



1. TEST RESULT REPORT

Applicant (4SEILS)  
HYEONJOON, RYU

Test Laboratory: ESTECH CO., LTD

Tested Engineer;	
	Ian, Ryu
Approval person;	
	Keum Bum, Lee

Equipment Type	VIVA TAG
Model Name	DP0420
Serial Number	-
Number of Tested Equipment	1
Date of Testing	2024-01-17 ~ 2024-01-19
Place of Testing	ESTECH CO., LTD. Suite 1015, World Venture Center II, 123 Gasan Digital 2-ro, Geumcheon-gu, Seoul, 08505, Korea
Test Result	PASS (Refer to attachment)

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2. TEST INFORMATION

1 Classification of Specified Radio Equipment	Article 2 Paragraph 1 of Item 19
2 Test Method	Ministry of Internal Affairs and Communications MIC Notification. No. 88, Annex 43
3 Supply Voltage	DC 3.0 V (Battery)
4 Size ( W x D x H )	97.8 x 91.8 x 12.6 (mm)
5 RF Specification Frequency range	GFSK : 2402 - 2480 MHz
6 RF Channels	GFSK : 40 Channels (2 MHz interval)
7 Modulation method & Data rate	GFSK & 2Mbps
8 Measurement Equipment	Refer to Item 4
9 Type of Emissions, Frequency and Declaration Output Power to be tested	Refer to Test Results

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**2.1 TEST RESULTS DATA FOR JAPANESE CERTIFICATION (GFSK High Voltage)**

Environment of Test Room	Temperature	22.8 °C
	Humidity	51 %

Peak Antenna Gain	-0.68	dBi
Declaration Output Power	0.8	mW
Declaration Output Power	-0.97	dBm
<b>E.I.R.P</b>	<b>-1.65</b>	<b>dBm</b>
Input Power Voltage	3.3	VDC

Tested Circit Insertion Loss		1	dB
Burst	ON TIME	-Not applicable-	sec
	OFF TIME	-Not applicable-	sec
	Ratio	-Not applicable-	%
Packet Type (Mode)		-Not applicable-	mode

Frequency equal to the transmission rate of the modulation signal
N/A

Test Category ; 2.4GHz Band Wideband Direct Sequence Spread Spectrum Communication System

Comprehensive operation test
"When the input voltage to receiver RF circuit varies below $\pm 1\%$ , as the input voltage from the external power supply to the receiver varies $\pm 10\%$ (excluding power supply)."

**2.4.1. TEST Results**

Measurement Frequency		MHz	2402	2440	2480	Result	NOTES
Channel Number		Ch.	0	19	39	-----	
Reading Frequency		MHz	2401.98513	2439.98481	2479.98462	-----	
Frequency Tolerance		ppm	-6.19067	-6.22664	-6.20282	PASS	
Occupied Bandwidth		MHz	1.078109	1.086416	1.072523	PASS	
Spread Bandwidth		MHz	0.708890	0.724601	0.727020	PASS	
RF Output Power		mW	0.709	0.725	0.727	PASS	
RF Output Power Tolerance		%	-11.39	-9.42	-9.12	PASS	
Real Total Output Power		dBm	-5.23	-6.58	-7.72	-----	<Reference>
Unwanted Emission Strength	Under 2387MHz	μW/MHz	0.00861	0.01627	0.00820	PASS	
		MHz	2167.44	2167.44	2166.58	-----	
	2387-2400MHz	μW/MHz	0.049181	0.001612	0.001580	PASS	
		MHz	2400	2396.48	2398.48	-----	
	2483.5-2496.5MHz	μW/MHz	0.001131	0.001197	0.001279	PASS	
		MHz	2485.22	2484.61	2484.19	-----	
	2496.5 - 12.5GHz	μW/MHz	0.007730	0.001733	0.002661	PASS	
		MHz	3601.80	7319.70	7439.90	-----	
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 1GHz	nW	0.019	0.017	0.016	PASS	
		MHz	501.56	749.06	332.69	-----	
	1 - 12.5GHz	nW	0.503	0.496	0.540	PASS	
		MHz	7277.40	12494.70	7907.10	-----	
Interference Prevention Function		-----	good			PASS	

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**2.1 TEST RESULTS DATA FOR JAPANESE CERTIFICATION (GFSK Rated Voltage)**

Environment of Test Room	Temperature	22.8 °C
	Humidity	51 %

Peak Antenna Gain	-0.68	dBi
Declaration Output Power	0.8	mW
Declaration Output Power	-0.97	dBm
<b>E.I.R.P</b>	<b>-1.65</b>	<b>dBm</b>
Input Power Voltage	3	VDC

Tested Circit Insertion Loss		1	dB
Burst	ON TIME	-Not applicable-	sec
	OFF TIME	-Not applicable-	sec
	Ratio	-Not applicable-	%
Packet Type (Mode)		-Not applicable-	mode

Frequency equal to the transmission rate of the modulation signal

N/A

Test Category ; 2.4GHz Band Wideband Direct Sequence Spread Spectrum Communication System

Comprehensive operation test

"When the input voltage to receiver RF circuit varies below  $\pm 1\%$ , as the input voltage from the external power supply to the receiver varies  $\pm 10\%$  (excluding power supply)."

**2.4.1. TEST Results**

Measurement Frequency		MHz	2402	2440	2480	Result	NOTES
Channel Number		Ch.	0	19	39	-----	
Reading Frequency		MHz	2401.98511	2439.98489	2479.98468	-----	
Frequency Tolerance		ppm	-6.20067	-6.19426	-6.17581	PASS	
Occupied Bandwidth		MHz	1.064333	1.075076	1.101749	PASS	
Spread Bandwidth		MHz	0.710597	0.707076	0.715612	PASS	
RF Output Power		mW	0.301	0.220	0.169	PASS	
RF Output Power Tolerance		%	-62.36	-72.47	-78.90	PASS	
Real Total Output Power		dBm	-5.21	-6.57	-7.73	-----	<Reference>
Unwanted Emission Strength	Under 2387MHz	μW/MHz	0.007495	0.022673	0.006206	PASS	
		MHz	2168.88	1848.9	2167.16	-----	
	2387-2400MHz	μW/MHz	0.073858	0.001542	0.001319	PASS	
		MHz	2400	2393.16	2396.78	-----	
	2483.5-2496.5MHz	μW/MHz	0.001136	0.001083	0.001561	PASS	
		MHz	2484.19	2485.32	2483.88	-----	
	2496.5 - 12.5GHz	μW/MHz	0.001492	0.001848	0.002951	PASS	
		MHz	7205.80	7319.70	7439.90	-----	
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 1GHz	nW	0.016	0.019	0.016	PASS	
		MHz	902.18	725.73	911.66	-----	
	1 - 12.5GHz	nW	0.521	0.473	0.461	PASS	
		MHz	8016.10	8202.60	8001.80	-----	
Interference Prevention Function		-----	good			PASS	

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2.1 TEST RESULTS DATA FOR JAPANESE CERTIFICATION (GFSK Low Voltage)

Environment of Test Room	Temperature	22.8 °C
	Humidity	51 %

Peak Antenna Gain	-0.68	dBi
Declaration Output Power	0.8	mW
Declaration Output Power	-0.97	dBm
E.I.R.P	-1.65	dBm
Input Power Voltage	2.7	VDC

Tested Circit Insertion Loss		1	dB
Burst	ON TIME	-Not applicable-	sec
	OFF TIME	-Not applicable-	sec
	Ratio	-Not applicable-	%
Packet Type (Mode)		-Not applicable-	mode

Frequency equal to the transmission rate of the modulation signal
N/A

Test Category ; 2.4GHz Band Wideband Direct Sequence Spread Spectrum Communication System
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Comprehensive operation test
"When the input voltage to receiver RF circuit varies below $\pm 1\%$ , as the input voltage from the external power supply to the receiver varies $\pm 10\%$ (excluding power supply)."

2.4.1. TEST Results

Measurement Frequency			MHz	2402	2440	2480	Result	NOTES
Channel Number			Ch.	0	19	39	----	
Reading Frequency			MHz	2401.98519	2439.98497	2479.98476	----	
Frequency Tolerance			ppm	-6.16778	-6.16189	-6.14355	PASS	
Occupied Bandwidth			MHz	1.072776	1.092023	1.090401	PASS	
Spread Bandwidth			MHz	0.696412	0.74823	0.710561	PASS	
RF Output Power			mW	0.299	0.220	0.171	PASS	
RF Output Power Tolerance			%	-62.68	-72.55	-78.61	PASS	
Real Total Output Power			dBm	-5.25	-6.58	-7.67	----	<Reference>
Unwanted Emission Strength	Under 2387MHz	μW/MHz	0.014054	0.008457	0.011752	PASS		
		MHz	2166.87	1849.19	2167.16	----		
	2387-2400MHz	μW/MHz	0.046548	0.001278	0.001518	PASS		
		MHz	2400.00	2396.61	2399.31	----		
	2483.5-2496.5MHz	μW/MHz	0.001012	0.001016	0.001558	PASS		
		MHz	2493.11	2486.07	2483.72	----		
	2496.5 - 12.5GHz	μW/MHz	0.001242	0.001827	0.002563	PASS		
		MHz	7205.8	7319.7	7439.9	----		
Secondarily Emitted Radio Wave Strength (RX Spurious)	Under 1GHz	nW	0.017	0.018	0.016	PASS		
		MHz	380.41	89.57	893.89	----		
	1 - 12.5GHz	nW	0.467	0.540	0.474	PASS		
		MHz	7978.80	7912.90	7910.00	----		
Interference Prevention Function			----	good			PASS	

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### 3. Measurement Equipment List

[illegible]

**Note : 1. The calibration of measurement equipment is valid for a one year period.**

2. "X" used equipment.

## Calibration Method

- a) : Calibration conducted by the National Institute of Information and Communications Technology(NICT) or a designated calibration agency under Article 102-18 paragraph (1) of the Radio Law.
- b) : Calibration conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992) Japan Calibration Service System.
- 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 other equipment that listed above from a) to c).

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4. About Uncertainty of Measured Value

\*In this test, the influence of an error or uncertainty may be done according to the following factors.

- Bias of a measurement equipment, Change by aging, Attrition, Noise
- Skill and capability of an inspector
- Environment (Temperature, Humidity)
- Dispersion in a EUT (Equipment Under Test)
- Uncertainty of calibration of a measurement equipment

Therefore, Synthetic uncertainty is calculated using "k=2" of coverage factor, and about 95% of confidence level shall be obtained.

In consideration of the above, it judged as follows.

JUDGE	Measured value and Standard limit value	
PASS	Case1	<div><div>Standard limit value</div><div><div>+uncertainty</div><div>-uncertainty</div><div>Measured value</div></div><div>*Even if it takes uncertainty into consideration, a standard limit value is fulfilled.</div></div>
	Case2	<div><div></div><div></div><div>*Although measured value is in a standard limit value, a limit value won't be fulfilled if uncertainty is taken into consideration.</div></div>
FAIL	Case3	<div><div></div><div></div><div>*Although measured value exceeds a standard limit value, a limit value will be fulfilled if uncertainty is taken into consideration.</div></div>
	Case4	<div><div></div><div></div><div>*Even if it takes uncertainty into consideration, a standard limit value isn't fulfilled.</div></div>

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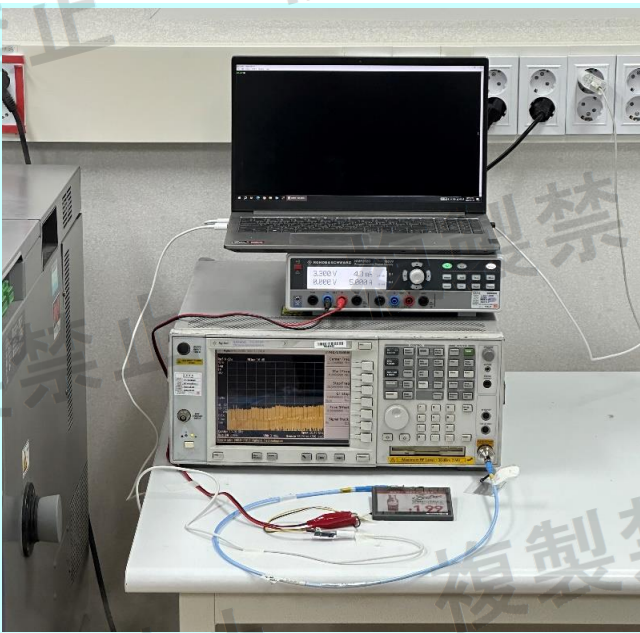
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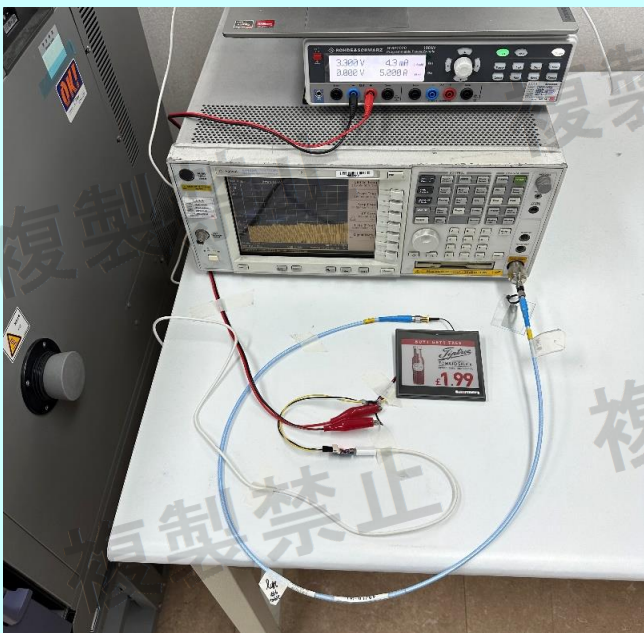
5. PHOTOGRAPHS

5 Test Conditions Photographs

Test Circuit Photo



Conducted Measurement Photo



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6. Antenna List Table

MAX VALUE ;	-0.68 dBi
-------------	-----------

ANTENNA			Gain Specification				NOTES ( Cable or Others )
No	Type	Model Name	Max Gain (dBi)	Polarization (H or V)	Attenuation (dB)	Net Gain (dBi)	
1	PCB	4seils ANT #3	-0.68	Horizontal	0	-0.680	
2			0	Horizontal	0	0.000	
3			0	Horizontal	0	0.000	
4			0	Horizontal	0	0.000	
5			0	Horizontal	0	0.000	
6			0	Horizontal	0	0.000	
7			0	Horizontal	0	0.000	
8			0	Horizontal	0	0.000	
9			0	Horizontal	0	0.000	
10			0	Horizontal	0	0.000	
11			0	Horizontal	0	0.000	
12			0	Horizontal	0	0.000	
13			0	Horizontal	0	0.000	
14			0	Horizontal	0	0.000	
15			0	Horizontal	0	0.000	
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30			0	Horizontal	0	0.000	
31			0	Horizontal	0	0.000	
32			0	Horizontal	0	0.000	
33			0	Horizontal	0	0.000	
34			0	Horizontal	0	0.000	
35			0	Horizontal	0	0.000	
36			0	Horizontal	0	0.000	
37			0	Horizontal	0	0.000	
38			0	Horizontal	0	0.000	
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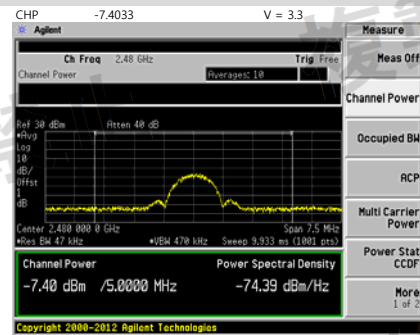
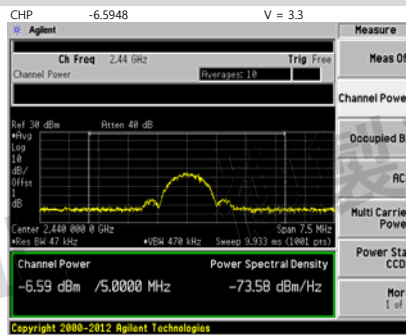
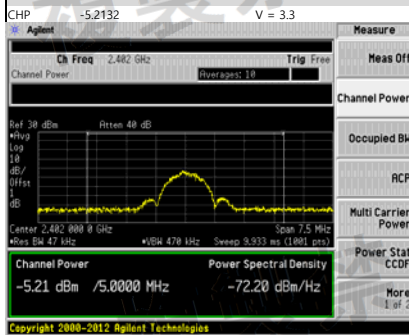
If the equipment has more than two transmission chains (such like MIMO), the antenna combination should be considered not to exceed the limit of total EIRP.

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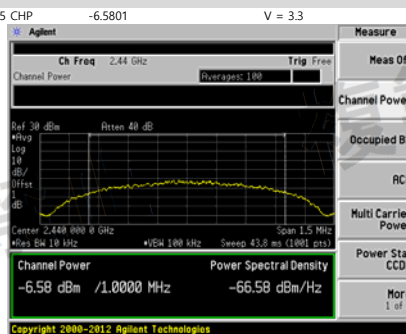
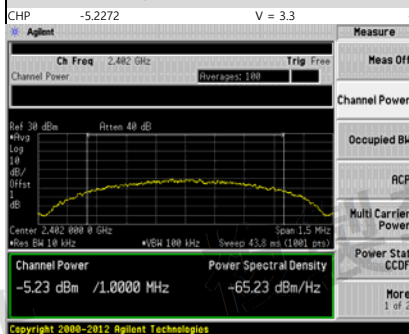
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# High Voltage

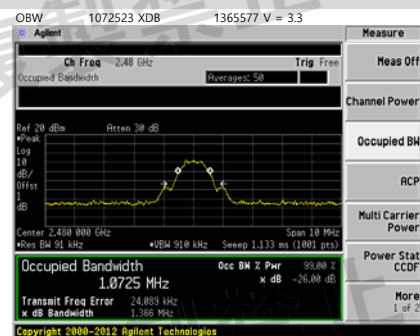
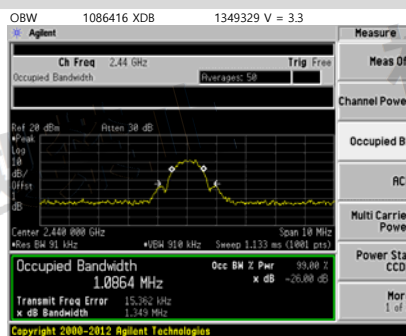
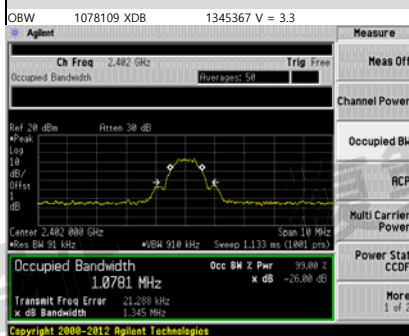
Channel Power / 5 MHz



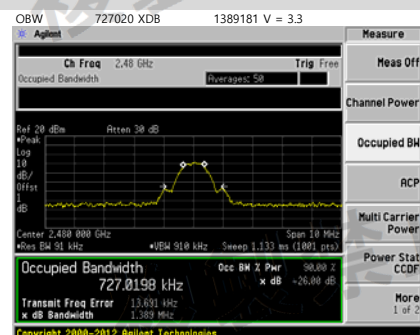
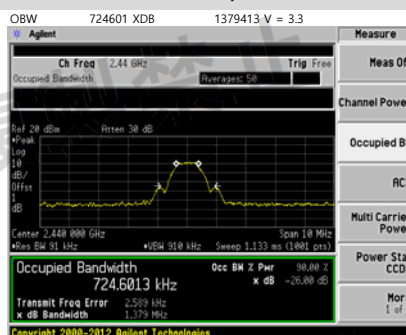
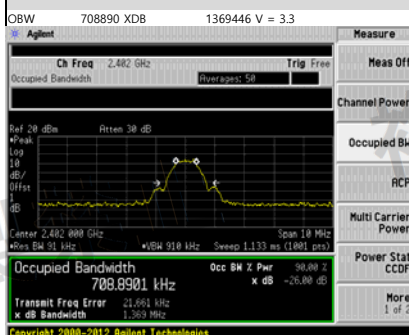
Channel Power / 1 MHz



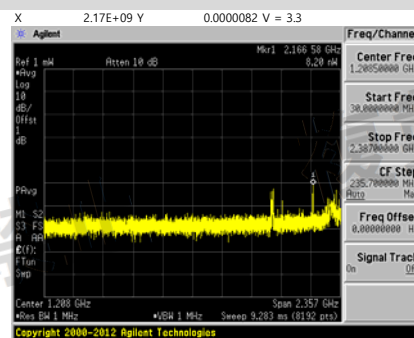
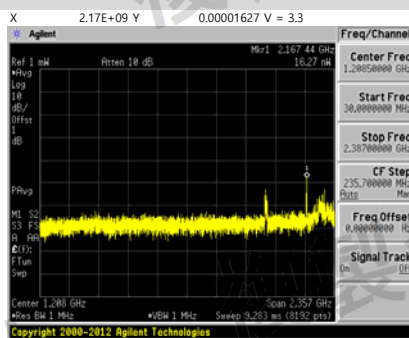
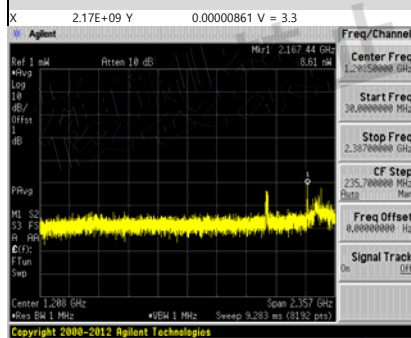
OBW / 99%



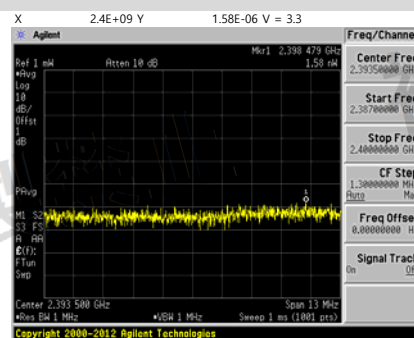
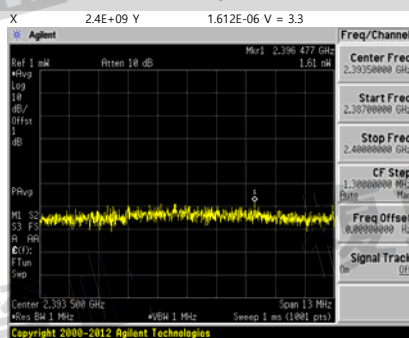
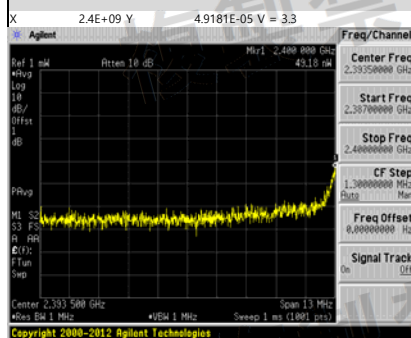
OBW / 90%



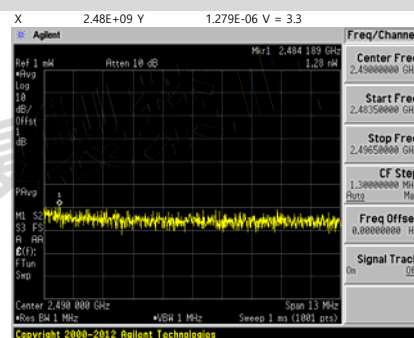
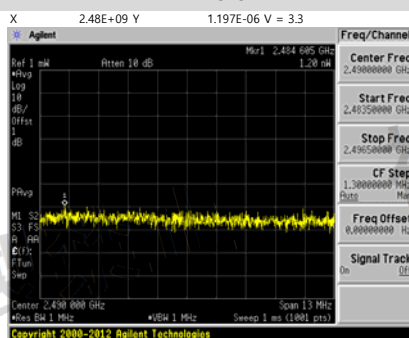
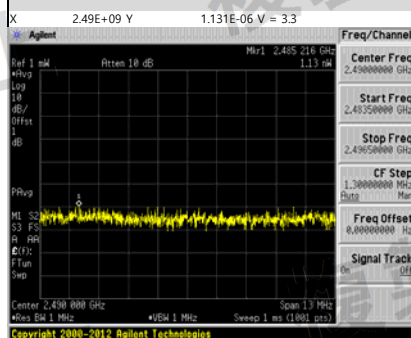
## SP1



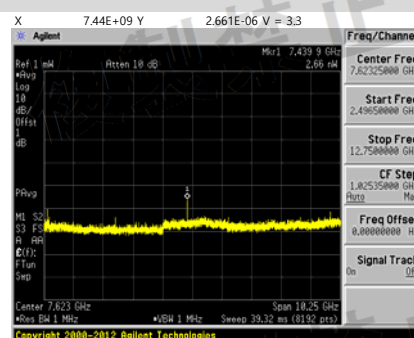
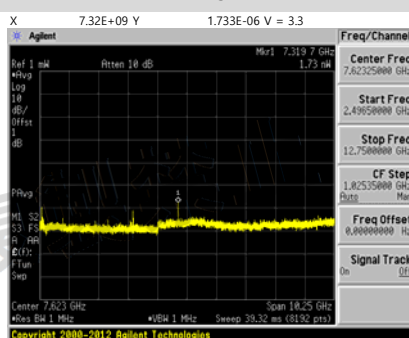
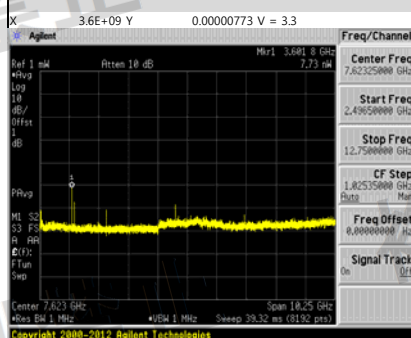
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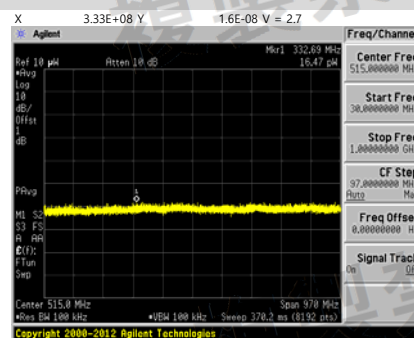
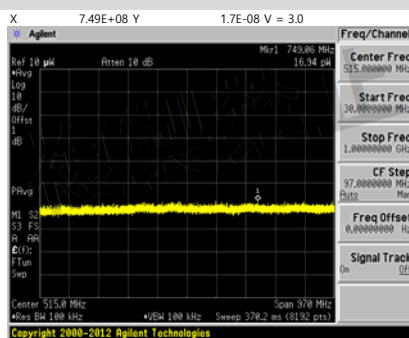
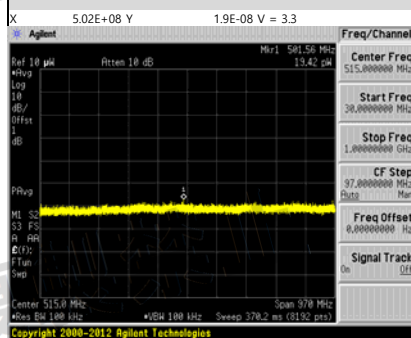
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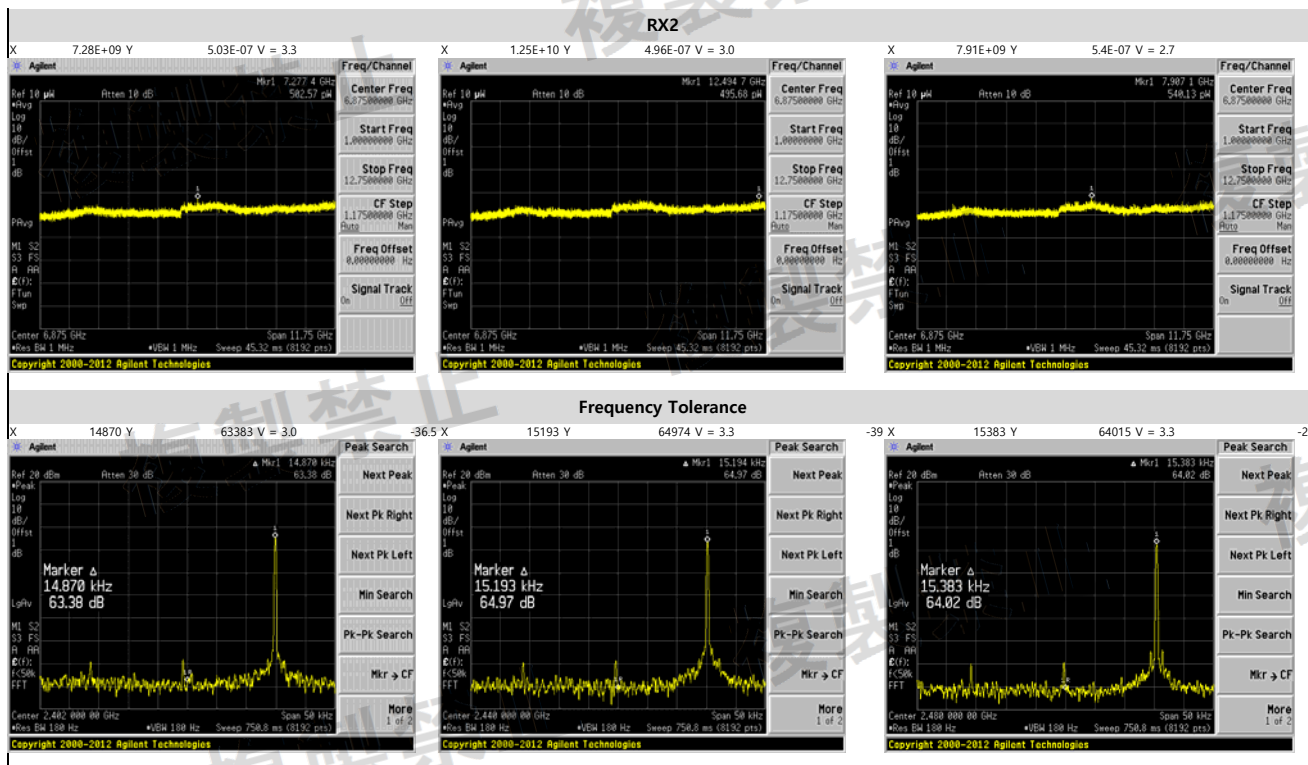
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## RX1



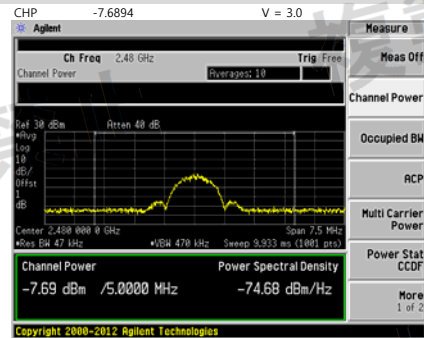
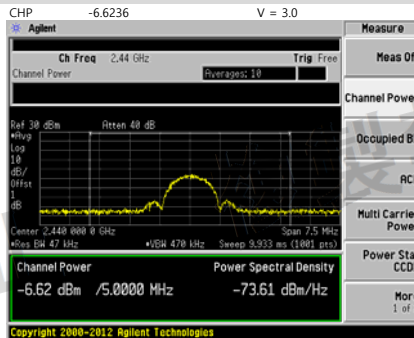
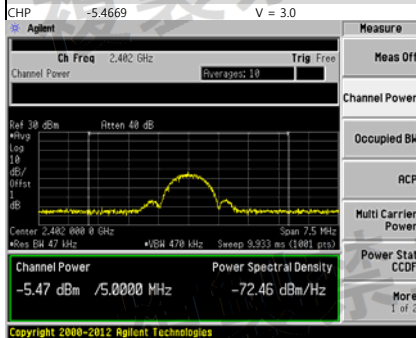




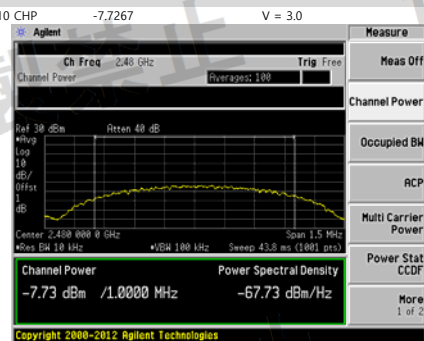
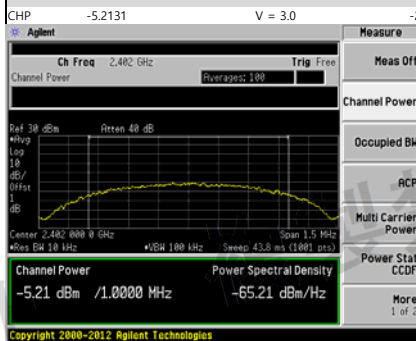


# Rated Voltage

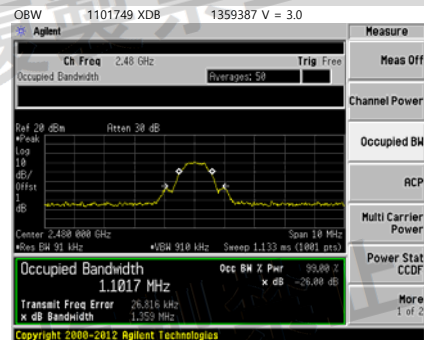
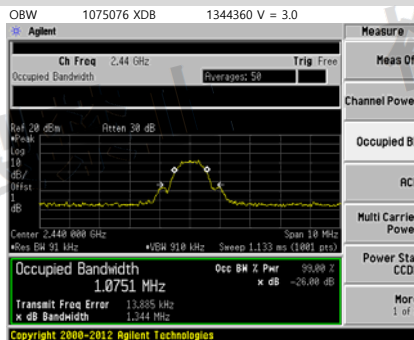
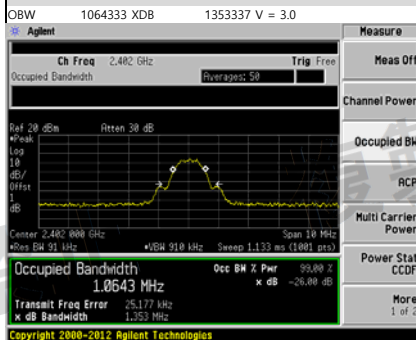
## Channel Power / 5 MHz



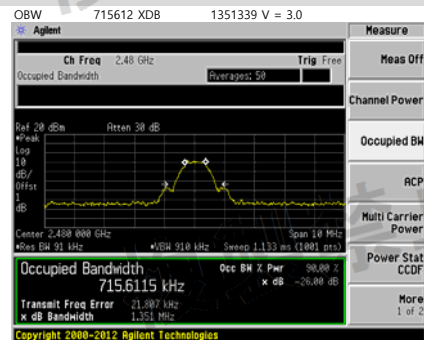
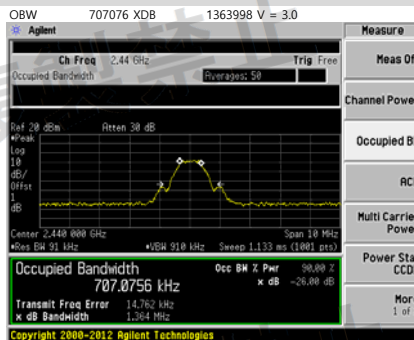
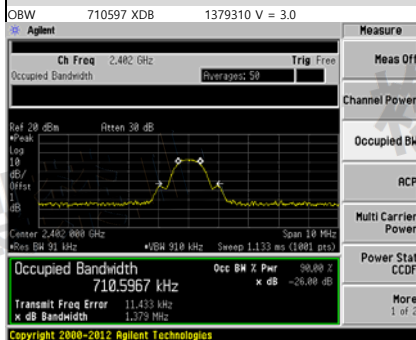
## Channel Power / 1 MHz

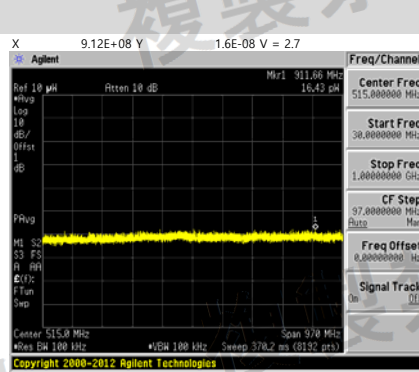
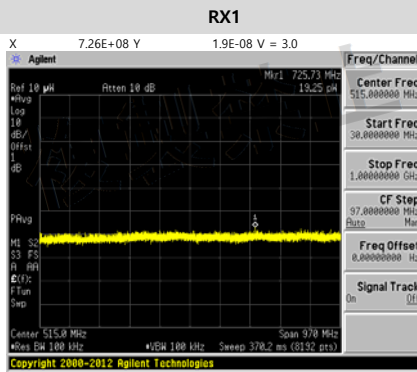
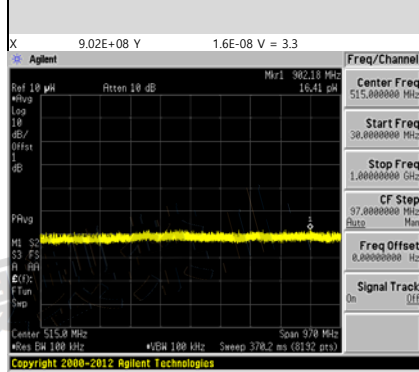
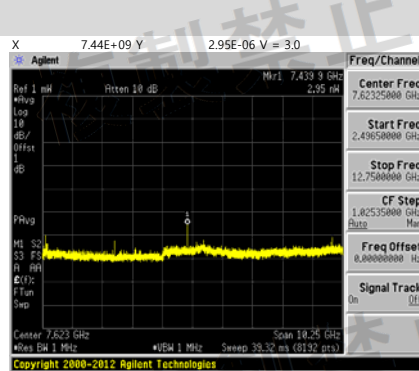
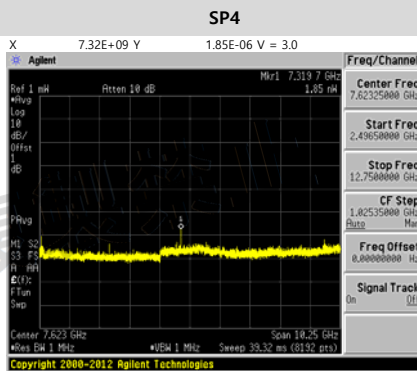
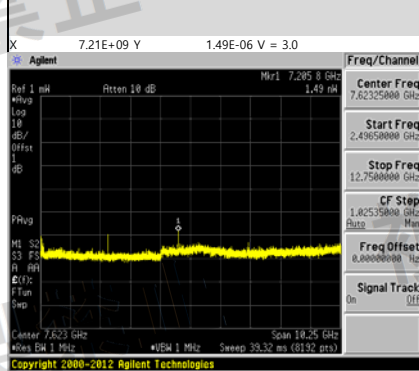
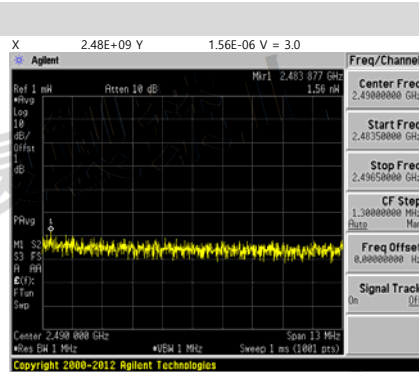
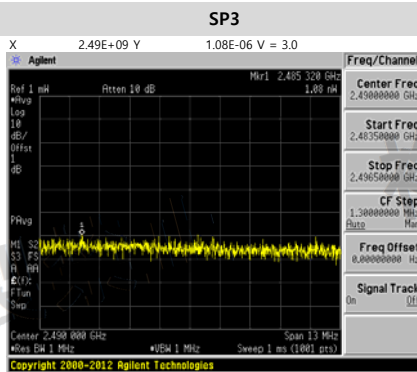
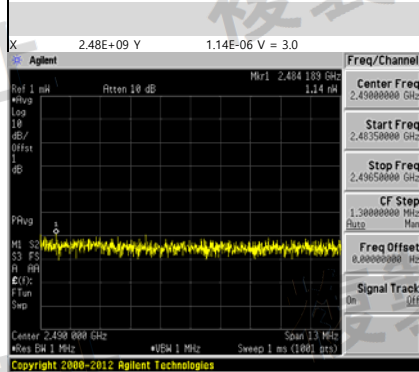
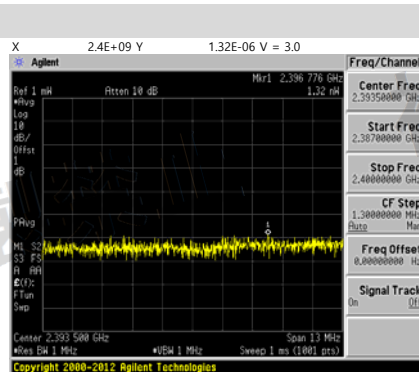
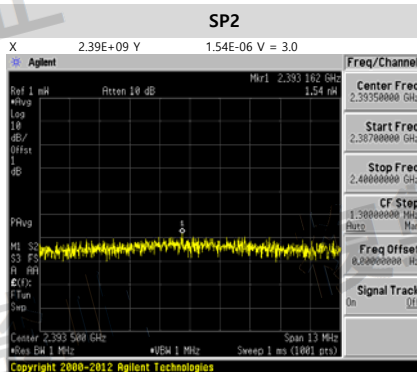
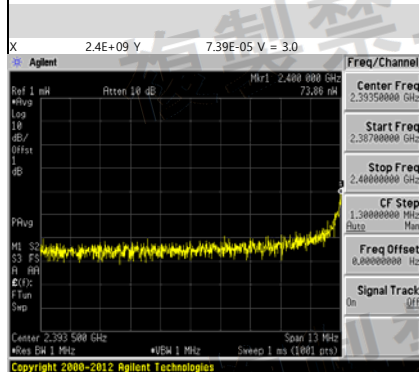
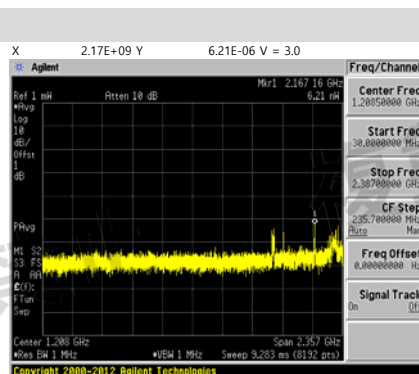
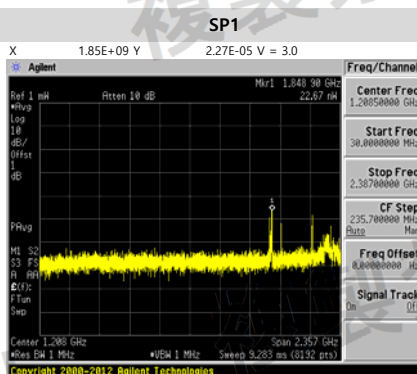
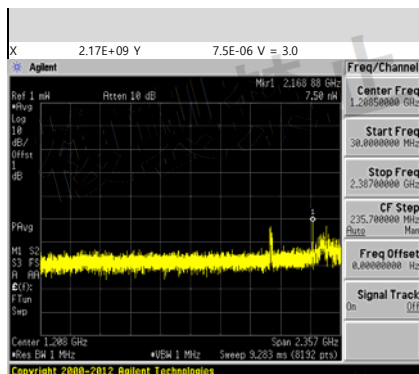


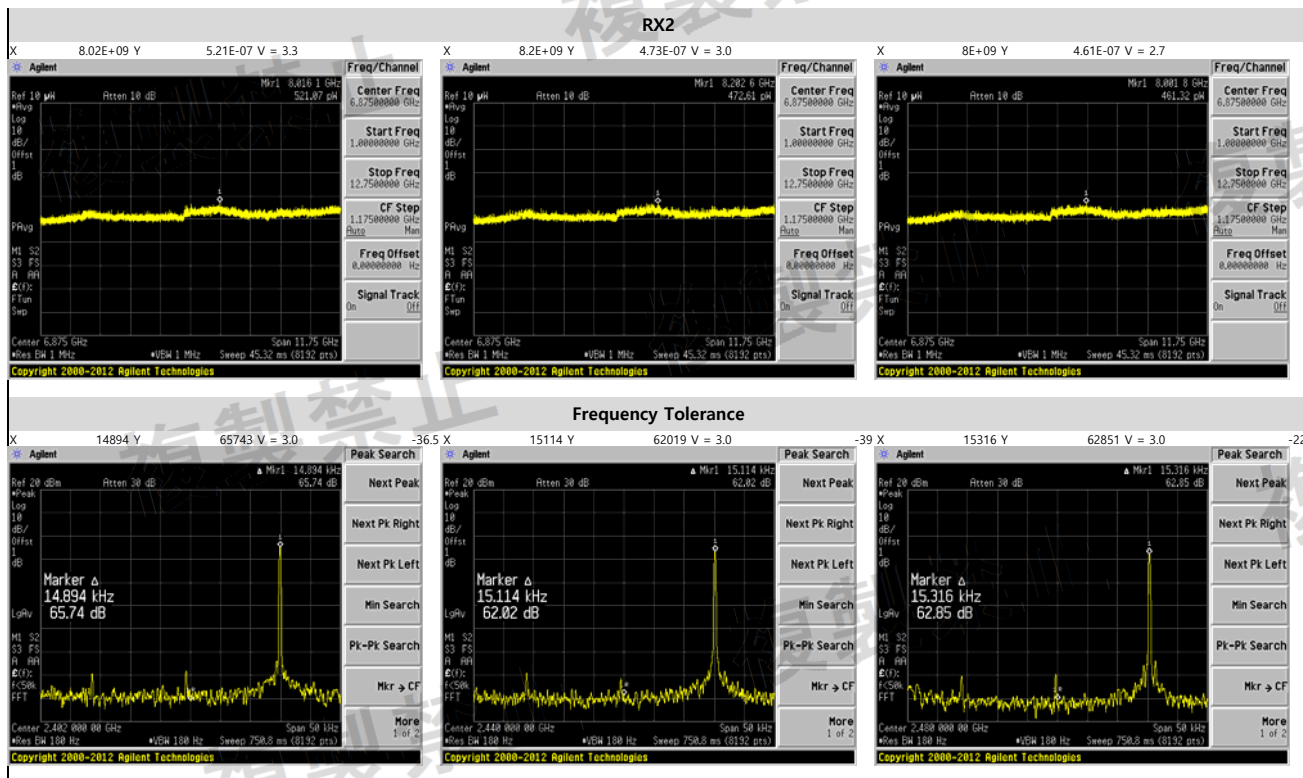
## OBW / 99%



## OBW / 90%

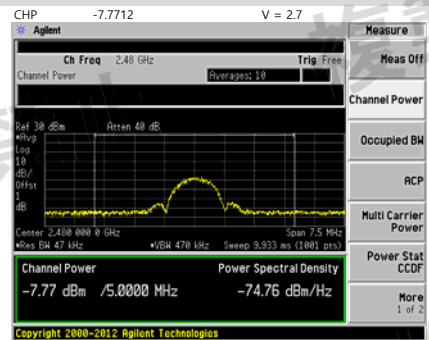
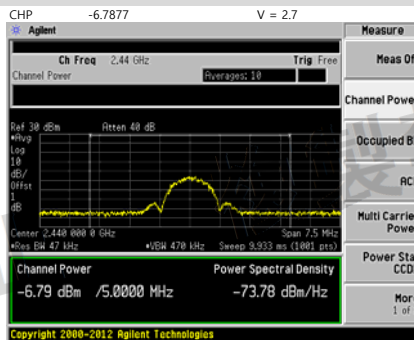
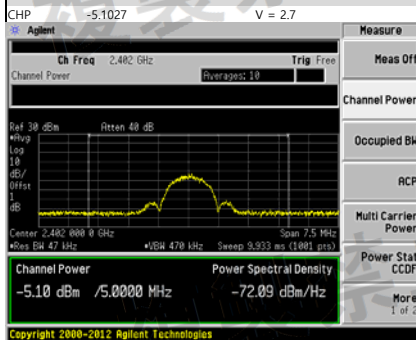




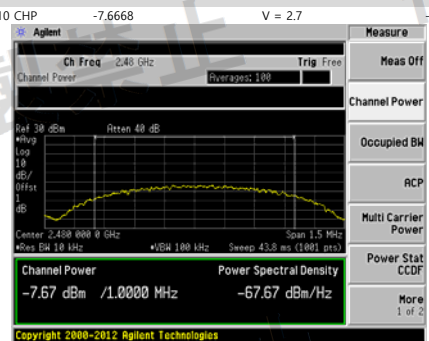
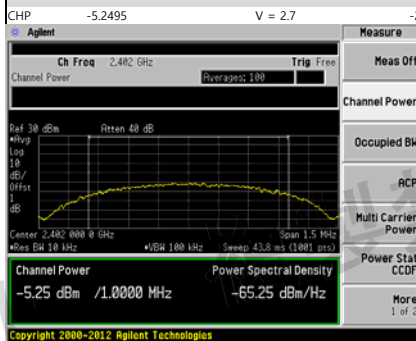


# Low Voltage

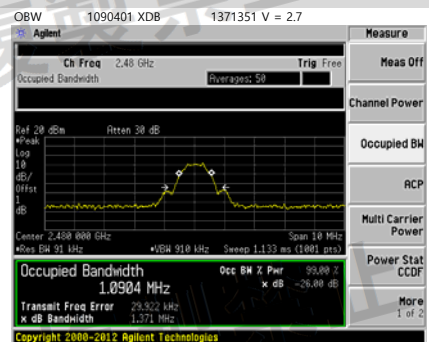
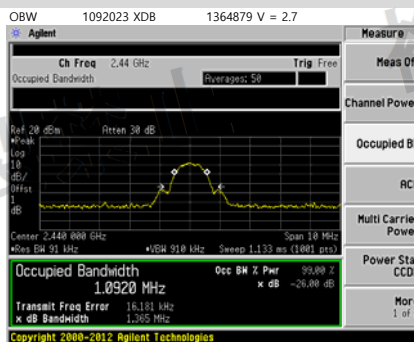
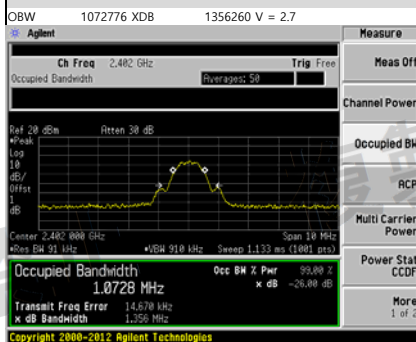
## Channel Power / 5 MHz



## Channel Power / 1 MHz



## OBW / 99%



## OBW / 90%

