






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.: KR18-SEF0087-A Page (1) of (25)	
1. Client ◦ Name : IB Korea ◦ Address : #910 SunTech city 1, 474, Dunchondaero, Jungwon-gu, Seongnam-si, Gyeonggi-do, Korea ◦ Date of Receipt : 2018-06-05			
2. Use of Report : -			
3. Name of Product and Model : KOJAK / IBNK110			
4. Manufacturer and Country of Origin : IB Korea / Korea			
5. Date of Test : 2018-06-12			
6. Test method used : FCC part 15 subpart B, Class B ANSI C63.4:2014			
7. Classification : Certification			
8. Test Results : Refer to the test result in the test report			
Affirmation	Tested by	Technical Manager	
	 Name : Donghyun Kim (Signature)	 Name : Gunsu Park (Signature)	
2018-08-09			
<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
2018-06-14	Originally issued(KR18-SEF0087)	-
2018-08-09	Added the comment as requested by customer (KR18-SEF0087-A)	-

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1. Applicant information

Applicant: IB Korea
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E-mail: Billy@ibkr.co.kr
Contact name: Billy Jeon

Manufacturer: IB Korea
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2. Laboratory information

Address

KCTL Inc. (Suwon Lab.)

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Telephone Number: 82 31 285 0894

Facsimile Number: 82 505 299 8311

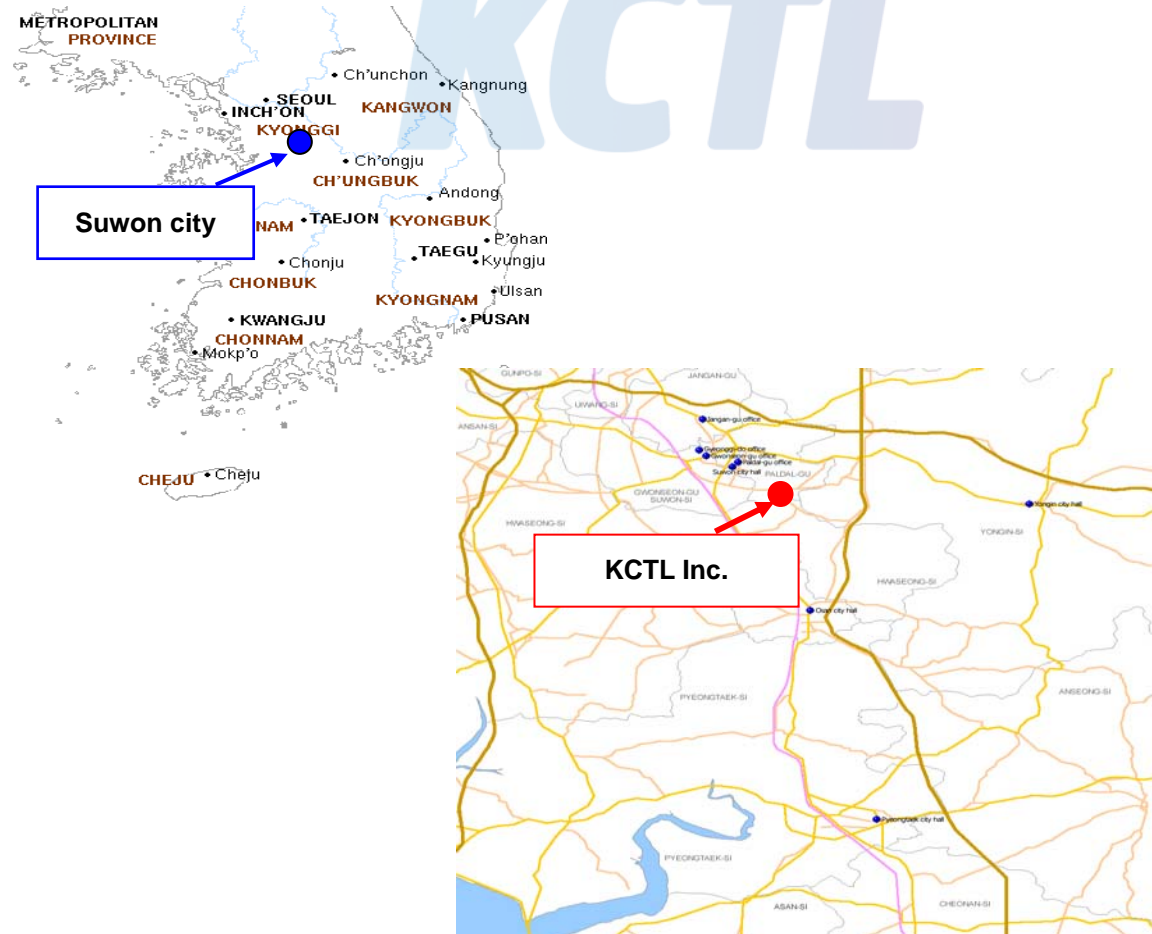
FCC Site Designation No: KR0040

VCCI Registration No. : R-3327, G-198, C-3706, T-1849

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)	22.5 °C	30.1 % R.H.	-
Shielded room(CE)	21.8 °C	37.2 % 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 (C.L.: Approx 95 %, $k = 2$)			
Shielded Room (CE#1)	9 kHz ~ 150 kHz:	3.66 dB	
	150 kHz ~ 30 MHz:	3.24 dB	
Shielded Room (CE#2)	9 kHz ~ 150 kHz:	3.48 dB	
	150 kHz ~ 30 MHz:	3.06 dB	
Radiated Emission measurement (C.L.: Approx 95 %, $k = 2$)			
10 m Chamber (4F)	30 MHz ~ 300 MHz	3 m:	5.02 dB
		10 m:	5.00 dB
	300 MHz ~ 1 000 MHz	3 m:	5.16 dB
		10 m:	5.04 dB
	1 GHz ~ 6 GHz	3 m:	6.30 dB
	6 GHz ~ 18 GHz	3 m:	6.72 dB
18 GHz ~ 40 GHz	3 m:	6.22 dB	
10 m Chamber (2F)	30 MHz ~ 300 MHz	3 m:	5.54 dB
		10 m:	5.52 dB
	300 MHz ~ 1 000 MHz	3 m:	5.60 dB
		10 m:	5.48 dB
	1 GHz ~ 6 GHz	3 m:	6.32 dB
	6 GHz ~ 18 GHz	3 m:	6.76 dB
10 m Chamber (3F)	30 MHz ~ 300 MHz	3 m:	4.90 dB
	300 MHz ~ 1 000 MHz	3 m:	5.06 dB
	1 GHz ~ 6 GHz	3 m:	6.62 dB
	6 GHz ~ 18 GHz	3 m:	6.64 dB

3.3 Measurement Program

These test items were performed by software programs;

Test item	Measurement Program		Used
Conducted Emission	EP5CE_V 5.4.0(TOYO)		☒
Radiated Emission	2F	EP5RE_V 4.6.0(TOYO)	☒
	4F	EP5RE_V 5.11.10(TOYO)	



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4. Description of EUT

4.1 General information

USB 5 V (PC USB power), 100 MHz

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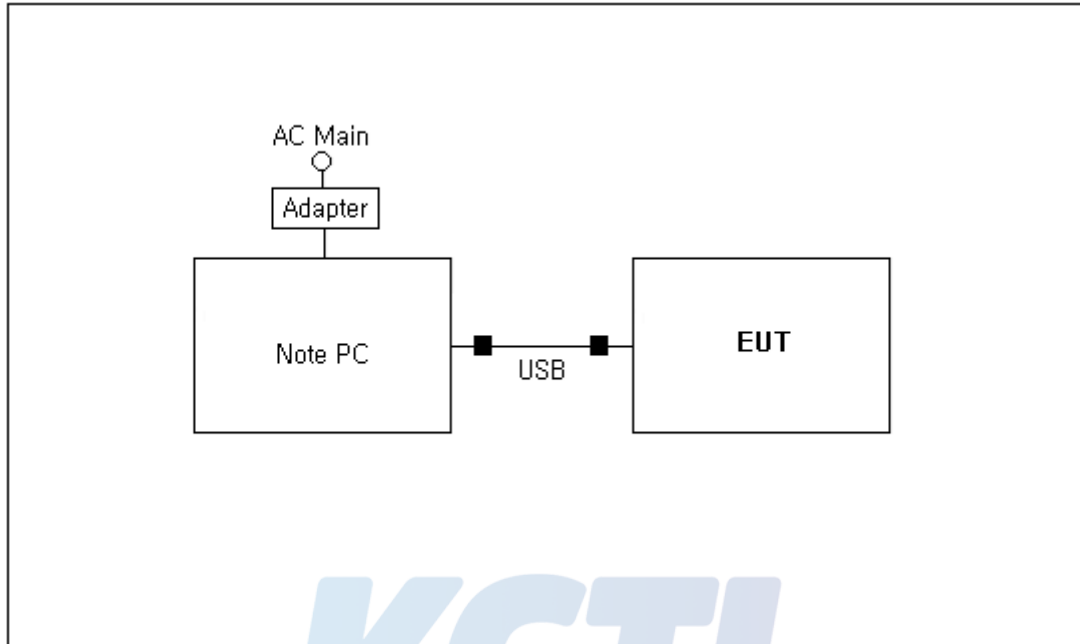
4.2 Product description

Type of product	KOJAK
Model name (Basic)	IBNK110
Model name (Variant)	IBNK11A (PL)
Difference	Buyer model name
Serial no	-
Testing voltage	DC 5 V
Input rating	DC 5 V
Internal clock frequency	100 MHz
Note	-

4.3 Auxiliary equipments

Type	Model / Part #	S/N	Manufacturer
Note PC	XU100093-15004A	-	DELL
Adapter	LA130PM121	-	DELL

4.4 Test configuration



	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT	USB	Note PC	USB	1.0	Shield (Core)
2	Note PC	Power	Adapter	-	1.5	Unshield

-USB cable description: Solid shielding cable with two ferrite cores.

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
Test #1	After connecting the EUT and Note PC, the fingerprint recognition(standby) operation status is checked using the IBScan Ultimate program.

5. Summary of test results

5.1 Summary of EMI emission test results

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

Test specification	FCC Part 15 Subpart B, Class B, ANSI C63.4:2014		
Testing voltage	DC 5 V		
Test facility	Shielded room (CE#2)		
Date	2018-06-12		
Temperature (°C)	21.8 °C	Humidity (% R.H.)	37.2 % R.H.
Remarks	Pass		

6.1.1 Limits of conducted emission measurement

AC main

Frequency [MHz]	Class A Limits (dB(μ V))		Class B Limits (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

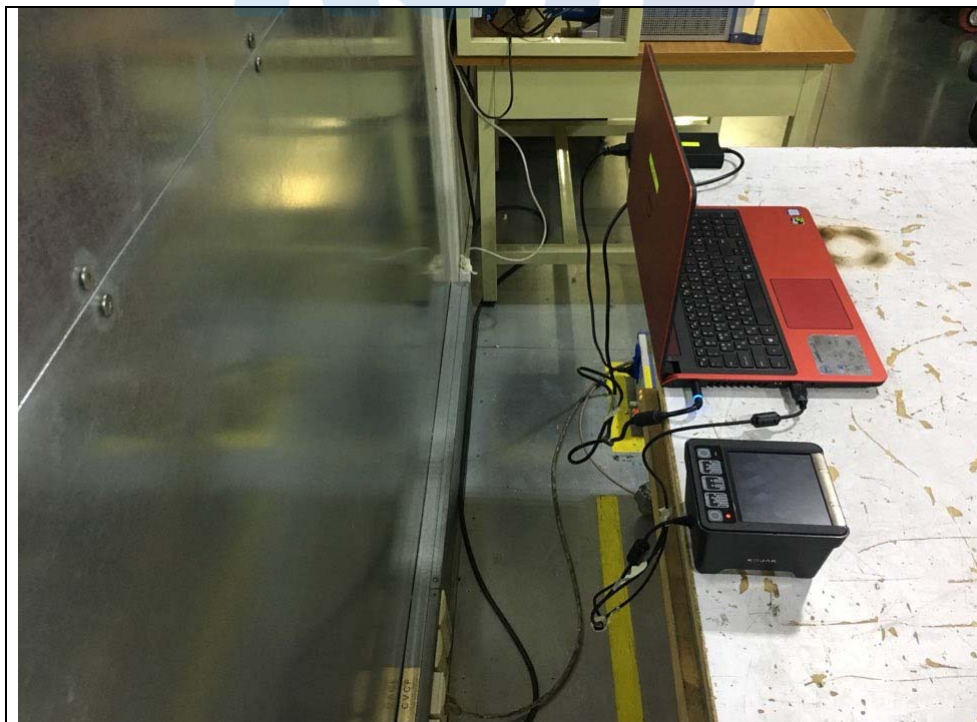
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground 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	100710	R&S	2018.08.24	<input checked="" type="checkbox"/>
TWO-LINE V-NETWORK	ENV216	101352	R&S	2019.05.24	<input checked="" type="checkbox"/>
TWO-LINE V-NETWORK	NNLK8121	8121-472	SCHWARZBECK	2018.08.25	<input type="checkbox"/>

6.1.4 Photographs of test setup

AC Main



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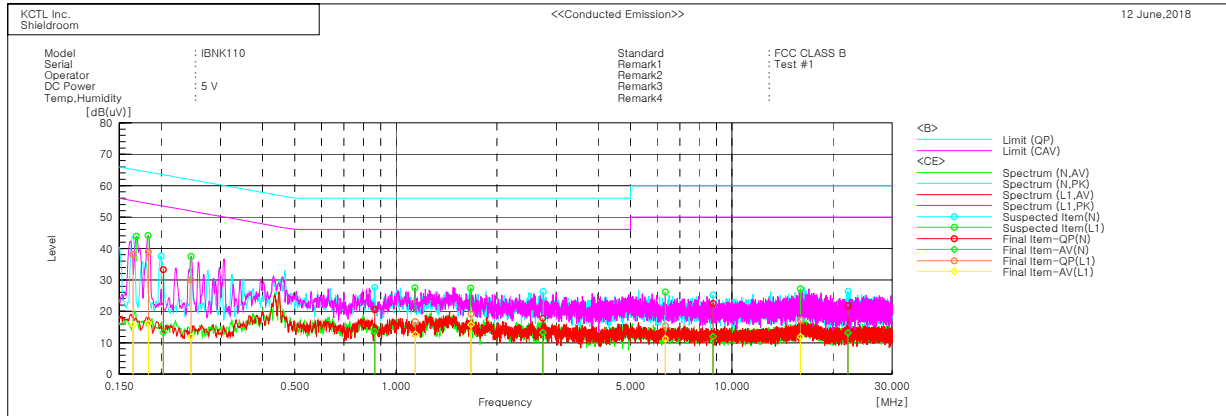
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6.1.5 Conducted emission measurement result

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	0.20293	23.5	3.5	9.8	33.3	13.3	63.5	53.5	30.2	40.2
2	0.86477	10.6	3.8	9.8	20.4	13.6	56.0	46.0	35.6	32.4
3	2.73814	8.1	3.5	9.7	17.8	13.2	56.0	46.0	38.2	32.8
4	8.79328	12.6	2.1	9.9	22.5	12.0	60.0	50.0	37.5	38.0
5	22.16642	11.6	3.0	10.1	21.7	13.1	60.0	50.0	38.3	36.9

--- 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	0.16497	28.1	5.6	10.0	38.1	15.6	65.2	55.2	27.1	39.6
2	0.18314	28.9	6.1	10.0	38.9	16.1	64.3	54.3	25.4	38.2
3	0.24546	20.4	2.3	9.6	30.0	11.9	61.9	51.9	31.9	40.0
4	1.14201	7.0	3.0	9.7	16.7	12.7	56.0	46.0	39.3	33.3
5	1.67403	9.4	6.1	9.7	19.1	15.8	56.0	46.0	36.9	30.2
6	6.3446	5.6	1.5	9.8	15.4	11.3	60.0	50.0	44.6	38.7
7	16.00665	7.1	1.7	10.1	17.2	11.8	60.0	50.0	42.8	38.2

6.2 Radiated Emission

Test specification	FCC Part 15 Subpart B, Class B ANSI C63.4:2014		
Testing voltage	DC 5 V		
Test facility	10 m Chamber (4F)		
Test distance	3 m		
Date	2018-06-12		
Temperature(°C)	22.5 °C	Humidity (% R.H.)	30.1 % R.H.
Remarks	Pass		

6.2.1 Limits of radiated emission measurement

Frequency [MHz]	Class A (dB(μ V/m)) @10 m	Class B (dB(μ V/m)) @3 m
30-88	39	40
88-216	43.5	43.5
216-960	46.4	46
Above 960	49.5	54

Note- Alternative standard: CISPR, Pub. 22

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 0.1 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	2018.08.24	<input checked="" type="checkbox"/>
Bilog Antenna	VULB9168	583	SCHWARZBECK	2020.04.13	<input checked="" type="checkbox"/>
AMPLIFIER	310N	293004	SONOMA	2018.08.24	<input checked="" type="checkbox"/>
COAXIAL FIXED ATTENUATOR	8491B-003	2708A18758	AGILENT	-	<input checked="" type="checkbox"/>
Antenna Mast	MA4640-XP-ET	-	Innco Systems	-	<input checked="" type="checkbox"/>
Turn Table	TT 3.0-3t	-	MATURO	-	<input checked="" type="checkbox"/>
PREAMPLIFIER	8449B	3008A01802	AGILENT	2019.04.05	<input type="checkbox"/>
DOUBLE RIDGED HORN ANTENNA	3115	00086706	ETS-LINDGREN	2018.08.31	<input type="checkbox"/>
Spectrum Analyzer	FSV40	100988	R&S	2019.01.05	<input type="checkbox"/>

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

Correction

$$E_m = E_{dm} + 20\log(d/3)$$

E_m : Result, E_{dm} : Measured value of the measured distance

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6.2.5 Photographs of test setup

30 MHz ~ 1 GHz



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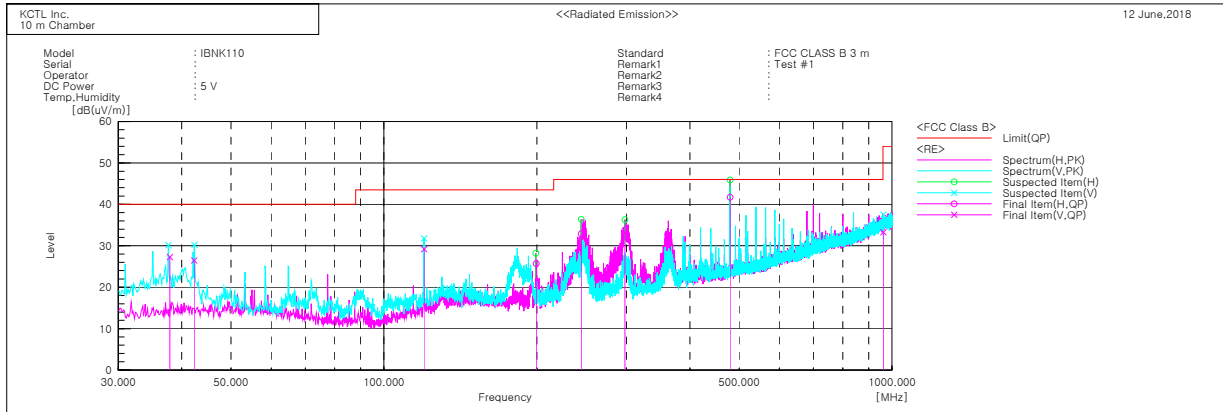
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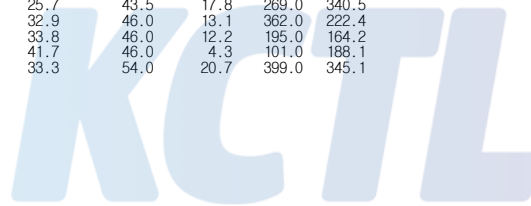


6.2.6 Radiated emission measurement result

30 MHz ~ 1 GHz



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	37.894	V	39.1	-11.8	27.3	40.0	12.7	378.0	4.6
2	42.312	V	37.8	-11.3	26.5	40.0	13.5	106.0	6.1
3	120.006	V	39.9	-10.7	29.2	43.5	14.3	117.0	72.6
4	199.362	H	36.7	-11.0	25.7	43.5	17.8	269.0	340.5
5	244.493	H	41.4	-8.5	32.9	46.0	13.1	362.0	222.4
6	298.125	H	39.8	-6.0	33.8	46.0	12.2	195.0	164.2
7	480.072	H	41.4	0.3	41.7	46.0	4.3	101.0	188.1
8	962.056	V	21.4	11.9	33.3	54.0	20.7	399.0	345.1



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7. EUT photographs

Front View



Rear View



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Left View



Right View



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Top View



Bottom View



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Label



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Inside

