



JAPAN RADIO TEST REPORT

Client Information:			
Applicant:	Shoutou CO., LTD		
Applicant add.:	2333 Komatsuri Kishiwada Osaka Japan		
Product Information:			
Product Name:	Wireless Carplay		
Model No.:	DA-AD		
Derivative model No.:	DA-AD01, Y1, Y2, Y3, Y4, Y6, Y7, Y8, Y9, Y10, Y11		
Brand Name:	N/A		
Report No.:	CTT2025031707R21T-02		
Standards:	Item 19 of Article 2 Paragraph 1 MIC public notice 88:2004, annex 43		
Prepared By:			
Shenzhen C-link Testing & Technology Co., Ltd.			
Add. : No.709, Enhai Building, No.1 Hangkong Road, Sanwei Community, Hangcheng Street, Bao 'an District, Shenzhen, Guangdong, China			
Date of Receipt:	Mar. 17, 2025	Date of Test:	Mar. 17, 2025~ Mar. 31, 2025
Date of Issue:	Mar. 31, 2025	Test Result:	Pass
This device has been tested and found to comply with the stated standard(s) above, which is (are) applicable only to the tested sample identified in the report. Note: This report shall not be reproduced except in full, without the written approval of Shenzhen C-link Testing & Technology Co., Ltd. this document may be altered or revised by Shenzhen C-link Testing & Technology Co., Ltd. personal only, and shall be noted in the revision of the document. This test report must not be used by the client to claim product endorsement.			
Reviewed by:	Mary Ye	Approved by:	Brown Lu





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2 Test Summary

Test	Test Requirement	Limit/Severity	Result
Antenna Requirement	Item 19 of Article 2-1	Notice 88 Appendix 43,B-1 (1)&(2)	PASS
Test frequency	Item 19 of Article 2-1	Notice 88 Appendix 43, A-3	PASS
Frequency Error	Item 19 of Article 2-1	±50 PPM or less	PASS
Occupied Bandwidth	Item 19 of Article 2-1	OFDM : 40MHz or less DSSS : 26MHz or less	PASS
Spread-spectrum Bandwidth	Item 19 of Article 2-1	Only for reported	PASS
Antenna Power	Item 19 of Article 2-1	0.01W /MHz or less Error + 20%	PASS
Spurious Emission of Tx	Item 19 of Article 2-1	(1) Below 2387 MHz : -26dBm (2) 2387 to 2400 MHz : -16dBm (3) 2483.5 through 2496.5 MHz : -16dBm (4) Over 2496.5 MHz : -26dBm	PASS
Interference prevention capability	Item 19 of Article 2-1	Notice 88 Appendix 43	PASS
RF accessibility	Item 19 of Article 2-1	Notice 88 Appendix 43	PASS
Spurious Emission of Rx	Item 19 of Article 2-1	(1) Below 1 GHz: -54dBm (2) 1GHz or higher: -47dBm	PASS
Carrier sense function①	Item 19 of Article 2-1	/	N/A, Note2
Carrier sense function②	Item 19 of Article 2-1	/	PASS Note3

Remark:

Note 1:EUT: In this whole report EUT means Equipment Under Test.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radio Frequency.

Item 19 of Article 2 Paragraph 1

Note 2: Not apply to this device, since EIRP does not require compensation through Antenna Power.

Note3: Apply for 802. 11n40 which the Occupied bandwidth within 26MHz 40MHz

2.1 Measurement Uncertainty

The report uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty Multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

No.	Item	Uncertainty
1	Frequency Error / 99% & 90% Bandwidth	$\pm 0.85 \times 10^{-7}$
2	Antenna Power	± 0.70 dB



3	Spurious Emissions	± 0.80 dB
4	DC / AC Power Source	$\pm 1.4\%$



3 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2025-03-31		Original

3.1 Test Location

All tests were performed at:

Shenzhen C-link Testing &Technology Co., Ltd.
No.709, Enhai Building, No.1 Hangkong Road, Sanwei Community, Hangcheng Street,
Bao 'an District, Shenzhen, Guangdong, China



4 General Information

Manufacturer:	shenzhen elebest technology (HK) Co., LTD
Manufacturer Address:	6th Floor, Building 5, Guole Science and Technology Park, No. 1 Lirong Road, Dalang Street, Longhua New District, Shenzhen
Product Name:	Wireless Carplay
Model No.:	DA-AD
Brand Name:	N/A
Derivative model No.:	DA-AD01, Y1, Y2, Y3, Y4, Y6, Y7, Y8, Y9, Y10, Y11
Operating Frequency	2412 MHz to 2472 MHz
Type of Modulation:	802.11b: DSSS(CCK/QPSK/BPSK) 802.11g/n: OFDM(BPSK/QPSK/16QAM/64QAM)
Transmit Data Rate:	802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps
Number of Channels	13 Channels for 802.11b/g/n (HT20) 9 Channels for 802.11n (HT40)
Channel Separation:	5 MHz
Antenna Type	PCB Antenna
Antenna gain:	2.03dBi
Normal antenna power:	802.11b:4.0 mW/MHz 802.11g:3.0 mW/MHz 802.11n(HT20):3.0 mW/MHz 802.11n(HT40): 2.0 mW/MHz
Power Supply Range:	DC 5V
Normal Test Voltage:	The same as above
Hard Ware Version:	C85124N_V1.1-20241218
Soft Ware Version:	24112501.C01P
Model difference:	All the model are the same circuit and RF module, Only the model name are different.



4.1 EUT Peripheral List

No.	Equipment	Manufacturer	Model No.	Serial No.	Power cord	Signal cord
1	N/A	N/A	N/A	N/A	N/A	N/A

4.2 Test Peripheral List

No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	Signal cord
1	Computer	Lenovo	N/A	TP00076A	N/A	N/A	N/A
3	USB Line	UGREEN	N/A	USB3.0	N/A	N/A	N/A

5 Equipment Used during Test

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date	Cal. Lab
1	SIGNAL Analyzer	Keysight	N9020A	MY53300466	2025.01.17	2026.01.16	Guangdong LiSai
2	RF Automatic Test System	MWRFTest	MV1 00-RFCB	/	2025.01.17	2026.01.16	

Remark:

(a) Calibration conducted by the National Institute of Information and Communications Technology (NICT) in Japan (hereinafter referred to as "NICT") or a designated calibration agency under Article 102-18 paragraph (1) in JRL.

(b) Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Act (Act No. 51 of 1992) .

(c) Calibration conducted in countries except Japan, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).

(d) Calibration, etc. conducted by using measuring instruments and other equipment listed in the right column of appended table No. 3, which shall have been given any type of calibration, etc. listed above from (a) to (C)

From JRL Article 24-2, paragraph 4, Item 2



6 Test Results

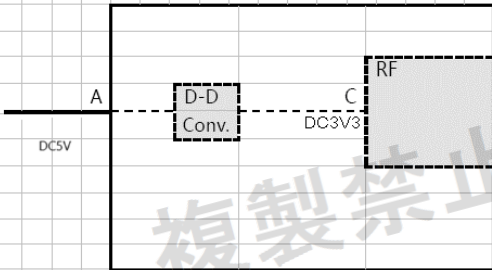
6.1 Radio Technical Requirements Specification

Table 1: Radio Technical Requirements Specification for 2.4 GHz band wide-band low-power data communication system (Item 19 of Article 2-1)

Items	Technical standard
Assigned frequency or designated frequency	2,400-2,483.5MHz
Communication method	One-way communication, simplex, semi-duplex, or duplex operation of digital signal transmission including spread spectrum
Tolerance of frequency ($\times 10^{-6}$)	± 50
Tolerance of occupied bandwidth	FH : 83.5MHz or less FH + DS : 83.5MHz or less FH + OFDM : 83.5MHz or less OFDM : 40MHz or less Others : 26MHz or less
Antenna power	Designated value (1) FH, FH+DS , FH+OFDM: 3mW/MHz (used in the range of 2400 – 2483.5 MHz) (2) OFDM , DS other than (1) 10mW/MHz (3) Other than (1) & (2) 10mW (4) OFDM OBW 26 -40MHz: 5mW/MHz Tolerance:+20%
Antenna gain	1) 12.14 dBi or less in principle 2) In case of directional antenna (1) FH, FH+DS or FH+OFDM using 2400 – 2483.5 MHz EIRP $\leq$ 16.91 dBm/MHz (2) OFDM or DS other than (1) EIRP $\leq$ 22.14 dBm/MHz (3) Other than (1) and (2): 22.14 dBm or less (4) OFDM OBW 26 - 40MHz: 19.14dBm/MHz (5) Half-power angle of directional antenna (e) in case of the item 2): $e \leq 360/A$ (The A is 10 in maximum.)
Tolerance of spurious emission intensity	(1) Below 2387 MHz : 2.5 μ W (2) 2387 to 2400 MHz : 25 μ W (3) 2483.5 through 2496.5 MHz : 25 μ W (4) Over 2496.5 MHz : 2.5 μ W
Spreading bandwidth	Only for reported
Spreading rate of spectrum	For DS system; (Spreading bandwidth) / (Frequency corresponding to transmission rate) ≥ 5
Limit of secondary radiated emissions	(1) Below 1 GHz : 4 nW (2) 1 GHz or higher : 20 nW
Interference prevention function	Shall have the function of automatic transmission and reception of identification sign.
Structure	Shall be of the structure that the RF and modulator sections excluding antenna cannot easily be opened.
Note	DS: Direct spread FH: Frequency hopping OFDM: Orthogonal frequency division multiplexing



6.2 E.U.T. Test Conditions

Power supply:	The EUT has the input voltage to the circuit of RF unit complies with output voltage limitation ($\pm 1\%$) against input voltage fluctuation ($\pm 10\%$). So, all measurements were conducted at only rated voltage DC 5V.								
	All measurements were performed by rated voltage DC 5V.								
	 Test below: 1: The fluctuation of C point is under $\pm 1\%$, when input voltage from A point to the test equipment is fluctuated by $\pm 10\%$.								
	The measurement result of the voltage fluctuation at RF circuit when DC 5V $\pm 10\%$ <table><thead><tr><th>DC 5V</th><th>DC3V3</th></tr></thead><tbody><tr><td>5V</td><td>3.33V</td></tr><tr><td>5.5V</td><td>3.33V</td></tr><tr><td>4.5V</td><td>3.33V</td></tr></tbody></table> Pre-test the EUT in all voltage mode at the DC 5.5V, DC 5V and DC4.5V and conducted to determine the worst-case mode, only the worst-case results (DC 5V) are recorded in this report. The EUT has the input voltage to the circuit of RF unit complies with output voltage limitation ($\pm 1\%$) against input voltage fluctuation ($\pm 10\%$). So, all measurements were conducted at only rated voltage DC 5V.	DC 5V	DC3V3	5V	3.33V	5.5V	3.33V	4.5V	3.33V
DC 5V	DC3V3								
5V	3.33V								
5.5V	3.33V								
4.5V	3.33V								
Temperature:	25.0 °C								
Humidity:	75 % RH								
Atmospheric Pressure:	1013 mbar								
Test frequencies:	If the EUT can be set to 3 or more different (carrier) frequencies in 1 allocated band, testing shall be performed using the Lowest, Middle and the Highest frequency (L, M and H). If there are 2 or fewer frequencies, testing shall be performed with the available frequencies.								
EUT channels and frequencies list:									



Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	12	2467
6	2437	13	2472
7	2442	/	/

Remark:

- Test frequencies are lowest channel: 2412 MHz, middle channel: 2442 MHz and highest channel: 2472 MHz for 802.11b/g/n (HT20)
Test frequencies are lowest channel: 2422 MHz, middle channel: 2442 MHz and highest channel: 2462 MHz for 802.11n (HT40)

6.3 Antenna Requirement

Standard requirement

Applicable for equipment with an antenna terminal, including testing terminals) If an antenna connector is available, all relevant tests will be carried out conducted. If not, tests will be carried out in an anechoic room or with a suitable test-fixture.

EUT Antenna

The antenna is integrated inside the EUT and no consideration of replacement. The best case gain of the antenna is 2.03dBi.

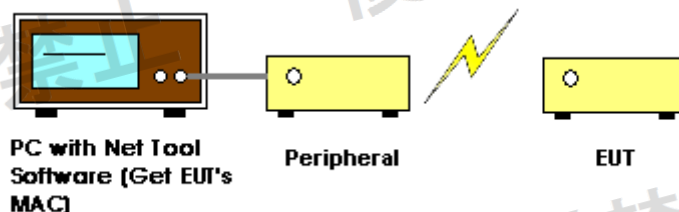


Antenna

Result: All relevant tests will be carried out conducted.

6.4 Interference Prevention Function

The device consists of the PCB antenna and 2.4 GHz WIFI IC; Component IC CPU also can use the protocol function to protect interference come from outside.



Test Procedure:

1. In the case that the EUT has the function of automatically transmitting the identification code: a. Transmit the predetermined identification codes form EUT. b. Check the transmitted identification codes with the demodulator.
2. In the case of receiving the identification ocde: a. Transmit the predetermined identification codes form the counterpart. b . Check if communication is normal. c. Transmit the signals other than predetermined ID codes form the counterpart. d. check if the EUT stops the transmission, or if it displays that idnetification codes are different from the predetermined ones.

Test Results:

MAC Address: 28: D2: 43: 60: 7C: A5

Test result: The unit does meet the requirements.



6.5 Frequency Error

Test Requirement:	Item 19 of Article 2-1
	Tolerance of frequency: $\pm 50 \times 10^{-6}$
Temperature:	25.0 °C
Humidity:	75 % RH
Atmospheric Pressure:	1013 mbar
Test Status:	Test the EUT in transmitting mode with modulation.
Test Configuration:	
 <pre>graph LR; PC[PC] --> EUT[EUT]; EUT --> SA[Spectrum Analyzer]</pre>	
Test Procedure:	
1. Test Conditions:	
	Frequency Counter or Spectrum Analyzer is used for measurement.
2. EUT conditions:	
	Modulation/Spread/Hopping ON, CW Tx
3. Spectrum Analyzer conditions:	
	Frequency: Test Frequency Span 1MHz RBW 10 kHz (Modulation OFF), VBW 30 kHz (Modulation OFF), Sweep Time Auto Detector mode Positive peak Indication mode Max hold



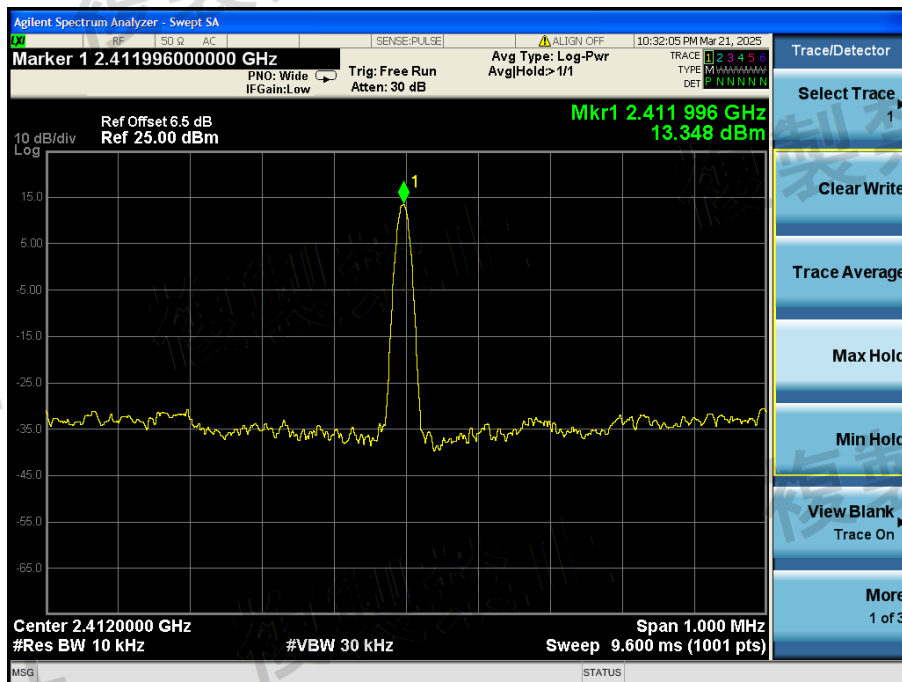
Test result:

Test Frequency (MHz)	Test Result	Unit	Limit
	Normal Voltage DC 5V		
2412.0	2411.996	MHz	±50 PPM or less
	-1.66	PPM	
2422.0	2421.994	MHz	
	-2.48	PPM	
2442.0	2441.995	MHz	
	-2.05	PPM	
2462.0	2461.993	MHz	
	-2.84	PPM	
2472.0	2471.994	MHz	
	-2.43	PPM	

Note: The nominal frequency shall be confirmed by the applicant and test lab.

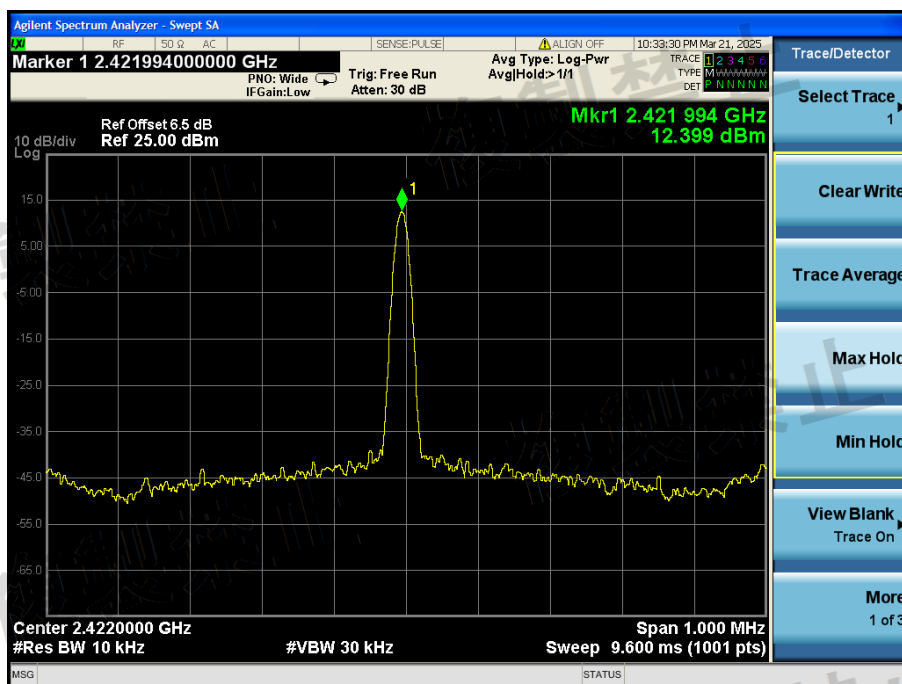
Result plot as follows:

Channel: 2.412GHz:

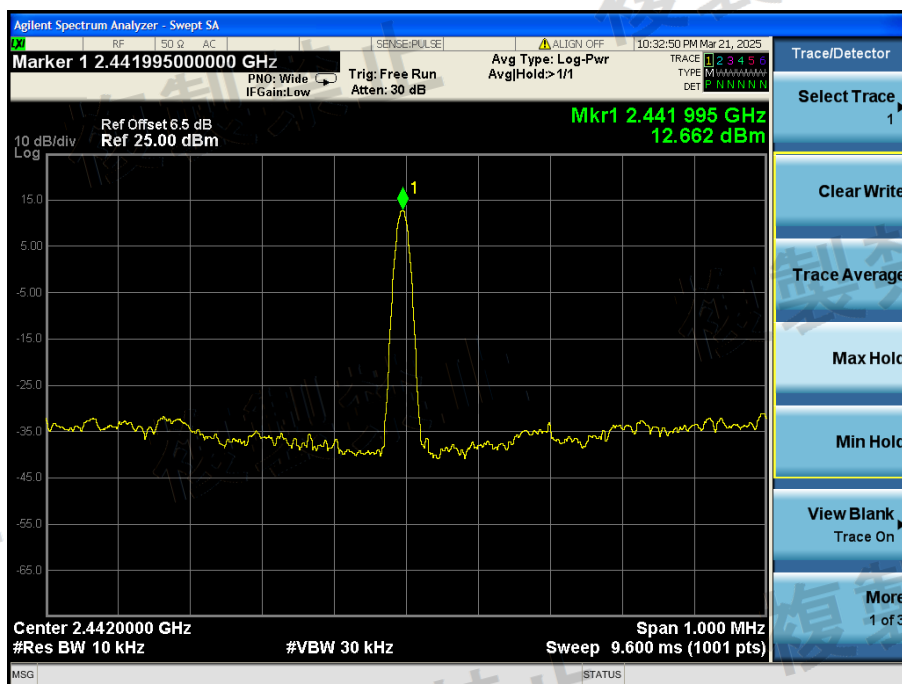




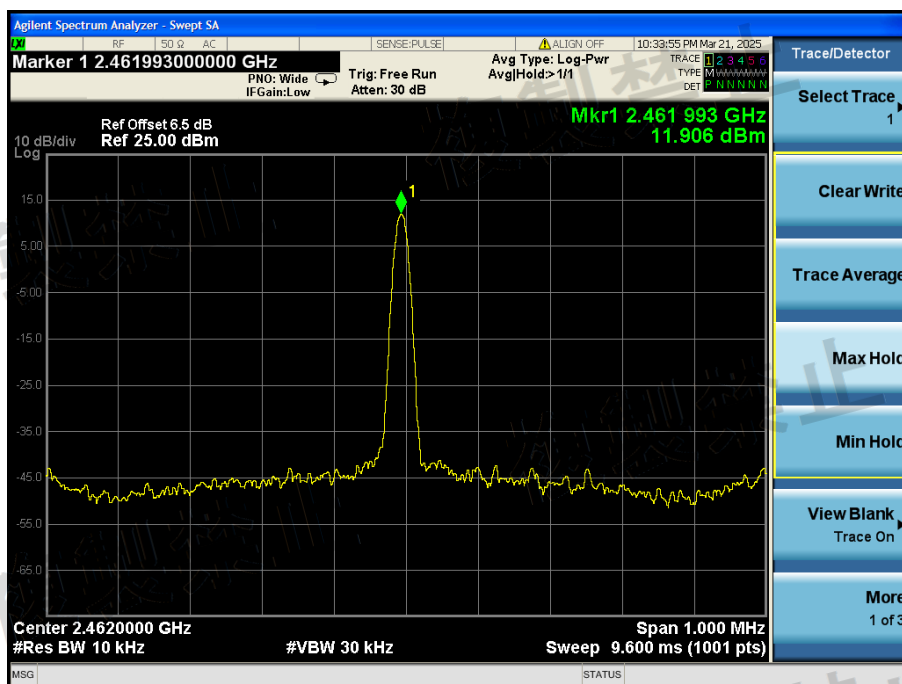
Channel: 2.422GHz:



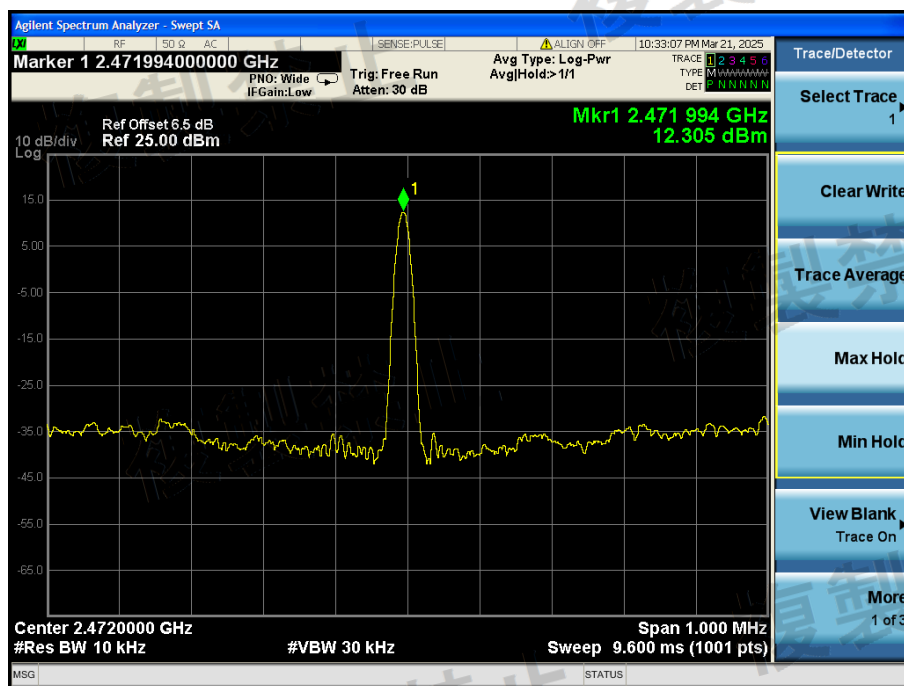
Channel : 2.442GHz:



Channel: 2.462GHz



Channel : 2.472GHz:



Test result: The unit does meet the requirements.



6.6 Occupied Bandwidth (99%)

Test Requirement:	Item 19 of Article 2-1
	OFDM :40 MHz or less DSSS : 26 MHz or less
Temperature:	25.0 °C
Humidity:	75 % RH
Atmospheric Pressure:	1013 mbar
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.
Test Configuration:	
<pre>graph LR; PC[PC] --> EUT[EUT]; EUT --> SA[Spectrum Analyzer]</pre>	
Test Procedure:	
1. Test Conditions:	
	Spectrum Analyzer is used for measurement.
2. EUT conditions:	
	Modulation/Spread/Hopping ON For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.
3. Spectrum Analyzer conditions:	
	Frequency: Test Frequency Span 40/80MHz (DSSS,OFDM) RBW 300 kHz VBW 300 kHz Sweep Time Auto detector mode Positive peak Indication mode Max hold OBW 99%

**Test result:****802.11b:**

Test channel	Test Frequency (MHz)	Test Result	Unit	Limit
		Normal Voltage DC 5V		
Lowest	2412.0	13.310	MHz	26 MHz or less
Middle	2442.0	13.392	MHz	
Highest	2472.0	13.371	MHz	

802.11g:

Test channel	Test Frequency (MHz)	Test Result	Unit	Limit
		Normal Voltage DC 5V		
Lowest	2412.0	16.605	MHz	40 MHz or less
Middle	2442.0	16.571	MHz	
Highest	2472.0	16.622	MHz	

802.11n(HT20):

Test channel	Test Frequency (MHz)	Test Result	Unit	Limit
		Normal Voltage DC 5V		
Lowest	2412.0	17.598	MHz	40 MHz or less
Middle	2442.0	17.607	MHz	
Highest	2472.0	17.641	MHz	

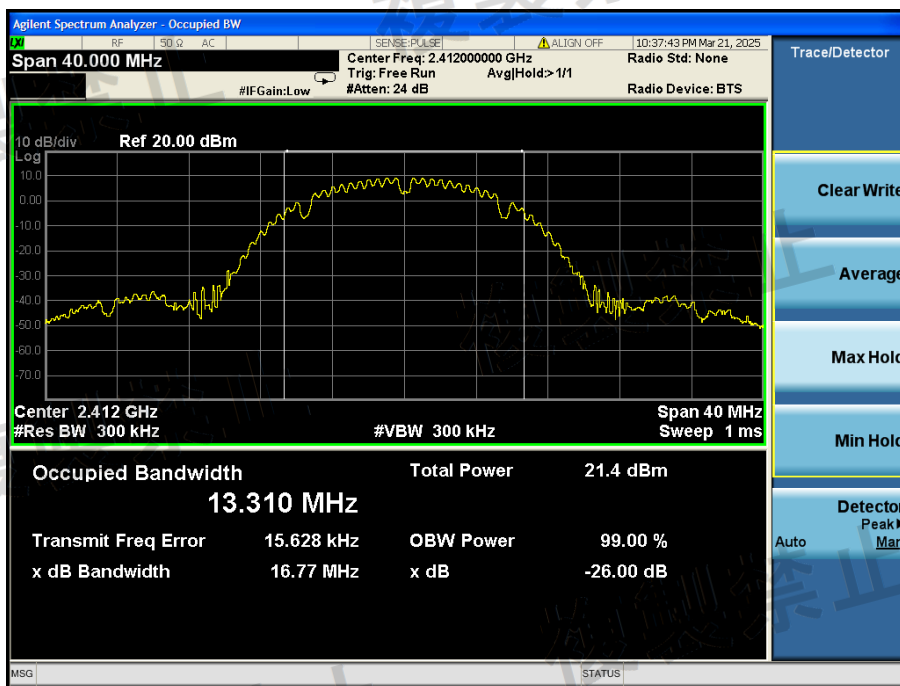
802.11n(HT40):

Test channel	Test Frequency (MHz)	Test Result	Unit	Limit
		Normal Voltage DC 5V		
Lowest	2422.0	36.162	MHz	40 MHz or less
Middle	2442.0	36.102	MHz	
Highest	2462.0	36.198	MHz	

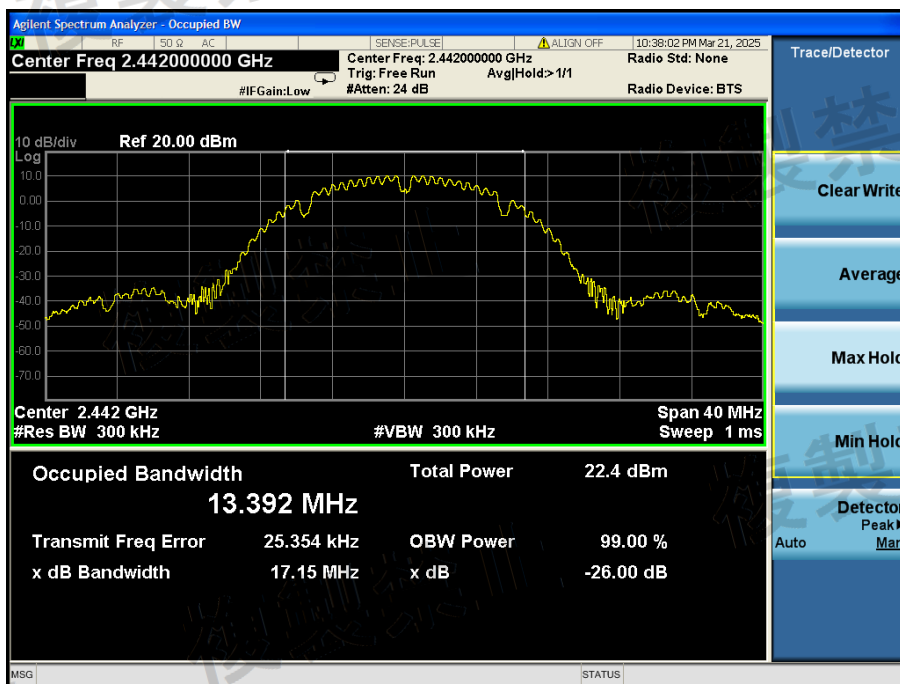
Result plot as follows:

802.11b:

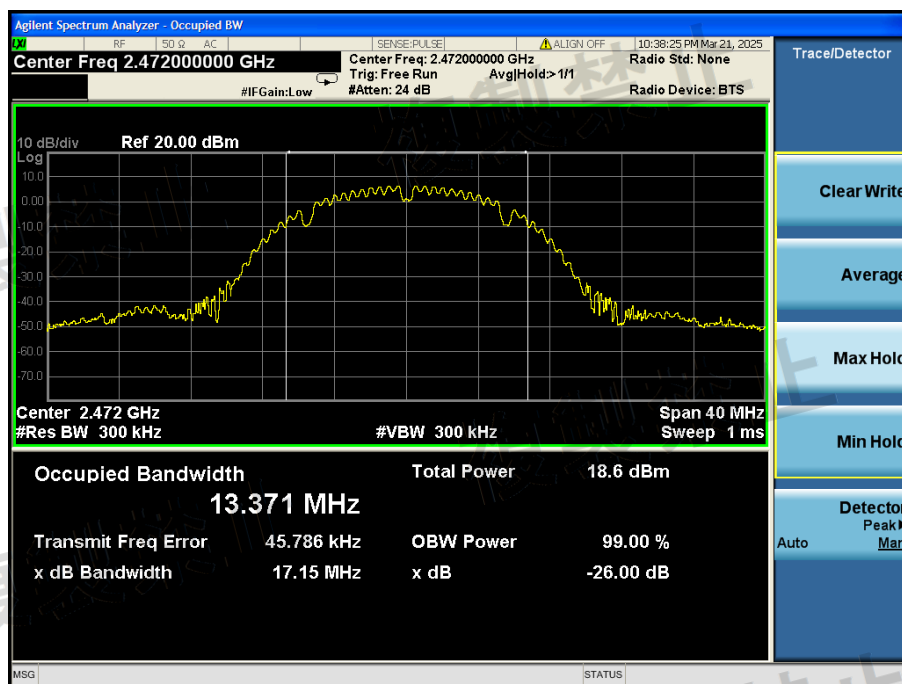
Channel 1: 2.412 GHz:



Channel 7: 2.442 GHz:

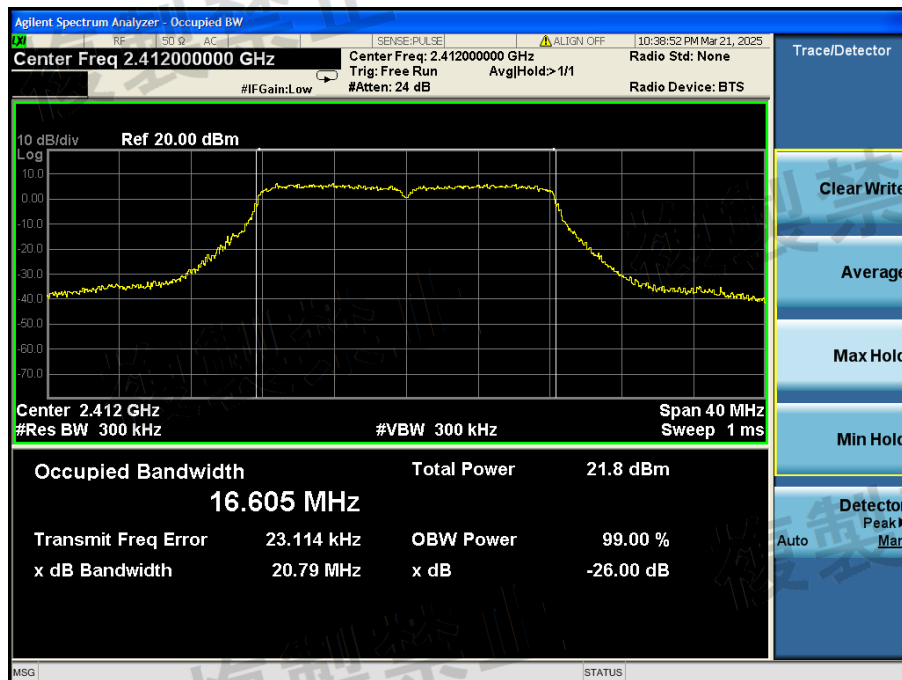


Channel 13: 2.472GHz:

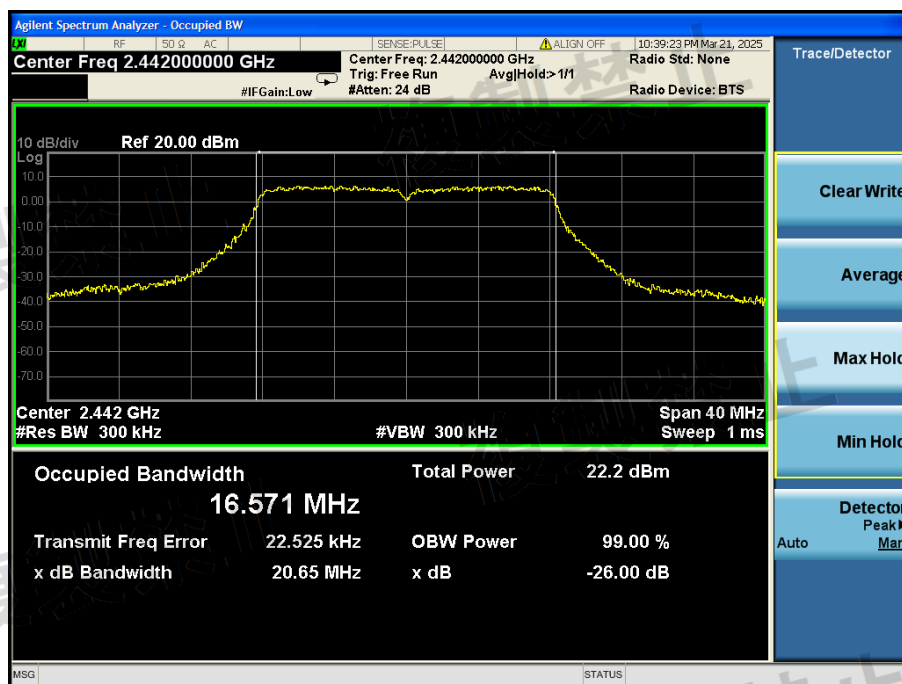


802.11g:

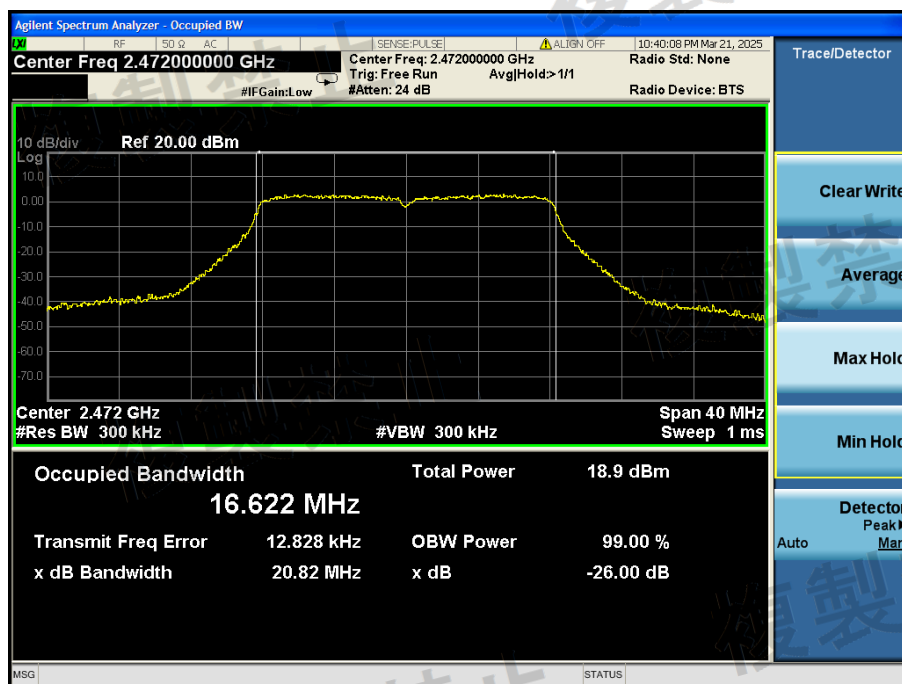
Channel 1: 2.412 GHz:



Channel 7: 2.442 GHz:

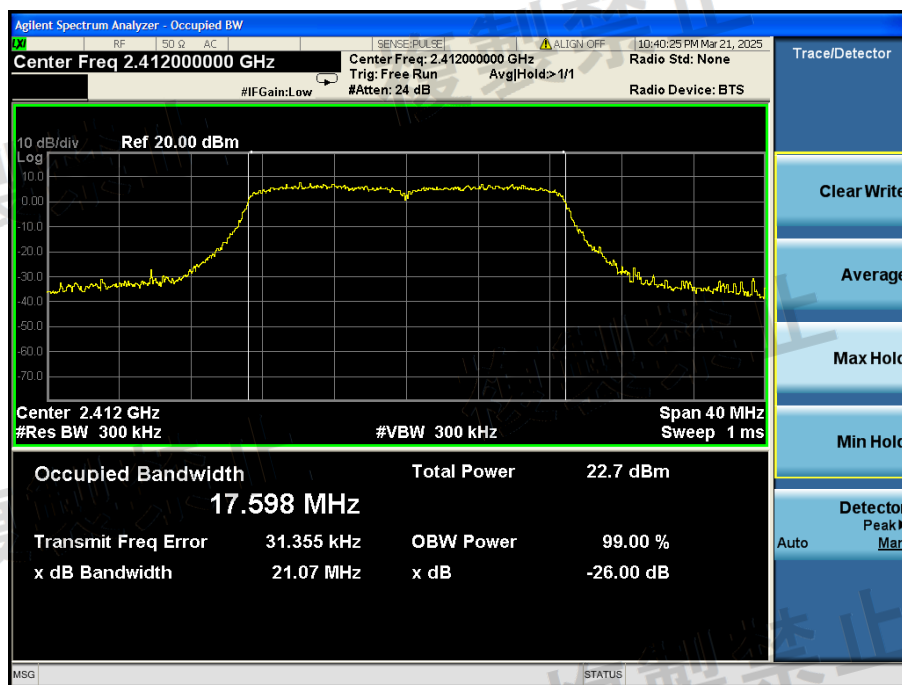


Channel 13: 2.472GHz:

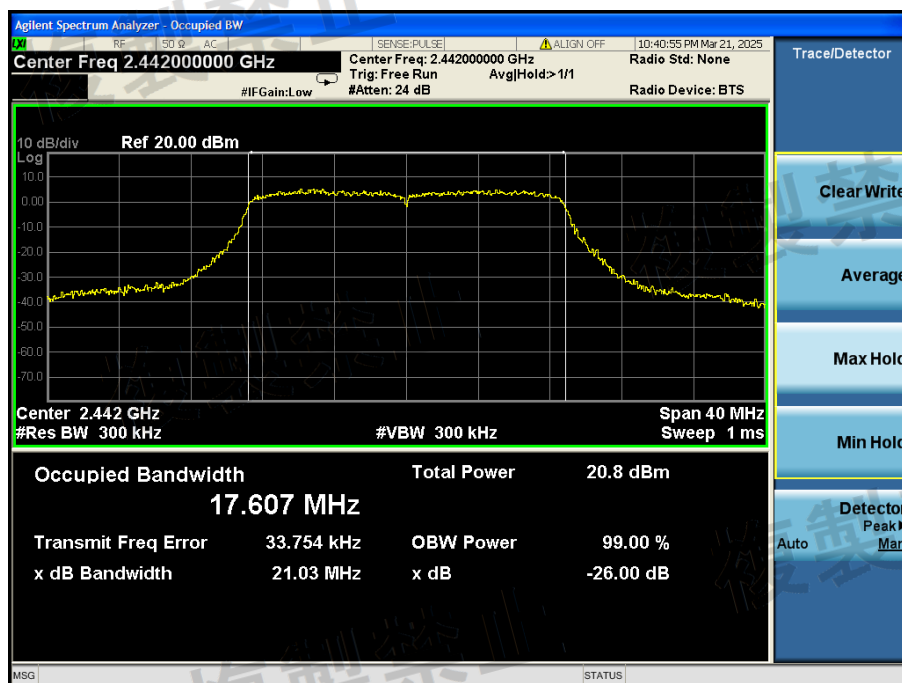


**802.11n(HT20):**

Channel 1: 2.412 GHz:

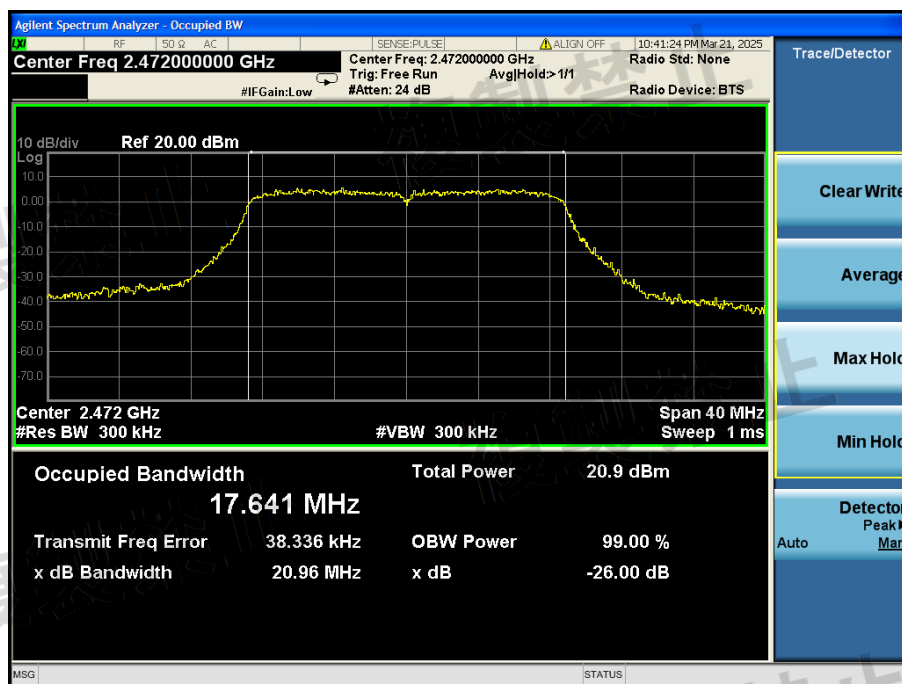


Channel 7: 2.442 GHz:



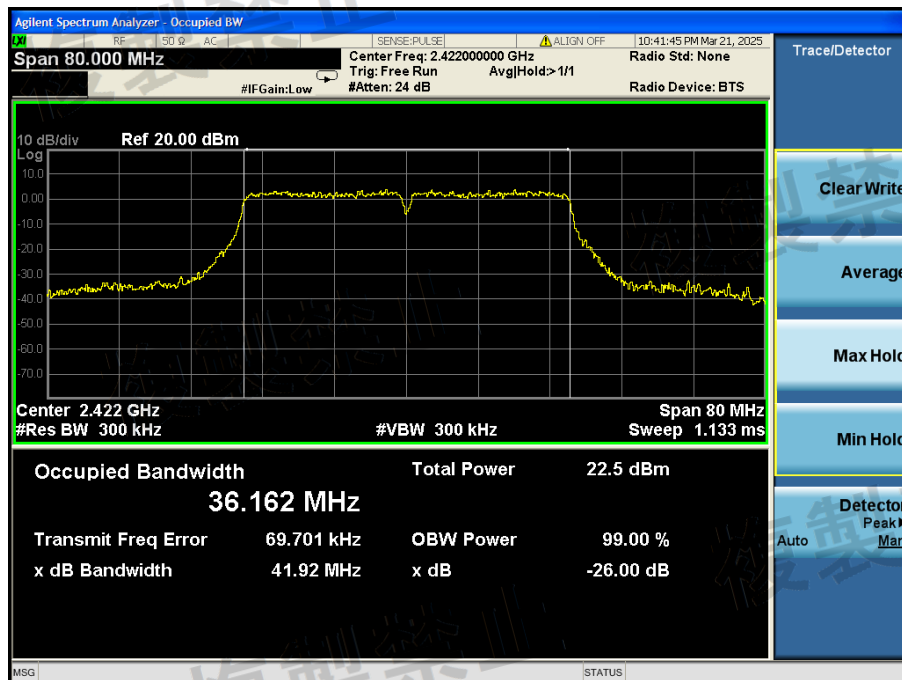


Channel 13: 2.472GHz:



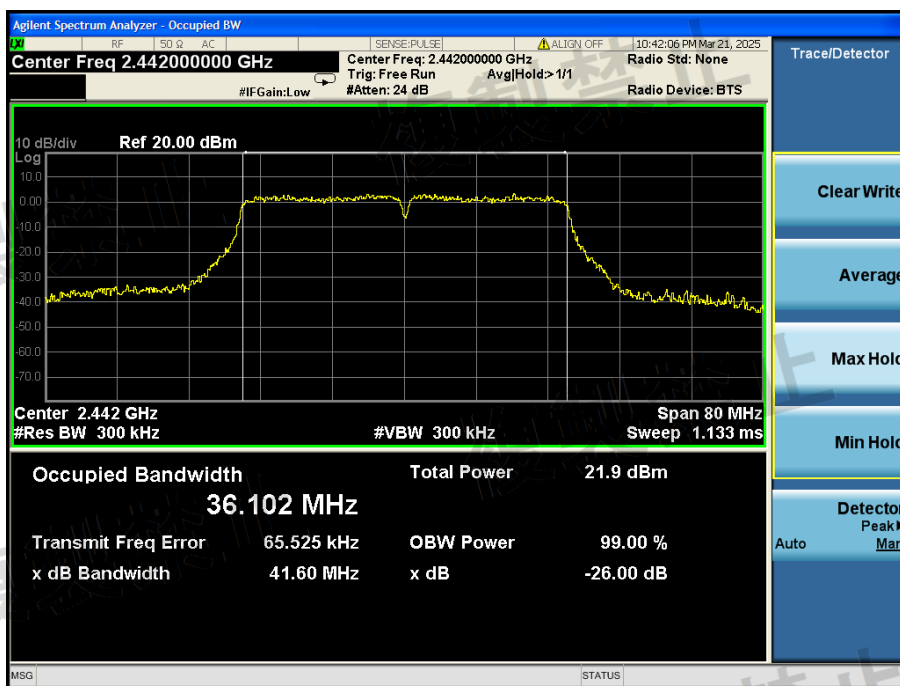
802.11n(HT40):

Channel 3: 2.422 GHz:

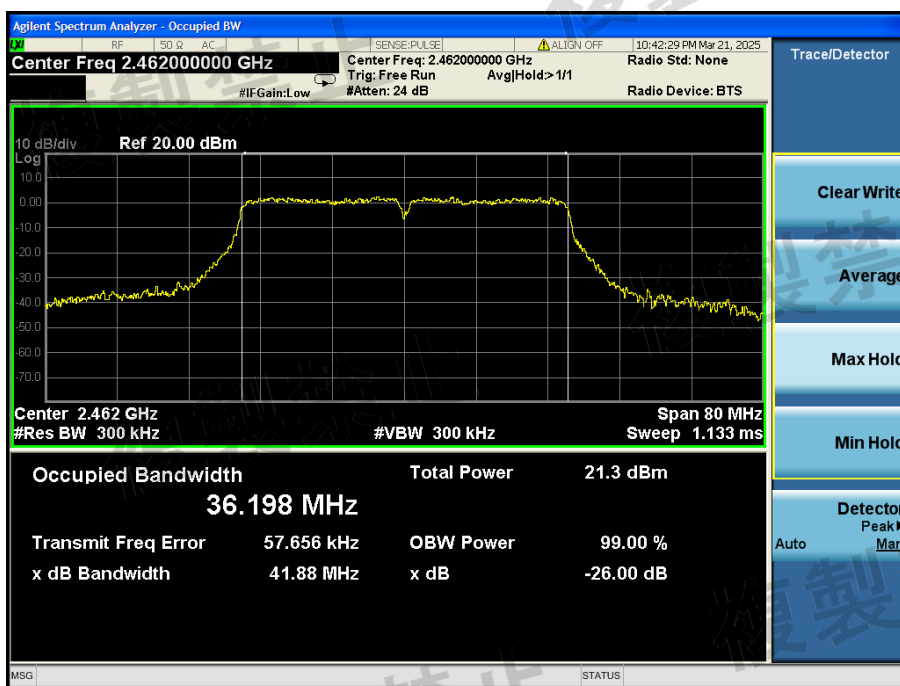




Channel 7: 2.442 GHz:



Channel 11: 2.462GHz:



Test result: The unit does meet the requirements.



6.7 Spread Spectrum Bandwidth (90%)

Test Requirement:	Item 19 of Article 2-1
Temperature:	25.0 °C
Humidity:	75 % RH
Atmospheric Pressure:	1013 mbar
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.
Test Configuration:	
 <pre>graph LR; PC[PC] --> EUT[EUT]; EUT --> SA[Spectrum Analyzer]</pre>	
Test Procedure:	
1. Test Conditions:	
	Spectrum Analyzer is used for measurement.
2. EUT conditions:	
	Modulation/Spread/Hopping ON For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.
3. Spectrum Analyzer conditions:	
	Frequency: Test Frequency Span 40/80MHz (DSSS,OFDM) RBW 300kHz VBW 300kHz Sweep Time Auto detector mode Positive peak Indication mode Max hold OBW 90%
4. Spread Factor=Spread Bandwidth/modulation rate.	
	The modulation rate: MR=1.375 for 802.11b, MR=1.5 for 802.11g/n/ax20,MR=3 for 802.11n/ax 40.

**Test result:****802.11b:**

Test channel	Test Frequency (MHz)	Test Result	Unit
		Normal Voltage DC 5V	
Lowest	2412.0	8.8996	MHz
Middle	2442.0	8.9243	MHz
Highest	2472.0	8.9240	MHz

802.11g:

Test channel	Test Frequency (MHz)	Test Result	Unit
		Normal Voltage DC 5V	
Lowest	2412.0	14.628	MHz
Middle	2442.0	14.613	MHz
Highest	2472.0	14.585	MHz

802.11n(HT20):

Test channel	Test Frequency (MHz)	Test Result	Unit
		Normal Voltage DC 5V	
Lowest	2412.0	15.348	MHz
Middle	2442.0	15.277	MHz
Highest	2472.0	15.330	MHz

802.11n(HT40):

Test channel	Test Frequency (MHz)	Test Result	Unit
		Normal Voltage DC 5V	
Lowest	2422.0	32.463	MHz
Middle	2442.0	32.290	MHz
Highest	2462.0	32.538	MHz

Result plot as follows:

802.11b 1Mbps data rate:

Channel 1: 2.412 GHz:

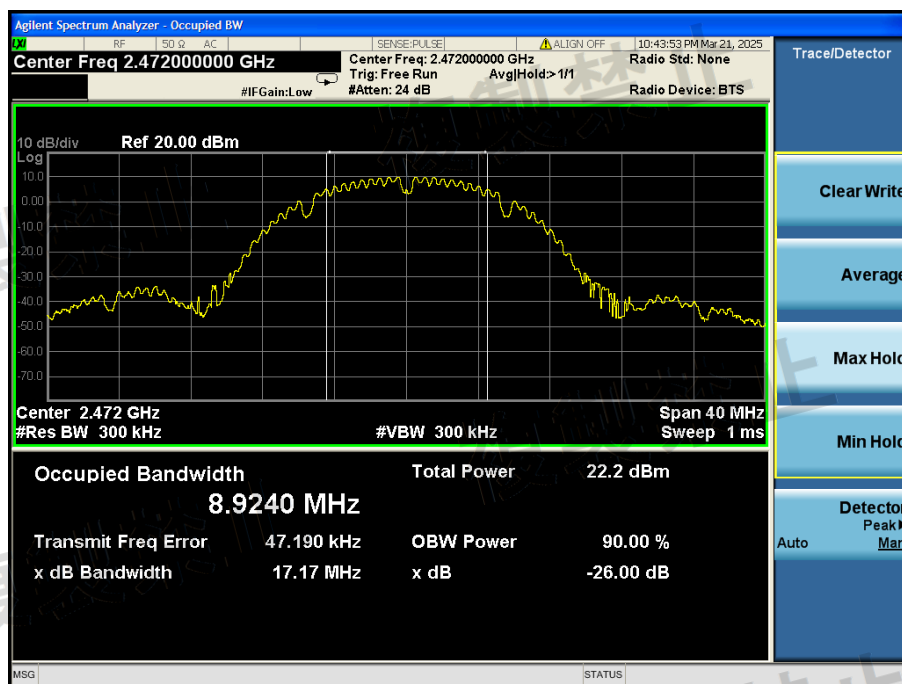


Channel 7: 2.442 GHz:



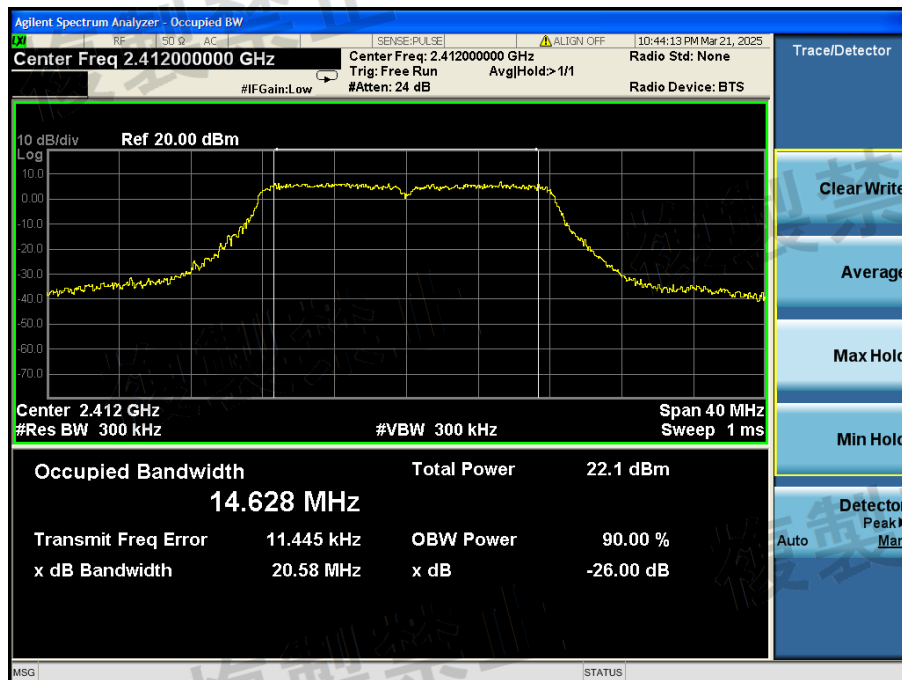


Channel 13: 2.472GHz:

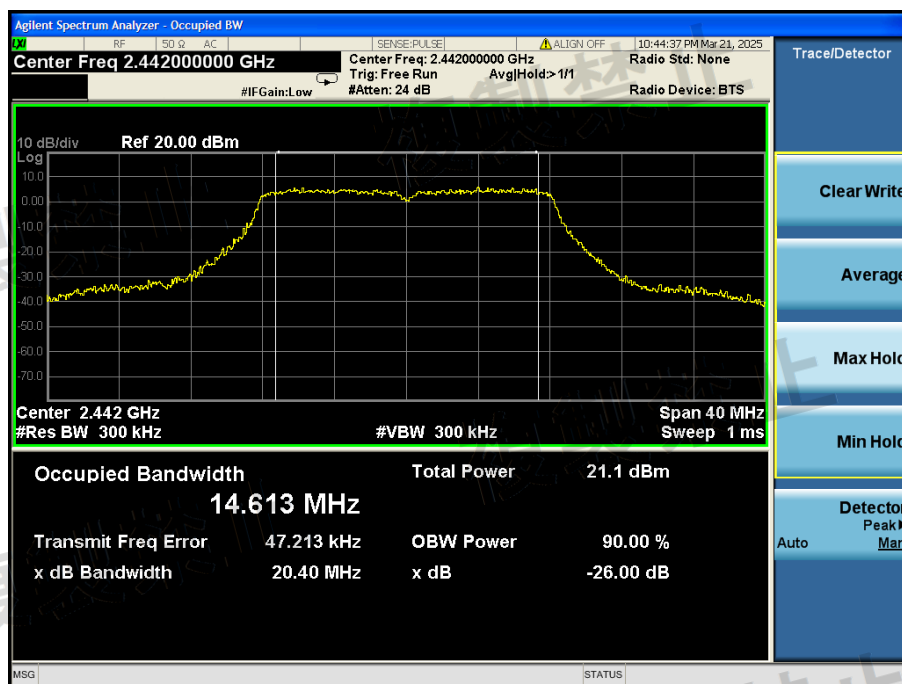


802.11g:

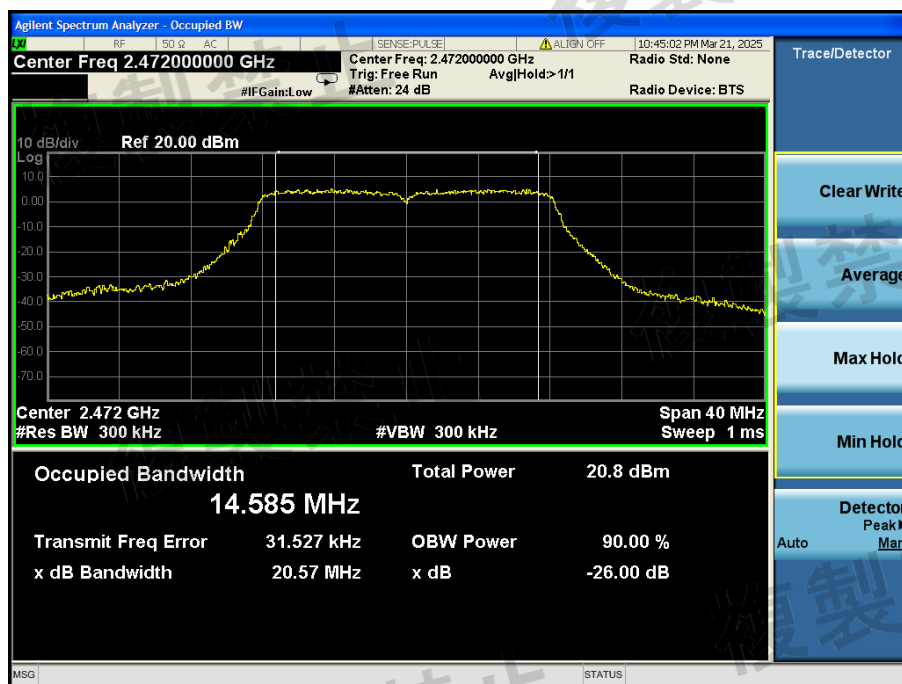
Channel 1: 2.412 GHz:



Channel 7: 2.442 GHz:

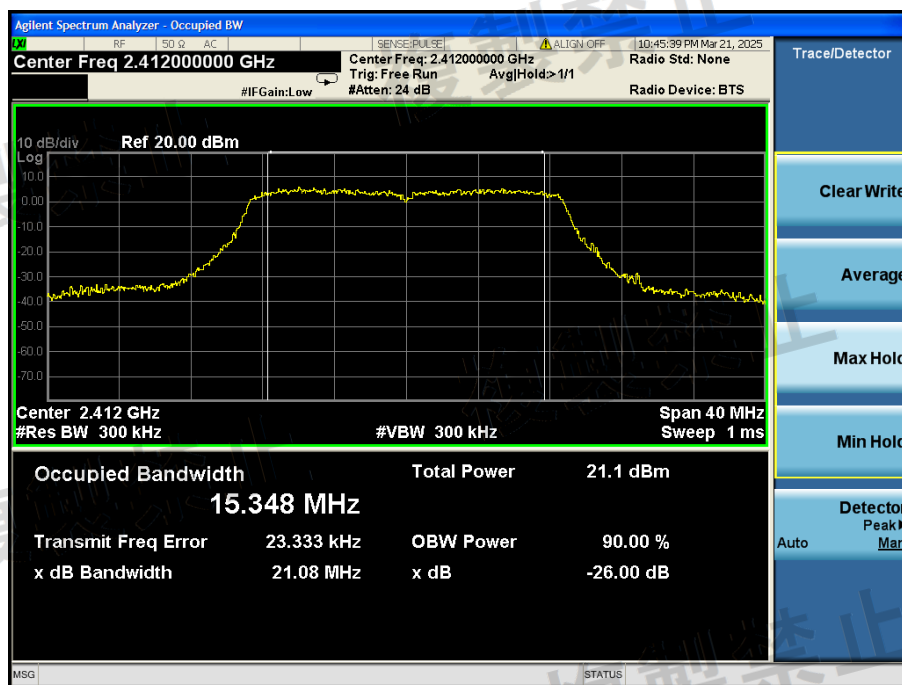


Channel 13: 2.472GHz:

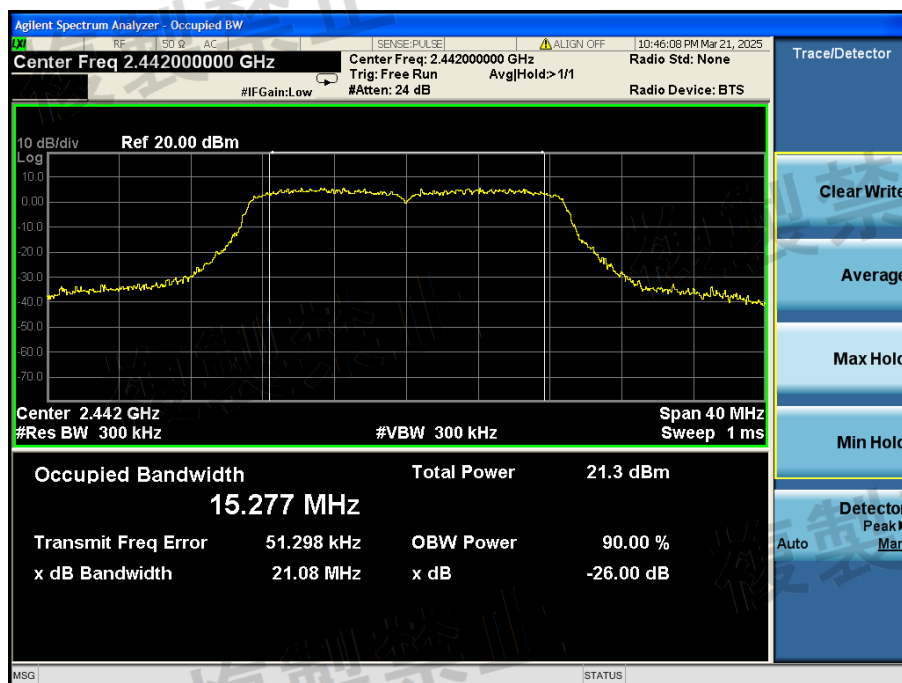


**802.11n(HT20):**

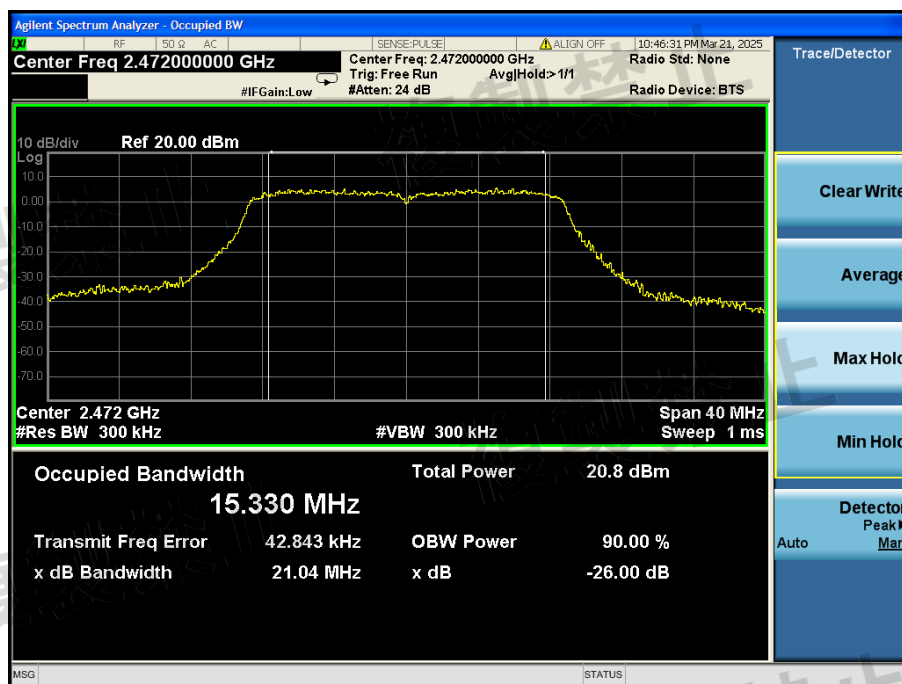
Channel 1: 2.412 GHz:



Channel 7: 2.442 GHz:

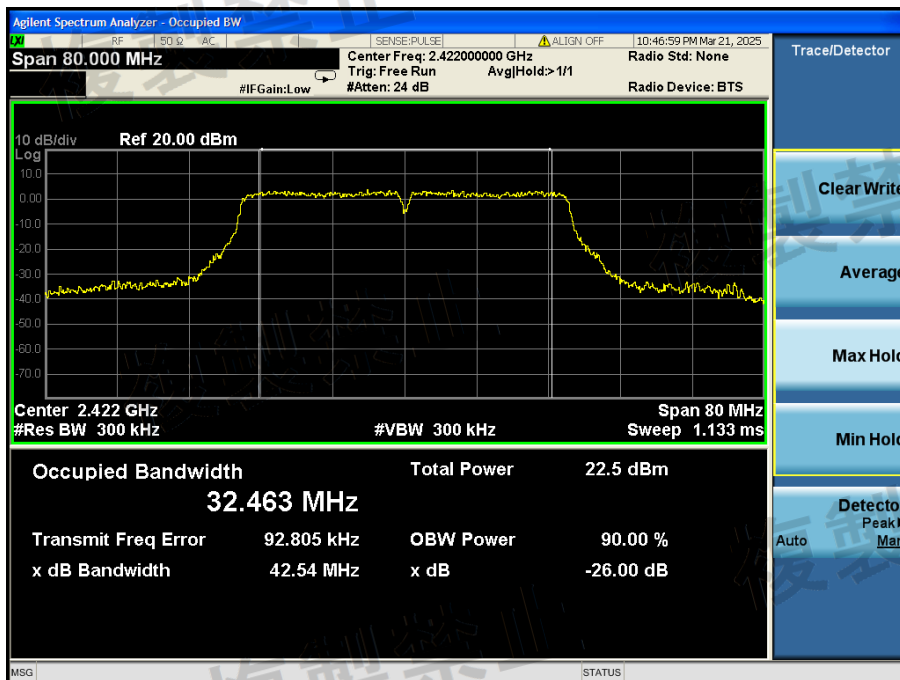


Channel 13: 2.472GHz:

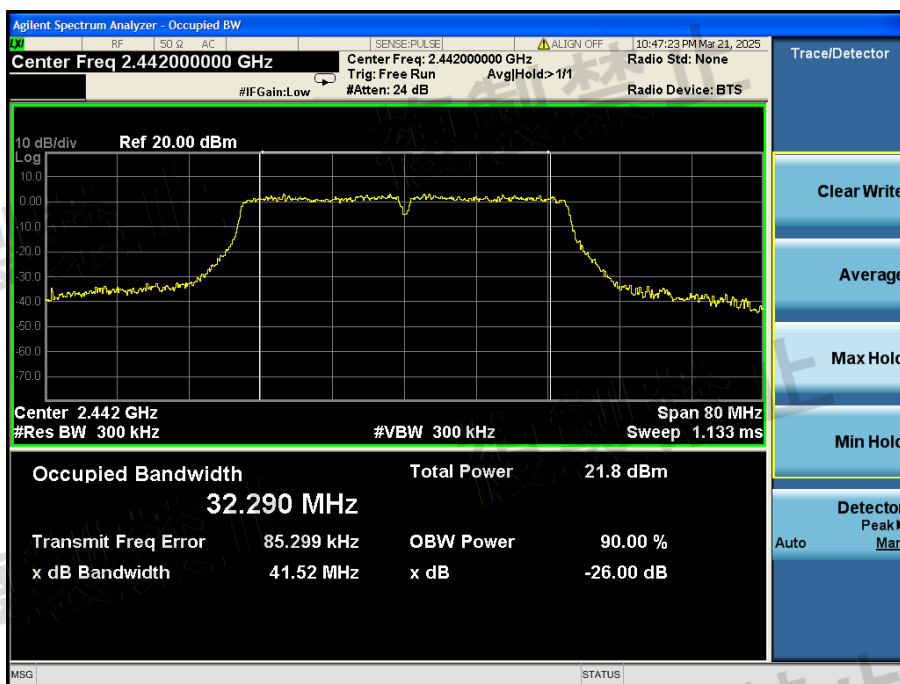


802.11n(HT40):

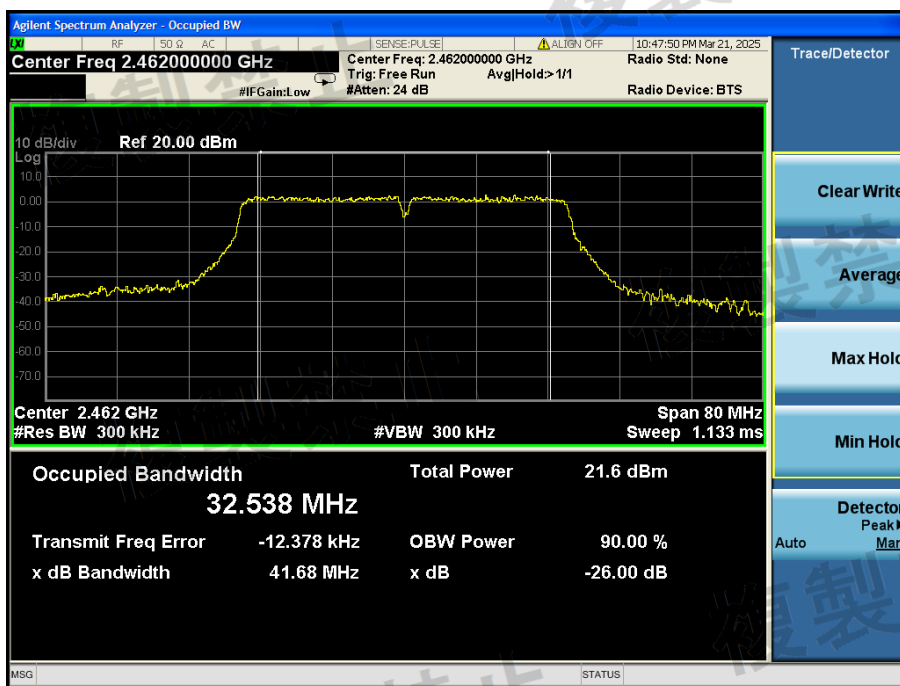
Channel 3: 2.422 GHz:



Channel 7: 2.442 GHz:



Channel 11: 2.462GHz:



Test result: The unit does meet the requirements.



6.8 Antenna Power

Test Requirement:	Item 19 of Article 2-1
	10mW/MHz or less
	12.14dBm/MHz or less (EIRP)
Temperature:	25.0 °C
Humidity:	75 % RH
Atmospheric Pressure:	1013 mbar
Test Configuration:	PC EUT Spectrum Analyzer
Test Procedure:	The test procedure contained in this option 1 shall be as follows: Step 1: Connect the UUT to the spectrum analyser and use the following settings: • Centre Frequency: The centre frequency of the channel under test. • Resolution BW: 1 MHz. • Video BW: 3 MHz. • Span: Wide enough to cover the complete power envelope of the signal of the UUT. • Detector: Peak. • Trace Mode: Max Hold. Step 2: When the trace is complete, find the peak value of the power envelope and record the frequency. Step 3: Make the following changes to the settings of the spectrum analyser: • Centre Frequency: Equal to the frequency recorded in step 2. • Span:0 MHz. • Resolution BW: 1 MHz. • Video BW: 1 MHz. • Sweep time: 1 minute. • Detector: Average (see note). • Trace Mode: Max Hold.

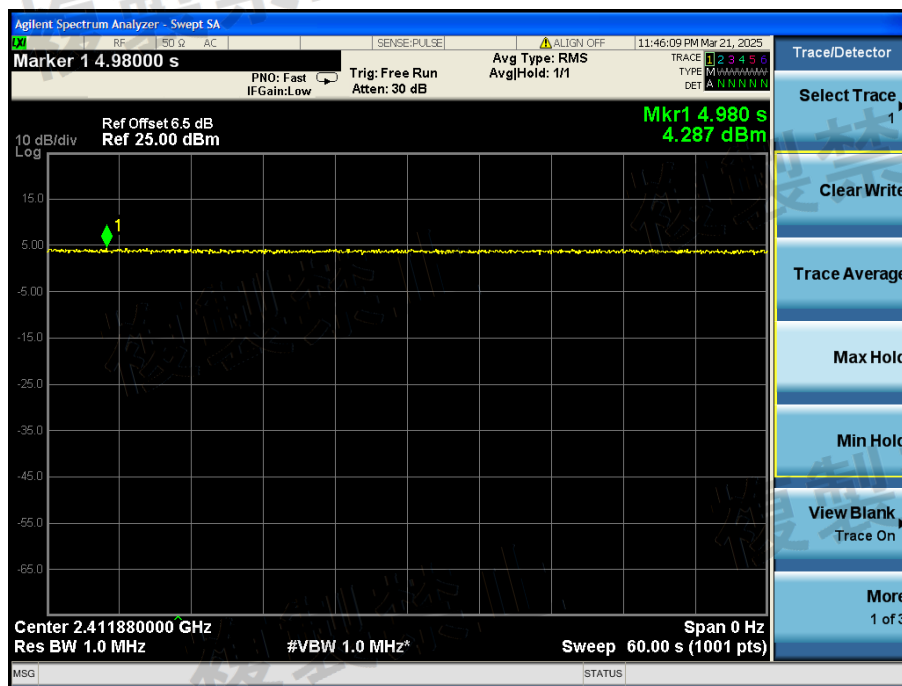
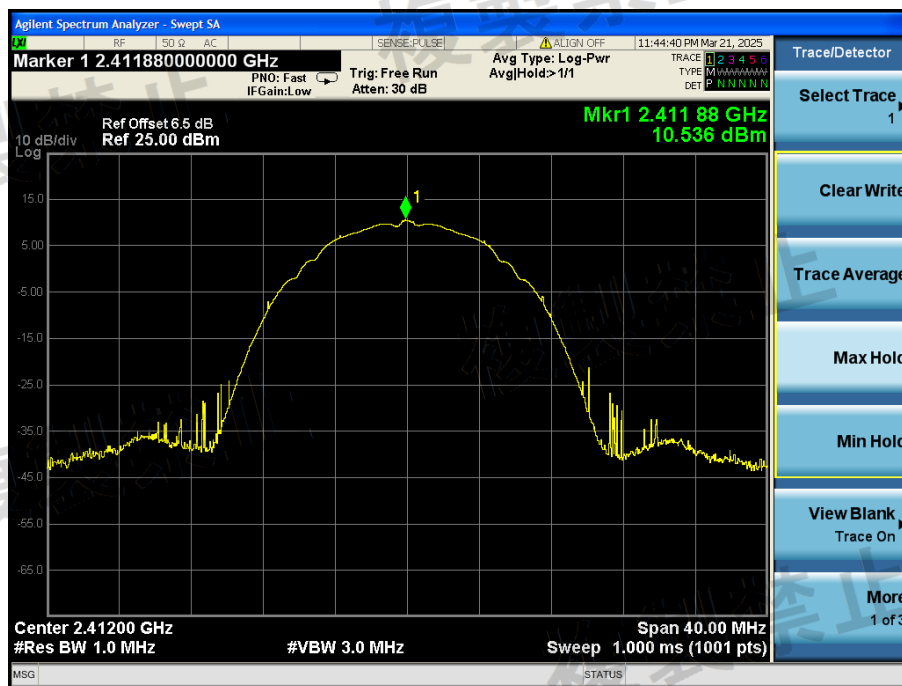


Test result:

Mode	Freq (MHz)	Antenna Power (dBm/MHz)	Antenna Power (mW/MHz)	Declared Power (mW/MHz)	Tolerance (%)	Upper Limit (%)	Verdict
b	2412	4.287	2.683	4	-32.93	20	Pass
b	2442	4.633	2.906	4	-27.35	20	Pass
b	2472	3.826	2.413	4	-39.68	20	Pass
g	2412	2.834	1.920	3	-36.00	20	Pass
g	2442	1.202	1.319	3	-56.03	20	Pass
g	2472	1.222	1.325	3	-55.83	20	Pass
n20	2412	1.204	1.319	3	-56.03	20	Pass
n20	2442	1.867	1.537	3	-48.77	20	Pass
n20	2472	1.176	1.311	3	-56.30	20	Pass
N40	2422	-0.401	0.912	2	-54.40	20	Pass
N40	2442	-0.675	0.856	2	-57.20	20	Pass
N40	2462	-0.244	0.945	2	-52.75	20	Pass

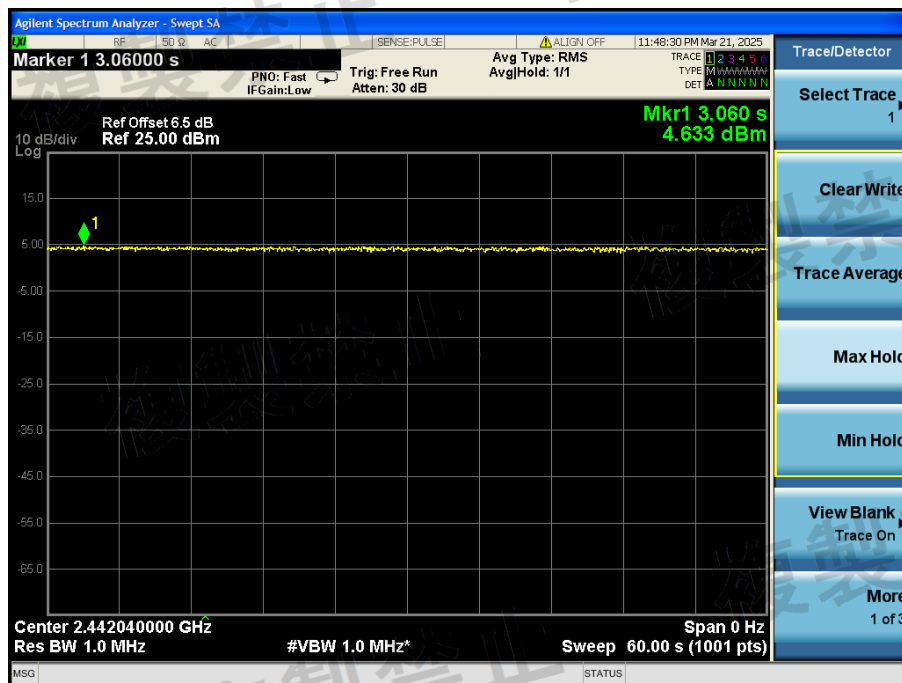
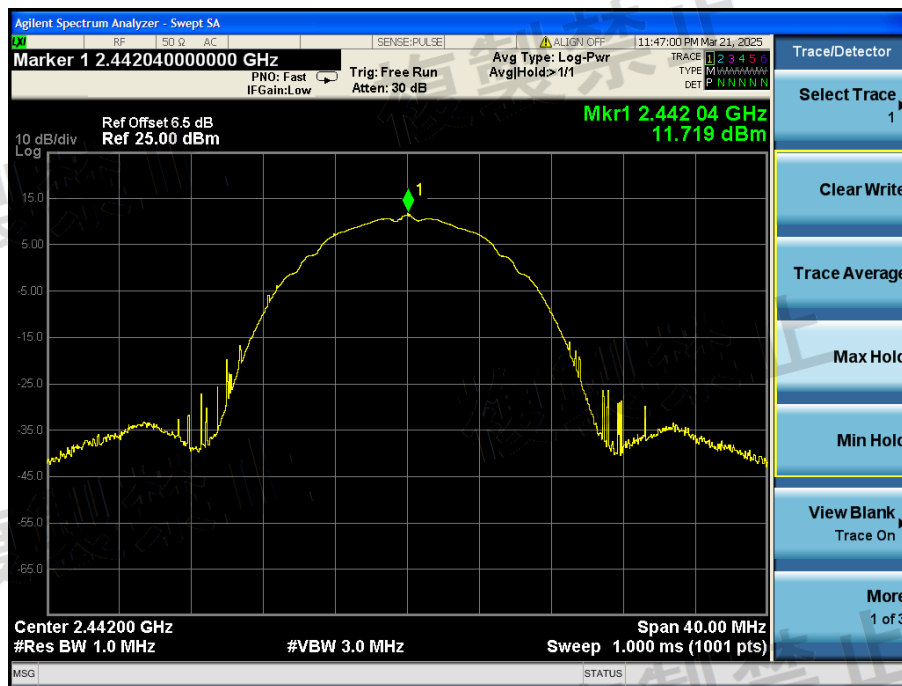
802.11b:

Channel 1: 2.412 GHz:



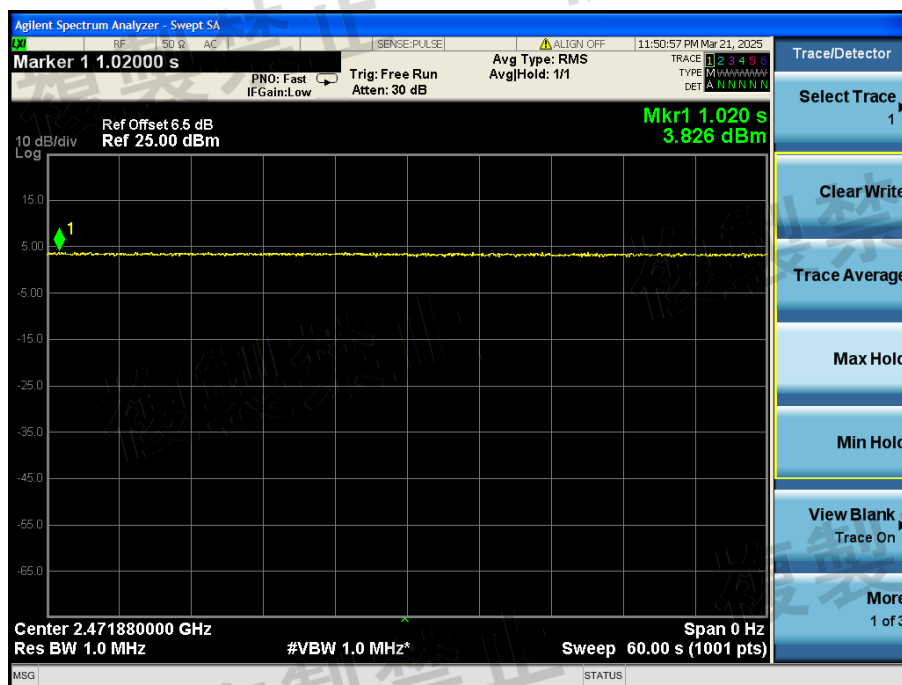
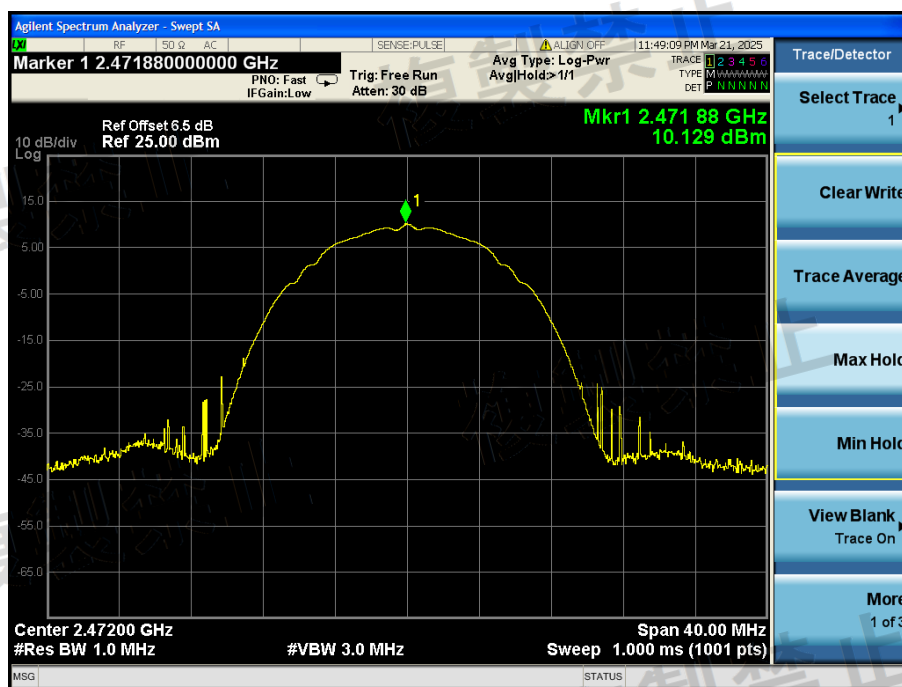


Channel 1: 2.442 GHz:





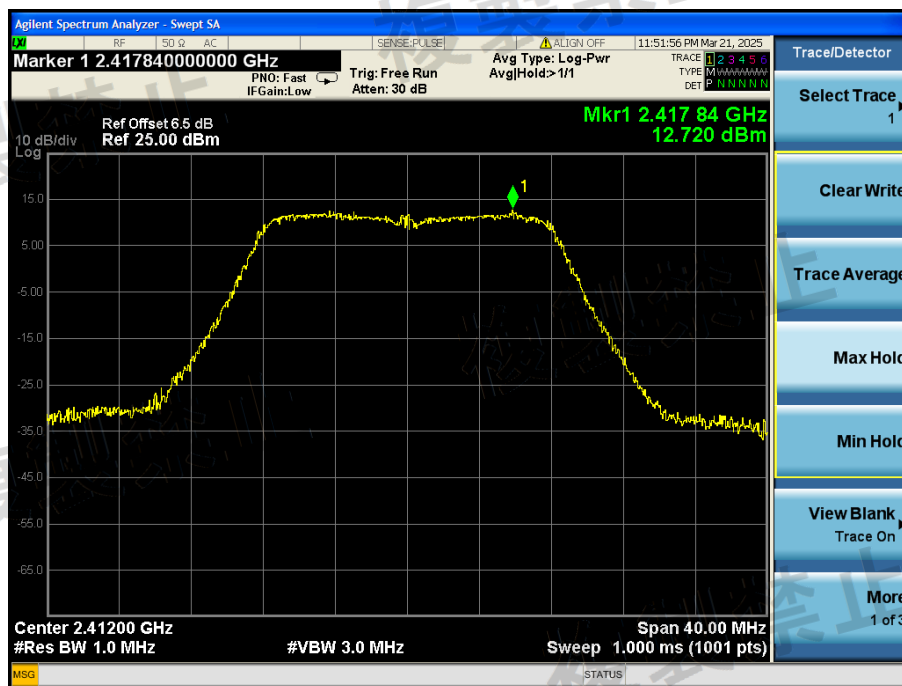
Channel 1: 2.472 GHz:





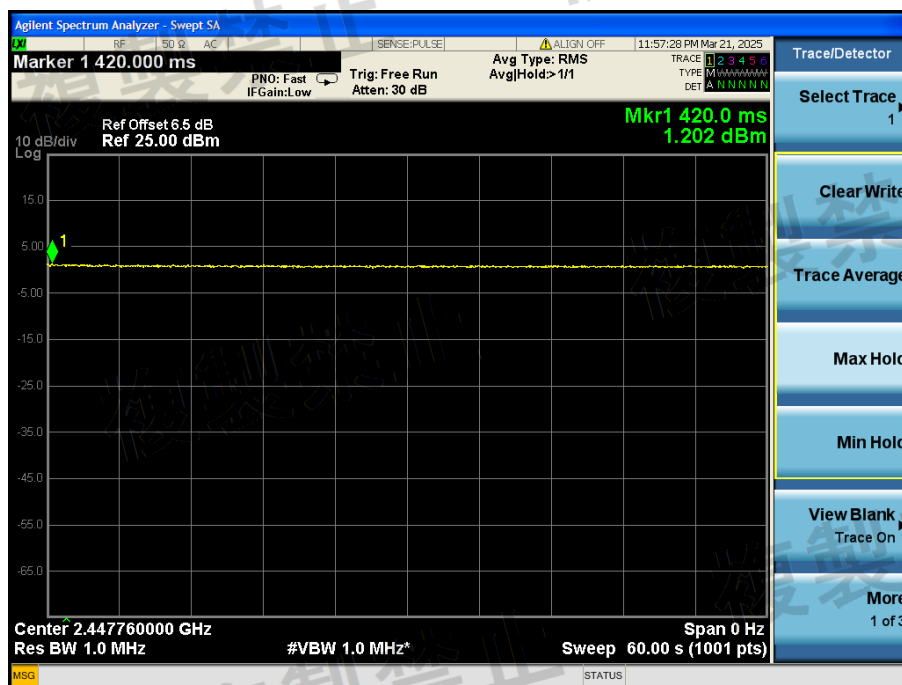
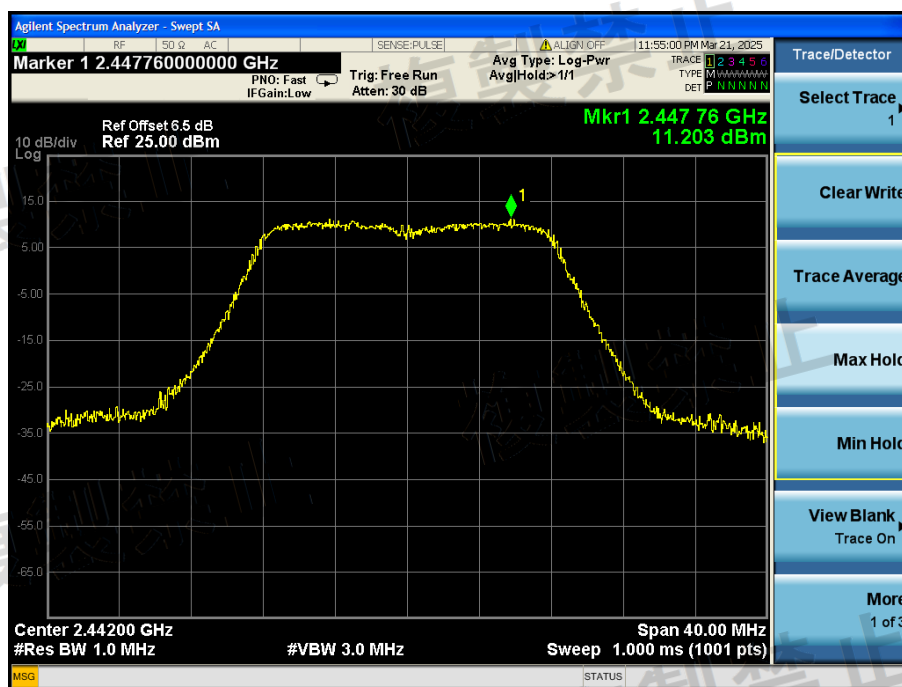
802.11g:

Channel 1: 2.412 GHz:



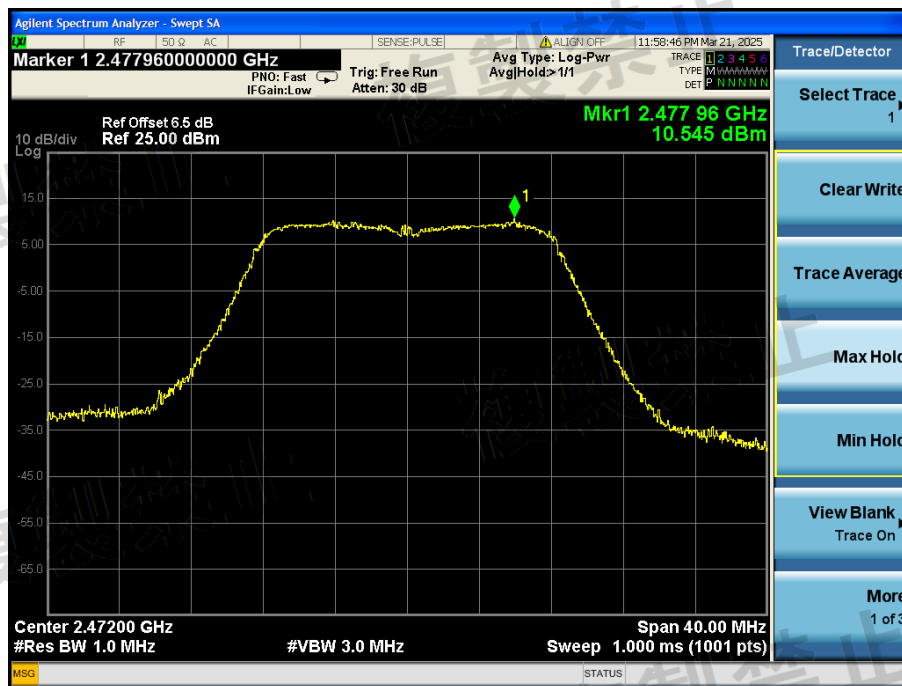


Channel 1: 2.442 GHz:



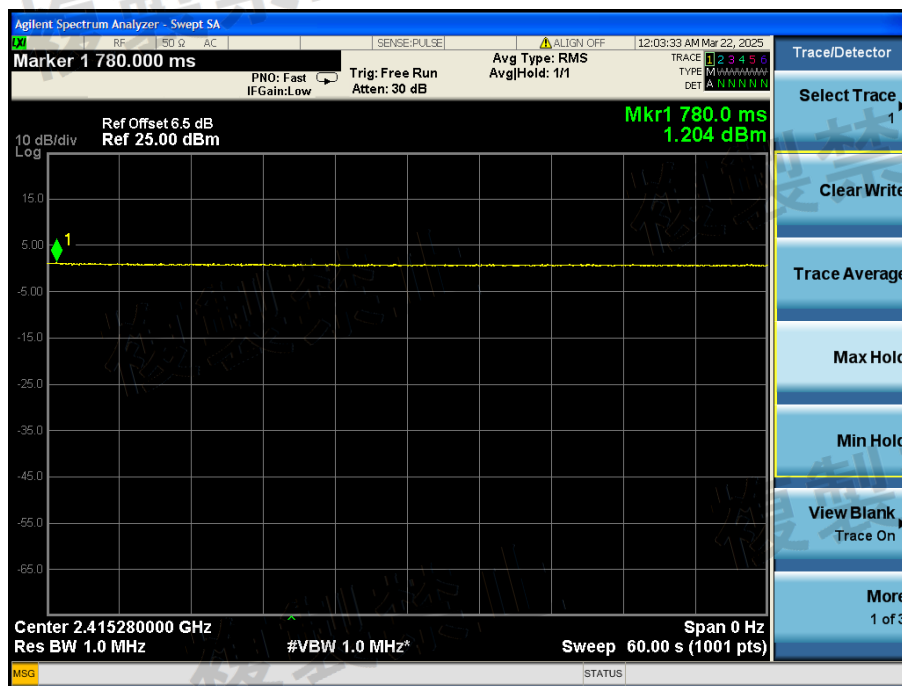
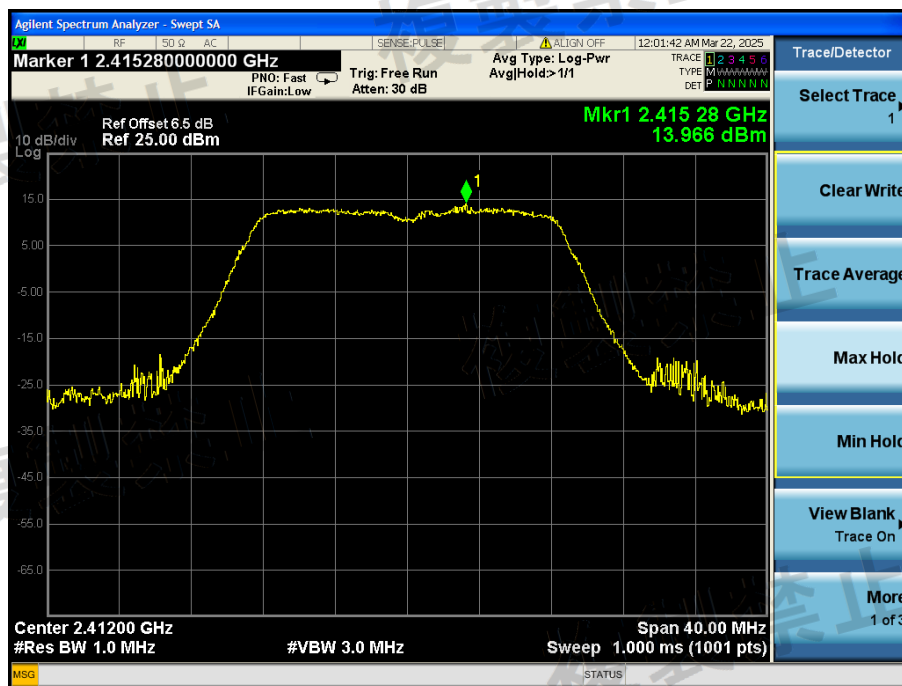


Channel 1: 2.472 GHz:



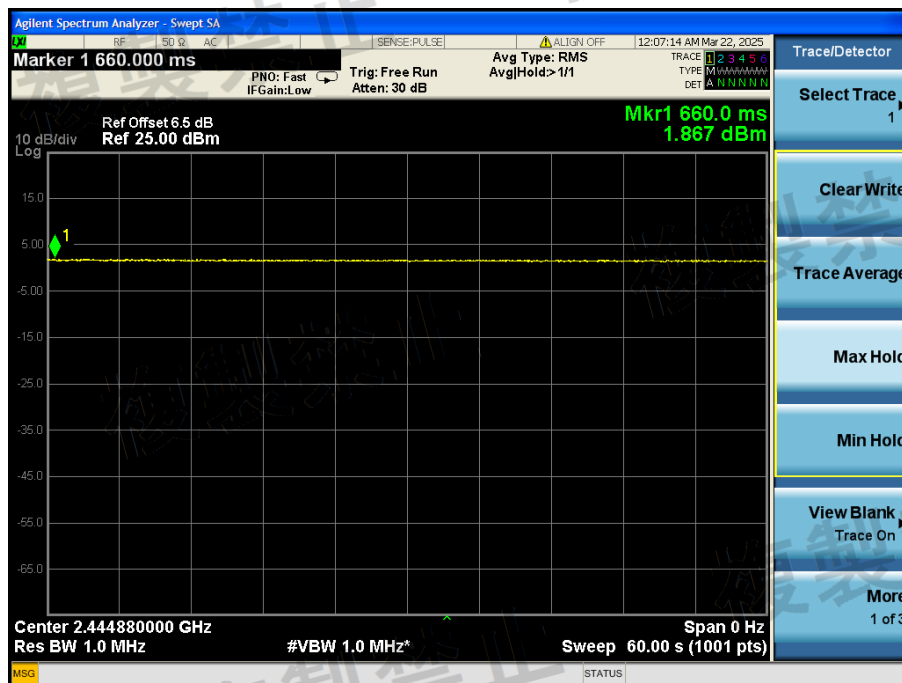
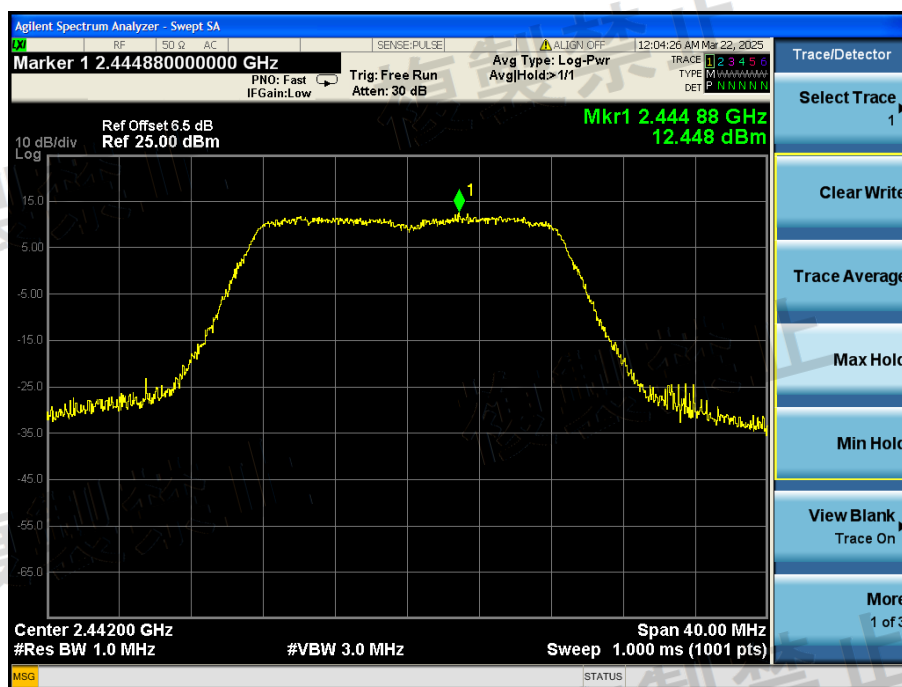
802.11n20:

Channel 1: 2.412 GHz:



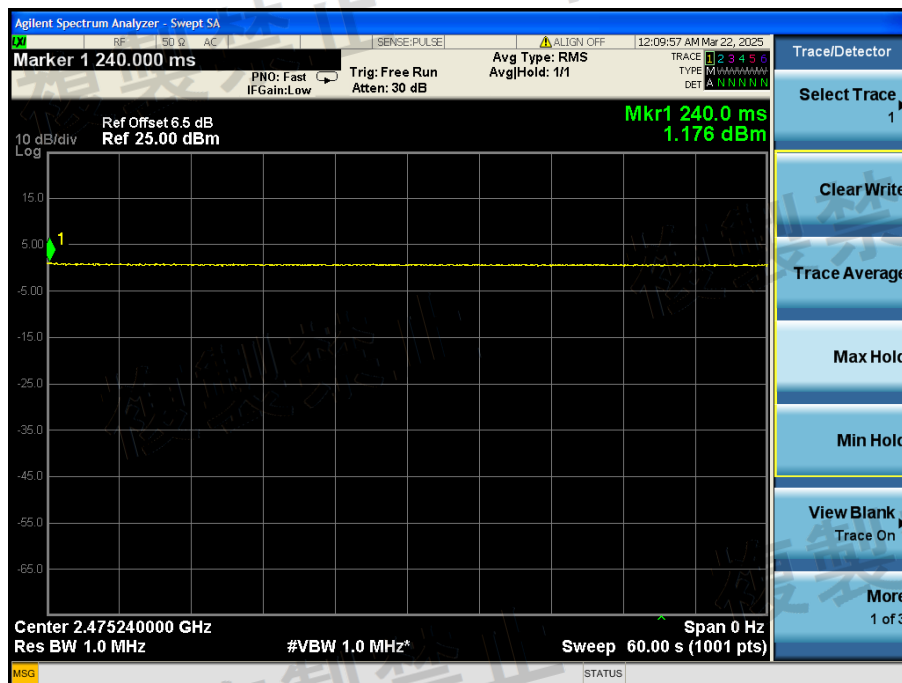
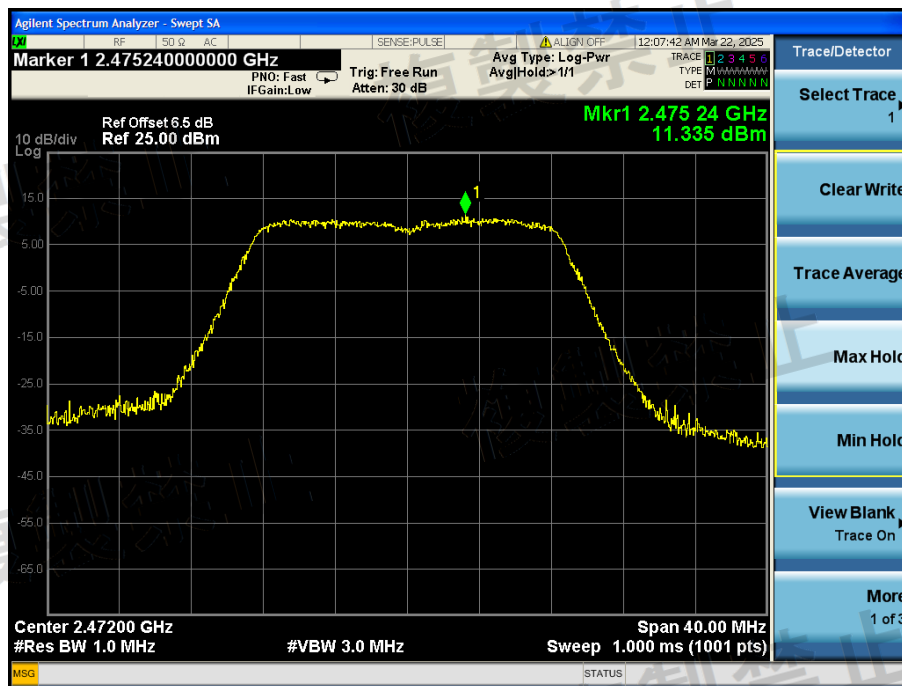


Channel 1: 2.442 GHz:





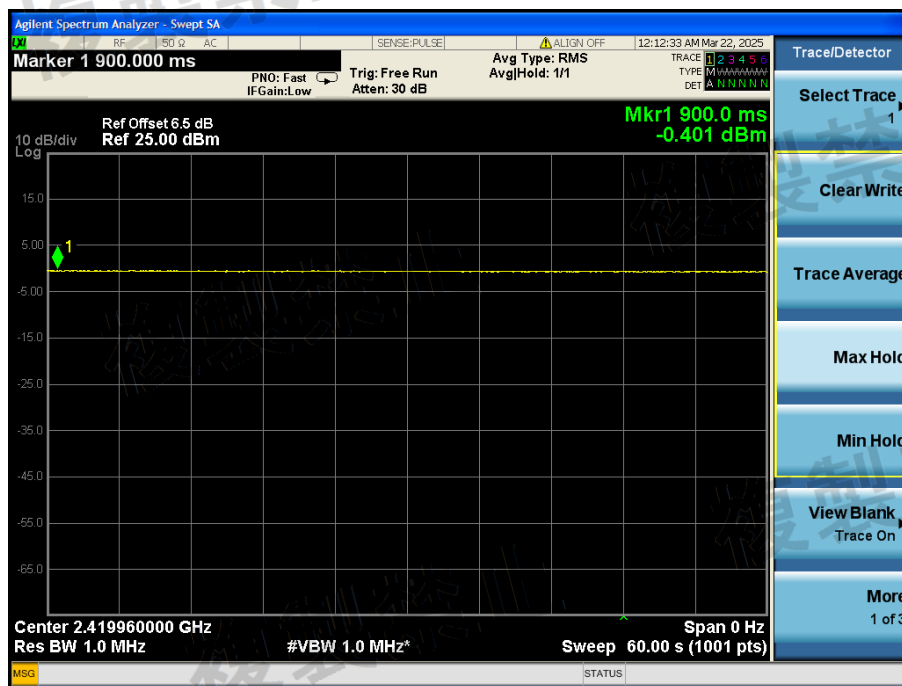
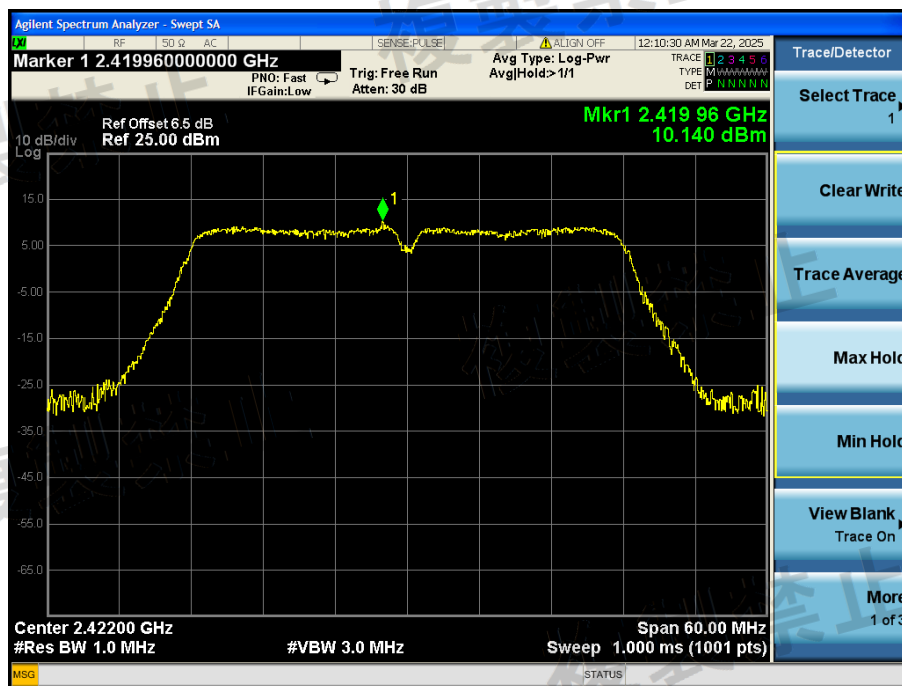
Channel 1: 2.472 GHz:





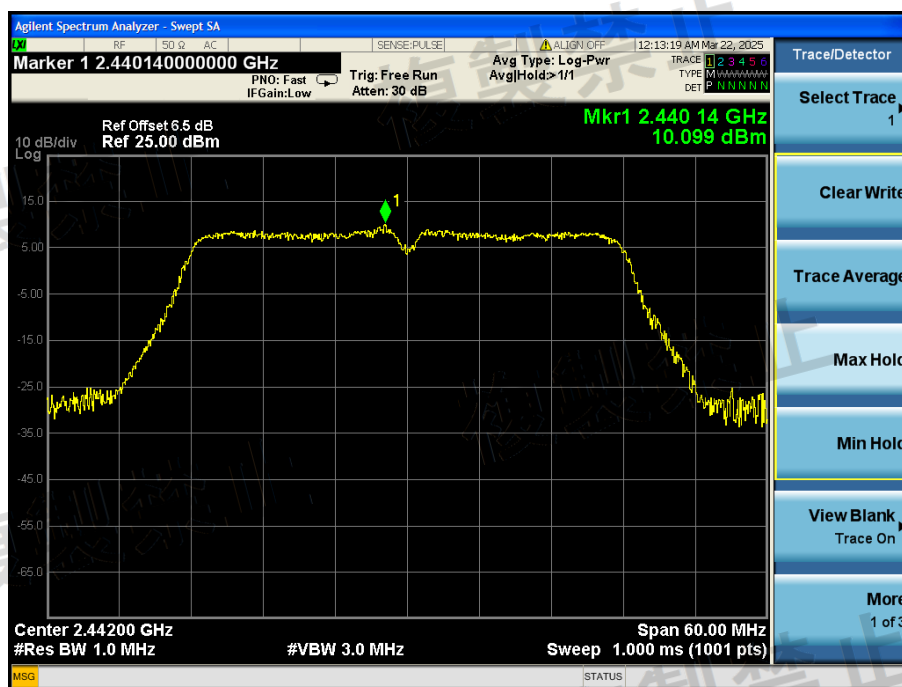
802.11n40:

Channel 1: 2.422 GHz:



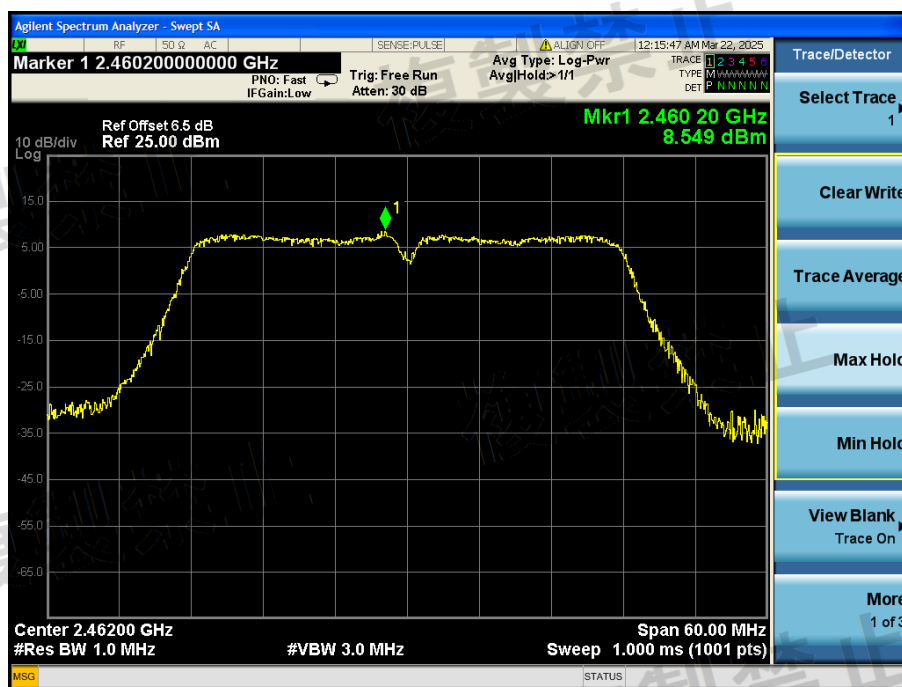


Channel 1: 2.442 GHz:





Channel 1: 2.462 GHz:





6.9 Spurious Emissions of Tx

Test Requirement:	Item 19 of Article 2-1
	(1) 30 to 1000 MHz : 2.5 μ W/MHz(-36dBm/100kHz) (2) 1000 to 2387 MHz : 2.5 μ W/MHz(-26dBm/MHz) (3) 2387 to 2400 MHz : 25 μ W/MHz(-16dBm/MHz) (4) 2483.5 through 2496.5 MHz : 25 μ W/MHz(-16dBm/MHz) (5) Over 2496.5 MHz : 2.5 μ W/MHz(-26dBm/MHz)
Temperature:	25.0 °C
Humidity:	75 % RH
Atmospheric Pressure:	1013 mbar
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.
Test Configuration:	PC EUT Spectrum Analyzer
Test Procedure:	
1. Test Conditions:	Spectrum Analyzer is used for measurement.
2. EUT conditions:	Modulation/Spread/Hopping ON For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.
3. Spectrum Analyzer conditions:	Step 1 All spurious are measured from 30 MHz to 13 GHz by peak mode. Step 2 IF the value measured by Step1 is 2 dB or less, measure in average mode. Test setup for Step 1: Frequency: 30 MHz – 1000 MHz, RBW 100 kHz (Below 1000 MHz), VBW 100 kHz (Below 1000 MHz) 1000 MHz – 2400 MHz, 2483.5 MHz –13 GHz RBW 1 MHz (above 1000 MHz), VBW 1 MHz (above 1000 MHz) Sweep Time Auto detector mode Positive peak, Indication mode Max hold



Test setup for Step 2:

Frequency: Spurious Frequency

RBW 100 kHz (Below 1000 MHz), VBW 100 kHz (Below 1000 MHz)

RBW 1 MHz (above 1000 MHz), VBW 1 MHz (above 1000 MHz)

Sweep Time Auto,

Detector mode Sample, Indication mode Max hold



Test result:

802.11b:

Test channel	Test Frequency (MHz)	Test Result			Unit	Limit
		Normal Voltage	High Voltage	Low Voltage		
		5V DC	N/A	N/A		
Channel 1 (2412MHz)	36.014	-44.955	N/A	N/A	dBm	(1)30 to 1000 MHz:-36dBm/100kHz (2)1000 to 2387 MHz:-26dBm/MHz (3)2387 to 2400 MHz :-16dBm/MHz (4)2483.5 to 2496.5 MHz : -16dBm/MHz (5)Over 2496.5 MHz: -26dBm/MHz
	2080.58	-44.234	N/A	N/A		
	2399.969	-27.780	N/A	N/A		
	2489.477	-46.262	N/A	N/A		
	2502.01	-47.717	N/A	N/A		

Test channel	Test Frequency (MHz)	Test Result			Unit	Limit
		Normal Voltage	High Voltage	Low Voltage		
		5V DC	N/A	N/A		
Channel 7 (2442MHz)	36.160	-44.725	N/A	N/A	dBm	(1)30 to 1000 MHz:-36dBm/100kHz (2)1000 to 2387 MHz:-26dBm/MHz (3)2387 to 2400 MHz :-16dBm/MHz (4)2483.5 to 2496.5 MHz : -16dBm/MHz (5)Over 2496.5 MHz: -26dBm/MHz
	2080.51	-44.427	N/A	N/A		
	2399.958	-43.838	N/A	N/A		
	2488.203	-44.723	N/A	N/A		
	2499.13	-46.375	N/A	N/A		



Test channel	Test Frequency (MHz)	Test Result			Unit	Limit
		Normal Voltage	High Voltage	Low Voltage		
		5V DC	N/A	N/A		
Channel 13 (2472MHz)	33.225	-47.341	N/A	N/A	dBm	(1)30 to 1000 MHz:-36dBm/100kHz (2)1000 to 2387 MHz:-26dBm/MHz (3)2387 to 2400 MHz :-16dBm/MHz (4)2483.5 to 2496.5 MHz : -16dBm/MHz (5)Over 2496.5 MHz: -26dBm/MHz
	2081.03	-43.896	N/A	N/A		
	2399.833	-43.809	N/A	N/A		
	2483.672	-30.483	N/A	N/A		
	2575.80	-48.420	N/A	N/A		

802.11g:

Test channel	Test Frequency (MHz)	Test Result			Unit	Limit
		Normal Voltage	High Voltage	Low Voltage		
		5V DC	N/A	N/A		
Channel 1 (2412MHz)	36.014	-44.861	N/A	N/A	dBm	(1)30 to 1000 MHz:-36dBm/100kHz (2)1000 to 2387 MHz:-26dBm/MHz (3)2387 to 2400 MHz :-16dBm/MHz (4)2483.5 to 2496.5 MHz : -16dBm/MHz (5)Over 2496.5 MHz: -26dBm/MHz
	2386.62	-42.360	N/A	N/A		
	2399.746	-21.306	N/A	N/A		
	2494.910	-46.378	N/A	N/A		
	2501.75	-48.296	N/A	N/A		



Test channel	Test Frequency (MHz)	Test Result			Unit	Limit
		Normal Voltage	High Voltage	Low Voltage		
		5V DC	N/A	N/A		
Channel 7 (2442MHz)	35.456	-47.371	N/A	N/A	dBm	(1)30 to 1000 MHz:-36dBm/100kHz (2)1000 to 2387 MHz:-26dBm/MHz (3)2387 to 2400 MHz :-16dBm/MHz (4)2483.5 to 2496.5 MHz : -16dBm/MHz (5)Over 2496.5 MHz: -26dBm/MHz
	2080.75	-43.729	N/A	N/A		
	2399.957	-44.156	N/A	N/A		
	2484.035	-42.914	N/A	N/A		
	2539.30	-48.305	N/A	N/A		

Test channel	Test Frequency (MHz)	Test Result			Unit	Limit
		Normal Voltage	High Voltage	Low Voltage		
		5V DC	N/A	N/A		
Channel 13 (2472MHz)	35.287	-46.501	N/A	N/A	dBm	(1)30 to 1000 MHz:-36dBm/100kHz (2)1000 to 2387 MHz:-26dBm/MHz (3)2387 to 2400 MHz :-16dBm/MHz (4)2483.5 to 2496.5 MHz : -16dBm/MHz (5)Over 2496.5 MHz: -26dBm/MHz
	2240.19	-45.935	N/A	N/A		
	2399.726	-48.434	N/A	N/A		
	2483.663	-23.372	N/A	N/A		
	2496.76	-52.289	N/A	N/A		



802.11n20:

Test channel	Test Frequency (MHz)	Test Result			Unit	Limit
		Normal Voltage	High Voltage	Low Voltage		
		5V DC	N/A	N/A		
Channel 1 (2412MHz)	36.014	-45.353	N/A	N/A	dBm	(1)30 to 1000 MHz:-36dBm/100kHz (2)1000 to 2387 MHz:-26dBm/MHz (3)2387 to 2400 MHz :-16dBm/MHz (4)2483.5 to 2496.5 MHz : -16dBm/MHz (5)Over 2496.5 MHz: -26dBm/MHz
	2379.58	-36.800	N/A	N/A		
	2399.953	-22.741	N/A	N/A		
	2489.586	-45.732	N/A	N/A		
	2522.76	-48.782	N/A	N/A		

Test channel	Test Frequency (MHz)	Test Result			Unit	Limit
		Normal Voltage	High Voltage	Low Voltage		
		5V DC	N/A	N/A		
Channel 7 (2442MHz)	35.311	-48.747	N/A	N/A	dBm	(1)30 to 1000 MHz:-36dBm/100kHz (2)1000 to 2387 MHz:-26dBm/MHz (3)2387 to 2400 MHz :-16dBm/MHz (4)2483.5 to 2496.5 MHz : -16dBm/MHz (5)Over 2496.5 MHz: -26dBm/MHz
	2080.61	-43.937	N/A	N/A		
	2398.945	-34.455	N/A	N/A		
	2487.688	-41.269	N/A	N/A		
	2505.43	-47.325	N/A	N/A		



Test channel	Test Frequency (MHz)	Test Result			Unit	Limit
		Normal Voltage	High Voltage	Low Voltage		
		5V DC	N/A	N/A		
Channel 13 (2472MHz)	35.723	-45.678	N/A	N/A	dBm	(1)30 to 1000 MHz:-36dBm/100kHz (2)1000 to 2387 MHz:-26dBm/MHz (3)2387 to 2400 MHz : -16dBm/MHz (4)2483.5 to 2496.5 MHz : -16dBm/MHz (5)Over 2496.5 MHz: -26dBm/MHz
	2080.33	-45.962	N/A	N/A		
	2399.918	-47.636	N/A	N/A		
	2483.548	-21.158	N/A	N/A		
	2498.34	-51.558	N/A	N/A		

802.11n40:

Test channel	Test Frequency (MHz)	Test Result			Unit	Limit
		Normal Voltage	High Voltage	Low Voltage		
		5V DC	N/A	N/A		
Channel 3 (2422MHz)	35.287	-45.207	N/A	N/A	dBm	(1)30 to 1000 MHz:-36dBm/100kHz (2)1000 to 2387 MHz:-26dBm/MHz (3)2387 to 2400 MHz : -16dBm/MHz (4)2483.5 to 2496.5 MHz : -16dBm/MHz (5)Over 2496.5 MHz: -26dBm/MHz
	2381.04	-35.977	N/A	N/A		
	2399.920	-22.087	N/A	N/A		
	2485.632	-42.495	N/A	N/A		
	2562.93	-48.293	N/A	N/A		



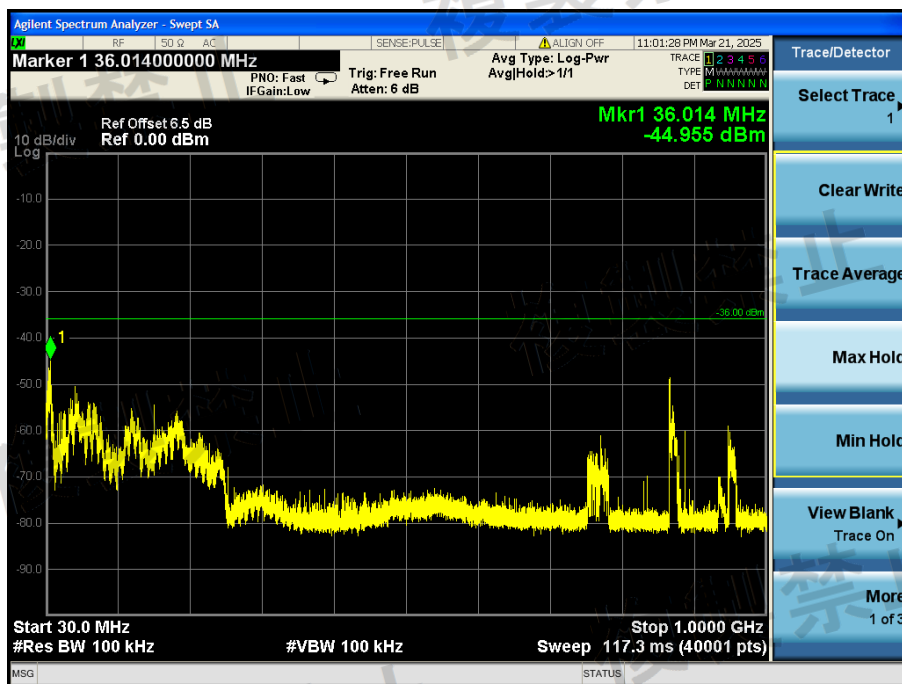
Test channel	Test Frequency (MHz)	Test Result			Unit	Limit
		Normal Voltage	High Voltage	Low Voltage		
		5V DC	N/A	N/A		
Channel 7 (2442MHz)	35.262	-48.270	N/A	N/A	dBm	(1)30 to 1000 MHz:-36dBm/100kHz (2)1000 to 2387 MHz:-26dBm/MHz (3)2387 to 2400 MHz :-16dBm/MHz (4)2483.5 to 2496.5 MHz : -16dBm/MHz (5)Over 2496.5 MHz: -26dBm/MHz
	2079.81	-43.223	N/A	N/A		
	2399.665	-26.074	N/A	N/A		
	2483.520	-27.817	N/A	N/A		
	2496.50	-41.735	N/A	N/A		

Test channel	Test Frequency (MHz)	Test Result			Unit	Limit
		Normal Voltage	High Voltage	Low Voltage		
		5V DC	N/A	N/A		
Channel 11 (2462MHz)	35.529	-45.358	N/A	N/A	dBm	(1)30 to 1000 MHz:-36dBm/100kHz (2)1000 to 2387 MHz:-26dBm/MHz (3)2387 to 2400 MHz :-16dBm/MHz (4)2483.5 to 2496.5 MHz : -16dBm/MHz (5)Over 2496.5 MHz: -26dBm/MHz
	2240.71	-46.636	N/A	N/A		
	2399.949	-48.126	N/A	N/A		
	2483.525	-19.739	N/A	N/A		
	3283.47	-51.263	N/A	N/A		

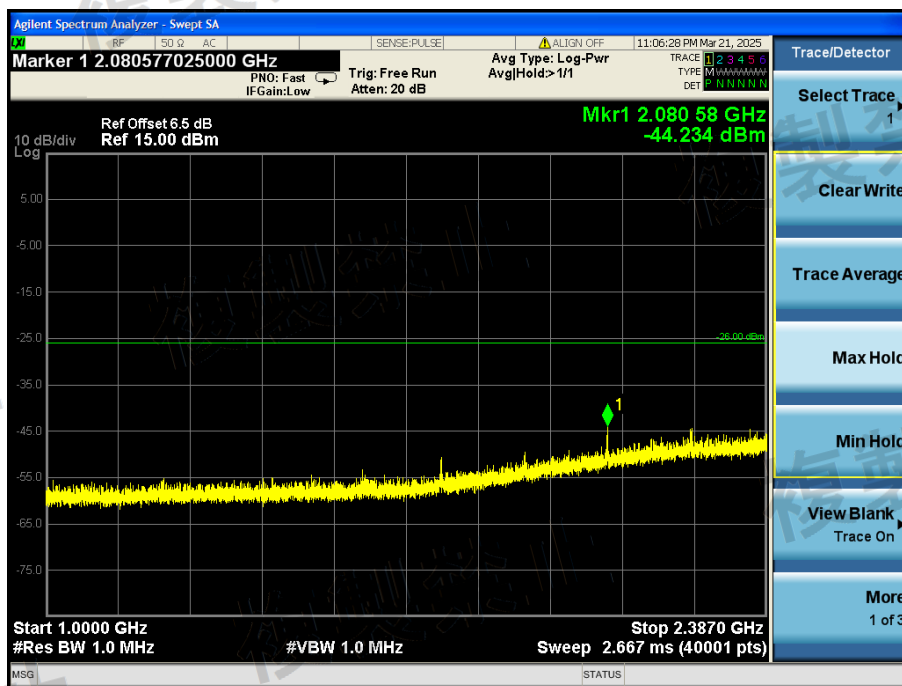
802.11b:

Channel 1: 2.412 GHz:

30MHz to 1000MHz:

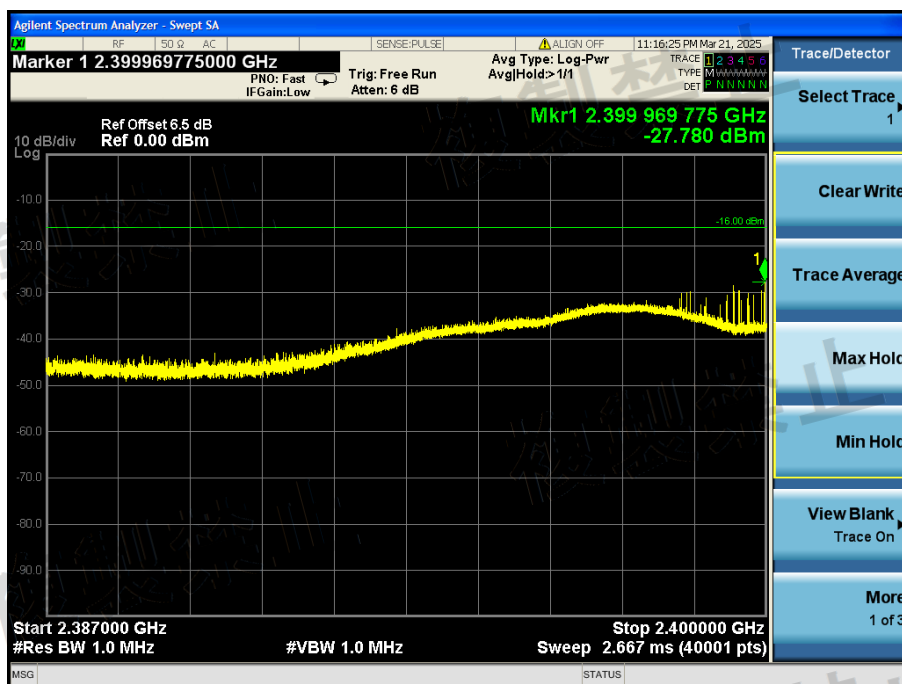


1000MHz to 2387MHz:

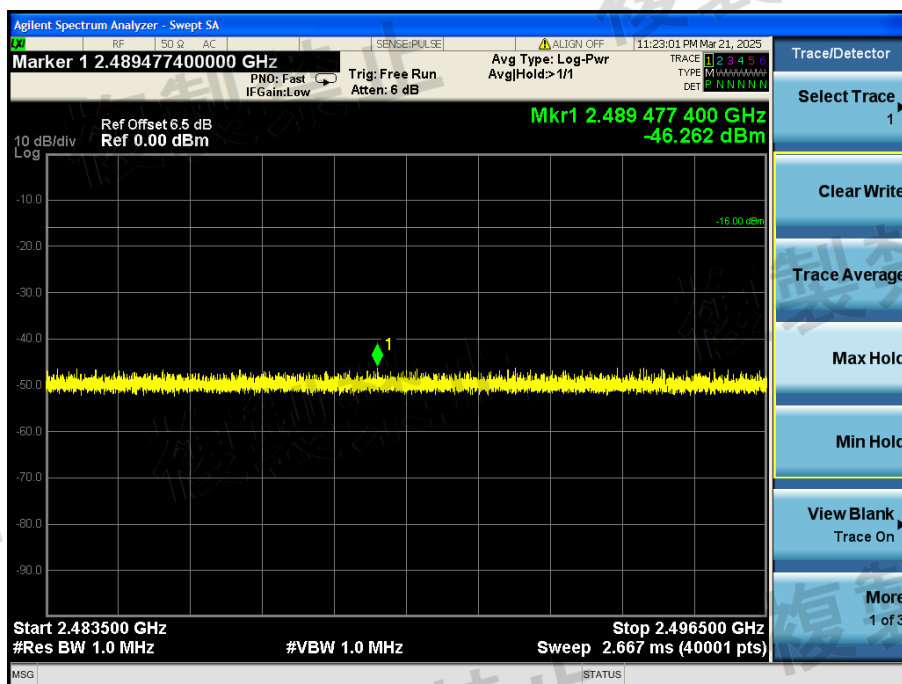




2387MHz to 2400MHz:

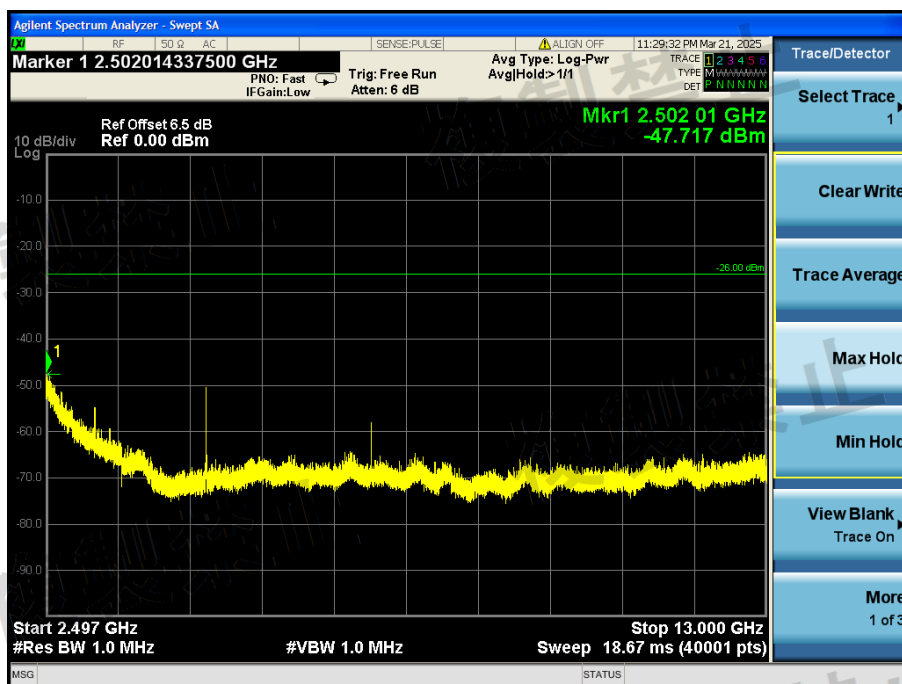


2483.5MHz to 2496.5MHz:



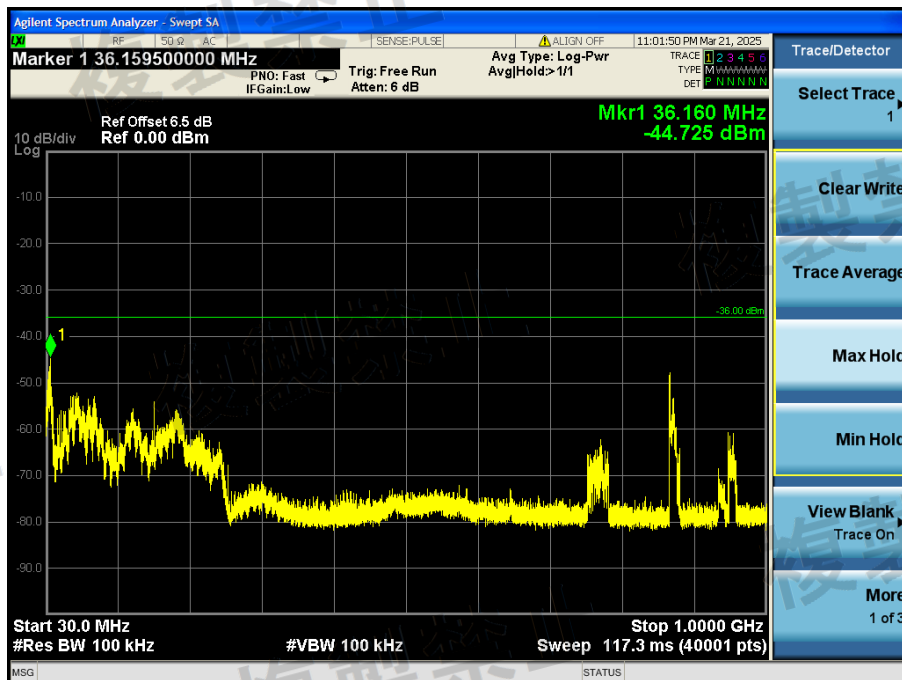


2496.5MHz to 13 GHz:



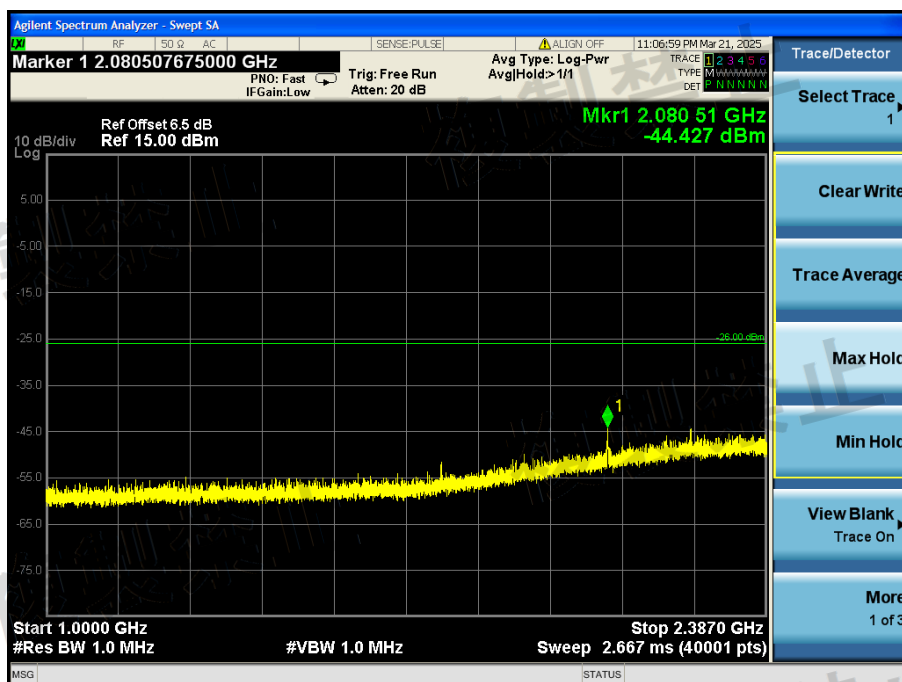
Channel 7: 2.442 GHz

30MHz to 1000MHz:

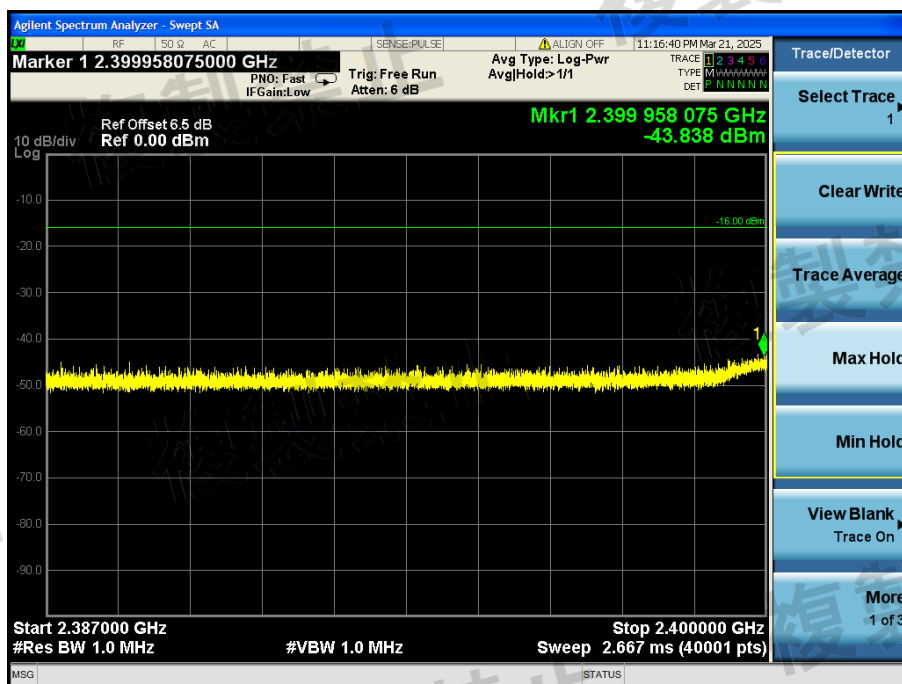




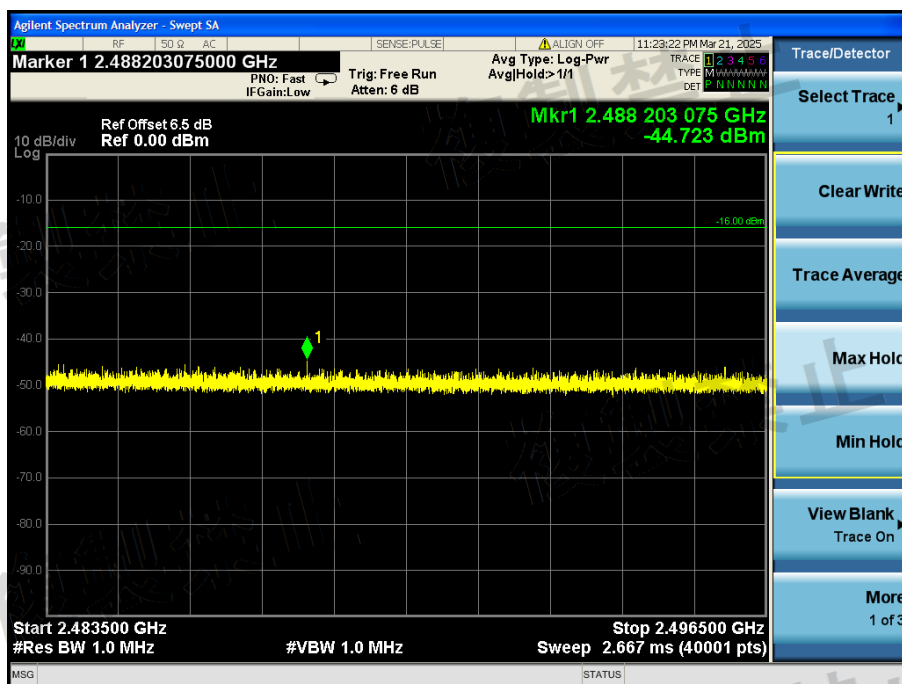
1000MHz to 2387MHz:



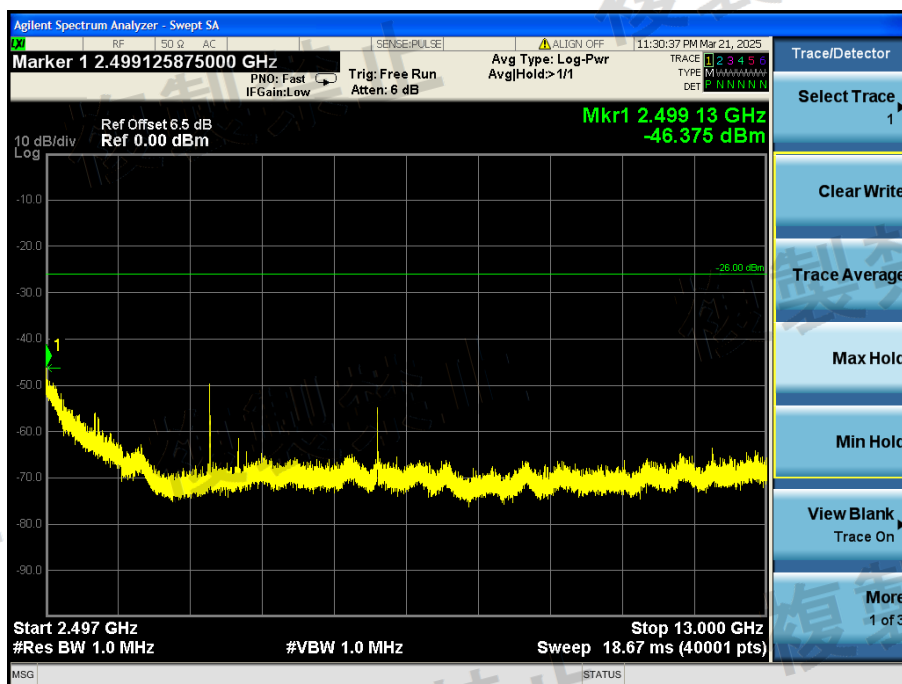
2387MHz to 2400MHz:



2483.5MHz to 2496.5MHz:

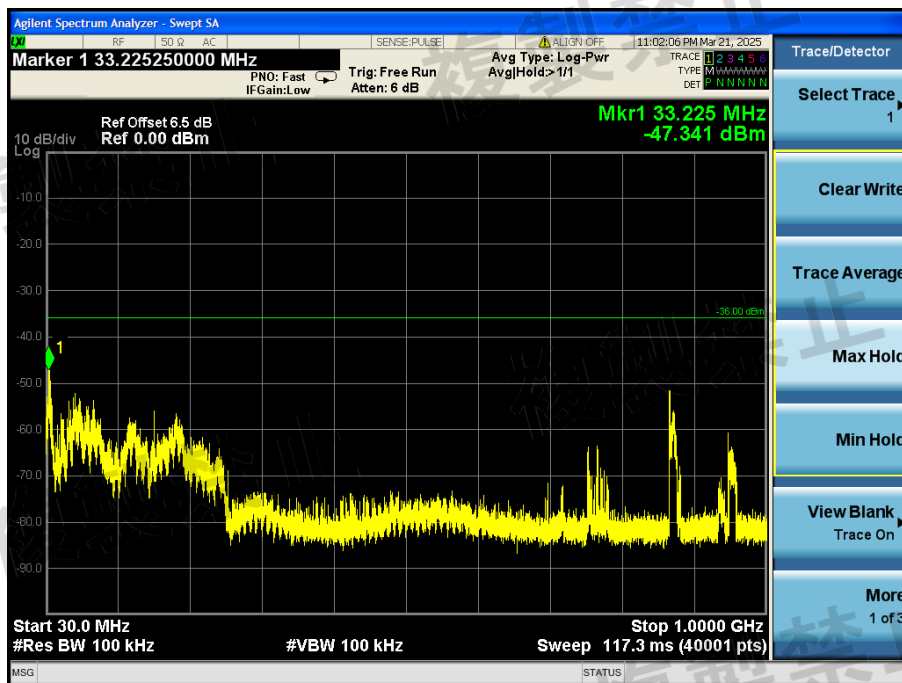


2496.5MHz to 13 GHz:

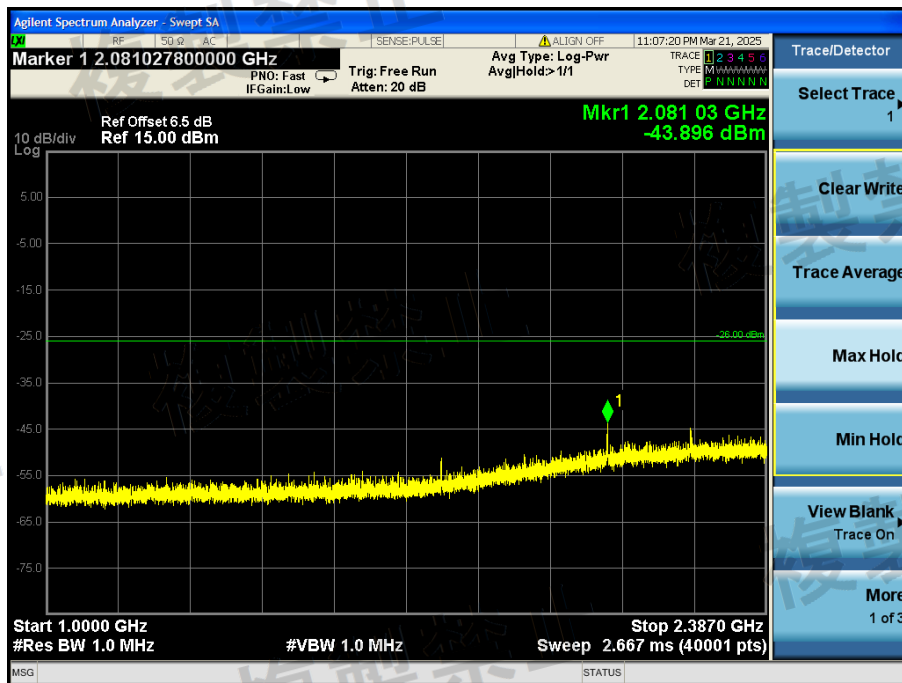


Channel 13: 2.472 GHz

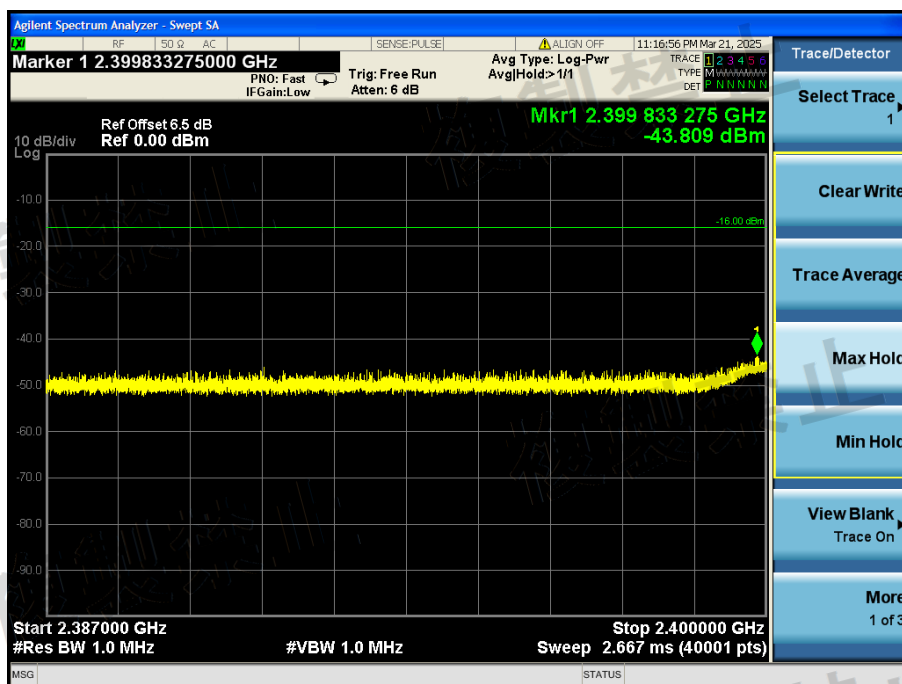
30MHz to 1000MHz:



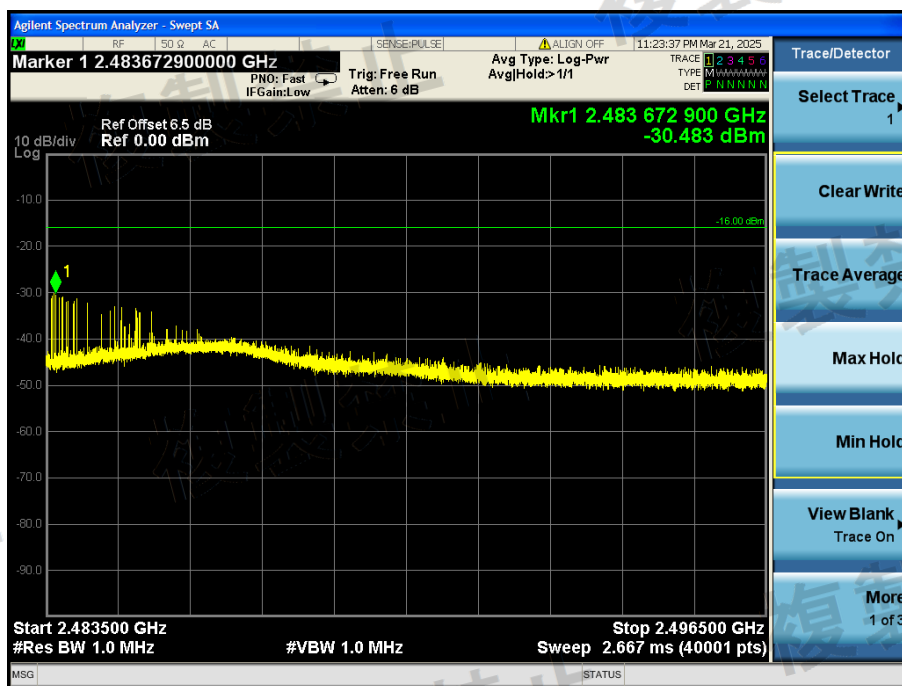
1000MHz to 2387MHz:



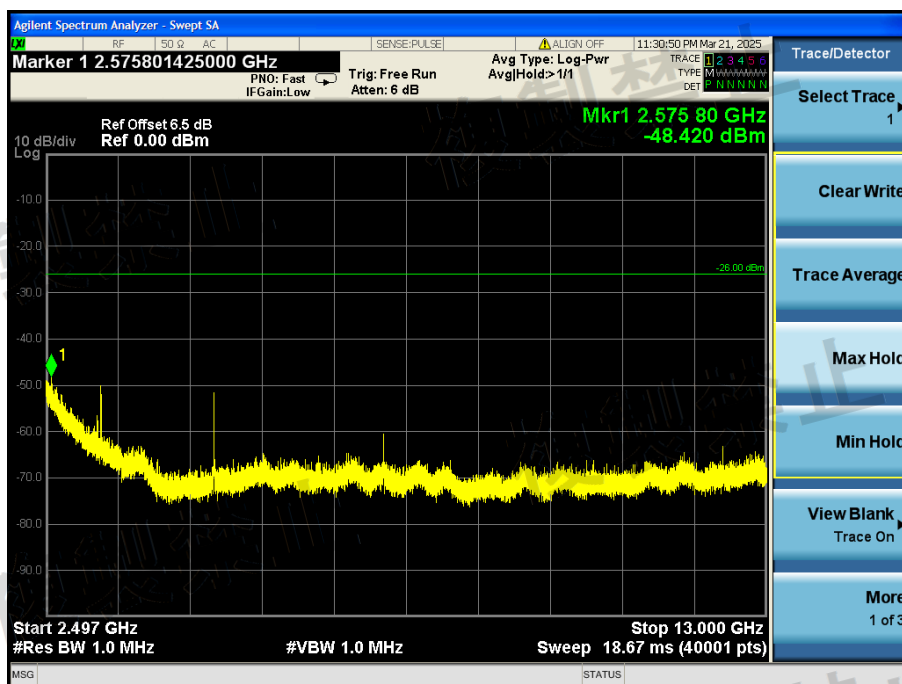
2387MHz to 2400MHz:



2483.5MHz to 2496.5MHz:



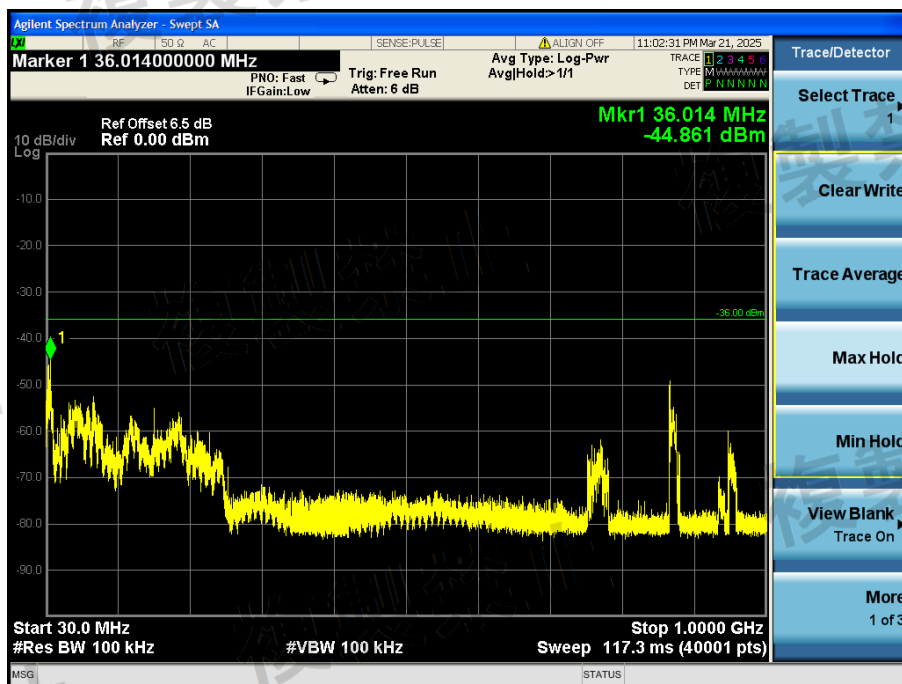
2496.5MHz to 13 GHz:



802.11g:

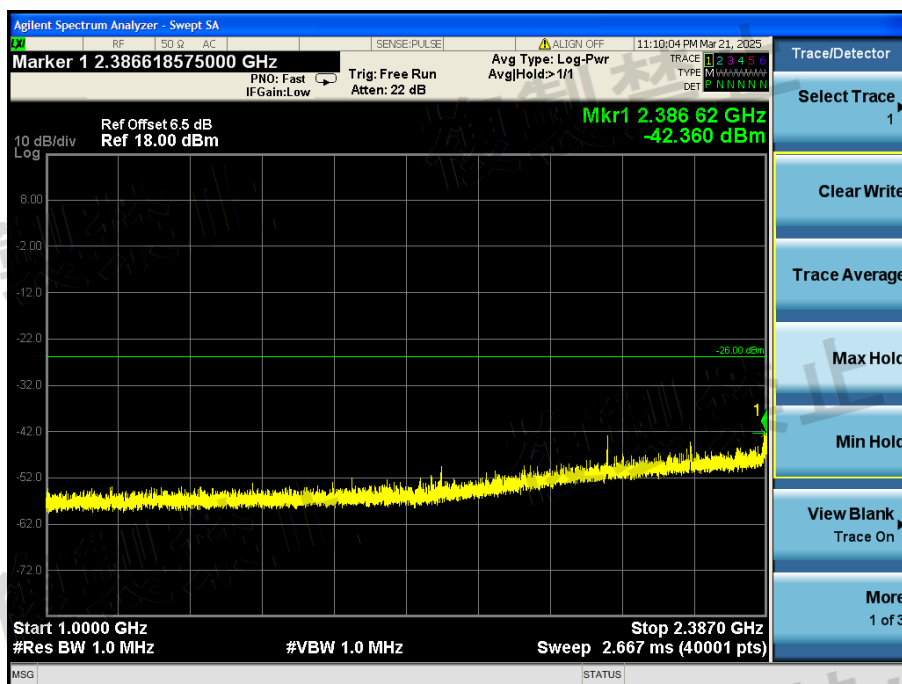
Channel 1: 2.412 GHz

30MHz to 1000MHz:

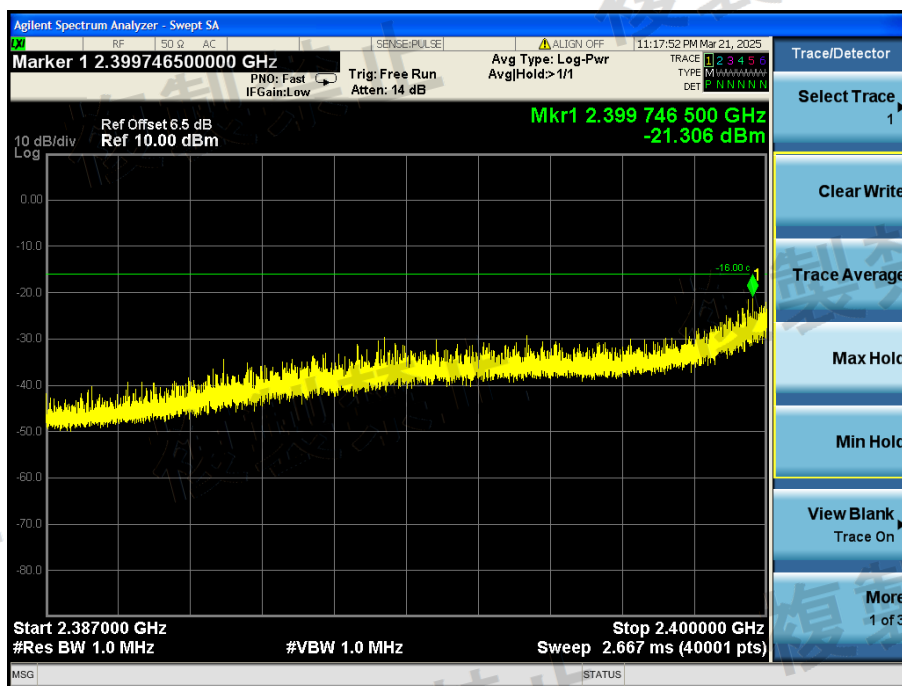




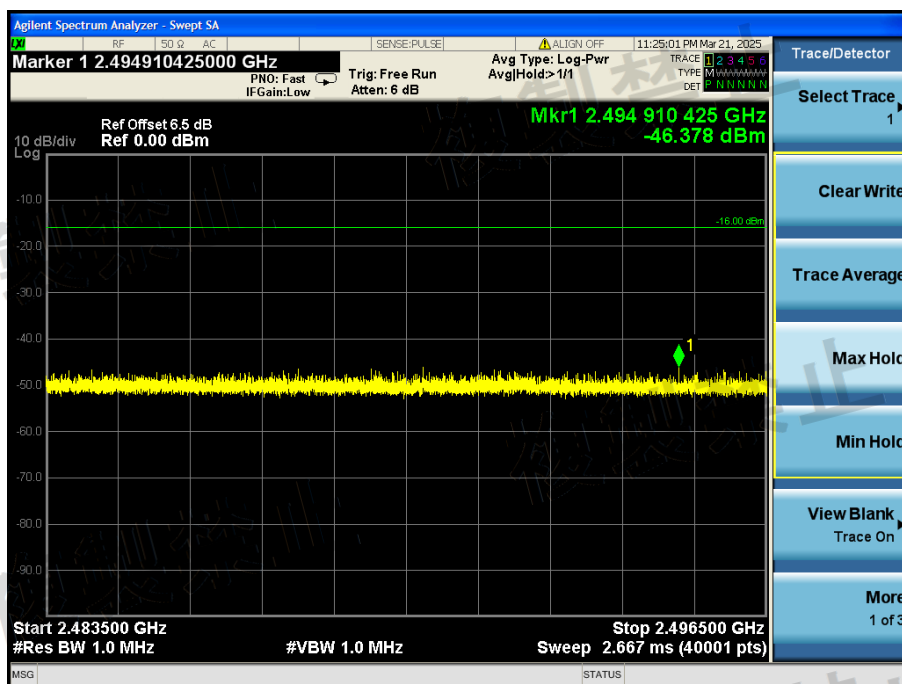
1000MHz to 2387MHz:



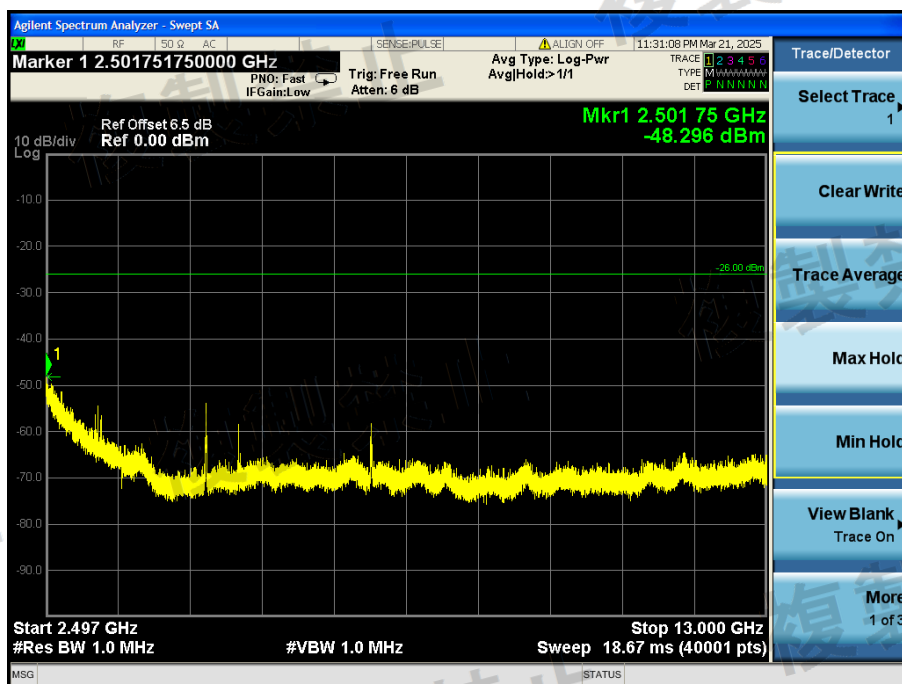
2387MHz to 2400MHz:



2483.5MHz to 2496.5MHz:

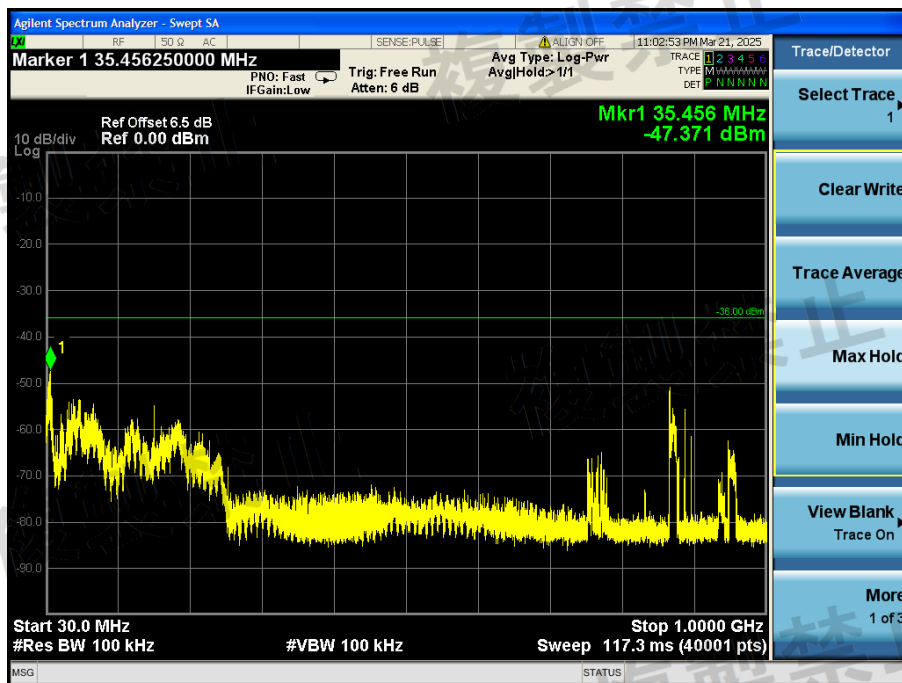


2496.5MHz to 13 GHz:

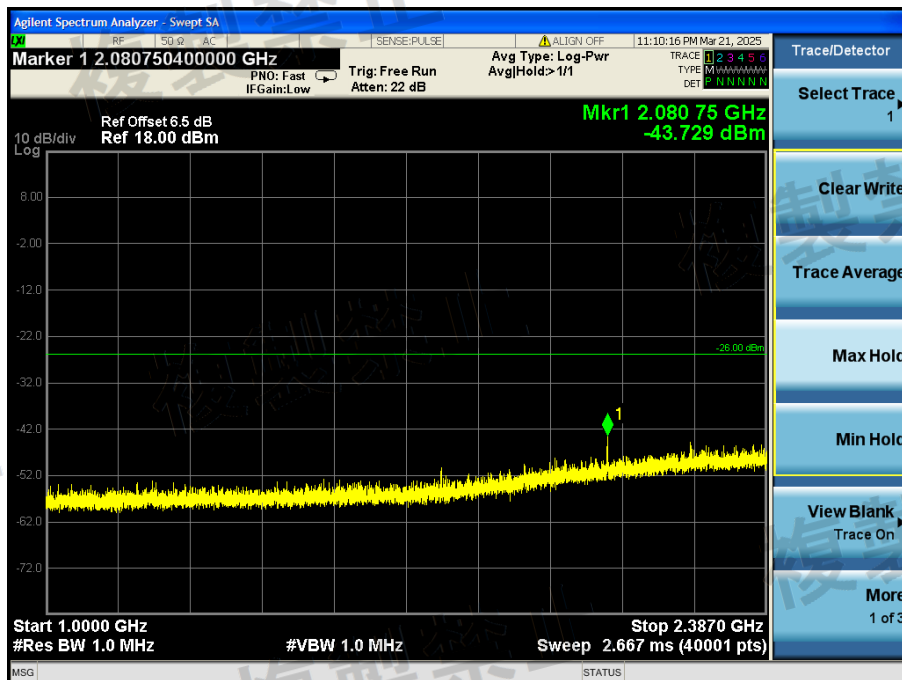


Channel 7: 2.442 GHz

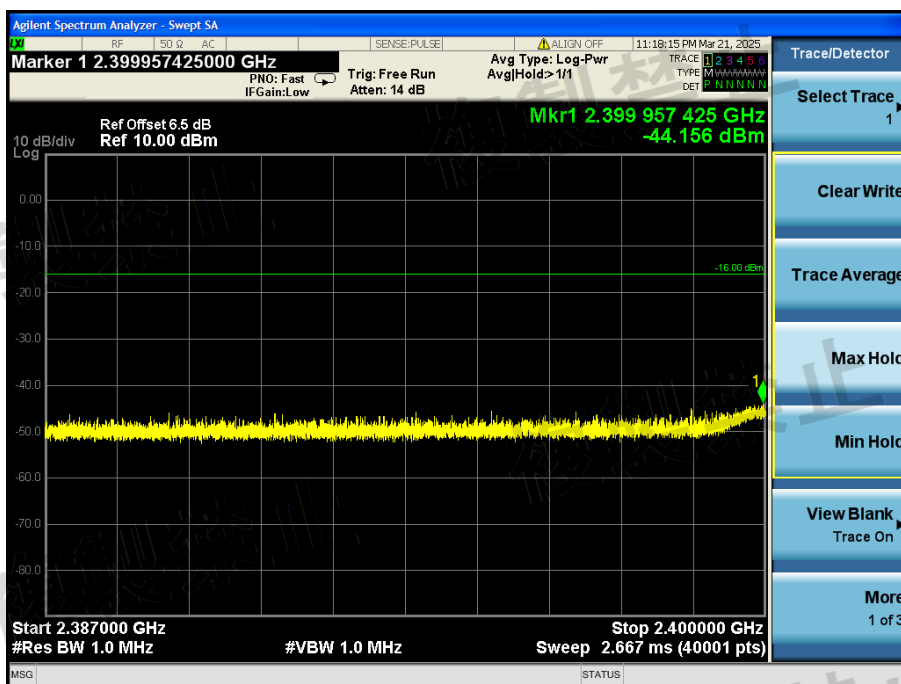
30MHz to 1000MHz:



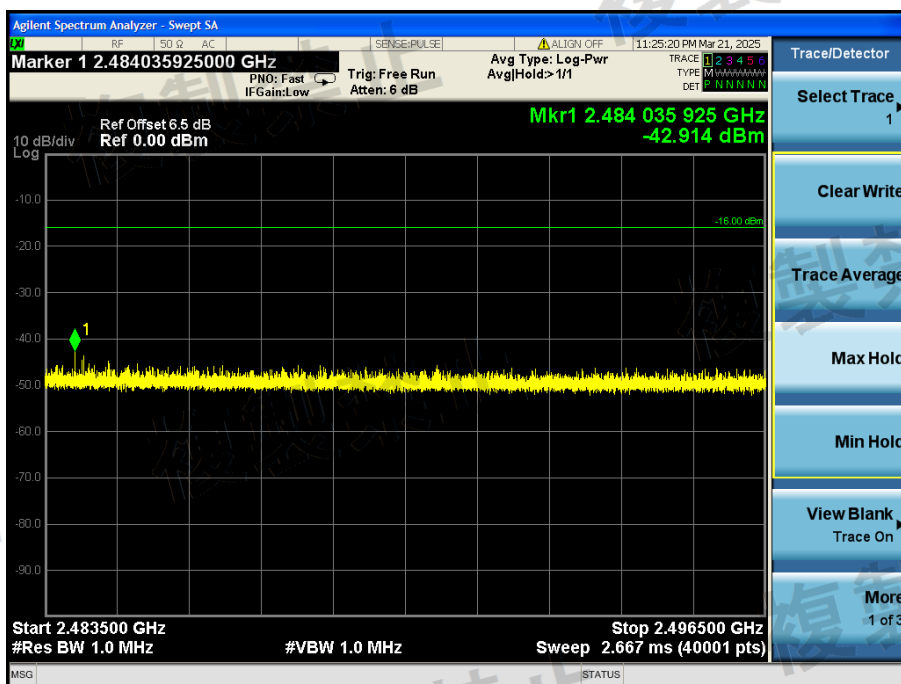
1000MHz to 2387MHz:



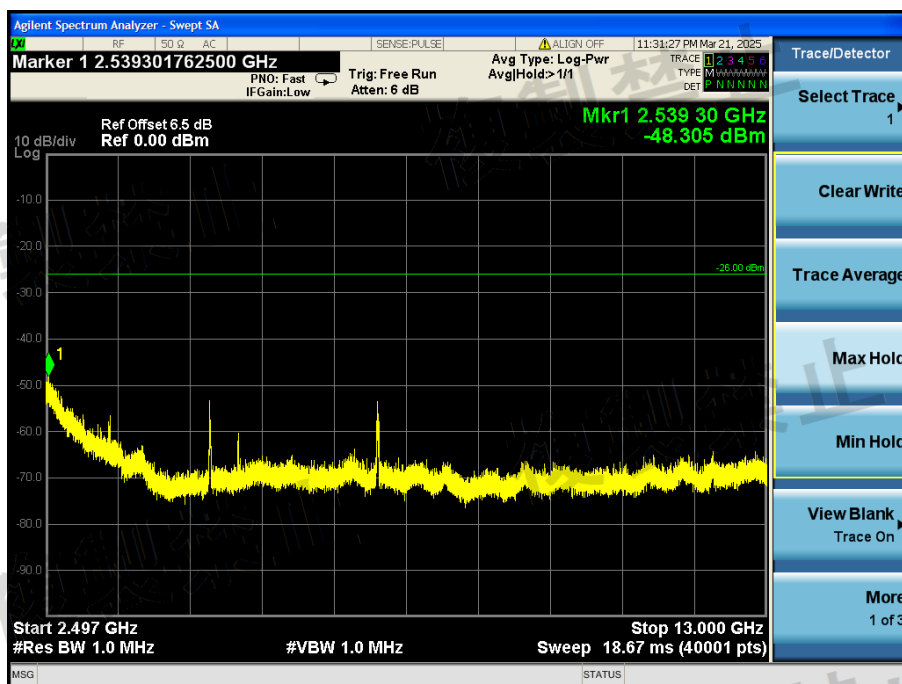
2387MHz to 2400MHz:



2483.5MHz to 2496.5MHz:

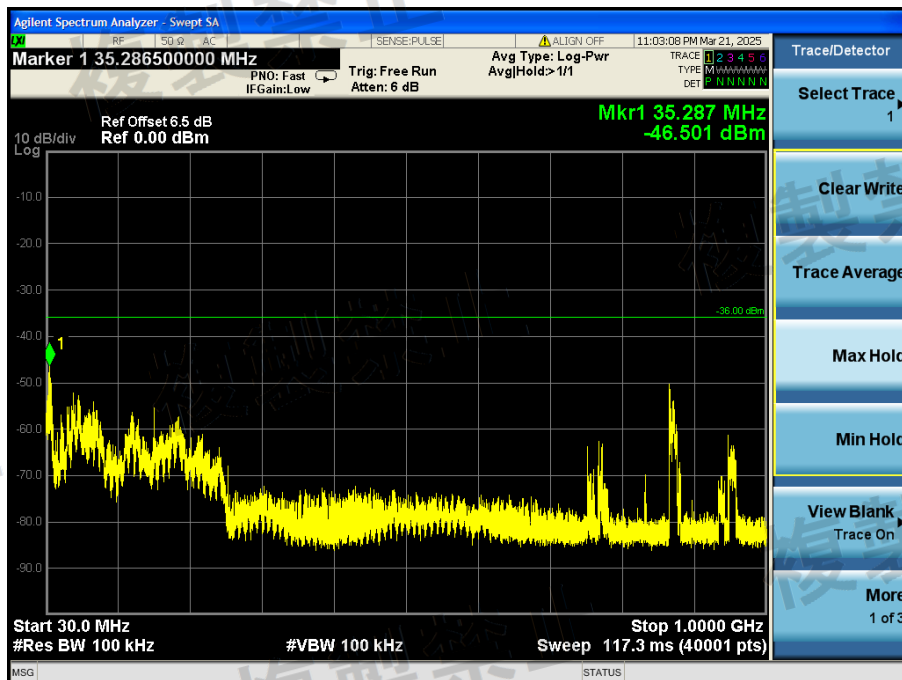


2496.5MHz to 13 GHz:

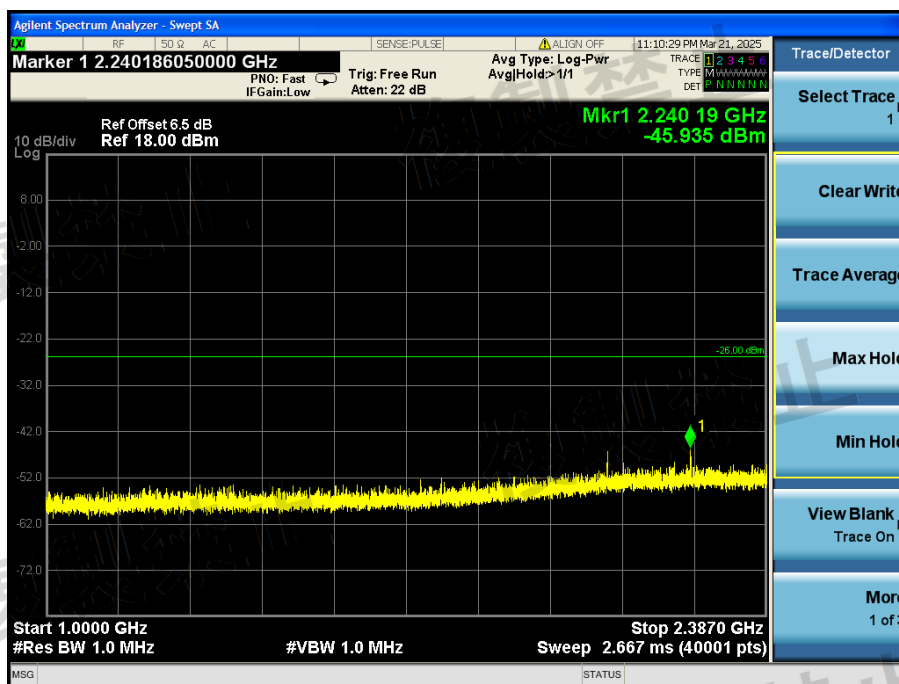


Channel 13: 2.472 GHz

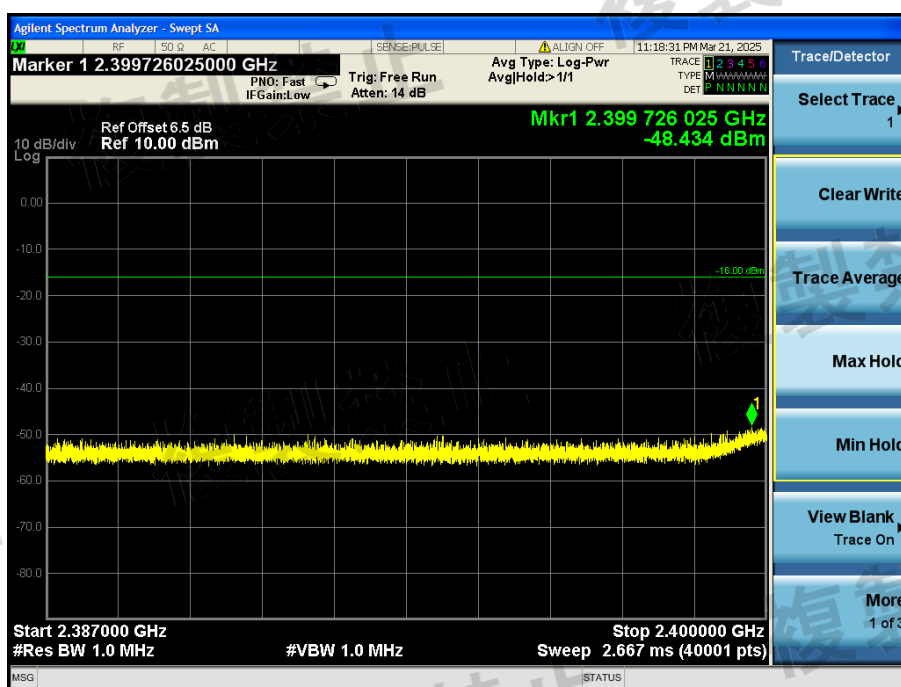
30MHz to 1000MHz:



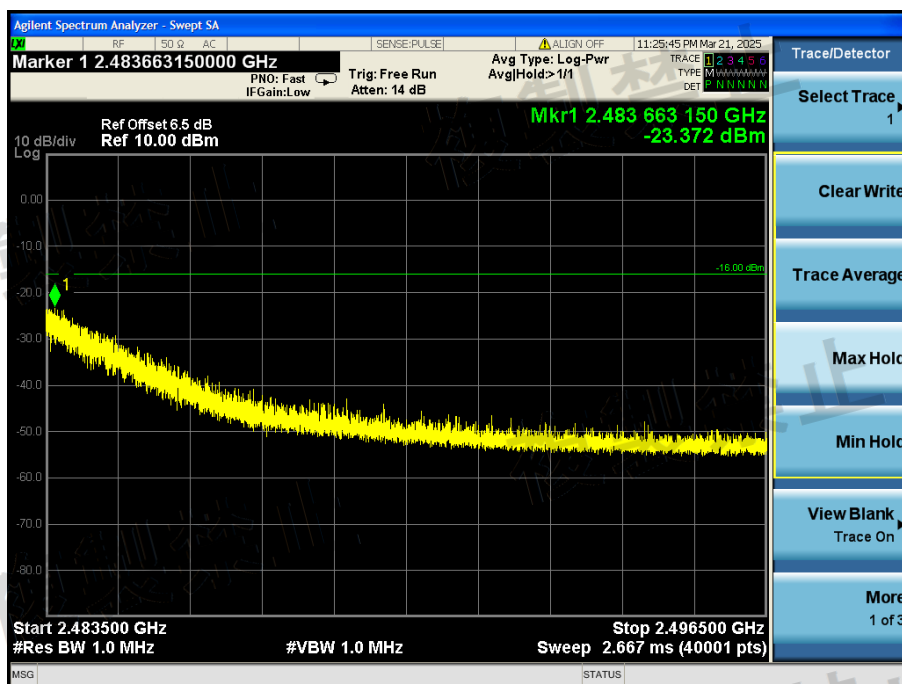
1000MHz to 2387MHz:



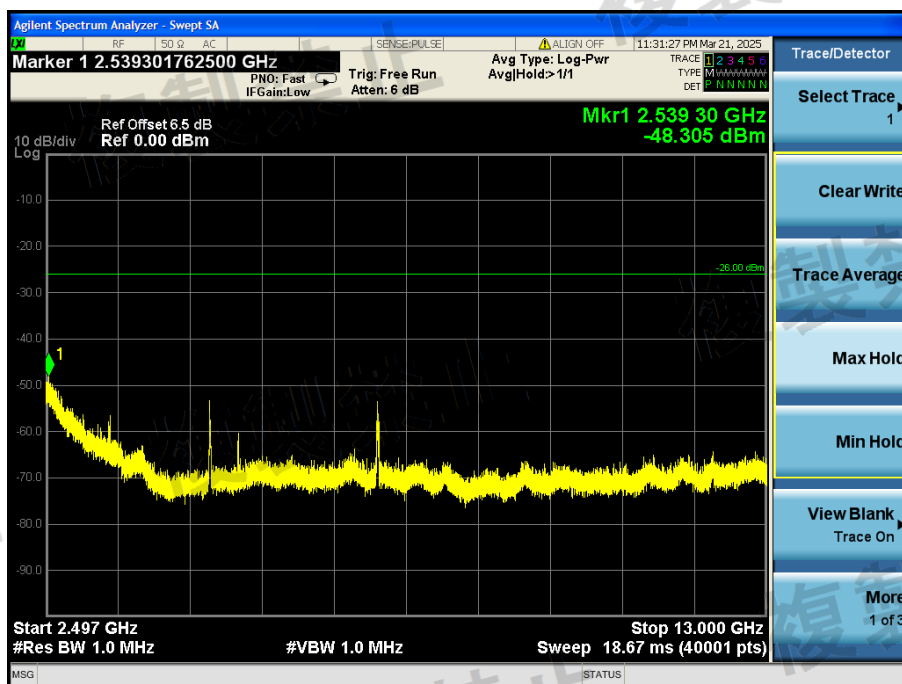
2387MHz to 2400MHz:



2483.5MHz to 2496.5MHz:



2496.5MHz to 13 GHz:

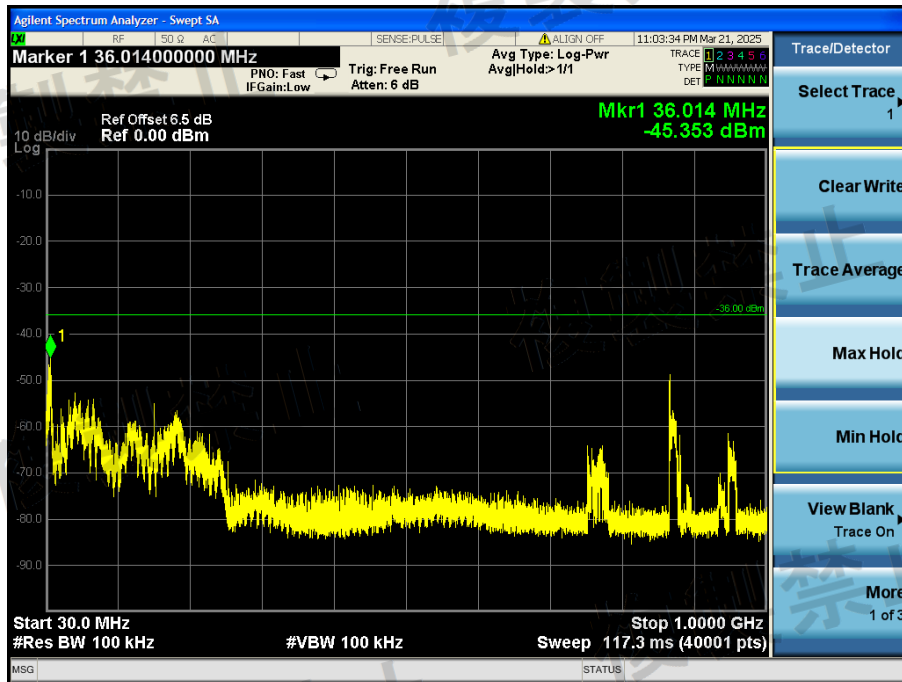




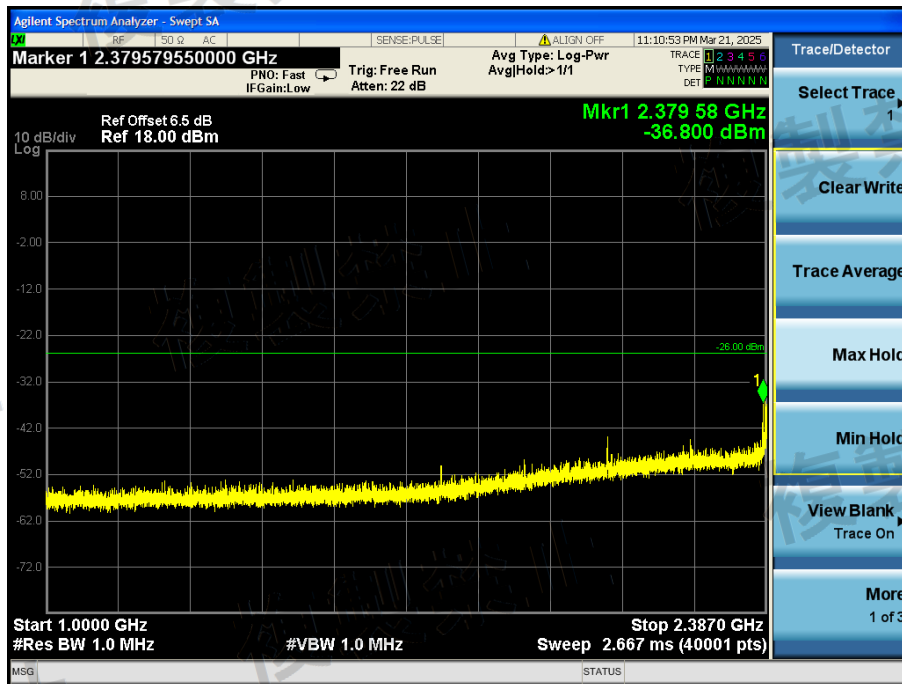
802.11n(HT20):

Channel 1: 2.412 GHz

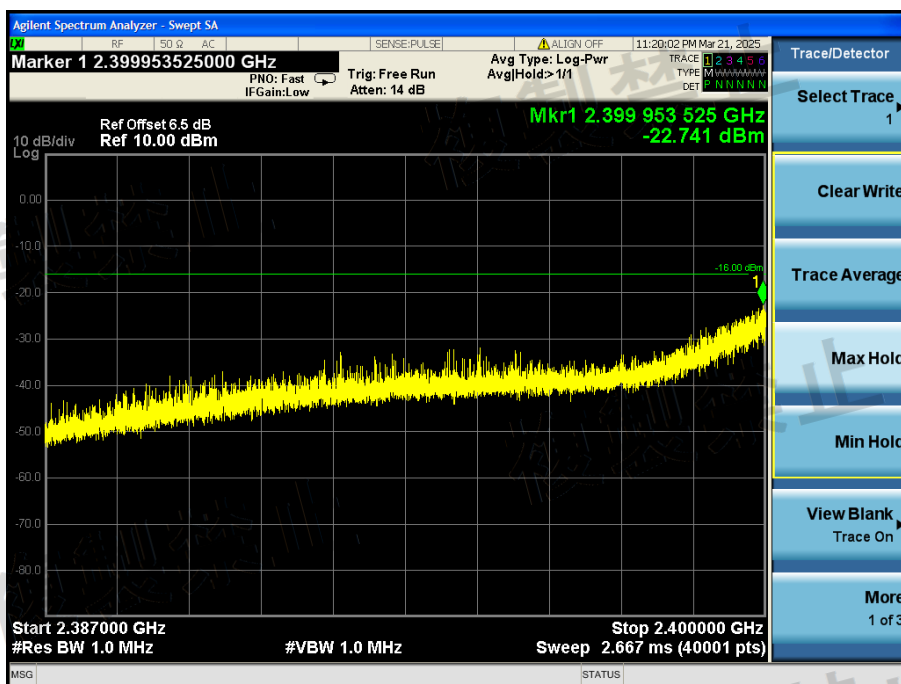
30MHz to 1000MHz:



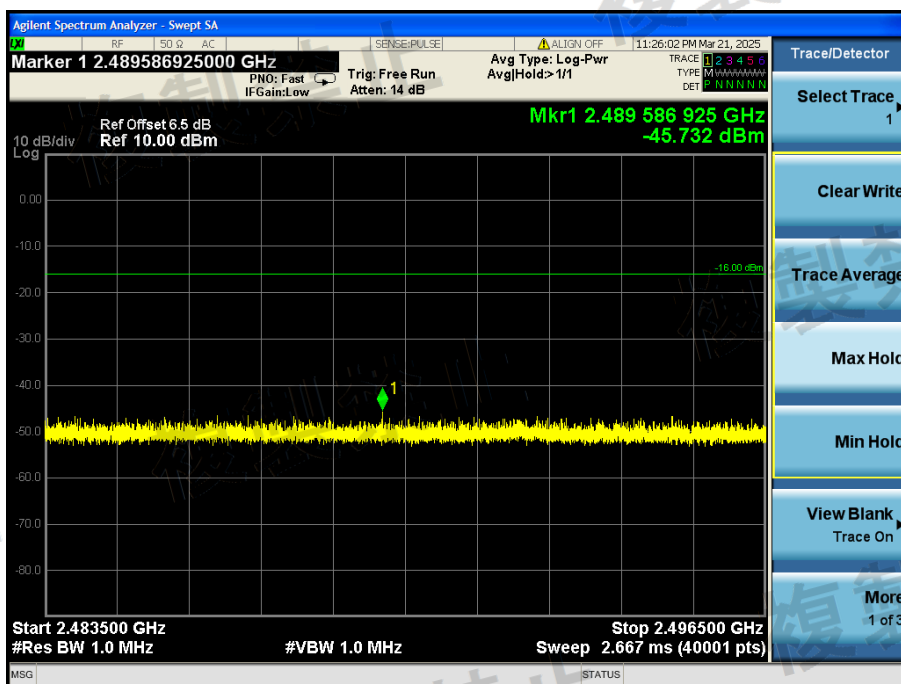
1000MHz to 2387MHz:



2387MHz to 2400MHz:

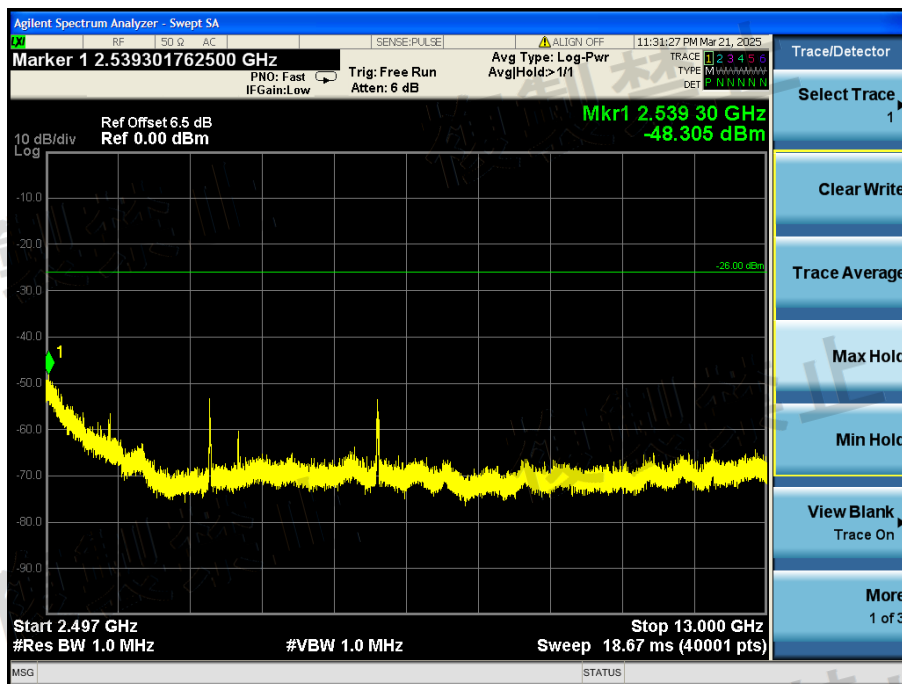


2483.5MHz to 2496.5MHz:



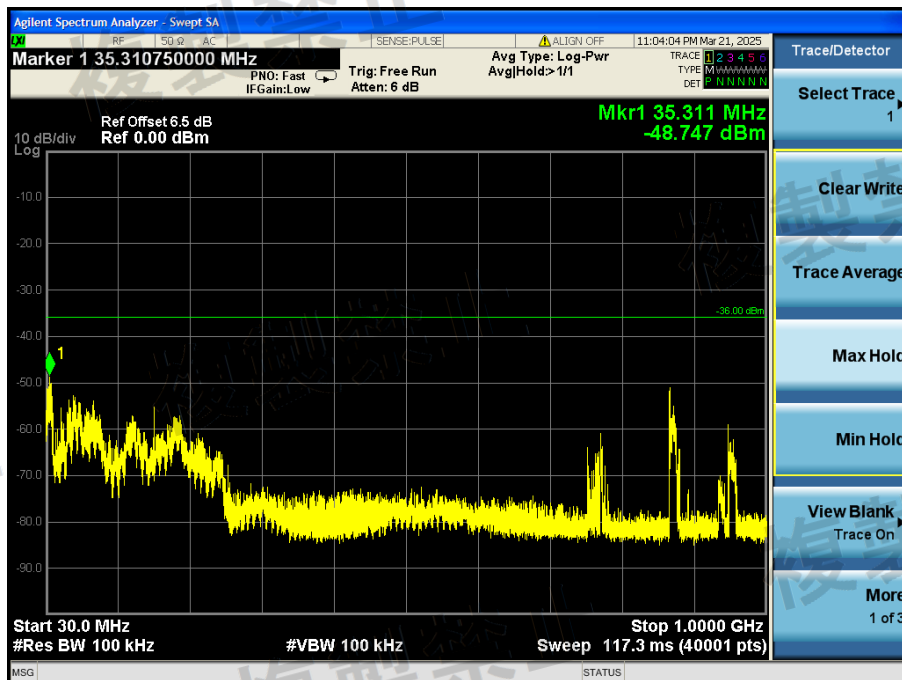


2496.5MHz to 13 GHz:



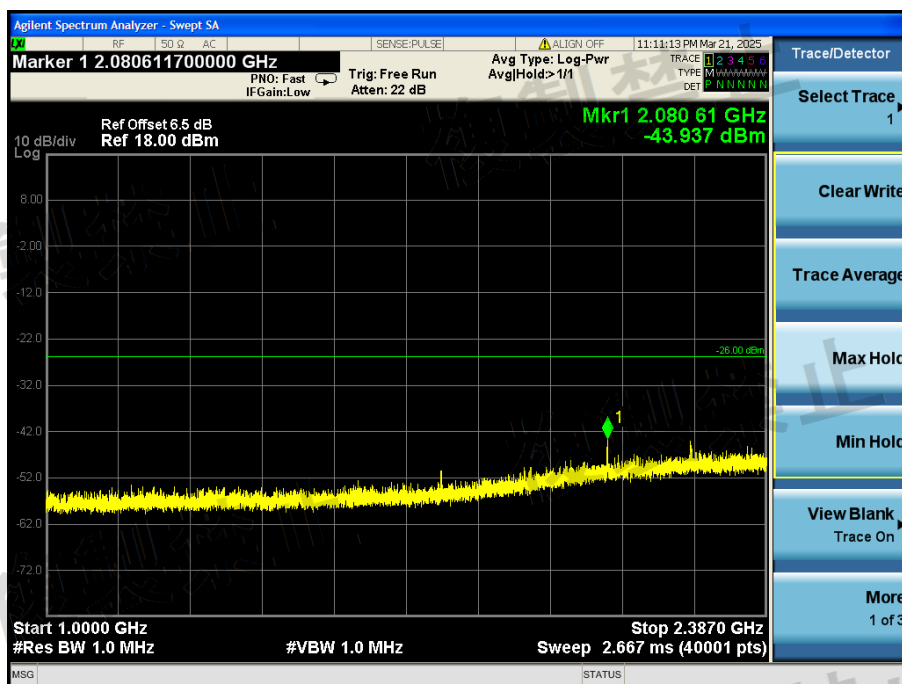
Channel 7: 2.442 GHz

30MHz to 1000MHz:

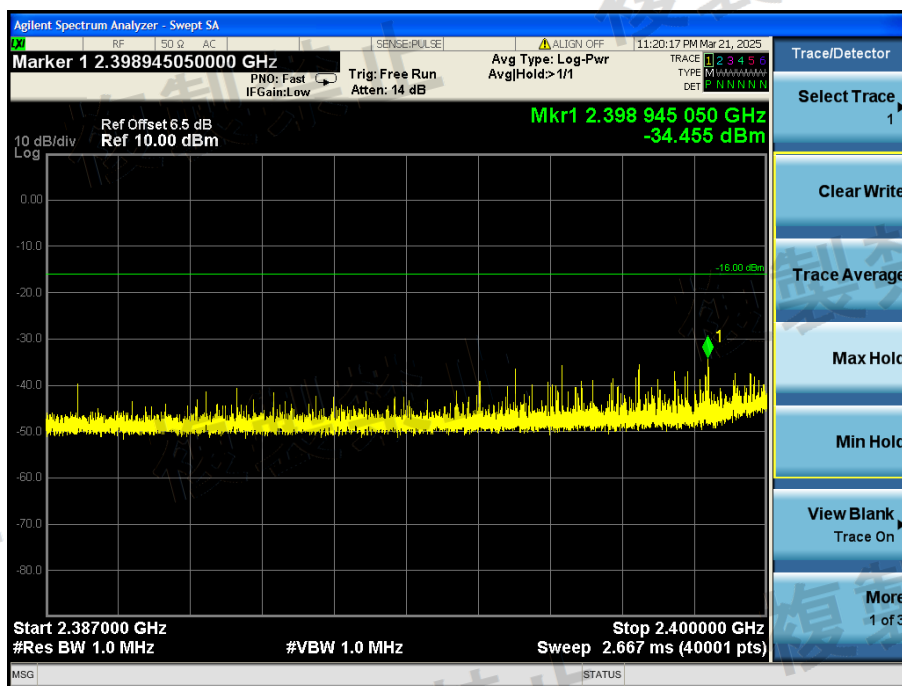




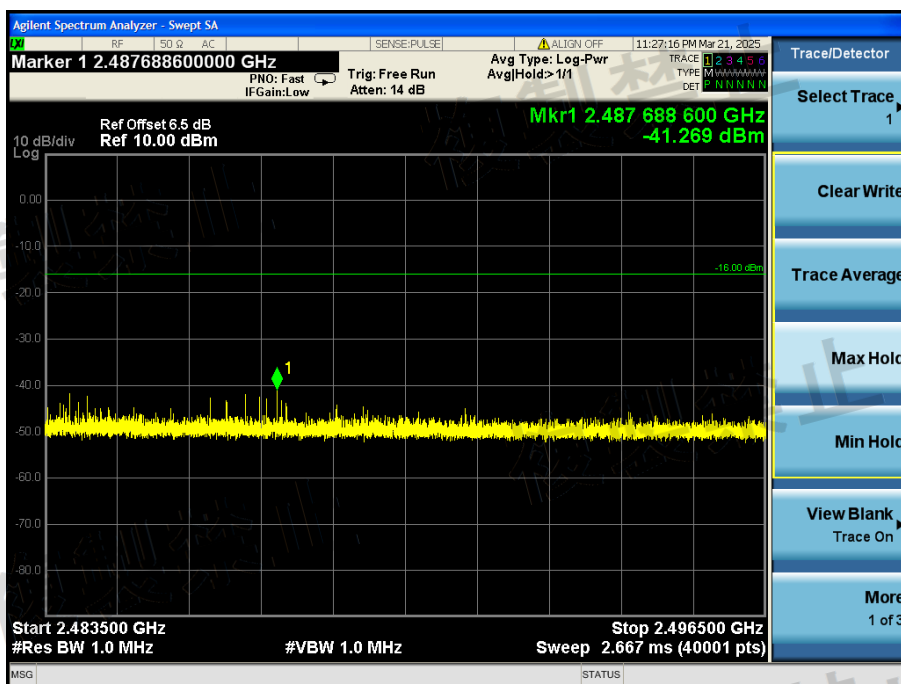
1000MHz to 2387MHz:



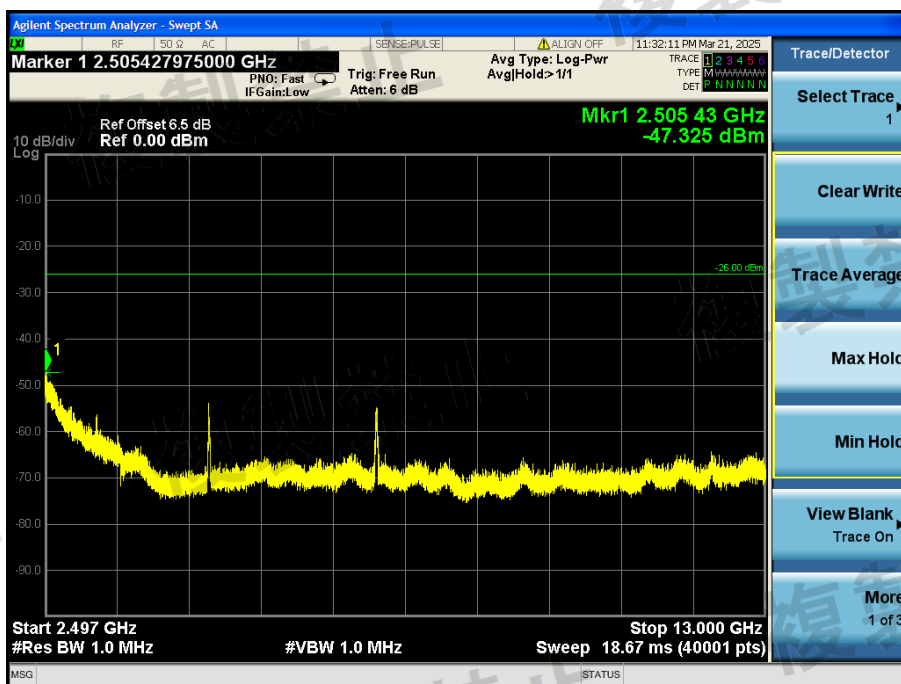
2387MHz to 2400MHz:



2483.5MHz to 2496.5MHz:

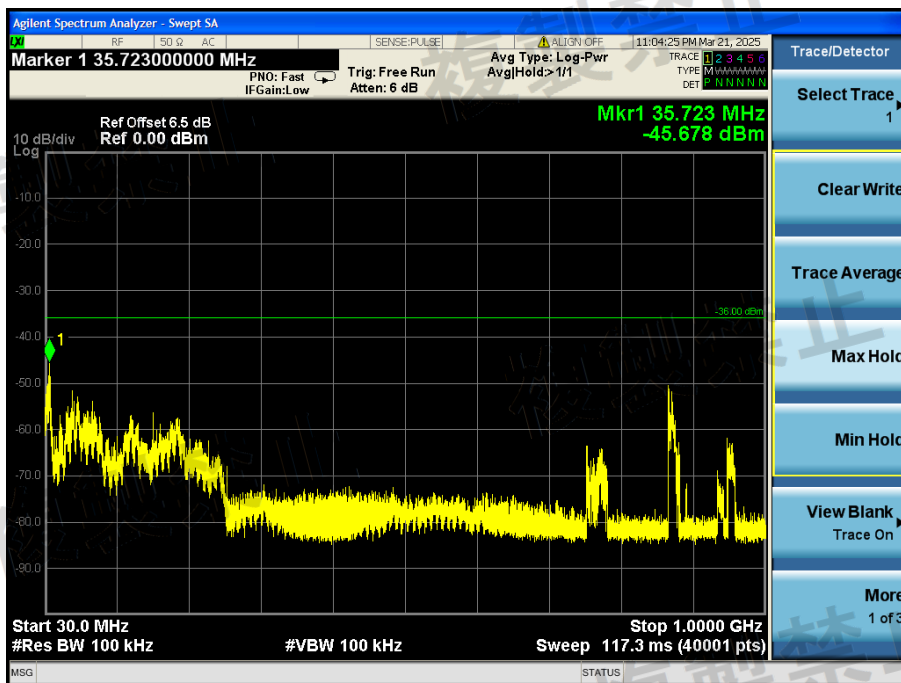


2496.5MHz to 13 GHz:

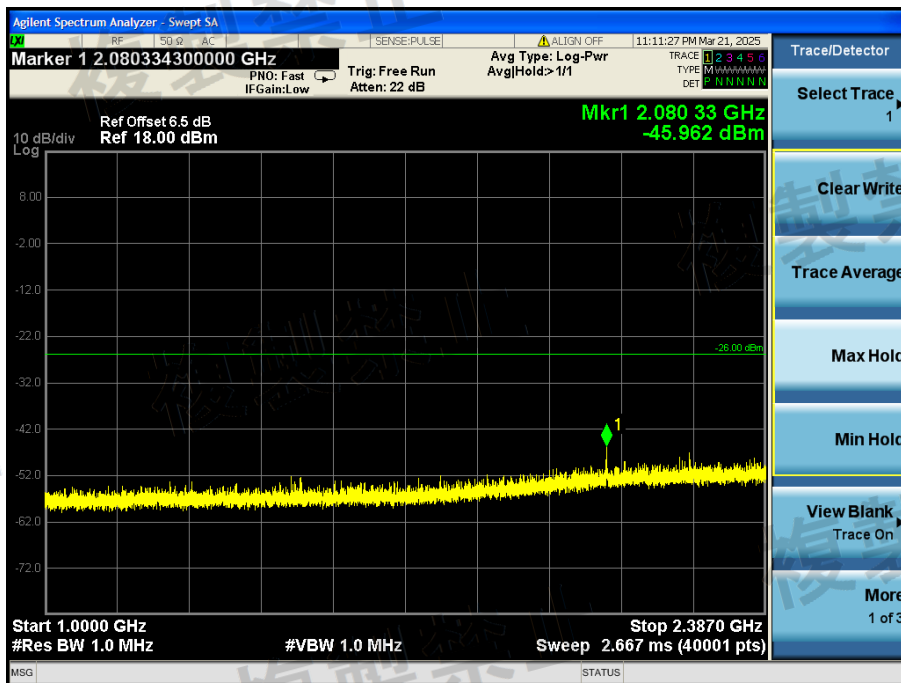


Channel 13: 2.472 GHz

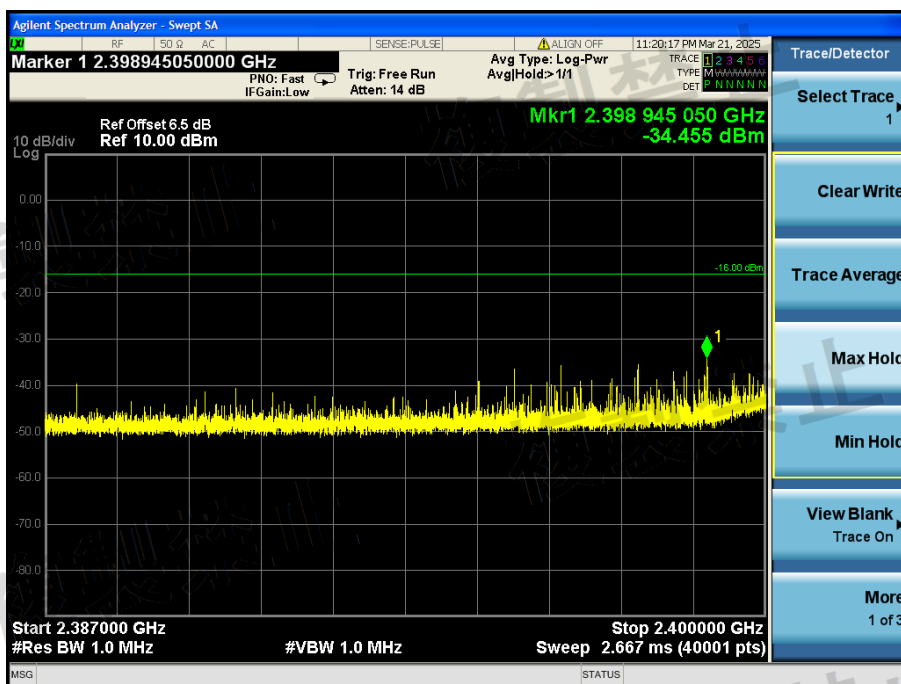
30MHz to 1000MHz:



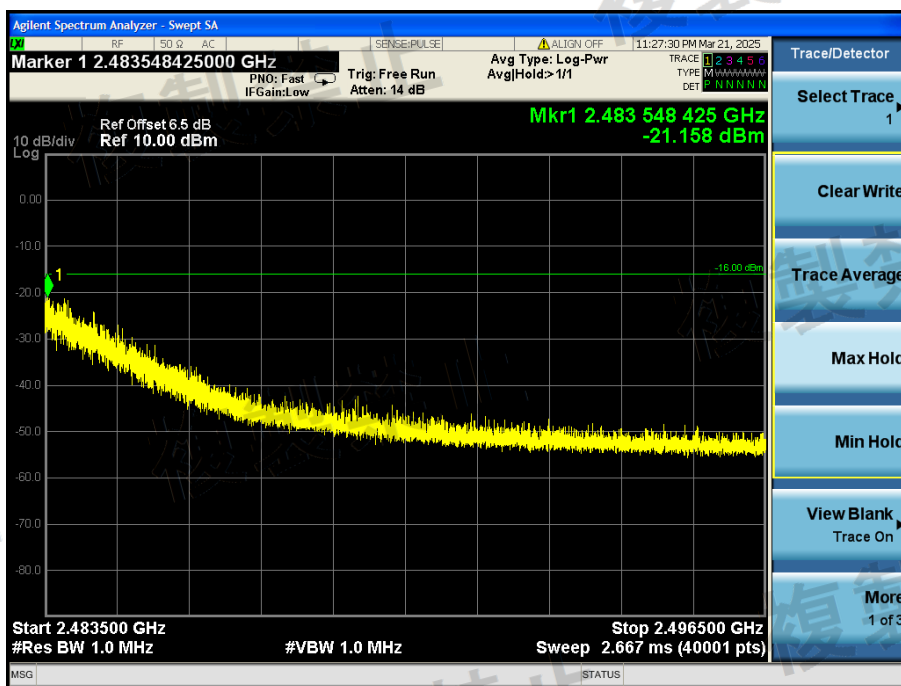
1000MHz to 2387MHz:



2387MHz to 2400MHz:

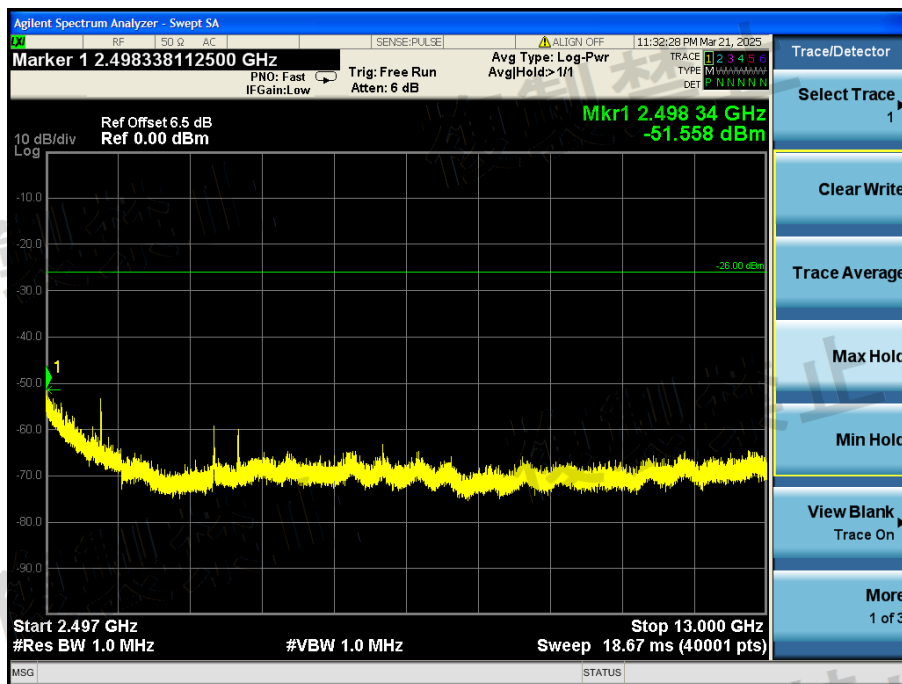


2483.5MHz to 2496.5MHz:





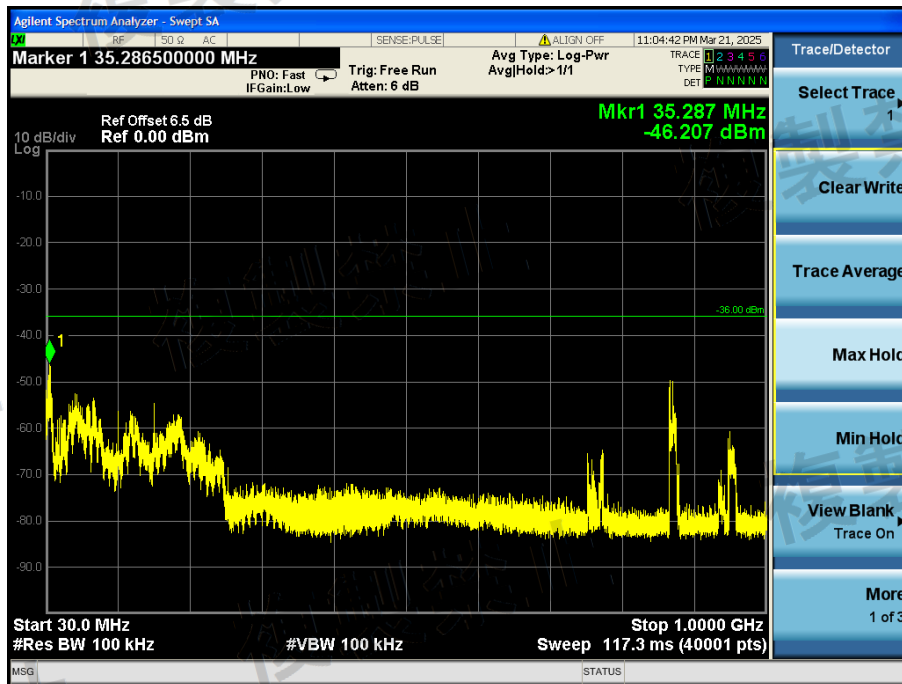
2496.5MHz to 13 GHz:



802.11n(HT40):

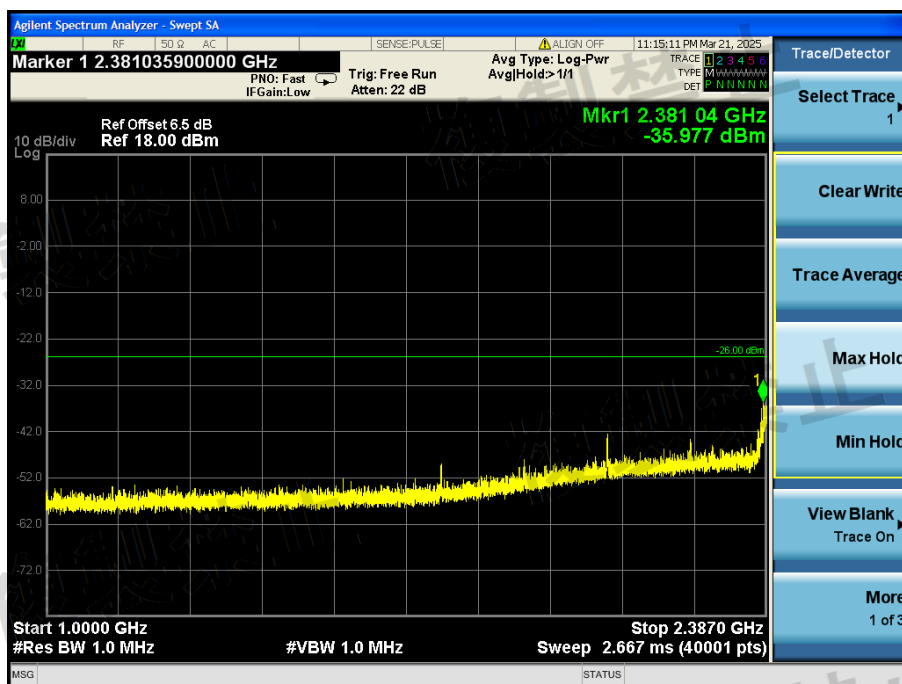
Channel 3: 2.422 GHz

30MHz to 1000MHz:

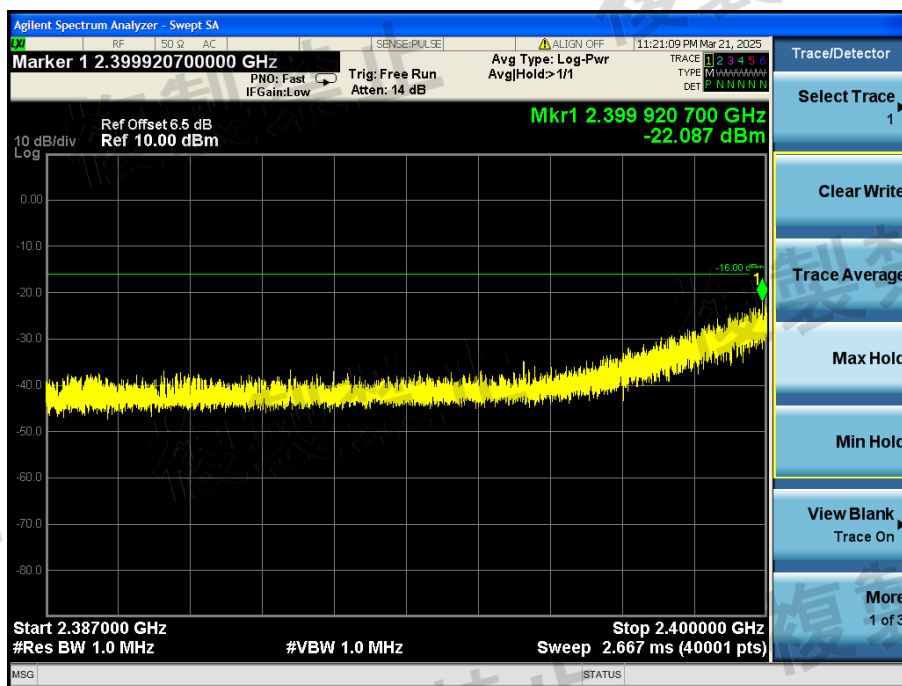




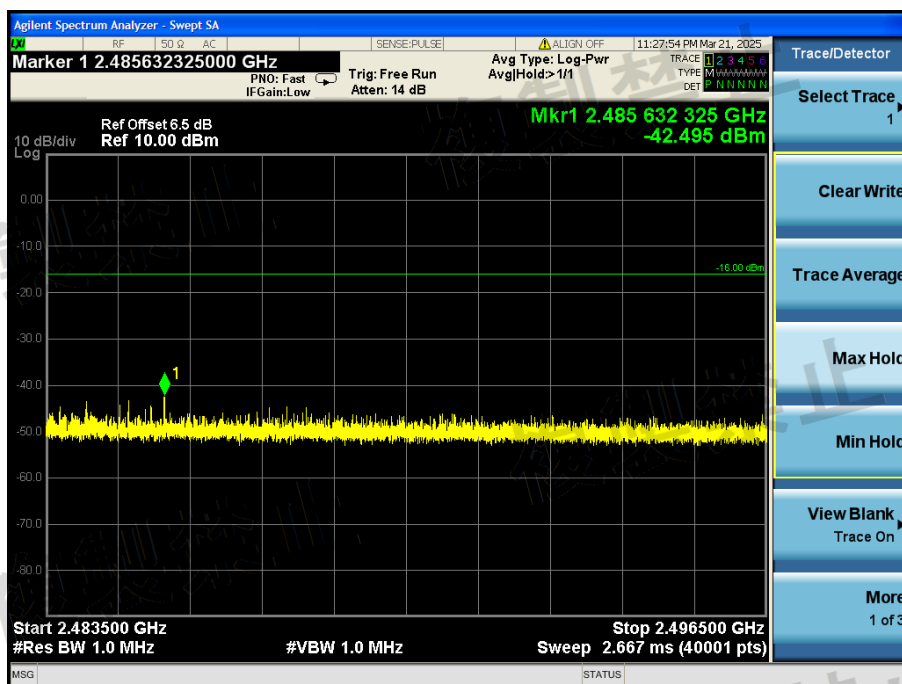
1000MHz to 2387MHz:



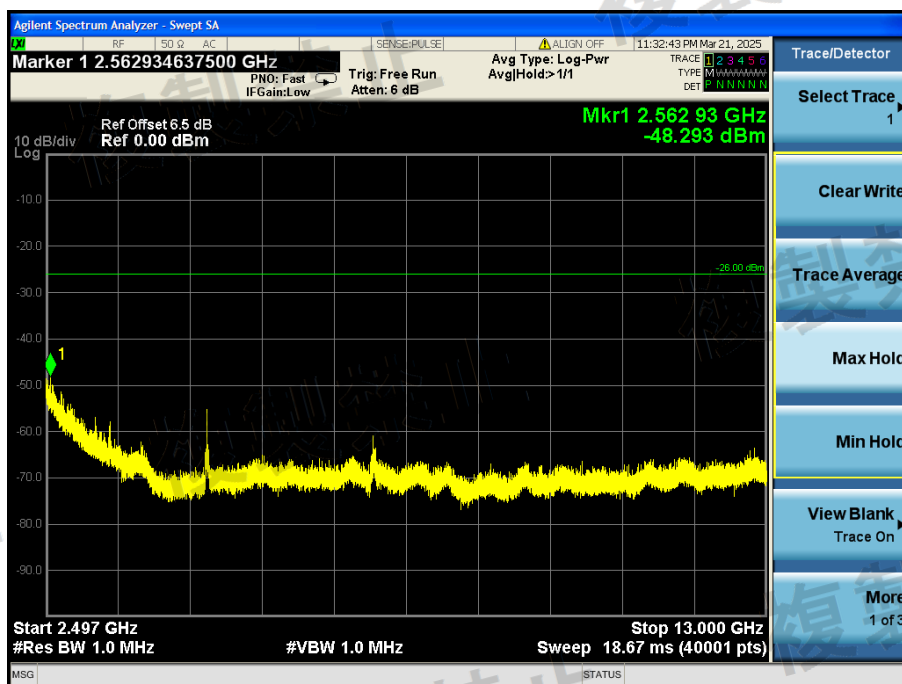
2387MHz to 2400MHz:



2483.5MHz to 2496.5MHz:

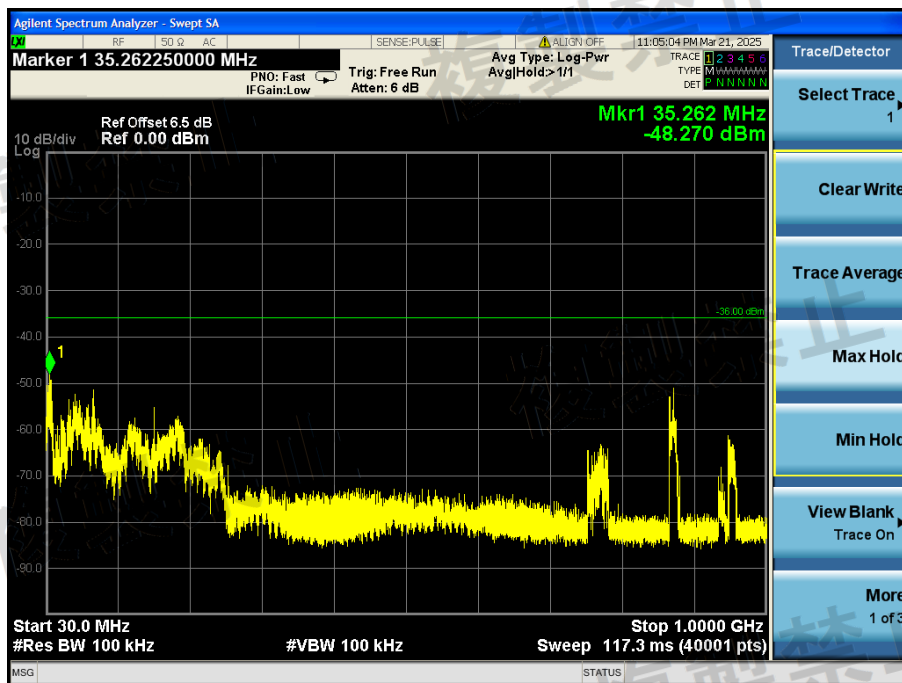


2496.5MHz to 13 GHz:

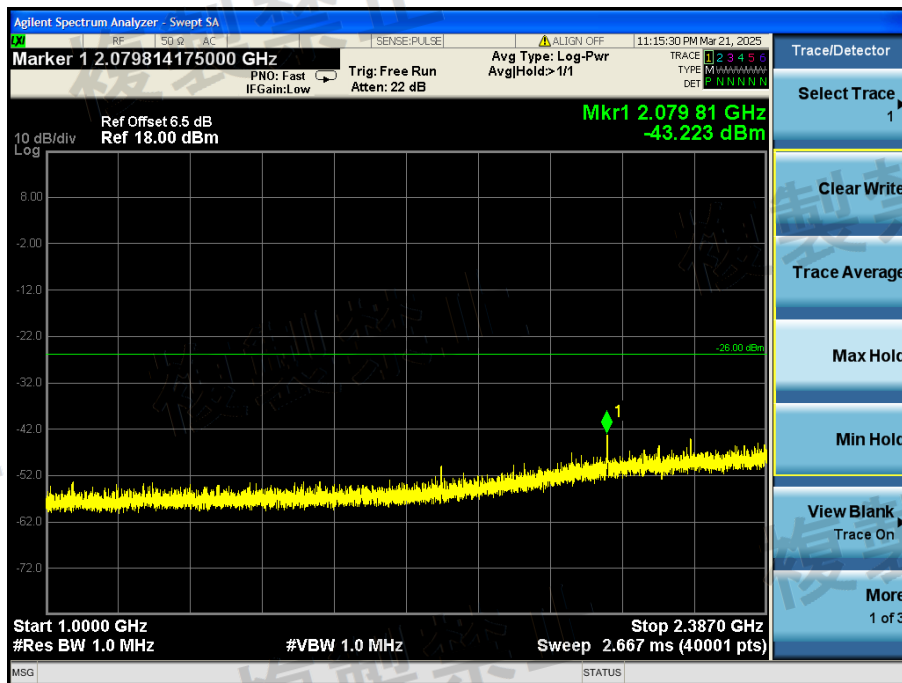


Channel 7: 2.442 GHz

30MHz to 1000MHz:

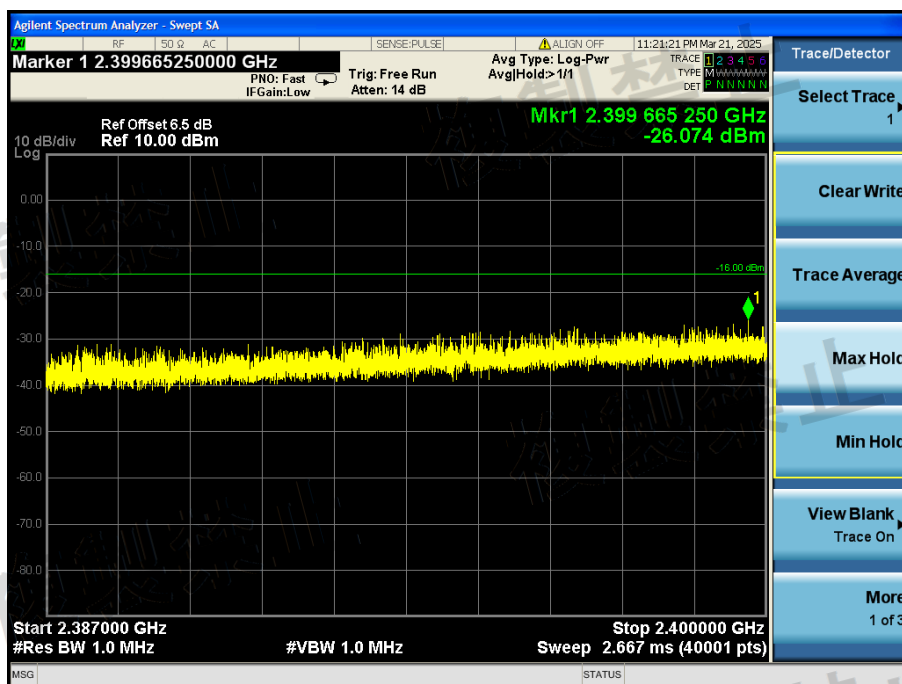


1000MHz to 2387MHz:

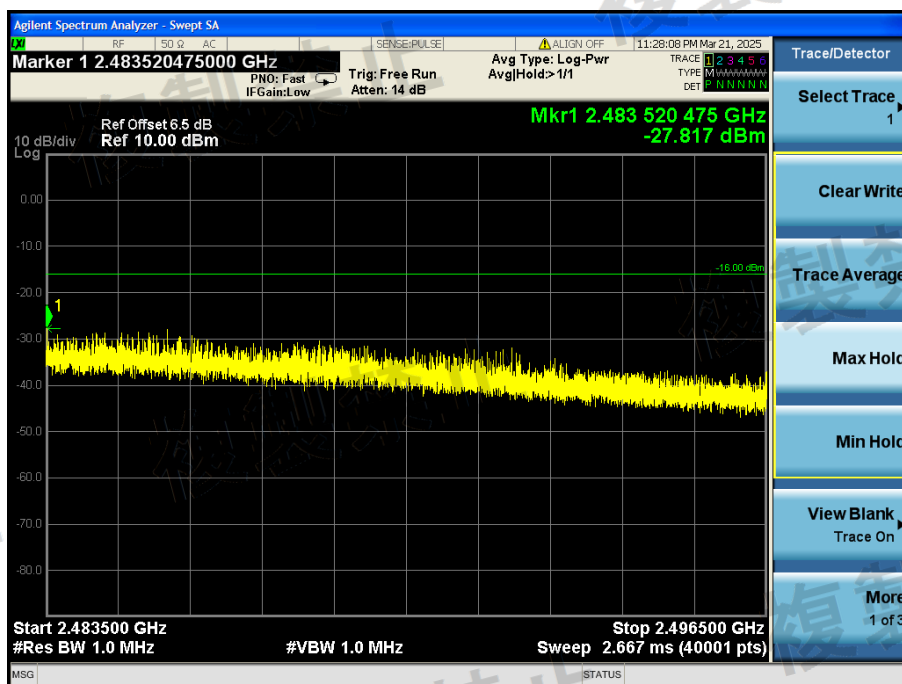




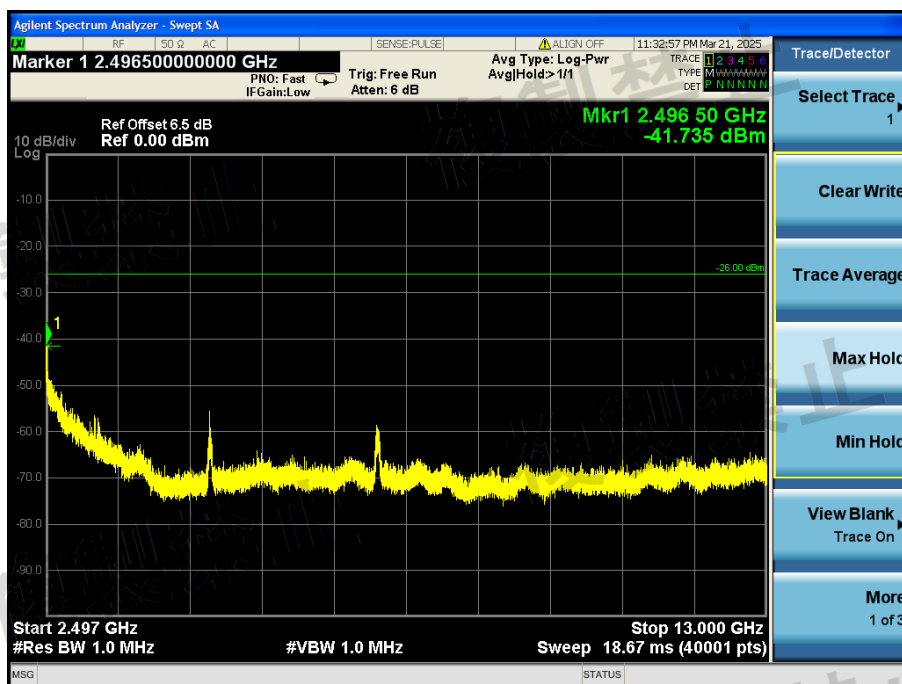
2387MHz to 2400MHz:



2483.5MHz to 2496.5MHz:

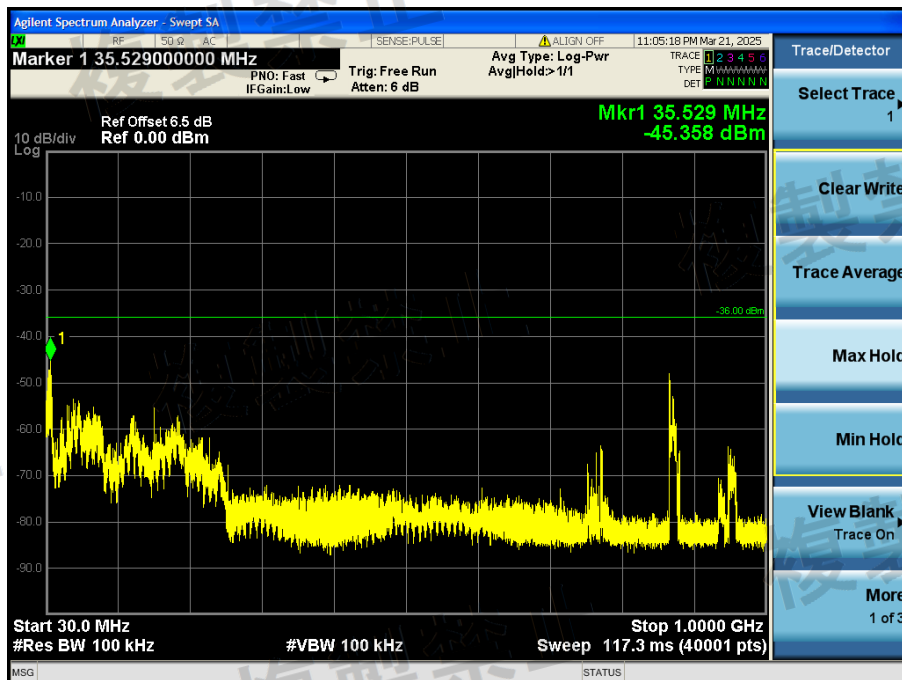


2496.5MHz to 13 GHz:



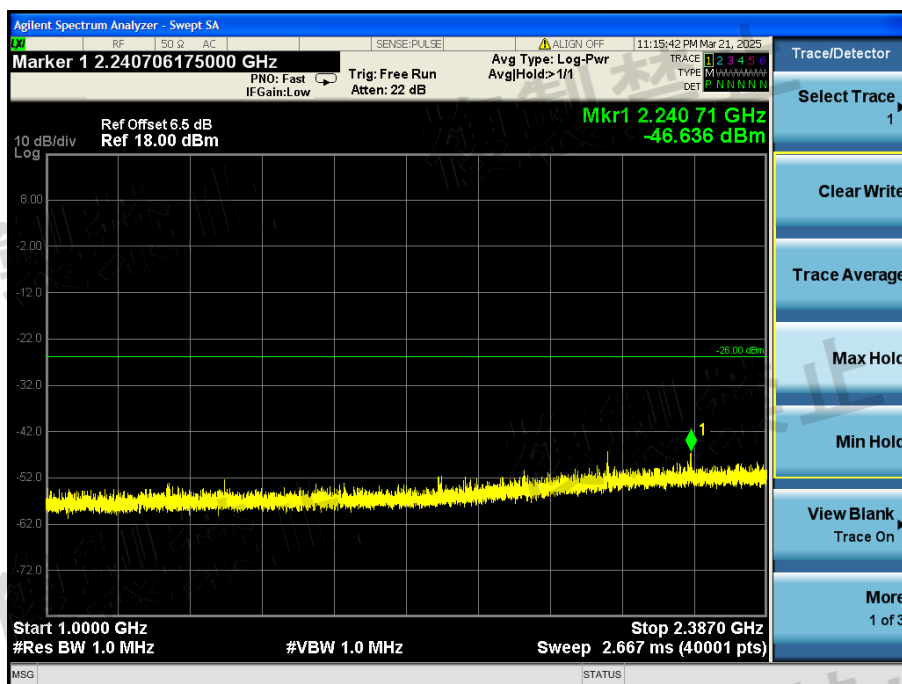
Channel 11: 2.462 GHz

30MHz to 1000MHz:

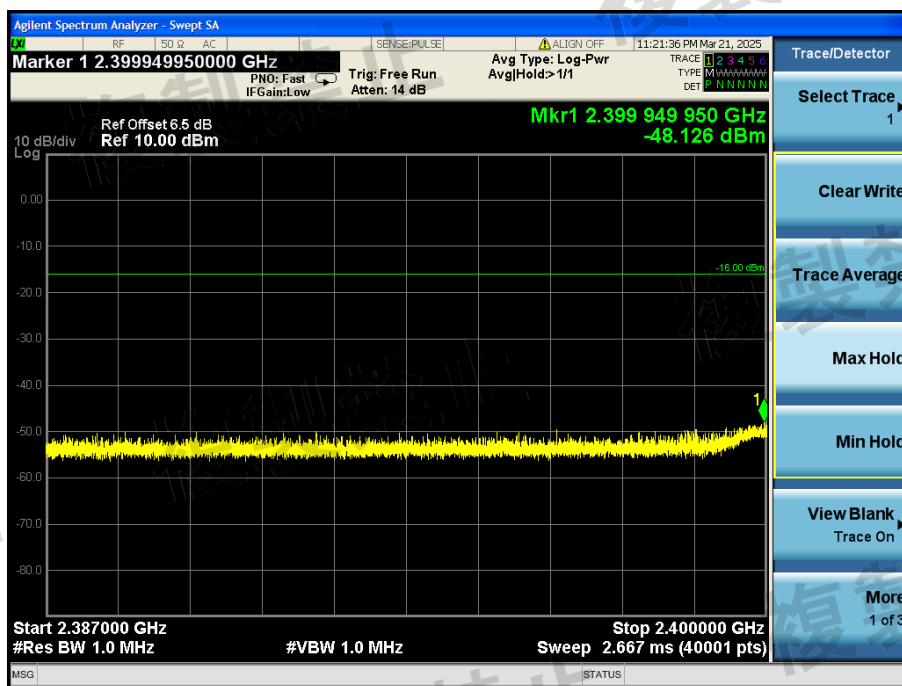




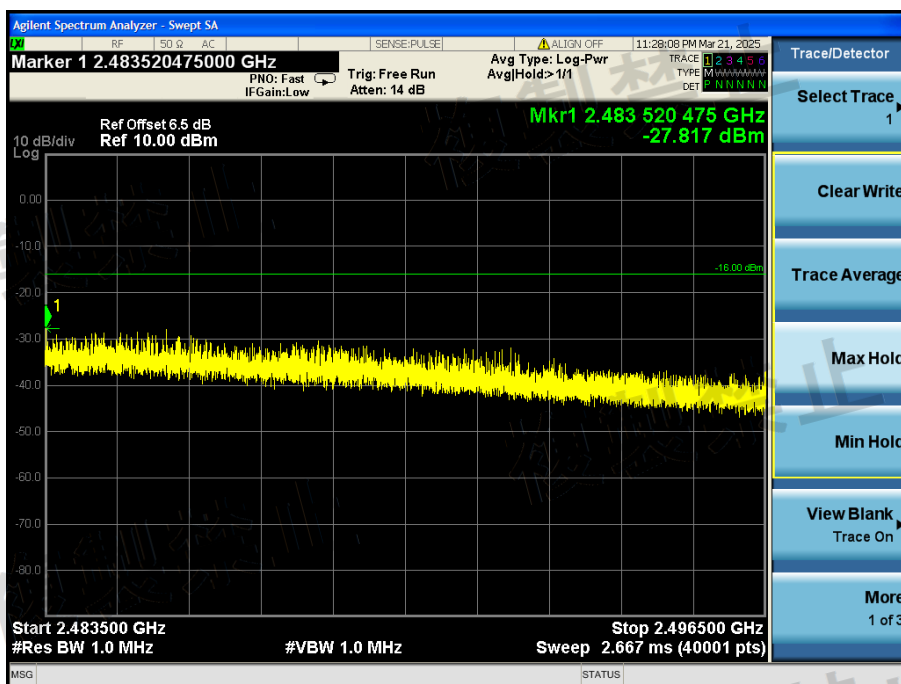
1000MHz to 2387MHz:



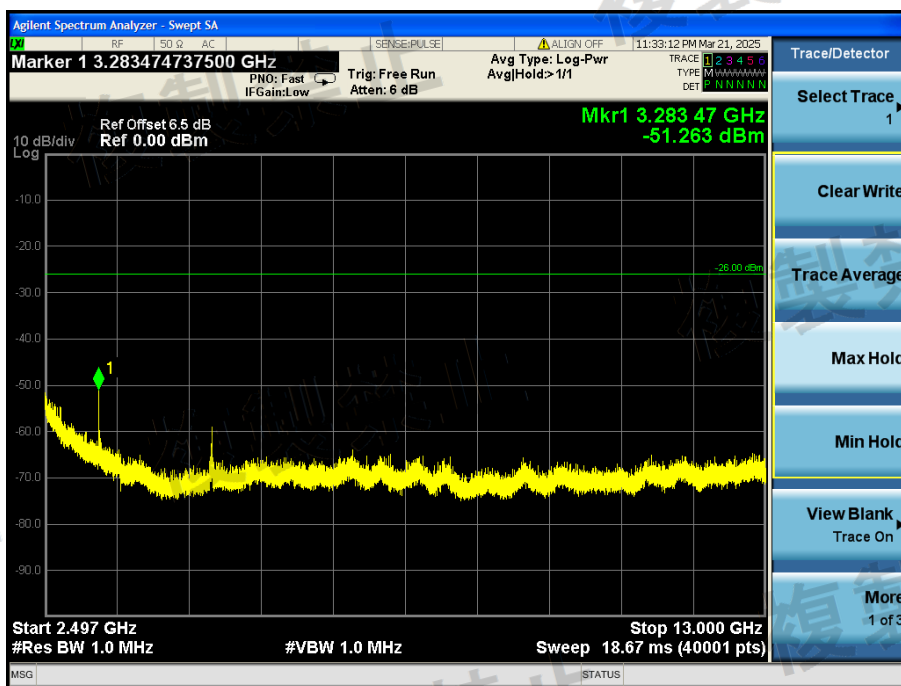
2387MHz to 2400MHz:



2483.5MHz to 2496.5MHz:



2496.5MHz to 13 GHz:



Test result: The unit does meet the requirements.

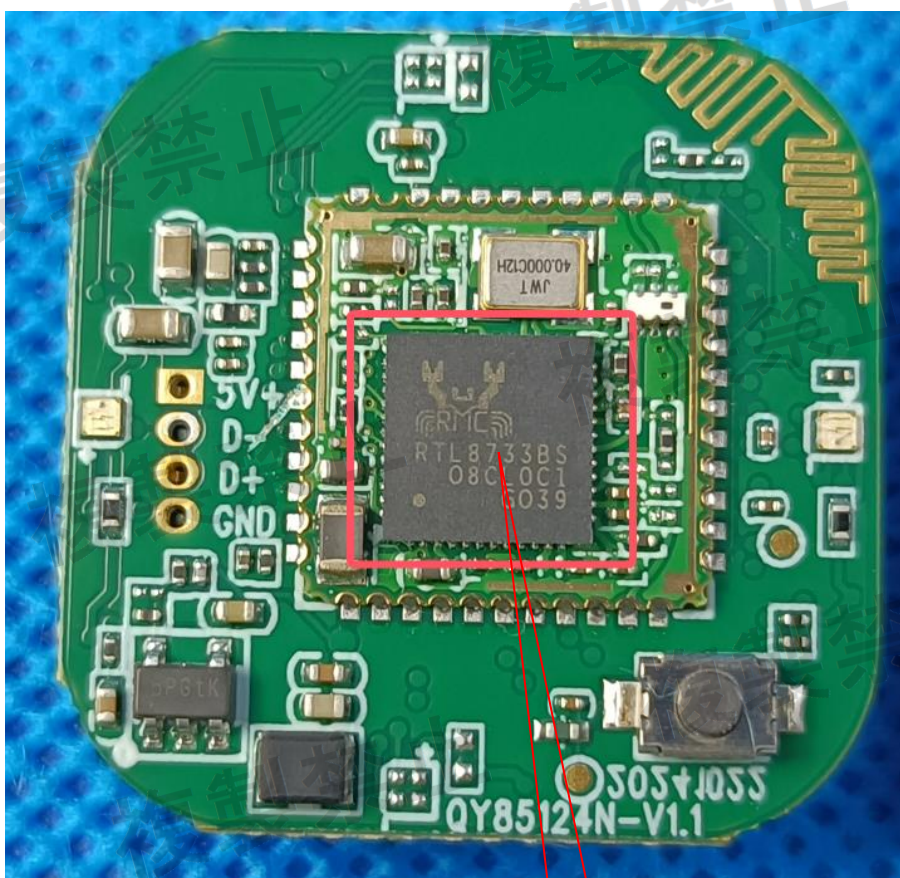
6.10 RF Accessibility

Standard requirement

Article 2, Item (19) Notice 88 Appendix 43, 44, 45

The EUT shall be constructed in such a way that sensitive RF parts, (like modulation and oscillator parts) cannot be reached easily by the user. These parts shall be covered by soldered metal caps or glue or by other mechanical covers. If the covers are fixed with screws, these shall be not the common type(s) like a Phillips, but special versions like Torx, so that the user cannot open the device with common tools.

The chip's pin spacing is 0.4mm and is not easy to modify, The number of pins on the chip is 44.



Welding



6.11 Spurious Emissions of Rx

Test Requirement:	Item 19 of Article 2-1
	(1) Below 1 GHz : 4 nW or less(-54dBm) (2) 1 GHz and over : 20 nW or less(-47dBm)
Temperature:	25.0 °C
Humidity:	75 % RH
Atmospheric Pressure:	1013 mbar
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.
Test Configuration:	PC → EUT → Spectrum Analyzer
Test Procedure:	
1. Test Conditions:	Spectrum Analyzer is used for measurement.
2. EUT conditions:	Modulation/Spread/Hopping ON For equipment using diffusion code, set to the test diffusion code and modulate with standard coding test signal.
3. Spectrum Analyzer conditions:	Step 1 All spurious are measured from 30 MHz to 13 GHz by peak mode. Step 2 IF the value measured by Step1 is 2 dB or less, measure in average mode.
	Test setup for Step 1: Frequency: 30 MHz – 2400 MHz , 2483.5 MHz –13 GHz RBW 100 kHz (30 – 1GHz) , 1 MHz (over 1GHz) VBW 100 kHz (30 – 1GHz) , 1 MHz (over 1GHz) Sweep Time Auto detector mode Positive peak Indication mode Max hold
	Test setup for Step 2: Frequency: Spurious Frequency Span 0 Hz RBW 100 kHz (30 – 1GHz) , 1 MHz (over 1GHz) VBW 100 kHz (30 – 1GHz) , 1 MHz (over 1GHz) Sweep Time Auto detector mode Sample Indication mode Max hold



Test result:

802.11b:

Test channel	Test Frequency (MHz)	Test Result			Unit	Limit
		Normal Voltage	High Voltage	Low Voltage		
		5V DC	N/A	N/A		
13 channels (2412~2472 MHz)	869.341	-62.327	N/A	N/A	dBm	(1) Below 1 GHz : -54dBm (2) 1 GHz to 13 GHz : -47dBm
	2426.8	-63.241	N/A	N/A		

802.11g:

Test channel	Test Frequency (MHz)	Test Result			Unit	Limit
		Normal Voltage	High Voltage	Low Voltage		
		5V DC	N/A	N/A		
13 channels (2412~2472 MHz)	869.317	-62.215	N/A	N/A	dBm	(1) Below 1 GHz : -54dBm (2) 1 GHz to 13 GHz : -47dBm
	2429.2	-63.222	N/A	N/A		

802.11n20:

Test channel	Test Frequency (MHz)	Test Result			Unit	Limit
		Normal Voltage	High Voltage	Low Voltage		
		5V DC	N/A	N/A		
13 channels (2412~2472 MHz)	869.317	-61.477	N/A	N/A	dBm	(1) Below 1 GHz : -54dBm (2) 1 GHz to 13 GHz : -47dBm
	3157.0	-64.315	N/A	N/A		

802.11n40:

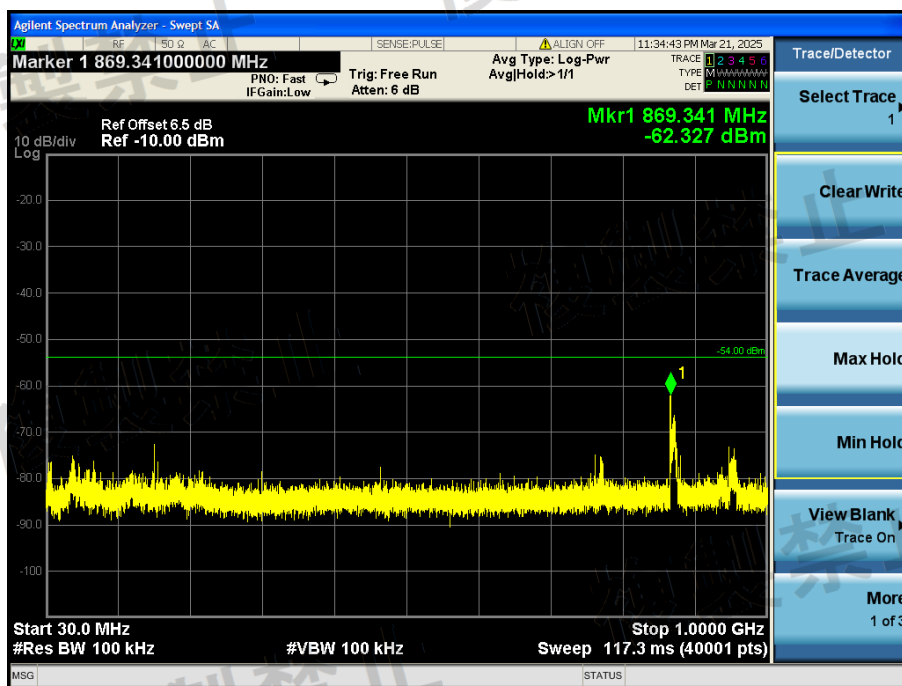
Test channel	Test Frequency (MHz)	Test Result			Unit	Limit
		Normal Voltage	High Voltage	Low Voltage		
		5V DC	N/A	N/A		
9 channels (2422~2462 MHz)	869.414	-62.316	N/A	N/A	dBm	(1) Below 1 GHz : -54dBm (2) 1 GHz to 13 GHz : -47dBm
	2426.2	-63.746	N/A	N/A		



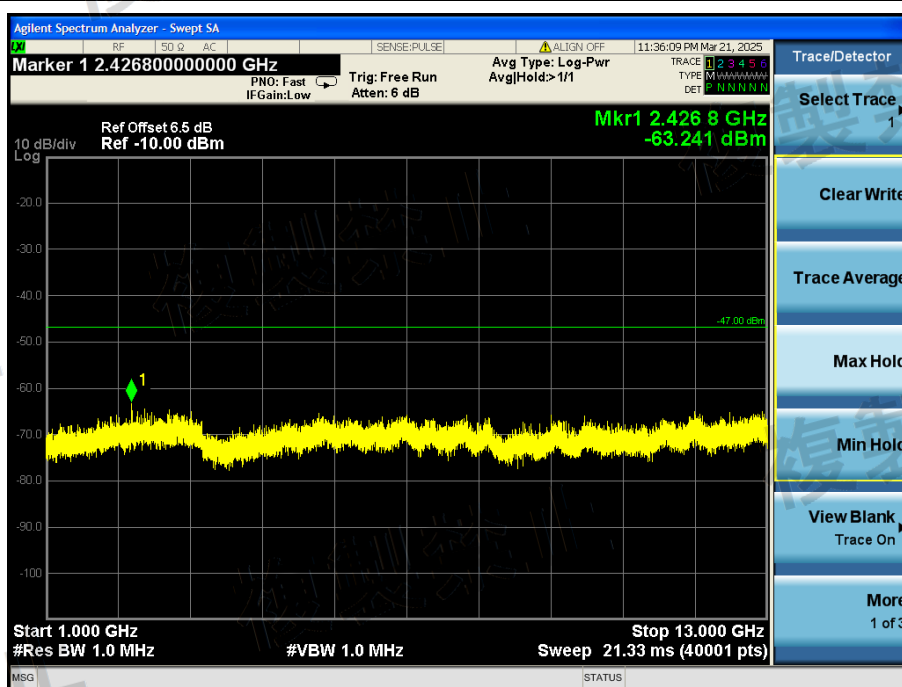
Result plot as follows:

802.11b:

30MHz to 1 GHz:

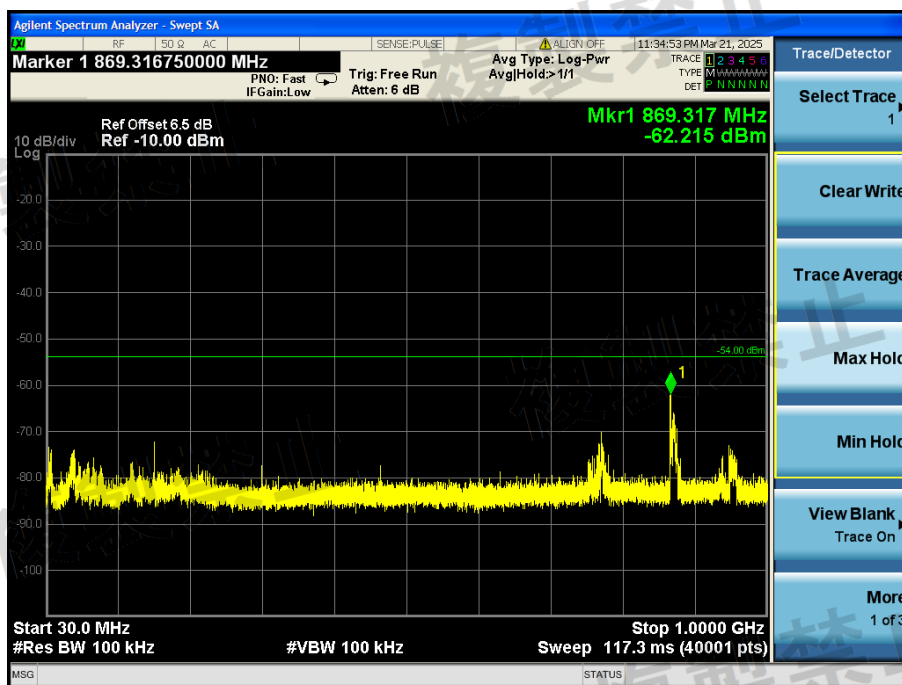


1 GHz to 13 GHz:

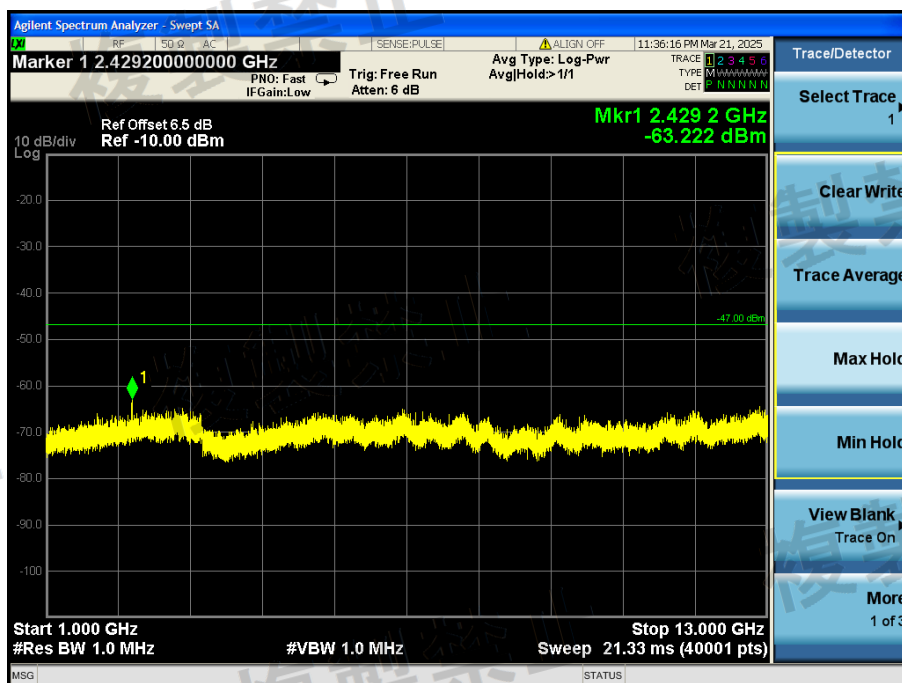


802.11g:

30MHz to 1 GHz:

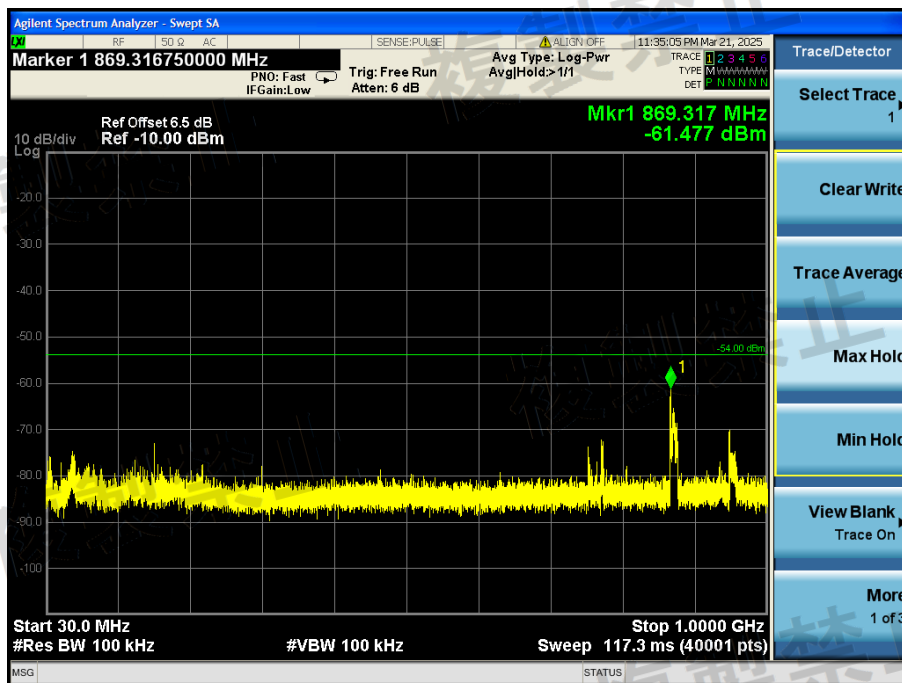


1 GHz to 13 GHz:

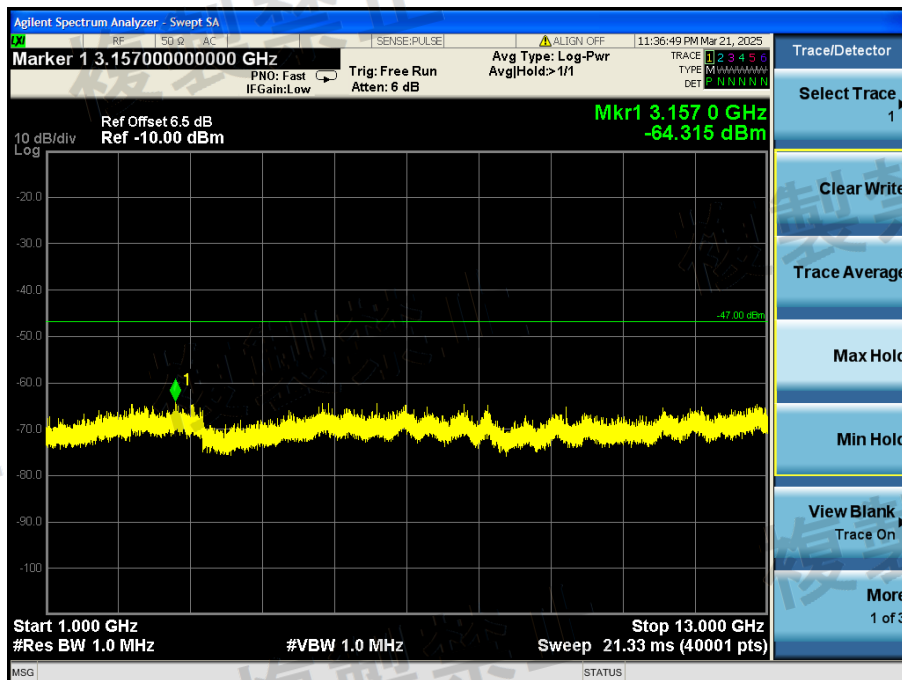


802.11n20:

30 MHz to 1 GHz:

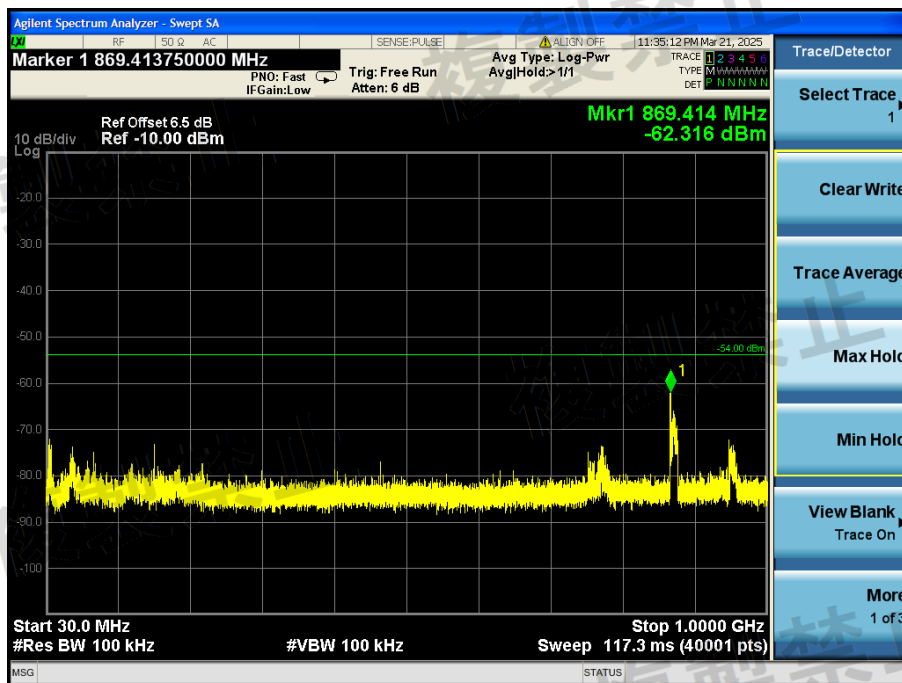


1 GHz to 13 GHz:

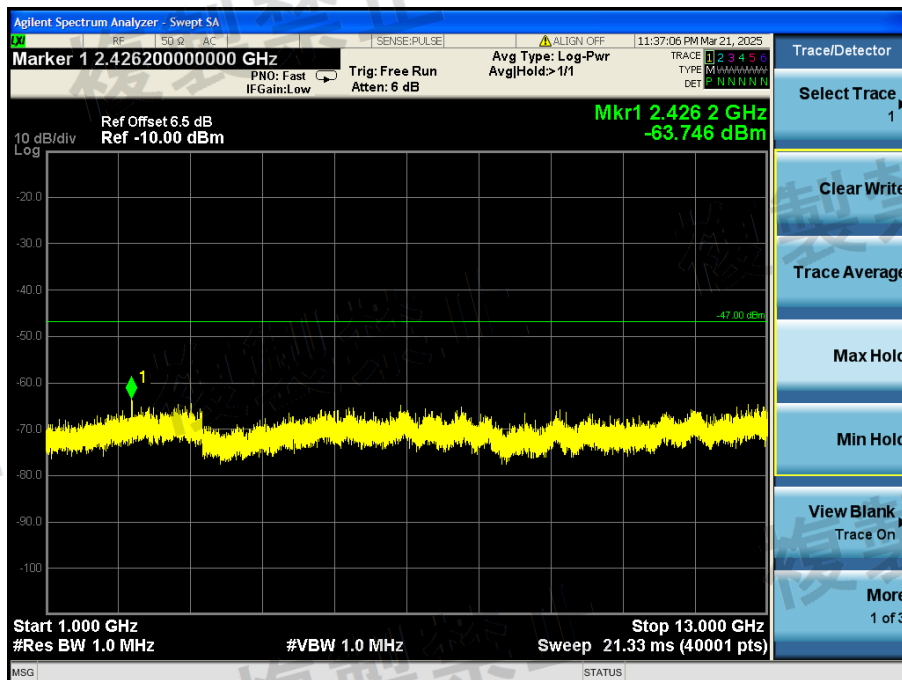


802.11n40:

30MHz to 1 GHz:



1 GHz to 13 GHz:



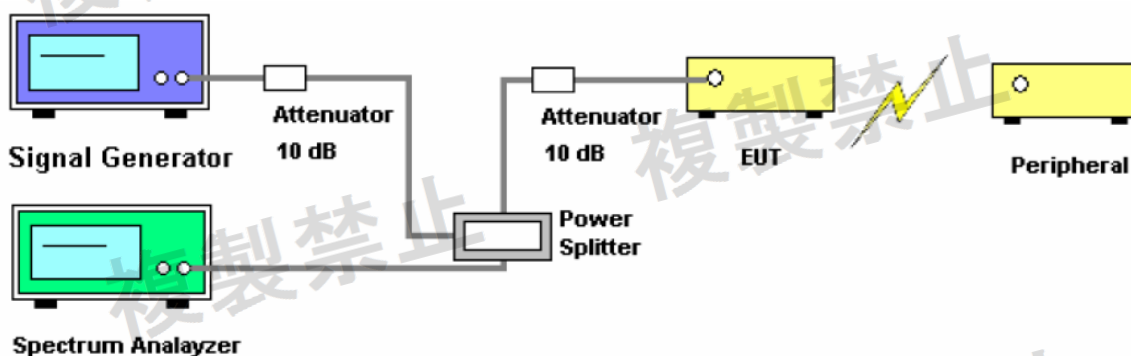
6.12 CARRIER SENSE CAPABILITY

Limit

EUT stop RF transmission signal after carrier inject to EUT

Test Procedure

Measurement System Diagram



1. SG adjusted the frequency as same as the EUT transmitted signal and emitted the absence of modulation from SG and power level is $(on\ 22.79 + G - 20 \cdot \log(f) \text{ dBm})$ (G is the antenna gain, f is the test frequency).
2. turn off the RF signal of the SG.
3. EUT have transmitted the maximum modulation signal and fixed channelize.
4. Setting of SA :RBW/VBW=1MHz/1MHz, Span=50MHz, Sweep time=auto, Sweep mode=continuous, Detect mode=positive peak
5. SG RF signal on.
6. EUT shall be stop the transmitted any signal and SG RF signal off, the EUT will be continuous transmitted signal.

802.11n40 mode:

	Normal Voltage
Result	OK