Testing Laboratory
3023

Test Report No:
24C0472R-RFUSV09S-A

# TEST REPORT
## FCC Rules&Regulations

| | |
|---|---|
| Product Name | Dongle |
| Brand Name | ASUS |
| Model No. | MD101-D |
| FCC ID | MSQ-DG-MD101D |
| Applicant´s Name / Address | ASUSTeK Computer Inc<br>1F, No. 15, Lide Rd, Beitou, Taipei, 112 Taiwan |
| Manufacturer's Name | ASUSTeK COMPUTER INC. |
| Test Method Requested, Standard | FCC CFR Title 47 Part 15 Subpart C Section 15.249<br>ANSI C63.10-2013 |
| Verdict Summary | IN COMPLIANCE |
| Documented By Genie Chang | Genie Chang |
| Tested By Bill Lin | Bill Lin |
| Approved By Steven Tsai | Steven Tsai |
| Date of Receipt | 2024/12/13 |
| Date of Issue | 2025/01/20 |
| Report Version | V1.0 |

# INDEX

## Competences and Guarantees

DEKRA is a testing laboratory competent to carry out the tests described in this report.
In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.



## General Conditions

1. The test results relate only to the samples tested.
2. The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
3. This report must not be used to claim product endorsement by TAF or any agency of the government.
4. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
5. Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

## Revision History

| Version | Description | Issued Date |
|---|---|---|
| V1.0 | Initial issue of report | 2025/01/20 |

## Summary of Test Result

| Report Clause | Test Items | Result (PASS/FAIL) | Remark |
|---|---|---|---|
| 3 | AC Power Line Conducted Emission | PASS | - |
| 4 | Field Strength of Fundamental | PASS | - |
| 5 | Radiated Emission | PASS | - |

| Comments and Explanations |
|---|
| The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification. |

# 1. General Information

## 1.1. EUT Description

| | |
|---|---|
| Frequency Range | 2400 ~ 2483.5 MHz |
| Operation Frequency / Channel Number | 2403 ~ 2473 MHz / 4 Channels |
| Mode | 2.4 GHz Wireless |
| Type of Modulation | GFSK |

| Accessories Information | | | | |
|---|---|---|---|---|
| No. | Equipment Name | Brand Name | Model No. | Remark |
| 1 | MD101 Mouse | ASUS | MD101 | -- |

| Antenna Information | | | | |
|---|---|---|---|---|
| Item. | Brand Name | Model No. | Type | Antenna Gain (dBi) |
| 1 | G.TECH TECHNOLOGY LTD | RG58 | PCB | 1.03 |

Note: The antenna of EUT conforms to FCC 15.203.

| Working Frequency of Each Channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 00 | 2403 | 01 | 2433 | 02 | 2447 | 03 | 2473 |

## 1.2. EUT Information

| | |
|---|---|
| EUT Power Type | From DC 5V |

## 1.3. Testing Location Information

| | |
|---|---|
| USA | FCC Registration Number: TW0033 |
| Canada | CAB Identifier Number: TW3023 / Company Number: 26930 |

| | |
|---|---|
| Site Description | Accredited by TAF |
| | Accredited Number: 3023 |

| | |
|---|---|
| Test Laboratory | DEKRA Testing and Certification Co., Ltd. |
| | Linkou Laboratory |
| Address | No.5-22, Ruishukeng Linkou District, New Taipei City, 24451, Taiwan, R.O.C. |
| Performed Location | No. 26, Huaya 1st Rd., Guishan Dist.,Taoyuan City 333411, Taiwan, R.O.C. |
| Phone Number | +886-3-275-7255 |
| Fax Number | +886-3-327-8031 |

Ambient conditions in the laboratory:

| Performed Item | Items | Required | Actual | Test Date |
|---|---|---|---|---|
| AC Power Line Conducted Emission | Temperature (°C) | 10~40 °C | 24.8 °C | 2024/12/25 |
| | Humidity (%RH) | 10~90 % | 64.4 % | |
| Radiated Emission | Temperature (°C) | 10~40 °C | 22.4 °C | 2024/12/23 |
| | Humidity (%RH) | 10~90 % | 60.5 % | |

## 1.4. Measurement Uncertainty

Uncertainties have been calculated according to the DEKRA internal document.

The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

| Test item | Uncertainty |
|---|---|
| AC Power Line Conducted Emission | ±3.50 dB |
| Field Strength of Fundamental | 9 kHz~30 MHz: ±3.30 dB<br>30 MHz~1 GHz: ±4.79 dB<br>1 GHz~18 GHz: ±4.17 dB<br>18 GHz~40 GHz: ±3.32 dB |
| Radiated Emission | 9 kHz~30 MHz: ±3.30 dB<br>30 MHz~1 GHz: ±4.79 dB<br>1 GHz~18 GHz: ±4.17 dB<br>18 GHz~40 GHz: ±3.32 dB |

## 1.5. List of Test Equipment

For Conduction Measurements / HY-SR01

| | Equipment | Manufacturer | Model No. | Serial No. | Cal. Date | Due Date |
|---|---|---|---|---|---|---|
| V | EMI Test Receiver | R&S | ESR7 | 101601 | 2024/06/24 | 2025/06/23 |
| V | Two-Line V-Network | R&S | ENV216 | 101306 | 2024/04/01 | 2026/03/31 |
| V | Two-Line V-Network | R&S | ENV216 | 101307 | 2023/08/17 | 2025/08/16 |
| V | Coaxial Cable | SUHNER | RG400_BNC | RF001 | 2024/01/10 | 2025/01/09 |

Note:
1. Two-Line V-Network is calibrated every two years, the other equipment is calibrated every year.
2. The test instruments marked with “V” are used to measure the final test results.
3. Test Software Version: e3 230303 dekra V9.

For Radiated measurements / HY-CB03

| | Equipment | Manufacturer | Model No. | Serial No. | Cal. Date | Due Date |
|---|---|---|---|---|---|---|
| V | Loop Antenna | TESEQ | HLA6121 | 49611 | 2024/02/23 | 2025/02/22 |
| V | Bi-Log Antenna | SCHWARZBECK | VULB9168 | 9168-0675 | 2023/08/09 | 2025/08/08 |
| V | Horn Antenna | Com-Power | AH-840 | 101101 | 2023/12/04 | 2025/12/03 |
| V | Horn Antenna | RF SPIN | DRH18-E | 210507A18ES | 2024/05/15 | 2025/05/14 |
| V | Pre-Amplifier | SGH | SGH0301-9 | 20211007-11 | 2024/01/10 | 2025/01/09 |
| V | Pre-Amplifier | SGH | PRAMP118 | 20200701 | 2024/01/10 | 2025/01/09 |
| V | Pre-Amplifier | EMCI | EMC05820SE | 980310 | 2024/01/10 | 2025/01/09 |
| V | Pre-Amplifier | EMCI | EMC184045SE | 980369 | 2024/01/10 | 2025/01/09 |
| V | Coaxial Cable | EMCI | EMC102-KM-KM-600 | 1160314 | 2024/01/10 | 2025/01/09 |
| V | Coaxial Cable | EMCI | EMC102-KM-KM-7000 | 170242 | 2024/01/10 | 2025/01/09 |
| V | Filter | MICRO TRONICS | BRM50702 | G269 | 2024/01/05 | 2025/01/04 |
| | Filter | MICRO TRONICS | BRM50716 | G196 | 2024/01/05 | 2025/01/04 |
| v | EMI Test Receiver | R&S | ESR3 | 102793 | 2024/12/06 | 2025/12/05 |
| V | Spectrum Analyzer | R&S | FSV3044 | 101114 | 2024/02/21 | 2025/02/20 |
| V | Coaxial Cable | SGH | SGH18 | 2021005-1 | 2024/01/10 | 2025/01/09 |
| V | Coaxial Cable | SGH | SGH18 | 202108-4 | 2024/01/10 | 2025/01/09 |
| V | Coaxial Cable | SGH | HA800 | GD20110223-1 | 2024/01/10 | 2025/01/09 |
| V | Coaxial Cable | SGH | HA800 | GD20110222-3 | 2024/01/10 | 2025/01/09 |

Note:
1. Bi-Log Antenna and Horn Antenna (AH-840) are calibrated every two years, the other equipment is calibrated every year.
2. The test instruments marked with “V” are used to measure the final test results.
3. Test Software Version: e3 230303 dekra V9.

# 2. Test Configuration of EUT

## 2.1. Test Condition

| EUT Operational Condition | |
|---|---|
| Testing Voltage | DC 5V (Power by USB) |

## 2.2. Test Software

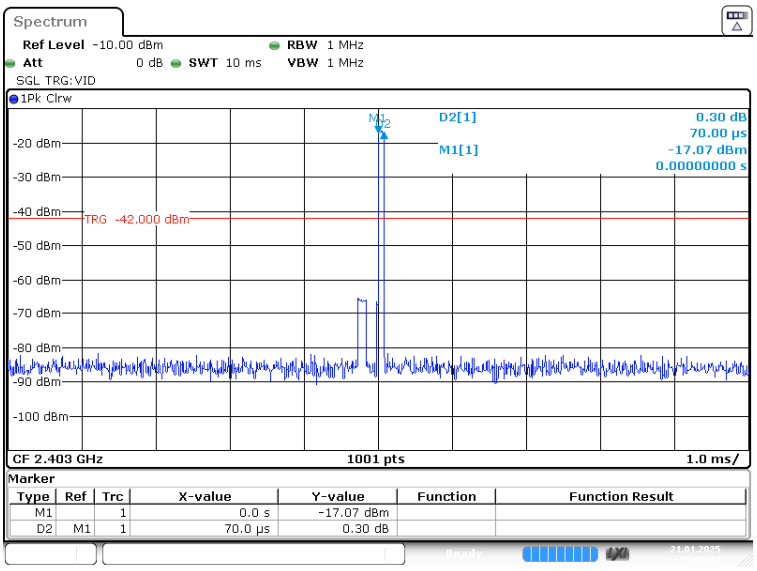
| Test Software Version | Bus Hound / Version: 7.04 |
|---|---|

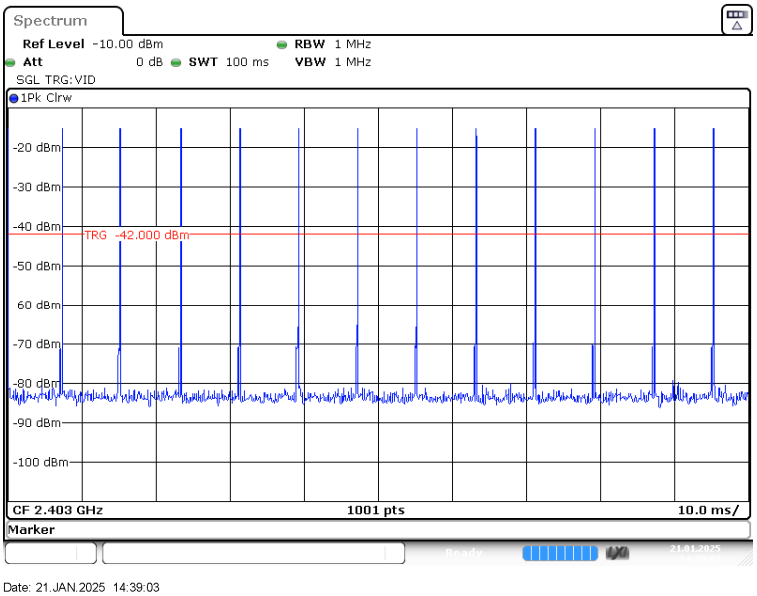
| Modulation | Frequency (MHz) | Power Setting |
|---|---|---|
| GFSK | 2403 | default |
| | 2433 | default |
| | 2473 | default |

## 2.3. Duty Cycle

| Modulation | Time on of 100 ms (ms) | Duty Cycle (Ton/100 ms) | Duty Cycle Correction factor (dB) |
|---|---|---|---|
| GFSK | 0.840 | 0.0084 | -41.514 |

Note: Duty Cycle correction factor = 20 LOG(Duty Cycle).



## 2.4. The Worst Case Measurement Configuration

| | | |
|---|---|---|
| Test Mode | Mode 1 (Transmit) | GFSK |

Note:

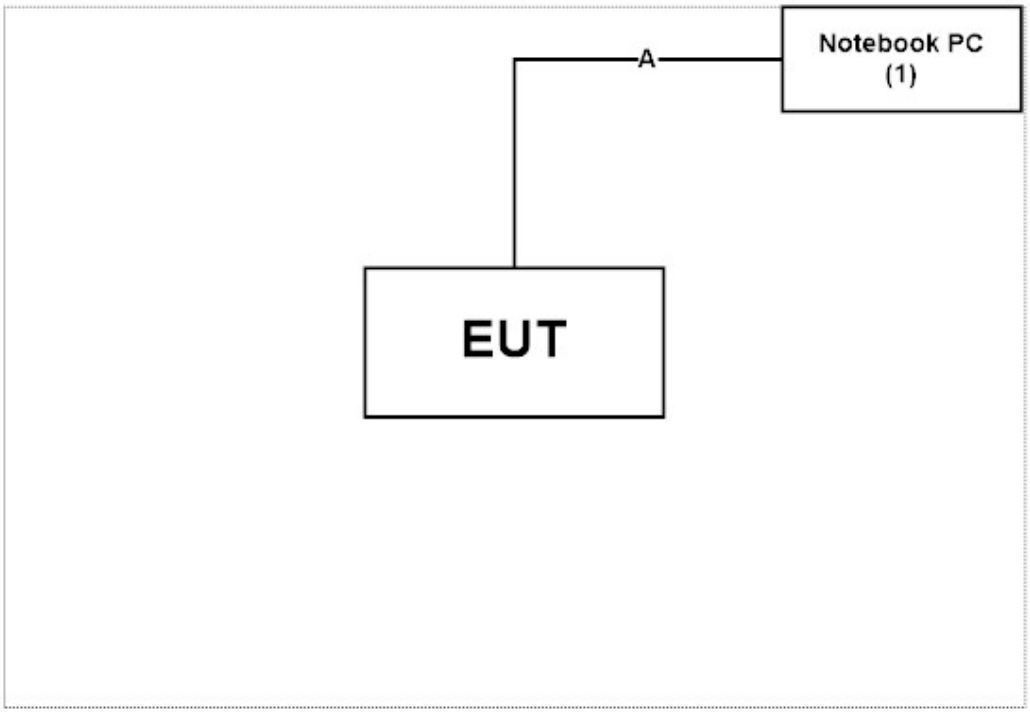
1. Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

## 2.5. Tested System Details

| No. | Equipment | Brand Name | Model No. | Serial No. | Power Cord |
|---|---|---|---|---|---|
| 1 | Notebook PC | Lenovo | TP00135A | RF-3ZD0E9 | N/A |

## 2.6. Configuration of tested System

Connection Diagram



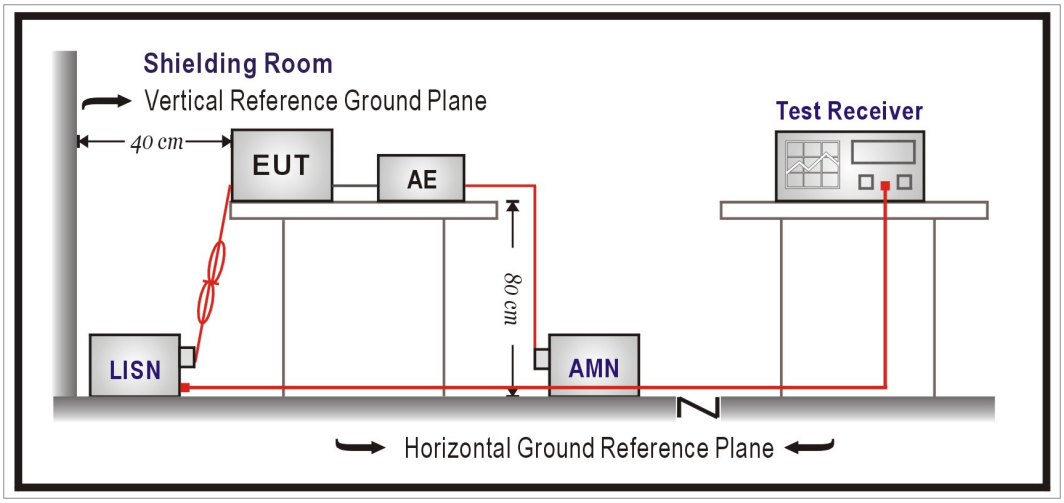

| Signal Cable Type | | Signal cable Description |
|---|---|---|
| A | USB extension cable | Shielded, 1m |

## 2.7. EUT Operating Procedures

| | |
|---|---|
| 1 | Setup the EUT as shown in Section 2.6. |
| 2 | Execute software “Bus Hound / Version: 7.04” on the Notebook PC. |
| 3 | Configure the test mode, the test channel, and the data rate. |
| 4 | Verify that the EUT works properly. |

# 3. AC Power Line Conducted Emission

## 3.1. Test Setup




## 3.2. Test Limit

| Frequency (MHz) | QP (dBuV) | AV (dBuV) |
|---|---|---|
| 0.15 - 0.50 | 66 - 56 | 56 - 46 |
| 0.50 - 5.0 | 56 | 46 |
| 5.0 - 30 | 60 | 50 |

Remarks: In the above table, the tighter limit applies at the band edges.

## 3.3. Test Procedure

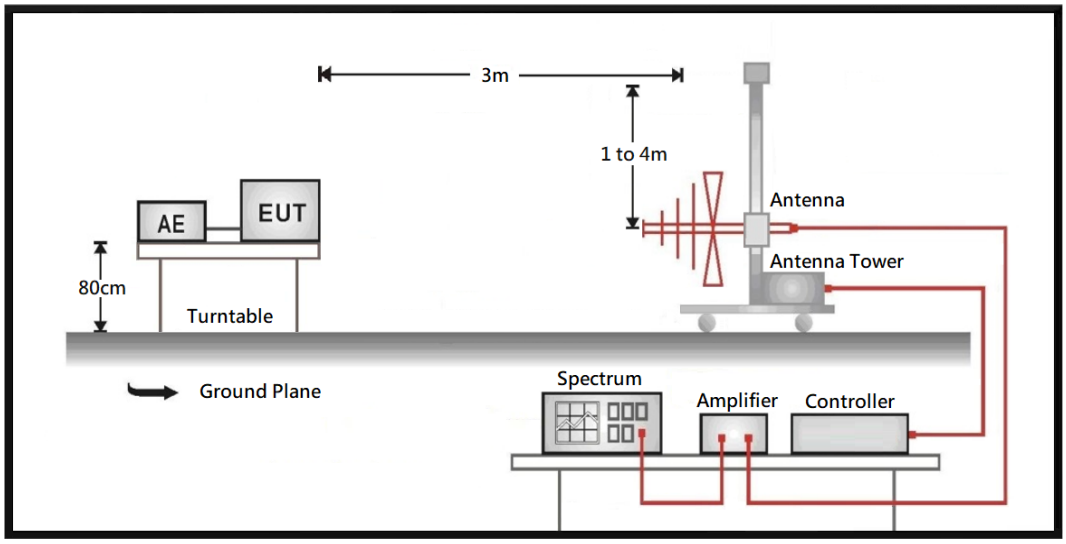
The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50 uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm /50 uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)
Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.
Conducted emissions were invested over the frequency range from 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz.

## 3.4. Test Result of AC Power Line Conducted Emission

Refer as Appendix A

# 4. Field Strength of Fundamental

## 4.1. Test Setup




## 4.2. Test Limit

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

| Fundamental Frequency (MHz) | Field Strength of Fundamental (millivolts/meter) | Field Strength of Harmonics (microvolts/meter) |
|---|---|---|
| 902 ~ 928 | 50 | 500 |
| 2400 ~ 2483.5 | 50 | 500 |
| 5725 ~ 5875 | 50 | 500 |
| 24000 ~ 24250 | 250 | 2500 |

Note：

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limit in §15.209, whichever is the lesser attenuation.
4. For frequencies above 1000 MHz, the field strength limit are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limit, specified above by more than 20 dB under any condition of modulation.

## 4.3. Test Procedures

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.The turn table can rotate 360 degrees to determine the position of the maximum emission level. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

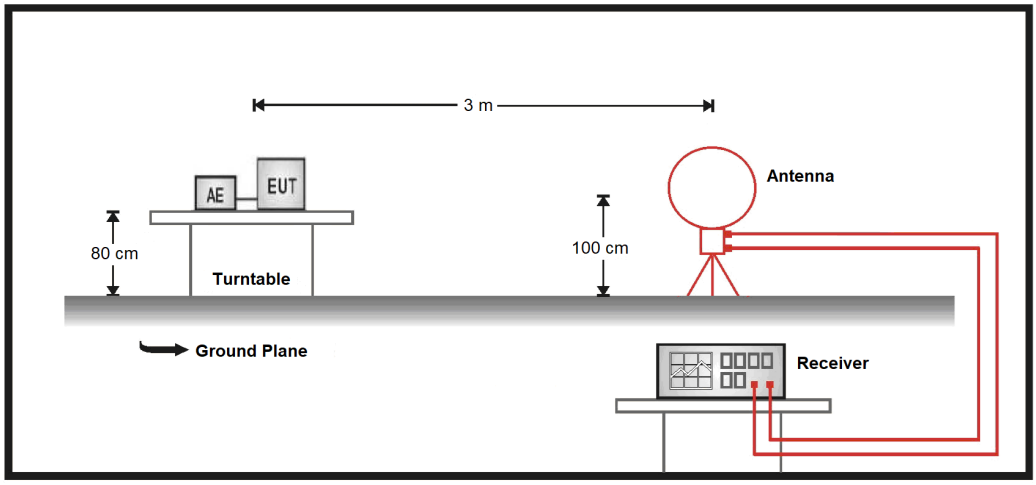
## 4.4. Test Result of Field Strength of Fundamental

Refer as Appendix B

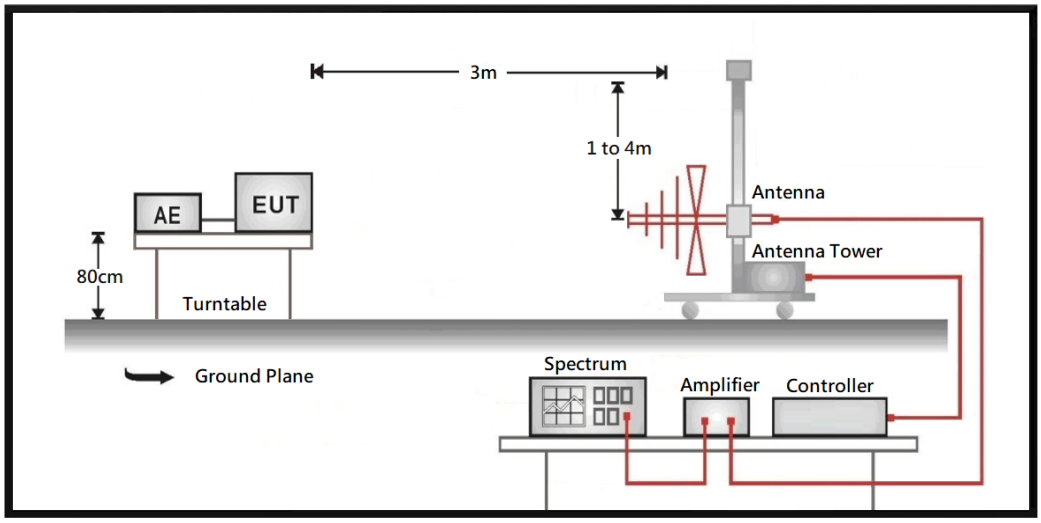
# 5. Radiated Emission

## 5.1. Test Setup

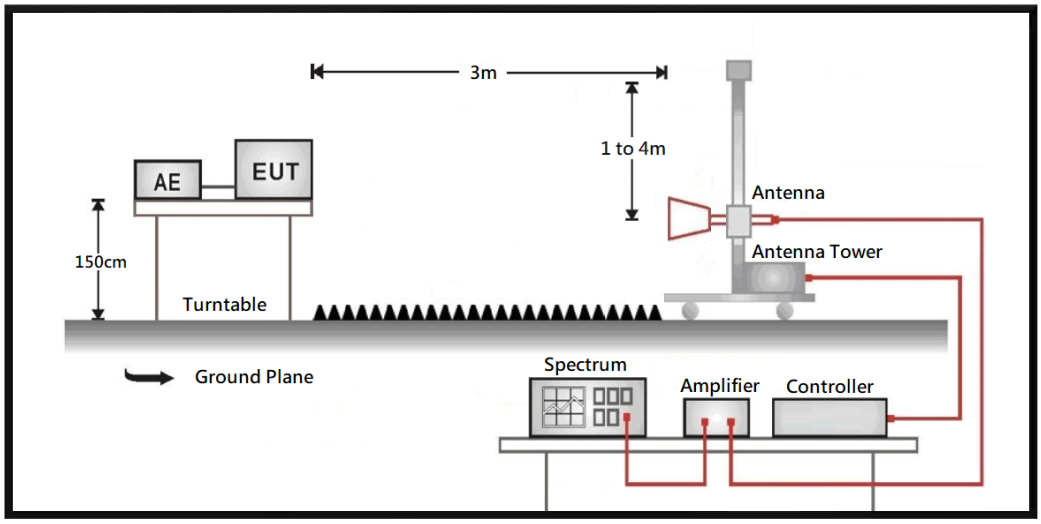
9 kHz ~ 30 MHz




30 MHz ~ 1 GHz




Above 1 GHz



## 5.2. Test Limit

| Frequency (MHz) | Field strength (uV/m) | Field strength (dBuV/m) | Measurement distance (m) |
|---|---|---|---|
| 0.009 – 0.490 | 2400/F(kHz) | 20 log (2400/F(kHz)) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 20 log (24000/F(kHz)) | 30 |
| 1.705 - 30 | 30 | 29.5 | 30 |
| 30 - 88 | 100 | 40 | 3 |
| 88 - 216 | 150 | 43.5 | 3 |
| 216 - 960 | 200 | 46 | 3 |
| Above 960 | 500 | 54 | 3 |

Remarks:

1. Field strength (dBuV/m) = 20 log Field strength (uV/m)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

## 5.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 for compliance to FCC 47CFR 15.249 requirements.
The EUT and its simulators are placed on a turn table which is 0.8 or 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.
On any frequency or frequencies form 9kHz(inculde The the lowest oscillator frequency generated within the device up to the 10th harmonic) to 1000 MHz, the limit shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limit shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
The bandwidth below 1 GHz setting on the field strength meter is 120 kHz and above 1 GHz is 1MHz.

## 5.4. Test Result of Radiated Emissions

Refer as Appendix C