EMI TEST REPORT

Test Report No.: 10006854S-B

Applicant	:	**JAI Corporation**
Type of Equipment	:	**C-MOS Camera**
Model No.	:	**SP-5000M-MCL**
Test regulation	:	**FCC Part15 Subpart B: 2012, Class B**
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.
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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.

Date of test: March 19 - 21, 2013

Representative test engineer:

Yohsuke Matsuzawa
Engineer of WiSE Japan,
UL Verification Service

Approved by :

Ichiro Isozaki
Leader of WiSE Japan,
UL Verification Service

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

RTL02610

UL Japan, Inc.
Shonan EMC Lab.
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REVISION HISTORY

Original Test Report No.: 10006854S-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10006854S-B	March 29, 2013	-	-

UL Japan, Inc.
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SECTION 1: Customer information

Company Name	:	JAI Corporation
Address	:	10-35 Sakae-cho, Kanagawa-ku, Yokohama-shi, Kanagawa, 221-0052 JAPAN
Telephone Number	:	+81 45 440 0165
Facsimile Number	:	+81 45 440 0167
Contact Person	:	Yoshinobu Ihara

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

2.1 Identification of E.U.T.

Type of equipment	:	C-MOS Camera
Model number	:	SP-5000M-MCL
Serial number	:	β2 000007
Rating	:	DC 12V
Country of mass-production:		Japan
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Receipt date of sample	:	March 19, 2013
Modification of EUT	:	No modification by the test lab.

2.2 Product description

Model: SP-5000M-MCL (call EUT in the future) is a C-MOS Camera.

Clock frequencies: 288MHz

SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification	:	Test specification: FCC Part 15 Subpart B: 2012, final revised on December 27, 2012 and effective January 28, 2013
Title	:	FCC 47CFR Part 15 Radio Frequency Device Subpart B Unintentional Radiators

3.2 Test procedures & results

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	ANSI C63.4: 2009 7. AC powerline conducted emission measurements	Class B	N/A *1)	20.9 dB (11.86780 MHz, AV, N)	Complied
Radiated emission	ANSI C63.4: 2009 8. Radiated emission measurements	Class B	N/A	3.7 dB (72.001 MHz, QP, Vertical)	Complied
Note: EMI Procedure of UL Japan: No.13-EM-W0420. *1) The calibration of test receiver contains CISPR 16-1-1 requirements.					

3.3 Additions to standards

There was no addition, deviation or exclusion from standard.

3.4 Confirmation

UL Japan, Inc. hereby confirms the E.U.T., in the configuration tested, complies with the specifications FCC Part 15 Subpart B: 2012, Class B and ICES-003 Issue 5:2012 Class B.

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-2GHz	4.8 dB	4.8 dB	4.9 dB
*1: SAC=Semi-Anechoic Chamber *2: SR= Shielded Room is applied besides radiated emission				

Conducted emission test

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

Radiated emission test

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

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 chamber	697847	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☐ No.2 semi-anechoic chamber	697847	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☐ No.3 semi-anechoic chamber	697847	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
☐ No.4 semi-anechoic chamber	-	-	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

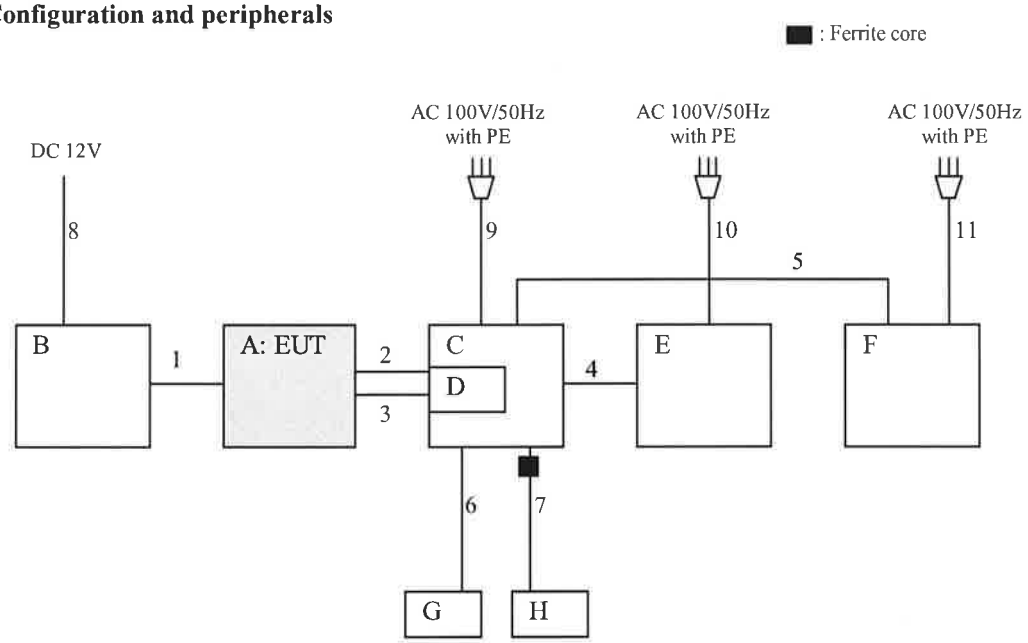
Refer to APPENDIX 1 to 3.

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

4.1 Operating mode

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: Normal 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	Remark
A	C-MOS Camera	SP-5000M-MCL	β2 000007	JAI Corporation	EUT
B	Conversion BOX	-	0001	JAI Corporation	-
C	Personal Computer	T3500	5M836BX	DELL	-
D	DIGITAL IF MCL	X64 Xcelera-CL+PX-8	S5152025	Teledyne Dalsa	-
E	LCD Monitor	S2243W	36965080	NANAO	-
F	Printer	MD-5000	J89C0121H	ALPS ELECTRIC	-
G	Keyboard	SK-8175	0W213F	DELL	-
H	Mouse	MX-500	LZB33351434	Logicool	-

List of cable used

No.	Item	Length (m)	Shield (Cable)	Shield (Connector)	Remark
1	DC Power Cable	10.0	Shielded	Shielded	-
2	Camera Link Cable	7.0	Shielded	Shielded	-
3	Camera Link Cable	7.0	Shielded	Shielded	-
4	RGB Cable	1.8	Unshielded	Unshielded	-
5	Parallel Cable	1.8	Shielded	Shielded	-
6	USB Cable	1.4	Shielded	Shielded	-
7	USB Cable	1.4	Shielded	Shielded	-
8	DC Power Cable	0.3	Unshielded	Unshielded	Conversion BOX
9	AC Power Cable	2.0	Unshielded	Unshielded	Personal Computer
10	AC Power Cable	2.0	Unshielded	Unshielded	LCD Monitor
11	AC Power Cable	2.0	Unshielded	Unshielded	Printer

SECTION 5: Conducted emission

5.1 Operating environment

The test was carried out in No.1 Shielded room.

Temperature : Refer to the APPENDIX 2
Humidity : Refer to the APPENDIX 2

5.2 Test configuration

EUT was placed on a platform of nominal size, 1.0m by 3.0m, 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 tabletop was located 40cm to the vertical conducting plane. The rear of EUT was aligned and flushed with rear of tabletop. The rear of 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. EUT was located 80cm from LISN and excess AC cables were bundled in center. I/O cables that were connected to the peripherals were bundled in center. They were folded back and for the forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane.
Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source. All unused 50 ohm connectors of the LISN were resistively terminated in 50 ohm when not connected to the measuring equipment.
Photographs of the set up are shown in APPENDIX 1.

5.3 Test conditions

Frequency range : 0.15 - 30MHz
EUT position : Table top
EUT operation mode : Normal mode

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT within a 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, an average detector.
The conducted emission measurements were made with the following detection of the test receiver.

Detection Type : Quasi-Peak/ CISPR average
IF Bandwidth : 9kHz

5.5 Results

Summary of the test results : Pass
Refer to APPENDIX 2

SECTION 6: Radiated emission

6.1 Operating environment

The test was carried out in No.1 Semi-Anechoic chamber.

Temperature : Refer to the APPENDIX 2
Humidity : Refer to the APPENDIX 2

6.2 Test configuration

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 was aligned and flushed with rear of tabletop.
Photographs of the set up are shown in APPENDIX 1.

6.3 Test conditions

Frequency range	:	30 - 2000MHz
Test distance	:	3m
EUT position	:	Table top
EUT operation mode	:	Normal mode

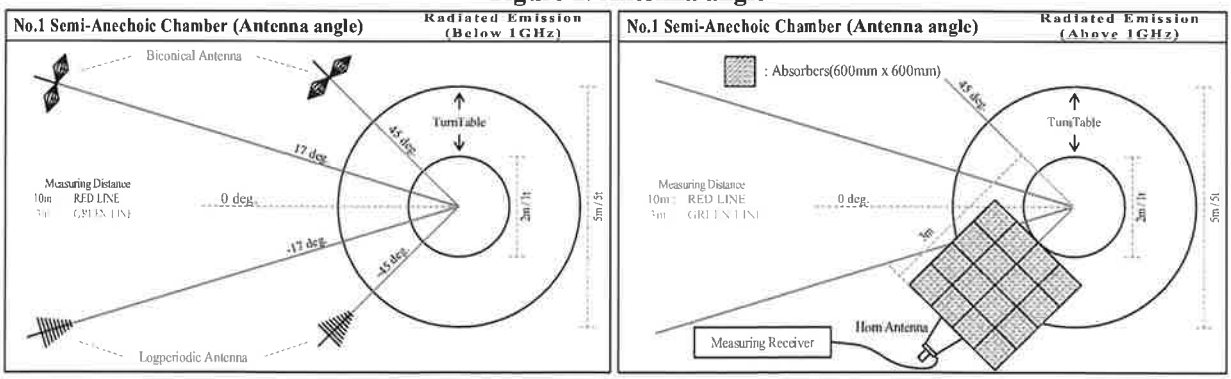
6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on a semi anechoic chamber with a ground plane and at a distance of 3m. Measurements were performed with quasi-peak detector. 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 both vertical and horizontal antenna polarization. The radiated emission measurements were made with the following detection of the test receiver.

		30-1000 MHz (Test receiver)	1000-2000 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.

Figure 1. Antenna angle



6.5 Results

Summary of the test results : Pass
Refer to APPENDIX 2

Contents of APPENDIXES

APPENDIX 1: Photographs of test setup

Conducted emission
Radiated emission

APPENDIX 2: EMI test data

Conducted emission
Radiated emission

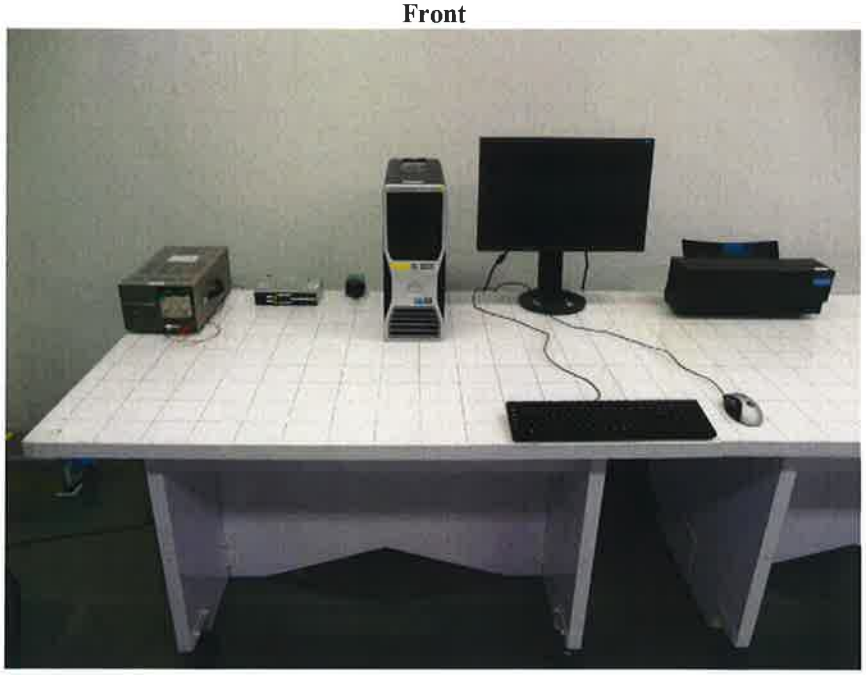
APPENDIX 3: Test instruments

Test instruments

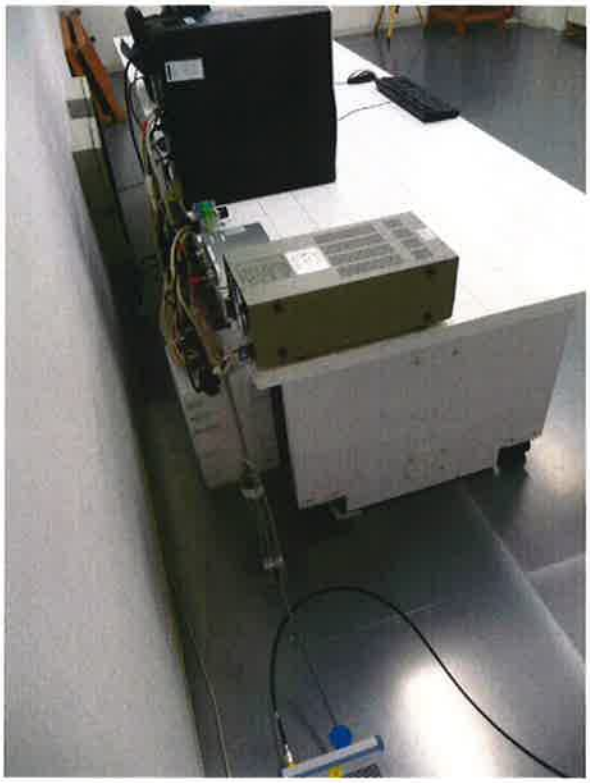
APPENDIX 1: Photographs of test setup

Conducted emission

Front



Side



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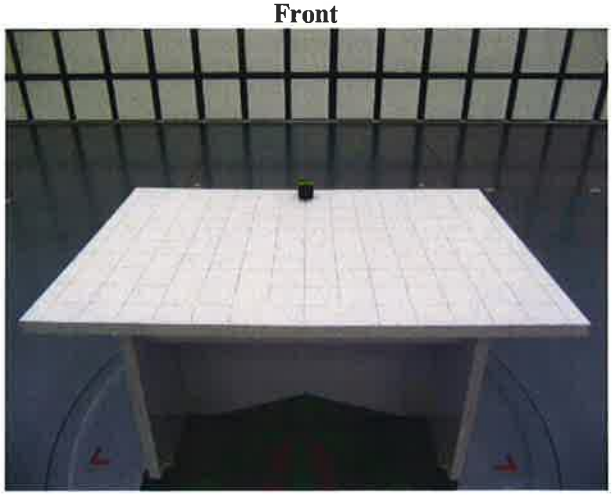
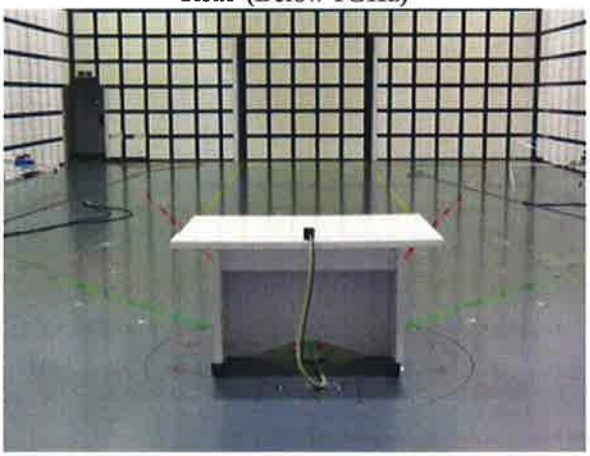
Radiated emission

Front



Rear (Below 1GHz)



Rear (Above 1GHz)

Under the turn table

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APPENDIX 2: EMI test data

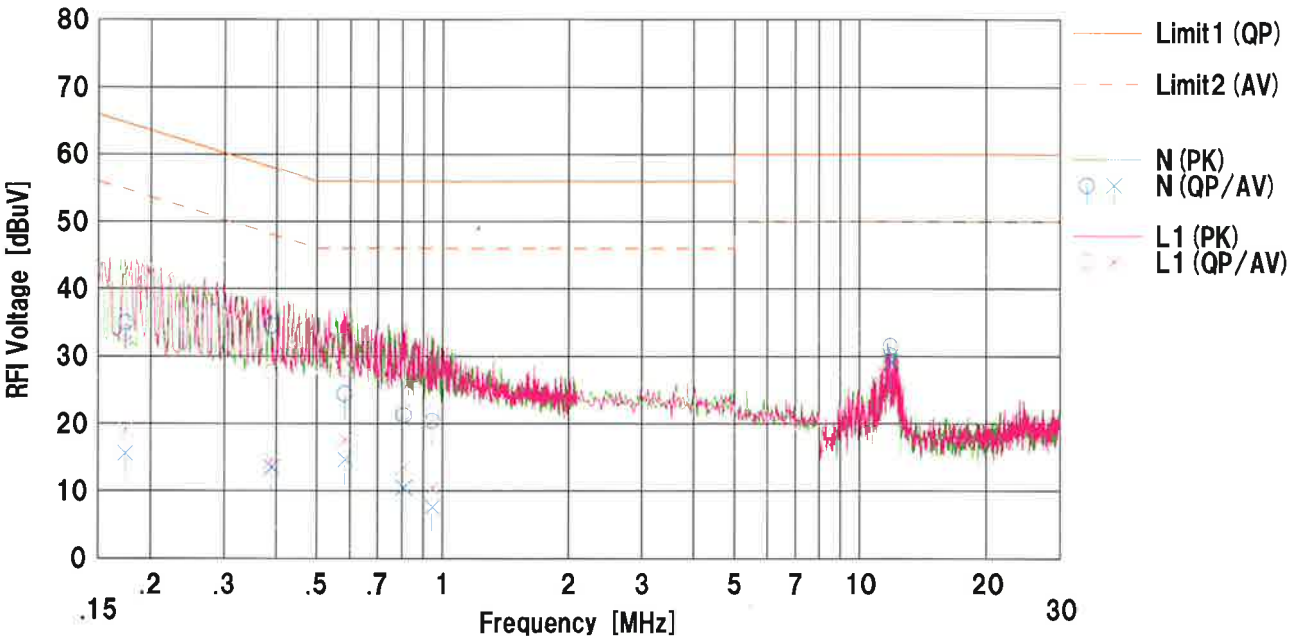
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.1 Shielded Room
Date : 2013/03/21

Company	: JAI Corporation	Mode	: Normal
Kind of EUT	: C-MOS Camera	Report No.	: 10006854S-B
Model No.	: SP-5000M-MCL	Power	: DC12V (AC120V/60Hz with PE)
Serial No.	: β2 000007	Temp./Humi.	: 23deg.C/42%RH
Remarks	: -		

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

Engineer : Tomochika Sato



No.	Freq.	Reading <QP>	Reading <AV>	C.Fac	Results <QP>	Results <AV>	Limit <QP>	Limit <AV>	Margin <QP>	Margin <AV>	Phase	Comment
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.17400	22.4	3.0	12.6	35.0	15.6	64.7	54.7	29.7	39.1	N	
2	0.39000	22.0	1.0	12.6	34.6	13.6	58.0	48.0	23.4	34.4	N	
3	0.58507	11.8	2.1	12.6	24.4	14.7	56.0	46.0	31.6	31.3	N	
4	0.81141	8.6	-2.1	12.6	21.2	10.5	56.0	46.0	34.8	35.5	N	
5	0.94779	7.8	-4.9	12.6	20.4	7.7	56.0	46.0	35.6	38.3	N	
6	11.86780	17.8	15.5	13.6	31.4	29.1	60.0	50.0	28.6	20.9	N	
7	0.17383	20.8	6.5	12.6	33.4	19.1	64.7	54.7	31.3	35.6	L1	
8	0.38955	15.0	2.0	12.6	27.6	14.6	58.0	48.0	30.4	33.4	L1	
9	0.58507	15.4	5.0	12.6	28.0	17.6	56.0	46.0	28.0	28.4	L1	
10	0.81141	9.2	1.0	12.6	21.8	13.6	56.0	46.0	34.2	32.4	L1	
11	0.94800	8.9	-2.1	12.6	21.5	10.5	56.0	46.0	34.5	35.5	L1	
12	11.87391	16.5	14.3	13.6	30.1	27.9	60.0	50.0	29.9	22.1	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 : 2013/03/19

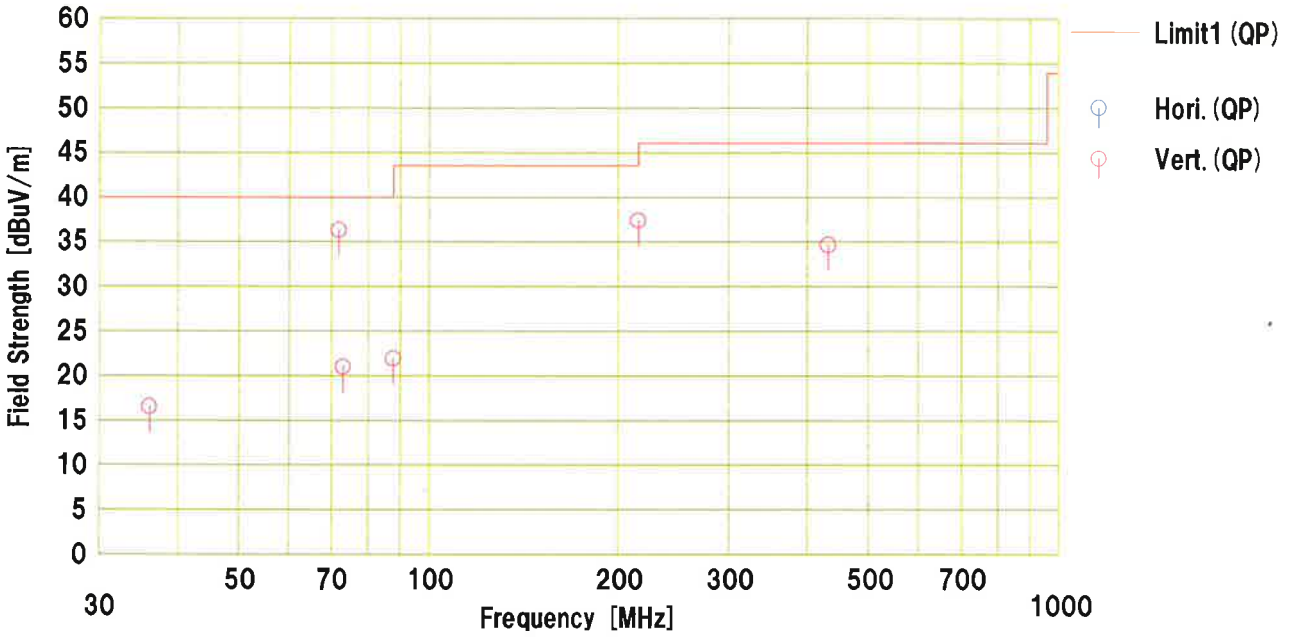
Company : JAI Corporation
Kind of EUT : C-MOS Camera
Model No. : SP-5000M-MCL
Serial No. : β2 000007

Mode : Normal
Report No. : 10006854S-B
Power : DC12V
Temp./Humi. : 20deg.C / 55%RH

Remarks : -

Limit1 : FCC 15B Class B (3m)

Engineer : Yohsuke Matsuzawa



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	36.108	25.3	16.1	7.0	31.8	-0.1	16.5	40.0	23.5	Vert.	100	156	BC	
2	72.001	54.1	6.5	7.6	31.8	-0.1	36.3	40.0	3.7	Vert.	100	272	BC	
3	73.299	38.7	6.5	7.6	31.8	0.0	21.0	40.0	19.0	Vert.	100	284	BC	
4	87.989	37.6	7.9	7.8	31.8	0.4	21.9	40.0	18.1	Vert.	100	323	BC	
5	215.998	43.0	16.8	9.4	31.8	0.0	37.4	43.5	6.1	Vert.	102	323	BC	
6	432.004	42.0	16.6	7.9	31.9	0.0	34.6	46.0	11.4	Vert.	100	152	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 SHA**: Horn

DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.1 Semi-Anechoic Chamber
Date : 2013/03/21

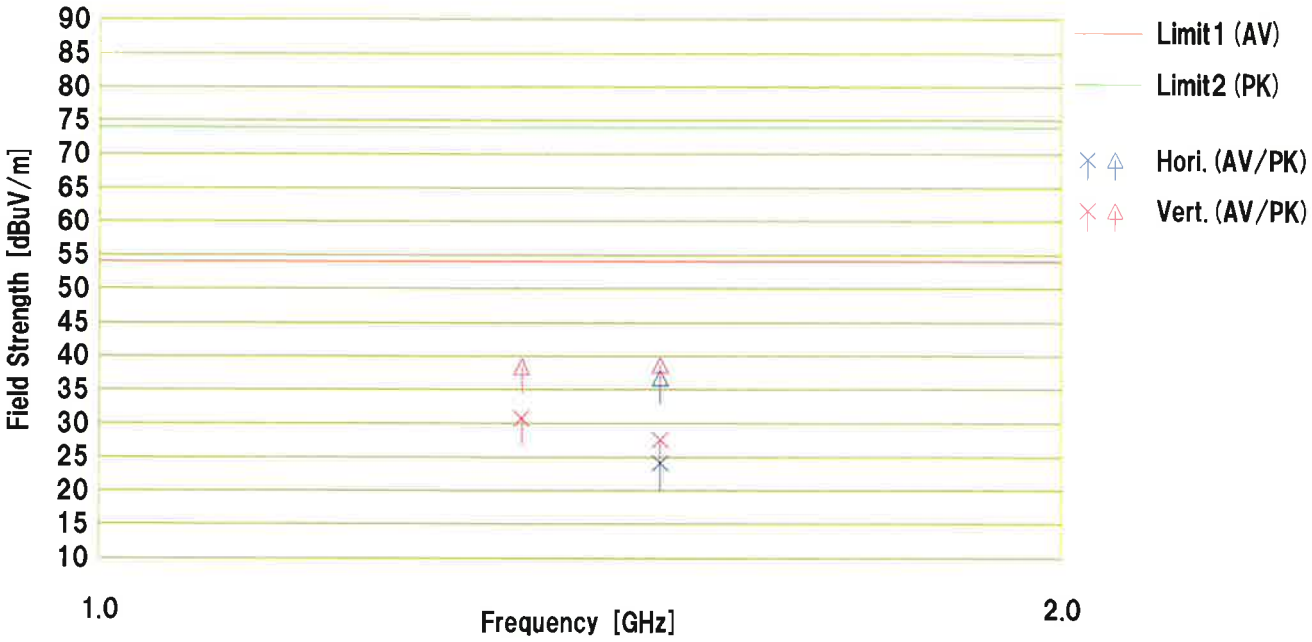
Company : JAI Corporation
Kind of EUT : C-MOS Camera
Model No. : SP-5000M-MCL
Serial No. : β2 000007

Mode : Normal
Report No. : 10006854S-B
Power : DC12V
Temp./Humi. : 22deg.C/47%RH

Remarks : -

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

Engineer : Tomochika Sato



No.	Freq.	Reading		Ant.Fac	Loss	Gain	Result		Limit		Margin		Pola.	Height	Angle	Ant. Type	Comment
		<AV>	<PK>				<AV>	<PK>	<AV>	<PK>	<AV>	<PK>					
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	[H/V]	[cm]	[deg]		
1	1583.996	36.3	48.9	25.4	3.2	40.8	24.1	36.7	53.9	73.9	29.8	37.2	Hori.	100	12	SHA01	
2	1440.004	43.5	51.2	25.0	3.0	40.8	30.7	38.4	53.9	73.9	23.2	35.5	Vert.	100	219	SHA01	
3	1584.004	39.7	50.9	25.4	3.2	40.8	27.5	38.7	53.9	73.9	26.4	35.2	Vert.	100	200	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 SHA**: Horn

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	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