



FCC RADIO TEST REPORT

FCC ID : MSQ-RTAXI600
Equipment : Wireless-AX5700 Dual-band Gigabit Router
Brand Name : ASUS
Model Name : RT-AX86U/RT-AX5700
Applicant : ASUSTeK COMPUTER INC.
1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112,
Taiwan
Manufacturer (1) : Compal Networking(KunShan) CO., LTD.
No.520,Nan Bang RD., Economic & Technical
Development Zone, KunShan,JiangSu,China
Manufacturer (2) : ARCADYAN TECHNOLOGY (VIETNAM) CO., LTD.
Ba Thien Industrial Park, Ba Hien commune, Binh
Xuyen district, Vinh Phuc Province
Standard : 47 CFR FCC Part 15.407

The product was received on Mar. 18, 2020, and testing was started from Mar. 18, 2020 and completed on Sep.08, 2020. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications 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. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.


Approved by: Sam Chen

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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Photographs of EUT v01



History of this test report

| Report No. | Version | Description | Issued Date |
|---------------|---------|-------------------------|---------------|
| FR9D0510-02AB | 01 | Initial issue of report | Oct. 12, 2020 |
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Summary of Test Result

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

Reference to Sporton Project No.: 9D0510-01.

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

1. The test configuration, test mode and test software were written in this test report are declared by the manufacturer.
2. 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.

Reviewed by: **Sam Chen**

Report Producer: **Cindy Peng**



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 | a, n (HT20), ac (VHT20), ax (HEW20) | 5180-5240 | 36-48 [4] |
| 5250-5350 | | 5260-5320 | 52-64 [4] |
| 5470-5725 | | 5500-5720 | 100-144 [12] |
| 5725-5850 | | 5745-5825 | 149-165 [5] |
| 5150-5250 | n (HT40), ac (VHT40), ax (HEW40) | 5190-5230 | 38-46 [2] |
| 5250-5350 | | 5270-5310 | 54-62 [2] |
| 5470-5725 | | 5510-5710 | 102-132 [6] |
| 5725-5850 | | 5755-5795 | 151-159 [2] |
| 5150-5250 | ac (VHT80), ax (HEW80) | 5210 | 42 [1] |
| 5250-5350 | | 5290 | 58 [1] |
| 5470-5725 | | 5530-5690 | 106-138 [3] |
| 5725-5850 | | 5775 | 155 [1] |
| 5150-5350 | ac (VHT160), ax (HEW160) | 5250 | 50 [1] |
| 5470-5725 | | 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 |
| 5.15-5.25GHz | 802.11ax HEW80 | 80 | 4TX |
| 5.15-5.25GHz | 802.11ax HEW80-BF | 80 | 4TX |
| 5.15-5.25GHz | 802.11ac VHT160 | 160 | 4TX |
| 5.15-5.25GHz | 802.11ac VHT160-BF | 160 | 4TX |
| 5.15-5.25GHz | 802.11ax HEW160 | 160 | 4TX |
| 5.15-5.25GHz | 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 |



| Band | Mode | BWch (MHz) | Nant |
|---------------|--------------------|-------------------|-------------|
| 5.25-5.35GHz | 802.11ac VHT160 | 160 | 4TX |
| 5.25-5.35GHz | 802.11ac VHT160-BF | 160 | 4TX |
| 5.25-5.35GHz | 802.11ax HEW160 | 160 | 4TX |
| 5.25-5.35GHz | 802.11ax HEW160-BF | 160 | 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 |
| 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 |



| Band | Mode | BWch (MHz) | Nant |
|---------------|-------------------|-------------------|-------------|
| 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

| Set | Ant. | Port | | Brand | P/N | Type | Connector | Antenna Gain (dBi) | | | | |
|-----|------|---------|-------|--------|------------------------|--------|--------------|--------------------|-------------|-------------|-------------|-------------|
| | | 2.4 GHz | 5 GHz | | | | | 2.4GHz | 5GHz Band 1 | 5GHz Band 2 | 5GHz Band 3 | 5GHz Band 4 |
| 1 | 1 | 1 | 1 | WHA YU | C660-510490-A | Dipole | Reversed-SMA | 1.66 | 1.86 | 1.86 | 1.90 | 1.84 |
| | 2 | 2 | 3 | | | | | | | | | |
| | 3 | 3 | 4 | | | | | | | | | |
| | 4 | - | 2 | WHA YU | C660-510390-A | PCB | I-PEX | - | 2.90 | 2.90 | 3.00 | 2.52 |
| 2 | 1 | - | - | WHA YU | C660-510492-A | Dipole | Reversed-SMA | 1.52 | 1.41 | 1.45 | 1.72 | 1.74 |
| | 2 | - | - | | | | | | | | | |
| | 3 | - | - | | | | | | | | | |
| | 4 | - | - | WHA YU | C660-510390-A | PCB | I-PEX | - | 2.90 | 2.90 | 3.00 | 2.52 |
| 3 | 1 | - | - | WHLSIN | RFDPA141500 SBLB802 | Dipole | Reversed-SMA | 1.52 | 1.66 | 1.76 | 1.82 | 1.65 |
| | 2 | - | - | | | | | | | | | |
| | 3 | - | - | | | | | | | | | |
| | 4 | - | - | WHLSIN | RFPCA302603I M5B301 | PCB | I-PEX | - | 2.17 | 2.30 | 2.20 | 2.49 |

| Set | Directional Gain (dBi) | | | | | |
|-----|------------------------|-------------|-------------|-------------|-------------|------|
| | 2.4GHz | 5GHz Band 1 | 5GHz Band 2 | 5GHz Band 3 | 5GHz Band 4 | |
| | Nss1 | Nss1 | Nss1 | Nss1 | Nss1 | Nss2 |
| 1 | 6.43 | 6.63 | 6.63 | 6.67 | 6.61 | 4.85 |

Note1: The above information was declared by manufacturer.

Note2: The EUT has three sets of antenna, and each set contains four antennas.

For 2.4GHz function (3TX/3RX):

Only the higher gain antenna "Set 1" was tested.

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

For 5GHz function (4TX/4RX):

Only the higher gain antenna "Set 1" was tested.

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

Note3: 5GHz Band with four antennas and device designed the three dipole antennas are used in the vertical position, the other one PCB antenna is used in the horizontal position.

So array gain only calculation $10\log(3)$.



1.1.3 EUT Operational Condition

| | | | |
|------------------------------|---|--|--|
| EUT Power Type | From power adapter | | |
| Beamforming Function | <input checked="" type="checkbox"/> With beamforming | <input type="checkbox"/> Without beamforming | |
| Weather Band | <input checked="" type="checkbox"/> With 5600~5650MHz | <input type="checkbox"/> Without 5600~5650MHz | |
| Function | <input type="checkbox"/> Outdoor P2M | <input checked="" type="checkbox"/> Indoor P2M | |
| | <input type="checkbox"/> Fixed P2P | <input type="checkbox"/> Client | |
| TPC Function | <input checked="" type="checkbox"/> With TPC | <input type="checkbox"/> Without TPC | |
| Test Software Version | Mtool V3.2.0.0 | | |

Note: The above information was declared by manufacturer.

1.1.4 Table for EUT Supports Functions

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

After evaluating, for “AP Router” and “Mesh” were performed for AC power-line conducted emissions test and recorded in this report.

1.1.5 Table for Multiple Listing

The model names in the following table are all refer to the identical product.

| Model Name | Description |
|------------|--|
| RT-AX86U | There is nothing different of two model names, just for different marketing use. |
| RT-AX5700 | |

From the above models, model: RT-AX86U was selected as representative model for the test and its data was recorded in this report.

1.1.6 Table for SKU Information

| EUT | 2.4G FEM | |
|-------|------------|-------------|
| | Brand Name | Model Name |
| SKU 1 | Qorvo | QPF4216B |
| SKU 2 | SKYWORKS | SKY85331-11 |

Note: The SKU 2 is same as SKU 1 except for the 2.4G FEM.



1.1.7 Table for Class II Change

This product is an extension of original one reported under Sporton project number: FR9D0510AB

Below is the table for the change of the product with respect to the original one.

| Modifications | Performance Checking |
|--|---------------------------------|
| 1. Adding LED Light PCB Board for the SKU 1. 2. Adding SKU 2 (The SKU 2 is same as SKU 1 except for the 2.4G FEM). | Unwanted Emissions Below 1GHz. |
| 3. Changing the applicant address to "1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan" from "4F, No. 150, Li-Te Rd., Peitou, Taipei 112, Taiwan". 4. Updating adapter 3 label (Adding BSMI Labeling information) | Do not affect the test results. |



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 D01 v02r01
- ♦ FCC KDB 412172 D01 v01r01
- ♦ FCC KDB 414788 D01 v01r01

1.3 Testing Location Information

| Testing Location | | |
|-------------------------------------|--------|---|
| <input type="checkbox"/> | HWA YA | ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL : 886-3-327-3456 FAX : 886-3-327-0973 |
| <input checked="" type="checkbox"/> | JHUBEI | ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085 |

| Test Condition | Test Site No. | Test Engineer | Test Environment | Test Date |
|--------------------------------|---------------|---------------|----------------------|----------------------------|
| Radiated Below 1GHz for mode 1 | 03CH04-CB | Eason Chen | 21.1~22.5°C / 46~49% | Mar. 18, 2020 |
| Radiated Below 1GHz for mode 2 | 03CH05-CB | Stim Sung | 24.7~25.7°C / 55~58% | Aug. 26, 2020~Sep.08, 2020 |

Test site Designation No. TW0006 with FCC

Test site registered number IC 4086D with Industry Canada.

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 (30MHz ~ 1,000MHz) for mode 1 | 4.3 dB | Confidence levels of 95% |
| Radiated Emission (30MHz ~ 1,000MHz) for mode 2 | 5.6 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 If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type. |
| Operating Mode < 1GHz | CTX |
| The EUT was performed at Adapter 1 ~ Adapter 3, the worst case was found at Adapter 3. So the measurement will follow this same test configuration. The EUT has two operate mode as below: a. WLAN 2.4GHz b. WLAN 5GHz And, from above the worst case was found at WLAN 2.4GHz. So the measurement will follow this same test configuration. | |
| 1 | SKU 1 - WLAN 2.4GHz + Adapter 3 + Antenna Set 1 |
| 2 | SKU 2 - WLAN 2.4GHz + Adapter 3 + Antenna Set 1 |
| For operating mode 1 is the worst case and it was record in this test report. | |

| 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 + Antenna Set 1 |
| Refer to Sporton Test Report No.: FA9D0510-02 for Co-location RF Exposure Evaluation. | |

Note: The EUT can only be used at Y axis position.



2.2 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

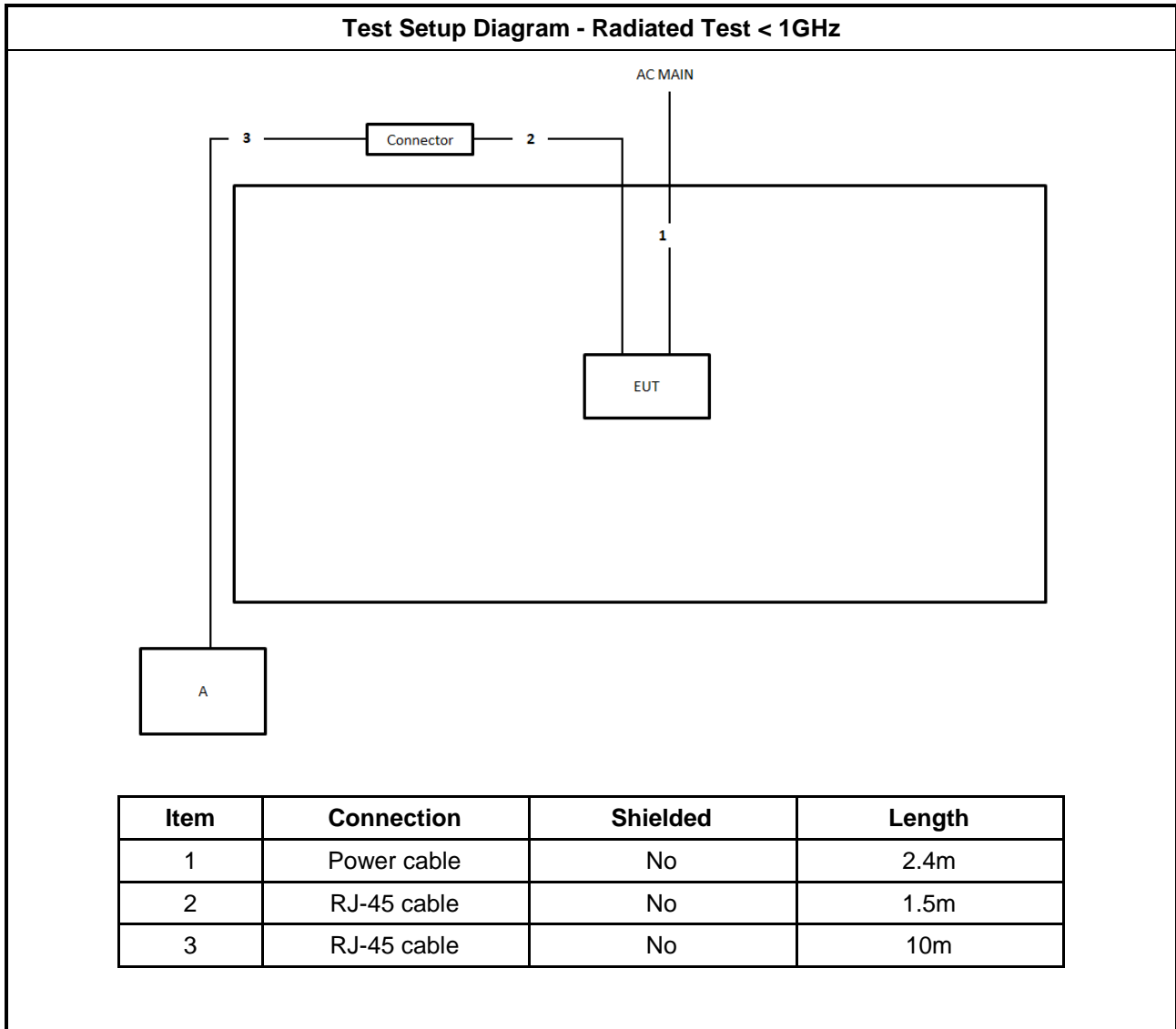
2.3 Accessories

| Accessories | | | | | |
|-------------|-----------------------------------|------------|------------|---|--|
| No. | Equipment Name | Brand Name | Model Name | Rating | Remark |
| 1 | Adapter 1 | DELTA | ADP-45ZE B | INPUT: 100-240V ~ 50-60Hz, 1.2A OUTPUT: 19V, 2.37A | With the DC cable: Non-shielded, 1.8m |
| 2 | Adapter 2 | DELTA | ADP-45FE F | INPUT: 100-240V ~1.2A, 50-60Hz OUTPUT: 19V, 2.37A | With the DC cable: Non-shielded, 1.5m |
| 3 | Adapter 3 | AcBel | ADH011 | INPUT: 100-240V ~1.4A, 50-60Hz OUTPUT: 19.5V, 2.31A, 45W MAX | With the DC cable: Non-shielded, 1.5m |
| No. | Others | | | | |
| 4 | Power cable*1: Non-shielded, 0.9m | | | | |
| 5 | RJ-45 cable*1: Non-shielded, 1.5m | | | | |

2.4 Support Equipment

| Support Equipment | | | | |
|-------------------|-----------|------------|------------|--------|
| No. | Equipment | Brand Name | Model Name | FCC ID |
| A | NB | 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 (m) |
| 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.

| Un-restricted band emissions above 1GHz Limit | |
|--|---|
| Operating Band | Limit |
| <input checked="" type="checkbox"/> 5.15 - 5.25 GHz | e.i.r.p. -27 dBm [68.2 dBuV/m@3m] |
| <input checked="" type="checkbox"/> 5.25 - 5.35 GHz | e.i.r.p. -27 dBm [68.2 dBuV/m@3m] |
| <input checked="" type="checkbox"/> 5.47 - 5.725 GHz | e.i.r.p. -27 dBm [68.2 dBuV/m@3m] |
| <input checked="" type="checkbox"/> 5.725 - 5.85 GHz | all emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. |

Note 1: 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).

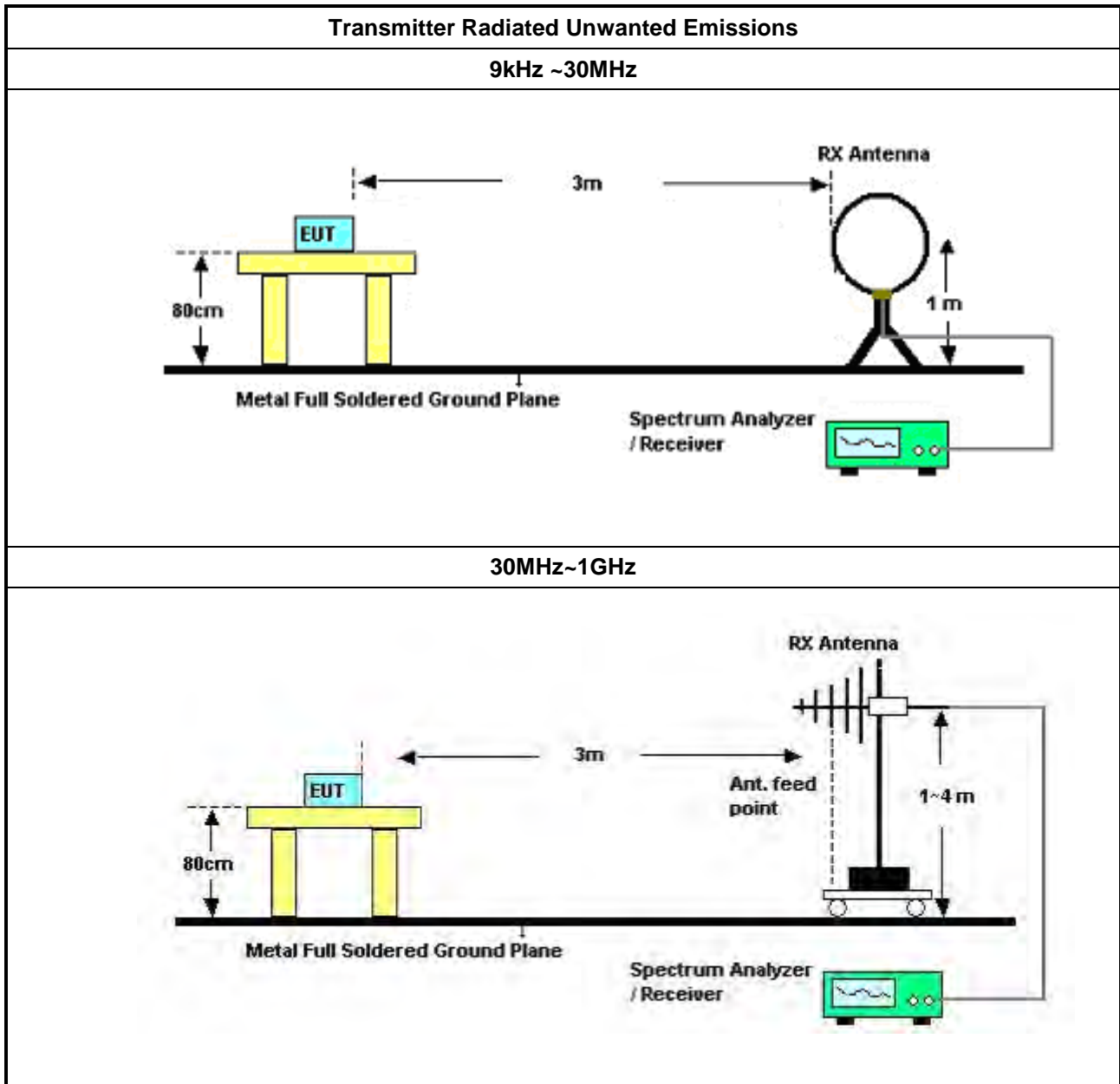
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

| Test Method | | | | | | | | | | | | | | | | | |
|-------------|--|--|---|--|---|--|---|--|--|--|--|--|---|--|--|--|---|
| | <ul style="list-style-type: none"> ▪ 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). | | | | | | | | | | | | | | | | |
| | <ul style="list-style-type: none"> ▪ The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor]. | | | | | | | | | | | | | | | | |
| | <ul style="list-style-type: none"> ▪ For the transmitter unwanted emissions shall be measured using following options below: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 5%;"></td> <td> <ul style="list-style-type: none"> ▪ Refer as FCC KDB 789033, clause G)2) for unwanted emissions into non-restricted bands. </td> </tr> <tr> <td></td> <td> <ul style="list-style-type: none"> ▪ Refer as FCC KDB 789033, clause G)1) for unwanted emissions into restricted bands. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 5%;"></td> <td> <input type="checkbox"/> Refer as FCC KDB 789033, G)6) Method AD (Trace Averaging). </td> </tr> <tr> <td></td> <td> <input checked="" type="checkbox"/> Refer as FCC KDB 789033, G)6) Method VB (Reduced VBW). </td> </tr> <tr> <td></td> <td> <input type="checkbox"/> Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time. </td> </tr> <tr> <td></td> <td> <input type="checkbox"/> Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions. </td> </tr> <tr> <td></td> <td> <input checked="" type="checkbox"/> Refer as FCC KDB 789033, clause G)5) measurement procedure peak limit. </td> </tr> <tr> <td></td> <td> <input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit. </td> </tr> </table> </td> </tr> </table> | | <ul style="list-style-type: none"> ▪ Refer as FCC KDB 789033, clause G)2) for unwanted emissions into non-restricted bands. | | <ul style="list-style-type: none"> ▪ Refer as FCC KDB 789033, clause G)1) for unwanted emissions into restricted bands. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 5%;"></td> <td> <input type="checkbox"/> Refer as FCC KDB 789033, G)6) Method AD (Trace Averaging). </td> </tr> <tr> <td></td> <td> <input checked="" type="checkbox"/> Refer as FCC KDB 789033, G)6) Method VB (Reduced VBW). </td> </tr> <tr> <td></td> <td> <input type="checkbox"/> Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time. </td> </tr> <tr> <td></td> <td> <input type="checkbox"/> Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions. </td> </tr> <tr> <td></td> <td> <input checked="" type="checkbox"/> Refer as FCC KDB 789033, clause G)5) measurement procedure peak limit. </td> </tr> <tr> <td></td> <td> <input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit. </td> </tr> </table> | | <input type="checkbox"/> Refer as FCC KDB 789033, G)6) Method AD (Trace Averaging). | | <input checked="" type="checkbox"/> Refer as FCC KDB 789033, G)6) Method VB (Reduced VBW). | | <input type="checkbox"/> Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time. | | <input type="checkbox"/> Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions. | | <input checked="" type="checkbox"/> Refer as FCC KDB 789033, clause G)5) measurement procedure peak limit. | | <input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit. |
| | <ul style="list-style-type: none"> ▪ Refer as FCC KDB 789033, clause G)2) for unwanted emissions into non-restricted bands. | | | | | | | | | | | | | | | | |
| | <ul style="list-style-type: none"> ▪ Refer as FCC KDB 789033, clause G)1) for unwanted emissions into restricted bands. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 5%;"></td> <td> <input type="checkbox"/> Refer as FCC KDB 789033, G)6) Method AD (Trace Averaging). </td> </tr> <tr> <td></td> <td> <input checked="" type="checkbox"/> Refer as FCC KDB 789033, G)6) Method VB (Reduced VBW). </td> </tr> <tr> <td></td> <td> <input type="checkbox"/> Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time. </td> </tr> <tr> <td></td> <td> <input type="checkbox"/> Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions. </td> </tr> <tr> <td></td> <td> <input checked="" type="checkbox"/> Refer as FCC KDB 789033, clause G)5) measurement procedure peak limit. </td> </tr> <tr> <td></td> <td> <input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit. </td> </tr> </table> | | <input type="checkbox"/> Refer as FCC KDB 789033, G)6) Method AD (Trace Averaging). | | <input checked="" type="checkbox"/> Refer as FCC KDB 789033, G)6) Method VB (Reduced VBW). | | <input type="checkbox"/> Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time. | | <input type="checkbox"/> Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions. | | <input checked="" type="checkbox"/> Refer as FCC KDB 789033, clause G)5) measurement procedure peak limit. | | <input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit. | | | | |
| | <input type="checkbox"/> Refer as FCC KDB 789033, G)6) Method AD (Trace Averaging). | | | | | | | | | | | | | | | | |
| | <input checked="" type="checkbox"/> Refer as FCC KDB 789033, G)6) Method VB (Reduced VBW). | | | | | | | | | | | | | | | | |
| | <input type="checkbox"/> Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time. | | | | | | | | | | | | | | | | |
| | <input type="checkbox"/> Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions. | | | | | | | | | | | | | | | | |
| | <input checked="" type="checkbox"/> Refer as FCC KDB 789033, clause G)5) measurement procedure peak limit. | | | | | | | | | | | | | | | | |
| | <input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit. | | | | | | | | | | | | | | | | |
| | <ul style="list-style-type: none"> ▪ For radiated measurement. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 5%;"></td> <td> <ul style="list-style-type: none"> ▪ Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m. </td> </tr> <tr> <td></td> <td> <ul style="list-style-type: none"> ▪ Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m. </td> </tr> <tr> <td></td> <td> <ul style="list-style-type: none"> ▪ Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz. </td> </tr> </table> | | <ul style="list-style-type: none"> ▪ Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m. | | <ul style="list-style-type: none"> ▪ Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m. | | <ul style="list-style-type: none"> ▪ Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz. | | | | | | | | | | |
| | <ul style="list-style-type: none"> ▪ Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m. | | | | | | | | | | | | | | | | |
| | <ul style="list-style-type: none"> ▪ Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m. | | | | | | | | | | | | | | | | |
| | <ul style="list-style-type: none"> ▪ Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz. | | | | | | | | | | | | | | | | |
| | <ul style="list-style-type: none"> ▪ The any unwanted emissions level shall not exceed the fundamental emission level. | | | | | | | | | | | | | | | | |
| | <ul style="list-style-type: none"> ▪ All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported. | | | | | | | | | | | | | | | | |

3.1.4 Test Setup



3.1.5 Measurement Results Calculation

The measured Level is calculated using:

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



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 10 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 | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Calibration Due Date | Remark |
|------------------------------------|------------------|--------------------|--------------------|-----------------|------------------|----------------------|-----------------------|
| Loop Antenna | Teseq | HLA 6120 | 24155 | 9kHz - 30 MHz | Mar. 29, 2019 | Mar. 28, 2020 | Radiation (03CH04-CB) |
| BILOG ANTENNA with 6 dB attenuator | SCHAFFNER / EMCI | 22021 / AT-N0607 | CBL 6112B / N-6-06 | 30MHz~1GHz | Oct. 12, 2019 | Oct. 11, 2020 | Radiation (03CH04-CB) |
| Pre-Amplifier | Agilent | 310N | 187291 | 30MHz~1GHz | Mar. 20, 2019 | Mar. 19, 2020 | Radiation (03CH04-CB) |
| Spectrum Analyzer | R&S | FSP40 | 100142 | 9kHz~40GHz | Dec. 18, 2019 | Dec. 17, 2020 | Radiation (03CH04-CB) |
| EMI Test Receiver | R&S | ESCS | 826547/017 | 9kHz ~ 2.75GHz | May 15, 2019 | May 14, 2020 | Radiation (03CH04-CB) |
| Low Cable | WOKEN | RG402 | Low Cable-03+22 | 30MHz~1GHz | Oct. 07, 2019 | Oct. 06, 2020 | Radiation (03CH04-CB) |
| Test Software | Audix | E3 | 6.120210d | - | N.C.R. | N.C.R. | Radiation (03CH04-CB) |
| Loop Antenna | Teseq | HLA 6120 | 24155 | 9kHz - 30 MHz | Apr. 13, 2020 | Apr. 12, 2021 | Radiation (03CH05-CB) |
| BILOG ANTENNA with 6 dB attenuator | Teseq / EMCI | CBL 6112D / N-6-06 | 35236 / AT-N0610 | 30MHz~1GHz | Mar. 27, 2020 | Mar. 26, 2021 | Radiation (03CH05-CB) |
| Pre-Amplifier | EMCI | EMC330N | 980331 | 30MHz~1GHz | Apr. 28, 2020 | Apr. 27, 2021 | Radiation (03CH05-CB) |
| Signal Analyzer | R&S | FSV40 | 101904 | 9kHz ~ 40GHz | May 12, 2020 | May 11, 2021 | Radiation (03CH05-CB) |
| EMI Test Receiver | R&S | ESCS | 826547/017 | 9kHz ~ 2.75GHz | May 13, 2020 | May 12, 2021 | Radiation (03CH05-CB) |
| Low Cable | WOKEN | RG402 | Low Cable-04+23 | 30MHz~1GHz | Oct. 07, 2019 | Oct. 06, 2020 | Radiation (03CH05-CB) |
| Test Software | SPORTON | SENSE | V5.10 | - | N.C.R. | N.C.R. | Radiation (03CH05-CB) |

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

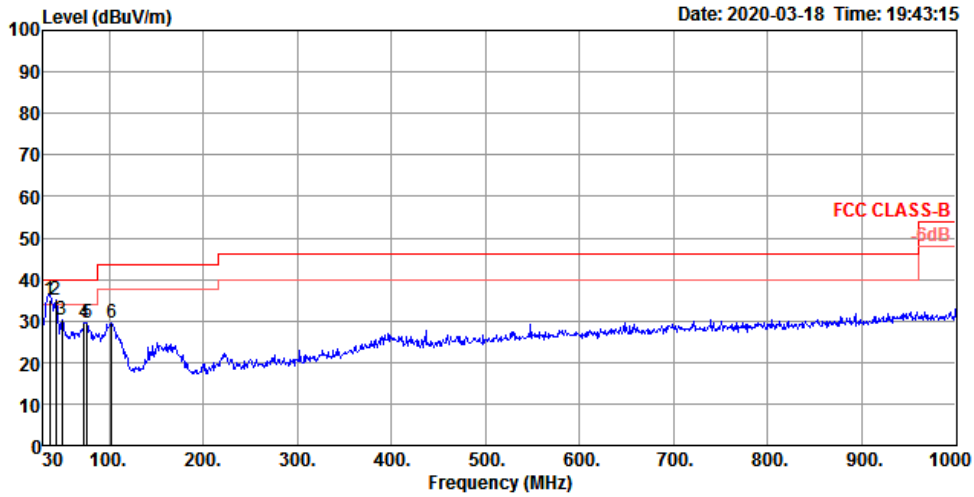


Radiated Emission below 1GHz Result

Appendix A

| | | | |
|-----------|--------|-----------------|---------------------|
| Test Mode | Mode 1 | Frequency Range | 30 MHz to 1,000 MHz |
|-----------|--------|-----------------|---------------------|

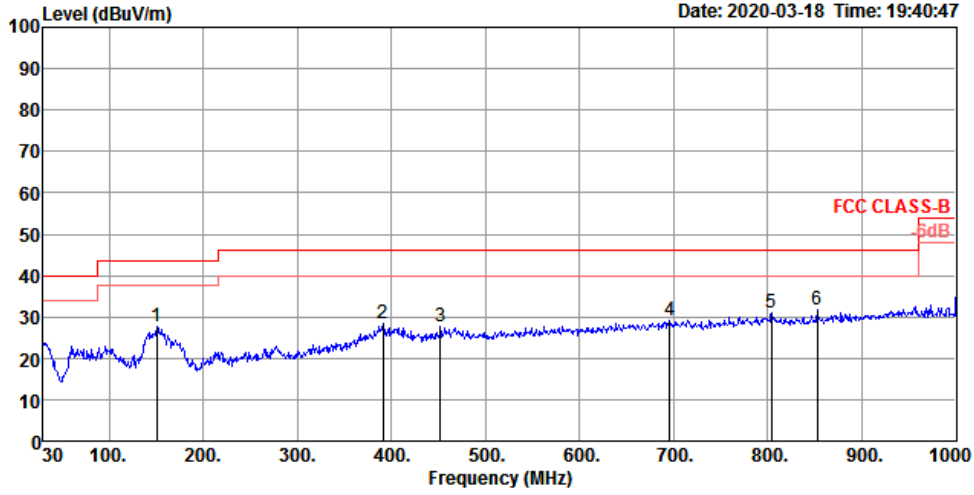
Vertical 30 MHz to 1,000 MHz



| | Freq | Level | Limit | Over | Read | CableAntenna | Preamp | A/Pos | T/Pos | Remark | Pol/Phase |
|---|--------|--------|--------|--------|-------|--------------|--------|-------|-------|----------|-----------|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB | dB/m | dB | cm | deg | |
| 1 | 36.79 | 35.04 | 40.00 | -4.96 | 46.20 | 0.74 | 20.31 | 32.21 | 100 | 113 QP | VERTICAL |
| 2 | 43.58 | 35.09 | 40.00 | -4.91 | 49.96 | 0.80 | 16.54 | 32.21 | 125 | 291 Peak | VERTICAL |
| 3 | 49.40 | 30.21 | 40.00 | -9.79 | 47.54 | 0.89 | 13.96 | 32.18 | 100 | 180 Peak | VERTICAL |
| 4 | 73.65 | 29.61 | 40.00 | -10.39 | 48.52 | 1.00 | 12.22 | 32.13 | 150 | 175 Peak | VERTICAL |
| 5 | 76.56 | 29.45 | 40.00 | -10.55 | 48.22 | 1.00 | 12.36 | 32.13 | 150 | 64 Peak | VERTICAL |
| 6 | 102.75 | 29.66 | 43.50 | -13.84 | 43.53 | 1.22 | 16.98 | 32.07 | 300 | 204 Peak | VERTICAL |



Horizontal 30 MHz to 1,000 MHz



| | Freq | Level | Limit | Over | Read | CableAntenna | Preamp | A/Pos | T/Pos | Remark | PoI/Phase |
|---|--------|--------|--------|--------|-------|--------------|--------|-------|-------|----------|------------|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB | dB/m | dB | cm | deg | |
| 1 | 150.28 | 27.57 | 43.50 | -15.93 | 41.71 | 1.46 | 16.54 | 32.14 | 200 | 253 Peak | HORIZONTAL |
| 2 | 390.84 | 28.34 | 46.00 | -17.66 | 36.48 | 2.36 | 21.55 | 32.05 | 125 | 150 Peak | HORIZONTAL |
| 3 | 451.95 | 27.69 | 46.00 | -18.31 | 34.16 | 2.51 | 22.87 | 31.85 | 100 | 14 Peak | HORIZONTAL |
| 4 | 695.42 | 29.07 | 46.00 | -16.93 | 32.30 | 3.18 | 25.50 | 31.91 | 200 | 181 Peak | HORIZONTAL |
| 5 | 804.06 | 31.12 | 46.00 | -14.88 | 33.43 | 3.32 | 26.02 | 31.65 | 150 | 51 Peak | HORIZONTAL |
| 6 | 852.56 | 31.63 | 46.00 | -14.37 | 33.40 | 3.51 | 26.32 | 31.60 | 300 | 232 Peak | HORIZONTAL |