

**TEST REPORT**

Report Number : 4840125330100 Date of Issue: 2025.11.14

Product Name : Outdoor solar panel

Model : DD1538E

Applicant : BX Tenpal Co., Ltd.

Address : 5F, BX113 Bldg, 4-14-5 Nishisugamo, Toshima-ku, Tokyo, 170-0001, JAPAN

Factory : Ningbo Dooya Mechanic & Electronic Technology Co., Ltd.

Address : No.168 Shengguang Road, Luotuo, Zhenhai, 315202
Ningbo, Zhejiang province, PEOPLE'S REPUBLIC OF CHINA

Test Result : ☒ Positive ☐ Negative

Total pages including
Appendices : 43



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1 General Information

1.1 Product information and other Remarks

The EUT is an Outdoor solar panel.

Prepared by
Project Engineer

2025.11.14

Date

Yiquan Wang

Name

Wang Yiquan

Signature

Approved by
Project Manager

2025.11.14

Date

Zhilan Xue

Name

Zhilan Xue

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: BX Tenpal Co., Ltd.

Address: 5F, BX113 Bldg, 4-14-5 Nishisugamo, Toshima-ku, Tokyo, 170-0001, JAPAN

Product Description: Outdoor solar panel

Model No.: DD1538E

1.4 Application Details

Sample Received Date: 2025.07.15

Testing Start Date: 2025.07.15

Testing End Date: 2025.08.20

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	PASS

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.



2 Equipment Specification

2.1 General Description

2.2 Technical Data

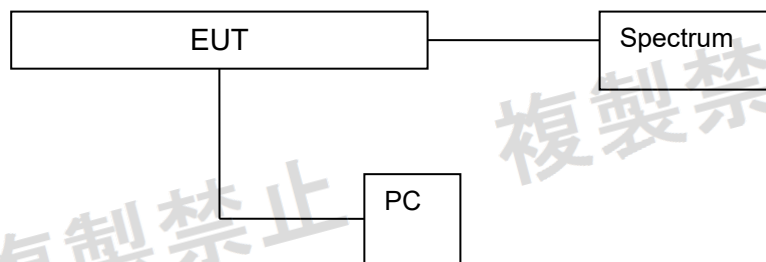
Description	Outdoor solar panel
Model	DD1538E
Operation frequency	429.1875MHz
BT Antenna type	PCB board Antenna
Antenna gain	-4.14dBi
Rated Input	DC 5V
Modulation	GFSK

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

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	±4.02dB(Horizontal), ±4.06dB(Vertical)
Uncertainty for Conducted RF test	Power level test involved: 1.32dB Frequency test involved:5.6×10 ⁻⁶

3 Measurements Result

3.1 Frequency Tolerance

3.1.1 Test condition

Date of testing:	2025.07.25
Channel:	429.1875MHz
Test position:	Transmitting
Ambient temperature:	23.1°C
Relative humidity:	58.1%
Atmosphere Pressure:	1017.6 mBar

3.1.2 Limit

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

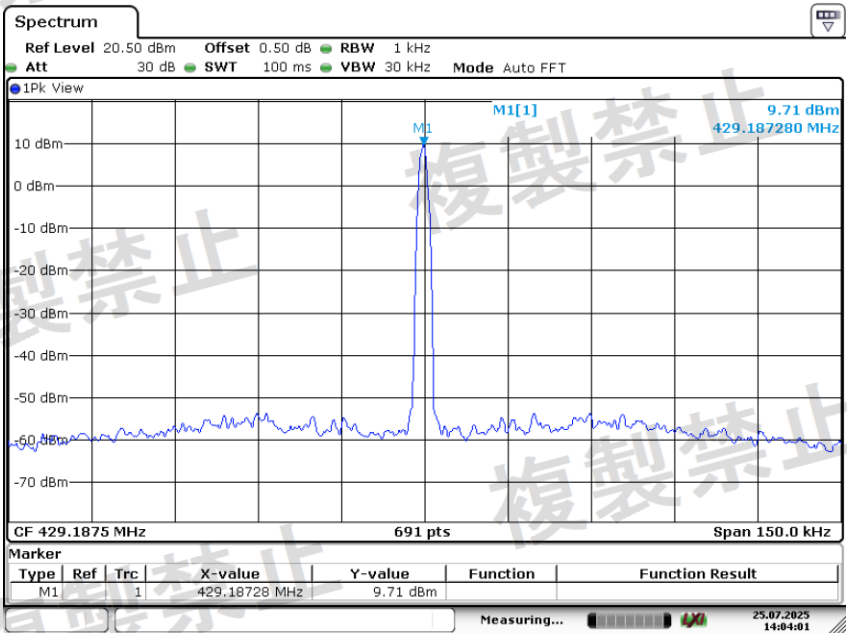
3.1.3 Test result

Test Frequency (MHz)	Voltage (VDC)	Result (MHz)	Tolerance (kHz)	Tolerance (ppm)	Limit (ppm)
429.1875	4.5	429.18728	-0.22	-0.5126	± 4
429.1875	5.0	429.18707	-0.43	-1.0019	± 4
429.1875	5.5	429.18707	-0.43	-1.0019	± 4
Conclusion: PASS					



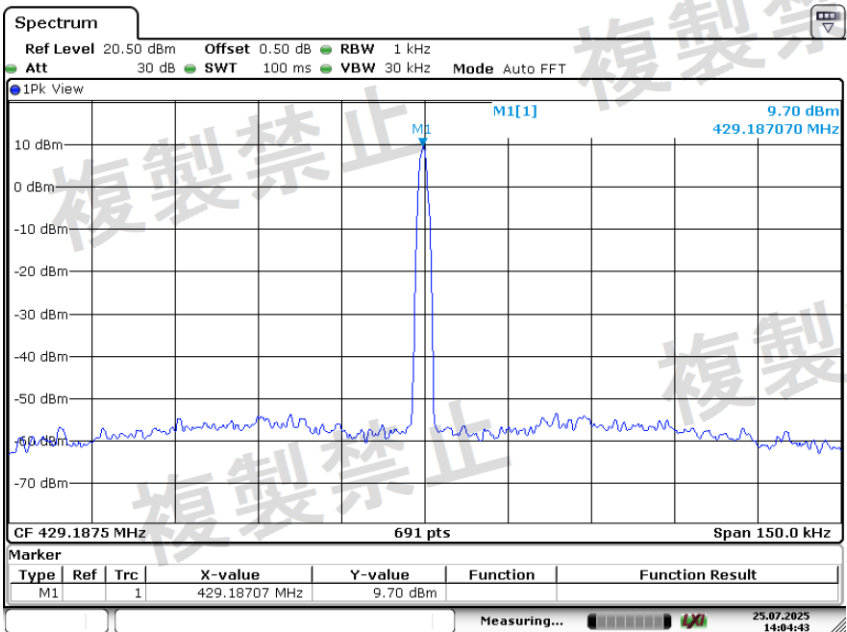
Test data

DC 4.5V



Date: 25 JUL 2025 14:04:00

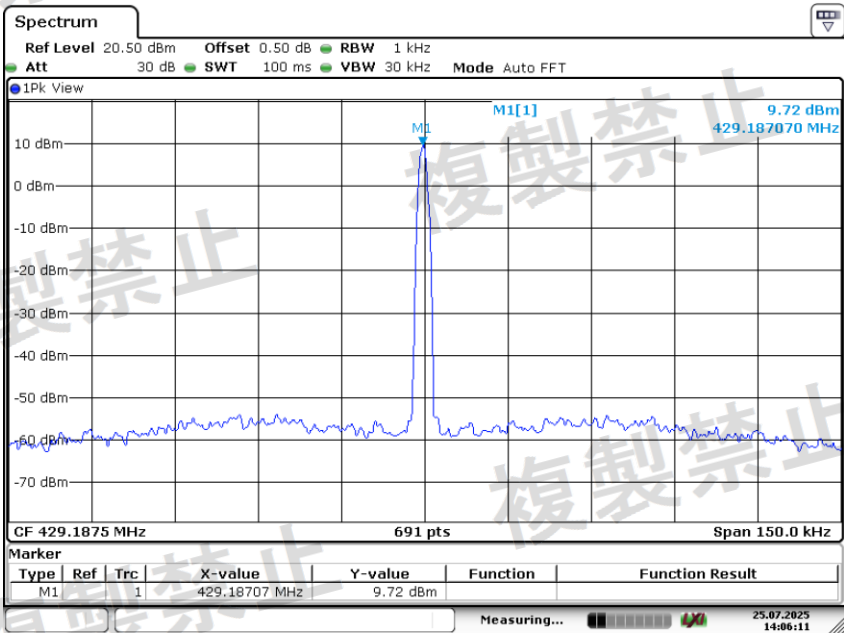
DC 5.0 V



Date: 25 JUL 2025 14:04:44



DC 5.5V



Date: 25.JUL 2025 14:06:10

3.1.4 Result

The equipment met the requirement of this clause.

3.2 Occupied Bandwidth

3.2.1 Test condition

Date of testing:	2025.07.25
Channel:	429.1875MHz
Test position:	Transmitting
Ambient temperature:	23.1°C
Relative humidity:	58.1%
Atmosphere Pressure:	1017.6 mBar

3.2.2 Limit

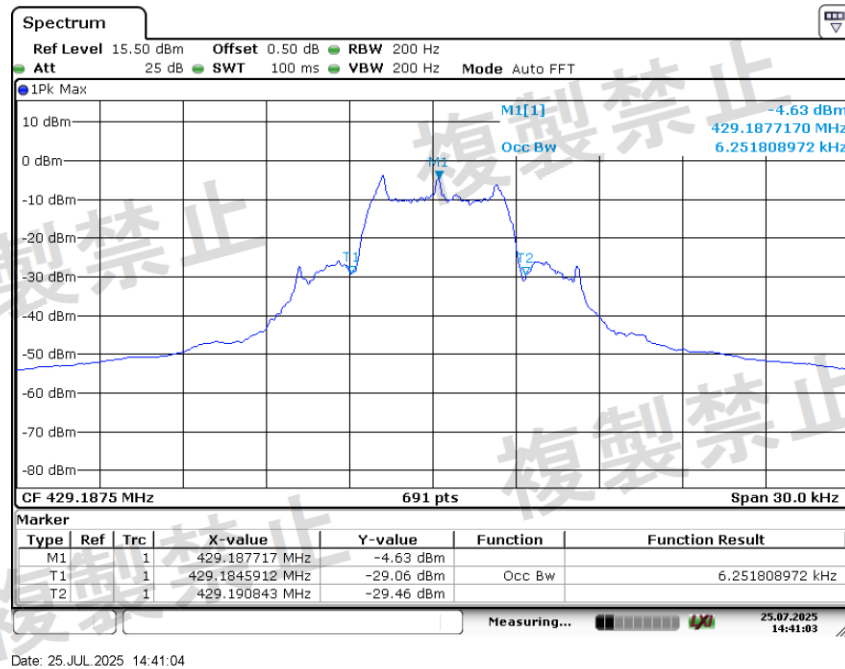
Objective radio equipment	Permissible value
Radio equipment with occupied bandwidth of 5.8kHz or less	5.8kHz
Radio equipment with occupied bandwidth over 5.8kHz	8.5kHz
Radio equipment operated in over 426MHz and up to 427MHz band with 25kHz interval	16kHz

3.2.3 Test result

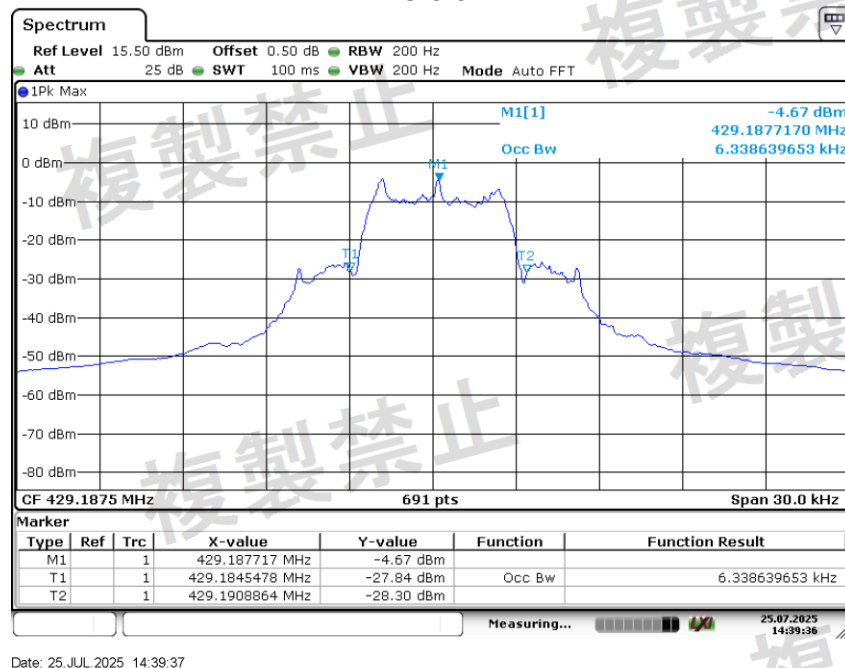
Test Frequency (MHz)	Voltage (VDC)	99% Bandwidth (KHz)	Limit (KHz)
429.1875	4.5	6.252	<8.5
429.1875	5.0	6.339	<8.5
429.1875	5.5	6.208	<8.5
Conclusion: PASS			

Test data

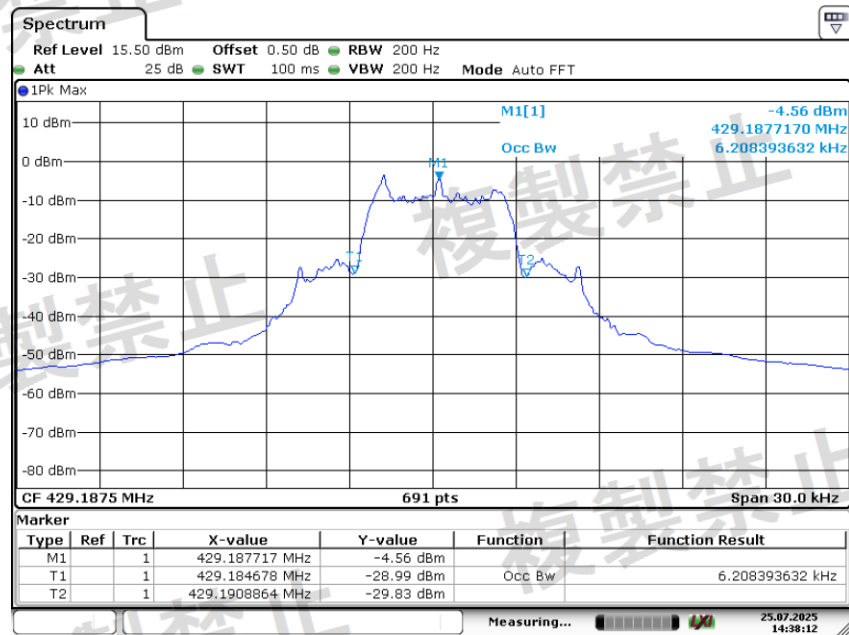
DC 4.5V



DC 5.0V



DC 5.5V



Date: 25 JUL 2025 14:38:13

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:	2025.07.25
Channel:	429.1875MHz
Test position:	Transmitting
Ambient temperature:	23.1°C
Relative humidity:	58.1%
Atmosphere Pressure:	1017.6 mBar

3.3.2 Limit

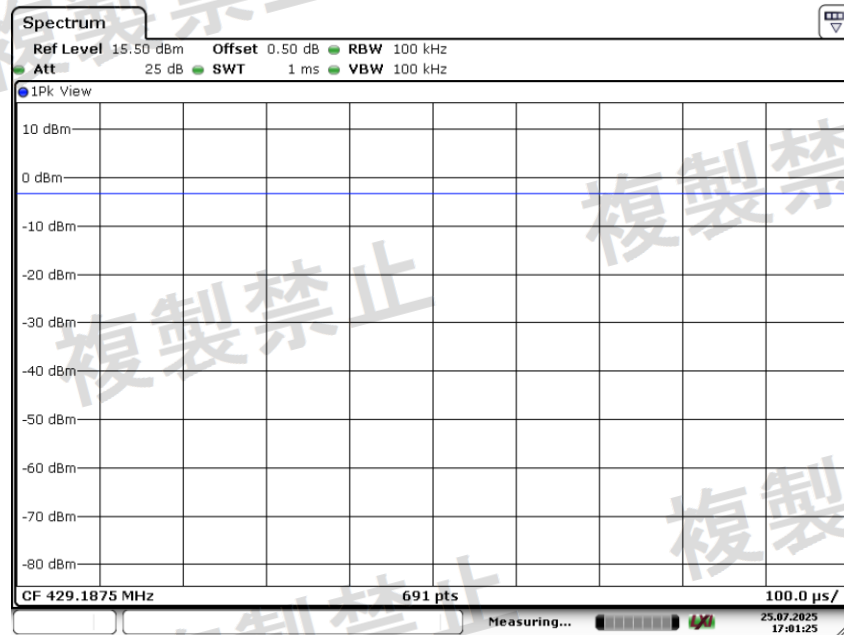
The antenna power (the specified or rated power that is supplied from the transmitter to the feeder of an antenna system in normal operation and is averaged over a sufficiently long period of time compared to the cycle of the lowest frequency) shall be 1 W or less. However, for transmission units using 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)
429.1875	4.5	0.5164	1000
429.1875	5.0	0.5140	1000
429.1875	5.5	0.5164	1000
Conclusion: PASS			

Test data

DC 4.5V

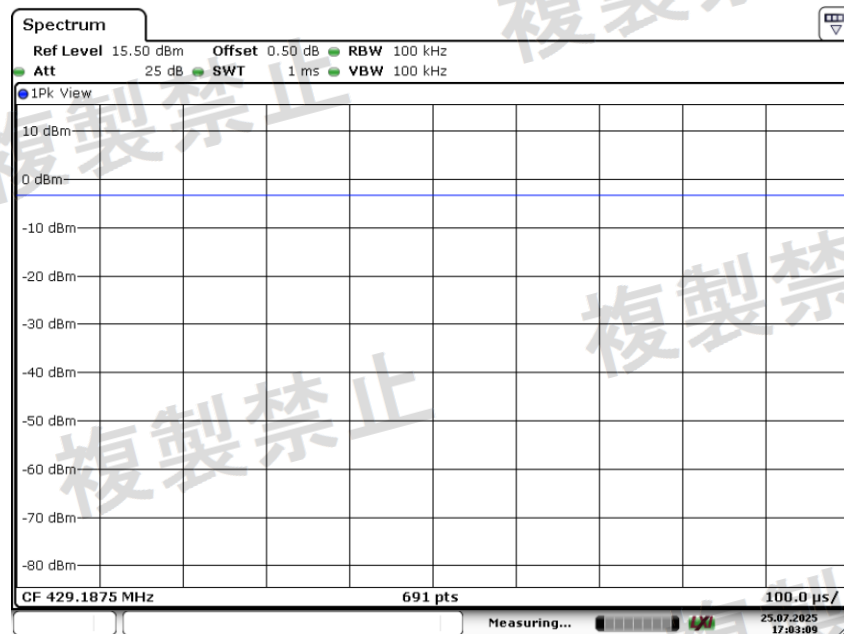


Date: 25. JUL 2025 17:01:25

A=-2.87dBm, duty cycle=100%

$$\text{Output power (mW)} = 10^{(A/10)/\text{Duty cycle}}$$
$$= 10^{(-2.87/10)/1} = 0.5164\text{mW}$$

DC 5.0V

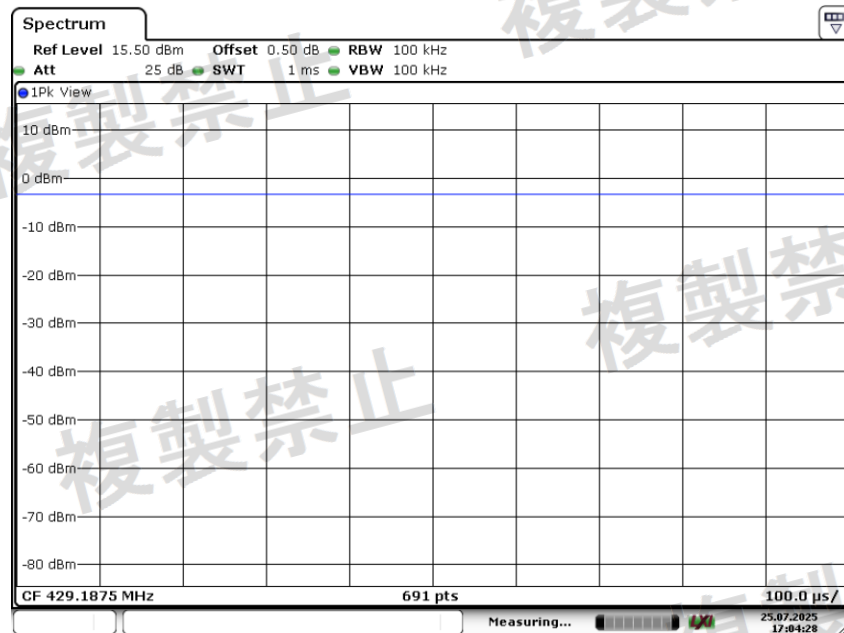


Date: 25. JUL. 2025 17:03:10

A=-2.89dBm, duty cycle=100%

$$\text{Output power (mW)} = 10^{(A/10)/\text{Duty cycle}}$$
$$= 10^{(-2.89/10)/1} = 0.5140\text{mW}$$

DC 5.5V



Date: 25 JUL 2025 17:04:29

 $A = -2.87 \text{ dBm}$, duty cycle = 100%
$$\text{Output power (mW)} = 10^{(A/10)/\text{Duty cycle}}$$
$$= 10^{(-2.87/10)/1} = 0.5164 \text{ mW}$$

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:	429.1875MHz
Test position:	Transmitting
Ambient temperature:	23.1°C
Relative humidity:	58.1%
Atmosphere Pressure:	1017.6 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 (mW)
429.1875	4.5	0.500	0.5164	3.28%	+20%~-50%
429.1875	5.0	0.500	0.5140	2.8%	+20%~-50%
429.1875	5.5	0.500	0.5164	3.28%	+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:	2025.07.25
Channel:	429.1875MHz
Test position:	Transmitting
Ambient temperature:	23.1°C
Relative humidity:	58.1%
Atmosphere Pressure:	1017.6 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

4.5VDC

Frequency	Level	Limit
carrier frequency	3.70dBm	40dBc or below
±4.25KHz bandwidth at carrier frequency +12.5KHz	-41.83dBc	
±4.25KHz bandwidth at carrier frequency -12.5KHz	-42.32dBc	
conclusion: PASS		



5.0VDC

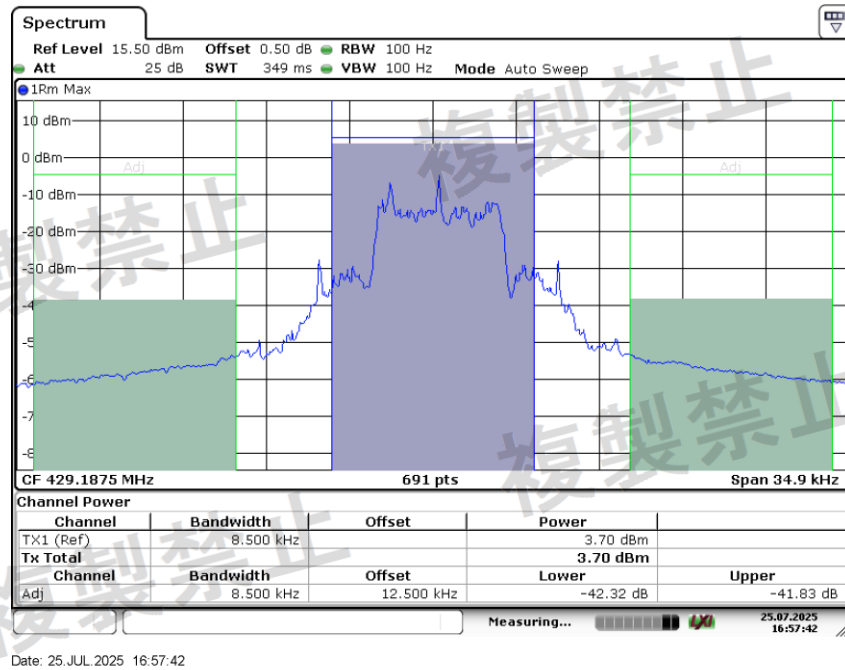
Frequency	Level	Limit
carrier frequency	4.09dBm	40dBc or below
±4.25KHz bandwidth at carrier frequency +12.5KHz	-42.15dBc	
±4.25KHz bandwidth at carrier frequency -12.5KHz	-42.64dBc	
conclusion: PASS		

5.5VDC

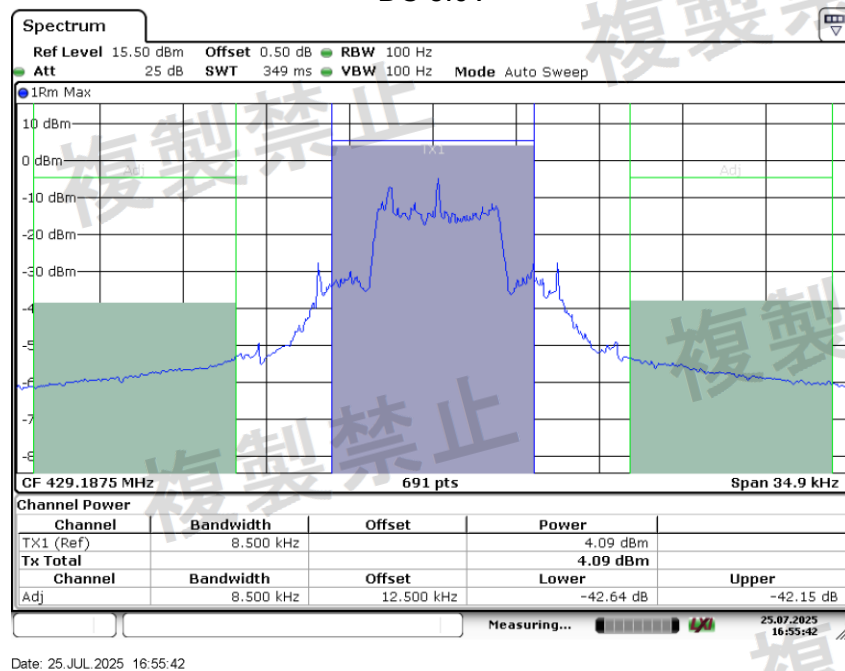
Frequency	Level	Limit
carrier frequency	3.93dBm	40dBc or below
±4.25KHz bandwidth at carrier frequency +12.5KHz	-42.03dBc	
±4.25KHz bandwidth at carrier frequency -12.5KHz	-42.54dBc	
conclusion: PASS		

Test data

DC 4.5V

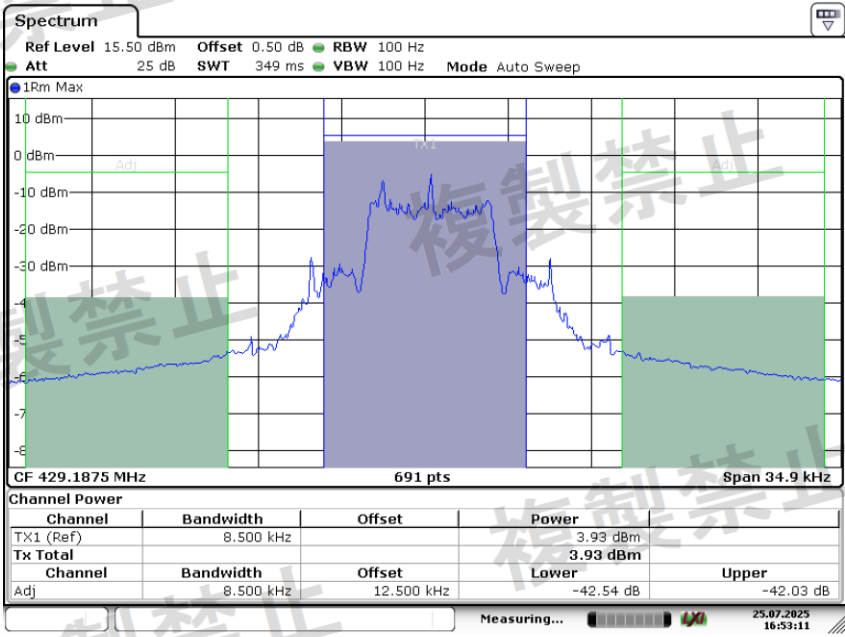


DC 5.0V





DC 5.5V



Date: 25 JUL 2025 16:53:12

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:	2025.07.28, 2025.08.20
Channel:	429.1875MHz
Test position:	Transmitting
Ambient temperature:	23.1°C
Relative humidity:	58.1%
Atmosphere Pressure:	1017.6 mBar

3.6.2 Limit

Transmission Continuous Time: 40 seconds,

Transmission Quiescence Time: 2 seconds

Channel No.	Operating Frequency (MHz)	Transmission Time restriction (Transmission Continuous Time, Transmission Quiescence Time)
1	429.1875	Transmission Continuous Time : 40 seconds. Transmission Quiescence Time : 2 seconds

3.6.3 Test Result

4.5VDC

Test condition	Time(s)
TX on	0.34782
TX off	7.42609

5.0VDC

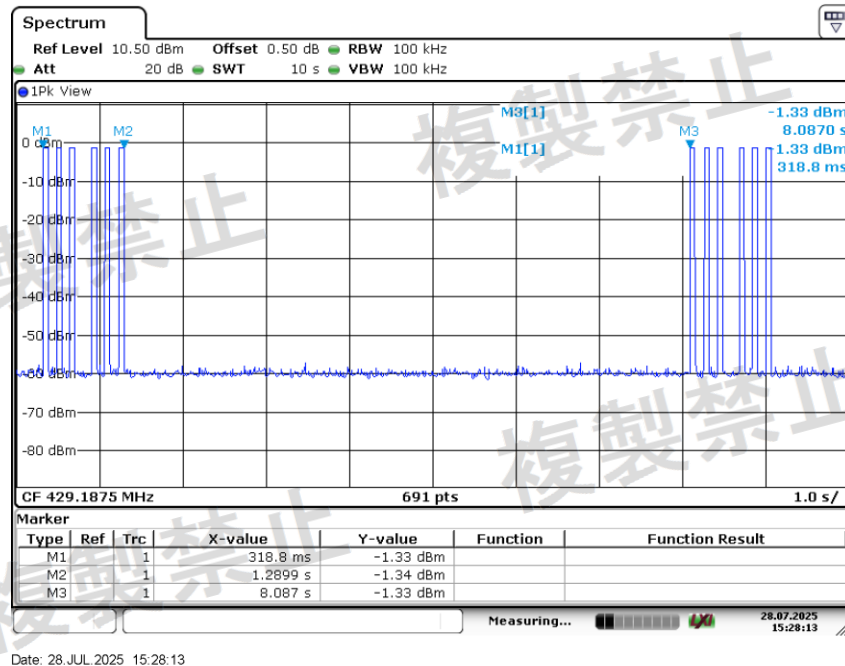
Test condition	Time(s)
TX on	0.35363
TX off	7.18839

5.5VDC

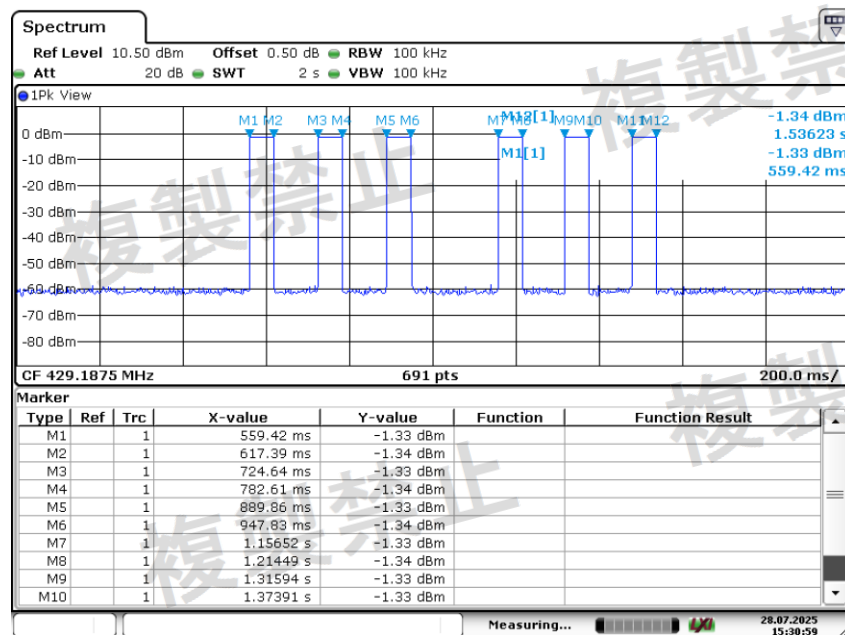
Test condition	Time(s)
TX on	0.35362
TX off	7.42029

Test data

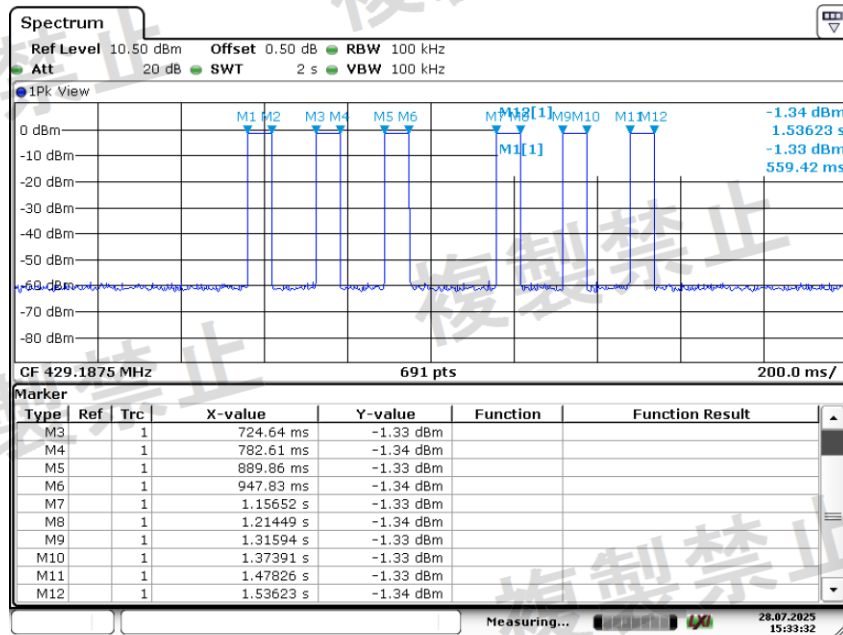
DC 4.5V



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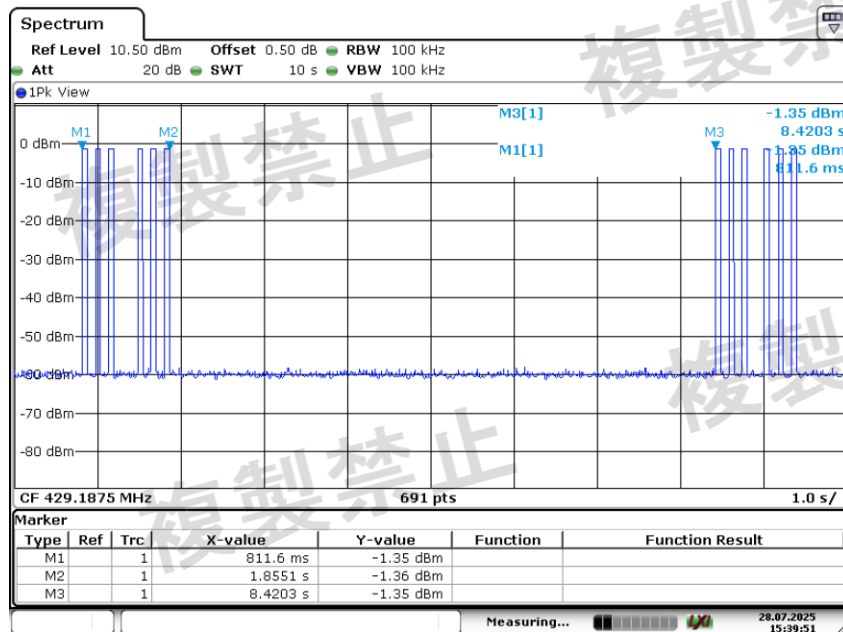


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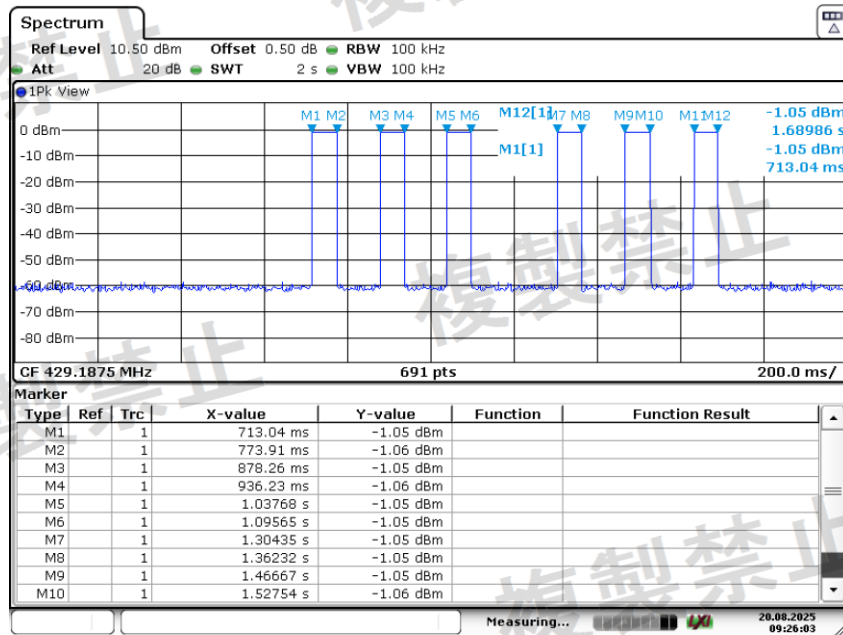


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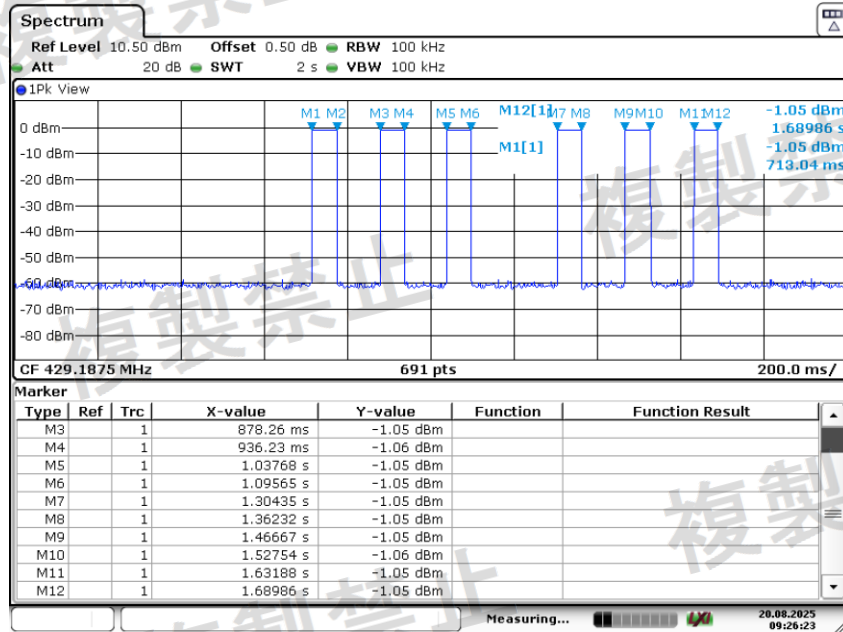
DC 5.0V



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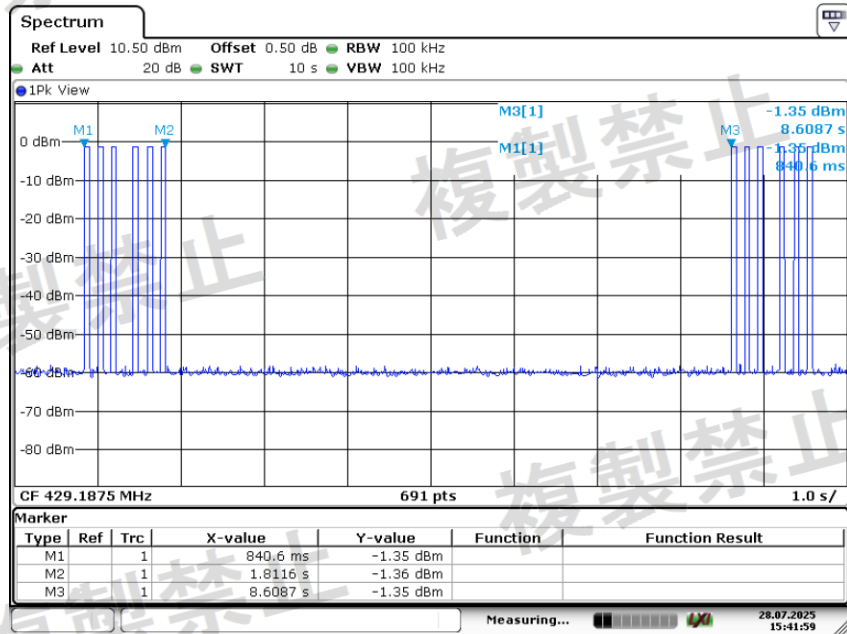


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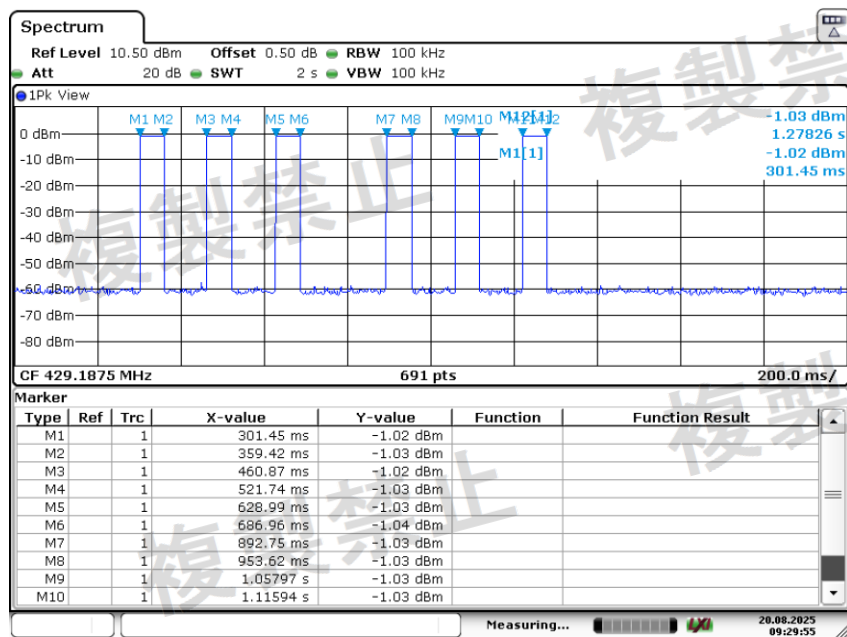


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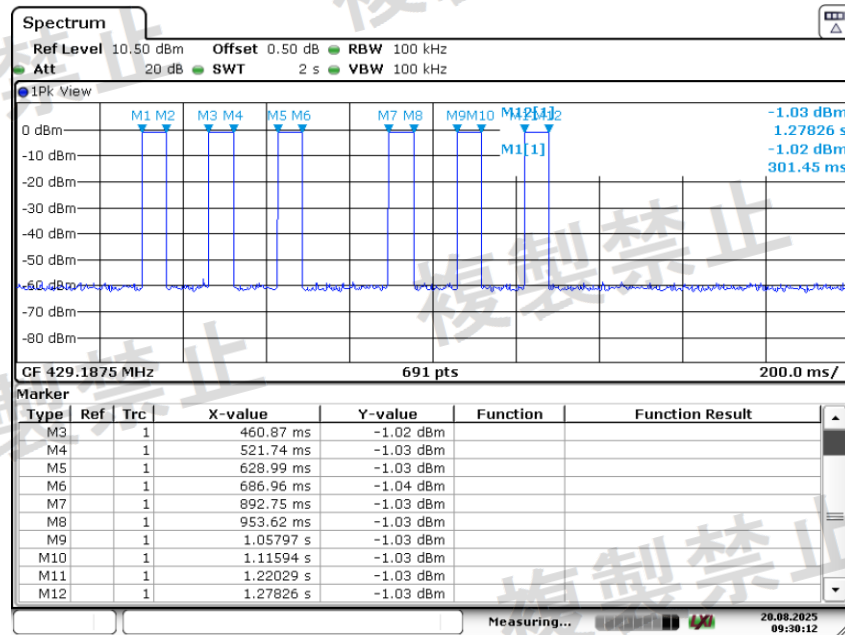
DC 5.5V



Date: 28.JUL 2025 15:41:59



Date: 20.AUG 2025 09:29:55



Date: 20.AUG.2025 09:30:12

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:	2025.07.28
Channel:	429.1875MHz
Test position:	Transmitting
Ambient temperature:	23.1°C
Relative humidity:	58.1%
Atmosphere Pressure:	1017.6 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 4.5V

Frequency (MHz)	Reading (MHz)	Reading (dBm)	Results (uW)	Scanning Bandwidth	Limit
429.1875	427.6650	-67.27	0.000187	30 to 428.1875MHz*1	2.5uW or below (-26.02dBm)
	858.3775	-53.27	0.004710	430.1875 to 1000MHz *1	2.5uW or below (-26.02dBm)
	2575.4000	-55.13	0.003069	1000 to 3000MHz	2.5uW or below (-26.02dBm)
	429.1250	-39.03*	0.125026	±1MHz Carrier Frequency *2 *3	2.5uW or below (-26.02dBm)
	429.2000	-38.13	0.153815	±62.5kHz Carrier Frequency *2 *4	2.5uW or below (-26.02dBm)

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

DC 5.0V

Frequency (MHz)	Reading (MHz)	Reading (dBm)	Results (uW)	Scanning Bandwidth	Limit
429.2	328.2670	-67.26	0.000188	30 to 428.1875MHz*1	2.5uW or below (-26.02dBm)
	858.3775	-53.32	0.004656	430.1875 to 1000MHz *1	2.5uW or below (-26.02dBm)
	2575.4000	-56.43	0.002275	1000 to 3000MHz	2.5uW or below (-26.02dBm)
	429.2500	-37.96*	0.159956	± 1MHz Carrier Frequency *2 *3	2.5uW or below (-26.02dBm)
	429.2000	-38.06	0.156315	± 62.5kHz Carrier Frequency *2 *4	2.5uW or below (-26.02dBm)

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

DC 5.5V

Frequency (MHz)	Reading (MHz)	Reading (dBm)	Results (uW)	Scanning Bandwidth	Limit
429.2	65.8620	-67.30	0.000186	30 to 428.1875MHz*1	2.5uW or below (-26.02dBm)
	858.3775	-53.40	0.004571	430.1875 to 1000MHz *1	2.5uW or below (-26.02dBm)
	2575.0000	-54.67	0.003412	1000 to 3000MHz	2.5uW or below (-26.02dBm)
	429.1250	-38.58*	0.138676	± 1MHz Carrier Frequency *2 *3	2.5uW or below (-26.02dBm)
	429.2000	-38.10	0.154882	± 62.5kHz Carrier Frequency *2 *4	2.5uW or below (-26.02dBm)

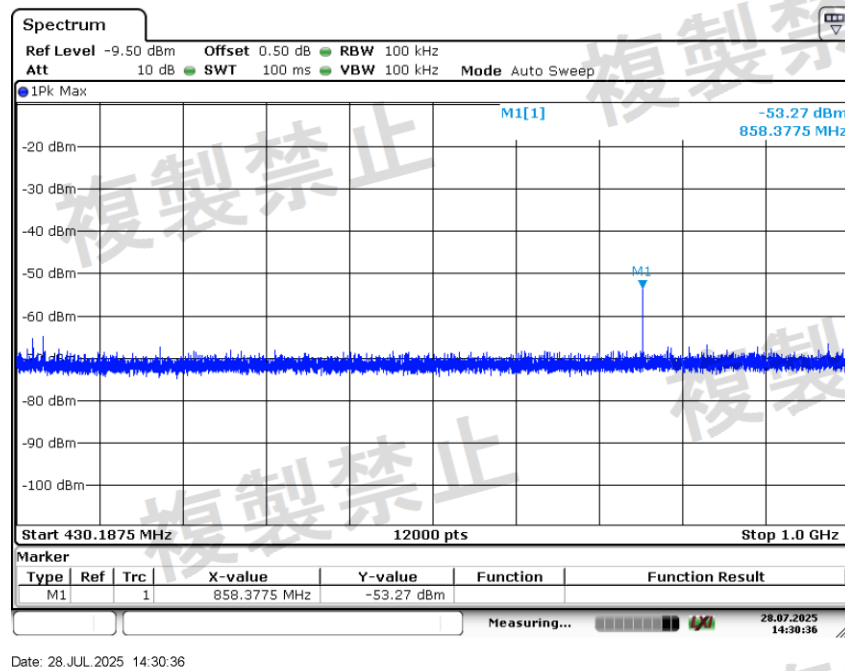
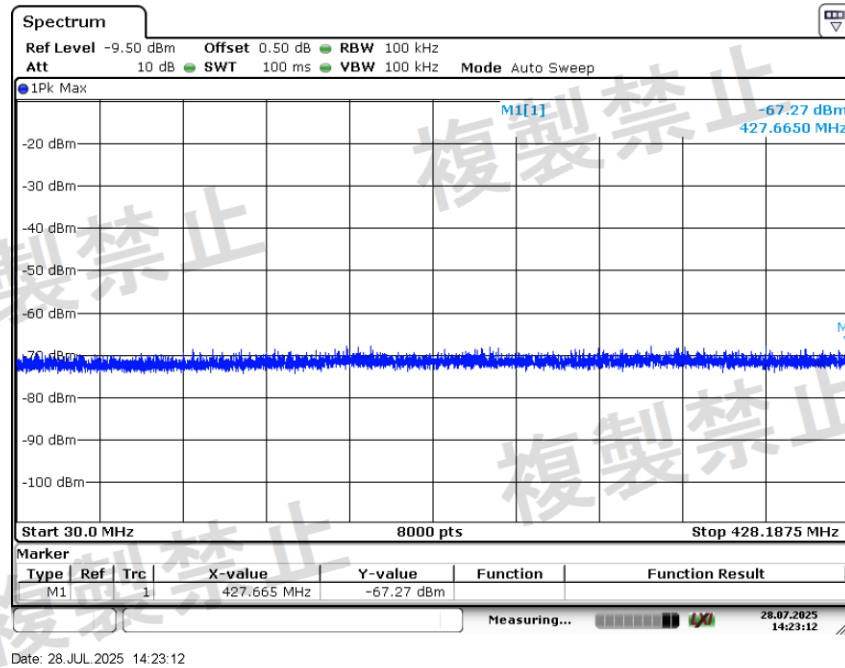
Note: "*" denotes for correction of RBW (+15.2dB for 3kHz).

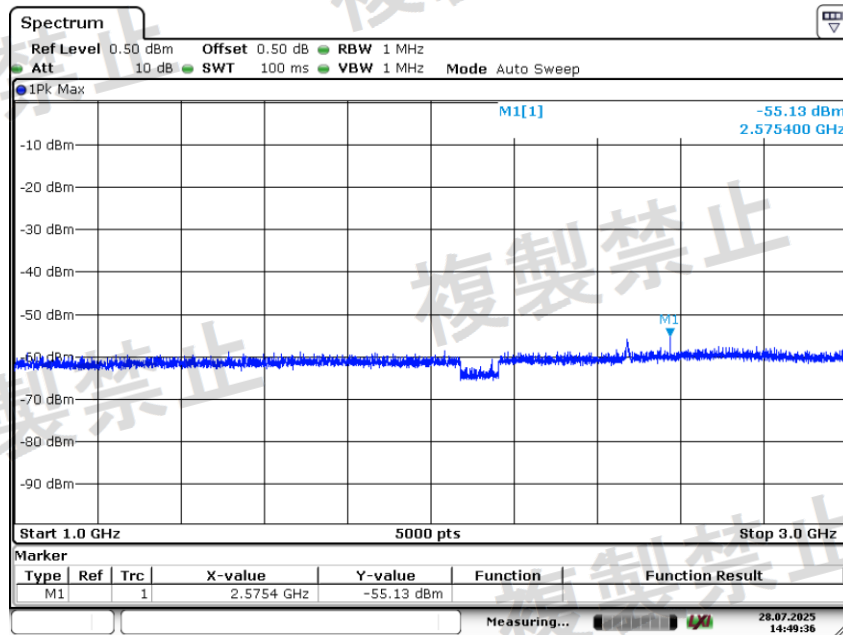
3.7.4 Result

The equipment met the requirement of this clause.

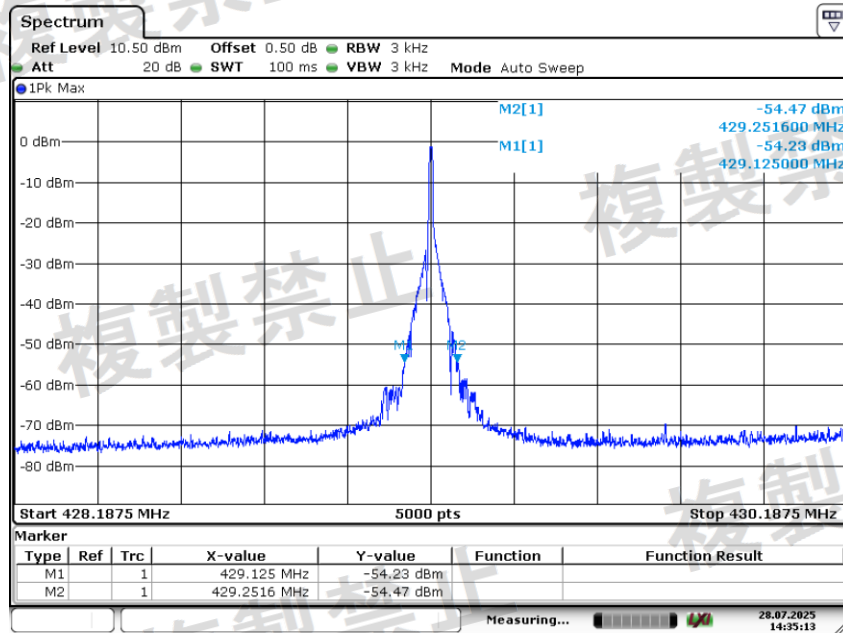
3.7.5 Test Graphs

DC 4.5V



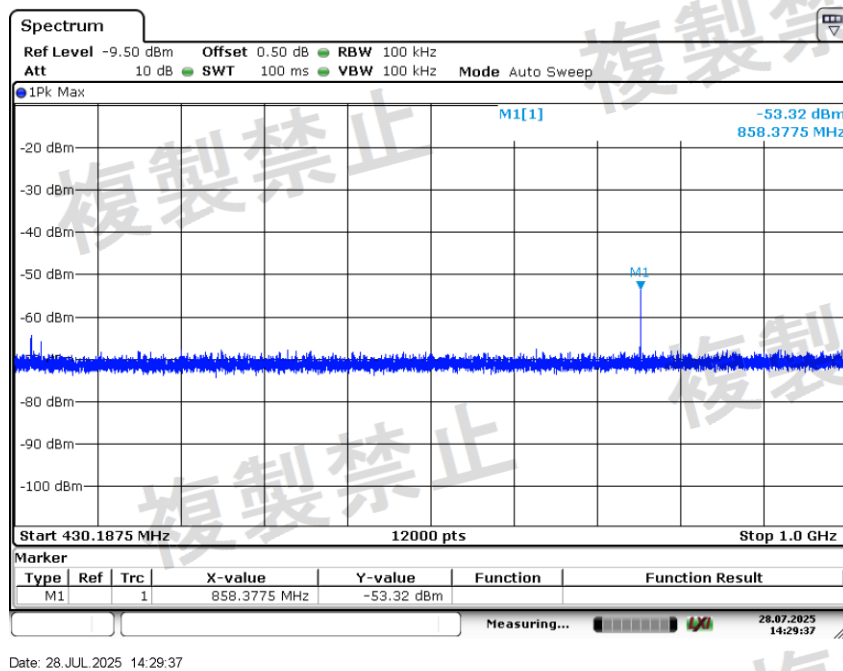
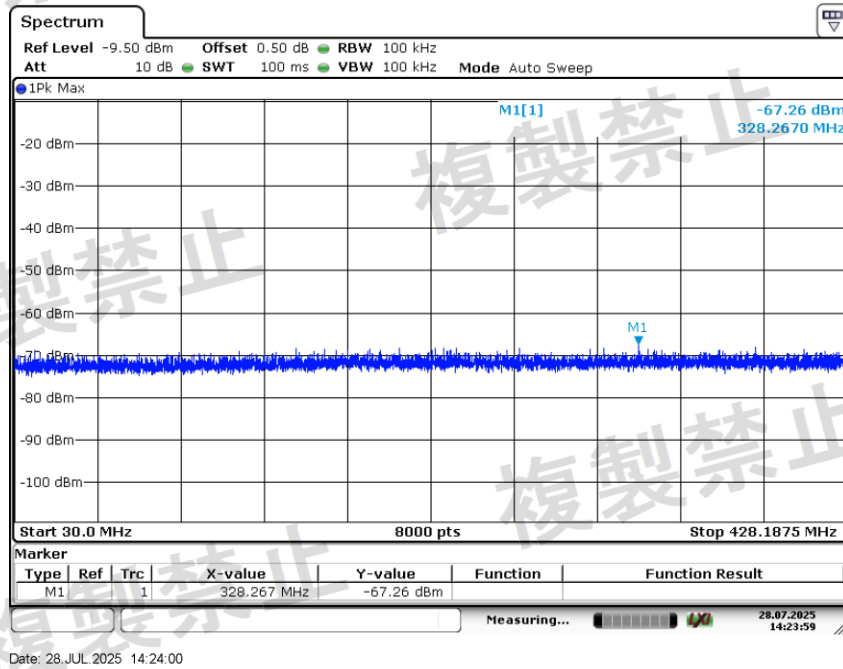


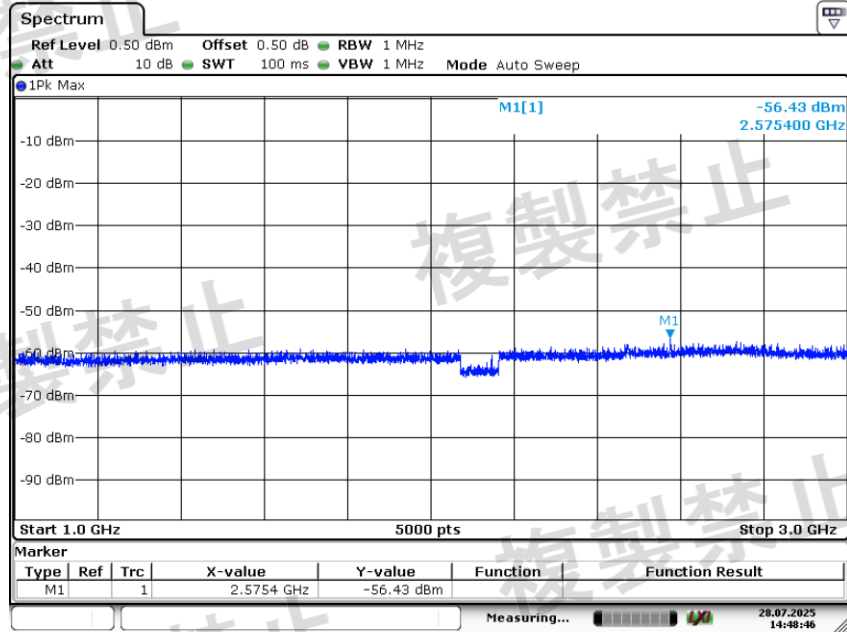
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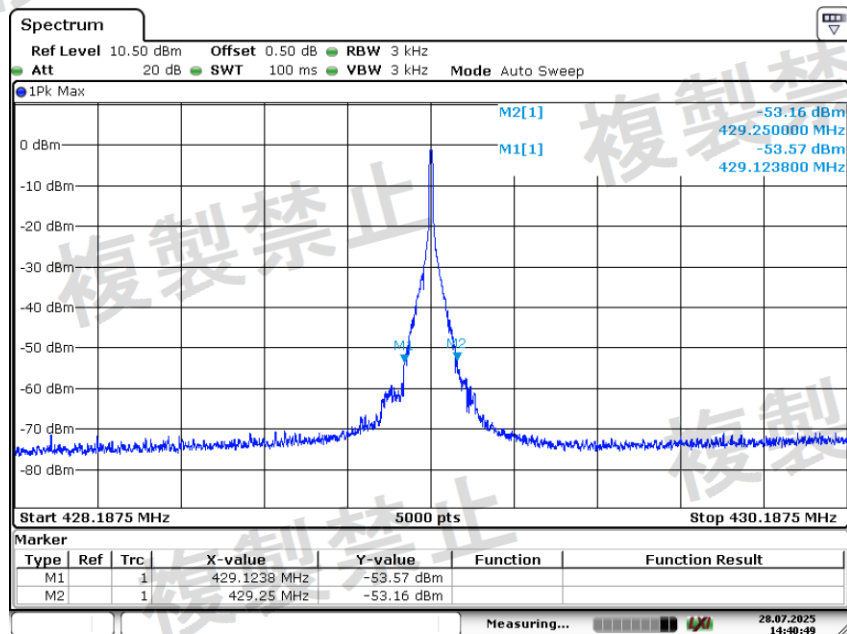
Date: 28. JUL 2025 14:35:13

DC 5.0V



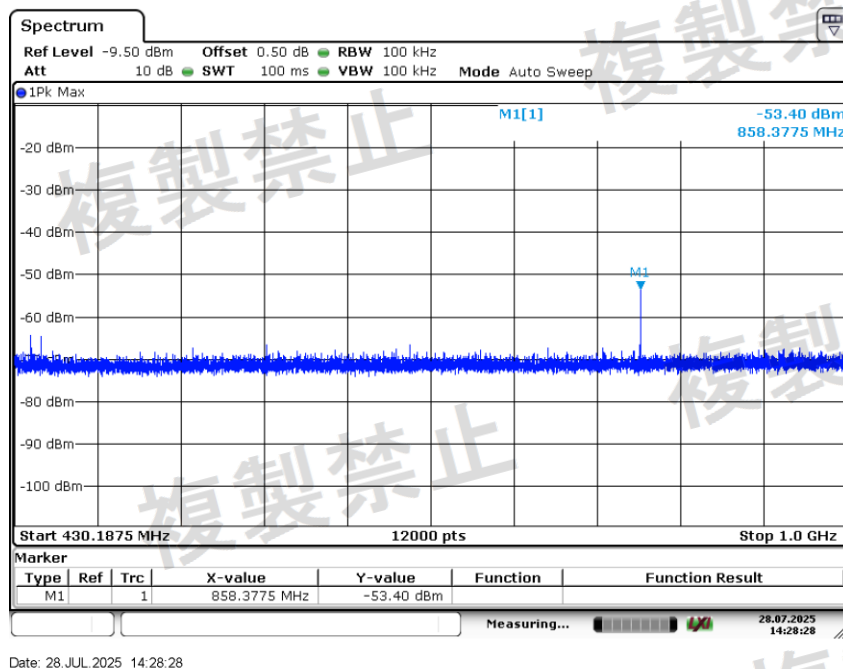
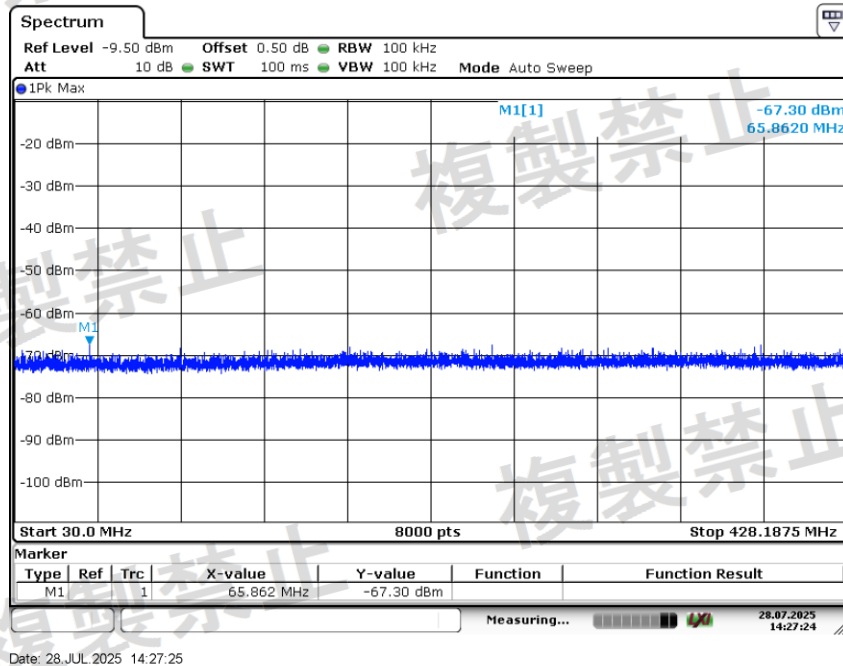


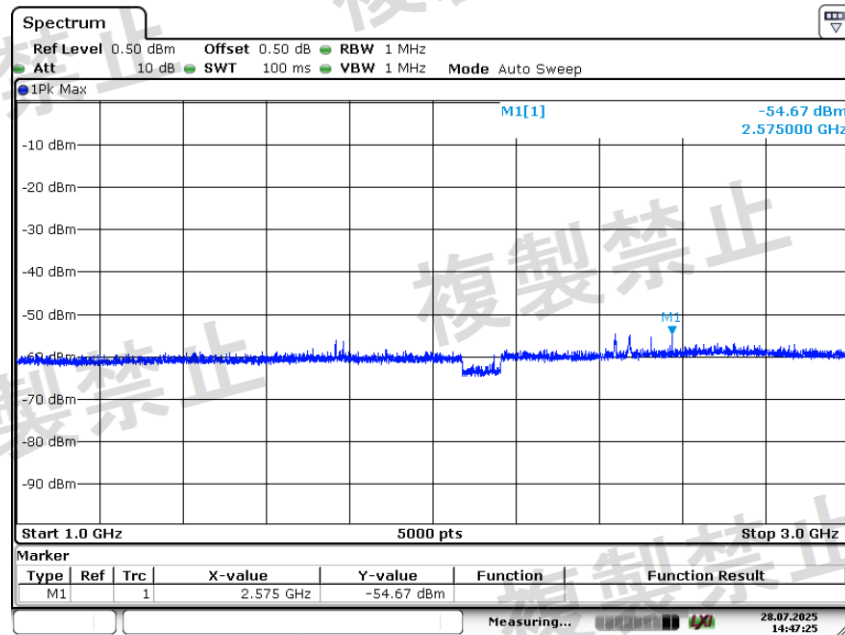
Date: 28 JUL 2025 14:48:46



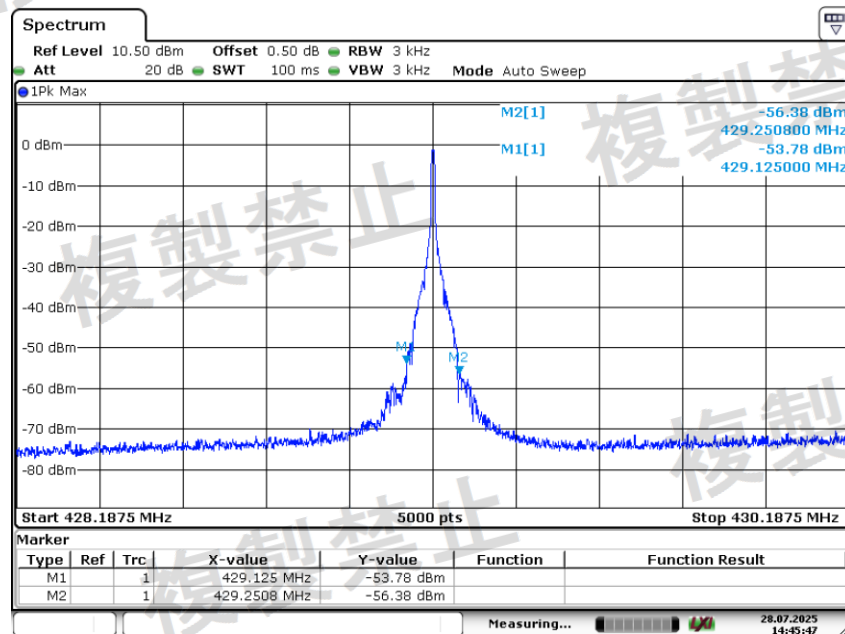
Date: 28 JUL 2025 14:40:49

DC 5.5V





Date: 28. JUL 2025 14:47:25



Date: 28. JUL 2025 14:45:48

3.8 Secondary Radiated Emissions Strength (Conducted) (For receiver)

3.8.1 Test condition

Date of testing:	2025.07.28
Channel:	429.1875MHz
Test position:	Receiving
Ambient temperature:	23.1°C
Relative humidity:	58.1%
Atmosphere Pressure:	1017.6 mBar

3.8.2 Limit

Frequency Range	Limit
30 to 1000MHz	4nW or below(-54dBm)
1000 to 3000MHz	4nW or below(-54dBm)

3.8.3 Test Result

DC 4.5V

Frequency (MHz)	Reading (MHz)	Reading (dBm)	Results (nW)	Scanning Bandwidth	Limit
429.1875	652.7160	-66.89	0.205	30 to 1000MHz	4nW or below (-54dBm)
	2731.000	-57.08	1.959	1000 to 3000MHz	4nW or below (-54dBm)

DC 5.0V

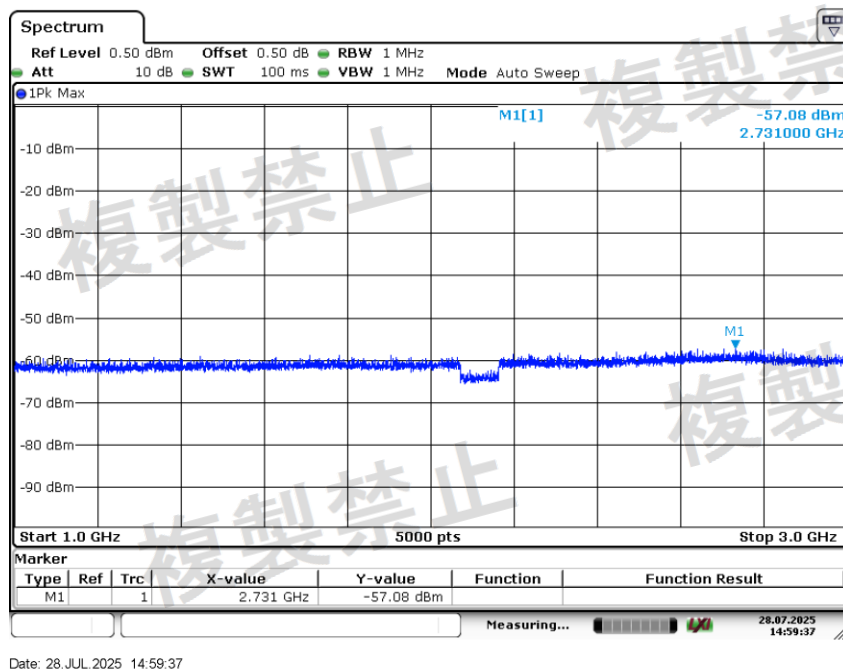
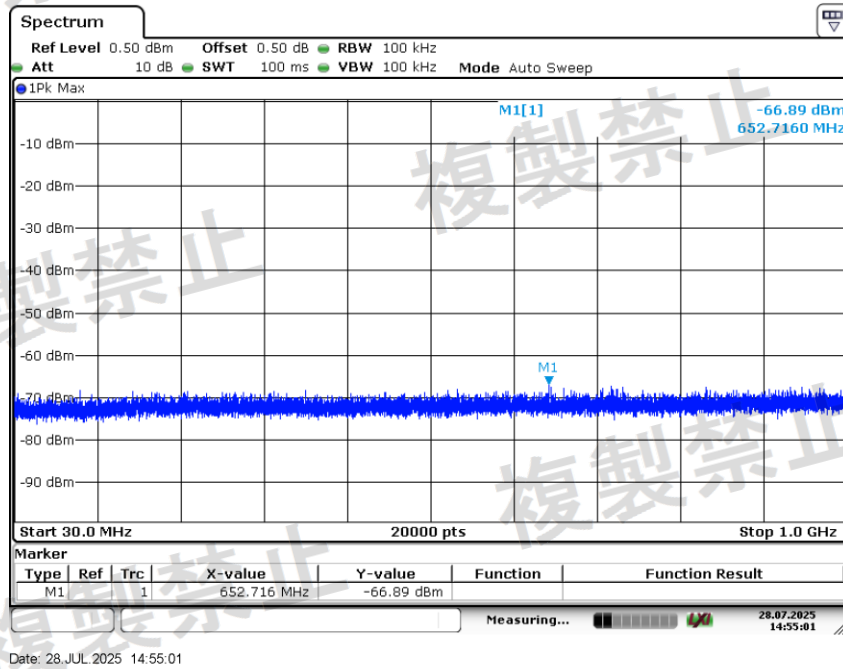
Frequency (MHz)	Reading (MHz)	Reading (dBm)	Results (nW)	Scanning Bandwidth	Limit
429.1875	883.7700	-66.31	0.234	30 to 1000MHz	4nW or below (-54dBm)
	2684.600	-56.77	2.104	1000 to 3000MHz	4nW or below (-54dBm)

DC5.5V

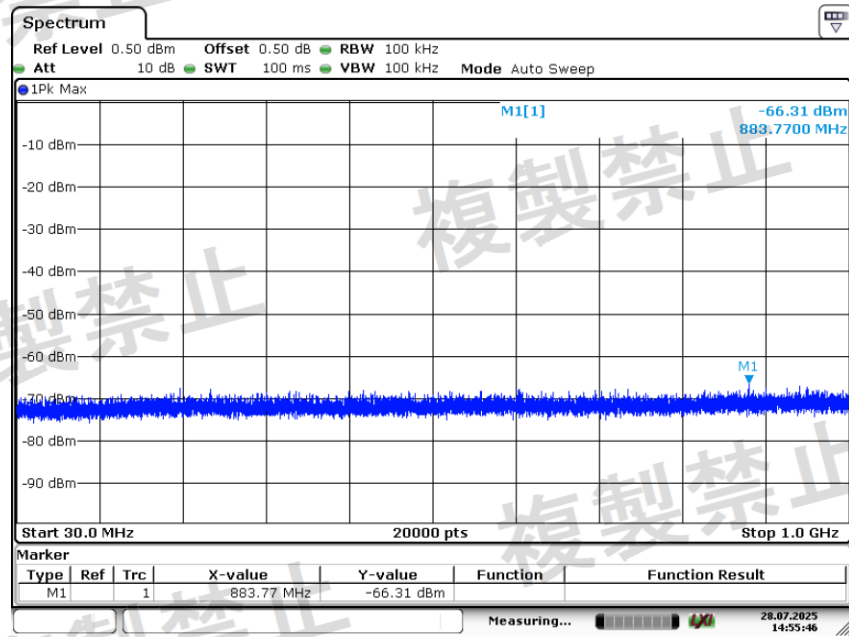
Frequency (MHz)	Reading (MHz)	Reading (dBm)	Results (nW)	Scanning Bandwidth	Limit
429.1875	657.4690	-66.79	0.209	30 to 1000MHz	4nW or below (-54dBm)
	2556.600	-57.22	1.897	1000 to 3000MHz	4nW or below (-54dBm)



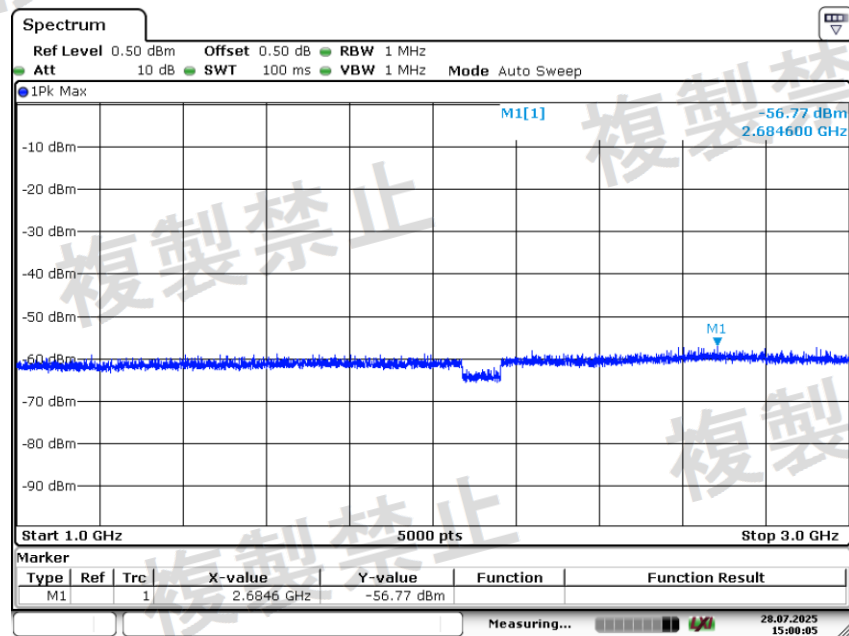
DC 4.5V



DC 5.0V

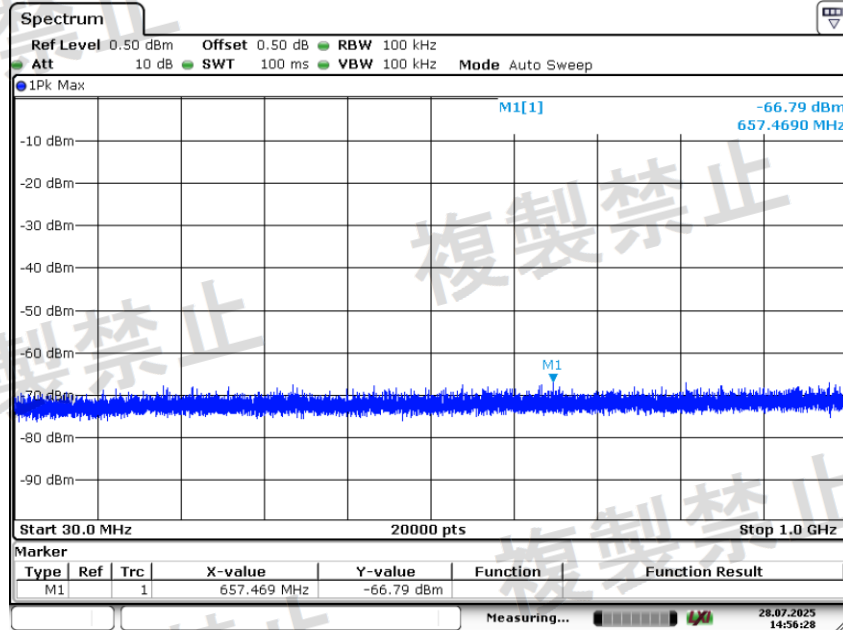


Date: 28 JUL 2025 14:55:46

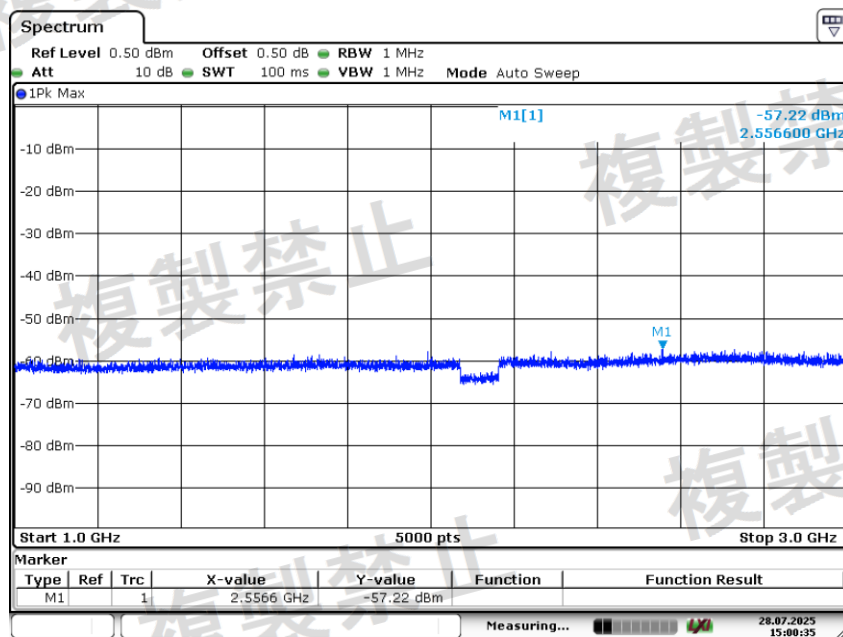


Date: 28 JUL 2025 15:00:06

DC 5.5V



Date: 28.JUL.2025 14:56:29



Date: 28.JUL.2025 15:00:35

3.9 Carrier Sensing Function

3.9.1 Test condition

Date of testing:	2025.08.10
Channel:	429.1875MHz
Test position:	Receiving
Ambient temperature:	23.1°C
Relative humidity:	58.1%
Atmosphere Pressure:	1017.6 mBar

3.9.2 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.

3.9.3 Test Result

Test Condition	Test Frequency	Limit	Result
NTNV	429.1875MHz	-96dBm	Pass
NTLV	429.1875MHz	-96dBm	Pass
NTHV	429.1875MHz	-96dBm	Pass

3.9.4 Result

The equipment met the requirement of this clause.

4 Photographs of Test Set-ups

