



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.: KR24-SEF0098 Page (1) of (24)	 KCTL
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1. Client	
◦ Name	: Uniden America Corporation
◦ Address	: 301 International Parkway, Suite 460 Flower Mound, TX 75022
◦ Date of Receipt	: 2024-06-03
2. Use of Report	: -
3. Name of Product / Model	: RADAR DETECTOR / R4w
4. Manufacturer / Country of Origin	: ATTOWAVE CO., LTD / Korea
5. Date of Test	: 2024-06-18
6. Location of Test	: ☒ Permanent Testing Lab ☐ On Site Testing (Address: 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)
7. Test method used	: ANSI C63.4:2014, Class B FCC Part 15 Subpart B
8. FCC ID	: AMWUA2401
9. Test Results	: Refer to the test result in the test report

Affirmation	Tested by 	Technical Manager 
	Name : Mincheol Baek (Signature)	Name : Moonseop Cho (Signature)

2024-07-05

Eurofins KCTL Co.,Ltd.

As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by Eurofins KCTL Co.,Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2024-07-05	Originally issued	-

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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

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1. Applicant information

Applicant: Uniden America Corporation
Address: 301 International Parkway, Suite 460 Flower Mound, TX 75022

Manufacturer: ATTOWAVE CO., LTD
Address: 1005, 10F Leader's Tower, 286, Beotkkot-ro, Geumcheon-gu,
South Korea 08511



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2. Laboratory information

Address

Eurofins KCTL Co.,Ltd. (Suwon Lab.)

65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea

Telephone Number: 82 70 5008 1021

Facsimile Number: 82 505 299 8311

FCC Site Designation No: KR0040

VCCI Registration No.: R-20080, G-20078, C-20059, T-20056

Industry Canada Registration No. : 8035A

KOLAS NO.: KT231

SITE MAP



3. Test system configuration

3.1 Operation environment

	Temperature	Humidity	Pressure
Chamber 10 m (RE)	25.7 °C / 25.6 °C	37.5 % R.H. / 37.6 % R.H.	-
Shielded room(CE)	25.5 °C	38.7 % R.H.	-

Test site

These testing items were performed following locations;

Test item	Test site
Conducted Emission	Shielded Room
Radiated Emission	10 m Chamber

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC.

The factors contributing to uncertainties are test receiver, cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability. Based on CISPR 16-4-2, the measurement uncertainty level with a 95 % confidence level was applied.

Conducted Emission measurement (Confidence level about 95 %, $k = 2$)		
Shielded Room (CE#1)	9 kHz ~ 150 kHz:	3.6 dB
	150 kHz ~ 30 MHz:	3.1 dB
Shielded Room (CE#2)	9 kHz ~ 150 kHz:	3.6 dB
	150 kHz ~ 30 MHz:	3.1 dB
Radiated Emission measurement (Confidence level about 95 %, $k = 2$)		
10 m Chamber (4F)	30 MHz ~ 1 000 MHz	3 m: 6.2 dB
		10 m: 5.0 dB
	1 GHz ~ 6 GHz	3 m: 5.5 dB
	6 GHz ~ 18 GHz	3 m: 6.1 dB
	18 GHz ~ 30 GHz	3 m: 5.2 dB
	30 GHz ~ 40 GHz	3 m: 4.7 dB
10 m Chamber (2F)	300 MHz ~ 1 000 MHz	3 m: 5.8 dB
		10 m: 4.5 dB
	1 GHz ~ 6 GHz	3 m: 5.3 dB
	6 GHz ~ 18 GHz	3 m: 6.2 dB

3.3 Measurement Program

These test items were performed by software programs;

Test item	Measurement Program		Used
Conducted Emission	EP5/CE_Ver 5.4.0(TOYO)		☒
Radiated Emission	2F	EP10/RE_Ver 2021.01.000 (TOYO)	☒
	4F	EP5/RE_Ver 5.11.10(TOYO)	

4. Description of EUT

4.1 General information

Radar

Receiver type : Dual conversion super-heterodyne

Antenna type : Linear polarized, self-contained

Detector type : Scanning frequency discriminator

Frequency operation : X-band; 10.525 GHz $\pm$ 0.025 GHz

K-band; 24.075 GHz $\pm$ 0.175 GHz

Ka-band (super-wide); 34.550 GHz $\pm$ 1.150 GHz

Laser

Receiver type : Pulsed laser signal receiver

Detector type : Digital signal pulse width discriminator

Optical sensor : Dual convex condenser lens and high speed photo diode detector,
950nm $\pm$ 150nm (nanometers)

General

Operating Temperature Range : -10° C to +70° C

Storage Temperature Range : -30° C to +95° C

Power requirements : 11V to 16V DC, 300 mA, negative ground

Dimensions HxWxL : 32.8 mm x 70.52 mm x 117.65 mm

4.2 Product description

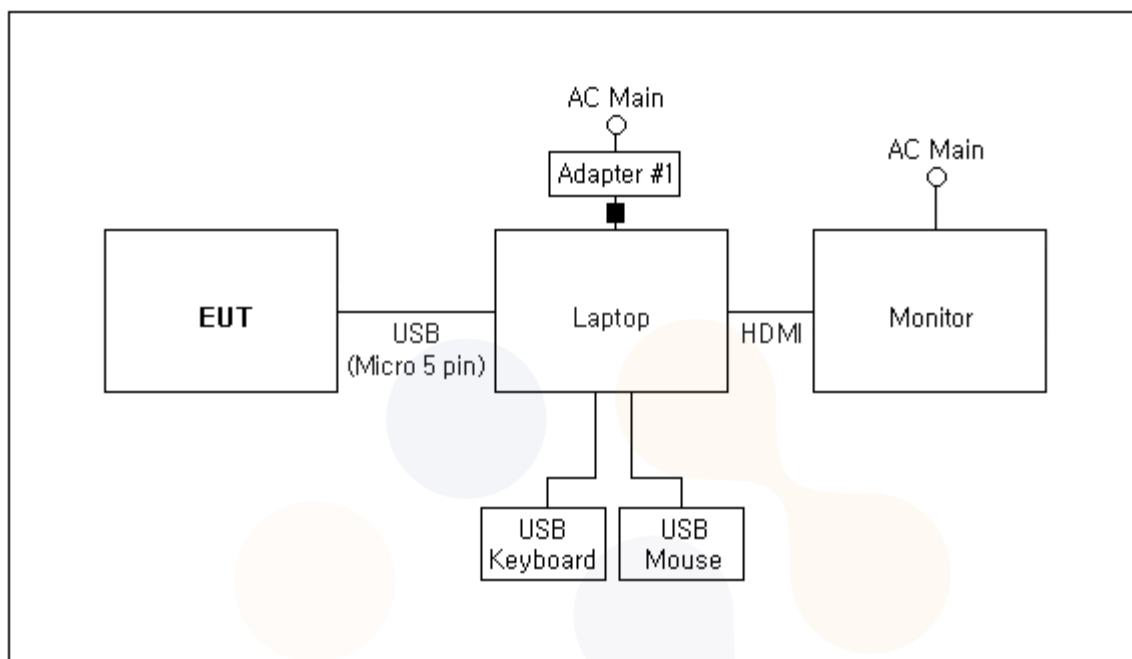
Type of product	RADAR DETECTOR
Model name (Basic)	R4w
Model name (Variant)	-
Difference	-
Serial no	-
Testing voltage	120 V, 60 Hz (Power supplied from Laptop) DC 12 V
Input rating	DC 11 V ~ DC 16 V
Internal clock frequency	12 MHz
RF frequency	Bluetooth: 2 402 MHz ~ 2 480 MHz Wi-Fi 2.4 GHz: 2 412 MHz ~ 2 472 MHz, 2 422 MHz ~ 2 452 MHz
FCC ID	AMWUA2401
Note	-The following accessories were provided by the manufacturer. 1) Cigar Jack 2) Bluetooth/WiFi Module -FCC ID: AMWUA2404

4.3 Auxiliary equipments

Type	Model / Part #	S/N	Manufacturer
Laptop	E470-DOS	PF-10DLGA	Lenovo
Adapter #1	ADLX45DLC3A	8SSA10E75791L1CZ 7V0HRZ	Lenovo
Monitor	PM24KO	ZQ9XH1HBB00087V	SAMSUNG
USB Mouse	M-BZ96C	-	Logitech
USB Keyboard	K120	-	Logitech
DC Power Supply	6032A	US38322201	HP
Button Controller	-	-	-
Radar Detectors	R9	-	Uniden
Laser Transponders	-	-	-
Mobile Phone	SM-N976N	R3CMB08Q6VE	SAMSUNG
Headset	SHS-150V/W	-	SAMSUNG
AP	DIR-850L	R3WD3H6000597	D-LINK
Adapter #2	WB-18D12R	-	Yang Ming Industrial

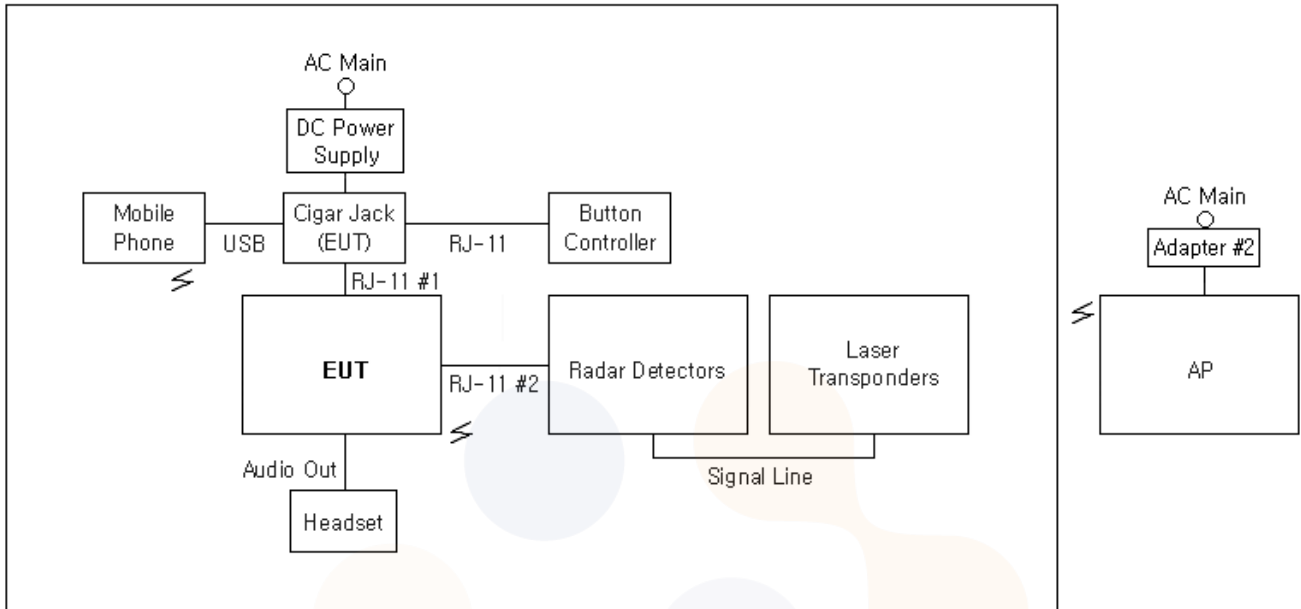
4.4 Test configuration

[Test #1]



	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT	USB (Micro 5 pin)	Laptop	USB	0.5	Shield
2	Laptop	Power	Adapter #1	-	1.2	Unshield
3		HDMI	Monitor	HDMI	1.5	Shield
4		USB	USB Keyboard	-	1.7	Unshield
5		USB	USB Mouse	-	1.8	Unshield

[Test #2]



	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT	RJ-11 #1	Cigar Jack (EUT)	-	1.5	Unshield
2		Audio Out	Headset	-	2.0	Unshield
3		RJ-11 #2	Radar Detectors	-	1.8	Unshield
4	Cigar Jack (EUT)	Power	DC Power Supply	-	1.5	Unshield
5		USB	Mobile Phone	-	0.5	Shield
6		RJ-11	Button Controller	-	2.0	Unshield
7	Radar Detectors	Signal Line	Laser Transponders	-	3.0	Unshield
8	AP	Power	Adapter #2	-	1.2	Unshield

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
Test #1	Connect with a USB cable between EUT and Laptop and use the 'Uniden FCC Tool' Program to check and Test data communication
Test #2	Check the operation of Radar Detectors and laser transponders on the LCD of the EUT, and check the charging status by connecting the USB port of the Cigar Jack to the Mobile Phone. The operation of the button controller can be checked on the LCD of the EUT. Check the audio out port with the Headset and proceed with the test by checking the Wi-Fi 2.4 GHz communication status and Bluetooth communication status using the 'Uniden BLE Test' application on the AP and Mobile Phone.

5. Summary of test results

5.1 Summary of EMI emission test results

Applied	Test items	Test method	Result
☒	Conducted Emission	ANSI C63.4:2014, Class B FCC Part 15 Subpart B	Pass
☒	Radiated Emission	ANSI C63.4:2014, Class B FCC Part 15 Subpart B	Pass

The data collected shows that EUT the complied with technical requirements of above rules part 15.107(a), (d) and 15.109(a).

6. Test results

6.1 Conducted Emissions

Testing voltage	120 V, 60 Hz		
Test facility	Shielded room (CE#2)		
Date	2024-06-18		
Temperature (°C)	25.5 °C	Humidity (% R.H.)	38.7 % R.H.
Remarks	Pass		

6.1.1 Limits of conducted emissions measurement

Frequency [MHz]	Class A (dB(μ V))		Class B (dB(μ V))	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	79	66	66 ~ 56 ¹⁾	56 ~ 46 ¹⁾
0.5 ~ 5	73	60	56	46
5 ~ 30	73	60	60	50

¹⁾ The limit decreases linearly with the logarithm of frequency

6.1.2 Measurement procedure

The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground plane. The LISN power was filtered. Each EUT power lead, except ground (safety) lead was individually connected through a LISN to input power source. EUT signal cables that hung closer than 0.4 m to the Horizontal metal ground 0.3 m ~ 0.4 m long. The power cord was bundles in the center. All peripheral equipment was powered from a sub LISN. The LISN and ISN were positioned 0.8 m from the EUT. Peak and Average detection were used in preliminary testing and Quasi-peak and Average detections were used at final measurement.

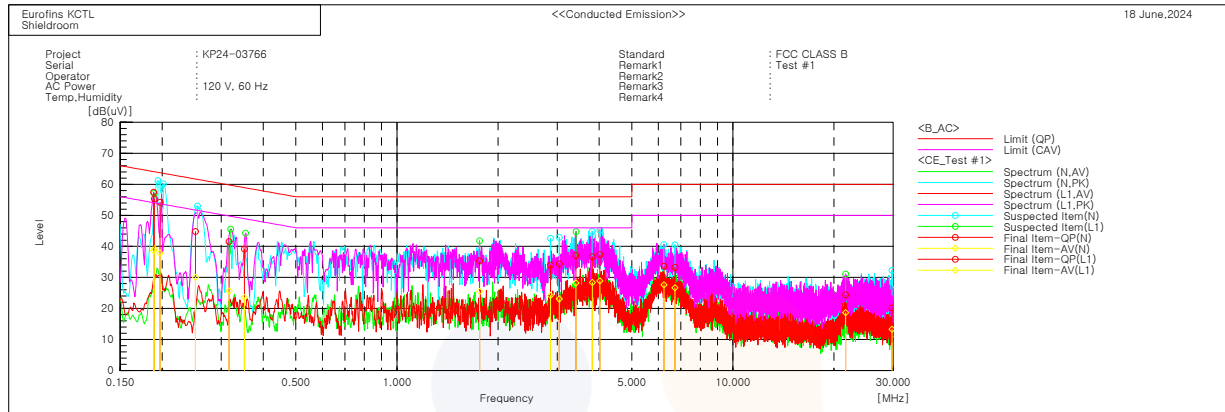
6.1.3 Used equipments

Date : 2024-06-18

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
EMI TEST RECEIVER	ESCI 3	101408	R&S	2024.08.18	☒
TWO-LINE V-NETWORK	ENV216	101358	R&S	2024.09.27	☒
TWO-LINE V-NETWORK	ENV216	101352	R&S	2025.03.27	☒

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Page (18) of (24)**6.1.4 Conducted emissions measurement result****AC Main****Final Result****--- N Phase ---**

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result CAV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin CAV [dB]
1	0.18952	45.1	28.9	10.3	55.4	39.2	64.1	54.1	8.7	14.9
2	0.19707	44.0	27.7	10.2	54.2	37.9	63.7	53.7	9.5	15.8
3	0.25131	34.8	20.0	10.0	44.8	30.0	61.7	51.7	16.9	21.7
4	2.86596	24.1	14.4	9.8	33.9	24.2	56.0	46.0	22.1	21.8
5	3.04345	24.6	13.3	9.8	34.4	23.1	56.0	46.0	21.6	22.9
6	3.81683	26.9	18.6	9.8	36.7	28.4	56.0	46.0	19.3	17.6
7	4.01954	27.6	19.1	9.8	37.4	28.9	56.0	46.0	18.6	17.1
8	6.23575	23.7	17.7	9.9	33.6	27.6	60.0	50.0	26.4	22.4
9	6.72739	23.3	16.6	10.0	33.3	26.6	60.0	50.0	26.7	23.4
10	29.78309	9.8	2.9	10.4	20.2	13.3	60.0	50.0	39.8	36.7

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(μV)]	Reading CAV [dB(μV)]	c.f [dB]	Result QP [dB(μV)]	Result CAV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin CAV [dB]
1	0.1886	47.1	28.4	10.3	57.4	38.7	64.1	54.1	6.7	15.4
2	0.31661	31.6	15.7	10.0	41.6	25.7	59.8	49.8	18.2	24.1
3	0.35167	29.2	13.6	10.0	39.2	23.6	58.9	48.9	19.7	25.3
4	1.76295	25.5	15.7	9.8	35.3	25.5	56.0	46.0	20.7	20.5
5	3.41136	27.3	18.5	9.7	37.0	28.2	56.0	46.0	19.0	17.8
6	21.66727	14.0	8.3	10.4	24.4	18.7	60.0	50.0	35.6	31.3

6.2 Radiated Emission

Testing voltage		120 V, 60 Hz		
Test facility		10 m Chamber (4F)		
Site validation date		Below 1 GHz	2024-03-15	
		Above 1 GHz	2023-11-20	
Test distance		3 m		
Date		2024-06-18		
10 m	Temperature (°C)	25.7 °C	Humidity (% R.H.)	37.5 % R.H.
3 m		25.6 °C		37.6 % R.H.
Remarks		Pass		

6.2.1 Limits of radiated emission measurement

	Class A at 10 m QP(dB(μV/m))		Class B at 3 m QP(dB(μV/m))	
Frequency [MHz]	FCC ¹⁾	ISED (ICES Issue 7)	FCC ¹⁾	ISED (ICES Issue 7)
30-88	39.1	40.0	40.0	40.0
88-216	43.5	43.5	43.5	43.5
216-230	46.4	46.4	46.0	46.0
230-960	46.4	47.0	46.0	47.0
Above 960	49.5	49.5	54.0	54.0

- ¹⁾: Alternative standard: CISPR, Pub. 22

- Test data in this section has been taken against the FCC 15.109(a) or (B) Limit as it is the most stringent limit.

By complying with more restrictive FCC 15.109 Limit compliance with the ICES-003 Issue 7 limit also demonstrated.

6.2.2 Measurement procedure

The test was done at a 10 m chamber with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane. Cables were folded back and forth forming a bundle 0.3 m to 0.4 m long and were hanged at a 0.4 m height to the ground plane.

Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

6.2.3 Used equipments

Date : 2024-06-18

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
EMI TEST RECEIVER	ESR7	101078	R&S	2024.08.18	☒
Bilog Antenna	CBL 6112D	37876	TESEQ	2025.05.25	☒
AMPLIFIER	310N	293004	SONOMA	2024.08.18	☒
ATTENUATOR	8491B	MY39270292	AGILENT	-	☒
Antenna Mast	MA4640-XP-ET	-	Innco Systems	-	☒
Turn Table	DT3000-2t	-	Innco Systems	-	☒
DOUBLE RIDGED HORN ANTENNA	3117	00161083	ETS-LINDGREN	2025.02.05	☒
AMPLIFIER	BBV9718C	00138	SCHWARZBECK	2024.10.13	☒
EMI TEST RECEIVER	ESW44	103121	R&S	2025.05.13	☒

6.2.4 Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follow:

$$\text{Result} = \text{M.R} + \text{C.F}(\text{A.F} + \text{C.L} + 6 \text{ dB Att} - \text{A.G})$$

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna Factor

C.L = Cable Loss

A.G = Amplifier Gain

6 dB Att = 6 dB Attenuator

If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 6 dB, A.G 35 dB

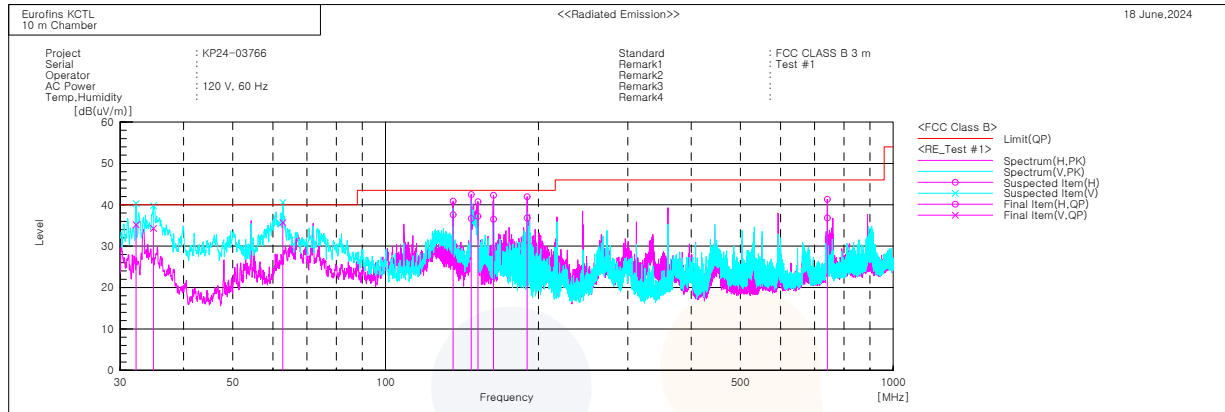
The result is $30 + 12 + 5 + 6 - 35 = 18 \text{ dB } (\mu\text{V/m})$

Bilog Antenna and ATTENUATOR (6 dB) were calibrated together.

AV = CAV : Abbreviation of CISPR Average

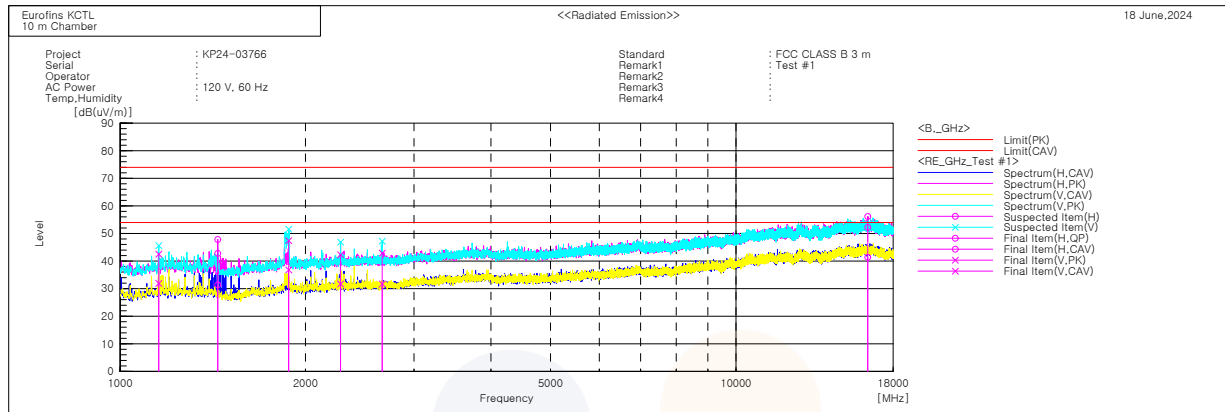
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Page (21) of (24)**6.2.5 Radiated emission measurement result****30 MHz ~ 1 GHz****Final Result**

No.	Frequency [MHz]	(P)	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit QP [dB(μV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	32.234	V	39.5	-4.3	35.2	40.0	4.8	280.0	135.0
2	34.896	V	39.3	-5.0	34.3	40.0	5.7	115.0	270.0
3	62.736	V	50.4	-14.7	35.7	40.0	4.3	197.0	108.0
4	135.835	H	45.8	-8.2	37.6	43.5	5.9	143.0	80.0
5	147.476	H	45.7	-9.0	36.7	43.5	6.8	207.0	208.0
6	152.038	H	46.6	-9.4	37.2	43.5	6.3	216.0	186.0
7	163.232	H	46.4	-9.9	36.5	43.5	7.0	331.0	254.0
8	190.104	H	47.2	-10.4	36.8	43.5	6.7	210.0	105.0
9	741.777	H	30.8	6.0	36.8	46.0	9.2	260.0	230.0

1 GHz ~ 18 GHz



Final Result

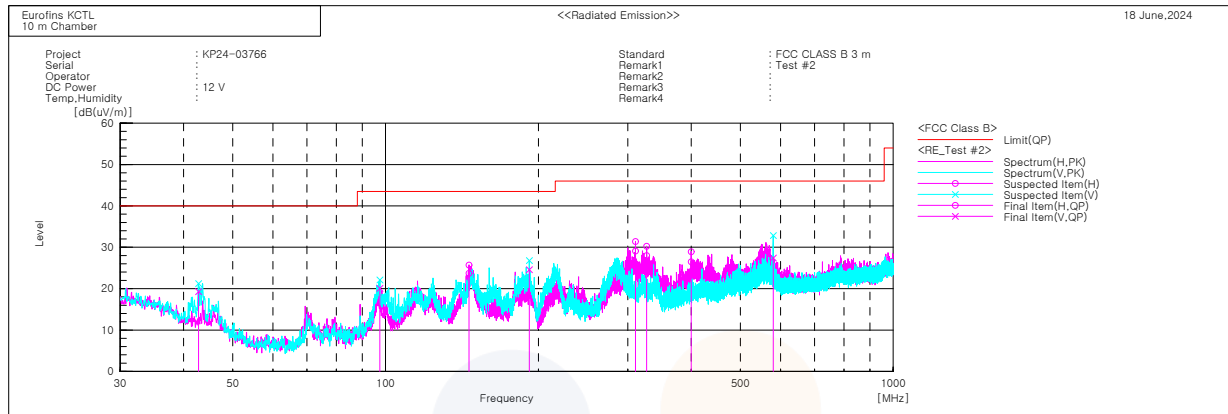
No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]
1	1154.713	V	47.6	37.0	-5.1	42.5	31.9	74.0	54.0	31.5	22.1	123.0	80.0
2	1440.336	H	47.6	36.2	-4.8	42.8	31.4	74.0	54.0	31.2	22.6	160.0	180.0
3	1877.242	V	48.5	37.9	-1.1	47.4	36.8	74.0	54.0	26.6	17.2	116.0	205.0
4	2280.168	V	42.3	31.7	0.0	42.3	31.7	74.0	54.0	31.7	22.3	160.0	310.0
5	2663.537	V	41.9	30.7	1.0	42.9	31.7	74.0	54.0	31.1	22.3	251.0	266.9
6	16366.230	H	34.2	23.4	18.0	52.2	41.4	74.0	54.0	21.8	12.6	290.0	160.0

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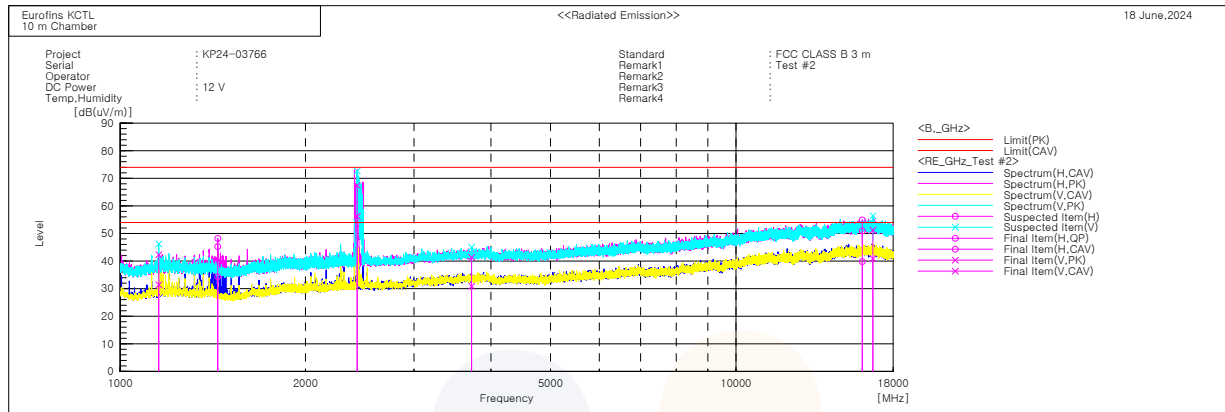
30 MHz ~ 1 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	42.807	V	28.6	-9.3	19.3	40.0	20.7	142.0	130.0
2	97.462	V	31.2	-11.1	20.1	43.5	23.4	127.0	105.0
3	146.050	H	32.6	-8.9	23.7	43.5	19.8	350.0	200.0
4	191.954	V	34.8	-10.2	24.6	43.5	18.9	214.0	195.0
5	310.686	H	34.0	-4.9	29.1	46.0	16.9	160.0	140.0
6	326.833	H	32.5	-4.5	28.0	46.0	18.0	270.0	120.0
7	400.028	H	28.1	-1.6	26.5	46.0	19.5	194.0	70.0
8	580.417	V	24.9	2.5	27.4	46.0	18.6	315.0	78.0

1 GHz ~ 18 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result CAV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin CAV [dB]	Height [cm]	Angle [deg]
1	1154.885	V	47.4	36.5	-5.1	42.3	31.4	74.0	54.0	31.7	22.6	135.0	310.0
2	1439.975	H	49.9	39.0	-4.7	45.2	34.3	74.0	54.0	28.8	19.7	140.0	275.0
3	2426.193	V	66.8	55.6	0.6	67.4	56.2	74.0	54.0	6.6	-2.2	115.0	130.0
4	3720.684	V	36.2	25.7	5.2	41.4	30.9	74.0	54.0	32.6	23.1	180.0	60.0
5	16033.710	H	33.7	22.6	17.2	50.9	39.8	74.0	54.0	23.1	14.2	335.0	290.0
6	16689.430	V	32.7	22.4	18.5	51.2	40.9	74.0	54.0	22.8	13.1	220.0	201.3

No. 3 is the fundamental frequency. (2 426.193 MHz_Bluetooth/Wi-Fi 2.4 GHz)