RADIO TEST REPORT

Report No. : FR290613-02AB

0.00



# **RADIO TEST REPORT**

| FCC ID           | 12 | MCO DTAVCOOD  |
|------------------|----|---|
|                  | ÷  | MSQ-RTAX6800  |
| Equipment        | :  | AX6000 Dual Band Wi-Fi Router   |
| Brand Name       | ;  | ASUS  |
| Model Name       | :  | RT-AX88U Pro  |
| Applicant        | •  | ASUSTeK COMPUTER INC.   |
|                  |    | 1F., No. 15, Lide Rd., Beitou, Taipei City 112, Taiwan  |
| Manufacturer (1) | ;  | Compal Networking(KunShan) CO., LTD   |
|                  |    | No.520,Nan Bang RD., Economic & Technical<br>Development Zone, KunShan,JiangSu,China  |
| Manufacturer (2) | :  | Datamax Electronics (DongGuan) Co., Ltd.<br>Niu Shan Foreign Economic Industrial Park, Dong Cheng<br>District, Dong Guan City, Guang Dong, China                                  |
| Manufacturer (3) | •  | ARCADYAN TECHNOLOGY (VIETNAM) CO., LTD.<br>Land plot No. D4-5-6, Thang Long Industrial Park (Vinh<br>Phuc), Thien Ke Commune, Binh Xuyen District, Vinh<br>Phuc Province, Vietnam |
| Manufacturer (4) | :  | Lih Rong Electronic Enterprise Co.,Ltd.<br>No. 486, Sec. 1, Wanshou Road, Guishan District, ,<br>Taoyuan City, Taiwan   |
| Standard         | :  | 47 CFR FCC Part 15.407  |
|                  |    |   |

The product was received on Jul. 18, 2023, and testing was started from Jul. 19, 2023 and completed on Sep. 26, 2023. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

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

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

TEL : 886-3-656-9065 FAX : 886-3-656-9085 Report Template No.: CB-A12\_1 Ver1.4

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#### **Appendix B. Test Photos**

Photographs of EUT v01



# History of this test report

| Report No.    | Version | Description             | Issued Date   |
|---------------|---------|-------------------------|---------------|
| FR290613-02AB | 01      | Initial issue of report | Oct. 03, 2023 |
|               |         |                         |               |
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# Summary of Test Result

| Report<br>Clause | Ref Std.<br>Clause | Test Items          | Result<br>(PASS/FAIL) | Remark |
|------------------|--------------------|---------------------|-----------------------|--------|
| 1.1.2            | 15.203             | Antenna Requirement | PASS                  | -      |
| 3.1              | 15.407(b)          | Unwanted Emissions  | PASS                  | -      |

#### **Conformity Assessment Condition:**

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.

2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

#### Disclaimer:

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

#### Reviewed by: Sam Chen

Report Producer: Sandy Chuang



# 1 General Description

## 1.1 Information

### 1.1.1 RF General Information

| Frequency Range (MHz) | IEEE Std. 802.11         | Ch. Frequency (MHz) | Channel Number |
|-----------------------|--------------------------|---------------------|----------------|
| 5150-5250             |                          | 5180-5240           | 36-48 [4]      |
| 5250-5350             | a, n (HT20), ac (VHT20), | 5260-5320           | 52-64 [4]      |
| 5470-5725             | ax (HEW20)               | 5500-5720           | 100-144 [12]   |
| 5725-5850             |                          | 5745-5825           | 149-165 [5]    |
| 5150-5250             |                          | 5190-5230           | 38-46 [2]      |
| 5250-5350             | n (HT40), ac (VHT40),    | 5270-5310           | 54-62 [2]      |
| 5470-5725             | ax (HEW40)               | 5510-5710           | 102-142 [6]    |
| 5725-5850             |                          | 5755-5795           | 151-159 [2]    |
| 5150-5250             |                          | 5210                | 42 [1]         |
| 5250-5350             |                          | 5290                | 58 [1]         |
| 5470-5725             | ac (VHT80), ax (HEW80)   | 5530-5690           | 106-138 [3]    |
| 5725-5850             |                          | 5775                | 155 [1]        |
| 5150-5350             | ac (VHT160),             | 5250                | 50 [1]         |
| 5470-5725             | ax (HEW160)              | 5570                | 114 [1]        |

| Band         | Mode              | BWch (MHz) | Nant |
|--------------|-------------------|------------|------|
| 5.15-5.25GHz | 802.11a           | 20         | 4TX  |
| 5.15-5.25GHz | 802.11n HT20      | 20         | 4TX  |
| 5.15-5.25GHz | 802.11n HT20-BF   | 20         | 4TX  |
| 5.15-5.25GHz | 802.11ac VHT20    | 20         | 4TX  |
| 5.15-5.25GHz | 802.11ac VHT20-BF | 20         | 4TX  |
| 5.15-5.25GHz | 802.11ax HEW20    | 20         | 4TX  |
| 5.15-5.25GHz | 802.11ax HEW20-BF | 20         | 4TX  |
| 5.15-5.25GHz | 802.11n HT40      | 40         | 4TX  |
| 5.15-5.25GHz | 802.11n HT40-BF   | 40         | 4TX  |
| 5.15-5.25GHz | 802.11ac VHT40    | 40         | 4TX  |
| 5.15-5.25GHz | 802.11ac VHT40-BF | 40         | 4TX  |
| 5.15-5.25GHz | 802.11ax HEW40    | 40         | 4TX  |
| 5.15-5.25GHz | 802.11ax HEW40-BF | 40         | 4TX  |
| 5.15-5.25GHz | 802.11ac VHT80    | 80         | 4TX  |
| 5.15-5.25GHz | 802.11ac VHT80-BF | 80         | 4TX  |

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| Band          | Mode               | BWch (MHz)       | Nant |
|---------------|--------------------|------------------|------|
| 5.15-5.25GHz  | 802.11ax HEW80     | 80               | 4TX  |
| 5.15-5.25GHz  | 802.11ax HEW80-BF  | I1ax HEW80-BF 80 |      |
| 5.15-5.35GHz  | 802.11ac VHT160    |                  |      |
| 5.15-5.35GHz  | 802.11ac VHT160-BF | 160              | 4TX  |
| 5.15-5.35GHz  | 802.11ax HEW160    | 160              | 4TX  |
| 5.15-5.35GHz  | 802.11ax HEW160-BF | 160              | 4TX  |
| 5.25-5.35GHz  | 802.11a            | 20               | 4TX  |
| 5.25-5.35GHz  | 802.11n HT20       | 20               | 4TX  |
| 5.25-5.35GHz  | 802.11n HT20-BF    | 20               | 4TX  |
| 5.25-5.35GHz  | 802.11ac VHT20     | 20               | 4TX  |
| 5.25-5.35GHz  | 802.11ac VHT20-BF  | 20               | 4TX  |
| 5.25-5.35GHz  | 802.11ax HEW20     | 20               | 4TX  |
| 5.25-5.35GHz  | 802.11ax HEW20-BF  | 20               | 4TX  |
| 5.25-5.35GHz  | 802.11n HT40       | 40               | 4TX  |
| 5.25-5.35GHz  | 802.11n HT40-BF    | 40               | 4TX  |
| 5.25-5.35GHz  | 802.11ac VHT40     | 40               | 4TX  |
| 5.25-5.35GHz  | 802.11ac VHT40-BF  | 40               | 4TX  |
| 5.25-5.35GHz  | 802.11ax HEW40     | 40               | 4TX  |
| 5.25-5.35GHz  | 802.11ax HEW40-BF  | 40               | 4TX  |
| 5.25-5.35GHz  | 802.11ac VHT80     | 80               | 4TX  |
| 5.25-5.35GHz  | 802.11ac VHT80-BF  | 80               | 4TX  |
| 5.25-5.35GHz  | 802.11ax HEW80     | 80               | 4TX  |
| 5.25-5.35GHz  | 802.11ax HEW80-BF  | 80               | 4TX  |
| 5.47-5.725GHz | 802.11a            | 20               | 4TX  |
| 5.47-5.725GHz | 802.11n HT20       | 20               | 4TX  |
| 5.47-5.725GHz | 802.11n HT20-BF    | 20               | 4TX  |
| 5.47-5.725GHz | 802.11ac VHT20     | 20               | 4TX  |
| 5.47-5.725GHz | 802.11ac VHT20-BF  | 20               | 4TX  |
| 5.47-5.725GHz | 802.11ax HEW20     | 20               | 4TX  |
| 5.47-5.725GHz | 802.11ax HEW20-BF  | 20               | 4TX  |
| 5.47-5.725GHz | 802.11n HT40       | 40               | 4TX  |
| 5.47-5.725GHz | 802.11n HT40-BF    | 40               | 4TX  |
| 5.47-5.725GHz | 802.11ac VHT40     | 40 4TX           |      |
| 5.47-5.725GHz | 802.11ac VHT40-BF  | 40               | 4TX  |
| 5.47-5.725GHz | 802.11ax HEW40     | 40               | 4TX  |
| 5.47-5.725GHz | 802.11ax HEW40-BF  | 40               | 4TX  |
| 5.47-5.725GHz | 802.11ac VHT80     | 80               | 4TX  |

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| Band          | Mode               | BWch (MHz) | Nant |
|---------------|--------------------|------------|------|
| 5.47-5.725GHz | 802.11ac VHT80-BF  | 80         | 4TX  |
| 5.47-5.725GHz | 802.11ax HEW80     | 80         | 4TX  |
| 5.47-5.725GHz | 802.11ax HEW80-BF  | 80         | 4TX  |
| 5.47-5.725GHz | 802.11ac VHT160    | 160        | 4TX  |
| 5.47-5.725GHz | 802.11ac VHT160-BF | 160        | 4TX  |
| 5.47-5.725GHz | 802.11ax HEW160    | 160        | 4TX  |
| 5.47-5.725GHz | 802.11ax HEW160-BF | 160        | 4TX  |
| 5.725-5.85GHz | 802.11a            | 20         | 4TX  |
| 5.725-5.85GHz | 802.11n HT20       | 20         | 4TX  |
| 5.725-5.85GHz | 802.11n HT20-BF    | 20         | 4TX  |
| 5.725-5.85GHz | 802.11ac VHT20     | 20         | 4TX  |
| 5.725-5.85GHz | 802.11ac VHT20-BF  | 20         | 4TX  |
| 5.725-5.85GHz | 802.11ax HEW20     | 20         | 4TX  |
| 5.725-5.85GHz | 802.11ax HEW20-BF  | 20         | 4TX  |
| 5.725-5.85GHz | 802.11n HT40       | 40         | 4TX  |
| 5.725-5.85GHz | 802.11n HT40-BF    | 40         | 4TX  |
| 5.725-5.85GHz | 802.11ac VHT40     | 40         | 4TX  |
| 5.725-5.85GHz | 802.11ac VHT40-BF  | 40         | 4TX  |
| 5.725-5.85GHz | 802.11ax HEW40     | 40         | 4TX  |
| 5.725-5.85GHz | 802.11ax HEW40-BF  | 40         | 4TX  |
| 5.725-5.85GHz | 802.11ac VHT80     | 80         | 4TX  |
| 5.725-5.85GHz | 802.11ac VHT80-BF  | 80         | 4TX  |
| 5.725-5.85GHz | 802.11ax HEW80     | 80         | 4TX  |
| 5.725-5.85GHz | 802.11ax HEW80-BF  | 80         | 4TX  |

Note:

• 11a, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.

• VHT20, VHT40, VHT80 and VHT160 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.

• HEW20, HEW40, HEW80 and HEW160 use a combination of OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.

• BWch is the nominal channel bandwidth.



#### 1.1.2 Antenna Information

|      | Port           |                          | Brand |                    | Antenna |              | Gain   |
|------|----------------|--------------------------|-------|--------------------|---------|--------------|--------|
| Ant. | WLAN<br>2.4GHz | WLAN 5GHz<br>UNII1~UNII3 | Name  | Model Name         | Туре    | Connector    | (dBi)  |
| 1    | 2              | 1                        | PSA   | RFDPA171300SBLB820 | Dipole  | Reversed-SMA |        |
| 2    | 3              | 4                        | PSA   | RFDPA171300SBLB820 | Dipole  | Reversed-SMA | Nata 4 |
| 3    | 1              | 2                        | PSA   | RFDPA171300SBLB820 | Dipole  | Reversed-SMA | Note 1 |
| 4    | 4              | 3                        | PSA   | RFDPA171300SBLB820 | Dipole  | Reversed-SMA |        |

Note 1: The directional gain is measured which follows the procedure of KDB 662911 D03.

| Free Dend (Up)        | WLAN   | WLAN 5GHz |         |        |       |  |  |
|-----------------------|--------|-----------|---------|--------|-------|--|--|
| Freq. Band (Hz)       | 2.4GHz | UNII 1    | UNII 2A | UNII2C | UNII3 |  |  |
| Ant. 1 Max Gain (dBi) | 2.01   | 2.66      | 2.74    | 3.53   | 3.93  |  |  |
| Ant. 2 Max Gain (dBi) | 1.25   | 1.8       | 1.59    | 2.37   | 2.6   |  |  |
| Ant. 3 Max Gain (dBi) | 1.61   | 2.05      | 1.47    | 2.32   | 2.49  |  |  |
| Ant. 4 Max Gain (dBi) | 1.81   | 2.7       | 1.47    | 3.17   | 3.83  |  |  |
| DG [1SS] (dBi)        | 6.35   | 6.38      | 5.9     | 6.27   | 7.14  |  |  |
| DG [2SS] (dBi)        | 3.35   | 3.38      | 2.9     | 3.53   | 4.14  |  |  |
| DG [4SS] (dBi)        | 2.01   | 2.7       | 2.74    | 3.53   | 3.93  |  |  |

Note 2: The above information was declared by manufacturer. Note 3:

#### <For WLAN 2.4GHz function>

#### For IEEE 802.11b/g/n/VHT/ax(4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

#### <For WLAN 5GHz function>

#### For IEEE 802.11a/n/ac/ax (4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.



### 1.1.3 EUT Operational Condition

| EUT Power Type              | From Power Adapter |   |             |                      |  |  |
|-----------------------------|--------------------|---|-------------|----------------------|--|--|
|                             | $\boxtimes$        | With beamforming  |             | Without beamforming  |  |  |
| Beamforming Function        |                    | The product has beamforming function for n/VHT/ax in 2.4GHz, n/ac/ax in 5GHz. |             |                      |  |  |
| Weather Band                |                    | With 5600~5650MHz   |             | Without 5600~5650MHz |  |  |
|                             |                    | Outdoor P2M   | $\boxtimes$ | Indoor P2M           |  |  |
| Function                    |                    | Fixed P2P   |             | Client               |  |  |
|                             | $\boxtimes$        | Point-to-multipoint   |             | Point-to-point       |  |  |
| TPC Function                |                    | With TPC  |             | Without TPC          |  |  |
| Channel Puncturing Function |                    | Supported   | $\boxtimes$ | Unsupported          |  |  |

Note: The above information was declared by manufacturer.

#### 1.1.4 Table for Components Source Information

| Sauraa       |           | Transformer (2.5G WAN)          |                                     |                    |  |  |
|--------------|-----------|---------------------------------|-------------------------------------|--------------------|--|--|
| Source Brand |           | Model                           | Rate                                | Transformer Method |  |  |
| Main         | Broadcom  | BCM54991E 2.5Gbps/1Gbps/100Mbps |                                     | SMD                |  |  |
| Second       | MAXLINEAR | GPY211                          | GPY211 2.5Gbps/1Gbps/100Mbps/10Mbps |                    |  |  |
| Third        | Broadcom  | BCM50991EL                      | 2.5Gbps/1Gbps/100Mbps               | N/A                |  |  |

Note: The above information was declared by manufacturer.

#### 1.1.5 Table for EUT Combination

| EUT | Transformer (2.5G WAN) | Front End Module of 2.4GHz | Transformer Method | EUT Version |
|-----|------------------------|----------------------------|--------------------|-------------|
| 1   | Main                   | Main                       | Main               | R2.10       |
| 2   | Second                 | Main                       | Main               | R2.00       |
| 3   | Third                  | Second                     | Second             | R3.10       |

Note 1: The above information was declared by manufacturer.

Note 2: For a more detailed features description, please refer to the photograph of EUT.

#### 1.1.6 Table for EUT Supports Function

| Function  | Support Type                  |  |
|-----------|-------------------------------|--|
| AP Router | Master                        |  |
| Bridge    | Slave without radar detection |  |
| Repeater  | Master                        |  |
| Mesh      | Master                        |  |

Note 1: The AP Router (Master) mode has been tested and recorded in this test report. Note 2: Please refer to the photograph of EUT for detailed differences for Front End Module of 2.4GHz.



### 1.1.7 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FR290613AB Below is the table for the change of the product with respect to the original one.

| Modifications  | Performance Checking                |
|--|-------------------------------------|
| Adding the EUT 3 (The difference with EUT 2 is using the   |                                     |
| third source of Transformer (2.5G WAN), second source      |                                     |
| of Front End Module of 2.4GHz and Transformer Method       | Unwanted Emissions below 1GHz test. |
| of DIP (Please refer to section 1.1.4 and 1.1.5 for detail |                                     |
| information).  |                                     |



# **1.2 Applicable Standards**

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

- 47 CFR FCC Part 15
- ANSI C63.10-2013
- FCC KDB 789033 D02 v02r01
- The following reference test guidance is not within the scope of accreditation of TAF.
- FCC KDB 662911 D03 v01
- FCC KDB 412172 D01 v01r01
- FCC KDB 414788 D01 v01r01

### **1.3 Testing Location Information**

| Testing Location Information                                    |  |  |  |  |  |
|---|--|--|--|--|--|
| Test Lab. : Sporton International Inc. Hsinchu Laboratory       |  |  |  |  |  |
| Hsinchu   | Hsinchu ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.) |  |  |  |  |
| (TAF: 3787)   | (TAF: 3787) TEL: 886-3-656-9065 FAX: 886-3-656-9085  |  |  |  |  |
|   | Test site Designation No. TW3787 with FCC.   |  |  |  |  |
| Conformity Assessment Body Identifier (CABID) TW3787 with ISED. |  |  |  |  |  |

| Test Condition | Test Site No. | Test Engineer | Test Environment<br>(°C / %) | Test Date                   |
|----------------|---------------|---------------|------------------------------|-----------------------------|
| Radiated       | 03CH06-CB     | George Fan    | 22.4-23.5 / 55-58            | Jul. 19, 2023~Sep. 26, 2023 |

### 1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

| Test Items                           | Uncertainty | Remark                   |
|--------------------------------------|-------------|--------------------------|
| Radiated Emission (9kHz ~ 30MHz)     | 3.7 dB      | Confidence levels of 95% |
| Radiated Emission (30MHz ~ 1,000MHz) | 5.1 dB      | Confidence levels of 95% |



# 2 Test Configuration of EUT

# 2.1 The Worst Case Measurement Configuration

| The Worst Case Mode for Following Conformance Tests |   |  |
|---|---|--|
| Tests Item Unwanted Emissions                       |   |  |
| Test Condition                                      | Radiated measurement<br>If EUT consist of multiple antenna assembly (multiple antenna are used in EUT<br>regardless of spatial multiplexing MIMO configuration), the radiated test should<br>be performed with highest antenna gain of each antenna type. |  |
|   | СТХ   |  |
| Operating Mode < 1GHz                               | According to the original test report, "EUT in Z axis + Adapter 3 / WLAN 2.4 GHz" has been evaluated to be the worst case, so the measurement will follow this same test configuration.   |  |
| 1   | EUT 3 in Z axis + Adapter 3 / WLAN 2.4 GHz  |  |

| The Worst Case Mode for Following Conformance Tests  |  |  |  |
|--|--|--|--|
| Tests Item         Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation |  |  |  |
| Operating Mode   |  |  |  |
| 1 WLAN 2.4GHz + WLAN 5GHz  |  |  |  |
| Refer to Sporton Test Report No.: FA290613-02 for Co-location RF Exposure Evaluation.      |  |  |  |

# 2.2 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.



# 2.3 Accessories

| Accessories                       |               |  |  |   |
|-----------------------------------|---------------|--|--|---|
| Equipment Name                    | Brand<br>Name | Model Name   | Rating   | Power Line  |
|                                   |               | Input: 100-240V~1.4A, 50-60Hz<br>Output: 19.5V, 2.31A, 45.0W MAX | With the DC Power<br>cable:<br>Non-shielded, 1.5m                |   |
| Adapter 2                         | AcBel         | ADH011   | Input: 100-240V~1.4A, 50-60Hz<br>Output: 19.5V, 2.31A, 45.0W MAX | With the DC Power<br>cable:<br>Non-shielded, 1.5m |
| Adapter 3                         | DELTA         | ADP-45FE F   | Input: 100-240V~1.2A, 50-60Hz<br>Output: 19.0V, 2.37A, 45.0W     | With the DC Power<br>cable:<br>Non-shielded, 1.5m |
| Others                            |               |  |  |   |
| RJ-45 cable*1: Non-Shielded, 1.5m |               |  |  |   |
| Power cable*1: Non-Shielded, 0.8m |               |  |  |   |

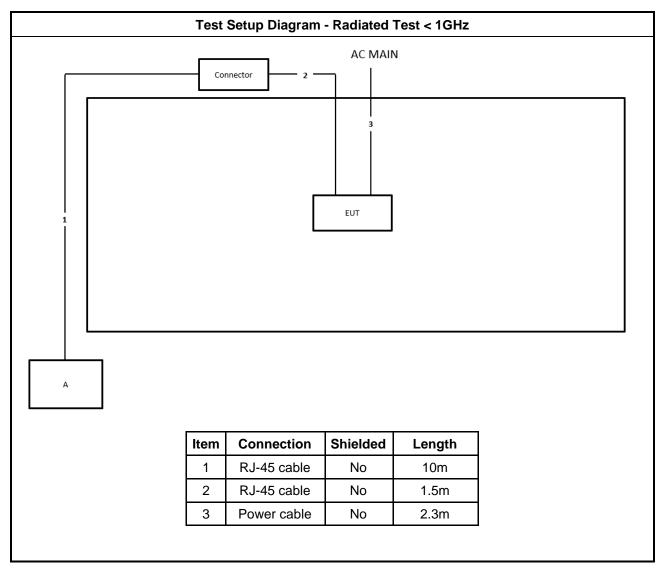
Note: The Adapter 1 and 2 are identical except for the product number.

# 2.4 Support Equipment

| Support Equipment |  |      |       |     |
|-------------------|--|------|-------|-----|
| No.               | Equipment         Brand Name         Model Name         FCC ID |      |       |     |
| А                 | Notebook   | DELL | E4300 | N/A |



# 2.5 Test Setup Diagram





# **3** Transmitter Test Result

### 3.1 Unwanted Emissions

### 3.1.1 Transmitter Unwanted Emissions Limit

| Unwanted emissions below 1 GHz and restricted band emissions above 1GHz limit          |              |             |     |  |  |
|--|--------------|-------------|-----|--|--|
| Frequency Range (MHz) Field Strength (uV/m) Field Strength (dBuV/m) Measure Distance ( |              |             |     |  |  |
| 0.009~0.490  | 2400/F(kHz)  | 48.5 - 13.8 | 300 |  |  |
| 0.490~1.705  | 24000/F(kHz) | 33.8 - 23   | 30  |  |  |
| 1.705~30.0   | 30           | 29          | 30  |  |  |
| 30~88  | 100          | 40          | 3   |  |  |
| 88~216   | 150          | 43.5        | 3   |  |  |
| 216~960  | 200          | 46          | 3   |  |  |
| Above 960  | 500          | 54          | 3   |  |  |

- Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
- Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.
- Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

### 3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.



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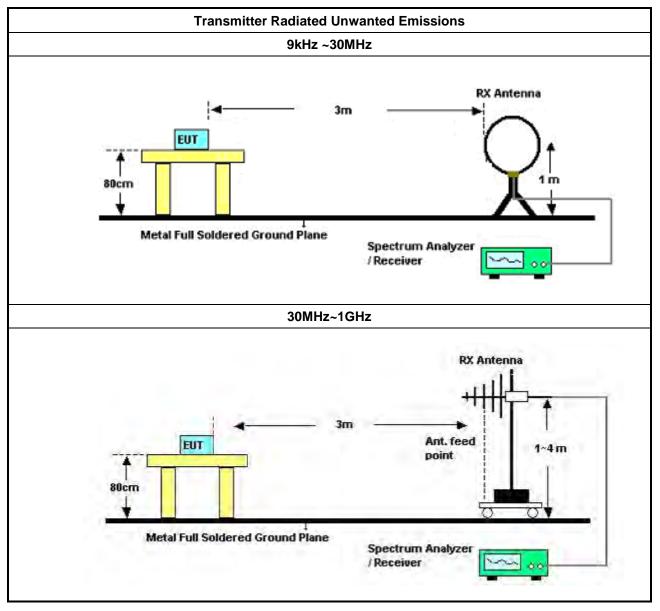
### 3.1.3 Test Procedures

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|   | Test Method  |             |  |  |  |  |
|---|--|-------------|--|--|--|--|
| • | Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 m for frequencies above 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements). |             |  |  |  |  |
| • | The  | avera       | age emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].                |  |  |  |
| • | For  | the tra     | ansmitter unwanted emissions shall be measured using following options below:                  |  |  |  |
|   | •  | Refe        | er as FCC KDB 789033 D02, clause G)2) for unwanted emissions into non-restricted bands.        |  |  |  |
|   | •  | Refe        | er as FCC KDB 789033 D02, clause G)1) for unwanted emissions into restricted bands.            |  |  |  |
|   |  |             | Refer as FCC KDB 789033 D02, G)6) Method AD (Trace Averaging).                                 |  |  |  |
|   |  | $\boxtimes$ | Refer as FCC KDB 789033 D02, G)6) Method VB (Reduced VBW).                                     |  |  |  |
|   |  |             | Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW $\geq$ 1/T, where T is pulse time. |  |  |  |
|   |  |             | Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.                            |  |  |  |
|   |  | $\square$   | Refer as FCC KDB 789033 D02, clause G)5) measurement procedure peak limit.                     |  |  |  |
|   |  |             | Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.                       |  |  |  |
| • | <ul> <li>For radiated measurement.</li> </ul>  |             |  |  |  |  |
|   | • Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.  |             |  |  |  |  |
|   | • Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.   |             |  |  |  |  |
|   | <ul> <li>Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz.</li> </ul>  |             |  |  |  |  |
| • | The  | any u       | inwanted emissions level shall not exceed the fundamental emission level.                      |  |  |  |
| • | <ul> <li>All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value<br/>has no need to be reported.</li> </ul>   |             |  |  |  |  |



### 3.1.4 Test Setup





### 3.1.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable) = Level.

### 3.1.6 Transmitter Unwanted Emissions (Below 30MHz)

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10th harmonic or 40 GHz, whichever is appropriate.

#### 3.1.7 Test Result of Transmitter Unwanted Emissions

Refer as Appendix A



# 4 Test Equipment and Calibration Data

| Instrument                            | Brand        | Model No.            | Serial No.          | Characteristics | Calibration<br>Date | Calibration<br>Due Date | Remark                   |
|---------------------------------------|--------------|----------------------|---------------------|-----------------|---------------------|-------------------------|--------------------------|
| Loop Antenna                          | Teseq        | HLA 6120             | 31244               | 9kHz - 30 MHz   | Mar. 23, 2023       | Mar. 22, 2024           | Radiation<br>(03CH06-CB) |
| 3m Semi Anechoic<br>Chamber NSA       | TDK          | SAC-3M               | 03CH06-CB           | 30 MHz ~ 1 GHz  | Aug. 04, 2022       | Aug. 03. 2023           | Radiation<br>(03CH06-CB) |
| 3m Semi Anechoic<br>Chamber NSA       | ТDК          | SAC-3M               | 03CH06-CB           | 30 MHz ~ 1 GHz  | Aug. 03, 2023       | Aug. 02, 2024           | Radiation<br>(03CH06-CB) |
| Bilog Antenna<br>with 6 dB attenuator | TESEQ & EMCI | CBL6112D &<br>N-6-06 | 37878 &<br>AT-N0606 | 20MHz ~ 2GHz    | Jul. 31, 2022       | Jul. 30, 2023           | Radiation<br>(03CH06-CB) |
| Bilog Antenna<br>with 6 dB attenuator | TESEQ & EMCI | CBL6112D &<br>N-6-06 | 37878 &<br>AT-N0606 | 20MHz ~ 2GHz    | Jul. 30, 2023       | Jul. 29, 2024           | Radiation<br>(03CH06-CB) |
| Pre-Amplifier                         | Agilent      | 310N                 | 187290              | 0.1MHz ~ 1GHz   | Nov. 04, 2022       | Nov. 03, 2023           | Radiation<br>(03CH06-CB) |
| Spectrum analyzer                     | R&S          | FSP40                | 100080              | 9kHz~40GHz      | Dec. 21, 2022       | Dec. 20, 2023           | Radiation<br>(03CH06-CB) |
| EMI Test Receiver                     | R&S          | ESCS                 | 826547/017          | 9kHz ~ 2.75GHz  | Jun. 13, 2023       | Jun. 12, 2024           | Radiation<br>(03CH06-CB) |
| RF Cable-low                          | Woken        | RG402                | Low<br>Cable-24+68  | 30MHz~1GHz      | Oct. 03, 2022       | Oct. 02, 2023           | Radiation<br>(03CH06-CB) |
| Test Software                         | SPORTON      | SENSE                | V5.10               | -               | N.C.R.              | N.C.R.                  | Radiation<br>(03CH06-CB) |

Note: Calibration Interval of instruments listed above is one year.

N.C.R means Non-Calibration required.



### Radiated Emissions below 1GHz

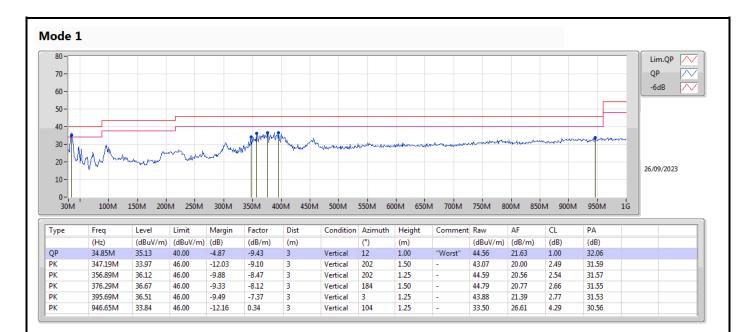
# Appendix A

| Summary |        |      |        |          |          |        |           |  |  |  |  |  |
|---------|--------|------|--------|----------|----------|--------|-----------|--|--|--|--|--|
| Mode    | Result | Туре | Freq   | Level    | Limit    | Margin | Condition |  |  |  |  |  |
|         |        |      | (Hz)   | (dBuV/m) | (dBuV/m) | (dB)   |           |  |  |  |  |  |
| Mode 1  | Pass   | QP   | 34.85M | 35.13    | 40.00    | -4.87  | Vertical  |  |  |  |  |  |



### Radiated Emissions below 1GHz

### Appendix A





### Radiated Emissions below 1GHz

### Appendix A

