TEST REPORT

Report Number	:	4840125246300	Date of Issue:	2025.05.15
Product Name	:	Remote controller		
Model	:	MD-RC1-A		
Applicant	:	Ningbo Sunfree Motor Technology Company Limited		
Address	:	202, No. 418, Qihang North Road, Yinzhou Economic Development Zone, 315415 Ningbo, Zhejiang, PEOPLE'S REPUBLIC OF CHINA		
Factory	:	Ningbo Sunfree Motor Technology Company Limited		
Address	:	202, No. 418, Qihang North Road, Yinzhou Economic Development Zone, 315415 Ningbo, Zhejiang, PEOPLE'S REPUBLIC OF CHINA		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	**37**		

TÜV SÜD CERTIFICATION AND TESTING (CHINA) CO., LTD.

TÜV SÜD Certification and Testing (China) Co., Ltd. reports apply only to the specific samples tested under stated test conditions and the results apply to the sample as received. Construction of the actual test samples has been documented. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. The manufacturer/importer is responsible to the Competent Authorities in Local Market Supervision for any modifications made to the production units which result in non-compliance to the relevant regulations. TÜV SÜD Certification and Testing (China) Co., Ltd. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD Certification and Testing (China) Co., Ltd. issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval.

Phone: +86 510 8820 3737
Fax: +86 510 8820 3636

TÜV SÜD Certification and Testing (China) Co., Ltd.
Floor 1-4, Building B, No.37, Tuanjie Road(Middle), Xishan Economic and Technological Development Zone, Wuxi, Jiangsu. China

Table of Content

1 General Information 3
1.1 Product information and other Remarks 3
1.2 Testing Laboratory Information 4
1.3 Details of Applicant 4
1.4 Application Details 4
1.5 Test Item 4
1.6 Applied Standard 5
1.7 Test Summary 5
2 Equipment Specification 6
2.1 General Description 6
2.2 Technical Data 6
2.3 Test conditions and test Connections 7
2.4 Auxiliary Equipment Used during Test 8
2.5 Lists of Test Instruments 8
2.6 Measurement Uncertainty (95% confidence levels, k=2) 8
3 Measurements Result 9
3.1 Frequency Tolerance 9
3.2 Occupied Bandwidth 12
3.3 RF Output Power 15
3.4 RF Output Power Tolerance 19
3.5 Adjacent Channel Leakage Power 20
3.6 Transmission time limiting device 24
3.7 Unwanted Spurious Emissions Strength (Conducted) (For transmitter) 28
3.8 Carrier Sensing Function 36
4 Photographs of Test Set-ups 37

Phone: +86 510 8820 3737
Fax: +86 510 8820 3636

TÜV SÜD Certification and Testing (China) Co., Ltd.
Floor 1-4, Building B, No.37, Tuanjie Road(Middle), Xishan Economic and Technological Development Zone, Wuxi, Jiangsu. China

複製禁止

1 General Information

1.1 Product information and other Remarks

The EUT is a Remote controller.

Prepared by Project Engineer	**2025.05.15** Date	**Zhilan Xue** Name	Signature
Approved by Project Manager	**2025.05.15** Date	**Dingpeng Xia** Name	Signature

1.2 Testing Laboratory Information

Company name:	**TÜV SÜD Certification and Testing (China) Co., Ltd.**
Company Address:	**Floor 1-4, Building B, No.37, Tuanjie Road(Middle), Xishan Economic and Technological Development Zone, Wuxi, 214101 , P.R.China**
Test Location:	**Floor 1-4, Building B, No.37, Tuanjie Road(Middle), Xishan Economic and Technological Development Zone, Wuxi, 214101 , P.R.China – EMC Lab**
Telephone:	**+86 510 8820 3737**
Fax:	**+86 510 8820 3636**

1.3 Details of Applicant

Applicant: Ningbo Sunfree Motor Technology Company Limited

Address: 202, No. 418, Qihang North Road, Yinzhou Economic Development Zone, 315415 Ningbo, Zhejiang, PEOPLE'S REPUBLIC OF CHINA

Product Description: Remote controller

Model No.: MD-RC1-A

1.4 Application Details

Sample Received Date:	2025.03.15
Testing Start Date:	2025.03.16
Testing End Date:	2025.04.15

1.5 Test Item

Refer to table 1

1.6 Applied Standard

APPLIED PRODUCT STANDARD
Article 2 Paragraph 1 of Item 8 of Radio Law Certification Regulations, Specified Low Power Radio Equipment: Ministry of Internal Affairs and Communications notification of No. 88, Appendix 22-2

1.7 Test Summary

Table 1. Summary of results

Essential parameter	Corresponding technical requirements: notification of No. 88, Appendix 22-2	Result
Transmitter requirements	Frequency Tolerance	PASS
	Occupied Bandwidth	PASS
	RF Output Power	PASS
	RF Output Power Tolerance	PASS
	Adjacent Channel Leakage Power	PASS
	Transmission time limiting device	PASS
	Carrier Sensing Function	PASS
	Unwanted (Spurious) Emission Strength	PASS
Receiver requirements	Secondary Emitted Radio Wave Strength	N/A

NOTE 1: Measurement taken is within the measurement uncertainty of measurement system.

Remark: It is compliance to the appropriate section of the Ordinance Article 2 Paragraph 1 of Item 8.

Phone: +86 510 8820 3737
Fax: +86 510 8820 3636

TÜV SÜD Certification and Testing (China) Co., Ltd.
Floor 1-4, Building B, No.37, Tuanjie Road(Middle), Xishan Economic and Technological Development Zone, Wuxi, Jiangsu. China

複製禁止

2 Equipment Specification

2.1 General Description

2.2 Technical Data

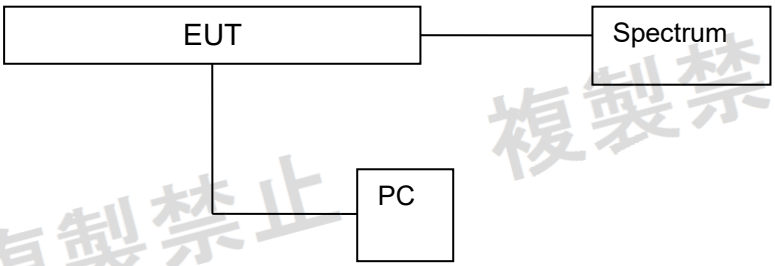
Description	Remote controller
Model	MD-RC1-A
Operation frequency	429.2MHz
Antenna type	PCB Antenna
Antenna gain	-38.64dBi
Rated Input	DC 3V
Modulation	FSK

2.3 Test conditions and test Connections

2.3.1 Test Conditions

The EUT will be connected to test system in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

2.3.2 Test Connections



Test Configuration

2.4 Auxiliary Equipment Used during Test

Table 3. Auxiliary Equipment Used during Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE

2.5 Lists of Test Instruments

Table 4. Lists of Test Instruments

Except for duty cycle

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED BY	CAL. METHOD	CAL. DATE	CAL. DUE DATE
Spectrum Analyzer	R&S	FSV40	487/641405	JEPSI	C	2024/04/08	2025/04/07
RF test system	R&S	TS8997	487/391835	JEPSI	C	2024/11/23	2025/11/22
Power Probe	R&S	NRP-Z81	487/431819	JEPSI	C	2024/11/23	2025/11/22

Only for duty cycle

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED BY	CAL. METHOD	CAL. DATE	CAL. DUE DATE
Spectrum Analyzer	R&S	FSV40	487/641405	JEPSI	C	2025/04/08	2026/04/07
RF test system	R&S	TS8997	487/391835	JEPSI	C	2024/11/23	2025/11/22
Power Probe	R&S	NRP-Z81	487/431819	JEPSI	C	2024/11/23	2025/11/22

2.6 Measurement Uncertainty (95% confidence levels, k=2)

System Measurement Uncertainty	
Test Items	**Extended Uncertainty**
Uncertainty for Radiated Spurious Emission 30MHz-1000MHz	**±3.49dB(Horizontal), ±3.50dB(Vertical)**
Uncertainty for Conducted RF test	**Power level test involved: 1.17dB Frequency test involved:0.6×10^{-7}**

3 Measurements Result

3.1 Frequency Tolerance

3.1.1 Test condition

Date of testing:	2025.03.28
Channel:	429.2MHz
Test position:	Transmitting
Ambient temperature:	21.2°C
Relative humidity:	55.3%
Atmosphere Pressure:	1018.7 mBar

3.1.2 Limit

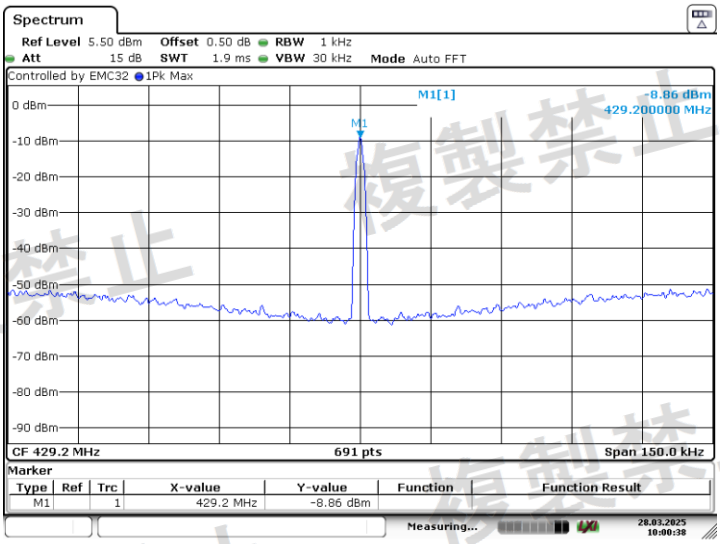
	Objective radio equipment	Tolerance
(1)	400MHz band radio equipment (6.25kHz interval)	$\pm 2\times10^{-6}$
(2)	400MHz band radio equipment (12.5kHz、25kHz interval (Radio equipment listed in (3) is excluded)	$\pm 4\times10^{-6}$
(3)	Over 426.0375MHzandd up to 426.1125MHz Radio equipment (25kHz interval and occupied band width 12kHz or less)	$\pm 10\times10^{-6}$

3.1.3 Test result

Test Frequency (MHz)	Voltage (VDC)	Result (MHz)	Tolerance (kHz)	Tolerance (ppm)	Limit (ppm)
429.2	2.7	429.2	0	0	±4
429.2	3	429.2	0	0	±4
429.2	3.3	429.20022	0.22	0.513	±4
Conclusion: PASS					

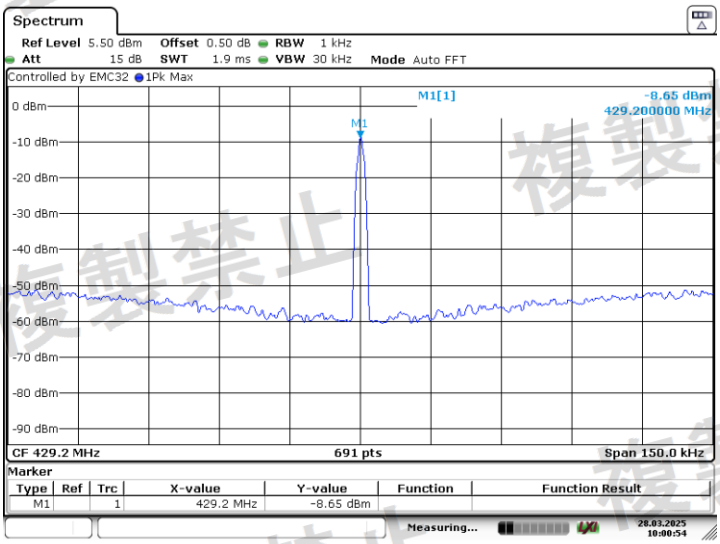
Test data

DC 2.7V



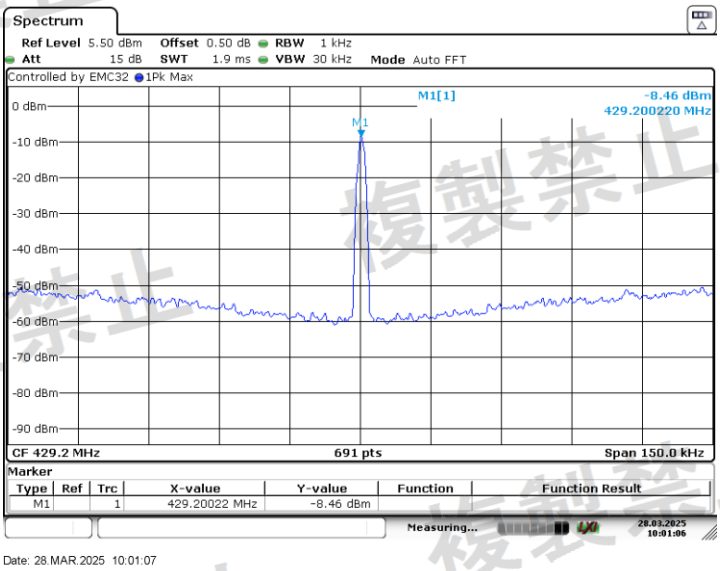
Date: 28.MAR.2025 10:00:38

DC 3V



Date: 28.MAR.2025 10:00:54

DC 3.3V



3.1.4 Result

The equipment met the requirement of this clause.

3.2 Occupied Bandwidth

3.2.1 Test condition

Date of testing:	2025.03.28
Channel:	429.2MHz
Test position:	Transmitting
Ambient temperature:	21.2°C
Relative humidity:	55.3%
Atmosphere Pressure:	1018.7 mBar

3.2.2 Limit

Objective radio equipment	Permissible value
Radio equipment with occupied bandwidth of 5.8kHz or less	5.8kHz
Radio equipment with occupied bandwidth over 5.8kHz	8.5kHz
Radio equipment operated in over 426MHz and up to 427MHz band with 25kHz interval	16kHz

3.2.3 Test result

Test Frequency (MHz)	Voltage (VDC)	99% Bandwidth (KHz)	Limit (KHz)
429.2	2.7	7.6168	<8.5
429.2	3	7.6666	<8.5
429.2	3.3	7.6666	<8.5
Conclusion: PASS			

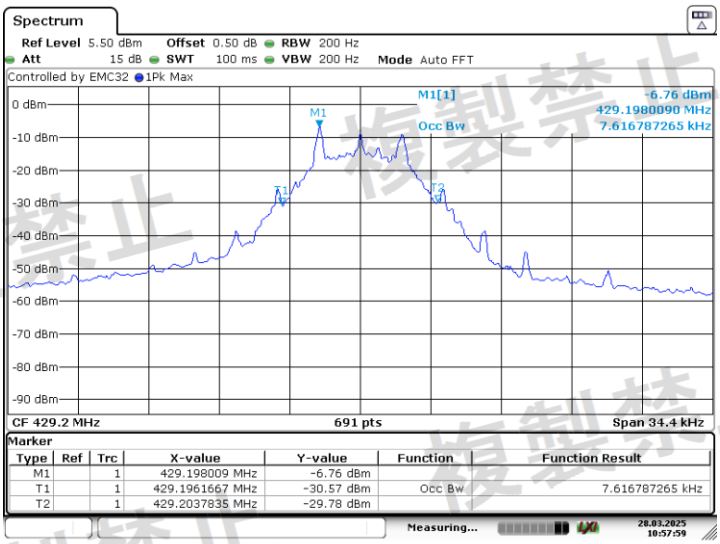
Phone: +86 510 8820 3737
Fax: +86 510 8820 3636

TÜV SÜD Certification and Testing (China) Co., Ltd.
Floor 1-4, Building B, No.37, Tuanjie Road(Middle), Xishan Economic and Technological Development Zone, Wuxi, Jiangsu. China

複製禁止

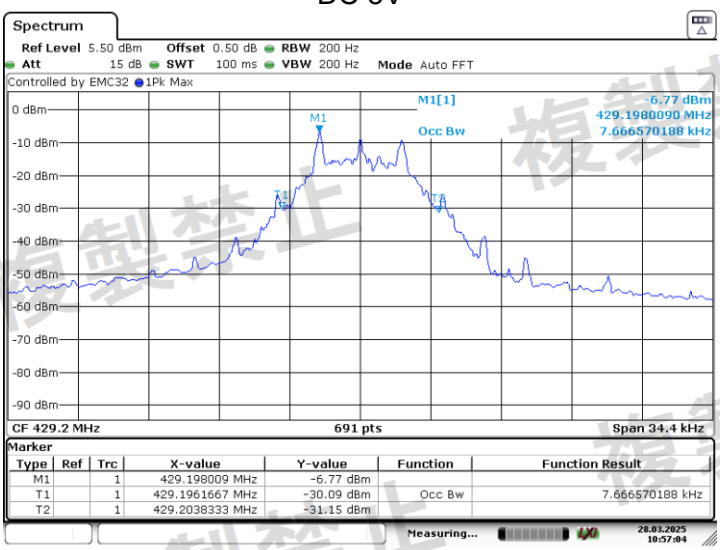
Test data

DC 2.7V



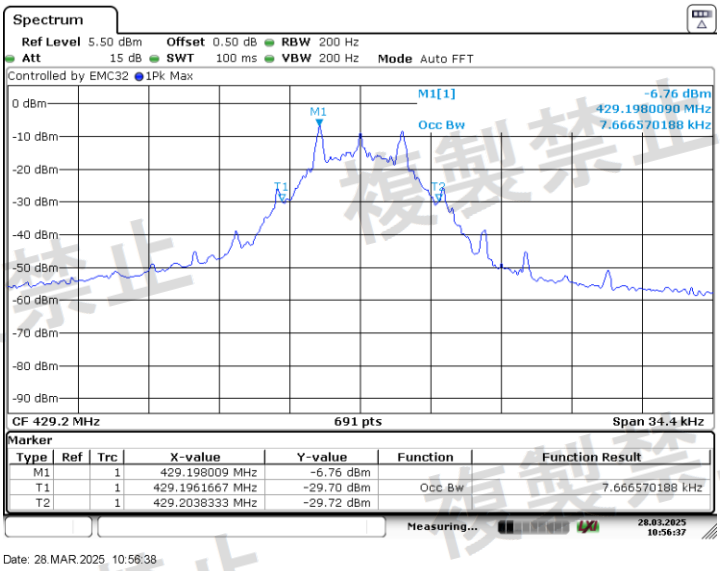
Date: 28.MAR.2025 10:57:59

DC 3V



Date: 28.MAR.2025 10:57:04

DC 3.3V



Date: 28.MAR.2025 10:56:38

3.2.4 Result

The equipment met the requirement of this clause.

3.3 RF Output Power

3.3.1 Test condition

Date of testing:	2025.03.27, 2025.04.26
Channel:	429.2MHz
Test position:	Transmitting
Ambient temperature:	21.2°C
Relative humidity:	55.3%
Atmosphere Pressure:	1018.7 mBar

3.3.2 Limit

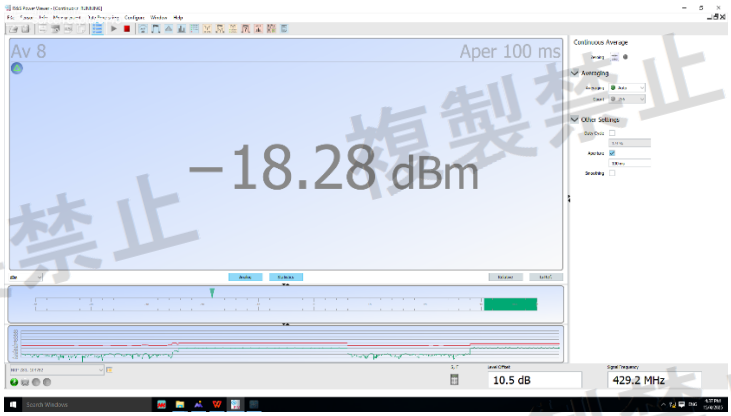
The antenna power (the specified or rated power that is supplied from the transmitter to the feeder of an antenna system in normal operation and is averaged over a sufficiently long period of time compared to the cycle of the lowest frequency) shall be 1 W or less. However, for transmission units using a frequency between 426.025 MHz and 426.1375 MHz, the antenna power shall be 0.1 W or less.

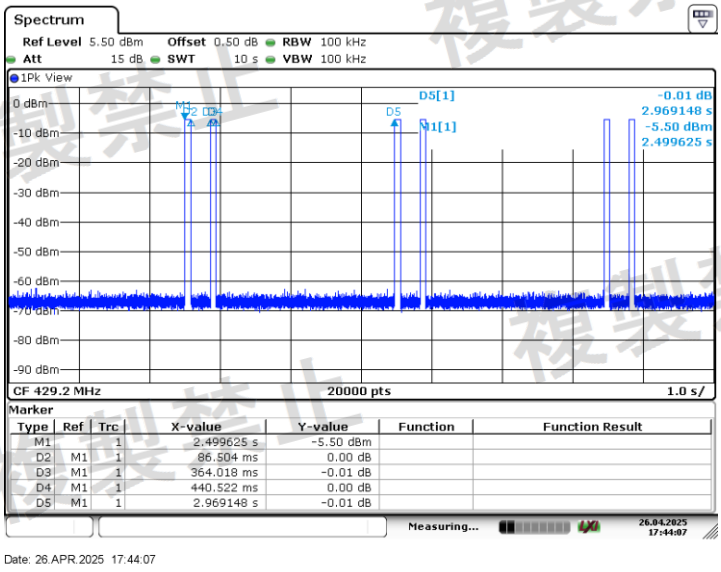
3.3.3 Test Result

Test Frequency (MHz)	Voltage (DC)	Result (mW)	Limit (mW)
429.2	2.7	0.2707	1000
429.2	3	0.2700	1000
429.2	3.3	0.2673	1000
Conclusion: PASS			

Test data

DC 2.7V





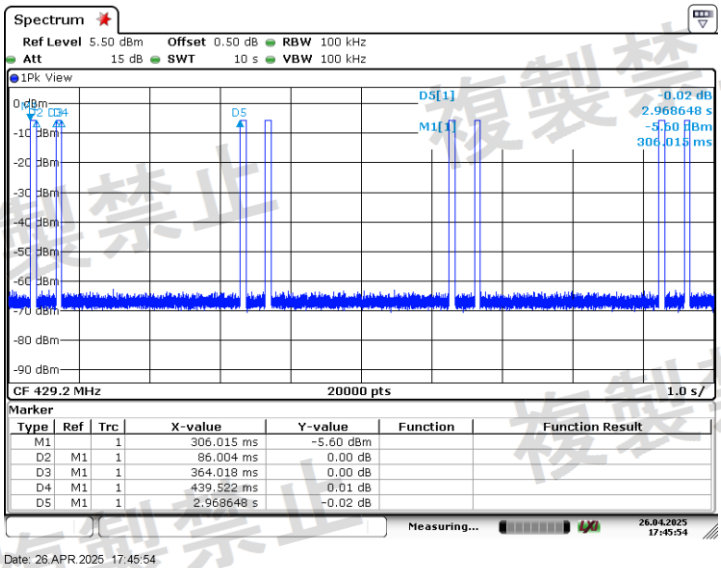
Date: 26.APR.2025 17:44:07

A=-18.28dBm, duty cycle=5.4901%

Output power (mW) =10^(A/10)/Duty cycle
=10^(-18.28/10)/0.054901=0.2707mW

DC 3V



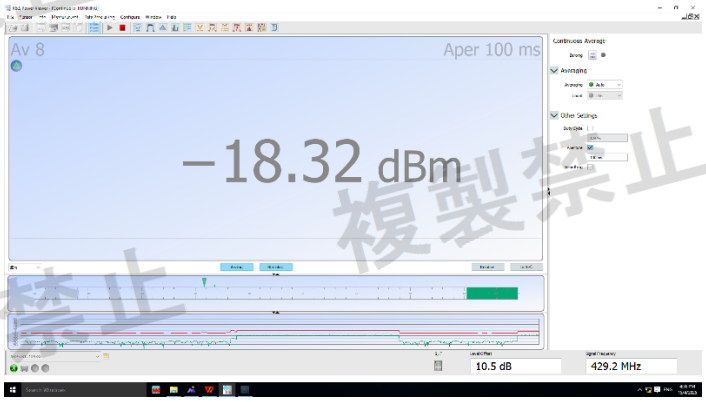


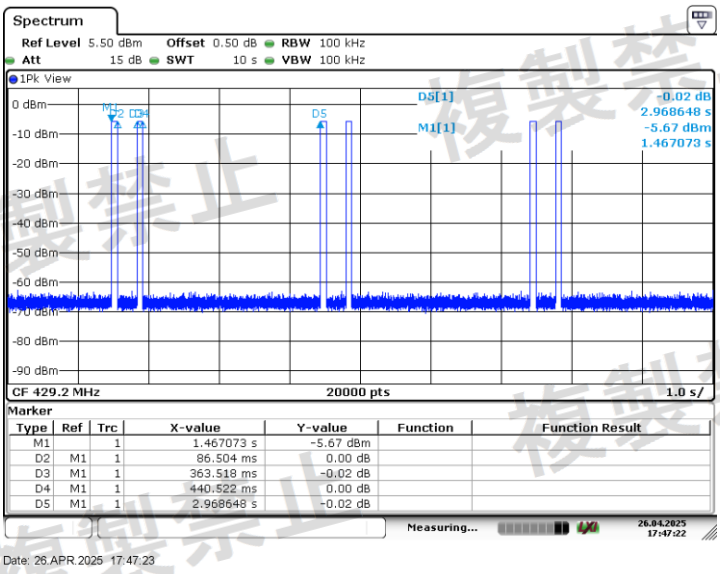
Date: 26.APR.2025 17:45:54

A=-18.33dBm, duty cycle=5.4405%

Output power (mW) =10^(A/10)/Duty cycle
=10^(-18.33/10)/0.054405=0.27mW

DC 3.3V





Date: 26.APR.2025 17:47:23

A=-18.32dBm, duty cycle=5.5078%

Output power (mW) =10^(A/10)/Duty cycle
=10^(-18.32/10)/0.055078=0.2673mW

3.3.4 Result

The equipment met the requirement of this clause.

3.4 RF Output Power Tolerance

3.4.1 Test condition

Date of testing:	2025.03.27
Channel:	429.2MHz
Test position:	Transmitting
Ambient temperature:	21.2°C
Relative humidity:	55.3%
Atmosphere Pressure:	1018.7 mBar

3.4.2 Limit

The tolerances for antenna power (the maximum allowable deviation from the specified or rated antenna power) shall be +20% to -50%.

3.4.3 Test Result

Frequency (MHz)	Voltage (VDC)	Declared Output Power (mW)	Result (mW)	Tolerances	Limit
429.2	2.7	0.39	0.2707	-30.59%	+20%~-50%
429.2	3	0.39	0.2700	-30.77%	+20%~-50%
429.2	3.3	0.39	0.2673	-31.46%	+20%~-50%
Conclusion: PASS					

3.4.4 Result

The equipment met the requirement of this clause.

3.5 Adjacent Channel Leakage Power

3.5.1 Test condition

Date of testing:	2025.03.28
Channel:	429.2MHz
Test position:	Transmitting
Ambient temperature:	21.2°C
Relative humidity:	55.3%
Atmosphere Pressure:	1018.7 mBar

3.5.2 Limit

As for the adjacent-channel leakage power (the power radiated in a certain band of the adjacent channel separated from the carrier frequency at the specified frequency interval), the power radiated into the band of the frequency the specified frequency distant from the carrier frequency shall be lower than the carrier power by 40 dB or more, when modulation is performed using the standard coded test signal at the same transmission speed as that of the modulation signal.

Objective radio equipment	Detune frequency	Measured bandwidth
400MHz band radio equipment (6.25kHz interval)	6.25kHz	±2.0kHz
400MHz band /1,200MHz band radio equipment (12.5kHz interval)	12.5kHz	±4.25kHz
400MHz band /1,200MHz band radio equipment (25kHz interval)	25kHz	±8.0kHz

3.5.3 Test Result

2.7VDC

Frequency	Level	Limit
carrier frequency	1.85dBm	40dBc or below
±4.25KHz bandwidth at carrier frequency +12.5KHz	-42.35dBc	
±4.25KHz bandwidth at carrier frequency -12.5KHz	-40.02dBc	
conclusion: PASS		

3VDC

Frequency	Level	Limit
carrier frequency	2.13dBm	40dBc or below
±4.25KHz bandwidth at carrier frequency +12.5KHz	-42.34dBc	
±4.25KHz bandwidth at carrier frequency -12.5KHz	-40.13dBc	
conclusion: PASS		

3.3VDC

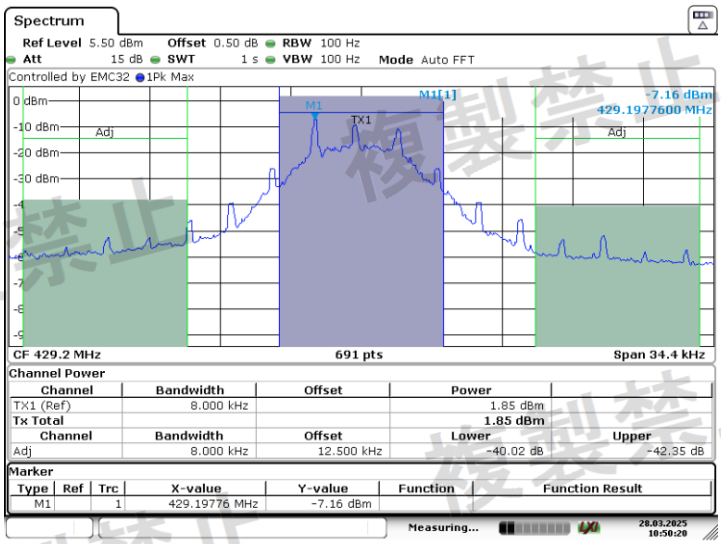
Frequency	Level	Limit
carrier frequency	2.02dBm	40dBc or below
±4.25KHz bandwidth at carrier frequency +12.5KHz	-42.29dBc	
±4.25KHz bandwidth at carrier frequency -12.5KHz	-40.23dBc	
conclusion: PASS		

Phone: +86 510 8820 3737
Fax: +86 510 8820 3636

TÜV SÜD Certification and Testing (China) Co., Ltd.
Floor 1-4, Building B, No.37, Tuanjie Road(Middle), Xishan Economic and Technological Development Zone, Wuxi, Jiangsu. China

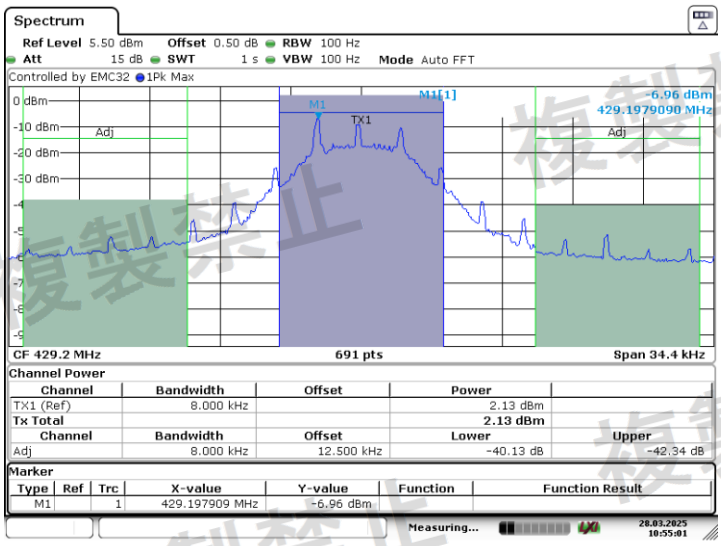
Test data

DC 2.7V



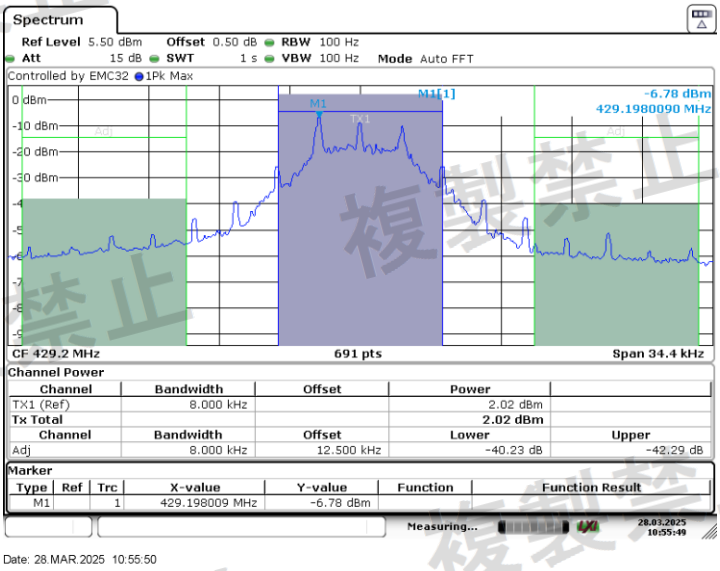
Date: 28.MAR.2025 10:50:20

DC 3V



Date: 28.MAR.2025 10:55:01

DC 3.3V



3.5.4 Result

The equipment met the requirement of this clause

3.6 Transmission time limiting device

3.6.1 Test condition

Date of testing:	2025.04.26
Channel:	429.2MHz
Test position:	Transmitting
Ambient temperature:	21.2°C
Relative humidity:	55.3%
Atmosphere Pressure:	1018.7 mBar

3.6.2 Limit

Operating Frequency (MHz)	Transmission Time restriction (Transmission Continuous Time, Transmission Quiescence Time)
429.2	Transmission Continuous Time: 40 seconds, Transmission Quiescence Time:2 seconds

3.6.3 Test Result

2.7VDC

Test condition	Time(s)
TX on	0.440522
TX off	2.528626

3VDC

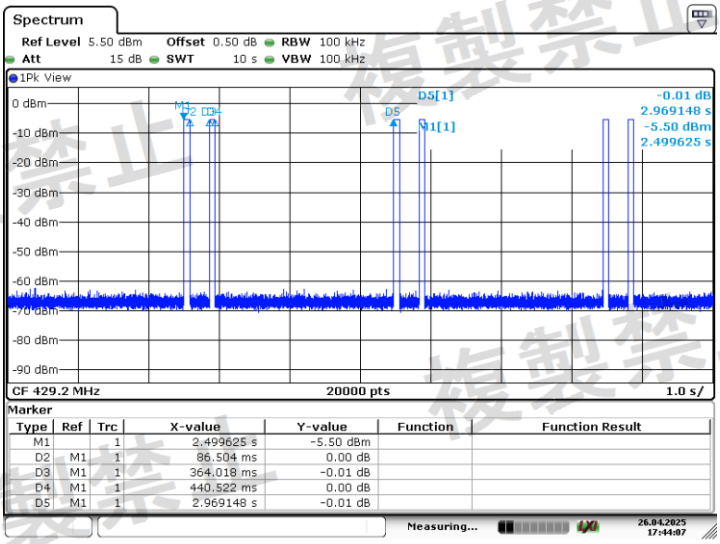
Test condition	Time(s)
TX on	0.439522
TX off	2.529126

3.3VDC

Test condition	Time(s)
TX on	0.440522
TX off	2.528126

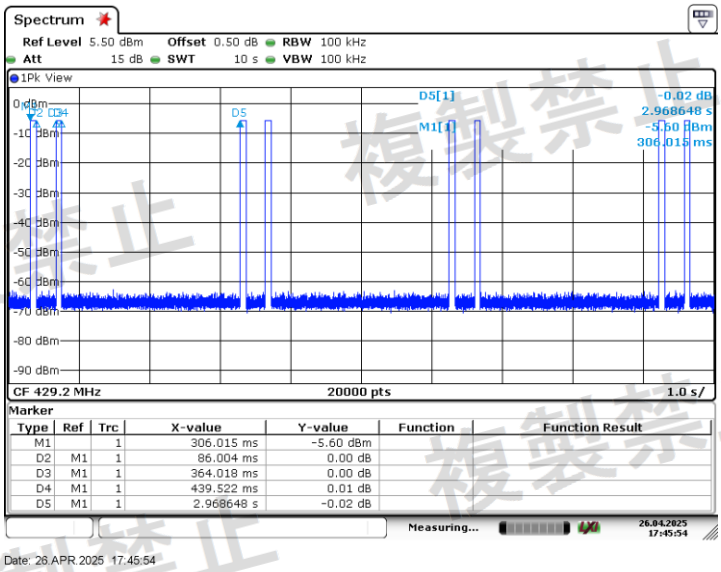
Test data

DC 2.7V



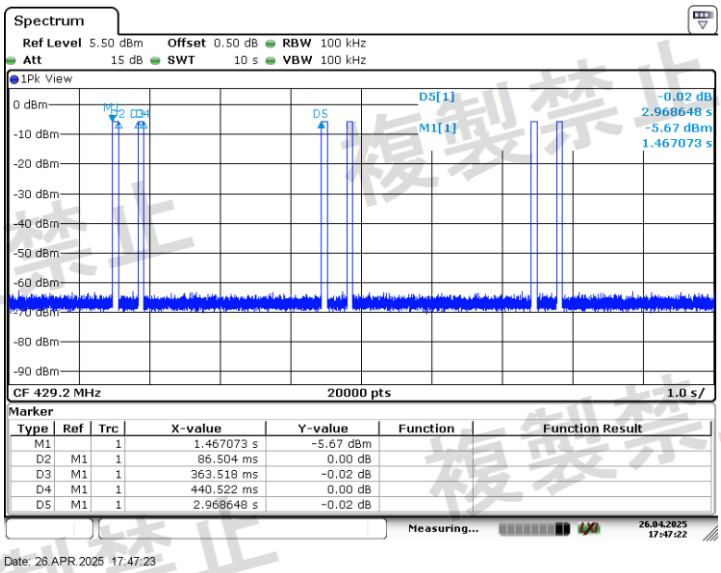
Date: 26.APR.2025 17:44:07

DC 3V



Date: 26.APR.2025 17:45:54

DC 3.3V



3.6.4 Result

The equipment met the requirement of this clause

3.7 Unwanted Spurious Emissions Strength (Conducted) (For transmitter)

3.7.1 Test condition

Date of testing:	2025.03.28
Channel:	429.2MHz
Test position:	Transmitting
Ambient temperature:	21.2°C
Relative humidity:	55.3%
Atmosphere Pressure:	1018.7 mBar

3.7.2 Limit

Scanning Bandwidth:

Frequency Range	Limit
30 to 428.1875MHz *1	2.5uW or below(-26.02dBm)
430.1875 to 1000MHz *1	2.5uW or below(-26.02dBm)
1000 to 3000MHz	2.5uW or below(-26.02dBm)
±1MHz Carrier Frequency *2 *3	2.5uW or below(-26.02dBm)
±62.5kHz Carrier Frequency *2 *4	2.5uW or below(-26.02dBm)

*1:Carrier frequency, excluding ± 1MHz.
*2:Value of the Adjacent Channel Leakage Power.
*3:Carrier frequency, excluding ± 62.5kHz.
*4:Carrier frequency, excluding ± 4.25kHz.

3.7.3 Test Result

DC 2.7V

Frequency (MHz)	Reading (MHz)	Reading (dBm)	Results (uW)	Scanning Bandwidth	Limit
429.2	428.175	-55.62	0.0027	30 to 428.1875MHz*1	2.5uW or below (-26.02dBm)
	430.271	-55.89	0.0026	430.1875 to 1000MHz *1	2.5uW or below (-26.02dBm)
	2619	-51.58	0.0070	1000 to 3000MHz	2.5uW or below (-26.02dBm)
	429.3347	-27.88*	1.6293	±1MHz Carrier Frequency *2 *3	2.5uW or below (-26.02dBm)
	429.1875	-38.17	0.1524	±62.5kHz Carrier Frequency *2 *4	2.5uW or below (-26.02dBm)

Note: "*" denotes for correction of RBW (+15.2dB for 3kHz).

DC 3V

Frequency (MHz)	Reading (MHz)	Reading (dBm)	Results (uW)	Scanning Bandwidth	Limit
429.2	428.175	-54.97	0.0032	30 to 428.1875MHz*1	2.5uW or below (-26.02dBm)
	430.271	-54.72	0.0034	430.1875 to 1000MHz *1	2.5uW or below (-26.02dBm)
	2524.6	-52.21	0.0060	1000 to 3000MHz	2.5uW or below (-26.02dBm)
	429.1003	-26.94*	2.0230	±1MHz Carrier Frequency *2 *3	2.5uW or below (-26.02dBm)
	429.1875	-38	0.1585	±62.5kHz Carrier Frequency *2 *4	2.5uW or below (-26.02dBm)

Note: "*" denotes for correction of RBW (+15.2dB for 3kHz).

DC 3.3V

Frequency (MHz)	Reading (MHz)	Reading (dBm)	Results (uW)	Scanning Bandwidth	Limit
429.2	428.076	-56.29	0.0024	30 to 428.1875MHz*1	2.5uW or below (-26.02dBm)
	430.319	-54.26	0.0038	430.1875 to 1000MHz *1	2.5uW or below (-26.02dBm)
	2429.8	-49.1	0.0123	1000 to 3000MHz	2.5uW or below (-26.02dBm)
	429.3552	-29.88*	1.0280	±1MHz Carrier Frequency *2 *3	2.5uW or below (-26.02dBm)
	429.1875	-38.21	0.1510	±62.5kHz Carrier Frequency *2 *4	2.5uW or below (-26.02dBm)

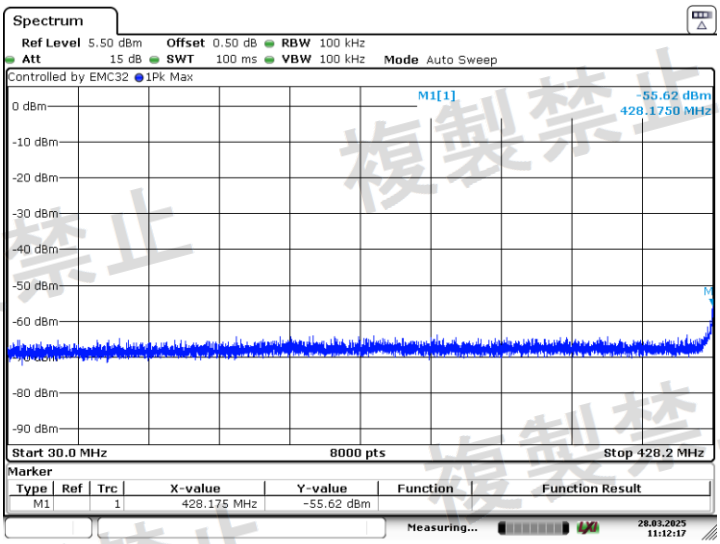
Note: "*" denotes for correction of RBW (+15.2dB for 3kHz).

3.7.4 Result

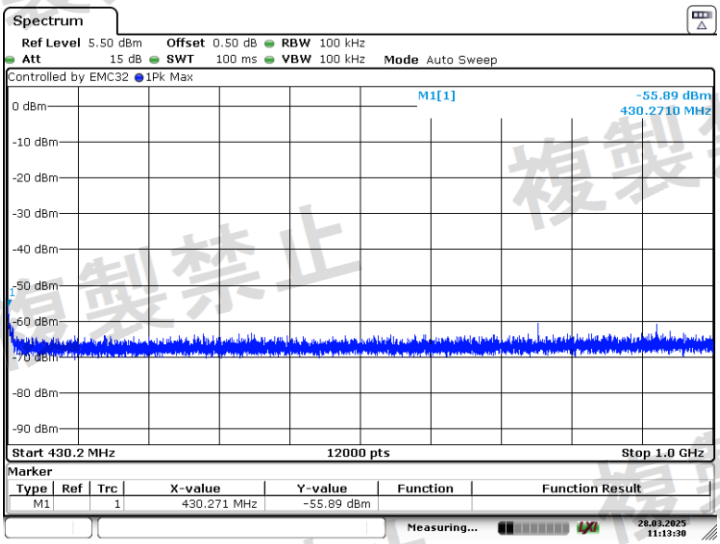
The equipment met the requirement of this clause.

3.7.5 Test Graphs

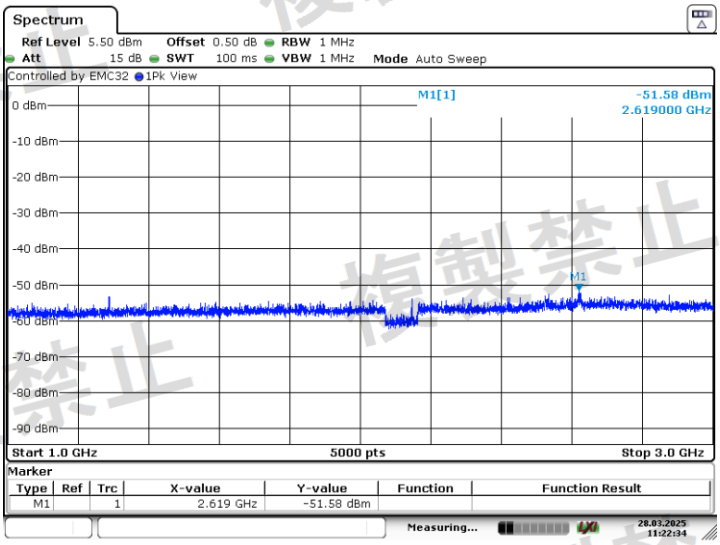
DC 2.7V



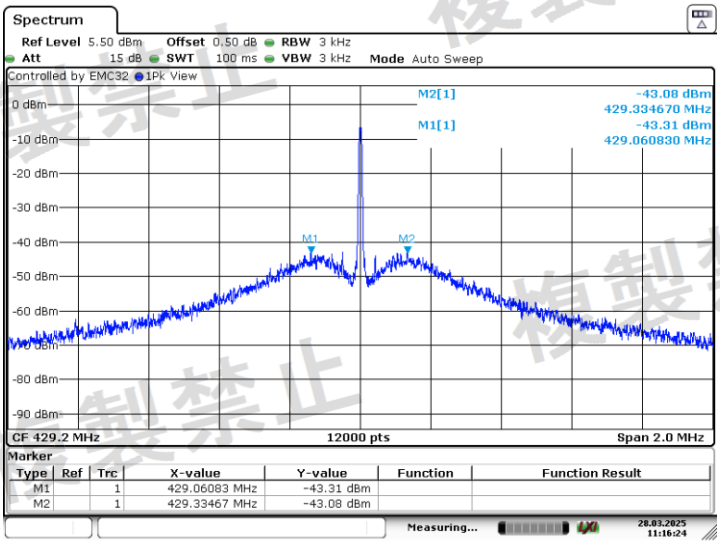
Date: 28.MAR.2025 11:12:18



Date: 28.MAR.2025 11:13:30

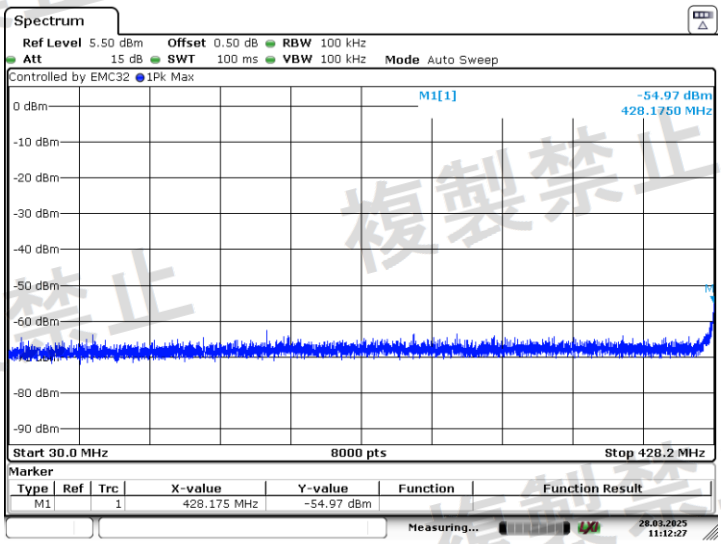


Date: 28.MAR.2025 11:22:34

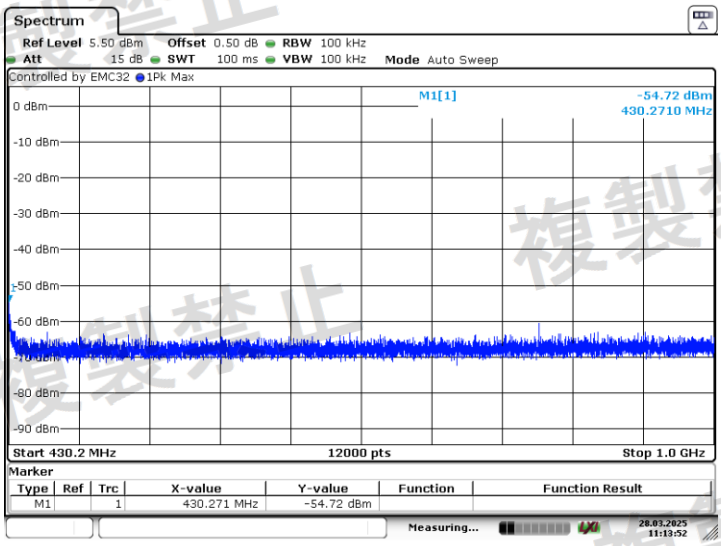


Date: 28.MAR.2025 11:16:25

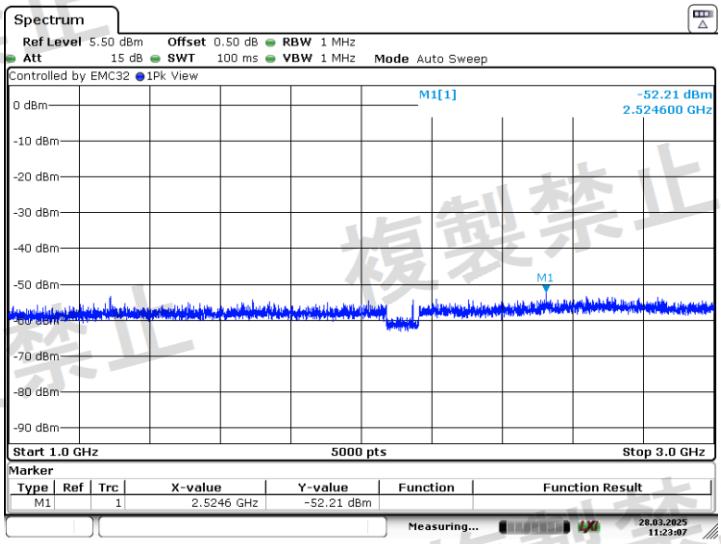
DC 3V



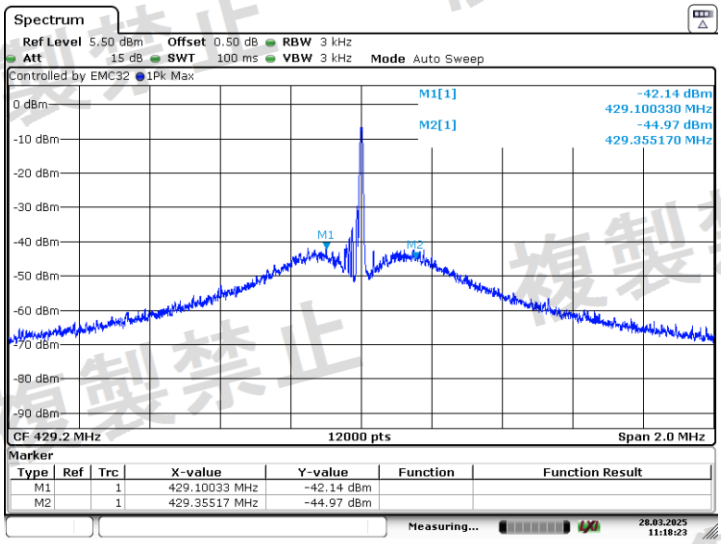
Date: 28.MAR.2025 11:12:27



Date: 28.MAR.2025 11:13:52

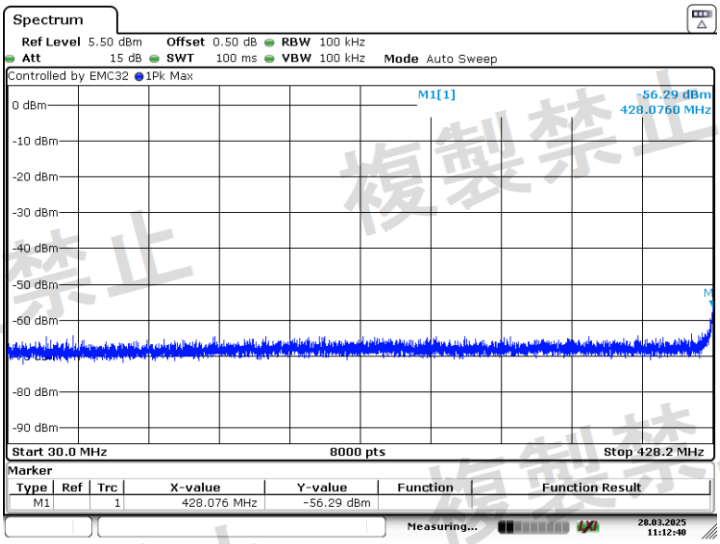


Date: 28.MAR.2025 11:23:07

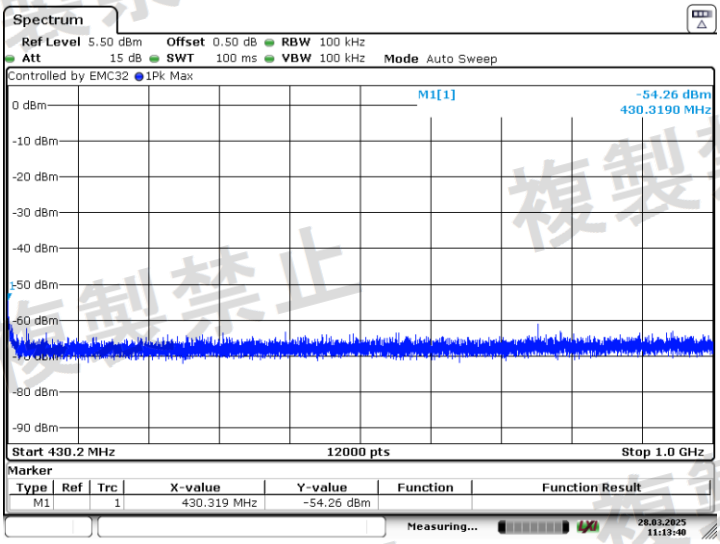


Date: 28.MAR.2025 11:18:23

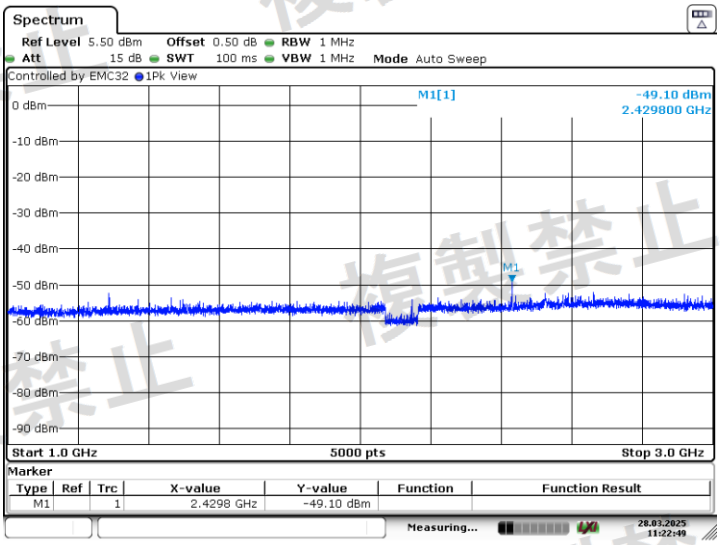
DC 3.3V



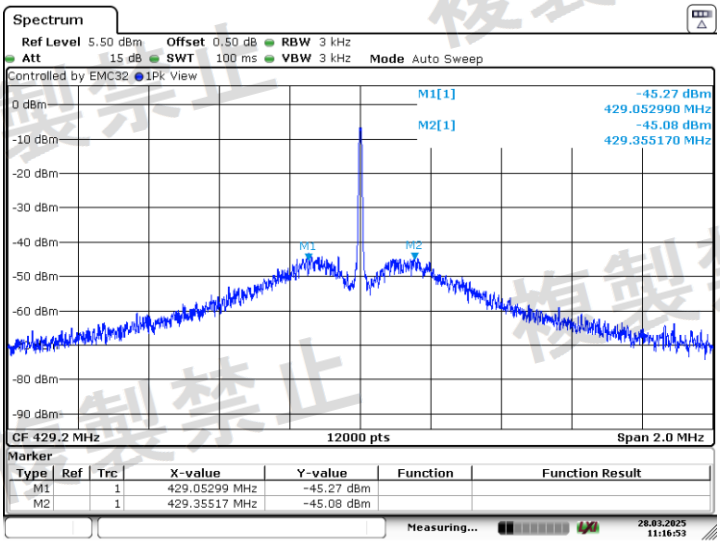
Date: 28.MAR.2025 11:12:40



Date: 28.MAR.2025 11:13:40



Date: 28.MAR.2025 11:22:48



Date: 28.MAR.2025 11:16:53

3.8 Carrier Sensing Function

3.8.1 Test condition

Date of testing:	2025.03.27
Channel:	429.2MHz
Test position:	Receiving
Ambient temperature:	21.2°C
Relative humidity:	55.3%
Atmosphere Pressure:	1018.7 mBar

3.8.2 Limit

When the carrier sensing device receives a radio wave from another radio station before a radio communication channel is established, it shall not radiate emissions of the same frequency (if the communication method of the carrier sensing device is duplex operation or semi-duplex operation, the transmission frequency corresponding to the receiving frequency) as that which the said radio station radiates.

3.8.3 Test Result

Test Condition	Test Frequency	Limit	Result
NTNV	429.2MHz	-96dBm	Pass
NTLV	429.2MHz	-96dBm	Pass
NTHV	429.2MHz	-96dBm	Pass

3.8.4 Result

The equipment met the requirement of this clause.

4 Photographs of Test Set-ups

