



FCC RADIO TEST REPORT

FCC ID : PU5-TP00139AS
Equipment : Notebook Computer
Brand Name : Lenovo
Model Name : TP00139A
Applicant : Wistron Corporation
21F, No. 88, Sec. 1, Hsin Tai Wu Rd., Hsichih Dist,
New Taipei City 221, Taiwan
Manufacturer : Lenovo PC HK Limited.
23/F, Lincoln House, Taikoo Place, 979 King's Road,
Quarry Bay, Hong Kong, China
Standard : FCC 47 CFR Part 2, 27

Equipment: Foxconn T99W175 tested inside of Lenovo Notebook Computer.

The product was received on Dec. 29, 2021 and testing was performed from Jan. 06, 2022 to Feb. 09, 2022. We, Sporton International Inc. Wensan Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.

The test results in this partial report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Wensan Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. Wensan Laboratory



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History of this test report

| Report No. | Version | Description | Issued Date |
|--------------|---------|-------------------------|---------------|
| FG1D1645-01G | 01 | Initial issue of report | Mar. 15, 2022 |
| FG1D1645-01G | 02 | Remove 5G NR n78 data | Mar. 21, 2022 |
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Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|---------------|--------------------------|--|--------------------|---|
| 3.2 | §2.1046 | Conducted Output Power | Reporting only | - |
| | §27.50 (j)(3) | Equivalent Isotropic Radiated Power (n77) | Pass | |
| - | §27.50 (j)(4) | Peak-to-Average Ratio | - | See Note |
| - | §2.1049 | Occupied Bandwidth | - | See Note |
| - | §2.1051 §27.53 (l)(2) | Conducted Band Edge Measurement (n77) | - | See Note |
| - | §2.1051 §27.53 (l)(2) | Conducted Spurious Emission (n77) | - | See Note |
| - | §2.1055 §27.54 | Frequency Stability Temperature & Voltage | - | See Note |
| 4.2 | §2.1051 §27.53 (l)(2) | Radiated Spurious Emission (n77) | Pass | Under limit 21.57 dB at 15846.000 MHz |

Note: The module (Model: T99W175) makes no difference after verifying output power, this report reuses test data from the module report.

Declaration of Conformity:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
2. The measurement uncertainty please refer to this report "Uncertainty of Evaluation".

Comments and Explanations:

The product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Sheng Kuo

Report Producer: Tina Chuang

1 General Description

1.1 Product Feature of Equipment Under Test

| Product Feature | |
|---------------------------------|--|
| Equipment | Notebook Computer |
| Brand Name | Lenovo |
| Model Name | TP00139A |
| FCC ID | PU5-TP00139AS |
| Sample 1 | EUT with AWAN Antenna |
| Sample 2 | EUT with LUXSHARE-ICT Antenna |
| EUT supports Radios application | WCDMA/HSPA/LTE/5G NR/GNSS WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT80/VHT160 WLAN 11ax HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE |
| EUT Stage | Production Unit |

Remark:

1. The above EUT's information was declared by manufacturer.
2. Equipment: Foxconn T99W175 tested inside of Lenovo Notebook Computer.

| WWAN Antenna Information | | | | |
|--------------------------|--------------|--------------|-----------------|-------------------|
| Main Antenna | Manufacturer | AWAN | Peak gain (dBi) | 5G NR n77 : 2.55 |
| | Part number | SA30Y56103AA | Type | PIFA |
| | Manufacturer | LUXSHARE-ICT | Peak gain (dBi) | 5G NR n77 : -1.30 |
| | Part number | SA30Y56102AA | Type | PIFA |
| MIMO 2 Antenna | Manufacturer | AWAN | Peak gain (dBi) | 5G NR n77 : 2.94 |
| | Part number | SA30Y56105AA | Type | PIFA |
| | Manufacturer | LUXSHARE-ICT | Peak gain (dBi) | 5G NR n77 : 0.30 |
| | Part number | SA30Y56104AA | Type | PIFA |

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.
2. The output power measurement was performed with "LUXSHARE-ICT Antenna"

1.2 Product Specification of Equipment Under Test

| Product Specification is subject to this standard | |
|---|---|
| Tx/Rx Frequency | 5G NR n77: 3705 MHz ~ 3975 MHz |
| Bandwidth | 20MHz/40MHz/50MHz/60MHz/80MHz/90MHz/100MHz |
| Maximum Output Power to Antenna | 5G NR n77: 26.13 dBm |
| Type of Modulation | CP-OFDM: QPSK/16QAM/64QAM/256QAM DFT-s-OFDM: PI/2 BPSK/QPSK/16QAM/64QAM/256QAM |

Remark: The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.



1.3 Modification of EUT

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

1.4 Testing Location

| | |
|--------------------|--|
| Test Site | Sporton International Inc. EMC & Wireless Communications Laboratory |
| Test Site Location | No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333 |
| Test Site No. | Sporton Site No. |
| | TH03-HY (TAF Code: 1190) |
| Test Engineer | Sherry Wu |
| Temperature | 20.1~23.5°C |
| Relative Humidity | 39.9~60.9% |
| Remark | The Conducted test item subcontracted to Sporton International Inc. EMC & Wireless Communications Laboratory |

| | |
|--------------------|--|
| Test Site | Sporton International Inc. Wensan Laboratory |
| Test Site Location | No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010 |
| Test Site No. | Sporton Site No. |
| | 03CH12-HY |
| Test Engineer | Jack Cheng, Lance Chiang, and Chuan Chu |
| Temperature | 21.6~26.2°C |
| Relative Humidity | 56~68% |

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No.: TW1190 and TW3786

1.5 Applicable Standards

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

- ♦ ANSI C63.26-2015
- ♦ ANSI / TIA-603-E
- ♦ FCC 47 CFR Part 2, 27
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01.

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The TAF code is not including all the FCC KDB listed without accreditation.

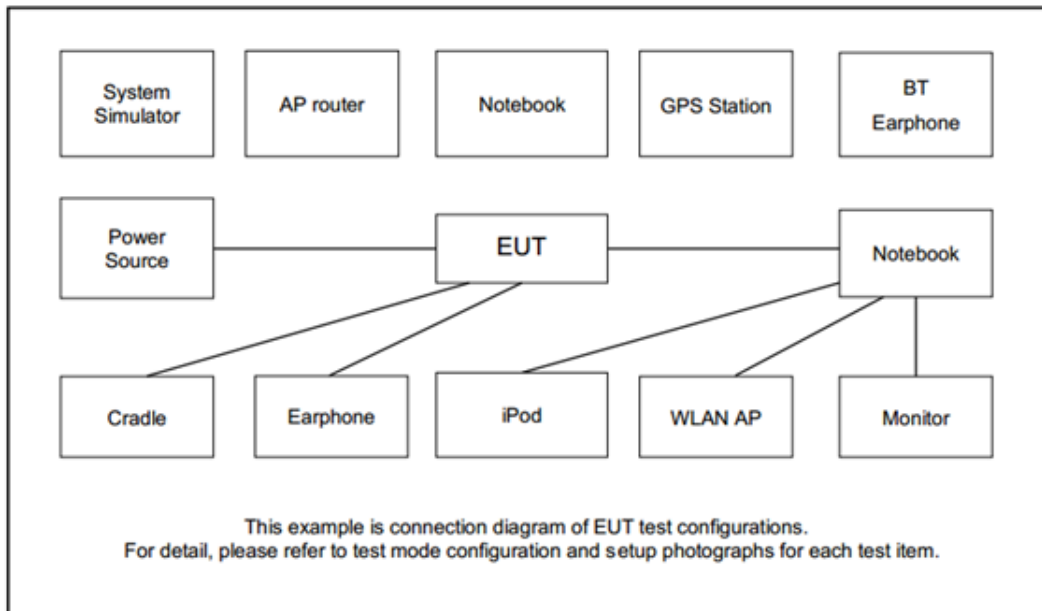
2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

| Test Items | NR Band | Bandwidth (MHz) | | | | | | | | | | | | Modulation | | | | | RB # | | | Test Channel | | |
|----------------------------|--|-----------------|----|----|----|----|----|----|----|----|----|----|-----|------------|------|-------|-------|--------|------------|------|------|--------------|---|---|
| | | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 80 | 90 | 100 | PI/2 BPSK | QPSK | 16QAM | 64QAM | 256QAM | 1 | Half | Full | L | M | H |
| Max. Output Power | n77 | - | - | - | v | - | - | v | v | v | v | v | v | v | v | v | v | v | v | v | v | v | v | v |
| E.I.R.P | n77 | - | - | - | v | - | - | v | v | v | v | v | v | v | v | v | v | v | Max. Power | | | | | |
| Radiated Spurious Emission | n77 | - | - | - | v | - | - | | | | | | | v | | | | | v | | | v | v | v |
| Remark | <ol style="list-style-type: none"> The mark "v" means that this configuration is chosen for testing The mark "-" means that this bandwidth is not supported. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported. Test combination are EN-DC 66A_n77A. For radiated measurement, pre-scanned in two modes, DFT-s OFDM and CP OFDM. The worst cases (DFT-s OFDM) were recorded in this report, and the worst modes of FR1 and LTE for simultaneous transmission were verified and compliant. All the radiated test cases were performed with Battery1. | | | | | | | | | | | | | | | | | | | | | | | |

2.2 Connection Diagram of Test System





2.3 Support Unit used in test configuration and system

| Item | Equipment | Brand Name | Model No. | FCC ID | Data Cable | Power Cord |
|------|------------------|------------|-----------|--------------|-------------------|-------------------|
| 1. | System Simulator | Anritsu | MT8820C | N/A | N/A | Unshielded, 1.8 m |
| 2. | System Simulator | Anritsu | MT8821C | N/A | N/A | Unshielded, 1.8 m |
| 3. | iPod Earphone | Apple | N/A | Verification | Unshielded, 1.0 m | N/A |

2.4 Frequency List of Low/Middle/High Channels

| 5G NR Band n77 Channel and Frequency List | | | | |
|---|------------------------|---------|--------|---------|
| BW [MHz] | Channel/Frequency(MHz) | Lowest | Middle | Highest |
| 100 | Channel | 650000 | 656000 | 662000 |
| | Frequency | 3750 | 3840 | 3930 |
| 80 | Channel | 649334 | 656000 | 662666 |
| | Frequency | 3740.01 | 3840 | 3939.99 |
| 60 | Channel | 648668 | 656000 | 663332 |
| | Frequency | 3730.02 | 3840 | 3949.98 |
| 50 | Channel | 648334 | 656000 | 663666 |
| | Frequency | 3725.01 | 3840 | 3954.99 |
| 40 | Channel | 648000 | 656000 | 664000 |
| | Frequency | 3720 | 3840 | 3960 |
| 20 | Channel | 647334 | 656000 | 664666 |
| | Frequency | 3710.01 | 3840 | 3969.99 |

3 Conducted Test Items

3.1 Measuring Instruments

See list of measuring instruments of this test report.

3.1.1 Test Setup

3.1.2 Conducted Output Power



3.1.3 Test Result of Conducted Test

Please refer to Appendix A.



3.2 Conducted Output Power and EIRP

3.2.1 Description of the Conducted Output Power Measurement and EIRP Measurement

A system simulator was used to establish communication with the EUT. Its parameters were set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The EIRP of mobile transmitters must not exceed 1 Watts for 5G NR n77

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$, $ERP = EIRP - 2.15$, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.2.2 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through the system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.

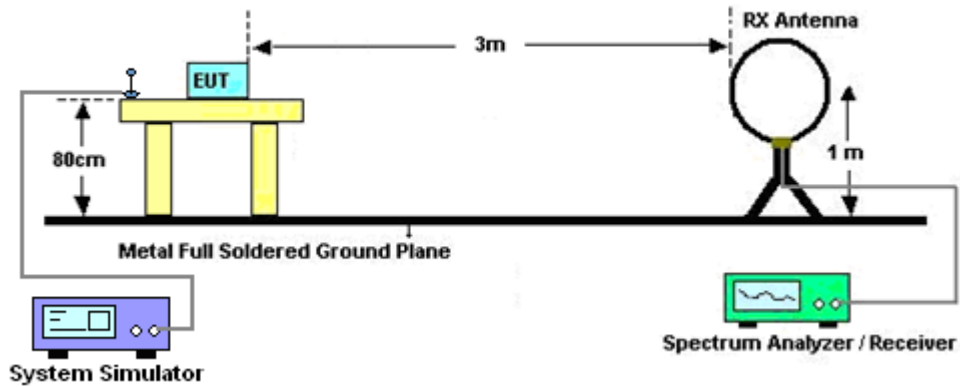
4 Radiated Test Items

4.1 Measuring Instruments

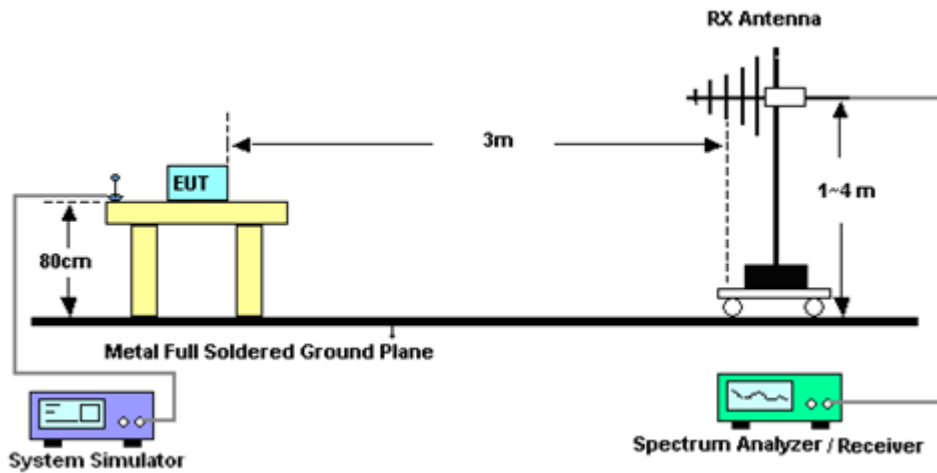
See list of measuring instruments of this test report.

4.1.1 Test Setup

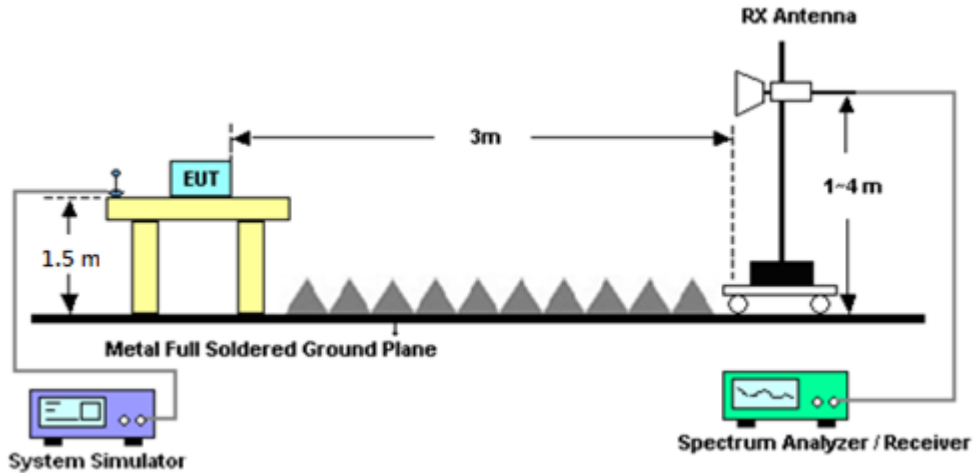
For radiated emissions below 30MHz



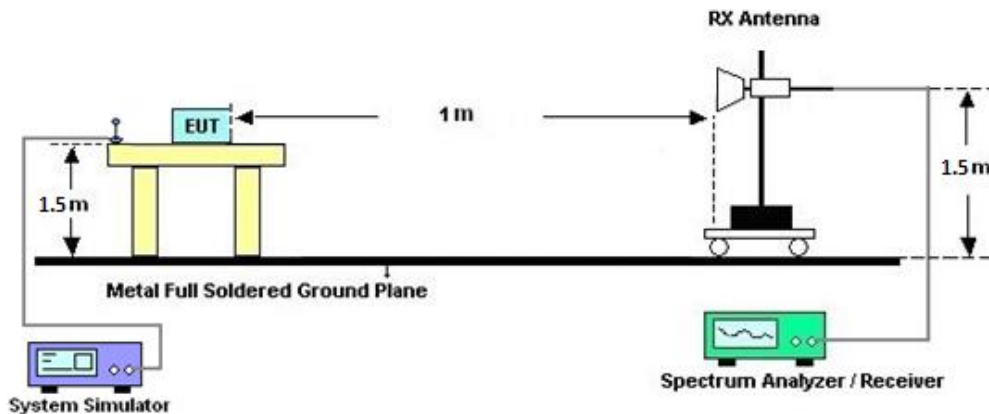
For radiated test from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



4.1.2 Test Result of Radiated Test

Please refer to Appendix B.

Note:

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.



4.2 Radiated Spurious Emission Measurement

4.2.1 Description of Radiated Spurious Emission Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB.

4.2.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 7 and ANSI / TIA-603-E Section 2.2.12.

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.



5 List of Measuring Equipment

| Instrument | Brand Name | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---------------------------|----------------------------|-------------------------------------|---------------------|----------------------------------|------------------|---------------------------------|---------------|--------------------------|
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 100488 | 9 kHz~30 MHz | Sep. 07, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | Sep. 06, 2022 | Radiation (03CH12-HY) |
| Bilog Antenna | TESEQ | CBL 6111D & 00800N1D01N -06 | 37059 & 01 | 30MHz~1GHz | Oct. 09, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | Oct. 08, 2022 | Radiation (03CH12-HY) |
| Bilog Antenna | TESEQ | CBL 6111D & N-6-06 | 35414 & AT-N0602 | 30MHz~1GHz | Oct. 09, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | Oct. 08, 2022 | Radiation (03CH12-HY) |
| Horn Antenna | SCHWARZBE CK | BBHA 9120 D | 9120D-1326 | 1GHz~18GHz | Oct. 25, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | Oct. 24, 2022 | Radiation (03CH12-HY) |
| Horn Antenna | SCHWARZBE CK | BBHA 9120 D | 9120D-1212 | 1GHz~18GHz | May 18, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | May 17, 2022 | Radiation (03CH12-HY) |
| SHF-EHF Horn Antenna | SCHWARZBE CK | BBHA 9170 | BBHA91702 51 | 18GHz~40GHz | Nov. 30, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | Nov. 29, 2022 | Radiation (03CH12-HY) |
| SHF-EHF Horn Antenna | SCHWARZBE CK | BBHA 9170 | BBHA91705 76 | 18GHz~40GHz | May 21, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | May 20, 2022 | Radiation (03CH12-HY) |
| Preamplifier | COM-POWER | PA-103 | 161075 | 10MHz~1GHz | Mar. 24, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | Mar. 23, 2022 | Radiation (03CH12-HY) |
| Preamplifier | Aglient | 8449B | 3008A02375 | 1GHz~26.5GHz | May 25, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | May 24, 2022 | Radiation (03CH12-HY) |
| Preamplifier | E-INSTRUME NT TECH LTD. | ERA-100M-18 G-56-01-A70 | EC1900270 | 1GHz-18GHz | Dec. 27, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | Dec. 26, 2022 | Radiation (03CH12-HY) |
| Preamplifier | EMEC | EM18G40G | 060801 | 18GHz~40GHz | Jun. 22, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | Jun. 21, 2022 | Radiation (03CH12-HY) |
| Spectrum Analyzer | Keysight | N9010A | MY54200486 | 10Hz~44GHz | Oct. 15, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | Oct. 14, 2022 | Radiation (03CH12-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | 505134/2 | 30MHz~40GHz | Feb. 22, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | Feb. 21, 2022 | Radiation (03CH12-HY) |
| RF Cable | HUBER + SUHNER | SUCOFLEX 102 | 800740/2 | 30MHz~40GHz | Feb. 22, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | Feb. 21, 2022 | Radiation (03CH12-HY) |
| Filter | Wainwright | WLKS1200-12 SS | SN2 | 1.2GHz Low Pass Filter | Mar. 17, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | Mar. 16, 2022 | Radiation (03CH12-HY) |
| Filter | Wainwright | WHKX12-1080 -1200-15000-6 OSS | SN1 | 1.2GHz High Pass Filter | Mar. 17, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | Mar. 16, 2022 | Radiation (03CH12-HY) |
| Filter | Wainwright | WHKX12-2700 -3000-18000-6 OST | SN2 | 3GHz High Pass Filter | Jul. 12, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | Jul. 11, 2022 | Radiation (03CH12-HY) |
| Hygrometer | TECPEL | DTM-303B | TP140349 | N/A | Sep. 30, 2021 | Jan. 27, 2022~ Feb. 05, 2022 | Sep. 29, 2022 | Radiation (03CH12-HY) |
| Controller | EMEC | EM1000 | N/A | Control Turn table & Ant Mast | N/A | Jan. 27, 2022~ Feb. 05, 2022 | N/A | Radiation (03CH12-HY) |
| Antenna Mast | EMEC | AM-BS-4500-B | N/A | 1m~4m | N/A | Jan. 27, 2022~ Feb. 05, 2022 | N/A | Radiation (03CH12-HY) |
| Turn Table | EMEC | TT2000 | N/A | 0~360 Degree | N/A | Jan. 27, 2022~ Feb. 05, 2022 | N/A | Radiation (03CH12-HY) |
| Software | Audix | E3 6.2009-8-24 | RK-000989 | N/A | N/A | Jan. 27, 2022~ Feb. 05, 2022 | N/A | Radiation (03CH12-HY) |
| Base Station (Measure) | Anritsu | MT8821C | 6261849015 | LTE | Oct. 06, 2021 | Jan. 06 2022~ Feb. 09, 2022 | Oct. 05, 2022 | Conducted (TH03-HY) |
| Base Station (Measure) | Anritsu | MT8000A | 6261940327 | FR1 | Oct. 29, 2021 | Jan. 06 2022~ Feb. 09, 2022 | Oct. 28, 2022 | Conducted (TH03-HY) |



6 Uncertainty of Evaluation

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

| | |
|---|---------|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 3.10 dB |
|---|---------|

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

| | |
|---|---------|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 3.39 dB |
|---|---------|

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

| | |
|---|---------|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 4.34 dB |
|---|---------|



Appendix A. Test Results of Conducted Test

Conducted Output Power (Average power) and EIRP

| NR n77 (HPUE) Maximum Average Power [dBm] (GT - LC = 2.94 dB) | | | | | | | | |
|---|-----------|-----------|-----------|--------|--------|---------|------------|---------|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest | EIRP (dBm) | EIRP(W) |
| 20 | 1 | 1 | PI/2 BPSK | 25.67 | 25.65 | 25.62 | 28.72 | 0.7447 |
| 20 | 1 | 49 | | 25.78 | 25.34 | 25.72 | | |
| 20 | 25 | 12 | | 25.71 | 25.24 | 25.66 | | |
| 20 | 1 | 0 | | 22.39 | 22.05 | 22.29 | | |
| 20 | 1 | 50 | | 22.39 | 21.95 | 22.35 | | |
| 20 | 50 | 0 | | 25.36 | 25.22 | 25.34 | | |
| 20 | 1 | 1 | QPSK | 25.74 | 25.61 | 25.54 | | |
| 20 | 1 | 49 | | 25.75 | 25.55 | 25.68 | | |
| 20 | 25 | 12 | | 25.74 | 25.41 | 25.64 | | |
| 20 | 1 | 0 | | 22.41 | 22.24 | 22.32 | | |
| 20 | 1 | 50 | | 22.41 | 22.15 | 22.35 | | |
| 20 | 50 | 0 | | 24.92 | 24.69 | 24.79 | | |
| 20 | 1 | 1 | 16-QAM | 25.04 | 24.73 | 24.78 | 27.98 | 0.6281 |
| 20 | 1 | 1 | 64-QAM | 23.41 | 23.14 | 23.35 | | |
| 20 | 1 | 1 | 256-QAM | 21.37 | 21.29 | 21.29 | | |
| Limit | EIRP < 1W | | | Result | | | Pass | |

| NR n77 (HPUE) Maximum Average Power [dBm] (GT - LC = 2.94 dB) | | | | | | | | |
|---|-----------|-----------|-----------|--------|--------|---------|------------|---------|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest | EIRP (dBm) | EIRP(W) |
| 40 | 1 | 1 | PI/2 BPSK | 25.90 | 25.89 | 25.66 | 29.07 | 0.8072 |
| 40 | 1 | 104 | | 26.13 | 25.88 | 25.77 | | |
| 40 | 50 | 25 | | 25.96 | 25.78 | 25.66 | | |
| 40 | 1 | 0 | | 22.69 | 22.55 | 22.28 | | |
| 40 | 1 | 105 | | 22.67 | 22.44 | 22.42 | | |
| 40 | 100 | 0 | | 25.69 | 25.55 | 25.32 | | |
| 40 | 1 | 1 | QPSK | 25.98 | 25.85 | 25.66 | | |
| 40 | 1 | 104 | | 26.08 | 25.76 | 25.81 | | |
| 40 | 50 | 25 | | 26.01 | 25.81 | 25.65 | | |
| 40 | 1 | 0 | | 22.58 | 22.48 | 22.26 | | |
| 40 | 1 | 105 | | 22.62 | 22.48 | 22.46 | | |
| 40 | 100 | 0 | | 25.11 | 24.88 | 24.84 | | |
| 40 | 1 | 1 | 16-QAM | 25.01 | 24.95 | 24.98 | 27.95 | 0.6237 |
| 40 | 1 | 1 | 64-QAM | 23.48 | 23.46 | 23.29 | | |
| 40 | 1 | 1 | 256-QAM | 21.53 | 21.51 | 21.48 | | |
| Limit | EIRP < 1W | | | Result | | | Pass | |



| NR n77 (HPUE) Maximum Average Power [dBm] (GT - LC = 2.94 dB) | | | | | | | | |
|---|-----------|-----------|-----------|--------|--------|---------|------------|---------|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest | EIRP (dBm) | EIRP(W) |
| 50 | 1 | 1 | PI/2 BPSK | 25.67 | 25.47 | 25.69 | 28.73 | 0.7464 |
| 50 | 1 | 131 | | 25.71 | 25.48 | 25.64 | | |
| 50 | 64 | 32 | | 25.79 | 25.50 | 25.52 | | |
| 50 | 1 | 0 | | 22.26 | 22.05 | 22.23 | | |
| 50 | 1 | 132 | | 22.27 | 22.05 | 22.17 | | |
| 50 | 128 | 0 | | 25.35 | 25.10 | 25.19 | | |
| 50 | 1 | 1 | QPSK | 25.58 | 25.36 | 25.61 | | |
| 50 | 1 | 131 | | 25.65 | 25.47 | 25.53 | | |
| 50 | 64 | 32 | | 25.65 | 25.53 | 25.54 | | |
| 50 | 1 | 0 | | 22.19 | 22.02 | 22.26 | | |
| 50 | 1 | 132 | | 22.25 | 22.08 | 22.09 | | |
| 50 | 128 | 0 | | 24.78 | 24.63 | 24.62 | | |
| 50 | 1 | 1 | 16-QAM | 24.77 | 24.72 | 24.71 | 27.71 | 0.5902 |
| 50 | 1 | 1 | 64-QAM | 23.19 | 23.01 | 23.12 | | |
| 50 | 1 | 1 | 256-QAM | 21.21 | 21.13 | 21.22 | | |
| Limit | EIRP < 1W | | | Result | | | Pass | |

| NR n77 (HPUE) Maximum Average Power [dBm] (GT - LC = 2.94 dB) | | | | | | | | |
|---|-----------|-----------|-----------|--------|--------|---------|------------|---------|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest | EIRP (dBm) | EIRP(W) |
| 60 | 1 | 1 | PI/2 BPSK | 25.78 | 25.45 | 25.54 | 28.72 | 0.7447 |
| 60 | 1 | 160 | | 25.70 | 25.44 | 25.34 | | |
| 60 | 81 | 40 | | 25.74 | 25.54 | 25.36 | | |
| 60 | 1 | 0 | | 22.26 | 22.06 | 21.70 | | |
| 60 | 1 | 161 | | 22.25 | 22.07 | 21.95 | | |
| 60 | 162 | 0 | | 25.37 | 25.28 | 24.89 | | |
| 60 | 1 | 1 | QPSK | 25.66 | 25.42 | 25.42 | | |
| 60 | 1 | 160 | | 25.65 | 25.47 | 25.38 | | |
| 60 | 81 | 40 | | 25.72 | 25.58 | 25.38 | | |
| 60 | 1 | 0 | | 22.21 | 22.07 | 22.01 | | |
| 60 | 1 | 161 | | 22.28 | 22.11 | 21.98 | | |
| 60 | 162 | 0 | | 24.85 | 24.58 | 24.48 | | |
| 60 | 1 | 1 | 16-QAM | 24.72 | 24.62 | 24.65 | 27.66 | 0.5834 |
| 60 | 1 | 1 | 64-QAM | 23.32 | 23.09 | 23.09 | | |
| 60 | 1 | 1 | 256-QAM | 21.23 | 21.13 | 21.08 | | |
| Limit | EIRP < 1W | | | Result | | | Pass | |



| NR n77 (HPUE) Maximum Average Power [dBm] (GT - LC = 2.94 dB) | | | | | | | | |
|---|-----------|-----------|-----------|--------|--------|---------|------------|---------|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest | EIRP (dBm) | EIRP(W) |
| 80 | 1 | 1 | PI/2 BPSK | 25.68 | 25.63 | 25.41 | 28.67 | 0.7362 |
| 80 | 1 | 215 | | 25.59 | 25.56 | 25.36 | | |
| 80 | 108 | 54 | | 25.63 | 25.52 | 25.47 | | |
| 80 | 1 | 0 | | 22.25 | 22.12 | 21.93 | | |
| 80 | 1 | 216 | | 22.21 | 21.98 | 21.93 | | |
| 80 | 216 | 0 | | 25.32 | 25.04 | 25.03 | | |
| 80 | 1 | 1 | QPSK | 25.73 | 25.55 | 25.52 | | |
| 80 | 1 | 215 | | 25.62 | 25.34 | 25.38 | | |
| 80 | 108 | 54 | | 25.61 | 25.51 | 25.43 | | |
| 80 | 1 | 0 | | 22.29 | 22.12 | 22.20 | | |
| 80 | 1 | 216 | | 22.21 | 22.09 | 21.94 | | |
| 80 | 216 | 0 | | 24.73 | 24.56 | 24.65 | | |
| 80 | 1 | 1 | 16-QAM | 24.79 | 24.77 | 24.44 | 27.73 | 0.5929 |
| 80 | 1 | 1 | 64-QAM | 23.29 | 23.01 | 22.98 | | |
| 80 | 1 | 1 | 256-QAM | 21.42 | 21.18 | 21.06 | | |
| Limit | EIRP < 1W | | | Result | | | Pass | |

| NR n77 (HPUE) Maximum Average Power [dBm] (GT - LC = 2.94 dB) | | | | | | | | |
|---|-----------|-----------|-----------|--------|--------|---------|------------|---------|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest | EIRP (dBm) | EIRP(W) |
| 90 | 1 | 1 | PI/2 BPSK | 25.71 | 25.68 | 25.51 | 28.69 | 0.7396 |
| 90 | 1 | 243 | | 25.75 | 25.49 | 25.34 | | |
| 90 | 120 | 60 | | 25.66 | 25.47 | 25.38 | | |
| 90 | 1 | 0 | | 22.27 | 22.25 | 22.01 | | |
| 90 | 1 | 244 | | 22.25 | 22.06 | 21.93 | | |
| 90 | 243 | 0 | | 25.29 | 25.21 | 25.03 | | |
| 90 | 1 | 1 | QPSK | 25.68 | 25.64 | 25.50 | | |
| 90 | 1 | 243 | | 25.72 | 25.42 | 25.25 | | |
| 90 | 120 | 60 | | 25.63 | 25.48 | 25.39 | | |
| 90 | 1 | 0 | | 22.30 | 22.02 | 22.09 | | |
| 90 | 1 | 244 | | 22.30 | 22.11 | 21.89 | | |
| 90 | 243 | 0 | | 24.89 | 24.62 | 24.51 | | |
| 90 | 1 | 1 | 16-QAM | 24.83 | 24.76 | 24.65 | 27.77 | 0.5984 |
| 90 | 1 | 1 | 64-QAM | 23.35 | 23.36 | 23.15 | | |
| 90 | 1 | 1 | 256-QAM | 21.35 | 21.37 | 21.16 | | |
| Limit | EIRP < 1W | | | Result | | | Pass | |



| NR n77 (HPUE) Maximum Average Power [dBm] (GT - LC = 2.94 dB) | | | | | | | | |
|---|-----------|-----------|-----------|--------|--------|---------|------------|---------|
| BW [MHz] | RB Size | RB Offset | Mod | Lowest | Middle | Highest | EIRP (dBm) | EIRP(W) |
| 100 | 1 | 1 | PI/2 BPSK | 25.74 | 25.63 | 25.56 | 28.70 | 0.7413 |
| 100 | 1 | 271 | | 25.75 | 25.44 | 25.39 | | |
| 100 | 135 | 67 | | 25.71 | 25.41 | 25.41 | | |
| 100 | 1 | 0 | | 22.25 | 22.16 | 22.12 | | |
| 100 | 1 | 272 | | 22.36 | 22.06 | 22.02 | | |
| 100 | 270 | 0 | | 25.34 | 25.12 | 24.93 | | |
| 100 | 1 | 1 | QPSK | 25.74 | 25.67 | 25.38 | 27.89 | 0.6152 |
| 100 | 1 | 271 | | 25.76 | 25.46 | 25.34 | | |
| 100 | 135 | 67 | | 25.72 | 25.47 | 25.35 | | |
| 100 | 1 | 0 | | 22.32 | 22.16 | 22.04 | | |
| 100 | 1 | 272 | | 22.33 | 22.06 | 22.03 | | |
| 100 | 270 | 0 | | 24.83 | 24.65 | 24.46 | | |
| 100 | 1 | 1 | 16-QAM | 24.95 | 24.73 | 24.38 | 27.89 | 0.6152 |
| 100 | 1 | 1 | 64-QAM | 23.50 | 23.12 | 23.02 | | |
| 100 | 1 | 1 | 256-QAM | 21.42 | 21.15 | 20.98 | | |
| Limit | EIRP < 1W | | | Result | | | Pass | |



Appendix B. Test Results of Radiated Test

<Sample 2>

<Ant. 0+2>

EN-DC 66A n77A (HPUE)

| EN-DC 66A_n77A (HPUE) / 20MHz / PI/2 BPSK | | | | | | | | | |
|---|-------------------|--------------|---------------|-------------------|-------------------|--------------------|----------------------|-----------------------|--------------------|
| Channel | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | SPA Reading (dBm) | S.G. Power (dBm) | TX Cable loss (dB) | TX Antenna Gain (dBi) | Polarization (H/V) |
| Lowest | 7406 | -44.68 | -13 | -31.68 | -72.03 | -51.84 | 1.94 | 11.25 | H |
| | 11107 | -39.63 | -13 | -26.63 | -71.32 | -45.90 | 2.61 | 11.03 | H |
| | 14808 | -34.95 | -13 | -21.95 | -72.83 | -41.85 | 2.94 | 11.99 | H |
| | 18510 | -55.79 | -13 | -42.79 | -74.38 | -69.64 | 1.90 | 17.90 | H |
| | 22206 | -53.80 | -13 | -40.80 | -76.52 | -68.42 | 2.05 | 18.82 | H |
| | 25914 | -51.38 | -13 | -38.38 | -77.76 | -66.36 | 1.95 | 19.08 | H |
| | | | | | | | | | H |
| | 7406 | -44.86 | -13 | -31.86 | -72.06 | -52.02 | 1.94 | 11.25 | V |
| | 11107 | -40.24 | -13 | -27.24 | -71.76 | -46.51 | 2.61 | 11.03 | V |
| | 14808 | -37.33 | -13 | -24.33 | -73.26 | -44.23 | 2.94 | 11.99 | V |
| | 18510 | -57.22 | -13 | -44.22 | -74.95 | -71.07 | 1.90 | 17.90 | V |
| | 22207 | -53.71 | -13 | -40.71 | -76.45 | -68.33 | 2.05 | 18.82 | V |
| | 25914 | -50.68 | -13 | -37.68 | -78.16 | -65.66 | 1.95 | 19.08 | V |
| | | | | | | | | | V |
| Middle | 7663 | -45.04 | -13 | -32.04 | -71.46 | -52.01 | 2.01 | 11.13 | H |
| | 11496 | -40.36 | -13 | -27.36 | -72.55 | -47.26 | 2.44 | 11.50 | H |
| | 15324 | -35.28 | -13 | -22.28 | -73.13 | -44.85 | 3.09 | 14.80 | H |
| | 19154 | -56.22 | -13 | -43.22 | -75.51 | -70.31 | 1.82 | 18.05 | H |
| | 22983 | -53.03 | -13 | -40.03 | -77.37 | -67.12 | 1.98 | 18.22 | H |
| | 26818 | -50.57 | -13 | -37.57 | -77.48 | -64.98 | 2.17 | 18.74 | H |
| | | | | | | | | | H |
| | 7663 | -45.12 | -13 | -32.12 | -71.41 | -52.09 | 2.01 | 11.13 | V |
| | 11496 | -40.54 | -13 | -27.54 | -72.58 | -47.44 | 2.44 | 11.50 | V |
| | 15324 | -37.04 | -13 | -24.04 | -73.47 | -46.61 | 3.09 | 14.80 | V |
| | 19154 | -57.08 | -13 | -44.08 | -75.68 | -71.17 | 1.82 | 18.05 | V |
| | 22987 | -53.05 | -13 | -40.05 | -77.41 | -67.13 | 1.98 | 18.21 | V |
| | 26813 | -49.02 | -13 | -36.02 | -77.42 | -63.43 | 2.18 | 18.74 | V |



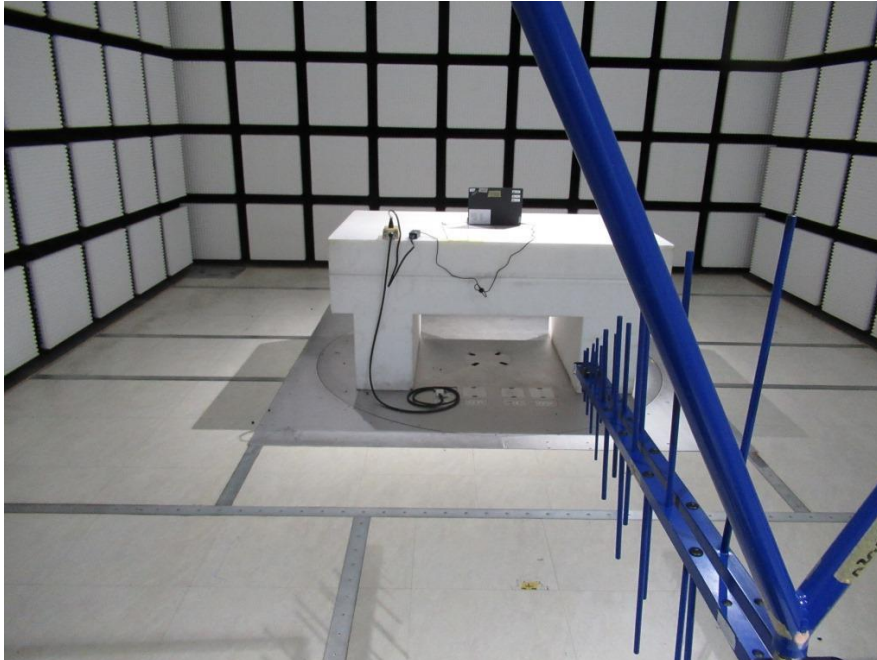
| EN-DC 66A_n77A (HPUE) / 20MHz / PI/2 BPSK | | | | | | | | | |
|---|-------------------|--------------|---------------|-------------------|-------------------|--------------------|----------------------|-----------------------|--------------------|
| Channel | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | SPA Reading (dBm) | S.G. Power (dBm) | TX Cable loss (dB) | TX Antenna Gain (dBi) | Polarization (H/V) |
| Highest | 7926 | -44.43 | -13 | -31.43 | -71.49 | -51.42 | 2.05 | 11.19 | H |
| | 11884 | -39.54 | -13 | -26.54 | -72.35 | -47.40 | 2.56 | 12.58 | H |
| | 15846 | -34.71 | -13 | -21.71 | -72.87 | -46.67 | 3.06 | 17.18 | H |
| | 19809 | -56.33 | -13 | -43.33 | -76.45 | -70.65 | 1.93 | 18.40 | H |
| | 23767 | -52.50 | -13 | -39.50 | -77.77 | -66.37 | 1.98 | 18.00 | H |
| | 27728 | -51.17 | -13 | -38.17 | -77.55 | -66.02 | 2.29 | 19.29 | H |
| | | | | | | | | | H |
| | 7926 | -44.48 | -13 | -31.48 | -71.34 | -51.47 | 2.05 | 11.19 | V |
| | 11884 | -39.05 | -13 | -26.05 | -72.33 | -46.91 | 2.56 | 12.58 | V |
| | 15846 | -34.57 | -13 | -21.57 | -72.95 | -46.53 | 3.06 | 17.18 | V |
| | 19809 | -56.94 | -13 | -43.94 | -76.46 | -71.26 | 1.93 | 18.40 | V |
| | 23767 | -52.33 | -13 | -39.33 | -77.99 | -66.20 | 1.98 | 18.00 | V |
| | 27728 | -49.57 | -13 | -36.57 | -77.29 | -64.42 | 2.29 | 19.29 | V |
| | | | | | | | | | V |

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

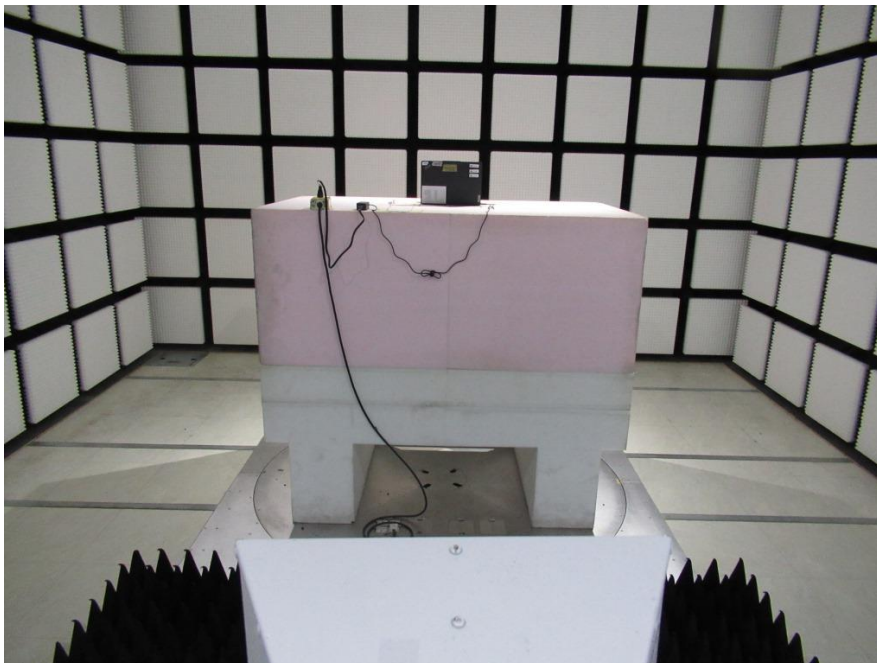
Appendix C. Setup Photographs

<Radiated Emission>

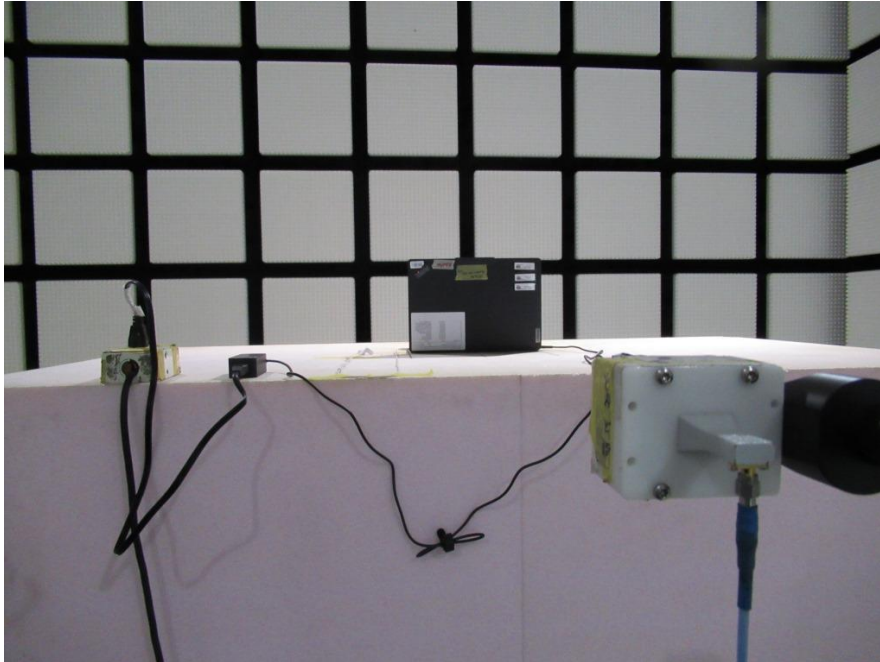
EUT with accessory for EN-DC 66A_n77A



HF



SHF



————THE END————