



MIC TEST REPORT

Applicant	:	Shenzhen Kingree Electronic Co., Ltd.
Address of Applicant	:	3F, Bohua Tech Park, Shangwei Industrial Zone, Guanhu Street, Longhua District, Shenzhen, China
Manufacturer	:	Ninebot (Changzhou) Tech Co., Ltd.
Address of Manufacturer	:	16F-17F, Block A, Building 3, No.18, Changwu Mid Rd, Wujin Dist. Changzhou, Jiangsu, China
Equipment under Test	:	Ninebot Engine Speaker
Model No.	:	BT2928
Test Standard(s)	:	Item 19 of Article 2 Paragraph 1, MIC Notification 88, ANNEX 43.
Report No.	:	DDT-RE23101904-2E09
Issue Date	:	2023/12/18
Issue By	:	Guangdong Dongdian Testing Service Co., Ltd.
Address of Laboratory	:	Unit 2, Building 1, No. 17, Zongbu 2nd Road, Songshan Lake Park, Dongguan, Guangdong, China, 523808

REPORT

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Test Report Declare

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Equipment under Test	:	Ninebot Engine Speaker
Model No.	:	BT2928
Manufacturer	:	Ninebot (Changzhou) Tech Co., Ltd.
Address of Manufacturer	:	16F-17F, Block A, Building 3, No.18, Changwu Mid Rd, Wujin Dist. Changzhou, Jiangsu, China

Test Standard Used: Item 19 of Article 2 Paragraph 1.

Test method: MIC Notification 88, ANNEX 43.

We Declare:

The equipment described above is tested by Guangdong Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standard specified above. The test results are contained in this test report and Guangdong Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above standards.

Report No.:	DDT-RE23101904-2E09		
Date of Receipt:	2023/10/10	Date of Test:	2023/10/10-2023/12/18

Prepared By:

Approved By:

Tiger Mo

Damon Hu

Tiger Mo/Engineer

Damon Hu/EMC Manager

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Guangdong Dongdian Testing Service Co., Ltd.

Revision History

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	2023/12/18	

1. Summary of Test Results

Test Parameter	Standard	Method	Results
Antenna Power	Item 19 of Article 2 Paragraph 1	Notification 88, Appendix No. 43	Pass
Tolerances for Antenna Power	Item 19 of Article 2 Paragraph 1	Notification 88, Appendix No. 43	Pass
Frequency Tolerance	Item 19 of Article 2 Paragraph 1	Notification 88, Appendix No. 43	Pass
Transmission Rate	Item 19 of Article 2 Paragraph 1	Notification 88, Appendix No. 43	N/A
Occupied Frequency Bandwidth	Item 19 of Article 2 Paragraph 1	Notification 88, Appendix No. 43	Pass
Spread Bandwidth	Item 19 of Article 2 Paragraph 1	Notification 88, Appendix No. 43	N/A
Spreading Factor	Item 19 of Article 2 Paragraph 1	Notification 88, Appendix No. 43	N/A
Number of Carriers	Item 19 of Article 2 Paragraph 1	Notification 88, Appendix No. 43	N/A
Dwell Time	Item 19 of Article 2 Paragraph 1	Notification 88, Appendix No. 43	N/A
Spurious Emissions	Item 19 of Article 2 Paragraph 1	Notification 88, Appendix No. 43	Pass
Carrier Sense	Item 19 of Article 2 Paragraph 1	Notification 88, Appendix No. 43	N/A, Note2
Process Gain	Item 19 of Article 2 Paragraph 1	Notification 88, Appendix No. 43	N/A
Secondary Radiated Emissions	Item 19 of Article 2 Paragraph 1	Notification 88, Appendix No. 43	Pass
Note1: N/A is an abbreviation for Not Applicable.			
Note2 : Not apply to this device, since EIRP does not require compensation through Antenna Power.			

2. General Test Information

2.1. Description of EUT

EUT Name	:	Ninebot Engine Speaker
Model Number	:	BT2928
EUT Function Description	:	Please reference user manual of this device
Power Supply	:	DC 5V, 3A (supplied via type C port) DC 7.4V, 2200mAh (supplied by internal rechargeable Liion battery)
Radio Specification	:	Bluetooth V4.2 and above (BR/EDR/LE)
Operation Frequency	:	Bluetooth (BR/EDR/LE): 2402 MHz-2480 MHz
Modulation	:	Bluetooth BR/EDR: GFSK, $\pi/4$ -DQPSK, 8DPSK Bluetooth LE: GFSK

Note 1: EUT is the abbreviation of equipment under test.

Note 2: “☑” means to be chosen or applicable; “☐” means don't to be chosen or not applicable; This note applies to entire report.

Note 3: This report only for Bluetooth LE 1Mbps

Note 4: Antenna information:

Bluetooth Antenna information		
Antenna Type	:	PCB
Antenna Gain(dBi)	:	-0.58

Note 5: Bluetooth LE Channel information:

Bluetooth LE 1Mbps Channel information					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	14	2430	28	2458
1	2404	15	2432	29	2460
2	2406	16	2434	30	2462
3	2408	17	2436	31	2464
4	2410	18	2438	32	2466
5	2412	19	2440	33	2468
6	2414	20	2442	34	2470
7	2416	21	2444	35	2472
8	2418	22	2446	36	2474
9	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454		
13	2428	27	2456		

Note 6: The above EUT information is declared by manufacturer and for more detailed features description please refer to the manufacturer's specifications or User's Manual. The above Antenna information is declared by manufacturer and for more detailed features description please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number	Description	Remark
USB cable	Dongguan Zhonghao Electronics Co., Ltd.	N/A	unshielded	100cm

2.3. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	EMC Compliance	SN
NoteBook	Lenovo	I7-4810MQ	N/A	00331-1000-00001-AA816

2.4. Block diagram of EUT configuration for test



Test software: nRFgo Studio v1.17.0.3211.exe

The test software was used to control EUT work

in Continuous Tx mode and Rx mode, and select test channel, wireless mode as below table.

The pathloss of external cable: 0.5dB (According to the manufacturer's claims)

Tested mode, channel, information			
Mode	Setting Tx Power	Channel	Frequency (MHz)
Tx mode_1M	Default	CH0	2402
	Default	CH19	2440
	Default	CH39	2480
Rx mode_1M	/	CH0	2402
	/	CH19	2440
	/	CH39	2480

2.5. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

/	Normal Conditions
Temperature range	23 °C
Humidity range	46%
Pressure range	100.1 kPa
Power supply	DC 7.4V (When the input voltage to equipment fluctuated $\pm 10\%$, the RF unit circuit voltage fluctuation under 1%, therefore all test performed on the rated voltage for equipment.)

The measurement result of the voltage fluctuation at RF circuit when DC 7.4V +/- 10%.	
Input voltage	RF module voltage
DC 8.14	DC 3.3V
DC 7.4	DC 3.3V
DC 6.66	DC 3.3V

2.6. Deviations of test standard

No Deviation.

2.7. Test laboratory

Guangdong Dongdian Testing Service Co., Ltd.

Unit 2, Building 1, No.17, Zongbu 2nd Road, Songshan Lake Park, Dongguan, Guangdong, China, 523808

Tel.: +86-0769-38826678, <http://www.dgddt.com>, Email: ddt@dgddt.com.

CNAS Accreditation No. L6451; A2LA Accreditation Number: 3870.01

FCC Designation Number: CN1182, Test Firm Registration Number: 540522

Innovation, Science and Economic Development Canada Site Registration Number: 10288A

Conformity Assessment Body identifier: CN0048

VCCI facility registration number: C-20087, T-20088, R-20123, R-20155, G-20118

2.8. Measurement uncertainty

Test Item	Uncertainty
Occupied Channel Bandwidth	±1%
Uncertainty for radio frequency	1×10^{-9}
RF Output power, conducted	±0.6 dB
Power Spectral Density, Conducted	±1.2 dB
Unwanted Emissions, Conducted	±0.6 dB
Temperature	±0.2 °C
Humidity	±1%
DC and Low frequency voltage	±0.5%
Time	±1%
Duty Cycle	±1%

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3. Equipment Used During Test

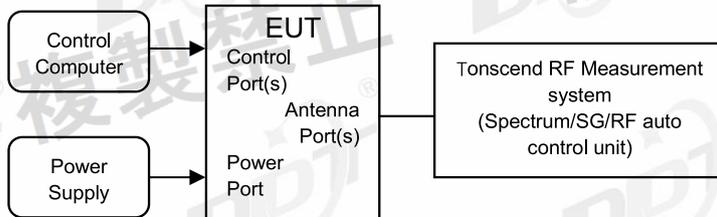
Equipment	Manufacturer	Model No.	Serial Number	Due Date
<input checked="" type="checkbox"/> RF Connected Test (RF Measurement System 2#)				
SPECTRUM ANALYZER	R&S	FSU26	201124	2024/07/11
Power Sensor	R&S	NRP-Z22	101254	2024/07/11
Digital Multimeter	FLUKE	15B PRO	55060058WS	2024/07/18
Test Software	Tonscend	JS1120-3	Ver.3.2.22	N/A

4. Frequency Tolerance

4.1. Limit

+/- 50 x 10⁻⁶ or less (50ppm)

4.2. Block diagram of test setup



4.3. Test procedure

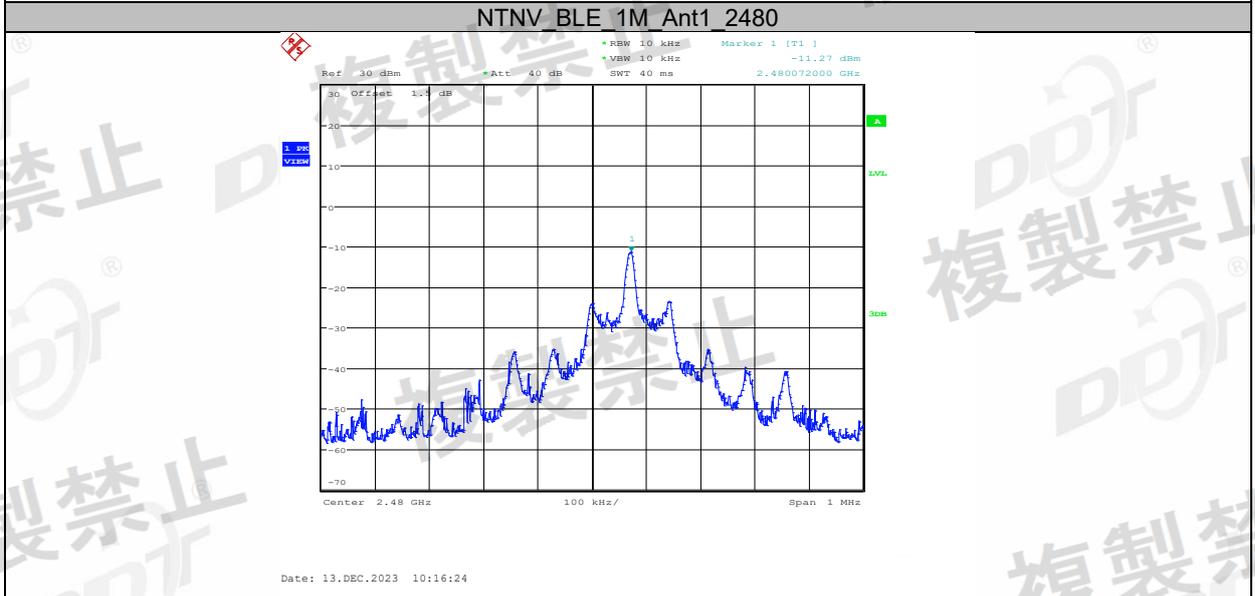
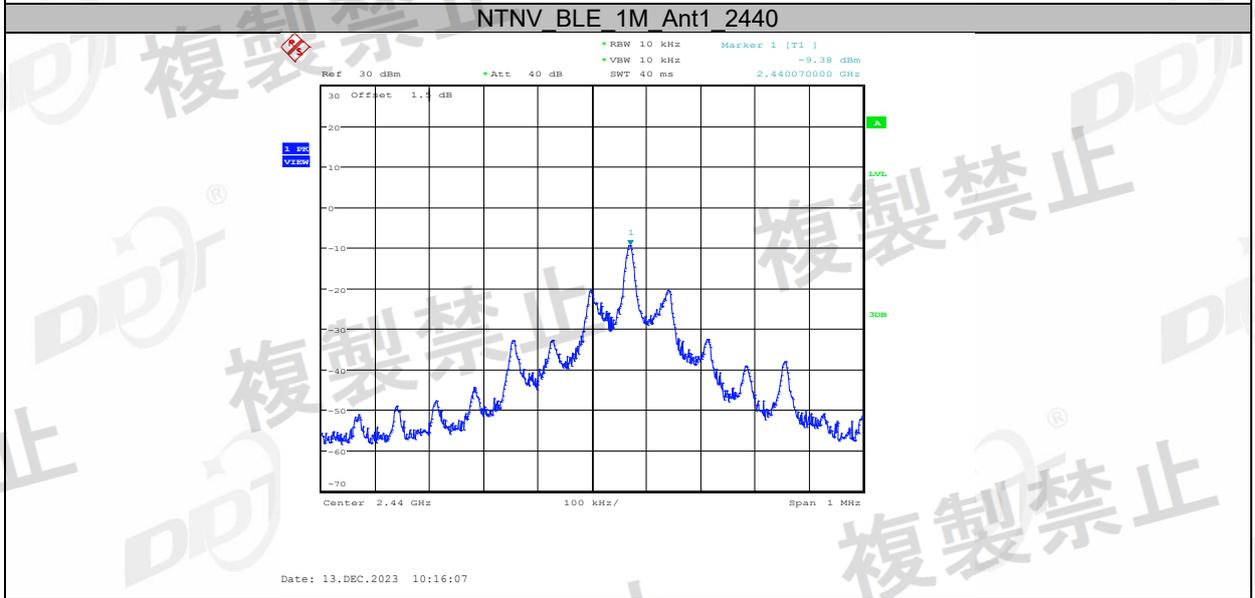
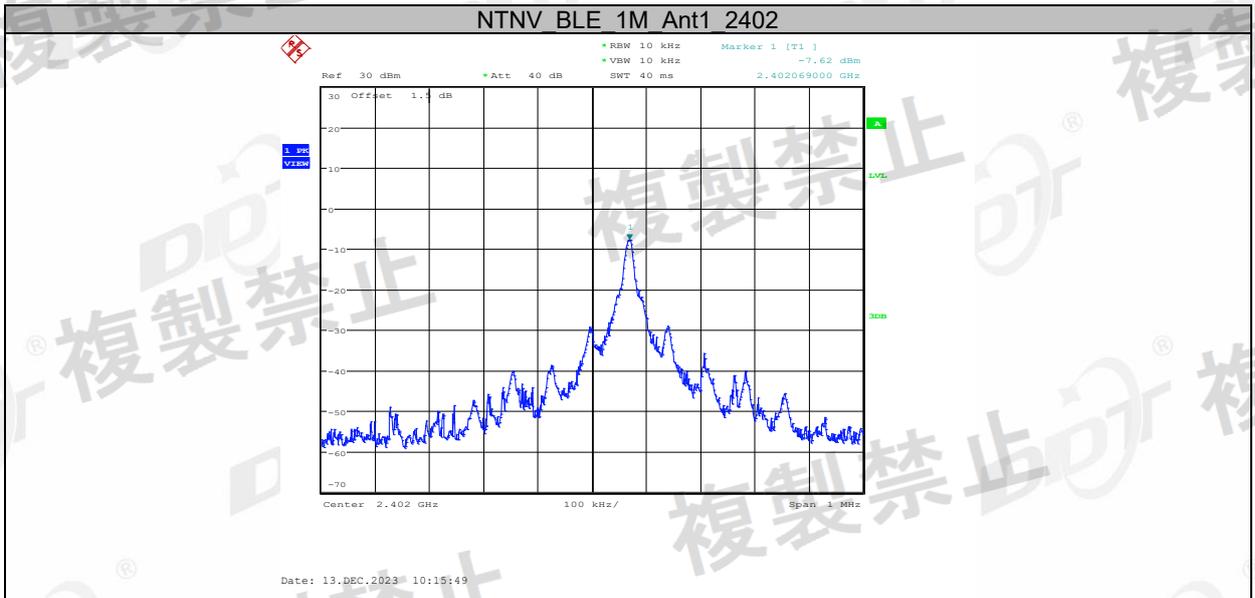
- (1) Set EUT work in carrier Tx mode.
- (2) Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:
 - Centre Frequency: The centre frequency of the channel under test.
 - Resolution BW: 10 kHz.
 - Video BW: 10 kHz.
 - Span: 1 MHz.
 - Detector: Peak.
 - Trace Mode: Max Hold.
- (3) When the trace is complete, find the peak value of the power envelope and record the frequency.

4.4. Test result

Test Engineer:	Zoe	Test Site:	RF 2#
Ambient Condition:	24.0°C, 47.5%RH	Test Date:	2023.11.28-2023.12.13
Test Power Supply:	Battery	EUT:	Ninebot Engine Speaker
Sample Number:	S23092807-06	Model No.:	BT2928

TestCondition	TestMode	Antenna	Freq(MHz)	Result[ppm]	Limit[ppm]	Verdict
NTNV	CW	Ant1	2402	28.72606	±50	PASS
			2440	28.68853	±50	PASS
			2480	29.03226	±50	PASS

4.5. Test graphs

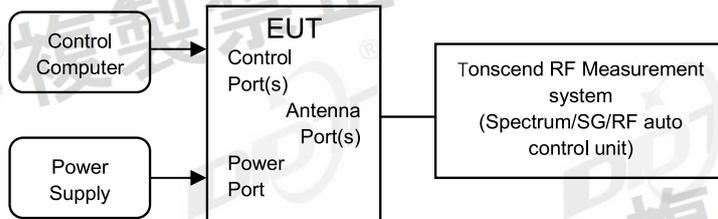


5. Antenna Power and Tolerances for Antenna Power

5.1. Limit

Limit	10mW (10dBm)
Tolerance	+20%

5.2. Block diagram of test setup



5.3. Test procedure

- (1) Connect each EUT's antenna output to power sensor by RF cable and attenuator and measure the total power.
 - (2) Antenna power is as follows:
 - a) Continuous wave: Value of step (1).
 - b) Burst wave: Calculate the average power Value from the value of step (1) and Burst Ratio.
- Note: The cable loss and attenuator loss have been taken into account.

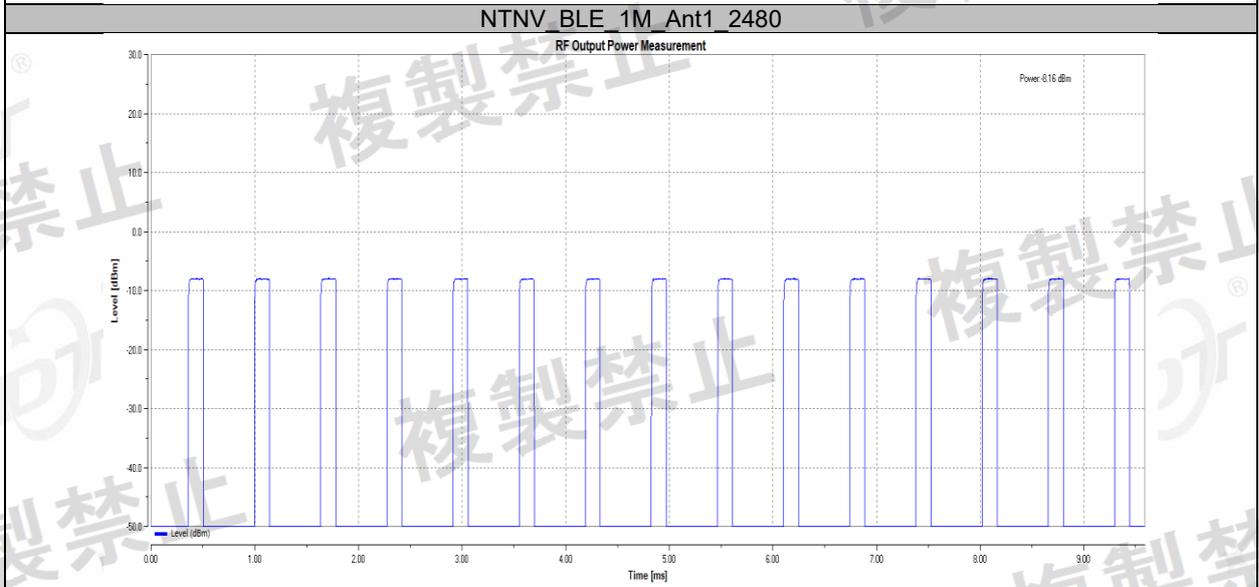
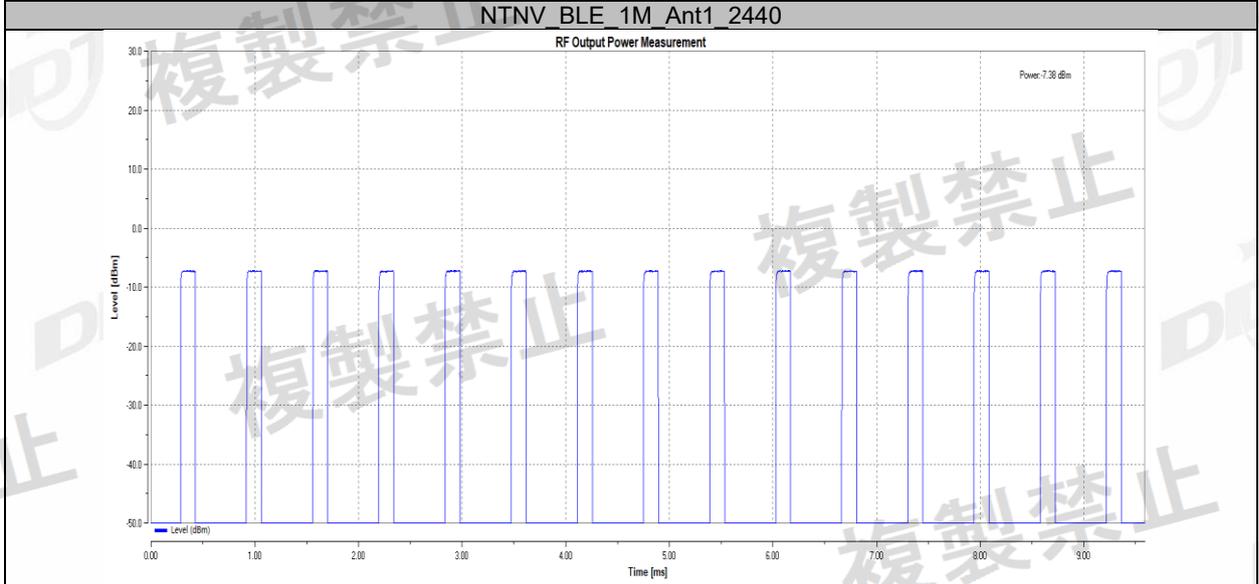
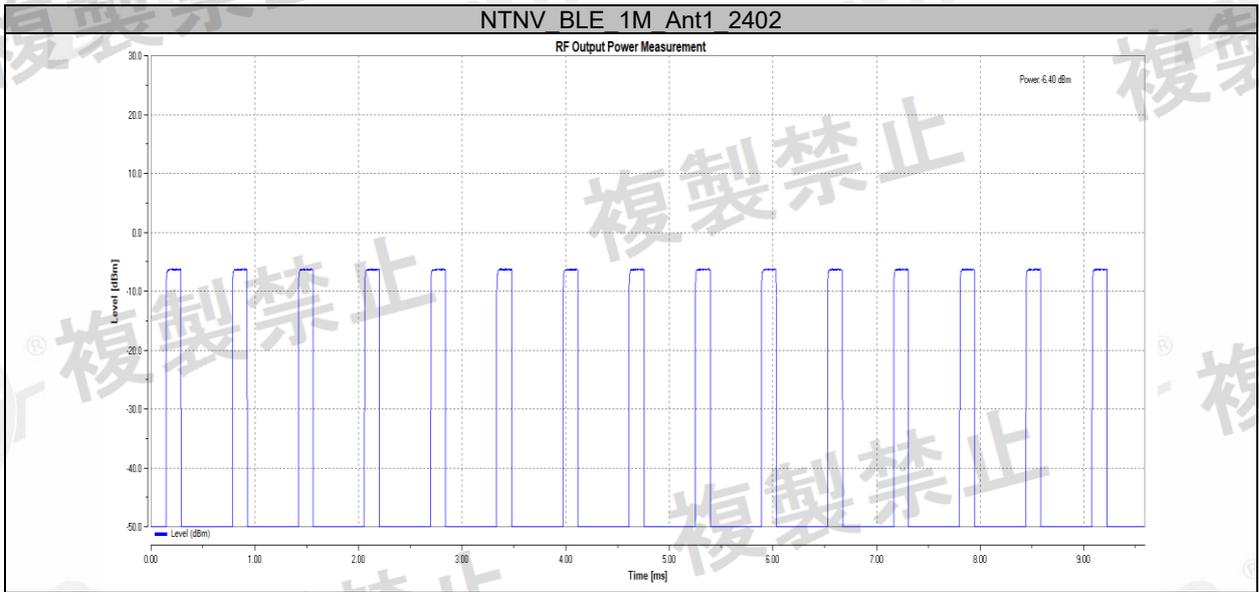
5.4. Test result

Test Engineer:	Zoe	Test Site:	RF 2#
Ambient Condition:	24.0°C,47.5%RH	Test Date:	2023.11.28-2023.12.13
Test Power Supply:	Battery	EUT:	Ninebot Engine Speaker
Sample Number:	S23092807-06	Model No.:	BT2928

Antenna Power							
Test Condition	Test Mode	Antenna	Frequency[MHz]	Result(dBm)	Result(mW)	Limit(mW)	Verdict
NTNV	BLE_1M	Ant1	2402	-6.40	0.23	≤10	PASS
			2440	-7.38	0.18	≤10	PASS
			2480	-8.16	0.15	≤10	PASS

Tolerance								
Test Condition	Test Mode	Antenna	Frequency[MHz]	Power (mW)	Rated Power (mW)	Result (%)	Limit (%)	Verdict
NTNV	BLE_1M	Ant1	2402	0.23	0.2	15.0	+20	PASS
			2440	0.18	0.2	-10.0	+20	PASS
			2480	0.15	0.2	-25.0	+20	PASS

5.5. Test graphs

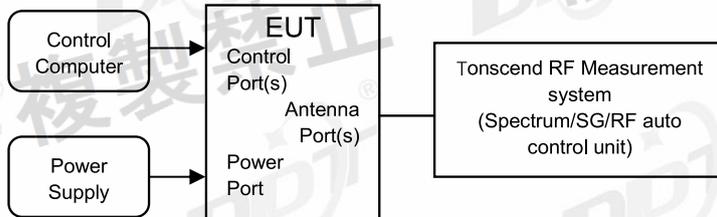


6. Occupied Frequency Bandwidth

6.1. Limit

26 MHz or less

6.2. Block diagram of test setup



6.3. Test procedure

(1) Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:

Centre Frequency: The centre frequency of the channel under test.

Resolution BW: 300 kHz

Video BW: 300 kHz

Span: 5 MHz

Detector: Peak.

Trace Mode: Max Hold.

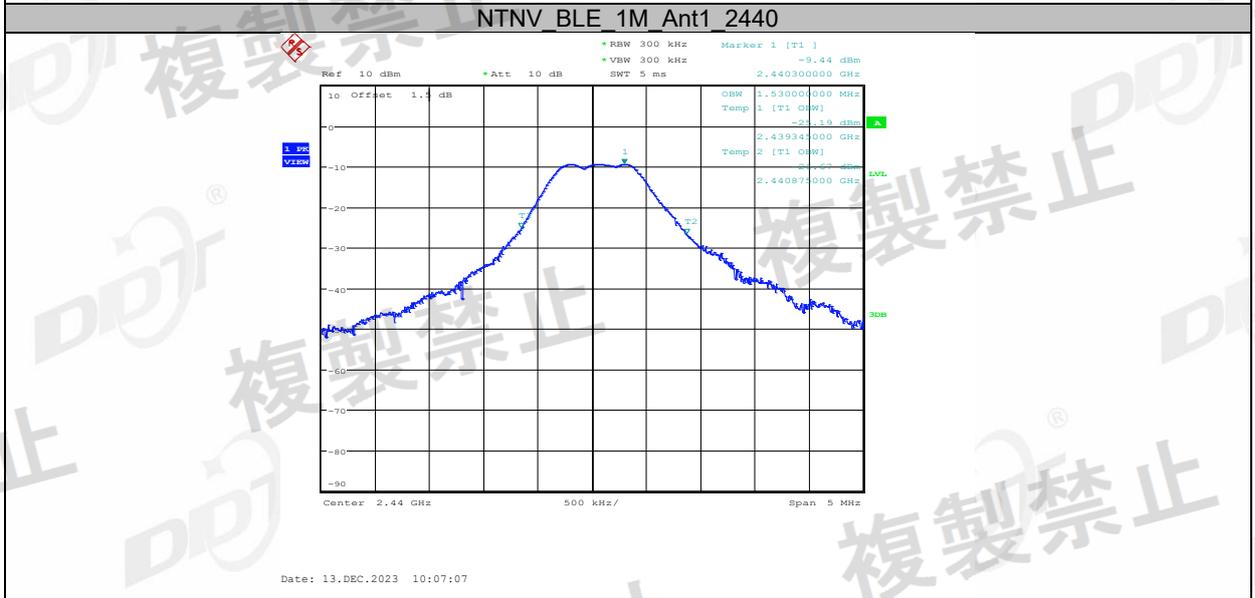
(2) When the trace is complete, measure the Occupied bandwidth (99% bandwidth) with spectrum analyzer's bandwidth measure function.

6.4. Test result

Test Engineer:	Zoe	Test Site:	RF 2#
Ambient Condition:	24.0°C,47.5%RH	Test Date:	2023.11.28-2023.12.13
Test Power Supply:	Battery	EUT:	Ninebot Engine Speaker
Sample Number:	S23092807-06	Model No.:	BT2928

TestCondition	TestMode	Antenna	Freq(MHz)	Result [MHz]	Limit [MHz]	Verdict
NTNV	BLE_1M	Ant1	2402	1.750	≤26	PASS
			2440	1.530	≤26	PASS
			2480	1.495	≤26	PASS

6.5. Test graphs



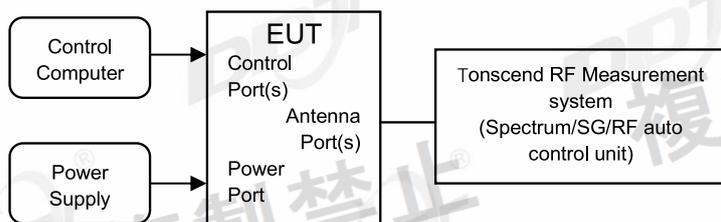
7. Transmitter Spurious Emissions (Conducted)

7.1. 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. $2,387 \text{ MHz} \leq f \leq 2,400 \text{ MHz}$ and $2,483.5 \text{ MHz} < f \leq 2,496.5 \text{ MHz}$ 25 μW or less
- b. $2,387 \text{ MHz} > f$ and $2,496.5 \text{ MHz} < f$ 2.5 μW or less

7.2. Block diagram of test setup



7.3. Test procedure

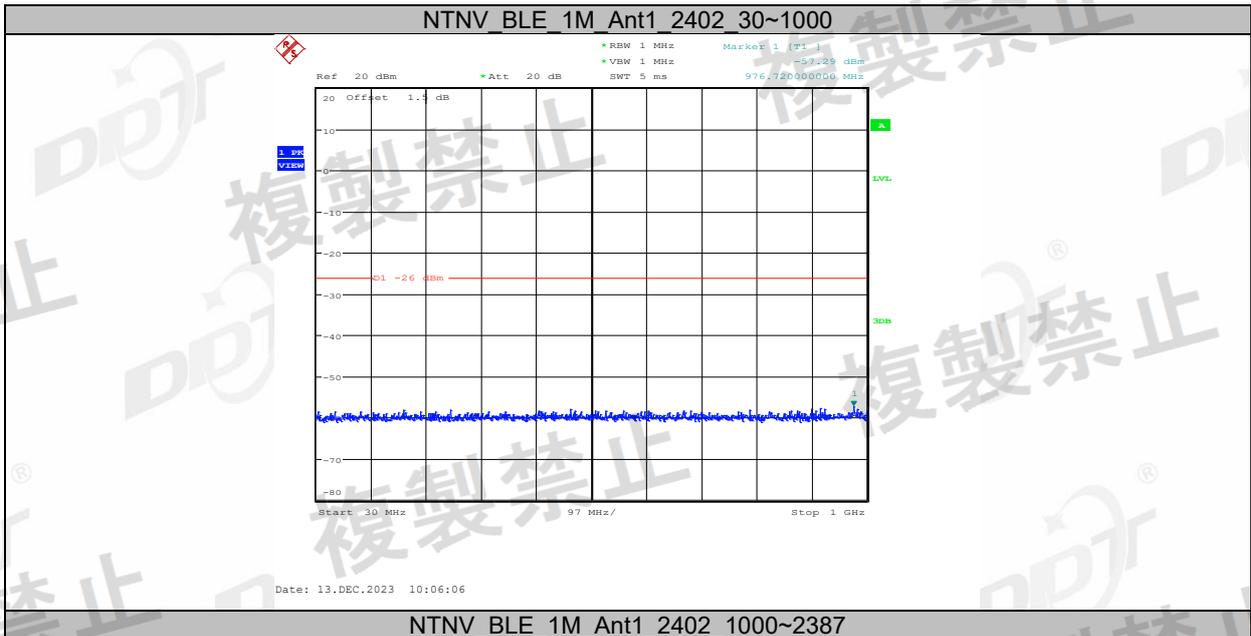
- (1) Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator.
- (2) Set the Spectrum Analyzer as below, sweep the frequency, and search for unwanted emission.
 - Resolution BW: 1 MHz,
 - Video BW: Same with Resolution BW,
 - Detector: Peak,
 - Trace Mode: Max Hold,
- (3) All the emissions from 30 MHz to 13 GHz were measured and record.
- (4) In the vicinity of the carrier wave, etc., it is possible to set a narrower resolution bandwidth for measurement as necessary. In that case, convert the intensity of the unwanted emission to the value in the reference bandwidth. For this report if spurious emissions are greater than [limit -3dB] in 1MHz RBW, then more detailed measurements are required. Repeat the test in 30kHz RBW, the spurious emission value using following the formula below:
 - Calculated Value = (Measured Value + 15.2 dB)
 - 15.2 dB adjustment is derived from the Conversion Factor of RBW
 - Conversion Factor of RBW = $10 \times \text{Log} (\text{Reference Bandwidth} / \text{RBW of measurement}) = 15.2[\text{dB}]$
 - Where: Reference Bandwidth = 1 MHz
 - RBW of measurement = 30 kHz

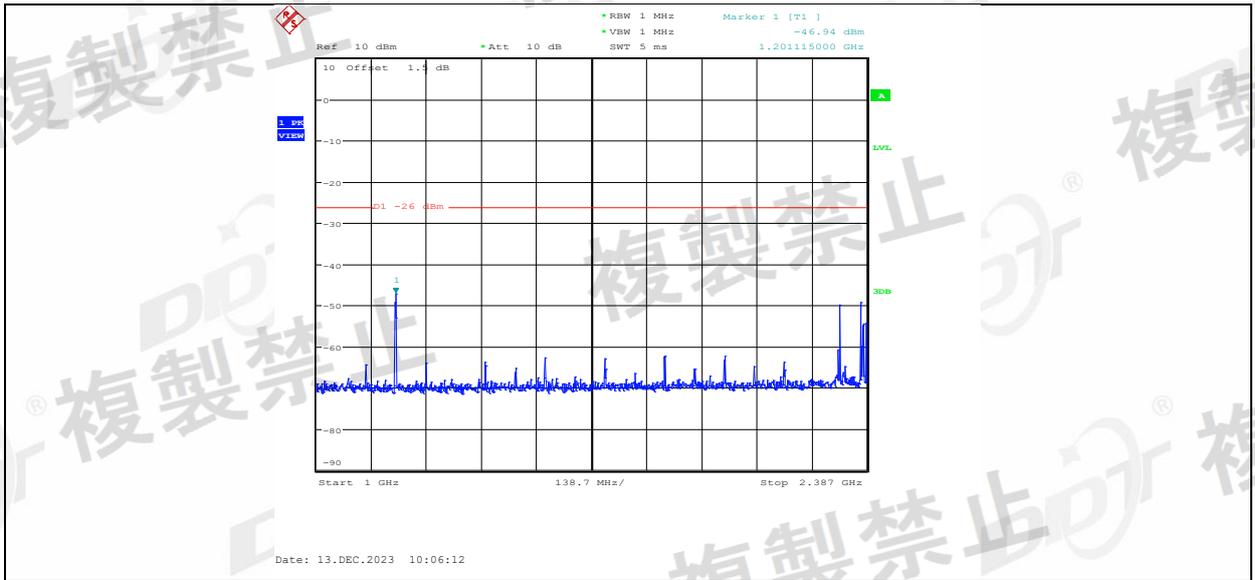
7.4. Test result

Test Engineer:	Zoe	Test Site:	RF 2#
Ambient Condition:	24.0°C,47.5%RH	Test Date:	2023.11.28-2023.12.13
Test Power Supply:	Battery	EUT:	Ninebot Engine Speaker
Sample Number:	S23092807-06	Model No.:	BT2928

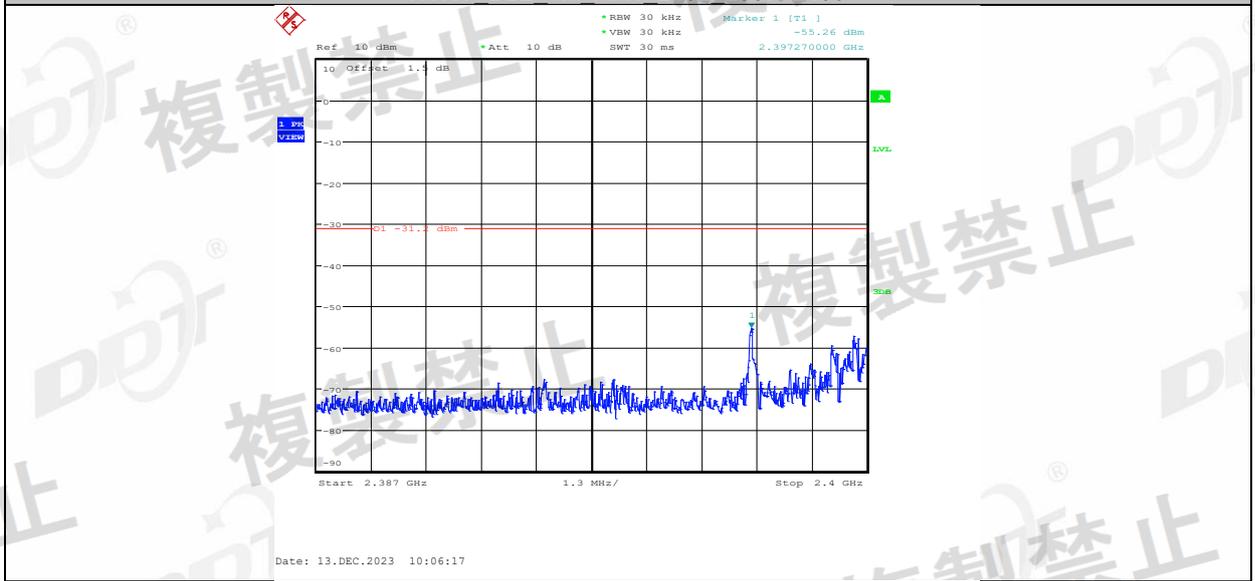
TestCondition	TestMode	Antenna	Freq(MHz)	Freq.Range [MHz]	Result [dBm]	Limit [dBm]	Verdict
NTNV	BLE_1M	Ant1	2402	30~1000	-57.29	≤-26	PASS
				1000~2387	-46.94	≤-26	PASS
				2387~2400	-40.06	≤-16	PASS
				2483.5~2496.5	-54.82	≤-16	PASS
				2496.5~13000	-53.83	≤-26	PASS
			2440	30~1000	-57.29	≤-26	PASS
				1000~2387	-46.94	≤-26	PASS
				2387~2400	-40.06	≤-16	PASS
				2483.5~2496.5	-54.82	≤-16	PASS
				2496.5~13000	-53.83	≤-26	PASS
			2480	30~1000	-57.29	≤-26	PASS
				1000~2387	-46.94	≤-26	PASS
				2387~2400	-40.06	≤-16	PASS
				2483.5~2496.5	-54.82	≤-16	PASS
				2496.5~13000	-53.83	≤-26	PASS

7.5. Test graphs

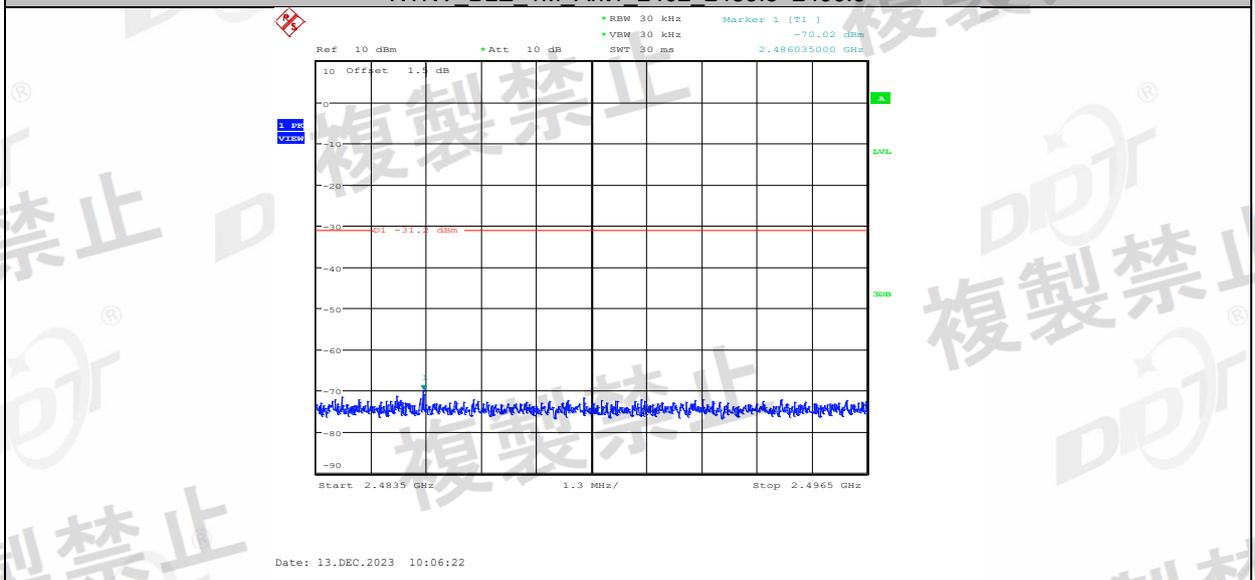




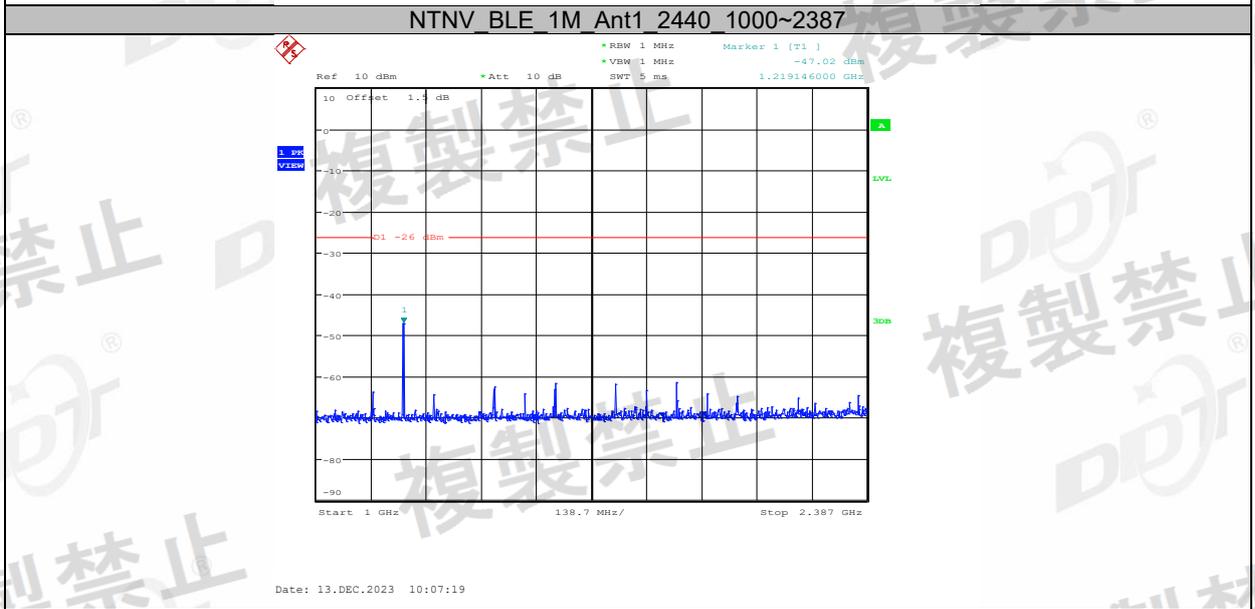
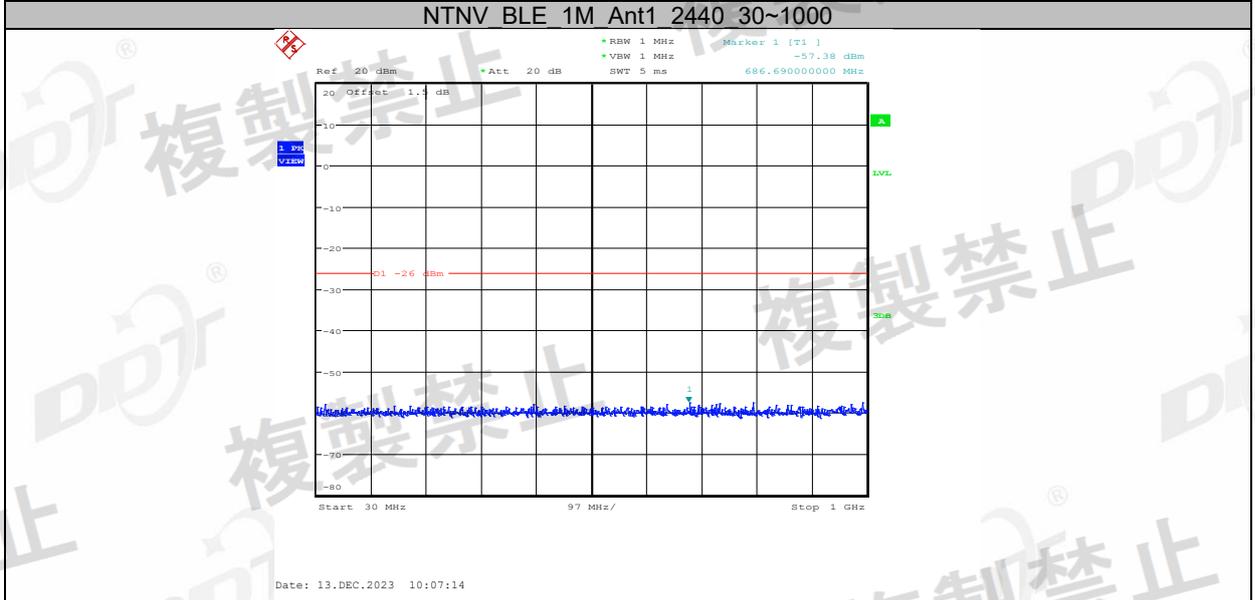
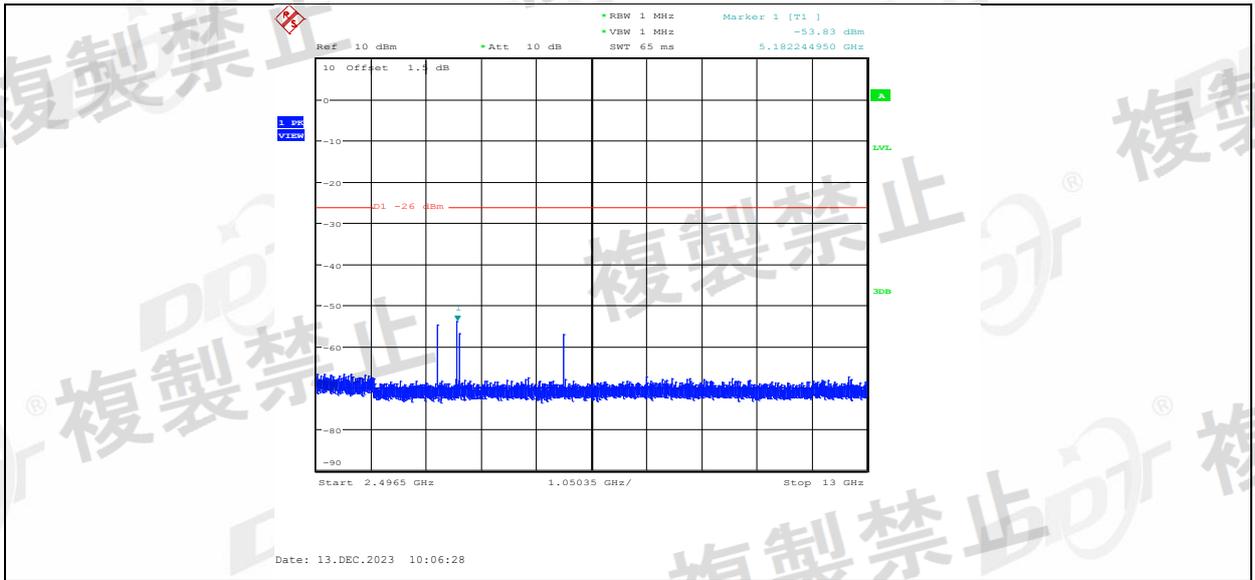
NTNV BLE 1M Ant1 2402 2387~2400

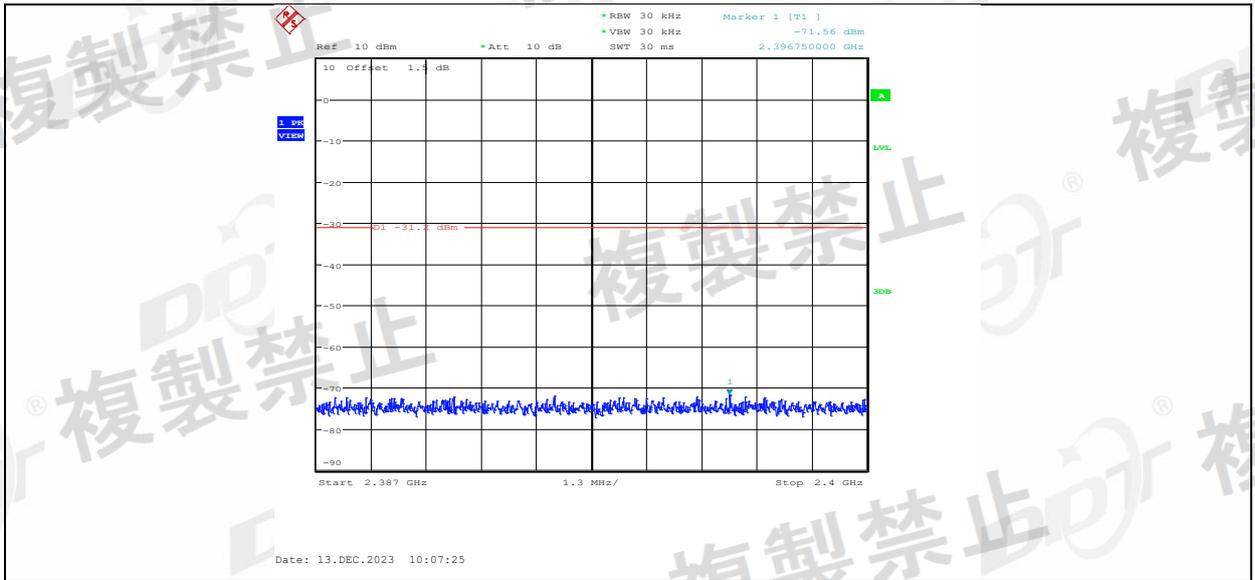


NTNV BLE 1M Ant1 2402 2483.5~2496.5

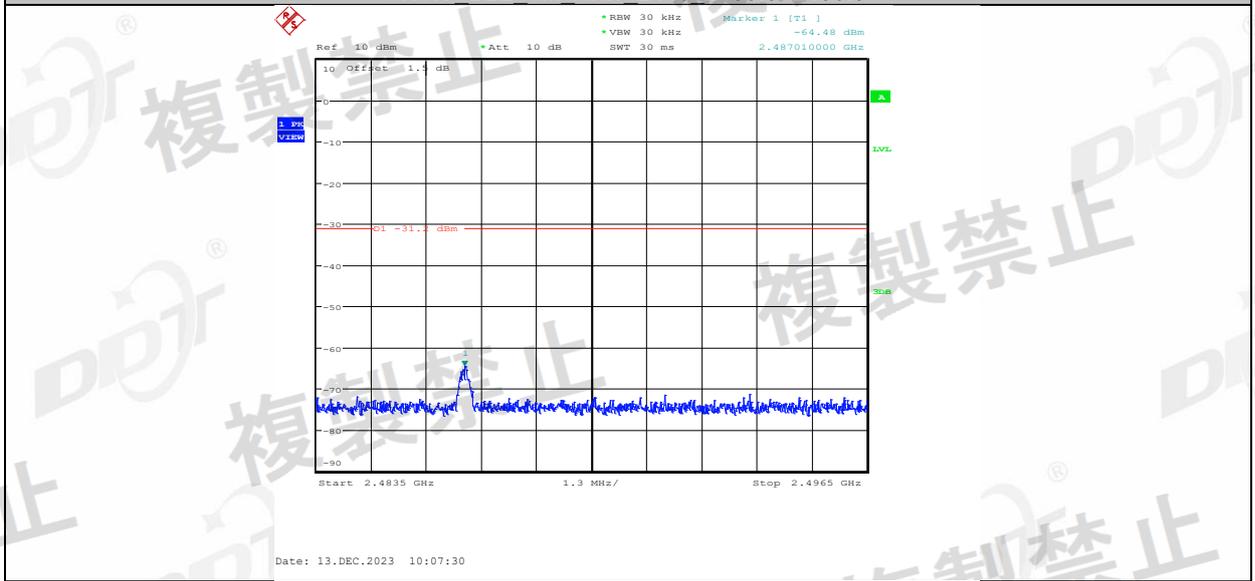


NTNV BLE 1M Ant1 2402 2496.5~13000

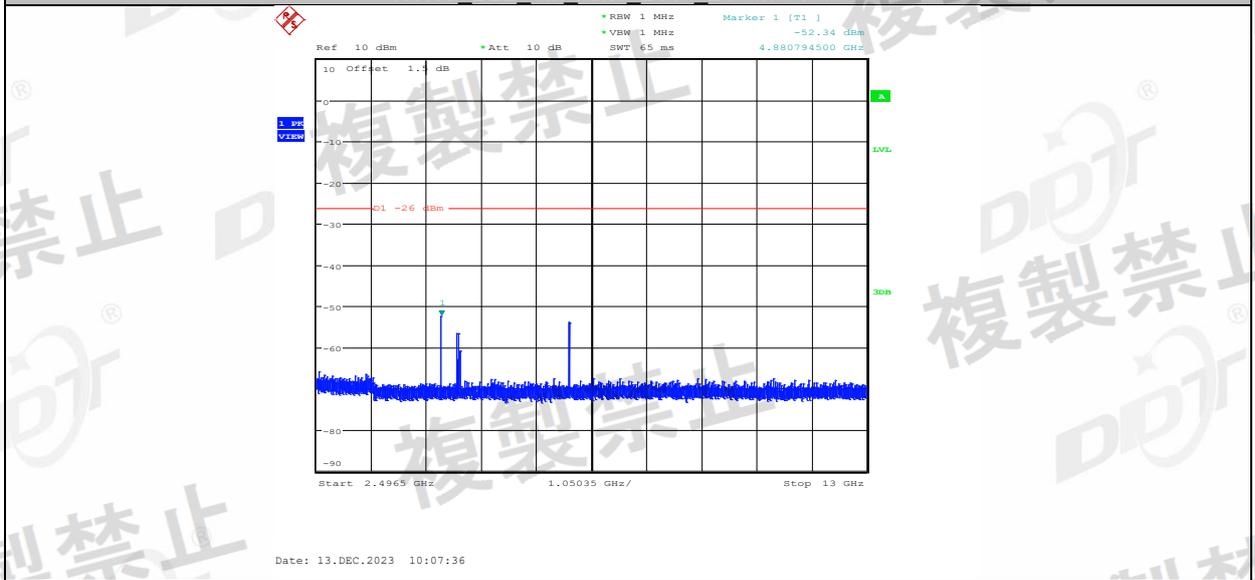




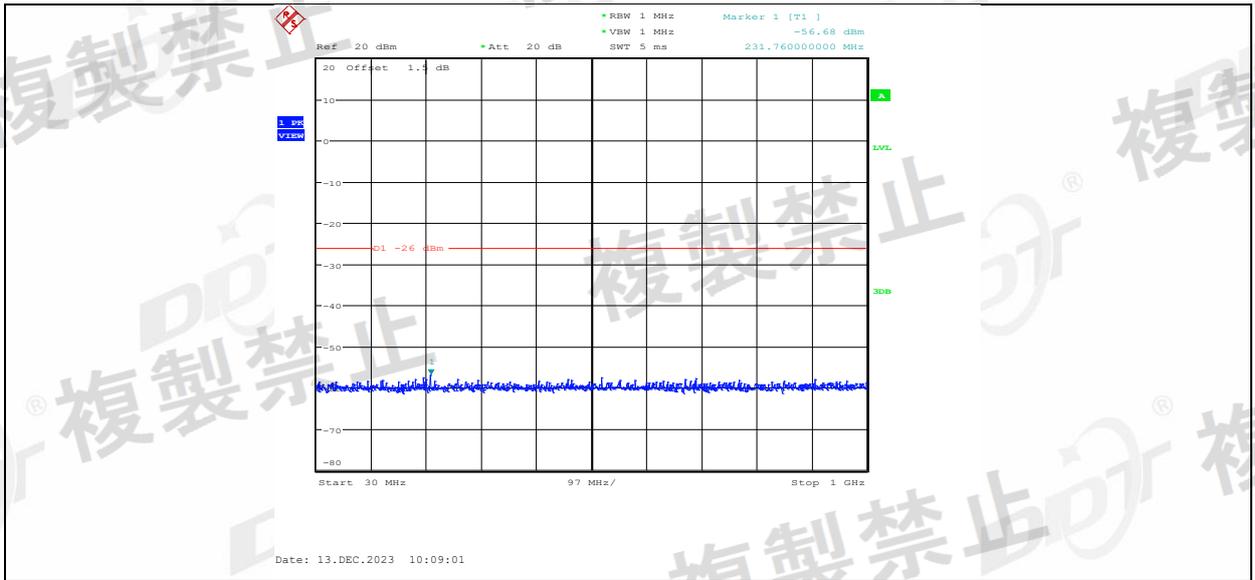
NTNV BLE 1M Ant1 2440 2483.5~2496.5



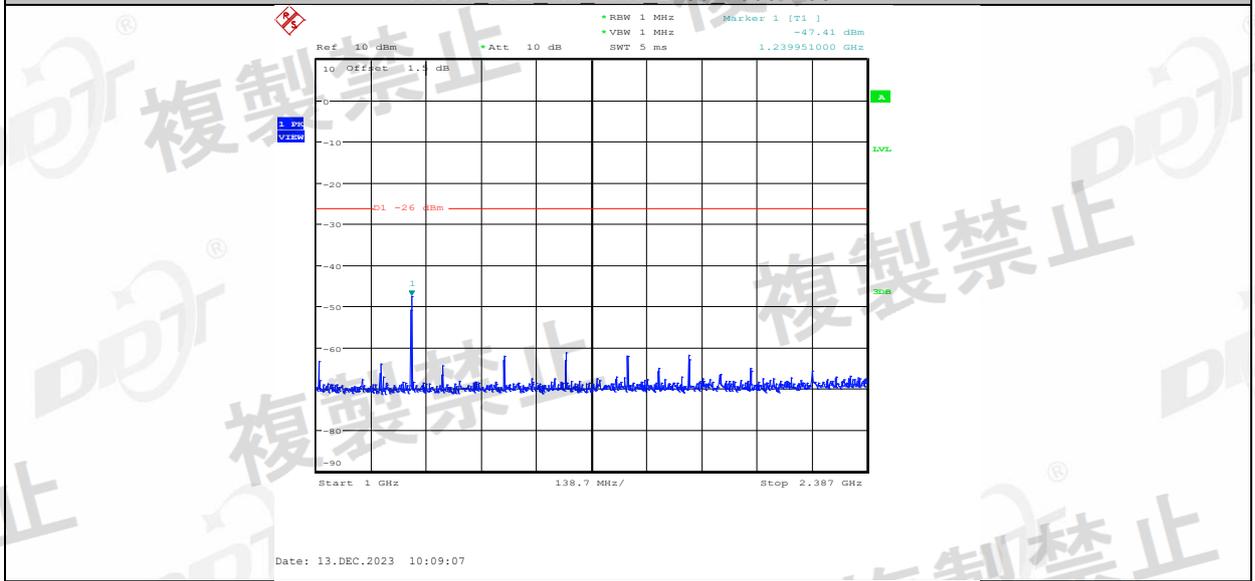
NTNV BLE 1M Ant1 2440 2496.5~13000



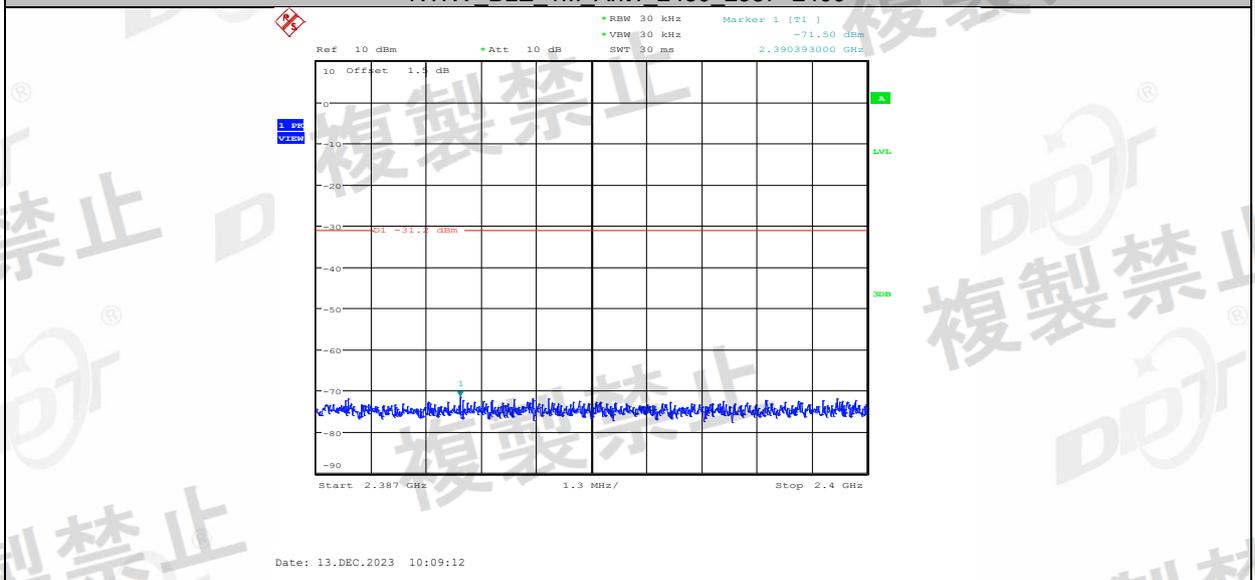
NTNV BLE 1M Ant1 2480 30~1000



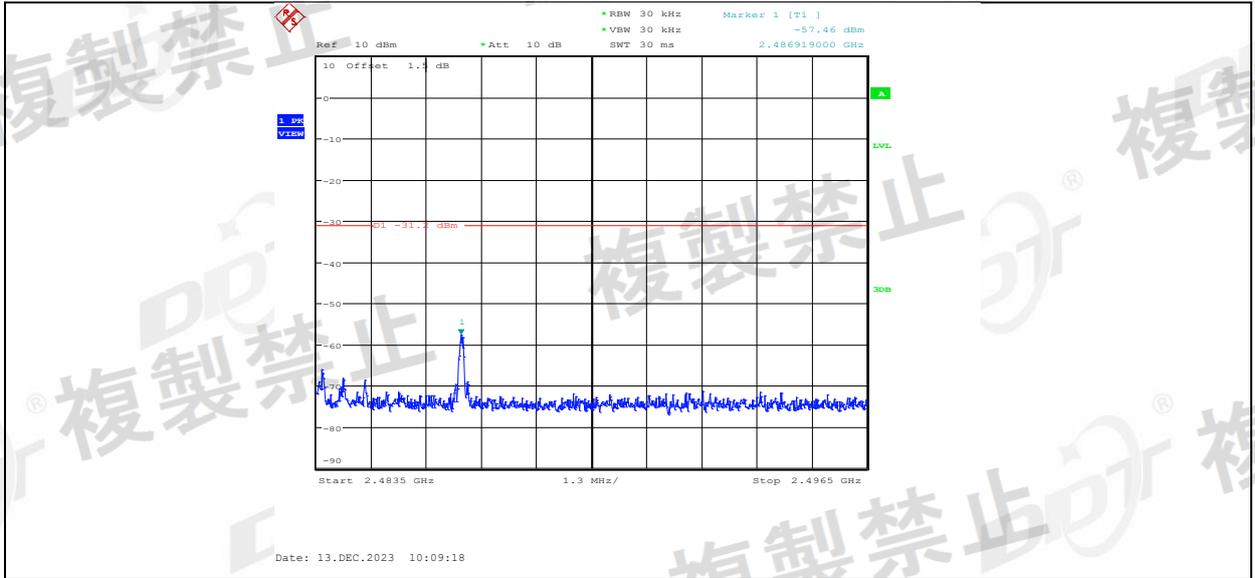
NTNV BLE 1M Ant1 2480 1000~2387



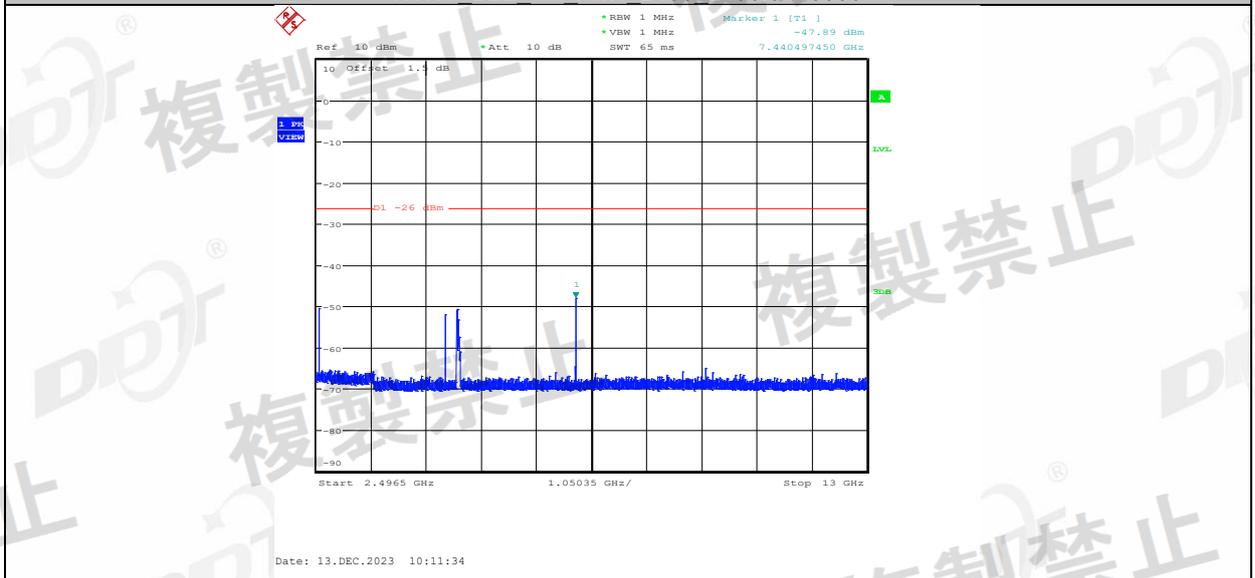
NTNV BLE 1M Ant1 2480 2387~2400



NTNV BLE 1M Ant1 2480 2483.5~2496.5



NTNV BLE 1M Ant1 2480 2496.5~13000

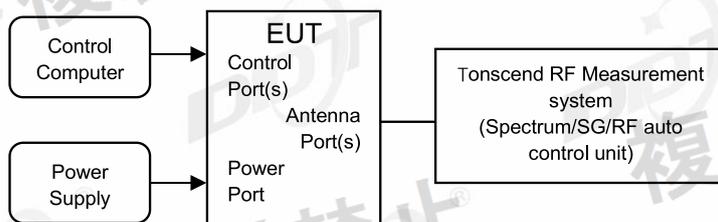


8. Secondary Radiated Emissions

8.1. 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 or less at a frequency below 1 GHz and 20 nW or less at a frequency of 1 GHz or higher as measured using the circuit.

8.2. Block diagram of test setup



8.3. Test procedure

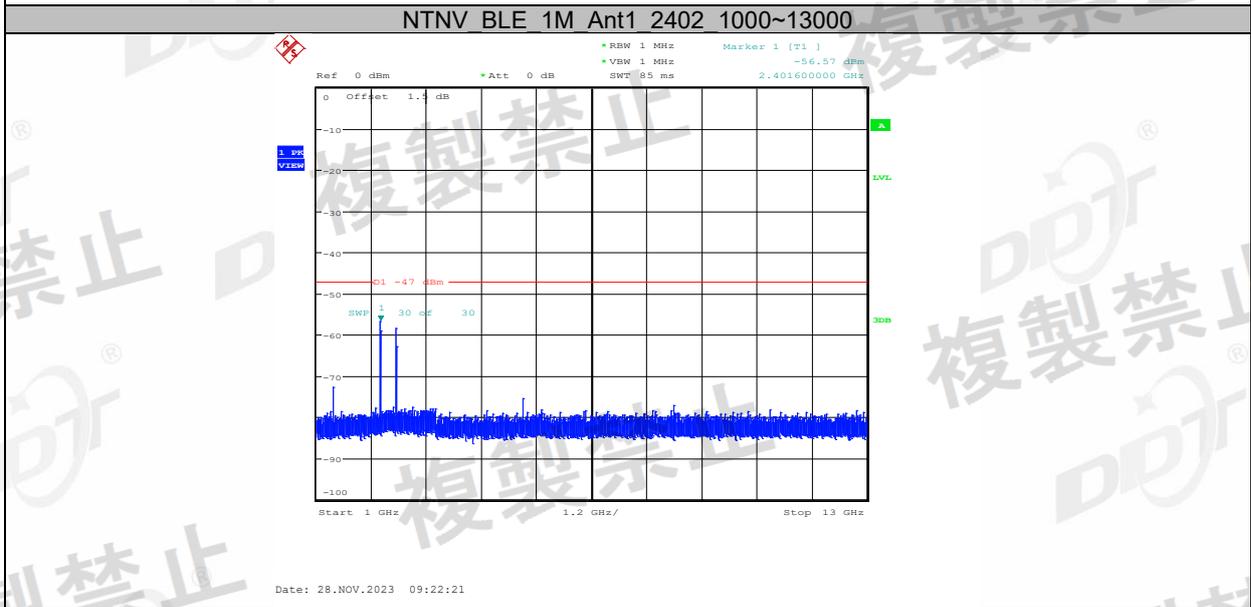
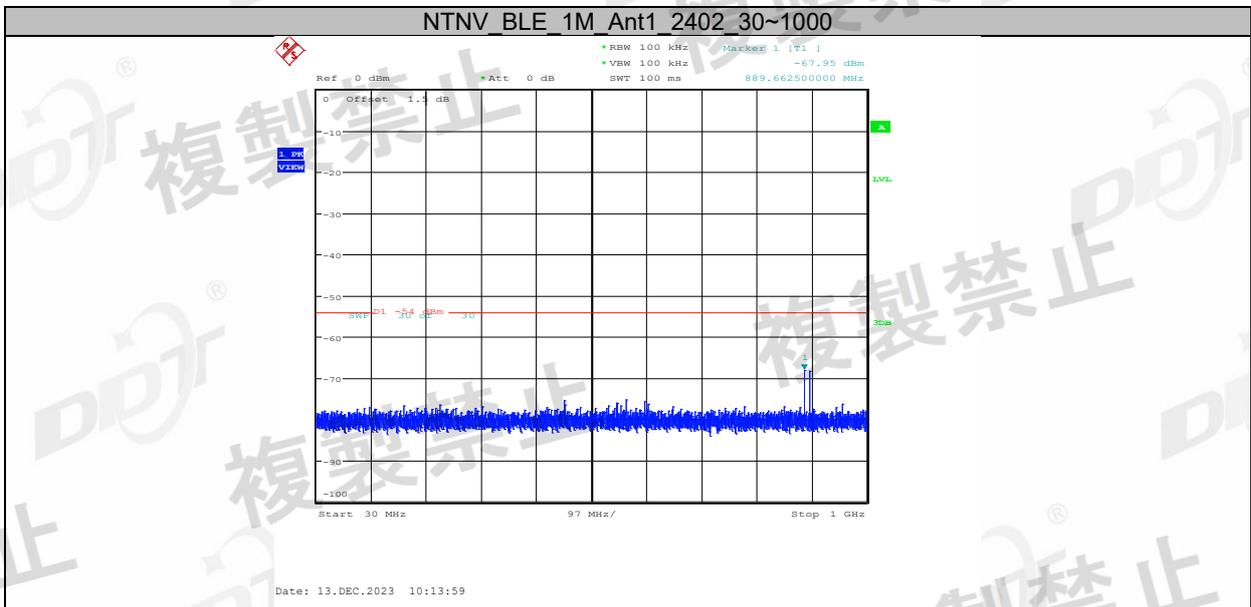
- (1) Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, set the Spectrum Analyzer as below:
 Resolution BW: 100 kHz for frequency below 1 GHz and 1 MHz for frequency above 1 GHz
 Video BW: 100 kHz for frequency below 1 GHz and 1 MHz for frequency above 1 GHz
 Detector: Peak.
 Trace Mode: Max Hold.
- (2) All the emissions from 30 MHz to 13 GHz were measured and record.
- (3) If the searched value is 1/10 or less of the allowable value specified in the Equipment Regulations, the searched value shall be the measured value.
- (4) If the searched value exceeds 1/10 of the allowable value specified in the equipment Regulations, the frequency sweep width is gradually narrowed to about 10 times the resolution bandwidth in order to improve the setting accuracy of the center frequency of the spectrum analyzer. Then, measure the secondary emission frequency, set the spectrum analyzer as below, perform averaging, and measure the secondary emission power.
 Span: 0Hz
 Resolution BW: 100kHz for frequency below 1GHz and 1MHz for frequency above 1GHz.
 Video BW: Same with Resolution BW
 Detector: Sample
 Trace Mode: Max. Hold

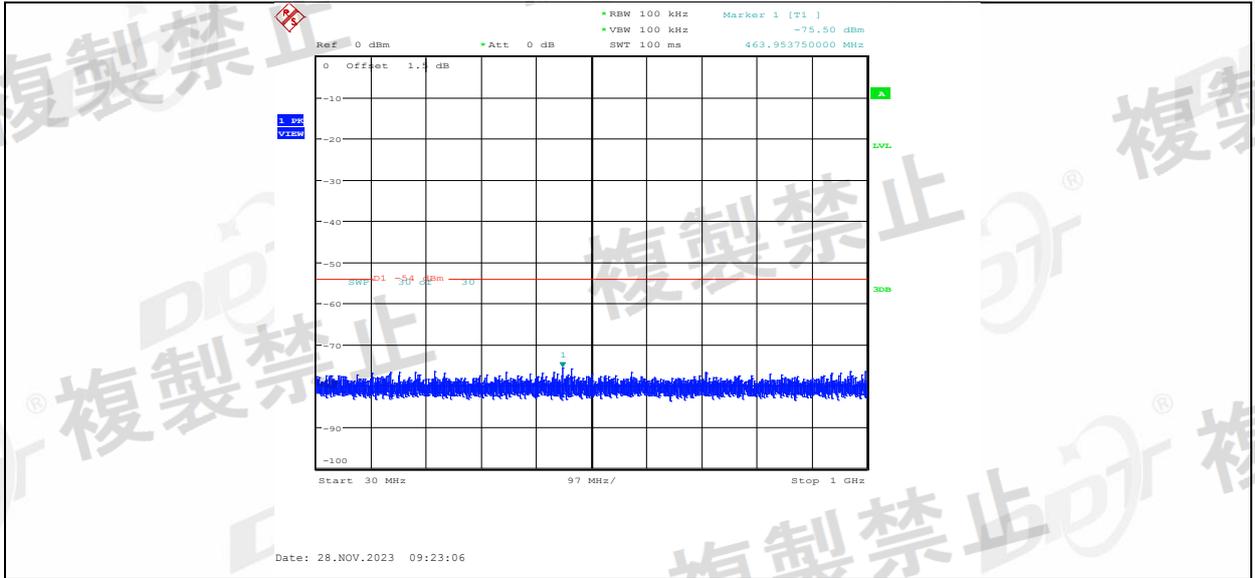
8.4. Test result

Test Engineer:	Zoe	Test Site:	RF 2#
Ambient Condition:	24.0°C,47.5%RH	Test Date:	2023.11.28-2023.12.13
Test Power Supply:	Battery	EUT:	Ninebot Engine Speaker
Sample Number:	S23092807-06	Model No.:	BT2928

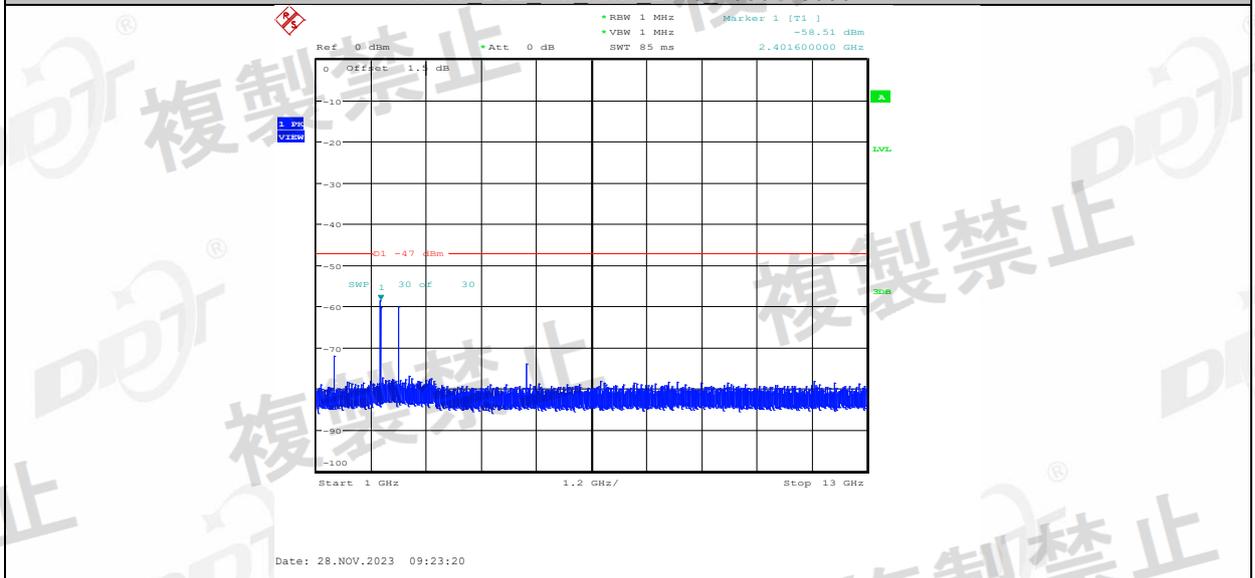
TestCondition	TestMode	Antenna	Freq(MHz)	Freq.Range [MHz]	Result [dBm]	Limit [dBm]	Verdict
NTNV	BLE_1M	Ant1	2402	30~1000	-67.95	≤-54	PASS
				1000~13000	-56.57	≤-47	PASS
			2440	30~1000	-75.5	≤-54	PASS
				1000~13000	-58.51	≤-47	PASS
			2480	30~1000	-74.64	≤-54	PASS
				1000~13000	-58.97	≤-47	PASS

8.5. Test graphs

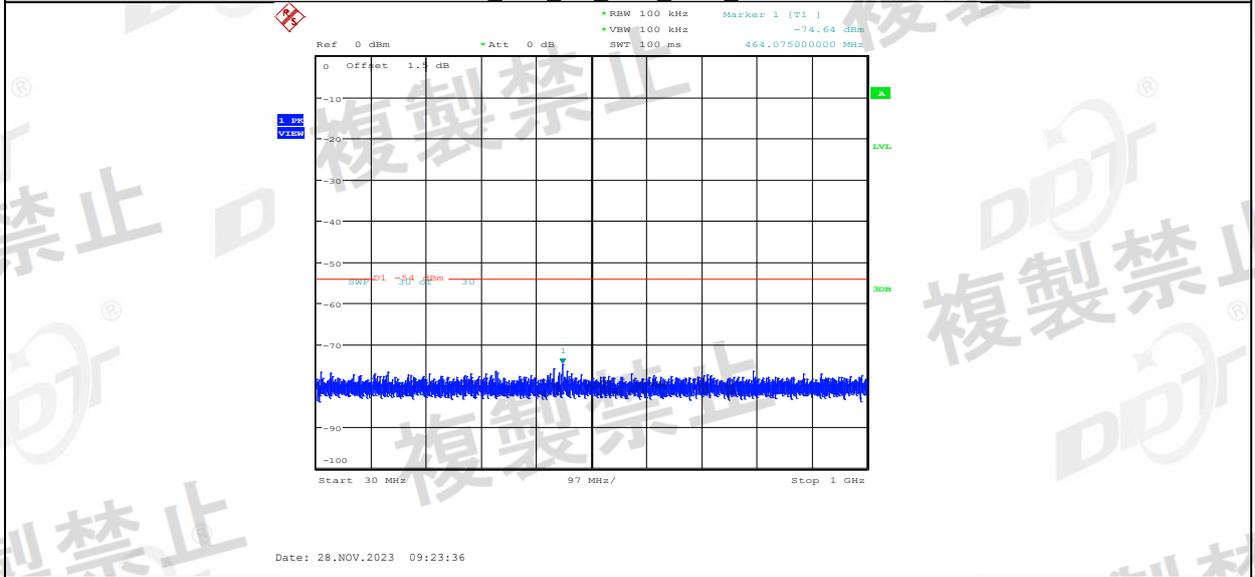




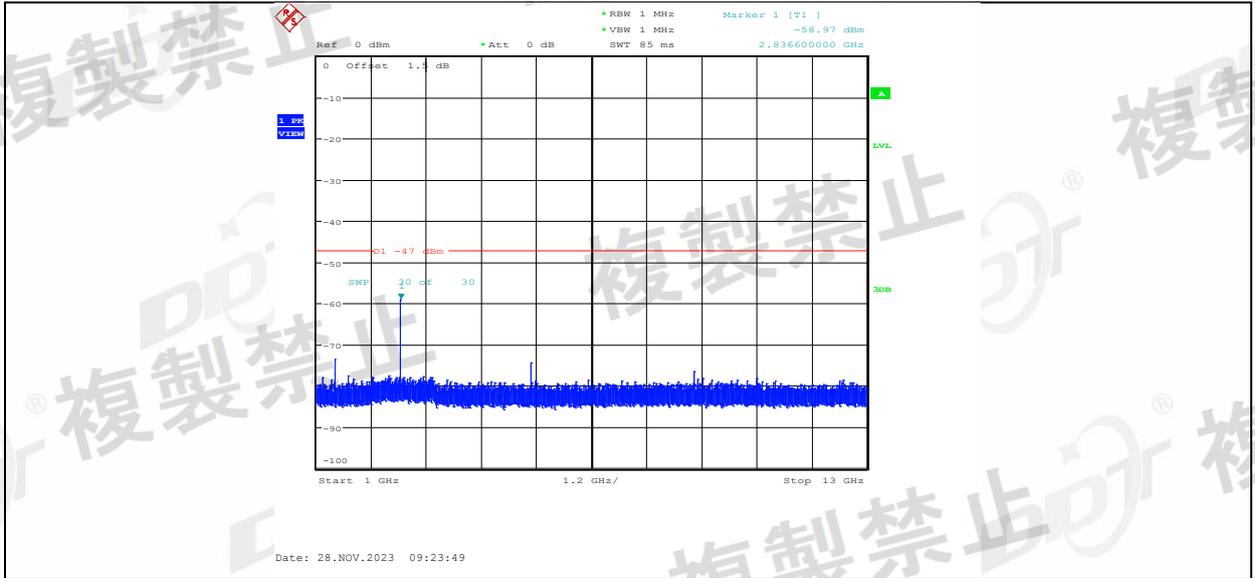
NTNV BLE 1M Ant1 2440 1000~13000



NTNV BLE 1M Ant1 2480 30~1000



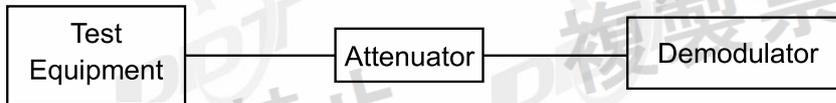
NTNV BLE 1M Ant1 2480 1000~13000



9. Interference Prevention Function

9.1. Measurement system diagram

- 1) When transmitting identification code



- 2) Condition of measuring instrument

Demodulator must be able to demodulate the transmitting signal emitted by test equipment and to indicate the identification code.

- 3) Condition of test equipment the mode of normal use.

9.2. Measuring operation procedure

- 1) When test equipment has the function to transmit identification code automatically:

- A) Transmit the predetermined identification code from test equipment.
- B) Confirm the transmitted identification code by demodulator.

9.3. Test result: The unit does meet the requirements.

MAC address:

C6:59:B7:35:4B:15

10. Test Setup Photograph



11. Photos of The EUT

Please refer to appendix I.

END OF REPORT