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-SRF0088-A Page (1) of (25)	eurofins | KCTL

1. Client

- Name : VC Inc.
- Address : 23, Teheran-ro 108-gil, Gangnam-gu, Seoul, Republic of Korea
- Date of Receipt : 2022-12-13

2. Use of Report : Certification

3. Name of Product / Model : Swing Caddie / SC4

4. Manufacturer / Country of Origin : VC Inc. / Korea

5. FCC ID : 2ABTKSC4

6. IC Certificate No. : 30154-SC4

7. Date of Test : 2023-02-14 to 2023-02-28

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

9. Test method used : FCC Part 15 Subpart C, 15.249
RSS-210 Issue 10 April 2020
RSS-Gen Issue 5 February 2021

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

Affirmation	Tested by Name : Minki Kim (Signature)	Technical Manager Name : Heesu Ahn (Signature)

2023-04-07

Eurofins KCTL Co.,Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2023-03-31	Originally issued	-
2023-04-07	Updated	4

Note. The report No. KR23-SRF0088 is superseded by the report No. KR23-SRF0088-A.

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	:	VC Inc.
Address	:	23, Teheran-ro 108-gil, Gangnam-gu, Seoul, Republic of Korea
Manufacturer	:	VC Inc.
Address	:	23, Teheran-ro 108-gil, Gangnam-gu, Seoul, 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	:	Swing Caddie
Model	:	SC4
Modulation technique	:	GFSK (Bluetooth Low Energy) FMCW (24 ㎓ radar sensor)
Number of channels	:	40 ch (Bluetooth Low Energy) 1 ch (24 ㎓ radar sensor)
Power source	:	DC 3.85 V (Battery)
Antenna specification	:	Chip antenna (Bluetooth Low Energy) PCB Array antenna (24 ㎓ radar sensor)
Antenna gain	:	1.8 ㏈i (Bluetooth Low Energy) 8.05 ㏈i (24 ㎓ radar sensor)
Frequency range	:	2 402 ㎒ ~ 2 480 ㎒ (Bluetooth Low Energy) 24 050 ㎒ ~ 24 250 ㎒ (24 ㎓ radar sensor)
Software version	:	1.0
Hardware version	:	1.0
Test device serial No.	:	SC40B23001067
Operation temperature	:	-10 ℃ ~ 50 ℃

2.1. Frequency/channel operations

This device contains the following capabilities:
Bluetooth Low Energy, 24 ㎓ radar sensor

Ch.	Frequency (㎓)
0	24.111 9

Table 2.1.1 24 ㎓ Radar

2.2. Simultaneous Tx Condition

Test mode	24 ㎓ Radar sensor	Bluetooth LE
Case1	O	O

Notes.

1. The worst Spurious emission or Band-edge condition among the channels and modes were selected for test.

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.

Requirement of RSS-Gen Section 6.8:

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

- The transmitter has permanently attached PCB Array Antenna on board.
- The E.U.T Complies with the requirement of §15.203, §15.249.

4. Summary of tests

FCC Part section(s)	IC Rule Referene	Parameter	Test Condition	Test results
15.215(c)	-	20 dB Bandwidth	Radiated	Pass
-	RSS-Gen (6.7)	Occupied Bandwidth		Pass
15.249 (a),(d),(e)	RSS-210 Annex B.10	Field strength of fundamental & harmonic		Pass
15.207(a)	RSS-Gen (8.8)	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. According to exploratory test no any obvious emission were detected from 9 ㎑ to 30 ㎒. Although 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 test procedure(s) in this report were performed in accordance as following.
   - ANSI C63.10-2013

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	Below 30 ㎒	2.3 dB
	30 ㎒ ~ 1 000 ㎒	2.5 dB
	1 000 ㎒ ~ 18 000 ㎒	4.7 dB
	Above 18 000 ㎒	4.8 dB
	Above 40 000 ㎒	4.8 dB
Conducted emissions	150 ㎑ ~ 30 ㎒	2.7 dB

6. Test results

6.1. 20 dB Bandwidth & 99% Bandwidth

Limit

According to §15.215(c)and RSS-Gen(6.7), For 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.
The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained.

Test procedure

ANSI C63.10 – Section 6.9.2, 6.9.3

Occupied bandwidth (or 20 dB emission bandwidth)

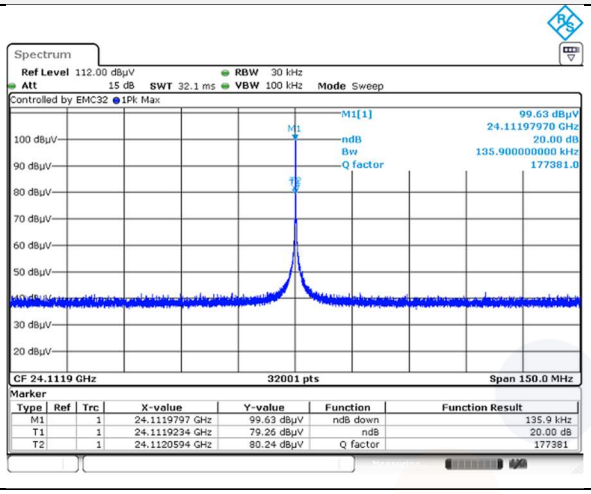
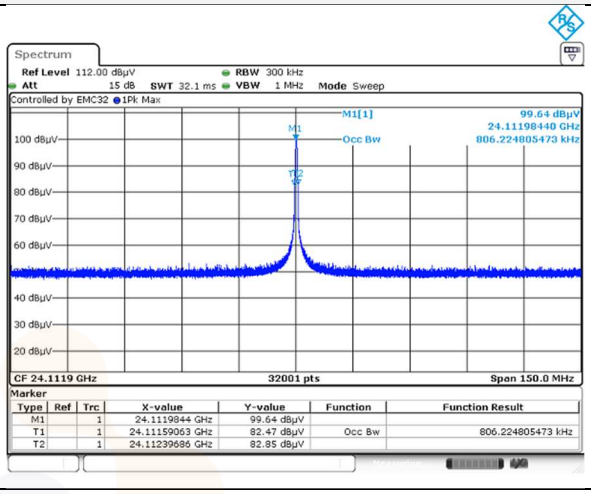
The occupied bandwidth is measured as the width of the spectral envelope of the modulated signal, at an amplitude level reduced from a reference value by a specified ratio (or in decibels, a specified number of dB down from the reference value). Typical ratios, expressed in dB, are −6 dB, −20 dB, and −26 dB, corresponding to 6 dB BW, 20 dB BW, and 26 dB BW, respectively. In this subclause, the ratio is designated by “−xx dB.” The reference value is either the level of the unmodulated carrier or the highest level of the spectral envelope of the modulated signal, as stated by the applicable requirement. Some requirements might specify a specific maximum or minimum value for the “−xx dB” bandwidth; other requirements might specify that the “−xx dB” bandwidth be entirely contained within the authorized or designated frequency band

Occupied bandwidth (or 99% emission bandwidth)

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth

Test results

Frequency(㎓)	20 ㏈ bandwidth(㎒)	99% bandwidth(㎒)
24.111 9	0.14	0.81

20 ㏈ bandwidth	99% bandwidth
	

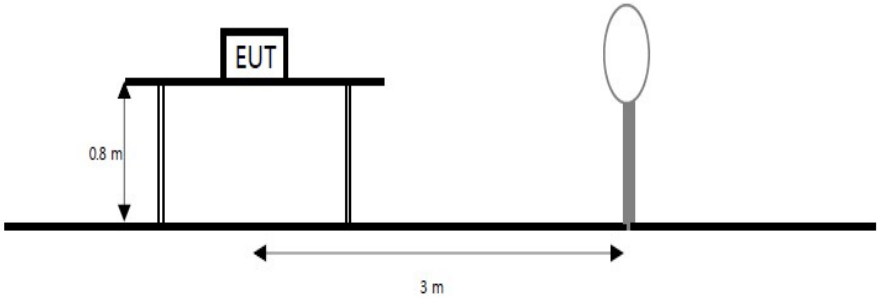
Note:

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.

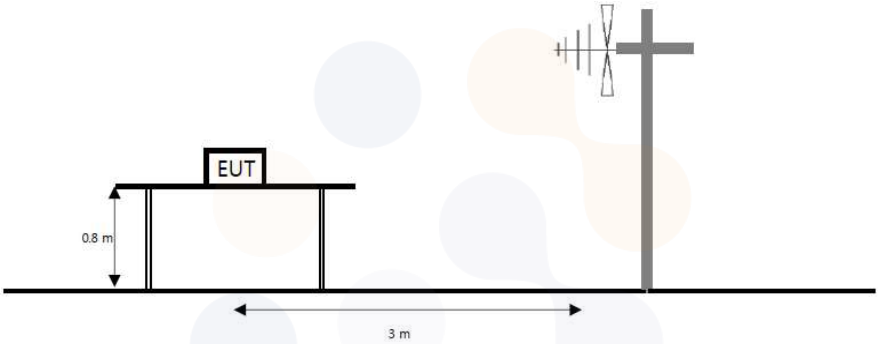
6.2. Field strength of fundamental & harmonic

Test setup

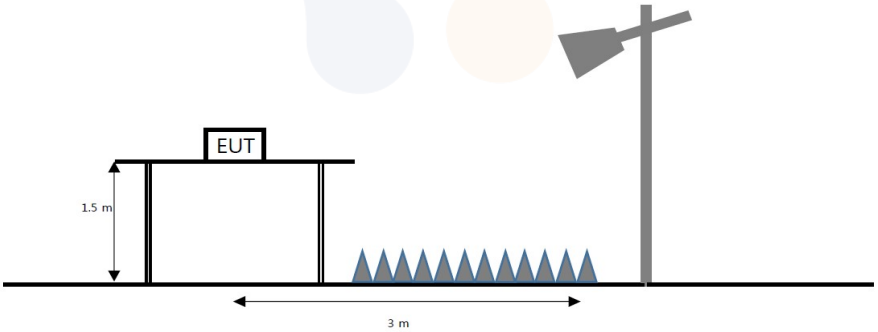
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ emissions.



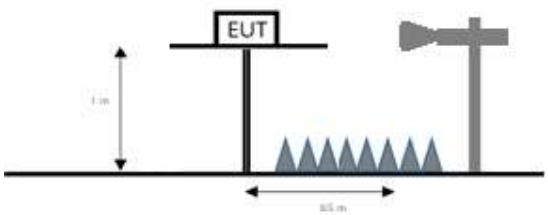
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 ㎓ to 40 ㎓ emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from Above 40 ㎓ emissions.



Limit

FCC

According to section 15.209(a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (㎒)	Field strength (㎶/m)	Measurement distance (m)
0.009 - 0.490	2 400/F(㎑)	300
0.490 - 1.705	24 000/F(㎑)	30
1.705 - 30	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 ㎒, 76–88 ㎒, 174–216 ㎒ or 470–806 ㎒. However, operation within these frequency bands is permitted under other sections of this part, e.g., Section15.231 and 15.241.

According to section 15.249(a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Frequency (㎒)	Field strength of fundamental (㎷/m)	Field strength of harmonics (㎶/m)
902 – 928	50	500
2 400 – 2 483.5	50	500
5 725 – 5 875	50	500
24 000 – 24 250	250	2 500

(b) Fixed, point-to-point operation as referred to in this paragraph shall be limited to systems employing a fixed transmitter transmitting to a fixed remote location. Point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information are not allowed. Fixed, point-to-point operation is permitted in the 24.05-24.25 ㎓ band subject to the following conditions:

(1) The field strength of emissions in this band shall not exceed 2 500 millivolts/meter.
(2) The frequency tolerance of the carrier signal shall be maintained within ±0.001% 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.
(3) Antenna gain must be at least 33 ㏈i. Alternatively, the main lobe beamwidth must not exceed 3.5 degrees. The beamwidth limit shall apply to both the azimuth and elevation planes. At antenna gains over 33 ㏈i or beamwidths narrower than 3.5 degrees, power must be reduced to ensure that the field strength does not exceed 2 500 millivolts/meter.

(c) Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

IC

According to RSS-Gen(8.9), except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in table 5 and table 6. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.

Table 5- General field strength limits at frequencies above 30 ㎒

Frequency(㎒)	Field strength (㎶/m at 3 m)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

Table 6- General field strength limits at frequencies below 30 ㎒

Frequency	Magnetic field strength (H-Field) (㎂/m)	Measurement distance(m)
9 – 490 ㎑ 1)	6.37/F (F in ㎑)	300
490 – 1705 ㎑	63.7/F (F in ㎑)	30
1.705 - 30 ㎒	0.08	30

Note 1: The emission limits for the ranges 9-90 ㎑ and 110-490 ㎑ are based on measurements employing a linear average detector.

According to RSS-210 Annex B.10 devices shall comply with the following requirements:
(a) The field strength of fundamental and harmonic emissions measured at 3 m shall not exceed the limits in table B2.

Table B2- Field strength limits at various frequencies

Frequency Band (㎒)	Field strength (㎷/m)	
	Fundamental emissions	Harmonic emissions
902-928	50	0.5
2 400-2 483.5	50	0.5
5 725-5 875	50	0.5
24 000-24 250	250	2.5

The field strength shall be measured using an average detector, except for the fundamental emission in the frequency band 902-928 ㎒, which is based on measurements using an International Special Committee on Radio Interference (CISPR) quasi-peak detector.

(b) Emissions radiated outside of the specified frequency bands, except for harmonic emissions, shall be attenuated by at least 50 ㏈ below the level of the fundamental emissions or to the general field strength limits listed in RSS-Gen, whichever is less stringent.

The provisions of RSS-Gen regarding pulsed operation do not apply to CISPR measurement for the band 902-928 ㎒.

Models of devices operating in the 24-24.25 ㎓ frequency band, compliant with RSS-310, issue 4, that were previously certification-exempt, may continue to be manufactured, imported, distributed, leased, offered for sale or sold, for the life of the vehicle within which such device models are already installed, for the purpose of replacing or repairing defective, damaged or potentially malfunctioning devices.

Notwithstanding the above, effective 18 months after the publication of this standard, devices installed on new vehicles shall comply with RSS-210, section B.10.

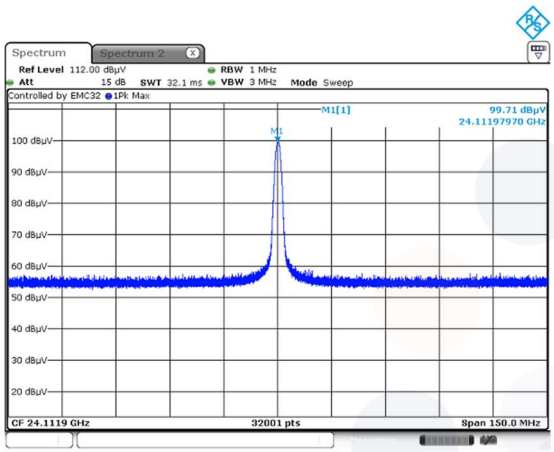
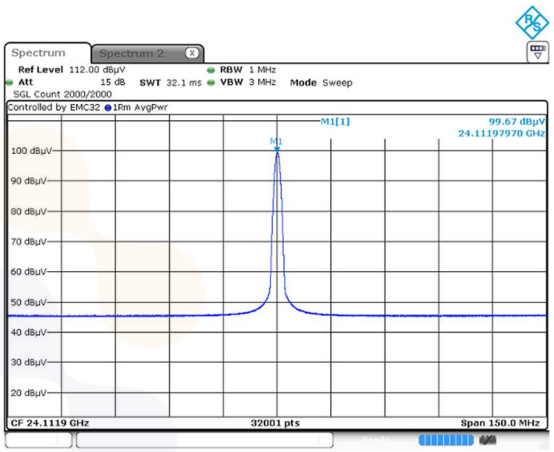
Notes:

1. *f* <30 ㎒, extrapolation factor of 40 ㏈/decade of distance. $F_d = 40\log(D_m/D_s)$
   f ≥30 ㎒, extrapolation factor of 20 ㏈/decade of distance. $F_d = 20\log(D_m/D_s)$
   Where:
   F_d= Distance factor in ㏈
   D_m= Measurement distance in meters
   D_s= Specification distance in meters
2. Factors(㏈) = Antenna factor(㏈/m) + Cable loss(㏈) + or Amp. gain(㏈) - or F_d(㏈)
3. The worst-case emissions are reported however emissions whose levels were not within 20 ㏈ of respective limits were not reported.
4. 1) means restricted band
5. Average test would be performed if the peak result were greater than the average limit.
6. Band edge Limit = The main wave limit is 250 ㎷/m at 3 m, attenuate 50 ㏈.
   This Average limit, so:
   107.96 ㏈㎶ - 50 ㏈ = 57.96 ㏈㎶
   General 15.209 limit = 54.00 ㏈㎶
   57.96 ㏈㎶ or 54.00 ㏈㎶ whichever is the lesser arrenuation.
   This results Band edge limit 57.96 ㏈㎶
7. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X ㎑ resulted in a level of Y ㏈㎶/m, which is equivalent to Y - 51.5 = Z ㏈㎂/m, which has the same margin, W ㏈, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

Test results

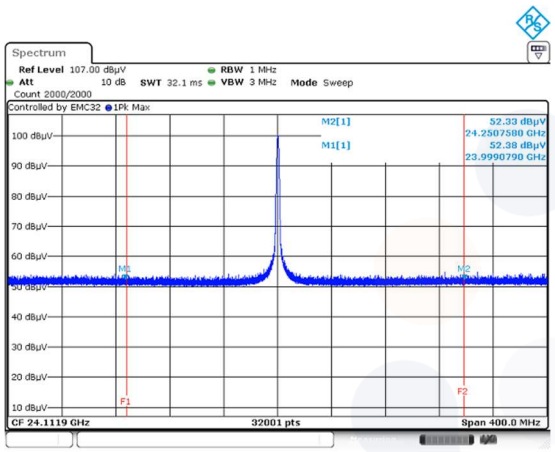
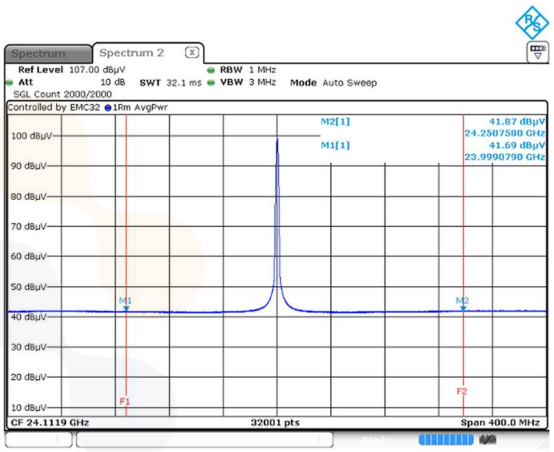
(Field strength of fundamental)

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB(μV)]	[dB]	[dB]	[dB]	[dB(μV/m)]	[dB(μV/m)]	[dB]
Peak data								
24 111.98	H	99.71	45.44	-40.13	-	105.02	127.96	22.94
Average Data								
24 111.98	H	99.67	45.44	-40.13	-	104.98	107.96	2.98

Peak Data	Average Data
	

(Field strength of band edges)

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB(μV)]	[dB]	[dB]	[dB]	[dB(μV/m)]	[dB(μV/m)]	[dB]
Peak data								
23 999.08[1)]	H	52.38	45.40	-40.22	-	57.56	77.96	20.40
24 250.76	H	52.33	45.50	-40.01	-	57.82	77.96	20.14
Average Data								
23 999.08[1)]	H	41.69	45.40	-40.22	-	46.87	57.96	11.09
24 250.76	H	41.87	45.50	-40.01	-	47.36	57.96	10.60

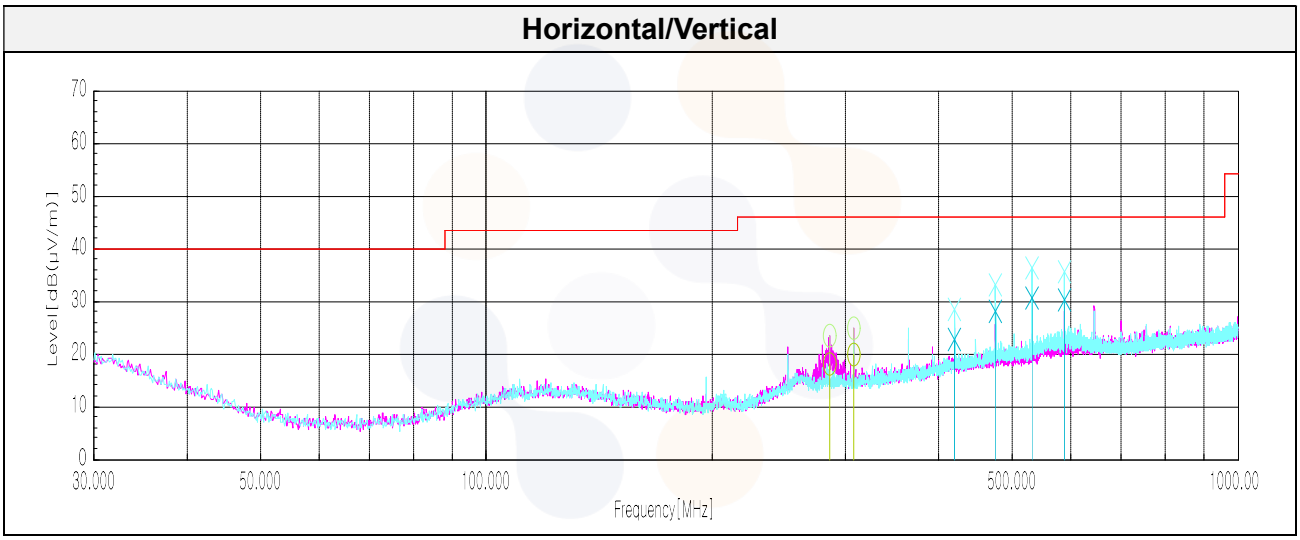
Peak Data	Average Data
	

Test results

(30 ~ 1 000 ㎒)

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data								
286.44	H	30.50	18.90	-31.25	-	18.15	46.00	27.85
308.03	H	31.70	19.30	-31.24	-	19.76	46.00	26.24
420.06	V	31.20	22.40	-31.02	-	22.58	46.00	23.42
476.08	V	35.80	23.00	-30.81	-	27.99	46.00	18.01
531.98	V	37.80	23.30	-30.69	-	30.41	46.00	15.59
588.11	V	36.40	24.51	-30.62	-	30.29	46.00	15.71

Horizontal/Vertical

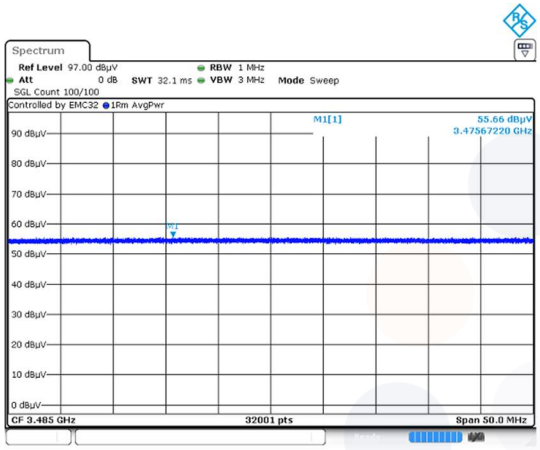
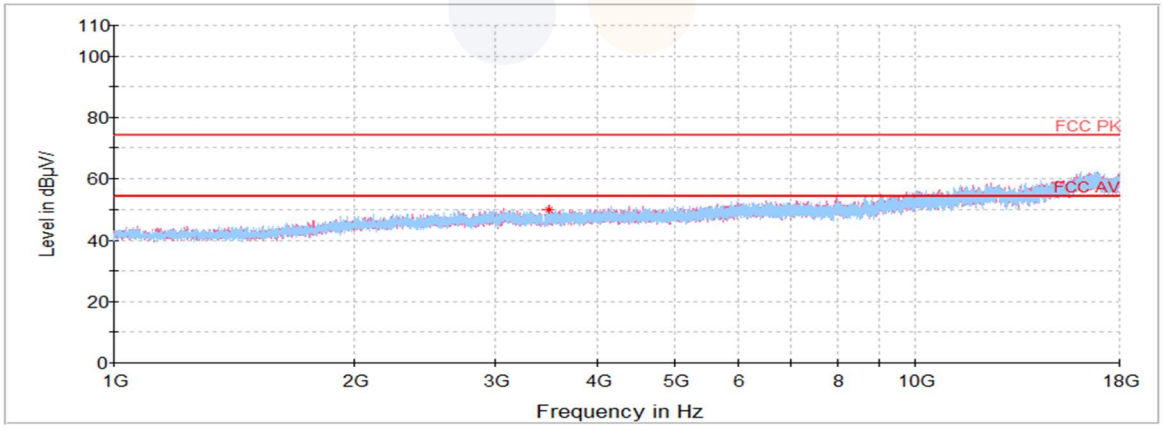


Note : The measurement results below 30 ㎒ is greater than 20 dB below the limit, so only the radiated spurious emissions from 30 ㎒ to 100 ㎓ were reported.

Test results

(1 000 ~ 18 000 ㎒)

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
[㎒]	[V/H]	[dB(㎶)]	[dB]	[dB]	[dB]	[dB(㎶/m)]	[dB(㎶/m)]	[dB]
Peak data								
3 475.67	H	65.71	33.01	-48.67	-	50.05	74.00	23.95
Average Data								
3 475.67	H	55.66	33.01	-48.67	-	40.00	54.00	14.00

Average Data	
	Blank
Horizontal/Vertical	
	

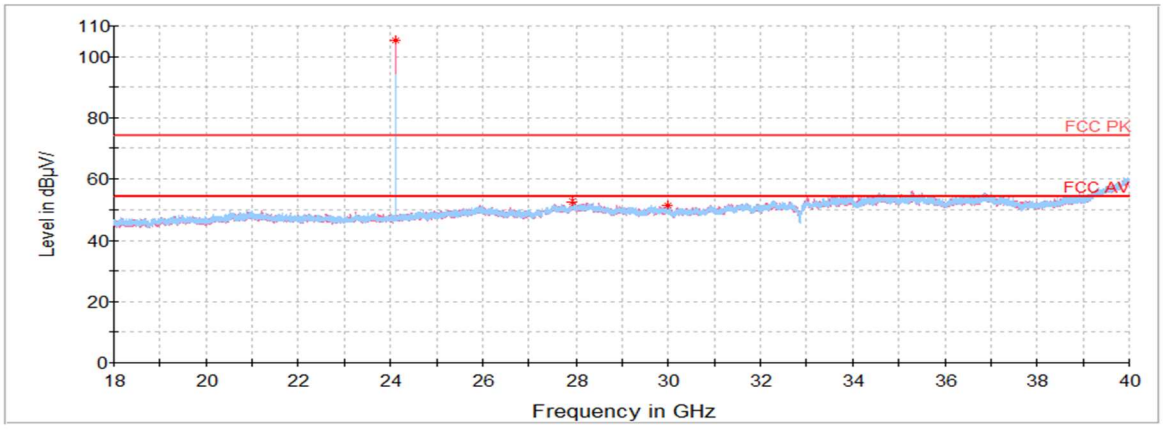
Test results

(18 000 ~ 40 000 ㎒)

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
[㎒]	[V/H]	[dB(μV)]	[dB]	[dB]	[dB]	[dB(μV/m)]	[dB(μV/m)]	[dB]
Peak data								
24 111.88*	V	99.88	45.44	-40.13	-	105.19	-	-
27 925.08	V	41.07	46.78	-35.30	-	52.55	74.00	21.45
29 956.16	H	40.92	46.31	-35.71	-	51.52	74.00	22.48
Average Data								
27 925.08	V	39.68	46.78	-35.30	-	51.16	54.00	2.84
29 956.16	H	38.95	46.31	-35.71	-	49.55	54.00	4.45

Average Data

Horizontal/Vertical

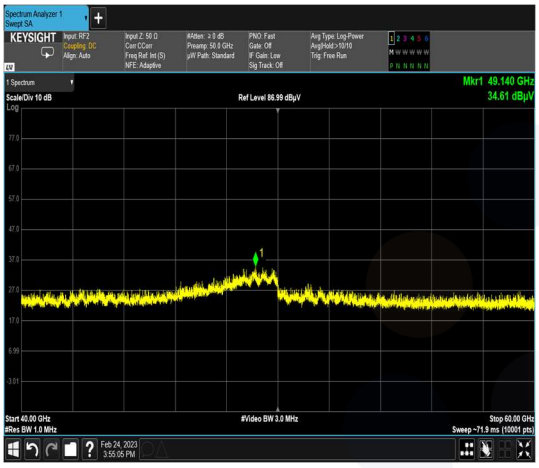
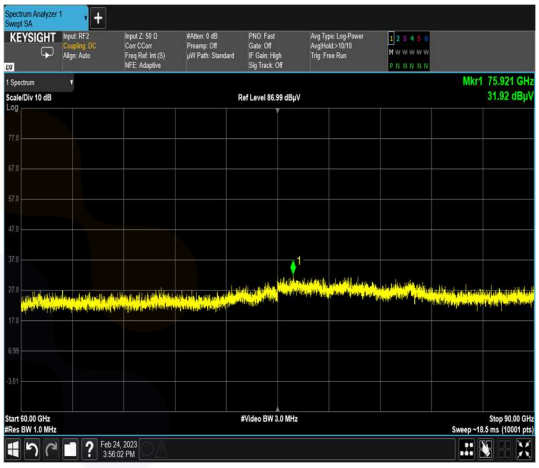
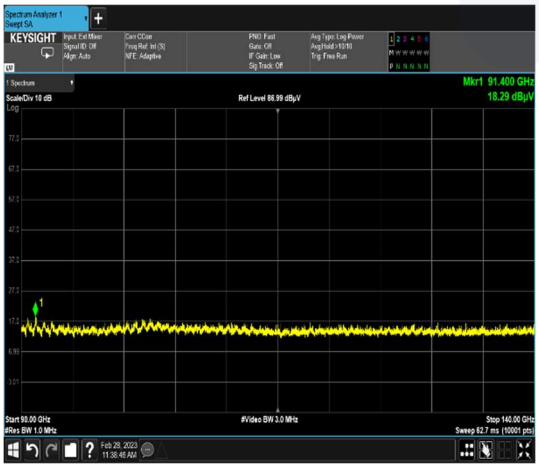


Note : Equipment's fundamental frequency, no need to evaluate it.

Test results

(40 000 ~ 140 000 ㎒)

Frequency	Pol.	Reading	Antenna Factor	Cable Loss	Mixer Loss	Distance Factor	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data									
49 140.00	V	34.61	41.10	11.01	-	15.56	71.16	87.96	16.80
75 921.00	V	31.92	44.90	21.87	-	15.56	83.13	87.96	4.83
91 400.00	V	18.29	47.10	0.37	36.21	15.56	86.41	87.96	1.55

Horizontal/Vertical 40 ~ 60 ㎓	Horizontal/Vertical 60 ~ 90 ㎓
	
Horizontal/Vertical 90 ~ 140 ㎓	**-**
	Blank

Note :
1. Distance Factor = 20*log(3/0.5)

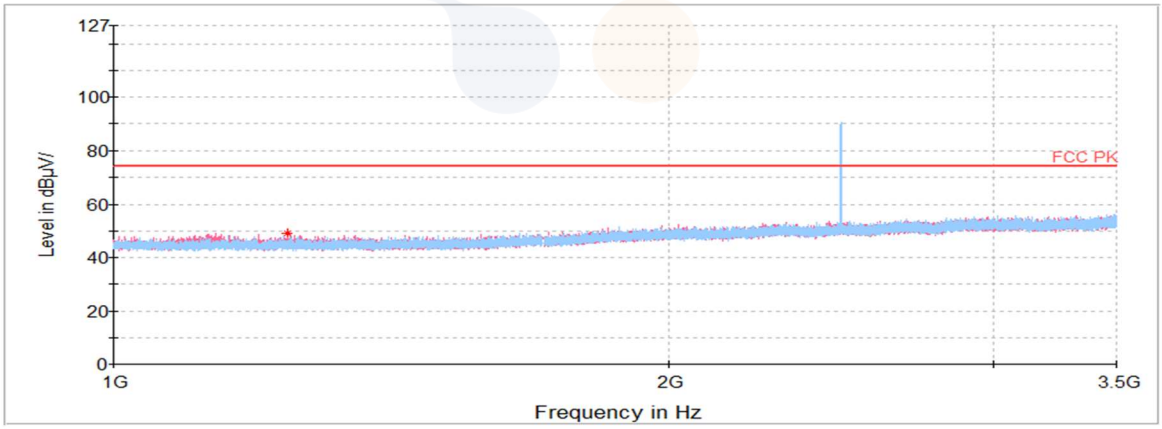
Spurious Emission for Simultaneous Tx Condition

Case1	24 ㎓ radar sensor	Bluetooth
Mode	24 ㎓ radar sensor	Bluetooth LE
Channel	-	40
Frequency	24.111 9 ㎓	2 480 ㎒
Data Rate	-	1M Bits/s, 37 Packet

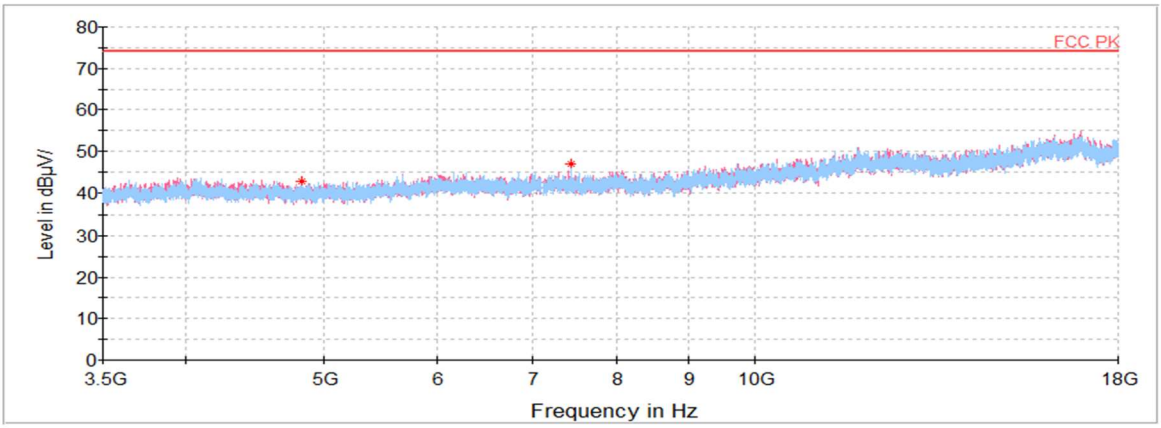
Notes.
1. The worst Spurious emission or Band-edge condition among the channels and modes were selected for test.

Test results – Case1 : Bluetooth LE _1M_2 480 ㎒ + 24 ㎓ radar sensor (1 000 ~ 40 000 ㎒)

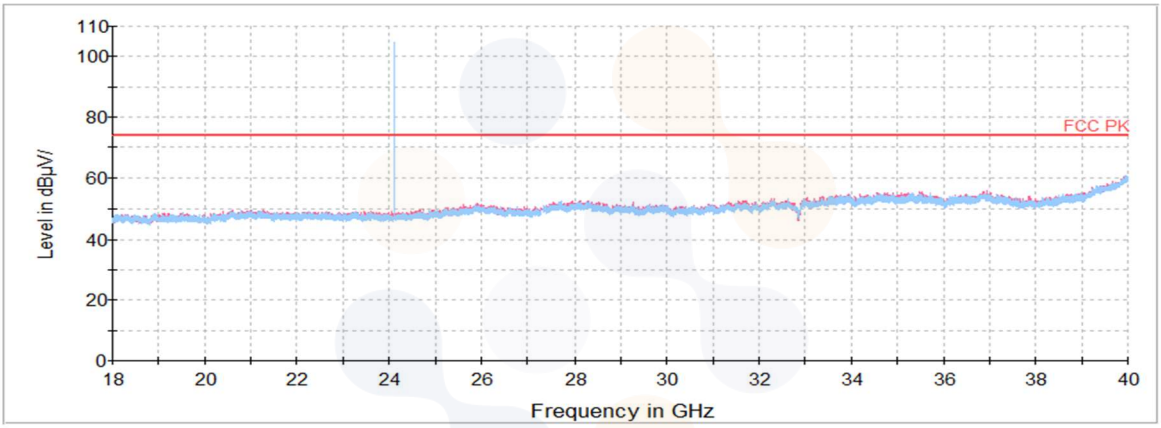
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
1 243.52	V	41.52	28.15	-20.52	-	49.15	74.00	24.85
4 823.13[1)]	H	65.01	33.70	-55.90	-	42.81	74.00	31.19
7 439.02[1)]	H	63.71	35.19	-51.95	-	46.95	74.00	27.05
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								
Horizontal/Vertical for 1 ㎓ ~ 3.5 ㎓								



Horizontal/Vertical for 3.5 ㎓ ~ 18 ㎓

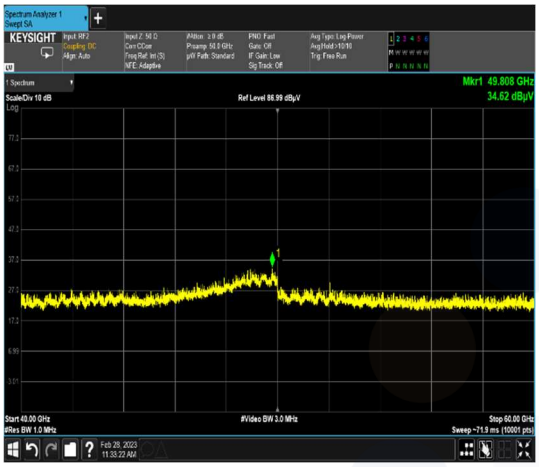
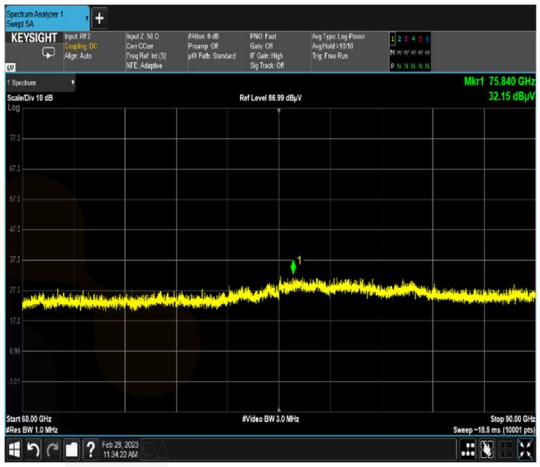
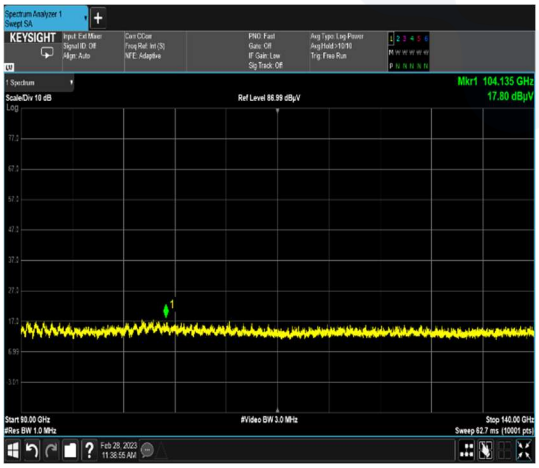


Horizontal/Vertical for 18 ㎓ ~ 40 ㎓



(40 000 ~ 140 000 ㎒)

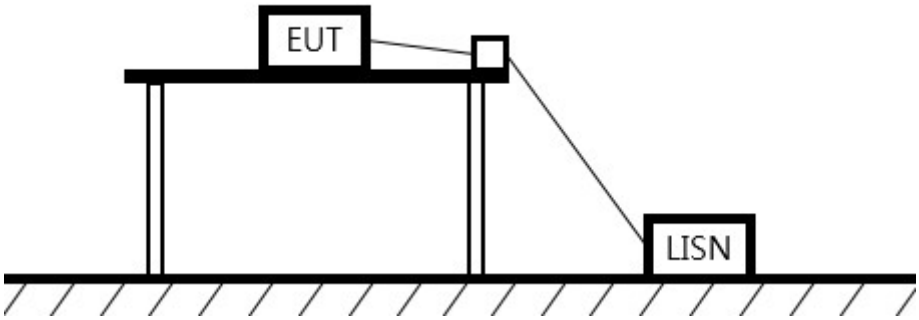
Frequency	Pol.	Reading	Antenna Factor	Cable Loss	Mixer Loss	Distance Factor	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data									
49 808.00	V	34.62	41.40	10.80	-	15.56	71.26	87.96	16.70
75 840.00	V	32.15	44.90	21.87	-	15.56	83.36	87.96	4.60
104 135.00	No spurious emissions were detected								

Horizontal/Vertical 40 ~ 60 ㎓	Horizontal/Vertical 60 ~ 90 ㎓
	
Horizontal/Vertical 90 ~ 140 ㎓	**-**
	Blank

Note :
1. Measurements were made with RBW 1 ㎒, 100 ㎑ and 10 ㎑ for the 90 ㎓ ~ 140 ㎓ spurious region, but no signal was detected.
2. Distance Factor = 20*log(3/0.5)

6.3. AC Conducted emission

Test setup



Limit

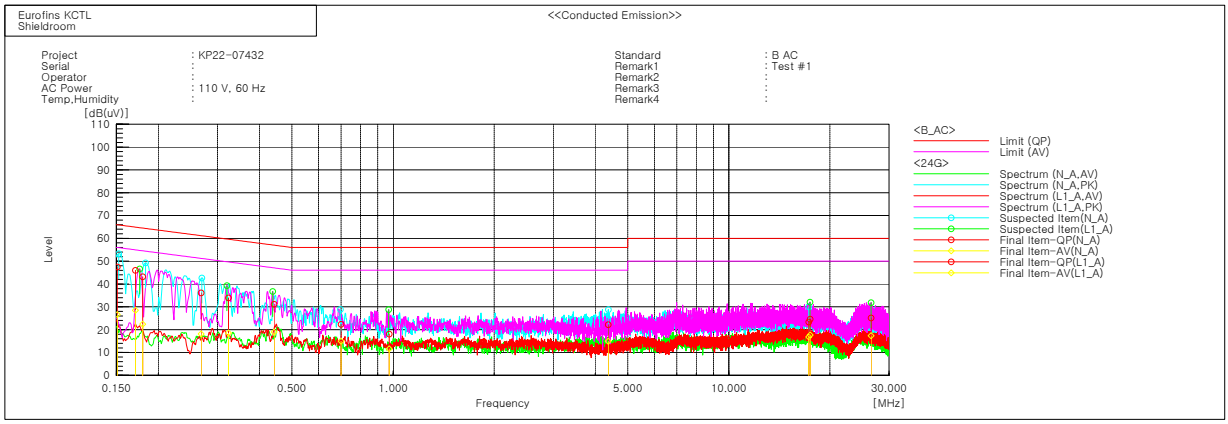
According to 15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 ㎑ to 30 ㎒, shall not exceed the limits in the following 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 (㏈㎶/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



Final Result

--- N_A 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	0.15093	37.5	16.7	9.9	47.4	26.6	65.9	55.9	18.5	29.3
2	0.17966	32.9	12.2	10.2	43.1	22.4	64.5	54.5	21.4	32.1
3	0.26803	26.3	8.3	9.8	36.1	18.1	61.2	51.2	25.1	33.1
4	0.70042	12.4	5.1	9.9	22.3	15.0	56.0	46.0	33.7	31.0
5	4.37387	12.3	5.0	9.9	22.2	14.9	56.0	46.0	33.8	31.1
6	17.28905	12.6	6.1	10.7	23.3	16.8	60.0	50.0	36.7	33.2

--- L1_A 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	0.17095	35.8	18.2	10.2	46.0	28.4	64.9	54.9	18.9	26.5
2	0.32334	24.1	8.7	9.8	33.9	18.5	59.6	49.6	25.7	31.1
3	0.44236	21.2	9.1	9.9	31.1	19.0	57.0	47.0	25.9	28.0
4	0.97435	8.1	1.7	9.9	18.0	11.6	56.0	46.0	38.0	34.4
5	17.46112	14.0	7.0	10.6	24.6	17.6	60.0	50.0	35.4	32.4
6	26.51913	14.1	6.3	11.0	25.1	17.3	60.0	50.0	34.9	32.7

7. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV40	100989	23.10.14
Horn antenna	ETS.lindgren	3117	155787	23.09.29
Horn antenna	ETS.lindgren	3116	86632	24.01.25
Attenuator	API Inmet	40AH2W-10	12	23.05.03
AMPLIFIER	B&Z Technologies	BZRT-00504000-481055-382525	26299-27735	23.09.19
High pass Filter	Qotana	DBHF058004000A	20070100016	23.07.04
TWO-LINE V - NETWORK	R&S	ENV216	101358	23.09.29
EMI TEST RECEIVER	R&S	ESCI3	100001	23.08.18
Vector Signal Generator	R&S	SMBV100A	257566	23.07.04
Signal Generator	R&S	SMB100A	176206	24.01.19
Spectrum Analyzer	R&S	FSVA40	101575	23.07.22
PSA Spectrum Analyzer	Agilent	E4440A	MY46186407	23.07.11
Amplifier	SONOMA INSTRUMENT	310N	421821	23.12.14
Bilog Antenna	Teseq GmbH	CBL 6112D	63756	24.11.17
Loop Antenna	R&S	HFH2-Z2	100355	24.08.10
UXA Signal Analyzer	KEYSIGHT	N9041B	MY60100003	24.01.19
Millimeter Wave Source Module	OML, Inc.	S19MS-A	190725-1	23.10.26
Millimeter Wave Source Module	OML, Inc.	S12MS-A	190621-1	23.10.26
Millimeter Wave Source Module	OML, Inc.	S08MS-A	190621-1	23.10.26
Harmonic Mixer	OML, Inc.	M08HWD	190621-1	23.10.27
Horn Antenna	OML, Inc.	M19RH	190621-1	23.10.28
Horn Antenna	OML, Inc.	M12RH	190621-1	23.10.28
Horn Antenna	OML, Inc.	M08RH	190621-1	23.10.28
Horn Antenna	OML, Inc.	M19RH	190621-2	23.10.28
Horn Antenna	OML, Inc.	M12RH	190621-2	23.10.28
Horn Antenna	OML, Inc.	M08RH	190621-2	23.10.28
mmWave Single-Axis measuring jig	C&K Technologies, Inc.	N/A	N/A	N/A
Antenna Mast	Innco Systems	MA4640-XP-ET	N/A	N/A
Turn Table	Innco Systems	CO3000	1175/45850319/P	N/A
Controller	INNCO SYSTEMS	CO3000	1441/54370322/P	N/A
Antenna Mast	INNCO SYSTEMS	MA4640-XP-ET	N/A	N/A
Turn Device	INNCO SYSTEMS	DS1200-S-1t	N/A	N/A

End of test report