Appendix for 15.247

1. Bandwidth

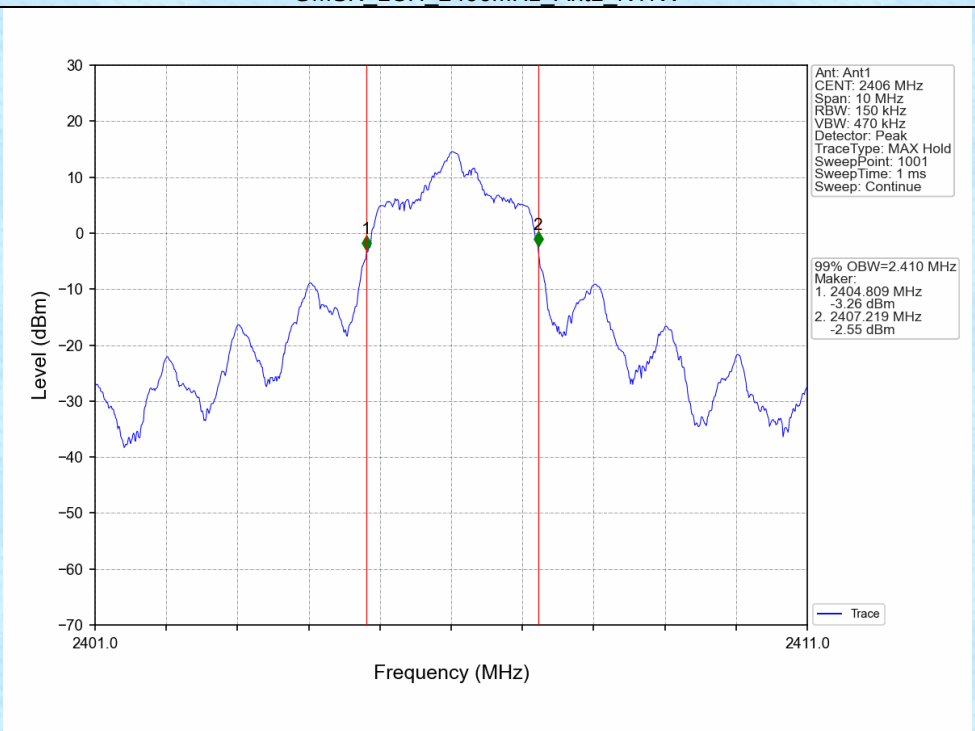
1.1 OBW

1.1.1 Test Result

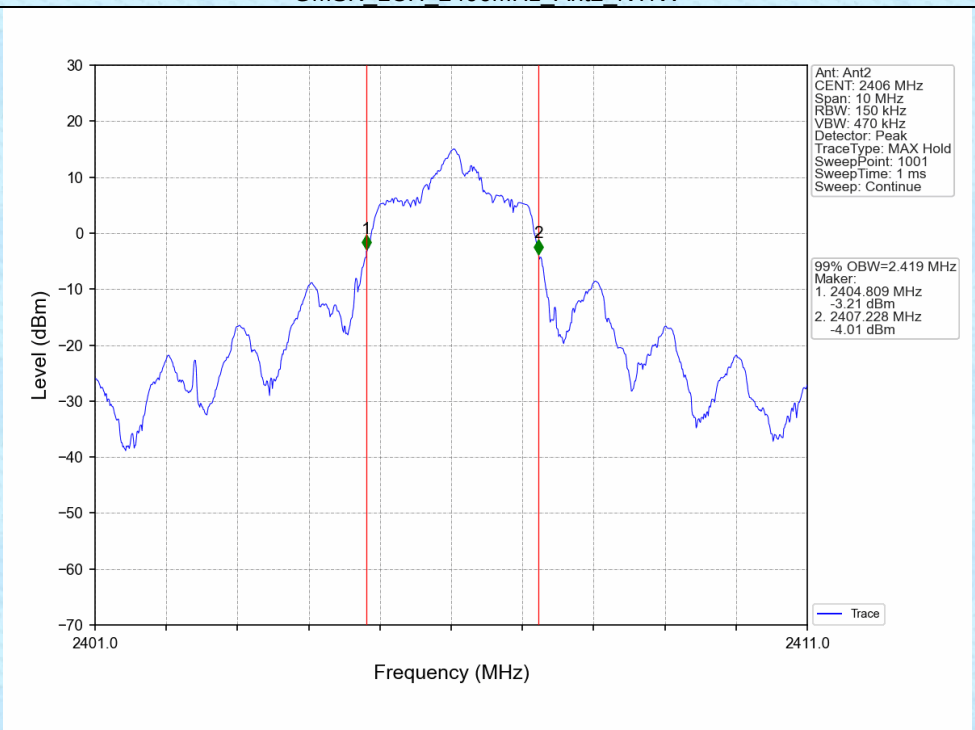
Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)	Verdict
				Result	
GMSK	SISO	2406	1	2.410	Pass
			2	2.419	Pass
		2440	1	2.740	Pass
			2	2.658	Pass
		2472	1	2.844	Pass
			2	2.906	Pass

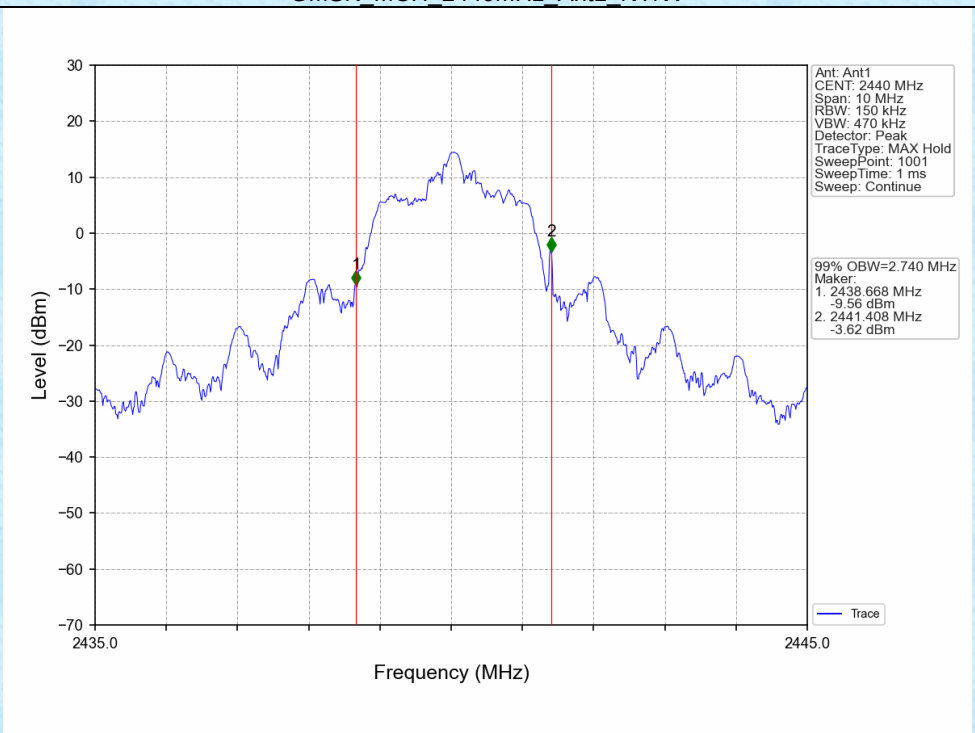
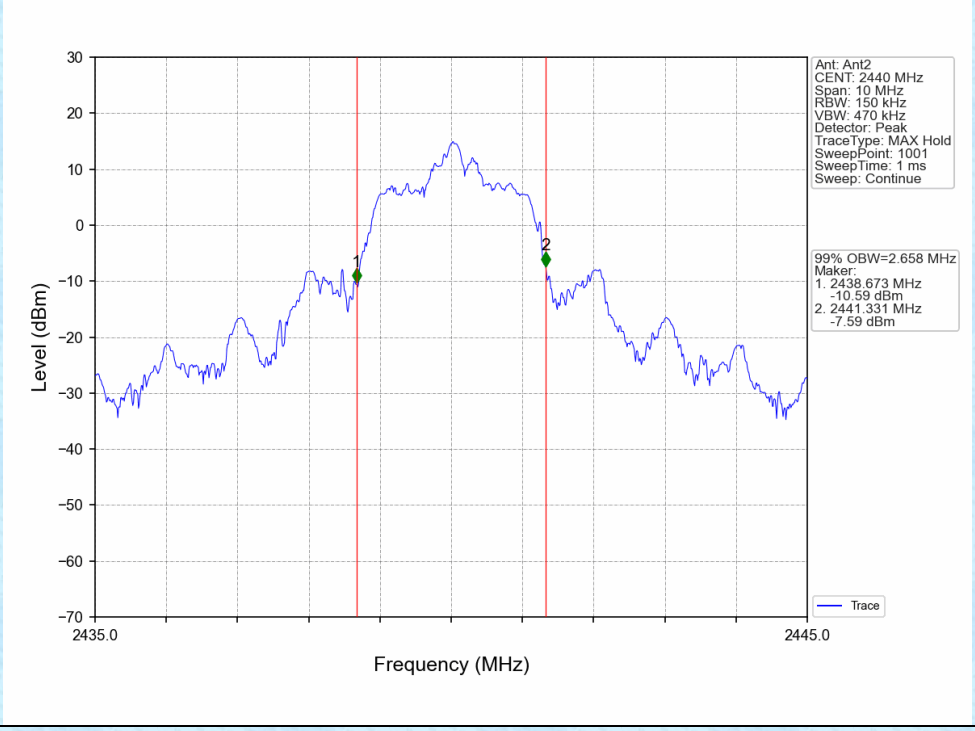
1.1.2 Test Graph

GMSK_LCH_2406MHz_Ant1_NTNV

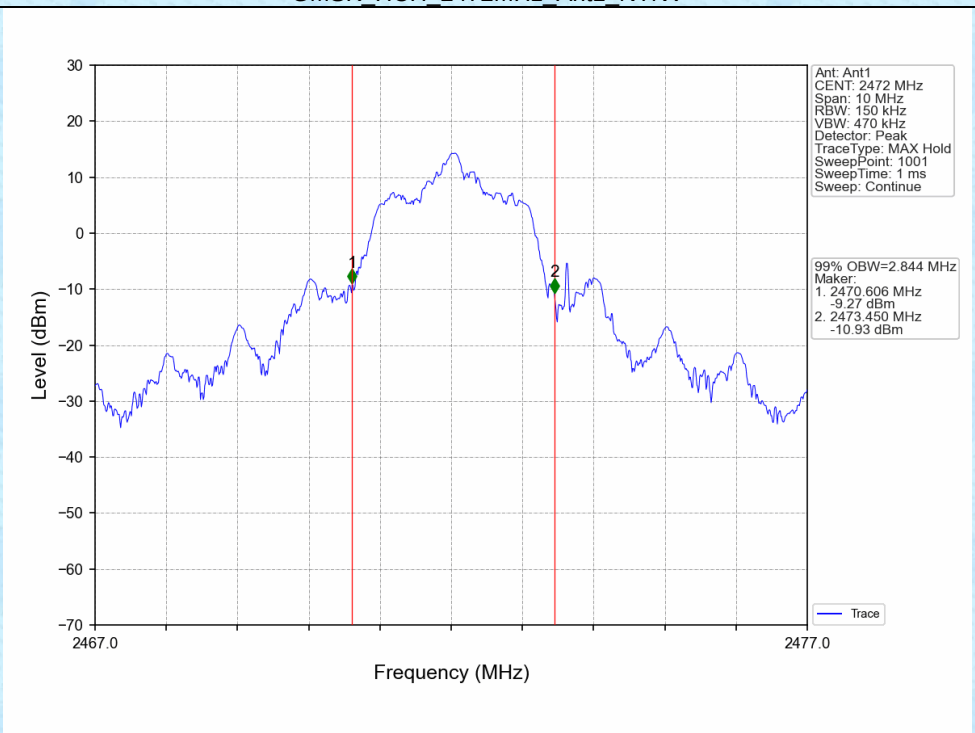


GMSK_LCH_2406MHz_Ant2_NTNV

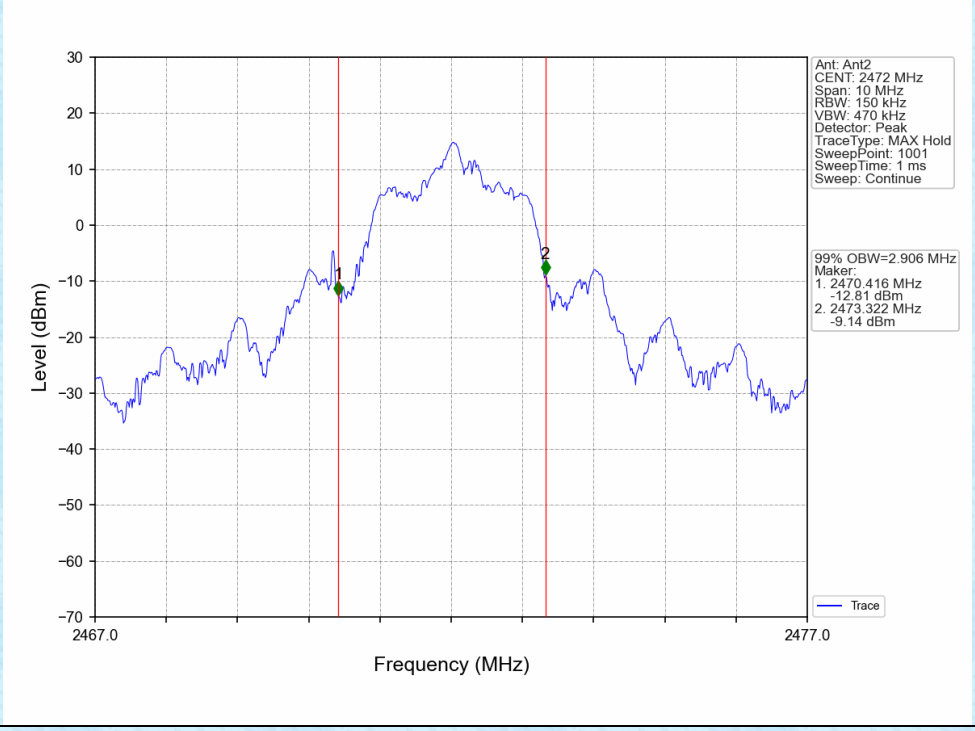


GMSK_MCH_2440MHz_Ant1_NTNV

GMSK_MCH_2440MHz_Ant2_NTNV


GMSK_HCH_2472MHz_Ant1_NTNV



GMSK_HCH_2472MHz_Ant2_NTNV



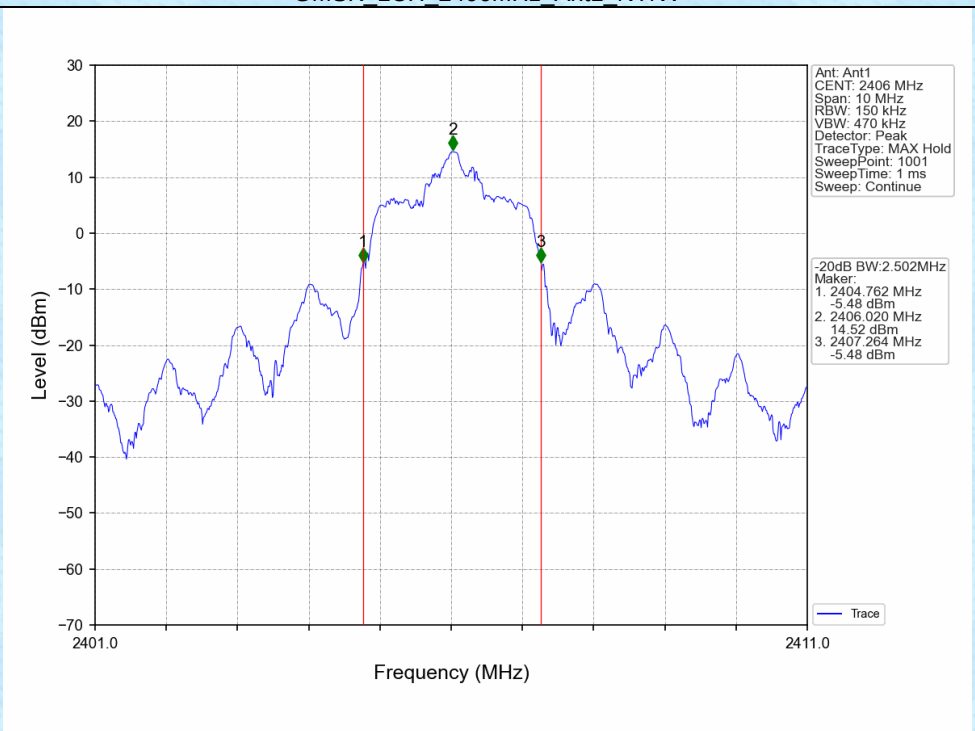
1.2 20dB BW

1.2.1 Test Result

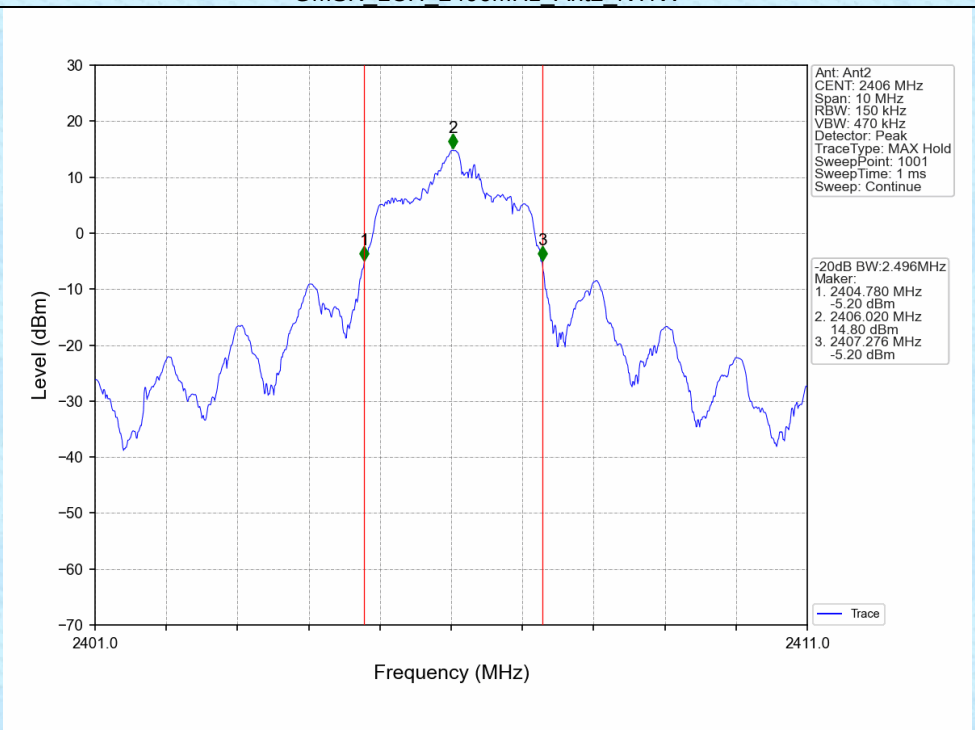
Mode	TX Type	Frequency (MHz)	ANT	20dB Bandwidth (MHz)	Verdict
				Result	
GMSK	SISO	2406	1	2.502	Pass
			2	2.496	Pass
		2440	1	2.513	Pass
			2	2.870	Pass
		2472	1	2.548	Pass
			2	2.512	Pass

1.2.2 Test Graph

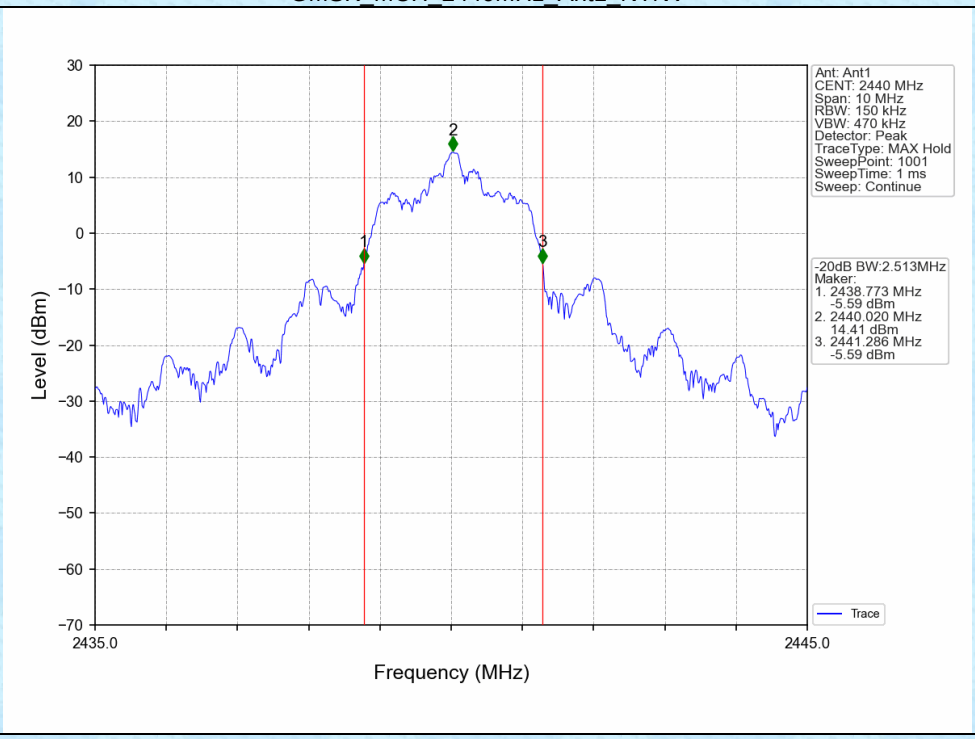
GMSK_LCH_2406MHz_Ant1_NTNV



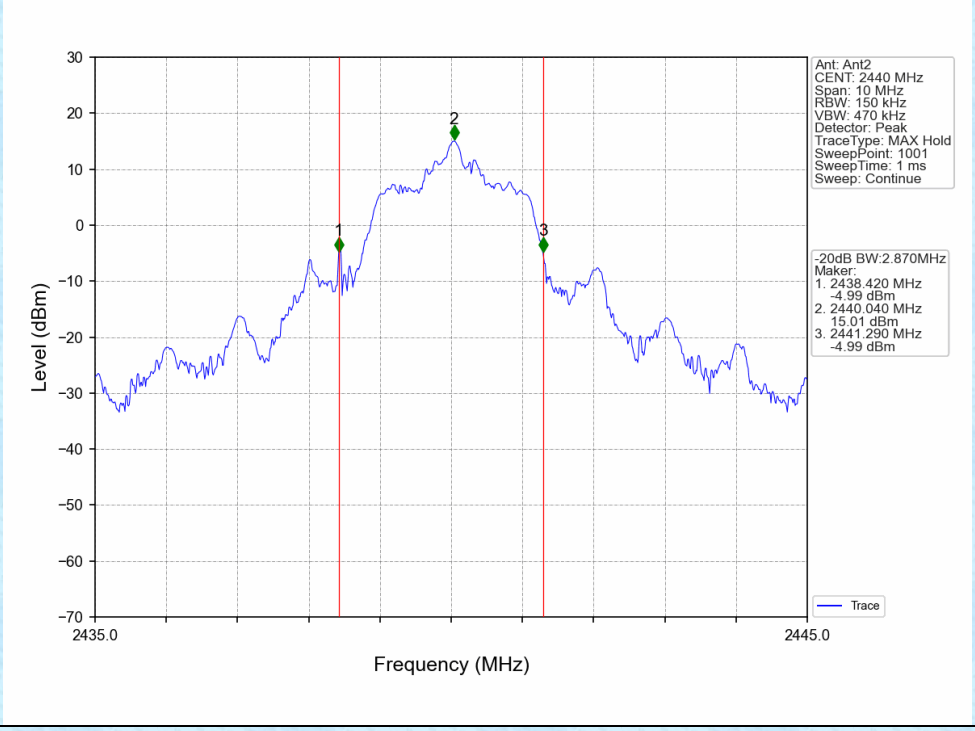
GMSK_LCH_2406MHz_Ant2_NTNV



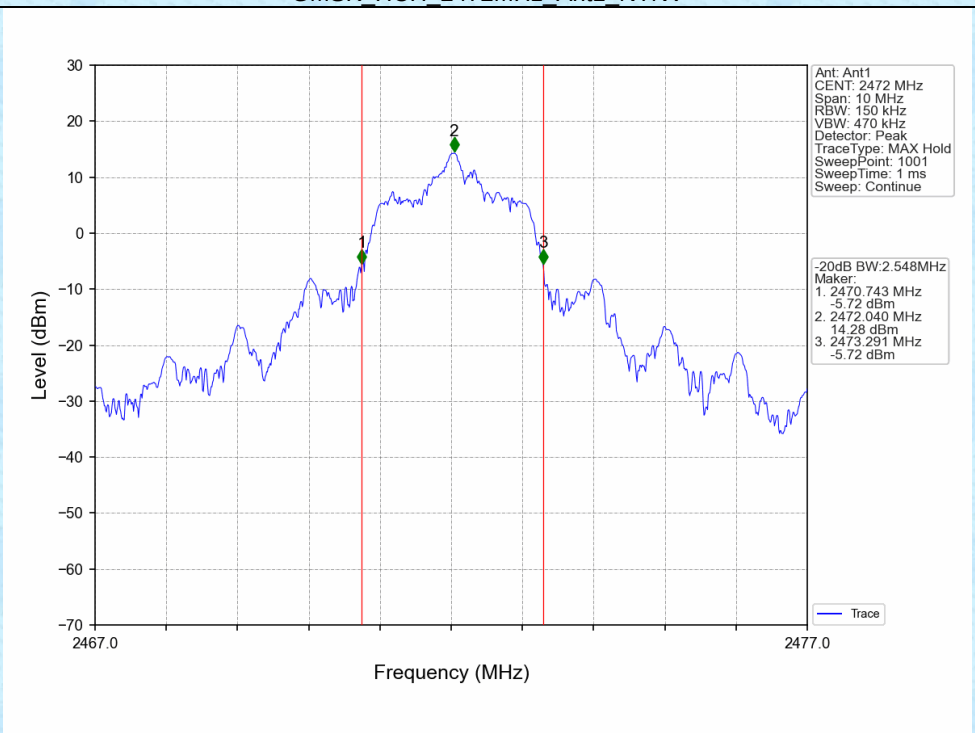
GMSK_MCH_2440MHz_Ant1_NTNV



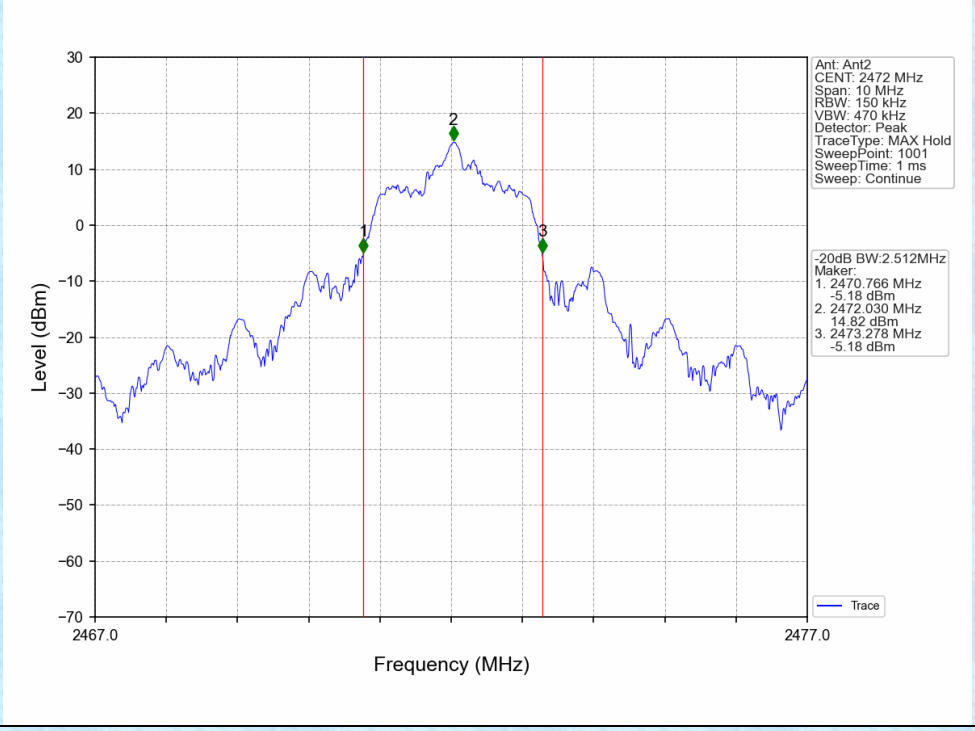
GMSK_MCH_2440MHz_Ant2_NTNV



GMSK_HCH_2472MHz_Ant1_NTNV



GMSK_HCH_2472MHz_Ant2_NTNV



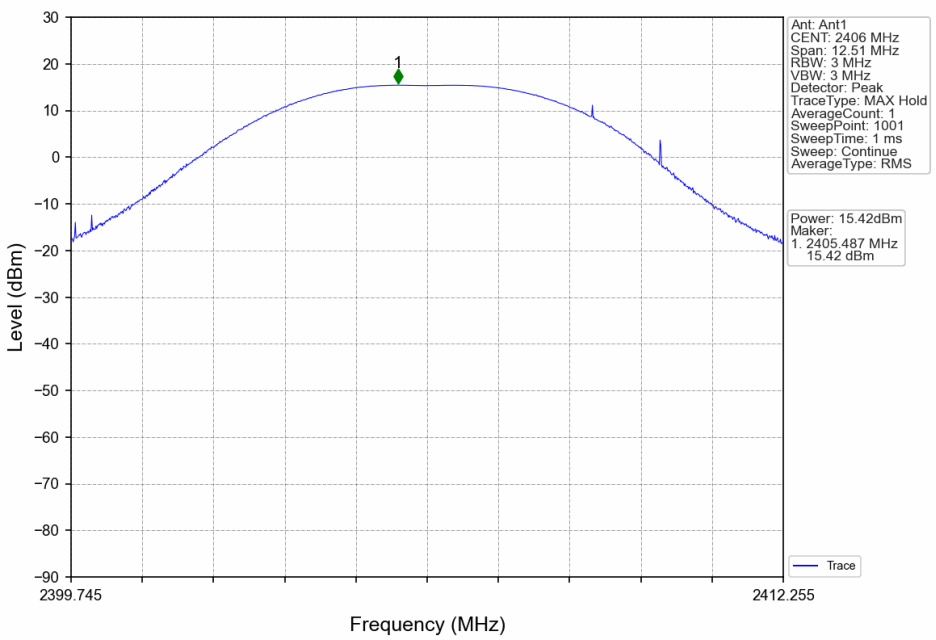
2. Maximum Conducted Output Power

2.1 Test Result

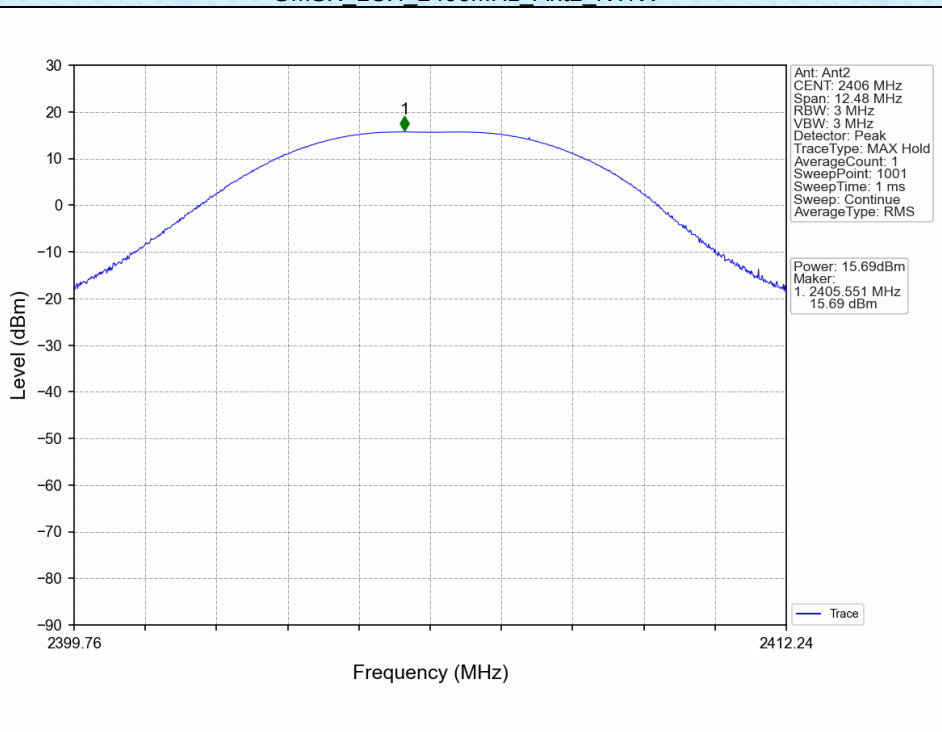
Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)			Verdict
			ANT1	ANT2	Limit	
GMSK	SISO	2406	15.42	15.69	<=20.97	Pass
		2440	15.42	15.62	<=20.97	Pass
		2472	15.25	15.43	<=20.97	Pass

2.2 Test Graph

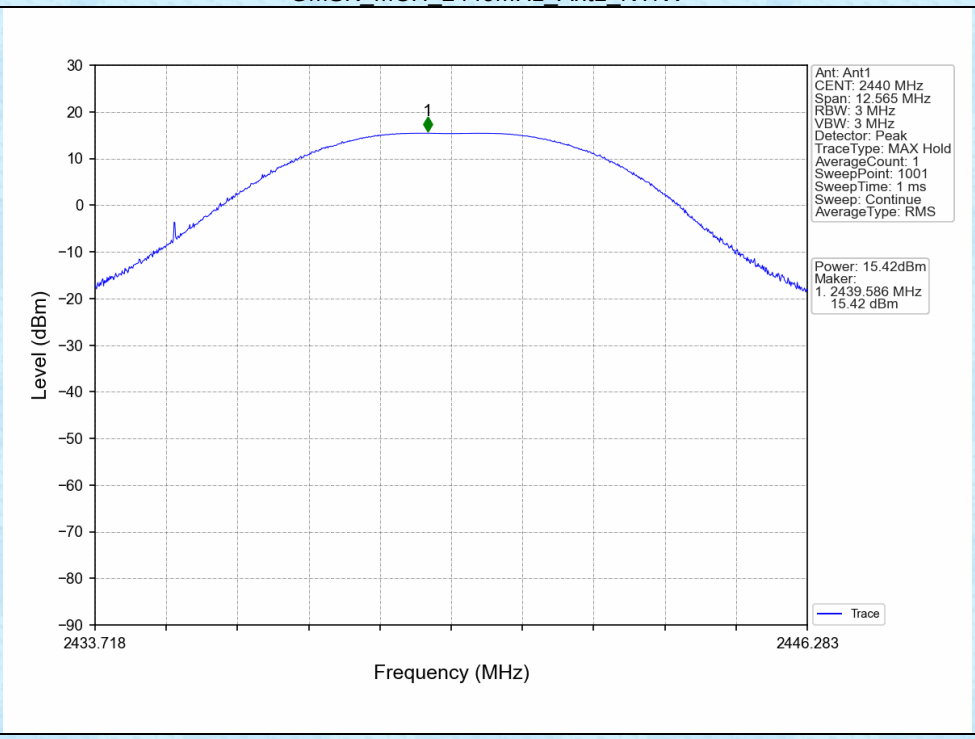
GMSK_LCH_2406MHz_Ant1_NTNV



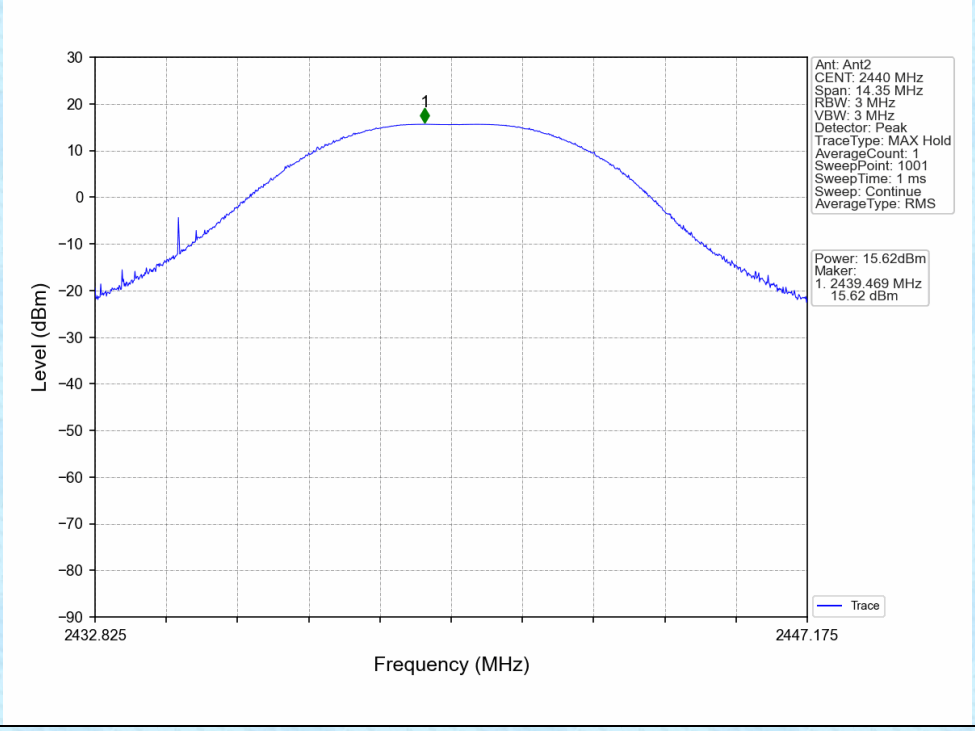
GMSK_LCH_2406MHz_Ant2_NTNV



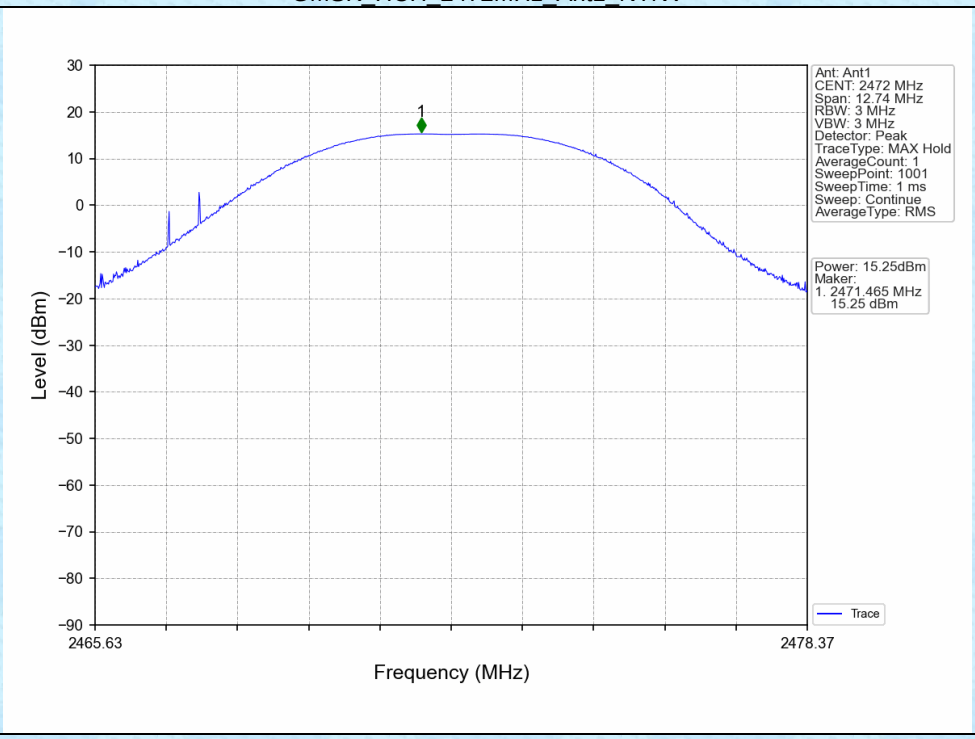
GMSK_MCH_2440MHz_Ant1_NTNV



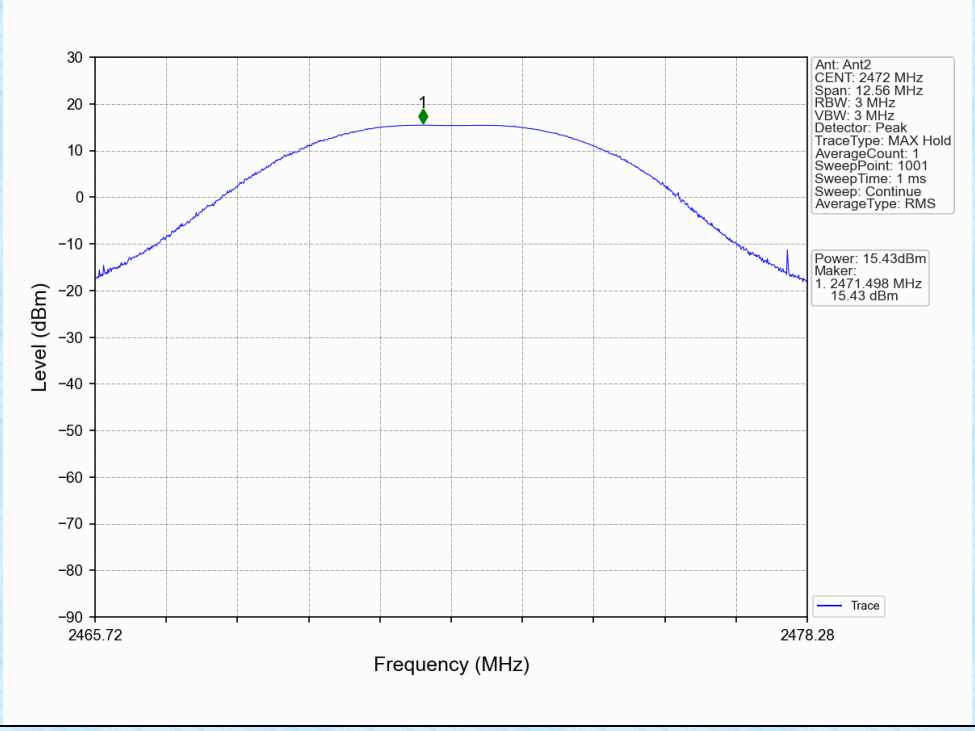
GMSK_MCH_2440MHz_Ant2_NTNV



GMSK_HCH_2472MHz_Ant1_NTNV



GMSK_HCH_2472MHz_Ant2_NTNV

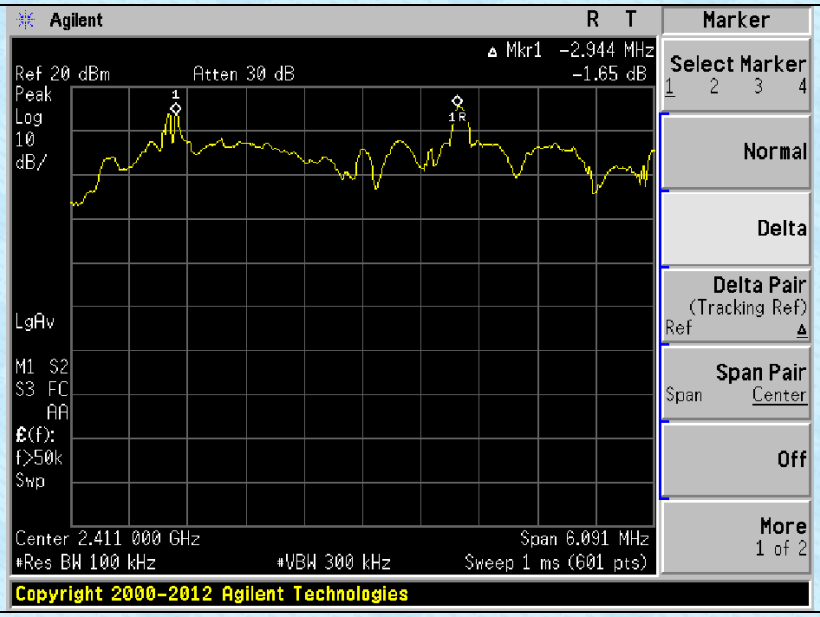


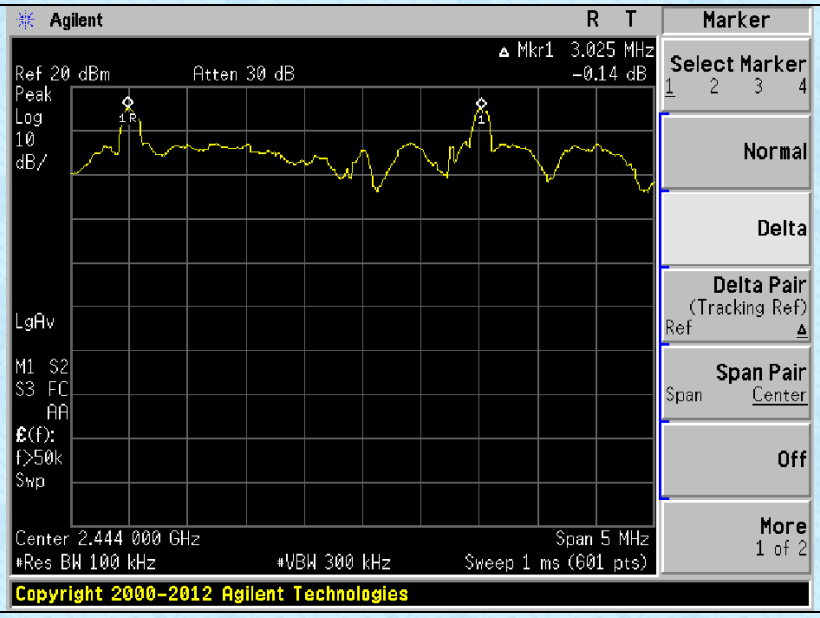
3. Carrier frequency separation

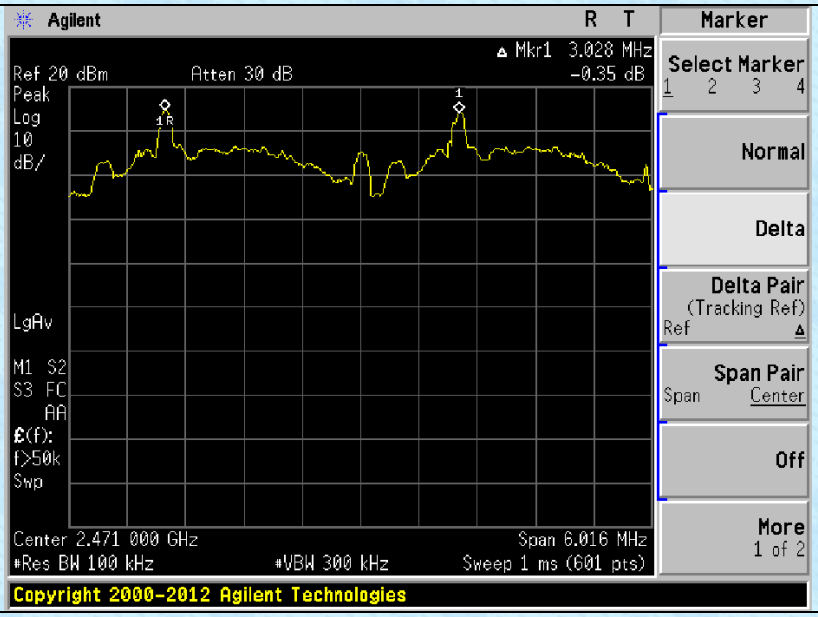
3.1 Test Result

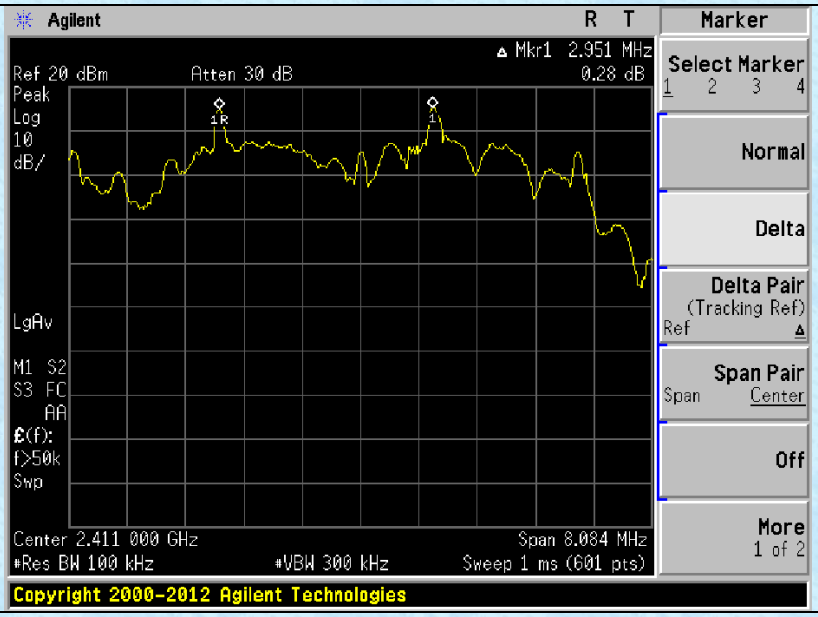
ANT No.	Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
1	Lowest	2944	1668	Pass
	Middle	3025	1664	Pass
	Highest	3028	1675	Pass
2	Lowest	2951	1913	Pass
	Middle	2983	1699	Pass
	Highest	3038	1675	Pass

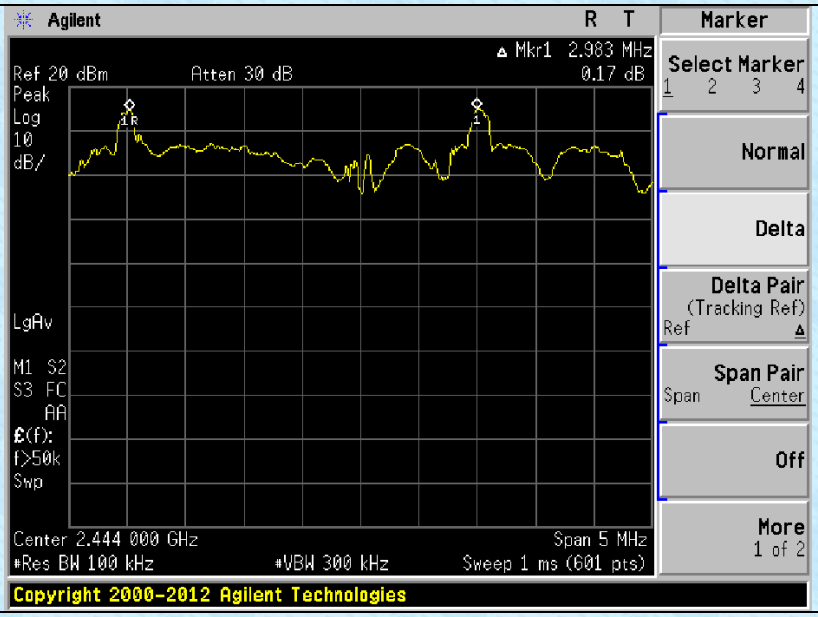
3.2 Test Graph

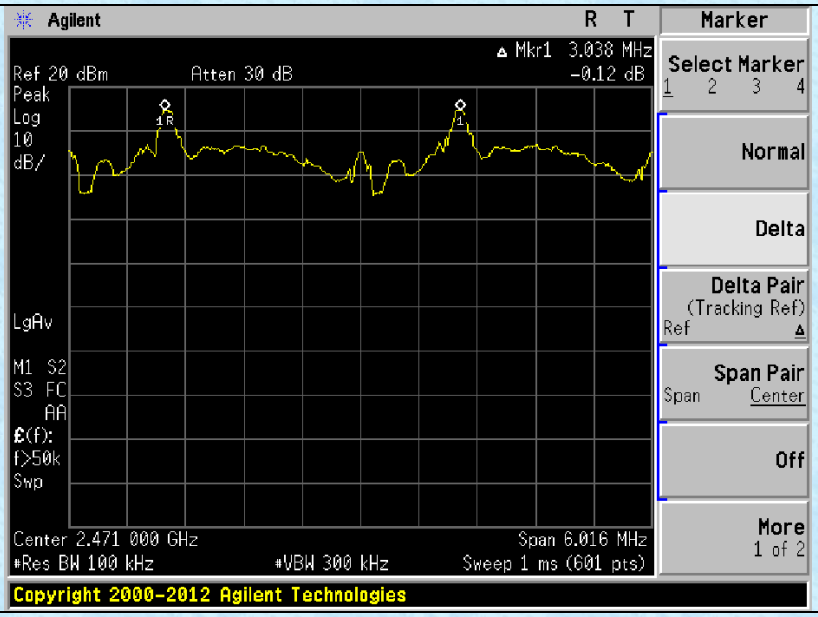





Agilent
R T
Marker
Mkr1 3.028 MHz
-0.35 dB
Ref 20 dBm
Atten 30 dB
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Center 2.471 000 GHz
Span 6.016 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 1 ms (601 pts)
Copyright 2000-2012 Agilent Technologies


Agilent
R T
Marker
Mkr1 2.951 MHz
0.28 dB
Ref 20 dBm
Atten 30 dB
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Center 2.411 000 GHz
Span 8.084 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 1 ms (601 pts)
Copyright 2000-2012 Agilent Technologies


Agilent
R T
Marker
Mkr1 2.983 MHz
0.17 dB
Ref 20 dBm
Atten 30 dB
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Center 2.444 000 GHz
Span 5 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 1 ms (601 pts)
Copyright 2000-2012 Agilent Technologies


Agilent
R T
Marker
Mkr1 3.038 MHz
-0.12 dB
Ref 20 dBm
Atten 30 dB
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Center 2.471 000 GHz
Span 6.016 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 1 ms (601 pts)
Copyright 2000-2012 Agilent Technologies

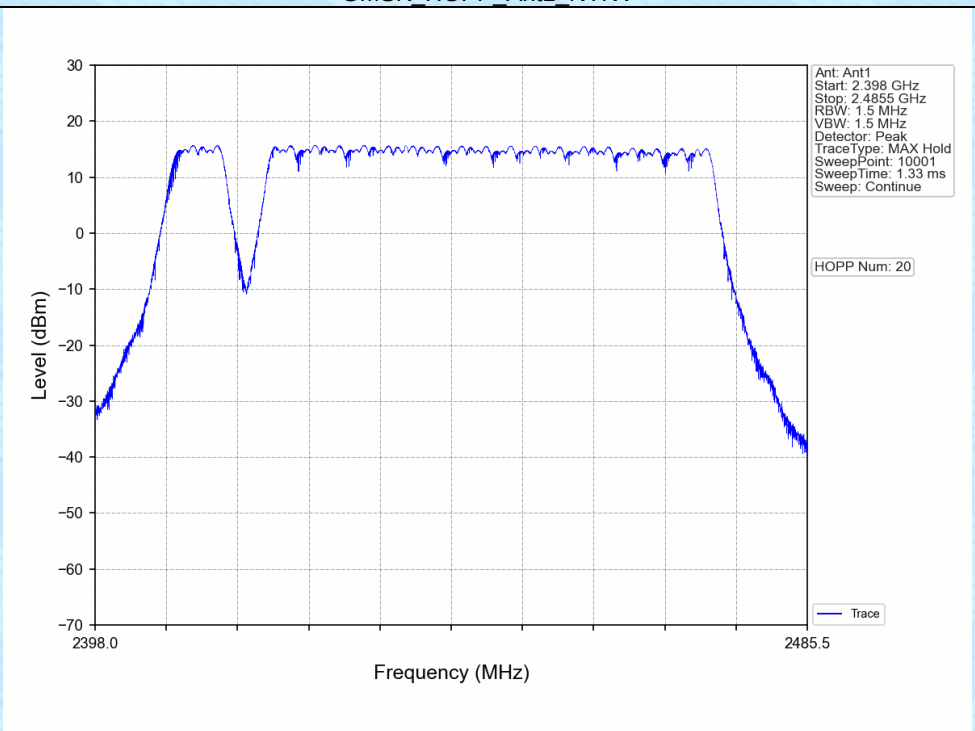
4. Number of Hopping Frequencies

4.1 Test Result

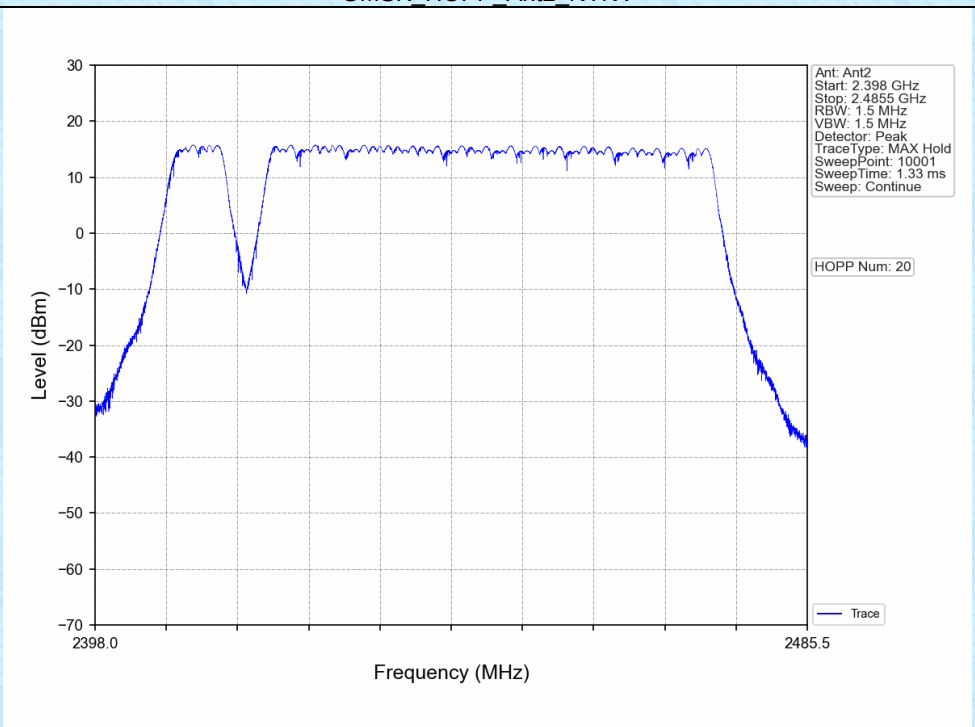
Mode	TX Type	Frequency (MHz)	Num of Hopping Frequencies			Verdict
			ANT1	ANT2	Limit	
GMSK	SISO	HOPP	20	20	>=15	Pass

4.2 Test Graph

GMSK_HOPP_Ant1_NTNV



GMSK_HOPP_Ant2_NTNV



5. Time of occupancy (dwell time)

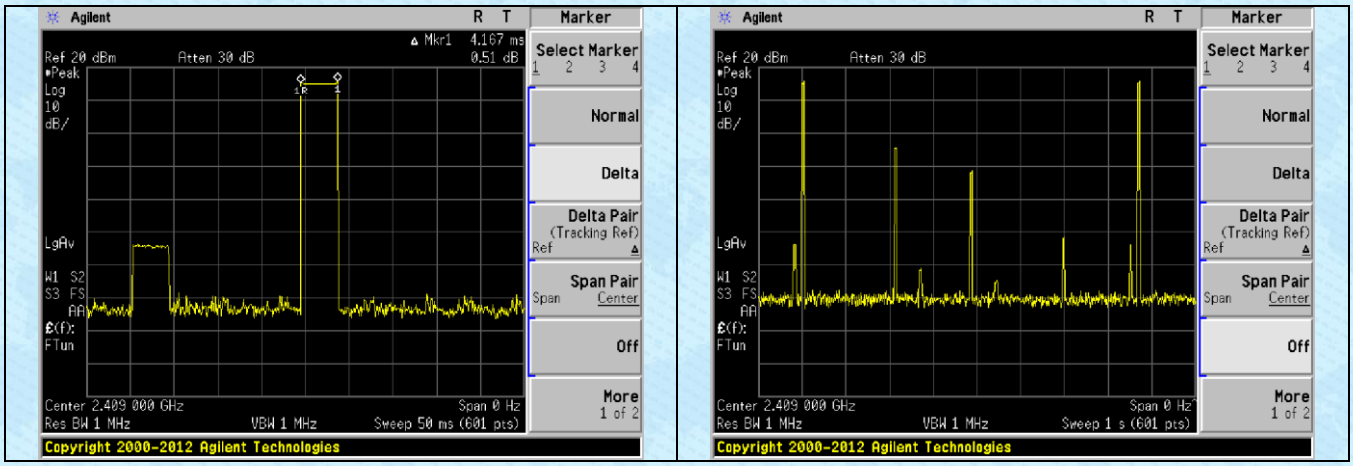
5.1 Test Result

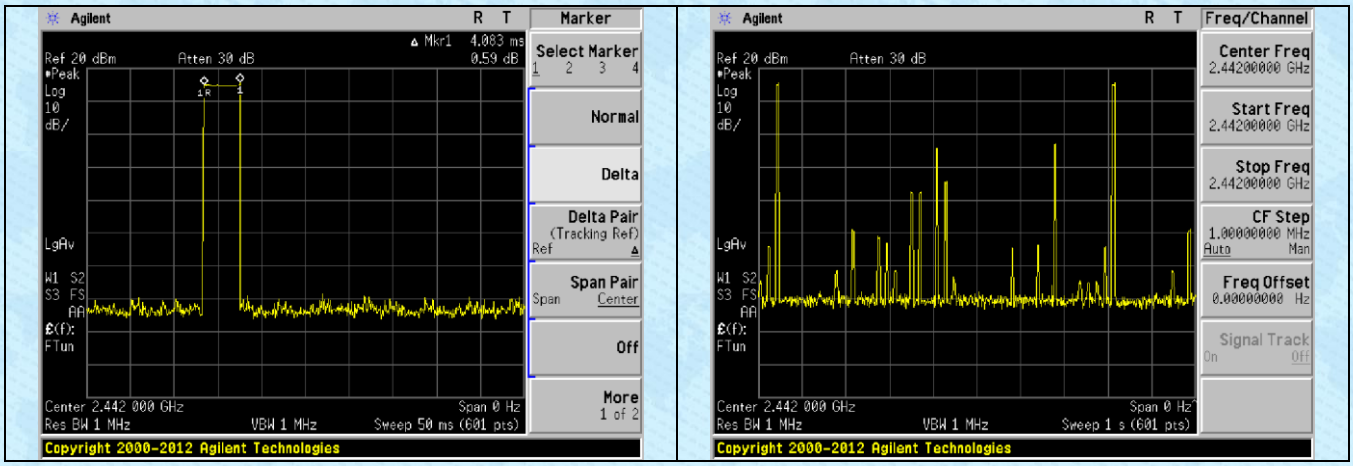
ANT No.	Test channel	**Ton (ms)**	**Dwell time(ms)**	**Limit(ms)**	**Result**
1	Lowest	4.167	66.67	400	Pass
	Middle	4.083	65.33	400	Pass
	Highest	4.167	66.67	400	Pass
2	Lowest	4.167	66.67	400	Pass
	Middle	4.167	66.67	400	Pass
	Highest	4.167	66.67	400	Pass

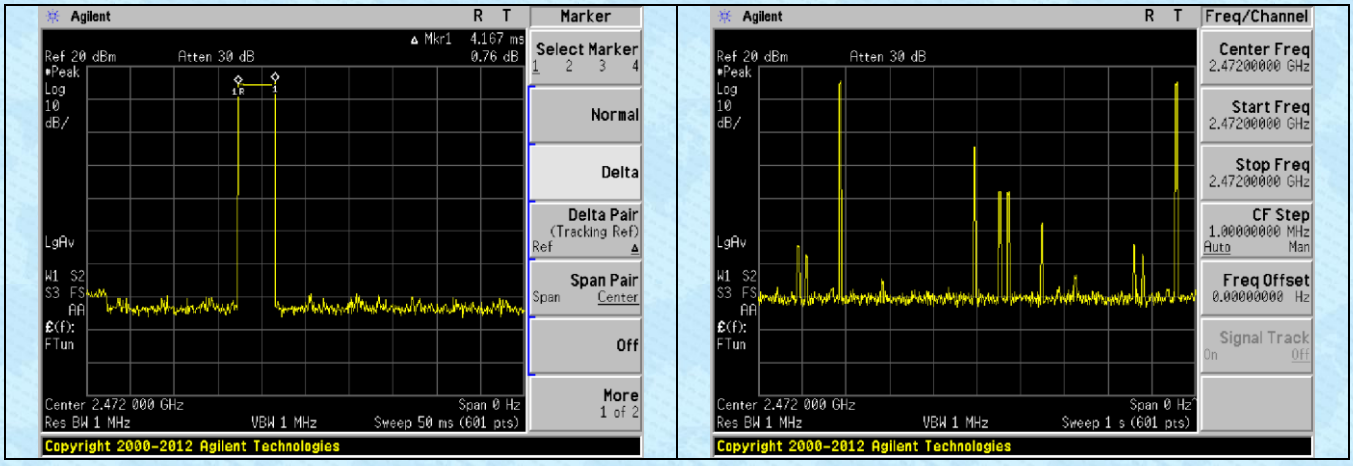
The formula as below:
ANT 1:
Lowest: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=4.167ms*2*0.4*20=66.67ms
Middle: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=4.083ms*2*0.4*20=65.33ms
Highest: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=4.167ms*2*0.4*20=66.67ms
ANT 2:
Lowest: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=4.167ms*2*0.4*20=66.67ms
Middle: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=4.167ms*2*0.4*20=66.67ms
Highest: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=4.167ms*2*0.4*20=66.67ms

5.2 Test Graph

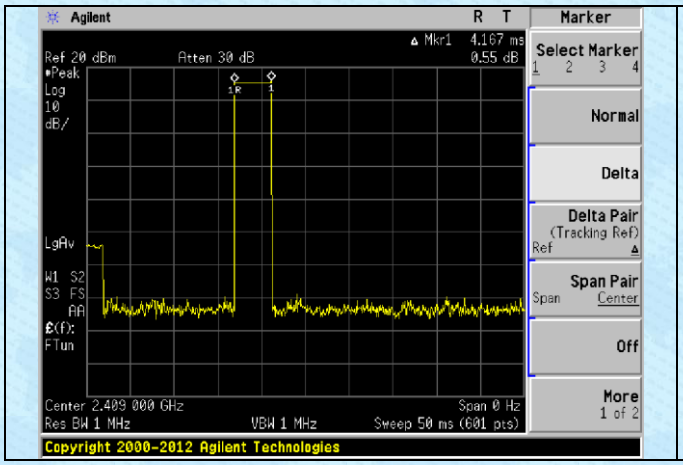
ANT 1:

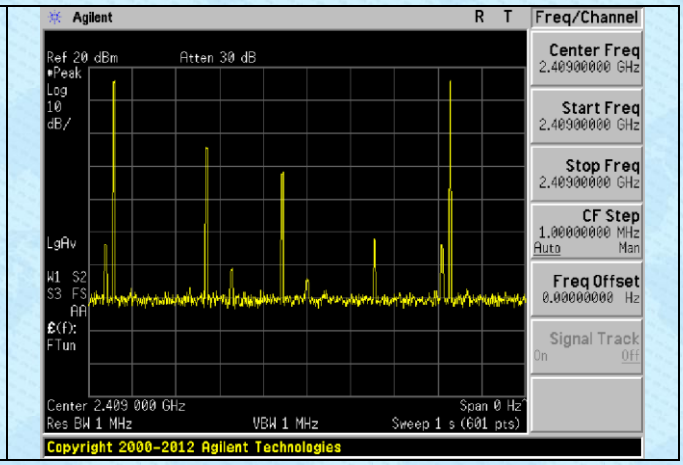


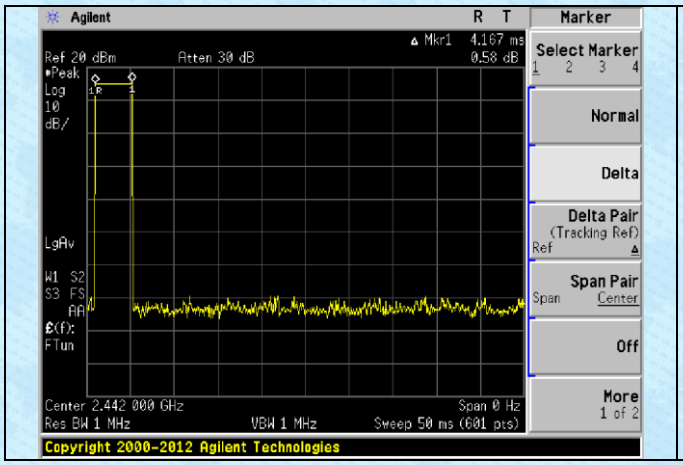


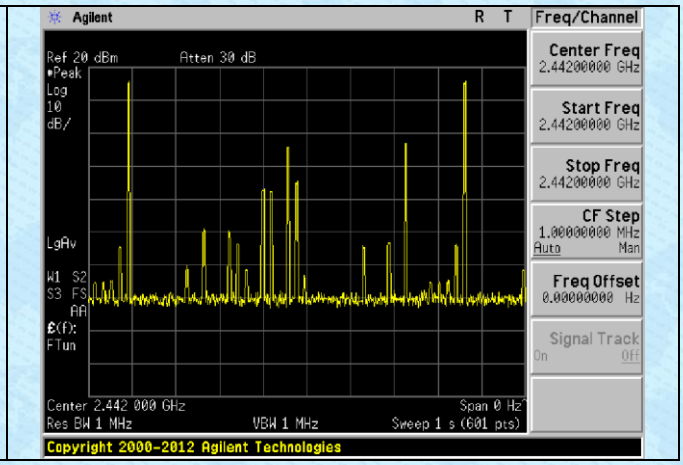


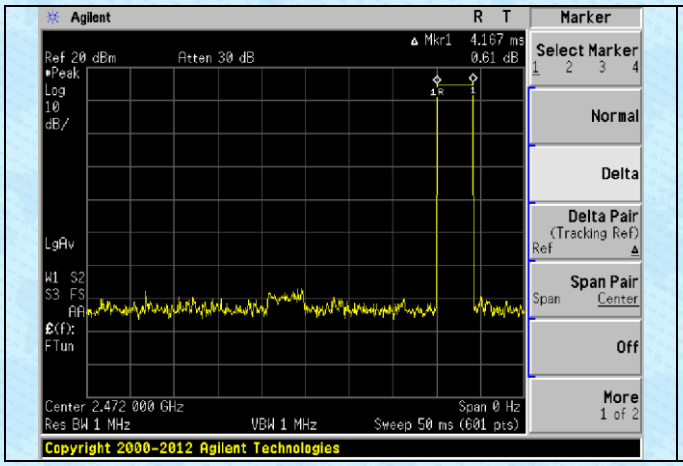
ANT 2:

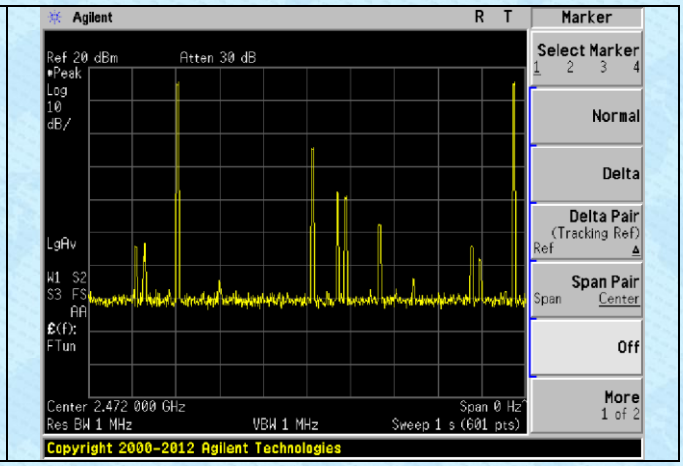

Agilent
R T
Marker
Mkr1 4.167 ms
0.55 dB
Ref 20 dBm
Atten 30 dB
Peak
Log
10
dB/
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Center 2.409 000 GHz
Res BW 1 MHz
VBW 1 MHz
Span 0 Hz
Sweep 50 ms (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Copyright 2000-2012 Agilent Technologies


Agilent
R T
Freq/Channel
Ref 20 dBm
Atten 30 dB
Peak
Log
10
dB/
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Center 2.409 000 GHz
Res BW 1 MHz
VBW 1 MHz
Span 0 Hz
Sweep 1 s (601 pts)
Center Freq
2.40900000 GHz
Start Freq
2.40900000 GHz
Stop Freq
2.40900000 GHz
CF Step
1.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2012 Agilent Technologies


Agilent
R T
Marker
Mkr1 4.167 ms
0.58 dB
Ref 20 dBm
Atten 30 dB
Peak
Log
10
dB/
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Center 2.442 000 GHz
Res BW 1 MHz
VBW 1 MHz
Span 0 Hz
Sweep 50 ms (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Copyright 2000-2012 Agilent Technologies


Agilent
R T
Freq/Channel
Ref 20 dBm
Atten 30 dB
Peak
Log
10
dB/
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Center 2.442 000 GHz
Res BW 1 MHz
VBW 1 MHz
Span 0 Hz
Sweep 1 s (601 pts)
Center Freq
2.44200000 GHz
Start Freq
2.44200000 GHz
Stop Freq
2.44200000 GHz
CF Step
1.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2012 Agilent Technologies


Agilent
R T
Marker
Mkr1 4.167 ms
0.61 dB
Ref 20 dBm
Atten 30 dB
Peak
Log
10
dB/
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Center 2.472 000 GHz
Res BW 1 MHz
VBW 1 MHz
Span 0 Hz
Sweep 50 ms (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Copyright 2000-2012 Agilent Technologies


Agilent
R T
Marker
Ref 20 dBm
Atten 30 dB
Peak
Log
10
dB/
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Center 2.472 000 GHz
Res BW 1 MHz
VBW 1 MHz
Span 0 Hz
Sweep 1 s (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Copyright 2000-2012 Agilent Technologies

6. Unwanted Emissions In Non-restricted Frequency Bands

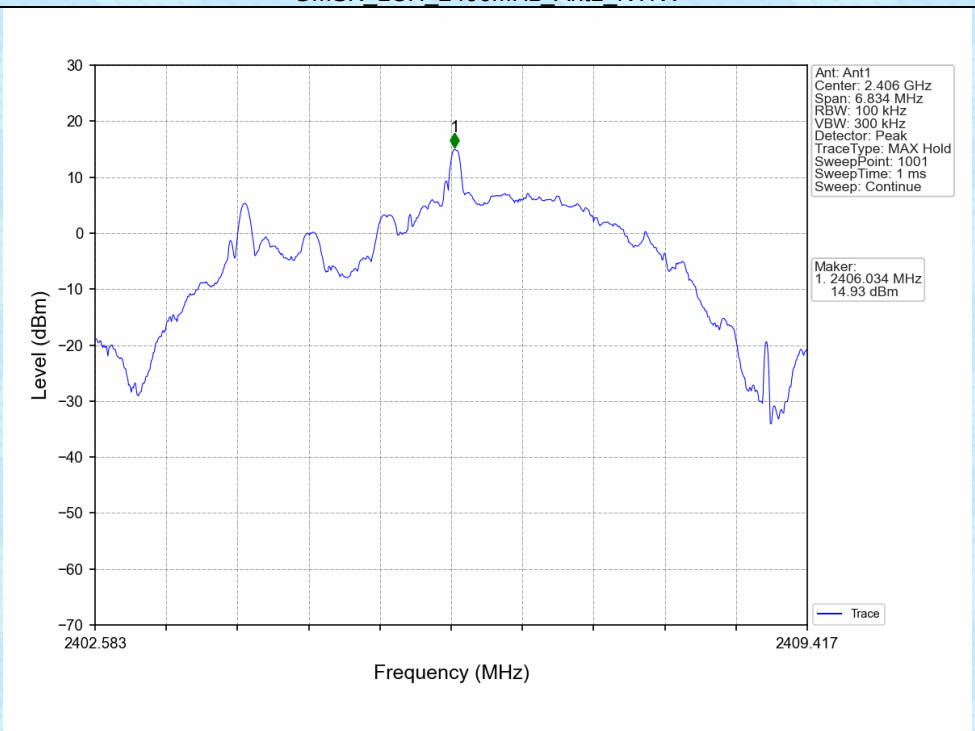
6.1 Ref

6.1.1 Test Result

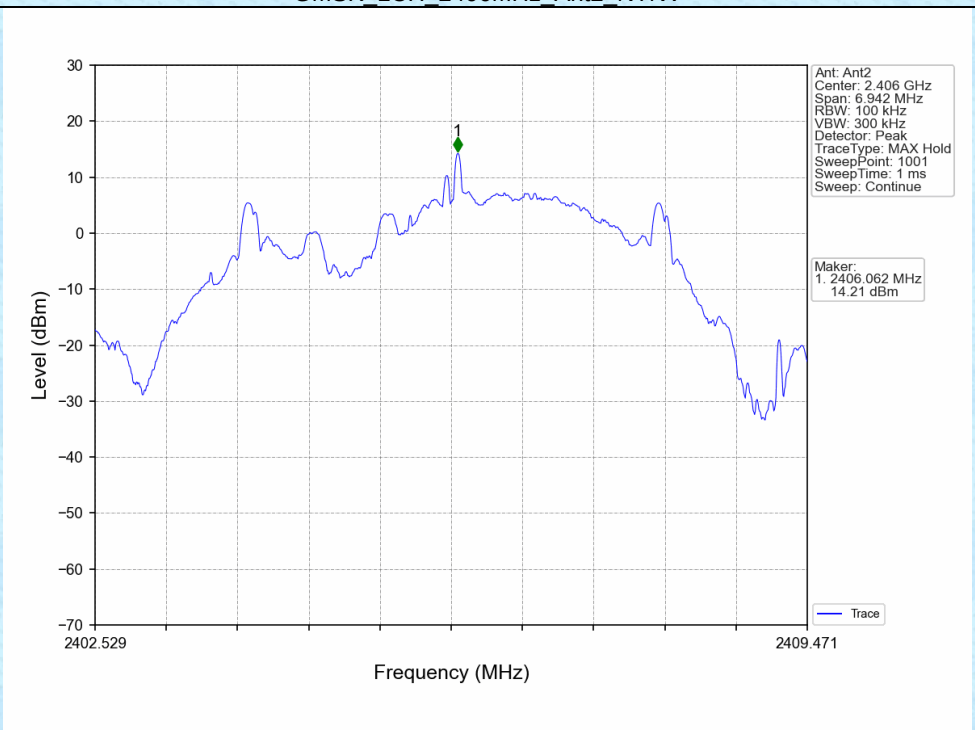
Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
GMSK	SISO	2406	1	14.93
			2	14.21
		2440	1	14.76
			2	15.09
		2472	1	14.49
			2	14.51
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.				

6.1.2 Test Graph

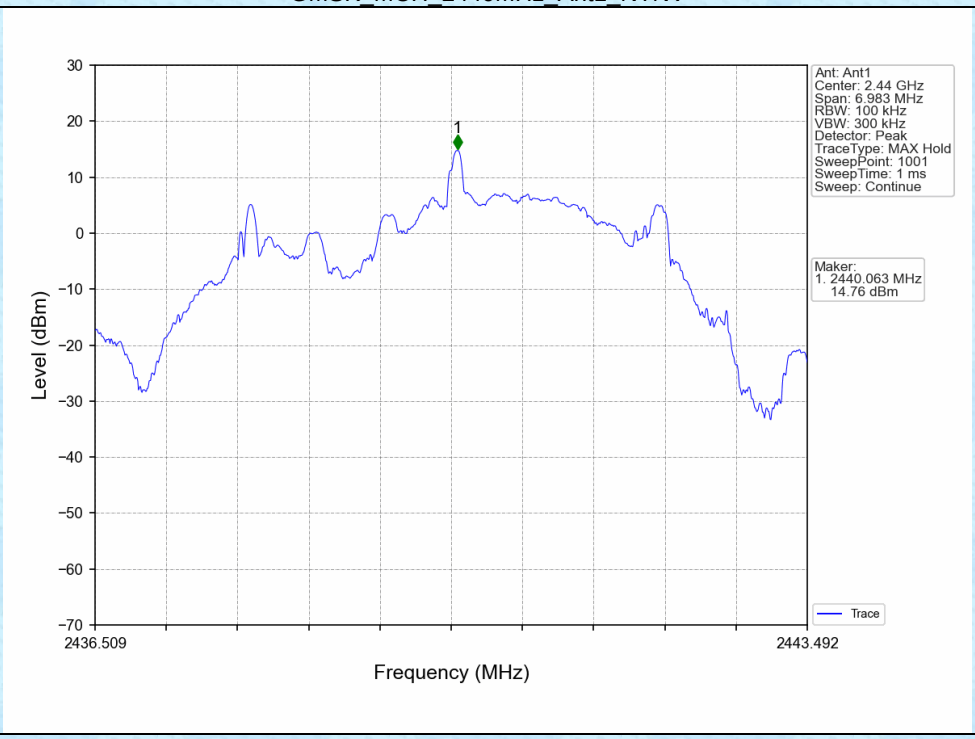
GMSK_LCH_2406MHz_Ant1_NTNV



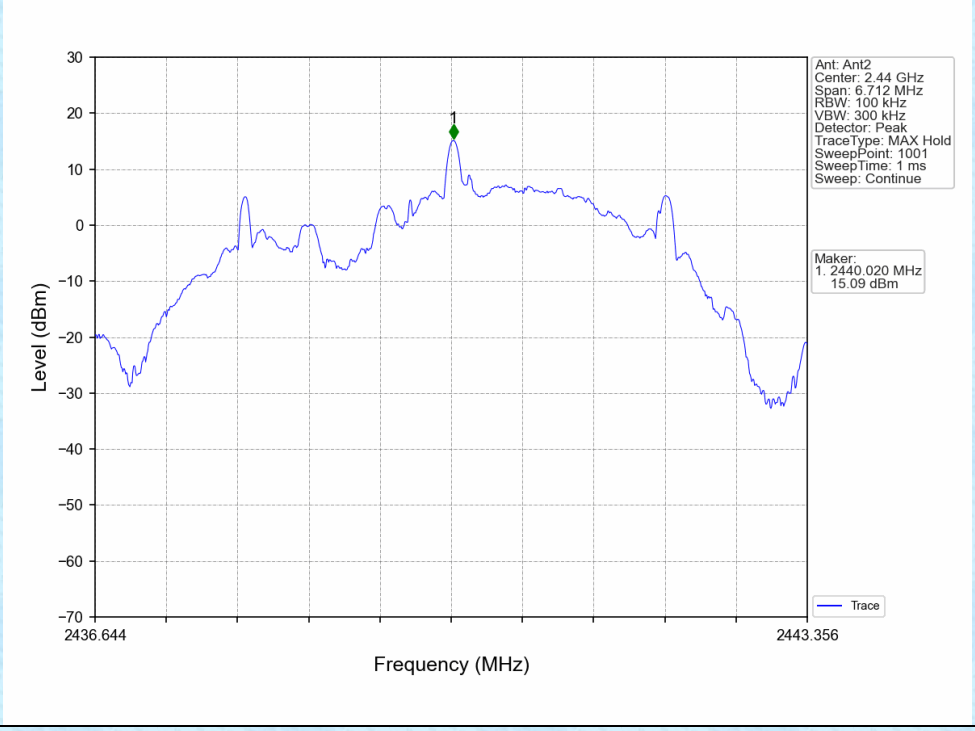
GMSK_LCH_2406MHz_Ant2_NTNV



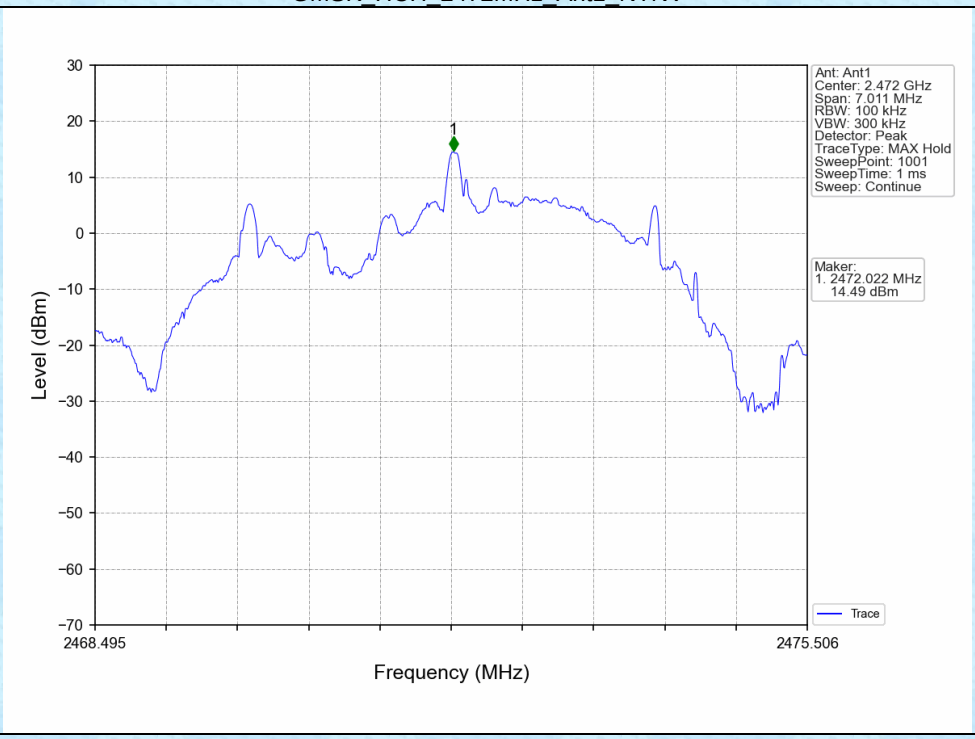
GMSK_MCH_2440MHz_Ant1_NTNV



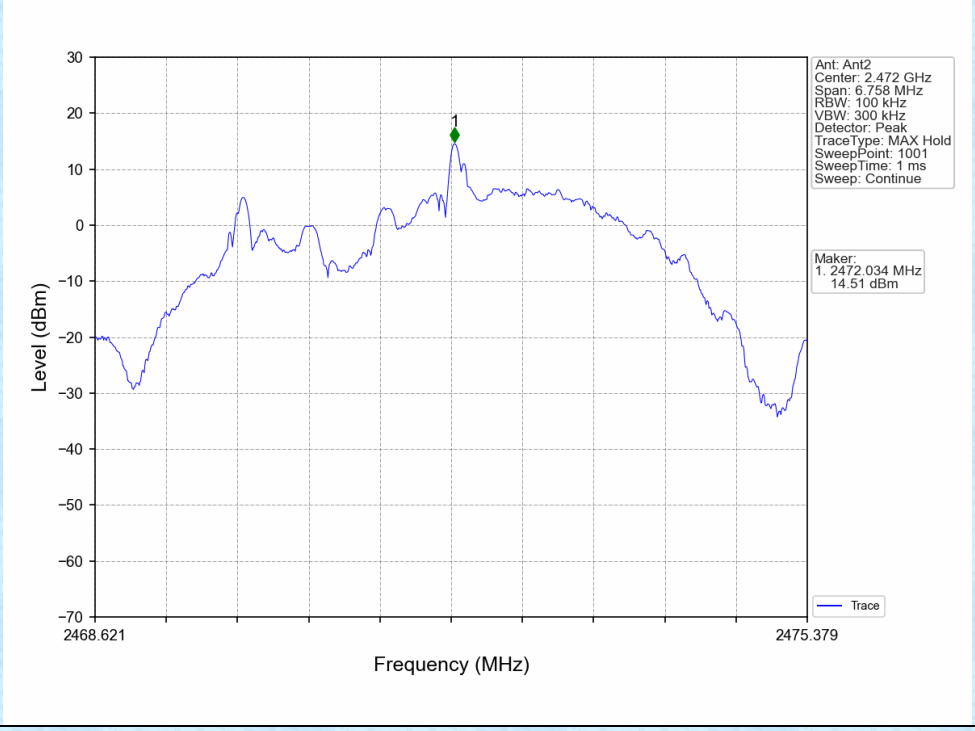
GMSK_MCH_2440MHz_Ant2_NTNV



GMSK_HCH_2472MHz_Ant1_NTNV



GMSK_HCH_2472MHz_Ant2_NTNV



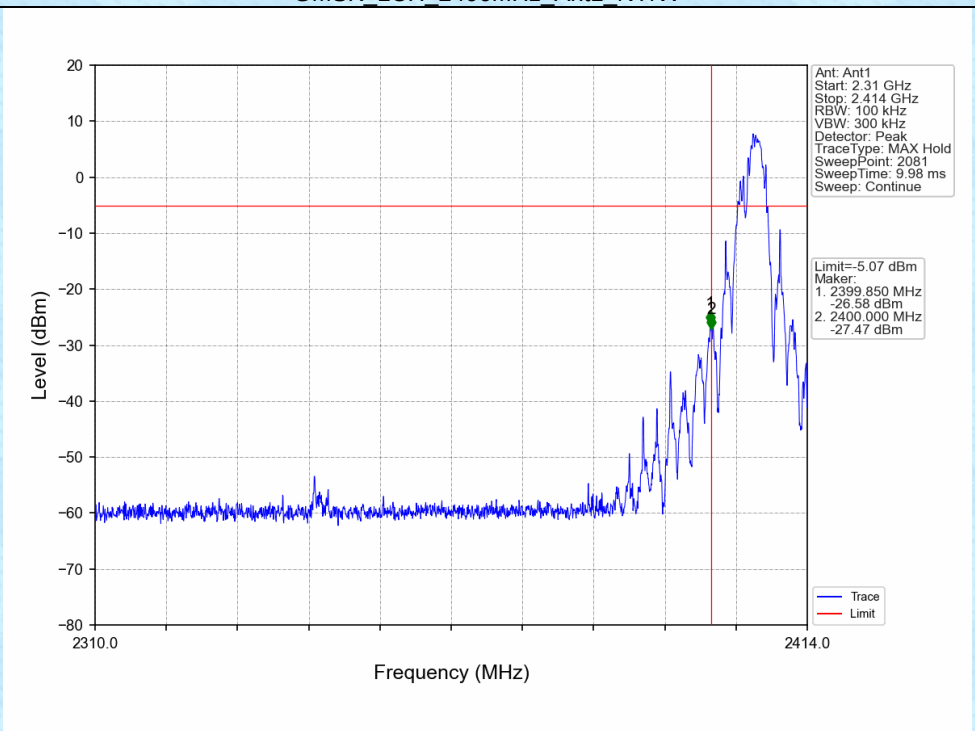
6.2 CSE

6.2.1 Test Result

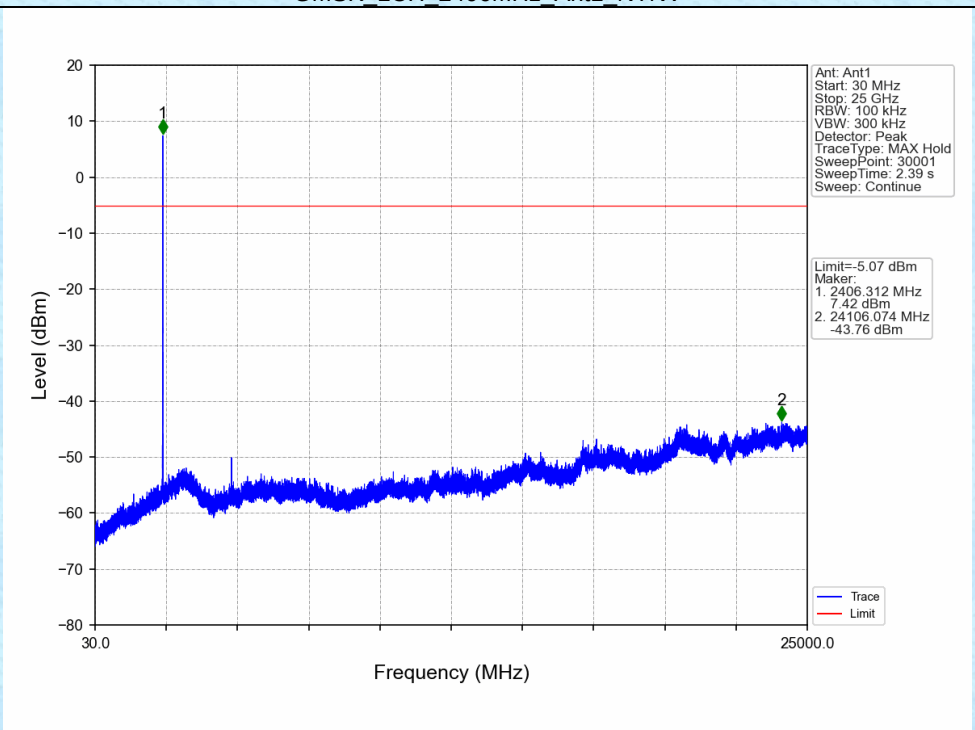
Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
GMSK	SISO	2406	1	14.93	-5.07	Pass
			2	15.09	-4.91	Pass
		2440	1	14.93	-5.07	Pass
			2	15.09	-4.91	Pass
		2472	1	14.93	-5.07	Pass
			2	15.09	-4.91	Pass
		HOPP	1	14.93	-5.07	Pass
			2	15.09	-4.91	Pass
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.						

6.2.2 Test Graph

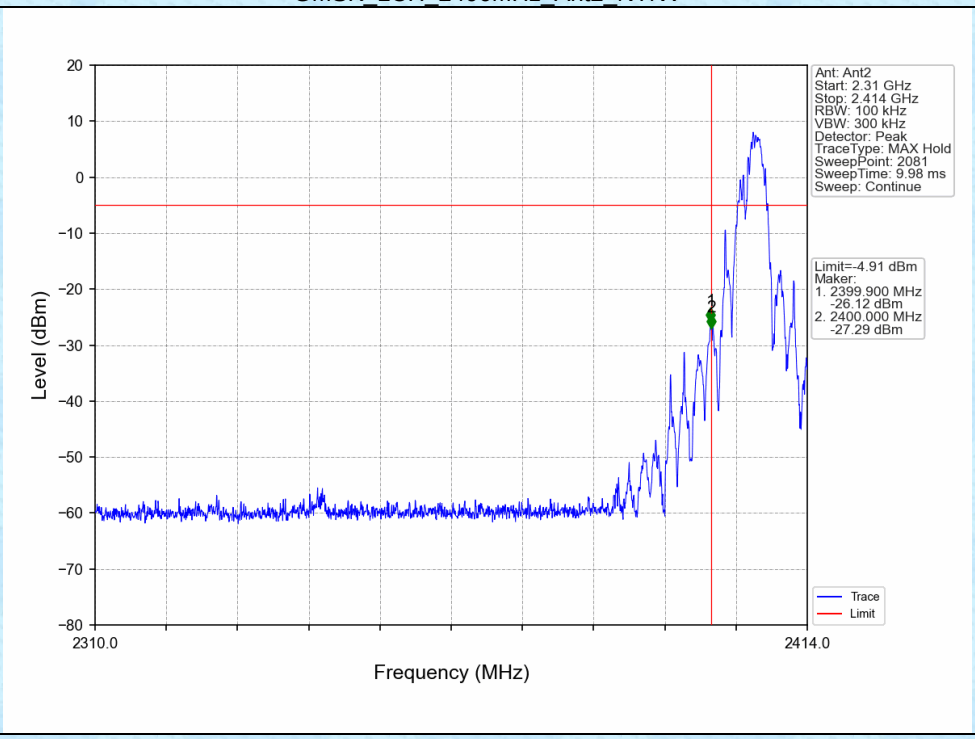
GMSK_LCH_2406MHz_Ant1_NTNV



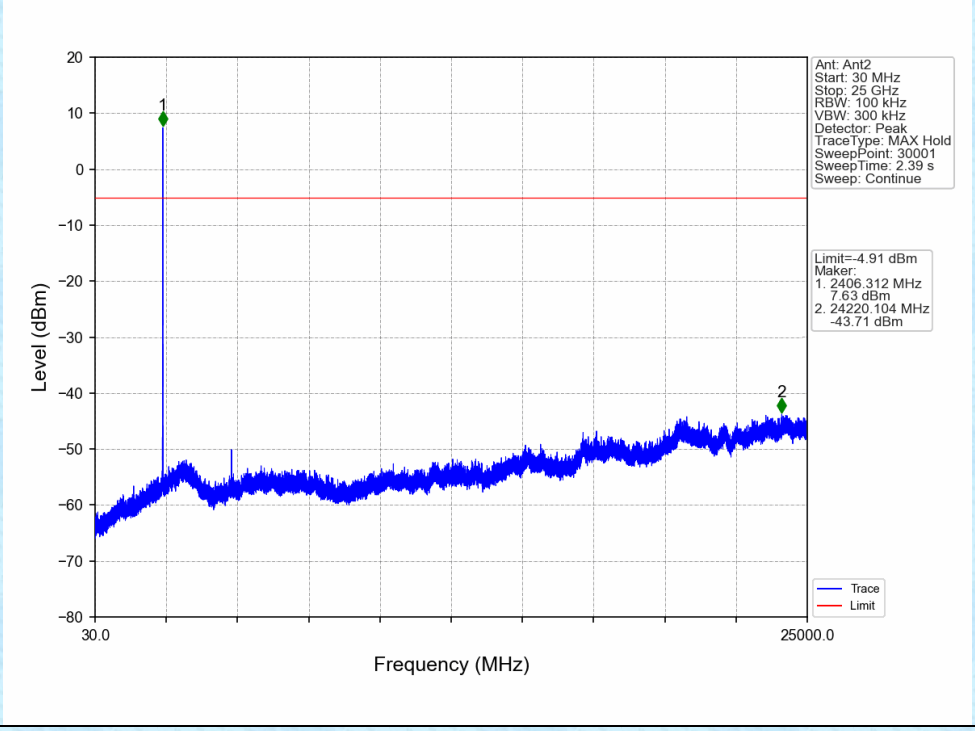
GMSK_LCH_2406MHz_Ant1_NTNV



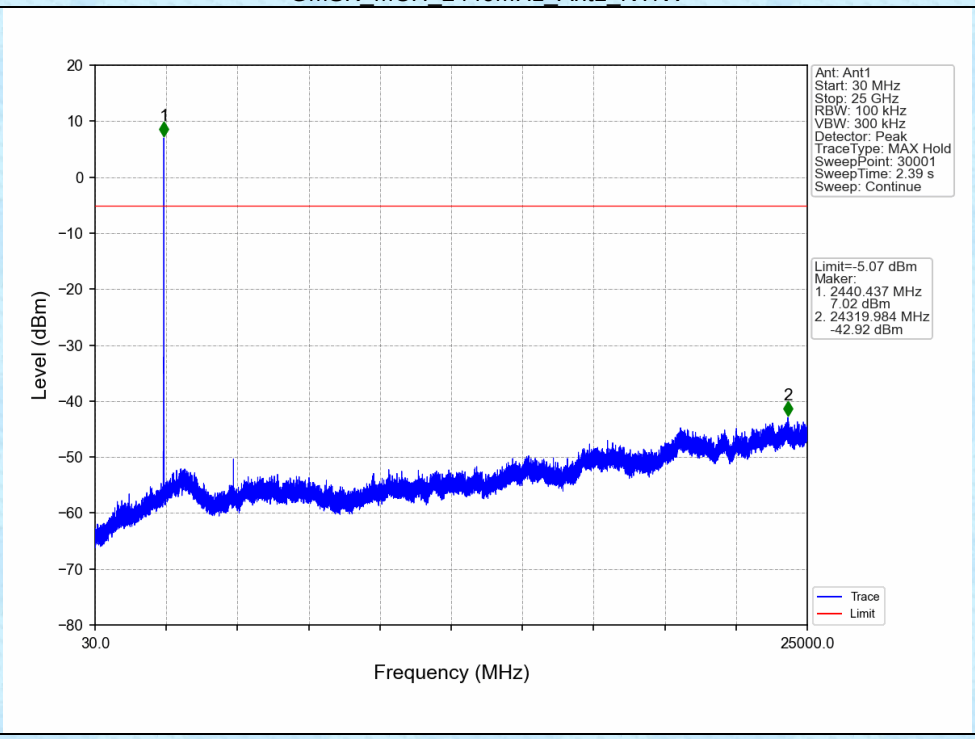
GMSK_LCH_2406MHz_Ant2_NTNV



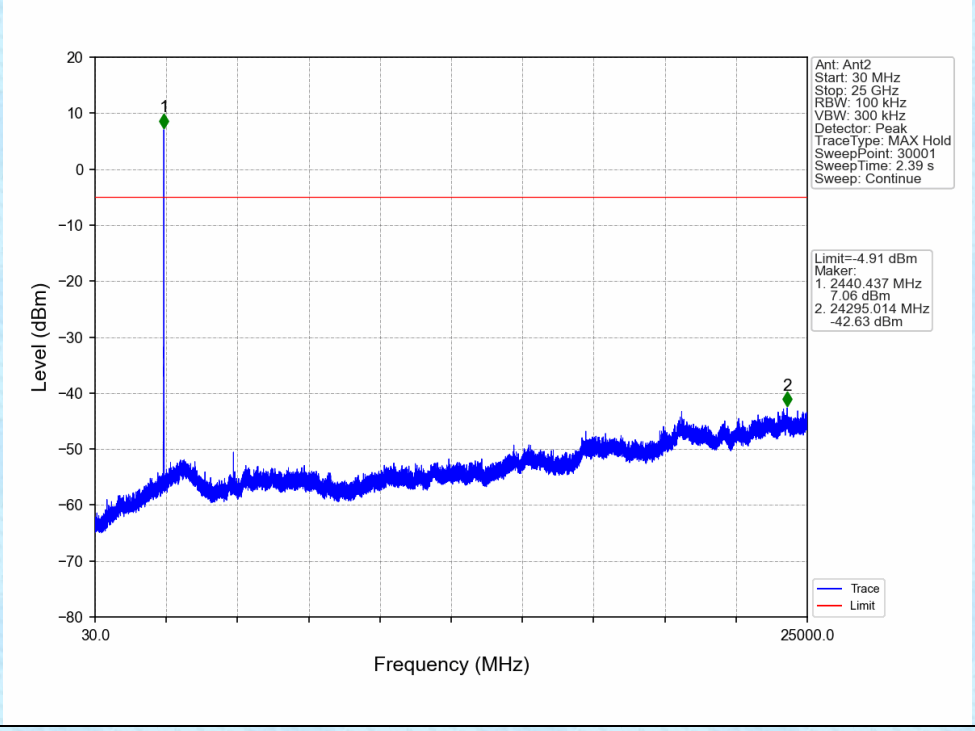
GMSK_LCH_2406MHz_Ant2_NTNV

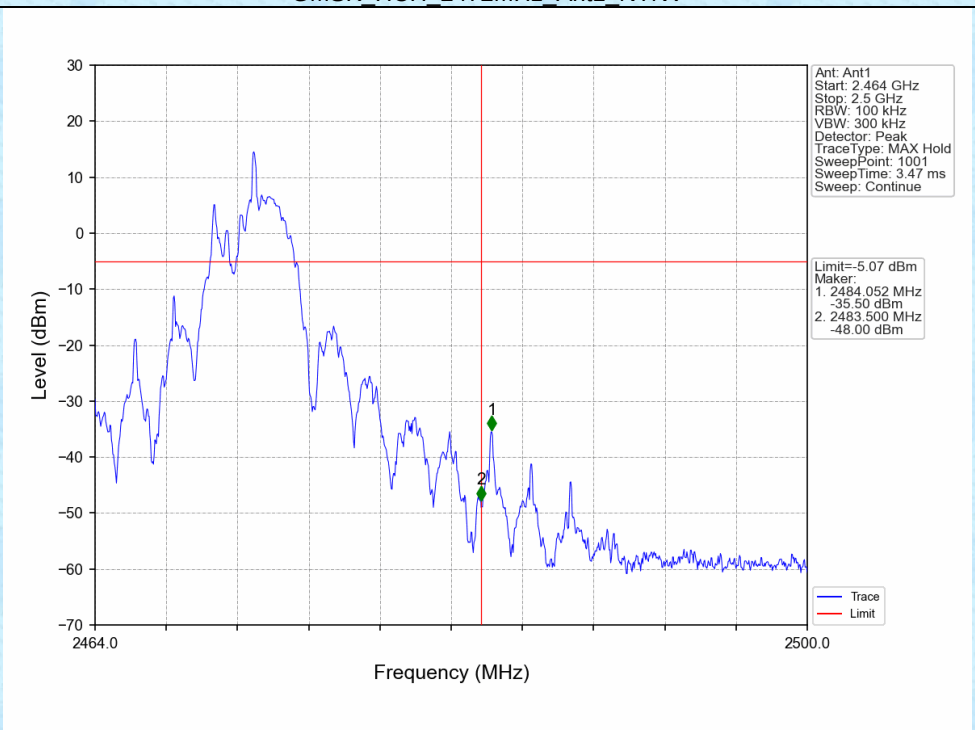
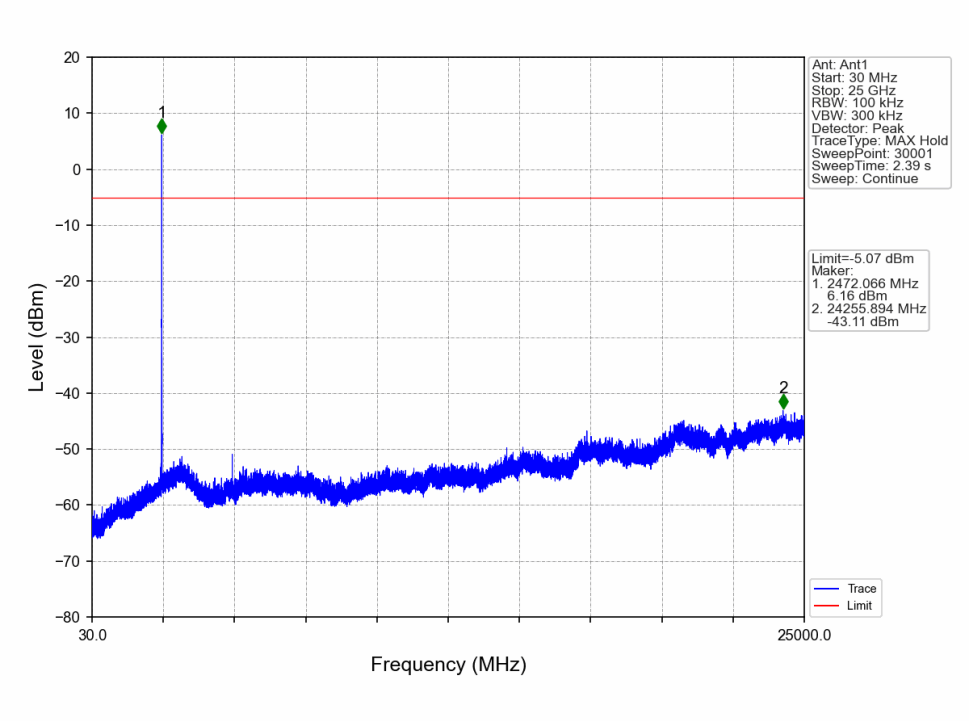


GMSK_MCH_2440MHz_Ant1_NTNV

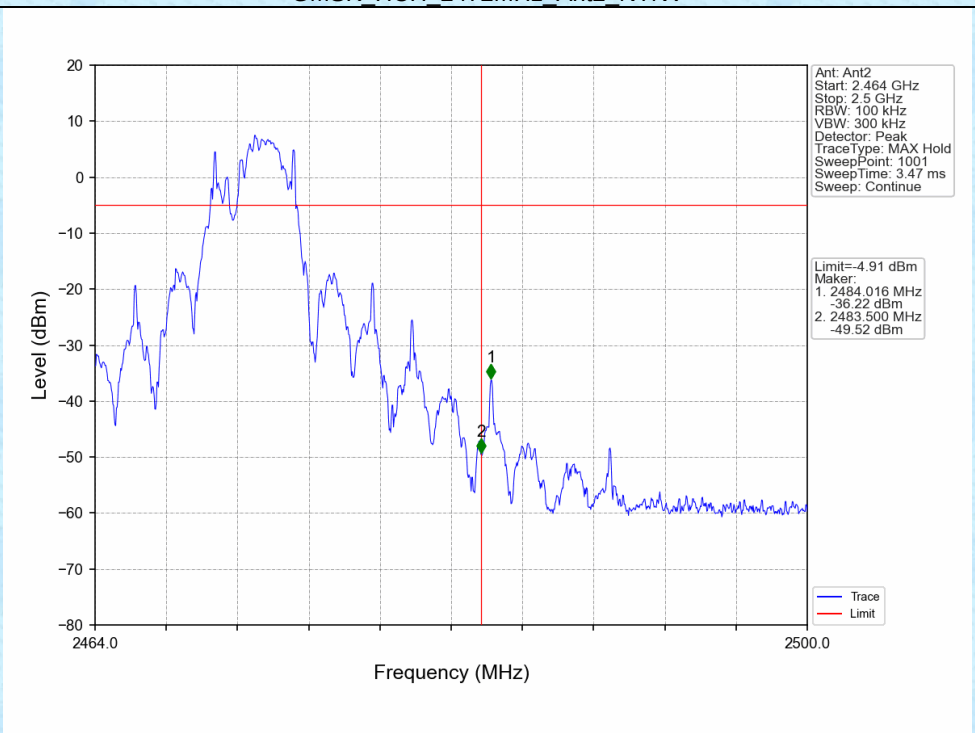


GMSK_MCH_2440MHz_Ant2_NTNV

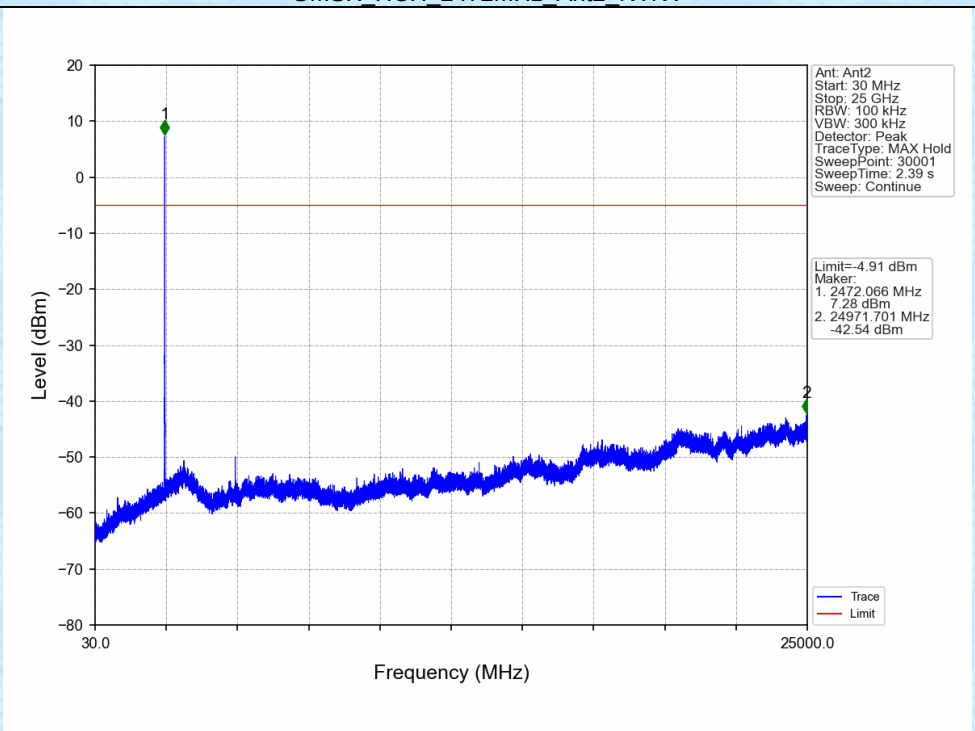


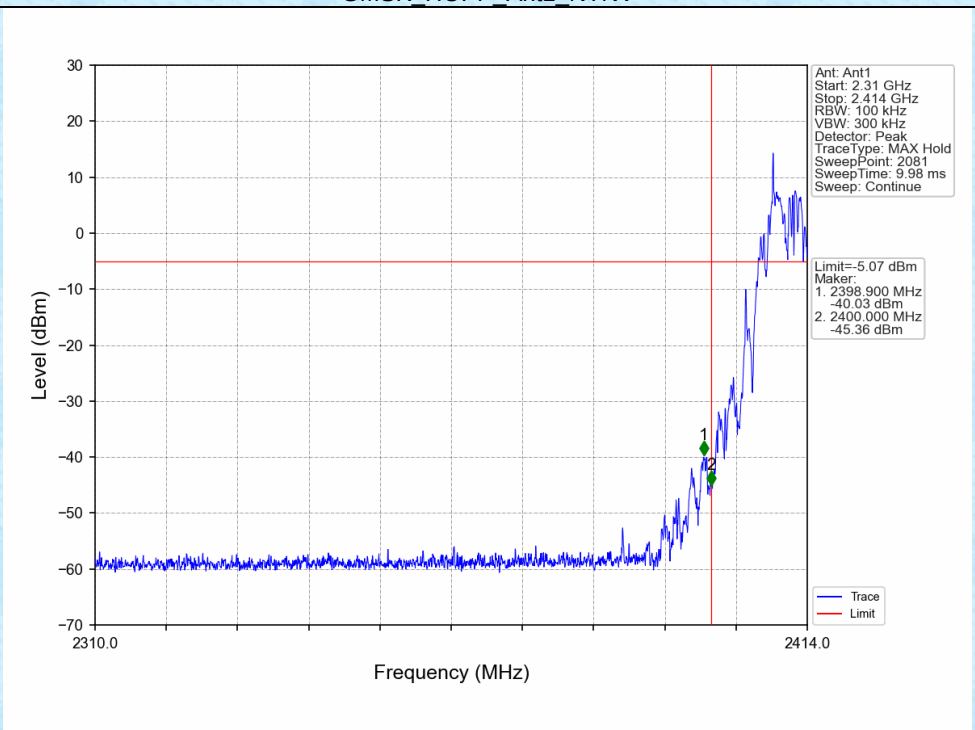
GMSK_HCH_2472MHz_Ant1_NTNV

GMSK_HCH_2472MHz_Ant1_NTNV


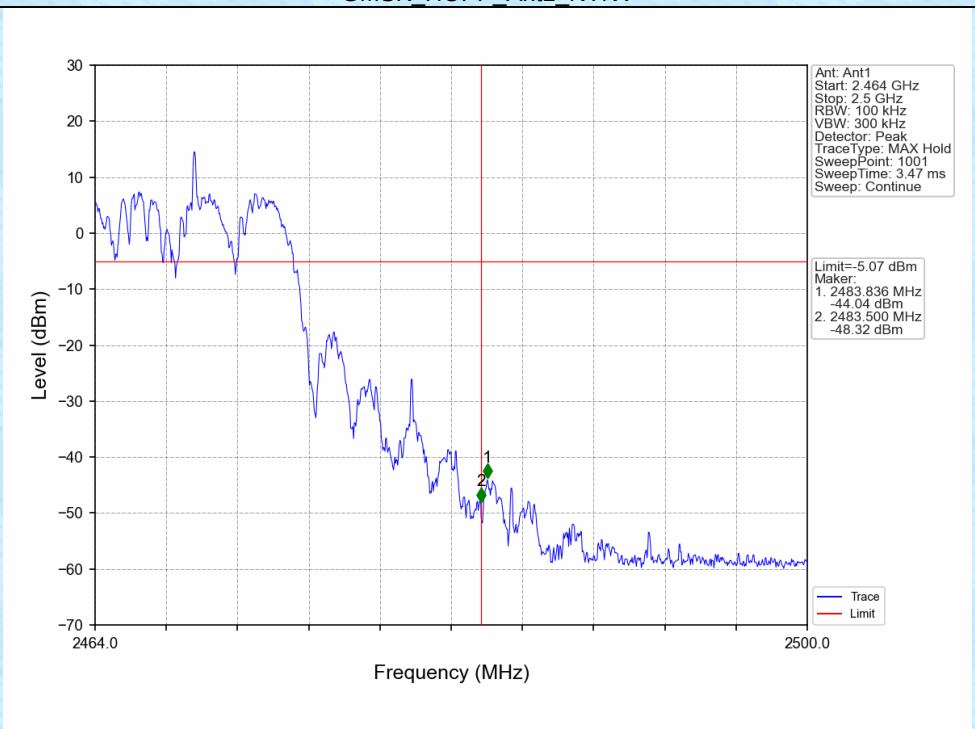
GMSK_HCH_2472MHz_Ant2_NTNV

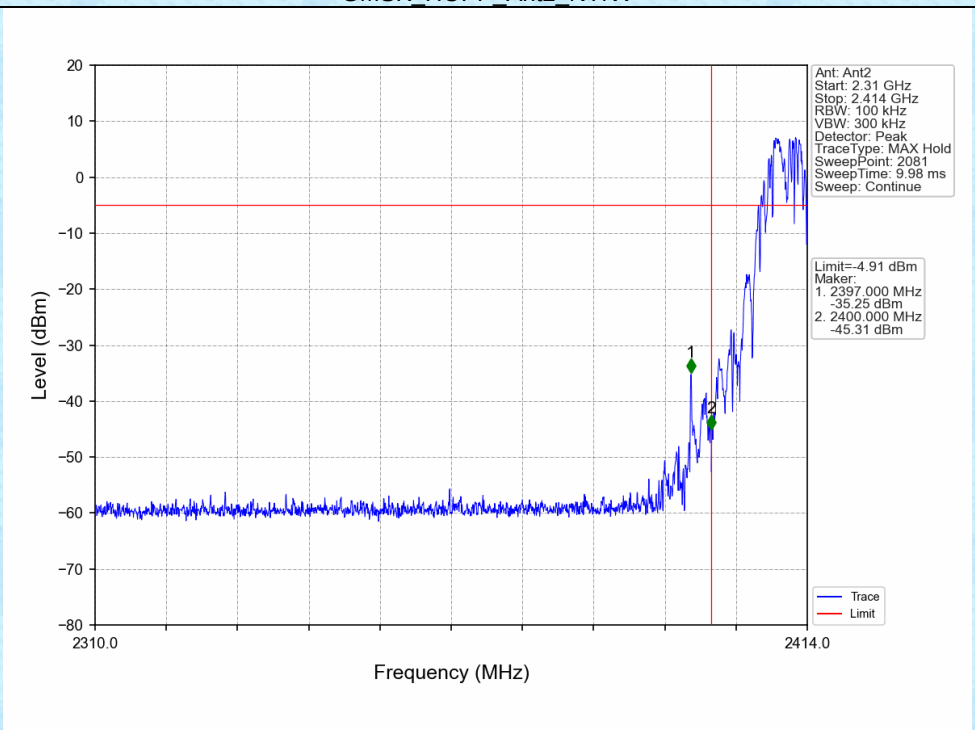
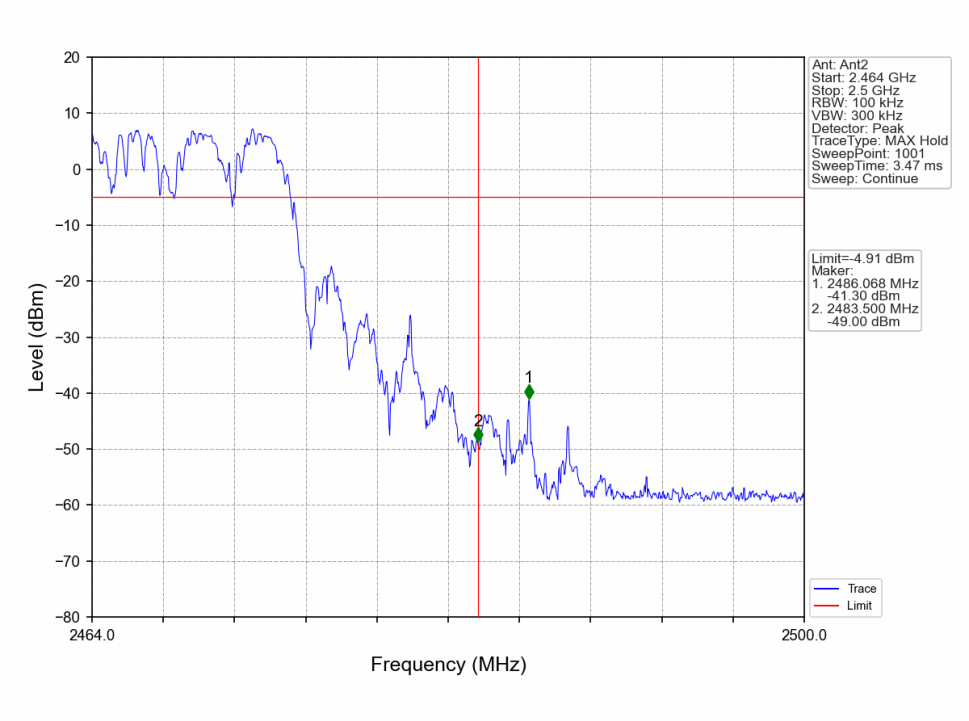


GMSK_HCH_2472MHz_Ant2_NTNV



GMSK_HOPP_Ant1_NTNV


GMSK_HOPP_Ant1_NTNV


GMSK_HOPP_Ant2_NTNV

GMSK_HOPP_Ant2_NTNV


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