



# RF Test Report

## FCC ID: 2AW68- GR140IG

**Report No.** : TBR-C-202304-0016-71  
**Applicant** : Shenzhen SDMC Technology Co., Ltd.  
**Equipment Under Test (EUT)**  
**EUT Name** : FTTH GEN8 AX GPON GR140IG V2 B05-1  
**Model No.** : GR140IG  
**Series Model No.** : ---  
**Brand Name** : Altice Labs  
**Sample ID** : HC-C-202304-0016-01-01#&HC-C-202304-0016-01-02#  
**Receipt Date** : 2023-04-18  
**Test Date** : 2023-04-19 to 2023-11-21  
**Issue Date** : 2023-11-23  
**Standards** : FCC Part 15 Subpart E 15.407  
**Test Method** : ANSI C63.10: 2013  
KDB 789033 D02 General UNII Test Procedures New Rules v02r01  
KDB 662911 D01 Multiple Transmitter Output v02r01  
**Conclusions** : **PASS**

In the configuration tested, the EUT complied with the standards specified above.

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**Engineer Manager** :  Ray Lai



This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

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## Revision History

| Report No.           | Version | Description             | Issued Date |
|----------------------|---------|-------------------------|-------------|
| TBR-C-202304-0016-71 | Rev.01  | Initial issue of report | 2023-11-23  |
|                      |         |                         |             |
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|                      |         |                         |             |



# 1. General Information about EUT

## 1.1 Client Information

|                     |   |                                                                                                                                              |
|---------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Applicant</b>    | : | Shenzhen SDMC Technology Co., Ltd.                                                                                                           |
| <b>Address</b>      | : | Room 1022, Floor 10, Building A, Customs Building, No. 2, Xin'an 3rd Road, Dalang Community, Xin'an Street, Bao'an District, Shenzhen, China |
| <b>Manufacturer</b> | : | Shenzhen SDMC Technology Co., Ltd.                                                                                                           |
| <b>Address</b>      | : | Room 1022, Floor 10, Building A, Customs Building, No. 2, Xin'an 3rd Road, Dalang Community, Xin'an Street, Bao'an District, Shenzhen, China |

## 1.2 General Description of EUT (Equipment Under Test)

|                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                          |                                                                                                                                    |                 |           |        |        |        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------|--------|--------|--------|
| EUT Name                                                                                                                                                                                                                                                                                              | :                                                                                                                                                                                                        | FTTH GEN8 AX GPON GR140IG V2 B05-1                                                                                                 |                 |           |        |        |        |
| Models No.                                                                                                                                                                                                                                                                                            | :                                                                                                                                                                                                        | GR140IG                                                                                                                            |                 |           |        |        |        |
| Model Different                                                                                                                                                                                                                                                                                       | :                                                                                                                                                                                                        | N/A                                                                                                                                |                 |           |        |        |        |
| Product Description                                                                                                                                                                                                                                                                                   | :                                                                                                                                                                                                        | Operation Frequency:<br>U-NII-1: 5180MHz~5240MHz, U-NII-2A: 5250MHz~5320MHz<br>U-NII-2C: 5500MHz~5720MHz, U-NII-3: 5745MHz~5825MHz |                 |           |        |        |        |
|                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                          | Antenna Gain:                                                                                                                      | PCB Antenna     | Gain(dBi) |        |        |        |
|                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                          |                                                                                                                                    |                 | Ant. 1    | Ant. 2 | Ant. 3 | Ant. 4 |
|                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                          |                                                                                                                                    | Band(U-NII-1):  | 5.45      | 5.89   | 5.65   | 4.59   |
|                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                          |                                                                                                                                    | Band(U-NII-2A): | 5.45      | 5.89   | 5.65   | 4.59   |
|                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                          |                                                                                                                                    | Band(U-NII-2C): | 5.45      | 5.89   | 5.65   | 4.59   |
|                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                          | Band(U-NII-3):                                                                                                                     | 5.45            | 5.89      | 5.65   | 4.59   |        |
| Modulation Type:                                                                                                                                                                                                                                                                                      | 802.11a: OFDM (QPSK, BPSK, 16QAM, 64QAM)<br>802.11n: OFDM (QPSK, BPSK, 16QAM, 64QAM)<br>802.11ac: OFDM (QPSK, BPSK, 16QAM, 64QAM, 256QAM)<br>802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) |                                                                                                                                    |                 |           |        |        |        |
| Power Rating                                                                                                                                                                                                                                                                                          | :                                                                                                                                                                                                        | AC Adapter (Model: S024-1C120200VU):<br>Input: 100-240V~, 50/60Hz, 0.6A<br>Output: 12.0V=2.0A                                      |                 |           |        |        |        |
| Software Version                                                                                                                                                                                                                                                                                      | :                                                                                                                                                                                                        | N/A                                                                                                                                |                 |           |        |        |        |
| Hardware Version                                                                                                                                                                                                                                                                                      | :                                                                                                                                                                                                        | N/A                                                                                                                                |                 |           |        |        |        |
| Remark:<br>(1)The adapter provided by the applicant, the verified for the RF conduction test provided by TOBY test lab.<br>(2)For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.<br>(3)Antenna information from antenna specification. |                                                                                                                                                                                                          |                                                                                                                                    |                 |           |        |        |        |



#### (4)Channel List:

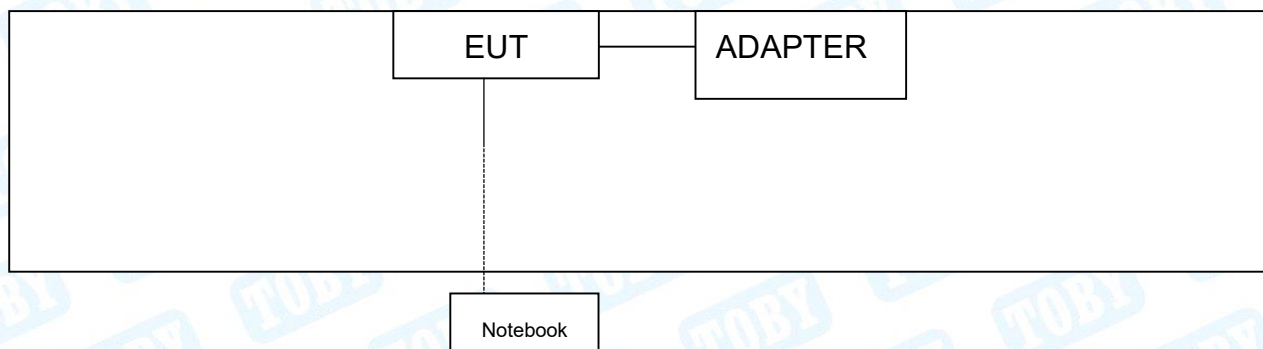
| Frequency Band                                                                                                                                                                                                                                             | Channel No. | Frequency | Channel No. | Frequency |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------|-------------|-----------|
| 5180~5240MHz<br>(U-NII-1)                                                                                                                                                                                                                                  | 36          | 5180 MHz  | 44          | 5220 MHz  |
|                                                                                                                                                                                                                                                            | 38          | 5190 MHz  | 46          | 5230 MHz  |
|                                                                                                                                                                                                                                                            | 40          | 5200 MHz  | 48          | 5240 MHz  |
|                                                                                                                                                                                                                                                            | 42          | 5210 MHz  |             |           |
| For 20 MHz Bandwidth, use channel 36, 40, 44, 48. For 40 MHz Bandwidth, use channel 38, 46.<br>For 80 MHz Bandwidth, use channel 42.                                                                                                                       |             |           |             |           |
| Frequency Band                                                                                                                                                                                                                                             | Channel No. | Frequency | Channel No. | Frequency |
| 5250~5320 MHz<br>(U-NII-2A)                                                                                                                                                                                                                                | 50          | 5250 MHz  | 58          | 5290MHz   |
|                                                                                                                                                                                                                                                            | 52          | 5260 MHz  | 60          | 5300 MHz  |
|                                                                                                                                                                                                                                                            | 54          | 5270 MHz  | 62          | 5310MHz   |
|                                                                                                                                                                                                                                                            | 56          | 5280MHz   | 64          | 5320 MHz  |
| For 20 MHz Bandwidth, use channel 52, 56, 60, 64. For 40 MHz Bandwidth, use channel 54, 62.<br>For 80 MHz Bandwidth, use channel 58. For 160 MHz Bandwidth, use channel 50.                                                                                |             |           |             |           |
| Frequency Band                                                                                                                                                                                                                                             | Channel No. | Frequency | Channel No. | Frequency |
| 5500~5720 MHz<br>(U-NII-2C)                                                                                                                                                                                                                                | 100         | 5500 MHz  | 122         | 5610 MHz  |
|                                                                                                                                                                                                                                                            | 102         | 5510 MHz  | 124         | 5620 MHz  |
|                                                                                                                                                                                                                                                            | 104         | 5520 MHz  | 126         | 5630 MHz  |
|                                                                                                                                                                                                                                                            | 106         | 5530 MHz  | 128         | 5640 MHz  |
|                                                                                                                                                                                                                                                            | 108         | 5540 MHz  | 132         | 5660 MHz  |
|                                                                                                                                                                                                                                                            | 110         | 5550 MHz  | 134         | 5670 MHz  |
|                                                                                                                                                                                                                                                            | 112         | 5560 MHz  | 136         | 5680 MHz  |
|                                                                                                                                                                                                                                                            | 114         | 5570 MHz  | 138         | 5690 MHz  |
|                                                                                                                                                                                                                                                            | 116         | 5580 MHz  | 140         | 5700 MHz  |
|                                                                                                                                                                                                                                                            | 118         | 5590 MHz  | 142         | 5710 MHz  |
|                                                                                                                                                                                                                                                            | 120         | 5600 MHz  | 144         | 5720 MHz  |
| For 20 MHz Bandwidth, use channel 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 144<br>For 40 MHz Bandwidth, use channel 102, 110, 118, 126, 134, 142<br>For 80 MHz Bandwidth, use channel 106, 122, 138. For 160 MHz Bandwidth, use channel 114. |             |           |             |           |
| Frequency Band                                                                                                                                                                                                                                             | Channel No. | Frequency | Channel No. | Frequency |
| 5745~5825MHz<br>(U-NII-3)                                                                                                                                                                                                                                  | 149         | 5745 MHz  | 157         | 5785 MHz  |
|                                                                                                                                                                                                                                                            | 151         | 5755 MHz  | 159         | 5795 MHz  |
|                                                                                                                                                                                                                                                            | 153         | 5765 MHz  | 161         | 5805 MHz  |
|                                                                                                                                                                                                                                                            | 155         | 5775 MHz  | 165         | 5825 MHz  |
| For 20 MHz Bandwidth, use channel 149, 153, 157, 161, 165. For 40 MHz Bandwidth, use channel 151, 159.<br>For 80 MHz Bandwidth, use channel 155.                                                                                                           |             |           |             |           |

#### (5)Antenna Information:

| Band                                                                                                                                                                                                                                                                                                                                                                                                       | Antenna Gain(dBi) |                   |                   |                 |                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------|-------------------|-----------------|------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                            | Ant.1(Horizontal) | Ant.2(Horizontal) | Ant.3(Horizontal) | Ant.4(Vertical) | Directional gain |
| 5G                                                                                                                                                                                                                                                                                                                                                                                                         | 5.45              | 5.89              | 5.65              | 4.59            | 8.78             |
| According to the manufacture, the FiberGateway utilizes cross-polarized antennas. The ant.1 horizontal, (ant.2 and ant.3) horizontal orthogonal, ant.4 vertical, the antenna 2 and antenna3 are in the same polarization, they are orthogonal to the other two antennas (antenna 1 and antenna 4). Per FCC KDB "662911 D01 Multiple Transmitter Output v02r01", The highest of the total gain shall apply. |                   |                   |                   |                 |                  |
| The highest of the total gain=(ANT2+ANT3=8.78dBi)                                                                                                                                                                                                                                                                                                                                                          |                   |                   |                   |                 |                  |
| Directional gain = $10 \log[(10^{G1/10} + 10^{G2/10})^2 / 2]$                                                                                                                                                                                                                                                                                                                                              |                   |                   |                   |                 |                  |
| <b>Note: The antenna gain corresponding to the test data is:</b>                                                                                                                                                                                                                                                                                                                                           |                   |                   |                   |                 |                  |
| <b>5G: Ant.1: 5.65dBi; Ant.2: 5.89dBi; Ant.3: 4.59dBi; Ant.4: 5.45dBi;</b>                                                                                                                                                                                                                                                                                                                                 |                   |                   |                   |                 |                  |



### 1.3 Block Diagram Showing the Configuration of System Tested



### 1.4 Description of Support Units

| Equipment Information |               |              |              |           |
|-----------------------|---------------|--------------|--------------|-----------|
| Name                  | Model         | FCC ID/VOC   | Manufacturer | Used “√”  |
| Notebook              | Inspiron 5493 | ----         | DELL         | √         |
| Cable Information     |               |              |              |           |
| Number                | Shielded Type | Ferrite Core | Length       | Note      |
| Cable 1               | Yes           | NO           | 1.0M         | Accessory |



## 1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

| For Conducted Test                            |                                          |                                                       |
|-----------------------------------------------|------------------------------------------|-------------------------------------------------------|
| Final Test Mode                               |                                          | Description                                           |
| Mode 1                                        |                                          | TX a Mode(5180MHz)                                    |
| For Radiated Test Below 1GHz                  |                                          |                                                       |
| Final Test Mode                               |                                          | Description                                           |
| Mode 2                                        |                                          | TX a Mode(5180MHz)                                    |
| For Radiated Above 1GHz and RF Conducted Test |                                          |                                                       |
| Test Band                                     | Final Test Mode                          | Description                                           |
| U-NII-1                                       | Mode 3                                   | TX Mode 802.11a Mode Channel 36/40/48                 |
|                                               | Mode 4                                   | TX Mode 802.11n(HT20) Mode Channel 36/40/48           |
|                                               | Mode 5                                   | TX Mode 802.11ac(VHT20) Mode Channel 36/40/48         |
|                                               | Mode 6                                   | TX Mode 802.11ax(HE20) Mode Channel 36/40/48          |
|                                               | Mode 7                                   | TX Mode 802.11n(HT40) Mode Channel 38/46              |
|                                               | Mode 8                                   | TX Mode 802.11ac(VHT40) Mode Channel 38/46            |
|                                               | Mode 9                                   | TX Mode 802.11ax(HE40) Mode Channel 38/46             |
|                                               | Mode 10                                  | TX Mode 802.11ac(VHT80) Mode Channel 42               |
|                                               | Mode 11                                  | TX Mode 802.11ax(HE80) Mode Channel 42                |
| U-NII-2A                                      | Mode 12                                  | TX Mode 802.11a Mode Channel 52/56/64                 |
|                                               | Mode 13                                  | TX Mode 802.11n(HT20) Mode Channel 52/56/64           |
|                                               | Mode 14                                  | TX Mode 802.11ac(VHT20) Mode Channel 52/56/64         |
|                                               | Mode 15                                  | TX Mode 802.11ax(HE20) Mode Channel 52/56/64          |
|                                               | Mode 16                                  | TX Mode 802.11n(HT40) Mode Channel 54/62              |
|                                               | Mode 17                                  | TX Mode 802.11ac(VHT40) Mode Channel 54/62            |
|                                               | Mode 18                                  | TX Mode 802.11ax(HE40) Mode Channel 54/62             |
|                                               | Mode 19                                  | TX Mode 802.11ac(VHT80) Mode Channel 58               |
|                                               | Mode 20                                  | TX Mode 802.11ax(HE80) Mode Channel 58                |
|                                               | Mode 21                                  | TX Mode 802.11ac(VHT160) Mode Channel 50              |
|                                               | Mode 22                                  | TX Mode 802.11ax(HE160) Mode Channel 50               |
| U-NII-2C                                      | Mode 23                                  | TX Mode 802.11a Mode Channel 100/116//140/144         |
|                                               | Mode 24                                  | TX Mode 802.11n(HT20) Mode Channel 100/116//140/144   |
|                                               | Mode 25                                  | TX Mode 802.11ac(VHT20) Mode Channel 100/116//140/144 |
|                                               | Mode 26                                  | TX Mode 802.11ax(HE20) Mode Channel 100/116//140/144  |
|                                               | Mode 27                                  | TX Mode 802.11n(HT40) Mode Channel 102/110/134/142    |
|                                               | Mode 28                                  | TX Mode 802.11ac(VHT40) Mode Channel 102/110/134/142  |
|                                               | Mode 29                                  | TX Mode 802.11ax(HE40) Mode Channel 102/110/134/142   |
|                                               | Mode 23                                  | TX Mode 802.11ac(VHT80) Mode Channel 106/122/138      |
|                                               | Mode 24                                  | TX Mode 802.11ax(HE80) Mode Channel 106/122/138       |
|                                               | Mode 25                                  | TX Mode 802.11ac(VHT160) Mode Channel 114             |
| Mode 26                                       | TX Mode 802.11ax(HE160) Mode Channel 114 |                                                       |
| U-NII-3                                       | Mode 27                                  | TX Mode 802.11a Mode Channel 149/157/165              |
|                                               | Mode 28                                  | TX Mode 802.11n(HT20) Mode Channel 149/157/165        |
|                                               | Mode 29                                  | TX Mode 802.11ac(VHT20) Mode Channel 149/157/165      |
|                                               | Mode 30                                  | TX Mode 802.11ax(HE20) Mode Channel 149/157/165       |
|                                               | Mode 31                                  | TX Mode 802.11n(HT40) Mode Channel 151/159            |
|                                               | Mode 32                                  | TX Mode 802.11ac(VHT40) Mode Channel 151/159          |
|                                               | Mode 33                                  | TX Mode 802.11ax(HE40) Mode Channel 151/159           |
|                                               | Mode 34                                  | TX Mode 802.11ac(VHT80) Mode Channel 155              |
|                                               | Mode 35                                  | TX Mode 802.11ax(HE80) Mode Channel 155               |



**Note:**

- (1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.

According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:

| Mode                   | Data Rate |
|------------------------|-----------|
| A Mode-SISO/CDD/BF     | 6Mbps     |
| N(HT20) Mode-CDD/BF    | MCS0      |
| N(HT40) Mode-CDD/BF    | MCS0      |
| AC(VHT20) Mode-CDD/BF  | MCS0NSS1  |
| AC(VHT40) Mode-CDD/BF  | MCS0NSS1  |
| AC(VHT80) Mode-CDD/BF  | MCS0NSS1  |
| AC(VHT160) Mode-CDD/BF | MCS0NSS1  |
| AX(HE20) Mode-CDD/BF   | HE0NSS1   |
| AX(HE40) Mode-CDD/BF   | HE0NSS1   |
| AX(HE80) Mode-CDD/BF   | HE0NSS1   |
| AX(HE160) Mode-CDD/BF  | HE0NSS1   |

- (2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.
- (3) The EUT is considered a Mobile unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.



## 1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of RF setting.

| Test Software: accessMtool |                 |            |     |     |     |     |    |
|----------------------------|-----------------|------------|-----|-----|-----|-----|----|
| U-NII-1 for FCC            |                 |            |     |     |     |     |    |
| Mode                       | Frequency (MHz) | Parameters |     |     |     |     |    |
|                            |                 | SISO       |     |     |     | CDD | BF |
|                            |                 | 1          | 2   | 3   | 4   |     |    |
| 802.11a                    | 5180            | 100        | 100 | 100 | 100 | 86  | 82 |
|                            | 5200            | 100        | 100 | 100 | 100 | 86  | 82 |
|                            | 5240            | 100        | 100 | 100 | 100 | 86  | 82 |
| 802.11n(HT20)              | 5180            | /          |     |     |     | 88  | 84 |
|                            | 5200            | /          |     |     |     | 88  | 84 |
|                            | 5240            | /          |     |     |     | 88  | 84 |
| 802.11ac(VHT20)            | 5180            | /          |     |     |     | 88  | 84 |
|                            | 5200            | /          |     |     |     | 88  | 84 |
|                            | 5240            | /          |     |     |     | 88  | 84 |
| 802.11ax(HE20)             | 5180            | /          |     |     |     | 88  | 83 |
|                            | 5200            | /          |     |     |     | 88  | 83 |
|                            | 5240            | /          |     |     |     | 88  | 83 |
| 802.11n(HT40)              | 5190            | /          |     |     |     | 88  | 84 |
|                            | 5230            | /          |     |     |     | 88  | 84 |
| 802.11ac(VHT40)            | 5190            | /          |     |     |     | 88  | 83 |
|                            | 5230            | /          |     |     |     | 88  | 83 |
| 802.11ax(HE40)             | 5190            | /          |     |     |     | 84  | 82 |
|                            | 5230            | /          |     |     |     | 82  | 80 |
| 802.11ac(VHT80)            | 5210            | /          |     |     |     | 88  | 82 |
| 802.11ax(HE80)             | 5210            | /          |     |     |     | 80  | 80 |
| U-NII-2A                   |                 |            |     |     |     |     |    |
| Mode                       | Frequency (MHz) | Parameters |     |     |     |     |    |
|                            |                 | SISO       |     |     |     | CDD | BF |
|                            |                 | 1          | 2   | 3   | 4   |     |    |
| 802.11a                    | 5260            | 94         | 94  | 94  | 94  | 62  | 58 |
|                            | 5280            | 94         | 94  | 94  | 94  | 62  | 58 |
|                            | 5320            | 94         | 94  | 94  | 94  | 64  | 58 |
| 802.11n(HT20)              | 5260            | /          |     |     |     | 64  | 58 |
|                            | 5280            | /          |     |     |     | 64  | 58 |
|                            | 5320            | /          |     |     |     | 64  | 58 |
| 802.11ac(VHT20)            | 5260            | /          |     |     |     | 62  | 60 |
|                            | 5280            | /          |     |     |     | 62  | 60 |
|                            | 5320            | /          |     |     |     | 64  | 60 |
| 802.11ax(HE20)             | 5260            | /          |     |     |     | 62  | 58 |
|                            | 5280            | /          |     |     |     | 62  | 58 |
|                            | 5320            | /          |     |     |     | 62  | 60 |
| 802.11n(HT40)              | 5270            | /          |     |     |     | 70  | 60 |
|                            | 5310            | /          |     |     |     | 72  | 60 |
| 802.11ac(VHT40)            | 5270            | /          |     |     |     | 70  | 60 |
|                            | 5310            | /          |     |     |     | 72  | 60 |
| 802.11ax(HE40)             | 5270            | /          |     |     |     | 68  | 58 |
|                            | 5310            | /          |     |     |     | 70  | 58 |
| 802.11ac(VHT80)            | 5290            | /          |     |     |     | 72  | 60 |
| 802.11ax(HE80)             | 5290            | /          |     |     |     | 72  | 60 |
| 802.11ac(VHT160)           | 5250            | /          |     |     |     | 70  | 58 |
| 802.11ax(HE160)            | 5250            | /          |     |     |     | 70  | 58 |



| Test Software: accessMtool |                 |            |    |    |    |     |    |
|----------------------------|-----------------|------------|----|----|----|-----|----|
| U-NII-2C                   |                 |            |    |    |    |     |    |
| Mode                       | Frequency (MHz) | Parameters |    |    |    |     |    |
|                            |                 | SISO       |    |    |    | CDD | BF |
|                            |                 | 1          | 2  | 3  | 4  |     |    |
| 802.11a                    | 5500            | 94         | 94 | 96 | 94 | 62  | 58 |
|                            | 5580            | 94         | 94 | 96 | 94 | 62  | 58 |
|                            | 5700            | 94         | 94 | 96 | 94 | 62  | 58 |
|                            | 5720            | 94         | 94 | 96 | 94 | 62  | 58 |
| 802.11n(HT20)              | 5500            | /          |    |    |    | 64  | 58 |
|                            | 5580            | /          |    |    |    | 64  | 58 |
|                            | 5700            | /          |    |    |    | 64  | 58 |
|                            | 5720            | /          |    |    |    | 64  | 58 |
| 802.11ac(VHT20)            | 5500            | /          |    |    |    | 66  | 58 |
|                            | 5580            | /          |    |    |    | 66  | 59 |
|                            | 5700            | /          |    |    |    | 66  | 59 |
|                            | 5720            | /          |    |    |    | 66  | 59 |
| 802.11ax(HE20)             | 5500            | /          |    |    |    | 66  | 58 |
|                            | 5580            | /          |    |    |    | 66  | 59 |
|                            | 5700            | /          |    |    |    | 66  | 59 |
|                            | 5720            | /          |    |    |    | 66  | 58 |
| 802.11n(HT40)              | 5510            | /          |    |    |    | 70  | 60 |
|                            | 5550            | /          |    |    |    | 70  | 60 |
|                            | 5670            | /          |    |    |    | 70  | 60 |
|                            | 5710            | /          |    |    |    | 70  | 60 |
| 802.11ac(VHT40)            | 5510            | /          |    |    |    | 70  | 60 |
|                            | 5550            | /          |    |    |    | 70  | 60 |
|                            | 5670            | /          |    |    |    | 70  | 60 |
|                            | 5710            | /          |    |    |    | 70  | 60 |
| 802.11ax(HE40)             | 5510            | /          |    |    |    | 70  | 60 |
|                            | 5550            | /          |    |    |    | 70  | 60 |
|                            | 5670            | /          |    |    |    | 70  | 60 |
|                            | 5710            | /          |    |    |    | 72  | 60 |
| 802.11ac(VHT80)            | 5530            | /          |    |    |    | 72  | 58 |
|                            | 5610            | /          |    |    |    | 72  | 58 |
|                            | 5690            | /          |    |    |    | 72  | 58 |
| 802.11ax(HE80)             | 5530            | /          |    |    |    | 72  | 58 |
|                            | 5610            | /          |    |    |    | 72  | 58 |
|                            | 5690            | /          |    |    |    | 72  | 58 |
| 802.11ac(VHT160)           | 5570            | /          |    |    |    | 70  | 58 |
| 802.11ax(HE160)            | 5570            | /          |    |    |    | 70  | 58 |



| U-NII-3         |                 |            |     |    |    |     |    |
|-----------------|-----------------|------------|-----|----|----|-----|----|
| Mode            | Frequency (MHz) | Parameters |     |    |    |     |    |
|                 |                 | SISO/SDM   |     |    |    | CDD | BF |
|                 |                 | 1          | 2   | 3  | 4  |     |    |
| 802.11a         | 5745            | 100        | 100 | 98 | 98 | 94  | 84 |
|                 | 5785            | 100        | 100 | 98 | 98 | 94  | 82 |
|                 | 5825            | 100        | 100 | 98 | 98 | 94  | 82 |
| 802.11n(HT20)   | 5745            | /          |     |    |    | 94  | 84 |
|                 | 5785            | /          |     |    |    | 94  | 82 |
|                 | 5825            | /          |     |    |    | 94  | 82 |
| 802.11ac(VHT20) | 5745            | /          |     |    |    | 94  | 83 |
|                 | 5785            | /          |     |    |    | 94  | 83 |
|                 | 5825            | /          |     |    |    | 94  | 83 |
| 802.11ax(HE20)  | 5745            | /          |     |    |    | 94  | 84 |
|                 | 5785            | /          |     |    |    | 94  | 84 |
|                 | 5825            | /          |     |    |    | 94  | 84 |
| 802.11n(HT40)   | 5755            | /          |     |    |    | 94  | 83 |
|                 | 5795            | /          |     |    |    | 94  | 83 |
| 802.11ac(VHT40) | 5755            | /          |     |    |    | 94  | 84 |
|                 | 5795            | /          |     |    |    | 94  | 83 |
| 802.11ax(HE40)  | 5755            | /          |     |    |    | 94  | 84 |
|                 | 5795            | /          |     |    |    | 94  | 83 |
| 802.11ac(VHT80) | 5775            | /          |     |    |    | 94  | 83 |
| 802.11ax(HE80)  | 5775            | /          |     |    |    | 94  | 84 |

## 1.7 Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

| Test Item                        | Parameters                                        | Expanded Uncertainty ( $U_{Lab}$ ) |
|----------------------------------|---------------------------------------------------|------------------------------------|
| Conducted Emission               | Level Accuracy:<br>9kHz~150kHz<br>150kHz to 30MHz | $\pm 3.50$ dB<br>$\pm 3.10$ dB     |
| Radiated Emission                | Level Accuracy:<br>9kHz to 30 MHz                 | $\pm 4.60$ dB                      |
| Radiated Emission                | Level Accuracy:<br>30MHz to 1000 MHz              | $\pm 4.50$ dB                      |
| Radiated Emission                | Level Accuracy:<br>Above 1000MHz                  | $\pm 4.20$ dB                      |
| RF Power-Conducted               | /                                                 | $\pm 0.95$ dB                      |
| Power Spectral Density-Conducted | /                                                 | $\pm 3$ dB                         |
| Occupied Bandwidth               | /                                                 | $\pm 3.8\%$                        |
| Unwanted Emission-Conducted      | /                                                 | $\pm 2.72$ dB                      |



## 1.8 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1/F., Building 6, Rundongsheng Industrial Zone, Longzhu, Xixiang, Bao'an District, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

### **CNAS (L5813)**

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

### **A2LA Certificate No.: 4750.01**

The laboratory has been accredited by American Association for Laboratory Accreditation(A2LA) to ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories for the technical competence in the field of Electrical Testing. And the A2LA Certificate No.: 4750.01.FCC Accredited Test Site Number: 854351. Designation Number: CN1223.

### **IC Registration No.: (11950A)**

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A. CAB identifier: CN0056.



## 2. Test Summary

| Standard Section                                                                                                                                                                                                                                  | Test Item                      | Test Sample(s)          | Test Mode                                                 | Judgment |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------------------|-----------------------------------------------------------|----------|
| FCC 15.207(a)                                                                                                                                                                                                                                     | Conducted Emission             | HC-C-202304-0016-01-02# | 802.11a SISO                                              | PASS     |
| FCC 15.209 & 15.407(b)                                                                                                                                                                                                                            | Radiated Unwanted Emissions    | HC-C-202304-0016-01-02# | 802.11a SISO<br>802.11a/n/ac/ax CDD                       | PASS     |
| FCC 15.203                                                                                                                                                                                                                                        | Antenna Requirement            | HC-C-202304-0016-01-01# | /                                                         | PASS     |
| FCC 15.407(a)                                                                                                                                                                                                                                     | -26dB Emission Bandwidth       | HC-C-202304-0016-01-01# | 802.11a SISO<br>802.11a/n/ac/ax CDD                       | PASS     |
| FCC 15.407(a)                                                                                                                                                                                                                                     | 99% Occupied Bandwidth         | /                       | /                                                         | N/A      |
| FCC 15.407(e)                                                                                                                                                                                                                                     | -6dB Min Emission Bandwidth    | HC-C-202304-0016-01-01# | 802.11a SISO<br>802.11a/n/ac/ax CDD                       | PASS     |
| FCC 15.407(a)                                                                                                                                                                                                                                     | Maximum Conducted Output Power | HC-C-202304-0016-01-01# | 802.11a SISO<br>802.11a/n/ac/ax CDD<br>802.11a/n/ac/ax BF | PASS     |
| FCC 15.407(a)                                                                                                                                                                                                                                     | Power Spectral Density         | HC-C-202304-0016-01-01# | 802.11a SISO<br>802.11a/n/ac/ax CDD<br>802.11a/n/ac/ax BF | PASS     |
| FCC 15.407(b)& 15.205                                                                                                                                                                                                                             | Emissions in Restricted Bands  | HC-C-202304-0016-01-01# | 802.11a SISO<br>802.11a/n/ac/ax CDD                       | PASS     |
| FCC 15.407(b)&15.209                                                                                                                                                                                                                              | Conducted Unwanted Emissions   | HC-C-202304-0016-01-01# | 802.11a SISO<br>802.11a/n/ac/ax CDD                       | PASS     |
| FCC 15.407(g)                                                                                                                                                                                                                                     | Frequency Stability            | HC-C-202304-0016-01-01# | 802.11n20                                                 | PASS     |
| /                                                                                                                                                                                                                                                 | On Time and Duty Cycle         | HC-C-202304-0016-01-01# | 802.11a SISO<br>802.11a/n/ac/ax CDD                       | /        |
| <b>Note:</b> (1) N/A is an abbreviation for Not Applicable.<br>(2) Some test items only test the SISO/CDD test mode.<br>(3) <b>SISO</b> : Simple Input Simple Output Mode, <b>CDD</b> : Cyclic Delay Diversity mode, <b>BF</b> : Beamforming Mode |                                |                         |                                                           |          |

## 3. Test Software

| Test Item          | Test Software | Manufacturer | Version No. |
|--------------------|---------------|--------------|-------------|
| Conducted Emission | EZ-EMC        | EZ           | CDI-03A2    |
| Radiation Emission | EZ-EMC        | EZ           | FA-03A2RE   |
| Radiation Emission | EZ-EMC        | EZ           | FA-03A2RE+  |
| RF Test System     | JS1120-3      | Tonscend     | V3.2.22     |



## 4. Test Equipment

| Conducted Emission Test    |                                  |                    |               |               |               |
|----------------------------|----------------------------------|--------------------|---------------|---------------|---------------|
| Equipment                  | Manufacturer                     | Model No.          | Serial No.    | Last Cal.     | Cal. Due Date |
| EMI Test Receiver          | Rohde & Schwarz                  | ESCI               | 100321        | Jun. 20, 2023 | Jun. 19, 2024 |
| RF Switching Unit          | Compliance Direction Systems Inc | RSU-A4             | 34403         | Jun. 20, 2023 | Jun. 19, 2024 |
| AMN                        | SCHWARZBECK                      | NNBL 8226-2        | 8226-2/164    | Jun. 20, 2023 | Jun. 19, 2024 |
| LISN                       | Rohde & Schwarz                  | ENV216             | 101131        | Jun. 20, 2023 | Jun. 19, 2024 |
| Radiation Emission Test    |                                  |                    |               |               |               |
| Equipment                  | Manufacturer                     | Model No.          | Serial No.    | Last Cal.     | Cal. Due Date |
| Spectrum Analyzer          | Agilent                          | N9020A             | MY49100060    | Aug. 30, 2023 | Aug. 29, 2024 |
| Spectrum Analyzer          | Rohde & Schwarz                  | FSV40-N            | 102197        | Jun. 20, 2023 | Jun. 19, 2024 |
| EMI Test Receiver          | Rohde & Schwarz                  | ESU-8              | 100472/008    | Feb. 22, 2023 | Feb.22, 2024  |
| Bilog Antenna              | SCHWARZBECK                      | VULB 9168          | 1225          | Dec. 05, 2021 | Dec. 04, 2023 |
| Horn Antenna               | SCHWARZBECK                      | BBHA 9120 D        | 2463          | Feb. 26, 2022 | Feb.25, 2024  |
| Horn Antenna               | SCHWARZBECK                      | BBHA 9170          | 1118          | Jun. 26, 2022 | Jun.25, 2024  |
| Loop Antenna               | SCHWARZBECK                      | FMZB 1519 B        | 1519B-059     | Jun. 26, 2022 | Jun.25, 2024  |
| HF Amplifier               | Tonscend                         | TAP9E6343          | AP21C806117   | Aug. 30, 2023 | Aug. 29, 2024 |
| HF Amplifier               | Tonscend                         | TAP051845          | AP21C806141   | Aug. 30, 2023 | Aug. 29, 2024 |
| HF Amplifier               | Tonscend                         | TAP0184050         | AP21C806129   | Aug. 30, 2023 | Aug. 29, 2024 |
| Pre-amplifier              | HP                               | 8449B              | 3008A00849    | Feb. 22, 2023 | Feb.22, 2024  |
| Highpass Filter            | CD                               | HPM-6.4/18G        | ---           | N/A           | N/A           |
| Highpass Filter            | CD                               | HPM-2.8/18G        | ---           | N/A           | N/A           |
| Highpass Filter            | XINBO                            | XBLBQ-HTA67(8-25G) | 22052702-1    | N/A           | N/A           |
| Antenna Conducted Emission |                                  |                    |               |               |               |
| Equipment                  | Manufacturer                     | Model No.          | Serial No.    | Last Cal.     | Cal. Due Date |
| Spectrum Analyzer          | Rohde & Schwarz                  | FSV40-N            | 102197        | Jun. 20, 2023 | Jun. 19, 2024 |
| MXA Signal Analyzer        | Agilent                          | N9020A             | MY49100060    | Aug. 30, 2023 | Aug. 29, 2024 |
| Spectrum Analyzer          | KEYSIGT                          | N9020B             | MY60110172    | Aug. 30, 2023 | Aug. 29, 2024 |
| RF Power Sensor            | DARE!! Instruments               | RadiPowerRPR3006W  | 17I00015SNO26 | Aug. 30, 2023 | Aug. 29, 2024 |
|                            | DARE!! Instruments               | RadiPowerRPR3006W  | 17I00015SNO29 | Aug. 30, 2023 | Aug. 29, 2024 |
|                            | DARE!! Instruments               | RadiPowerRPR3006W  | 17I00015SNO31 | Aug. 30, 2023 | Aug. 29, 2024 |
|                            | DARE!! Instruments               | RadiPowerRPR3006W  | 17I00015SNO33 | Aug. 30, 2023 | Aug. 29, 2024 |
| RF Control Unit            | Tonsced                          | JS0806-2           | 21F8060439    | Aug. 30, 2023 | Aug. 29, 2024 |
| Power Control Box          | Tonsced                          | JS0806-4ADC        | 21C8060387    | N/A           | N/A           |



## 5. Conducted Emission Test

### 5.1 Test Standard and Limit

#### 5.1.1 Test Standard

##### FCC Part 15.207

#### 5.1.2 Test Limit

| Frequency     | Maximum RF Line Voltage (dB $\mu$ V) |               |
|---------------|--------------------------------------|---------------|
|               | Quasi-peak Level                     | Average Level |
| 150kHz~500kHz | 66 ~ 56 *                            | 56 ~ 46 *     |
| 500kHz~5MHz   | 56                                   | 46            |
| 5MHz~30MHz    | 60                                   | 50            |

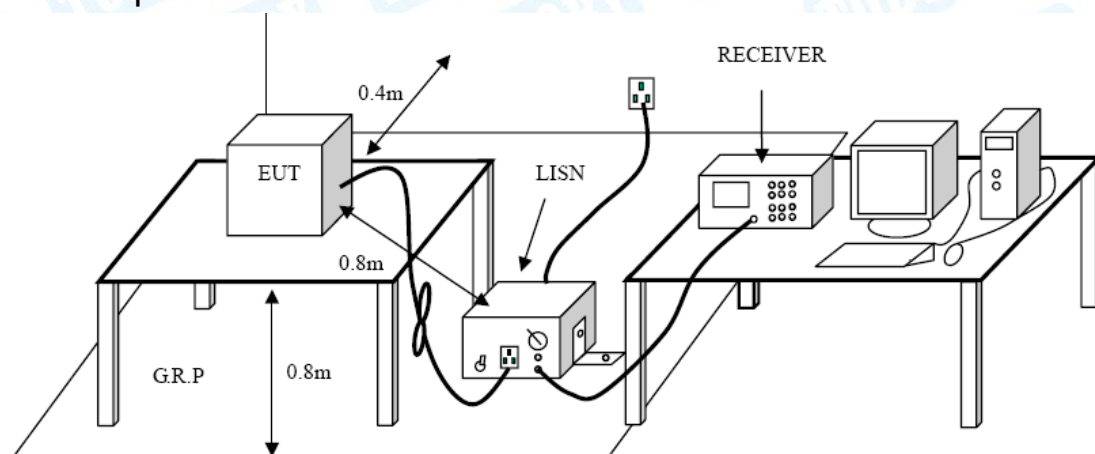
**Notes:**

(1) \*Decreasing linearly with logarithm of the frequency.

(2) The lower limit shall apply at the transition frequencies.

(3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

### 5.2 Test Setup



### 5.3 Test Procedure

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- The bandwidth of EMI test receiver is set at 9 kHz, and the test frequency band is from 0.15MHz to 30MHz.

### 5.4 Deviation From Test Standard

No deviation



## 5.5 EUT Operating Mode

Please refer to the description of test mode.

## 5.6 Test Data

Please refer to the Attachment A inside test report.



## 6. Radiated and Conducted Unwanted Emissions

### 6.1 Test Standard and Limit

#### 6.1.1 Test Standard

**FCC Part 15.209 & FCC Part 15.407(b)**

#### 6.1.2 Test Limit

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

| General field strength limits at frequencies Below 30MHz |                                  |                               |
|----------------------------------------------------------|----------------------------------|-------------------------------|
| Frequency (MHz)                                          | Field Strength (microvolt/meter) | Measurement Distance (meters) |
| 0.009~0.490                                              | 2400/F(KHz)                      | 300                           |
| 0.490~1.705                                              | 24000/F(KHz)                     | 30                            |
| 1.705~30.0                                               | 30                               | 30                            |

**Note:** 1, The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

| General field strength limits at frequencies above 30 MHz |                              |                               |
|-----------------------------------------------------------|------------------------------|-------------------------------|
| Frequency (MHz)                                           | Field strength (μV/m at 3 m) | Measurement Distance (meters) |
| 30~88                                                     | 100                          | 3                             |
| 88~216                                                    | 150                          | 3                             |
| 216~960                                                   | 200                          | 3                             |
| Above 960                                                 | 500                          | 3                             |

| General field strength limits at frequencies Above 1000MHz |                         |         |
|------------------------------------------------------------|-------------------------|---------|
| Frequency (MHz)                                            | Distance of 3m (dBuV/m) |         |
|                                                            | Peak                    | Average |
| Above 1000                                                 | 74                      | 54      |

**Note:**

- (1) The tighter limit applies at the band edges.
- (2) Emission Level(dBuV/m)=20log Emission Level(uV/m)
- (3) For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

#### Limits of unwanted emission out of the restricted bands

| Frequency (MHz) | EIRP Limits (dBm) | Equivalent Field Strength at 3m (dBuV/m) |
|-----------------|-------------------|------------------------------------------|
| 5150~5250       | -27               | 68.3                                     |
| 5250~5350       | -27               | 68.3                                     |
| 5470~5725       | -27               | 68.3                                     |
| 5725~5825       | -27(Note 2)       | 68.3                                     |
|                 | 10(Note 2)        | 105.3                                    |
|                 | 15.6(Note 2)      | 110.9                                    |
|                 | 27(Note 2)        | 122.3                                    |

**NOTE:**

1, The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:



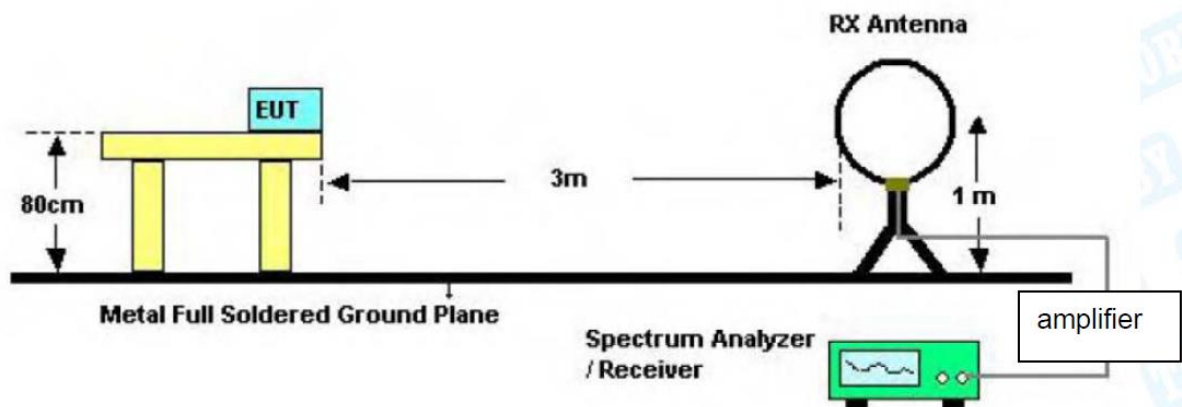
$$E = \frac{1000000\sqrt{30P}}{3} \text{ uV/m, where P is the eirp (Watts)}$$

2, According to FCC 16-24, 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 25MHz 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 27dBm/MHz at the band edge.

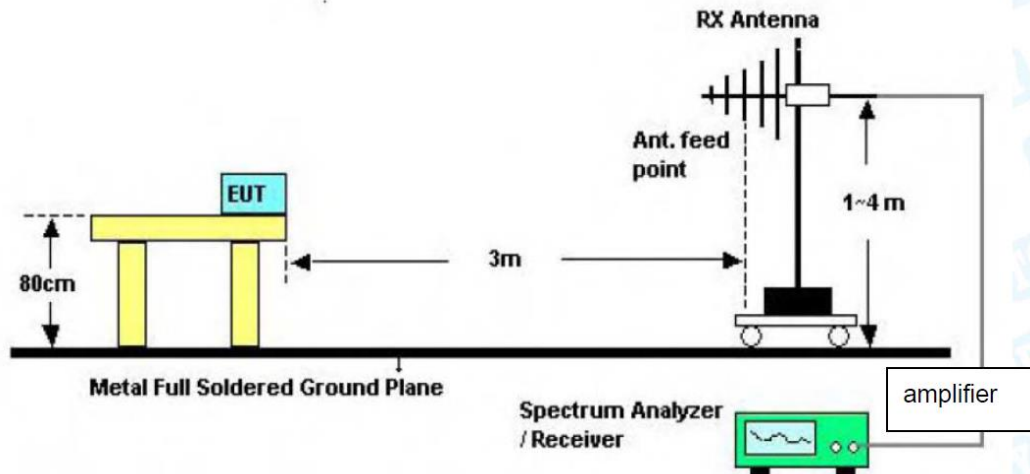
3, For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

## 6.2 Test Setup

### Radiated measurement

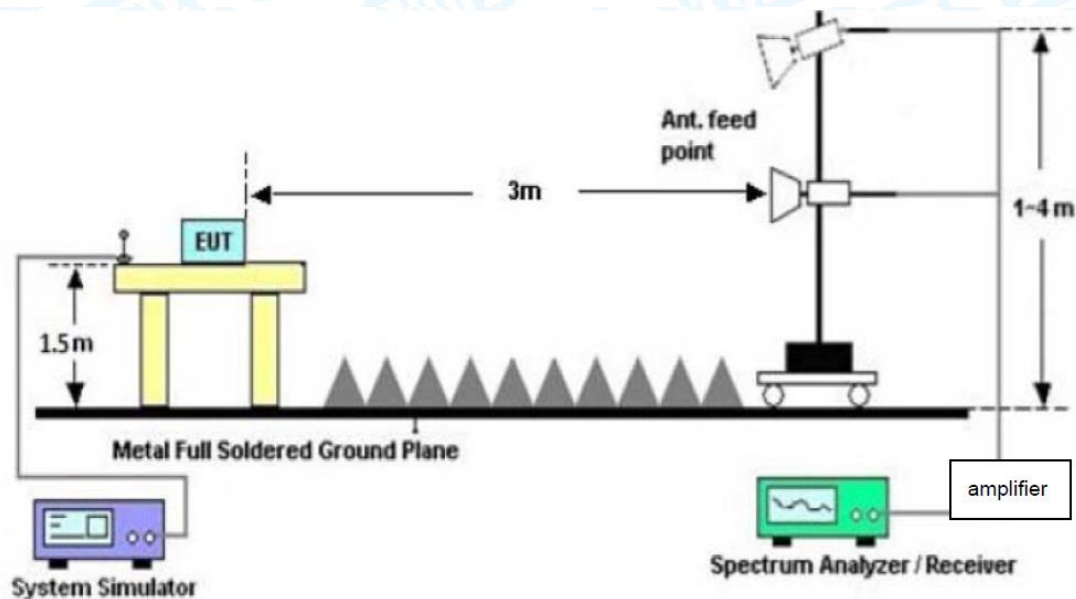


### Below 30MHz Test Setup

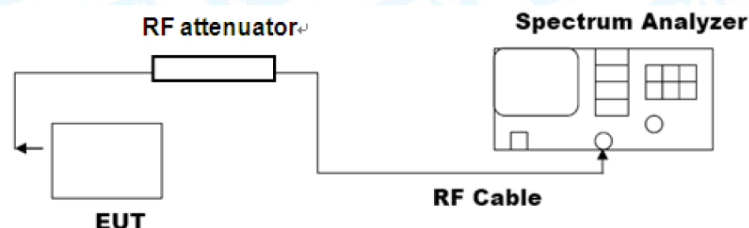


### Below 1000MHz Test Setup





**Above 1GHz Test Setup**



**Conducted measurement**

## 6.3 Test Procedure

### ---Radiated measurement

- The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Below 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to



comply with applicable limit above 1 GHz.

● Testing frequency range 30MHz-1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection. Testing frequency range 9KHz-150Hz the measuring instrument use VBW=200Hz with Quasi-peak detection. Testing frequency range 9KHz-30MHz the measuring instrument use VBW=9kHz with Quasi-peak detection.

● Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

● For the actual test configuration, please see the test setup photo.

### --- Conducted measurement

#### ● Reference level measurement

Establish a reference level by using the following procedure:

- Set instrument center frequency to DTS channel center frequency.
- Set the span to  $\geq 1.5$  times the DTS bandwidth.
- Set the RBW = 100 kHz.
- Set the  $VBW \geq [3 \times RBW]$ .
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum PSD level.

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

#### ● Emission level measurement

Establish an emission level by using the following procedure:

- Set the center frequency and span to encompass frequency range to be measured.
- Set the RBW = 100 kHz.
- Set the  $VBW \geq [3 \times RBW]$ .
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.



## 6.4 Deviation From Test Standard

No deviation

## 6.5 EUT Operating Mode

Please refer to the description of test mode.

## 6.6 Test Data

Radiated measurement please refer to the Attachment B inside test report.

Conducted measurement please refer to the external appendix report of 5G Wi-Fi.



## 7. Restricted Bands Requirement

### 7.1 Test Standard and Limit

#### 7.1.1 Test Standard

#### FCC Part 15.205 & FCC Part 15.407(b)

#### 7.1.2 Test Limit

| Frequency (MHz) | EIRP Limits (dBm) | Equivalent Field Strength at 3m (dBuV/m) |
|-----------------|-------------------|------------------------------------------|
| 5150~5250       | -27               | 68.3                                     |
| 5250~5350       | -27               | 68.3                                     |
| 5470~5725       | -27               | 68.3                                     |
| 5725~5825       | -27(Note 2)       | 68.3                                     |
|                 | 10(Note 2)        | 105.3                                    |
|                 | 15.6(Note 2)      | 110.9                                    |
|                 | 27(Note 2)        | 122.3                                    |

**NOTE:**

1, The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \text{ uV/m, where P is the eirp (Watts)}$$

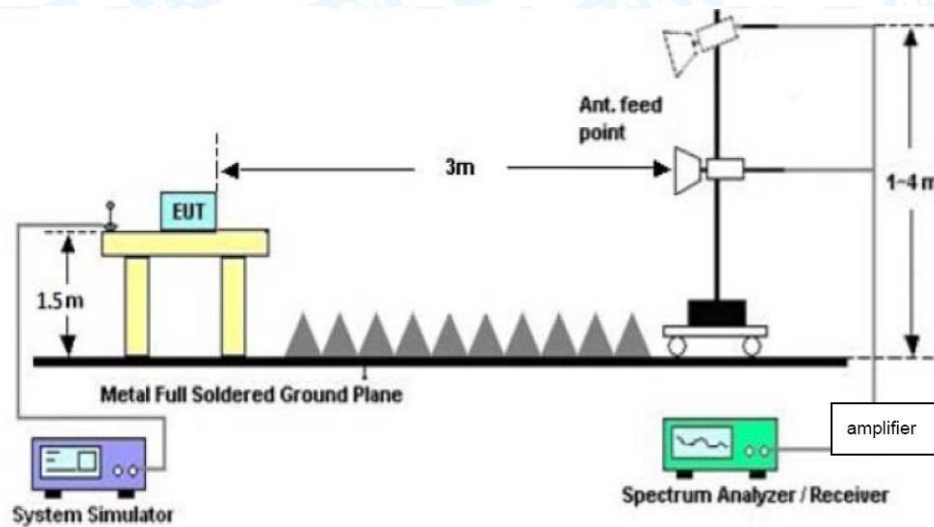
2, According to FCC 16-24, All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27dBm/MHz at the band edge.

**Note:** According the ANSI C63.10 11.12.2 antenna-port conducted measurements may also be used as an alternative to radiated measurements for determining compliance in the restricted frequency bands requirements. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test forcabinet/case emissions is required.

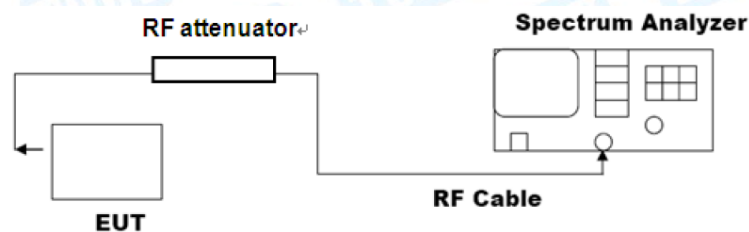


## 7.2 Test Setup

### Radiated measurement



### Conducted measurement



## 7.3 Test Procedure

### ---Radiated measurement

- Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- The Peak Value and average value both need to comply with applicable limit above 1 GHz.
- Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- For the actual test configuration, please see the test setup photo.



**--- Conducted measurement**

- a) Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency (see 11.12.2.3 through 11.12.2.5 for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
- b) Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP (see 11.12.2.6 for guidance on determining the applicable antenna gain).
- c) Add the appropriate maximum ground reflection factor to the EIRP (6 dB for frequencies  $\leq 30$  MHz; 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive; and 0 dB for frequencies  $> 1000$  MHz).
- d) For MIMO devices, measure the power of each chain and sum the EIRP of all chains in linear terms (i.e., watts and mW).
- e) Convert the resultant EIRP to an equivalent electric field strength using the following relationship:

$$E = \text{EIRP} - 20 \log d + 104.8$$

where

$E$  is the electric field strength in dBuV/m

EIRP is the equivalent isotropically radiated power in dBm

$d$  is the specified measurement distance in m

- f) Compare the resultant electric field strength level with the applicable regulatory limit.
- g) Perform the radiated spurious emission test.

**7.4 Deviation From Test Standard**

No deviation

**7.5 EUT Operating Mode**

Please refer to the description of test mode.

**7.6 Test Data**

Please refer to the Attachment C inside test report.



## 8. Bandwidth Test

### 8.1 Test Standard and Limit

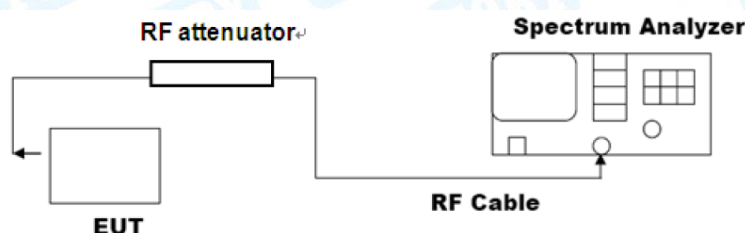
#### 8.1.1 Test Standard

**FCC Part 15.407(a) & FCC Part 15.407(e)**

#### 8.1.2 Test Limit

| Test Item       | Limit                | Frequency Range (MHz) |
|-----------------|----------------------|-----------------------|
| 26 dB Bandwidth | N/A                  | 5150~5250             |
|                 |                      | 5250~5350             |
|                 |                      | 5470~5725             |
| 6 dB Bandwidth  | $\geq 500\text{kHz}$ | 5725~5850             |
| 99% Bandwidth   | N/A                  | 5150~5250             |
|                 |                      | 5250~5350             |
|                 |                      | 5470~5725             |
|                 |                      | 5725~5850             |

### 8.2 Test Setup



### 8.3 Test Procedure

#### ---Emission bandwidth

● The procedure for this method is as follows:

- Set RBW = approximately 1% of the emission bandwidth.
- Set the VBW > RBW.
- Detector = peak.
- Trace mode = max hold.
- Measure the maximum width of the emission that is 26 dB down from the peak of the emission.

Compare this with the RBW setting of the instrument. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

NOTE—The automatic bandwidth measurement capability of a spectrum analyzer or an EMI receiver may be employed if it implements the functionality described in the preceding items.



**---DTS bandwidth**

● The steps for the first option are as follows:

- a) Set RBW = 100 kHz.
- b) Set the  $VBW \geq [3 \times RBW]$ .
- c) Detector = peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

**---occupied bandwidth**

● The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

- a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
- c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than  $[10 \log (OBW/RBW)]$  below the reference level. Specific guidance is given in 4.1.5.2.
- d) Step a) through step c) might require iteration to adjust within the specified range.
- e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
- g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The



process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

#### 8.4 Deviation From Test Standard

No deviation

#### 8.5 EUT Operating Mode

Please refer to the description of test mode.

#### 8.6 Test Data

Please refer to the external appendix report of 5G Wi-Fi.



## 9. Maximum Conducted Output Power

### 9.1 Test Standard and Limit

#### 9.1.1 Test Standard

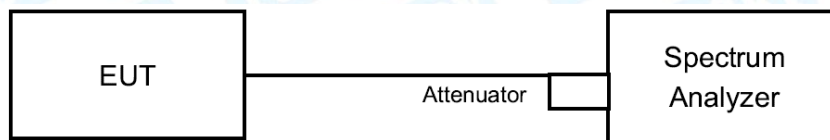
#### FCC Part 15.407(a)

#### 9.1.2 Test Limit

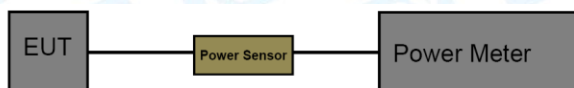
| FCC Part 15 Subpart E(15.407) |                                                                                                                |                                                                                     |           |                                    |
|-------------------------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------|------------------------------------|
| Limit                         | Frequency Range(MHz)                                                                                           |                                                                                     |           |                                    |
|                               | 5150~5250                                                                                                      | 5250~5350                                                                           | 5470~5725 | 5725~5850                          |
| Max Conducted<br>TX Power     | Master Device: 1 Watt(30dBm) Client<br>Device: 250mW(24dBm)                                                    | 24dBm (250 mW) or 11 dBm+ 10<br>log B, whichever is lower (B= 26-dB<br>emission BW) |           | 1 Watt (30dBm)                     |
| Max E.I.R.P                   | 4 W (36 dBm) with 6 dBi antenna                                                                                | 1 W (30 dBm) with 6 dBi antenna                                                     |           | 4 W (36 dBm) with<br>6 dBi antenna |
|                               | 200 W (53 dBm) for fixed P-t-P application<br>with 23 dBiantenna                                               |                                                                                     |           |                                    |
|                               | Additional rule for outdoor operation:<br>Max_EIRP< 125 mW(21 dBm) at any<br>elevation angle > 30°from horizon |                                                                                     |           |                                    |
| TPC                           | NO                                                                                                             | YES, if Max_EIRP ≥ 500 mW (27<br>dBm) and able to lower EIRP below<br>24dBm         |           | NO                                 |
|                               |                                                                                                                | NO, if Max_EIRP < 500mW<br>(27dBm)                                                  |           |                                    |

### 9.2 Test Setup

For channel straddling 5720MHz & 5710MHz & 5690MHz



For Other Channel



### 9.3 Test Procedure

#### **For channel straddling 5720MHz & 5710MHz & 5690MHz**

- a) Set span to encompass the entire 26 dB EBW or 99% OBW of the signal.
- b) Set RBW = 1 MHz.
- c) Set VBW  $\geq$  3 MHz.
- d) Number of points in sweep  $\geq$   $[2 \times \text{span} / \text{RBW}]$ . (This gives bin-to-bin spacing  $\leq$   $\text{RBW} / 2$ , so that narrowband signals are not lost between frequency bins.)
- e) Sweep time = auto.
- f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- g) If transmit duty cycle  $< 98\%$ , use a video trigger with the trigger level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle  $\geq 98\%$ , and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.”
- h) Trace average at least 100 traces in power averaging (rms) mode.
- i) Compute power by integrating the spectrum across the 26 dB EBW or 99% OBW of the signal using the instrument’s band power measurement function, with band limits set equal to the EBW or OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW or 99% OBW of the spectrum.

#### **For Other Channel**

- The EUT was connected to RF power meter via a broadband power sensor as show the block above. The power sensor video bandwidth is greater than or equal to the DTS bandwidth of the equipment.

### 9.4 Deviation From Test Standard

No deviation

### 9.5 EUT Operating Mode

Please refer to the description of test mode.

### 9.6 Test Data

Please refer to the external appendix report of 5G Wi-Fi.



## 10. Power Spectral Density Test

### 10.1 Test Standard and Limit

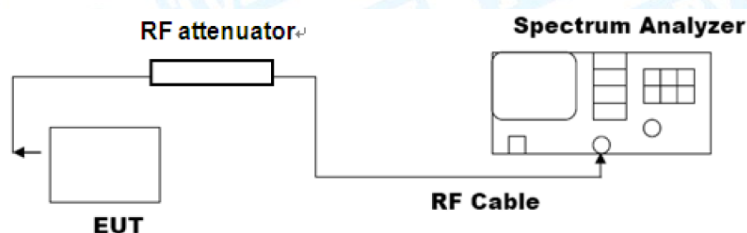
#### 10.1.1 Test Standard

##### FCC Part 15.407(a)

#### 10.1.2 Test Limit

| Test Item              | Limit                                                | Frequency Range(MHz) |
|------------------------|------------------------------------------------------|----------------------|
| Power Spectral Density | Master Device: 17dBm/MHz<br>Client Device: 11dBm/MHz | 5150~5250            |
|                        | 11dBm/MHz                                            | 5250~5350            |
|                        | 11dBm/MHz                                            | 5470~5725            |
|                        | 30dBm/500kHz                                         | 5725~5850            |

### 10.2 Test Setup



### 10.3 Test Procedure

● Notwithstanding that some regulatory requirements refer to peak power spectral density (PPSD), in some cases the intent is to measure the maximum value of the time average of the power spectral density during a period of continuous transmission. The procedure for this method is as follows:

- Create an average power spectrum for the EUT operating mode being tested by following the instructions in 12.3.2 for measuring maximum conducted output power using a spectrum analyzer or EMI receiver; that is, select the appropriate test method (SA-1, SA-2, SA-3, or their respective alternatives) and apply it up to, but not including, the step labeled, "Compute power...". (This procedure is required even if the maximum conducted output power measurement was performed using the power meter method PM.)
- Use the peak search function on the instrument to find the peak of the spectrum.
- Make the following adjustments to the peak value of the spectrum, if applicable:
  - If method SA-2 or SA-2A was used, then add  $[10 \log (1 / D)]$ , where D is the duty cycle, to the peak of the spectrum.



2) If method SA-3A was used and the linear mode was used in step h) of 12.3.2.7, add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.

d) The result is the PPSD.

e) The procedure in item a) through item c) requires the use of 1 MHz resolution bandwidth to satisfy the 1 MHz measurement bandwidth specified by some regulatory authorities.<sup>95</sup> This requirement also permits use of resolution bandwidths less than 1 MHz "provided that the measured power is integrated to show the total power over the measurement bandwidth" (i.e., 1 MHz). If measurements are performed using a reduced resolution bandwidth and integrated over 1 MHz bandwidth, the following adjustments to the procedures apply:

1) Set  $RBW \geq 1 / T$ , where T is defined in 12.2 a).

2) Set  $VBW \geq [3 \cdot RBW]$ .

3) Care shall be taken such that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

#### 10.4 Deviation From Test Standard

No deviation

#### 10.5 Antenna Connected Construction

Please refer to the description of test mode.

#### 10.6 Test Data

Please refer to the external appendix report of 5G Wi-Fi.



## 11. Frequency Stability

### 11.1 Test Standard and Limit

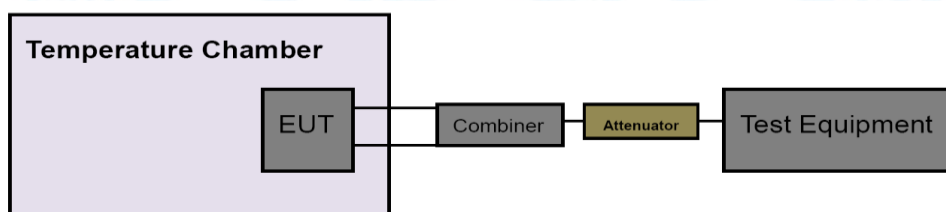
#### 11.1.1 Test Standard

##### **FCC Part 15.407(g)**

#### 11.1.2 Test Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

### 11.2 Test Setup



### 11.3 Test Procedure

#### Frequency stability with respect to ambient temperature

a) Supply the EUT with a nominal ac voltage or install a new or fully charged battery in the EUT. If possible, a dummy load shall be connected to the EUT because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, then the EUT shall be placed in the center of the chamber with the antenna adjusted to the shortest length possible. Turn ON the EUT and tune it to one of the number of frequencies shown in 5.6.

b) Couple the unlicensed wireless device output to the measuring instrument by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away), or by connecting a dummy load to the measuring instrument, through an attenuator if necessary.

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory agency is the recommended measuring instrument.

c) Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).

d) Turn the EUT OFF and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.

e) Set the temperature control on the chamber to the highest specified in the regulatory requirements for the type of device and allow the oscillator heater and the chamber temperature to stabilize.

f) While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.

g) Measure the frequency at each of frequencies specified in 5.6.

h) Switch OFF the EUT but do not switch OFF the oscillator heater.



i) Lower the chamber temperature by not more than  $10^{\circ}\text{C}$ , and allow the temperature inside the chamber to stabilize.

j) Repeat step f) through step i) down to the lowest specified temperature.

#### Frequency stability when varying supply voltage

Unless otherwise specified, these tests shall be made at ambient room temperature ( $+15^{\circ}\text{C}$  to  $+25^{\circ}\text{C}$ ). An antenna shall be connected to the antenna output terminals of the EUT if possible. If the EUT is equipped with or uses an adjustable-length antenna, then it shall be fully extended.

a) Supply the EUT with nominal voltage or install a new or fully charged battery in the EUT. Turn ON the EUT and couple its output to a frequency counter or other frequency-measuring instrument.

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory agency is the recommended measuring instrument.

b) Tune the EUT to one of the number of frequencies required in 5.6. Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).

c) Measure the frequency at each of the frequencies specified in 5.6.

d) Repeat the above procedure at 85% and 115% of the nominal supply voltage as described in 5.13.

### 11.4 Deviation From Test Standard

No deviation

### 11.5 Antenna Connected Construction

Please refer to the description of test mode.

### 11.6 Test Data

Please refer to the external appendix report of 5G Wi-Fi.



## 12. Antenna Requirement

### 12.1 Test Standard and Limit

#### 12.1.1 Test Standard

##### **FCC Part 15.203**

#### 12.1.2 Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

### 12.2 Deviation From Test Standard

No deviation

### 12.3 Antenna Connected Construction

The max. gains of the antenna used for transmitting is 5.89dBi, and the antenna de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

### 12.4 Test Data

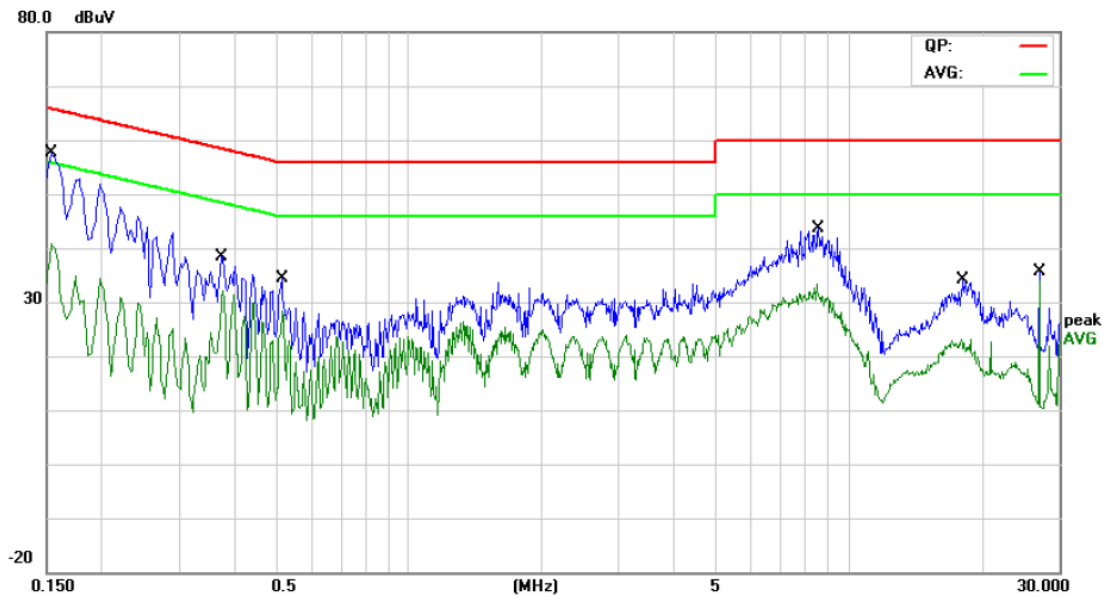
The EUT antenna is a PCB Antenna. It complies with the standard requirement.

| Antenna Type                        |                                   |
|-------------------------------------|-----------------------------------|
| <input type="checkbox"/>            | Permanent attached antenna        |
| <input checked="" type="checkbox"/> | Unique connector antenna          |
| <input type="checkbox"/>            | Professional installation antenna |



## Attachment A-- Conducted Emission Test Data

|               |                              |                    |     |
|---------------|------------------------------|--------------------|-----|
| Temperature:  | 24.6°C                       | Relative Humidity: | 42% |
| Test Voltage: | AC 120V 60Hz                 |                    |     |
| Terminal:     | Line                         |                    |     |
| Test Mode:    | Mode 1                       |                    |     |
| Remark:       | Only worse case is reported. |                    |     |



| No. | Mk. | Freq.   | Reading Level | Correct Factor | Measurement | Limit | Over   |          |
|-----|-----|---------|---------------|----------------|-------------|-------|--------|----------|
|     |     | MHz     | dBuV          | dB             | dBuV        | dBuV  | dB     | Detector |
| 1   | *   | 0.1539  | 44.74         | 10.99          | 55.73       | 65.78 | -10.05 | QP       |
| 2   |     | 0.1539  | 27.16         | 10.99          | 38.15       | 55.78 | -17.63 | AVG      |
| 3   |     | 0.3740  | 23.49         | 10.91          | 34.40       | 58.41 | -24.01 | QP       |
| 4   |     | 0.3740  | 18.75         | 10.91          | 29.66       | 48.41 | -18.75 | AVG      |
| 5   |     | 0.5140  | 18.83         | 10.92          | 29.75       | 56.00 | -26.25 | QP       |
| 6   |     | 0.5140  | 17.68         | 10.92          | 28.60       | 46.00 | -17.40 | AVG      |
| 7   |     | 8.5300  | 24.29         | 10.12          | 34.41       | 60.00 | -25.59 | QP       |
| 8   |     | 8.5300  | 19.30         | 10.12          | 29.42       | 50.00 | -20.58 | AVG      |
| 9   |     | 18.2020 | 15.02         | 10.47          | 25.49       | 60.00 | -34.51 | QP       |
| 10  |     | 18.2020 | 8.47          | 10.47          | 18.94       | 50.00 | -31.06 | AVG      |
| 11  |     | 26.9980 | 23.11         | 10.96          | 34.07       | 60.00 | -25.93 | QP       |
| 12  |     | 26.9980 | 22.55         | 10.96          | 33.51       | 50.00 | -16.49 | AVG      |

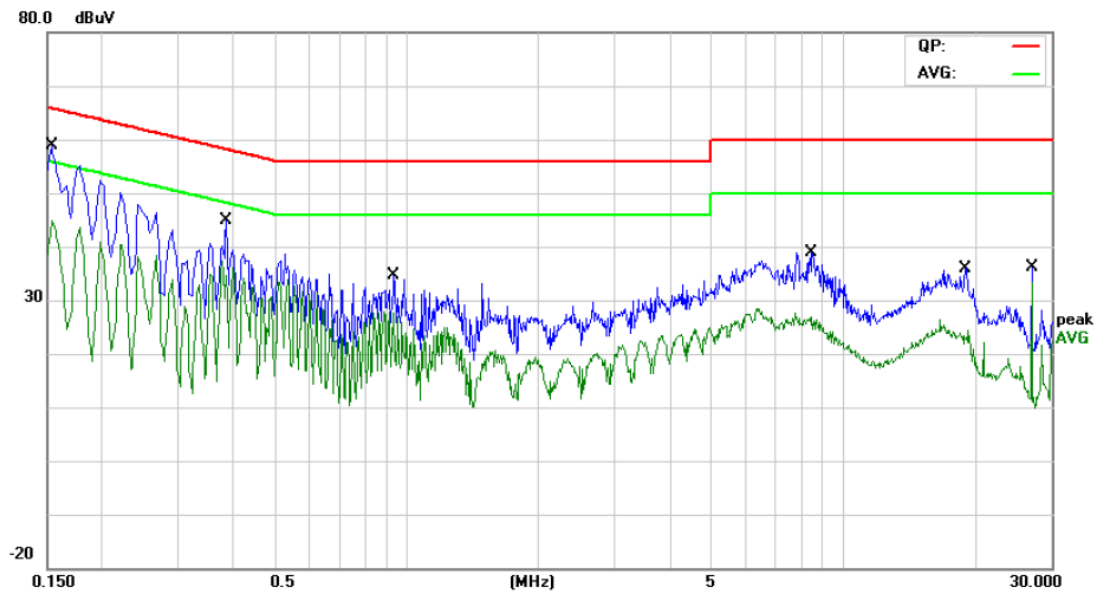
**Remark:**

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)

2. Margin (dB) = QuasiPeak/Average (dBuV) - Limit (dBuV)



|               |                              |                    |     |
|---------------|------------------------------|--------------------|-----|
| Temperature:  | 24.6°C                       | Relative Humidity: | 42% |
| Test Voltage: | AC 120V 60Hz                 |                    |     |
| Terminal:     | Neutral                      |                    |     |
| Test Mode:    | Mode 1                       |                    |     |
| Remark:       | Only worse case is reported. |                    |     |



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|
| 1   | *   | 0.1539       | 45.28                    | 10.99                   | 56.27                    | 65.78         | -9.51      | QP       |
| 2   |     | 0.1539       | 32.67                    | 10.99                   | 43.66                    | 55.78         | -12.12     | AVG      |
| 3   |     | 0.3860       | 29.04                    | 10.91                   | 39.95                    | 58.15         | -18.20     | QP       |
| 4   |     | 0.3860       | 15.11                    | 10.91                   | 26.02                    | 48.15         | -22.13     | AVG      |
| 5   |     | 0.9340       | 17.49                    | 10.74                   | 28.23                    | 56.00         | -27.77     | QP       |
| 6   |     | 0.9340       | 12.83                    | 10.74                   | 23.57                    | 46.00         | -22.43     | AVG      |
| 7   |     | 8.4940       | 18.55                    | 10.11                   | 28.66                    | 60.00         | -31.34     | QP       |
| 8   |     | 8.4940       | 13.47                    | 10.11                   | 23.58                    | 50.00         | -26.42     | AVG      |
| 9   |     | 19.0300      | 14.68                    | 10.50                   | 25.18                    | 60.00         | -34.82     | QP       |
| 10  |     | 19.0300      | 8.13                     | 10.50                   | 18.63                    | 50.00         | -31.37     | AVG      |
| 11  |     | 27.0020      | 23.01                    | 10.96                   | 33.97                    | 60.00         | -26.03     | QP       |
| 12  |     | 27.0020      | 22.41                    | 10.96                   | 33.37                    | 50.00         | -16.63     | AVG      |

**Remark:**

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)

2. Margin (dB) = QuasiPeak/Average (dBuV) - Limit (dBuV)



## Attachment B--Unwanted Emissions Data

### ---Radiated Unwanted Emissions

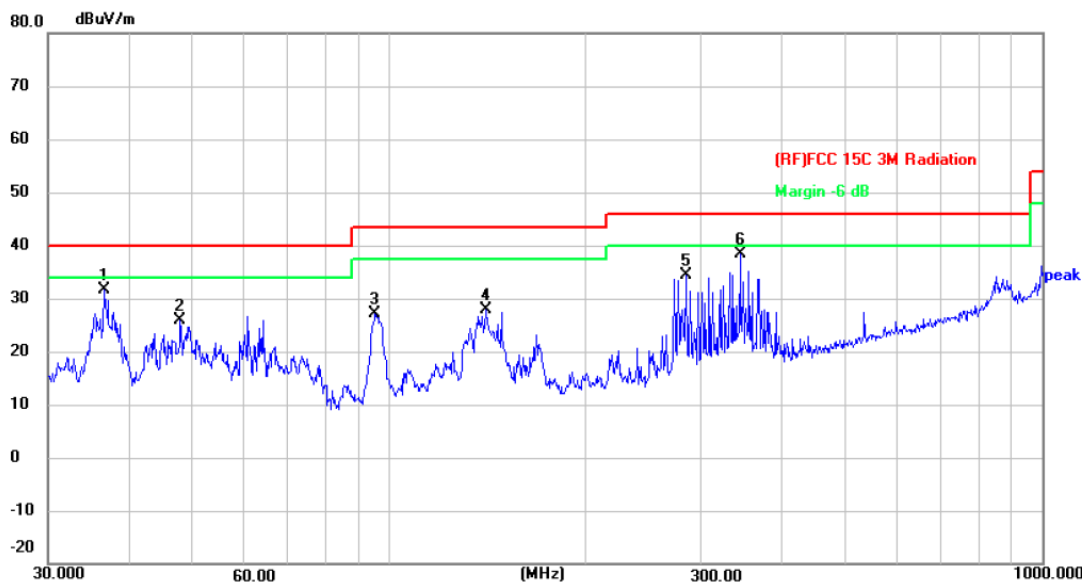
#### 9 KHz~30 MHz

From 9 KHz to 30 MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB Below the permissible value has no need to be reported.

#### 30MHz~1GHz

|               |                              |                    |     |
|---------------|------------------------------|--------------------|-----|
| Temperature:  | 23.5℃                        | Relative Humidity: | 49% |
| Test Voltage: | AC 120V 60Hz                 |                    |     |
| Ant. Pol.     | Horizontal                   |                    |     |
| Test Mode:    | Mode 2                       |                    |     |
| Remark:       | Only worse case is reported. |                    |     |



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-----|
| 1   | 36.5092         | 54.70          | -23.06        | 31.64          | 40.00          | -8.36       | peak     | P   |
| 2   | 47.8260         | 48.59          | -22.66        | 25.93          | 40.00          | -14.07      | peak     | P   |
| 3   | 95.0930         | 53.31          | -26.12        | 27.19          | 43.50          | -16.31      | peak     | P   |
| 4   | 140.8351        | 50.66          | -22.74        | 27.92          | 43.50          | -15.58      | peak     | P   |
| 5   | 284.9767        | 55.53          | -21.19        | 34.34          | 46.00          | -11.66      | peak     | P   |
| 6 * | 344.3855        | 57.96          | -19.53        | 38.43          | 46.00          | -7.57       | peak     | P   |

#### Remark:

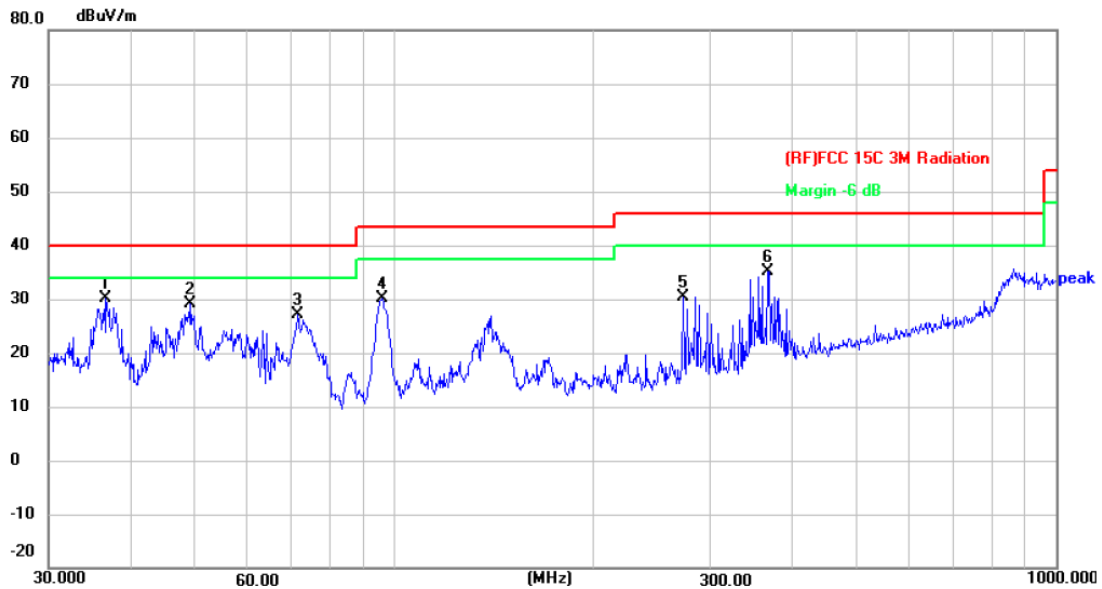
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)

2. QuasiPeak (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)

3. Margin (dB) = QuasiPeak (dBμV/m)-Limit QPK(dBμV/m)



|               |                              |                    |     |
|---------------|------------------------------|--------------------|-----|
| Temperature:  | 23.5°C                       | Relative Humidity: | 49% |
| Test Voltage: | AC 120V 60Hz                 |                    |     |
| Ant. Pol.     | Vertical                     |                    |     |
| Test Mode:    | Mode 2                       |                    |     |
| Remark:       | Only worse case is reported. |                    |     |



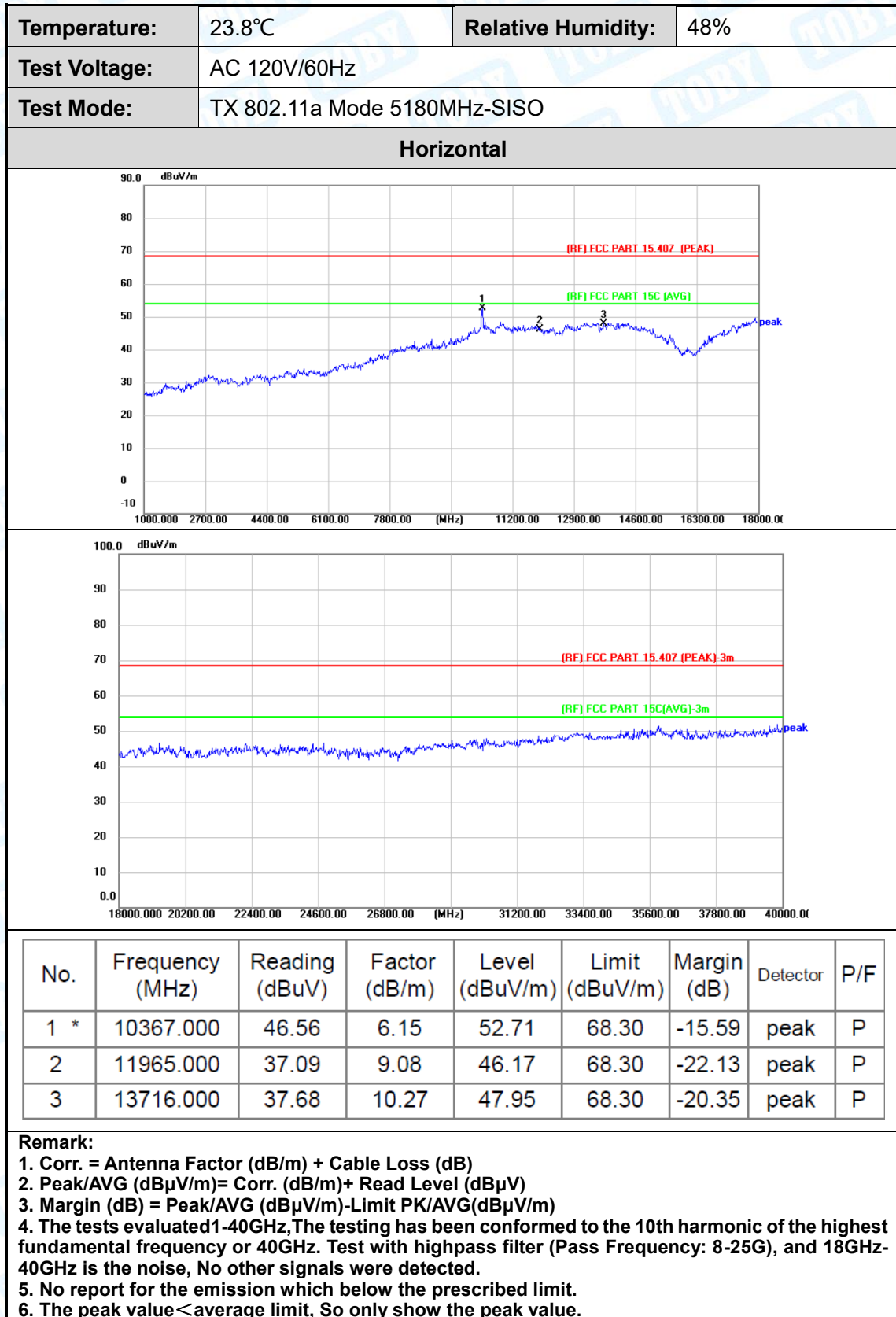
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-----|
| 1 * | 36.6375         | 53.10          | -23.06        | 30.04          | 40.00          | -9.96       | peak     | P   |
| 2   | 49.1865         | 51.82          | -22.59        | 29.23          | 40.00          | -10.77      | peak     | P   |
| 3   | 71.3300         | 51.83          | -24.63        | 27.20          | 40.00          | -12.80      | peak     | P   |
| 4   | 95.7622         | 56.26          | -26.07        | 30.19          | 43.50          | -13.31      | peak     | P   |
| 5   | 273.2341        | 52.18          | -21.70        | 30.48          | 46.00          | -15.52      | peak     | P   |
| 6   | 366.8231        | 54.09          | -18.90        | 35.19          | 46.00          | -10.81      | peak     | P   |

**Remark:**

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
3. Margin (dB) = QuasiPeak (dBμV/m)-Limit QPK(dBμV/m)

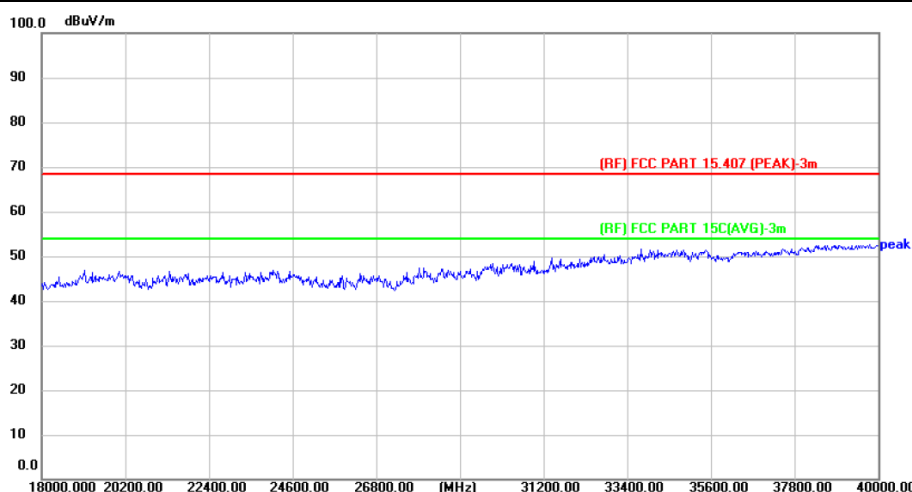
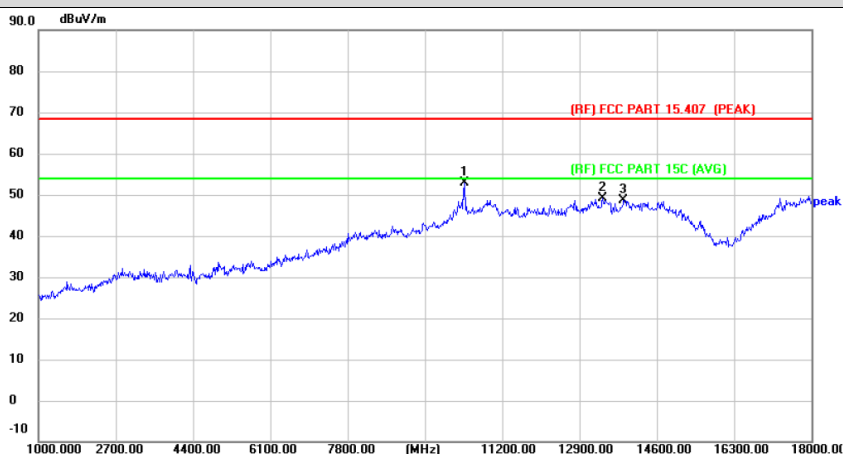


**Above 1GHz (only show the worst data)**



|               |                              |                    |     |
|---------------|------------------------------|--------------------|-----|
| Temperature:  | 23.8°C                       | Relative Humidity: | 48% |
| Test Voltage: | AC 120V/60Hz                 |                    |     |
| Test Mode:    | TX 802.11a Mode 5180MHz-SISO |                    |     |

**Vertical**

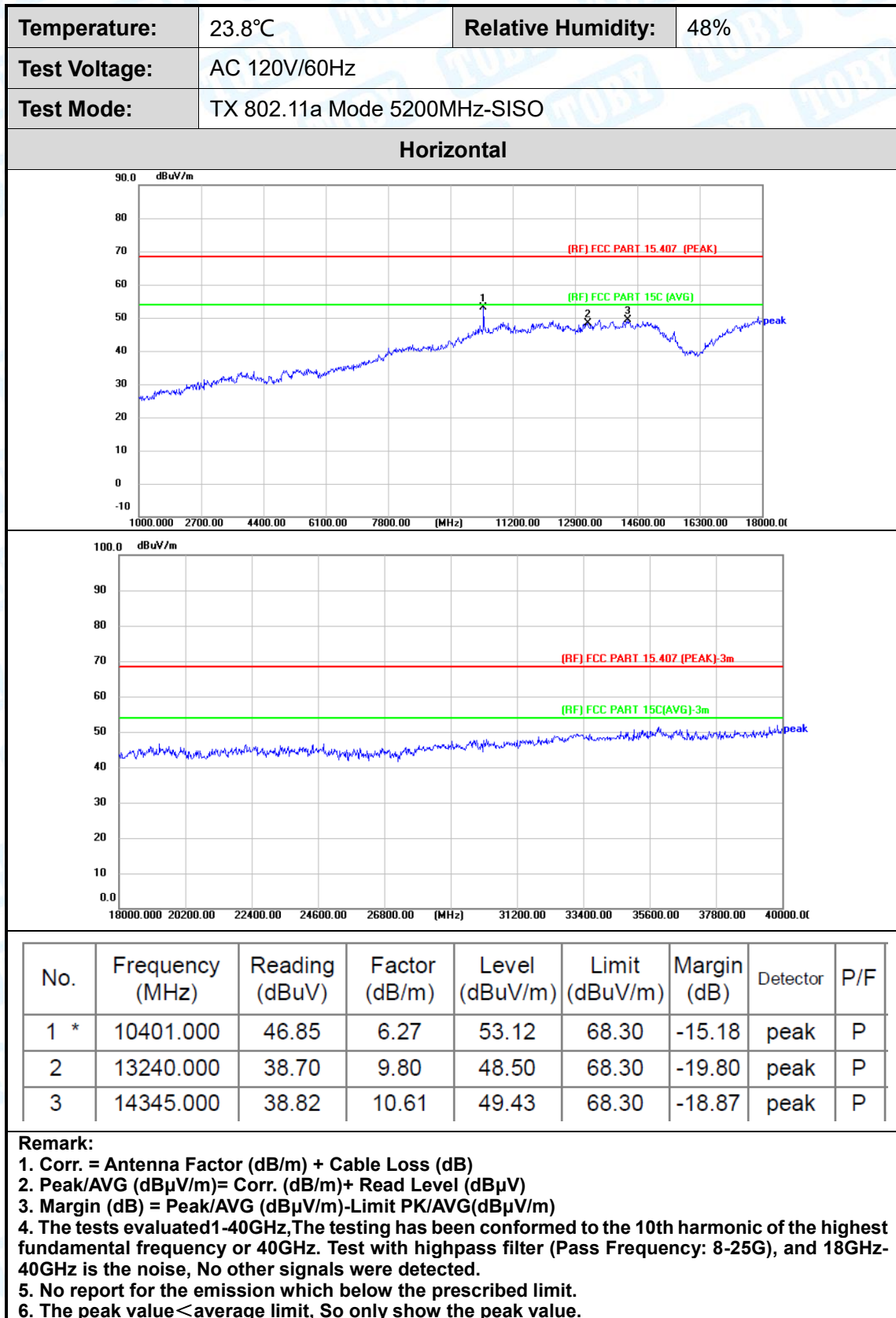


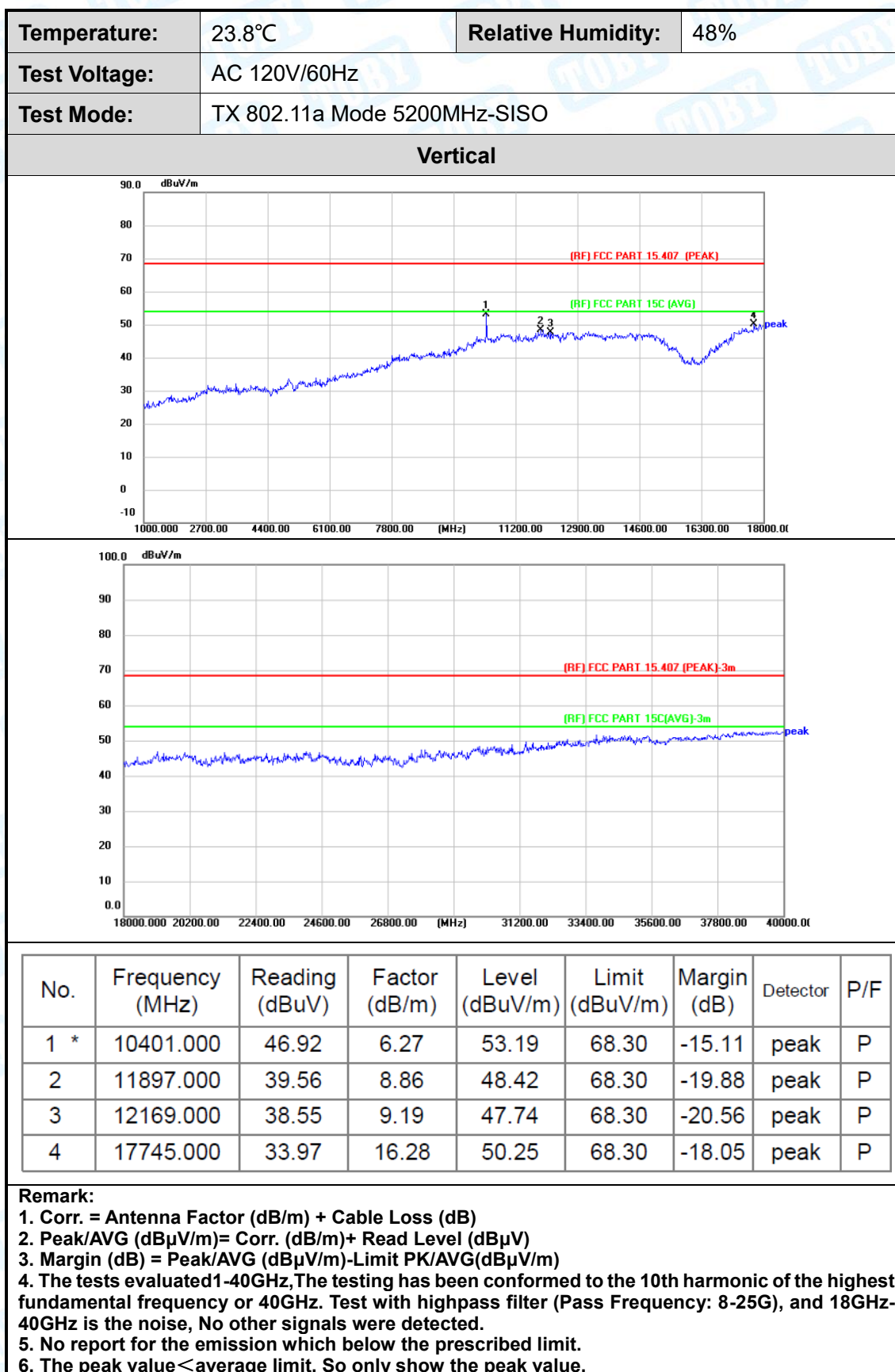
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-----|
| 1 * | 10367.000       | 46.62          | 6.15          | 52.77          | 68.30          | -15.53      | peak     | P   |
| 2   | 13410.000       | 38.87          | 10.17         | 49.04          | 68.30          | -19.26      | peak     | P   |
| 3   | 13869.000       | 37.93          | 10.73         | 48.66          | 68.30          | -19.64      | peak     | P   |

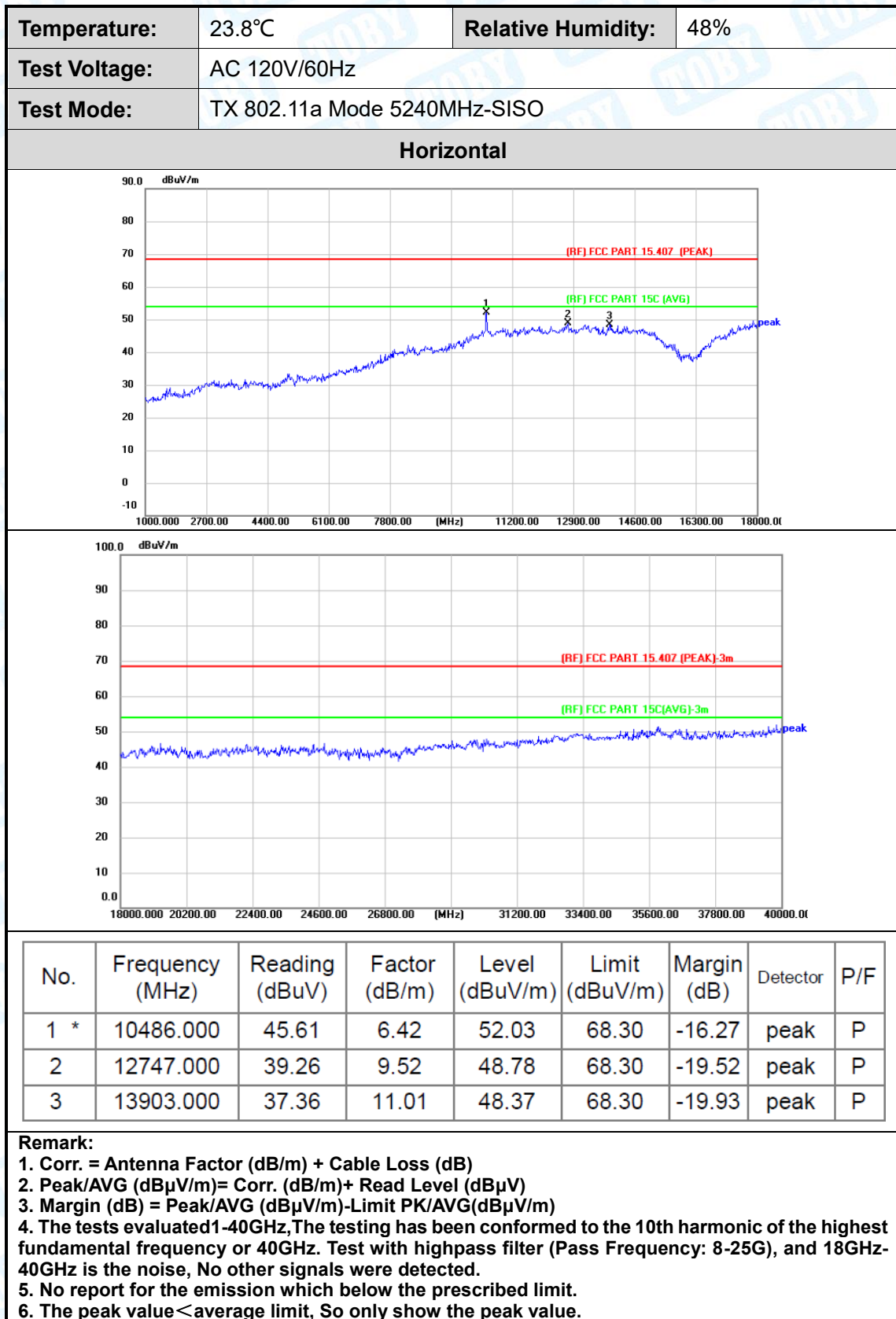
**Remark:**

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Peak/AVG (dBuV/m) = Corr. (dB/m) + Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m) - Limit PK/AVG (dBuV/m)
4. The tests evaluated 1-40GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency or 40GHz. Test with highpass filter (Pass Frequency: 8-25G), and 18GHz-40GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.



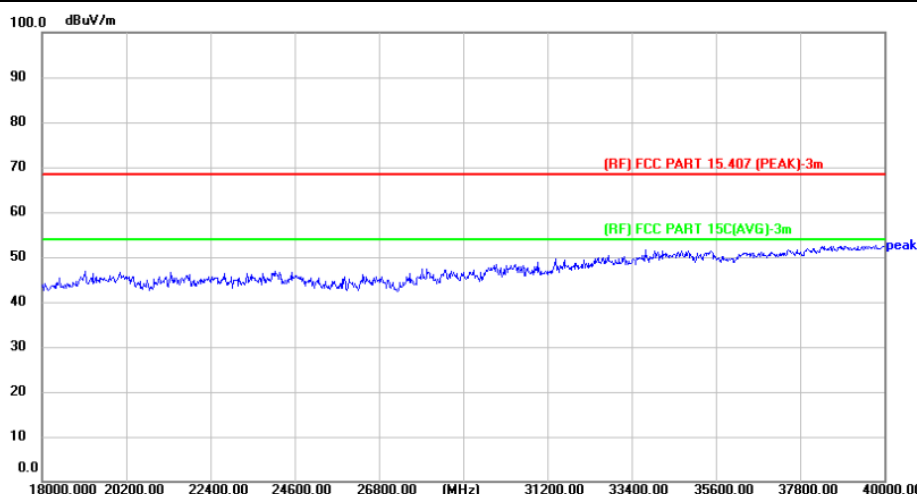
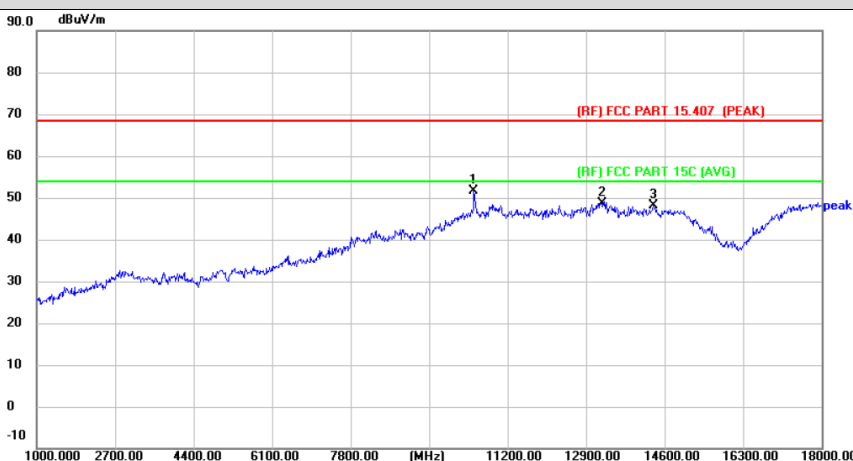






|               |                              |                    |     |
|---------------|------------------------------|--------------------|-----|
| Temperature:  | 23.8°C                       | Relative Humidity: | 48% |
| Test Voltage: | AC 120V/60Hz                 |                    |     |
| Test Mode:    | TX 802.11a Mode 5240MHz-SISO |                    |     |

**Vertical**

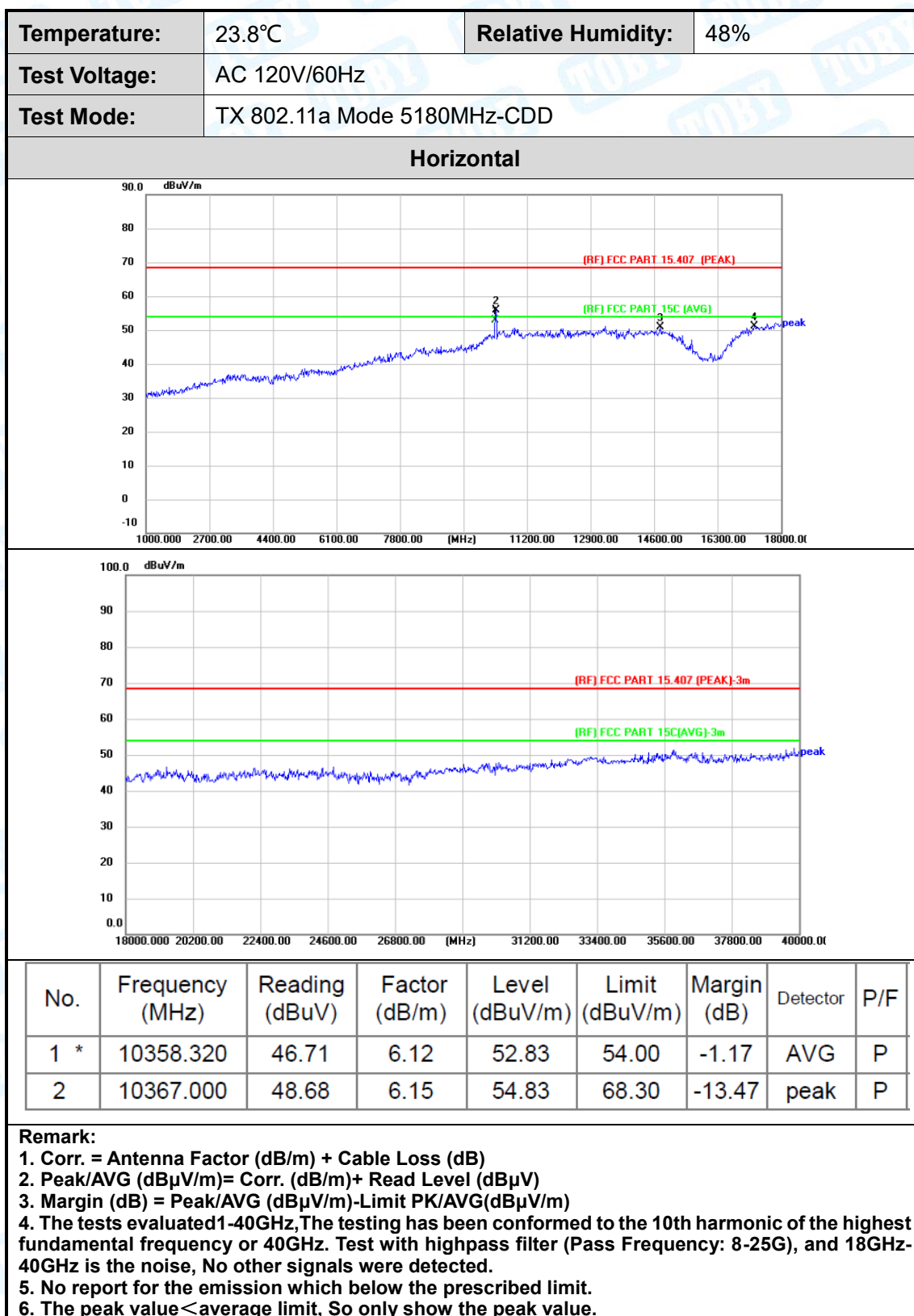


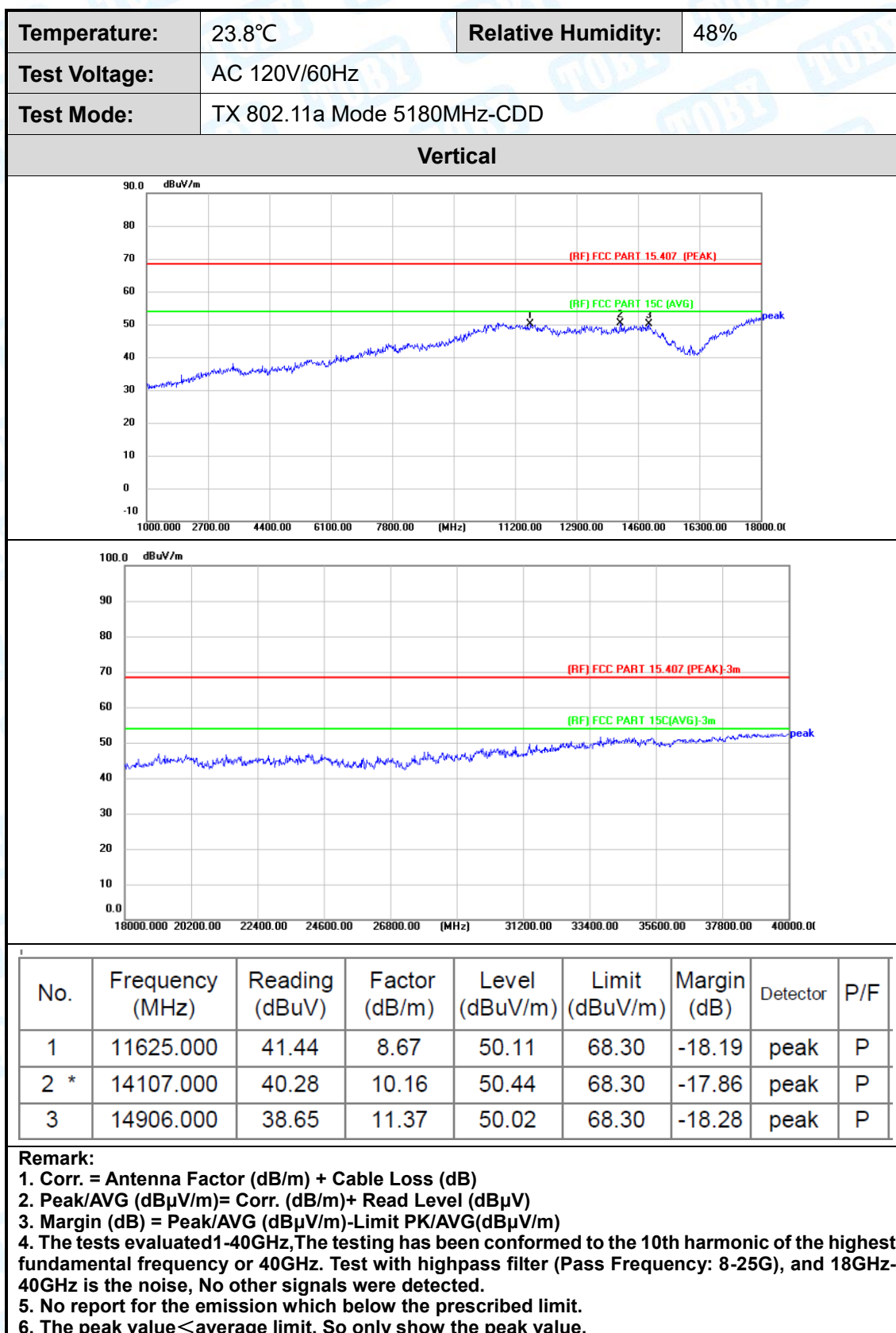
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-----|
| 1 * | 10469.000       | 45.13          | 6.39          | 51.52          | 68.30          | -16.78      | peak     | P   |
| 2   | 13240.000       | 38.95          | 9.80          | 48.75          | 68.30          | -19.55      | peak     | P   |
| 3   | 14362.000       | 37.43          | 10.73         | 48.16          | 68.30          | -20.14      | peak     | P   |

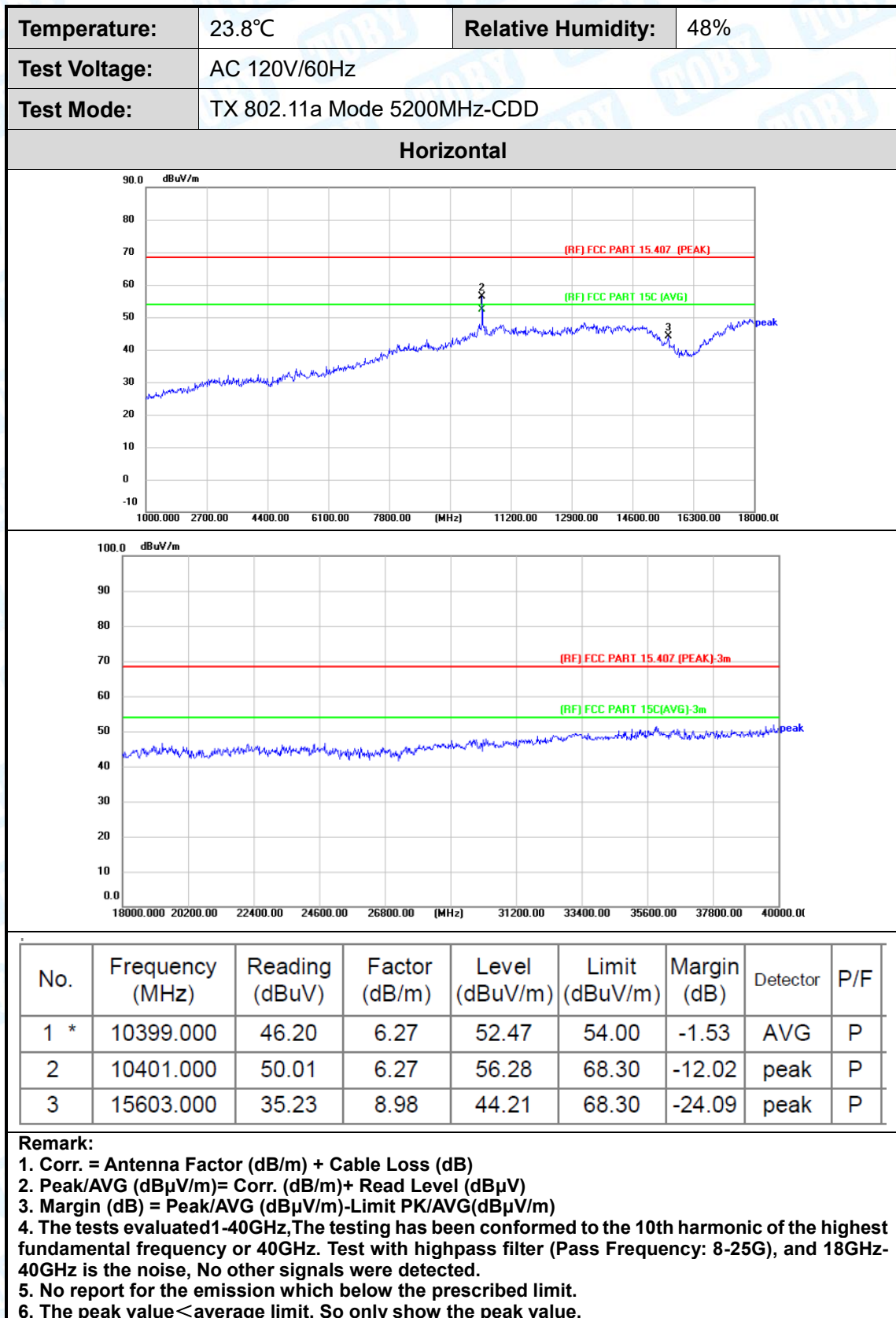
**Remark:**

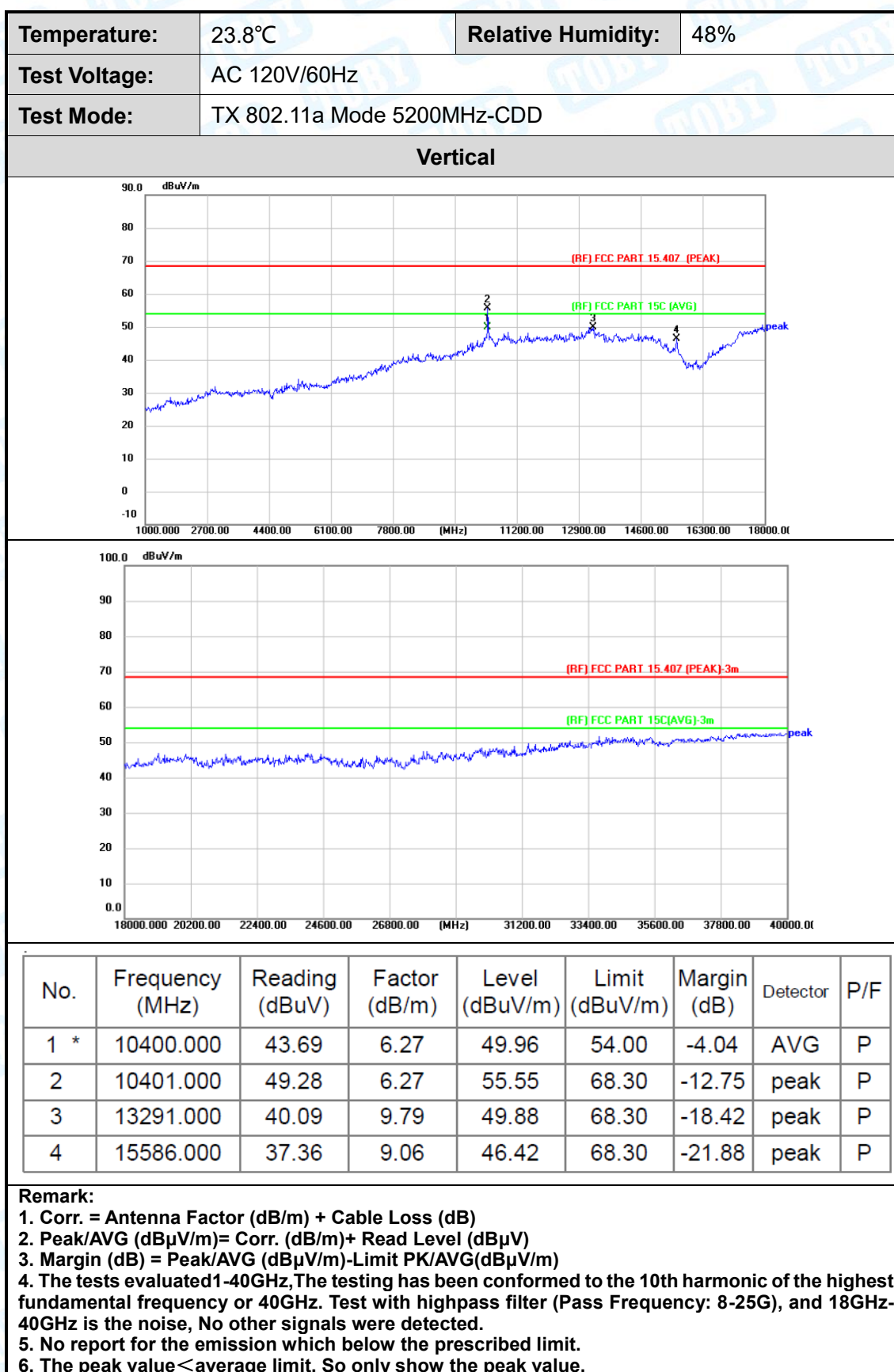
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Peak/AVG (dBuV/m) = Corr. (dB/m) + Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m) - Limit PK/AVG (dBuV/m)
4. The tests evaluated 1-40GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency or 40GHz. Test with highpass filter (Pass Frequency: 8-25G), and 18GHz-40GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.

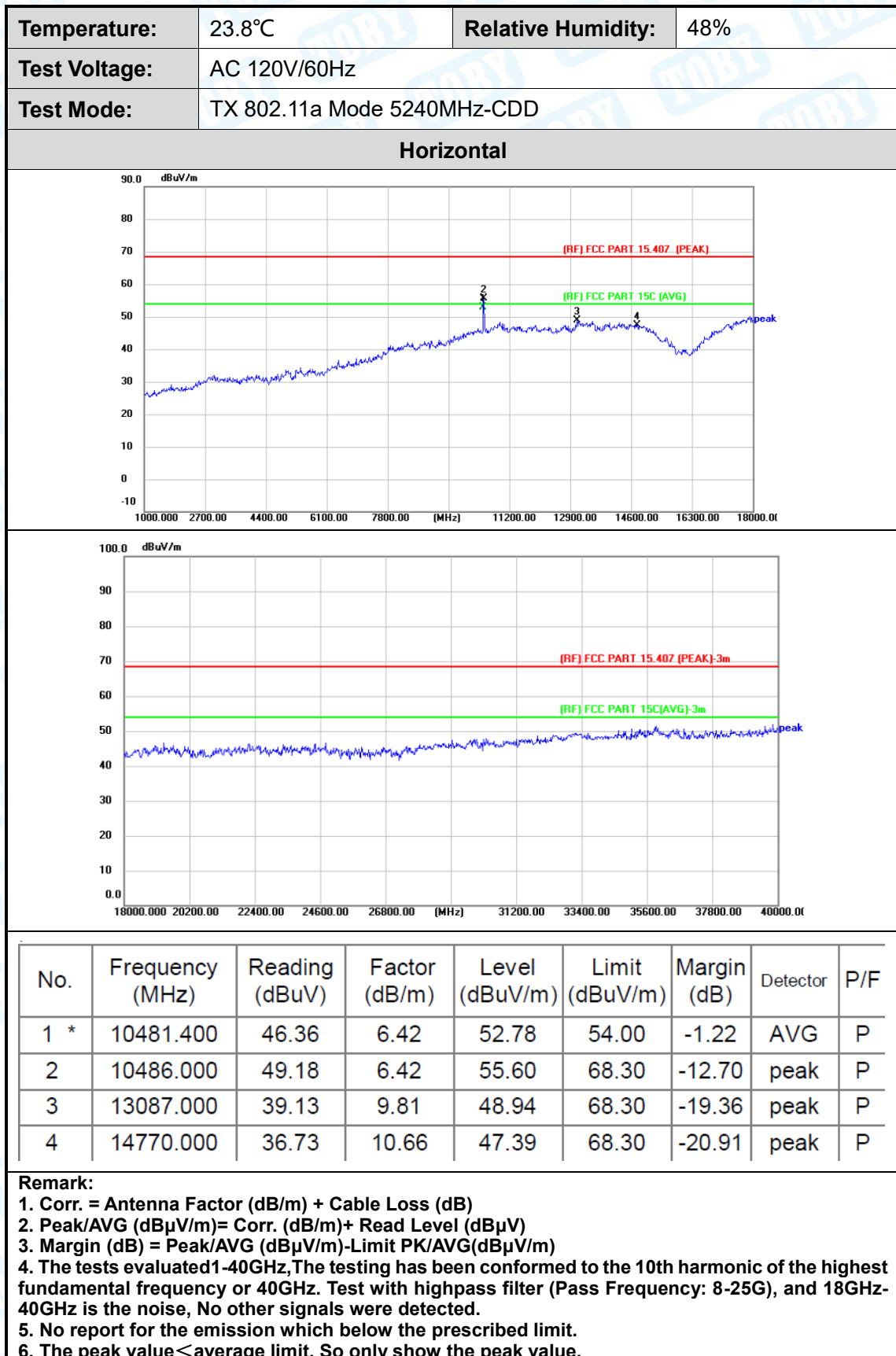






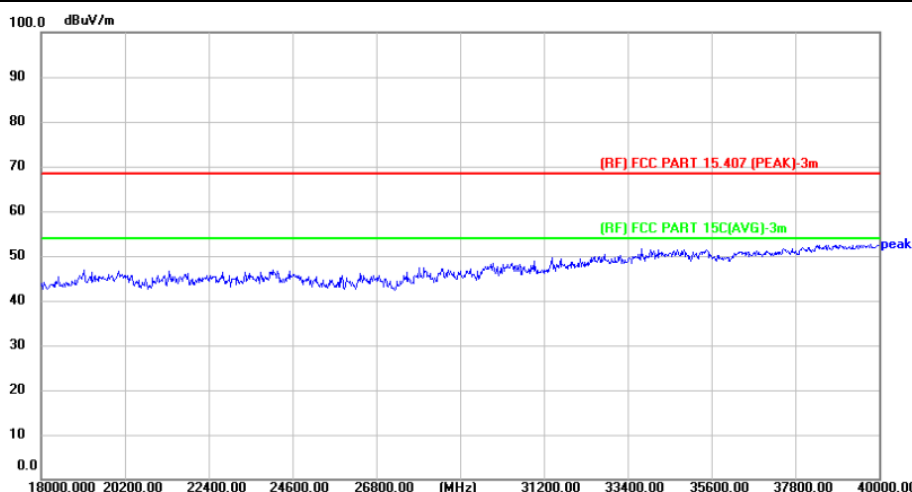
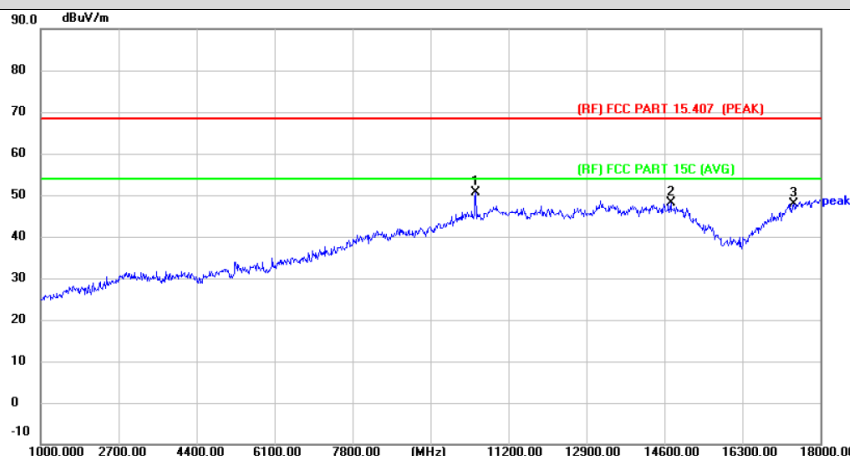






|               |                             |                    |     |
|---------------|-----------------------------|--------------------|-----|
| Temperature:  | 23.8°C                      | Relative Humidity: | 48% |
| Test Voltage: | AC 120V/60Hz                |                    |     |
| Test Mode:    | TX 802.11a Mode 5240MHz-CDD |                    |     |

**Vertical**

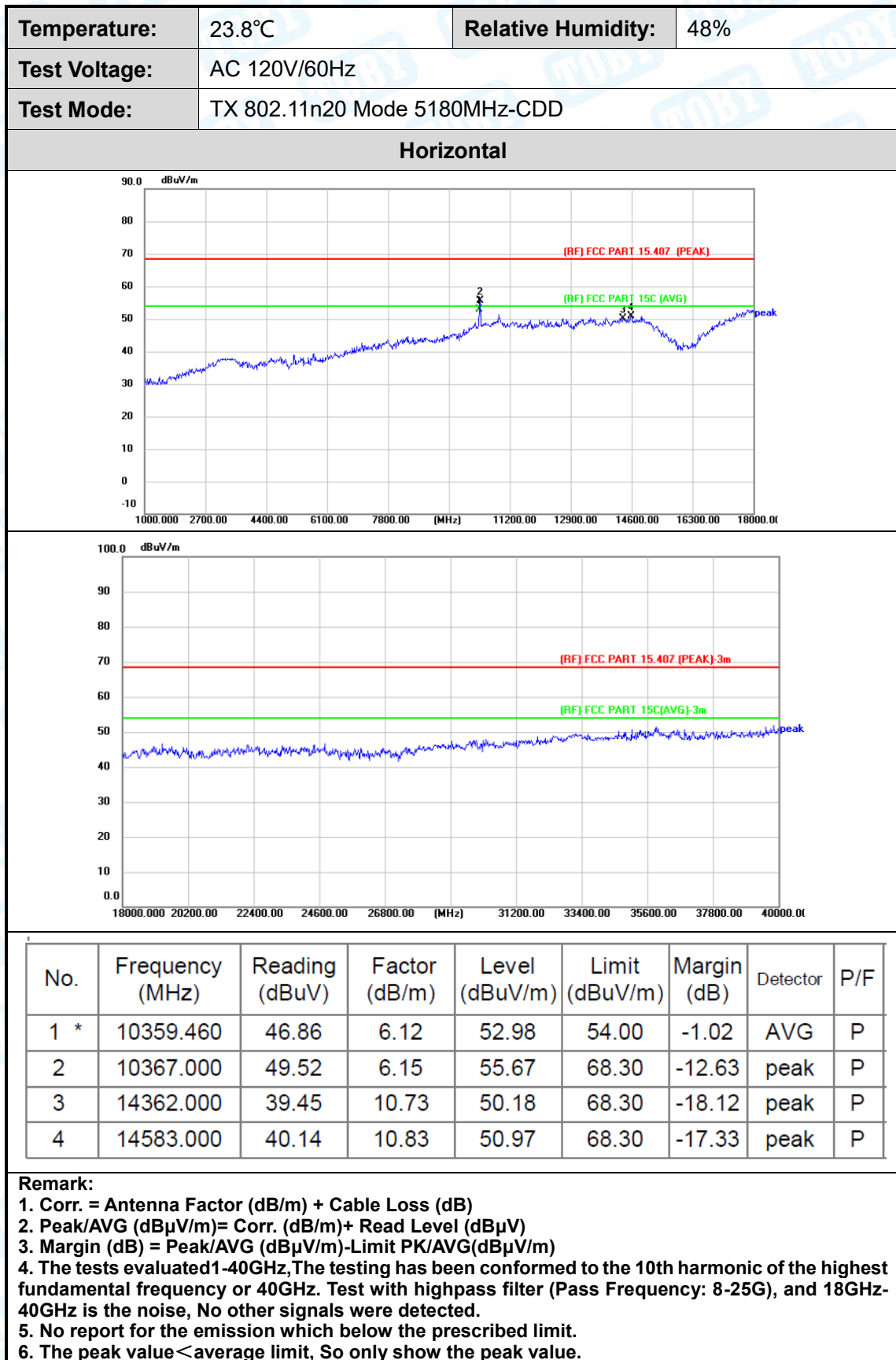


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-----|
| 1 * | 10486.000       | 44.20          | 6.42          | 50.62          | 68.30          | -17.68      | peak     | P   |
| 2   | 14736.000       | 37.27          | 10.77         | 48.04          | 68.30          | -20.26      | peak     | P   |
| 3   | 17422.000       | 33.32          | 14.61         | 47.93          | 68.30          | -20.37      | peak     | P   |

**Remark:**

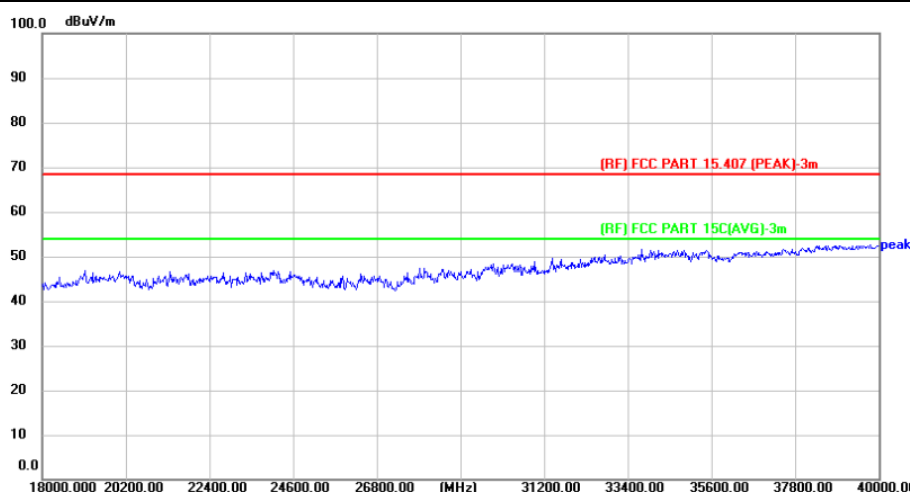
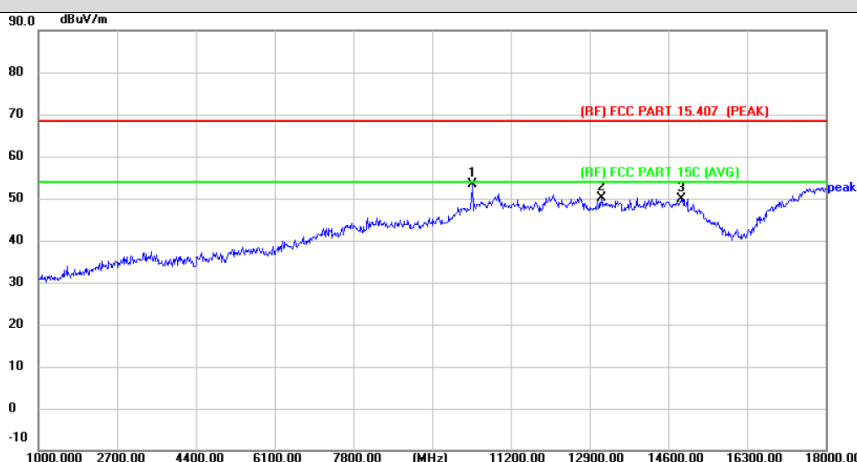
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Peak/AVG (dBuV/m) = Corr. (dB/m) + Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m) - Limit PK/AVG (dBuV/m)
4. The tests evaluated 1-40GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency or 40GHz. Test with highpass filter (Pass Frequency: 8-25G), and 18GHz-40GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.





|               |                               |                    |     |
|---------------|-------------------------------|--------------------|-----|
| Temperature:  | 23.8°C                        | Relative Humidity: | 48% |
| Test Voltage: | AC 120V/60Hz                  |                    |     |
| Test Mode:    | TX 802.11n20 Mode 5180MHz-CDD |                    |     |

**Vertical**

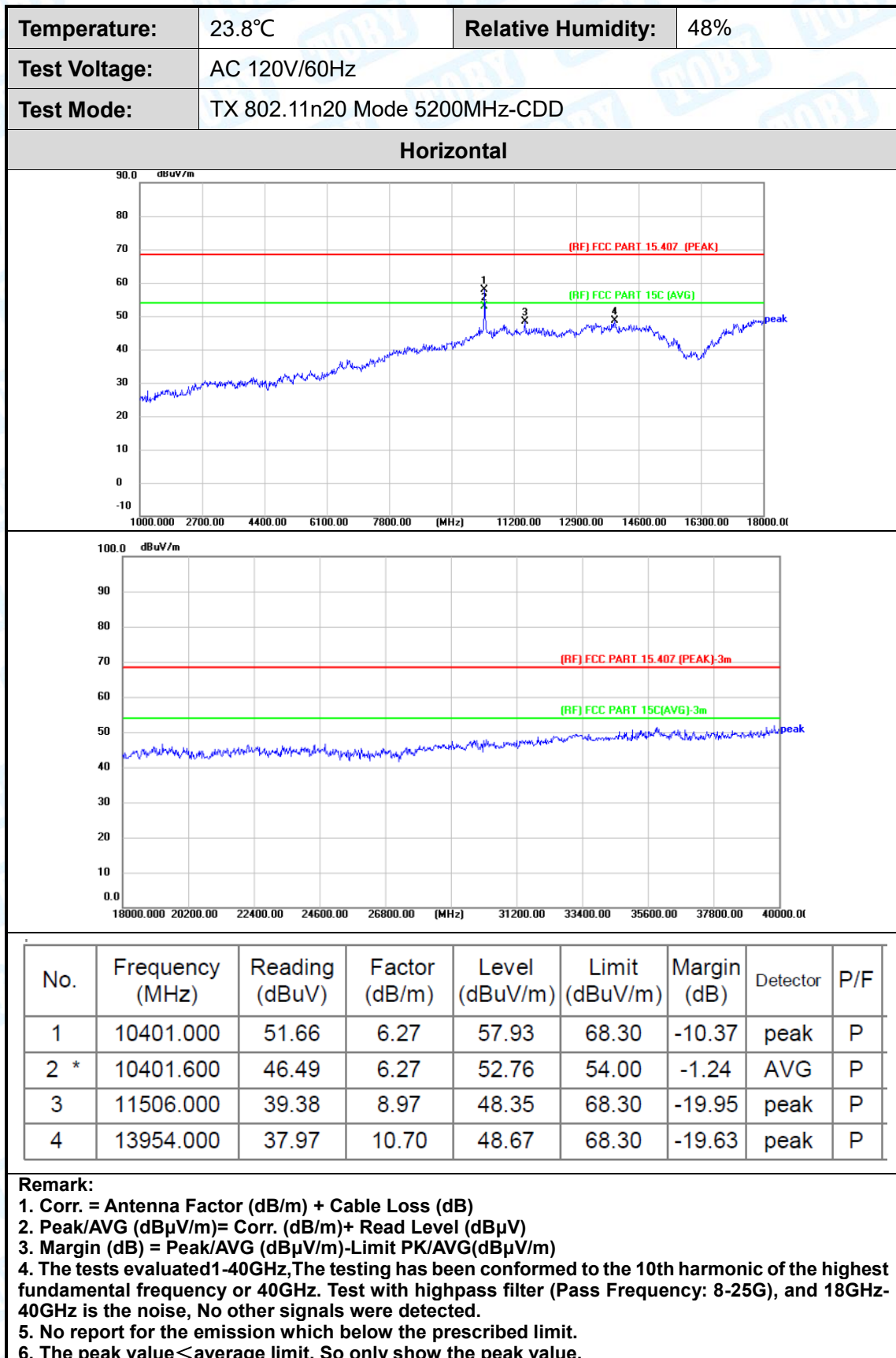


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-----|
| 1 * | 10367.000       | 47.27          | 6.15          | 53.42          | 68.30          | -14.88      | peak     | P   |
| 2   | 13155.000       | 40.19          | 9.82          | 50.01          | 68.30          | -18.29      | peak     | P   |
| 3   | 14872.000       | 38.85          | 11.14         | 49.99          | 68.30          | -18.31      | peak     | P   |

**Remark:**

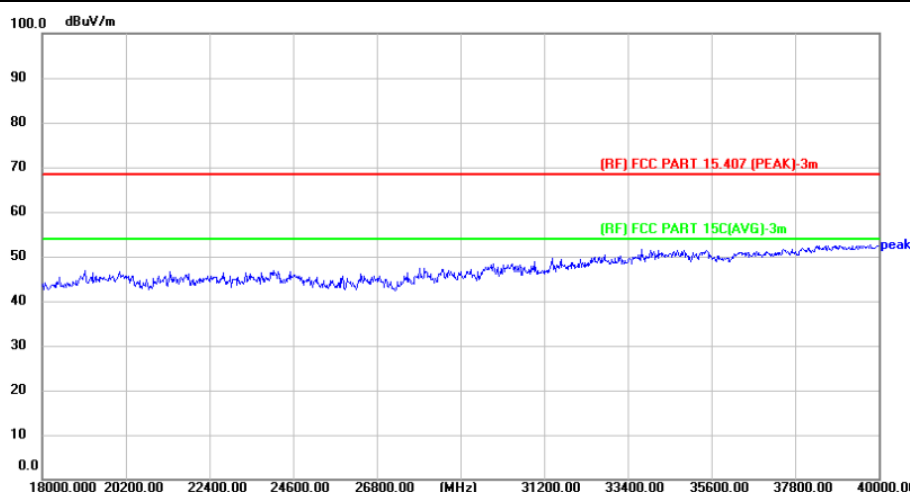
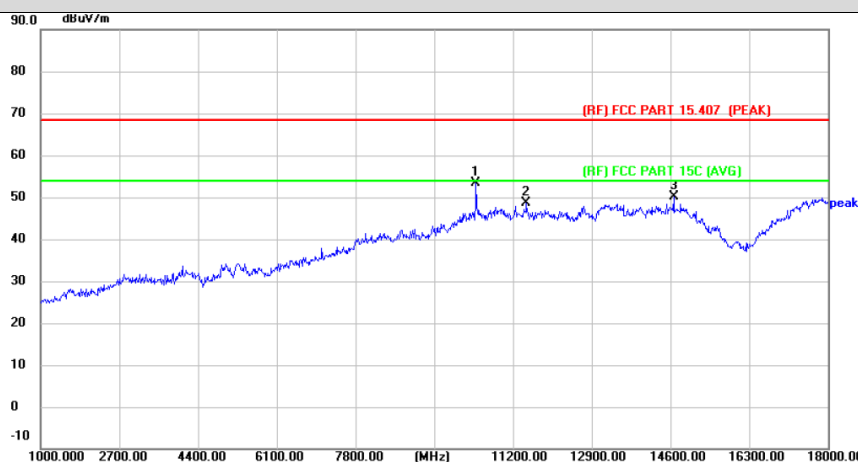
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Peak/AVG (dBuV/m) = Corr. (dB/m) + Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m) - Limit PK/AVG (dBuV/m)
4. The tests evaluated 1-40GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency or 40GHz. Test with highpass filter (Pass Frequency: 8-25G), and 18GHz-40GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.





|               |                               |                    |     |
|---------------|-------------------------------|--------------------|-----|
| Temperature:  | 23.8°C                        | Relative Humidity: | 48% |
| Test Voltage: | AC 120V/60Hz                  |                    |     |
| Test Mode:    | TX 802.11n20 Mode 5200MHz-CDD |                    |     |

### Vertical

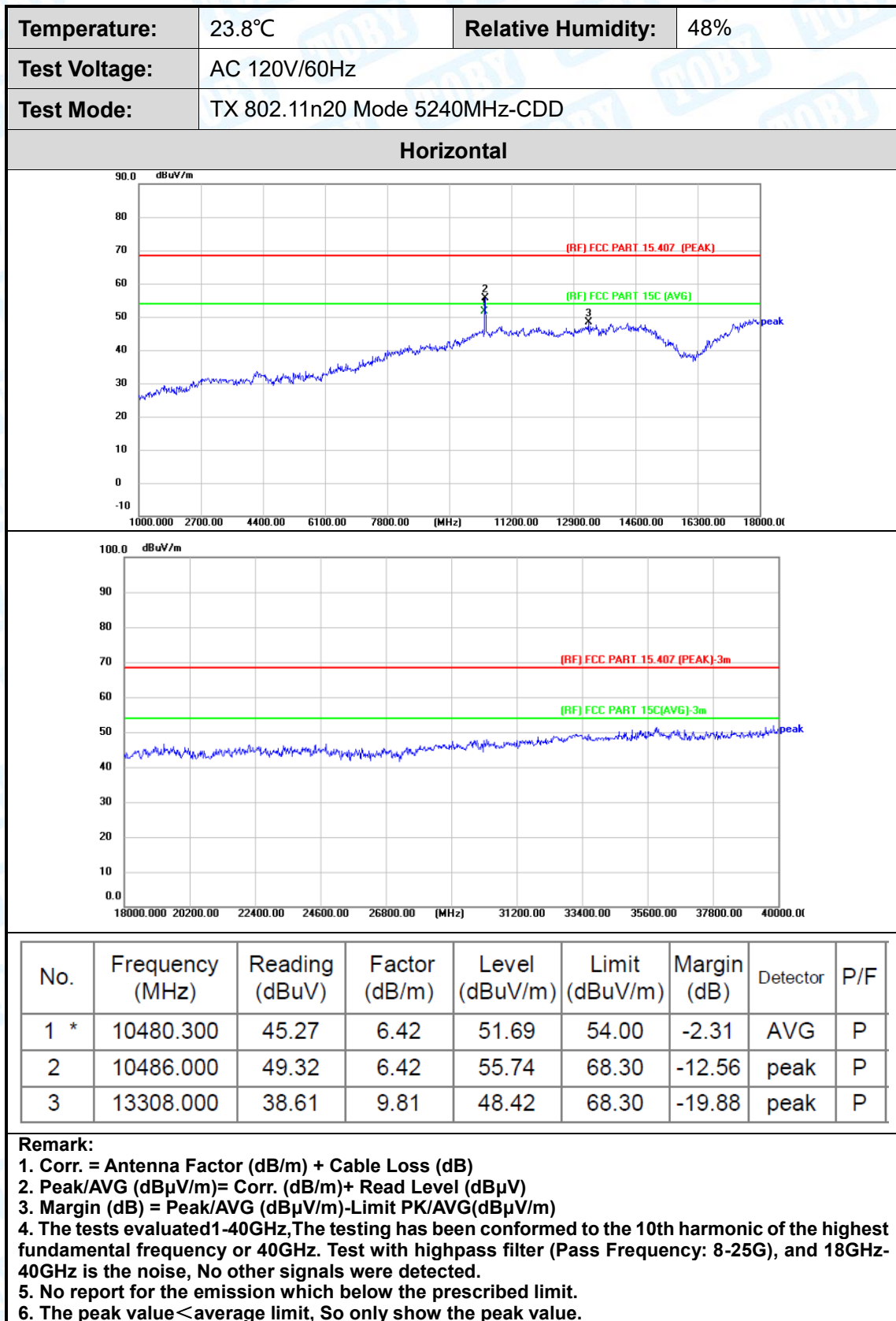


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-----|
| 1 * | 10401.000       | 47.18          | 6.27          | 53.45          | 68.30          | -14.85      | peak     | P   |
| 2   | 11489.000       | 39.61          | 9.00          | 48.61          | 68.30          | -19.69      | peak     | P   |
| 3   | 14668.000       | 39.25          | 10.88         | 50.13          | 68.30          | -18.17      | peak     | P   |

### Remark:

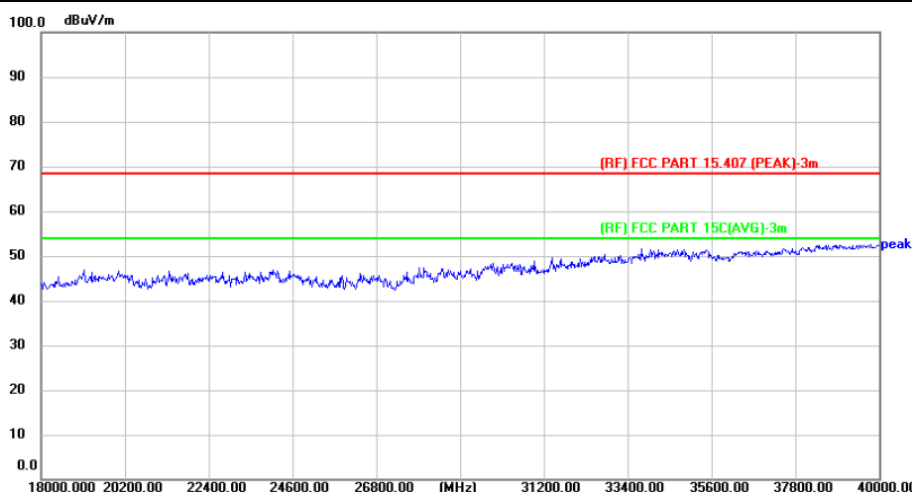
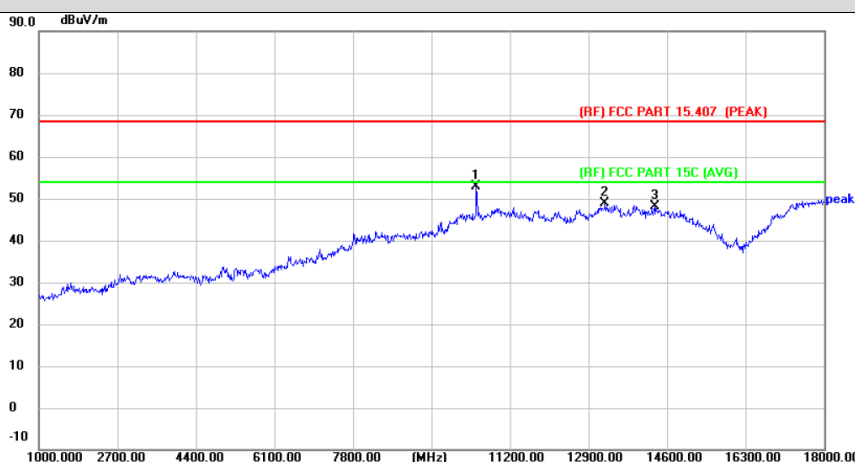
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Peak/AVG (dBuV/m) = Corr. (dB/m) + Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m) - Limit PK/AVG (dBuV/m)
4. The tests evaluated 1-40GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency or 40GHz. Test with highpass filter (Pass Frequency: 8-25G), and 18GHz-40GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.





|               |                               |                    |     |
|---------------|-------------------------------|--------------------|-----|
| Temperature:  | 23.8°C                        | Relative Humidity: | 48% |
| Test Voltage: | AC 120V/60Hz                  |                    |     |
| Test Mode:    | TX 802.11n20 Mode 5240MHz-CDD |                    |     |

**Vertical**

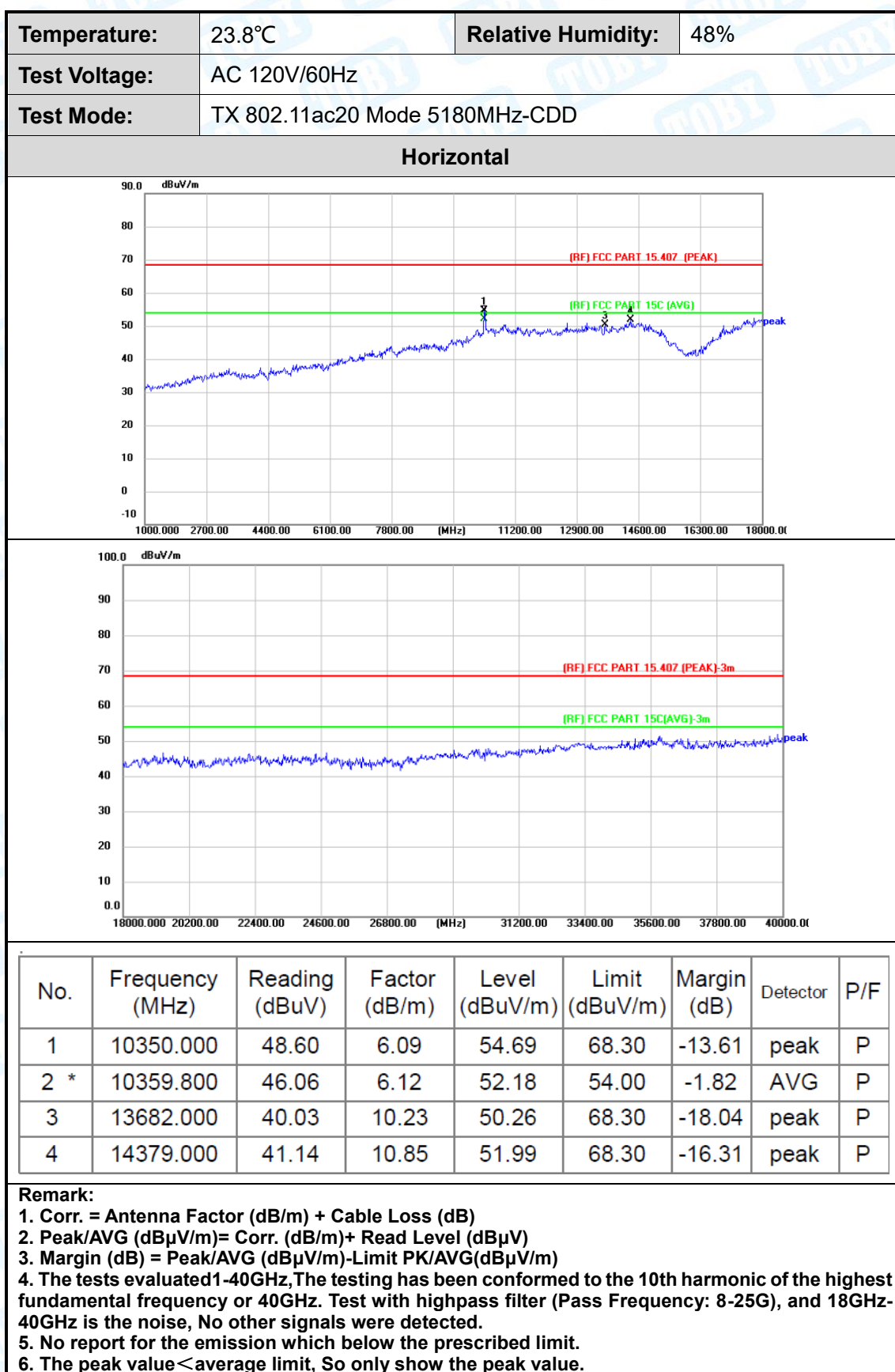


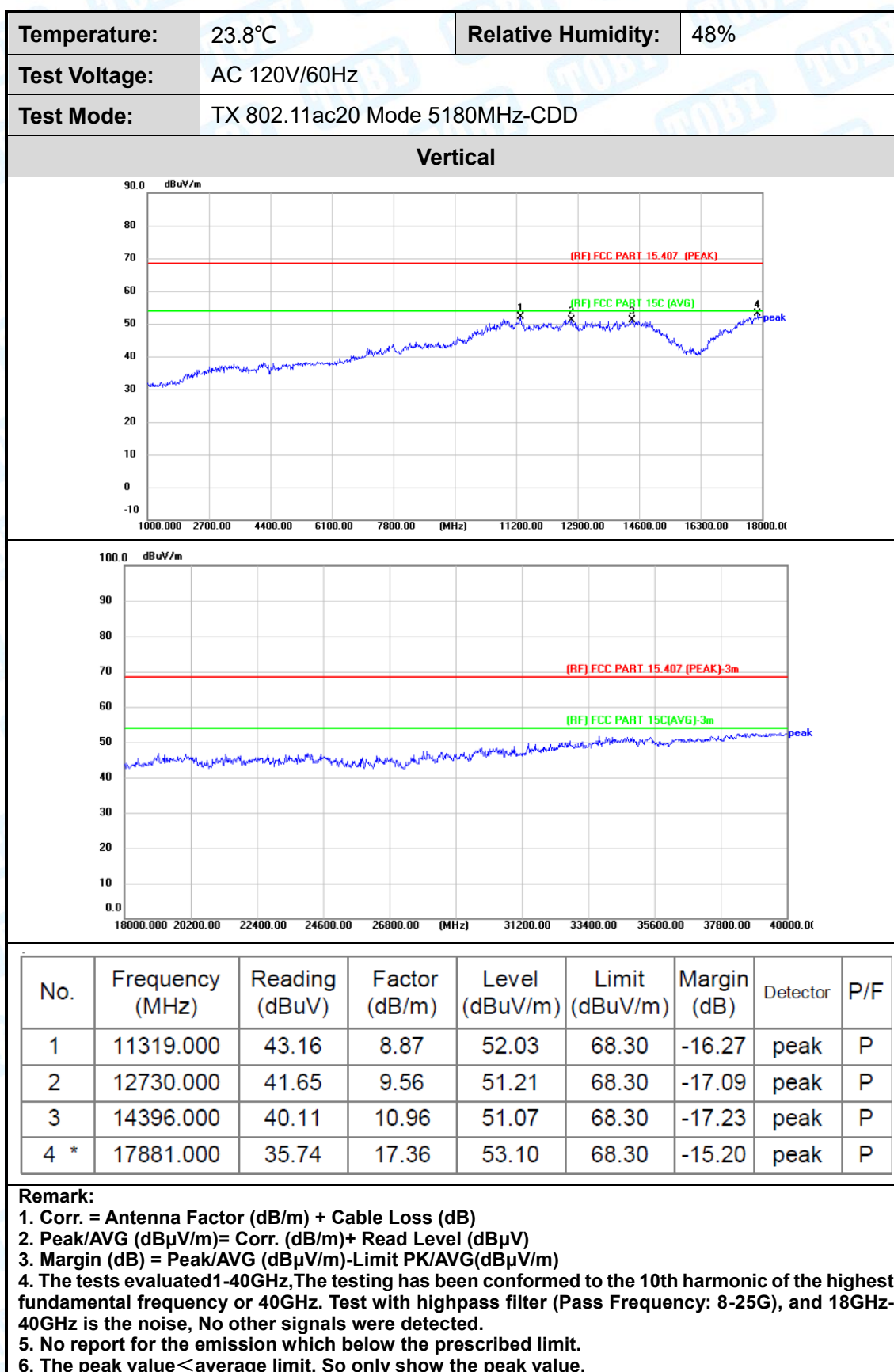
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-----|
| 1 * | 10469.000       | 46.61          | 6.39          | 53.00          | 68.30          | -15.30      | peak     | P   |
| 2   | 13257.000       | 39.20          | 9.79          | 48.99          | 68.30          | -19.31      | peak     | P   |
| 3   | 14345.000       | 37.48          | 10.61         | 48.09          | 68.30          | -20.21      | peak     | P   |

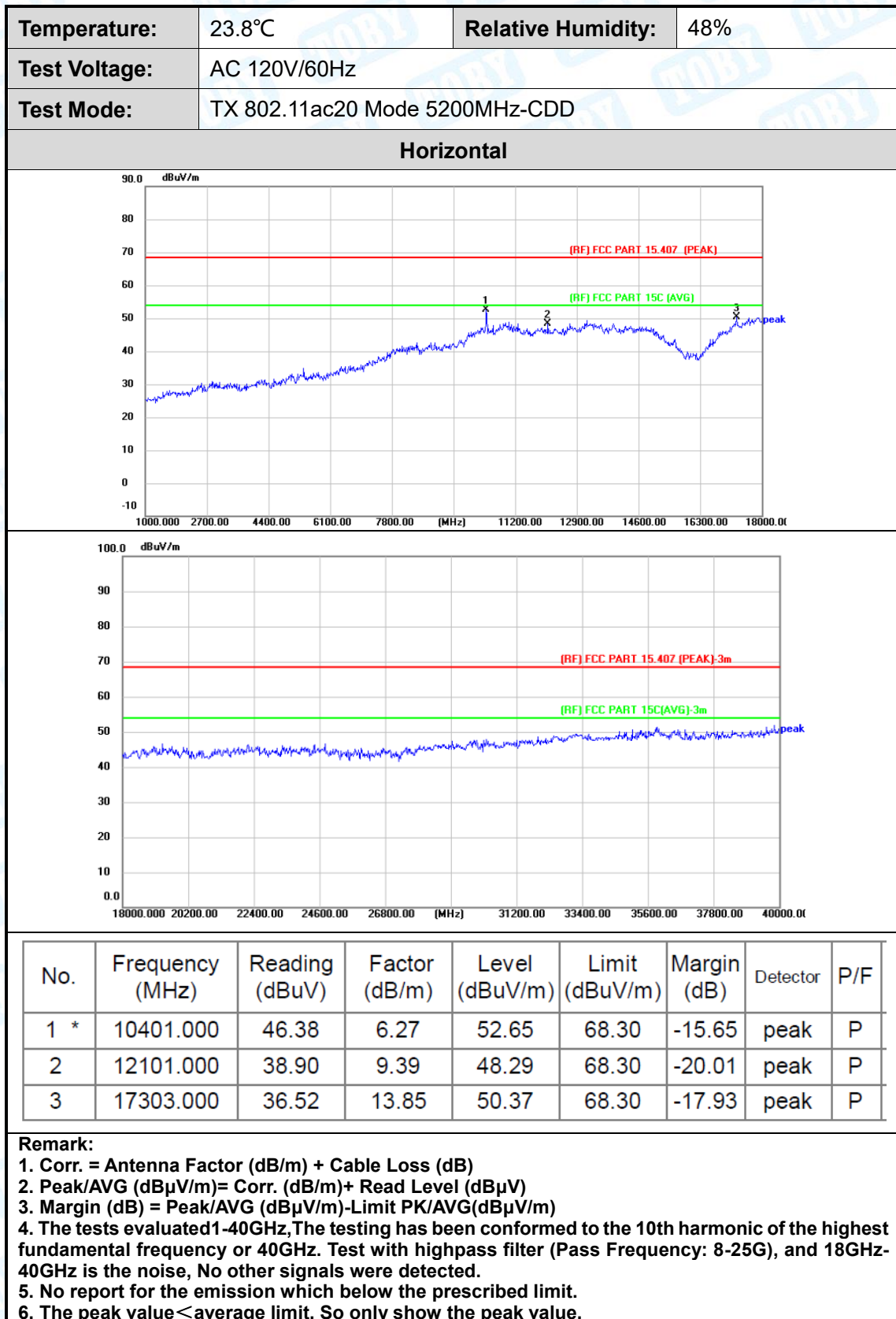
**Remark:**

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Peak/AVG (dBuV/m) = Corr. (dB/m) + Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m) - Limit PK/AVG (dBuV/m)
4. The tests evaluated 1-40GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency or 40GHz. Test with highpass filter (Pass Frequency: 8-25G), and 18GHz-40GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.



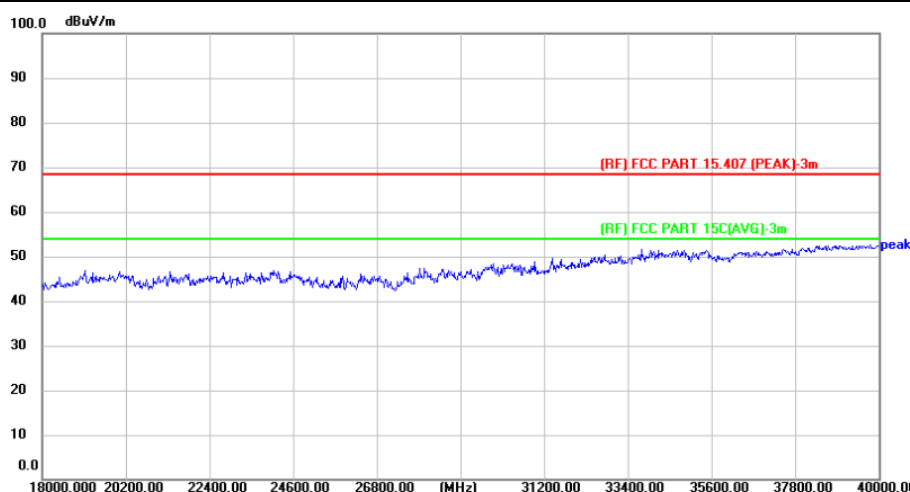
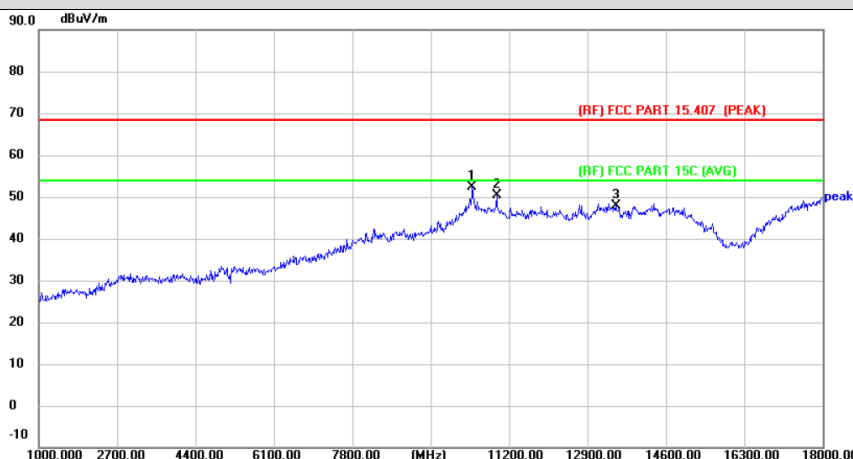






|               |                                |                    |     |
|---------------|--------------------------------|--------------------|-----|
| Temperature:  | 23.8°C                         | Relative Humidity: | 48% |
| Test Voltage: | AC 120V/60Hz                   |                    |     |
| Test Mode:    | TX 802.11ac20 Mode 5200MHz-CDD |                    |     |

**Vertical**

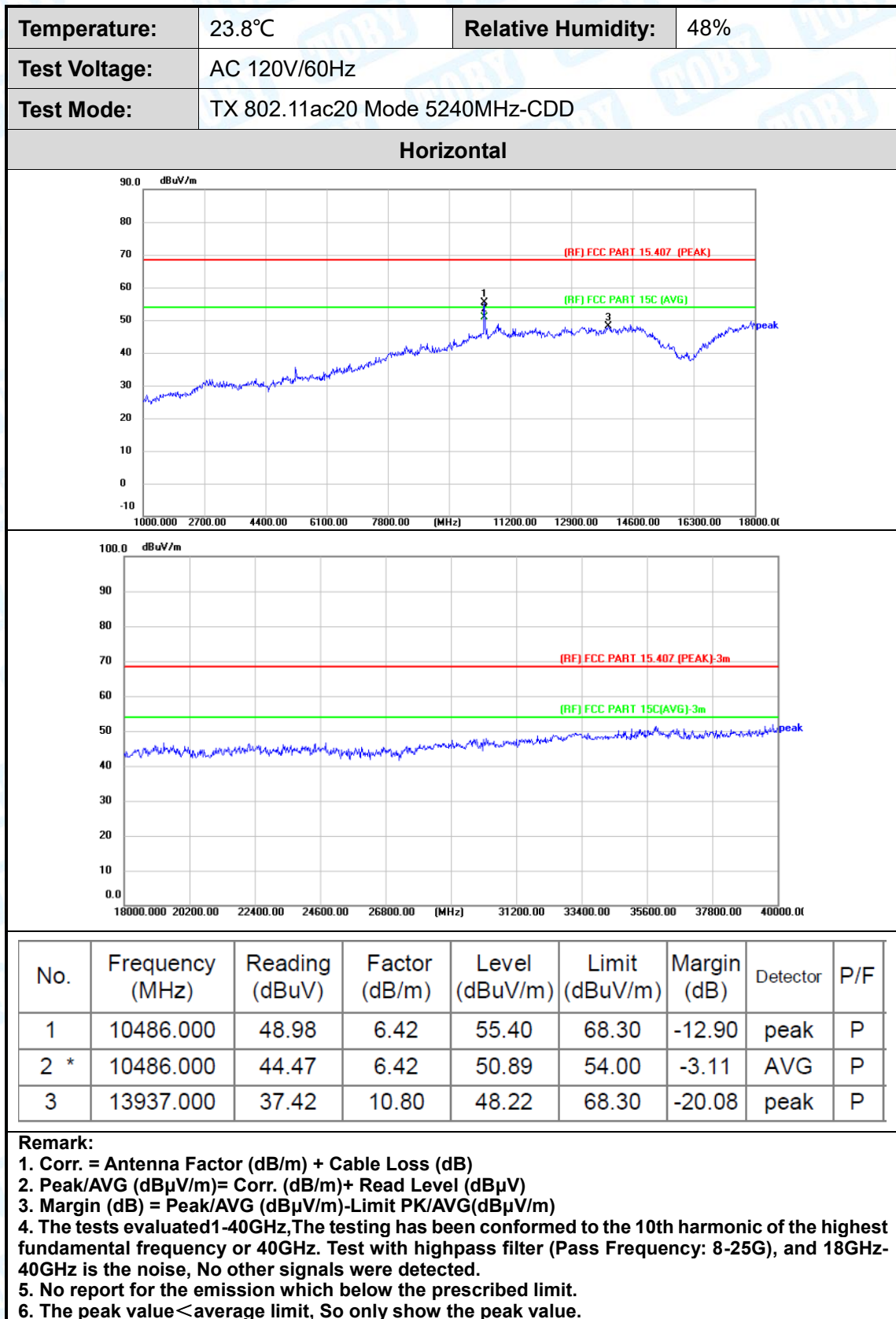


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-----|
| 1 * | 10401.000       | 46.21          | 6.27          | 52.48          | 68.30          | -15.82      | peak     | P   |
| 2   | 10928.000       | 42.28          | 8.21          | 50.49          | 68.30          | -17.81      | peak     | P   |
| 3   | 13512.000       | 37.69          | 10.09         | 47.78          | 68.30          | -20.52      | peak     | P   |

**Remark:**

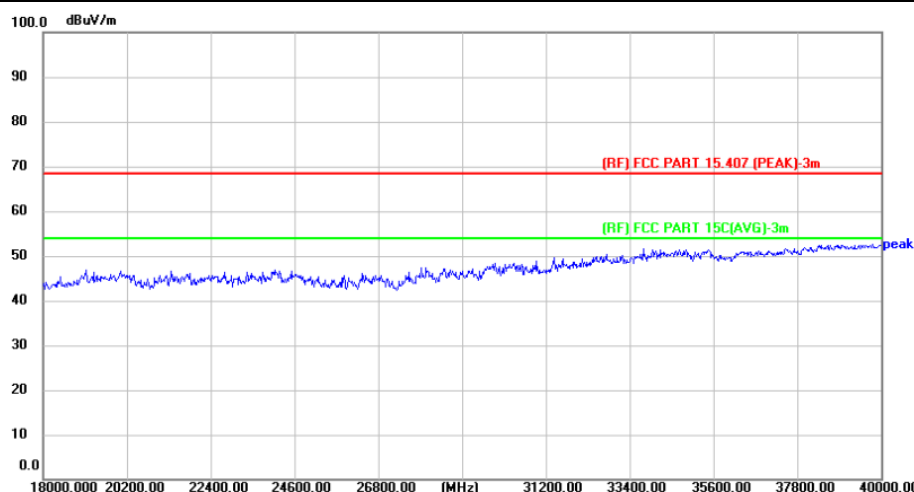
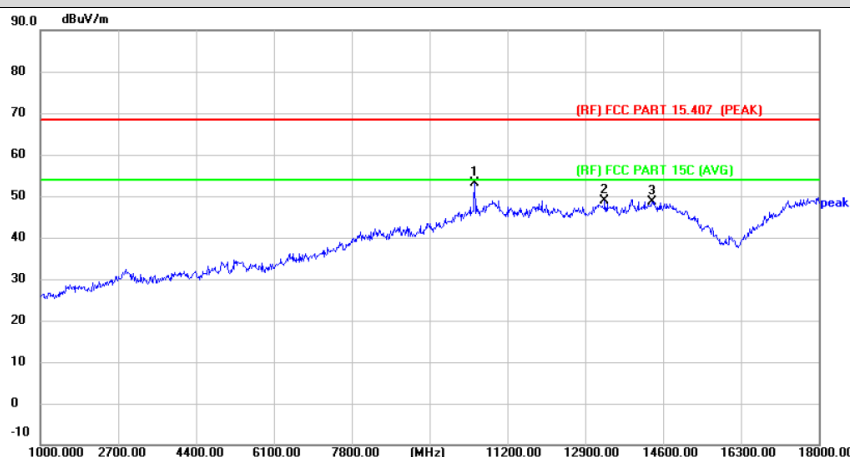
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Peak/AVG (dBuV/m) = Corr. (dB/m) + Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m) - Limit PK/AVG (dBuV/m)
4. The tests evaluated 1-40GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency or 40GHz. Test with highpass filter (Pass Frequency: 8-25G), and 18GHz-40GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.





|               |                                |                    |     |
|---------------|--------------------------------|--------------------|-----|
| Temperature:  | 23.8°C                         | Relative Humidity: | 48% |
| Test Voltage: | AC 120V/60Hz                   |                    |     |
| Test Mode:    | TX 802.11ac20 Mode 5240MHz-CDD |                    |     |

**Vertical**

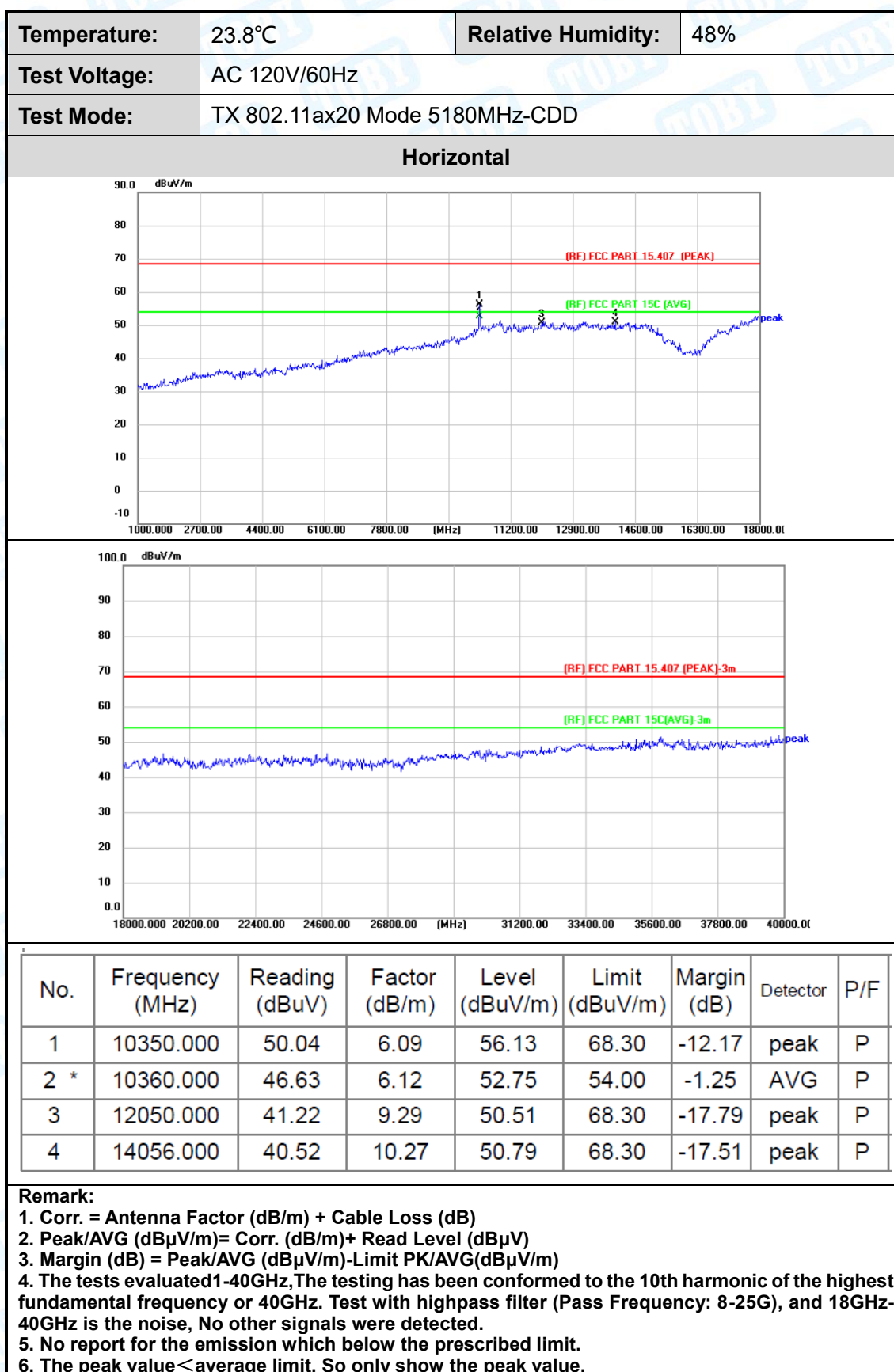


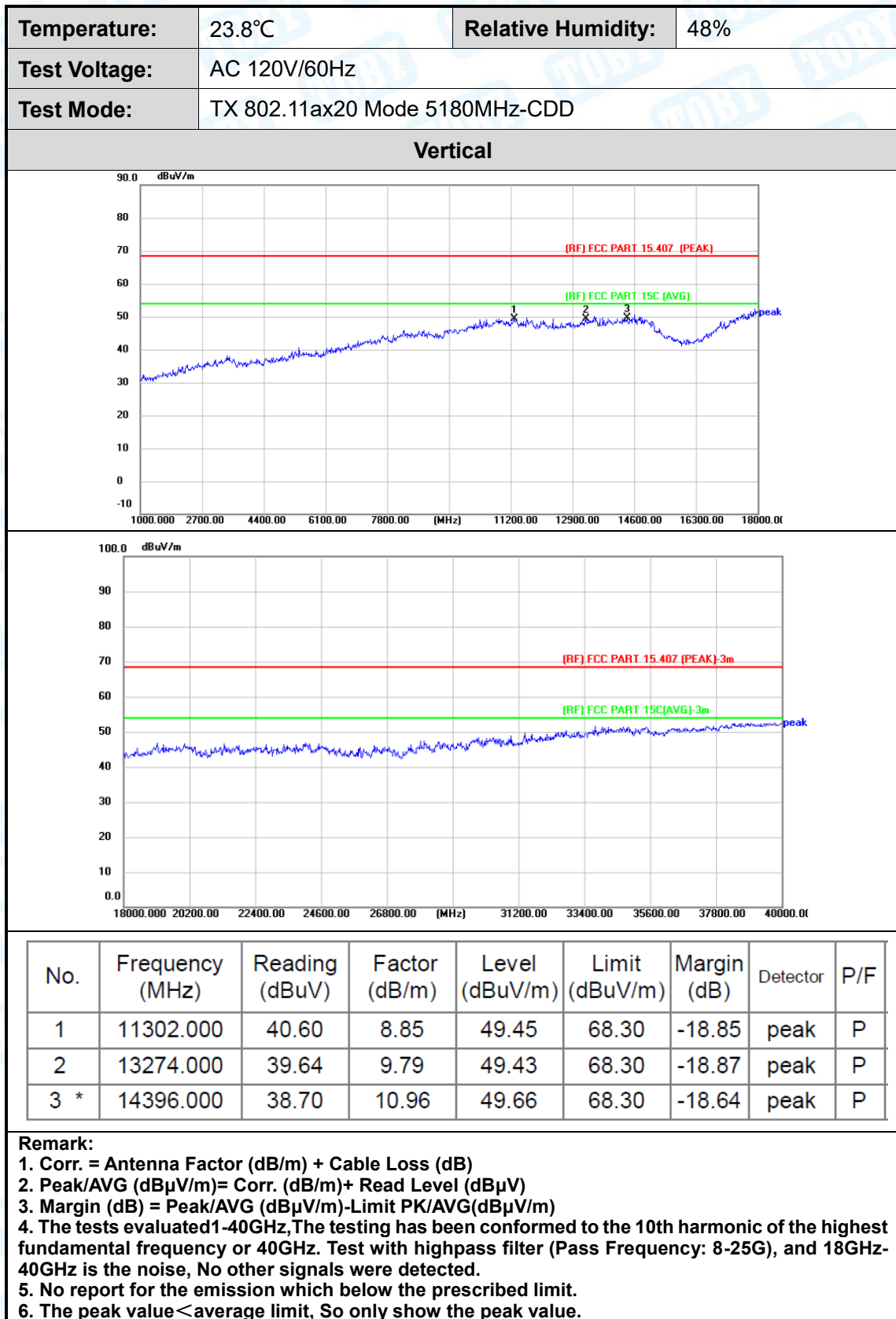
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-----|
| 1 * | 10486.000       | 46.79          | 6.42          | 53.21          | 68.30          | -15.09      | peak     | P   |
| 2   | 13325.000       | 39.10          | 9.89          | 48.99          | 68.30          | -19.31      | peak     | P   |
| 3   | 14362.000       | 37.84          | 10.73         | 48.57          | 68.30          | -19.73      | peak     | P   |

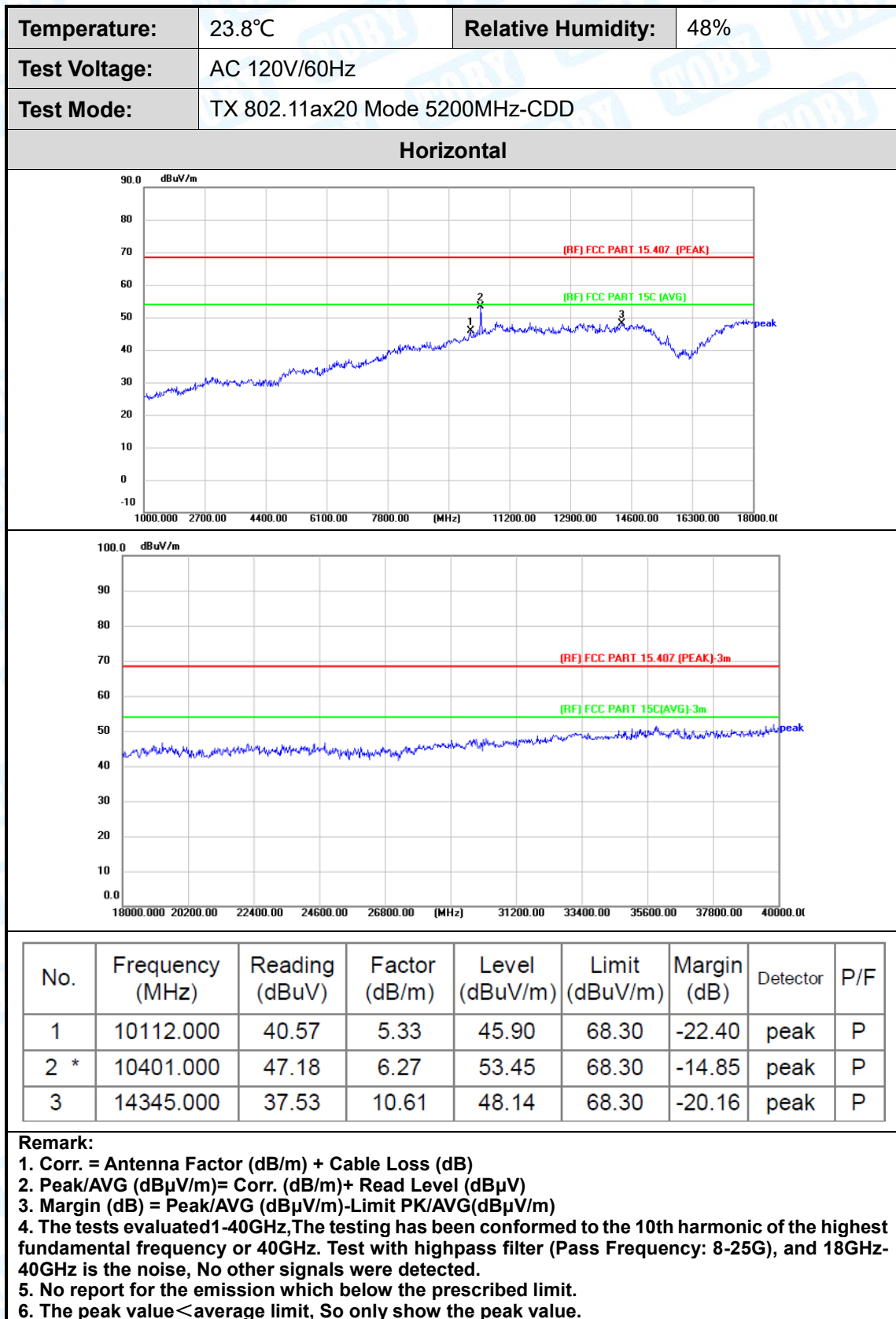
**Remark:**

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Peak/AVG (dBuV/m) = Corr. (dB/m) + Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m) - Limit PK/AVG (dBuV/m)
4. The tests evaluated 1-40GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency or 40GHz. Test with highpass filter (Pass Frequency: 8-25G), and 18GHz-40GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.



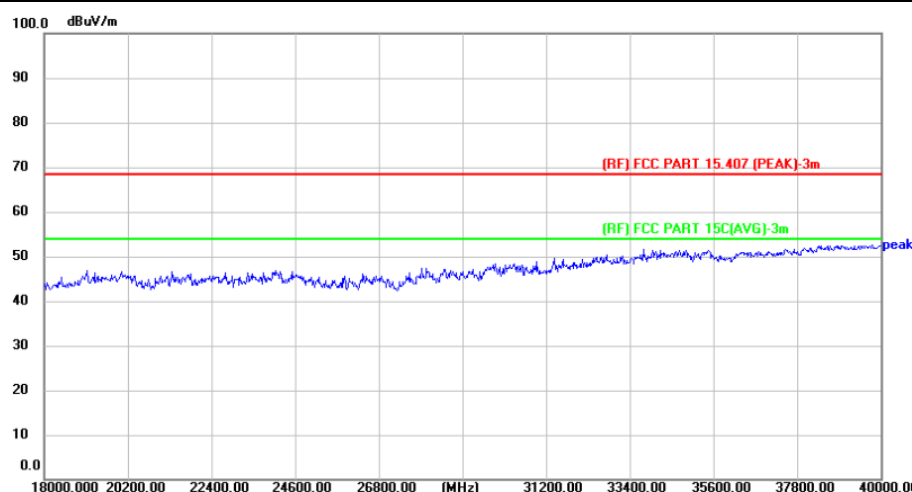
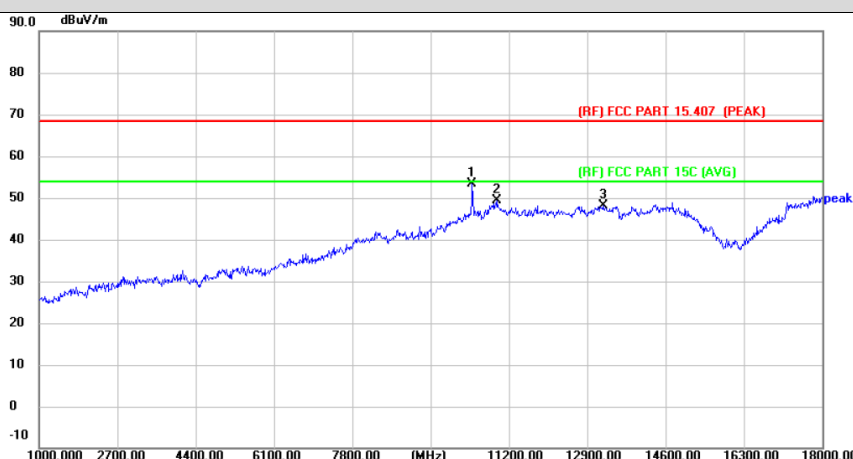






|               |                                |                    |     |
|---------------|--------------------------------|--------------------|-----|
| Temperature:  | 23.8°C                         | Relative Humidity: | 48% |
| Test Voltage: | AC 120V/60Hz                   |                    |     |
| Test Mode:    | TX 802.11ax20 Mode 5200MHz-CDD |                    |     |

### Vertical

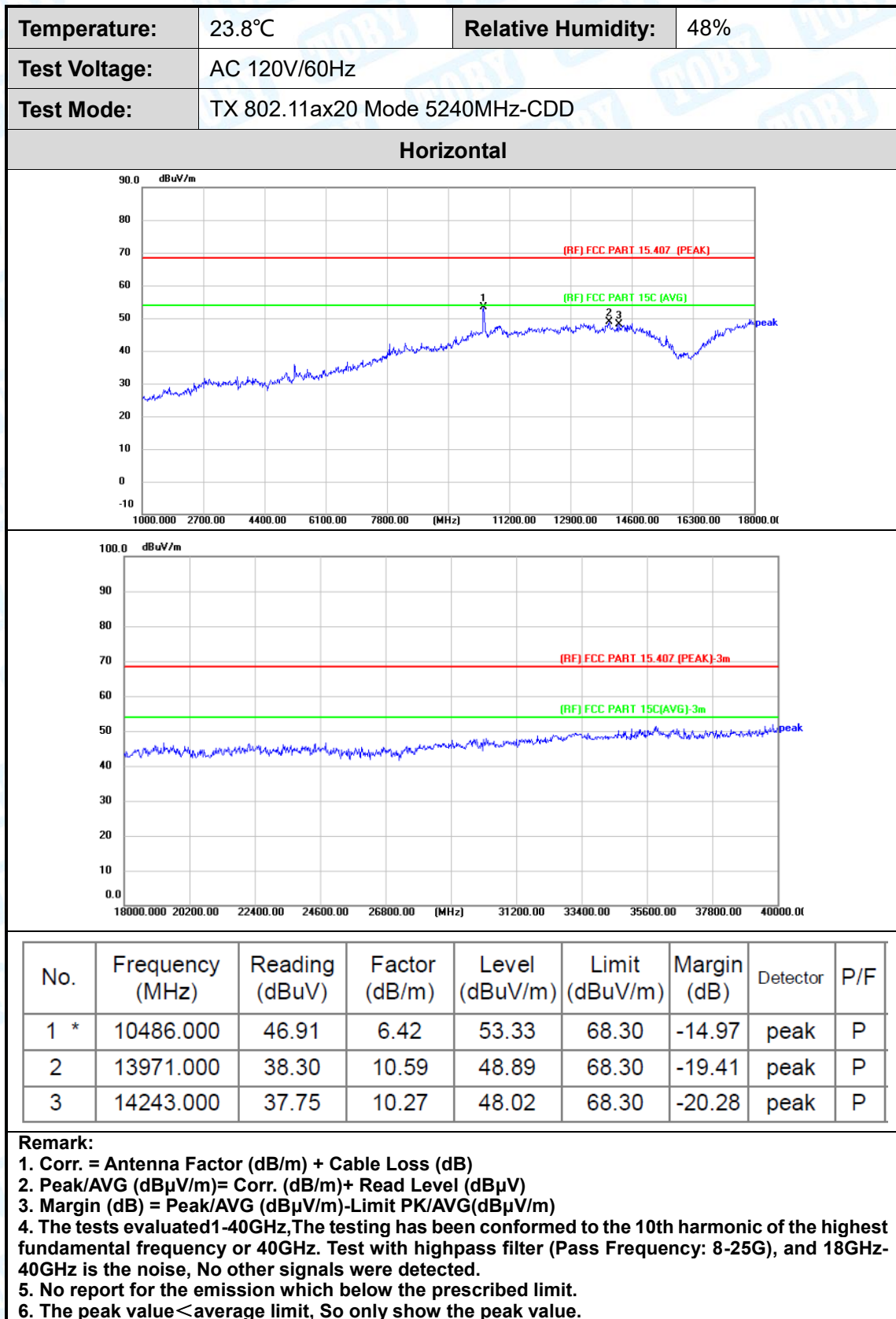


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-----|
| 1 * | 10401.000       | 47.06          | 6.27          | 53.33          | 68.30          | -14.97      | peak     | P   |
| 2   | 10945.000       | 41.16          | 8.20          | 49.36          | 68.30          | -18.94      | peak     | P   |
| 3   | 13240.000       | 38.36          | 9.80          | 48.16          | 68.30          | -20.14      | peak     | P   |

### Remark:

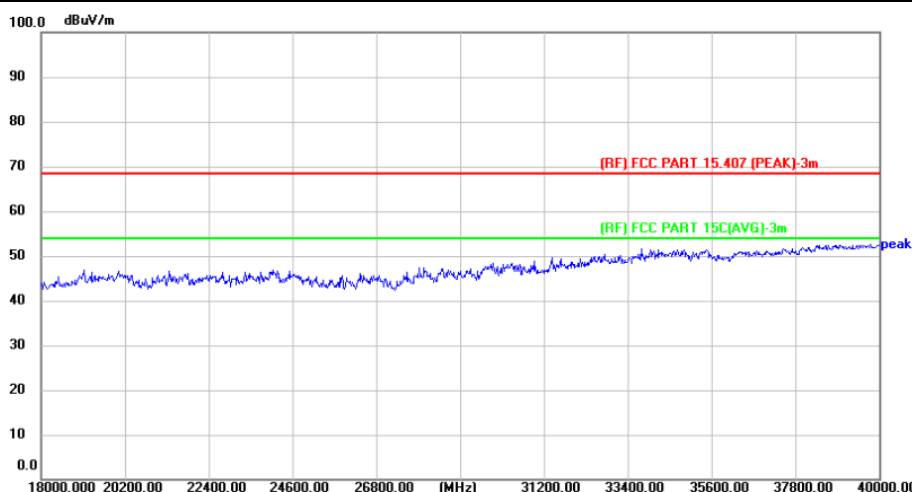
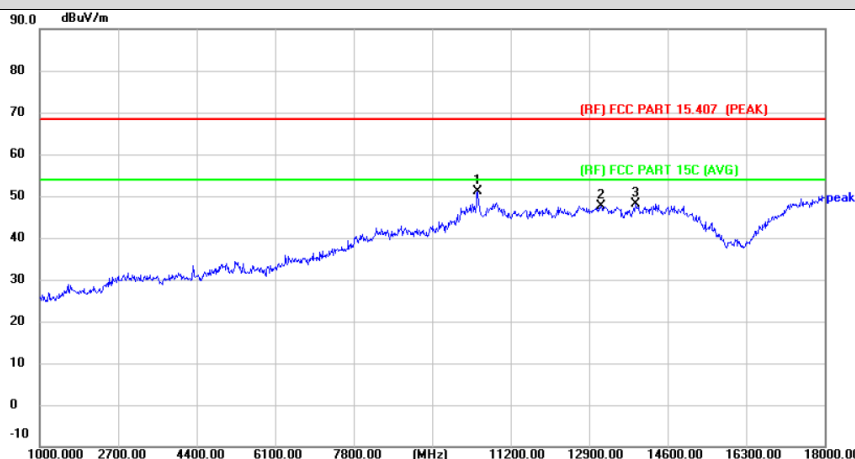
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Peak/AVG (dBuV/m) = Corr. (dB/m) + Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m) - Limit PK/AVG (dBuV/m)
4. The tests evaluated 1-40GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency or 40GHz. Test with highpass filter (Pass Frequency: 8-25G), and 18GHz-40GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.





|               |                                |                    |     |
|---------------|--------------------------------|--------------------|-----|
| Temperature:  | 23.8°C                         | Relative Humidity: | 48% |
| Test Voltage: | AC 120V/60Hz                   |                    |     |
| Test Mode:    | TX 802.11ax20 Mode 5240MHz-CDD |                    |     |

**Vertical**

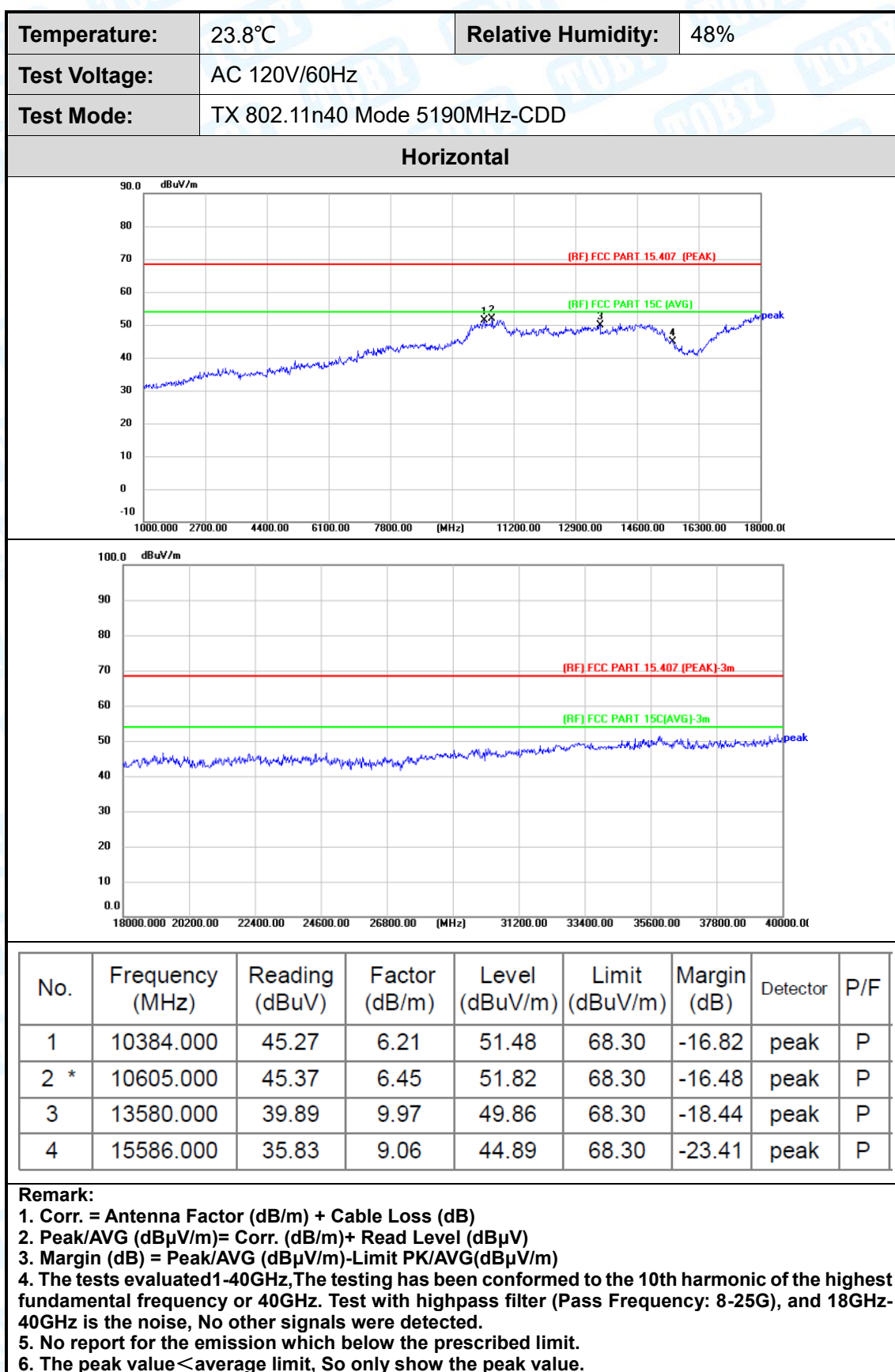


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-----|
| 1 * | 10486.000       | 44.63          | 6.42          | 51.05          | 68.30          | -17.25      | peak     | P   |
| 2   | 13155.000       | 37.75          | 9.82          | 47.57          | 68.30          | -20.73      | peak     | P   |
| 3   | 13903.000       | 37.23          | 11.01         | 48.24          | 68.30          | -20.06      | peak     | P   |

**Remark:**

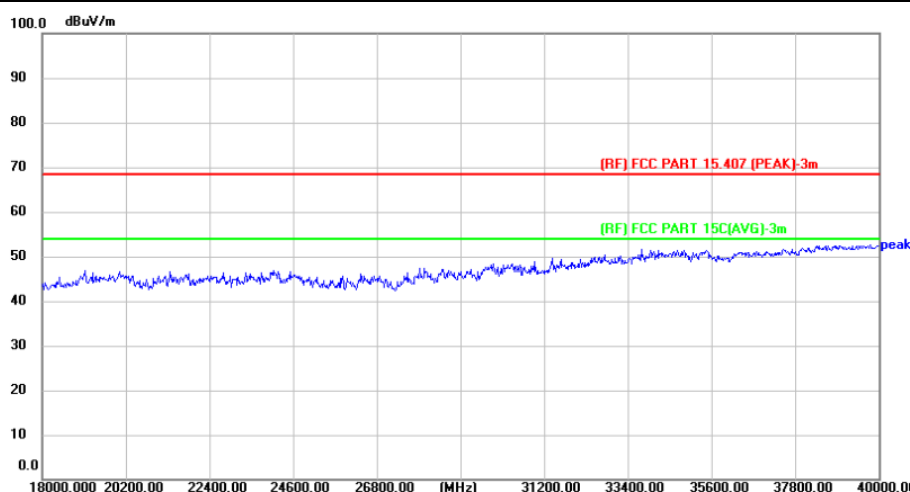
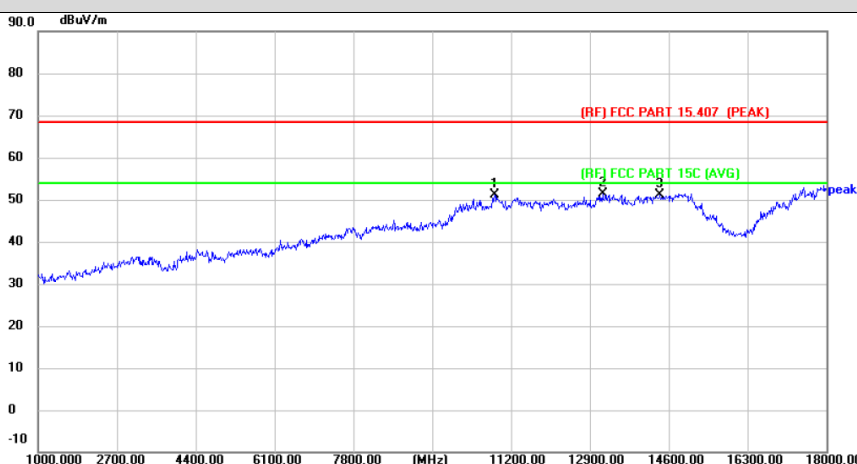
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Peak/AVG (dBuV/m) = Corr. (dB/m) + Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m) - Limit PK/AVG (dBuV/m)
4. The tests evaluated 1-40GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency or 40GHz. Test with highpass filter (Pass Frequency: 8-25G), and 18GHz-40GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.





|               |                               |                    |     |
|---------------|-------------------------------|--------------------|-----|
| Temperature:  | 23.8°C                        | Relative Humidity: | 48% |
| Test Voltage: | AC 120V/60Hz                  |                    |     |
| Test Mode:    | TX 802.11n40 Mode 5190MHz-CDD |                    |     |

**Vertical**

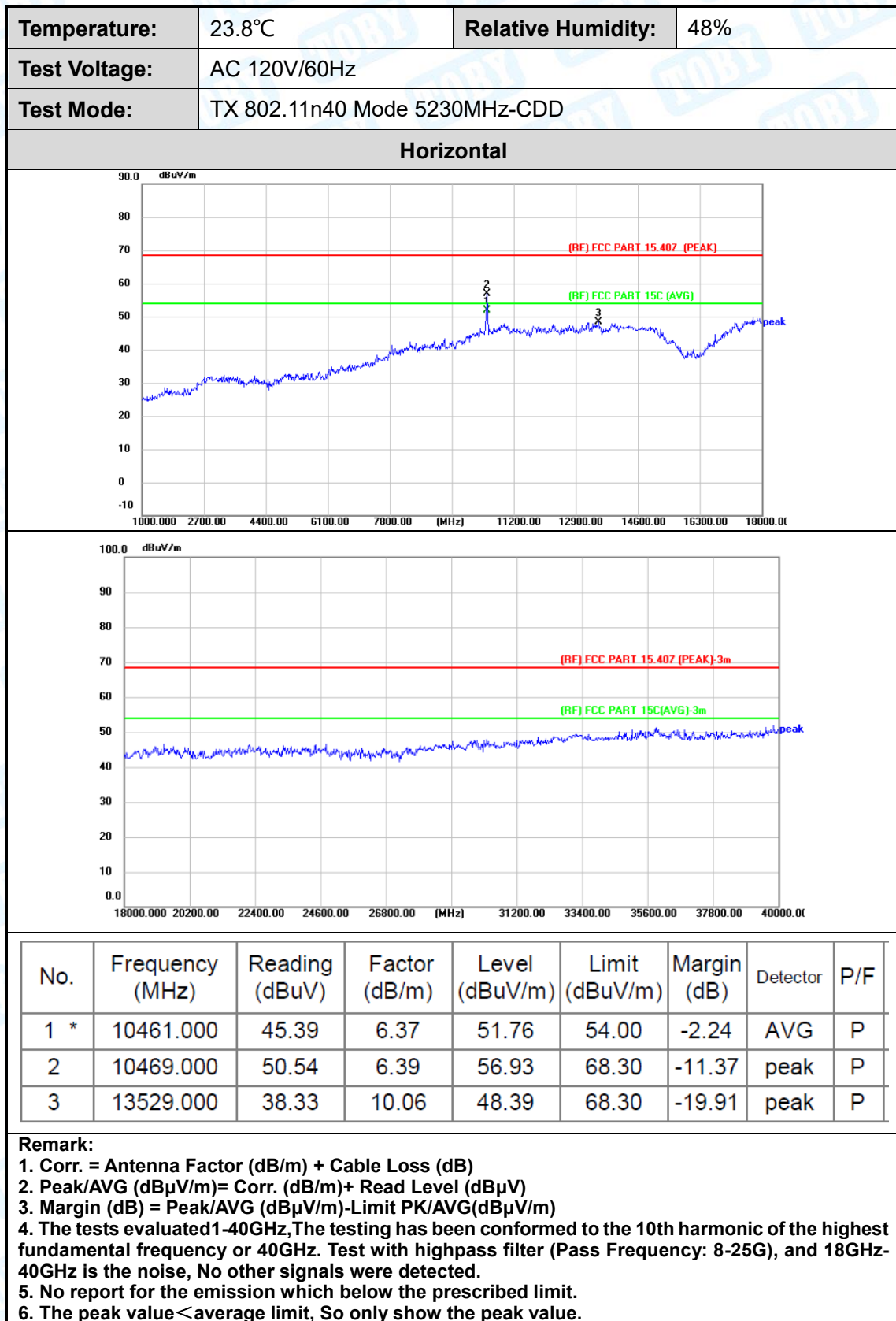


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-----|
| 1   | 10843.000       | 43.11          | 7.96          | 51.07          | 68.30          | -17.23      | peak     | P   |
| 2 * | 13172.000       | 41.59          | 9.81          | 51.40          | 68.30          | -16.90      | peak     | P   |
| 3   | 14413.000       | 40.29          | 10.94         | 51.23          | 68.30          | -17.07      | peak     | P   |

**Remark:**

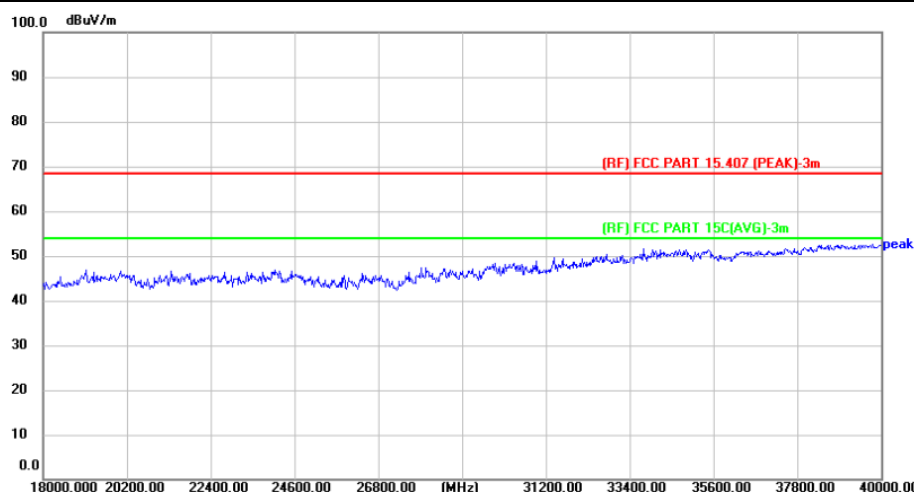
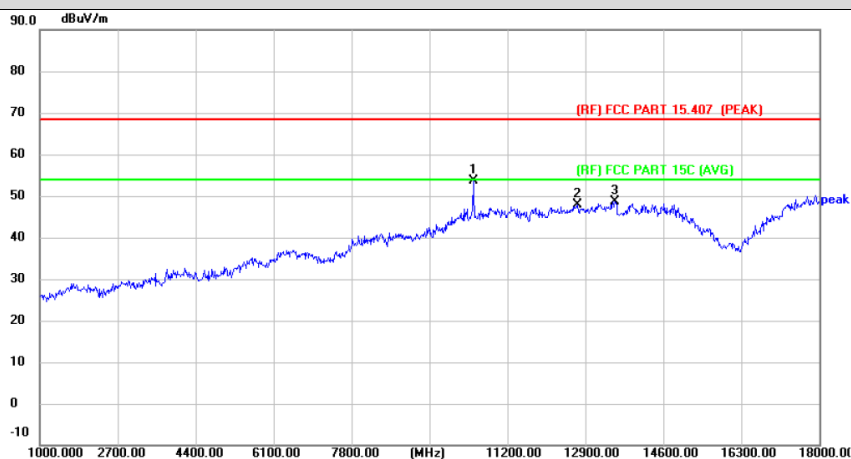
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Peak/AVG (dBuV/m) = Corr. (dB/m) + Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m) - Limit PK/AVG (dBuV/m)
4. The tests evaluated 1-40GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency or 40GHz. Test with highpass filter (Pass Frequency: 8-25G), and 18GHz-40GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.





|               |                               |                    |     |
|---------------|-------------------------------|--------------------|-----|
| Temperature:  | 23.8°C                        | Relative Humidity: | 48% |
| Test Voltage: | AC 120V/60Hz                  |                    |     |
| Test Mode:    | TX 802.11n40 Mode 5230MHz-CDD |                    |     |

**Vertical**



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-----|
| 1 * | 10452.000       | 47.35          | 6.36          | 53.71          | 68.30          | -14.59      | peak     | P   |
| 2   | 12730.000       | 38.43          | 9.56          | 47.99          | 68.30          | -20.31      | peak     | P   |
| 3   | 13546.000       | 38.69          | 10.02         | 48.71          | 68.30          | -19.59      | peak     | P   |

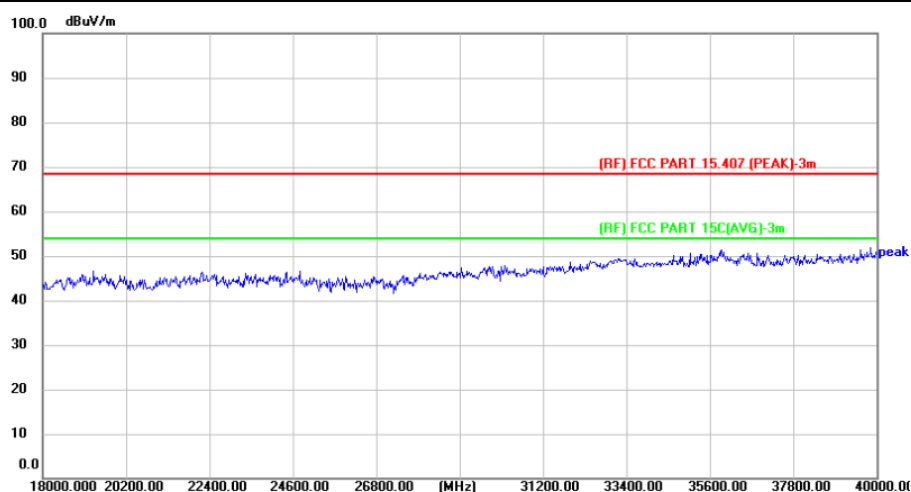
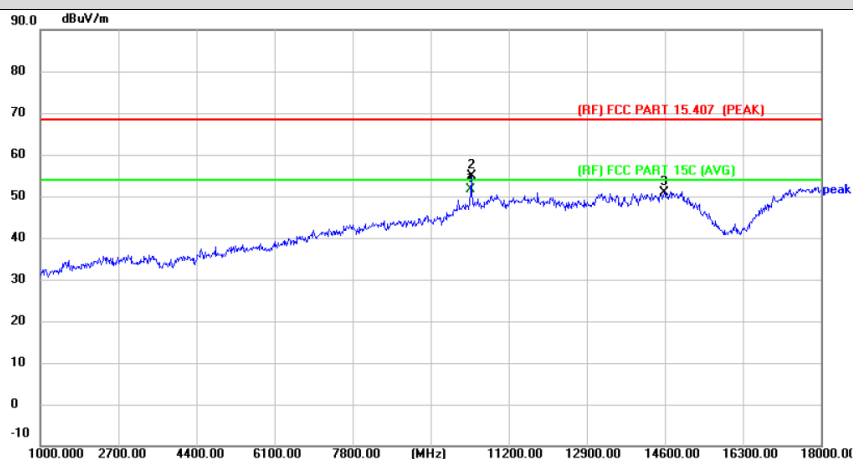
**Remark:**

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Peak/AVG (dBuV/m) = Corr. (dB/m) + Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m) - Limit PK/AVG (dBuV/m)
4. The tests evaluated 1-40GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency or 40GHz. Test with highpass filter (Pass Frequency: 8-25G), and 18GHz-40GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.



|               |                                |                    |     |
|---------------|--------------------------------|--------------------|-----|
| Temperature:  | 23.8°C                         | Relative Humidity: | 48% |
| Test Voltage: | AC 120V/60Hz                   |                    |     |
| Test Mode:    | TX 802.11ac40 Mode 5190MHz-CDD |                    |     |

### Horizontal



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|-----|
| 1 * | 10378.600       | 45.35          | 6.19          | 51.54          | 54.00          | -2.46       | AVG      | P   |
| 2   | 10384.000       | 48.55          | 6.21          | 54.76          | 68.30          | -13.54      | peak     | P   |
| 3   | 14583.000       | 40.15          | 10.83         | 50.98          | 68.30          | -17.32      | peak     | P   |

#### Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Peak/AVG (dBuV/m) = Corr. (dB/m) + Read Level (dBuV)
3. Margin (dB) = Peak/AVG (dBuV/m) - Limit PK/AVG (dBuV/m)
4. The tests evaluated 1-40GHz, The testing has been conformed to the 10th harmonic of the highest fundamental frequency or 40GHz. Test with highpass filter (Pass Frequency: 8-25G), and 18GHz-40GHz is the noise, No other signals were detected.
5. No report for the emission which below the prescribed limit.
6. The peak value < average limit, So only show the peak value.

