

### 3. Test results (Rated voltage)

S/N : N/A

Environment of test room	Date of test	2018-10-18	2018-10-19
	Temperature	23 °C	23 °C
	Humidity	51 %	51 %

Peak Antenna Gain	2.03	dBi
Declaration Output Power	0.020	mW/MHz
Declaration Output Power	-16.99	dBm/MHz
<b>E.I.R.P.</b>	<b>-14.96</b>	<b>dBm/MHz</b>
Input Power Voltage	5.00	VDC

Tested Circuit Insertion Loss		0	dB
Frequency equal to the Transmission rate		1	MHz
Transmission Time	ON TIME	2.888	ms
	OFF TIME	0.864	ms
	Ratio	0.7697	
Packet Type (Mode)		3DH5	mode
Transmit Speed		3	MHz

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

(Att : 10dB + Power Divider : 6dB + Cable loss + EUT cable: 0.5dB offset )

Test category ; 2.4GHz Band Low-Power Data Communication System (BluetoothV4+EDR [8DPSK])	
The reason why the tests are performed only at rated voltage;	

Measurement Frequency		MHz	2402	2441	2480	Result	Limit	Note
Channel Number		Ch.	0	39	78	---	---	
Frequency Measurements		MHz	2401.970000	2440.980000	2479.980000	---	---	
Frequency Tolerance		ppm	-12.48959	-8.19336	-8.06452	PASS	±50×10 <sup>-6</sup> (50ppm)	
Occupied Bandwidth		MHz	---	78.4131826	---	PASS	83.5MHz or below	
Spread Bandwidth		MHz	---	71.4698272	---	PASS	500kHz or more	
RF Output Power		mW/MHz	0.019794	0.017682	0.016016	PASS	3mW/MHz or below	
RF Output Power Tolerance		%	-1.027871	-11.587654	-19.922056	PASS	+20 to -80%	
Unwanted (Spurious) Emission Strength	30 to 2387MHz	uW/MHz	---	0.045709	---	PASS	2.5uW/MHz or below	
		MHz	---	2383.500	---	----		
	2387 to 2400MHz	uW/MHz	---	2.382319	---	PASS	25uW/MHz or below	
		MHz	---	2399.994	---	----		
	2483.5 to 2496.5MHz	uW/MHz	---	0.021577	---	PASS	25uW/MHz or below	
		MHz	---	2484.961	---	----		
	2496.5 to 12500MHz	uW/MHz	---	0.027102	---	PASS	2.5uW/MHz or below	
		MHz	---	4898.500	---	----		
Secondary Emitted Radio Wave Strength	30 to 1000MHz	nW	---	0.054325	---	PASS	4nW or below	
		MHz	---	516.940	---	----		
	1000 to 10000MHz	nW	---	0.843335	---	PASS	20nW or below	
		MHz	---	8880.600	---	----		
	10000 to 12500MHz	nW	---	0.868960	---	PASS	20nW or below	
		MHz	---	12451.900	---	----		
Time of occupancy hopping frequency		sec	---	0.002892	---	PASS	0.4sec or below	0.4sec×Spread rate
		sec	---	0.289200	---	PASS	0.4sec or below	
Spreading Factor		---		71.469827		PASS	5 or more	
Interference Prevention Function			Good			PASS		

**S/N : N/A**

Peak Antenna Gain	2.03	dBi
Declaration Output Power	0.020	mW/MHz
Declaration Output Power	-16.99	dBm/MHz
<b>E.I.R.P.</b>	<b>-14.96</b>	<b>dBm/MHz</b>
Input Power Voltage	4.50	VDC

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

(Att : 10dB + Power Divider : 6dB + Cable loss + EUT cable: 0.5dB offset )

Measurement Frequency		MHz	2402	2441	2480	Result	Limit	Note
Channel Number		Ch.	0	39	78	---	---	
Frequency Measurements		MHz	2401.980000	2440.975000	2479.980000	---	---	
Frequency Tolerance		ppm	-8.32639	-10.24170	-8.06452	PASS	$\pm 50 \times 10^{-6}$ (50ppm)	
Occupied Bandwidth		MHz	---	78.4184195	---	PASS	83.5MHz or below	
Spread Bandwidth		MHz	---	71.4965615	---	PASS	500kHz or more	
RF Output Power		mW/MHz	0.019742	0.017595	0.016121	PASS	3mW/MHz or below	
RF Output Power Tolerance		%	-1.292423	-12.026780	-19.397133	PASS	+20 to -80%	
Unwanted (Spurious) Emission Strength	30 to 2387MHz	uW/MHz	---	0.054702	---	PASS	2.5uW/MHz or below	
		MHz	---	2383.500	---	----		
	2387 to 2400MHz	uW/MHz	---	2.152782	---	PASS	25uW/MHz or below	
		MHz	---	2399.994	---	----		
	2483.5 to 2496.5MHz	uW/MHz	---	0.020464	---	PASS	25uW/MHz or below	
		MHz	---	2484.104	---	----		
	2496.5 to 12500MHz	uW/MHz	---	0.022182	---	PASS	2.5uW/MHz or below	
		MHz	---	4888.500	---	----		
Secondary Emitted Radio Wave Strength	30 to 1000MHz	nW	---	0.053703	---	PASS	4nW or below	
		MHz	---	552.790	---	----		
	1000 to 10000MHz	nW	---	0.770903	---	PASS	20nW or below	
		MHz	---	8871.600	---	----		
	10000 to 12500MHz	nW	---	1.042317	---	PASS	20nW or below	
		MHz	---	12534.300	---	----		
Time of occupancy hopping frequency		sec	---	0.002892	---	PASS	0.4sec or below	
		sec	---	0.257388	---	PASS	0.4sec or below	0.4sec×Spread rate
Spreading Factor		---		71.496561		PASS	5 or more	
Interference Prevention Function			Good			PASS		

### 3. Test results (+10 % voltage)

S/N : N/A

Environment of test room	Date of test	2018-10-18	2018-10-19
	Temperature	23 °C	23 °C
	Humidity	51 %	51 %

Peak Antenna Gain	2.03	dBi
Declaration Output Power	0.020	mW/MHz
Declaration Output Power	-16.99	dBm/MHz
<b>E.I.R.P.</b>	<b>-14.96</b>	<b>dBm/MHz</b>
Input Power Voltage	5.50	VDC

Tested Circuit Insertion Loss		0	dB
Frequency equal to the Transmission rate		1	MHz
Transmission Time	ON TIME	2.888	ms
	OFF TIME	0.864	ms
	Ratio	0.7697	
Packet Type (Mode)		3DH5	mode
Transmit Speed		3	MHz

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

(Att : 10dB + Power Divider : 6dB + Cable loss + EUT cable: 0.5dB offset )

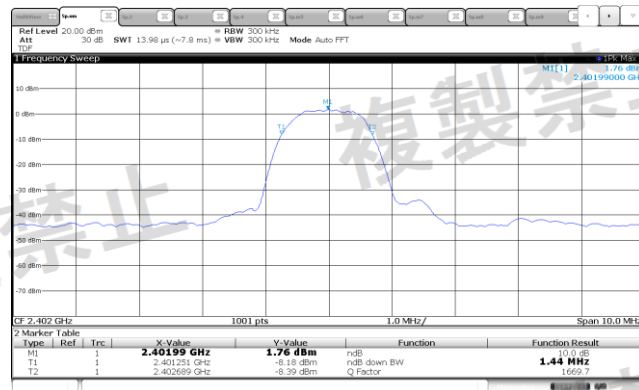
Test category ; 2.4GHz Band Low-Power Data Communication System (BluetoothV4+EDR [8DPSK])	
The reason why the tests are performed only at rated voltage;	

Measurement Frequency		MHz	2402	2441	2480	Result	Limit	Note
Channel Number		Ch.	0	39	78	---	---	
Frequency Measurements		MHz	2401.970000	2440.975000	2479.980000	---	---	
Frequency Tolerance		ppm	-12.48959	-10.24170	-8.06452	PASS	±50×10 <sup>-6</sup> (50ppm)	
Occupied Bandwidth		MHz	---	78.3985513	---	PASS	83.5MHz or below	
Spread Bandwidth		MHz	---	71.487329	---	PASS	500kHz or more	
RF Output Power		mW/MHz	0.019790	0.017719	0.016160	PASS	3mW/MHz or below	
RF Output Power Tolerance		%	-1.052102	-11.405538	-19.200890	PASS	+20 to -80%	
Unwanted (Spurious) Emission Strength	30 to 2387MHz	uW/MHz	---	0.053703	---	PASS	2.5uW/MHz or below	
		MHz	---	2385.800	---	----		
	2387 to 2400MHz	uW/MHz	---	2.228435	---	PASS	25uW/MHz or below	
		MHz	---	2399.968	---	----		
	2483.5 to 2496.5MHz	uW/MHz	---	0.020137	---	PASS	25uW/MHz or below	
		MHz	---	2483.805	---	----		
	2496.5 to 12500MHz	uW/MHz	---	0.029376	---	PASS	2.5uW/MHz or below	
		MHz	---	4878.500	---	----		
Secondary Emitted Radio Wave Strength	30 to 1000MHz	nW	---	0.048306	---	PASS	4nW or below	
		MHz	---	541.160	---	----		
	1000 to 10000MHz	nW	---	0.666807	---	PASS	20nW or below	
		MHz	---	8871.600	---	----		
	10000 to 12500MHz	nW	---	1.004616	---	PASS	20nW or below	
		MHz	---	12594.800	---	----		
Time of occupancy hopping frequency		sec	---	0.002892	---	PASS	0.4sec or below	0.4sec×Spread rate
		sec	---	0.277632	---	PASS	0.4sec or below	
Spreading Factor		---		71.487329		PASS	5 or more	
Interference Prevention Function			Good			PASS		

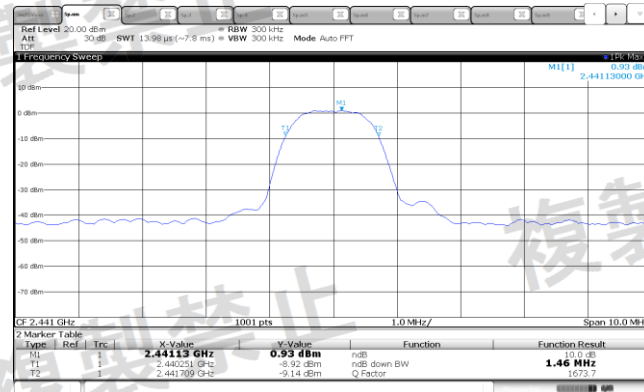
## 7. Test chart

### 7.1 Frequency tolerance (Rated voltage)

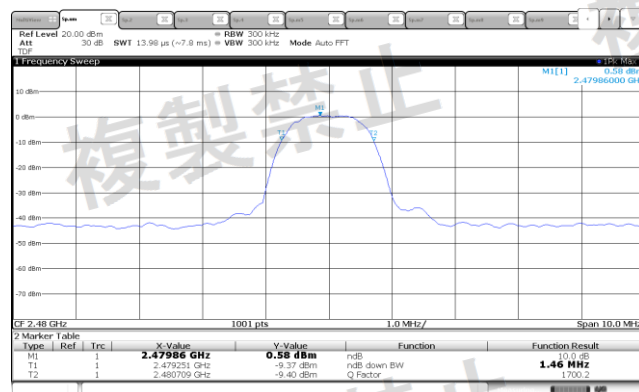
Ch.1: 2402MHz



Ch.40: 2441MHz



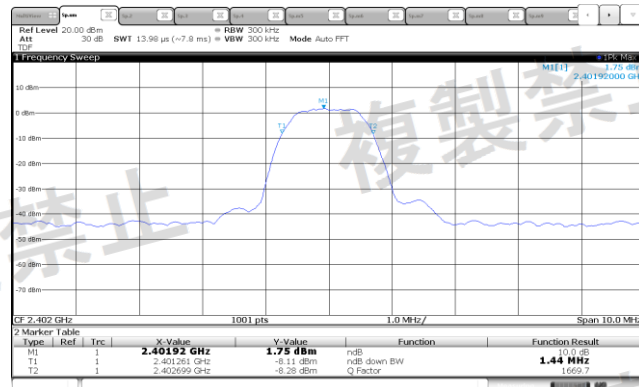
Ch.79: 2480MHz



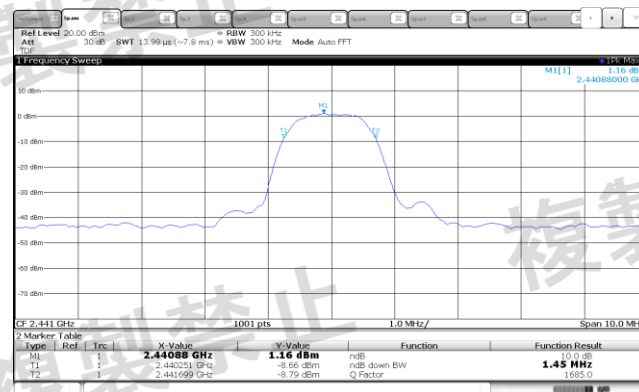
## 7. Test chart

### 7.1 Frequency tolerance (-10% voltage)

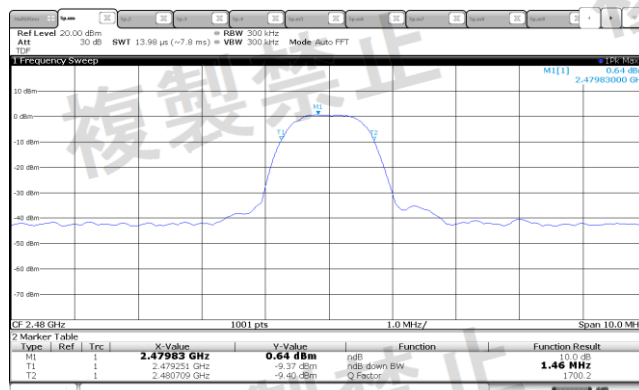
Ch.1: 2402MHz



Ch.40: 2441MHz



Ch.79: 2480MHz

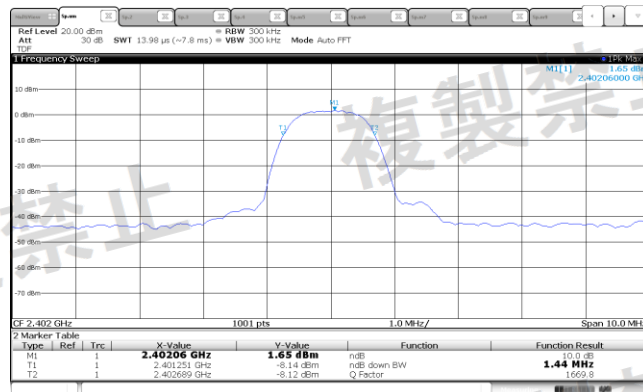




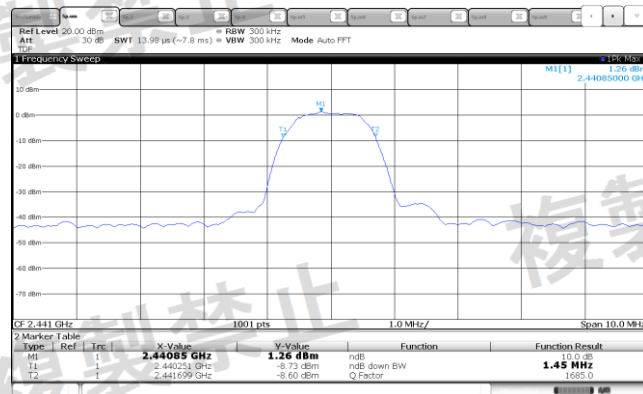
## 7. Test chart

### 7.1 Frequency tolerance (+10% voltage)

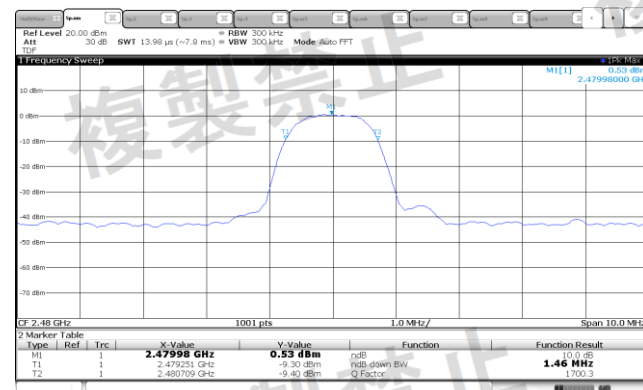
Ch.1: 2402MHz



Ch.40: 2441MHz



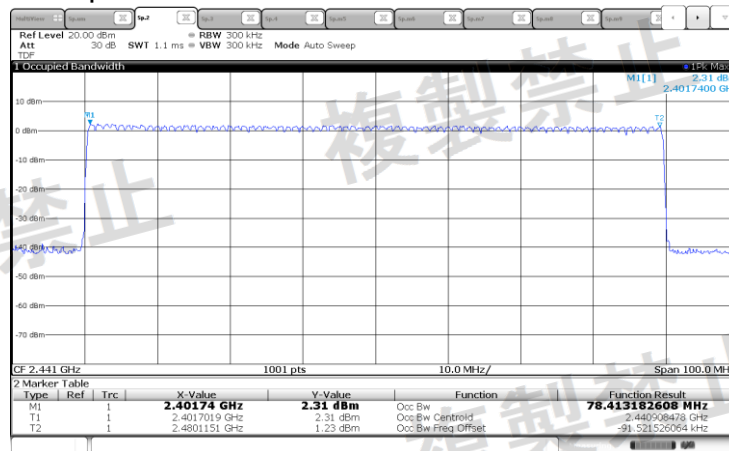
Ch.79: 2480MHz



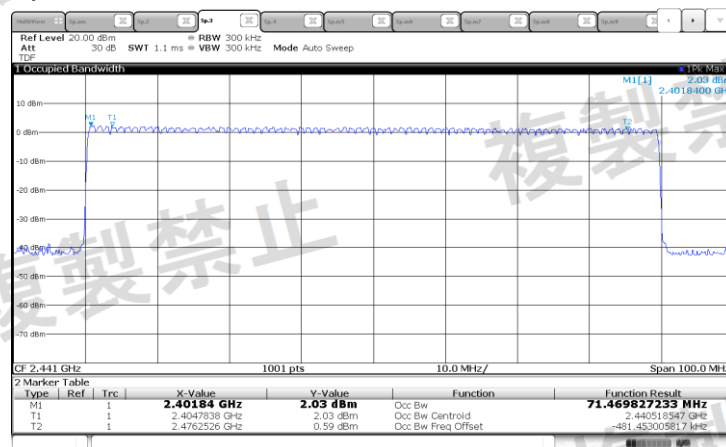
## 7. Test chart

### 7.2 Occupied bandwidth / Spread bandwidth (Rated voltage)

#### Occupied bandwidth



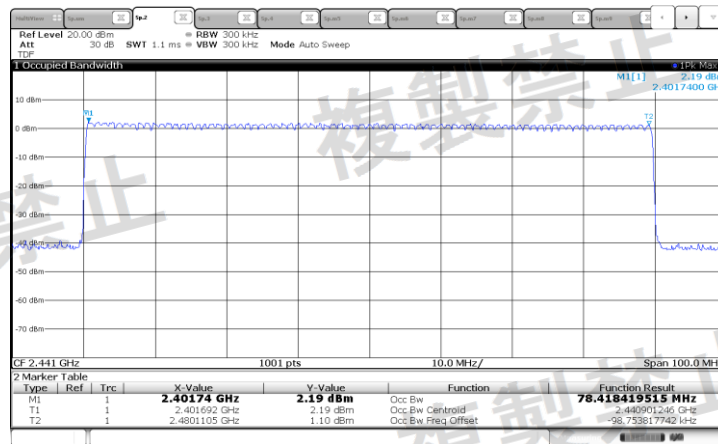
#### Spread bandwidth



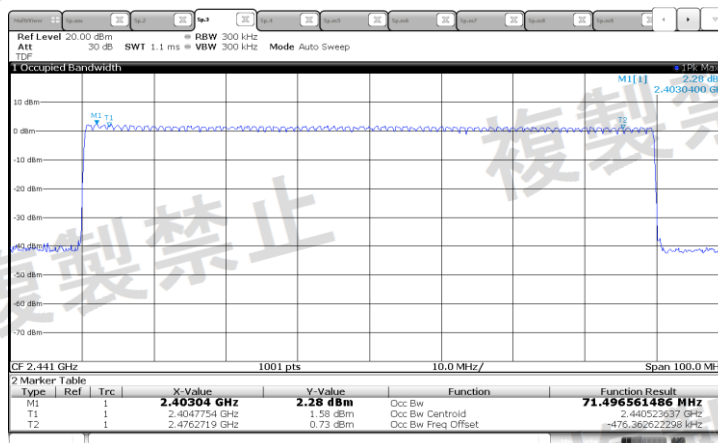
## 7. Test chart

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

#### Occupied bandwidth



#### Spread bandwidth

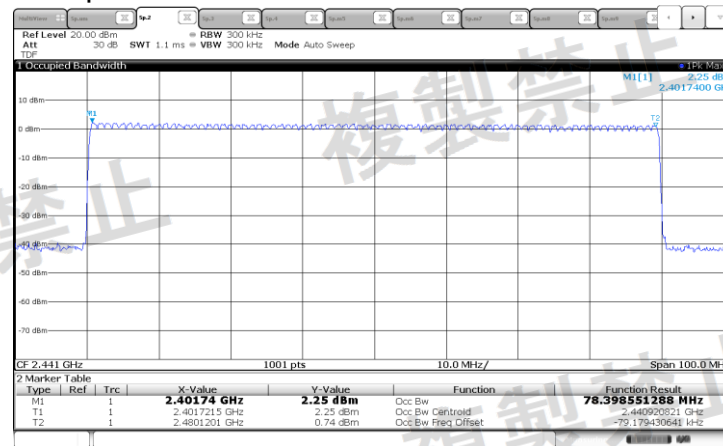




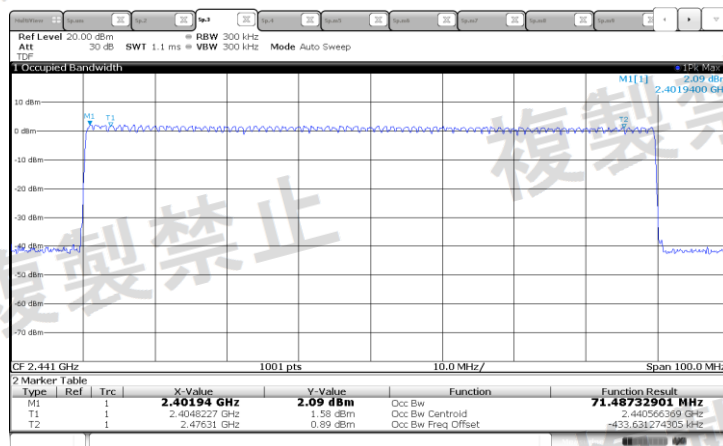
## 7. Test chart

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

#### Occupied bandwidth



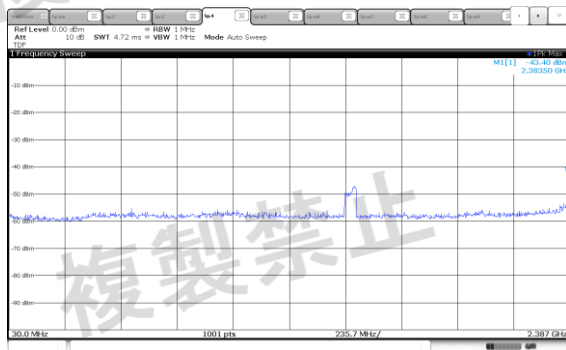
#### Spread bandwidth



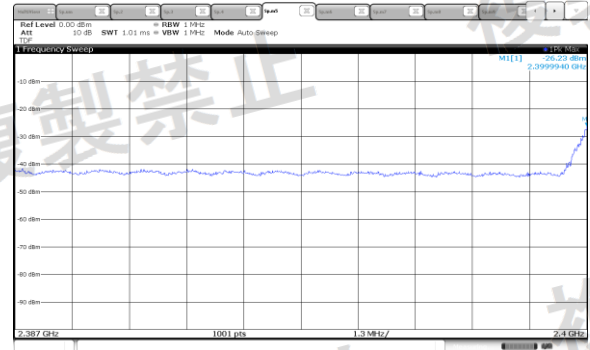
## 7. Test chart

### 7.3 Unwanted(Spurious) emission strength (Rated voltage)

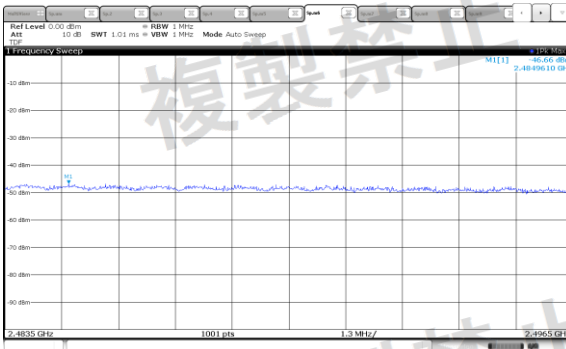
30-2387MHz



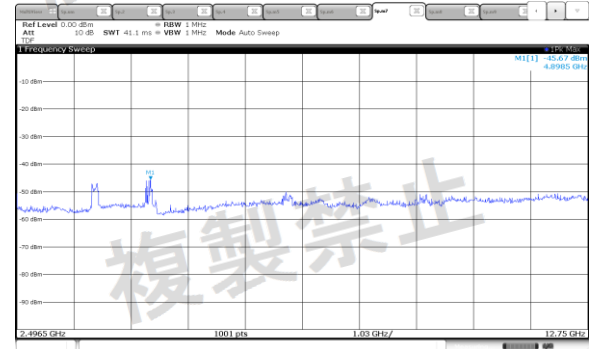
2387-2400MHz



2483.5-2496.5MHz



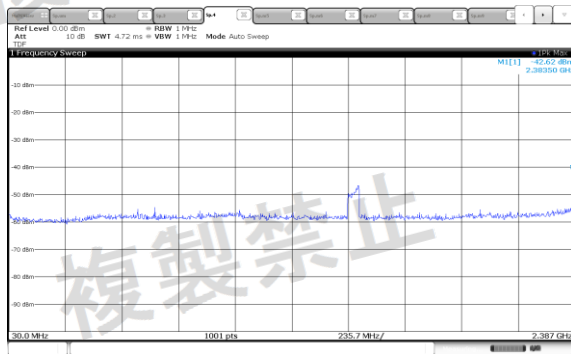
2496.5-12500MHz



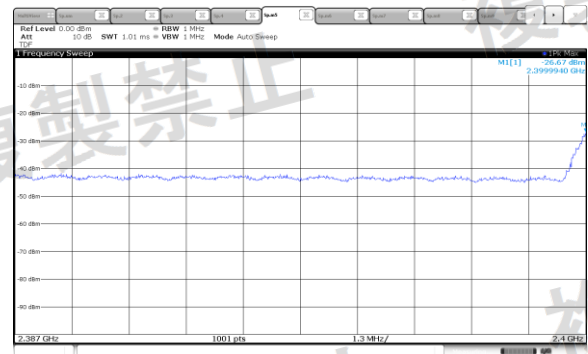
## 7. Test chart

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

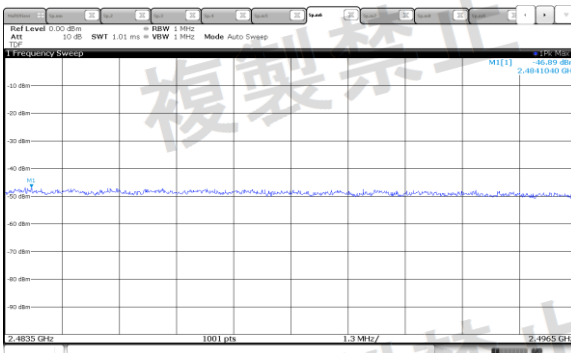
30-2387MHz



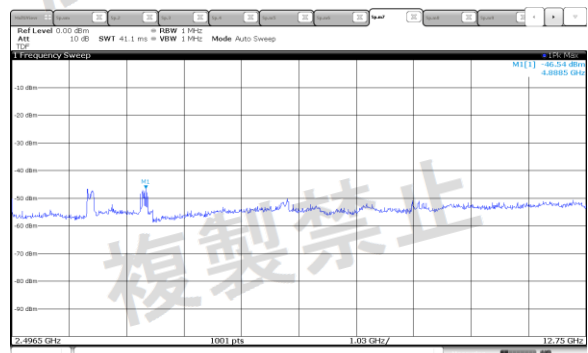
2387-2400MHz



2483.5-2496.5MHz



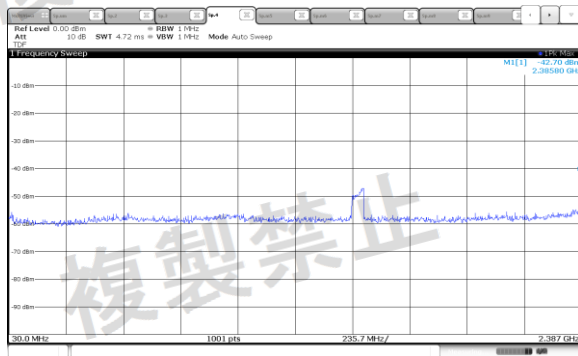
2496.5-12500MHz



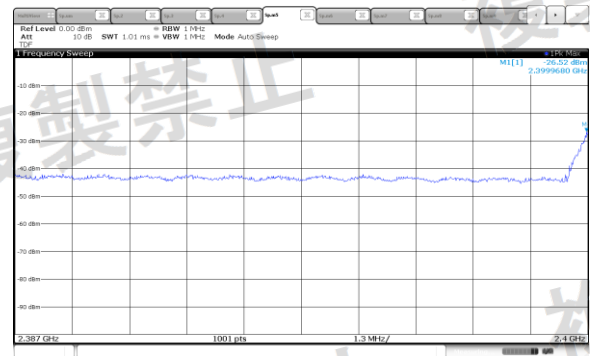
## 7. Test chart

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

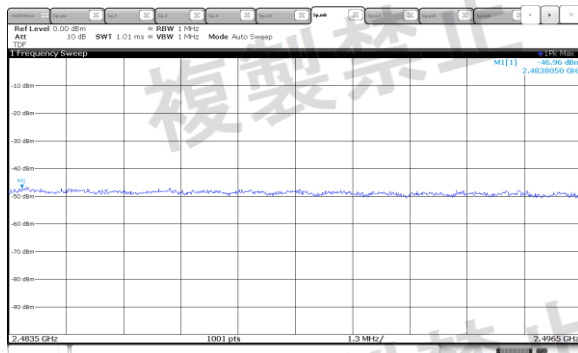
30-2387MHz



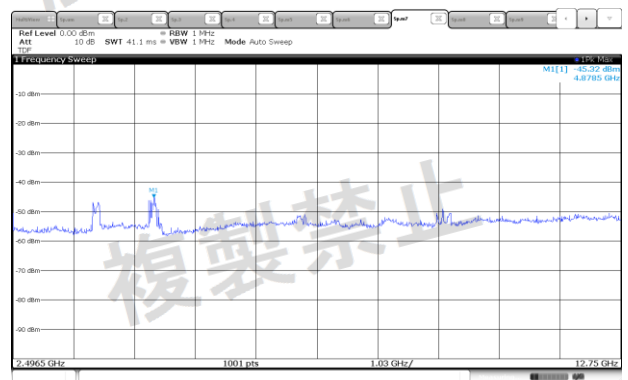
2387-2400MHz



2483.5-2496.5MHz



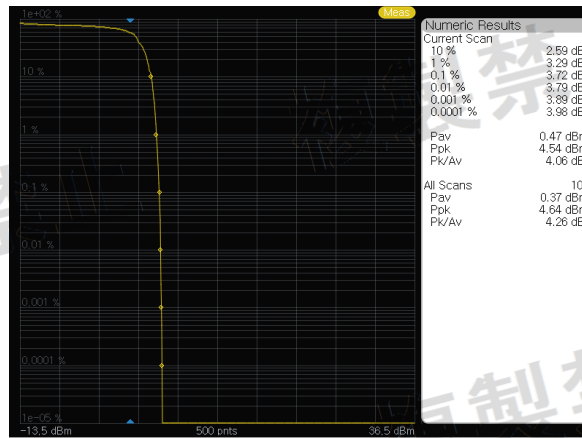
2496.5-12500MHz



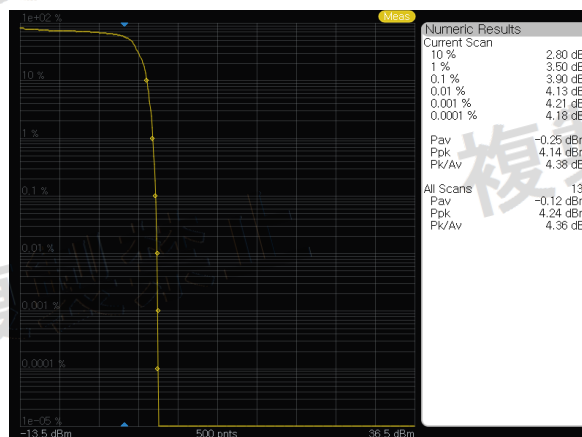
## 7. Test chart

### 7.4 RF output power tolerance (Rated voltage)

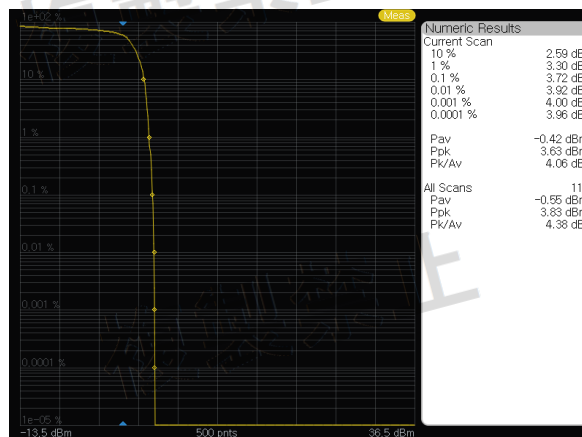
Ch.1: 2402MHz



Ch.40: 2441MHz

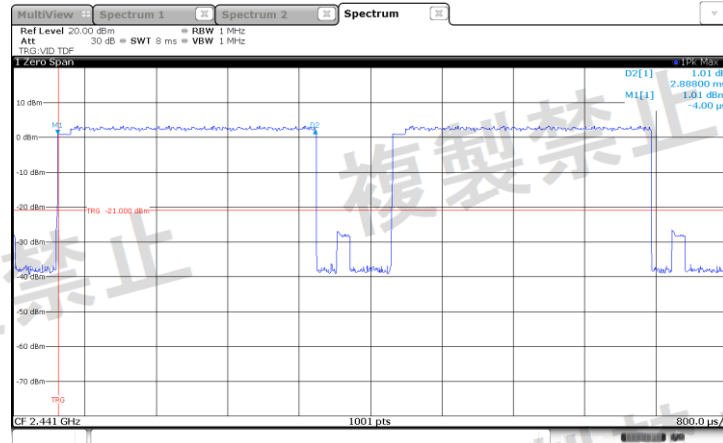


Ch.79: 2480MHz

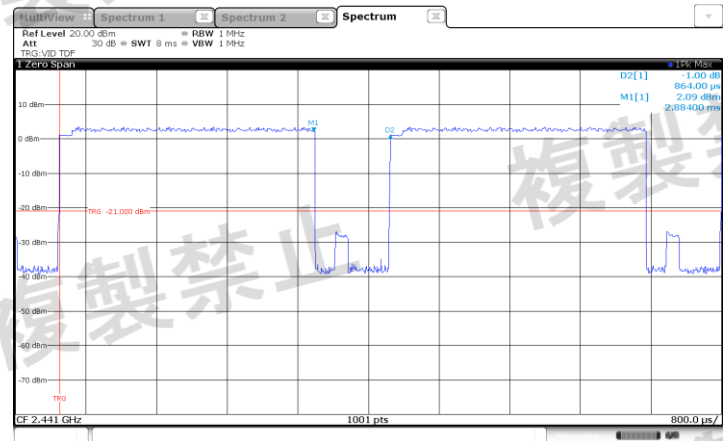




ON time



OFF time



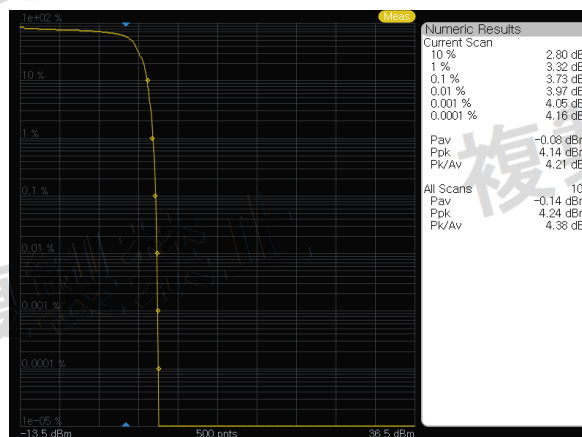
## 7. Test chart

### 7.4 RF output power tolerance (-10% voltage)

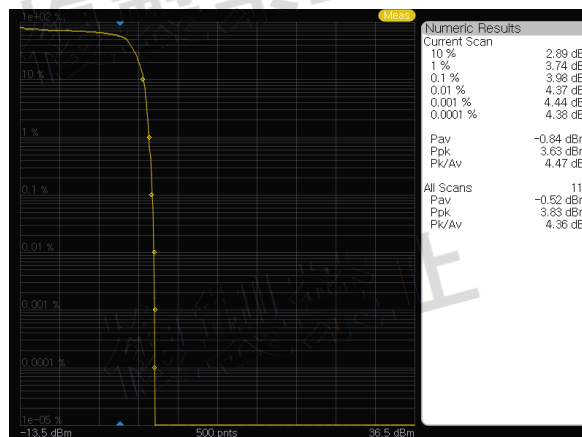
Ch.1: 2402MHz



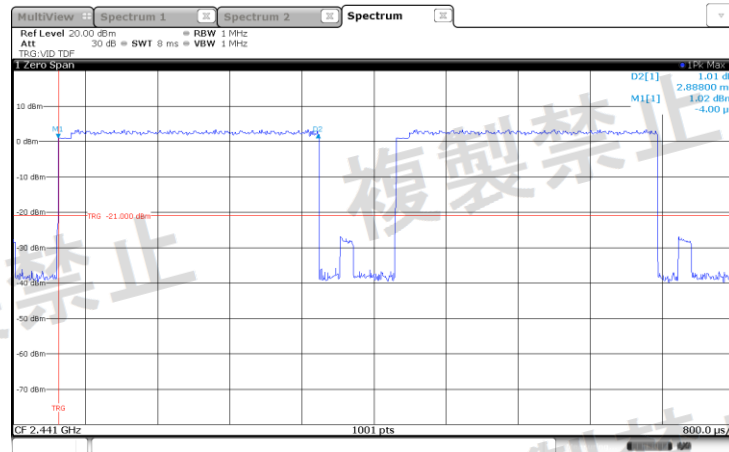
Ch.40: 2441MHz



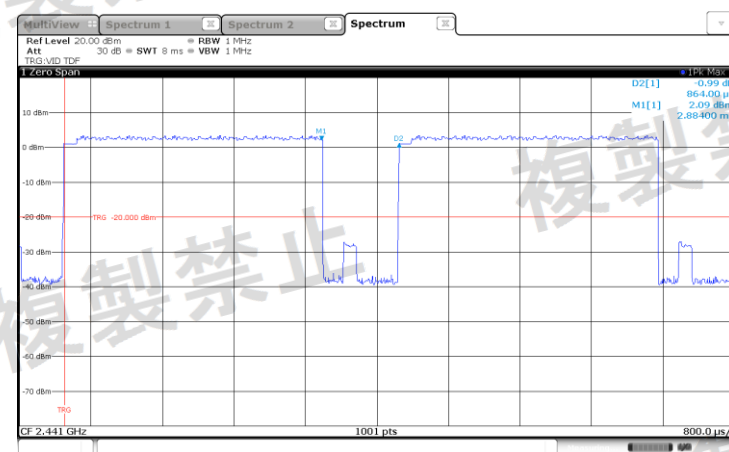
Ch.79: 2480MHz



ON time



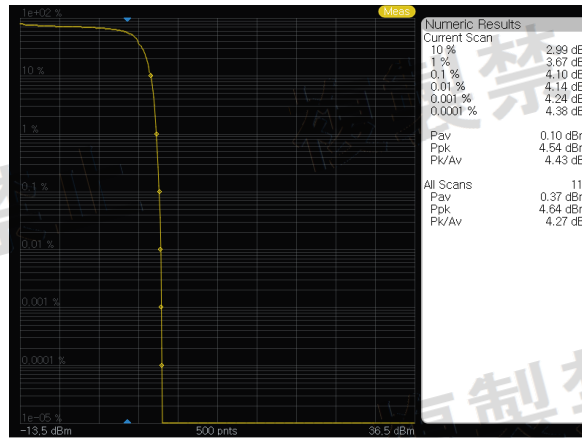
OFF time



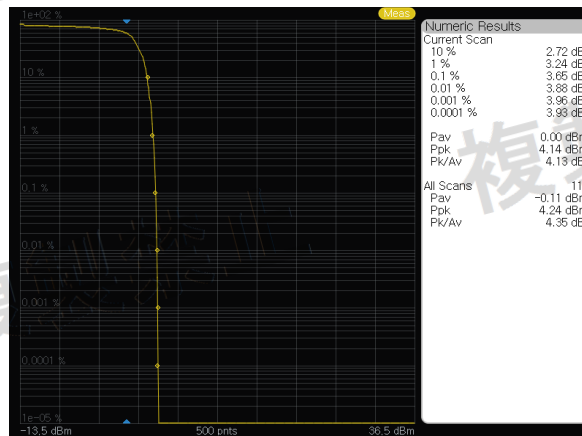
## 7. Test chart

### 7.4 RF output power tolerance (+10% voltage)

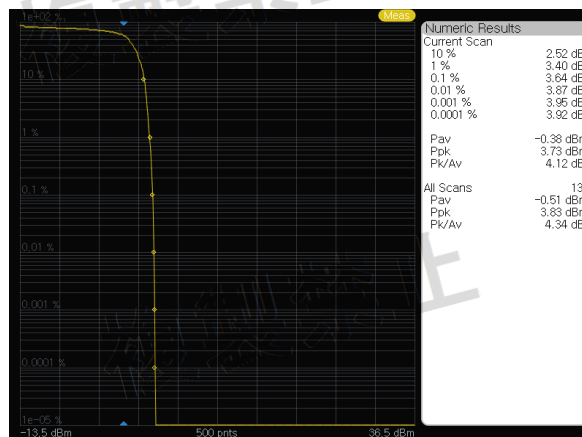
Ch.1: 2402MHz



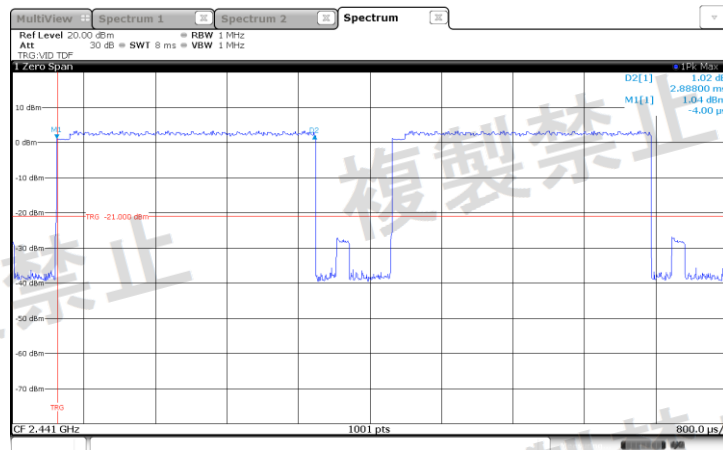
Ch.40: 2441MHz



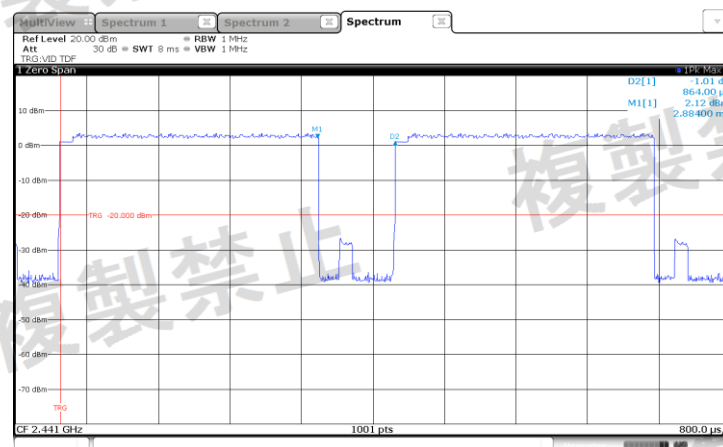
Ch.79: 2480MHz



ON time



OFF time

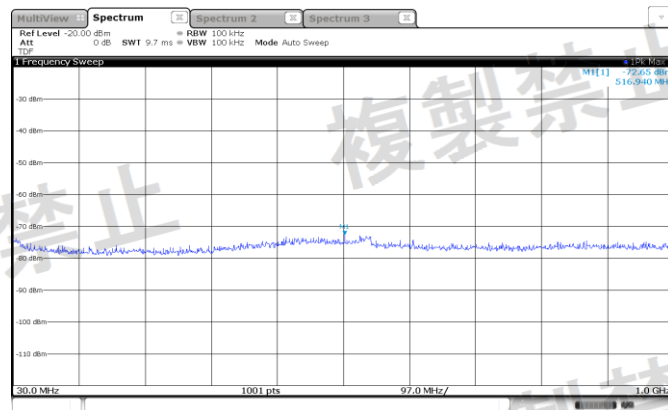




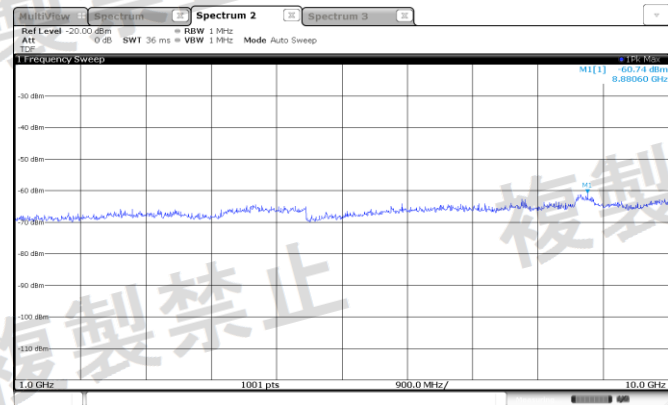
## 7. Test chart

### 7.5 Secondary emitted radio wave strength (Rated voltage)

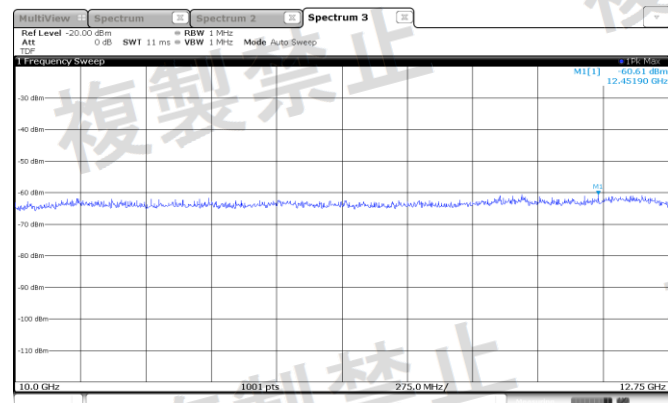
30MHz-1GHz



1-10GHz



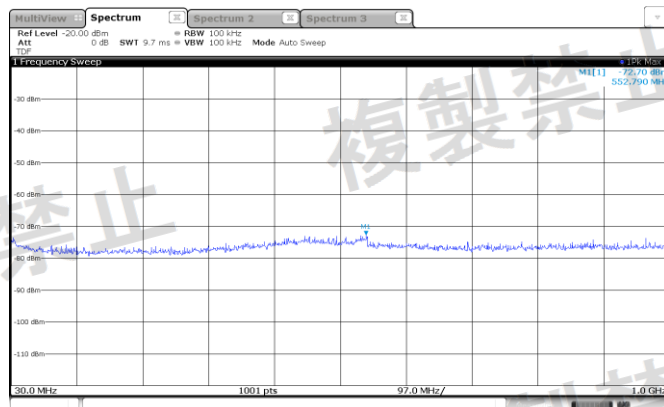
10-12.5GHz



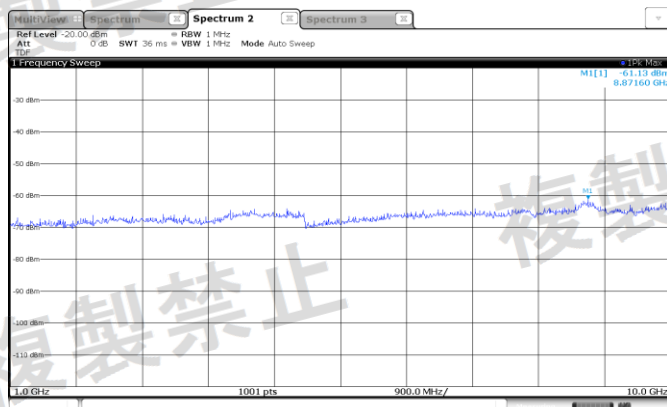
## 7. Test chart

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

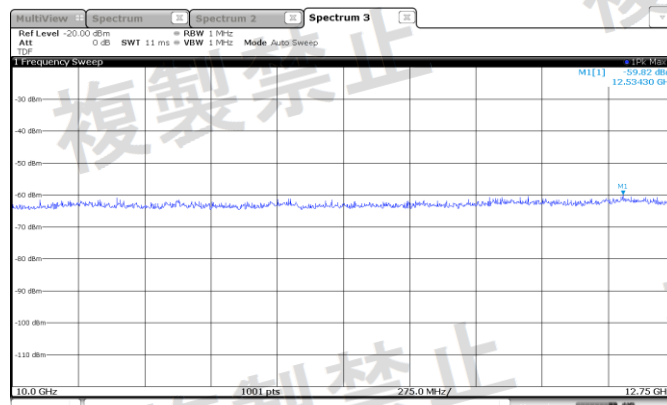
30MHz-1GHz



1-10GHz



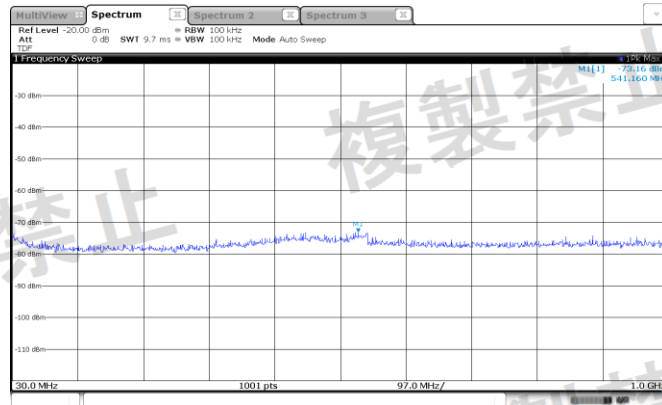
10-12.5GHz



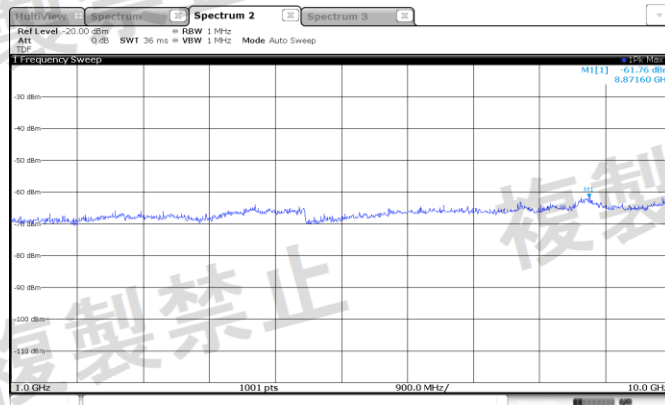
## 7. Test chart

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

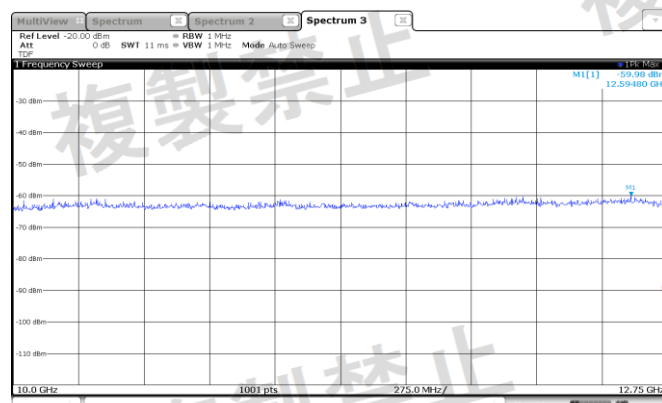
30MHz-1GHz



1-10GHz

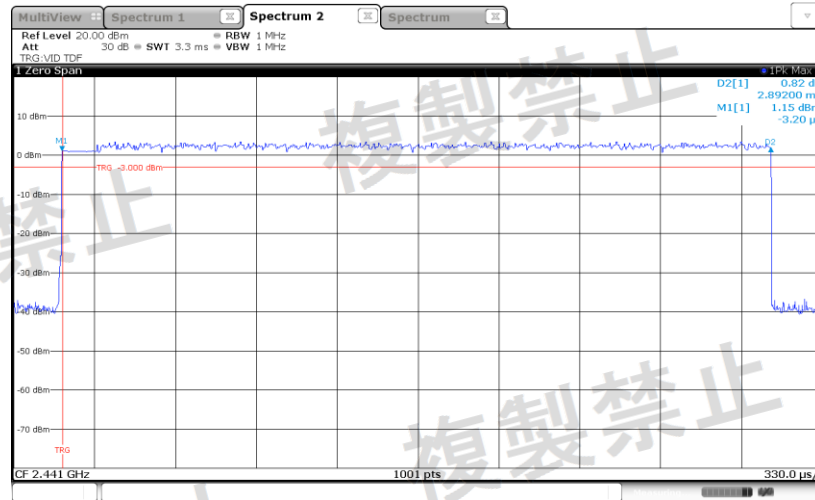


10-12.5GHz

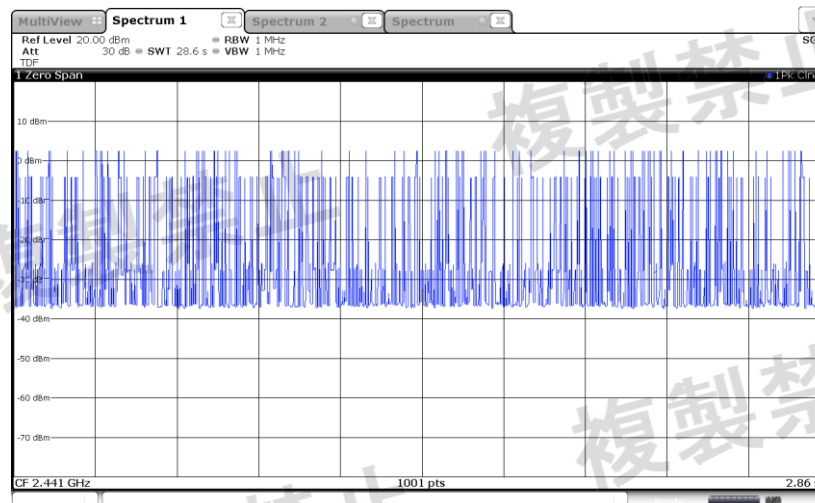


## 7. Test chart

### 7.6 Time of occupancy (Rated voltage)

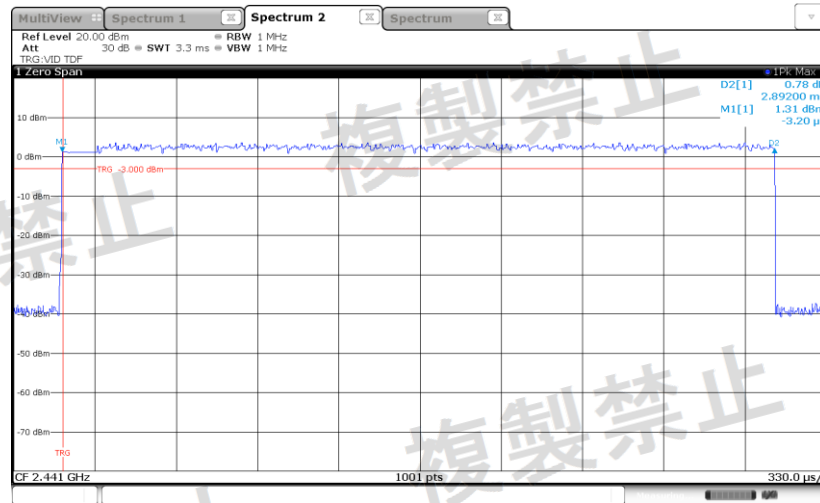


$$\text{Sweep time} = (0.4\text{sec} \times \text{Spread rate})$$

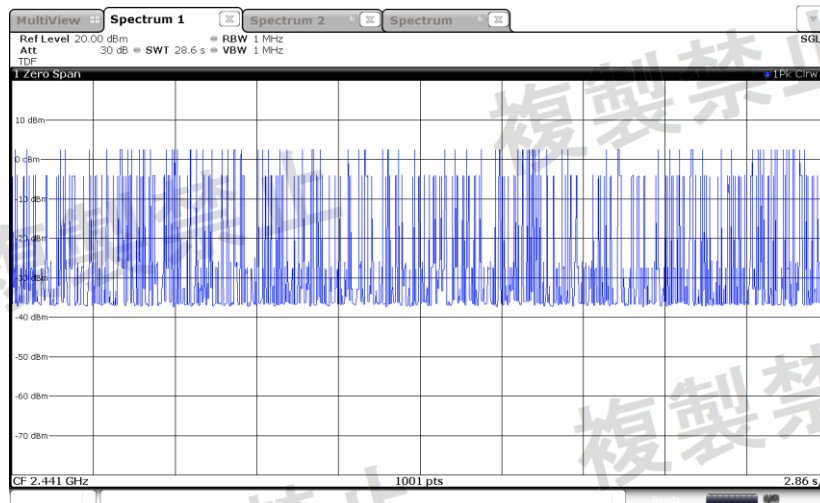


## 7. Test chart

### 7.6 Time of occupancy (-10% voltage)



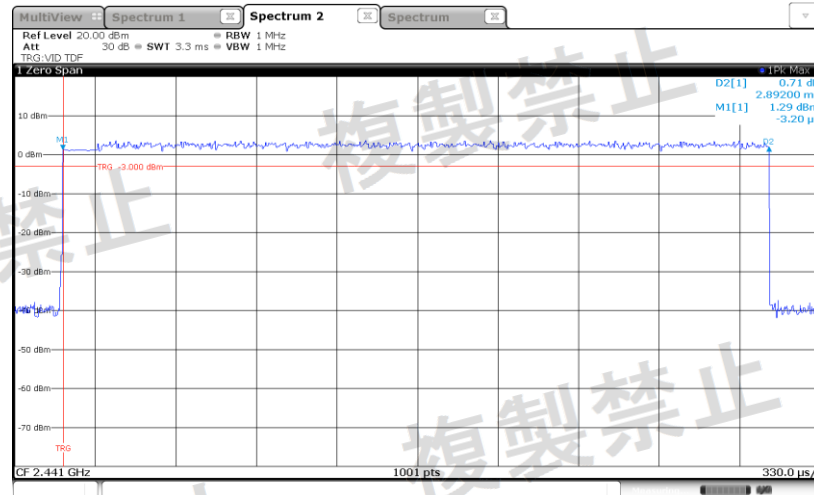
Sweep time = (0.4secxSpread rate)





## 7. Test chart

### 7.6 Time of occupancy (+10% voltage)



$$\text{Sweep time} = (0.4\text{sec} \times \text{Spread rate})$$

