TEST REPORT

Eurofins KCTL Co.,Ltd. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-70-5008-1021 FAX: 82-505-299-8311 www.kctl.co.kr	Report No.: KR23-SRF0085 Page (1) of (27)	eurofins | KCTL

1. Client

- Name : SUPREMA INC
- Address : 17F-5, Parkview officetower,, 248, Jeongjail-ro, Bundang-gu, Seongnam-si, Gyeonggi-do 13554 Korea (Republic Of)
- Date of Receipt : 2023-02-23

2. Use of Report : Certification

3. Name of Product / Model : BioEntry W2 / BEW2-OAP

4. Manufacturer / Country of Origin : SUPREMA INC / Korea

5. FCC ID : TKWBEW2-OAP2

6. Date of Test : 2023-03-15 to 2023-03-22

7. Location of Test : ■ Permanent Testing Lab ☐ On Site Testing
(Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

8. Test method used : FCC Part 15 Subpart C, 15.225

9. Test Result : Refer to the test result in the test report

	Tested by	Technical Manager
Affirmation	Name : Jungwon Seo (Signature)	Name : Heesu Ahn (Signature)

2023-03-28

Eurofins KCTL Co.,Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2023-03-28	Originally issued	-

General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ **Statement not required by the standard or client used for type testing**

CONTENTS

1. General information

Client	:	SUPREMA INC
Address	:	17F-5, Parkview officetower,, 248, Jeongjail-ro, Bundang-gu, Seongnam-si, Gyeonggi-do 13554 Korea (Republic Of)
Manufacturer	:	SUPREMA INC
Address	:	17F-5, Parkview officetower,, 248, Jeongjail-ro, Bundang-gu, Seongnam-si, Gyeonggi-do 13554 Korea (Republic Of)
Laboratory	:	Eurofins KCTL Co.,Ltd.
Address	:	65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Accreditations	:	FCC Site Designation No: KR0040, FCC Site Registration No: 687132
		VCCI Registration No. : R-20080, G-20078, C-20059, T-20056
		CAB Identifier: KR0040, ISED Number: 8035A
		KOLAS No.: KT231

2. Device information

Equipment under test	:	BioEntry W2
Model	:	BEW2-OAP
Derivative model	:	BEW2-ODP, BEW2-OHP
Frequency range	:	13.56 ㎒ (NFC)
		131 ㎑ (RFID)
Modulation technique	:	ASK (NFC,RFID)
Number of channels	:	1 ch (NFC, RFID)
Power source	:	DC 12 Ⅴ, PoE 48 Ⅴ
Antenna specification	:	PCB Loop antenna (NFC)
		Coil Loop antenna (RFID)
Antenna gain	:	N/A
Software version	:	V1.7
Hardware version	:	V1.0
Operation temperature	:	-20 ℃ ~ 50 ℃

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
N/A	-	-	-	-

2.2. Information about derivative model

The difference between basic model and derivative models is:

BEW2-OAP	BEW2-ODP	BEW2-OHP
Basic model	Removed SAM IC	Removed SAM IC, add HID s/w license.

All models are made up by same H/W, F/W and compared with basic mode, the difference described as above. Each models are the same functionality except for the SAM function. The SAM IC operation is activated / deactivated by registering the model name.

2.3. Frequency/channel operations

This device contains the following capabilities:
NFC, RFID(131 ㎑)

Frequency (㎒)
13.56

Table 2.3.1. NFC mode

3. Antenna requirement

Requirement of FCC part section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

-The transmitter has permanently attached PCB Loop antenna (internal antenna) on board.

4. Summary of tests

FCC Part section(s)	Parameter	Test Condition	Test results
15.225(a)	In-band Fundamental Emission	Radiated	Pass
15.225(b), (c)	In-band Spurious Emission		Pass
15.225(d) 15.209	Out-of–band Spurious Emission		Pass
15.225(e)	Frequency Stability Tolerance	Conducted	Pass
15.215(c)	20 dB Bandwidth		Pass
15.207(a)	AC Conducted emissions		Pass

Notes: (N/T: Not Tested, N/A: Not Applicable)

1. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2. These tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
3. The fundamental of the EUT was investigated in three orthogonal orientations X, Y, Z It was determined that **X** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **X** orientation
4. The test procedure(s) in this report were performed in accordance as following.
   - ANSI C63.10-2013
5. The radiated test was performed with and without passive tag. The test results shown in the following sections represent the worst case emissions.
   - Worst Case : Without passive tag

5. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

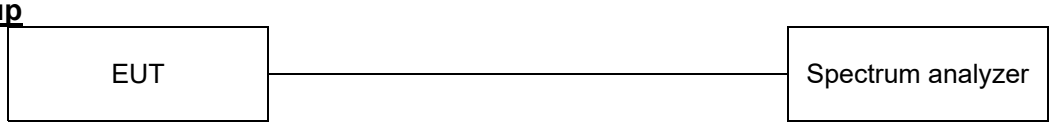
All measurement uncertainty values are shown with a coverage factor of k=2 to indicated a 95 % level of confidence. The measurement data shown herein meets of exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded uncertainty (±)	
Radiated spurious emissions	9 ㎑ ~ 30 ㎒:	2.3 ㏈
	30 ㎒ ~ 300 ㎒	2.5 ㏈
	300 ㎒ ~ 1 000 ㎒	4.7 ㏈
Conducted emissions	150 ㎑ ~ 30 ㎒	2.7 ㏈

6. Test results

6.1. 20 dB Bandwidth

Test setup



Limit

According to §15.215(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Test procedure

ANSI C63.10-2013 - Section 6.9.2

Test settings

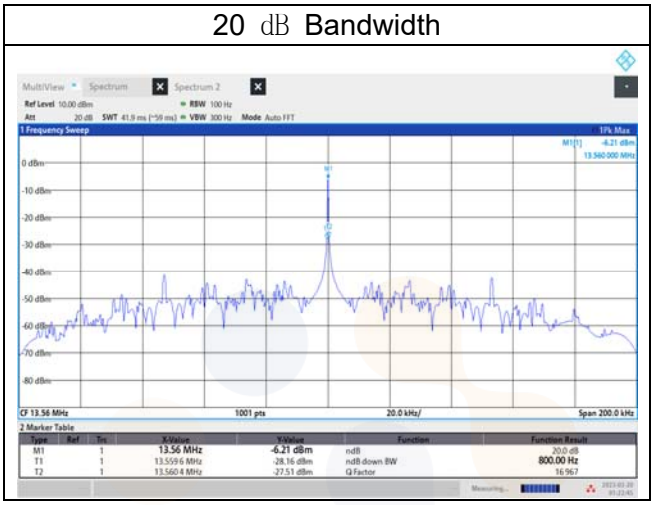
The spectrum analyzer connected receive antenna and the EUT placed on near the receive antenna. The RBW is set to 10㎑. The VBW is set to 3 times the RBW. The sweep time is coupled.

Test results

[DC 12 V]

Frequency [㎒]	20 dB Bandwidth [㎒]		Limit [㎒]	20 dB Bandwidth [㎑]
13.56	Lowest Frequency	13.559 600	13.110 000	0.80
	Highest Frequency	13.560 400	14.010 000	

20 dB Bandwidth



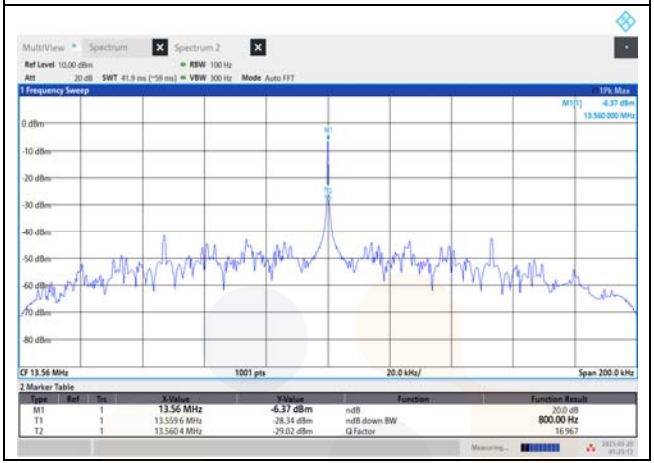
Note:

Because the measured signal is CW/CW-like, adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW

[PoE 48 V]

Frequency [㎒]	20 dB Bandwidth [㎒]		Limit [㎒]	20 dB Bandwidth [㎑]
13.56	Lowest Frequency	13.559 600	13.110 000	0.80
	Highest Frequency	13.560 400	14.010 000	

20 dB Bandwidth

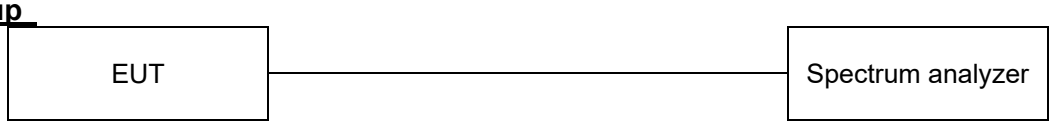


Note:

Because the measured signal is CW/CW-like, adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW

6.2. Frequency tolerance

Test setup



Limit

According to §15.225 (e), the frequency tolerance of the carrier signal shall be maintained within ±0.01 % of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85 % to 115 % of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test procedure

ANSI C63.10-2013 - Section 6.8.1

Test results

[DC 12 V]

Voltage	Voltage	TEMP	Maintaining time	Measure frequency	Frequency deviation	Deviation
[%]	[V]	[℃]		[㎐]	[㎐]	[%]
100	12.00	20	Startup	13 559 657	342.7	-0.002 53
			2 minutes	13 560 052	-51.6	0.000 38
			5 minutes	13 559 898	102.0	-0.000 75
			10 minutes	13 560 046	-46.3	0.000 34
		-20	Startup	13 558 845	1155.0	-0.008 52
			2 minutes	13 558 851	1149.1	-0.008 48
			5 minutes	13 559 031	969.4	-0.007 15
			10 minutes	13 558 857	1143.1	-0.008 43
		-10	Startup	13 559 296	703.9	-0.005 19
			2 minutes	13 559 048	951.9	-0.007 02
			5 minutes	13 559 200	799.7	-0.005 90
			10 minutes	13 559 517	483.0	-0.003 56
		0	Startup	13 559 698	302.2	-0.002 23
			2 minutes	13 559 706	293.7	-0.002 17
			5 minutes	13 559 889	111.4	-0.000 82
			10 minutes	13 559 833	167.1	-0.001 23
		10	Startup	13 559 857	142.5	-0.001 05
			2 minutes	13 559 853	146.6	-0.001 08
			5 minutes	13 559 929	71.4	-0.000 53
			10 minutes	13 559 946	54.0	-0.000 40
		25	Startup	13 559 880	120.2	-0.000 89
			2 minutes	13 559 842	157.9	-0.001 16
			5 minutes	13 559 925	74.7	-0.000 55
			10 minutes	13 559 993	6.8	-0.000 05
		30	Startup	13 559 574	425.7	-0.003 14
			2 minutes	13 559 609	391.1	-0.002 88
			5 minutes	13 559 615	385.0	-0.002 84
			10 minutes	13 559 641	358.6	-0.002 65
		40	Startup	13 559 810	190.2	-0.001 40
			2 minutes	13 559 691	308.8	-0.002 28
			5 minutes	13 559 579	420.8	-0.003 10
			10 minutes	13 559 766	234.5	-0.001 73
		50	Startup	13 560 065	-65.4	0.000 48
			2 minutes	13 560 100	-100.2	0.000 74
			5 minutes	13 560 308	-307.9	0.002 27
			10 minutes	13 560 090	-90.3	0.000 67
85	10.20	20	Startup	13 559 923	77.4	-0.000 57
			2 minutes	13 559 775	225.5	-0.001 66
			5 minutes	13 559 278	721.6	-0.005 32
			10 minutes	13 559 092	907.6	-0.006 69
115	13.80	20	Startup	13 559 911	89.4	-0.000 66
			2 minutes	13 559 741	258.6	-0.001 91
			5 minutes	13 559 360	640.4	-0.004 72
			10 minutes	13 559 713	287.0	-0.002 12

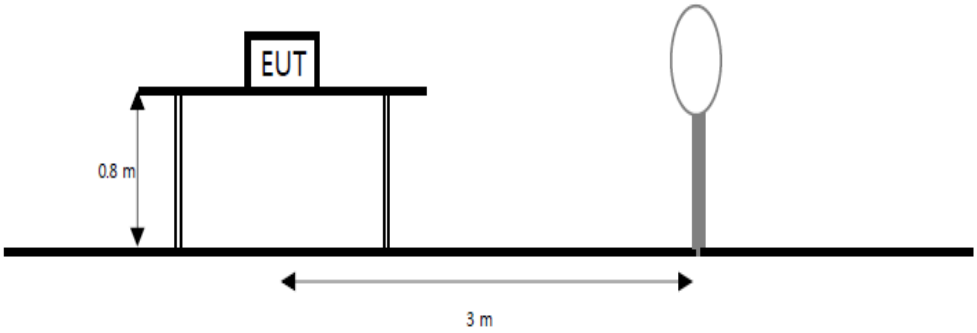
[PoE 48 V]

Voltage	Voltage	TEMP	Maintaining time	Measure frequency	Frequency deviation	Deviation
[%]	[V]	[℃]		[㎐]	[㎐]	[%]
100	48.00	20(Ref.)	Startup	13 559 691	308.8	-0.002 28
			2 minutes	13 560 020	-20.0	0.000 15
			5 minutes	13 560 007	-7.2	0.000 05
			10 minutes	13 559 965	35.3	-0.000 26
		-20	Startup	13 558 940	1060.1	-0.007 82
			2 minutes	13 558 769	1231.5	-0.009 08
			5 minutes	13 558 996	1003.9	-0.007 40
			10 minutes	13 558 817	1182.9	-0.008 72
		-10	Startup	13 559 282	717.9	-0.005 29
			2 minutes	13 559 111	888.8	-0.006 56
			5 minutes	13 559 351	649.4	-0.004 79
			10 minutes	13 559 369	631.4	-0.004 66
		0	Startup	13 559 644	355.9	-0.002 63
			2 minutes	13 559 650	349.9	-0.002 58
			5 minutes	13 559 757	243.3	-0.001 79
			10 minutes	13 559 964	36.4	-0.000 27
		10	Startup	13 559 910	89.8	-0.000 66
			2 minutes	13 559 838	162.4	-0.001 20
			5 minutes	13 559 942	58.5	-0.000 43
			10 minutes	13 559 915	85.3	-0.000 63
		25	Startup	13 559 736	264.1	-0.001 95
			2 minutes	13 559 785	214.8	-0.001 58
			5 minutes	13 559 881	118.7	-0.000 88
			10 minutes	13 559 850	149.9	-0.001 11
		30	Startup	13 559 511	488.6	-0.003 60
			2 minutes	13 559 801	198.6	-0.001 47
			5 minutes	13 559 706	294.3	-0.002 17
			10 minutes	13 559 717	282.8	-0.002 09
		40	Startup	13 559 714	286.3	-0.002 11
			2 minutes	13 559 755	245.4	-0.001 81
			5 minutes	13 559 569	430.9	-0.003 18
			10 minutes	13 559 659	341.3	-0.002 52
		50	Startup	13 560 026	-26.1	0.000 19
			2 minutes	13 559 989	11.2	-0.000 08
			5 minutes	13 560 313	-313.3	0.002 31
			10 minutes	13 560 143	-143.4	0.001 06
85	40.80	20	Startup	13 559 810	190.3	-0.001 40
			2 minutes	13 559 732	267.5	-0.001 97
			5 minutes	13 559 294	706.2	-0.005 21
			10 minutes	13 559 136	864.2	-0.006 37
115	55.20	20	Startup	13 559 928	72.4	-0.000 53
			2 minutes	13 559 699	301.3	-0.002 22
			5 minutes	13 559 331	668.9	-0.004 93
			10 minutes	13 559 640	360.0	-0.002 66

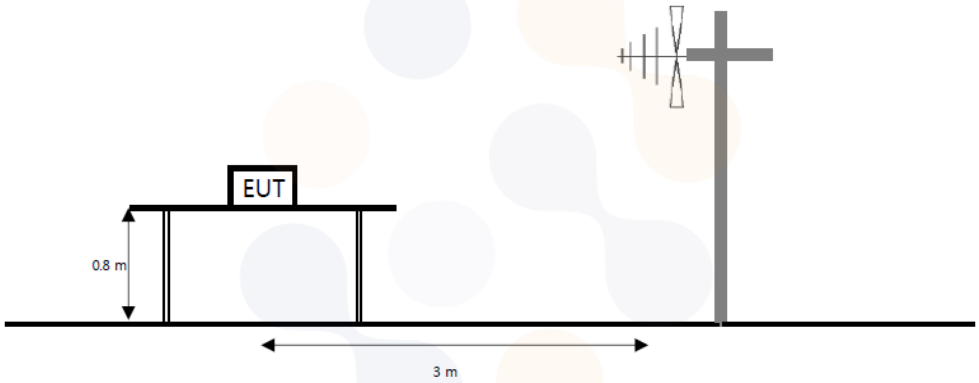
6.3. Radiated spurious emissions

Test setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ Emissions



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



Limit

15.225 (a), The field strength of any emission within the band 13.553-13.567 ㎒ shall not exceed 15, 848 microvolts/meter at 30 meters.

15.225 (b), With in the bands 13.410-13.553 ㎒ and 13.567-13.710 ㎒, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

15.225 (c), With in the bands 13.110-13.410 ㎒ and 13.710-14.010 ㎒, the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

15.225 (d), The Field Strength of any emissions appearing outside of the 13.110-14.010 ㎒ band shall not exceed the general radiated emission limits in 15.209.

Frequency (㎒)	Field Strength (㎶/m)	Measurement distance (meters)
0.009-0.490	2400/F(㎑)	300
0.490-1.705	24000/F(㎑)	30
1.705-30.0	30(29.54 dB㎶/m)	30
30.0-88.0	100(40 dB㎶/m)	3
88-216	150(43.5 dB㎶/m)	3
216-960	200 (46 dB㎶/m)	3
Above 960	500 (53.98 dB㎶/m)	3

Test procedure

ANSI C63.10-2013 - Section 6.4, 6.5

Test settings

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in table
3. VBW ≥ 3 x RBW
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Table. RBW as a function of frequency

Frequency	RBW
9 ㎑ to 150 ㎑	200 ㎐ to 300 ㎐
0.15 ㎒ to 30 ㎒	9 ㎑ to 10 ㎑
30 ㎒ to 1 000 ㎒	100 ㎑ to 120 ㎑
> 1 000 ㎒	1 ㎒

Notes:

1. *f* <30 ㎒, extrapolation factor of 40 dB/decade of distance. $F_d = 40\log(D_m/Ds)$
   f ≥30 ㎒, extrapolation factor of 20 dB/decade of distance. $F_d = 20\log(D_m/Ds)$
   Where:
   F_d= Distance factor in dB
   D_m= Measurement distance in meters
   D_s= Specification distance in meters
2. Measurements were performed at 3m and the data was extrapolated to the specified measurement distance of 30m using the square of an inverse linear distance extrapolation factor (40 dB/decade) as specified in § 15.31(f)(2). Extrapolation Factor = 40 log10(30/3) = 40 dB.
3. (dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or F_d(dB)
4. Result = Reading + Cable loss + Amp gain + Ant. factor - Distance factor
5. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
6. All measurements were recorded using a spectrum analyzer employing a quasi-peak detector.
7. Below 30 ㎒ frequency range, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported and the worse orientations of Face-on and Face-off were set for final test.
8. Face-on = Parallel, Face-off = Perpendicular

[DC 12 V]

Test results for fundamental

15.225 (a) 13.553-13.567 ㎒

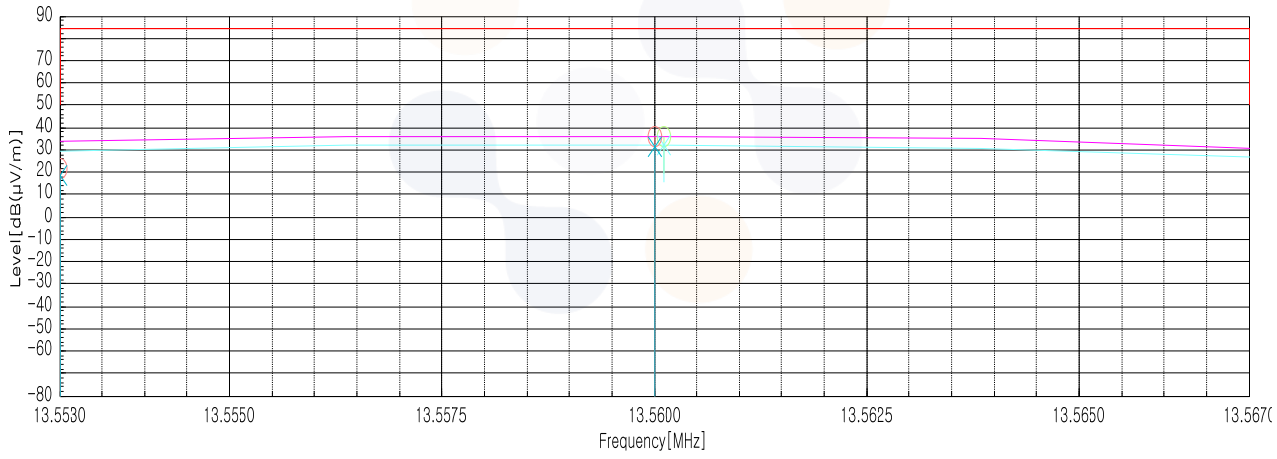
[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
13.56	88.00	20.31	-32.21	40.00	36.10	84.00	47.90

[Face-off]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
13.56	83.60	20.31	-32.21	40.00	31.70	84.00	52.30

Face-on/Face-off



Test results for in-band & out-band (9 ㎑ to 30 ㎒)

15.225 (b,c) 13.110-14.010 ㎒

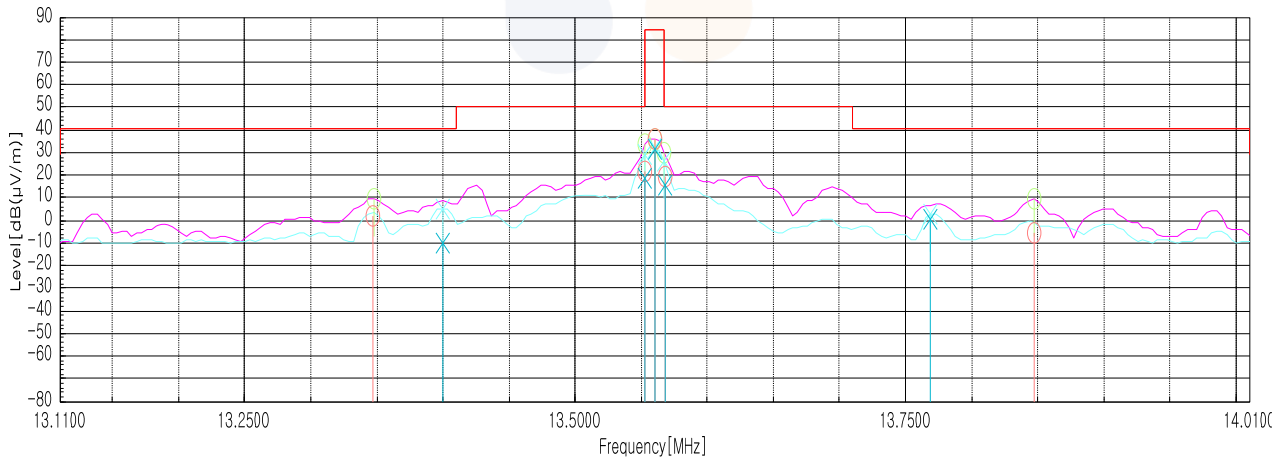
[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
13.35	53.70	20.30	-32.20	40.00	1.80	40.50	38.70
13.55	73.90	20.31	-32.21	40.00	22.00	50.50	28.50
13.57	70.90	20.31	-32.21	40.00	19.00	50.50	31.50
13.85	46.40	20.33	-32.23	40.00	-5.50	40.50	46.00

[Face-off]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
13.40	41.60	20.30	-32.20	40.00	-10.30	40.50	50.80
13.55	70.20	20.31	-32.21	40.00	18.30	50.50	32.20
13.57	67.20	20.31	-32.21	40.00	15.30	50.50	35.20
13.77	52.30	20.33	-32.23	40.00	0.40	40.50	40.10

Face-on/Face-off



Test results (9 ㎑ to 30 ㎒)

15.225 (d) 0.009-30 ㎒

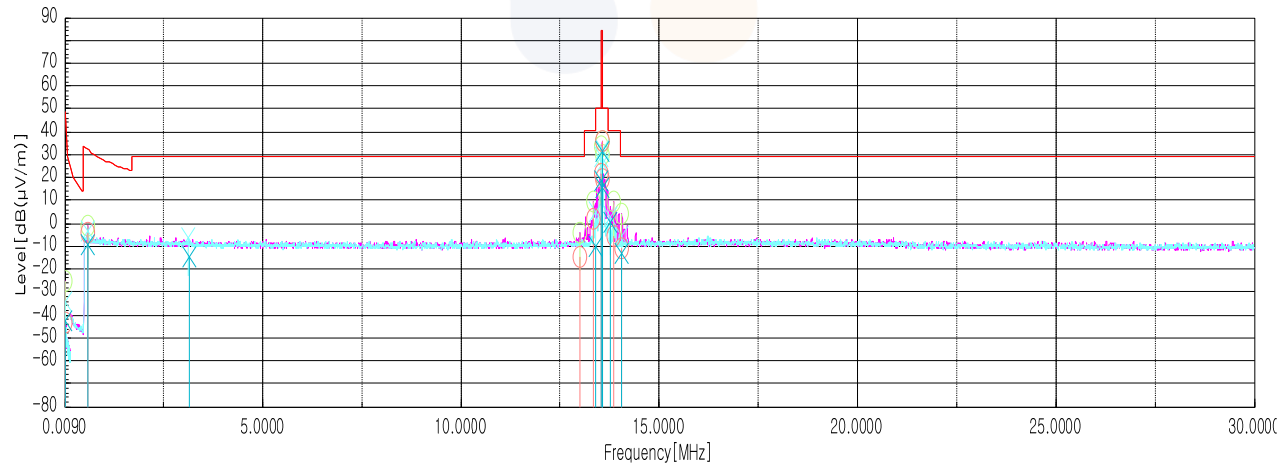
[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
0.01	47.70	21.00	-31.80	80.00	-43.10	47.60	90.70
0.59	48.30	19.92	-32.42	40.00	-4.20	32.20	36.40
13.00	37.60	20.28	-32.18	40.00	-14.30	29.50	43.80
14.06	40.90	20.34	-32.14	40.00	-10.90	29.50	40.40

[Face-off]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
0.01	48.20	19.50	-30.30	80.00	-42.60	47.60	90.20
0.59	43.50	19.54	-32.04	40.00	-9.00	32.20	41.20
3.14	37.80	19.69	-31.89	40.00	-14.40	29.50	43.90
14.06	38.60	20.34	-32.14	40.00	-13.20	29.50	42.70

Face-on/Face-off

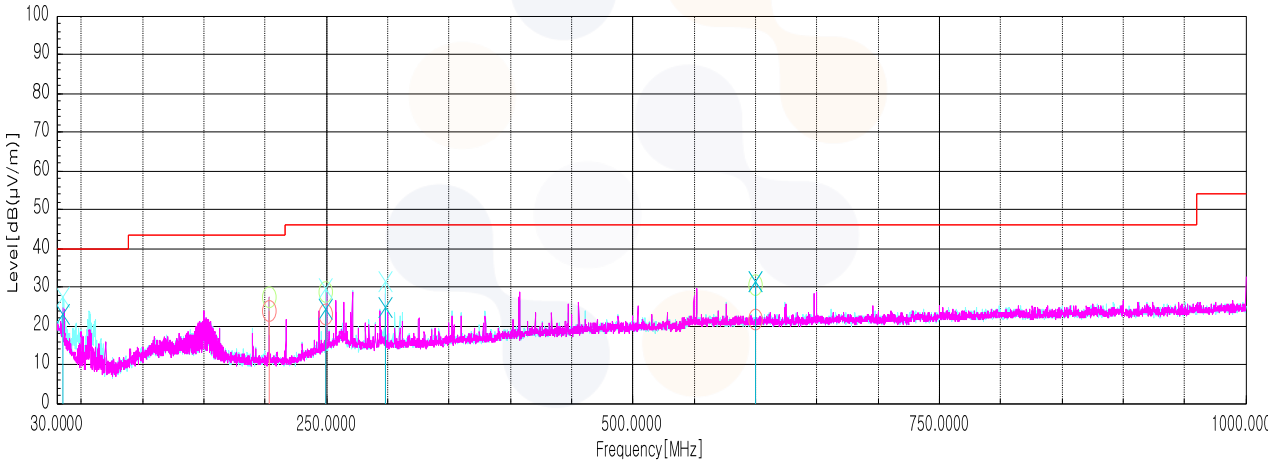


Test results (Below 1 000 ㎒)

15.225 (d) 30-1 000 ㎒

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data								
35.46	V	33.30	21.63	-31.93	-	23.00	40.00	17.00
203.39	H	39.90	15.42	-31.42	-	23.90	43.50	19.60
249.95[1)]	H	35.90	18.50	-31.30	-	23.10	46.00	22.90
249.95[1)]	V	37.10	18.50	-31.30	-	24.30	46.00	21.70
298.33	V	36.70	19.08	-31.08	-	24.70	46.00	21.30
600.00	V	37.30	24.60	-30.60	-	31.30	46.00	14.70

Horizontal/Vertical



[PoE 48 V]

Test results for fundamental

15.225 (a) 13.553-13.567 ㎒

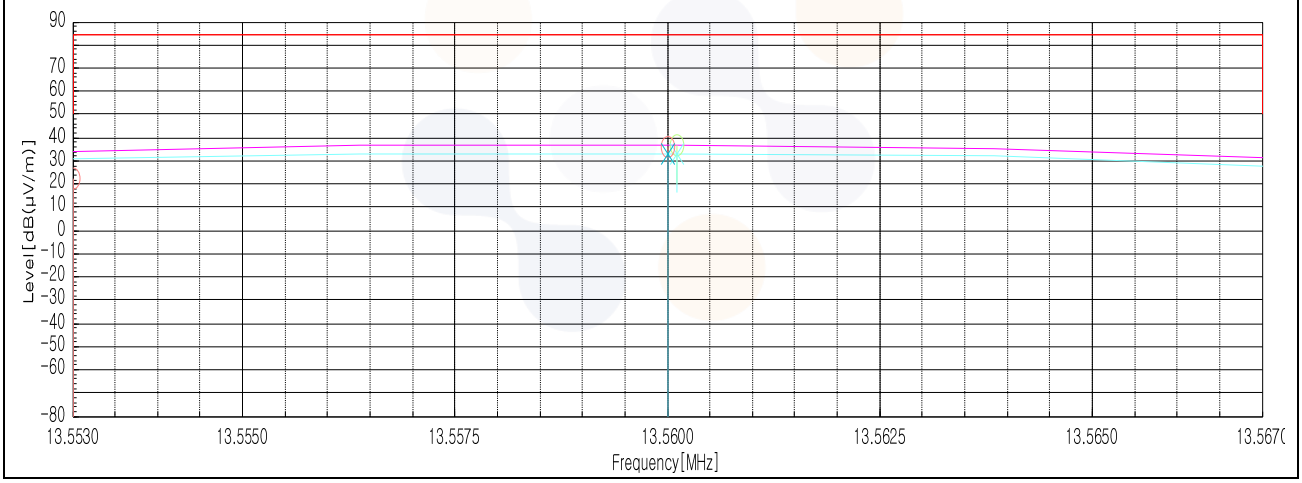
[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
13.56	88.10	20.31	-32.21	40.00	36.20	84.00	47.80

[Face-off]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
13.56	85.00	20.31	-32.21	40.00	33.10	84.00	50.90

Face-on/Face-off



Test results for in-band & out-band (9 ㎑ to 30 ㎒)

15.225 (b,c) 13.110-14.010 ㎒

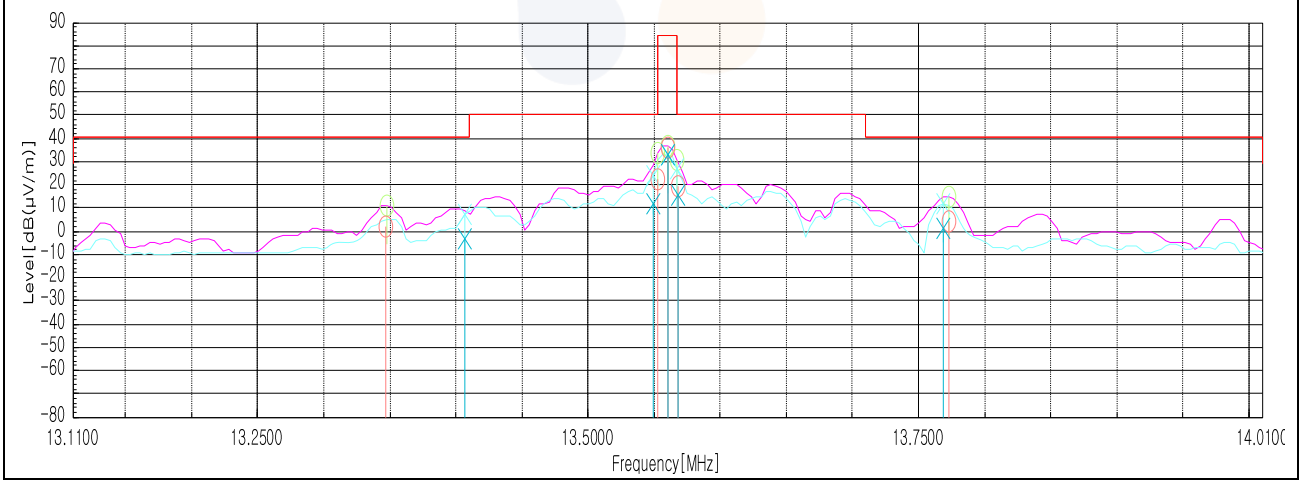
[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
13.35	53.70	20.30	-32.20	40.00	1.80	40.50	38.70
13.55	74.00	20.31	-32.21	40.00	22.10	50.50	28.40
13.57	70.90	20.31	-32.21	40.00	19.00	50.50	31.50
13.77	56.50	20.33	-32.23	40.00	4.60	40.50	35.90

[Face-off]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
13.41	48.70	20.30	-32.20	40.00	-3.20	40.50	43.70
13.55	63.50	20.31	-32.21	40.00	11.60	50.50	38.90
13.57	67.80	20.31	-32.21	40.00	15.90	50.50	34.60
13.77	52.90	20.33	-32.23	40.00	1.00	40.50	39.50

Face-on/Face-off



Test results (9 ㎑ to 30 ㎒)

15.225 (d) 0.009-30 ㎒

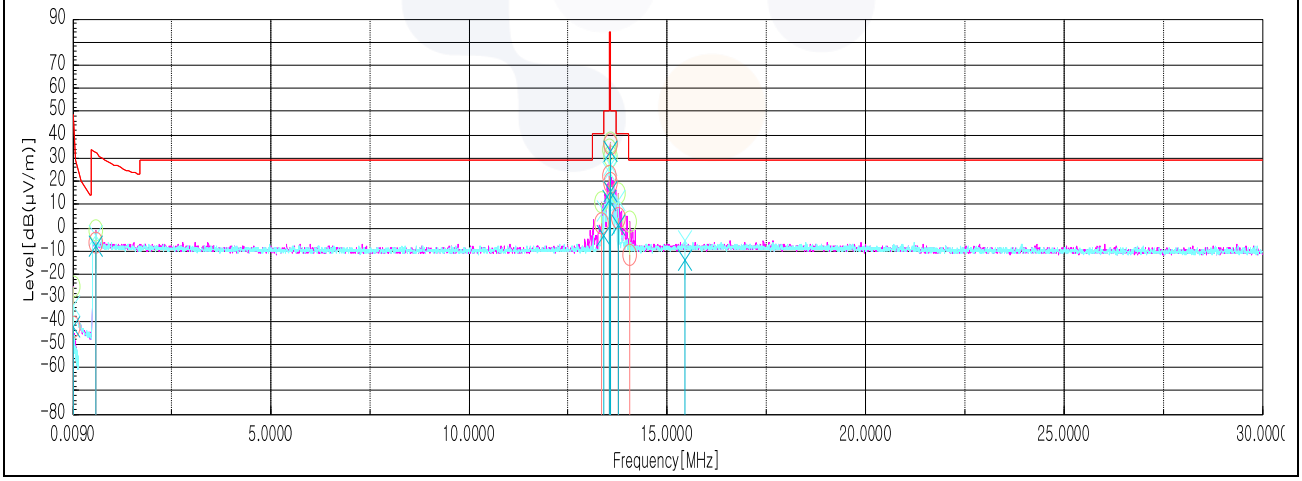
[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
0.01	48.50	21.00	-31.80	80.00	-42.30	47.60	89.90
0.59	46.20	19.92	-32.42	40.00	-6.30	32.20	38.50
14.06	40.00	20.34	-32.14	40.00	-11.80	29.50	41.30

[Face-off]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
0.01	48.40	19.50	-30.30	80.00	-42.40	47.60	90.00
0.59	44.80	19.54	-32.04	40.00	-7.70	32.20	39.90
15.46	38.00	20.34	-32.14	40.00	-13.80	29.50	43.30

Face-on/Face-off

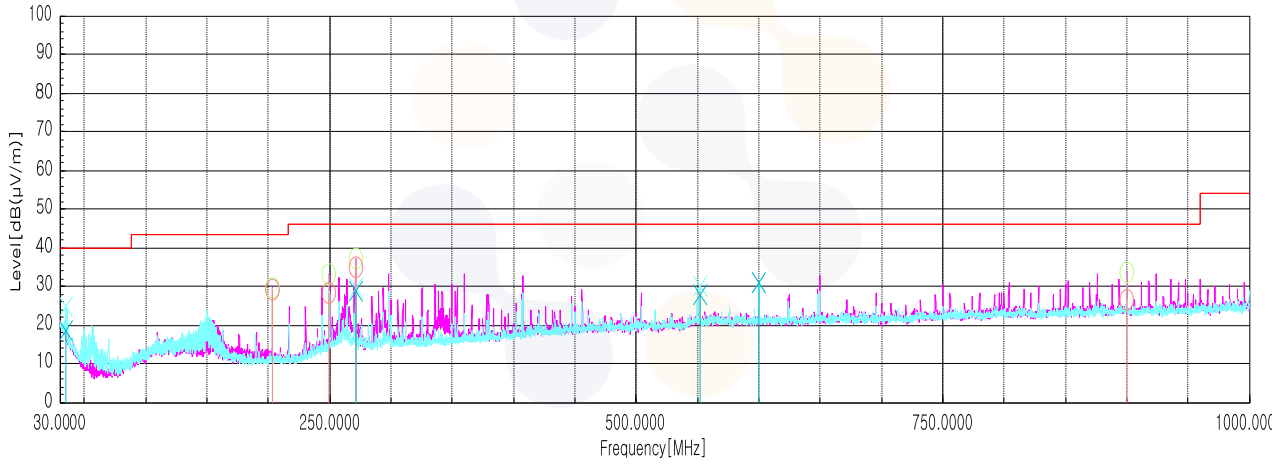


Test results (Below 1 000 ㎒)

15.225 (d) 30-1000 ㎒

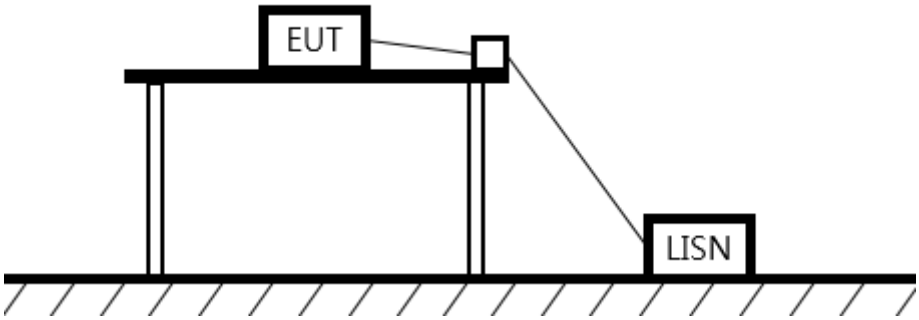
Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data								
203.39	H	45.20	15.42	-31.42	-	29.20	43.50	14.30
249.95[1)]	H	41.00	18.50	-31.30	-	28.20	46.00	17.80
271.17[1)]	H	47.20	18.75	-31.05	-	34.90	46.00	11.10
271.17[1)]	V	40.80	18.75	-31.05	-	28.50	46.00	17.50
600.00	V	37.10	24.60	-30.60	-	31.10	46.00	14.90
900.09	H	29.40	26.50	-29.30	-	26.60	46.00	19.40

Horizontal/Vertical



6.4. AC Conducted emission

Test setup



Limit

According to 15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 ㎑ to 30 ㎒, shall not exceed the limits in the following table, as measured using a 50uH/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

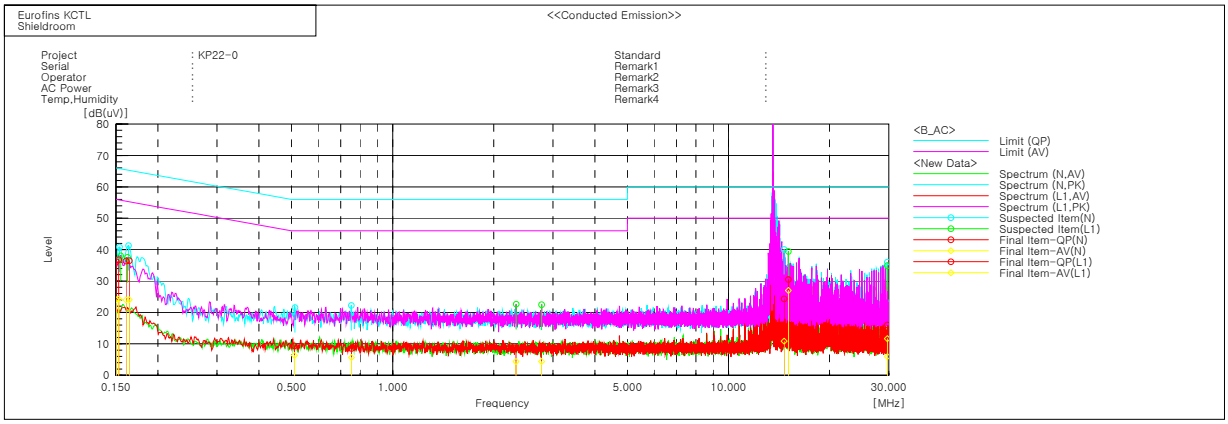
Frequency of Emission (㎒)	Conducted limit (dB㎶/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

Measurement procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 ㎝ in which is located 40 ㎝ away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50μH LISN, which is an input transducer to a spectrum analyzer or an EMI/Field Intensity Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 ㎒ to 30 ㎒.
5. The measurements were made with the detector set to peak amplitude within a bandwidth of 10 ㎑ or to quasi-peak and average within a bandwidth of 9 ㎑. The EUT was in transmitting mode during the measurements.

Test results

[PoE 48 V]



Final Result

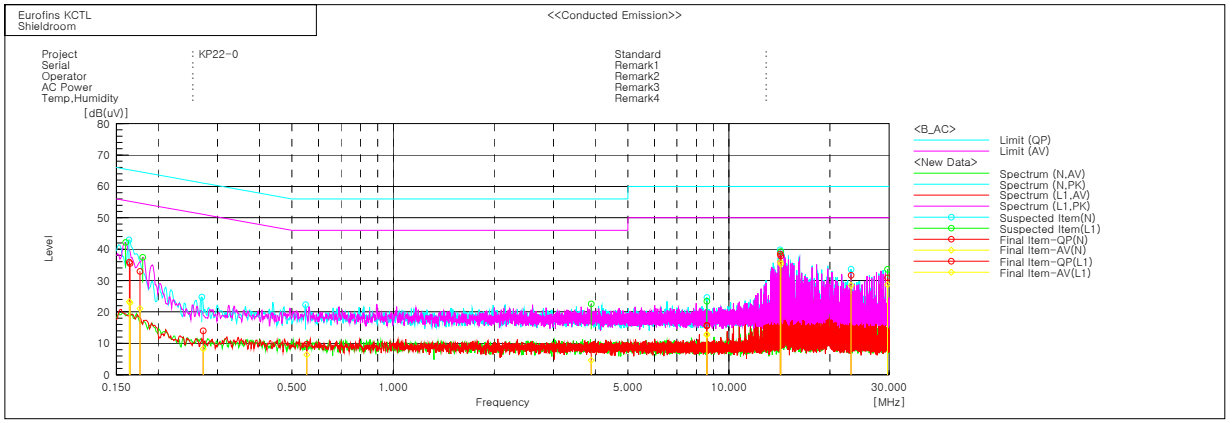
--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.15294	27.1	14.7	9.6	36.7	24.3	65.8	55.8	29.1	31.5
2	0.16429	26.6	14.1	9.9	36.5	24.0	65.2	55.2	28.7	31.2
3	0.50999	-0.5	-3.6	9.9	9.4	6.3	56.0	46.0	46.6	39.7
4	0.75431	-1.3	-4.2	9.8	8.5	5.6	56.0	46.0	47.5	40.4
5	14.64714	14.4	1.0	9.9	24.3	10.9	60.0	50.0	35.7	39.1
6	29.72385	0.5	-4.1	10.0	10.5	5.9	60.0	50.0	49.5	44.1

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.15028	26.5	14.4	9.6	36.1	24.0	66.0	56.0	29.9	32.0
2	0.16074	26.6	14.2	9.8	36.4	24.0	65.4	55.4	29.0	31.4
3	2.32918	-0.9	-5.3	9.7	8.8	4.4	56.0	46.0	47.2	41.6
4	2.77496	-0.9	-5.3	9.7	8.8	4.4	56.0	46.0	47.2	41.6
5	15.06896	20.6	17.1	9.9	30.5	27.0	60.0	50.0	29.5	23.0
6	29.69416	6.0	1.7	10.0	16.0	11.7	60.0	50.0	44.0	38.3

[NFC termination]



Final Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.16474	25.5	13.0	9.9	35.4	22.9	65.2	55.2	29.8	32.3
2	0.27216	4.3	-1.4	9.6	13.9	8.2	61.1	51.1	47.2	42.9
3	14.21362	28.6	26.1	9.9	38.5	36.0	60.0	50.0	21.5	14.0
4	23.12904	21.7	18.5	10.0	31.7	28.5	60.0	50.0	28.3	21.5
5	8.59788	5.8	3.0	9.9	15.7	12.9	60.0	50.0	44.3	37.1
6	0.55355	-0.1	-3.4	9.8	9.7	6.4	56.0	46.0	46.3	39.6

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.16387	26.0	13.3	9.9	35.9	23.2	65.3	55.3	29.4	32.1
2	0.17631	22.9	11.0	10.0	32.9	21.0	64.7	54.7	31.8	33.7
3	14.27407	28.0	25.4	9.9	37.9	35.3	60.0	50.0	22.1	14.7
4	29.65971	20.9	18.7	10.0	30.9	28.7	60.0	50.0	29.1	21.3
5	8.59792	5.6	2.7	9.9	15.5	12.6	60.0	50.0	44.5	37.4
6	3.89119	-0.7	-5.2	9.8	9.1	4.6	56.0	46.0	46.9	41.4

7. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV3030	1330.5000K30-101710-Wt	23.08.10
DC Power Supply	AGILENT	E3632A	KR73001026	24.01.19
Attenuator	API Inmet	40AH2W-10	18	23.05.03
Temp & Humid Chamber	Myeongseong R&P	CTHC-50P-DT	20150824-3	23.10.14
Signal Generator	R&S	SMB100A	176206	24.01.19
Spectrum Analyzer	R&S	FSV40-N	101462	23.10.14
EMI TEST RECEIVER	R&S	ESCI 3	100710	23.08.22
Bilog Antenna	Teseq GmbH	CBL 6112D	63756	24.11.17
Loop Antenna	R&S	HFH2-Z2	100355	24.08.10
Amplifier	SONOMA INSTRUMENT	310N	421910	23.12.14
Controller	innco systems GmbH	CO3000	CO3000/1441/5437 0322/P	N/A
Antenna Mast	innco systems GmbH	MA4640-XP-ET	N/A	N/A
Turn Device	innco systems GmbH	DS1200-S-1t	N/A	N/A
DC Power Supply	Powercom	DCP-50100A	20220610-01	24.02.02
TWO-LINE V - NETWORK	R&S	ENV216	101358	23.09.29
EMI TEST RECEIVER	R&S	ESCI3	100001	23.08.18

End of test report