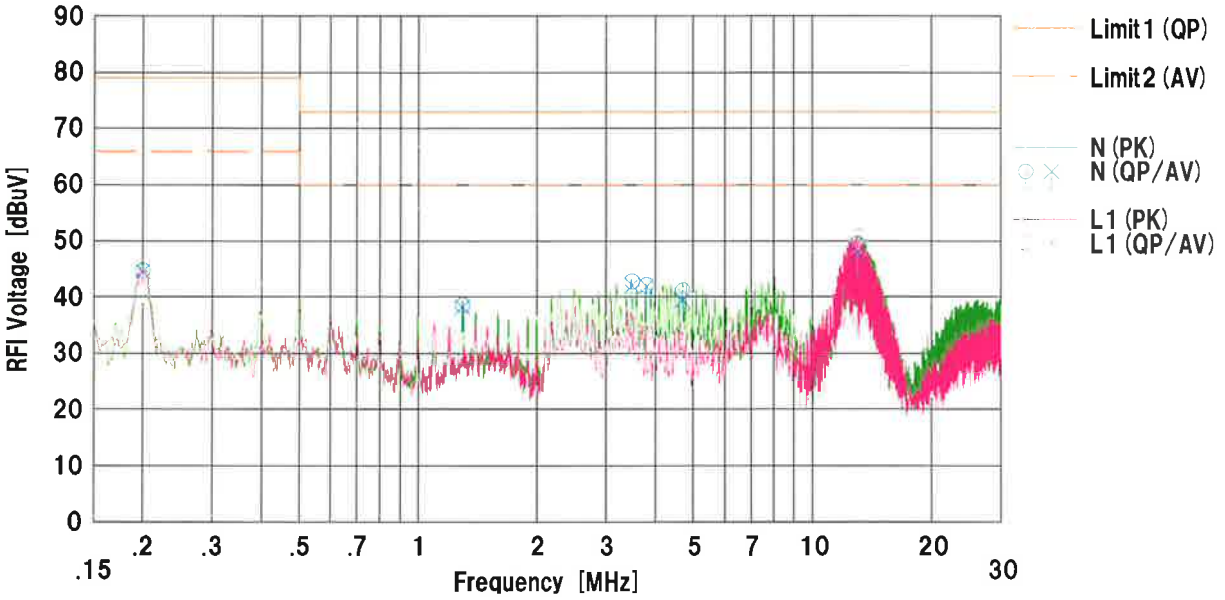
UL Japan,Inc. Shonan EMC Lab. No.1 Shielded Room
Date : 2013/03/07

Company	: JAI Corporation	Mode	: Continuous
Kind of EUT	: CCD Camera	Report No.	: 10005715S
Model No.	: SP-5000M-CXP2	Power	: DC12V
Serial No.	: 1	Temp./Humi.	: 21deg.C / 43%RH

Remarks : -

Limit1 : FCC 15B (15.107) ClassA QP
Limit2 : FCC 15B (15.107) ClassA AV

Engineer : Takahiro Suzuki



No.	Freq.	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP>	<AV>		<QP>	<AV>	<QP>	<AV>	<QP>	<AV>		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.20000	32.0	31.8	12.7	44.7	44.5	79.0	66.0	34.3	21.5	N	
2	1.29697	25.8	25.4	12.8	38.6	38.2	73.0	60.0	34.4	21.8	N	
3	3.49264	29.8	29.1	13.0	42.8	42.1	73.0	60.0	30.2	17.9	N	
4	3.79211	29.1	29.0	13.0	42.1	42.0	73.0	60.0	30.9	18.0	N	
5	4.68923	28.2	26.5	13.0	41.2	39.5	73.0	60.0	31.8	20.5	N	
6	12.97392	35.6	33.9	13.8	49.4	47.7	73.0	60.0	23.6	12.3	N	
7	0.20000	30.9	30.5	12.7	43.6	43.2	79.0	66.0	35.4	22.8	L1	
8	1.19649	20.8	20.0	12.8	33.6	32.8	73.0	60.0	39.4	27.2	L1	
9	3.49324	22.2	20.4	13.0	35.2	33.4	73.0	60.0	37.8	26.6	L1	
10	3.79067	20.7	20.5	13.0	33.7	33.5	73.0	60.0	39.3	26.5	L1	
11	4.68923	20.9	17.8	13.0	33.9	30.8	73.0	60.0	39.1	29.2	L1	
12	12.97392	37.0	34.8	13.8	50.8	48.6	73.0	60.0	22.2	11.4	L1	

Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+Cable+ATT) [dB]
LISN:SLS-02

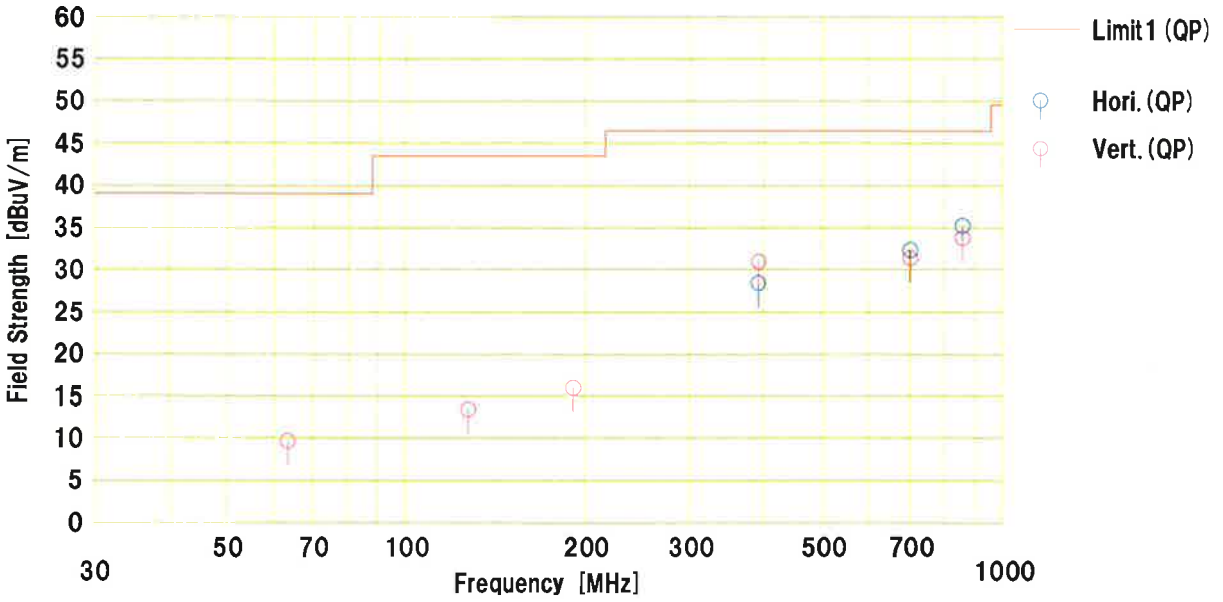
DATA OF RADIATED EMISSION TEST

UL Japan,Inc. Shonan EMC Lab. No.1 Semi-Anechoic Chamber
Date : 2013/03/07

Company	: JAI Corporation	Mode	: Continuous
Kind of EUT	: CCD Camera	Report No.	: 10005715S-A
Model No.	: SP-5000M-CXP2	Power	: DC12V
Serial No.	: 1	Temp./Humi.	: 20deg.C / 42%RH
Remarks	: -		

Limit1 : FCC 15B Class A (10m)

Engineer : Takahiro Suzuki



No.	Freq.	Reading <QP>	Ant.Fac	Loss	Gain	S.Fac	Result <QP>	Limit <QP>	Margin <QP>	Pola.	Height	Angle	Ant. Type	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]		
1	390.629	36.6	15.9	7.7	31.8	0.0	28.4	46.4	18.0	Hori.	257	328	LP	
2	703.128	34.2	20.8	9.3	32.0	0.0	32.3	46.4	14.1	Hori.	100	251	LP	
3	859.375	34.4	22.5	9.9	31.6	0.0	35.2	46.4	11.2	Hori.	100	139	LP	
4	63.396	27.1	7.4	7.5	31.8	-0.5	9.7	39.0	29.3	Vert.	100	219	BC	
5	127.485	23.4	13.7	8.3	31.8	-0.2	13.4	43.5	30.1	Vert.	100	11	BC	
6	191.200	22.5	16.4	9.0	31.8	-0.1	16.0	43.5	27.5	Vert.	100	194	BC	
7	390.622	39.2	15.9	7.7	31.8	0.0	31.0	46.4	15.4	Vert.	400	200	LP	
8	703.130	33.3	20.8	9.3	32.0	0.0	31.4	46.4	15.0	Vert.	234	38	LP	
9	859.379	33.0	22.5	9.9	31.6	0.0	33.8	46.4	12.6	Vert.	200	214	LP	

Calculation:Result [dBuV/m] =Reading [dBuV] +Ant.Fac [dB/m] +Loss (Cable+ATT) [dB] -Gain (AMP) [dB] +S.Fac (ΔAF) [dB]
Ant.Type=BC:Biconical Antenna, LP:Logperiodic Antenna, SHA01:Horn Antenna

DATA OF RADIATED EMISSION TEST

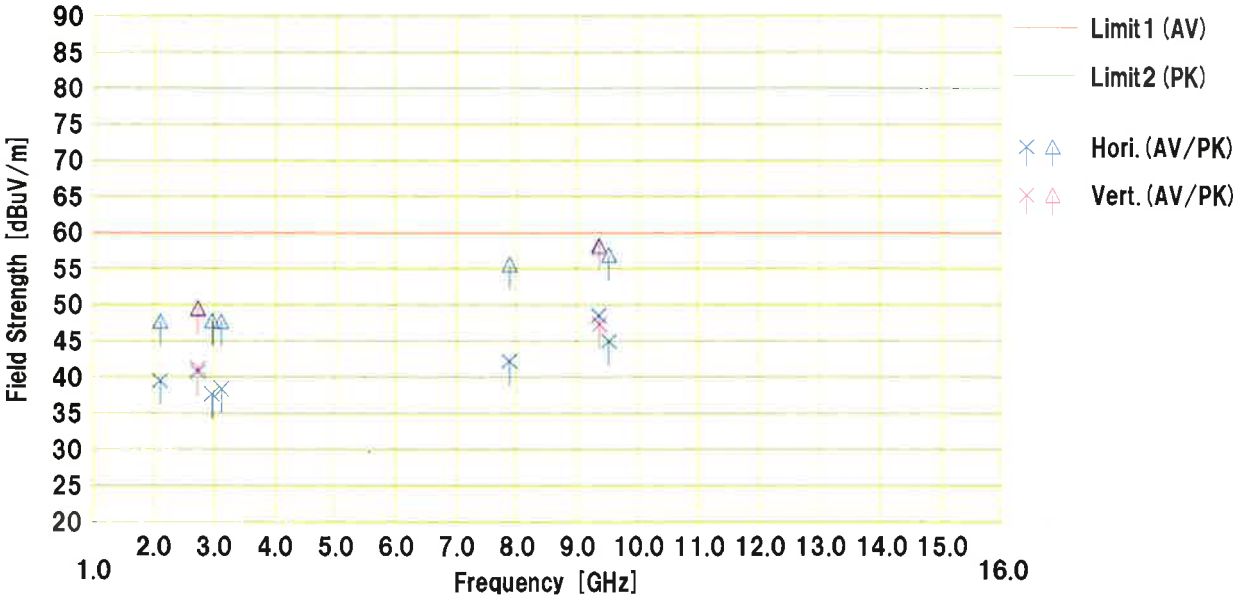
UL Japan,Inc. Shonan EMC Lab. No.1 Semi-Anechoic Chamber
Date : 2013/03/07

Company	: JAI Corporation	Mode	: Continuous
Kind of EUT	: CCD Camera	Report No.	: 10005715S
Model No.	: SP-5000M-CXP2	Power	: DC12V
Serial No.	: 1	Temp./Humi.	: 20deg.C / 42%RH

Remarks : -

Limit1 : FCC 15B Class A (3m) AV
Limit2 : FCC 15B Class A (3m) Peak

Engineer : Takahiro Suzuki



No.	Freq.	Reading <AV>	Reading <PK>	Ant.Fac	Loss	Gain	Result <AV>	Result <PK>	Limit <AV>	Limit <PK>	Margin <AV>	Margin <PK>	Pola.	Height	Angle	Ant. Type	Comment
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	[H/V]	[cm]	[deg]		
1	2110.200	49.3	57.5	27.3	3.7	40.8	39.5	47.7	59.9	79.9	20.4	32.2	Hori.	124	346	SHA01	
2	2736.095	49.2	58.0	28.2	4.2	40.8	40.8	49.6	59.9	79.9	19.1	30.3	Hori.	131	106	SHA01	
3	2970.806	45.4	55.5	28.7	4.5	40.9	37.7	47.8	59.9	79.9	22.2	32.1	Hori.	166	134	SHA01	
4	3123.089	46.0	55.4	28.9	4.5	41.1	38.3	47.7	59.9	79.9	21.6	32.2	Hori.	132	162	SHA01	
5	7889.985	38.7	52.1	37.2	7.4	41.1	42.2	55.6	59.9	79.9	17.7	24.3	Hori.	100	45	SHA01	
6	9373.707	43.1	52.9	37.9	8.0	40.5	48.5	58.3	59.9	79.9	11.4	21.6	Hori.	130	126	SHA01	
7	9532.996	39.3	51.2	38.1	8.1	40.5	45.0	56.9	59.9	79.9	14.9	23.0	Hori.	100	98	SHA01	
8	2734.381	49.6	57.8	28.2	4.2	40.8	41.2	49.4	59.9	79.9	18.7	30.5	Vert.	150	121	SHA01	
9	9375.047	41.9	52.6	37.9	8.0	40.5	47.3	58.0	59.9	79.9	12.6	21.9	Vert.	117	123	SHA01	

Calculation:Result [dBuV/m] =Reading [dBuV] +Ant.Fac [dB/m] +Loss (Cable+ATT) [dB] -Gain (AMP) [dB]
Ant.Type=BC:Biconical Antenna, LP:Logperiodic Antenna, SHA01:Horn Antenna

APPENDIX 3
Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAF-01	Pre Amplifier	SONOMA	310N	290211	RE	2013/02/12 * 12
SAT6-05	Attenuator	JFW	50HF-006N	-	RE	2013/02/12 * 12
SAT3-04	Attenuator	JFW	50HF-003N	-	RE	2013/02/12 * 12
SBA-01	Biconical Antenna	Schwarzbeck	BBA9106	91032664	RE	2012/10/08 * 12
SCC-A1/A3/A5/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2012/04/10 * 12
SCC-A2/A4/A6/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2012/04/10 * 12
SLA-01	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0888	RE	2012/11/18 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2013/02/27 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE,CE	2012/10/04 * 12
SJM-08	Measure	PROMART	SEN1935	-	RE,CE	-
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2012/09/11 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFI,MF)	-	RE,CE	-
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2012/03/12 * 12
SCC-G01	Coaxial Cable	Suhner	SUCOFLEX 104A	46497/4A	RE	2012/04/10 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX 104	296169/4	RE	2012/05/22 * 12
SHA-01	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	RE	2012/08/20 * 12
SCC-A12/A13/SRSE-01	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-269(RF Selector)	CE	2012/04/10 * 12
SLS-01	LISN	Rohde & Schwarz	ENV216	100511	CE(AE)	2013/02/22 * 12
SLS-02	LISN	Rohde & Schwarz	ENV216	100512	CE(EUT)	2013/02/21 * 12
SAT3-03	Attenuator	JFW	50HF-003N	-	CE	2013/02/12 * 12
SOS-02	Humidity Indicator	A&D	AD-5681	4063343	CE	2013/03/07 * 12
STM-01	Terminator	TME	CT-01 BP	-	CE	2013/01/16 * 12

The expiration date of the calibration is the end of the expired month .
As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards.
Test Item :
CE: Conducted emission,
RE: Radiated emission,

End of Report