

EMI TEST REPORT

Test Report No.: FCN21007

Applicant: PRIMETECH ENGINEERING CORP.

Address: Koishikawadaikoku Bldg.3F,1-3-25,Koishikawa,Bunkyo-ku,
Tokyo 112-0002,Japan

Equipment under test: InGaAs camera
PXG130SP

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

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Verified by:

K. 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
PXG130SP	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
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1.3 Receipt date

Receipt date	July 27, 2021
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1.4 Sampling

Sampling of the equipment	The equipment was selected by the applicant therefore the test site has not sampling.
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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 •PID Temperature Control •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
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2.4 Submitted document

Submitted document	Appendix 3 Family model
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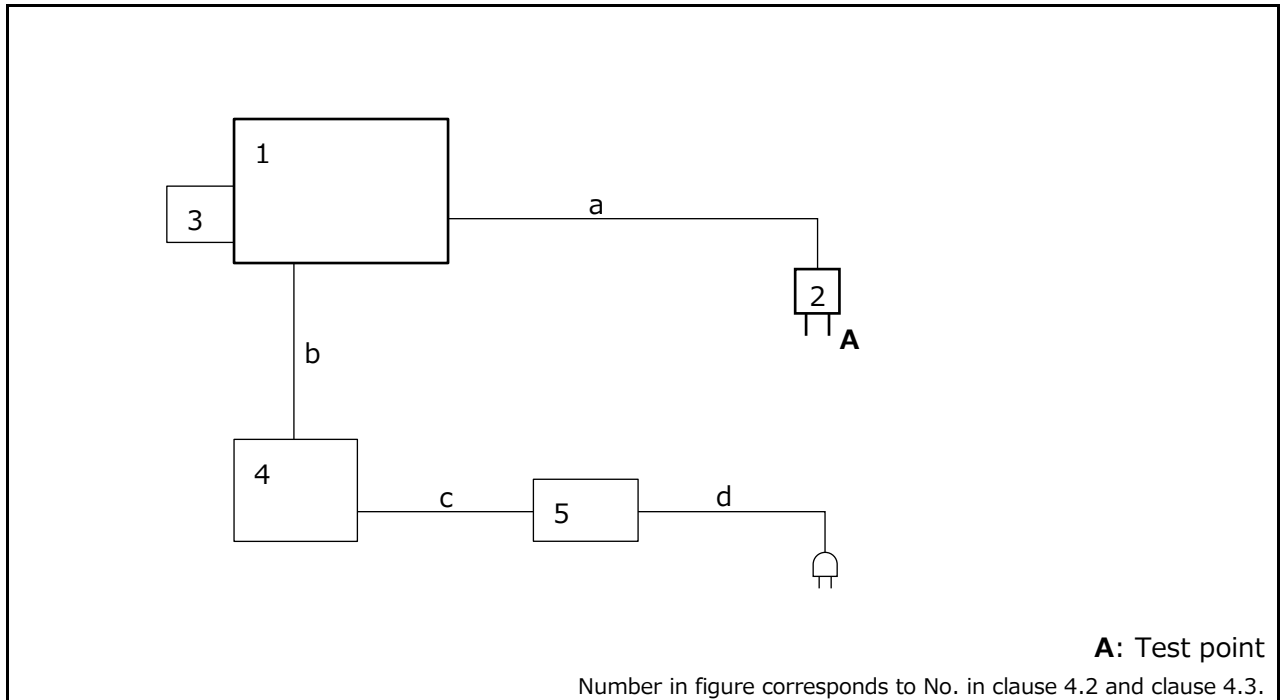
3. Summary of test results

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



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	○	PXG130SP	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
$F_x \leq 108$ MHz	1 GHz
○ 108 MHz $< F_x \leq 500$ MHz	2 GHz
500 MHz $< F_x \leq 1000$ MHz	5 GHz
$F_x > 1$ GHz or F_x is unknown.	$5 \times F_x$ 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) 300 MHz – 1 GHz (LPDA antenna)	1 GHz – 2 GHz (Horn 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 $[20 \log (\text{Actual measurement distance} / 3.0 \text{ m})]$

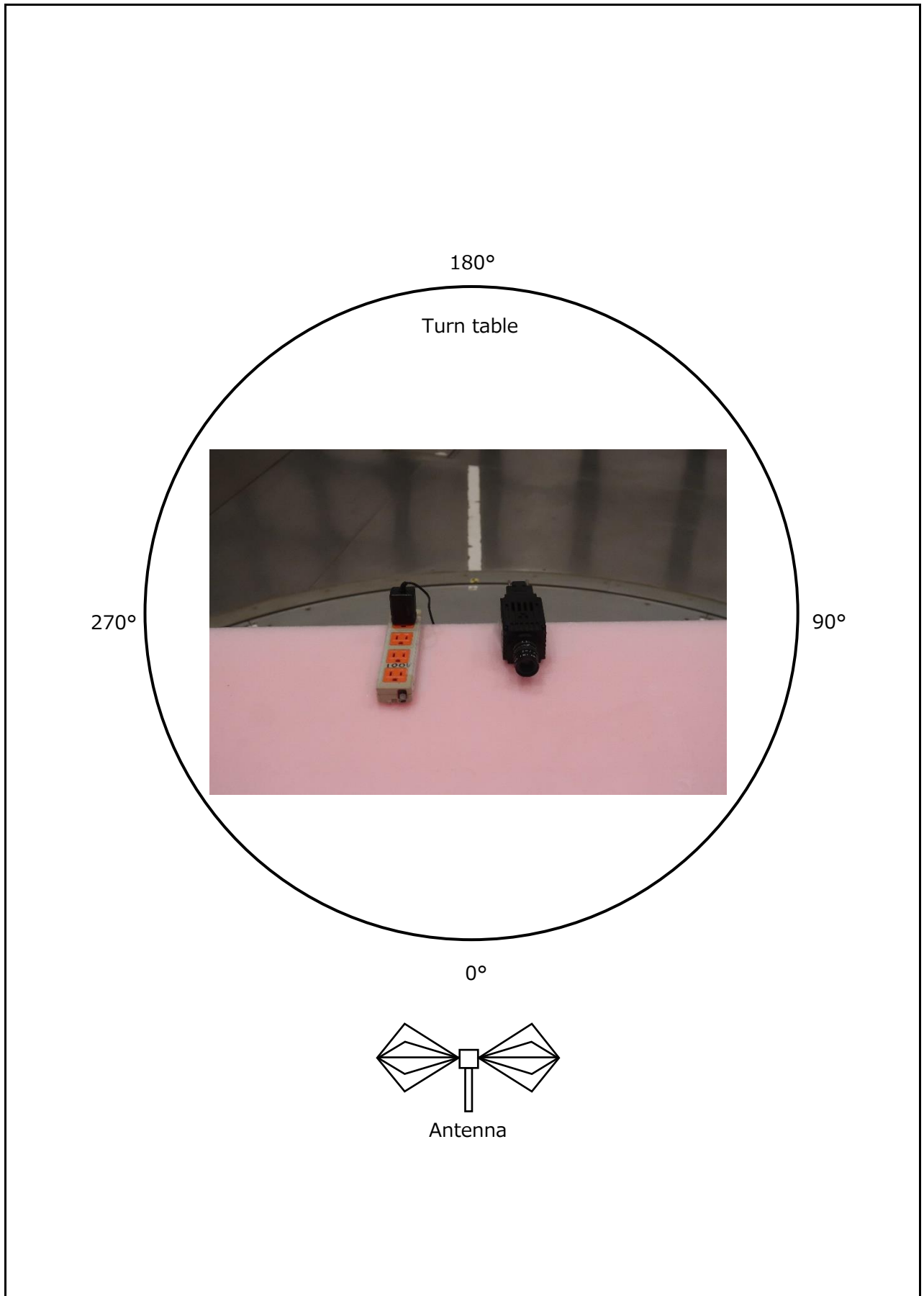
5.4 Uncertainty of EMI measurement (MIU)

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	

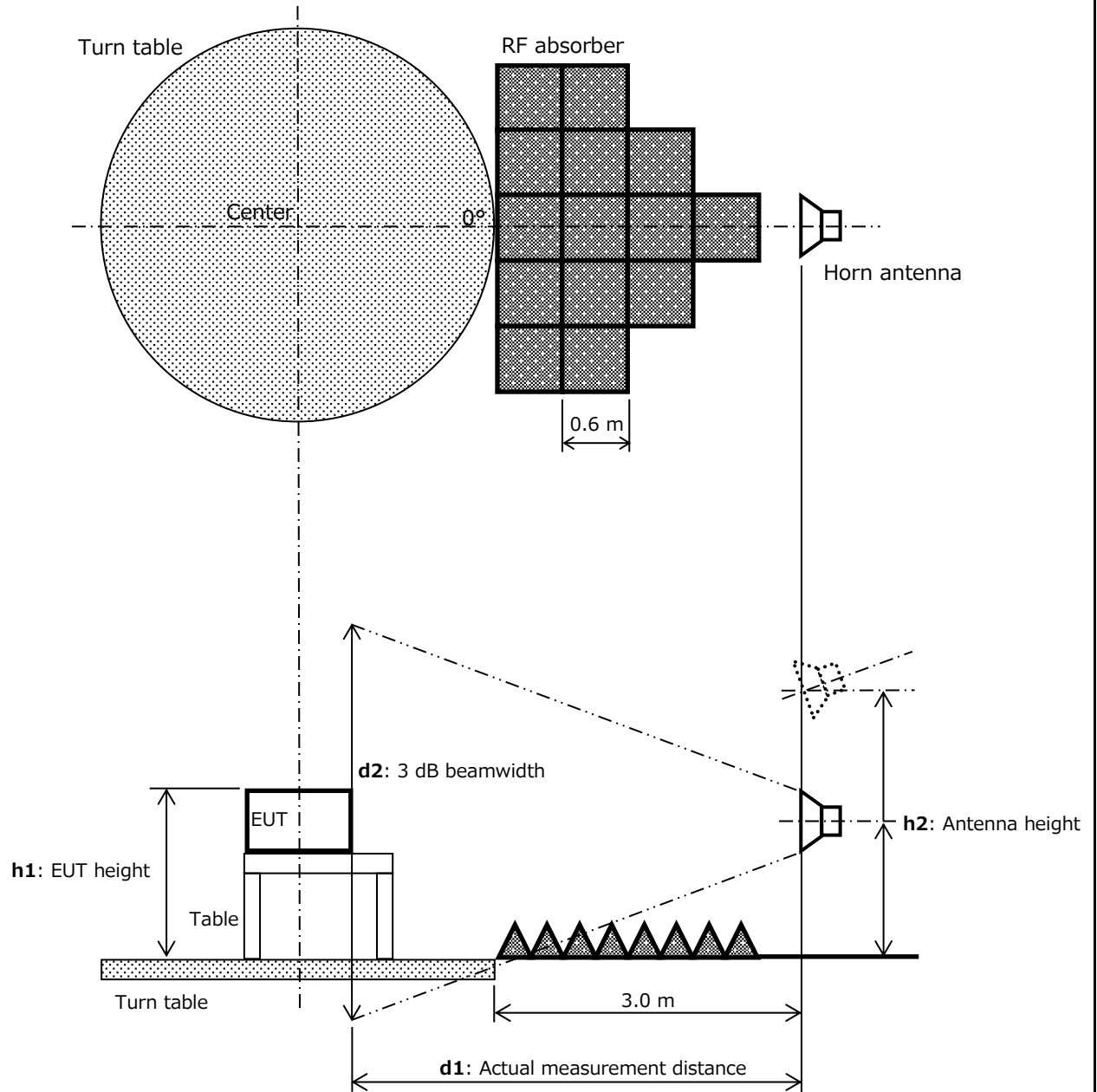
5.5 Test results

Conducted emission				
Test item	Test point	Minimum margin		Result
Mains power port	A	L1 Phase	5.978 MHz 15.9 dB (QP)	Pass
Radiated emission				
Test item		Minimum margin		Result
Radiated emission (Up to 1 GHz)		Horizontal	875.000 MHz 5.0 dB (QP)	Pass
Radiated emission (Above 1 GHz)		Vertical	1124.994 MHz 20.8 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 $d2 = 2 \times d1 \times \tan (47^\circ / 2)$	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

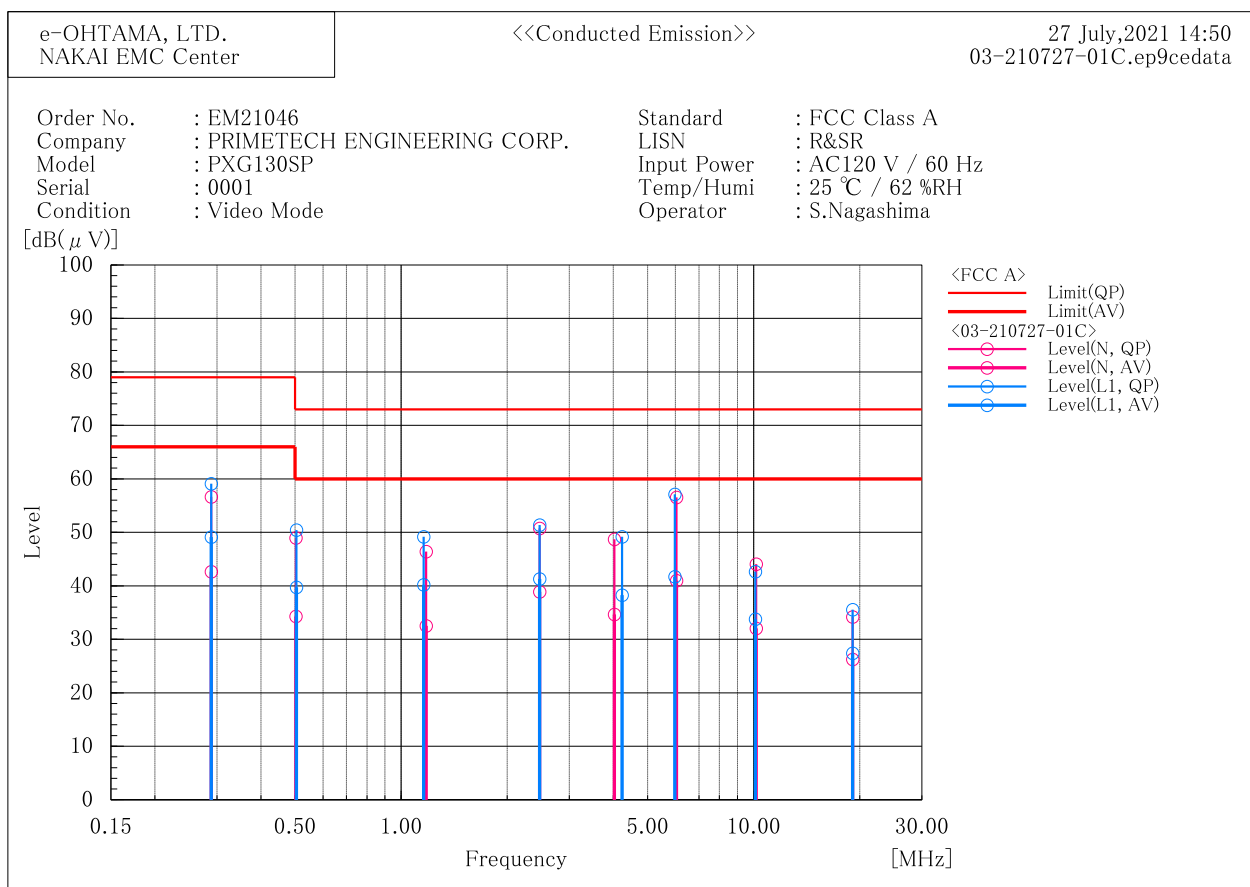
EMI test (radiated emission / 1 GHz – 18 GHz)

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



Final Result

--- N (QP) ---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f [dB]	Result [dB(μV)]	Limit [dB(μV)]	Margin [dB]
1	0.289	46.3	10.4	56.7	79.0	22.3
2	0.502	38.6	10.4	49.0	73.0	24.0
3	1.178	35.9	10.5	46.4	73.0	26.6
4	2.473	40.1	10.6	50.7	73.0	22.3
5	4.026	37.9	10.8	48.7	73.0	24.3
6	6.039	45.6	10.9	56.5	73.0	16.5
7	10.172	32.8	11.2	44.0	73.0	29.0
8	19.104	22.6	11.6	34.2	73.0	38.8

--- N (AV) ---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f [dB]	Result [dB(μV)]	Limit [dB(μV)]	Margin [dB]
1	0.289	32.3	10.4	42.7	66.0	23.3
2	0.502	23.9	10.4	34.3	60.0	25.7
3	1.178	22.0	10.5	32.5	60.0	27.5
4	2.473	28.3	10.6	38.9	60.0	21.1
5	4.026	23.9	10.8	34.7	60.0	25.3
6	6.039	30.1	10.9	41.0	60.0	19.0
7	10.172	20.8	11.2	32.0	60.0	28.0
8	19.104	14.7	11.6	26.3	60.0	33.7

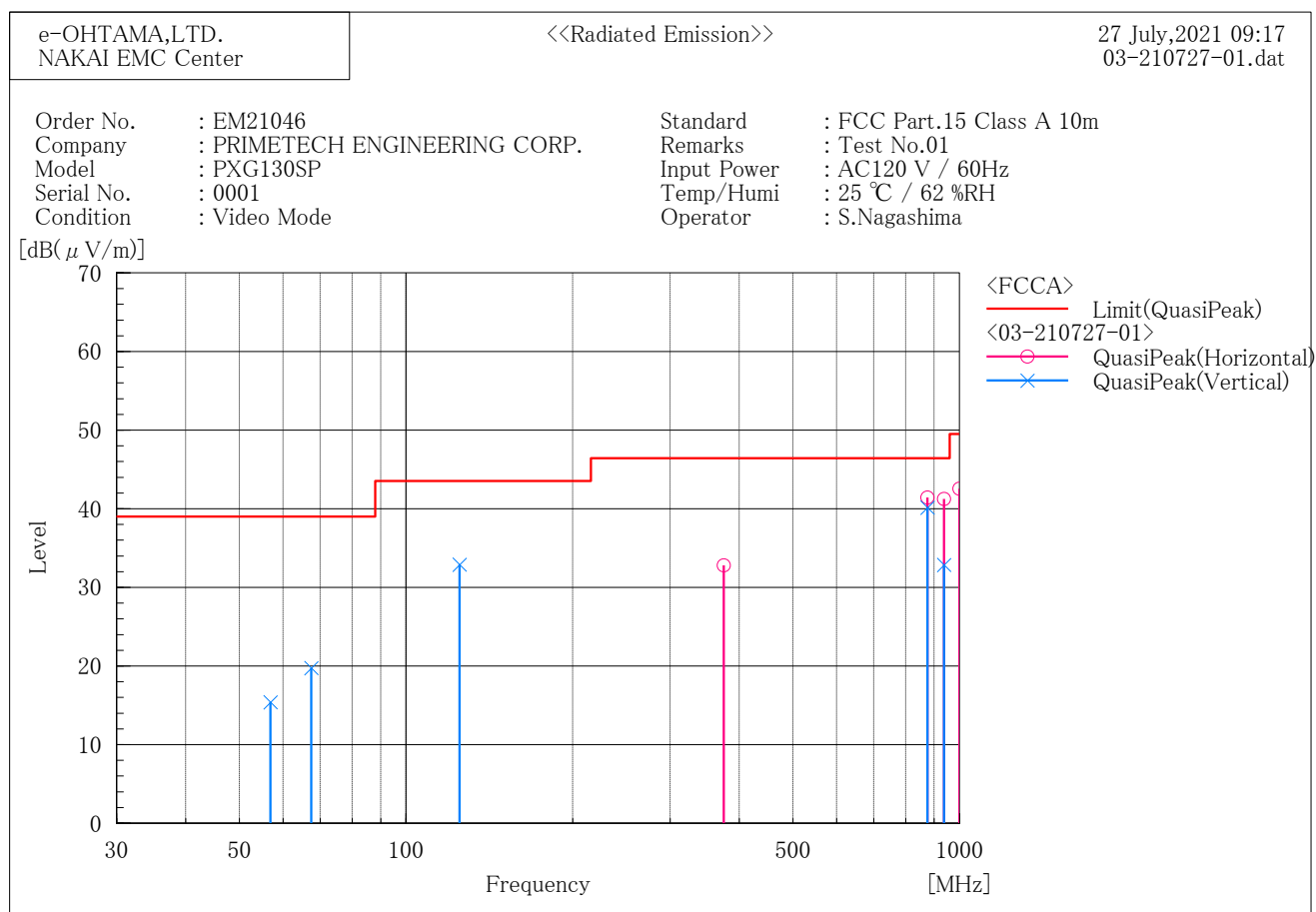
--- L1 (QP) ---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f [dB]	Result [dB(μV)]	Limit [dB(μV)]	Margin [dB]
1	0.289	48.7	10.4	59.1	79.0	19.9
2	0.504	40.0	10.4	50.4	73.0	22.6
3	1.159	38.7	10.5	49.2	73.0	23.8
4	2.472	40.7	10.7	51.4	73.0	21.6
5	4.234	38.4	10.8	49.2	73.0	23.8
6	5.978	46.2	10.9	57.1	73.0	15.9
7	10.109	31.5	11.2	42.7	73.0	30.3
8	19.098	23.8	11.7	35.5	73.0	37.5

--- L1 (AV) ---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f [dB]	Result [dB(μV)]	Limit [dB(μV)]	Margin [dB]
1	0.289	38.7	10.4	49.1	66.0	16.9
2	0.504	29.3	10.4	39.7	60.0	20.3
3	1.159	29.7	10.5	40.2	60.0	19.8
4	2.472	30.6	10.7	41.3	60.0	18.7
5	4.234	27.4	10.8	38.2	60.0	21.8
6	5.978	30.8	10.9	41.7	60.0	18.3
7	10.109	22.5	11.2	33.7	60.0	26.3
8	19.098	15.7	11.7	27.4	60.0	32.6

Radiated emission data (Up to 1 GHz)



Final Result

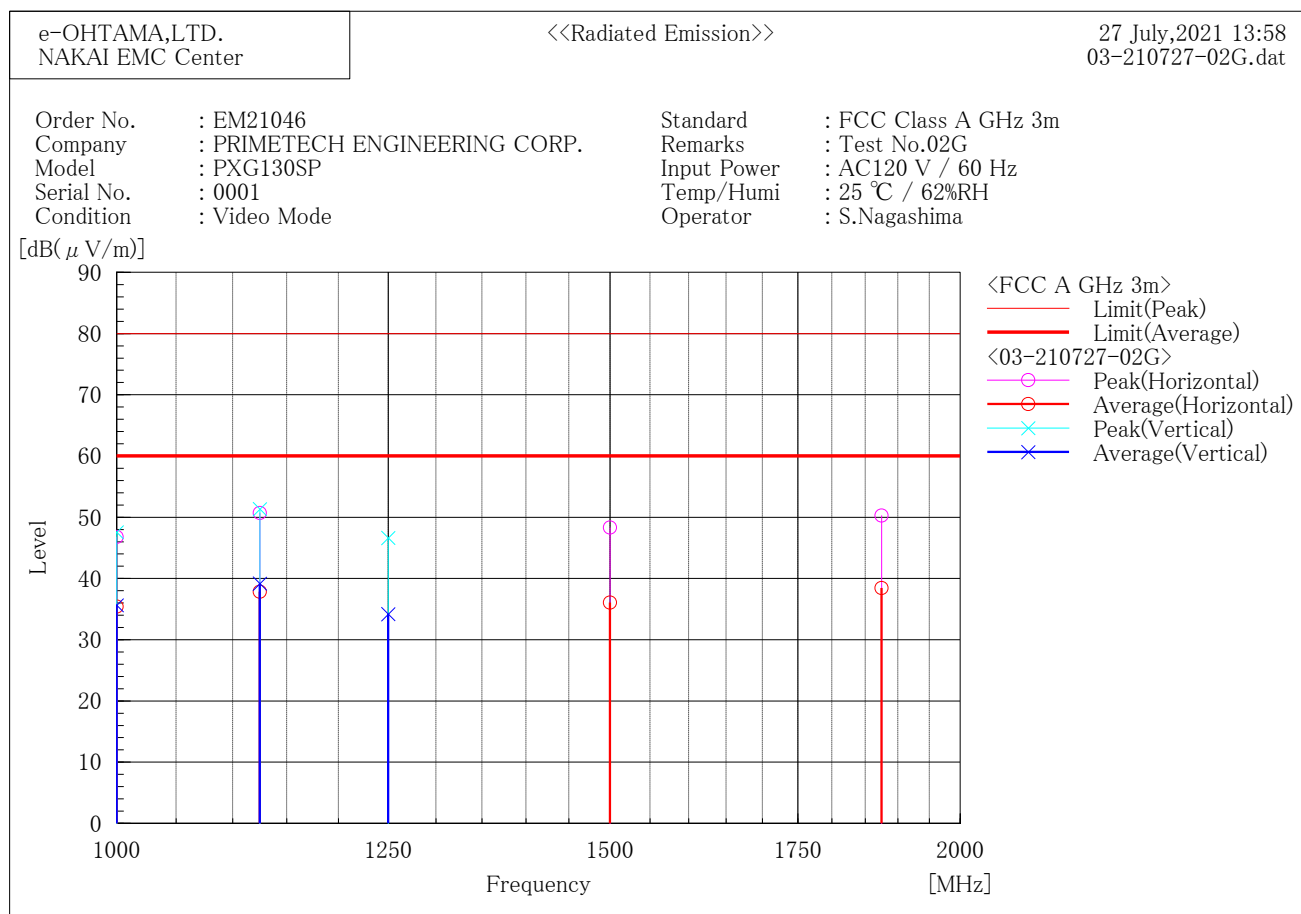
--- Horizontal Polarization (QP)---

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	374.984	41.2	-8.4	32.8	46.4	13.6	265.0	60.2
2	875.000	39.4	2.0	41.4	46.4	5.0	100.0	304.1
3	937.485	38.6	2.6	41.2	46.4	5.2	100.0	323.6
4	999.995	39.9	2.6	42.5	49.5	7.0	100.0	306.7

--- 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	56.939	32.7	-17.3	15.4	39.0	23.6	100.0	245.5
2	67.439	39.5	-19.8	19.7	39.0	19.3	222.6	352.5
3	124.999	44.8	-11.9	32.9	43.5	10.6	100.0	315.5
4	874.996	38.1	2.0	40.1	46.4	6.3	214.5	169.6
5	937.508	30.3	2.6	32.9	46.4	13.5	192.8	152.7

Radiated emission data (Above 1 GHz)



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	49.3	-2.5	46.8	80.0	33.2	227.6	195.4
2	1124.983	52.8	-2.1	50.7	80.0	29.3	233.7	283.9
3	1499.982	49.5	-1.2	48.3	80.0	31.7	294.1	120.7
4	1874.982	48.6	1.7	50.3	80.0	29.7	290.2	311.5

--- 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	37.9	-2.5	35.4	60.0	24.6	227.6	195.4
2	1124.983	39.9	-2.1	37.8	60.0	22.2	233.7	283.9
3	1499.982	37.2	-1.2	36.0	60.0	24.0	294.1	120.7
4	1874.982	36.7	1.7	38.4	60.0	21.6	290.2	311.5

--- 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	50.1	-2.5	47.6	80.0	32.4	212.5	318.5
2	1124.994	53.4	-2.1	51.3	80.0	28.7	100.0	198.6
3	1250.016	48.4	-1.8	46.6	80.0	33.4	308.3	171.2

--- 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	38.2	-2.5	35.7	60.0	24.3	212.5	318.5
2	1124.994	41.3	-2.1	39.2	60.0	20.8	100.0	198.6
3	1250.016	36.0	-1.8	34.2	60.0	25.8	308.3	171.2

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
PXG130SP Tested model	Only the difference of CMOS Image Sensor. (IMX990-AABA-C)		1300,000 pixels	SXGA 1280 × 1024
PXG030SP Family model	Only the difference of CMOS Image Sensor. (IMX991-AABA-C) IMX990 and IMX991 In the image output area with the same pixels. The electric circuit is the same with different sensors.	Set the difference in the number of pixels of CMOS Image Sensor. The parameters are different.	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.				