

JAPAN MIC
TEST REPORT
For

SZ DJI TECHNOLOGY CO., LTD

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Nanshan, Shenzhen, Guangdong, China

Model: WM334R

This Report Concerns: <input checked="" type="checkbox"/> Original Report		Equipment Type: Phantom 4 RTK
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Report Number:	RDG180118005-07B	
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

Equipment Name		Phantom 4 RTK
Model Number		WM334R
Radio Type		1.4/10M Mode
1.4M Technical Parameters	Modulation Type	OFDM: PSK/QPSK/16QAM/64QAM
	Frequency Range	2403.5-2477.5MHz
	Output Power	0.5mW/MHz
	Antenna Gain	3dBi
10M Mode Technical Parameters	Modulation Type	OFDM: QPSK,16QAM
	Frequency Range	2406.5-2476.5MHz
	Output Power	3.5mW/MHz for 2409.5-2476.5MHz, 0.15mW/MHz for 2406.5-2408.5MHz
	Antenna Gain	3dBi
Nominal Power Supply:		DC15.2V from battery
External Dimension		29 cm (L) x 29 cm (W) x 21 cm (H)
Software Version		V1.0
serial number		180118005 (assigned by BACL, Dongguan)
Received Date		2018-01-18

Objective

The objective of the manufacturer is to demonstrate compliance with Radio Law of Japan item 19 of Article 2 Paragraph 1.

Test Methodology

All measurements contained in this report were conducted with technical regulations of the Radio Law of Japan.

EUT TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a testing mode which was selected by manufacturer.

The device has two antenna used for 10M mode, but the system only configured one antenna for using(1T1R) Judge by good performance.

For 10M mode, 71 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2406.5	37	2442.5
2	2407.5
...
...	...	70	2475.5
36	2441.5	71	2476.5

Channel 1, 36 and 71 were tested.

The extreme voltage test conditions which were declared by the manufacturer and the normal conditions are as below:

NV: Normal Voltage 15.2V_{DC}

LV: Low Voltage 13.68V_{DC}

HV: High Voltage 16.72V_{DC}

EUT Exercise Software

The software 'DjiRfCertConsole_V1.3.0.51' was used in test, which was provided by manufacturer. The worst condition (maximum power) was configured by following setting.

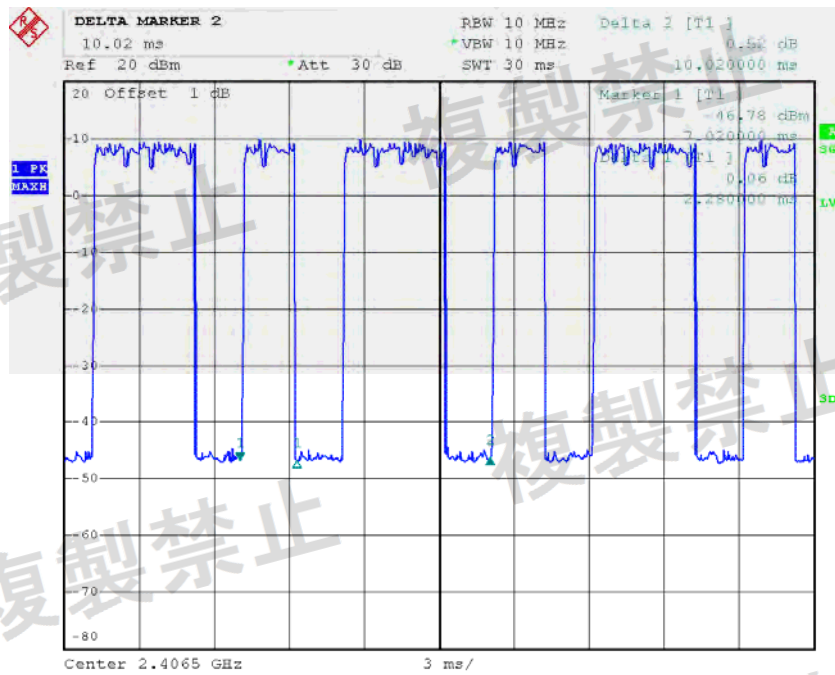
Software and version			DjiRfCertConsole_V1.3.0.51	
Mode	Channel	Frequency (MHz)	Power Level	
			Ant 1	Ant 2
10M	Low	2406.5	2	2
	Middle	2441.5	2	2
	High	2476.5	2	2

Duty cycle and Duty cycle factor:

Antenna	T _{on} (ms)	T _{on} +T _{off} (ms)	Duty Cycle	Duty Cycle Factor (dB)
0	6.54	10.02	0.65	1.87
1	6.52	10.02	0.65	1.87

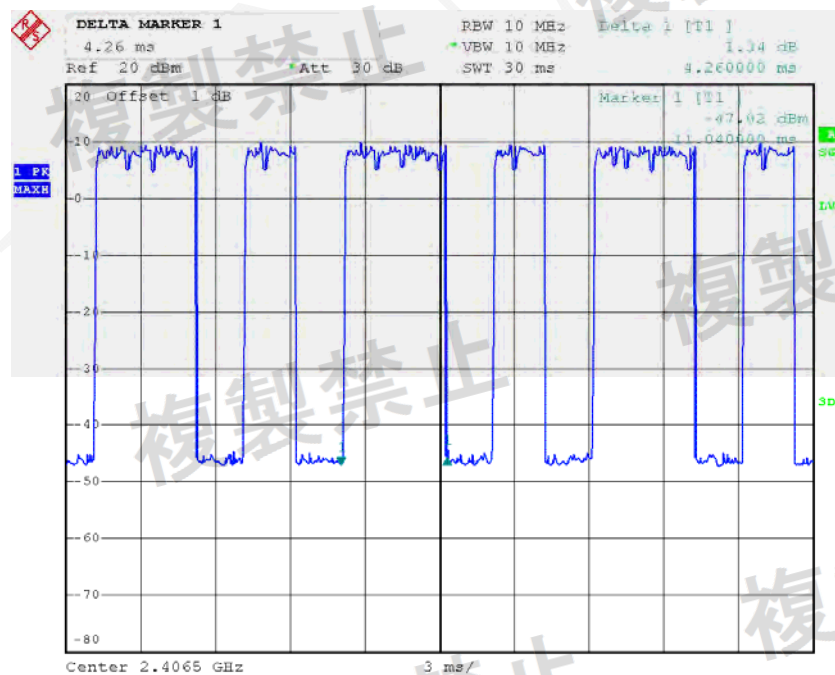
Note: Duty Cycle Factor = 10*log(1/Duty Cycle)

Ant 1-1



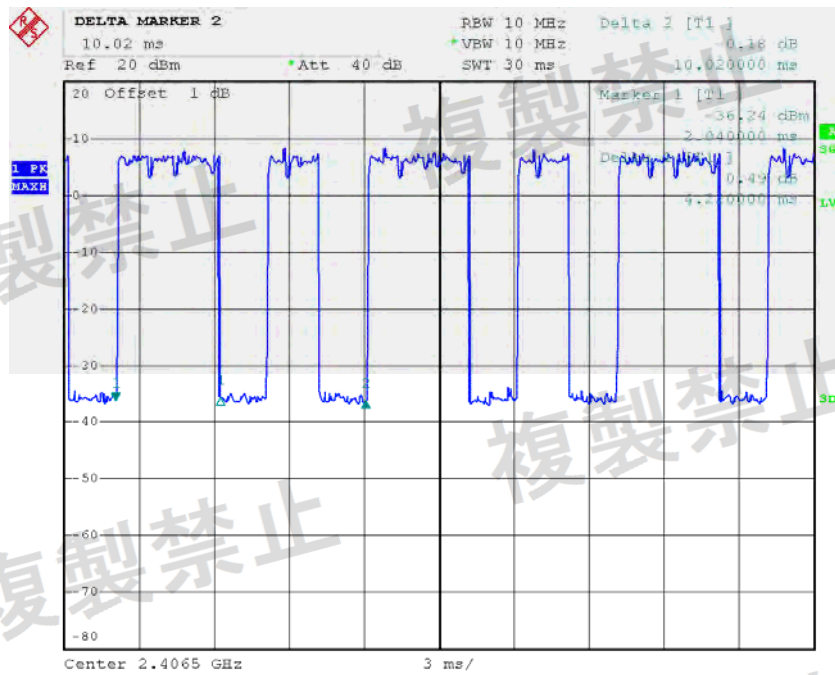
Date: 23.JAN.2018 08:48:09

Ant 1-2



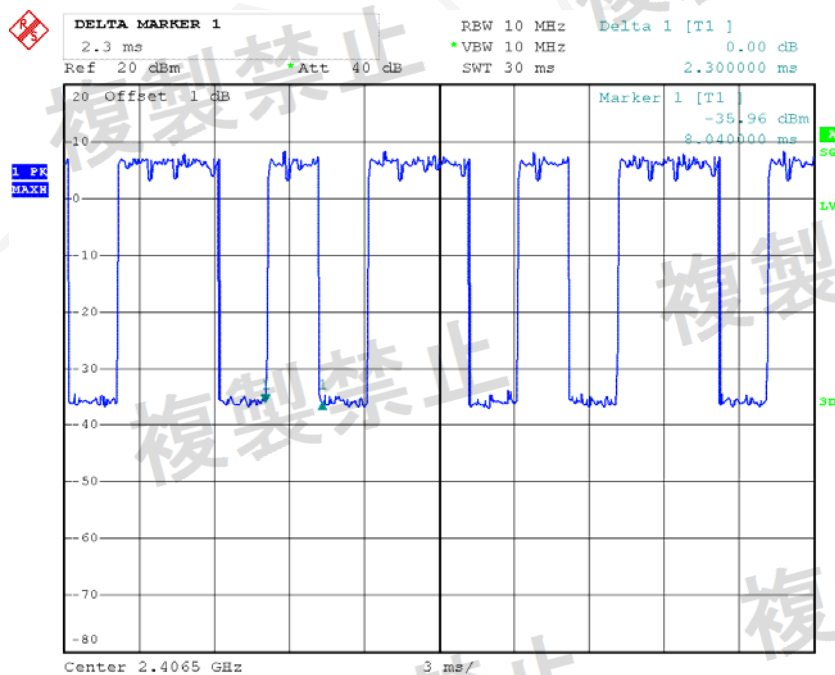
Date: 23.JAN.2018 08:48:51

Ant 2-1



Date: 23.JAN.2018 10:03:26

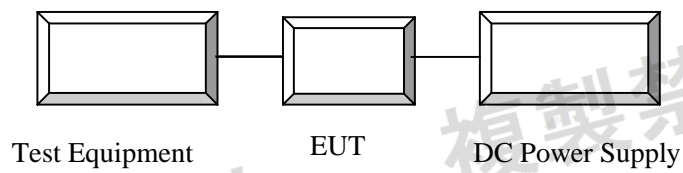
Ant 2-2



Date: 23.JAN.2018 10:04:03

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Pro instrument	DC Power Supply	pps3300	N/A

Configuration of Test Setup

SUMMARY OF TEST RESULTS

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

Not Applicable: Please refer to 'Note 3' of Antenna Output Power and Output Power Tolerance section.

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

Not Applicable**: Testing is only required for bandwidth which more than 26MHz and less than 38MHz.

FREQUENCY ERROR**Limit**

50ppm or below

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESPI	100120	2017-12-11	2018-12-11
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
Pro instrument	DC Power Supply	pps3300	N/A	N/A	N/A
UNI-T	Multimeter	UT39A	M130199938	2017-04-10	2018-04-10

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

Set the EUT to the measurement frequency without modulation.

Setting of SA is following as: RB: 300 kHz / VB: 300 kHz / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold.

Record the peak spot frequency.

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

Test Data**Environmental Conditions**

Temperature:	25.2°C
Relative Humidity:	48 %
ATM Pressure:	100.8 kPa

The testing was performed by Emily Wang on 2018-01-23.

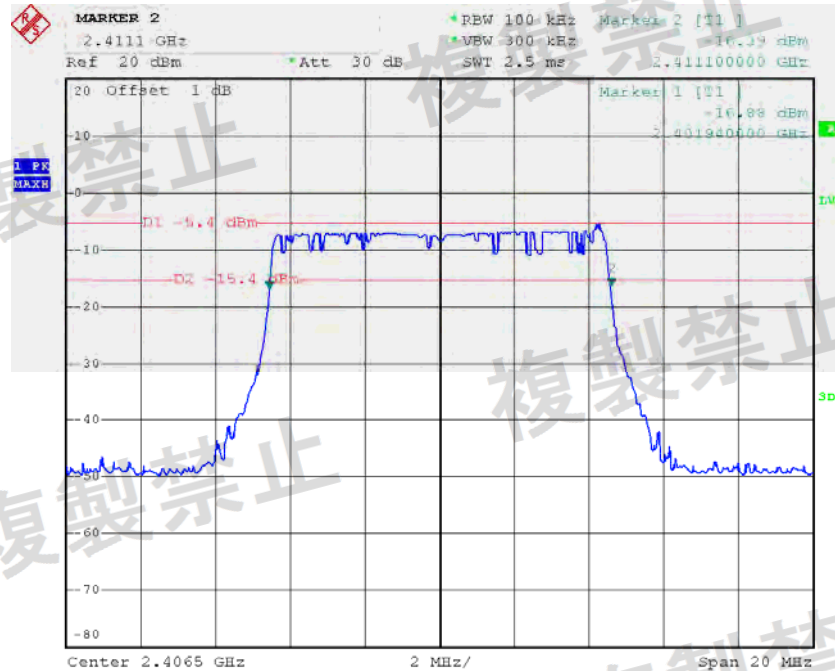
Test Result: Compliant*Test Mode: Transmitting*

Frequency			Measure Frequency		Result	Tolerance	Limit
Antenna	Channel	Voltage	F1	F2	MHz	ppm	
Ant 1	Low	LV	2401.89	2411.14	2406.52	8.31	<50ppm
		NV	2401.94	2411.10	2406.52	8.31	
		HV	2401.85	2411.18	2406.52	8.31	
	Middle	LV	2436.87	2446.11	2441.49	-4.10	
		NV	2436.94	2446.06	2441.50	0.00	
		HV	2436.88	2446.09	2441.49	-4.10	
	High	LV	2471.88	2481.13	2476.51	4.04	
		NV	2471.94	2481.10	2476.52	8.08	
		HV	2471.96	2481.07	2476.52	8.08	
Ant 2	Low	LV	2401.91	2411.13	2406.52	8.31	<50ppm
		NV	2401.94	2411.10	2406.52	8.31	
		HV	2401.89	2411.15	2406.52	8.31	
	Middle	LV	2436.92	2446.12	2441.52	8.19	
		NV	2436.94	2446.10	2441.52	8.19	
		HV	2436.89	2446.15	2441.52	8.19	
	High	LV	2471.97	2481.04	2476.51	4.04	
		NV	2471.94	2481.10	2476.52	8.08	
		HV	2471.88	2481.13	2476.51	4.04	

Please refer to the following plots for normal voltage:

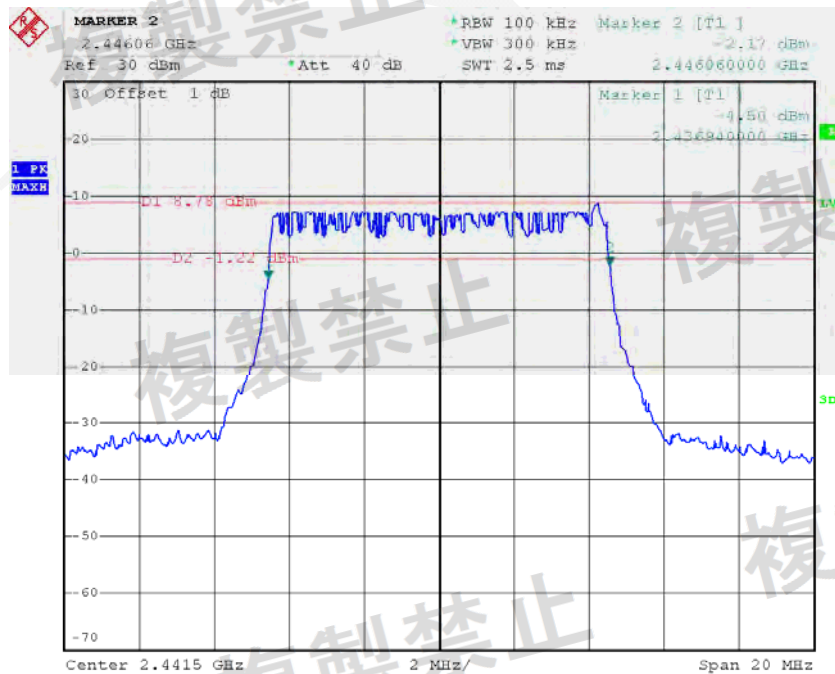
Ant 1:

Test Frequency: 2406.5 MHz



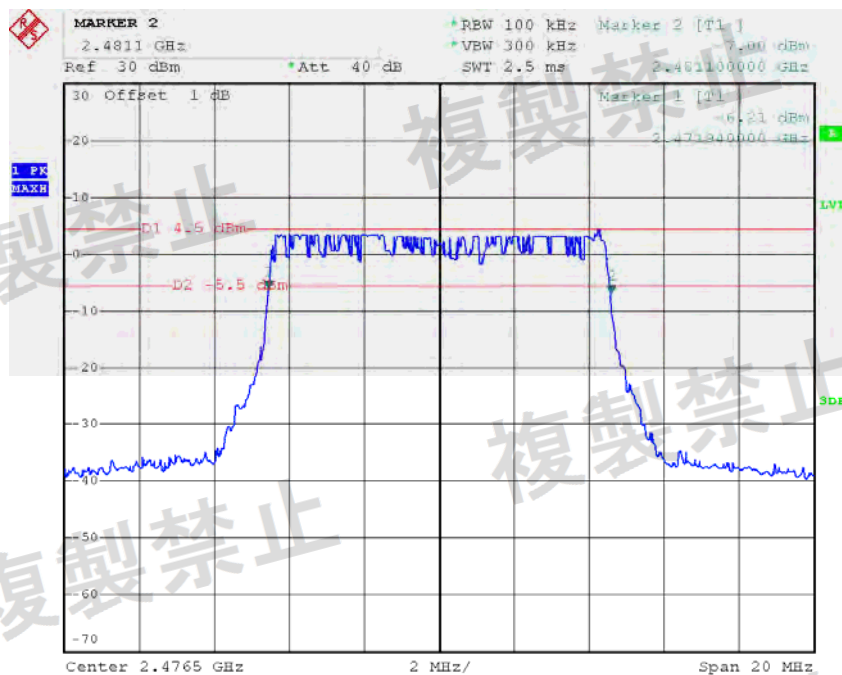
Date: 23.JAN.2018 08:58:16

Test Frequency: 2441.5 MHz



Date: 23.JAN.2018 09:00:33

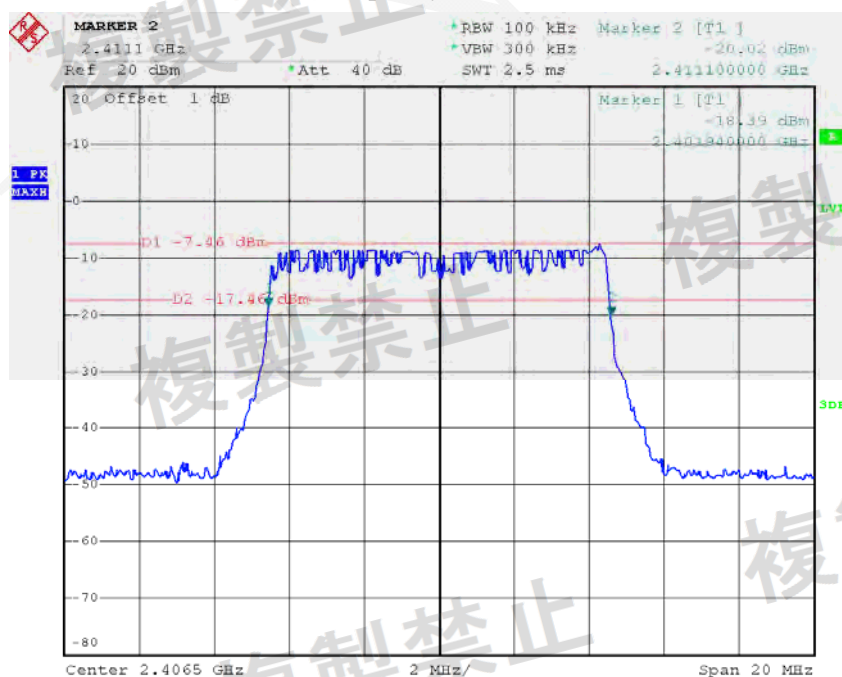
Test Frequency:2476.5MHz



Date: 23.JAN.2018 09:03:05

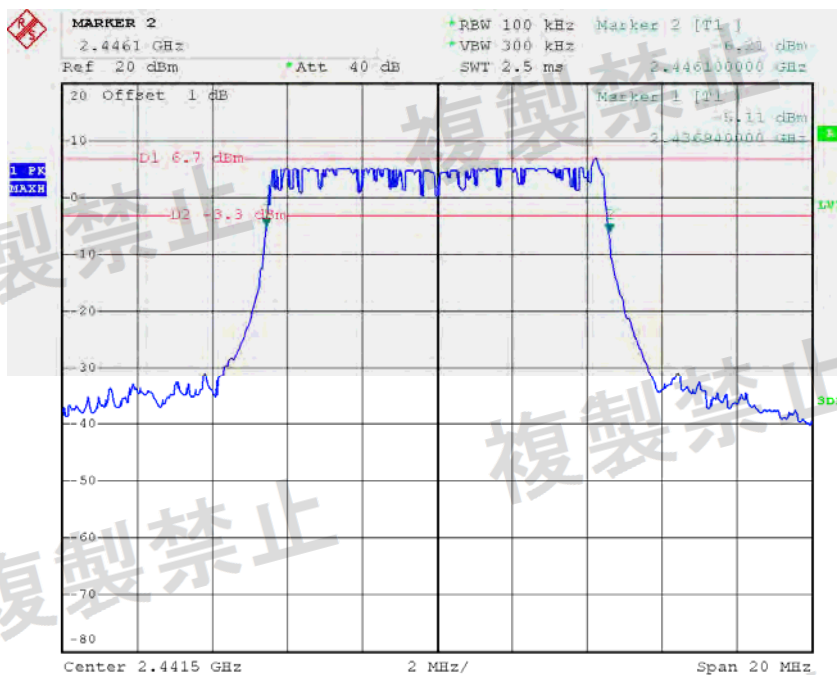
Ant 2:

Test Frequency:2406.5MHz



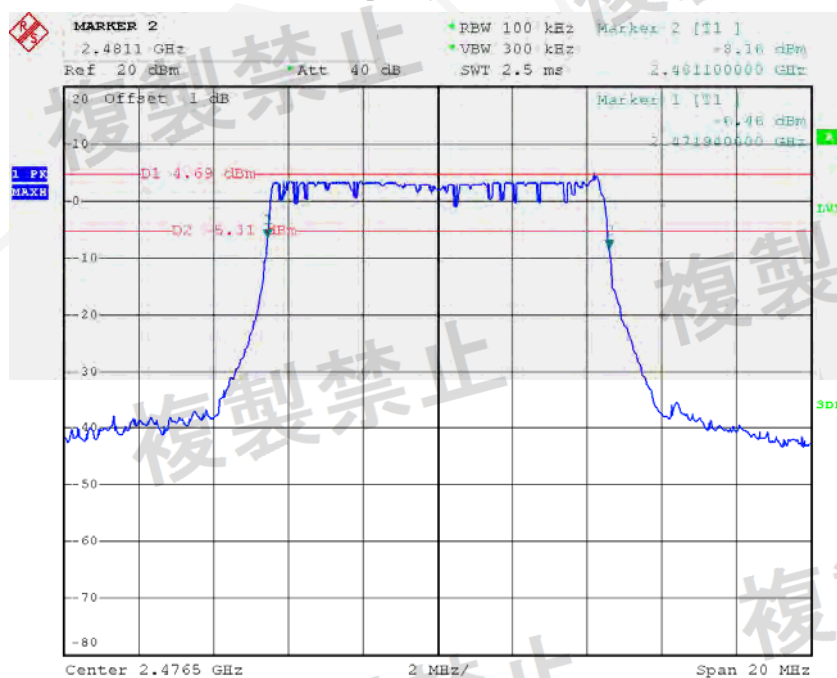
Date: 23.JAN.2018 10:08:45

Test Frequency: 2441.5 MHz



Date: 23.JAN.2018 10:10:57

Test Frequency: 2476.5 MHz



Date: 23.JAN.2018 10:14:13

OCCUPIED BANDWIDTH AND SPREADING BANDWIDTH

Limit

- Occupied bandwidth: FH \leq 83.5 MHz; DS \leq 26 MHz; OFDM \leq 38 MHz, Others \leq 26 MHz
- Spread Bandwidth: \geq 500 kHz(FH,DS), Spread factor $>$ 5.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESPI	100120	2017-12-11	2018-12-11
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
Pro instrument	DC Power Supply	pps3300	N/A	N/A	N/A
UNI-T	Multimeter	UT39A	M130199938	2017-04-10	2018-04-10

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

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

Test Data**Environmental Conditions**

Temperature:	25.2°C
Relative Humidity:	48 %
ATM Pressure:	100.8 kPa

The testing was performed by Emily Wang on 2018-01-23.

Test Result: Compliant

Test Mode: Transmitting

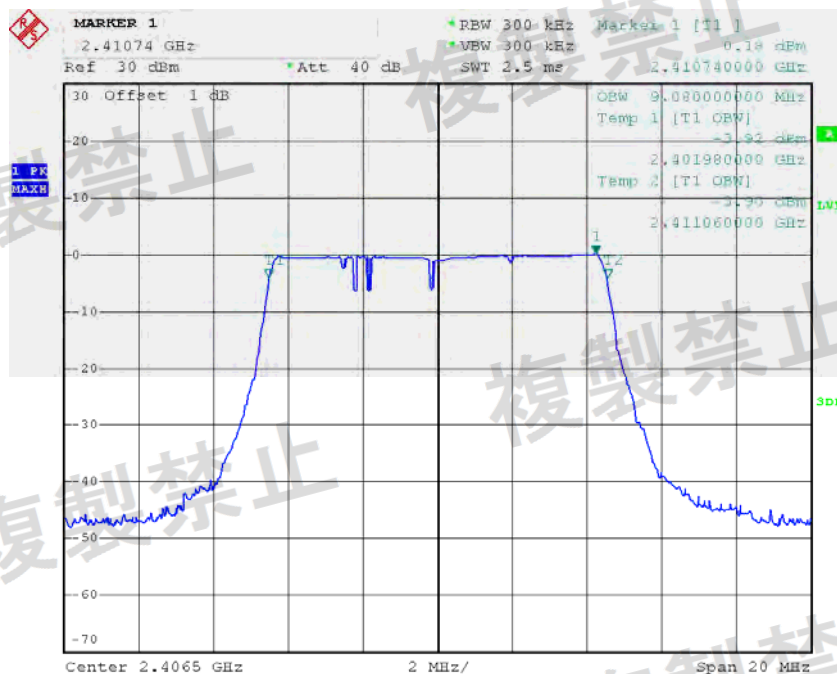
Frequency	2406.5MHz			2441.5 MHz			2476.5 MHz			Limit
Voltage	LV	NV	HV	LV	NV	HV	LV	NV	HV	
Occupied Bandwidth (MHz) Ant 1	9.10	9.08	9.08	9.12	9.08	9.12	9.06	9.08	9.06	≤26MHz
Occupied Bandwidth (MHz) Ant 2	9.12	9.08	9.12	9.08	9.08	9.10	9.12	9.08	9.08	≤26MHz
Spread Bandwidth (MHz) Ant 1	8.16	8.16	8.18	8.18	8.20	8.20	8.22	8.20	8.22	≥0.5MHz
Spread Bandwidth (MHz) Ant 2	8.04	8.04	8.10	8.20	8.20	8.18	8.20	8.24	8.20	≥0.5MHz
Spread Factor Ant 1	8.16	8.16	8.18	8.18	8.20	8.20	8.22	8.20	8.22	>5
Spread Factor Ant 2	8.04	8.04	8.10	8.20	8.20	8.18	8.20	8.24	8.20	>5

Please refer to the following plots for normal voltage:

Occupied Bandwidth:

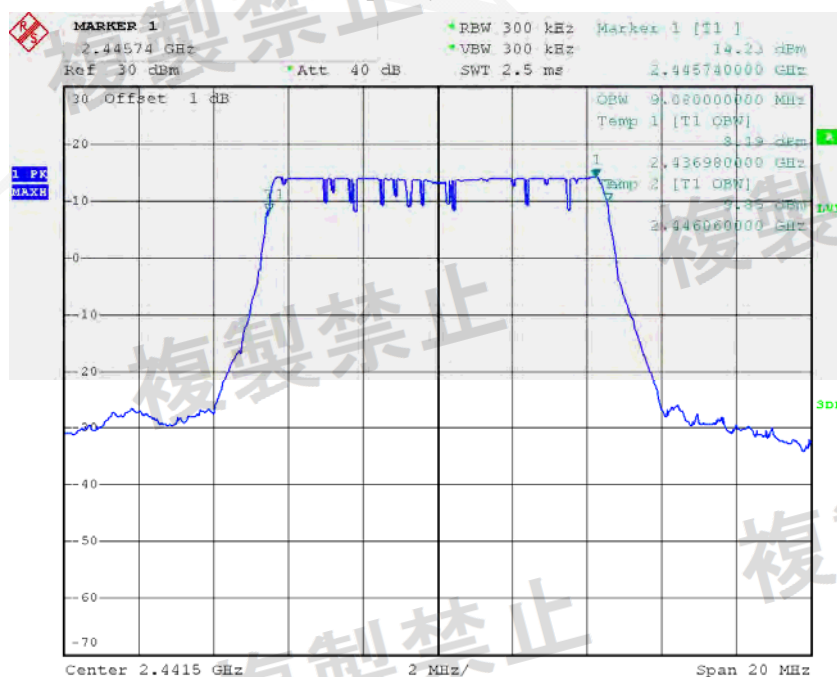
Ant 1:

Test Frequency:2406.5MHz



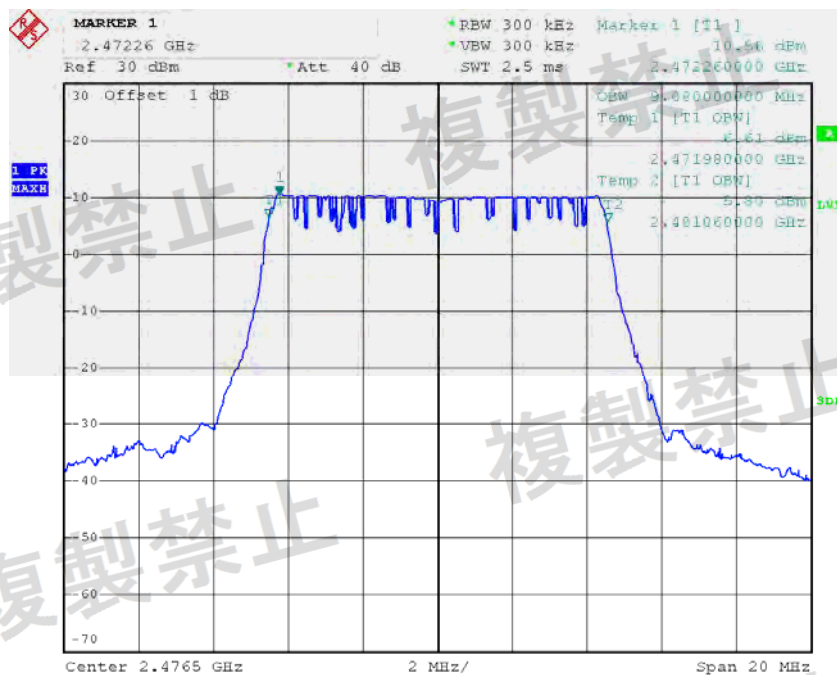
Date: 23.JAN.2018 09:19:24

Test Frequency:2441.5MHz



Date: 23.JAN.2018 09:12:14

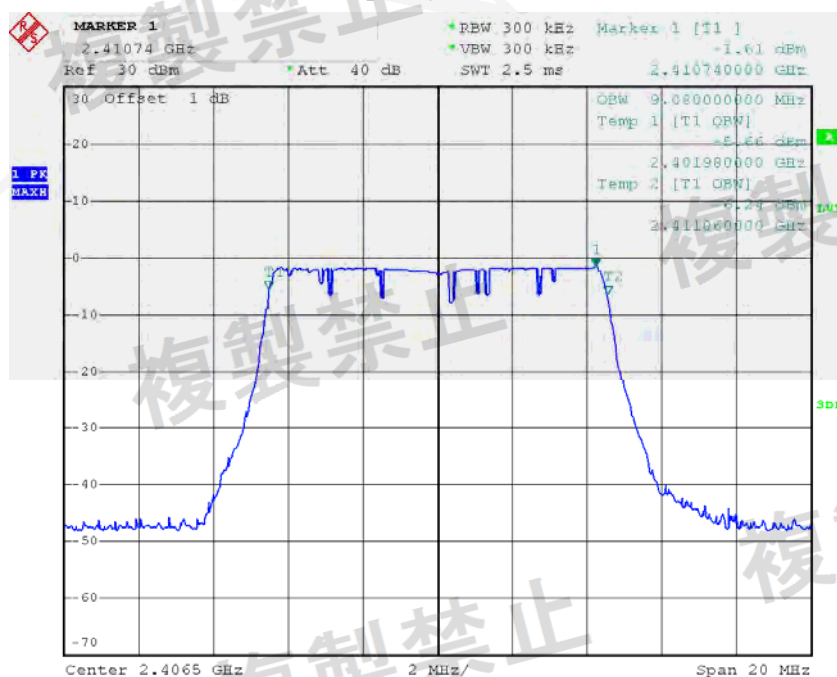
Test Frequency:2476.5MHz



Date: 23.JAN.2018 09:08:13

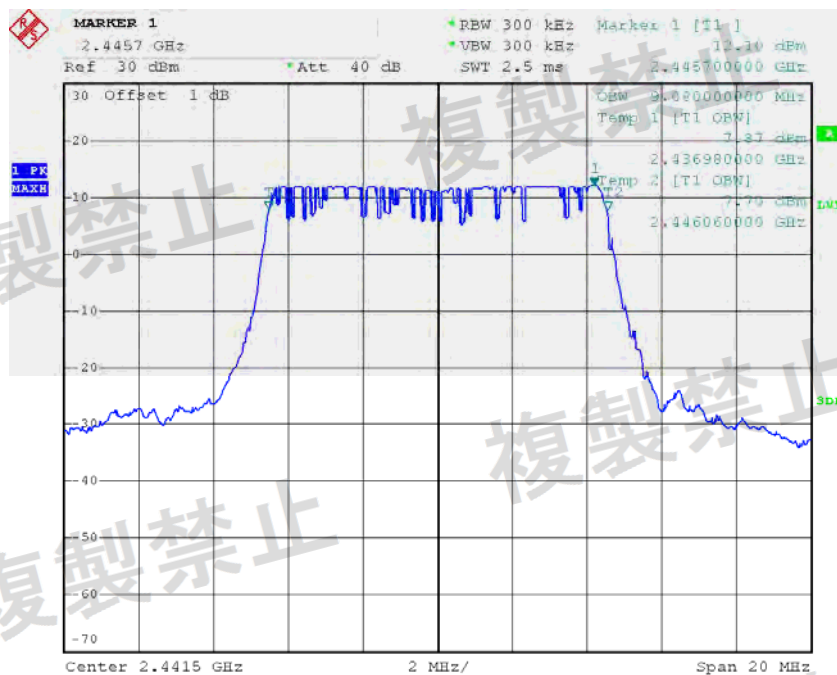
Ant 2:

Test Frequency:2406.5MHz



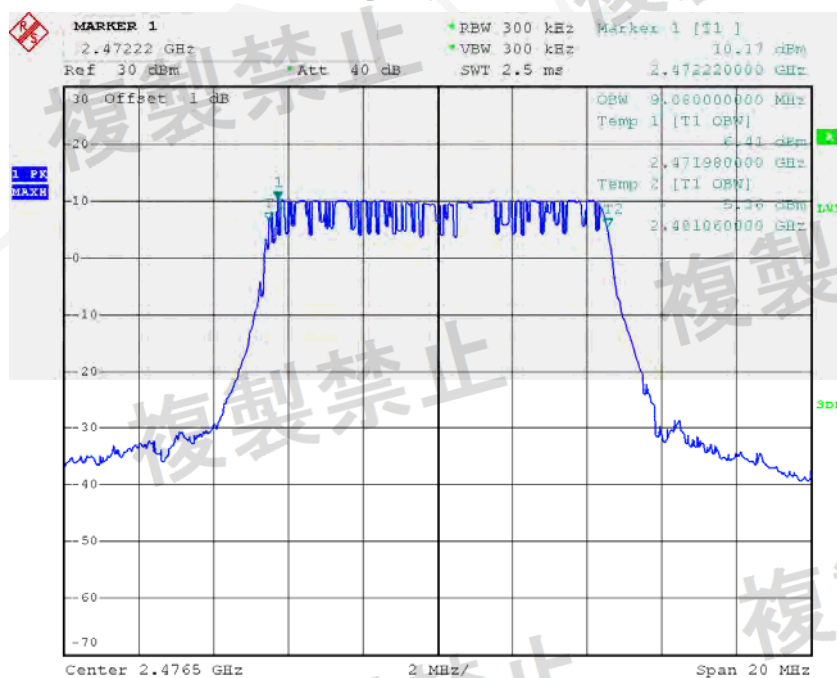
Date: 23.JAN.2018 10:26:20

Test Frequency:2441.5MHz



Date: 23.JAN.2018 10:21:33

Test Frequency:2476.5MHz

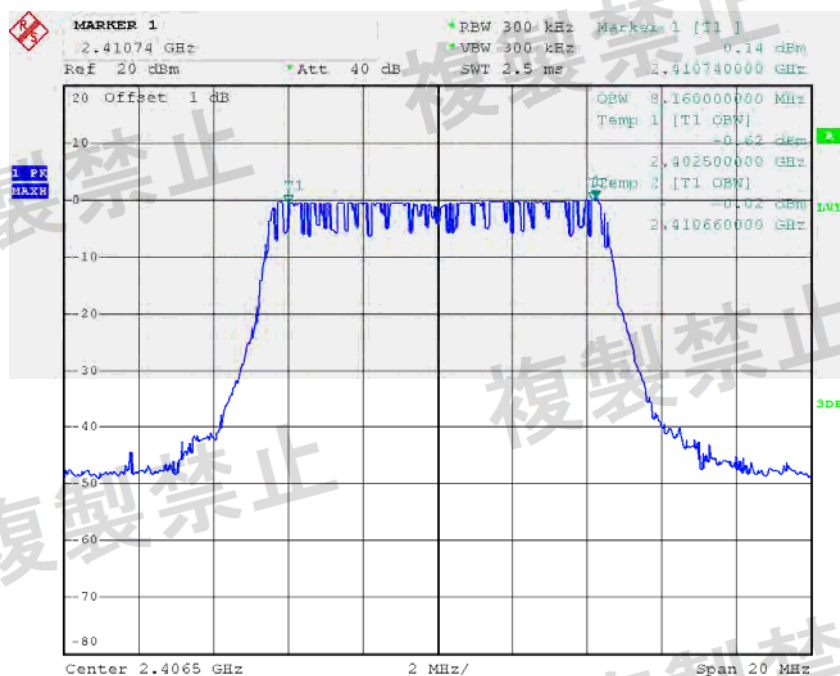


Date: 23.JAN.2018 10:18:39

Spread Bandwidth:

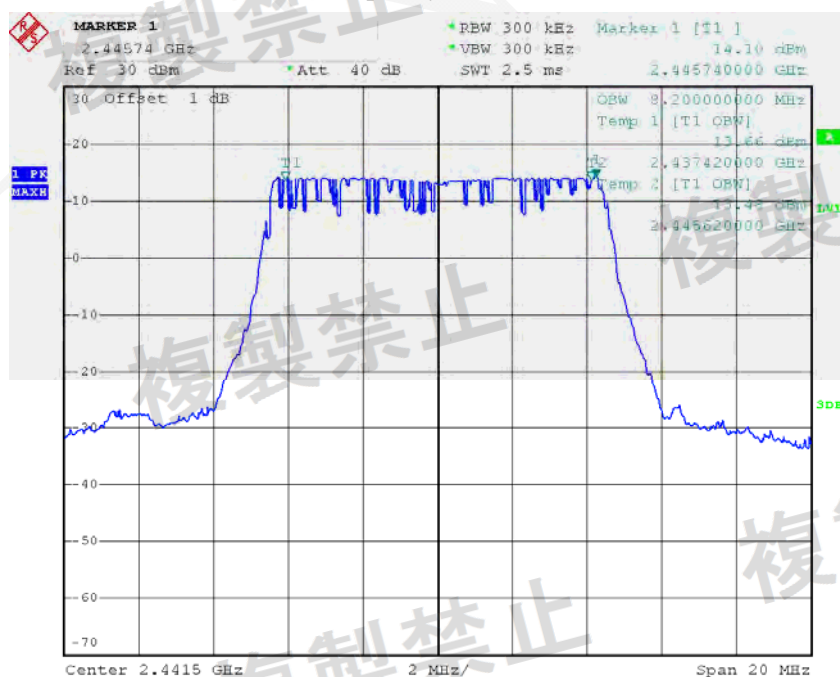
Ant 1:

Test Frequency:2406.5MHz



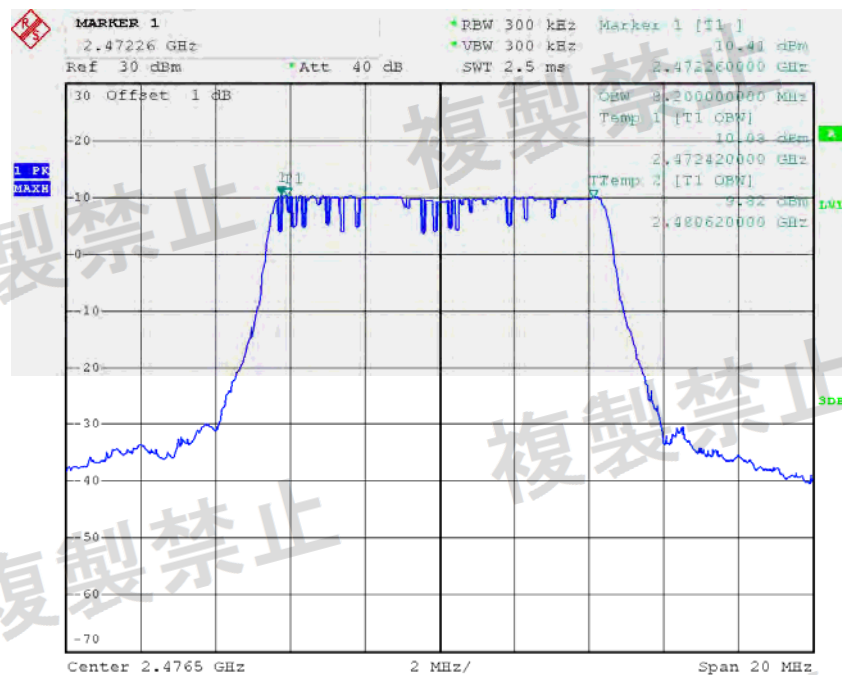
Date: 23.JAN.2018 09:26:19

Test Frequency:2441.5MHz



Date: 23.JAN.2018 09:29:05

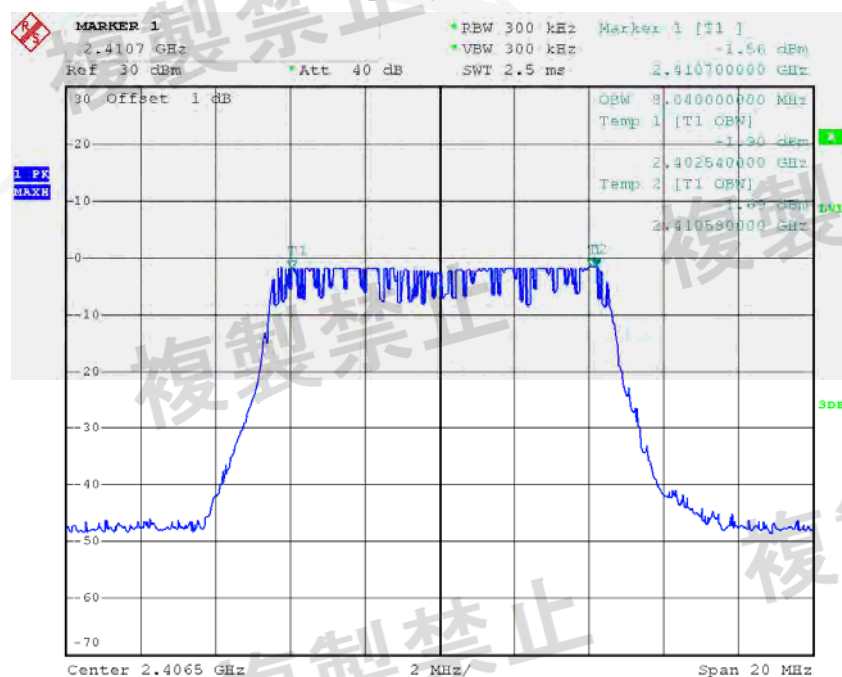
Test Frequency:2476.5MHz



Date: 23.JAN.2018 09:33:08

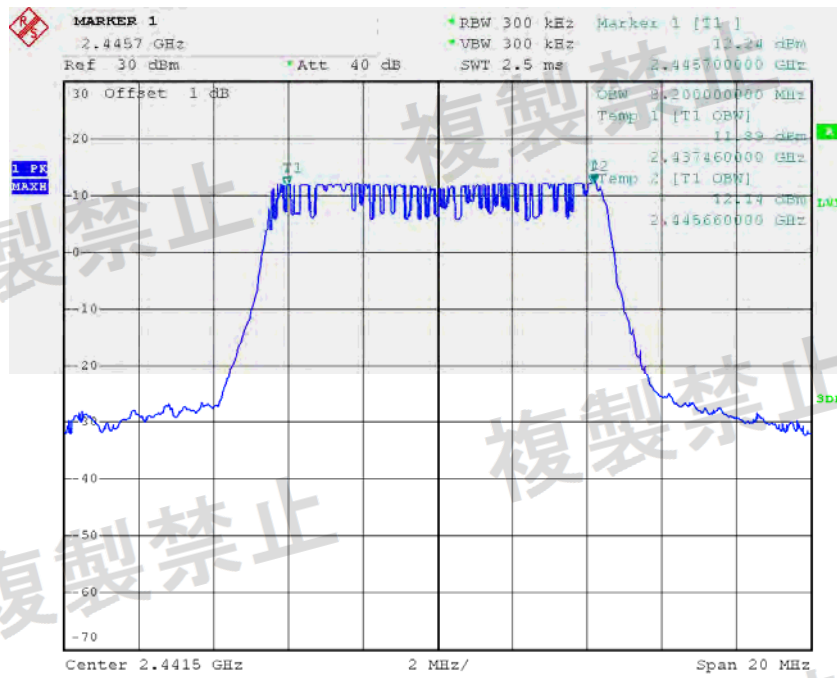
Ant 2:

Test Frequency:2406.5MHz



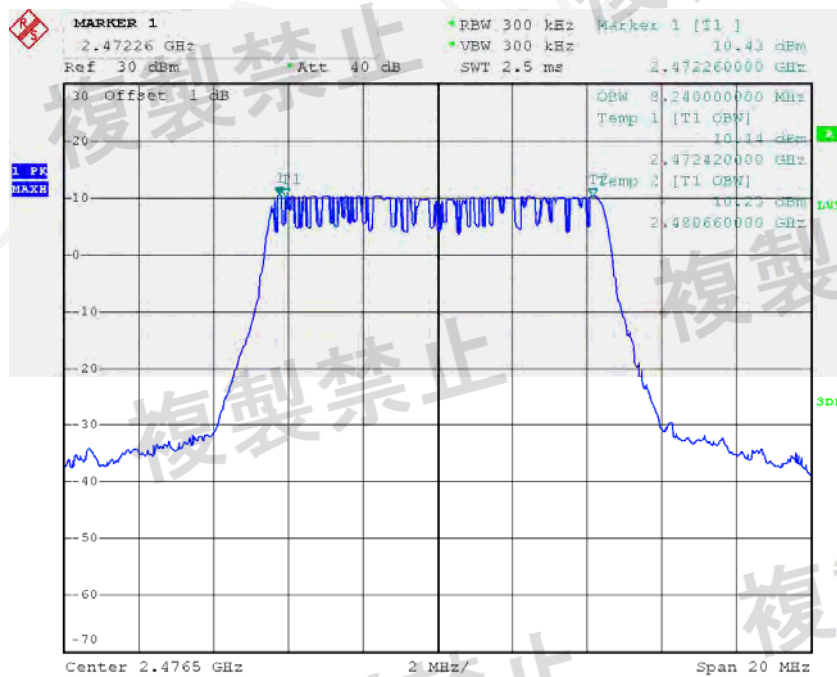
Date: 23.JAN.2018 10:32:05

Test Frequency:2441.5MHz



Date: 23.JAN.2018 10:34:15

Test Frequency:2476.5MHz



Date: 23.JAN.2018 10:36:48

TRANSMITTER SPURIOUS EMISSION STRENGTH AND UNWANTED EMISSION INTENSITY

Limit

- $f < 1000 \text{ MHz}$: $\leq 0.25 \mu\text{W}/100\text{kHz}$
- $1000\text{MHz} \leq f < 2387 \text{ MHz}$, $f > 2496.5 \text{ MHz}$: $\leq 2.5 \mu\text{W}/\text{MHz}$
- $2387 \text{ MHz} \leq f \leq 2400 \text{ MHz}$; $2483.5 \text{ MHz} < f \leq 2496.5 \text{ MHz}$: $\leq 25 \mu\text{W}/\text{MHz}$

Test Procedure

❖ Conditions of Application Equipment (EUT)

- The modulation state shall be in continuously transmitting mode.

❖ Spectrum Analyzer Conditions

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-8	2018-12-8
R&S	EMI Test Receiver	ESPI	100120	2017-12-11	2018-12-11
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
Pro instrument	DC Power Supply	pps3300	N/A	N/A	N/A
UNI-T	Multimeter	UT39A	M130199938	2017-04-10	2018-04-10

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	20.9~22.7°C
Relative Humidity:	40~41 %
ATM Pressure:	101.5~102.2 kPa

The testing was performed by Emily Wang from 2018-01-29 to 2018-01-31.

Test Mode: Transmitting,

Test Result: *Compliant, Please refer to the below plots*

Frequency		2406.5 MHz			2441.5 MHz			2476.5 MHz			Limit
Voltage		LV	NV	HV	LV	NV	HV	LV	NV	HV	
Raw data Ant 1	Band I (dBm/100kHz)	-66.34	-66.18	-66.30	-66.45	-66.71	-66.46	-66.84	-66.54	-66.81	-36dBm/100kHz
	Band II (dBm/MHz)	-60.07	-60.27	-60.05	-61.66	-61.51	-61.26	-61.14	-61.31	-61.18	-26dBm/MHz
	Band III (dBm/MHz)	-49.63	-49.79	-49.79	-51.69	-51.71	-51.84	-51.20	-51.46	-51.60	-16dBm/MHz
	Band IV (dBm/MHz)	-51.81	-51.60	-51.82	-50.86	-51.13	-51.05	-35.41	-35.18	-35.26	-16dBm/MHz
	Band V (dBm/MHz)	-30.16	-30.03	-30.11	-29.78	-30.04	-29.78	-30.72	-30.99	-30.73	-26dBm/MHz
Raw data Ant 2	Band I (dBm/100kHz)	-66.54	-66.40	-66.22	-54.11	-53.84	-54.05	-56.15	-55.98	-56.27	-36dBm/100kHz
	Band II (dBm/MHz)	-50.94	-51.01	-50.90	-51.09	-51.30	-51.02	-51.73	-51.56	-51.79	-26dBm/MHz
	Band III (dBm/MHz)	-28.82	-28.80	-28.98	-51.29	-51.34	-51.58	-51.08	-51.33	-51.50	-16dBm/MHz
	Band IV (dBm/MHz)	-51.96	-51.79	-51.68	-50.41	-50.47	-50.76	-20.48	-20.34	-20.49	-16dBm/MHz
	Band V (dBm/MHz)	-30.45	-30.16	-30.37	-29.59	-29.87	-29.99	-29.81	-29.94	-29.73	-26dBm/MHz
Unwanted Emission Intensity Ant 1	Band I (μ W/100kHz)	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.25 μ W/100kHz
	Band II (μ W/MHz)	0.0010	0.0009	0.0010	0.0007	0.0007	0.0007	0.0008	0.0007	0.0008	2.5 μ W/MHz
	Band III (μ W/MHz)	0.01089	0.01050	0.01050	0.00678	0.00675	0.00655	0.00759	0.00714	0.00692	25 μ W/MHz
	Band IV (μ W/MHz)	0.00659	0.00692	0.00658	0.00820	0.00771	0.00785	0.28774	0.30339	0.29785	25 μ W/MHz
	Band V (μ W/MHz)	0.96383	0.99312	0.97499	1.05196	0.99083	1.05196	0.84723	0.79616	0.84528	2.5 μ W/MHz
Unwanted Emission Intensity Ant 2	Band I (μ W/100kHz)	0.00022	0.00023	0.00024	0.00388	0.00413	0.00394	0.00243	0.00252	0.00236	0.25 μ W/100kHz
	Band II (μ W/MHz)	0.00805	0.00793	0.00813	0.00778	0.00741	0.00791	0.00671	0.00698	0.00662	2.5 μ W/MHz
	Band III (μ W/MHz)	1.31220	1.3183	1.2647	0.0074	0.0073	0.0070	0.0078	0.0074	0.0071	25 μ W/MHz
	Band IV (μ W/MHz)	0.00637	0.0066	0.0068	0.0091	0.0090	0.0084	8.9536	9.2470	8.9331	25 μ W/MHz
	Band V (μ W/MHz)	0.90157	0.9638	0.9183	1.0990	1.0304	1.0023	1.0447	1.0139	1.0641	2.5 μ W/MHz

Frequency		2409.5 MHz			Limit
Voltage		LV	NV	HV	
Raw data Ant 1	Band III (dBm/MHz)	-24.55	-24.06	-24.13	- 16dBm/MHz
Raw data Ant 2	Band III (dBm/MHz)	-26.77	-26.80	-26.83	- 16dBm/MHz
Unwanted Emission Intensity Ant 1	Band III (μW/MHz)	3.50752	3.92645	3.86367	25 μW/MHz
Unwanted Emission Intensity Ant 2	Band III (μW/MHz)	2.10378	2.08930	2.07491	25 μW/MHz

Note:

Band I: 30MHz~1000MHz

Band II: 1000MHz~2387MHz

Band III: 2387MHz~2400MHz

Band IV: 2483.5MHz~2496.5MHz

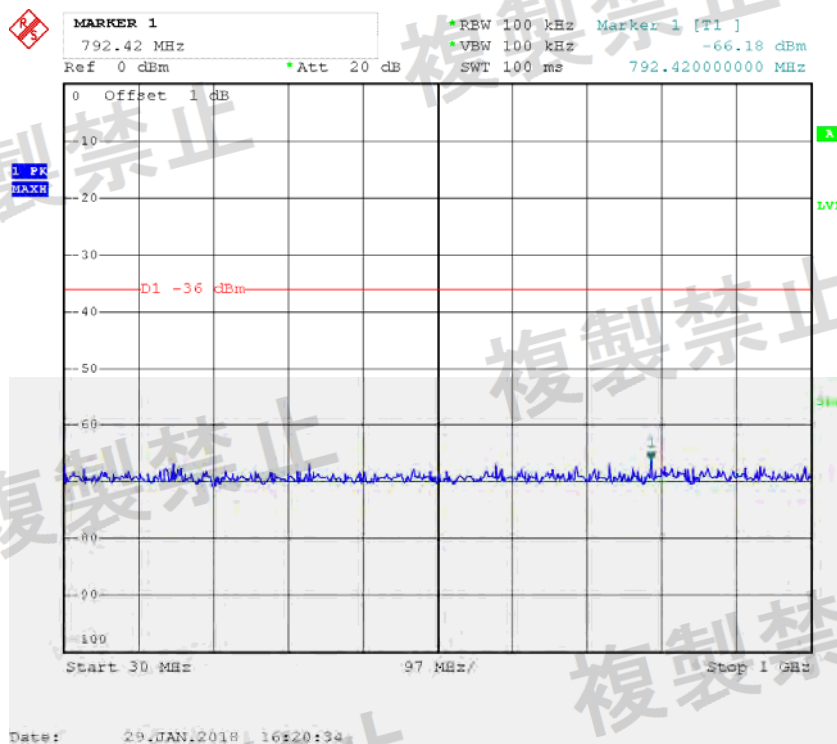
Band V: 2496.5MHz~12500MHz

Please refer to the following plots for normal voltage:

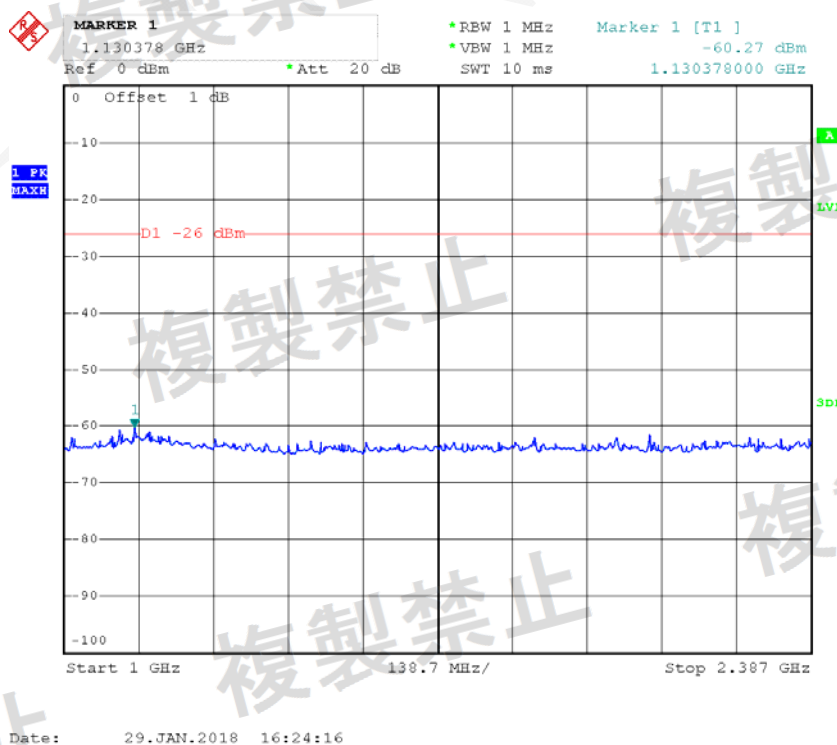
Ant 1:

Test Frequency: 2406.5MHz

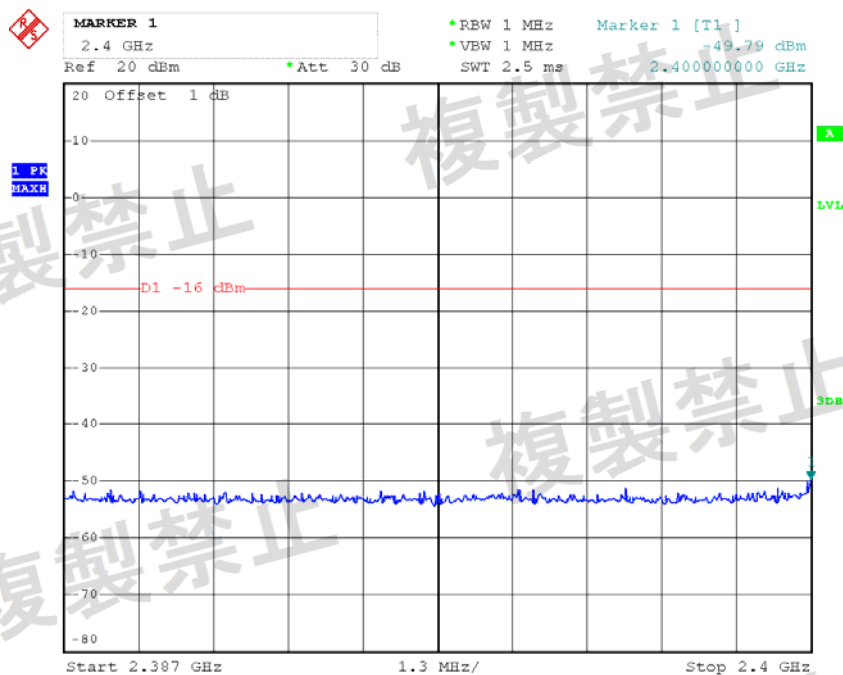
30MHz~1000MHz



1000MHz~2387MHz

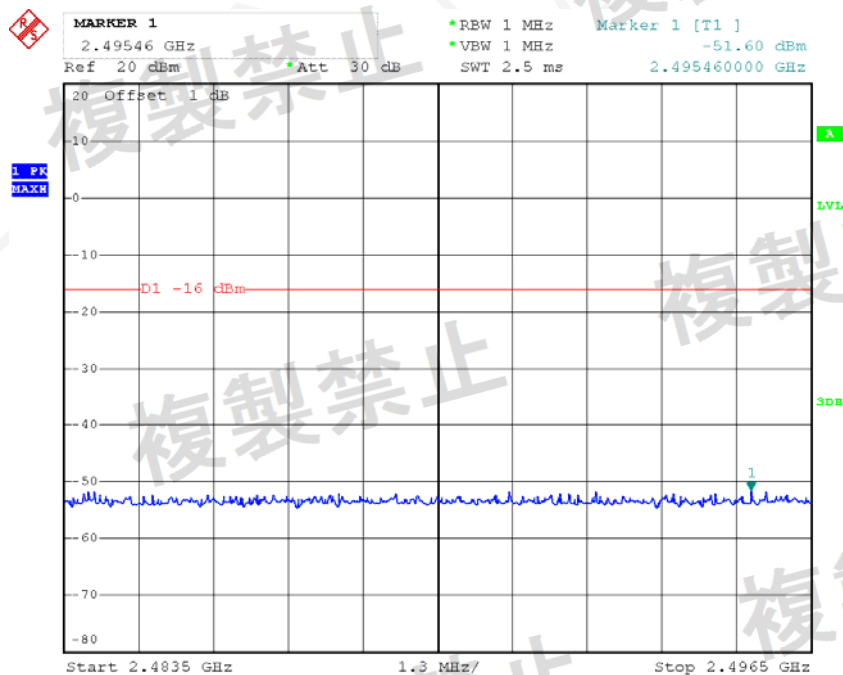


2387MHz~2400MHz



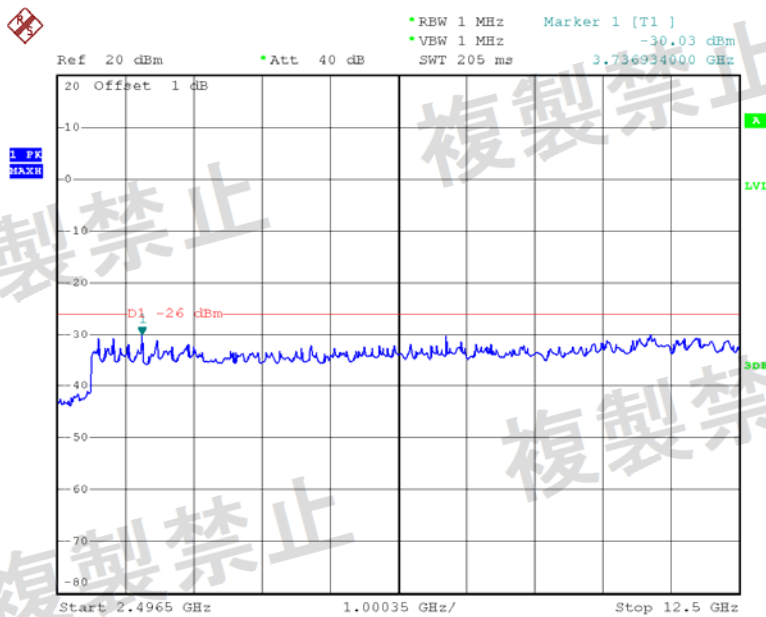
Date: 29.JAN.2018 16:27:31

2483.5MHz~2496.5MHz



Date: 29.JAN.2018 16:35:11

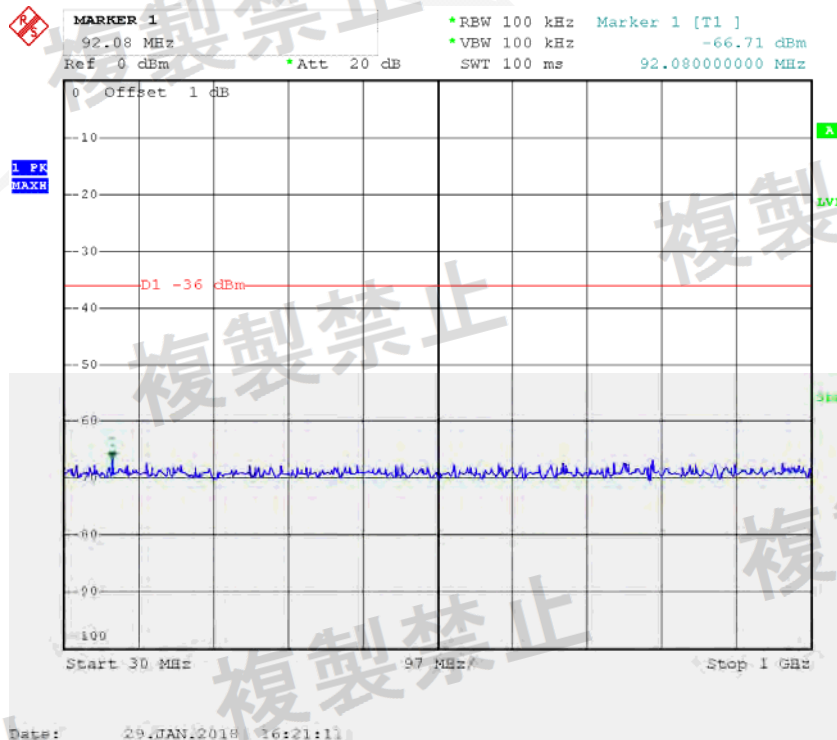
2496.5MHz~12500MHz



Date: 31.JAN.2018 12:27:39

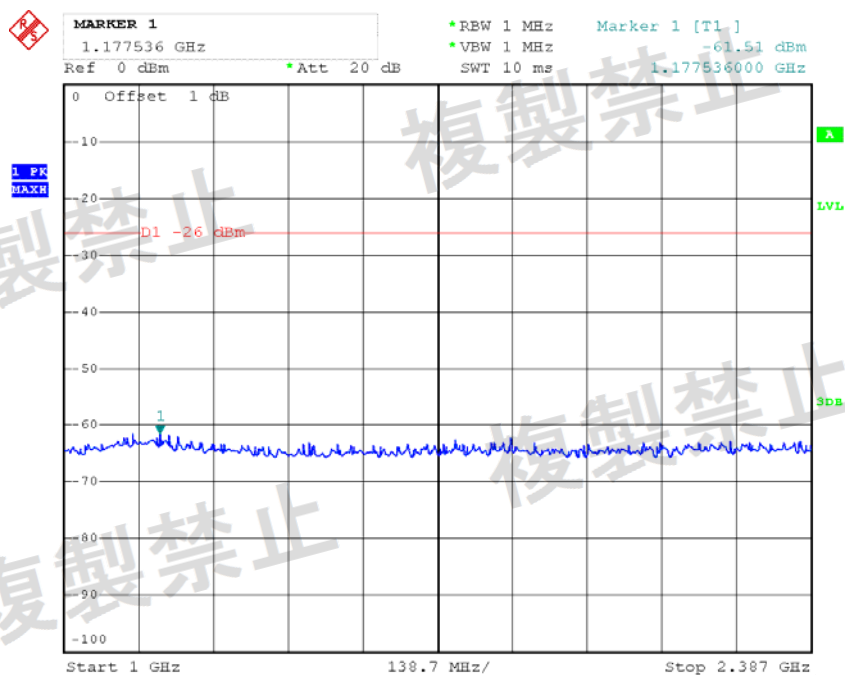
Test Frequency: 2441.5MHz:

30MHz~1000MHz



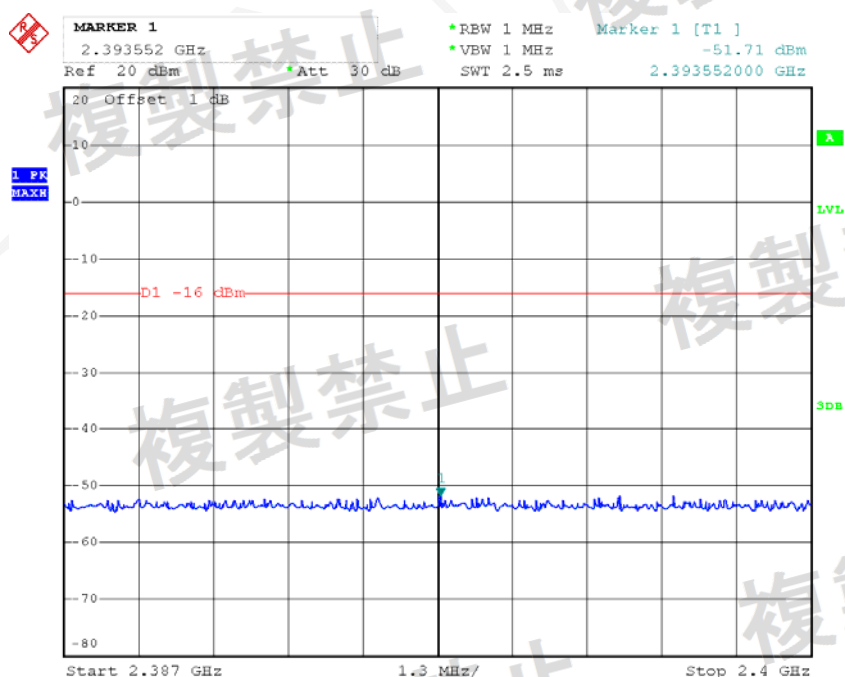
Date: 29.JAN.2018 16:21:11

1000MHz~2387MHz



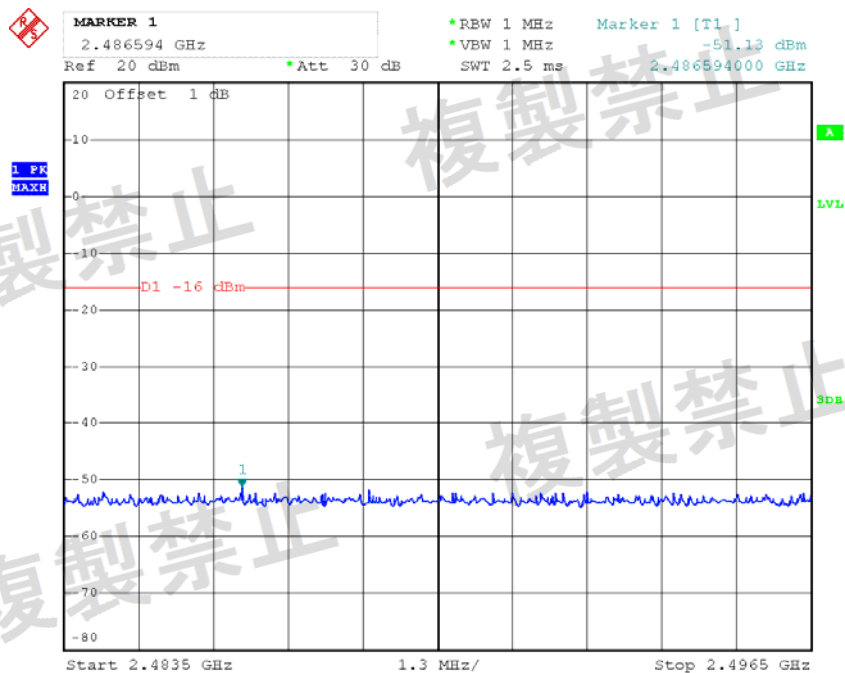
Date: 29.JAN.2018 16:24:38

2387MHz~2400MHz



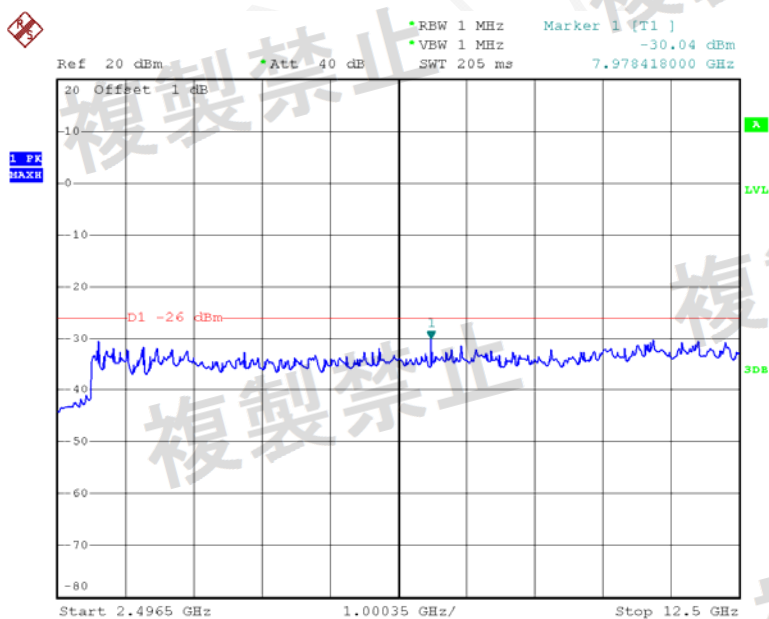
Date: 29.JAN.2018 16:28:01

2483.5MHz~2496.5MHz



Date: 29.JAN.2018 16:35:40

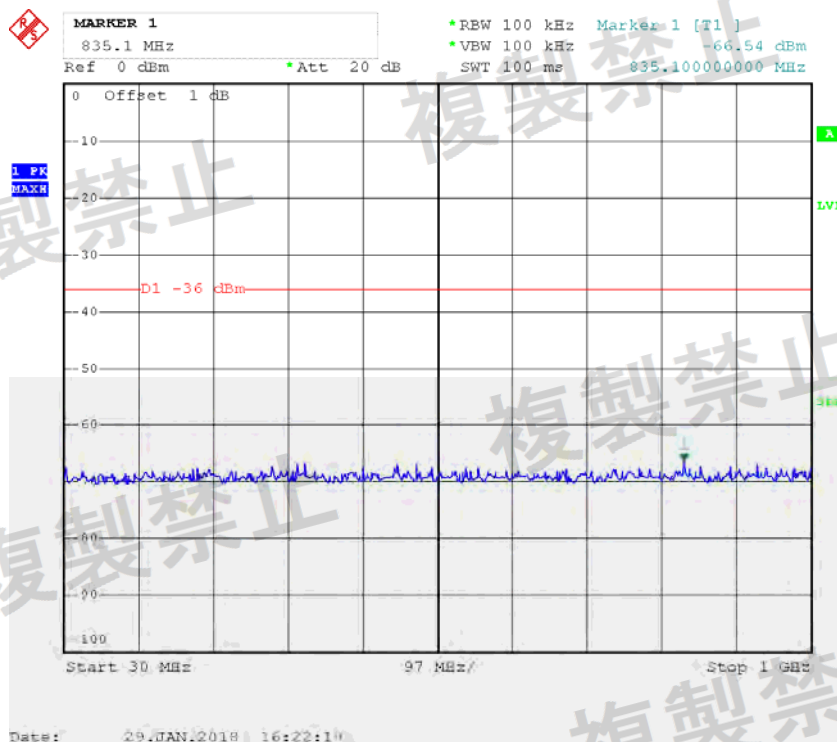
2496.5MHz~12500MHz



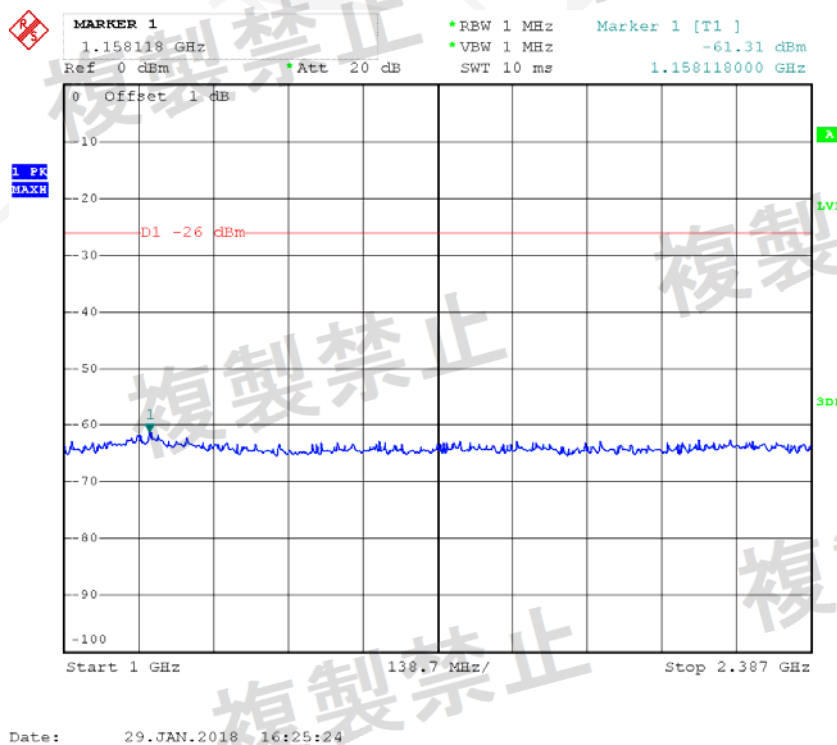
Date: 31.JAN.2018 12:28:01

Test Frequency: 2476.5MHz:

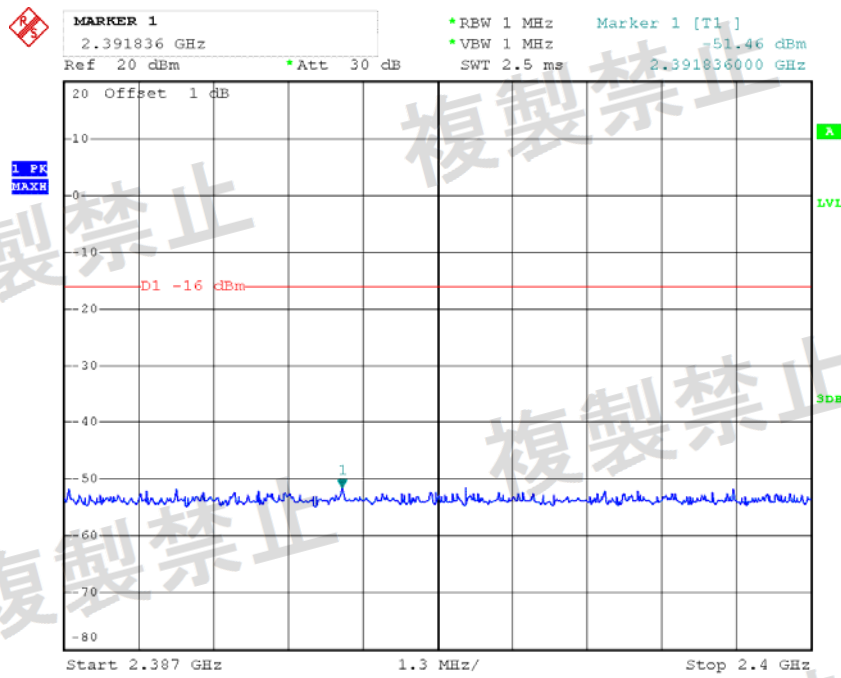
30MHz~1000MHz



1000MHz~2387MHz

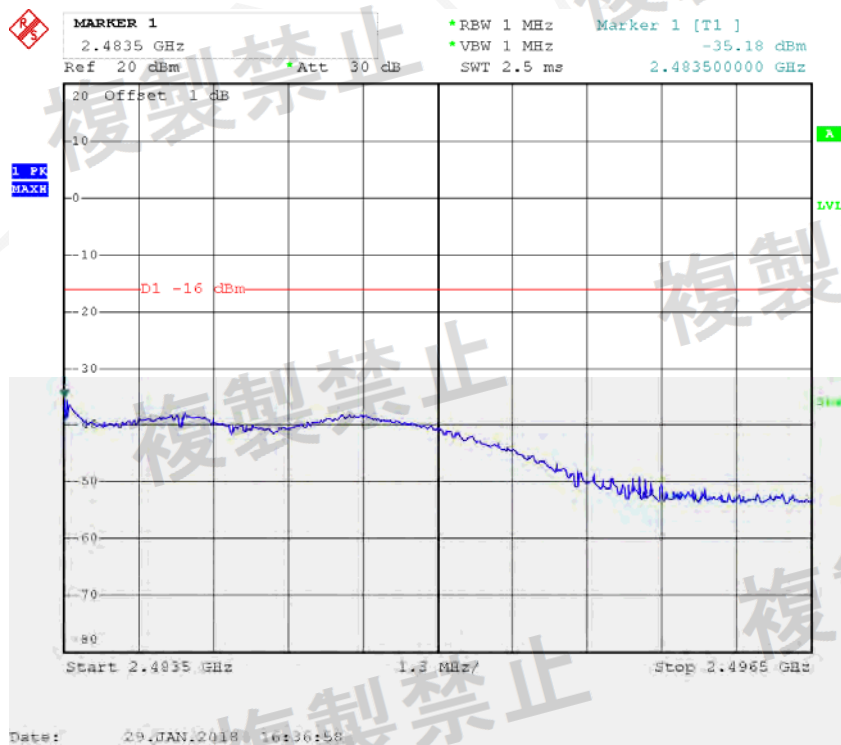


2387MHz~2400MHz



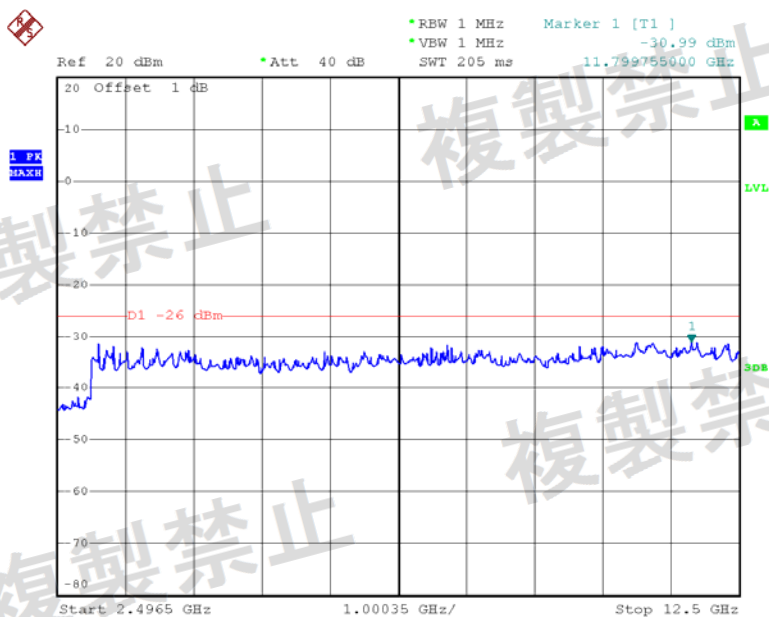
Date: 29.JAN.2018 16:28:29

2483.5MHz~2496.5MHz



Date: 29.JAN.2018 16:36:58

2496.5MHz~12500MHz

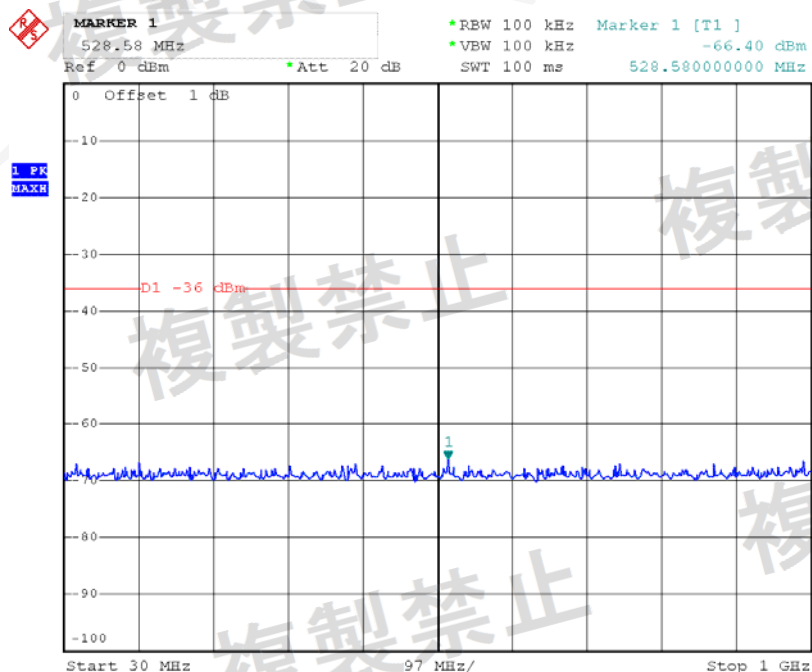


Date: 31.JAN.2018 12:28:31

Ant 2:

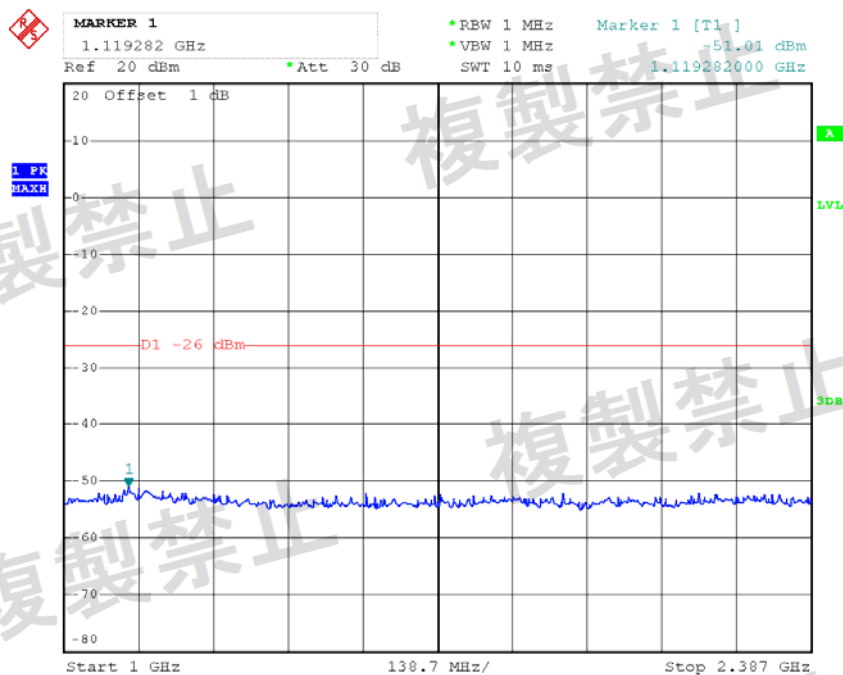
Test Frequency: 2406.5MHz

30MHz~1000MHz



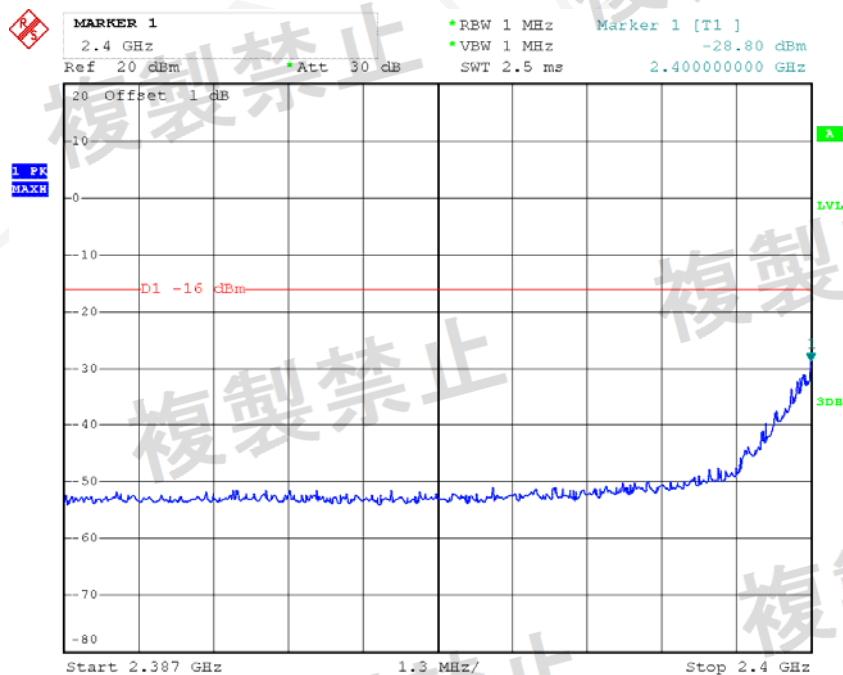
Date: 29.JAN.2018 15:51:17

1000MHz~2387MHz



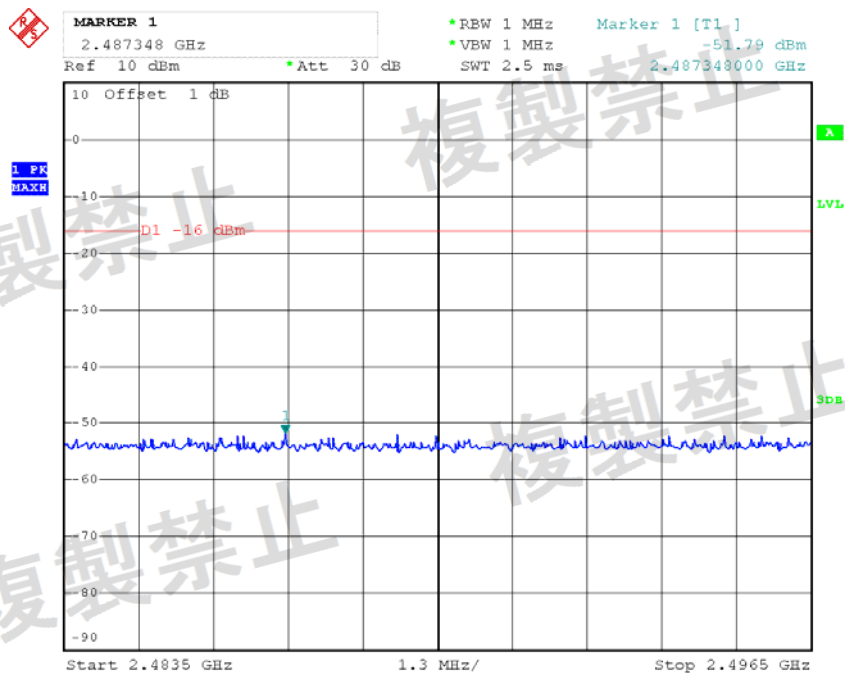
Date: 29.JAN.2018 15:52:54

2387MHz~2400MHz



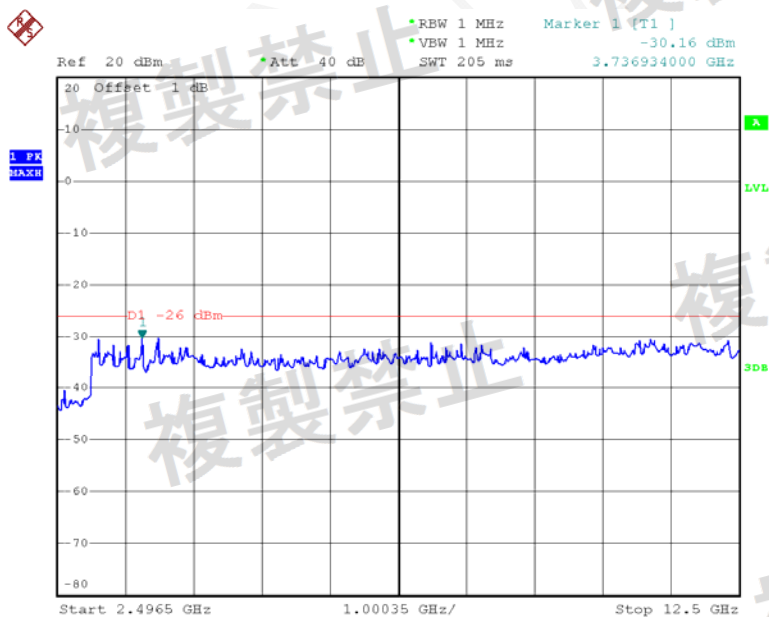
Date: 29.JAN.2018 15:53:39

2483.5MHz~2496.5MHz



Date: 29.JAN.2018 15:54:46

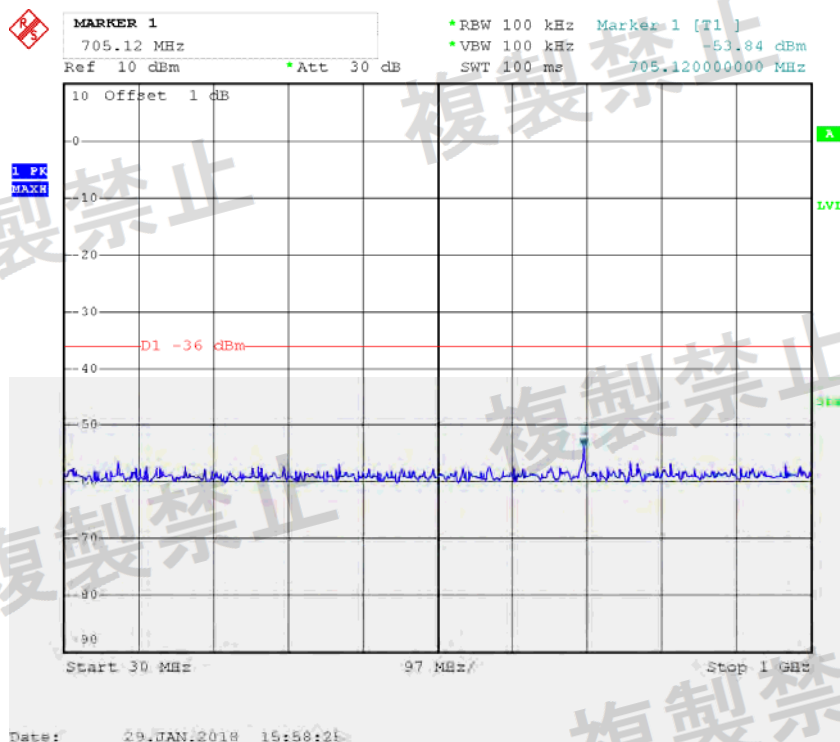
2496.5MHz~12500MHz



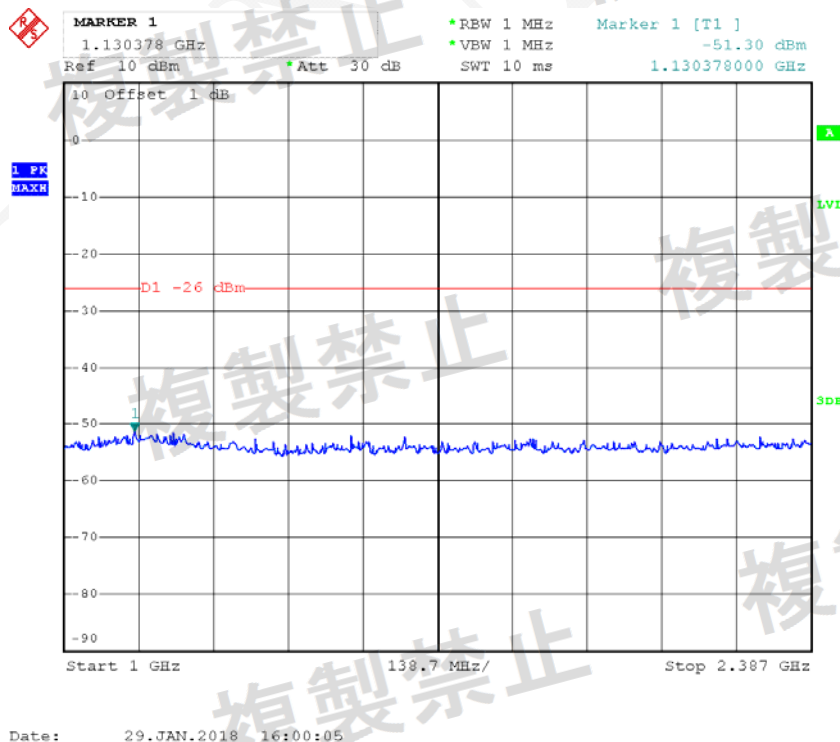
Date: 31.JAN.2018 12:30:10

Test Frequency: 2441.5MHz:

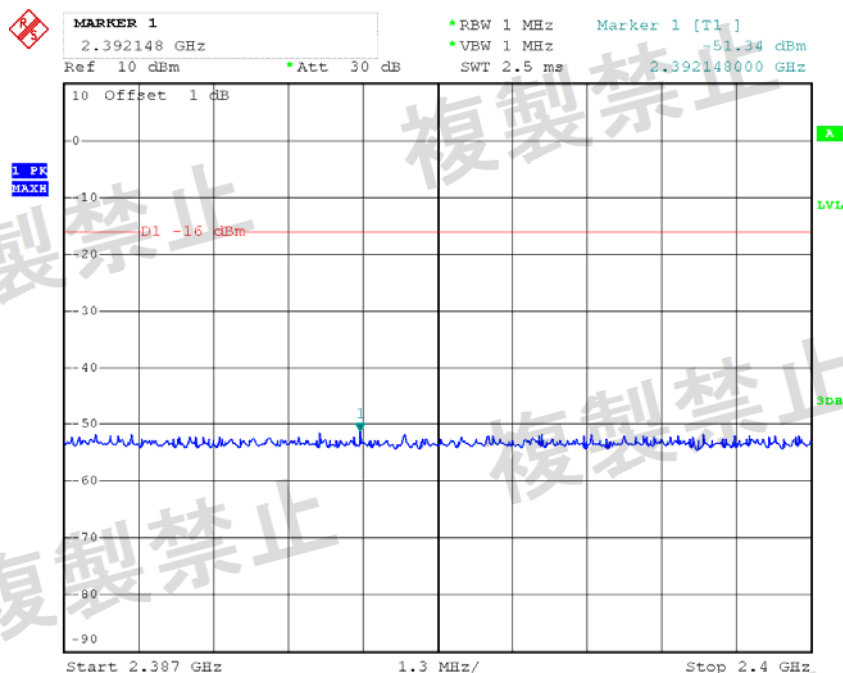
30MHz~1000MHz



1000MHz~2387MHz

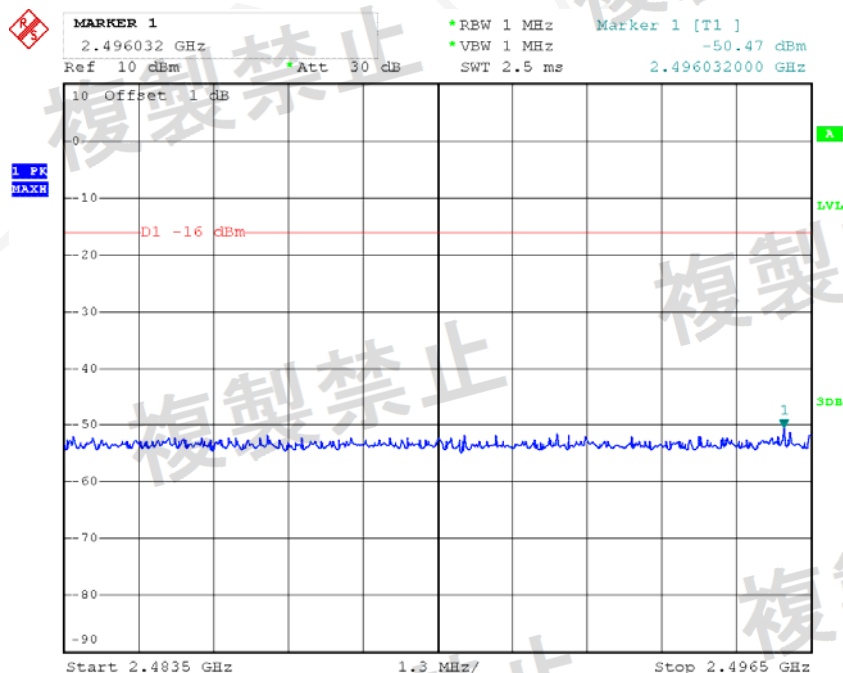


2387MHz~2400MHz



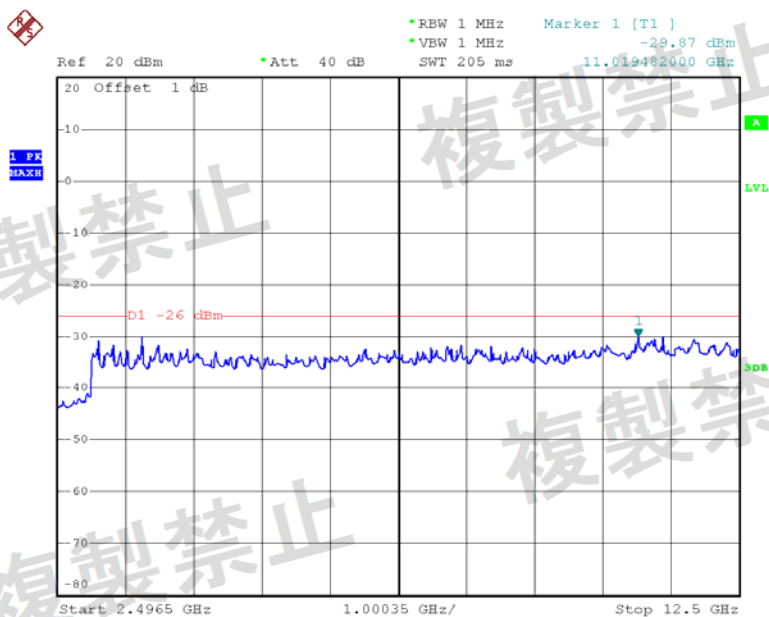
Date: 29.JAN.2018 16:00:43

2483.5MHz~2496.5MHz



Date: 29.JAN.2018 16:01:19

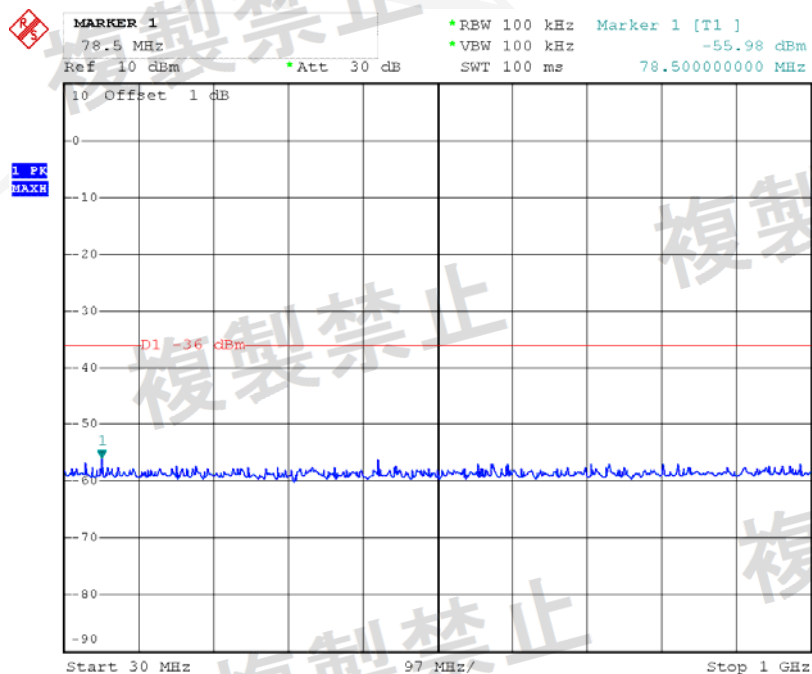
2496.5MHz~12500MHz



Date: 31.JAN.2018 12:30:38

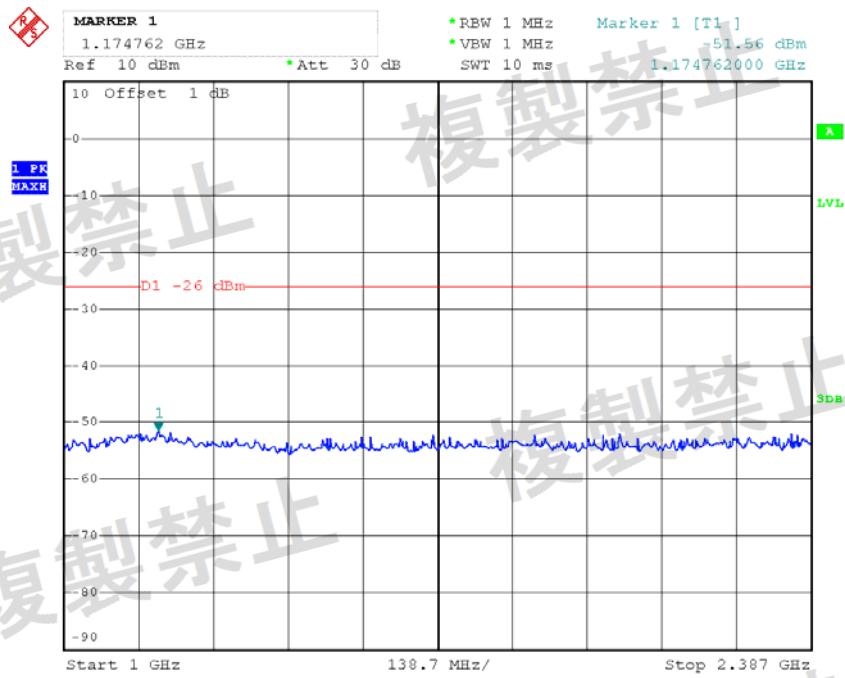
Test Frequency: 2476.5MHz:

30MHz~1000MHz



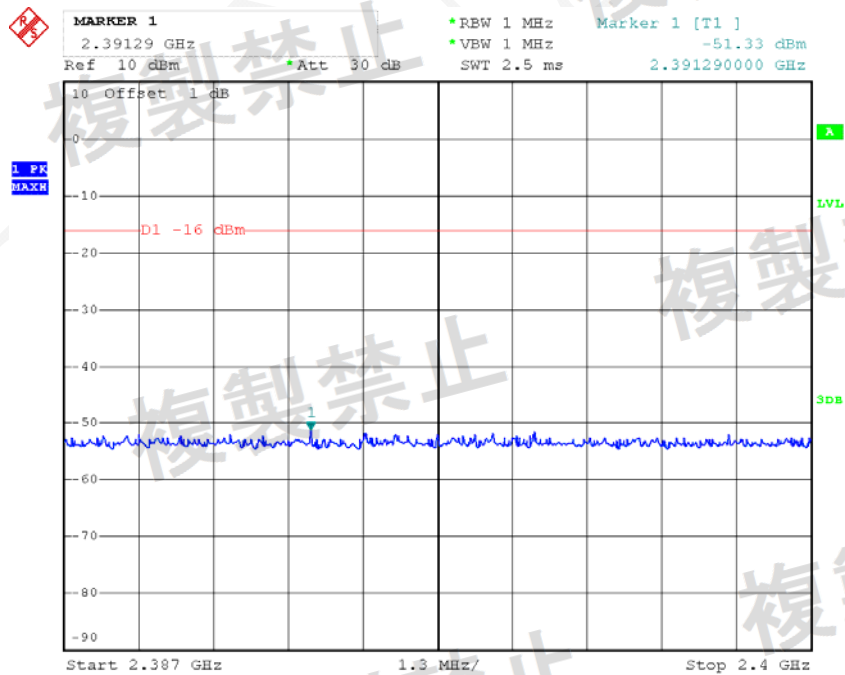
Date: 29.JAN.2018 16:04:08

1000MHz~2387MHz



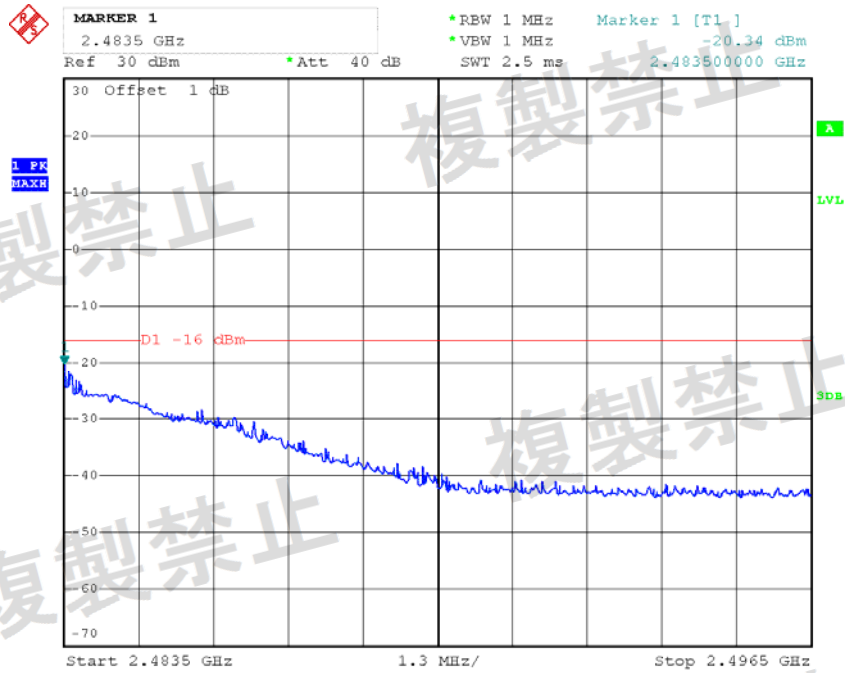
Date: 29.JAN.2018 16:05:01

2387MHz~2400MHz



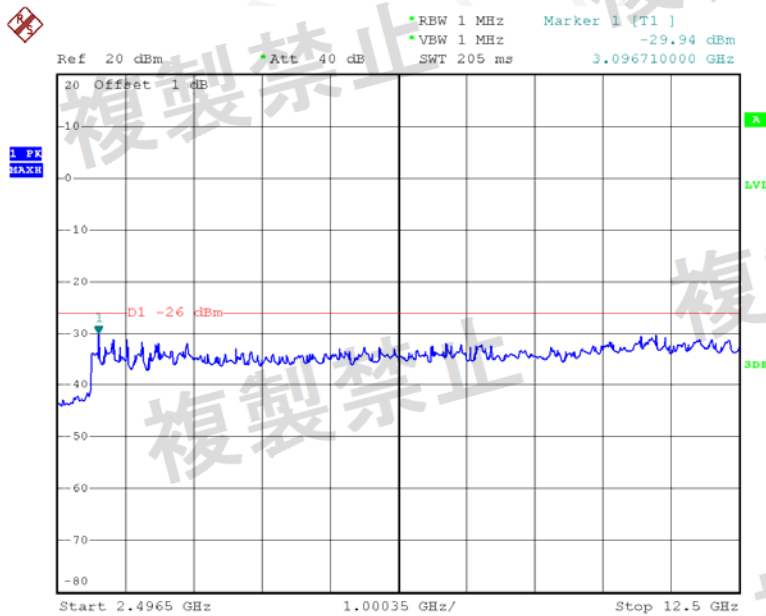
Date: 29.JAN.2018 16:06:29

2483.5MHz~2496.5MHz



Date: 29.JAN.2018 16:07:46

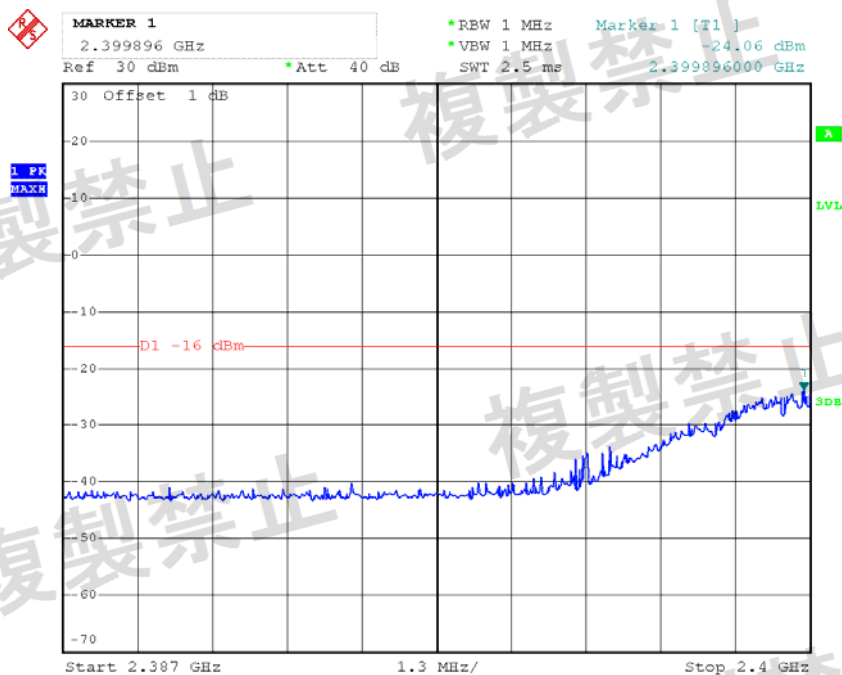
2496.5MHz~12500MHz



Date: 31.JAN.2018 12:31:13

Test Frequency: 2409.5MHz

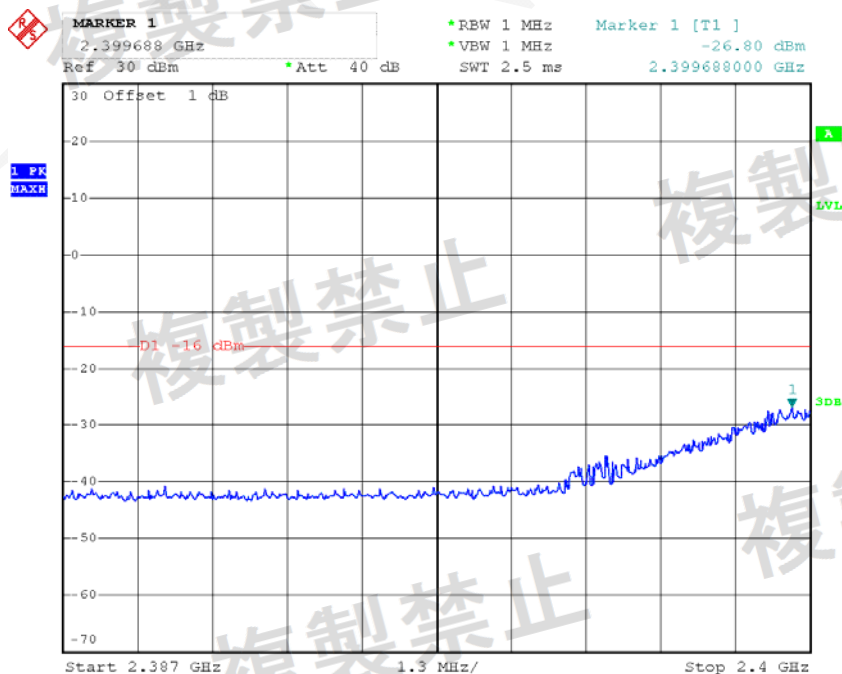
ANT0-2387MHz~2400MHz



Date: 29.JAN.2018 15:35:25

Test Frequency: 2409.5MHz

ANT1-2387MHz~2400MHz



Date: 29.JAN.2018 15:44:04

ANTENNA OUTPUT POWER, ANTENNA POWER TOLERANCE AND TRANSMISSION ANTENNA GAIN

Limit

- ≤ 3 mW /MHz(FHSS from 2402-2480 MHz)
- ≤ 10 mW/MHz (OFDM, DSSS from 2400-2483.5 MHz)
- ≤ 10 mW (other from 2400-2483.5 MHz)

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

E.i.r.p:

- ≤ 12.14 dBm/MHz(OFDM, DS form 2400-2483.5MHz)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-8	2018-12-8
R&S	EMI Test Receiver	ESPI	100120	2017-12-11	2018-12-11
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
Pro instrument	DC Power Supply	pps3300	N/A	N/A	N/A
UNI-T	Multimeter	UT39A	M130199938	2017-04-10	2018-04-10

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

For FHSS UUT:

Connect the UUT to the power meter

For OFDM, DSSS UUT:

Step 1:

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

- Centre Frequency: The centre frequency of the channel under test.
- RBW: 1 MHz.
- VBW: 1 MHz.
- Span: Wide enough to cover the complete power envelope of the signal of the UUT.
- Detector: Peak.
- Trace Mode: Max Hold.

Step 2:

When the trace is complete, find the peak value of the power envelope and record the frequency.

Step 3:

Make the following changes to the settings of the spectrum analyser:

- Centre Frequency: Equal to the frequency recorded in step 2.
- Span: 3 MHz.

- RBW: 1 MHz.
- VBW: 1 MHz.
- Detector: Average (see note).
- Trace Mode: Max Hold.

For other UUT:

Make the following changes to the settings of the spectrum analyser:

- Centre Frequency: The centre frequency of the channel under test.
- Span: 5MHz.
- RBW: 3 MHz.
- VBW: 10 MHz.
- Detector: Peak
- Trace Mode: Max Hold.

NOTE: The detector mode "Average" is often referred to as "RMS Average" or "Sample" but do not use Video Average.

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

D shall be recorded in the test report.

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

$$PD = D + G$$

Test Data

Environmental Conditions

Temperature:	22.7°C
Relative Humidity:	40 %
ATM Pressure:	102.2 kPa

The testing was performed by Emily Wang on 2018-01-29.

Test Result: Compliant

Test Mode: Transmitting

Frequency		2409.5 MHz			2441.5 MHz			2476.5 MHz			Limit
Voltage		LV	NV	HV	LV	NV	HV	LV	NV	HV	
Antenna power Ant 1	dBm /MHz	1.15	1.17	1.20	3.87	3.90	3.93	0.59	0.57	0.61	10dBm/MHz
Antenna power Ant 2	dBm /MHz	-0.13	-0.12	-0.14	2.09	2.10	2.14	-0.07	-0.05	-0.01	10dBm/MHz
Duty Cycle Factor	dB	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	/
Antenna power Ant 1	mW /MHz	2.00	2.01	2.03	3.75	3.78	3.80	1.76	1.75	1.77	10mW/MHz
Antenna power Ant 2	mW /MHz	1.49	1.50	1.49	2.49	2.49	2.52	1.51	1.52	1.53	10mW/MHz
antenna power Error Ant 1	%	-42.86	-42.57	-42.00	7.14	8.00	8.57	-49.71	-50.00	-49.43	+20% ~ -80%
antenna power Error Ant 2	%	-57.43	-57.14	-57.43	-28.86	-28.86	-28.00	-56.86	-56.57	-56.29	+20% ~ -80%
EIRP Ant 1	dBm /MHz	6.02	6.04	6.07	8.74	8.77	8.80	5.46	5.44	5.48	12.14dBm/MHz
EIRP Ant 2	dBm /MHz	4.74	4.75	4.73	6.96	6.97	7.01	4.80	4.82	4.86	12.14dBm/MHz

Frequency		2406.5M			Limit
Voltage		LV	NV	HV	
Antenna power Ant 1	dBm /MHz	-10.36	-10.33	-10.29	10dBm/MHz
Antenna power Ant 2	dBm /MHz	-11.52	-11.50	-11.47	10dBm/MHz
Duty Cycle Factor	dB	1.87	1.87	1.87	/
Antenna power Ant 1	mW /MHz	0.14	0.14	0.14	10mW/MHz
Antenna power Ant 2	mW /MHz	0.11	0.11	0.11	10mW/MHz
antenna power Error Ant 1	%	-6.67	-6.67	-6.67	+20% ~ -80%
antenna power Error Ant 2	%	-26.67	-26.67	-26.67	+20% ~ -80%
EIRP Ant 1	dBm /MHz	-5.49	-5.46	-5.42	12.14dBm/MHz
EIRP Ant 2	dBm /MHz	-6.65	-6.63	-6.60	12.14dBm/MHz

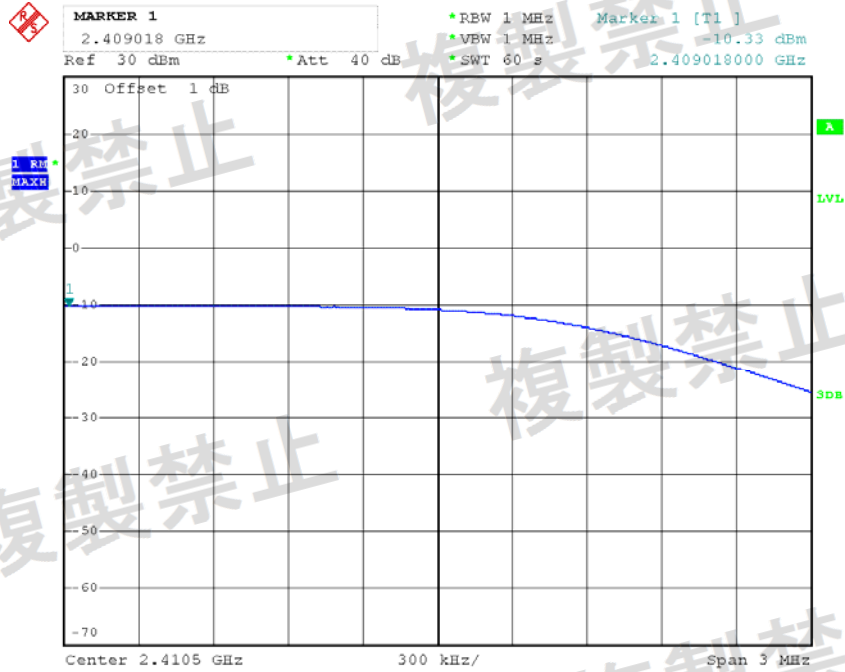
Note 1: the antenna gain is 3dBi.

Note 2: the nominal output power is 3.5mW/MHz for 2409.5MHz-2476.5 MHz, 0.15mW/MHz for 2406.5MHz-2408.5MHz.

Note 3: Transmission Antenna Gain and Transmission Radiation Angle Width are not required since EIRP less than 12.14dBm/MHz.

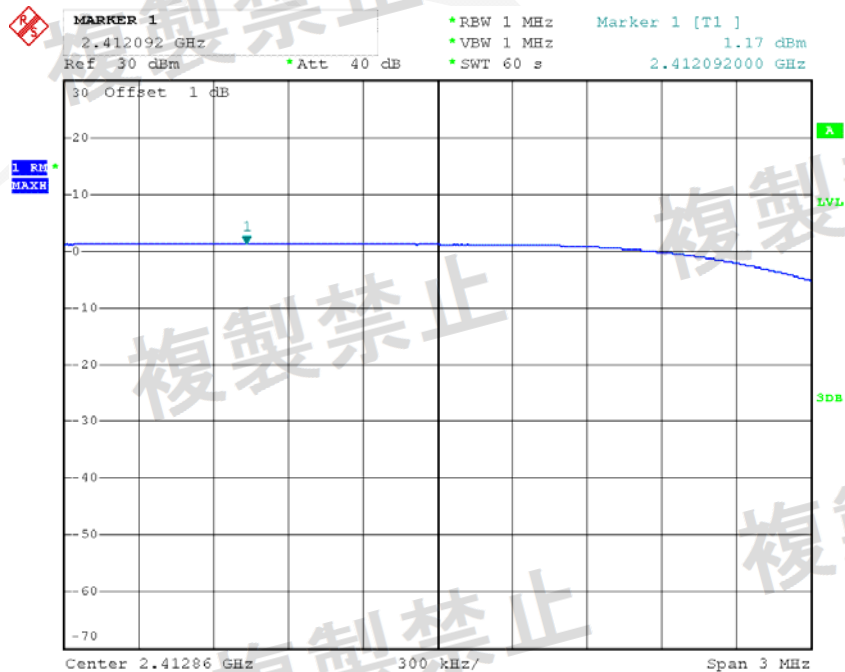
Please refer to the plots below for normal voltage.
Ant 1:

Test Frequency:2406.5



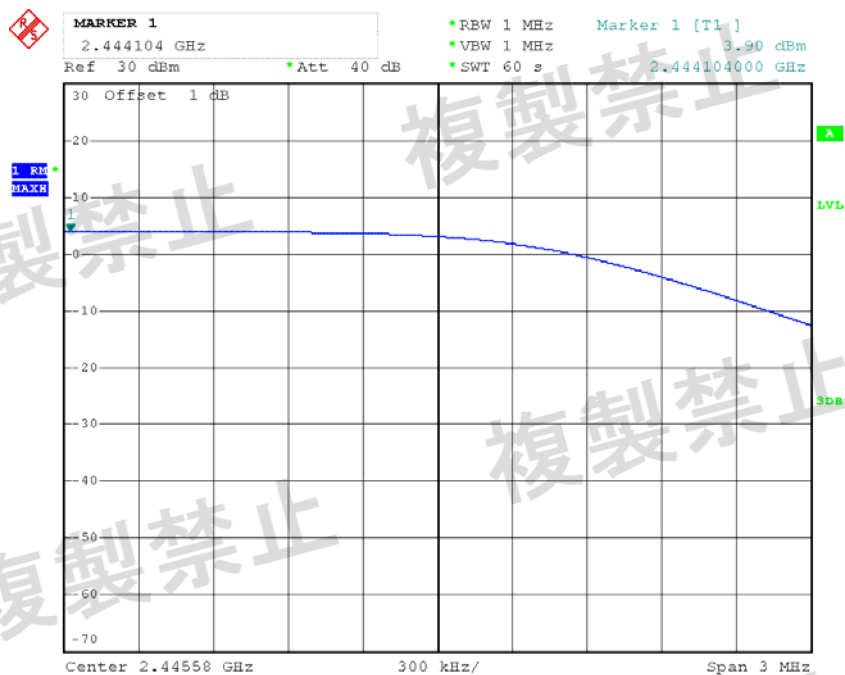
Date: 29.JAN.2018 10:20:03

Test Frequency:2409.5MHz



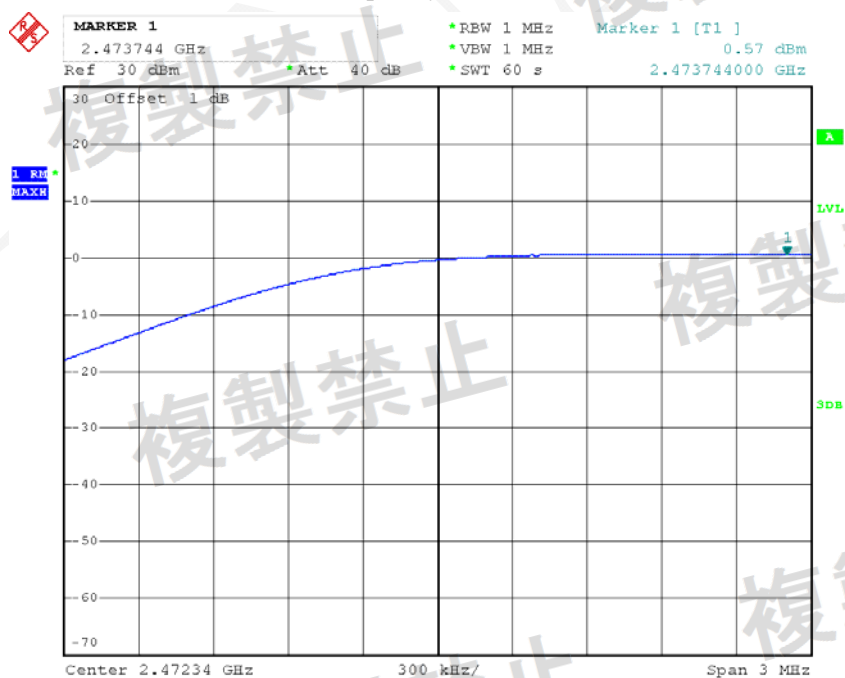
Date: 29.JAN.2018 10:34:16

Test Frequency: 2441.5 MHz



Date: 29.JAN.2018 10:08:46

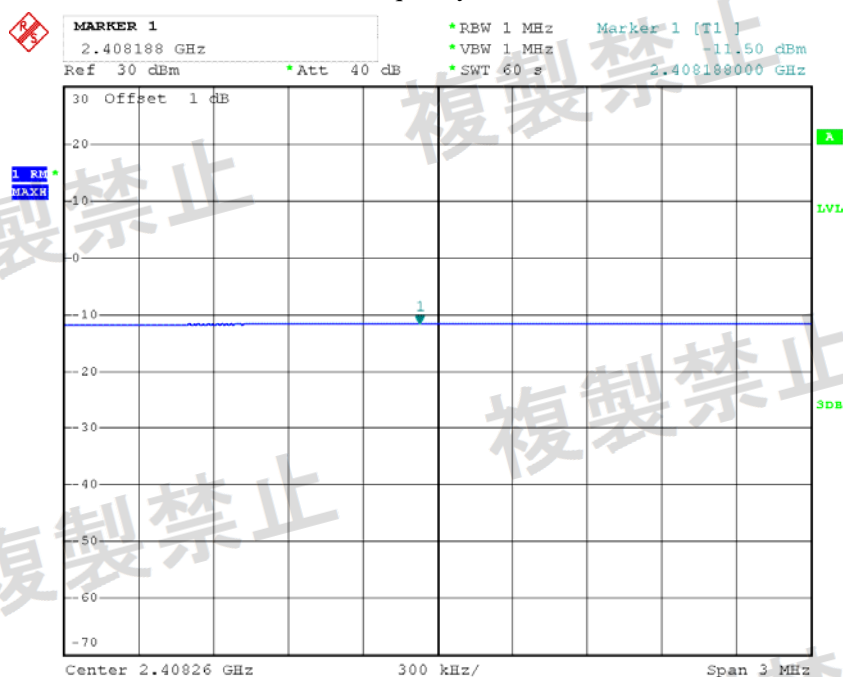
Test Frequency: 2476.5 MHz



Date: 29.JAN.2018 10:23:38

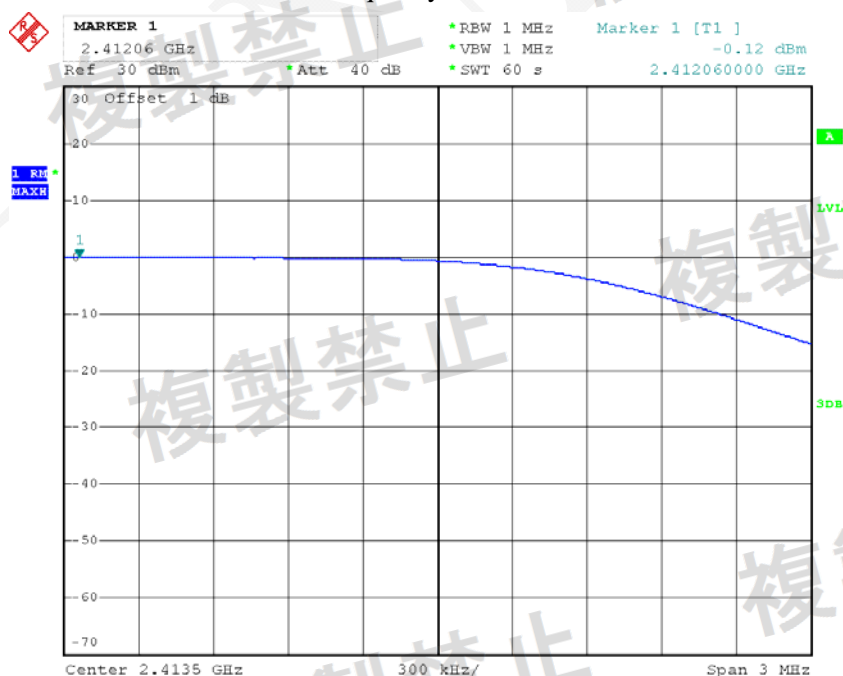
Ant 2:

Test Frequency:2406.5



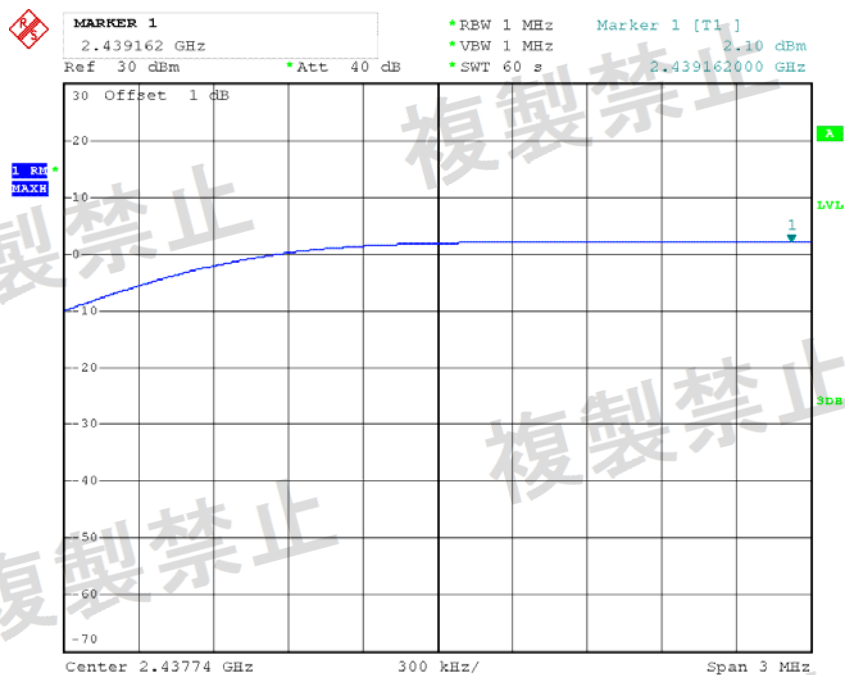
Date: 29.JAN.2018 11:43:58

Test Frequency:2409.5MHz



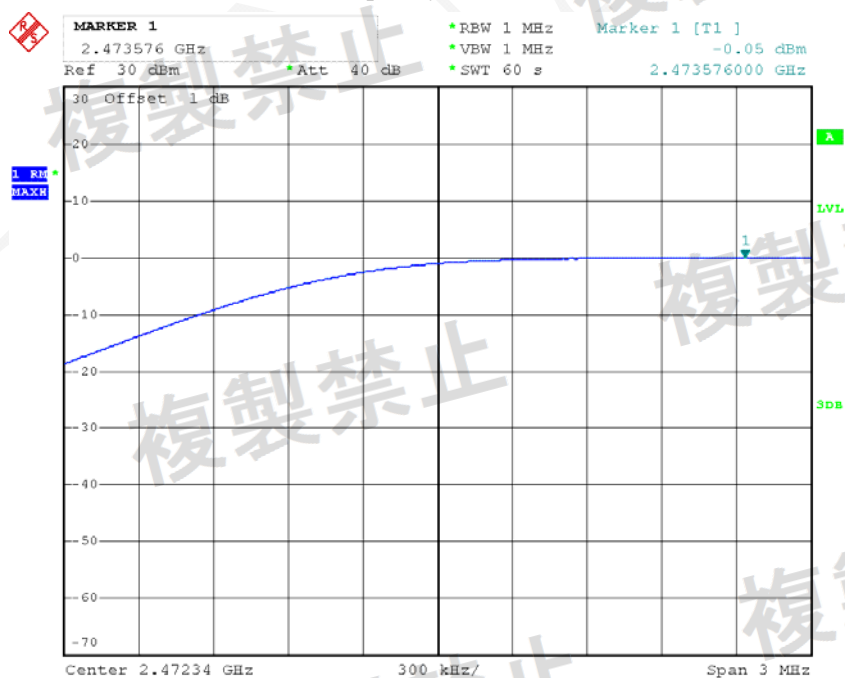
Date: 29.JAN.2018 11:51:46

Test Frequency:2441.5MHz



Date: 29.JAN.2018 11:38:50

Test Frequency:2476.5MHz



Date: 29.JAN.2018 11:27:03

RECEIVER SPURIOUS EMISSION AND UNWANTED EMISSION INTENSITY

Limit

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-8	2018-12-8
R&S	EMI Test Receiver	ESPI	100120	2017-12-11	2018-12-11
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
Pro instrument	DC Power Supply	pps3300	N/A	N/A	N/A
UNI-T	Multimeter	UT39A	M130199938	2017-04-10	2018-04-10

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

❖ Conditions of Application Equipment (EUT)

- The modulation state shall be “continuous receiving mode”.

❖ Spectrum Analyzer Conditions

- Start Frequency: Start Frequency of frequency range to measure (30MHz or 1GHz)
- Stop Frequency: Stop Frequency of frequency range to measure (1GHz or 12.5GHz)
- Span: AUTO (Measurement Range)
- RBW: 100 kHz, VBW: 100 kHz for Frequency < 1 GHz
- RBW: 1MHz, VBW: 1MHz for Frequency > 1 GHz
- Sweep time: AUTO or more
- Sweep mode: Auto Sweep
- Detection: Positive Peak
- Reference Level: Enough level for maximum dynamic range

Measurement Result

Environmental Conditions

Temperature:	20.9°C
Relative Humidity:	41 %
ATM Pressure:	101.5 kPa

The testing was performed by Emily Wang on 2018-01-31.

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

Test Mode: Receiving

Frequency		2406.5 MHz			2441.5 MHz			2476.5 MHz			Limit
Voltage		LV	NV	HV	LV	NV	HV	LV	NV	HV	
Raw data Ant 1	Band VI (dBm)	-68.57	-68.38	-68.54	-68.63	-68.77	-69.01	-68.20	-68.07	-68.09	-54dBm
	Band VII (dBm)	-58.78	-59.04	-59.34	-60.50	-60.25	-59.98	-59.39	-59.25	-59.04	-47dBm
Raw data Ant 2	Band VI (dBm)	-67.67	-67.81	-67.54	-68.70	-68.86	-68.61	-68.24	-68.39	-68.22	-54dBm
	Band VII (dBm)	-60.65	-60.41	-60.24	-59.92	-59.74	-59.49	-60.99	-60.99	-60.94	-47dBm
Unwanted Emission Intensity Ant 1	Band VI (nW)	0.13900	0.14521	0.13996	0.13709	0.13274	0.12560	0.15136	0.15596	0.15524	4nW
	Band VII (nW)	1.32434	1.24738	1.16413	0.89125	0.94406	1.00462	1.15080	1.18850	1.24738	20nW
Unwanted Emission Intensity Ant 2	Band VI (nW)	0.17100	0.16558	0.17620	0.13490	0.13002	0.13772	0.14997	0.14488	0.15066	4nW
	Band VII (nW)	0.86099	0.90991	0.94624	1.01859	1.06170	1.12460	0.79616	0.79616	0.80538	20nW

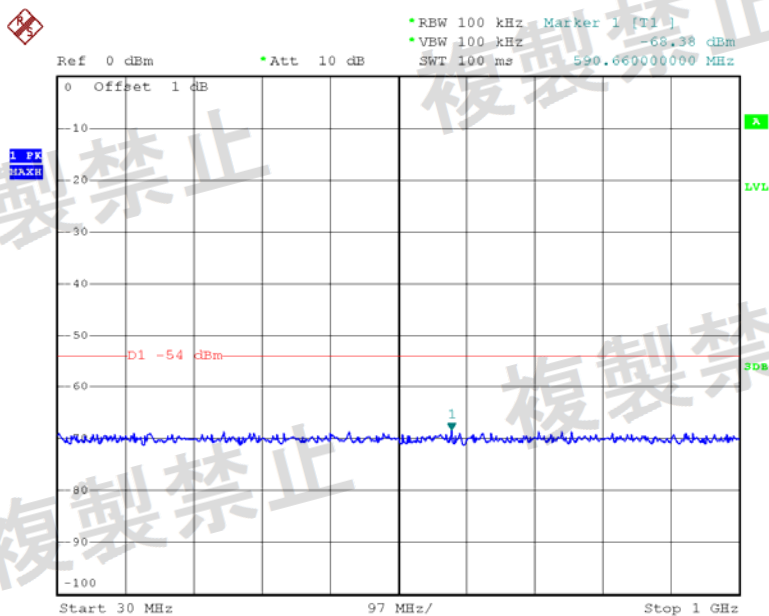
Note: Band VI: 30MHz~1000MHz Band VII: 1000MHz~12500MHz

Please refer to the plots below for normal voltage

Ant 1:

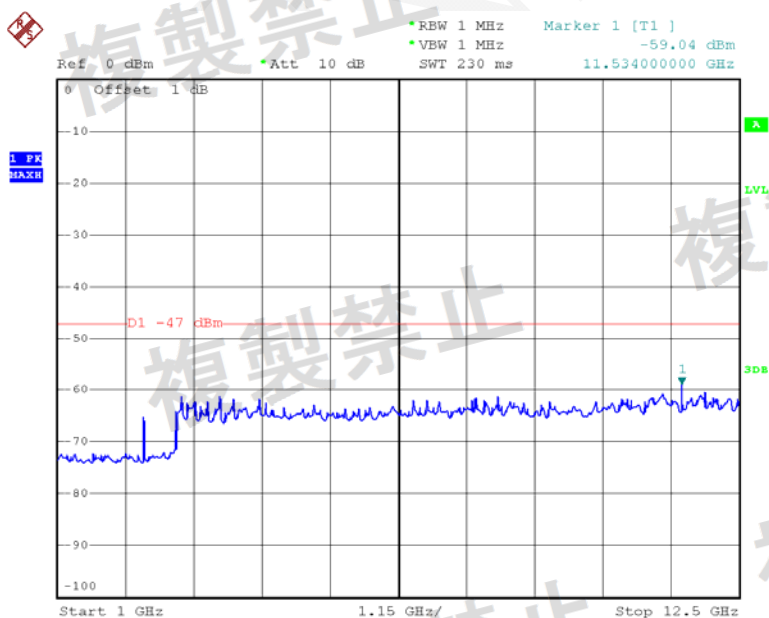
Test Frequency: 2406.5MHz

30MHz~1000MHz



Date: 31.JAN.2018 12:35:42

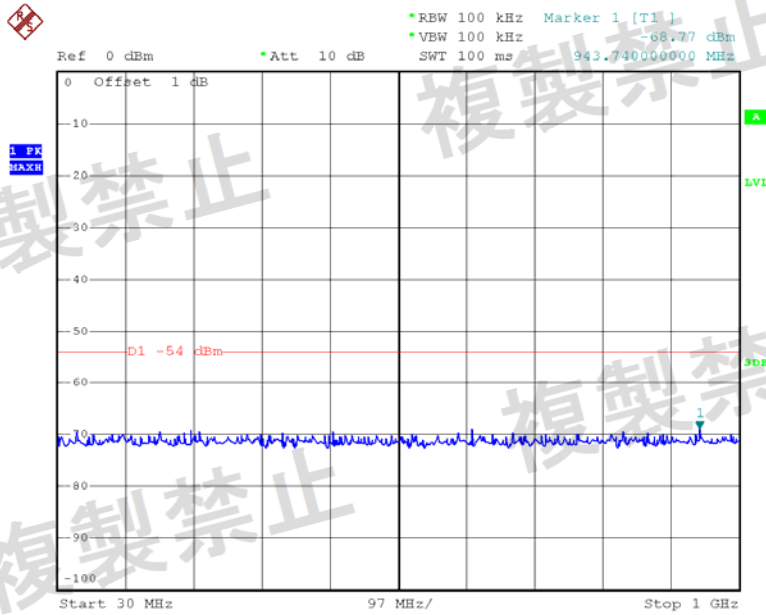
1000MHz~12500MHz



Date: 31.JAN.2018 12:37:30

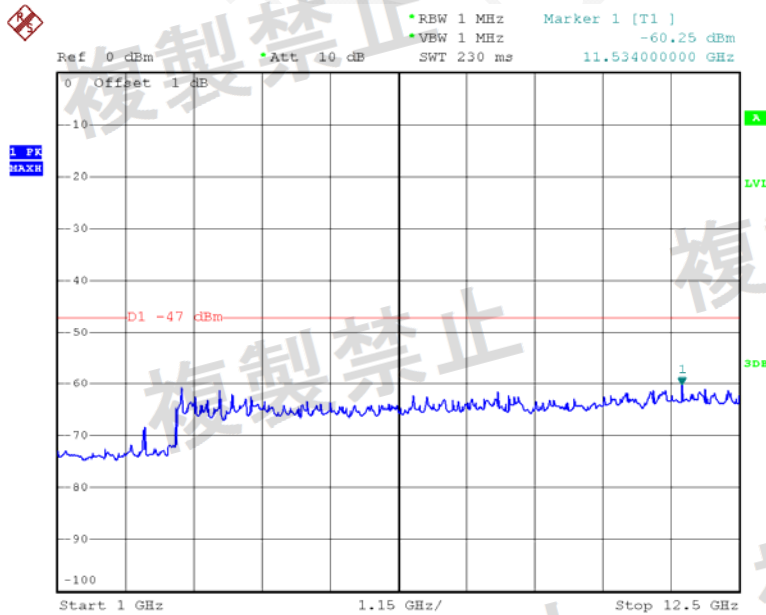
Test Frequency: 2441.5MHz:

30MHz~1000MHz



Date: 31.JAN.2018 12:35:57

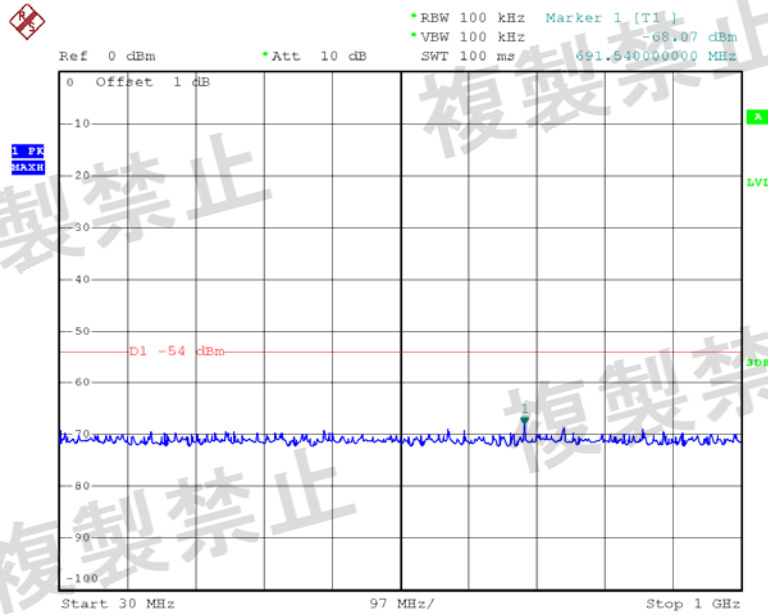
1000MHz~12500MHz



Date: 31.JAN.2018 12:37:54

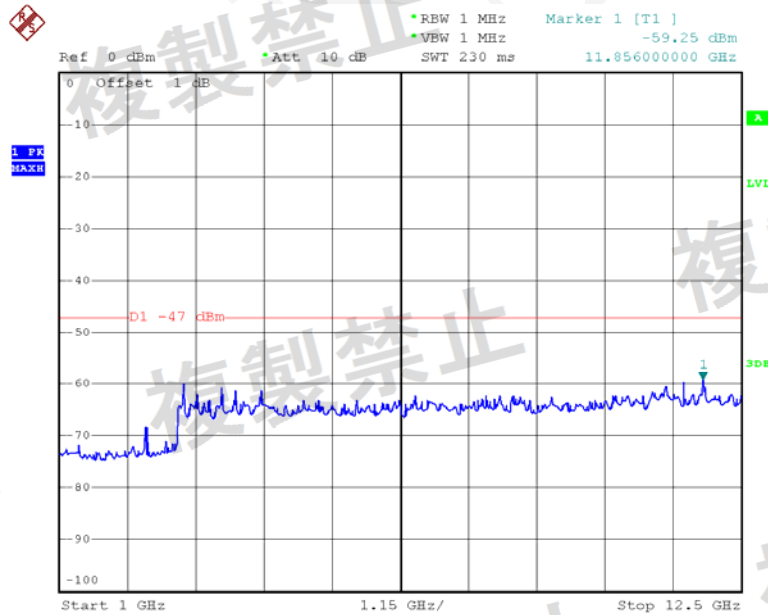
Test Frequency: 2476.5MHz:

30MHz~1000MHz



Date: 31.JAN.2018 12:36:22

1000MHz~12500MHz

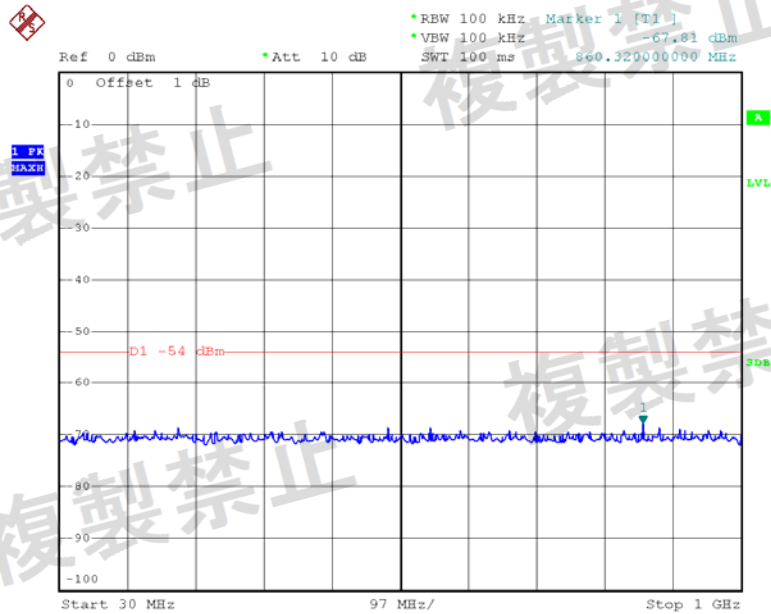


Date: 31.JAN.2018 12:38:22

Ant 2:

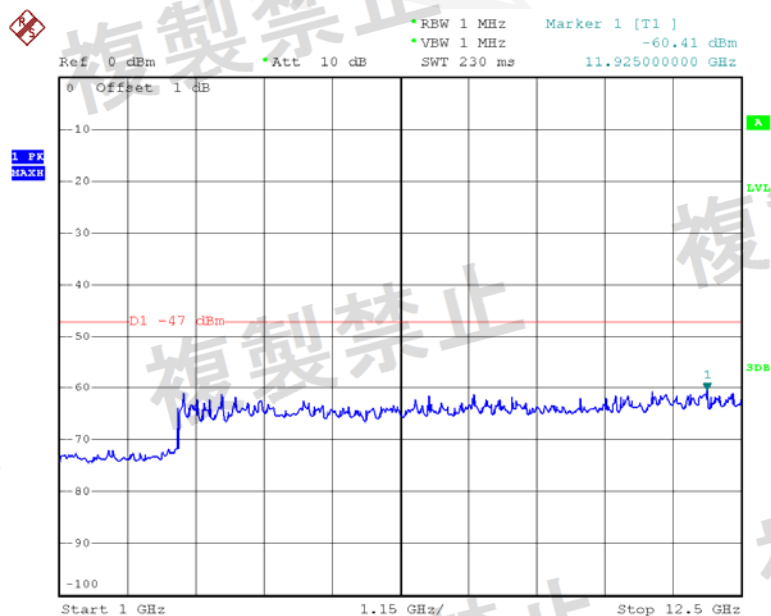
Test Frequency: 2406.5MHz

30MHz~1000MHz



Date: 31.JAN.2018 12:41:23

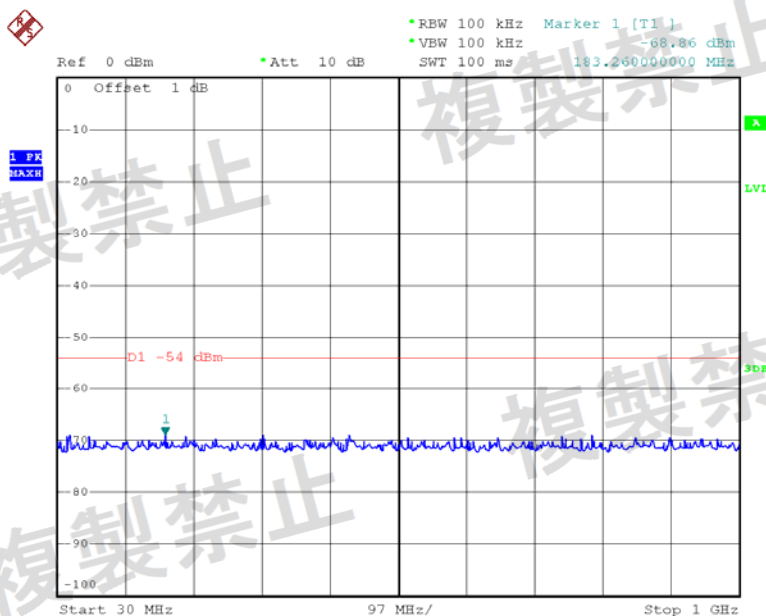
1000MHz~12500MHz



Date: 31.JAN.2018 12:44:45

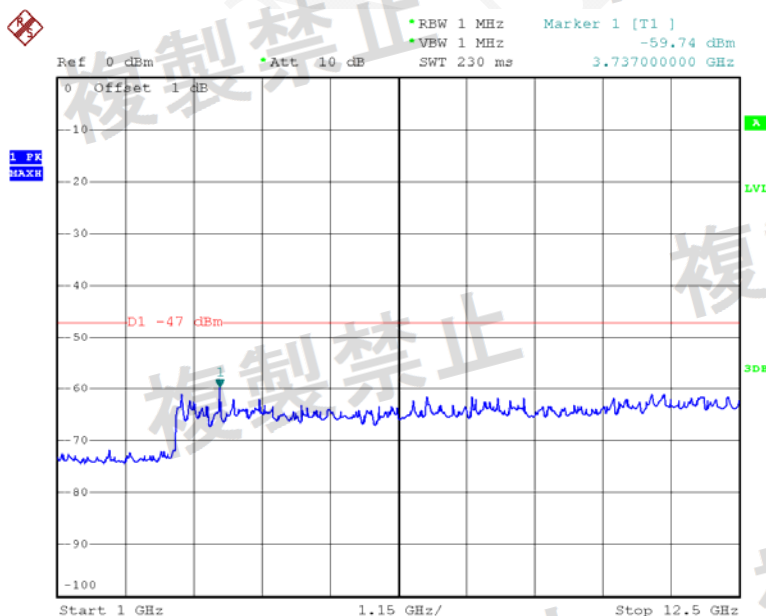
Test Frequency: 2441.5MHz:

30MHz~1000MHz



Date: 31.JAN.2018 12:41:41

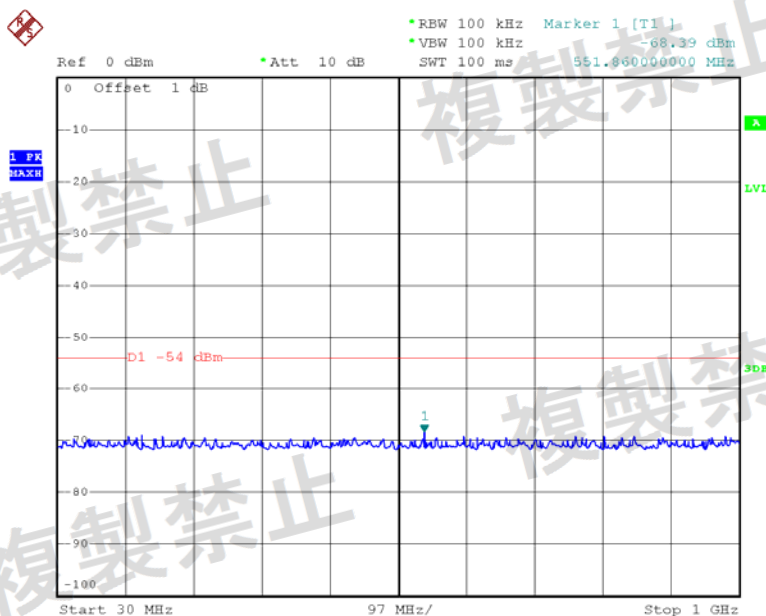
1000MHz~12500MHz



Date: 31.JAN.2018 12:44:06

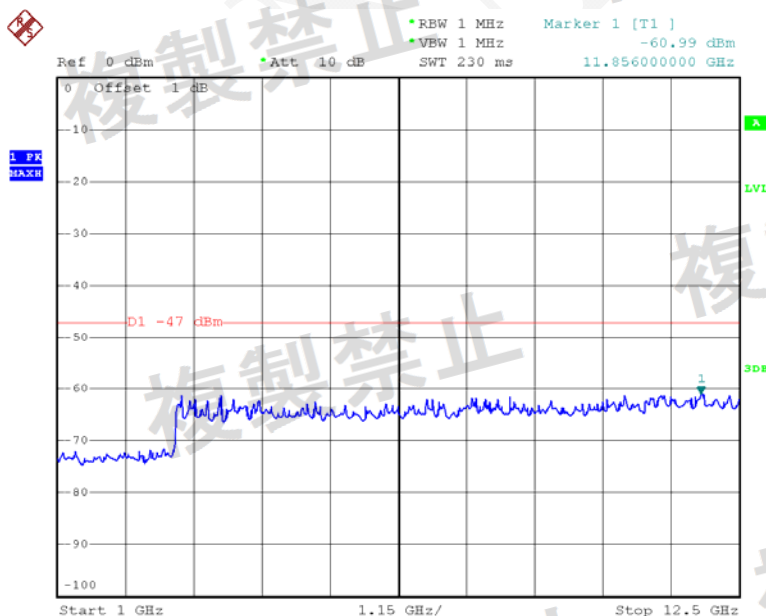
Test Frequency: 2476.5MHz:

30MHz~1000MHz



Date: 31.JAN.2018 12:42:18

1000MHz~12500MHz



Date: 31.JAN.2018 12:43:29

INTERFERENCE PREVENTION FUNCTION

Requirement

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

Test Procedure

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

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

In the case of receiving the identification codes:

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

Measurement Result

Environmental Conditions

Temperature:	24.6°C
Relative Humidity:	46 %
ATM Pressure:	101 kPa

The testing was performed by Emily Wang on 2018-01-24.

Test Result: Good