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# TEST REPORT

**KCTL Inc.**
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KCTL

**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<br>Name : Donghyun Kim (Signature) | Technical Manager<br>Name : Gunsu Park (Signature) |

2018-08-09

## KCTL Inc.

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 |
| **Address:** | #910 SunTech city 1, 474, Dunchondaero,<br>Jungwon-gu, Seongnam-si, Gyeonggi-do, Korea |
| **Telephone:** | +82-31-777-2205 |
| **Fax:** | +82-31-777-2210 |
| **E-mail:** | Billy@ibkr.co.kr |
| **Contact name:** | Billy Jeon |

| | |
|---|---|
| **Manufacturer:** | IB Korea |
| **Address:** | #910 SunTech city 1, 474, Dunchondaero,<br>Jungwon-gu, Seongnam-si, Gyeonggi-do, Korea |
| **Telephone:** | +82-31-777-2205 |
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| **E-mail:** | Billy@ibkr.co.kr |
| **Contact name:** | Billy Jeon |

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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-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 |

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## 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 |

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## 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 |

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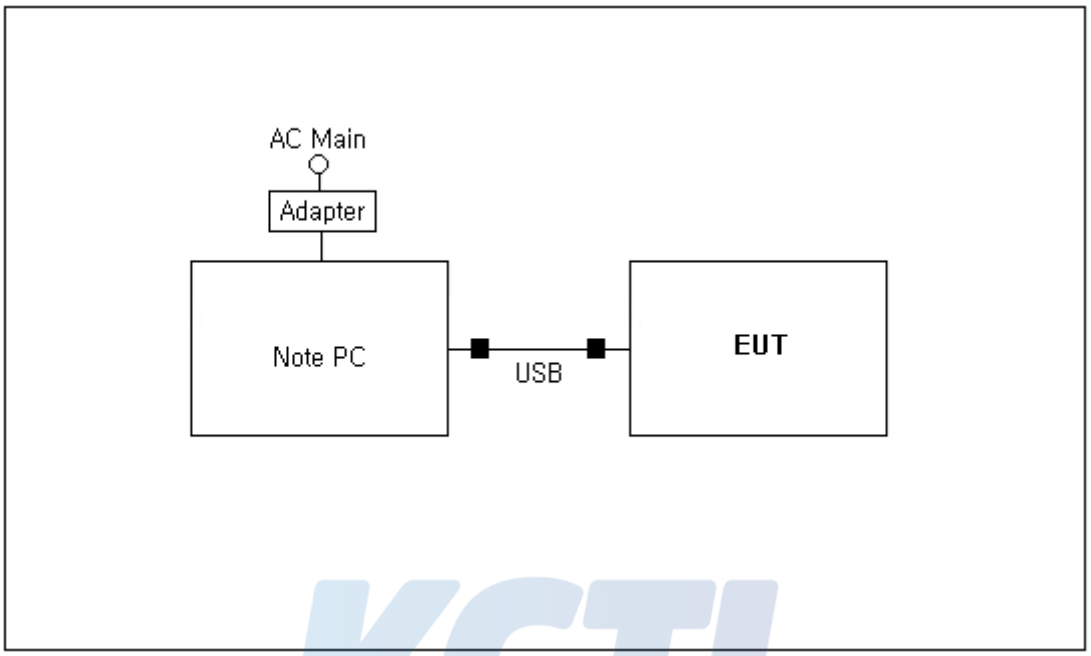
## 4.4 Test configuration




| | 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)<br>ANSI C63.4:2014 | Pass |
| ☒ | Radiated Emission | FCC Part 15 Subpart B (Class B)<br>ANSI C63.4:2014 | Pass |

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

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# 6. Test results

## 6.1 Conducted Emission

| | | | |
|---|---|---|---|
| Test specification | FCC Part 15 Subpart B, Class B,<br>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(μV)) | | Class B Limits (dB(μV)) | |
|---|---|---|---|---|
| | 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

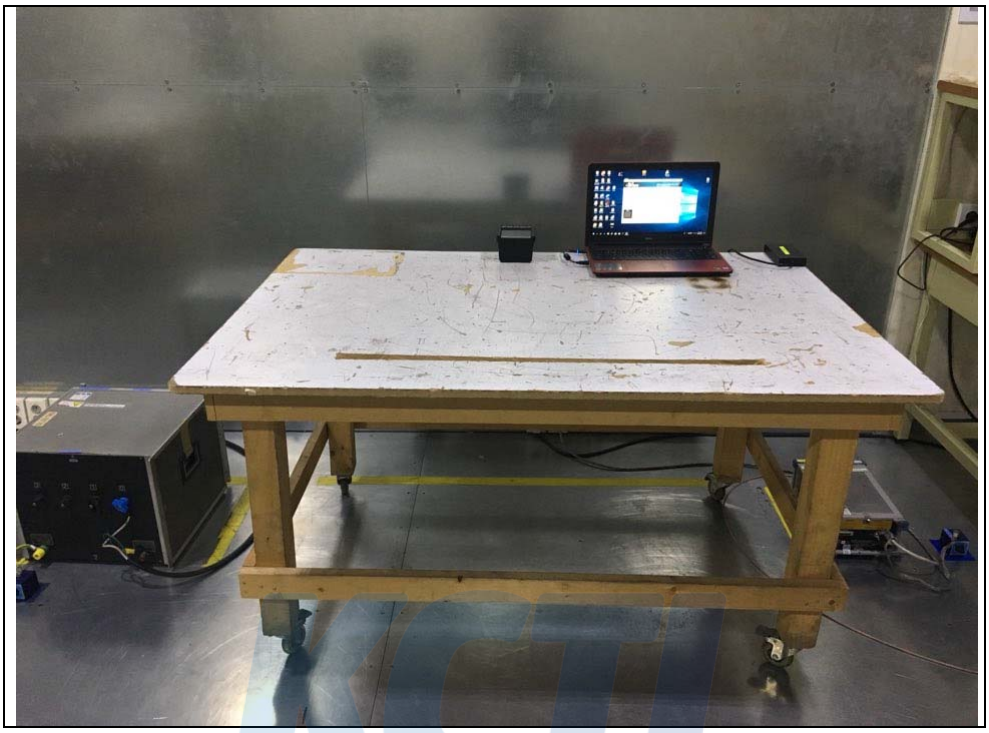
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground 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.

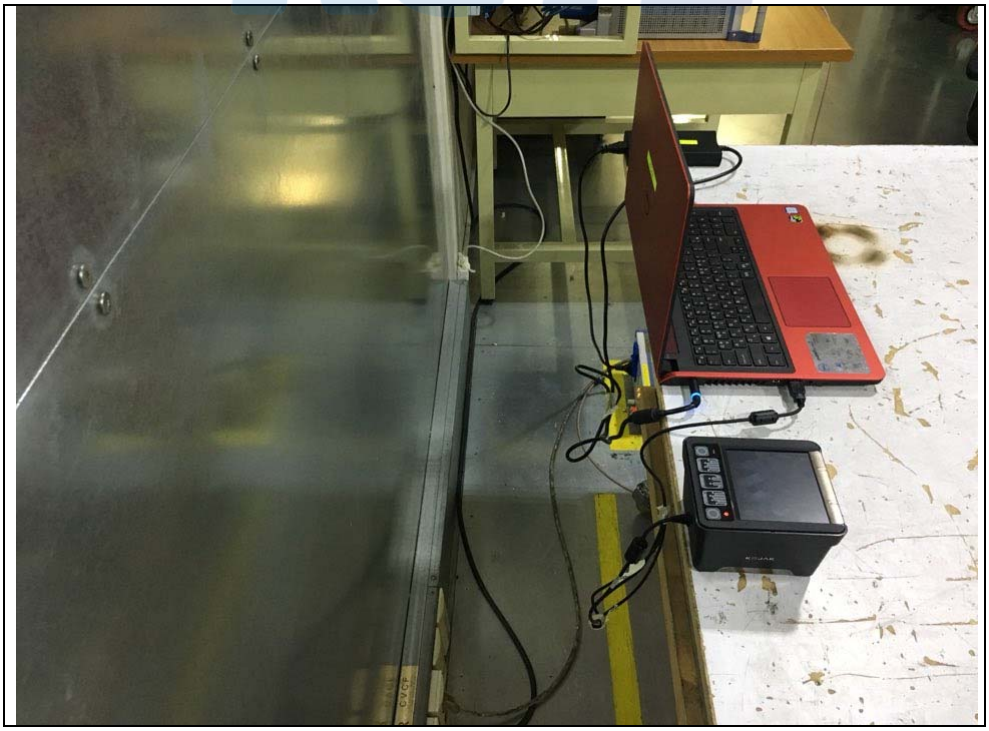
### 6.1.3 Used equipments

| Equipment | Model no. | Serial no. | Makers | Next Cal. Date | Used |
|---|---|---|---|---|---|
| EMI TEST RECEIVER | ESCI | 100710 | R&S | 2018.08.24 | ☒ |
| TWO-LINE V-NETWORK | ENV216 | 101352 | R&S | 2019.05.24 | ☒ |
| TWO-LINE V-NETWORK | NNLK8121 | 8121-472 | SCHWARZBECK | 2018.08.25 | ☐ |

### 6.1.4 Photographs of test setup

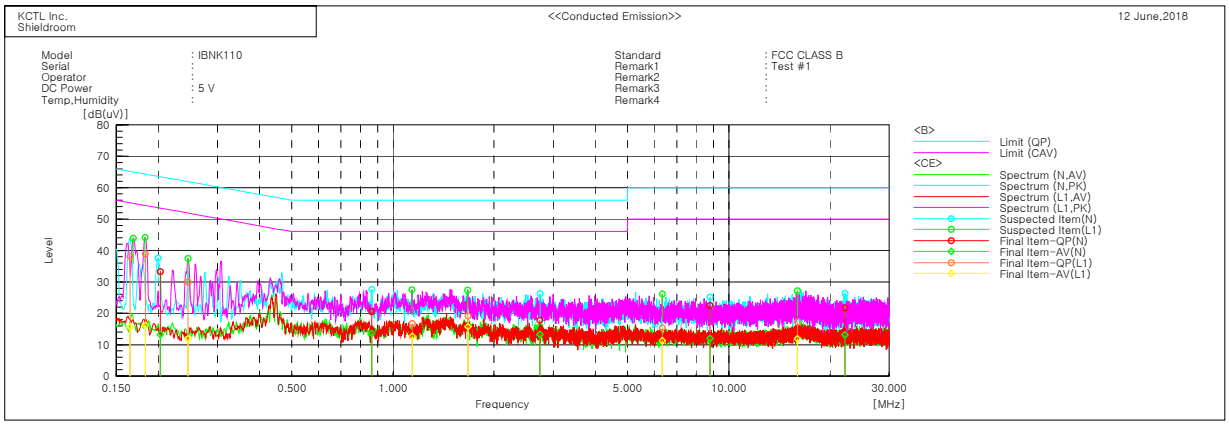
AC Main





## 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<br>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(μV/m)) @10 m | Class B (dB(μV/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 | ☒ |
| Bilog Antenna | VULB9168 | 583 | SCHWARZBECK | 2020.04.13 | ☒ |
| AMPLIFIER | 310N | 293004 | SONOMA | 2018.08.24 | ☒ |
| COAXIAL FIXED ATTENUATOR | 8491B-003 | 2708A18758 | AGILENT | - | ☒ |
| Antenna Mast | MA4640-XP-ET | - | Innco Systems | - | ☒ |
| Turn Table | TT 3.0-3t | - | MATURO | - | ☒ |
| PREAMPLIFIER | 8449B | 3008A01802 | AGILENT | 2019.04.05 | ☐ |
| DOUBLE RIDGED HORN ANTENNA | 3115 | 00086706 | ETS-LINDGREN | 2018.08.31 | ☐ |
| Spectrum Analyzer | FSV40 | 100988 | R&S | 2019.01.05 | ☐ |

### 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:

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 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 dB($\mu$N/m)

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

AV = CAV : Abbreviation of CISPR Average

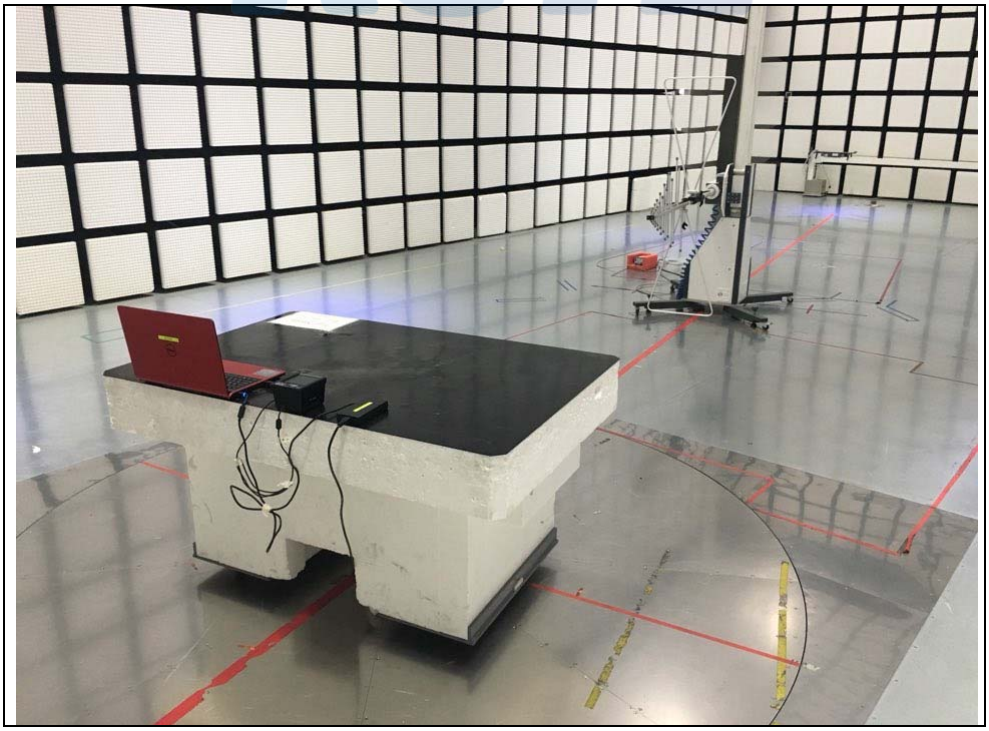
Correction

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

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

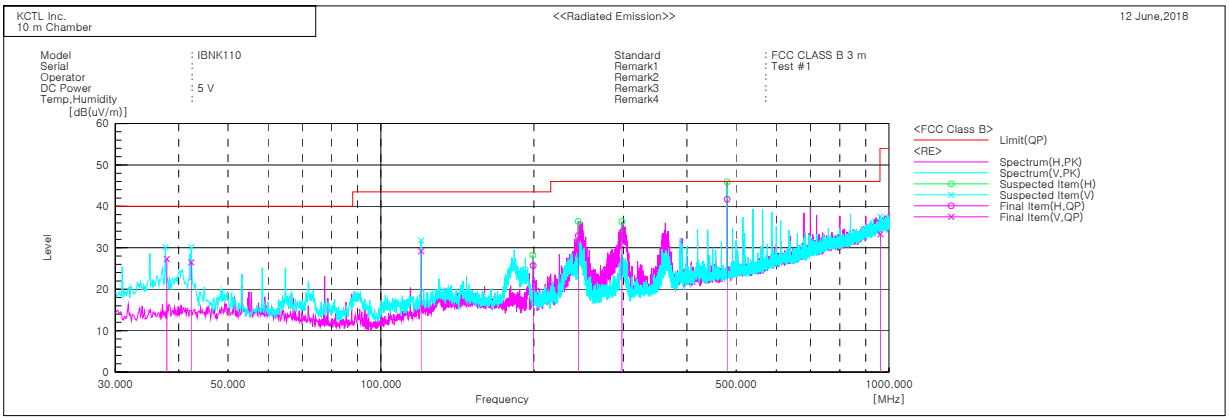
6.2.5 Photographs of test setup

30 MHz ~ 1 GHz



## 6.2.6 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 | 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 |

# 7. EUT photographs

Front View

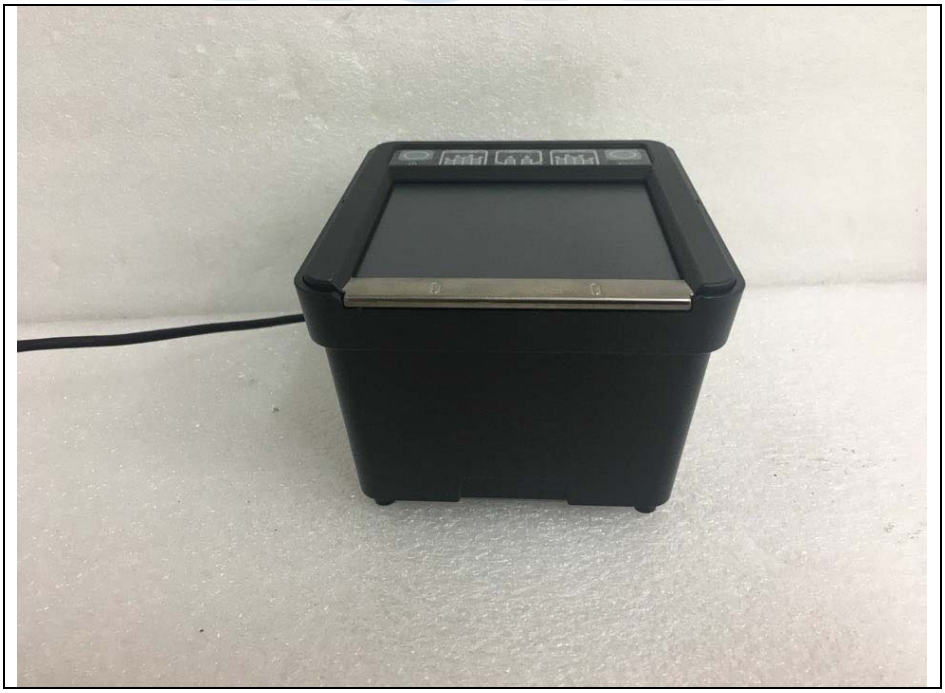
Rear View

Left View

Right View

Top View

Bottom View



Label

Inside