

# TEST REPORT

Report No.: SHE20060042-02HE

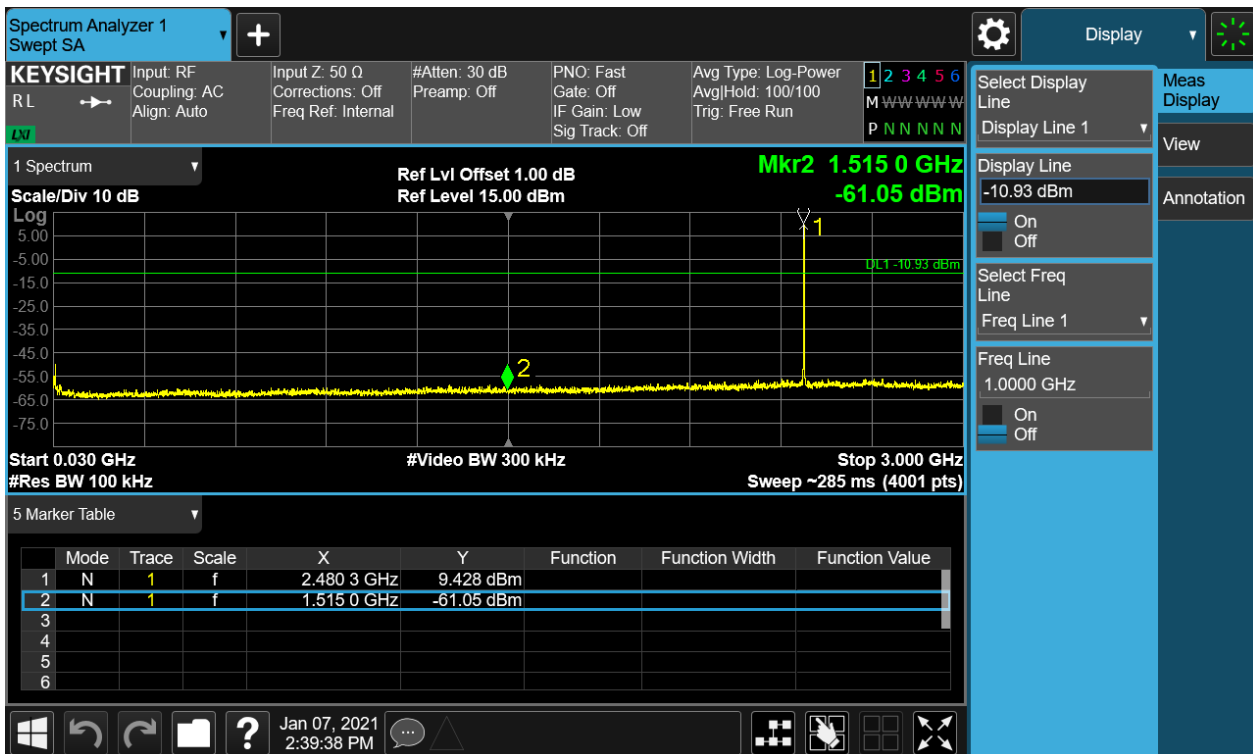
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## Band Edge



## Conducted spurious emissions 30MHz-25GHz



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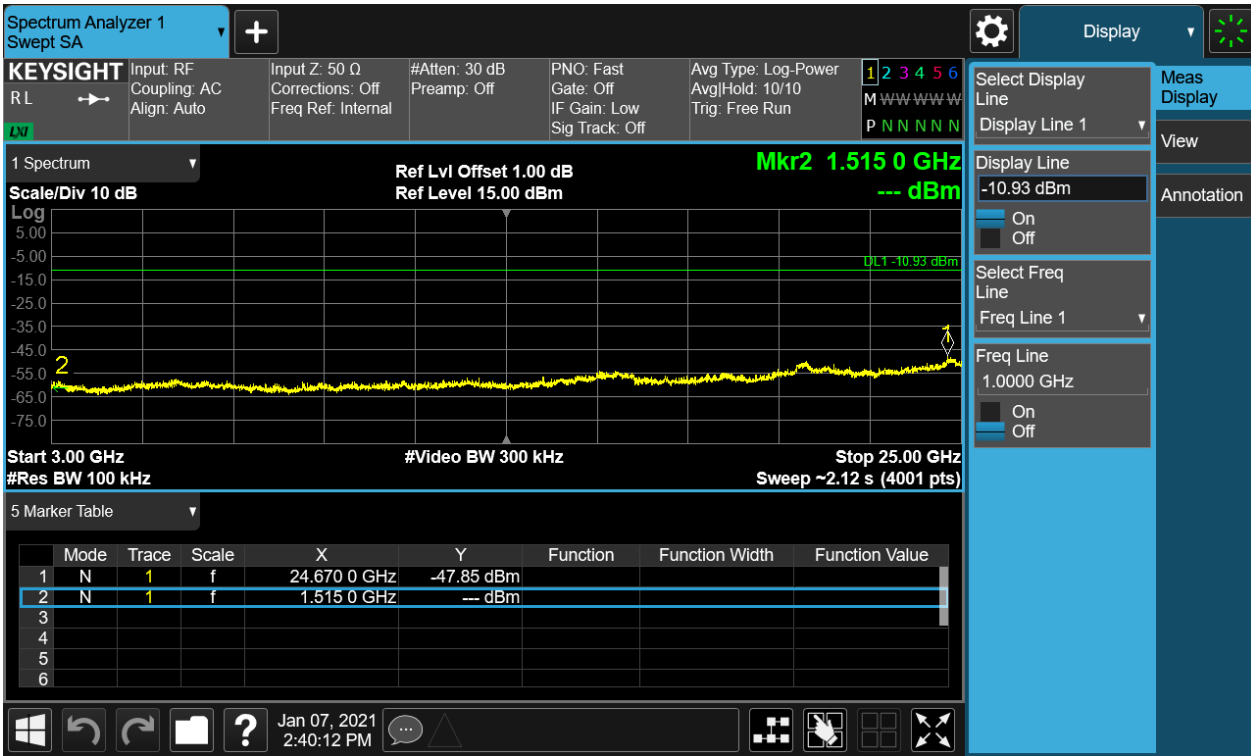
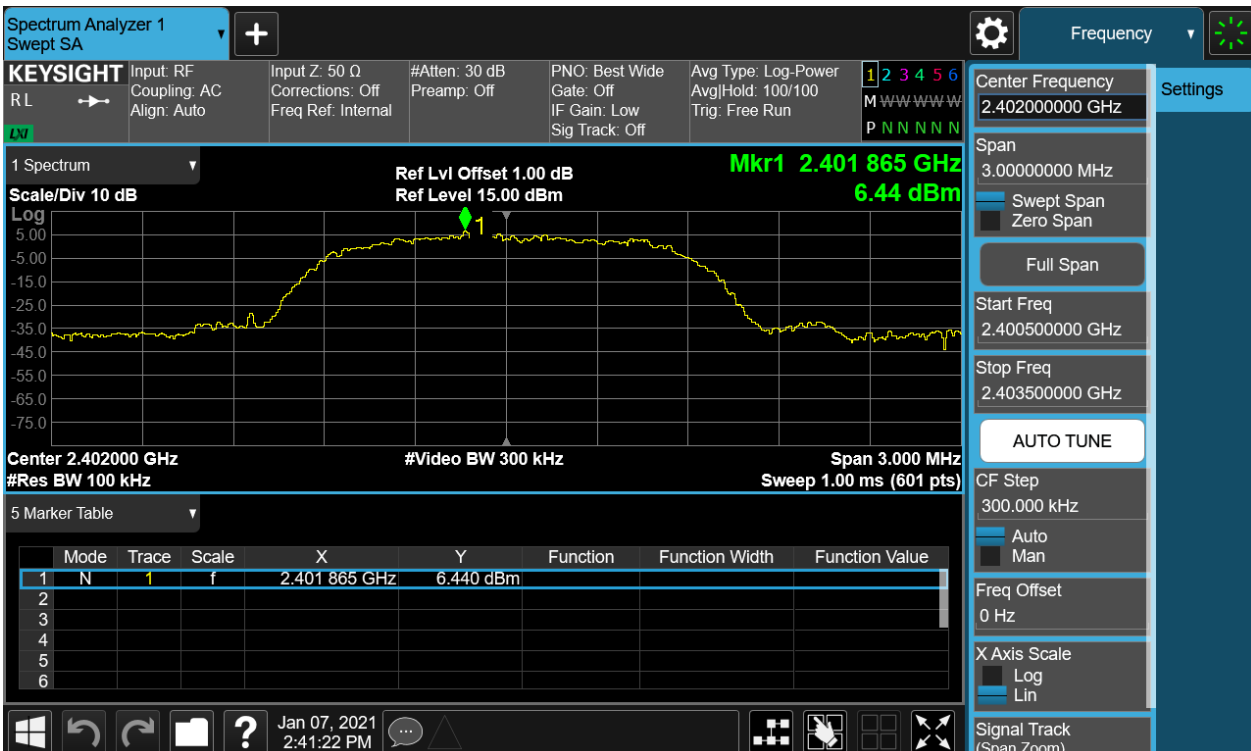


Figure 19: Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, 8-DPSK Carrier Level



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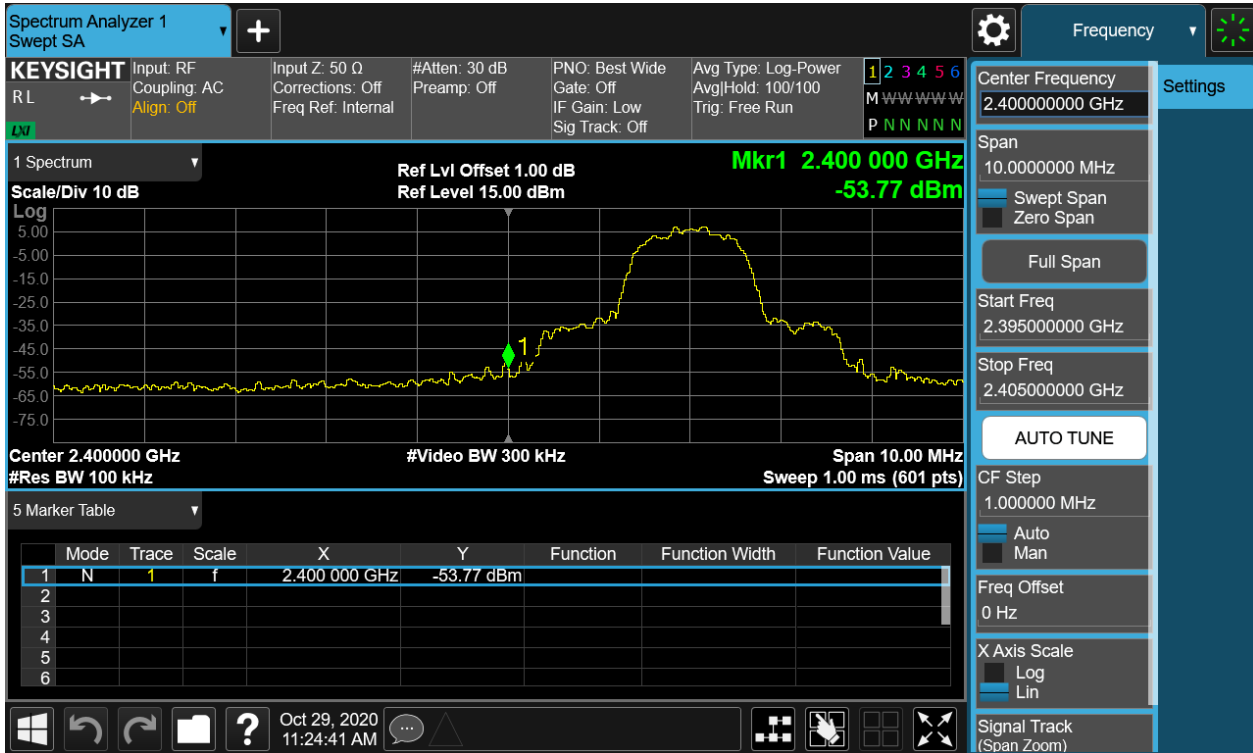
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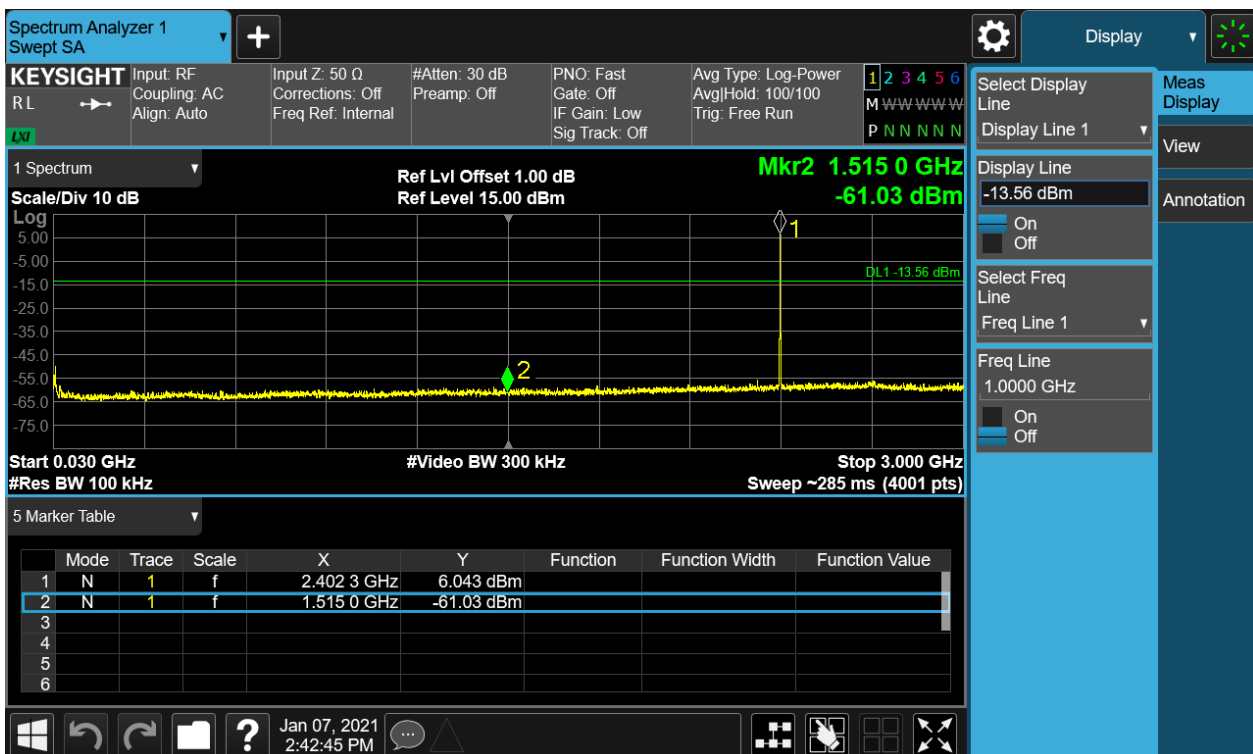
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## Band Edge



## Conducted spurious emissions 30MHz-25GHz



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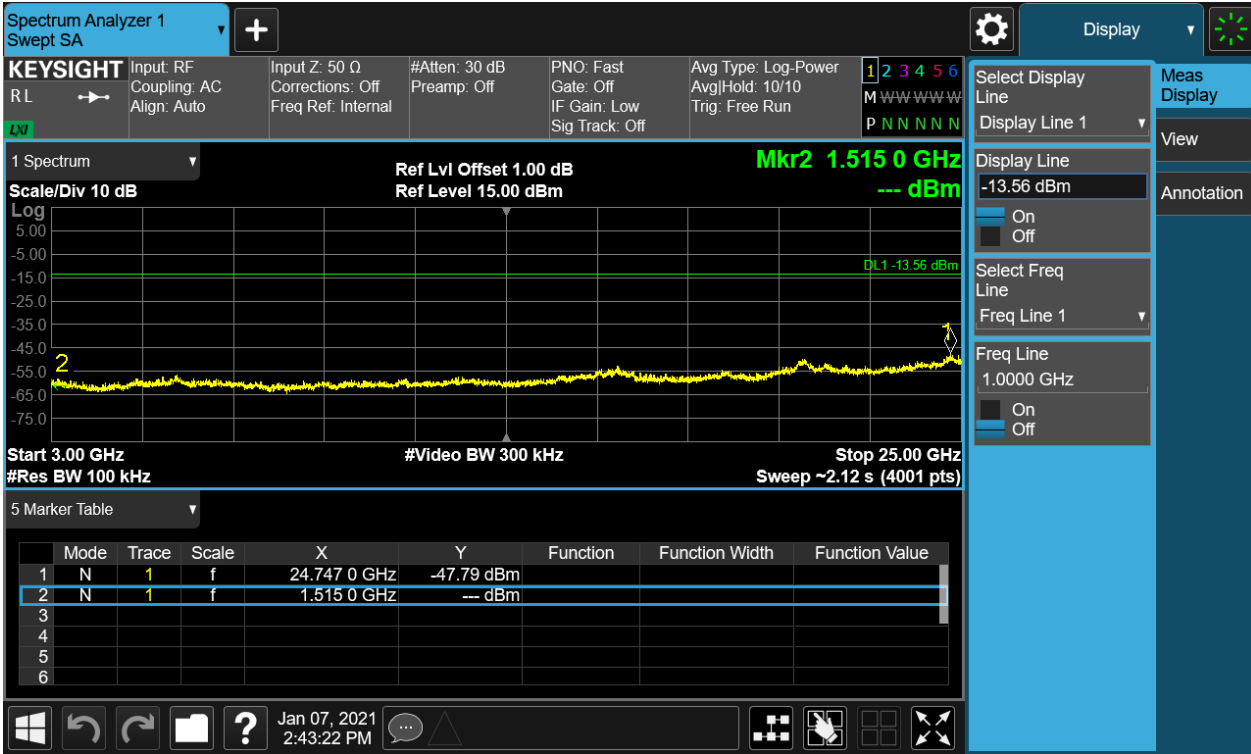
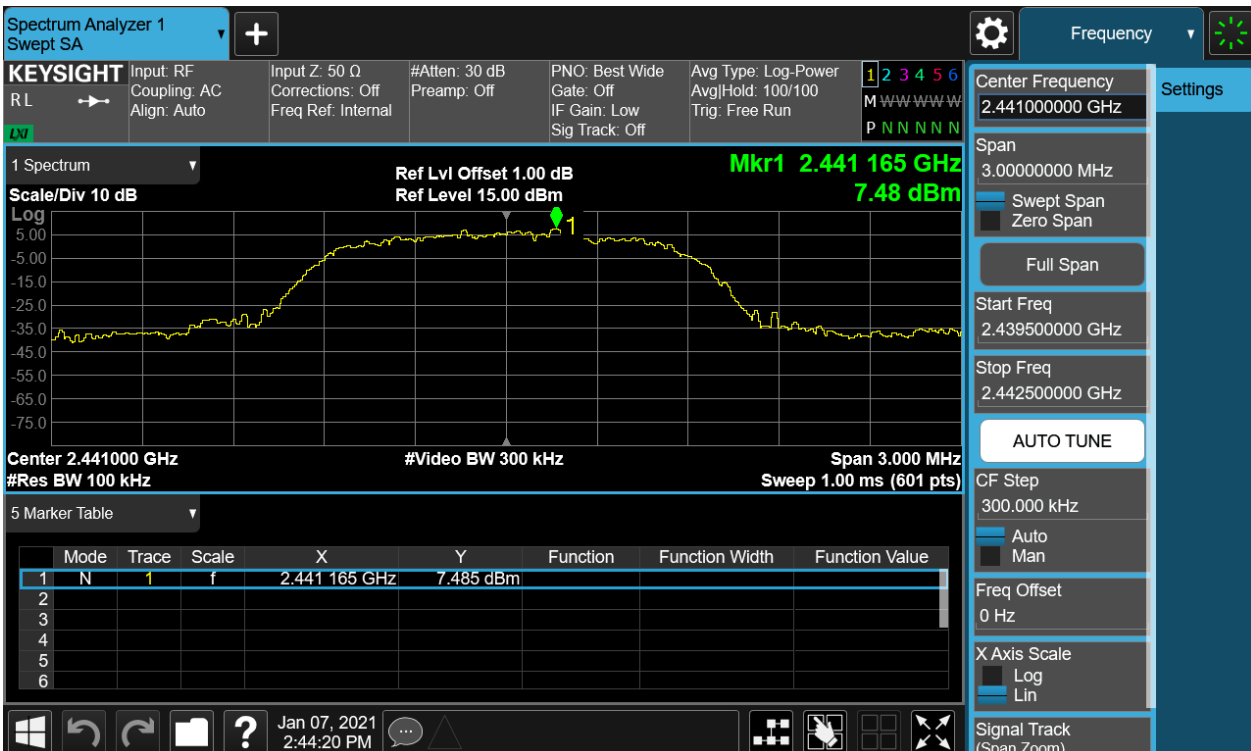


Figure 20: Conducted Spurious Emission & Authorized-band band-edge, 2441MHz, 8-DPSK Carrier Level



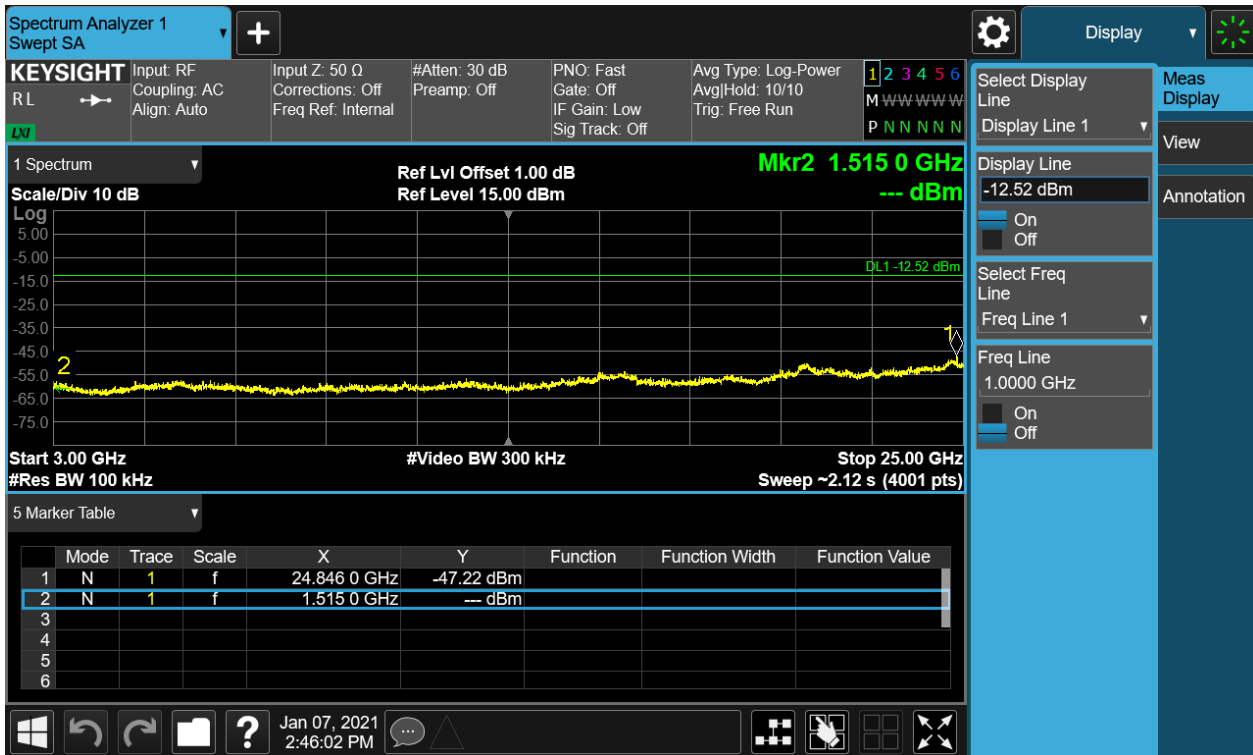
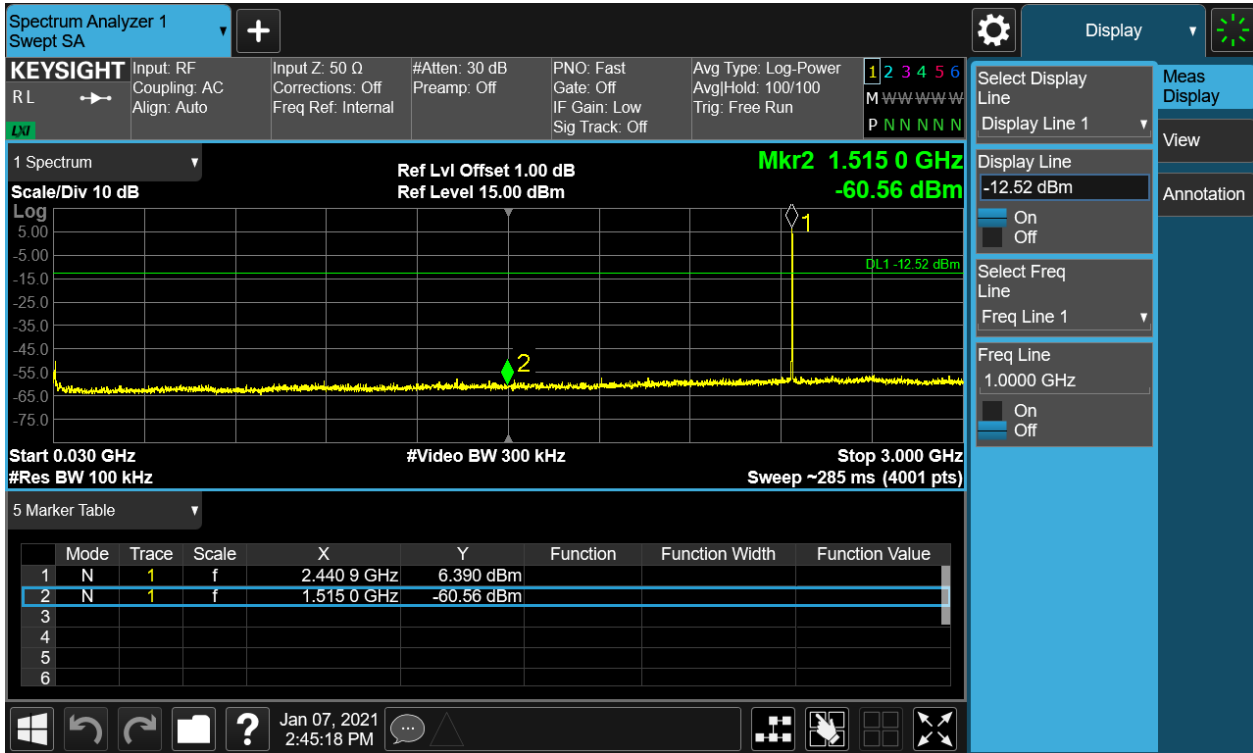
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Figure 21: Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, 8-DPSK Carrier Level



## Band Edge



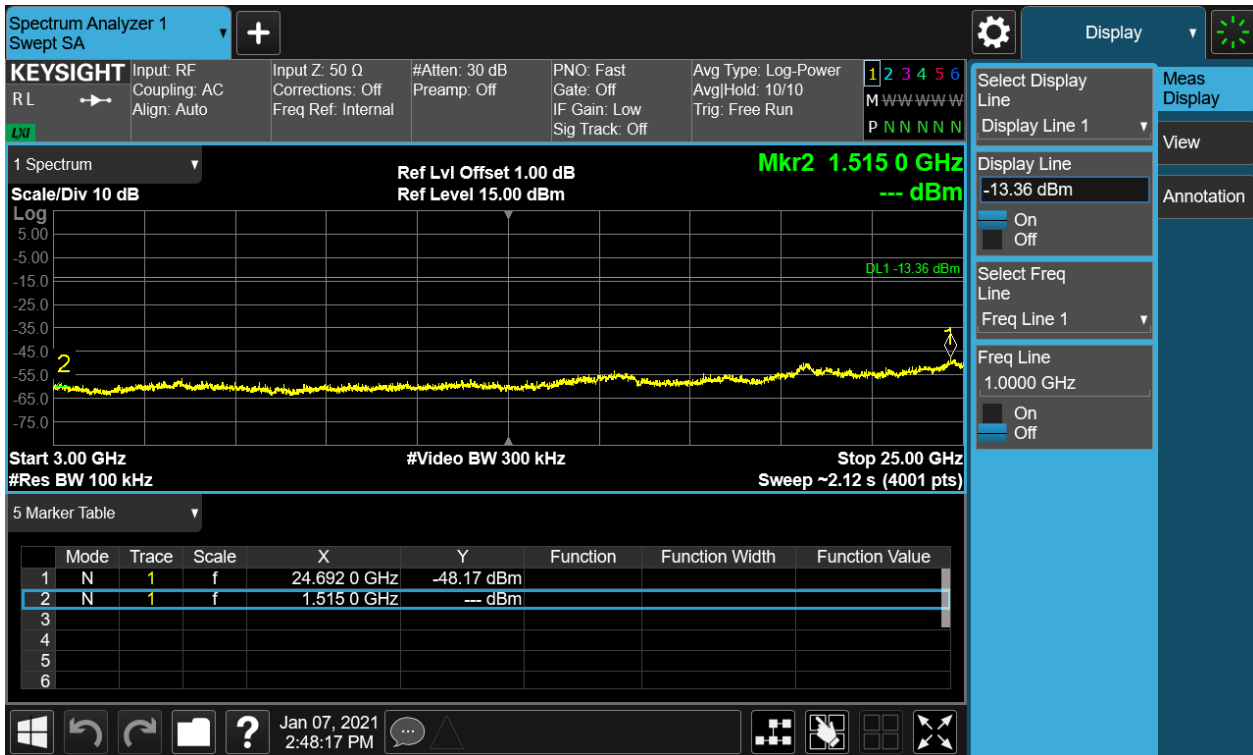
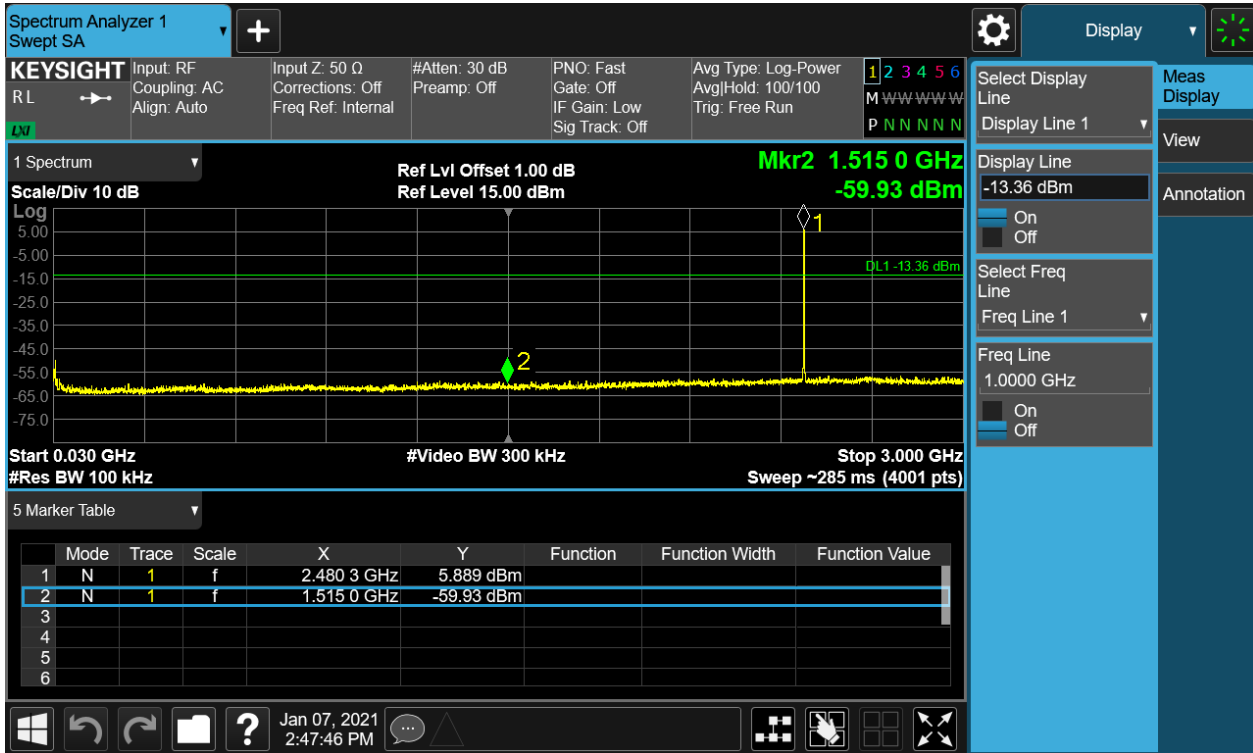
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## Conducted spurious emissions 30MHz-25GHz



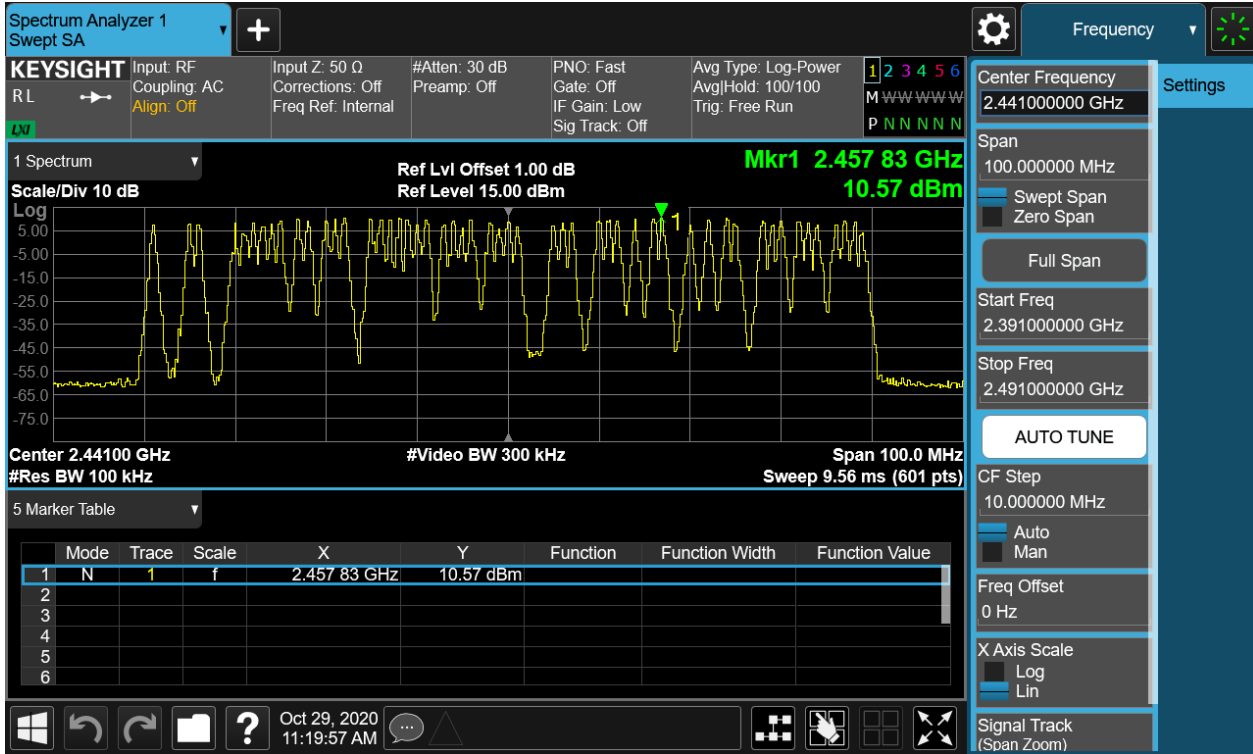
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Figure 22: Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, GFSK Carrier Level



Band Edge(Low)





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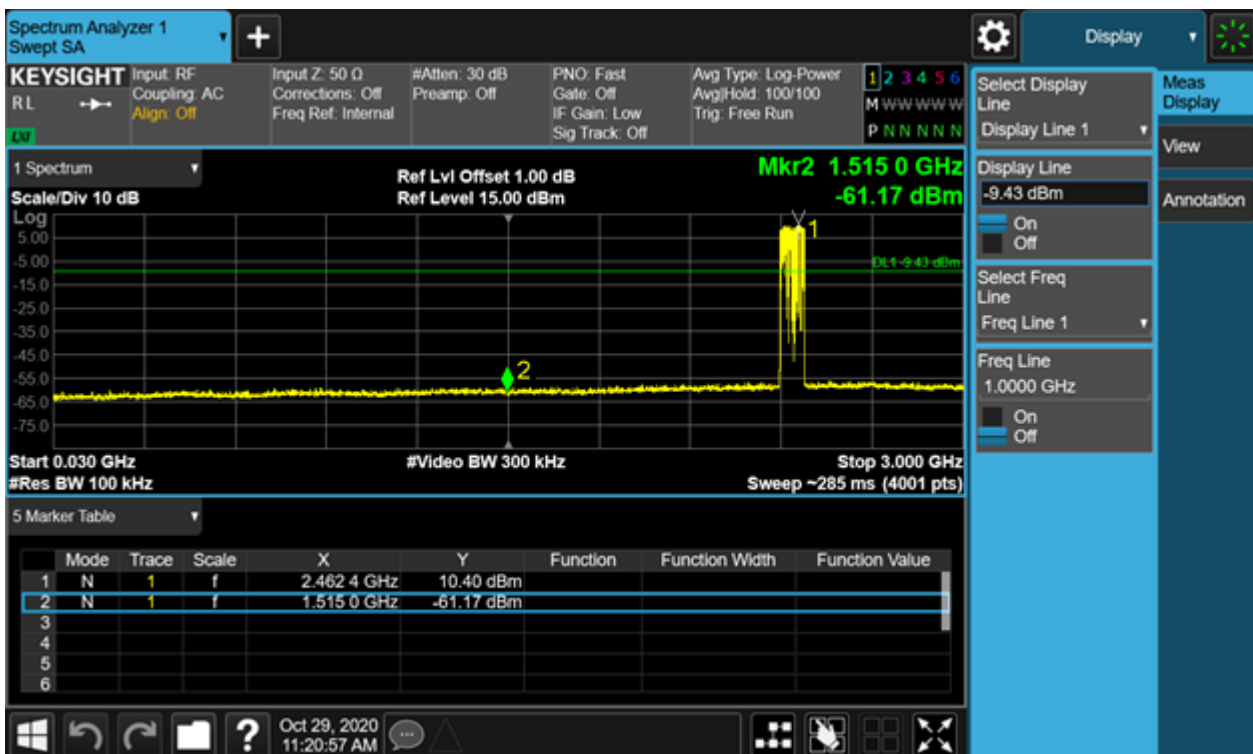
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## Band Edge(High)



## Conducted spurious emissions 30MHz-25GHz



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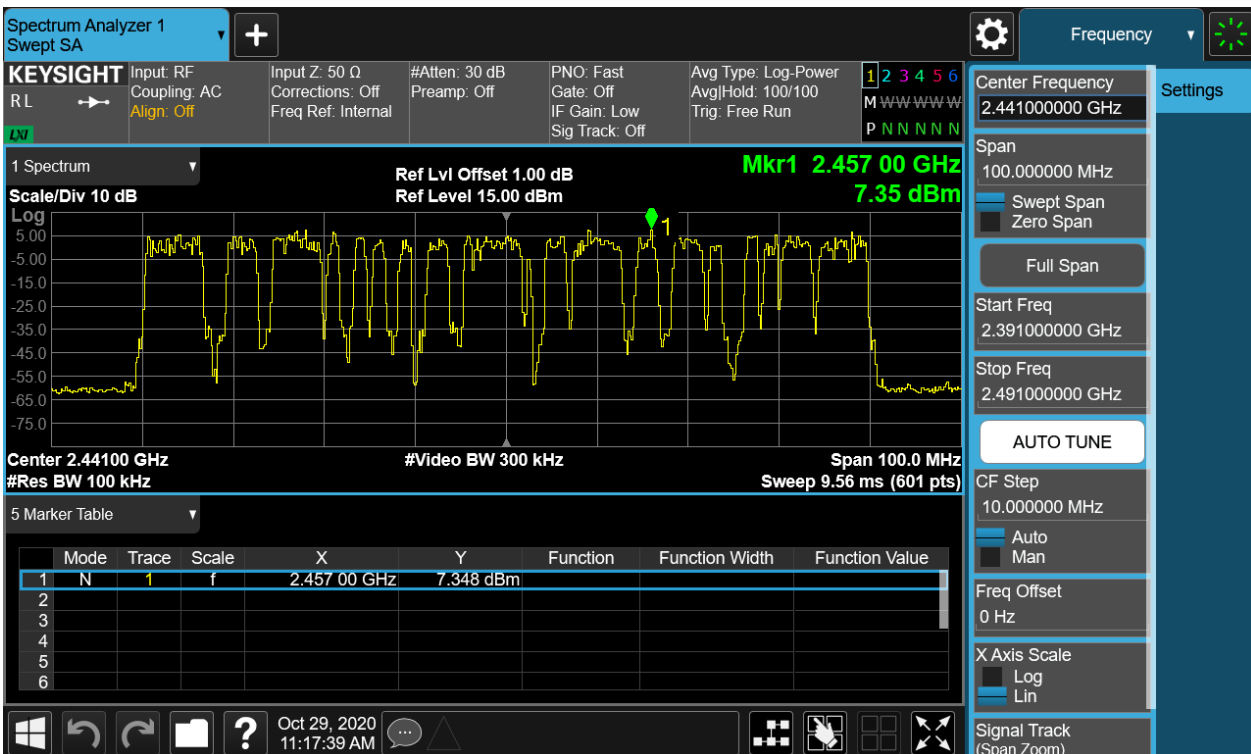
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Figure 23: Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, 8-DPSK Carrier Level



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## Band Edge(Low)



## Band Edge(High)



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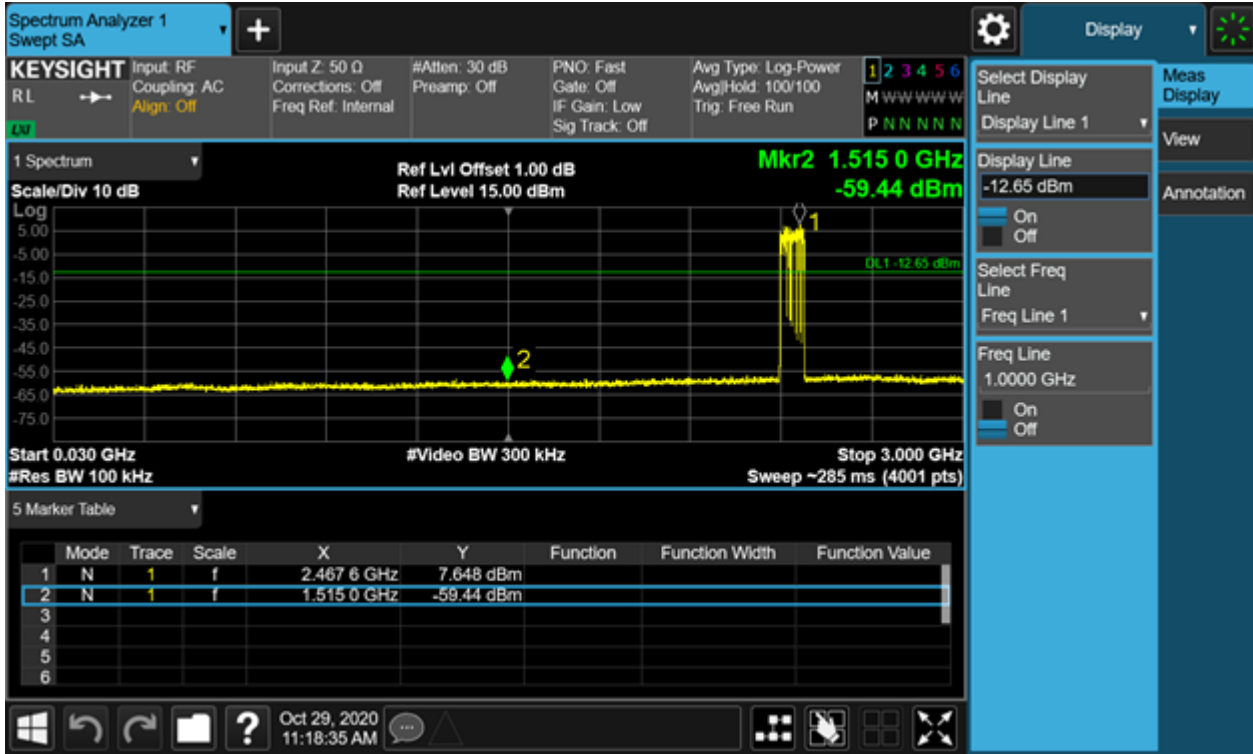
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## Conducted spurious emissions 30MHz-25GHz



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## 4.1.5 Spurious Emission

RESULT:

**PASS**

Test standard : FCC Part 15.247(d), 15.205, 15.209  
RSS-247 5.5  
Requirement : ANSI C63.10-2013  
Kind of test site : 3m Semi-Anechoic Chamber

### Test setup

Test Channel : Low/Middle/High  
Operation Mode : A  
Ambient temperature : 25°C  
Relative humidity : 52%

### Notes

*Test plots please refer to the annex document "BDEDR-TX EXHIBIT A of SHE20060042-02HE".*

1. For 9 kHz ~ 30 MHz, the amplitude of spurious emissions that are attenuated by more than 20dB below the permissible. The value has no need to be reported.
2. The spurious above 18GHz is noise only and 20dB below the limit. The value has no need to be reported.
3. The EUT is working in the Normal link mode below 1 GHz.

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## 4.1.6 Band Edge (Restricted-band band-edge)

RESULT:

**PASS**

Test standard : FCC Part 15.247(d), 15.205, 15.209  
RSS-247 5.5  
Requirement : ANSI C63.10-2013  
Kind of test site : 3m Semi-Anechoic Chamber

### Test setup

Test Channel : Low/Middle/High  
Operation Mode : A.1  
Ambient temperature : 25°C  
Relative humidity : 52%

### Notes

*Test plots please refer to the annex document "BDED-RX EXHIBIT A of SHE20060042-02HE".*

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## 4.1.7 Hopping Frequency Separation

RESULT:

PASS

Test standard : FCC Part 15.247(a)(1)  
RSS-247 5.1(2)  
Requirement : ANSI C63.10-2013  
Kind of test site : Shielded room

### Test setup

Test Channel : Hopping  
Operation Mode : A.1.a.iv  
Ambient temperature : 25°C  
Relative humidity : 52%

Table 4: Hopping Frequency Separation

Mode	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)
GFSK	2441	1.000	≥ 25kHz or two-thirds of 20dB bandwidth
8-DPSK	2441	1.045	

\*Note: The systems operate with an output power no greater than 125mW.

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Figure 24: Hopping Frequency Separation, Hopping Mode, GFSK

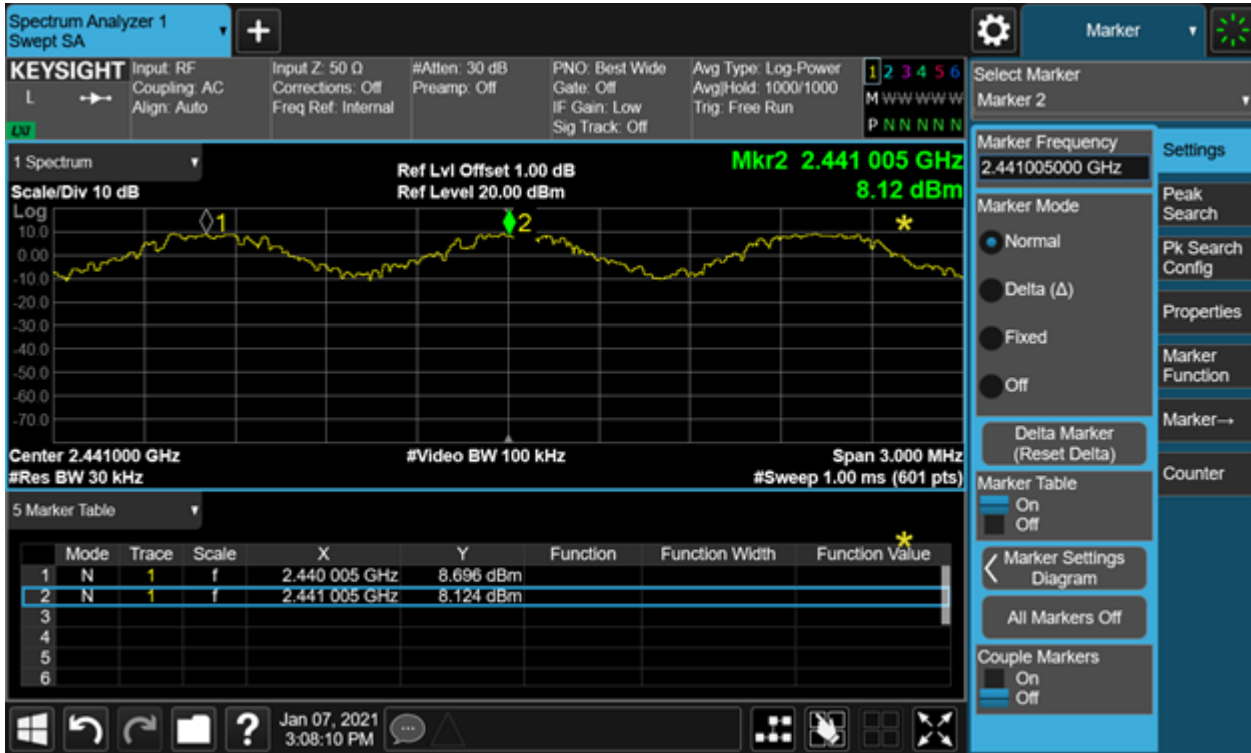
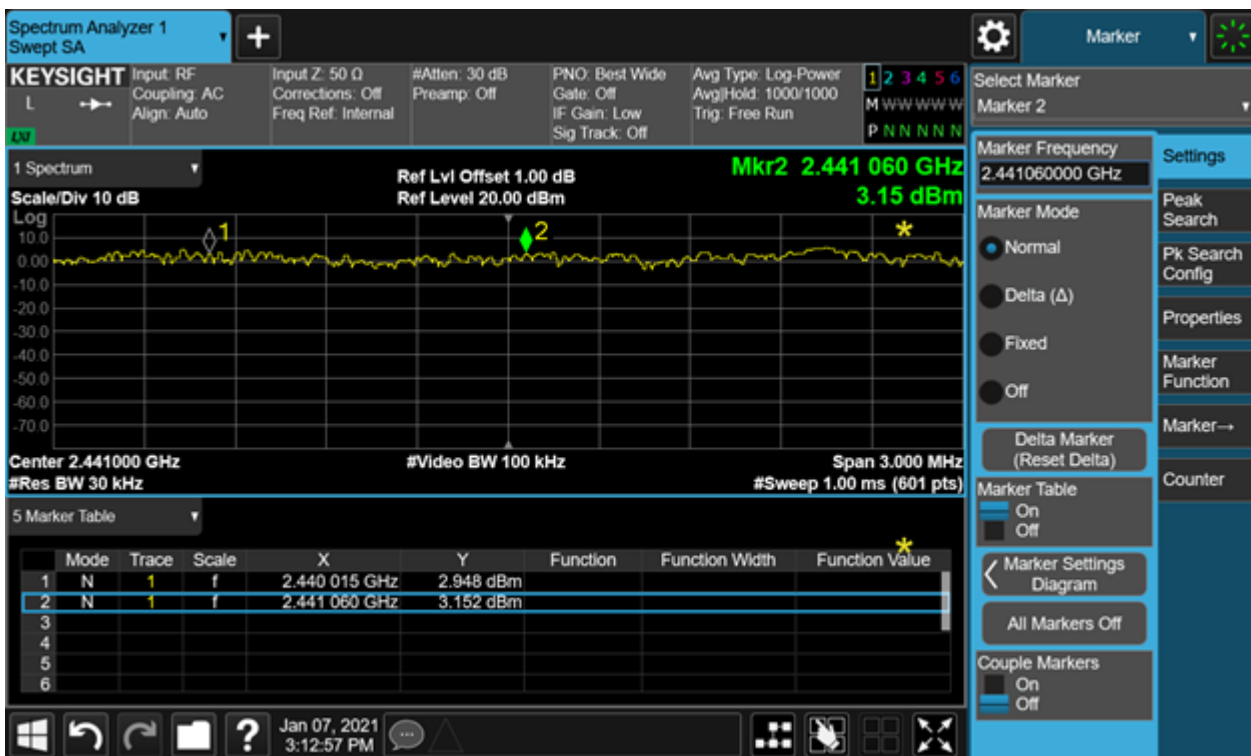


Figure 25: Hopping Frequency Separation, Hopping Mode, 8DPSK





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## 4.1.8 Number of Hopping Frequency

RESULT:

**PASS**

Test standard : FCC Part 15.247(a)(1)(iii)  
RSS-247 5.1(4)  
Requirement : ANSI C63.10-2013  
Kind of test site : Shielded room

### Test setup

Test Channel : Hopping  
Operation Mode : A.1.a.iv  
Ambient temperature : 25°C  
Relative humidity : 52%

**Table 5: Number of Hopping Frequency**

Mode	Frequency Range	Measured Quantity of Hopping Channel	Limit
GFSK	2400 – 2483.5	79	≥15
8-DPSK	2400 – 2483.5	79	≥15

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Figure 26: Number of Hopping Frequency, Hopping Mode, GFSK

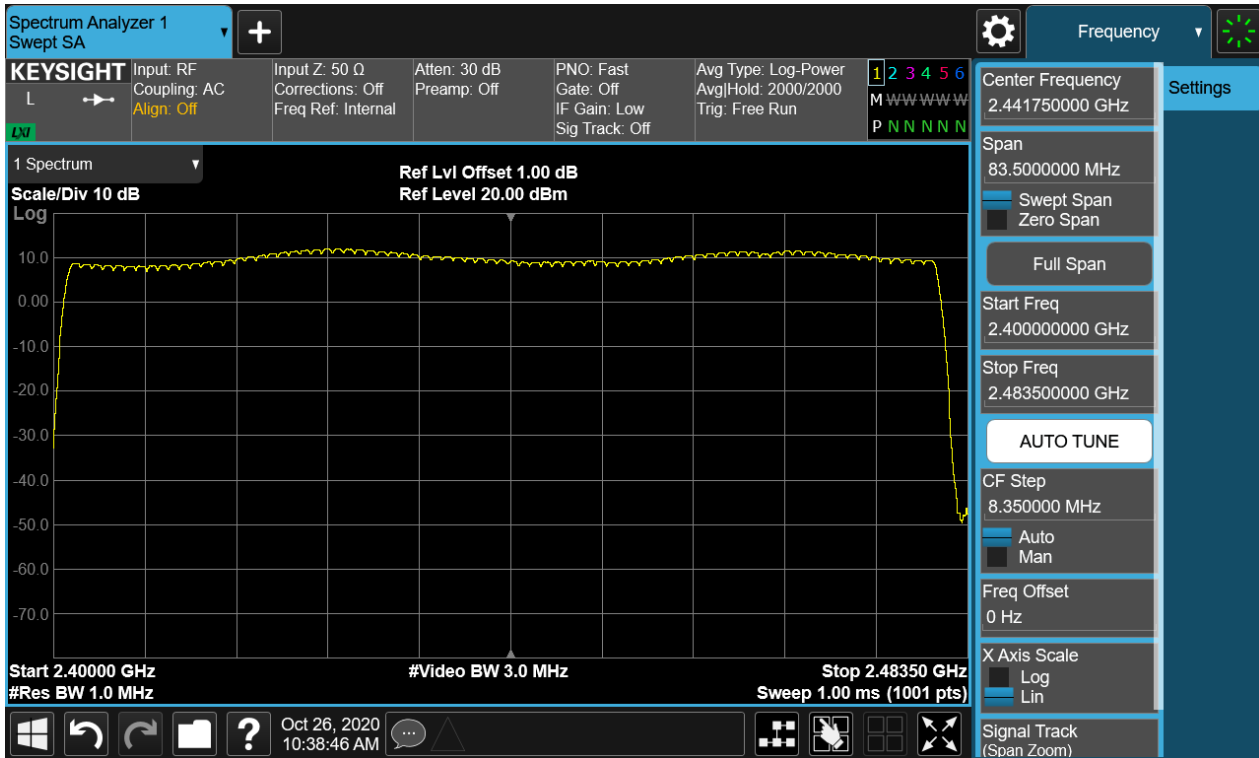
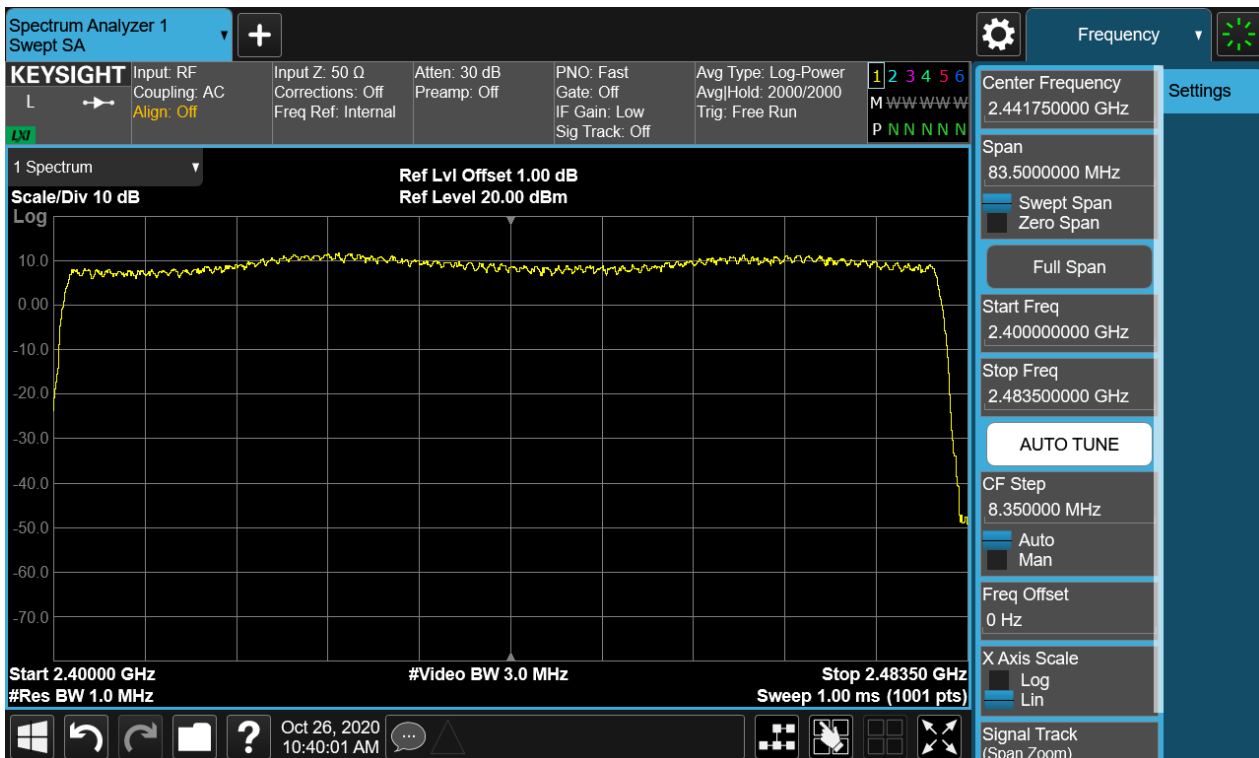


Figure 27: Number of Hopping Frequency, Hopping Mode, 8-DPSK



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## 4.1.9 Time of Occupancy

RESULT:

PASS

Test standard : FCC Part 15.247(a)(1)(iii)  
RSS-247 5.1(4)  
Requirement : ANSI C63.10-2013  
Kind of test site : Shielded room

### Test setup

Test Channel : Middle  
Operation Mode : A.1.a  
Ambient temperature : 25°C  
Relative humidity : 52%

Table 6: Time of Occupancy

Mode	Packet Type	Pulse Time (ms)	Total of Dwell (ms)	Limit (s)
GFSK	DH1	0.4083	130.656	0.4
	DH3	1.6830	269.280	0.4
	DH5	2.9370	313.280	0.4
8-DPSK	DH1	0.4150	132.800	0.4
	DH3	1.6720	267.520	0.4
	DH5	2.9250	312.000	0.4

Note:

For DH1 package type:

Total of Dwell = Pulse Time\*(1600/2)/Number of Hopping Frequency\*Period

Period = 0.4\* Number of Hopping Frequency

For DH3 package type:

Total of Dwell = Pulse Time\*(1600/4)/Number of Hopping Frequency\*Period

Period = 0.4\* Number of Hopping Frequency

For DH5 package type:

Total of Dwell = Pulse Time\*(1600/6)/Number of Hopping Frequency\*Period

Period = 0.4\* Number of Hopping Frequency

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Figure 28: Time of Occupancy, 2441MHz, GFSK DH1

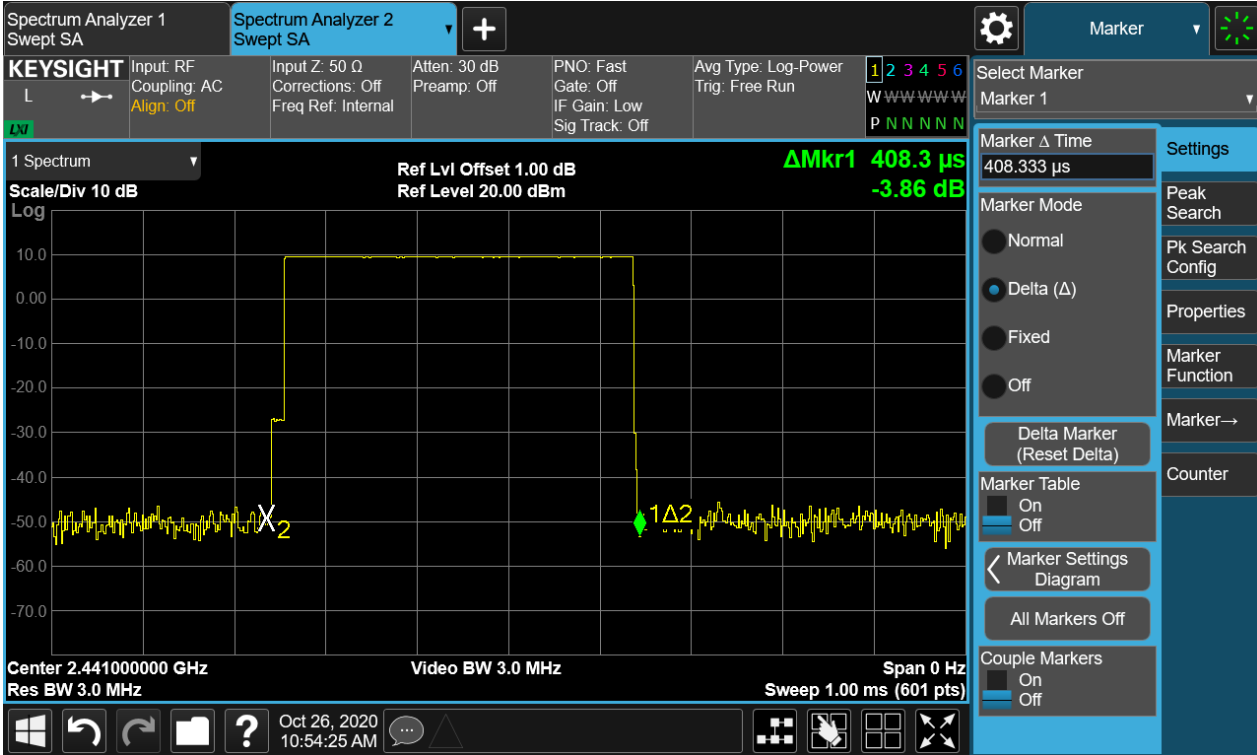
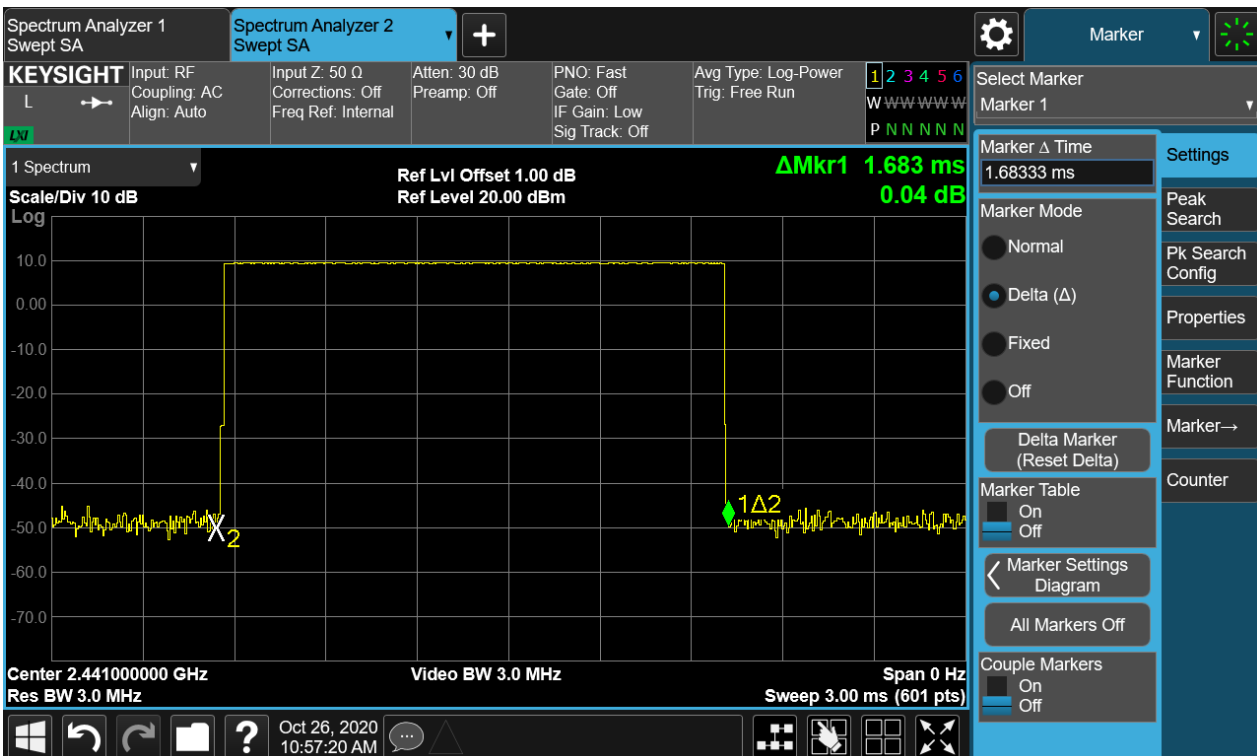


Figure 26: Time of Occupancy, 2441MHz, GFSK DH3



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Figure 30: Time of Occupancy, 2441MHz, GFSK DH5

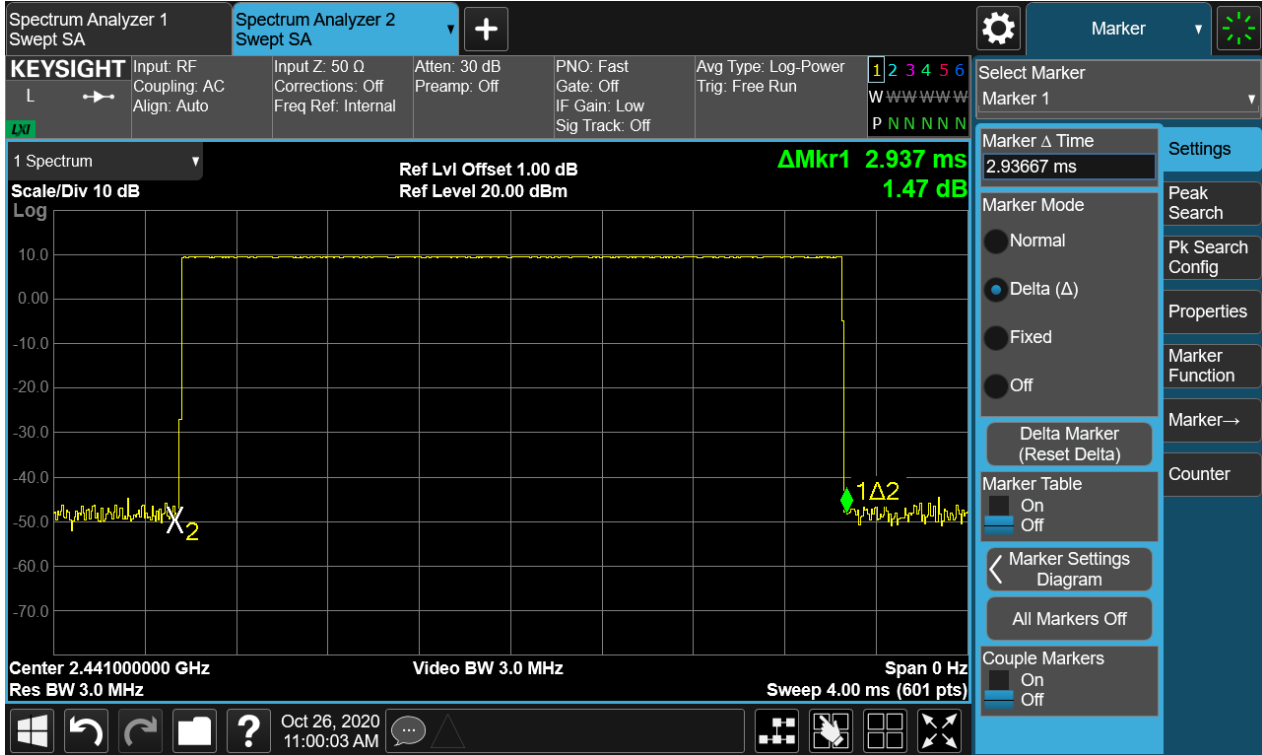
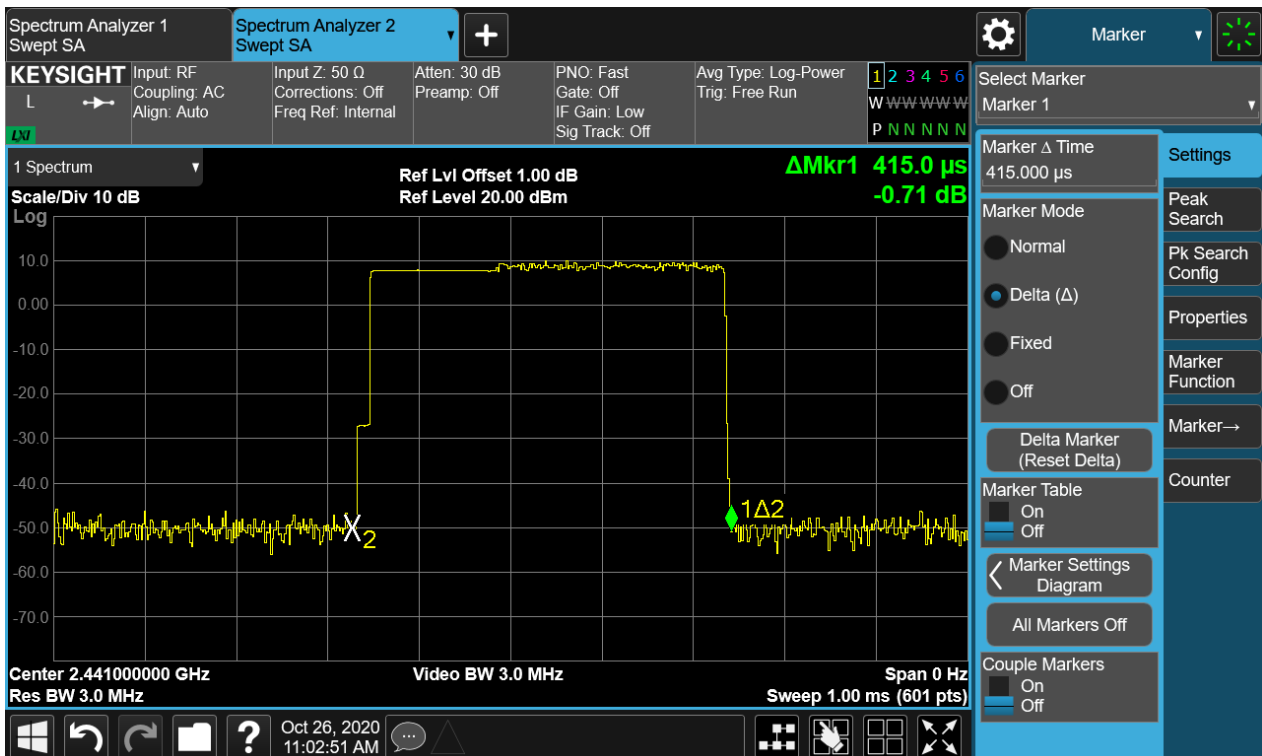


Figure 31: Time of Occupancy, 2441MHz, 8-DPSK DH1



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Figure 32: Time of Occupancy, 2441MHz, 8-DPSK DH3

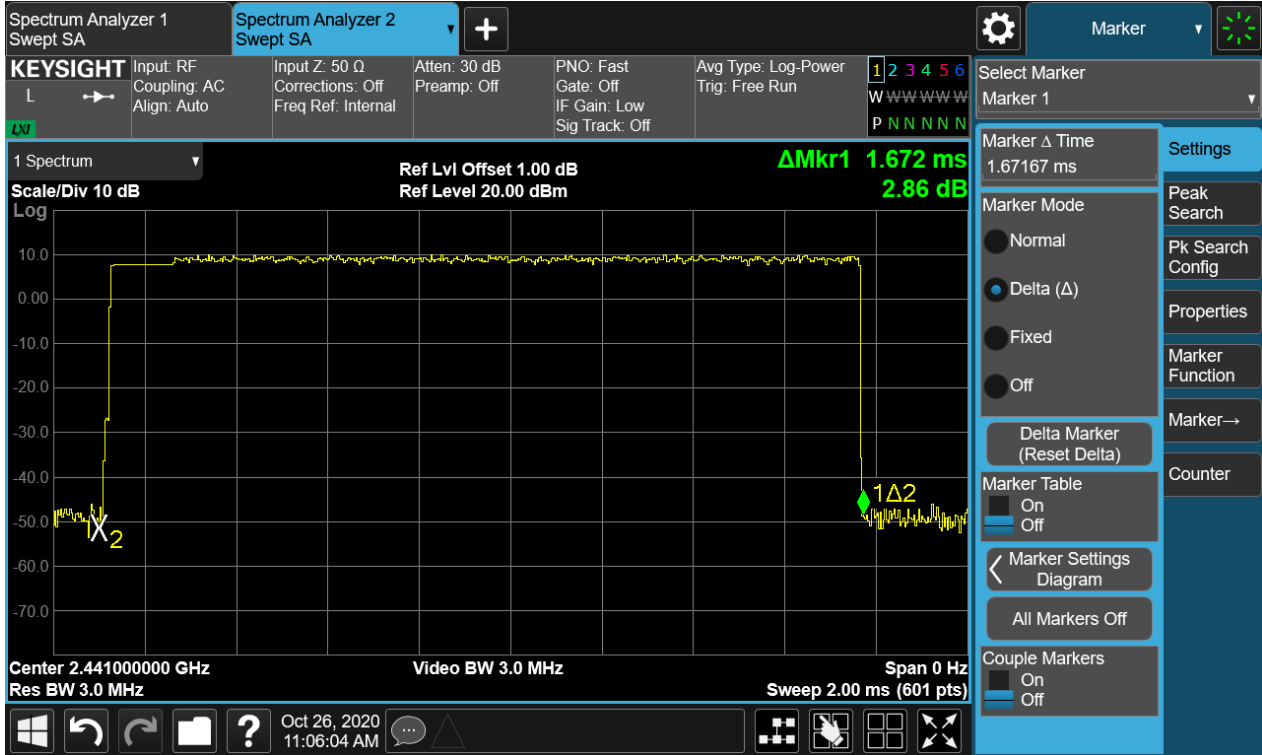
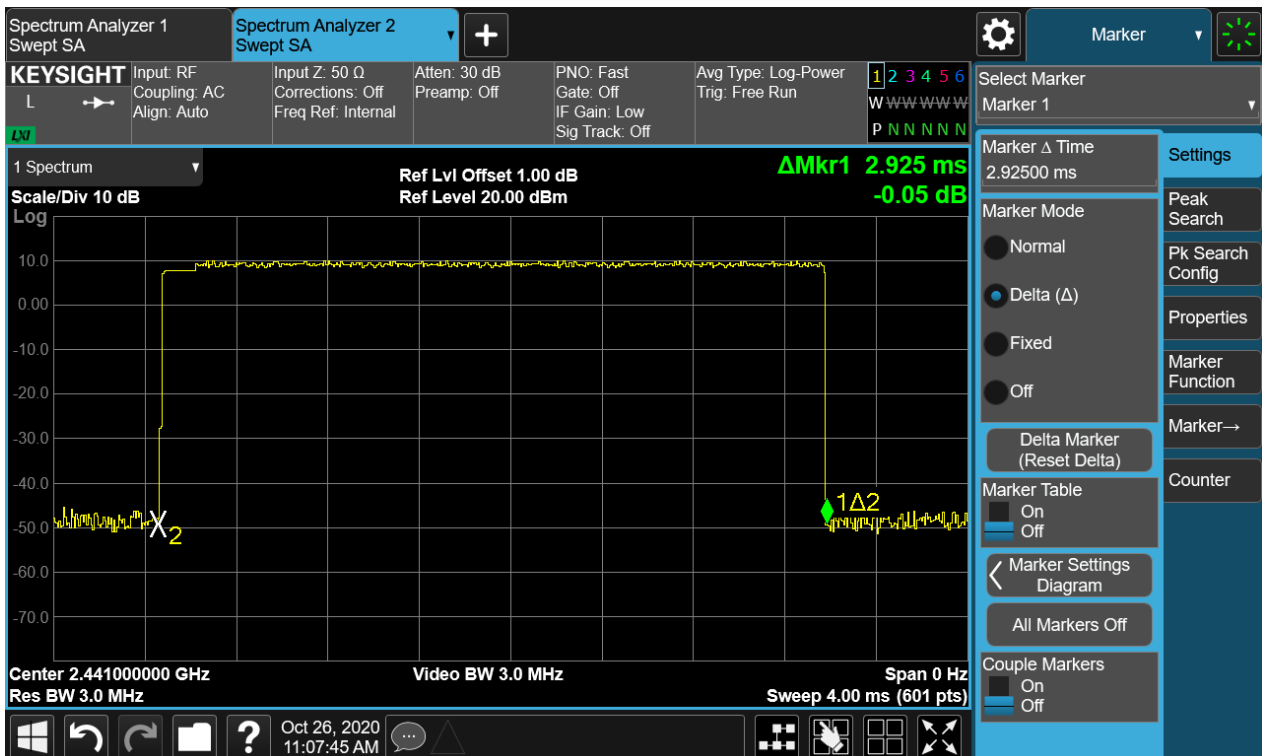


Figure 33: Time of Occupancy, 2441MHz, 8-DPSK DH5



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## 4.2 Mains Emissions

### 4.2.1 Conducted Emission on AC Mains

**RESULT:**

**PASS**

Test standard : FCC Part 15.207(a)

RSS-Gen 8.8

Requirement : ANSI C63.10-2013

Kind of test site : Shielded room

#### Test setup

Input Voltage : AC 120V, 60Hz; AC 240V, 50Hz

Operation Mode : A.1.a

Earthing : Not Connected

Ambient temperature : 25°C

Relative humidity : 52%

For details refer to following test plot.

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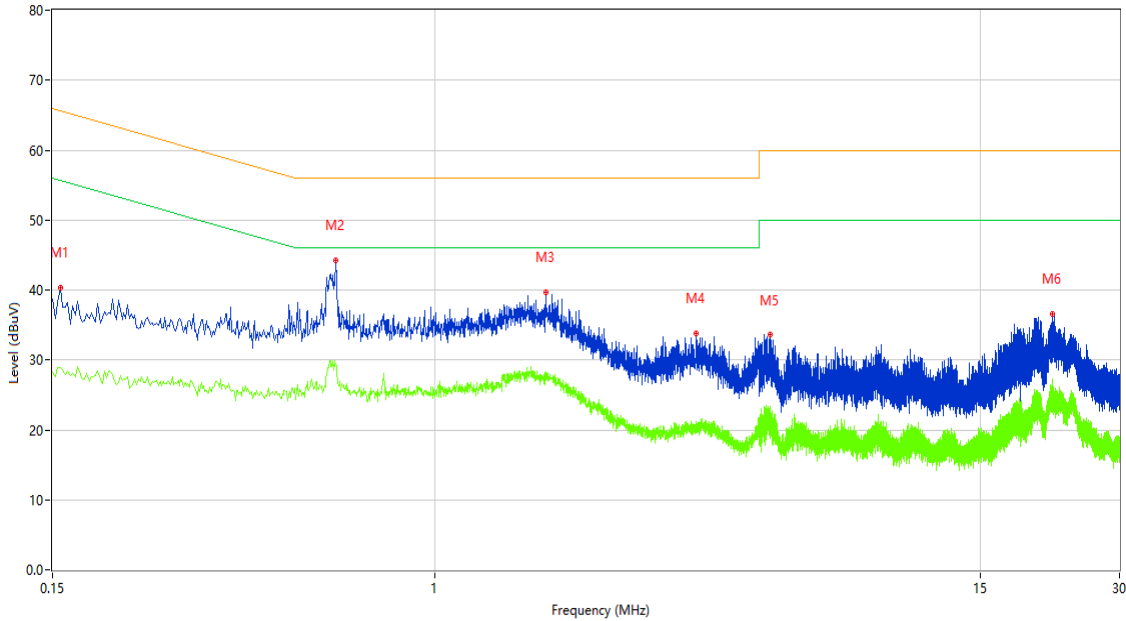
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**Note:**

The all configurations were tested respectively, but only the worst configuration shown here.

**Figure 34: Conducted Emission on AC Mains, L Phase**

C:Emission Test case\_FCC\_CE\_FCC PART 15B\_Class B



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.156	38.45	9.64	65.67	-27.22	Peak	L	Pass
1*	0.156	32.43	9.64	65.67	-33.24	QP	L	Pass
1**	0.156	28.91	9.64	55.67	-26.76	AV	L	Pass
2	0.612	42.67	9.74	56.00	-13.33	Peak	L	Pass
2*	0.612	38.18	9.74	56.00	-17.82	QP	L	Pass
2**	0.612	29.43	9.74	46.00	-16.57	AV	L	Pass
3	1.736	34.62	9.67	56.00	-21.38	Peak	L	Pass
3*	1.736	26.93	9.67	56.00	-29.07	QP	L	Pass
3**	1.736	27.41	9.67	46.00	-18.59	AV	L	Pass
4	3.660	32.00	9.68	56.00	-24.00	Peak	L	Pass
4*	3.660	25.26	9.68	56.00	-30.74	QP	L	Pass
4**	3.660	21.24	9.68	46.00	-24.76	AV	L	Pass
5	5.288	34.29	9.70	60.00	-25.71	Peak	L	Pass
5*	5.288	26.95	9.70	60.00	-33.05	QP	L	Pass
5**	5.288	23.19	9.70	50.00	-26.81	AV	L	Pass
6	21.506	36.31	9.42	60.00	-23.69	Peak	L	Pass
6*	21.506	29.92	9.42	60.00	-30.08	QP	L	Pass
6**	21.506	27.19	9.42	50.00	-22.81	AV	L	Pass



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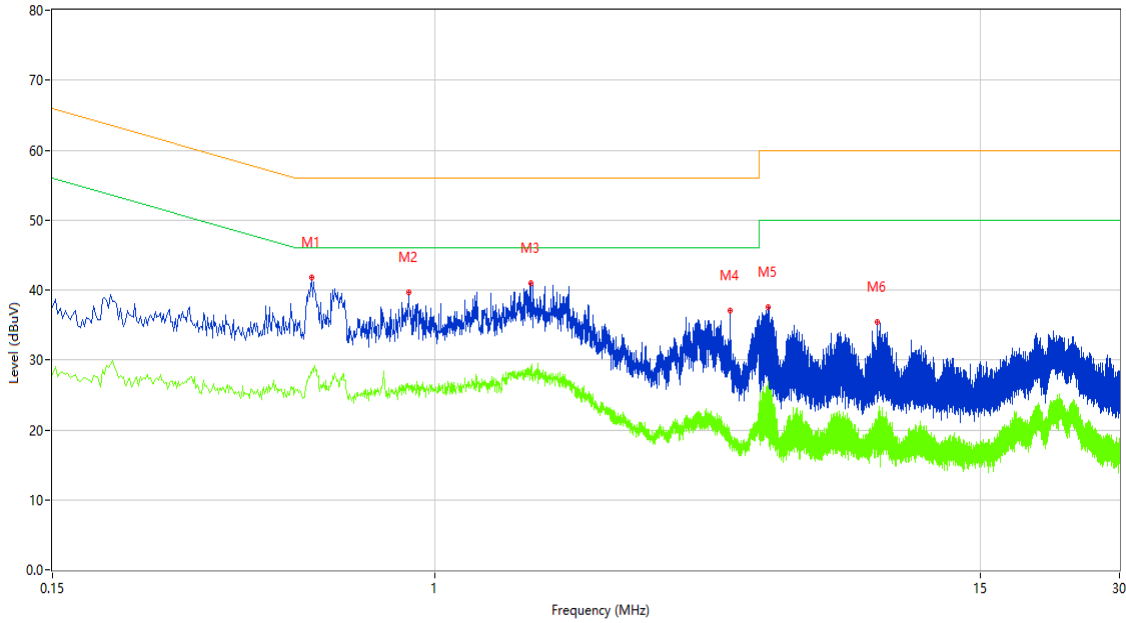
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Figure 35: Conducted Emission on AC Mains, N Phase

CEmission Test case\_FCC\_CE\_FCC PART 15B\_Class B



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.544	37.13	9.75	56.00	-18.87	Peak	N	Pass
1*	0.544	31.57	9.75	56.00	-24.43	QP	N	Pass
1**	0.544	28.05	9.75	46.00	-17.95	AV	N	Pass
2	0.878	36.17	9.76	56.00	-19.83	Peak	N	Pass
2*	0.878	30.00	9.76	56.00	-26.00	QP	N	Pass
2**	0.878	25.95	9.76	46.00	-20.05	AV	N	Pass
3	1.610	39.41	9.67	56.00	-16.59	Peak	N	Pass
3*	1.610	32.13	9.67	56.00	-23.87	QP	N	Pass
3**	1.610	28.91	9.67	46.00	-17.09	AV	N	Pass
4	4.348	34.44	9.69	56.00	-21.56	Peak	N	Pass
4*	4.348	26.71	9.69	56.00	-29.29	QP	N	Pass
4**	4.348	19.27	9.69	46.00	-26.73	AV	N	Pass
5	5.242	40.49	9.70	60.00	-19.51	Peak	N	Pass
5*	5.242	32.53	9.70	60.00	-27.47	QP	N	Pass
5**	5.242	26.90	9.70	50.00	-23.10	AV	N	Pass
6	9.006	35.12	9.67	60.00	-24.88	Peak	N	Pass
6*	9.006	27.26	9.67	60.00	-32.74	QP	N	Pass
6**	9.006	21.44	9.67	50.00	-28.56	AV	N	Pass

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## 5 Appendixes

### 5.1 Photographs of the Sample



Front of the sample



Rear of the sample

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## 5.2 Set-up for Conducted Emissions



## 5.3 Set-up for Conducted RF test at Antenna Port



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## 5.4 Set-up for Spurious Emissions below 1GHz



Below 1 GHz

## 5.5 Set-up for Spurious Emissions above 1GHz



Above 1GHz

\*\*\*End of the report\*\*\*