EMTEK
Access to the World

# TEST REPORT

**Product Name : smart watch**
**Model Number : TB39, TB62D, TB67D, TB40D**

| | | |
|---|---|---|
| Prepared for | : | Shenzhen Luomandi Electronic Technology Co., Ltd |
| Address | : | Longhua Dist, Minzhi St, 810 Mintai Bldg, No. 241 Minzhi Ave Shenzhen, Guangdong, China |
| Prepared by | : | EMTEK (DONGGUAN) CO., LTD. |
| Address | : | Room 111&112, Building 8, -1&2/F., Office Building2, Zone A, Zhongda Marine Biotechnology Research and Development Base, No.9, Xincheng Avenue, Songshan Lake High-Tech Industrial Development Zone, Dongguan, Guangdong, China<br><br>TEL: +86-0769-22807078<br>FAX: +86-0769-22807079 |

| | | |
|---|---|---|
| Report Number | : | EDG2508280253E00602R |
| Date of sample receipt | : | September 04, 2025 |
| Date(s) of Tests | : | September 04, 2025 to September 19, 2025 |
| Date of issue | : | September 19, 2025 |

# TEST RESULT CERTIFICATION

| | | |
|---|---|---|
| Applicant | : | Shenzhen Luomandi Electronic Technology Co., Ltd |
| Address | : | Longhua Dist, Minzhi St, 810 Mintai Bldg, No. 241 Minzhi Ave Shenzhen, Guangdong, China |
| Manufacturer | : | Shenzhen Luomandi Electronic Technology Co., Ltd |
| Address | : | Longhua Dist, Minzhi St, 810 Mintai Bldg, No. 241 Minzhi Ave Shenzhen, Guangdong, China |
| Factory | : | Shenzhen Luomandi Electronic Technology Co., Ltd |
| Address | : | Longhua Dist, Minzhi St, 810 Mintai Bldg, No. 241 Minzhi Ave Shenzhen, Guangdong, China |
| EUT | : | smart watch |
| Model Name | : | TB39, TB62D, TB67D, TB40D |
| Trademark | : | N/A |

**Measurement Procedure Used:**

| APPLICABLE STANDARDS | | |
|---|---|---|
| **STANDARD** | **Test Procedure** | **TEST RESULT** |
| Item 19 of Article 2 Paragraph 1 | MIC public notice 88:2004, annex 43 | PASS |

The device described above is tested by EMTEK (DONGGUAN) CO., LTD. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and EMTEK (DONGGUAN) CO., LTD. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) was measured according to the test methods of Ordinance Concerning Technical Regulations Conformity Certification etc. of Specified Radio Equipment in Annex 1, the Ministry of Internal Affairs and Communication notification in Annex “43” of Article 88, Paragraph 1 or the test method more than equivalent and the result is technically compliant with the ARIB STD T-66 requirements.
The test results of this report relate only to the tested sample identified in this report

Date of Test : September 04, 2025 to September 19, 2025

Prepared by : Warren Deng

Warren Deng /Editor

Reviewer : Jessica Zhang

Jessica Zhang /Supervisor

Approved & Authorized Signer :

Sam Lv / Manager

# Modified Information

| Version | Report No. | Revision Date | Summary |
|---|---|---|---|
| V1.0 | EDG2508280253E00602R | / | Original Report |
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# 1 EUT TECHNICAL DESCRIPTION

| Characteristics | Description |
|---|---|
| **Product:** | smart watch |
| **Model Number:** | TB39, TB62D, TB67D, TB40D<br>Note: All models are the same, except the model name, color and charging stand. Select model TB39 here to complete all the tests. |
| **BT Version** | BT V5.4 |
| **Data Rate** | 1Mbps |
| **Modulation:** | GFSK |
| **Operating Frequency Range(s):** | 2402-2480MHz |
| **Number of Channels:** | 40 channels |
| **Rated Antenna Power:** | 1 mW |
| **Antenna Type :** | PCB Antenna |
| **Antenna Gain:** | 2.09 dBi |
| **Power Supply:** | DC 3.7V from battery, DC 5V from USB |
| **Hardware version:** | SW: N/A<br>HW: TZ2 MB V1.2 |
| **Software version:** | SW: N/A<br>HW: TZ2 MB V1.2 |
| **Temperature Range** | 0°C ~ +40°C |

***Note:*** *for more details, please refer to the user's manual of the EUT.*

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## 2 SUMMARY OF TEST RESULT

| MIC RULES | DESCRIPTION OF TEST | RESULT |
|---|---|---|
| Item 19 | RF Output Power | Compliant |
| Item 19 | Frequency Tolerance | Compliant |
| Item 19 | Occupied Bandwidth /Spreading Bandwidth/Spread Factor | Compliant |
| Item 19 | Holding time of hopping frequency | N/A |
| Item 19 | Transmitter Spurious Emissions | Compliant |
| Item 19 | Receiver Spurious Emissions | Compliant |
| Item 19 | Interference Prevention Function | Compliant |
| Item 19 | Carrier Sending Function | N/A |

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# 3 TEST METHODOLOGY

## 3.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards: Item 19 of Article 2 Paragraph 1 of the TELEC rules for 2.4GHz band wide-band low-power data communication system. All measurements contained in this report were conducted with test method for radio equipment specified in MIC public notice 88:2004, annex 43 for certification. And measuring method for electric field intensity of radio station with remarkably weak radiowave transmitted.

### 3.1.1 MEASUREMENT EQUIPMENT USEDRadio Frequency Test Equipment

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval | Calibration Method |
|---|---|---|---|---|---|---|
| Wireless Connectivity Tester | R&S | CMW270 | 102543 | 2025/4/28 | 1Year | c |
| Automatic Control Unit | Tonscend | JS0806-2 | 21I8060480 | 2025/4/28 | 1Year | c |
| Signal Analyzer | KEYSIGHT | N9010B | MY60242456 | 2025/4/28 | 1Year | c |
| Analog Signal Generator | KEYSIGHT | N5173B | MY61252625 | 2025/4/28 | 1Year | c |
| UP/DOWN-Converter | R&S | CMW-Z800A | 100274 | 2025/4/28 | 1Year | c |
| Vector Signal Generator | KEYSIGHT | N5182B | MY61252674 | 2025/4/28 | 1Year | c |
| Frequency Extender | KEYSIGHT | N5182BX07 | MY59362541 | 2025/4/28 | 1Year | c |
| Temperature&Humidity test chamber | ESPEC | EL-02KA | 12107166 | 2025/4/28 | 1 Year | c |
| Attenuator | Huixunda technology co., ltd | SMA-JK 6G-10dB | N/A | 2025/4/28 | 1 Year | c |

Calibration agency : Guangzhou LiSai Metrology & Test Co., Ltd.

Address : Address: No.8.South Street ShiJi Institute Guangzhou.Guangdong.China

### 3.1.2 Calibration Method:

a) Calibration conducted by the National Institute of Information and Communications Technology (NICT) (hereinafterl referred to as "NICT") or a designated calibration agency under Article 102-18 paragraph (1).
b) Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992).
c) Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).

d) Calibration conducted by using measuring instruments and other equipment listed Table attached hereto, which shall have been given any of calibration, etc. listed above from a) to c).

*For measurement cables(It is from the antenna end of EUT to the test port of test equipment.)*

| Equipment | Manufacturer | cable loss | Application frequency band | Measurement data of line loss comes from | Last Cal. | Cal. Interval |
|---|---|---|---|---|---|---|
| measurement cable | Provided by the applicant | 0.5 dBm | 2400-2500MHz | Manufacturers claim themselves. | N/A | N/A |

## 3.2 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.
The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, and then record on this report.

Those data rates (BLE mode: 1Mbps) were used for all tests.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
Frequency and Channel list for Bluetooth DTS:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|---|---|
| 0 | 2402 | 20 | 2440 | … | … |
| 1 | 2404 | 21 | 2442 | 38 | 2476 |
| 2 | 2406 | 22 | 2444 | 39 | 2478 |
| … | … | … | … | 40 | 2480 |
| Note: fc=2402MHz+(k-1)×2MHz k=1 to 40 | | | | | |

Test Frequency and channel for Bluetooth DTS 1Mbps:

| Lowest Frequency | | Middle Frequency | | Highest Frequency | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 0 | 2402 | 20 | 2440 | 40 | 2480 |

## 3.3 SUPPORT EQUIPMENT

| EUT Cable List and Details | | | |
|---|---|---|---|
| Cable Description | Length (m) | Shielded/Unshielded | With / Without Ferrite |
| / | / | / | / |

| Auxiliary Cable List and Details | | | |
|---|---|---|---|
| Cable Description | Length (m) | Shielded/Unshielded | With / Without Ferrite |
| | | | |

| Auxiliary Equipment List and Details | | | |
|---|---|---|---|
| Description | Manufacturer | Model | Serial Number |
| Notebook | Lenovo | E46L | 11S168003748Z0LR06E0HG |

***Notes:***

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

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# 4 FACILITIES AND ACCREDITATIONS

## 4.1 FACILITIES

All measurement facilities used to collect the measurement data are located at:

EMTEK (DONGGUAN) CO., LTD.
Room 111&112, Building 8, -1&2/F., Office Building2, Zone A, Zhongda Marine Biotechnology Research and Development Base, No.9, Xincheng Avenue, Songshan Lake High-Tech Industrial Development Zone, Dongguan, Guangdong, China

## 4.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab. : Accredited by CNAS, 2024.07.06
The certificate is valid until 2030.07.05
The Laboratory has been assessed and proved to be in compliance with CNAS/CL01:2018
The Certificate Registration Number is L3150

Accredited by FCC
Designation Number: CN1300
Test Firm Registration Number: 945551

Accredited by A2LA, April 03, 2027
The Certificate Registration Number is 4321.02

Accredited by Industry Canada
The Certificate Registration Number is CN0109

Name of Firm : EMTEK (DONGGUAN) CO., LTD.

Site Location : Room 111&112, Building 8, -1&2/F., Office Building2, Zone A, Zhongda Marine Biotechnology Research and Development Base, No.9, Xincheng Avenue, Songshan Lake High-Tech Industrial Development Zone, Dongguan, Guangdong, China

# 5 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Parameter | Uncertainty |
|---|---|
| Radio Frequency | ±1x10^-5 |
| Uncertainty for Output power test | ±0.83dB |
| Conducted Emissions Test | ±2.0dB |
| Radiated Emission Test | ±2.0dB |
| Occupied Bandwidth Test | ±1.0dB |
| Power density test | ±1.85dB |
| All emission, radiated | ±3dB |
| Antenna Port Emission | ±3dB |
| Temperature | ±0.5℃ |
| Humidity | ±3% |

Measurement Uncertainty for a level of Confidence of 95%

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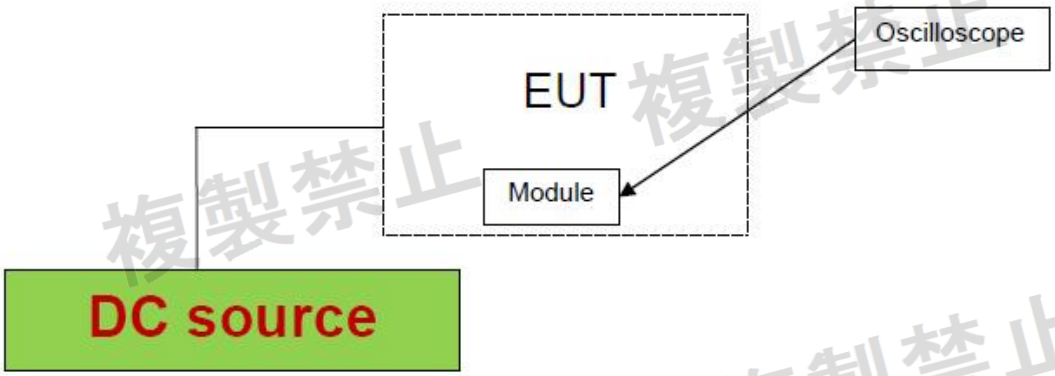
# 6 WIRELESS MODULE VOLTAGE TEST IN EXTREME CONDITIONS

## 6.1 Applicable Standard

When there is a fluctuation of +/-10% input voltage from external power to the test equipment. If the fluctuation of input voltage to the circuit of the radio part (excl. power) in the test equipment is confirmed below +/-1%, Measurement shall be tested with the rated voltage.

## 6.2 Test Configuration




Note: The sample is powered by the serial port board, which is connected to the computer. Refer to the test photos.Products are powered by a serial port board, which is connected to a computer., please see the test photos for details.

## 6.3 Test Results

| Test Voltage | DC 2.7V | DC 3.0 | DC 3.3V |
|---|---|---|---|
| Module Test voltage | 3.0 | 3.0 | 3.0 |
| Module Ratedvoltage | 3.0 | 3.0 | 3.0 |
| The Range of Module Voltage (%) | 0 | 0 | 0 |

Note: In extreme conditions, EUT module power is confirmed below +/-1%.

# 7 TEST REQUIREMENTS

## 7.1 FREQUENCY TOLERANCE

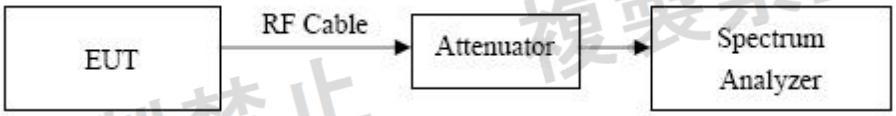
### 7.1.1 Applicable Standard

According to Item 19 of Article 2 Paragraph 1.

### 7.1.2 Conformance Limit

For the 2.4 GHz bands it shall be better than 50 ppm under the operational conditions

### 7.1.3 Test Setup Block Diagram




### 7.1.4 Test Procedure

If the fluctuation of input voltage to the circuit of the radio part (excl. power) in the test equipment is confirmed below +/-1%, Measurement shall be tested with the rated voltage.
When there is a fluctuation of +/-10% input voltage from external power to the test equipment. In case the test equipment is designed to function only within the specified fluctuation range of +/-10% for the voltage source tests shall be conducted applying the rated voltage and a respective specified maximum/minimum value of fluctuation range.
Set the EUT on the test frequency and transmit.
Stop the modulation (stop the spreading), set on “continuous transmission of no-modulated radiation” in principle. If impossible, on “continuous burst transmission of no-modulated radiation”, or a modulation mode to generate a specific frequency spectrum so that the frequency can be measured using a spectrum analyzer (example: a wave of the sub-carrier).
In case of no-modulation (consecutive or continuous burst), direct measurement is conducted with the frequency meter.
In case of burst wave, the measurement is conducted for a time period to achieve a sufficient accuracy. The mean value is employed as the measurement value.
In case of a test mode generating specific frequency spectrum, the spectrum frequency is measured with the spectrum analyzer.

### 7.1.5 Environmental Conditions

| | |
|---|---|
| Temperature: | 25°C |
| Relative Humidity: | 45% |
| ATM Pressure: | 1011 mbar |

### 7.1.6 Test Results

| TestCondition | TestMode | Antenna | Freq(MHz) | CenterFreq [MHz] | Result[ppm] | Limit[ppm] | Verdict |
|---|---|---|---|---|---|---|---|
| NTNV | BLE_1M | Ant1 | 2402 | 2402.006 | +2.497918 | ±50 | PASS |
| NTNV | BLE_1M | Ant1 | 2440 | 2440.006 | +2.459016 | ±50 | PASS |
| NTNV | BLE_1M | Ant1 | 2480 | 2480.006 | +2.419355 | ±50 | PASS |

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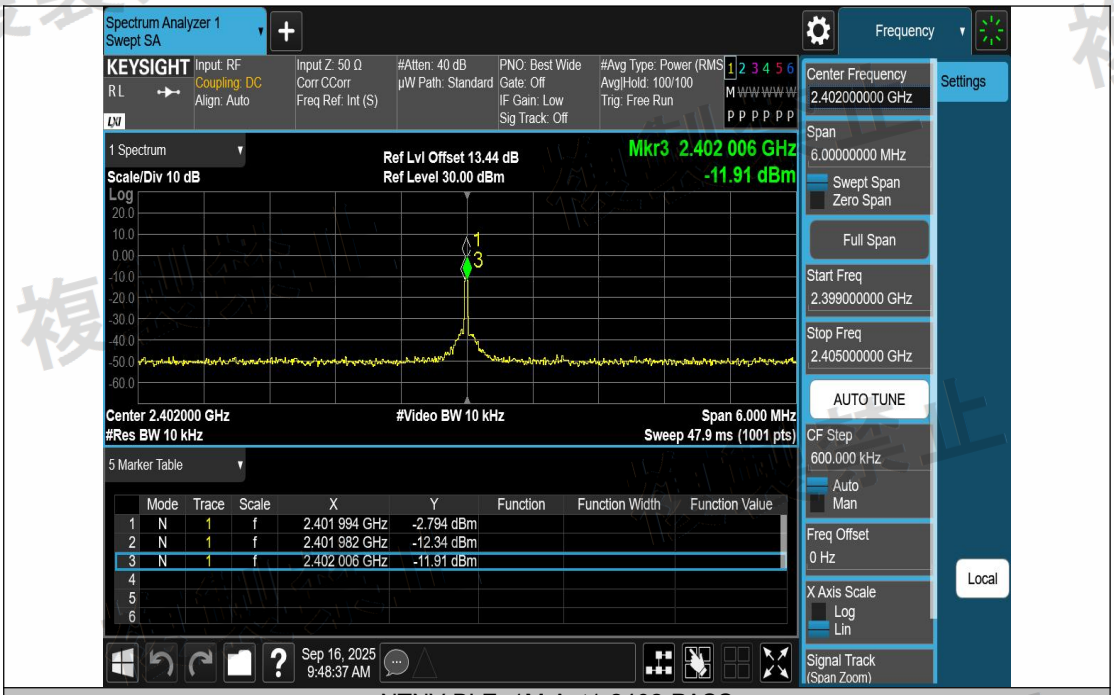
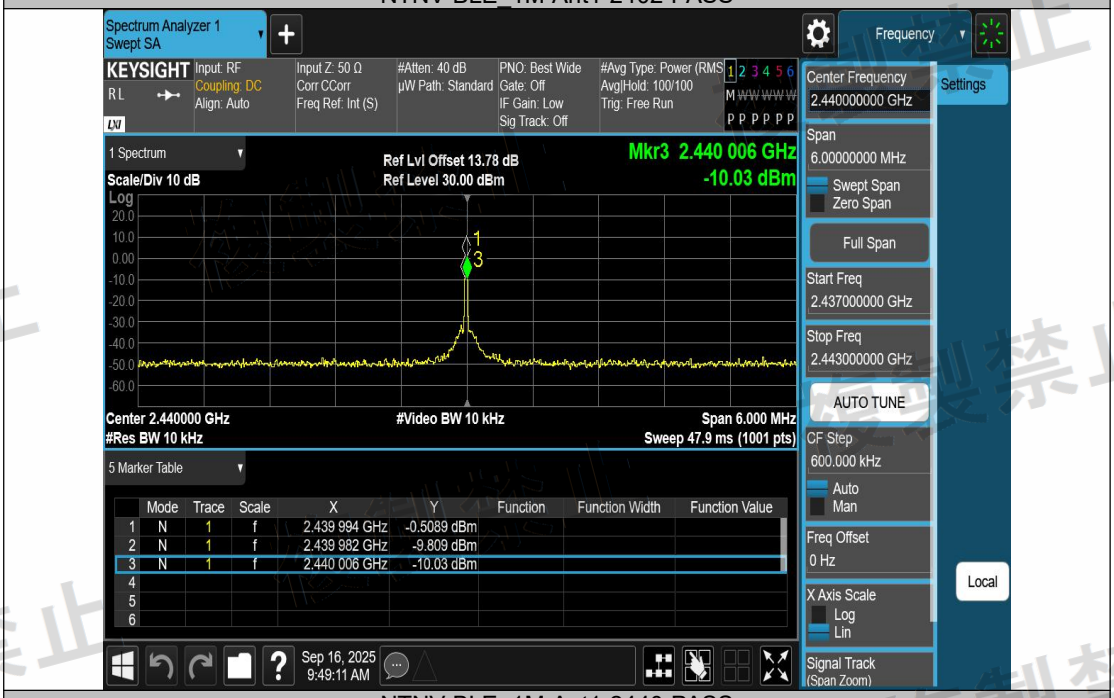
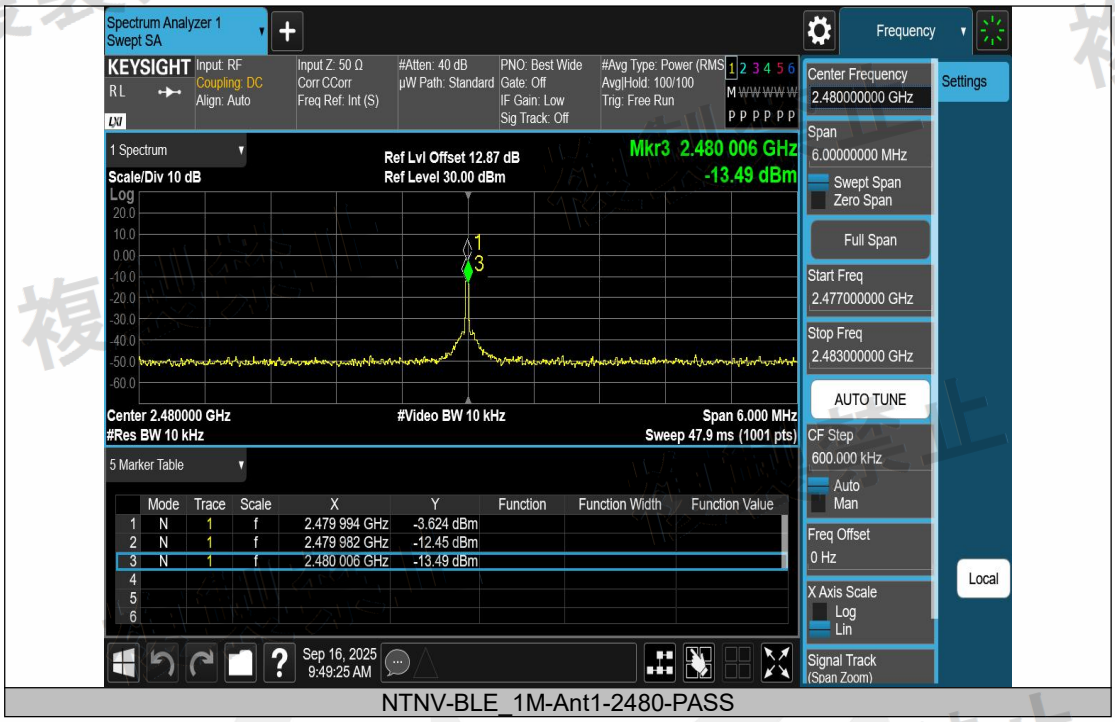



NTNV-BLE_1M-Ant1-2402-PASS




NTNV-BLE_1M-Ant1-2440-PASS




NTNV-BLE_1M-Ant1-2480-PASS

## 7.2 OCCUPIED BANDWIDTH & SPREADING BANDWIDTH

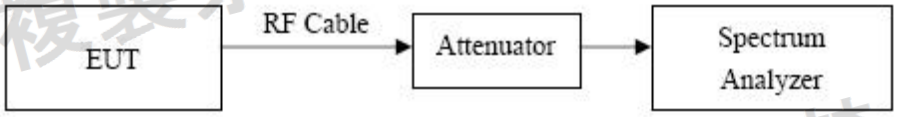
### 7.2.1 Applicable Standard

According to Item 19 of Article 2 Paragraph 1.

### 7.2.2 Conformance Limit

Permissible value for occupied bandwidth using the FH system, a hybrid systems combining DS and FH systems or hybrid system combining FH and OFDM systems shall be 83.5MHz or less,
In spread spectrum systems, spread bandwidth (which refers to a frequency bandwidth with an upper limit and lower limit such that each of the mean powers radiated above the upper frequency limit and below the lower frequency limit is equal to 5% of the total mean power radiated ,this also applies hereafter ) shall be 500kHz or more.

### 7.2.3 Test Setup Block Diagram




### 7.2.4 Test Procedure

Spectrum analyzer is set as below

| | |
|---|---|
| Central Frequency | Test frequency |
| Sweeping Bandwidth | 2 to 3.5 times the allowable value |
| Resolution Bandwidth | Lower than 3 % of allowable value |
| Video Bandwidth | Same level as Resolution Bandwidth |
| Y-Axis Scale | 10 dB/Div |
| Input Level | Carrier level is sufficiently higher than spectrum analyzer noise |
| Sweep Time | Minimum time to assure the measurement accuracy (In case of burst wave, 1 burst per 1 sample) |
| Sampling points | More than 400 points |
| Sweep Mode | Consecutive sweep |
| Phase-Detection Mode | Positive peak |
| Trigger Condition | Max-hold |

The measured value of the spectrum analyzer is processed by the computer internally or externally
Conditions of EUT
Set the test frequency and the modulation is performed with the standard coded test signal. In case of OFDM with burst wave, the modulation is conducted to minimize the rate of the time that the number of sub-carrier is less (short preamble).
After a repetition of sweep so that no variation is found, values of all the data points are loaded into the array variable on the computer.
For all the data, the dB values are converted to antilogarithm of power dimension.
Power summation of all the data is estimated and stored as “total power value”.
Starting with the data of the minimum frequency, the power is summed sequentially, and the limiting data point where the value achieves 0.5% of the total power is sensed. The limiting point is converted to frequency, stored as “lower limit”.
Starting with the data of the maximum frequency, the power is summed sequentially, and the limiting data

point where the value achieves 0.5% of the total power is sensed. The limiting point is converted to frequency, stored as “upper limit”

### 7.2.5 Environmental Conditions

| | |
|---|---|
| Temperature: | 25 °C |
| Relative Humidity: | 45% |
| ATM Pressure: | 1011 mbar |

### 7.2.6 Test Results

Occupied Bandwidth

| TestCondition | TestMode | Antenna | Freq(MHz) | Result [MHz] | Limit [MHz] | Verdict |
|---|---|---|---|---|---|---|
| NTNV | BLE_1M | Ant1 | 2402 | 1.317 | ≤26 | PASS |
| NTNV | BLE_1M | Ant1 | 2440 | 1.314 | ≤26 | PASS |
| NTNV | BLE_1M | Ant1 | 2480 | 1.327 | ≤26 | PASS |

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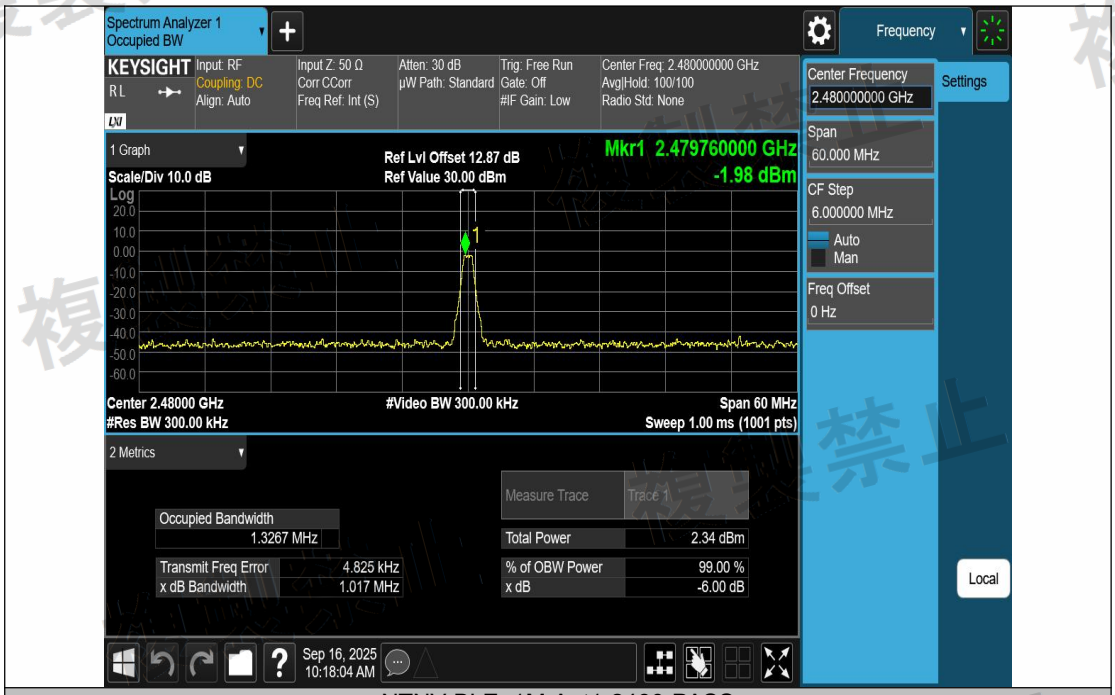
Occupied Bandwidth

NTNV-BLE_1M-Ant1-2402-PASS

NTNV-BLE_1M-Ant1-2440-PASS




NTNV-BLE_1M-Ant1-2480-PASS

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## 7.3 HOPPING FREQUENCY STAYING TIME (DWELL TIME)

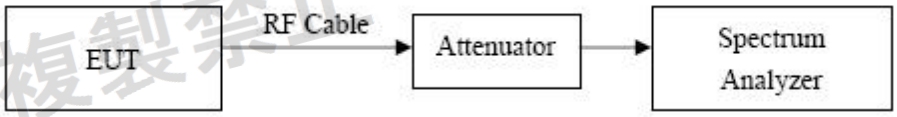
### 7.3.1 Applicable Standard

According to Item 19 of Article 2 Paragraph 1.

### 7.3.2 Conformance Limit

Frequency dwell time (time during which radio waves continue to be emitted at a specified frequency) of a transmitting equipment using the FH system shall be 0.4 seconds or less. When a simple system (except hybrid system) is used ,total frequency dwell time at an arbitrary frequency within the time period obtained by multiplying 0.4 seconds by the process gain shall be 0.4 seconds or less.

### 7.3.3 Test Setup Block Diagram




### 7.3.4 Test Procedure

Set the EUT at the test frequency with test spreading code(Frequency Hopping), then modulation is performed with standard PN test signal
Spectrum analyzer is set as below

| | |
|---|---|
| Central Frequency | Measurement hopping frequency |
| Sweep Frequency Bandwidth | 0 MHz |
| Resolution Bandwidth | Approx. 1 MHz |
| Video Bandwidth | Same level as resolution bandwidth |
| Y-Axis Scale | 10 dB/Div |
| Sweep Time | Hopping period |
| Sweep Mode | Single sweep |
| Trigger Condition | Video trigger |
| Phase-Detection Mode | Positive peak |

Set the spectrum analyzer as in 2 above, wait for the hopping signal at the frequency to hop to.
Read the staying time from the trajectory on the screen at the frequency to hop in the hopping period by using marker, confirm the summation of the staying time to be less than 0.4 seconds.
In the same manner as (2), read the integral of the staying time at the frequency to hop in the hopping period.
Calculate the total of the frequency staying time at the frequency to hop to as described in the equation below.
Repeat the measurement for each frequency to hop.

### 7.3.5 Environmental Conditions

| | |
|---|---|
| Temperature: | 25 °C |
| Relative Humidity: | 45% |
| ATM Pressure: | 1011 mbar |

### 7.3.6 Test Results

**N/A**

## 7.4 POWER TO ANTENNA (CONDUCTED)

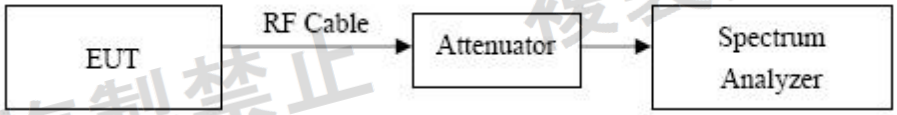
### 7.4.1 Applicable Standard

According to Item 19 of Article 2 Paragraph 1.

### 7.4.2 Conformance Limit

The maximum permit antenna power is 3mW/MHz for DSSS the maximum permit antenna power is 10mW, and the maximum permit tolerance is +20%

### 7.4.3 Test Setup Block Diagram




### 7.4.4 Test Procedure

Set the EUT on the test frequency and the consecutive TX mode or continuous (constant period, constant burst length) burst TX mode.
In case of spreading code used, set on the test spreading code, then the modulation is performed with standard coding test signal.
(1) Measure the equivalent noise bandwidth at the spectrum analyzer for resolution bandwidth of 1 MHz, then read the value correcting the resolution bandwidth on the 1 MHz equivalent bandwidth. In case of a spreading bandwidth lower than 1 MHz, however, perform the correction only for a higher value than “Spreading bandwidth (MHz) / Equivalent noise bandwidth (MHz)”.
(2)The attenuation value of the attenuator shall be set to achieve the optimal operating input level at the spectrum analyzer.
(3)Spectrum analyzer for seeking the maximum antenna power is set as below.

| | |
|---|---|
| Central Frequency | Test frequency |
| Sweeping Bandwidth | Approx. twice the Occupied Bandwidth |
| Resolution Bandwidth | 3 MHz |
| Video Bandwidth | Approx. twice the resolution bandwidth (VBW=6MHz) |
| Y-Axis Scale | 10 dB/Div |
| Sweep Time | Minimum time to assure the measurement accuracy<br>(In case of burst wave, 1 burst per 1 sample) |
| Trigger Condition | Free run |
| Data points | More than 400 points |
| Sweep Mode | Consecutive sweep |
| Phase-Detection Mode | Positive peak |
| Display mode | Max-hold |

(4) Spectrum analyzer for measuring the antenna power is set as below. In this case, calibrate the indication of the RF Power Meter on the output of the EUT with the RF Power Meter connected to the IF output of the spectrum analyzer.

| | |
|---|---|
| Central Frequency | Frequency to achieve the maximum power<br>(sought frequency) |
| Sweeping Bandwidth | 0 Hz |

| | |
|---|---|
| Resolution Bandwidth | 3 MHz |
| Video Bandwidth | Same level as the resolution bandwidth |
| Sweep Mode | Consecutive sweep |
| Phase-Detection Mode | Sample |

Measurement Procedure
Frequency hopping system or combined systems of direct spread and frequency hopping:
a. Connect the high frequency power meter to the output of the attenuator and measure the total power (without bandwidth limitation)
b. Divide the total power by the spread bandwidth to find the “average” power per MHz.
c. Confirm that frequency distribution of the hopping frequencies is homogeneous according to the supporting data. If frequency distribution of the frequencies is not homogeneous, consider other measurement or correction methods based on the supporting data.
d. Set the antenna power as follows:
- Continuous waves: value in b.
- Burst waves: value in b. and value calculated from the average power within bursts from rates of transmission times (i.e. correction on the duty-cycle, to find the average within the transmit burst)
.

### 7.4.5 Environmental Conditions

| | |
|---|---|
| Temperature: | 25°C |
| Relative Humidity: | 45% |
| ATM Pressure: | 1011 mbar |

### 7.4.6 Test Results

| TestCondition | TestMode | Antenna | Freq(MHz) | Result(dBm) | Result(mW) | Limit(mW) | Verdict |
|---|---|---|---|---|---|---|---|
| NTNV | BLE_1M | Ant1 | 2402 | -2.53 | 0.5585 | ≤10 | PASS |
| NTNV | BLE_1M | Ant1 | 2440 | -1.30 | 0.7413 | ≤10 | PASS |
| NTNV | BLE_1M | Ant1 | 2480 | -3.15 | 0.4842 | ≤10 | PASS |

| Test Condition | Test Mode | Antenna | Freq(MHz) | Power (mW) | RatedPower (mW) | Result (%) | Limit (%) | Verdict |
|---|---|---|---|---|---|---|---|---|
| NTNV | BLE_1M | Ant1 | 2402 | 0.5585 | 1 | -44.15 | +20 | PASS |
| NTNV | BLE_1M | Ant1 | 2440 | 0.7413 | 1 | -25.87 | +20 | PASS |
| NTNV | BLE_1M | Ant1 | 2480 | 0.4842 | 1 | -51.58 | +20 | PASS |

| TestCondition | TestMode | Antenna | Freq(MHz) | Result(dBm) | EIRP(dBm) | Limit(dBm) | Verdict |
|---|---|---|---|---|---|---|---|
| NTNV | BLE_1M | Ant1 | 2402 | -2.53 | -0.44 | ≤12.14 | PASS |
| NTNV | BLE_1M | Ant1 | 2440 | -1.30 | 0.79 | ≤12.14 | PASS |
| NTNV | BLE_1M | Ant1 | 2480 | -3.15 | -1.06 | ≤12.14 | PASS |

Note: Tolerance = (Output Power – Rated Output Power) / Rated Output Power * 100%

## 7.5 SPURIOUS EMISSIONS INTENSITY

### 7.5.1 Applicable Standard

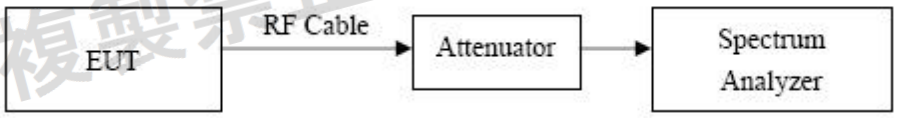
According to Item 19 of Article 2 Paragraph 1.

### 7.5.2 Conformance Limit

Permissible mean power of spurious emission of each frequency supplied to a feeder, that is, mean power of spurious emission in the 1 MHz bandwidth at frequency f other than frequency band used shall be as follows:

a. 2,387MHz ≤ f ≤ 2,400MHz and 2,483.5MHz < f ≤ 2,496.5MHz 25 μW(-16dB) or less
b. 2,387MHz > f and 2,496.5MHz < f 2.5 μW(-26dB) or less

### 7.5.3 Test Setup Block Diagram




### 7.5.4 Test Procedure

(1)Spectrum analyzer for seeking the spurious emission is set as below

| | |
|---|---|
| Sweeping Bandwidth | For seeking the spurious emission, from frequency lowest possible to the 5 times the carrier frequency |
| Resolution Bandwidth | 1 MHz |
| Video Bandwidth | Approx. As same as Resolution bandwidth |
| Y-Axis Scale | 10 dB/Div |
| Input Level | Value of maximum dynamic range |
| Sweep Time | Minimum time to assure the measurement accuracy (Note 1) |
| Sweep Mode | Single sweep |
| Phase-Detection Mode | Positive peak |

(2)The settings of the spectrum analyzer while conducting spurious amplitude measurements are as follows:

- Central Frequency: Acquired spurious frequencies in (1)
- Sweep Frequency 0 Hz
- Resolution Bandwidth 1 MHz
- Video Bandwidth same as Resolution Bandwidth
- Note: take into account that the requirement limits the power in a bandwidth of 1 MHz.
- If the measurement is carried out with a bandwidth of 100 kHz (for frequencies below 1 GHz), the limit shall be reduced with 10 dB.
- For example 2.5 uW in 1 MHz = -26 dBm limit, becomes –36 dBm for 100 kHz bandwidth.
- Y-Axis Scale 10 dB/Div
- Input Level: choose input level within the linear range of the SA mixer (so that no additional spurious are generated by the mixer)
- Sweep Time: Minimum amount of time to ensure measurement accuracy. However, in the case of burst waves, time exceeds duration of 1 burst.
- Data Points Over 400 points
- Sweep Mode: Single sweep
- Detection Mode Sample (BIN-Width << RBW, so that all spurious emissions are captured) [BIN-width is the frequency difference between 2 adjacent sample points on the display)

(3)Set EUT as occupied bandwidth is measure. That is, Set the EUT on the test frequency and the continuous TX mode or continuous (constant period, constant burst length) burst TX mode. In case of spreading code used, set on the test spreading code, then the modulation is performed with standard coding test signal.

The spectrum analyzer is set as 2 (1). Seek the spurious emission If the amplitude of the sought spurious emission satisfies the specified value (in case of 2 (2) Note 1, the specified value is –3dB), the measurement of 2 (2) is not performed, then the estimated value is employed as the measured value.

In case the sought spurious emission amplitude exceeds the specified value, seek the spurious frequency by narrowing the sweeping band sequentially as 100 MHz, 10 MHz, 1 MHz for the purpose of higher accuracy of the spectrum analyzer. Set the spectrum analyzer as 2 (2). Estimate the mean value of the spurious amplitude, then employ it as the measured value (In case DSSS as well as OFDM with burst wave, the mean inside of the burst).

Sweep Bandwidth: 30MHz~2387MHz, 2483.5MHz~2496.5MHz, 2496.5MHz~12500MHz

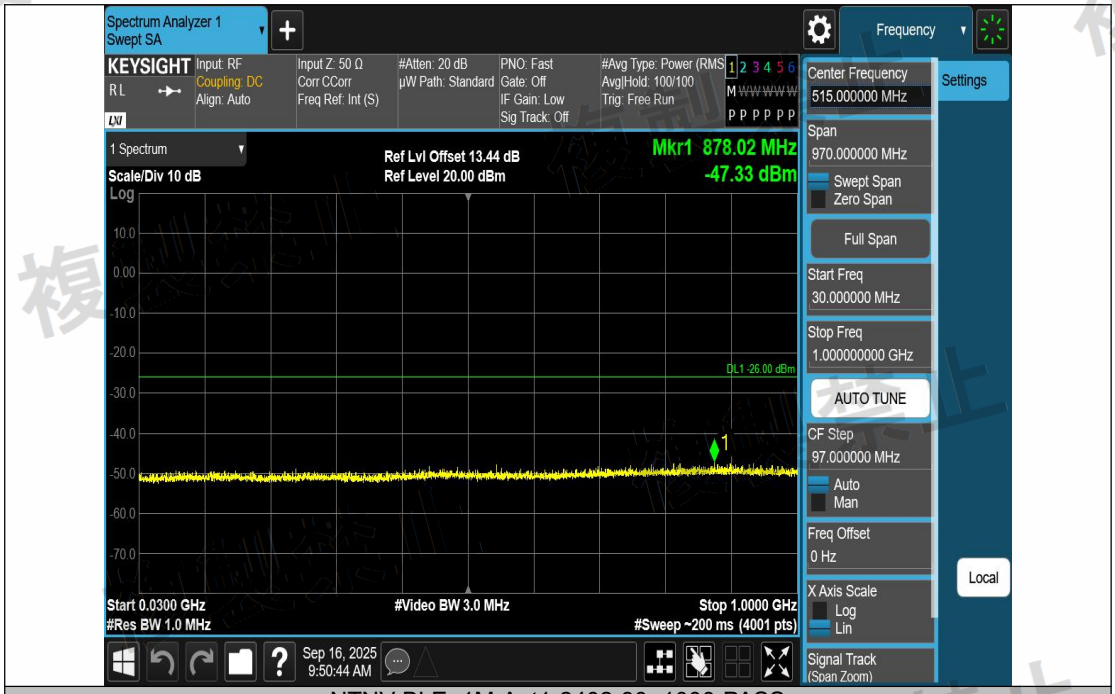
1. Respectively mark the maximum results in the above sweep bandwidth.

### 7.5.5 Environmental Conditions

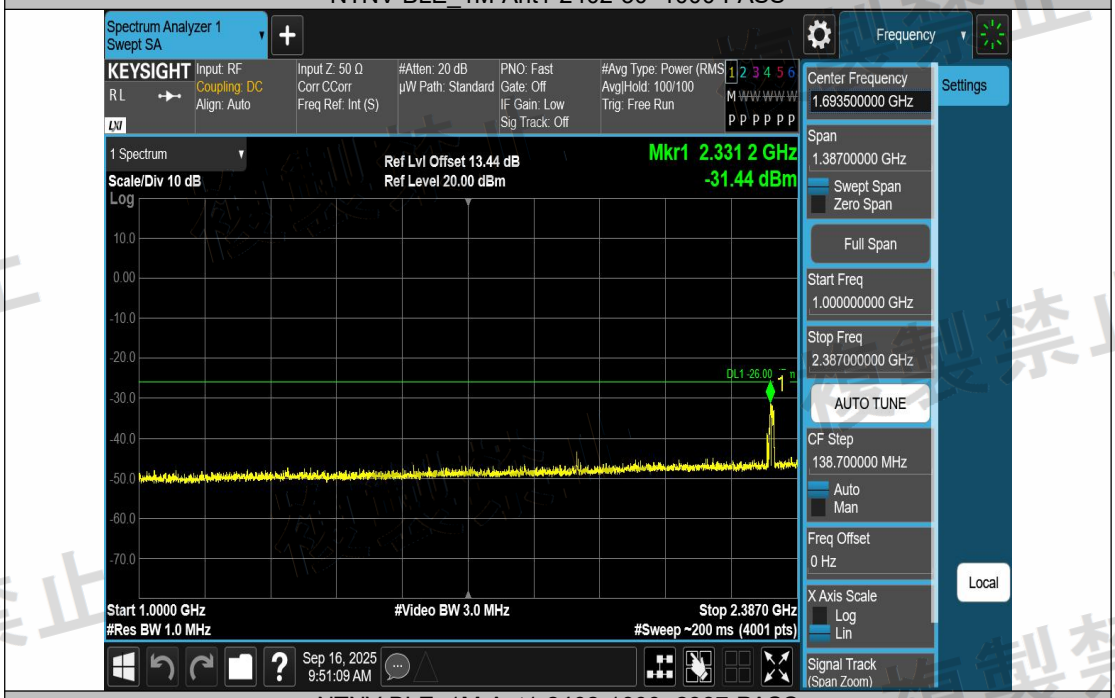
| | |
|---|---|
| Temperature: | 25°C |
| Relative Humidity: | 45% |
| ATM Pressure: | 1011 mbar |

### 7.5.6 Test Results

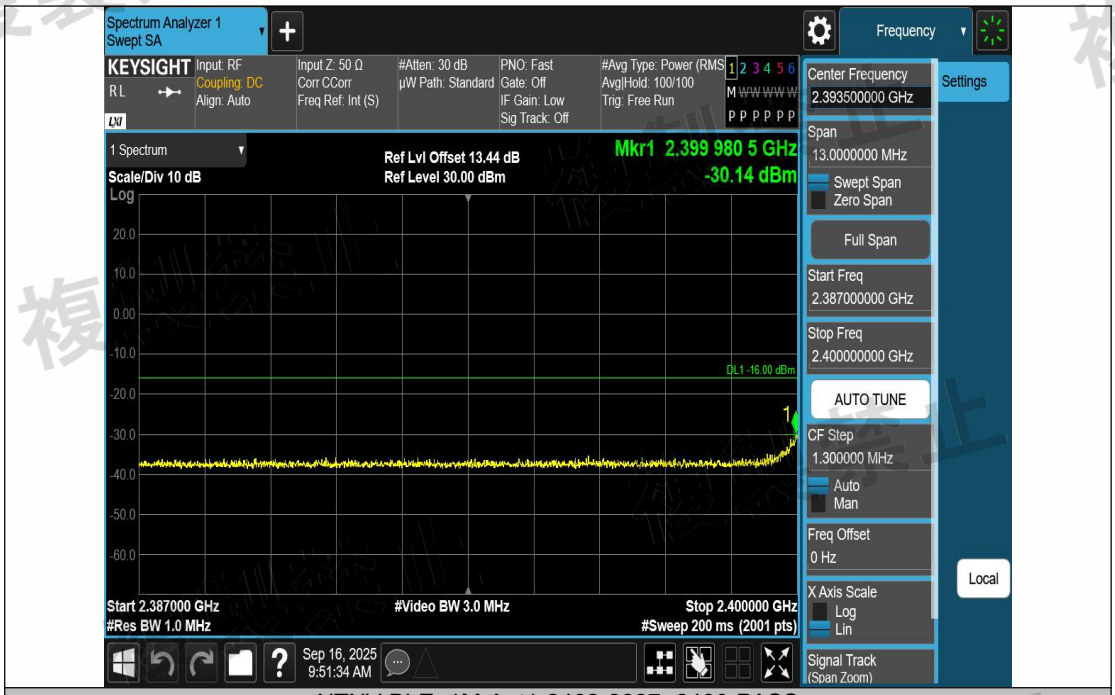
| TestCondition | TestMode | Antenna | Freq(MHz) | Freq.Range [MHz] | Freq. [MHz] | Result [dBm] | Limit [dBm] | Result [μW/MHz] | Limit [μW/MHz] | Verdict |
|---|---|---|---|---|---|---|---|---|---|---|
| NTNV | BLE_1M | Ant1 | 2402 | 30~1000 | 878.02 | -47.33 | ≤-26 | 0.01849 | ≤2.5 | PASS |
| NTNV | BLE_1M | Ant1 | 2402 | 1000~2387 | 2331.17 | -31.44 | ≤-26 | 0.71779 | ≤2.5 | PASS |
| NTNV | BLE_1M | Ant1 | 2402 | 2387~2400 | 2399.98 | -30.15 | ≤-16 | 0.96605 | ≤25 | PASS |
| NTNV | BLE_1M | Ant1 | 2440 | 30~1000 | 906.15 | -47.09 | ≤-26 | 0.01954 | ≤2.5 | PASS |
| NTNV | BLE_1M | Ant1 | 2440 | 1000~2387 | 1926.52 | -43.71 | ≤-26 | 0.04256 | ≤2.5 | PASS |
| NTNV | BLE_1M | Ant1 | 2440 | 2387~2400 | 2387.85 | -34.88 | ≤-16 | 0.32509 | ≤25 | PASS |
| NTNV | BLE_1M | Ant1 | 2440 | 2483.5~2496.5 | 2490.07 | -34.64 | ≤-16 | 0.34356 | ≤25 | PASS |
| NTNV | BLE_1M | Ant1 | 2440 | 2496.5~3000 | 2702.26 | -44.34 | ≤-26 | 0.03681 | ≤2.5 | PASS |
| NTNV | BLE_1M | Ant1 | 2440 | 3000~13000 | 4880.00 | -41.38 | ≤-26 | 0.07278 | ≤2.5 | PASS |
| NTNV | BLE_1M | Ant1 | 2480 | 30~1000 | 832.68 | -48.01 | ≤-26 | 0.01581 | ≤2.5 | PASS |
| NTNV | BLE_1M | Ant1 | 2480 | 1000~2387 | 1932.76 | -41.55 | ≤-26 | 0.06998 | ≤2.5 | PASS |
| NTNV | BLE_1M | Ant1 | 2480 | 2387~2400 | 2388.74 | -36.11 | ≤-16 | 0.24491 | ≤25 | PASS |
| NTNV | BLE_1M | Ant1 | 2480 | 2483.5~2496.5 | 2483.62 | -35.52 | ≤-16 | 0.28054 | ≤25 | PASS |
| NTNV | BLE_1M | Ant1 | 2480 | 2496.5~3000 | 2593.00 | -45.07 | ≤-26 | 0.03112 | ≤2.5 | PASS |
| NTNV | BLE_1M | Ant1 | 2480 | 3000~13000 | 4959.50 | -41.32 | ≤-26 | 0.07379 | ≤2.5 | PASS |



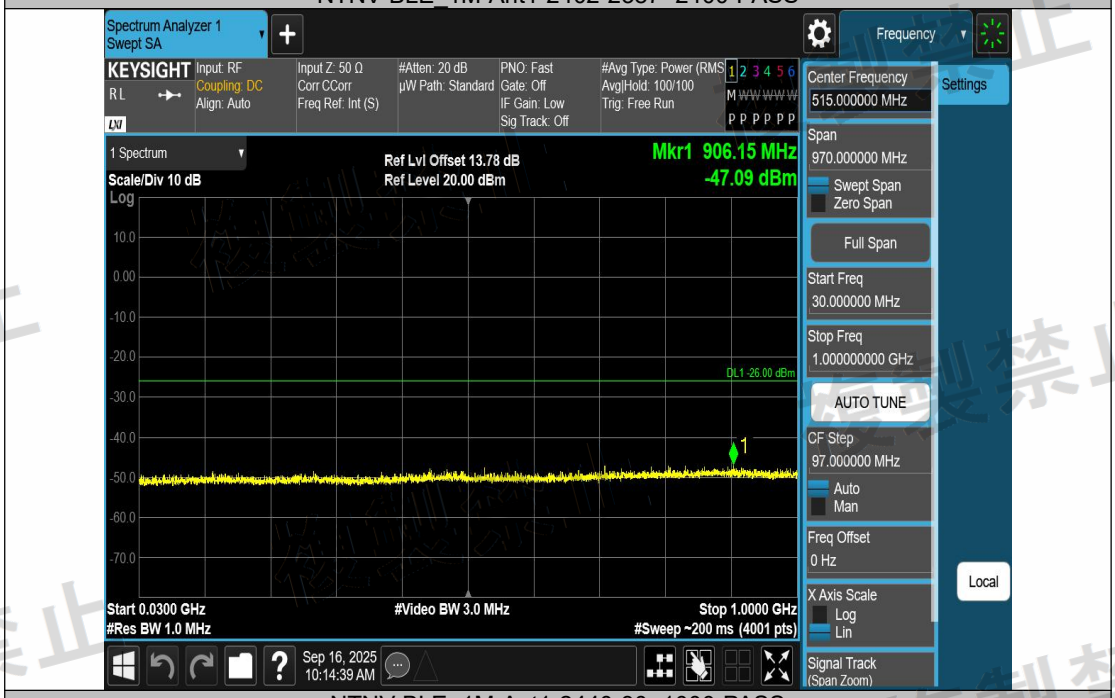

NTNV-BLE_1M-Ant1-2402-30~1000-PASS



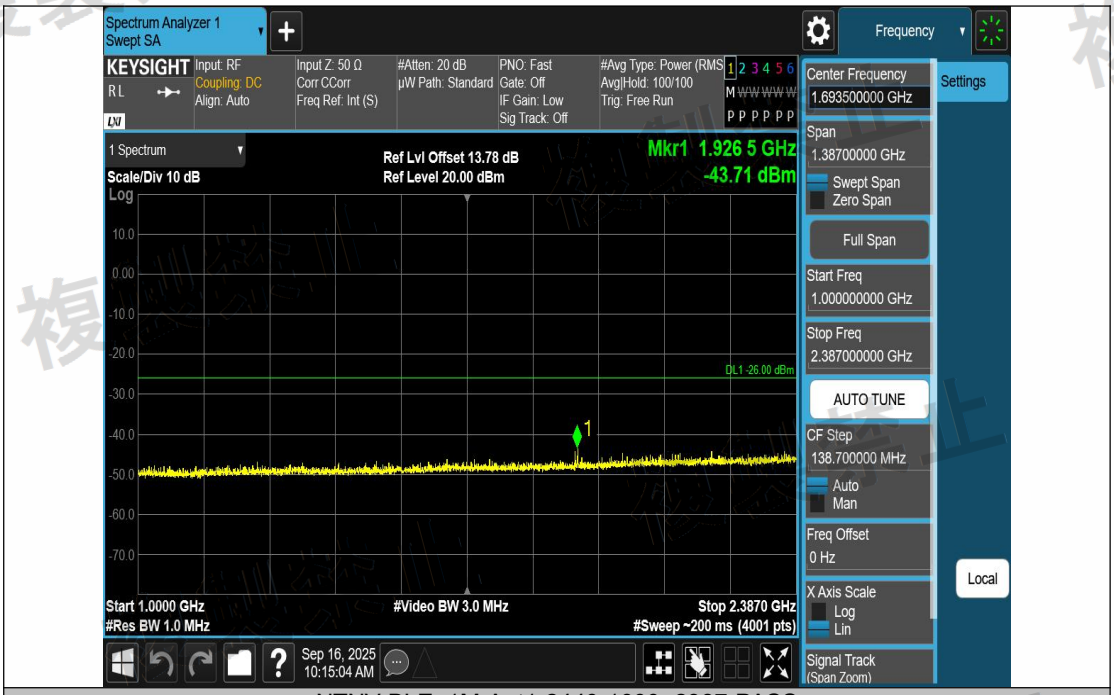

NTNV-BLE_1M-Ant1-2402-1000~2387-PASS



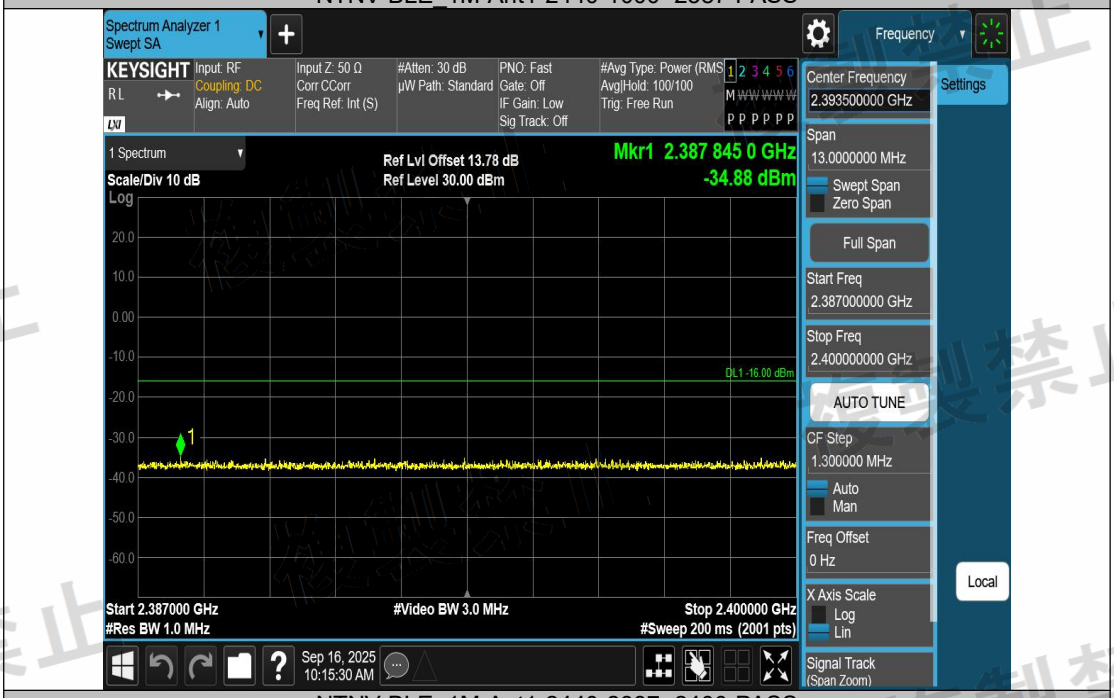

NTNV-BLE_1M-Ant1-2402-2387~2400-PASS



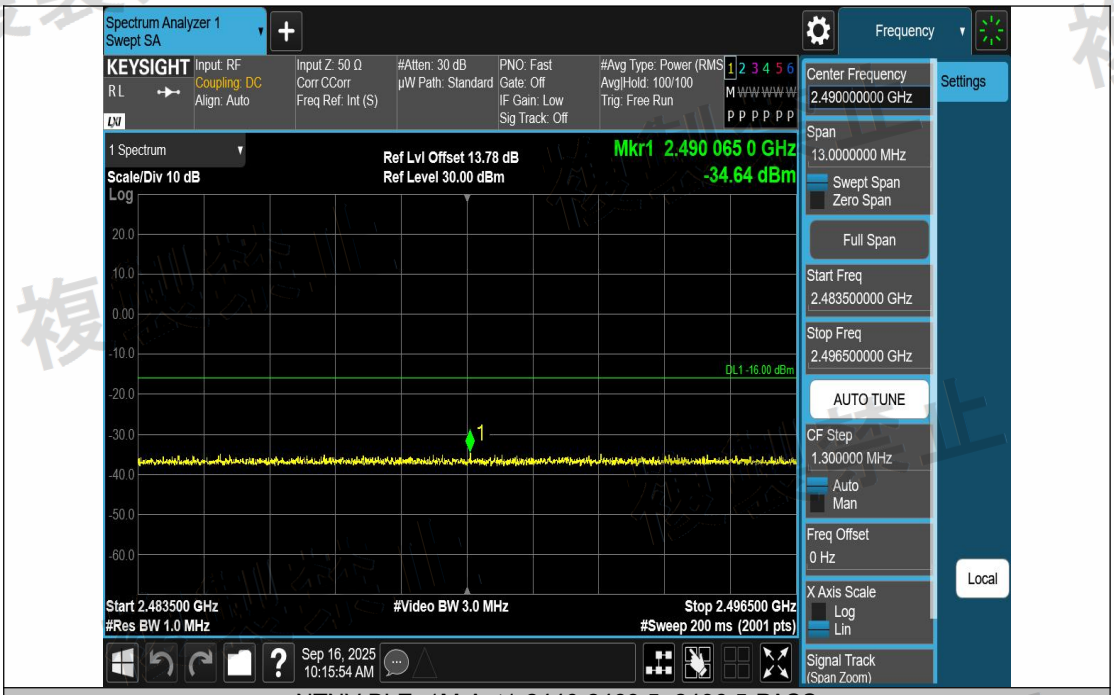

NTNV-BLE_1M-Ant1-2440-30~1000-PASS



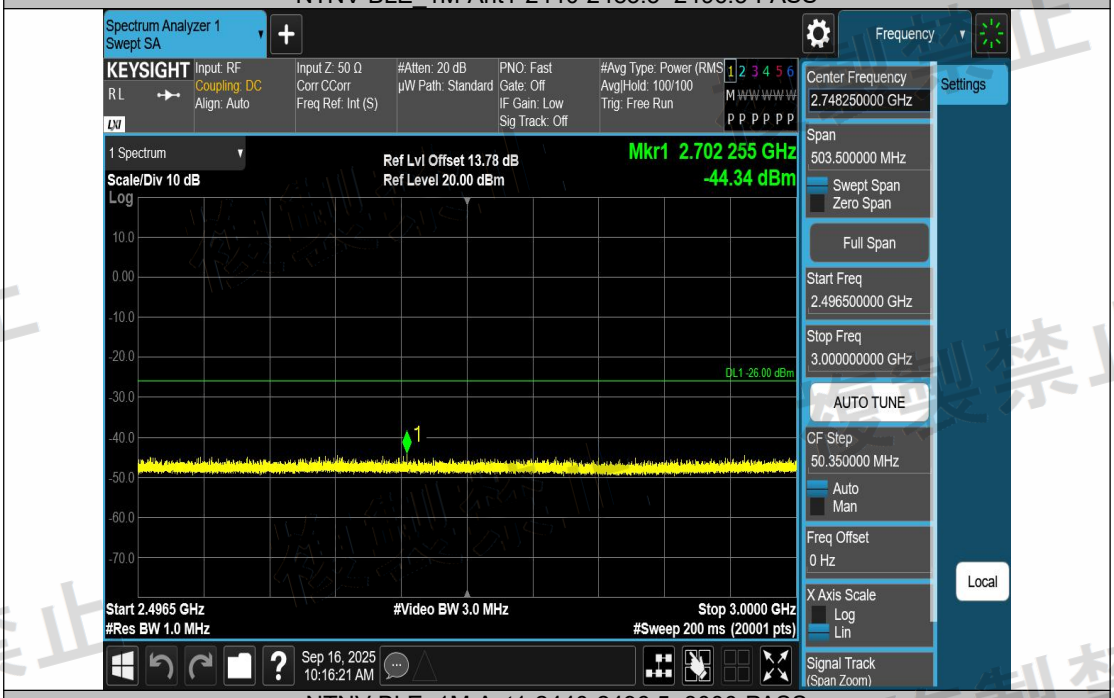

NTNV-BLE_1M-Ant1-2440-1000~2387-PASS



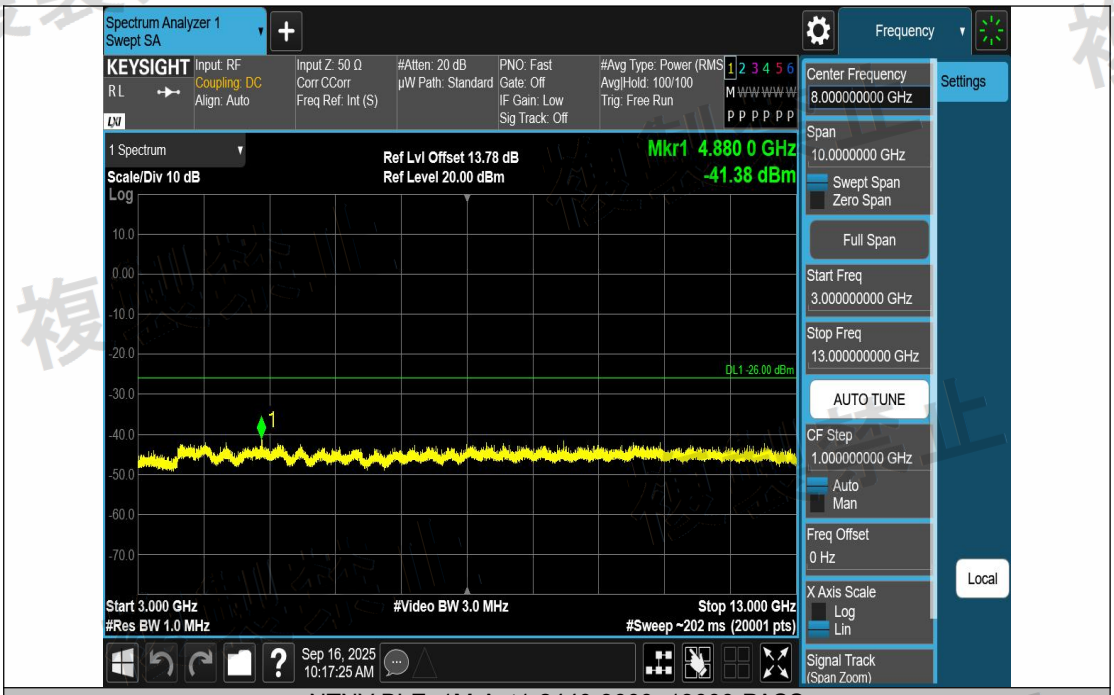

NTNV-BLE_1M-Ant1-2440-2387~2400-PASS



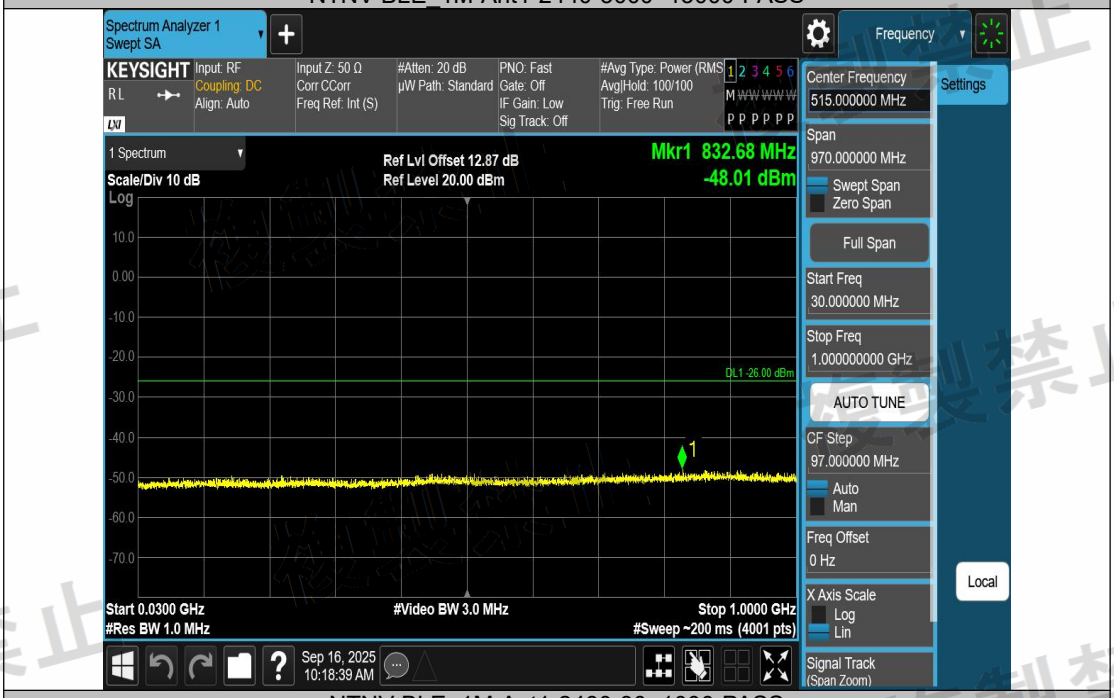

NTNV-BLE_1M-Ant1-2440-2483.5~2496.5-PASS



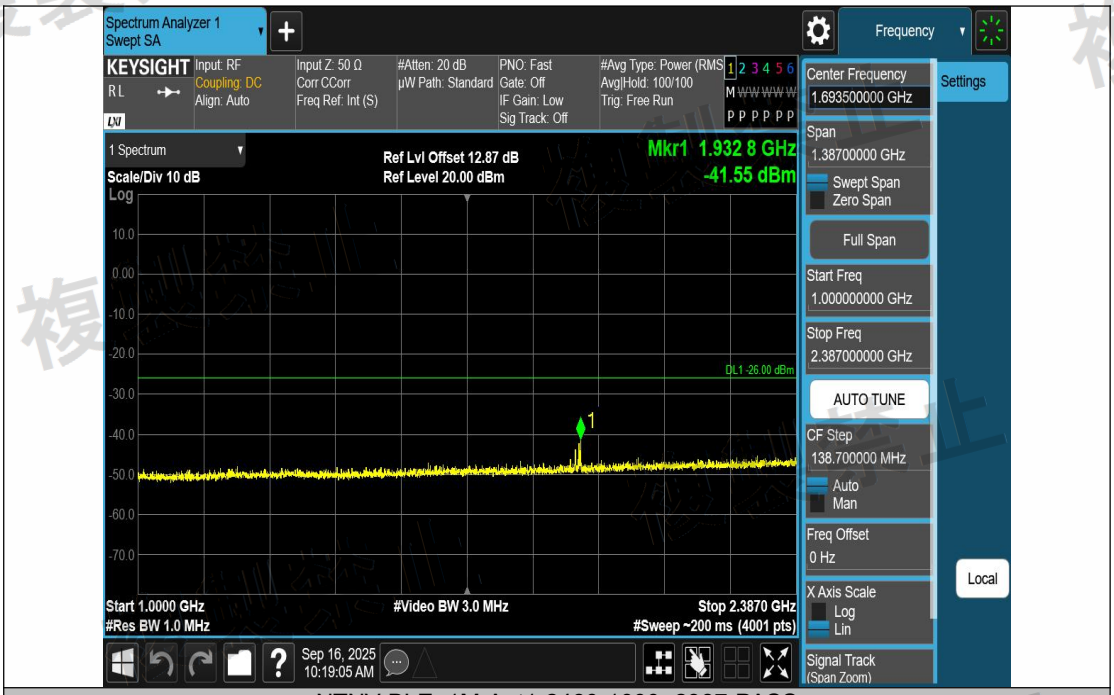

NTNV-BLE_1M-Ant1-2440-2496.5~3000-PASS




NTNV-BLE_1M-Ant1-2440-3000~13000-PASS



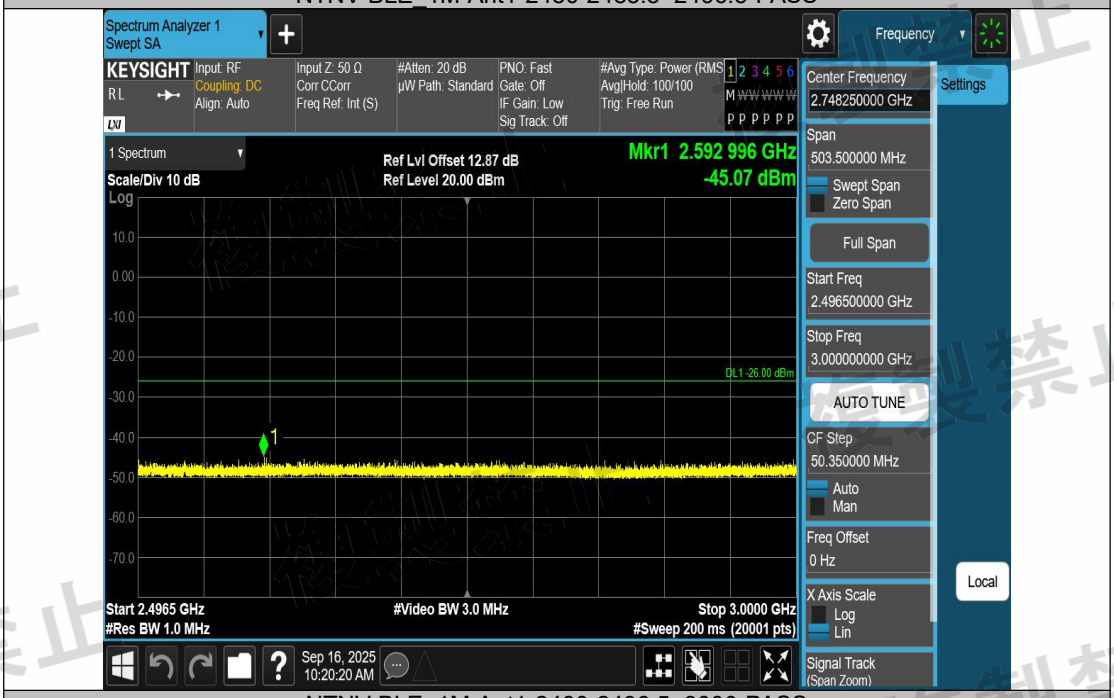

NTNV-BLE_1M-Ant1-2480-30~1000-PASS



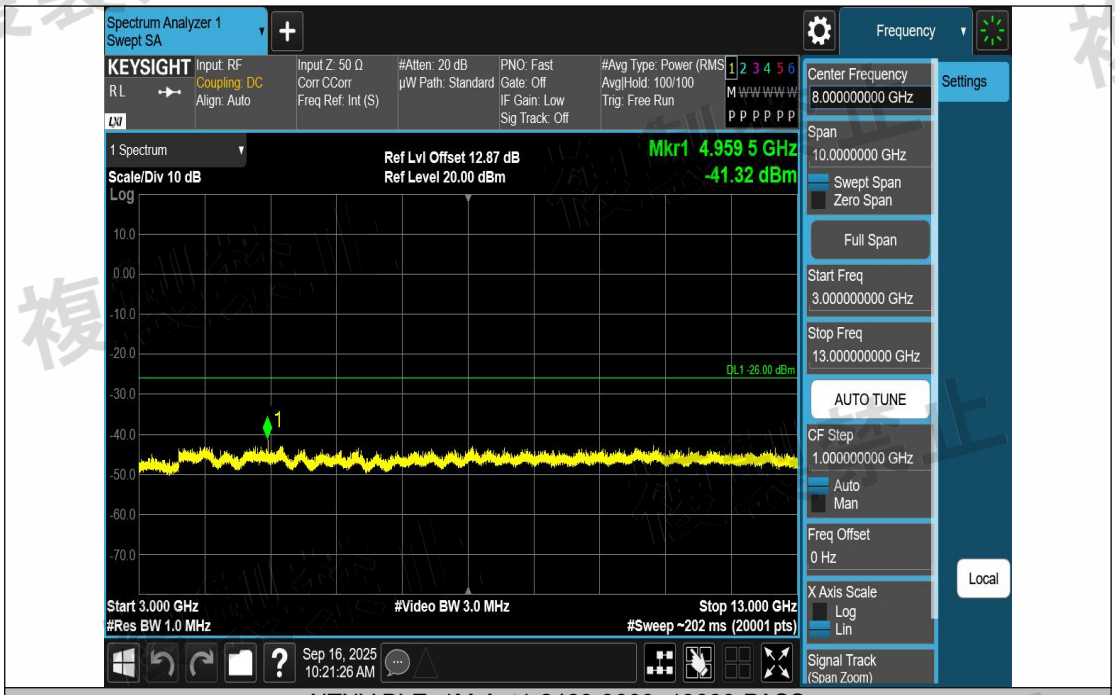

NTNV-BLE_1M-Ant1-2480-1000~2387-PASS

NTNV-BLE_1M-Ant1-2480-2387~2400-PASS

NTNV-BLE_1M-Ant1-2480-2483.5~2496.5-PASS




NTNV-BLE_1M-Ant1-2480-2496.5~3000-PASS




NTNV-BLE_1M-Ant1-2480-3000~13000-PASS

## 7.6 COLLATERAL EMISSIONS OF RECEIVER

### 7.6.1 Applicable Standard

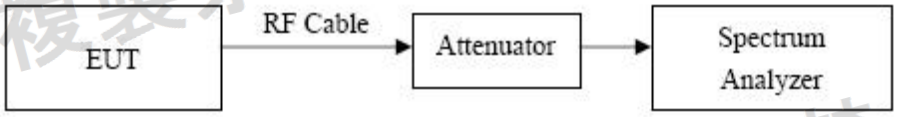
According to Item 19 of Article 2 Paragraph 1.

### 7.6.2 Conformance Limit

The limit on secondary emissions radiated from the receiving equipment within which the function of other radio equipment will not be impaired shall be, in terms of the power of a dummy antenna circuit that has the same electrical constant as the receiving antenna, 4 nW (-54dBm) or less at a frequency below 1 GHz and 20 nW(-47dBm) or less at a frequency of 1 GHz or higher as measured using the circuit.

| | |
|---|---|
| a. 30 MHz - 1000 MHz | 4 nW (-54dBm) or less |
| b. 1GHz – 12.5 GHz | 20 nW(-47dBm) or less |

### 7.6.3 Test Setup Block Diagram




### 7.6.4 Test Procedure

Set the EUT so that the test frequency is can be measured receipt consecutively all the time.
(1) Set the attenuation value of the dummy load lowest as possible, due to low level of the measured object.
(2) Set Spectrum analyzer for seeking the collateral emission is set as below.

| | |
|---|---|
| Sweeping Bandwidth | 30MHz to 5 times of carrier frequency |
| Resolution Bandwidth | In case of frequency lower than 1 GHz, 100 kHz<br>In case of frequency higher than 1 MHz |
| Video Bandwidth | Same level as the resolution bandwidth |
| Sweep Time | Minimum time to assure the measurement accuracy |
| Y-Axis Scale | 10 dB/Div |
| Sweep Mode | Single sweep |
| Phase-Detection Mode | Positive peak |

(3) Spectrum analyzer for measuring the collateral emission is set as below.

| | |
|---|---|
| Central Frequency | Collateral emission frequency |
| Sweeping Bandwidth | 0 Hz |
| Resolution Bandwidth | In case of frequency lower than 1 GHz, 100 kHz<br>In case of frequency higher than 1 MHz |
| Video Bandwidth | Same level as the resolution bandwidth |
| Sweep Mode | Single sweep |
| Detection Mode | Sample |

Set the spectrum analyzer as (2), seek the maximum amplitude of the collateral emission.
In case of sought result lower than 1/10 limit value, employ the sought value as the measured value.
In case the sought value exceeds 1/10 limit value, seek the collateral emission frequency by narrowing the sweeping band sequentially to 1/10 for the purpose of higher accuracy of the spectrum analyzer. Set the

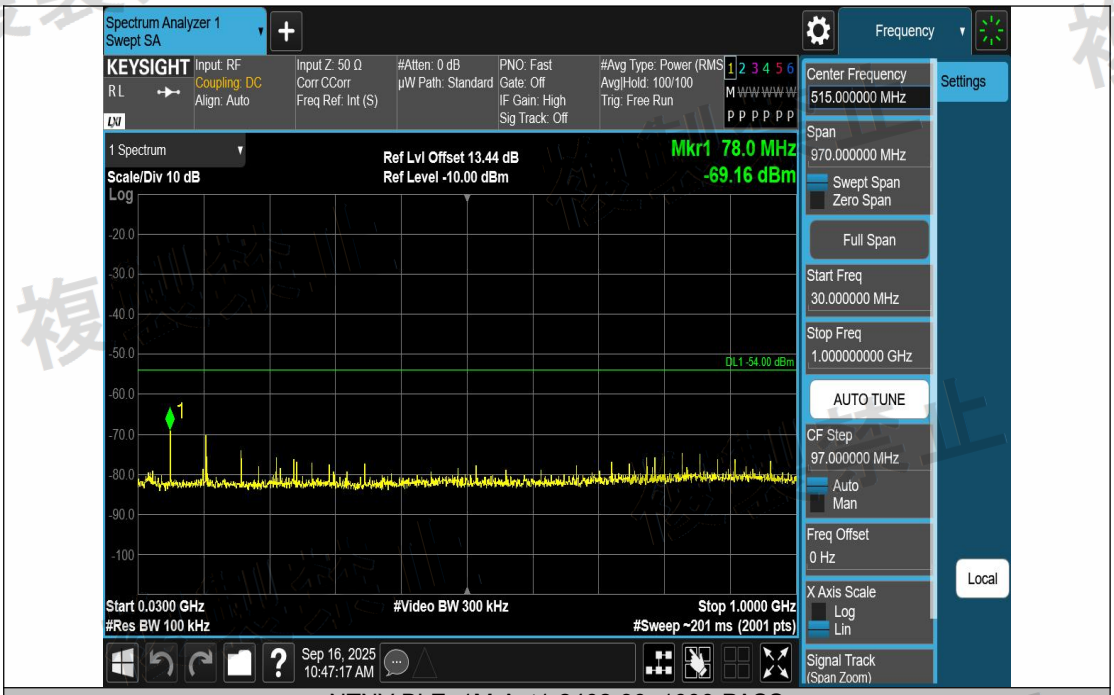
spectrum analyzer as (3).

### 7.6.5 Environmental Conditions

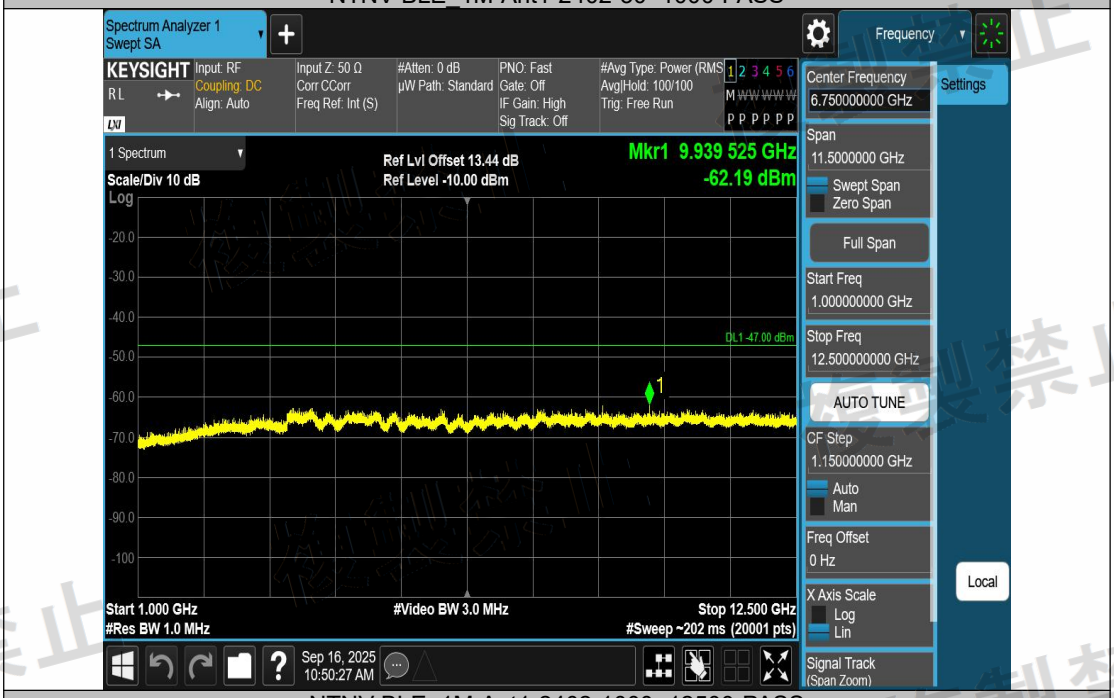
| | |
|---|---|
| Temperature: | 25 °C |
| Relative Humidity: | 45% |
| ATM Pressure: | 1011 mbar |

### 7.6.6 Test Results

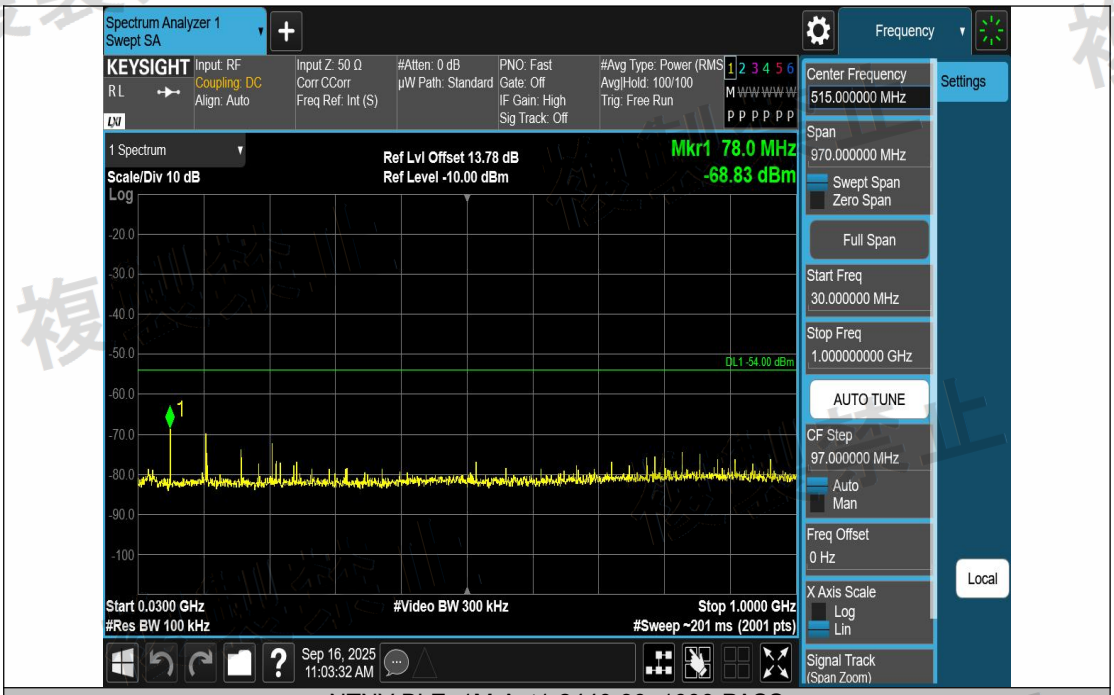
| TestCondition | TestMode | Antenna | Freq(MHz) | Freq.Range [MHz] | Freq. [MHz] | Result [dBm] | Limit [dBm] | Result [nW] | Limit [nW] | Verdict |
|---|---|---|---|---|---|---|---|---|---|---|
| NTNV | BLE_1M | Ant1 | 2402 | 30~1000 | 78.02 | -69.16 | ≤-54 | 0.12134 | ≤4 | PASS |
| NTNV | BLE_1M | Ant1 | 2402 | 1000~12500 | 9939.53 | -62.19 | ≤-47 | 0.60395 | ≤20 | PASS |
| NTNV | BLE_1M | Ant1 | 2440 | 30~1000 | 78.02 | -68.83 | ≤-54 | 0.13092 | ≤4 | PASS |
| NTNV | BLE_1M | Ant1 | 2440 | 1000~12500 | 3977.93 | -62.33 | ≤-47 | 0.58479 | ≤20 | PASS |
| NTNV | BLE_1M | Ant1 | 2480 | 30~1000 | 78.02 | -69.64 | ≤-54 | 0.10864 | ≤4 | PASS |
| NTNV | BLE_1M | Ant1 | 2480 | 1000~12500 | 4676.55 | -62.64 | ≤-47 | 0.54450 | ≤20 | PASS |



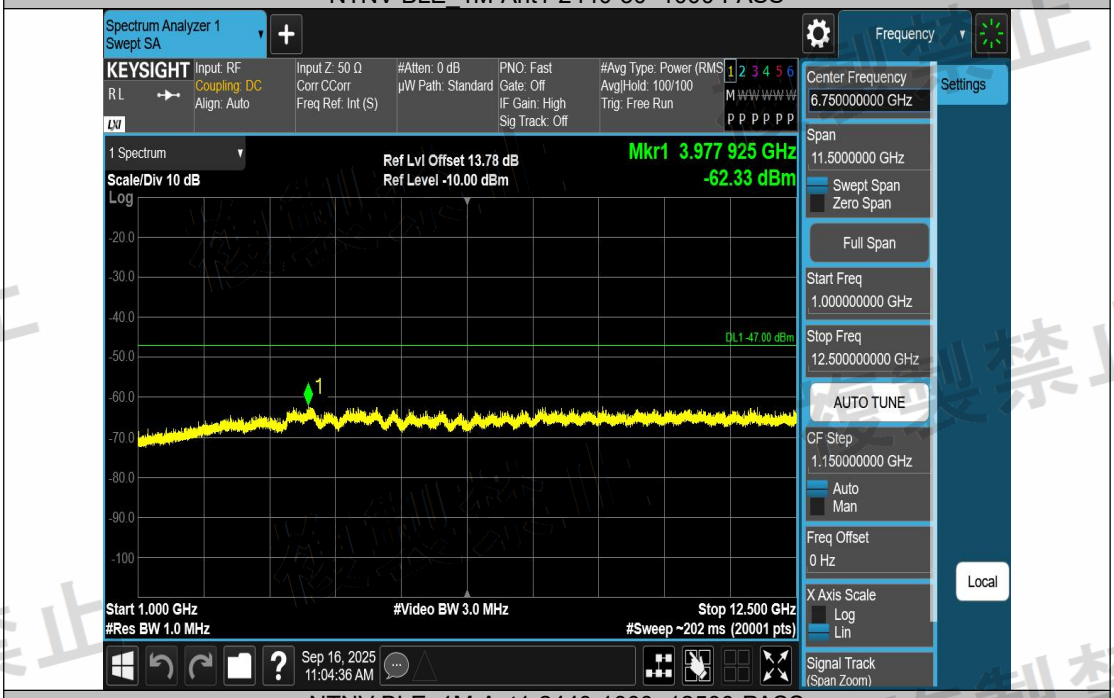

NTNV-BLE_1M-Ant1-2402-30~1000-PASS



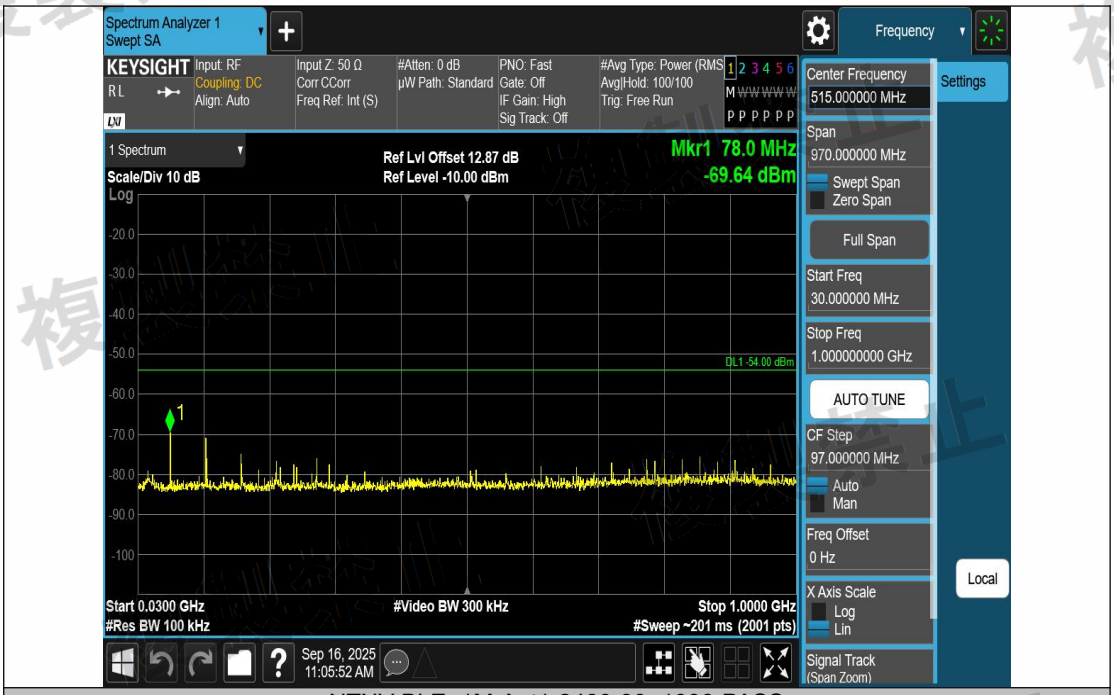

NTNV-BLE_1M-Ant1-2402-1000~12500-PASS



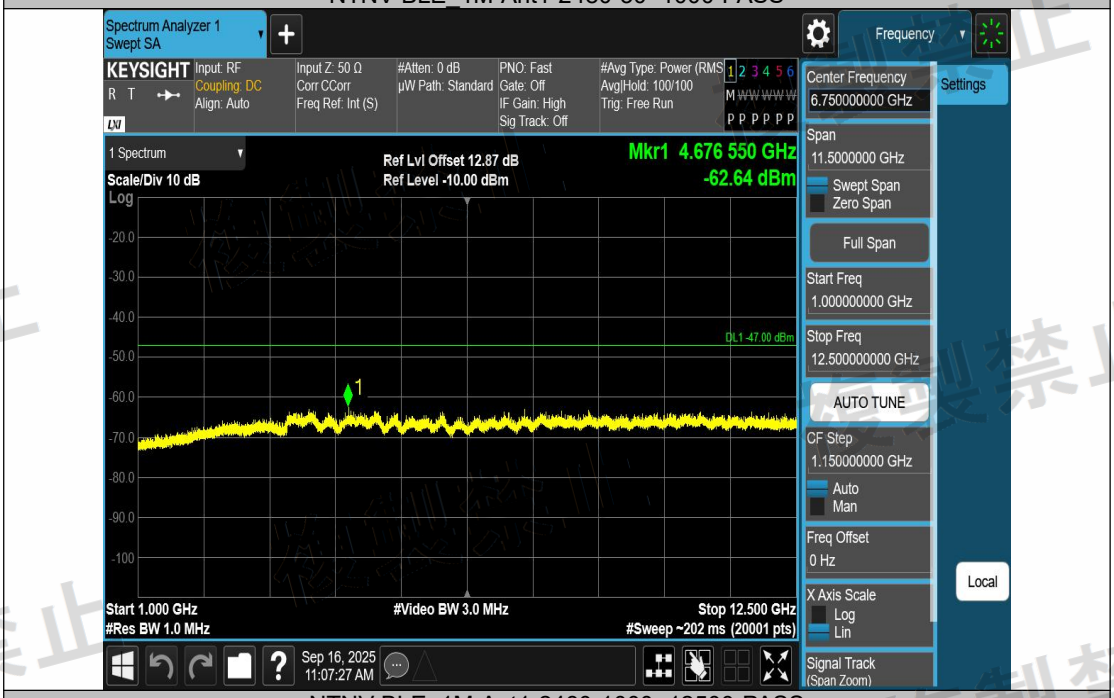

NTNV-BLE_1M-Ant1-2440-30~1000-PASS




NTNV-BLE_1M-Ant1-2440-1000~12500-PASS




NTNV-BLE_1M-Ant1-2480-30~1000-PASS



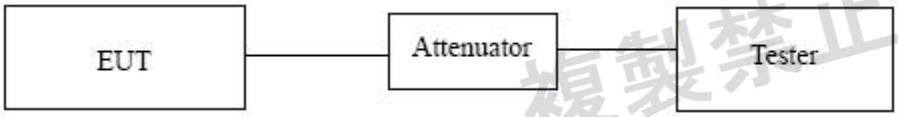

NTNV-BLE_1M-Ant1-2480-1000~12500-PASS

## 7.7 INTERFERENCE PREVENTION FUNCTION

### 7.7.1 Standard Applicable

According to Item 19 of Article 2 Paragraph 1. The device shall have the function of automatic transmission or reception of identification code.

### 7.7.2 Test Setup Block Diagram




### 7.7.3 Test Procedure

1. Set the EUT in the usual operation condition

2. The radio equipment with automatic transmitting function of identification code

A. Transmit the assigned identification code from the radio equipment.
B. Confirm the identification code received by the demodulator.

3. The radio equipment with automatic receiving function of identification code

A. Transmit the assigned identification code from the opposite equipment.
B. Confirm that the usual communication is available.
C. Transmit the identification code distinct from the assigned one from the opposite equipment.
D. Confirm that the radio equipment is stopped or an indication is displayed as the identification code is different.

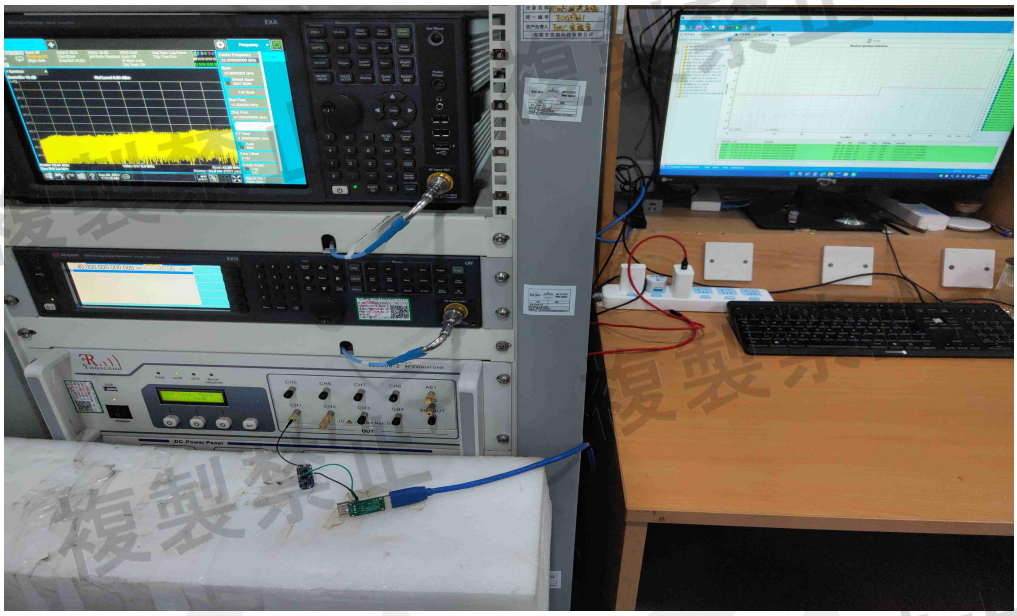
The identification function shall be recorded.

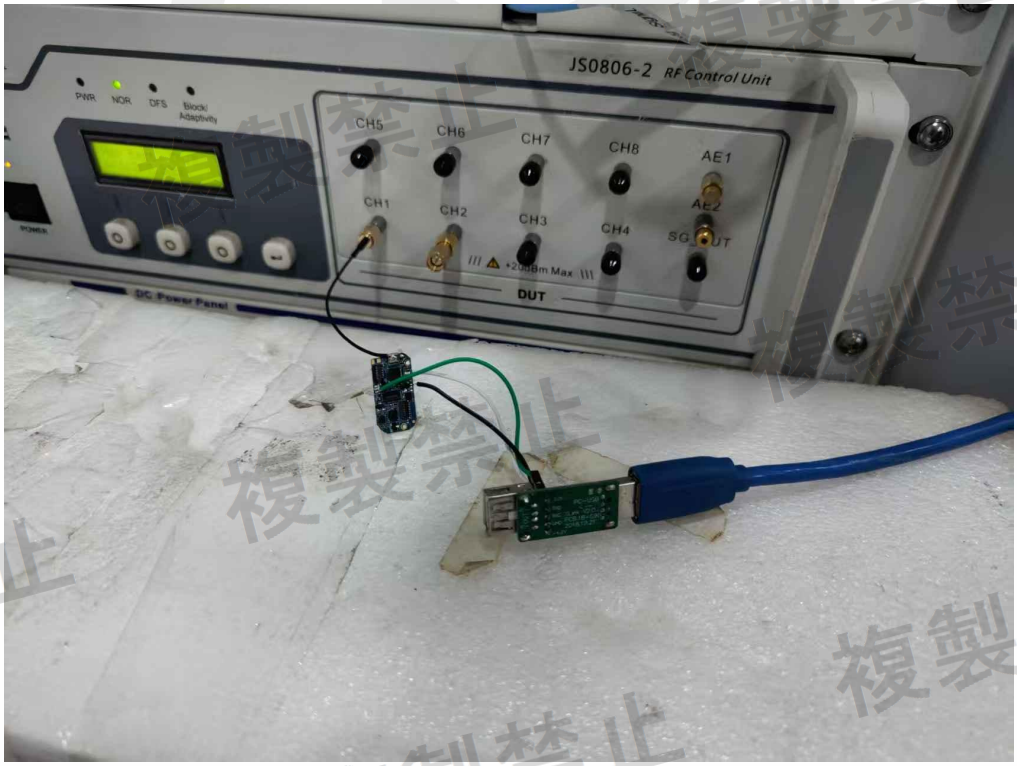
### 7.7.4 Summary of Test Results/Plots

All the modes were tested and recorded,the results of the test item are good.

| Test Item | Test Result |
|---|---|
| Transmitting Function of Identification Code | >48 bits |
| Receiving Function of Identification Code | >48 bits |
| Mark Address | 88:65:34:BB:CC:11 |
| Test Results | Pass |

# 8 APPENDIX PHOTOGRAPHS OF TEST SETUP






--- End of Report ---