



中认信通

CHINA CERTIFICATION ICT CO., LTD (DONGGUAN)

JAPAN MIC TEST REPORT

Applicant: Visteon Electronics Germany GmbH

Address: Amalienbadstrasse, 41a Karlsruhe Baden-Wurttemberg - Germany

Product Name: Driver Display Unit

Model Number: DDU-ADV, DDU-MID, DDU-BSC

Standard(s): Radio Law of Japan item 19 of Article 2 Paragraph 1

Test Method: MIC Notice No.88 Appendix No.43

The above device has been tested and found compliant with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

Report Number: CR231165359-07B

Date Of Issue: 2024/1/18

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Test Facility

The Test site used by China Certification ICT Co., Ltd (Dongguan) to collect test data is located on the No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, China.

Declarations

China Certification ICT Co., Ltd (Dongguan) is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol “▲”. Customer model name, addresses, names, trademarks etc. are not considered data.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	CR231165359-07B	Original Report	2024/1/18

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Name:	Driver Display Unit
Trade Name:	VISTEON
EUT Model:	DDU-ADV
Multiple Models:	DDU-MID, DDU-BSC
Frequency Range:	802.11b/g/n20: 2412-2472 MHz 802.11n40: 2422-2462 MHz
Nominal RF Output Power (Conducted):	802.11b: 3.30mW/MHz; 802.11g: 1.35mW/MHz; 802.11n ht20: 1.10mW/MHz; 802.11n ht40: 0.70mW/MHz
Number of TX Chain(s):	1
Number of RX Chain(s):	1
Antenna Gain (dBi)▲:	0
Modulation Type:	DBPSK, DQPSK, CCK, BPSK, QPSK, 16QAM, 64QAM
Emission Type:	G1D, D1D
Rated Input Voltage:	DC 28V from Vehicle Battery
Serial Number:	2CX5-1
EUT Received Date:	2023/11/7
EUT Received Status:	Good

Note: The Multiple models are electrically identical with the test model. Please refer to the declaration letter for more detail, which was provided by manufacturer.

Operation Frequency Detail: For 802.11b/g/n ht20:

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	/	/
The test frequencies were performed the test as below:			
Test Channel		Frequency (MHz)	
Lowest		2412	
Middle		2442	
Highest		2472	

For 802.11n ht40:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	8	2447
4	2427	9	2452
5	2432	10	2457
6	2437	11	2462
7	2442	/	/

Per section 15.31(m), the below frequencies were performed the test as below:

Test Channel	Frequency (MHz)
Lowest	2422
Middle	2442
Highest	2462

Accessory Information:

Accessory Description	Manufacturer	Model	Parameters
/	/	/	/

1.2 Description of Test Configuration

1.2.1 EUT Operation Condition

EUT Operation Mode:	The system was configured for testing in Engineering Mode, which was provided by the manufacturer.		
Equipment Modifications:	No		
EUT Exercise Software:	QRCT4.exe		
The software was provided by manufacturer. The maximum power was configured as below, that was provided by the manufacturer▲:			
Test Modes	Power Level Setting		
	Lowest	Middle	Highest
802.11b	21	21	21
802.11g	19	19	19
802.11n ht20	18	18	18
802.11n ht40	18	18	18

1.2.2 Power Supply Voltage Fluctuation Test

Voltage Fluctuation Test	Normal Voltage	Low Voltage -10% of Normal Voltage	High Voltage +10% of Normal Voltage
Power Supply Voltage (Vdc)	28	25.2	30.8
Measured Voltage for the RF circuit (Vdc)	3.304	3.302	3.305
Voltage Variation (%)	/	-0.06	0.03

Note:

1. Voltage Variation (%) = (Measured Voltage at High or Low Voltage - Measured Voltage at Normal Voltage)/ Measured Voltage at Normal Voltage*100

2. The Voltage for the Radio Part fluctuation is verified at the power input PIN of the RF circuit.

Due to the power management chip (PMIC Model: PMM8155AU) equipped with the EUT, theoretically, when the EUT input power supply voltage changes is varied by $\pm 10\%$, the voltage impact on the RF circuit of the EUT will be minimal or even negligible. From the Voltage Fluctuation Test data in the table above, it can be seen that the change of the measured voltage at the radio part of the EUT is below $\pm 1\%$, when input voltage from external power supply to the EUT is varied by $\pm 10\%$, thus the RF test is tested at **Normal Voltage (NV)** only.

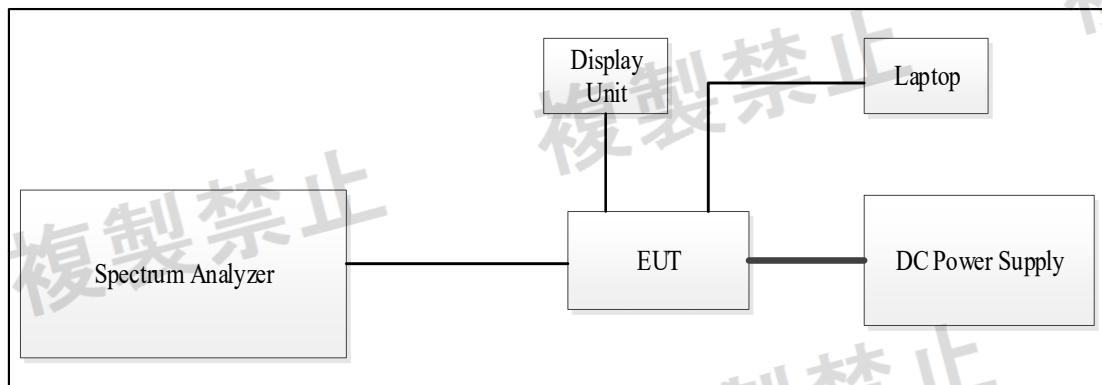
1.2.3 Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
ZHAOXIN	DC Power Supply	RXN-6010D	21R6010D0912386
Unknown	Display	Unknown	Unknown
Lenovo	Laptop	T460S	60PDTEK7
Weinschel	Power Splitter	1515	RA914

1.2.4 Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Main Harness	no	no	2.0	DC Power Supply	EUT/ Display
GSML Cable	no	no	2.0	EUT	Display
QFIL USB Cable	no	no	2.0	EUT	Laptop
Coaxial Cable	no	no	1	EUT	Spectrum Analyzer

1.2.5 Block Diagram of Test Setup



1.3 Measurement Uncertainty

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Parameter	Measurement Uncertainty
Frequency Error	$\pm 0,5$ ppm
Occupied bandwidth and spreading bandwidth	± 5 %
RF output power, conducted	± 0.61 dB
Unwanted Emissions (TX&RX), conducted	± 2.47 dB
Temperature	$\pm 1^{\circ}\text{C}$
Humidity	$\pm 5\%$
DC and low frequency voltages	$\pm 0.4\%$
Duty Cycle	1%

2. SUMMARY OF TEST RESULTS

MIC Notice No.88 Appendix No.43 Article 2, Paragraph 1, Item 19 Rules Section	Description of Test	Result
3	Frequency Error	Compliant
4	Occupied Bandwidth	Compliant
5	Transmitter Spurious Emission and Unwanted Emission Intensity	Compliant
6	Antenna Output Power and Output Power Tolerance	Compliant
7	Receiver Spurious Emission and Unwanted Emission Intensity	Compliant
8	Carrier sense capability (1)	Compliant
9	Carrier sense capability (2)	Not Applicable*
10	Transmission Antenna Gain	Not Applicable**
11	Transmission Radiation Angle Width	Not Applicable**
12	Interference Prevention Function	Compliant
13	Frequency Hopping Dwell Time	Not Applicable***
Note 1	Construction Protection Confirmation	Compliant

Note:

Not Applicable:* Only required for outdoor use radio control of model airplanes.

*Not Applicable**:* This item not applicable for the EIRP less than the limit.

*Not Applicable***:* Testing is only required for FHSS system devices.

3. REQUIREMENTS AND TEST PROCEDURES

3.1 Frequency Tolerance

3.1.1 Limit

Within $\pm 50\text{ppm}$.

3.1.2 Test Procedure

Set the EUT to the measurement frequency without modulation.

Setting of SA is following as: Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode:

Positive peak / Trace mode: MAX Hold.

Record the peak spot frequency.

If the EUT can't set at un-modulation mode, measure the 10dBc center frequency.

3.2 Occupied Bandwidth and Spreading Bandwidth

3.2.1 Limit

- Occupied bandwidth: $\leq 26\text{ MHz}$
- Occupied bandwidth: $\geq 26\text{ MHz}$ and $\leq 40\text{ MHz}$
- Spreading bandwidth (DSSS): $\geq 0.5\text{ MHz}$
- Spreading Factor (DSSS): ≥ 5

3.2.2 Test Procedure

1. Setting of SA is following as: RB: 300 kHz/VB: 300 kHz / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
2. EUT have transmitted the maximum modulation signal and fixed channelize. SA set to 99% of occupied bandwidth to measure occupied bandwidth.
3. SA set to 90% of occupied bandwidth to measure spreading bandwidth.
4. Calculate spreading factor = spreading bandwidth / 1.375

3.3 Transmitter Spurious Emission Strength and Unwanted Emission Intensity

3.3.1 Limit

- $30\text{MHz} \leq f < 2387\text{ MHz}: \leq 2.5\mu\text{W}/\text{MHz}$
- $2387\text{ MHz} \leq f \leq 2400\text{ MHz}: \leq 25\mu\text{W}/\text{MHz};$
- $2483.5\text{ MHz} < f \leq 2496.5\text{ MHz}: \leq 25\mu\text{W}/\text{MHz}$
- $2496.5\text{ MHz} < f \leq 12500\text{MHz}: \leq 2.5\mu\text{W}/\text{MHz}$

3.3.2 Test Procedure

❖ Conditions of Application Equipment (EUT)

- The modulation state shall be in continuously transmitting mode.

❖ Spectrum Analyzer Conditions

- Setting of SA start 30MHz and stop frequency 1000MHz, RB:100kHz/VB:100kHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. reading value + cable loss shall be less than $0.25\mu\text{W}/100\text{kHz}$.
- Setting of SA start 1000MHz and stop frequency 2387MHz, RB:1MHz/VB:1MHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. reading value + cable loss shall be less than $2.5\mu\text{W}/\text{MHz}$.
- Setting of SA start 2387MHz and stop frequency 2400MHz, RB:1MHz/VB:1MHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. reading value + cable loss shall be less than $25\mu\text{W}/\text{MHz}$.
- Setting of SA start 2483.5MHz and stop frequency 2496.5MHz, RB:1MHz/VB:1MHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. reading value + cable loss shall be less than $25\mu\text{W}/\text{MHz}$.
- Setting of SA start 2496.5MHz and stop frequency 12500MHz, RB:1MHz/VB:1MHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. reading value + cable loss shall be less than $2.5\mu\text{W}/\text{MHz}$.

If above test over the limit, the below test procedure should be used:

Step 1:

Center the frequency which was want to investigate, search the peak frequency.

Step 2:

Center frequency: Searched Frequency

Span: 0Hz

RBW: 1MHz (Above 1GHz), VBW: Same as RBW.

Sweep time: Auto (Minimum time to ensure measurement accuracy. *In case of burst wave, one burst shall be included per data point) Data points: 400 points or more. Sweep mode: Single Sweep.

Detection Mode: Sample

3.4 Antenna Output Power and Antenna Power Tolerance

3.4.1 Limit

- ≤ 10 mW/MHz (OFDM/DSSS for bandwidth ≤ 26 MHz)
- ≤ 5 mW/MHz (OFDM for bandwidth ≤ 40 MHz)

The Output Power Tolerance must be within +20%, -80%.

E.I.R.P:

- ≤ 12.14 dBm/MHz (OFDM/DSSS for bandwidth ≤ 26 MHz)
- ≤ 9.13 dBm/MHz (OFDM for bandwidth ≤ 40 MHz)

Note: E.I.R.P will not be applied to the transmission antenna which has a gain of 2.14dBi or less.

3.4.2 Test Procedure

Step 1:

Connect the UUT to the spectrum analyser and use the following settings:

- Centre Frequency: The centre frequency of the channel under test.
- RBW: 1 MHz.
- VBW: 1 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: 3 MHz.
- RBW: 1 MHz.
- VBW: 1 MHz.
- Detector: Average (see note).
- Trace Mode: Max Hold.

When the trace is complete, capture the trace, for example using the "View" option on the spectrum analyser. For Find the peak value of the trace and place the analyser marker on this peak. This level is recorded as D.

D shall be recorded in the test report.

The maximum PD, which is e.i.r.p. PSD (spectral density power) or power, is calculated from the above measured value D, and the applicable antenna assembly gain "G" in dBi, according to the formula below. If more than one antenna assembly is intended for this power setting, the gain of the antenna assembly with the highest gain shall be used.

$$PD = D + G$$

3.5 Receiver Spurious Emission and Unwanted Emission Intensity

3.5.1 Limit

- $\leq 4 \text{ nW}$ ($30 \text{ MHz} \leq f \leq 1000 \text{ MHz}$)
- $\leq 20 \text{ nW}$ ($1 \text{ GHz} \leq f \leq 12.5 \text{ GHz}$)

3.5.2 Test Procedure

- ❖ Conditions of Application Equipment (EUT)
 - The modulation state shall be “continuous receiving mode”.
- ❖ Spectrum Analyzer Conditions
 - Start Frequency: Start Frequency of frequency range to measure (30MHz to 1GHz)
 - Stop Frequency: Stop Frequency of frequency range to measure (1GHz to 12.5GHz)
 - Span: AUTO (Measurement Range)
 - RBW: 100 kHz, VBW: 100 kHz for Frequency < 1 GHz
 - RBW: 1MHz, VBW: 1MHz for Frequency > 1 GHz
 - Sweep time: AUTO or more
 - Sweep mode: Auto Sweep
 - Detection: Positive Peak
 - Reference Level: Enough level for maximum dynamic range

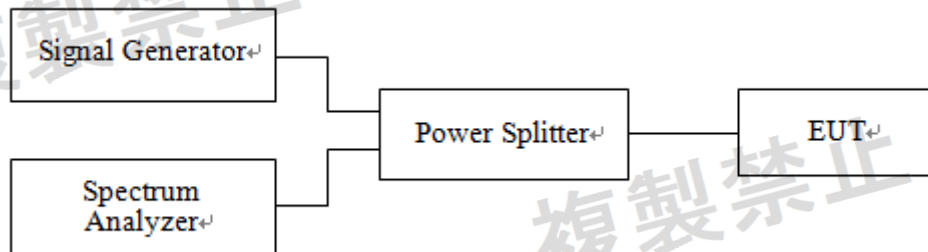
3.6 Carrier Sense Capability

3.6.1 Limit

EUT stop RF transmission signal after carrier inject to EUT

3.6.2 Test Procedure

❖ Measurement System Diagram



❖ Conditions of Application Equipment (EUT)

- The EUT state shall be “normal mode link with wireless router”.

❖ Test Procedure

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.

3.6.3 Measurement Result

Result: Compliant.

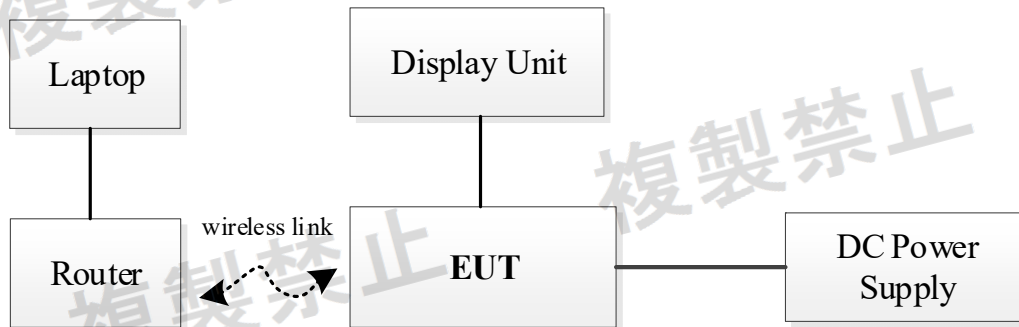
3.7 Interference Prevention Function

3.7.1 Requirement

The EUT shall have the interference prevention capability to transmit or to receive the identification automatically, so that sender and receiver shall exclude other equipment.

3.7.2 Test Procedure

Measurement System Diagram:



In the case that the EUT has the function of automatically transmitting the identification code:

1. Transmit the predetermined identification codes from EUT
2. Check the transmitted identification codes with the demodulator.

In the case of receiving the identification codes:

1. Transmit the predetermined identification codes from the counterpart.
2. Check if communication is normal
3. Transmit the signal other than predetermined ID codes from the counterpart.
4. Check if the EUT stops the transmission, or if it displays that identification codes are different from the predetermined ones.

3.7.3 Measurement Result

Test Result: Good

3.8 Note 1 - Construction Protection Confirmation

3.8.1 Limit

The high-frequency section and modulation section of the radio equipment except for the antenna system shall not be capable of being opened easily.

3.8.2 Confirmation Method

The RF and Modulation components are covered by a metal shell with special screws, which is not easy to open. Please refer the EUT photo.

4. TEST DATA AND RESULTS

4.1 Test Environmental Conditions & Test Equipment List and Details

Test Date:		2023/11/15			
Tester:		Claire Liu/Arthur Su			
Environmental Conditions:					
Temperature: (°C)	25.3	Relative Humidity: (%)	53	ATM Pressure: (kPa)	101.7

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date	Calibration Agency	Calibration Method ^{Note}
R&S	Spectrum Analyzer	FSU26	200256	2023/3/31	2024/3/30	BACL	C
Agilent	MXG Vector Signal Generator	N5182B	MY51350144	2023/03/31	2024/03/30	BACL	C
UNI-T	Multimeter	UT39A+	C210582554	2023/9/28	2024/9/27	BACL	C
* Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).							

- Note:
- A. Calibration conducted by the National Institute of Information and Communications Technology (NICT) (hereinafter referred to as "NICT") or a designated calibration agency under Article 102-18 paragraph (1).
 - B. Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992).
 - C. Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).
 - D. Calibration conducted by using measuring instruments and other equipment which shall have been given any of calibration, etc. listed above from a) to c)

4.2 Frequency Tolerance

Test Result: Compliant

Test Mode: Carrier transmitting mode

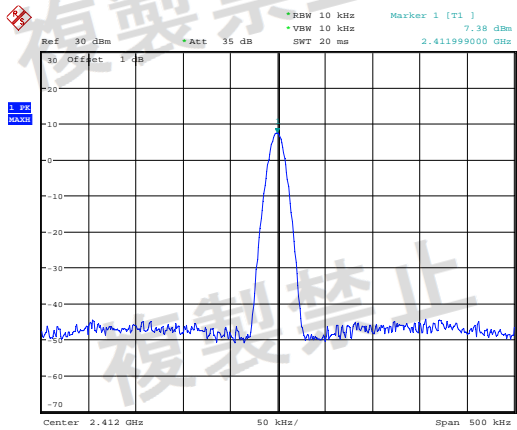
Test Condition	Mode	Channel	Test Frequency (MHz)	Measured Frequency (MHz)	Result (ppm)	Limit (ppm)
NV	Single Carrier	Low	2412	2411.9990	-0.41	≤ 50
			2422	2421.9990	-0.41	≤ 50
		Middle	2442	2441.9990	-0.41	≤ 50
			2462	2461.9990	-0.41	≤ 50
		High	2472	2471.9990	-0.40	≤ 50

Note:

$$\text{Result} = (\text{Measured Frequency} - \text{Test Frequency}) / \text{Test Frequency} * 10^6$$

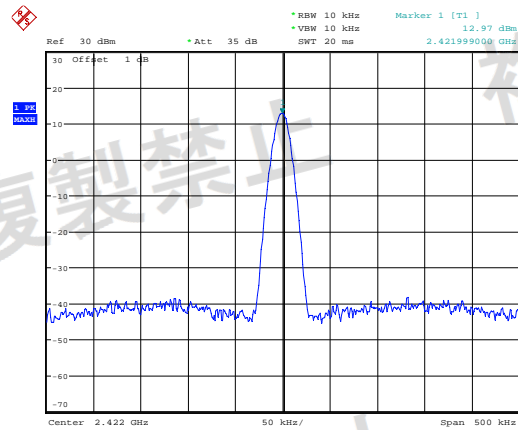
Please refer to the plots for normal voltage test:

2412MHz



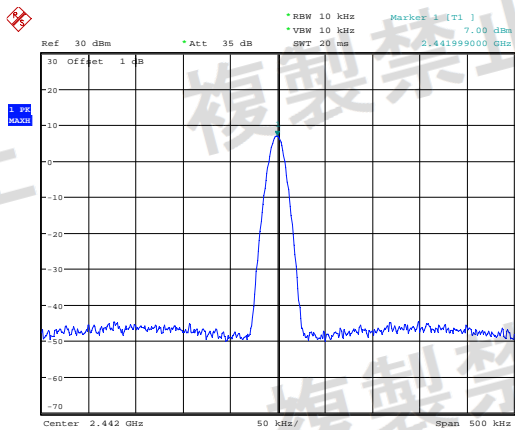
ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 20:19:44

2422MHz



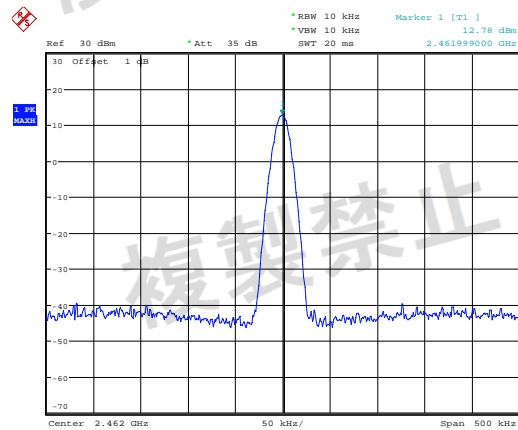
ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 20:19:13

2442MHz



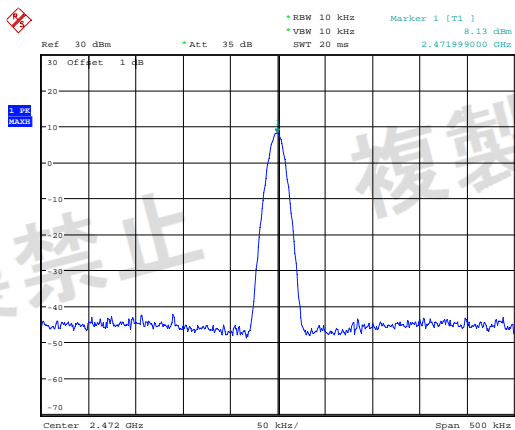
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Date: 15.NOV.2023 20:18:35

2462MHz



ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 20:17:55

2472MHz



ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 20:17:01

4.3 Occupied Bandwidth and Spreading Bandwidth

Test Result: Compliant

Test Mode: Transmitting

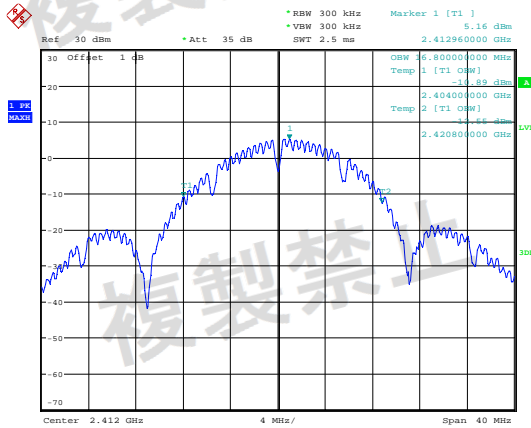
Test Condition	Occupied Bandwidth (MHz)				
	Mode	Low Channel	Middle Channel	High Channel	Limit
NV	802.11b	16.800	16.080	16.000	≤ 26
	802.11g	17.440	17.200	17.440	≤ 26
	802.11n ht20	18.160	18.160	18.320	≤ 26
	802.11n ht40	35.680	36.800	36.160	≤ 40

Spreading Bandwidth and Spreading Factor for 802.11b(DSSS)

Test Condition	Test Items	Low Channel	Middle Channel	High Channel	Limit
NV	Spreading bandwidth (MHz)	10.640	9.680	9.840	≥ 0.5
	Spreading Factor	7.74	7.04	7.16	≥ 5

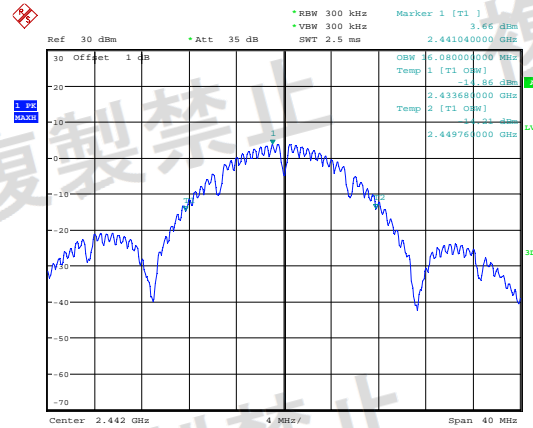
Please refer to the below plots for normal voltage test:

Occupied Bandwidth: 802.11b, Low Channel



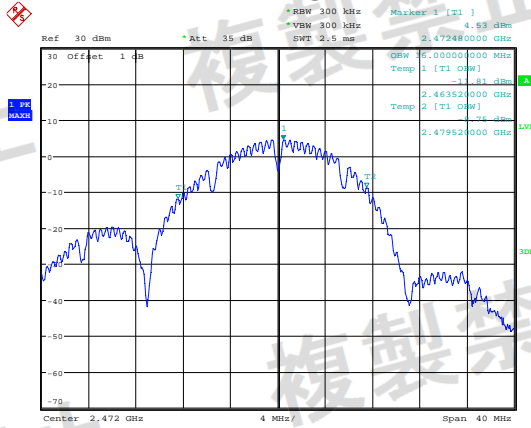
ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 20:09:02

802.11b, Middle Channel



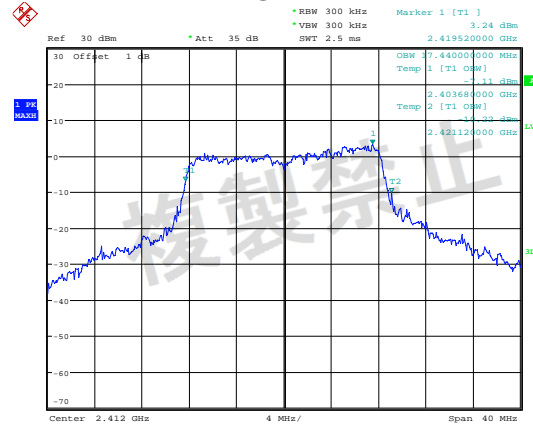
ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 20:09:42

802.11b, High Channel



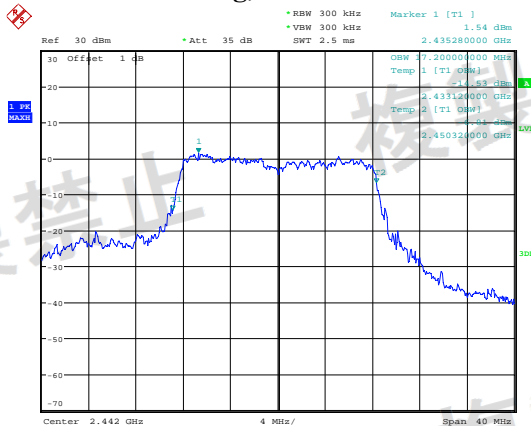
ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 20:10:16

802.11g, Low Channel



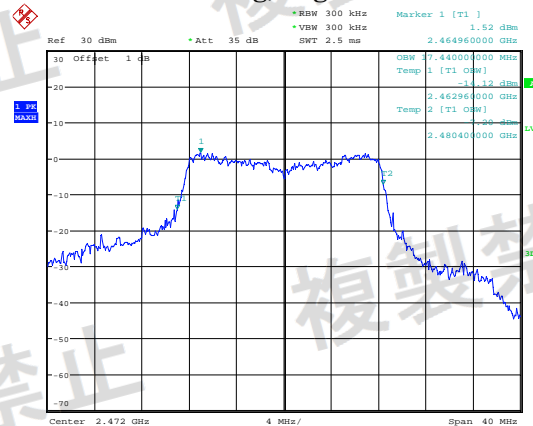
ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 20:06:40

802.11g, Middle Channel



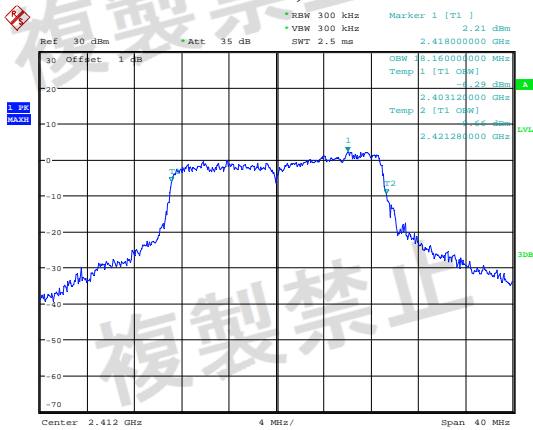
ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 20:07:24

802.11g, High Channel



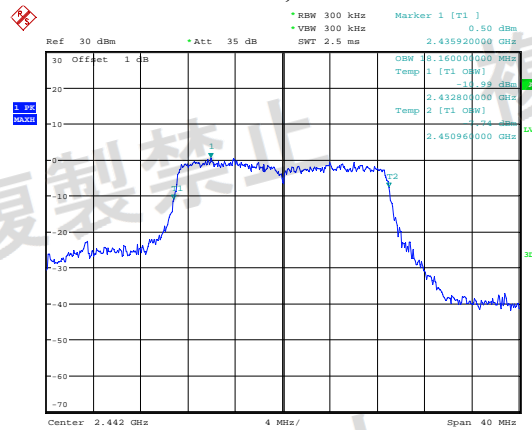
ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 20:08:06

802.11n ht20, Low Channel



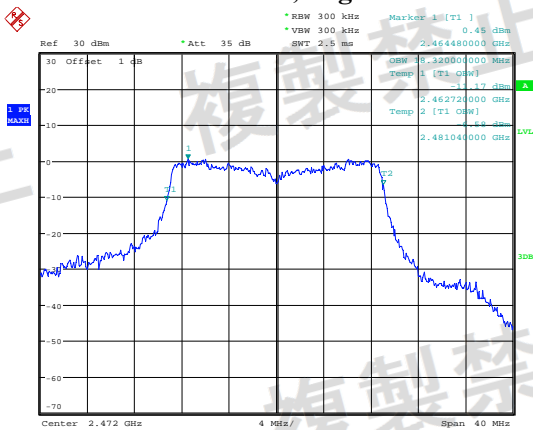
ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 20:03:38

802.11n ht20, Middle Channel



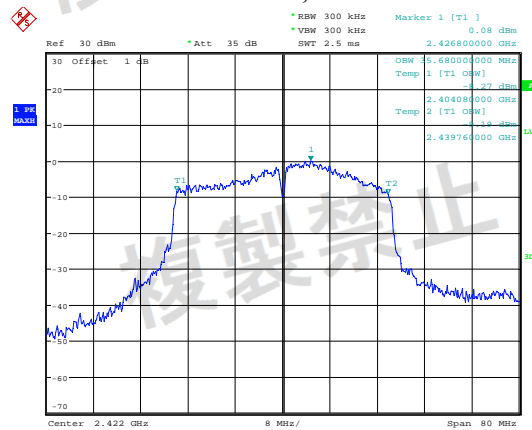
ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 20:04:22

802.11n ht20, High Channel



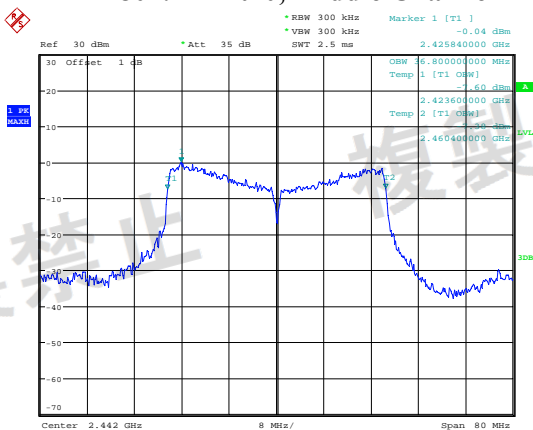
ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 20:05:18

802.11n ht40, Low Channel



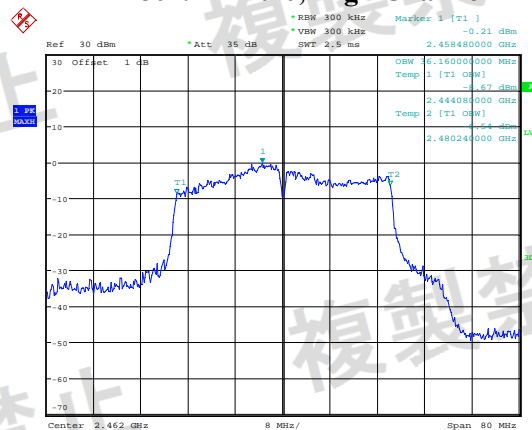
ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 20:02:21

802.11n ht40, Middle Channel



ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 20:01:38

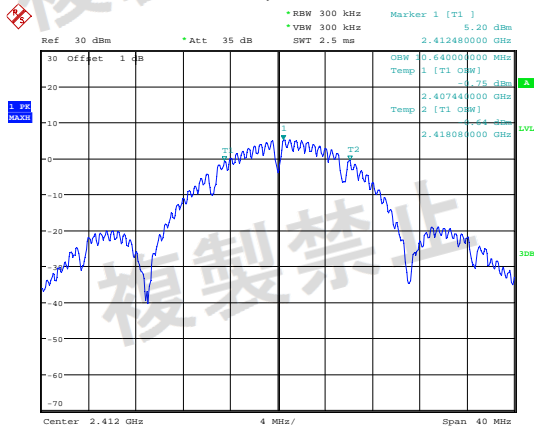
802.11n ht40, High Channel



ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 20:00:47

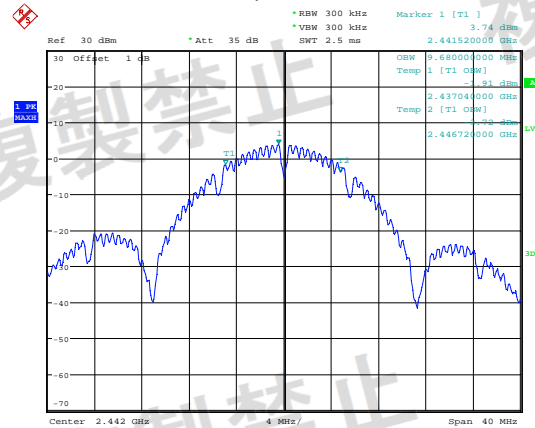
Spreading Bandwidth:

802.11b, Low Channel



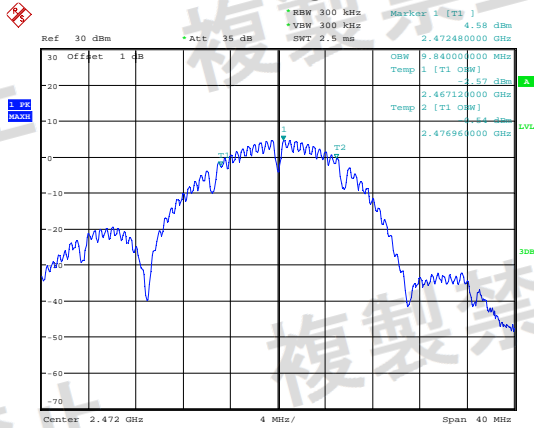
ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 20:09:09

802.11b, Middle Channel



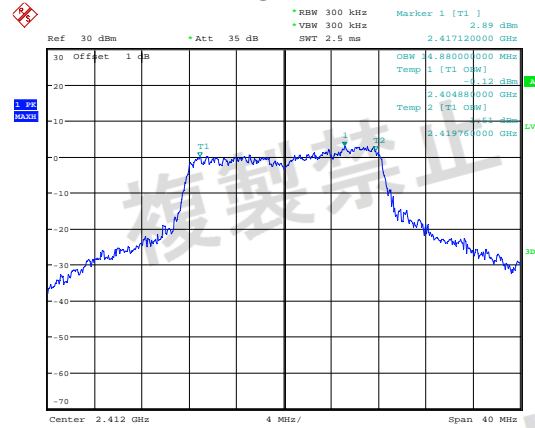
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802.11b, High Channel



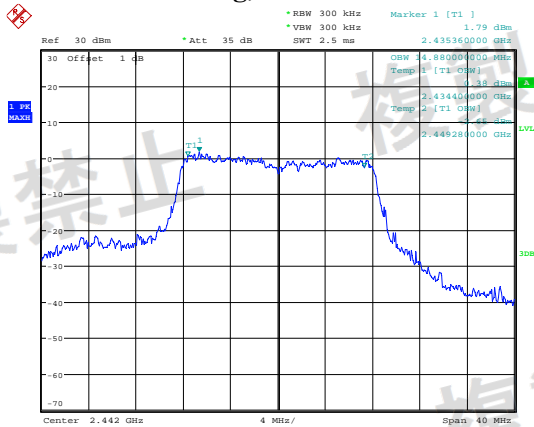
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Date: 15.NOV.2023 20:10:23

802.11g, Low Channel



ProjectNo.:CR231165359-RF Testers:Claire Liu
Date: 15.NOV.2023 20:06:49

802.11g, Middle Channel



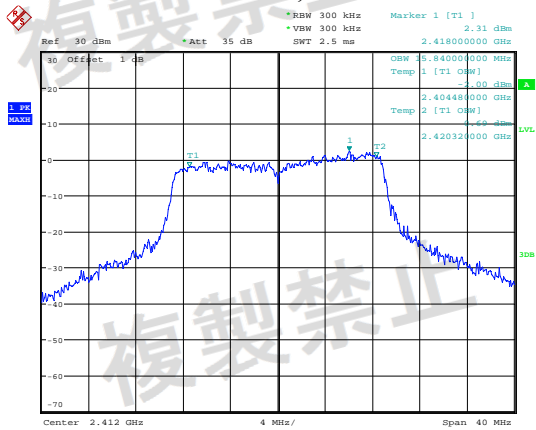
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802.11g, High Channel



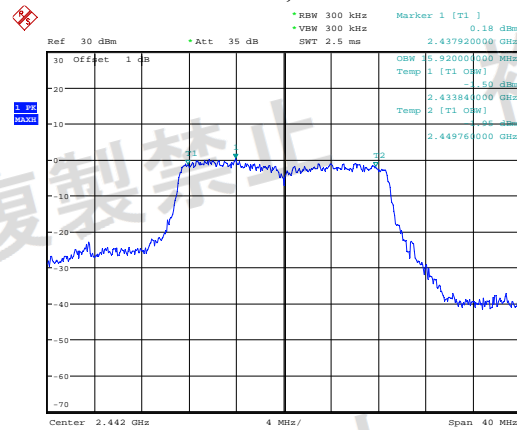
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802.11n ht20, Low Channel



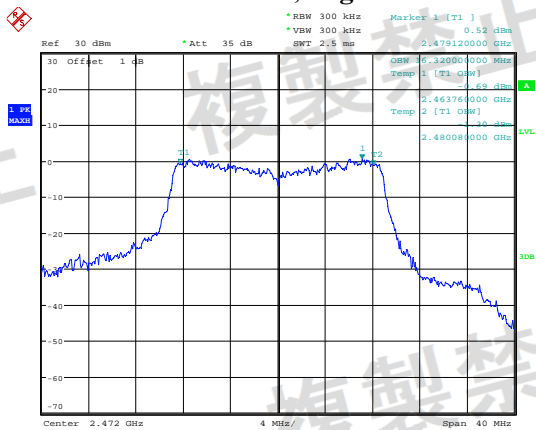
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802.11n ht20, Middle Channel



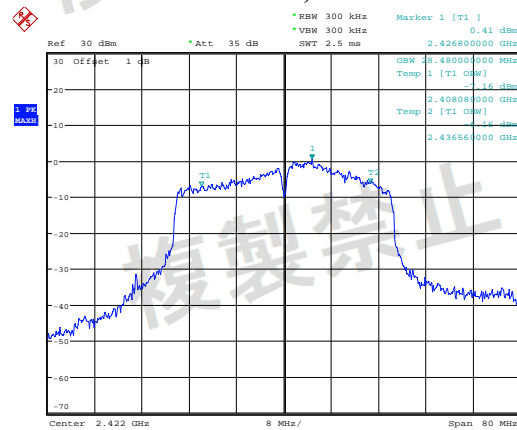
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802.11n ht20, High Channel



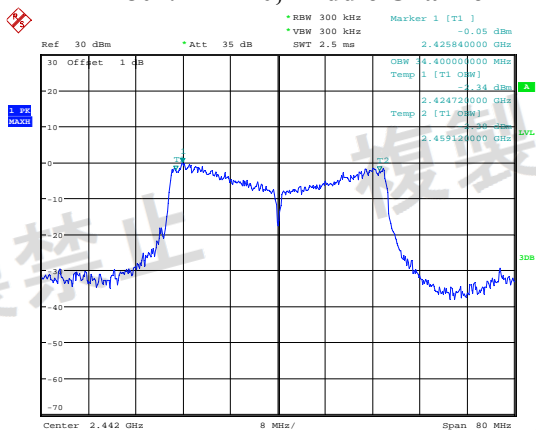
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Date: 15.NOV.2023 20:05:31

802.11n ht40, Low Channel



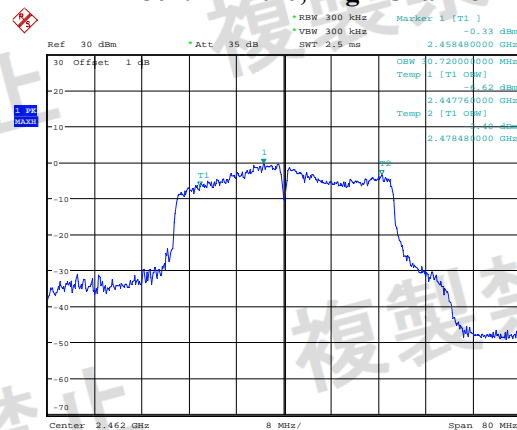
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802.11n h40, Middle Channel



ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 20:01:48

802.11n ht40, High Channel



ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 20:01:00

4.4 Transmitter Spurious Emission Strength and Unwanted Emission Intensity

Test Result: Compliant

Test Mode: Transmitting

802.11b:

Test Condition	Channel	Test Band (RBW)	Reading		Limit (dBm/RBW)	Limit (μW/RBW)
			Frequency (MHz)	Amplitude (dBm/RBW)		
NV	Lowest Channel	Band I (100kHz)	97.900	-51.80	-36	0.25
		Band II (1MHz)	2387.000	-40.76	-26	2.5
		Band III (1MHz)	2397.426	-17.43	-16	25
		Band IV (1MHz)	2495.200	-43.12	-16	25
		Band V (1MHz)	12039.839	-42.22	-26	2.5
NV	Middle Channel	Band I (100kHz)	972.840	-54.61	-36	0.25
		Band II (1MHz)	2262.170	-44.18	-26	2.5
		Band III (1MHz)	2399.402	-43.70	-16	25
		Band IV (1MHz)	2483.250	-42.76	-16	25
		Band V (1MHz)	3156.731	-42.23	-26	2.5
NV	Highest Channel	Band I (100kHz)	158.040	-52.87	-36	0.25
		Band II (1MHz)	2314.876	-44.81	-26	2.5
		Band III (1MHz)	2388.950	-43.08	-16	25
		Band IV (1MHz)	2485.528	-29.44	-16	25
		Band V (1MHz)	3156.731	-41.50	-26	2.5

802.11g:

Test Condition	Channel	Test Band (RBW)	Reading		Limit (dBm/RBW)	Limit (μW/RBW)
			Frequency (MHz)	Amplitude (dBm/RBW)		
NV	Lowest Channel	Band I (100kHz)	825.400	-54.52	-36	0.25
		Band II (1MHz)	2387.000	-43.43	-26	2.5
		Band III (1MHz)	2400.000	-16.51	-16	25
		Band IV (1MHz)	2492.314	-43.54	-16	25
		Band V (1MHz)	3156.731	-40.74	-26	2.5
NV	Middle Channel	Band I (100kHz)	862.260	-54.72	-36	0.25
		Band II (1MHz)	1729.562	-44.86	-26	2.5
		Band III (1MHz)	2399.428	-43.12	-16	25
		Band IV (1MHz)	2485.684	-42.88	-16	25
		Band V (1MHz)	3156.731	-39.72	-26	2.5
NV	Highest Channel	Band I (100kHz)	617.820	-54.75	-36	0.25
		Band II (1MHz)	2245.526	-44.59	-26	2.5
		Band III (1MHz)	2393.578	-43.43	-16	25
		Band IV (1MHz)	2483.500	-21.45	-16	25
		Band V (1MHz)	3156.731	-39.48	-26	2.5

802.11n ht20:

Test Condition	Channel	Test Band (RBW)	Reading		Limit (dBm/RBW)	Limit (μW/RBW)
			Frequency (MHz)	Amplitude (dBm/RBW)		
NV	Lowest Channel	Band I (100kHz)	786.600	-55.23	-36	0.25
		Band II (1MHz)	2387.000	-41.99	-26	2.5
		Band III (1MHz)	2399.896	-18.10	-16	25
		Band IV (1MHz)	2495.512	-43.48	-16	25
		Band V (1MHz)	5177.438	-38.50	-26	2.5
NV	Middle Channel	Band I (100kHz)	722.580	-45.90	-36	0.25
		Band II (1MHz)	2245.526	-44.75	-26	2.5
		Band III (1MHz)	2399.610	-42.14	-16	25
		Band IV (1MHz)	2484.514	-42.94	-16	25
		Band V (1MHz)	3136.724	-41.94	-26	2.5
NV	Highest Channel	Band I (100kHz)	225.940	-55.07	-36	0.25
		Band II (1MHz)	1726.788	-37.88	-26	2.5
		Band III (1MHz)	2395.372	-43.92	-16	25
		Band IV (1MHz)	2483.578	-19.50	-16	25
		Band V (1MHz)	3156.731	-41.89	-26	2.5

802.11n ht40:

Test Condition	Channel	Test Band (RBW)	Reading		Limit (dBm/RBW)	Limit (μW/RBW)
			Frequency (MHz)	Amplitude (dBm/RBW)		
NV	Lowest Channel	Band I (100kHz)	732.280	-54.32	-36	0.25
		Band II (1MHz)	1724.014	-40.65	-26	2.5
		Band III (1MHz)	2400.000	-22.08	-16	25
		Band IV (1MHz)	2484.566	-39.63	-16	25
		Band V (1MHz)	5177.438	-38.91	-26	2.5
NV	Middle Channel	Band I (100kHz)	922.400	-55.31	-36	0.25
		Band II (1MHz)	1729.562	-34.12	-26	2.5
		Band III (1MHz)	2398.752	-21.56	-16	25
		Band IV (1MHz)	2483.500	-24.79	-16	25
		Band V (1MHz)	3156.731	-40.13	-26	2.5
NV	Highest Channel	Band I (100kHz)	728.400	-52.24	-36	0.25
		Band II (1MHz)	2181.724	-44.60	-26	2.5
		Band III (1MHz)	2399.688	-36.58	-16	25
		Band IV (1MHz)	2483.604	-19.67	-16	25
		Band V (1MHz)	5197.445	-36.76	-26	2.5

Note:

Band I:30MHz~1000MHz

Band II:1000MHz~2387MHz

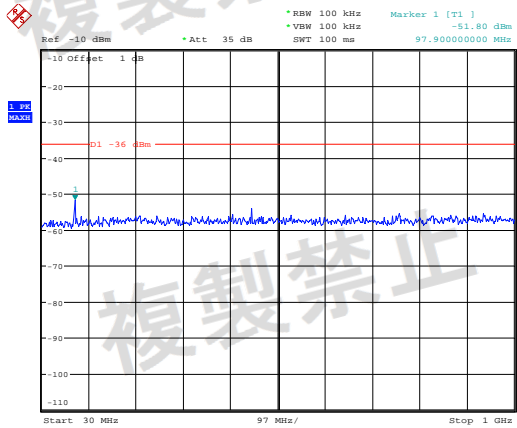
Band III:2387MHz~2400MHz

Band IV:2483.5MHz~2496.5MHz

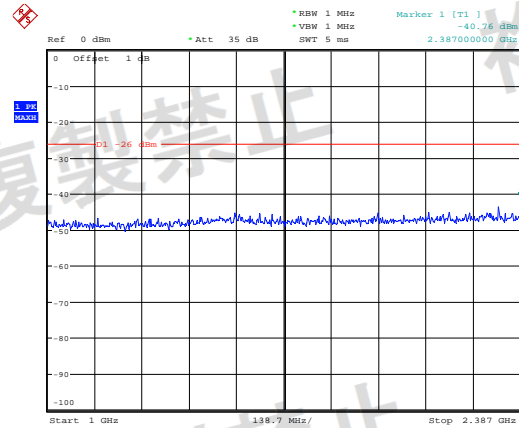
Band V:2496.5MHz~12500MHz

Please refer to the below plots for normal voltage test.

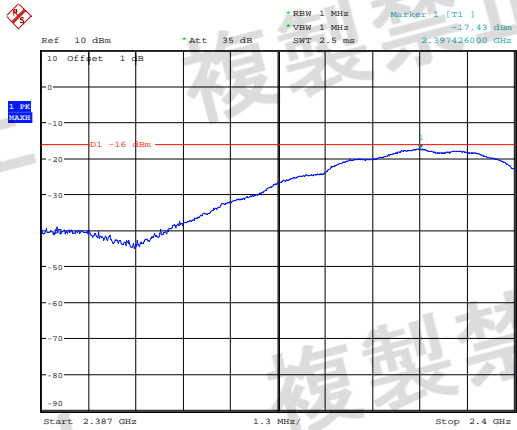
802.11b Low Channel



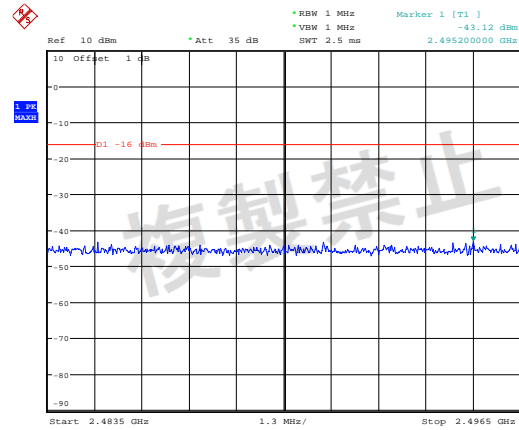
ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 17:40:37



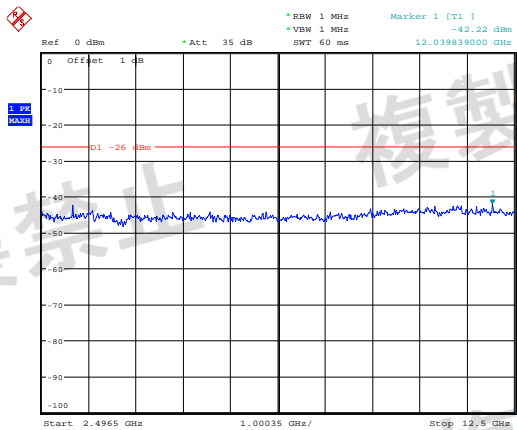
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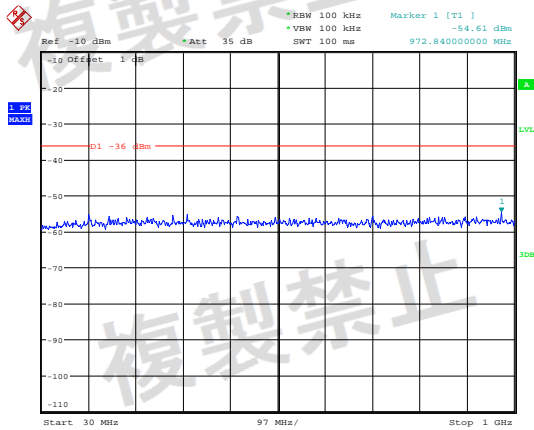


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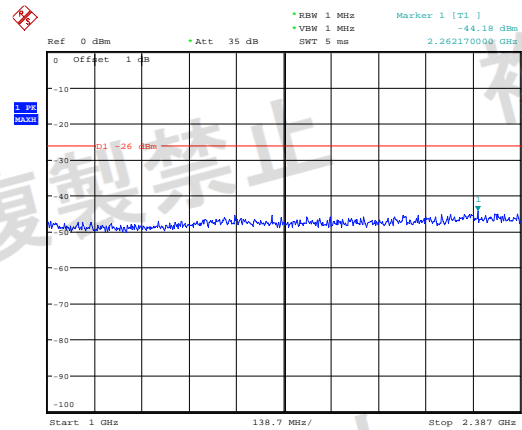


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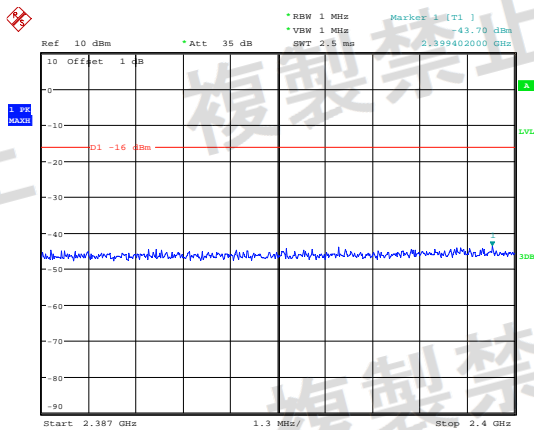
802.11b Middle Channel



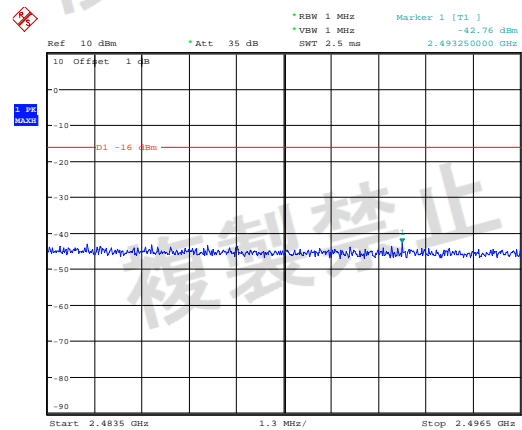
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Date: 15.NOV.2023 18:46:37



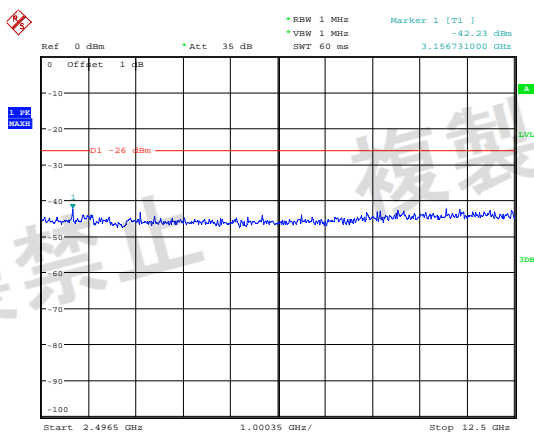
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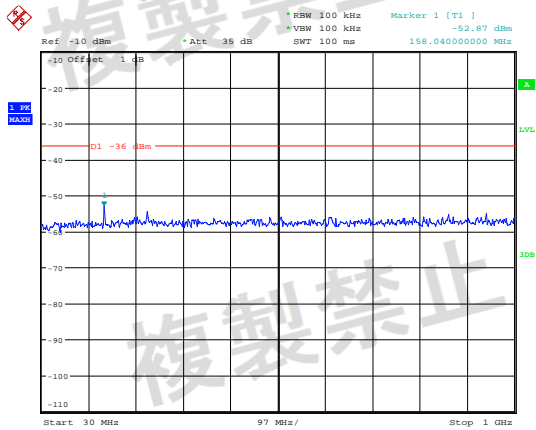


ProjectNo.:CR231165359-RF Tester: Claire Liu
Date: 15.NOV.2023 18:47:18

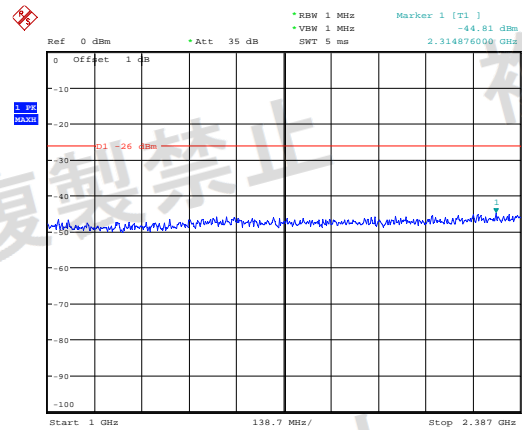


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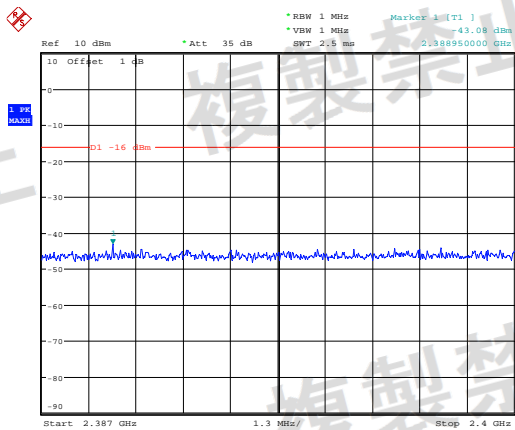
802.11b High Channel



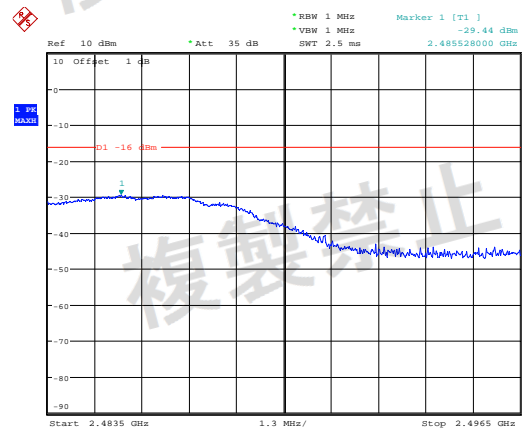
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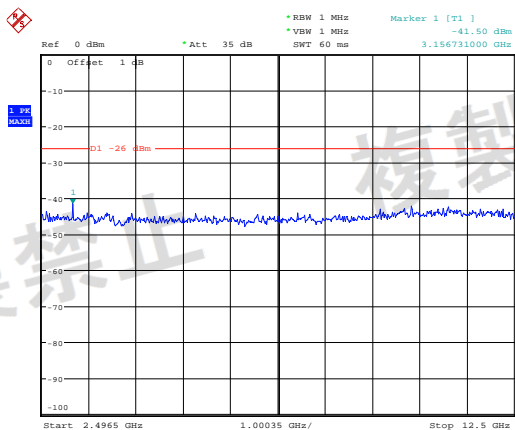
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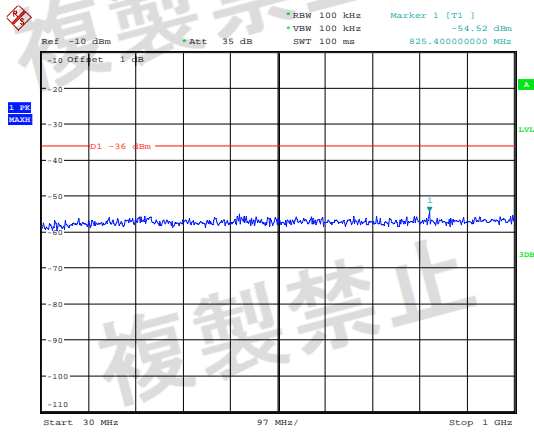


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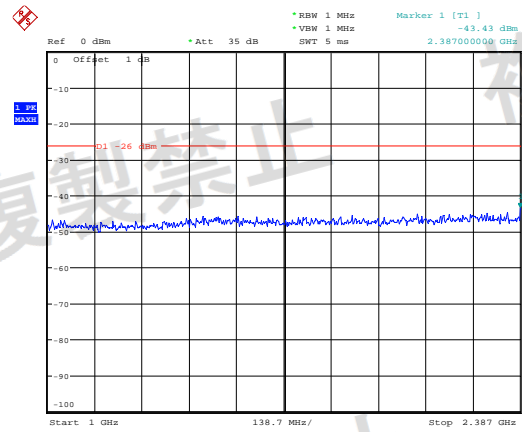


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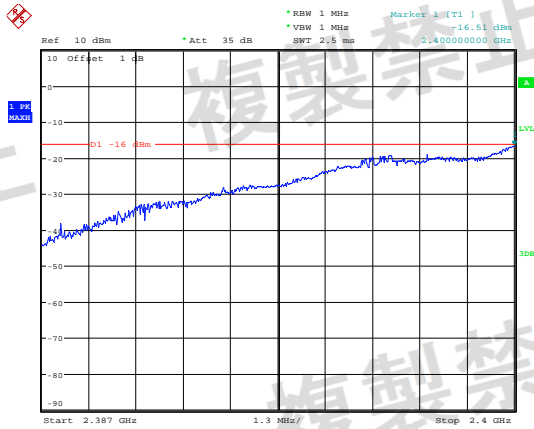
802.11g Low Channel



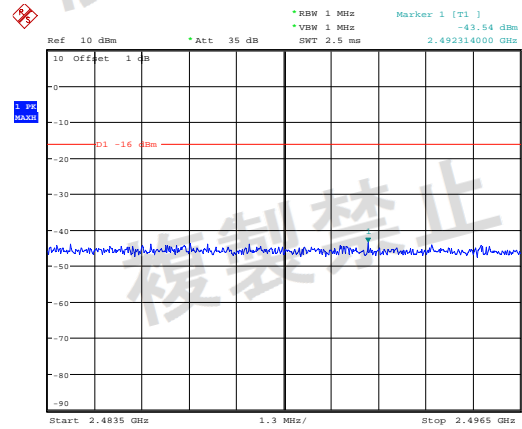
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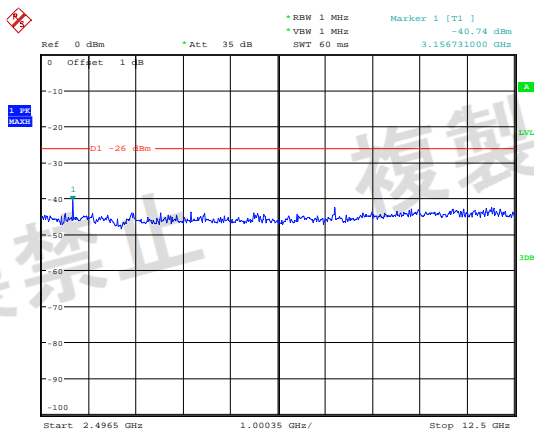
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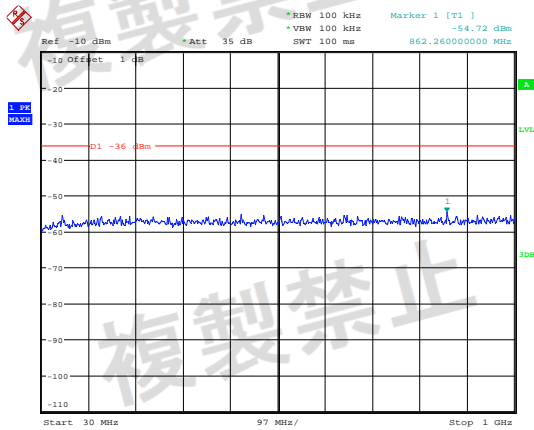


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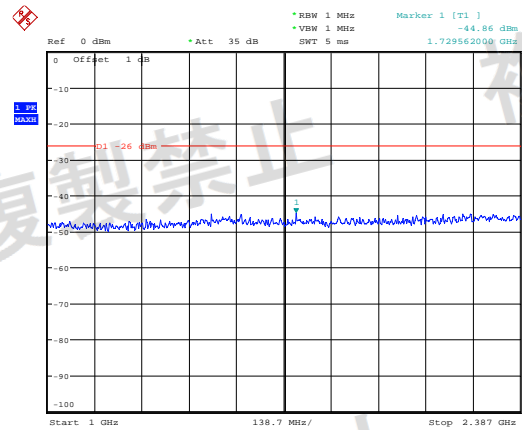


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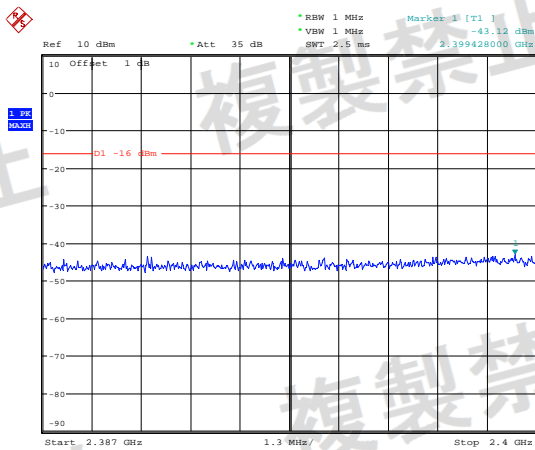
802.11g Middle Channel



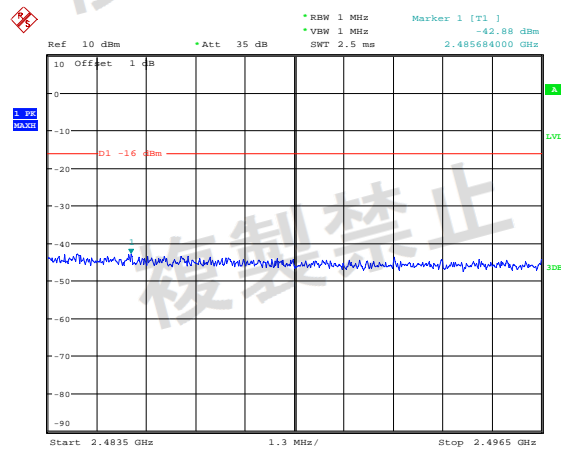
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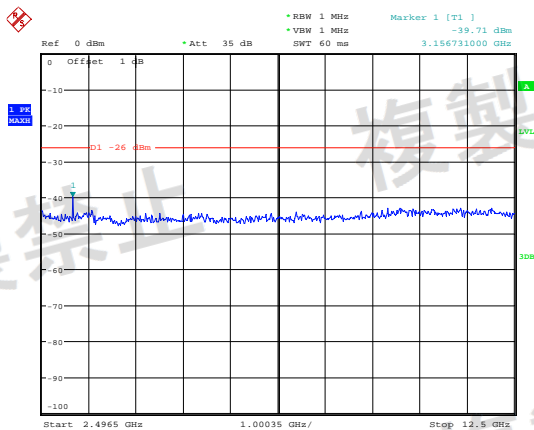
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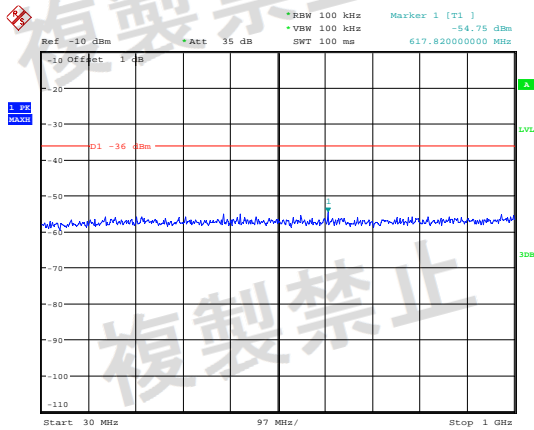


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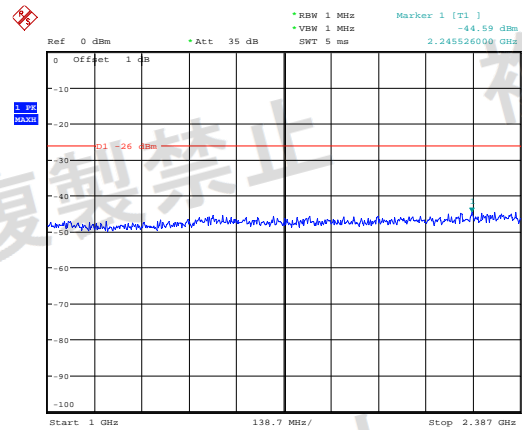


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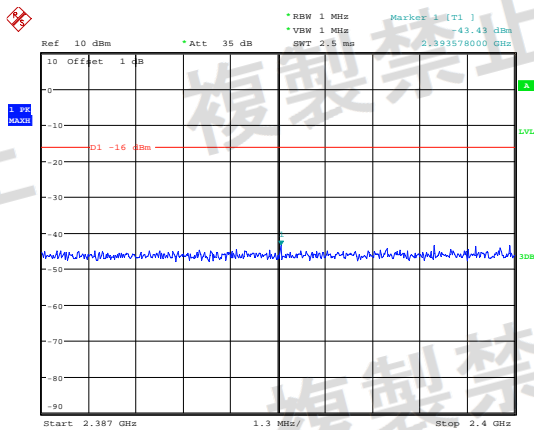
802.11g High Channel



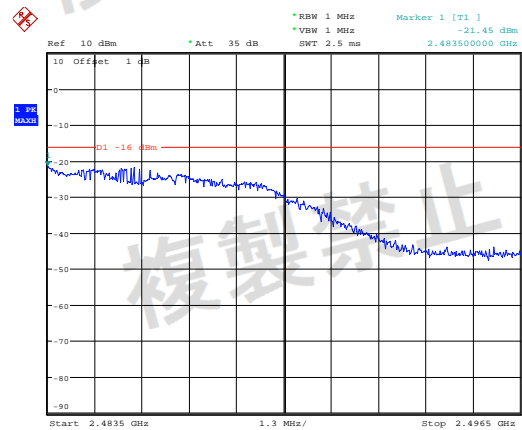
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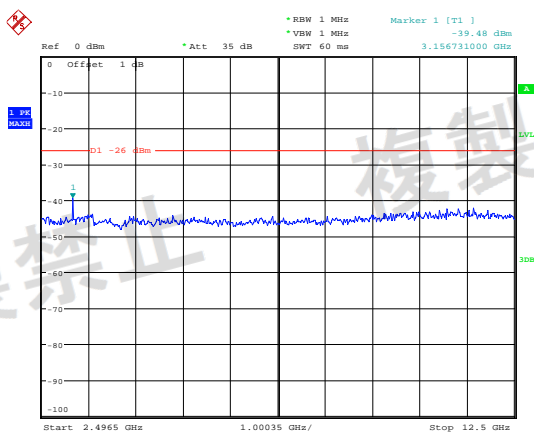
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Date: 15.NOV.2023 18:58:06



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Date: 15.NOV.2023 18:58:19

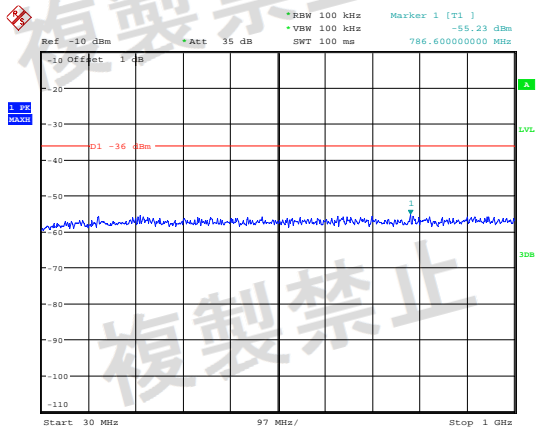


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Date: 15.NOV.2023 18:58:31

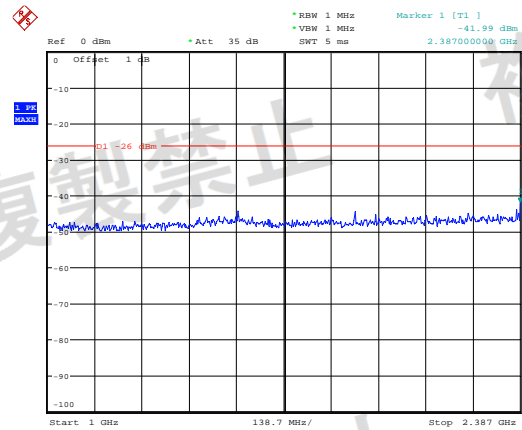


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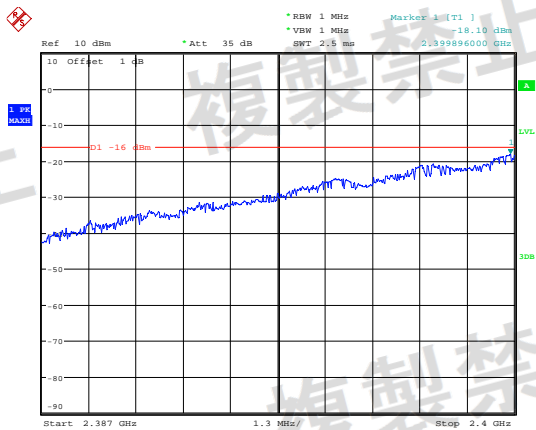
802.11n ht20 Low Channel



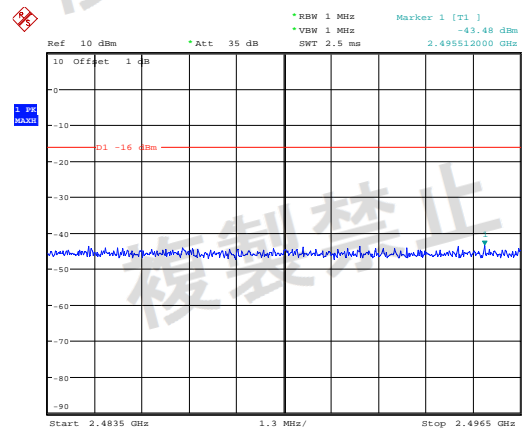
ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 19:41:01



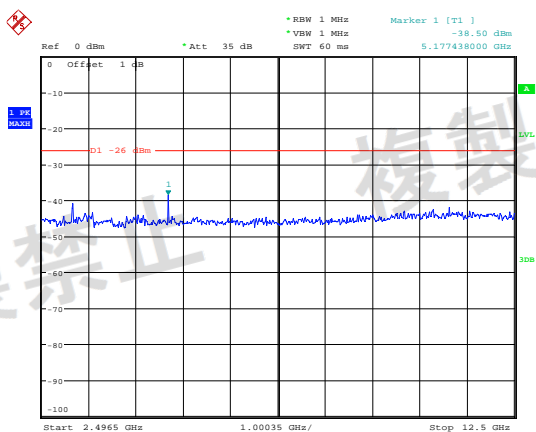
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Date: 15.NOV.2023 19:41:14



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Date: 15.NOV.2023 19:41:33

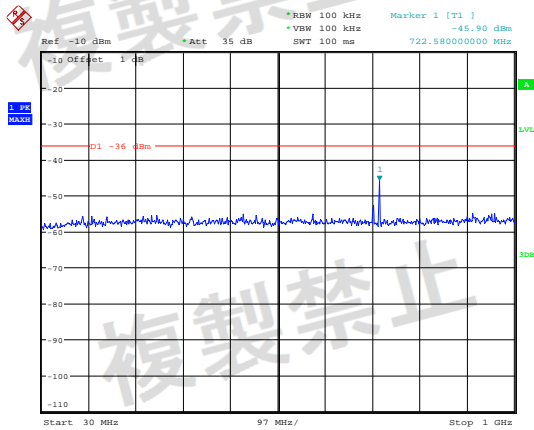


ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 19:41:45

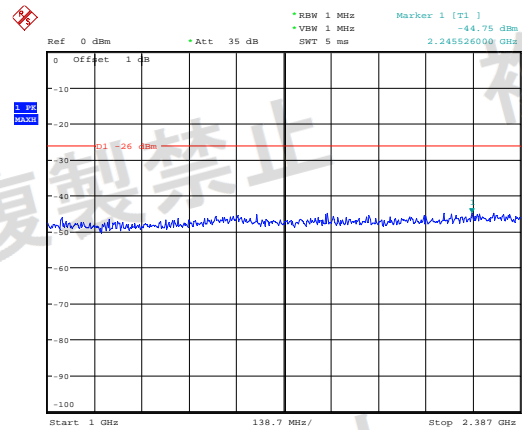


ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 19:41:57

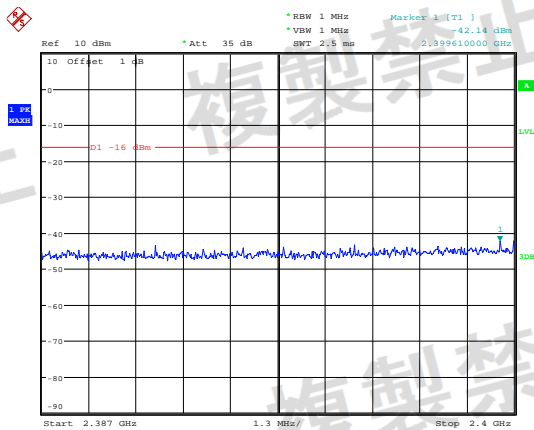
802.11n ht20 Middle Channel



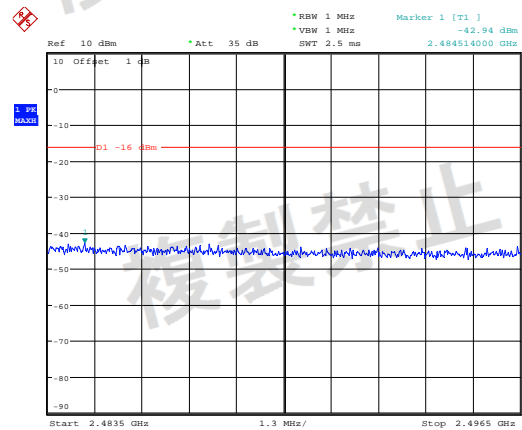
ProjectNo.:CR231165359-RF Tester: Claire Liu
Date: 15.NOV.2023 19:50:04



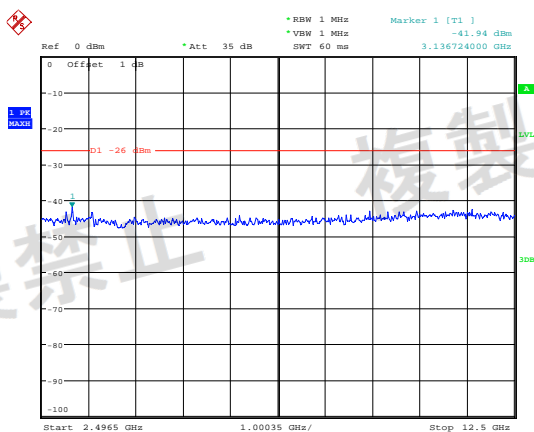
ProjectNo.:CR231165359-RF Tester: Claire Liu
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ProjectNo.:CR231165359-RF Tester: Claire Liu
Date: 15.NOV.2023 19:50:33

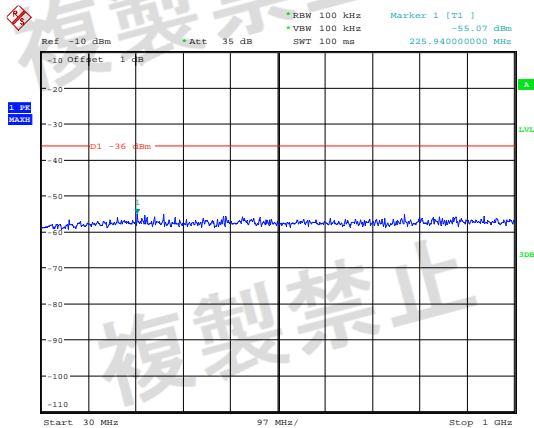


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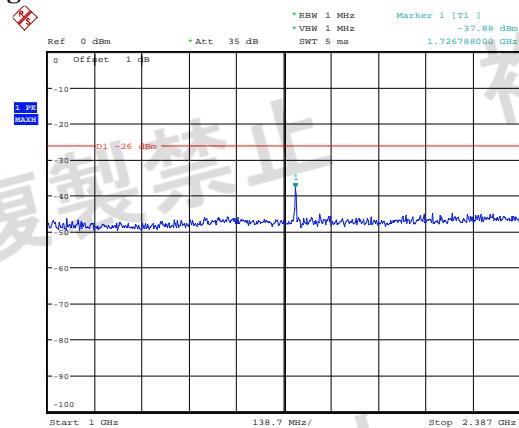


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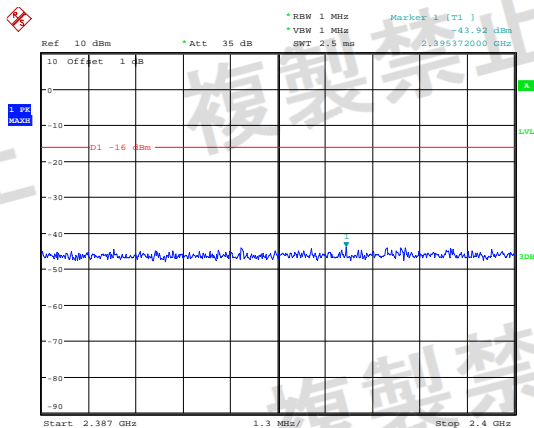
802.11n ht20 High Channel



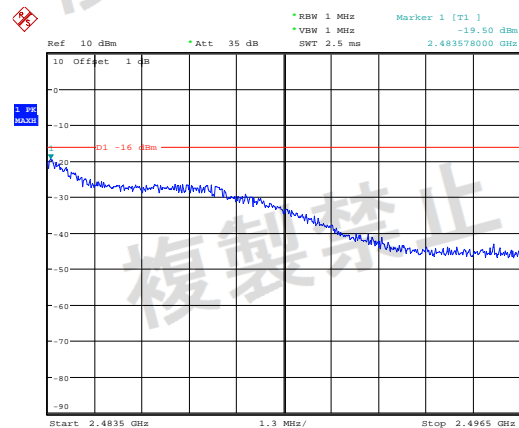
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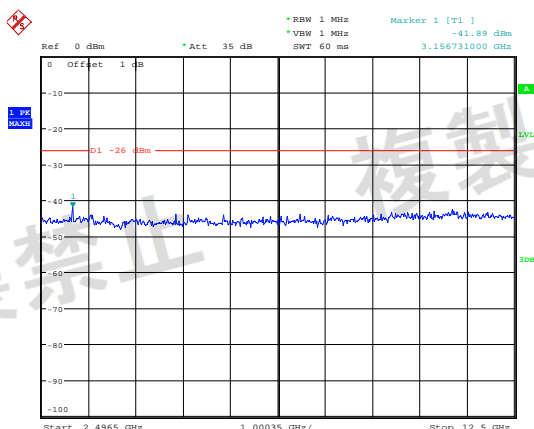
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ProjectNo.:CR231165359-RF Tester: Claire Liu
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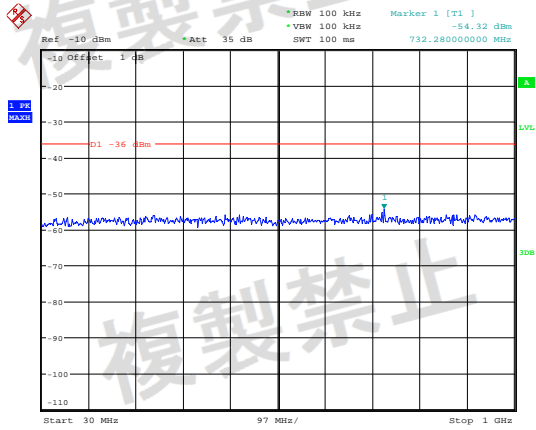


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Date: 15.NOV.2023 19:52:15

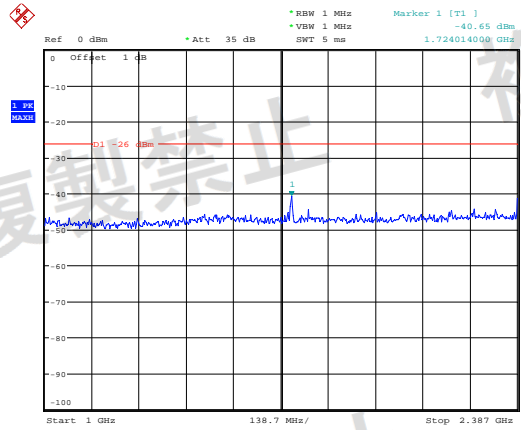


ProjectNo.:CR231165359-RF Tester: Claire Liu
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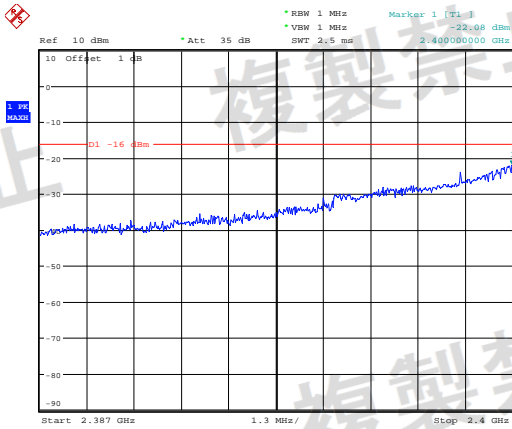
802.11n ht40 Low Channel



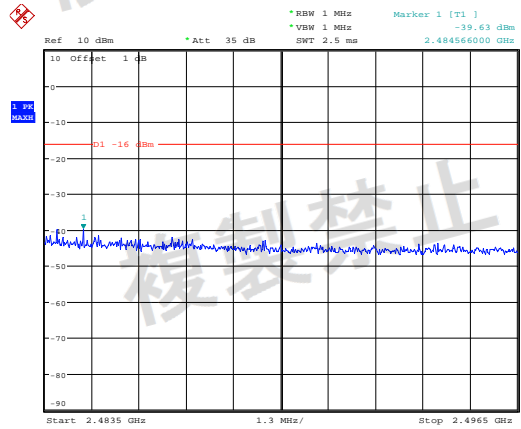
ProjectNo.:CR231165359-RF Tester:Claire Liu
Date: 15.NOV.2023 19:53:36



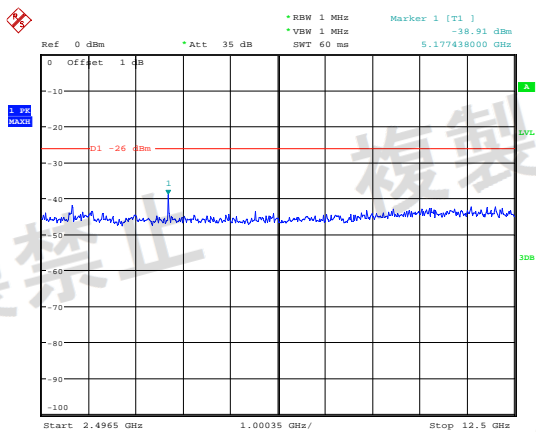
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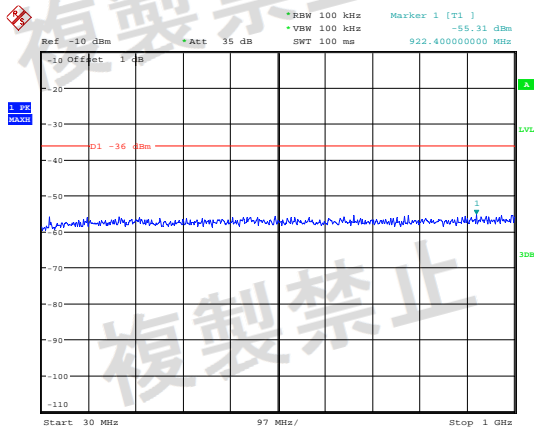


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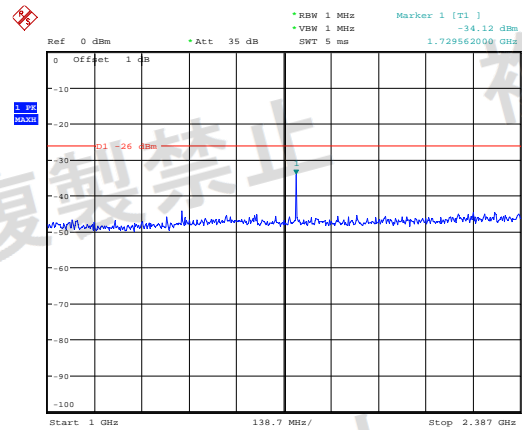


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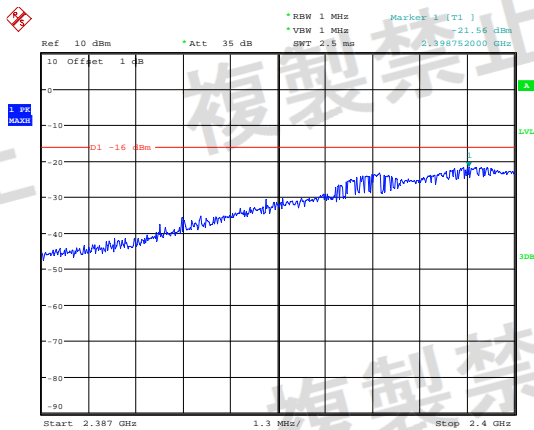
802.11n ht40 Middle Channel



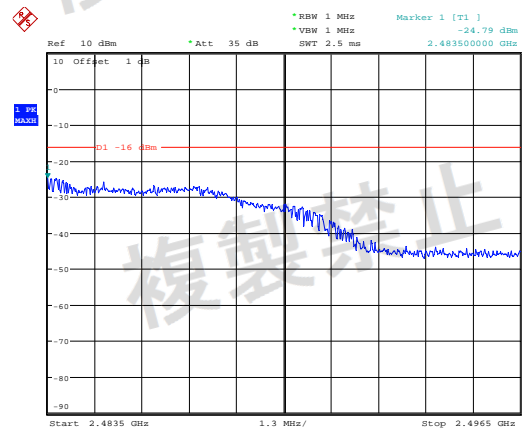
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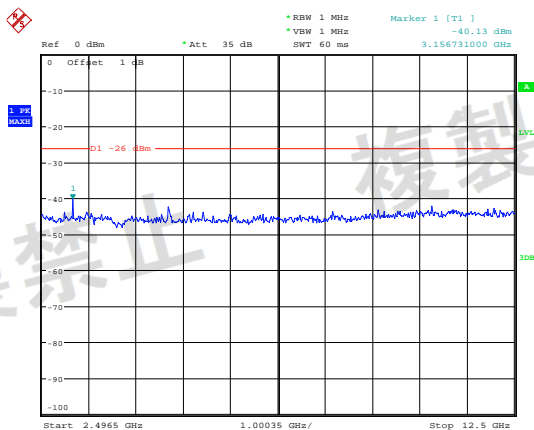
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ProjectNo.:CR231165359-RF Tester:Claire Liu
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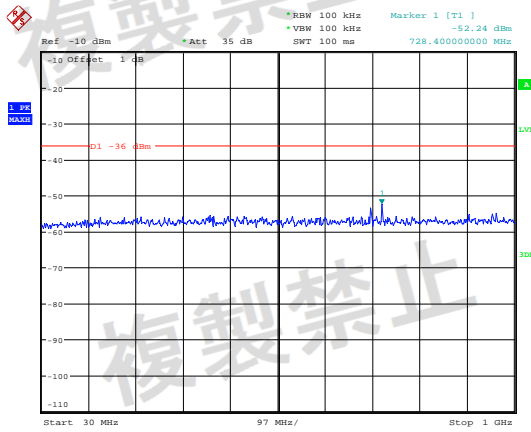


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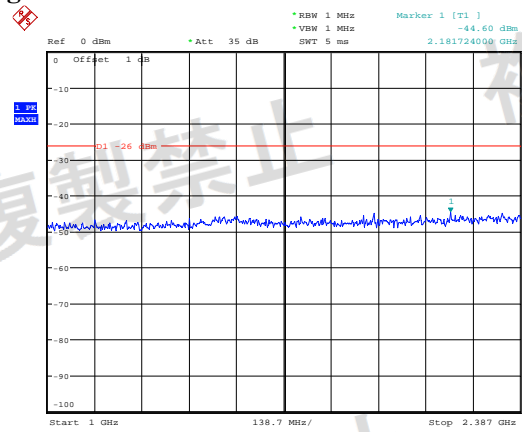


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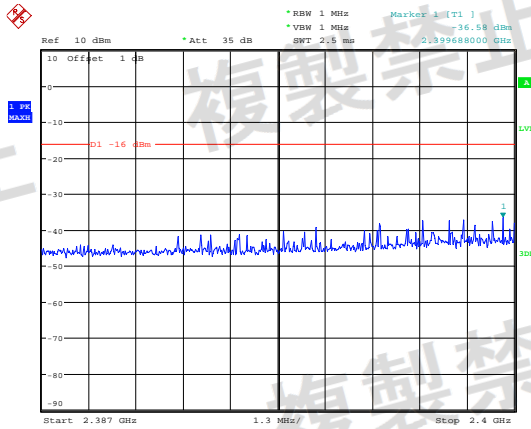
802.11n ht40 High Channel



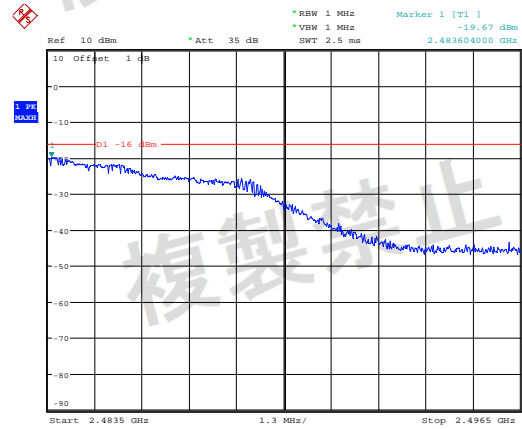
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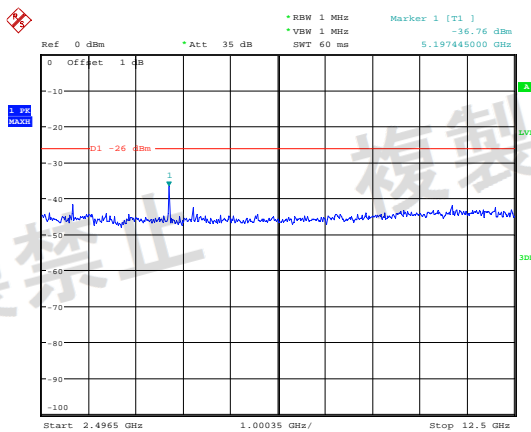
ProjectNo.:CR231165359-RF Tester: Claire Liu
Date: 15.NOV.2023 19:57:05



ProjectNo.:CR231165359-RF Tester: Claire Liu
Date: 15.NOV.2023 19:57:21



ProjectNo.:CR231165359-RF Tester: Claire Liu
Date: 15.NOV.2023 19:57:36



ProjectNo.:CR231165359-RF Tester: Claire Liu
Date: 15.NOV.2023 19:57:49

4.5 Antenna Output Power and Antenna Power Tolerance

Test Result: Compliant

Test Mode: Transmitting

Duty Cycle and Declared Power:

Mode	Ton (ms)	Ton+Toff (ms)	Duty Cycle (%)
802.11b	100.000	100.000	100.00
802.11g	2.031	2.143	94.77
802.11n ht20	1.903	2.015	94.44
802.11n ht40	0.934	1.043	89.55

Mode	Antenna Gain (dBi)	Declared Power (mW/MHz)
802.11b	0	3.30
802.11g		1.35
802.11n ht20		1.10
802.11n ht40		0.70

Output Power

Test Condition	Mode	Channel	Conducted Power (dBm/MHz)	Antenna Output Power (mW/MHz)		Antenna Output Tolerance (%)		EIRP (dBm/MHz)	
				Result	Limit	Result	Limit	Result	Limit
NV	802.11b	Low	5.15	3.273	≤ 10	-0.82	-80~+20	5.15	≤ 12.14
		Middle	3.64	2.312	≤ 10	-29.94		3.64	≤ 12.14
		High	4.41	2.761	≤ 10	-16.33		4.41	≤ 12.14
	802.11g	Low	1.06	1.347	≤ 10	-0.22	-80~+20	1.29	≤ 12.14
		Middle	-1.14	0.812	≤ 10	-39.85		-0.90	≤ 12.14
		High	-0.77	0.884	≤ 10	-34.52		-0.54	≤ 12.14
	802.11n ht20	Low	-0.11	1.032	≤ 10	-6.18	-80~+20	0.14	≤ 12.14
		Middle	-2.36	0.615	≤ 10	-44.09		-2.11	≤ 12.14
		High	-2.06	0.659	≤ 10	-40.09		-1.81	≤ 12.14
	802.11n ht40	Low	-2.40	0.643	≤ 5	-8.14	-80~+20	-1.92	≤ 9.13
		Middle	-2.92	0.570	≤ 5	-18.57		-2.44	≤ 9.13
		High	-2.71	0.598	≤ 5	-14.57		-2.23	≤ 9.13

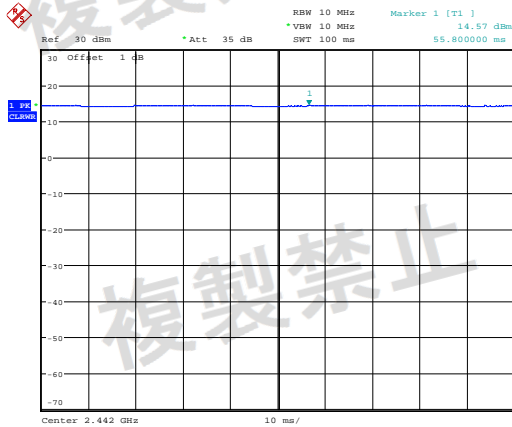
Note:

Antenna Output Power = Conducted power (mW/MHz) / Duty Cycle;

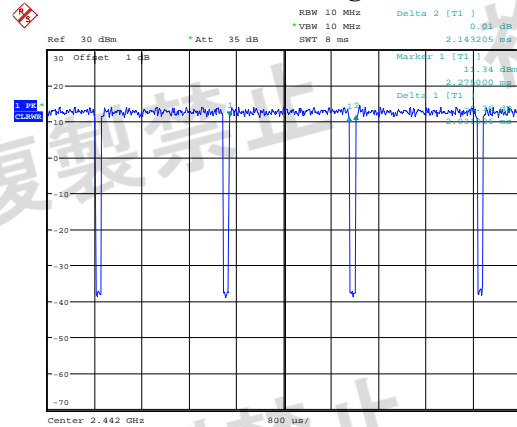
*Antenna Output Power Tolerance = (Antenna Output power - Declared Power)/Declared Power*100%*

Duty Cycle:

802.11b



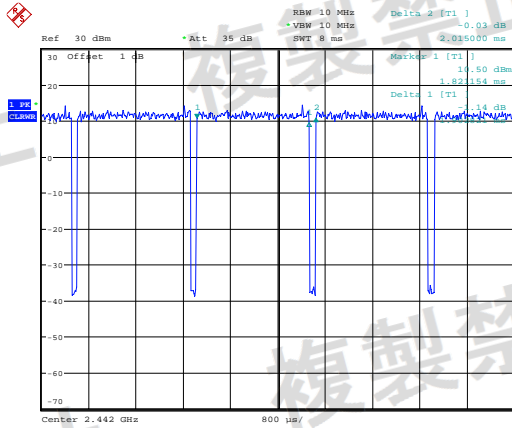
802.11g



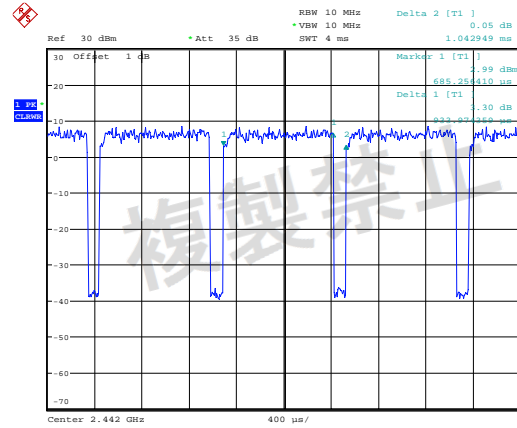
ProjectNo.:CR231165359-RP Tester:Arthur Su
Date: 15.NOV.2023 20:30:26

ProjectNo.:CR231165359-RP Tester:Arthur Su
Date: 15.NOV.2023 20:35:26

802.11n ht20



802.11n ht40

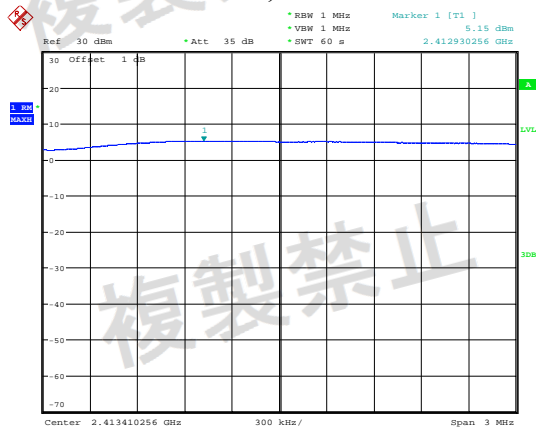


ProjectNo.:CR231165359-RP Tester:Arthur Su
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ProjectNo.:CR231165359-RP Tester:Arthur Su
Date: 15.NOV.2023 20:38:59

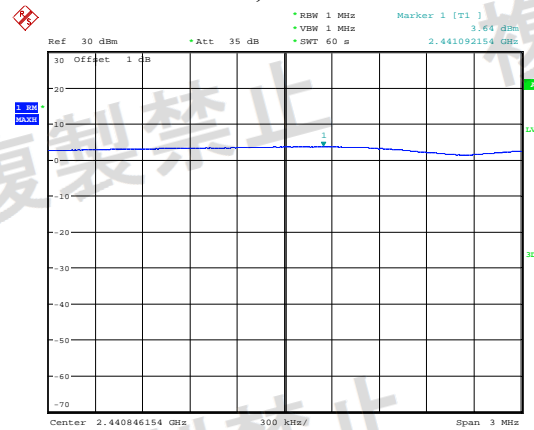
Antenna Power:

802.11b, Low Channel



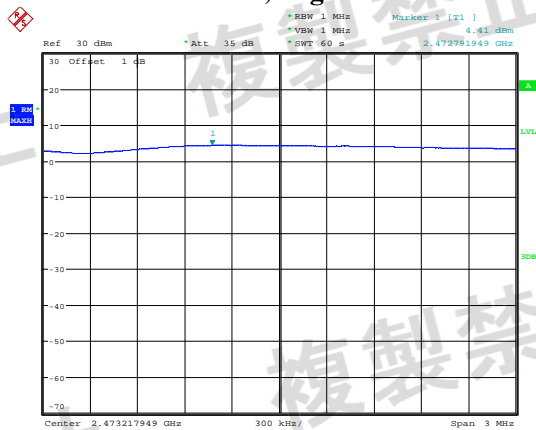
ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 20:44:11

802.11b, Middle Channel



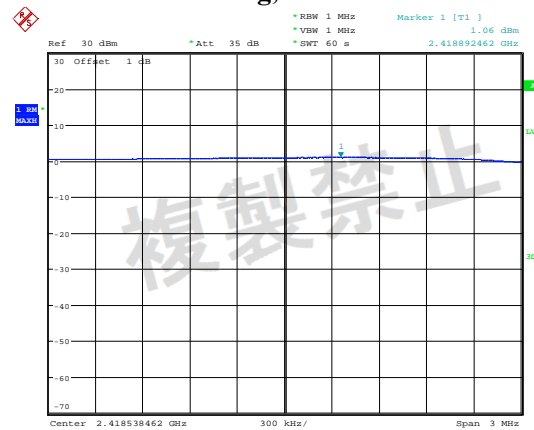
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802.11b, High Channel



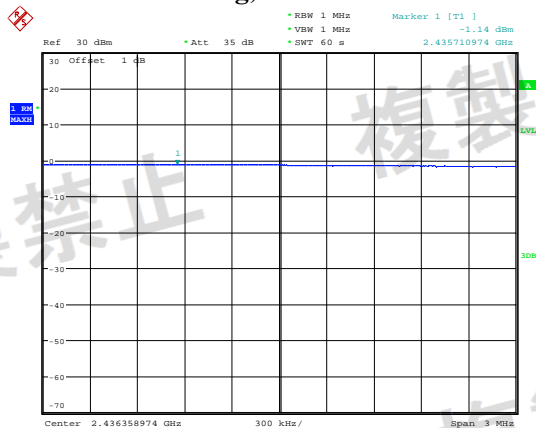
ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 20:49:03

802.11g, Low Channel



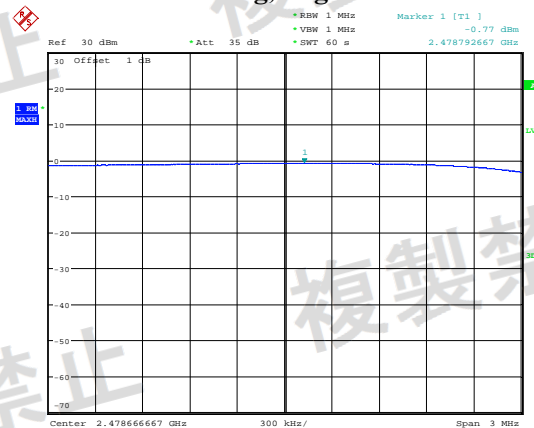
ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 20:51:25

802.11g, Middle Channel



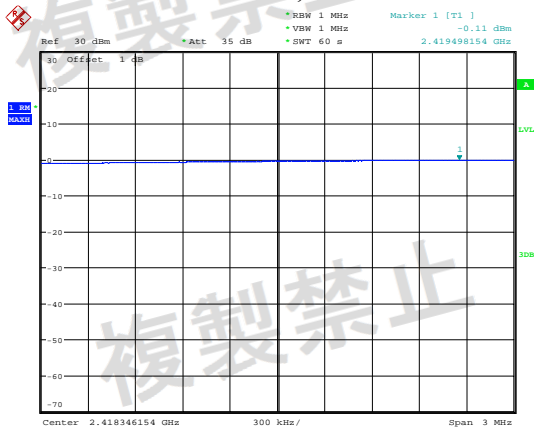
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Date: 15.NOV.2023 20:53:50

802.11g, High Channel



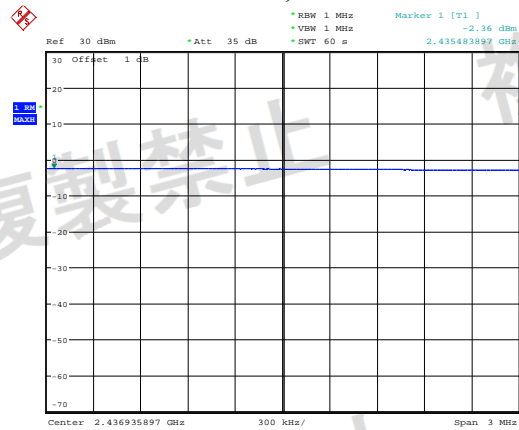
ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 20:56:45

802.11n ht20, Low Channel



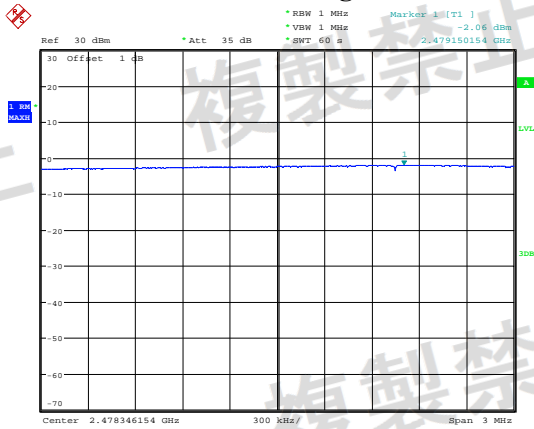
ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 20:58:52

802.11n ht20, Middle Channel



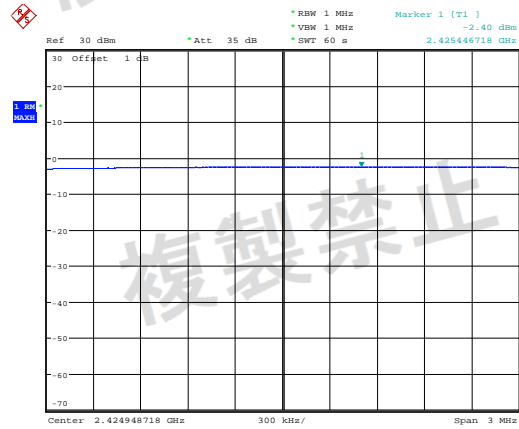
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802.11n ht20, High Channel



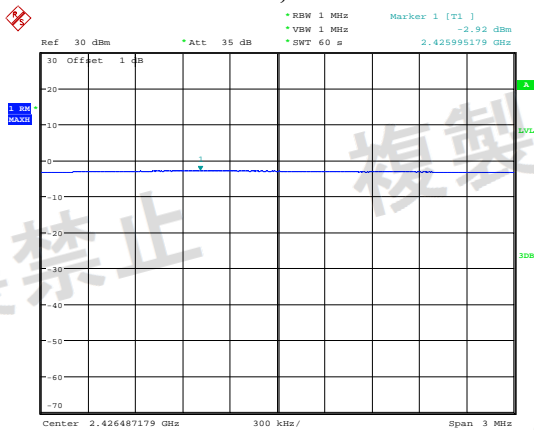
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802.11n ht40, Low Channel



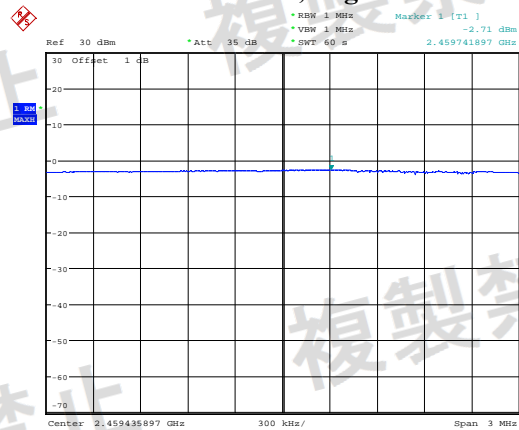
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802.11n ht40, Middle Channel



ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:10:48

802.11n ht40, High Channel



ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:13:43

4.6 Receiver Spurious Emission and Unwanted Emission Intensity

Test Result: Compliant, please see the below tables and plots

Test Mode: Receiving

802.11b:

Test Condition	Channel	Test Band (RBW)	Reading		Limit (dBm)	Limit (nW)
			Frequency (MHz)	Amplitude (dBm)		
NV	Low Channel	Band I (100kHz)	579.020	-82.41	-54	4
		Band II (1MHz)	3156.250	-67.44	-47	20
	Middle Channel	Band I (100kHz)	476.380	-82.07	-54	4
		Band II (1MHz)	3156.250	-67.50	-47	20
	High Channel	Band I (100kHz)	99.840	-81.91	-54	4
		Band II (1MHz)	3156.250	-66.81	-47	20

802.11g:

Test Condition	Channel	Test Band (RBW)	Reading		Limit (dBm)	Limit (nW)
			Frequency (MHz)	Amplitude (dBm)		
NV	Low Channel	Band I (100kHz)	943.740	-81.96	-54	4
		Band II (1MHz)	3156.250	-68.42	-47	20
	Middle Channel	Band I (100kHz)	373.380	-81.75	-54	4
		Band II (1MHz)	3156.250	-68.39	-47	20
	High Channel	Band I (100kHz)	939.860	-81.42	-54	4
		Band II (1MHz)	3137.820	-68.40	-47	20

802.11n ht20:

Test Condition	Channel	Test Band (RBW)	Reading		Limit (dBm)	Limit (nW)
			Frequency (MHz)	Amplitude (dBm)		
NV	Low Channel	Band I (100kHz)	877.780	-81.40	-54	4
		Band II (1MHz)	3156.250	-67.31	-47	20
	Middle Channel	Band I (100kHz)	274.440	-81.59	-54	4
		Band II (1MHz)	3156.250	-67.78	-47	20
	High Channel	Band I (100kHz)	996.300	-81.53	-54	4
		Band II (1MHz)	3156.250	-68.01	-47	20

802.11n ht40:

Test Condition	Channel	Test Band (RBW)	Reading		Limit (dBm)	Limit (nW)
			Frequency (MHz)	Amplitude (dBm)		
NV	Low Channel	Band I (100kHz)	383.080	-81.28	-54	4
		Band II (1MHz)	3156.250	-67.88	-47	20
	Middle Channel	Band I (100kHz)	825.400	-80.84	-54	4
		Band II (1MHz)	3137.820	-67.60	-47	20
	High Channel	Band I (100kHz)	866.140	-81.35	-54	4
		Band II (1MHz)	3137.820	-67.65	-47	20

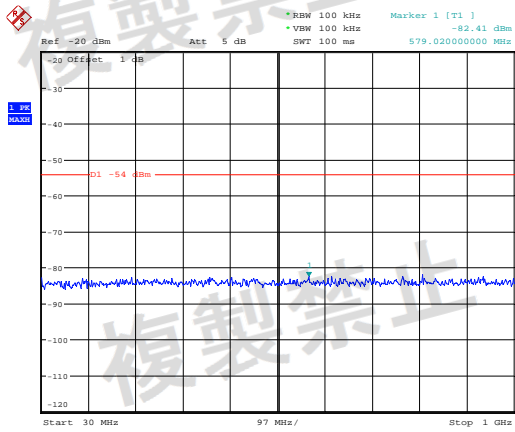
Note:

Band I: 30MHz~1000MHz

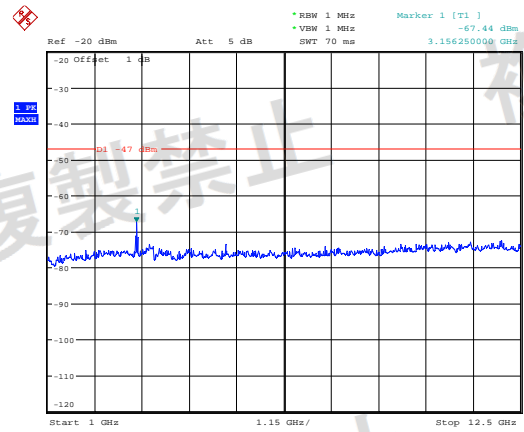
Band II: 1000MHz~12500MHz

Please refer to the below plots for normal voltage test.

802.11b, Low Channel

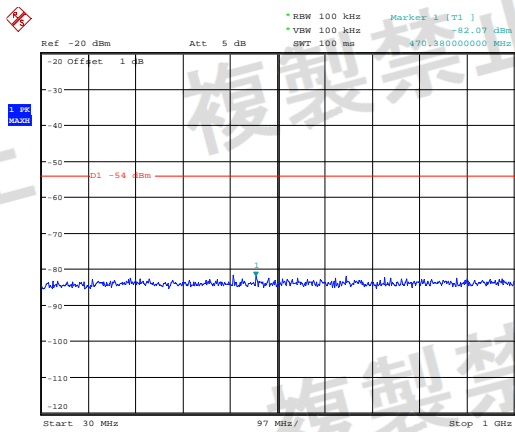


ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:30:27

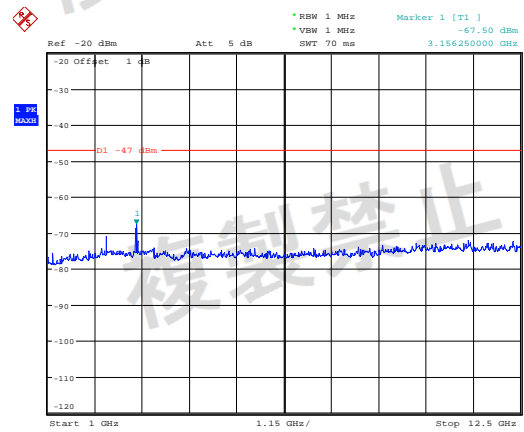


ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:30:51

802.11b, Middle Channel

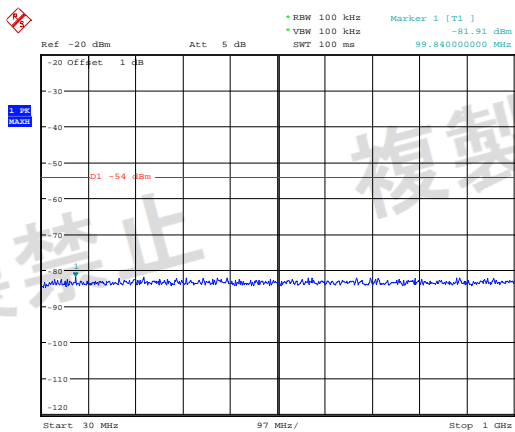


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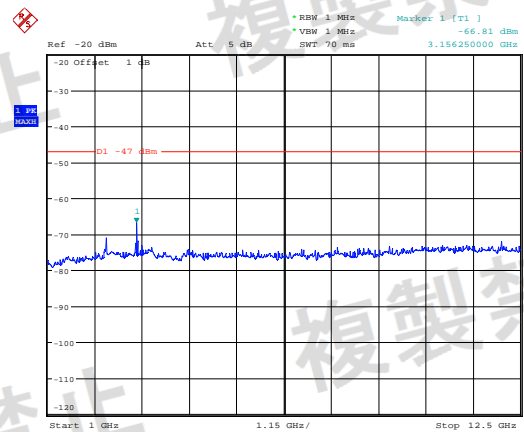


ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:35:00

802.11b, High Channel

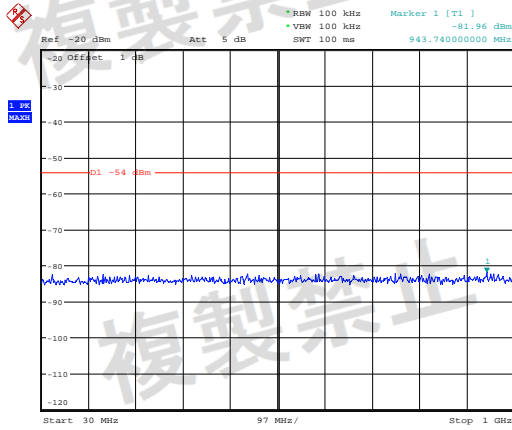


ProjectNo.:CR231165359-RF Tester:Arthur Su
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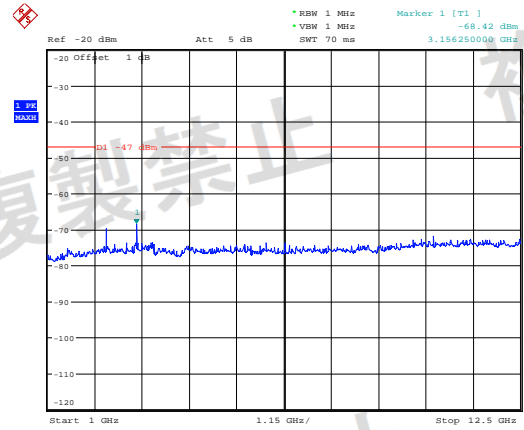


ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:43:16

802.11g, Low Channel

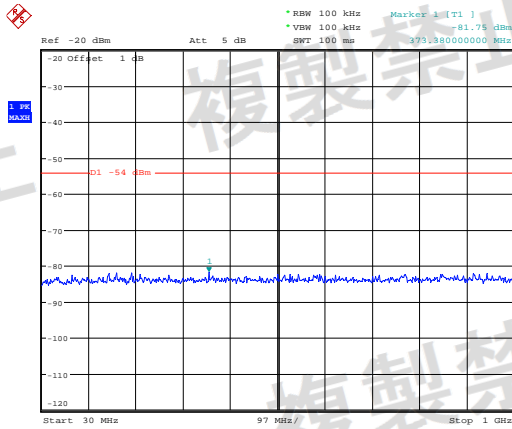


ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:44:01

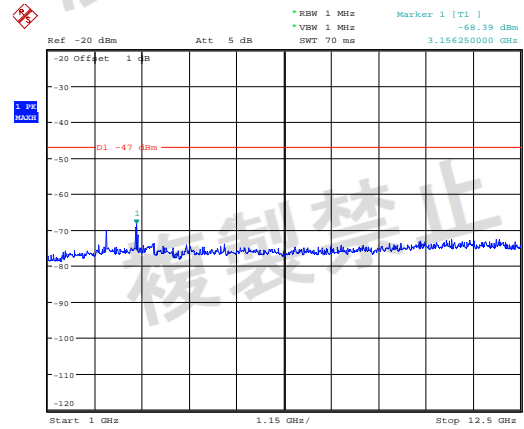


ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:44:33

802.11g, Middle Channel

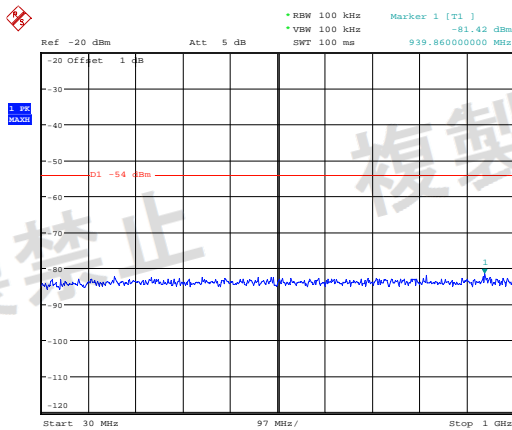


ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:45:15

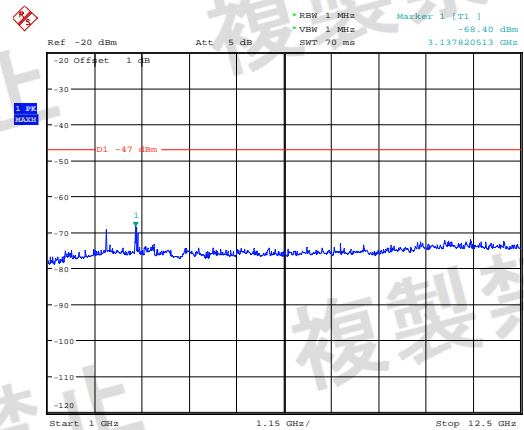


ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:45:39

802.11g, High Channel

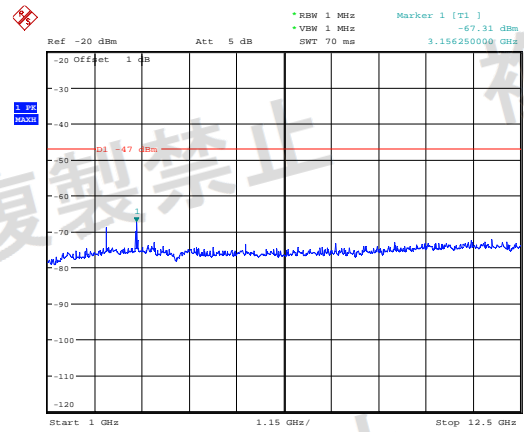
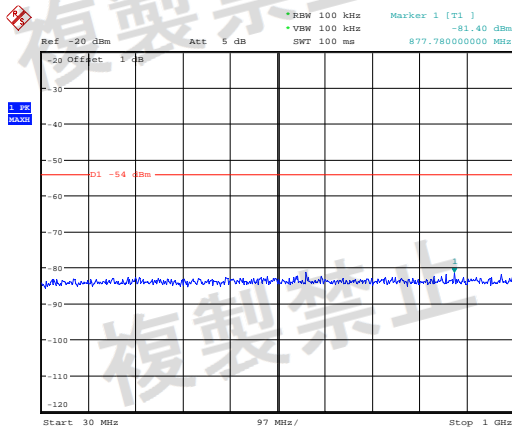


ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:46:17



ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:46:49

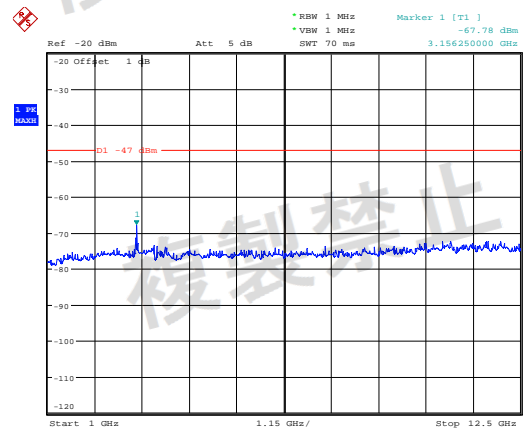
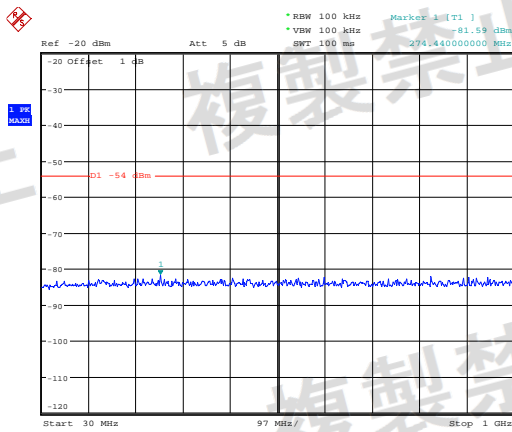
802.11n ht20, Low Channel



ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:47:24

ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:47:50

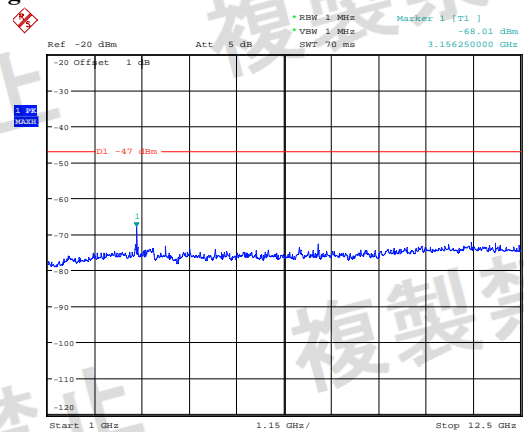
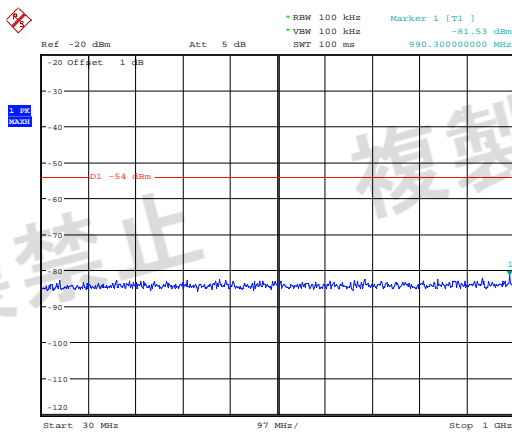
802.11n ht20, Middle Channel



ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:48:25

ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:48:52

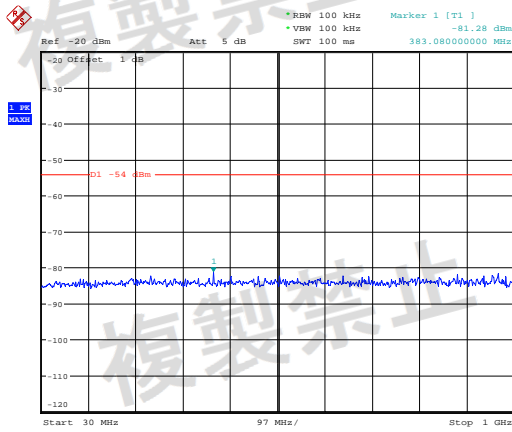
802.11n ht20, High Channel



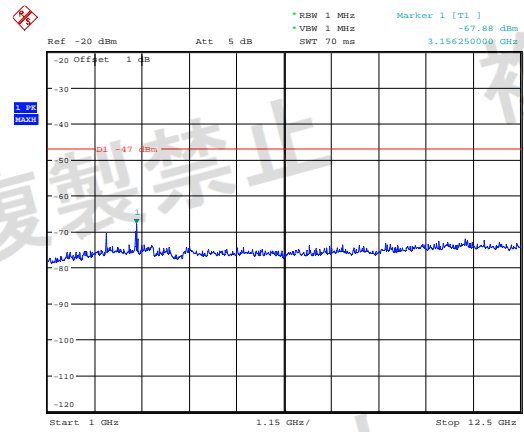
ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:49:17

ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:49:41

802.11n ht40, Low Channel

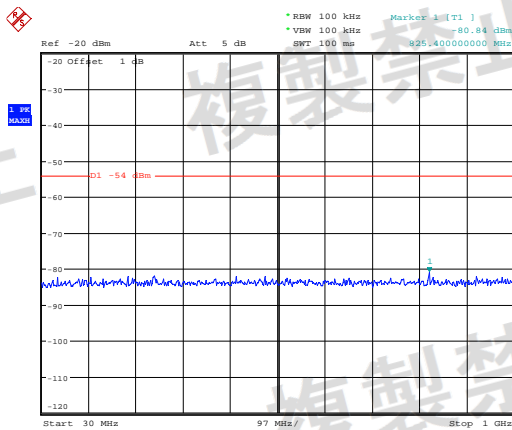


ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:50:12

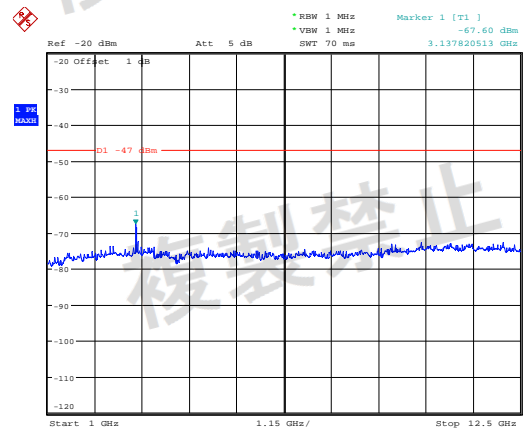


ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:50:40

802.11n ht40, Middle Channel

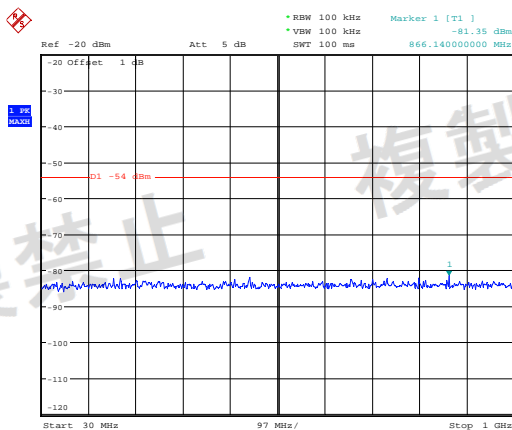


ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:51:15

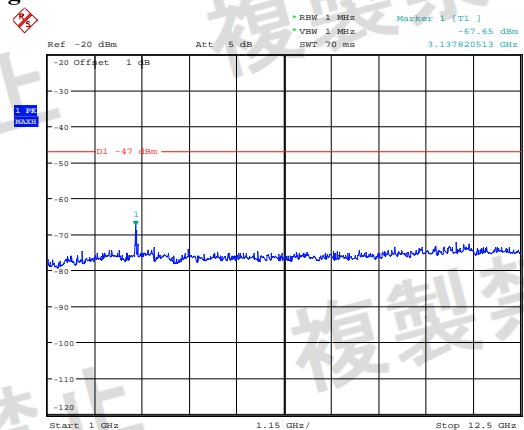


ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:51:36

802.11n ht40, High Channel



ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:52:04



ProjectNo.:CR231165359-RF Tester:Arthur Su
Date: 15.NOV.2023 21:52:22

5. EUT PHOTOGRAPHS

Please refer to the attachment CR231165359-EXP EUT EXTERNAL PHOTOGRAPHS and CR231165359-INP EUT INTERNAL PHOTOGRAPHS

6. TEST SETUP PHOTOGRAPHS

Please refer to the attachment CR231165359-07B-TSP TEST SETUP PHOTOGRAPHS.

***** END OF REPORT *****

TEST SETUP PHOTOGRAPHS

Test Setup photo

