EMI TEST REPORT

Test Report No.:	FCN21006
Applicant:	PRIMETECH ENGINEERING CORP.
Address:	Koishikawadaikoku Bldg.3F,1-3-25,Koishikawa,Bunkyo-ku, Tokyo 112-0002,Japan
Equipment under test:	InGaAs camera PXG130S
Test date:	July 27, 2021
Regulations applied:	FCC Part 15.107 (2020.10) Class A FCC Part 15.109 (2020.10) Class A
Test method used:	ANSI C63.4-2014 including C63.4a-2017
Test result:	Pass
Modification during test:	No

Test site: e-OHTAMA, LTD. NAKAI EMC Center
Address: 456 Sakai, Nakai-machi, Ashigarakami-gun, Kanagawa, 259-0157 Japan
TEL: +81-465-87-2793 FAX: +81-465-81-5938

Verified by: Katsuo Terai
K. Terai Manager

Approved date: Aug. 24, 2021 Approved by: R. Hoshi
R. Hoshi Manager

Notes
- This test report is related only to the equipment described in the cover page.
- This report must not be reproduced in part without written permission by e-OHTAMA, LTD.
- The test results are obtained with test facilities which are traceable to national standards and/or international standards.

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1. Equipment under test (EUT)

1.1 Equipment rating

Model/Type	Equipment name	Manufacturer	Power supply rating
PXG130S	InGaAs camera	PRIMETECH ENGINEERING CORP.	DC12 V
UA310-1210	AC Adapter	UNIFIVE Co., Ltd.	AC100 – 240 V 50/60 Hz, 1 Φ

1.2 Condition

Condition	Preproduction sample

1.3 Receipt date

Receipt date	July 27, 2021

1.4 Sampling

Sampling of the equipment	The equipment was selected by the applicant therefore the test site has not sampling.

2. Test conditions

The information in this clause is based on the application from the applicant.

2.1 Mode of operation

Mode of operation	Video shooting mode ・Data bit width 16bit, Framerate 25Hz ・Number of pixels : 1300,000 pixels ・resolution : SXGA 1280 × 1024
Program name / Version	pia / 64.17

2.2 Measurement arrangements of EUT

Intended operational arrangement	Table-top, Floor-standing, Rack installation, Ceiling, On hand, Tripod fixed, Device built-in
Measurement arrangement	Table-top

2.3 Deviation from the test method

Contents of deviation	No

2.4 Submitted document

Submitted document	Appendix 3 Family model

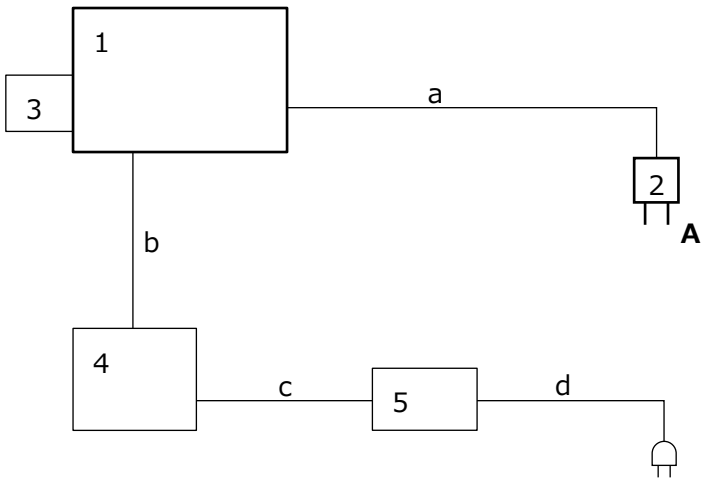
3. Summary of test results

Conducted emission					
Test contents	The port with the EUT	Operator	Test site	Result	Remarks
Mains power port	Yes	S. Nagashima	No. 3 Site	Pass	
Radiated emission					
Test contents	The port with the EUT	Operator	Test site	Result	Remarks
Radiated emission (Up to 1 GHz)	Yes	S. Nagashima	No. 3 Site	Pass	
Radiated emission (Above 1 GHz)	Yes	S. Nagashima	No. 3 Site	Pass	

4. Test configuration

The test of this report was executed that takes into consideration risks in the typical configurations by the applicant.
The all equipment and cables described in the test configuration were provided by the applicant.

4.1 System diagram



A: Test point

Number in figure corresponds to No. in clause 4.2 and clause 4.3.

4.2 Equipment list of test configuration

No.	EUT	Model/Type	Equipment name	Ser. No.	FCC ID	Manufacturer	Input voltage			Remarks
							V	Hz	Φ	
1	○	PXG130S	InGaAs camera	0001	—	PRIMETECH ENGINEERING CORP.	DC12	—	—	
2	○	UA310-1210	AC Adapter	L10-0518419	—	UNIFIVE Co., Ltd.	AC120	60	1	
3		C1614A	CCTV Lens	—	—	RICOH IMAGING COMPANY, LTD.	—	—	—	
4		P1G6MPBW	Note PC	20113916H	DoC	Dynabook Inc.	DC5	—	—	
5		PA5177U-1ACA	AC ADAPTER	JZ2525278GGD	DoC	Dynabook Inc.	AC100	50	1	

4.3 Cable list

No.	Connected from (port name) — to (port name)	Cable name	Length (m)	Qty.	Connector	Shielded	Remarks
a	1 — 2	DC cable	3.0	1	Plastic	No	
b	1 — 4	Ethernet cable	5.0	1	Metal	Yes	STP Cat. 6
c	4 — 5	DC cable	1.8	1	Plastic	No	
d	5 — AC100 V	AC cable	0.4	1	Plastic	No	

5. EMI test (conducted emission, radiated emission)

5.1 Test specifications

Regulations applied	FCC Part 15.107 (2020.10) Class A
	FCC Part 15.109 (2020.10) Class A
Test method used	ANSI C63.4-2014 including C63.4a-2017

Test date		Jul. 27, 2021
Environment	Temperature	25 °C
	Relative humidity	62 %RH
	Atmospheric pressure	982 hPa

EUT's highest internal frequency (*F*x):		297 MHz (Application by the applicant)
Highest fundamental frequency generated or used within the EUT or highest frequency at which it operates		Highest measured frequency
	*F*x ≤ 108 MHz	1 GHz
○	108 MHz < *F*x ≤ 500 MHz	2 GHz
	500 MHz < *F*x ≤ 1000 MHz	5 GHz
	*F*x > 1 GHz or *F*x is unknown.	5 × *F*x up to a maximum of 40 GHz Highest measured frequency: —

	Conducted emission (Mains power port)	Radiated emission at frequencies up to 1 GHz	Radiated emission at frequencies above 1 GHz
Measurement facility	SAC	SAC	FSOATS (SAC with RF absorber on the RGP)
Measurement frequency range	150 kHz – 30 MHz (LISN)	30 MHz – 300 MHz (Biconical antenna)	1 GHz – 2 GHz (Horn antenna)
		300 MHz – 1 GHz (LPDA antenna)	
Actual measured distance	—	10 m	4.4 m (The result is converted into the level in the distance of 3 m.)
Antenna height scan range	—	1 m – 4 m	1 m – 4 m
EMI receiver detection mode	Average mode: CISPR-Ave 9 kHz (B_6)	Quasi peak mode: QP 120 kHz (B_6)	Average mode: CISPR-Ave 1 MHz (B_{imp})
	Quasi peak mode: QP 9 kHz (B_6)		Peak mode: Peak 1 MHz (B_{imp})

5.2 Test procedure

1	**Measurement of wide range frequencies using spectrum analyzer** • Spectrum analyzer settings were optimized considering final measurement. • Confirming the measurement instruments were not saturation by overload. • Determine the cable arrangement giving the maximum emission level by the arrangement of the EUT, the arrangement of the local AE and the placement of cables within the range of typical to attempt varied.
2	**Selection of the frequencies** • The frequencies showing high noise levels were chosen from the data on spectrum analyzer.
3	**Measurement by EMI receiver for selected frequencies** • EMI receiver settings (IF bandwidth and detection mode) were in accordance with standards. • Confirming the measurement instruments were not saturation by overload. • The measured AV level is CISPR-Average of CISPR 16-1-1:2010. • Radiated emission was measured at maximum radiation point obtained by operating the turn table and the antenna mast.
4	**Adjusting the angle of the antenna (above 1 GHz)** • In the measurement above 1 GHz, if the antenna height exceeds the EUT height was measured by adjusting the angle of the antenna to the direction of the EUT.

5.3 Calculation of measurement results

Measurement results are calculated by EMI measurement software as shown below sub-clause. The values of the factor and the cable loss at frequencies not selected at calibration are calculated by natural spline interpolation of the third degree.

5.3.1 Conducted emission

Mains power port
Measurement result = Measurement (receiver reading) + Correction factor (c.f.) Correction factor (c.f.) = Factor of LISN + Cable loss

5.3.2 Radiated emission

Up to 1 GHz
Measurement result = Measurement (receiver reading) + Correction factor (c.f.) Correction factor (c.f.) = Antenna factor + Cable loss − Preamp gain
Above 1 GHz
Measurement result = Measurement (receiver reading) + Correction factor (c.f.) Correction factor (c.f.) = Antenna factor + Cable loss − Preamp gain + Factor of distance [20 log (Actual measurement distance / 3.0 m)]

5.4 Uncertainty of EMI measurement (MIU)

The actual test results may contain measurement uncertainty and do not mean to assure complete repeatability and reproducibility. Our lab uses the CISPR International Standard CISPR 16-4-2 to calculate the measurement uncertainty as shown below. Our lab measurement uncertainty (MIU) coverage factor k=2, approximately 95 % confidence level:

Measurement contents	Measurement specification			Uncertainty
Conducted emission	9 kHz – 30 MHz (LISN)	Mains power port	—	3.34 dB
Radiated emission	30 MHz – 300 MHz (Biconical antenna)	10 m	Horizontal	3.78 dB
			Vertical	3.75 dB
	300 MHz – 1000 MHz (LPDA antenna)	10 m	Horizontal	3.84 dB
			Vertical	3.84 dB
	1 GHz – 6 GHz (Horn antenna)	3 m (With floor absorber)	Horizontal	5.18 dB
			Vertical	
	6 GHz – 18 GHz (Horn antenna)		Horizontal	4.99 dB
			Vertical	
	18 GHz – 26.5 GHz (Horn antenna)		Horizontal	5.36 dB
			Vertical	
	26.5 GHz – 40 GHz (Horn antenna)		Horizontal	5.49 dB
			Vertical	

5.5 Test results

Conducted emission

Test item	Test point	Minimum margin				Result
Mains power port	**A**	L1 Phase	0.306 MHz	16.2 dB	(AV)	Pass

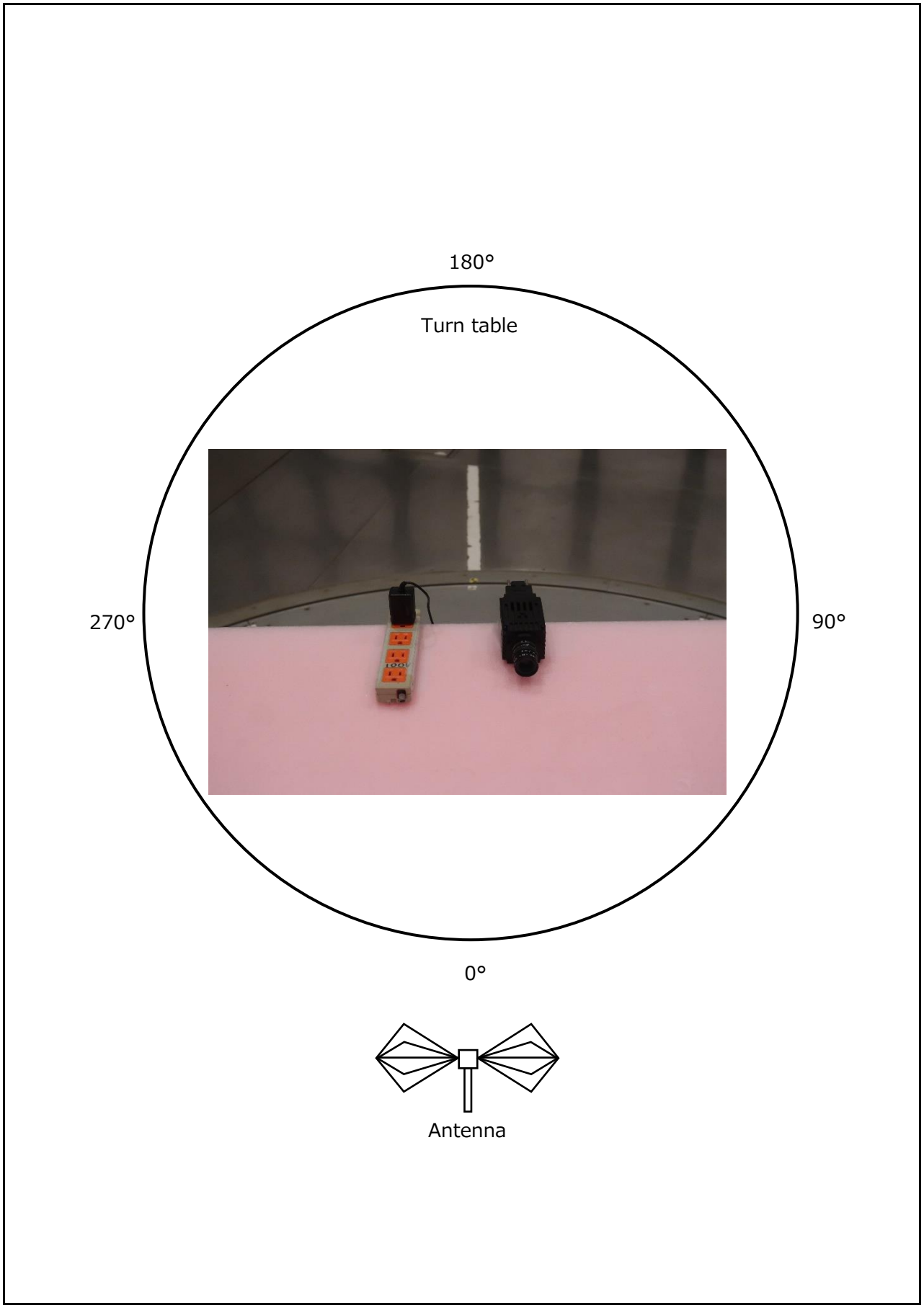
Radiated emission

Test item	Minimum margin				Result
Radiated emission (Up to 1 GHz)	Horizontal	874.990 MHz	7.6 dB	(QP)	Pass
Radiated emission (Above 1 GHz)	Horizontal	1000.001 MHz	21.3 dB	(AV)	Pass

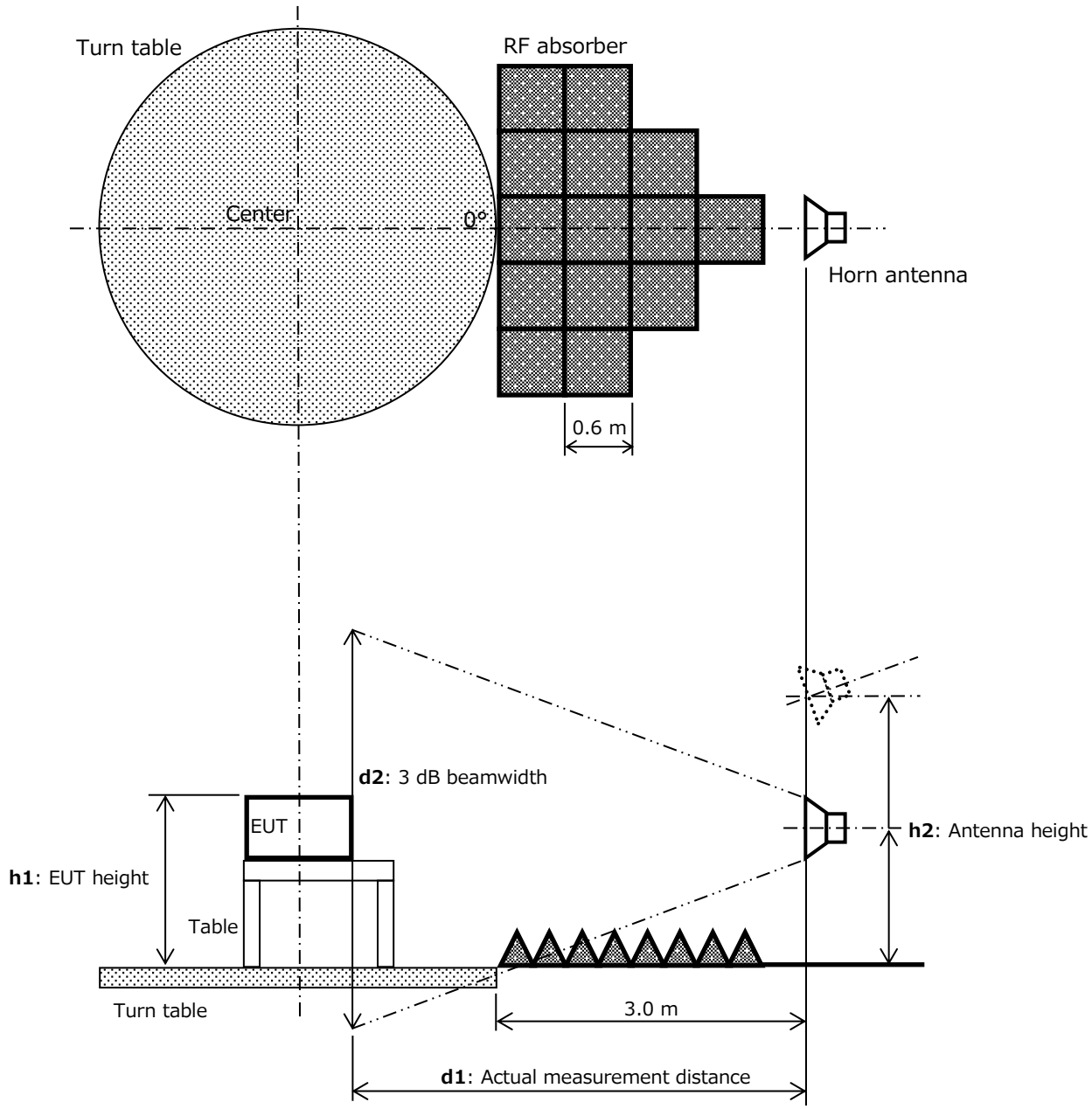
Refer to appendix 1 for details of the test result.

Note 1: The phase of mains power port is temporarily defined for measurement.

5.6 Angle of EUT for radiated emission



5.7 Test layout of radiated emission (Above 1 GHz)



h1	EUT height	0.87 m
h2	Antenna height (scan range)	1.0 m – 4.0 m
d1	Actual measurement distance	4.4 m
d2	3 dB beamwidth at 1 GHz – 6 GHz d2 = 2 x d1 x tan (47° / 2)	3.8 m

6. List of measuring instruments

EMI test (conducted emission)

Instrument name	Type	Ser. No. (ID)	Manufacturer	Due date of calibration
Spectrum analyzer / receiver	ESCI	100418	Rohde & Schwarz	2022.02
AMN (LISN) (Measurement port)	ESH3-Z5	831887/015 (R&SR)	Rohde & Schwarz	2021.12
Attenuator	6810.01.A	(7018)	SUHNER	2021.08
Coax cable	3D-2W	(2073)	Kansai Tsushin Densen	2021.08
	5D-2W	(2041)	Kansai Tsushin Densen	2021.08
	TCF500DD4000	16G06010	TOKUDEN PROSELL	2021.08

EMI test (radiated emission / 30 MHz – 1 GHz)

Instrument name	Type	Ser. No. (ID)	Manufacturer	Due date of calibration
Spectrum analyzer / receiver	ESCI	100418	Rohde & Schwarz	2022.02
Biconical antenna	BBA9106	B-002	Schwarzbeck	2021.10
Log-periodic antenna	UHALP9108-A	0764	Schwarzbeck	2022.01
Preamplifier	8447F	2805A03043	Agilent Technology	2021.08
Coax cable (10 m)	SUCOFLEX106	2371/6	SUHNER	2021.08
	LHPX-10D	(2096)	Hitachi	2021.08
	SUCOFLEX106	8910/6	SUHNER	2021.08
	TCF500DD4000	16G06011	TOKUDEN PROSELL	2021.08
	TCF500DD2000	16G06014	TOKUDEN PROSELL	2021.08
Test site (Semi anechoic chamber)	FACT-10-QZ3.0 Standard Plus	ETS B Pink (No.3)	ETS LINDGREN	2022.05

EMI test (radiated emission / 1 GHz – 18 GHz)

Instrument name	Type	Ser. No. (ID)	Manufacturer	Due date of calibration
Spectrum analyzer / receiver	ESU40	100260	Rohde & Schwarz	2021.10
Horn antenna	3117	00081287 (H-ETS2)	ETS LINDGREN	2021.10
Preamplifier	8449B	3008A01298	Agilent Technology	2022.06
RF cable	TCF358FG5000	16Y07001	TOKUDEN PROSELL	2022.06
	TCF358FG300	13X24001		2022.06

Appendix 1 Test results

Conducted emission data (Mains power port)

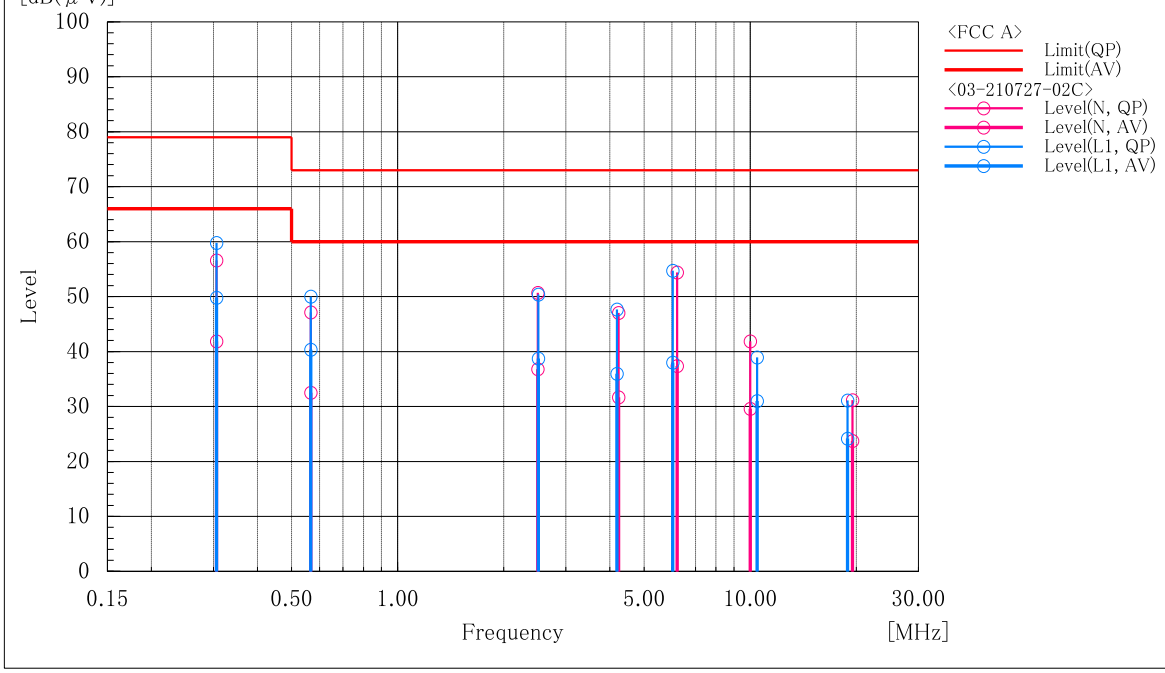
Test point **A**

e-OHTAMA, LTD.
NAKAI EMC Center

<<Conducted Emission>>

27 July,2021 15:26
03-210727-02C.ep9cedata

Order No.	: EM21046	Standard	: FCC Class A
Company	: PRIME TECH ENGINEERING CORP.	LISN	: R&SR
Model	: PXG130S	Input Power	: AC120 V / 60 Hz
Serial	: 0001	Temp/Humi	: 25 ℃ / 62 %RH
Condition	: Video Mode	Operator	: S.Nagashima



Final Result

--- N (QP) ---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB]	Result [dB(μV)]	Limit [dB(μV)]	Margin [dB]
1	0.306	46.2	10.4	56.6	79.0	22.4
2	0.567	36.7	10.4	47.1	73.0	25.9
3	2.497	40.1	10.6	50.7	73.0	22.3
4	4.232	36.2	10.8	47.0	73.0	26.0
5	6.206	43.5	10.9	54.4	73.0	18.6
6	10.002	30.8	11.1	41.9	73.0	31.1
7	19.517	19.6	11.6	31.2	73.0	41.8

--- N (AV) ---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB]	Result [dB(μV)]	Limit [dB(μV)]	Margin [dB]
1	0.306	31.5	10.4	41.9	66.0	24.1
2	0.567	22.1	10.4	32.5	60.0	27.5
3	2.497	26.2	10.6	36.8	60.0	23.2
4	4.232	20.9	10.8	31.7	60.0	28.3
5	6.206	26.5	10.9	37.4	60.0	22.6
6	10.002	18.5	11.1	29.6	60.0	30.4
7	19.517	12.1	11.6	23.7	60.0	36.3

--- L1 (QP) ---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB]	Result [dB(μV)]	Limit [dB(μV)]	Margin [dB]
1	0.306	49.4	10.4	59.8	79.0	19.2
2	0.567	39.6	10.4	50.0	73.0	23.0
3	2.507	39.6	10.7	50.3	73.0	22.7
4	4.192	36.8	10.8	47.6	73.0	25.4
5	6.031	43.8	10.9	54.7	73.0	18.3
6	10.471	27.6	11.3	38.9	73.0	34.1
7	18.907	19.4	11.7	31.1	73.0	41.9

--- L1 (AV) ---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB]	Result [dB(μV)]	Limit [dB(μV)]	Margin [dB]
1	0.306	39.4	10.4	49.8	66.0	16.2
2	0.567	30.0	10.4	40.4	60.0	19.6
3	2.507	28.0	10.7	38.7	60.0	21.3
4	4.192	25.2	10.8	36.0	60.0	24.0
5	6.031	27.1	10.9	38.0	60.0	22.0
6	10.471	19.7	11.3	31.0	60.0	29.0
7	18.907	12.5	11.7	24.2	60.0	35.8

Radiated emission data (Up to 1 GHz)

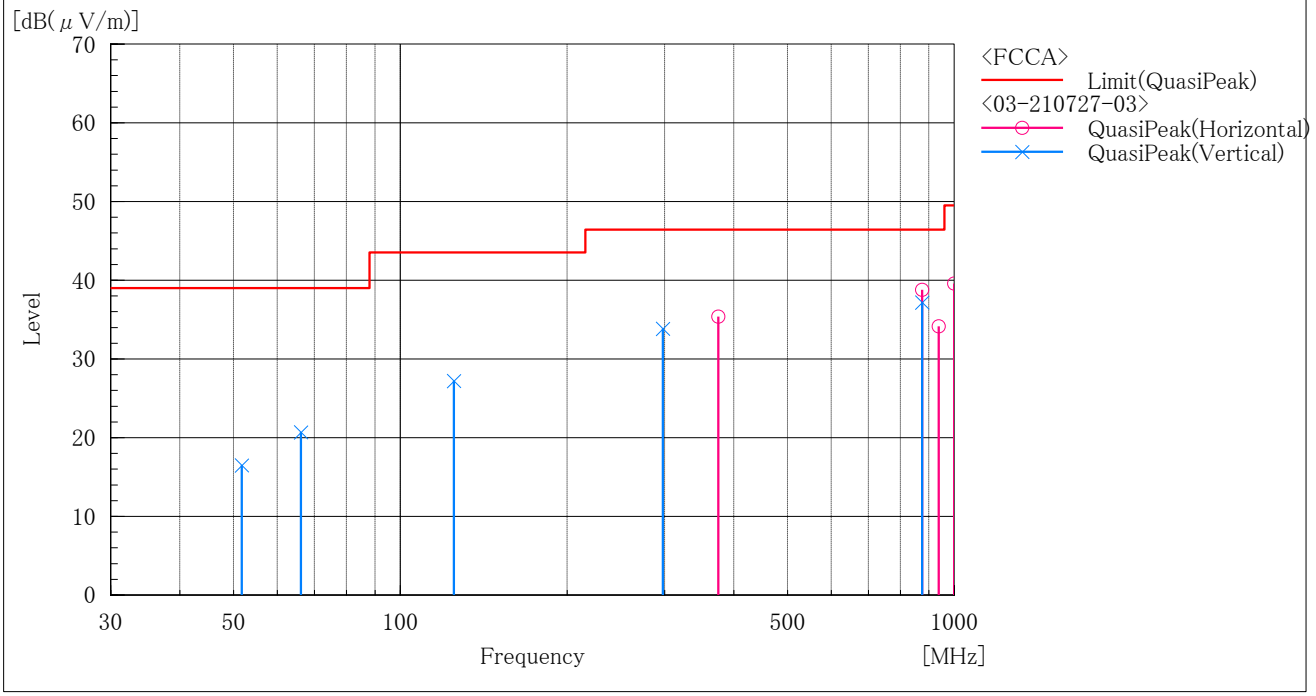
e-OHTAMA,LTD.
NAKAI EMC Center

<<Radiated Emission>>

27 July,2021 10:39
03-210727-03.dat

Order No. : EM21046
Company : PRIMETECH ENGINEERING CORP.
Model : PXG130S
Serial No. : 0001
Condition : Video Mode

Standard : FCC Part.15 Class A 10m
Remarks : Test No.03
Input Power : AC120 V / 60Hz
Temp/Humi : 25 ℃ / 62 %RH
Operator : S.Nagashima



Final Result

--- Horizontal Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	374.986	43.8	-8.4	35.4	46.4	11.0	256.2	80.0
2	874.990	36.8	2.0	38.8	46.4	7.6	119.1	57.5
3	937.505	31.5	2.6	34.1	46.4	12.3	120.9	0.0
4	999.999	36.9	2.7	39.6	49.5	9.9	273.6	310.3

--- Vertical Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	51.760	32.3	-15.8	16.5	39.0	22.5	100.0	235.7
2	66.198	40.3	-19.6	20.7	39.0	18.3	195.8	331.7
3	124.992	39.1	-11.9	27.2	43.5	16.3	100.0	270.0
4	297.983	37.7	-3.9	33.8	46.4	12.6	100.0	0.0
5	875.000	35.2	2.0	37.2	46.4	9.2	178.6	171.1

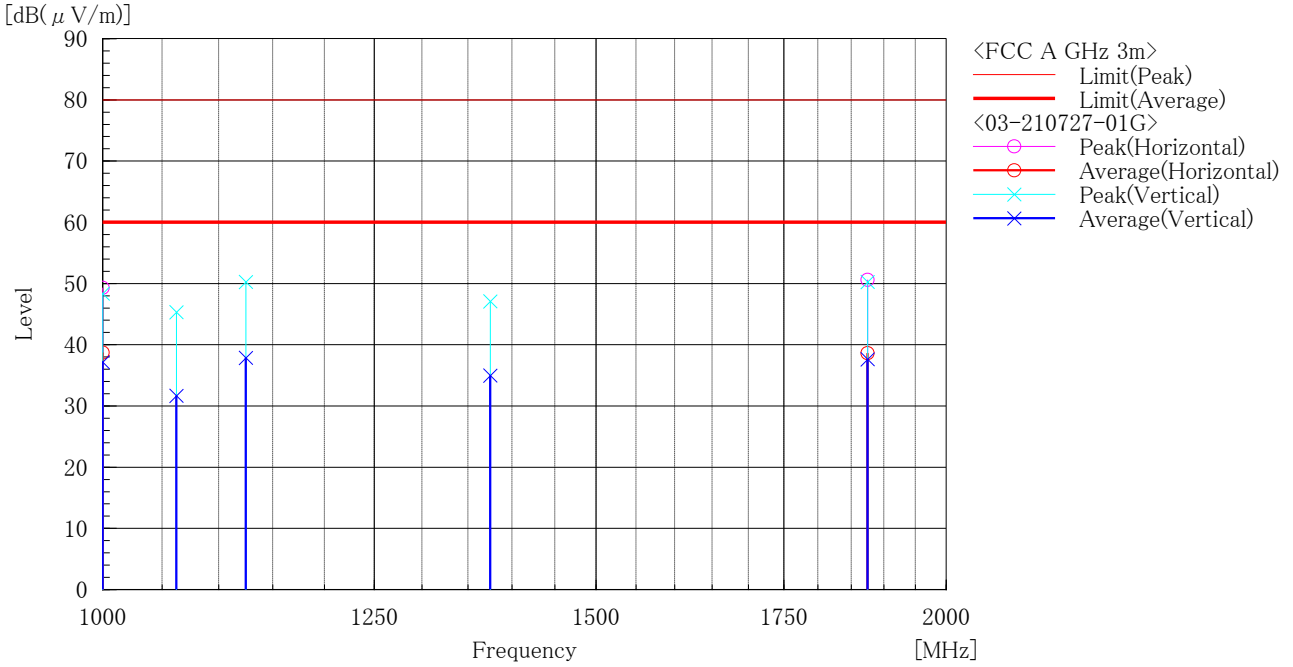
Radiated emission data (Above 1 GHz)

e-OHTAMA,LTD.
NAKAI EMC Center

<<Radiated Emission>>

27 July,2021 13:08
03-210727-01G.dat

Order No.	: EM21046	Standard	: FCC Class A GHz 3m
Company	: PRIMETECH ENGINEERING CORP.	Remarks	: Test No.01G
Model	: PXG130S	Input Power	: AC120 V / 60 Hz
Serial No.	: 0001	Temp/Humi	: 25 ℃ / 62%RH
Condition	: Video Mode	Operator	: S.Nagashima



Final Result

--- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	1000.001	51.8	-2.5	49.3	80.0	30.7	341.0	304.0
2	1874.976	48.9	1.7	50.6	80.0	29.4	100.0	244.8

--- Horizontal Polarization (CAV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	1000.001	41.2	-2.5	38.7	60.0	21.3	341.0	304.0
2	1874.976	36.9	1.7	38.6	60.0	21.4	100.0	244.8

--- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	1000.001	50.8	-2.5	48.3	80.0	31.7	211.3	204.1
2	1062.500	47.6	-2.3	45.3	80.0	34.7	100.0	145.8
3	1125.005	52.4	-2.1	50.3	80.0	29.7	100.0	200.2
4	1375.002	48.6	-1.5	47.1	80.0	32.9	100.0	335.5
5	1874.952	48.5	1.7	50.2	80.0	29.8	119.2	208.7

--- Vertical Polarization (CAV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	1000.001	39.7	-2.5	37.2	60.0	22.8	211.3	204.1
2	1062.500	34.0	-2.3	31.7	60.0	28.3	100.0	145.8
3	1125.005	40.0	-2.1	37.9	60.0	22.1	100.0	200.2
4	1375.002	36.5	-1.5	35.0	60.0	25.0	100.0	335.5
5	1874.952	35.9	1.7	37.6	60.0	22.4	119.2	208.7

Note: The measurement level (Result) of radiated emission is converted into the level in the distance of 3 m.

Appendix 3 Family model

	Type name difference			
	Hardware	Firmware	Number of pixels	resolution
PXG130S Tested model	Only the difference of CMOS Image Sensor. (IMX990-AABJ-C)	Set the difference in the number of pixels of CMOS Image Sensor. The parameters are different.	1300,000 pixels	SXGA 1280 × 1024
PXG030S Family model	Only the difference of CMOS Image Sensor. (IMX991-AABJ-C) IMX990 and IMX991 In the image output area with the same pixels. The electric circuit is the same with different sensors.		300,000 pixels	VGA 640 × 512
The information in this clause is based on the application from the applicant. The photograph of the board for each type name is shown on the next page.				