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-SEF0132 Page (1) of (20)	eurofins | KCTL

1. Client

- Name : ACEVIEW CO.,LTD
- Address : #607 25, Podowon-ro 116beon-gil, siheung-si Gyeongi-do, Korea
- Date of Receipt : 2022-06-20

2. Use of Report : -

3. Name of Product / Model : 3D Around view Monitoring system / IV-360

4. Manufacturer / Country of Origin : ACEVIEW CO.,LTD / Korea

5. Date of Test : 2022-07-27

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 A

8. FCC ID 2A8P3-AVM-IV-360

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

Affirmation	Tested by Name : Mincheol Baek (Signature)	Technical Manager Name : Gunsu Park (Signature)

2022-09-14

Eurofins KCTL Co.,Ltd..

REPORT REVISION HISTORY

Date	Revision	Page No
2022-09-14	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. Applicant information

Applicant: ACEVIEW CO.,LTD
Address: #607 25, Podowon-ro 116beon-gil, siheung-si Gyeongi-do, korea

Manufacturer: ACEVIEW CO.,LTD
Address: #607 25, Podowon-ro 116beon-gil, siheung-si Gyeongi-do, korea

2. Laboratory information

Address

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

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

Telephone Number: 82 31 285 0894

Facsimile Number: 82 505 299 8311

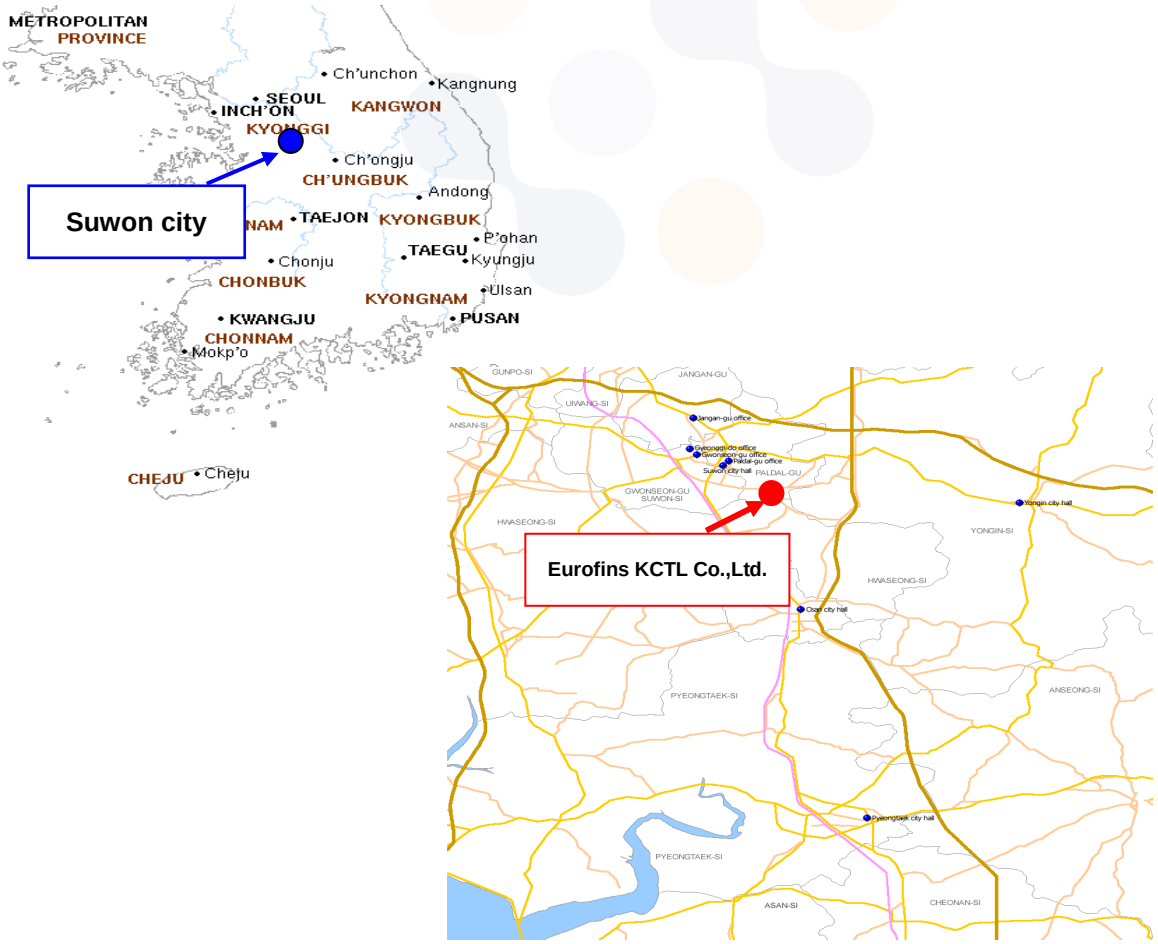
FCC Site Designation No: KR0040

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)	24.5 °C / 24.7 °C	39.6 % R.H. / 39.8 % 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: 3.50 dB	
	150 kHz ~ 30 MHz: 3.06 dB	
Shielded Room (CE#2)	9 kHz ~ 150 kHz: 3.05 dB	
	150 kHz ~ 30 MHz: 3.06 dB	
Radiated Emission measurement (Confidence level about 95 %, *k* = 2)		
10 m Chamber (4F)	30 MHz ~ 200 MHz	3 m: 4.98 dB
		10 m: 4.96 dB
	200 MHz ~ 1 000 MHz	3 m: 4.28 dB
		10 m: 4.28 dB
	1 GHz ~ 6 GHz	3 m: 5.08 dB
	6 GHz ~ 18 GHz	3 m: 5.38 dB
	18 GHz ~ 30 GHz	3 m: 5.22 dB
	30 GHz ~ 40 GHz	3 m: 4.44 dB
10 m Chamber (2F)	30 MHz ~ 200 MHz	3 m: 4.50 dB
		10 m: 4.48 dB
	200 MHz ~ 1 000 MHz	3 m: 3.72 dB
		10 m: 3.70 dB
	1 GHz ~ 6 GHz	3 m: 5.08 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

Monitor

Screen dimension	10.1"	**Screen Type**	LCD mode, a-Si TFT LCD
Resolution	1,920 x 1,080	**Pixel**	RGB vertical strip
Display Size (HxV)	216.96 x 135.6mm	**Unit size (HxVxD)**	227.42 x 147.69 x 4.85 mm
Visible Size (HxV)	219.31 x 138.25 mm	**Surface**	Mist , Hard coating (3H)
Brightness	350 (Typ.)	**Contrast ratio**	800 : 1 (Typ.)
Best view angle	Full view angle	**Optical mode**	AAS,
View angle	85/85/85/85 (Typ.)(CR≥10)	**Response speed**	14/11 (Typ.)(Tr/Td) ms
Color	262K , 50% [CIE1931]	**Backlight**	3 st in s WLED
Weight of screen	120/135g (Typ./Max)	**Touch function**	No Touch
Refresh Frequency	60Hz	**Video input**	HDMI 1080P
Poewr	D.C 12V		
Storage temperature	-20 ~ 70℃	**Operating temperature**	-10 ~ 60℃

Camera

1080P Specification	
Model	INT-307(2.0MegaPixel), 1/2.8inch
Chipset	SONY IMX307 + NVP2441
System Format	NTSC, 30FPS
Effective Pixels	1920(H) X 1080(V)
Minimum illumination	Color 0.0001Lux & F2.0
Horizontal Resolution	AHD: 2.0MegaPixel 1080P, Analog: 2000TVL
Scanning Frequency	60Hz
Gamma	0.45
Electronic shutter speed	1/60 ~ 1/100000s
SNR	>46db
Video output	1.0V p-p
Operation Temperature	Temp -20℃ ~ 70℃
Power supply	5.0V(±10%)

ECU

Items		Unit	Specification
ECU	Supply Voltage	V	DC 12V / 24V
	Operating Voltage Range	V	DC 9V ~ 36V
	Power Consumption	W	Max 24W (Including cameras)
	SVM + 4CH HD Black Box	mA	12V=670mA/24V=310mA
	Operating Temperature Range	℃	- 30℃ ~ +80℃
Video	Input		AHD(1080P,720P, 30fps, 4~6ch)
	Output		720P 30fps,60Hz (AHD & HDMI)
Ext. I/F	GPS	eA	1ch
	USB	eA	1ch
Trigger	Right / Left Blinker		Standard
	High Beam / Rear Blinker		Standard
View Mode (2D / 3D + Corner)	3D Live View / 2D Live View / Cornor		Standard
	2D(Top View) + Front Live + Rear Live		Mode select
	3D live View + Rear Live View		Mode select
Recording	Video Codec		H.264
	Frame rate		Max 30fps
	Resolution		1,280 x 720
	Type (Monitor Live / 4Cam Merge)		Continuous / Event
Storage	Micro SD class 10		32 / 64 / 128 / 256GB
	External		Max 1TB, SSD or HDD
	Temperature Range	℃	- 20℃ ~ +80℃
Others	G-Sensor		Built in 3-Axis Sensor
	GPS (Option)		External Module
ECU (Aluminium)	Size (L x W x H)	mm	134mm x 132mm x 33mm
	Weight	g	220g

4.2 Product description

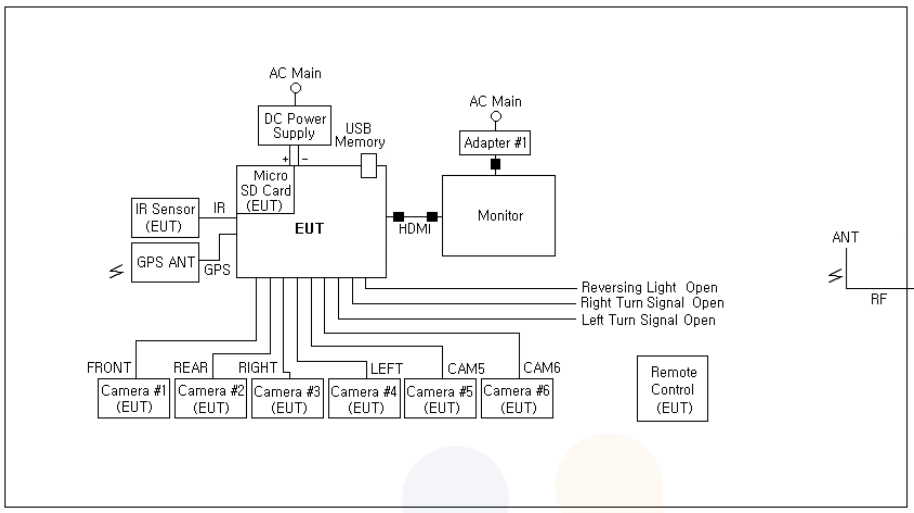
Type of product	3D Around view Monitoring system
Model name (Basic)	IV-360
Model name (Variant)	IV-360M, IV-300
Difference	Buyer model name
Serial no	-
Testing voltage	DC 12 V, DC 24 V
Input rating	DC 12 V, DC 24 V
Internal clock frequency	1.5 GHz
FCC ID	2A8P3-AVM-IV-360
Note	-The following accessories were provided by the manufacturer. 1) Camera #1 ~ #6 2) Remote Control 3) IR Sensor 4) Micro SD Card

4.3 Auxiliary equipments

Type	Model / Part #	S/N	Manufacturer
DC Power Supply	6032A	US38322201	HP
Monitor	-	-	-
Adapter	PA-1061-71	-	LITE-ON POWER TECHNOLOGY (DONGGUAN) CO.,LTD
GPS Simulator	RLLSP01	21359	RACELOGIC
ANT	-	-	-
USB Memory	Z430	-	Sandisk(65G)
GPS ANT	-	-	-

4.4 Test configuration

[Test #1. Test #2]



	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	**EUT**	Power	DC Power Supply	-	3.8	Unshield
2		FRONT	Camera #1 (EUT)	-	3.8	Shield
3		REAR	Camera #2 (EUT)	-	3.8	Shield
4		RIGHT	Camera #3 (EUT)	-	3.8	Shield
5		LEFT	Camera #4 (EUT)	-	3.8	Shield
6		CAM5	Camera #5 (EUT)	-	3.8	Shield
7		CAM6	Camera #6 (EUT)	-	3.8	Shield
8		IR	IR Sensor (EUT)	-	1.7	Unshield
9		GPS	GPS ANT	-	4.2	Unshield
10		HDMI	Monitor	-	1.5	Shield (Core)
11		Reversing Light	Open	-	2.0	Unshield
12		Right Turn Signal	Open	-	2.0	Unshield
13		Left Turn Signal	Open	-	2.0	Unshield
14		USB	USB Memory	-	Direct	-
15		Micro SD	Micro SD Card (EUT)	-	Direct	-
16	Monitor	Power	Adapter #1	-	1.2	Unshield (Core)
17	GPS Simulator	RF	ANT	-	1.5	Shield

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
Test #1: DC 12 V Test #2: DC 24 V	Power is supplied using DC Power supply. Check EUT operation using Camera #1~#6 and monitor, connect GPS with GPS Simulator and ANT, check IR sensor operation with remote control, and check the images stored in USB Memory and Micro SD Card.

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 FCC Part 15 Subpart B, Class A	NA
☒	Radiated Emission	ANSI C63.4:2014 FCC Part 15 Subpart B, Class A	Pass

6. Test results

6.1 Radiated Emission

Testing voltage		DC 12 V, DC 24 V		
Test facility		10 m Chamber (4F)		
Test distance		10 m, 3 m		
Date		2022-07-27		
10 m	Temperature (°C)	24.5 °C	Humidity (% R.H.)	39.6 % R.H.
3 m		24.7 °C		39.8 % R.H.
Remarks		Pass		

6.1.1 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.

6.1.2 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.

6.1.3 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
EMI TEST RECEIVER	ESR7	101078	R&S	2022.08.19	☒
Bilog Antenna	CBL 6112D	37876	TESEQ	2022.12.08	☒
AMPLIFIER	310N	293004	SONOMA	2022.08.19	☒
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	2023.01.21	☒
BROADBAND PREAMPLIFIER	BBV 9718C	00138	SCHWARZBECK	2023.10.19	☒
Spectrum Analyzer	N9040B	MY57010132	AGILENT	2022.12.31	☒

6.1.4 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:

Result = M.R + C.F(A.F + C.L + 6 dB Att – A.G)

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna FactorC.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

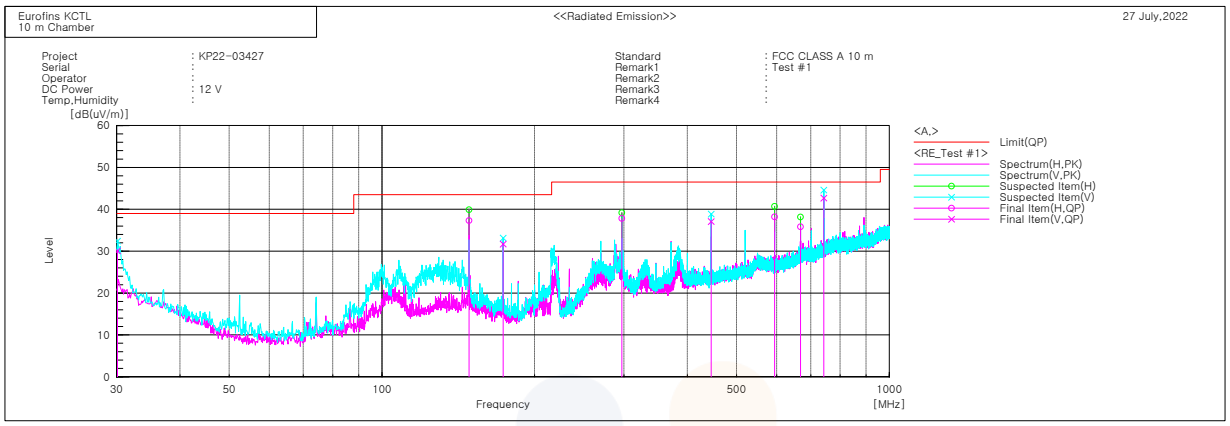
The result is 30 + 12 + 5 + 6 – 35 = 18 dB (μN/m)

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

AV = CAV : Abbreviation of CISPR Average

6.1.5 Radiated emission measurement result

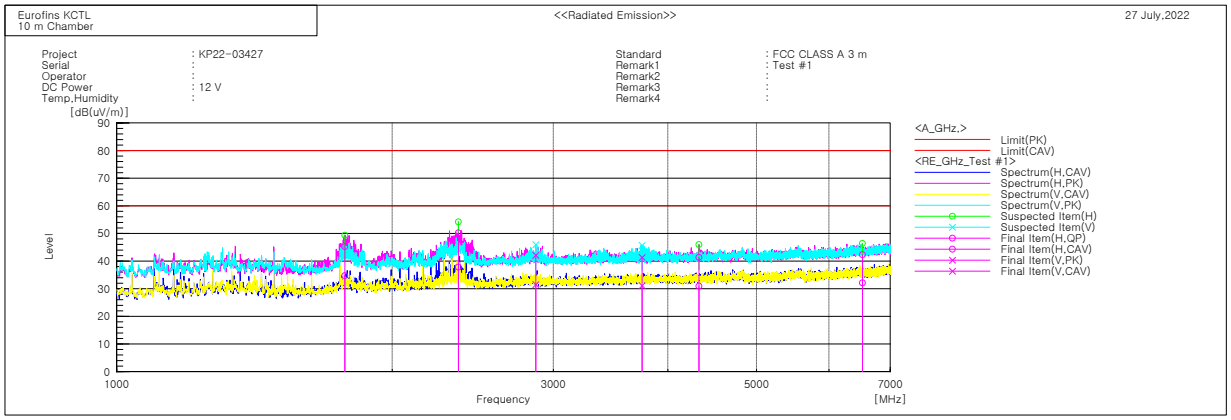
30 MHz ~ 1 GHz



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	30.121	V	35.2	-5.1	30.1	39.0	8.9	140.0	158.0
2	148.461	H	47.5	-10.2	37.3	43.5	6.2	301.0	86.0
3	173.318	V	42.9	-11.2	31.7	43.5	11.8	136.0	255.0
4	296.993	H	43.3	-5.5	37.8	46.5	8.7	360.0	17.0
5	445.524	V	37.3	-0.2	37.1	46.5	9.4	255.0	165.0
6	594.055	H	34.8	3.4	38.2	46.5	8.3	344.0	315.0
7	668.381	H	30.7	5.1	35.8	46.5	10.7	250.0	180.0
8	742.586	V	35.7	7.0	42.7	46.5	3.8	122.0	158.0

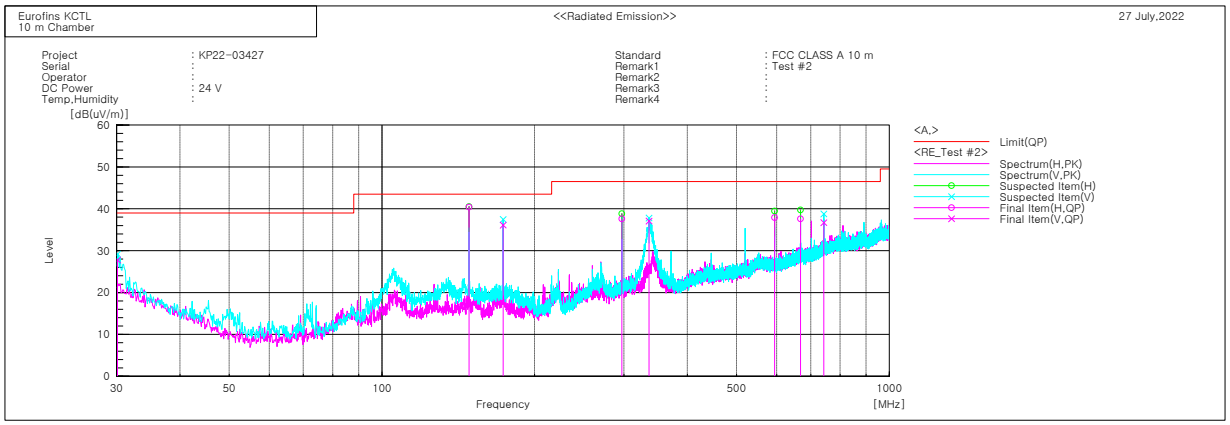
1 GHz ~ 7 GHz



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	1775.239	H	47.9	37.4	-2.7	45.2	34.7	80.0	60.0	34.8	25.3	135.0	17.0
2	2362.618	H	50.8	38.4	-0.6	50.2	37.8	80.0	60.0	29.8	22.2	168.0	18.0
3	2870.093	V	41.3	30.7	0.8	42.1	31.5	80.0	60.0	37.9	28.5	210.0	355.0
4	3749.887	V	38.4	28.2	2.9	41.3	31.1	80.0	60.0	38.7	28.9	120.0	350.0
5	4327.066	H	37.1	26.7	4.2	41.3	30.9	80.0	60.0	38.7	29.1	220.0	306.0
6	6526.126	H	34.0	23.8	8.3	42.3	32.1	80.0	60.0	37.7	27.9	380.0	135.0

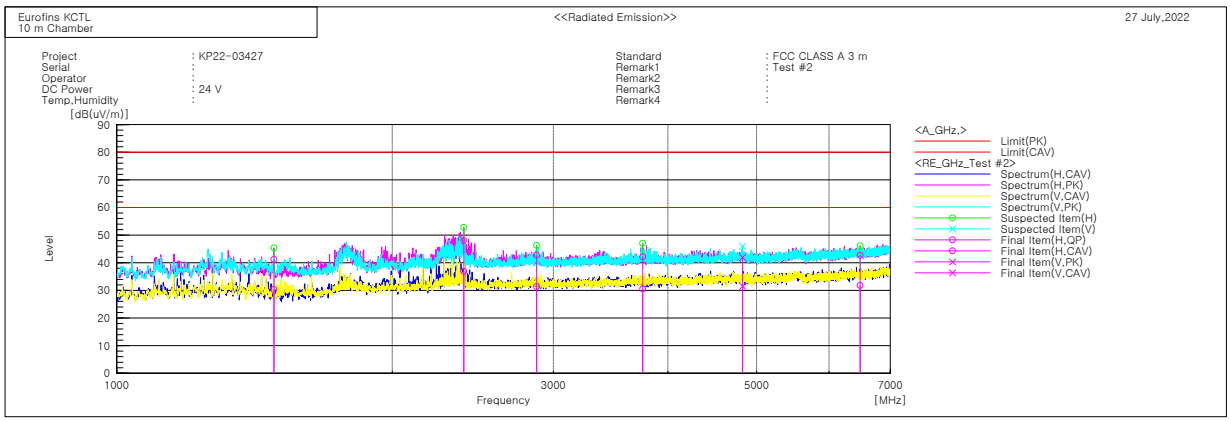
30 MHz ~ 1 GHz



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	30.121	V	32.9	-5.1	27.8	39.0	11.2	142.0	317.0
2	148.461	H	50.6	-10.2	40.4	43.5	3.1	301.0	66.0
3	173.318	V	47.3	-11.2	36.1	43.5	7.4	150.0	185.0
4	296.993	H	43.1	-5.5	37.6	46.5	8.9	350.0	223.0
5	335.914	V	41.6	-4.5	37.1	46.5	9.4	152.0	140.0
6	594.055	H	34.5	3.4	37.9	46.5	8.6	170.0	185.0
7	668.260	H	32.5	5.1	37.6	46.5	8.9	210.0	143.0
8	742.586	V	29.7	7.0	36.7	46.5	9.8	230.0	55.0

1 GHz ~ 7 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	1485.374	H	46.7	35.8	-5.5	41.2	30.3	80.0	60.0	38.8	29.7	150.0	35.0
2	2394.070	H	48.5	37.4	-0.5	48.0	36.9	80.0	60.0	32.0	23.1	240.0	50.0
3	2876.044	H	42.0	30.6	0.8	42.8	31.4	80.0	60.0	37.2	28.6	250.0	74.0
4	3754.138	H	39.3	27.6	2.9	42.2	30.5	80.0	60.0	37.8	29.5	308.0	94.0
5	4826.891	V	37.0	26.5	5.0	42.0	31.5	80.0	60.0	38.0	28.5	348.0	52.0
6	6487.874	H	34.4	23.5	8.3	42.7	31.8	80.0	60.0	37.3	28.2	115.0	132.0