TEST REPORT

Eurofins KCTL Co.,Ltd. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-31-285-0894 FAX: 82-505-299-8311 www.kctl.co.kr	Report No.: KR22-SRF0237 Page (1) of (27)	eurofins | KCTL

1. Client

- Name : Suprema ID Inc.
- Address : 1207, 37, Sagimakgol-ro 62beon-gil, Jungwon-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
- Date of Receipt : 2022-09-20

2. Use of Report : Certification

3. Name of Product / Model : RealPass-N / RP-N

4. Manufacturer / Country of Origin : Suprema ID Inc. / Korea

5. FCC ID : 2AVDARP-N

6. Date of Test : 2022-10-14 to 2022-11-02

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)

2022-12-29

Eurofins KCTL Co.,Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2022-12-29	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 ID Inc.INC
Address	:	1207, 37, Sagimakgol-ro 62beon-gil, Jungwon-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
Manufacturer	:	Suprema ID Inc.
Address	:	1207, 37, Sagimakgol-ro 62beon-gil, Jungwon-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
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	:	RealPass-N
Model	:	RP-N
Derivative Model	:	RealPass-N(MOJ), RealPass-NB, RealPass-N, RP-NB,RPN-B, RPN-F, RPN-J
Frequency range	:	13.56 ㎒
Modulation technique	:	ASK
Number of channels	:	1 ch
Power source	:	DC 5 V (USB)
		DC 12 V (Adapter)
Antenna specification	:	Loop antenna (NFC)
Antenna gain	:	N/A
Software version	:	01.01.02
Hardware version	:	V03
Operation temperature	:	-20 ℃ ~ 55 ℃

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
AC Adapter	KEERDA	DZ036DL120250F	N/A	Input: 100-240V, 50/60㎐ 1.2 A Output: 12V/2.5A

2.2. Information about derivative model

The difference between basic model and derivative models is:
RealPass-N(MOJ), RealPass-NB, RealPass-N, RP-NB,RPN-B, RPN-F, RPN-J: RP-N with customer's mark & label Each models are the same functionality

2.3. Frequency/channel operations

This device contains the following capabilities:
NFC

Ch.	Frequency (㎒)
01	13.56

Table 2.3.1. NFC

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 transmitters have permanently attached TAG antennas (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:

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 and 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 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. The test procedure(s) in this report were performed in accordance as following.
   - ANSI C63.10-2013
6. The device was tested in 2 mode. (5V, 12V)

5. Measurement uncertainty

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

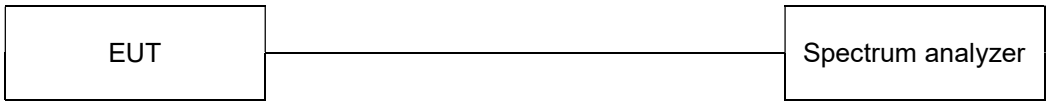
All measurement uncertainty values are shown with a coverage factor of k=2 to indicated a 95 % level of confidence. The measurement data shown herein meets of exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine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

Parameter	Expanded uncertainty (±)	
Radiated spurious emissions	9 ㎑ ~ 30 ㎒	2.4 dB
	30 ㎒ ~ 1 000 ㎒	2.3 dB
Conducted emissions	9 ㎑ ~ 150 ㎑	1.6 dB
	150 ㎑ ~ 30 ㎒	1.7 dB

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 - 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 100 Hz. The VBW is set to 3 times the RBW. The sweep time is coupled.

Test results

Mode	Frequency [㎒]	20 ㏈ Bandwidth [㎒]		Limit [㎒]	20 ㏈ Bandwidth [㎑]
12V	13.56	Lowest Frequency	13.560 2	13.110 000	0.51
		Highest Frequency	13.560 7	14.010 000	
5V	13.56	Lowest Frequency	13.560 2	13.110 000	0.50
		Highest Frequency	13.560 7	14.010 000	

20 ㏈ Bandwidth

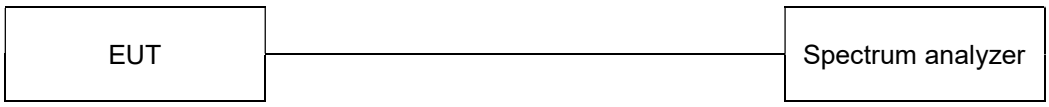
12V	5V
	

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

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

- 12 V

Voltage	Voltage	TEMP	Maintaining time	Measure frequency	Frequency deviation	Deviation
[%]	[V]	[℃]		[㎐]	[㎐]	[%]
100	12.00	20(Ref.)	Startup	13 560 452	-452.0	0.003 33
			2 minutes	13 560 455	-455.0	0.003 36
			5 minutes	13 560 456	-456.0	0.003 36
			10 minutes	13 560 461	-461.0	0.003 40
		-20	Startup	13 560 482	-482.0	0.003 55
			2 minutes	13 560 488	-488.0	0.003 60
			5 minutes	13 560 486	-486.0	0.003 58
			10 minutes	13 560 491	-491.0	0.003 62
		-10	Startup	13 560 477	-477.0	0.003 52
			2 minutes	13 560 475	-475.0	0.003 50
			5 minutes	13 560 479	-479.0	0.003 53
			10 minutes	13 560 471	-471.0	0.003 47
		0	Startup	13 560 459	-459.0	0.003 39
			2 minutes	13 560 461	-461.0	0.003 40
			5 minutes	13 560 458	-458.0	0.003 38
			10 minutes	13 560 460	-460.0	0.003 39
		10	Startup	13 560 458	-458.0	0.003 38
			2 minutes	13 560 455	-455.0	0.003 36
			5 minutes	13 560 458	-458.0	0.003 38
			10 minutes	13 560 455	-455.0	0.003 36
		25	Startup	13 560 450	-450.0	0.003 32
			2 minutes	13 560 451	-451.0	0.003 33
			5 minutes	13 560 453	-453.0	0.003 34
			10 minutes	13 560 451	-451.0	0.003 33
		30	Startup	13 560 449	-449.0	0.003 31
			2 minutes	13 560 448	-448.0	0.003 30
			5 minutes	13 560 446	-446.0	0.003 29
			10 minutes	13 560 449	-449.0	0.003 31
		40	Startup	13 560 442	-442.0	0.003 26
			2 minutes	13 560 443	-443.0	0.003 27
			5 minutes	13 560 440	-440.0	0.003 25
			10 minutes	13 560 440	-440.0	0.003 25
		50	Startup	13 560 370	-370.0	0.002 73
			2 minutes	13 560 376	-376.0	0.002 77
			5 minutes	13 560 372	-372.0	0.002 74
			10 minutes	13 560 370	-370.0	0.002 73
85	10.20	20	Startup	13 560 455	-455.0	0.003 36
			2 minutes	13 560 453	-453.0	0.003 34
			5 minutes	13 560 456	-456.0	0.003 36
			10 minutes	13 560 455	-455.0	0.003 36
115	13.80	20	Startup	13 560 453	-453.0	0.003 34
			2 minutes	13 560 456	-456.0	0.003 36
			5 minutes	13 560 460	-460.0	0.003 39
			10 minutes	13 560 458	-458.0	0.003 38

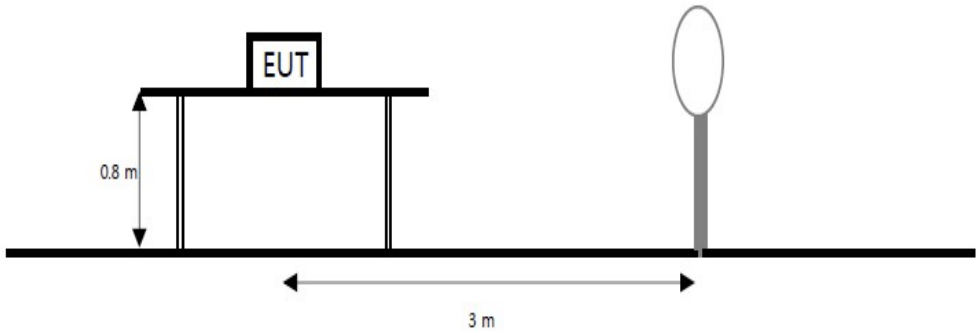
- 5 V

Voltage [%]	Voltage [V]	TEMP [℃]	Maintaining time	Measure frequency [㎐]	Frequency deviation [㎐]	Deviation [%]
100	5.00	20(Ref.)	Startup	13 560 437	-437.0	0.003 22
			2 minutes	13 560 444	-444.0	0.003 27
			5 minutes	13 560 445	-445.0	0.003 28
			10 minutes	13 560 449	-449.0	0.003 31
		-20	Startup	13 560 468	-468.0	0.003 45
			2 minutes	13 560 474	-474.0	0.003 50
			5 minutes	13 560 473	-473.0	0.003 49
			10 minutes	13 560 480	-480.0	0.003 54
		-10	Startup	13 560 462	-462.0	0.003 41
			2 minutes	13 560 464	-464.0	0.003 42
			5 minutes	13 560 466	-466.0	0.003 44
			10 minutes	13 560 458	-458.0	0.003 38
		0	Startup	13 560 447	-447.0	0.003 30
			2 minutes	13 560 447	-447.0	0.003 30
			5 minutes	13 560 444	-444.0	0.003 27
			10 minutes	13 560 449	-449.0	0.003 31
		10	Startup	13 560 446	-446.0	0.003 29
			2 minutes	13 560 442	-442.0	0.003 26
			5 minutes	13 560 447	-447.0	0.003 30
			10 minutes	13 560 444	-444.0	0.003 27
		25	Startup	13 560 439	-439.0	0.003 24
			2 minutes	13 560 436	-436.0	0.003 22
			5 minutes	13 560 442	-442.0	0.003 26
			10 minutes	13 560 439	-439.0	0.003 24
		30	Startup	13 560 437	-437.0	0.003 22
			2 minutes	13 560 435	-435.0	0.003 21
			5 minutes	13 560 436	-436.0	0.003 22
			10 minutes	13 560 438	-438.0	0.003 23
		40	Startup	13 560 431	-431.0	0.003 18
			2 minutes	13 560 433	-433.0	0.003 19
			5 minutes	13 560 430	-430.0	0.003 17
			10 minutes	13 560 430	-430.0	0.003 17
		50	Startup	13 560 358	-358.0	0.002 64
			2 minutes	13 560 364	-364.0	0.002 68
			5 minutes	13 560 359	-359.0	0.002 65
			10 minutes	13 560 358	-358.0	0.002 64
85	4.25	20	Startup	13 560 440	-440.0	0.003 25
			2 minutes	13 560 439	-439.0	0.003 24
			5 minutes	13 560 441	-441.0	0.003 25
			10 minutes	13 560 443	-443.0	0.003 27
115	5.75	20	Startup	13 560 442	-442.0	0.003 26
			2 minutes	13 560 444	-444.0	0.003 27
			5 minutes	13 560 450	-450.0	0.003 32
			10 minutes	13 560 447	-447.0	0.003 30

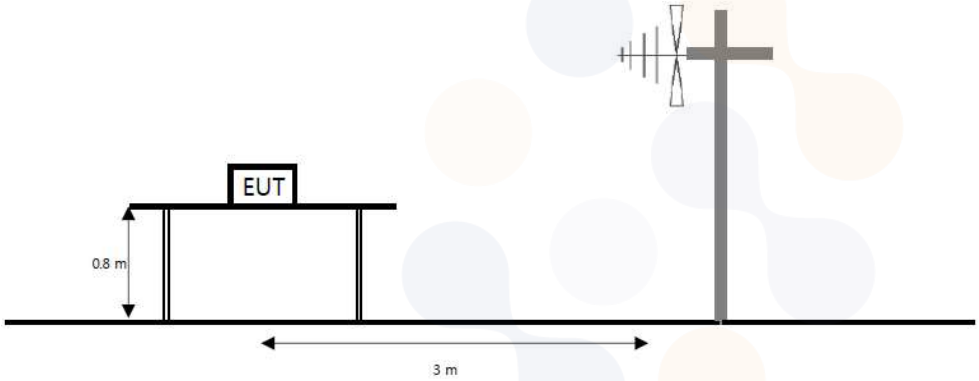
6.3. Radiated spurious emissions

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. Factors(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
9. [1)] means restricted band

Test results for fundamental

- 12 V

15.225 (a) 13.553-13.567 ㎒

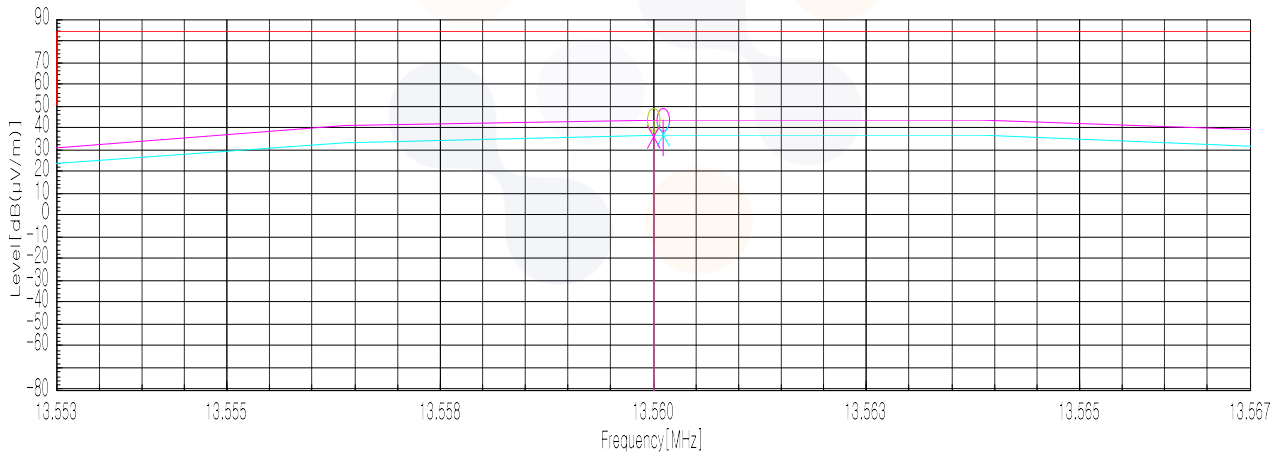
[Face-on]

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	94.00	20.31	-31.13	40.00	43.18	84.00	40.82

[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	86.30	20.31	-31.13	40.00	35.48	84.00	48.52

Face-on/Face-off



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

15.225 (b,c) 13.110-14.010 ㎒

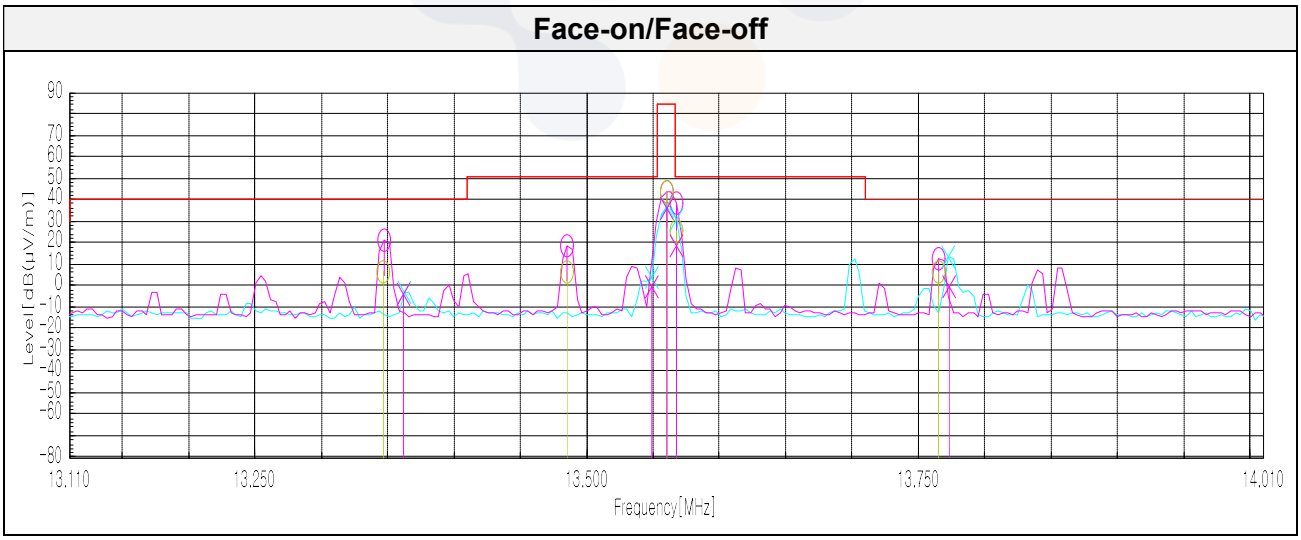
[Face-on]

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	57.10	20.20	-31.04	40.00	6.26	40.50	34.24
13.49	56.90	20.20	-31.03	40.00	6.07	50.50	44.43
13.57	76.40	20.20	-31.02	40.00	25.58	50.50	24.92
13.77	57.20	20.20	-30.99	40.00	6.41	40.50	34.09

[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							
13.36	46.70	20.20	-31.04	40.00	-4.14	50.50	54.64
13.55	50.10	20.20	-31.02	40.00	-0.72	50.50	51.22
13.57	69.10	20.20	-31.02	40.00	18.28	50.50	32.22
13.77	50.20	20.20	-30.99	40.00	-0.59	40.50	41.09

Face-on/Face-off



Test results (9 ㎑ to 30 ㎒)

15.225 (d) 0.009-30 ㎒

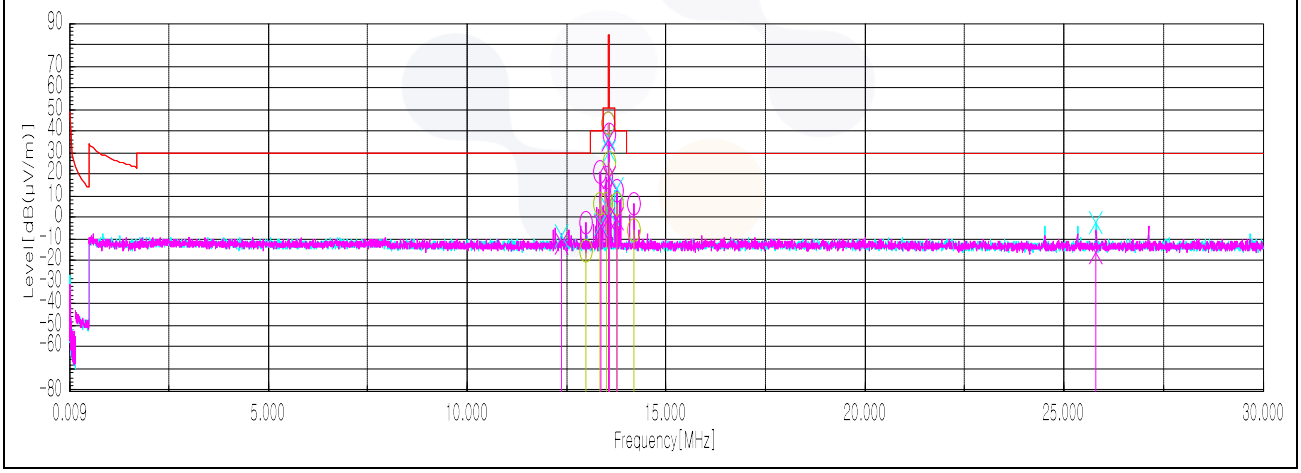
[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
12.99	35.10	20.20	-31.06	40.00	-15.76	29.54	45.30
14.20	44.70	20.20	-30.94	40.00	-6.04	29.54	35.58

[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							
12.37	38.90	20.20	-31.13	40.00	-12.03	29.54	41.57
25.81	33.70	20.69	-30.52	40.00	-16.13	29.54	45.67

Face-on/Face-off

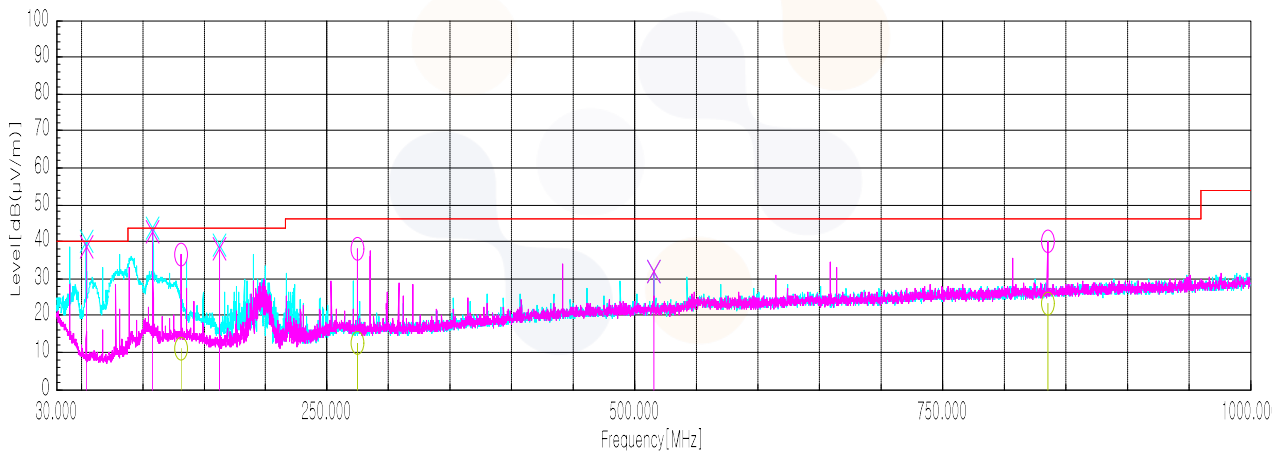


Test results (Below 1 000 ㎒)

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								
54.25	V	54.80	12.78	-29.82	-	37.76	40.00	2.24
108.45	V	52.60	17.70	-28.53	-	41.77	43.50	1.73
131.61	H	20.40	17.80	-28.14	-	10.06	43.50	33.44
162.65	V	48.90	15.84	-27.68	-	37.06	43.50	6.44
274.68	H	19.10	18.62	-26.15	-	11.57	46.00	34.43
835.22	H	16.70	25.90	-20.32	-	22.28	46.00	23.72
515.36	V	31.00	23.31	-23.48	-	30.83	46.00	15.17

Horizontal/Vertical



- 5 V

15.225 (a) 13.553-13.567 ㎒

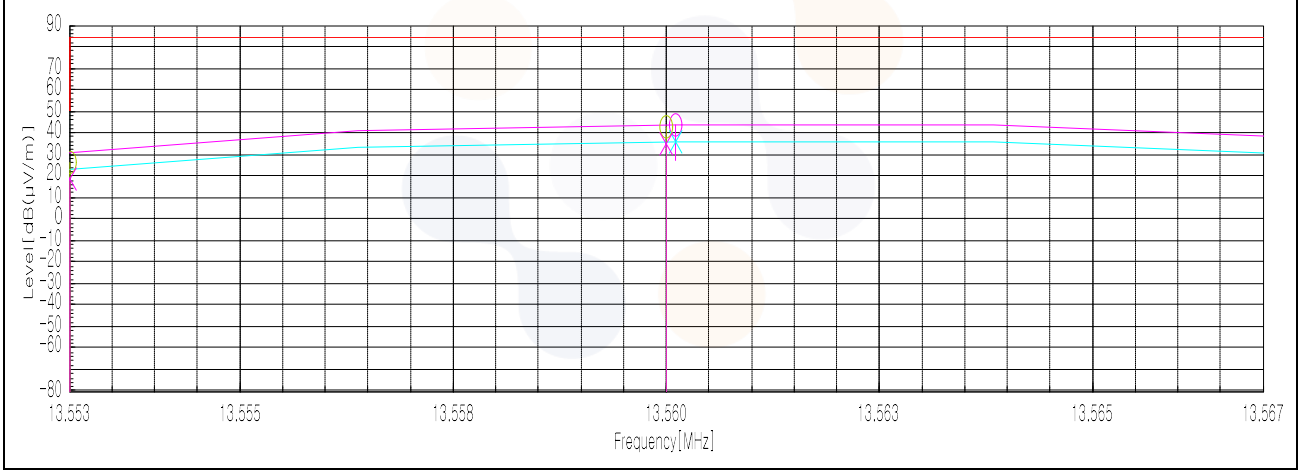
[Face-on]

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	93.40	20.31	-31.13	40.00	42.58	84.00	41.42

[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	95.60	20.31	-31.13	40.00	44.78	84.00	39.22

Face-on/Face-off



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

15.225 (b,c) 13.110-14.010 ㎒

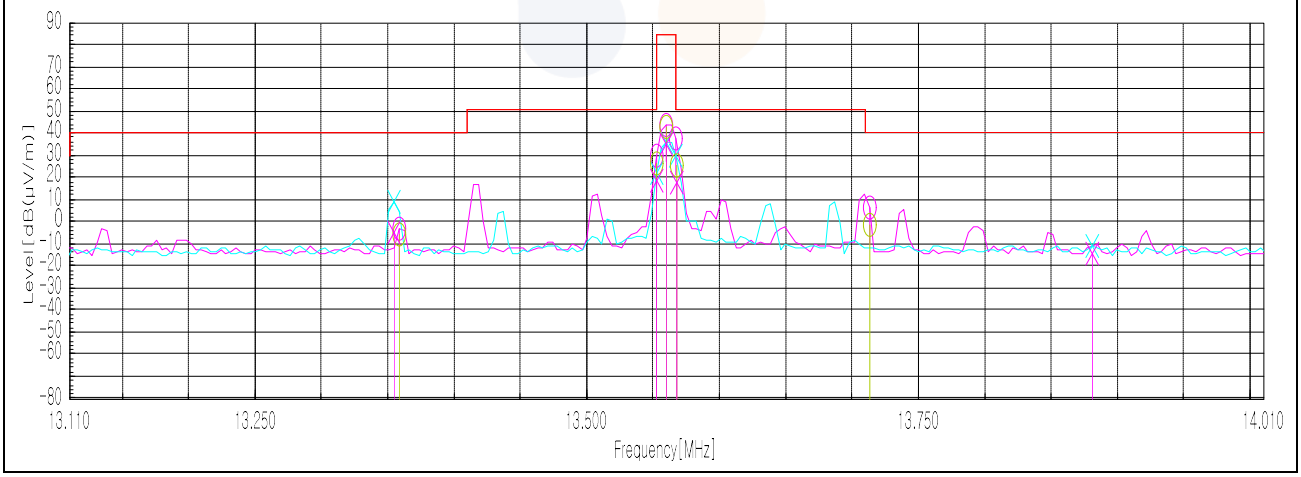
[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
13.36	44.60	20.30	-31.14	40.00	-6.24	40.50	46.74
13.55	77.00	20.31	-31.13	40.00	26.18	50.50	24.32
13.57	76.20	20.31	-31.13	40.00	25.38	50.50	25.12
13.71	49.20	20.32	-31.13	40.00	-1.61	40.50	42.11

[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							
13.36	45.80	20.30	-31.14	40.00	-5.04	50.50	55.54
13.55	69.20	20.31	-31.13	40.00	18.38	50.50	32.12
13.57	68.50	20.31	-31.13	40.00	17.68	50.50	32.82
13.88	35.90	20.33	-31.14	40.00	-14.91	40.50	55.41

Face-on/Face-off



Test results (9 ㎑ to 30 ㎒)

15.225 (d) 0.009-30 ㎒

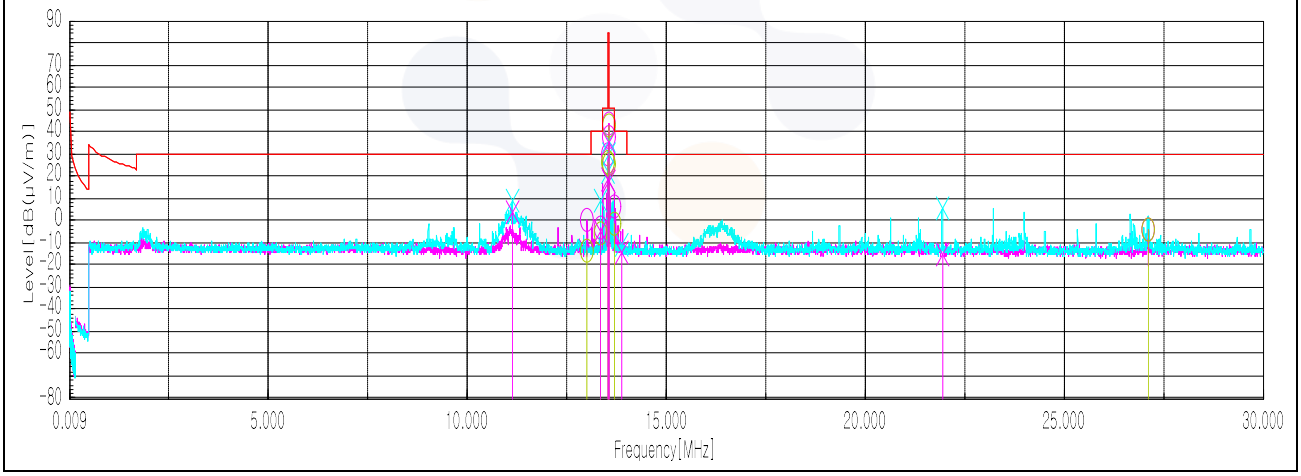
[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
13.02	37.10	20.28	-31.17	40.00	-13.79	29.54	43.33
27.12	45.50	20.66	-30.58	40.00	-4.42	29.54	33.96

[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							
11.14	55.00	20.17	-31.28	40.00	3.89	29.54	25.65
21.94	34.60	20.82	-30.72	40.00	-15.30	29.54	44.84

Face-on/Face-off

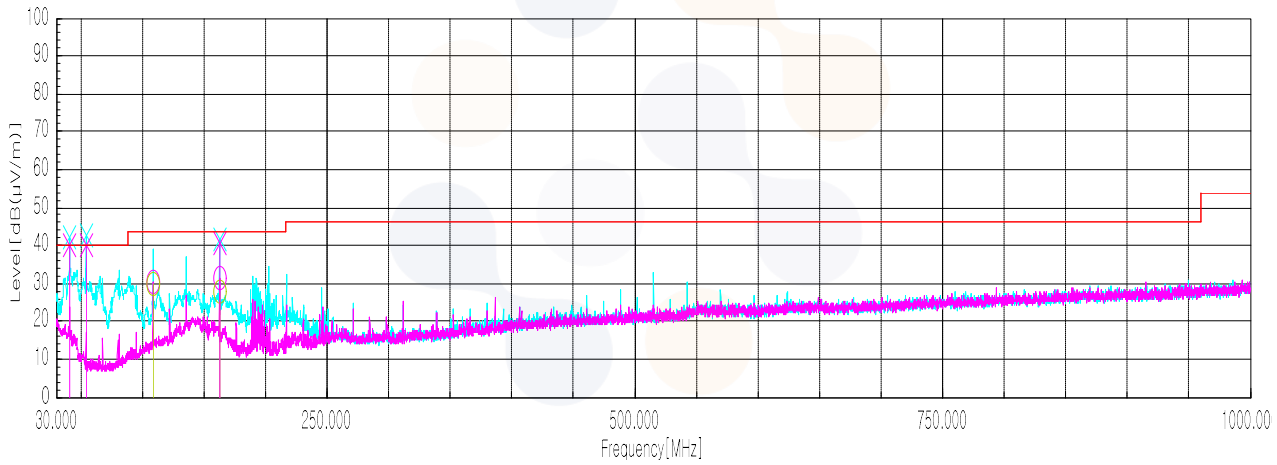


Test results (Below 1 000 ㎒)

15.225 (d) 30-1 000 ㎒

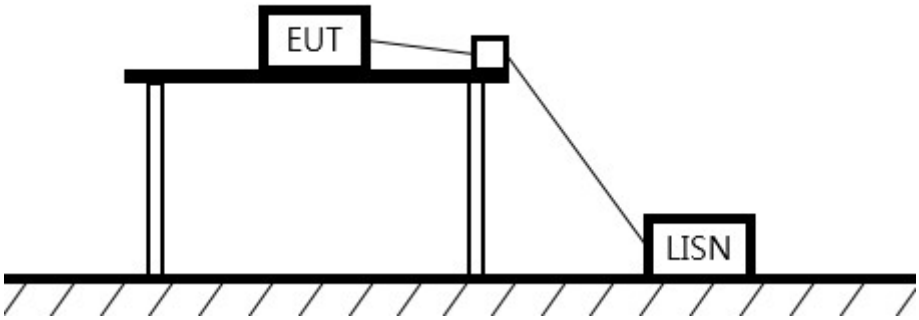
Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data								
40.67	V	50.30	18.93	-29.46	-	37.76	40.00	2.24
54.25	V	56.20	12.63	-29.07	-	41.77	43.50	1.73
108.45	H	39.70	17.63	-27.78	-	10.06	43.50	33.44
162.65	H	39.00	15.80	-26.83	-	37.06	43.50	6.44
162.65	V	51.80	15.80	-26.83	-	11.57	46.00	34.43
40.67	V	50.30	18.93	-29.46	-	37.76	40.00	2.24

Horizontal/Vertical



6.4. AC Conducted emission

Test setup



Limit

According to 15.207(a), RSS-Gen Issue 5 (8.8) 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

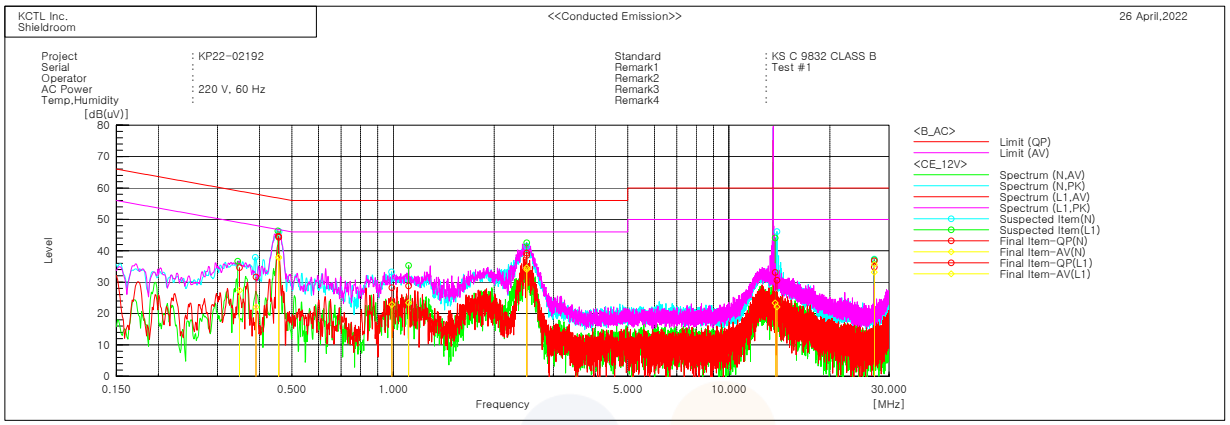
Measurement procedure

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 ㅡ 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

[Tests with the antenna connected]

[12 V]



Final Result

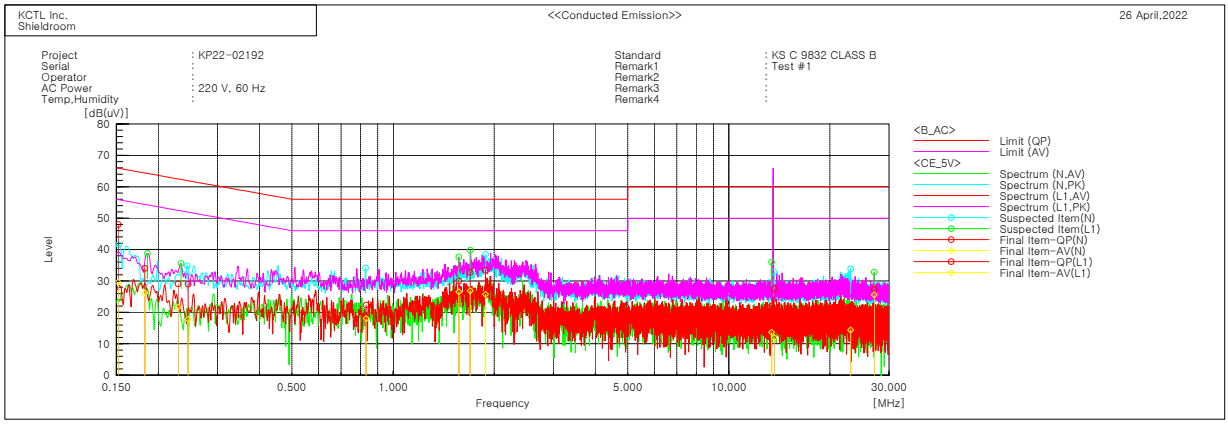
--- N Phase ---

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	0.3905	21.8	12.2	9.8	31.6	22.0	58.1	48.1	26.5	26.1
2	0.45679	34.5	28.0	9.8	44.3	37.8	56.8	46.8	12.5	9.0
3	0.99159	18.5	13.1	9.7	28.2	22.8	56.0	46.0	27.8	23.2
4	2.5018	28.8	24.3	9.7	38.5	34.0	56.0	46.0	17.5	12.0
5	13.90452	20.6	12.1	10.0	30.6	22.1	60.0	50.0	29.4	27.9
6	27.12309	25.0	23.3	9.8	34.8	33.1	60.0	50.0	25.2	16.9

--- 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	0.45624	34.8	28.2	9.8	44.6	38.0	56.8	46.8	12.2	8.8
2	13.73569	23.1	13.3	10.0	33.1	23.3	60.0	50.0	26.9	26.7
3	27.12125	26.9	25.8	9.9	36.8	35.7	60.0	50.0	23.2	14.3
4	0.34903	24.8	17.6	9.8	34.6	27.4	59.0	49.0	24.4	21.6
5	2.49911	29.6	24.9	9.7	39.3	34.6	56.0	46.0	16.7	11.4
6	1.11276	19.1	13.7	9.7	28.8	23.4	56.0	46.0	27.2	22.6

[5 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	0.15181	38.3	19.9	9.7	48.0	29.6	65.9	55.9	17.9	26.3
2	0.24548	19.4	8.2	9.6	29.0	17.8	61.9	51.9	32.9	34.1
3	0.83171	12.6	8.2	9.8	22.4	18.0	56.0	46.0	33.6	28.0
4	1.88561	23.7	16.1	9.7	33.4	25.8	56.0	46.0	22.6	20.2
5	13.63988	17.5	2.0	10.0	27.5	12.0	60.0	50.0	32.5	38.0
6	23.06783	12.0	4.6	9.8	21.8	14.4	60.0	50.0	38.2	35.6

--- 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	0.18225	24.0	16.2	10.0	34.0	26.2	64.4	54.4	30.4	28.2
2	0.22904	19.4	11.8	9.7	29.1	21.5	62.5	52.5	33.4	31.0
3	1.56943	20.3	16.9	9.7	30.0	26.6	56.0	46.0	26.0	19.4
4	1.69744	23.0	17.2	9.7	32.7	26.9	56.0	46.0	23.3	19.1
5	13.41231	12.2	3.7	9.9	22.1	13.6	60.0	50.0	37.9	36.4
6	27.12147	17.4	15.7	9.9	27.3	25.6	60.0	50.0	32.7	24.4

[NFC termination]

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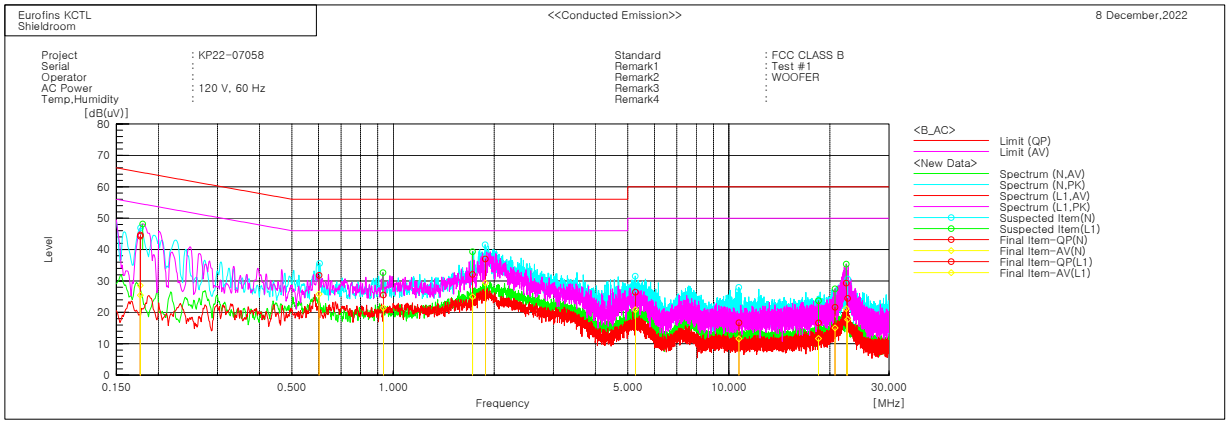

Final Result

--- 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	0.17653	34.2	18.5	10.1	44.3	28.6	64.6	54.6	20.3	26.0
2	0.60177	22.0	16.0	9.8	31.8	25.8	56.0	46.0	24.2	20.2
3	1.8815	27.3	19.7	9.7	37.0	29.4	56.0	46.0	19.0	16.6
4	5.27043	16.7	11.1	9.7	26.4	20.8	60.0	50.0	33.6	29.2
5	10.71494	6.9	1.8	9.8	16.7	11.6	60.0	50.0	43.3	38.4
6	22.59185	14.6	7.8	9.9	24.5	17.7	60.0	50.0	35.5	32.3

--- 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	0.1768	34.6	15.3	10.1	44.7	25.4	64.6	54.6	19.9	29.2
2	0.93564	15.8	11.7	9.7	25.5	21.4	56.0	46.0	30.5	24.6
3	1.72494	22.4	15.3	9.7	32.1	25.0	56.0	46.0	23.9	21.0
4	18.5046	6.6	1.6	10.0	16.6	11.6	60.0	50.0	43.4	38.4
5	20.7208	11.6	5.0	10.0	21.6	15.0	60.0	50.0	38.4	35.0
6	22.37004	19.3	11.2	10.0	29.3	21.2	60.0	50.0	30.7	28.8

7. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Vector Signal Generator	R&S	SMBV100A	257566	23.01.19
Spectrum Analyzer	R&S	FSV40-N	101462	23.01.06
AC/DC Power Supply	KIKUSUI	PCR2000W	GB001619	23.07.11
Temp & Humid Chamber	Myeongseong R&P	CTHC-50P-DT	20150824-1	22.12.21
LOOP Antenna	R&S	HFH2-Z2	100355	24.08.10
Bi-Log Antenna	TESEQ	CBL 6112D	62438	24.08.24
ATTENUATOR	KEYSIGHT	8491B-6dB	MY39271060	24.04.27
Amplifier	SONOMA INSTRUMENT	310N	284608	23.08.18
EMI TEST RECEIVER	R&S	ESCI7	101408	23.03.04
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