

2.4GHz Wideband Low Power Data Communication System Test Report

Product Name	ROG STRIX GO 2.4 Dongle
Model No.	ROG STRIX GO 2.4 Dongle

Applicant	ASUSTeK COMPUTER INC.
Address	4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan

Date of Receipt	Aug. 06, 2019
Issued Date	Sep. 11, 2019
Report No.	1980086R-RFJPP24V00
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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Test Report

Issued Date : Sep. 11, 2019

Report No. : 1980086R-RFJPP24V00



Product Name	ROG STRIX GO 2.4 Dongle
Applicant	ASUSTeK COMPUTER INC.
Address	4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan
Manufacturer	ASUSTeK COMPUTER INC.
Model No.	ROG STRIX GO 2.4 Dongle
EUT Rated Voltage	DC 5V (Power by USB)
EUT Test Voltage	DC 5V (Power by USB)
Trade Name	ASUS
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

:

Jinn Chen

(Senior Adm. Specialist / Jinn Chen)

Tested By

:

Droll Yang

(Assistant Engineer / Droll Yang)

Approved By

:



(Director / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	ROG STRIX GO 2.4 Dongle
Trade Name	ASUS
Model No.	ROG STRIX GO 2.4 Dongle
SERIAL NUMBER	N/A
Frequency Range	2409.35-2477.35MHz
Number of Channels	35CH
Type of Modulation	Pi/4 DQPSK
Antenna Type	Chip Antenna
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto
Declared Output Power	2.000 mW

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Advanced Ceramic X Corp.	QEC-1907094-C	Chip Antenna	0.1dBi for 2.4GHz

Center Frequency of Each Channel

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 1:	2409.35 MHz	Channel 11:	2429.35 MHz	Channel 21:	2449.35 MHz	Channel 31:	2469.35 MHz
Channel 2:	2411.35 MHz	Channel 12:	2431.35 MHz	Channel 22:	2451.35 MHz	Channel 32:	2471.35 MHz
Channel 3:	2413.35 MHz	Channel 13:	2433.35 MHz	Channel 23:	2453.35 MHz	Channel 33:	2473.35 MHz
Channel 4:	2415.35 MHz	Channel 14:	2435.35 MHz	Channel 24:	2455.35 MHz	Channel 34:	2475.35 MHz
Channel 5:	2417.35 MHz	Channel 15:	2437.35 MHz	Channel 25:	2457.35 MHz	Channel 35:	2477.35 MHz
Channel 6:	2419.35 MHz	Channel 16:	2439.35 MHz	Channel 26:	2459.35 MHz		
Channel 7:	2421.35 MHz	Channel 17:	2441.35 MHz	Channel 27:	2461.35 MHz		
Channel 8:	2423.35 MHz	Channel 18:	2443.35 MHz	Channel 28:	2463.35 MHz		
Channel 9:	2425.35 MHz	Channel 19:	2445.35 MHz	Channel 29:	2465.35 MHz		
Channel 10:	2427.35 MHz	Channel 20:	2447.35 MHz	Channel 30:	2467.35 MHz		

Note:

1. This device is a ROG STRIX GO 2.4 Dongle with a built-in 2.4GHz wireless transceiver.
2. DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode	Mode 1: Transmit
	Mode 2: Receive

1.2. Operation Description

The EUT is a ROG STRIX GO 2.4 Dongle with built-in 2.4GHz wireless transceiver. The number of the channels is 35(2409.35-2477.35MHz). The modulation is Pi/4 DQPSK. The antenna is Chip Antenna. The EUT can receive wireless signal and transmit signal for associate device.

1.3. EUT Exercise Software

- (1) Execute “Avnera_Continue_Power V2018.5.18.1” program on the Notebook.
- (2) Configure the test mode and the test channel
- (3) 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.

2.4GHz mode

Test Software	Avnera_Continue_Power V2018.5.18.1		
Frequency	2409.35MHz	2443.35MHz	2477.35MHz
Value	default	default	default

1.5. Test Conditions

Voltage Test Item	Test Voltage	Voltage meter reading value (RF Chip U2 pin 40)
Nominal Voltage	DC 5V	3.2V DC
Highest Voltage	DC 5.5V	3.2V DC
Lowest Voltage	DC 4.5V	3.2V DC

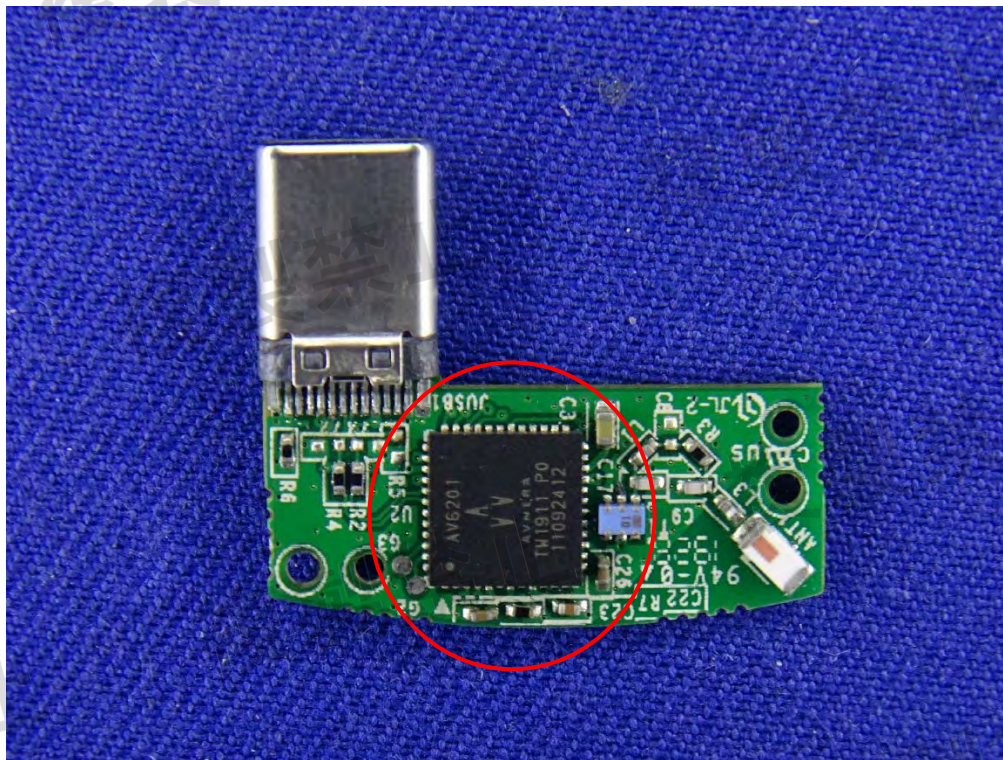
Note:

1. The Voltage supply for RF Chip is 3.2V DC.
2. The internal supply gives a fluctuation value less than 1 % (**Around 0% from max. to min.**)

Temperature	25 °C
Relative Humidity	55 %

1.6. RF and IF section must be tamper requirement

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



1.7. Test Facility

Ambient conditions in the laboratory:

Items	Required (JIS Z8703)	Actual
Temperature (°C)	5-35	18-28
Humidity (%RH)	45 - 85%	50-65
Barometric pressure (mbar)	860-1060	950-1000

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 Item and Equipment

For Conducted measurements /ASR2

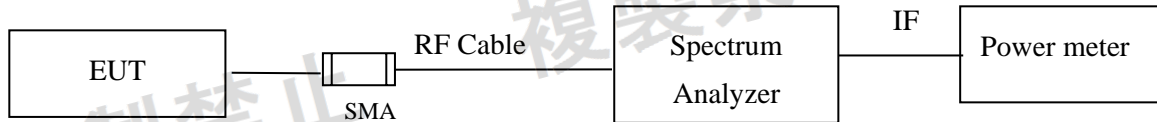
	Equipment	Manufacturer	Model No.	Serial No.	Calibrated	Cal. Method	Cali. Data	Due. Data
X	Spectrum Analyzer	R&S	FSV30	103464	ETC	*(c)	2019.01.25	2020.01.24
X	Power Meter	Anritsu	ML2496A	1548003	ETC	*(c)	2018.12.19	2019.12.18
X	Power Sensor	Anritsu	MA2411B	1531024	ETC	*(c)	2018.12.19	2019.12.18
X	Power Sensor	Anritsu	MA2411B	1531025	ETC	*(c)	2018.12.19	2019.12.18
	Bluetooth Tester	R&S	CBT	101238	ETC	*(c)	2019.01.21	2020.01.20

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 System V9.0.5
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 other equipment that listed above from a) to c).

2. Output Power and Output Power Tolerance

2.1. Test Setup



2.2. Limits

$\leq 10\text{dBm}$

2.3. 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 sample detector function must be used.
- (b) A measurement instrument with an integrated 1MHz power bandwidth function may be used to automate the test process.
- (c) Connect the power meter to the IF output of the spectrum analyzer.
- (d) Set zero span of spectrum analyzer and 'Maximum Hold' than test result will show in power meter.

2.4. Uncertainty

Spectrum Analyzer: $\pm 1.23\text{ dB}$

Power meter: $\pm 0.86\text{ dB}$

2.5. Test Result of Output Power and Output Power Tolerance

Product : ROG STRIX GO 2.4 Dongle
Test Item : Output Power
Test Date : 2019/09/05
Test Mode : Mode 1: Transmit

Maximum Antenna Gain= 0.1dBi				
Frequency (MHz)	Real Value (dBm)	Limit (dBm)	Real Value (EIRP) (dBm)	Limit (EIRP) (dBm)
2409.35	1.55	10	1.65	12.14
2443.35	1.73	10	1.83	12.14
2477.35	0.43	10	0.53	12.14

Real Value (EIRP) = Real Value + Antenna Gain

Test Result	PASS
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Product : ROG STRIX GO 2.4 Dongle
Test Item : Output Power Tolerance
Test Date : 2019/09/05
Test Mode : Mode 1: Transmit

Frequency (MHz)	Declared Output Power (mW)	Output Power (mW)	Tolerance (%)	Limit (%)
2409.35	2.000	1.429	-28.56	+20% to -80%
2443.35	2.000	1.489	-25.53	+20% to -80%
2477.35	2.000	1.104	-44.80	+20% to -80%

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

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

3. Occupied Bandwidth

3.1. Test Setup



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) 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.

3.3. Limits

≤ 26 MHz for DSSS&OFDM, ≤ 83.5 MHz for FHSS,
 ≤ 38 MHz for OFDM(Wide-band)

3.4. Uncertainty

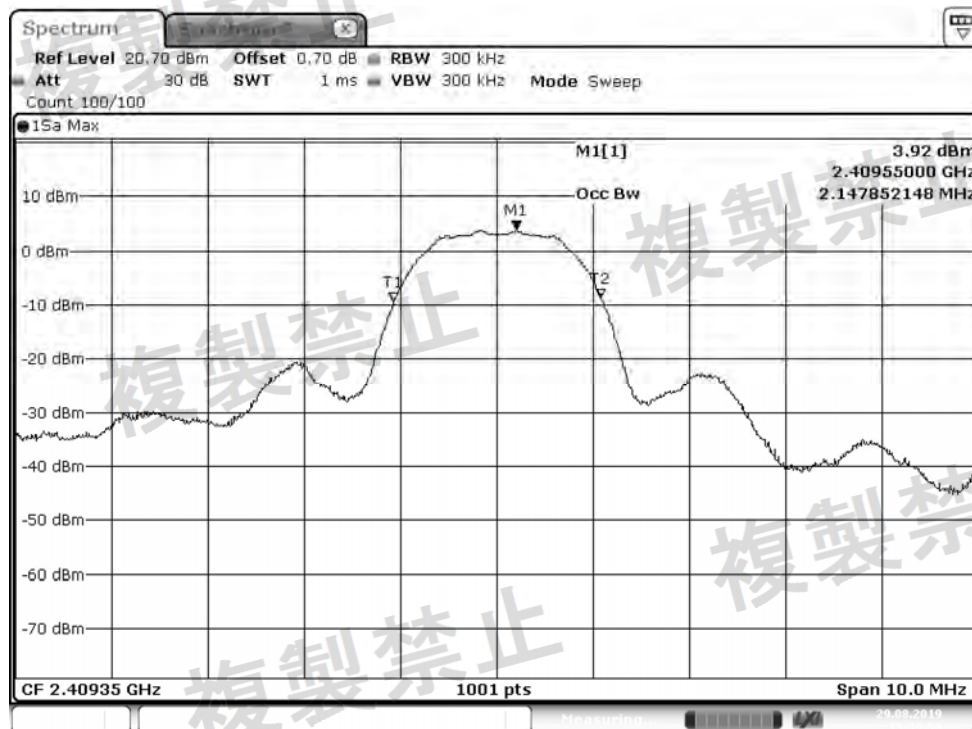
± 279.2 Hz

3.5. Test Result of Occupied Bandwidth

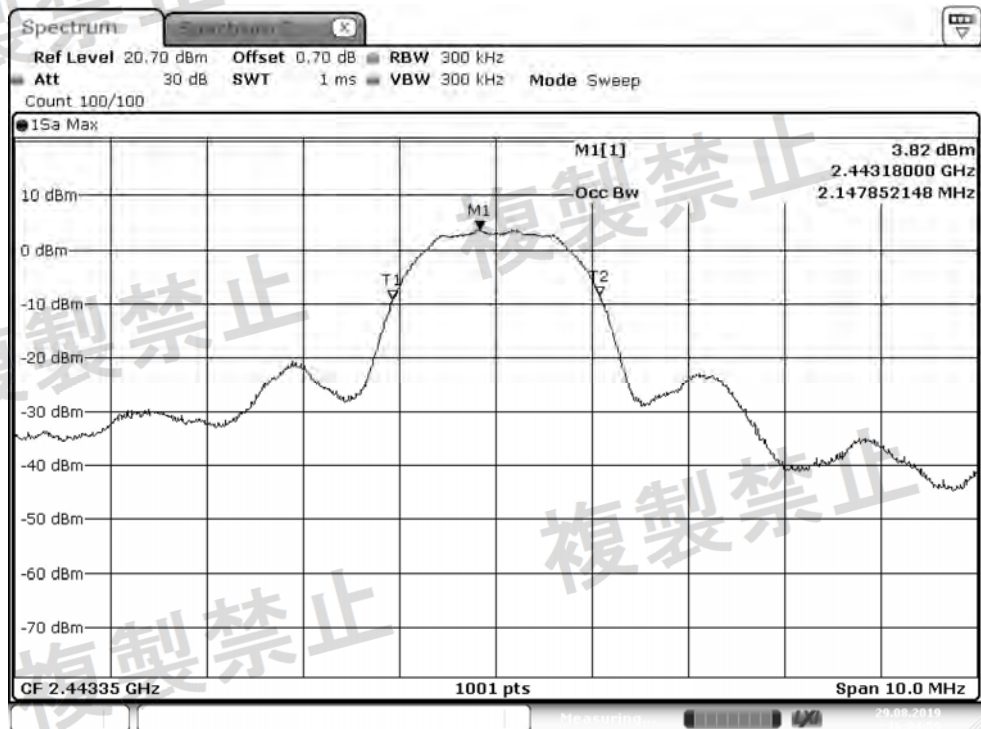
Product : ROG STRIX GO 2.4 Dongle
 Test Item : Occupied Bandwidth
 Test Mode : Mode 1: Transmit

Frequency (MHz)	Reading Value (MHz)	Limit (MHz)
2409.35	2.148	≤ 26
2443.35	2.148	≤ 26
2477.35	2.148	≤ 26

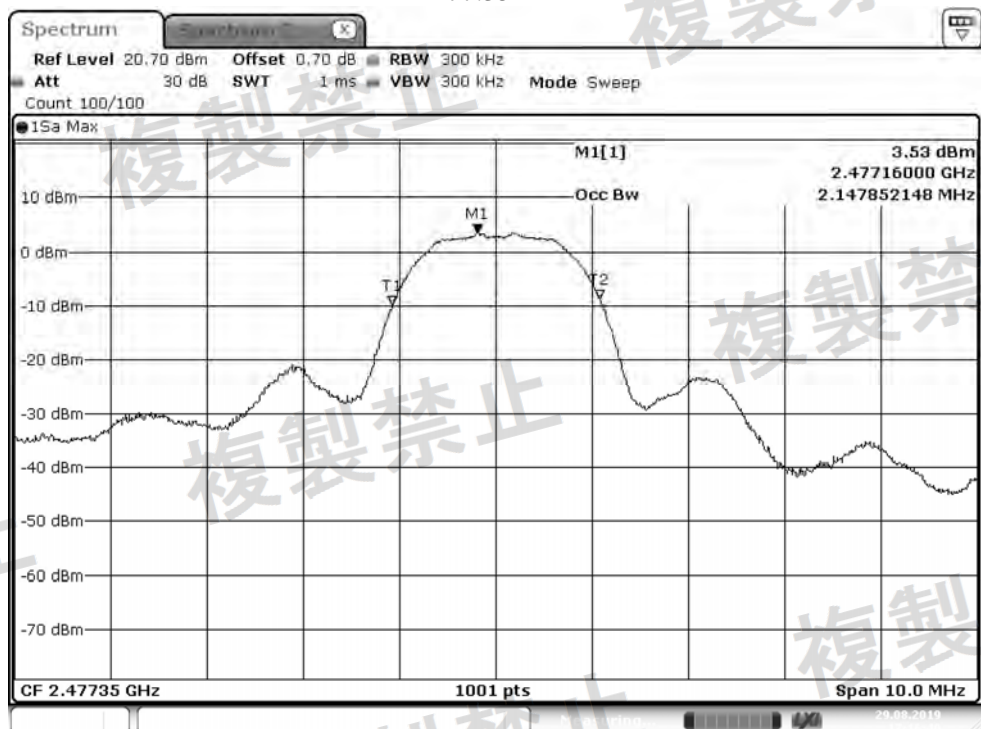
2409.35MHz



2443.35MHz



2477.35MHz



Test Result

PASS

4. Frequency Tolerance

4.1. Test Setup



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) 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.
- (c) 'Maximum Hold' mode may be used to accumulate the measurement result over several scans provided the emission is repetitive in nature.

4.3. Limits

± 50 ppm

4.4. Uncertainty

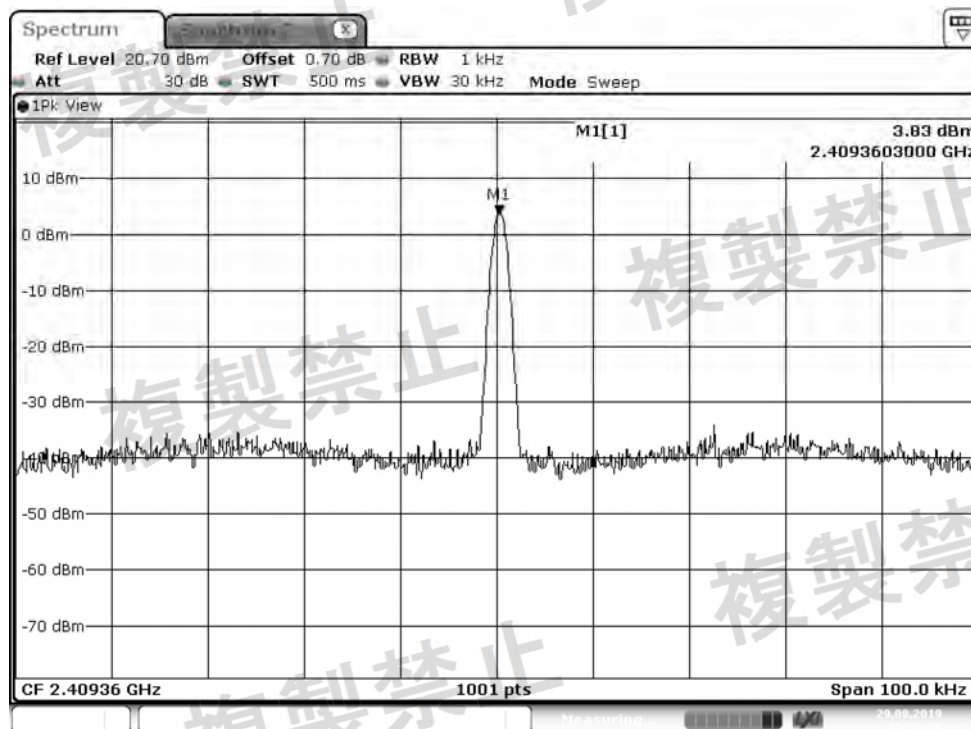
± 279.2 Hz

4.5. Test Result of Frequency Tolerance

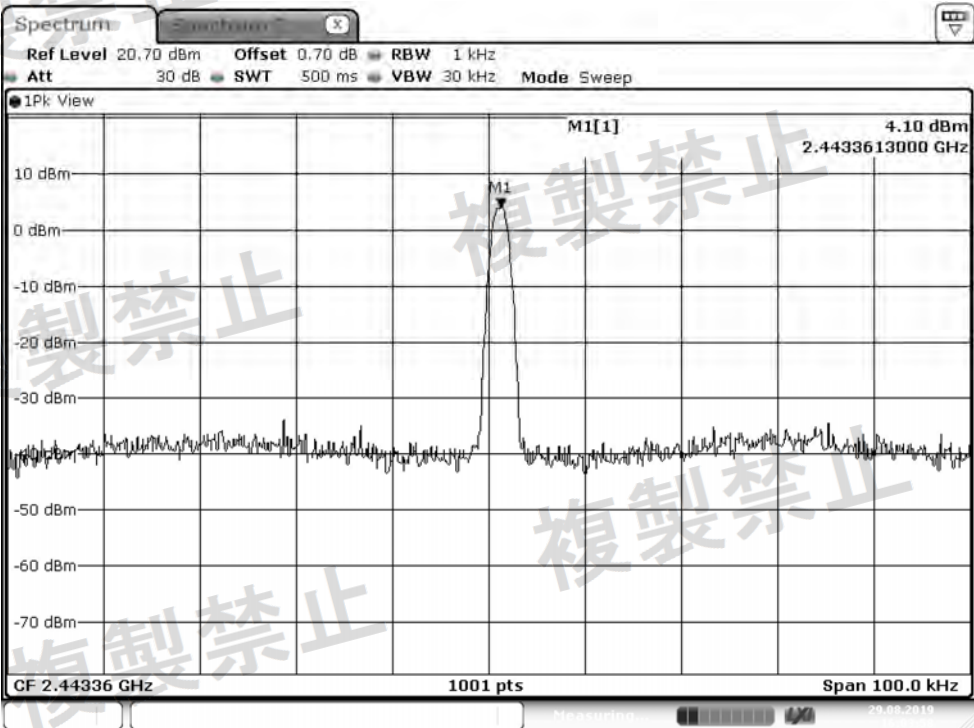
Product : ROG STRIX GO 2.4 Dongle
 Test Item : Frequency Tolerance
 Test Mode : Mode 1: Transmit

Frequency (MHz)	Reading Value (MHz)	Tolerance (ppm)	Limit (ppm)
2409.35	2409.3603	4.2750	± 50
2443.35	2443.3613	4.6248	± 50
2477.35	2477.3607	4.3191	± 50

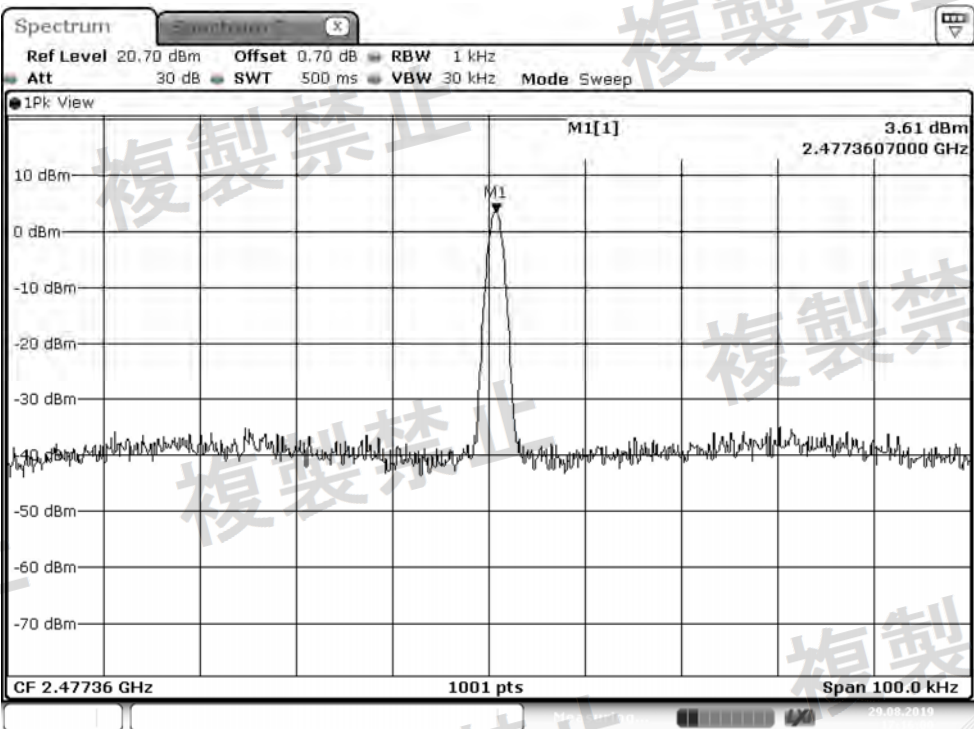
2409.35MHz



2443.35MHz



2477.35MHz



Test Result

PASS

5. Transmitter Spurious Emissions

5.1. Test Setup



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) A positive peak detector function must be used.
- (b) 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.
- (c) 'Maximum Hold' mode may be used to accumulate the measurement result over several scans provided the emission is repetitive in nature.

5.3. 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 – 12500 MHz

5.4. Uncertainty

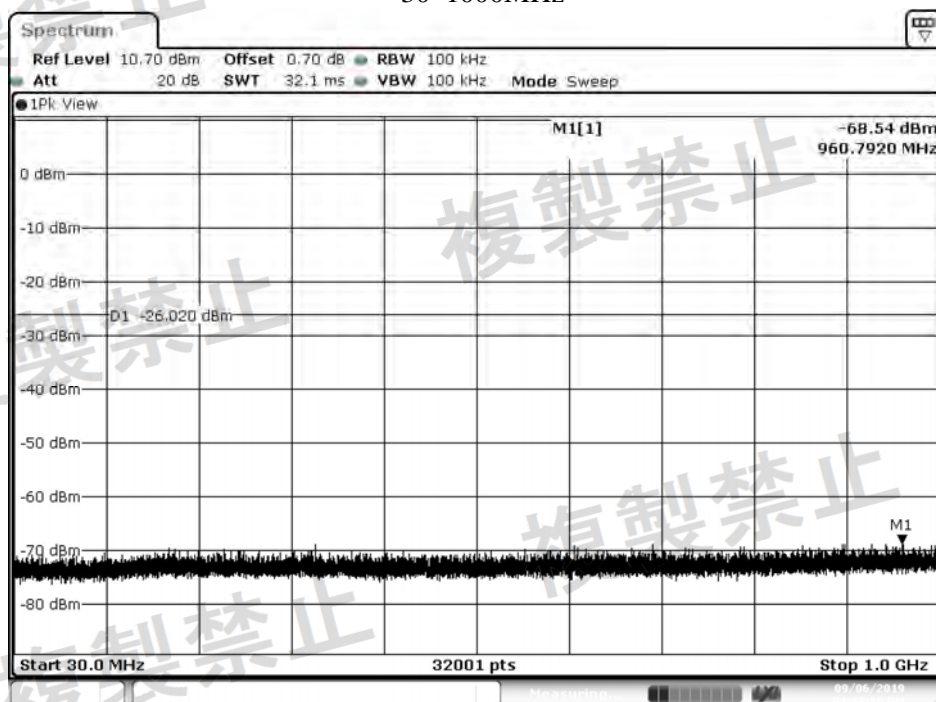
$\pm 1.23\text{dB}$

5.5. Test Result of Transmitter Spurious Emissions

Product : ROG STRIX GO 2.4 Dongle
Test Item : Transmitter Spurious Emissions
Test Mode : Mode 1: Transmit 2409.35MHz

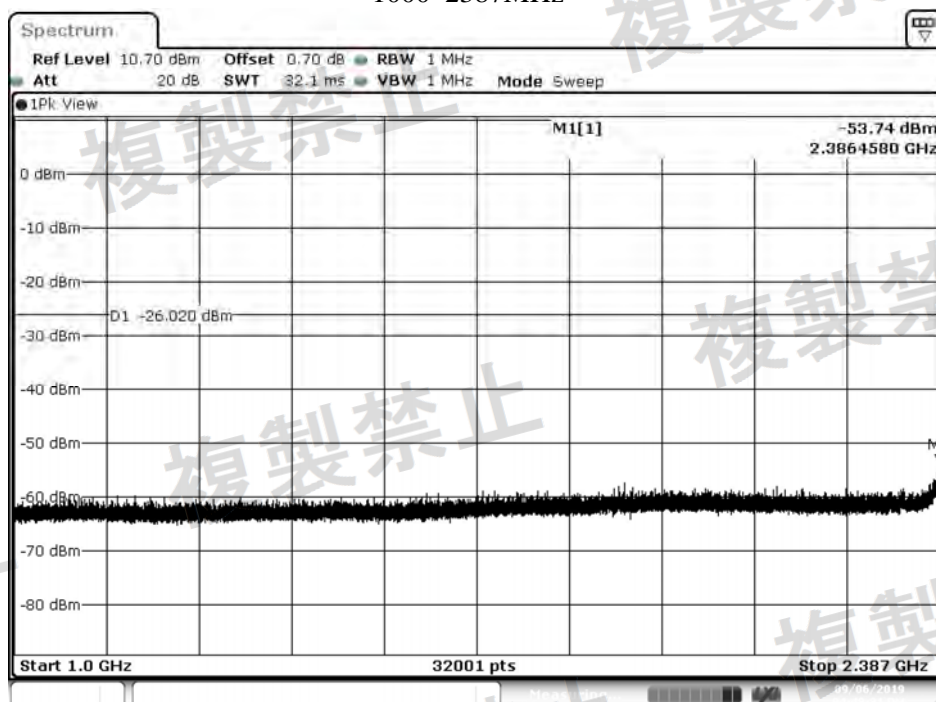
Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
30 - 1000	-68.54	-26 (2.5uW)
1000 – 2387	-53.74	-26 (2.5uW)
2387 – 2400	-40.11	-16 (25uW)
2483.5 – 2496.5	-57.71	-16 (25uW)
2496.5 – 8000	-54.14	-26 (2.5uW)
8000 – 12750	-57.76	-26 (2.5uW)

30–1000MHz



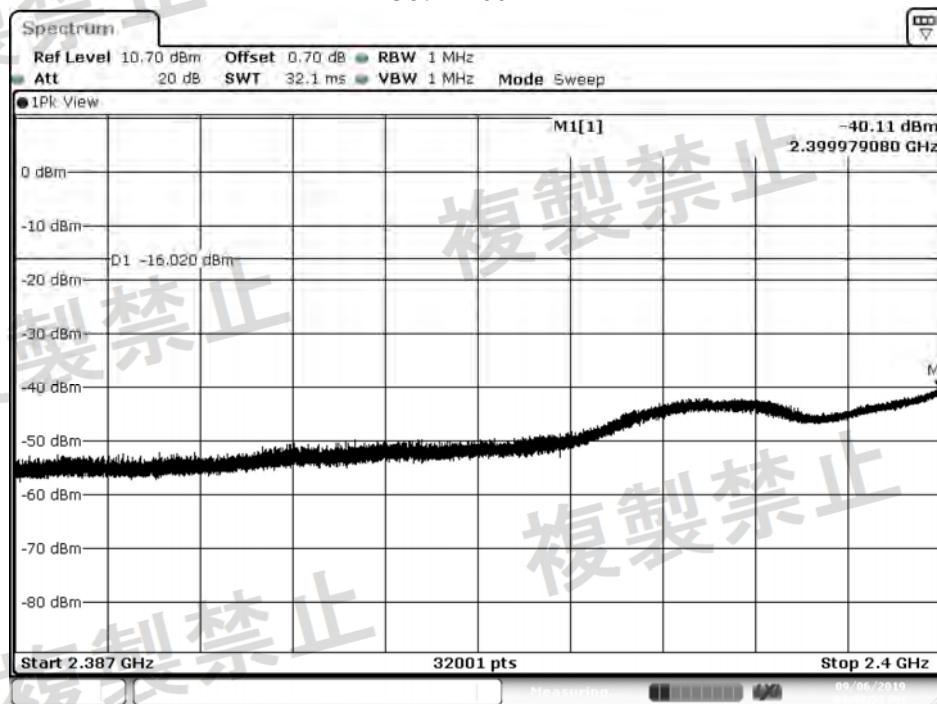
Date: 6.SEP.2019 16:48:10

1000–2387MHz



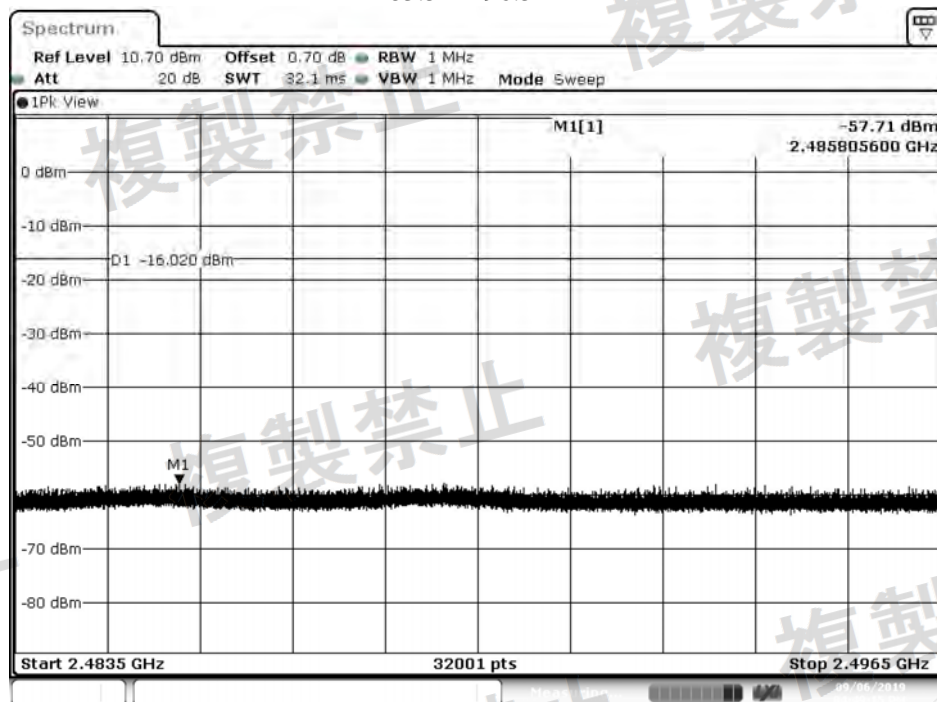
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2387–2400 MHz



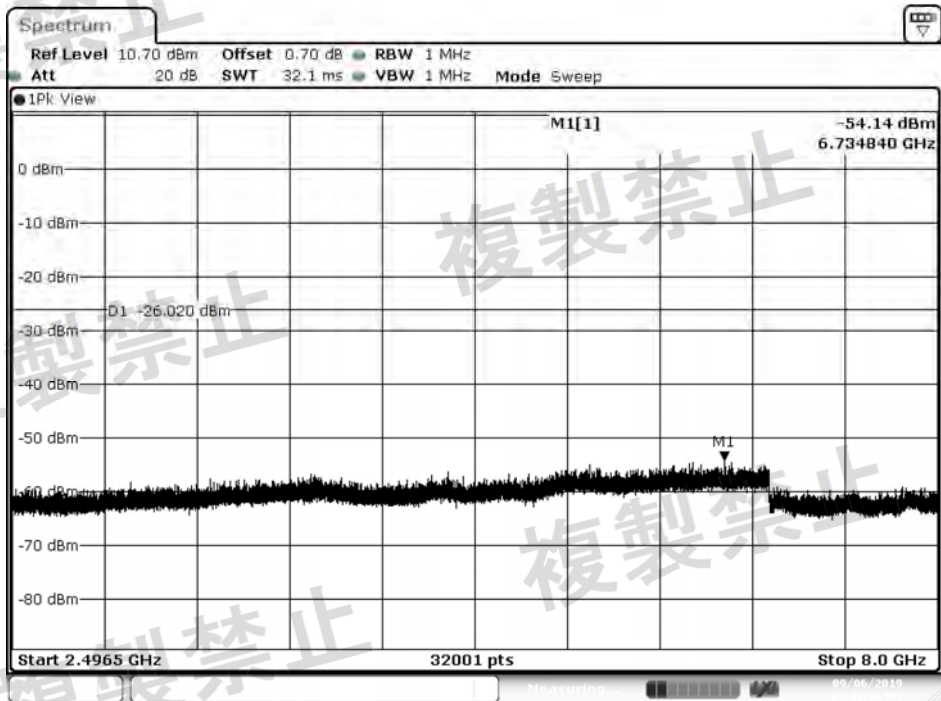
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2483.5–2496.5MHz

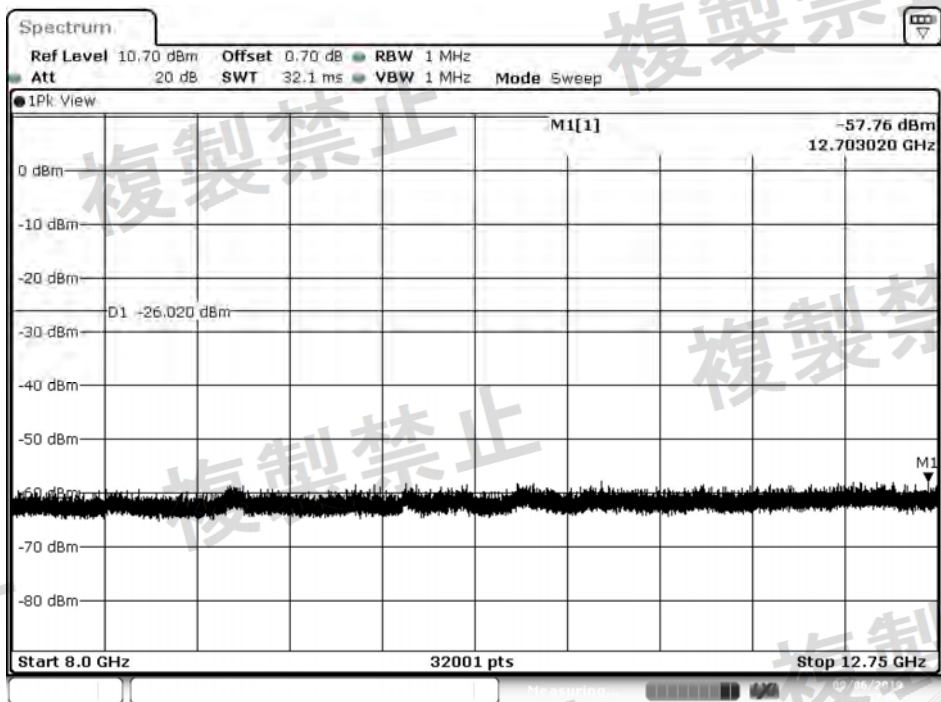


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2496.5–8000MHz



8000–12750MHz



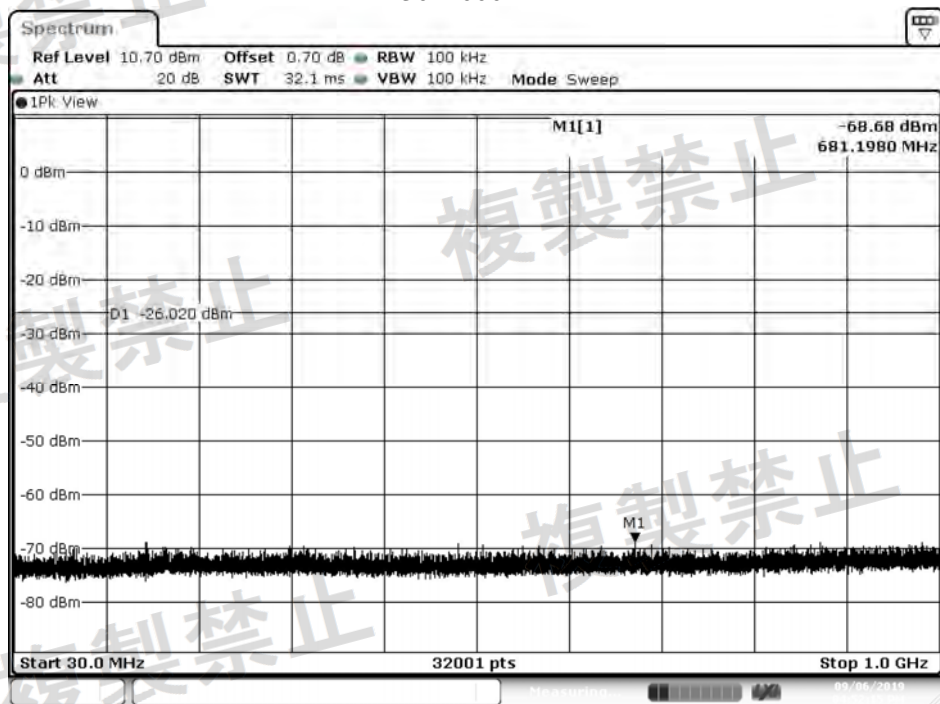
Test Result

PASS

Product : ROG STRIX GO 2.4 Dongle
Test Item : Transmitter Spurious Emissions
Test Mode : Mode 1: Transmit 2443.35MHz

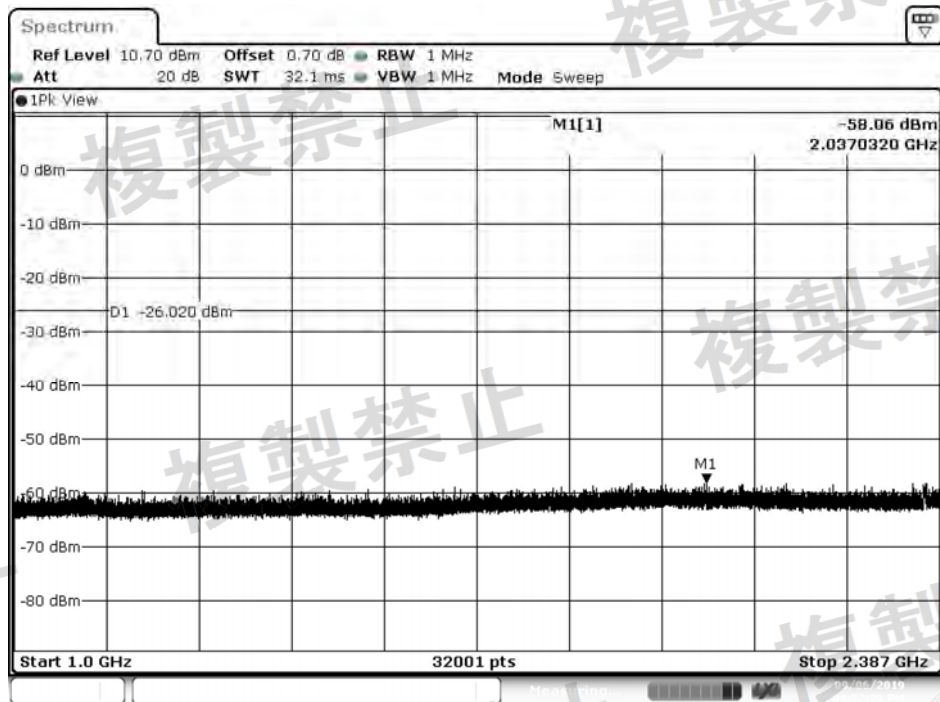
Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
30 - 1000	-68.68	-26 (2.5uW)
1000 – 2387	-58.06	-26 (2.5uW)
2387 – 2400	-57.12	-16 (25uW)
2483.5 – 2496.5	-56.87	-16 (25uW)
2496.5 – 8000	-54.38	-26 (2.5uW)
8000 – 12750	-57.39	-26 (2.5uW)

30–1000MHz



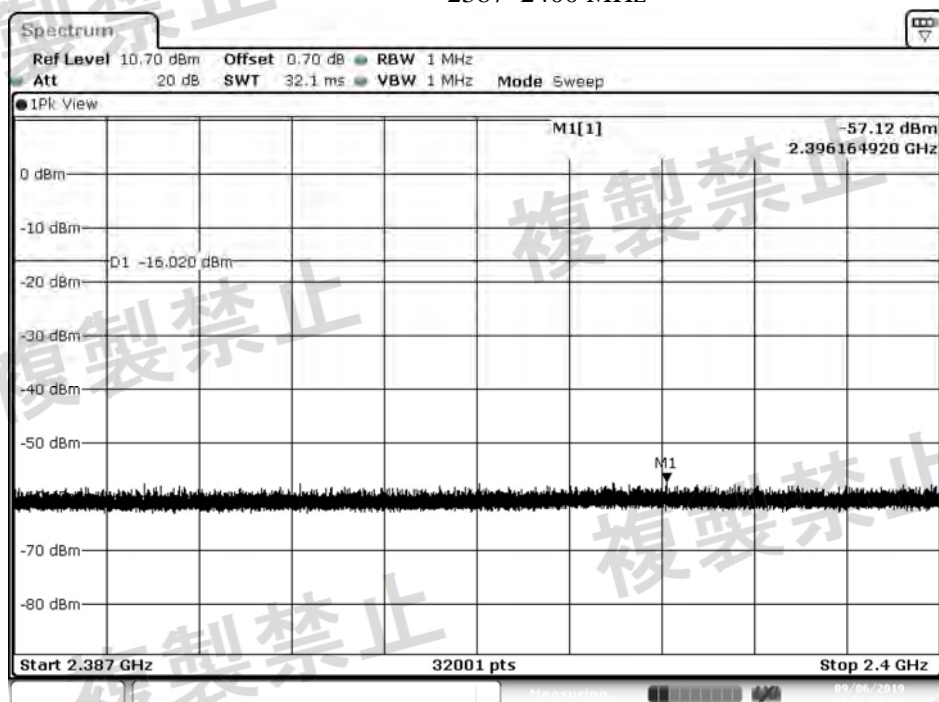
Date: 6.SEP.2019 16:52:15

1000–2387MHz



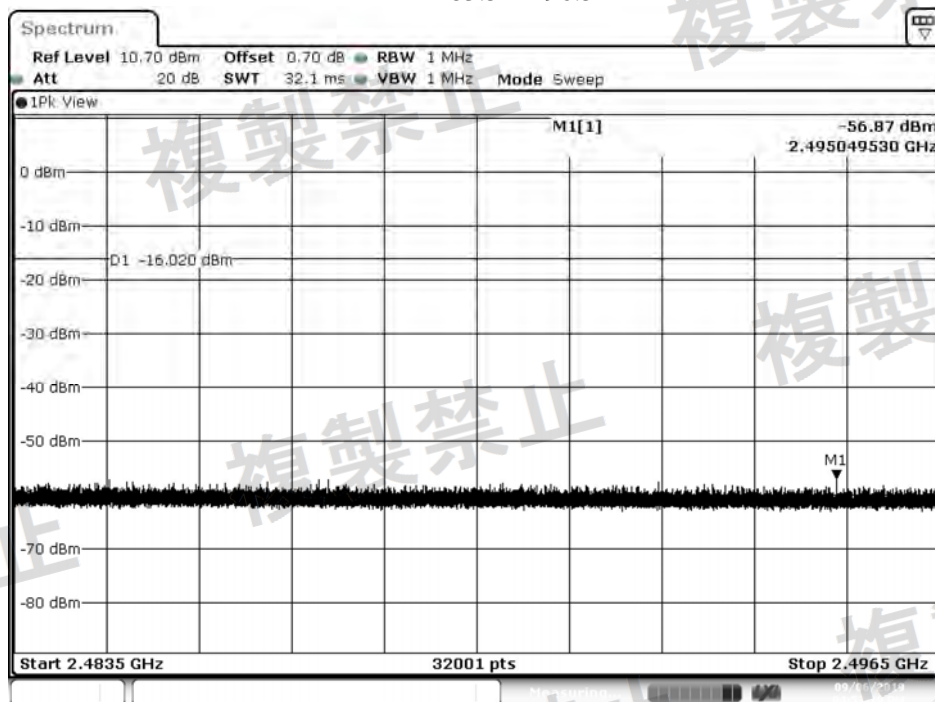
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2387–2400 MHz



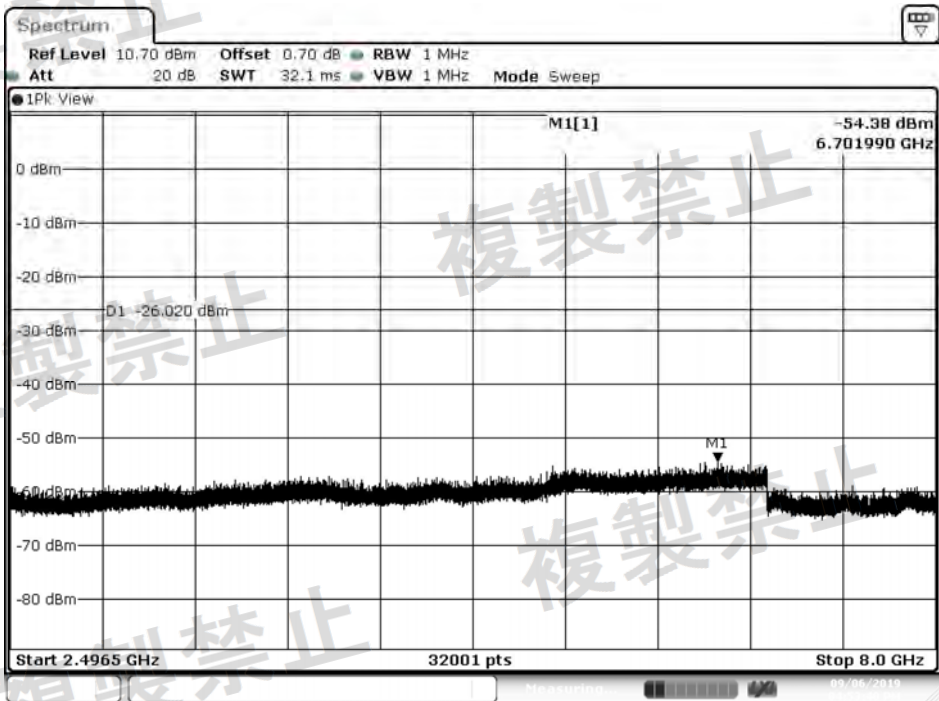
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2483.5–2496.5MHz

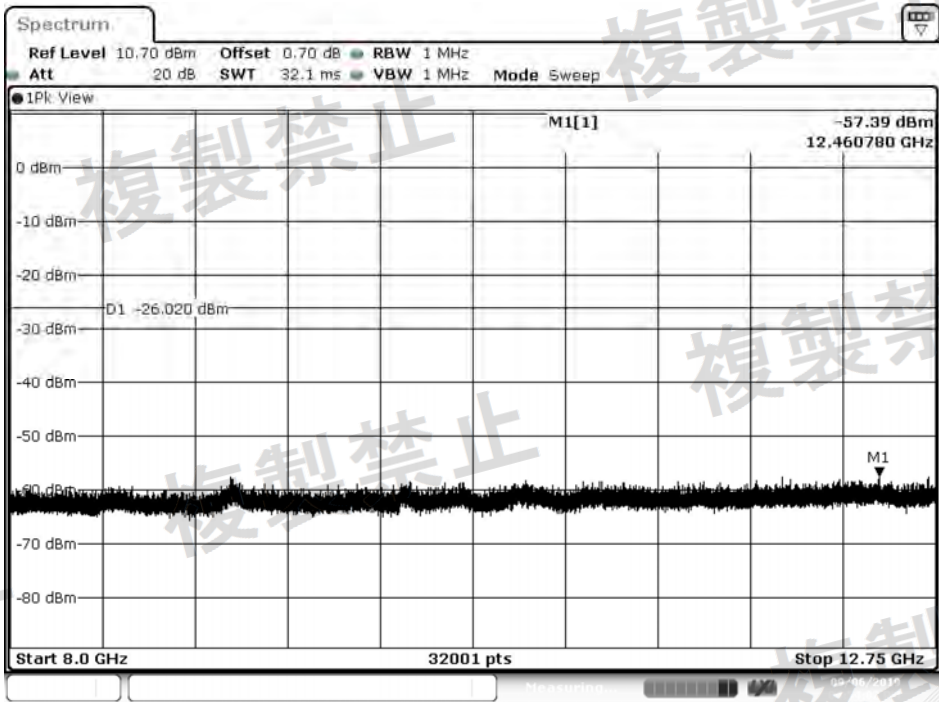


Date: 6.SEP.2019 16:53:20

2496.5–8000MHz



8000–12750MHz



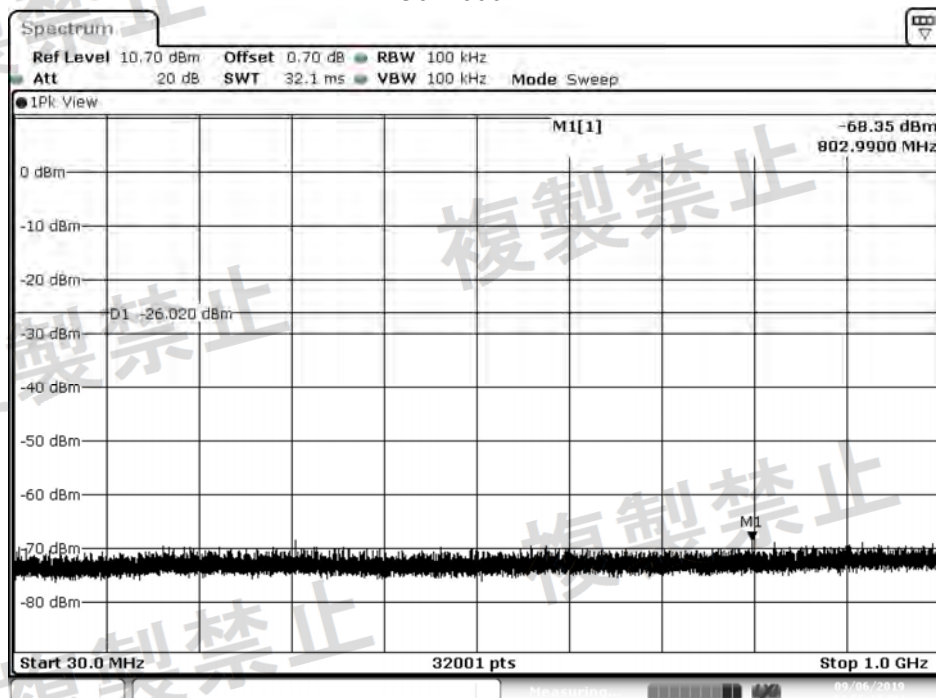
Test Result

PASS

Product : ROG STRIX GO 2.4 Dongle
Test Item : Transmitter Spurious Emissions
Test Mode : Mode 1: Transmit 2477.35MHz

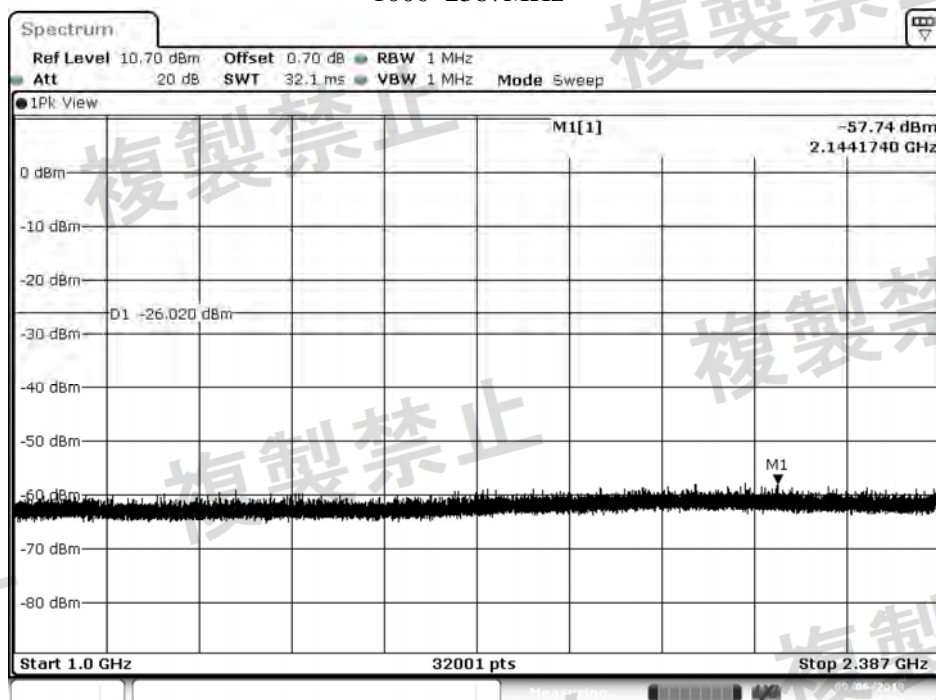
Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
30 - 1000	-68.35	-26 (2.5uW)
1000 - 2387	-57.74	-26 (2.5uW)
2387 - 2400	-57.47	-16 (25uW)
2483.5 - 2496.5	-36.25	-16 (25uW)
2496.5 - 8000	-54.28	-26 (2.5uW)
8000 - 12750	-57.12	-26 (2.5uW)

30–1000MHz



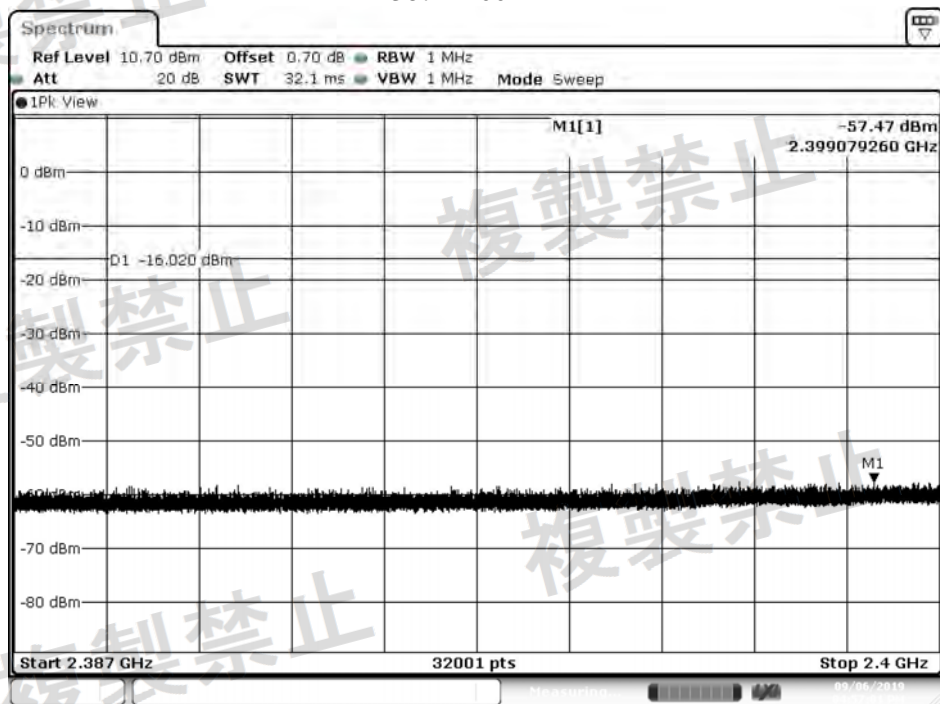
Date: 6.SEP.2019 16:56:19

1000–2387MHz

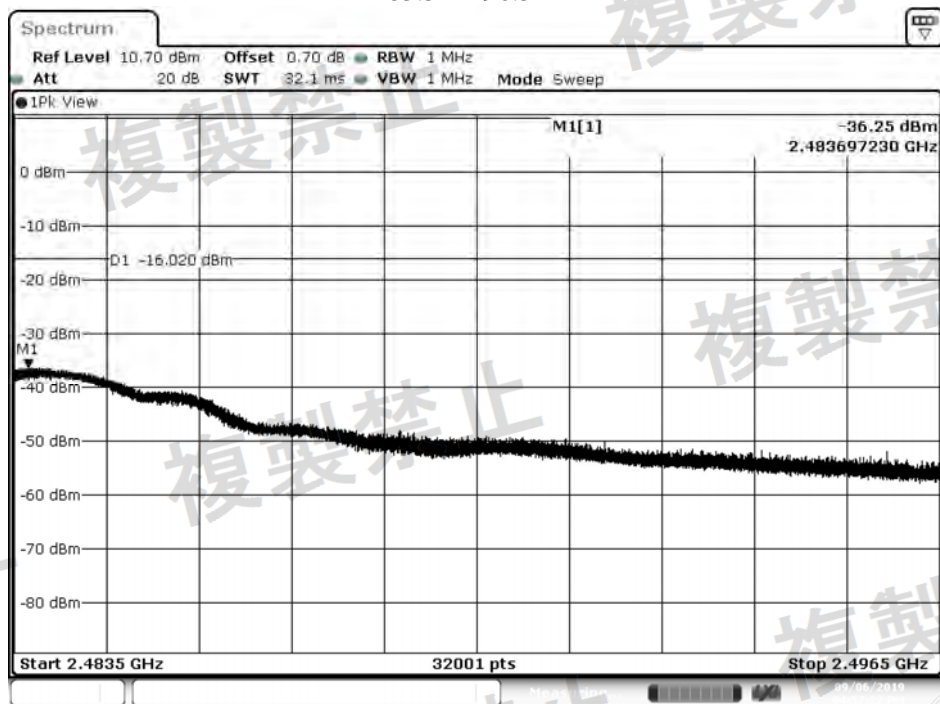


Date: 6.SEP.2019 16:56:40

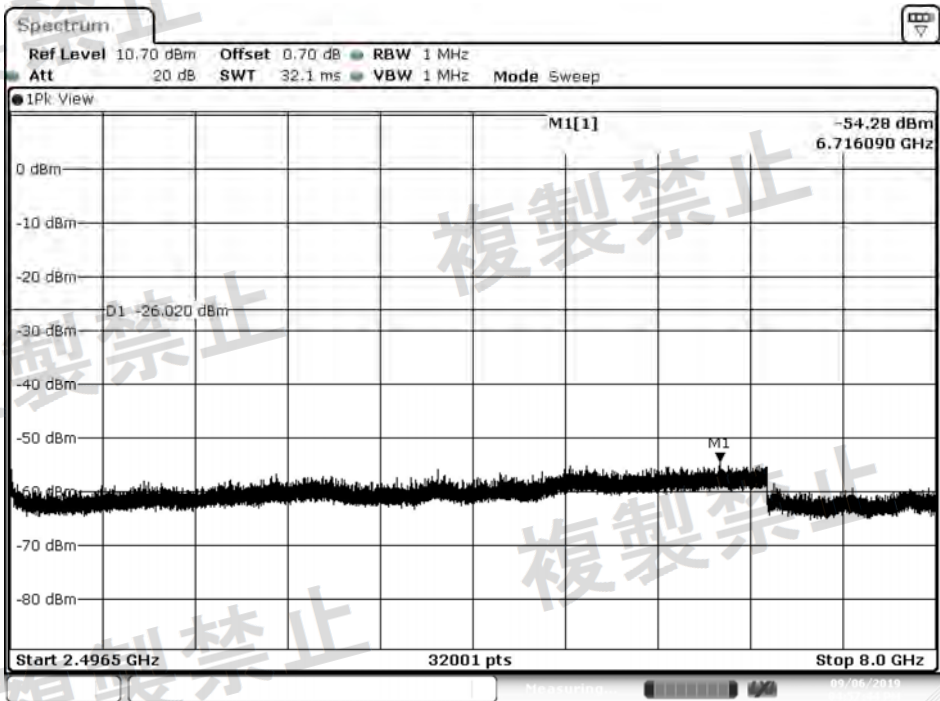
2387–2400 MHz



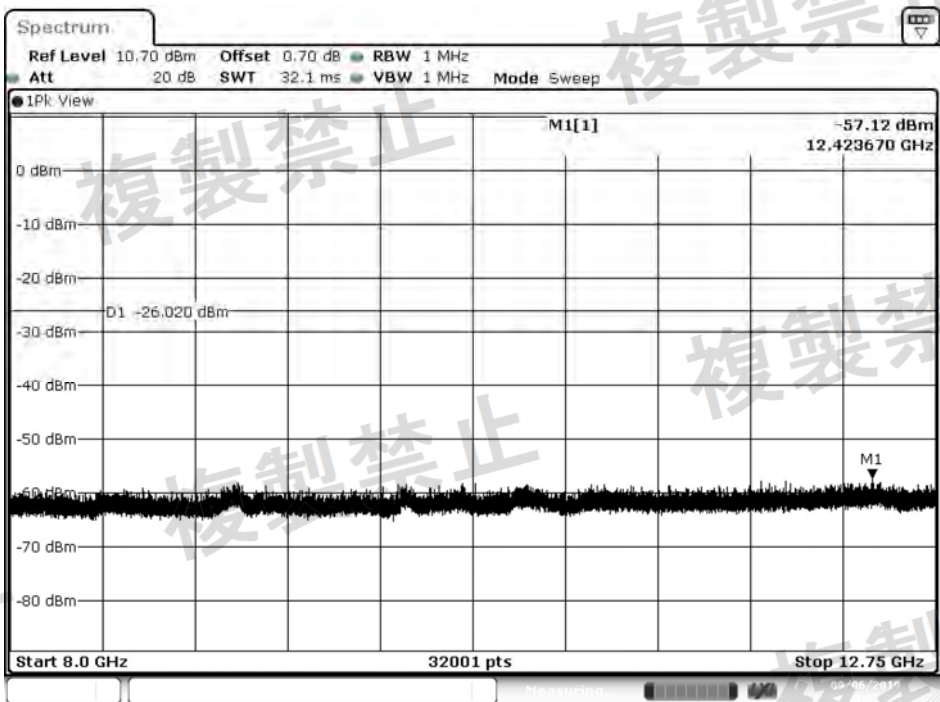
2483.5–2496.5MHz



2496.5–8000MHz



8000–12750MHz



Test Result

PASS

6. Receiver Suprious Emissions

6.1. Test Setup



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 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.
- (c) 'Maximum Hold' mode may be used to accumulate the measurement result over several scans provided the emission is repetitive in nature.

6.3. Limits

- $\leq 4\text{nW}$ for 30 – 1000 MHz
- $\leq 20\text{nW}$ for 1000 – 3000 MHz
- $\leq 20\text{nW}$ for 3000 – 12750 MHz

6.4. Uncertainty

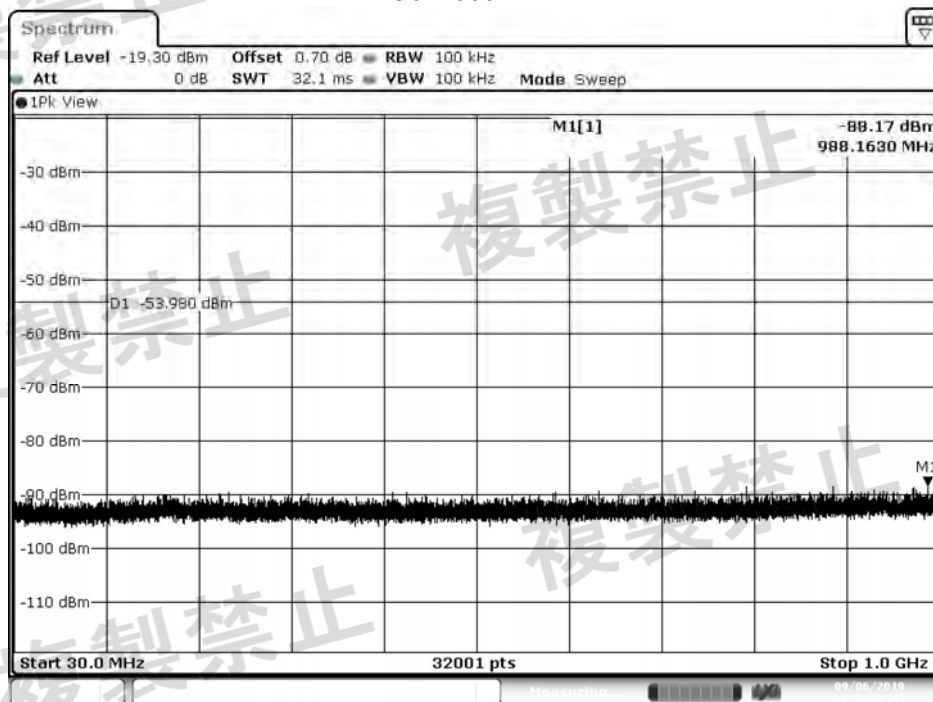
$\pm 1.23\text{dB}$

6.5. Test Result of Receiver Spurious Emissions

Product : ROG STRIX GO 2.4 Dongle
Test Item : Receiver Spurious Emissions
Test Mode : Mode 2: Receive 2409.35MHz

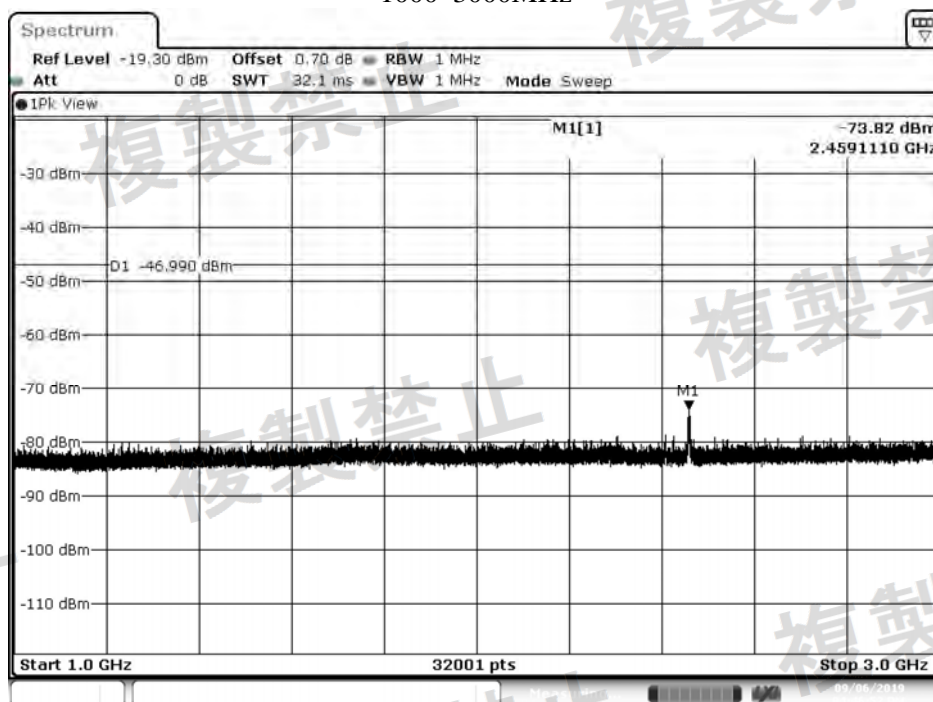
Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
30 - 1000	-88.17	-54 (4nW)
1000 – 3000	-73.82	-47 (20nW)
3000 – 8000	-74.66	-47 (20nW)
8000 – 12750	-77.55	-47 (20nW)

30–1000MHz



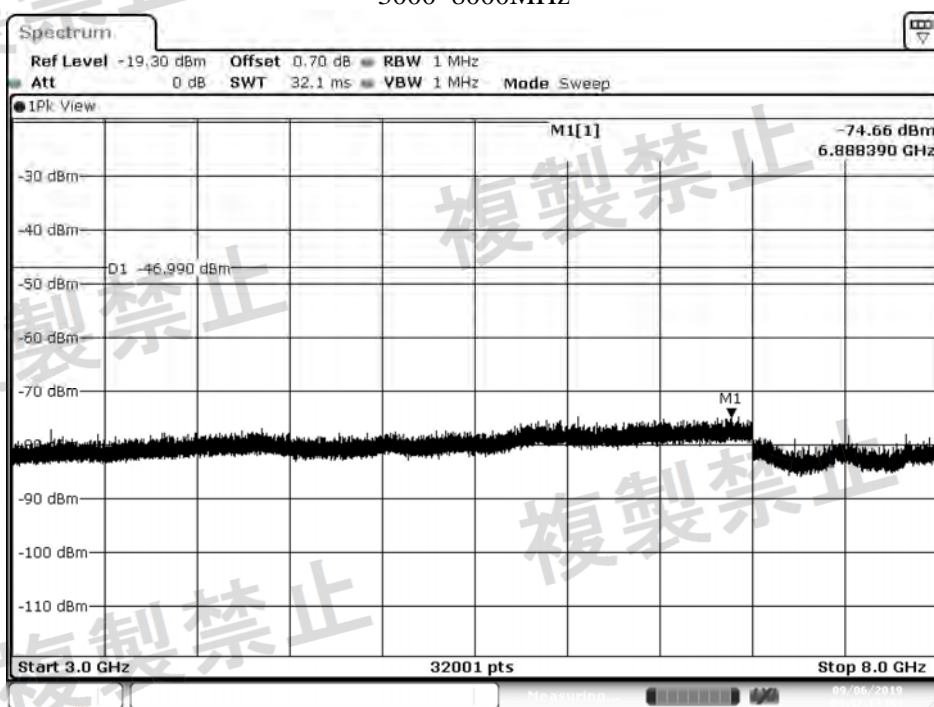
Date: 6.SEP.2019 16:46:31

1000–3000MHz



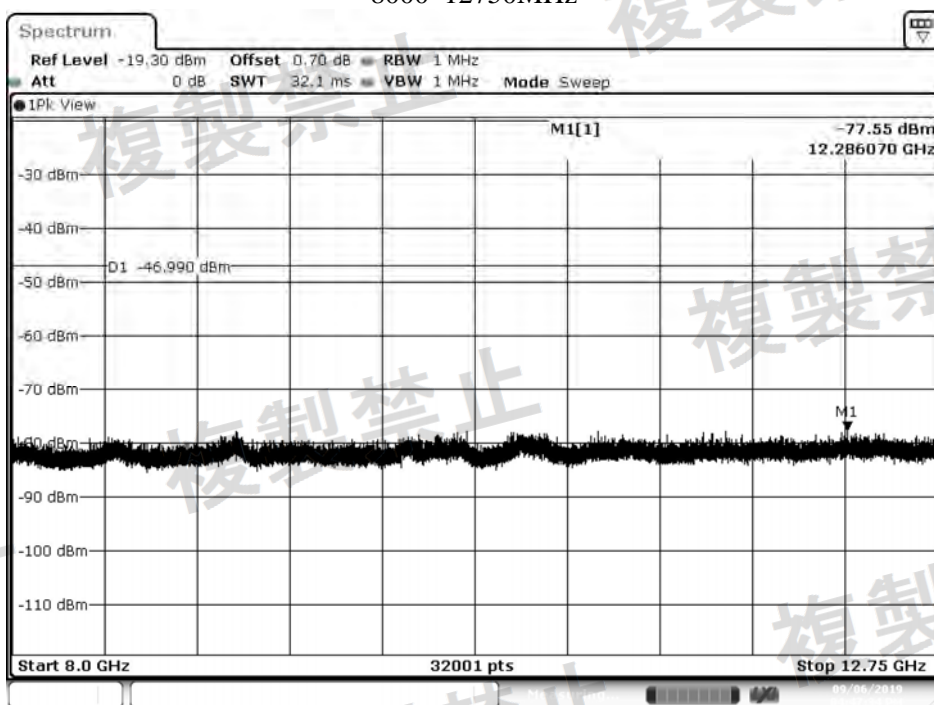
Date: 6.SEP.2019 16:46:52

3000–8000MHz



Date: 6.SEP.2019 16:47:13

8000–12750MHz



Date: 6.SEP.2019 16:47:35

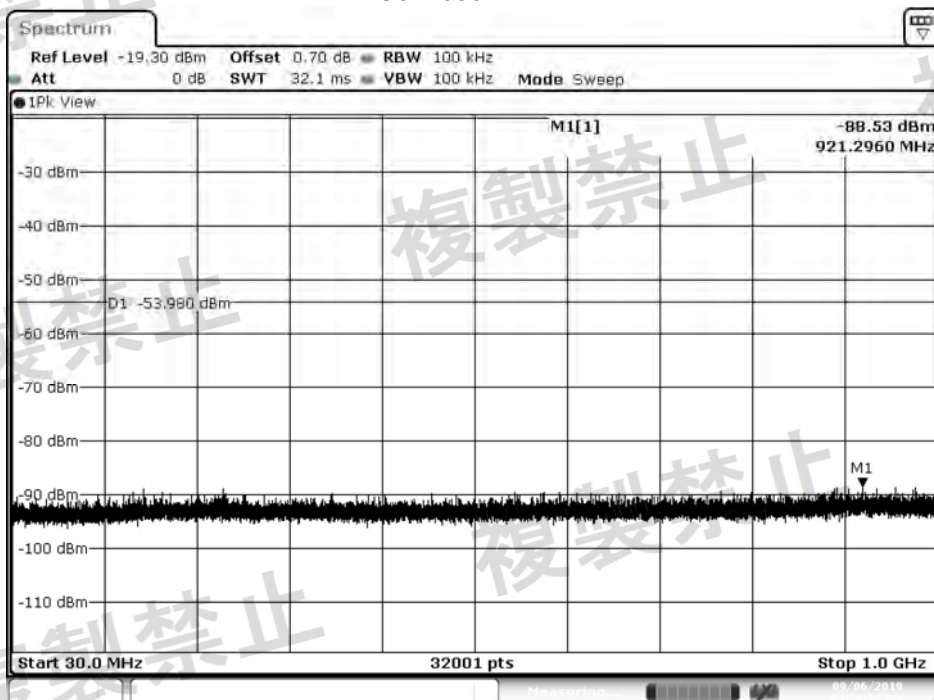
Test Result

PASS

Product : ROG STRIX GO 2.4 Dongle
Test Item : Receiver Spurious Emissions
Test Mode : Mode 2: Receive 2443.35MHz

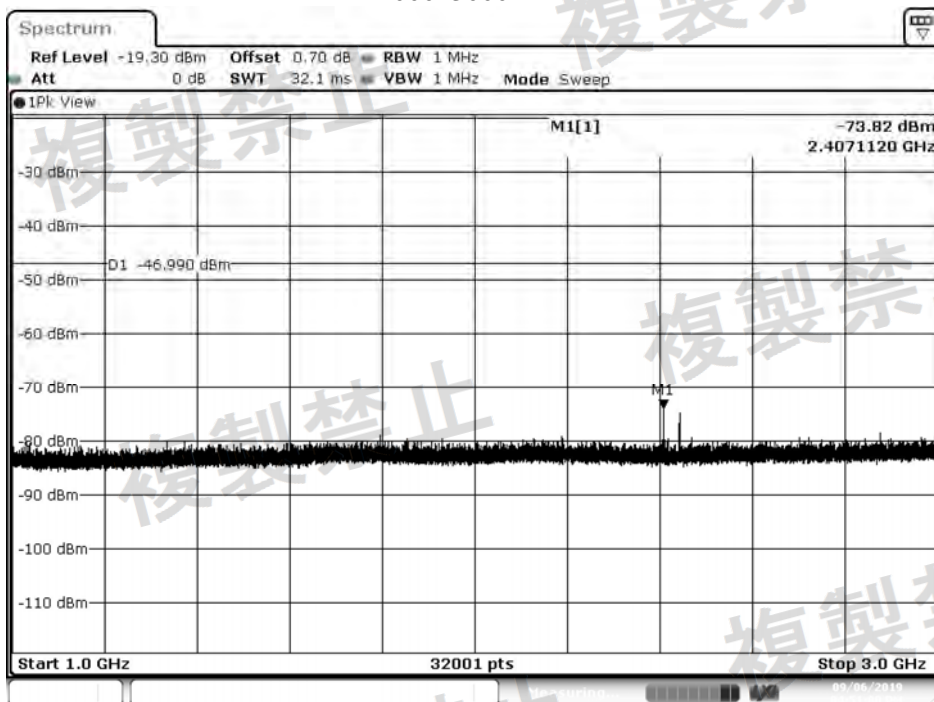
Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
30 - 1000	-88.53	-54 (4nW)
1000 - 3000	-73.82	-47 (20nW)
3000 - 8000	-74.05	-47 (20nW)
8000 - 12750	-76.79	-47 (20nW)

30–1000MHz



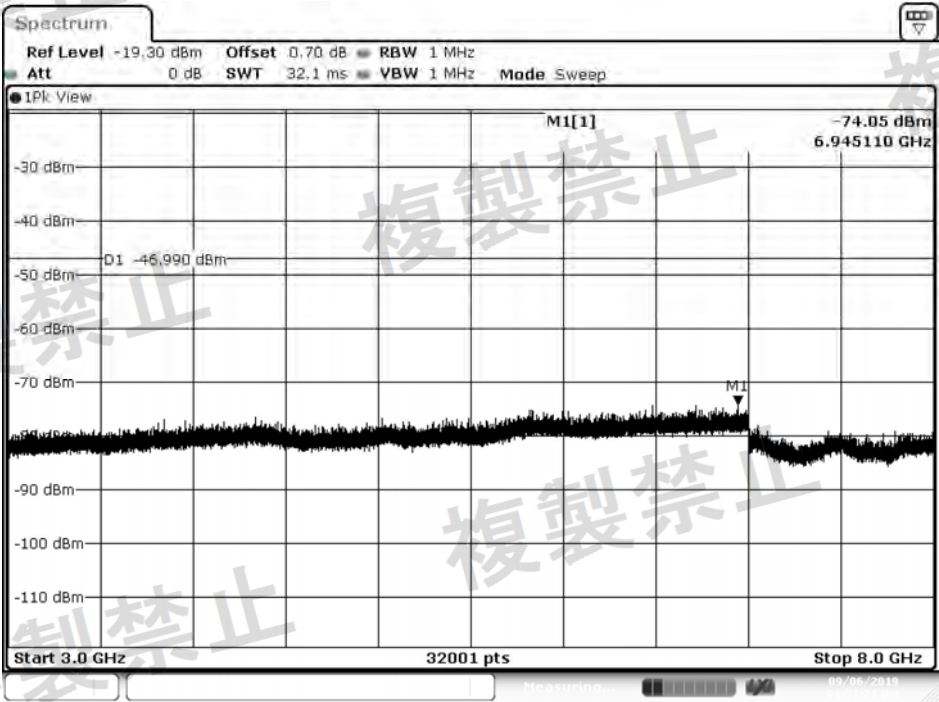
Date: 6.SEP.2019 16:50:39

1000–3000MHz



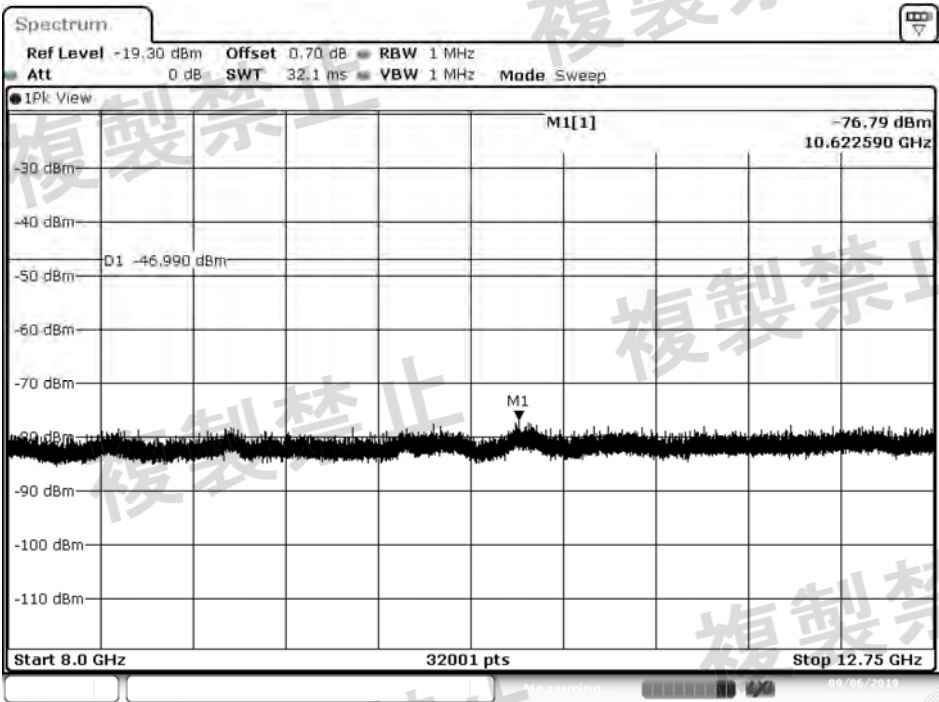
Date: 6.SEP.2019 16:51:01

3000–8000MHz



Date: 6.SEP.2019 16:51:22

8000–12750MHz



Date: 6.SEP.2019 16:51:44

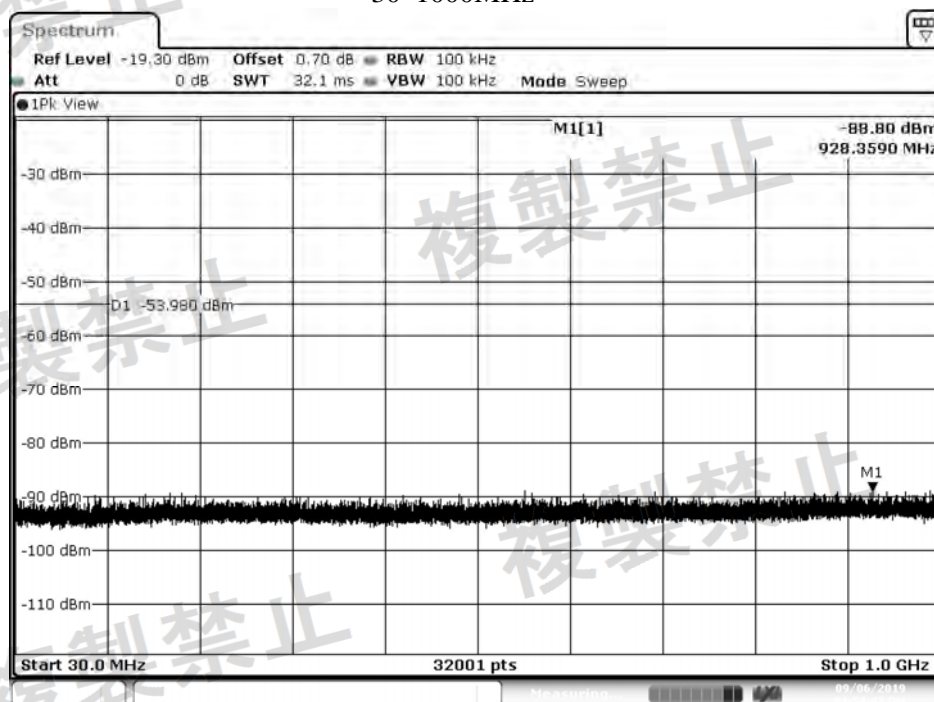
Test Result

PASS

Product : ROG STRIX GO 2.4 Dongle
Test Item : Receiver Spurious Emissions
Test Mode : Mode 2: Receive 2477.35MHz

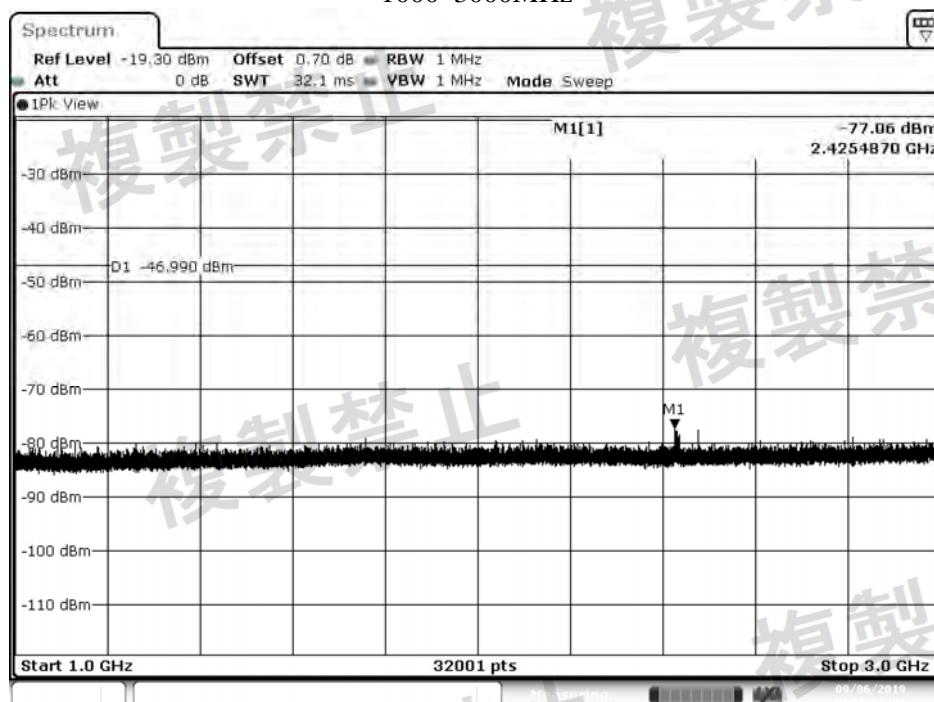
Frequency Range (MHz)	Reading Value (dBm)	Limit (dBm)
30 - 1000	-88.80	-54 (4nW)
1000 - 3000	-77.06	-47 (20nW)
3000 - 8000	-73.77	-47 (20nW)
8000 - 12750	-76.91	-47 (20nW)

30–1000MHz



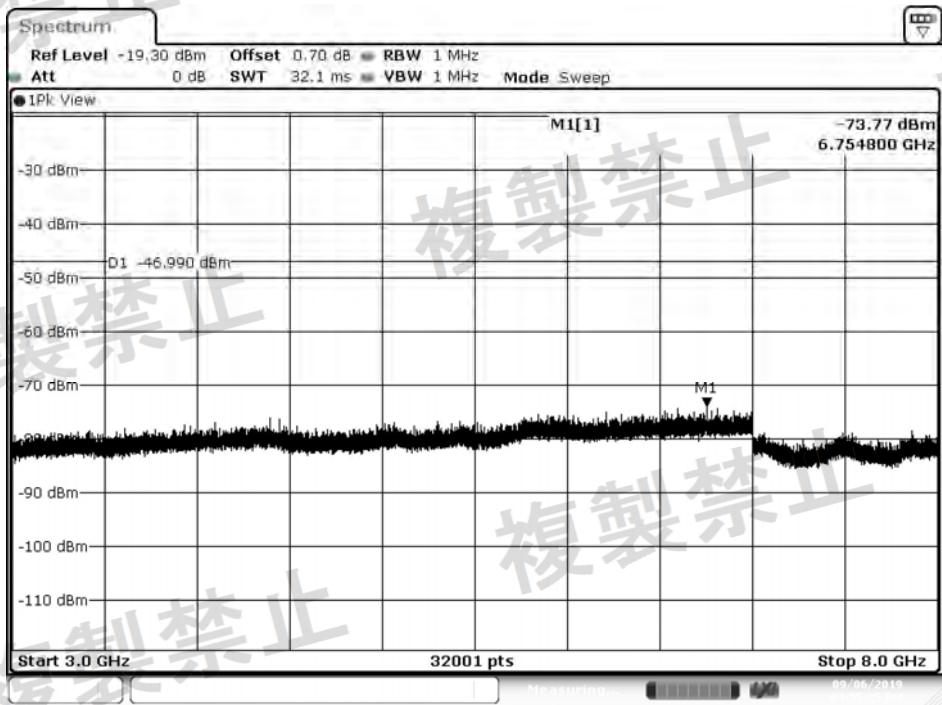
Date: 6.SEP.2019 16:54:42

1000–3000MHz



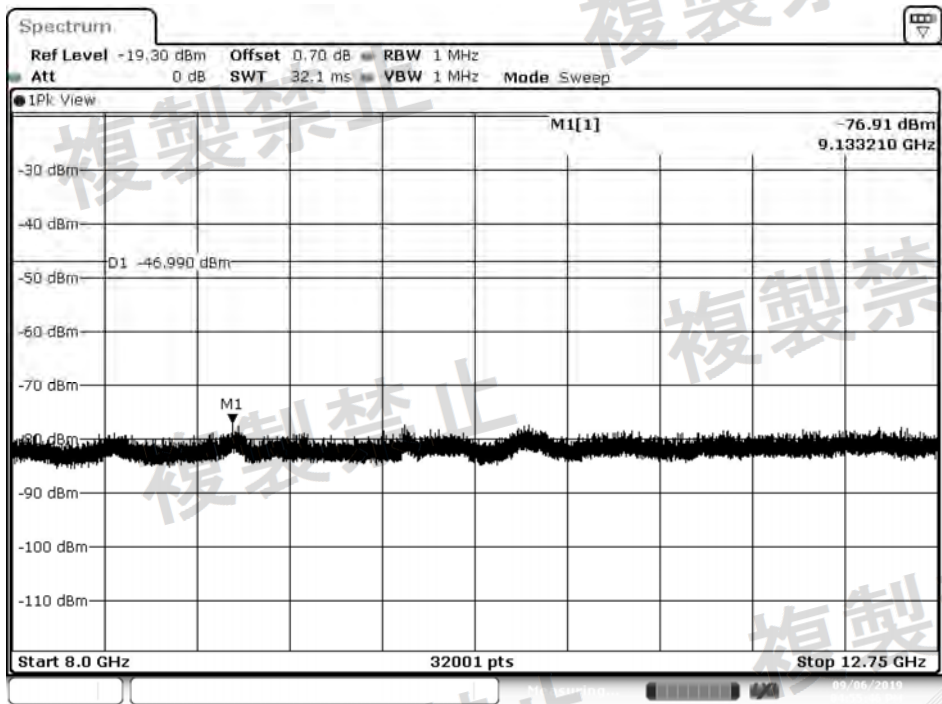
Date: 6.SEP.2019 16:55:04

3000–8000MHz



Date: 6.SEP.2019 16:55:25

8000–12750MHz



Date: 6.SEP.2019 16:55:47

Test Result

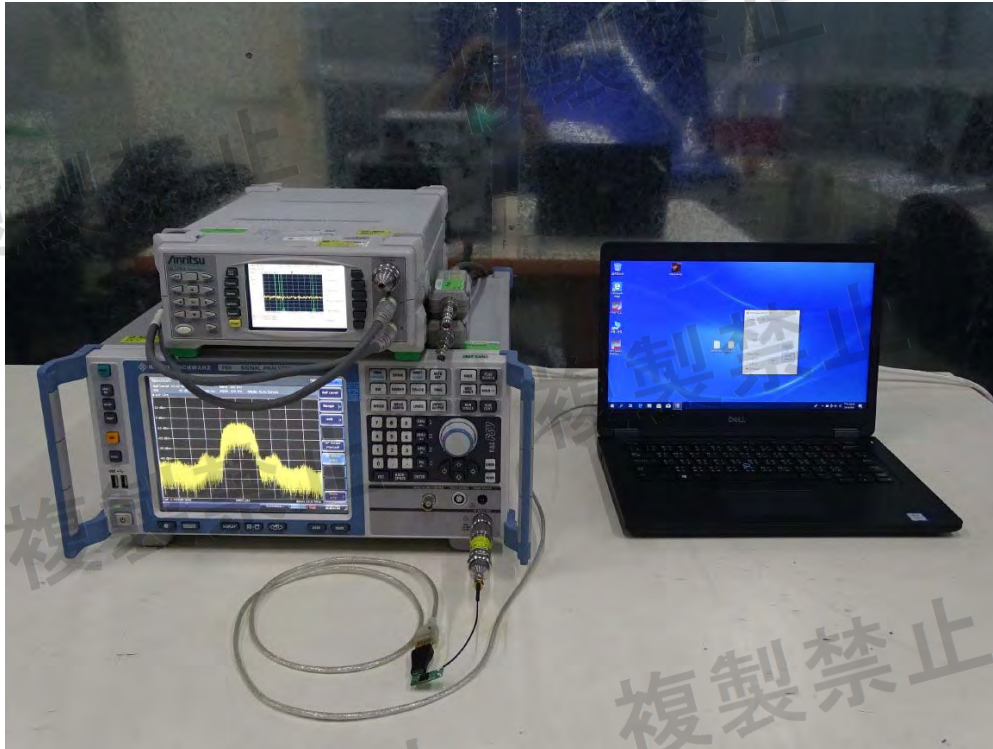
PASS

7. **EMI Reduction Method During Compliance Testing**

No modification was made during testing.

Attachment

- EUT Test Photographs
 - Spectrum Measurement



Power Meter Measurement

