9.6.5 Test Results

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

Reference level measurement

TestMode	Antenna	Freq(MHz)	Max.Point[MHz]	Result[dBm]
DH5	Ant1	2402	2402.01	-1.96
		2441	2441.01	-0.97
		2480	2480.02	-0.99
2DH5	Ant1	2402	2401.99	-2.41
		2441	2441.17	-0.84
		2480	2479.97	-1.27
3DH5	Ant1	2402	2401.87	-1.05
		2441	2440.85	-0.85
		2480	2479.99	-1.19

Band edge measurements

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	-1.96	-46.81	≤-21.96	PASS
		High	2480	-0.99	-47.69	≤-20.99	PASS
		Low	Hop_2402	-2.64	-47.38	≤-22.64	PASS
		High	Hop_2480	-0.96	-47.04	≤-20.96	PASS
2DH5	Ant1	Low	2402	-2.41	-49.46	≤-22.41	PASS
		High	2480	-1.27	-50.14	≤-21.27	PASS
3DH5	Ant1	Low	2402	-1.05	-47.77	≤-21.05	PASS
		High	2480	-1.19	-48.86	≤-21.19	PASS

the hopping worst case is DH5 mode

Conducted Spurious Emission

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	30~1000	-1.96	-74.18	≤-21.96	PASS
			1000~26500	-1.96	-42.63	≤-21.96	PASS
		2441	30~1000	-0.97	-75.78	≤-20.97	PASS
			1000~26500	-0.97	-42.33	≤-20.97	PASS
		2480	30~1000	-0.99	-73.02	≤-20.99	PASS
			1000~26500	-0.99	-42.05	≤-20.99	PASS
2DH5	Ant1	2402	30~1000	-2.41	-74.59	≤-22.41	PASS
			1000~26500	-2.41	-44.18	≤-22.41	PASS
		2441	30~1000	-0.84	-75.87	≤-20.84	PASS
			1000~26500	-0.84	-44.16	≤-20.84	PASS
		2480	30~1000	-1.27	-72.14	≤-21.27	PASS
			1000~26500	-1.27	-44.03	≤-21.27	PASS
3DH5	Ant1	2402	30~1000	-1.05	-72.91	≤-21.05	PASS
			1000~26500	-1.05	-42.18	≤-21.05	PASS
		2441	30~1000	-0.85	-73.86	≤-20.85	PASS
			1000~26500	-0.85	-43.33	≤-20.85	PASS
		2480	30~1000	-1.19	-73.73	≤-21.19	PASS
			1000~26500	-1.19	-43.09	≤-21.19	PASS

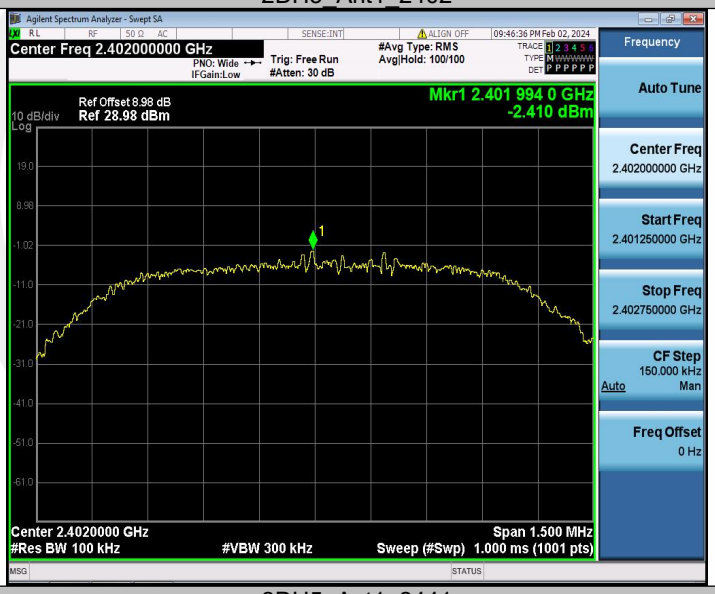
Reference level measurement

DH5_Ant1_2402

DH5_Ant1_2441

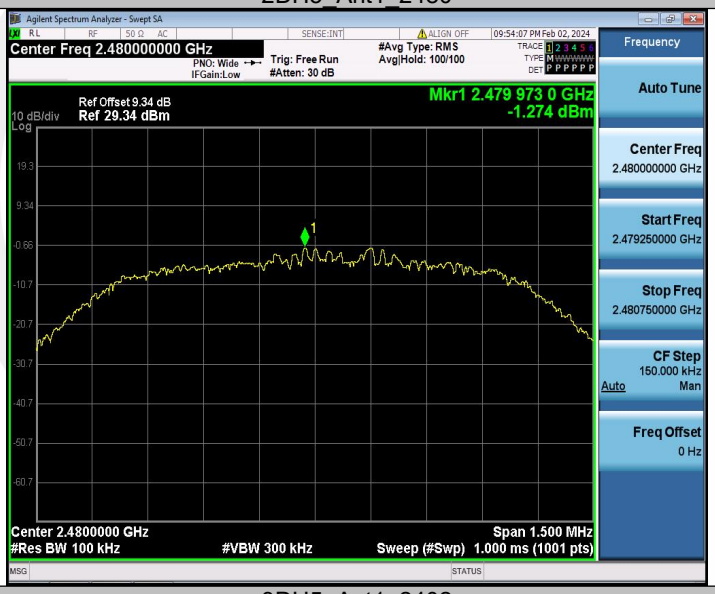
DH5_Ant1_2480

2DH5_Ant1_2402



2DH5_Ant1_2441

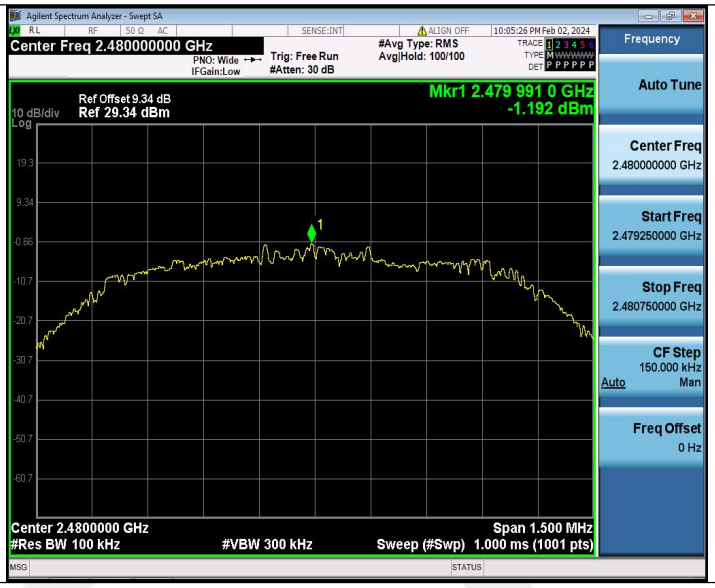
2DH5_Ant1_2480



3DH5_Ant1_2402

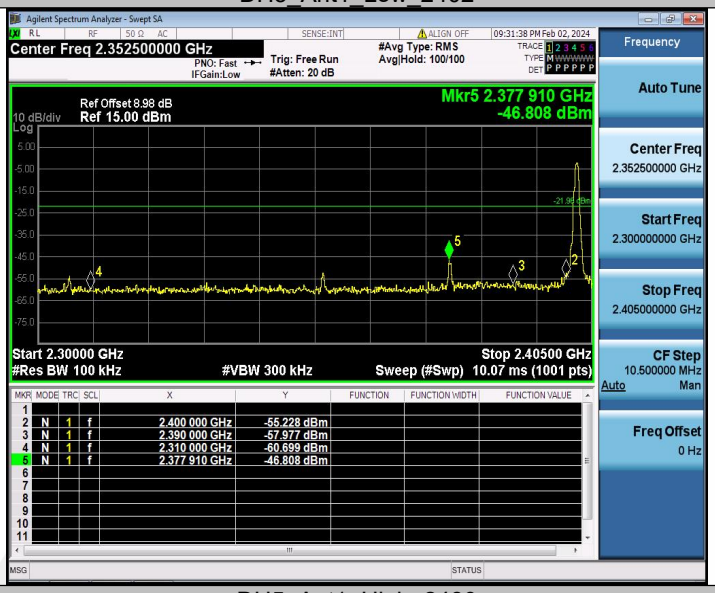
3DH5_Ant1_2441

3DH5_Ant1_2480

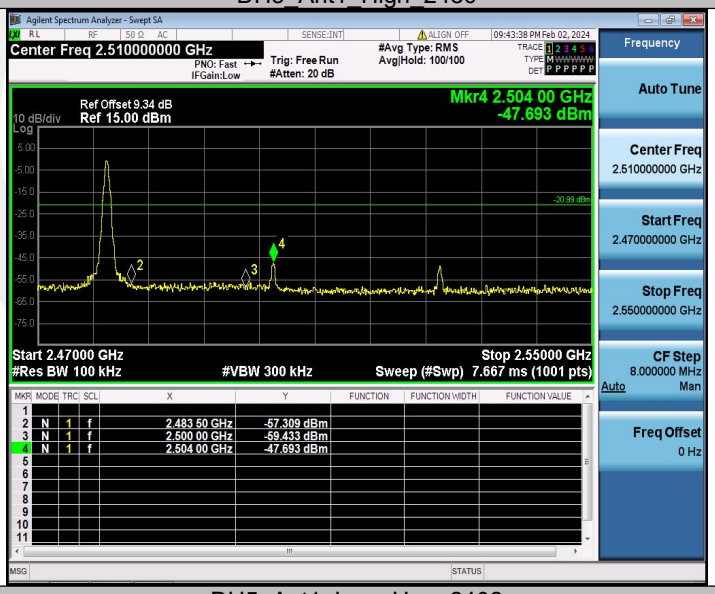

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 100/100
10:05:26 PM Feb 02, 2024
Ref Offset 9.34 dB
10 dB/div
Ref 29.34 dBm
Log
Mkr1 2.479 991 0 GHz
-1.192 dBm
Center 2.4800000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 1.500 MHz
Sweep (#Swp) 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.479250000 GHz
Stop Freq
2.480750000 GHz
CF Step
150.000 kHz
Auto
Man
Freq Offset
0 Hz

Band edge measurements

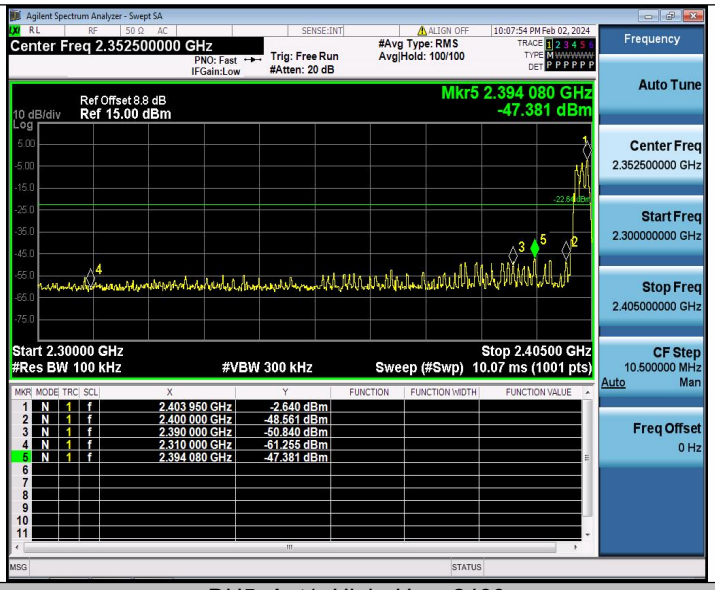
DH5_Ant1_Low_2402



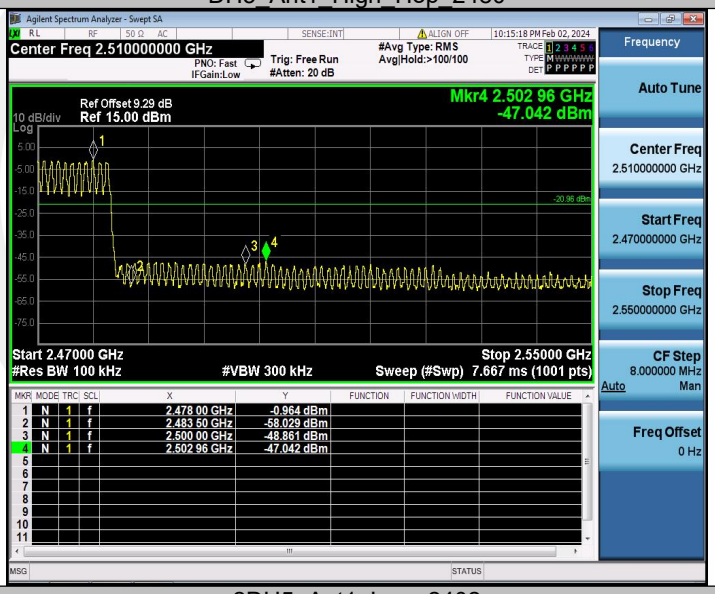
DH5_Ant1_High_2480



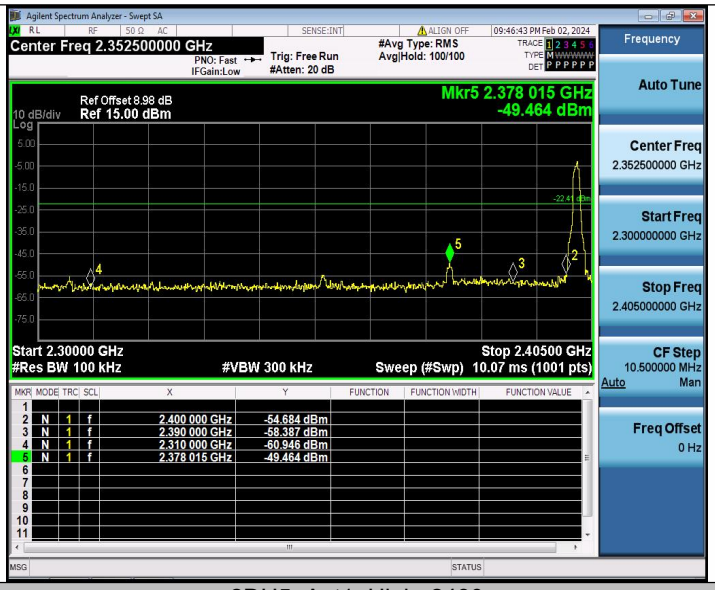
DH5_Ant1_Low_Hop_2402



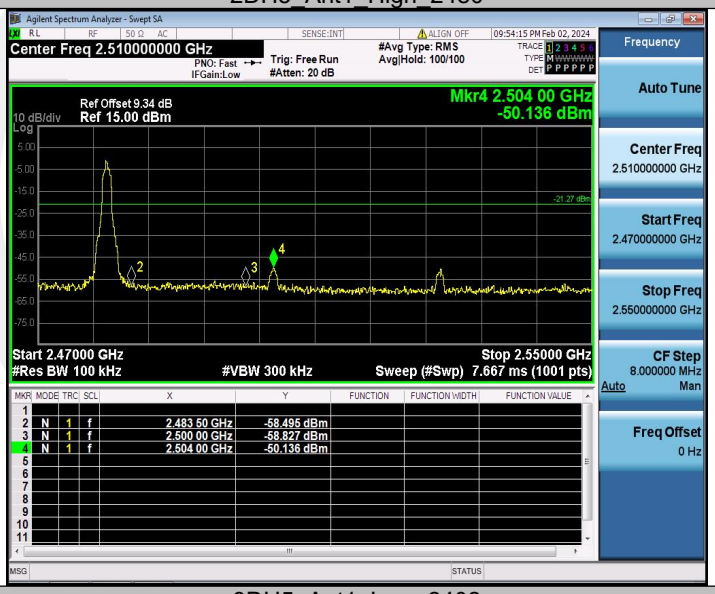
DH5_Ant1_High_Hop_2480



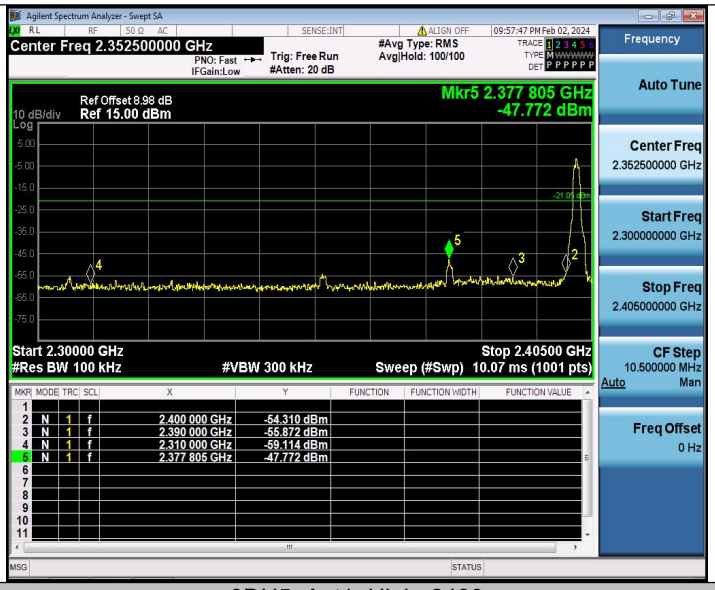
2DH5_Ant1_Low_2402



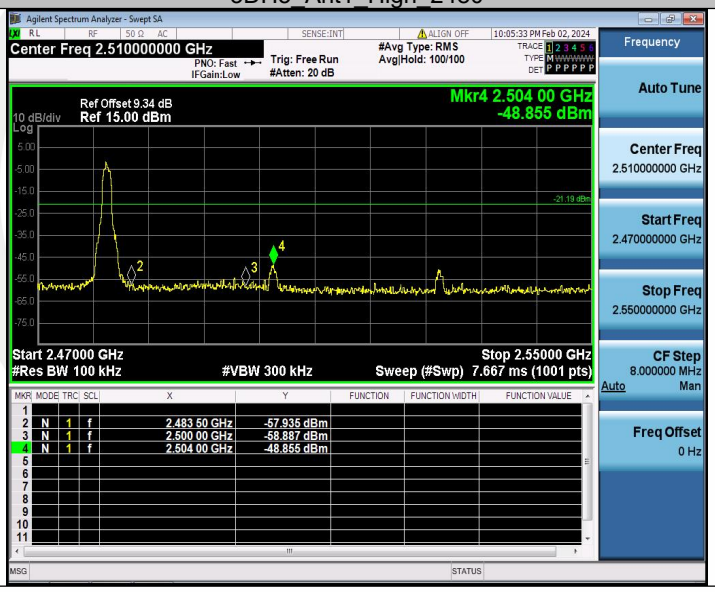
2DH5_Ant1_High_2480



3DH5_Ant1_Low_2402

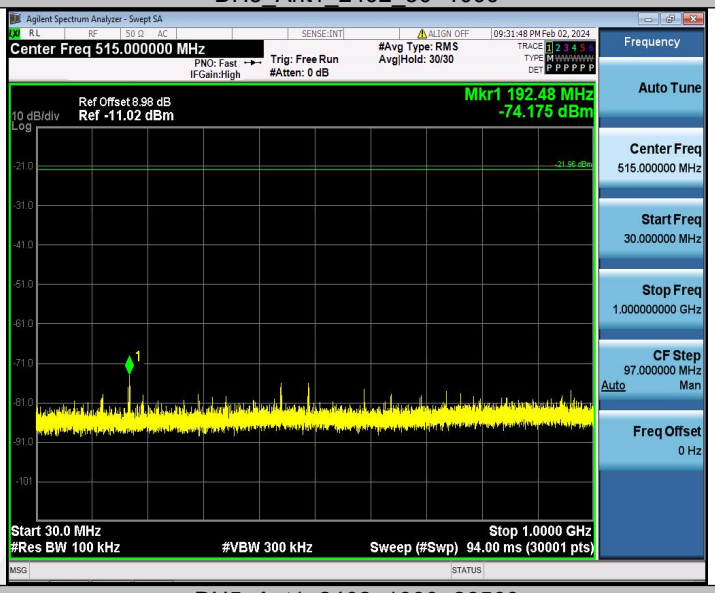


3DH5_Ant1_High_2480

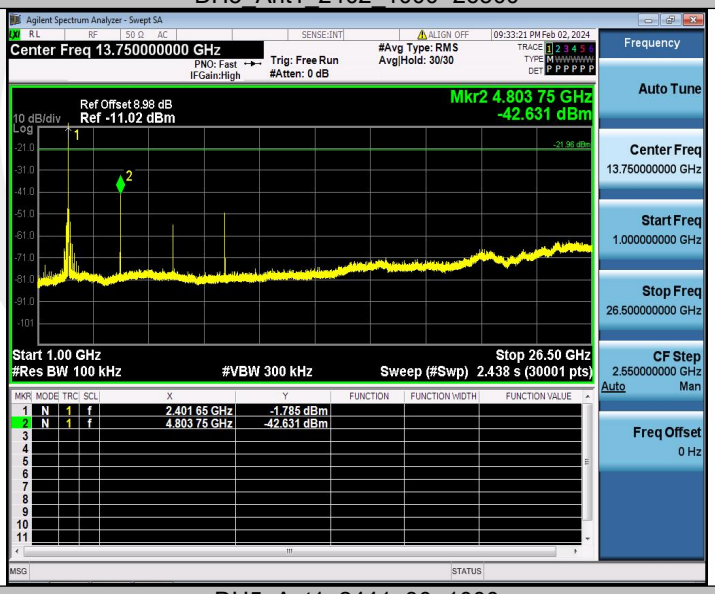


Conducted Spurious Emission

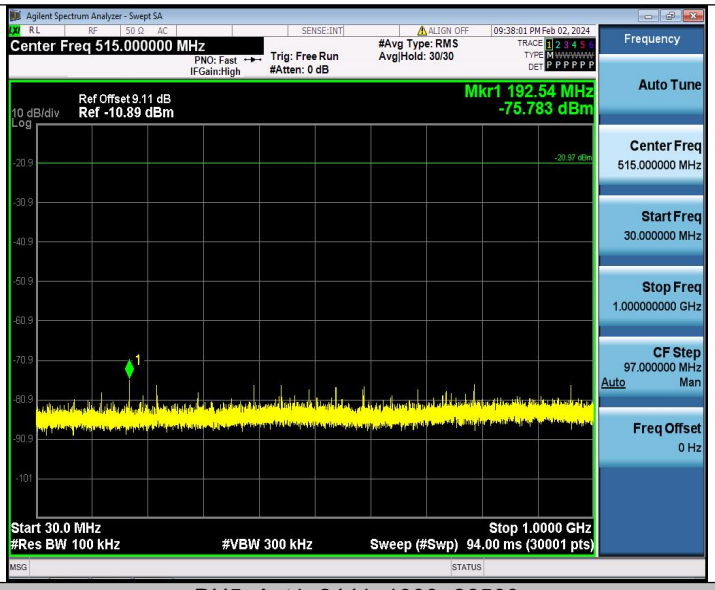
DH5_Ant1_2402_30~1000



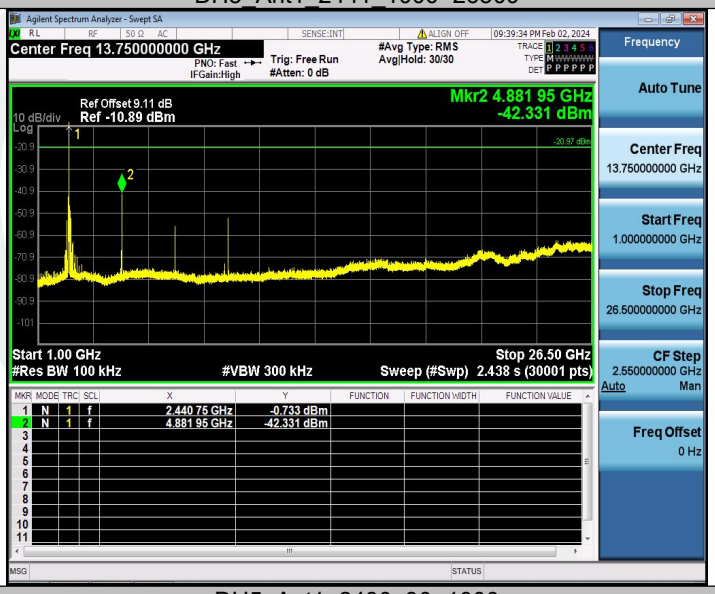
DH5_Ant1_2402_1000~26500



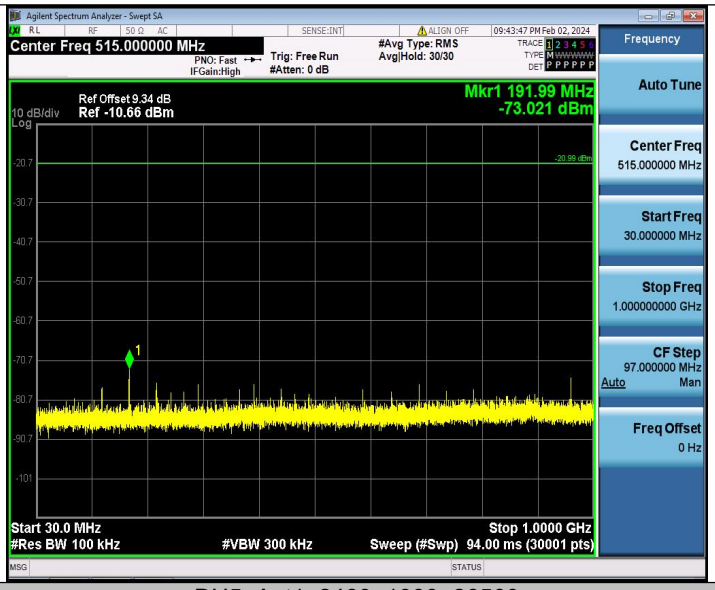
DH5_Ant1_2441_30~1000



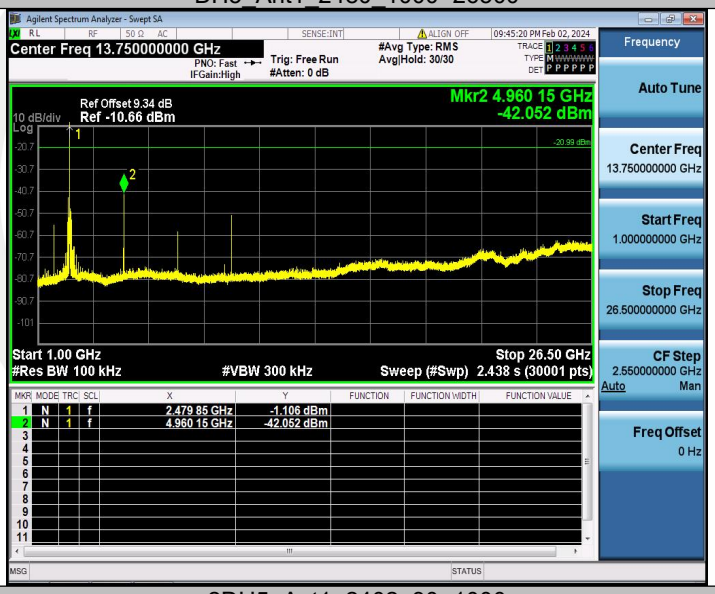
DH5_Ant1_2441_1000~26500



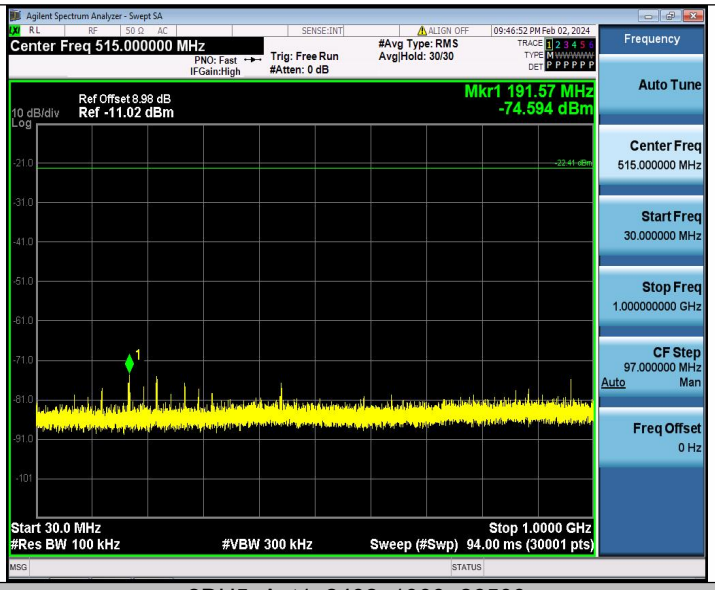
DH5_Ant1_2480_30~1000



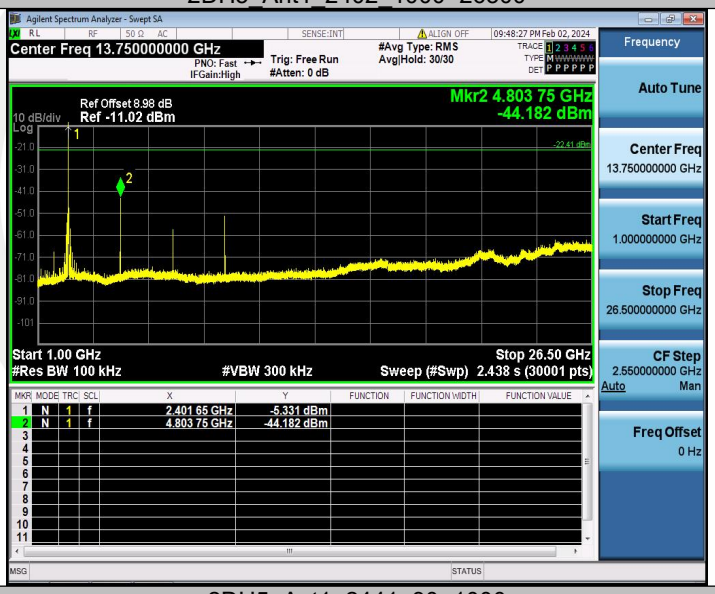
DH5_Ant1_2480_1000~26500



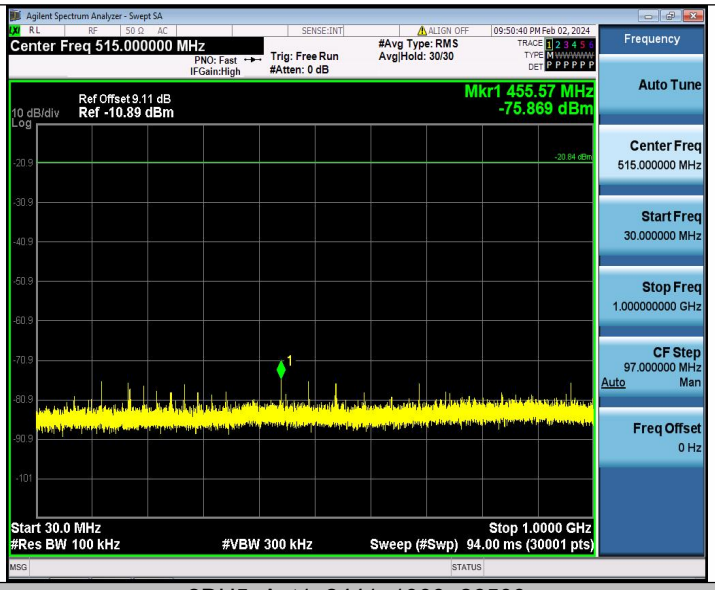
2DH5_Ant1_2402_30~1000



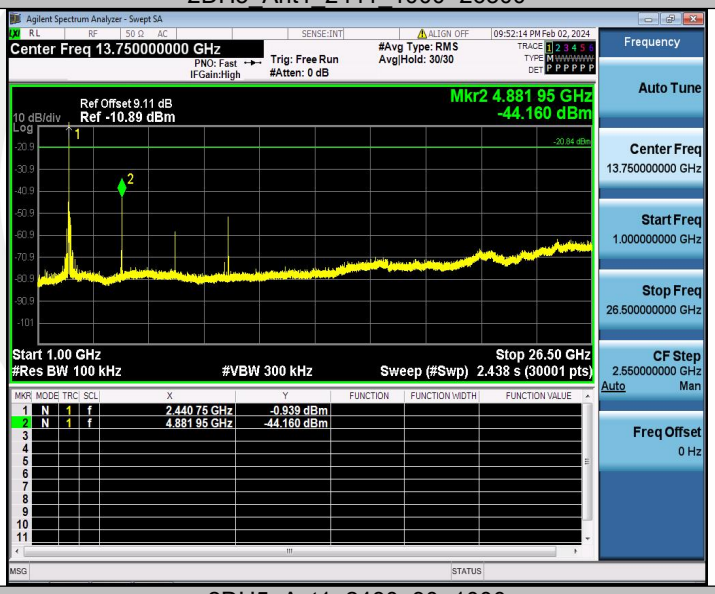
2DH5_Ant1_2402_1000~26500



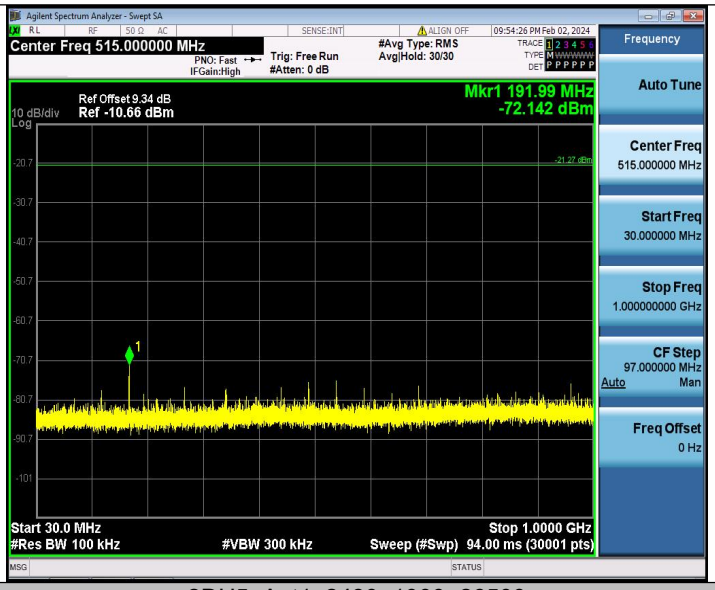
2DH5_Ant1_2441_30~1000



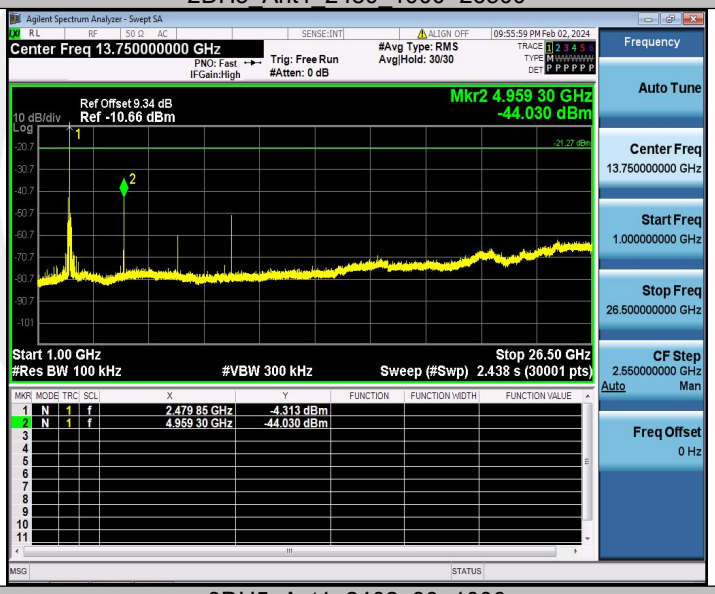
2DH5_Ant1_2441_1000~26500



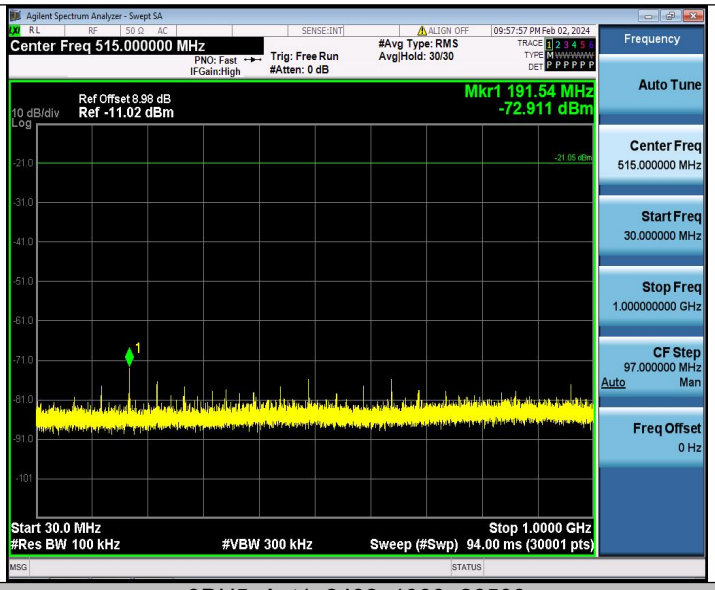
2DH5_Ant1_2480_30~1000



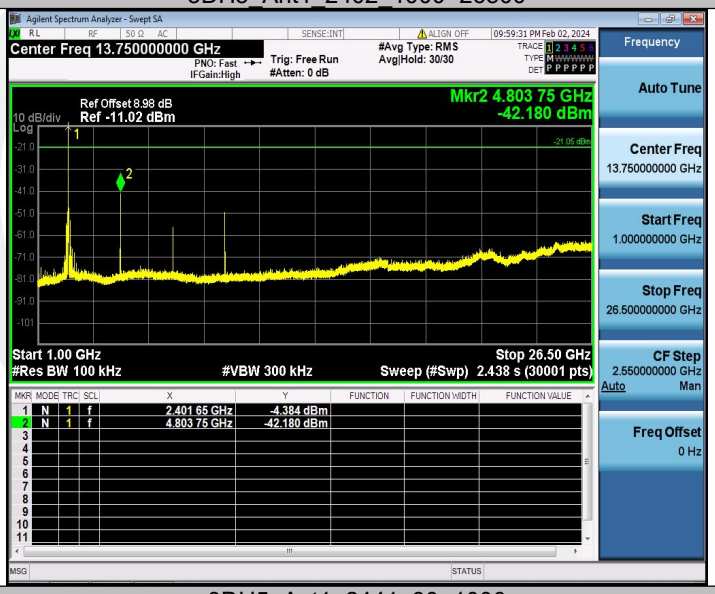
2DH5_Ant1_2480_1000~26500



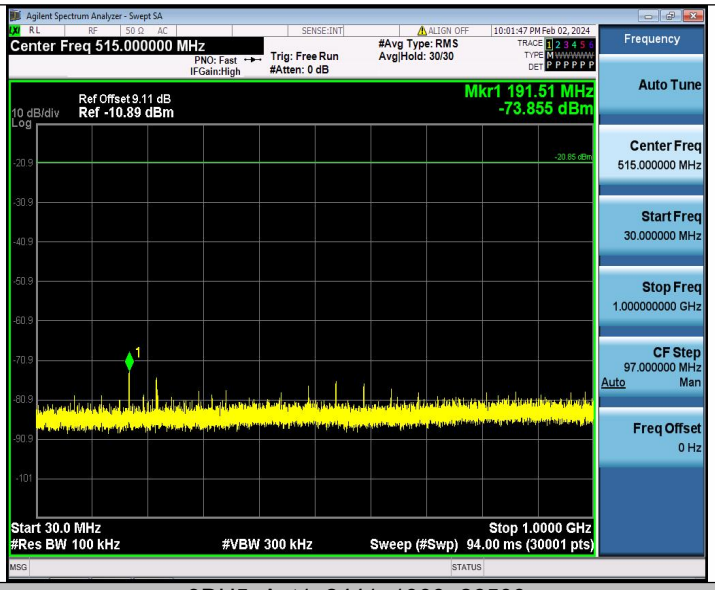
3DH5_Ant1_2402_30~1000



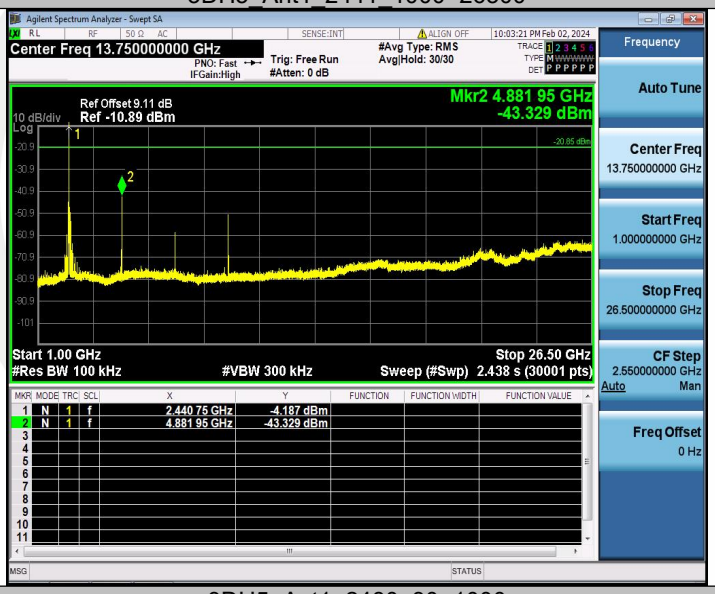
3DH5_Ant1_2402_1000~26500



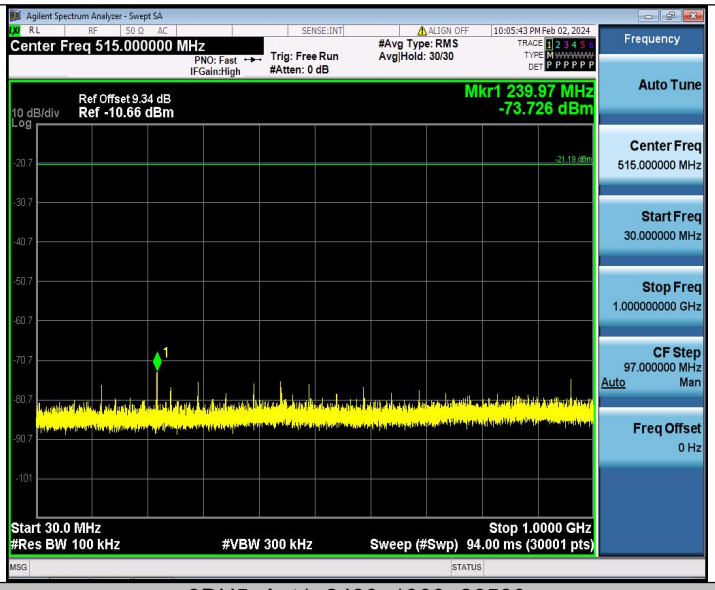
3DH5_Ant1_2441_30~1000



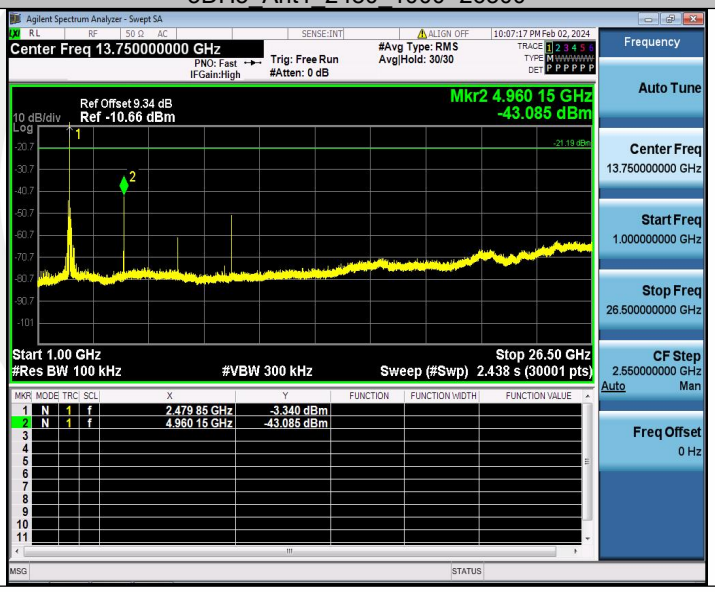
3DH5_Ant1_2441_1000~26500



3DH5_Ant1_2480_30~1000



3DH5_Ant1_2480_1000~26500



9.7 RADIATED SPURIOUS EMISSION

9.7.1 Applicable Standard

According to FCC Part 15.247(d) and 15.209 and FCC KDB 558074 D01 15.247 Meas Guidance v05r02

9.7.2 Conformance Limit

According to FCC Part 15.247(d): 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)).
According to FCC Part15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

According to FCC Part15.205,the level of any transmitter spurious emission in Restricted bands shall not exceed the level of the emission specified in the following table

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009-0.490	2400/F(KHz)	20 log (uV/m)	300
0.490-1.705	2400/F(KHz)	20 log (uV/m)	30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

9.7.3 Test Configuration

Test according to clause 7.2 radio frequency test setup 2

9.7.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:
The EUT was placed on a turn table which is 0.8m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz(1GHz to 25GHz), 100 kHz for f < 1 GHz(30MHz to 1GHz)

VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Follow the guidelines in ANSI C63.10-2013 respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.
Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from 20log(dwell time/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.
Repeat above procedures until all frequency measured was complete.

9.7.5 Test Results

■ Spurious Emission below 30MHz(9KHz to 30MHz)

Temperature:	25℃	Test Date:	February 7, 2024
Humidity:	60 %	Test By:	KK
Test mode:	GFSK		

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
	H/V	PK	AV	PK	AV	PK	AV
--	--	--	--	--	--	--	--

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor

■ Spurious Emission Above 1GHz(1GHz to 25GHz)
Bluetooth (GFSK, pi/4-DQPSK, 8DPSK) mode have been tested, and the worst result(AC 120V/60Hz) was report as below:

Temperature:	25℃	Test Date:	February 7, 2024
Humidity:	60 %	Test By:	KK
Test mode:	GFSK	Frequency:	Channel 0: 2402MHz

Freq. [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity	Pass/Fail
11484.375	60.42	74	13.58	PK	Vertical	Pass
14617.5	62.61	74	11.39	PK	Vertical	Pass
17604.375	67.32	74	6.68	PK	Vertical	Pass
11484.375	42.23	54	11.77	AV	Vertical	Pass
14617.5	44.53	54	9.47	AV	Vertical	Pass
17604.375	46.67	54	7.33	AV	Vertical	Pass
11456.25	60.29	74	13.71	PK	Horizontal	Pass
14636.25	62.53	74	11.47	PK	Horizontal	Pass
17608.125	66.57	74	7.43	PK	Horizontal	Pass
11456.25	41.83	54	12.17	AV	Horizontal	Pass
14636.25	44.05	54	9.95	AV	Horizontal	Pass
17608.125	46.04	54	7.96	AV	Horizontal	Pass

Note:
(1) All Readings are Peak Value (VBW=3MHz) and Average Value (VBW=10Hz).
(2) Emission Level= Reading Level+Correct Factor.
(3) Correct Factor= Ant_F + Cab_L - Preamp
(4) Margin = Limit - Emission Level
(5)The reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.