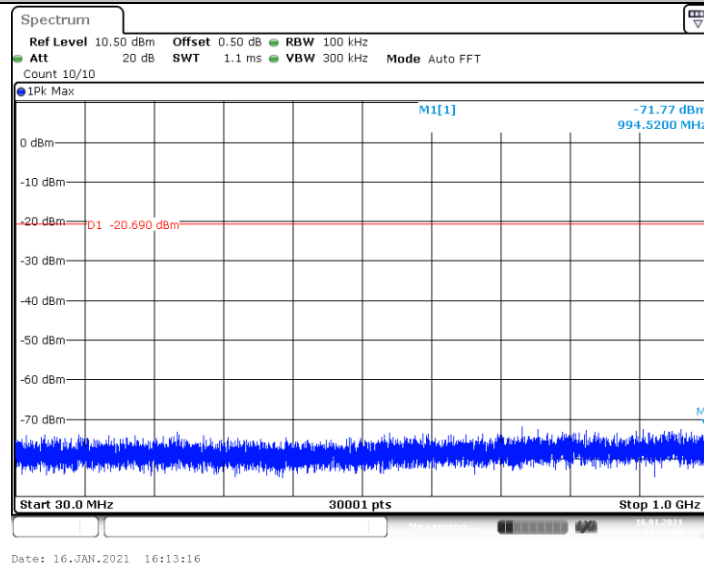
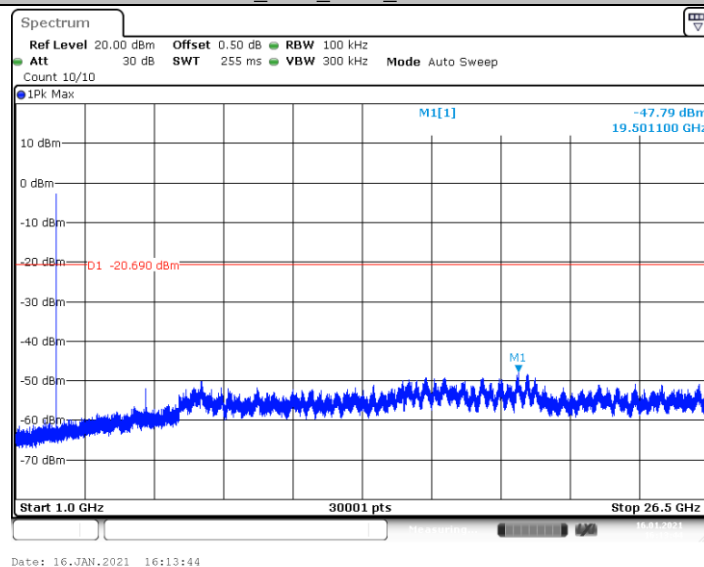


## 3DH5\_Ant1\_2480\_30~1000



## 3DH5\_Ant1\_2480\_1000~26500



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### 3.3. Band Edge Emissions

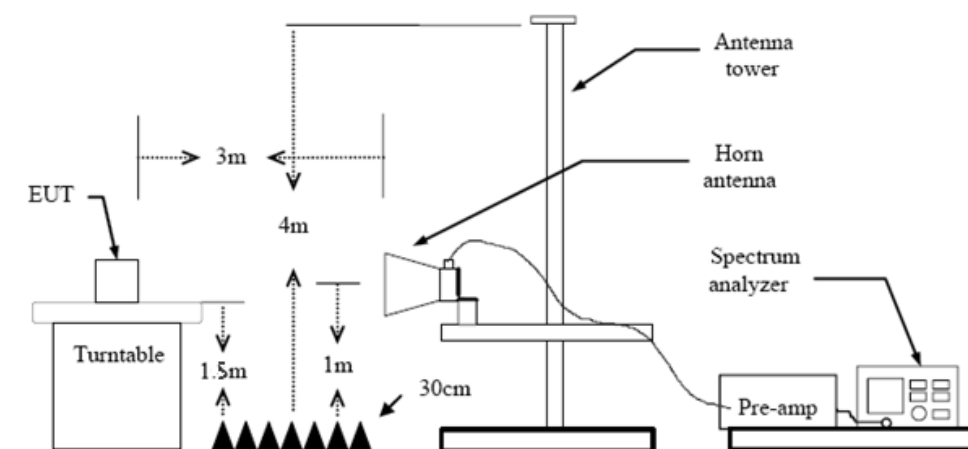
#### Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

Restricted Frequency Band (MHz)	(dBuV/m)(at 3m)	
	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54

Conducted band edge limit: The highest point of the operating frequency waveform down 20dB

#### Test Configuration

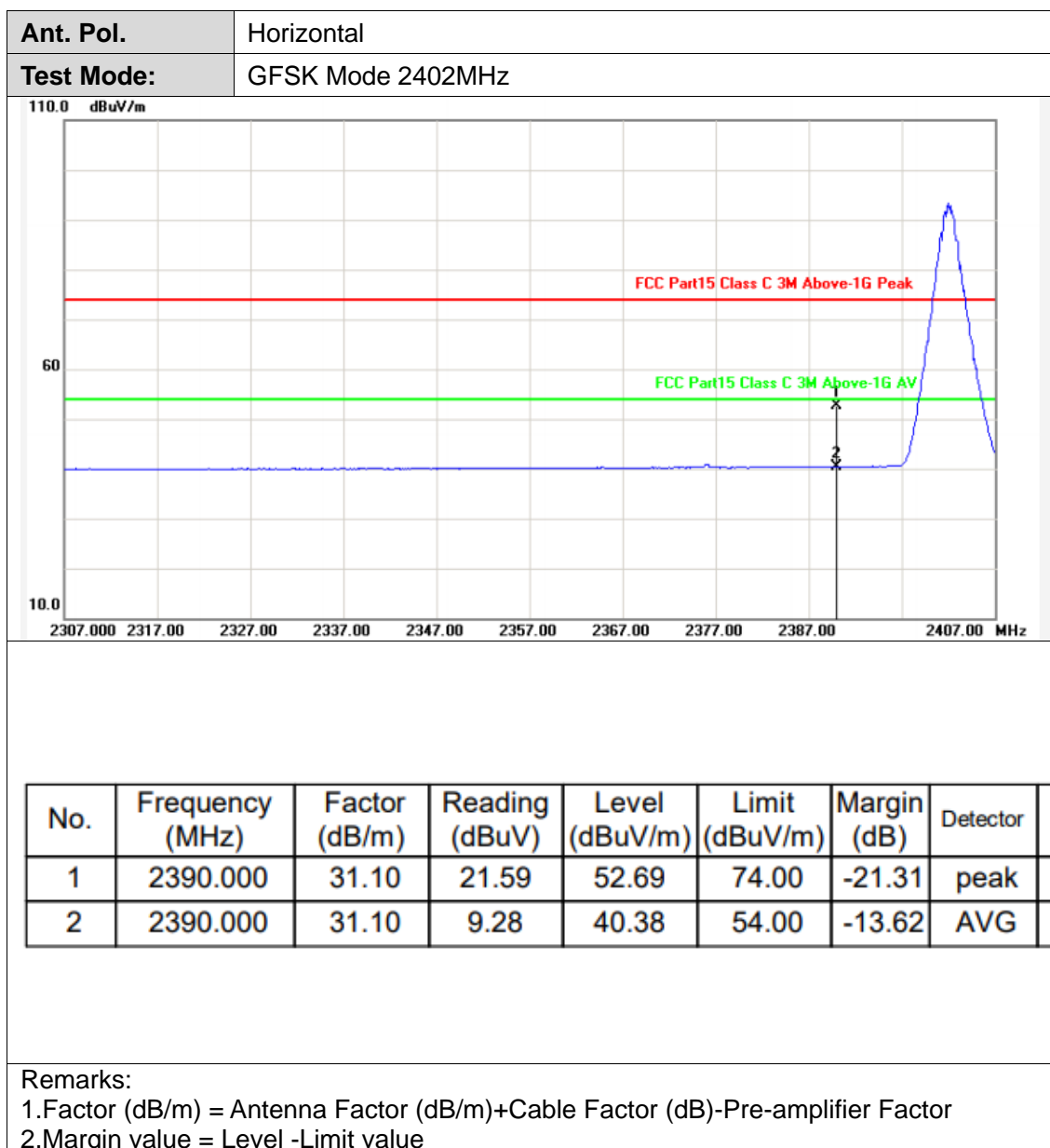


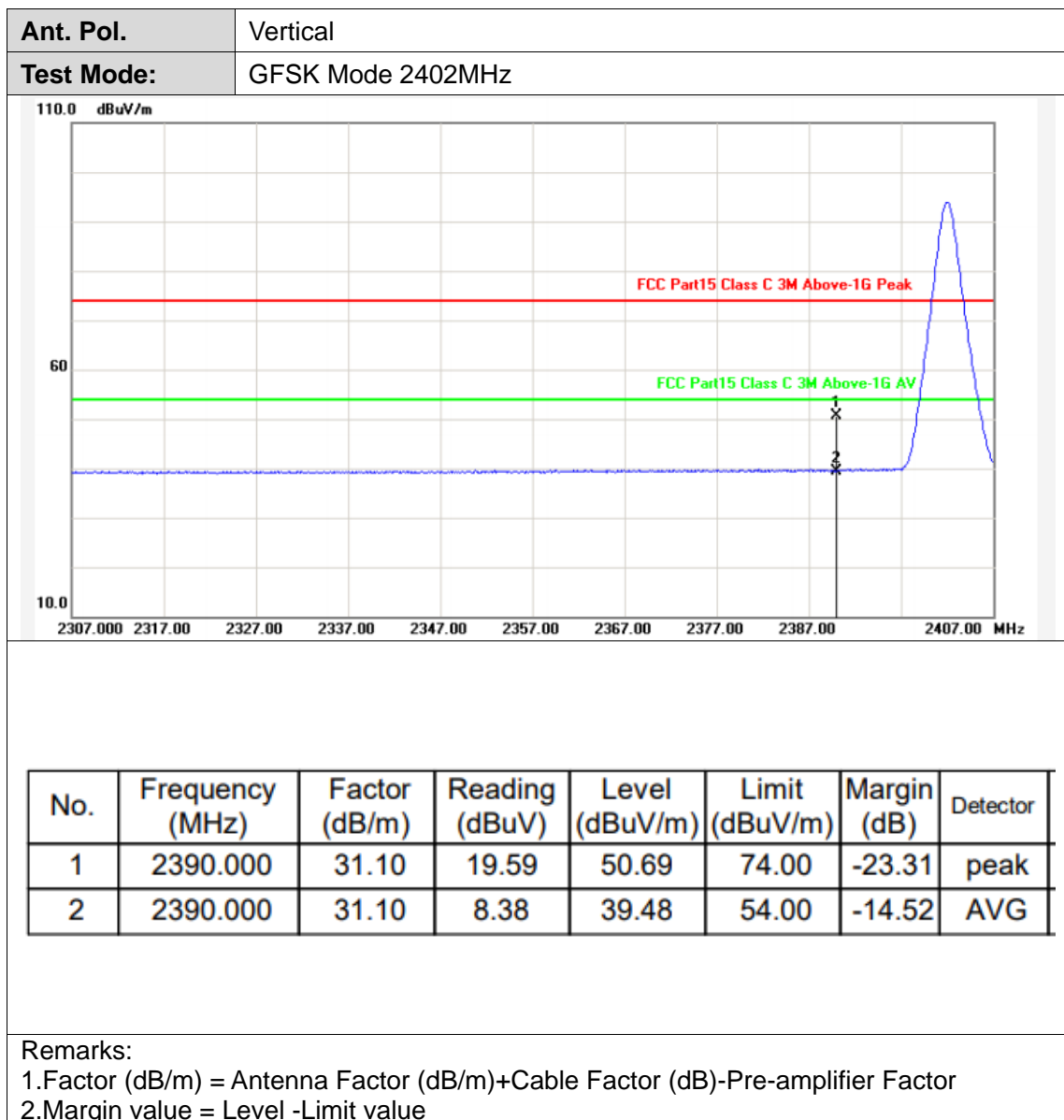
#### Test Procedure

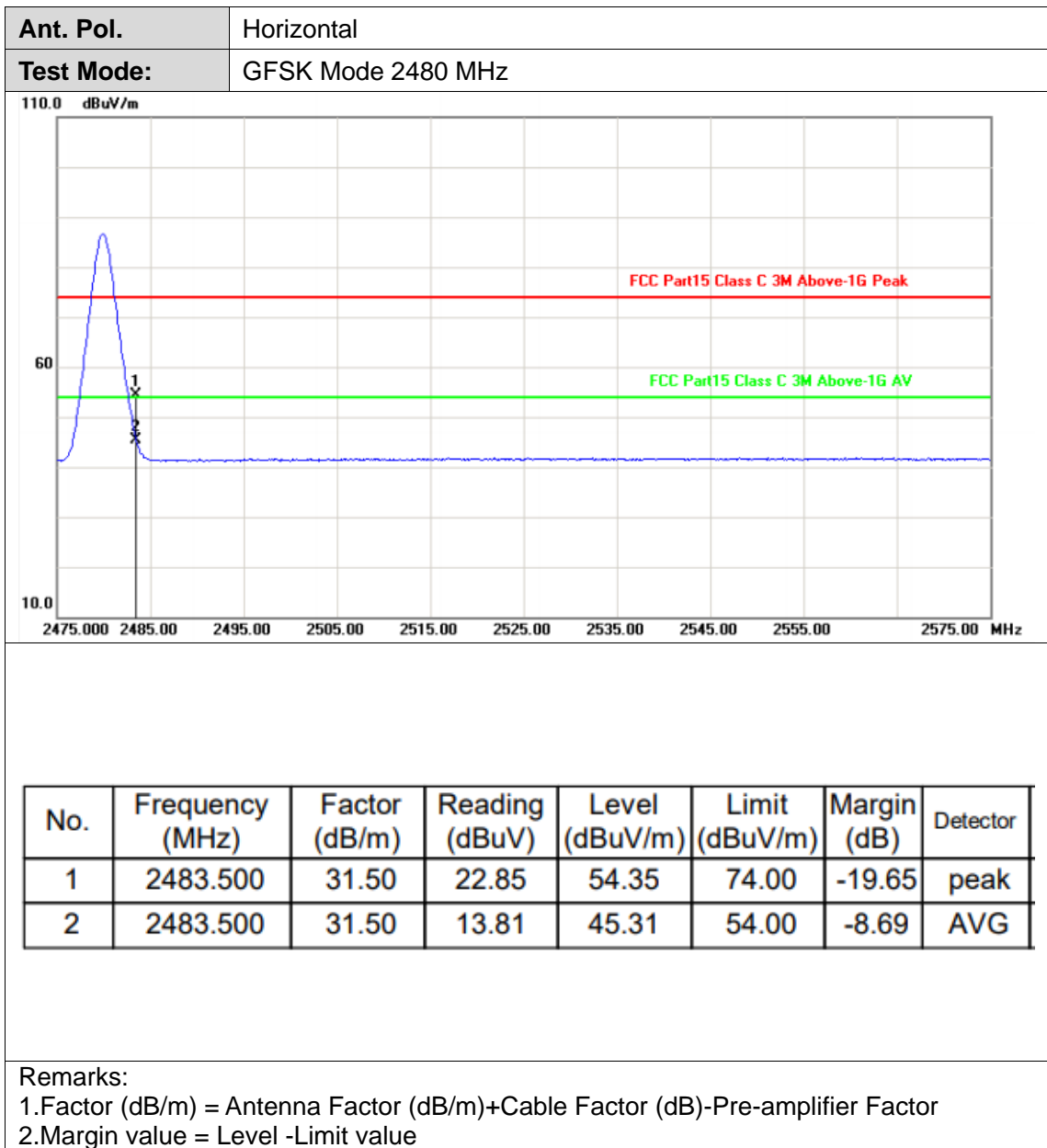
1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5. The receiver set as follow:  
RBW=1MHz, VBW=3MHz PEAK detector for Peak value.  
RBW=1MHz, VBW=10Hz with PEAK Detector for Average Value.

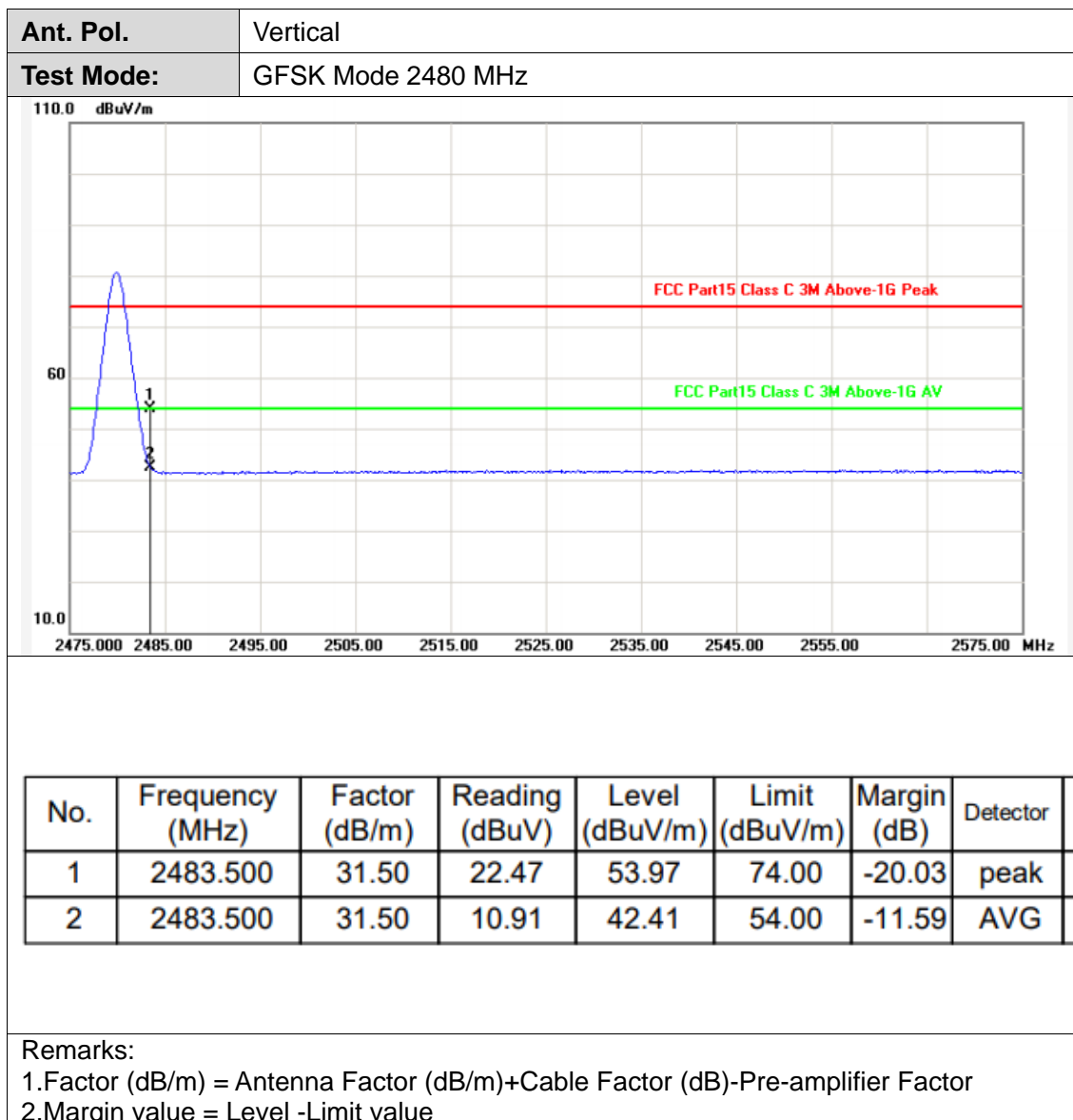
#### Test Mode

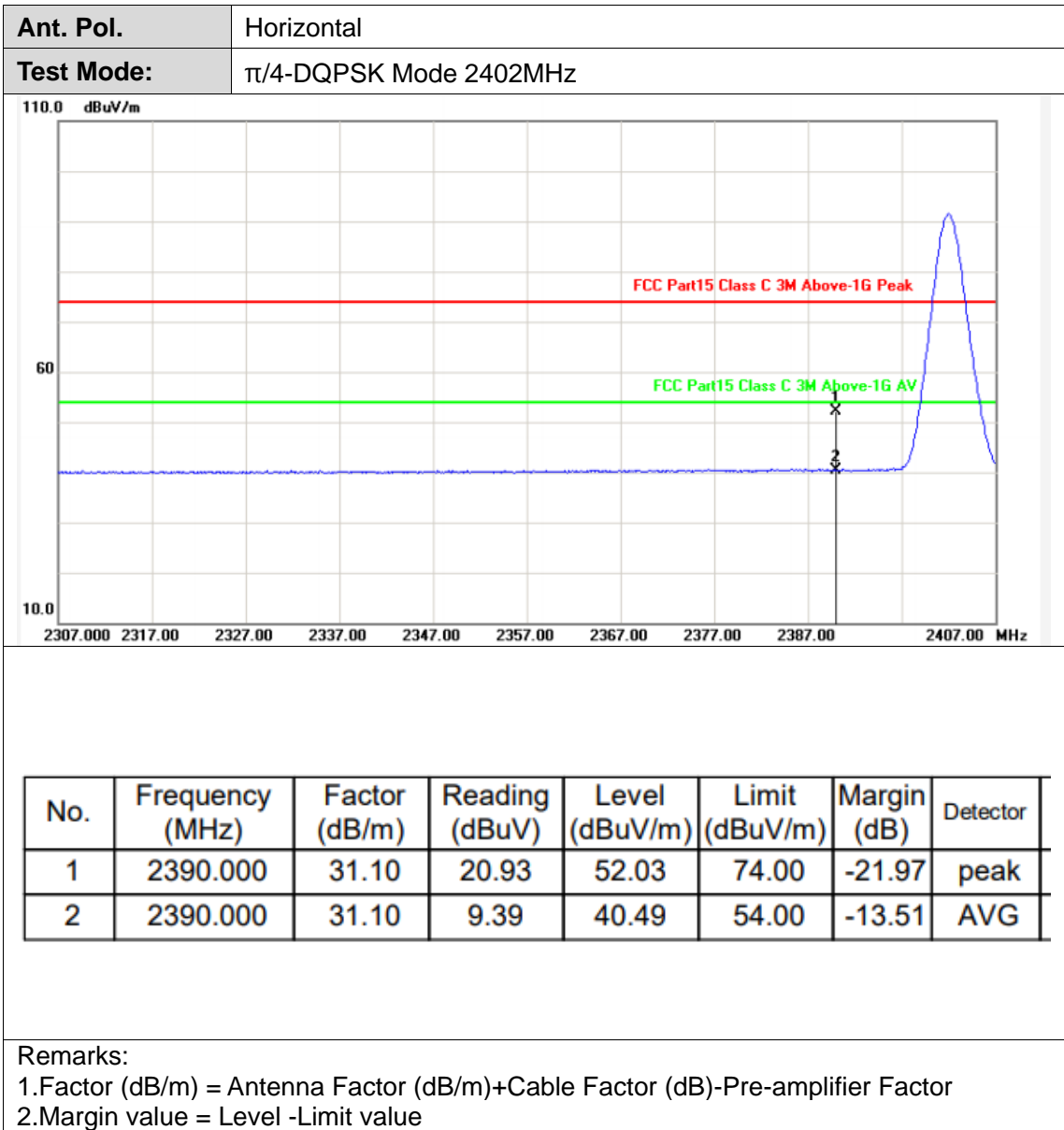
Please refer to the clause 2.3.

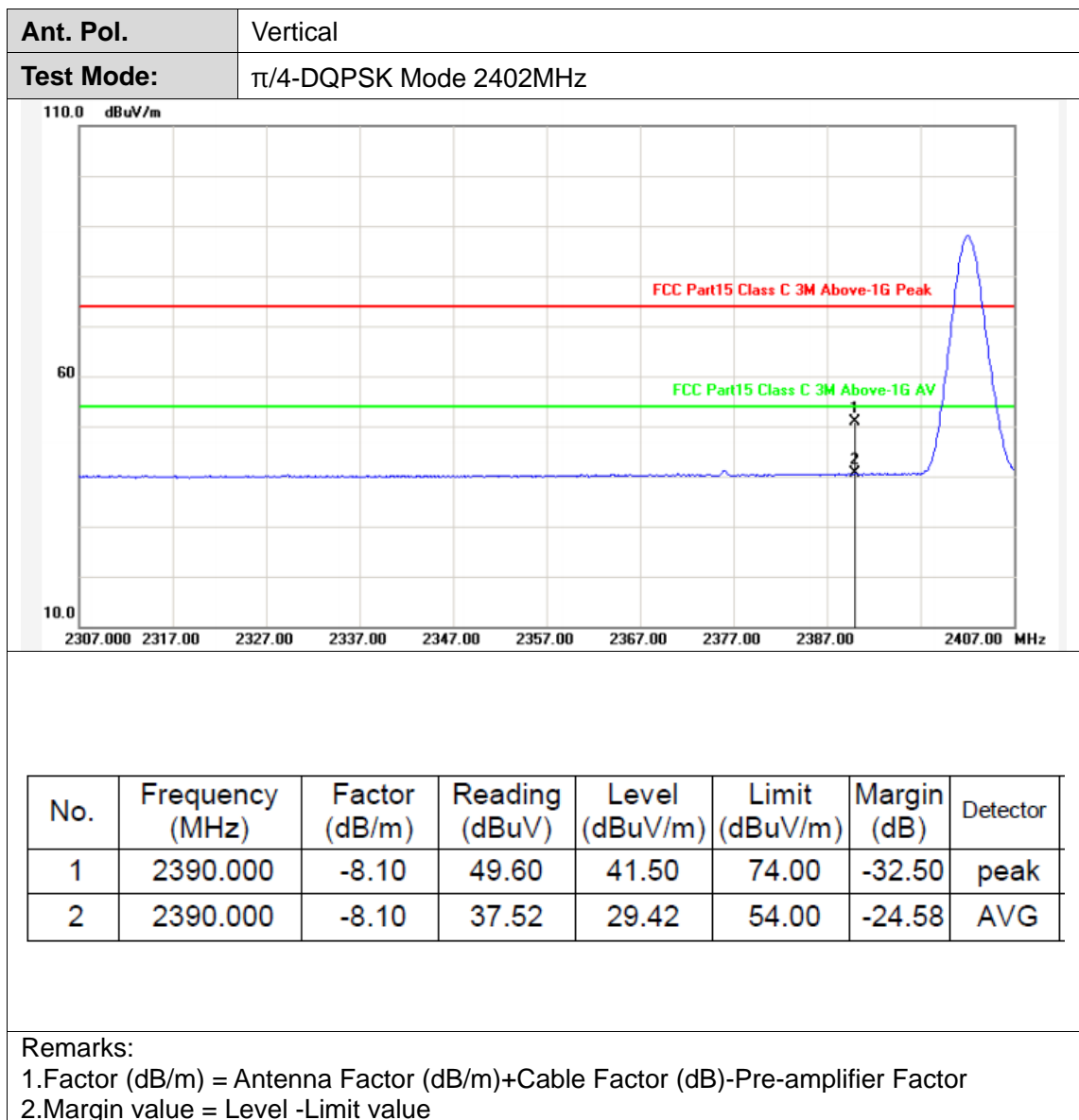
**Test Results****(1) Radiation Test**



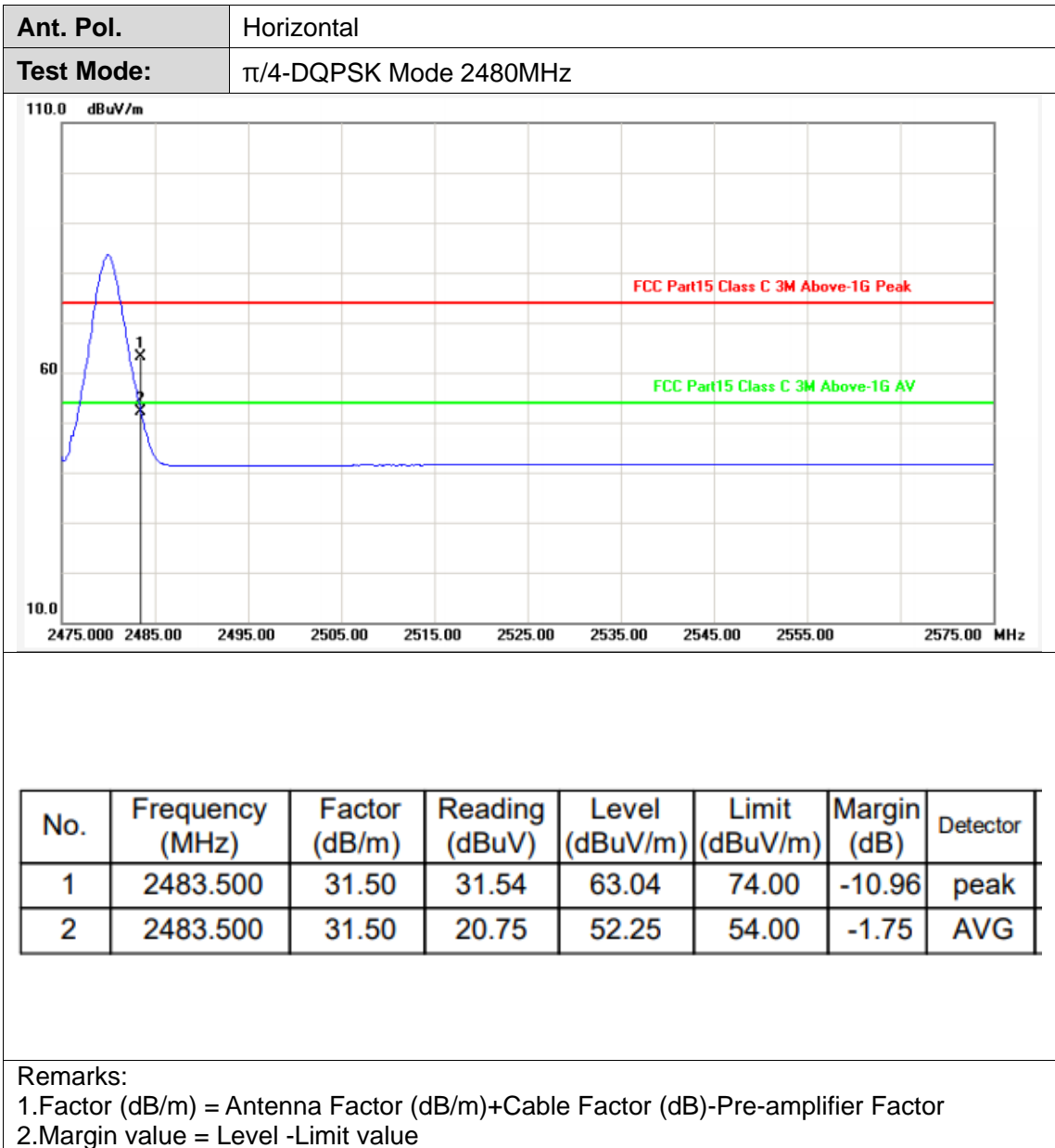


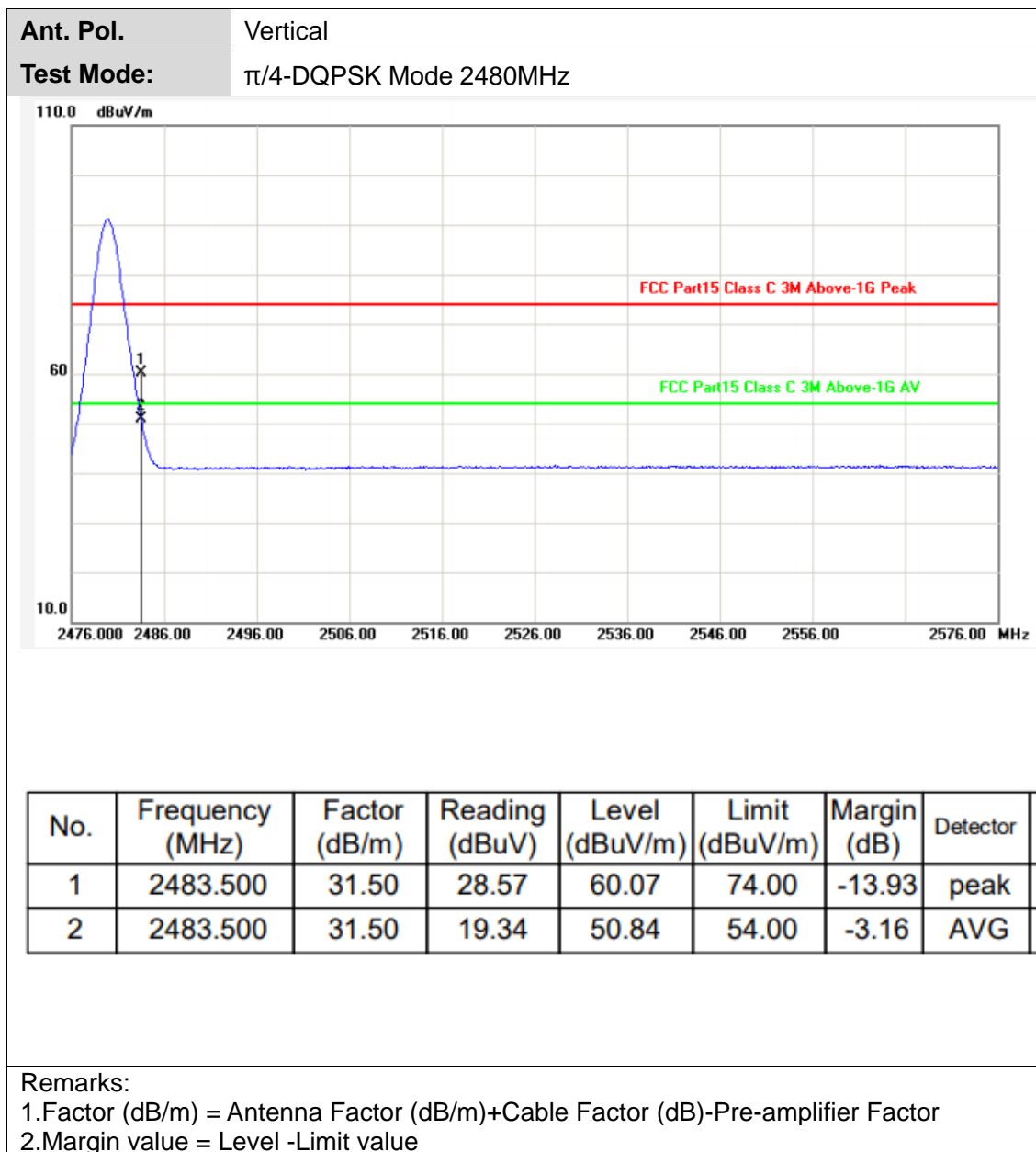


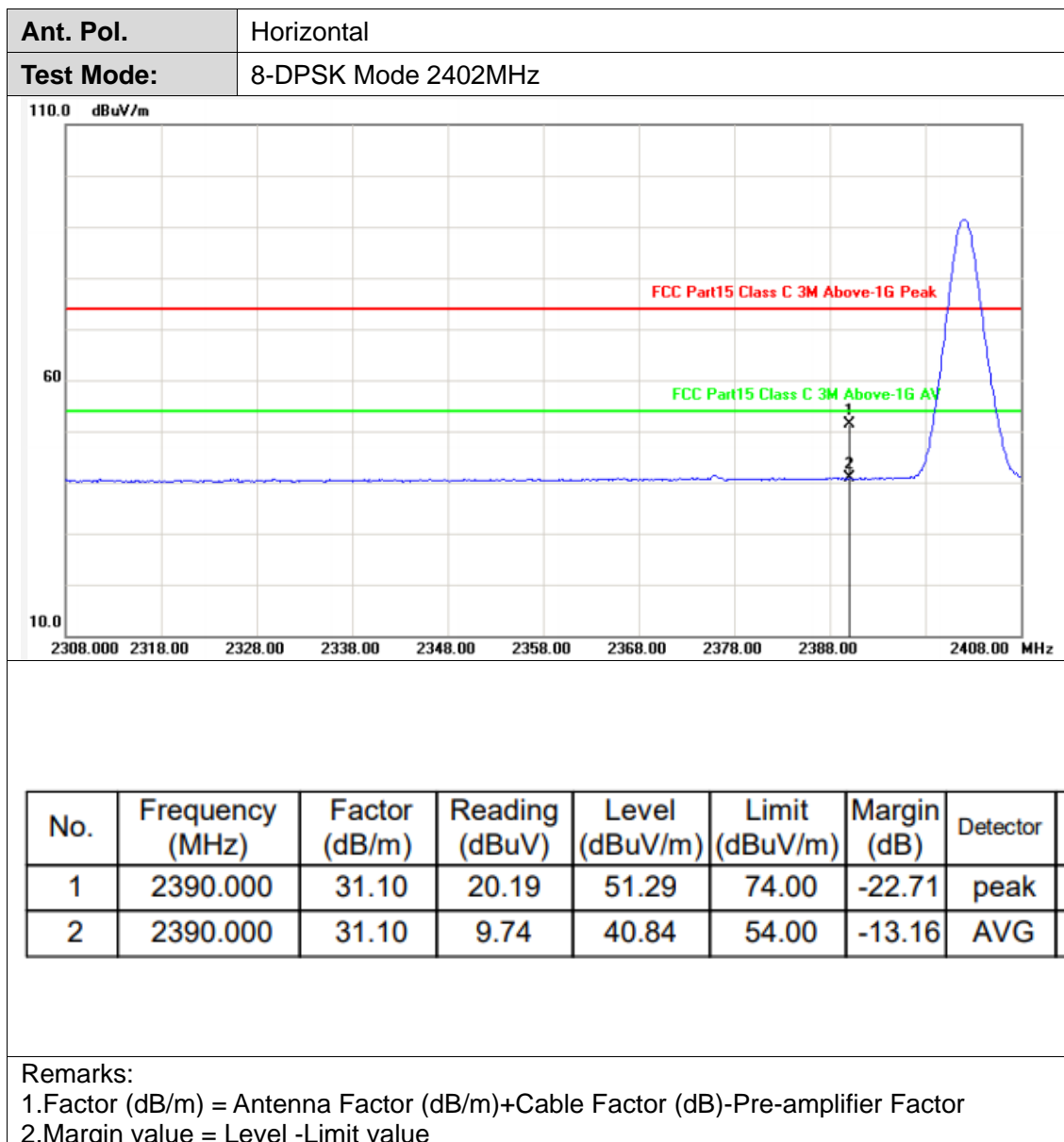


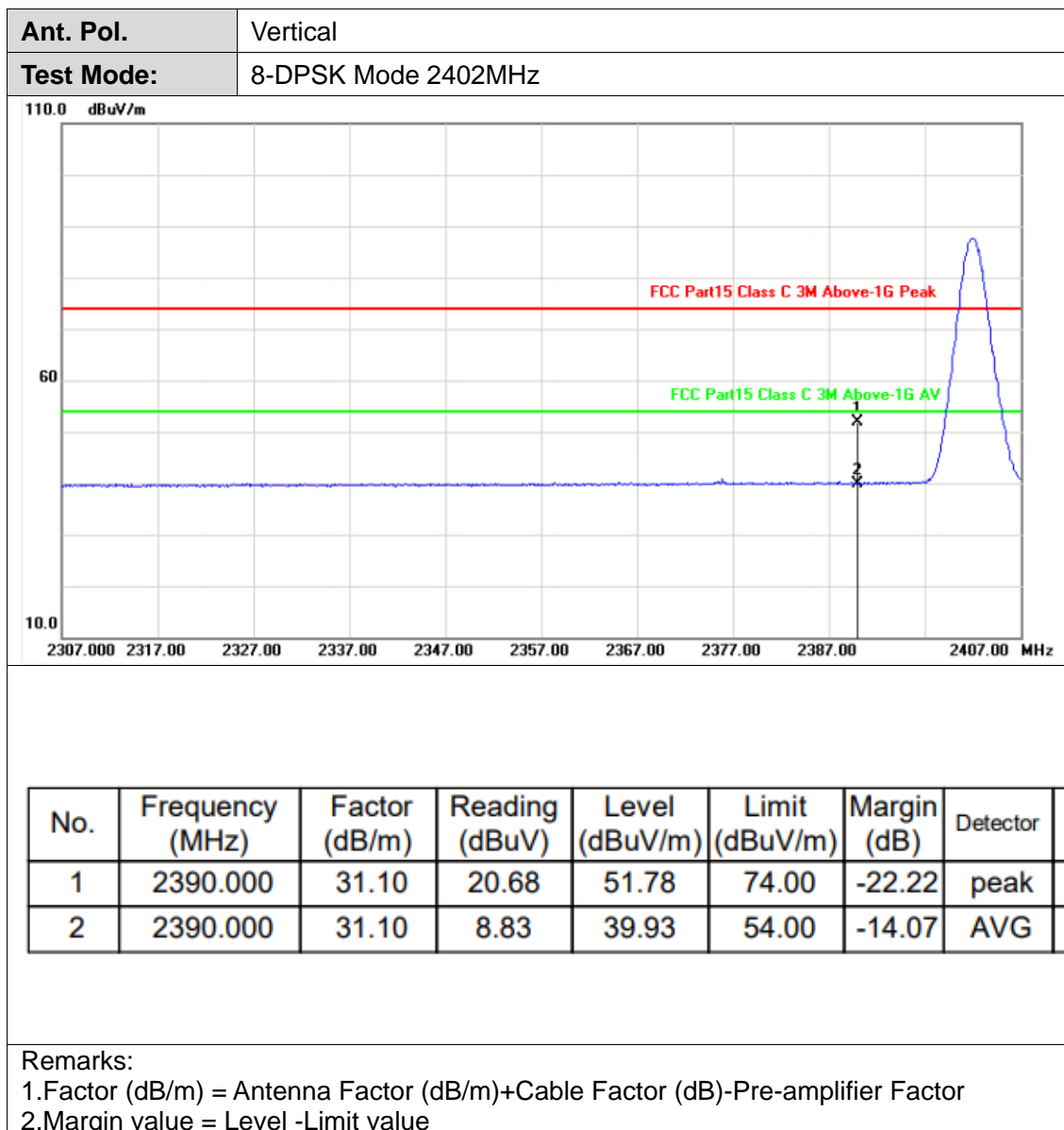


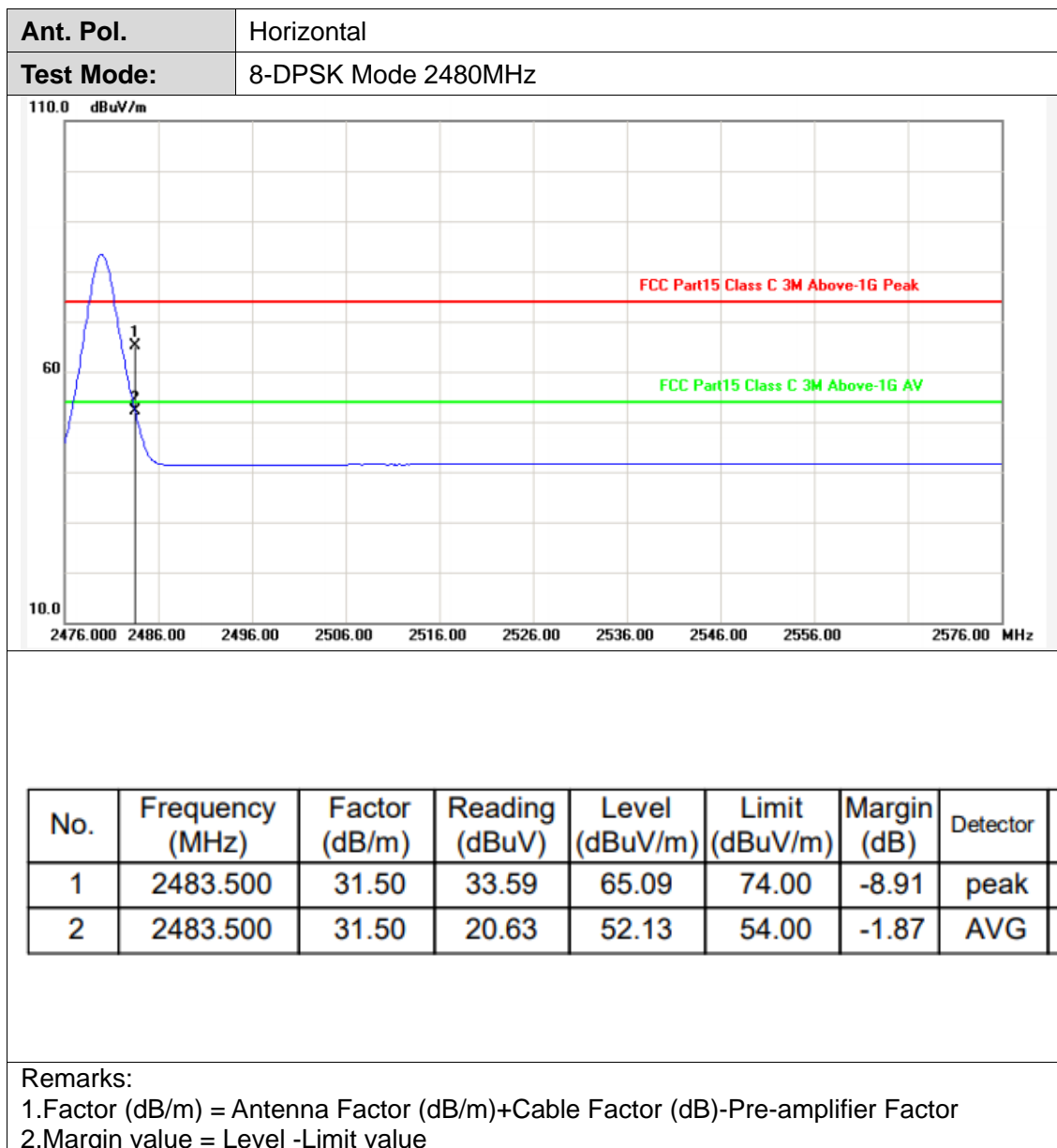


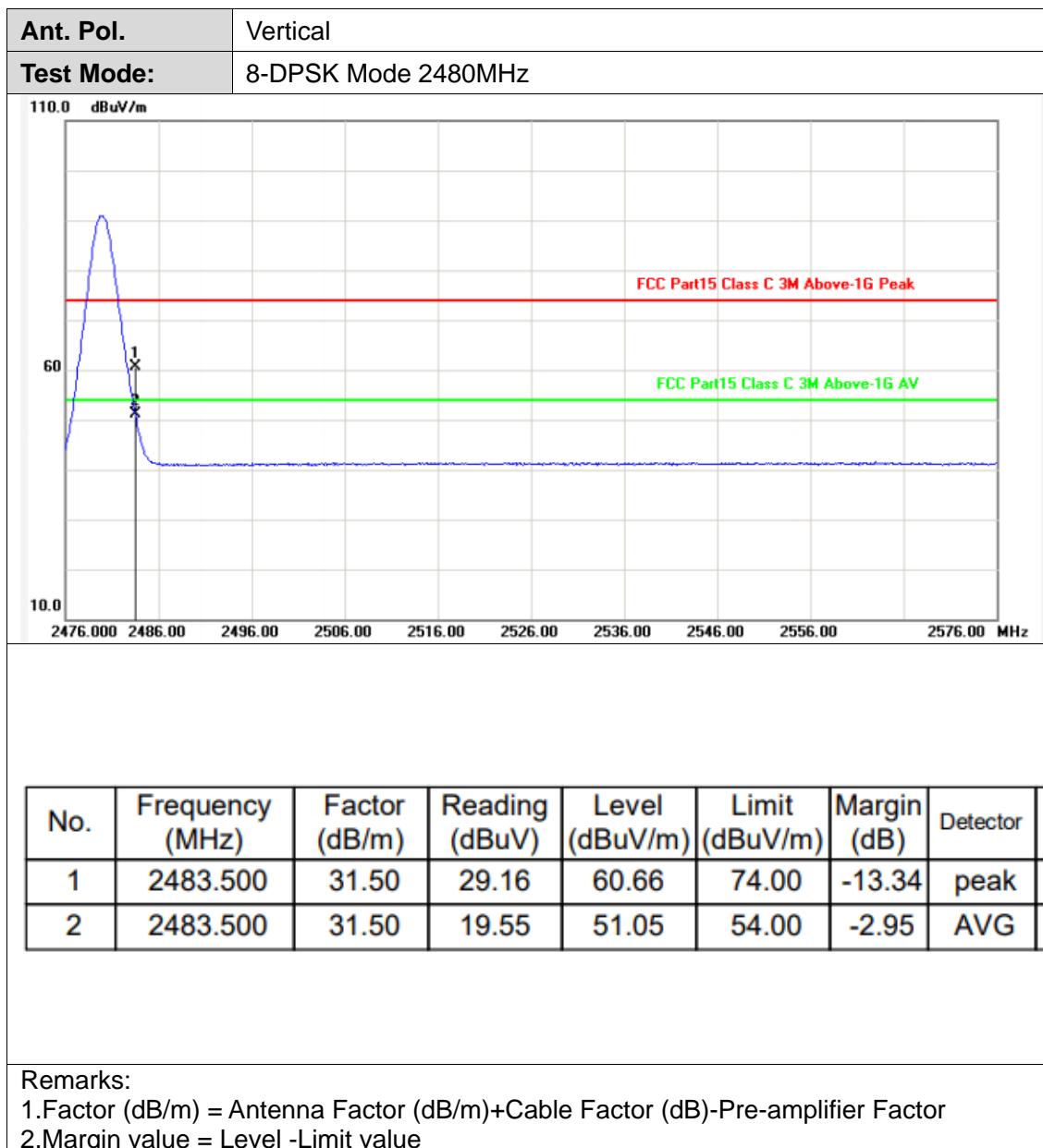














## (2) Conducted Test



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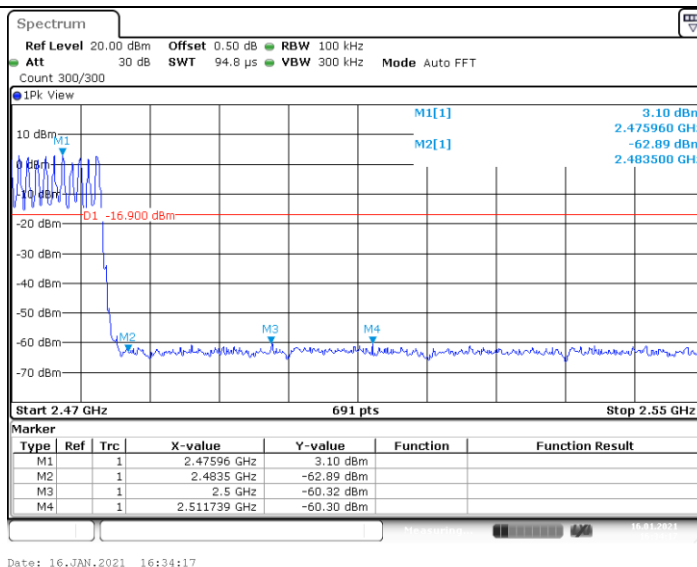
1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

Tel.: (86)755-27521059

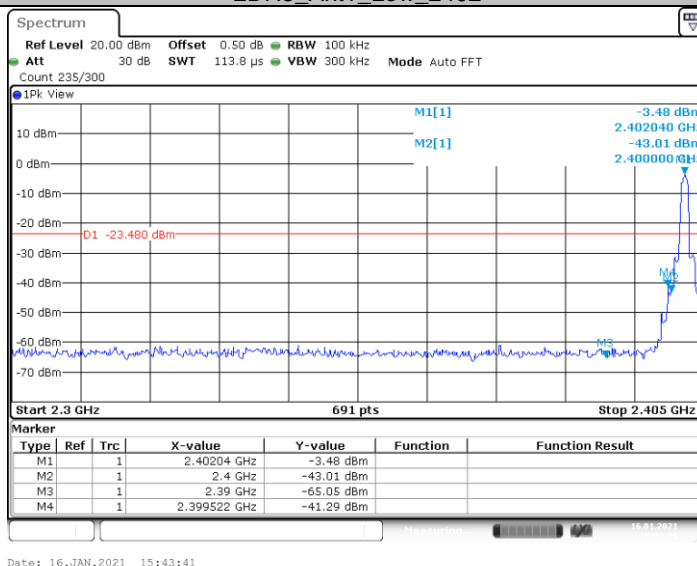
Fax: (86)755-27521011

Http://www.sz-ctc.org.cn

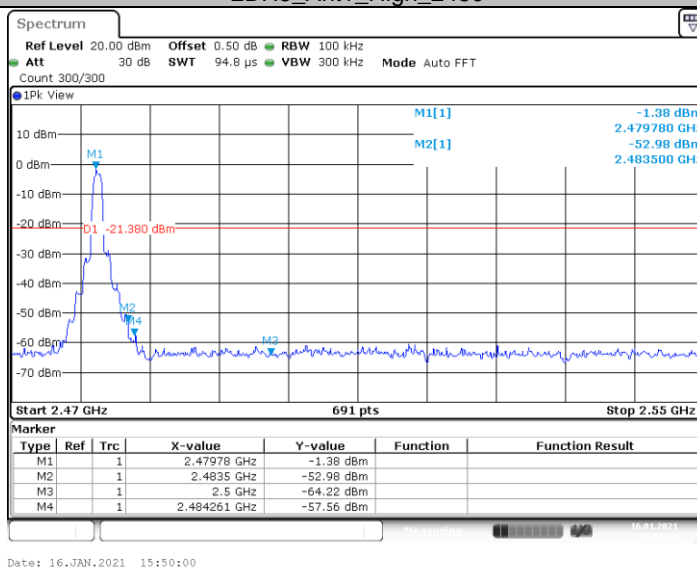
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## 2DH5\_Ant1\_Low\_2402



## 2DH5\_Ant1\_High\_2480



## 2DH5\_Ant1\_Low\_Hop\_2402

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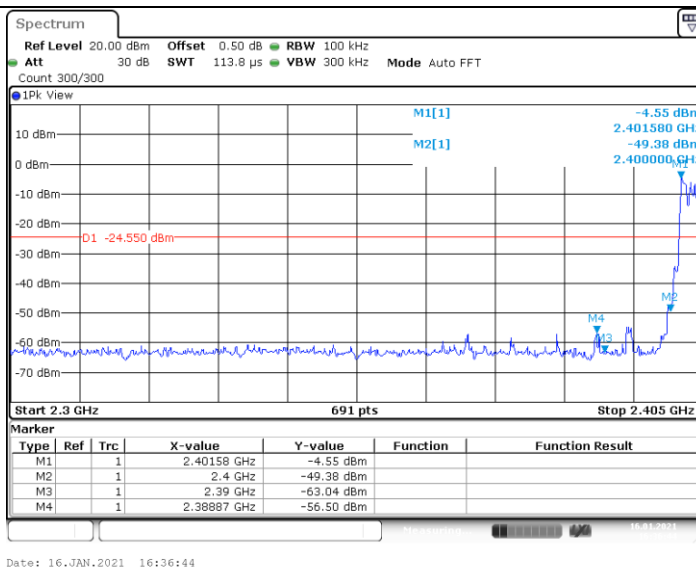
Tel.: (86)755-27521059

Fax: (86)755-27521011

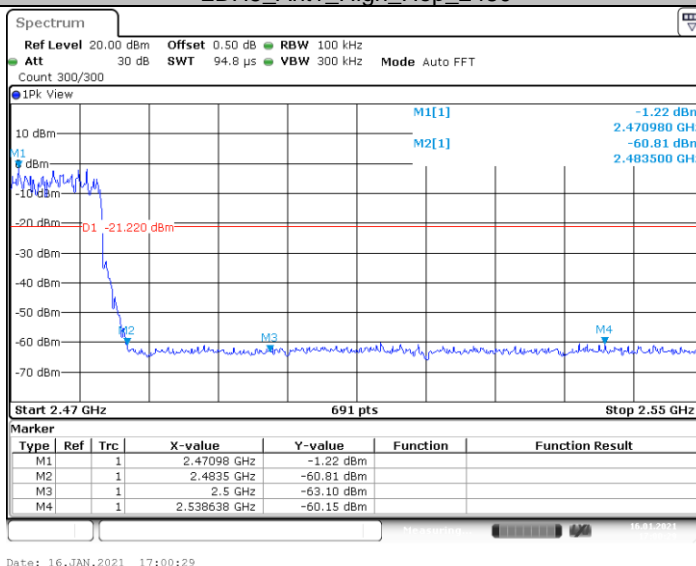
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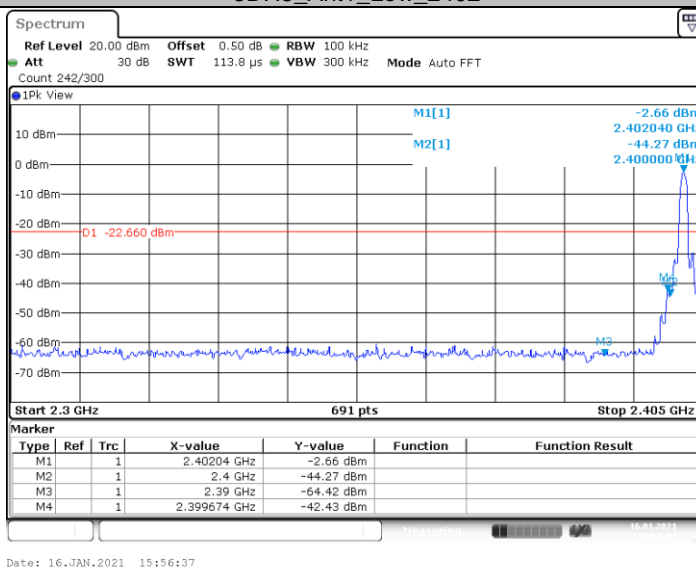




## 2DH5\_Ant1\_High\_Hop\_2480



## 3DH5\_Ant1\_Low\_2402



## 3DH5\_Ant1\_High\_2480

CTC Laboratories, Inc.

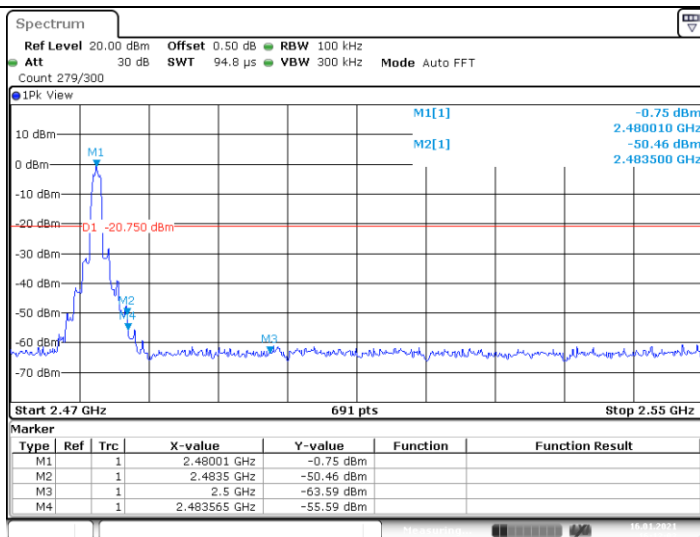
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Tel.: (86)755-27521059

Fax: (86)755-27521011

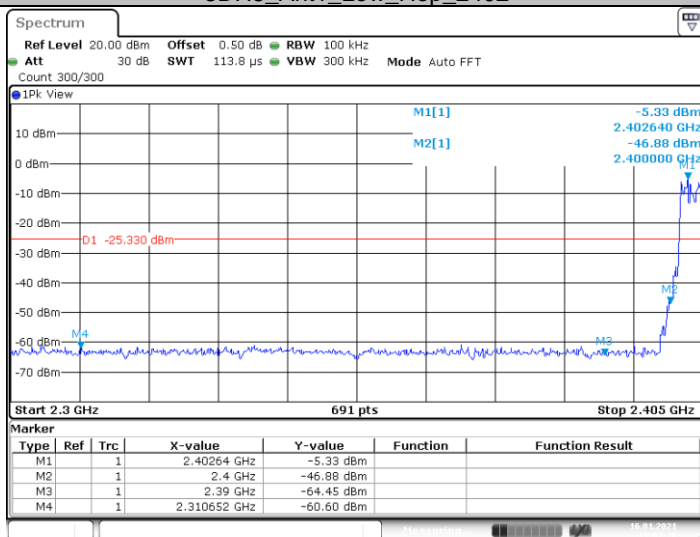
Http://www.sz-ctc.org.cn

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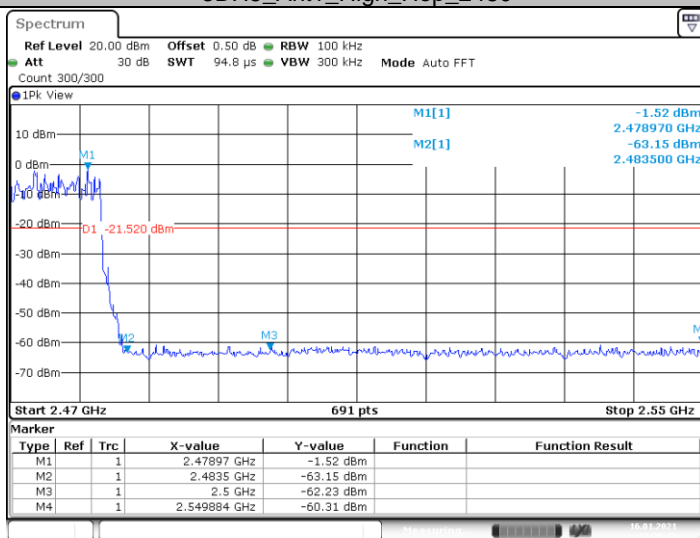
Date: 16.JAN.2021 16:12:03

## 3DH5\_Ant1\_Low\_Hop\_2402



Date: 16.JAN.2021 17:02:26

## 3DH5\_Ant1\_High\_Hop\_2480



Date: 16.JAN.2021 17:26:13

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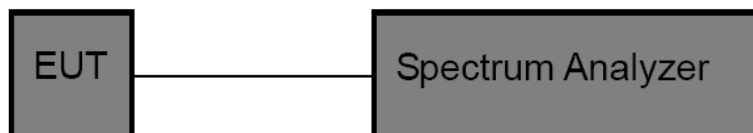


### 3.4. Occupied Channel Bandwidth and 20dB Bandwidth

#### Limit

N/A

#### Test Configuration



#### Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. OCB and 20dB Spectrum Setting:
  - (1) Set RBW = 1% ~ 5% occupied bandwidth.
  - (2) Set the video bandwidth (VBW)  $\geq 3$  RBW.
  - (3) Detector = Peak.
  - (4) Trace mode = Max hold.
  - (5) Sweep = Auto couple.

Note: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

#### Test Mode

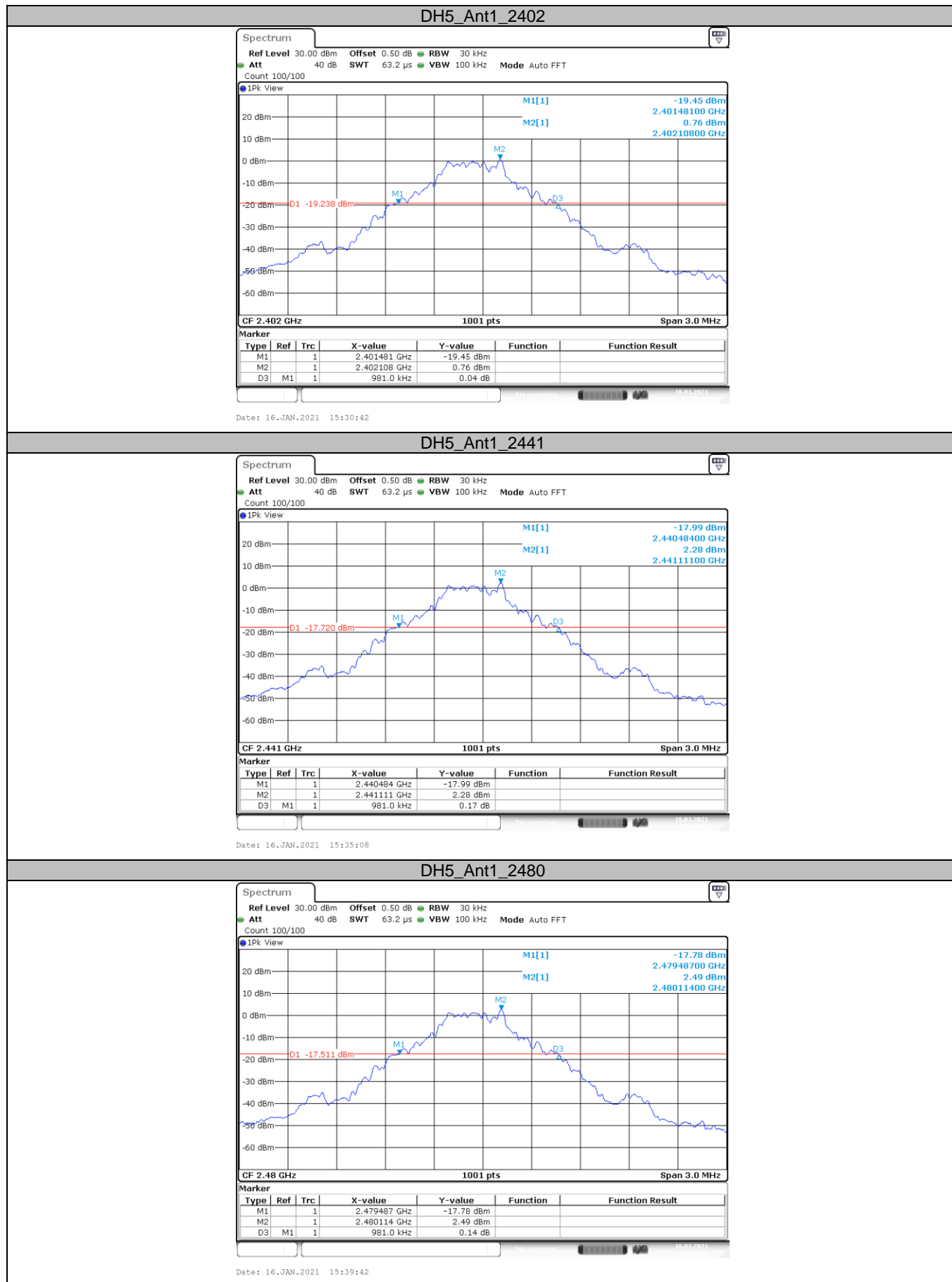
Please refer to the clause 2.3.

#### Test Results

Modulation type	Channel	99% Bandwidth (MHz)	20dB Bandwidth (MHz)	20dB Bandwidth *2/3 (MHz)
GFSK	00	0.896	0.981	0.654
	39	0.899	0.981	0.654
	78	0.899	0.981	0.654
$\pi/4$ -DQPSK	00	1.232	1.356	0.904
	39	1.220	1.356	0.904
	78	1.223	1.356	0.904
8-DPSK	00	1.211	1.308	0.872
	39	1.214	1.311	0.874
	78	1.214	1.338	0.892



20dB Bandwidth



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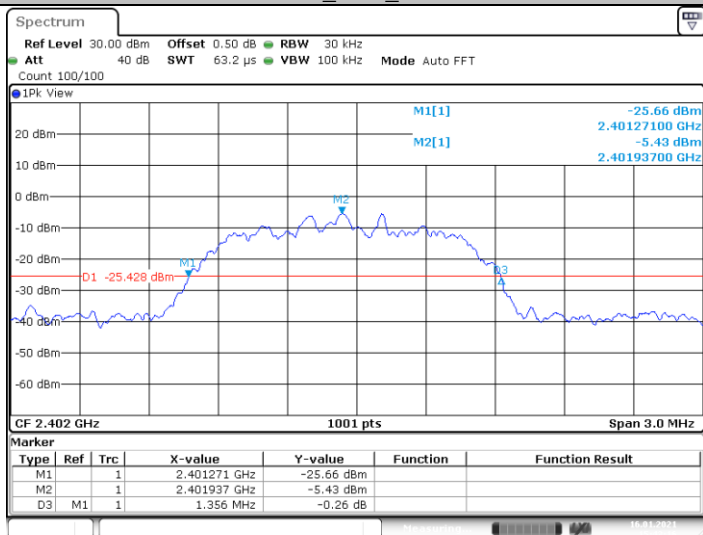
Http://www.sz-ctc.org.cn



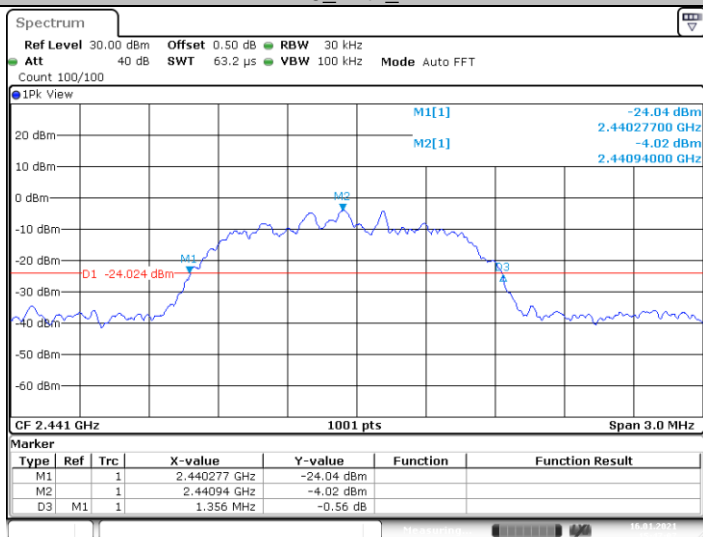
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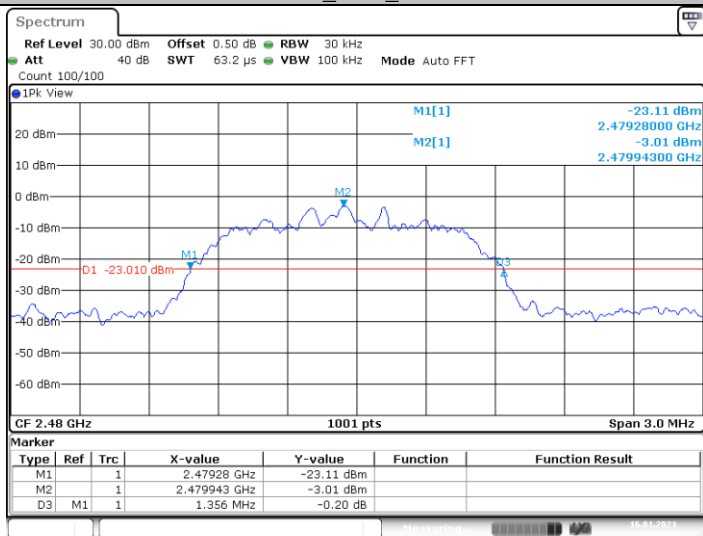
## 2DH5\_Ant1\_2402



## 2DH5\_Ant1\_2441



## 2DH5\_Ant1\_2480



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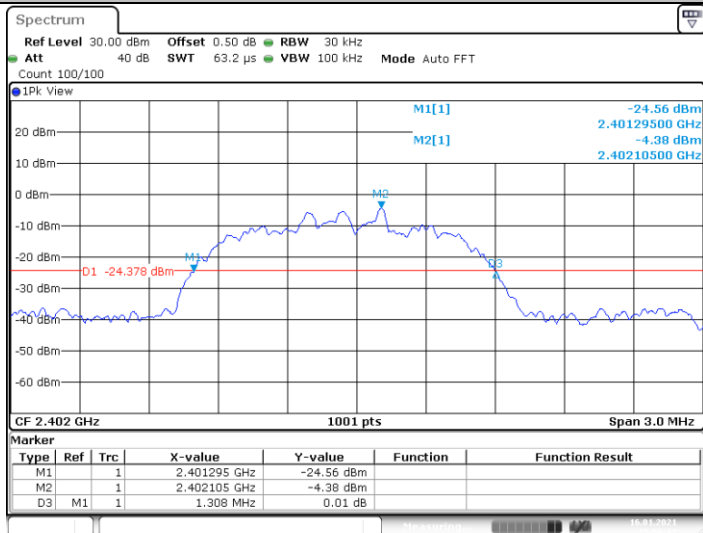
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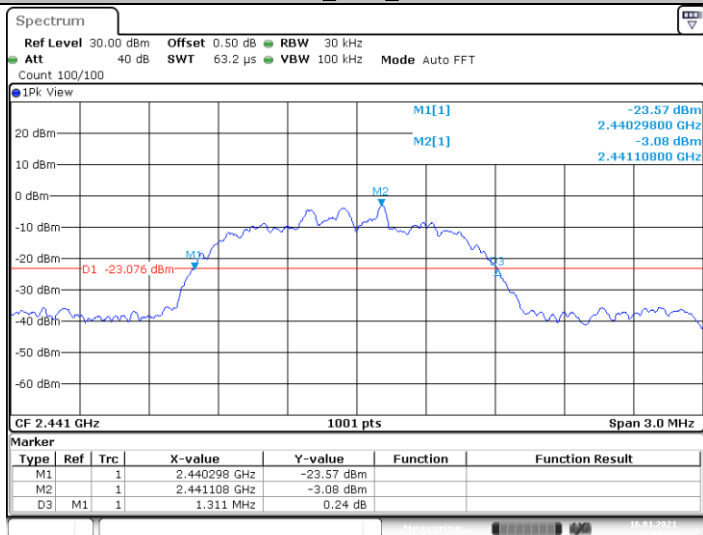
For anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : [yz.cnca.cn](http://yz.cnca.cn)



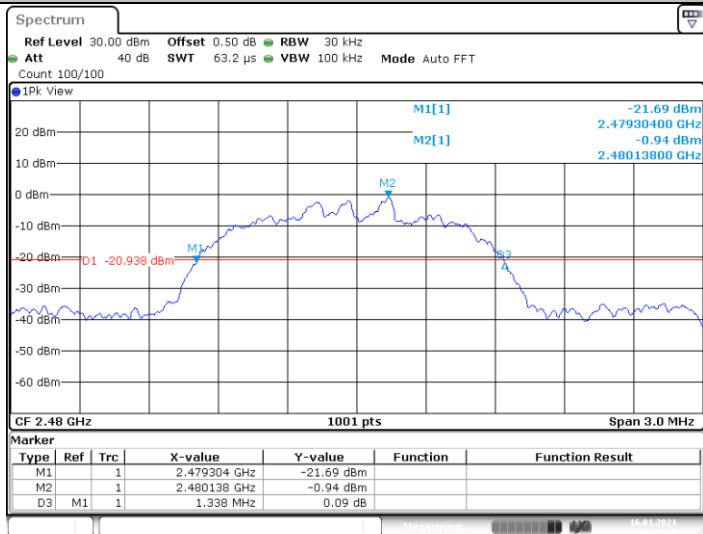
## 3DH5\_Ant1\_2402



## 3DH5\_Ant1\_2441



## 3DH5\_Ant1\_2480



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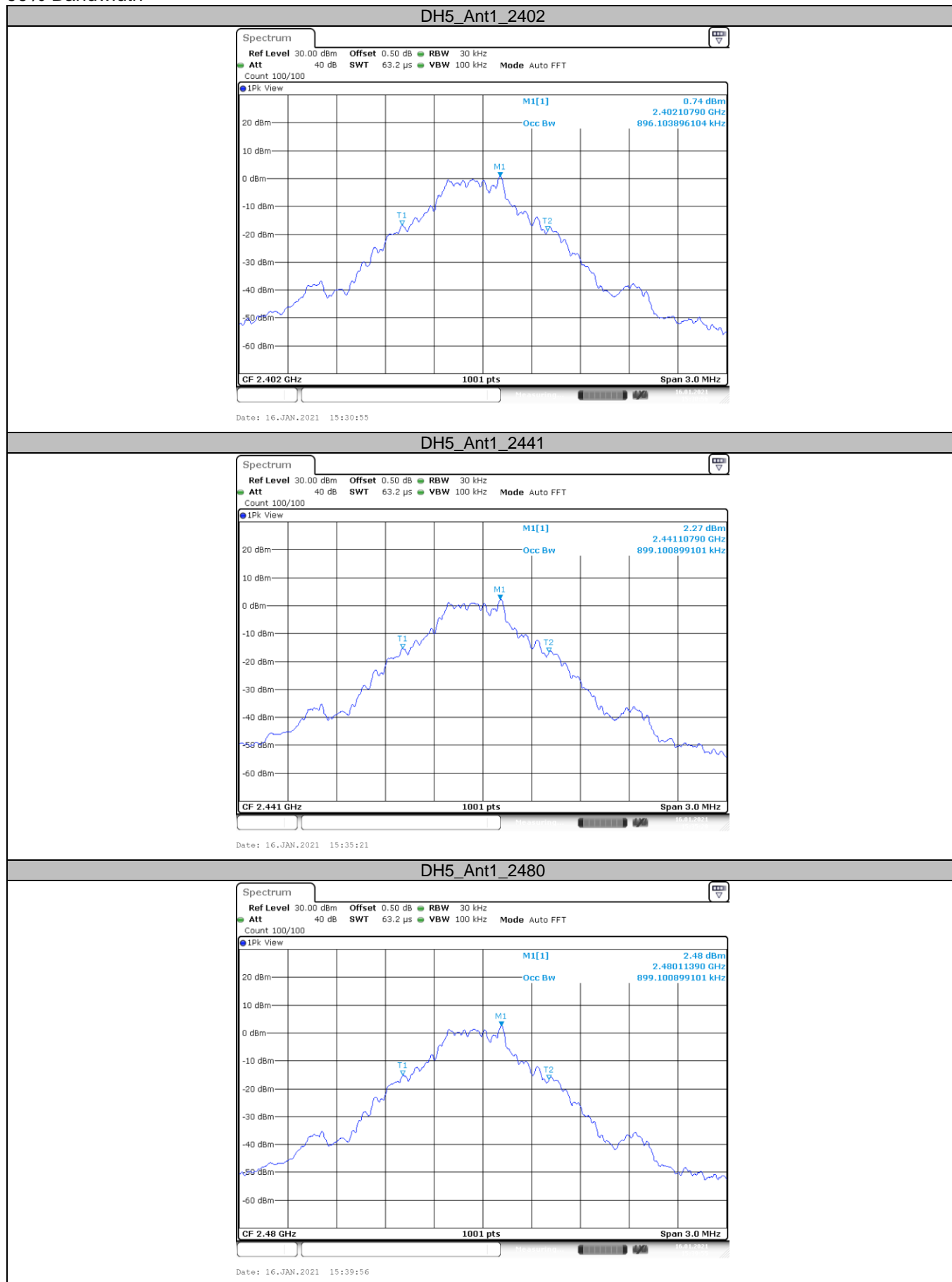
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## 99% Bandwidth



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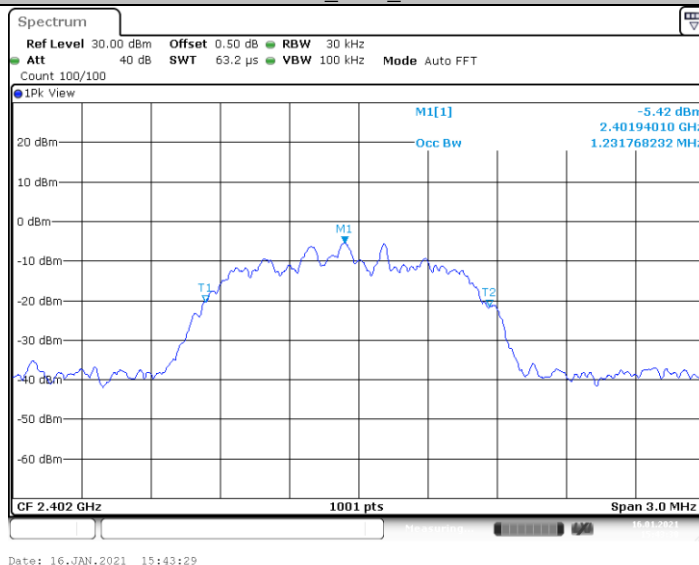
Fax: (86)755-27521011

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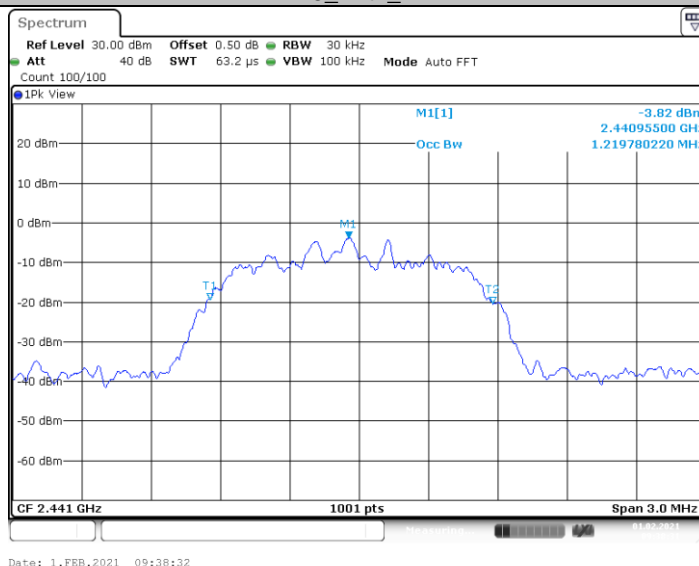
中国国家认证认可监督管理委员会  
Certification and Accreditation Administration of the People's Republic of ChinaFor anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : [yz.cnca.cn](http://yz.cnca.cn)



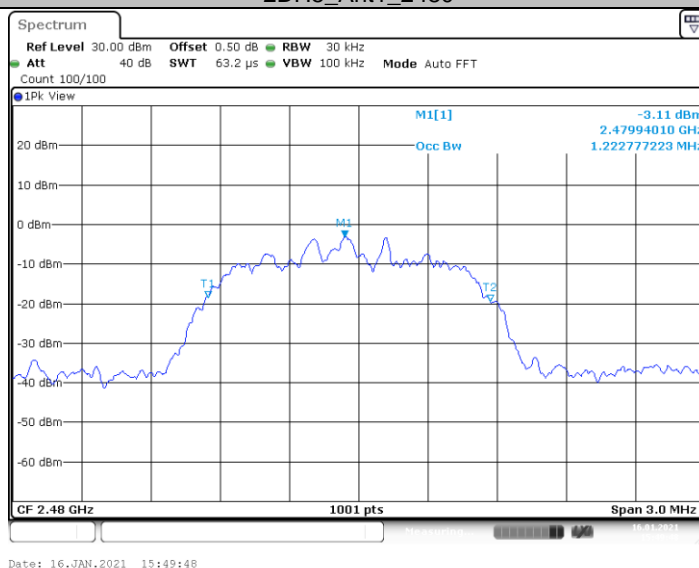
## 2DH5\_Ant1\_2402



## 2DH5\_Ant1\_2441



## 2DH5\_Ant1\_2480



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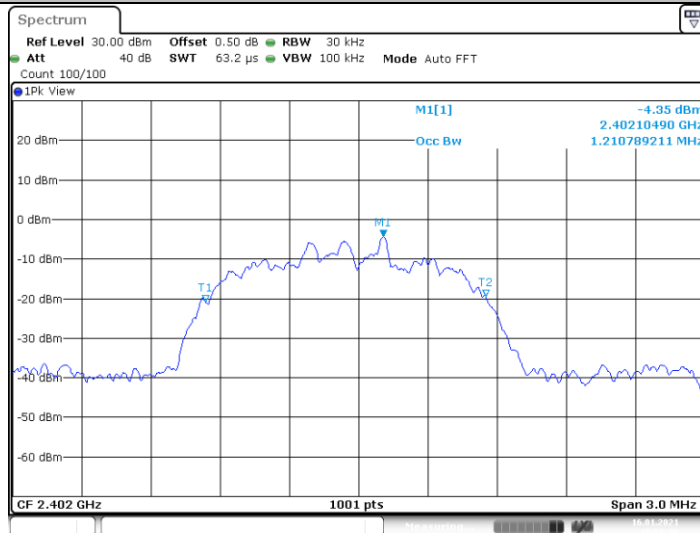


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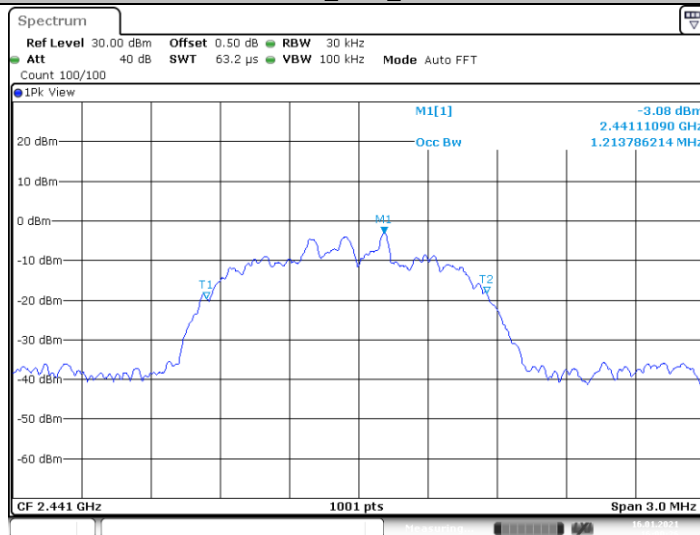


## 3DH5\_Ant1\_2402



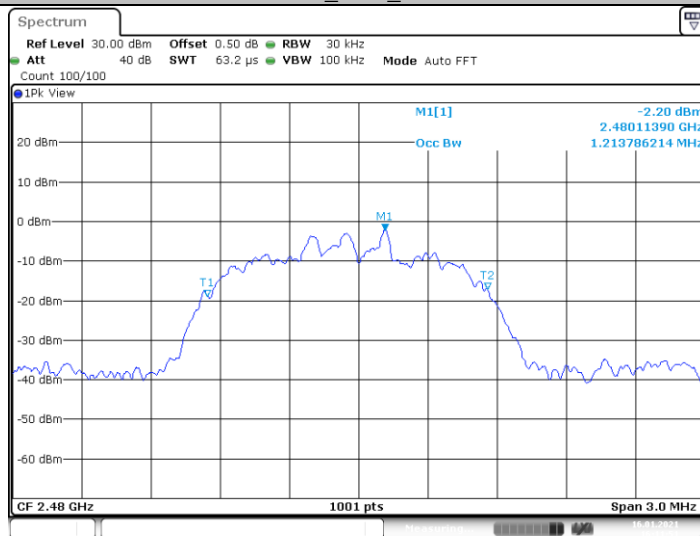
Date: 16.JAN.2021 15:56:25

## 3DH5\_Ant1\_2441



Date: 16.JAN.2021 16:00:36

## 3DH5\_Ant1\_2480



Date: 16.JAN.2021 16:11:51

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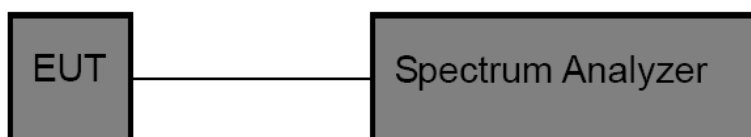
### 3.5. Channel Separation

#### Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1)/ RSS-247 5.1 b :

Test Item	Limit	Frequency Range(MHz)
Channel Separation	>25KHz or >two-thirds of the 20 dB bandwidth Which is greater	2400~2483.5

#### Test Configuration



#### Test Procedure

3. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
4. Spectrum Setting:
  - (1) Set RBW = 100 kHz.
  - (2) Set the video bandwidth (VBW)  $\geq 3$  RBW.
  - (3) Detector = Peak.
  - (4) Trace mode = Max hold.
  - (5) Sweep = Auto couple.

#### Test Mode

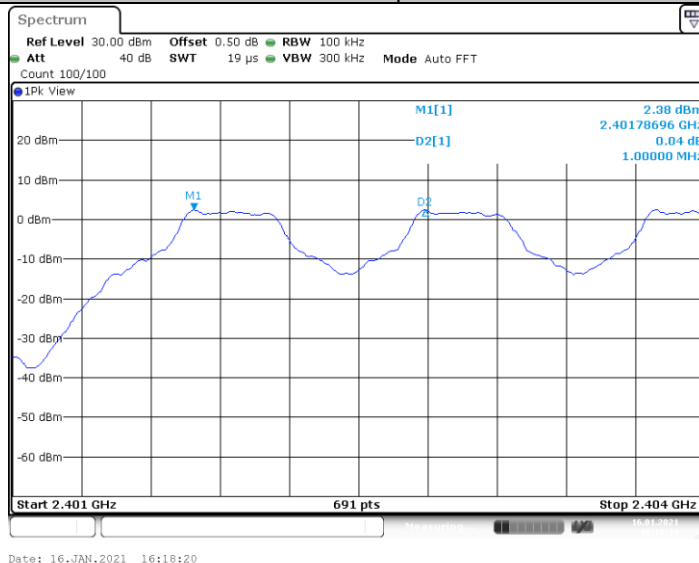
Please refer to the clause 2.3.

**Test Results**

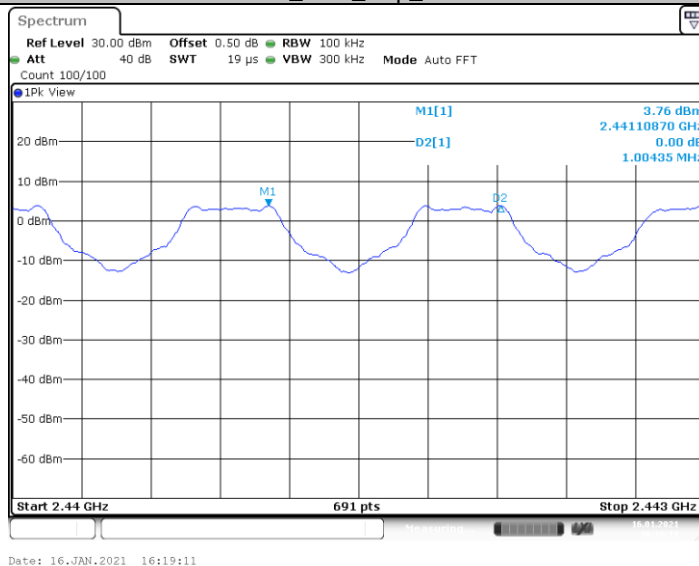
Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz)	Result
GFSK	00	1.000	652.00	Pass
	39	1.004	652.00	
	78	1.000	654.00	
$\pi/4$ -DQPSK	00	1.004	906.00	Pass
	39	1.000	908.00	
	78	1.004	908.00	
8-DPSK	00	1.004	878.00	Pass
	39	1.043	884.00	
	78	1.004	880.00	



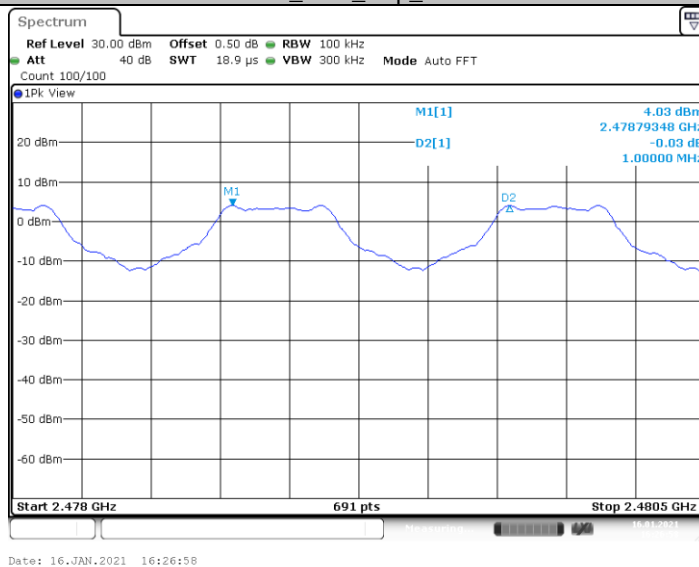
## DH5\_Ant1\_Hop\_2402



## DH5\_Ant1\_Hop\_2441



## DH5\_Ant1\_Hop\_2480



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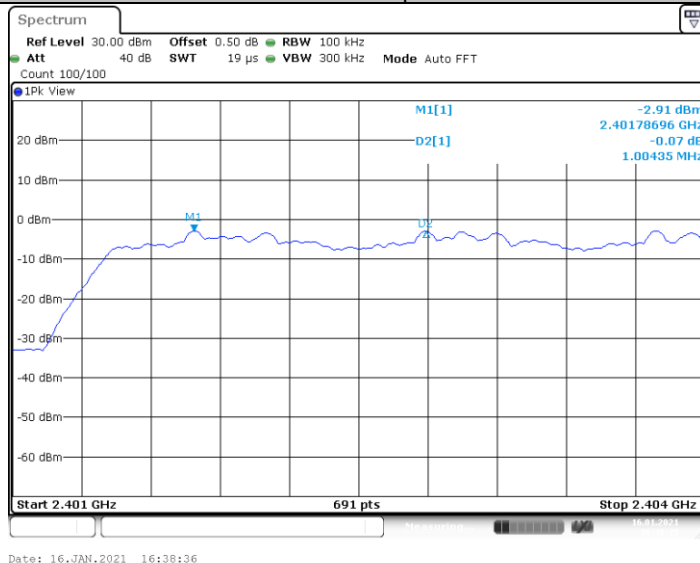
Http://www.sz-ctc.org.cn



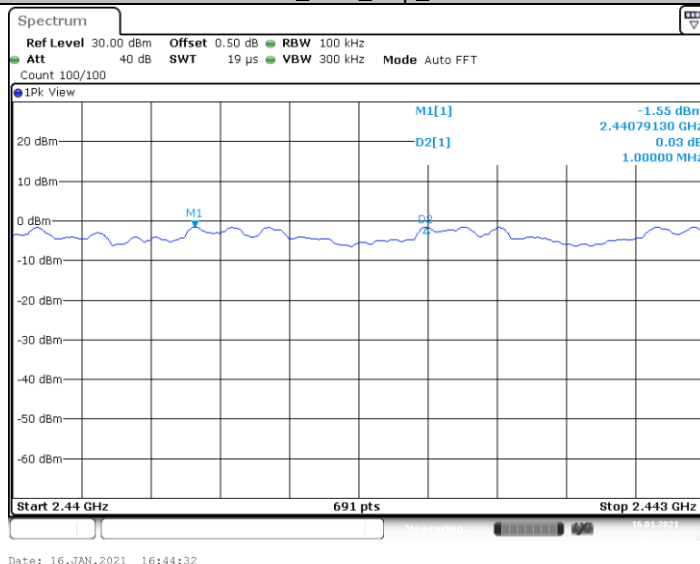
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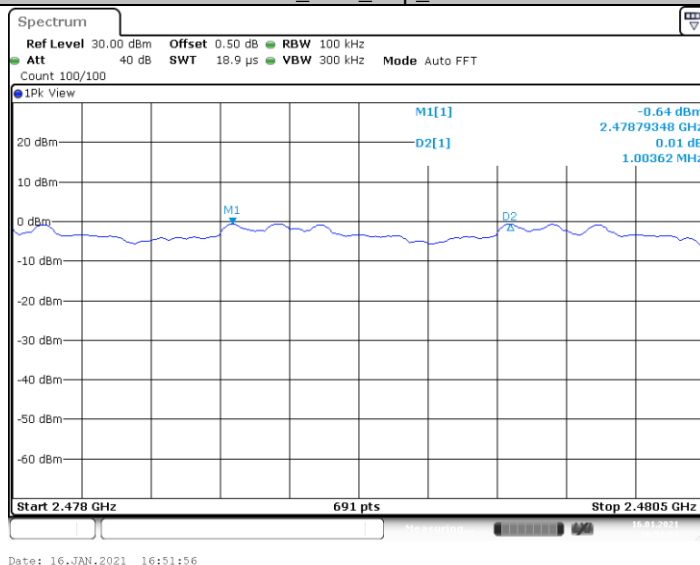
## 2DH5\_Ant1\_Hop\_2402



## 2DH5\_Ant1\_Hop\_2441



## 2DH5\_Ant1\_Hop\_2480



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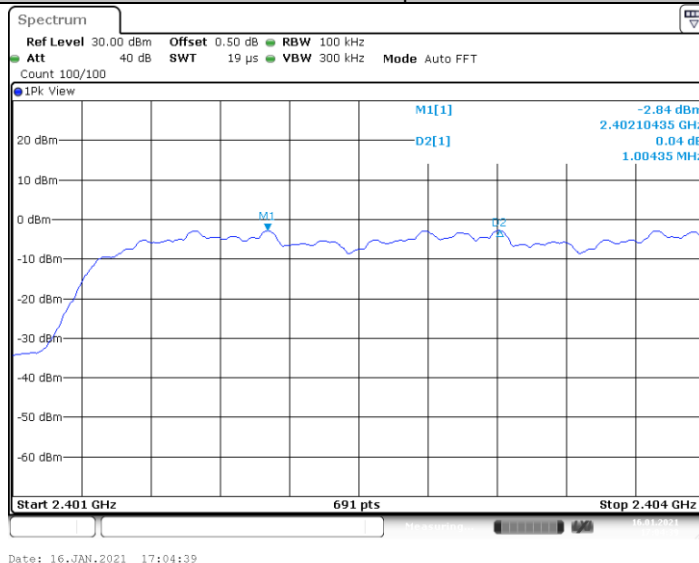
Fax: (86)755-27521011

Http://www.sz-ctc.org.cn

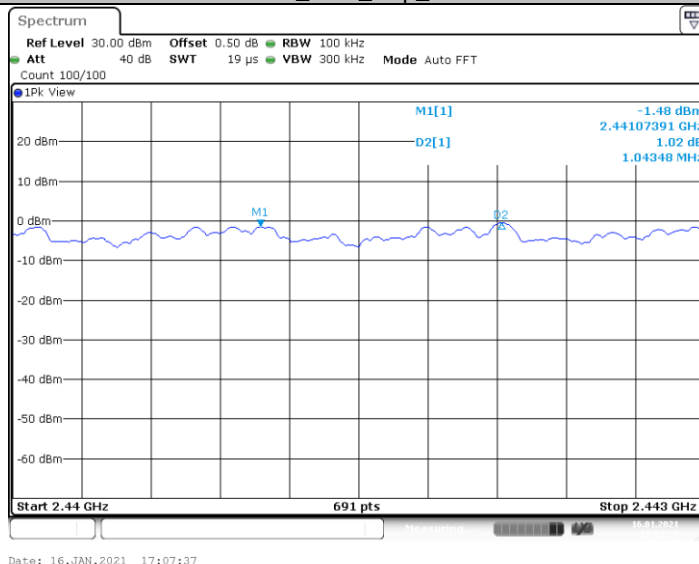
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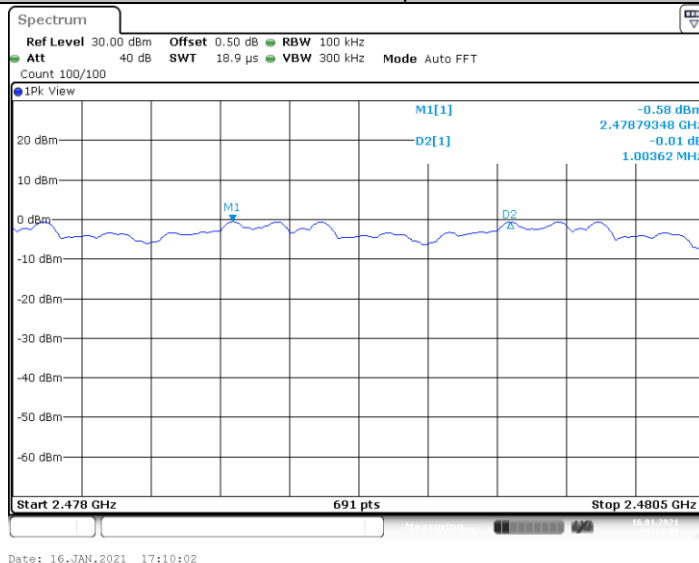
## 3DH5\_Ant1\_Hop\_2402



## 3DH5\_Ant1\_Hop\_2441



## 3DH5\_Ant1\_Hop\_2480



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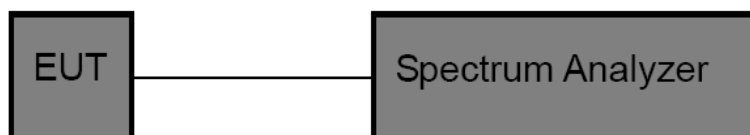
### 3.6. Number of Hopping Channel

#### Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(iii)/ RSS-247 5.1 d:

Section	Test Item	Limit
15.247 (a)(iii)/ RSS-247 5.1 d:	Number of Hopping Channel	>15

#### Test Configuration



#### Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
  - (1) Peak Detector: RBW=100 kHz, VBW $\geq$ RBW, Sweep time= Auto.

#### Test Mode

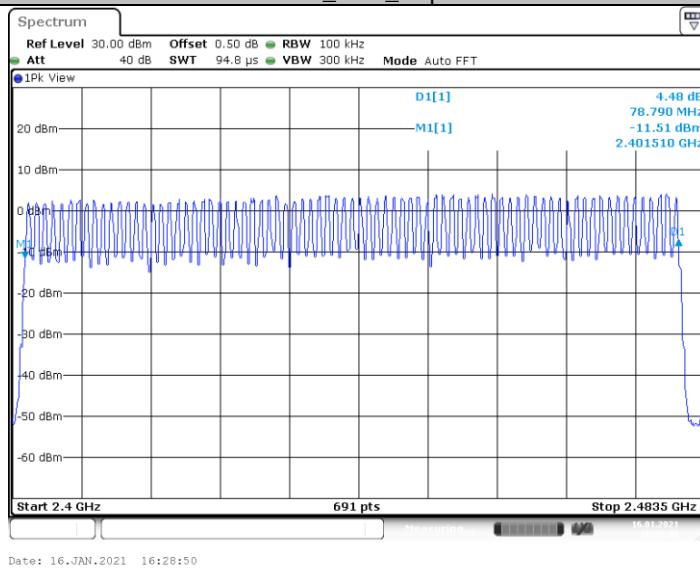
Please refer to the clause 2.3.

#### Test Result

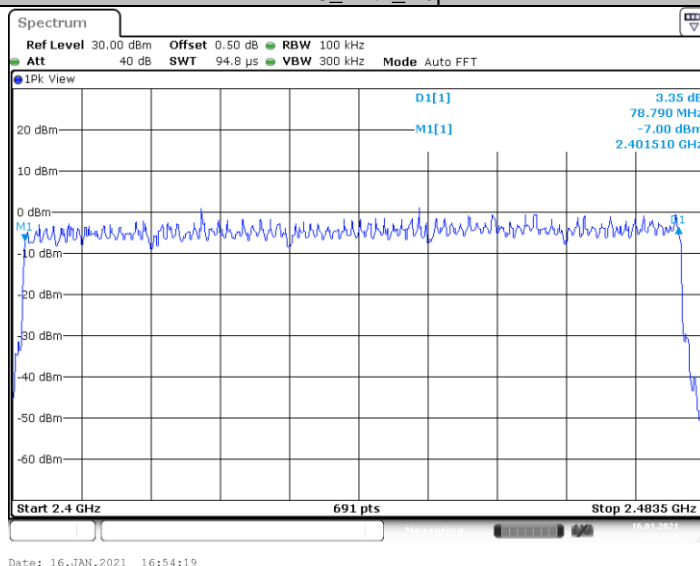
Modulation type	Channel number	Limit	Result
GFSK	79	$\geq 15.00$	Pass
$\pi/4$ -DQPSK	79		
8DPSK	79		



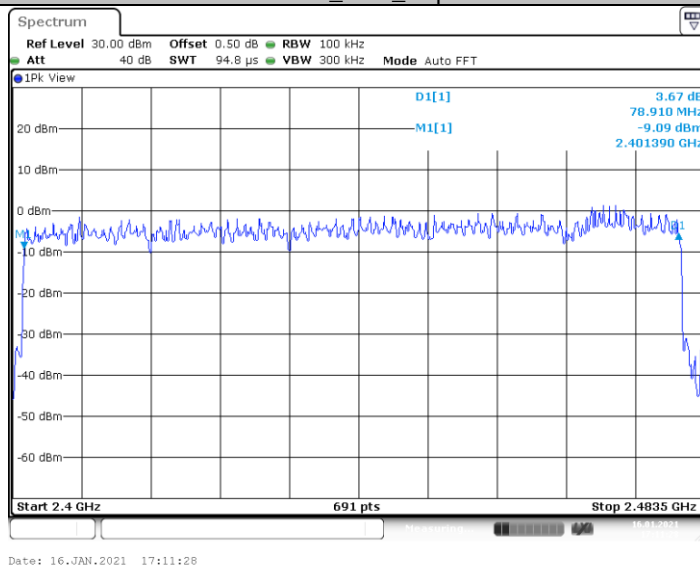
## DH5\_Ant1\_Hop



## 2DH5\_Ant1\_Hop



## 3DH5\_Ant1\_Hop



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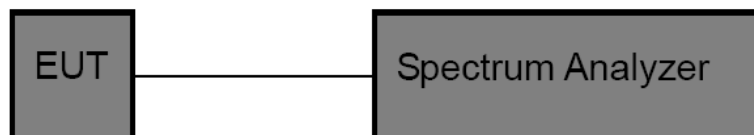


### 3.7. Dwell Time

#### Limit

Section	Test Item	Limit
15.247(a)(iii)/ RSS-247 5.1 d	Average Time of Occupancy	0.4 sec

#### Test Configuration



#### Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
  - (1) Spectrum Setting: RBW=1MHz, VBW $\geq$ RBW.
  - (2) Use video trigger with the trigger level set to enable triggering only on full pulses.
  - (3) Sweep Time is more than once pulse time.
  - (4) Set the center frequency on any frequency would be measure and set the frequency span to zero.
  - (5) Measure the maximum time duration of one single pulse.
  - (6) Set the EUT for packet transmitting.

#### Test Mode

Please refer to the clause 2.3.

**Test Result**

Modulation type	Channel	Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (ms)	Limit (Second)	Result
GFSK	DH1	2441	0.38	121.6	31.60	$\leq 0.40$	Pass
	DH3	2441	1.63	260.8	31.60		
	DH5	2441	2.87	306.1	31.60		
$\pi/4$ -DQPSK	2DH1	2441	0.39	124.8	31.60	$\leq 0.40$	Pass
	2DH3	2441	1.63	160.8	31.60		
	2DH5	2441	2.88	307.2	31.60		
8-DPSK	3DH1	2441	0.39	124.8	31.60	$\leq 0.40$	Pass
	3DH3	2441	1.63	160.8	31.60		
	3DH5	2441	2.88	307.2	31.60		

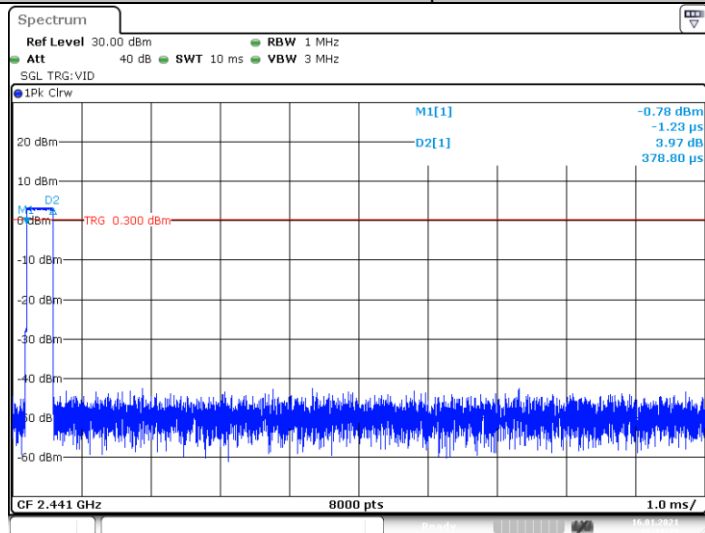
Note: 1DH1/2DH1/3DH1 Total of Dwell= Pulse Time\*(1600/2)\*31.6/79

1DH3/2DH3/3DH3 Total of Dwell= Pulse Time\*(1600/4)\*31.6/79

1DH5/2DH5/3DH5 Total of Dwell= Pulse Time\*(1600/6)\*31.6/79

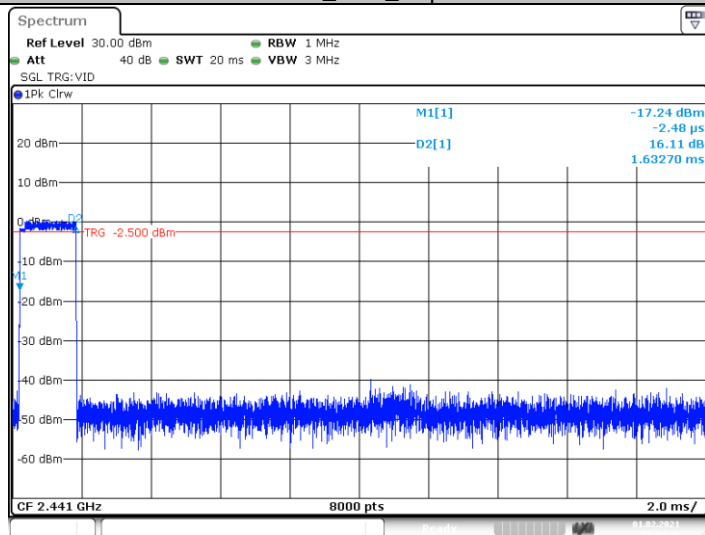


## DH1\_Ant1\_Hop



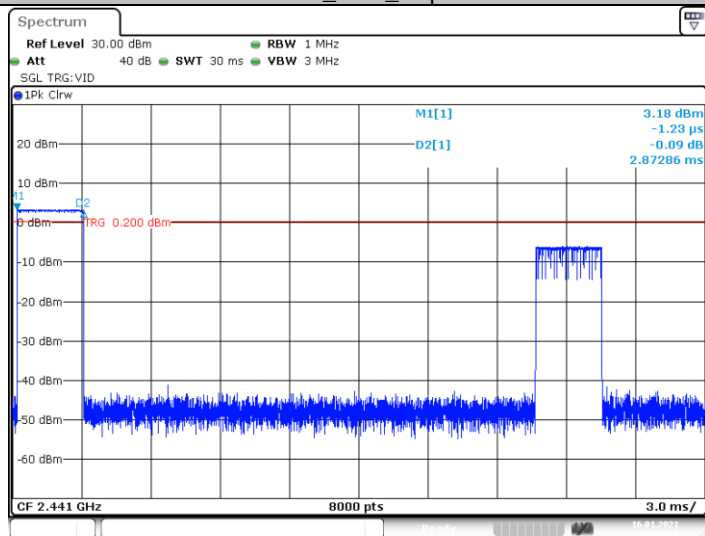
Date: 16.JAN.2021 16:31:35

## DH3\_Ant1\_Hop



Date: 1.FEB.2021 09:04:47

## DH5\_Ant1\_Hop



Date: 16.JAN.2021 17:28:28

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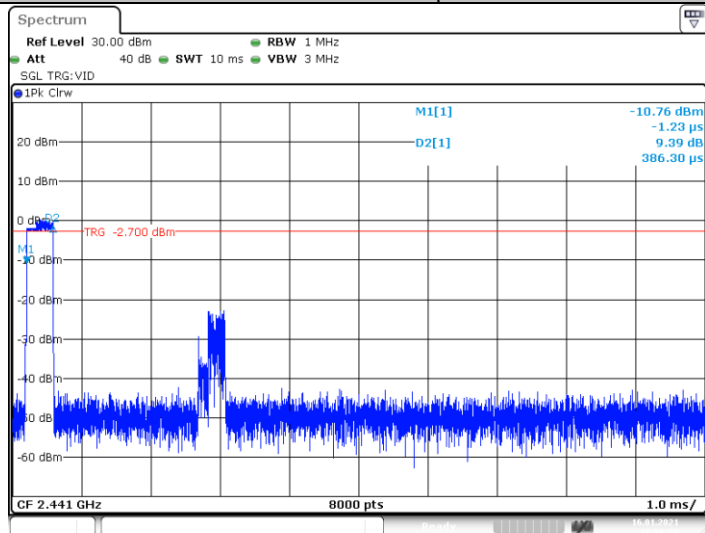
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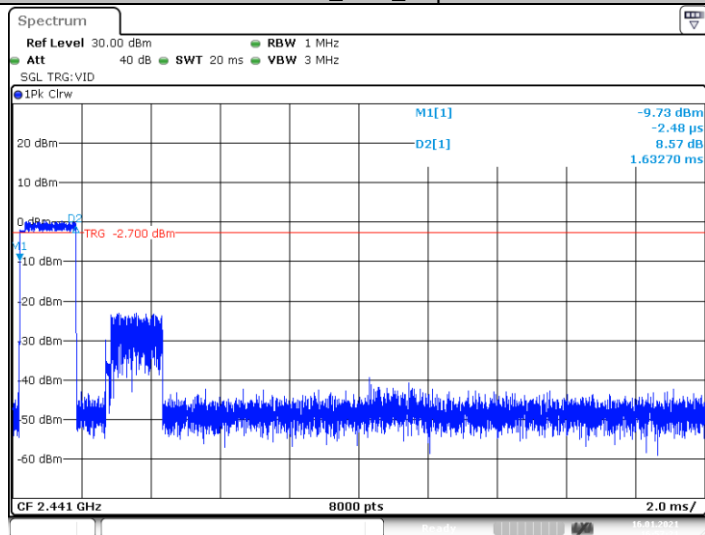


## 2DH1\_Ant1\_Hop



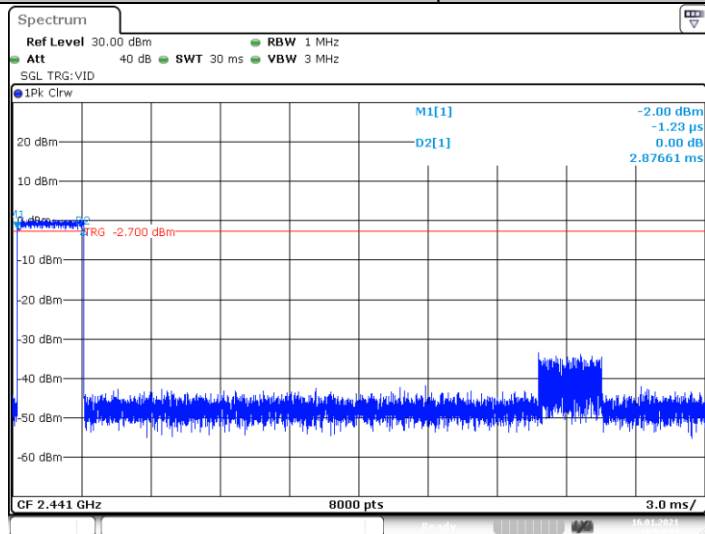
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## 2DH3\_Ant1\_Hop



Date: 16.JAN.2021 16:57:21

## 2DH5\_Ant1\_Hop



Date: 16.JAN.2021 16:54:34

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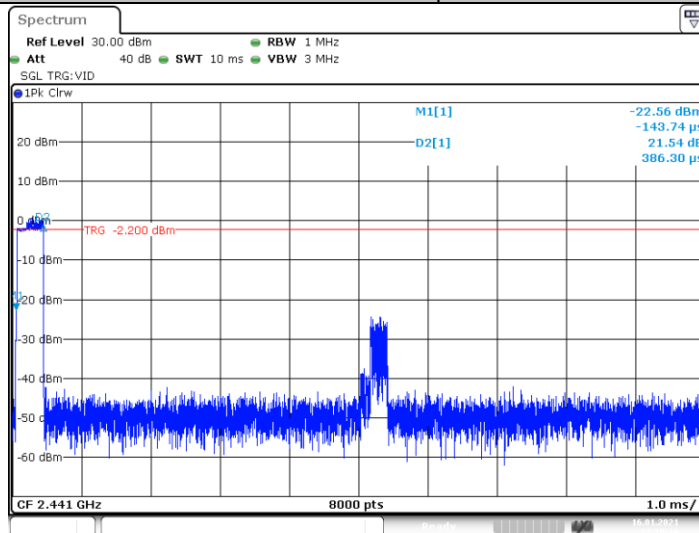
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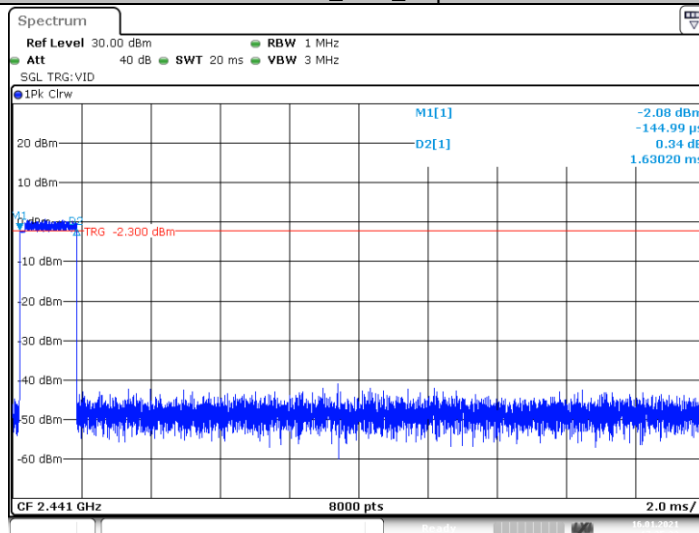


## 3DH1\_Ant1\_Hop



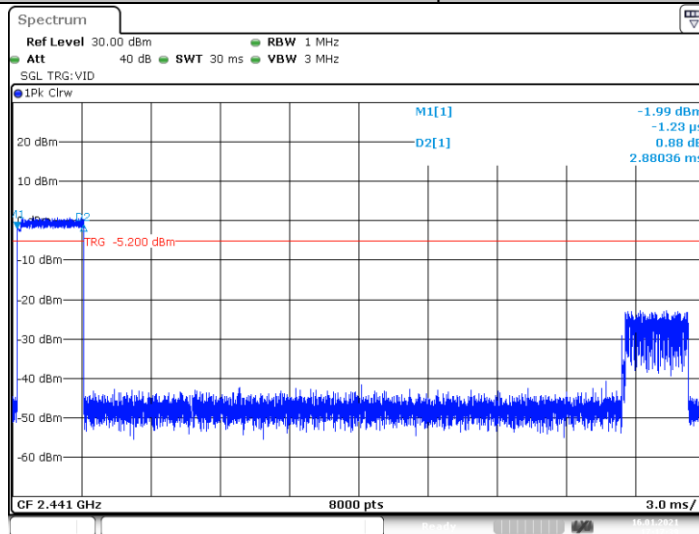
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## 3DH3\_Ant1\_Hop



Date: 16.JAN.2021 17:25:22

## 3DH5\_Ant1\_Hop



Date: 16.JAN.2021 17:17:38

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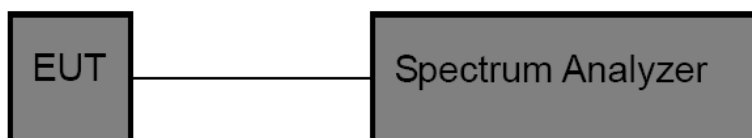
### 3.8. Peak Output Power

#### Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(1) / RSS-247 5.4 b:

Test Item	Limit	Frequency Range(MHz)
Peak Output Power	Hopping Channels>75 Power<1W(30dBm) Other <125mW(21dBm)	2400~2483.5

#### Test Configuration



#### Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:  
Peak Detector: RBW=1 MHz, VBW=3 MHz for bandwidth less than 1MHz.  
RBW=3 MHz, VBW=3 MHz for bandwidth more than 1MHz.

#### Test Mode

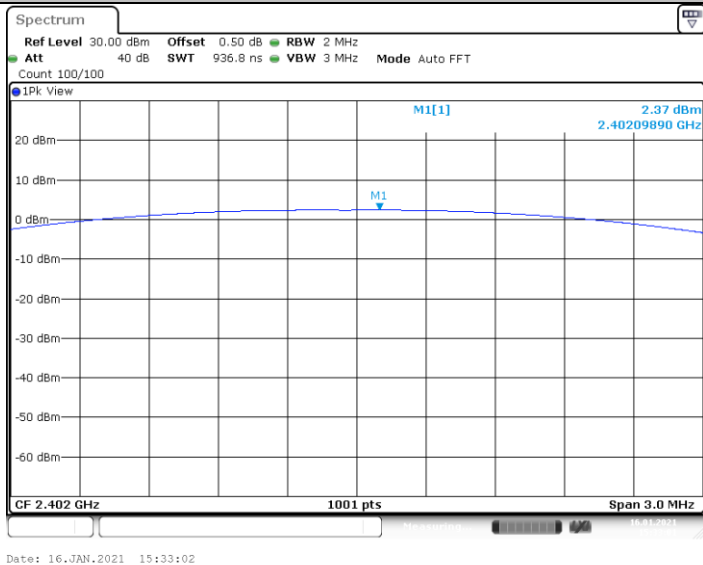
Please refer to the clause 2.3.

#### Test Result

Modulation type	Channel	Output power (dBm)	Limit (dBm)	Result
GFSK	00	2.37	≤ 30.00	Pass
	39	3.87		
	78	-9.14		
π/4-DQPSK	00	0.12	≤ 21.00	Pass
	39	1.08		
	78	1.71		
8-DPSK	00	0.4	≤ 21.00	Pass
	39	1.57		
	78	2.17		



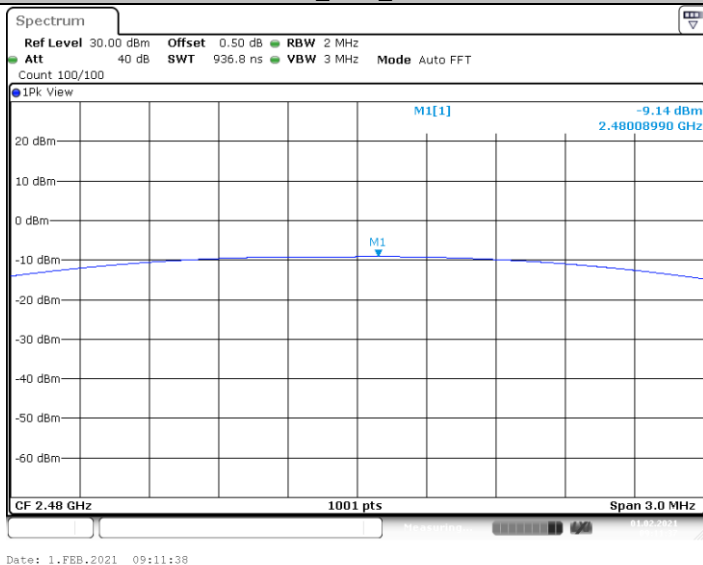
## DH5\_Ant1\_2402



## DH5\_Ant1\_2441



## DH5\_Ant1\_2480



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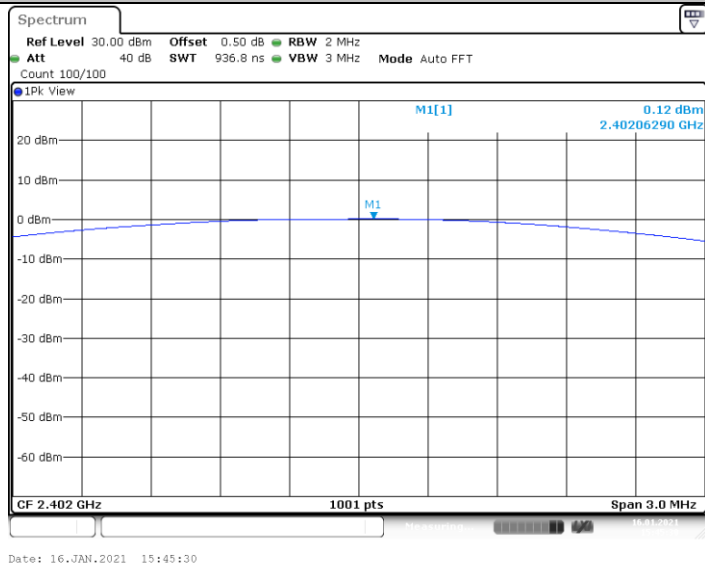
Http://www.sz-ctc.org.cn



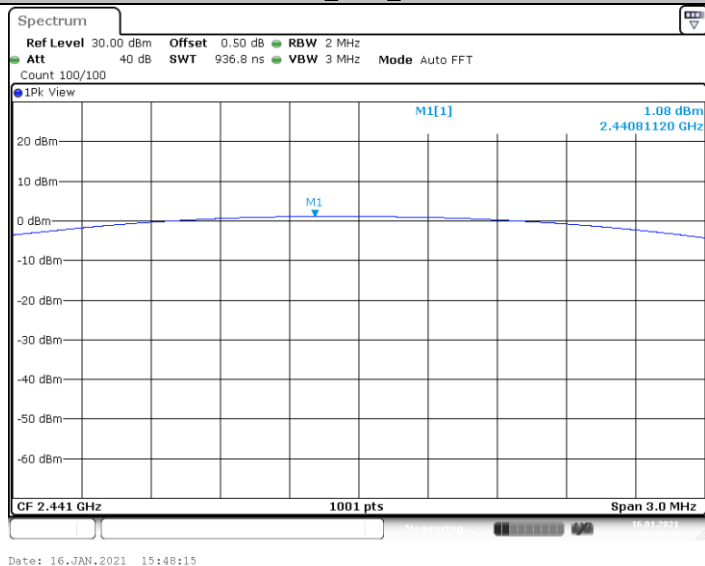
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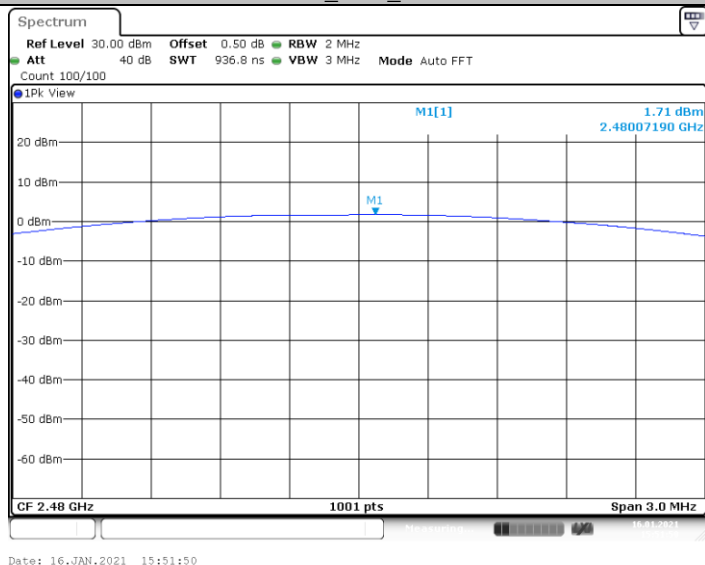
## 2DH5\_Ant1\_2402



## 2DH5\_Ant1\_2441



## 2DH5\_Ant1\_2480



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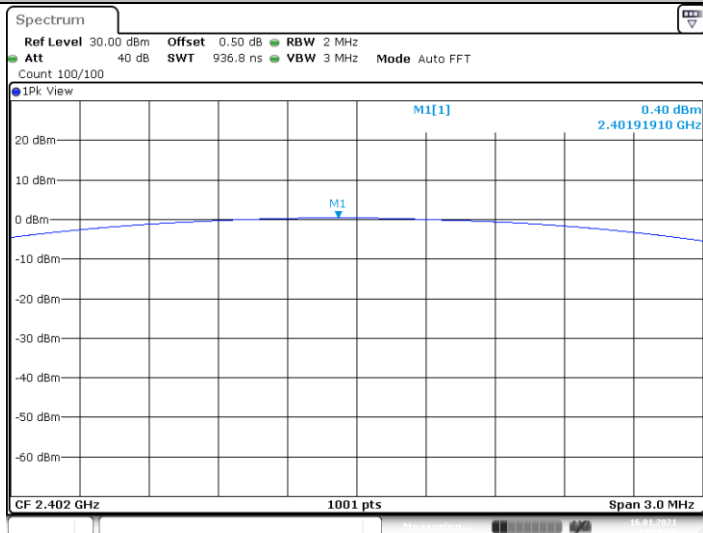


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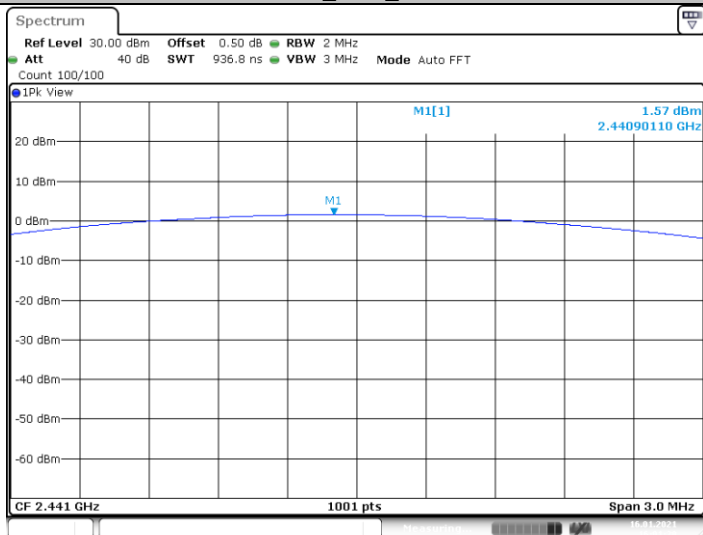


## 3DH5\_Ant1\_2402



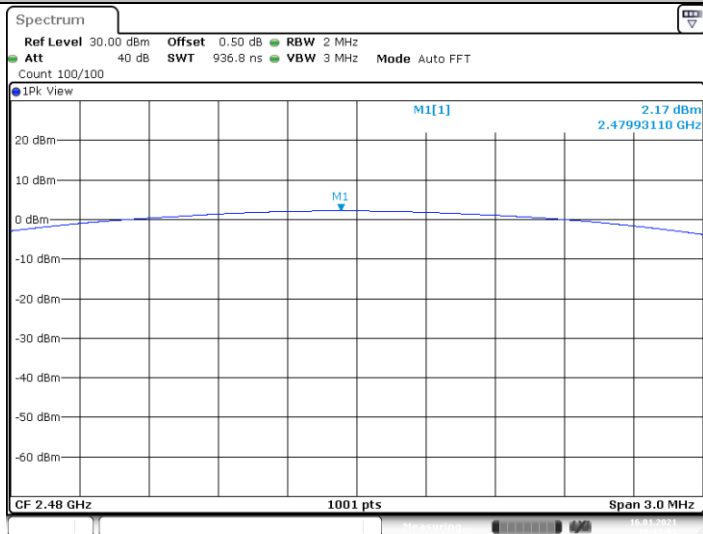
Date: 16.JAN.2021 15:58:26

## 3DH5\_Ant1\_2441



Date: 16.JAN.2021 16:01:30

## 3DH5\_Ant1\_2480



Date: 16.JAN.2021 16:13:53

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### 3.9. Antenna requirement

#### Requirement

##### **FCC CFR Title 47 Part 15 Subpart C Section 15.203:**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

##### **FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):**

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

#### Test Result

The directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.

\*\*\*\*\*THE END\*\*\*\*\*