

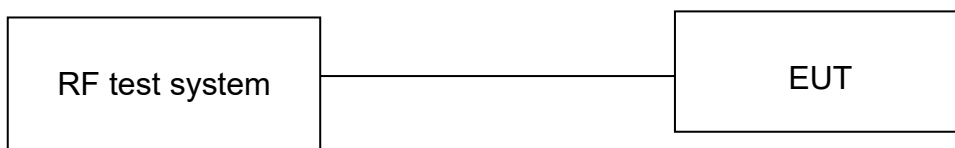
4. 20DB BANDWIDTH

4.1.Limit

For frequency hopping systems operating in the 2400MHz-2483.5MHz no limit for 20dB bandwidth.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.2.Test Setup



4.3.Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	30KHz
VBW	100KHz
Span	3MHz
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

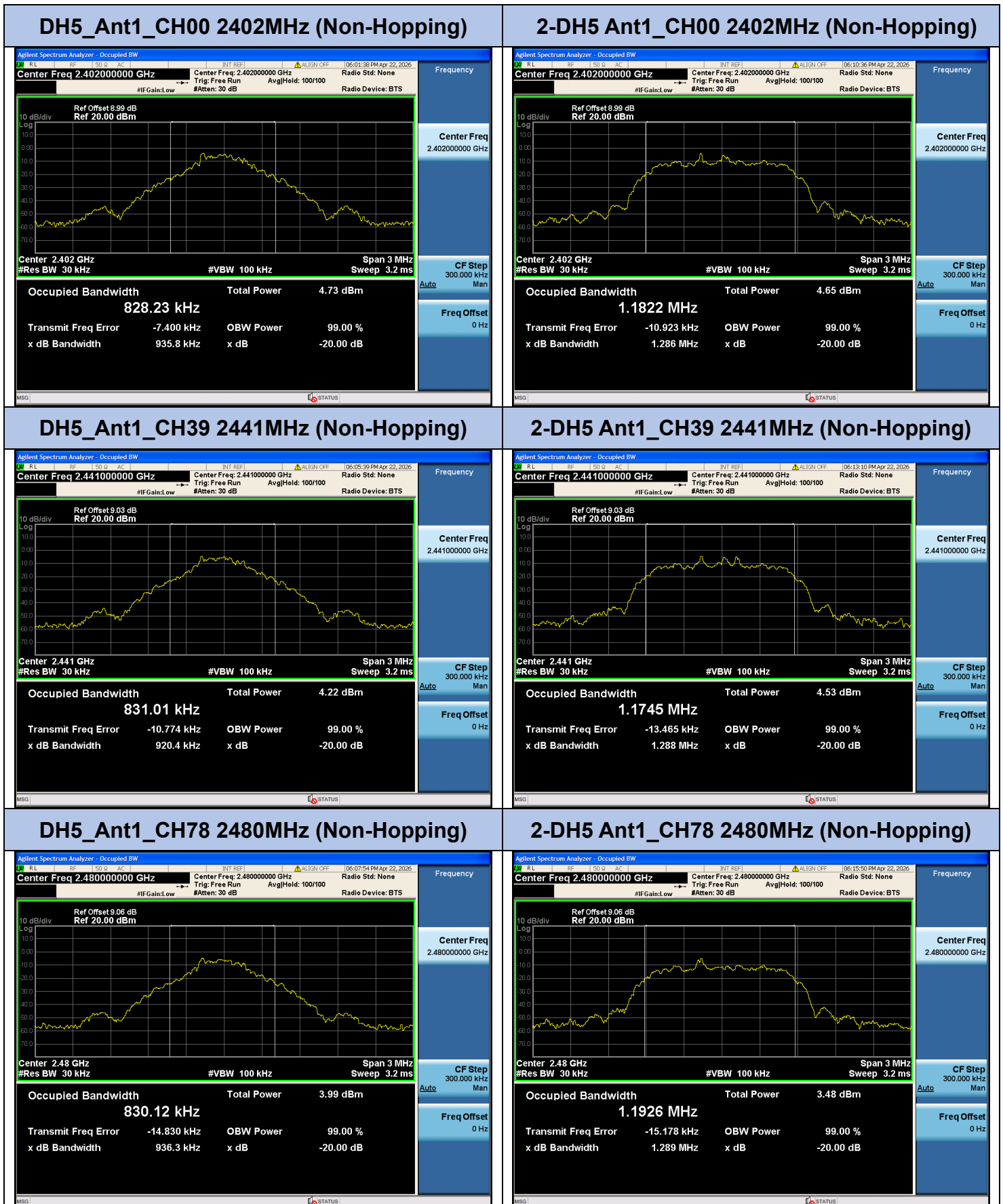
4.4.Test Procedure

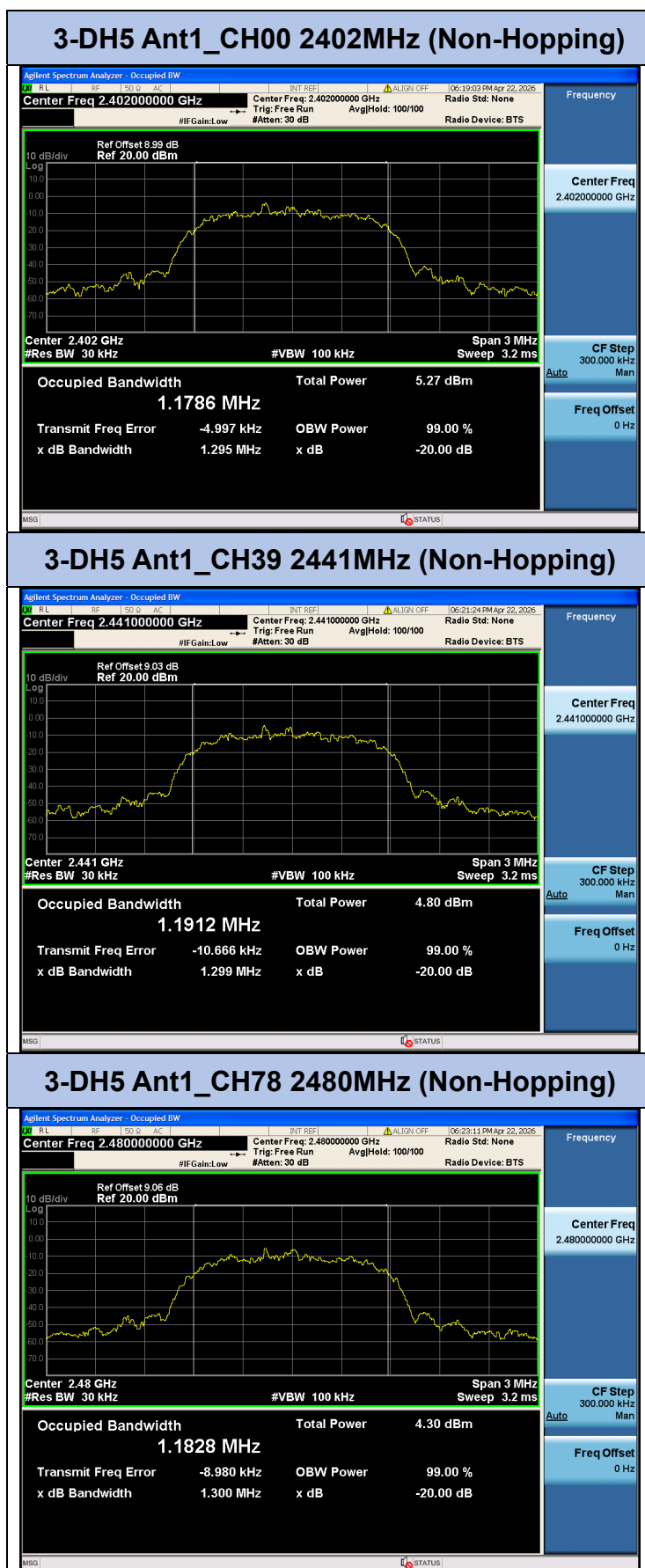
- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 4.3.
- Set the EUT transmit continuously with maximum output power over fixed single hopping channel.
- Allow trace to stabilize, use the ndB down function to measure 20dB Bandwidth.
- Repeat above procedures until all channels and test modes were measured.
- Record the results in the test report.

4.5. Test Result

Test Mode	Antenna	Channel& Frequency	20dB Bandwidth	Result
		MHz	MHz	
GFSK DH5 (Non-Hopping)	Ant1	CH00 2402	0.936	PASS
		CH39 2441	0.920	PASS
		CH78 2480	0.936	PASS
$\pi/4$ -DQPSK 2-DH5 (Non-Hopping)	Ant1	CH00 2402	1.286	PASS
		CH39 2441	1.288	PASS
		CH78 2480	1.289	PASS
8-DPSK 3-DH5 (Non-Hopping)	Ant1	CH00 2402	1.295	PASS
		CH39 2441	1.299	PASS
		CH78 2480	1.300	PASS

4.6.Original Test Record





5. CARRIER FREQUENCY SEPARATION

5.1. Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

5.2. Test Setup



5.3. Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	30KHz
VBW	100KHz
Span	3MHz
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

5.4. Test Procedure

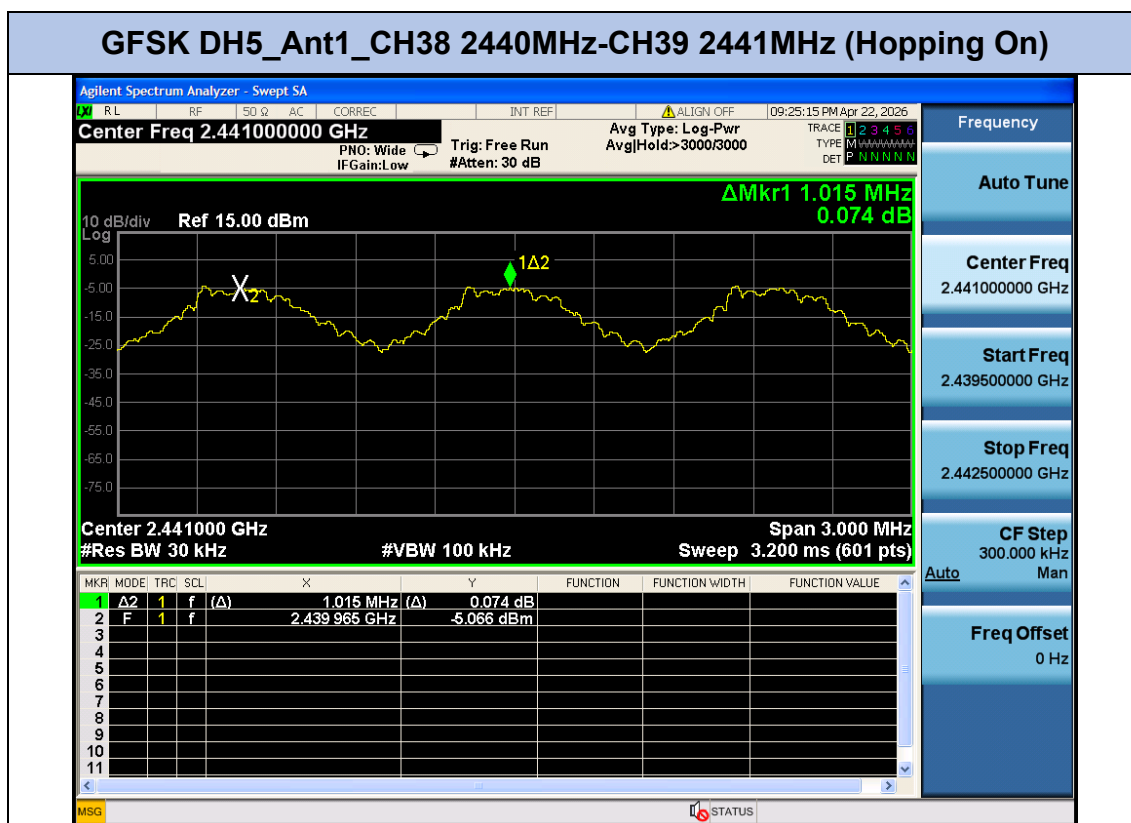
- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 5.3.
- Set the EUT transmit continuously with maximum output power in all channel hopping mode.
- Allow trace to stabilize, use the marker-delta function to measure channel separation between two adjacent channels.
- Repeat above procedures until all channels and test modes were measured.
- Record the results in the test report.

5.5. Test Result

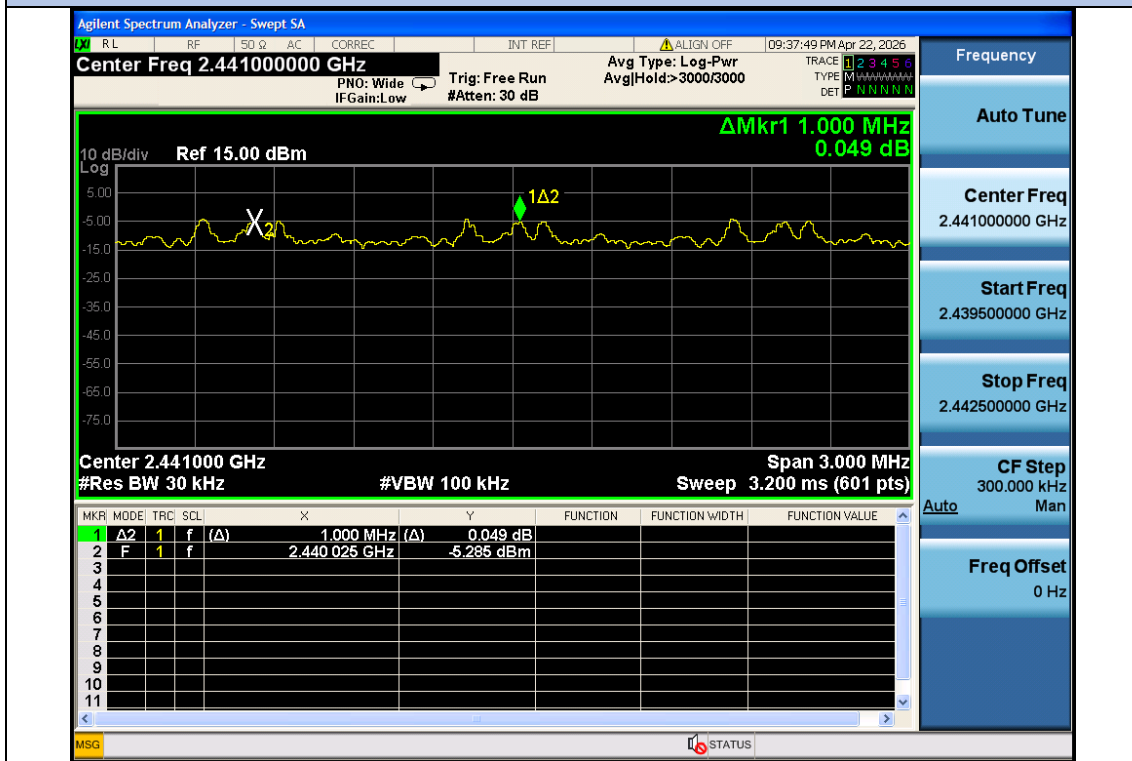
Test Mode	Antenna	Channel	Frequency	Channel Separation	Limit	Result
			MHz	MHz	MHz	
GFSK DH5 (Hopping On)	Ant1	CH38	2440	1.015	>0.624*	PASS
		CH39	2441			
$\pi/4$ -DQPSK 2-DH5 (Hopping On)	Ant1	CH38	2440	1.000	>0.859*	PASS
		CH39	2441			
8-DPSK 3-DH5 (Hopping On)	Ant1	CH38	2440	1.000	>0.867*	PASS
		CH39	2441			

Note *: Limit from Section 4 20DB BANDWIDTH 2/3 (> 2/3 of the 20dB Bandwidth or 25[kHz] (whichever is greater)

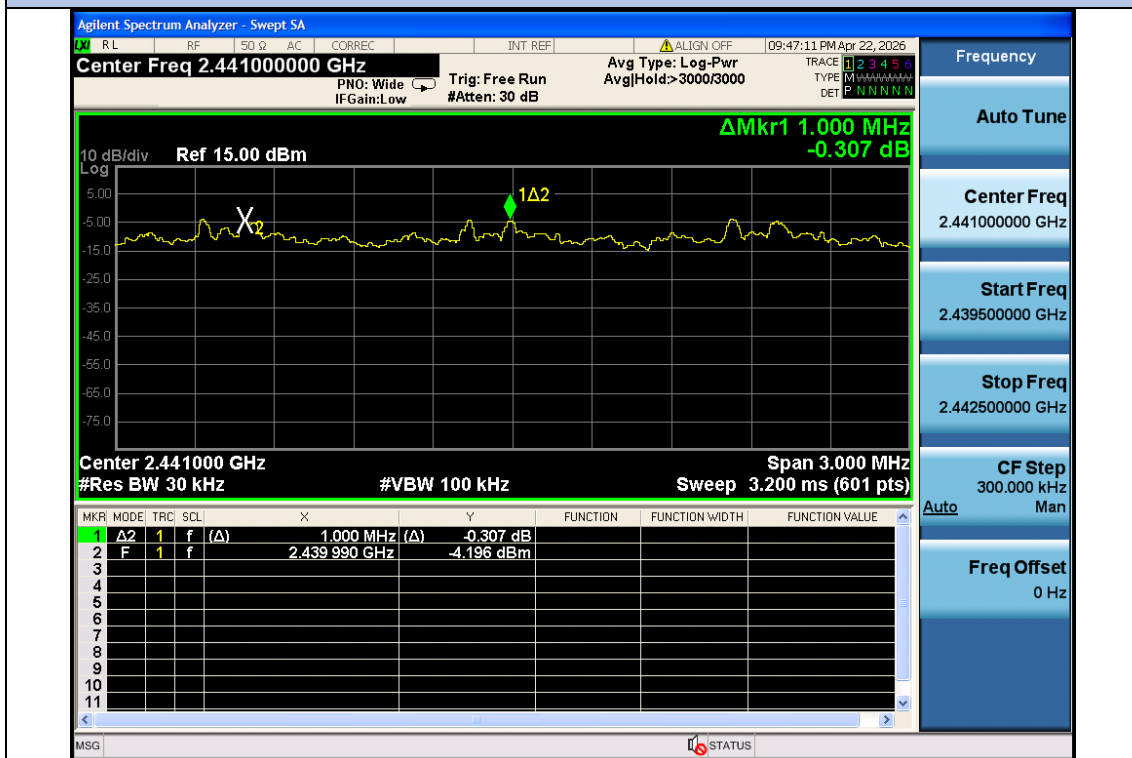
5.6. Original Test Record



$\pi/4$ -DQPSK 2-DH5_Ant1_CH38 2440MHz-CH39 2441MHz (Hopping On)



8-DPSK 3-DH5_Ant1_CH38 2440MHz-CH39 2441MHz (Hopping On)

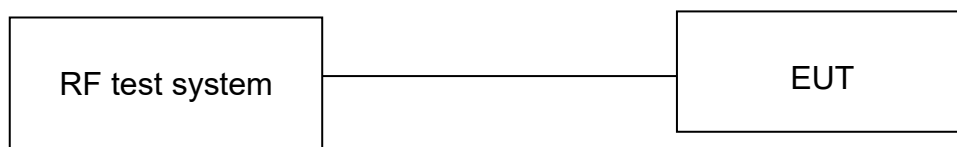


6. NUMBER OF HOPPING CHANNEL

6.1. Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

6.2. Test Setup



6.3. Spectrum Analyzer Setting

Spectrum Parameters	Setting	
RBW	300KHz	
VBW	300KHz	
Start frequency	2400MHz	2441MH
Stop frequency	2441MHz	2483.5MHz
Sweep Time	Auto	
Detector	Peak	
Trace Mode	Max Hold	

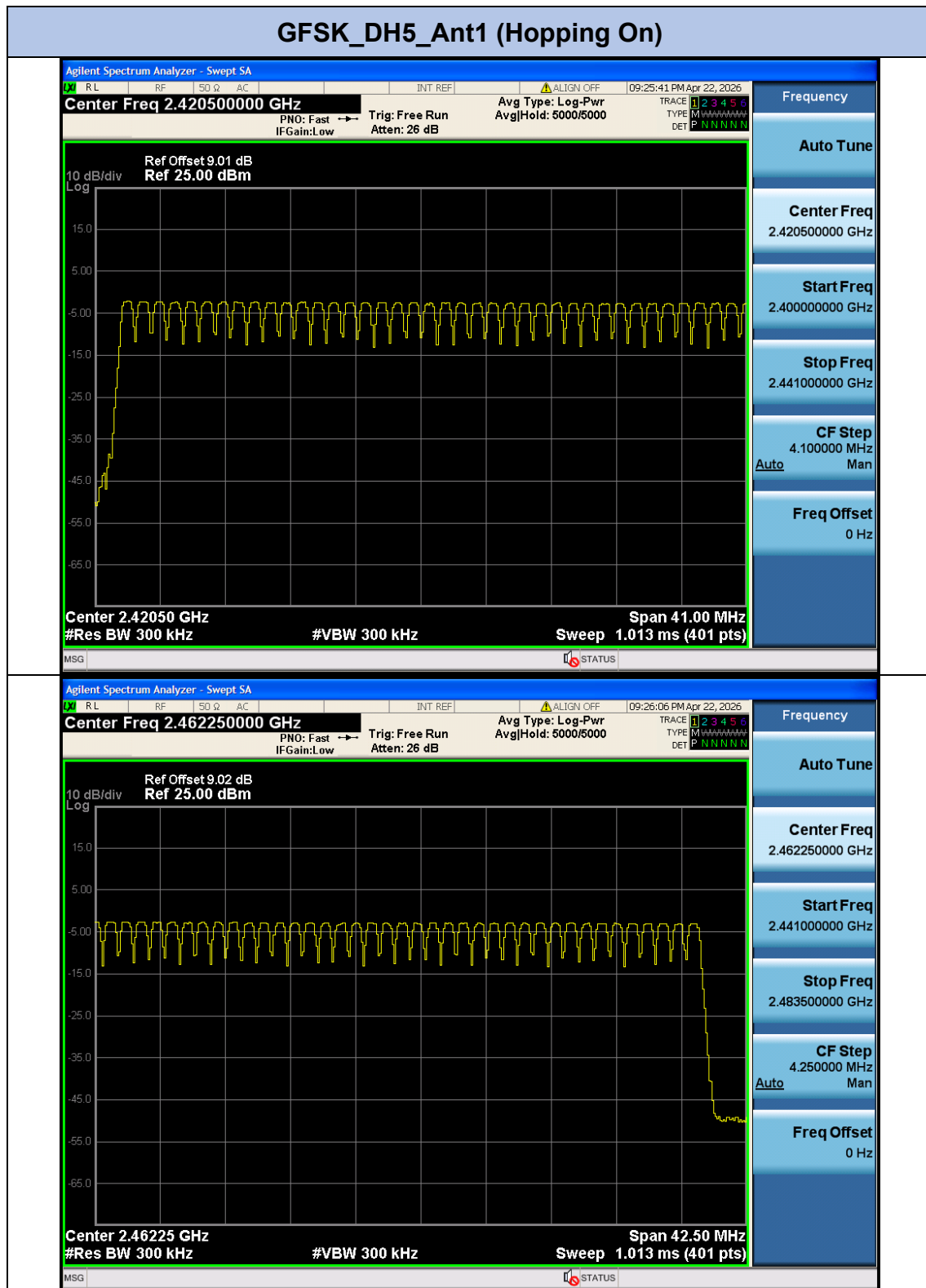
6.4. Test Procedure

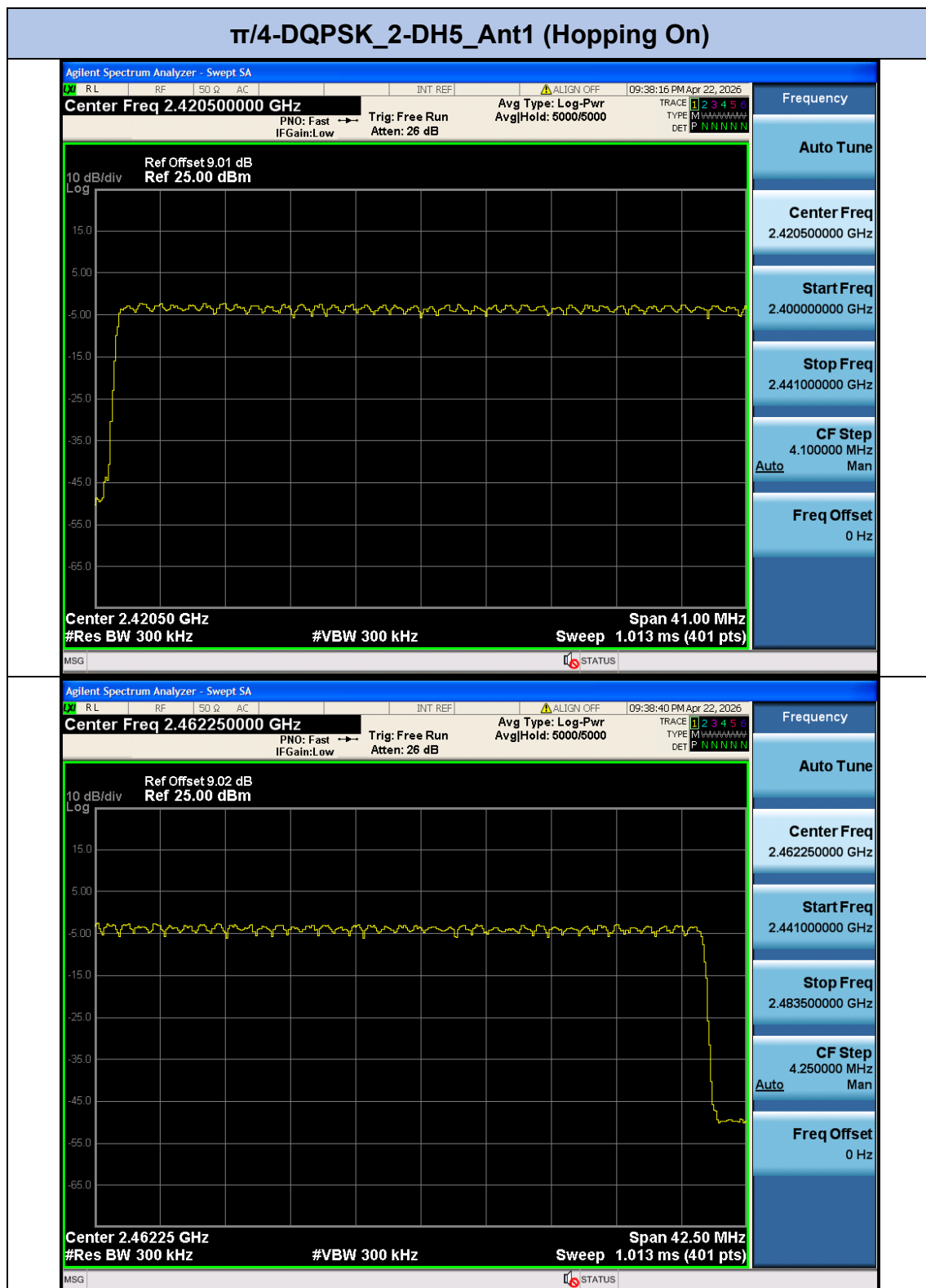
- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 6.3.
- Set the EUT transmit continuously with maximum output power in all channel hopping mode.
- Allow trace to stabilize, use the marker-peak function to mark the first and last frequency hopping channel.
- Repeat above procedures until all test modes were measured.
- Record the results in the test report.

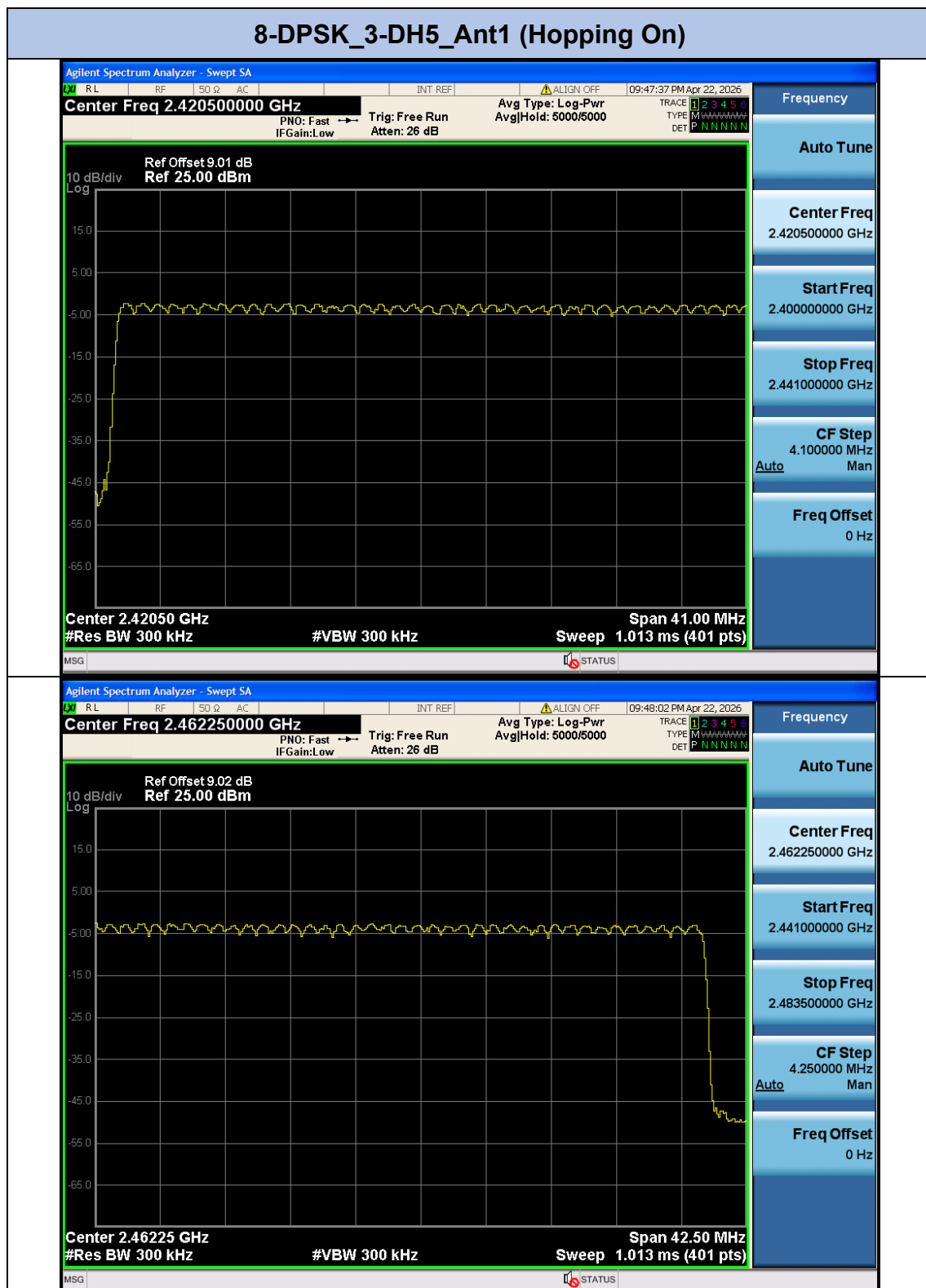
6.5. Test Result

Test Mode	Antenna	Number of Hopping Channel	Limit	Result
GFSK DH5 (Hopping On)	Ant1	79	>15	PASS
$\pi/4$ -DQPSK 2-DH5 (Hopping On)	Ant1	79		PASS
8-DPSK 3-DH5 (Hopping On)	Ant1	79		PASS

6.6.Original Test Record







7.TIME OF OCCUPANCY (DWELL TIME)

7.1.Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

7.2.Test Setup



7.3.Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	1MHz
VBW	3MHz
Span	Zero
Detector	Peak
Sweep Time	0.96ms(DH1)/4.2ms(DH3)/7.2ms(DH5)
Sweep Mode	Single Sweep

7.4.Test Procedure

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 7.3.
- Set the EUT transmit continuously with maximum output power in all channel hopping mode.
- Allow trace to stabilize, use the marker-delta function to measure single pulse duration.
- Repeat above procedures until all test modes were measured.
- Record the results in the test report.

7.5. Test Result

Test Mode	Packet	Channel & Frequency	Burst time	Dwell time	Limit	Result
		MHz	ms	s	s	
GFSK (Hopping On)	DH1	CH39 2441	0.421	0.1347	0.4	PASS
	DH3		1.687	0.2699		
	DH5		2.940	0.3136		
$\pi/4$ -DQPSK (Hopping On)	2-DH1	CH39 2441	0.430	0.1376	0.4	PASS
	2-DH3		1.694	0.2710		
	2-DH5		2.952	0.3149		
8-DPSK (Hopping On)	3-DH1	CH39 2441	0.432	0.1382	0.4	PASS
	3-DH3		1.694	0.2710		
	3-DH5		2.952	0.3149		

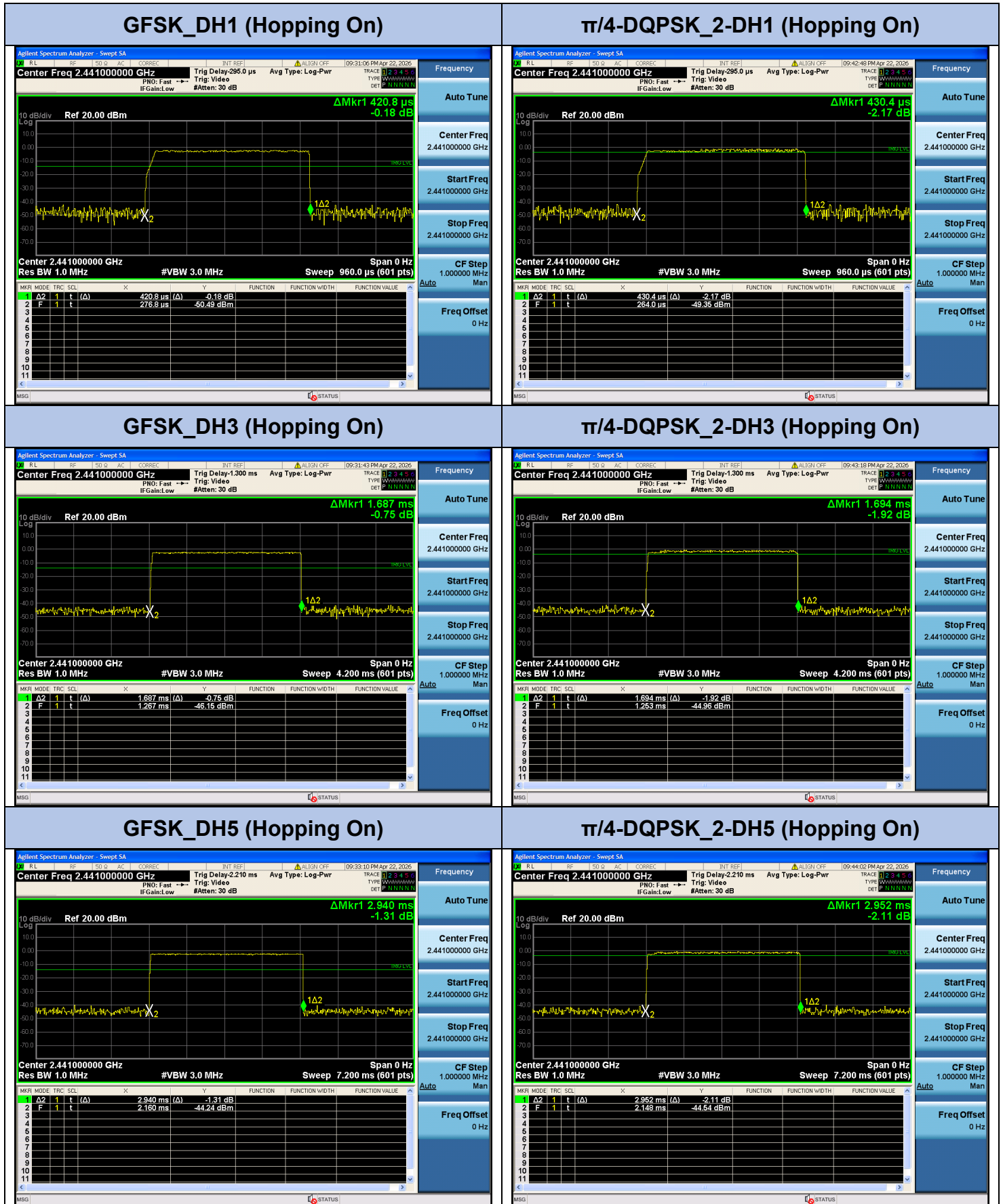
Note:

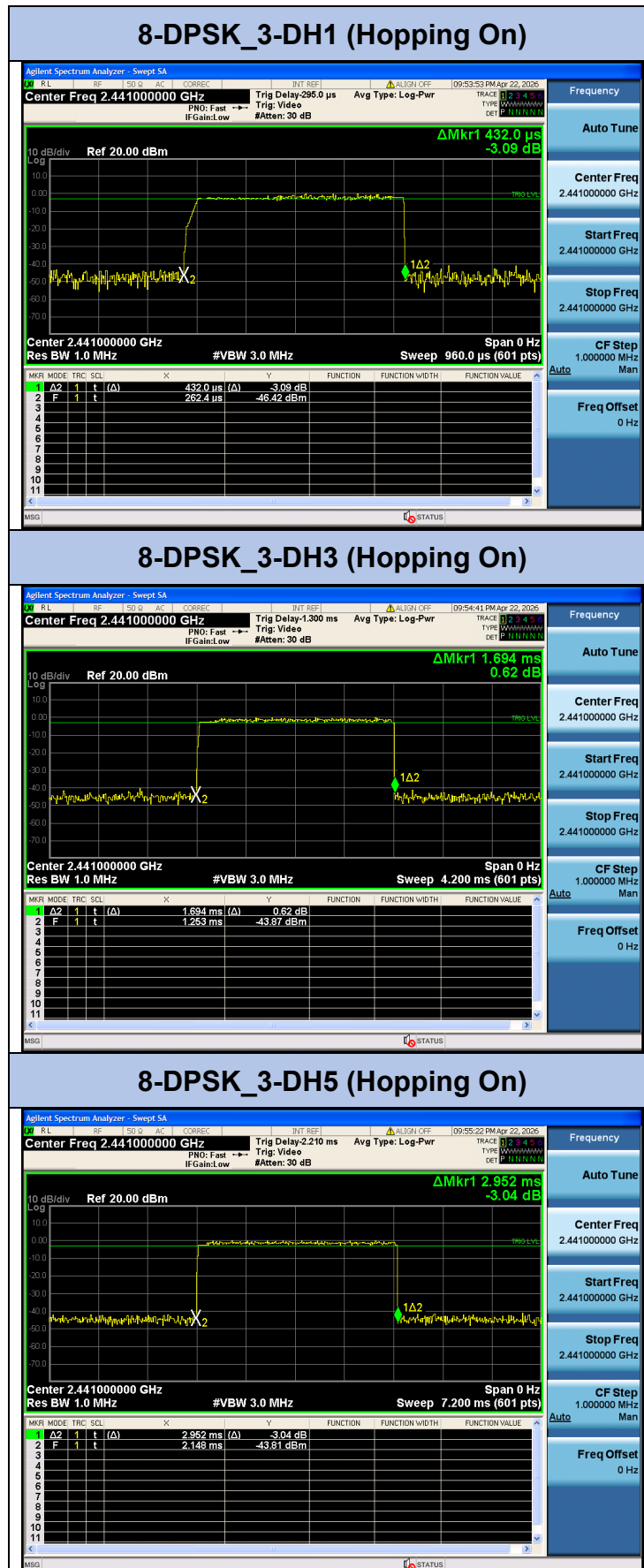
Dwell time = Pulse time (ms) $\times$ (1600 $\div$ 2 $\div$ 79) $\times$ 31.6 Second for DH1, 2-DH1, 3-DH1

Dwell time = Pulse time (ms) $\times$ (1600 $\div$ 4 $\div$ 79) $\times$ 31.6 Second for DH3, 2-DH3, 3-DH2

Dwell time = Pulse time (ms) $\times$ (1600 $\div$ 6 $\div$ 79) $\times$ 31.6 Second for DH5, 2-DH5, 3-DH3

7.6.Original Test Record



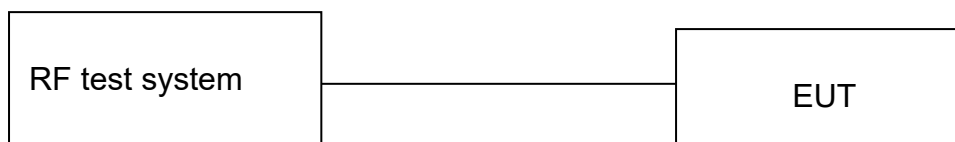


8.CONDUCTED BAND EDGE

8.1.Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

8.2.Test Setup



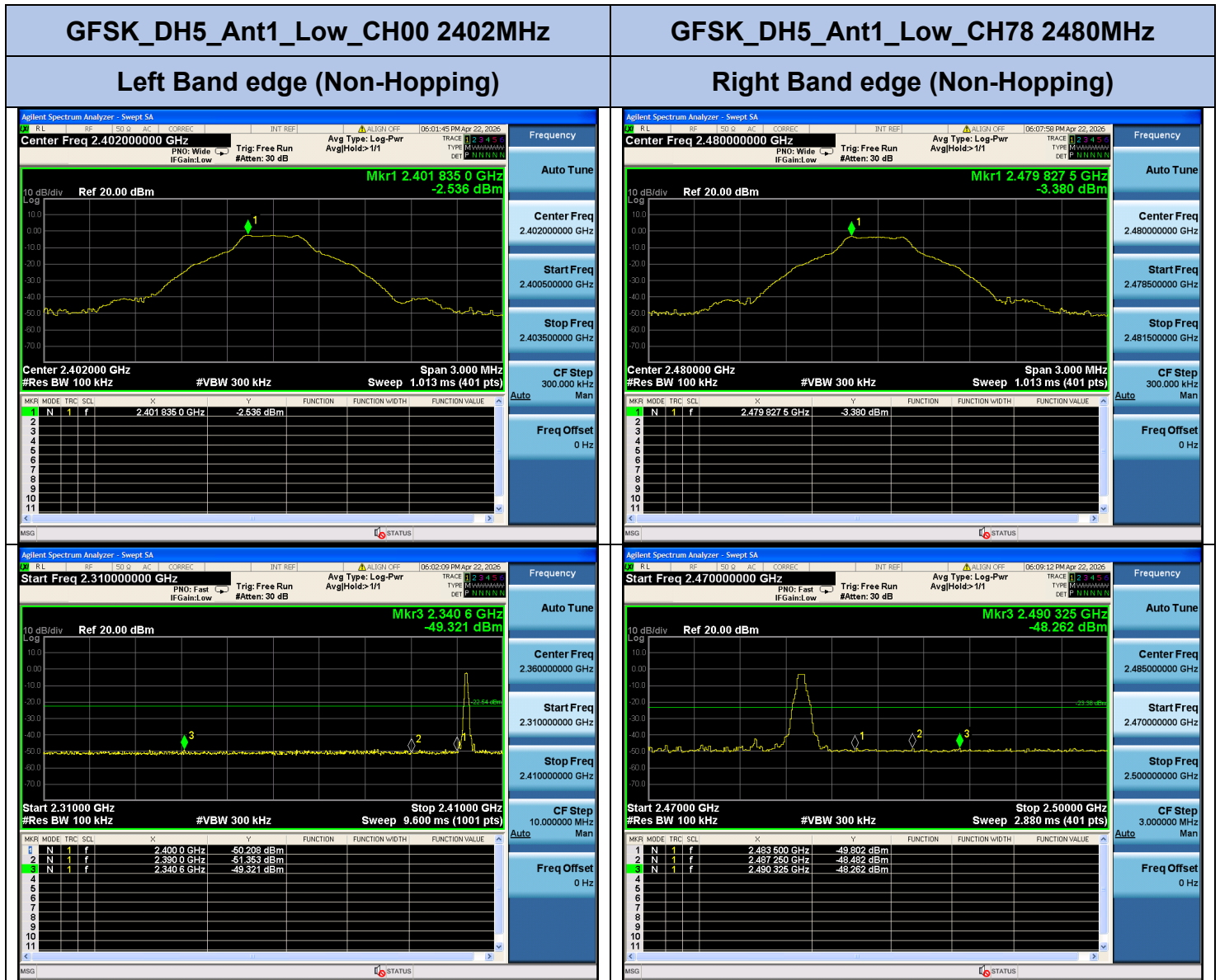
8.3.Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	100KHz
VBW	300KHz
Span	3MHz (Reference Level) 100MHz (Left Band edge) 30MHz (Right Band edge)
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

8.4.Test Procedure

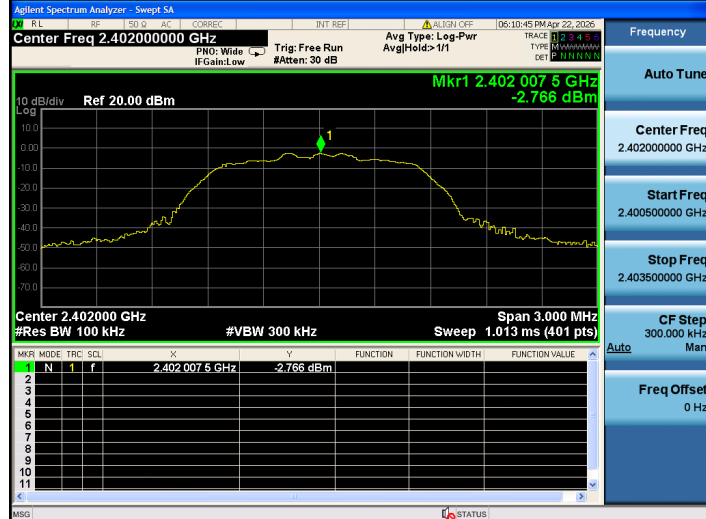
- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 8.3.
- Set the EUT transmit continuously with maximum output power over fixed single hopping channel.
- Allow trace to stabilize, use the marker function to mark the highest emission level outside the authorized band.
- Repeat above procedures until all channels and test modes were measured(including frequency hopping off and frequency hopping on).
- Record the results in the test report.

8.5. Test Result



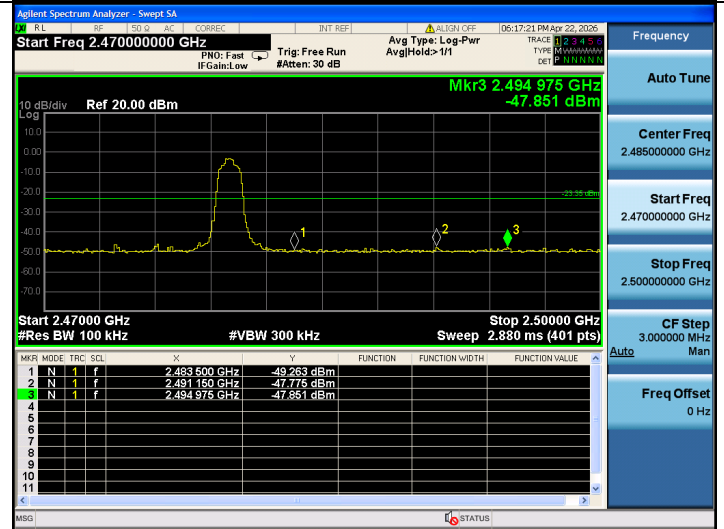
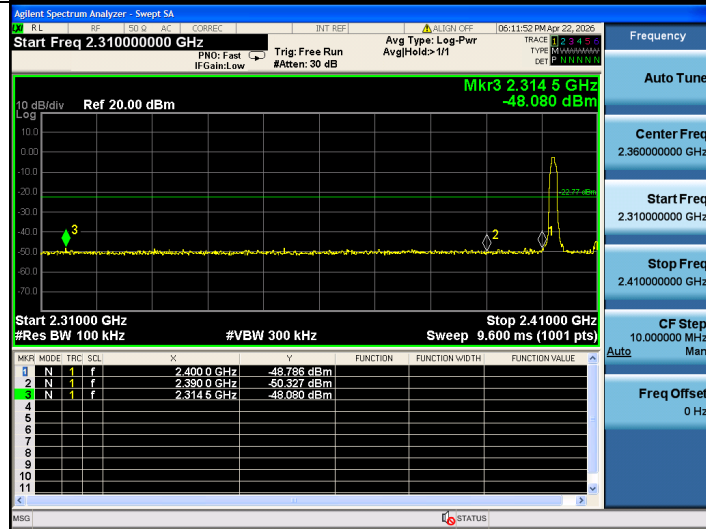
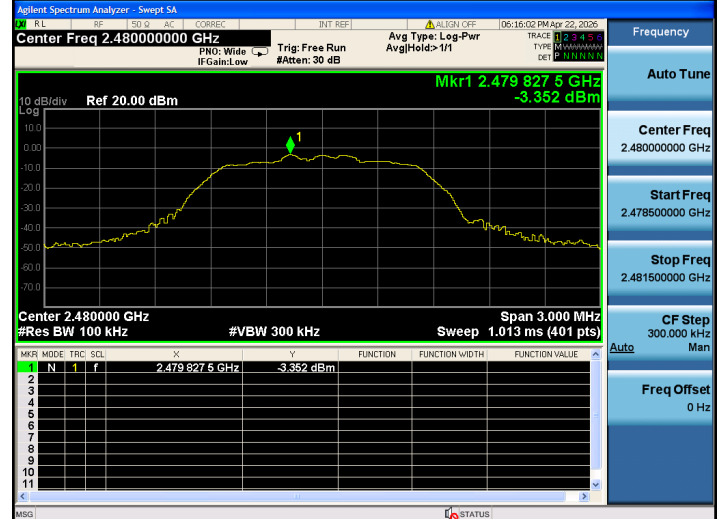
$\pi/4$ -DQPSK_2-DH5_Ant1_Low_CH00 2402MHz

Left Band edge (Non-Hopping)



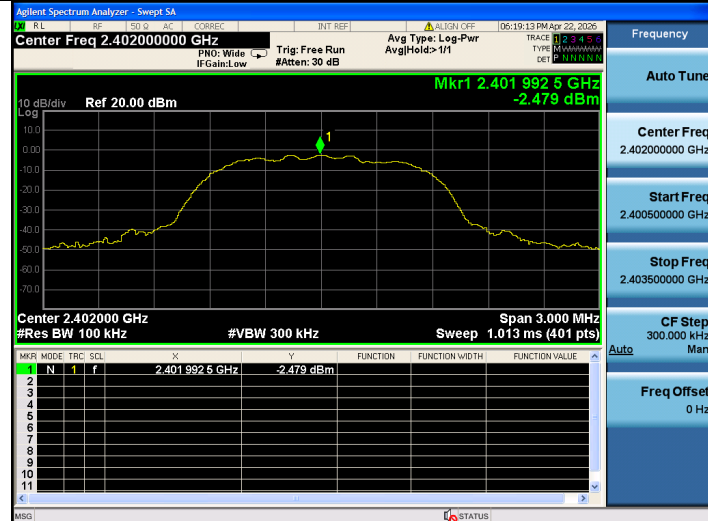
$\pi/4$ -DQPSK_2-DH5_Ant1_Low_CH78 2480MHz

Right Band edge (Non-Hopping)



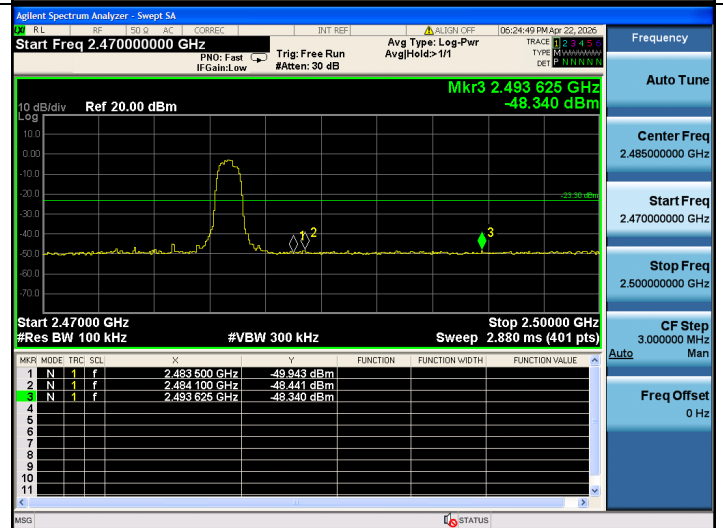
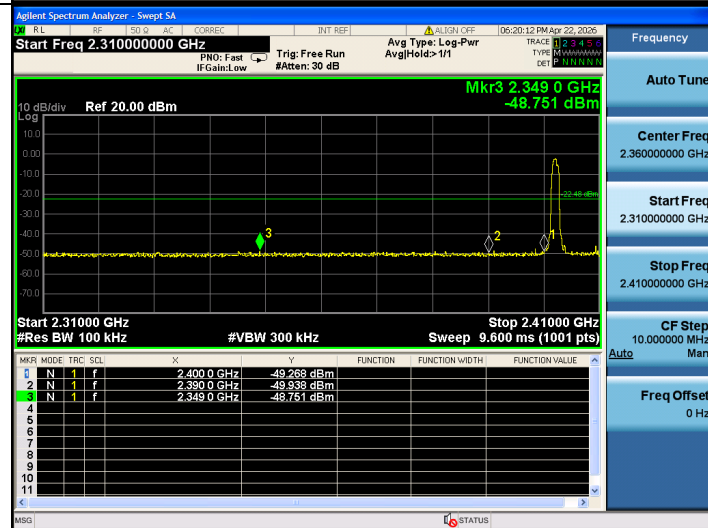
8-DPSK_3-DH5_Ant1_Low_CH00 2402MHz

Left Band edge (Non-Hopping)



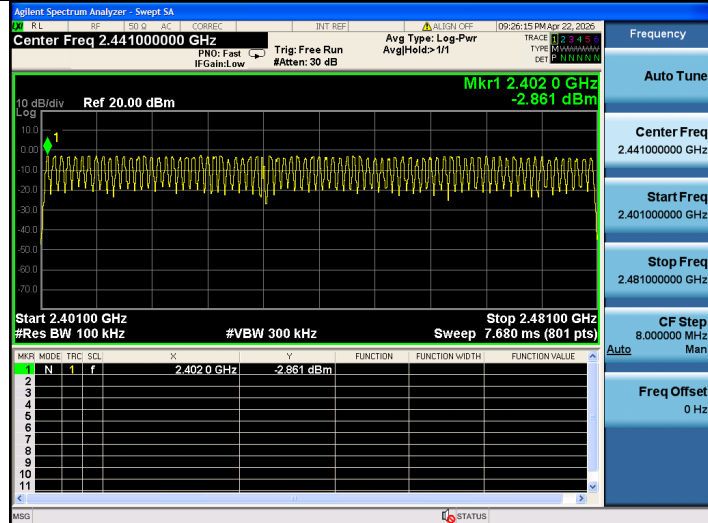
8-DPSK_3-DH5_Ant1_Low_CH78 2480MHz

Right Band edge (Non-Hopping)



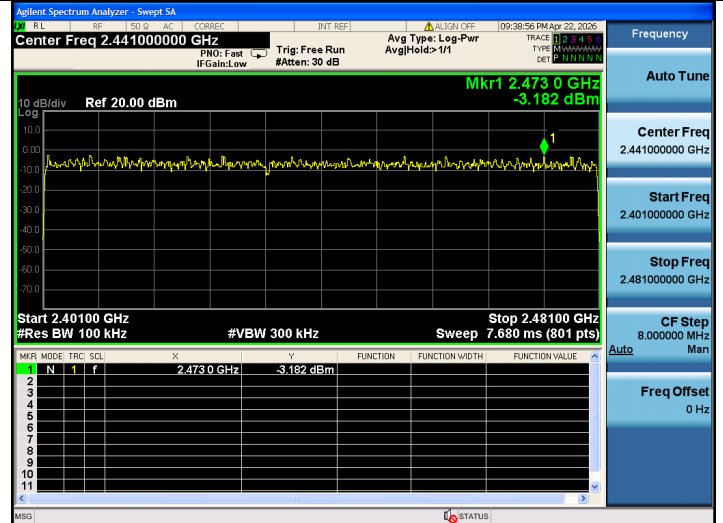
GFSK_DH5_Ant1

Reference_ (Hopping On)

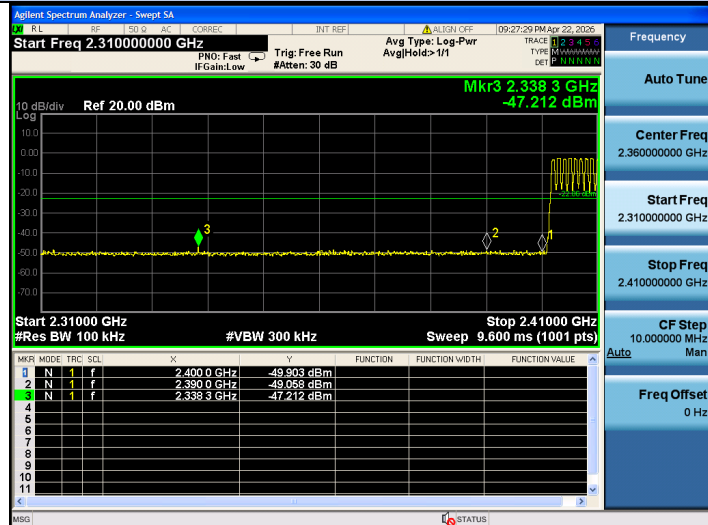


$\pi/4$ -DQPSK_2-DH5_Ant1

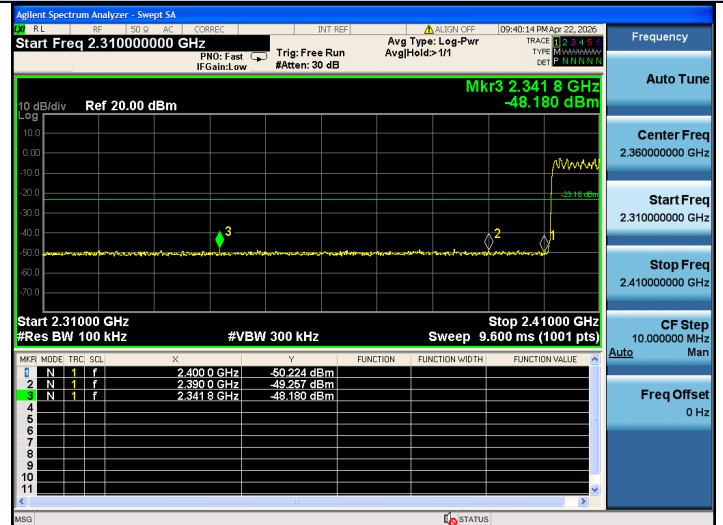
Reference_ (Hopping On)



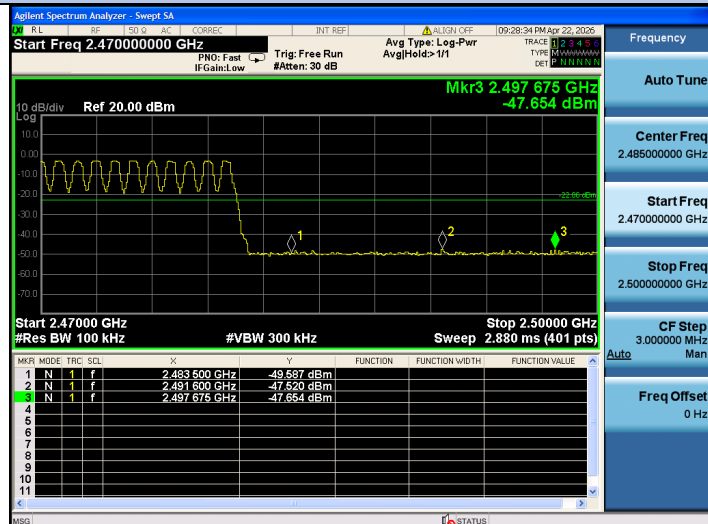
Left Band edge (Hopping On)



Left Band edge (Hopping On)



Right Band edge (Hopping On)



Right Band edge (Hopping On)

