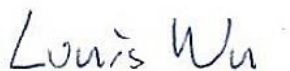


FCC Test Report

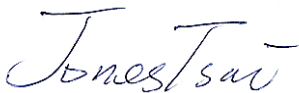
APPLICANT : Texas Instruments Incorporated
EQUIPMENT : 2.4GHz Wi-Fi® Module
BRAND NAME : Texas Instruments
MODEL NAME : CC3220MODASF12MON
CC3220MODASM2MON
CC3220MODSF12MOB
CC3220MODSM2MOB
MARKETING NAME : SimpleLink™ Wi-Fi® CC3220MOD
Wireless Microcontroller Module
FCC ID : Z64-CC3220MOD
STANDARD : FCC 47 CFR FCC Part 15 Subpart B
CLASSIFICATION : Declaration of Conformity

The product was received on Mar. 16, 2017 and testing was completed on Apr. 18, 2017. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4-2014 and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.



Reviewed by: Louis Wu / Manager



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.



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REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|------------|---------|-------------------------|---------------|
| FD731625 | Rev. 01 | Initial issue of report | Jun. 10, 2017 |
| | | | |
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SUMMARY OF TEST RESULT

| Report Section | FCC Rule | Description | Limit | Result | Remark |
|----------------|----------|-----------------------|-----------------|--------|---|
| 3.1 | 15.107 | AC Conducted Emission | < 15.107 limits | PASS | Under limit 12.20 dB at 0.150 MHz |
| 3.2 | 15.109 | Radiated Emission | < 15.109 limits | PASS | Under limit 7.74 dB at 39.720 MHz for peak |



1. General Description

1.1. Applicant

Texas Instruments Incorporated
12500 TI BLVD., Dallas Texas, 75243

1.2. Manufacturer

Texas Instruments Incorporated
12500 TI BLVD., Dallas Texas, 75243

1.3. Product Feature of Equipment Under Test

Wi-Fi 2.4GHz 802.11b/g/n.

| Antenna Information | | | | |
|---------------------|-----------------------|---------------------------------|---------------------|-------------|
| | Brand | Antenna Type | Model | 2.4GHz gain |
| 1 | FoxCon | PCB | T77H533 | 2.5dBi |
| 2 | Ethertronics | Dipole | 1000423 | -0.6dBi |
| 3 | LSR | Rubber Whip / Dipole | 001-0012 | 2dBi |
| 4 | | | 080-0013 | 2dBi |
| 5 | | | 080-0014 | 2dBi |
| 6 | | PIFA | 001-0016 | 2.5dBi |
| 7 | | | 001-0021 | 2.5dBi |
| 8 | Laird | PCB | CAF94504 | 2dBi |
| 9 | | | CAF9405 | 2dBi |
| 10 | ACX | Multilayer Chip | AT3216-BR2R7HAA | 0.5dBi |
| 11 | | | AT312-T2R4PAA | 1.5dBi |
| 12 | TDK | Multilayer Ceramic Chip Antenna | ANT016008LCD2442MA1 | 1.6dBi |
| 13 | | | ANT016008LCD2442MA2 | 2.5dBi |
| 14 | Mitsubishi Material | Chip Antenna | AM03DP-ST01 | 1.6dBi |
| 15 | | Antenna Unit | UB18CP-100ST01 | -1.0dBi |
| 16 | Taiyo Yuden | Chip Antenna / Herical Monopole | AF216M245001 | 1.5dBi |
| 17 | | Chip Antenna /Monopole Type | AH212M245001 | 1.3dBi |
| 18 | | | AH316M245001 | 1.9dBi |
| 19 | Antenna Technology | Dipole | AA2402SPU | 2.0dBi |
| 20 | | | AA2402RSPU | 2.0dBi |
| 21 | | | AA2402A-UFLLP | 2.0dBi |
| 22 | | | AA2402AU-UFLLP | 2.0dBi |
| 23 | Staf | Mono-pole | 1019-016 | 2.14dBi |
| 24 | | | 1019-017 | 2.14dBi |
| 25 | | | 1019-018 | 2.14dBi |
| 26 | | | 1019-019 | 2.14dBi |
| 27 | Map Electronics | Rubber Whip | MEIWX-2411SAXX-2400 | 2.0dBi |
| 28 | | | MEIWX-2411RSXX-2400 | 2.0dBi |
| 29 | | | MEIWX-282XSAXX-2400 | 2.0dBi |
| 30 | | | MEIWX-282XRSXX-2400 | 2.0dBi |
| 31 | | | MEIWF-HP01RS2X-2400 | 2.0dBi |
| 32 | Yageo | Chip | ANT3216A063R2400A | 1.69dBi |
| 33 | Mag Layers Scientific | Chip | LTA-3216-2G4S3-A1 | 1dBi |
| 34 | | | LTA-3216-2G4S3-A3 | 2dBi |
| 35 | Advantech | Rubber Whip / Dipole | AN2450-5706RS | 2.38dBi |

Note: the EUT used a 2.4GHz Chip antenna (Antenna 18 from Taiyo Yuden)

1.4. Modification of EUT

No modifications are made to the EUT during all test items.

1.5. Test Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

| | | |
|--------------------|--|-----------|
| Test Site | SPORTON INTERNATIONAL INC. | |
| Test Site Location | No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978 | |
| Test Site No. | Sporton Site No. | |
| | CO05-HY | 03CH06-HY |

1.6. Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 47 CFR FCC Part 15 Subpart B
- ANSI C63.4-2014

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2. Test Configuration of Equipment Under Test

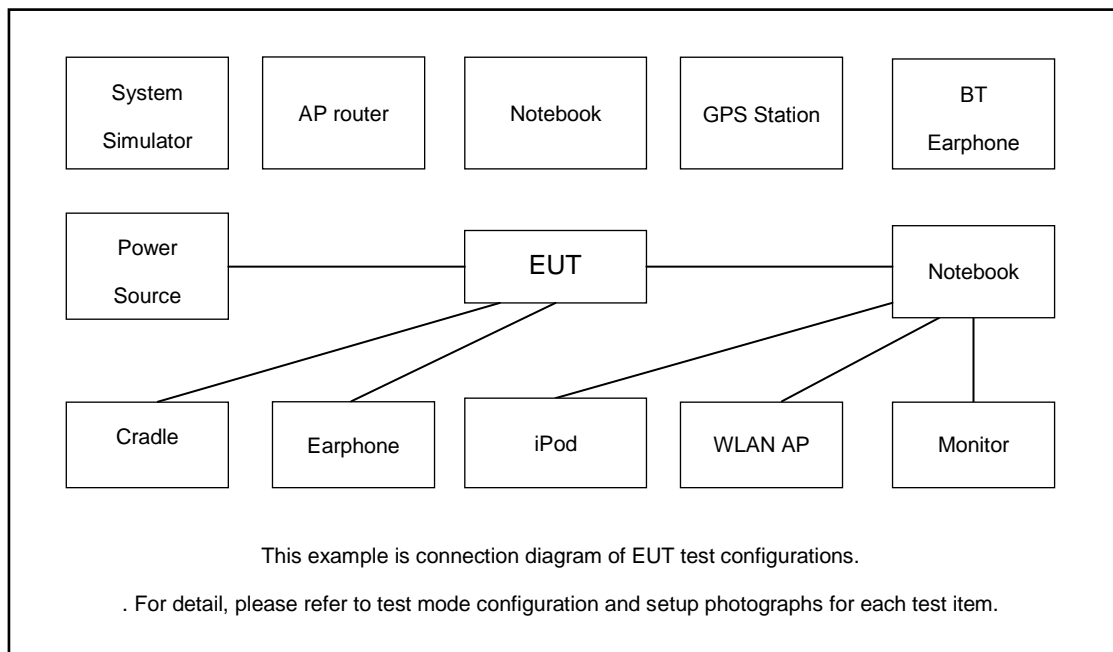
2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

| Test Items | Function Type |
|-----------------------|-------------------|
| AC Conducted Emission | Mode 1: WLAN Idle |
| Radiated Emissions | Mode 1: WLAN Idle |

2.2. Connection Diagram of Test System



2.3. Support Unit used in test configuration and system

| Item | Equipment | Trade Name | Model Name | FCC ID | Data Cable | Power Cord |
|------|-----------|------------|----------------|--|-------------------|--|
| 1. | WLAN AP | ASUS | RT-AC66U | MSQ-RTAC66U | N/A | Unshielded, 1.8 m |
| 2. | Notebook | DELL | Latitude E3340 | FCC DoC/ Contains FCC ID: PD97260NGU | N/A | AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m |
| 3. | iPod | Apple | A1199 | FCC DoC | Unshielded, 1.2 m | N/A |

2.4. EUT Operation Test Setup

The EUT was synchronized to the BCCH, and is in continuous receiving mode by setting system simulator's paging reorganization.

At the same time, the EUT was attached to the WLAN AP.

3. Test Result

3.1. Test of AC Conducted Emission Measurement

3.1.1 Limits of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

| Frequency of emission (MHz) | Conducted limit (dBuV) | |
|--------------------------------|------------------------|-----------|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

*Decreases with the logarithm of the frequency.

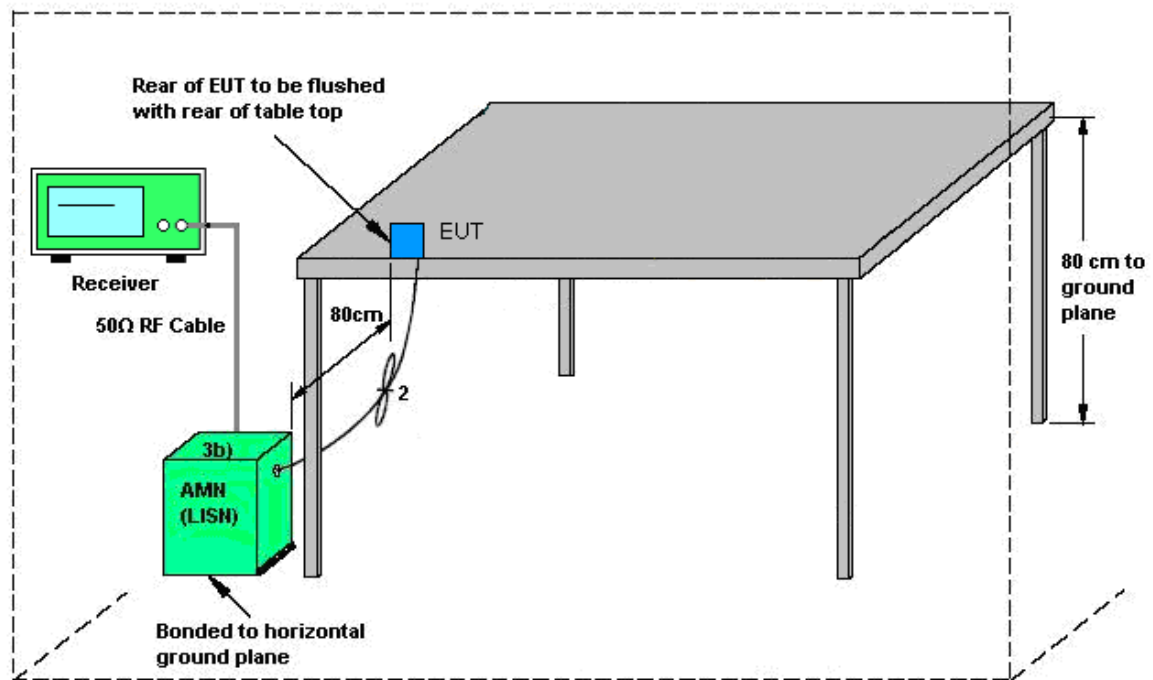
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedure

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

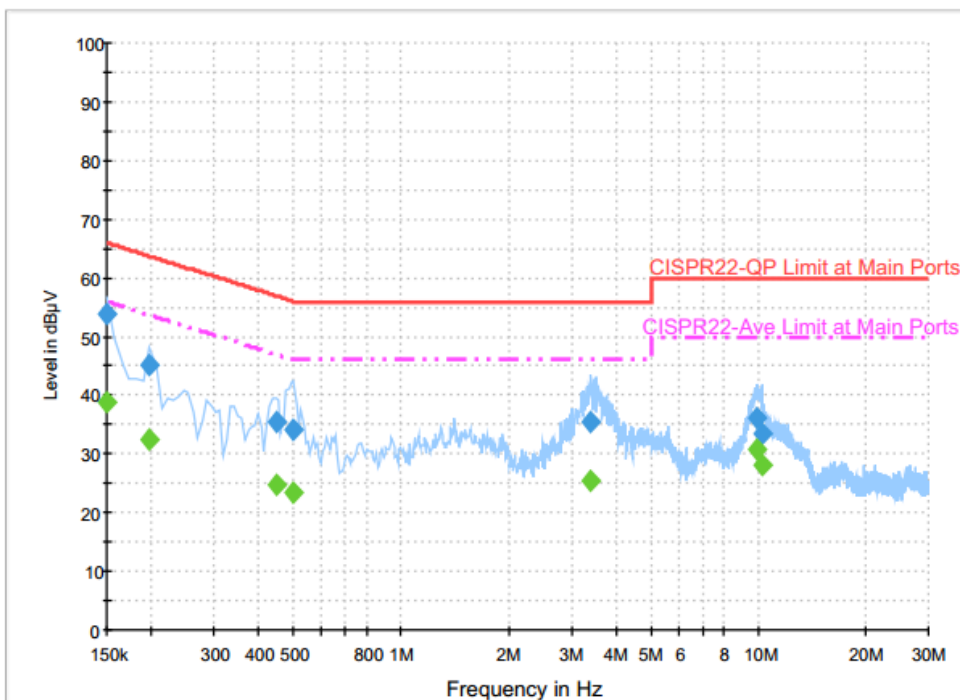
3.1.4 Test Setup



AMN = Artificial mains network (LISN)
 AE = Associated equipment
 EUT = Equipment under test
 ISN = Impedance stabilization network

3.1.5 Test Result of AC Conducted Emission

| | | | |
|------------------------|---------------|----------------------------|---------|
| Test Engineer : | Eric Jeng | Temperature : | 23~25°C |
| | | Relative Humidity : | 52~56% |
| Test Voltage : | 120Vac / 60Hz | Phase : | Line |



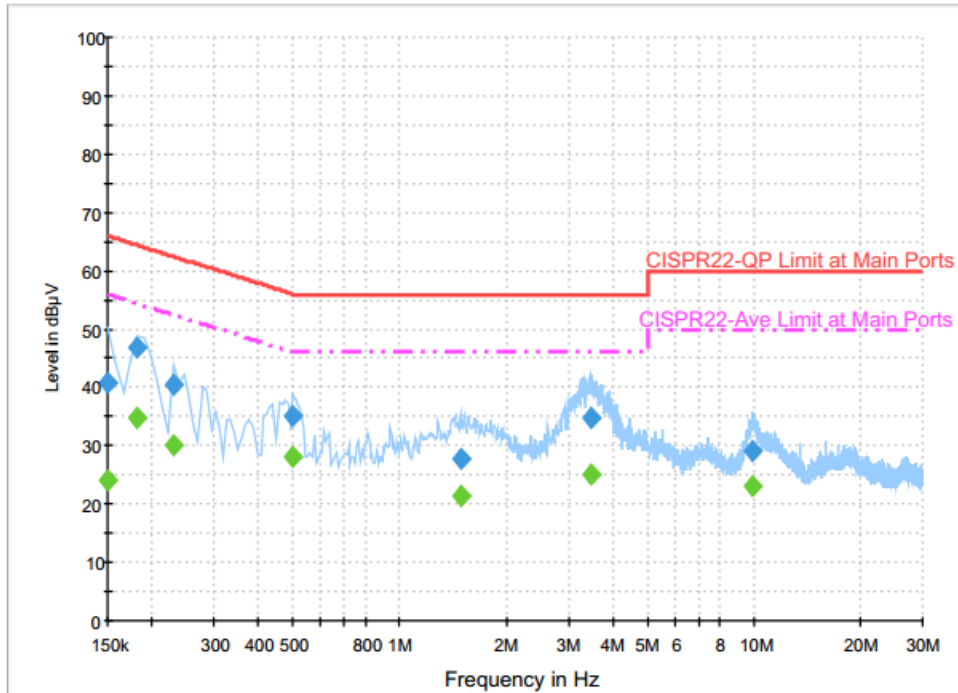
Final Result : Quasi-Peak

| Frequency (MHz) | Quasi-Peak (dBμV) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|-------------------|--------|------|------------|-------------|--------------|
| 0.150000 | 53.8 | Off | L1 | 19.6 | 12.2 | 66.0 |
| 0.198000 | 45.3 | Off | L1 | 19.5 | 18.4 | 63.7 |
| 0.446000 | 35.3 | Off | L1 | 19.5 | 21.6 | 56.9 |
| 0.502000 | 34.0 | Off | L1 | 19.5 | 22.0 | 56.0 |
| 3.414000 | 35.4 | Off | L1 | 19.5 | 20.6 | 56.0 |
| 9.878000 | 36.0 | Off | L1 | 19.7 | 24.0 | 60.0 |
| 10.286000 | 33.5 | Off | L1 | 19.7 | 26.5 | 60.0 |

Final Result : Average

| Frequency (MHz) | Average (dBμV) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|--------|------|------------|-------------|--------------|
| 0.150000 | 38.9 | Off | L1 | 19.6 | 17.1 | 56.0 |
| 0.198000 | 32.4 | Off | L1 | 19.5 | 21.3 | 53.7 |
| 0.446000 | 24.9 | Off | L1 | 19.5 | 22.0 | 46.9 |
| 0.502000 | 23.4 | Off | L1 | 19.5 | 22.6 | 46.0 |
| 3.414000 | 25.4 | Off | L1 | 19.5 | 20.6 | 46.0 |
| 9.878000 | 30.8 | Off | L1 | 19.7 | 19.2 | 50.0 |
| 10.286000 | 28.2 | Off | L1 | 19.7 | 21.8 | 50.0 |

| | | | |
|------------------------|---------------|----------------------------|---------|
| Test Engineer : | Eric Jeng | Temperature : | 23~25°C |
| | | Relative Humidity : | 52~56% |
| Test Voltage : | 120Vac / 60Hz | Phase : | Neutral |


Final Result : Quasi-Peak

| Frequency (MHz) | Quasi-Peak (dBµV) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|-----------------|-------------------|--------|------|------------|-------------|--------------|
| 0.150000 | 40.9 | Off | N | 19.5 | 25.1 | 66.0 |
| 0.182000 | 46.8 | Off | N | 19.5 | 17.6 | 64.4 |
| 0.230000 | 40.4 | Off | N | 19.5 | 22.0 | 62.4 |
| 0.502000 | 35.3 | Off | N | 19.5 | 20.7 | 56.0 |
| 1.486000 | 27.7 | Off | N | 19.5 | 28.3 | 56.0 |
| 3.470000 | 34.9 | Off | N | 19.5 | 21.1 | 56.0 |
| 9.934000 | 29.1 | Off | N | 19.7 | 30.9 | 60.0 |

Final Result : Average

| Frequency (MHz) | Average (dBµV) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|-----------------|----------------|--------|------|------------|-------------|--------------|
| 0.150000 | 23.9 | Off | N | 19.5 | 32.1 | 56.0 |
| 0.182000 | 34.9 | Off | N | 19.5 | 19.5 | 54.4 |
| 0.230000 | 30.0 | Off | N | 19.5 | 22.4 | 52.4 |
| 0.502000 | 28.1 | Off | N | 19.5 | 17.9 | 46.0 |
| 1.486000 | 21.3 | Off | N | 19.5 | 24.7 | 46.0 |
| 3.470000 | 25.2 | Off | N | 19.5 | 20.8 | 46.0 |
| 9.934000 | 23.1 | Off | N | 19.7 | 26.9 | 50.0 |

3.2. Test of Radiated Emission Measurement

3.2.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|--------------------|--------------------------------------|----------------------------------|
| 30 – 88 | 100 | 3 |
| 88 – 216 | 150 | 3 |
| 216 - 960 | 200 | 3 |
| Above 960 | 500 | 3 |

3.2.2. Measuring Instruments

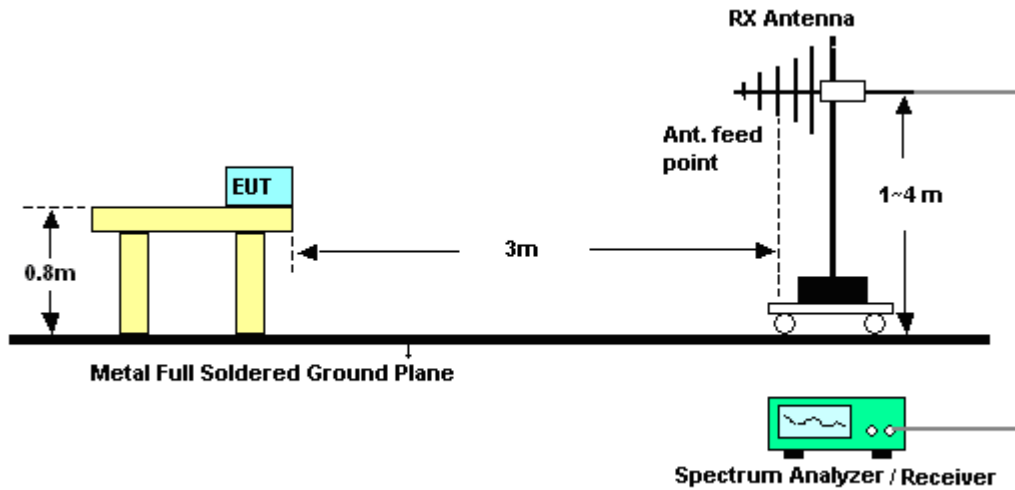
The measuring equipment is listed in the section 4 of this test report.

3.2.3. Test Procedures

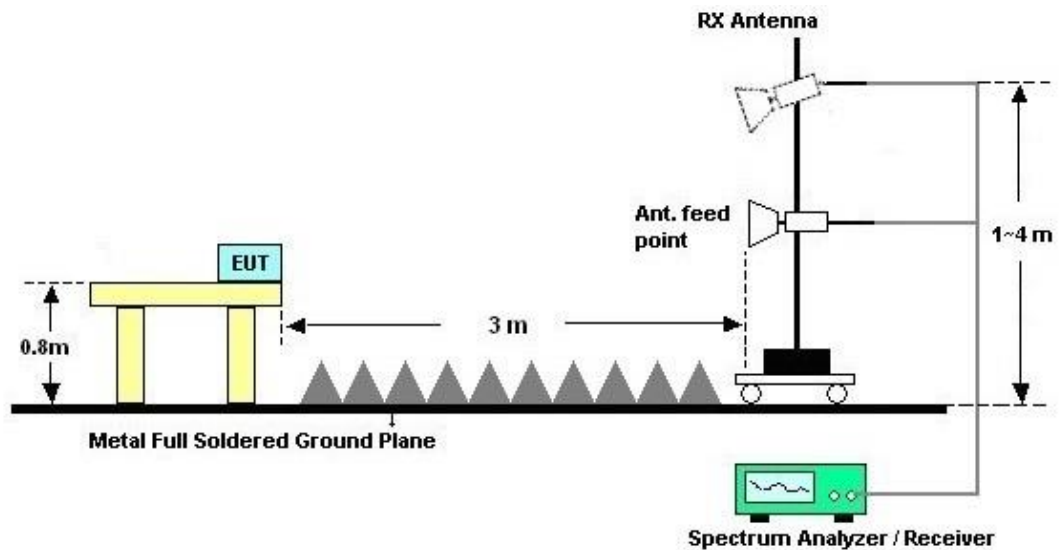
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dBμV/m) = 20 log Emission level (μV/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

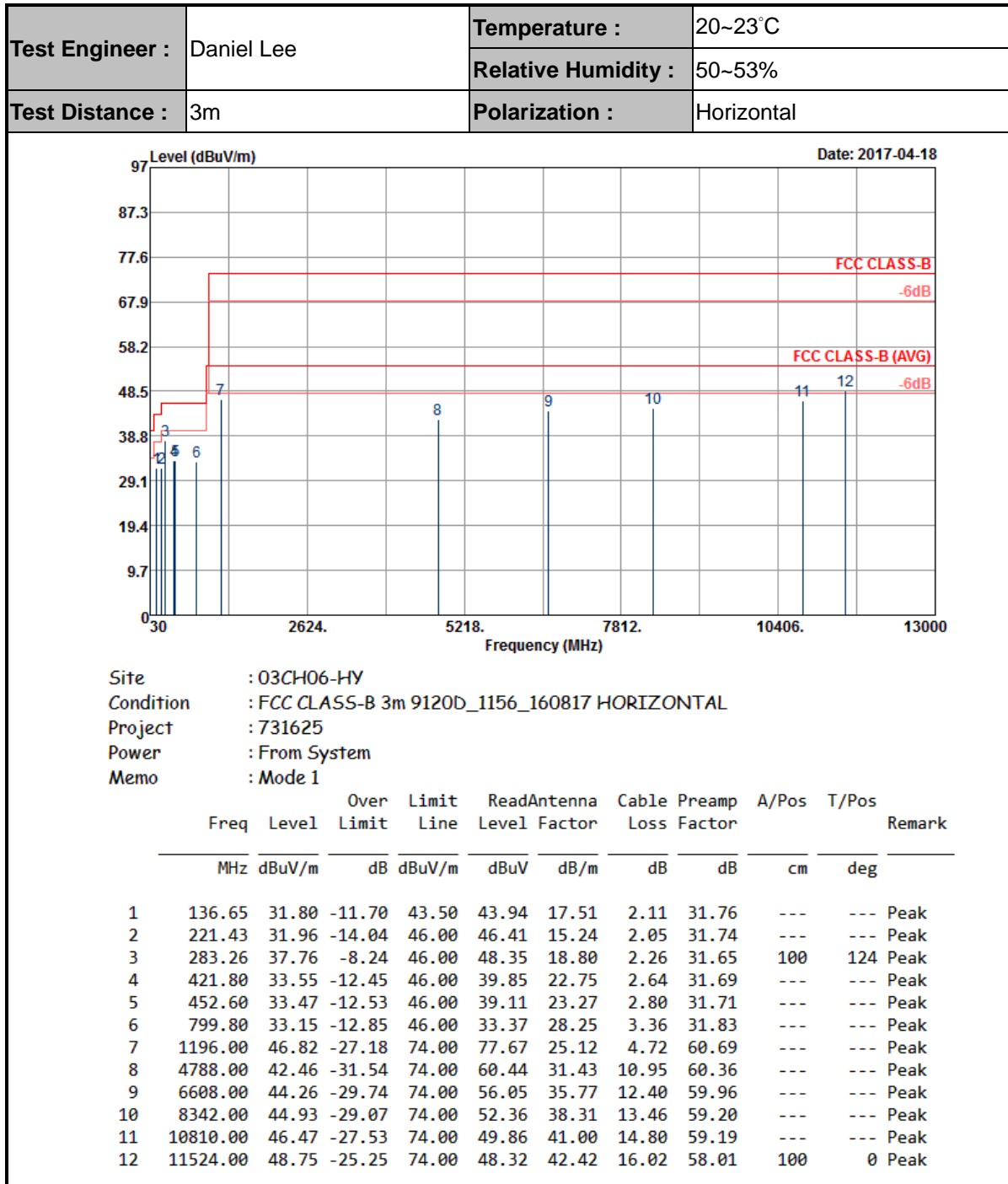
3.2.4. Test Setup of Radiated Emission

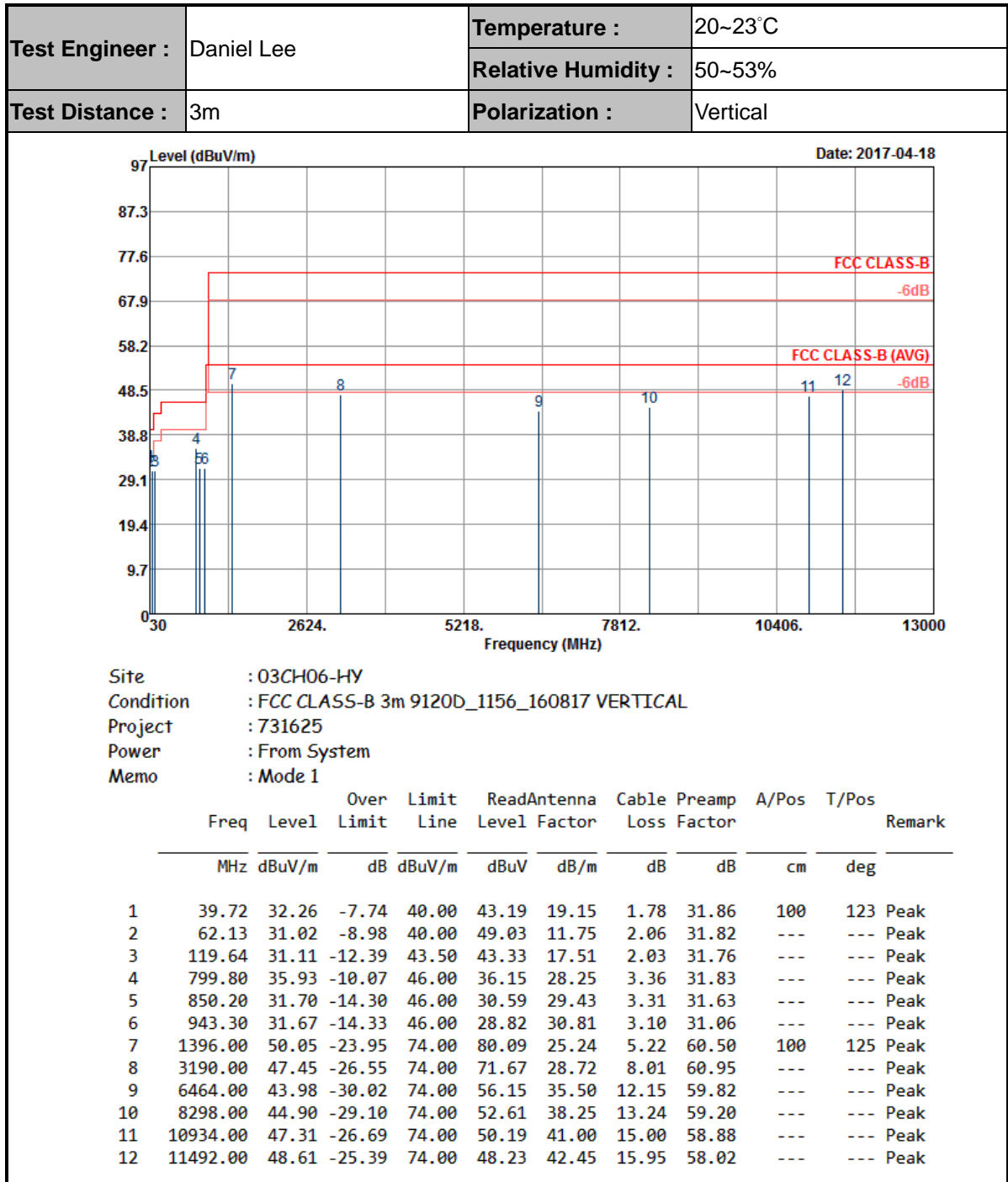
For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.2.5. Test Result of Radiated Emission






4. List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|-------------------|-----------------|----------------------------|---------------|-----------------|------------------|---------------|---------------|-----------------------|
| AC Power Source | ChainTek | APC-1000W | N/A | N/A | N/A | Apr. 18, 2017 | N/A | Conduction (CO05-HY) |
| EMI Test Receiver | Rohde & Schwarz | ESCI 7 | 100724 | 9kHz~7GHz | Aug. 30, 2016 | Apr. 18, 2017 | Aug. 29, 2017 | Conduction (CO05-HY) |
| LISN | Rohde & Schwarz | ENV216 | 100080 | 9kHz~30MHz | Nov. 29, 2016 | Apr. 18, 2017 | Nov. 28, 2017 | Conduction (CO05-HY) |
| LISN | Rohde & Schwarz | ENV216 | 100081 | 9kHz~30MHz | Dec. 06, 2016 | Apr. 18, 2017 | Dec. 05, 2017 | Conduction (CO05-HY) |
| Bilog Antenna | Schaffner | CBL6111C&N-6-06 | 2725&AT-N0601 | 30MHz~1GHz | Oct. 15, 2016 | Apr. 18, 2017 | Oct. 14, 2017 | Radiation (03CH06-HY) |
| EMI Test Receiver | Rohde & Schwarz | ESU26 | 100472 | 20Hz~26.5GHz | Dec. 29, 2016 | Apr. 18, 2017 | Dec. 28, 2017 | Radiation (03CH06-HY) |
| Horn Antenna | SCHWARZBECK | BBHA 9120 D | 9120D-1156 | 1GHz~18GHz | Aug. 05, 2016 | Apr. 18, 2017 | Aug. 04, 2017 | Radiation (03CH06-HY) |
| Preamplifier | MITEQ | AMF-7D-0010 1800-30-10P | 1850117 | 1GHz ~ 18GHz | Jun. 22, 2016 | Apr. 18, 2017 | Jun. 21, 2017 | Radiation (03CH06-HY) |
| Antenna Mast | MF | MF-7802 | MF780208212 | 1m~4m | N/A | Apr. 18, 2017 | N/A | Radiation (03CH06-HY) |
| Turn Table | INN-CO | DS2000 | 420/650/00 | 0-360 degree | N/A | Apr. 18, 2017 | N/A | Radiation (03CH06-HY) |
| Amplifier | SONOMA | 310N | 187231 | 9kHz~1GHz | Jan. 09, 2017 | Apr. 18, 2017 | Jan. 08, 2018 | Radiation (03CH06-HY) |

5. Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

| | |
|--|-----|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 2.7 |
|--|-----|

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

| | |
|--|-----|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 3.9 |
|--|-----|

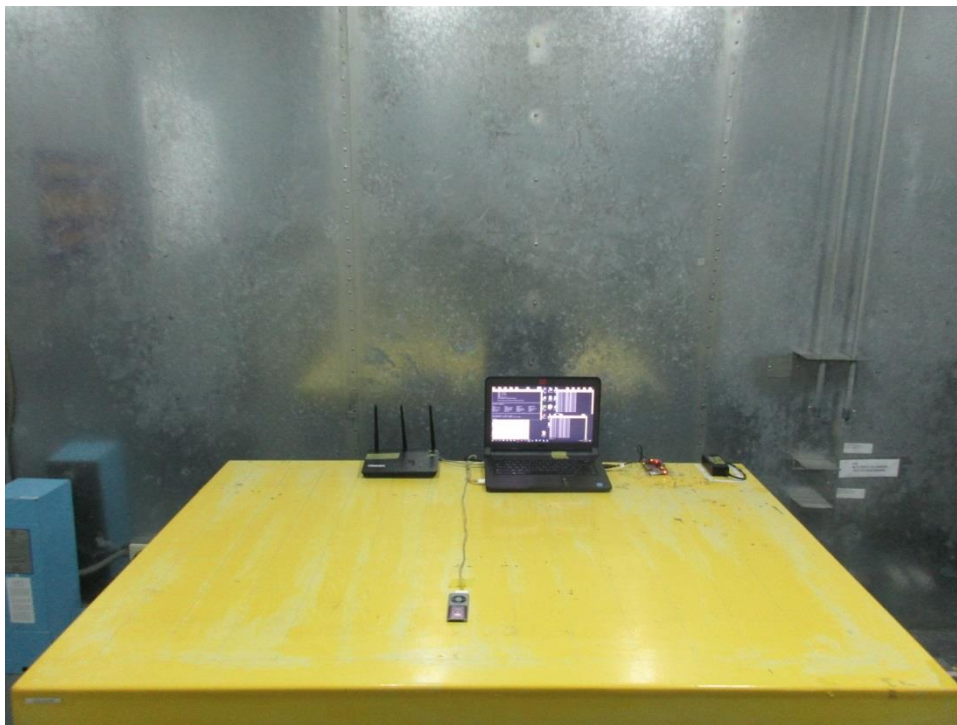
Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

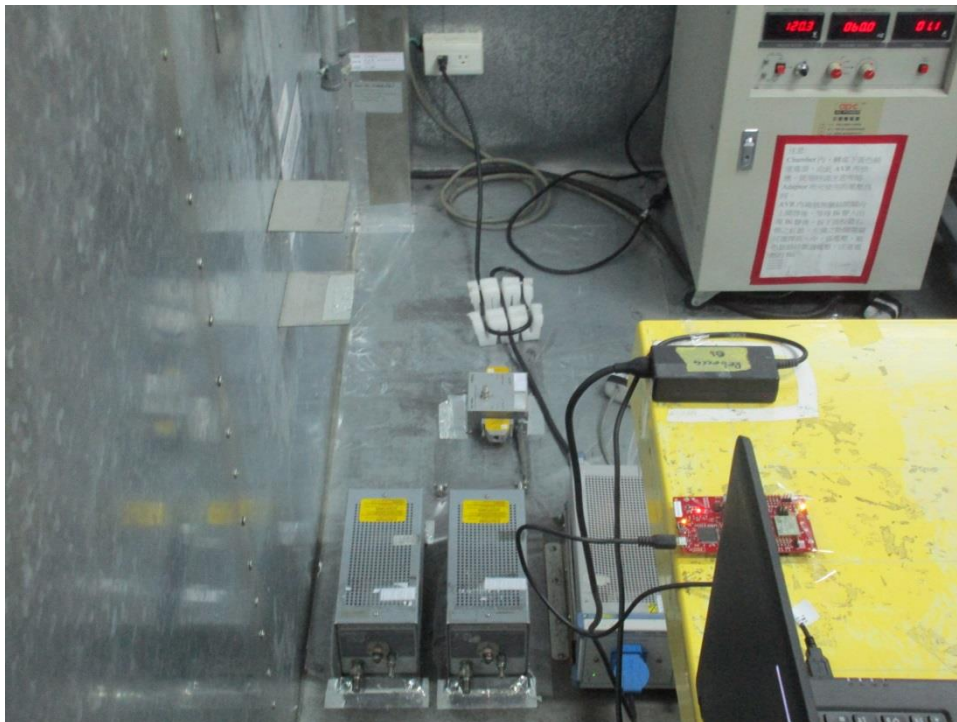
| | |
|--|-----|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 4.7 |
|--|-----|

Appendix A. Setup Photographs

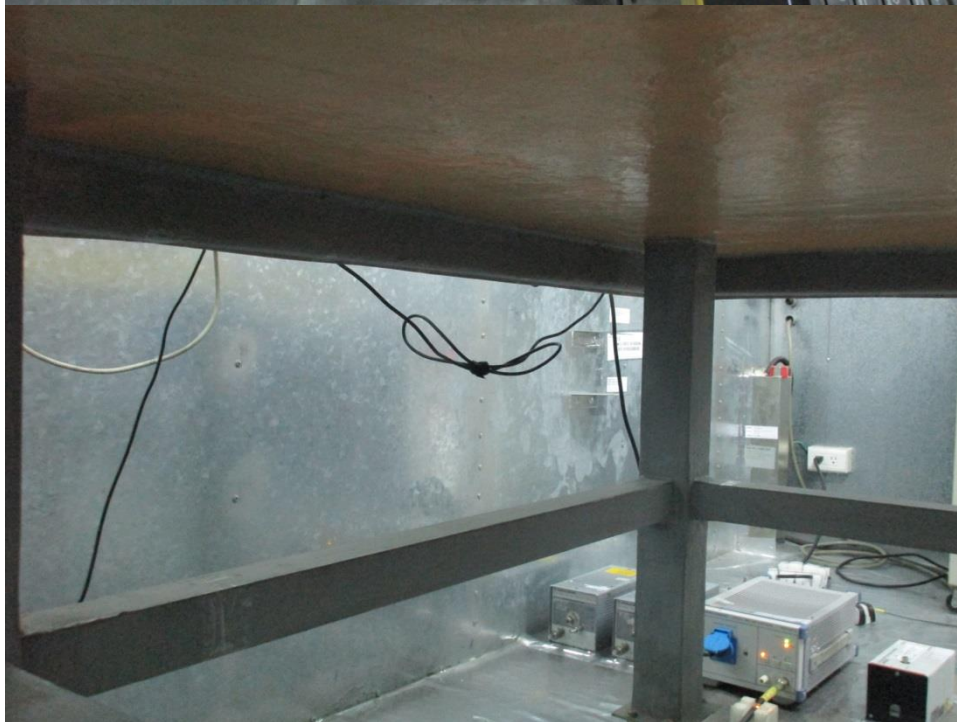
<Conducted Emission>

Remote View





Rear View



<Radiated Emission>

LF



HF

