

TEST REPORT

Report number : KR18-SRT0012

Issue date : 2018-04-05

Applicant : SELVAS Healthcare, Inc.
174 Gajung-ro, Yuseong-gu Daejeon South Kor
TEL : +82 42 864 4460
FAX : +82 42 864 4462

Equipment under test (EUT) : BrailleSense Polaris

Model name : H532B

Date of test : 2018-02-20 ~ 2018-02-22

Test place : KCTL Inc.
65 Sinwon-ro, Yeongtong-gu, Suwon-si,
Gyeonggi-do, Korea

Test results : PASS

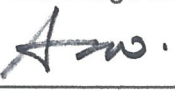
The results in this report are applicable only to the equipment tested.

This report shall not be re-produced except in full without the written approval of **KCTL Inc.**

Tested by;


Eui Jung.Kim

Approved by;


Seung Yong.Kim

1. Summary of Test

1. Purpose of test

Ordinance on Technical Standards Conformity Certification of Specified Radio Equipment

2.4GHz Band wide band low power data communication System

2. Standards

Certification Ordinance Article 2 Clause 1 Item19

1) Test Methods

Ministry of Internal Affairs and Communications Notification Article 88 Appendix 43

2) Deviation from standards

None

3. List of applied test to the EUT

Article 88 Appendix 43	Classification of EUT	Condition	Result
3	Frequency Tolerance	Conducted	PASS
4	Occupied Bandwidth	Conducted	PASS
5	Unwanted (Spurious) Emission Strength	Conducted	PASS
6	RF Output Power Tolerance	Conducted	PASS
7	Secondary Emitted Radio Wave Strength	Conducted	PASS
8	Carrier Sensing Function	Conducted	N/A
12	Interference Prevention Function	Conducted	PASS

1) Test set up

Table-Top

2) Modification to the EUT by laboratory

None

1. Test Information

1. Applicant

SELVAS Healthcare, Inc.
174 Gajung-ro, Yuseong-gu Daejeon South Korea

2. Equipment under test BrailleSense Polaris

3. Model number H532B

4. Serial number None

5. Size (W) 245 mm x (D) 144 mm x (H) 25.5 mm

6. Terminal limitation -20°C to 60°C

7. RF Specification Frequency range IEEE802.11b/g/n (HT20) : 2412 - 2472 MHz IEEE802.11n (HT40) : 2422 - 2462 MHz

8. Number of RF Channels IEEE802.11b/g/n (HT20) : 13 Ch IEEE802.11n (HT40) : 9 Ch

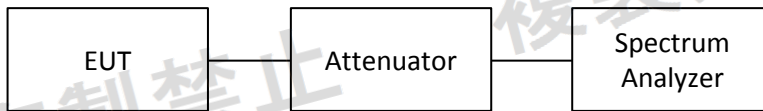
9. Modulation method IEEE802.11b: DSSS (DBPSK, DQPSK, CCK) IEEE802.11g / n (HT20,40) : OFDM (BPSK, QPSK, 16QAM, 64QAM)

10. Data rate IEEE802.11b: 1, 2, 5.5, 11Mbps IEEE802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps IEEE802.11n (HT20,40 LGI): 6.5, 13, 19.5, 26, 39, 52, 58.5, 65Mbps IEEE802.11n (HT20,40 SGI): 7.2, 14.4, 21.7, 28.9, 43.3, 57.8, 65, 72.2Mbps

11. Variation of the family model(s) None

2. Configuration of equipment

1. Frequency tolerance, RF output power tolerance, Occupied Bandwidth, Interference Prevention Function, Unwanted(Spurious) emission strength, Secondary emitted radio wave strength



3. Test results (Rated voltage)

S/N : N/A

Environment of test room	Date of test	2018-02-20	2018-02-21	2018-02-22
	Temperature	24 °C	23 °C	25 °C
	Humidity	51 %	50 %	53 %

Test category	IEEE802.11g	
Peak Antenna Gain	2.35	dBi
Declaration Output Power	1.000	mW/MHz
Declaration Output Power	0.00	dBm/MHz
E.I.R.P.	2.35	dBm/MHz
Input Power Voltage	5.00	VDC

Test category	IEEE802.11g	
Tested Circuit Insertion Loss	0	dB
Frequency equal to the Transmission rate	-	MHz
Transmission Time	ON TIME (1sec or less)	1.4093 ms
	OFF TIME (0.1sec or more)	0.7774 ms
	Ratio	0.6445 %
Packet Type (Mode)	Not Applicable	mode
Transmit Speed	Not Applicable	MHz

Using TDF and offset function in Spectrum Analyzer.
Measurement of plots are included Loss value.

(Att : 10dB + Cable loss + EUT cable: 0.5dB offset)

Test category :	2.4GHz Band Low-Power Data Communication System (IEEE802.11g)
The reason why the tests are performed only at rated voltage :	

Measurement Frequency	MHz	2412	2442	2472	Result	Limit	Note
Channel Number	Ch.	1	7	13	---	---	
Frequency Measurements	MHz	2411.982341	2441.982238	2471.981825	---	---	
Frequency Tolerance	ppm	-7.32131	-7.27355	-7.35235	PASS	±50×10 ⁻⁶ (50ppm)	
Occupied Bandwidth	MHz	16.98301698	16.98301698	16.98301698	PASS	26MHz or below	
RF Output Power	mW/MHz	0.744365	0.896986	0.812430	PASS	10mW/MHz or below	
RF Output Power Tolerance	%	-25.563533	-10.301382	-18.757037	PASS	+20 to -80%	
Unwanted (Spurious) Emission Strength (1-13ch)	30 to 2387MHz	uW/MHz	0.130317	0.004645	0.003936	PASS	2.5uW/MHz or below
		MHz	2385.800	2352.900	2352.900	----	
	2387 to 2400MHz	uW/MHz	15.452544	0.026853	0.009016	PASS	25uW/MHz or below
		MHz	2398.942	2399.669	2399.201	----	
	2483.5 to 2496.5MHz	uW/MHz	0.010186	0.040738	8.165824	PASS	25uW/MHz or below
		MHz	2485.779	2483.727	2483.610	----	
	2496.5 to 12750MHz	uW/MHz	0.006792	0.008222	0.346737	PASS	2.5uW/MHz or below
		MHz	6718.500	5798.500	2503.500	----	
Secondary Emitted Radio Wave Strength	30 to 1000MHz	nW	0.280543	0.277971	0.289068	PASS	4nW or below
		MHz	519.850	519.850	519.850	----	
	1000 to 10000MHz	nW	0.937562	1.035142	1.109175	PASS	20nW or below
		MHz	5958.500	6147.400	5985.500	----	
	10000 to 12750MHz	nW	1.004616	0.984011	0.918333	PASS	20nW or below
		MHz	12570.100	12699.200	12627.700	----	
Interference Prevention Function	Good				PASS		
Transmitting antenna absolute gain	-				----	*1	
Angular width of the main radiation of the transmitting antenna	-				----	*1	

*1 Measurement only if the E.I.R.P. exceeds 12.14dBm/MHz

3. Test results (-10 % voltage)

S/N : N/A

Environment of test room	Date of test	2018-02-20	2018-02-21	2018-02-22
	Temperature	24 °C	23 °C	25 °C
	Humidity	51 %	50 %	53 %

Test category	IEEE802.11g	
Peak Antenna Gain	2.35	dBi
Declaration Output Power	1.000	mW/MHz
Declaration Output Power	0.00	dBm/MHz
E.I.R.P.	2.35	dBm/MHz
Input Power Voltage	4.50	VDC

Test category	IEEE802.11g	
Tested Circuit Insertion Loss	0	dB
Frequency equal to the Transmission rate	-	MHz
Transmission Time	ON TIME (1sec or less)	1.4093 ms
	OFF TIME (0.1sec or more)	0.7774 ms
	Ratio	0.6445 %
Packet Type (Mode)	Not Applicable	mode
Transmit Speed	Not Applicable	MHz

Using TDF and offset function in Spectrum Analyzer.
Measurement of plots are included Loss value.

(Att : 10dB + Cable loss + EUT cable: 0.5dB offset)

Test category :	2.4GHz Band Low-Power Data Communication System (IEEE802.11g)
The reason why the tests are performed only at rated voltage :	

Measurement Frequency		MHz	2412	2442	2472	Result	Limit	Note
Channel Number		Ch.	1	7	13	---	---	
Frequency Measurements		MHz	2411.982317	2441.982171	2471.981815	---	---	
Frequency Tolerance		ppm	-7.33126	-7.30098	-7.35639	PASS	±50×10 ⁻⁶ (50ppm)	
Occupied Bandwidth		MHz	16.98301698	16.98301698	16.98301698	PASS	26MHz or below	
RF Output Power		mW/MHz	0.732463	0.876568	0.799440	PASS	10mW/MHz or below	
RF Output Power Tolerance		%	-26.753690	-12.343172	-20.056022		+20 to -80%	
Unwanted (Spurious) Emission Strength (1-13ch)	30 to 2387MHz	uW/MHz	0.145546	0.004436	0.003436	PASS	2.5uW/MHz or below	
		MHz	2385.800	2275.200	2235.100	----		
	2387 to 2400MHz	uW/MHz	16.557700	0.027669	0.008279	PASS	25uW/MHz or below	
		MHz	2398.968	2397.994	2399.448	----		
	2483.5 to 2496.5MHz	uW/MHz	0.008241	0.041783	7.925013	PASS	25uW/MHz or below	
		MHz	2484.597	2484.325	2483.519	----		
	2496.5 to 12750MHz	uW/MHz	0.008110	0.007980	0.254683	PASS	2.5uW/MHz or below	
		MHz	5263.500	6821.500	2503.500	----		
Secondary Emitted Radio Wave Strength	30 to 1000MHz	nW	0.246037	0.262422	0.258226	PASS	4nW or below	
		MHz	519.850	519.850	519.850	----		
	1000 to 10000MHz	nW	1.230269	1.081434	1.127197	PASS	20nW or below	
		MHz	6965.500	5482.000	6956.500	----		
	10000 to 12750MHz	nW	0.944061	0.853100	1.030386	PASS	20nW or below	
		MHz	12693.700	12693.700	12737.600	----		
Interference Prevention Function			Good			PASS		
Transmitting antenna absolute gain			-			----	*1	
Angular width of the main radiation of the transmitting antenna			-			----	*1	

*1 Measurement only if the E.I.R.P. exceeds 12.14dBm/MHz

3. Test results (+10 % voltage)

S/N : N/A

Environment of test room	Date of test	2018-02-20	2018-02-21	2018-02-22
	Temperature	24 °C	23 °C	25 °C
	Humidity	51 %	50 %	53 %

Test category	IEEE802.11g	
Peak Antenna Gain	2.35	dBi
Declaration Output Power	1.000	mW/MHz
Declaration Output Power	0.00	dBm/MHz
E.I.R.P.	2.35	dBm/MHz
Input Power Voltage	5.50	VDC

Test category	IEEE802.11g	
Tested Circuit Insertion Loss	0	dB
Frequency equal to the Transmission rate	-	MHz
Transmission Time	ON TIME (1sec or less)	1.4093 ms
	OFF TIME (0.1sec or more)	0.7774 ms
	Ratio	0.6445 %
Packet Type (Mode)	Not Applicable	mode
Transmit Speed	Not Applicable	MHz

Using TDF and offset function in Spectrum Analyzer.
Measurement of plots are included Loss value.

(Att : 10dB + Cable loss + EUT cable: 0.5dB offset)

Test category :	2.4GHz Band Low-Power Data Communication System (IEEE802.11g)
The reason why the tests are performed only at rated voltage :	

Measurement Frequency	MHz	2412	2442	2472	Result	Limit	Note
Channel Number	Ch.	1	7	13	---	---	
Frequency Measurements	MHz	2411.982307	2441.982137	2471.981806	---	---	
Frequency Tolerance	ppm	-7.33541	-7.31491	-7.36003	PASS	±50×10 ⁻⁶ (50ppm)	
Occupied Bandwidth	MHz	16.98301698	16.98301698	16.98301698	PASS	26MHz or below	
RF Output Power	mW/MHz	0.752984	0.894923	0.808697	PASS	10mW/MHz or below	
RF Output Power Tolerance	%	-24.701599	-10.507683	-19.130315	PASS	+20 to -80%	
Unwanted (Spurious) Emission Strength (1-13ch)	30 to 2387MHz	uW/MHz	0.072444	0.004742	0.003954	PASS	2.5uW/MHz or below
		MHz	2385.800	2369.300	2294.000	----	
	2387 to 2400MHz	uW/MHz	16.481624	0.026853	0.007499	PASS	25uW/MHz or below
		MHz	2398.968	2399.058	2399.838	----	
	2483.5 to 2496.5MHz	uW/MHz	0.007852	0.040551	8.072350	PASS	25uW/MHz or below
		MHz	2484.286	2484.117	2483.584	----	
	2496.5 to 12750MHz	uW/MHz	0.007362	0.007261	0.331131	PASS	2.5uW/MHz or below
		MHz	6658.500	6970.500	2503.500	----	
Secondary Emitted Radio Wave Strength	30 to 1000MHz	nW	0.301301	0.277971	0.276694	PASS	4nW or below
		MHz	519.850	519.850	519.850	----	
	1000 to 10000MHz	nW	0.928966	1.081434	1.327394	PASS	20nW or below
		MHz	5949.600	6992.500	6947.600	----	
	10000 to 12750MHz	nW	0.859014	0.857038	0.933254	PASS	20nW or below
		MHz	12556.300	12721.200	12743.100	----	
Interference Prevention Function	Good				PASS		
Transmitting antenna absolute gain	-				----	*1	
Angular width of the main radiation of the transmitting antenna	-				----	*1	

*1 Measurement only if the E.I.R.P. exceeds 12.14dBm/MHz

4. Measurement equipment list

[illegible]

Note1: "X" は使用した測定機器です。
"X" used equipment.

Note2: 較正期限は、較正を行った日の翌月から起算して1年以内です。
The validity of measurement equipment is one year from the first day of the following month of the calibration date.

Note3: 較正方法 ... Cal.Method ...

イ): 国立研究開発法人情報通信研究機構 (NICT) (以下「機構」という。)又は第百二条の十八第一項の指定較正機関 (TELEC, インターテックジャパン、キーサイト) が行う較正

a): Calibration conducted by the National Institute of Information and Communications Technology ~ NICT ~ or a designated calibration agency under Article 102-18 paragraph (1) ~ TELECOM Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc ~.

ロ): 計量法 (平成四年法律第五十一号) 第百三十五条 又は第百四十四条 の規定に基づく校正 (JCSS校正)

b): Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992) ~ Japan Calibration Service System ~

ハ): 外国において行う較正であつて、機構又は第百二条の十八第一項の指定較正機関 (TELEC, インターテックジャパン、キーサイト) が行う較正に相当するもの

c): Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1) ~ TELECOM Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc ~.

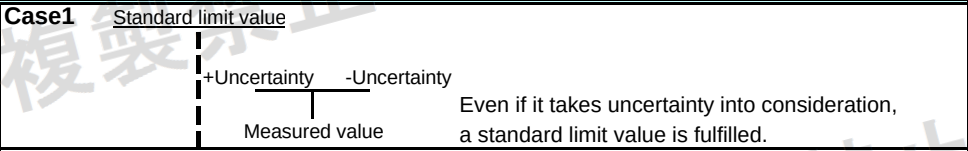
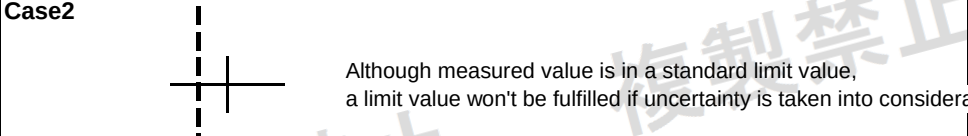
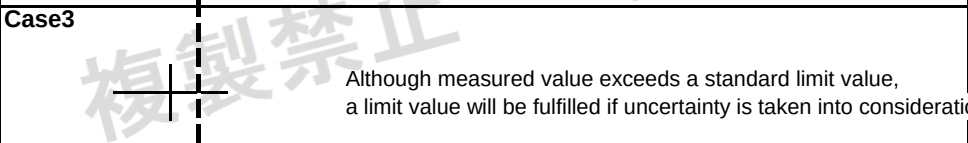
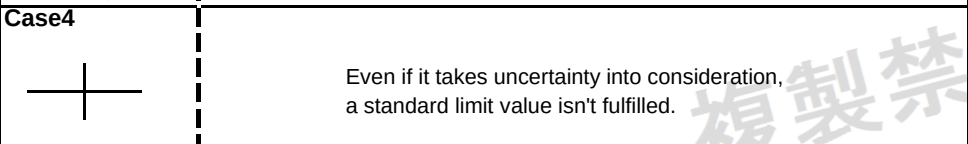
ニ): イからハまでのいずれかに掲げる較正等を受けたものを用いて行う較正等

d): Calibration conducted by using other equipment that listed above from a) to c)

5. Uncertainty

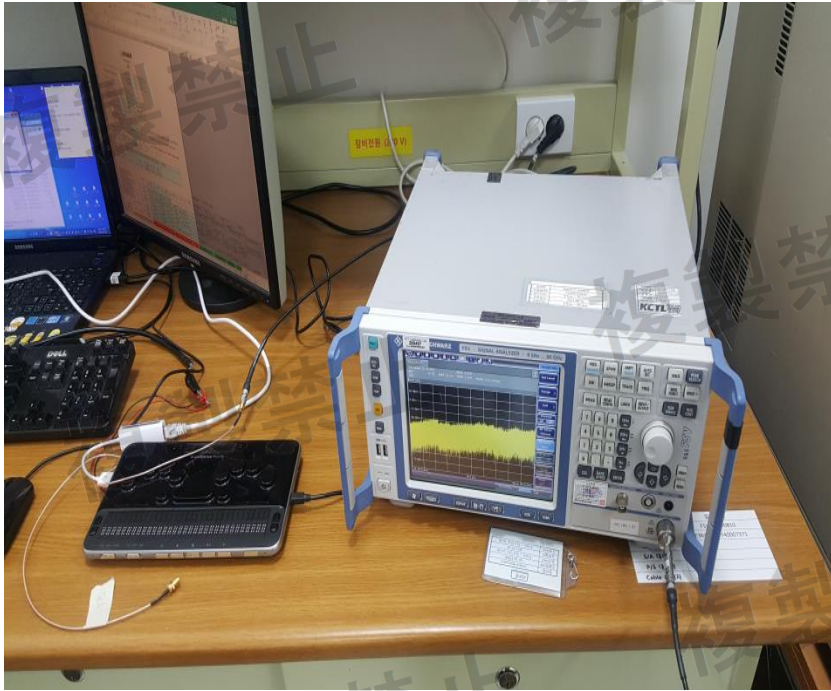
About uncertainty of measured value

Parameter	Uncertainty
Total RF power conducted	$\pm 1.44\text{dB}$
Spurious emissions conducted	$\pm 1.53\text{dB}$
Temperature	$\pm 2^\circ\text{C}$
Humidity	$\pm 0.1\%$

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

6. Photographs

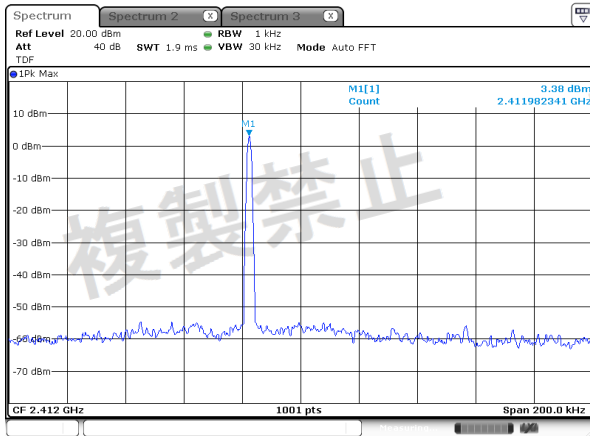
Conducted Measurement Photo



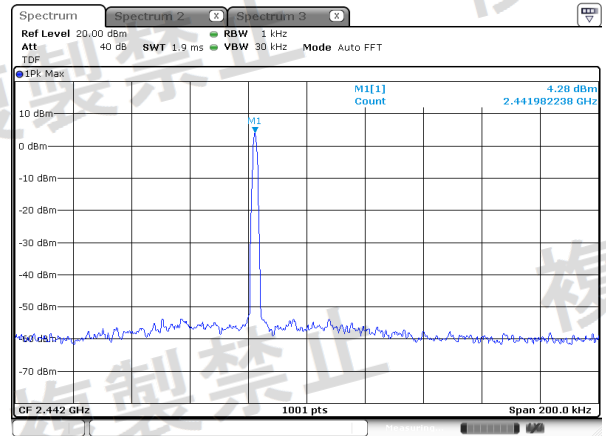
7. Test chart

7.1 Frequency tolerance (Rated voltage)

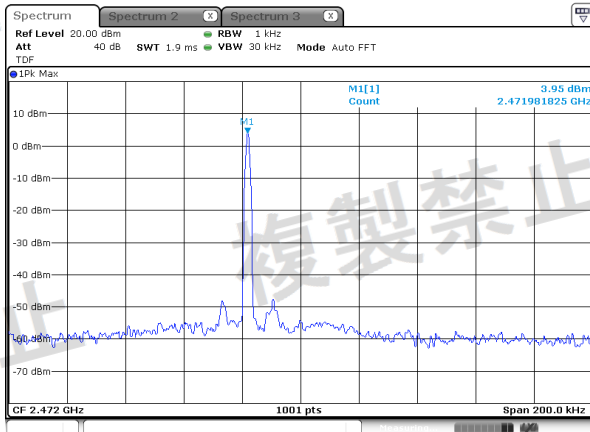
Ch.1: 2412MHz



Ch.7: 2442MHz



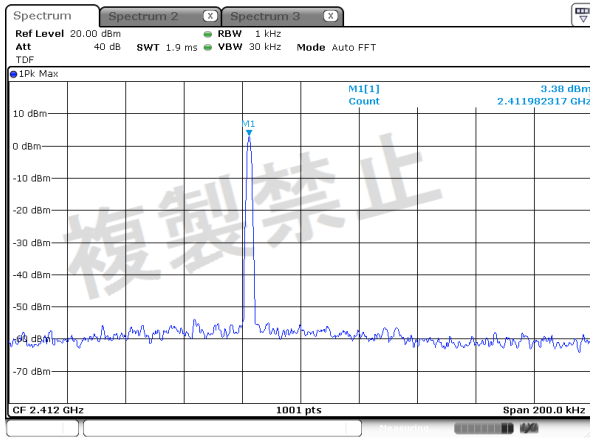
Ch.13: 2472MHz



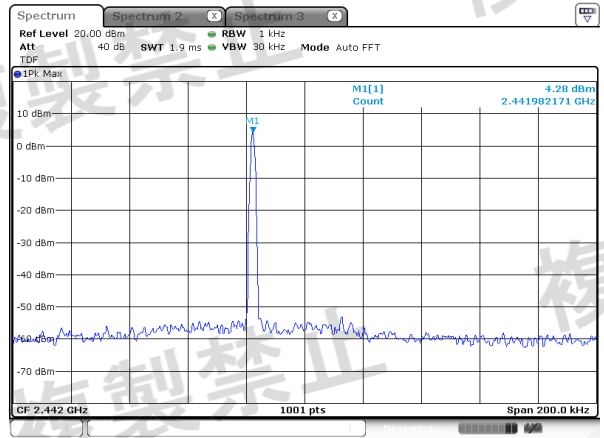
7. Test chart

7.1 Frequency tolerance (-10% voltage)

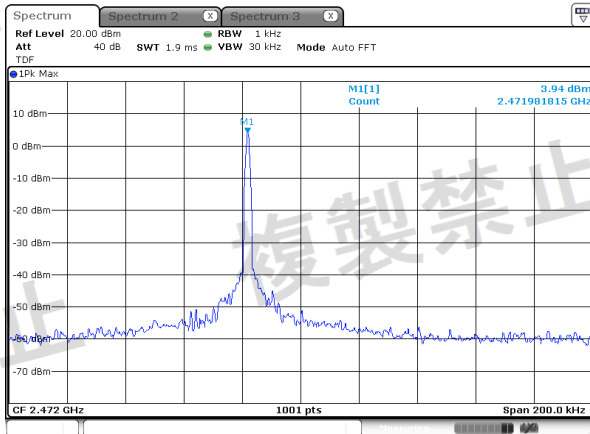
Ch.1: 2412MHz



Ch.7: 2442MHz



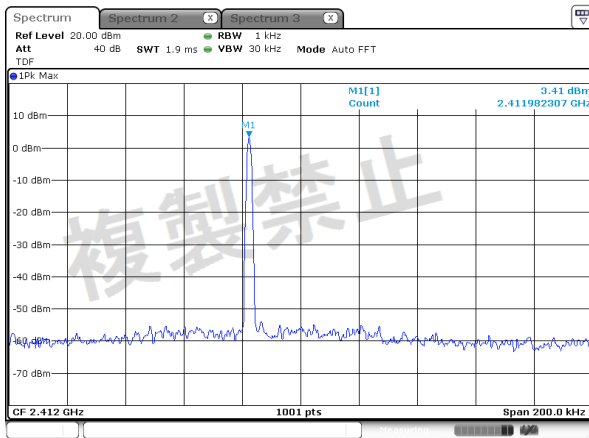
Ch.13: 2472MHz



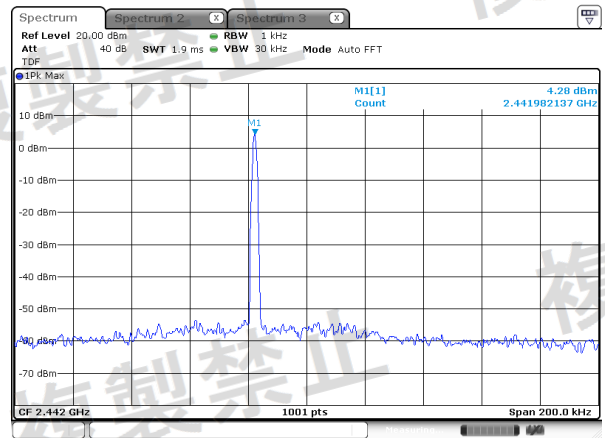
7. Test chart

7.1 Frequency tolerance (+10% voltage)

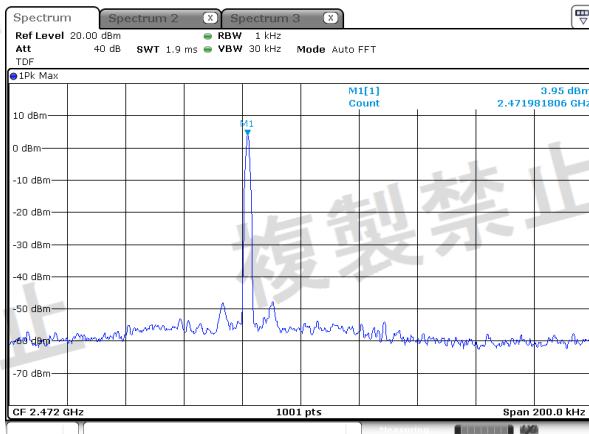
Ch.1: 2412MHz



Ch.7: 2442MHz



Ch.13: 2472MHz

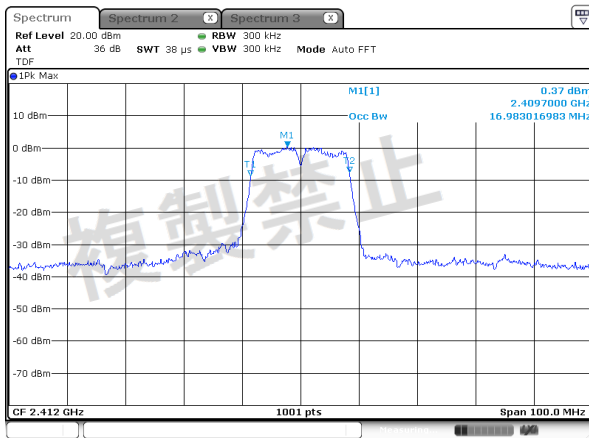


7. Test chart

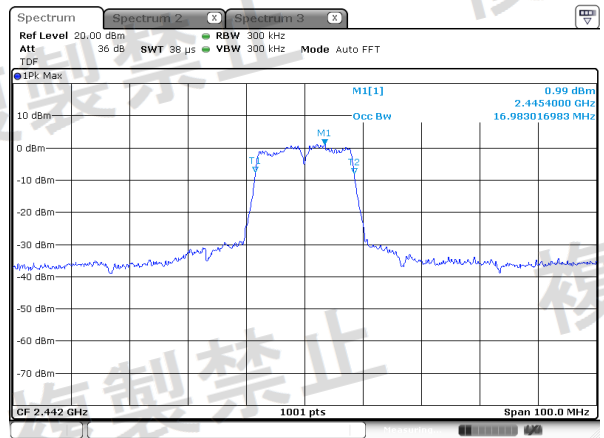
7.2 Occupied bandwidth / Spread bandwidth (Rated voltage)

Occupied bandwidth

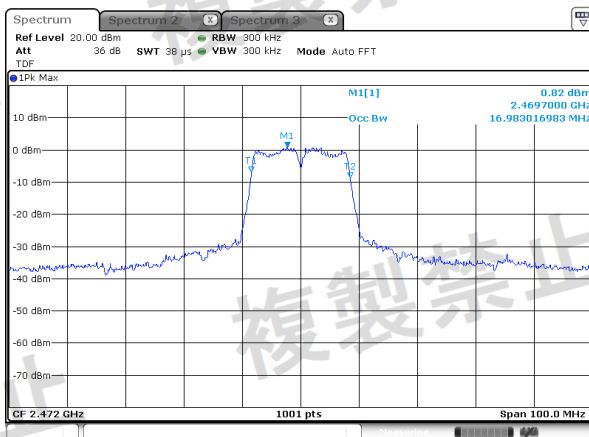
Ch.1: 2412MHz



Ch.7: 2442MHz



Ch.13: 2472MHz

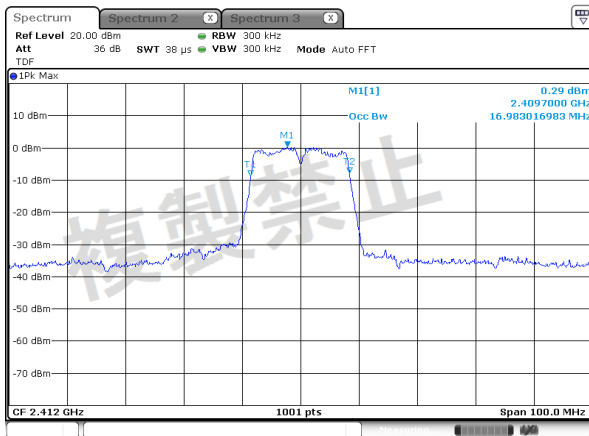


7. Test chart

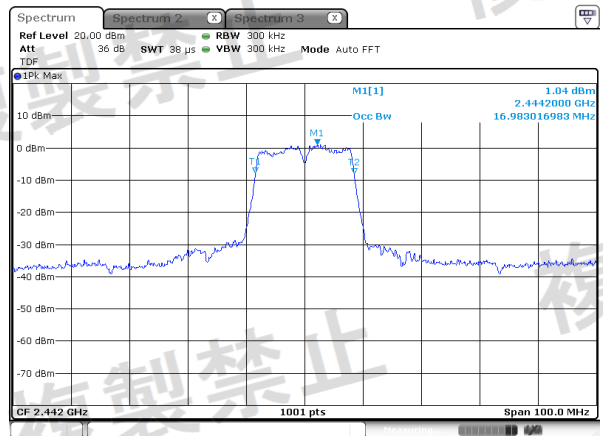
7.2 Occupied bandwidth / Spread bandwidth (-10% voltage)

Occupied bandwidth

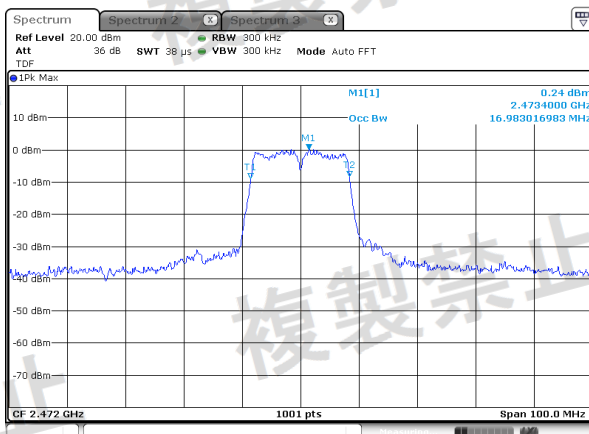
Ch.1: 2412MHz



Ch.7: 2442MHz



Ch.13: 2472MHz

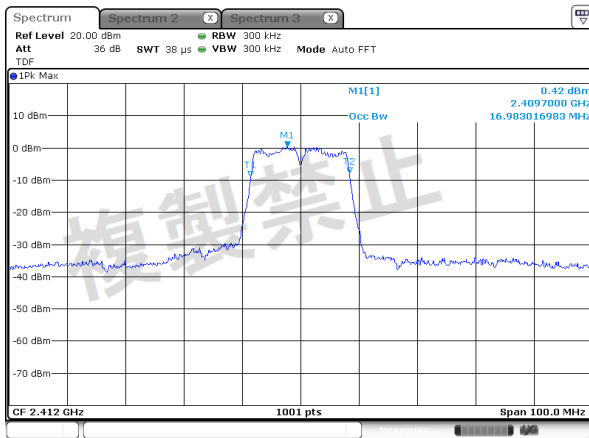


7. Test chart

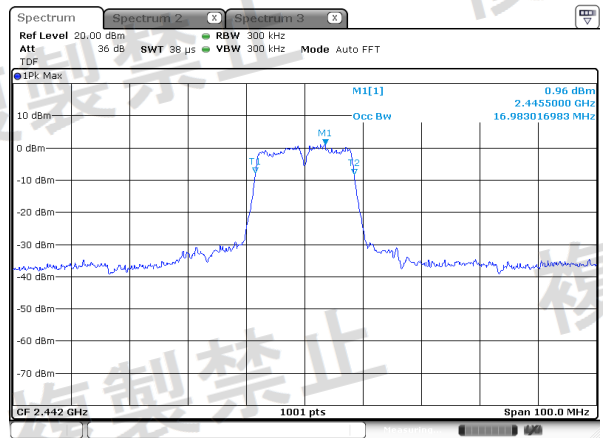
7.2 Occupied bandwidth / Spread bandwidth (+10% voltage)

Occupied bandwidth

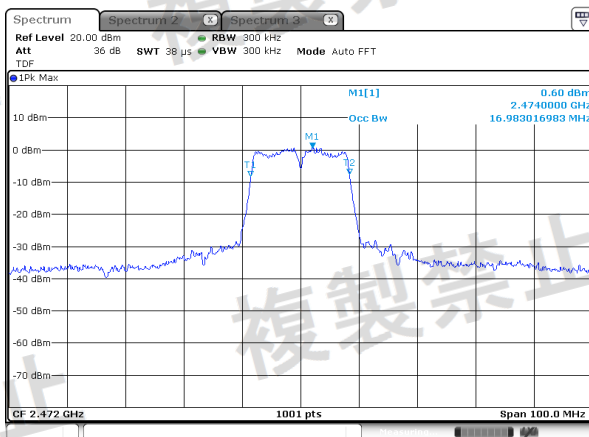
Ch.1: 2412MHz



Ch.7: 2442MHz



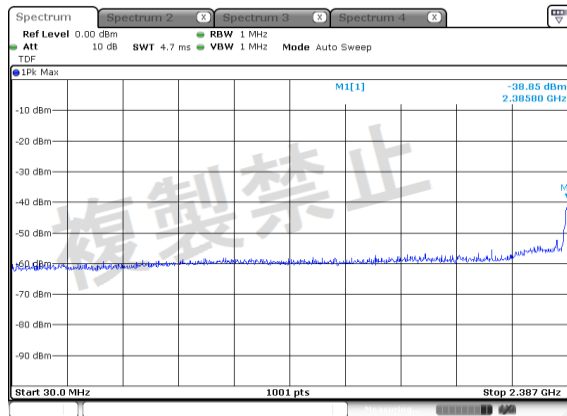
Ch.13: 2472MHz



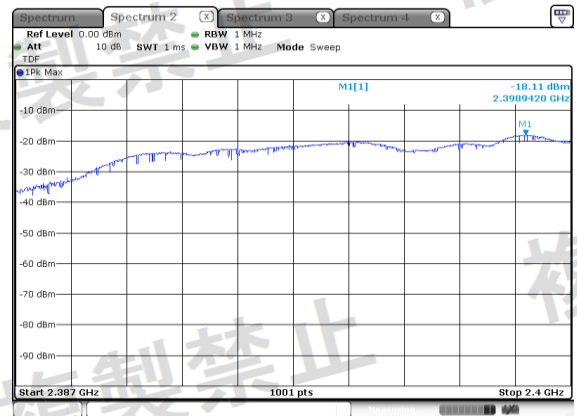
7. Test chart

7.3 Unwanted(Spurious) emission strength (Rated voltage)

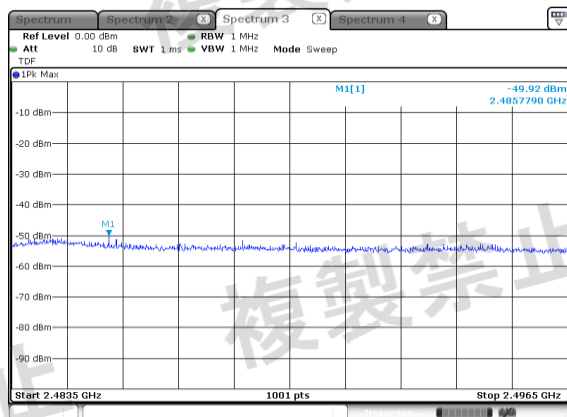
Ch.1: 2412MHz
30-2387MHz



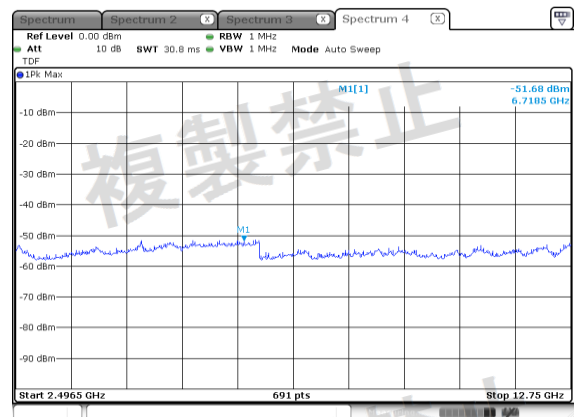
2387-2400MHz



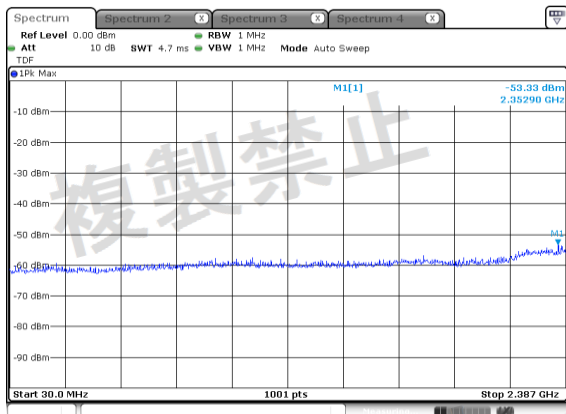
2483.5-2496.5MHz



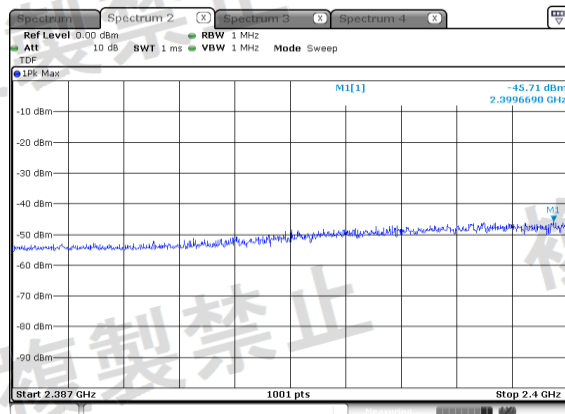
2496.5-12750MHz



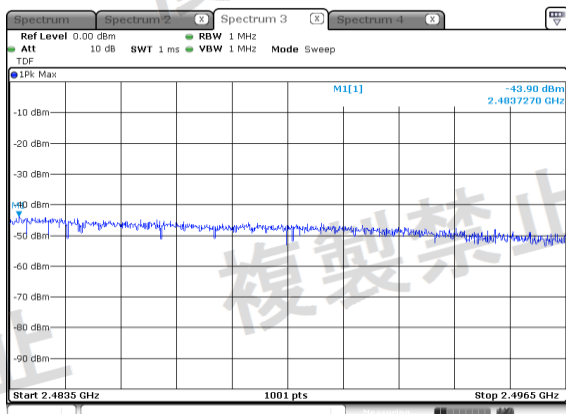
Ch.7: 2442MHz
30-2387MHz



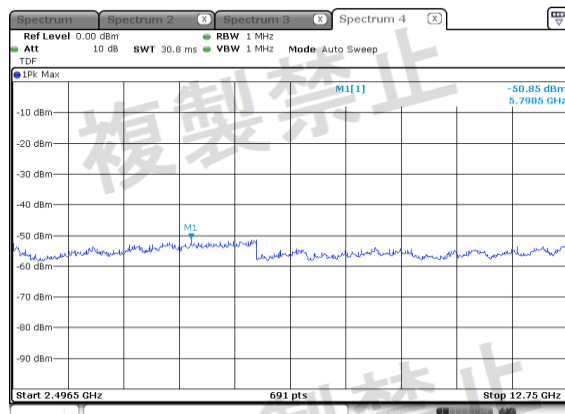
2387-2400MHz



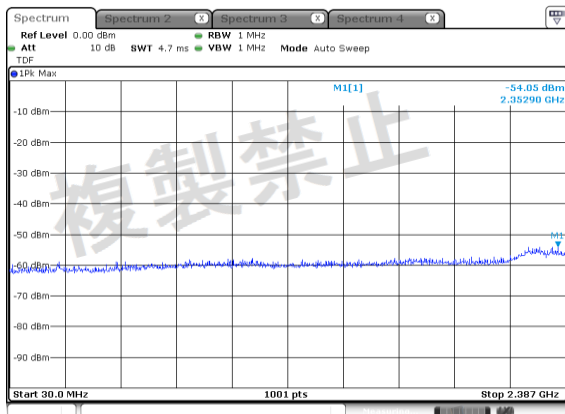
2483.5-2496.5MHz



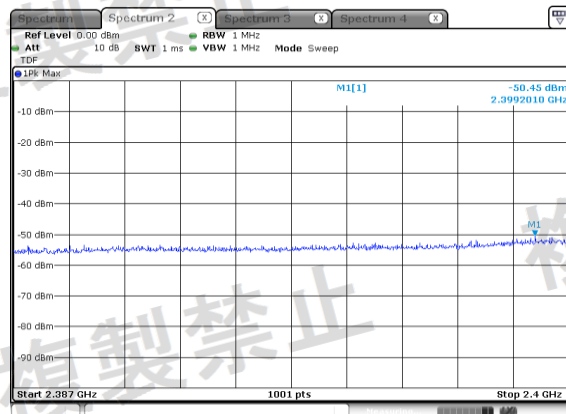
2496.5-12750MHz



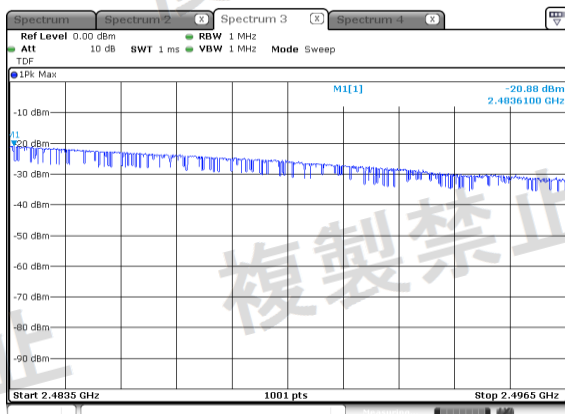
Ch.13: 2472MHz
30-2387MHz



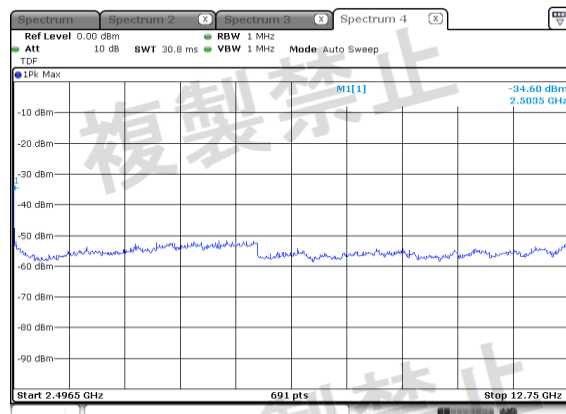
2387-2400MHz



2483.5-2496.5MHz



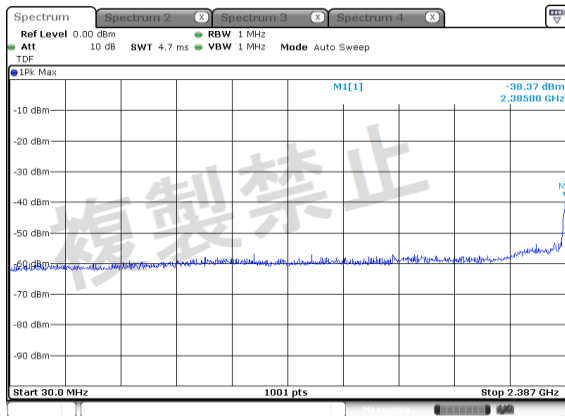
2496.5-12750MHz



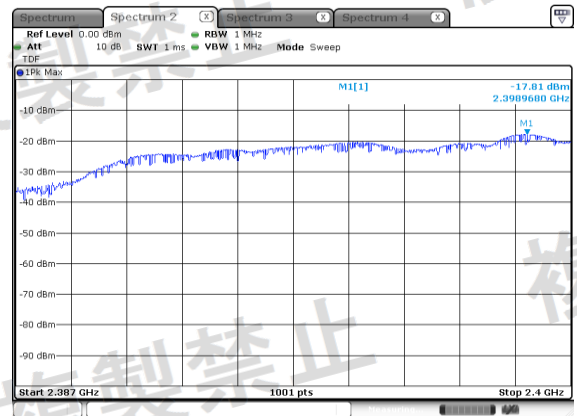
7. Test chart

7.3 Unwanted(Spurious) emission strength (-10% voltage)

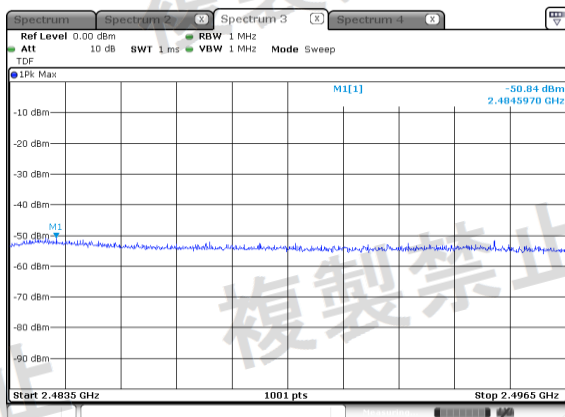
Ch.1: 2412MHz
30-2387MHz



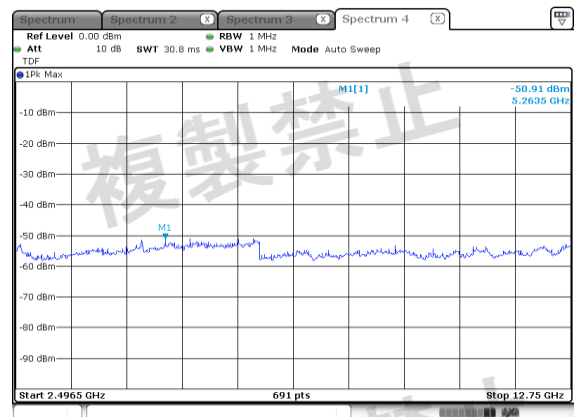
2387-2400MHz



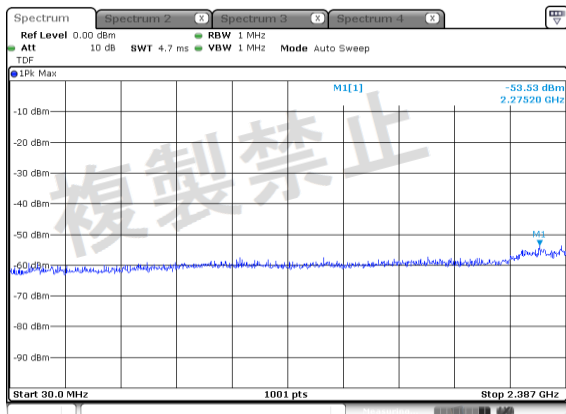
2483.5-2496.5MHz



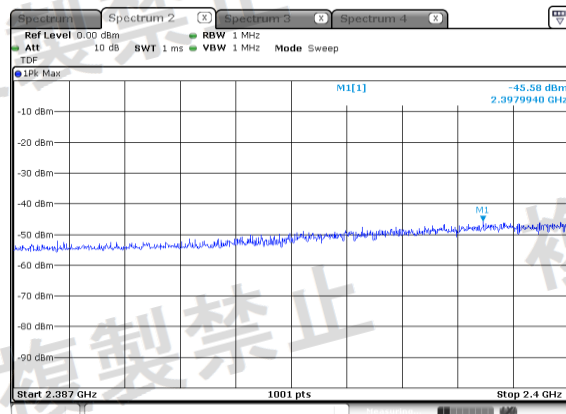
2496.5-12750MHz



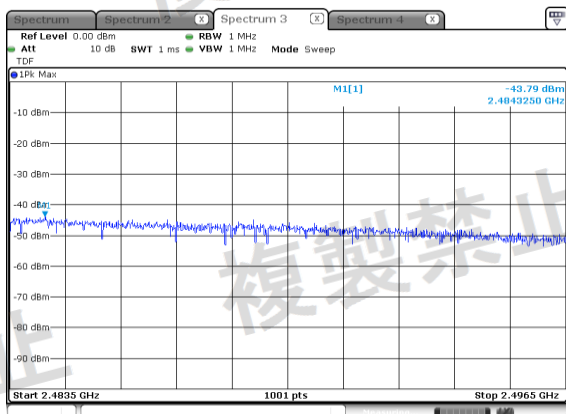
Ch.7: 2442MHz
30-2387MHz



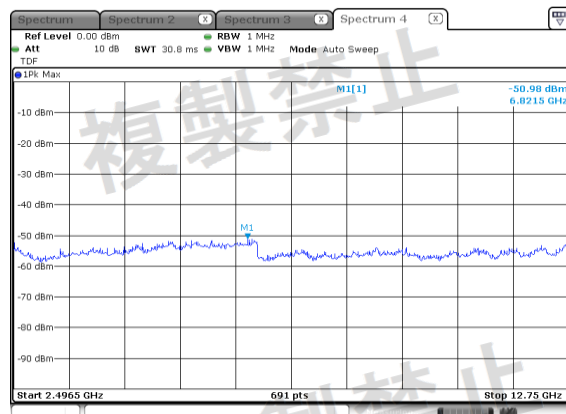
2387-2400MHz



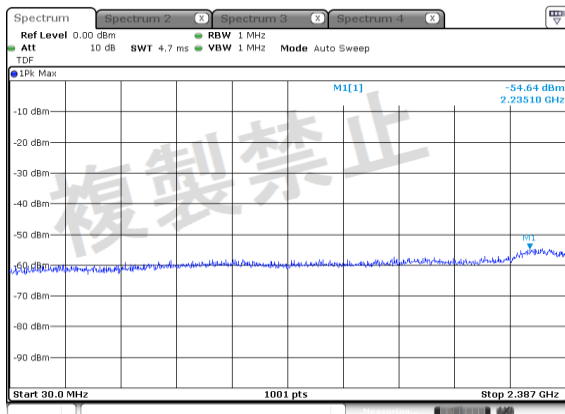
2483.5-2496.5MHz



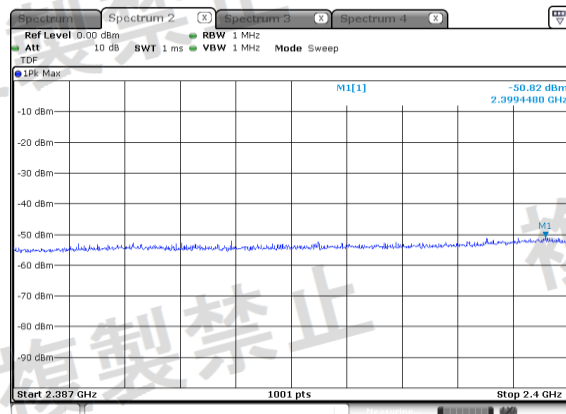
2496.5-12750MHz



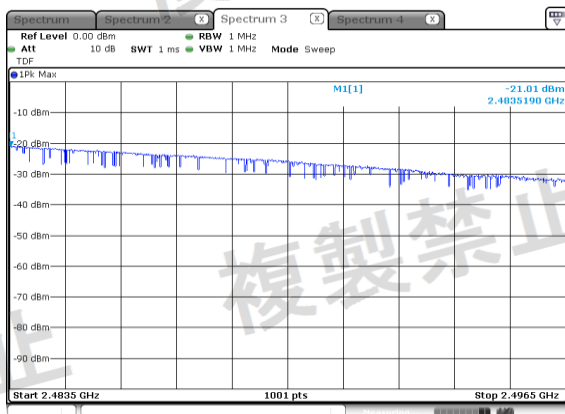
Ch.13: 2472MHz
30-2387MHz



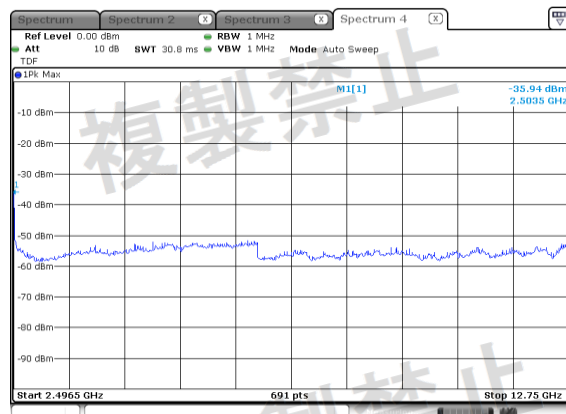
2387-2400MHz



2483.5-2496.5MHz



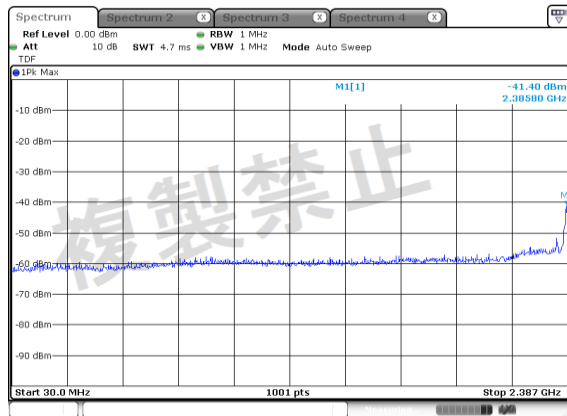
2496.5-12750MHz



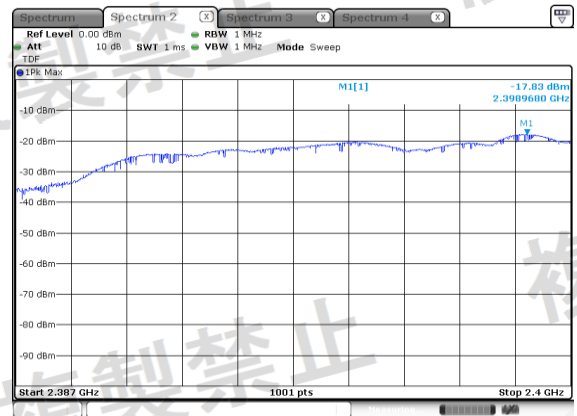
7. Test chart

7.3 Unwanted(Spurious) emission strength (+10% voltage)

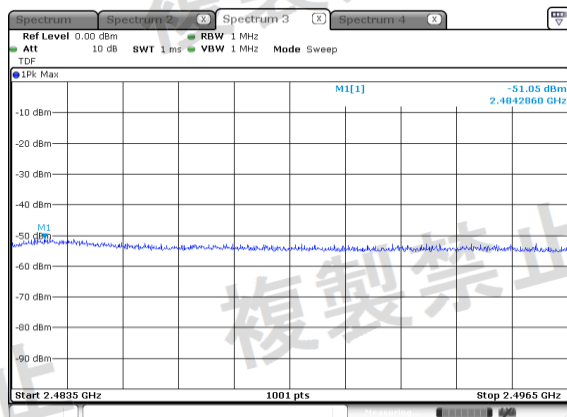
Ch.1: 2412MHz
30-2387MHz



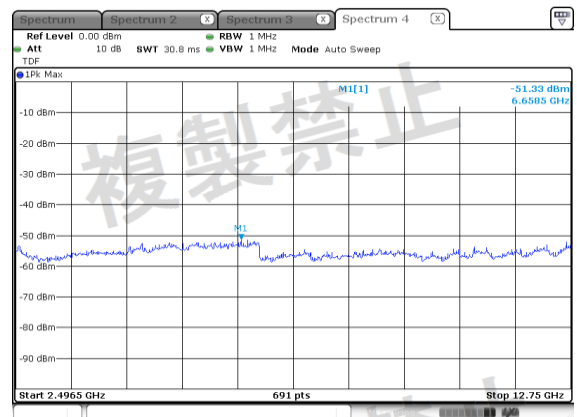
2387-2400MHz



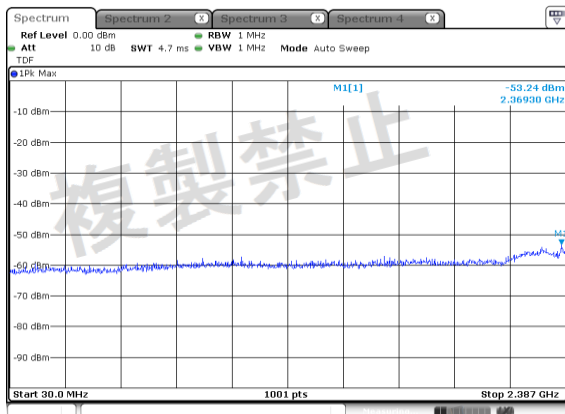
2483.5-2496.5MHz



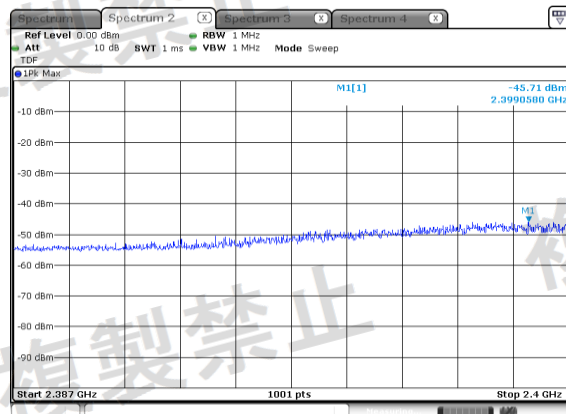
2496.5-12750MHz



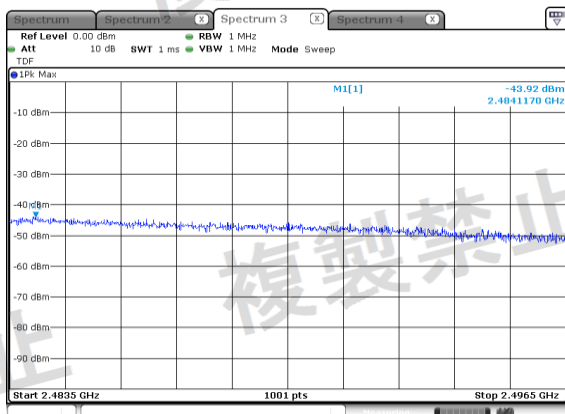
Ch.7: 2442MHz
30-2387MHz



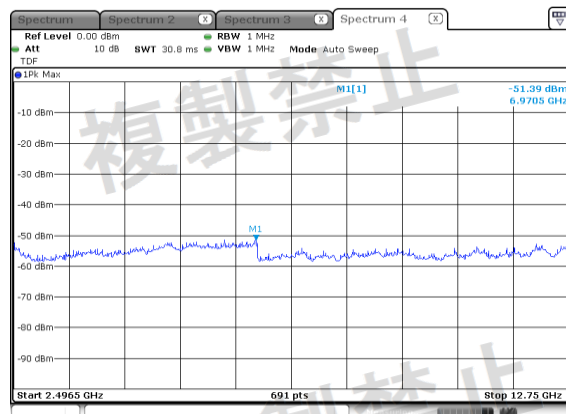
2387-2400MHz



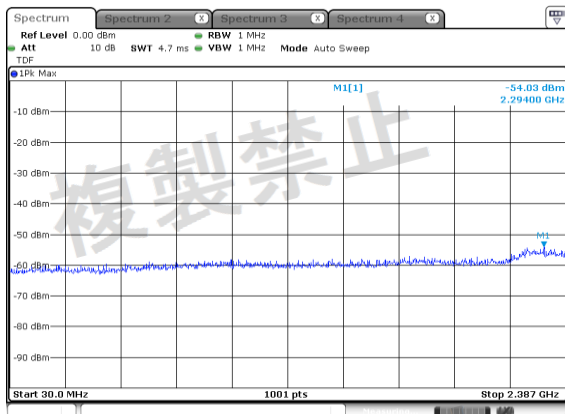
2483.5-2496.5MHz



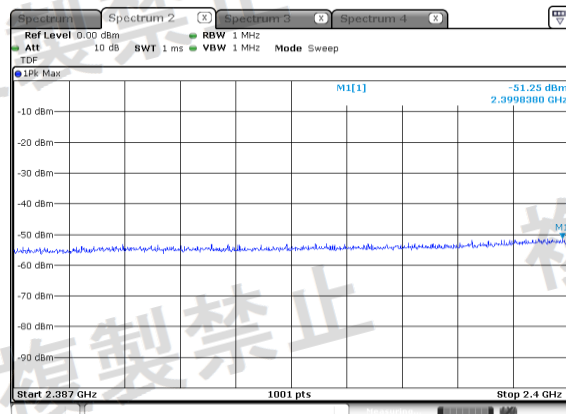
2496.5-12750MHz



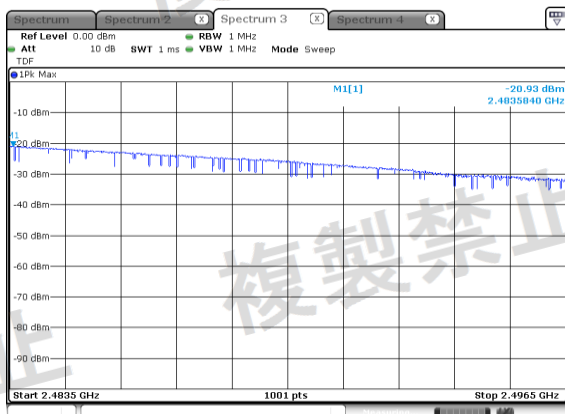
Ch.13: 2472MHz
30-2387MHz



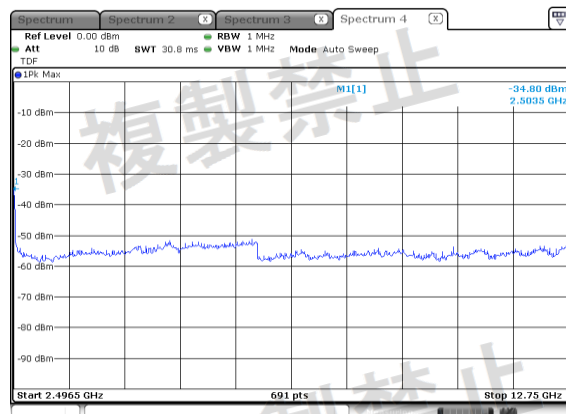
2387-2400MHz



2483.5-2496.5MHz



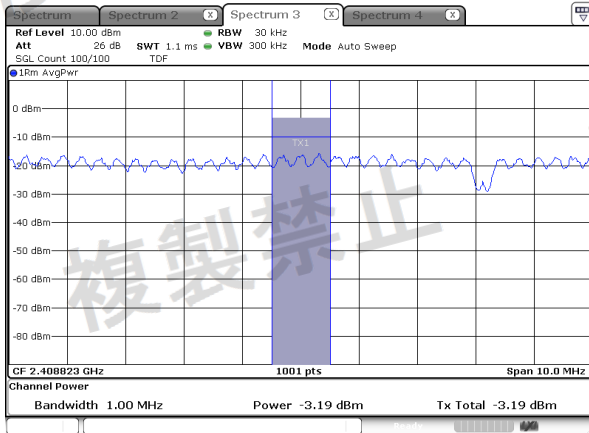
2496.5-12750MHz



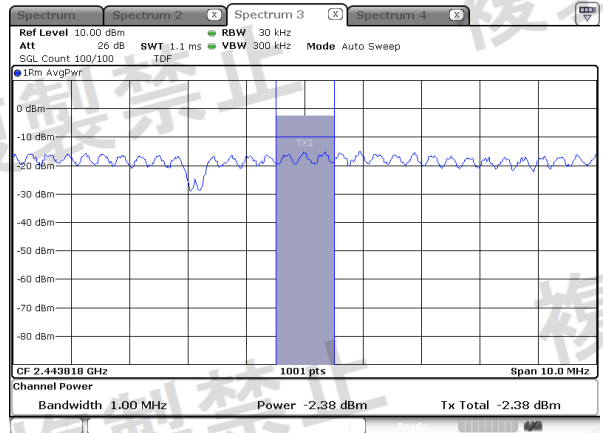
7. Test chart

7.4 RF output power tolerance (Rated voltage)

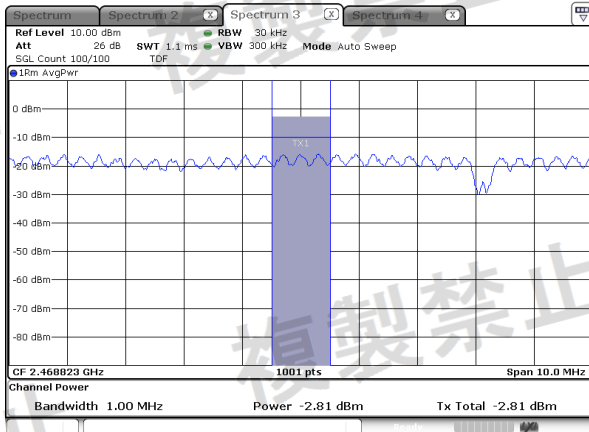
Ch.1: 2412MHz



Ch.7: 2442MHz



Ch.13: 2472MHz



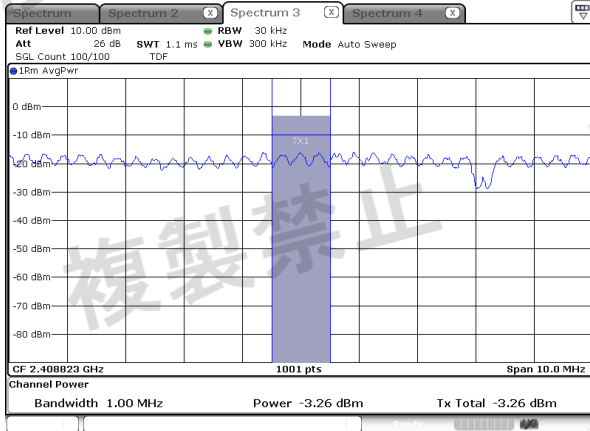
ON/OFF time



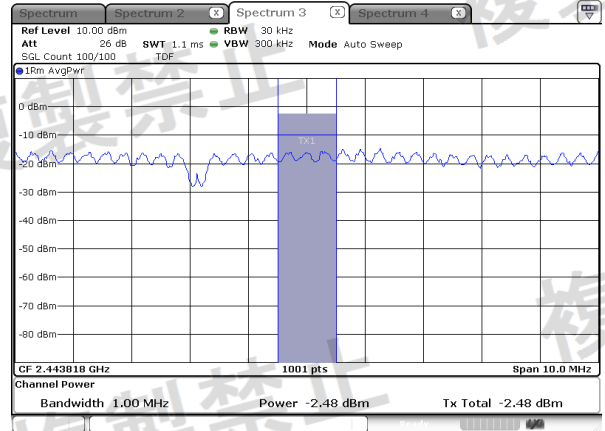
7. Test chart

7.4 RF output power tolerance (-10% voltage)

Ch.1: 2412MHz



Ch.7: 2442MHz



Ch.13: 2472MHz



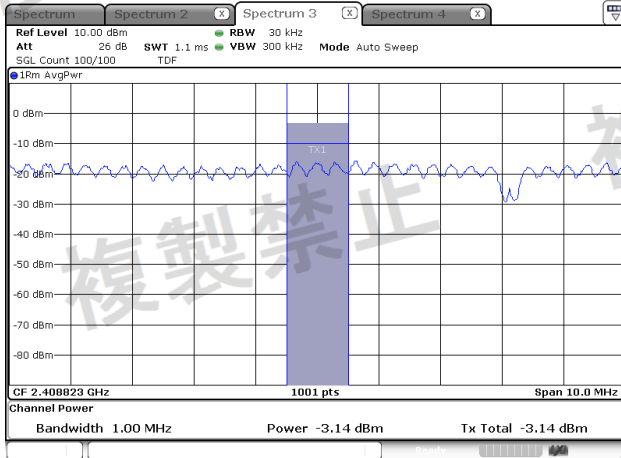
ON/OFF time



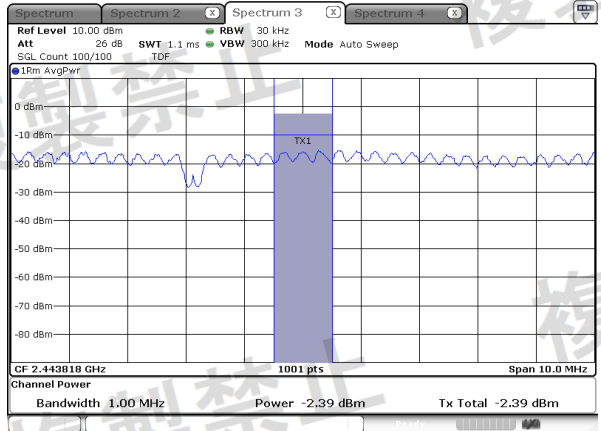
7. Test chart

7.4 RF output power tolerance (+10% voltage)

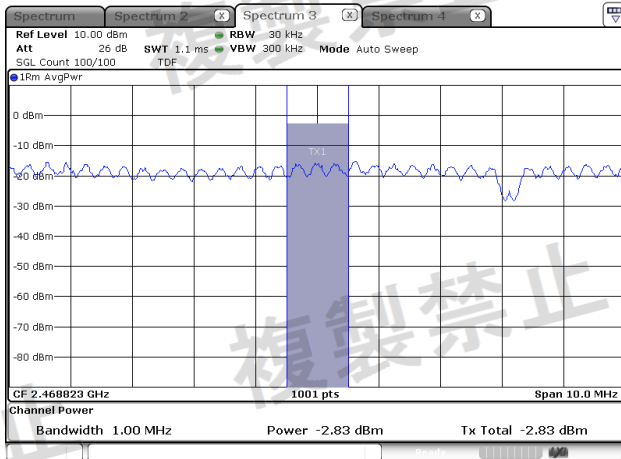
Ch.1: 2412MHz



Ch.7: 2442MHz



Ch.13: 2472MHz



ON/OFF time

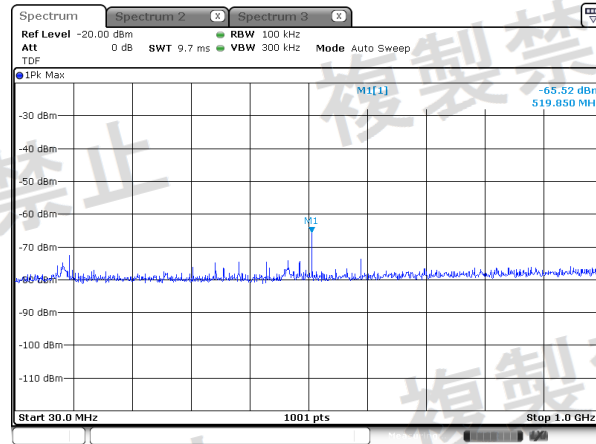


7. Test chart

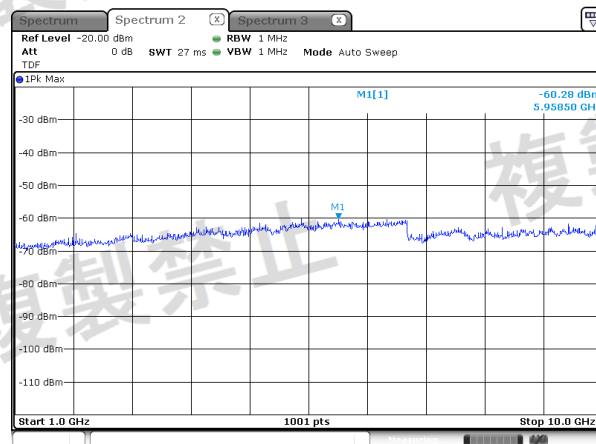
7.5 Secondary emitted radio wave strength (Rated voltage)

Ch.1: 2412MHz

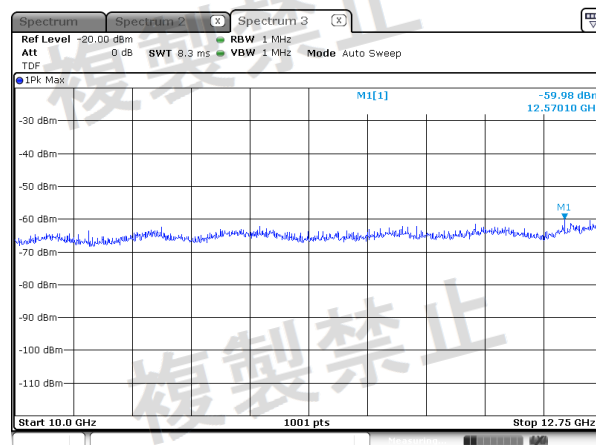
30MHz-1GHz



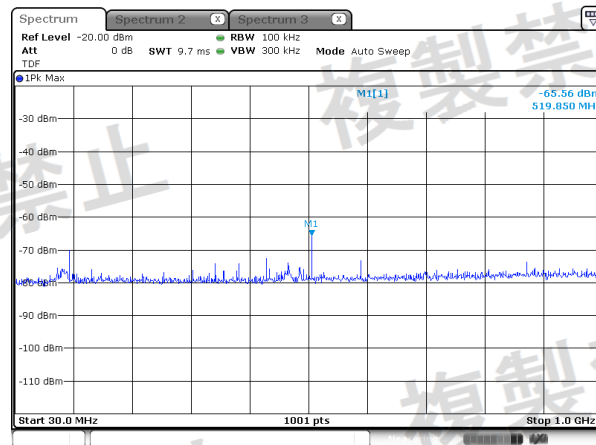
1-10GHz



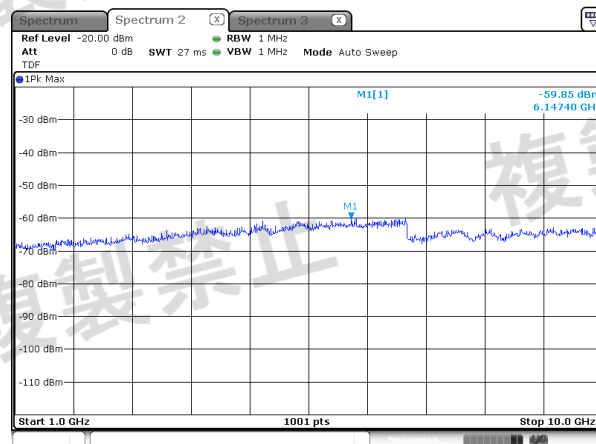
10-12.75GHz



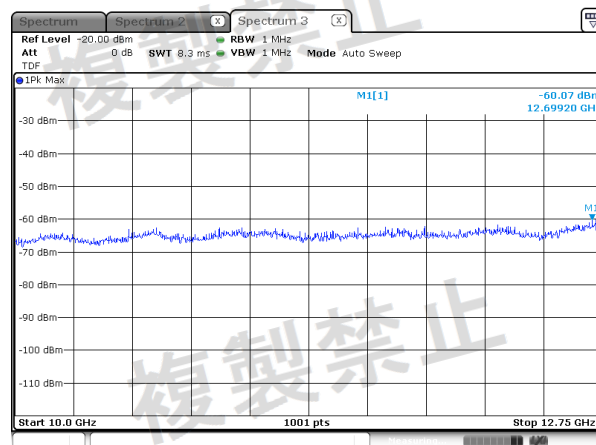
Ch.7: 2442MHz
30MHz-1GHz



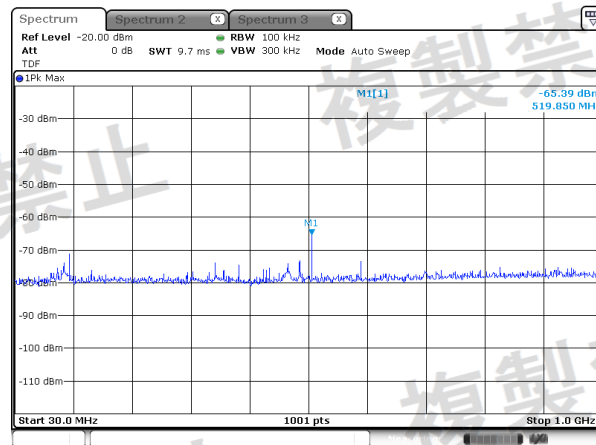
1-10GHz



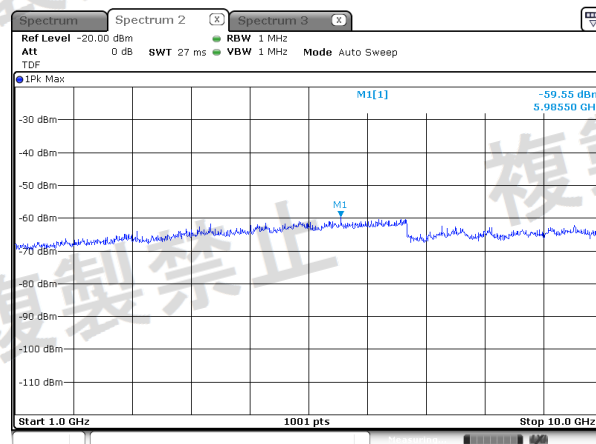
10-12.75GHz



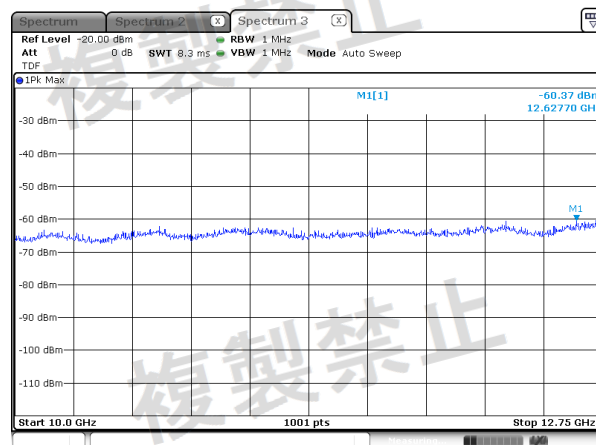
Ch.13: 2472MHz
30MHz-1GHz



1-10GHz



10-12.75GHz

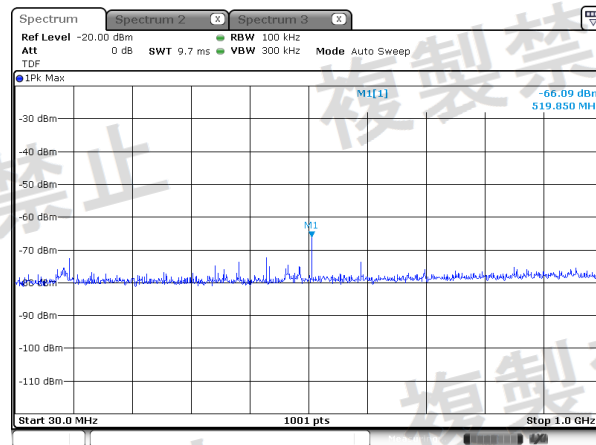


7. Test chart

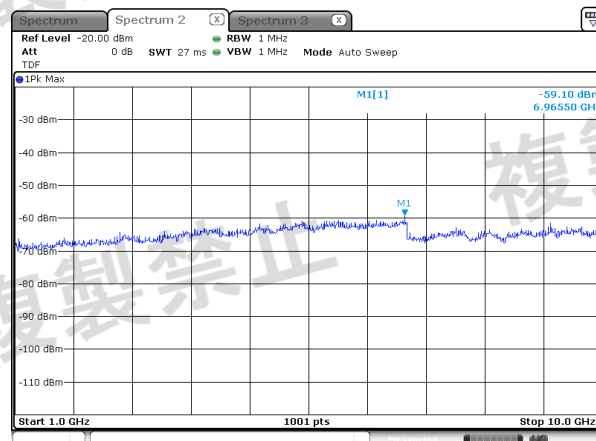
7.5 Secondary emitted radio wave strength (-10% voltage)

Ch.1: 2412MHz

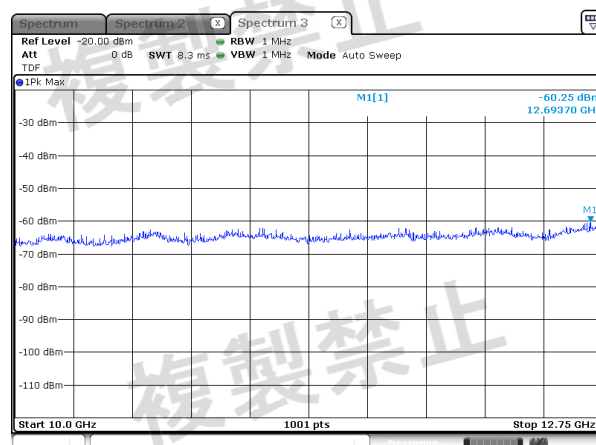
30MHz-1GHz



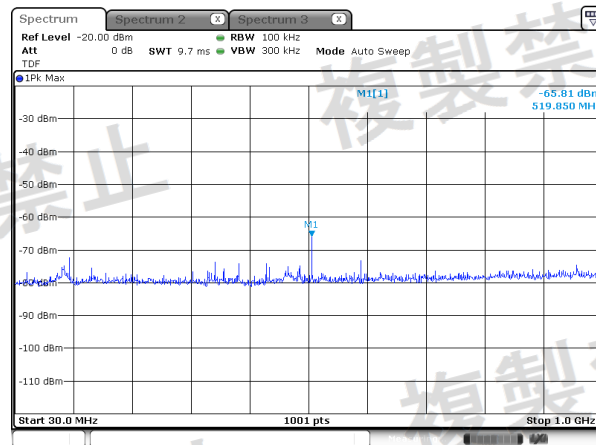
1-10GHz



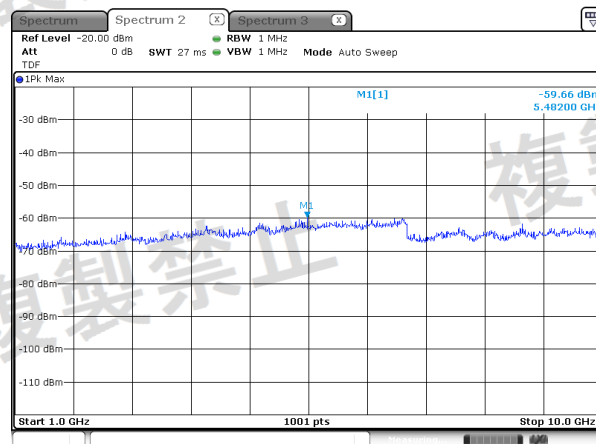
10-12.75GHz



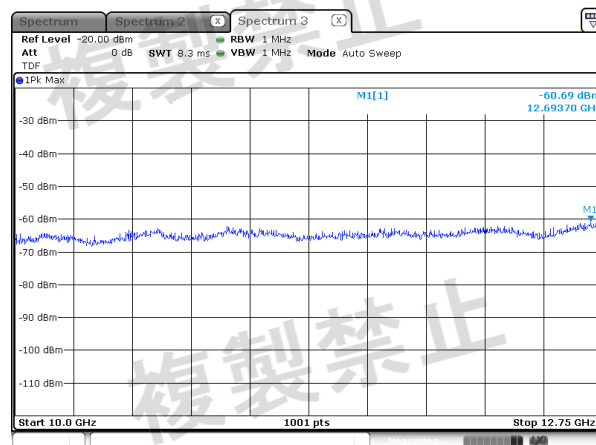
Ch.7: 2442MHz
30MHz-1GHz



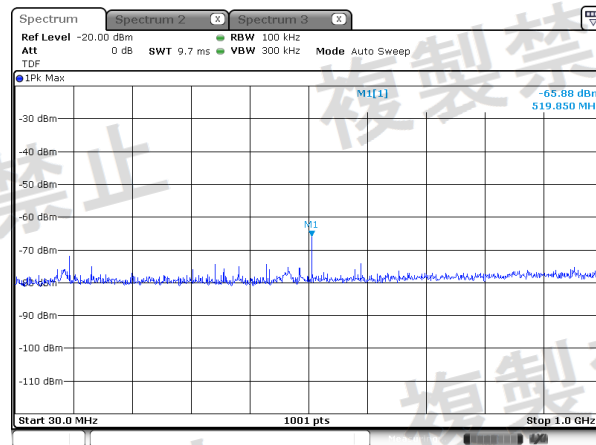
1-10GHz



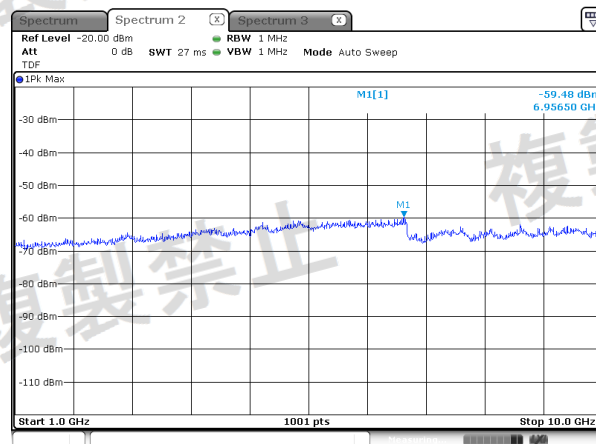
10-12.75GHz



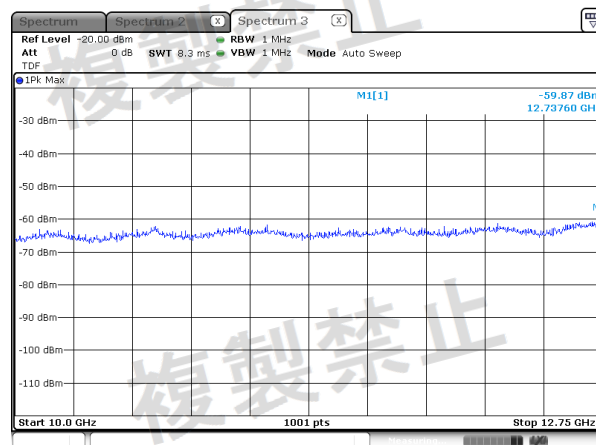
Ch.13: 2472MHz
30MHz-1GHz



1-10GHz



10-12.75GHz

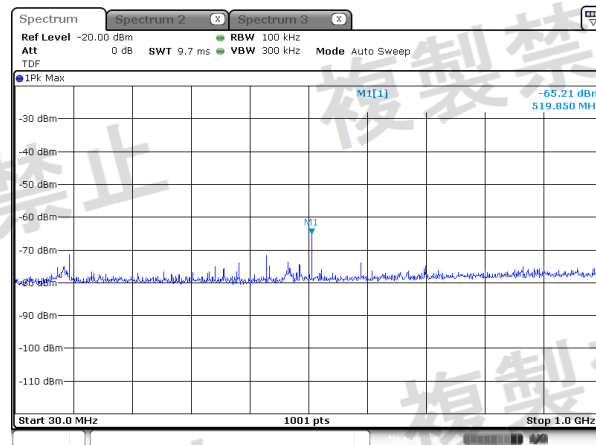


7. Test chart

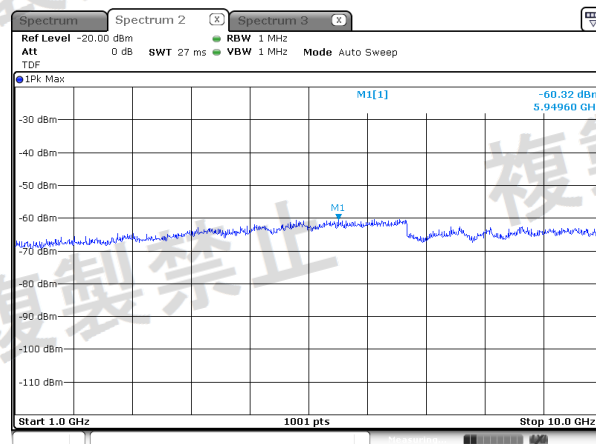
7.5 Secondary emitted radio wave strength (+10% voltage)

Ch.1: 2412MHz

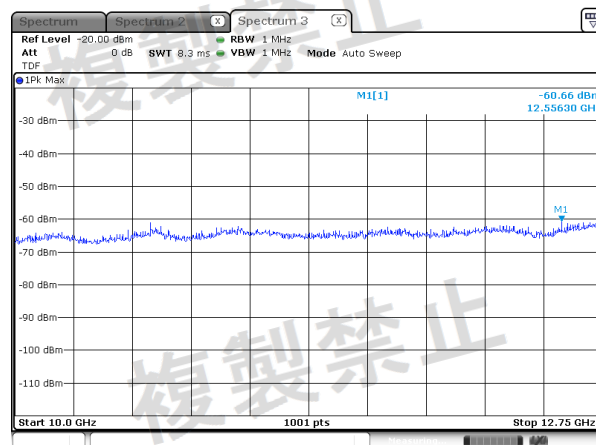
30MHz-1GHz



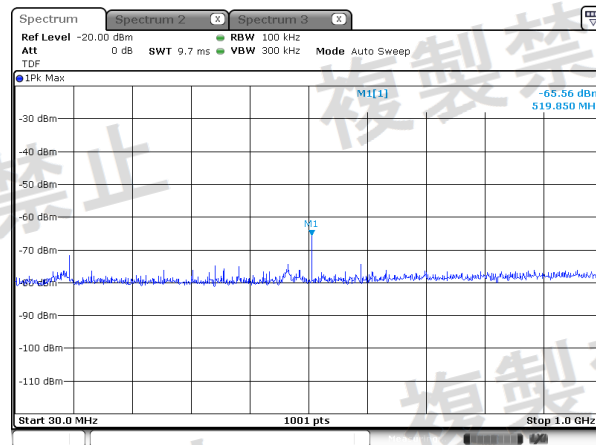
1-10GHz



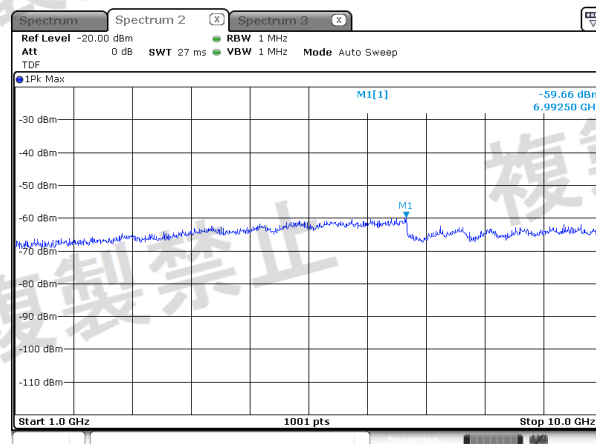
10-12.75GHz



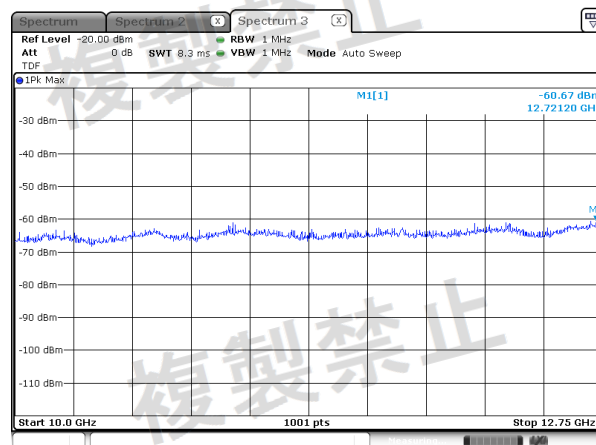
Ch.7: 2442MHz
30MHz-1GHz



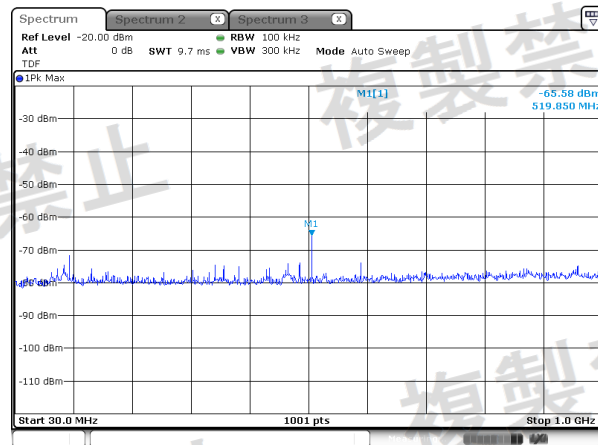
1-10GHz



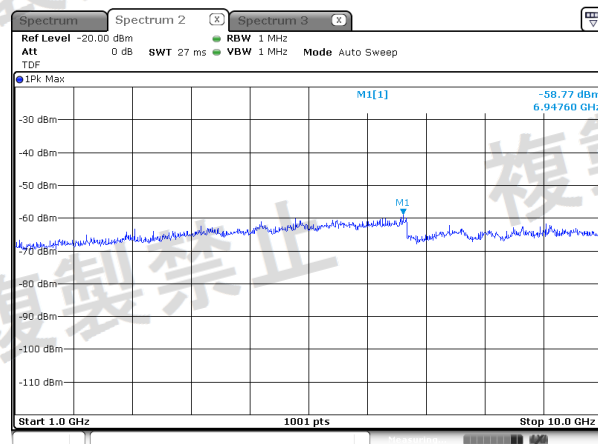
10-12.75GHz



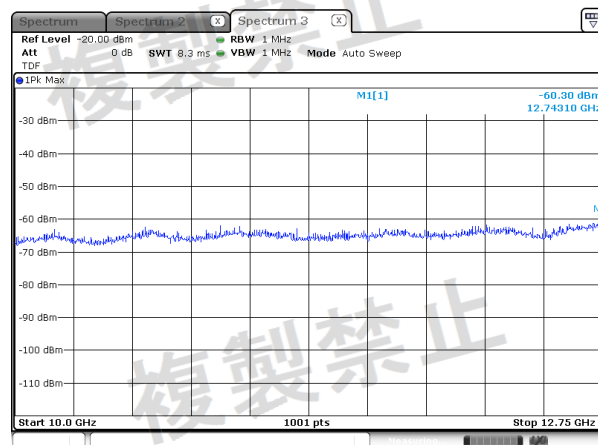
Ch.13: 2472MHz
30MHz-1GHz



1-10GHz



10-12.75GHz



8. Laboratory description

1. Location

Name: KCTL Inc.

65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea

Telephone Number: +82 31 285 0894

Facsimile Number: +82 505 299 8311

2. Accreditation and Registration

1) FCC

Site Designation No.: KR0040

Site Registration No.: 687132

2) VCCI

Registration No.: R-3327, G-198, C-3706, T-1849

3) Industry Canada

Registration No.: 8035A

Test Site	OATS 3m	OATS 10m	OATS 30m	Chamber 3m	Chamber 10m	Expiry Date
8035A-2	No	No	No	Yes	Yes	2018-07-10

4) KOLAS

Registration number	Expiration date
KT231	2020-09-13