EU Declaration of Conformity

# EU Declaration of Conformity

**According to**

# EMC Directive 2014/30/EU

**For the following**

| | | |
|---|---|---|
| **Product** | **:** | **Network Camera** |
| **Model Name** | **:** | **NC-FE550-WD** |
| **Variant Model Nams** | **:** | **DC-Y1513W, MNC552WF, NC-FE550-WDP1, DC-Y1514W** |

| | | |
|---|---|---|
| **Manufactured at** | **:** | **IDIS CO., LTD.** |
| **Address** | **:** | **8-10, TECHNO 3-RO, YUSEONG-GU, DAEJEON, KOREA** |

**The submitted sample of the above equipment has been tested for CE marking according to following European Directive and standards:**
**- Electromagnetic Compatibility Directive 2014/30/EU**

**The referred test report(s) show that the product complies with standard(s) recognized as giving presumption of compliance with the essential requirements in the specified European Directive.**
**This verification does not imply assessment of the production of the product.**
**The CE marking may be affixed if all relevant and effective European Directives with CE are applicable.**

**The standards relevant for the evaluation of EMC requirements are as follows:**

| | | |
|---|---|---|
| **Test Standards** | **:** | **EN 55032:2015, Class A**<br>**EN 50130-4:2011/ A1:2014** |

**Date of issue: 2017-04-11**

**IDIS CO., LTD.**

8-10, TECHNO 3-RO, YUSEONG-GU,
DAEJEON, KOREA

---
(Name and signature of authorized person)

# 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



KCTL

**1. Client**

- Name : IDIS CO., LTD.
- Address : 8-10, TECHNO 3-RO, YUSEONG-GU
  DAEJEON, KOREA
- Date of Receipt : 2017-03-27

**2. Use of Report** : -

**3. Name of Product and Model** : Network Camera / NC-FE550-WD

**4. Manufacturer and Country of Origin** : IDIS CO., LTD. / Korea

**5. Date of Test** : 2017-04-06 to 2017-04-07

**6. Test method used** : EN 55032:2015, Class A

**7. Test Results** Refer to the test result in the test report

| | | |
|---|---|---|
| Affirmation | Tested by<br>Name : Jinyoung Yeo (Signature) | Technical Manager<br>Name : Gunsu Park (Signature) |

2017-04-11

## KCTL Inc.

## REPORT REVISION HISTORY

| Date | Revision | Page No |
|---|---|---|
| 2015-08-24 | KCTL15-CE0054 (Originally issued) | - |
| 2016-02-26 | KCTL15-CE0054(1) (CS test update) | - |
| 2016-04-22 | KCTL15-CE0054(2) (Add the Variant Model) | - |
| 2017-04-11 | KR17-SEC0240 (Standard update) | - |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

# Contents

# 1. Applicant information

| | |
|---|---|
| **Applicant:** | IDIS CO., LTD. |
| **Address:** | 8-10, TECHNO 3-RO, YUSEONG-GU<br>DAEJEON, KOREA |
| **Telephone:** | +82-31-723-5205 |
| **Fax** | +82-31-723-5108 |
| **E-mail:** | jjungdoo@idis.co.kr |
| **Contact name:** | Jungdoo Jang |

| | |
|---|---|
| **Manufacturer:** | IDIS CO., LTD. |
| **Address:** | 8-10, TECHNO 3-RO, YUSEONG-GU<br>DAEJEON, KOREA |
| **Telephone:** | +82-31-723-5205 |
| **Fax** | +82-31-723-5108 |
| **E-mail:** | jjungdoo@idis.co.kr |
| **Contact name:** | Jungdoo Jang |

# 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, FCC Site Registration No: 687132

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) | : | 26.1 °C | 16.9 % R.H. | - |
| Shielded room(CE) | : | 22.5 °C | 15.1 % 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: 3.66 dB | |
| | 150 kHz ~ 30 MHz: 3.26 dB | |
| Shielded Room (CE#2) | 9 kHz ~ 150 kHz: 3.48 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: 5.42 dB |
| | | 10 m: 5.40 dB |
| | 300 MHz ~ 1 000 MHz | 3 m: 5.56 dB |
| | | 10 m: 5.44 dB |
| | 1 GHz ~ 6 GHz | 3 m: 6.28 dB |
| 10 m Chamber (2F) | 30 MHz ~ 300 MHz | 3 m: 5.06 dB |
| | | 10 m: 5.04 dB |
| | 300 MHz ~ 1 000 MHz | 3 m: 5.18 dB |
| | | 10 m: 5.06 dB |
| | 1 GHz ~ 6 GHz | 3 m: 6.36 dB |
| Radio Frequency Electromagnetic Fields (Confidence level about 95 %, $k$ = 2) | | |
| 1.82 dB | | |
| Disturbance Power Electromagnetic Fields (Confidence level about 95 %, $k$ = 2) | | |
| 3.73 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 | EP5RE_V 5.11.10(TOYO) | ☒ |

# 4. Description of E.U.T.

## 4.1 General information

| HARDWARE | |
|---|---|
| **IMAGING** | |
| Image Sensor | 1/1.8" CMOS |
| Lens | Fixed-focal (1.55mm, F2.0) |
| Optical Zoom/AF | no |
| Angle View | TBD |
| Effective Pixels | 2560x2048 |
| Scanning Mode | Progressive Scan |
| Minimum Illumination | COLOR : TBD<br>BW : TBD<br>BW : TBD |
| SNR | TBD |
| Dynamic Range | TBD |
| IRIS | Fixed |
| True Day&Night (IR Filter Changer) | yes |
| Image Stabilizing | no |
| Pan/Tilt Range | - |
| Pan/Tilt Speed | - |
| **VIDEO** | |
| Video Out | 1 BNC |
| Compression | H.264(MP), M-JPEG |
| Resolution Supported | ***CIF, 4CIF, 1280x720(720p), 1920x1080(1080p), Pivot, 5M 모드 추가?*** |
| Bitrate Control | H.264 - CBR / VBR (up to 35Mbps) |
| Frame Rate | 30ips @ 8M + 1ips @ 720p + 1ips @ 4CIF<br>6 Streaming |
| Video Quality Compensation | Auto Expose, Auto White Balance, Digital Noise Reduction, Black Level Correction |
| **IN/OUT** | |
| Audio | 1 (Line in) / 1 (Line out) |
| Alarm | 1/1 |
| External Storage | micro SD (SDXC) |
| Auxiliary | no |
| Ethernet | 10/100/1000M |
| LED | no |
| **ETC** | |
| Operating Temperature | -20 - 50°C<br>(boot up: -20 - 50°C) |
| Operating Humidity | 0% ~ 90% |
| IR Illuminator | Indoor: TBD, Outdoor: TBD |
| Vandal-proof Casing | no |
| Weatherproof | IP66 |
| PIR SENSOR | no |
| PoE (class) | TBD |
| Input Power | 12VDC, PoE |
| Power Consumption | TBD |

| FUNCTION | |
|---|---|
| **FEATURE** | |
| Motion Detection | yes |
| Audio Detection | yes |
| Video Analytics | yes (Tampering, Tripzone) |
| Event Buffering (Pre & Post) | yes (upto 60M) |
| Multi Streaming Video | 6 stream (Live & Recording) |
| External Storage Recording | yes (SD card) |
| FTP Upload | yes |
| Motion Adaptive Transmission (MAT) | yes |
| Two-way Audio | yes |
| Anonymous Login Support | yes |
| Privacy Masking | yes |
| Pre-Recorded Voice Alert | yes |
| Event Notification | Remote S/W, Email (with Image) |
| **SYSTEM** | |
| Network TimeSync | yes |
| Soft Reset | yes |
| Factory Reset | yes |
| Auto Recovery | yes |
| Security | Multi-User Authority<br>IP Filtering<br>HTTPS, SSL encryption<br>802.1x |
| Import/Export Settings | yes |
| Upgrade | Remote S/W |
| **NETWORK** | |
| Max. Connections | 10(Live + admin), 1 (Recording) |
| Protocols | Manual, ADSL, DHCP, UPnP, mDNS |
| DDNS(DVRNS) | yes |
| QoS | yes (QoS Layer 3 DiffServ) |
| Remote Access Client | Webguard, INIT, RASplus, iNEX |
| Open IP Protocols | yes (ONVIF) |
| **Webguard** | |
| Monitoring | yes |
| Setup | yes |
| PTZ Control | no |
| Two-way Audio Communication | yes |
| **INSTALLATION TOOL (INIT)** | |
| Auto Device Scan | yes |
| Auto IP Address Matching | yes (Control PC and INIT) |
| Upgrade | yes |
| Setup | yes |
| Remote Setup | yes |
| Setup File Load / Save | yes |
| Alarm Device Test | no |
| Reset | Soft Reset, Factory Reset |
| **Basic Recording Solution (iNEX Basic)** | |
| Monitoring | yes |
| Recording | yes (iNEX Recording Service) |
| Setup | yes |
| Multi Display Panels | yes |
| Timeline Search | yes |
| Integrated Event Search | yes, with thumbnail image |
| File Clipping | AVI, BMP, JPEG and Clip-Player (own player) |
| Multi-System Health Monitoring | yes |
| Map Integration | yes |
| Two-way Audio Communication | yes |
| **ETC** | |
| API Support | yes |

# MISCELLANEOUS

| MISCELLANEOUS | |
|---|---|
| Dimensions (W x H x D) or ØxH | Ø155x49mm |
| Shipping Dimensions (W x H x D) | oversea : TBD<br>domestic : TBD |
| Unit Weight | TBD |
| Shipping Weight | oversea : TBD<br>domestic : TBD |
| **APPROVALS** | |
| Electrical | TBD |
| Mechanical | TBD |

## 4.2 Product description

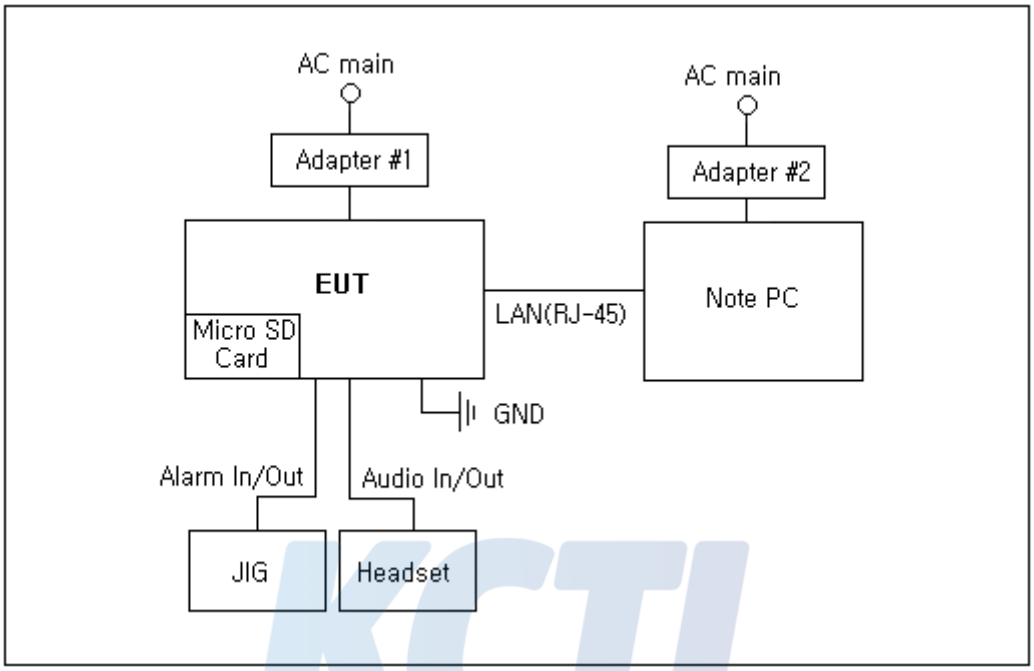
| | |
|---|---|
| Type of product | Network Camera |
| Model name (Basic) | NC-FE550-WD |
| Model name (Variant) | DC-Y1513W, MNC552WF, NC-FE550-WDP1, DC-Y1514W |
| Difference | - |
| Trade name | - |
| Serial no | - |
| Testing voltage | 230 V, 50 Hz, PoE |
| Input rating | DC 12 V, PoE |
| Internal clock frequency | 125 MHz |
| Note | Adapter #1 was not provided by the manufacturer.<br>PoE Switch was not provided by the manufacturer.<br>-BRAND WDP model.<br>-Outdoor model. |

## 4.3 Auxiliary equipments

| Type | Model / Part # | Serial number | Manufacturer |
|---|---|---|---|
| Note PC | NT271B5E-K3015 | JGFE91DF600046D | SAMSUNG |
| Adapter #2 | PA-1600-66 | - | SAMSUNG |
| Headset | SHS-250V | - | SAMSUNG |
| JIG | - | - | - |
| Micro SD Card (8 GB) | - | - | SanDisk |
| Adapter #1 (DC 12 V) | DSA-60PFB-12-1 120500 | - | DVE |
| PoE Switch | DH-2212PF | 14410416110007 | IDIS Co.,Ltd. |

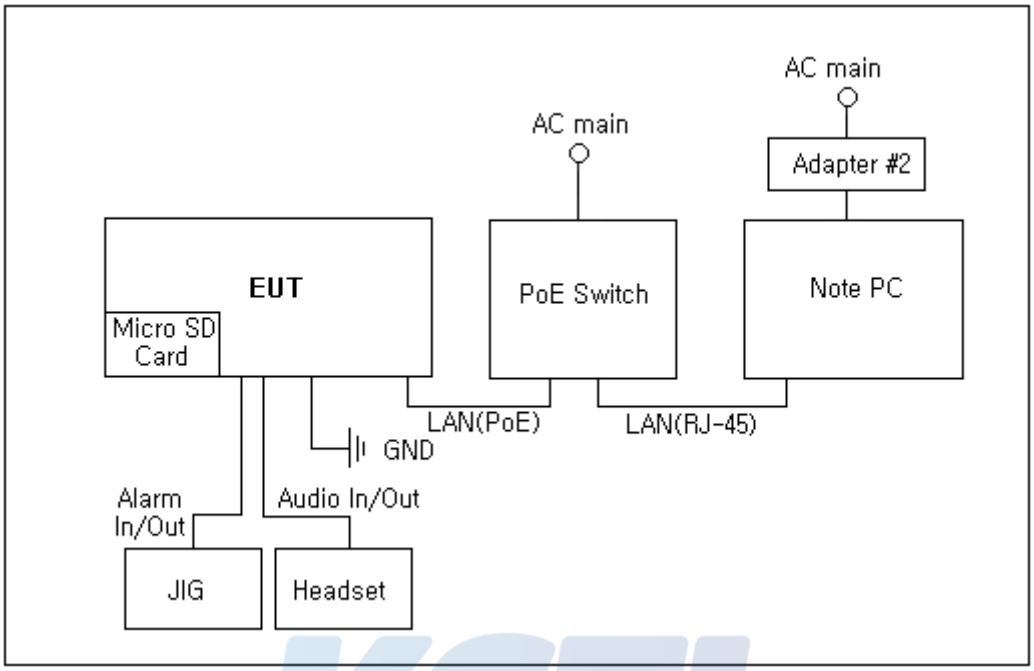
## 4.4 Test configuration

[Test #1]




| | Start | | End | | Cable | | |
|---|---|---|---|---|---|---|---|
| | Name | I/O port | Name | I/O port | Length (m) | Spec. | Cable |
| 1 | **EUT** | Power | Adapter #1 | - | 1.7 | Unshield | - |
| 2 | | Micro SD | Micro SD Card | Micro SD | Direct | - | - |
| 3 | | LAN(RJ-45) | Note PC | LAN(RJ-45) | 3.0 | Unshield | Out-Door |
| 4 | | Audio In/Out | Headset | - | 3.0 | Unshield | Out-Door |
| 5 | | Alarm In/Out | JIG | - | 3.0 | Unshield | Out-Door |
| 6 | | GND | GND | GND | 2.0 | Shield | - |
| 7 | Note PC | Power | Adapter #2 | Power | 1.5 | Unshield | - |

[Test #2]




Power supplied from PoE Switch

| | Start | | End | | Cable | | |
|---|---|---|---|---|---|---|---|
| | Name | I/O port | Name | I/O port | Length (m) | Spec. | Cable |
| 1 | **EUT** | LAN(PoE) | PoE Switch | LAN(PoE) | 3.0 | Unshield | Out-Door |
| 2 | | Audio In/Out | Headset | - | 3.0 | Unshield | Out-Door |
| 3 | | Alarm In/Out | JIG | - | 3.0 | Unshield | Out-Door |
| 4 | | GND | GND | GND | 2.0 | Shield | - |
| 5 | | Micro SD | Micro SD Card | Micro SD | Direct | - | - |
| 6 | Note PC | Power | Adapter #2 | Power | 1.5 | Unshield | - |
| 7 | | LAN(RJ-45) | PoE Switch | LAN(RJ-45) | 3.0 | Unshield | - |

## 4.5 Operating conditions

The EUT was configured as normal intended use.

| Test mode | Normal operating |
|---|---|
| Test #1[DC 12 V],<br>Test #2[PoE] | Web View Monitoring test. |
| | Ping test. |
| | Alarm In/Out test. |
| | Audio In/Out test. |

Note: 2 types of powers are available for the product, that are Adapter (DC 12 V), PoE switch.

Therefore, tests were performed for 2 different types of powers.

# 5. Summary of test results

## 5.1 Summary of EMI emission test results

| Applied | Test items | Test method | Result |
|---|---|---|---|
| ☒ | Conducted Emission | EN 55032:2015 | Pass |
| ☒ | Radiated Emission | EN 55032:2015 | Pass |
| ☐ | Harmonics current | EN 61000-3-2:2014 | N/A |
| ☐ | Voltage fluctuations and flickers | EN 61000-3-3:2013 | N/A |

This product complies with the requirements of the EMC Directive 2014/30/EU.

# 6. Test results

## 6.1 Conducted Emission

| Test specification | EN 55032:2015, Class A | | |
|---|---|---|---|
| Testing voltage | 230 V, 50 Hz, PoE | | |
| Test facility | Shielded room (CE#2) | | |
| Date | 2017-04-07 | | |
| Temperature (°C) | 22.5 °C | Humidity (% R.H.) | 15.1 % R.H. |
| Remarks | Pass | | |

Both conducted lines are measured in Quasi-Peak and C/Average mode, including the worst-case data points for each tested configuration. The EUT measured in accordance with the methods described in standards.

### 6.1.1 Limits of conducted emission measurement

☒ AC main

| Frequency [MHz] | Resolution Bandwidth [kHz] | Class A (dB($\mu$V)) | | Class B (dB($\mu$V)) | |
|---|---|---|---|---|---|
| | | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 ~ 0.5 | 9 | 79 | 66 | 66 ~ 56 | 56 ~ 46 |
| 0.5 ~ 5 | 9 | 73 | 60 | 56 | 46 |
| 5 ~ 30 | 9 | 73 | 60 | 60 | 50 |

☒ Telecommunication

| Frequency [MHz] | Resolution Bandwidth [kHz] | Class A Limits (dB($\mu$V)) | | Current Limits (dB($\mu$V)) | |
|---|---|---|---|---|---|
| | | Quasi-Peak | Average | Quasi-Peak | Average |
| 0.15 ~ 0.5 | 9 | 97 to 87 | 84 to 74 | 53 to 43 | 40 to 30 |
| 0.5 ~ 30 | 9 | 87 | 74 | 43 | 30 |
| Frequency [MHz] | Resolution Bandwidth [kHz] | Class B Limits (dB($\mu$V)) | | Current Limits (dB($\mu$V)) | |
| | | Quasi-Peak | Average | Quasi-Peak | Average |
| 0.15 ~ 0.5 | 9 | 84 to 74 | 74 to 64 | 40 to 30 | 30 to 20 |
| 0.5 ~ 30 | 9 | 74 | 64 | 30 | 20 |

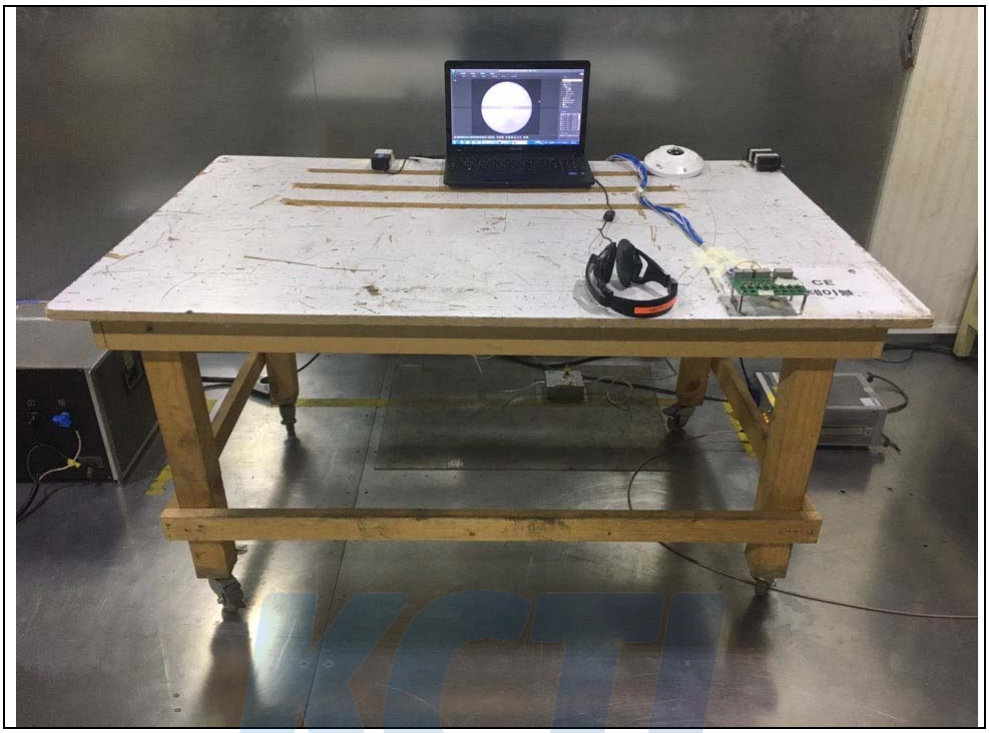
If the reading on the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 seconds at each measurement frequency, the highest reading shall be recorded, with the exception of any brief isolated high reading (which shall be ignored).

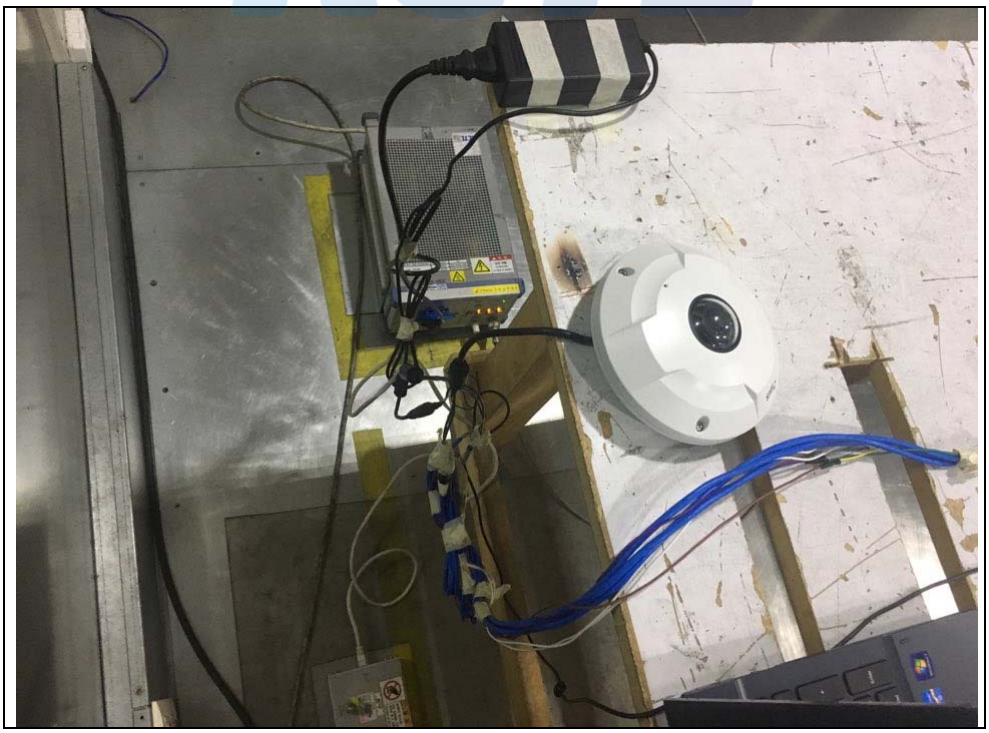
### 6.1.2 Used equipments

| Equipment | Model | Serial No. | Makers | Next Cal. Date | Used |
|---|---|---|---|---|---|
| EMI TEST RECEIVER | ESCI | 100710 | R&S | 2017.08.25 | ☒ |
| TWO-LINE V-NETWORK | ENV216 | 101352 | R&S | 2017.08.26 | ☒ |
| TWO-LINE V-NETWORK | NNLK8121 | 8121-472 | SCHWARZBECK | 2017.09.08 | ☒ |
| 8-WIRE ISN CAT5 | NTFM 8158 ISN CAT5 | CAT5 8158 #138 | SCHWARZBECK | 2017.05.19 | ☒ |

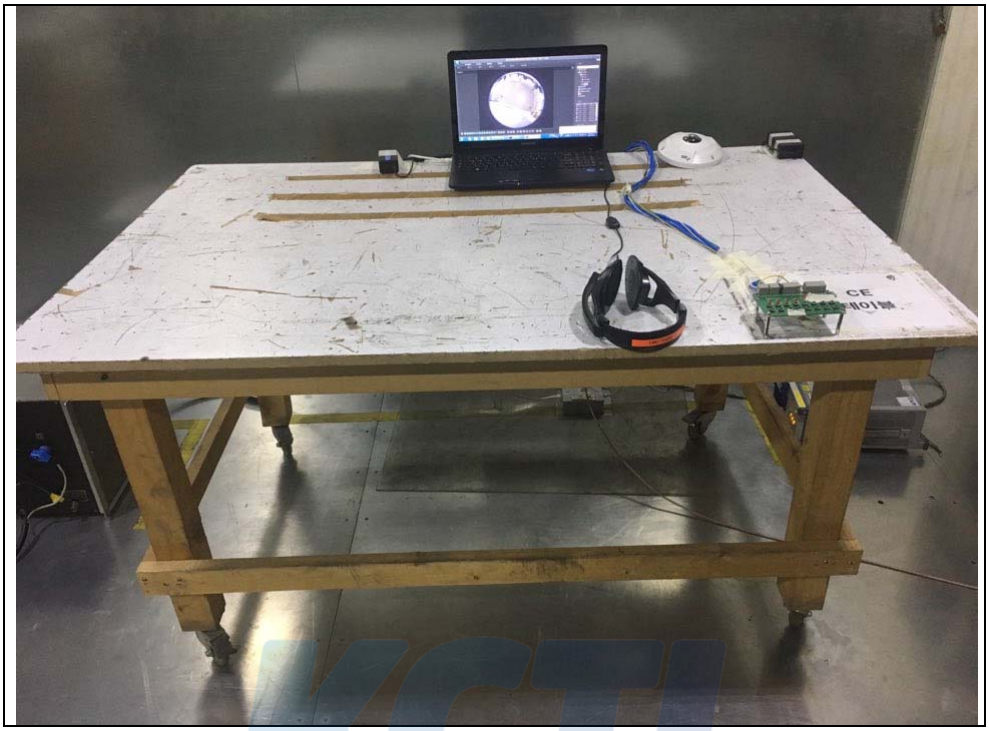
## 6.1.4 Photographs of test setup

AC Main [Test #1]

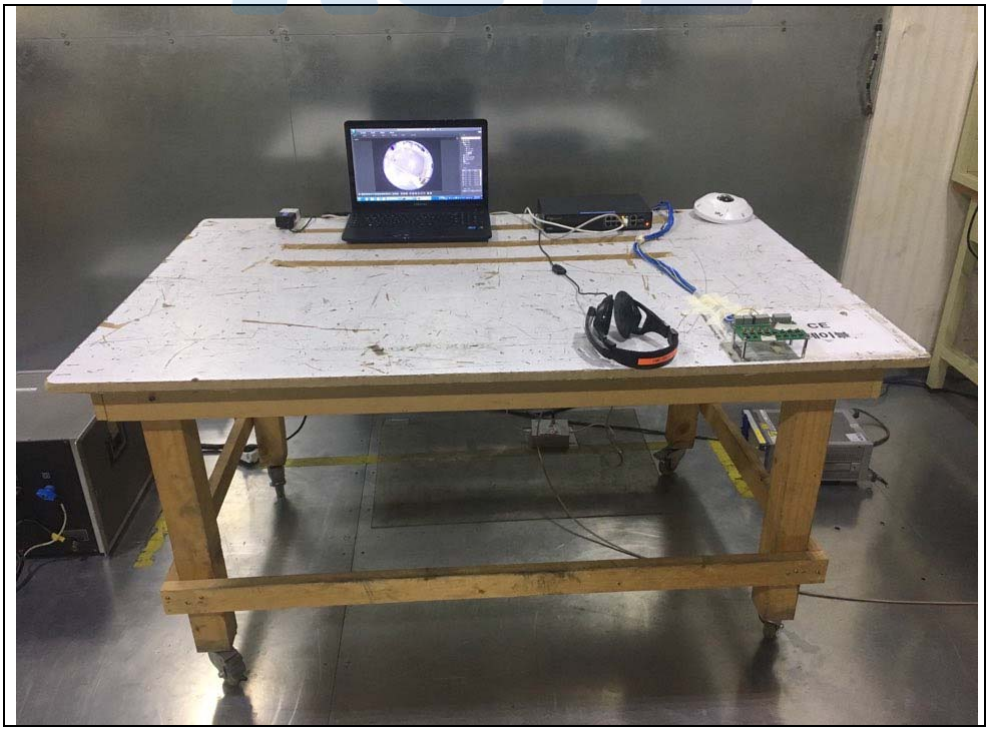




Telecommunication [Test #1]

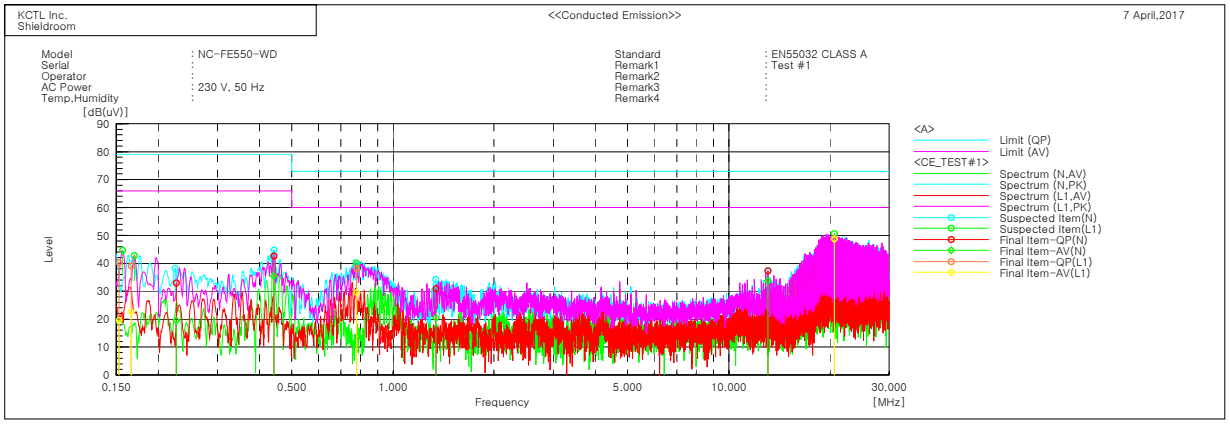


Telecommunication [Test #2]



## 6.1.5 Conducted emission measurement result

### AC Main




Final Result

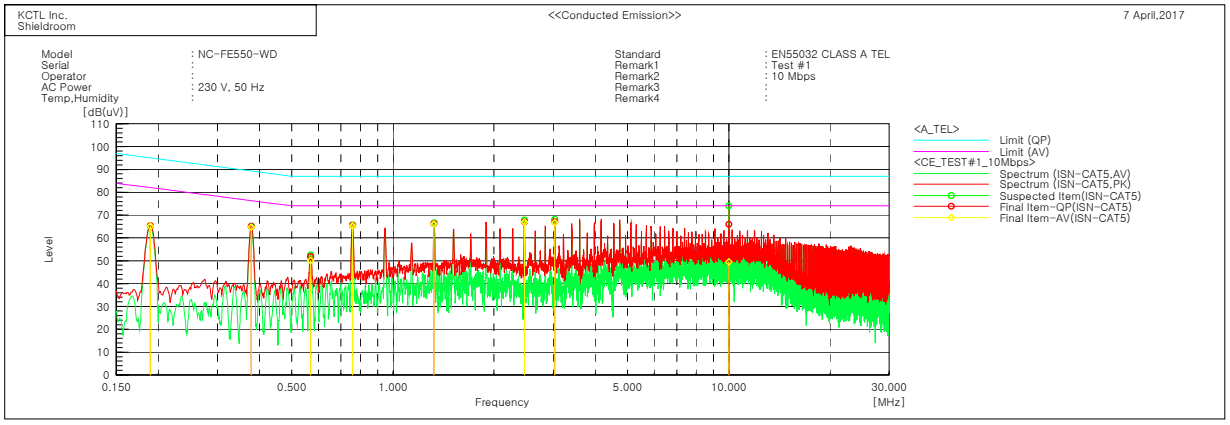
--- N Phase ---

| 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 | 0.22614 | 23.3 | 9.8 | 9.7 | 33.0 | 19.5 | 79.0 | 66.0 | 46.0 | 46.5 |
| 2 | 0.44276 | 32.7 | 25.6 | 9.9 | 42.6 | 35.5 | 79.0 | 66.0 | 36.4 | 30.5 |
| 3 | 1.3443 | 21.1 | 10.7 | 9.8 | 30.9 | 20.5 | 73.0 | 60.0 | 42.1 | 39.5 |
| 4 | 13.06421 | 27.4 | 23.8 | 9.9 | 37.3 | 33.7 | 73.0 | 60.0 | 35.7 | 26.3 |

--- 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 | 0.1529 | 30.3 | 9.7 | 9.9 | 40.2 | 19.6 | 79.0 | 66.0 | 38.8 | 46.4 |
| 2 | 0.16633 | 29.0 | 12.6 | 10.1 | 39.1 | 22.7 | 79.0 | 66.0 | 39.9 | 43.3 |
| 3 | 0.77971 | 28.1 | 19.6 | 9.9 | 38.0 | 29.5 | 73.0 | 60.0 | 35.0 | 30.5 |
| 4 | 20.63796 | 38.9 | 38.6 | 10.0 | 48.9 | 48.6 | 73.0 | 60.0 | 24.1 | 11.4 |

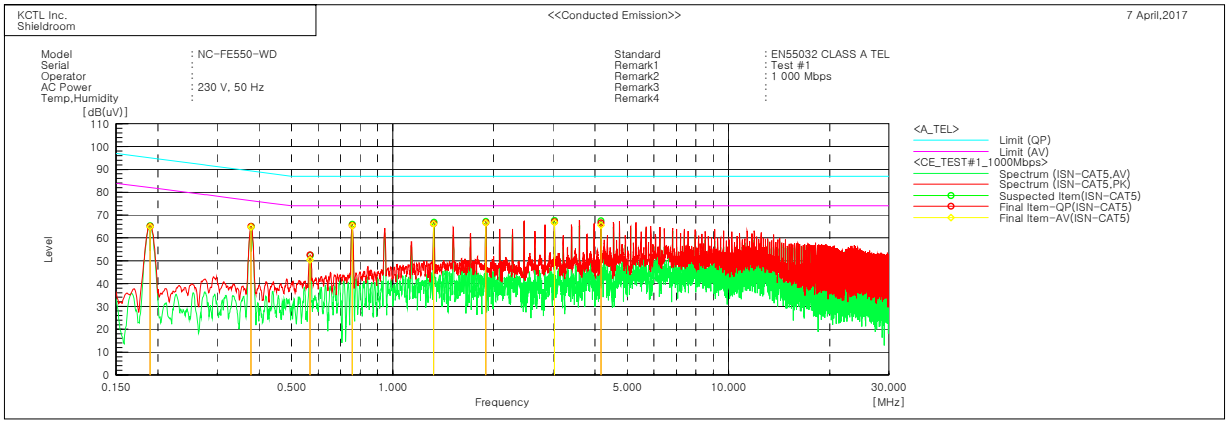
## Telecommunication port




Final Result

--- ISN-CAT5 Phase ---

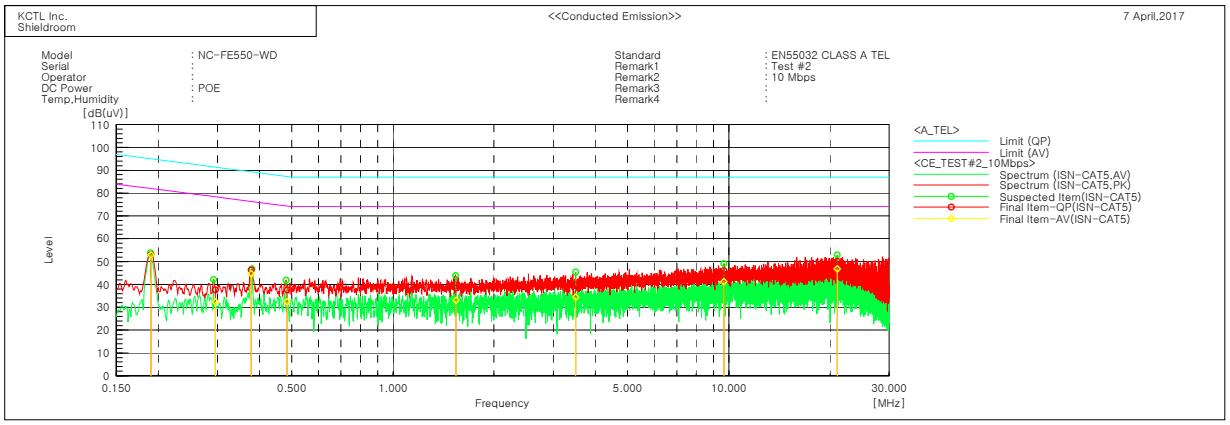
| No. | Frequency [MHz] | Reading QP [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB] | Result QP [dB(uV)] | Result CAV [dB(uV)] | Limit QP [dB(uV)] | Limit AV [dB(uV)] | Margin QP [dB] | Margin CAV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.1895 | 55.6 | 55.4 | 9.8 | 65.4 | 65.2 | 95.1 | 82.1 | 29.7 | 16.9 |
| 2 | 0.37881 | 55.3 | 55.1 | 9.7 | 65.0 | 64.8 | 89.3 | 76.3 | 24.3 | 11.5 |
| 3 | 0.5691 | 42.2 | 40.5 | 9.6 | 51.8 | 50.1 | 87.0 | 74.0 | 35.2 | 23.9 |
| 4 | 0.75785 | 55.9 | 55.8 | 9.6 | 65.5 | 65.4 | 87.0 | 74.0 | 21.5 | 8.6 |
| 5 | 1.32535 | 56.8 | 56.6 | 9.5 | 66.3 | 66.1 | 87.0 | 74.0 | 20.7 | 7.9 |
| 6 | 2.46205 | 57.6 | 57.5 | 9.4 | 67.0 | 66.9 | 87.0 | 74.0 | 20.0 | 7.1 |
| 7 | 3.03058 | 57.7 | 57.3 | 9.4 | 67.1 | 66.7 | 87.0 | 74.0 | 19.9 | 7.3 |
| 8 | 10.00035 | 56.3 | 39.8 | 9.6 | 65.9 | 49.4 | 87.0 | 74.0 | 21.1 | 24.6 |




Final Result

--- ISN-CAT5 Phase ---

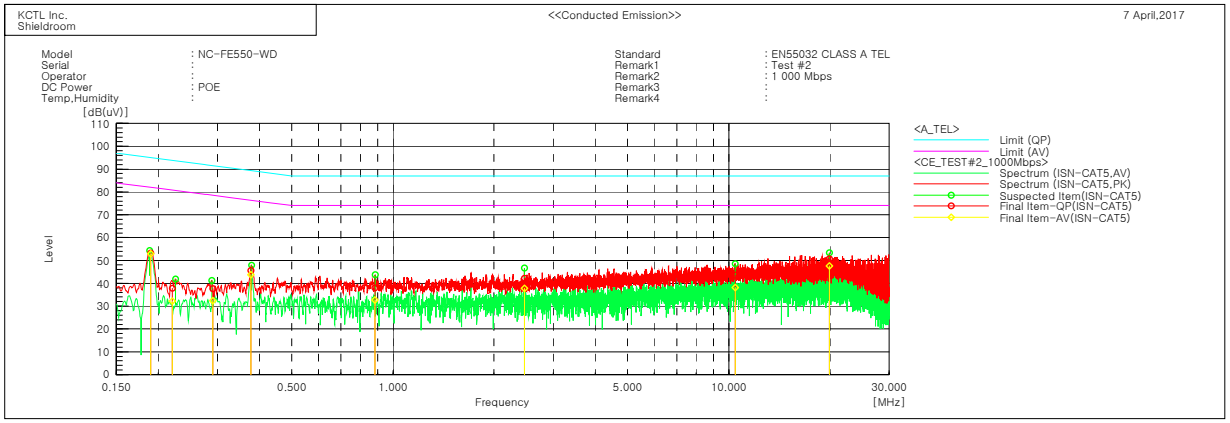
| No. | Frequency [MHz] | Reading QP [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB] | Result QP [dB(uV)] | Result CAV [dB(uV)] | Limit QP [dB(uV)] | Limit AV [dB(uV)] | Margin QP [dB] | Margin CAV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.18932 | 55.2 | 55.1 | 9.8 | 65.0 | 64.9 | 95.1 | 82.1 | 30.1 | 17.2 |
| 2 | 0.3785 | 55.3 | 55.1 | 9.7 | 65.0 | 64.8 | 89.3 | 76.3 | 24.3 | 11.5 |
| 3 | 0.56777 | 42.9 | 40.8 | 9.6 | 52.5 | 50.4 | 87.0 | 74.0 | 34.5 | 23.6 |
| 4 | 0.75741 | 55.9 | 55.8 | 9.6 | 65.5 | 65.4 | 87.0 | 74.0 | 21.5 | 8.6 |
| 5 | 1.32546 | 56.7 | 56.6 | 9.5 | 66.2 | 66.1 | 87.0 | 74.0 | 20.8 | 7.9 |
| 6 | 1.89399 | 57.4 | 57.2 | 9.4 | 66.8 | 66.6 | 87.0 | 74.0 | 20.2 | 7.4 |
| 7 | 3.0302 | 57.6 | 57.3 | 9.4 | 67.0 | 66.7 | 87.0 | 74.0 | 20.0 | 7.3 |
| 8 | 4.1654 | 57.2 | 56.1 | 9.4 | 66.6 | 65.5 | 87.0 | 74.0 | 20.4 | 8.5 |




Final Result

--- ISN-CAT5 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 | 0.19027 | 43.3 | 43.0 | 9.8 | 53.1 | 52.8 | 95.0 | 82.0 | 41.9 | 29.2 |
| 2 | 0.29585 | 28.0 | 22.7 | 9.7 | 37.7 | 32.4 | 91.4 | 78.4 | 53.7 | 46.0 |
| 3 | 0.37877 | 36.6 | 34.9 | 9.7 | 46.3 | 44.6 | 89.3 | 76.3 | 43.0 | 31.7 |
| 4 | 0.4842 | 28.1 | 22.8 | 9.6 | 37.7 | 32.4 | 87.3 | 74.3 | 49.6 | 41.9 |
| 5 | 1.54127 | 28.9 | 23.5 | 9.5 | 38.4 | 33.0 | 87.0 | 74.0 | 48.6 | 41.0 |
| 6 | 3.49706 | 30.3 | 25.0 | 9.4 | 39.7 | 34.4 | 87.0 | 74.0 | 47.3 | 39.6 |
| 7 | 9.66508 | 36.4 | 31.6 | 9.6 | 46.0 | 41.2 | 87.0 | 74.0 | 41.0 | 32.8 |
| 8 | 21.03652 | 40.5 | 37.3 | 9.6 | 50.1 | 46.9 | 87.0 | 74.0 | 36.9 | 27.1 |




Final Result

--- ISN-CAT5 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 | 0.19019 | 43.4 | 43.1 | 9.8 | 53.2 | 52.9 | 95.0 | 82.0 | 41.8 | 29.1 |
| 2 | 0.22055 | 27.9 | 22.5 | 9.8 | 37.7 | 32.3 | 93.8 | 80.8 | 56.1 | 48.5 |
| 3 | 0.29113 | 28.0 | 22.6 | 9.7 | 37.7 | 32.3 | 91.5 | 78.5 | 53.8 | 46.2 |
| 4 | 0.37718 | 35.9 | 34.1 | 9.7 | 45.6 | 43.8 | 89.3 | 76.3 | 43.7 | 32.5 |
| 5 | 0.8837 | 28.4 | 23.1 | 9.5 | 37.9 | 32.6 | 87.0 | 74.0 | 49.1 | 41.4 |
| 6 | 2.46191 | 32.8 | 28.4 | 9.4 | 42.2 | 37.8 | 87.0 | 74.0 | 44.8 | 36.2 |
| 7 | 10.45558 | 33.9 | 28.5 | 9.6 | 43.5 | 38.1 | 87.0 | 74.0 | 43.5 | 35.9 |
| 8 | 19.90066 | 41.2 | 38.0 | 9.6 | 50.8 | 47.6 | 87.0 | 74.0 | 36.2 | 26.4 |

## 6.2 Radiated Emission

| Test specification | EN 55032:2015, Class A | | |
|---|---|---|---|
| Testing voltage | 230 V, 50 Hz, PoE | | |
| Test facility | 10 m Chamber (4F) | | |
| Test distance | 10 m, 3 m | | |
| Date | 2017-04-06 | | |
| Temperature (°C) | 26.1 °C | Humidity (% R.H.) | 16.9 % R.H. |
| Remarks | Pass | | |

Of those emissions above (*L* – 20 dB), where *L* is the limit level in logarithmic units, record at least the emission levels and the frequencies of the six highest emissions.
The following data lists the significant emission frequencies, measured levels, correction factors (for antenna and cables), orientation of table, polarization and height of antenna, the corrected reading, the limit, and the amount of margin. All measurements were taken utilizing quasi-peak detection unless stated otherwise.
Measurements were performed at an antenna to EUT distance of 10 or 3 meters and elevated between 1 and 4 meters. Both vertical and horizontal antenna polarizations were measured.

Below 1 GHz, peak detector function mode for prescan was used with resolution bandwidth of 120 kHz and a video bandwidth of 300 kHz and sweep method.
The sweep time for prescan set below 200 ms up and final measurement with quasi-peak detector evaluated for suspected frequencies points, which are detected from prescan measurement.

Final measurements consisted of 3 steps.
First step, frequency fine tuning to find exact emission frequency.
Second step, rechecking to search for maximum height and azimuth for interference from EUT
In final step, there are conducted measuring with quasi-peak detector for points
which are detected from 1st step & 2nd step.

### 6.2.1 Limits of radiated emission measurement

☒ Limits below 1 GHz

| Frequency [MHz] | Resolution Bandwidth [kHz] | Class A (dB($\mu$V/m)) @ 10 m | Class B (dB($\mu$V/m)) @ 10 m |
|---|---|---|---|
| 30 ~ 230 | 120 | 40 | 30 |
| 230 ~ 1 000 | 120 | 47 | 37 |

☒ Limits above 1 GHz

| Frequency [GHz] | Resolution Bandwidth [MHz] | Class A @ 3 m | | Class B @ 3 m | |
|---|---|---|---|---|---|
| | | Average limit (dB($\mu$V/m)) | Peak limit (dB($\mu$V/m)) | Average limit (dB($\mu$V/m)) | Peak limit (dB($\mu$V/m)) |
| 1 ~ 3 | 1 | 56 | 76 | 50 | 70 |
| 3 ~ 6 | 1 | 60 | 80 | 54 | 74 |
| Note - The lower limit applies at the transition frequency. | | | | | |

Measurements within 20 dB of the limit were then maximized by adjusting turntable position.

Final measurements were made using an C/Average detector.

Results checked manually and points close to the limit line were re-measured.

### 6.2.2 Used equipments

| Equipment | Model no. | Serial no. | Makers | Next Cal. Date | Used |
|---|---|---|---|---|---|
| EMI TEST RECEIVER | ESR7 | 101078 | R&S | 2017.08.25 | ☒ |
| Bilog Antenna | VULB9168 | 583 | SCHWARZBECK | 2018.06.10 | ☒ |
| AMPLIFIER | 310N | 293004 | SONOMA | 2017.08.25 | ☒ |
| 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 | 2018.04.06 | ☒ |
| DOUBLE RIDGED HORN ANTENNA | 3115 | 00086706 | ETS-LINDGREN | 2017.09.09 | ☒ |
| Spectrum Analyzer | FSV40 | 100988 | R&S | 2018.01.06 | ☐ |

### 6.2.3 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

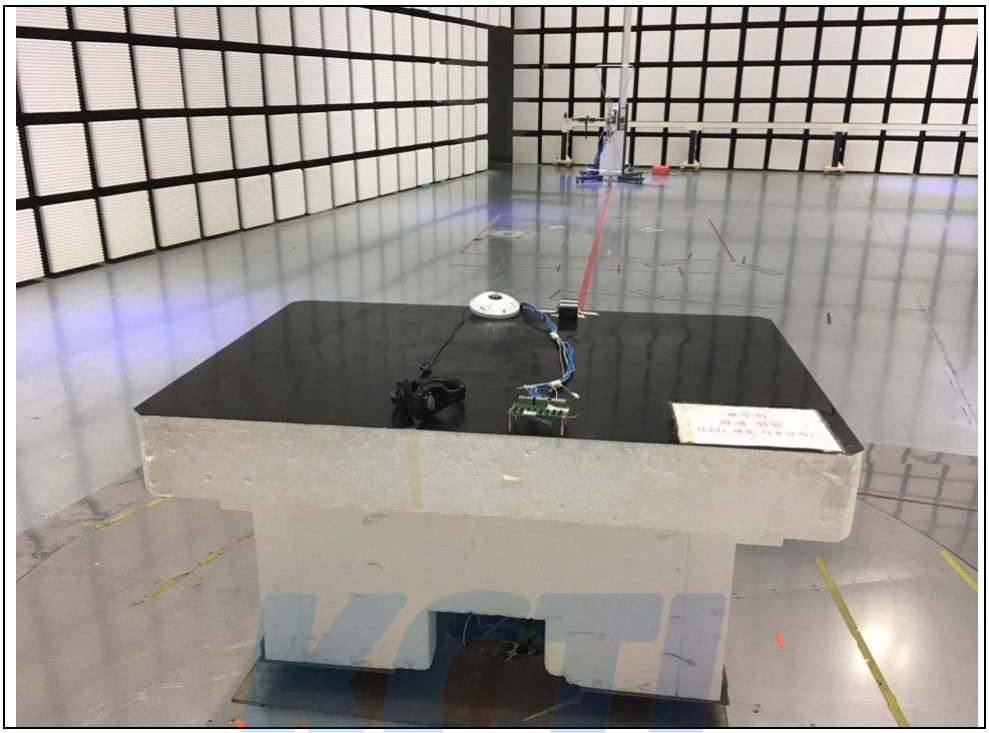
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 6 dB, A.G 35 dB

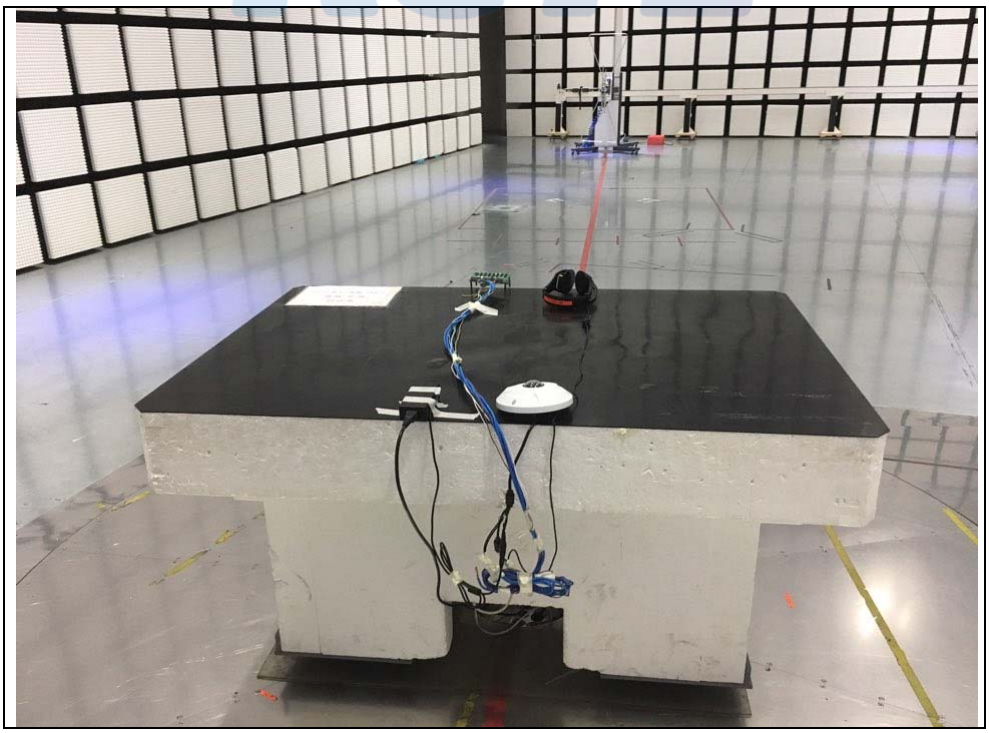
The result is 30 + 12 + 5 + 6 – 35 = 18 dB($\mu$N/m)

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

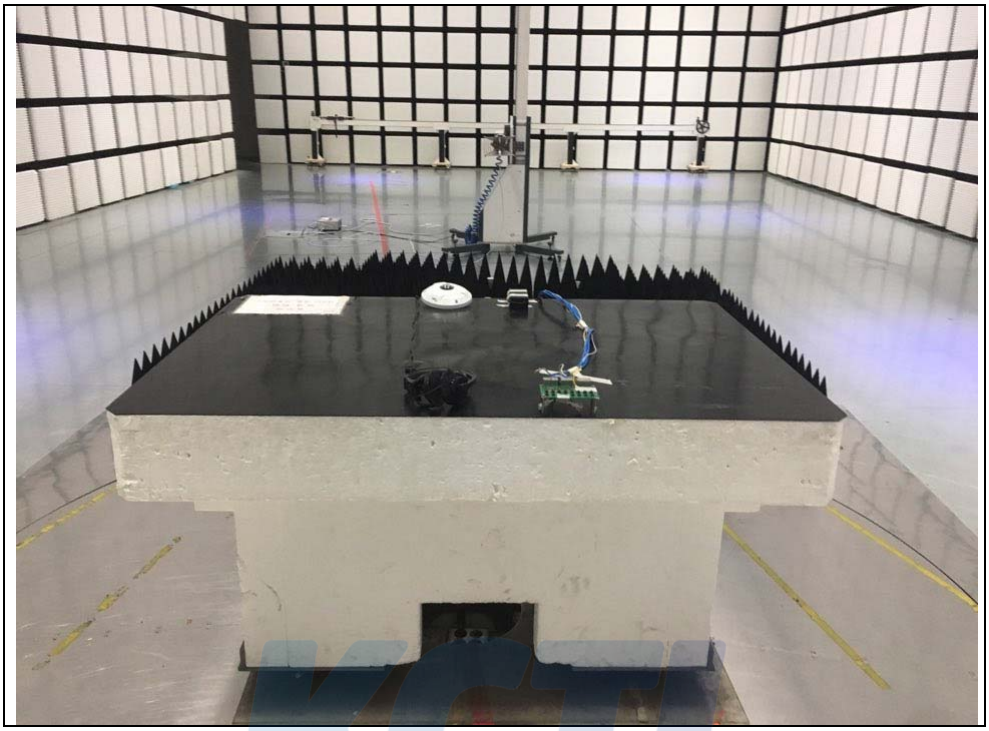
## 6.2.5 Photographs of test setup

30 MHz ~ 1 GHz [Test #1]

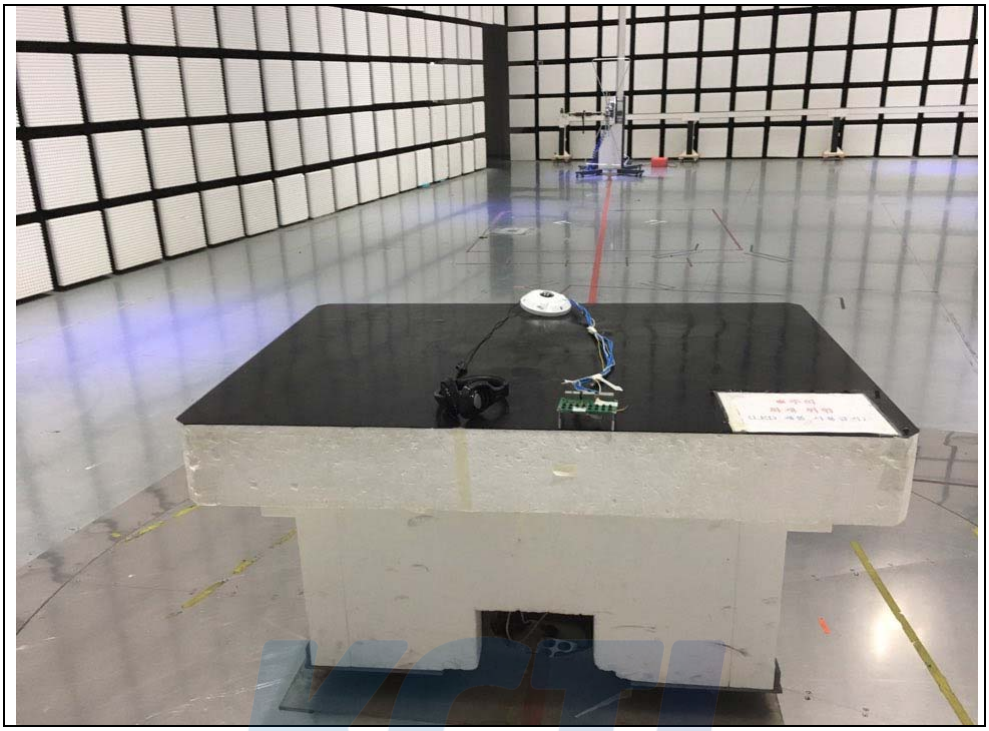




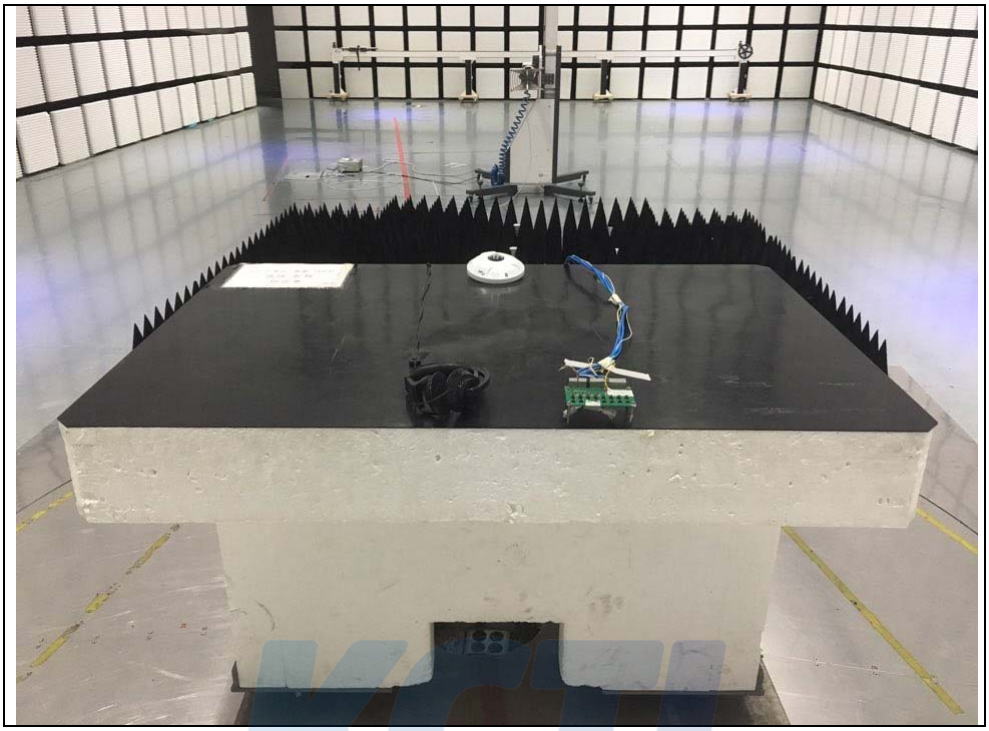
1 GHz ~ 6 GHz [Test #1]



30 MHz ~ 1 GHz [Test #2]

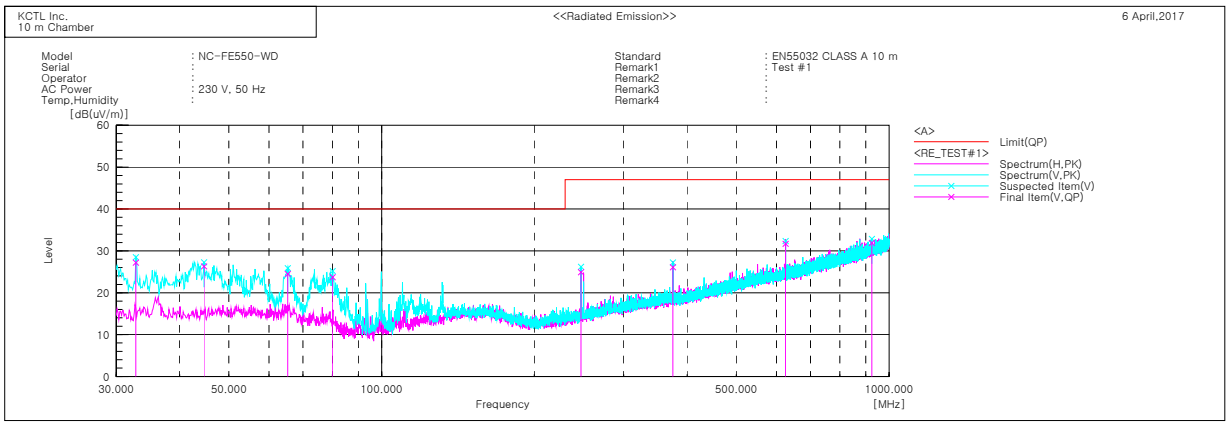


1 GHz ~ 6 GHz [Test #2]



## 6.2.6 Radiated emission measurement result

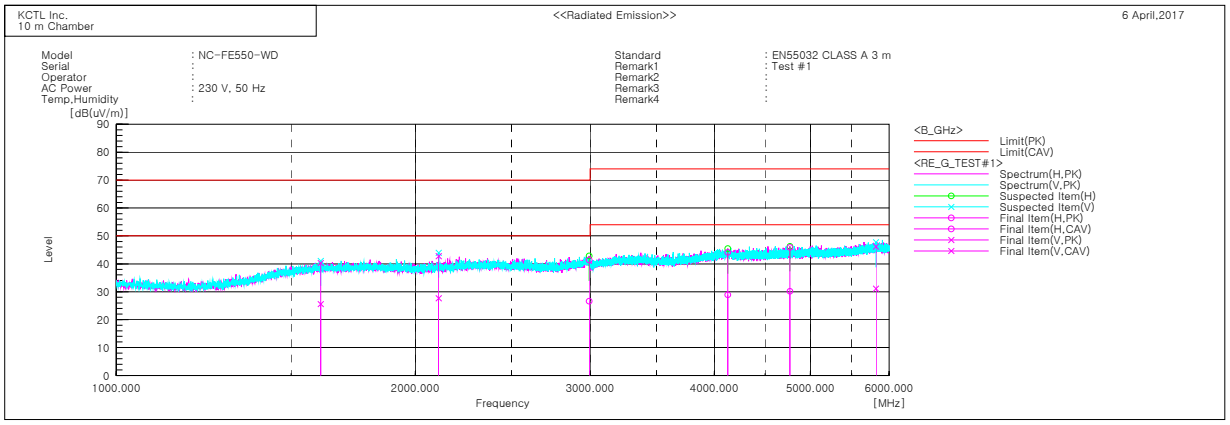
30 MHz ~ 1 GHz




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 | 32.789 | V | 39.5 | -12.3 | 27.2 | 40.0 | 12.8 | 123.3 | 259.9 |
| 2 | 44.671 | V | 37.7 | -11.4 | 26.3 | 40.0 | 13.7 | 154.7 | 21.6 |
| 3 | 65.284 | V | 36.1 | -11.6 | 24.5 | 40.0 | 15.5 | 108.6 | 127.9 |
| 4 | 80.076 | V | 38.6 | -14.9 | 23.7 | 40.0 | 16.3 | 247.1 | 38.3 |
| 5 | 247.159 | V | 35.6 | -10.7 | 24.9 | 47.0 | 22.1 | 298.6 | 244.0 |
| 6 | 374.956 | V | 32.4 | -6.3 | 26.1 | 47.0 | 20.9 | 116.3 | 300.0 |
| 7 | 624.974 | V | 31.6 | 0.1 | 31.7 | 47.0 | 15.3 | 387.2 | 338.4 |
| 8 | 924.704 | V | 26.0 | 5.9 | 31.9 | 47.0 | 15.1 | 147.9 | 8.3 |

1 GHz ~ 6 GHz



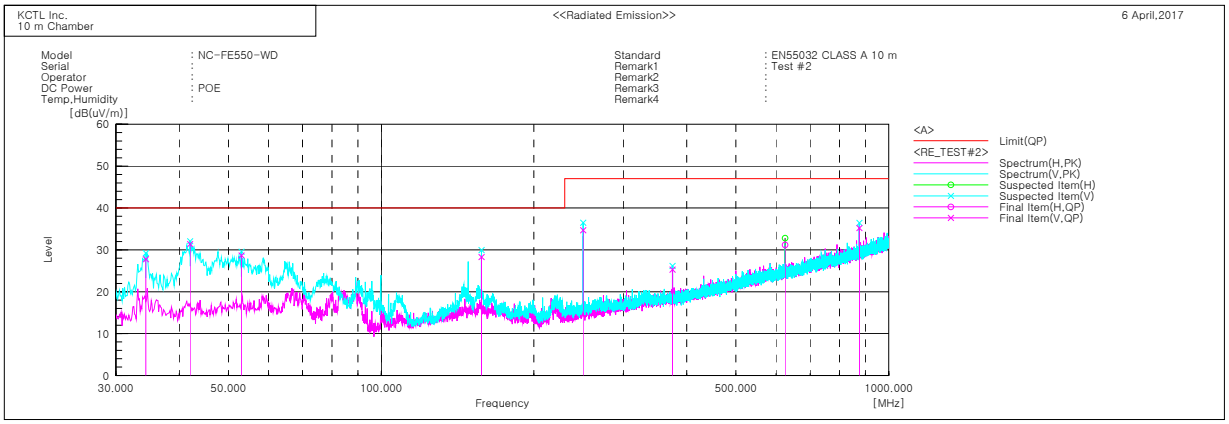

Final Result

| 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 | 1606.764 | V | 48.4 | 33.7 | -8.1 | 40.3 | 25.6 | 70.0 | 50.0 | 29.7 | 24.4 | 100.0 | 214.7 |
| 2 | 2112.196 | V | 47.9 | 32.8 | -5.1 | 42.8 | 27.7 | 70.0 | 50.0 | 27.2 | 22.3 | 100.0 | 327.3 |
| 3 | 2993.041 | H | 45.4 | 30.6 | -4.0 | 41.4 | 26.6 | 70.0 | 50.0 | 28.6 | 23.4 | 100.0 | 236.1 |
| 4 | 4127.213 | H | 42.9 | 27.7 | 1.2 | 44.1 | 28.9 | 74.0 | 54.0 | 29.9 | 25.1 | 100.0 | 67.2 |
| 5 | 4767.549 | H | 43.6 | 27.9 | 2.3 | 45.9 | 30.2 | 74.0 | 54.0 | 28.1 | 23.8 | 100.0 | 94.5 |
| 6 | 5818.704 | V | 41.7 | 26.6 | 4.5 | 46.2 | 31.1 | 74.0 | 54.0 | 27.8 | 22.9 | 100.0 | 78.6 |

◈ Correction(Distance: 3.8 m)

| Frequency [MHz] | (P) | Reading PK [dB ($\mu$V)] | Reading CAV [dB($\mu$V)] | c.f [dB(1/m)] | Result PK [dB($\mu$V/m)] | Result CAV [dB($\mu$V/m)] | Limit PK [dB($\mu$V/m)] | Limit CAV [dB($\mu$V/m)] | Margin PK [dB] | Margin CAV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1606.764 | V | 48.4 | 33.7 | -6.0 | 42.4 | 27.7 | 70.0 | 50.0 | 27.6 | 22.3 |
| 2112.196 | V | 47.9 | 32.8 | -3.0 | 44.9 | 29.8 | 70.0 | 50.0 | 25.1 | 20.2 |
| 2993.041 | H | 45.4 | 30.6 | -1.9 | 43.5 | 28.7 | 70.0 | 50.0 | 26.5 | 21.3 |
| 4127.213 | H | 42.9 | 27.7 | 3.3 | 46.2 | 31.0 | 74.0 | 54.0 | 27.8 | 23.0 |
| 4767.549 | H | 43.6 | 27.9 | 4.4 | 48.0 | 32.3 | 74.0 | 54.0 | 26.0 | 21.7 |
| 5818.704 | V | 41.7 | 26.6 | 6.6 | 48.3 | 33.2 | 74.0 | 54.0 | 25.7 | 20.8 |

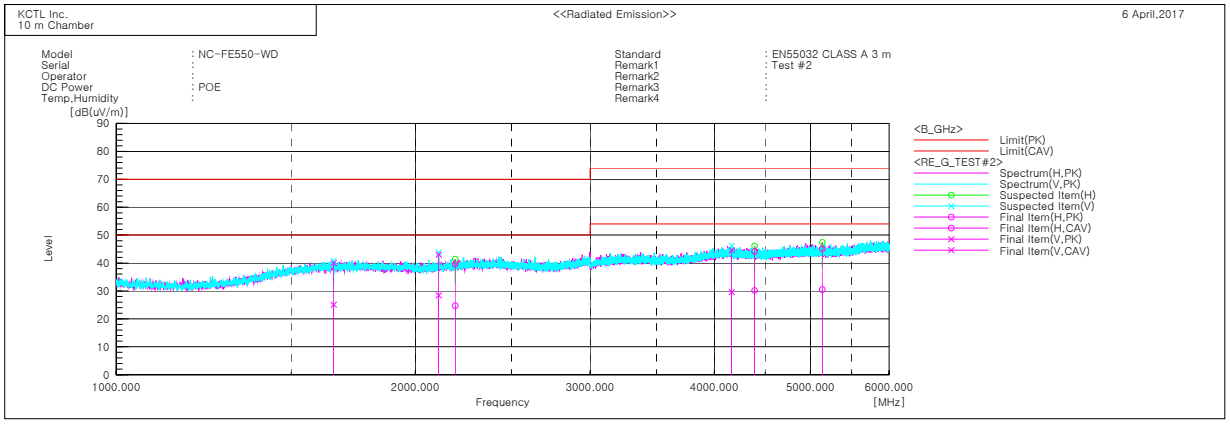
30 MHz ~ 1 GHz




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 | 34.365 | V | 40.1 | -12.3 | 27.8 | 40.0 | 12.2 | 159.3 | 306.8 |
| 2 | 42.004 | V | 43.1 | -11.7 | 31.4 | 40.0 | 8.6 | 187.5 | 236.1 |
| 3 | 53.038 | V | 39.7 | -11.0 | 28.7 | 40.0 | 11.3 | 104.2 | 96.3 |
| 4 | 157.555 | V | 38.3 | -10.0 | 28.3 | 40.0 | 11.7 | 193.3 | 256.4 |
| 5 | 249.948 | V | 45.3 | -10.6 | 34.7 | 47.0 | 12.3 | 265.3 | 154.6 |
| 6 | 374.956 | V | 31.6 | -6.3 | 25.3 | 47.0 | 21.7 | 328.5 | 218.0 |
| 7 | 624.974 | H | 31.1 | 0.1 | 31.2 | 47.0 | 15.8 | 142.6 | 338.0 |
| 8 | 875.113 | V | 30.3 | 4.9 | 35.2 | 47.0 | 11.8 | 397.6 | 156.7 |

1 GHz ~ 6 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 | 1655.598 | V | 47.6 | 32.7 | -7.6 | 40.0 | 25.1 | 70.0 | 50.0 | 30.0 | 24.9 | 100.0 | 284.6 |
| 2 | 2111.586 | V | 48.1 | 33.5 | -5.1 | 43.0 | 28.4 | 70.0 | 50.0 | 27.0 | 21.6 | 100.0 | 299.0 |
| 3 | 2194.604 | H | 44.9 | 30.0 | -5.3 | 39.6 | 24.7 | 70.0 | 50.0 | 30.4 | 25.3 | 100.0 | 343.1 |
| 4 | 4165.670 | V | 43.3 | 28.3 | 1.3 | 44.6 | 29.6 | 74.0 | 54.0 | 29.4 | 24.4 | 100.0 | 305.0 |
| 5 | 4393.358 | H | 42.5 | 28.5 | 1.7 | 44.2 | 30.2 | 74.0 | 54.0 | 29.8 | 23.8 | 100.0 | 63.7 |
| 6 | 5139.910 | H | 42.2 | 27.6 | 2.9 | 45.1 | 30.5 | 74.0 | 54.0 | 28.9 | 23.5 | 100.0 | 343.1 |

◈ Correction(Distance: 3.8 m)

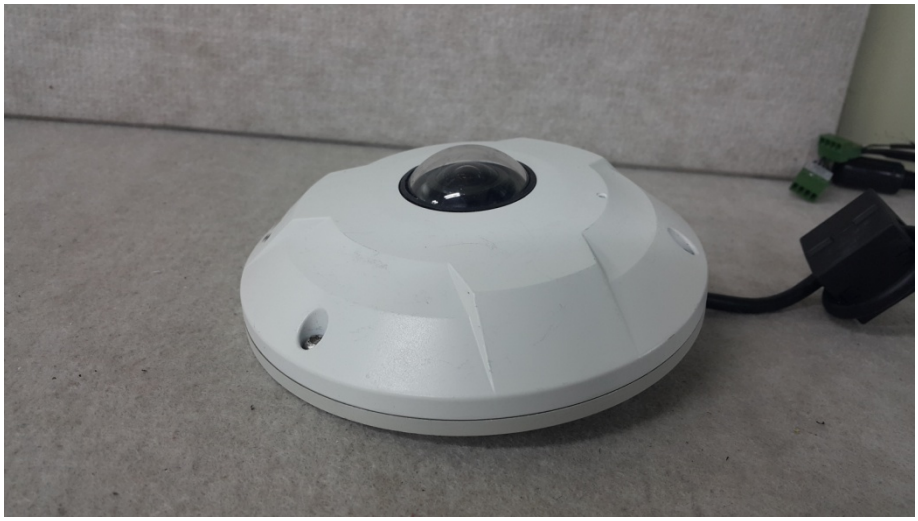
| Frequency [MHz] | (P) | Reading PK [dB ($\mu$V)] | Reading CAV [dB($\mu$V)] | c.f [dB(1/m)] | Result PK [dB($\mu$V/m)] | Result CAV [dB($\mu$V/m)] | Limit PK [dB($\mu$V/m)] | Limit CAV [dB($\mu$V/m)] | Margin PK [dB] | Margin CAV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1655.598 | V | 47.6 | 32.7 | -5.5 | 42.1 | 27.2 | 70.0 | 50.0 | 27.9 | 22.8 |
| 2111.586 | V | 48.1 | 33.5 | -3.0 | 45.1 | 30.5 | 70.0 | 50.0 | 24.9 | 19.5 |
| 2194.604 | H | 44.9 | 30.0 | -3.2 | 41.7 | 26.8 | 70.0 | 50.0 | 28.3 | 23.2 |
| 4165.670 | V | 43.3 | 28.3 | 3.4 | 46.7 | 31.7 | 74.0 | 54.0 | 27.3 | 22.3 |
| 4393.358 | H | 42.5 | 28.5 | 3.8 | 46.3 | 32.3 | 74.0 | 54.0 | 27.7 | 21.7 |
| 5139.910 | H | 42.2 | 27.6 | 5.0 | 47.2 | 32.6 | 74.0 | 54.0 | 26.8 | 21.4 |

# 7. E.U.T. photographs

Front View

Rear View

Left View

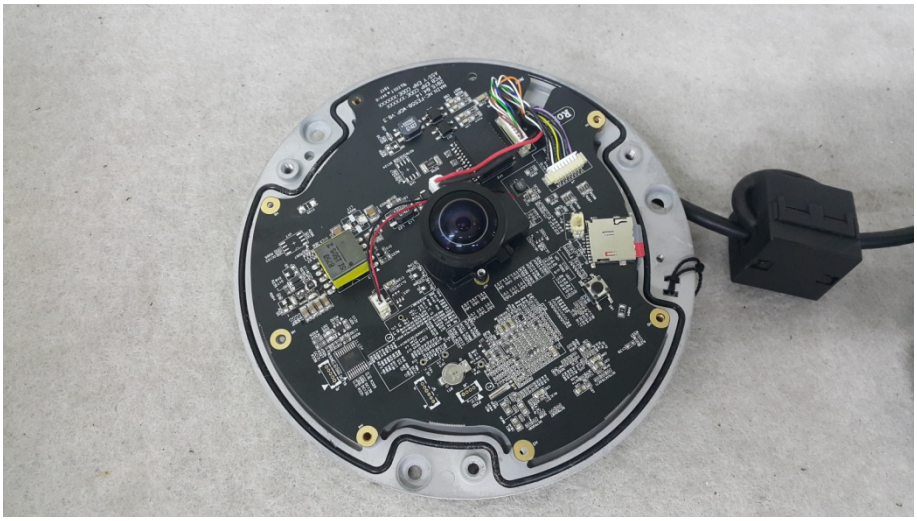


Right View

Top View

Bottom View

Inside



# TEST REPORT

**KCTL Inc.**
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 443-390, Korea
TEL: 82 70 5008 1021
FAX: 82 505 299 8311



http://www.kctl.co.kr

| | | |
|---|---|---|
| **Applicant** | : | IDIS CO., LTD.<br>8-10, TECHNO 3-RO, YUSEONG-GU,<br>DAEJEON, KOREA |
| **Manufacturer** | : | IDIS CO., LTD.<br>8-10, TECHNO 3-RO, YUSEONG-GU,<br>DAEJEON, KOREA |
| **Type of equipment** | : | Network Camera |
| **Model Name** | : | NC-FE550-WD |
| **Variant Model Name** | : | DC-Y1513W, MNC552WF,<br>NC-FE550-WDP1, DC-Y1514W |
| **Date of Receipt** | : | July 29, 2015 |
| **Date of Test** | : | August 07, 2015 ~ February 25, 2016 |
| **Test method used** | : | EN 55022:2010+AC:2011, Class A<br>EN 50130-4:2014 |
| **Test Results** | : | Complied |

This product complies with the requirements of the EMC Directive 2004/108/ EC.

The results in this report apply only to the sample tested.

This test report shall not be reproduced, except in full, without the written approval of KCTL Laboratory.

| | Tested by | Technical Manager |
|---|---|---|
| Affirmation | Name: LYU, JUNG-GIL | Name: PARK, GUN-SU |

2016. 04. 22

# Contents

# 1. Applicant information

| | |
|---|---|
| **Applicant:** | IDIS CO., LTD. |
| **Address:** | 10 8-10, TECHNO 3-RO, YUSEONG-GU, DAEJEON, KOREA |
| **Telephone:** | +82-31-723-5205 |
| **Fax:** | +82-31-723-5108 |
| **E-mail:** | jjungdoo@idis.co.kr |
| **Contact name:** | **Jang Jung Doo** |

| | |
|---|---|
| **Manufacturer:** | IDIS CO., LTD. |
| **Address:** | 10 8-10, TECHNO 3-RO, YUSEONG-GU, DAEJEON, KOREA |
| **Telephone:** | +82-31-723-5205 |
| **Fax:** | +82-31-723-5108 |
| **E-mail:** | jjungdoo@idis.co.kr |
| **Contact name:** | **Jang Jung Doo** |

# 2. Laboratory information

**Address**

**KCTL Inc.**

65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-390, Korea

Telephone Number: 82 70 5008 1021

Facsimile Number: 82 505 299 8311

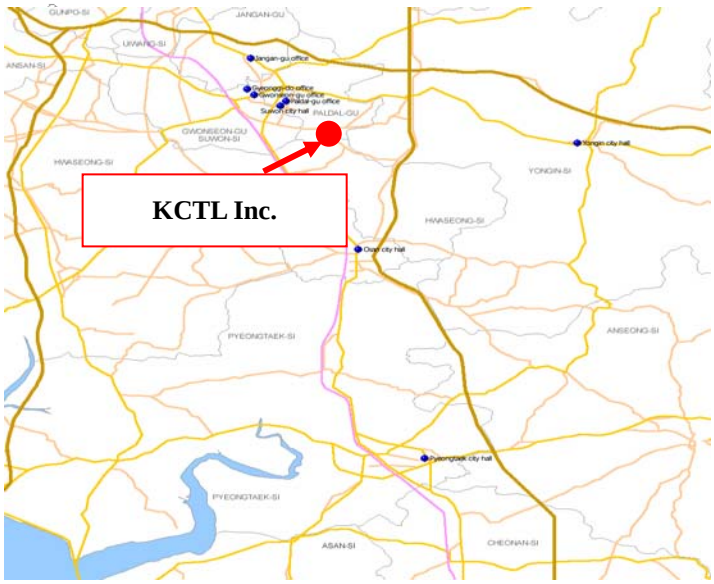
FCC Site Designation No: KR0040, FCC Site Registration No: 687132

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

Industry Canada Registration No. : 8035A

KOLAS NO.: 231

SITE MAP

# 3. Test system configuration

## 3.1 Operation environment

| | | Temperature | Humidity | Pressure |
|---|---|---|---|---|
| Chamber(10 m) | : | 25.8 ~ 26.2 °C | 36.4 ~ 39.4 % R.H. | - |
| Shielded room(CE) | : | 26.9 °C | 33.8 % R.H. | - |
| Shielded room(ESD) | : | 27.9 °C | 41.4 % R.H. | 100.2 kPa |

Test site

These testing items were performed following locations;

| Test item | Test site |
|---|---|
| Conducted Emission | Shielded Room |
| Radiated Emission | 10 m Chamber |
| Harmonics current | EMI Test area(6F) |
| Voltage fluctuations and flickers | EMI Test area(6F) |
| Electrostatic discharge | Shielded Room |
| Radiated RF immunity | 6F Fully anechoic chamber (3 m) |
| Electric Fast Transient/BURST | Shielded Room |
| Surge | Shielded Room |
| Conducted RF immunity | Shielded Room |
| Voltage dip/interruption | Shielded Room |
| Mains supply voltage variations | Shielded Room |

## 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 ㎑ ~ 150 ㎑: ± 3.75 dB | |
| | 150 ㎑ ~ 30 ㎒: ± 3.36 dB | |
| Shielded Room (CE#2) | 9 ㎑ ~ 150 ㎑: ± 3.79 dB | |
| | 150 ㎑ ~ 30 ㎒: ± 3.42 dB | |
| Radiated Emission measurement (C.L: Approx 95 %, $k$ = 2) | | |
| 10 m Chamber (4F) | 30 ㎒ ~ 300 ㎒ | 3 m: + 5.20 dB, - 5.31 dB |
| | | 10 m: + 5.19 dB, - 5.30 dB |
| | 300 ㎒ ~ 1000 ㎒ | 3 m: + 6.56 dB, - 6.65 dB |
| | | 10 m: + 6.45 dB, - 6.64 dB |
| | 1 ㎓ ~ 6 ㎓ | 3 m: + 6.70 dB, - 6.81 dB |
| 10 m Chamber (2F) | 30 ㎒ ~ 300 ㎒ | 3 m: + 5.21 dB, - 5.32 dB |
| | | 10 m: + 5.20 dB, - 5.31 dB |
| | 300 ㎒ ~ 1000 ㎒ | 3 m: + 5.82 dB, - 5.91 dB |
| | | 10 m: + 5.69 dB, - 5.91 dB |
| | 1 ㎓ ~ 6 ㎓ | 3 m: + 6.28 dB, - 6.30 dB |
| Radio Frequency Electromagnetic Fields (C.L: Approx 95 %, $k$ = 2) | | |
| ± 1.82 dB | | |
| Disturbance power Electromagnetic Fields (C.L: Approx 95 %, $k$ = 2) | | |
| Disturbance power (6F) | 30 ㎒ ~ 300 ㎒ | ± 3.30 dB |

## 3.3 Measurement Program

These test items were performed by software programs;

| Test item | Measurement Program | |
|---|---|---|
| Conducted Emission | EP5CE_V 5.4.0(TOYO) | |
| Radiated Emission | EP5RE_V 4.6.0(TOYO) | |
| Harmonics current, Voltage fluctuations and flickers | CTS 4_V 4.6.2 (AMETEK) | |
| Radiated RF immunity | 3F | EMC32_V 9.01.0 (ROHDE & SCHWARZ) |
| | 6F | EMC32_V 8.53.0 (ROHDE & SCHWARZ) |
| Electric Fast Transient/BURST, Surge, Magnetic field immunity, Voltage dip/interruption | 6F(#1) | ISMIEC_V 4.08(EM TEST) |
| | 6F(#2) | ISMIEC_V 4.07(EM TEST) |
| | 3F(#3) | IEC_V 5.2.9(EM TEST) |
| Conducted RF immunity | 6F(#1) | ICD_V 3.53.01(EM TEST) |
| | 6F(#2) | WIN2070_V 3.00(SCHAFFNER) |
| | 3F(#3) | ICD_V 5.3.4(EM TEST) |

# 4. Description of E.U.T.

## 4.1 General information

| HARDWARE | | |
|---|---|---|
| IMAGING | | |
| | Image Sensor | 1/1.8" CMOS |
| | Lens | Fixed-focal (1.55mm, F2.0) |
| | Optical Zoom/AF | no |
| | Angle View | TBD |
| | Effective Pixels | 2560x2048 |
| | Scanning Mode | Progressive Scan |
| | Minimum Illumination | COLOR : TBD<br>BW : TBD<br>BW : TBD |
| | SNR | TBD |
| | Dynamic Range | TBD |
| | IRIS | Fixed |
| | True Day&Night (IR Filter Changer) | yes |
| | Image Stabilizing | no |
| | Pan/Tilt Range | - |
| | Pan/Tilt Speed | - |
| VIDEO | | |
| | Video Out | 1 BNC |
| | Compression | H.264(MP), M-JPEG |
| | Resolution Supported | ***CIF, 4CIF, 1280x720(720p), 1920x1080(1080p), Pivot, 5M 모드 추가?*** |
| | Bitrate Control | H.264 - CBR / VBR (up to 35Mbps) |
| | Frame Rate | 30ips @ 8M + 1ips @ 720p + 1ips @ 4CIF<br>6 Streaming |
| | Video Quality Compensation | Auto Expose, Auto White Balance, Digital Noise Reduction, Black Level Correction |
| IN/OUT | | |
| | Audio | 1 (Line in) / 1 (Line out) |
| | Alarm | 1/1 |
| | External Storage | micro SD (SDXC) |
| | Auxiliary | no |
| | Ethernet | 10/100/1000M |
| | LED | no |
| ETC | | |
| | Operating Temperature | -20 - 50°C<br>(boot up: -20 - 50°C) |
| | Operating Humidity | 0% ~ 90% |
| | IR Illuminator | Indoor: TBD, Outdoor: TBD |
| | Vandal-proof Casing | no |
| | Weatherproof | IP66 |
| | PIR SENSOR | no |
| | PoE (class) | TBD |
| | Input Power | 12VDC, PoE |
| | Power Consumption | TBD |

| FUNCTION | |
|---|---|
| **FEATURE** | |
| Motion Detection | yes |
| Audio Detection | yes |
| Video Analytics | yes (Tampering, Tripzone) |
| Event Buffering (Pre & Post) | yes (upto 60M) |
| Multi Streaming Video | 6 stream (Live & Recording) |
| External Storage Recording | yes (SD card) |
| FTP Upload | yes |
| Motion Adaptive Transmission (MAT) | yes |
| Two-way Audio | yes |
| Anonymous Login Support | yes |
| Privacy Masking | yes |
| Pre-Recorded Voice Alert | yes |
| Event Notification | Remote S/W, Email (with Image) |
| **SYSTEM** | |
| Network TimeSync | yes |
| Soft Reset | yes |
| Factory Reset | yes |
| Auto Recovery | yes |
| Security | Multi-User Authority<br>IP Filtering<br>HTTPS, SSL encryption<br>802.1x |
| Import/Export Settings | yes |
| Upgrade | Remote S/W |
| **NETWORK** | |
| Max. Connections | 10(Live + admin), 1 (Recording) |
| Protocols | Manual, ADSL, DHCP, UPnP, mDNS |
| DDNS(DVRNS) | yes |
| QoS | yes (QoS Layer 3 DiffServ) |
| Remote Access Client | Webguard, INIT, RASplus, iNEX |
| Open IP Protocols | yes (ONVIF) |
| **Webguard** | |
| Monitoring | yes |
| Setup | yes |
| PTZ Control | no |
| Two-way Audio Communication | yes |
| **INSTALLATION TOOL (INIT)** | |
| Auto Device Scan | yes |
| Auto IP Address Matching | yes (Control PC and INIT) |
| Upgrade | yes |
| Setup | yes |
| Remote Setup | yes |
| Setup File Load / Save | yes |
| Alarm Device Test | no |
| Reset | Soft Reset, Factory Reset |
| **Basic Recording Solution (iNEX Basic)** | |
| Monitoring | yes |
| Recording | yes (iNEX Recording Service) |
| Setup | yes |
| Multi Display Panels | yes |
| Timeline Search | yes |
| Integrated Event Search | yes, with thumbnail image |
| File Clipping | AVI, BMP, JPEG and Clip-Player (own player) |
| Multi-System Health Monitoring | yes |
| Map Integration | yes |
| Two-way Audio Communication | yes |
| **ETC** | |
| API Support | yes |

| MISCELLANEOUS | | |
|---|---|---|
| **MISCELLANEOUS** | | |
| | Dimensions (W x H x D) or ØxH | Ø155x49mm |
| | Shipping Dimensions (W x H x D) | oversea : TBD<br>domestic : TBD |
| | Unit Weight | TBD |
| | Shipping Weight | oversea : TBD<br>domestic : TBD |
| **APPROVALS** | | |
| | Electrical | TBD |
| | Mechanical | TBD |

## 4.2 Product description

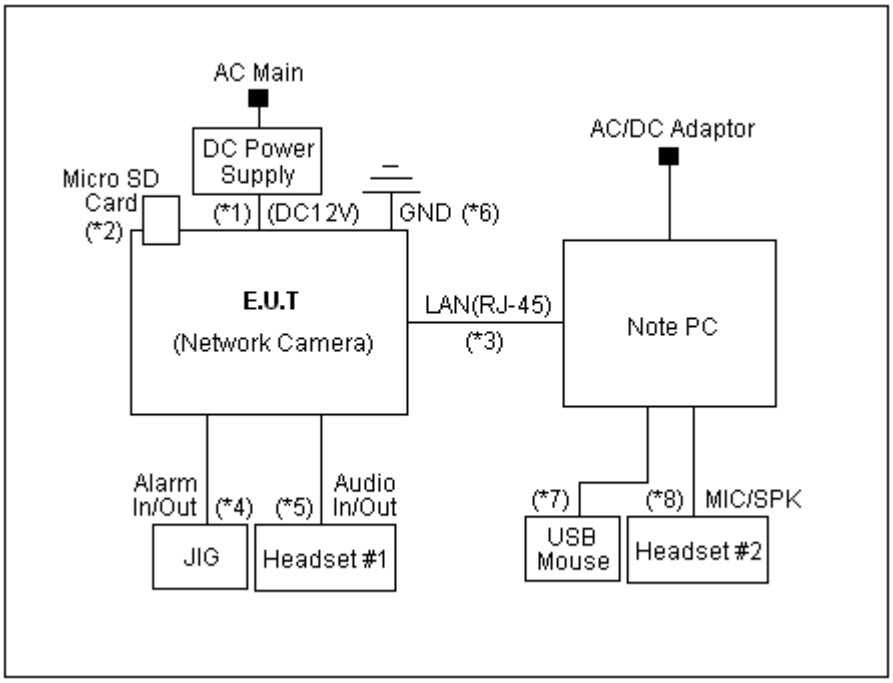
| | |
|---|---|
| Type of product | Network Camera |
| Model name (Basic) | NC-FE550-WD |
| Model name (Variant) | DC-Y1513W, MNC552WF,<br>NC-FE550-WDP1, DC-Y1514W |
| Difference | - |
| Trade name | - |
| Serial no | - |
| Testing voltage | DC 12 Ⅴ, PoE |
| Input range | DC 12 Ⅴ, PoE |
| Internal clock frequency | 125 ㎒ |
| Note | * PoE Switch was not provided by the manufacturer.<br>* BRAND WDP model.<br>* Outdoor model. |

## 4.3 Auxiliary equipments

| Type | Model / Part # | Serial number | Manufacturer |
|---|---|---|---|
| Note PC | G2-L9U99PA | - | HP |
| USB Mouse | 1088 | 816594870512265 | Microsoft |
| Headset #1 | SHS-250V | - | SAMSUNG |
| Headset #2 | SHS-250V | - | SAMSUNG |
| JIG | - | - | - |
| Micro SD Card (8 GB) | - | - | SanDisk |
| DC Power Supply | E3632A | KR01009281 | Agilent |
| PoE Switch | FS108P | 1DL20C3N00544 | NETGEAR |

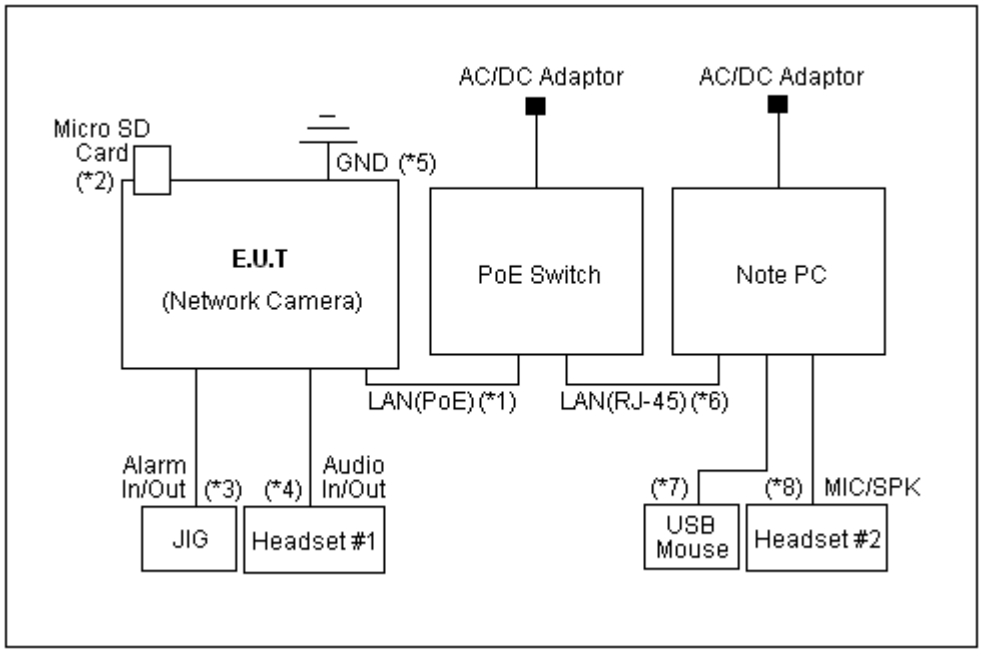
## 4.4 Test configuration

#1- DC 12 V




| Note | Start | | End | | Cable | | |
|---|---|---|---|---|---|---|---|
| * | Name | I/O port | Name | I/O port | Length (m) | Spec. | Cable |
| 1 | **EUT** (Network Camera) | Power | DC Power Supply | Power | 1.6 | Unshield | |
| 2 | | Micro SD | Micro SD Card | Micro SD | Direct | - | - |
| 3 | | LAN(RJ-45) | Note PC | LAN(RJ-45) | 3.0 | Unshield | Out-door |
| 4 | | Alarm In/Out | JIG | Alarm In/Out | 3.0 | Unshield | Out-door |
| 5 | | Audio In/Out | Headset #1 | Audio In/Out | 3.0 | Shield | Out-door |
| 6 | | GND | GND | GND | 2.0 | Unshield | - |
| 7 | Note PC | USB | USB Mouse | USB | 1.8 | Shield | - |
| 8 | | MIC/SPK | Headset #2 | MIC/SPK | 1.6 | Unshield | - |

#2- PoE




* Power supplied from PoE Switch

| Note | Start | | End | | Cable | | |
|---|---|---|---|---|---|---|---|
| * | Name | I/O port | Name | I/O port | Length (m) | Spec. | Cable |
| 1 | **EUT** (Network Camera) | LAN(PoE) | PoE Switch | LAN(PoE) | 3.0 | Unshield | Out-door |
| 2 | | Micro SD | Micro SD Card | Micro SD | Direct | - | - |
| 3 | | Alarm In/Out | JIG | Alarm In/Out | 3.0 | Unshield | Out-door |
| 4 | | Audio In/Out | Headset #1 | Audio In/Out | 3.0 | Shield | Out-door |
| 5 | | GND | GND | GND | 2.0 | Unshield | - |
| 6 | Note PC | LAN(RJ-45) | PoE Switch | LAN(RJ-45) | 3.0 | Unshield | Out-door |
| 7 | | USB | USB Mouse | USB | 1.8 | Shield | - |
| 8 | | MIC/SPK | Headset #2 | MIC/SPK | 1.6 | Unshield | - |

## 4.5 Operating conditions

The EUT was configured as normal intended use.

| Test mode | Normal operating |
|---|---|
| 1 | Web View Monitoring test. |
| | Ping test. |
| | Alarm In/Out test. |
| | Audio In/Out test. |

* Note: 2 types of powers are available for the product, that are DC 12 Ⅴ, PoE.
Therefore, tests were performed for 2 different types of powers.

# 5. Summary of test results

## 5.1 Summary of EMI emission test results

| Applied | Test items | Test method | Result |
|---|---|---|---|
| ☒ | Conducted Emission | EN 55022:2010+AC:2011 | Pass |
| ☒ | Radiated Emission | EN 55022:2010+AC:2011 | Pass |
| ☐ | Harmonics current | EN 61000-3-2:2014 | N/A |
| ☐ | Voltage fluctuations and flickers | EN 61000-3-3:2013 | N/A |

## 5.2 Summary of immunity test results

| Applied | Test items | Test method | Result |
|---|---|---|---|
| *** EN 50130-4:2014** | | | |
| ☒ | Electrostatic discharge | EN 61000-4-2:2009 | Pass |
| ☒ | Radiated RF immunity | EN 61000-4-3:2006+A2:2010 | Pass |
| ☒ | Electric Fast Transient/BURST | EN 61000-4-4:2012 | Pass |
| ☒ | Surge | EN 61000-4-5:2014 | Pass |
| ☒ | Conducted RF immunity | EN 61000-4-6:2014 | Pass |
| ☐ | Voltage dip/interruption | EN 61000-4-11:2004 | N/A |
| ☐ | Mains supply voltage variations | EN 50130-4:2011 | N/A |

## 5.3 Performance criteria

The variety and the diversity of the apparatus within the scope of this document makes it difficult to define precise criteria for the evaluation of the immunity test results.
If as a result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe then the apparatus shall be deemed to have failed the test.
A functional description and a definition of performance by the manufacture and noted in the test report, based on the following criteria:

**Electrostatic discharge**

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of discharge is permissible, providing which could be interpreted by associated equipment as a change,

**Radiated electromagnetic fields**

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of discharge is permissible, providing which could be interpreted by associated equipment as a change, and no such Flickering of indicators occurs at a field strength of 3 Ⅴ/m. For components of CCTV systems, where the picture is allowed at 10 Ⅴ/m, providing.

(a) there is no permanent damage or change to EUT
(e.g. no corruption of memory or changes to programmable setting etc.)
(b) at 3 Ⅴ/m, any deterioration of the picture is so minor that the system could still be used; and
(c) there is no observable deterioration of the picture at 1 Ⅴ/m.

**Fast transient burst / slow high energy voltage surge**

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of discharge is permissible, providing That there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as

**Conducted RF immunity**

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the application of discharge is permissible, providing
That there is no residual is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change,
and no such flickering of indicators oeuvres at U = 130 dBμV.
For component of CCTV systems, where the status is monitored by observing the TV picture,
then deterioration of the picture is allowed at U = 140 dBμV, providing:

(a) there is no permanent damage or change to the EUT
(e.g. no corruption of memory or changes to programmable settings etc.)
(b) at U = 130 dBμV, any deterioration of the picture is so minor that the system could still be used; and
(c) there in no observable deterioration of the picture at U = 120 dBμV.

**Voltage dip/interruption / Voltage variation**

There shall be no damage, malfunction or change of status due to the conditioning.
Flickering of an indicator during the conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change. The EUT shall meet the acceptance criteria for the functional test, after the conditioning.

# 6. Test results

## 6.1 Conducted Emission

| Test specification | EN 55022:2010+AC:2011, Class A | | |
|---|---|---|---|
| Testing voltage | DC 12 V, PoE | | |
| Test facility | Shielded room (CE#1) | | |
| Date | 2015. 08. 09 | | |
| Temperature (°C) | 26.9 °C | Humidity (% R.H.) | 33.8 % R.H. |
| Remarks | Pass | | |

### 6.1.1 Limits of conducted emission measurement

☐ AC main

| Frequency [㎒] | Class A (dB(㎶)) | | Class B (dB(㎶)) | |
|---|---|---|---|---|
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 ~ 0.5 | 79 | 66 | 66 ~ 56 * | 56 ~ 46* |
| 0.5 ~ 5 | 73 | 60 | 56 | 46 |
| 5 ~ 30 | 73 | 60 | 60 | 50 |

*The limit decreases linearly with the logarithm of frequency.

☒ Telecommunication

| Frequency [㎒] | Class A Voltage Limits (dB(㎶)) | | Current Limits (dB(㎂)) | |
|---|---|---|---|---|
| | Quasi-Peak | Average | Quasi-Peak | Average |
| 0.15 ~ 0.5 | 97 to 87 | 84 to 74 | 53 to 43 | 40 to 30 |
| 0.5 ~ 30 | 87 | 74 | 43 | 30 |
| Frequency [㎒] | Class B Limits (dB(㎶)) | | Current Limits (dB(㎂)) | |
| | Quasi-Peak | Average | Quasi-Peak | Average |
| 0.15 ~ 0.5 | 84 to 74 | 74 to 64 | 40 to 30 | 30 to 20 |
| 0.5 ~ 30 | 74 | 64 | 30 | 20 |

* The limits decrease linearly with the logarithm of the frequency in the range 0.15 ㎒ to 0.5 ㎒

* The current and voltage disturbance limits are derived for use with an impedance stabilization Network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is 20 $\log_{10}$ 150/I = 44 dB).

### 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. Te 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.
Both lines of power cord, hot and neutral, were measured.

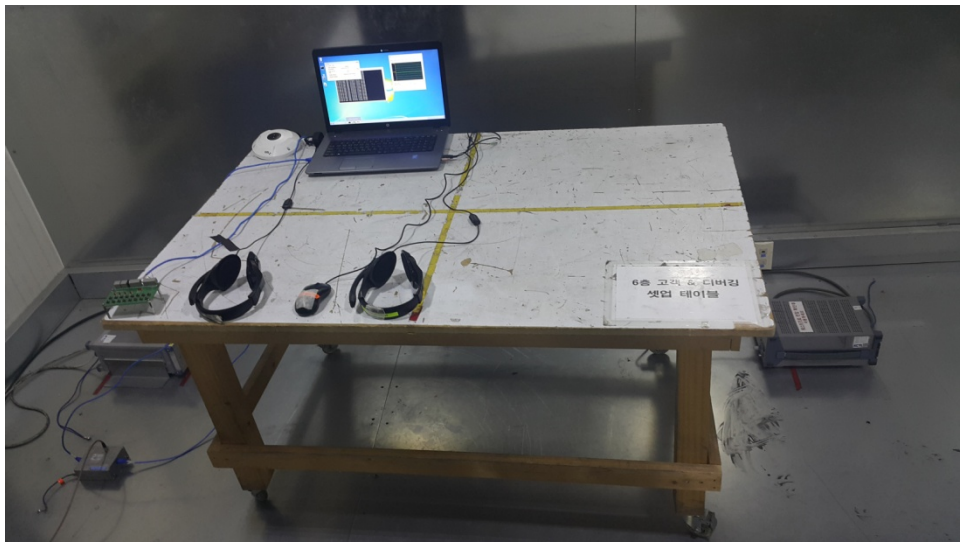
### 6.1.3 Used equipments

| Equipment | Model | Serial No. | Makers | Next Cal. Date | Used |
|---|---|---|---|---|---|
| Test Receiver | ESCI | 101408 | R&S | 2016.03.02 | ☐ |
| Test Receiver | ESCI | 100001 | R&S | 2016.08.04 | ☒ |
| Test Receiver | ESCI | 100710 | R&S | 2015.10.13 | ☐ |
| TWO-LINE V-NETWORK | ENV216 | 101358 | R&S | 2015.10.02 | ☒ |
| TWO-LINE V-NETWORK | ESH3-Z5 | 100267 | R&S | 2016.06.16 | ☒ |
| 8-WIRE ISN | NTFM 8158 CAT5 | CAT5-8158-0071 | SCHWARZBECK | 2016.03.29 | ☒ |
| 8-WIRE ISN | NTFM 8158 CAT3 | CAT3-8158-0020 | SCHWARZBECK | 2016.03.04 | ☐ |

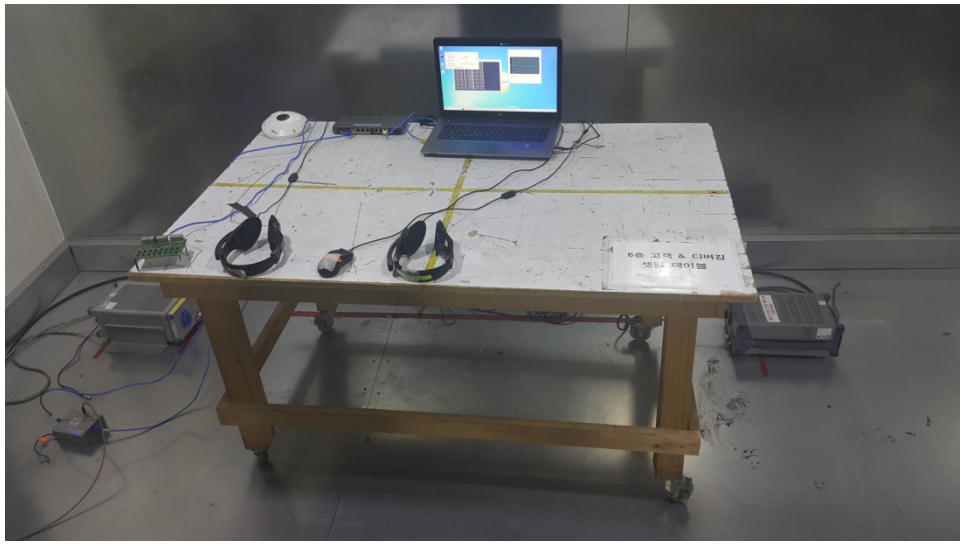
6.1.4 Photographs of test setup

* Telecommunication

#1- DC 12 V



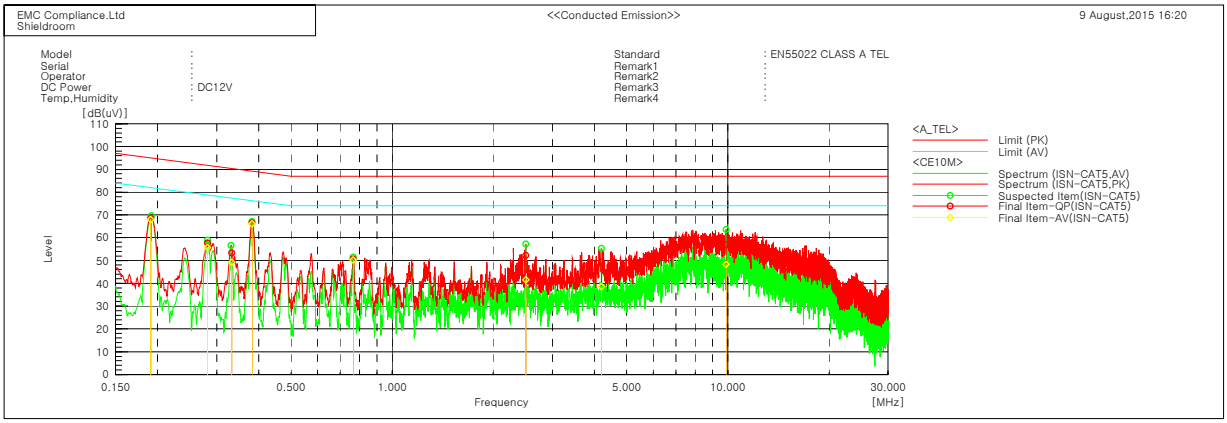
#2- PoE



## 6.1.5 Conducted emission measurement result

***** Telecommunication port

LAN Port (LCL 65 dB)_10 Mbps (NC-FE550-WD)_#1- DC 12 V

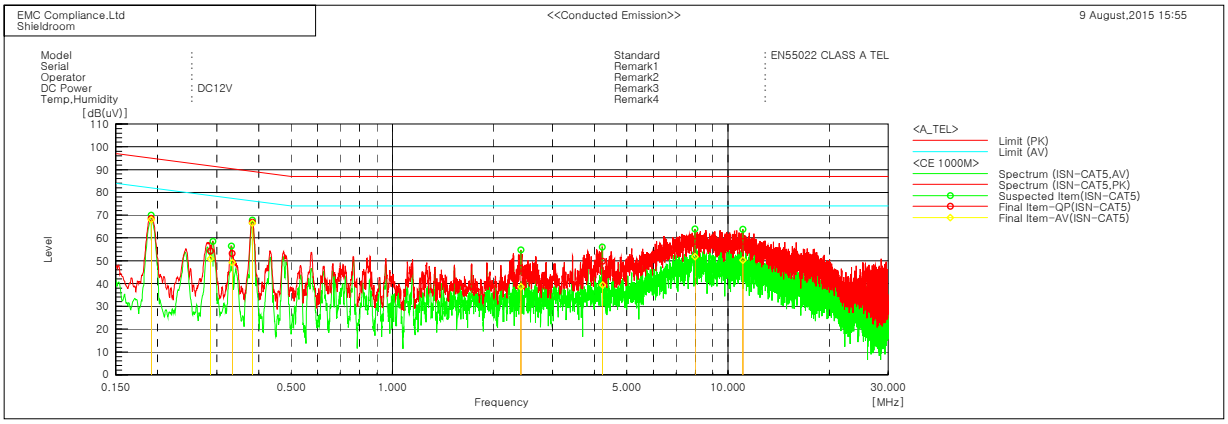



Final Result

--- ISN-CAT5 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 | 0.19098 | 58.9 | 58.2 | 9.8 | 68.7 | 68.0 | 95.0 | 82.0 | 26.3 | 14.0 |
| 2 | 0.2822 | 48.0 | 46.0 | 9.7 | 57.7 | 55.7 | 91.8 | 78.8 | 34.1 | 23.1 |
| 3 | 0.33229 | 43.7 | 39.6 | 9.6 | 53.3 | 49.2 | 90.4 | 77.4 | 37.1 | 28.2 |
| 4 | 0.38256 | 56.9 | 56.5 | 9.6 | 66.5 | 66.1 | 89.2 | 76.2 | 22.7 | 10.1 |
| 5 | 0.76512 | 41.2 | 40.7 | 9.5 | 50.7 | 50.2 | 87.0 | 74.0 | 36.3 | 23.8 |
| 6 | 2.50035 | 42.9 | 32.2 | 9.3 | 52.2 | 41.5 | 87.0 | 74.0 | 34.8 | 32.5 |
| 7 | 4.199 | 40.2 | 29.4 | 9.2 | 49.4 | 38.6 | 87.0 | 74.0 | 37.6 | 35.4 |
| 8 | 9.87329 | 47.7 | 39.2 | 9.2 | 56.9 | 48.4 | 87.0 | 74.0 | 30.1 | 25.6 |

## LAN Port (LCL 65 dB)_1000 Mbps (NC-FE550-WD)_#1- DC 12 V

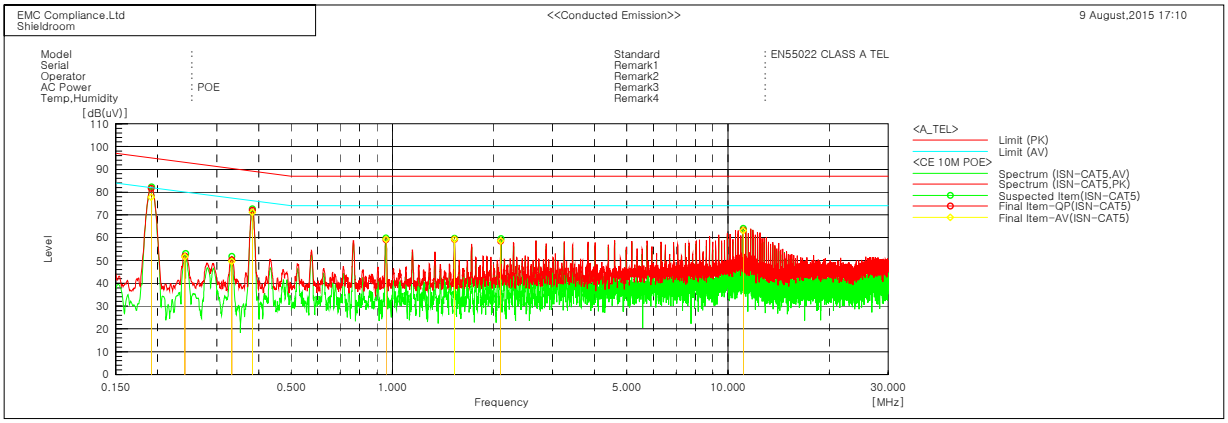



Final Result

--- ISN-CAT5 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 | 0.19153 | 58.9 | 58.3 | 9.8 | 68.7 | 68.1 | 95.0 | 82.0 | 26.3 | 13.9 |
| 2 | 0.28769 | 44.5 | 41.2 | 9.7 | 54.2 | 50.9 | 91.6 | 78.6 | 37.4 | 27.7 |
| 3 | 0.33325 | 43.6 | 39.6 | 9.6 | 53.2 | 49.2 | 90.4 | 77.4 | 37.2 | 28.2 |
| 4 | 0.38277 | 57.2 | 56.9 | 9.6 | 66.8 | 66.5 | 89.2 | 76.2 | 22.4 | 9.7 |
| 5 | 2.41659 | 37.3 | 29.2 | 9.3 | 46.6 | 38.5 | 87.0 | 74.0 | 40.4 | 35.5 |
| 6 | 4.22977 | 40.7 | 30.1 | 9.2 | 49.9 | 39.3 | 87.0 | 74.0 | 37.1 | 34.7 |
| 7 | 7.97649 | 49.3 | 42.5 | 9.2 | 58.5 | 51.7 | 87.0 | 74.0 | 28.5 | 22.3 |
| 8 | 11.08786 | 49.1 | 41.0 | 9.3 | 58.4 | 50.3 | 87.0 | 74.0 | 28.6 | 23.7 |

## LAN Port (LCL 65 dB)_10 Mbps (NC-FE550-WD)_#2- PoE

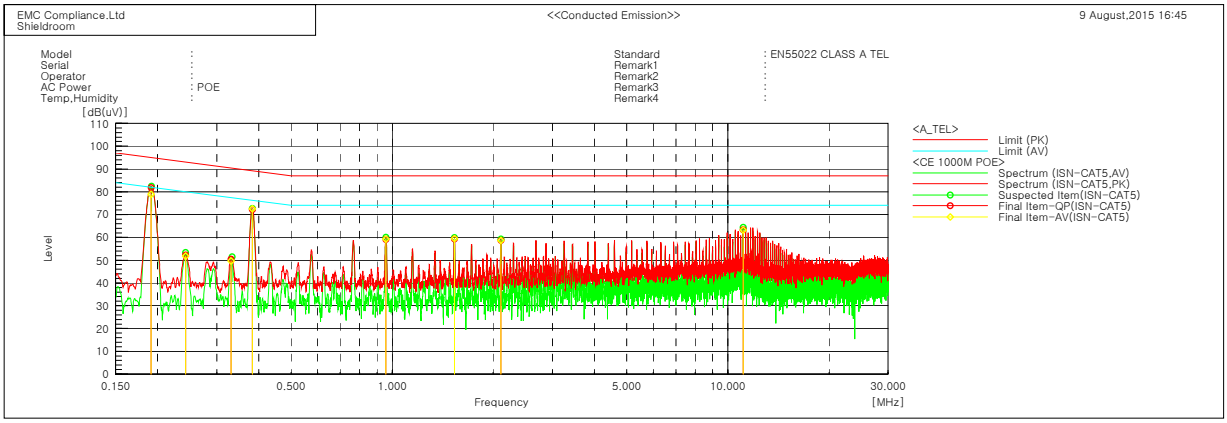



Final Result

--- ISN-CAT5 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 | 0.19136 | 71.9 | 68.0 | 9.8 | 81.7 | 77.8 | 95.0 | 82.0 | 13.3 | 4.2 |
| 2 | 0.24126 | 42.3 | 41.9 | 9.7 | 52.0 | 51.6 | 93.1 | 80.1 | 41.1 | 28.5 |
| 3 | 0.33281 | 40.7 | 40.1 | 9.6 | 50.3 | 49.7 | 90.4 | 77.4 | 40.1 | 27.7 |
| 4 | 0.38288 | 62.5 | 61.5 | 9.6 | 72.1 | 71.1 | 89.2 | 76.2 | 17.1 | 5.1 |
| 5 | 0.95687 | 49.7 | 49.8 | 9.5 | 59.2 | 59.3 | 87.0 | 74.0 | 27.8 | 14.7 |
| 6 | 1.53126 | 49.8 | 49.9 | 9.4 | 59.2 | 59.3 | 87.0 | 74.0 | 27.8 | 14.7 |
| 7 | 2.10567 | 49.2 | 49.2 | 9.4 | 58.6 | 58.6 | 87.0 | 74.0 | 28.4 | 15.4 |
| 8 | 11.1052 | 54.0 | 53.8 | 9.3 | 63.3 | 63.1 | 87.0 | 74.0 | 23.7 | 10.9 |

## LAN Port (LCL 65 dB)_1000 Mbps (NC-FE550-WD)_#2- PoE




Final Result

--- ISN-CAT5 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 | 0.19156 | 72.0 | 69.1 | 9.8 | 81.8 | 78.9 | 95.0 | 82.0 | 13.2 | 3.1 |
| 2 | 0.24242 | 42.5 | 42.2 | 9.7 | 52.2 | 51.9 | 93.0 | 80.0 | 40.8 | 28.1 |
| 3 | 0.33142 | 40.7 | 40.1 | 9.6 | 50.3 | 49.7 | 90.4 | 77.4 | 40.1 | 27.7 |
| 4 | 0.383 | 62.6 | 62.9 | 9.6 | 72.2 | 72.5 | 89.2 | 76.2 | 17.0 | 3.7 |
| 5 | 0.95757 | 49.7 | 49.8 | 9.5 | 59.2 | 59.3 | 87.0 | 74.0 | 27.8 | 14.7 |
| 6 | 1.53171 | 49.8 | 50.0 | 9.4 | 59.2 | 59.4 | 87.0 | 74.0 | 27.8 | 14.6 |
| 7 | 2.10626 | 49.2 | 49.3 | 9.4 | 58.6 | 58.7 | 87.0 | 74.0 | 28.4 | 15.3 |
| 8 | 11.10525 | 54.1 | 53.9 | 9.3 | 63.4 | 63.2 | 87.0 | 74.0 | 23.6 | 10.8 |

## 6.2 Radiated Emission

| | | | |
|---|---|---|---|
| Test specification | EN 55022:2010+AC:2011, Class A | | |
| Testing voltage | DC 12 V, PoE | | |
| Test facility | 10 m Chamber (4F) | | |
| Test distance | 10 m, 3 m | | |
| Date | 2015. 08. 07 | | |
| Temperature (°C) | 25.8 ~ 26.2 °C | Humidity (% R.H.) | 36.4 ~ 39.3 % R.H. |
| Remarks | Pass | | |

### 6.2.1 Limits of radiated emission measurement

☒ Limits below 1 ㎓

| Frequency [㎒] | Class A (dB(㎶/m)) @ 10 m | Class B (dB(㎶/m)) @ 10 m |
|---|---|---|
| 30 ~ 230 | 40 | 30 |
| 230 ~ 1 000 | 47 | 37 |

☒ Limits above 1 ㎓

| Frequency [㎓] | Class A @ 3 m | | Class B @ 3 m | |
|---|---|---|---|---|
| | Average limit (dB(㎶/m)) | Peak limit (dB(㎶/m)) | Average limit (dB(㎶/m)) | Peak limit (dB(㎶/m)) |
| 1 ~ 3 | 56 | 76 | 50 | 70 |
| 3 ~ 6 | 60 | 80 | 54 | 74 |
| Note - The lower limit applies at the transition frequency. | | | | |

### 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 |
|---|---|---|---|---|---|
| Test Receiver | ESR | 101078 | R&S | 2016.02.16 | ☒ |
| Test Receiver | ESCI7 | 100732 | R&S | 2016.01.20 | ☐ |
| Bi-Log Antenna | CBL 6112D | 37876 | TESEQ | 2016.08.28 | ☒ |
| Amplifier | 310N | 293004 | SONOMA INSTRUMENT | 2015.09.25 | ☒ |
| Coaxial Fixed Attenuator | 8491A | 16861 | HP | 2016.06.29 | ☒ |
| Antenna Mast | AM4.0 | 079/3440509 | MATURO | - | ☒ |
| Turn Table | CO2000-SOFT | - | MATURO | - | ☒ |
| Preamplifier | 8449B | 3008A01802 | AGILENT | 2016.07.30 | ☒ |
| Spectrum Analyzer | E4407B | US39010142 | AGILENT | 2015.10.13 | ☐ |

### 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 +3 dB Att – A.G)

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna Factor

C.L = Cable Loss

A.G= Amplifier Gain

3 dB Att = 3 dB Attenuator

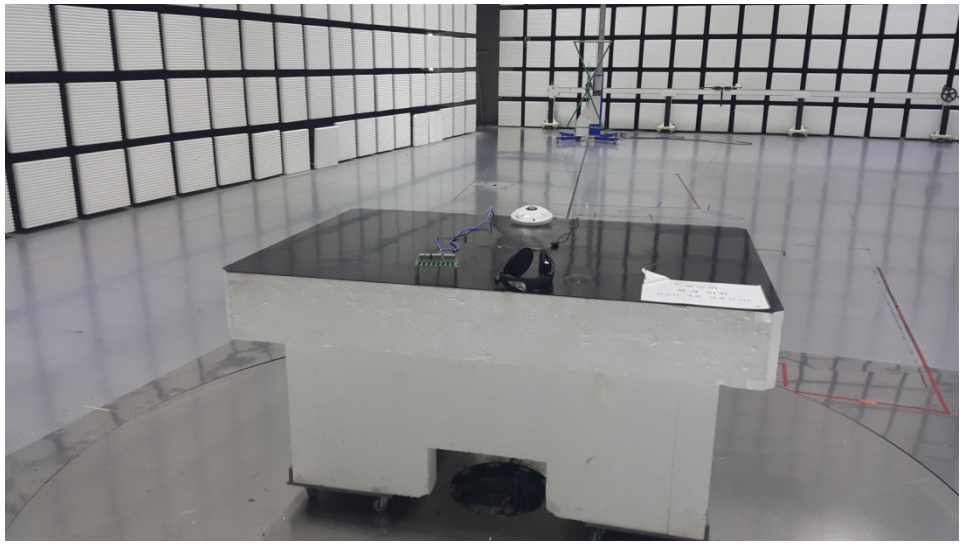
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

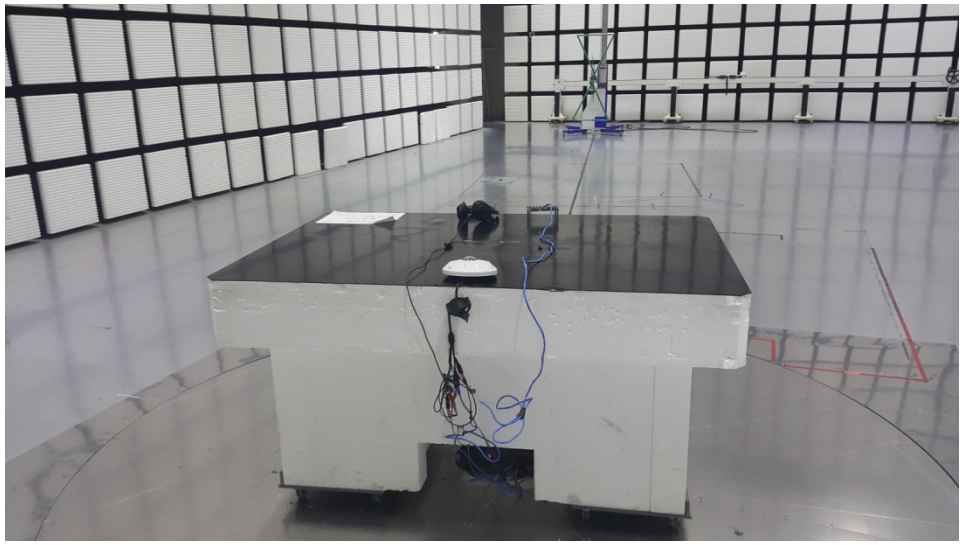
The result is

30 + 12 + 5 + 3 – 35 = 15 dB($\mu$V/m)

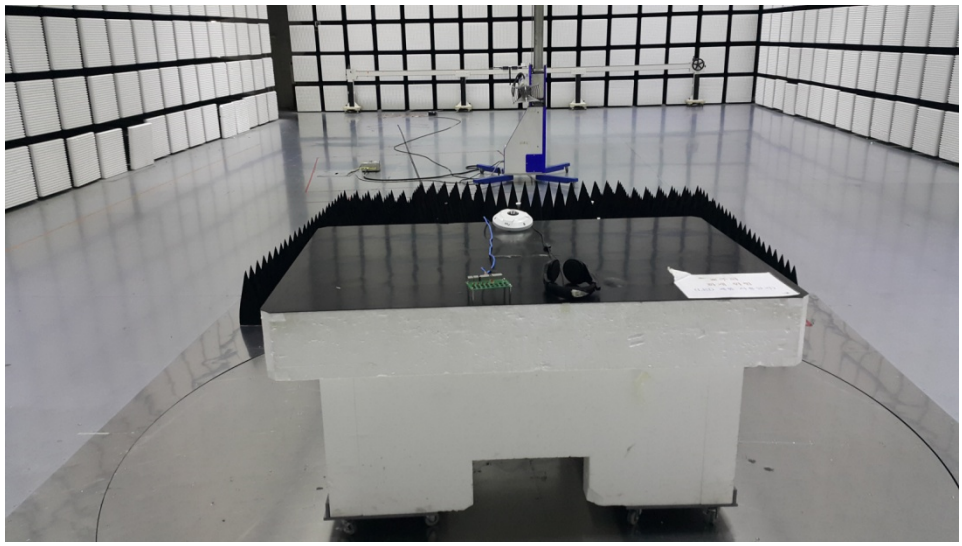
6.2.5 Photographs of test setup

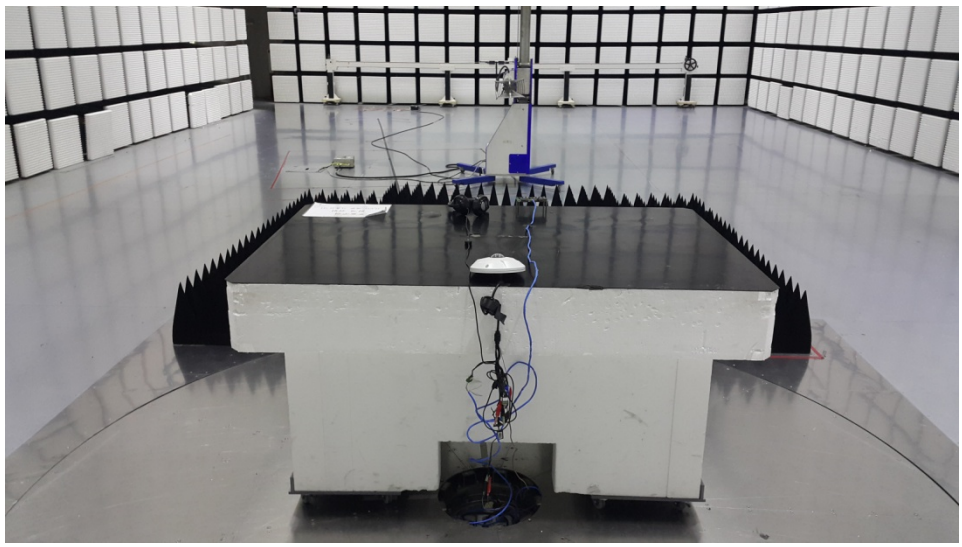
* 30 ㎒ ~ 1 ㎓ (#1- DC 12 V)



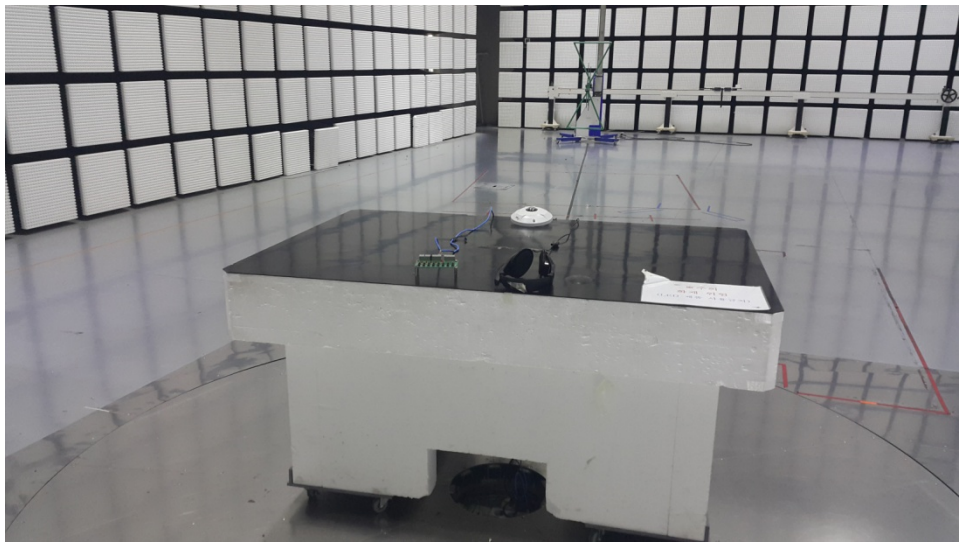


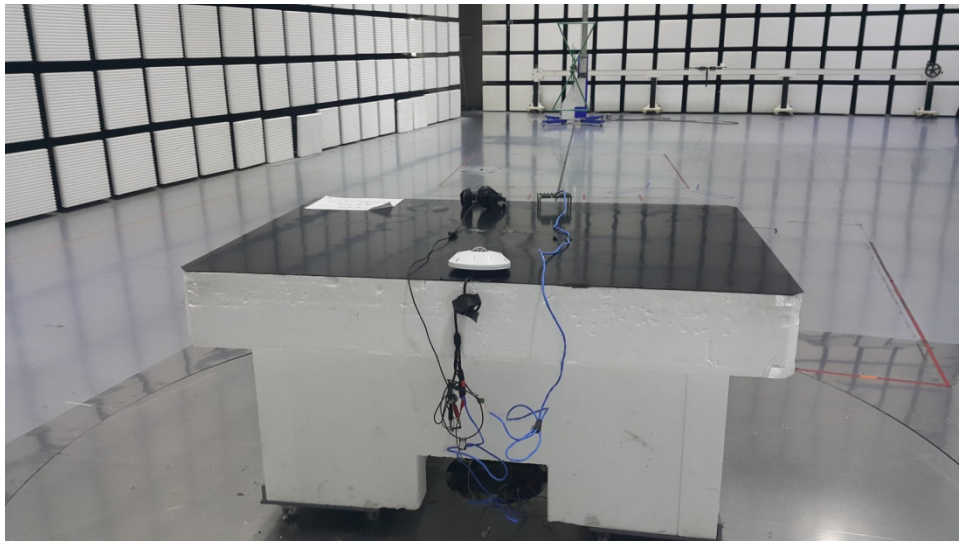
* 1 ㎓ ~ 6 ㎓ (#1- DC 12 V)



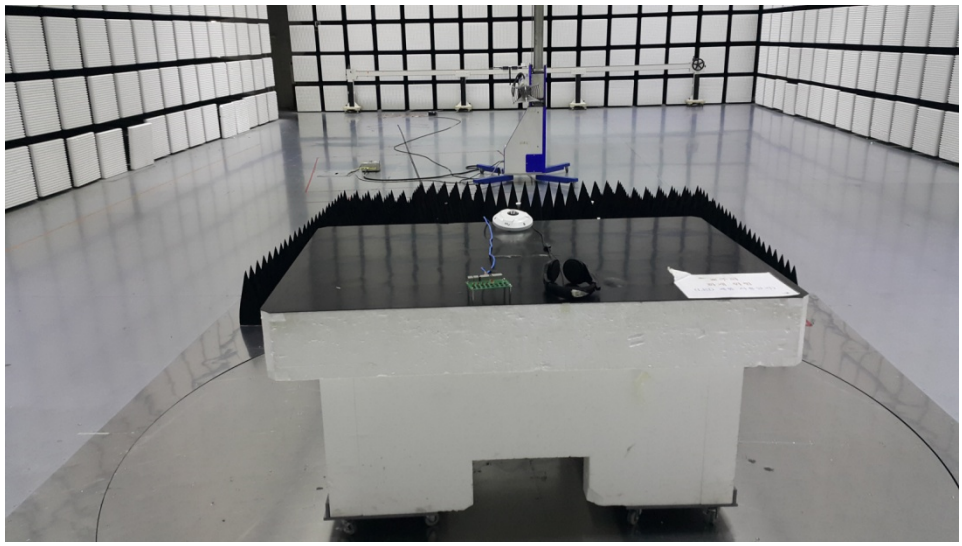


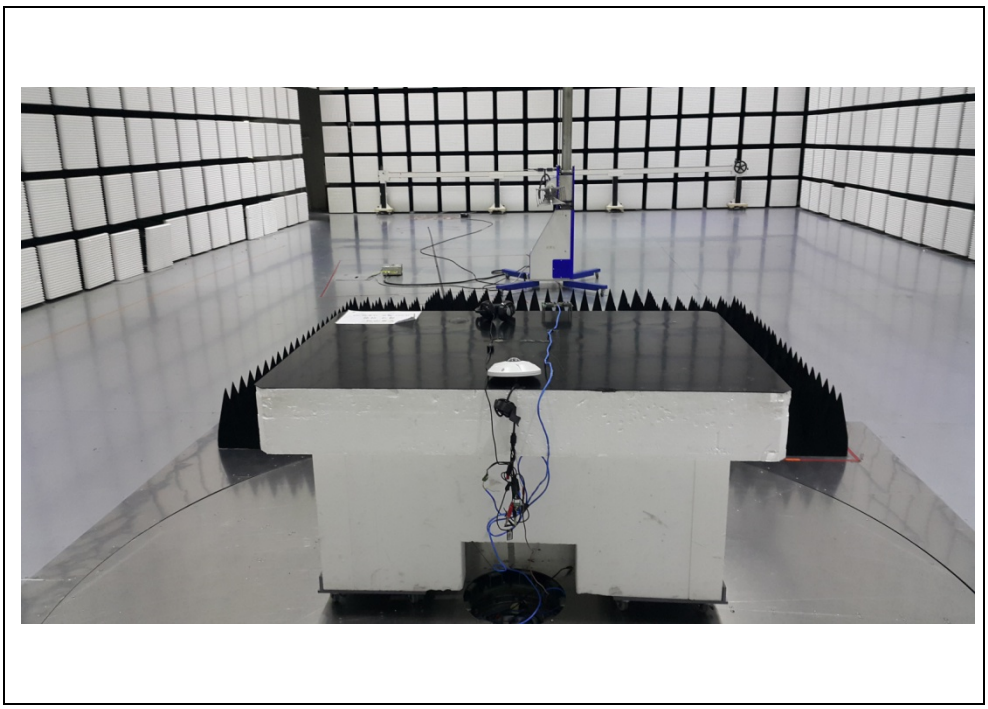
* 30 ㎒ ~ 1 ㎓ (#2- PoE)





* 1 ㎓ ~ 6 ㎓ (#2- PoE)

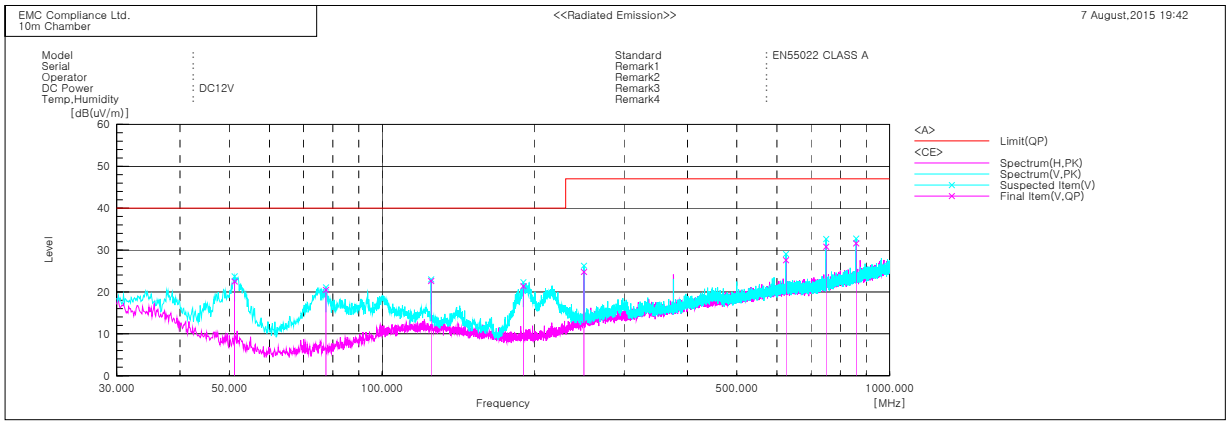




## 6.2.6 Radiated emission measurement result

*** Graph and Data**

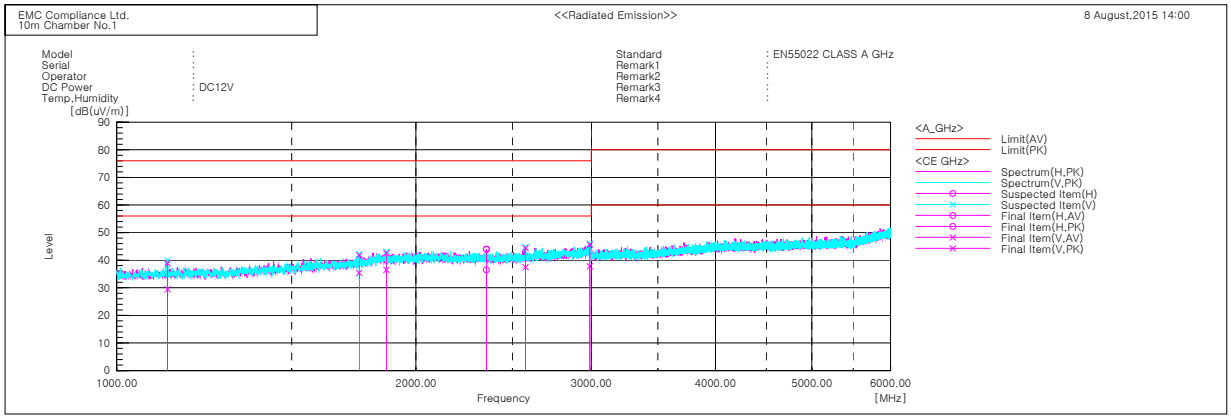
* 30 ㎒ ~ 1 ㎓ (NC-FE550-WD)_#1- DC 12 V




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 | 51.219 | V | 41.9 | -19.4 | 22.5 | 40.0 | 17.5 | 100.0 | 116.3 |
| 2 | 77.530 | V | 40.0 | -19.5 | 20.5 | 40.0 | 19.5 | 200.0 | 253.5 |
| 3 | 124.939 | V | 36.5 | -13.9 | 22.6 | 40.0 | 17.4 | 100.0 | 140.5 |
| 4 | 189.808 | V | 37.7 | -16.3 | 21.4 | 40.0 | 18.6 | 100.0 | 38.9 |
| 5 | 249.947 | V | 37.4 | -12.6 | 24.8 | 47.0 | 22.2 | 100.0 | 349.1 |
| 6 | 624.974 | V | 32.0 | -4.4 | 27.6 | 47.0 | 19.4 | 400.0 | 143.8 |
| 7 | 749.983 | V | 34.0 | -3.2 | 30.8 | 47.0 | 16.2 | 100.0 | 158.8 |
| 8 | 859.229 | V | 33.1 | -1.5 | 31.6 | 47.0 | 15.4 | 400.0 | 122.6 |

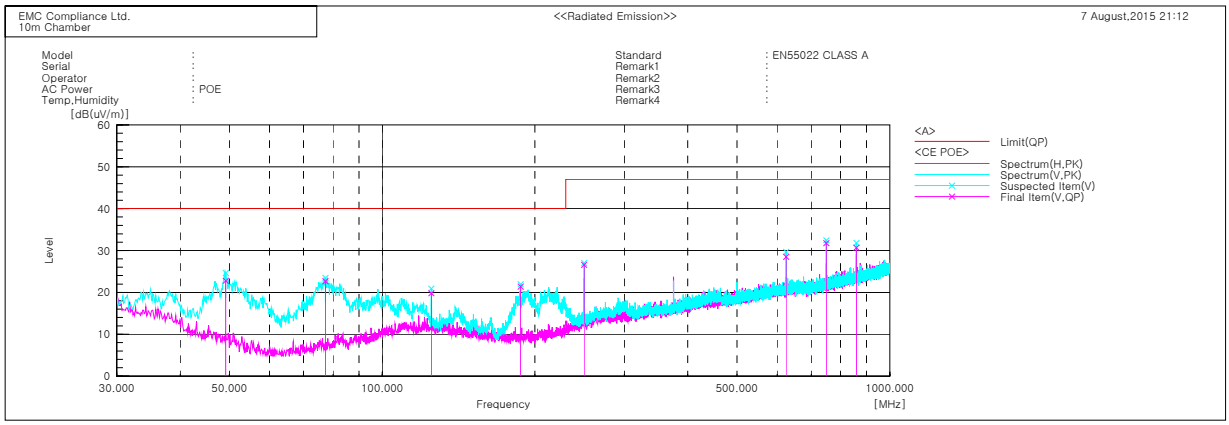
## * 1 ㎓ ~ 6 ㎓ (NC-FE550-WD)_#1- DC 12 V




Final Result

| No. | Frequency [MHz] | (P) | Reading AV [dB(uV)] | Reading PK [dB(uV)] | c.f [dB(1/m)] | Result AV [dB(uV/m)] | Result PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] | Height [cm] | Angle [deg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1125.000 | V | 40.2 | 49.6 | -10.7 | 29.5 | 38.9 | 56.0 | 76.0 | 26.5 | 37.1 | 100.0 | 146.6 |
| 2 | 1752.500 | V | 40.4 | 46.8 | -5.0 | 35.4 | 41.8 | 56.0 | 76.0 | 20.6 | 34.2 | 100.0 | 253.7 |
| 3 | 1866.875 | V | 40.4 | 46.5 | -3.9 | 36.5 | 42.6 | 56.0 | 76.0 | 19.5 | 33.4 | 100.0 | 146.6 |
| 4 | 2353.750 | H | 39.4 | 46.8 | -2.9 | 36.5 | 43.9 | 56.0 | 76.0 | 19.5 | 32.1 | 100.0 | 23.8 |
| 5 | 2576.250 | V | 40.2 | 47.1 | -2.7 | 37.5 | 44.4 | 56.0 | 76.0 | 18.5 | 31.6 | 100.0 | 5.7 |
| 6 | 2990.625 | V | 38.8 | 46.7 | -1.0 | 37.8 | 45.7 | 56.0 | 76.0 | 18.2 | 30.3 | 100.0 | 151.9 |

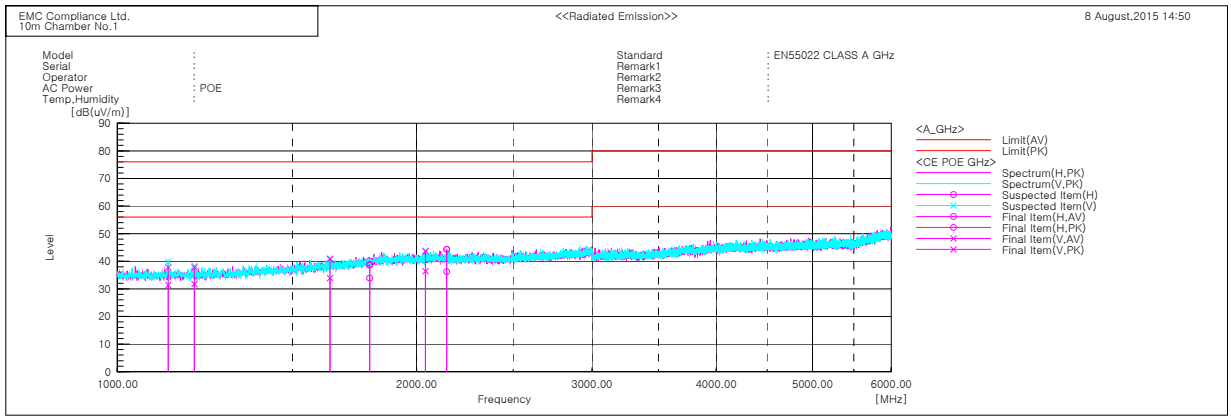
## * 30 ㎒ ~ 1 ㎓ (NC-FE550-WD)_#2- PoE




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 | 49.158 | V | 41.5 | -18.7 | 22.8 | 40.0 | 17.2 | 100.0 | 349.4 |
| 2 | 77.288 | V | 42.2 | -19.5 | 22.7 | 40.0 | 17.3 | 100.0 | 265.0 |
| 3 | 124.939 | V | 33.7 | -13.9 | 19.8 | 40.0 | 20.2 | 200.0 | 350.9 |
| 4 | 187.504 | V | 37.7 | -16.3 | 21.4 | 40.0 | 18.6 | 100.0 | 2.3 |
| 5 | 249.947 | V | 39.2 | -12.6 | 26.6 | 47.0 | 20.4 | 100.0 | 31.0 |
| 6 | 624.974 | V | 32.9 | -4.4 | 28.5 | 47.0 | 18.5 | 300.0 | 129.4 |
| 7 | 749.983 | V | 35.0 | -3.2 | 31.8 | 47.0 | 15.2 | 100.0 | 162.8 |
| 8 | 859.229 | V | 32.2 | -1.5 | 30.7 | 47.0 | 16.3 | 400.0 | 33.2 |

## * 1 ㎓ ~ 6 ㎓ (NC-FE550-WD)_#2- PoE




Final Result

| No. | Frequency [MHz] | (P) | Reading AV [dB(uV)] | Reading PK [dB(uV)] | c.f [dB(1/m)] | Result AV [dB(uV/m)] | Result PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] | Height [cm] | Angle [deg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1125.000 | V | 42.1 | 48.5 | -10.7 | 31.4 | 37.8 | 56.0 | 76.0 | 24.6 | 38.2 | 100.0 | 161.7 |
| 2 | 1195.000 | V | 42.1 | 48.1 | -10.3 | 31.8 | 37.8 | 56.0 | 76.0 | 24.2 | 38.2 | 100.0 | 207.9 |
| 3 | 1635.625 | V | 40.2 | 47.1 | -6.3 | 33.9 | 40.8 | 56.0 | 76.0 | 22.1 | 35.2 | 100.0 | 285.5 |
| 4 | 1793.750 | H | 38.5 | 43.2 | -4.6 | 33.9 | 38.6 | 56.0 | 76.0 | 22.1 | 37.4 | 100.0 | 286.8 |
| 5 | 2040.625 | V | 39.5 | 46.7 | -3.1 | 36.4 | 43.6 | 56.0 | 76.0 | 19.6 | 32.4 | 100.0 | 290.8 |
| 6 | 2143.750 | H | 39.1 | 47.2 | -2.9 | 36.2 | 44.3 | 56.0 | 76.0 | 19.8 | 31.7 | 100.0 | 130.1 |

## 6.3 Electrostatic Discharge

| Test specification | EN 61000-4-2:2009 | | | | |
|---|---|---|---|---|---|
| Test level | ☒ Contact: ± 6 kV<br>☒ Air: ± 2 kV, ± 4 kV, ± 8 kV<br>☐ HCP: ± 2 kV, ± 4 kV, ± 6 kV<br>☒ VCP: ± 2 kV, ± 4 kV, ± 6 kV | | | | |
| Discharge impedance | 330 Ω / 150 pF | | | | |
| Number of discharge (Each polarity) | ☒ Contact: 10 ☒ Air: 10 ☒ HCP / VCP: 10 | | | | |
| Interval between discharges | 1 s | | | | |
| Testing voltage | DC 12 V, PoE | | | | |
| Test facility | Shielded room(3F) | | | | |
| Date | 2015. 08. 11 | | | | |
| Temperature(°C) | 27.9 °C | Humidity (% R.H.) | 41.4 % R.H. | Pressure (kPa) | 100.2 kPa |
| Remarks | Pass<br>- There was no change of operation status during above testing. | | | | |

### 6.3.1 Measurement procedure

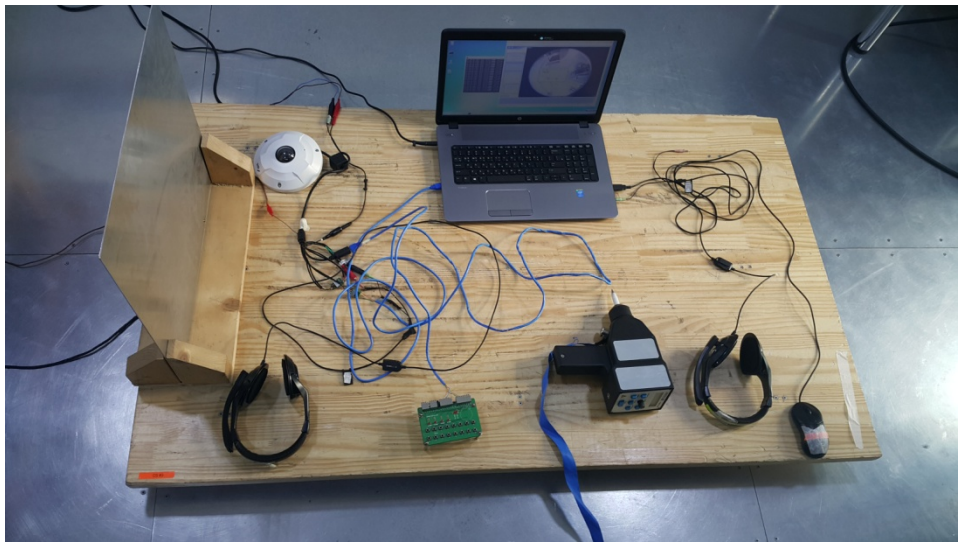
A ground reference plane was located on the floor, and connected to earth via a low Impedance connection. The return cable of the ESD generator was connected to the reference plane.
In case of floor standing equipment, EUT was placed on the reference plane on 0.1 m of insulating Support. In case of table top equipment, EUT was placed on a wooden table 0.8 m above the reference grounded floor. A horizontal coupling plane (HCP) was placed on the table, and Connected to the reference plane via a 470 kΩ resistor located in each end (0.5 mm insulating support between EUT and HCP). In both cases a vertical coupling plane(VCP) OF 0.5 X 0.5 m was located 0.1 m from the EUT's sides. The VCP was connected to the reference plane in the same matter as the HCP.

### 6.3.2 Used equipments

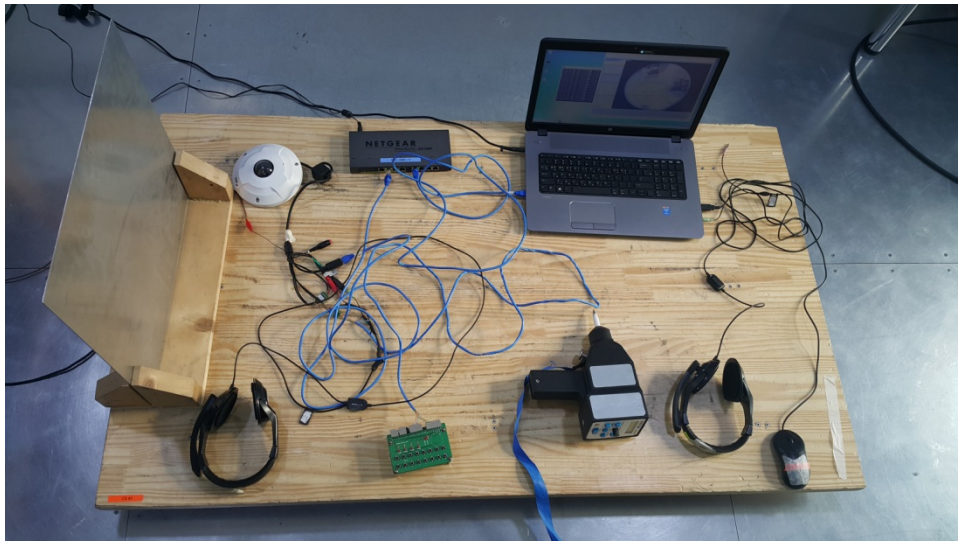
| Equipment | Model No. | Serial No. | Makers | Next Cal. Date | Used |
|---|---|---|---|---|---|
| ESD Tester | PESD-1600 | H011 309 | HAEFELY | 2016.06.16 | ☒ |
| ESD Tester | NSG 437 | 182 | TESEQ | 2016.04.23 | ☐ |
| HCP | - | - | - | - | ☐ |
| VCP | - | - | - | - | ☒ |

6.3.3 Photographs of test setup

#1- DC 12V



#2- PoE



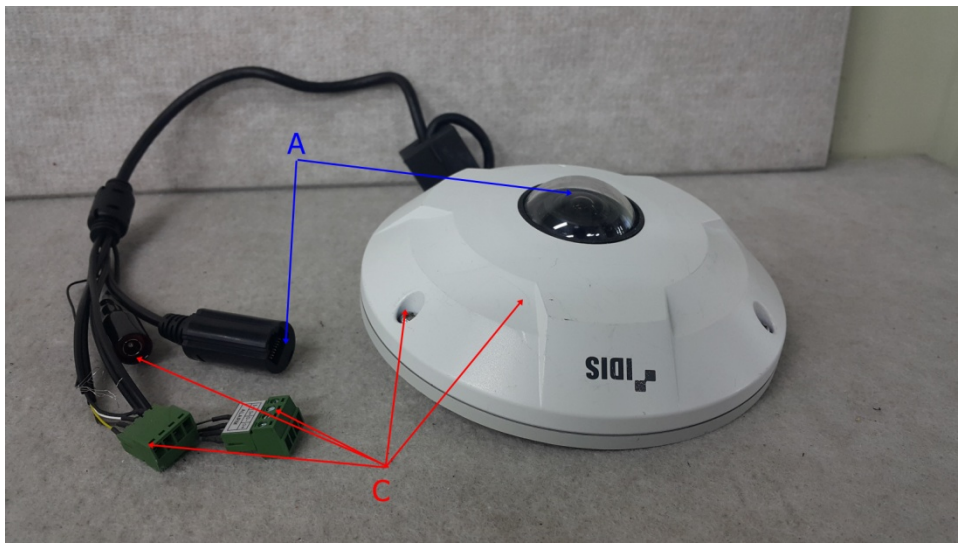
6.3.4 Measurement result

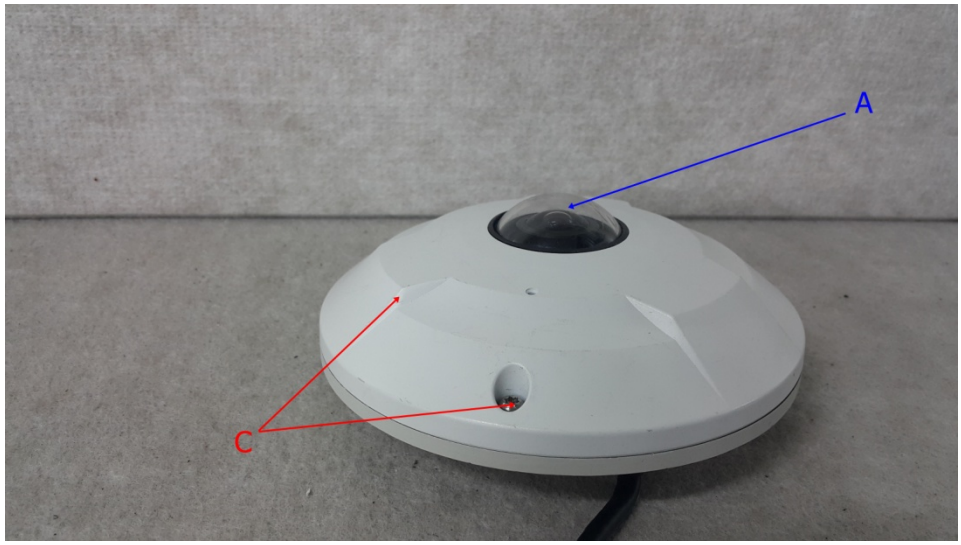
Electrostatic Discharge (Test Point)

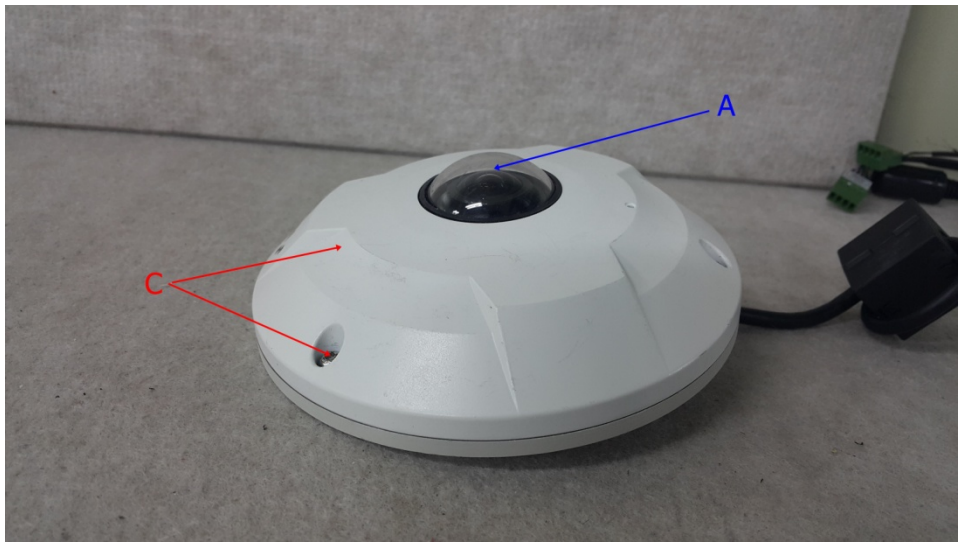
**Air discharge** →

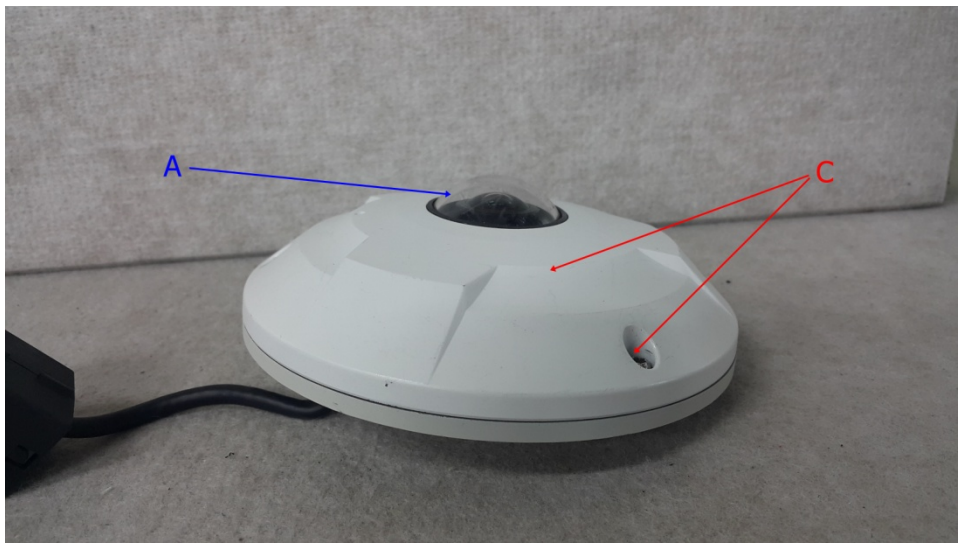
**Contact discharge** →

#1- DC 12V, #2- PoE





(#1- DC 12 V, #2- PoE)

**HCP/VCP discharge**

| Location(EUT) | Applied level (±) | Result |
|---|---|---|
| HCP (All 4 sides) | - | - |
| VCP (All 4 sides) | ± 2 kV, ± 4 kV, ± 6 kV | Pass |

**Contact discharge**

| Location(EUT) | Applied level (±) | Result |
|---|---|---|
| Front | ± 6 kV | Pass |
| Rear | ± 6 kV | Pass |
| Left | ± 6 kV | Pass |
| Right | ± 6 kV | Pass |

**Air discharge**

| Location(EUT) | Applied level (±) | Result |
|---|---|---|
| Front | ± 2 kV, ± 4 kV, ± 8 kV | Pass |
| Rear | ± 2 kV, ± 4 kV, ± 8 kV | Pass |
| Left | ± 2 kV, ± 4 kV, ± 8 kV | Pass |
| Right | ± 2 kV, ± 4 kV, ± 8 kV | Pass |

## 6.4 Radio Frequency Electromagnetic Fields

| | | | | | |
|---|---|---|---|---|---|
| Test specification | EN 61000-4-3:2006+A2:2010 | | | | |
| Tested frequency | 80 ㎒ ~ 1 ㎓, 1 ㎓ ~ 2.7 ㎓ | | | | |
| Test level & Modulation | 1 ㎷/m, 3 ㎷/m, 10 ㎷/m, 80 % Amplitude Modulation (1 ㎑)<br>1 ㎷/m, 3 ㎷/m, 10 ㎷/m, Pulse Modulation (1 ㎐ (0.5 s ON: 0.5 s OFF)) | | | | |
| Frequency Step | log 1 % step | | | | |
| Dwell time | 3 s | | | | |
| Distance | 3 m from EUT to tip of antenna | | | | |
| Testing Voltage | DC 12 ㎷, PoE | | | | |
| Test facility | 6F Fully anechoic chamber (3 m) | | | | |
| Date | 2015. 08. 10 | | | | |
| Temperature(°C) | 28.4 °C | Humidity (% R.H.) | 36.4 % R.H. | Pressure (㎪) | 100.1 ㎪ |
| Remarks | Pass<br>- There was no change of operation status during above testing. | | | | |

### 6.4.1 Measurement procedure

The test was performed at 3 m full anechoic chamber.

For floor standing equipment, the EUT was standing on the floor.

For tabletop equipment, the EUT was located on a wooden table 0.8 m above the floor.

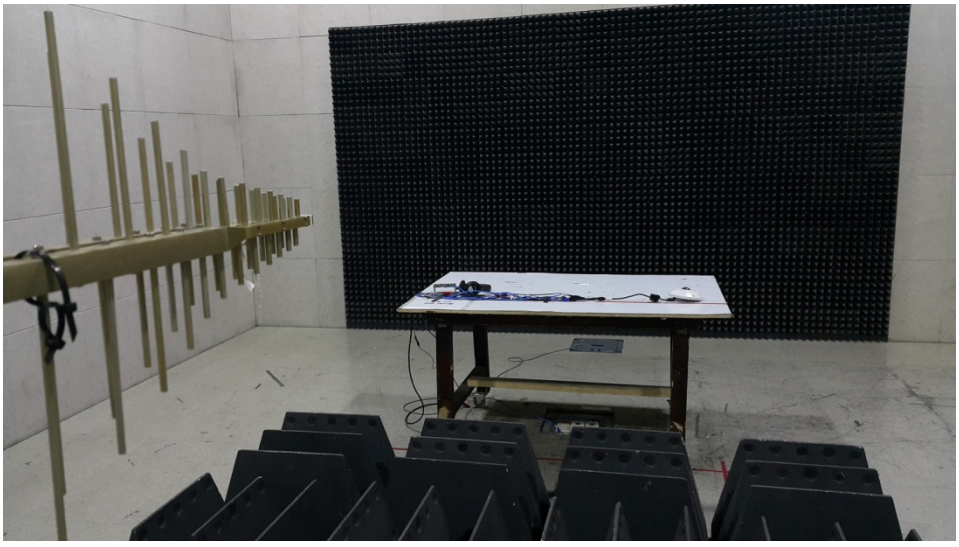
The EUT was tested all sides, horizontal and vertical polarization.

6.4.2 Used equipments

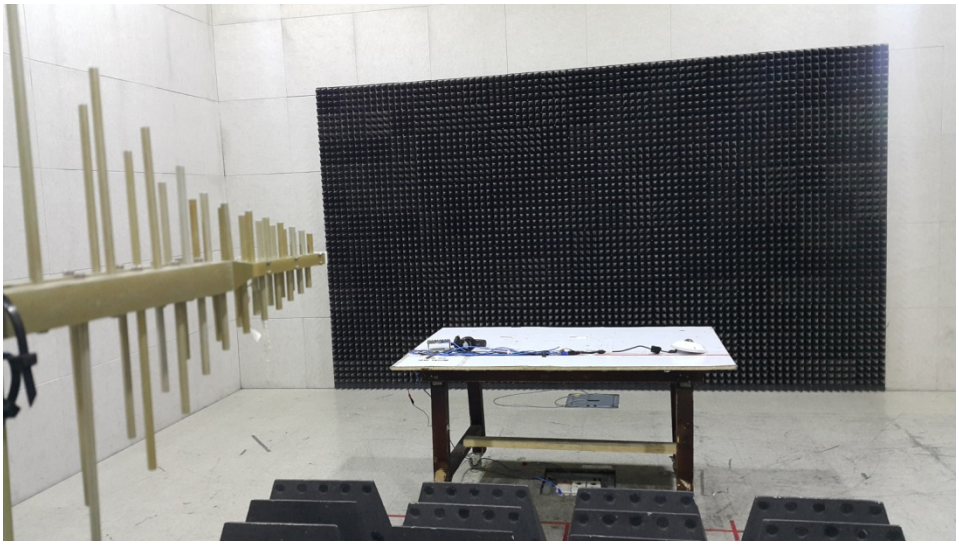
| Equipment | Model no. | Serial no. | Makers | Next Cal. date | Used |
|---|---|---|---|---|---|
| Power meter | PM2002 | 302852 | AR | 2015.09.23 | ☒ |
| Power sensor | PH2000 | 303224 | AR | 2015.09.23 | ☒ |
| Power sensor | PH2000 | 311217 | AR | 2015.09.23 | ☒ |
| Directional coupler | DC6180 | 303976 | AR | 2015.09.23 | ☒ |
| Directional coupler | DC7144M1 | 320279 | AR | 2015.09.23 | ☒ |
| Signal generator | E4421B | GB40052295 | AGILENT | 2015.09.23 | ☒ |
| Broadband Amplifier | BBA100 | 100996-1 | R&S | - | ☒ |
| Amplifier | 60S1G3M2 | 320444 | AR | - | ☒ |
| Log Periodic Dipole Antenna | LPDA-0803 | - | ETS | - | ☒ |
| Antenna master | - | - | ETS | - | ☒ |

6.4.3 Photographs of test setup

#1- DC 12 V



#2- PoE



6.4.4 Measurement result

(#1- DC 12 V, #2- PoE)

| Location(EUT) | Antenna polarization | Result |
|---|---|---|
| Front side | Horizontal | Pass |
| | Vertical | Pass |
| Rear side | Horizontal | Pass |
| | Vertical | Pass |
| Left side | Horizontal | Pass |
| | Vertical | Pass |
| Right side | Horizontal | Pass |
| | Vertical | Pass |

## 6.5 Electric Fast Transient/BURST

| Test specification | EN 61000-4-4:2012 | | | | |
|---|---|---|---|---|---|
| Coupling | ☒ DC 12 V<br>☒ Signal/Control: Clamp<br>☒ Telecommunication: Clamp | | | | |
| Test level | ☒ DC 12 V : ± 1 kV Peak<br>☒ Signal/Control: ± 1 kV Peak<br>☒ Telecommunication: ± 1 kV Peak | | | | |
| Repetition frequency | 100 ㎑, Tr/Th = 5 / 50 ns | | | | |
| Coupling time (Minimum) | 60 s | | | | |
| Testing Voltage | DC 12 V, PoE | | | | |
| Test facility | Shielded room(3F) | | | | |
| Date | 2015. 08. 12 | | | | |
| Temperature(°C) | 28.8 °C | Humidity (% R.H.) | 33.6 % R.H. | Pressure (㎪) | 100.2 ㎪ |
| Remarks | Pass<br>- There was no change of operation status during above testing.<br>* DC port: Clamp apply<br>(DC ports, which are not intended to be connected to a DC distribution network, e.g. outputs for Sounders, are treated as signal ports.) | | | | |

### 6.5.1 Measurement procedure

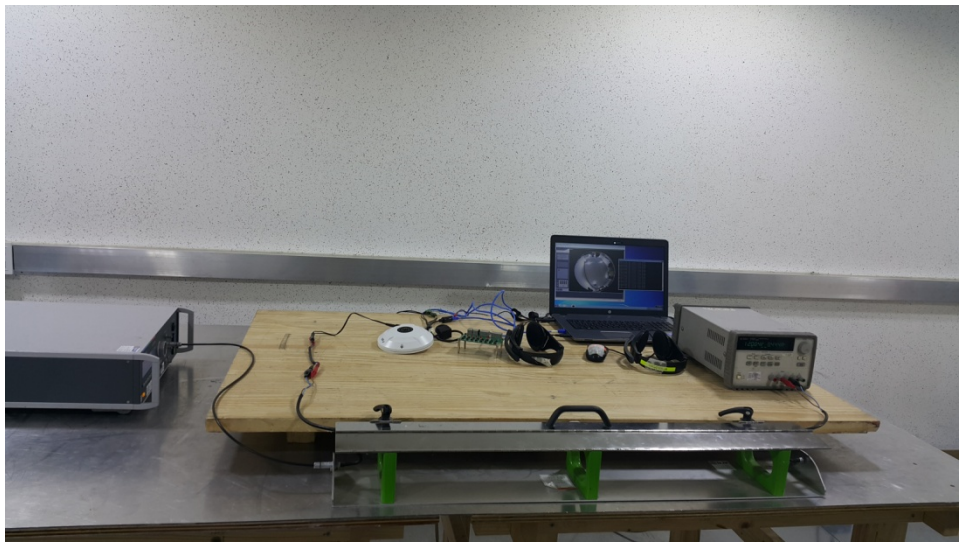
A ground reference plane was located on the floor.
EFT generator was connected to reference ground plane via low impedance connection.
For floor standing equipment, EUT was placed on a 0.1 m wooden table.
For tabletop equipment, EUT was placed on a 0.1 m above the ground reference plane.
Test generator and coupling/decoupling network was placed on, and bounded to, the ground reference plane. When using the coupling clamp, the minimum distance between the coupling plates and all other conductive surfaces, except the ground reference plane beneath the coupling clamp, Shall be 0.5 m.

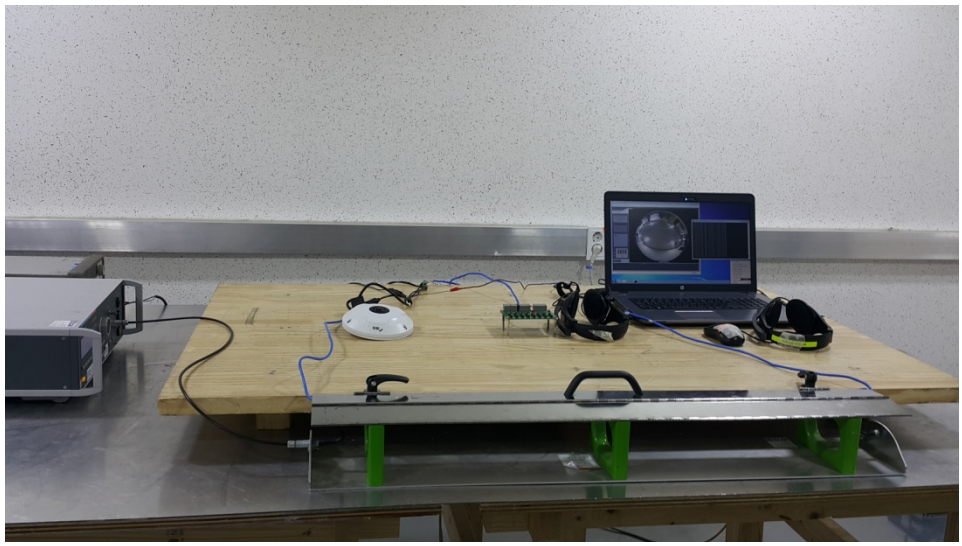
### 6.5.2 Used equipments

| Equipment | Model no. | Serial no. | Makers | Next Cal. date | Used |
|---|---|---|---|---|---|
| Ultra compact simulator | UCS500N | V1238113636 | EM TEST | 2016.02.04 | ☒ |
| Capacitive coupling clamp | HFK | P1411132494 | EM TEST | 2016.04.21 | ☒ |

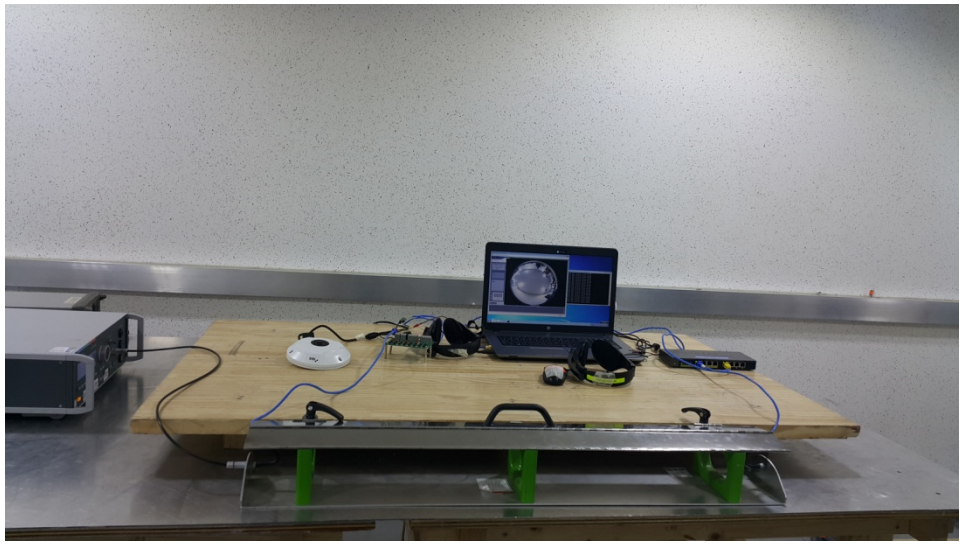
6.5.3 Photographs of test setup

#1- DC 12V





#2- PoE



6.5.4 Measurement result

* DC Line (#1- DC 12 V)

| Coupling point | (+) | (-) | Result |
|---|---|---|---|
| DC 12 V | + 1 kV | - 1 kV | Pass |

* Signal/Control (#1- DC 12 V, #2- PoE)

| Coupling point | (+) | (-) | Result |
|---|---|---|---|
| Alarm In/Out | + 1 kV | - 1 kV | Pass |
| Audio In/Out | + 1 kV | - 1 kV | Pass |

* Telecommunication (#1- DC 12 V, #2- PoE)

| Coupling point | (+) | (-) | Result |
|---|---|---|---|
| LAN(RJ-45) | + 1 kV | - 1 kV | Pass |
| LAN(PoE) | + 1 kV | - 1 kV | Pass |

## 6.6 Surge

| Test specification | EN 61000-4-5:2014 | | | | |
|---|---|---|---|---|---|
| Coupling | ☒ DC 12 V: CDN<br>☒ Signal/Control: CDN<br>☒ Telecommunication: CDN | | | | |
| Test level | ☒ DC 12 V : ± 0.5 kV, ± 1 kV<br>☒ Signal/Control: ± 0.5 kV, ± 1 kV<br>☒ Telecommunication: ± 0.5 kV, ± 1 kV | | | | |
| Coupling Impedance | ☐ Differential mode: 18 μF ☐ Common mode: 10 Ω + 9 μF<br>☒ 40 Ω + 0.5 μF ☐ Direct | | | | |
| Surge pulse shape | Tr/Th = 1.2 / 50 μs | | | | |
| Number of surge | 5 | | | | |
| Coupling time | 1 min | | | | |
| Testing Voltage | DC 12 V, PoE | | | | |
| Test facility | Shielded room(3F) | | | | |
| Date | 2015. 08. 12 | | | | |
| Temperature(°C) | 28.8 °C | Humidity (% R.H.) | 33.6 % R.H. | Pressure (kPa) | 100.2 kPa |
| Remarks | Pass<br>- There was no change of operation status during above testing. | | | | |

### 6.6.1 Measurement procedure

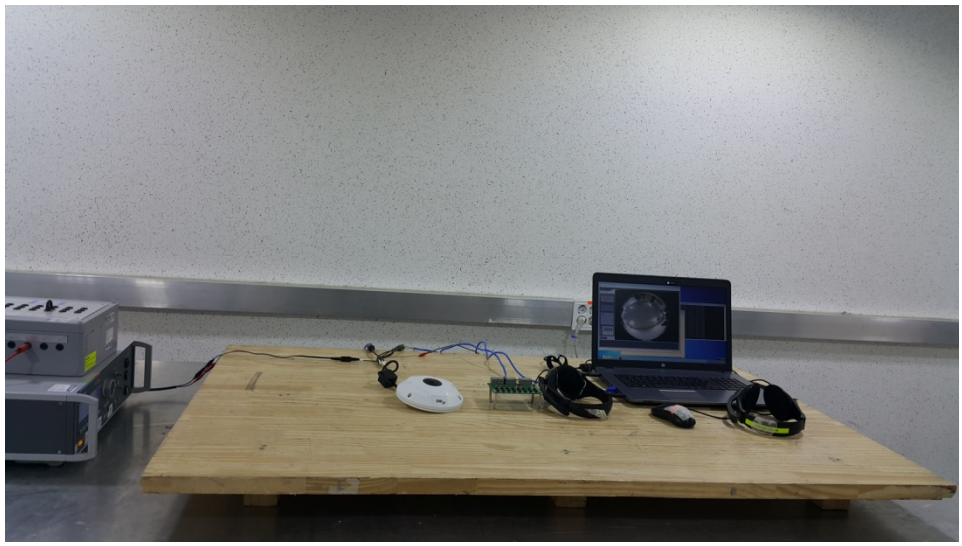
A ground reference plane was located on the floor. SURGE generator was connected to reference ground plane via low impedance connection. For floor standing equipment & table top equipment, EUT was placed on a wooden table.

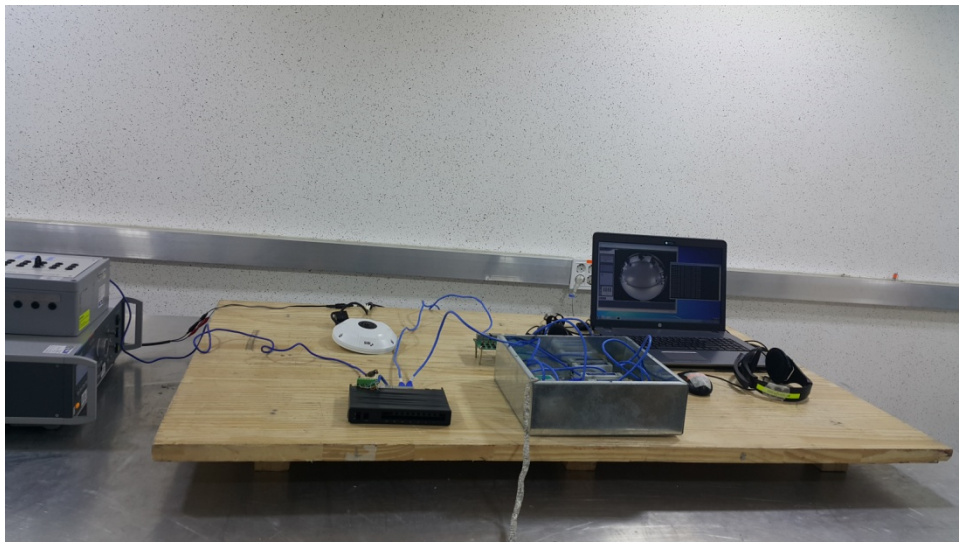
### 6.6.2 Used equipments

| Equipment | Model no. | Serial no. | Makers | Next Cal. date | Used |
|---|---|---|---|---|---|
| Ultra compact simulator | UCS500N | V1238113636 | EM TEST | 2016.02.04 | ☒ |
| CDN | CNV 508 N1 | V1108108861 | EM TEST | 2015.09.30 | ☒ |

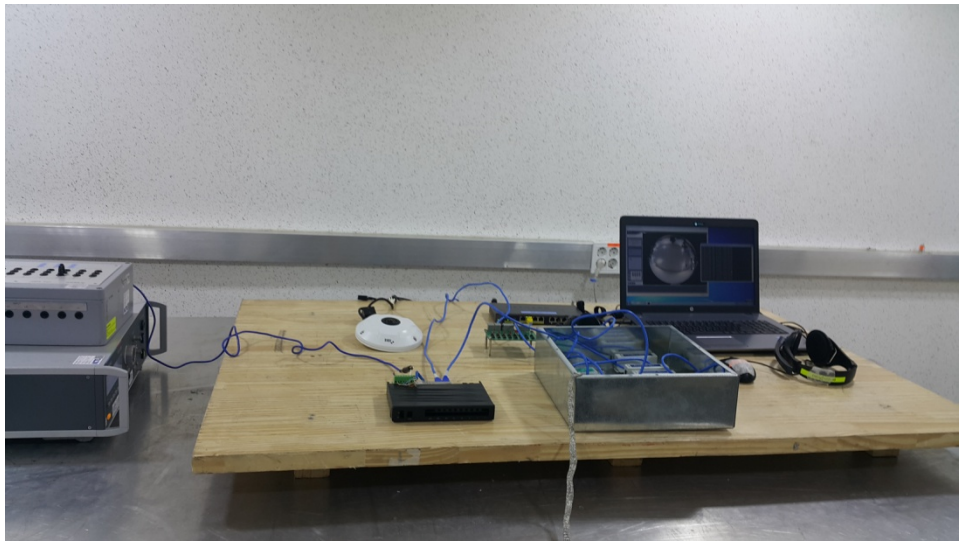
6.6.3 Photographs of test setup

#1- DC 12V





#2- PoE



6.6.4 Measurement result

* DC Line (#1- DC 12 V)

| Coupling point | (+) | (-) | Result |
|---|---|---|---|
| DC 12 V | + 0.5 kV, + 1 kV | - 0.5 kV, - 1 kV | Pass |

* Signal/Control (#1- DC 12 V, #2- PoE)

| Coupling point | (+) | (-) | Result |
|---|---|---|---|
| Alarm In/Out | + 0.5 kV, + 1 kV | - 0.5 kV, - 1 kV | Pass |
| Audio In/Out | + 0.5 kV, + 1 kV | - 0.5 kV, - 1 kV | Pass |

* Telecommunication (#1- DC 12 V, #2- PoE)

| Coupling point | (+) | (-) | Result |
|---|---|---|---|
| LAN(RJ-45) | + 0.5 kV, + 1 kV | - 0.5 kV, - 1 kV | Pass |
| LAN(PoE) | + 0.5 kV, + 1 kV | - 0.5 kV, - 1 kV | Pass |

## 6.7 Conducted Immunity

| Test specification | EN 61000-4-6:2014 | | | | |
|---|---|---|---|---|---|
| Tested frequency | 0.15 ㎒ ~ 100 ㎒ | | | | |
| Test level & Modulation | 1 Ⅴ, 3 Ⅴ, 10 Ⅴ, 80 % Amplitude Modulation (1 ㎑)<br>1 Ⅴ, 3 Ⅴ, 10 Ⅴ, Pulse Modulation (1 ㎐ (0.5 s ON: 0.5 s OFF)) | | | | |
| Frequency Step | log 1 % step | | | | |
| Dwell time | 3 s | | | | |
| Coupling method | ☒ DC 12 Ⅴ: CDN(M2)<br>☒ Signal/Control: Clamp<br>☒ Telecommunication: CDN(T8-RJ45) | | | | |
| Testing Voltage | DC 12 Ⅴ, PoE | | | | |
| Test facility | Shielded room(3F) | | | | |
| Date | 2016. 02. 25 | | | | |
| Temperature(°C) | 18.4 °C | Humidity (% R.H.) | 31.9 % R.H. | Pressure (㎪) | 102.6 ㎪ |
| Remarks | Pass<br>- There was no change of operation status during above testing. | | | | |

### 6.7.1 Measurement procedure

A ground reference plane was located on the floor.

The test was performed on a ground reference plane on a 0.1 m wooden table. This test were Performed using CDN for mains, clamp for signal and injection probe. The frequency range was swept from 0.15 ㎒ to 100 ㎒. This frequency range was Modulated with 1 ㎑ sine wave at 80 %.

The signal generators provided the modulated frequency at a 1 % step size.

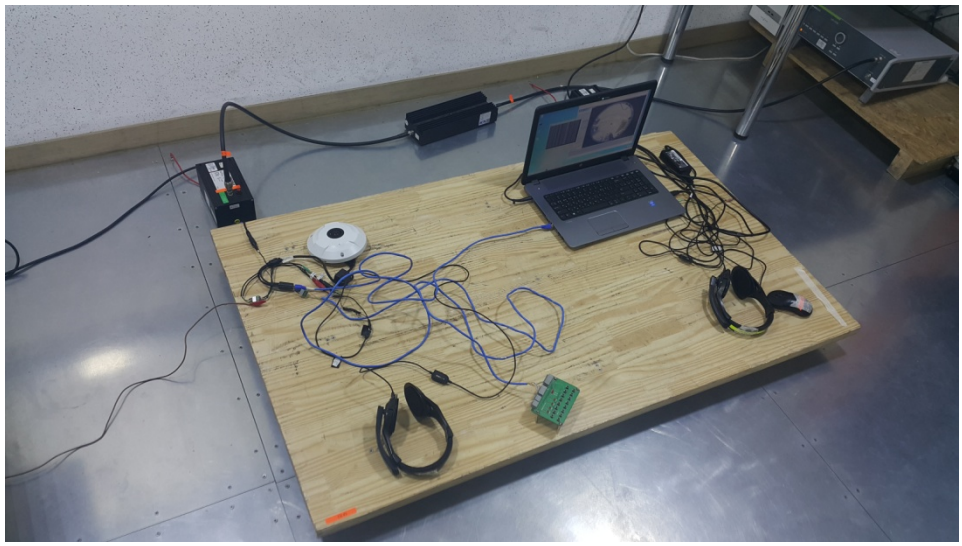
The power and all network cable, I/O cables longer than 3 m length were tested.

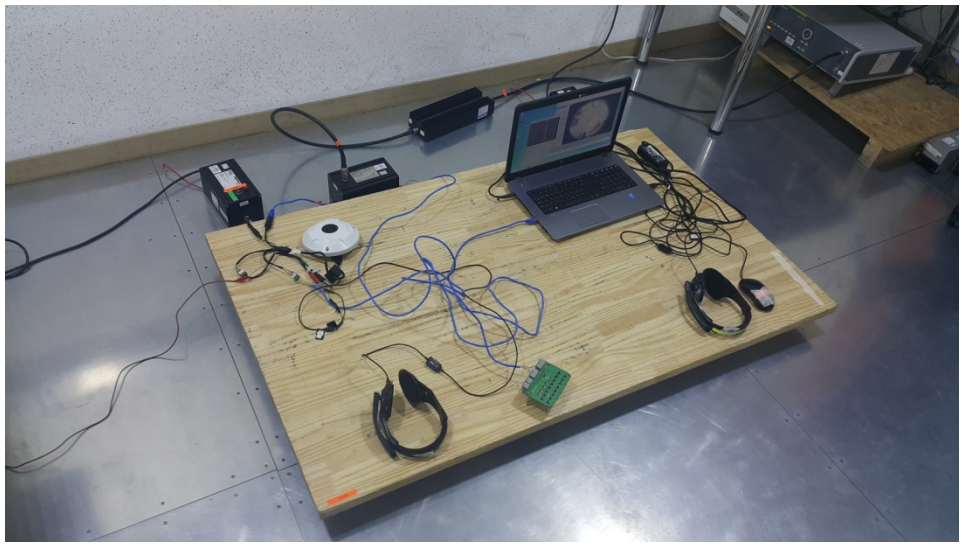
6.7.2 Used equipments

| Equipment | Model no. | Serial no. | Makers | Next Cal. date | Used |
|---|---|---|---|---|---|
| Continuous Wave Simulator | CWS500N1.4 | P1409132195 | EM TEST | 2016.05.12 | ☒ |
| CDN | CDN M2/M3 | P1402128648 | EM TEST | 2016.05.14 | ☒ |
| CDN | CDN M2/M3 | P1402128649 | EM TEST | 2016.05.14 | ☒ |
| Attenuator | ATT6/80 | P1402129094 | EM TEST | 2016.05.12 | ☒ |
| Electromagnetic Injection Clamp | EM101 | 36197 | EM TEST | 2016.05.13 | ☒ |
| CDN | CDN S1-75 | P1404129801 | EM TEST | 2016.05.14 | ☐ |
| CDN | CDN-T8-RJ45 | P1404129872 | EM TEST | 2016.05.14 | ☒ |

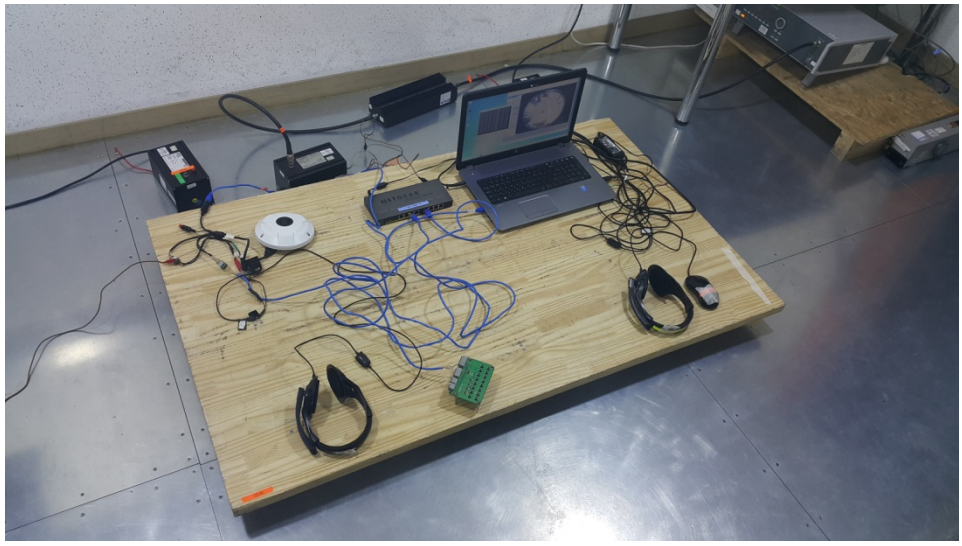
6.7.3 Photographs of test setup

#1- DC 12V





#2- PoE



6.7.4 Measurement result

* DC Line (#1-DC 12 V)

| Coupling point | Coupling method | Result |
|---|---|---|
| DC 12 V | CDN(M2) | Pass |

* Signal/Control (#1- DC 12 V, #2- PoE)

| Coupling point | Coupling method | Result |
|---|---|---|
| Alarm In/Out | Clamp | Pass |
| Audio In/Out | Clamp | Pass |

* Telecommunication (#1- DC 12 V, #2- PoE)

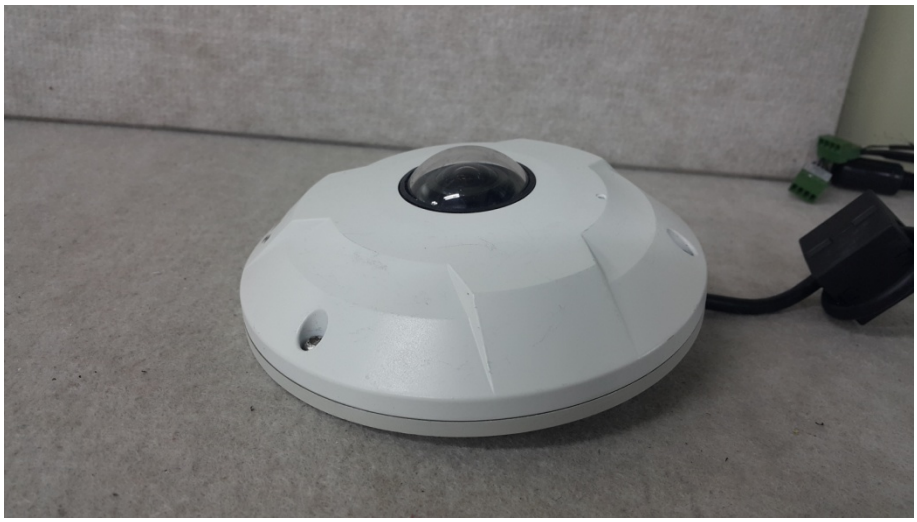
| Coupling point | Coupling method | Result |
|---|---|---|
| LAN(RJ-45) | CDN(T8-RJ45) | Pass |
| LAN(PoE) | CDN(T8-RJ45) | Pass |

# 7. E.U.T. photographs

Front View

Rear View

Left View

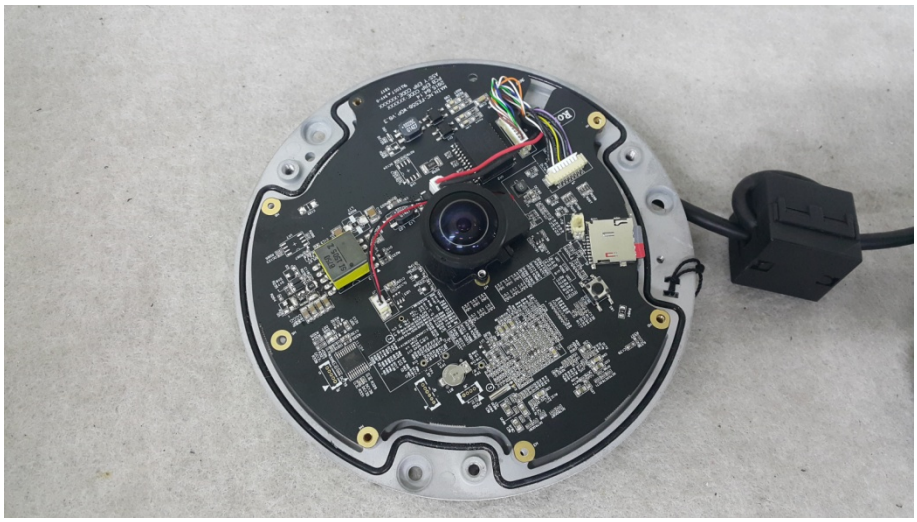


Right View

Top View

Bottom View

Inside



Main Board