

2.4GHz Wideband Low Power Data Communication System Test Report

Product Name	Humly Room Display One
Model No.	HUM1001

Applicant	Certus Eiger Ltd.
Address	814, Houston Center, Mody Road, TST East Kowloon, Hong Kong

Date of Receipt	Oct. 16, 2020
Issued Date	Dec. 21, 2020
Report No.	20A0401R-E3032140405
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test Report

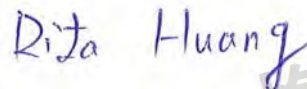
Issued Date: Dec. 21, 2020

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Product Name	Humly Room Display One
Applicant	Certus Eiger Ltd.
Address	814, Houston Center, Mody Road, TST East Kowloon, Hong Kong
Manufacturer	Certus Eiger Ltd.
Model No.	HUM1001
EUT Rated Voltage	AC 100-240V, 50/60Hz
EUT Test Voltage	AC 100V/50Hz
Trade Name	Humly
Test Method	Public notice of MIC No.88 test method of specified radio equipment (January 26, 2004) Annex43. Article 2 paragraph 1 item 19
Test Result	Complied

Documented By :



(Senior Adm. Specialist / Rita Huang)

Tested By :



(Engineer / Yunche Chen)

Approved By :



(Director / Vincent Lin)

TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION	6
1.1. EUT Description	6
1.2. Operation Description	8
1.3. EUT Exercise Software	9
1.4. Parament of test software setting	9
1.5. Test Conditions	9
1.6. RF and IF section must be tamper requirement	10
1.7. Test Facility	11
1.8. List of Test Equipment	12
1.9. Uncertainty	13
2. Output Power Density 、Output Power Density Tolerance and E.I.R.P	14
2.1. Test Setup	14
2.2. Limits	14
2.3. Test Procedure	14
2.4. Test Result of Output Power Density 、Output Power Density Tolerance and E.I.R.P	15
3. Spread Bandwidth and Spread Factor	21
3.1. Test Setup	21
3.2. Test Procedure	21
3.3. Limits	22
3.4. Test Result of Spread Bandwidth and Spread Factor	23
4. Occupied Bandwidth	35
4.1. Test Setup	35
4.2. Test Procedure	36
4.3. Limits	36
4.4. Test Result of Occupied Bandwidth	37
5. Frequency Tolerance	43
5.1. Test Setup	43
5.2. Test Procedure	43
5.3. Limits	43
5.4. Test Result of Frequency Tolerance	44
6. Dwell Time	56

6.1. Test Setup.....	56
6.2. Test Procedure.....	57
6.3. Limits	57
6.4. Test Result of Dwell Time and Burst Ratio	58
7. Transmitter Suprious Emissions.....	64
7.1. Test Setup.....	64
7.2. Test Procedure.....	64
7.3. Limits	64
7.4. Test Result of Transmitter Spurious Emissions	65
8. Receiver Suprious Emissions.....	89
8.1. Test Setup.....	89
8.2. Test Procedure.....	89
8.3. Limits	89
8.4. Test Result of Receiver Spurious Emissions.....	90
9. EMI Reduction Method During Compliance Testing	108
Attachment 1: EUT Test Photographs	
Attachment 2: EUT Detailed Photographs - External	
Attachment 3: EUT Detailed Photographs - Internal	

Revision History

Report No.	Version	Description	Issued Date
20A0401R-E3032140405	V1.0	Initial issue of report.	2020-12-21

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Humly Room Display One
Trade Name	Humly
Model No.	HUM1001
SERIAL NUMBER	CC:4B:73:AE:86:38
Frequency Range	2402-2480MHz
Type of Modulation	FHSS: GFSK(1Mbps) / π /4DQPSK(2Mbps) / 8DPSK(3Mbps)
Antenna Type	PIFA Antenna
Number of Channels	79
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto
Declared Output Power	Normal operation (79 channel): 0.029mW/MHz AFH operation (20 channel): 0.115 mW/MHz

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	ANJIE	AJDQ1J-B0027 (Main), AJDQ1J-W0020 (Aux)	PIFA Antenna	2.17dBi for 2.4GHz

Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00:	2402 MHz	Channel 20:	2422 MHz	Channel 40:	2442 MHz	Channel 60:	2462 MHz
Channel 01:	2403 MHz	Channel 21:	2423 MHz	Channel 41:	2443 MHz	Channel 61:	2463 MHz
Channel 02:	2404 MHz	Channel 22:	2424 MHz	Channel 42:	2444 MHz	Channel 62:	2464 MHz
Channel 03:	2405 MHz	Channel 23:	2425 MHz	Channel 43:	2445 MHz	Channel 63:	2465 MHz
Channel 04:	2406 MHz	Channel 24:	2426 MHz	Channel 44:	2446 MHz	Channel 64:	2466 MHz
Channel 05:	2407 MHz	Channel 25:	2427 MHz	Channel 45:	2447 MHz	Channel 65:	2467 MHz
Channel 06:	2408 MHz	Channel 26:	2428 MHz	Channel 46:	2448 MHz	Channel 66:	2468 MHz
Channel 07:	2409 MHz	Channel 27:	2429 MHz	Channel 47:	2449 MHz	Channel 67:	2469 MHz
Channel 08:	2410 MHz	Channel 28:	2430 MHz	Channel 48:	2450 MHz	Channel 68:	2470 MHz
Channel 09:	2411 MHz	Channel 29:	2431 MHz	Channel 49:	2451 MHz	Channel 69:	2471 MHz
Channel 10:	2412 MHz	Channel 30:	2432 MHz	Channel 50:	2452 MHz	Channel 70:	2472 MHz
Channel 11:	2413 MHz	Channel 31:	2433 MHz	Channel 51:	2453 MHz	Channel 71:	2473 MHz
Channel 12:	2414 MHz	Channel 32:	2434 MHz	Channel 52:	2454 MHz	Channel 72:	2474 MHz
Channel 13:	2415 MHz	Channel 33:	2435 MHz	Channel 53:	2455 MHz	Channel 73:	2475 MHz
Channel 14:	2416 MHz	Channel 34:	2436 MHz	Channel 54:	2456 MHz	Channel 74:	2476 MHz
Channel 15:	2417 MHz	Channel 35:	2437 MHz	Channel 55:	2457 MHz	Channel 75:	2477 MHz
Channel 16:	2418 MHz	Channel 36:	2438 MHz	Channel 56:	2458 MHz	Channel 76:	2478 MHz
Channel 17:	2419 MHz	Channel 37:	2439 MHz	Channel 57:	2459 MHz	Channel 77:	2479 MHz
Channel 18:	2420 MHz	Channel 38:	2440 MHz	Channel 58:	2460 MHz	Channel 78:	2480 MHz
Channel 19:	2421 MHz	Channel 39:	2441 MHz	Channel 59:	2461 MHz		

Note:

1. The EUT is a Humly Room Display One with built-in WLAN (802.11a/b/g/n/ac) and Bluetooth (5.0 and V3.0+HS, V2.1+EDR) transceiver, this report for Bluetooth (V3.0+HS, V2.1+EDR).

1.2. Operation Description

The EUT is a Humly Room Display One with built-in 2.4GHz Bluetooth V2.1+EDR transceiver. The number of the channels is 79 in 2402-2480MHz. This device provides three kinds of transmitting speed and modulation, respectively GFSK(1Mbps) / π / 4DQPSK(2Mbps) / 8DPSK(3Mbps). The antenna is PIFA antenna and provides diversity function to improve the receiving function.

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. The transmitter is presented with a continuous data stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its 79 channels and over the minimum number of hopping channels (75 channels).

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted.

The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Test Mode	Mode 1: Transmitter-Normal-1Mbps
	Mode 2: Transmitter-Normal-2Mbps
	Mode 3 :Transmitter-Normal-3Mbps
	Mode 4: Transmitter-AFH-1Mbps
	Mode 5: Transmitter-AFH-2Mbps
	Mode 6: Transmitter-AFH-3Mbps
	Mode 7: Receiver-Normal-1Mbps
	Mode 8: Receiver-Normal-2Mbps
	Mode 9: Receiver-Normal-3Mbps
	Mode 10: Receiver-AFH-1Mbps
	Mode 11: Receiver-AFH-2Mbps
	Mode 12: Receiver-AFH-3Mbps

1.3. EUT Exercise Software

- (1) Execute software “Cmd” on the EUT.
- (2) Configure the test mode, the test channel, and the data rate.
- (3) Press “OK” to start the continuous Transmit.
- (4) Verify that the EUT works properly.

1.4. Parament of test software setting

The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Normal mode

Test Software	Cmd		
Frequency	2402MHz	2441MHz	2480MHz
GFSK	default	default	default
$\pi/4$ DQPSK	default	default	default
8DPSK	default	default	default

AFH mode

Test Software	Cmd		
Frequency	2402MHz	2411MHz	2421MHz
GFSK	default	default	default
$\pi/4$ DQPSK	default	default	default
8DPSK	default	default	default

1.5. Test Conditions

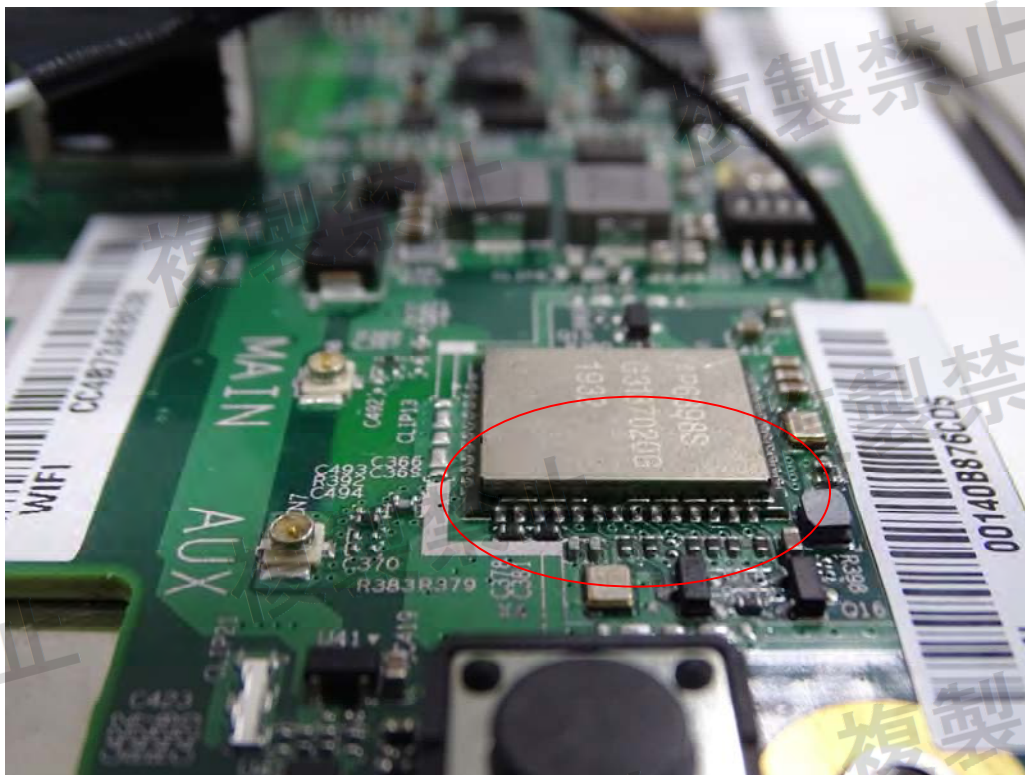
Voltage Test Item	Test Voltage	Voltage meter reading value (RF Chip pin 34)
Nominal Voltage	DC 1.7V	1.7V DC
Highest Voltage	DC 1.87V	1.7V DC
Lowest Voltage	DC 1.53V	1.7V DC

Note: 1. The Voltage supply for RF Chip pin 34 is 1.7 VDC.

2. The internal supply gives a fluctuation value less than 1 % (**Around 0% from max. to min.**)

1.6. RF and IF section must be tamper requirement

Requirement	Comments	Result
RF, IF and Modulation section must be tamper	☐ Use Special Screw ☒ Metal Shielding is Soldered (Please see Attachment: EUT Detailed Photographs) ☐ Use Ball Grid Array (BGA)	Complete
	☒ RF module/Chip pin >10 ☒ RF module/Chip pins distance <1.5mm (Please see mechanism photograph)	Complete



1.7. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Conductive	Temperature (°C)	15~35 °C	25°C
	Humidity (%RH)	20~75 %	74%

Site Description : Accredited by TAF
Accredited Number: 3023

Test Laboratory : DEKRA Testing and Certification Co., Ltd
Address : No.159, Sec. 2, Wenhua 1st Rd., Linkou Dist.,
New Taipei City 24457, Taiwan, R.O.C.

Phone number : 886-2-2602-7968
Fax number : 866-2-2602-3286
Email address : info.tw@dekra.com
Website : <http://www.dekra.com.tw>

1.8. List of Test Equipment

For Conducted measurements /ASR3

	Equipment	Manufacturer	Model No./ Serial No.	Calibrated	Cal. Method	Cali. Data	Due. Data
X	EXA Signal Analyzer	Keysight	N9010B /MY59071415	ETC	*(c)	2020.08.15	2021.08.14
X	Power Meter	Anritsu	ML2496A/ 1739004	ETC	*(c)	2020.04.20	2021.04.19
X	Power Sensor	Anritsu	MA2411B/ 1726078	ETC	*(c)	2020.04.20	2021.04.19
X	Power Sensor	Anritsu	MA2411B / 1726079	ETC	*(c)	2020.04.20	2021.04.19
X	Vector Signal Generator	R&S	SMBV100 / 261871	ETC	*(c)	2020.03.19	2021.03.18
	D.C.POWER SUPPLY	GW Instek	SPD-3606 / GEQ820915	ETC	*(c)	2020.06.22	2021.06.21

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : DEKRA Conduction Test SystemV9.0.5.
4.
 - 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 agency under Article 102-18 paragraph (1).
 - d) Calibration conducted by using measuring instruments and other equipment listed in the right column of Table No. 3 attached hereto, which shall have been given any of calibration, etc. listed above from a) to c).

1.9. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document, and is described in each test chapter of this report.

The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

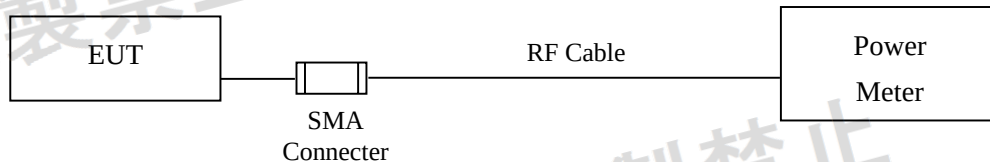
Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test item	Uncertainty	
Output Power Density · Output Power Density Tolerance and E.I.R.P	Power Meter ±0.91 dB	Spectrum Analyzer ±2.53 dB
Spread Bandwidth and Spread Factor	±682.83 Hz	
Occupied Bandwidth	±682.83 Hz	
Frequency Tolerance	±682.83 Hz	
Dwell Time	±2.31 ms	
Transmitter Suprious Emissions	±2.53 dB	
Receiver Suprious Emissions	±2.53 dB	

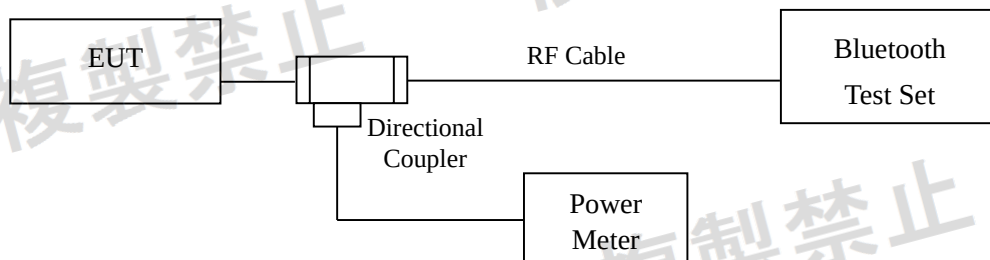
2. Output Power Density 、Output Power Density Tolerance and E.I.R.P

2.1. Test Setup

- ☒ Use the program to control transmitter



- ☐ Use the Bluetooth Test Set to control transmitter



2.2. Limits

Output Power must be 3mW/MHz or less.

Output Power Tolerance: +20% to -80%

E.I.R.P. must be 6.9112dBm/MHz or less or 16.9112dBm/MHz.

2.3. Test Procedure

- Measure the total power by Power Meter in a state of hopping mode (with Average Sensor).
- If it's the burst wave, please measure the burst ratio. Then calculate the real total power by burst ratio.
- Calculate the mean power per 1MHz by dividing the total power by spread bandwidth.

2.4. Test Result of Output Power Density 、Output Power Density Tolerance and E.I.R.P

Product : Humly Room Display One
 Test Item : Output Power Density 、Output Power Density Tolerance and E.I.R.P
 Test Date : 2020/12/03
 Test Mode : Mode 1: Transmitter-Normal-1Mbps

Output Power Density

Test Conditions		Frequency (MHz)	Reading Value (dBm)	Real Value (mW/MHz)	Limit (mW/MHz)
--	--	--	--	--	--
Tnom (25 °C)	Vnom (100VAC)	2441	-0.36	0.0168	3
--	--	--	--	--	--

Note: Reading Value= power meter reading value
 Real Value= $10^{(\text{Reading value (dBm)/10})}$ / Burst Ratio/ Spread bandwidth (MHz)

Output Power Density Tolerance

Frequency (MHz)	Declared Output Power (mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit (mW/MHz)
--	--	--	--	+20% to -80%
2441	0.029	0.0168	-42.19	+20% to -80%
--	--	--	--	+20% to -80%

Note: Deviation = (Output Power Density - Declared Output Power) / Declared Output Power * 100%

E.I.R.P

Maximum Antenna Gain= 0.1 dBi					
Test Conditions		Frequency (MHz)	Output Power (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
--	--	--	--	--	--
Tnom (25 °C)	Vnom (100VAC)	2441	-17.756	-15.586	6.911
--	--	--	--	--	--

Note: Real Value= Output Power Density + Antenna Max Gain (dBi)

Product : Humly Room Display One
 Test Item : Output Power Density 、 Output Power Density Tolerance and E.I.R.P
 Test Date : 2020/12/03
 Test Mode : Mode 2: Transmitter-Normal-2Mbps

Output Power Density

Test Conditions		Frequency (MHz)	Reading Value (dBm)	Real Value (mW/MHz)	Limit (mW/MHz)
--	--	--	--	--	--
Tnom (25 °C)	Vnom (100VAC)	2441	1.21	0.0241	3
--	--	--	--	--	--

Note: Reading Value= power meter reading value
 Real Value= $10^{(\text{Reading value (dBm)}/10)}$ / Burst Ratio/ Spread bandwidth (MHz)

Output Power Density Tolerance

Frequency (MHz)	Declared Output Power (mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit (mW/MHz)
--	--	--	--	+20% to -80%
2441	0.029	0.0241	-16.77	+20% to -80%
--	--	--	--	+20% to -80%

Note: Deviation = (Output Power Density - Declared Output Power) / Declared Output Power * 100%

E.I.R.P

Maximum Antenna Gain= 0.1 dBi					
Test Conditions		Frequency (MHz)	Output Power (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
--	--	--	--	--	--
Tnom (25 °C)	Vnom (100VAC)	2441	-16.173	-14.0031	6.911
--	--	--	--	--	--

Note: Real Value= Output Power Density + Antenna Max Gain (dBi)

Product : Humly Room Display One
 Test Item : Output Power Density 、 Output Power Density Tolerance and E.I.R.P
 Test Date : 2020/12/03
 Test Mode : Mode 3 :Transmitter-Normal-3Mbps

Output Power Density

Test Conditions		Frequency (MHz)	Reading Value (dBm)	Real Value (mW/MHz)	Limit (mW/MHz)
--	--	--	--	--	--
Tnom (25 °C)	Vnom (100VAC)	2441	0.79	0.0219	3
--	--	--	--	--	--

Note: Reading Value= power meter reading value
 Real Value= $10^{(\text{Reading value (dBm)}/10)}$ / Burst Ratio/ Spread bandwidth (MHz)

Output Power Density Tolerance

Frequency (MHz)	Declared Output Power (mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit (mW/MHz)
--	--	--	--	+20% to -80%
2441	0.029	0.029	-24.39	+20% to -80%
--	--	--	--	+20% to -80%

Note: Deviation = (Output Power Density - Declared Output Power) / Declared Output Power * 100%

E.I.R.P

Maximum Antenna Gain= 0.1 dBi					
Test Conditions		Frequency (MHz)	Output Power (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
--	--	--	--	--	--
Tnom (25 °C)	Vnom (100VAC)	2441	-16.590	-14.4200	6.911
--	--	--	--	--	--

Note: Real Value= Output Power Density + Antenna Max Gain (dBi)

Product : Humly Room Display One
 Test Item : Output Power Density 、Output Power Density Tolerance and E.I.R.P
 Test Date : 2020/12/03
 Test Mode : Mode 4: Transmitter-AFH-1Mbps

Output Power Density

Test Conditions		Frequency (MHz)	Reading Value (dBm)	Real Value (mW/MHz)	Limit (mW/MHz)
--	--	--	--	--	--
Tnom (25 °C)	Vnom (100VAC)	2411	-0.43	0.0652	3
--	--	--	--	--	--

Note: Reading Value= power meter reading value

Real Value= $10^{(\text{Reading value (dBm)}/10)}$ / Burst Ratio/ Spread bandwidth (MHz)

Output Power Density Tolerance

Frequency (MHz)	Declared Output Power (mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit (mW/MHz)
--	--	--	--	+20% to -80%
2411	0.115	0.0652	-43.29	+20% to -80%
--	--	--	--	+20% to -80%

Note: Deviation = (Output Power Density - Declared Output Power) / Declared Output Power * 100%

E.I.R.P

Maximum Antenna Gain= 0.1 dBi

Test Conditions		Frequency (MHz)	Reading Value (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
--	--	--	--	--	--
Tnom (25 °C)	Vnom (100VAC)	2411	-11.856	-9.6862	6.911
--	--	--	--	--	--

Note: Real Value= Output Power+ Antenna Max Gain (dBi)

Product : Humly Room Display One
 Test Item : Output Power Density 、Output Power Density Tolerance and E.I.R.P
 Test Date : 2020/12/03
 Test Mode : Mode 5: Transmitter-AFH-2Mbps

Output Power Density

Test Conditions		Frequency (MHz)	Reading Value (dBm)	Real Value (mW/MHz)	Limit (mW/MHz)
--	--	--	--	--	--
Tnom (25 °C)	Vnom (100VAC)	2411	1.29	0.0962	3
--	--	--	--	--	--

Note: Reading Value= power meter reading value

Real Value= $10^{(\text{Reading value (dBm)}/10)}$ / Burst Ratio/ Spread bandwidth (MHz)

Output Power Density Tolerance

Frequency (MHz)	Declared Output Power (mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit (mW/MHz)
--	--	--	--	+20% to -80%
2411	0.115	0.0962	-16.31	+20% to -80%
--	--	--	--	+20% to -80%

Note: Deviation = (Output Power Density - Declared Output Power) / Declared Output Power * 100%

E.I.R.P

Maximum Antenna Gain= 0.1 dBi					
Test Conditions		Frequency (MHz)	Reading Value (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
--	--	--	--	--	--
Tnom (25 °C)	Vnom (100VAC)	2411	-10.166	-7.9962	6.911
--	--	--	--	--	--

Note: Real Value= Output Power+ Antenna Max Gain (dBi)

Product : Humly Room Display One
 Test Item : Output Power Density 、Output Power Density Tolerance and E.I.R.P
 Test Date : 2020/12/03
 Test Mode : Mode 6: Transmitter-AFH-3Mbps

Output Power Density

Test Conditions		Frequency (MHz)	Reading Value (dBm)	Real Value (mW/MHz)	Limit (mW/MHz)
--	--	--	--	--	--
Tnom (25 °C)	Vnom (100VAC)	2411	0.99	0.0894	3
--	--	--	--	--	--

Note: Reading Value= power meter reading value
 Real Value= $10^{(\text{Reading value (dBm)}/10)}$ / Burst Ratio/ Spread bandwidth (MHz)

Output Power Density Tolerance

Frequency (MHz)	Declared Output Power (mW/MHz)	Output Power (mW/MHz)	Tolerance (%)	Limit (mW/MHz)
--	--	--	--	+20% to -80%
2411	0.115	0.0894	-22.26	+20% to -80%
--	--	--	--	+20% to -80%

Note: Deviation = (Output Power Density - Declared Output Power) / Declared Output Power * 100%

E.I.R.P

Maximum Antenna Gain= 0.1 dBi					
Test Conditions		Frequency (MHz)	Reading Value (dBm/MHz)	Real Value (dBm/MHz)	Limit (dBm/MHz)
--	--	--	--	--	--
Tnom (25 °C)	Vnom (100VAC)	2411	-10.486	-8.3164	6.911
--	--	--	--	--	--

Note: Real Value= Output Power+ Antenna Max Gain (dBi)

Test Result	PASS
--------------------	------

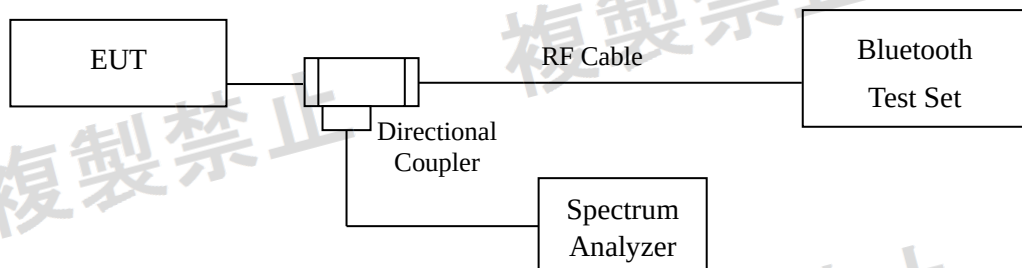
3. Spread Bandwidth and Spread Factor

3.1. Test Setup

☒ Use the program to control transmitter



☐ Use the Bluetooth Test Set to control transmitter



3.2. Test Procedure

A spectrum analyzer or similar device shall be used to observe a sample of the modulated transmitter's radio frequency power output.

- A positive peak detector function must be used.
- A measurement instrument with an integrated 90% power bandwidth function may be used to automate the test process.
- The measurement instrument bandwidth and span must be set sufficiently with, and, the scan time set sufficiently slow, to ensure all major modulation products are captured. Note that the measurement bandwidth should also be set sufficiently narrow to avoid adding significant error to the test result.
- 'Maximum Hold' mode may be used to accumulate the measurement result over several scans provided the emission is repetitive in nature.

3.3. Limits

Spread Bandwidth ≥ 500 kHz

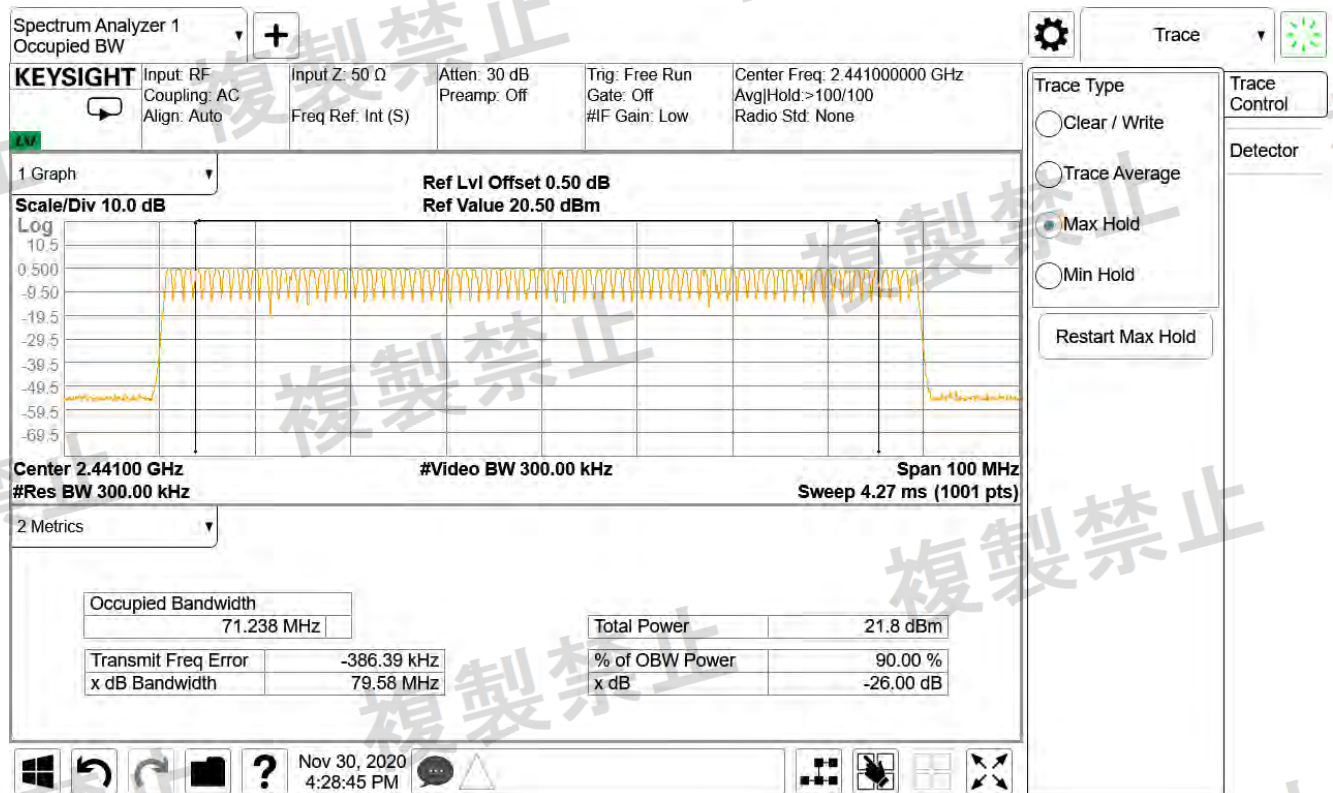
Spread Factor ≥ 5 for 2400 – 2483.5 MHz, ≥ 10 for 2471 – 2497 MHz

3.4. Test Result of Spread Bandwidth and Spread Factor

Product : Humly Room Display One
 Test Item : Spread Bandwidth
 Test Mode : Mode 1: Transmitter-Normal-1Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Limit (kHz)
--	--	--	--	≥ 500
Tnom (25 °C)	Vnom (100VAC)	2441	71.238	≥ 500
--	--	--	--	≥ 500

2441MHz



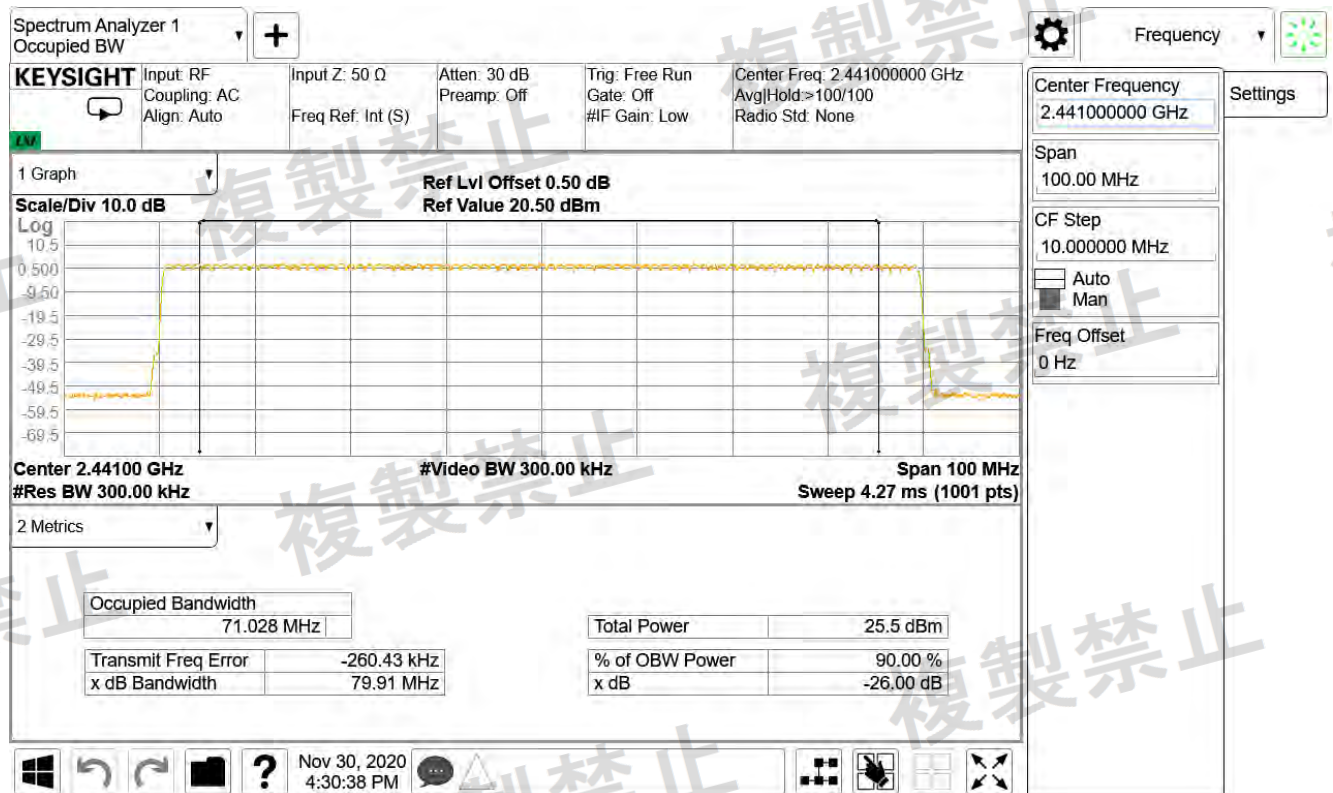
Product : Humly Room Display One
Test Item : Spread Factor
Test Mode : Mode 1: Transmitter-Normal-1Mbps

Test Conditions		Frequency (MHz)	Spread Bandwidth / 1	Limit
--	--	--	--	≥ 5
Tnom (25 °C)	Vnom (100VAC)	2441	71.238	≥ 5
--	--	--	--	≥ 5

Product : Humly Room Display One
 Test Item : Spread Bandwidth
 Test Mode : Mode 2: Transmitter-Normal-2Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Limit (kHz)
--	--	--	--	>= 500
Tnom (25 °C)	Vnom (100VAC)	2441	71.028	>= 500
--	--	--	--	>= 500

2441MHz



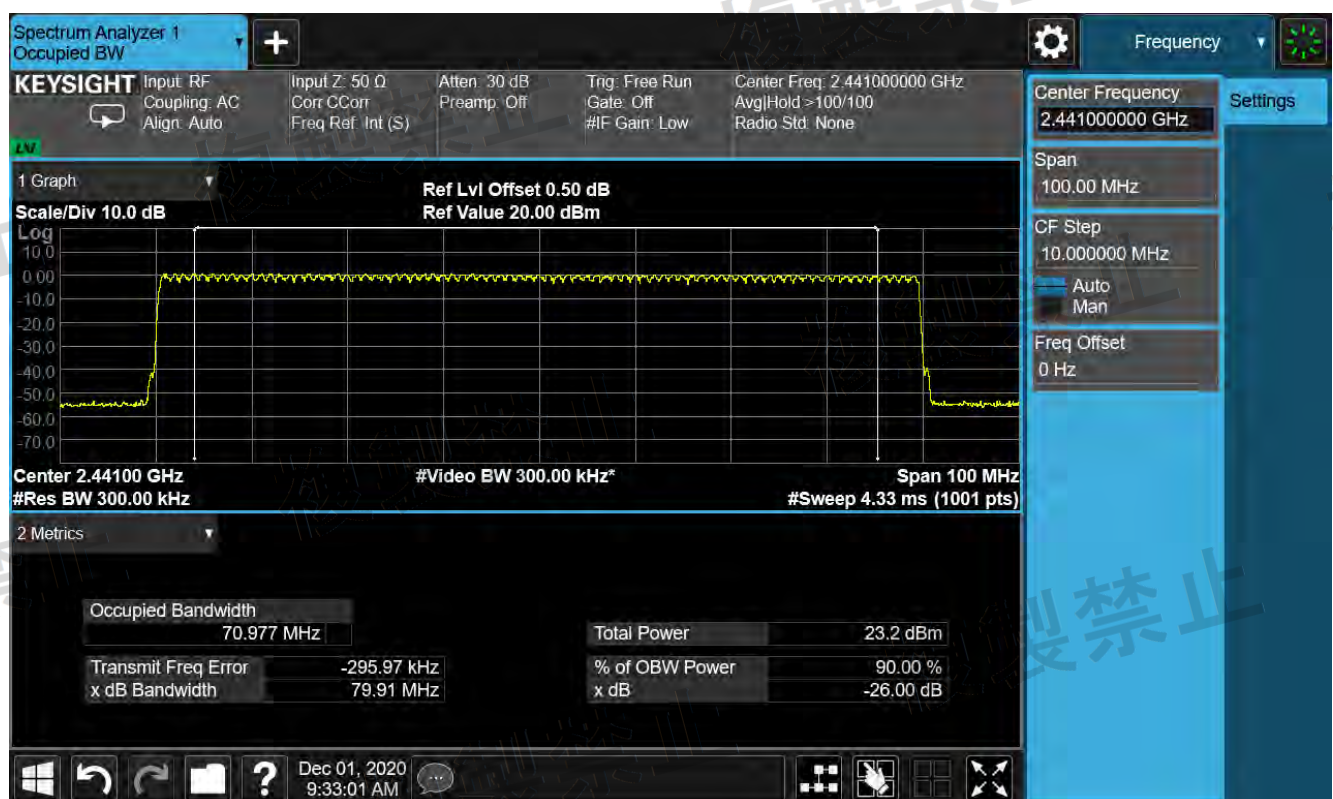
Product : Humly Room Display One
Test Item : Spread Factor
Test Mode : Mode 2: Transmitter-Normal-2Mbps

Test Conditions		Frequency (MHz)	Spread Bandwidth / 1	Limit
--	--	--	--	≥ 5
Tnom (25 °C)	Vnom (100VAC)	2441	71.028	≥ 5
--	--	--	--	≥ 5

Product : Humly Room Display One
 Test Item : Spread Bandwidth
 Test Mode : Mode 3 :Transmitter-Normal-3Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Limit (kHz)
--	--	--	--	>= 500
Tnom (25 °C)	Vnom (100VAC)	2441	70.977	>= 500
--	--	--	--	>= 500

2441MHz



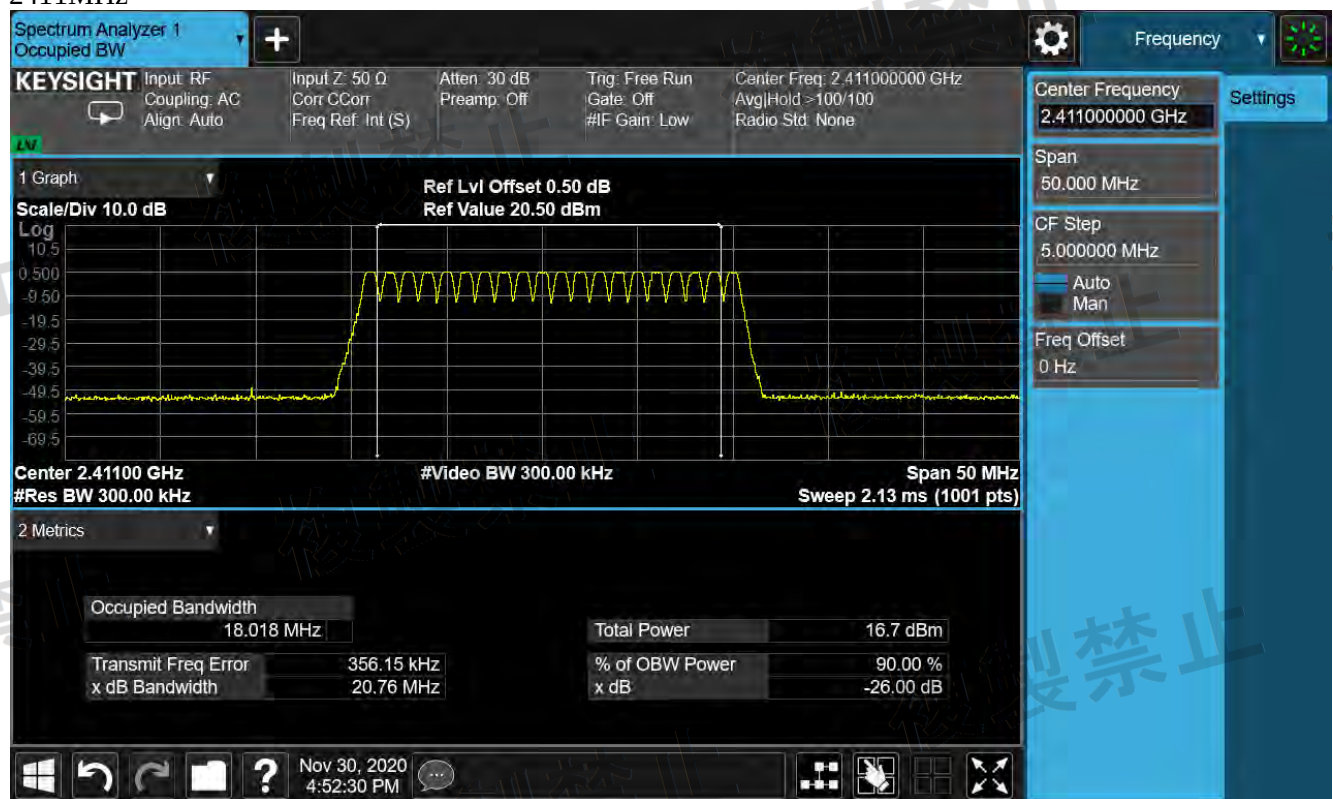
Product : Humly Room Display One
Test Item : Spread Factor
Test Mode : Mode 3 :Transmitter-Normal-3Mbps

Test Conditions		Frequency (MHz)	Spread Bandwidth / 1	Limit
--	--	--	--	≥ 5
Tnom (25 °C)	Vnom (100VAC)	2441	70.977	≥ 5
--	--	--	--	≥ 5

Product : Humly Room Display One
 Test Item : Spread Bandwidth
 Test Mode : Mode 4: Transmitter-AFH-1Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Limit (kHz)
--	--	--	--	>= 500
Tnom (25 °C)	Vnom (100VAC)	2411	18.018	>= 500
--	--	--	--	>= 500

2411MHz



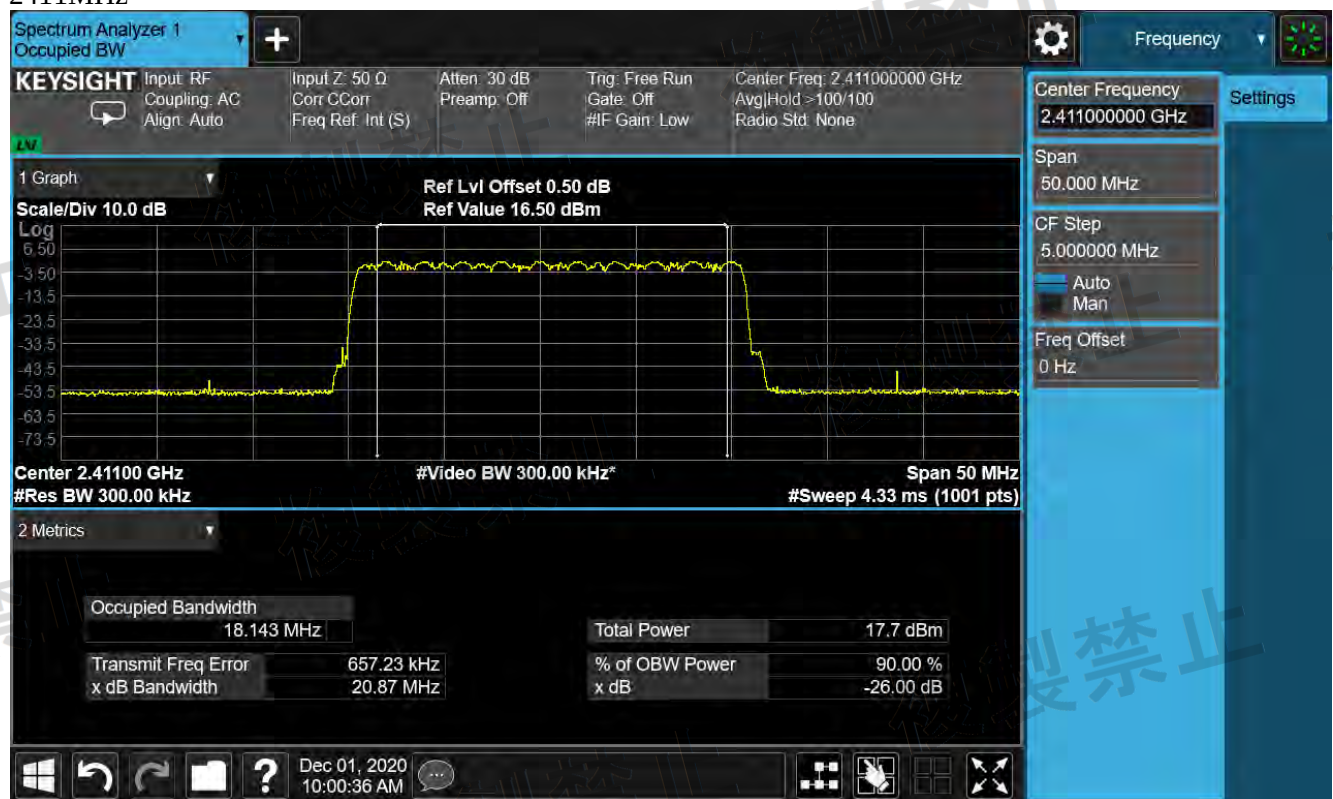
Product : Humly Room Display One
Test Item : Spread Factor
Test Mode : Mode 4: Transmitter-AFH-1Mbps

Test Conditions		Frequency (MHz)	Spread Bandwidth / 1	Limit
--	--	--	--	≥ 5
Tnom (25 °C)	Vnom (100VAC)	2411	18.018	≥ 5
--	--	--	--	≥ 5

Product : Humly Room Display One
 Test Item : Spread Bandwidth
 Test Mode : Mode 5: Transmitter-AFH-2Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Limit (kHz)
--	--	--	--	>= 500
Tnom (25 °C)	Vnom (100VAC)	2411	18.143	>= 500
--	--	--	--	>= 500

2411MHz



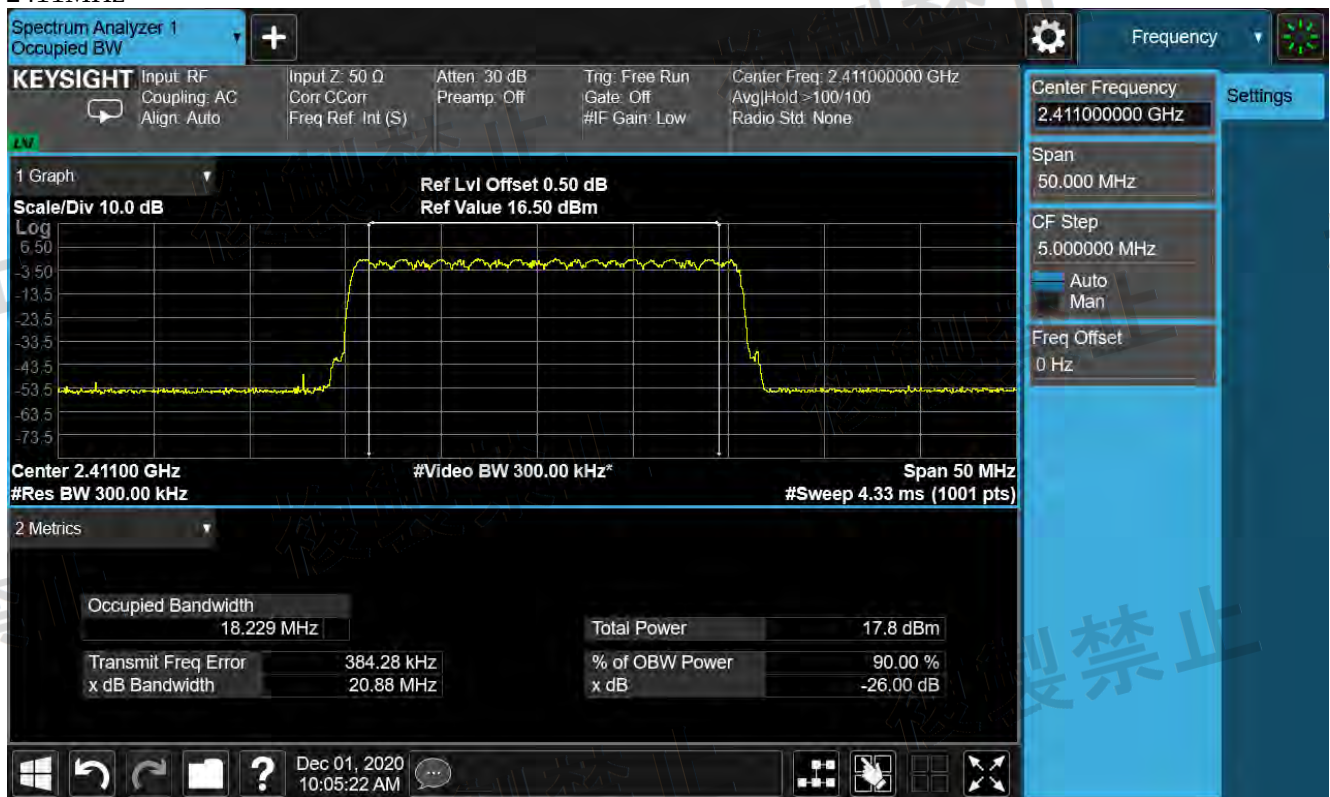
Product : Humly Room Display One
Test Item : Spread Factor
Test Mode : Mode 5: Transmitter-AFH-2Mbps

Test Conditions		Frequency (MHz)	Spread Bandwidth / 1	Limit
--	--	--	--	≥ 5
Tnom (25 °C)	Vnom (100VAC)	2411	18.143	≥ 5
--	--	--	--	≥ 5

Product : Humly Room Display One
 Test Item : Spread Bandwidth
 Test Mode : Mode 6: Transmitter-AFH-3Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Limit (kHz)
--	--	--	--	>= 500
Tnom (25 °C)	Vnom (100VAC)	2411	18.229	>= 500
--	--	--	--	>= 500

2411MHz



Product : Humly Room Display One
Test Item : Spread Factor
Test Mode : Mode 6: Transmitter-AFH-3Mbps

Test Conditions		Frequency (MHz)	Spread Bandwidth / 1	Limit
--	--	--	--	≥ 5
Tnom (25 °C)	Vnom (100VAC)	2411	18.229	≥ 5
--	--	--	--	≥ 5

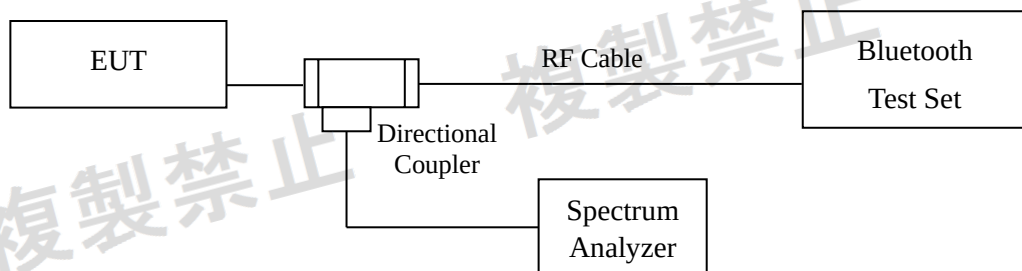
4. Occupied Bandwidth

4.1. Test Setup

☒ Use the program to control transmitter



☐ Use the Bluetooth Test Set to control transmitter



4.2. Test Procedure

A spectrum analyzer or similar device shall be used to observe a sample of the modulated transmitter's radio frequency power output.

- (a) A positive peak detector function must be used.
- (b) A measurement instrument with an integrated 99% power bandwidth function may be used to automate the test process.
- (c) The measurement instrument bandwidth and span must be set sufficiently with, and, the scan time set sufficiently slow, to ensure all major modulation products are captured. Note that the measurement bandwidth should also be set sufficiently narrow to avoid adding significant error to the test result.
- (d) 'Maximum Hold' mode may be used to accumulate the measurement result over several scans provided the emission is repetitive in nature.

4.3. Limits

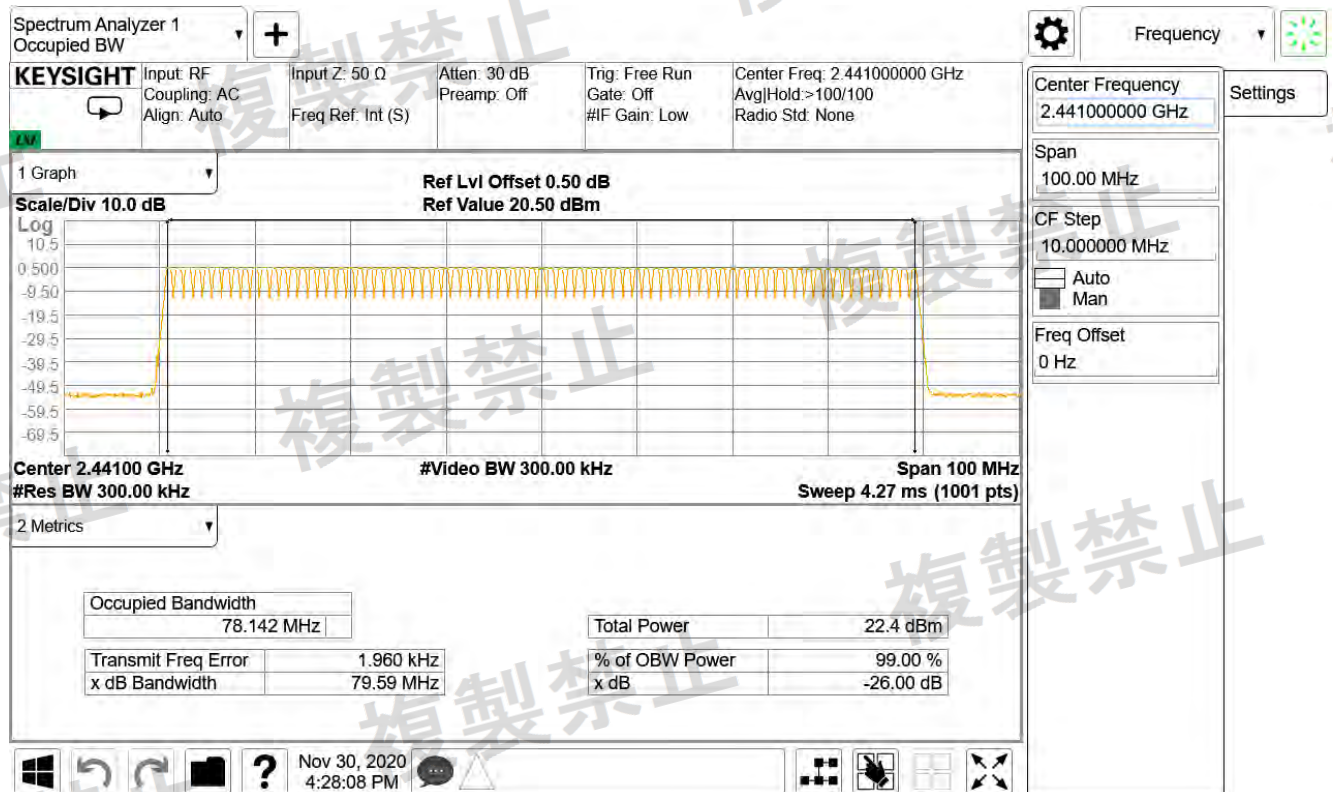
≤ 26 MHz for DSSS, ≤ 83.5 MHz for FHSS

4.4. Test Result of Occupied Bandwidth

Product : Humly Room Display One
 Test Item : Occupied Bandwidth
 Test Mode : Mode 1: Transmitter-Normal-1Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Limit (MHz)
--	--	--	--	<= 83.5
Tnom (25 °C)	Vnom (100VAC)	2441	78.142	<= 83.5
--	--	--	--	<= 83.5

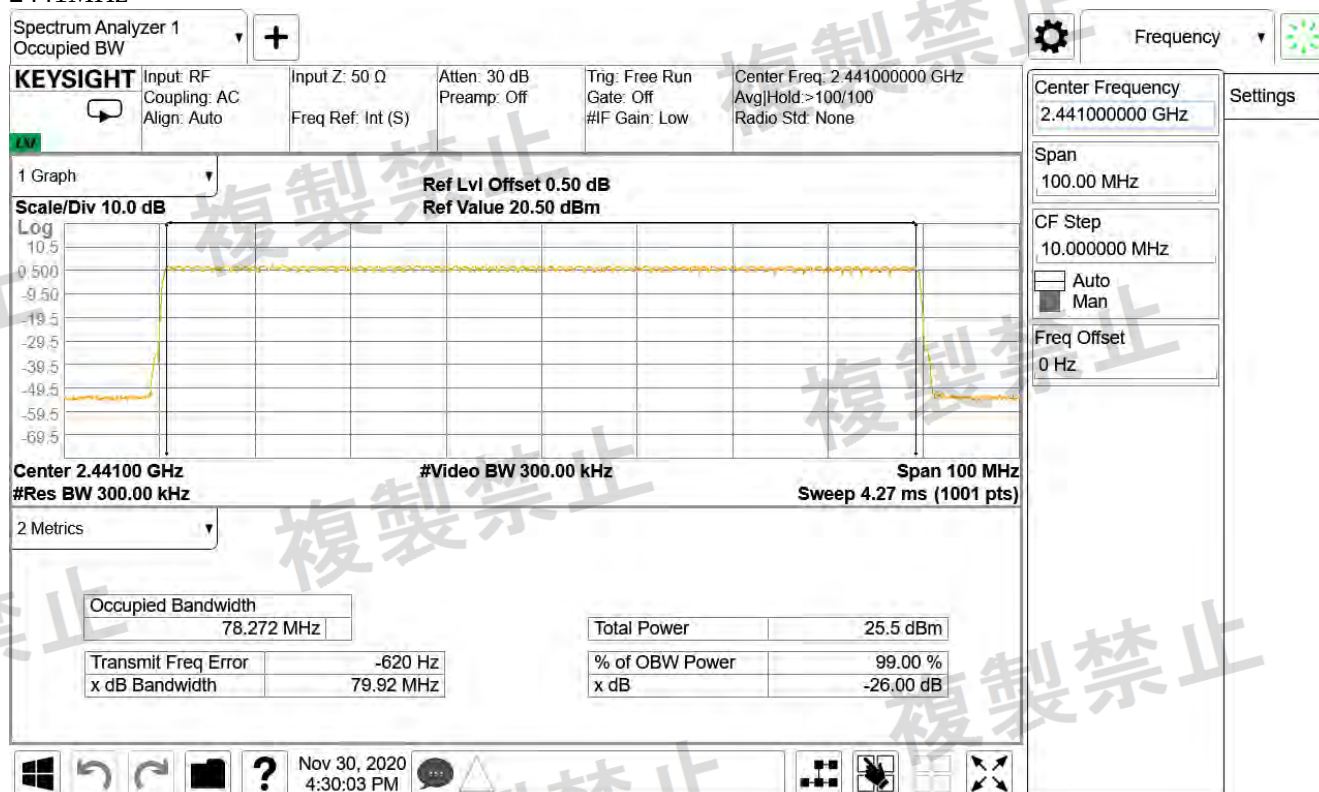
2441MHz



Product : Humly Room Display One
 Test Item : Occupied Bandwidth
 Test Mode : Mode 2: Transmitter-Normal-2Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Limit (MHz)
--	--	--	--	<= 83.5
Tnom (25 °C)	Vnom (100VAC)	2441	78.272	<= 83.5
--	--	--	--	<= 83.5

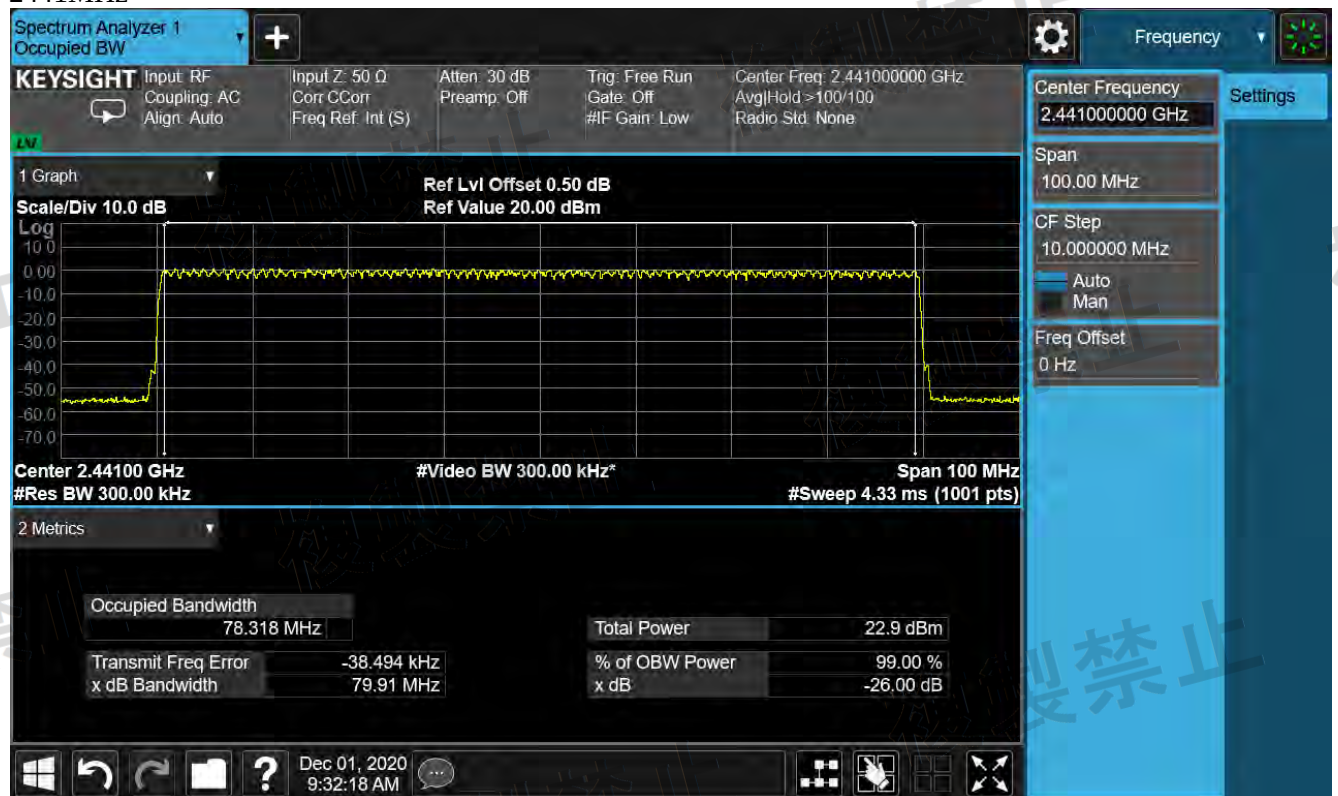
2441MHz



Product : Humly Room Display One
 Test Item : Occupied Bandwidth
 Test Mode : Mode 3 :Transmitter-Normal-3Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Limit (MHz)
--	--	--	--	<= 83.5
Tnom (25 °C)	Vnom (100VAC)	2441	78.318	<= 83.5
--	--	--	--	<= 83.5

2441MHz

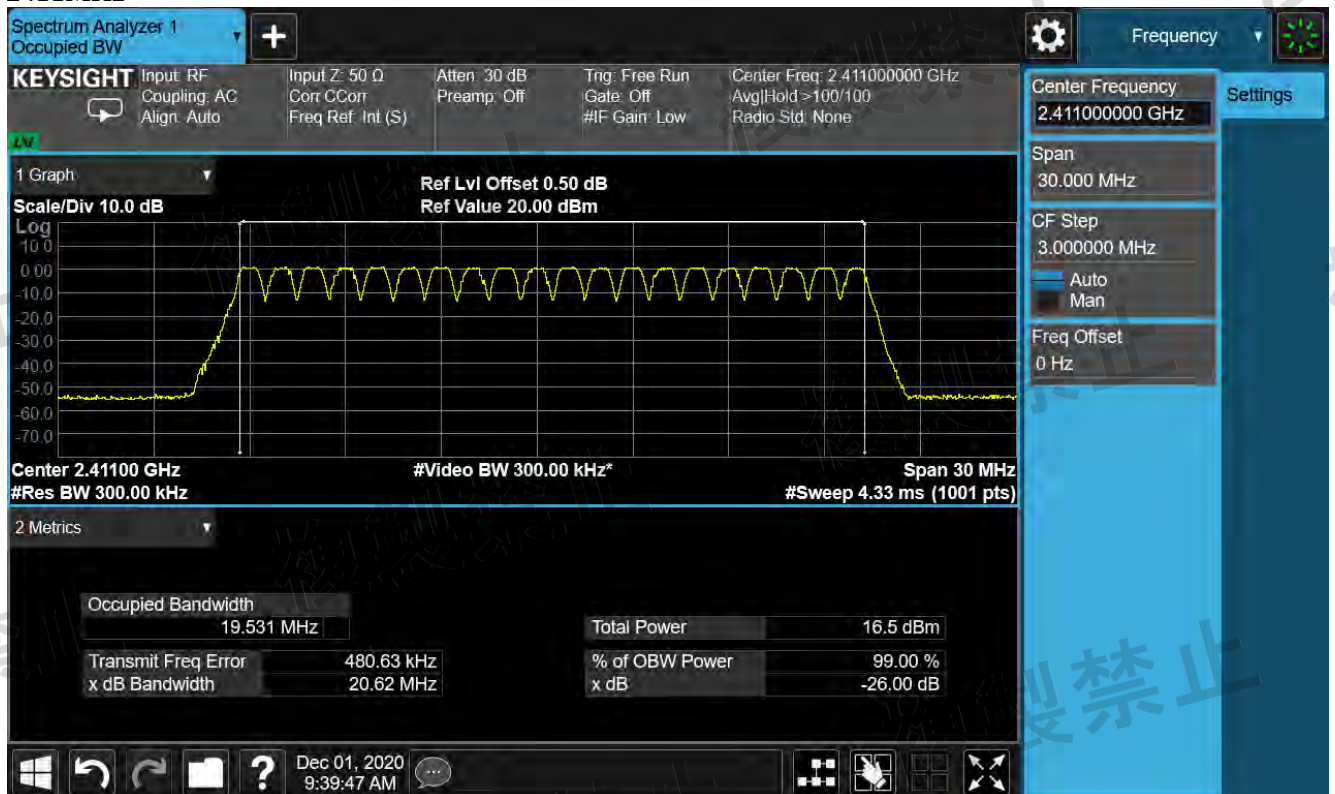


Test Result	PASS
-------------	------

Product : Humly Room Display One
 Test Item : Occupied Bandwidth
 Test Mode : Mode 4: Transmitter-AFH-1Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Limit (MHz)
--	--	--	--	<= 83.5
Tnom (25 °C)	Vnom (100VAC)	2411	19.531	<= 83.5
--	--	--	--	<= 83.5

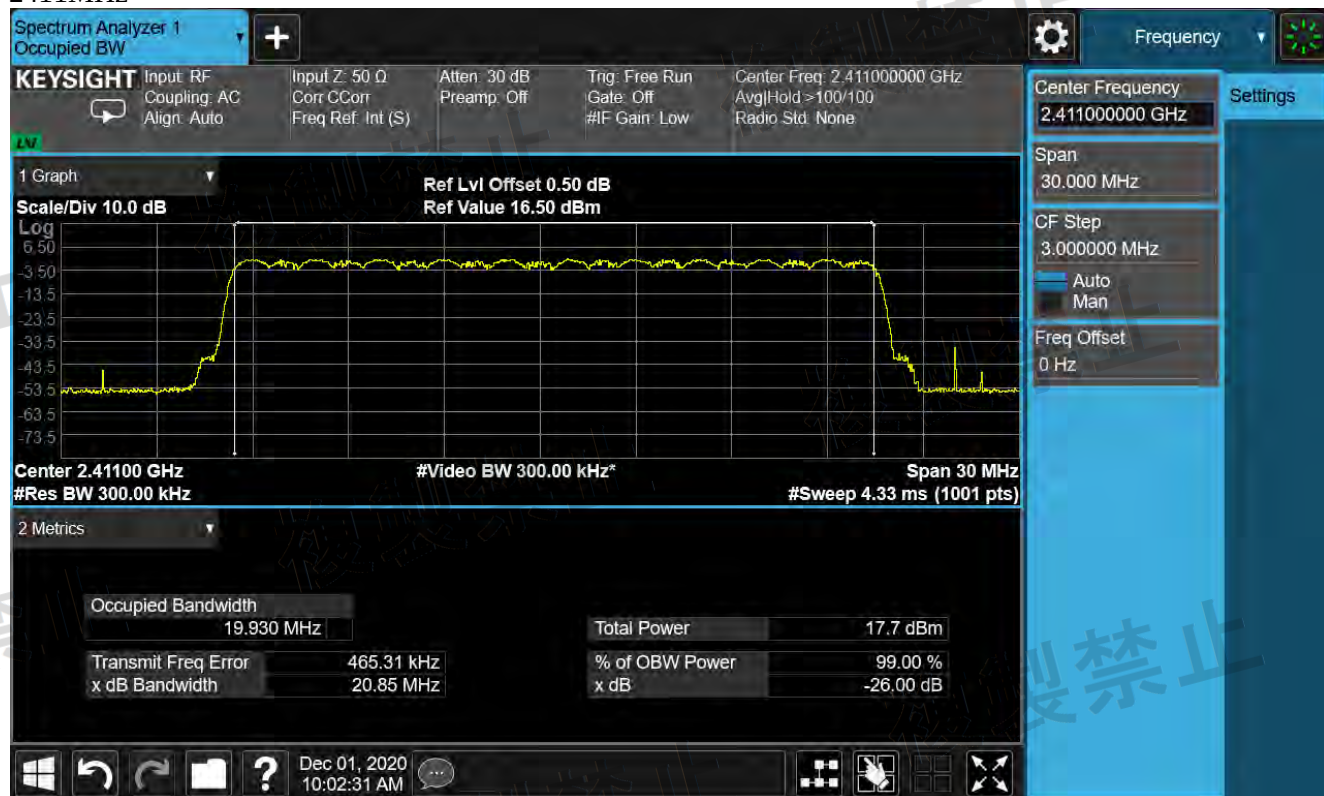
2411MHz



Product : Humly Room Display One
 Test Item : Occupied Bandwidth
 Test Mode : Mode 5: Transmitter-AFH-2Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Limit (MHz)
--	--	--	--	≤ 83.5
Tnom (25 °C)	Vnom (100VAC)	2411	19.93	≤ 83.5
--	--	--	--	≤ 83.5

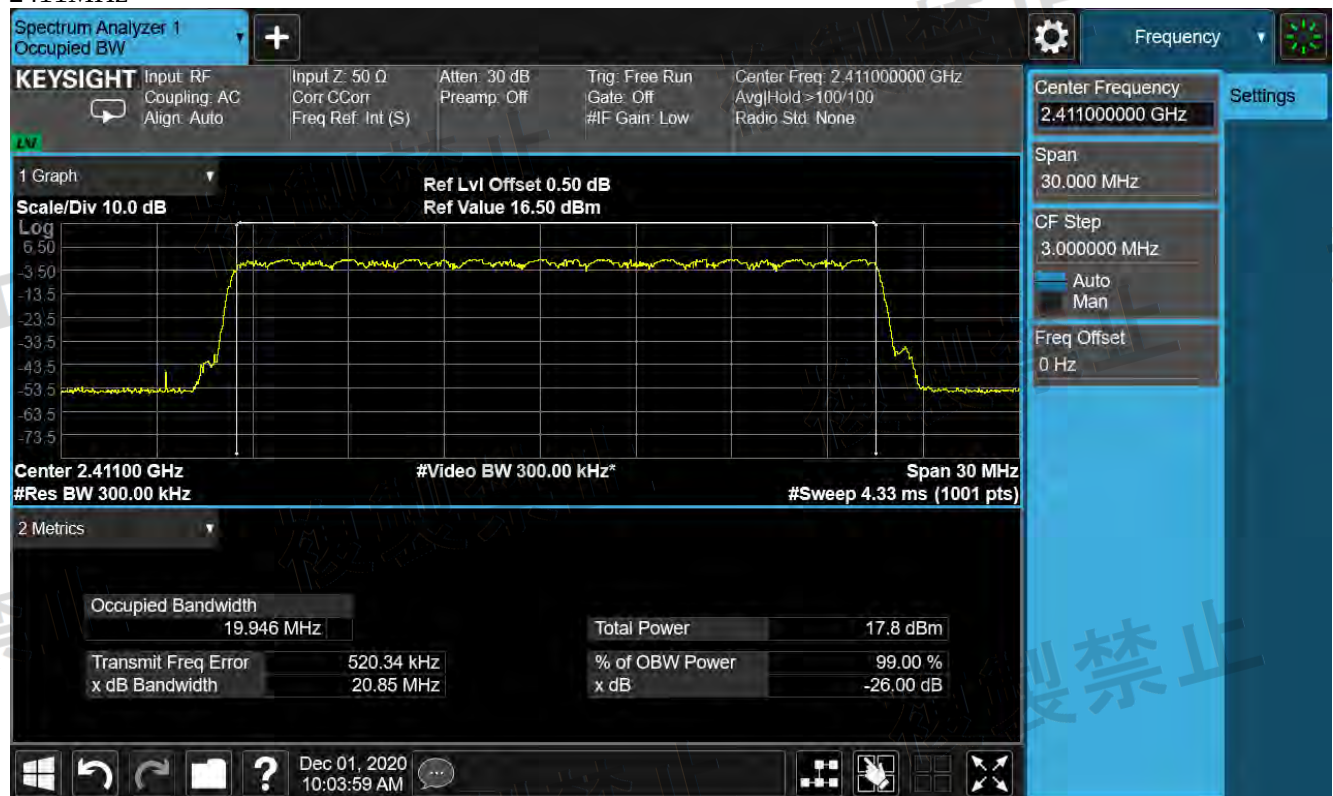
2411MHz



Product : Humly Room Display One
 Test Item : Occupied Bandwidth
 Test Mode : Mode 6: Transmitter-AFH-3Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Limit (MHz)
--	--	--	--	<= 83.5
Tnom (25 °C)	Vnom (100VAC)	2411	19.946	<= 83.5
--	--	--	--	<= 83.5

2411MHz



Test Result	PASS
-------------	------

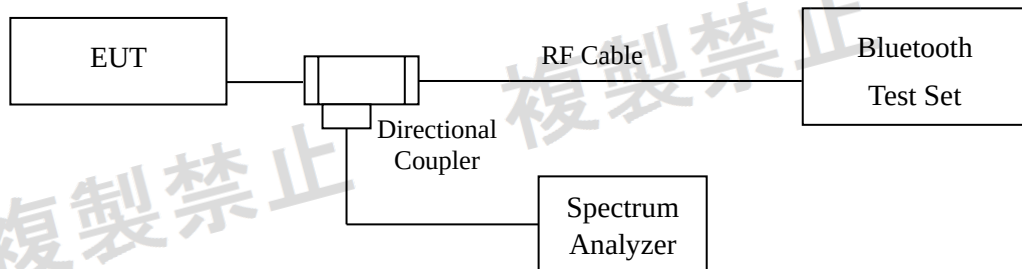
5. Frequency Tolerance

5.1. Test Setup

- ☒ Use the program to control transmitter



- ☐ Use the Bluetooth Test Set to control transmitter



5.2. Test Procedure

A spectrum analyzer or similar device shall be used to observe a sample of the modulated transmitter's radio frequency power output.

- A positive peak detector function must be used.
- The measurement instrument bandwidth and span must be set sufficiently with, and, the scan time set sufficiently slow, to ensure all major modulation products are captured. Note that the measurement bandwidth should also be set sufficiently narrow to avoid adding significant error to the test result.
- 'Maximum Hold' mode may be used to accumulate the measurement result over several scans provided the emission is repetitive in nature.

5.3. Limits

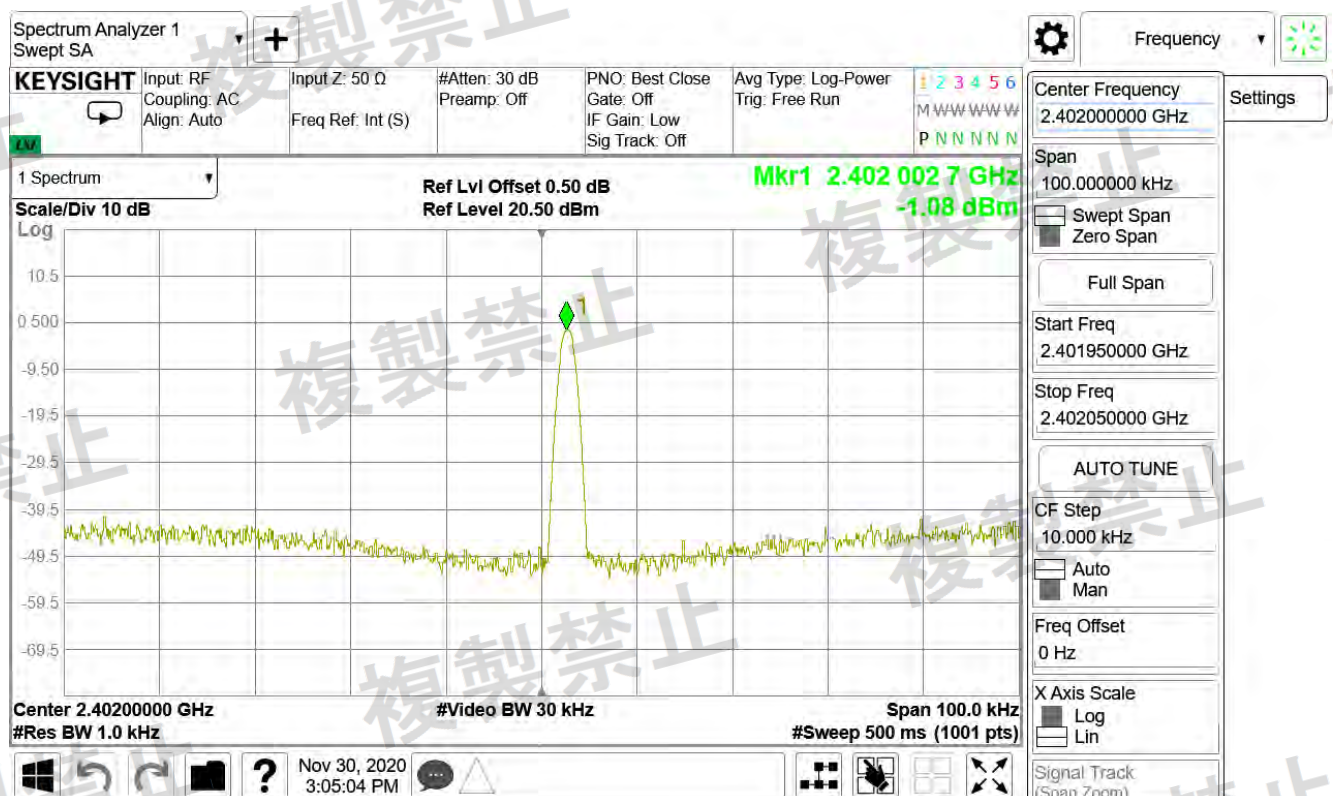
≤ 50 ppm

5.4. Test Result of Frequency Tolerance

Product : Humly Room Display One
 Test Item : Frequency Tolerance
 Test Mode : Mode 1: Transmitter-Normal-1Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Tolerance (ppm)	Limit (ppm)
Tnom (25 °C)	Vnom (100VAC)	2402	2402.0027	1.1241	<= 50
Tnom (25 °C)	Vnom (100VAC)	2441	2441.0072	2.9496	<= 50
Tnom (25 °C)	Vnom (100VAC)	2480	2480.0117	4.7177	<= 50

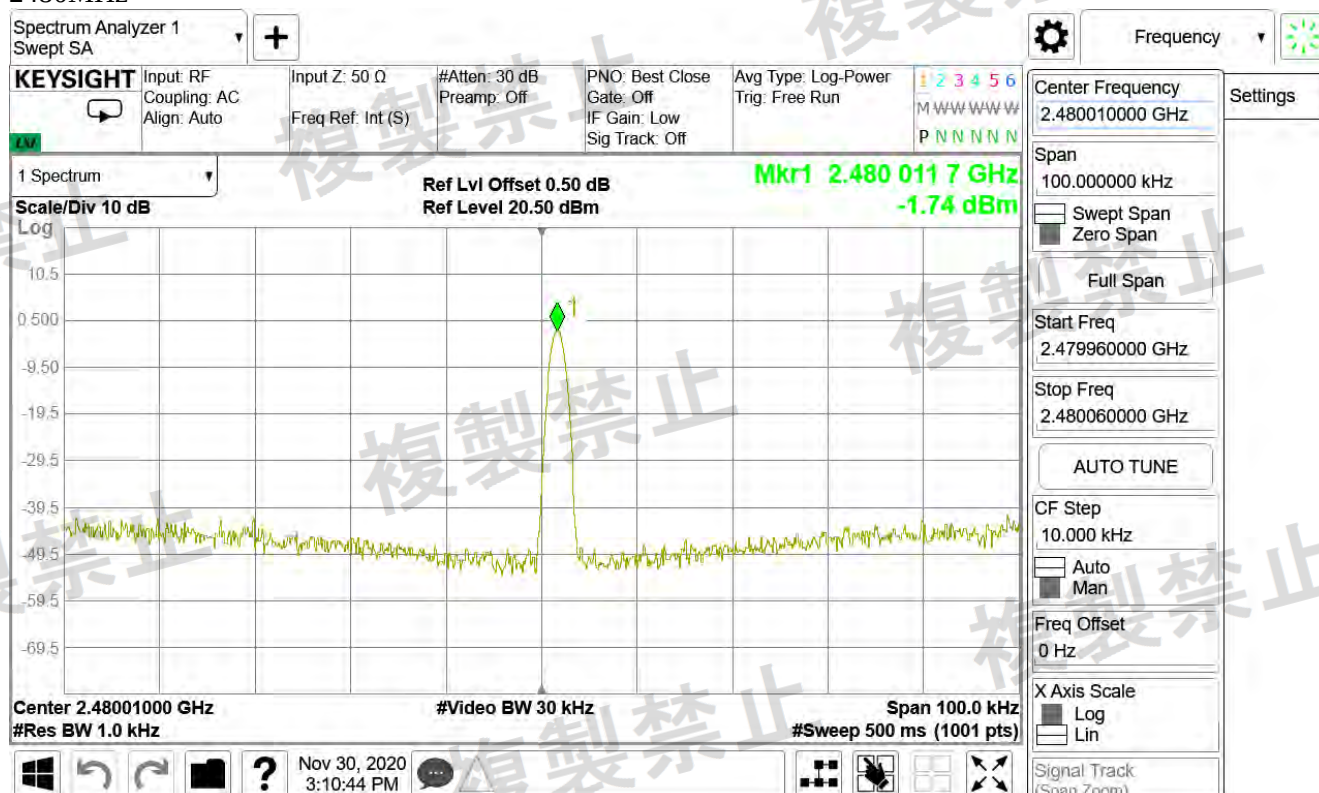
2402MHz



2441MHz



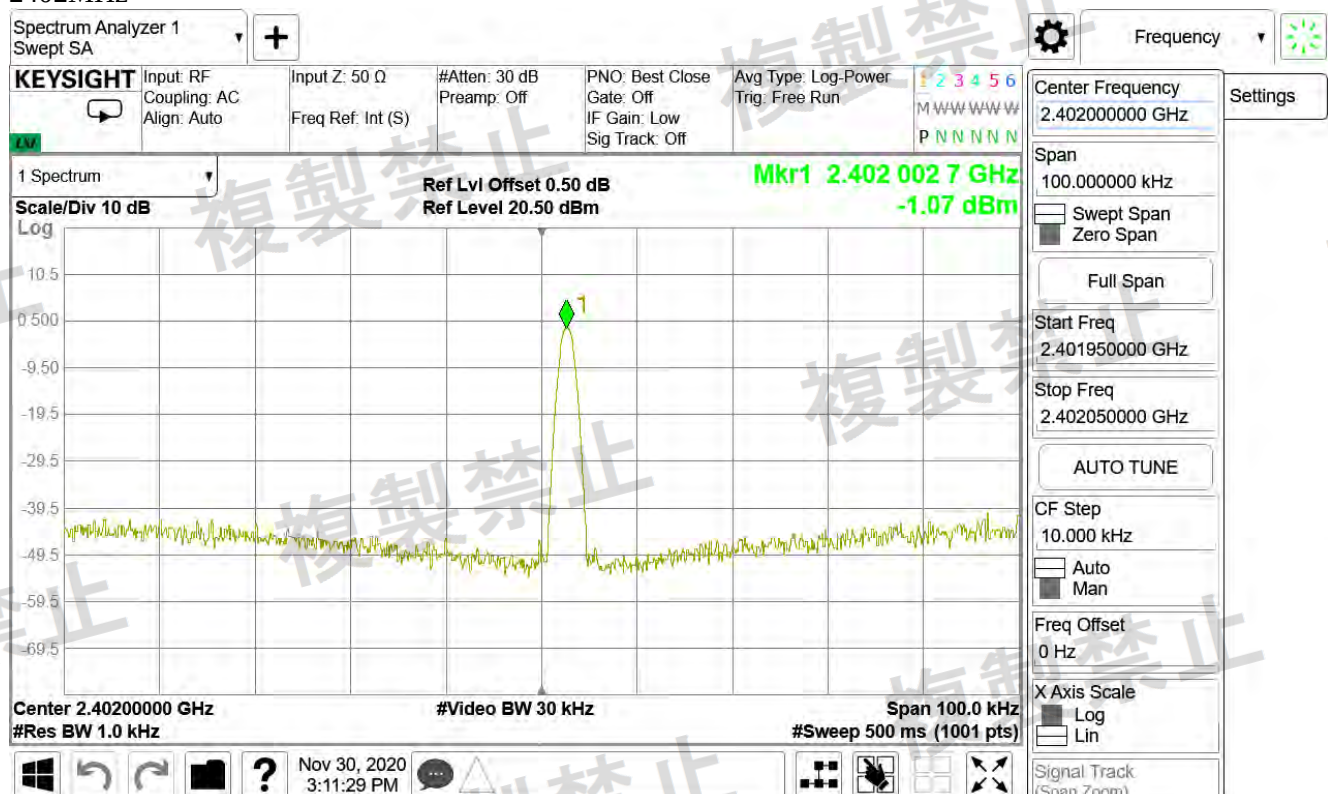
2480MHz



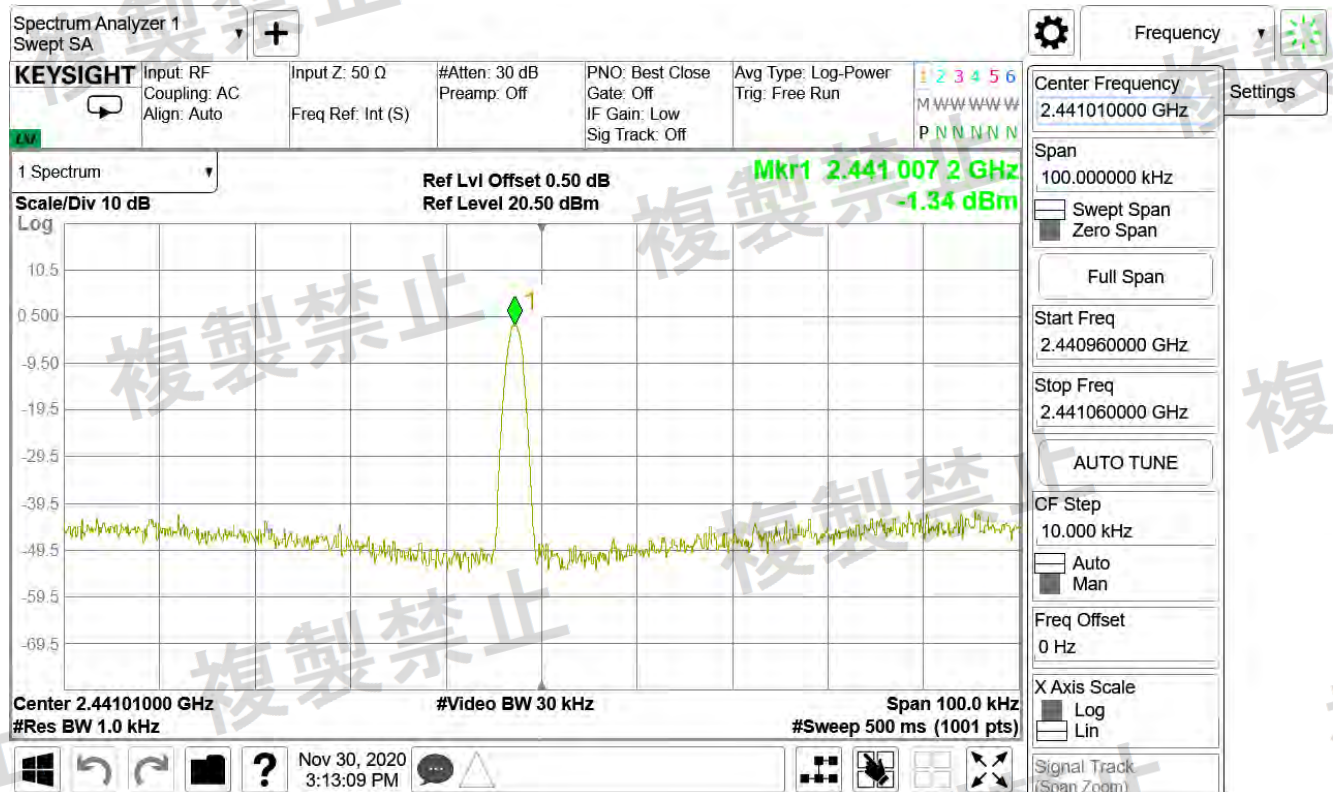
Product : Humly Room Display One
 Test Item : Frequency Tolerance
 Test Mode : Mode 2: Transmitter-Normal-2Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Tolerance (ppm)	Limit (ppm)
Tnom (25 °C)	Vnom (100VAC)	2402	2402.0027	1.1241	<= 50
Tnom (25 °C)	Vnom (100VAC)	2441	2441.0072	2.9496	<= 50
Tnom (25 °C)	Vnom (100VAC)	2480	2480.0117	4.7177	<= 50

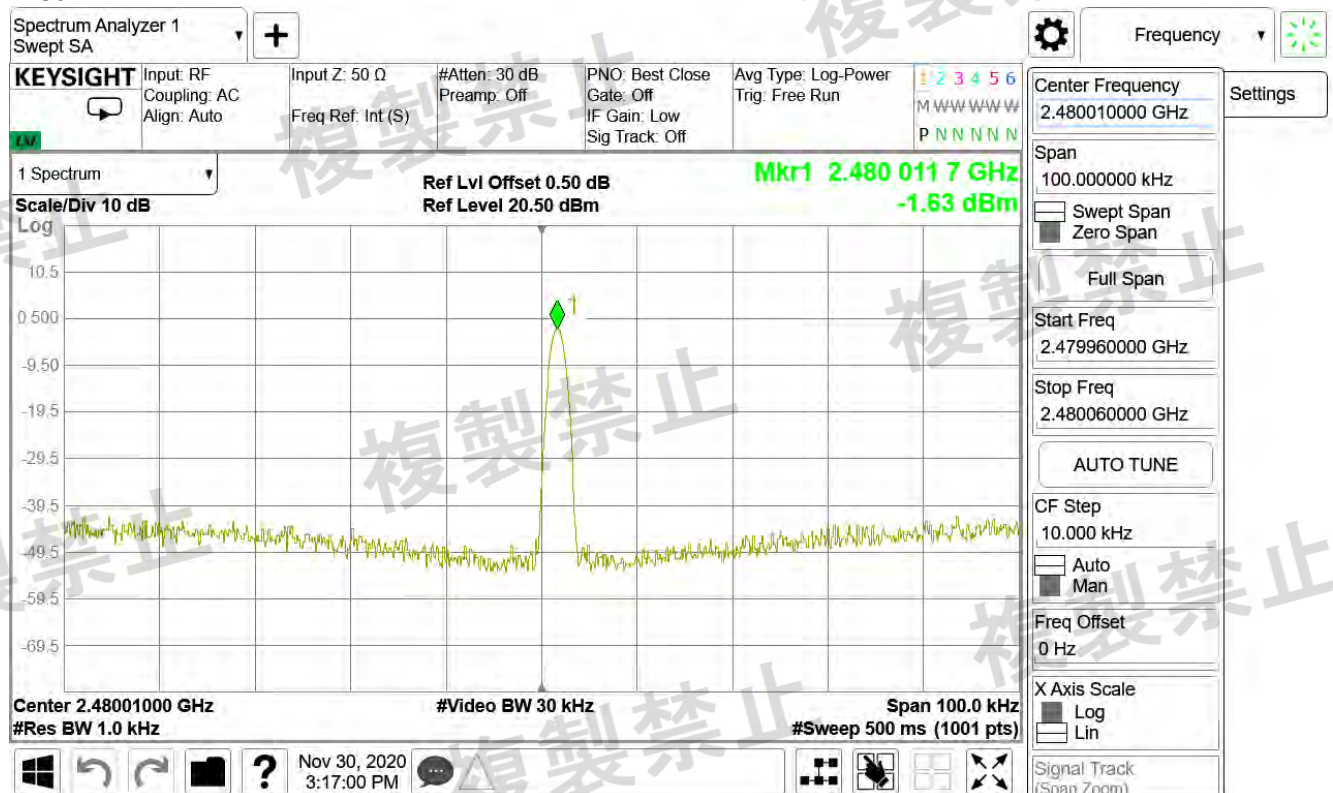
2402MHz



2441MHz



2480MHz



Product : Humly Room Display One
 Test Item : Frequency Tolerance
 Test Mode : Mode 3 :Transmitter-Normal-3Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Tolerance (ppm)	Limit (ppm)
Tnom (25 °C)	Vnom (100VAC)	2402	2402.0027	1.1241	<= 50
Tnom (25 °C)	Vnom (100VAC)	2441	2441.0073	2.9906	<= 50
Tnom (25 °C)	Vnom (100VAC)	2480	2480.0118	4.7581	<= 50

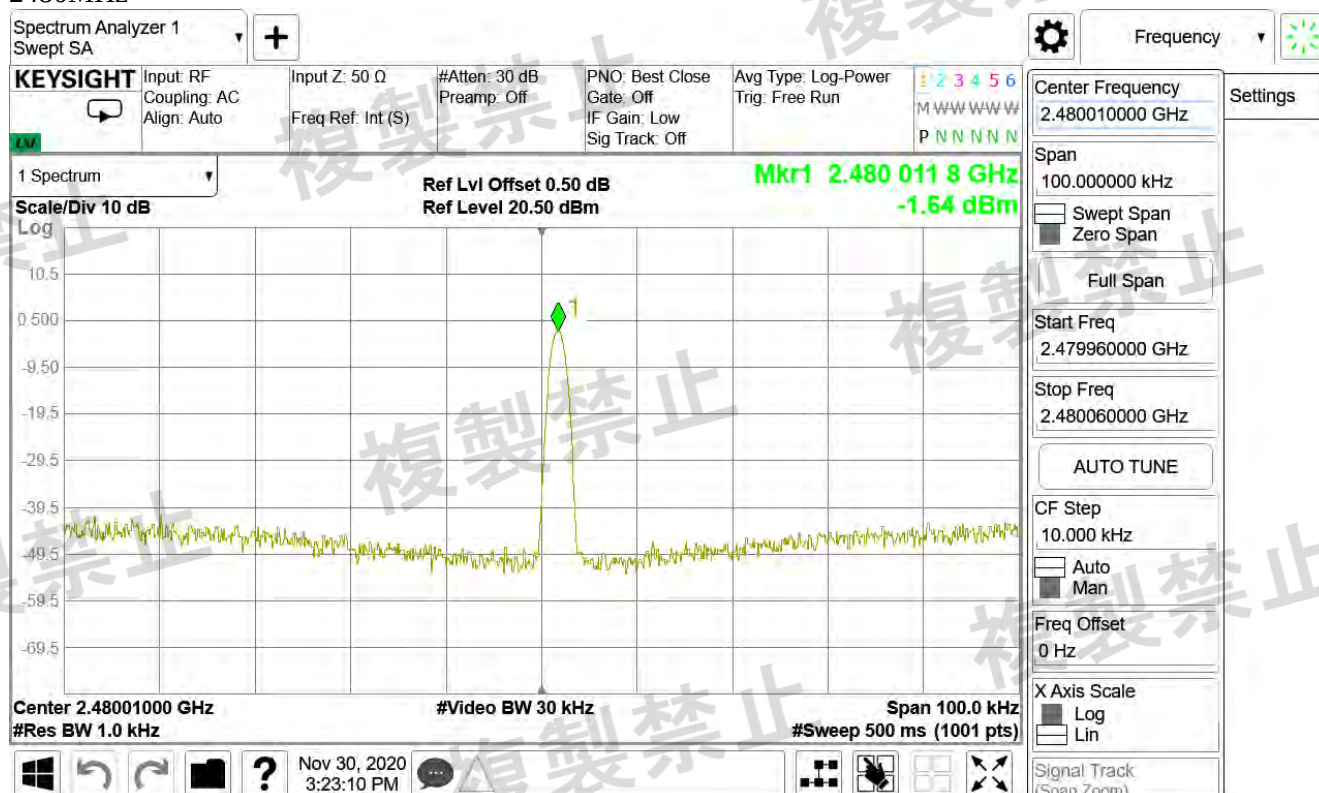
2402MHz



2441MHz



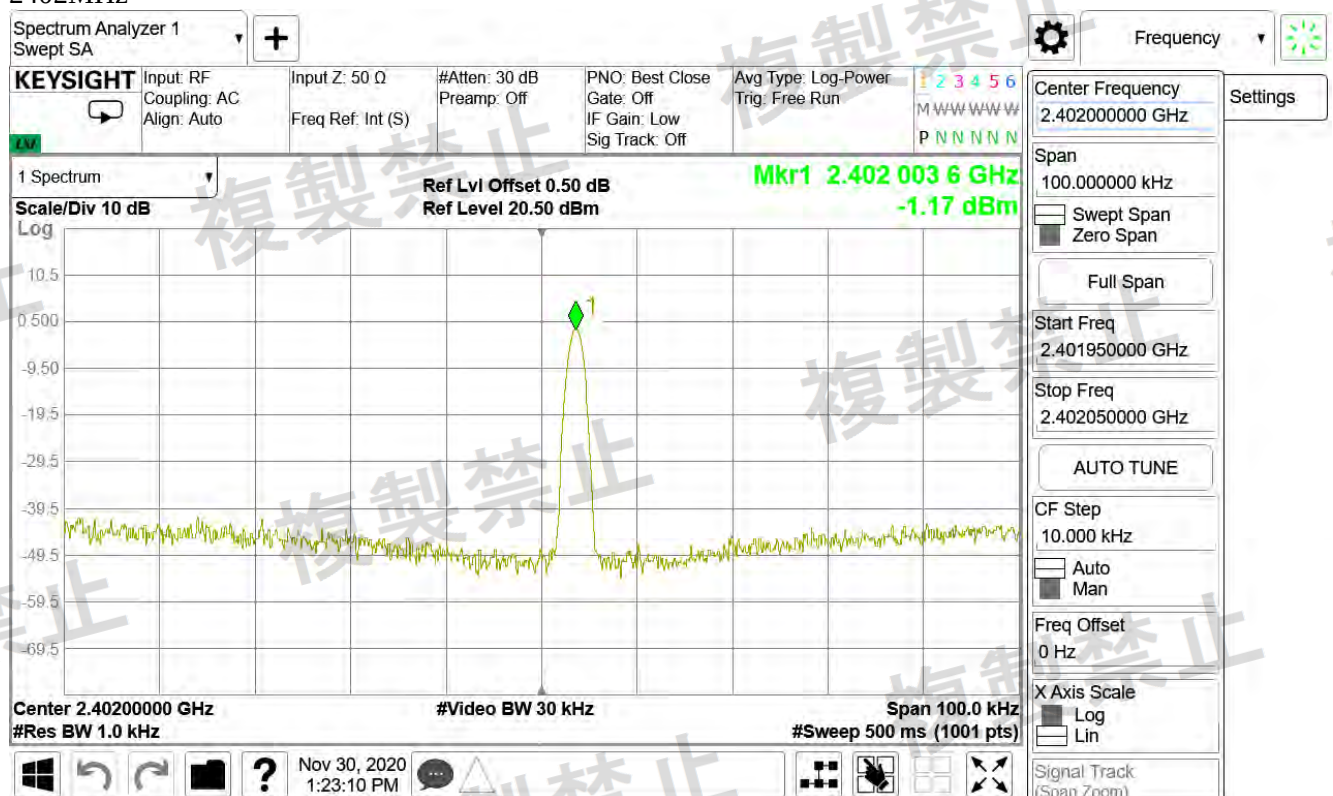
2480MHz



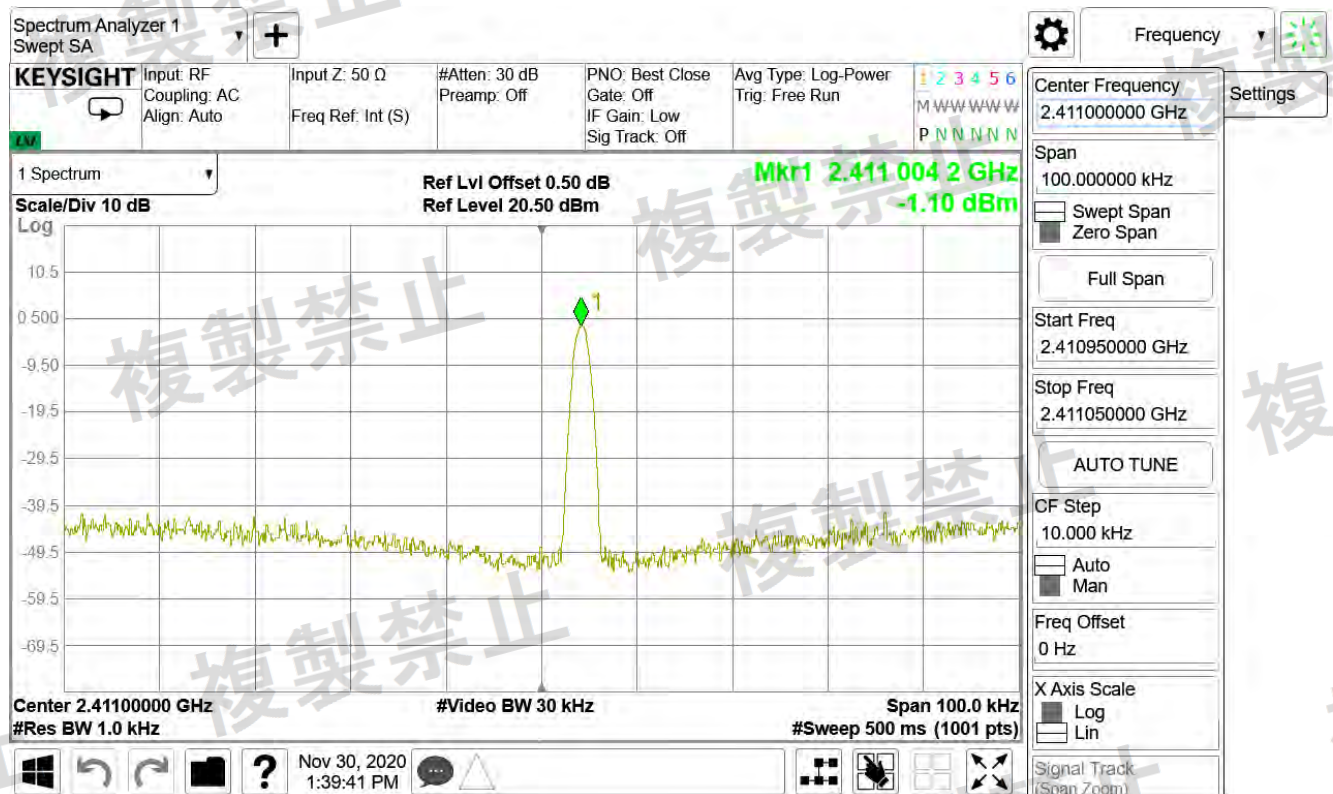
Product : Humly Room Display One
 Test Item : Frequency Tolerance
 Test Mode : Mode 4: Transmitter-AFH-1Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Tolerance (ppm)	Limit (ppm)
Tnom (25 °C)	Vnom (100VAC)	2402	2402.0036	1.4988	<= 50
Tnom (25 °C)	Vnom (100VAC)	2411	2411.0042	1.7420	<= 50
Tnom (25 °C)	Vnom (100VAC)	2421	2421.0049	2.0240	<= 50

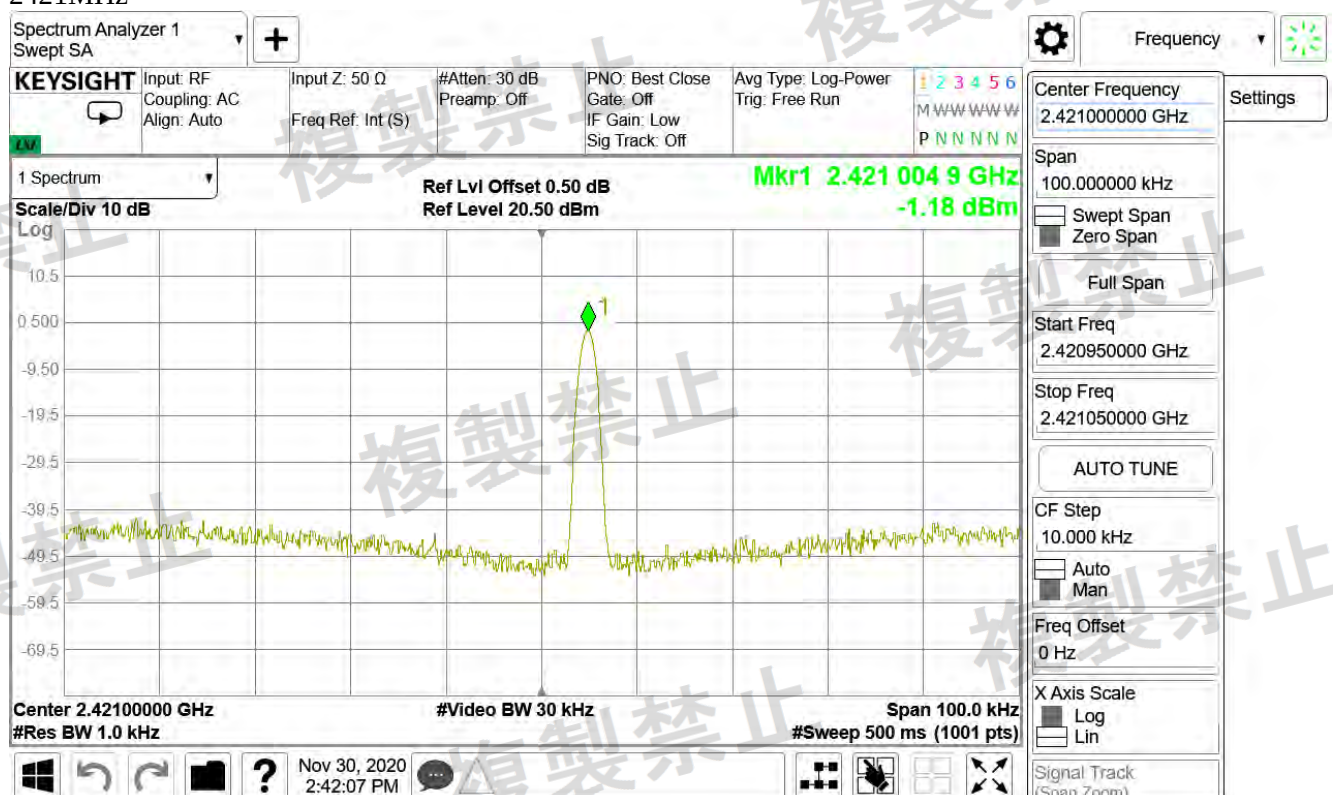
2402MHz



2411MHz



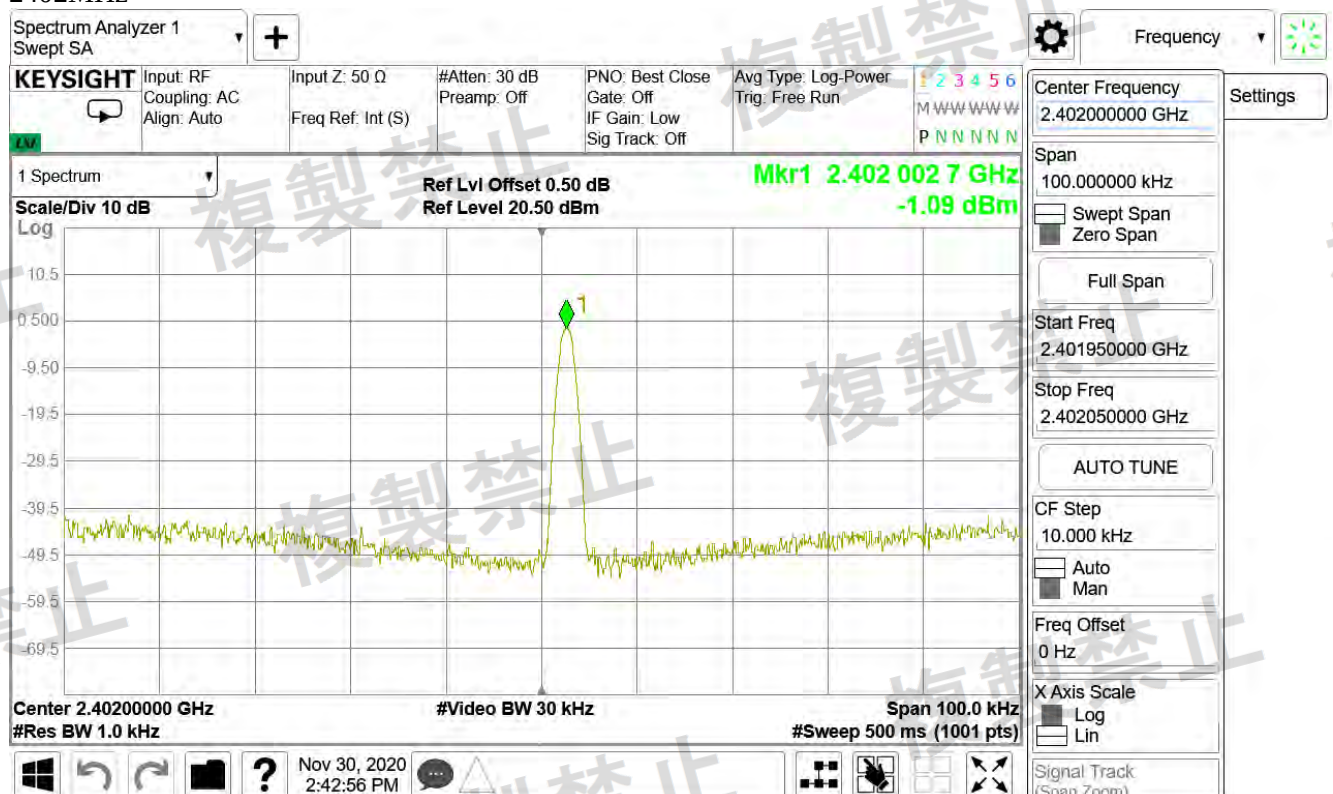
2421MHz



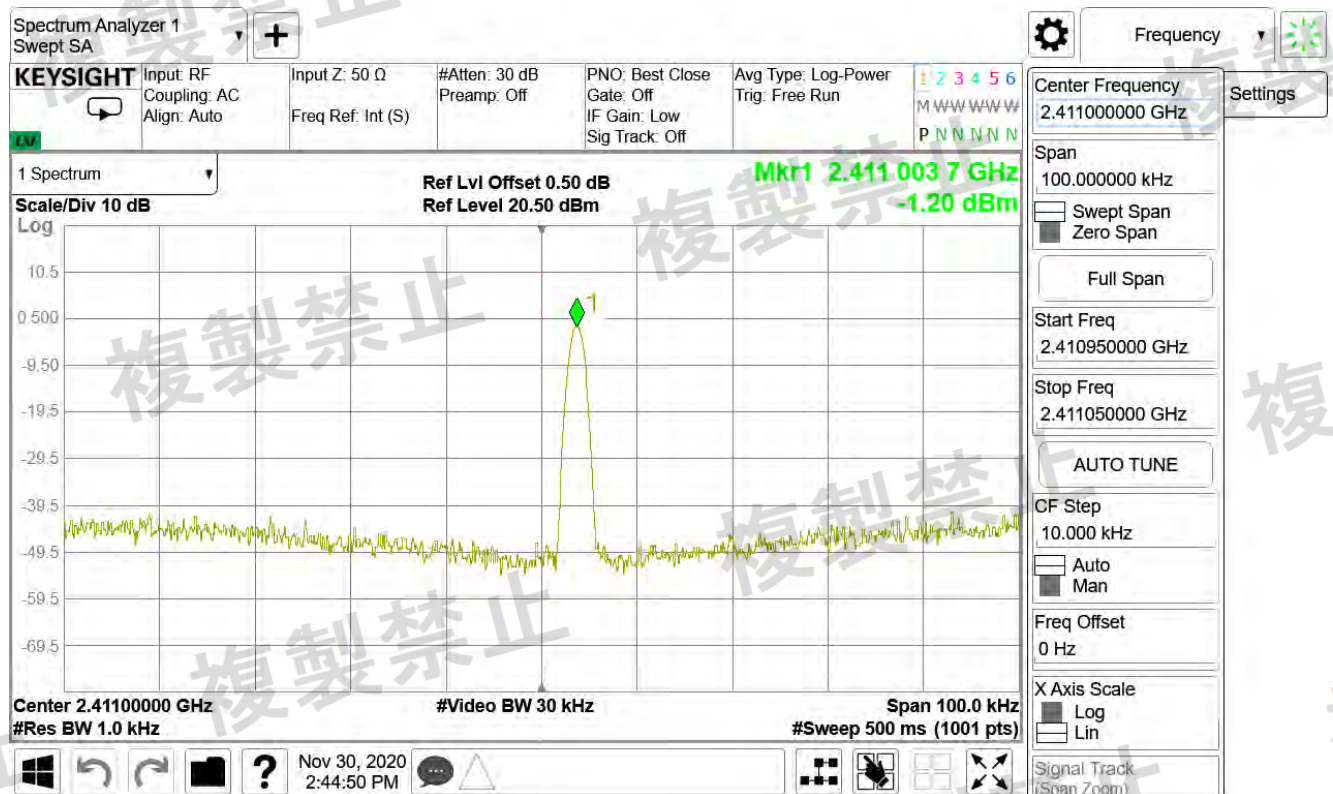
Product : Humly Room Display One
 Test Item : Frequency Tolerance
 Test Mode : Mode 5: Transmitter-AFH-2Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Tolerance (ppm)	Limit (ppm)
Tnom (25 °C)	Vnom (100VAC)	2402	2402.0027	1.1241	<= 50
Tnom (25 °C)	Vnom (100VAC)	2411	2411.0037	1.5346	<= 50
Tnom (25 °C)	Vnom (100VAC)	2421	2421.0050	2.0653	<= 50

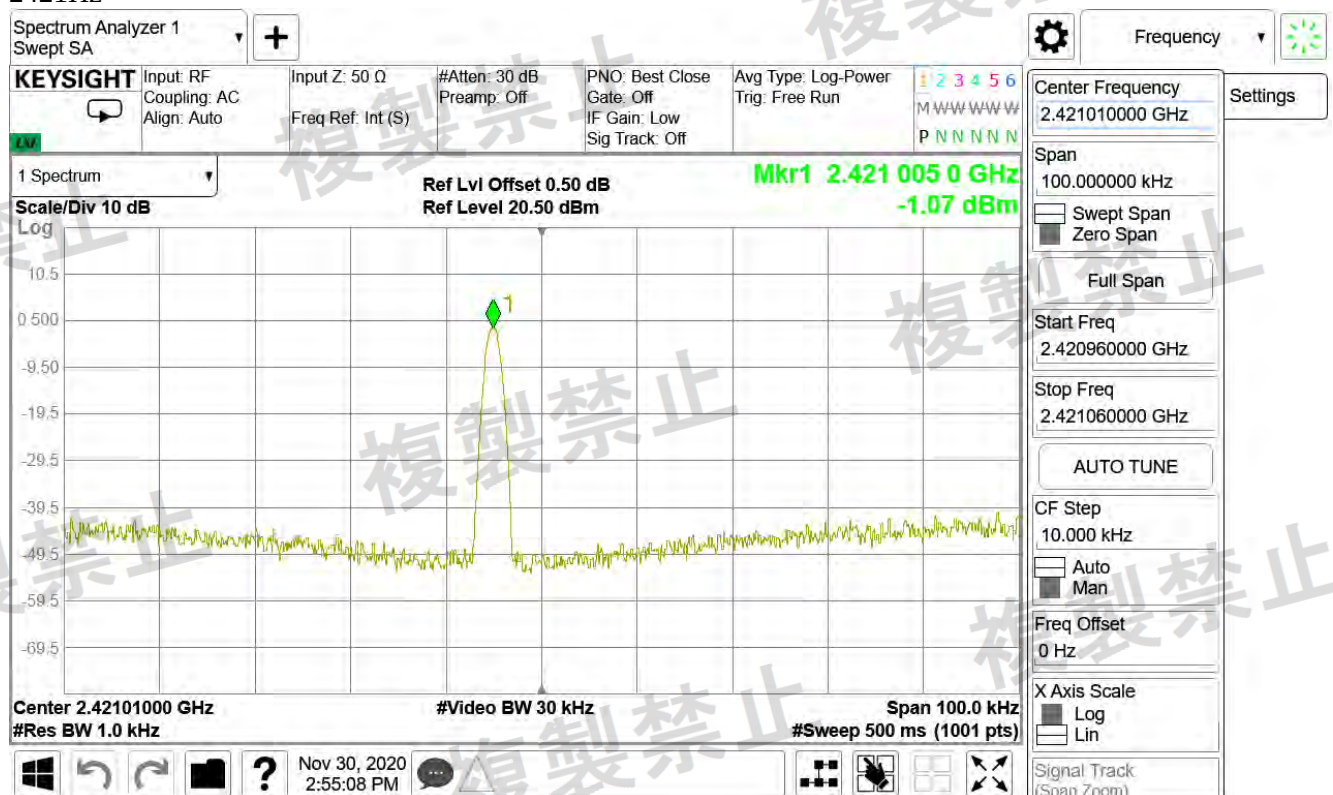
2402MHz



2411MHz



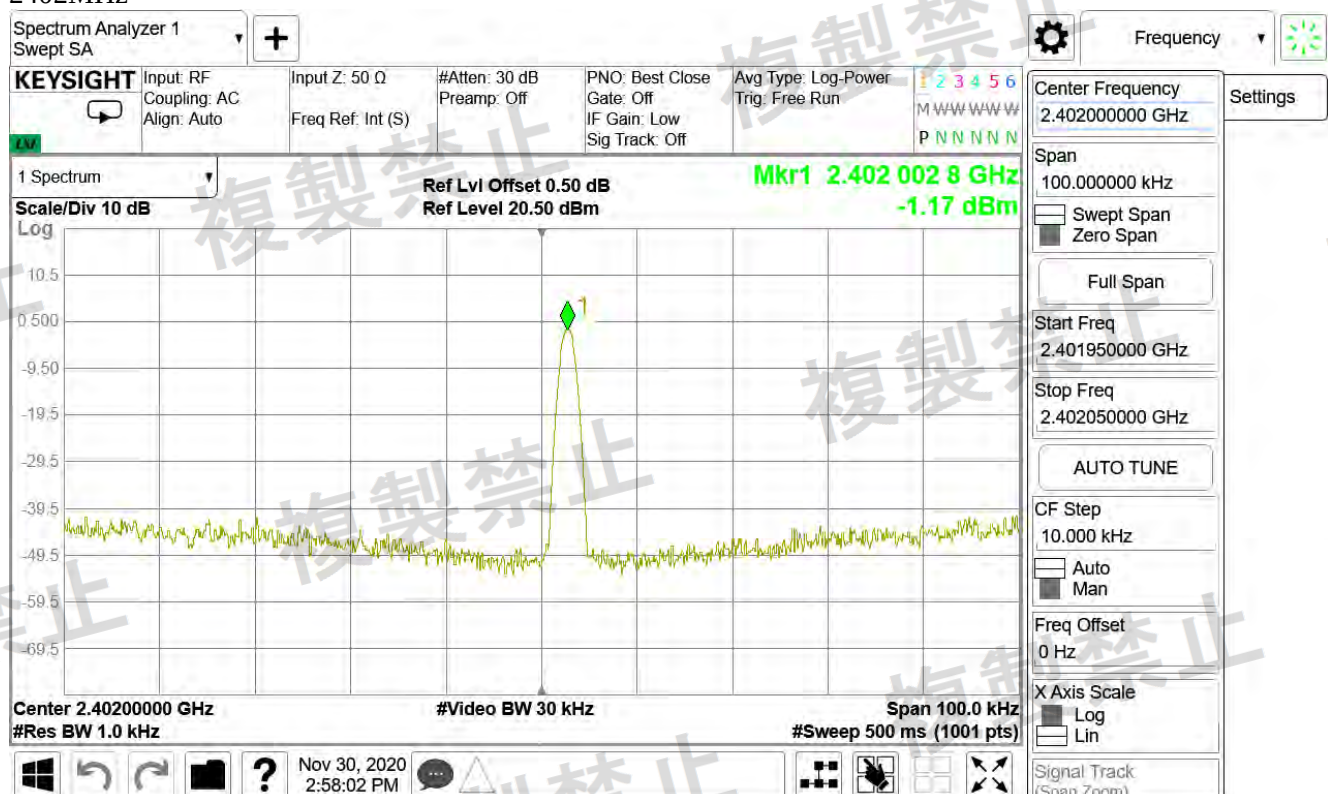
2421Hz



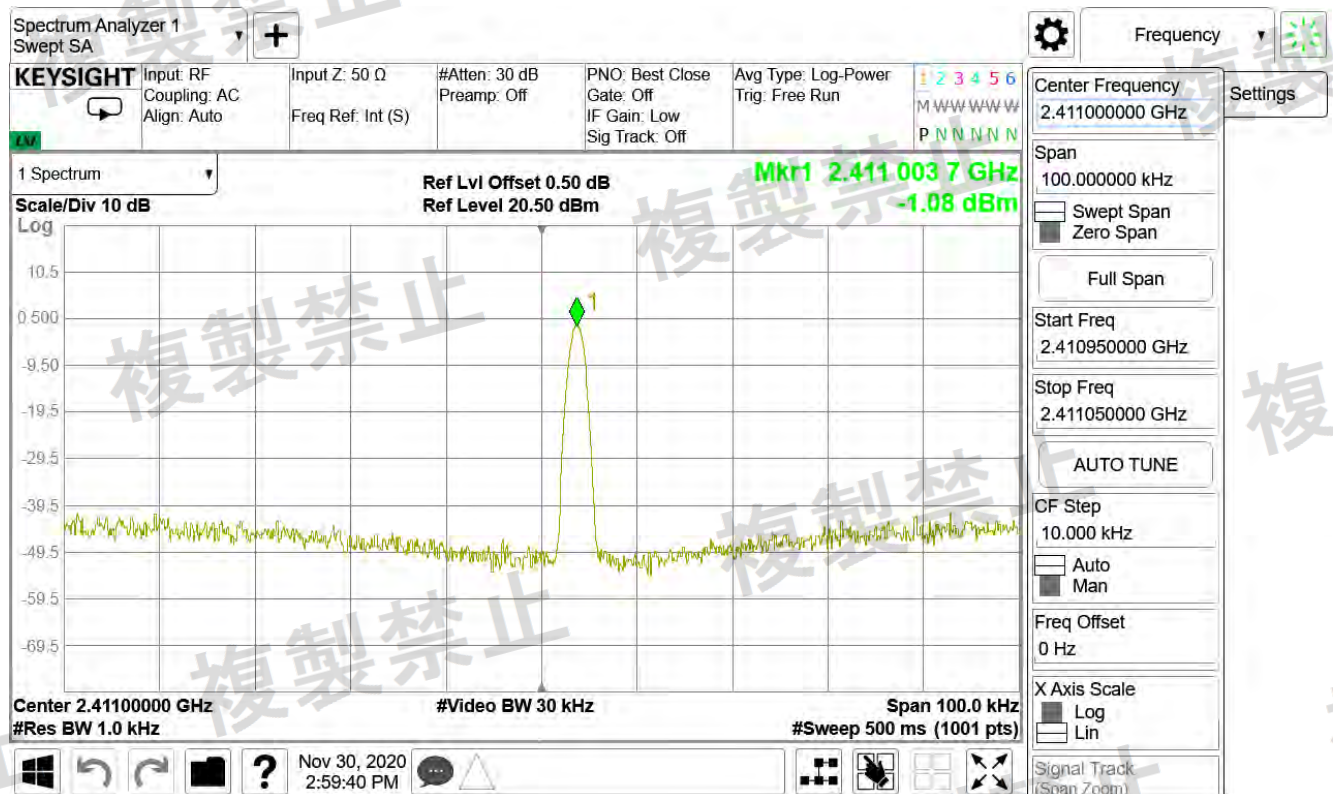
Product : Humly Room Display One
 Test Item : Frequency Tolerance
 Test Mode : Mode 6: Transmitter-AFH-3Mbps

Test Conditions		Frequency (MHz)	Reading Value (MHz)	Tolerance (ppm)	Limit (ppm)
Tnom (25 °C)	Vnom (100VAC)	2402	2402.0028	1.1657	<= 50
Tnom (25 °C)	Vnom (100VAC)	2411	2411.0037	1.5346	<= 50
Tnom (25 °C)	Vnom (100VAC)	2421	2421.0049	2.0240	<= 50

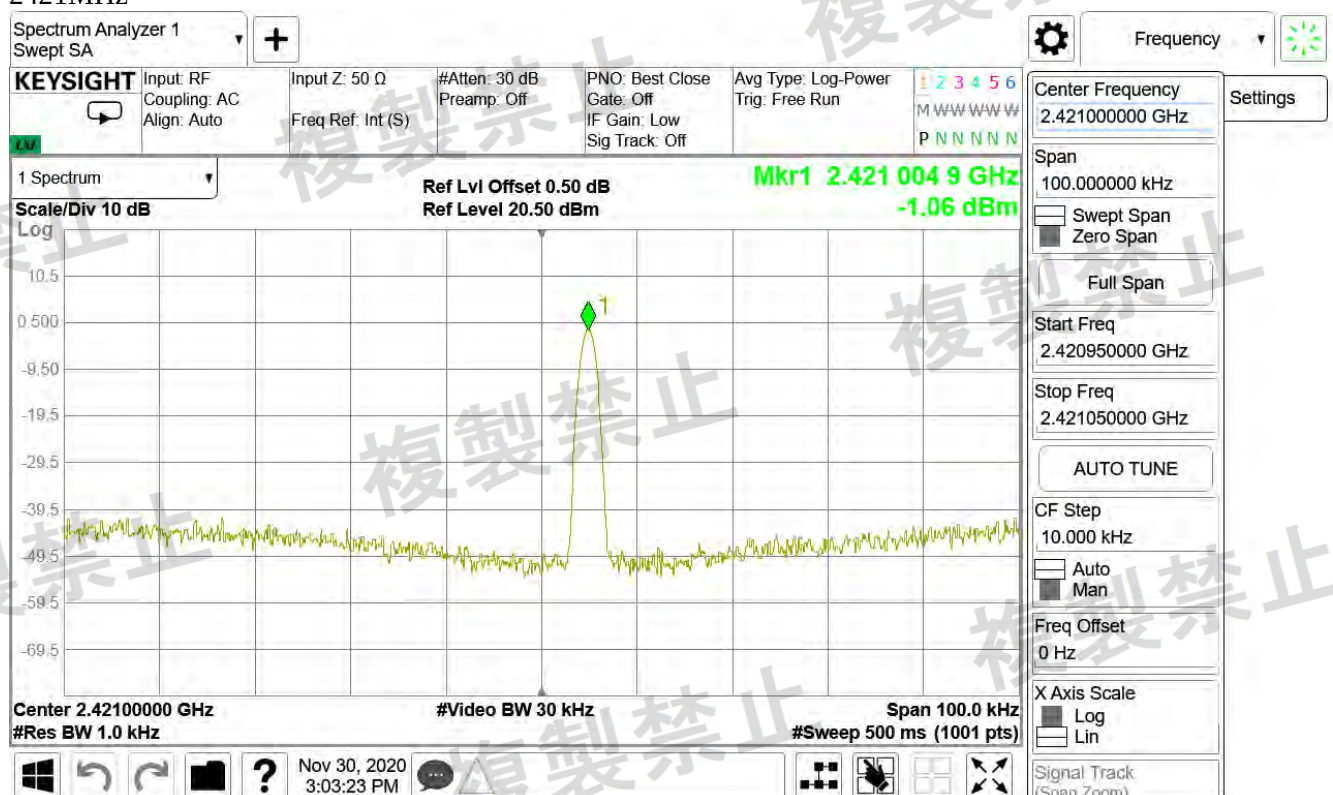
2402MHz



2411MHz



2421MHz



Test Result

PASS

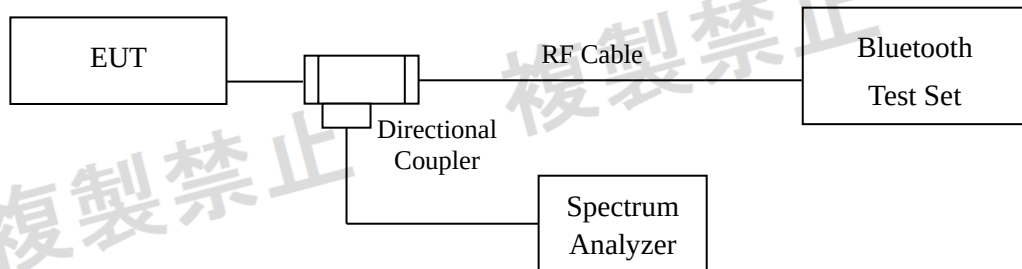
6. Dwell Time

6.1. Test Setup

- ☒ Use the program to control transmitter



- ☐ Use the Bluetooth Test Set to control transmitter



6.2. Test Procedure

A spectrum analyzer or similar device shall be used to observe a sample of the modulated transmitter's radio frequency power output.

- (a) A positive peak detector function must be used.
- (b) The center frequency is set to the test frequency and the span is switched to zero.
- (c) The measurement instrument bandwidth must be set sufficiently with, and, the scan time set sufficiently slow, to ensure all major modulation products are captured. Note that the measurement bandwidth should also be set sufficiently narrow to avoid adding significant error to the test result.
- (d) "Single sweep" mode may be used to capture a packet over a single scan.

6.3. Limits

≤ 400 ms

6.4. Test Result of Dwell Time and Burst Ratio

Product : Humly Room Display One
 Test Item : Dwell Time and Burst Ratio
 Test Mode : Mode 1: Transmitter-Normal-1Mbps (2441MHz)

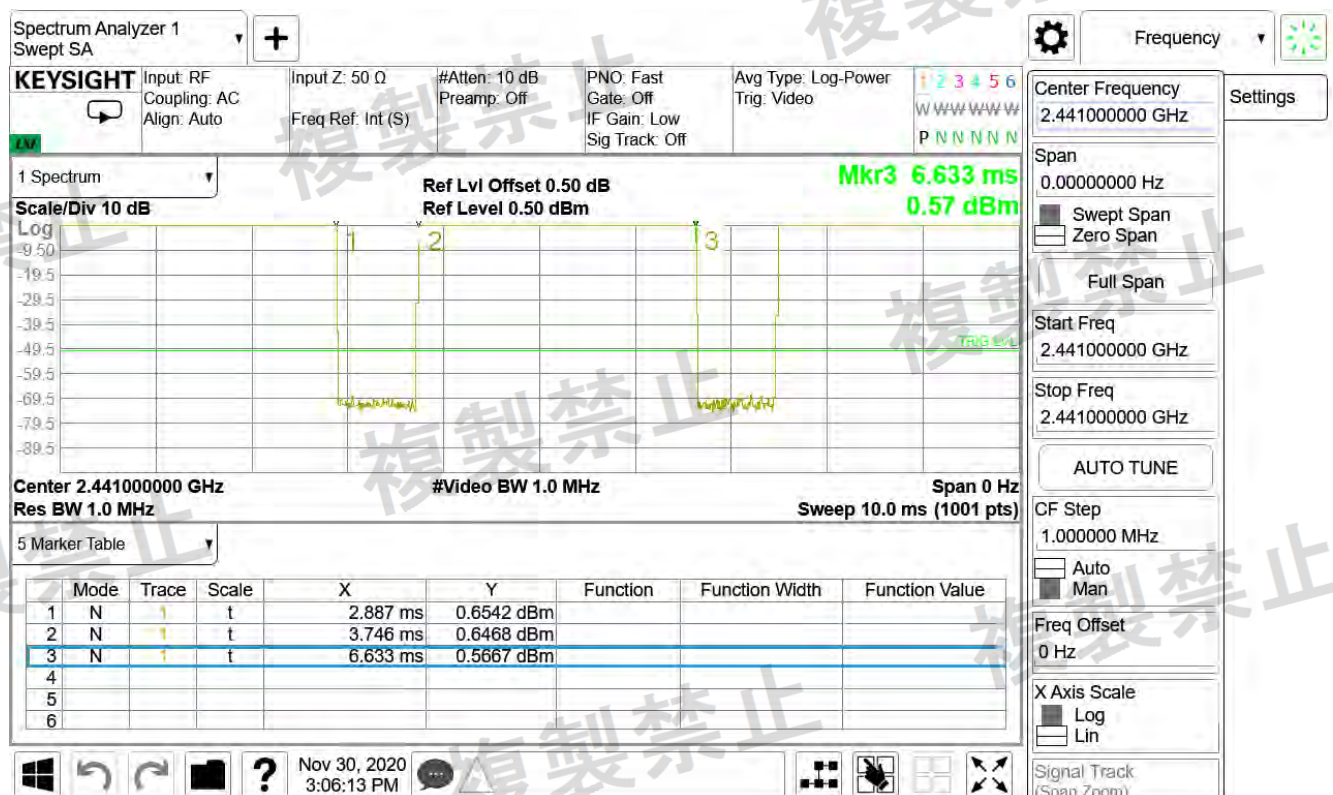
Frequency (MHz)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2441	0.7707	0.2780	0.4	Pass

Note: Dwell time = (spreading rate * 0.4) * (Duty cycle / 79)

Test Conditions		Frequency (MHz)	ON Time (ms)	OFF Time (ms)	Burst Ratio
Tnom (25 °C)	Vnom (100VAC)	2441	2.887	0.859	0.7707

Note: Burst Ratio=(ON Time/ ON Time + OFF Time)

CH 39 Transmission Time



Product : Humly Room Display One
 Test Item : Dwell Time and Burst Ratio
 Test Mode : Mode 2: Transmitter-Normal-2Mbps (2441MHz)

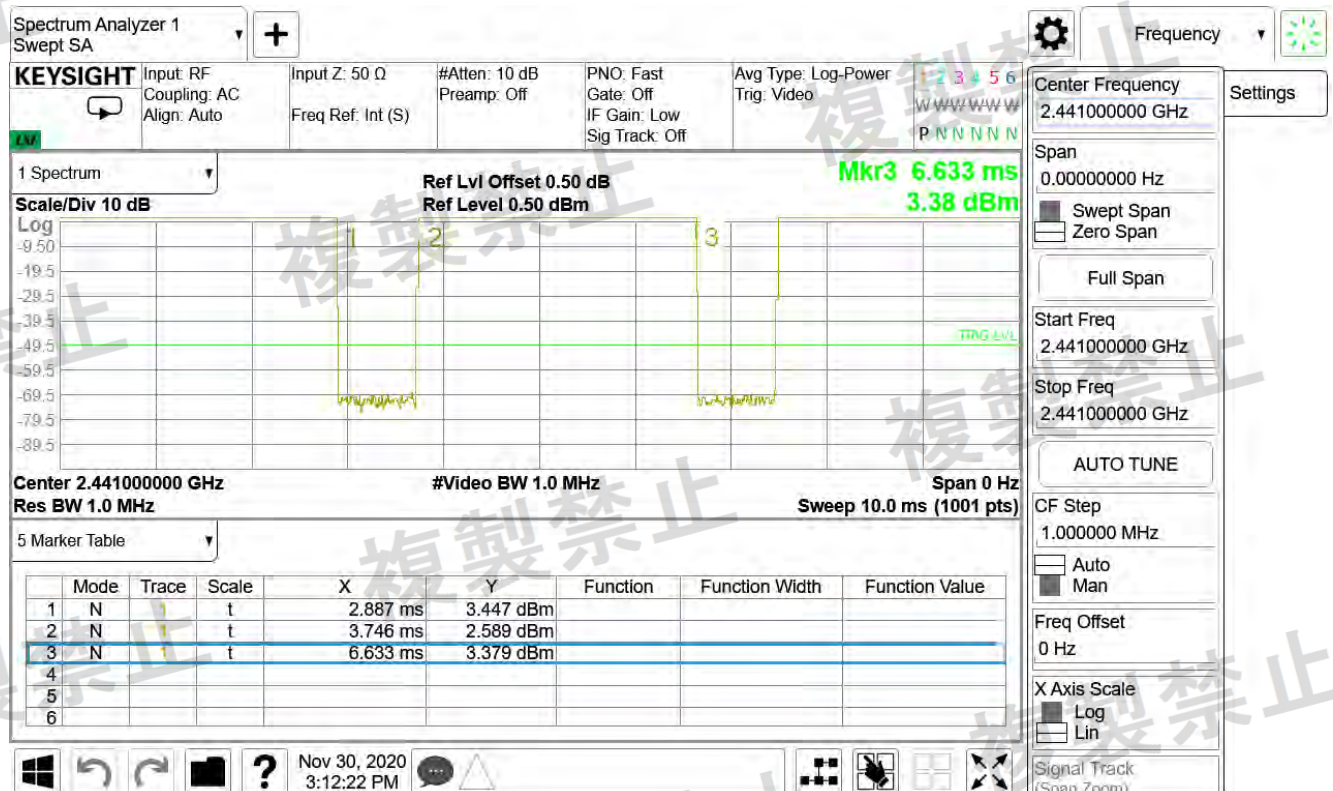
Frequency (MHz)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2441	0.7707	0.2772	0.4	Pass

Note: Dwell time = (spreading rate * 0.4) * (Duty cycle /79)

Test Conditions		Frequency (MHz)	ON Time (ms)	OFF Time (ms)	Burst Ratio
Tnom (25 °C)	Vnom (100VAC)	2441	2.887	0.859	0.7707

Note: Burst Ratio=(ON Time/ ON Time + OFF Time)

CH 39 Transmission Time



Product : Humly Room Display One
 Test Item : Dwell Time and Burst Ratio
 Test Mode : Mode 3 :Transmitter-Normal-3Mbps (2441MHz)

Frequency (MHz)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2441	0.7707	0.2770	0.4	Pass

Note: Dwell time = (spreading rate * 0.4) * (Duty cycle /79)

Test Conditions		Frequency (MHz)	ON Time (ms)	OFF Time (ms)	Burst Ratio
Tnom (25 °C)	Vnom (100VAC)	2441	2.887	0.859	0.7707

Note: Burst Ratio=(ON Time/ ON Time + OFF Time)

CH 39 Transmission Time



Product : Humly Room Display One
 Test Item : Dwell Time and Burst Ratio
 Test Mode : Mode 4: Transmitter-AFH-1Mbps (2411MHz)

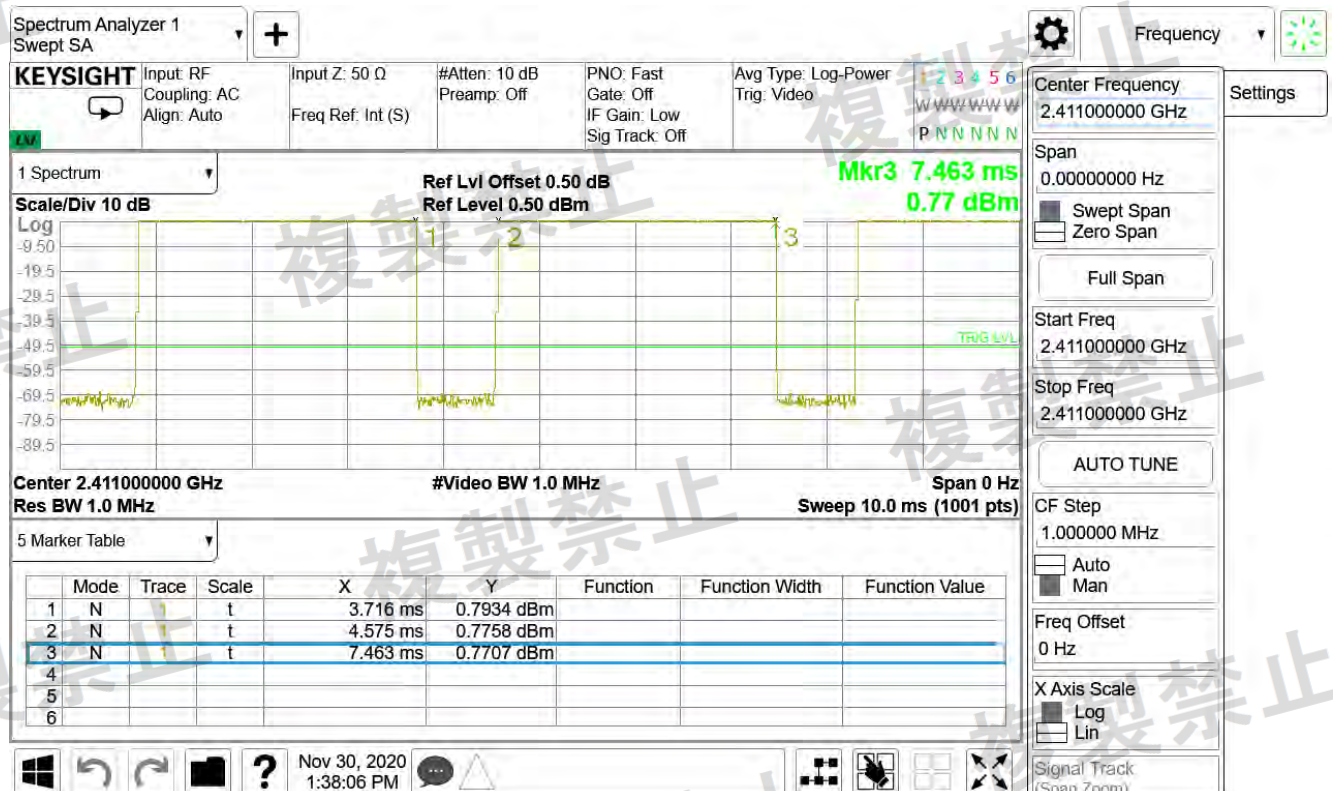
Frequency (MHz)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2411	0.7707	0.2777	0.4	Pass

Note: Dwell time = (spreading rate * 0.4) * (Duty cycle /20)

Test Conditions		Frequency (MHz)	ON Time (ms)	OFF Time (ms)	Burst Ratio
Tnom (25 °C)	Vnom (100VAC)	2411	2.888	0.859	0.7707

Note: Burst Ratio=(ON Time/ ON Time + OFF Time)

CH 09 Transmission Time



Product : Humly Room Display One
 Test Item : Dwell Time and Burst Ratio
 Test Mode : Mode 5: Transmitter-AFH-2Mbps (2411MHz)

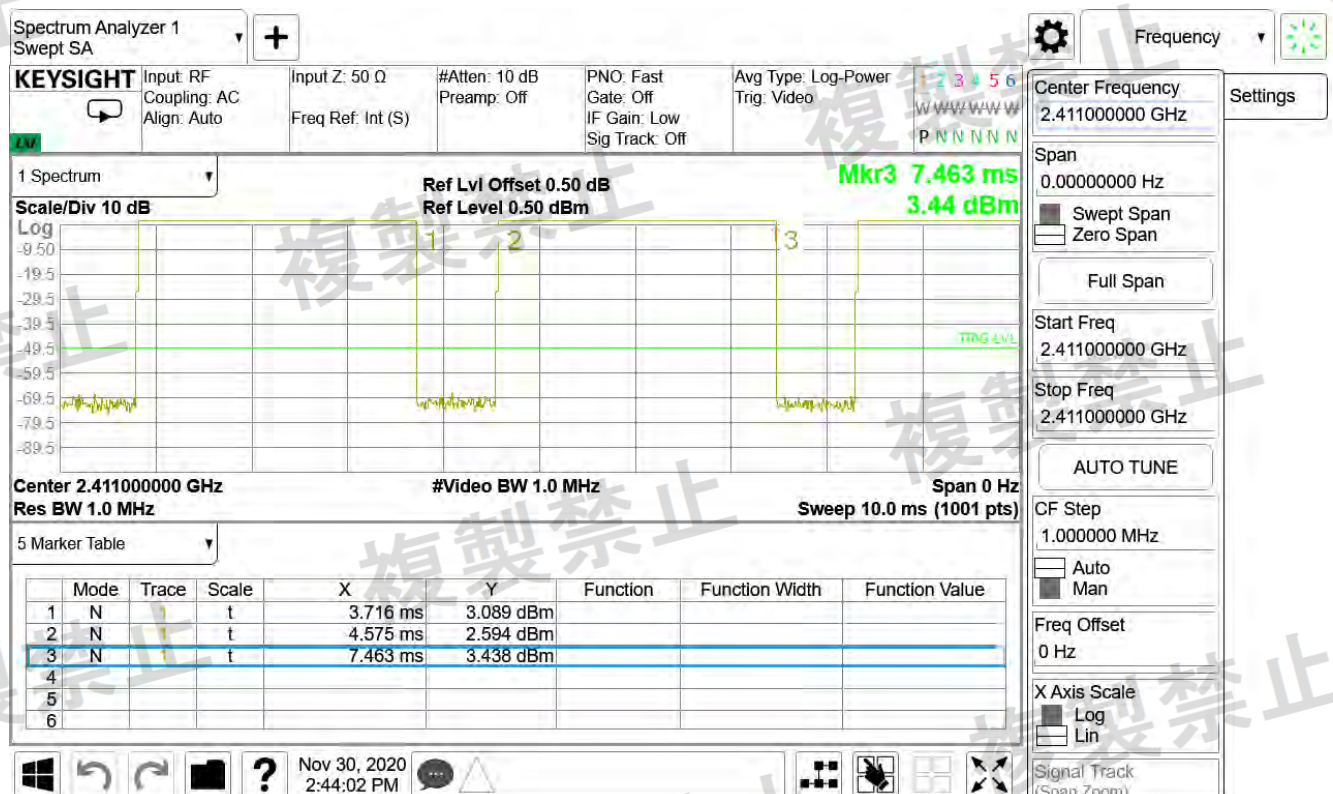
Frequency (MHz)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2411	0.7707	0.2797	0.4	Pass

Note: Dwell time = (spreading rate * 0.4) * (Duty cycle /20)

Test Conditions		Frequency (MHz)	ON Time (ms)	OFF Time (ms)	Burst Ratio
Tnom (25 °C)	Vnom (100VAC)	2411	2.888	0.859	0.7707

Note: Burst Ratio=(ON Time/ ON Time + OFF Time)

CH 09 Transmission Time



Product : Humly Room Display One
 Test Item : Dwell Time and Burst Ratio
 Test Mode : Mode 6: Transmitter-AFH-3Mbps (2411MHz)

Frequency (MHz)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2411	0.7707	0.2810	0.4	Pass

Note: Dwell time = (spreading rate * 0.4) * (Duty cycle / 20)

Test Conditions		Frequency (MHz)	ON Time (ms)	OFF Time (ms)	Burst Ratio
Tnom (25 °C)	Vnom (100VAC)	2411	2.887	0.859	0.7707

Note: Burst Ratio=(ON Time/ ON Time + OFF Time)

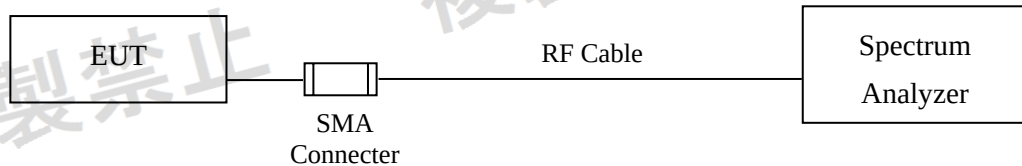
CH 09 Transmission Time



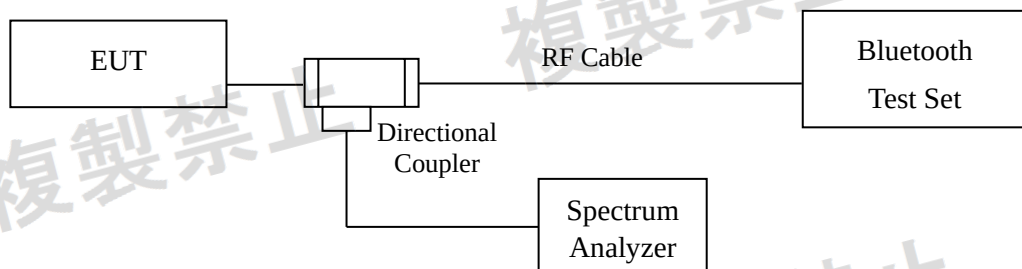
7. Transmitter Suprious Emissions

7.1. Test Setup

☒ Use the program to control transmitter



☐ Use the Bluetooth Test Set to control transmitter



7.2. Test Procedure

A spectrum analyzer or similar device shall be used to observe a sample of the modulated transmitter's radio frequency power output.

- A positive peak detector function must be used.
- The measurement instrument bandwidth and span must be set sufficiently with, and, the scan time set sufficiently slow, to ensure all major modulation products are captured. Note that the measurement bandwidth should also be set sufficiently narrow to avoid adding significant error to the test result.
- 'Maximum Hold' mode may be used to accumulate the measurement result over several scans provided the emission is repetitive in nature.

7.3. Limits

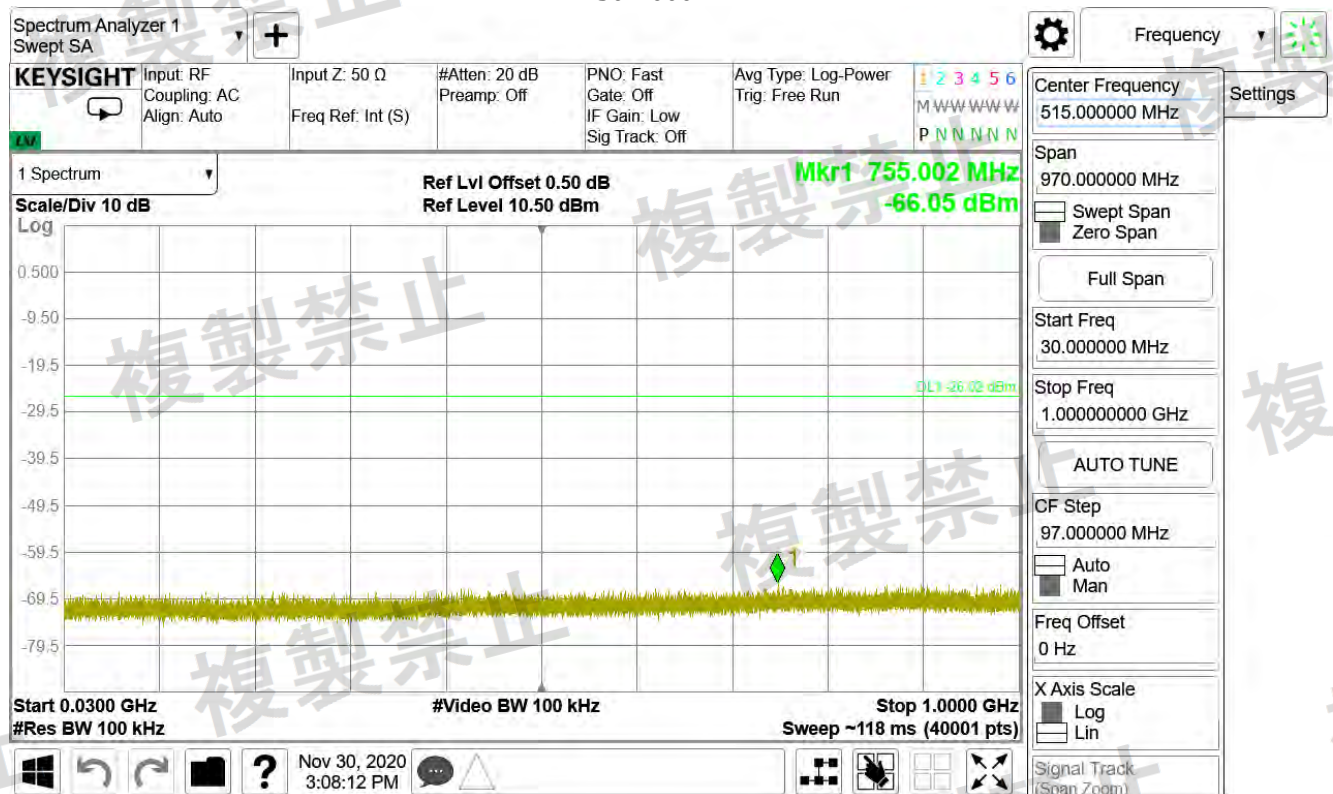
- $\leq 2.5\mu\text{W}$ for 30 – 2387 MHz
- $\leq 25\mu\text{W}$ for 2387 – 2400 MHz
- $\leq 25\mu\text{W}$ for 2483.5 – 2496.5 MHz
- $\leq 2.5\mu\text{W}$ for 2496.5 – 8000 MHz

7.4. Test Result of Transmitter Spurious Emissions

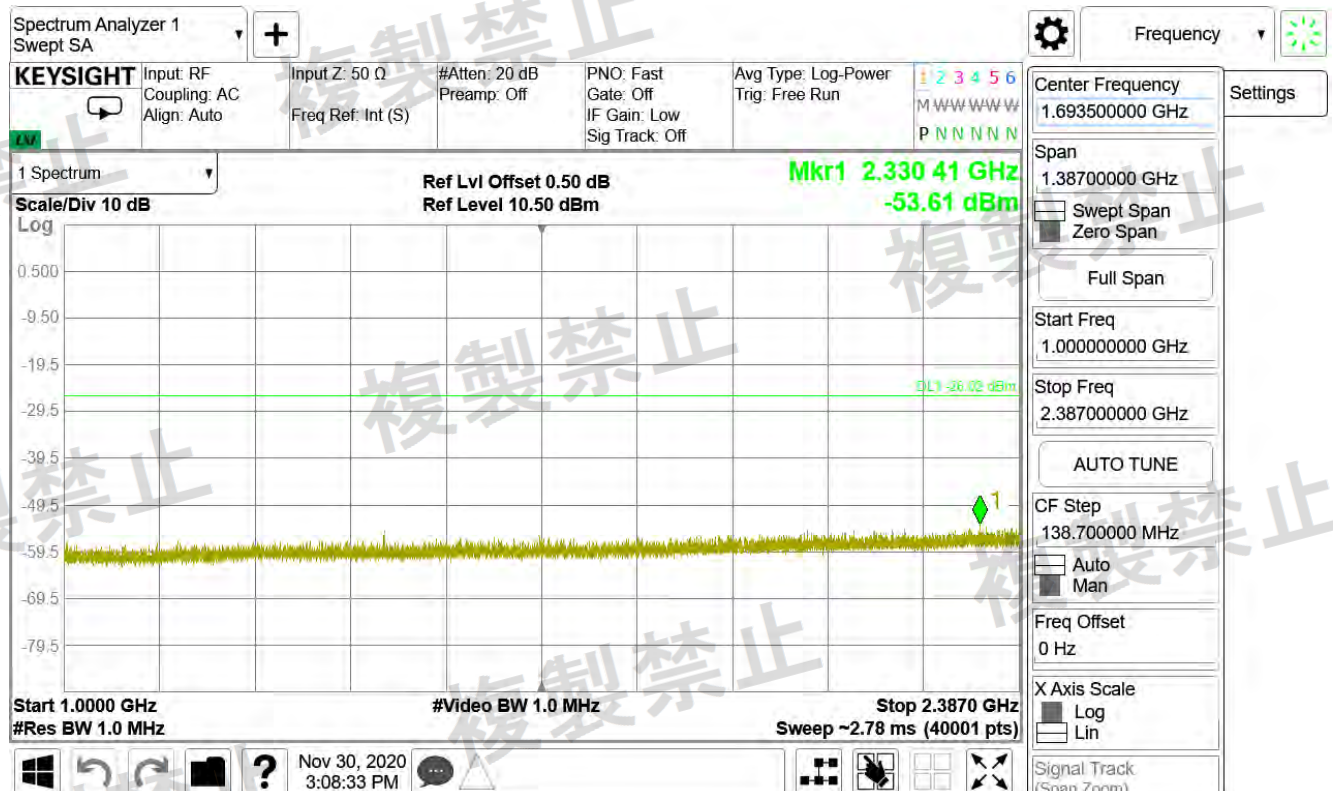
Product : Humly Room Display One
Test Item : Transmitter Spurious Emissions
Test Mode : Mode 1: Transmitter-Normal-1Mbps(2441MHz)

Test Conditions		Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
Tnom (25 °C)	Vnom (100VAC)	30-1000	-66.05	-26 (2.5uW)
		1000 – 2387	-53.61	-26 (2.5uW)
		2387 – 2400	-56.07	-16 (25uW)
		2483.5 –2496.5	-54.81	-16 (25uW)
		2497– 8000	-48.02	-26 (2.5uW)
		8000 – 12500	-54.57	-26 (2.5uW)

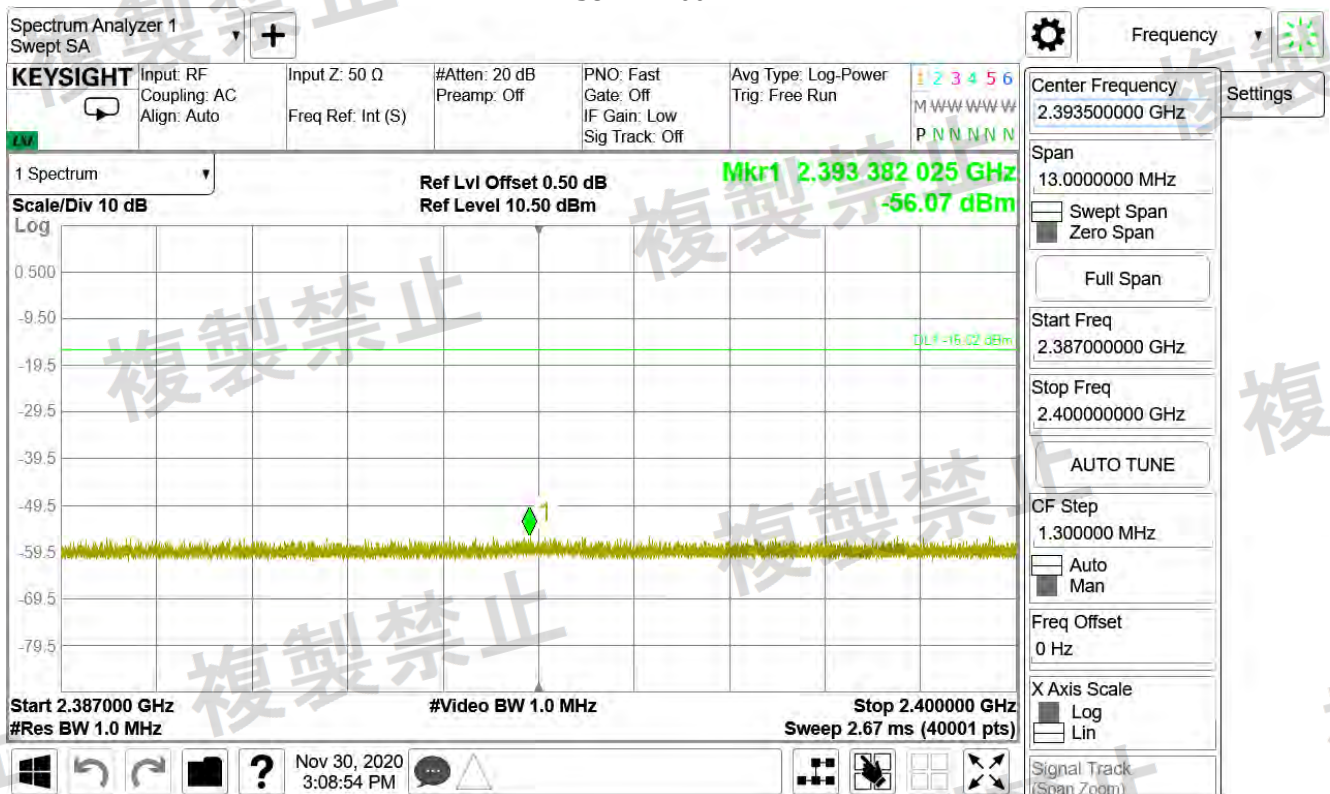
30-1000MHz



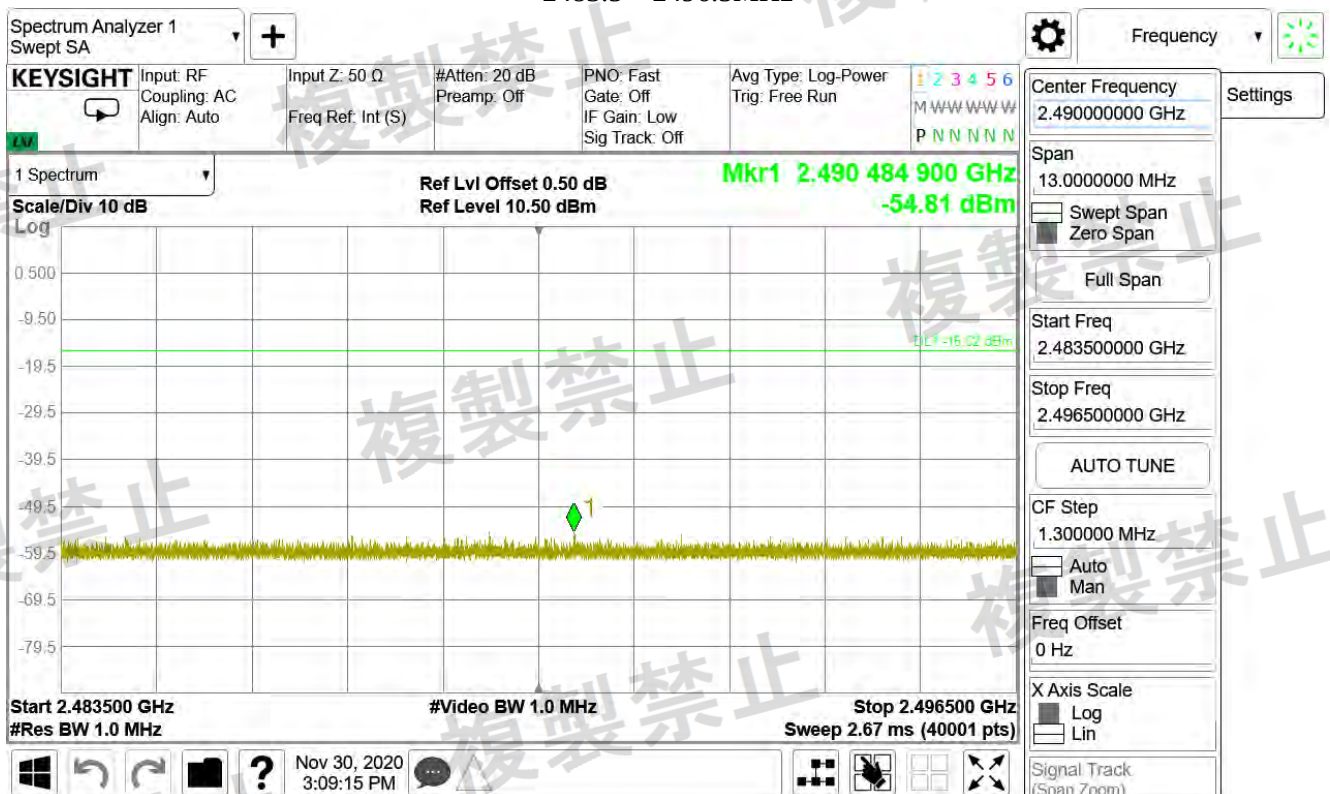
1000- 2387MHz



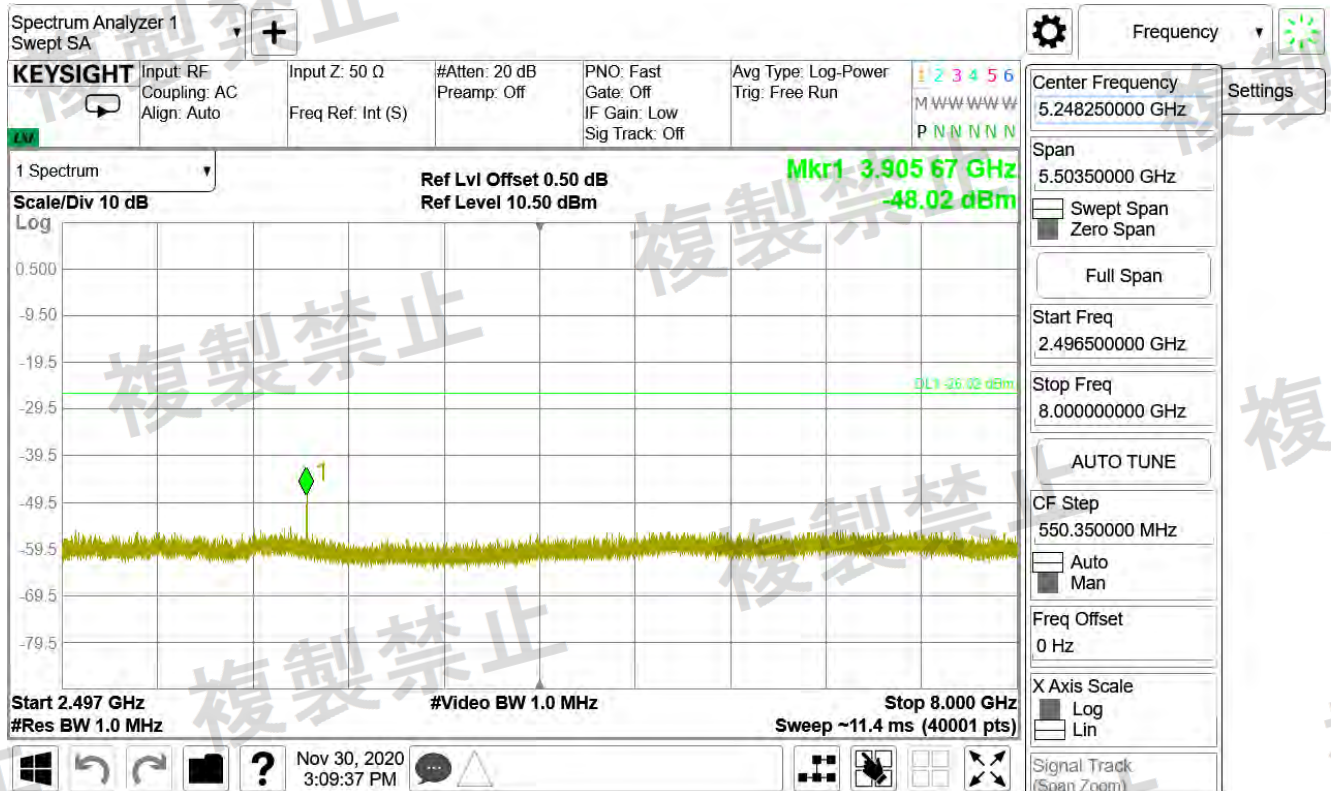
2387 – 2400 MHz



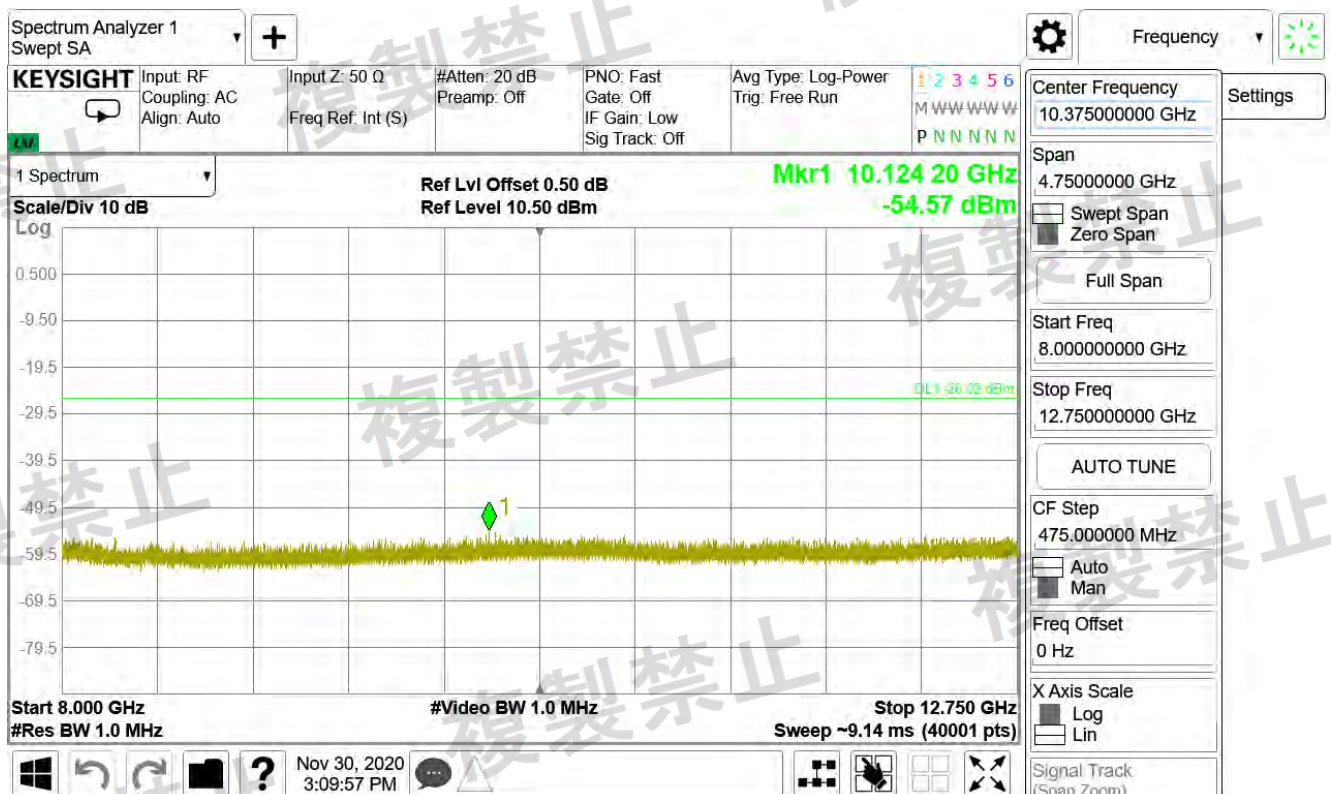
2483.5 – 2496.5 MHz



2497 – 8000MHz



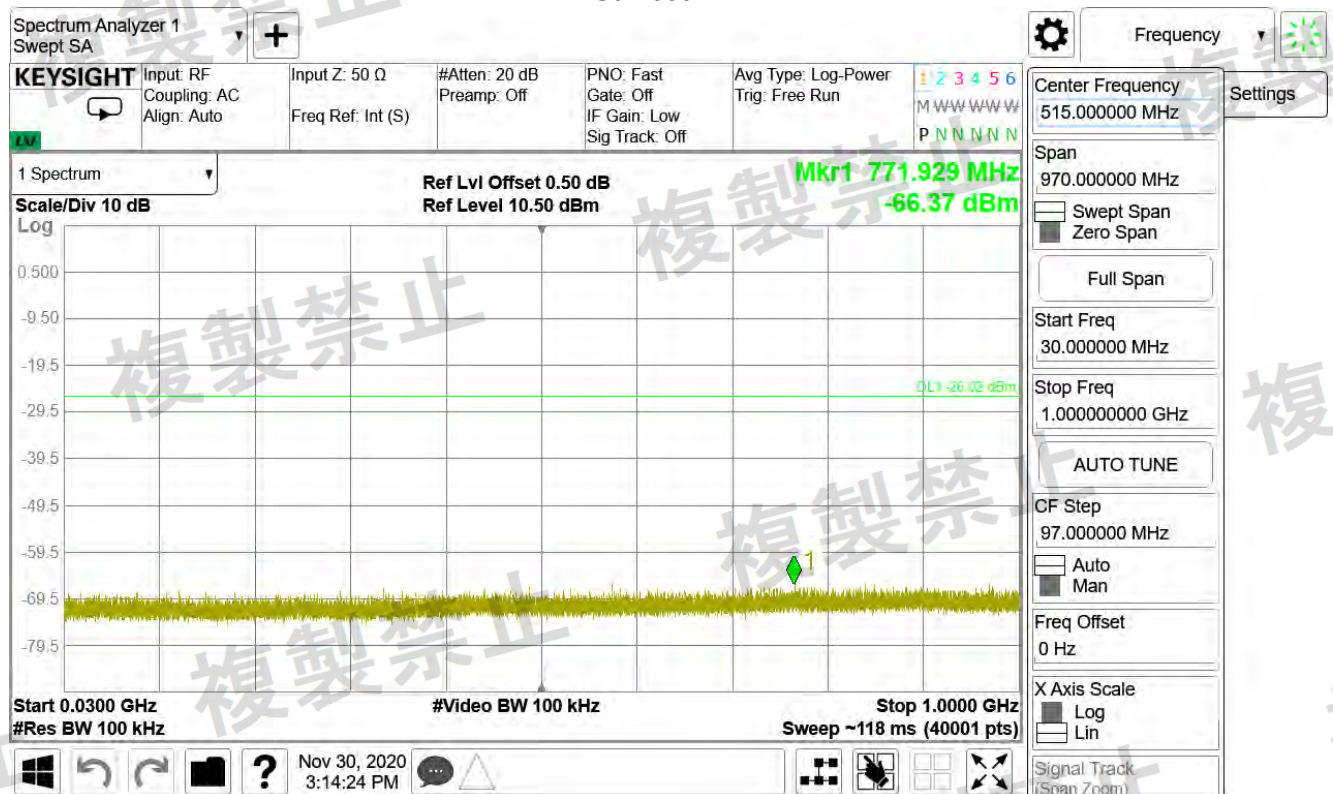
8000 – 12500MHz



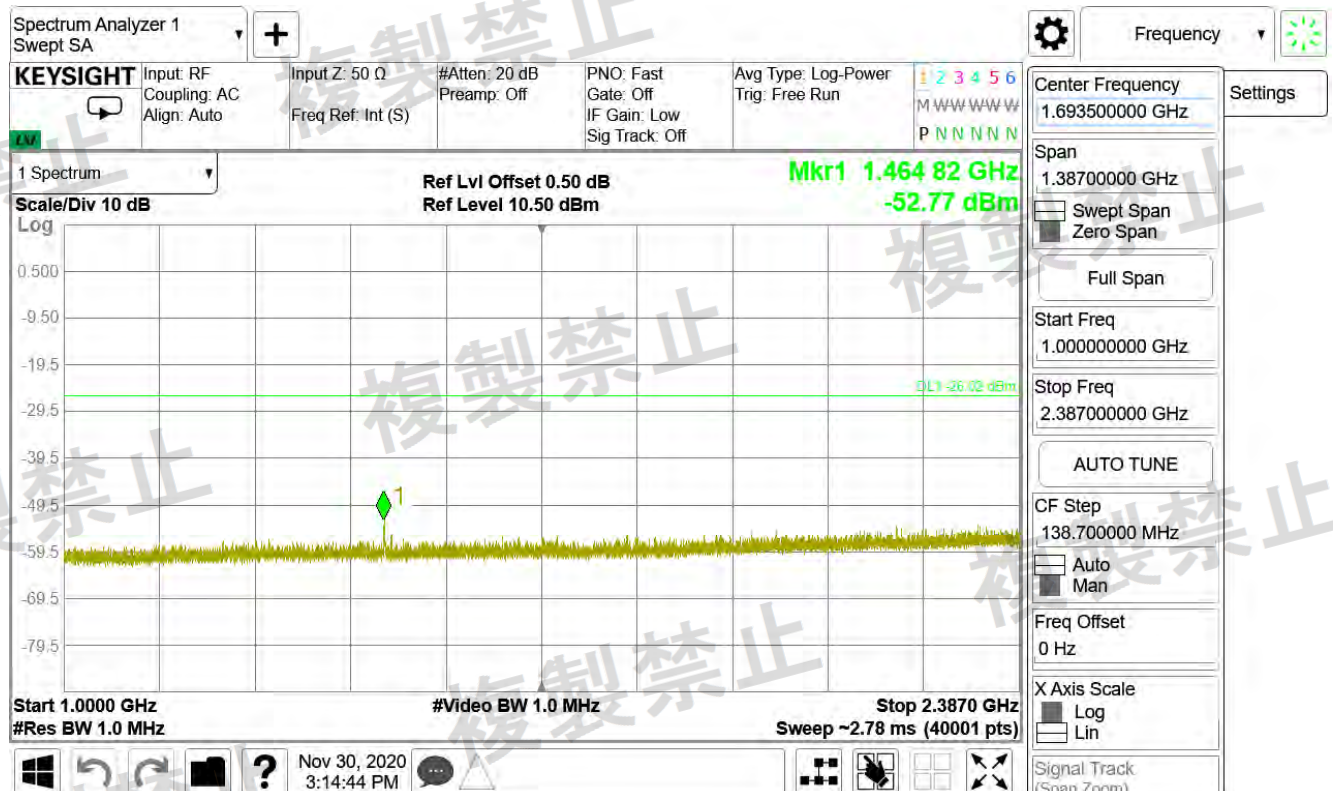
Product : Humly Room Display One
Test Item : Transmitter Spurious Emissions
Test Mode : Mode 2: Transmitter-Normal-2Mbps(2441MHz)

Test Conditions		Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
Tnom (25 °C)	Vnom (100VAC)	30-1000	-66.37	-26 (2.5uW)
		1000 – 2387	-52.77	-26 (2.5uW)
		2387 – 2400	-55.03	-16 (25uW)
		2483.5 –2496.5	-55.37	-16 (25uW)
		2497– 8000	-46.95	-26 (2.5uW)
		8000 – 12500	-55.14	-26 (2.5uW)

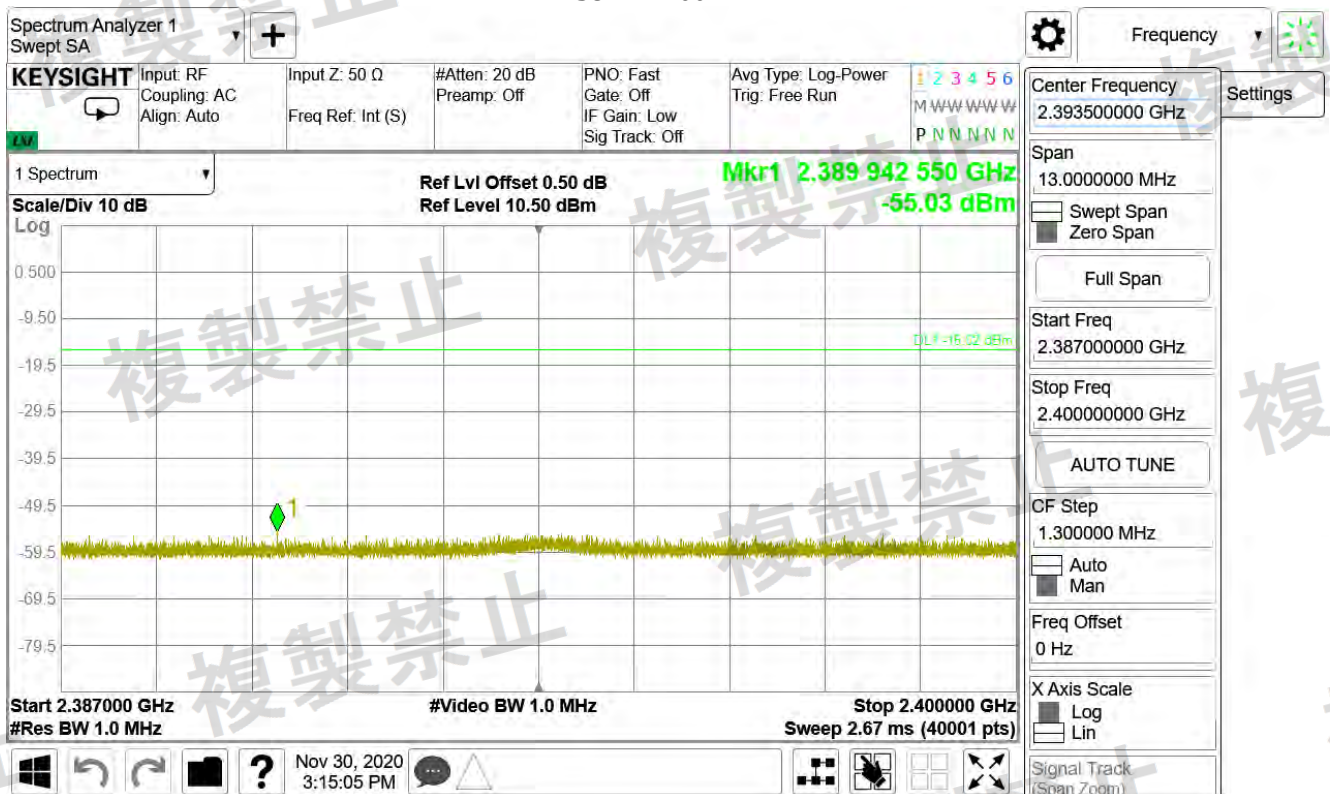
30-1000MHz



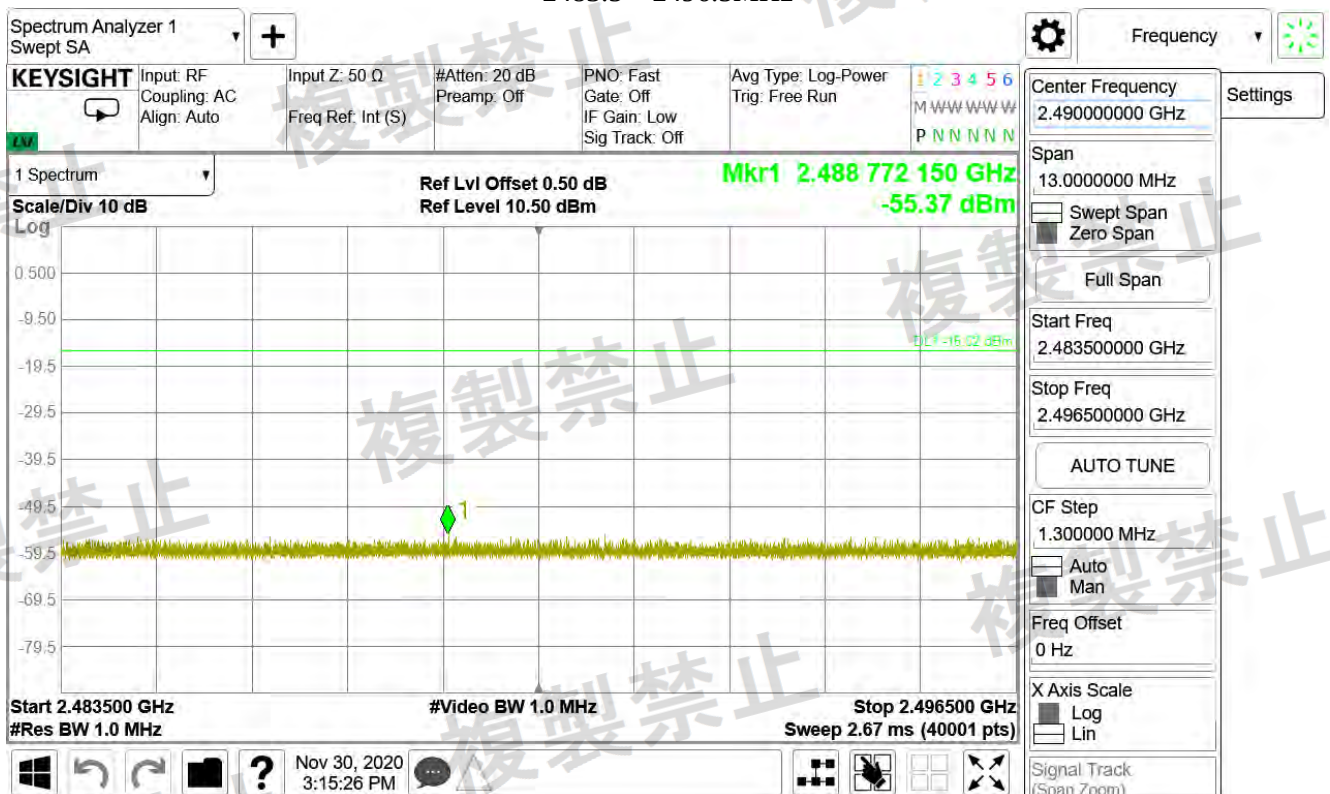
1000- 2387MHz



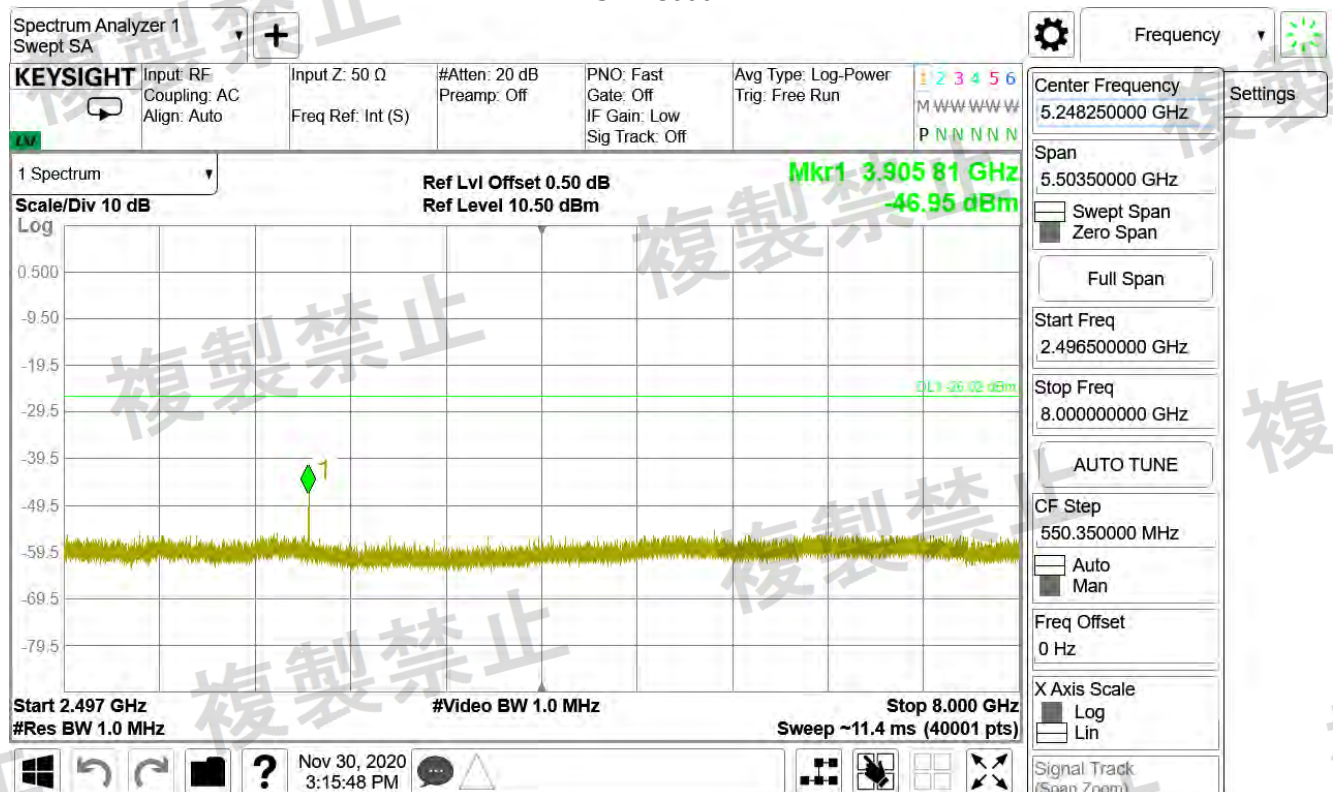
2387 – 2400 MHz



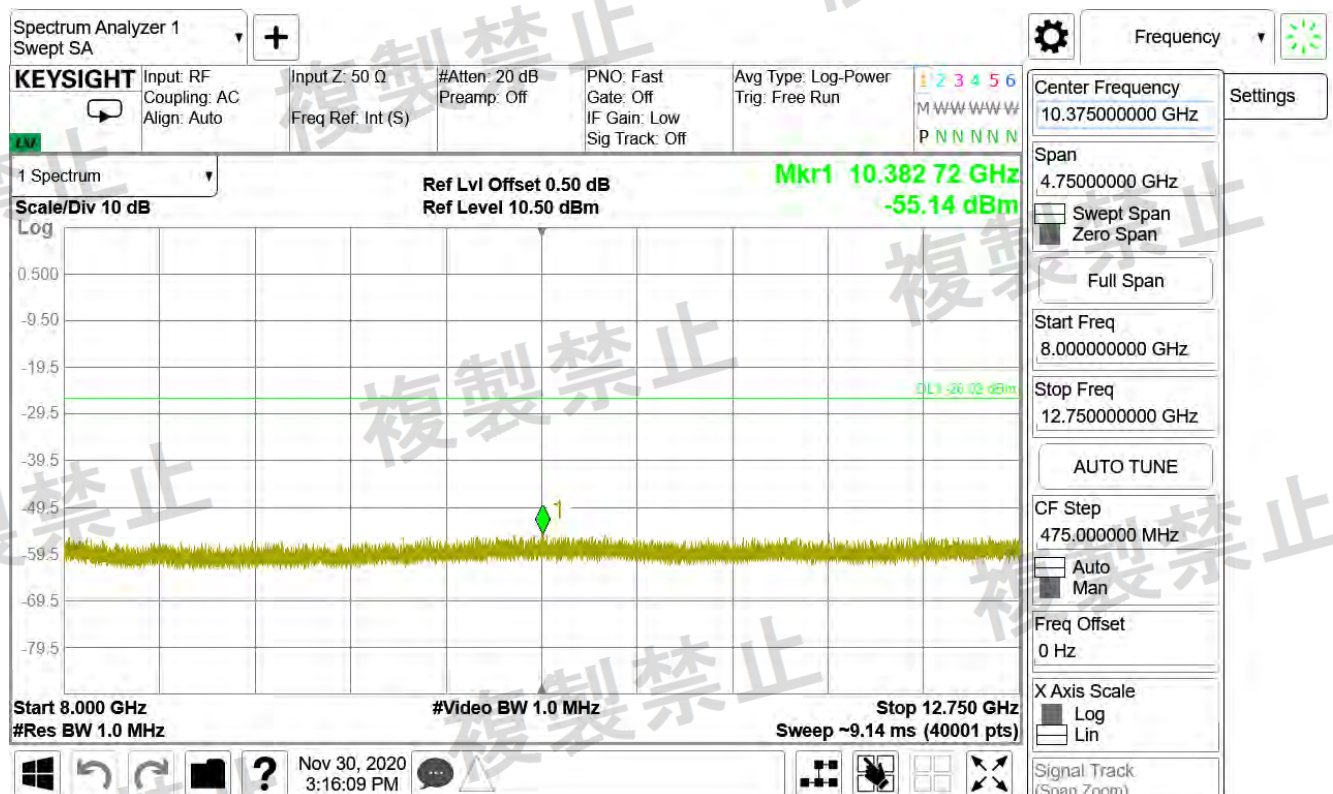
2483.5 – 2496.5 MHz



2497 – 8000MHz



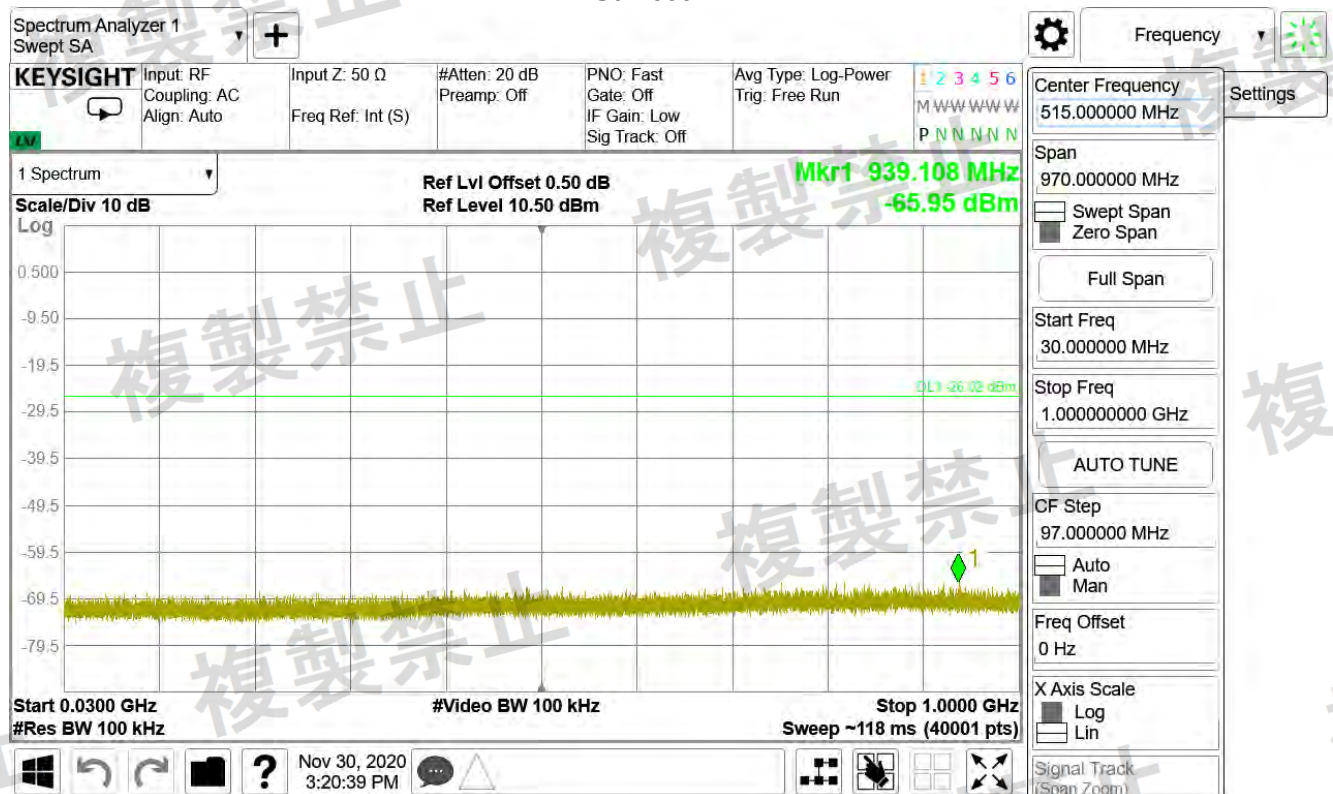
8000 – 12500MHz



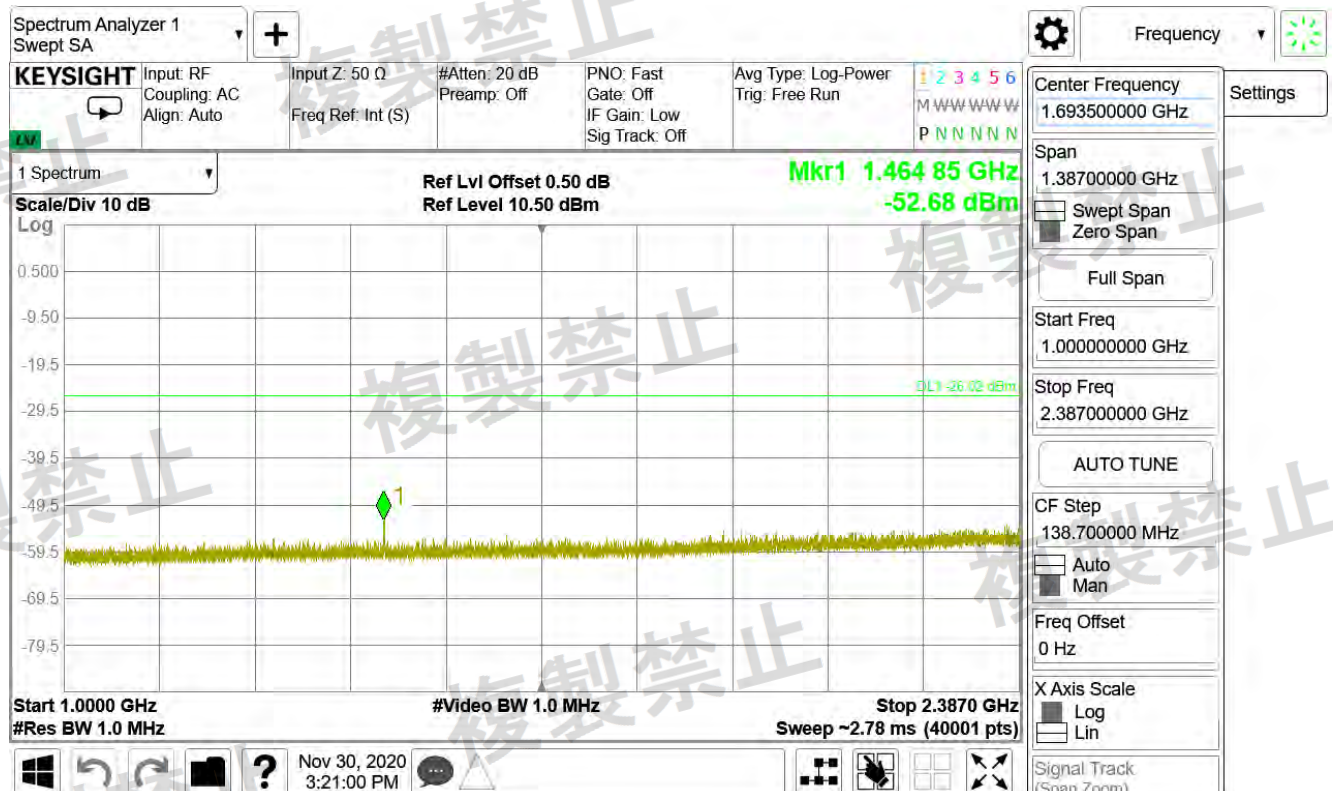
Product : Humly Room Display One
Test Item : Transmitter Spurious Emissions
Test Mode : Mode 3 :Transmitter-Normal-3Mbps (2441MHz)

Test Conditions		Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
Tnom (25 °C)	Vnom (100VAC)	30-1000	-65.95	-26 (2.5uW)
		1000 – 2387	-52.68	-26 (2.5uW)
		2387 – 2400	-54.50	-16 (25uW)
		2483.5 –2496.5	-55.42	-16 (25uW)
		2497– 8000	-48.03	-26 (2.5uW)
		8000 – 12500	-54.06	-26 (2.5uW)

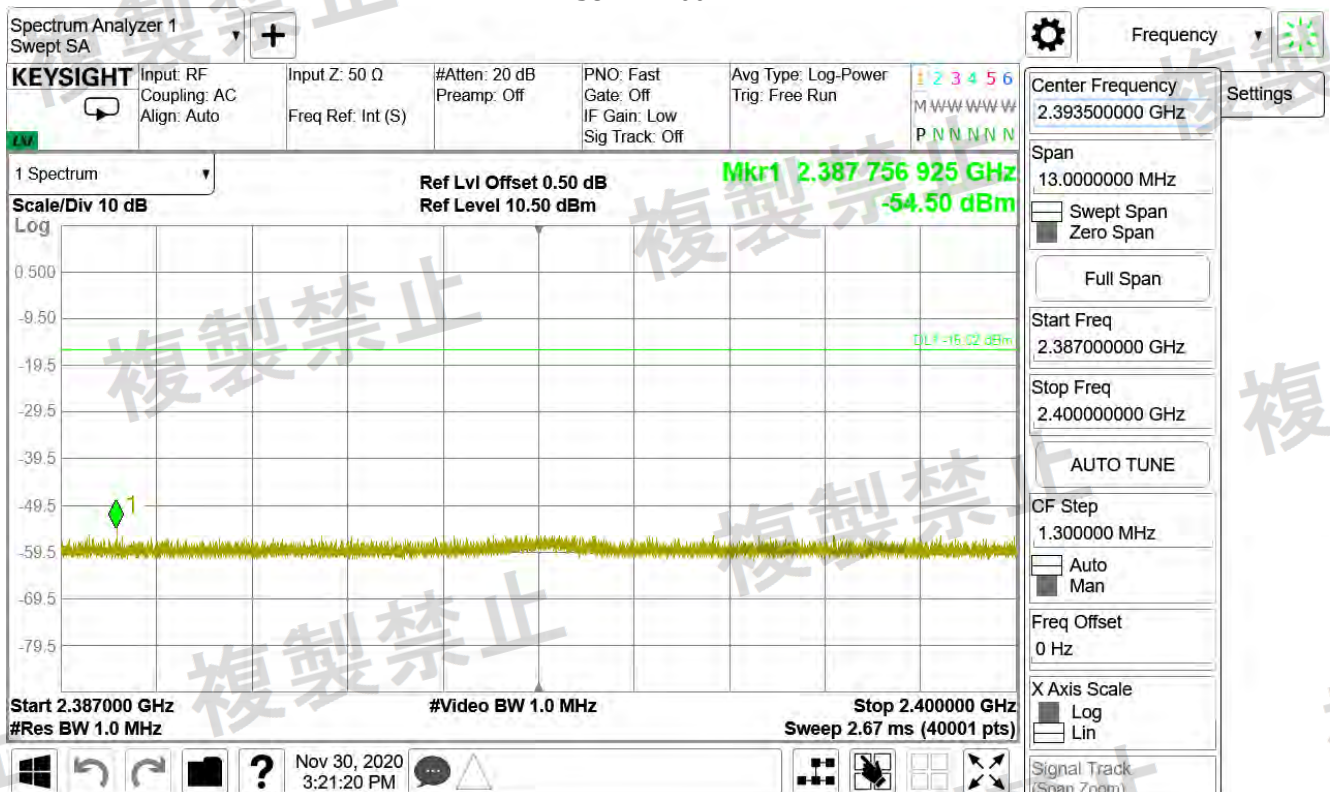
30-1000MHz



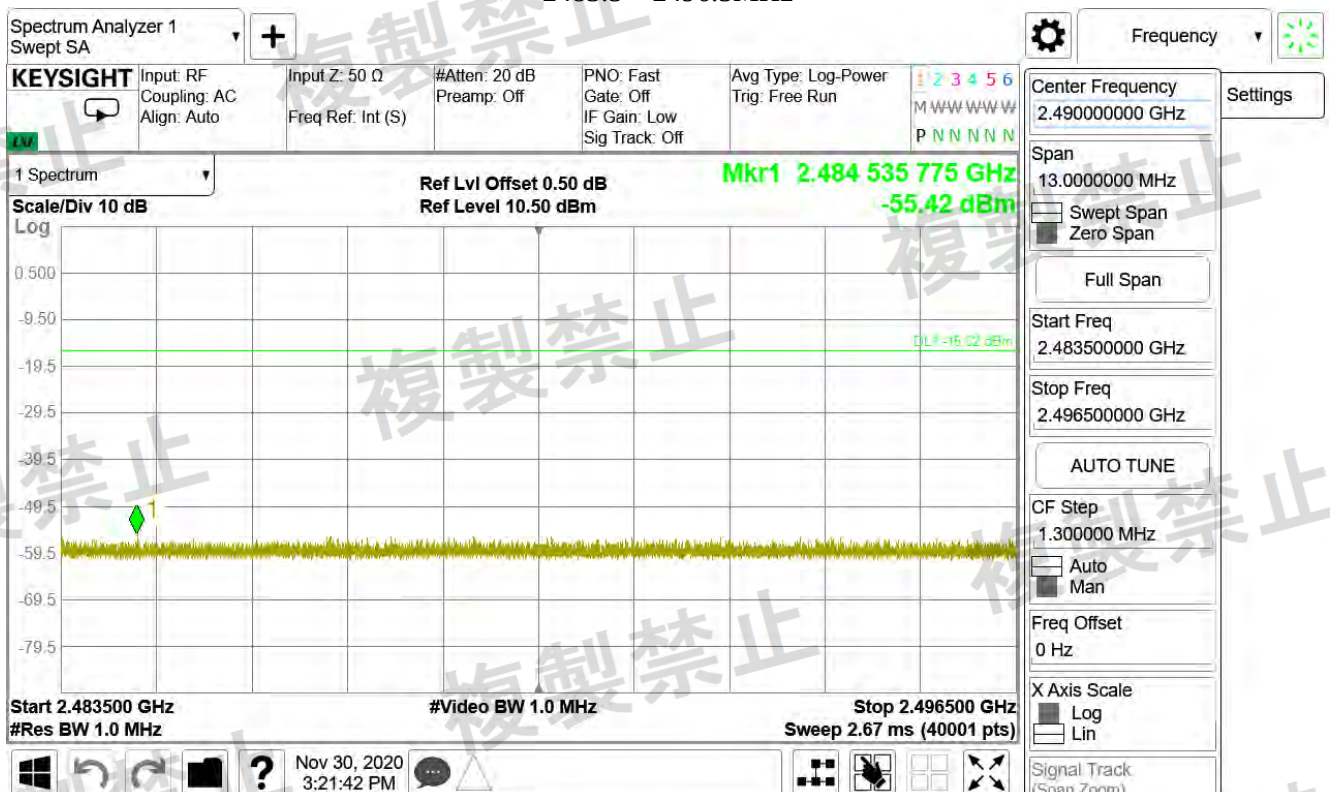
1000- 2387MHz



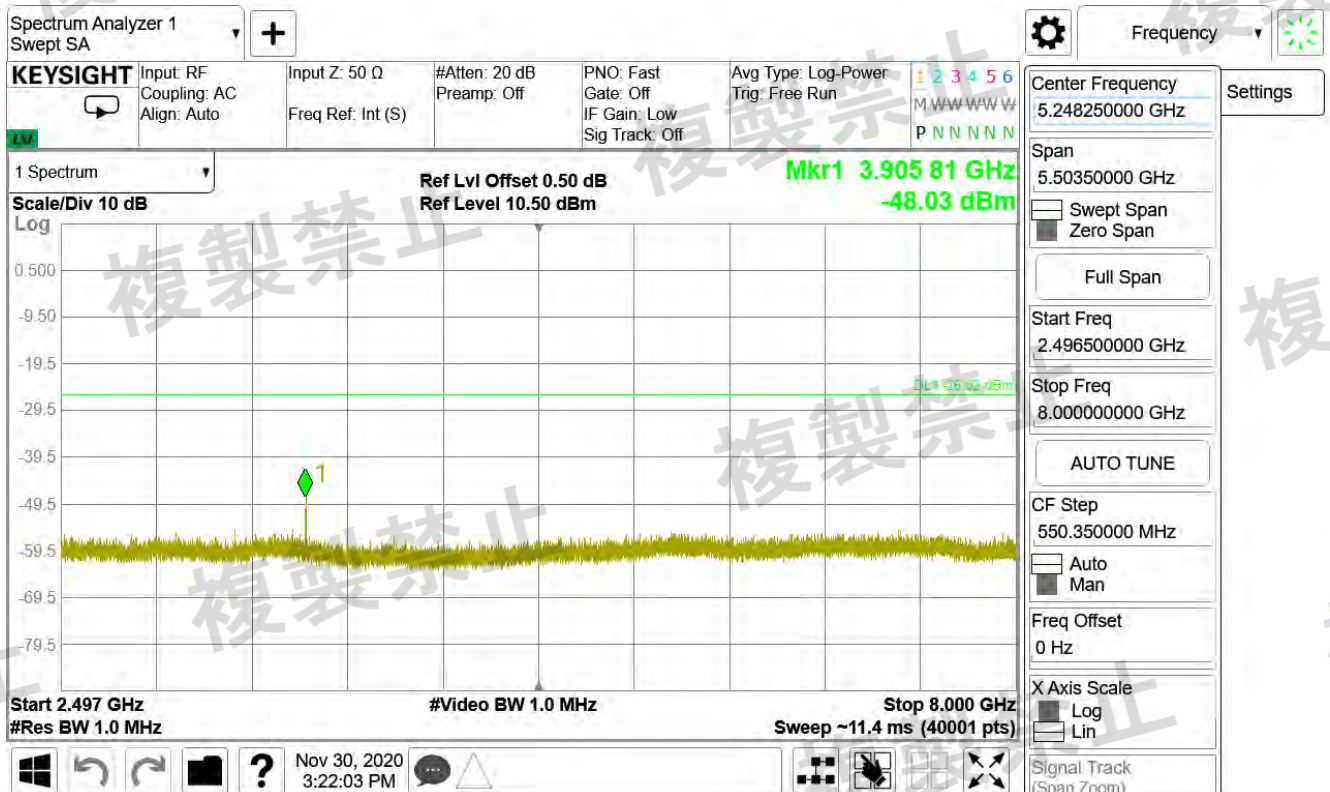
2387 – 2400 MHz



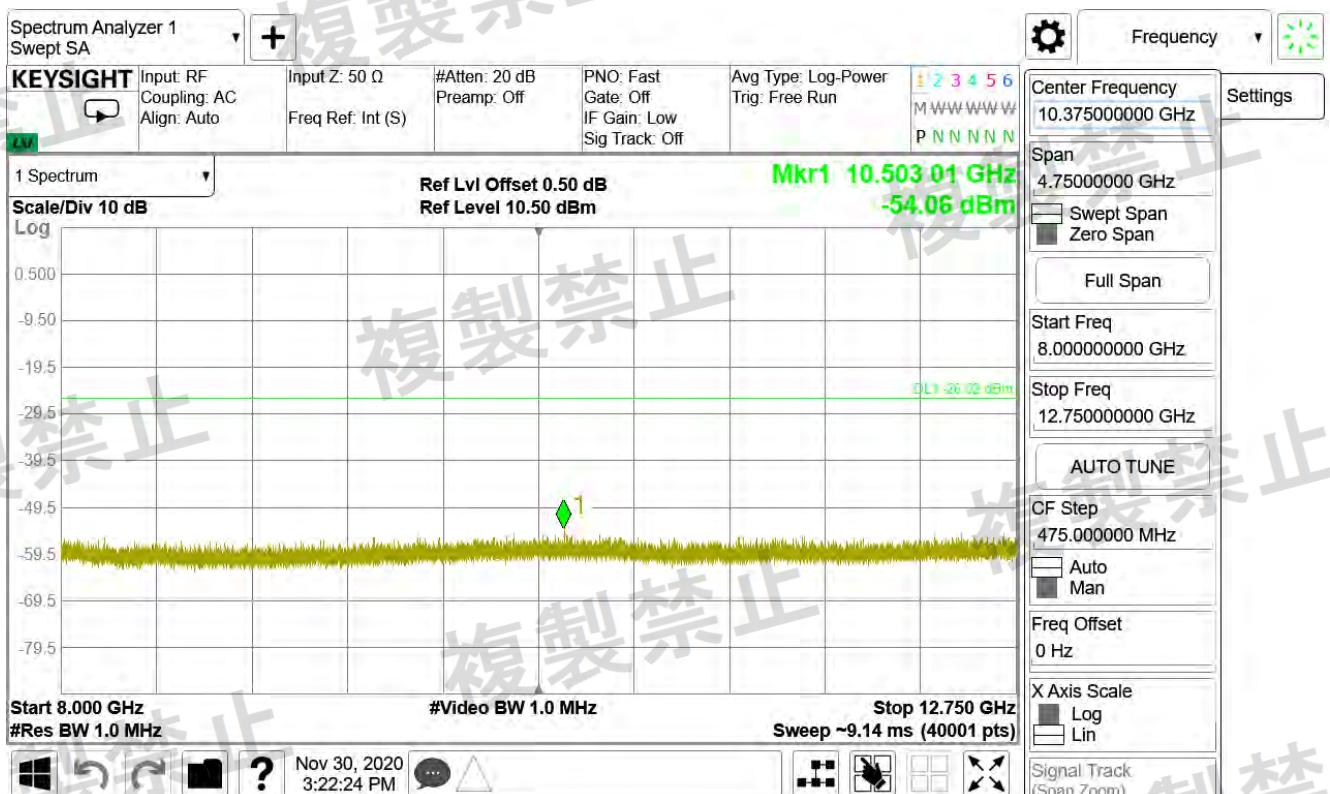
2483.5 – 2496.5 MHz



2497 – 8000MHz



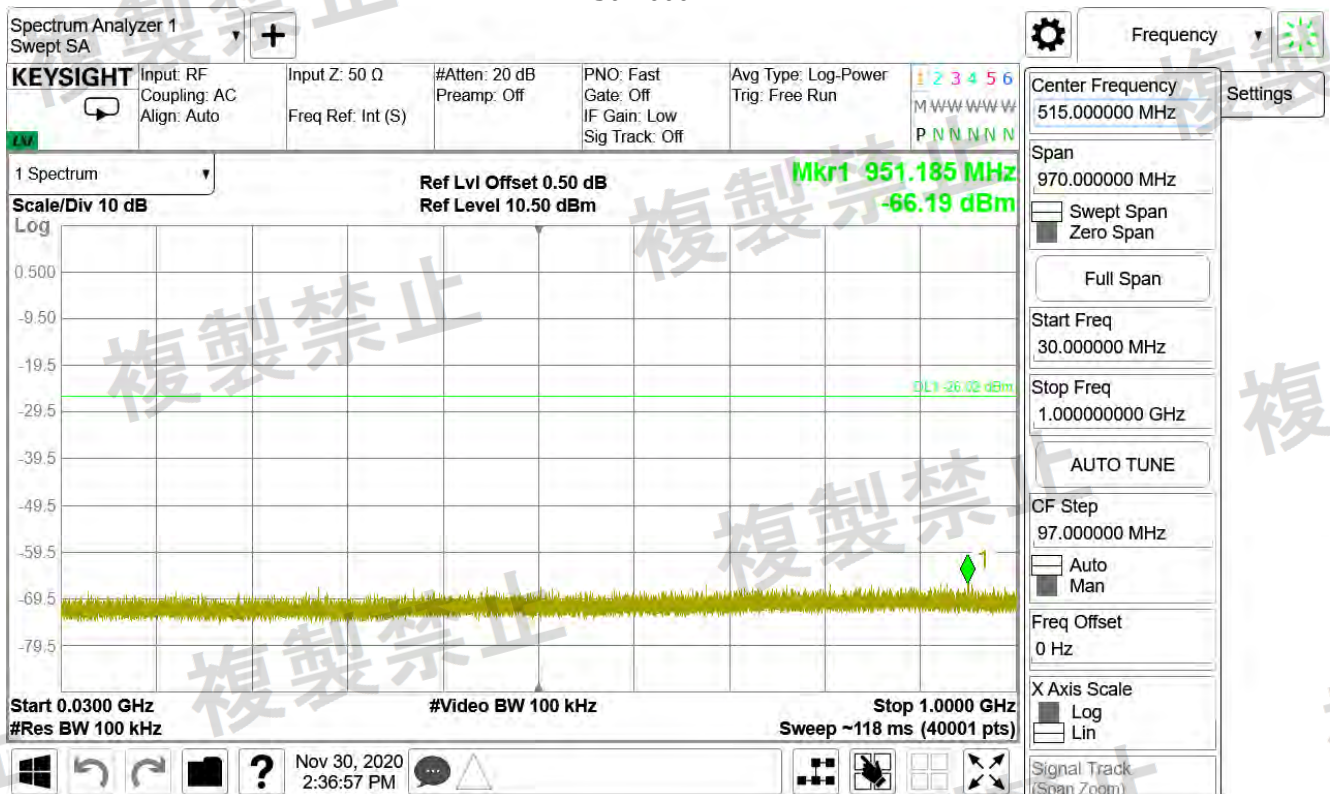
8000 – 12500MHz



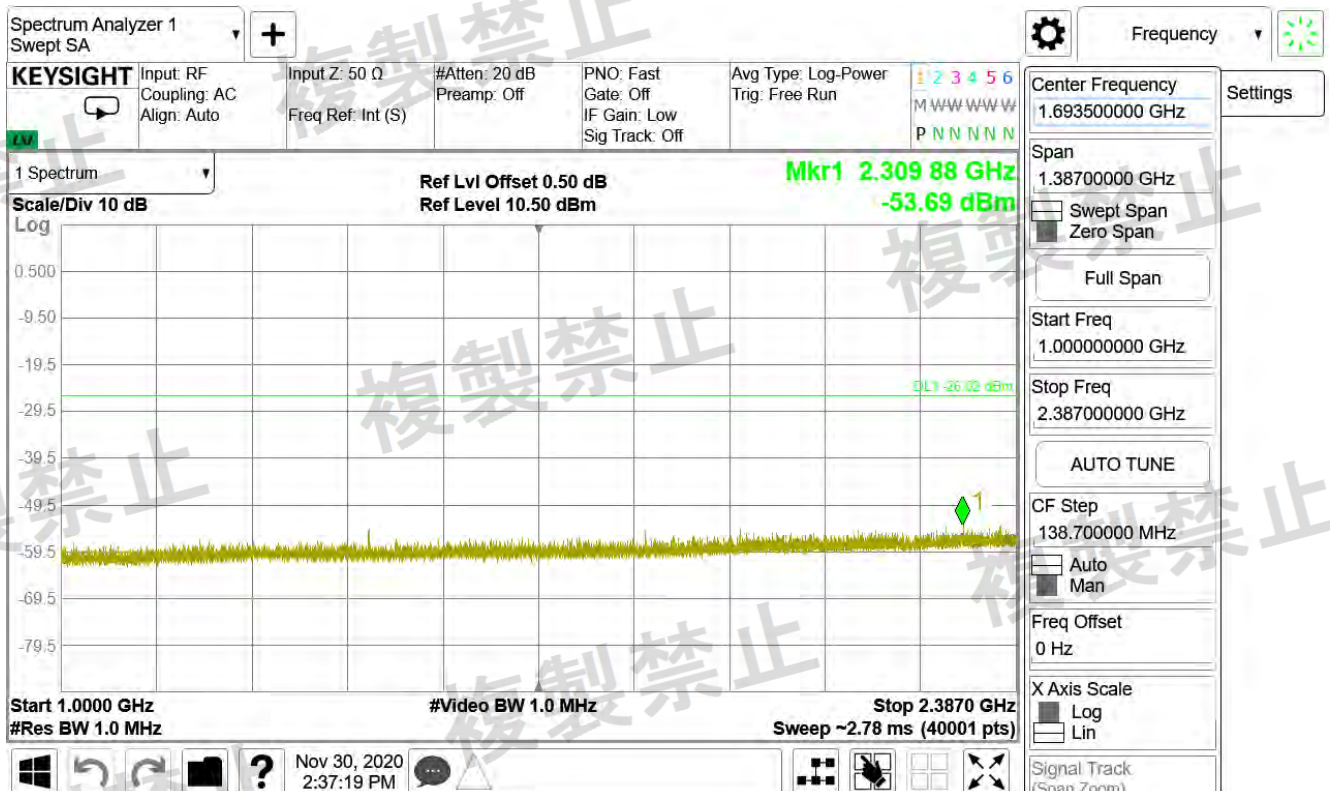
Product : Humly Room Display One
Test Item : Transmitter Spurious Emissions
Test Mode : Mode 4: Transmitter-AFH-1Mbps (2411MHz)

Test Conditions		Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
Tnom (25 °C)	Vnom (100VAC)	30-1000	-66.19	-26 (2.5uW)
		1000 – 2387	-53.69	-26 (2.5uW)
		2387 – 2400	-54.84	-16 (25uW)
		2483.5 –2496.5	-54.62	-16 (25uW)
		2497– 8000	-47.68	-26 (2.5uW)
		8000 – 12500	-53.86	-26 (2.5uW)

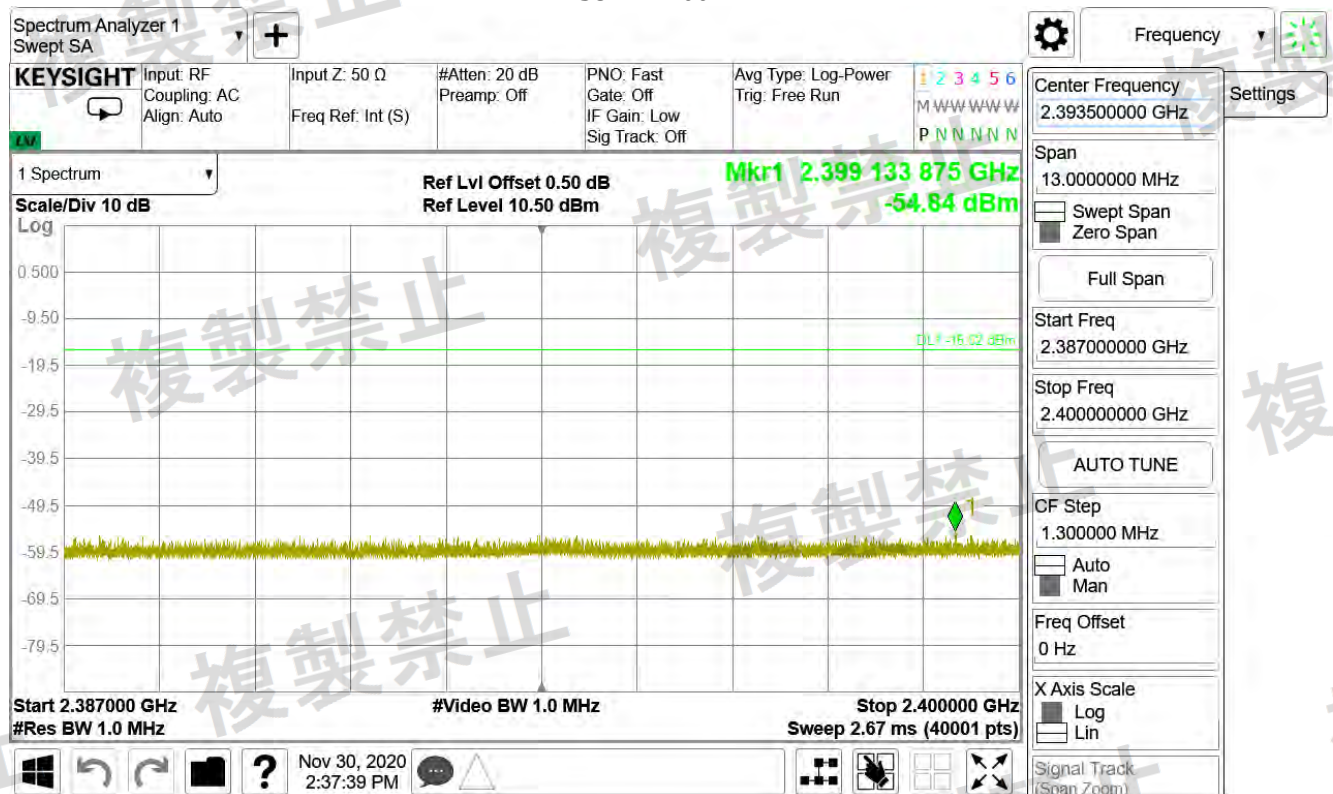
30-1000MHz



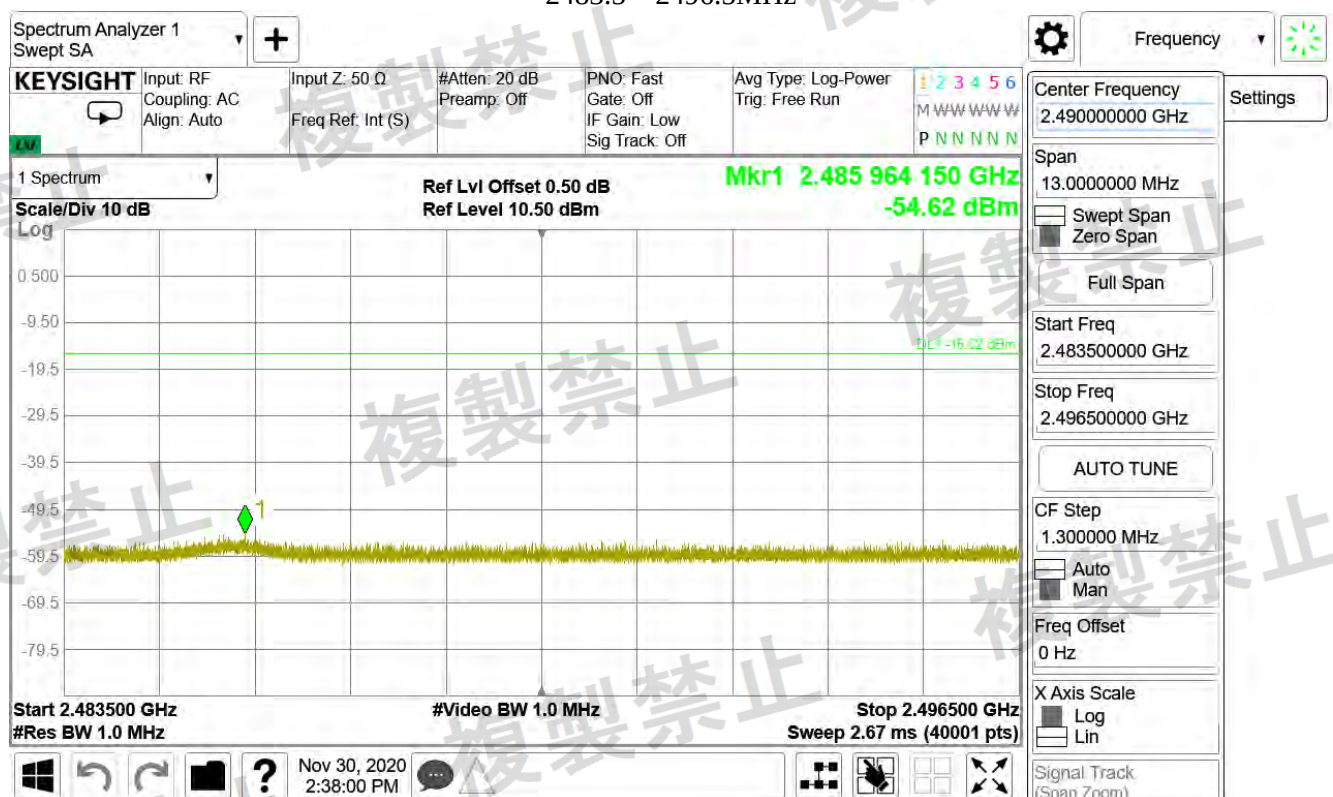
1000- 2387MHz



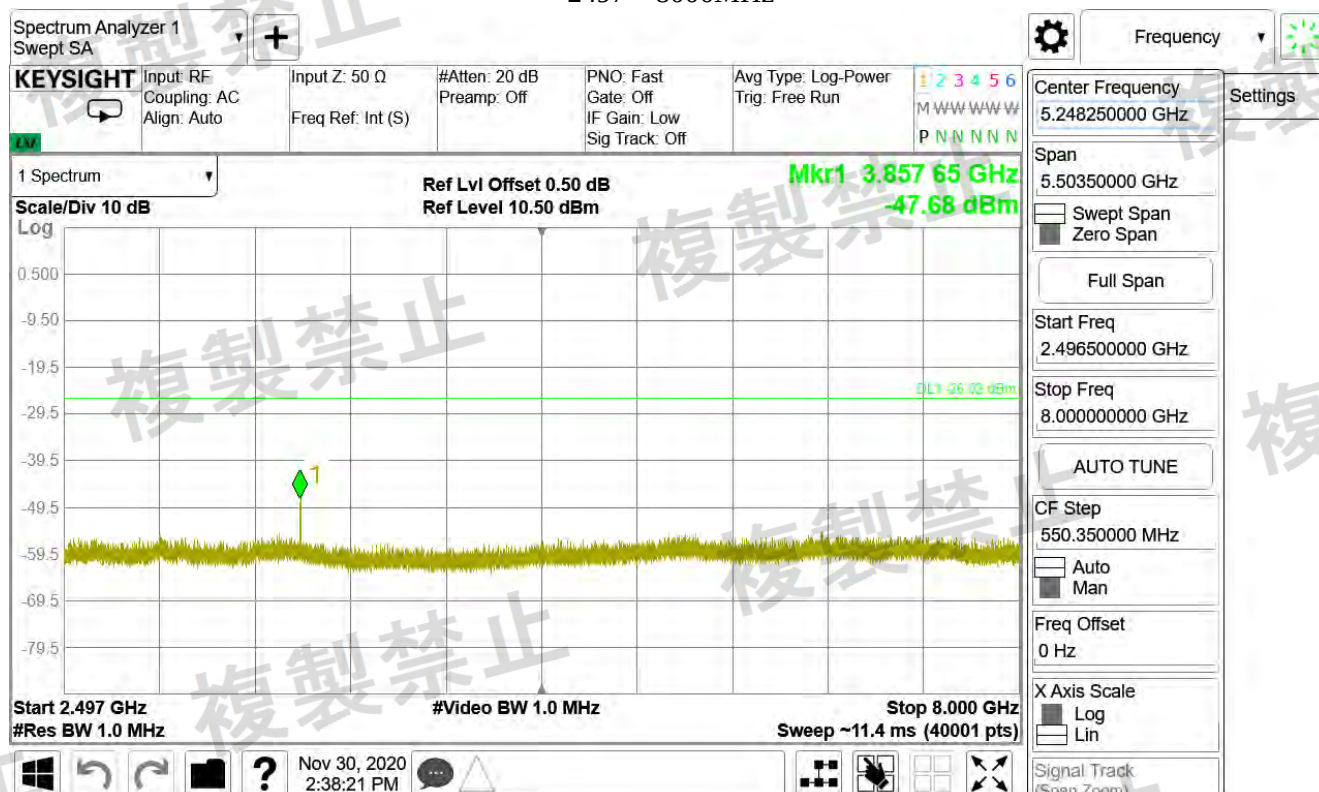
2387 – 2400 MHz



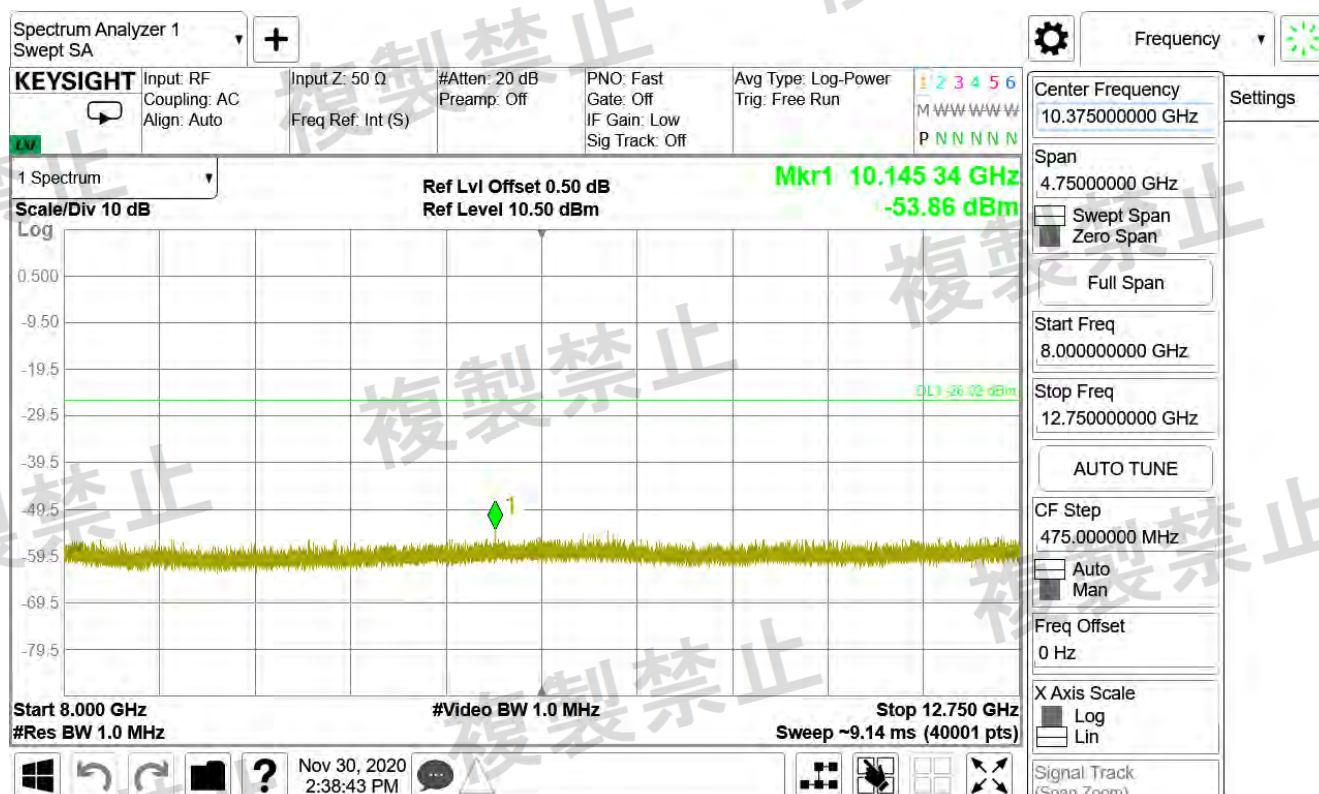
2483.5 – 2496.5 MHz



2497 – 8000MHz



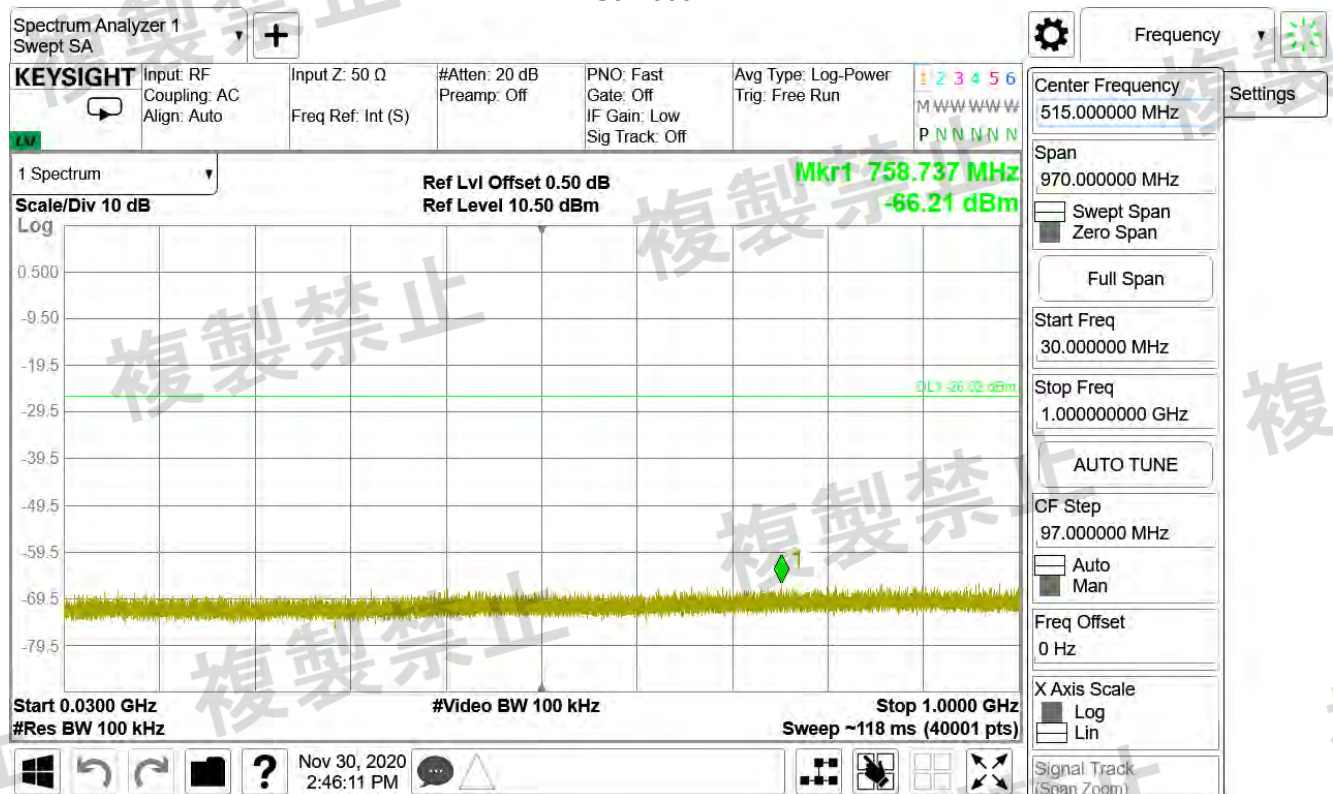
8000 – 12500MHz



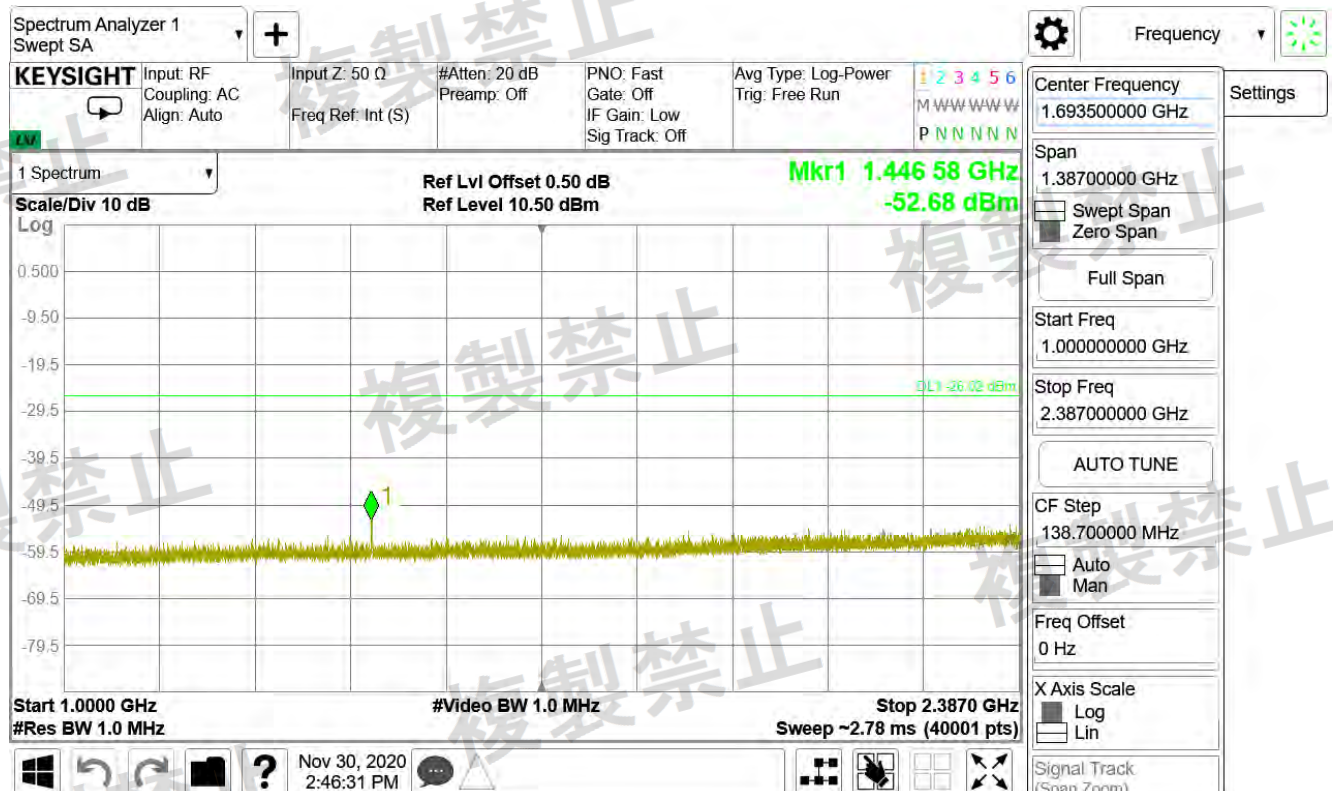
Product : Humly Room Display One
Test Item : Transmitter Spurious Emissions
Test Mode : Mode 5: Transmitter-AFH-2Mbps (2411MHz)

Test Conditions		Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
Tnom (25 °C)	Vnom (100VAC)	30-1000	-66.21	-26 (2.5uW)
		1000 – 2387	-52.68	-26 (2.5uW)
		2387 – 2400	-54.93	-16 (25uW)
		2483.5 – 2496.5	-54.00	-16 (25uW)
		2497– 8000	-48.45	-26 (2.5uW)
		8000 – 12500	-54.73	-26 (2.5uW)

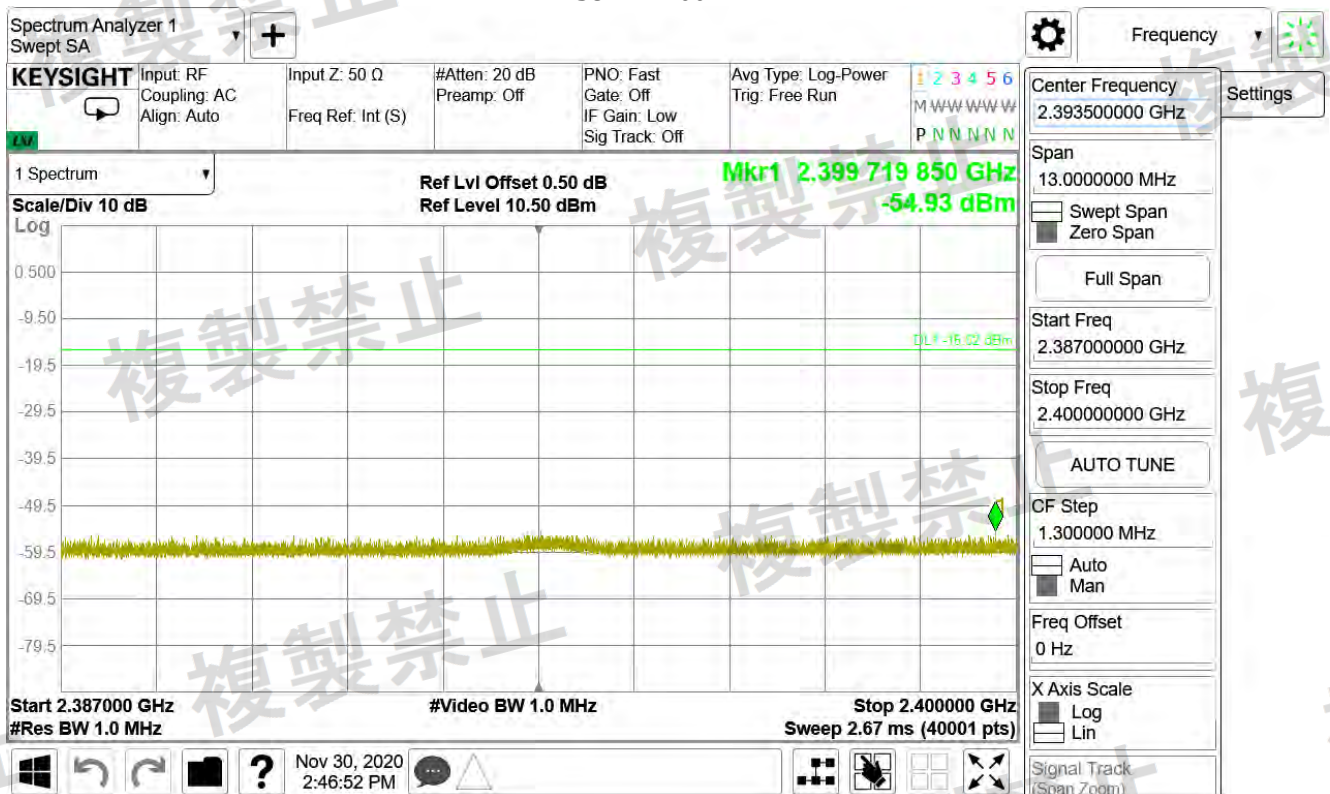
30-1000MHz



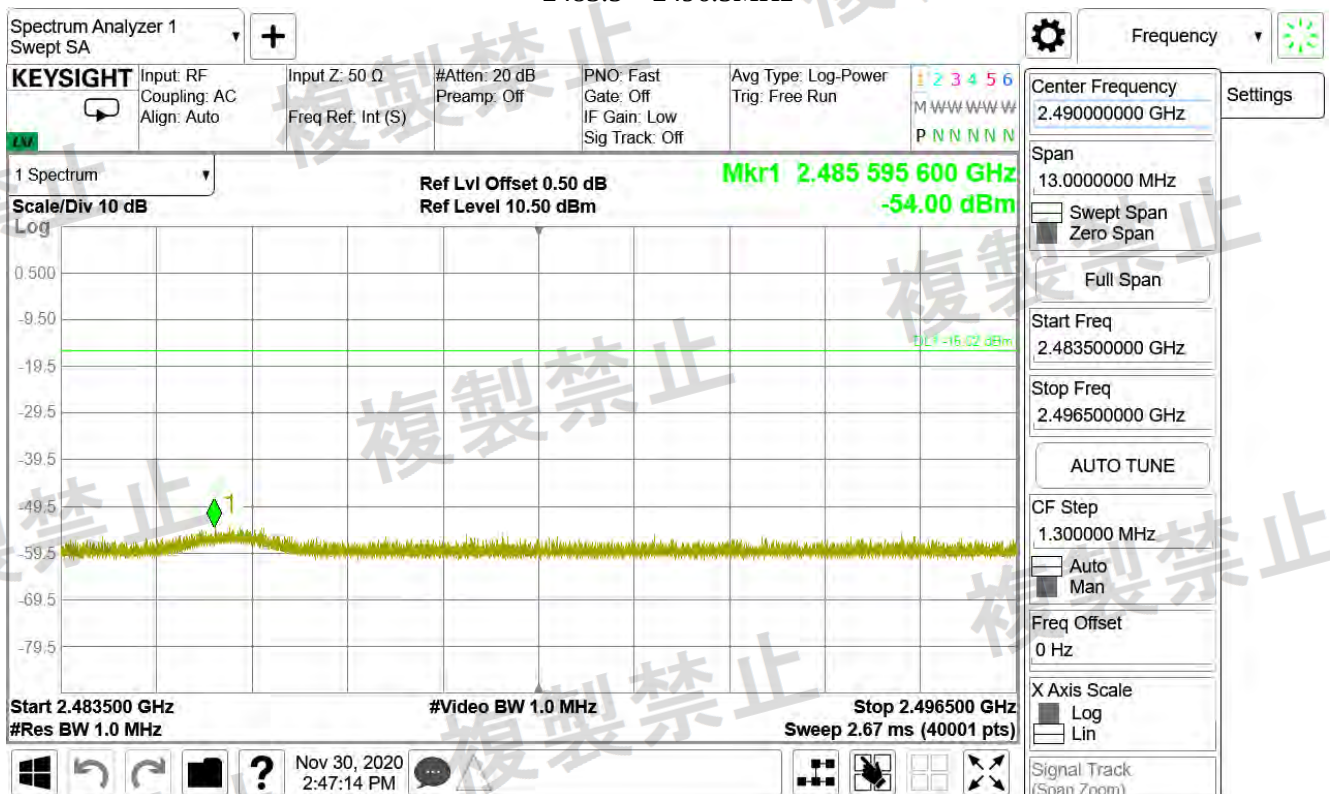
1000- 2387MHz



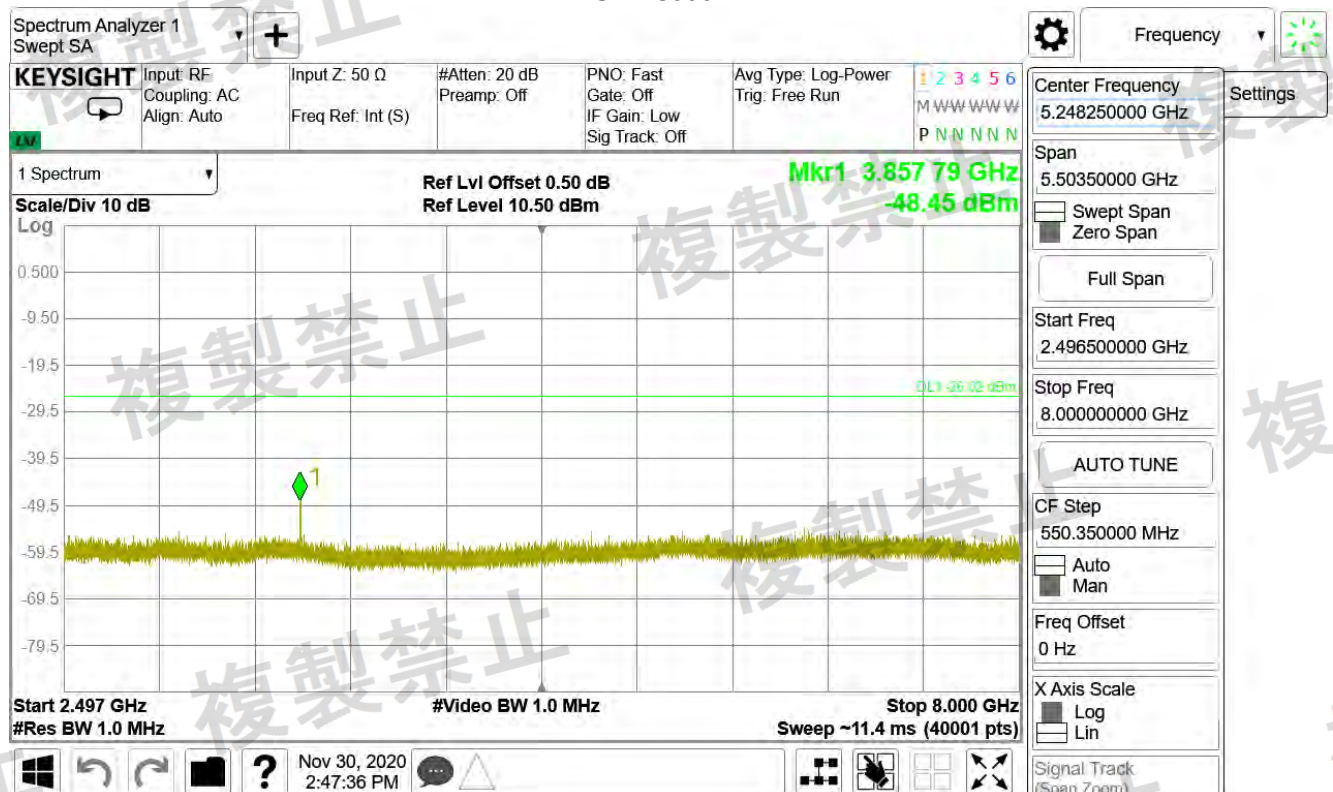
2387 – 2400 MHz



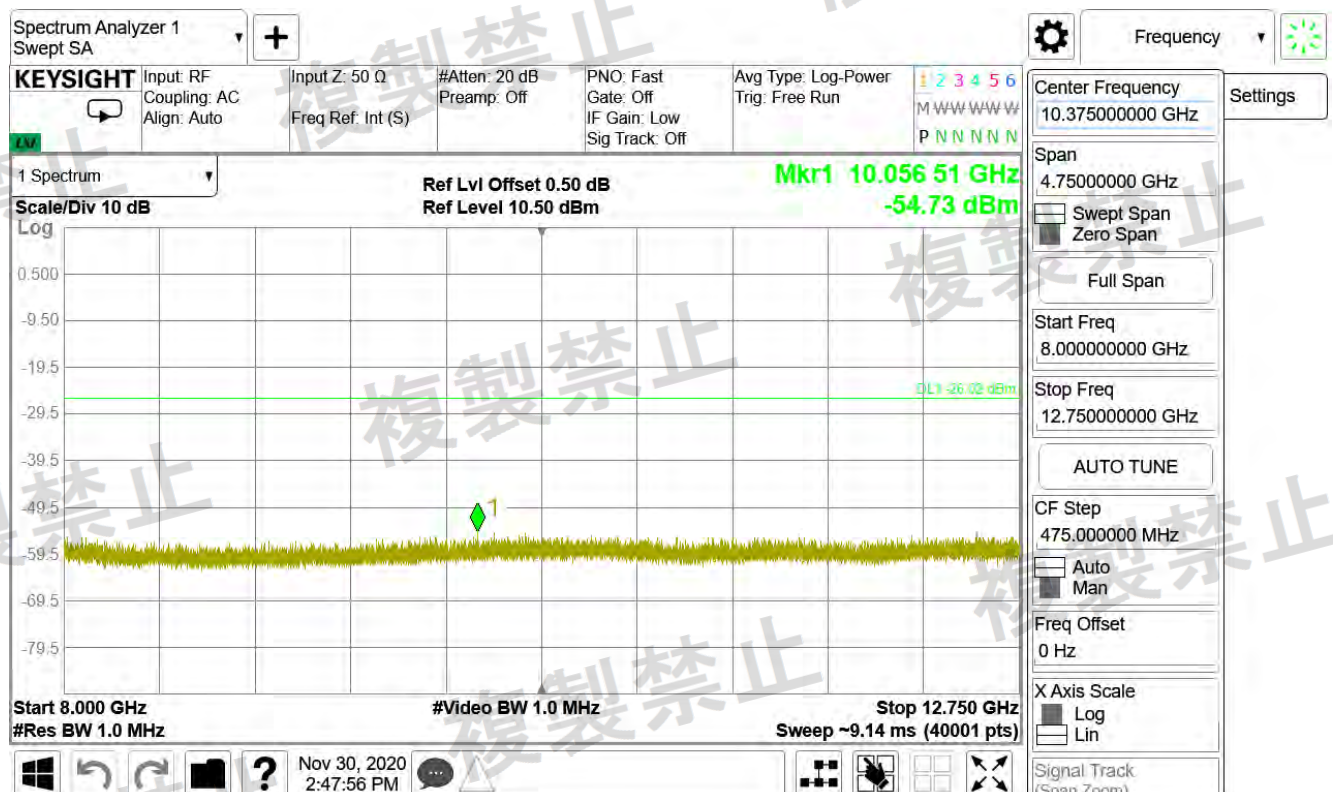
2483.5 – 2496.5 MHz



2497 – 8000MHz



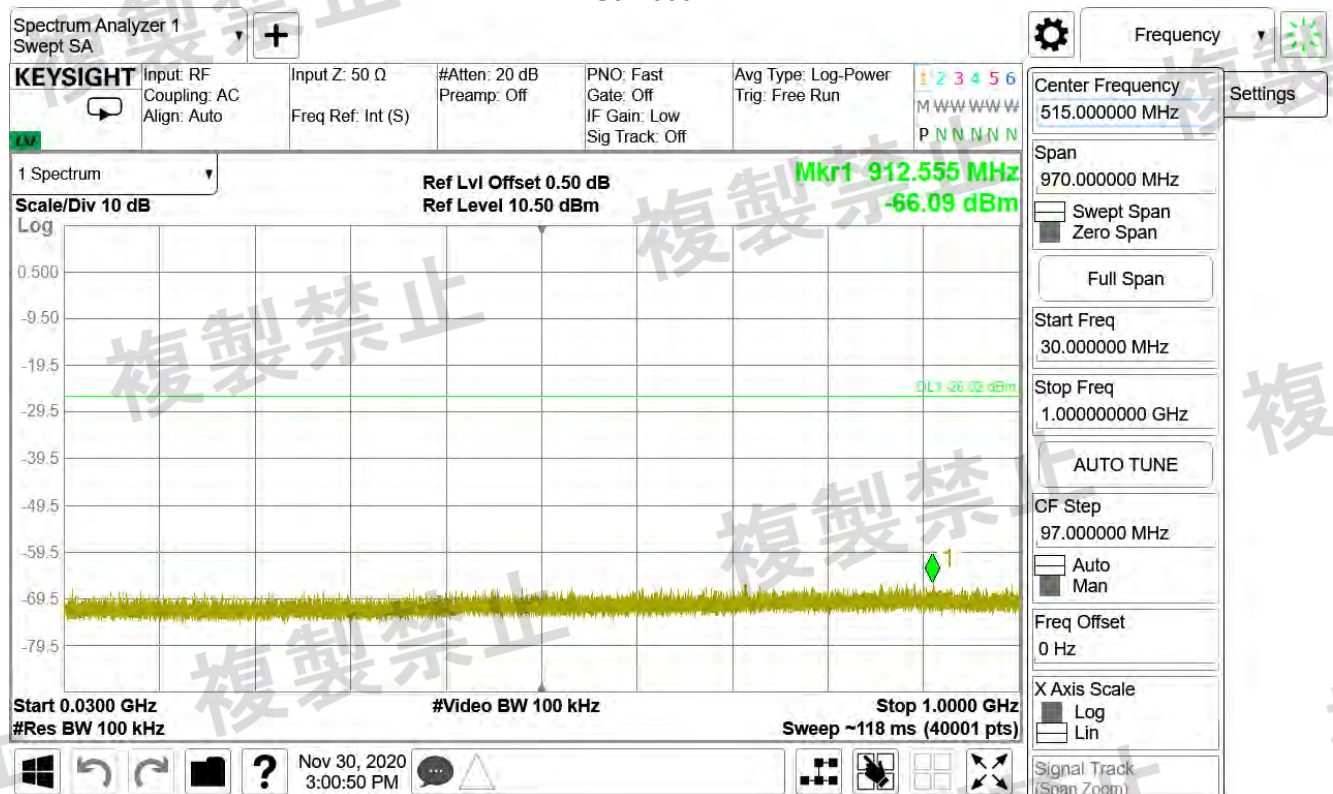
8000 – 12500MHz



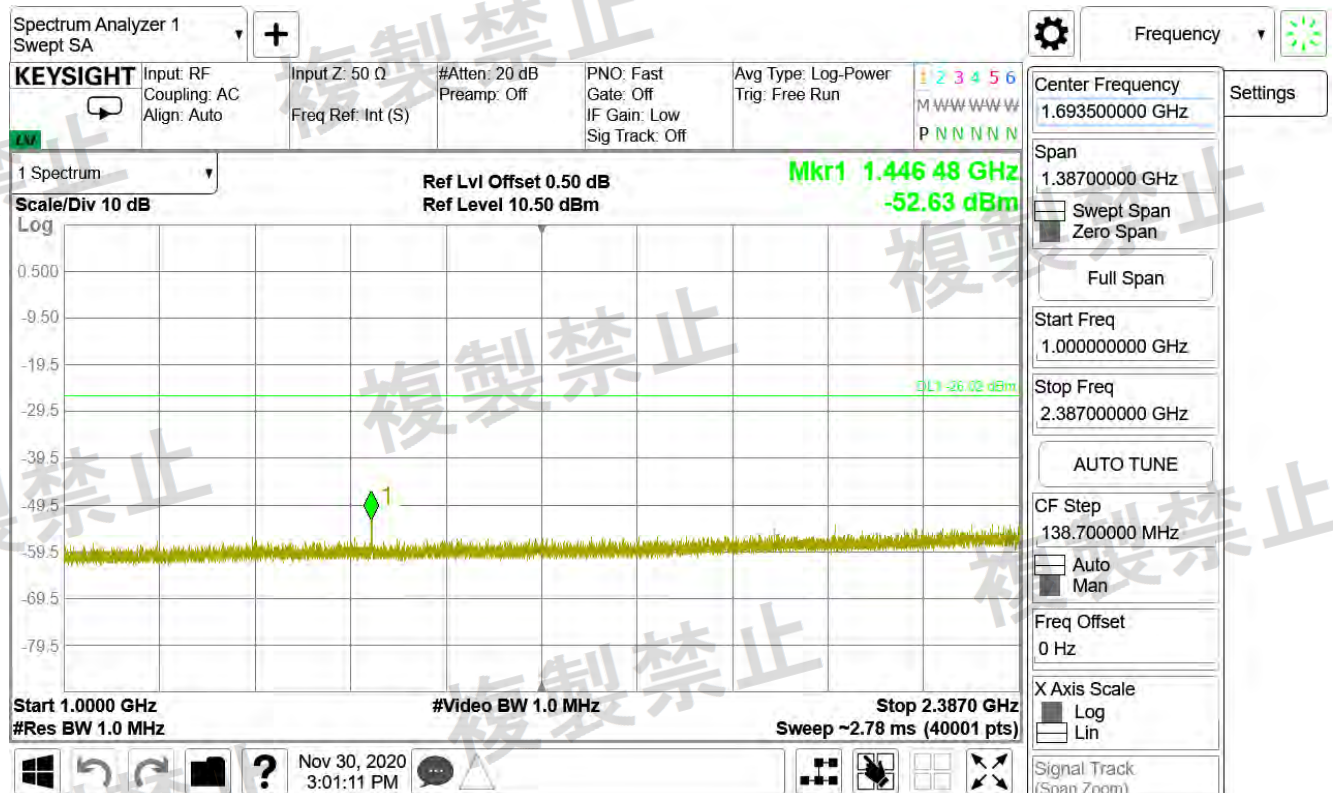
Product : Humly Room Display One
Test Item : Transmitter Spurious Emissions
Test Mode : Mode 6: Transmitter-AFH-3Mbps (2411MHz)

Test Conditions		Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
Tnom (25 °C)	Vnom (100VAC)	30-1000	-66.09	-26 (2.5uW)
		1000 – 2387	-52.63	-26 (2.5uW)
		2387 – 2400	-54.87	-16 (25uW)
		2483.5 –2496.5	-53.96	-16 (25uW)
		2497– 8000	-47.77	-26 (2.5uW)
		8000 – 12500	-54.69	-26 (2.5uW)

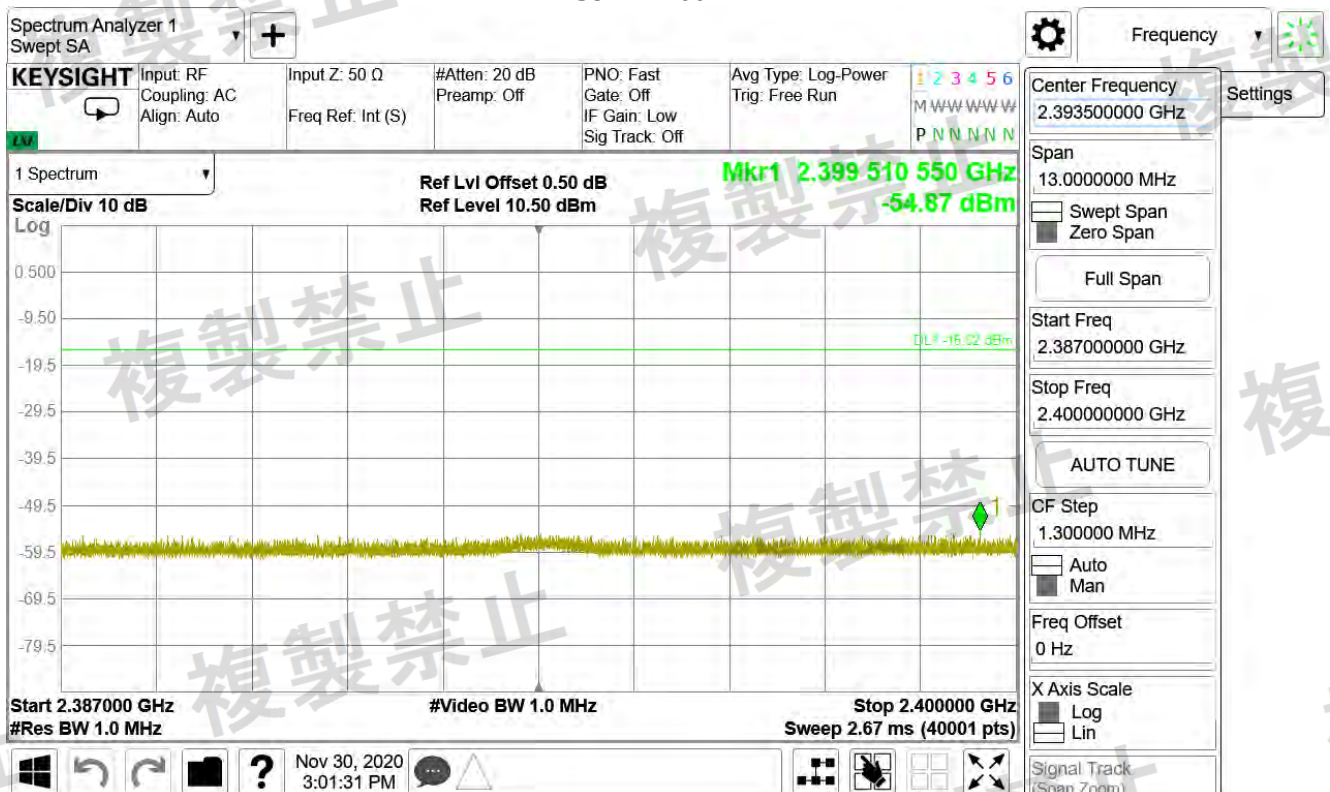
30-1000MHz



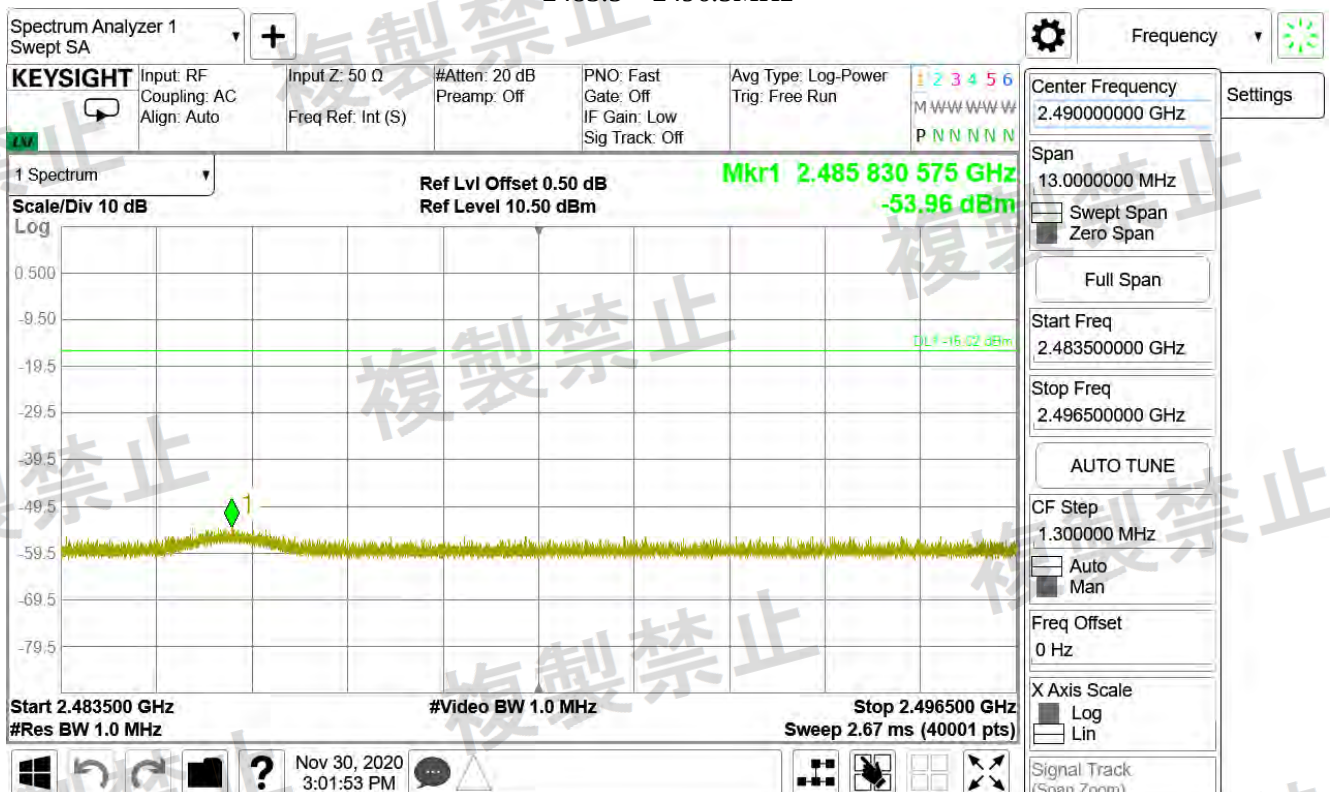
1000- 2387MHz



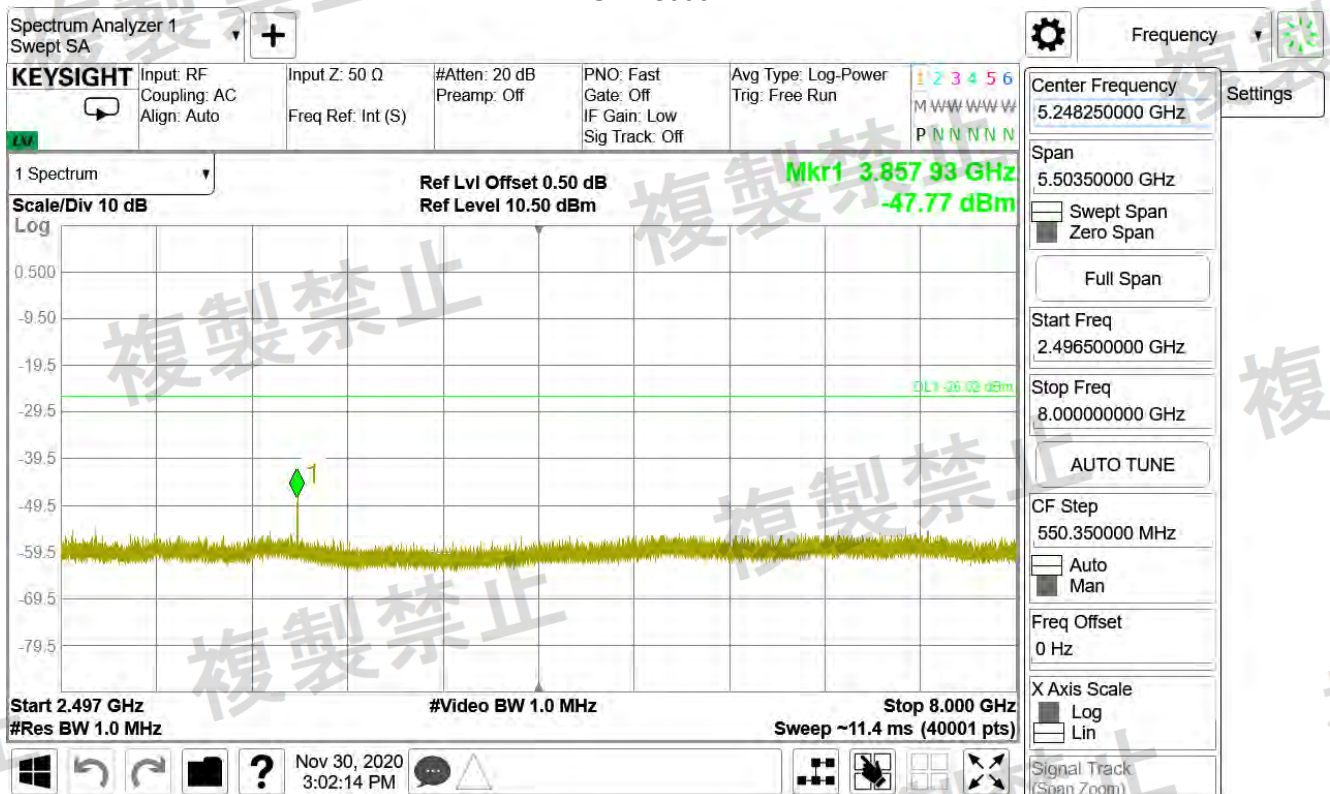
2387 – 2400 MHz



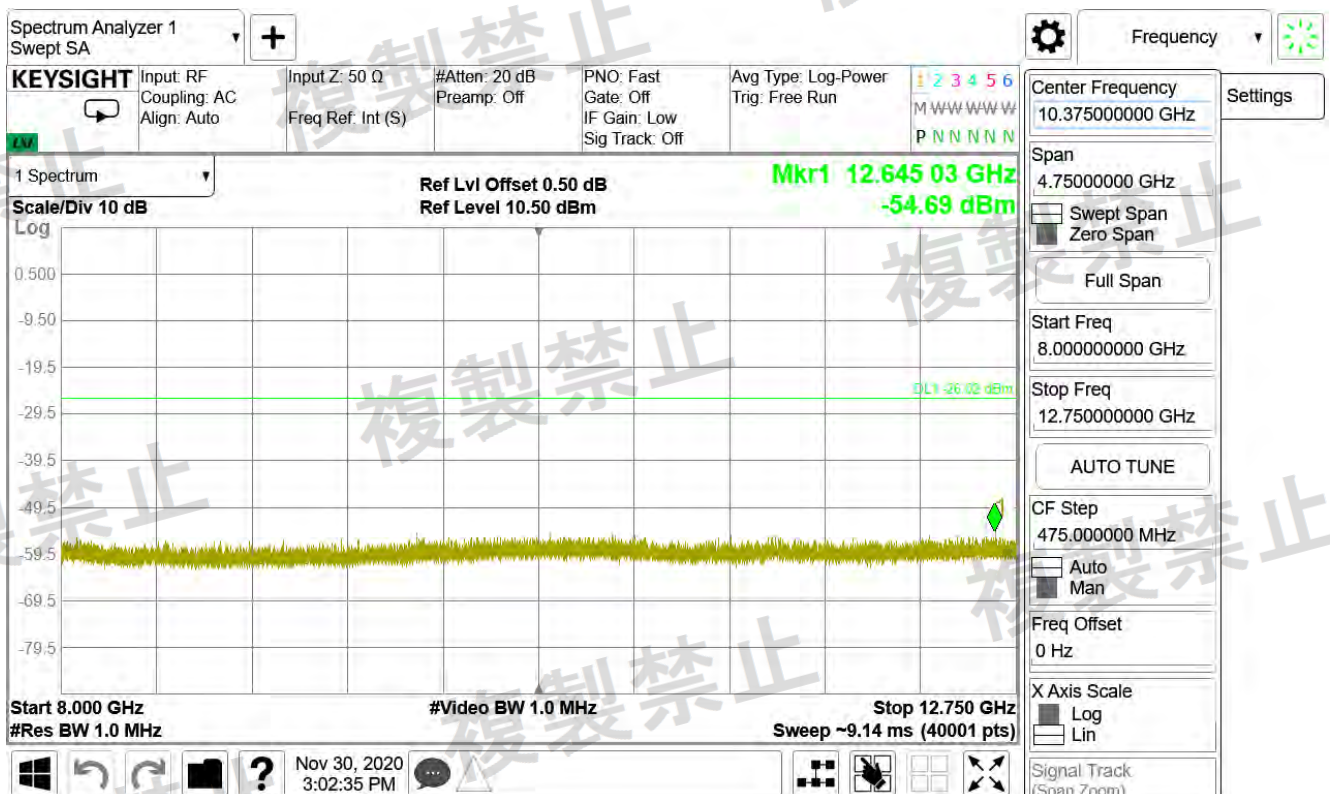
2483.5 – 2496.5 MHz



2497 – 8000MHz



8000 – 12500MHz



Test Result

PASS

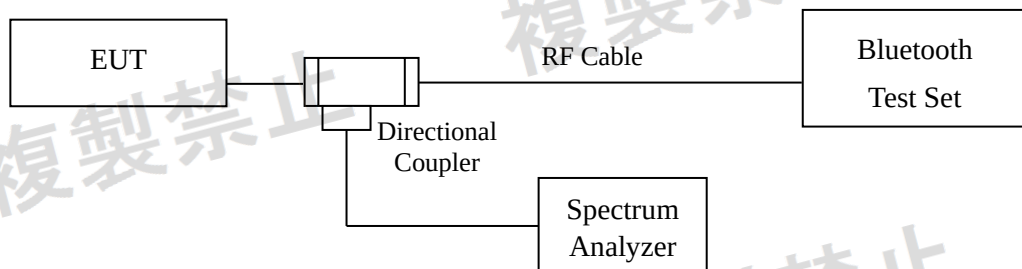
8. Receiver Suprious Emissions

8.1. Test Setup

- ☒ Use the program to control transmitter



- ☐ Use the Bluetooth Test Set to control transmitter



8.2. Test Procedure

A spectrum analyzer or similar device shall be used to observe a sample of the modulated transmitter's radio frequency power output.

- A positive peak detector function must be used.
- The measurement instrument bandwidth and span must be set sufficiently with, and, the scan time set sufficiently slow, to ensure all major modulation products are captured. Note that the measurement bandwidth should also be set sufficiently narrow to avoid adding significant error to the test result.
- 'Maximum Hold' mode may be used to accumulate the measurement result over several scans provided the emission is repetitive in nature.

8.3. Limits

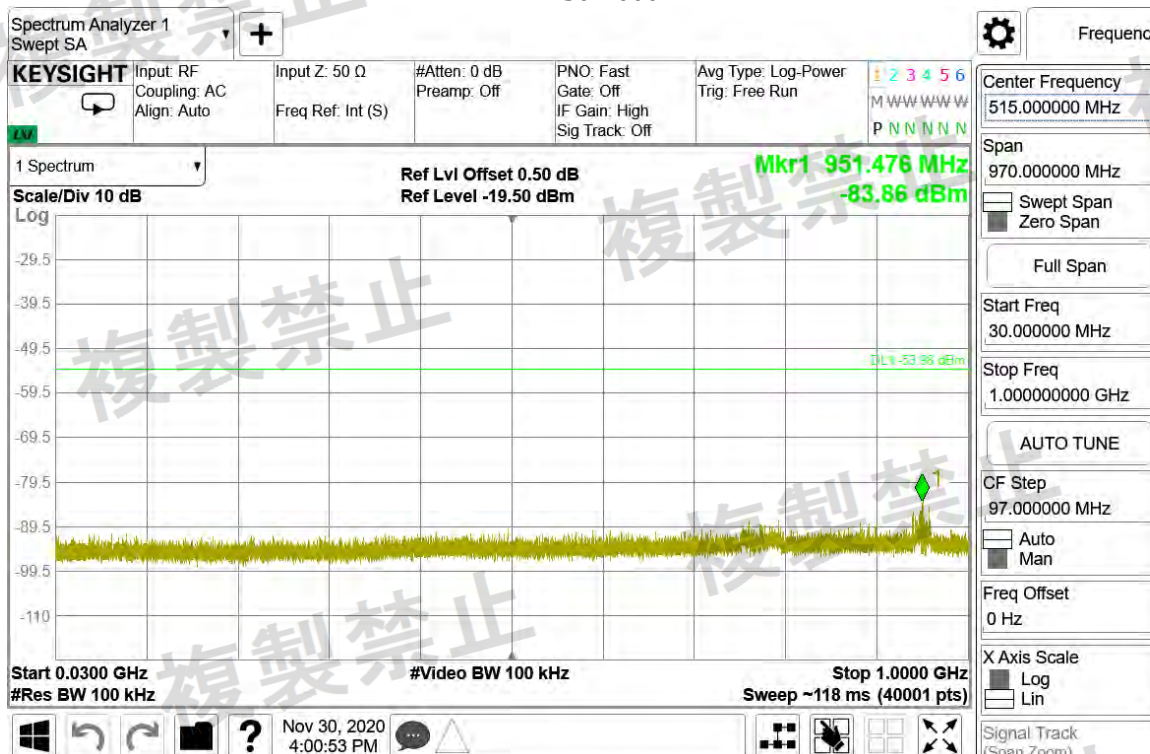
- $\leq 4\text{nW}$ for 30-1000 MHz
- $\leq 20\text{nW}$ for 1000 – 3000 MHz
- $\leq 20\text{nW}$ for 3000 – 8000 MHz

8.4. Test Result of Receiver Spurious Emissions

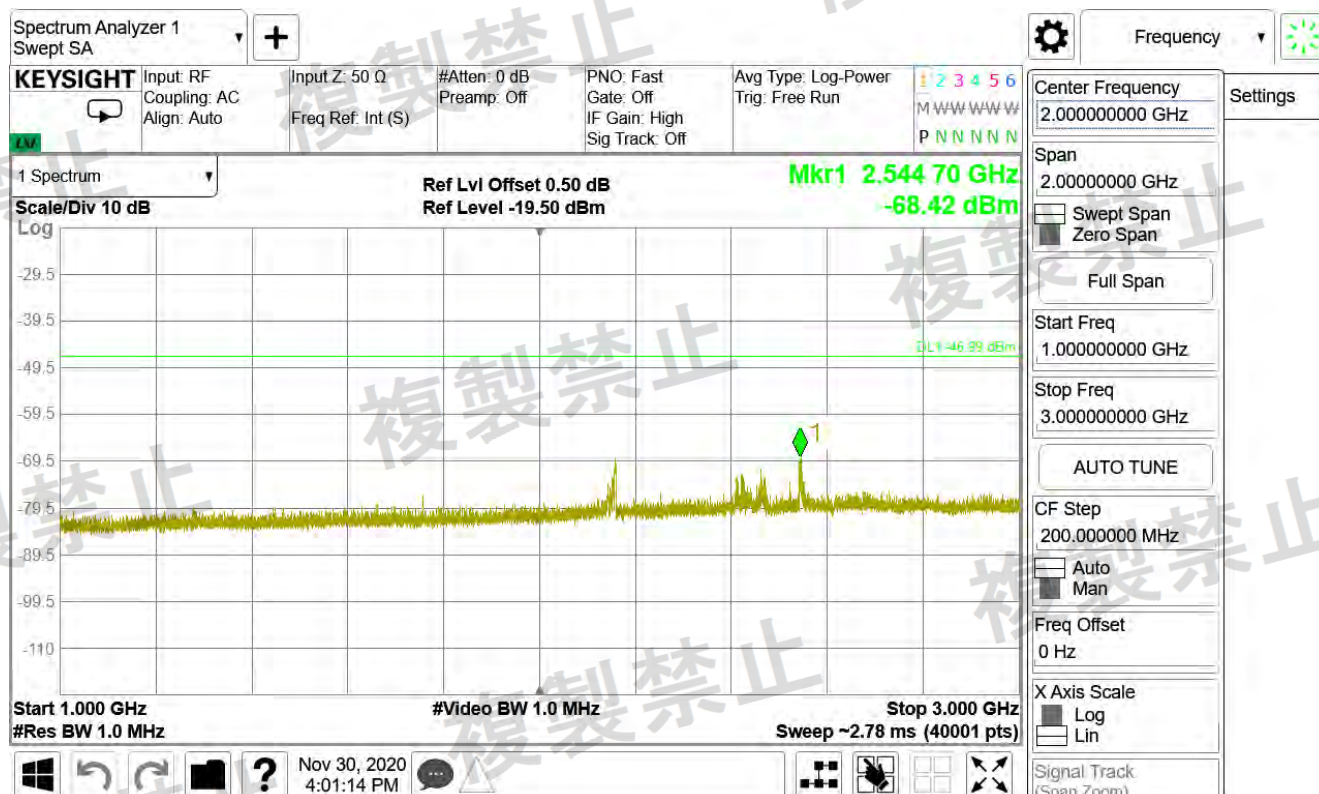
Product : Humly Room Display One
Test Item : Receiver Spurious Emissions
Test Mode : Mode 7: Receiver-Normal-1Mbps (2441MHz)

Test Conditions		Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
Tnom (25 °C)	Vnom (100VAC)	30-1000	-83.86	-54 (4nW)
		1000 – 3000	-68.42	-47 (20nW)
		3000 – 8000	-74.25	-47 (20nW)
		8000 – 12500	-77.06	-47 (20nW)

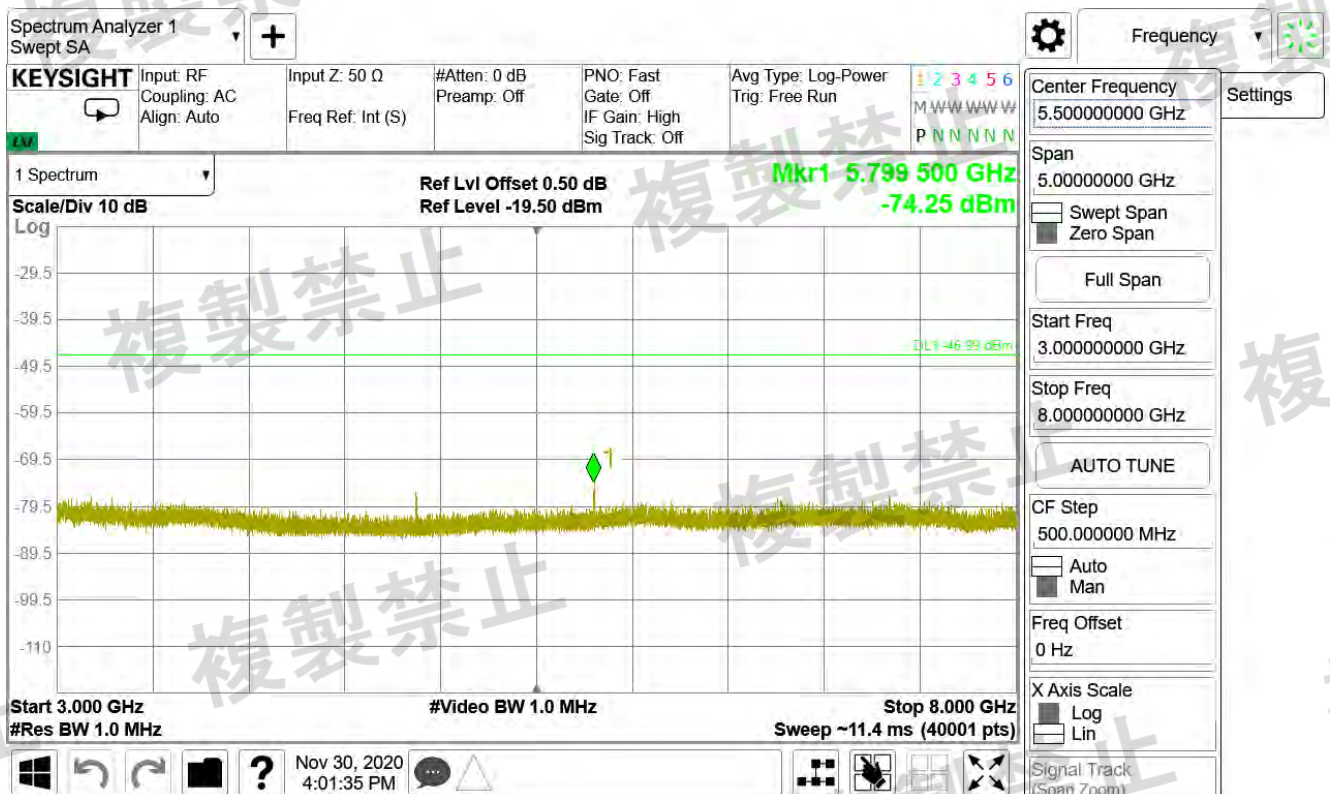
30-1000MHz



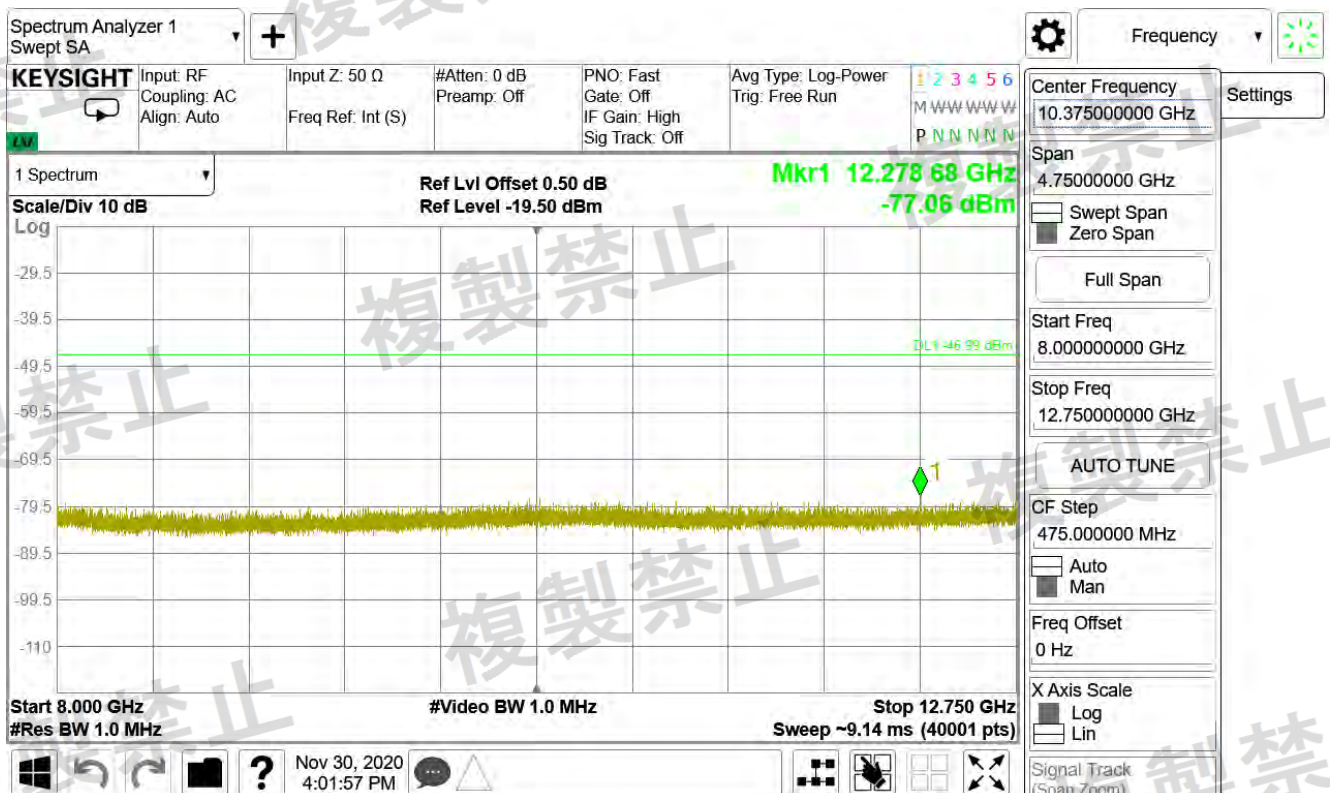
1000 – 3000MHz



3000 – 8000MHz



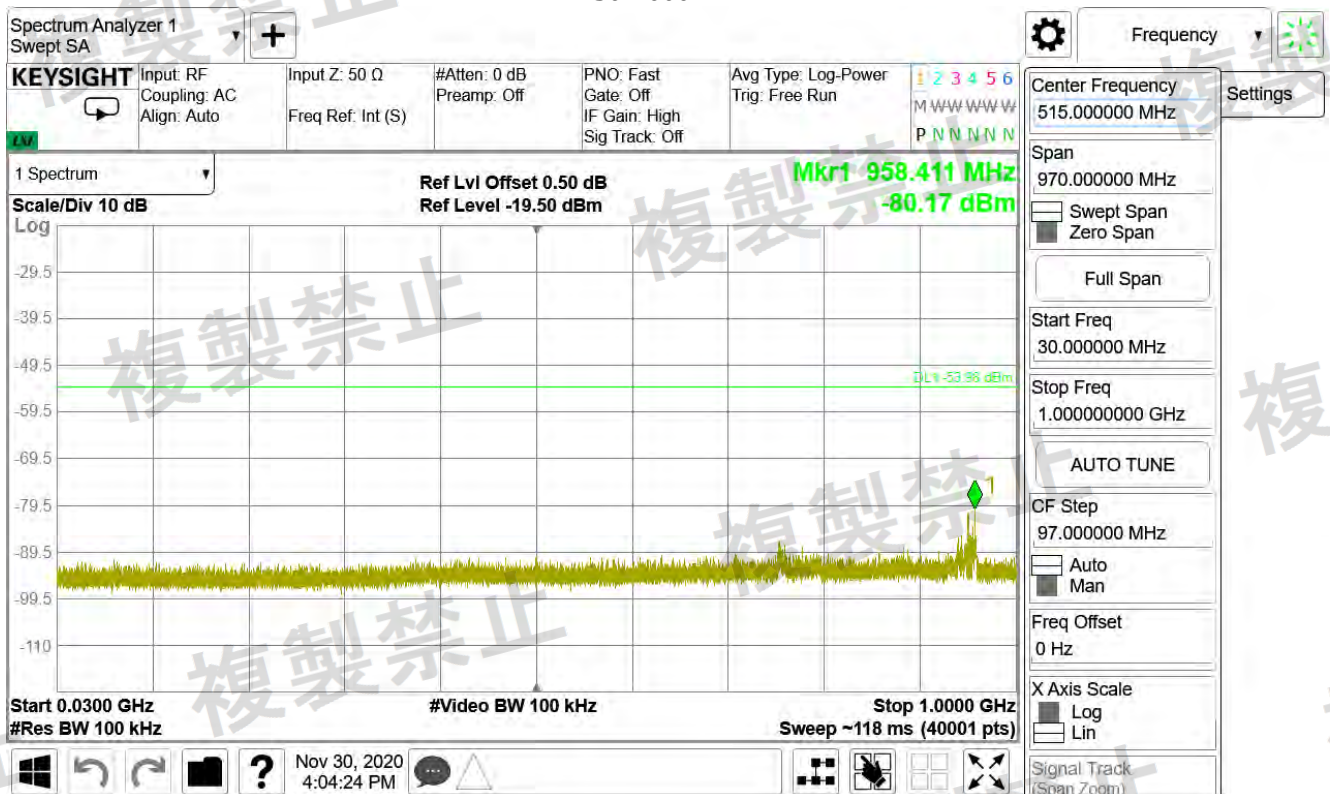
8000 – 12500MHz



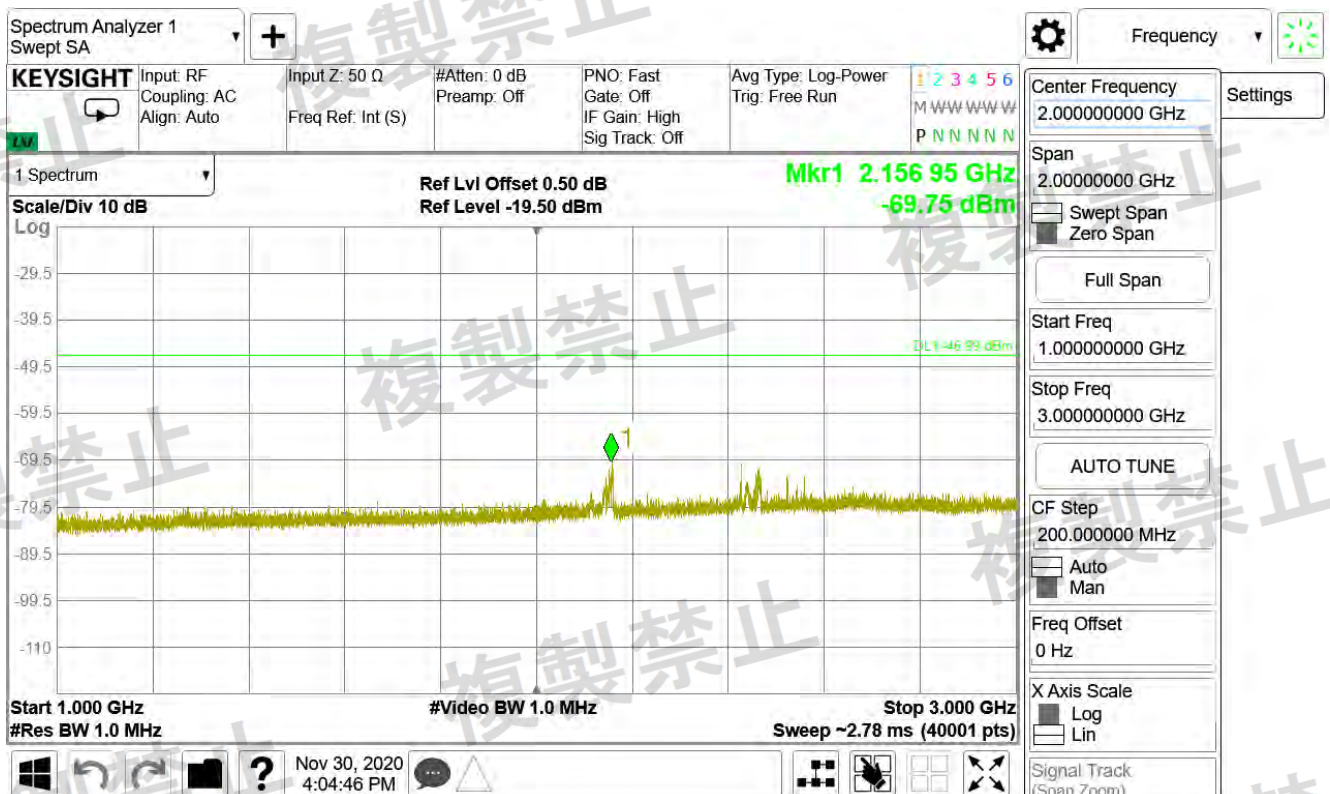
Product : Humly Room Display One
Test Item : Receiver Spurious Emissions
Test Mode : Mode 8: Receiver-Normal-2Mbps (2441MHz)

Test Conditions		Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
Tnom (25 °C)	Vnom (100VAC)	30-1000	-80.17	-54 (4nW)
		1000 – 3000	-69.75	-47 (20nW)
		3000 – 8000	-71.80	-47 (20nW)
		8000 – 12500	-77.72	-47 (20nW)

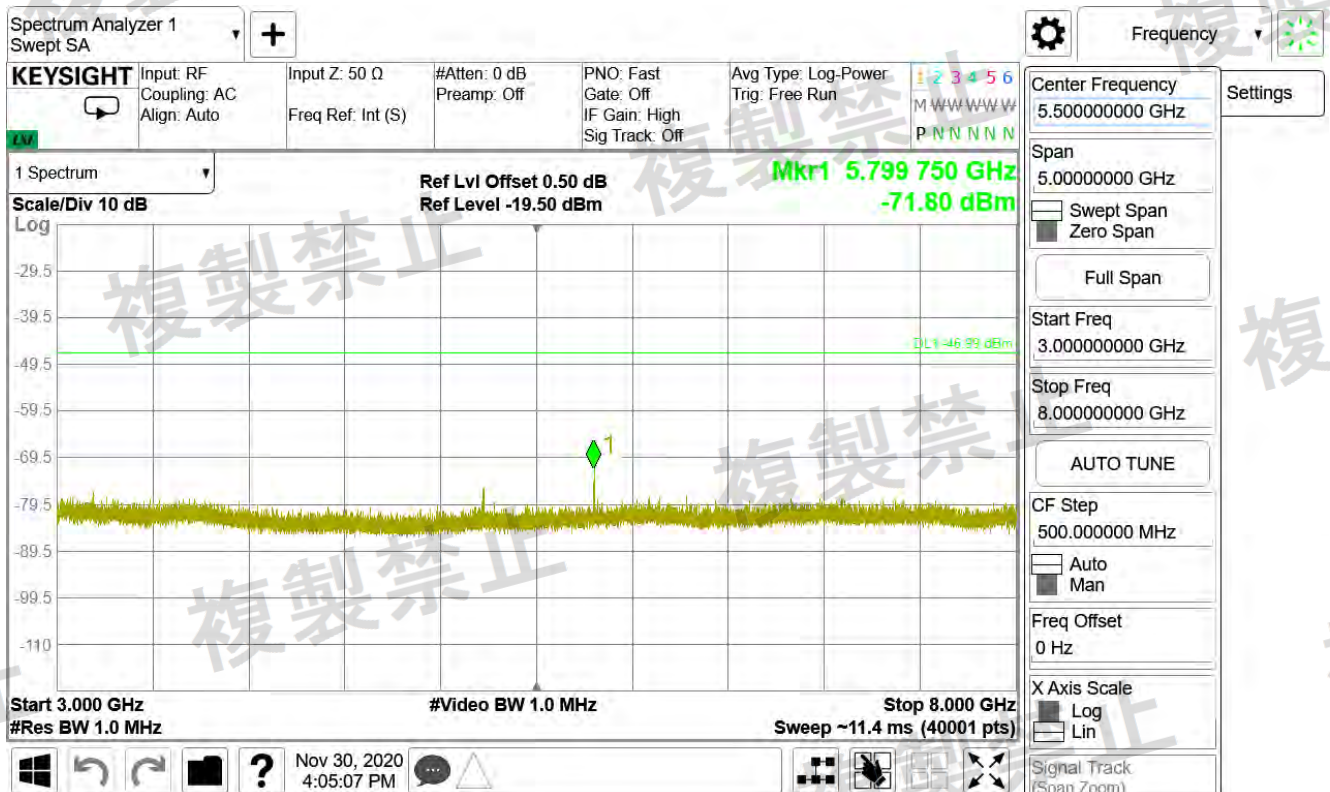
30-1000MHz



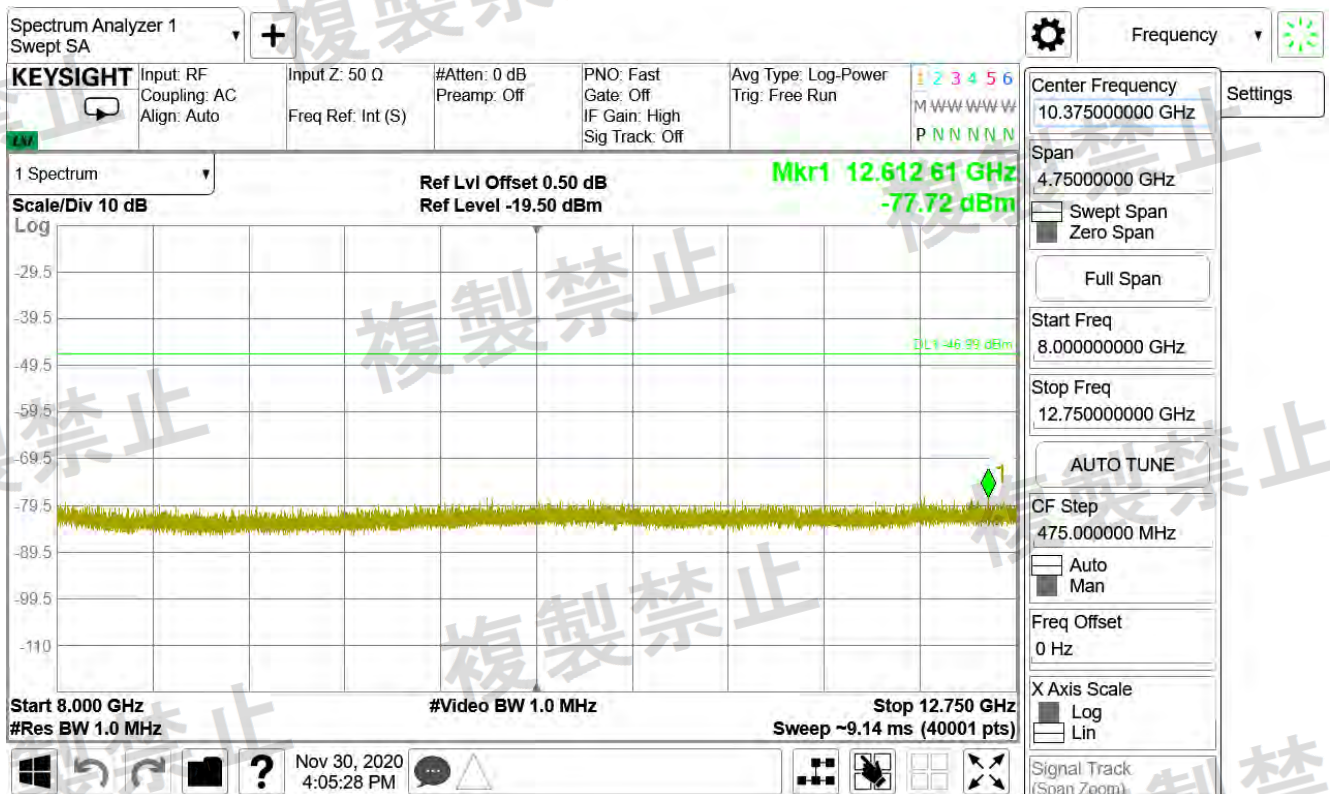
1000 – 3000MHz



3000 – 8000MHz



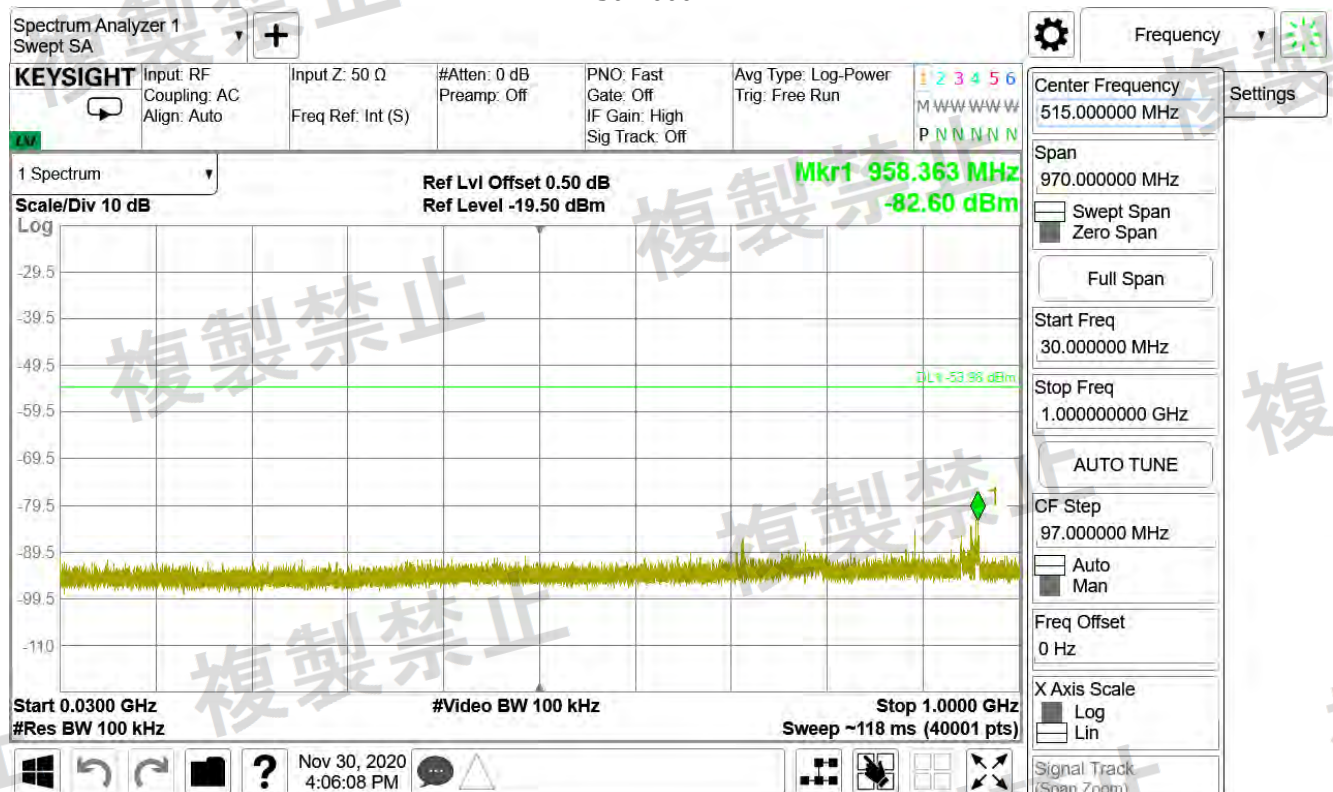
8000 – 12500MHz



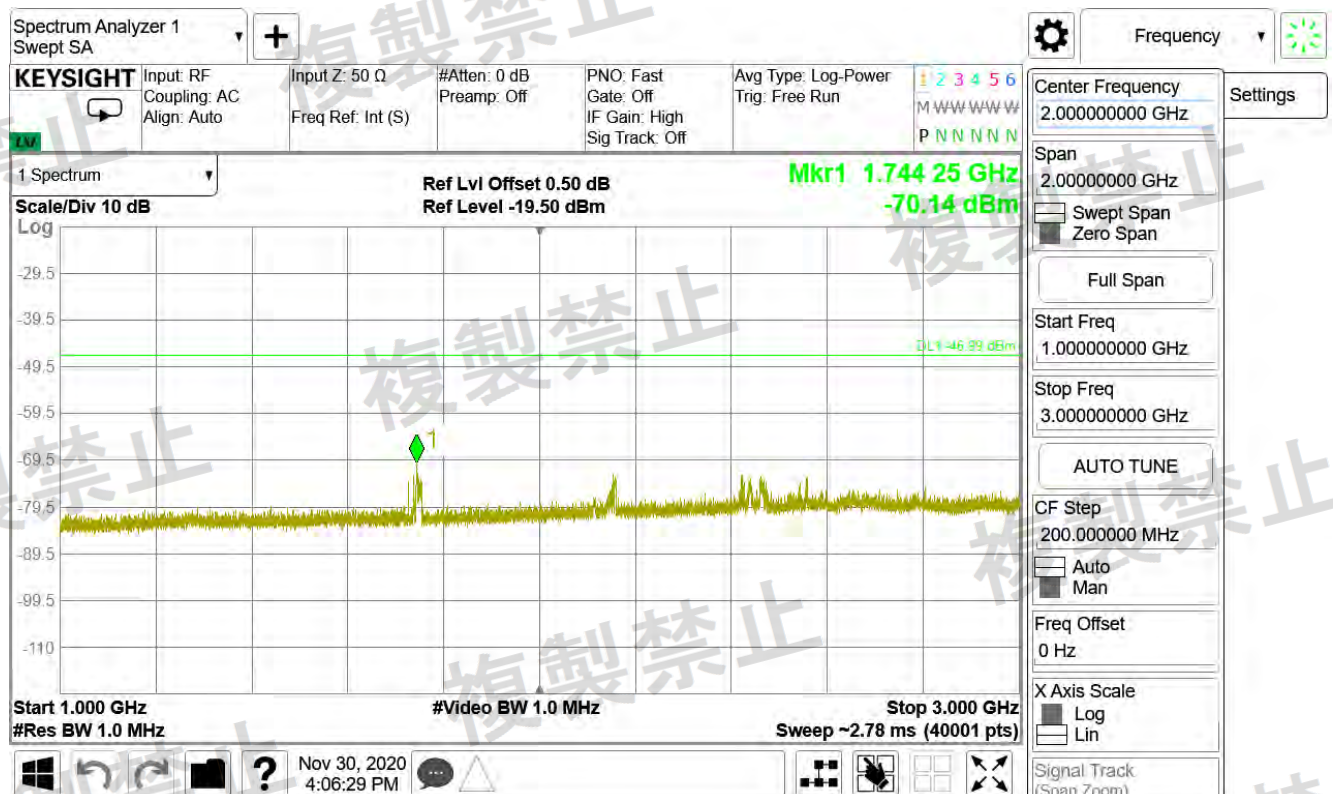
Product : Humly Room Display One
Test Item : Receiver Spurious Emissions
Test Mode : Mode 9: Receiver-Normal-3Mbps(2441MHz)

Test Conditions		Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
Tnom (25 °C)	Vnom (100VAC)	30-1000	-82.60	-54 (4nW)
		1000 – 3000	-70.14	-47 (20nW)
		3000 – 8000	-74.82	-47 (20nW)
		8000 – 12500	-78.09	-47 (20nW)

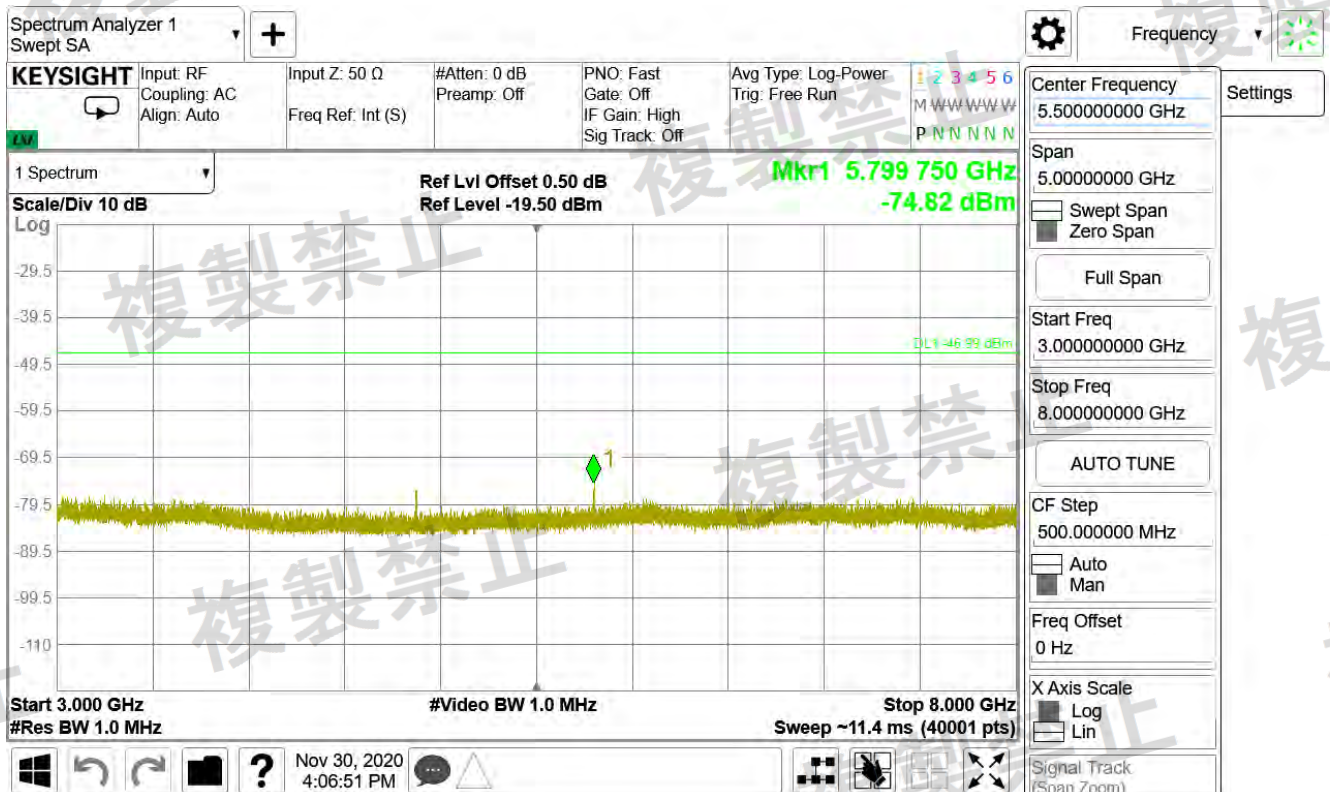
30-1000MHz



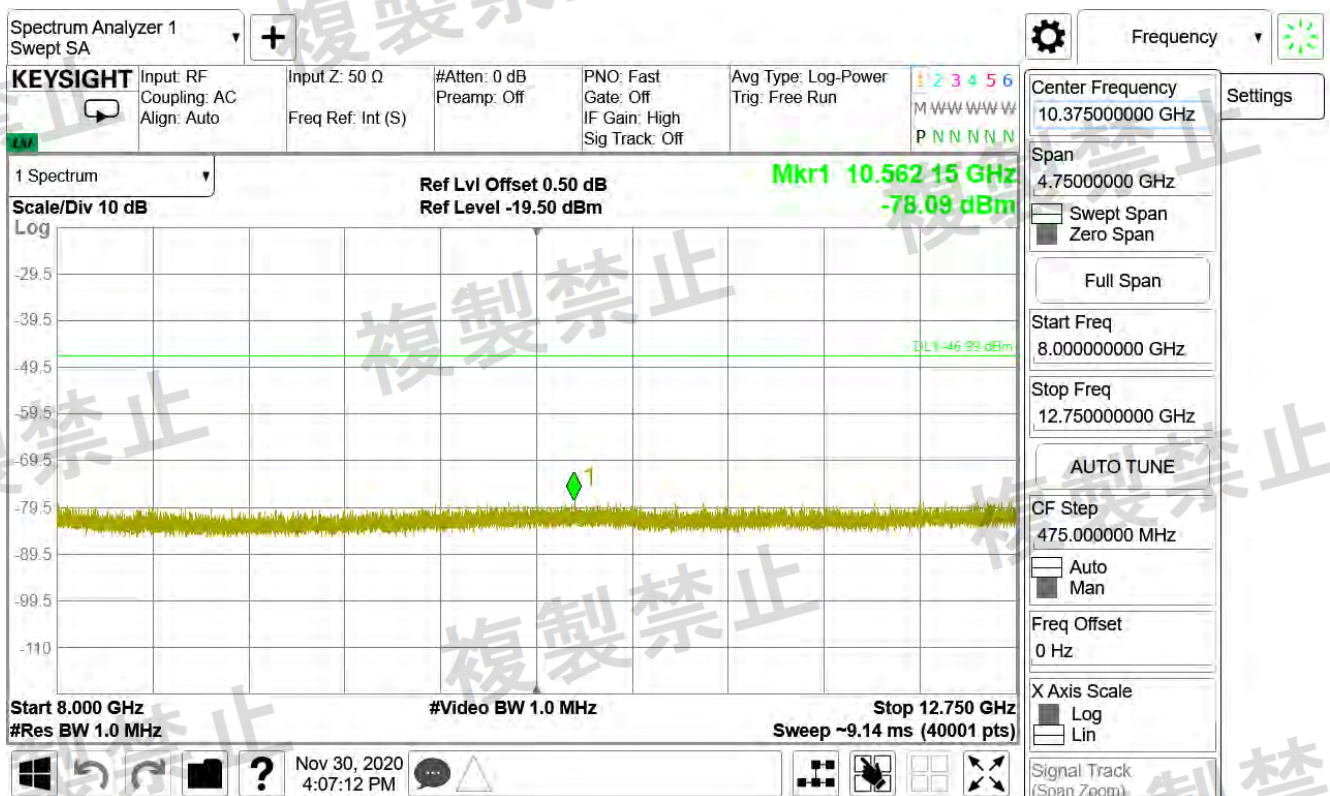
1000 – 3000MHz



3000 – 8000MHz



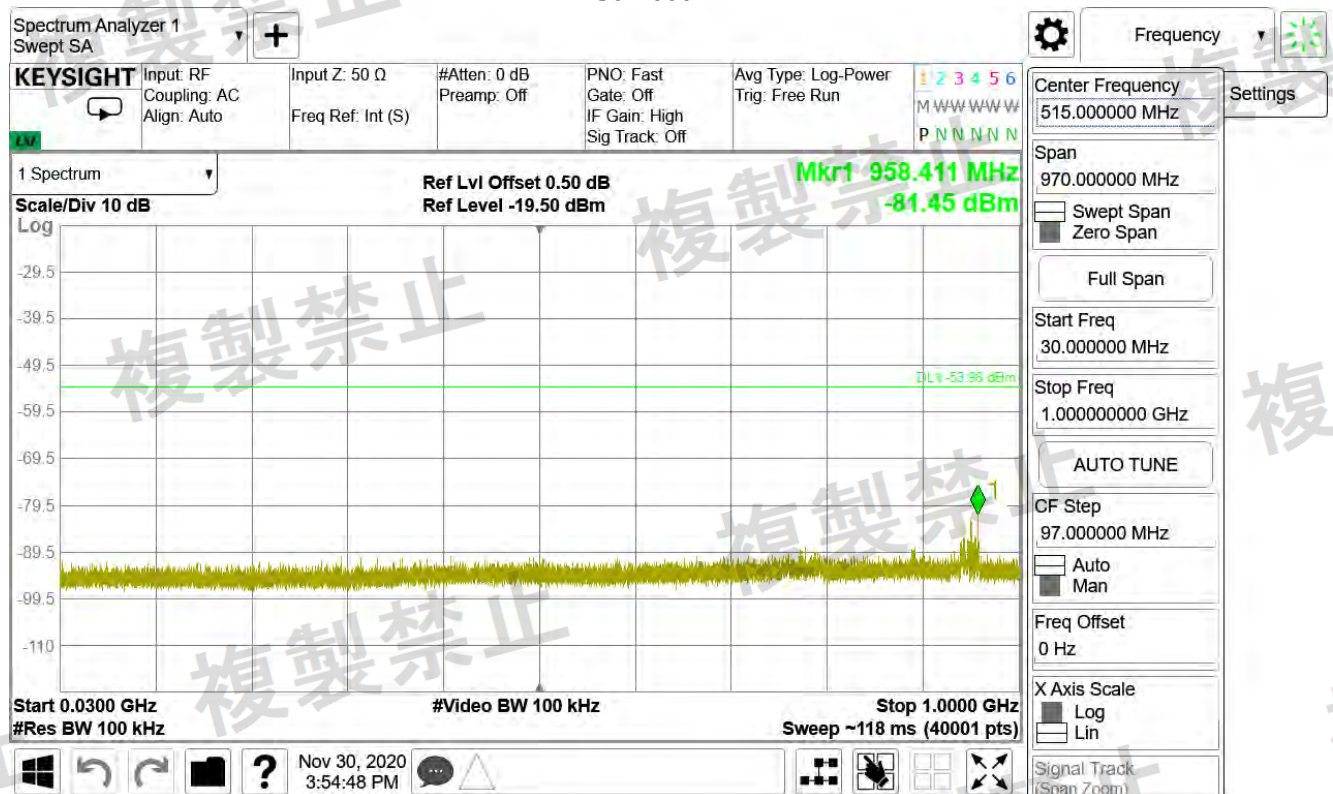
8000 – 12500MHz



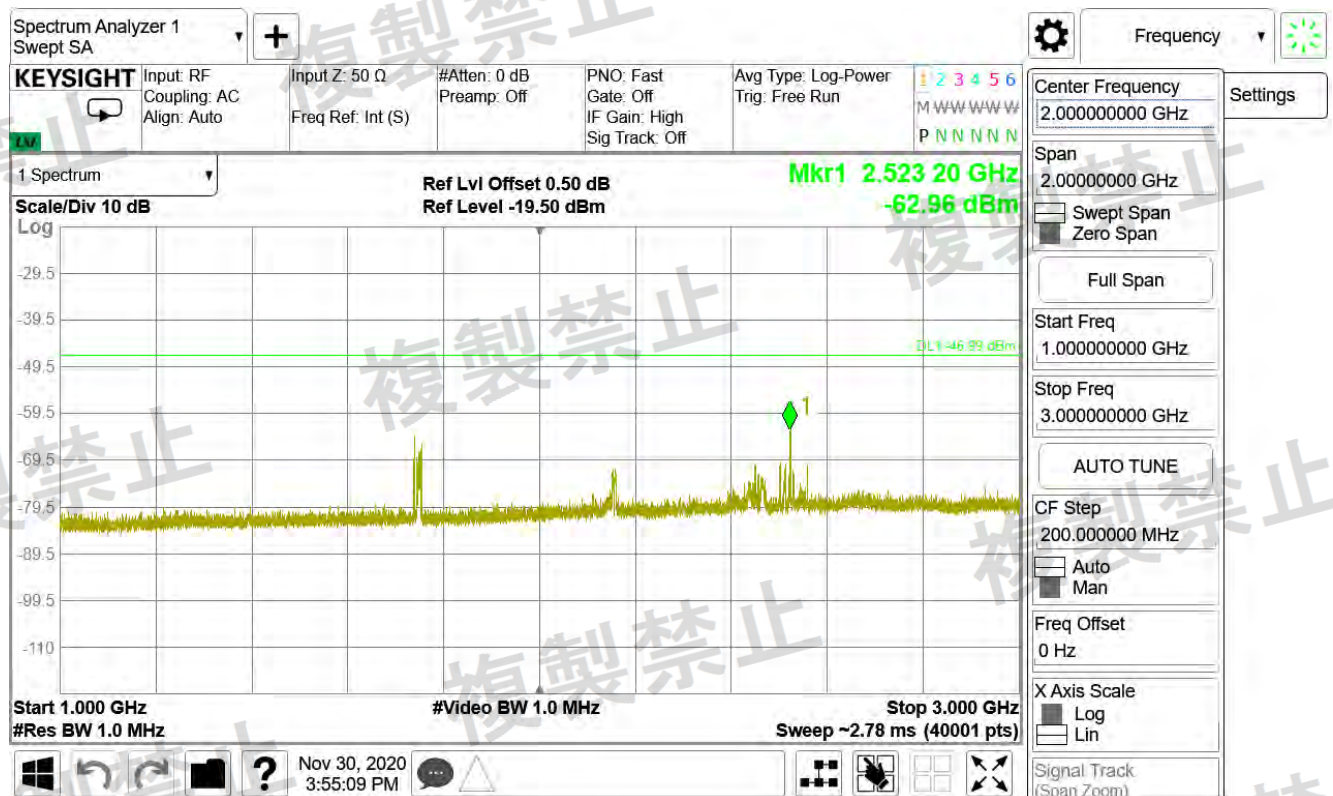
Product : Humly Room Display One
Test Item : Receiver Spurious Emissions
Test Mode : Mode 10: Receiver-AFH-1Mbps(2411MHz)

Test Conditions		Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
Tnom (25 °C)	Vnom (100VAC)	30-1000	-81.45	-54 (4nW)
		1000 – 3000	-62.96	-47 (20nW)
		3000 – 8000	-73.37	-47 (20nW)
		8000 – 12500	-77.95	-47 (20nW)

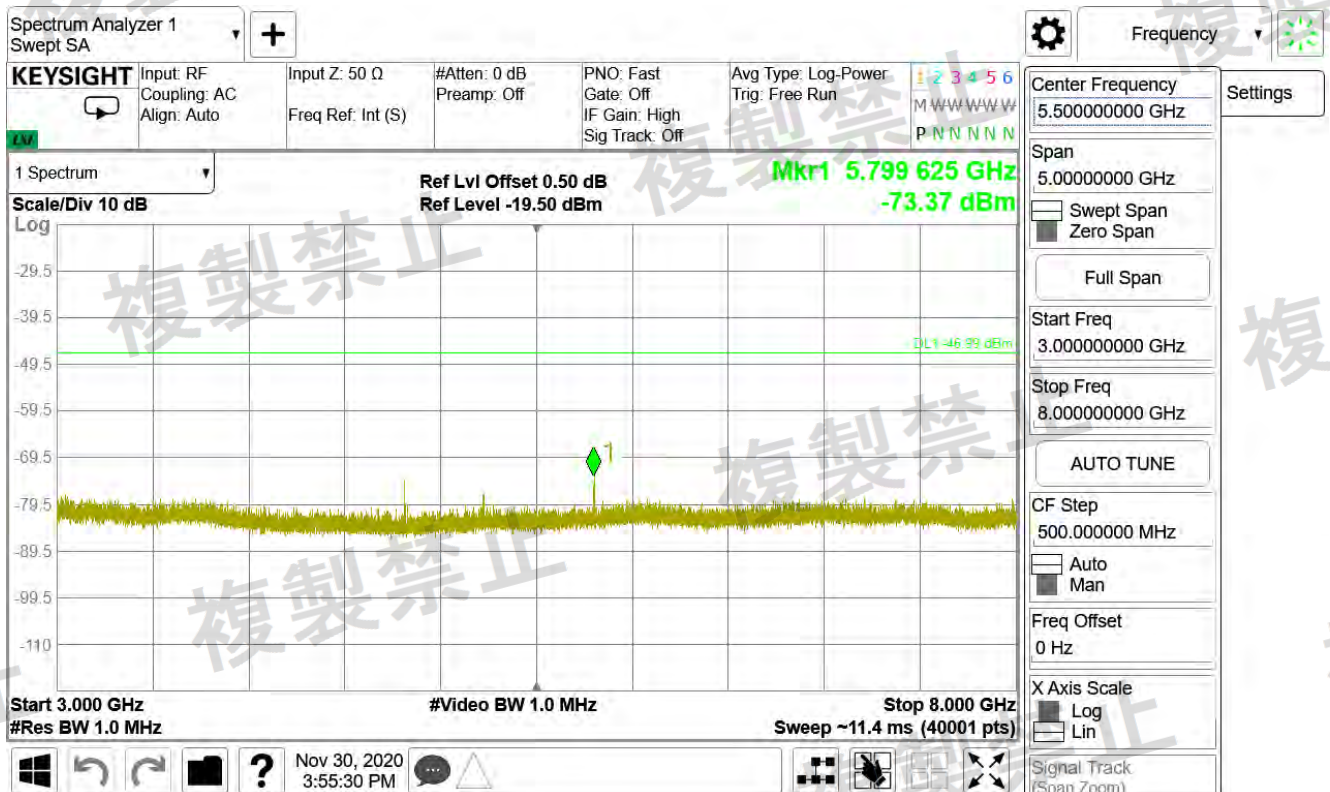
30-1000MHz



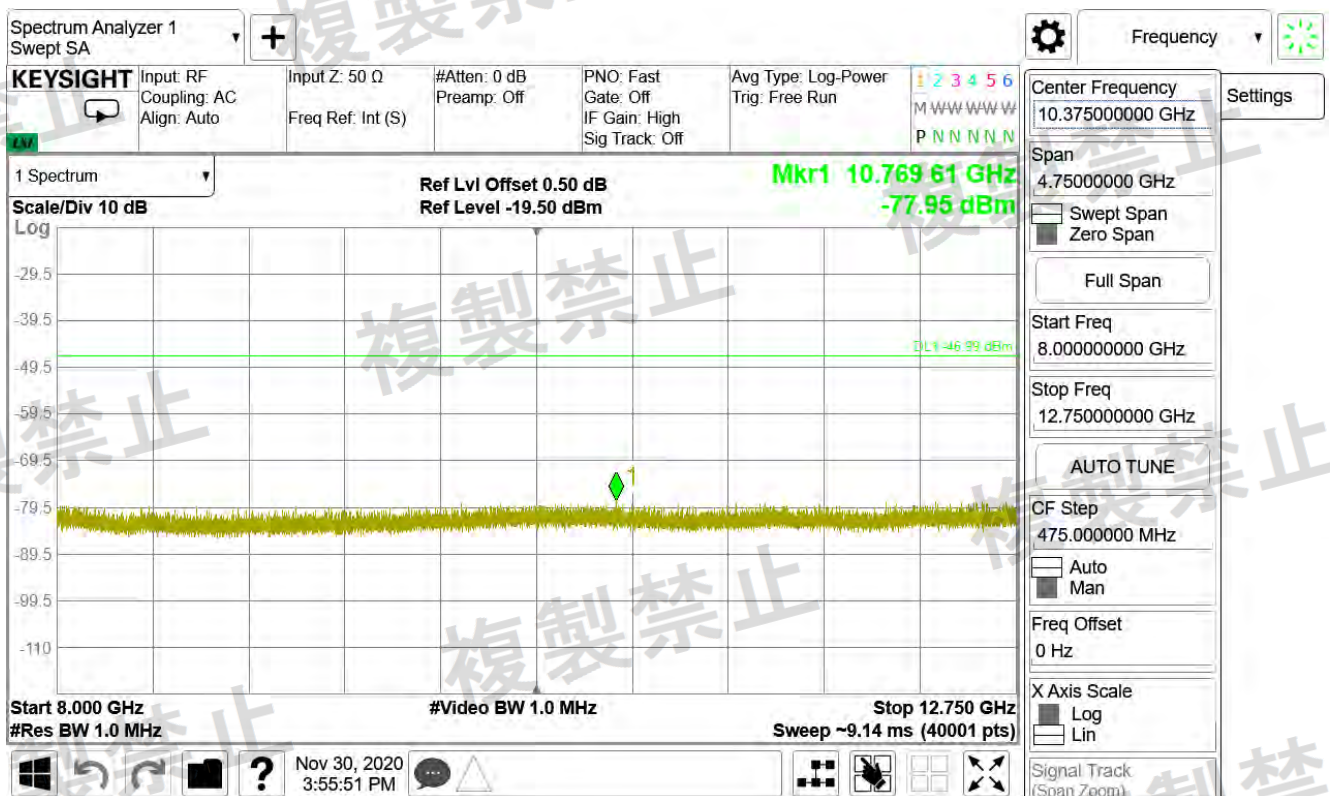
1000 – 3000MHz



3000 – 8000MHz



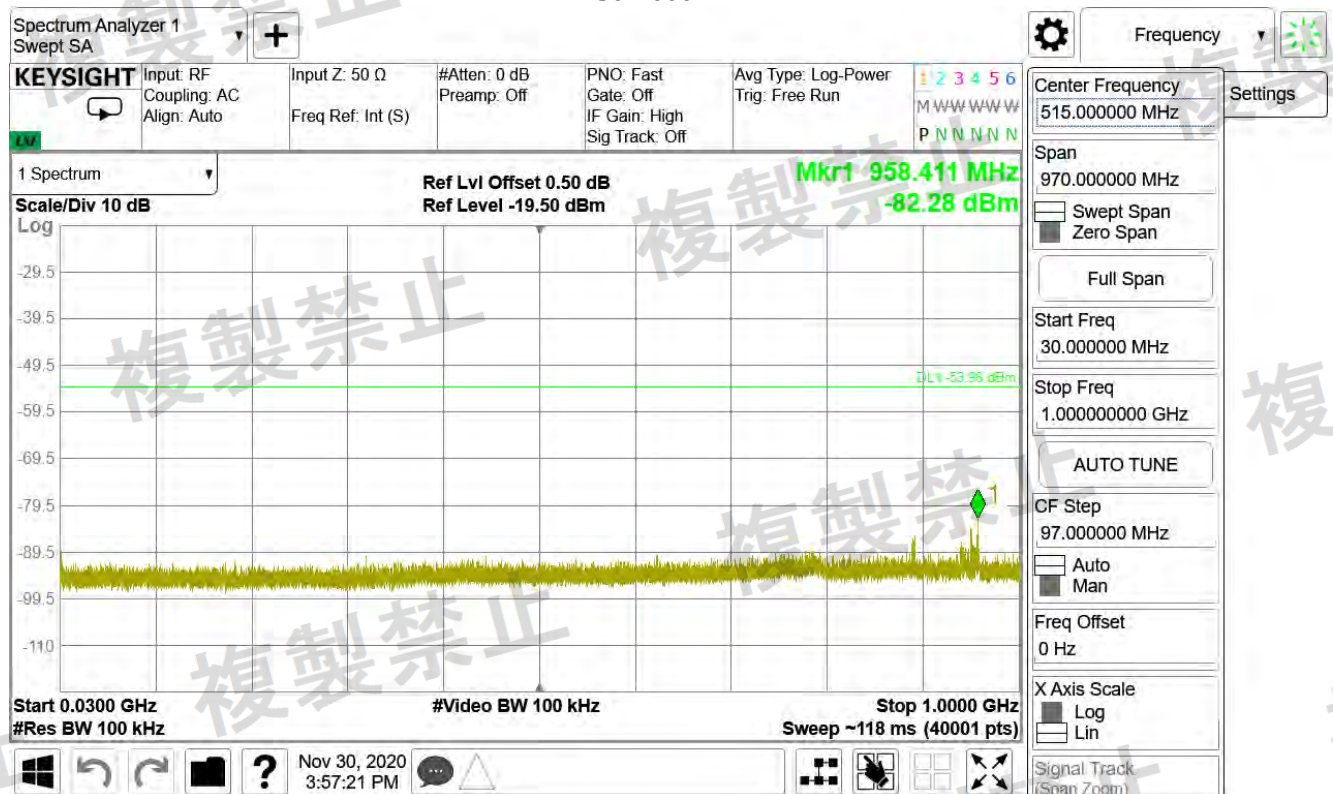
8000 – 12500MHz



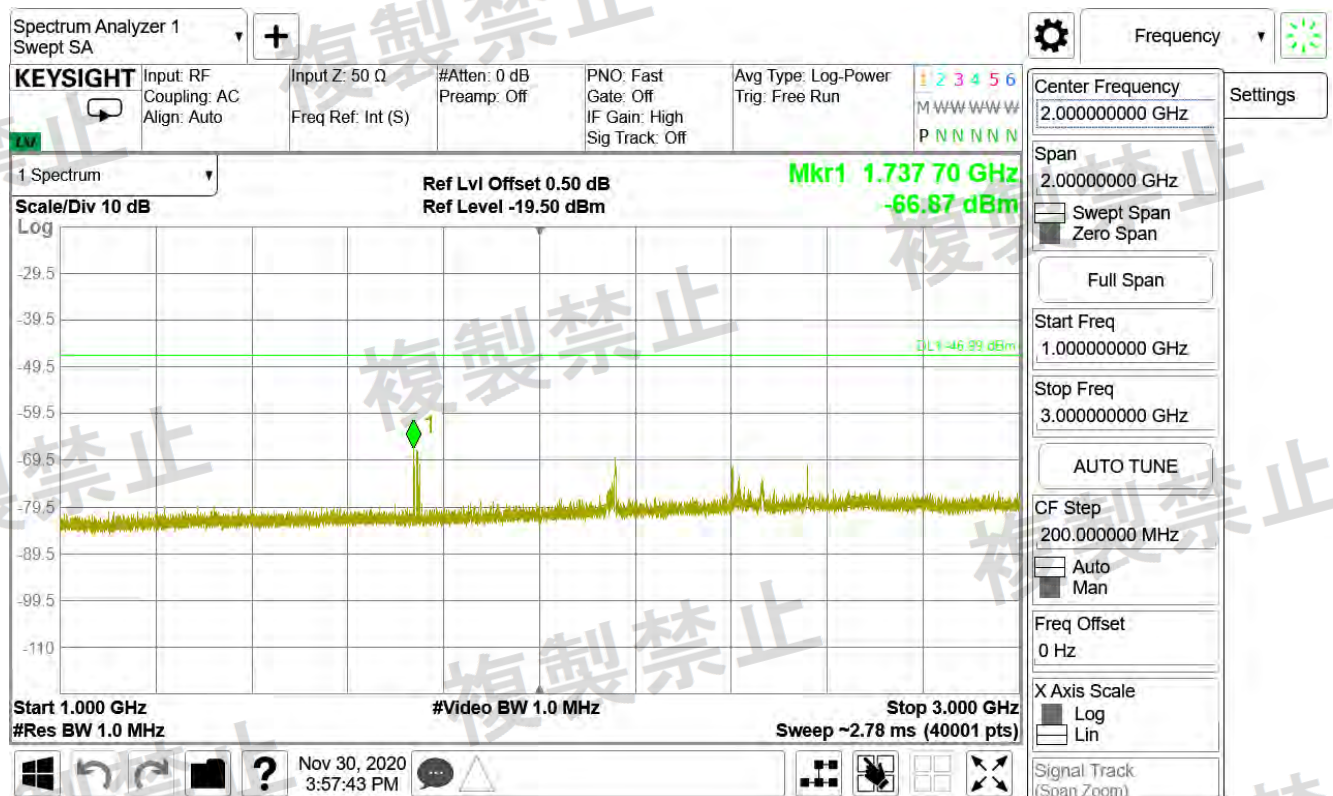
Product : Humly Room Display One
Test Item : Receiver Spurious Emissions
Test Mode : Mode 11: Receiver-AFH-2Mbps(2411MHz)

Test Conditions		Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
Tnom (25 °C)	Vnom (100VAC)	30-1000	-82.28	-54 (4nW)
		1000 – 3000	-66.87	-47 (20nW)
		3000 – 8000	-72.67	-47 (20nW)
		8000 – 12500	-77.83	-47 (20nW)

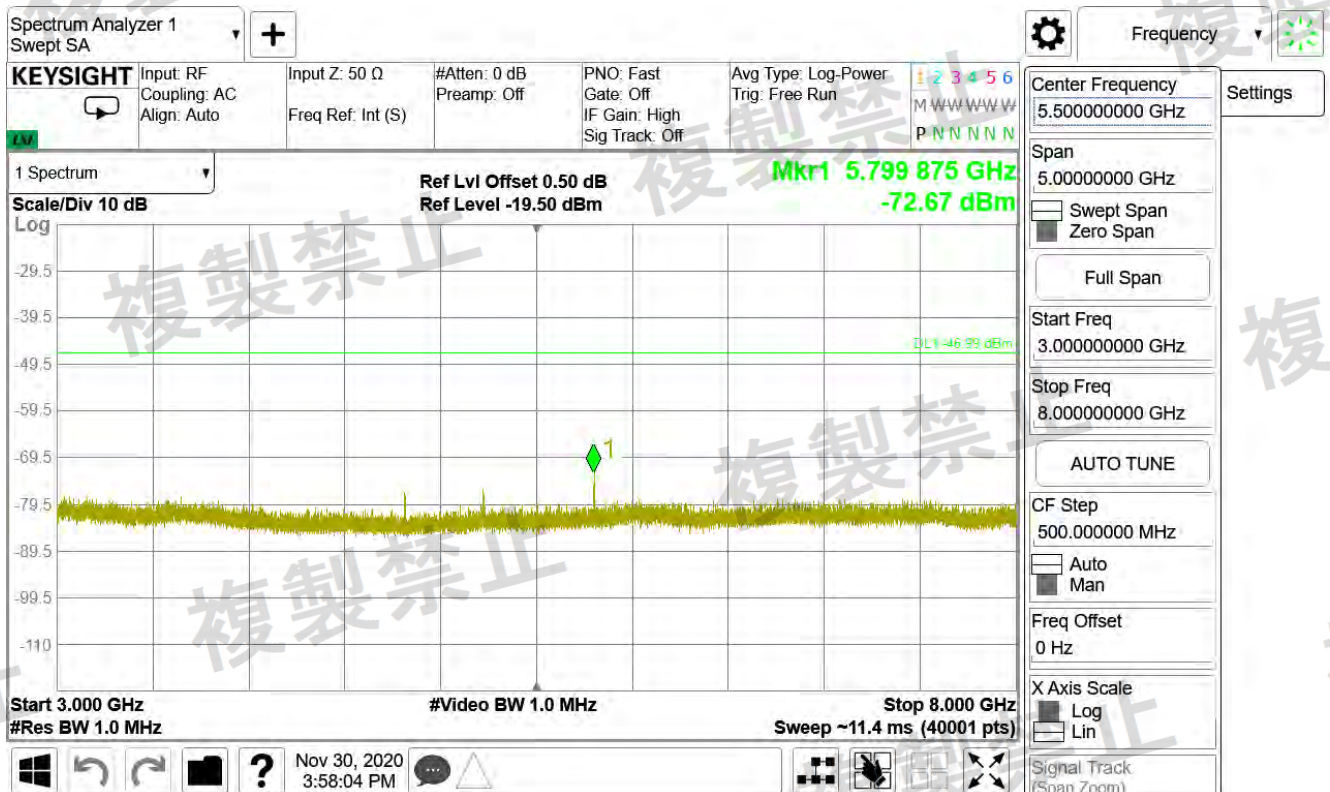
30-1000MHz



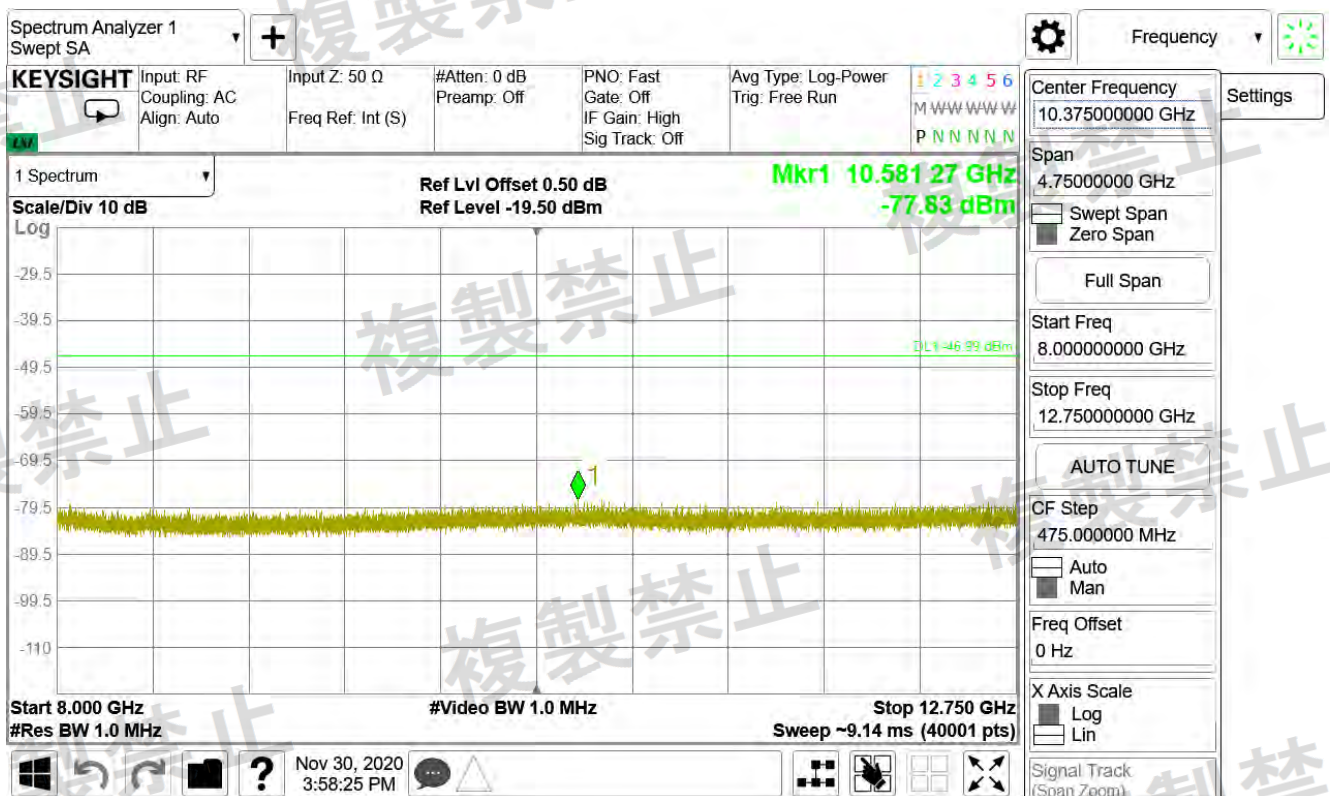
1000 – 3000MHz



3000 – 8000MHz



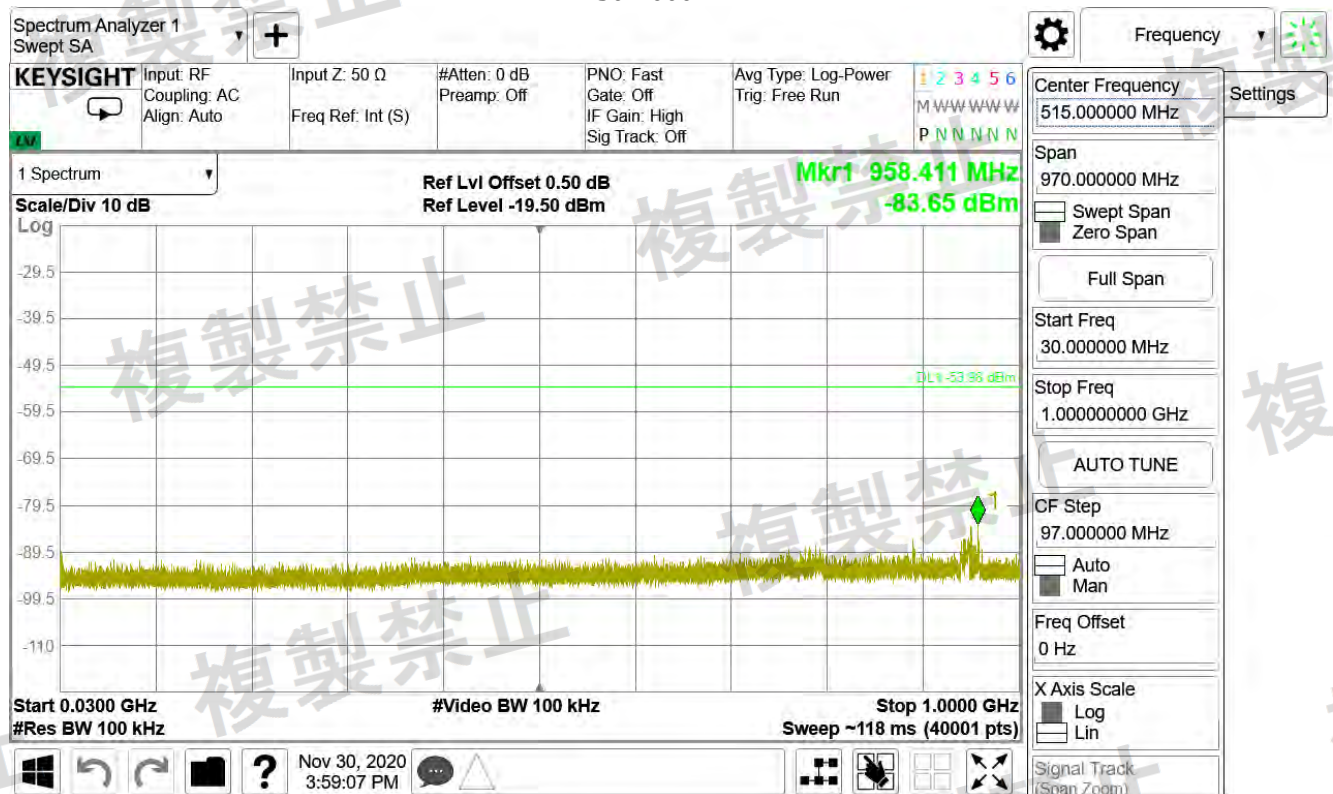
8000 – 12500MHz



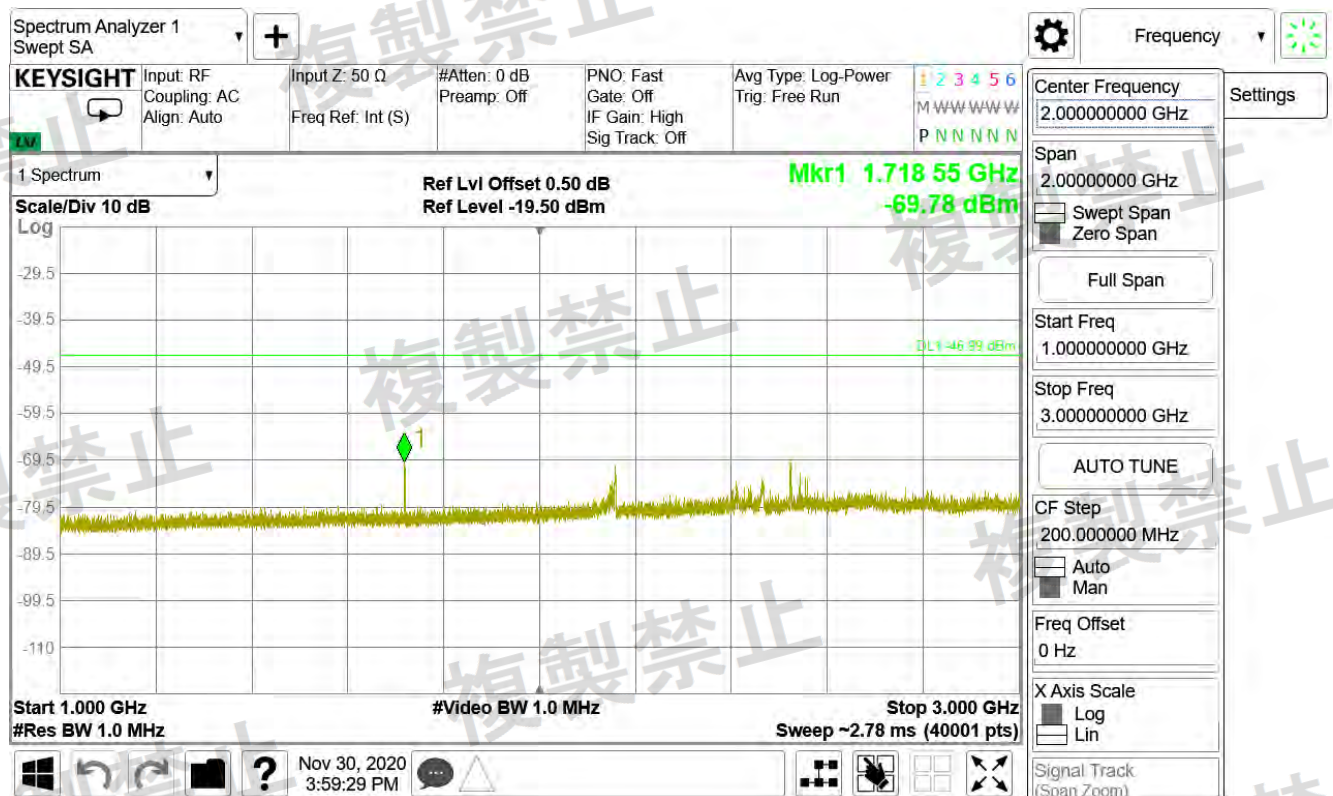
Product : Humly Room Display One
Test Item : Receiver Spurious Emissions
Test Mode : Mode 12: Receiver-AFH-3Mbps (2411MHz)

Test Conditions		Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
Tnom (25 °C)	Vnom (100VAC)	30-1000	-83.65	-54 (4nW)
		1000 – 3000	-69.78	-47 (20nW)
		3000 – 8000	-72.02	-47 (20nW)
		8000 – 12500	-78.06	-47 (20nW)

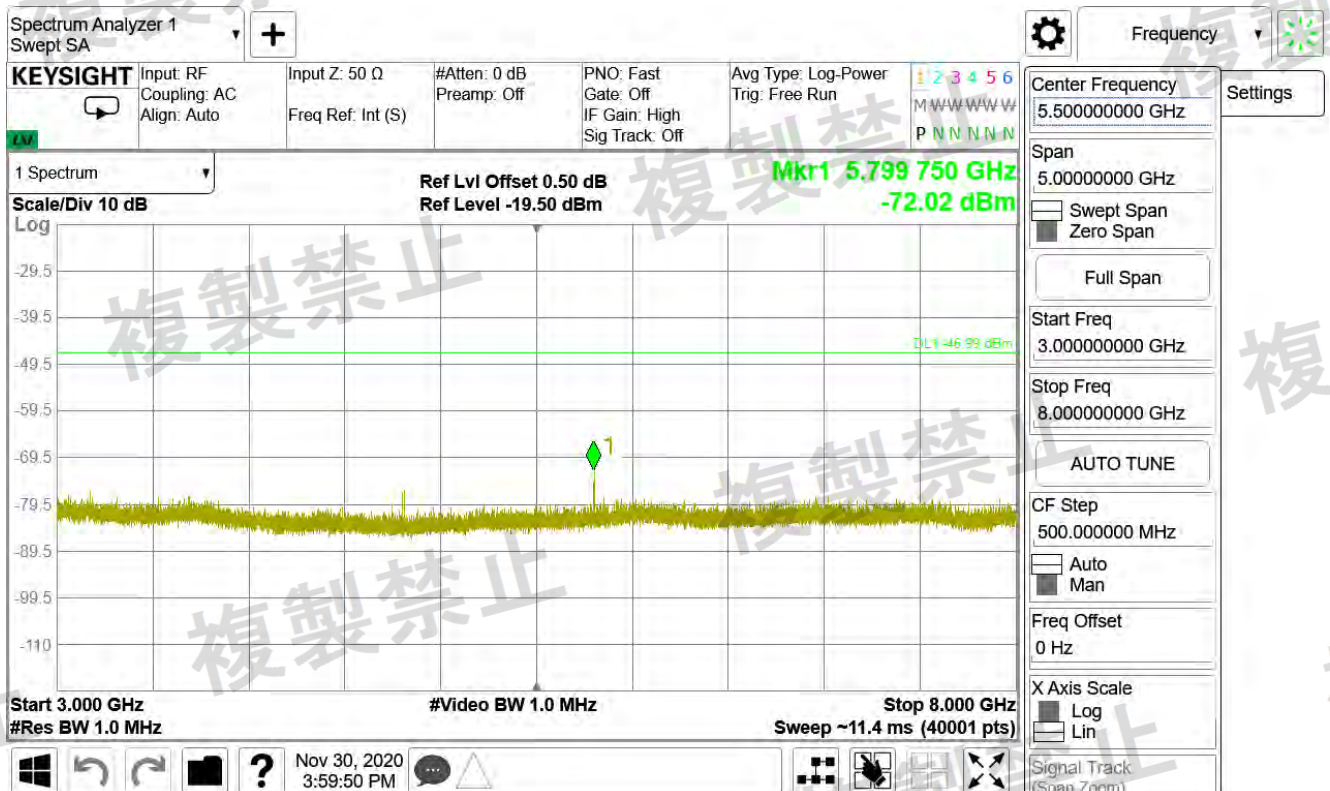
30-1000MHz



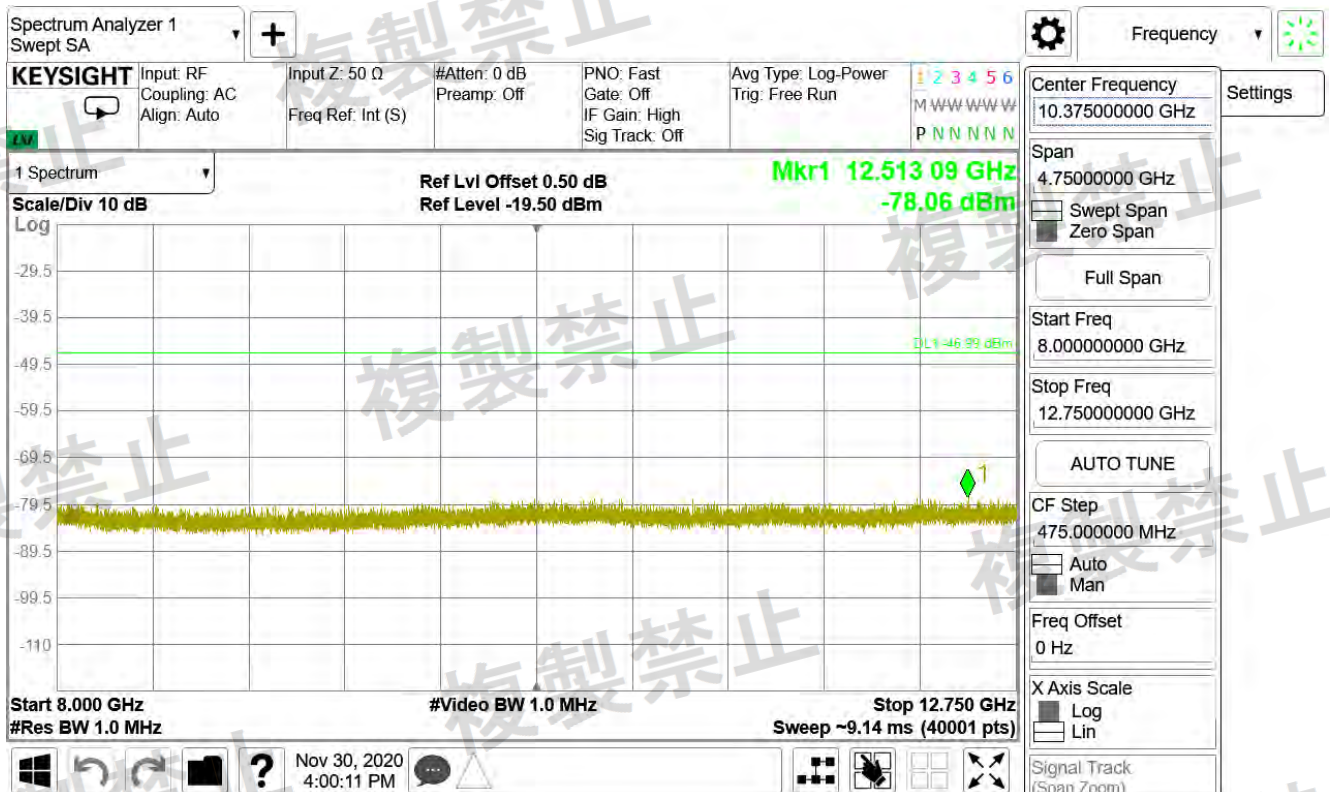
1000 – 3000MHz



3000 – 8000MHz



8000 – 12500MHz



Test Result

PASS

9. EMI Reduction Method During Compliance Testing

No modification was made during testing.