



## 99% Bandwidth Test Graphs



CTC Laboratories, Inc.

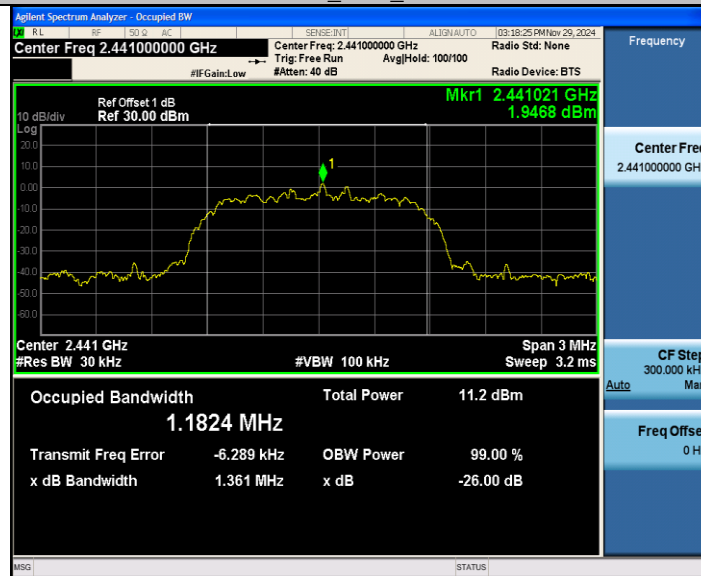
Room 101 Building B, No. 7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China  
Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

TRF No: CTC-TR-059\_A1

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2DH5\_Ant1\_2441



2DH5\_Ant1\_2480



3DH5\_Ant1\_2402

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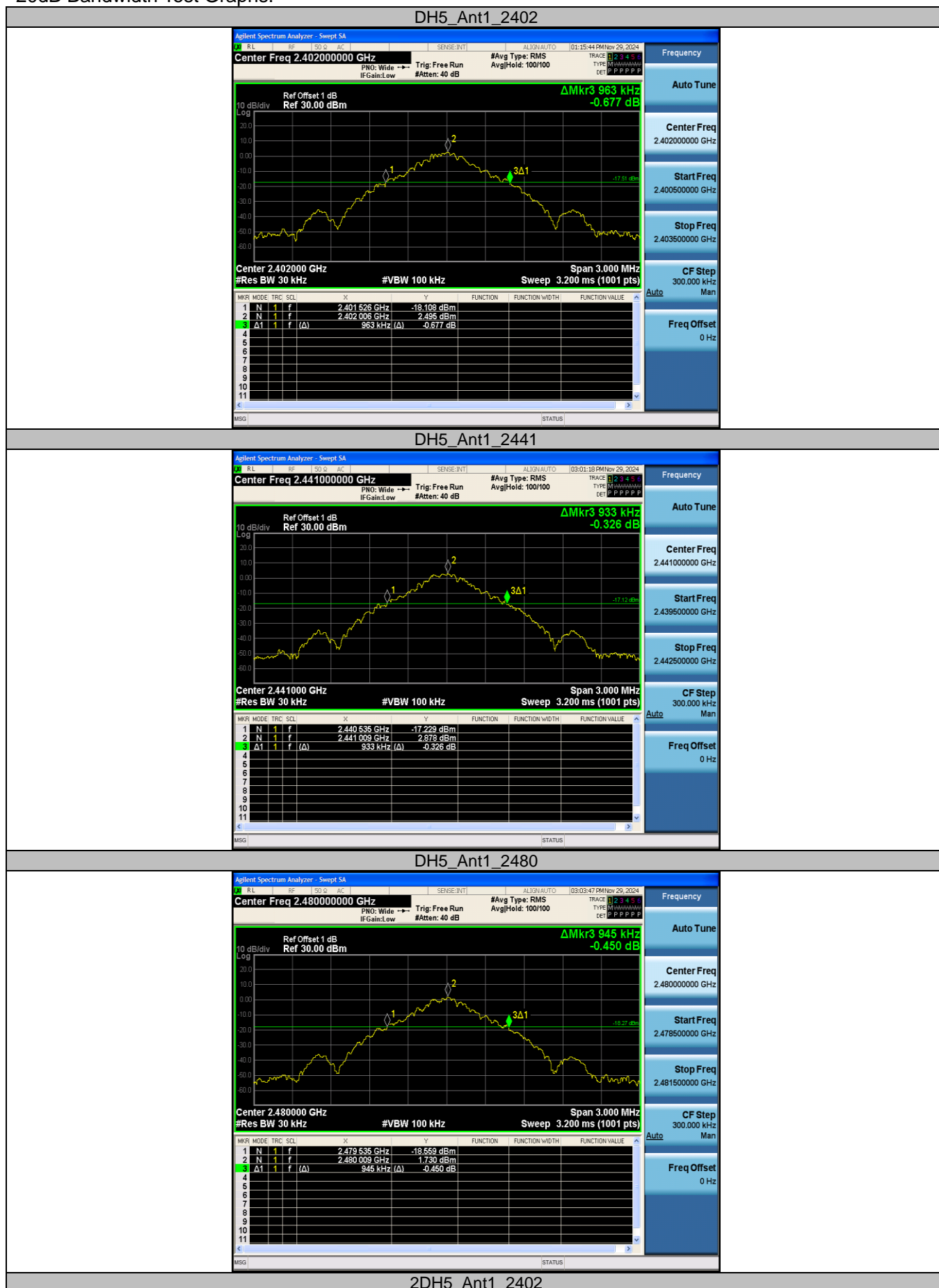
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### 20dB Bandwidth Test Graphs:



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2DH5\_Ant1\_2441



2DH5\_Ant1\_2480



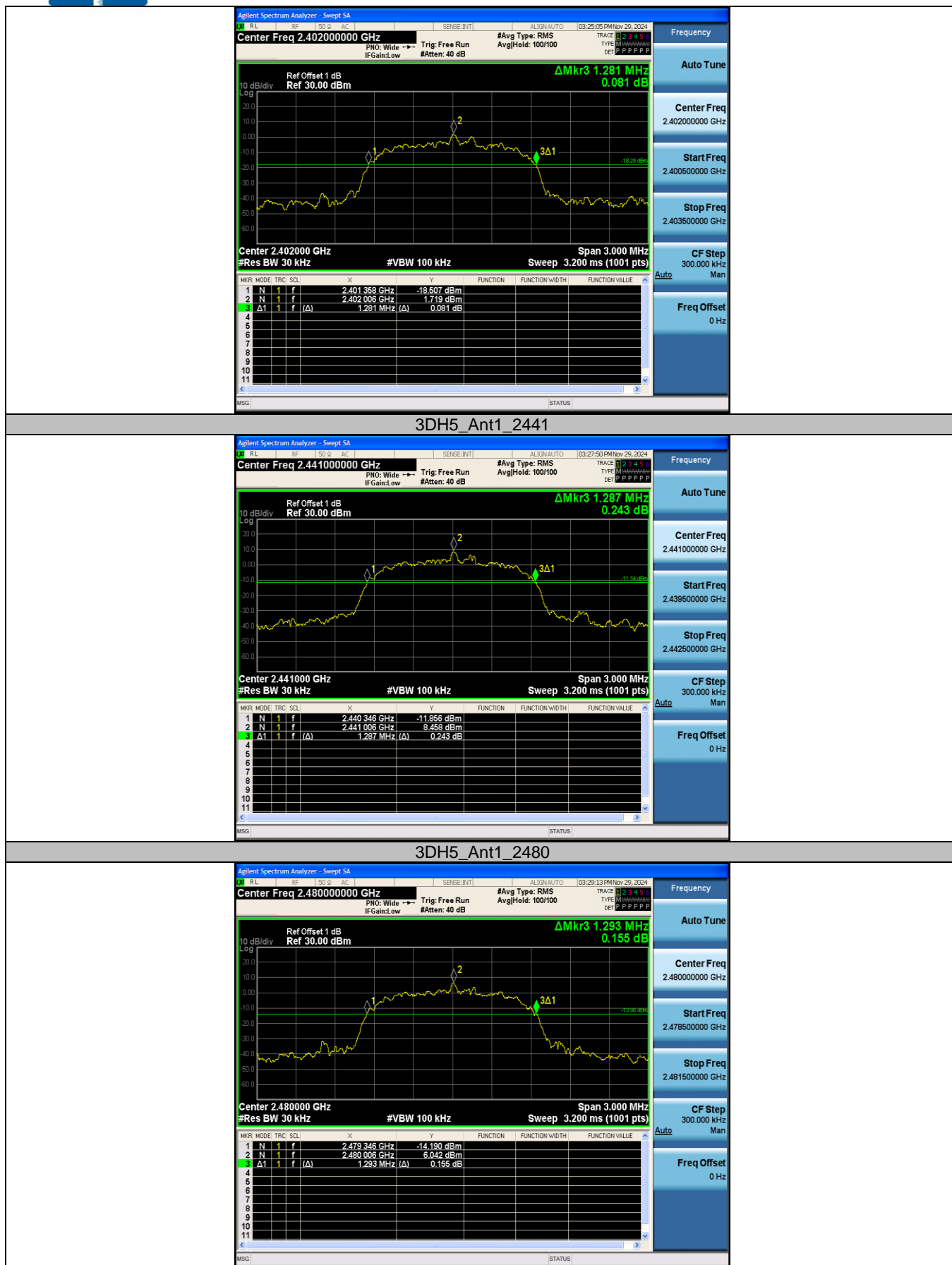
3DH5\_Ant1\_2402

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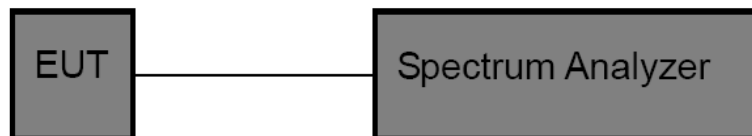
### 3.6. Channel Separation

#### 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

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) 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 2.4.

#### Test Result

Test Mode	Frequency (MHz)	Carrier Frequencies Separation (MHz)	Limit (MHz)	Verdict
GFSK	Hop_2441	1.006	>0.963	Pass
$\pi/4$ -DQPSK	Hop_2441	0.996	>0.862	Pass
8-DPSK	Hop_2441	0.996	>0.862	Pass





Test plot as follows:



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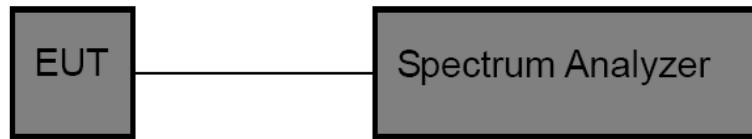
### 3.7. Number of Hopping Channel

#### 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	$\geq 15$

#### 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

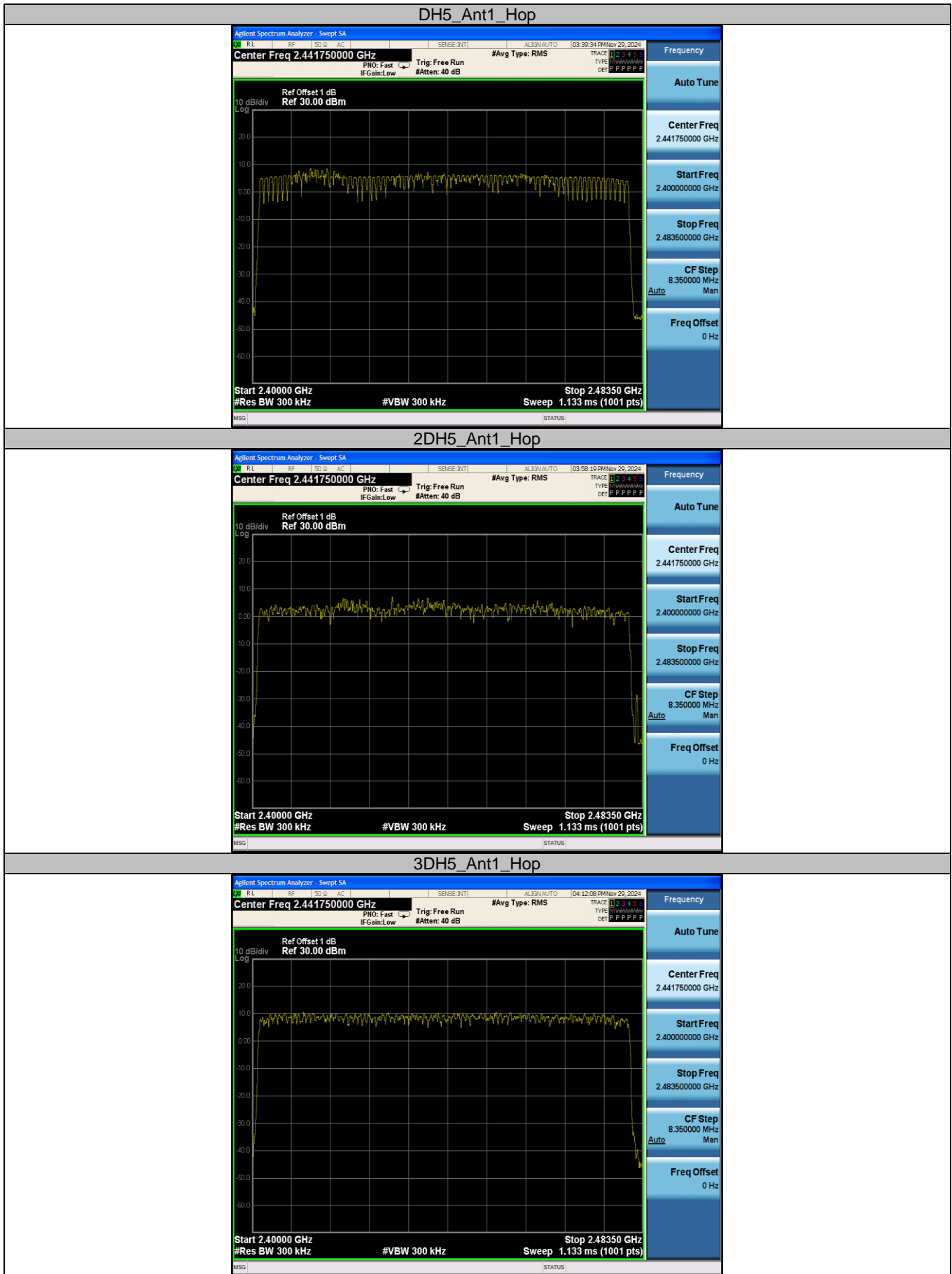
Please refer to the clause 2.4.

#### Test Result

Test Mode	Channel Number	Limit	Verdict
GFSK	79	$\geq 15$	Pass
$\pi/4$ -DQPSK	79	$\geq 15$	Pass
8-DPSK	79	$\geq 15$	Pass



Test plot as follows:



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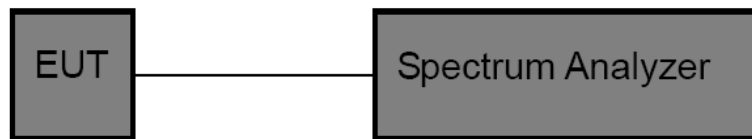
### 3.8. Dwell Time

#### 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	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 2.4.

**Test Result**

Test Mode	Channel	Frequency (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (ms)	Limit (second)	Verdict
GFSK	DH1	2441	0.381	121.92	31.60	≤0.40	Pass
	DH3	2441	1.637	261.92	31.60		
	DH5	2441	2.880	307.20	31.60		
π/4-DQPSK	2DH1	2441	0.388	124.16	31.60	≤0.40	Pass
	2DH3	2441	1.638	524.16	31.60		
	2DH5	2441	2.885	307.73	31.60		
8-DPSK	3DH1	2441	0.386	123.52	31.60	≤0.40	Pass
	3DH3	2441	1.638	262.08	31.60		
	3DH5	2441	2.888	308.05	31.60		

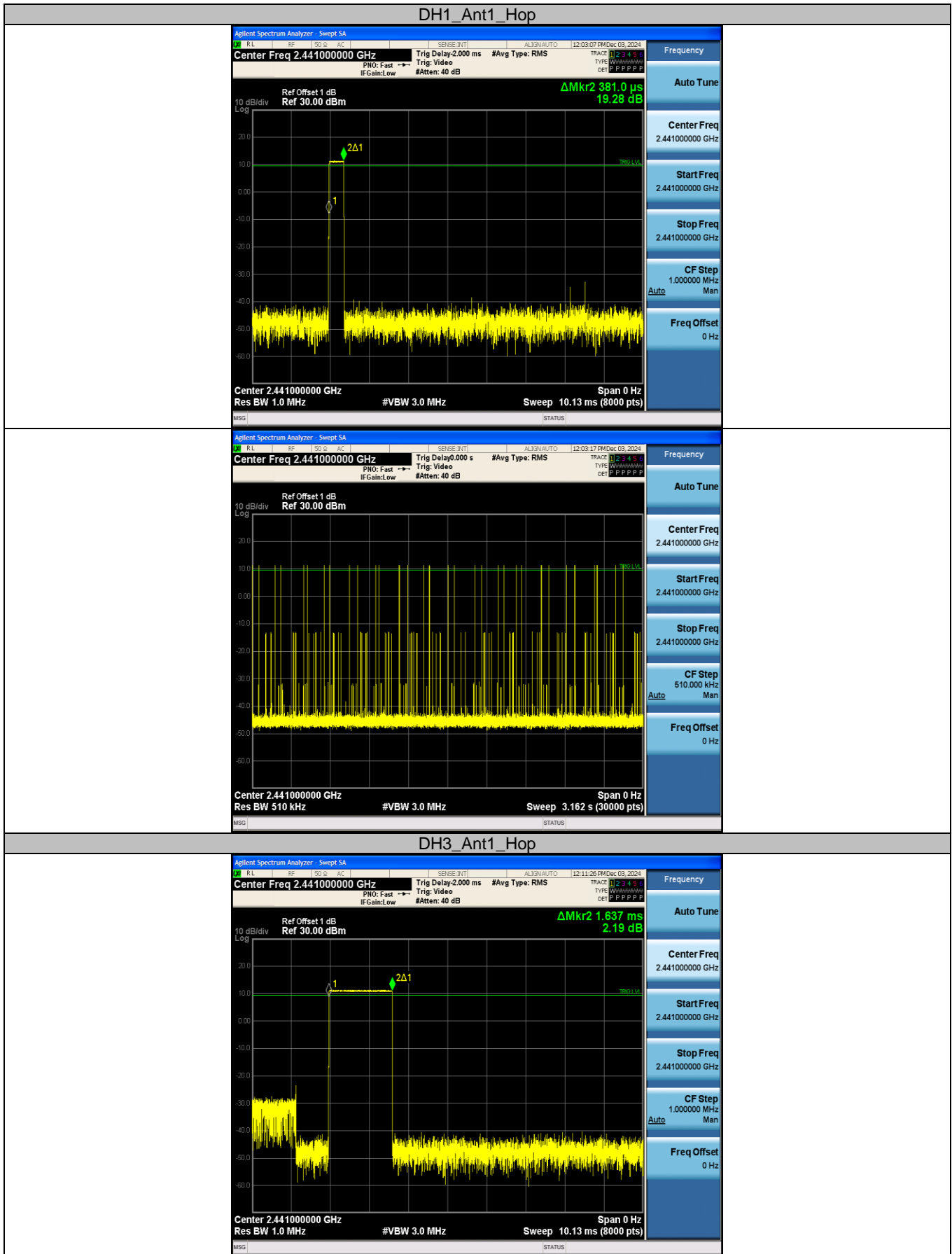
Note: 1DH1/2DH1/3DH1 Total of Dwell = Pulse Time\*(1600/2)\*31.6/79

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



Test plot as follows:

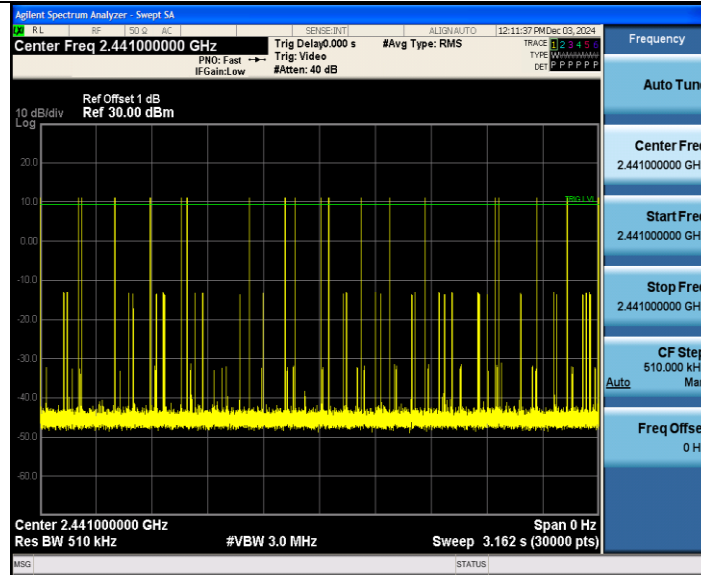


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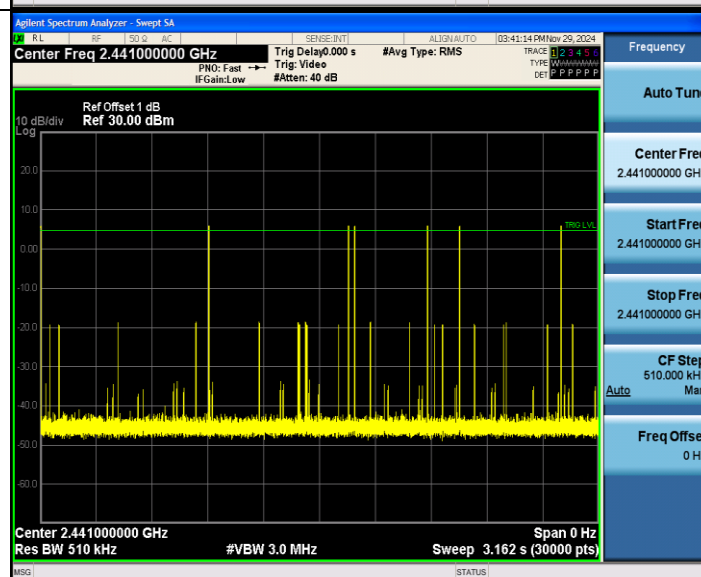
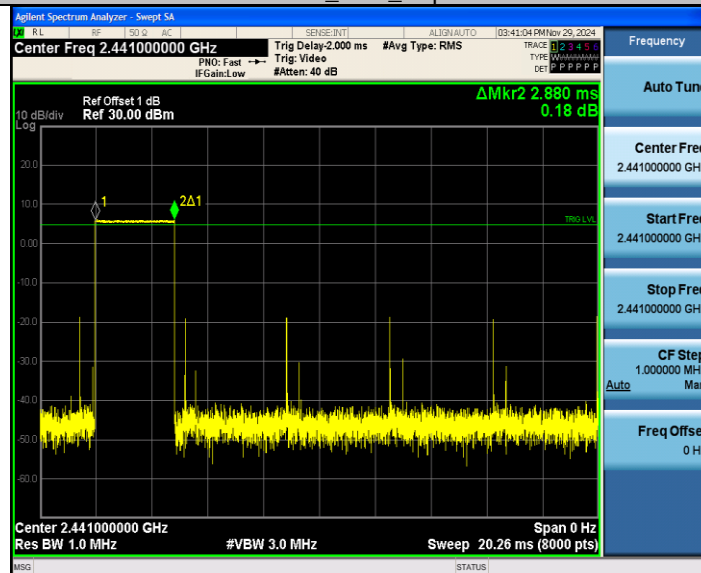
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DH5\_Ant1\_Hop



2DH1\_Ant1\_Hop

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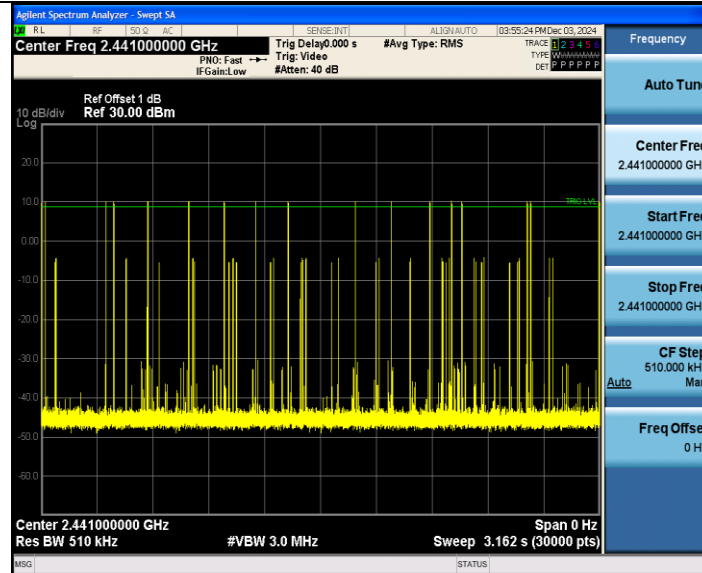
Room 101 Building B, No. 7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China  
Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

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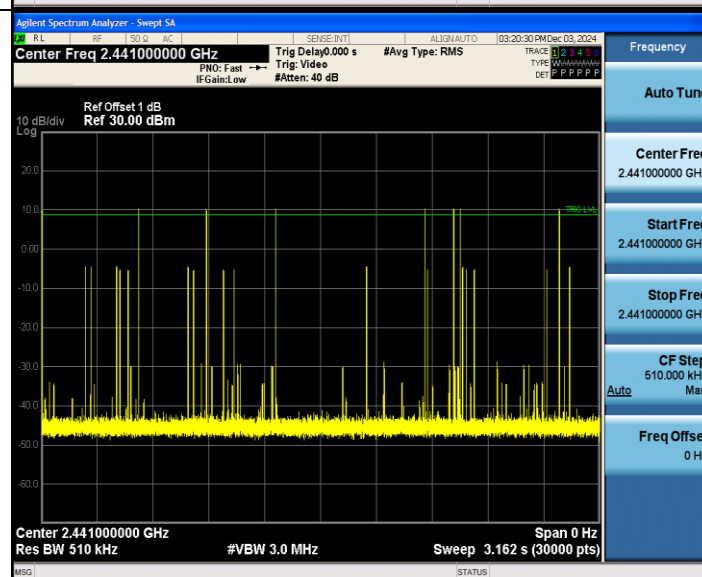
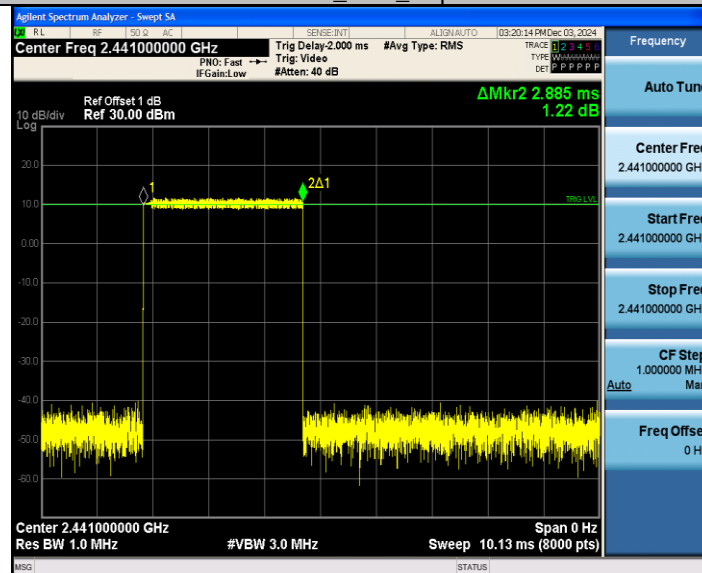
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2DH5\_Ant1\_Hop



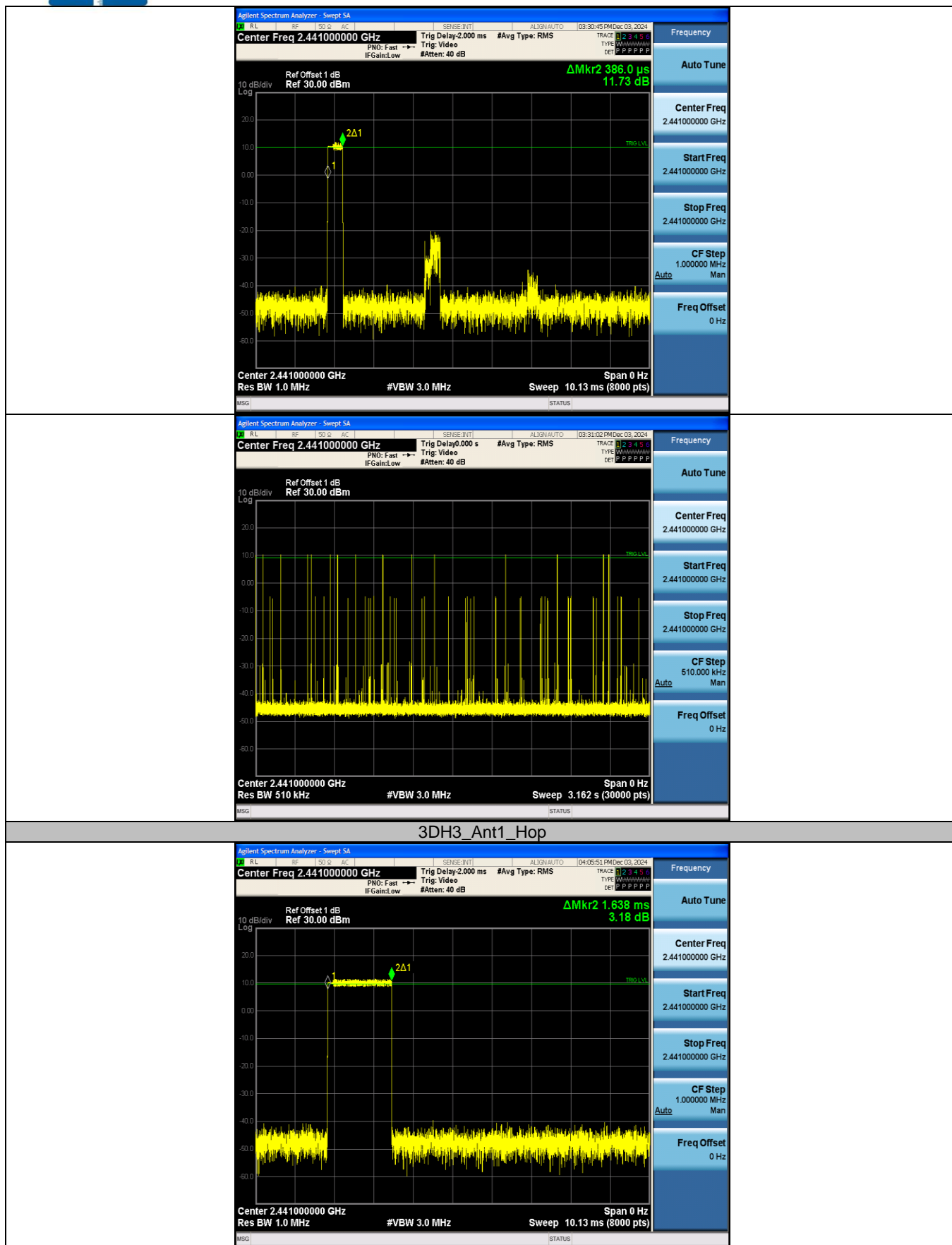
3DH1\_Ant1\_Hop

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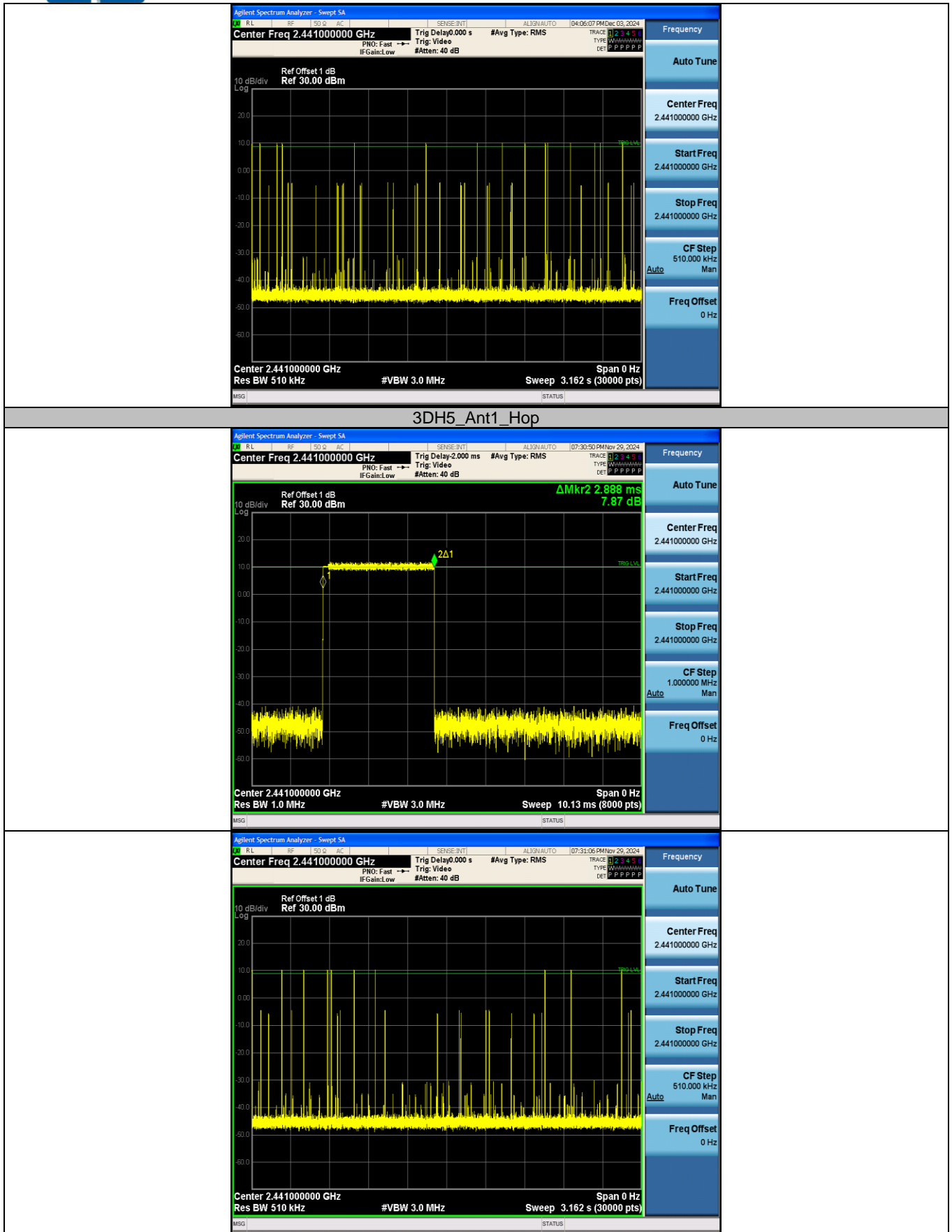


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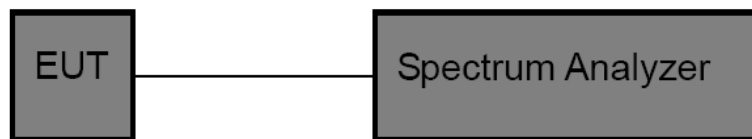
### 3.9. Peak Output Power

#### Limit

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

Section	Test Item	Limit	Frequency Range (MHz)
FCC CFR 47 Part15.247 (b)(1)	Maximum Conducted Output Power	Hopping Channels $\geq$ 75, Power <1W(30dBm); Others <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:
  - (1) Set RBW > 20dB Bandwidth.
  - (2) Set VBW  $\geq$  RBW.
  - (3) Detector = Peak.
  - (4) Trace mode = Max hold.
  - (5) Sweep = Auto couple.
  - (6) Span = Approximately five times the 20dB bandwidth, centered on a hopping channel.

#### Test Mode

Please refer to the clause 2.4.

#### Test Result

Test Mode	Frequency (MHz)	Conducted Output Power (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)	FCC Limit (dBm)	FCC Limit (dBm)	Verdict
GFSK	2402	5.25	3.24	8.49	$\leq$ 30	$\leq$ 36	Pass
	2441	6.27	3.24	9.51	$\leq$ 30	$\leq$ 36	Pass
	2480	4.39	3.24	7.63	$\leq$ 30	$\leq$ 36	Pass
$\pi/4$ -DQPSK	2402	6.46	3.24	9.70	$\leq$ 30	$\leq$ 36	Pass
	2441	7.43	3.24	10.67	$\leq$ 30	$\leq$ 36	Pass
	2480	5.53	3.24	8.77	$\leq$ 30	$\leq$ 36	Pass
8-DPSK	2402	6.75	3.24	9.99	$\leq$ 30	$\leq$ 36	Pass

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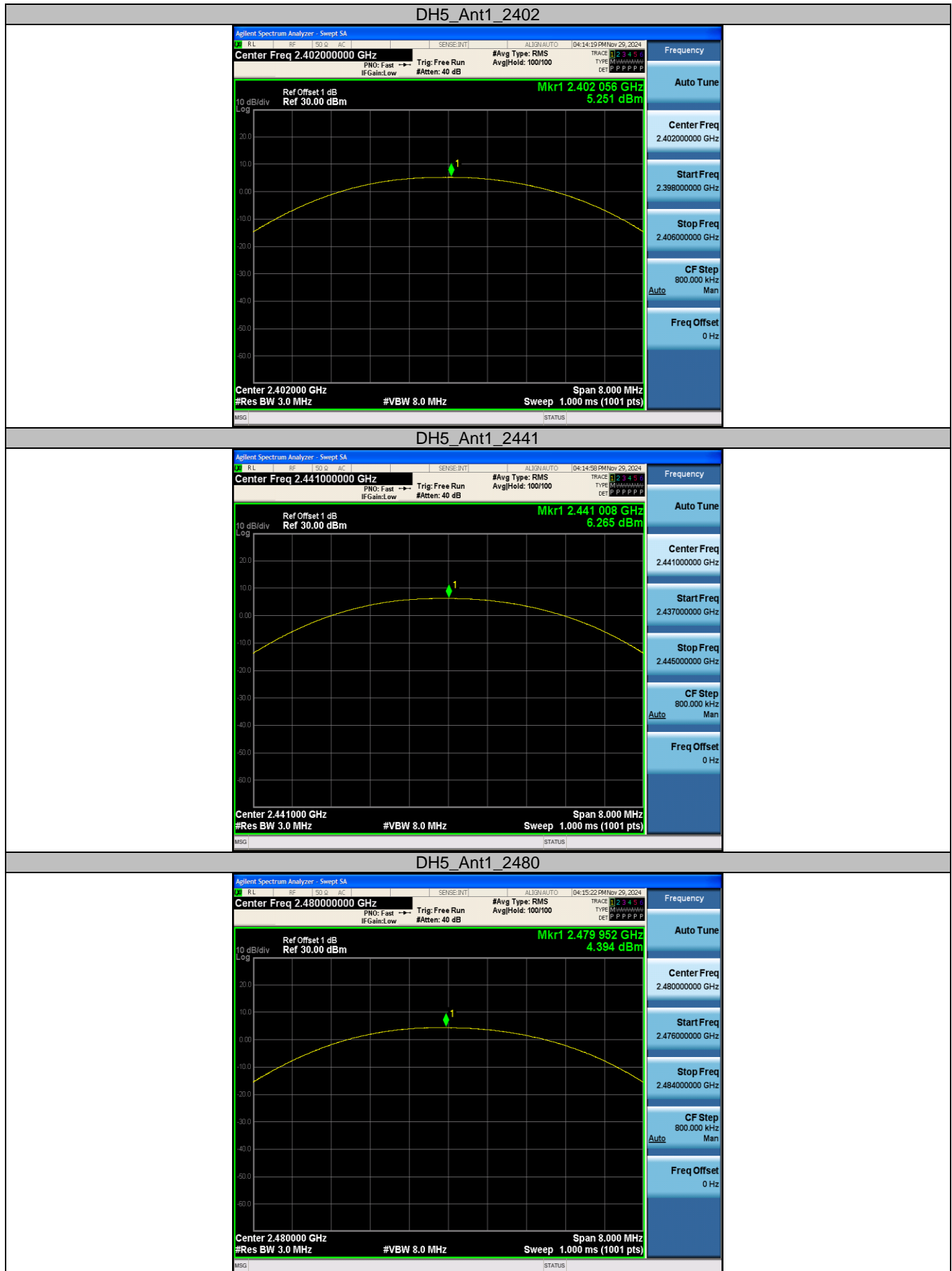
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	2441	7.83	3.24	11.07	≤30	≤36	Pass
	2480	5.99	3.24	9.23	≤30	≤36	Pass



Test plot as follows:



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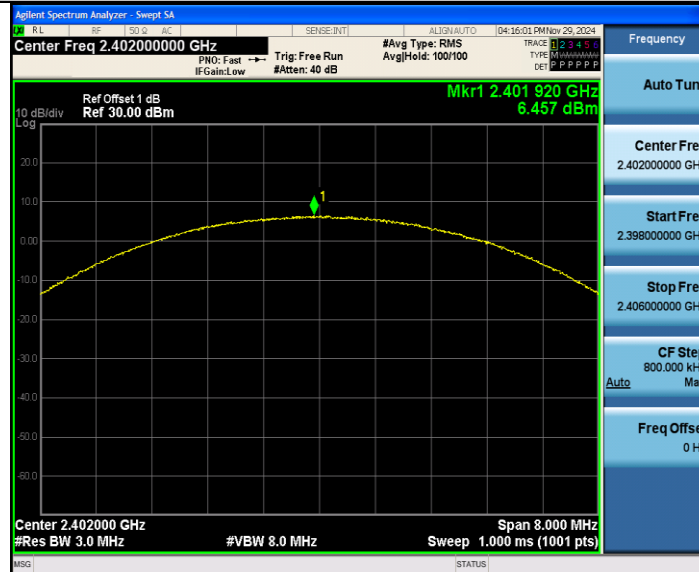
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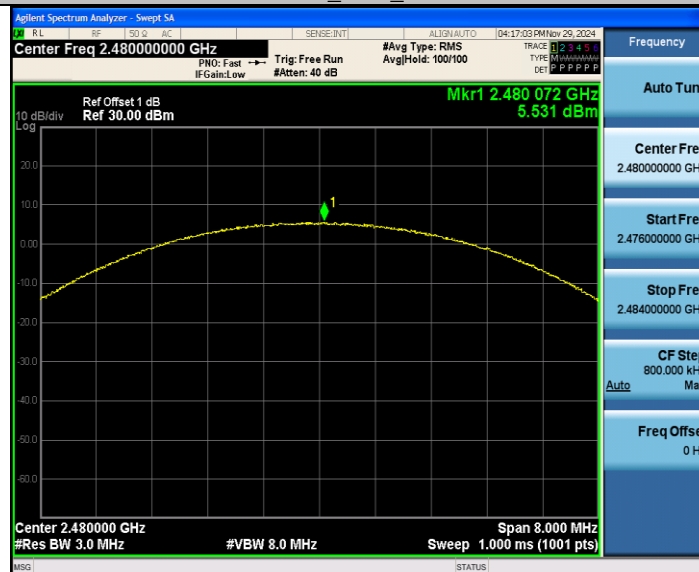
## 2DH5\_Ant1\_2402



## 2DH5\_Ant1\_2441



## 2DH5\_Ant1\_2480



## 3DH5\_Ant1\_2402

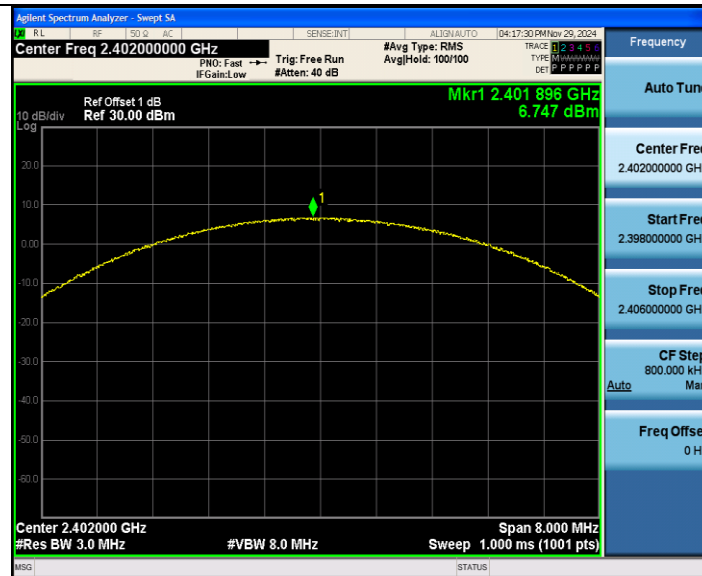
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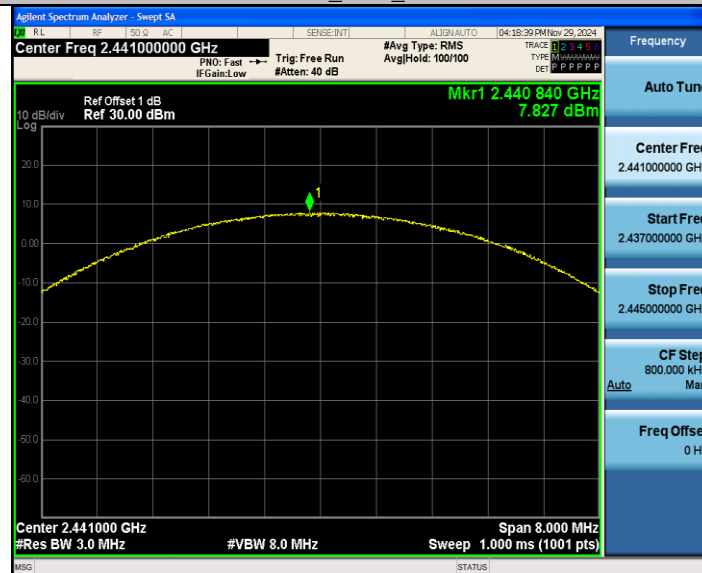
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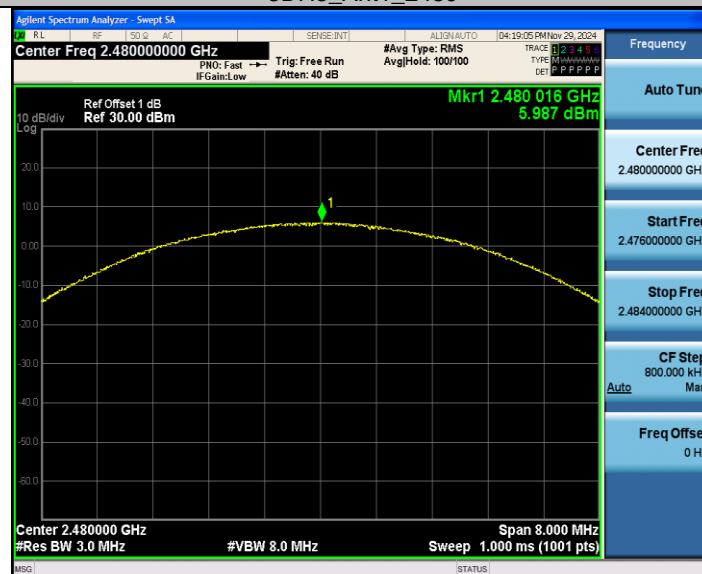




3DH5\_Ant1\_2441



3DH5\_Ant1\_2480



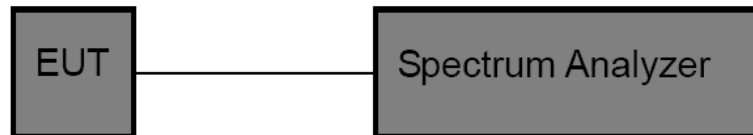


### 3.10. Duty Cycle

#### Limit

None, for report purposes only.

#### 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. The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v05r02.
3. Spectrum Setting:  
Set analyzer center frequency to test channel center frequency.  
Set the span to 0Hz.  
Set the RBW to 10MHz.  
Set the VBW to 10MHz.  
Detector: Peak.  
Sweep time: Auto.  
Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

#### Test Mode

Please refer to the clause 2.4.

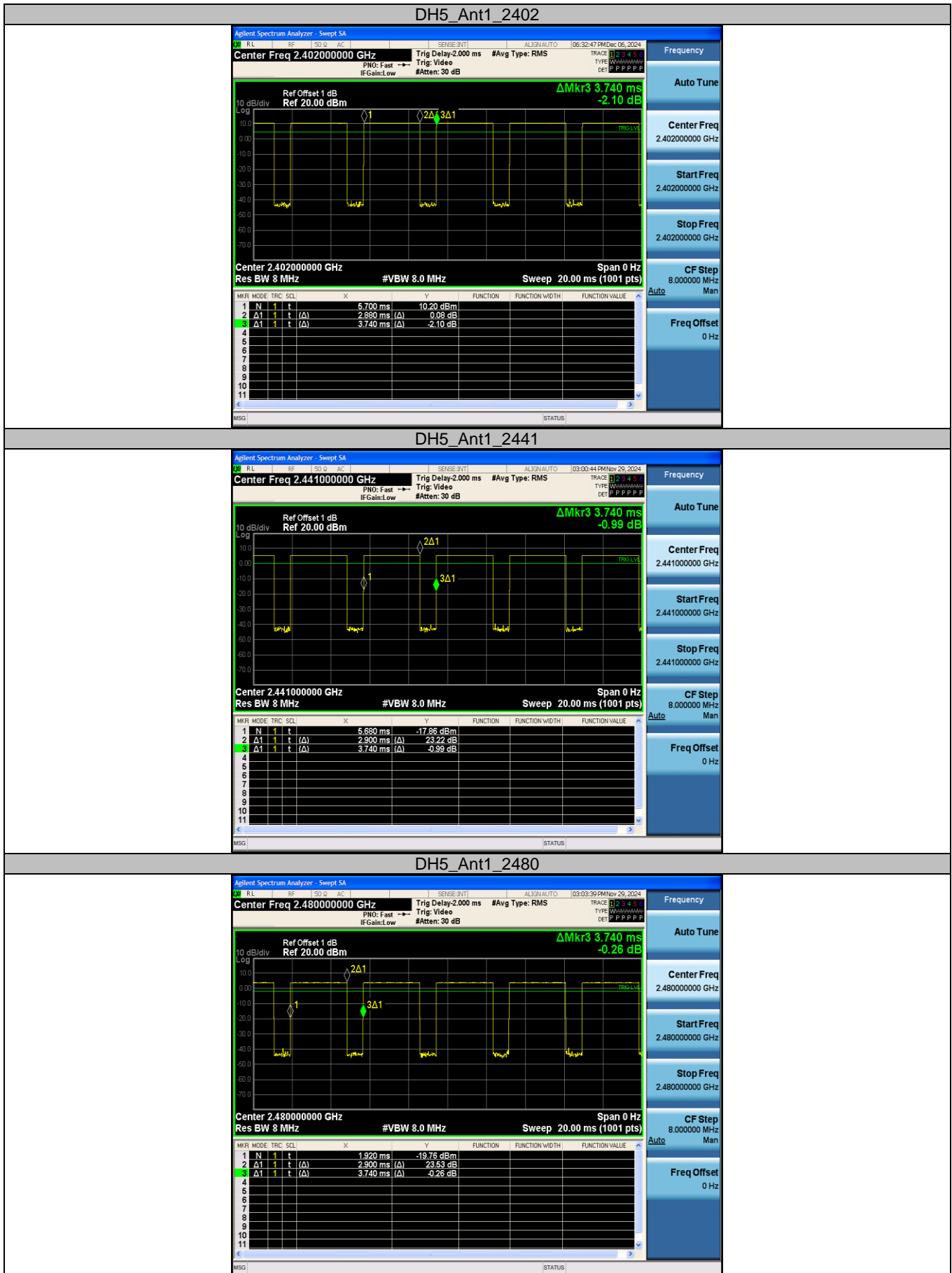
#### Test Result



Test Mode	Frequency (MHz)	Transmission Duration (ms)	Transmission Period (ms)	Duty Cycle (%)	1/T Minimum VBW (kHz)	Final Setting for VBW (kHz)
GFSK	2402	2.88	3.74	77.01	0.35	1
	2441	2.90	3.74	77.54	0.34	1
	2480	2.90	3.74	77.54	0.34	1
$\pi/4$ -DQPSK	2402	2.88	3.74	77.01	0.35	1
	2441	2.88	3.74	77.01	0.35	1
	2480	2.90	3.76	77.13	0.34	1
8-DPSK	2402	2.88	3.74	77.01	0.35	1
	2441	2.88	3.74	77.01	0.35	1
	2480	2.88	3.74	77.01	0.35	1



Test plot as follows:



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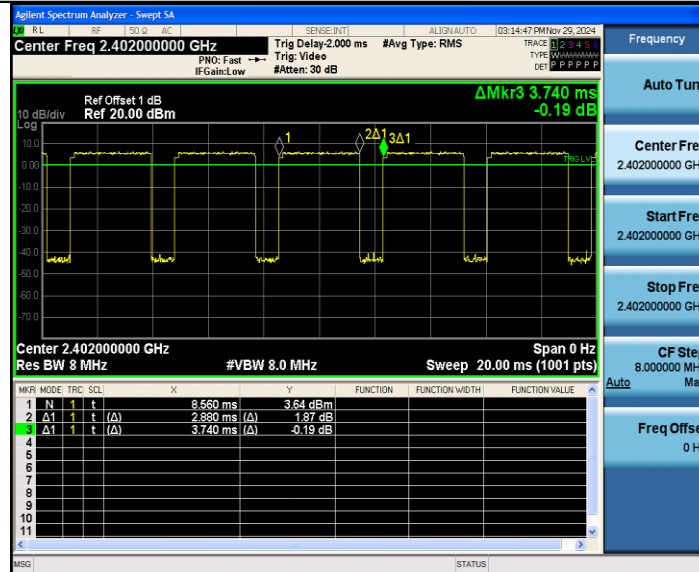
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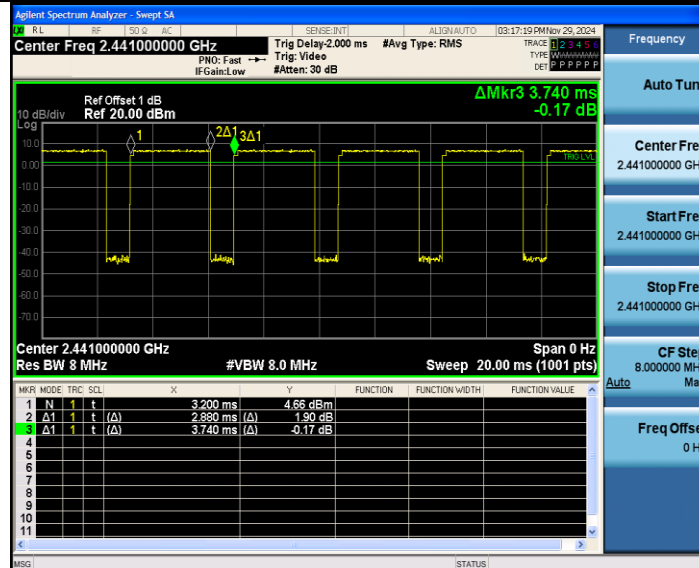
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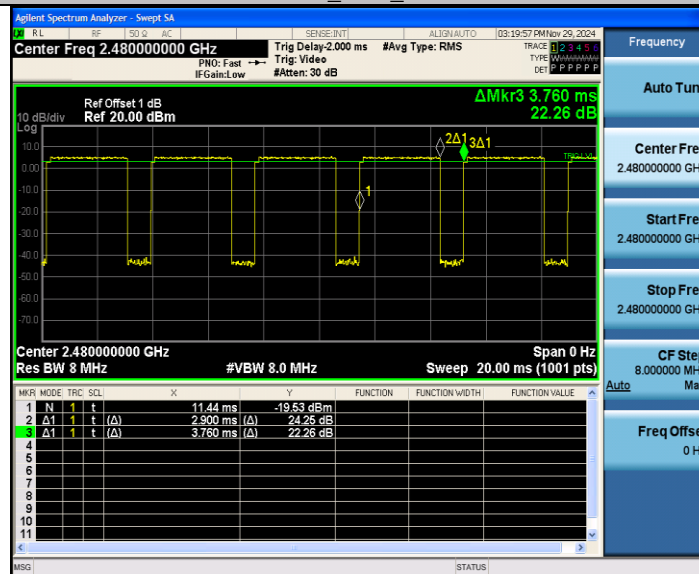
## 2DH5\_Ant1\_2402



## 2DH5\_Ant1\_2441



## 2DH5\_Ant1\_2480



## 3DH5\_Ant1\_2402

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### 3.11. 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 is less than 6dBi, please refer to the EUT internal photographs antenna photo.

##### **RSS-Gen Issue 5 Section 6.8**

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power(e.i.r.p.) limits specified in the applicable standard (RSS) for licence-exempt apparatus.

#### Result

PASS.

The EUT has 1 antenna: a FPC Antenna for BT.

Note: ☒ Antenna use a permanently attached antenna which is not replaceable.

☐ Not using a standard antenna jack or electrical connector for antenna replacement.

☐ The antenna has to be professionally installed (please provide method of installation).

Which in accordance to RSS-Gen 6.8, please refer to the internal photos.

\*\*\*\*\*THE END OF REPORT\*\*\*\*\*