






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-SEF0034-A Page (1) of (22)	
1. Client		
<ul style="list-style-type: none"> ◦ Name : Olive Union inc ◦ Address : 4F, 38, Seocho-daero 52-gil, Seocho-gu, Seoul, Republic of Korea ◦ Date of Receipt : 2021-01-18 		
2. Use of Report : -		
3. Name of Product / Model : Olive Pro / OSE300		
4. Manufacturer / Country of Origin : BLUECOM / Vietnam		
5. Date of Test : 2021-04-02		
6. Location of Test : <input checked="" type="checkbox"/> Permanent Testing Lab <input type="checkbox"/> 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 : 2AOLHOSE300		
9. Test Results : Refer to the test result in the test report		
Affirmation	Tested by 	Technical Manager 
	Name : Jiwon Shin (Signature)	Name : Gunsu Park (Signature)
2021-05-28		
<h2>KCTL Inc.</h2>		
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 KCTL Inc.		

REPORT REVISION HISTORY

Date	Revision	Page No
2021-04-12	Originally issued	-
2021-05-28	Revised difference between the basic model and the variant model.	10

This report shall not be reproduced except in full, without the written approval of KCTL Inc. This document may be altered or revised by KCTL Inc. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by KCTL Inc. will constitute fraud and shall nullify the document. This test report is a general report that does not use the KOLAS accreditation mark and is not related to KS Q ISO/IEC 17025 and KOLAS accreditation.

Note. The report No. KR21-SEF0034 is superseded by the report No. KR21-SEF0034-A.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. Applicant information	4
2. Laboratory information	5
3. Test system configuration	6
3.1 Operation environment.....	6
3.2 Measurement Uncertainty	7
4. Description of EUT	9
4.1 General information.....	9
4.2 Product description.....	10
4.3 Auxiliary equipments	10
4.4 Test configuration	11
4.5 Operating conditions	12
5. Summary of test results	13
5.1 Summary of EMI emission test results	13
6. Test results	14
6.1 Conducted Emissions.....	14
6.2 Radiated Emission	17

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-SEF0034-A
Page (4) of (22)

The logo for KCTL, consisting of the letters 'KCTL' in a bold, blue, sans-serif font.

1. Applicant information

Applicant: Olive Union inc
Address: 4F, 38, Seocho-daero 52-gil, Seocho-gu, Seoul, Republic of Korea

Manufacturer: BLUECOM
Address: 116, Venture-ro, Yeonsu-gu, Incheon, 22013, Korea

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-SEF0034-A
Page (5) of (22)

KCTL

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

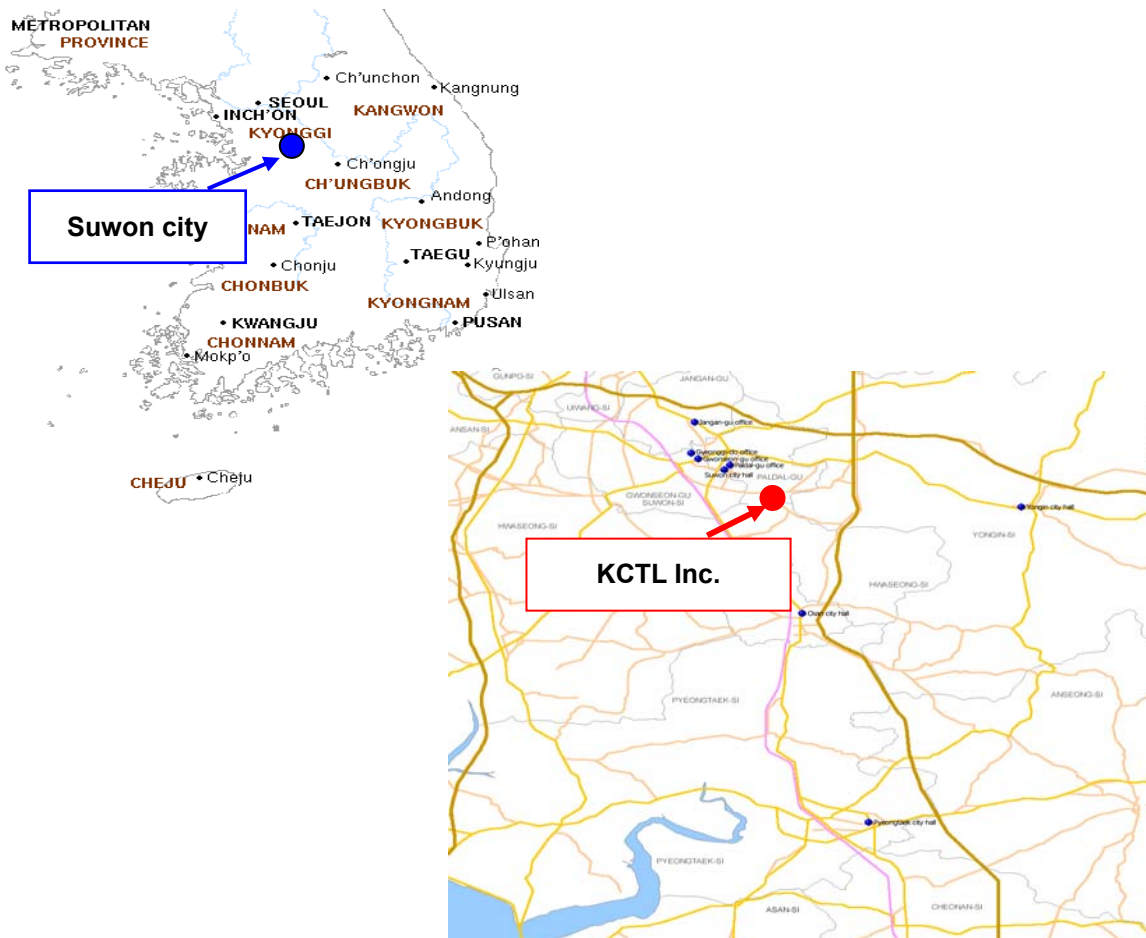
FCC Site Designation No: KR0040

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)	21.5 °C	28.8 % R.H.	-
Shielded room(CE)	21.8 °C	32.0 % R.H.	-

Test site

These testing items were performed following locations;

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

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-SEF0034-A
Page (7) of (22)



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	EP5/RE_Ver 4.6.0(TOYO)	☒
	4F	EP5/RE_Ver 5.11.10(TOYO)	

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-SEF0034-A
Page (9) of (22)



4. Description of EUT

4.1 General information

Battery	Olive: Lithium-ion battery 65mAh Charging case: Lithium-ion battery 410mAh
Power input	Olive: DC (DC) 5V, 130mA Charging case: DC(DC)5V, 410mA
Usage time	- Usage time calculated based on a volume level of ○%. - Charging time Main unit ○ hours / Charging case ○ hours ※ Battery life may vary depending on environment and usage factors such as distance between communicating Bluetooth devices.
Size and weight	Olive: 20mm × 20mm × 31mm / 7g Charging case: 66mm × 23mm × 45mm / 28g
Main unit and accessories	- Olive unit for left ear x 1 Olive unit for right ear x 1 - Charging case x 1 - 1 USB Type-C cable - Urethane Eartips: Small, Medium, Large (x2 for each size) (Size M is attached to the left and right Olive at the time of purchase)
Compatible models	Compatible with iOS 11 or later, Android 4.4.3 or later. Usage at a distance of ● meters is not guaranteed to work. Compatibility with older or newer versions is not guaranteed. Compatibility with old Bluetooth standards is not guarantee. Bluetooth radio waves may interfere with other radio waves. Please make sure to set up indoors.

4.2 Product description

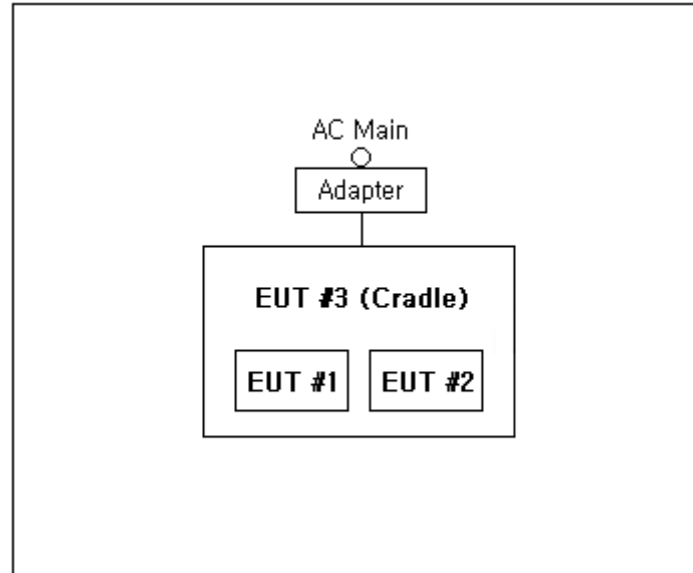
Type of product	Olive Pro
Model name (Basic)	OSE300
Model name (Variant)	OSE300A
Difference	The difference between the basic model and the variant model is color. All hardware is the same as the basic model. OSE300 - White OSE300A - Black
Serial no	-
Testing voltage	120 V, 60 Hz / DC 3.7 V
Input rating	DC 5 V (Power supplied from Adapter) DC 3.7 V (Built in Battery)
Internal clock frequency	40 MHz
RF frequency	2 402 MHz ~ 2 480 MHz
FCC ID	2AOLHOSE300
Note	-The following accessory was not provided by the manufacturer. 1) Adapter

4.3 Auxiliary equipments

Type	Model / Part #	S/N	Manufacturer
Adapter	EP-TA20KWK	-	DONGYANG E&P VIETNAM CO.,LTD.
Mobile Phone	SM-N935S	-	SAMSUNG

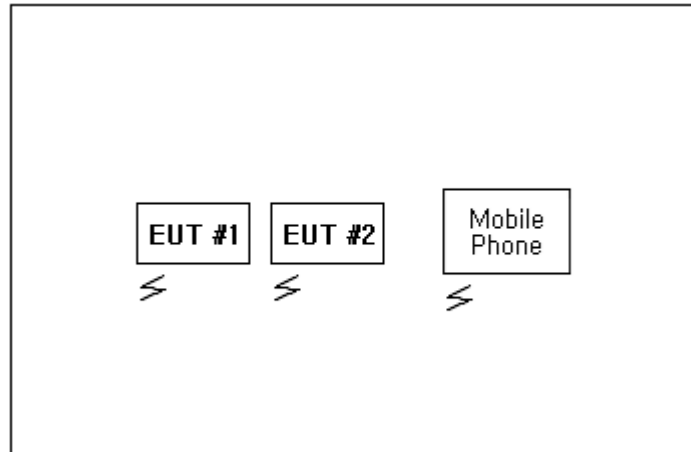
4.4 Test configuration

[Test #1]



	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT #3 (Cradle)	USB(C-TYPE)	Adapter	USB(A-TYPE)	2.5	Shield
2		-	EUT #1	-	Direct	-
3		-	EUT #2	-	Direct	-

[Test #2]



	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT #1	-	-	-	-	-
2	EUT #2	-	-	-	-	-

4.5 Operating conditions

The EUT was configured as normal intended use.

Test Mode	Normal operating
Test #1	The EUT Tested by checking the state of charge through the LED.
Test #2	Send and receive via Bluetooth window using Mobile Phone to check the operation status of the EUT Tested by outputting a 1 kHz sound source while checking the connection status.

Note. It means this device needs to be tested with 3 orientations (x, y and z) and at least the worst case orientation shall be set for final test.

It was determined that Z orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in Z orientation.

5. Summary of test results

5.1 Summary of EMI emission test results

Applied	Test items	Test method	Result
<input checked="" type="checkbox"/>	Conducted Emission	ANSI C63.4:2014, Class B	Pass
<input checked="" type="checkbox"/>	Radiated Emission	ANSI C63.4:2014, Class B	Pass

These results are deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations.

6. Test results

6.1 Conducted Emissions

Testing voltage	120 V, 60 Hz		
Test facility	Shielded room (CE#1)		
Date	2021-04-02		
Temperature (°C)	21.8 °C	Humidity (% R.H.)	32.0 % 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	2021.08.20	<input checked="" type="checkbox"/>
TWO-LINE V-NETWORK	ENV216	101358	R&S	2021.09.29	<input checked="" type="checkbox"/>
TWO-LINE V-NETWORK	ENV216	101352	R&S	2021.04.06	<input type="checkbox"/>

KCTL Inc.

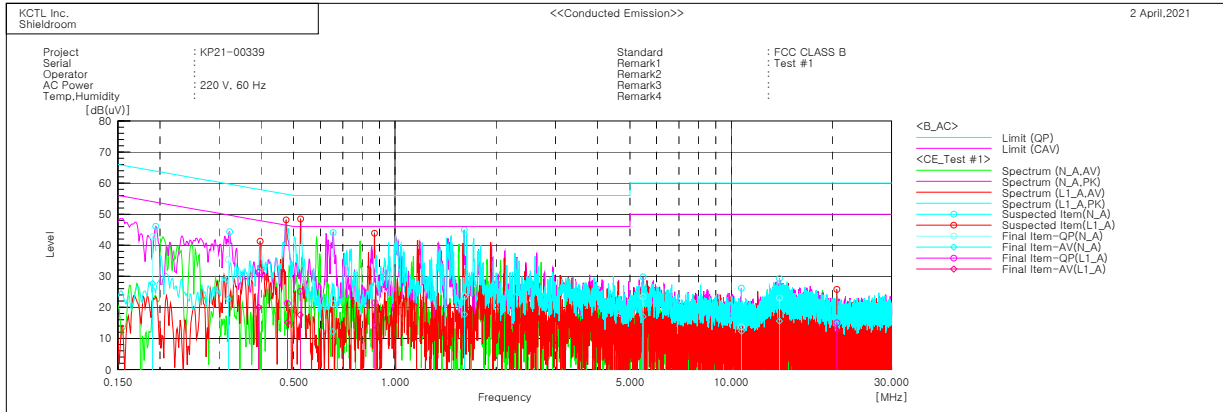
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
Tel: 82-31-285-0894 Fax: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SEF0034-A
Page (16) of (22)



6.1.4 Conducted emissions measurement result

AC Main



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	0.19028	32.7	17.5	10.1	42.8	27.6	64.0	54.0	21.2	26.4
2	0.31982	25.6	12.9	9.8	35.4	22.7	59.7	49.7	24.3	27.0
3	0.65411	11.3	2.3	9.9	21.2	12.2	56.0	46.0	34.8	33.8
4	1.60976	13.7	7.8	9.9	23.6	17.7	56.0	46.0	32.4	28.3
5	5.46623	13.4	7.0	10.0	23.4	17.0	60.0	50.0	36.6	33.0
6	10.73538	3.5	2.1	10.2	13.7	12.3	60.0	50.0	46.3	37.7
7	13.9173	12.7	5.3	10.3	23.0	15.6	60.0	50.0	37.0	34.4

--- 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	0.3935	21.4	10.1	9.9	31.3	20.0	58.0	48.0	26.7	28.0
2	0.47877	11.3	5.1	10.0	21.3	15.1	56.4	46.4	35.1	31.3
3	0.52314	15.2	7.6	10.0	25.2	17.6	56.0	46.0	30.8	28.4
4	0.87253	11.6	4.4	9.9	21.5	14.3	56.0	46.0	34.5	31.7
5	20.62698	4.2	2.0	10.8	15.0	12.8	60.0	50.0	45.0	37.2

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	2021-04-02		
Temperature (°C)	21.5 °C	Humidity (% R.H.)	28.8 % R.H.
Remarks	Pass		

6.2.1 Limits of radiated emission measurement

Frequency [MHz]	Class A at 10 m QP(dB(μV/m))		Class B at 3 m QP(dB(μV/m))	
	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	2021.08.20	☒
Bilog Antenna	CBL 6112D	37876	TESEQ	2022.12.08	☒
AMPLIFIER	310N	293004	SONOMA	2021.08.20	☒
ATTENUATOR	8491B	MY39270292	AGILENT	-	☒
Antenna Mast	MA4640-XP-ET	-	Innco Systems	-	☒
Turn Table	TT 3.0-3t	-	MATURO	-	☒
DOUBLE RIDGED HORN ANTENNA	3117	00155787	ETS-LINDGREN	2021.10.28	☒
SIGNAL ANALYZER	FSV40	100988	R&S	2021.12.23	☒

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

KCTL Inc.

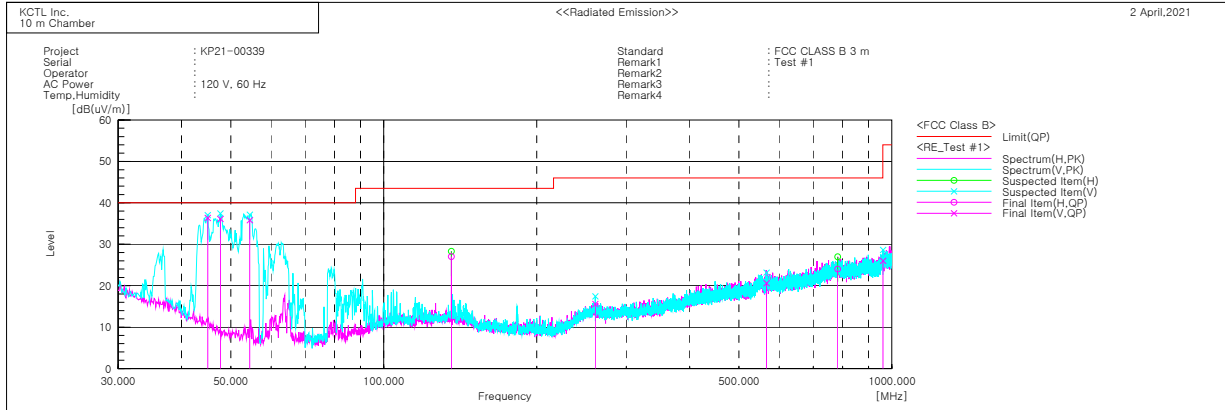
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
Tel: 82-31-285-0894 Fax: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SEF0034-A
Page (19) of (22)



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	45.035	V	49.3	-12.9	36.4	40.0	3.6	230.0	25.0
2	47.703	V	50.3	-14.2	36.1	40.0	3.9	170.0	262.0
3	54.493	V	52.2	-16.4	35.8	40.0	4.2	117.0	344.0
4	135.851	H	36.2	-9.2	27.0	43.5	16.5	371.0	85.0
5	260.860	V	20.9	-5.3	15.6	46.0	30.4	150.0	308.0
6	566.895	V	16.7	3.9	20.6	46.0	25.4	195.0	154.0
7	782.114	H	15.3	8.7	24.0	46.0	22.0	319.0	117.0
8	960.715	V	14.1	11.9	26.0	54.0	28.0	239.0	23.0

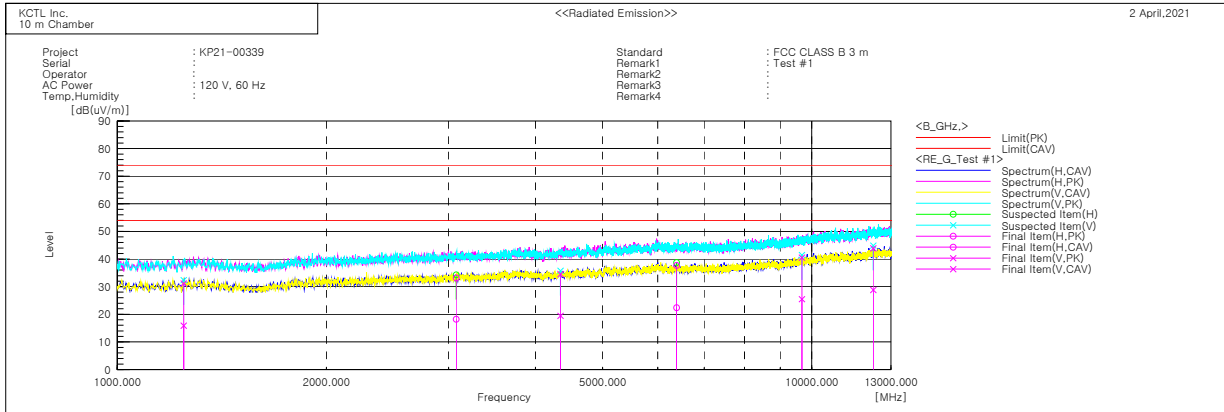
KCTL Inc.

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-SEF0034-A
Page (20) of (22)



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	1246.525	V	34.6	19.4	-3.5	31.1	15.9	74.0	54.0	42.9	38.1	163.0	15.0
2	3075.907	H	35.0	20.0	-1.8	33.2	18.2	74.0	54.0	40.8	35.8	377.0	54.0
3	4345.934	V	32.6	17.5	2.0	34.6	19.5	74.0	54.0	39.4	34.5	252.0	316.0
4	6386.138	H	32.3	17.0	5.4	37.7	22.4	74.0	54.0	36.3	31.6	149.0	3.0
5	9677.667	V	33.0	18.0	7.5	40.5	25.5	74.0	54.0	33.5	28.5	139.0	350.0
6	12258.530	V	32.0	16.9	11.9	43.9	28.8	74.0	54.0	30.1	25.2	290.0	13.0

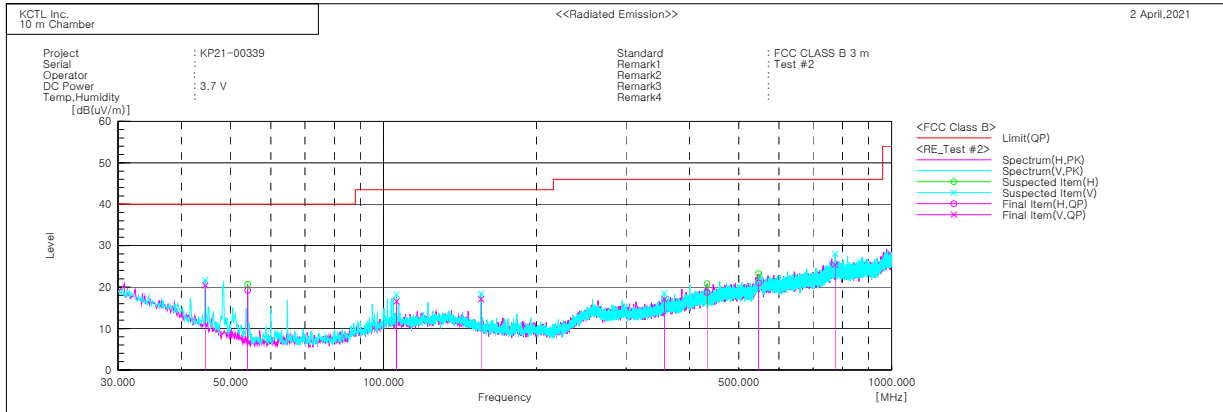
KCTL Inc.

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-SEF0034-A
Page (21) of (22)



30 MHz ~ 1 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Height [cm]	Angle [deg]
1	44.550	V	33.1	-12.7	20.4	40.0	19.6	195.0	158.0
2	54.008	H	35.6	-16.4	19.2	40.0	20.8	316.0	262.0
3	106.024	V	26.7	-10.1	16.6	43.5	26.9	230.0	20.0
4	155.494	V	27.6	-10.5	17.1	43.5	26.4	250.0	237.0
5	356.769	V	20.2	-3.1	17.1	46.0	28.9	147.0	33.0
6	433.399	H	18.8	-0.1	18.7	46.0	27.3	383.0	343.0
7	547.495	H	17.0	4.0	21.0	46.0	25.0	314.0	187.0
8	773.990	V	17.1	8.3	25.4	46.0	20.6	186.0	21.0

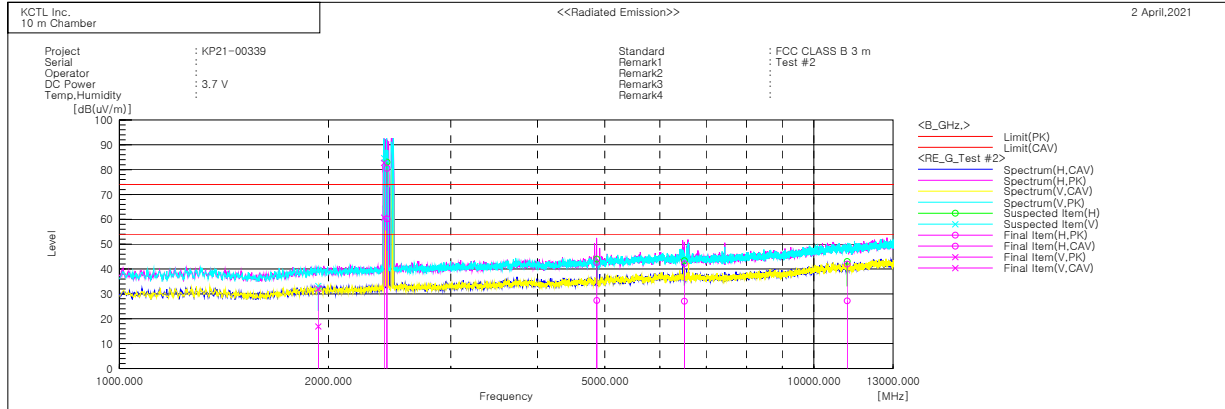
KCTL Inc.

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-SEF0034-A
Page (22) of (22)



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	1933.393	V	33.6	18.4	-1.5	32.1	16.9	74.0	54.0	41.9	37.1	289.0	267.0
2	2404.340	V	83.4	61.3	-0.6	82.8	60.7	74.0	54.0	-8.8	-6.7	158.0	228.0
3	2428.143	H	81.0	60.7	-0.5	80.5	60.2	74.0	54.0	-6.5	-6.2	260.0	273.0
4	4867.887	H	40.5	25.3	2.1	42.6	27.4	74.0	54.0	31.4	26.6	115.0	163.0
5	6510.251	H	37.3	22.2	4.9	42.2	27.1	74.0	54.0	31.8	26.9	149.0	99.0
6	11167.020	H	31.0	16.2	11.0	42.0	27.2	74.0	54.0	32.0	26.8	368.0	178.0

No. 2, 3 is the fundamental frequency. (2 404.340 MHz, 2 428.143 MHz_Bluetooth)