

JAPAN MIC
TEST REPORT
For

Shenzhen Soundsoul Information Technology Co., Ltd.

Room 1308-1309, Building B, Huihai Square, Chuangye Road, Longhua District, Shenzhen China

Tested Model: TrueFree
Multiple Model: Q32, TrueFree+, TrueFree², Truebuds, True, TrueFree mini, TrueFree Pro, TrueFree Air, TrueFree Max

Report Type:

Original Report

Product Type:

Bluetooth Headset

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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		Bluetooth Headset
Tested Model Number		TrueFree
Multiple Models:		Q32,TrueFree+,TrueFree ² ,Truebuds,True, TrueFree mini,TrueFree Pro,TrueFree Air,TrueFree Max
Bluetooth Technical Parameters	Support Technical	Bluetooth LE
	Modulation Type	GFSK
	Emission Type	F1D
	Frequency Range	2402-2480MHz
	Output Power	2.5mW
	Antenna Gain	3.1dBi
Nominal Power Supply:		DC3.7V from battery
Voltage Range		3.3V to 4.2V DC
External Dimension		21.90mm(L)* 16.00mm(W)* 24.00mm(H)
Serial Number		181011002 (Assigned by BACL, Dongguan)
Received Date		2018.10.11

Note: The series product, Q32, TrueFree+, TrueFree², Truebuds, True, TrueFree mini, TrueFree Pro, TrueFree Air, TrueFree Max are electrically identical, The difference between them please refer to the declaration letter for details. We selected TrueFree for fully test.

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 an engineering mode which was selected by manufacturer.

40 channels are provided for testing: channel 0, 19 and 39 were selected to test.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404
...
...
..	...	38	2478
19	2440	39	2480

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

NV: Normal Voltage 3.7V_{DC}

LV: Low Voltage 3.3V_{DC}

HV: High Voltage 4.2V_{DC}

EUT Exercise Software

Test software 'HCITester2' was used which was provided by manufacturer, the maximum power level was configured as default.

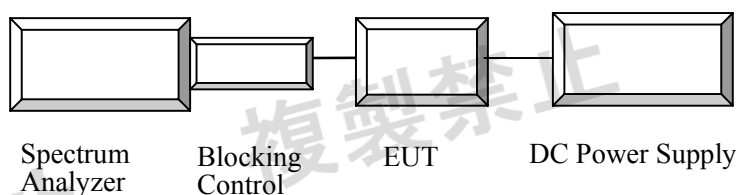
Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Pro instrument	DC Power Supply	pps3300	3300012

Configuration of Test Setup



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Blocking Control	EMDCB-00036	0E01201047	2018-05-06	2019-05-06
Agilent	USB Wideband Power Sensor	U2022XA	MY5417006	2017-12-11	2018-12-11
UNI-T	Multimeter	UT39A	M130199938	2018-07-24	2019-07-24
Pro instrument	DC Power Supply	pps3300	3300012	N/A	N/A

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

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	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

Note:

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**: The test only required for bandwidth more than 26MHz and less than 38MHz.

FREQUENCY ERROR

Limit

50 ppm or below

Test Procedure

Set the EUT to the measurement frequency without modulation.

Setting of SA is following as: RB: 1 kHz / VB: 30 kHz / Sweep time: Auto / Sweep Mode: Single sweep /

Detect mode: Positive peak / Trace mode: Clear.

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:	25.7 °C
Relative Humidity:	34%
ATM Pressure:	100.7 kPa

The testing was performed by Swim Lv on 2018-10-28.

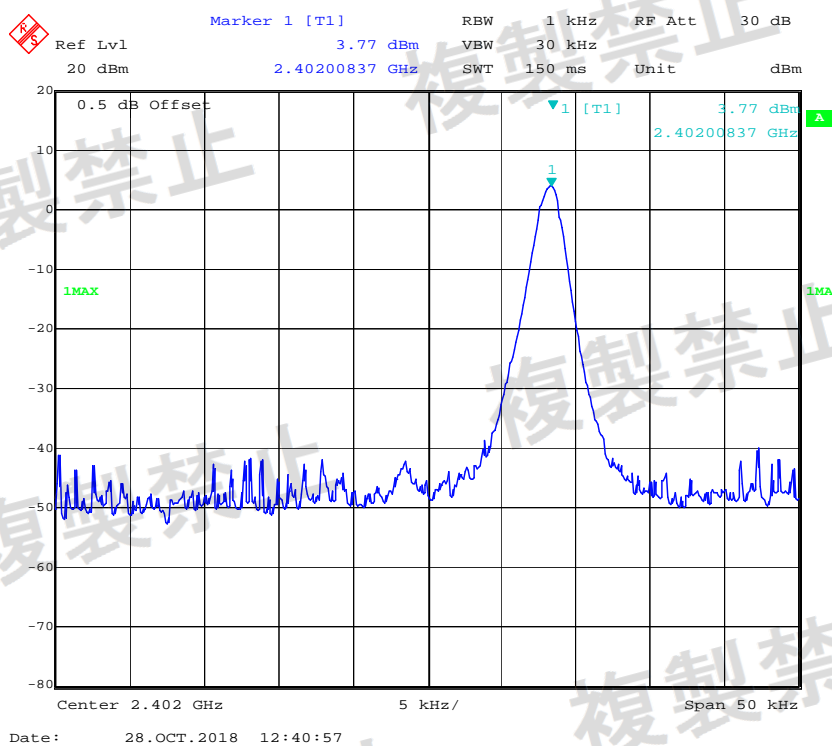
Test Result: Compliant

Test Mode: Transmitting

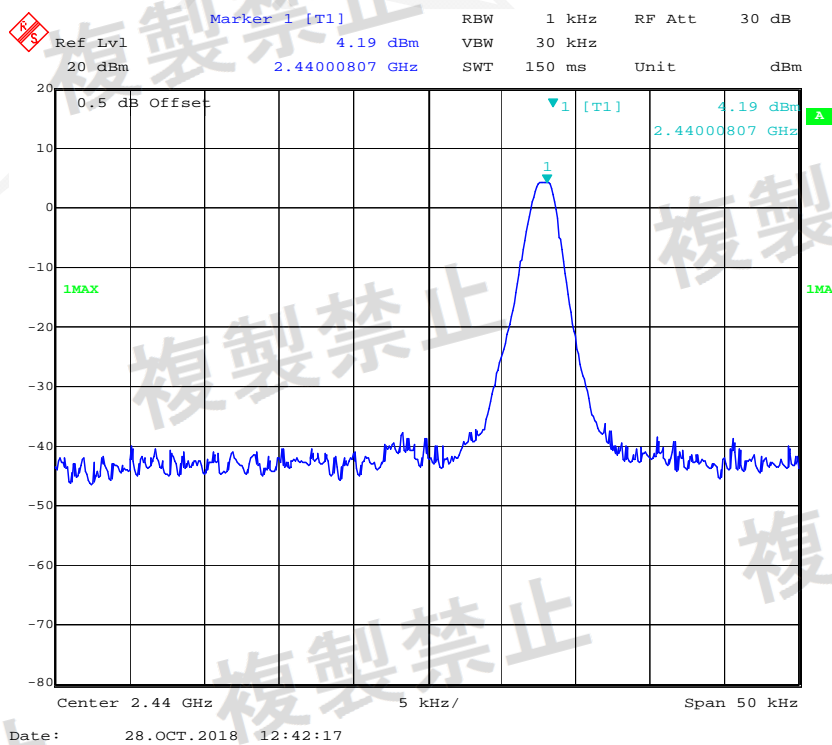
Test Channel	Voltage	Result	Tolerance	Limit
		MHz	ppm	
Low Channel	LV	2402.00844	3.51	<50ppm
	NV	2402.00837	3.48	
	HV	2402.00857	3.57	
Middle Channel	LV	2440.00835	3.42	
	NV	2440.00807	3.31	
	HV	2440.00821	3.36	
High channel	LV	2480.00864	3.48	
	NV	2480.00857	3.46	
	HV	2480.00869	3.50	

Please refer to the plots for normal voltage test.

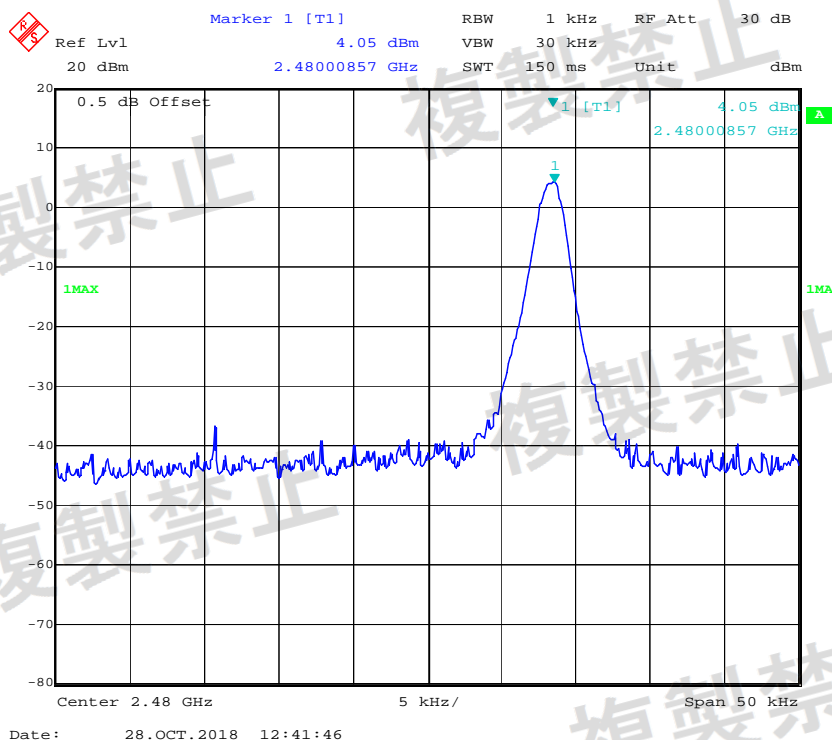
Low Channel



Middle Channel



High Channel



OCCUPIED BANDWIDTH

Limit

- Occupied bandwidth: FH≤83.5 MHz; OFDM, DS≤26 MHz; Others≤26 MHz

Test Procedure

- Setting of SA is following as: RB: 30 kHz/VB: 30 kHz / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
- EUT have transmitted the maximum modulation signal and fixed channelize. SA set to 99% of occupied bandwidth to measure occupied bandwidth.

Test Data

Environmental Conditions

Temperature:	25.7 °C
Relative Humidity:	34 %
ATM Pressure:	100.7 kPa

The testing was performed by Swim Lv on 2018-10-28.

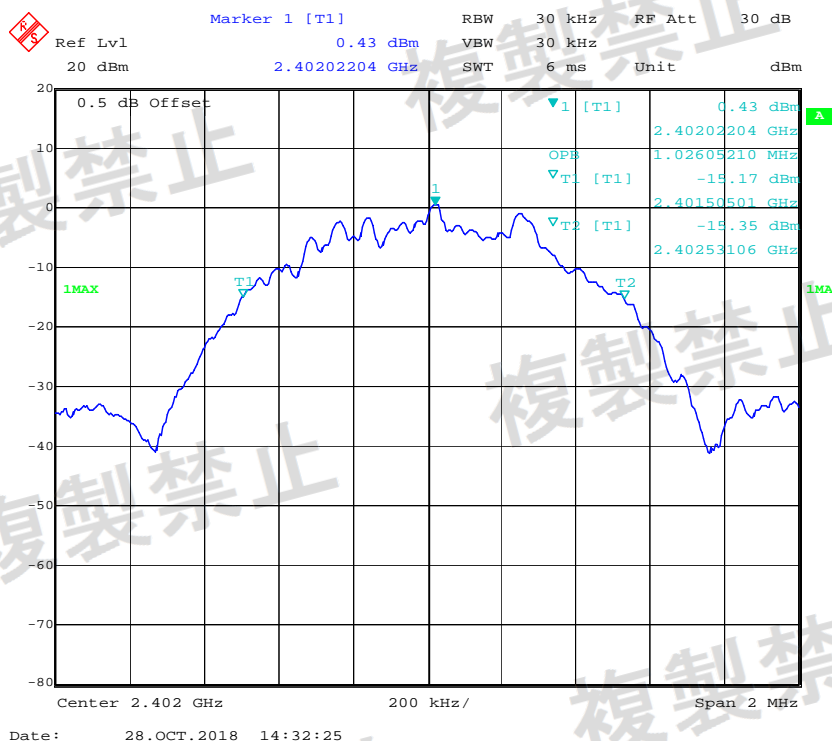
Test Result: Compliant

Test Mode: Transmitting

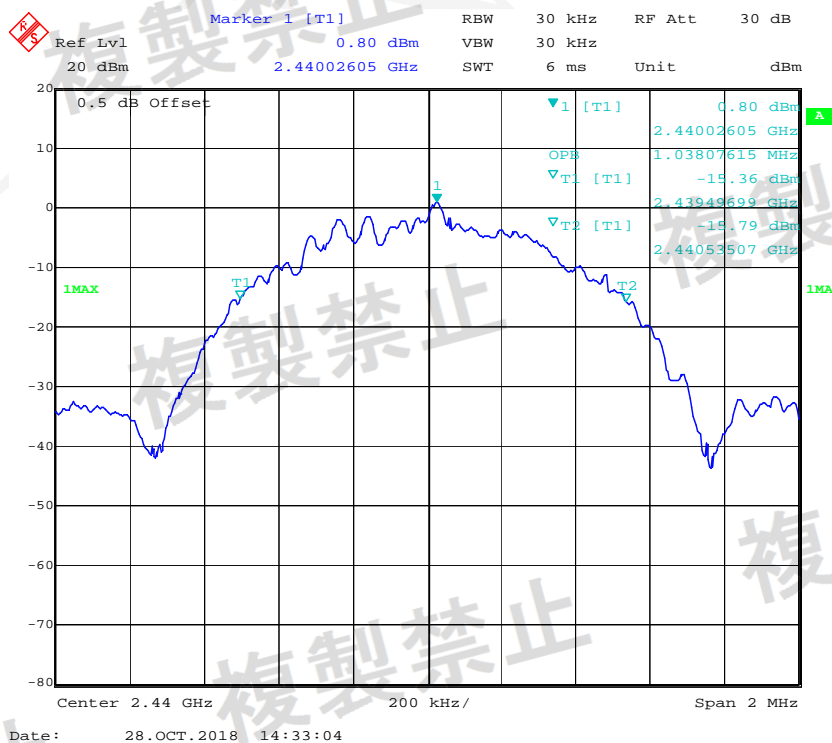
Test Channel	Low Channel			Middle Channel			High Channel			Limit
Voltage	LV	NV	HV	LV	NV	HV	LV	NV	HV	
Occupied Bandwidth (MHz)	1.031	1.026	1.035	1.042	1.038	1.045	1.038	1.034	1.041	<26MHz

Please refer to the plots for normal voltage test.

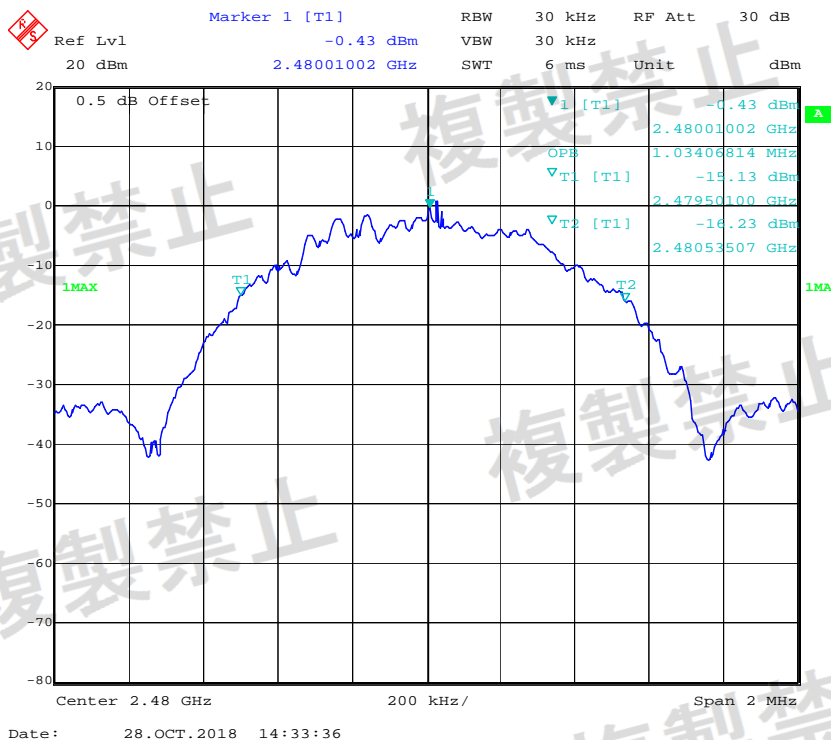
Low Channel



Middle Channel



High Channel



TRANSMITTER SPURIOUS EMISSION STRENGTH AND UNWANTED EMISSION INTENSITY

Limit

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

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 Data**Environmental Conditions**

Temperature:	25.7 °C
Relative Humidity:	34 %
ATM Pressure:	100.7 kPa

The testing was performed by Swim Lv on 2018-10-28.

Test Result: Compliant

Test Mode: Transmitting

Please refer to the below plots

Frequency Band		Low Channel			Middle Channel			High Channel			Limit
		LV	NV	HV	LV	NV	HV	LV	NV	HV	
Raw data	Band I (dBm/100kHz)	-65.08	-65.30	-65.46	-65.93	-66.15	-66.30	-65.31	-65.61	-65.53	-36dBm/ 100kHz
	Band II (dBm/MHz)	-58.77	-58.60	-58.60	-58.84	-59.00	-59.19	-59.29	-59.19	-59.14	-26dBm/ MHz
	Band III (dBm/MHz)	-21.03	-20.70	-20.80	-56.31	-56.57	-56.54	-57.90	-57.93	-58.01	-16dBm/ MHz
	Band IV (dBm/MHz)	-58.81	-58.64	-58.70	-57.65	-57.78	-57.46	-43.65	-43.61	-43.92	-16dBm/ MHz
	Band V (dBm/MHz)	-51.75	-51.42	-51.12	-53.08	-53.32	-53.12	-54.19	-54.13	-54.18	-26dBm/ MHz
Unwanted Emission Intensity	Band I (μW/100kHz)	0.00031	0.00030	0.00028	0.00026	0.00024	0.00023	0.00029	0.00027	0.00028	0.25 μW/100kHz
	Band II (μW/MHz)	0.00133	0.00138	0.00138	0.00131	0.00126	0.00121	0.00118	0.00121	0.00122	2.5 μW/MHz
	Band III (μW/MHz)	7.88860	8.51138	8.31764	0.00234	0.00220	0.00222	0.00162	0.00161	0.00158	25 μW/MHz
	Band IV (μW/MHz)	0.00132	0.00137	0.00135	0.00172	0.00167	0.00179	0.04315	0.04355	0.04055	25 μW/MHz
	Band V (μW/MHz)	0.00668	0.00721	0.00773	0.00492	0.00466	0.00488	0.00381	0.00386	0.00382	2.5 μW/MHz

Note:

Band I: 30MHz~1000MHz

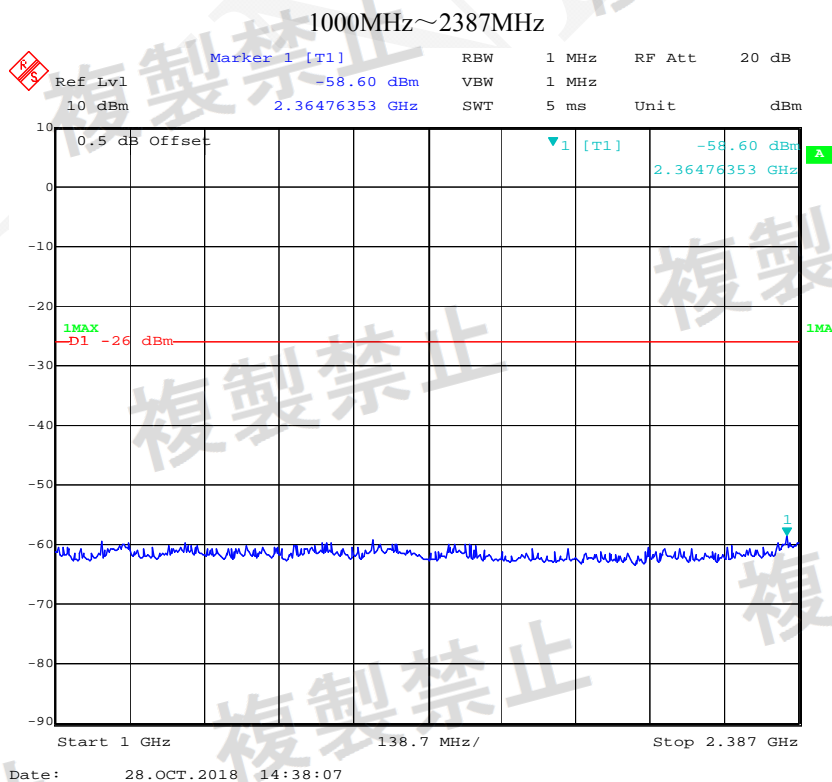
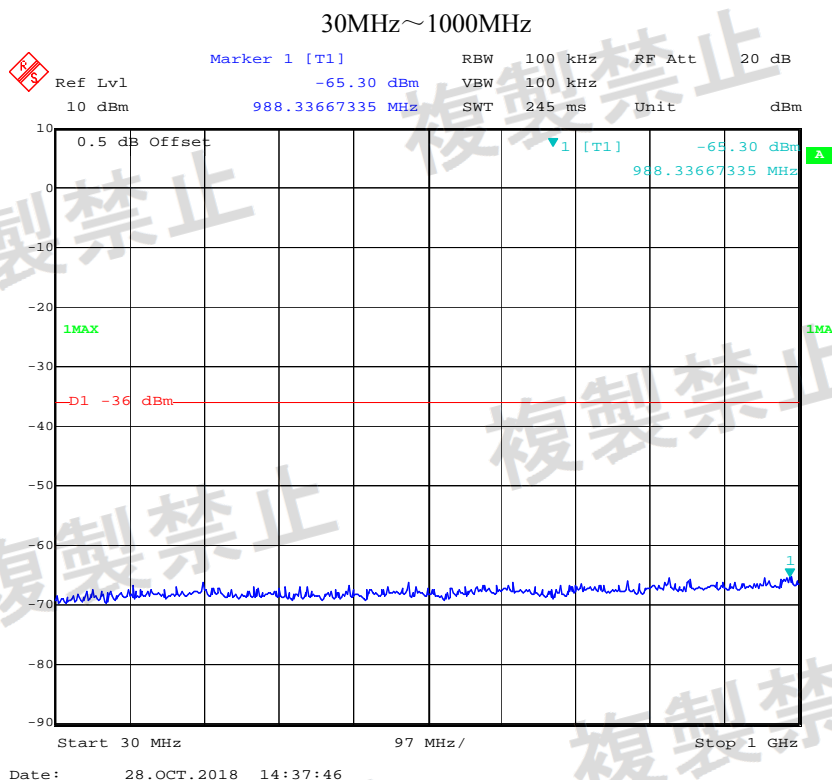
Band II: 1000MHz~2387MHz

Band III: 2387MHz~2400MHz

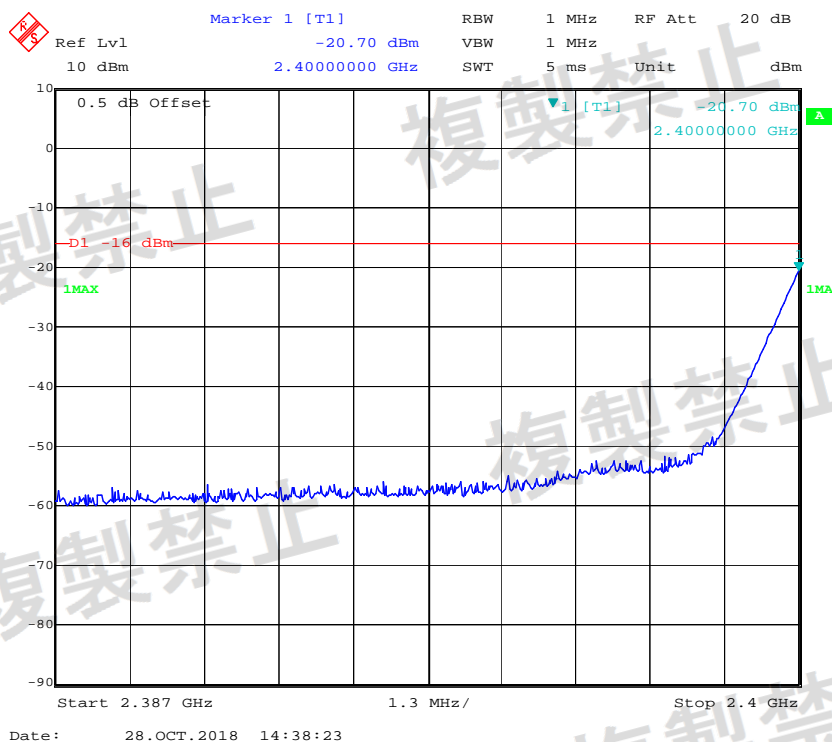
Band IV: 2483.5MHz~2496.5MHz

Band V: 2496.5MHz~12500MHz

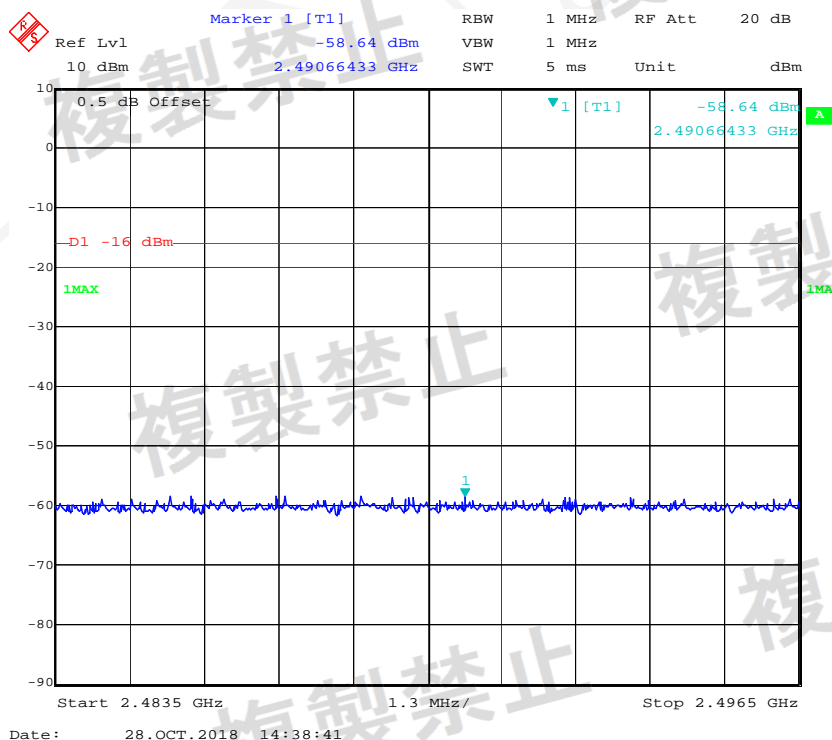
Please refer to the plots for normal voltage test.
Low Channel



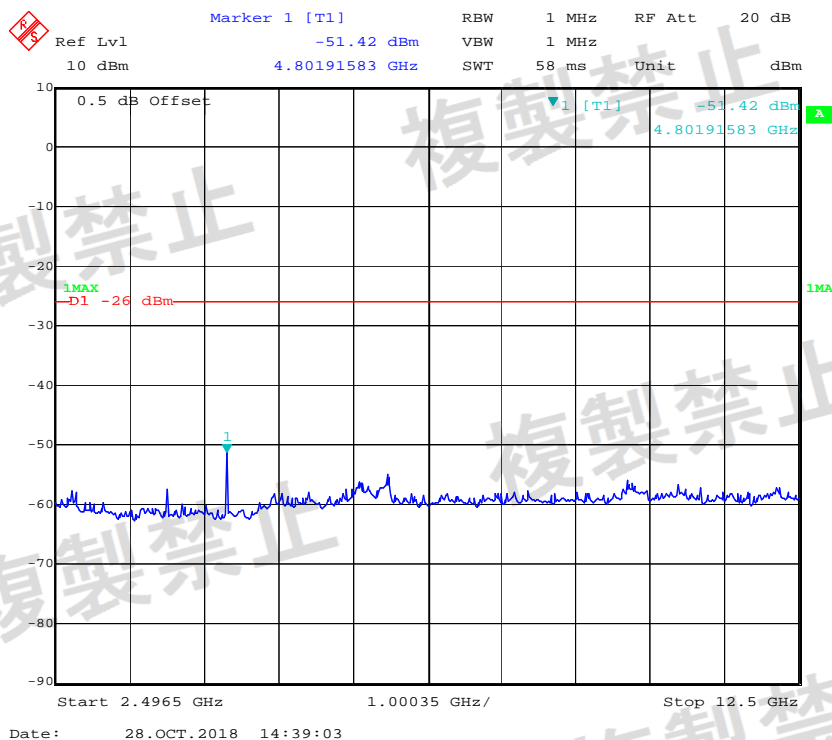
2387MHz~2400MHz



2483.5MHz~2496.5MHz

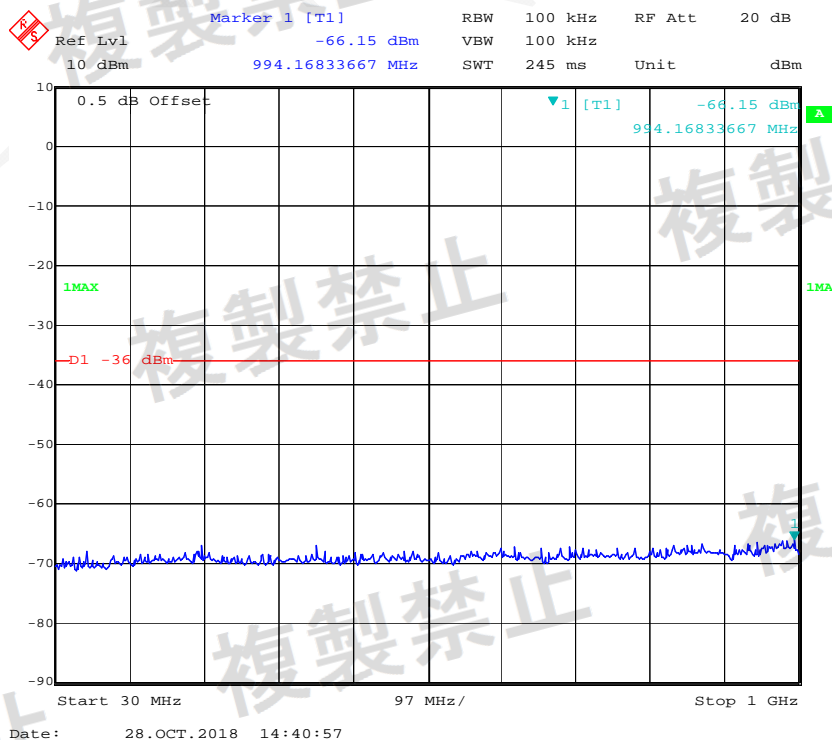


2496.5MHz~12500MHz

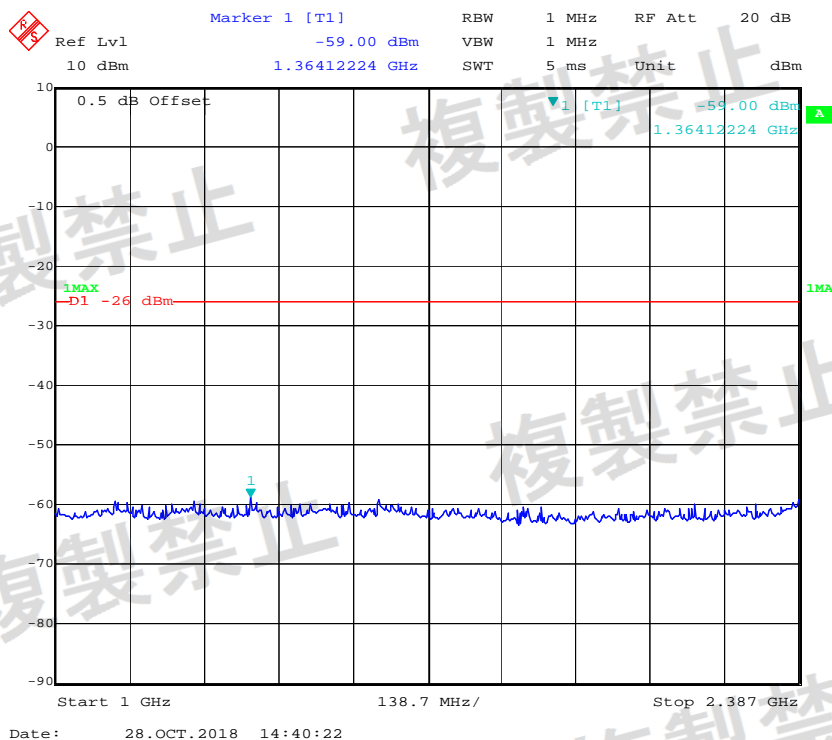


Middle Channel:

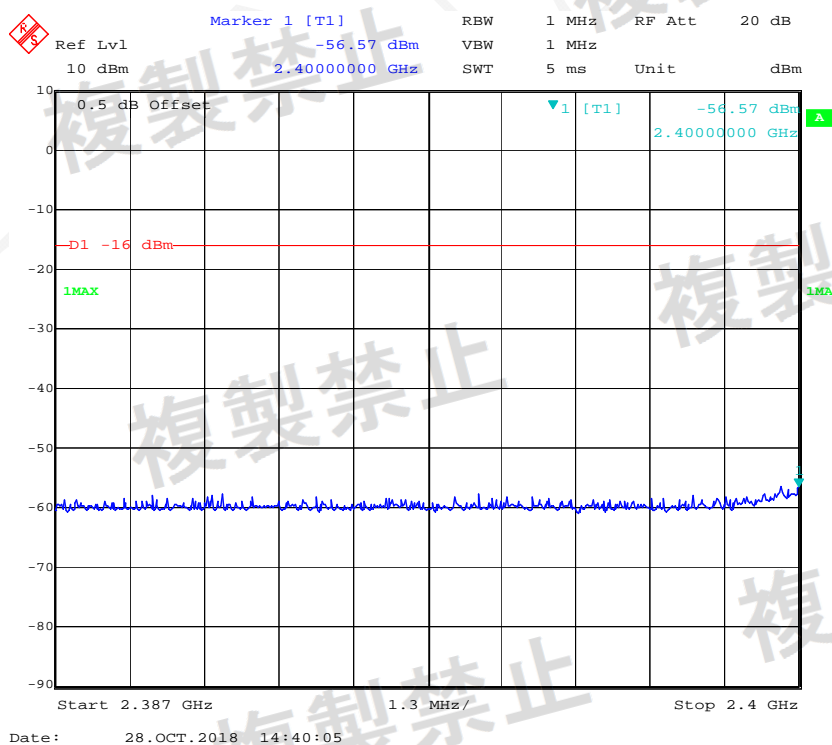
30MHz~1000MHz



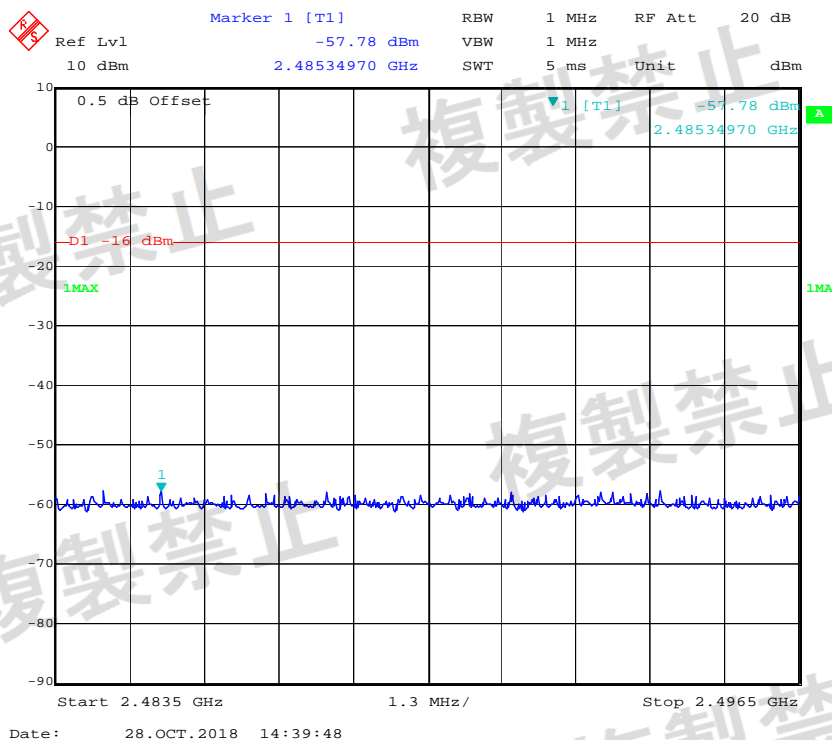
1000MHz~2387MHz



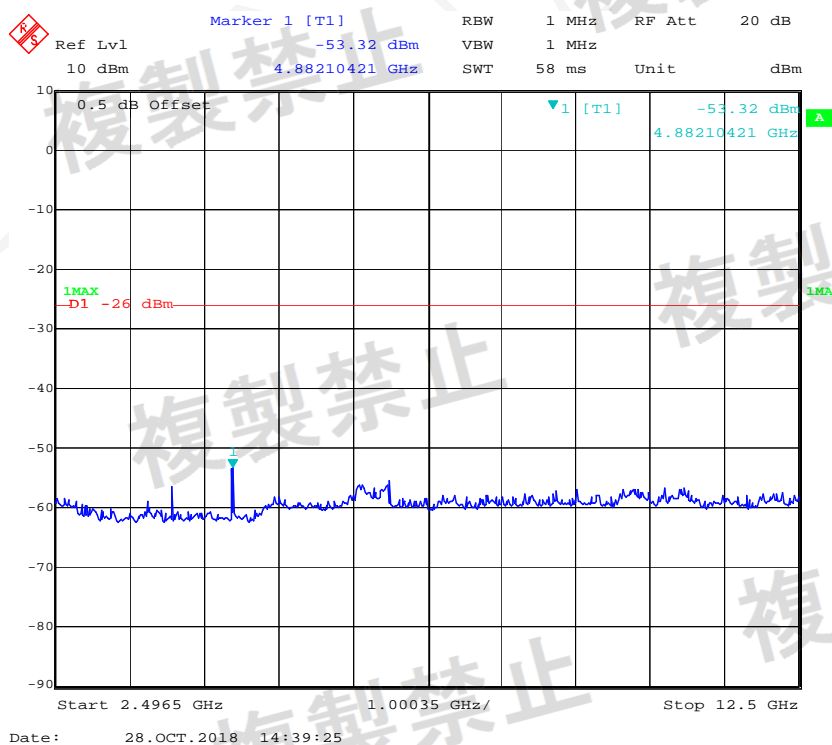
2387MHz~2400MHz



2483.5MHz~2496.5MHz

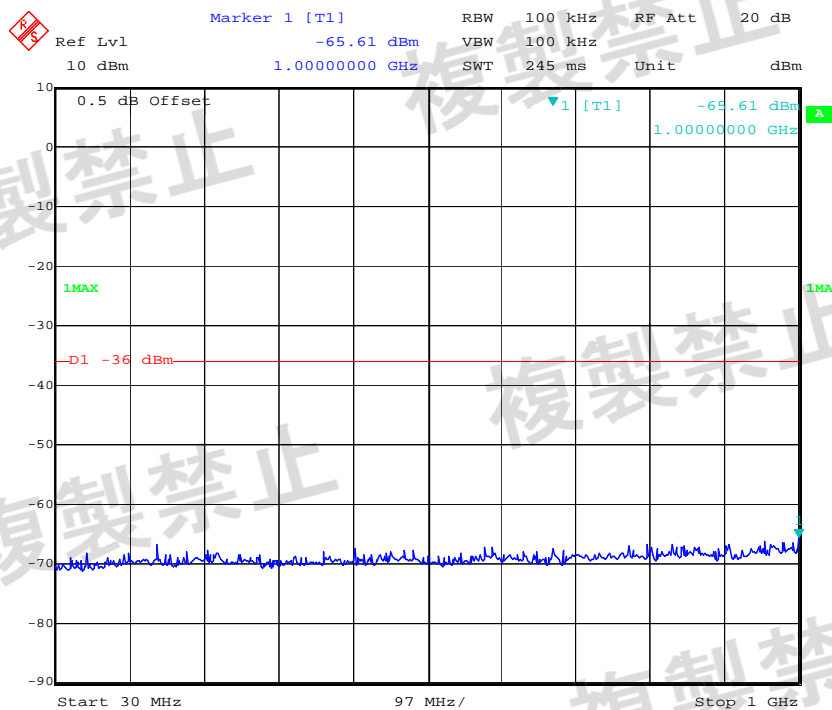


2496.5MHz~12500MHz



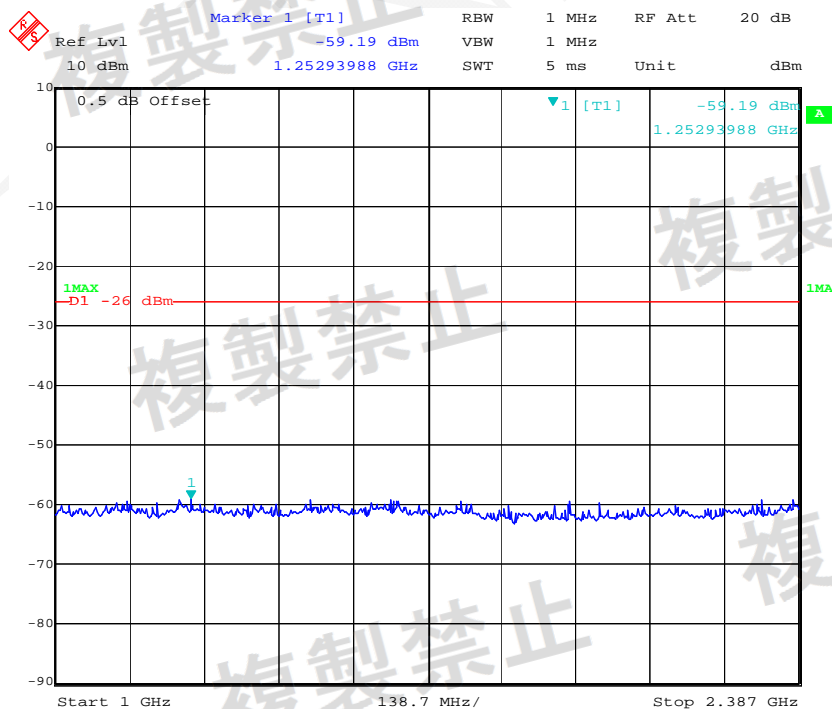
High Channel:

30MHz~1000MHz



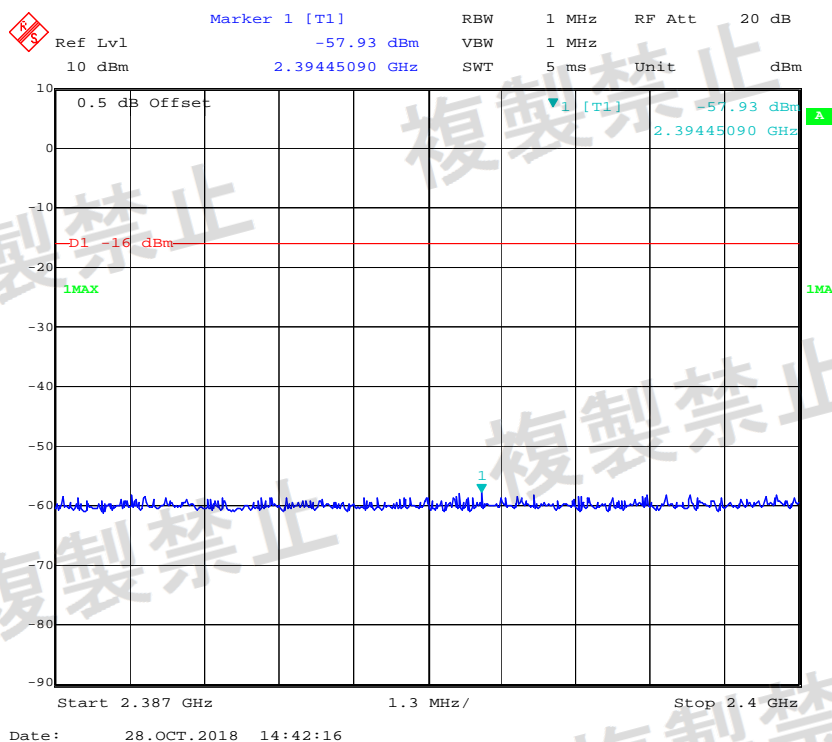
Date: 28.OCT.2018 14:41:25

1000MHz~2387MHz

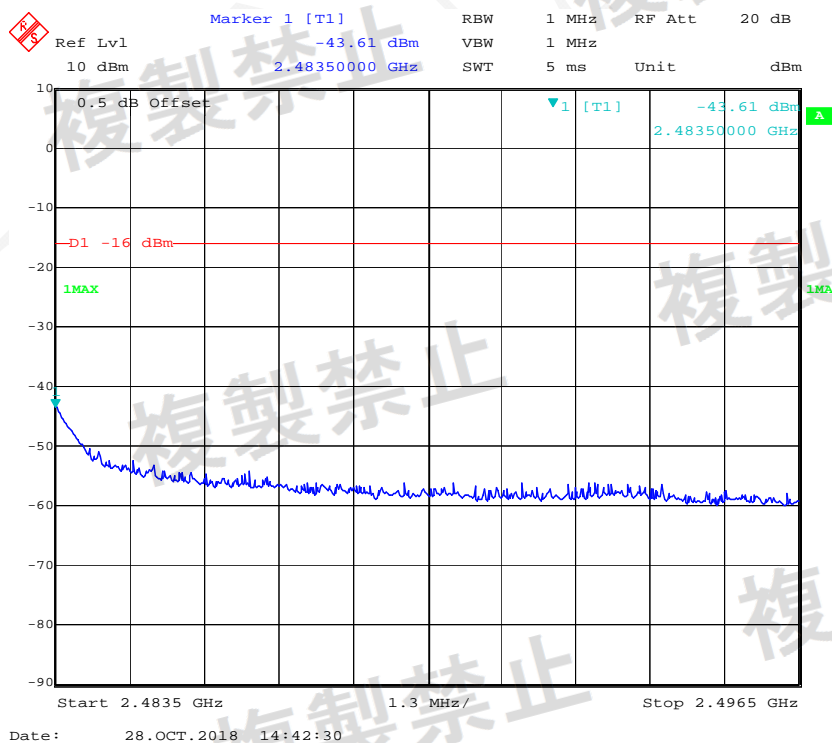


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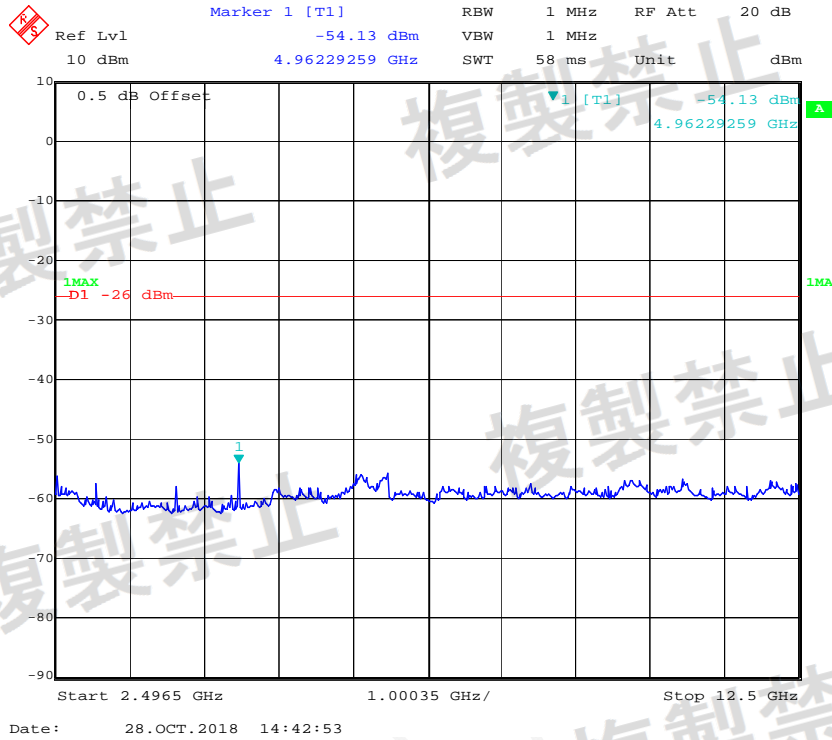
2387MHz~2400MHz



2483.5MHz~2496.5MHz



2496.5MHz~12500MHz



ANTENNA OUTPUT POWER AND ANTENNA POWER TOLERANCE

Limit

Antenna output power:

- $\leq 3 \text{ mW /MHz}$ (FHSS from 2402-2480 MHz)
- $\leq 10 \text{ mW/MHz}$ (OFDM, DSSS from 2400-2483.5 MHz)
- $\leq 10 \text{ mW}$ (other from 2400-2483.5 MHz)

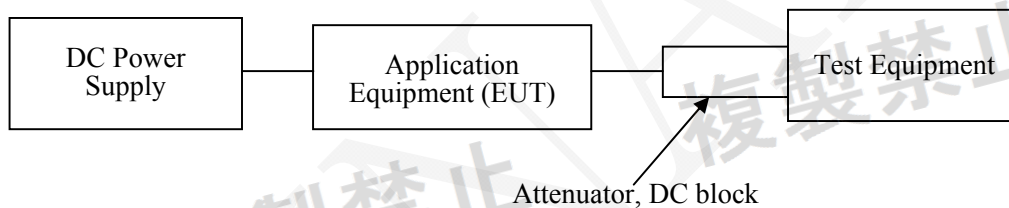
The Output Power Tolerance must be within +20%, -80%.

- $\text{EIRP} \leq 12.14 \text{ dBm}$ (other from 2400-2483.5 MHz)

Test Procedure

Set the EUT Frequency to measure
Detector: Average

Test Setup Block diagram



Test Data**Environmental Conditions**

Temperature:	25.7 °C
Relative Humidity:	34 %
ATM Pressure:	100.7 kPa

The testing was performed by Swim Lv on 2018-10-28.

Test Result: Compliant

Test Mode: Transmitting

Frequency		Low Channel			Middle Channel			High Channel			Limit
Voltage		LV	NV	HV	LV	NV	HV	LV	NV	HV	
Reading	dBm	3.38	3.33	3.42	3.76	3.78	3.85	3.69	3.66	3.72	10dBm
Reading	mW	2.18	2.15	2.20	2.38	2.39	2.43	2.34	2.32	2.36	10mW
Duty Cycle	%	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	87.60	/
Antenna Power	mW	2.49	2.45	2.51	2.72	2.73	2.77	2.67	2.65	2.69	10mW
Antenna power Error	%	-0.40	-2.00	0.40	8.80	9.20	10.80	6.80	6.00	7.60	+20% ~ -80%
EIRP	dBm	7.06	7.00	7.10	7.44	7.46	7.53	7.37	7.33	7.39	12.14dBm

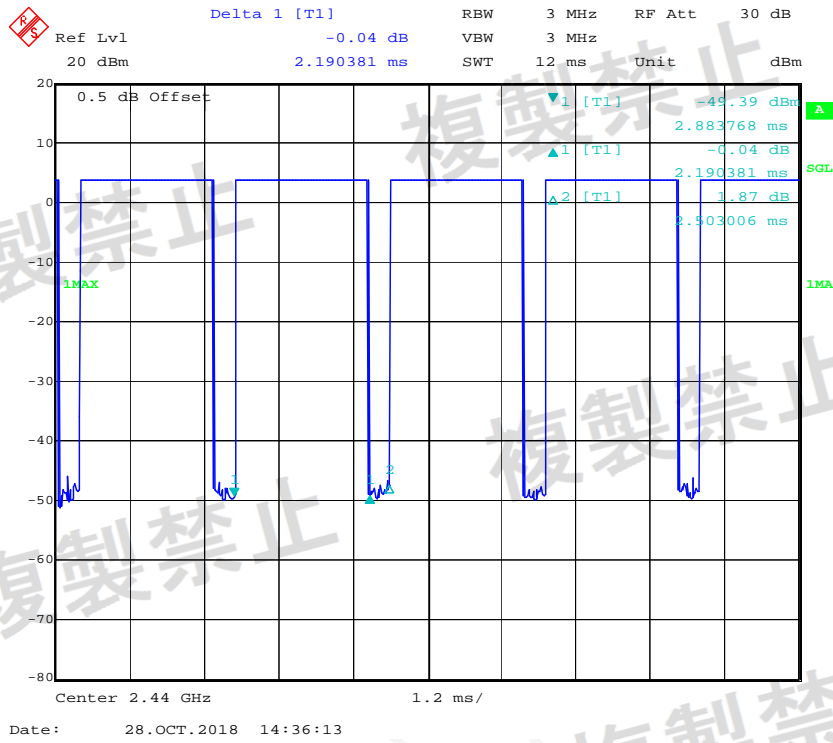
Note 1: the nominal output power is 2.5mW, which was declared by manufacturer.

Note 2: Antenna power = Reading / Duty Cycle.

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

Note 4: Duty Cycle = $2.19/2.50 = 87.60\%$

Duty Cycle



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 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:	25.7°C
Relative Humidity:	34 %
ATM Pressure:	100.7 kPa

The testing was performed by Swim Lv on 2018-10-28.

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

Test Mode: Receiving

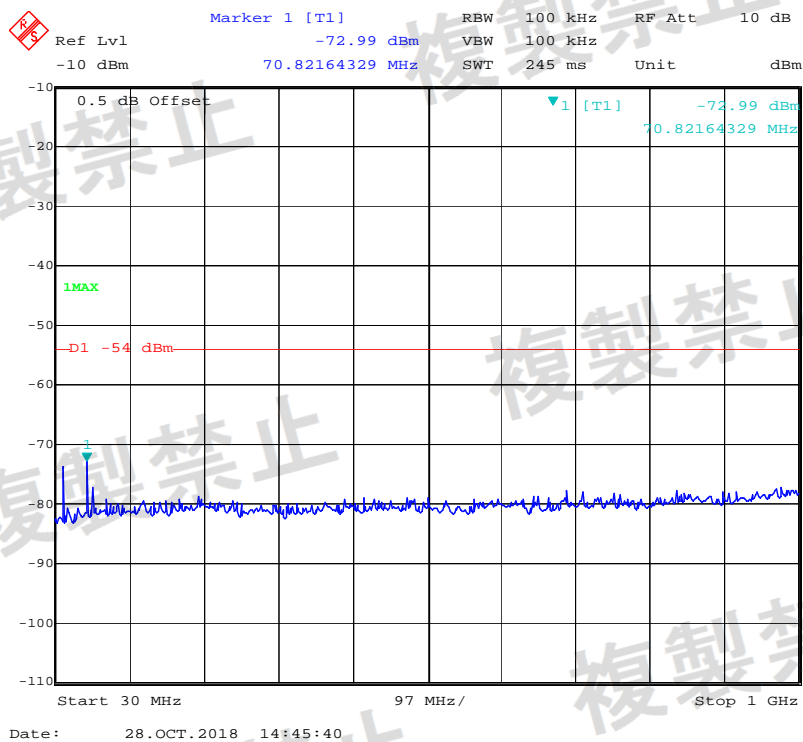
	Frequency band	Low Channel			Middle Channel			High Channel			Limit
		LV	NV	HV	LV	NV	HV	LV	NV	HV	
Raw data (dBm)	Band VI	-72.98	-72.99	-73.27	-72.94	-73.38	-73.23	-73.31	-73.94	-73.06	-54dBm
	Band VII	-58.87	-58.84	-59.00	-58.63	-58.54	-59.02	-59.16	-58.77	-58.56	-47dBm
Unwanted Emission Intensity (nW)	Band VI	0.05035	0.05023	0.04710	0.05082	0.04592	0.04753	0.04667	0.04036	0.04943	4nW
	Band VII	1.29718	1.30617	1.25893	1.37088	1.39959	1.25314	1.21339	1.32739	1.39316	20nW

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

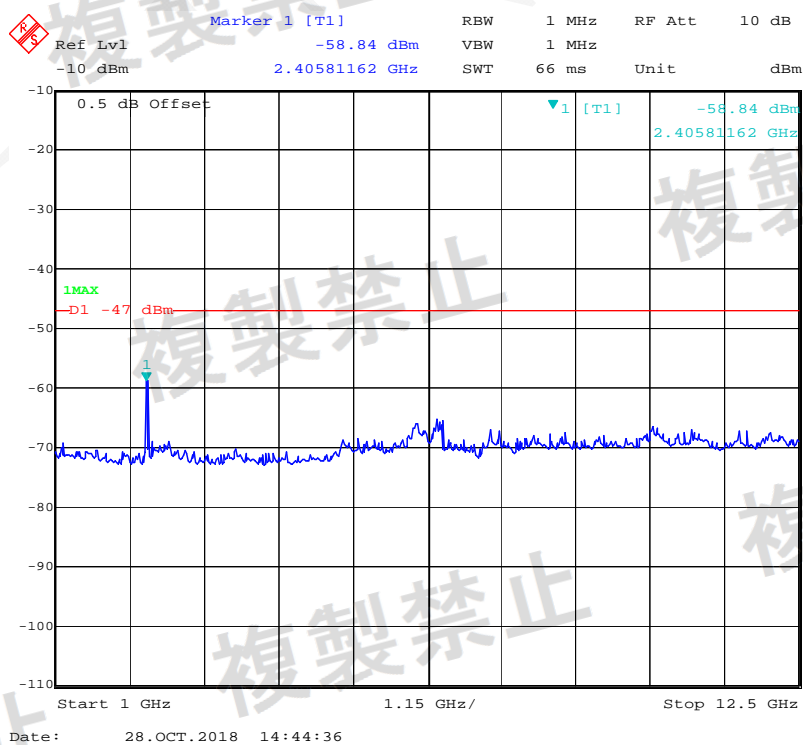
Please refer to the plots for normal voltage test.

Low Channel

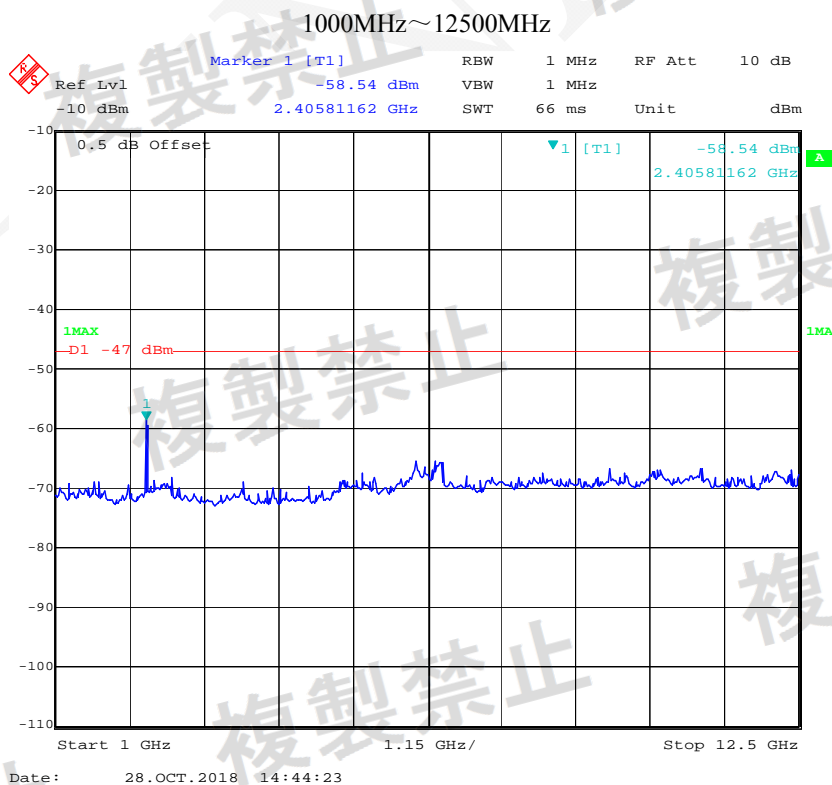
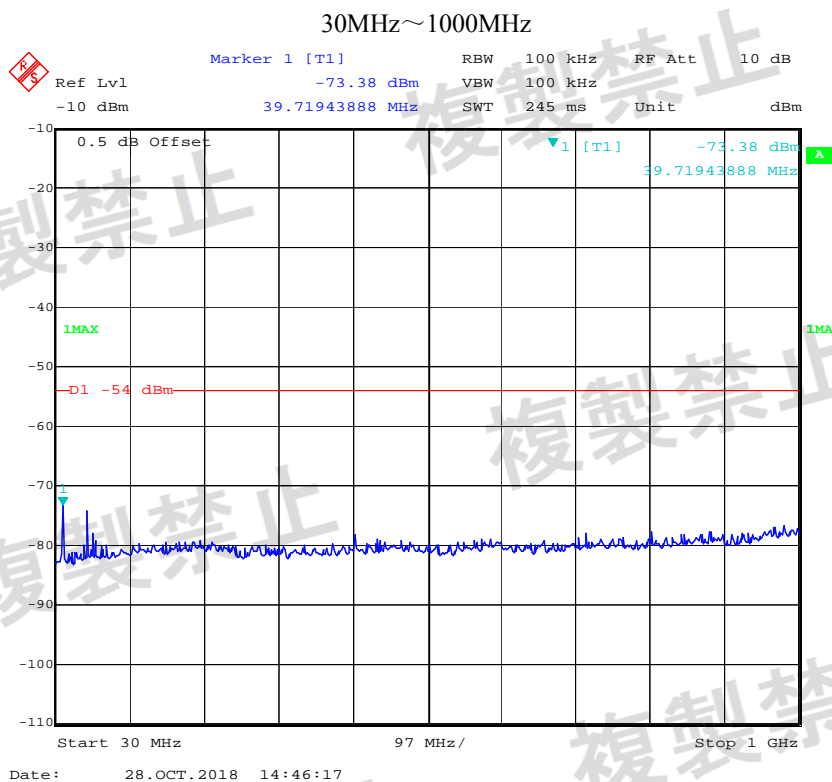
30MHz~1000MHz



1000MHz~12500MHz

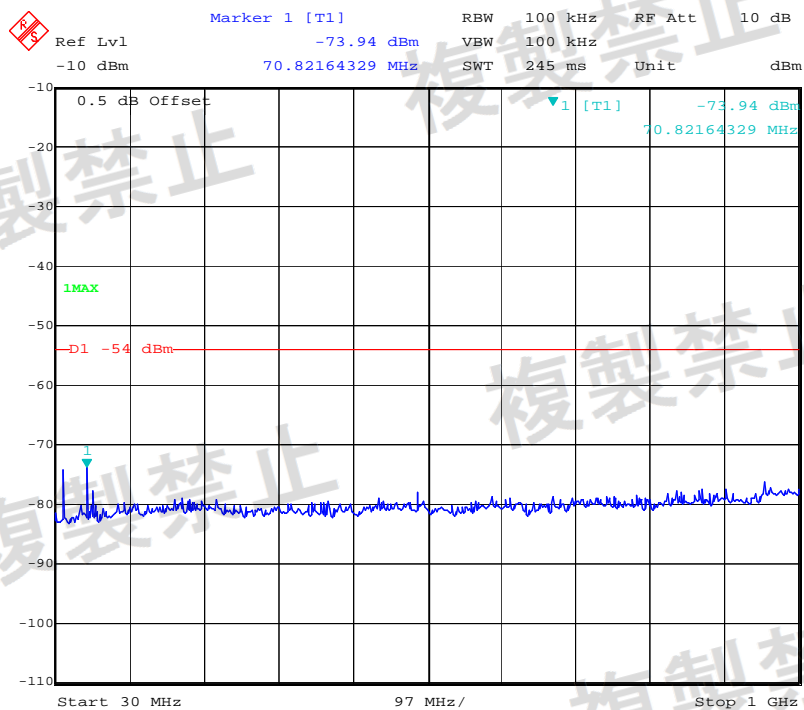


Middle Channel:



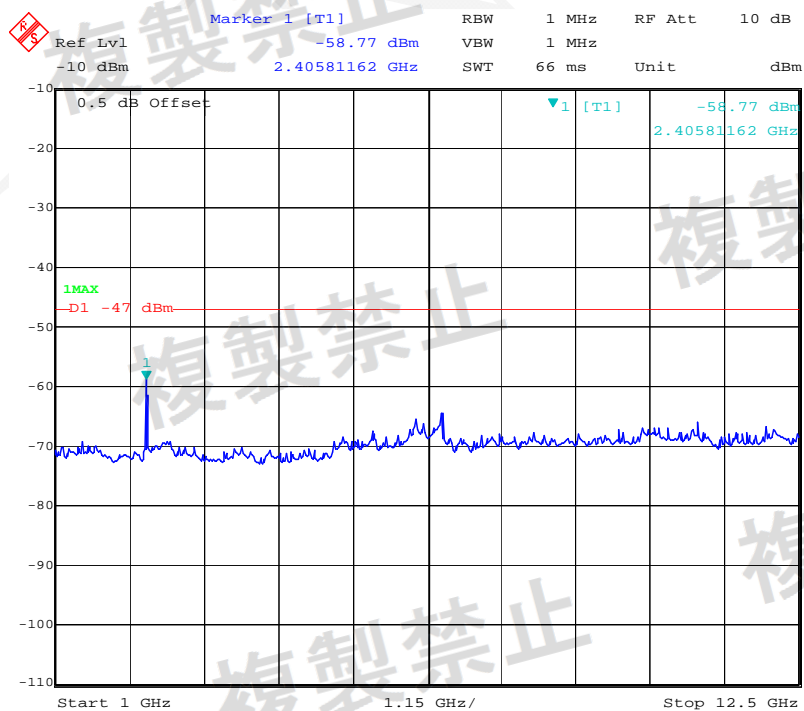
High Channel:

30MHz~1000MHz



Date: 28.OCT.2018 14:48:09

1000MHz~12500MHz



Date: 28.OCT.2018 14:44:03

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:	25.7 °C
Relative Humidity:	34 %
ATM Pressure:	100.7 kPa

The testing was performed by Swim Lv on 2018-10-28.

Test Result: Good

CONSTRUCTION PROTECTION CONFIRMATION

Limit

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

Confirmation Method

The EUT was locked by super glue, so the EUT cannot be opened easily. Please refer the photo below.



****END OF REPORT****