



# RF TEST REPORT

**Certificate No.** : TBC-C-202205-0119-1  
**Applicant** : Heltec Automation Technology Co., Ltd  
**Equipment Under Test (EUT)**  
**EUT Name** : Heltec Light Hotspot  
**Model No.** : HT-M7603  
**Serial Model No.** : ----  
**Brand Name** : Heltec  
**Receipt Date** : 2022-06-07  
**Test Date** : 2022-06-07 to 2022-06-20  
**Issue Date** : 2022-07-01  
**Standards** : ETSI EN 300 220-1 V3.1.1:2017  
ETSI EN 300 220-2 V3.2.1:2018  
**Conclusions** : **PASS**

In the configuration tested, the EUT complied with the standards specified above. The EUT technically complies with the Council Directive 2014/53/EU relating to radio equipment.

**Test/Witness Engineer** :

Wade Lv

**Engineer Supervisor** :

Ivan Su

**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-202205-0119-11 | Rev.01  | Initial issue of report | 2022-07-01  |
|                      |         |                         |             |
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|                      |         |                         |             |
|                      |         |                         |             |

# 1 General Information

## 1.1 Client Information

|                     |   |                                                                                   |
|---------------------|---|-----------------------------------------------------------------------------------|
| <b>Applicant</b>    | : | Heltec Automation Technology Co., Ltd                                             |
| <b>Address</b>      | : | 1st floor, No. 54, 56, 58 zirui North Street, High-tech Zone, Chengdu city, China |
| <b>Manufacturer</b> | : | Heltec Automation Technology Co., Ltd                                             |
| <b>Address</b>      | : | 1st floor, No. 54, 56, 58 zirui North Street, High-tech Zone, Chengdu city, China |

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

|                            |   |                                                                           |                       |
|----------------------------|---|---------------------------------------------------------------------------|-----------------------|
| <b>EUT Name</b>            | : | Heltec Light Hotspot                                                      |                       |
| <b>Model No.</b>           | : | HT-M7603                                                                  |                       |
| <b>Model Difference</b>    | : | ----                                                                      |                       |
| <b>Product Description</b> | : | LoRa: 863.1-869.9MHz                                                      |                       |
|                            | : | Number of Channel: 33 channels                                            |                       |
|                            | : | Output Power (Max): 13.83dBm                                              |                       |
|                            | : | Antenna Type:                                                             | 3.0dBi Dipole Antenna |
|                            | : | Receiver category:                                                        | 2                     |
|                            | : | Modulation Type: LORA                                                     |                       |
| <b>Power Rating</b>        | : | Adapter(DSS12D-0502000-B)<br>Input: 100-240V~50/60Hz 0.5A<br>Output: 5V2A |                       |
| <b>Software Version</b>    | : | N/A                                                                       |                       |
| <b>Hardware Version</b>    | : | N/A                                                                       |                       |

**Remark:** The antenna gain and adapter provided by the applicant, the verified for the RF conduction test provided by TOBY test lab.

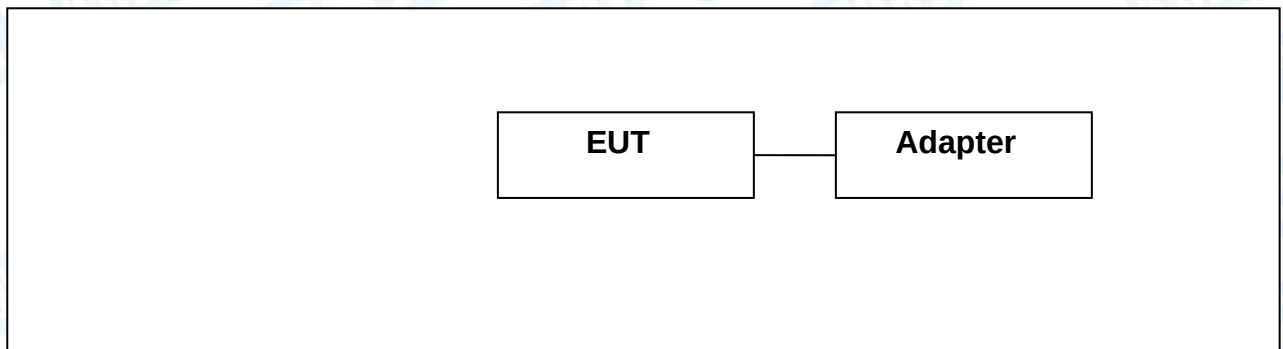
**Note:**

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

## (2) Frequency List:

| Frequency (MHz) | Frequency (MHz) | Frequency (MHz) | Frequency (MHz) | Frequency (MHz) |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| <b>863.1</b>    | 864.5           | 865.9           | 867.3           | 868.8           |
| 863.3           | 864.7           | 866.1           | 867.5           | 868.9           |
| 863.5           | 864.9           | <b>866.3</b>    | 867.7           | 869.1           |
| 863.7           | 865.1           | 866.5           | 867.9           | 869.5           |
| 863.9           | 865.3           | 866.7           | 868.1           | <b>869.9</b>    |
| 864.1           | 865.5           | 866.9           | 868.3           | /               |
| 864.3           | 865.7           | 867.1           | 868.5           | /               |

## 1.3 Block Diagram Showing the Configuration of System Tested



## 1.4 Description of Support Units

The EUT has been tested as an independent unit.

## 1.5 Description of Operating Mode

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based 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 above was evaluated respectively.

| Test Mode: Continuously transmitting |                        |                      |
|--------------------------------------|------------------------|----------------------|
|                                      | Frequency (MHz)        | Test Frequency (MHz) |
| K                                    | 863 MHz to 865 MHz     | 863.1                |
| L                                    | 865 MHz to 868 MHz     | 866.3                |
| Q                                    | 869.7 MHz to 870.0 MHz | 869.9                |

**Note:**

- (1) The EUT is considered a portable unit, and it was pre-tested on the positioned of each 3 axis: X axis, Y axis and Z axis. The worst case was found positioned on Z-plane. There for only the test data of this Z-plane were used for radiated emission measurement test.

## 1.6 Description of Testing Condition

|                | Normal Test Conditions | Extreme Test Conditions |
|----------------|------------------------|-------------------------|
| Temperature    | 15°C~35°C              | -25°C~40°C              |
| Humidity       | 20%~75%                | N/A                     |
| Supply Voltage | DC 5V                  | DC 4.0V~DC 5.5V         |

Note :

- (1) For tests at extreme temperatures, measurements shall be made in accordance with the procedures specified in clause 4.3.4.1.2(EN 300 220-1), at the upper and lower temperatures of the range as follows:

|                   |                 |
|-------------------|-----------------|
| General           | -25°C to +40°C  |
| Portable          | -10°C to +40°C  |
| Normal indoor use | +5°C to +35°C   |
| Automotive        | -40°C to +125°C |

(2) **Mains voltage:**

The extreme test voltage for equipment to be connected to an AC mains source shall be the nominal mains voltage  $\pm 10\%$ .

**Regulated lead-acid or gel-cell type batteries:**

When the radio equipment is intended for operation from the usual type of regulated lead-acid battery power sources, the extreme test voltages shall be 1,3 and 0,9 multiplied by the nominal voltage of the battery (6 V, 12 V, etc.).

For float charge applications using "gel-cell" type batteries, the extreme test voltages shall be 1,15 and 0,85 multiplied by the nominal voltage of the declared battery voltage.

**Power sources using other types of batteries:**

The lower extreme test voltages for equipment with power sources using the following types of battery shall be:

- For the Leclanché or lithium type battery: 0,85 times the nominal voltage of the battery;
- For the nickel-cadmium type of battery: 0,9 times the nominal voltage of the battery. In both cases, the upper extreme test voltage shall be 1,15 times the nominal voltage of the battery.
- For other types of batteries, the lower extreme test voltage for the discharged condition shall be declared by the equipment provider.

The nominal voltage is considered to be the upper extreme test voltage in this case.

## 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                                | Expanded Uncertainty ( $U_{Lab}$ ) |
|------------------------------------------|------------------------------------|
| Conducted Emission                       | $\pm 3.10$ dB                      |
| Radiated Emission<br>(9kHz to 30 MHz)    | $\pm 4.60$ dB                      |
| RF Power-Conducted                       | $\pm 0.18$ dB                      |
| RF level uncertainty for a<br>given BER  | $\pm 1.5$ dB                       |
| Radiated Emission<br>(30MHz to 1000 MHz) | $\pm 4.40$ dB                      |
| Radiated Emission<br>(Above 1000MHz)     | $\pm 4.20$ dB                      |
| Temperature                              | $\pm 0.6^{\circ}\text{C}$          |
| Humidity                                 | $\pm 4\%$                          |

## 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 Results Summary

| Harmonised Standards EN 300 220-2 |                                           |                      |                            |                                                                                                                                             |        |
|-----------------------------------|-------------------------------------------|----------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Requirement                       |                                           |                      | Requirement Conditionality |                                                                                                                                             | Result |
| No                                | Description                               | Reference: Clause No | U/C                        | Condition                                                                                                                                   | -      |
| 1                                 | Operating frequency                       | 4.2.1                | U                          | -                                                                                                                                           | PASS   |
| 2                                 | Unwanted emissions in the spurious domain | 4.2.2                | U                          | -                                                                                                                                           | PASS   |
| 3                                 | TX effective radiated power               | 4.3.1                | U                          | -                                                                                                                                           | PASS   |
| 4                                 | TX Maximum e.r.p. spectral density        | 4.3.2                | C                          | Applies to EUT using annex B bands I, L. Applies to EUT using DSSS or wideband techniques other than FHSS modulation, using annex C band X. | N/A    |
| 5                                 | TX Duty cycle                             | 4.3.3                | C                          | Not applicable to EUT with polite spectrum access where permitted in annex B, table B.1 or annex C, table C.1 or any NRI.                   | PASS   |
| 6                                 | TX Occupied bandwidth                     | 4.3.4                | U                          | -                                                                                                                                           | PASS   |
| 7                                 | TX out of band emissions                  | 4.3.5                | C                          | Applies to EUT with OCW > 25 kHz.                                                                                                           | PASS   |
| 8                                 | TX Transient Power                        | 4.3.6                | U                          | -                                                                                                                                           | PASS   |
| 9                                 | TX Adjacent channel power                 | 4.3.7                | C                          | Applies to EUT with OCW ≤ 25 kHz.                                                                                                           | N/A    |
| 10                                | TX behaviour under low voltage conditions | 4.3.8                | C                          | Applies to battery powered EUT.                                                                                                             | N/A    |
| 11                                | TX Adaptive power control                 | 4.3.9                | C                          | Applies to EUT with adaptive power control using annex C band AA.                                                                           | N/A    |
| 12                                | TX FHSS                                   | 4.3.10               | C                          | Applies to FHSS EUT.                                                                                                                        | N/A    |
| 13                                | TX Short term behaviour                   | 4.3.11               | C                          | Applies to EUT using annex C bands Y, Z, AA, AB, AC, AD.                                                                                    | N/A    |
| 14                                | RX sensitivity                            | 4.4.1                | C                          | Applies to EUT with polite spectrum access.                                                                                                 | N/A    |
| 15                                | Clear channel assessment threshold        | 4.5.2                | C                          | Applies to EUT with polite spectrum access.                                                                                                 | N/A    |
| 16                                | Polite spectrum access timing parameters  | 4.5.3                | C                          | Applies to EUT with polite spectrum access.                                                                                                 | N/A    |
| 17                                | RX Blocking                               | 4.4.2                | U                          | -                                                                                                                                           | PASS   |
| 18                                | Adaptive Frequency Agility                | 4.5.4                | C                          | Applies to EUT with AFA.                                                                                                                    | N/A    |

**Note:**

(1) "N/A" indicates test is not applicable in this Test Report.

(2) "U/C": Indicates whether the requirement is unconditionally applicable (U) or is conditional upon the manufacturer's claimed functionality of the equipment (C).

### 3 Test Equipment

| Radiation Emission Test (A Site)    |                    |                   |               |               |               |
|-------------------------------------|--------------------|-------------------|---------------|---------------|---------------|
| Equipment                           | Manufacturer       | Model No.         | Serial No.    | Last Cal.     | Cal. Due Date |
| Spectrum Analyzer                   | Rohde & Schwarz    | FSV40-N           | 102197        | Jul. 02, 2021 | Jul. 01, 2022 |
| EMI Test Receiver                   | Rohde & Schwarz    | ESPI              | 100010/007    | Jul. 02, 2021 | Jul. 01, 2022 |
| Bilog Antenna                       | ETS-LINDGREN       | 3142E             | 00117537      | Feb. 27, 2022 | Feb. 26, 2024 |
| Horn Antenna                        | ETS-LINDGREN       | 3117              | 00143207      | Feb. 26, 2022 | Feb. 25, 2024 |
| Horn Antenna                        | SCHWARZBECK        | BBHA 9170         | 1118          | Feb. 26, 2022 | Feb. 25, 2024 |
| Loop Antenna                        | SCHWARZBECK        | FMZB 1519 B       | 1519B-059     | Jul. 06, 2021 | Jul. 05, 2022 |
| Pre-amplifier                       | SONOMA             | 310N              | 185903        | Feb. 26, 2022 | Feb. 25, 2023 |
| Pre-amplifier                       | HP                 | 8449B             | 3008A00849    | Feb. 26, 2022 | Feb. 25, 2023 |
| HF Amplifier                        | Tonscend           | TAP0184050        | AP21C806129   | Sep. 03, 2021 | Sep. 02, 2022 |
| Radiation Emission Test (B Site)    |                    |                   |               |               |               |
| Equipment                           | Manufacturer       | Model No.         | Serial No.    | Last Cal.     | Cal. Due Date |
| Spectrum Analyzer                   | Rohde & Schwarz    | FSV40-N           | 102197        | Jul. 02, 2021 | Jul. 01, 2022 |
| MXA Signal Analyzer                 | Agilent            | N9020A            | MY47380425    | Sep. 03, 2021 | Sep. 02, 2022 |
| EMI Test Receiver                   | Rohde & Schwarz    | ESU-8             | 100472        | Feb. 26, 2022 | Feb. 25, 2023 |
| Bilog Antenna                       | SCHWARZBECK        | VULB 9168         | 1225          | Dec. 05, 2021 | Dec. 04, 2023 |
| Horn Antenna                        | SCHWARZBECK        | BBHA 9120 D       | 2463          | May 20, 2021  | May 19, 2023  |
| Horn Antenna                        | SCHWARZBECK        | BBHA 9170         | 1118          | Feb. 26, 2022 | Feb. 25, 2024 |
| Loop Antenna                        | SCHWARZBECK        | FMZB 1519 B       | 1519B-059     | Jul. 06, 2021 | Jul. 05, 2022 |
| HF Amplifier                        | Tonscend           | TAP9E6343         | AP21C806117   | Sep. 03, 2021 | Sep. 02, 2022 |
| HF Amplifier                        | Tonscend           | TAP051845         | AP21C806141   | Sep. 03, 2021 | Sep. 02, 2022 |
| HF Amplifier                        | Tonscend           | TAP0184050        | AP21C806129   | Sep. 03, 2021 | Sep. 02, 2022 |
| Antenna Conducted Emission          |                    |                   |               |               |               |
| Equipment                           | Manufacturer       | Model No.         | Serial No.    | Last Cal.     | Cal. Due Date |
| Spectrum Analyzer                   | Agilent            | E4407B            | MY45106456    | Jul. 02, 2021 | Jul. 01, 2022 |
| Spectrum Analyzer                   | Rohde & Schwarz    | FSV40-N           | 102197        | Jul. 02, 2021 | Jul. 01, 2022 |
| MXA Signal Analyzer                 | Agilent            | N9020A            | MY49100060    | Sep. 03, 2021 | Sep. 02, 2022 |
| Spectrum Analyzer                   | KEYSIGT            | N9020B            | MY60110172    | Sep. 03, 2021 | Sep. 02, 2022 |
| RF Power Sensor                     | DARE!! Instruments | RadiPowerRPR3006W | 17I00015SNO26 | Sep. 03, 2021 | Sep. 02, 2022 |
|                                     | DARE!! Instruments | RadiPowerRPR3006W | 17I00015SNO29 | Sep. 03, 2021 | Sep. 02, 2022 |
|                                     | DARE!! Instruments | RadiPowerRPR3006W | 17I00015SNO31 | Sep. 03, 2021 | Sep. 02, 2022 |
|                                     | DARE!! Instruments | RadiPowerRPR3006W | 17I00015SNO33 | Sep. 03, 2021 | Sep. 02, 2022 |
| RF Control Unit                     | Tonsced            | JS0806-2          | 21F8060439    | Sep. 03, 2021 | Sep. 02, 2022 |
| Wideband Radio Communication Tester | Rohde & Schwarz    | CMW500            | 144382        | Sep. 03, 2021 | Sep. 02, 2022 |

## 4 Unwanted Emissions In the Spurious Domain

### 4.1 Test Standard and Limit

#### 4.1.1 Test Standard

ETSI EN 300 220-1 V3.1.1:2017 clause 5.9

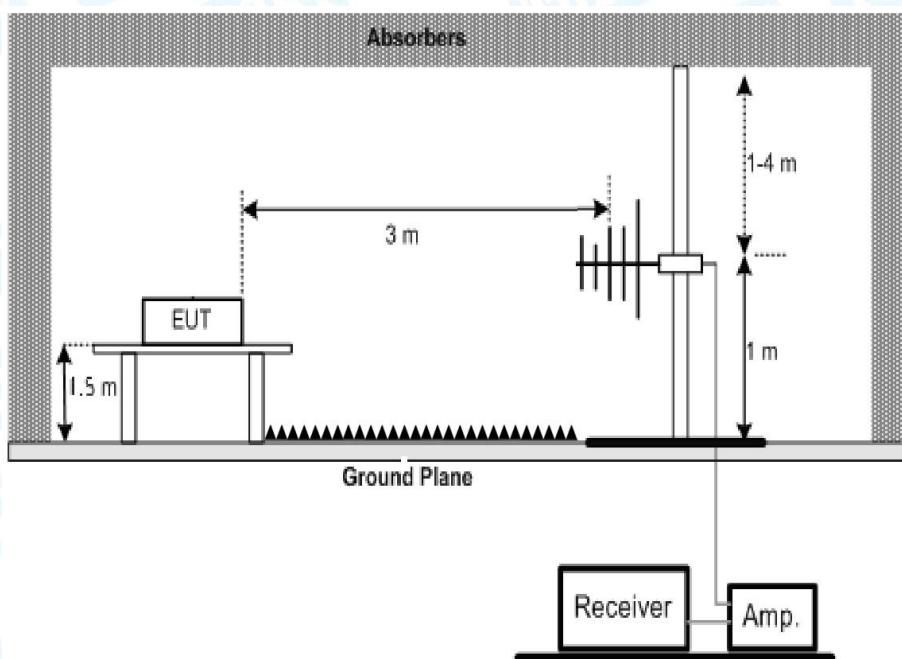
ETSI EN 300 220-2 V3.2.1:2018 clause 4.2.2

#### 4.1.2 Test Limit

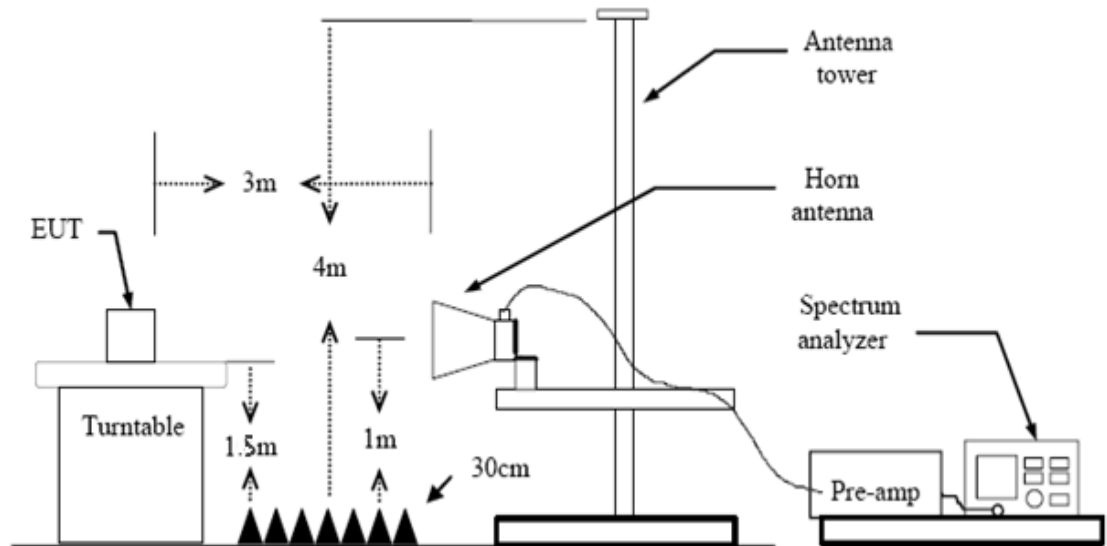
**Spurious domain emission limits**

| Frequency              | 47 MHz to 74 MHz<br>87,5 MHz to 118 MHz<br>174 MHz to 230 MHz<br>470 MHz to 790 MHz | Other frequencies<br>below 1 000 MHz | Frequencies<br>above 1 000 MHz |
|------------------------|-------------------------------------------------------------------------------------|--------------------------------------|--------------------------------|
| State                  |                                                                                     |                                      |                                |
| TX mode                | -54 dBm                                                                             | -36 dBm                              | -30 dBm                        |
| RX and all other modes | -57 dBm                                                                             | -57 dBm                              | -47 dBm                        |

### 4.2 Test Setup

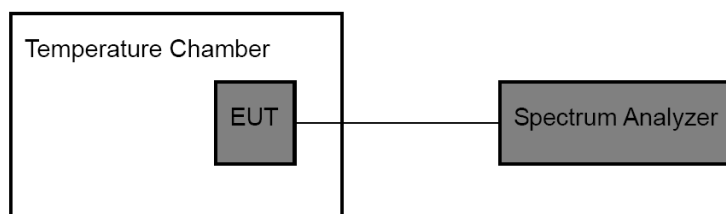


Below 1G



Above 1G

Extreme Condition:



#### 4.3 Test Procedure

The conducted measurement procedure in clause 5.9.3.3.1 of ETSI EN 300 220-1 V3.1.1. The radiated measurement procedure in clause 5.9.3.3.2 of ETSI EN 300 220-1 V3.1.1, with the antenna port terminated in a dummy load.

#### 4.4 EUT Operation During Test

The measurements shall be performed during continuously transmitting.

#### 4.5 Deviation From Test Standard

No deviation

#### 4.6 Test Data

Please refer to the Attachment A.

## 5 Effective Radiated Power

### 5.1 Test Standard and Limit

#### 5.1.1 Test Standard

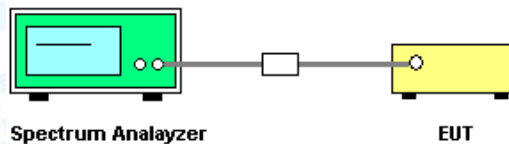
ETSI EN 300 220-1 V3.1.1:2017 clause 5.2  
ETSI EN 300 220-2 V3.2.1:2018 clause 4.3.1

#### 5.1.2 Limits

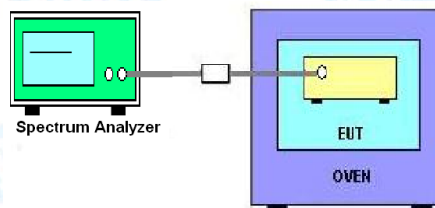
| Operational Frequency Band |                        | Maximum effective radiated power, e.r.p. | Maximum occupied bandwidth                                              | Channel access and occupation rules (e.g. Duty cycle or LBT + AFA) |
|----------------------------|------------------------|------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------|
| K                          | 863 MHz to 865 MHz     | 25 mW e.r.p.                             | The whole band except for audio & video applications limited to 300 kHz | $\leq 0,1$ % duty cycle or polite spectrum access                  |
| L                          | 865 MHz to 868 MHz     | 25 mW e.r.p.                             | The whole band                                                          | $\leq 1$ % duty cycle or polite spectrum access                    |
| Q                          | 869.7 MHz to 870.0 MHz | 25 mW e.r.p.                             | The whole band                                                          | $\leq 1$ % duty cycle or polite spectrum access                    |

### 5.2 Test Setup

#### Normal Condition



#### Extreme Condition



### 5.3 Test Procedure

The conducted measurement procedure in clause 5.2.2.1 of ETSI EN 300 220-1 V3.1.1.

### 5.4 EUT Operation During Test

The measurements shall be performed during continuously transmitting.

### 5.5 Deviation From Test Standard

No deviation

### 5.6 Test Data

Please refer to the Attachment B.

## 6 Duty cycle

### 6.1 Test Standard and Limit

#### 6.1.1 Test Standard

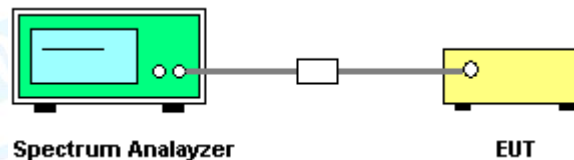
**ETSI EN 300 220-1 V3.1.1:2017 clause 5.4**  
**ETSI EN 300 220-2 V3.2.1:2018 Annex B&C**

#### 6.1.2 Limits

| Operational Frequency Band |                        | Maximum effective radiated power, e.r.p. | Maximum occupied bandwidth                                              | Channel access and occupation rules (e.g. Duty cycle or LBT + AFA) |
|----------------------------|------------------------|------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------|
| K                          | 863 MHz to 865 MHz     | 25 mW e.r.p.                             | The whole band except for audio & video applications limited to 300 kHz | $\leq 0.1\%$ duty cycle or polite spectrum access                  |
| L                          | 865 MHz to 868 MHz     | 25 mW e.r.p.                             | The whole band                                                          | $\leq 1\%$ duty cycle or polite spectrum access                    |
| Q                          | 869.7 MHz to 870.0 MHz | 25 mW e.r.p.                             | The whole band                                                          | $\leq 1\%$ duty cycle or polite spectrum access                    |

### 6.2 Test Setup

#### Normal Condition



### 6.3 Test Procedure

The conducted measurement procedure in clause 5.4 of ETSI EN 300 220-1 V3.1.1.

### 6.4 EUT Operation During Test

The measurements shall be performed during continuously transmitting.

### 6.5 Deviation From Test Standard

No deviation

### 6.6 Test Data

Please refer to the Attachment C.

## 7 Occupied Bandwidth

### 7.1 Test Standard and Limit

#### 7.1.1 Test Standard

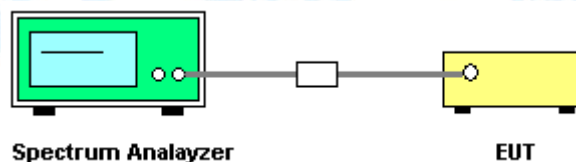
**ETSI EN 300 220-1 V3.1.1:2017 clause 5.6**  
**ETSI EN 300 220-2 V3.2.1:2018 clause 3.1.1**

#### 7.1.2 Limits

The Operating Channel shall be declared and shall reside entirely within the Operational Frequency Band.

The Maximum Occupied Bandwidth at 99 % shall reside entirely within the Operating Channel defined by  $F_{low}$  and  $F_{high}$ .

### 7.2 Test Setup



### 7.3 Test Procedure

The conducted measurement procedure in clause 5.6.3.4 of ETSI EN 300 220-1 V3.1.1.

### 7.4 EUT Operation During Test

The measurements shall be performed during continuously transmitting.

### 7.5 Deviation From Test Standard

No deviation

### 7.6 Test Data

Please refer to the Attachment D.

## 8 Tx Out of Band Emissions

### 8.1 Test Standard and Limit

#### 8.1.1 Test Standard

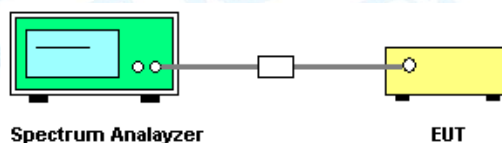
ETSI EN 300 220-1 V3.1.1:2017 clause 5.8

ETSI EN 300 220-2 V3.2.1:2018 clause 4.3.5

#### 8.1.2 Limits

| Tx Out of Band Emissions                                                                                                                                                                                                                                                             |                                                                                             |                    |                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------|-----------------|
| Domain                                                                                                                                                                                                                                                                               | Frequency Range                                                                             | RBW <sub>REF</sub> | Max power limit |
| OOB limits applicable to Operational Frequency Band<br>(See Figure 6)                                                                                                                                                                                                                | $f \leq f_{\text{low\_OFB}} - 400 \text{ kHz}$                                              | 10 kHz             | -36 dBm         |
|                                                                                                                                                                                                                                                                                      | $F_{\text{low\_OFB}} - 400 \text{ kHz} \leq f \leq f_{\text{low\_OFB}} - 200 \text{ kHz}$   | 1 kHz              | -36 dBm         |
|                                                                                                                                                                                                                                                                                      | $f_{\text{low}} - 200 \text{ kHz} \leq f < f_{\text{low\_OFB}}$                             | 1 kHz              | See Figure 6    |
|                                                                                                                                                                                                                                                                                      | $f = f_{\text{low\_OFB}}$                                                                   | 1 kHz              | 0 dBm           |
|                                                                                                                                                                                                                                                                                      | $f = f_{\text{high\_OFB}}$                                                                  | 1 kHz              | 0 dBm           |
|                                                                                                                                                                                                                                                                                      | $F_{\text{high\_OFB}} < f \leq f_{\text{high\_OFB}} + 200 \text{ kHz}$                      | 1 kHz              | See Figure 6    |
|                                                                                                                                                                                                                                                                                      | $F_{\text{high\_OFB}} + 200 \text{ kHz} \leq f \leq f_{\text{high\_OFB}} + 400 \text{ kHz}$ | 1 kHz              | -36 dBm         |
|                                                                                                                                                                                                                                                                                      | $F_{\text{high\_OFB}} + 400 \text{ kHz} \leq f$                                             | 10 kHz             | -36 dBm         |
| OOB limits applicable to Operating Channel<br>(See Figure 5)                                                                                                                                                                                                                         | $f = f_c - 2.5 \times \text{OCW}$                                                           | 1 kHz              | -36 dBm         |
|                                                                                                                                                                                                                                                                                      | $f_c - 2.5 \times \text{OCW} \leq f \leq f_c - 0.5 \times \text{OCW}$                       | 1 kHz              | See Figure 5    |
|                                                                                                                                                                                                                                                                                      | $f = f_c - 0.5 \times \text{OCW}$                                                           | 1 kHz              | 0 dBm           |
|                                                                                                                                                                                                                                                                                      | $f = f_c + 0.5 \times \text{OCW}$                                                           | 1 kHz              | 0 dBm           |
|                                                                                                                                                                                                                                                                                      | $f_c + 0.5 \times \text{OCW} \leq f \leq f_c + 2.5 \times \text{OCW}$                       | 1 kHz              | See Figure 5    |
|                                                                                                                                                                                                                                                                                      | $f = f_c + 2.5 \times \text{OCW}$                                                           | 1 kHz              | -36 dBm         |
| NOTE: $f$ is the measurement frequency.<br>$f_c$ is the Operating Frequency.<br>$F_{\text{low\_OFB}}$ is the lower edge of the Operational Frequency Band.<br>$F_{\text{high\_OFB}}$ is the upper edge of the Operational Frequency Band.<br>OCW is the operating channel bandwidth. |                                                                                             |                    |                 |

### 8.2 Test Setup



### 8.3 Test Procedure

Please refer to chapter 5.8.3.3 of ETSI EN 300 220-1 V3.1.1

### 8.4 EUT Operation During Test

The measurements shall be performed during continuously transmitting.

### 8.5 Deviation From Test Standard

No deviation

### 8.6 Test Data

Please refer to the Attachment E.

## 9 Transient Power

### 9.1 Test Standard and Limit

#### 9.1.1 Test Standard

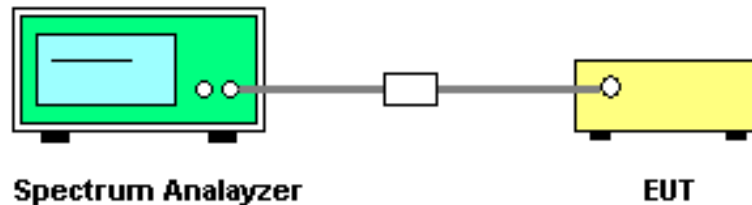
ETSI EN 300 220-1 V3.1.1:2017 clause 5.10

ETSI EN 300 220-2 V3.2.1:2018 clause 4.3.6

#### 9.1.2 Limit

| Transient power                       |                    |                                                   |
|---------------------------------------|--------------------|---------------------------------------------------|
| Absolute offset from centre frequency | RBW <sub>REF</sub> | Peak power limit applicable at measurement points |
| ≤ 400 kHz                             | 1 kHz              | 0 dBm                                             |
| > 400 kHz                             | 1 kHz              | -27 dBm                                           |

### 9.2 Test Setup



### 9.3 Test Procedure

Please refer to chapter 5.10.3.2 of ETSI EN 300 220-1 V3.1.1

### 9.4 EUT Operating Condition

The EUT was programmed to be in transmitting mode.

### 9.5 Deviation From Test Standard

No deviation

### 9.6 Test Data

Please refer to the Attachment F.

## 10 Adjacent Channel Power

### 10.1 Test Standard and Limit

#### 10.1.1 Test Standard

ETSI EN 300 220-1 V3.1.1:2017 clause 5.11

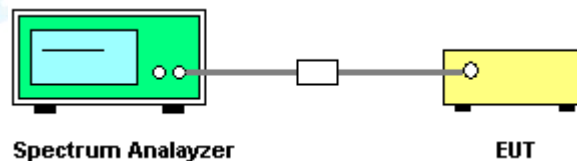
ETSI EN 300 220-2 V3.2.1:2018 clause 4.3.7

#### 10.1.2 Limits

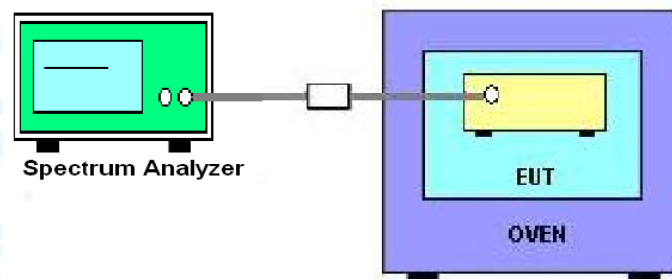
| Adjacent Channel Power |                         |                                                  |                                                            |
|------------------------|-------------------------|--------------------------------------------------|------------------------------------------------------------|
|                        |                         | Adjacent Channel power integrated over 0,7 x OCW | Alternate Adjacent Channel power integrated over 0,7 x OCW |
| OCW < 20 kHz           | Normal test conditions  | -20 dBm                                          | -20 dBm                                                    |
|                        | Extreme test conditions | -15 dBm                                          | -20 dBm                                                    |
| OCW ≥ 20 kHz           | Normal test conditions  | -37 dBm                                          | -40 dBm                                                    |
|                        | Extreme test conditions | -32 dBm                                          | -37 dBm                                                    |

### 10.2 Test Setup

#### Normal Condition



#### Extreme Condition



### 10.3 Test Procedure

Please refer to chapter 5.11.3.4 of ETSI EN 300 220-1 V3.1.1

### 10.4 EUT Operating Condition

The EUT was programmed to be in transmitting mode.

### 10.5 Test Data

No requirement for this test item

## 11 Tx Behaviour Under Low Voltage Conditions

### 11.1 Test Standard and Limit

#### 11.1.1 Test Standard

**ETSI EN 300 220-1 V3.1.1:2017 clause 5.12**  
**ETSI EN 300 220-2 V3.2.1:2018 clause 4.3.8**

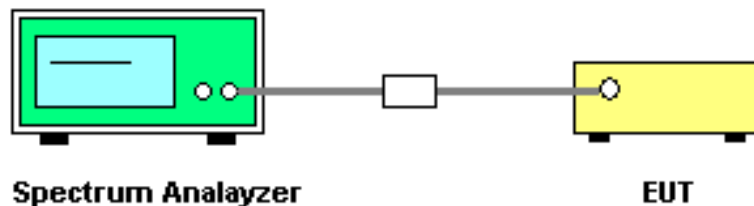
#### 11.1.2 Limits

##### TX behaviour under Low Voltage Conditions

The equipment shall either:

- a) remain in the Operating Channel OC without exceeding any applicable limits (e.g. Duty Cycle); or
- b) reduce its effective radiated power below the Spurious Emission limits without exceeding any applicable limits (e.g. Duty Cycle); or
- c) shut down, (ceasing function); as the voltage falls below the manufacturers declared operating voltage.

### 11.2 Test Setup



### 11.3 Test Procedure

Please refer to chapter 5.12.3.2 of ETSI EN 300 220-1 V3.1.1

### 11.4 EUT Operating Condition

The EUT was programmed to be in transmitting mode.

### 11.5 Deviation From Test Standard

No deviation

### 11.6 Test Data

The equipment is not battery-powered, so the test item is not require.

## 12 Blocking

### 12.1 Test Standard and Limit

#### 12.1.1 Test Standard

ETSI EN 300 220-1 V3.1.1:2017 clause 5.18

ETSI EN 300 220-2 V3.2.1:2018 clause 4.4.2

#### 12.1.2 Limits

The blocking level shall not be less than the values given in bellow table, except at frequencies on which spurious responses are found.

#### Limits for receiver blocking

**Table 41: Blocking level parameters for RX category 2**

| Requirement                                                                   | Limits              |
|-------------------------------------------------------------------------------|---------------------|
|                                                                               | Receiver category 2 |
| Blocking at $\pm 2$ MHz from OC edge $f_{\text{high}}$ and $f_{\text{low}}$   | $\geq -69$ dBm      |
| Blocking at $\pm 10$ MHz from OC edge $f_{\text{high}}$ and $f_{\text{low}}$  | $\geq -44$ dBm      |
| Blocking at $\pm 5$ % of Centre Frequency or 15 MHz, whichever is the greater | $\geq -44$ dBm      |

**Table 42: Blocking level parameters for RX category 1.5**

| Requirement                                                                   | Limits                |
|-------------------------------------------------------------------------------|-----------------------|
|                                                                               | Receiver category 1.5 |
| Blocking at $\pm 2$ MHz from OC edge $f_{\text{high}}$ and $f_{\text{low}}$   | $\geq -43$ dBm        |
| Blocking at $\pm 10$ MHz from OC edge $f_{\text{high}}$ and $f_{\text{low}}$  | $\geq -33$ dBm        |
| Blocking at $\pm 5$ % of Centre Frequency or 15 MHz, whichever is the greater | $\geq -33$ dBm        |

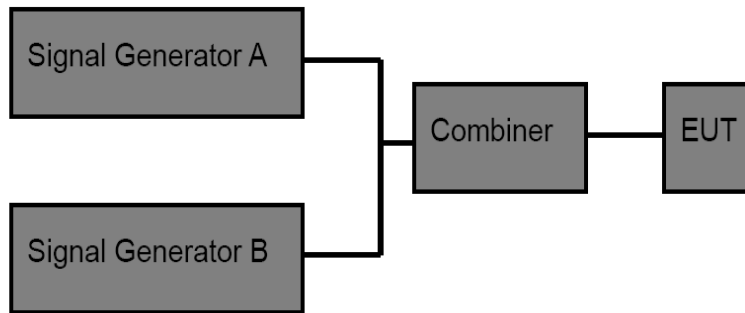
**Table 43: Blocking level parameters for RX category 1**

| Requirement                                                                   | Limits              |
|-------------------------------------------------------------------------------|---------------------|
|                                                                               | Receiver category 1 |
| Blocking at $\pm 2$ MHz from Centre Frequency                                 | $\geq -20$ dBm      |
| Blocking at $\pm 10$ MHz from Centre Frequency                                | $\geq -20$ dBm      |
| Blocking at $\pm 5$ % of Centre Frequency or 15 MHz, whichever is the greater | $\geq -20$ dBm      |

**Table 1: Receiver categories**

| Receiver category | Description                                                                                                                                                                                                                                                                                                                                         |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                 | Category 1 is a high performance level of receiver. In particular to be used where the operation of a SRD may have inherent safety of human life implications.                                                                                                                                                                                      |
| 1.5               | Category 1.5 is an improved performance level of receiver category 2.                                                                                                                                                                                                                                                                               |
| 2                 | Category 2 is standard performance level of receiver.                                                                                                                                                                                                                                                                                               |
| 3                 | Category 3 is a low performance level of receiver. Manufacturers have to be aware that category 3 receivers are not able to work properly in case of coexistence with some services such as a mobile radio service in adjacent bands. The manufacturer shall provide another mean to overcome the weakness of the radio link or accept the failure. |

## 12.2 Test Setup



## 12.3 Test Procedure

Please refer to chapter 5.18.6.4 of ETSI EN 300 220-1 V3.1.1

## 12.4 Deviation From Test Standard

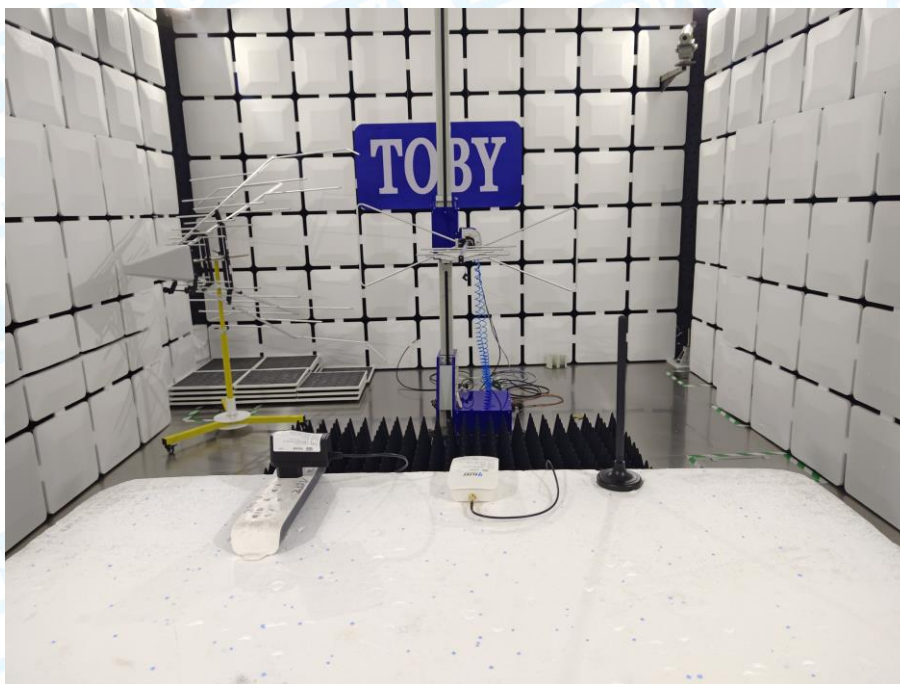
No deviation

## 12.5 Test Data

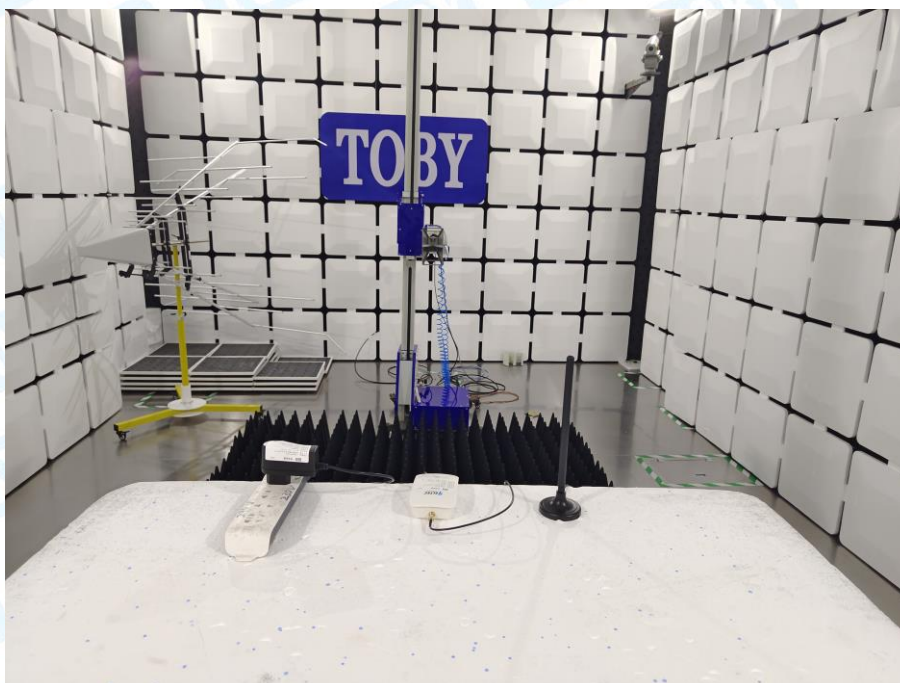
Please refer to the Attachment G.

## 13 Photographs – Test Setup

### Radiated Spurious Emission (Below 1 GHz)



### Radiated Spurious Emission (Above 1 GHz)



## Attachment A-- Unwanted Emissions In the Spurious Domain

|                                                                    |       |                  |         |
|--------------------------------------------------------------------|-------|------------------|---------|
| Test Mode :                                                        |       | TX Mode 866.3MHz |         |
| Unwanted Emissions in the Spurious Domain with reference BW=140kHz |       |                  |         |
| Frequency Range                                                    | RBW   | Limit            | Results |
|                                                                    | (kHz) | (dBm)            | (P/F)   |
| F <sub>c</sub> -4 x OCW<f< F <sub>c</sub> -2,5 x OCW               | 1kHz  | -36 dBm          | PASS    |
| F <sub>c</sub> -Max(10xOCW, 500kHz)<f<F <sub>c</sub> -4 x OCW      | 10kHz | -36 dBm          | PASS    |
| F <sub>c</sub> +2,5 x OCW<f< F <sub>c</sub> +4 x OCW               | 1kHz  | -36 dBm          | PASS    |
| F <sub>c</sub> +4 x OCW<f< F <sub>c</sub> +Max(10xOCW, 500kHz)     | 10kHz | -36 dBm          | PASS    |
| NOTE: Only showed test data of the worst mode                      |       |                  |         |

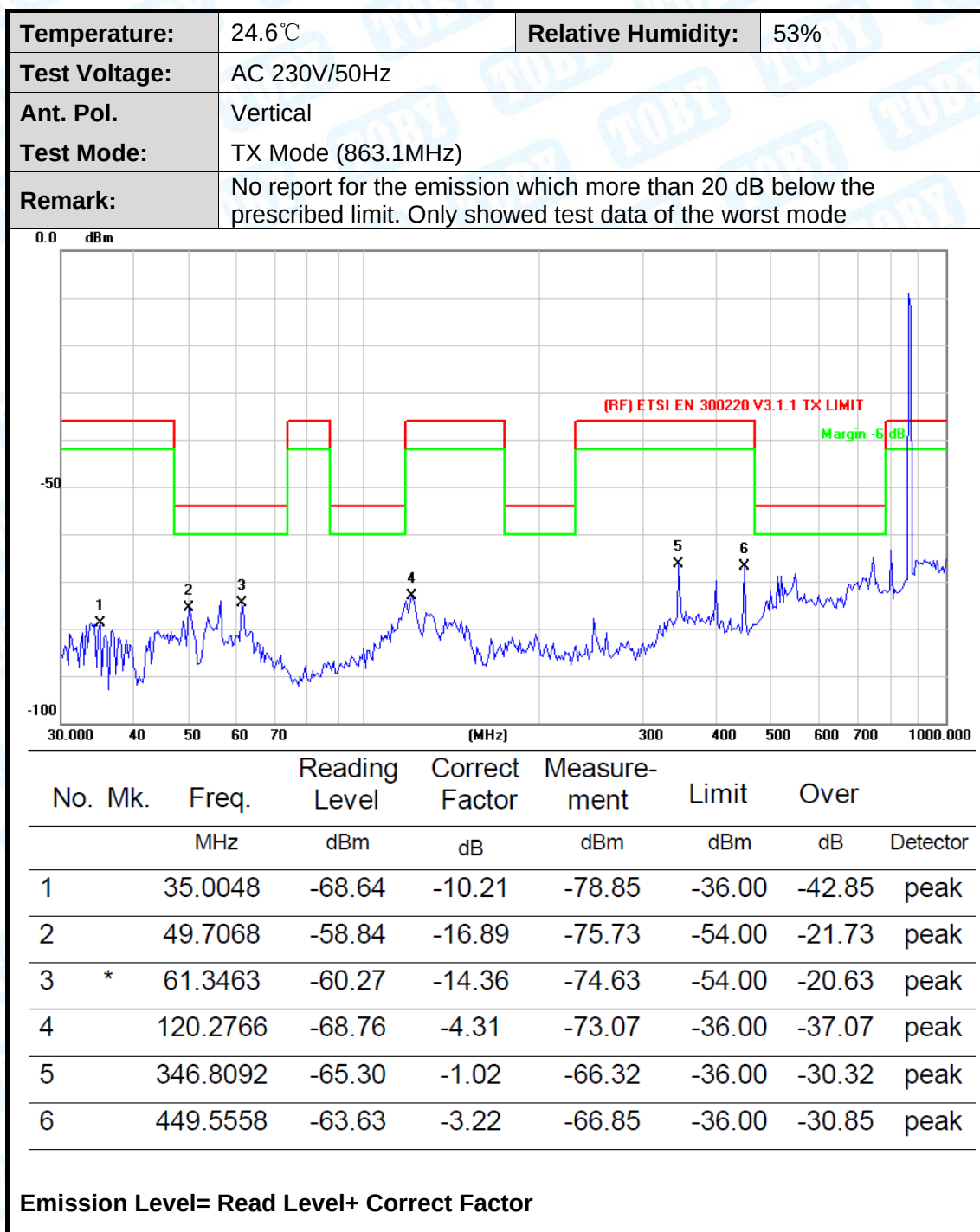
## Below 1G

|               |                                                                                                                      |                    |     |
|---------------|----------------------------------------------------------------------------------------------------------------------|--------------------|-----|
| Temperature:  | 24.6°C                                                                                                               | Relative Humidity: | 53% |
| Test Voltage: | AC 230V/50Hz                                                                                                         |                    |     |
| Ant. Pol.     | Horizontal                                                                                                           |                    |     |
| Test Mode:    | TX Mode (863.1MHz)                                                                                                   |                    |     |
| Remark:       | No report for the emission which more than 20 dB below the prescribed limit. Only showed test data of the worst mode |                    |     |

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|
| 1   |     | 33.7986      | -72.68                  | -1.03                   | -73.71                  | -36.00       | -37.71     | peak     |
| 2   |     | 73.6170      | -68.39                  | -11.88                  | -80.27                  | -54.00       | -26.27     | peak     |
| 3   |     | 116.9495     | -64.38                  | -11.59                  | -75.97                  | -54.00       | -21.97     | peak     |
| 4   |     | 134.5592     | -57.78                  | -11.17                  | -68.95                  | -36.00       | -32.95     | peak     |
| 5   |     | 249.4250     | -66.18                  | 4.99                    | -61.19                  | -36.00       | -25.19     | peak     |
| 6   | *   | 401.8385     | -57.07                  | 0.49                    | -56.58                  | -36.00       | -20.58     | peak     |

Emission Level= Read Level+ Correct Factor

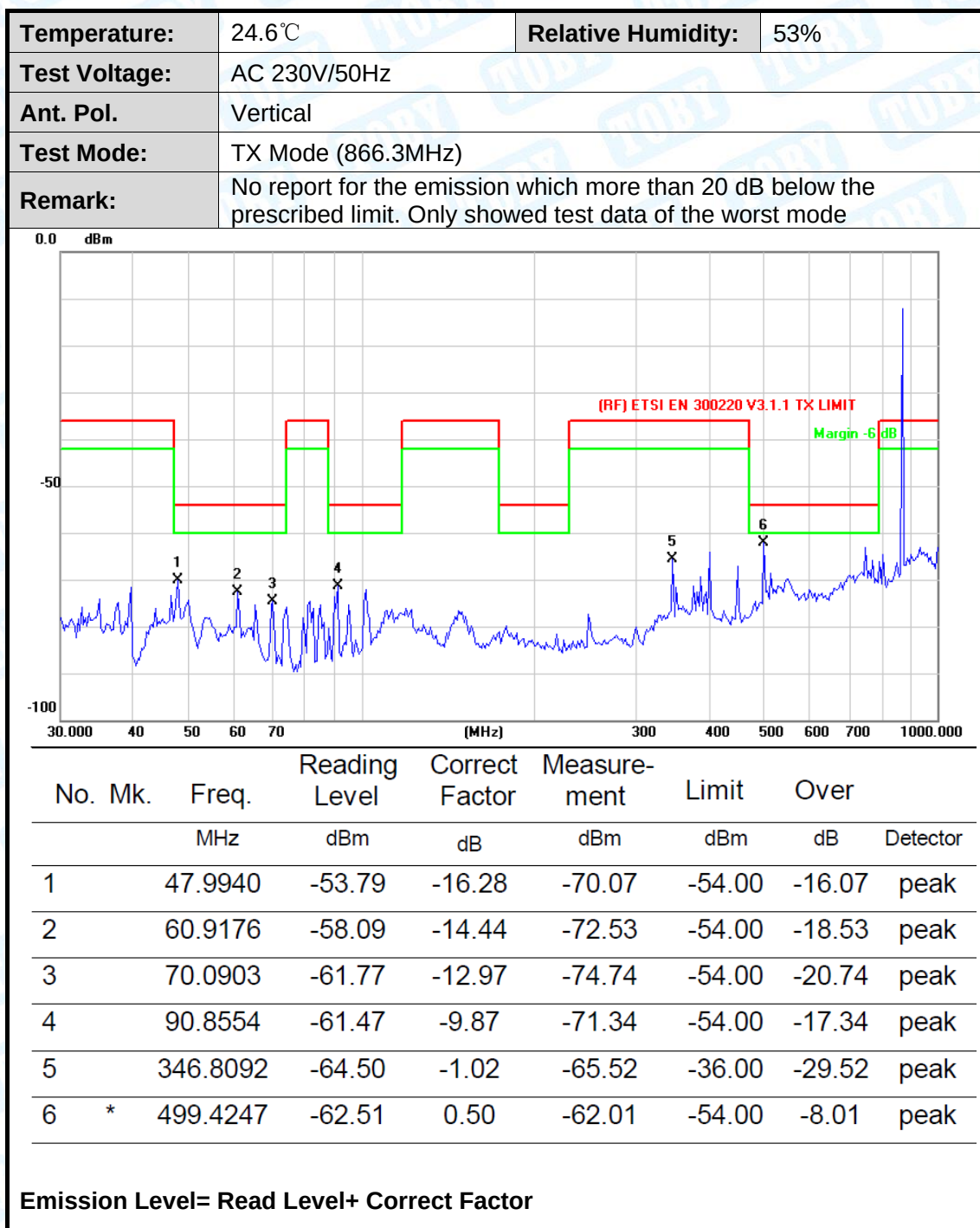


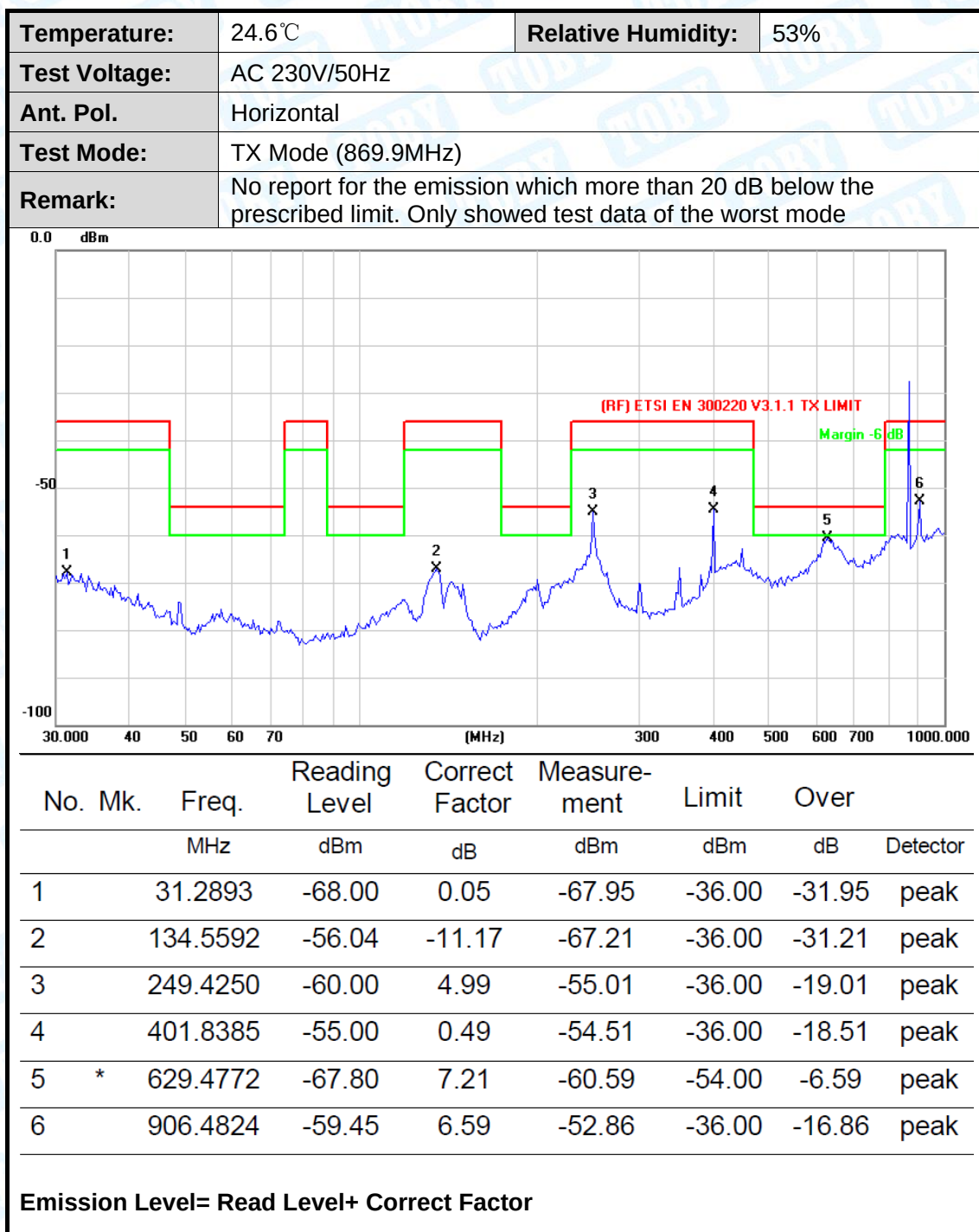
|               |                                                                                                                      |                    |     |
|---------------|----------------------------------------------------------------------------------------------------------------------|--------------------|-----|
| Temperature:  | 24.6°C                                                                                                               | Relative Humidity: | 53% |
| Test Voltage: | AC 230V/50Hz                                                                                                         |                    |     |
| Ant. Pol.     | Horizontal                                                                                                           |                    |     |
| Test Mode:    | TX Mode (866.3MHz)                                                                                                   |                    |     |
| Remark:       | No report for the emission which more than 20 dB below the prescribed limit. Only showed test data of the worst mode |                    |     |

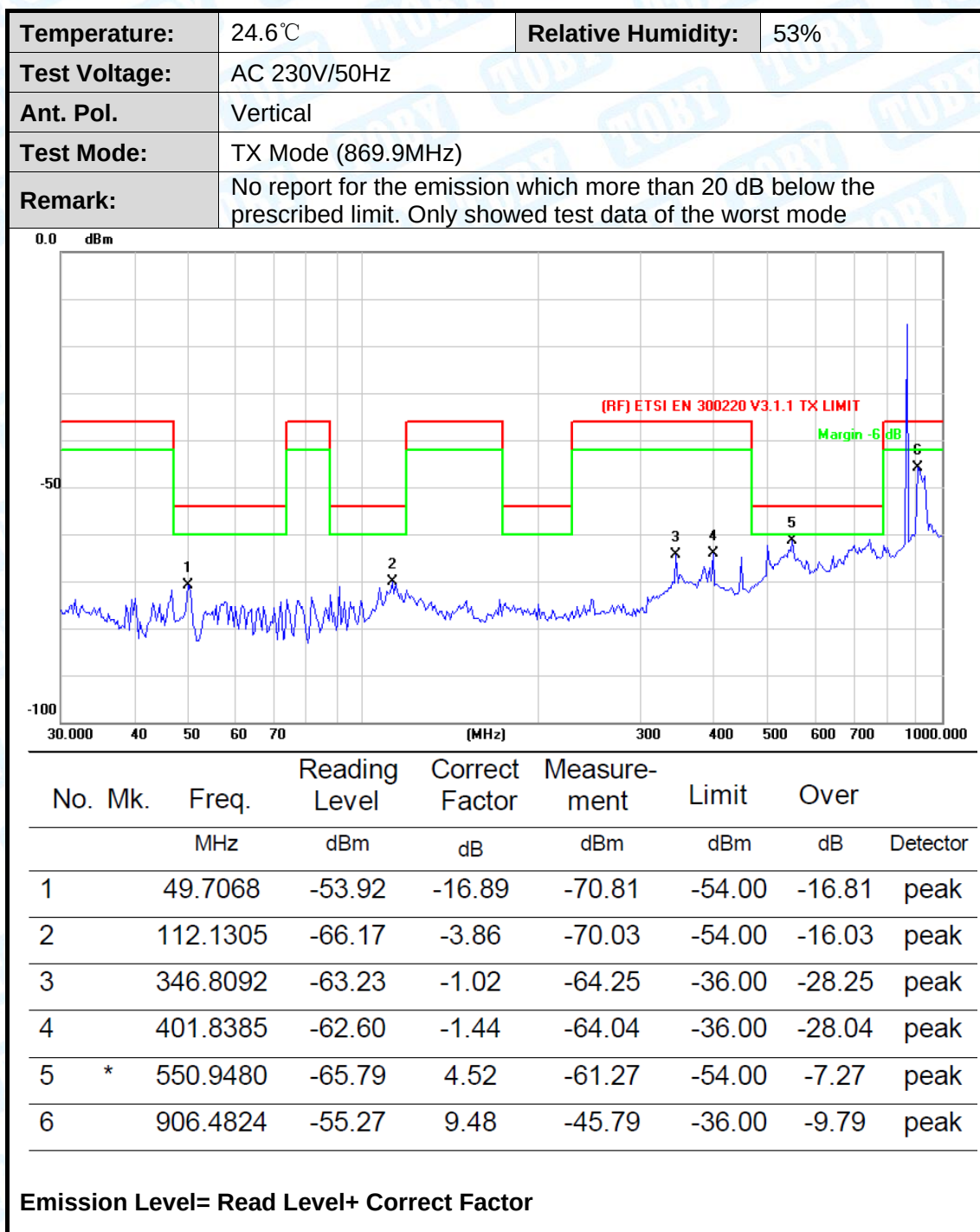
  

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|
| 1   |     | 34.0365      | -71.96                  | -1.13                   | -73.09                  | -36.00       | -37.09     | peak     |
| 2   |     | 135.5062     | -54.46                  | -11.14                  | -65.60                  | -36.00       | -29.60     | peak     |
| 3   |     | 247.6819     | -63.19                  | 4.54                    | -58.65                  | -36.00       | -22.65     | peak     |
| 4   |     | 401.8385     | -56.47                  | 0.49                    | -55.98                  | -36.00       | -19.98     | peak     |
| 5   |     | 449.5558     | -63.74                  | 2.18                    | -61.56                  | -36.00       | -25.56     | peak     |
| 6   | *   | 651.9417     | -69.06                  | 5.88                    | -63.18                  | -54.00       | -9.18      | peak     |

Emission Level= Read Level+ Correct Factor





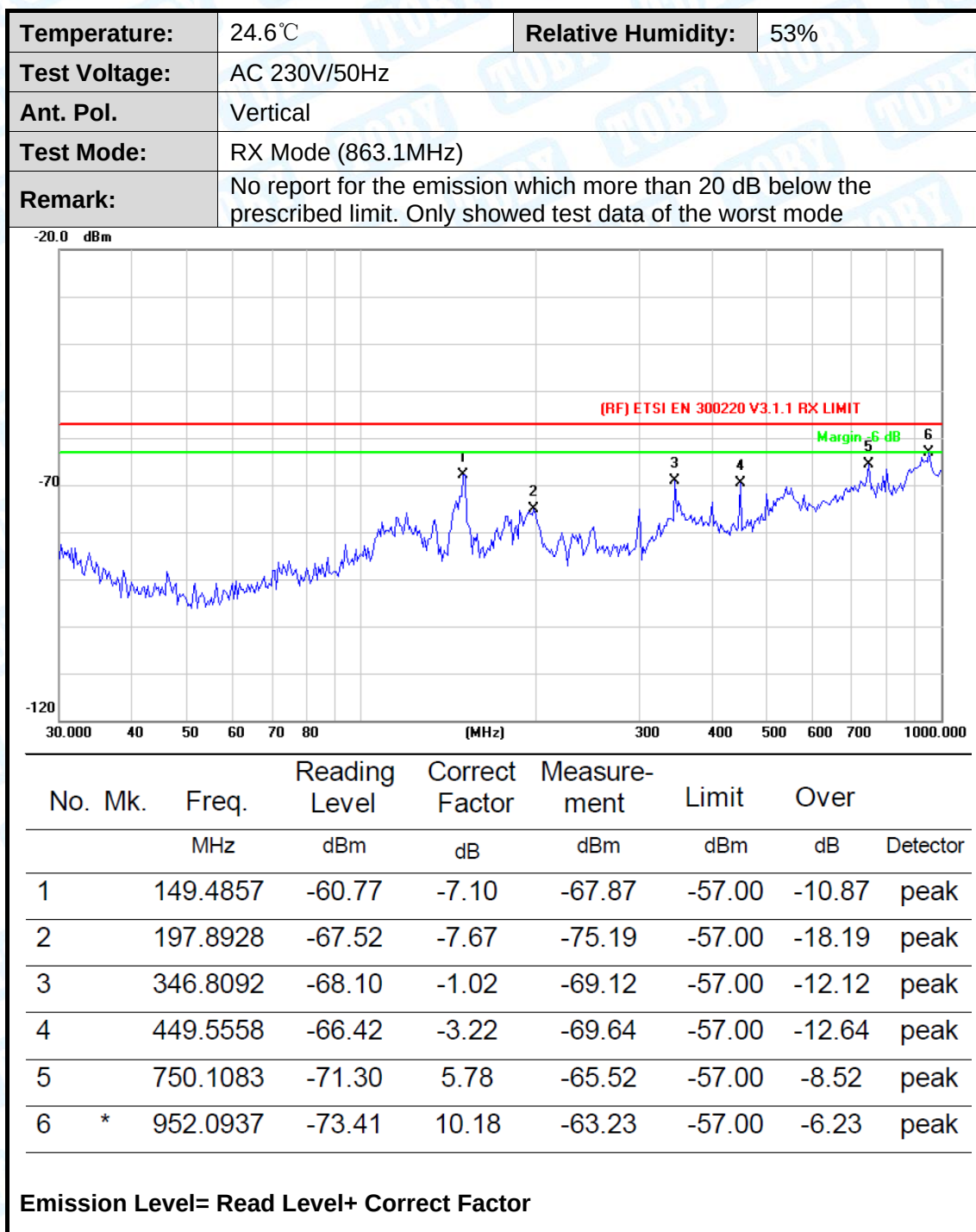


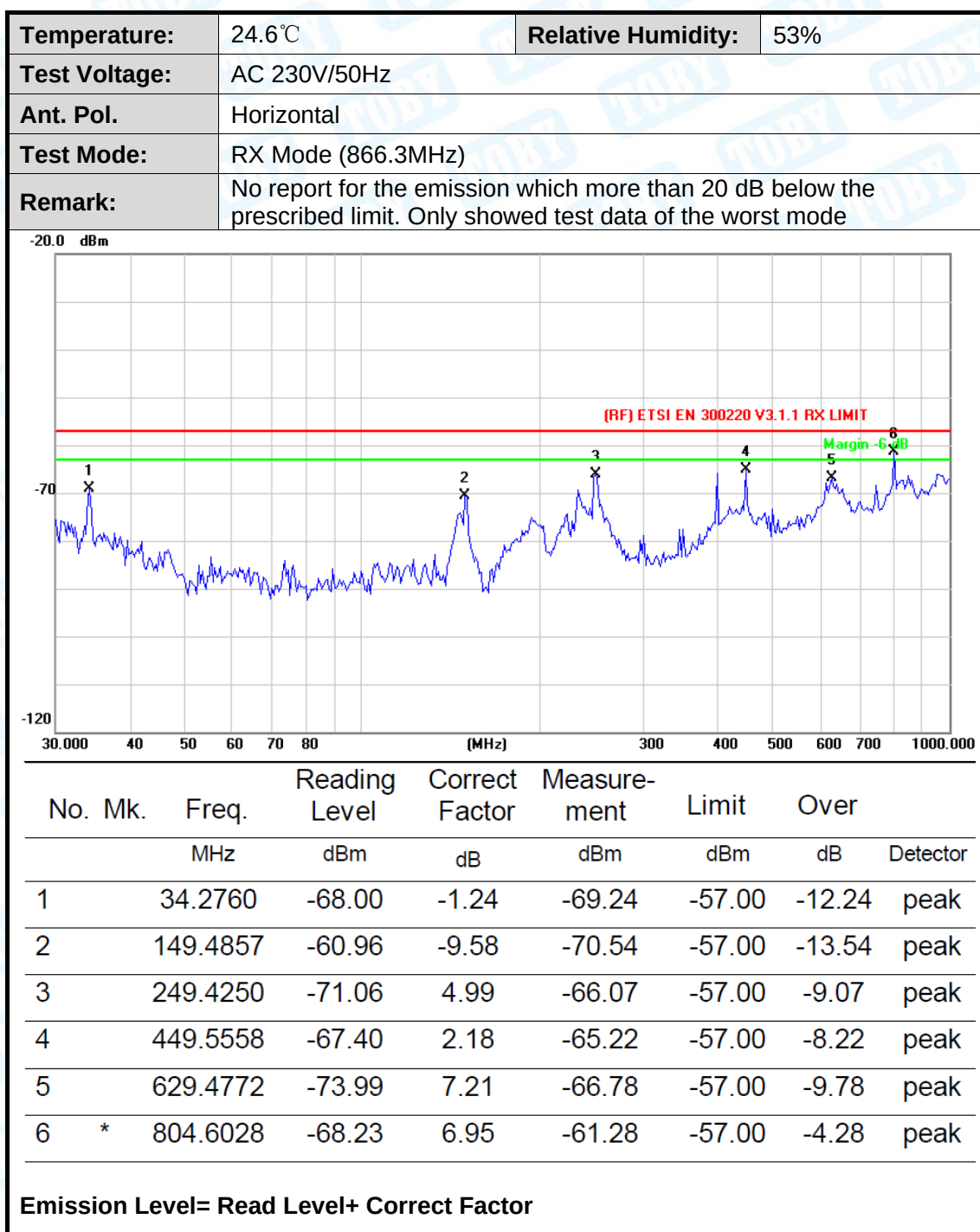
|               |                                                                                                                      |                    |     |
|---------------|----------------------------------------------------------------------------------------------------------------------|--------------------|-----|
| Temperature:  | 24.6°C                                                                                                               | Relative Humidity: | 53% |
| Test Voltage: | AC 230V/50Hz                                                                                                         |                    |     |
| Ant. Pol.     | Horizontal                                                                                                           |                    |     |
| Test Mode:    | RX Mode (863.1MHz)                                                                                                   |                    |     |
| Remark:       | No report for the emission which more than 20 dB below the prescribed limit. Only showed test data of the worst mode |                    |     |

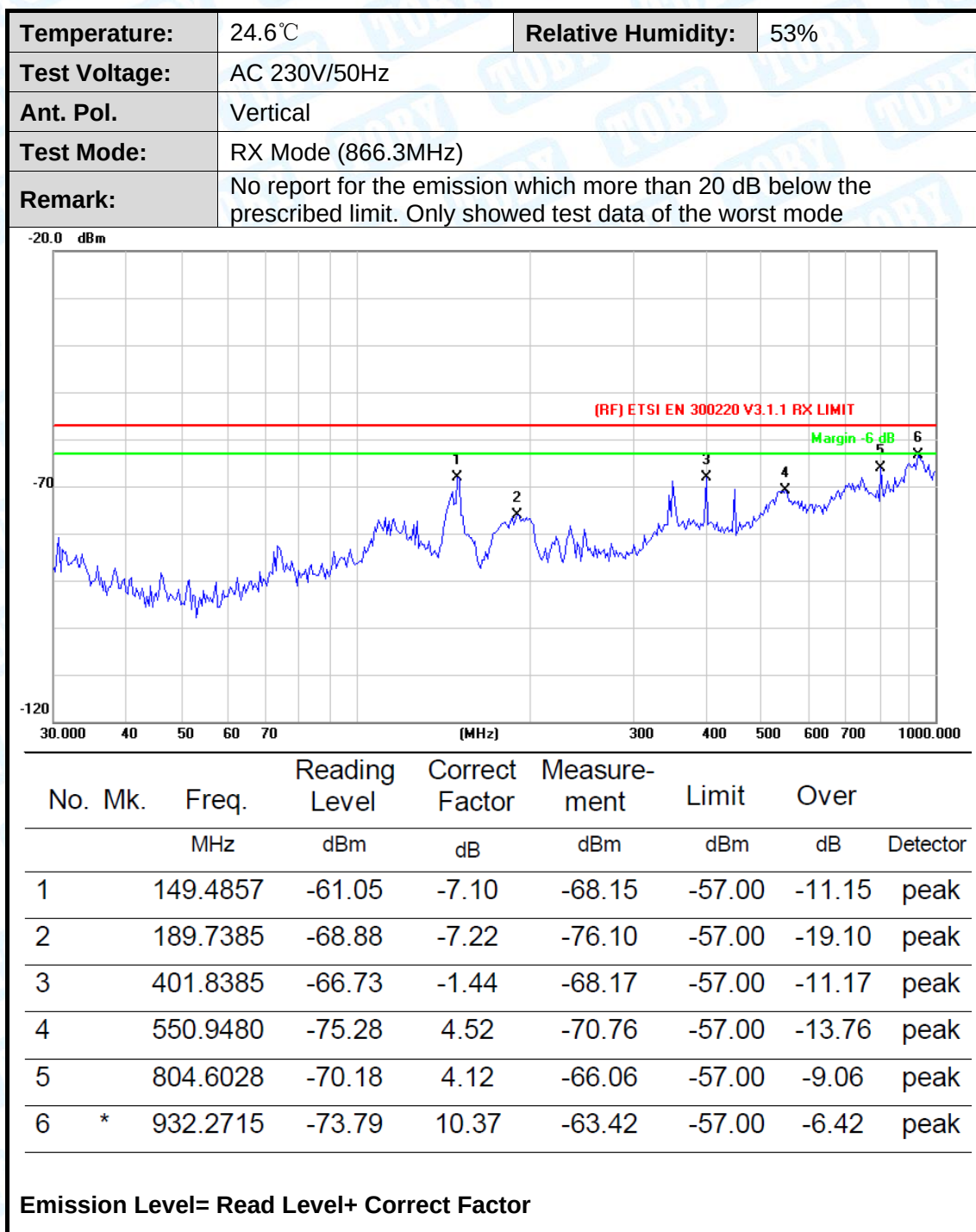
  

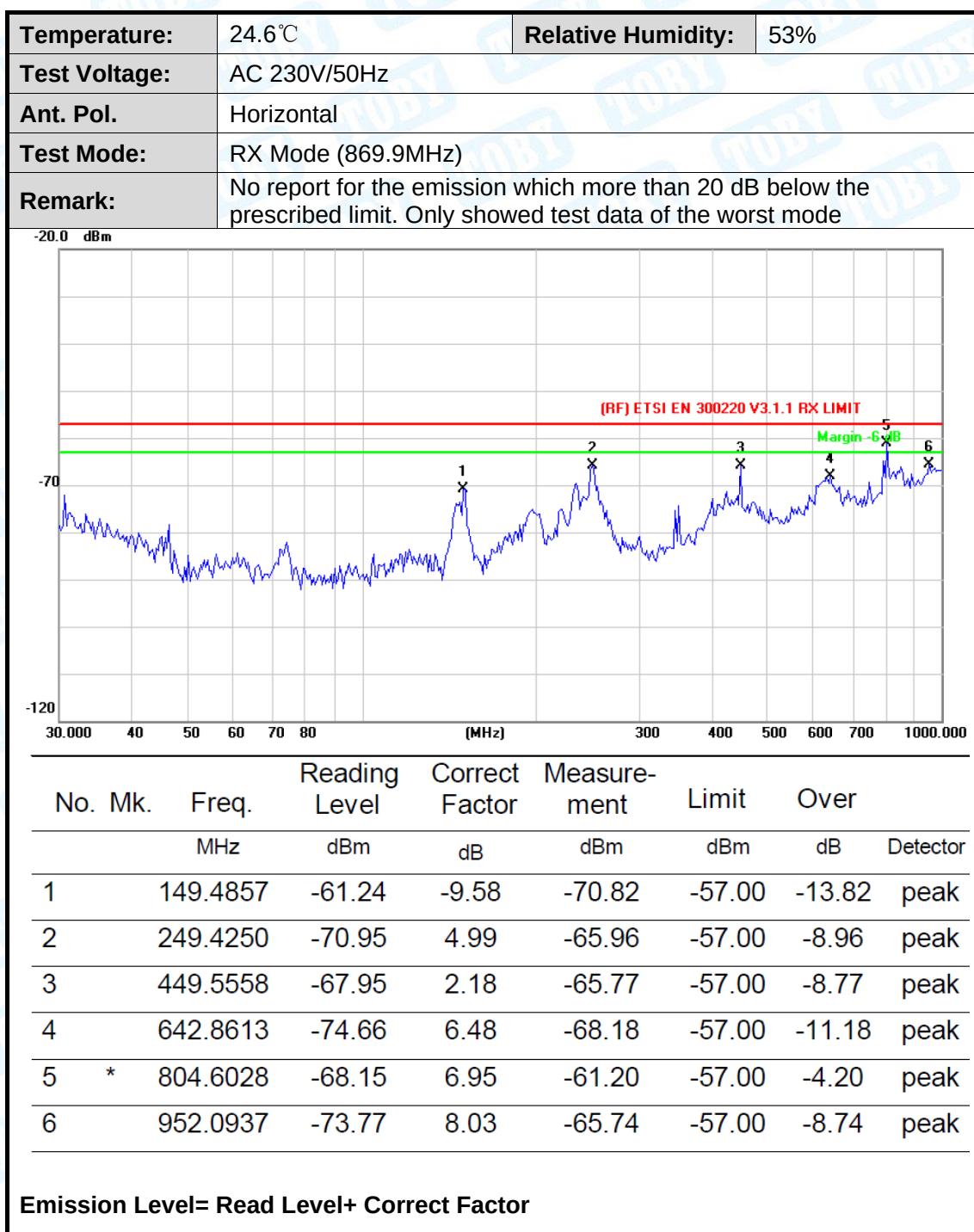
| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|
| 1   |     | 34.7602      | -68.17                  | -1.44                   | -69.61                  | -57.00       | -12.61     | peak     |
| 2   |     | 247.6819     | -67.89                  | 4.54                    | -63.35                  | -57.00       | -6.35      | peak     |
| 3   |     | 401.8385     | -64.24                  | 0.49                    | -63.75                  | -57.00       | -6.75      | peak     |
| 4   |     | 449.5558     | -65.95                  | 2.18                    | -63.77                  | -57.00       | -6.77      | peak     |
| 5   |     | 651.9417     | -72.57                  | 5.88                    | -66.69                  | -57.00       | -9.69      | peak     |
| 6   | *   | 804.6028     | -68.50                  | 6.95                    | -61.55                  | -57.00       | -4.55      | peak     |

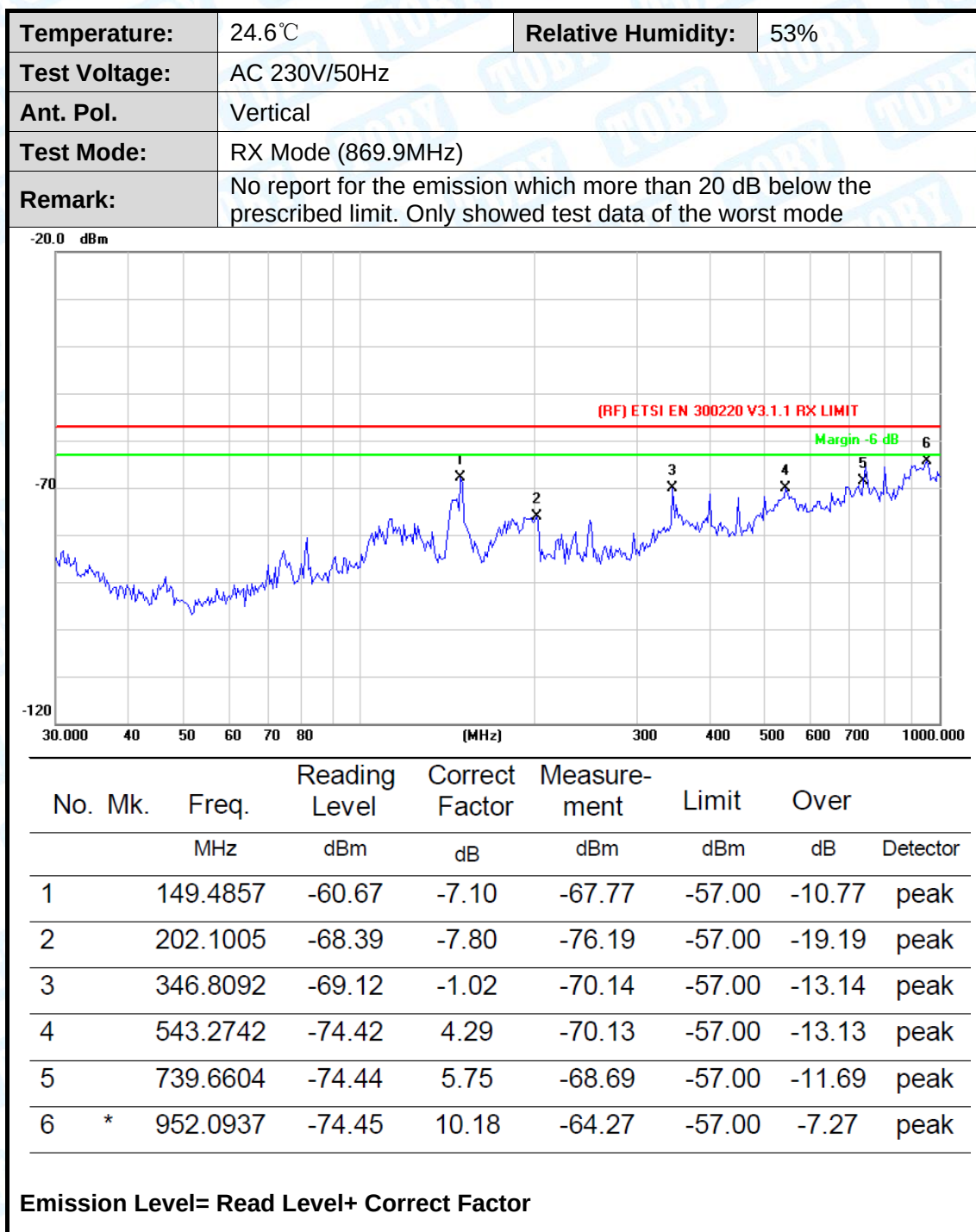
Emission Level= Read Level+ Correct Factor





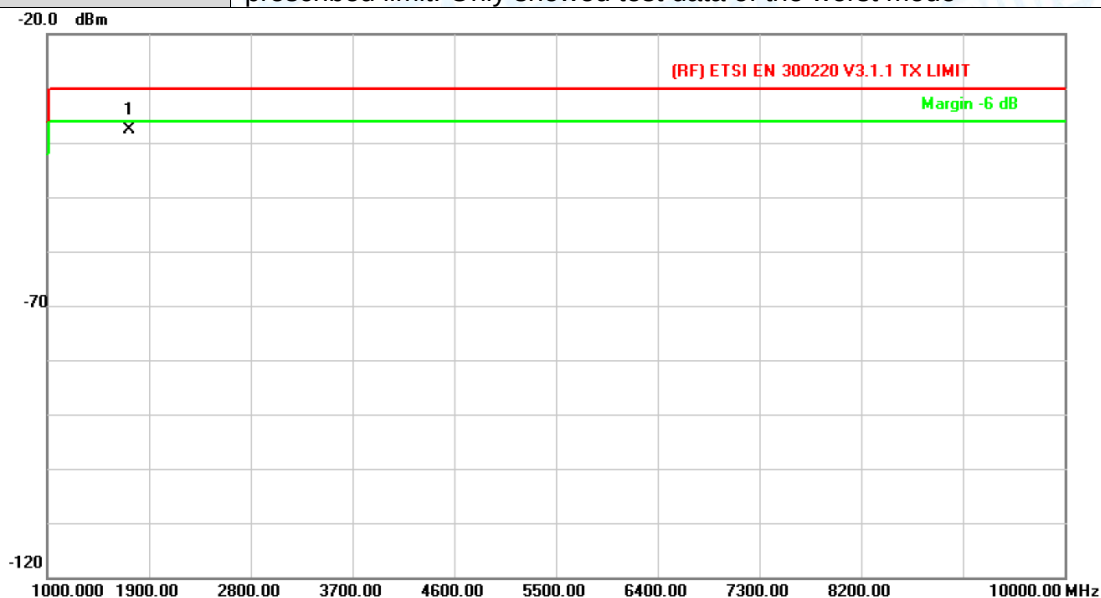






## Above 1G

|               |                                                                                                                      |                    |     |
|---------------|----------------------------------------------------------------------------------------------------------------------|--------------------|-----|
| Temperature:  | 24.6℃                                                                                                                | Relative Humidity: | 53% |
| Test Voltage: | AC 230V/50Hz                                                                                                         |                    |     |
| Ant. Pol.     | Horizontal                                                                                                           |                    |     |
| Test Mode:    | TX Mode (863.1MHz)                                                                                                   |                    |     |
| Remark:       | No report for the emission which more than 20 dB below the prescribed limit. Only showed test data of the worst mode |                    |     |



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over  |          |
|-----|-----|----------|---------------|----------------|-------------|--------|-------|----------|
|     |     | MHz      | dBm           | dB             | dBm         | dBm    | dB    | Detector |
| 1   | *   | 1726.554 | -82.20        | 44.69          | -37.51      | -30.00 | -7.51 | peak     |

Emission Level= Read Level+ Correct Factor



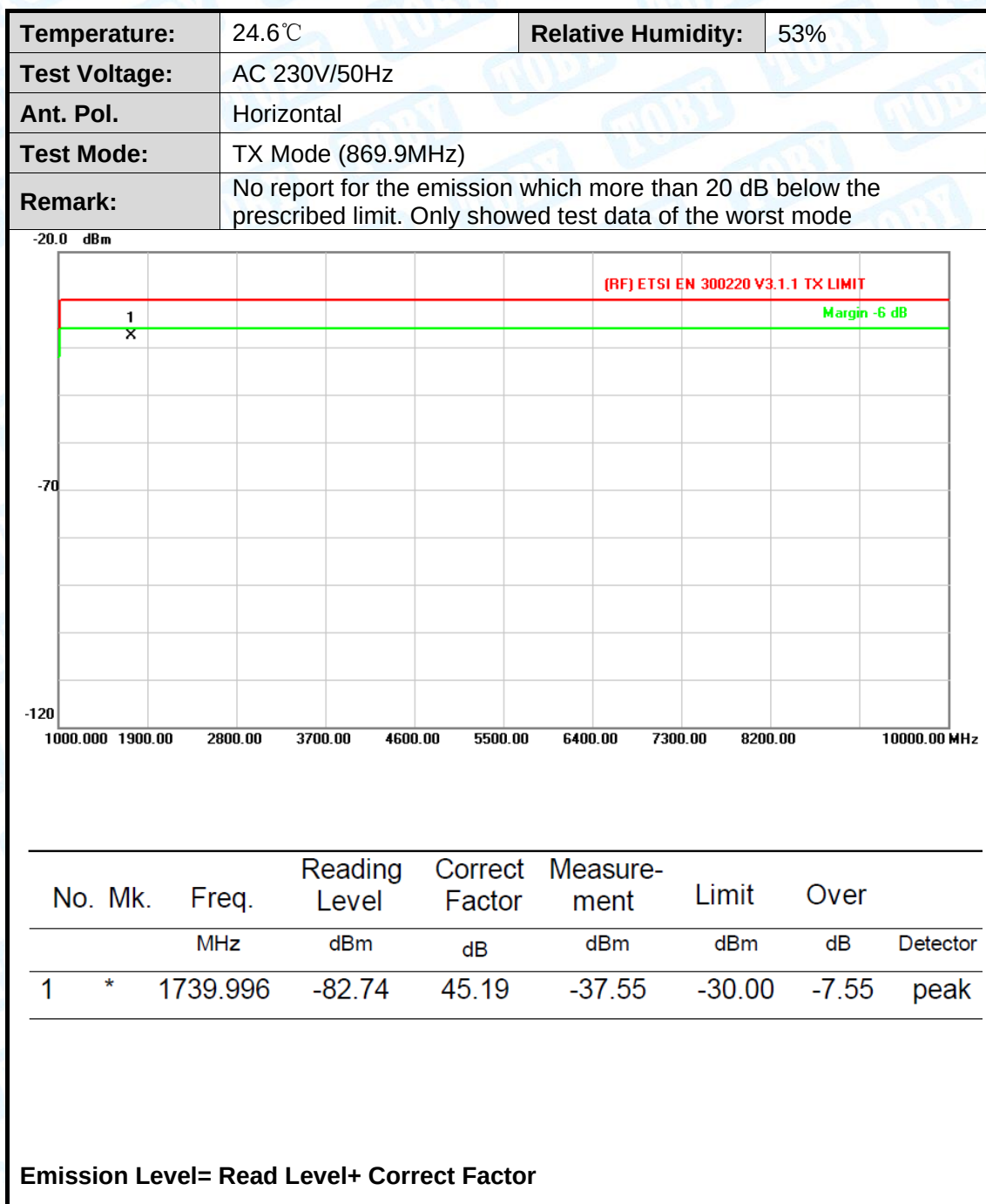
|               |                                                                                                                      |                    |     |
|---------------|----------------------------------------------------------------------------------------------------------------------|--------------------|-----|
| Temperature:  | 24.6℃                                                                                                                | Relative Humidity: | 53% |
| Test Voltage: | AC 230V/50Hz                                                                                                         |                    |     |
| Ant. Pol.     | Horizontal                                                                                                           |                    |     |
| Test Mode:    | TX Mode (866.3MHz)                                                                                                   |                    |     |
| Remark:       | No report for the emission which more than 20 dB below the prescribed limit. Only showed test data of the worst mode |                    |     |

-20.0 dBm

</

|               |                                                                                                                      |                    |     |
|---------------|----------------------------------------------------------------------------------------------------------------------|--------------------|-----|
| Temperature:  | 24.6℃                                                                                                                | Relative Humidity: | 53% |
| Test Voltage: | AC 230V/50Hz                                                                                                         |                    |     |
| Ant. Pol.     | Vertical                                                                                                             |                    |     |
| Test Mode:    | TX Mode (866.3MHz)                                                                                                   |                    |     |
| Remark:       | No report for the emission which more than 20 dB below the prescribed limit. Only showed test data of the worst mode |                    |     |

-20.0 dBm



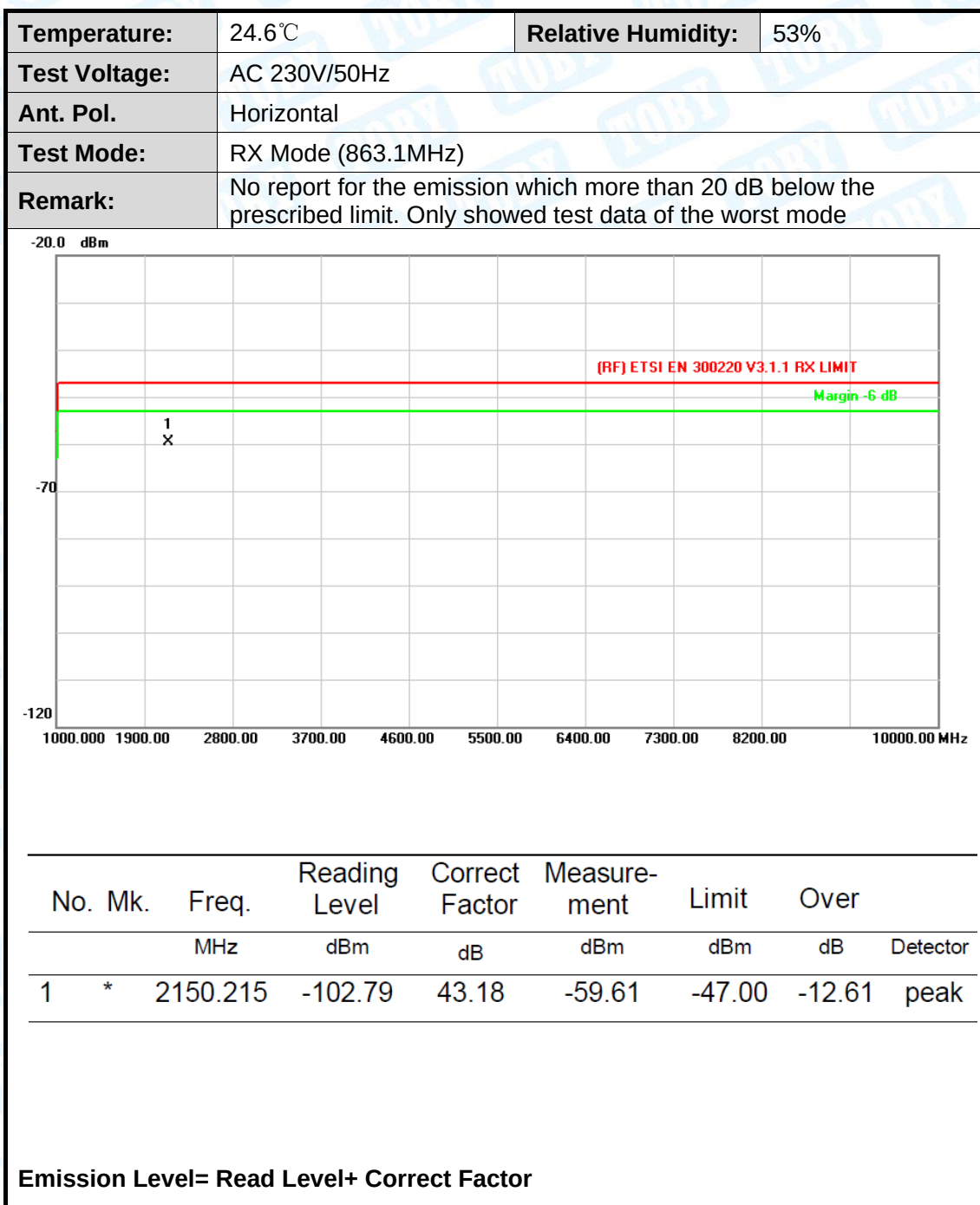
|               |                                                                                                                      |                    |     |
|---------------|----------------------------------------------------------------------------------------------------------------------|--------------------|-----|
| Temperature:  | 24.6℃                                                                                                                | Relative Humidity: | 53% |
| Test Voltage: | AC 230V/50Hz                                                                                                         |                    |     |
| Ant. Pol.     | Vertical                                                                                                             |                    |     |
| Test Mode:    | TX Mode (869.9MHz)                                                                                                   |                    |     |
| Remark:       | No report for the emission which more than 20 dB below the prescribed limit. Only showed test data of the worst mode |                    |     |

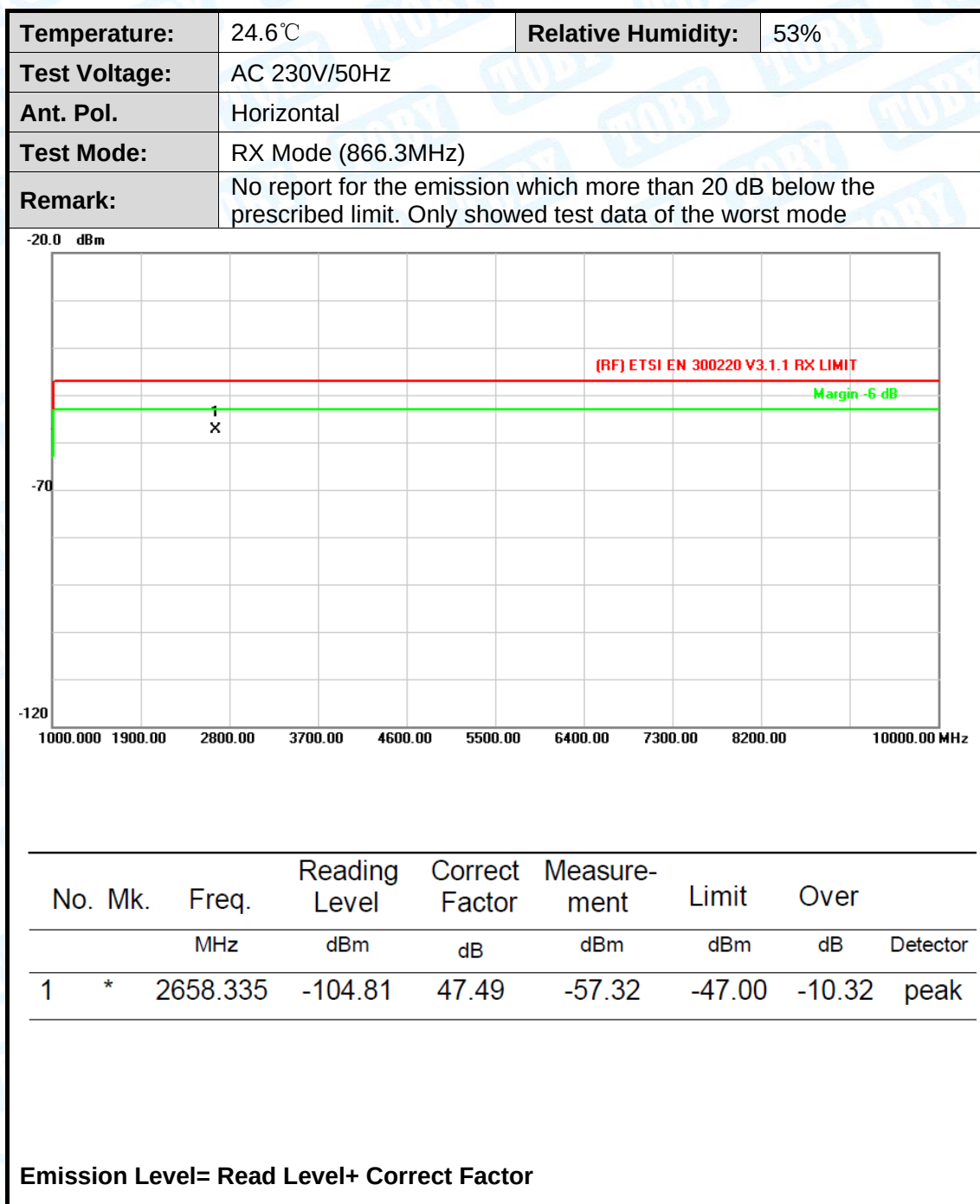
The spectrum plot displays the emission level in dBm across a frequency range from 1000.00 MHz to 10000.00 MHz. A red horizontal line indicates the (RF) ETSI EN 300220 V3.1.1 TX LIMIT at -30.00 dBm. A green horizontal line indicates the Margin -6 dB at -36.84 dBm. A single data point '1' is marked at 1739.832 MHz with a reading level of -80.19 dBm.

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Over  | Detector |
|-----|-----|----------|---------------|----------------|-------------|--------|-------|----------|
|     |     | MHz      | dBm           | dB             | dBm         | dBm    | dB    |          |
| 1   | *   | 1739.832 | -80.19        | 43.35          | -36.84      | -30.00 | -6.84 | peak     |

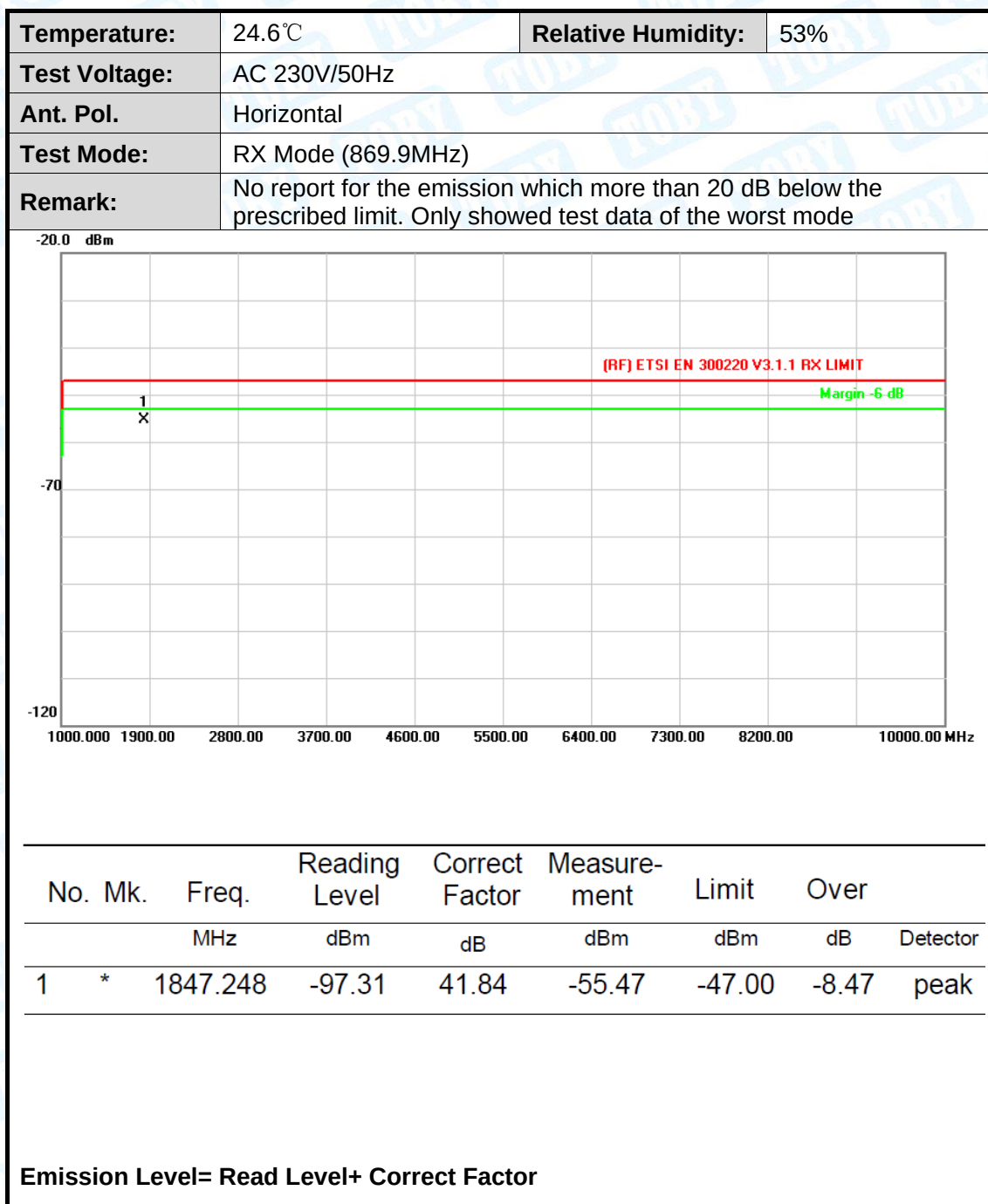
Emission Level= Read Level+ Correct Factor

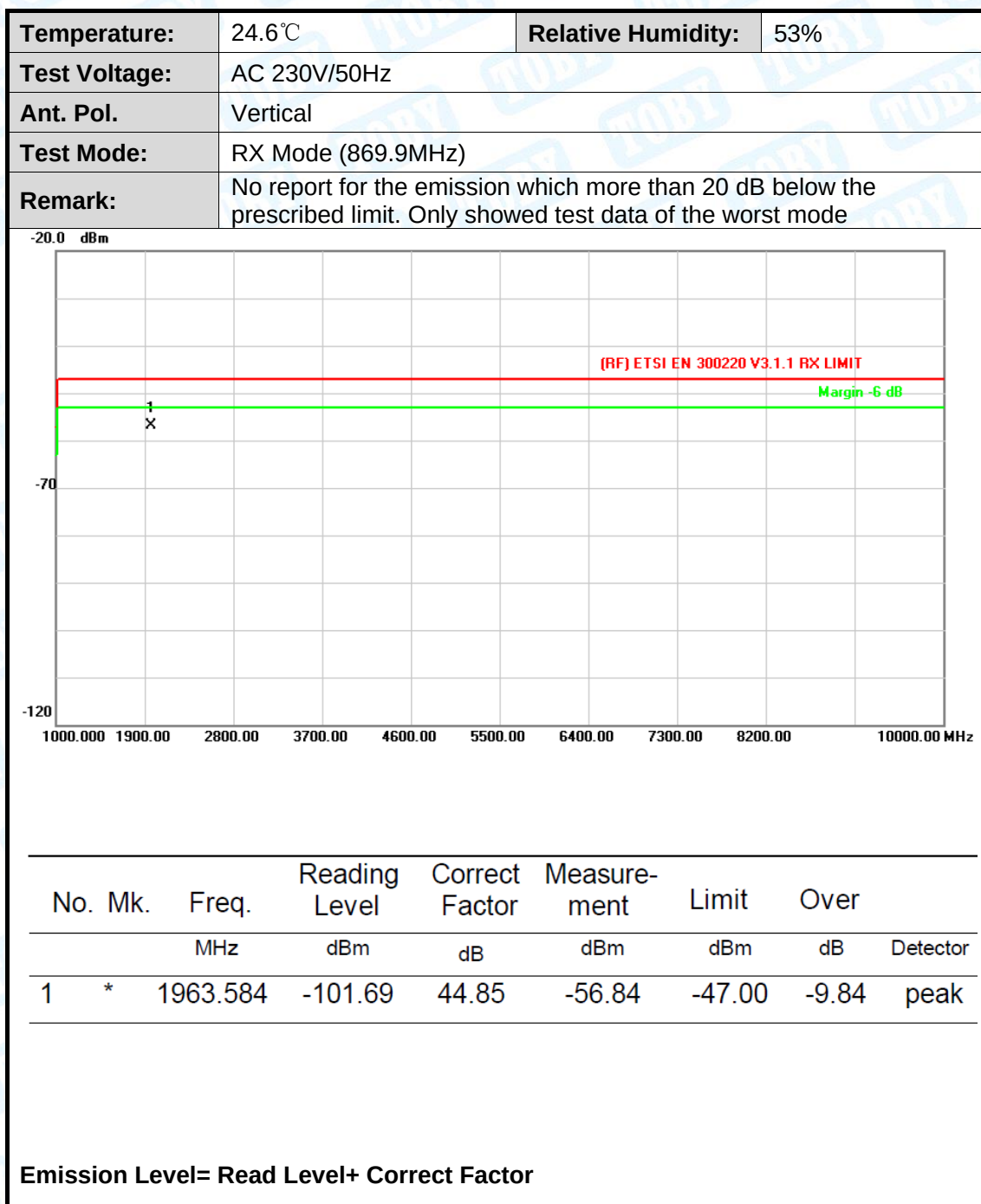












**Attachment B-- Effective Radiated Power**

|                        |      |                  |              |                        |     |
|------------------------|------|------------------|--------------|------------------------|-----|
| <b>Test Mode :</b>     |      | TX Mode 863.1MHz |              |                        |     |
| <b>Test Conditions</b> |      |                  |              | <b>ERP Power (dBm)</b> |     |
| <b>N nom</b>           | (°C) | 25.0             | <b>V nom</b> | (V)                    | 5.0 |
| <b>Limits</b>          |      |                  |              | 25mW(14dBm)            |     |
| <b>Result</b>          |      |                  |              | <b>PASS</b>            |     |

|                        |      |                  |              |                        |     |
|------------------------|------|------------------|--------------|------------------------|-----|
| <b>Test Mode :</b>     |      | TX Mode 866.3MHz |              |                        |     |
| <b>Test Conditions</b> |      |                  |              | <b>ERP Power (dBm)</b> |     |
| <b>N nom</b>           | (°C) | 25.0             | <b>V nom</b> | (V)                    | 5.0 |
| <b>Limits</b>          |      |                  |              | 25mW(14dBm)            |     |
| <b>Result</b>          |      |                  |              | <b>PASS</b>            |     |

|                        |      |                  |              |                        |     |
|------------------------|------|------------------|--------------|------------------------|-----|
| <b>Test Mode :</b>     |      | TX Mode 869.9MHz |              |                        |     |
| <b>Test Conditions</b> |      |                  |              | <b>ERP Power (dBm)</b> |     |
| <b>N nom</b>           | (°C) | 25.0             | <b>V nom</b> | (V)                    | 5.0 |
| <b>Limits</b>          |      |                  |              | 25mW(14dBm)            |     |
| <b>Result</b>          |      |                  |              | <b>PASS</b>            |     |

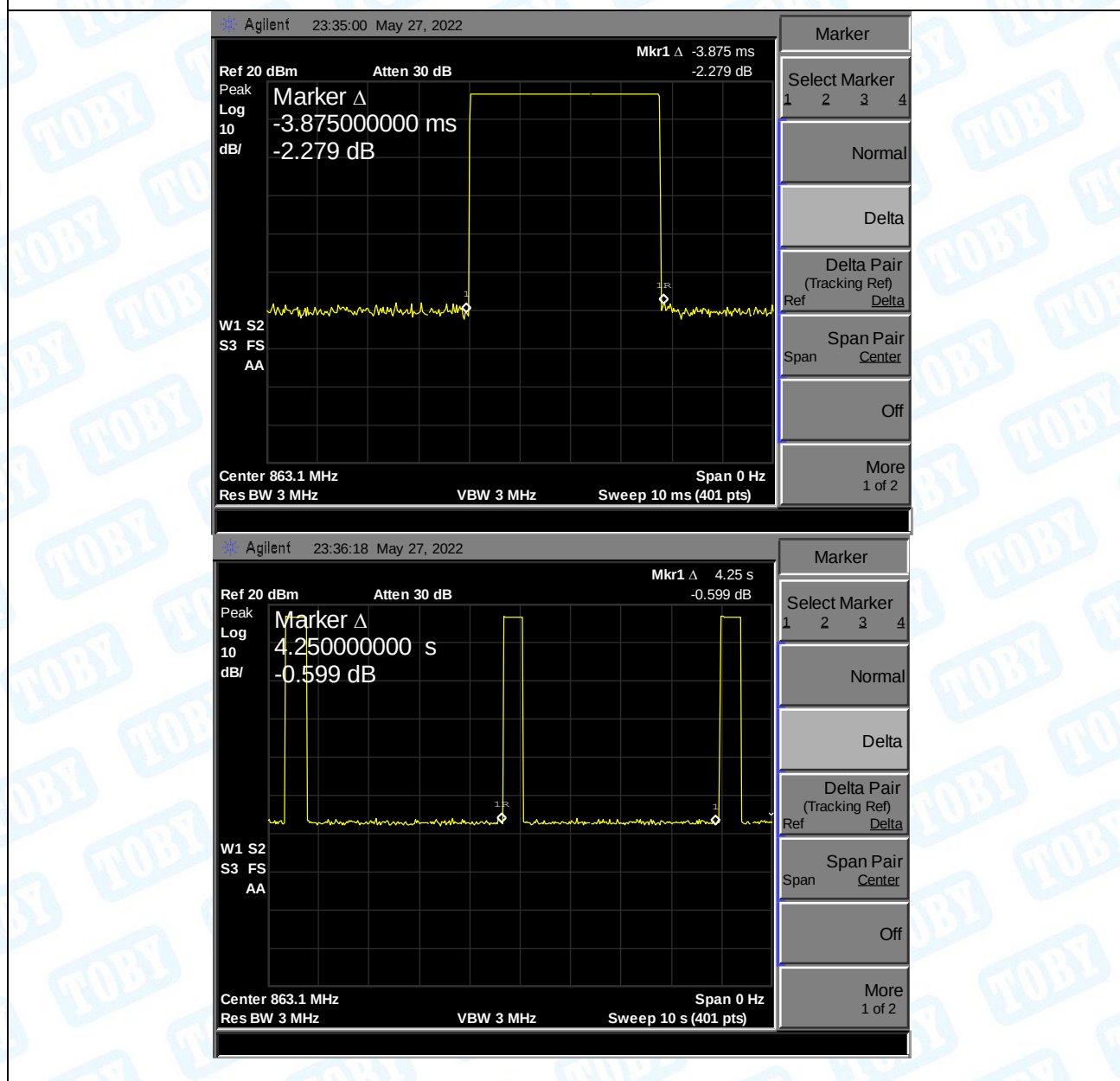
## Attachment C—Duty Cycle

|               |          |                     |       |
|---------------|----------|---------------------|-------|
| Temperature : | 26°C     | Relative Humidity : | 60%   |
| Pressure :    | 1010 hPa | Test Voltage :      | DC 5V |
| Test Mode :   | TX Mode  |                     |       |

### Blocking Signal Test(Category 2)

| Frequency | Transmit On Time | Duty Cycle | Limit (dB) | Result |
|-----------|------------------|------------|------------|--------|
| 863.1 MHz | 3.875ms          | 0.091%     | 0.1%       | Pass   |

### Test Plot



Note: The duty cycle is calculated as follow:

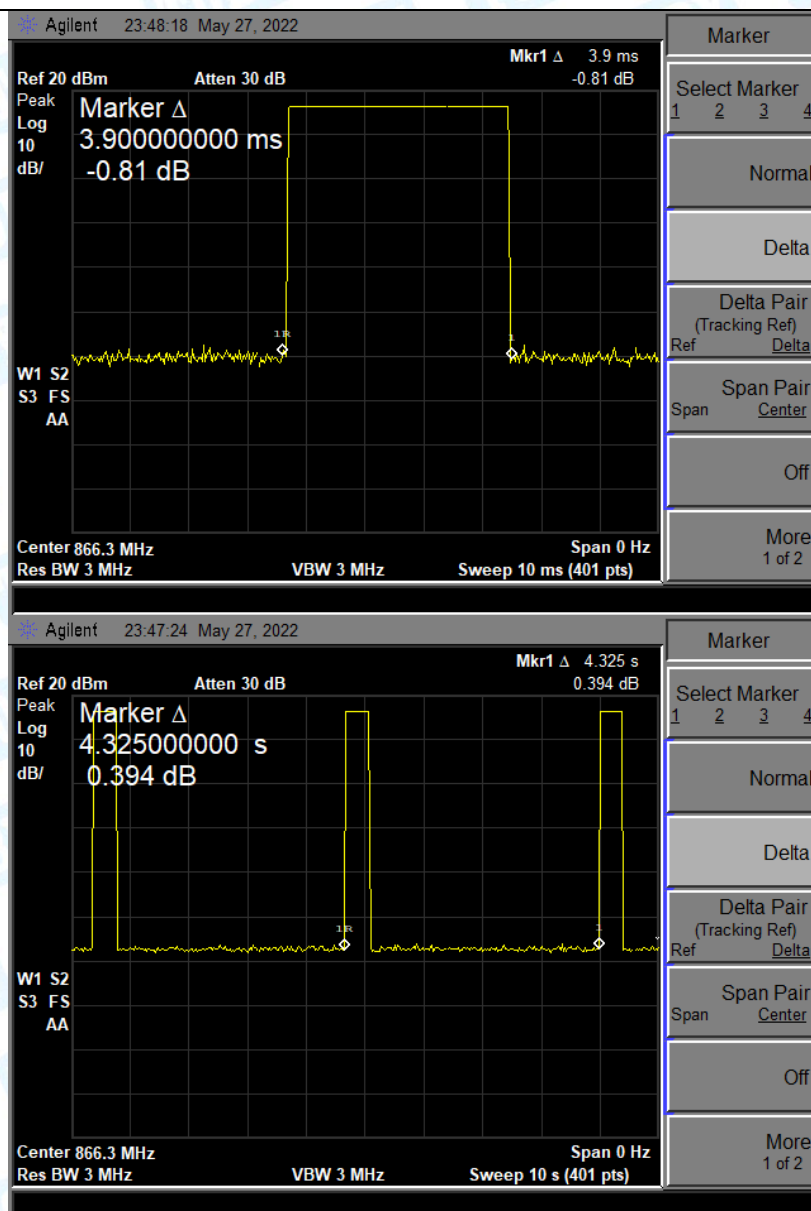
Duty cycle= Transmit On time (ms)/4.25(s)=Duty Cycle.

|               |          |                     |       |
|---------------|----------|---------------------|-------|
| Temperature : | 26°C     | Relative Humidity : | 60%   |
| Pressure :    | 1010 hPa | Test Voltage :      | DC 5V |
| Test Mode :   | TX Mode  |                     |       |

## Blocking Signal Test(Category 2)

| Frequency | Transmit On Time | Duty Cycle | Limit (dB) | Result |
|-----------|------------------|------------|------------|--------|
| 866.3MHz  | 3.9ms            | 0.090%     | 1%         | Pass   |

## Test Plot



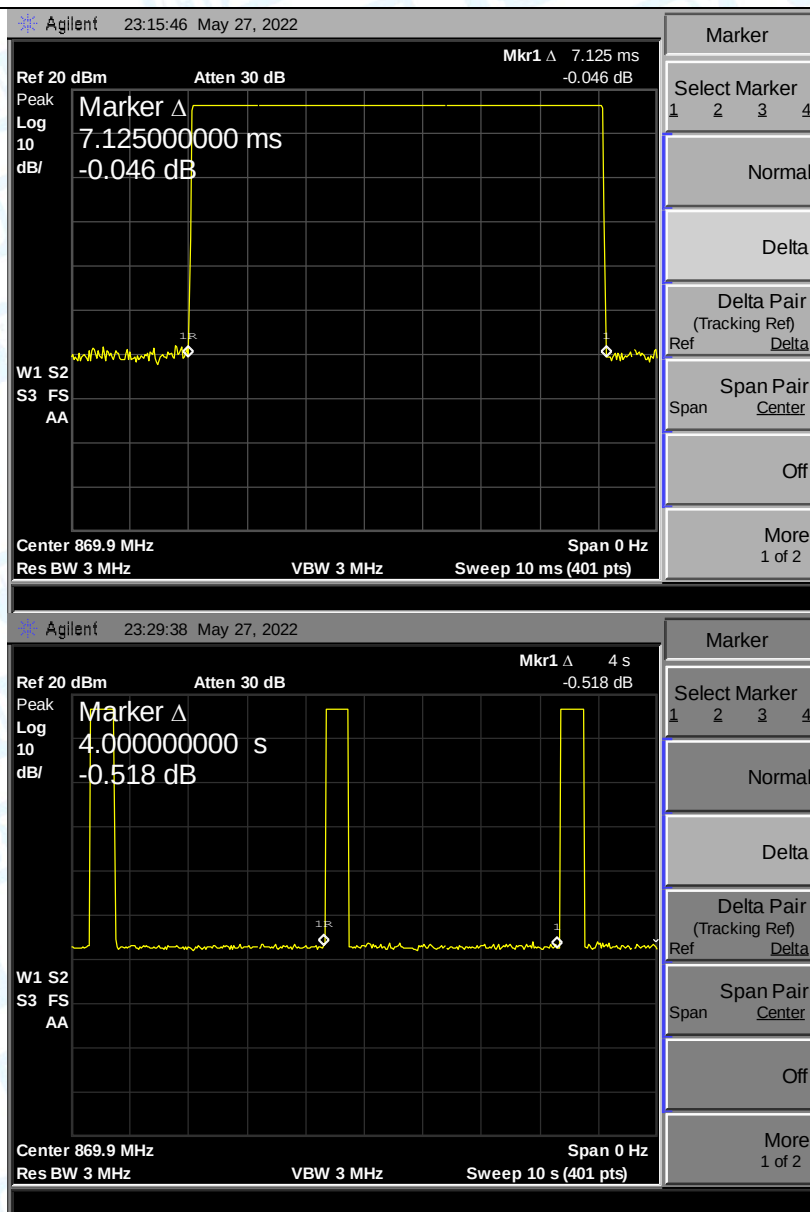
Note: The duty cycle is calculated as follow:

Duty cycle= Transmit On time (ms)/4.325(s)=Duty Cycle.

|               |          |                     |       |
|---------------|----------|---------------------|-------|
| Temperature : | 26°C     | Relative Humidity : | 60%   |
| Pressure :    | 1010 hPa | Test Voltage :      | DC 5V |
| Test Mode :   | TX Mode  |                     |       |

**Blocking Signal Test(Category 2)**

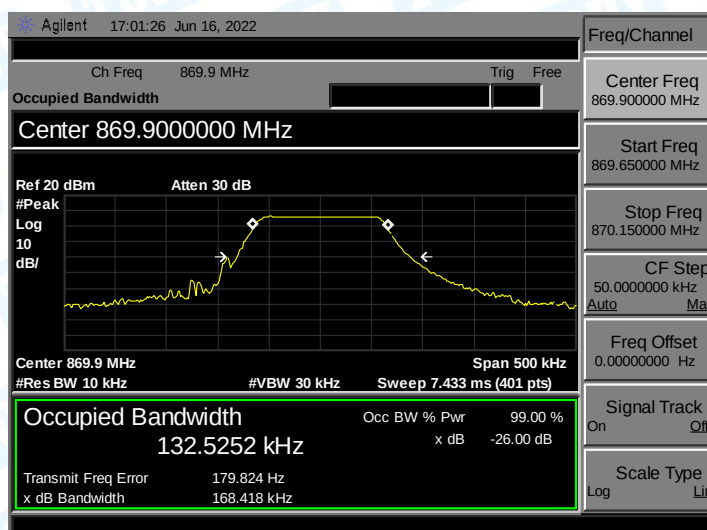
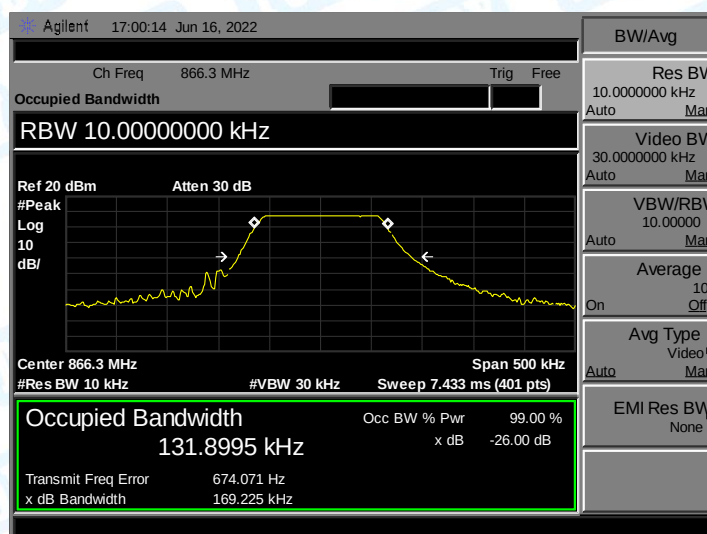
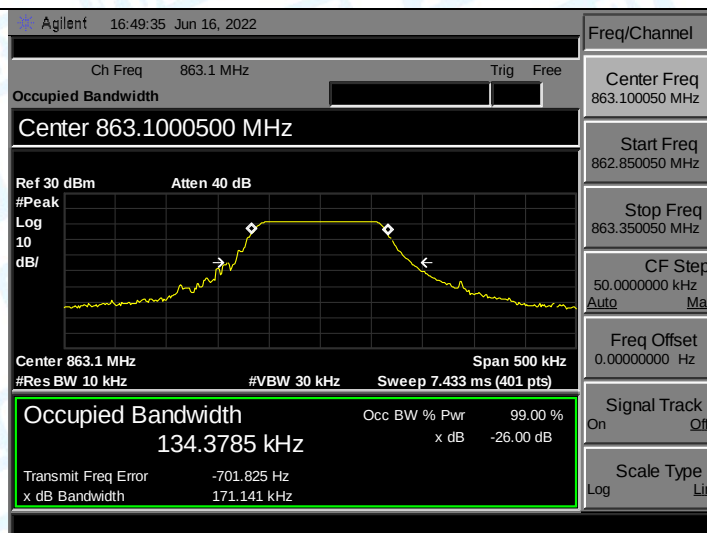
| Frequency | Transmit On Time | Duty Cycle | Limit (dB) | Result |
|-----------|------------------|------------|------------|--------|
| 869.9MHz  | 7.125ms          | 0.178%     | 1%         | Pass   |

**Test Plot**

Note: The duty cycle is calculated as follow:  
Duty cycle= Transmit On time (ms)/4(s)= Duty Cycle.

**Attachment D-- Occupied Bandwidth**

| Modulated Signal Test     |                                     |                                     |        |
|---------------------------|-------------------------------------|-------------------------------------|--------|
| Centre Frequency<br>(MHz) | Occupied Channel Bandwidth<br>(KHz) | Maximum Occupied Bandwidth<br>(KHz) | Result |
| 863.1                     | 134.3785                            | /                                   | Pass   |
| 866.3                     | 131.8995                            | /                                   | Pass   |
| 869.9                     | 132.5252                            | /                                   | Pass   |



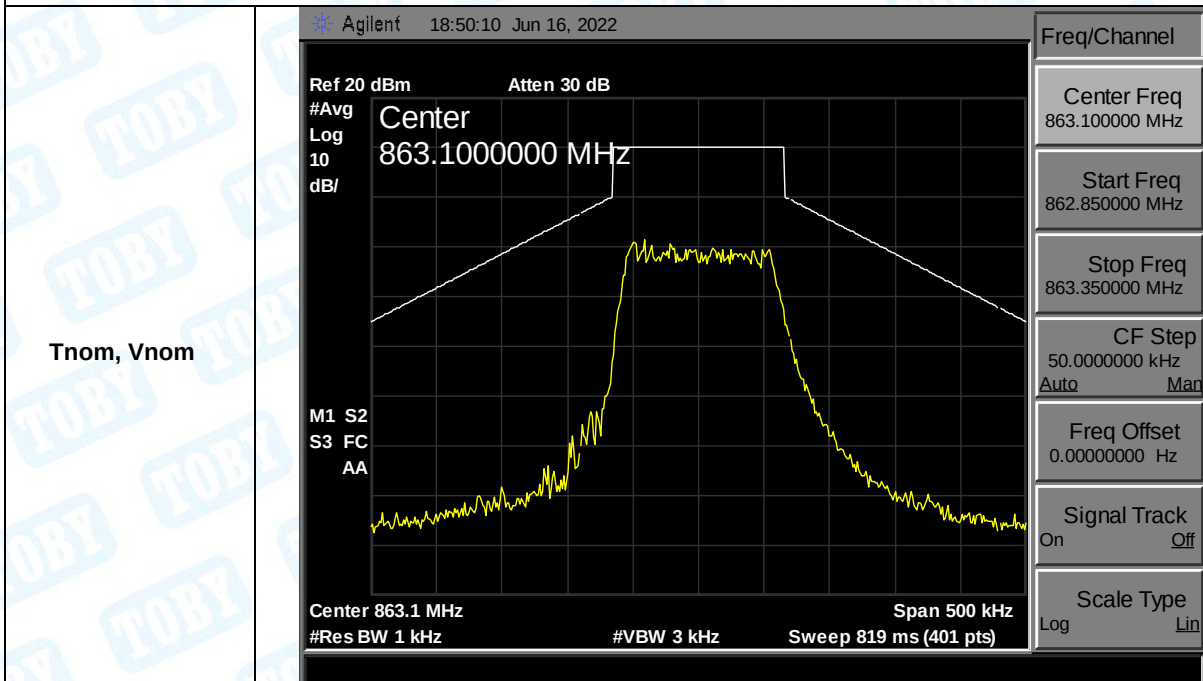
Remark: the plot only show the worst case.

## Attachment E--Tx Out of Band Emissions

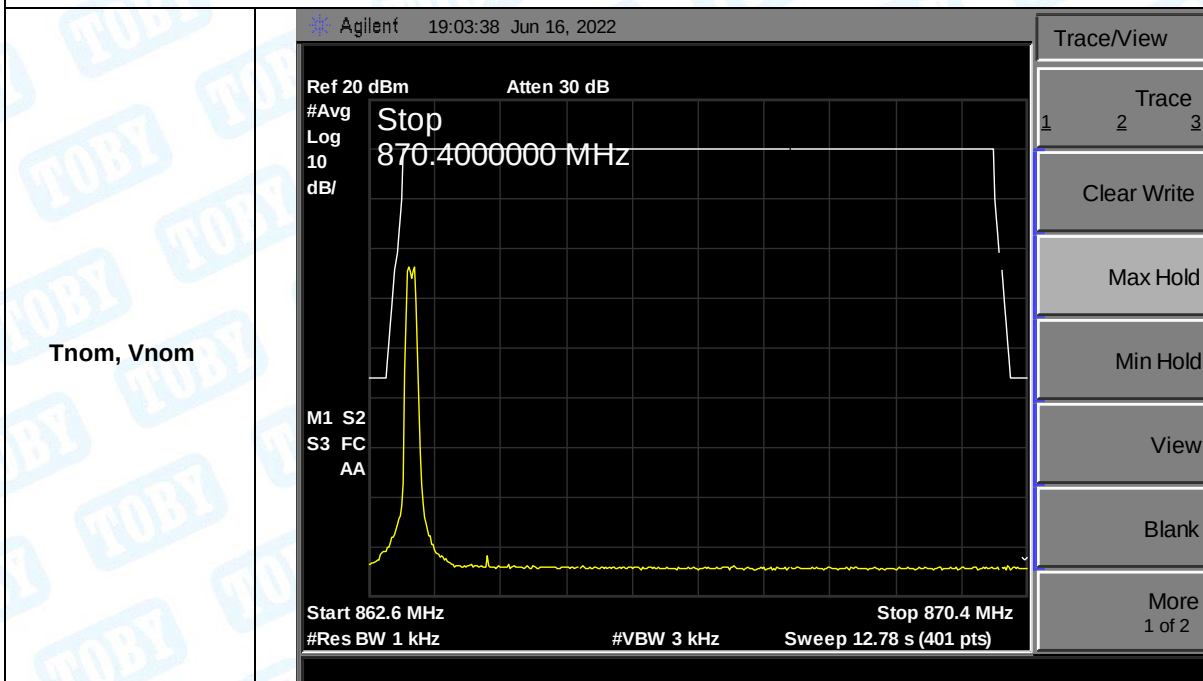
**Test Mode :** TX Mode 863.1MHz

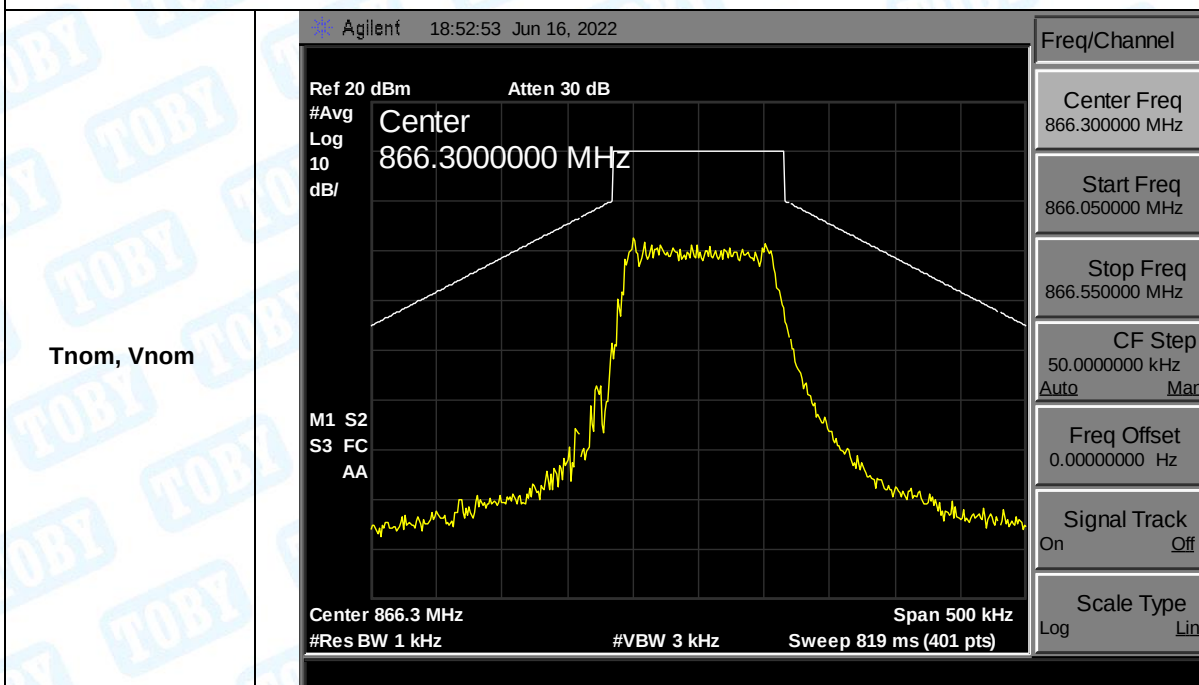
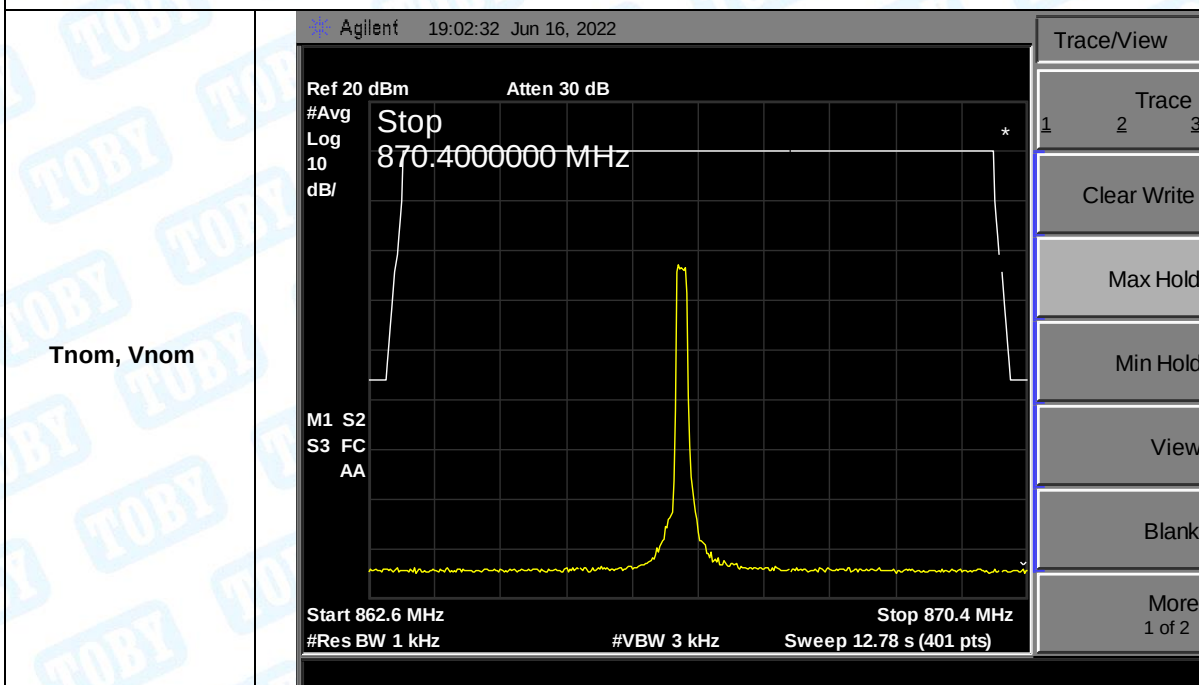
**Note:** All test modes were carried out for all operation modes, the worst test data(TN TN) is record the report

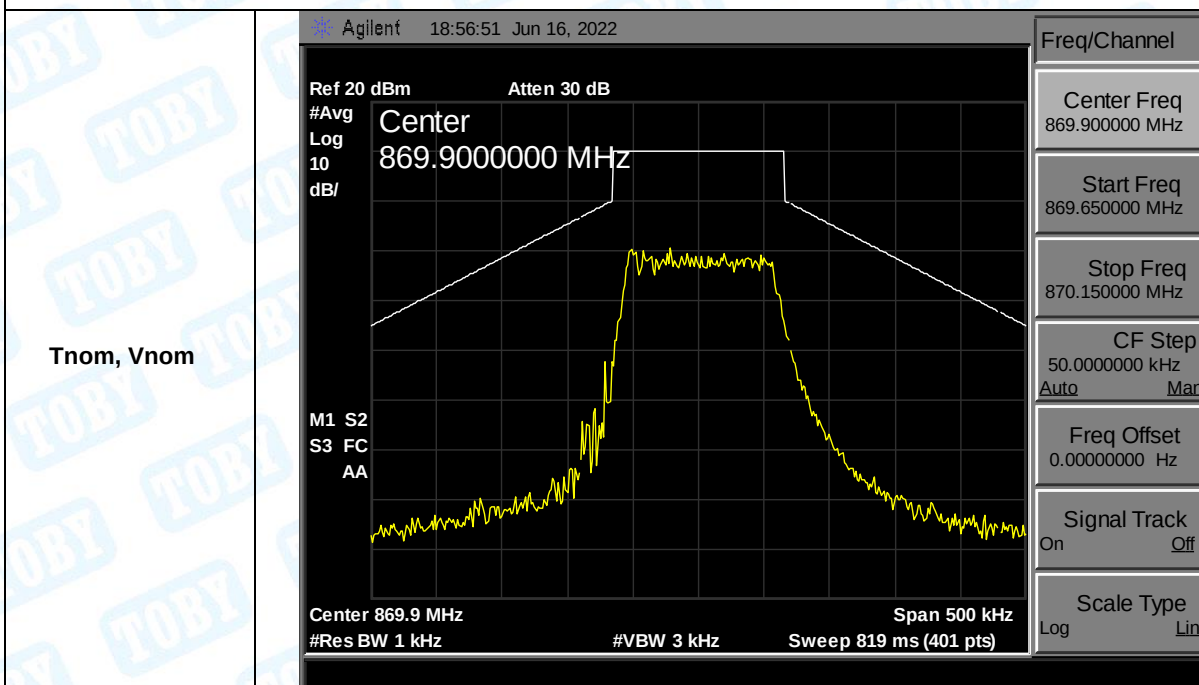
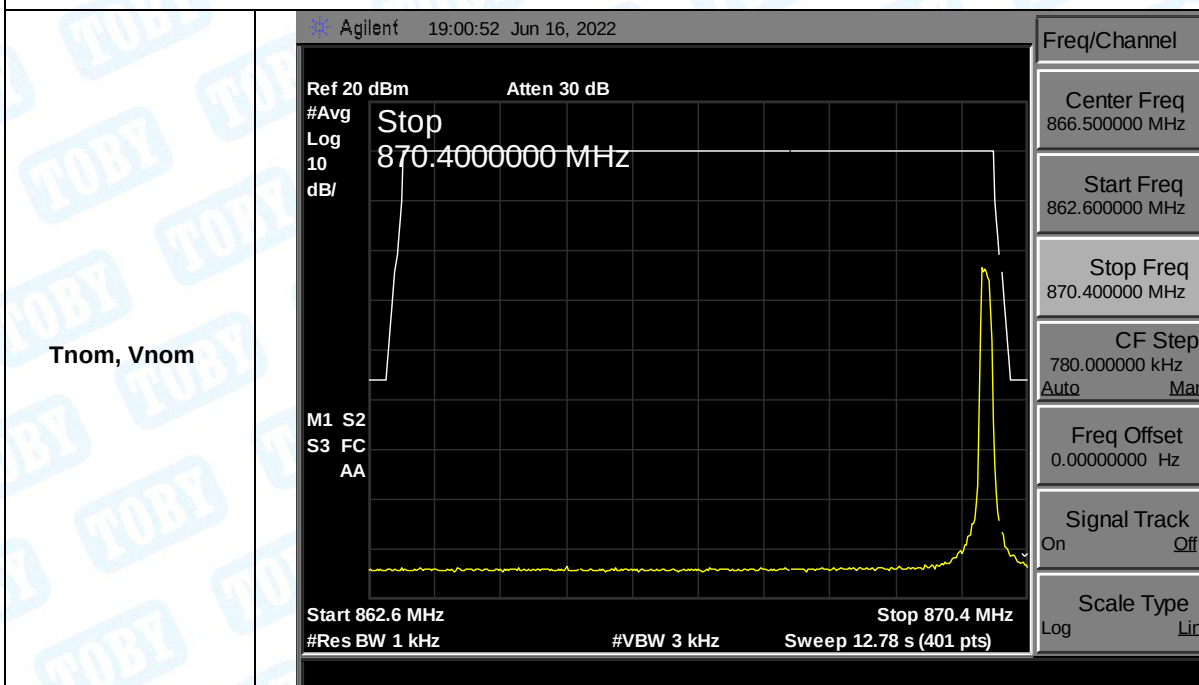
### Operating Channel with reference BW



### Operational Frequency Band with reference BW



**Test Mode :** TX Mode 866.3MHz**Note:** All test modes were carried out for all operation modes, the worst test data(TN TN) is record the report**Operating Channel with reference BW****Operational Frequency Band with reference BW**

**Test Mode :** TX Mode 869.9MHz**Note:** All test modes were carried out for all operation modes, the worst test data(TN TN) is record the report**Operating Channel with reference BW****Operational Frequency Band with reference BW**

**Attachment F--Transient Power**

| Test Mode :                              | Transmitting             |           |                          |           |
|------------------------------------------|--------------------------|-----------|--------------------------|-----------|
| Test Channel<br>(MHz)                    | Transient power<br>(dBm) |           | Transient power<br>(dBm) |           |
| Absolute offset from centre<br>frequency | ≤ 400 kHz                | > 400 kHz | ≤ 400 kHz                | > 400 kHz |
| 863.1                                    | -47.64                   | -48.32    | 0                        | -27       |
| 866.3                                    | -48.12                   | -47.04    | 0                        | -27       |
| 869.9                                    | -46.03                   | -48.17    | 0                        | -27       |
| Text result (pass/fail)                  | Pass                     |           |                          |           |

## Attachment G-- Blocking

|                                                                                                                            |                          |                     |        |
|----------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------|--------|
| Temperature :                                                                                                              | 26°C                     | Relative Humidity : | 40%    |
| Pressure :                                                                                                                 | 1010 hPa                 | Test Voltage :      | DC 5V  |
| Test Mode :                                                                                                                | Receive Mode (863.1MHz)  |                     |        |
| Blocking Signal Test(Category 2)                                                                                           |                          |                     |        |
| Frequency offset                                                                                                           | Blocking Signal B-A (dB) | Limit (dB)          | Result |
| +2 MHz                                                                                                                     | -64.33                   | ≥-69                | Pass   |
| -2 MHz                                                                                                                     | -63.31                   | ≥-69                | Pass   |
| +10 MHz                                                                                                                    | -30.74                   | ≥-44                | Pass   |
| -10 MHz                                                                                                                    | -31.34                   | ≥-44                | Pass   |
| +46 MHz                                                                                                                    | -26.52                   | ≥-44                | Pass   |
| -46 MHz                                                                                                                    | -27.04                   | ≥-44                | Pass   |
| <b>Note:</b><br>Criteria for blocking: Unwanted signal injected and monitoring the EUT whether can still work as intended. |                          |                     |        |

|                                                                                                                            |                          |                     |        |
|----------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------|--------|
| Temperature :                                                                                                              | 26°C                     | Relative Humidity : | 40%    |
| Pressure :                                                                                                                 | 1010 hPa                 | Test Voltage :      | DC 5V  |
| Test Mode :                                                                                                                | Receive Mode (866.3MHz)  |                     |        |
| Blocking Signal Test(Category 2)                                                                                           |                          |                     |        |
| Frequency offset                                                                                                           | Blocking Signal B-A (dB) | Limit (dB)          | Result |
| +2 MHz                                                                                                                     | -64.21                   | ≥-69                | Pass   |
| -2 MHz                                                                                                                     | -62.35                   | ≥-69                | Pass   |
| +10 MHz                                                                                                                    | -30.12                   | ≥-44                | Pass   |
| -10 MHz                                                                                                                    | -31.72                   | ≥-44                | Pass   |
| +46 MHz                                                                                                                    | -25.35                   | ≥-44                | Pass   |
| -46 MHz                                                                                                                    | -26.42                   | ≥-44                | Pass   |
| <b>Note:</b><br>Criteria for blocking: Unwanted signal injected and monitoring the EUT whether can still work as intended. |                          |                     |        |

|                                                                                                                            |                          |                     |        |
|----------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------|--------|
| Temperature :                                                                                                              | 26°C                     | Relative Humidity : | 40%    |
| Pressure :                                                                                                                 | 1010 hPa                 | Test Voltage :      | DC 5V  |
| Test Mode :                                                                                                                | Receive Mode (869.9MHz)  |                     |        |
| Blocking Signal Test(Category 2)                                                                                           |                          |                     |        |
| Frequency offset                                                                                                           | Blocking Signal B-A (dB) | Limit (dB)          | Result |
| +2 MHz                                                                                                                     | -65.37                   | ≥-69                | Pass   |
| -2 MHz                                                                                                                     | -65.25                   | ≥-69                | Pass   |
| +10 MHz                                                                                                                    | -33.46                   | ≥-44                | Pass   |
| -10 MHz                                                                                                                    | -33.17                   | ≥-44                | Pass   |
| +46 MHz                                                                                                                    | -27.41                   | ≥-44                | Pass   |
| -46 MHz                                                                                                                    | -26.35                   | ≥-44                | Pass   |
| <b>Note:</b><br>Criteria for blocking: Unwanted signal injected and monitoring the EUT whether can still work as intended. |                          |                     |        |

-----END OF REPORT-----