



TEST REPORT

KCTL Inc. 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.: KR21-SEF0201 Page (1) of (22)	
1. Client ◦ Name : AZLA Inc ◦ Address : 3F, 332, Hyoryeong-ro, Seocho-gu, Seoul, Republic of Korea ◦ Date of Receipt : 2021-06-24 2. Use of Report : - 3. Name of Product / Model : RF Gaming Earphone / AZPG-RF2000 4. Manufacturer / Country of Origin : AZLA Inc / Korea 5. Date of Test : 2021-11-22 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 8. FCC ID : 2A2RGAZPG-RF2000 9. Test Results : Refer to the test result in the test report		
Affirmation	Tested by Name : Hojin Moon (Signature)	Technical Manager Name : Moonseop Cho (Signature)
	2021-11-25	
KCTL Inc.		
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REPORT REVISION HISTORY

Date	Revision	Page No
2021-11-25	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: AZLA Inc
Address: 3F, 332, Hyoryeong-ro, Seocho-gu, Seoul, Republic of Korea

Manufacturer: AZLA Inc
Address: 3F, 332, Hyoryeong-ro, Seocho-gu, Seoul, Republic of Korea

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2. Laboratory information

Address

KCTL Inc. (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

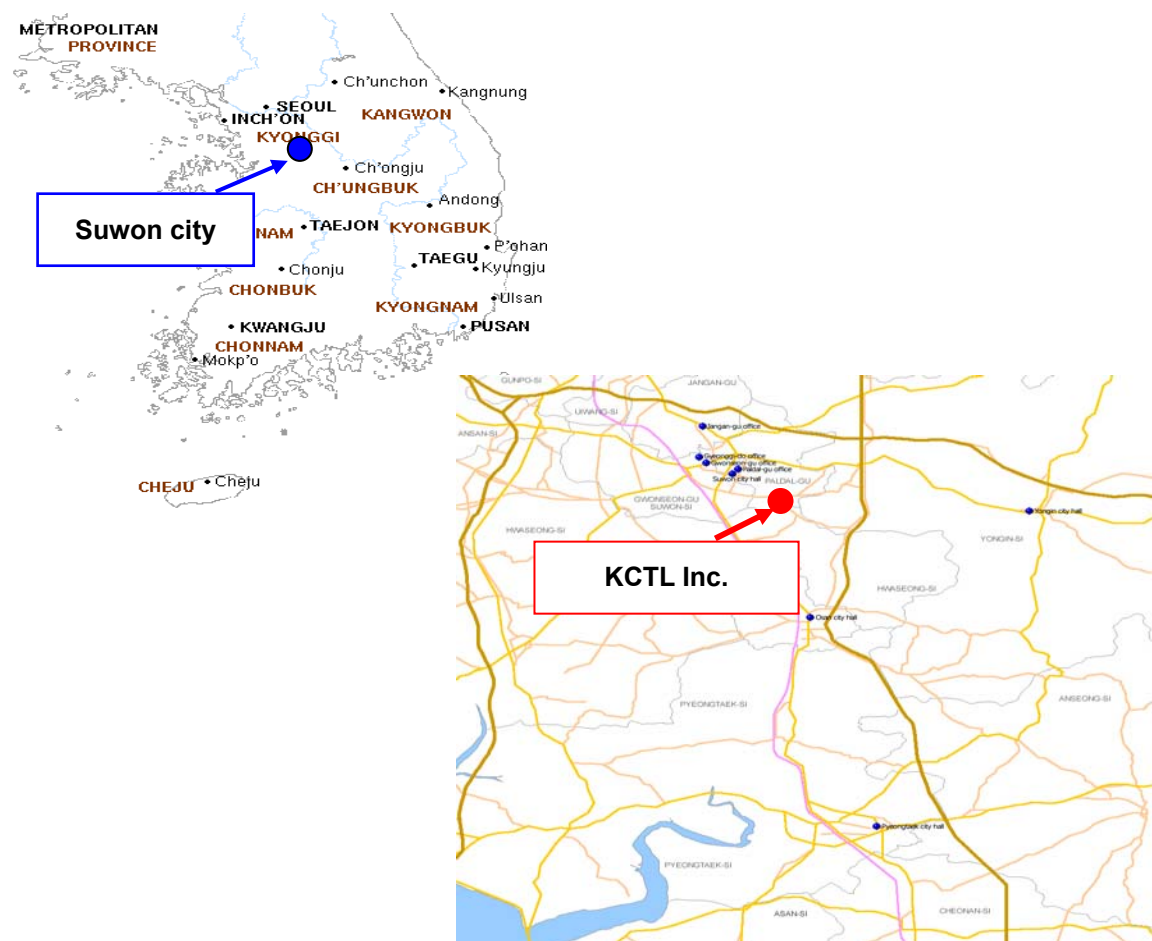
FCC Site Designation No: KR0040

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)	23.3 °C / 22.1 °C	41.2 % R.H. / 40.9 % R.H.	-
Shielded room(CE)	19.0 °C	42.7 % 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:	3.50 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 ~ 300 MHz	3 m: 5.36 dB
		10 m: 5.34 dB
	300 MHz ~ 1 000 MHz	3 m: 5.46 dB
		10 m: 5.44 dB
	1 GHz ~ 6 GHz	3 m: 6.24 dB
	6 GHz ~ 18 GHz	3 m: 6.60 dB
	18 GHz ~ 30 GHz	3 m: 6.72 dB
	30 GHz ~ 40 GHz	3 m: 6.14 dB
10 m Chamber (2F)	30 MHz ~ 300 MHz	3 m: 4.88 dB
		10 m: 4.86 dB
	300 MHz ~ 1 000 MHz	3 m: 4.94 dB
		10 m: 4.94 dB
	1 GHz ~ 6 GHz	3 m: 6.28 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

product type	2.4GHz Wireless Earphones
driver	Dynamic Driver + Premium BA
frequency range	2404~2460 MHz / 15 ch
audible frequency range	10-40,000 Hz
impedance	17 Ω
Sensitivity	107dB SPL/mW
Cable length and type	235mm, ③1.6, Black
LED	RGB
battery	350mA $\times$ 3
continuous use	about 10 hours
wireless range	Recommended within 2.4GHz/10m
weight	115g (including unit)
Microphone Orientation Characteristics	Unidirectional
operating/storage temperature	-20~50 $^{\circ}$ C
Rating	Input : 5 VDC (Battery 3.7 VDC)
texture	Body - PC, Al Cable - TPE Eartips - Silicone

4.2 Product description

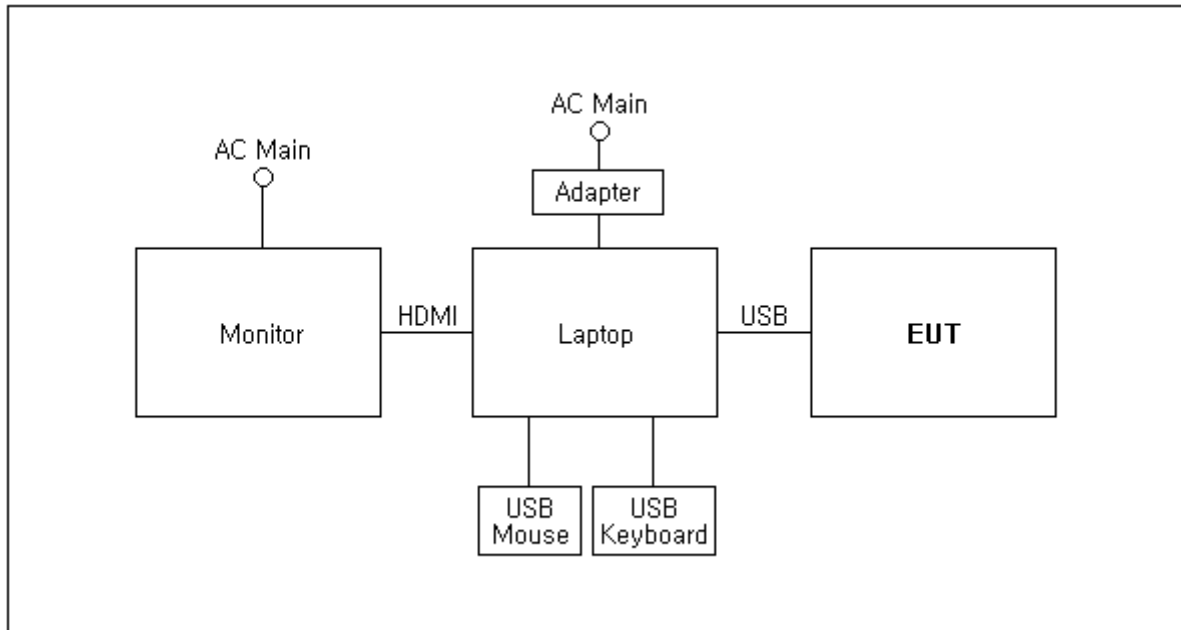
Type of product	RF Gaming Earphone
Model name (Basic)	AZPG-RF2000
Model name (Variant)	AZPG-RF2000W, AZPG-RF2000B, AZPG-RF2000R
Difference	Buyer model names
Serial no	-
Testing voltage	120 V, 60 Hz (Power supplied from Laptop) DC 3.7 V (Built in Battery)
Input rating	DC 5 V DC 3.7 V
Internal clock frequency	Above 108 MHz
RF Frequency	2 404 MHz ~ 2 460 MHz
Note	-

4.3 Auxiliary equipments

Type	Model / Part #	S/N	Manufacturer	SDoC & FCC ID
Laptop	P73G	-	DELL	SDoC
Adapter	LA65NM130	-	DELL	-
USB Mouse	HM5061A	-	Fujian New Times Digital Technology Co., Ltd.	SDoC
USB Keyboard	K120	1833SC52GXU8	Logitech	SDoC
Monitor	UN22D5003BF	-	SAMSUNG	SDoC
RF Gaming Earphone (USB Dongle)	AZPG-RF2000DG	-	AZLA Inc	SDoC

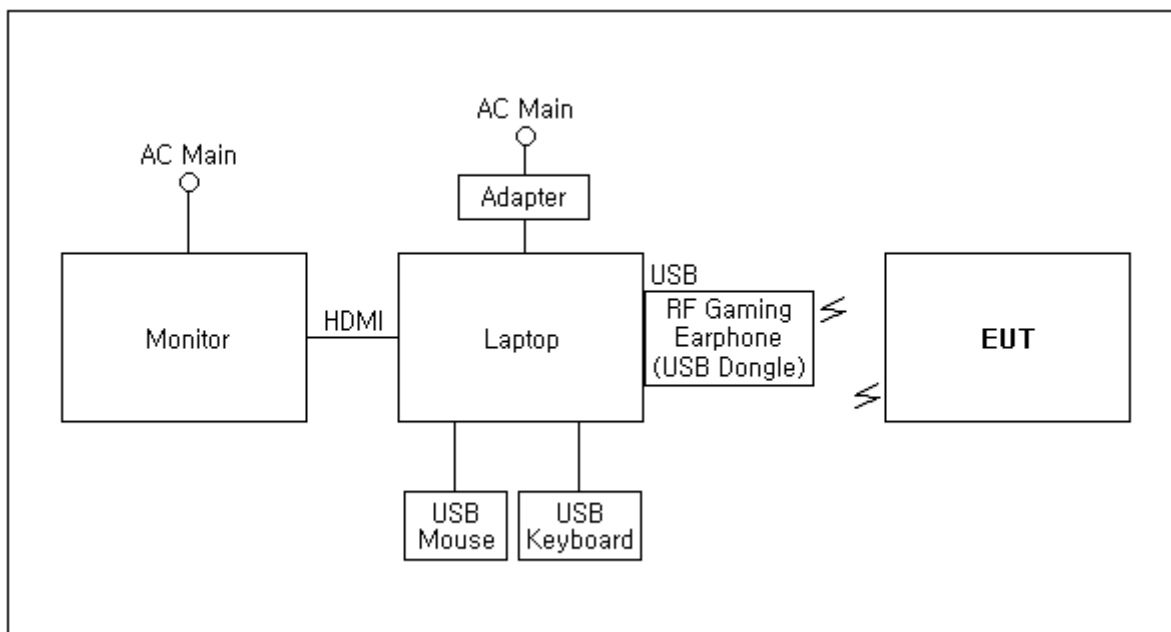
4.4 Test configuration

[Test #1]



	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT	USB	Laptop	USB	0.8	Shield
2	Laptop	Power	Adapter	-	1.6	Unshield
3		USB	USB Mouse	-	1.5	Unshield
4		USB	USB Keyboard	-	1.5	Unshield
5		HDMI	Monitor	HDMI	1.6	Shield

[Test #2]



	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
-	EUT	-	-	-	-	-
1	Laptop	Power	Adapter	-	1.6	Unshield
2		USB	USB Mouse	-	1.5	Unshield
3		USB	USB Keyboard	-	1.5	Unshield
4		HDMI	Monitor	HDMI	1.6	Shield
5		USB	RF Gaming Earphone (USB Dongle)	-	Direct	-

4.5 Operating conditions

The EUT was configured as normal intended use.

Test Mode	Normal operating
Test #1	Check the charging status of EUT using Laptop.
Test #2	Tested by checking the 1 kHz audio output by linking EUT and RF Gaming Earphone (USB Dongle).

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

6. Test results

6.1 Conducted Emissions

Testing voltage	120 V, 60 Hz		
Test facility	Shielded room (CE#1)		
Date	2021-11-22		
Temperature (°C)	19.0 °C	Humidity (% R.H.)	42.7 % 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

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
EMI TEST RECEIVER	ESCI	100001	R&S	2022.08.19	☒
TWO-LINE V-NETWORK	ENV216	101358	R&S	2022.09.30	☒
TWO-LINE V-NETWORK	ENV216	101352	R&S	2022.04.05	☒

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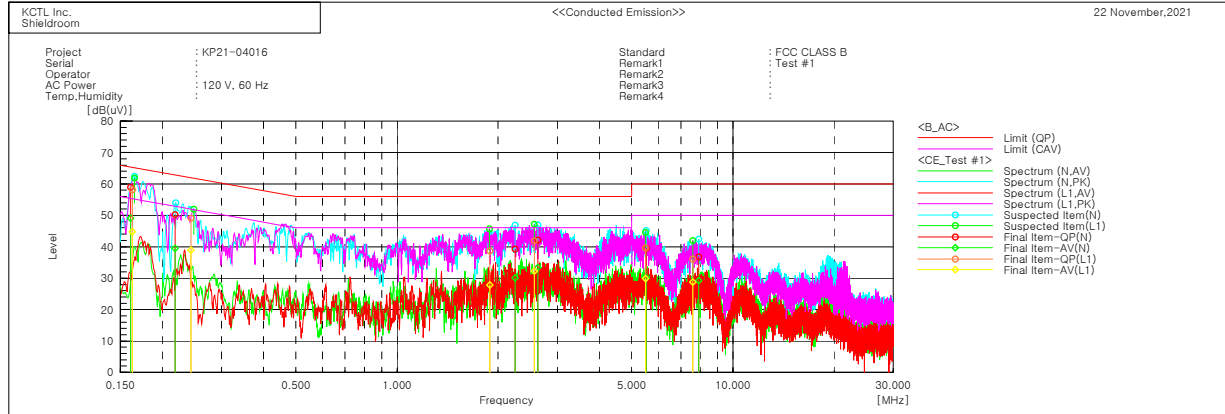
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6.1.4 Conducted emissions measurement result

AC Main



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	0.16093	49.0	39.2	9.9	58.9	49.1	65.4	55.4	6.5	6.3
2	0.21828	40.6	29.8	9.7	50.3	39.5	62.9	52.9	12.6	13.4
3	2.24433	29.6	20.4	9.7	39.3	30.1	56.0	46.0	16.7	15.9
4	2.62687	32.4	23.7	9.7	42.1	33.4	56.0	46.0	13.9	12.6
5	5.52129	29.8	20.4	9.7	39.5	30.1	60.0	50.0	20.5	19.9
6	7.914	27.1	19.5	9.7	36.8	29.2	60.0	50.0	23.2	20.8

--- 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	0.16314	48.2	34.8	10.0	58.2	44.8	65.3	55.3	7.1	10.5
2	0.24343	39.6	29.3	9.6	49.2	38.9	62.0	52.0	12.8	13.1
3	1.88923	28.9	18.1	9.7	38.6	27.8	56.0	46.0	17.4	18.2
4	2.56217	32.1	22.5	9.7	41.8	32.2	56.0	46.0	14.2	13.6
5	5.49229	29.9	20.1	9.7	39.6	29.8	60.0	50.0	20.4	20.2
6	7.59147	26.5	19.0	9.7	36.2	28.7	60.0	50.0	23.8	21.3

6.2 Radiated Emission

Testing voltage		120 V, 60 Hz / DC 3.7 V		
Test facility		10 m Chamber (4F)		
Test distance		3 m		
Date		2021-11-22		
30 MHz ~ 1 GHz	Temperature (°C)	23.3 °C	Humidity (% R.H.)	41.2 % R.H.
1 GHz ~ 13 GHz		22.1 °C		40.9 % 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

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	TT 3.0-3t	-	MATURO	-	☑
DOUBLE RIDGED HORN ANTENNA	3117	00161083	ETS-LINDGREN	2022.01.18	☑
Spectrum Analyzer	N9040B	MY57010132	AGILENT	2022.07.28	☑
AMPLIFIER	LLA01185522 Q-B	140	LTC MICROWAVE	2022.07.19	☑

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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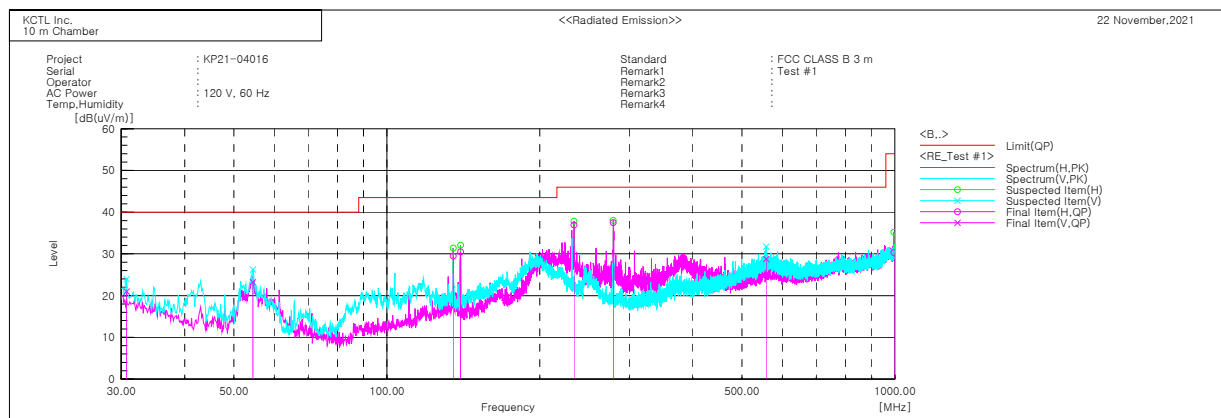
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6.2.5 Radiated emission measurement result

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	30.729	V	26.5	-5.5	21.0	40.0	19.0	127.0	280.0
2	54.495	V	39.9	-16.7	23.2	40.0	16.8	194.0	107.0
3	135.120	H	38.8	-9.3	29.5	43.5	14.0	288.0	349.0
4	139.611	H	40.0	-9.5	30.5	43.5	13.0	388.0	175.0
5	233.454	H	46.0	-9.1	36.9	46.0	9.1	190.0	19.0
6	279.047	H	43.6	-6.1	37.5	46.0	8.5	159.0	46.0
7	558.043	V	24.9	3.9	28.8	46.0	17.2	243.0	59.0
8	995.636	H	17.7	12.6	30.3	54.0	23.7	142.0	345.0

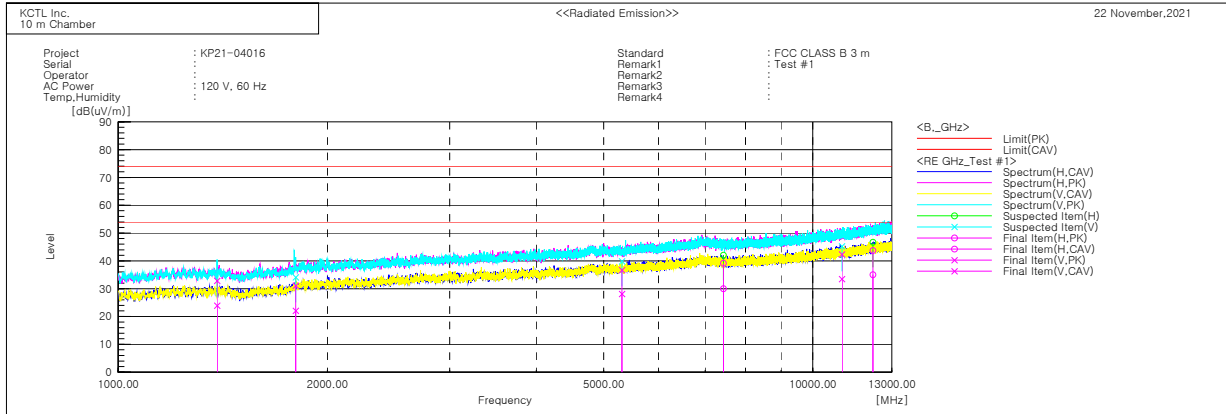
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1 GHz ~ 13 GHz



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	1387.616	V	61.6	52.7	-28.8	32.8	23.9	74.0	54.0	41.2	30.1	182.0	171.0
2	1801.596	V	58.9	49.9	-27.8	31.1	22.1	74.0	54.0	42.9	31.9	298.0	74.0
3	5313.961	V	56.5	47.9	-19.8	36.7	28.1	74.0	54.0	37.3	25.9	108.0	239.0
4	7435.670	H	57.1	48.0	-18.0	39.1	30.0	74.0	54.0	34.9	24.0	252.0	359.0
5	11016.050	V	54.7	45.8	-12.4	42.3	33.4	74.0	54.0	31.7	20.6	135.0	132.0
6	12206.960	H	55.0	46.3	-11.3	43.7	35.0	74.0	54.0	30.3	19.0	335.0	90.0

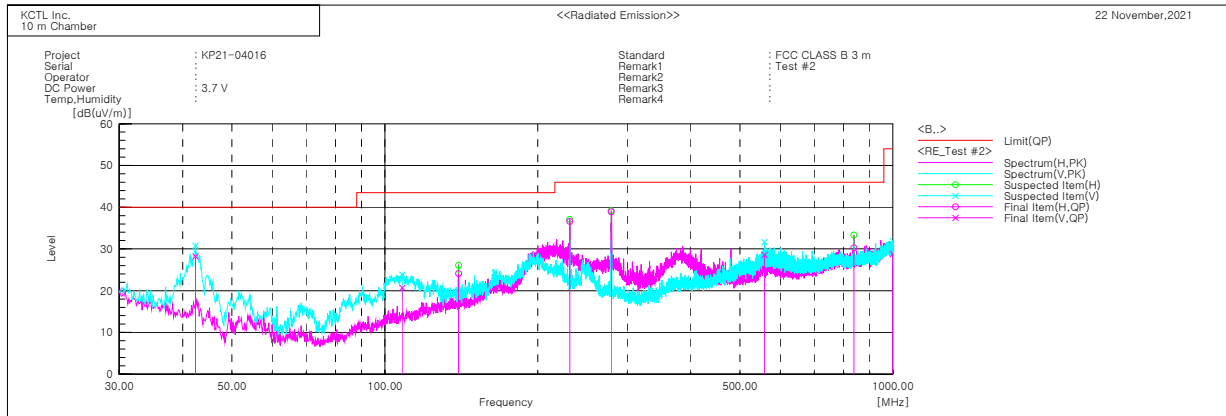
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30 MHz ~ 1 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading OP [dB(uV)]	c.f [dB(1/m)]	Result OP [dB(uV/m)]	Limit OP [dB(uV/m)]	Margin OP [dB]	Height [cm]	Angle [deg]
1	42.369	V	39.8	-11.6	28.2	40.0	11.8	177.0	112.0
2	108.205	V	30.8	-10.1	20.7	43.5	22.8	102.0	140.0
3	139.616	H	33.6	-9.5	24.1	43.5	19.4	334.0	261.0
4	231.277	H	46.0	-9.4	36.6	46.0	9.4	311.0	56.0
5	278.928	H	45.0	-6.1	38.9	46.0	7.1	189.0	243.0
6	558.770	V	24.7	3.9	28.6	46.0	17.4	155.0	116.0
7	837.524	H	21.5	8.8	30.3	46.0	15.7	144.0	43.0
8	999.398	V	16.2	12.6	28.8	54.0	25.2	223.0	241.0

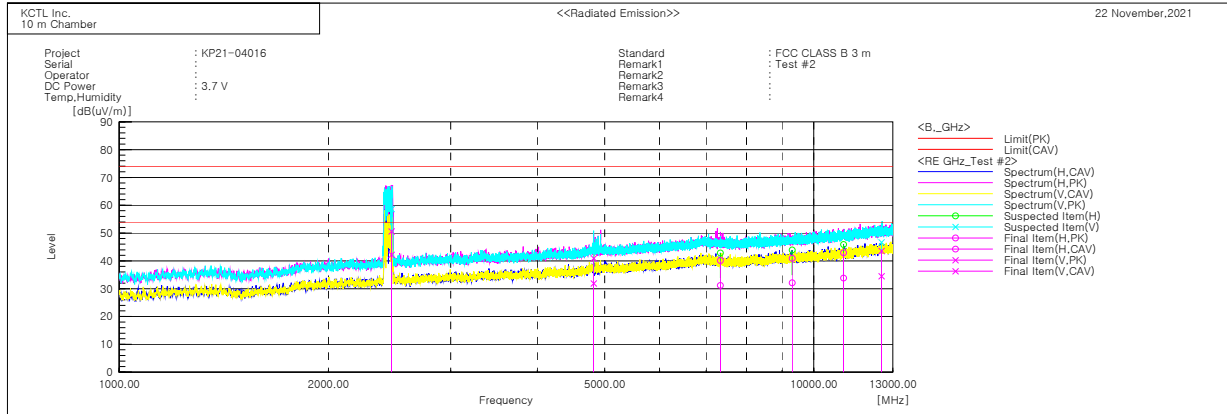
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1 GHz ~ 13 GHz



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	2466.322	V	76.6	68.2	-26.0	50.6	42.2	74.0	54.0	23.4	11.8	196.0	349.0
2	4822.645	V	61.7	52.7	-20.8	40.9	31.9	74.0	54.0	33.1	22.1	147.0	198.0
3	7339.618	H	57.9	49.0	-17.8	40.1	31.2	74.0	54.0	33.9	22.8	227.0	50.0
4	9308.313	H	57.1	48.3	-16.2	40.9	32.1	74.0	54.0	33.1	21.9	321.0	14.0
5	11039.860	H	55.4	46.3	-12.5	42.9	33.8	74.0	54.0	31.1	20.2	175.0	358.0
6	12513.820	V	54.9	45.8	-11.3	43.6	34.5	74.0	54.0	30.4	19.5	265.0	82.0