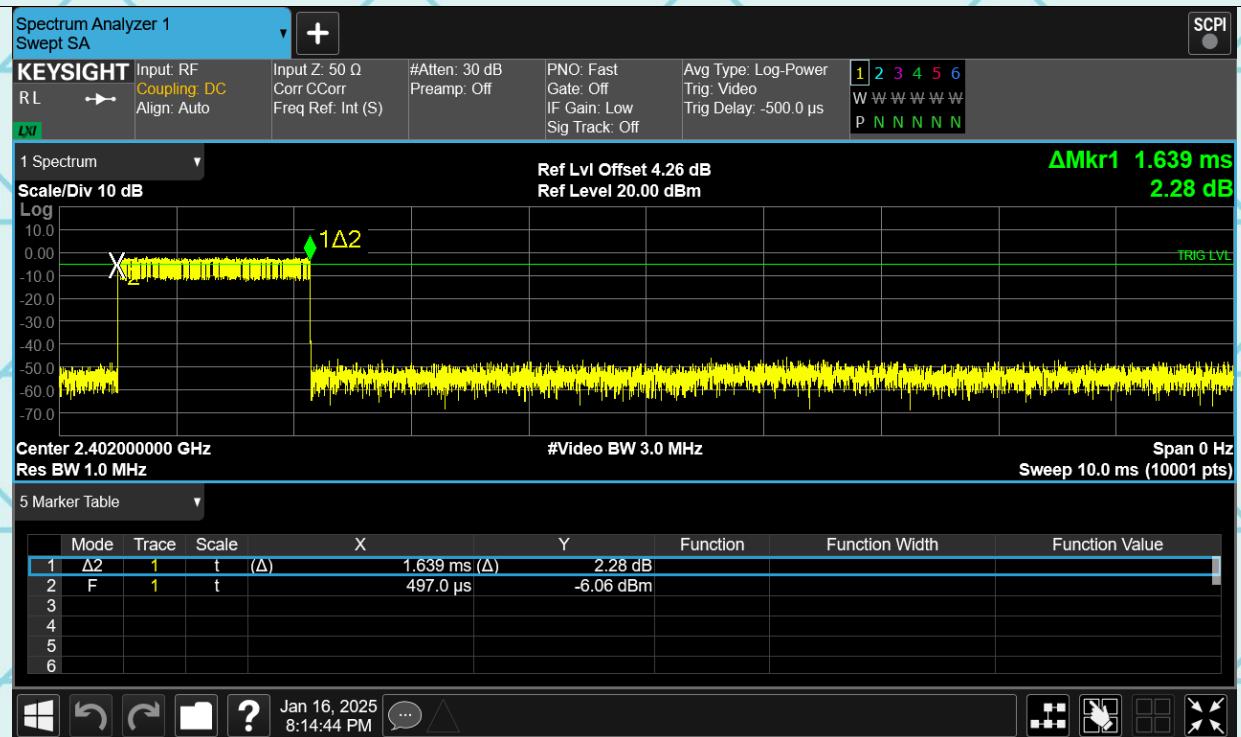
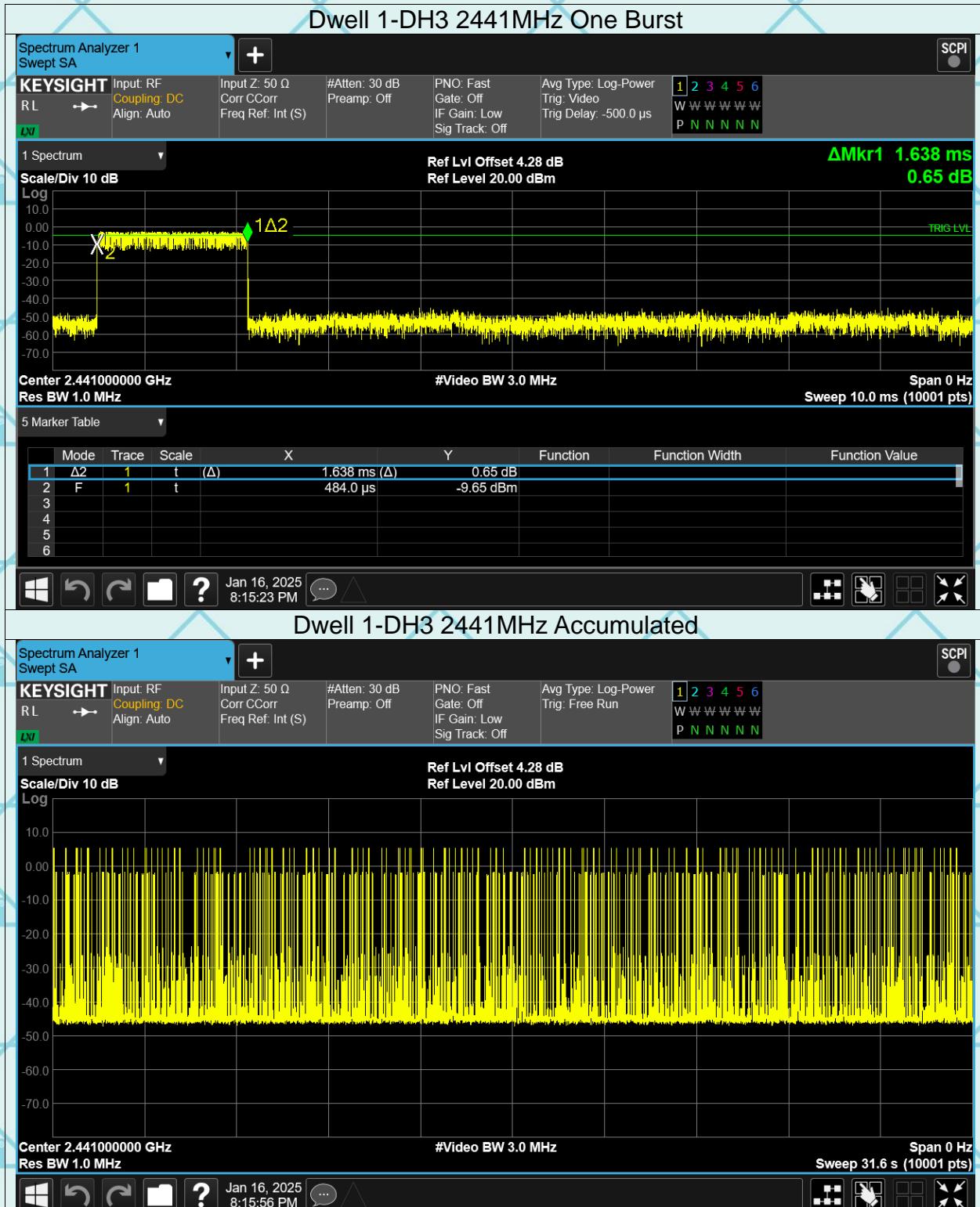


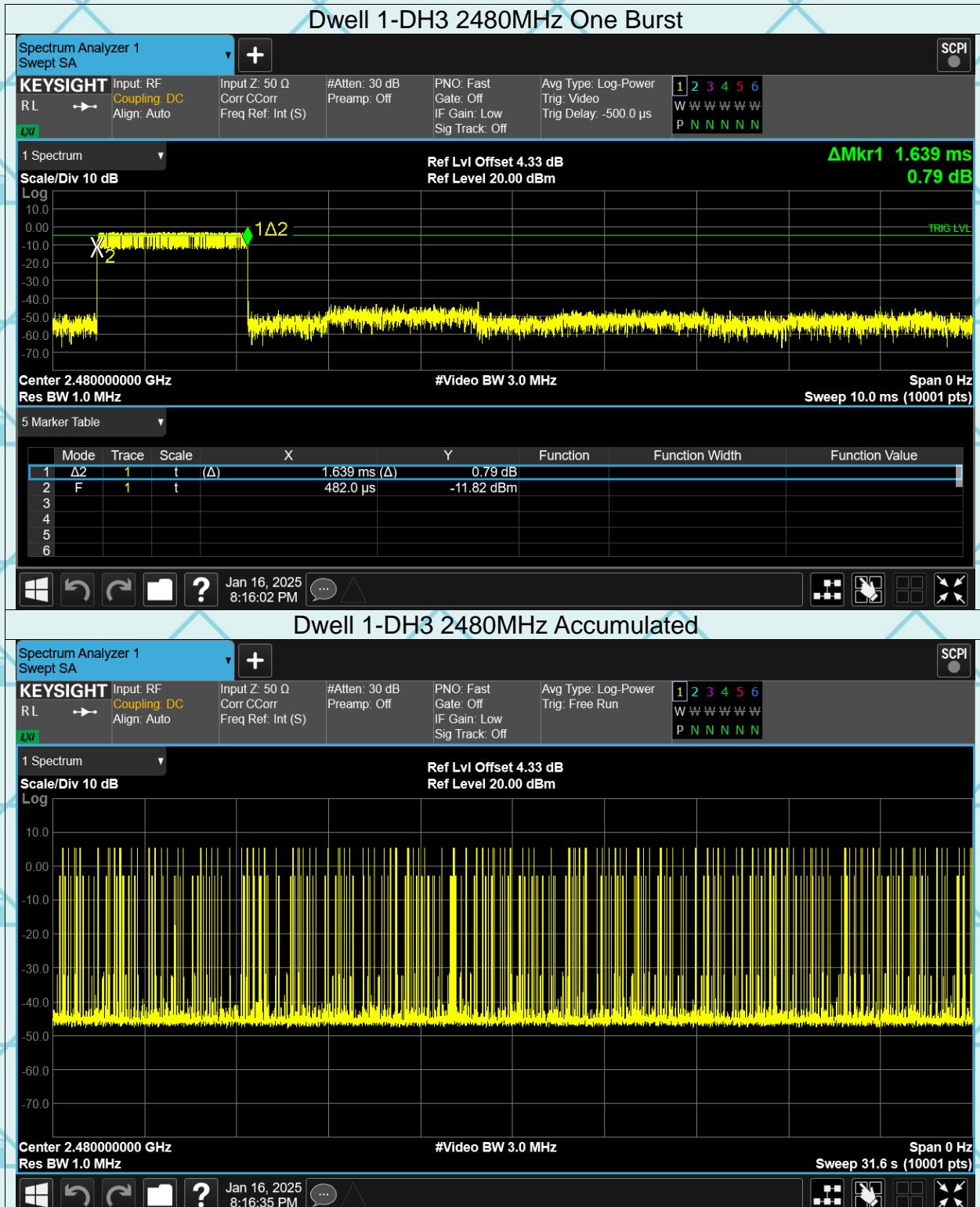
## Dwell 1-DH3 2402MHz One Burst

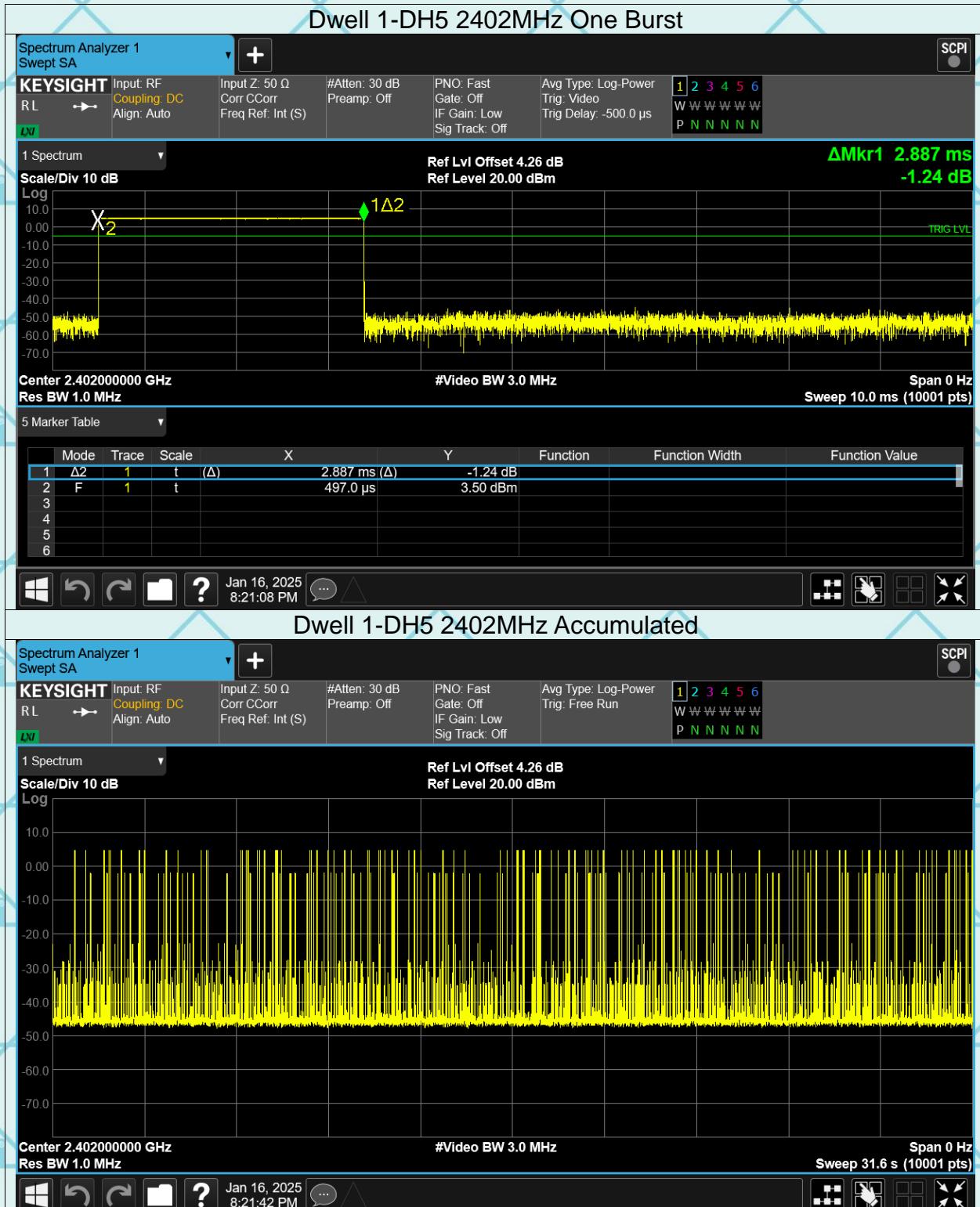


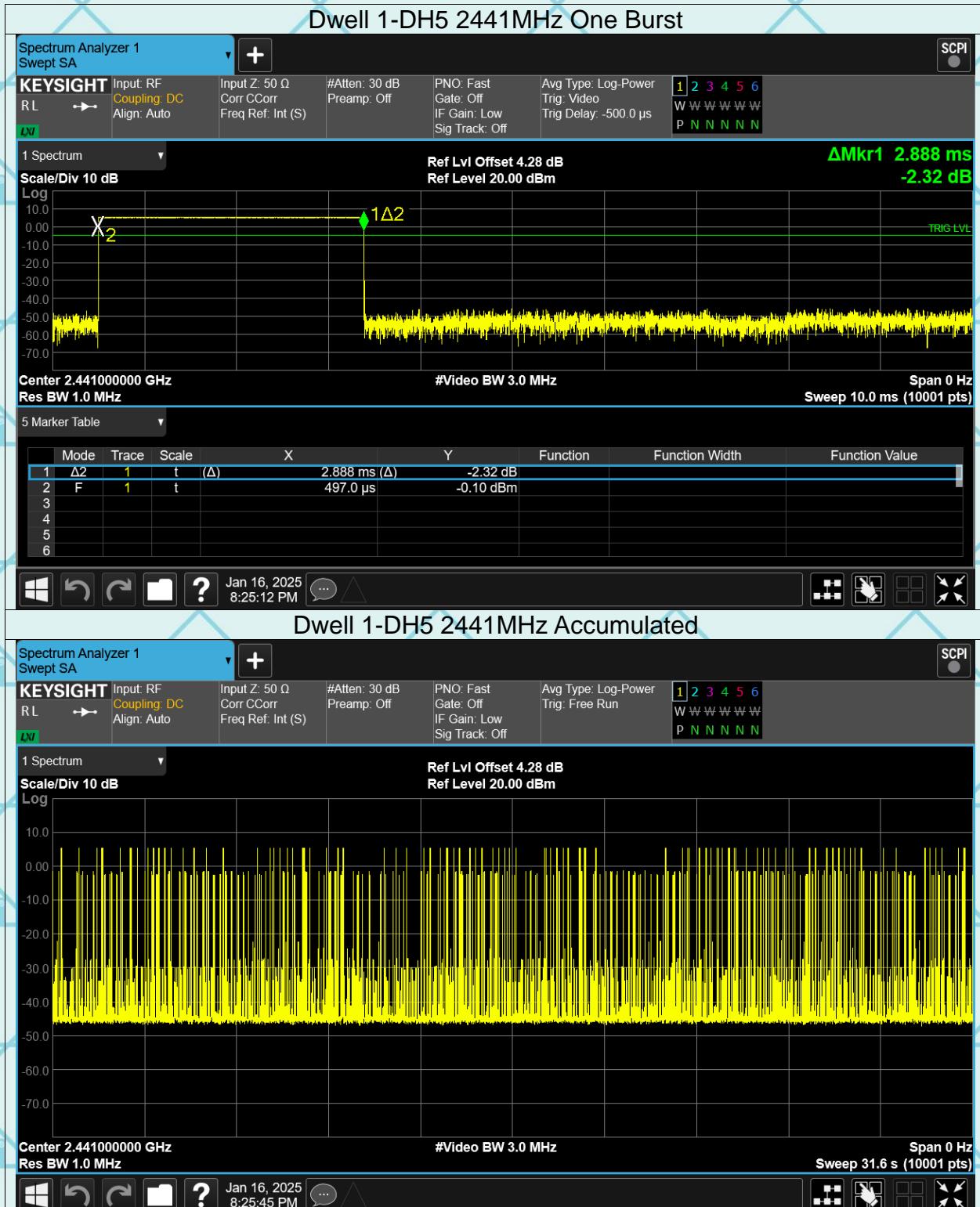
## Dwell 1-DH3 2402MHz Accumulated

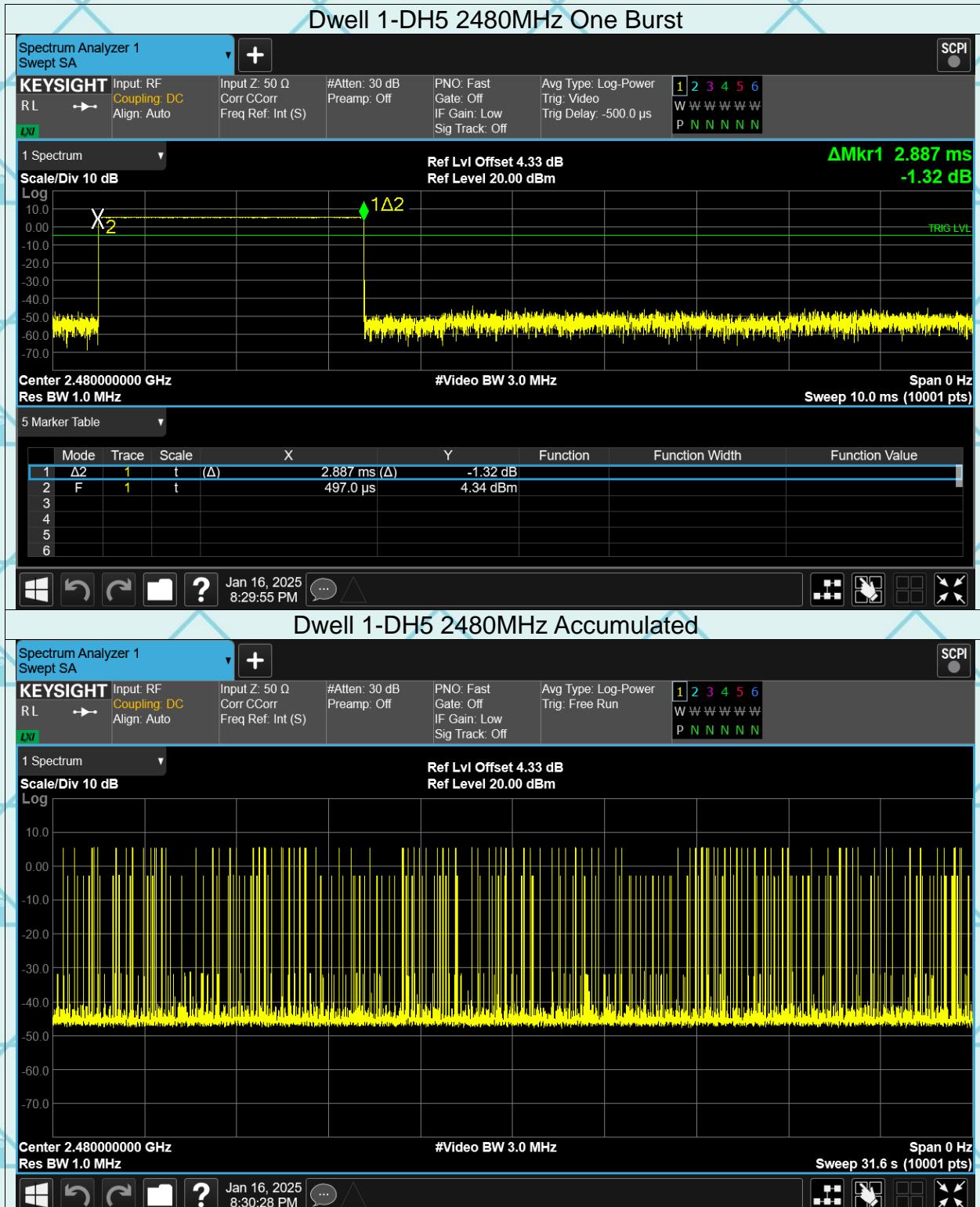












## 6.8. Pseudorandom Frequency Hopping Sequence

### Test Requirement:

### FCC Part15 C Section 15.247 (a)(1) requirement:

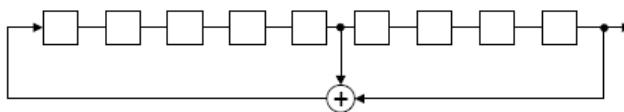
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

### EUT Pseudorandom Frequency Hopping Sequence

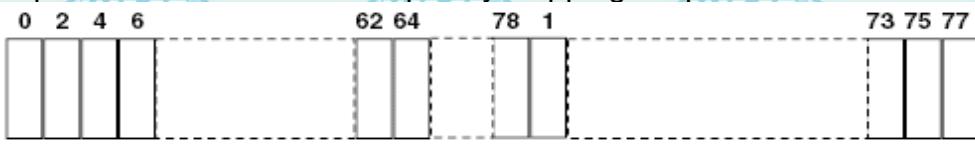
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first one of 9 consecutive ones; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence:  $2^9 - 1 = 511$  bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

## 6.9. Conducted Band Edge Measurement

### 6.9.1. Test Specification

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## 6.9.2. Test Data

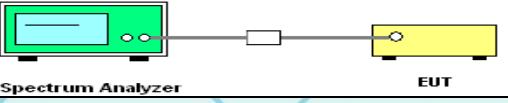
## GFSK Modulation ( the worst case )



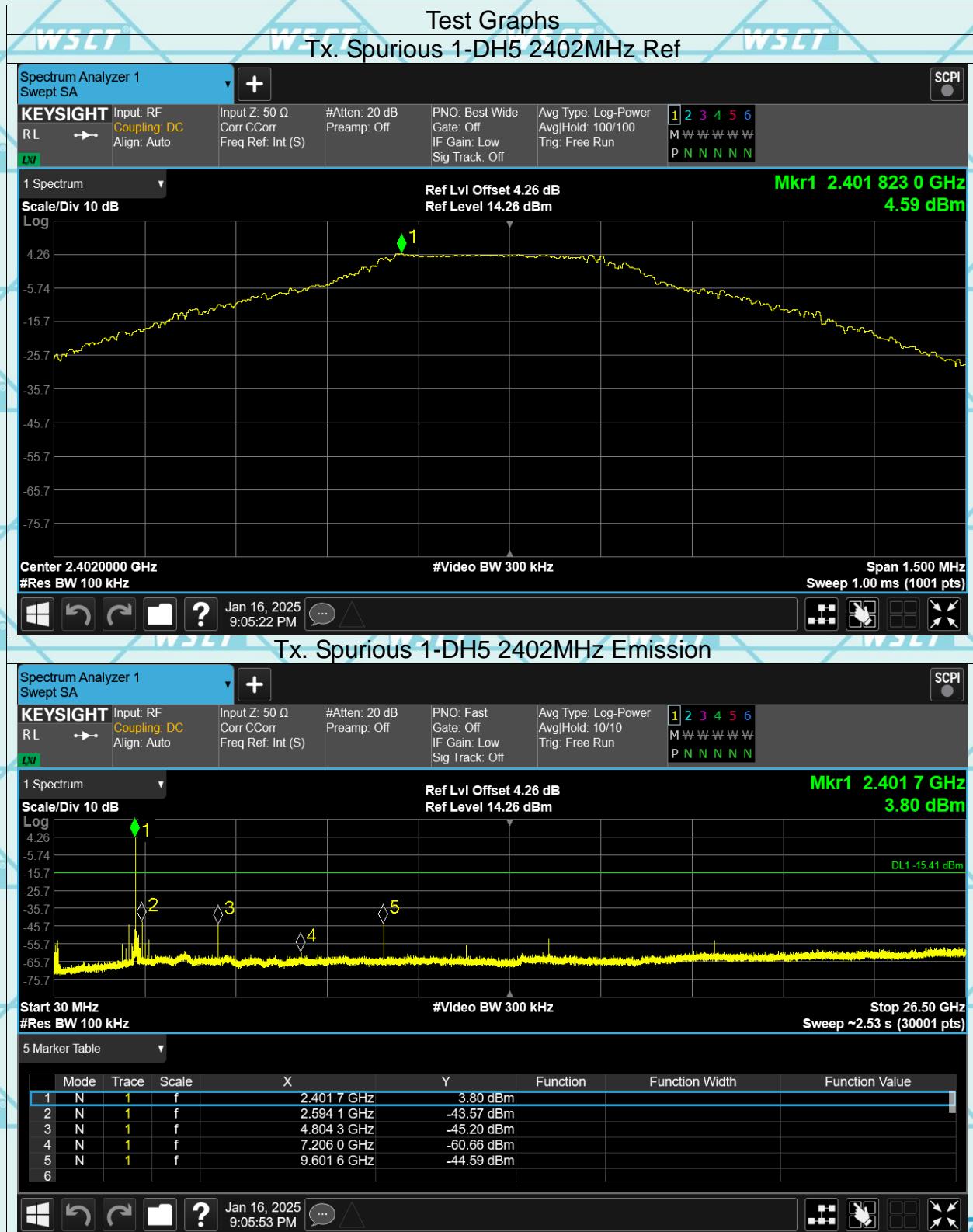


## 6.10. Conducted Spurious Emission Measurement

### 6.10.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.247 (d)
<b>Test Method:</b>	ANSI C63.10:2014
<b>Limit:</b>	In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.
<b>Test Setup:</b>	 <p>The diagram illustrates the test setup. A green 'Spectrum Analyzer' is connected to a yellow 'EUT' (Equipment Under Test) through a white 'RF cable' and a small white 'attenuator' box.</p>
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The testing follows the guidelines in Spurious RF Conducted Emissions of ANSI C63.10:2014 Measurement Guidelines</li> <li>2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.</li> <li>3. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>4. Set RBW = 100 kHz, VBW = 300kHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.</li> <li>5. Measure and record the results in the test report.</li> <li>6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.</li> </ol>
<b>Test Result:</b>	PASS

## Test Data













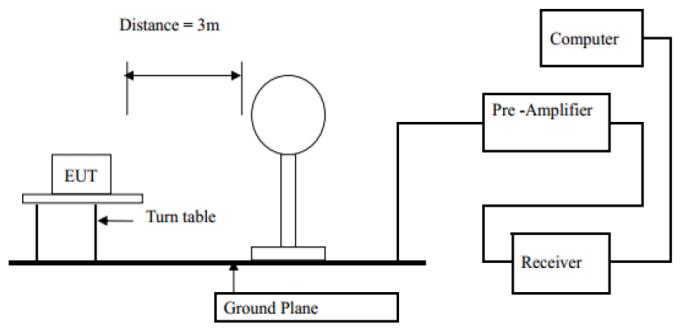


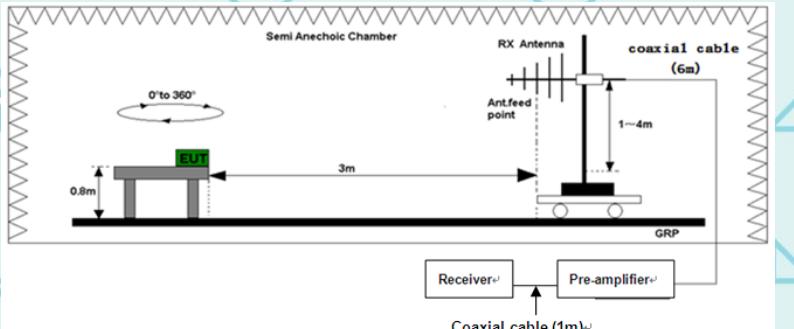
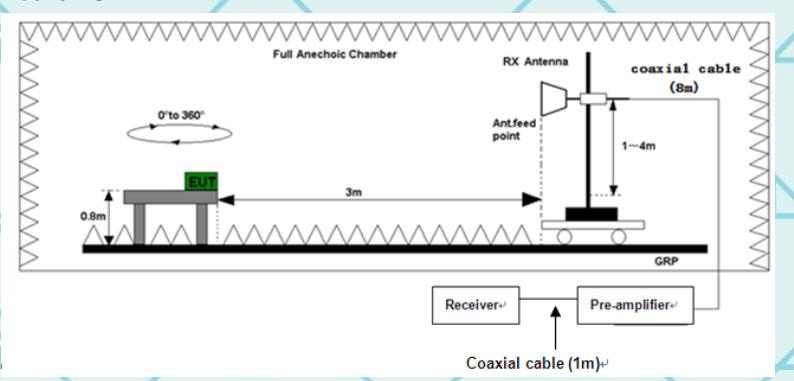




## 6.11. Radiated Spurious Emission Measurement

### 6.11.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.209							
<b>Test Method:</b>	ANSI C63.10:2014							
<b>Frequency Range:</b>	9 kHz to 25 GHz							
<b>Measurement Distance:</b>	3 m							
<b>Antenna Polarization:</b>	Horizontal & Vertical							
<b>Receiver Setup:</b>	Frequency	Detector	RBW	VBW	Remark			
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value			
	150kHz- 30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value			
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value			
	Above 1GHz	Peak	1MHz	3MHz	Peak Value			
		Peak	1MHz	10Hz	Average Value			
<b>Limit:</b>	Frequency	Field Strength (microvolts/meter)		Measurement Distance (meters)				
	0.009-0.490	2400/F(KHz)		300				
	0.490-1.705	24000/F(KHz)		30				
	1.705-30	30		30				
	30-88	100		3				
	88-216	150		3				
	216-960	200		3				
	Above 960	500		3				
<b>Test setup:</b>	Frequency	Field Strength (microvolts/meter)		Measurement Distance (meters)	Detector			
	Above 1GHz	500		3	Average			
		5000		3	Peak			
For radiated emissions below 30MHz								
								
30MHz to 1GHz								

	 <p>The diagram shows a semi-anechoic chamber setup. An EUT (Equipment Under Test) is placed on a turntable 0.8m above the ground. It is 3 meters away from a receiving antenna mounted on a variable height antenna tower. The antenna is connected via a coaxial cable (6m) to a pre-amplifier and receiver. The turntable is capable of 0 to 360 degrees rotation.</p>  <p>The diagram shows a full-anechoic chamber setup. An EUT is placed on a turntable 0.8m above the ground. It is 3 meters away from a receiving antenna mounted on a variable height antenna tower. The antenna is connected via a coaxial cable (8m) to a pre-amplifier and receiver. The turntable is capable of 0 to 360 degrees rotation.</p>
<b>Test Mode:</b>	<p>Transmitting mode with modulation</p>
<b>Test Procedure:</b>	<p>1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10:2014 Measurement Guidelines.</p> <p>2. For the radiated emission test below 1GHz:  The EUT was placed on a turntable with 0.8 meter above ground. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high PASS filter are used for the test in order to get better signal level.</p> <p>For the radiated emission test above 1GHz:  Place the measurement antenna on a turntable with 1.5 meter above ground, which is away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final</p>

	<p>measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.</p> <ol style="list-style-type: none"> <li>3. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>4. Use the following spectrum analyzer settings:           <ol style="list-style-type: none"> <li>(1) Span shall wide enough to fully capture the emission being measured;</li> <li>(2) Set RBW=100 kHz for <math>f &lt; 1</math> GHz, RBW=1MHz for <math>f &gt; 1</math> GHz ; <math>VBW \geq RBW</math>; Sweep = auto; Detector function = peak; Trace = max hold for peak</li> <li>(3) For average measurement: use duty cycle correction factor method per 15.35(c). Duty cycle = On time/100 milliseconds On time = <math>N_1 \cdot L_1 + N_2 \cdot L_2 + \dots + N_{n-1} \cdot L_{n-1} + N_n \cdot L_n</math> Where <math>N_1</math> is number of type 1 pulses, <math>L_1</math> is length of type 1 pulses, etc. Average Emission Level = Peak Emission Level + <math>20 \cdot \log(\text{Duty cycle})</math> Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level</li> </ol> </li> </ol>
Test results:	PASS



## 6.11.2. Test Data

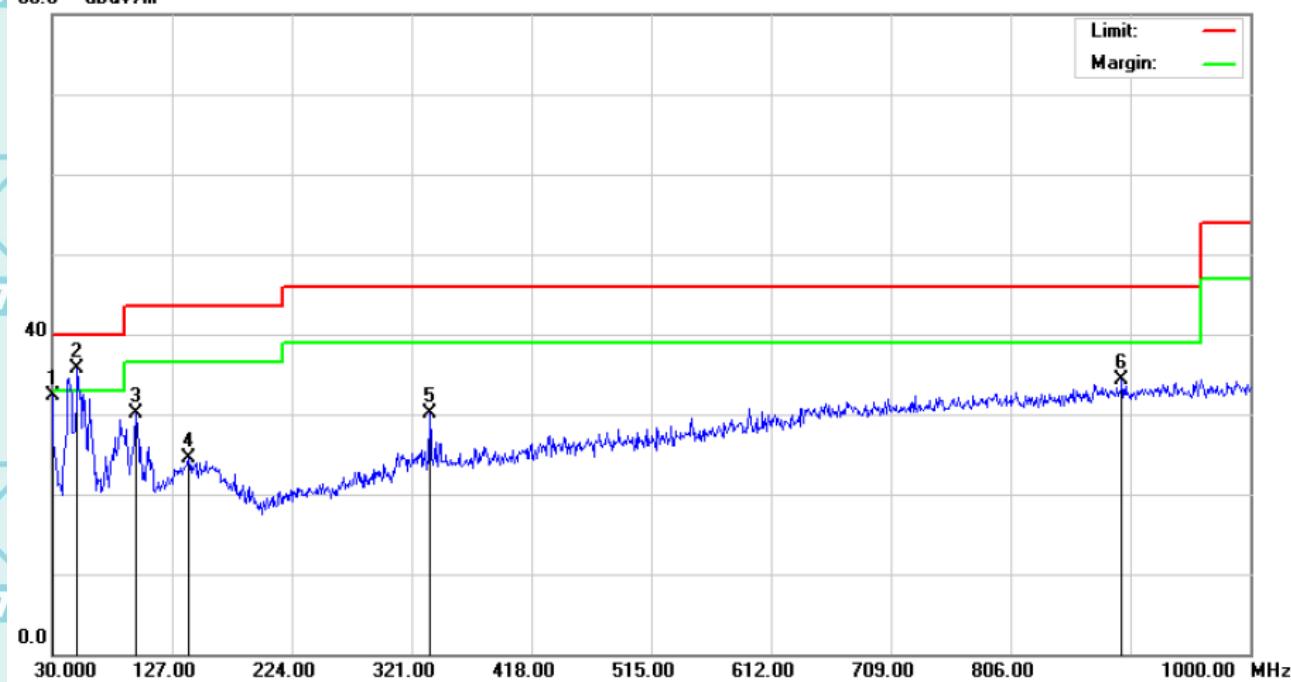
Please refer to following diagram for individual

Below 1GHz

The worst mode is GFSK

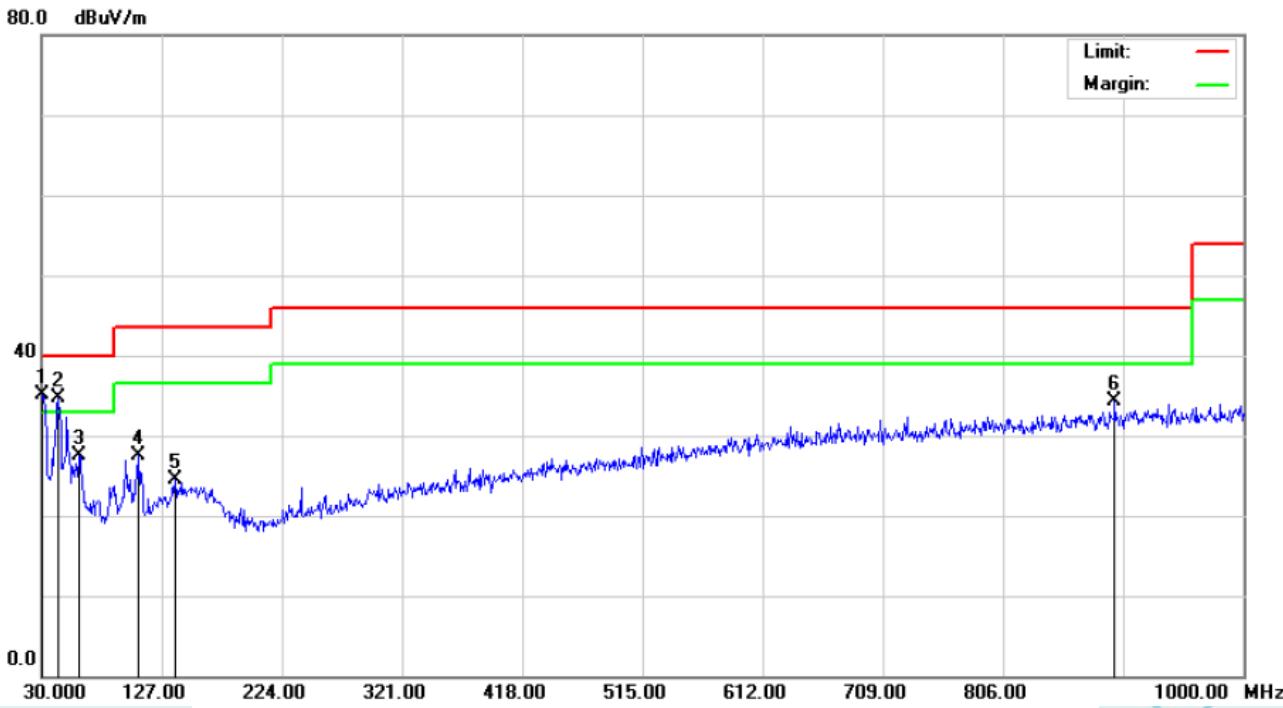
Horizontal:

80.0 dBuV/m



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over
		MHz	dBuV	dB	dBuV/m	dB	Detector
1	30.0000	30.000	34.86	-2.60	32.26	40.00	-7.74 QP
2	*	50.3700	37.81	-2.14	35.67	40.00	-4.33 QP
3	97.9000	97.9000	35.83	-5.68	30.15	43.50	-13.35 QP
4	140.5800	140.5800	26.82	-2.26	24.56	43.50	-18.94 QP
5	335.5500	335.5500	31.80	-1.68	30.12	46.00	-15.88 QP
6	896.2100	896.2100	26.71	7.51	34.22	46.00	-11.78 QP

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Vertical:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dB $\mu$ V	dB	dB $\mu$ V/m	dB $\mu$ V/m	dB	Detector
1	*	30.0000	37.64	-2.60	35.04	40.00	-4.96	QP
2	!	43.5800	36.49	-1.88	34.61	40.00	-5.39	QP
3		60.0700	30.38	-2.82	27.56	40.00	-12.44	QP
4		108.5700	32.30	-4.74	27.56	43.50	-15.94	QP
5		137.6700	26.91	-2.49	24.42	43.50	-19.08	QP
6		896.2100	26.71	7.51	34.22	46.00	-11.78	QP

#### Note1:

Freq. = Emission frequency in MHz

Reading level (dB $\mu$ V) = Receiver reading

Corr. Factor (dB) = Antenna factor + Cable loss - Amplifier factor.

Measurement (dB $\mu$ V) = Reading level (dB $\mu$ V) + Corr. Factor (dB)

Limit (dB $\mu$ V) = Limit stated in standard

Margin (dB) = Measurement (dB $\mu$ V) – Limits (dB $\mu$ V)

## Above 1GHz

Note 1: The marked spikes near 2400 MHz with circle should be ignored because they are Fundamental signal.

Note 2: The spurious above 18G is noise only, do not show on the report.

The worst mode is GFSK

Low channel: 2402MHz

Horizontal:



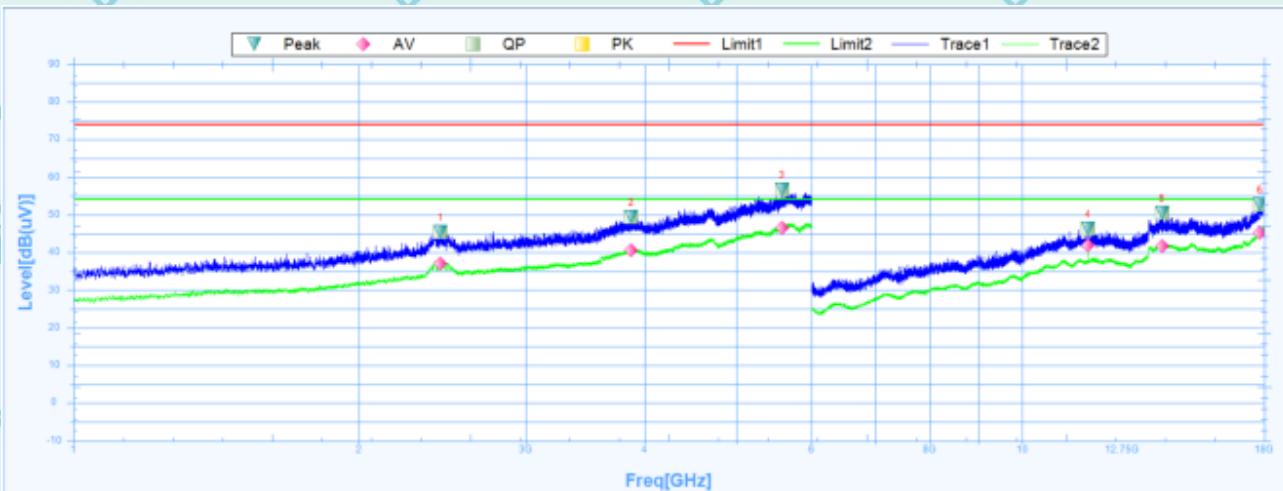
## Suspected Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB(uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	2399.3750	46.4	7.57	38.83	74	-27.6	360.1	Horizontal	PK	Pass
1	2399.3750	36.91	7.57	29.34	54	-17.09	360.1	Horizontal	AV	Pass
2	3905.6250	49.6	11.78	37.82	74	-24.4	110.5	Horizontal	PK	Pass
2	3905.6250	40.13	11.78	28.35	54	-13.87	110.5	Horizontal	AV	Pass
3	5754.3750	56.45	21.1	35.35	74	-17.55	115.3	Horizontal	PK	Pass
3	5754.3750	46.99	21.1	25.89	54	-7.01	115.3	Horizontal	AV	Pass
4	11745.0000	46.05	38.83	7.22	74	-27.95	310.5	Horizontal	PK	Pass
4	11745.0000	41.94	38.83	3.11	54	-12.06	310.5	Horizontal	AV	Pass
5	14221.5000	50.74	41.21	9.53	74	-23.26	309.3	Horizontal	PK	Pass
5	14221.5000	41.85	41.21	0.64	54	-12.15	309.3	Horizontal	AV	Pass
6	17926.5000	53.48	46.01	7.47	74	-20.52	132.3	Horizontal	PK	Pass
6	17926.5000	46.16	46.01	0.15	54	-7.84	132.3	Horizontal	AV	Pass



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Vertical:



Suspected Data List											
NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB(uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict	
1	2437.5000	45.41	7.7	37.71	74	-28.59	198.7	Vertical	PK	Pass	
1	2437.5000	37.05	7.7	29.35	54	-16.95	198.7	Vertical	AV	Pass	
2	3874.3750	49.35	11.52	37.83	74	-24.65	166.6	Vertical	PK	Pass	
2	3874.3750	40.61	11.52	29.09	54	-13.39	166.6	Vertical	AV	Pass	
3	5588.1250	56.8	20.73	36.07	74	-17.2	359.9	Vertical	PK	Pass	
3	5588.1250	46.67	20.73	25.94	54	-7.33	359.9	Vertical	AV	Pass	
4	11745.0000	46.38	38.83	7.55	74	-27.62	265.1	Vertical	PK	Pass	
4	11745.0000	42.02	38.83	3.19	54	-11.98	265.1	Vertical	AV	Pass	
5	14056.5000	50.59	41.43	9.16	74	-23.41	75	Vertical	PK	Pass	
5	14056.5000	41.64	41.43	0.21	54	-12.36	75	Vertical	AV	Pass	
6	17821.5000	52.66	45.3	7.36	74	-21.34	343.4	Vertical	PK	Pass	
6	17821.5000	45.31	45.3	0.01	54	-8.69	343.4	Vertical	AV	Pass	



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Middle channel: 2440MHz

Horizontal:



## Suspected Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB(uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	2436.2500	45.44	7.69	37.75	74	-28.56	61.3	Horizontal	PK	Pass
1	2436.2500	36.55	7.69	28.86	54	-17.45	61.3	Horizontal	AV	Pass
2	3875.0000	49.66	11.52	38.14	74	-24.34	92.4	Horizontal	PK	Pass
2	3875.0000	40.64	11.52	29.12	54	-13.36	92.4	Horizontal	AV	Pass
3	5938.7500	56.01	22.05	33.96	74	-17.99	49.4	Horizontal	PK	Pass
3	5938.7500	47.32	22.05	25.27	54	-6.68	49.4	Horizontal	AV	Pass
4	11745.0000	46.67	38.83	7.84	74	-27.33	0	Horizontal	PK	Pass
4	11745.0000	42	38.83	3.17	54	-12	0	Horizontal	AV	Pass
5	14035.5000	49.01	41.45	7.56	74	-24.99	4.2	Horizontal	PK	Pass
5	14035.5000	41.54	41.45	0.09	54	-12.46	4.2	Horizontal	AV	Pass
6	17962.5000	53.26	46.25	7.01	74	-20.74	0	Horizontal	PK	Pass
6	17962.5000	46.03	46.25	-0.22	54	-7.97	0	Horizontal	AV	Pass



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Vertical:



## Suspected Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB(uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	2493.7500	45.41	7.6	37.81	74	-28.59	124.8	Vertical	PK	Pass
1	2493.7500	36.05	7.6	28.45	54	-17.95	124.8	Vertical	AV	Pass
2	3954.3750	50.12	11.92	38.2	74	-23.88	360.1	Vertical	PK	Pass
2	3954.3750	40.59	11.92	28.67	54	-13.41	360.1	Vertical	AV	Pass
3	5204.3750	58.53	18.29	40.24	74	-15.47	236	Vertical	PK	Pass
3	5204.3750	44.53	18.29	26.24	54	-9.47	236	Vertical	AV	Pass
4	11916.0000	46.05	38.68	7.37	74	-27.95	110.9	Vertical	PK	Pass
4	11916.0000	37.94	38.68	-0.74	54	-16.06	110.9	Vertical	AV	Pass
5	14029.5000	49.61	41.46	8.15	74	-24.39	359.3	Vertical	PK	Pass
5	14029.5000	42	41.46	0.54	54	-12	359.3	Vertical	AV	Pass
6	17991.0000	53.14	46.44	6.7	74	-20.86	95.4	Vertical	PK	Pass
6	17991.0000	46.51	46.44	0.07	54	-7.49	95.4	Vertical	AV	Pass



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High channel: 2480MHz

Horizontal:



## Suspected Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB(uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	2401.8750	46.15	7.58	38.57	74	-27.85	44.7	Horizontal	PK	Pass
1	2401.8750	36.77	7.58	29.19	54	-17.23	44.7	Horizontal	AV	Pass
2	3873.1250	49.62	11.51	38.11	74	-24.38	360	Horizontal	PK	Pass
2	3873.1250	40.34	11.51	28.83	54	-13.66	360	Horizontal	AV	Pass
3	5235.6250	57.97	18.87	39.1	74	-16.03	243.1	Horizontal	PK	Pass
3	5235.6250	44.91	18.87	26.04	54	-9.09	243.1	Horizontal	AV	Pass
4	11745.0000	47.34	38.83	8.51	74	-26.66	-0.1	Horizontal	PK	Pass
4	11745.0000	41.44	38.83	2.61	54	-12.56	-0.1	Horizontal	AV	Pass
5	14812.5000	49.33	40.44	8.89	74	-24.67	37.9	Horizontal	PK	Pass
5	14812.5000	41.02	40.44	0.58	54	-12.98	37.9	Horizontal	AV	Pass
6	17802.0000	52.98	45.17	7.81	74	-21.02	359.5	Horizontal	PK	Pass
6	17802.0000	45.15	45.17	-0.02	54	-8.85	359.5	Horizontal	AV	Pass



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Vertical:



## Suspected Data List

NO.	Freq. [MHz]	Reading [dB(uV)]	Factor [dB]	Level [dB(uV)]	Limit [dB]	Margin [dB]	Deg [°]	Polarity	Trace	Verdict
1	2446.2500	45.15	7.73	37.42	74	-28.85	360	Vertical	PK	Pass
1	2446.2500	36.95	7.73	29.22	54	-17.05	360	Vertical	AV	Pass
2	3798.7500	49.88	11	38.88	74	-24.12	108.1	Vertical	PK	Pass
2	3798.7500	39.51	11	28.51	54	-14.49	108.1	Vertical	AV	Pass
3	5681.2500	55.84	21.19	34.65	74	-18.16	1.4	Vertical	PK	Pass
3	5681.2500	47.54	21.19	26.35	54	-6.46	1.4	Vertical	AV	Pass
4	11449.5000	45.7	39.1	6.6	74	-28.3	63.1	Vertical	PK	Pass
4	11449.5000	37.38	39.1	-1.72	54	-16.62	63.1	Vertical	AV	Pass
5	13908.0000	48.85	41.26	7.59	74	-25.15	84.6	Vertical	PK	Pass
5	13908.0000	41.4	41.26	0.14	54	-12.6	84.6	Vertical	AV	Pass
6	17551.5000	50.83	43.5	7.33	74	-23.17	358.9	Vertical	PK	Pass
6	17551.5000	43.38	43.5	-0.12	54	-10.62	358.9	Vertical	AV	Pass

## Note:

1. The emission levels of other frequencies are very lower than the limit and not show in test report.
2. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.
3. Data of measurement shown "---" in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.
4. Measurements were conducted in all three modulation (GFSK, Pi/4 DQPSK, 8DPSK), and the worst case Mode (GFSK) was submitted only.



### 6.11.3. Restricted Bands Requirements

Bluetooth (GFSK, Pi/4-DQPSK, 8DPSK) mode have been tested, and the worst result GFSK model was report as below

Frequency (MHz)	Reading (dB $\mu$ V/m)	Correct Factor	Emission Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Polar	Detector
Low Channel							
2387	64.04	-8.76	55.28	74	-18.72	H	PK
2387	55.83	-8.76	47.07	54	-6.93	H	AV
2387	60.76	-8.73	52.03	74	-21.97	V	PK
2387	54.20	-8.73	45.47	54	-8.53	V	AV
2390	60.17	-8.76	51.41	74	-22.59	H	PK
2390	56.84	-8.76	48.08	54	-5.92	H	AV
2390	60.64	-8.73	51.91	74	-22.09	V	PK
2390	57.75	-8.73	49.02	54	-4.98	V	AV
High Channel							
2483.5	63.73	-8.76	54.97	74	-19.03	H	PK
2483.5	56.49	-8.76	47.73	54	-6.27	H	AV
2483.5	63.35	-8.73	54.62	74	-19.38	V	PK
2483.5	56.22	-8.73	47.49	54	-6.51	V	AV

Note: Freq. = Emission frequency in MHz

Reading level (dB $\mu$ V) = Receiver reading

Corr. Factor (dB) = Attenuation factor + Cable loss

Level (dB $\mu$ V) = Reading level (dB $\mu$ V) + Corr. Factor (dB)

Limit (dB $\mu$ V) = Limit stated in standard

Margin (dB) = Level (dB $\mu$ V) – Limits (dB $\mu$ V)

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

