9.6 CONDUCTED SUPRIOUS EMISSION

Applicable Standard

According to FCC Part 15.247(d) and 558074 D01 15.247 Meas Guidance V05r02

Conformance Limit

According to FCC Part 15.247(d):
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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, provided the transmitter demonstrates compliance with the peak conducted power limits.

Test Configuration

Test according to clause 7.1 radio frequency test setup 1

Test Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer

- **Reference level measurement**

Establish a reference level by using the following procedure:
Set instrument center frequency to DSS channel center frequency.
Set Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel.
Set the RBW = 100 kHz. Set the VBW ≥ 3 x RBW.
Set Detector = peak. Set Sweep time = auto couple.
Set Trace mode = max hold. Allow trace to fully stabilize.
Use the peak marker function to determine the maximum Maximumconducetedlevel.
Note that the channel found to contain the maximum conduceted level can be used to establish the reference level.

- **Band-edge Compliance of RF Conducted Emissions**

Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation
Set RBW ≥ 1% of the span=100kHzSet VBW ≥ RBW
Set Sweep = autoSetDetector function = peakSetTrace = max hold
Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. The marker-delta value now displayed must comply with the limit specified in this Section.
Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

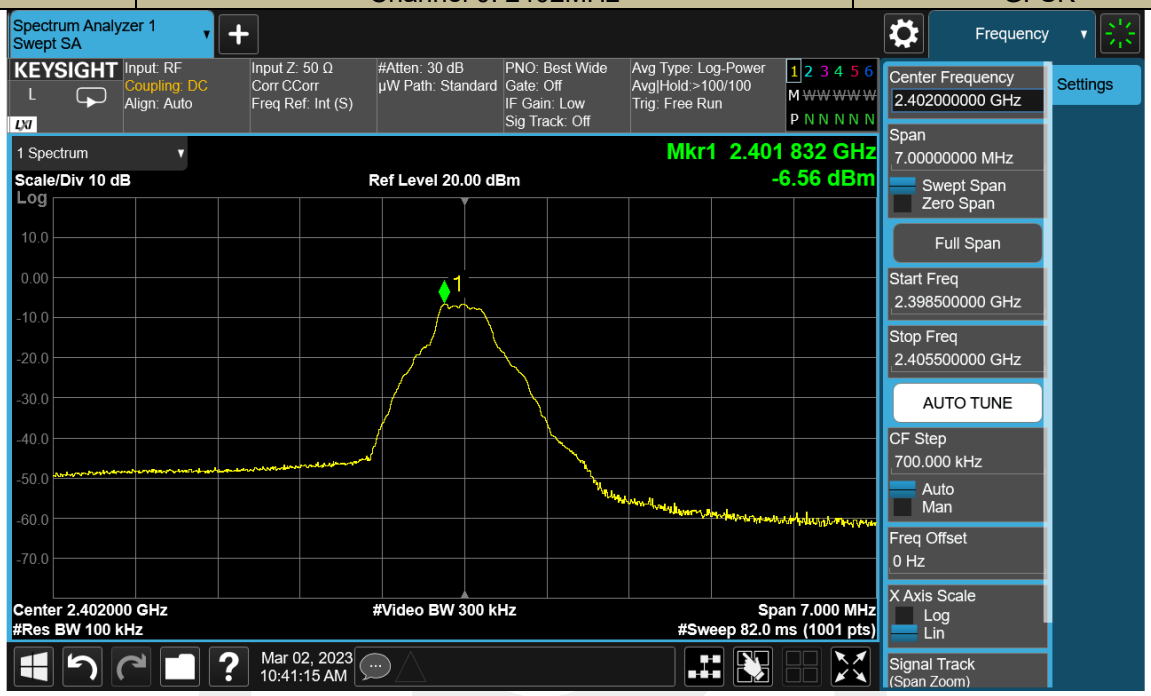
- **ConducetedSpurious RF Conducted Emission**

Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic.(30MHz to 25GHz).Set RBW = 100 kHzSetVBW≥ RBW
Set Sweep = autoSetDetector function = peakSetTrace = max hold
Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this Section.

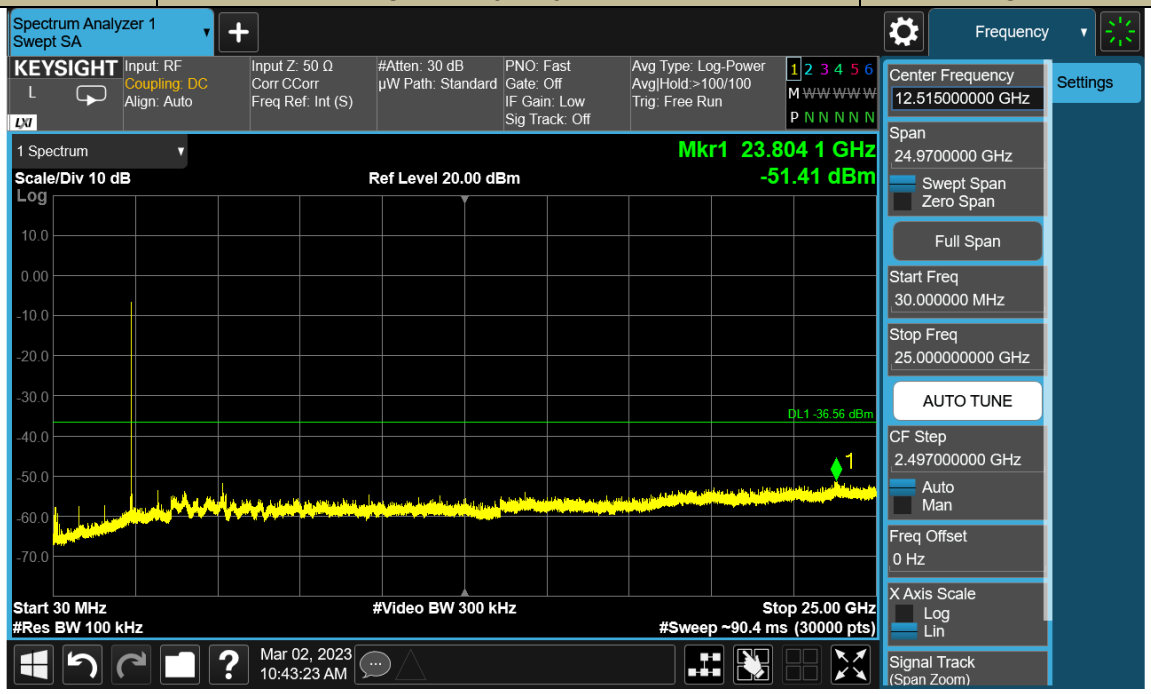
Test Results

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

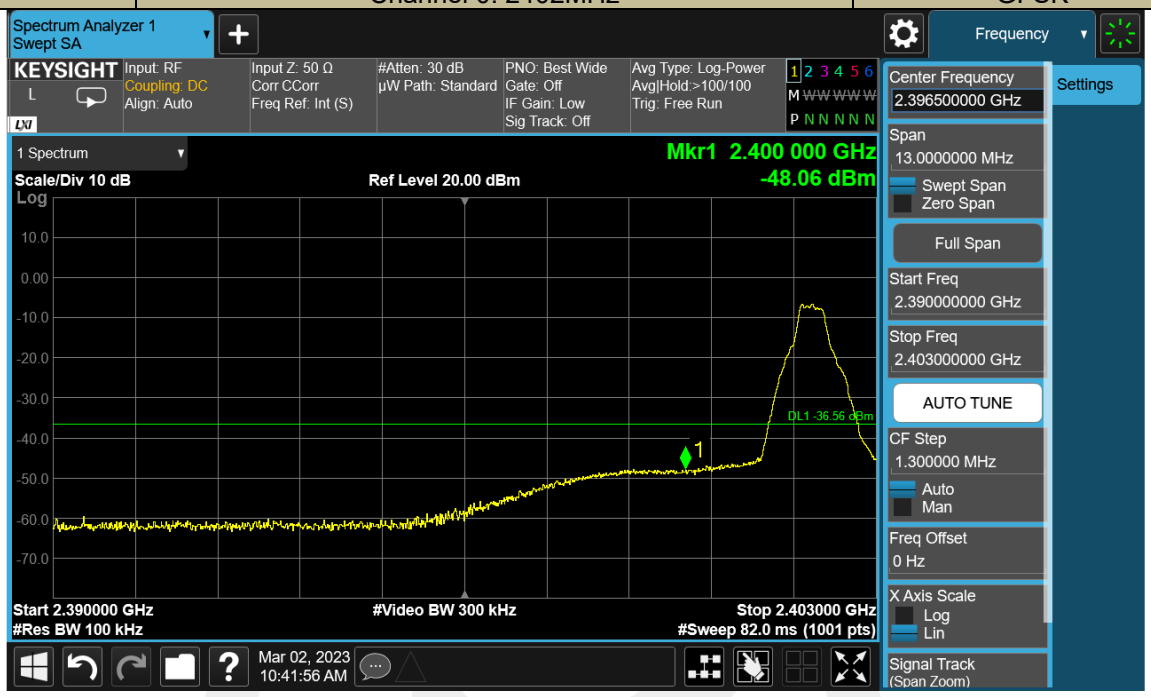
Test Model	Maximum Conduceted Level RBW=100kHz	
	Channel 0: 2402MHz	GFSK



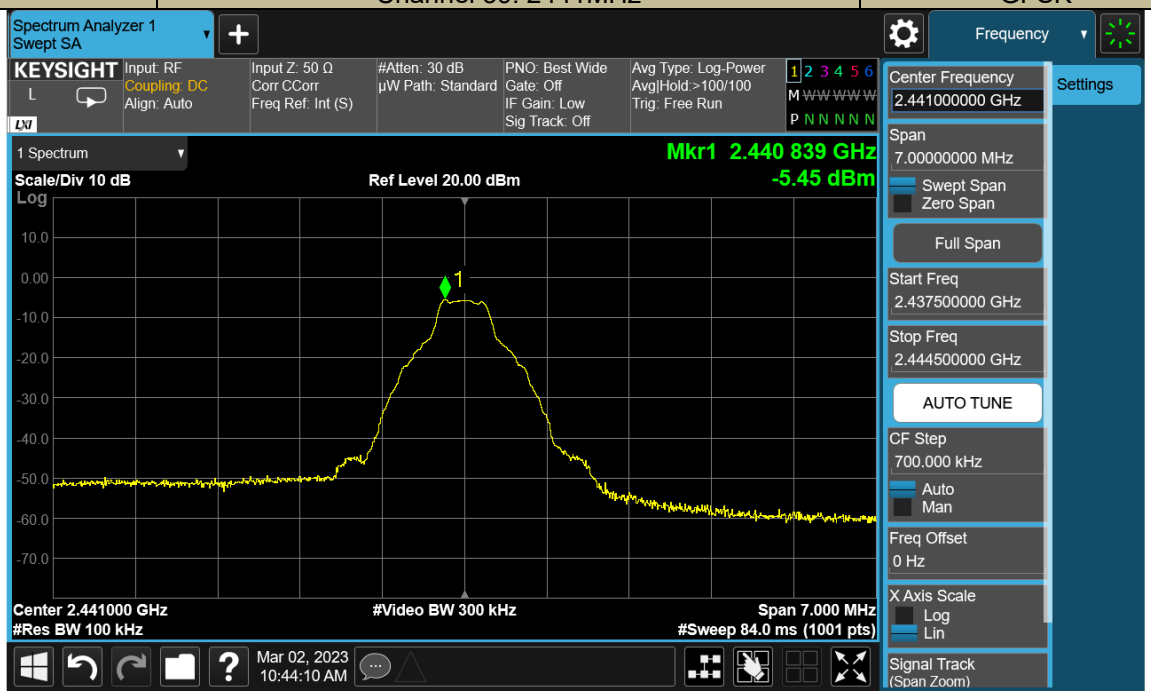
Test Model	ConducetedSpurious RF Conducted Emission(30 MHz-25GHz)	
	Channel 0: 2402MHz	GFSK



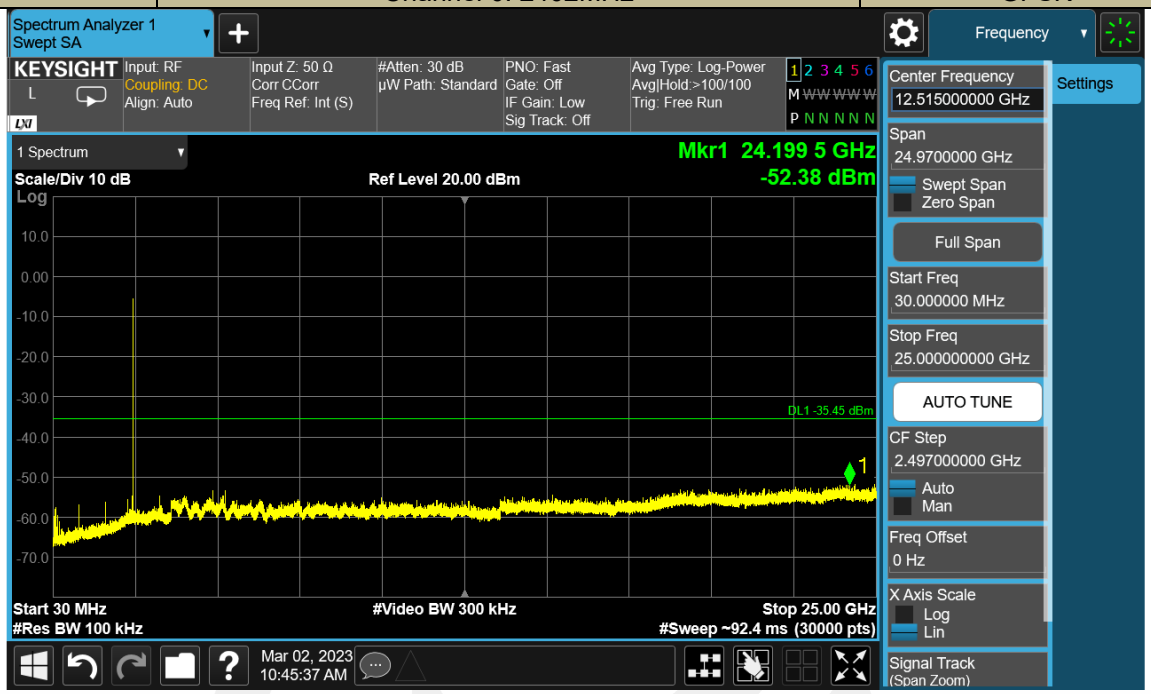
Test Model	Band-edge Conducted Emissions	
	Channel 0: 2402MHz	GFSK



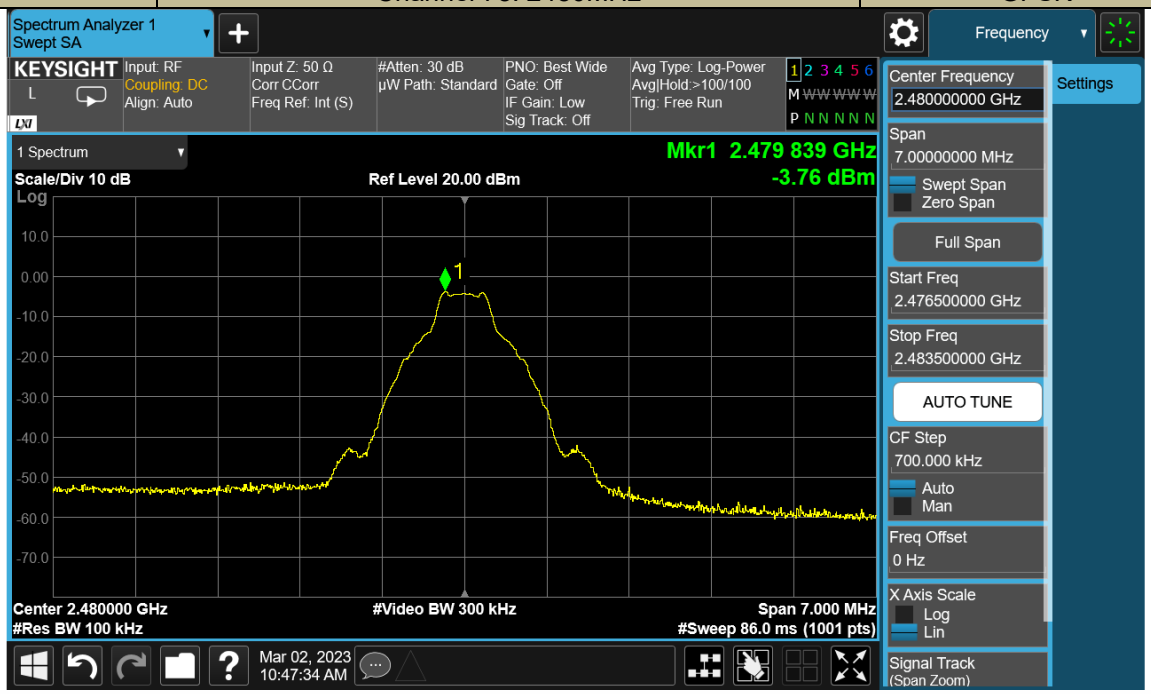
Test Model	Maximum Conduceted Level RBW=100kHz	
	Channel 39: 2441MHz	GFSK



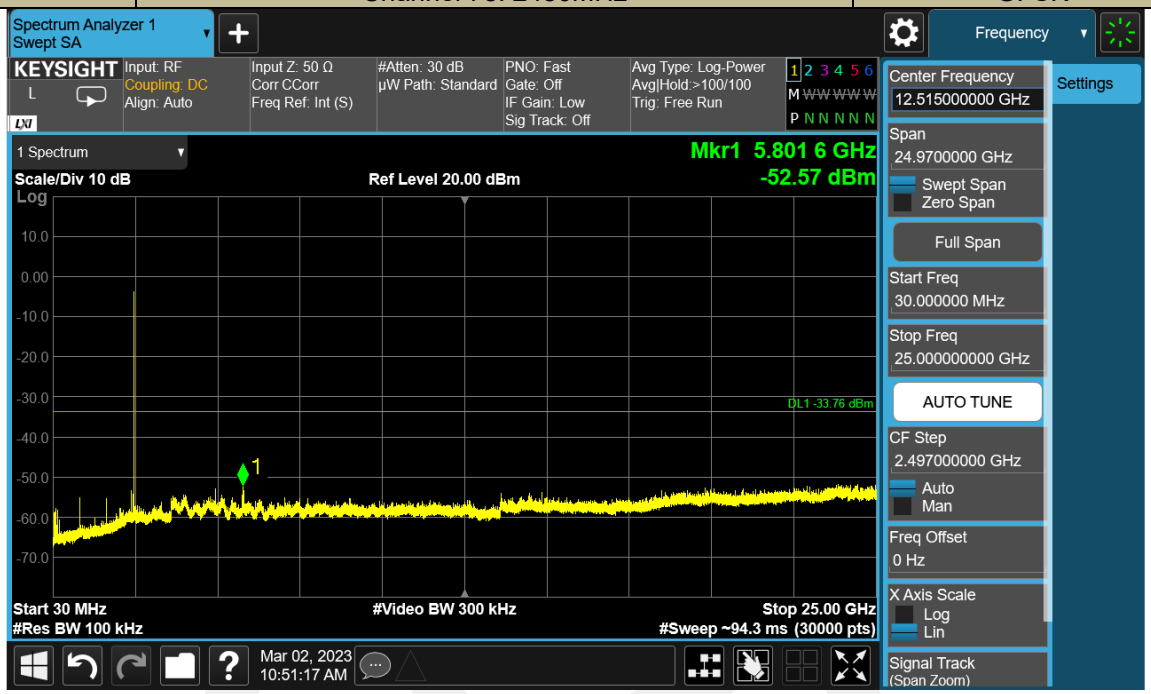
Test Model	ConducetedSpurious RF Conducted Emission(30 MHz-25GHz)	
	Channel 0: 2402MHz	GFSK



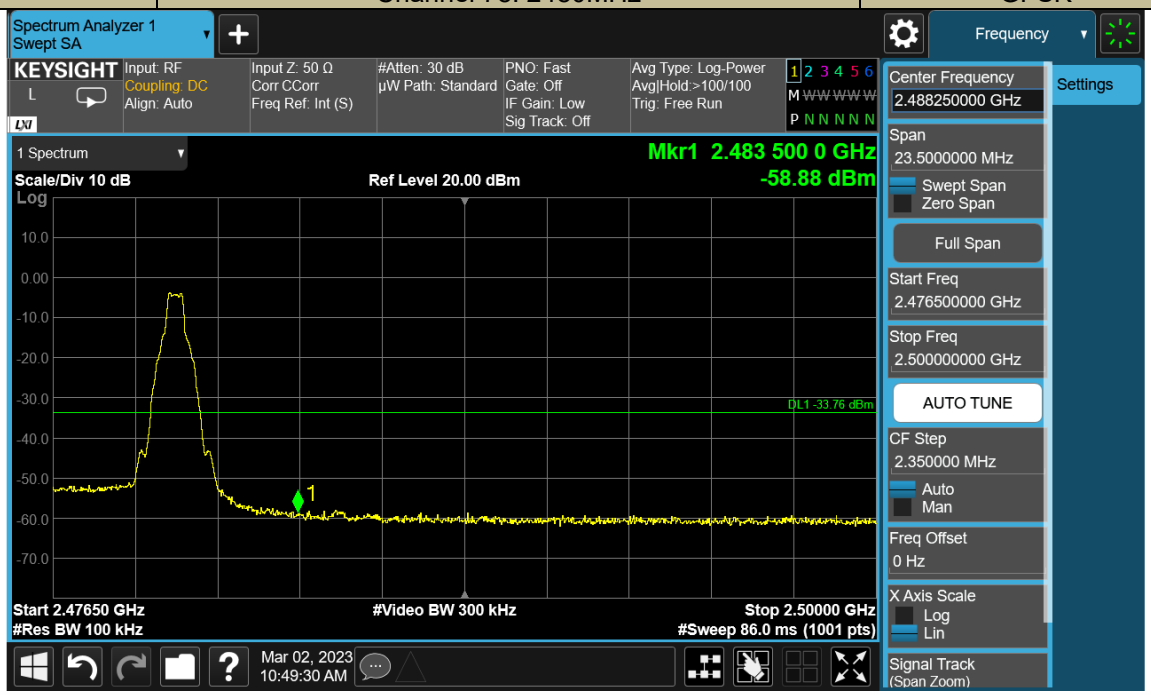
Test Model	Maximum Conducted Level RBW=100kHz	
	Channel 78: 2480MHz	GFSK



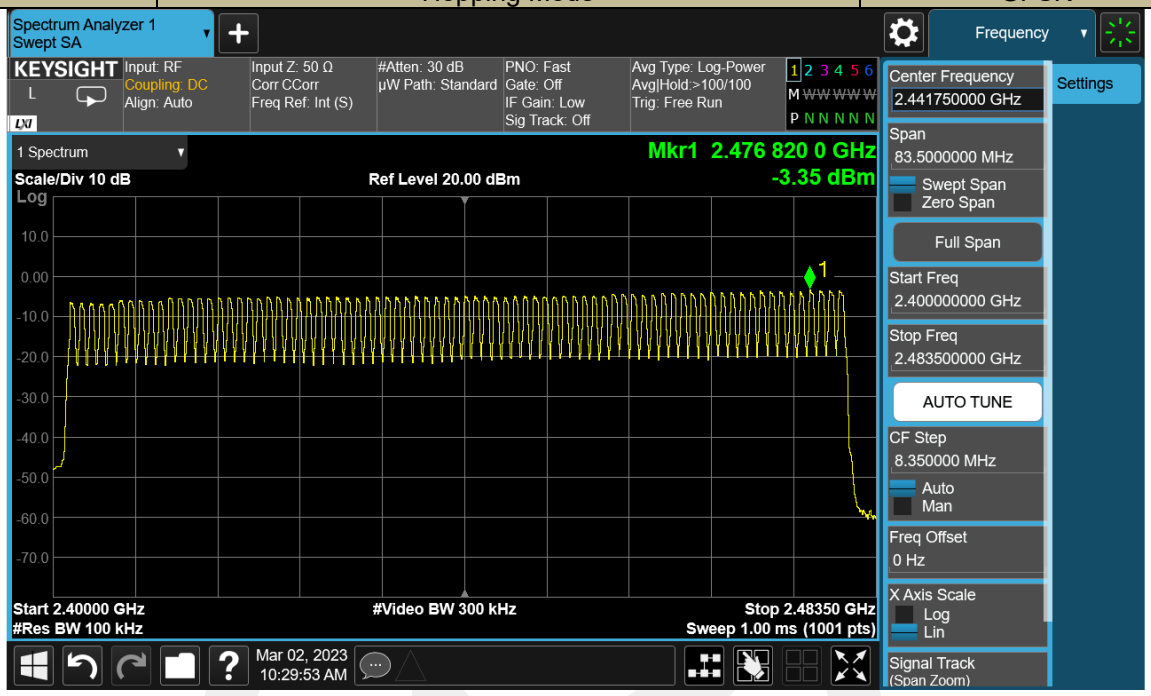
Test Model	ConducetedSpurious RF Conducted Emission(30 MHz-25 GHz)	
	Channel 78: 2480MHz	GFSK



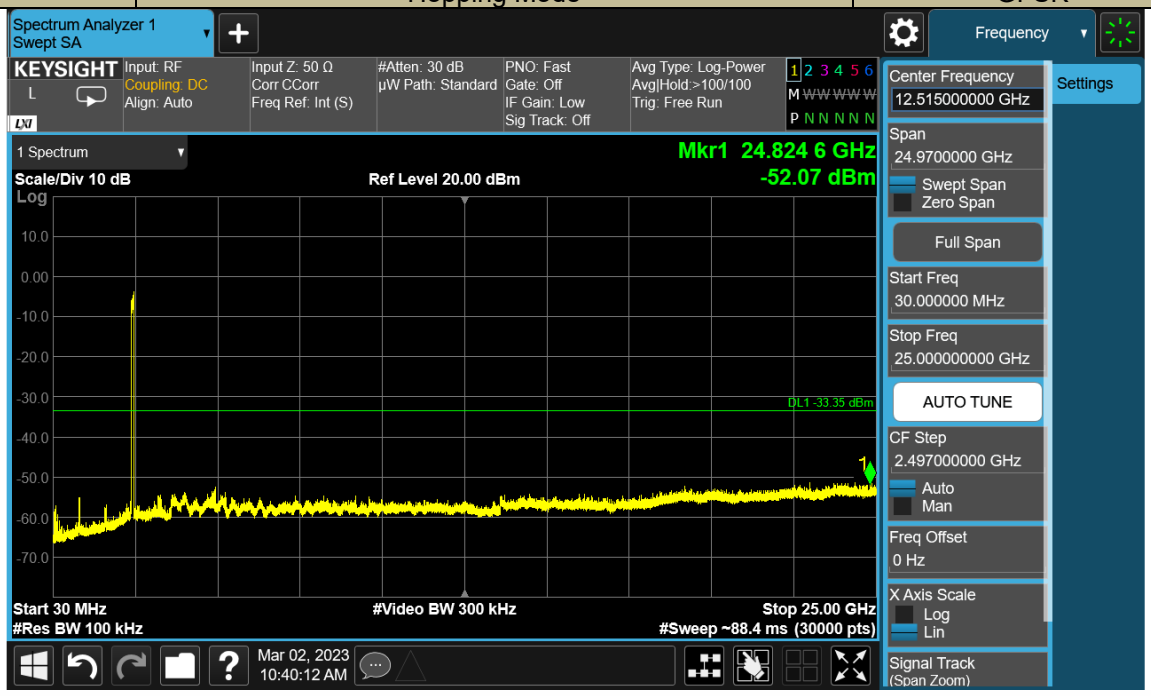
Test Model	Band-edge Conducted Emissions	
	Channel 78: 2480MHz	GFSK



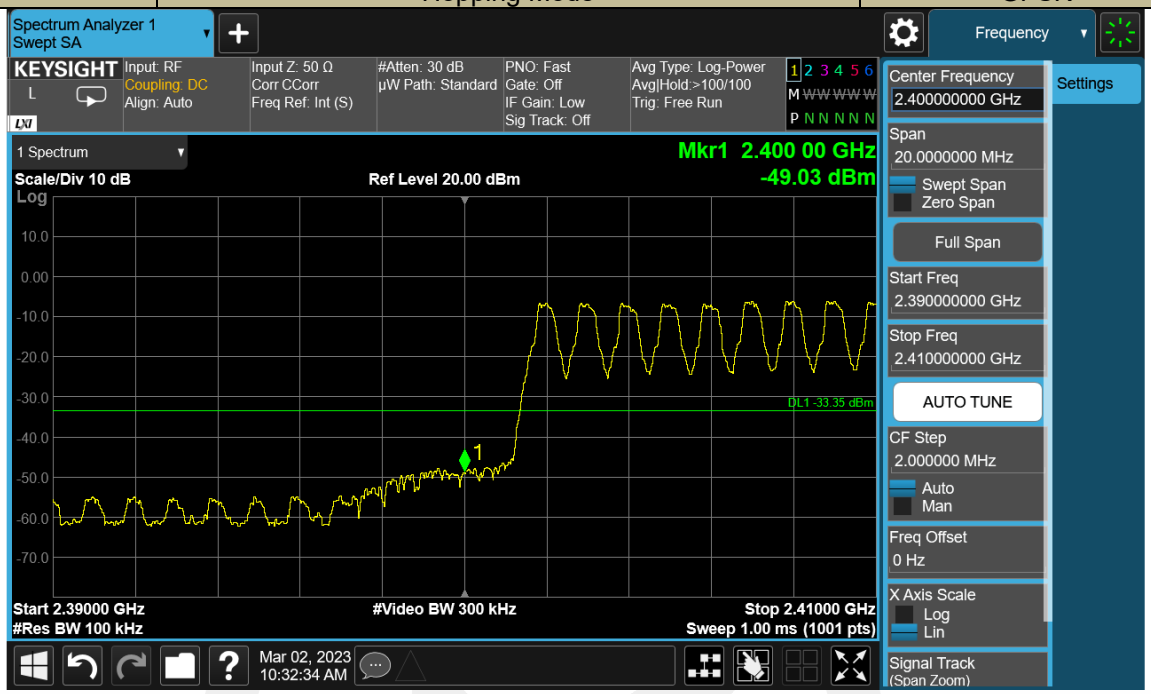
Test Model	Maximum Conducted Level RBW=100kHz	
	Hopping Mode	GFSK

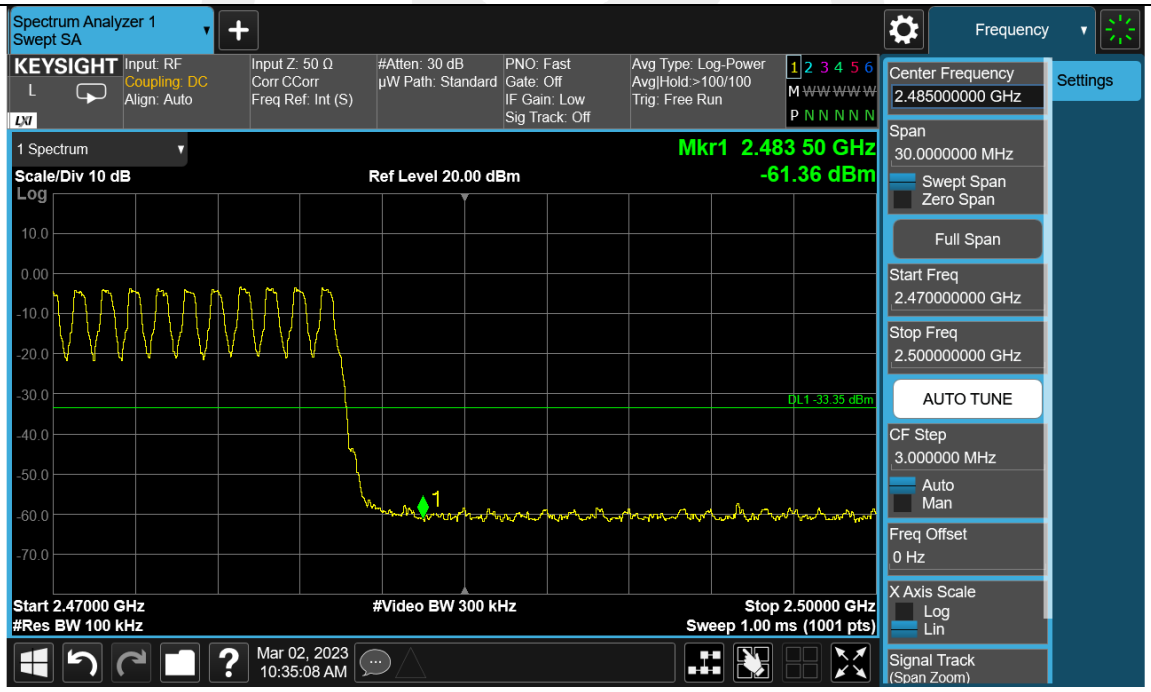


Test Model	ConducetedSpurious RF Conducted Emission(30 MHz-25GHz)	
	Hopping Mode	GFSK



Test Model	Band-edge Conducted Emissions	
	Hopping Mode	GFSK





9.7 RADIATED SPURIOUS EMISSION

Applicable Standard

According to FCC Part 15.247(d) and 15.209 and 558074 D01 15.247 Meas Guidance V05r02

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 Part15.209,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	24000/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

Test Configuration

Test according to clause 7.2 radio frequency test setup 2

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 C63.10-2014 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.

Test Results

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

Temperature:	17℃	Test Date:	March 08, 2023
Humidity:	42 %	Test By:	Lucas Xu
Test mode:	TX Mode		

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		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, non hopping) mode have been tested, and the worst result(GFSK)was report as below:

Temperature:	17℃	Test Date:	March 08, 2023
Humidity:	42 %	Test By:	Lucas Xu
Test mode:	GFSK	Frequency:	Channel 0: 2402MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4803.00	V	36.71	22.37	74.00	54.00	-37.29	-34.63
9241.50	V	48.85	34.48	74.00	54.00	-25.15	-19.52
11634.50	V	49.09	35.79	74.00	54.00	-24.91	-18.21
5710.00	H	42.02	27.75	74.00	54.00	-31.98	-26.25
7030.50	H	45.46	31.07	74.00	54.00	-28.54	-22.93
9608.00	H	51.77	37.48	74.00	54.00	-22.23	-16.52

Temperature:	17℃	Test Date:	March 08, 2023
Humidity:	42 %	Test By:	Lucas Xu
Test mode:	GFSK	Frequency:	Channel 39: 2441MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
5020.00	V	39.07	24.21	74.00	54.00	-34.93	-29.79
7904.00	V	47.85	33.42	74.00	54.00	-26.15	-20.58
11000.00	V	50.76	37.09	74.00	54.00	-23.24	-16.91
5886.50	H	41.56	27.41	74.00	54.00	-32.44	-26.59
7863.00	H	46.68	30.76	74.00	54.00	-27.32	-23.24
9764.00	H	51.77	37.55	74.00	54.00	-22.23	-16.45

Temperature:	17℃	Test Date:	March 08, 2023
Humidity:	42 %	Test By:	Lucas Xu
Test mode:	GFSK	Frequency:	Channel 78: 2480MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
6000.00	V	42.69	29.35	74.00	54.00	-31.31	-24.65
7929.00	V	46.91	31.54	74.00	54.00	-27.09	-22.46
9308.00	V	47.54	32.00	74.00	54.00	-26.46	-22.00
5663.50	H	40.82	26.47	74.00	54.00	-33.18	-27.53
6996.00	H	45.79	31.07	74.00	54.00	-28.21	-22.93
9920.00	H	49.93	35.38	74.00	54.00	-24.07	-18.62

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

■ Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz

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

Temperature:	17℃	Test Date:	March 08, 2023
Humidity:	42%	Test By:	Lucas Xu
Test mode:	GFSK	Frequency:	Channel 0: 2402MHz

Frequency (MHz)	Polarity H/V	PK(dBuV/m) (VBW=3MHz)	Limit 3m (dBuV/m)	Over(dB)	AV(dBuV/m) (VBW=10Hz)	Limit 3m (dBuV/m)	Over (dB)
2349.520	H	58.08	74.00	-15.92	44.15	54.00	-9.85
2349.400	V	58.05	74.00	-15.95	43.76	54.00	-10.24

Temperature:	17℃	Test Date:	Maech 08, 2023
Humidity:	42%	Test By:	Lucas Xu
Test mode:	GFSK	Frequency:	Channel 78: 2480MHz

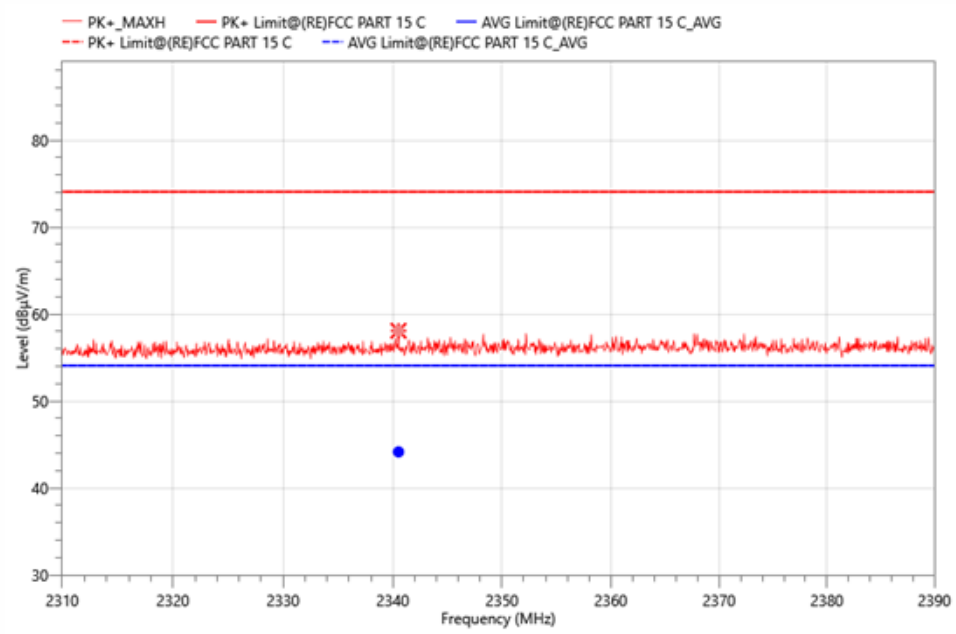
Frequency (MHz)	Polarity H/V	PK(dBuV/m) (VBW=3MHz)	Limit 3m (dBuV/m)	Over(dB)	AV(dBuV/m) (VBW=10Hz)	Limit 3m (dBuV/m)	Over (dB)
2492.290	H	58.69	74.00	-15.31	43.57	54.00	-10.43
2493.660	V	59.58	74.00	-14.42	43.51	54.00	-10.49

Temperature:	24℃	Test Date:	March 08, 2023
Humidity:	55%	Test By:	Lucas Xu
Test mode:	GFSK	Frequency:	Hopping

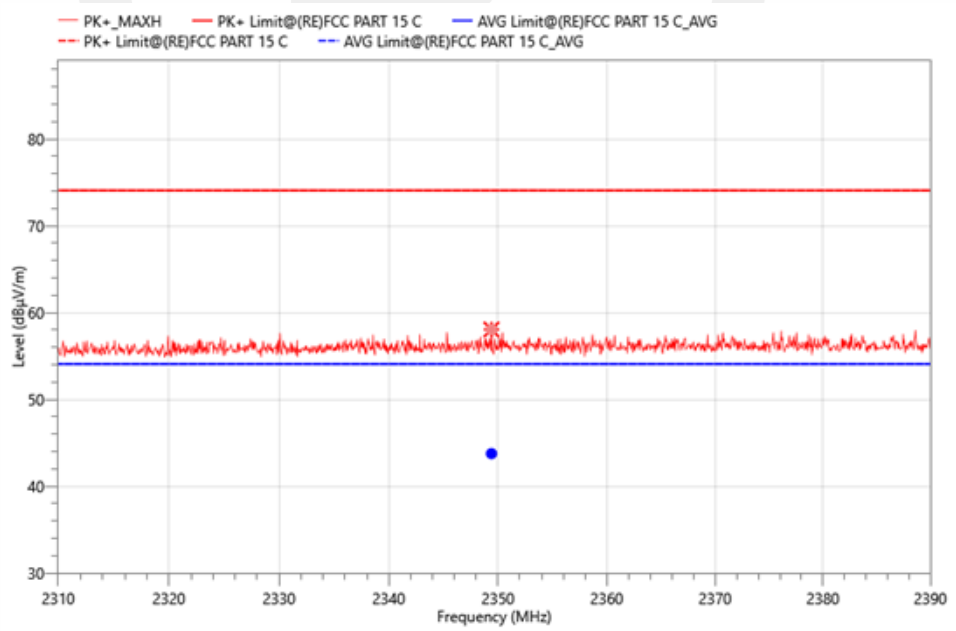
Frequency (MHz)	Polarity H/V	PK(dBuV/m) (VBW=3MHz)	Limit 3m (dBuV/m)	Over(dB)	AV(dBuV/m) (VBW=10Hz)	Limit 3m (dBuV/m)	Over (dB)
2400.000	H	56.14	74.00	-17.86	40.97	54.00	-13.03
2483.500	H	56.23	74.00	-17.77	41.57	54.00	-12.43
2400.000	V	55.57	74.00	-18.43	40.37	54.00	-13.63
2483.500	V	56.33	74.00	-17.67	41.29	54.00	-12.71

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

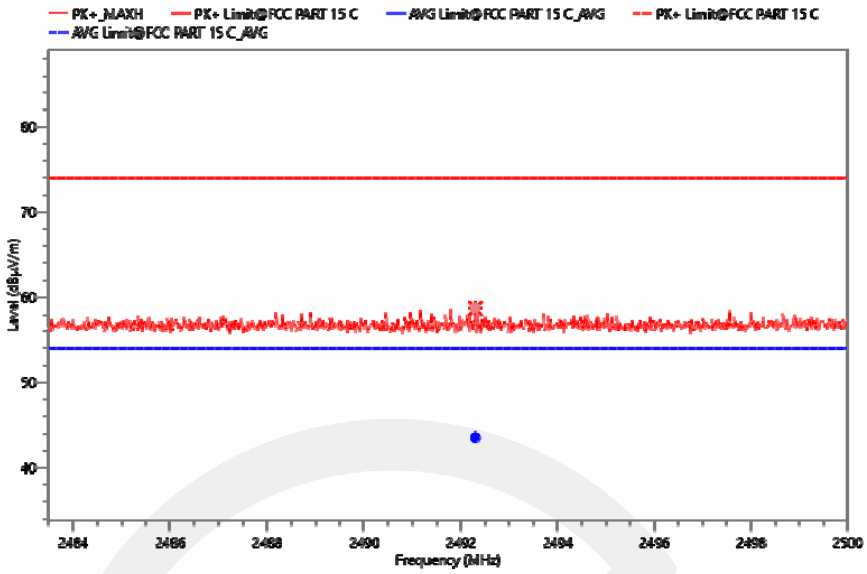
Test Model	Spurious Emission in Restricted Band 2310-2390MHz		
	Channel 0: 2402MHz	GFSK	H



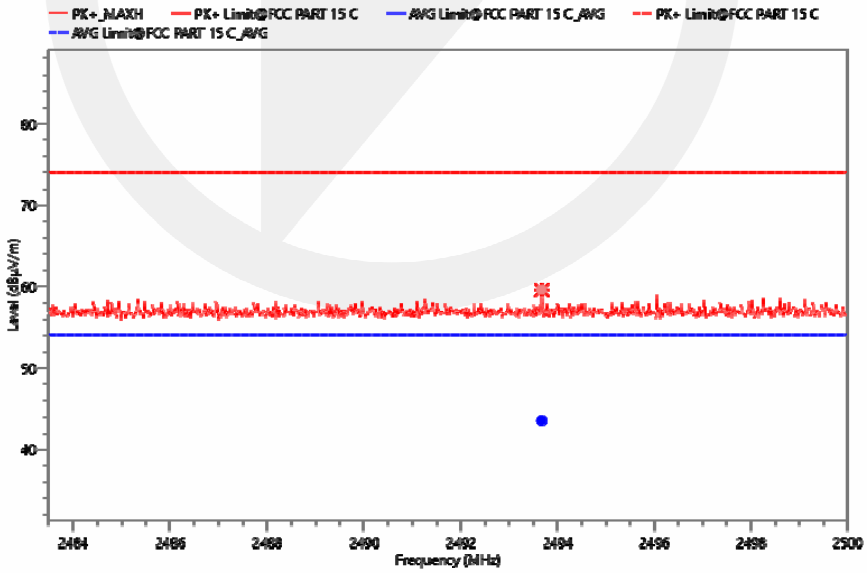
Test Model	Spurious Emission in Restricted Band 2310-2390MHz		
	Channel 0: 2402MHz	GFSK	V



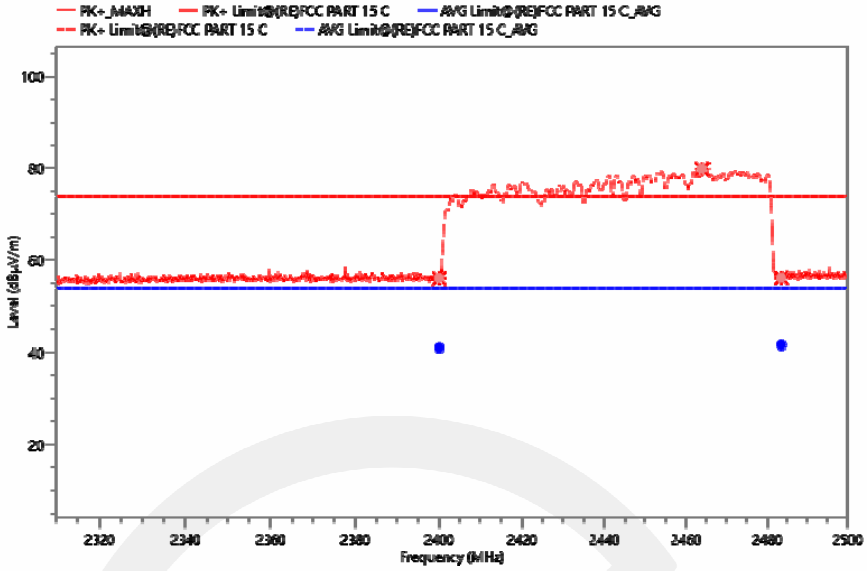
Test Model	Spurious Emission in Restricted Band 2483.5-2500MHz		
	Channel 78: 2480MHz	GFSK	H



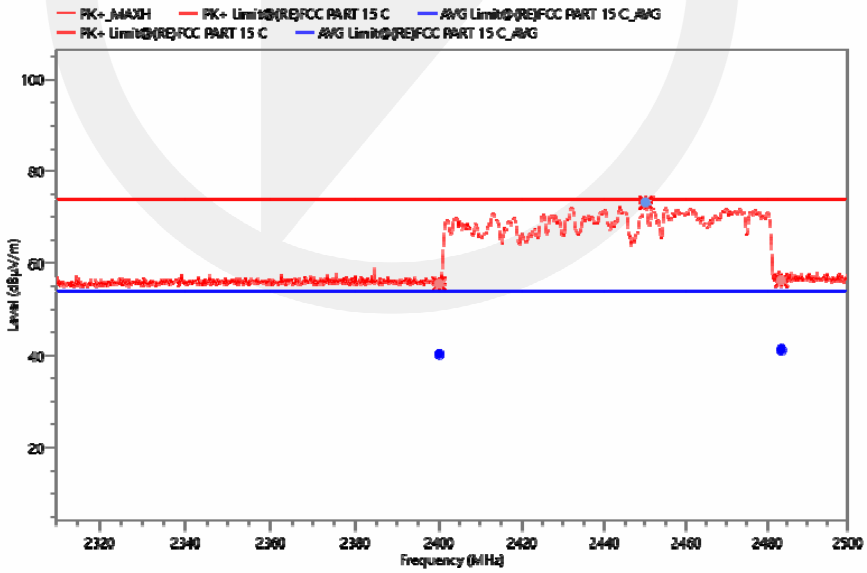
Test Model	Spurious Emission in Restricted Band 2483.5-2500MHz		
	Channel 78: 2480MHz	GFSK	V



Test Model	Spurious Emission in Restricted Band 2310-2390&2483.5-2500MHz		
	Hopping	GFSK	H



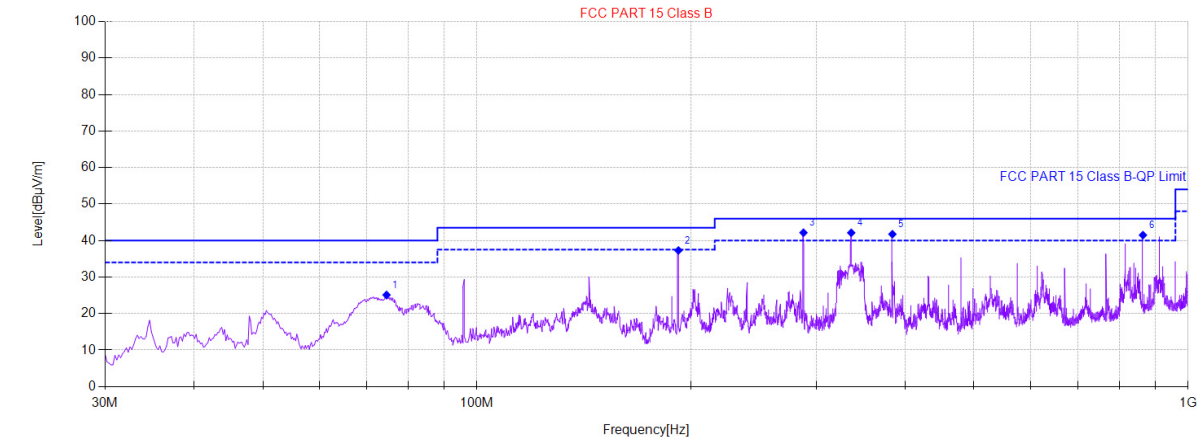
Test Model	Spurious Emission in Restricted Band2310-2390&2483.5-2500MHz		
	Hopping	GFSK	V



■ Spurious Emission below 1GHz(30MHz to 1GHz)

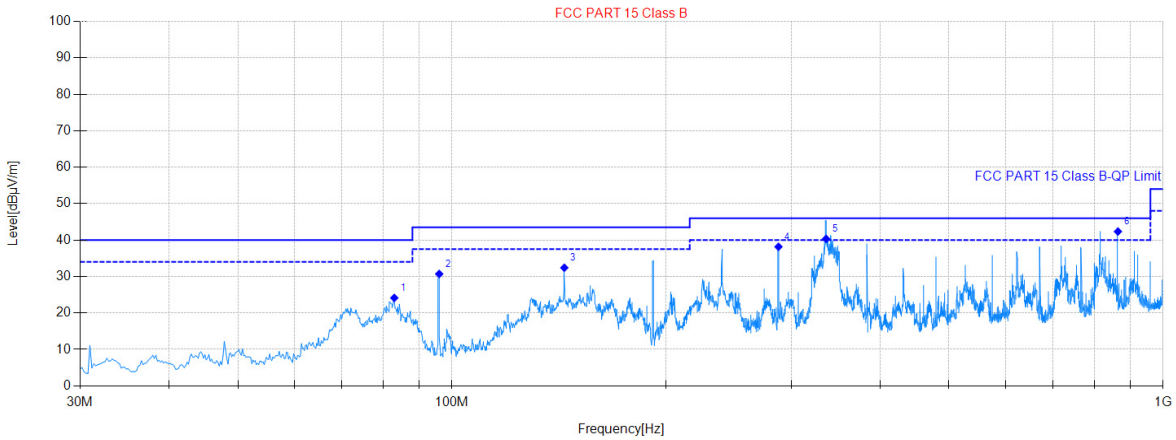
Bluetooth (GFSK, pi/4-DQPSK,8DPSK)mode have been tested, and the worst result(GFSK) recorded was report as below:

Project Information			
Mode:	TX2402	Voltage:	AC 120V/60Hz
Environment:	Temp: 15℃; Humi:50%	Engineer:	Jackson Xue



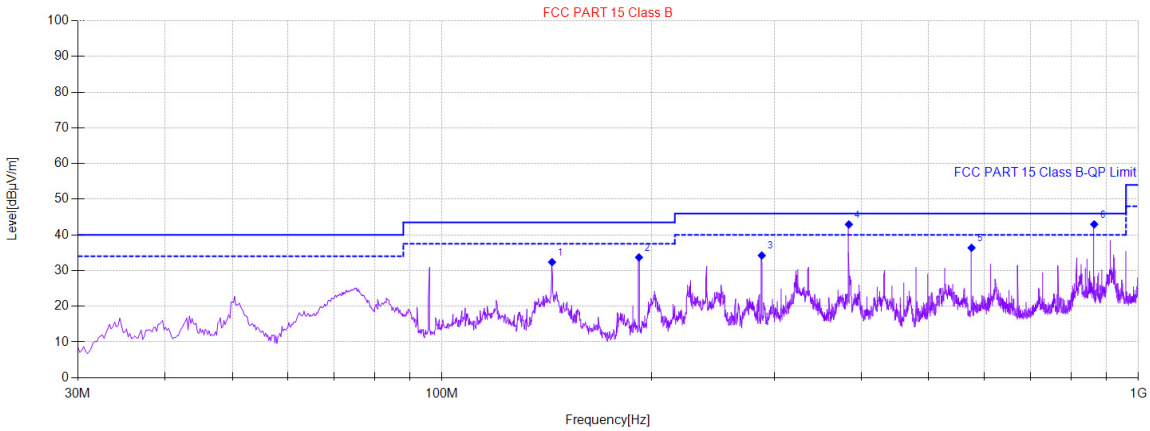
Final Data List										
NO.	Freq. [MHz]	QP Reading [dBµV/m]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	74.6289	58.13	-33.02	25.11	40.00	14.89	100	341	Vertical	PASS
2	192.0224	68.70	-31.40	37.30	43.50	6.20	100	352	Vertical	PASS
3	287.8776	70.80	-28.63	42.17	46.00	3.83	100	251	Vertical	PASS
4	335.9992	69.03	-26.90	42.13	46.00	3.87	100	344	Vertical	PASS
5	383.9268	68.19	-26.44	41.75	46.00	4.25	100	249	Vertical	PASS
6	863.9788	60.16	-18.66	41.50	46.00	4.50	100	274	Vertical	PASS

Project Information			
Mode:	TX2402	Voltage:	AC 120V/60Hz
Environment:	Temp: 15℃; Humi:50%	Engineer:	Jackson Xue



Final Data List										
NO.	Freq. [MHz]	QP Reading [dBµV/m]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	82.9726	56.85	-32.71	24.14	40.00	15.86	200	264	Horizontal	PASS
2	95.9732	62.35	-31.64	30.71	43.50	12.79	200	289	Horizontal	PASS
3	143.9008	66.09	-33.68	32.41	43.50	11.09	200	105	Horizontal	PASS
4	287.8776	66.80	-28.63	38.17	46.00	7.83	100	28	Horizontal	PASS
5	335.8052	67.24	-26.90	40.34	46.00	5.66	100	239	Horizontal	PASS
6	863.9788	61.01	-18.66	42.35	46.00	3.65	100	262	Horizontal	PASS

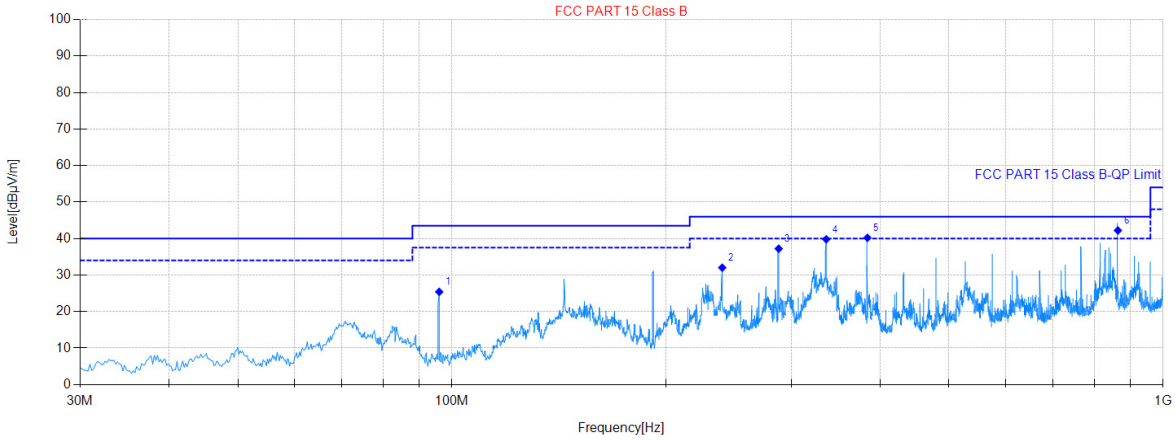
Project Information			
Mode:	TX2441	Voltage:	AC 120V/60Hz
Environment:	Temp: 15℃; Humi:50%	Engineer:	Jackson Xue



Final Data List

NO.	Freq. [MHz]	QP Reading [dBµV/m]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	143.9008	66.05	-33.68	32.37	43.50	11.13	100	96	Vertical	PASS
2	191.8284	65.11	-31.41	33.70	43.50	9.80	100	289	Vertical	PASS
3	287.8776	62.86	-28.63	34.23	46.00	11.77	100	272	Vertical	PASS
4	383.9268	69.37	-26.44	42.93	46.00	3.07	100	34	Vertical	PASS
5	576.0252	58.19	-21.81	36.38	46.00	9.62	100	40	Vertical	PASS
6	863.9788	61.62	-18.66	42.96	46.00	3.04	100	292	Vertical	PASS

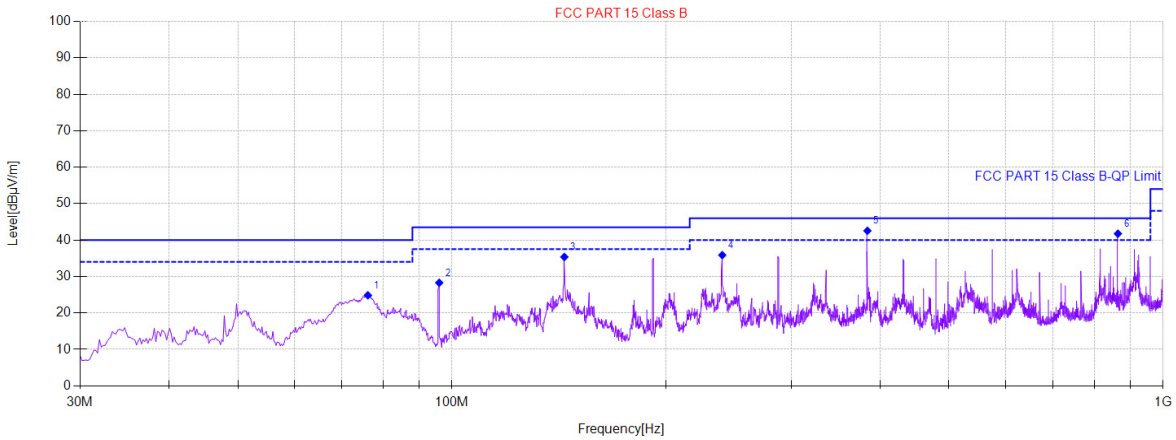
Project Information			
Mode:	TX2441	Voltage:	AC 120V/60Hz
Environment:	Temp: 15℃; Humi:50%	Engineer:	Jackson Xue



Final Data List

NO.	Freq. [MHz]	QP Reading [dBµV/m]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	95.9732	57.05	-31.64	25.41	43.50	18.09	100	251	Horizontal	PASS
2	239.9500	61.36	-29.34	32.02	46.00	13.98	100	359	Horizontal	PASS
3	288.0716	65.85	-28.62	37.23	46.00	8.77	100	220	Horizontal	PASS
4	335.9992	66.70	-26.90	39.80	46.00	6.20	100	13	Horizontal	PASS
5	383.9268	66.65	-26.44	40.21	46.00	5.79	100	285	Horizontal	PASS
6	863.9788	60.88	-18.66	42.22	46.00	3.78	100	71	Horizontal	PASS

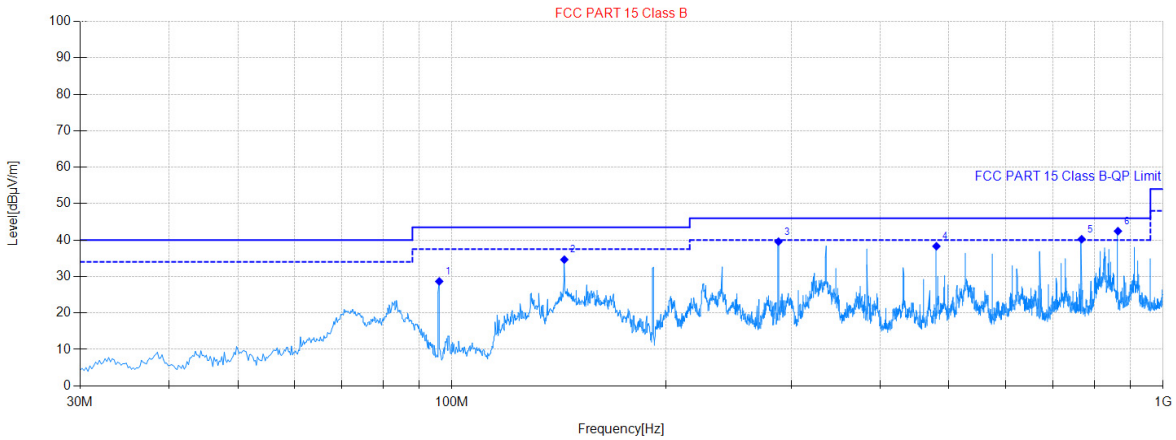
Project Information			
Mode:	TX2480	Voltage:	AC 120V/60Hz
Environment:	Temp: 15℃; Humi:50%	Engineer:	Jackson Xue



Final Data List

NO.	Freq. [MHz]	QP Reading [dBµV/m]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	76.1812	57.87	-33.01	24.86	40.00	15.14	100	344	Vertical	PASS
2	95.9732	59.93	-31.64	28.29	43.50	15.21	100	259	Vertical	PASS
3	143.9008	69.05	-33.68	35.37	43.50	8.13	100	306	Vertical	PASS
4	239.9500	65.22	-29.34	35.88	46.00	10.12	100	288	Vertical	PASS
5	383.9268	68.99	-26.44	42.55	46.00	3.45	100	16	Vertical	PASS
6	863.9788	60.42	-18.66	41.76	46.00	4.24	100	305	Vertical	PASS

Project Information			
Mode:	TX2480	Voltage:	AC 120V/60Hz
Environment:	Temp: 15℃; Humi:50%	Engineer:	Jackson Xue



Final Data List

NO.	Freq. [MHz]	QP Reading [dBµV/m]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	95.9732	60.31	-31.64	28.67	43.50	14.83	200	84	Horizontal	PASS
2	143.9008	68.32	-33.68	34.64	43.50	8.86	200	325	Horizontal	PASS
3	287.8776	68.21	-28.63	39.58	46.00	6.42	100	26	Horizontal	PASS
4	479.976	63.24	-24.92	38.32	46.00	7.68	200	290	Horizontal	PASS
5	768.1236	60.32	-20.08	40.24	46.00	5.76	100	307	Horizontal	PASS
6	863.9788	61.12	-18.66	42.46	46.00	3.54	200	244	Horizontal	PASS

9.8 CONDUCTED EMISSION TEST

Applicable Standard

According to FCC Part 15.207(a)

Conformance Limit

	Conducted Emission Limit	
Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Test Configuration

Test according to clause 7.3 conducted emission test setup

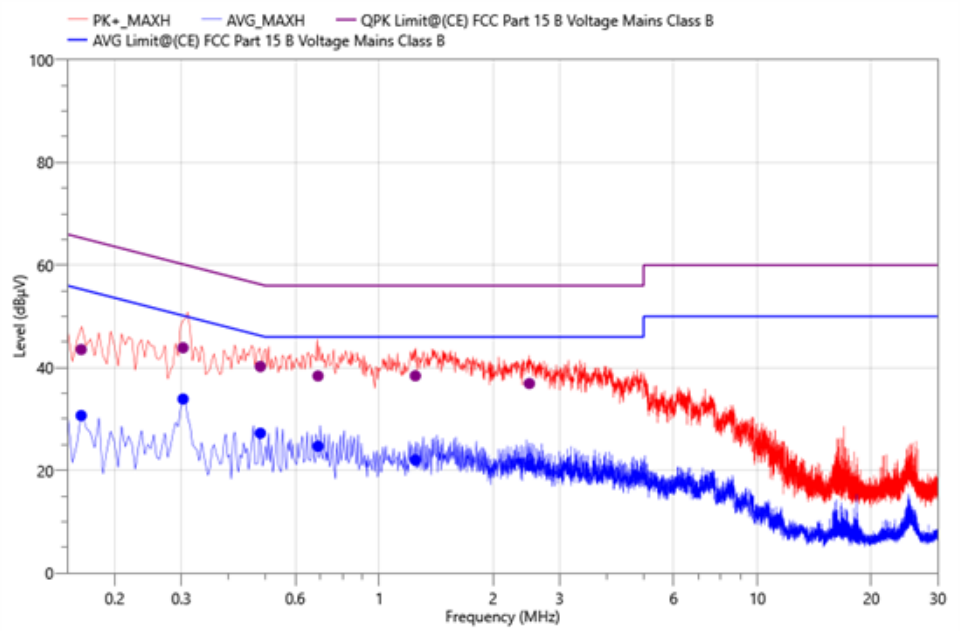
Test Procedure

The EUT was placed on a table which is 0.1m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Repeat above procedures until all frequency measured were complete.

Test Results

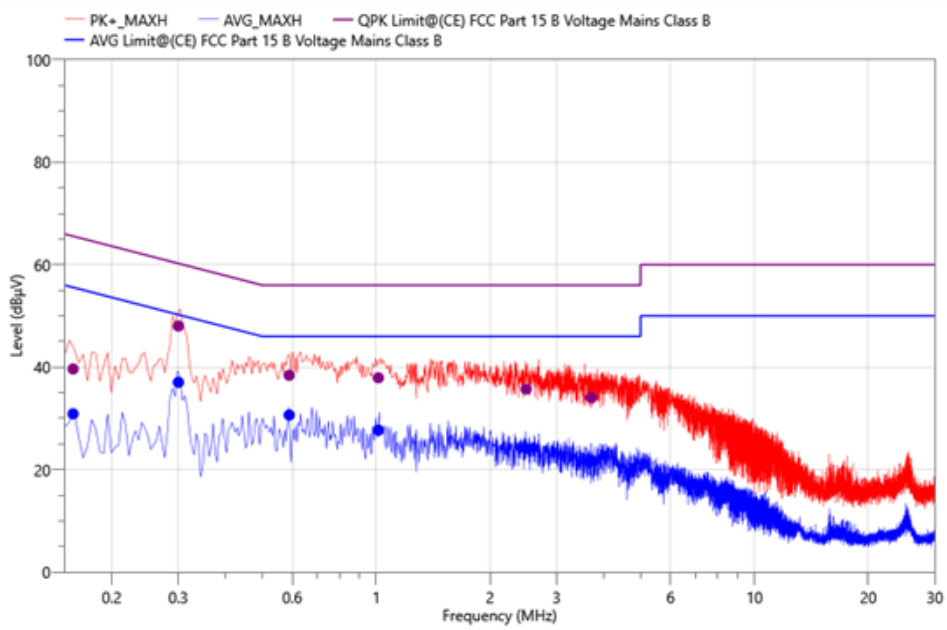
Pass.

Project Information			
Mode:	TX	Voltage:	AC 120V/60Hz
Environment:	Temp: 21℃; Humi:30%	Engineer:	Allen Tang



Freq. (MHz)	Reading (dBµV)	Meas. (dBµV)	Limit (dBµV)	Margin (dB)	Det.	Line	Corr. (dB)	Verdict
0.16	33.74	43.54	65.31	21.77	QPK	L1	9.8	PASS
0.16	20.88	30.68	55.31	24.63	AVG	L1	9.8	PASS
0.49	30.56	40.23	56.25	16.02	QPK	L1	9.67	PASS
0.49	17.56	27.23	46.25	19.02	AVG	L1	9.67	PASS
0.69	28.66	38.39	56.00	17.61	QPK	L1	9.73	PASS
0.69	14.96	24.69	46.00	21.31	AVG	L1	9.73	PASS
1.25	28.32	38.42	56.00	17.58	QPK	L1	10.1	PASS
1.25	11.92	22.02	46.00	23.98	AVG	L1	10.1	PASS
2.50	26.85	36.92	56.00	19.08	QPK	L1	10.07	PASS
2.50	10.82	20.89	46.00	25.11	AVG	L1	10.07	PASS
0.30	34.05	43.89	60.16	16.27	QPK	L1	9.84	PASS
0.30	24.06	33.90	50.16	16.26	AVG	L1	9.84	PASS

Project Information			
Mode:	TX	Voltage:	AC 120V/60Hz
Environment:	Temp: 21℃; Humi:30%	Engineer:	Allen Tang



Freq. (MHz)	Reading (dBµV)	Meas. (dBµV)	Limit (dBµV)	Margin (dB)	Det.	Line	Corr. (dB)	Verdict
0.16	29.88	39.64	65.57	25.93	QPK	N	9.76	PASS
0.16	21.13	30.89	55.57	24.68	AVG	N	9.76	PASS
0.30	38.33	48.02	60.24	12.22	QPK	N	9.69	PASS
0.30	27.35	37.04	50.24	13.2	AVG	N	9.69	PASS
0.59	28.74	38.41	56.00	17.59	QPK	N	9.67	PASS
0.59	20.98	30.65	46.00	15.35	AVG	N	9.67	PASS
1.01	28.15	37.92	56.00	18.08	QPK	N	9.77	PASS
1.01	17.93	27.70	46.00	18.3	AVG	N	9.77	PASS
2.49	25.57	35.69	56.00	20.31	QPK	N	10.12	PASS
2.49	13.97	24.09	46.00	21.91	AVG	N	10.12	PASS
3.70	24.07	34.06	56.00	21.94	QPK	N	9.99	PASS
3.70	11.80	21.79	46.00	24.21	AVG	N	9.99	PASS

9.9 ANTENNA APPLICATION

Antenna Requirement

Standard	Requirement
FCC CRF Part15.203	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217,§15.219, or §15.221. Further, this requirement does not apply to intentionalradiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Result

Pass.

The EUT has 1 PCB Antenna: The PCB Antenna Gain is 1.67 dBi;

Note: ☒ Antenna use a permanently attached antenna which is not replaceable.
☐ Not using a standard antenna jack or electrical connector for antenna replacement
☐ The antenna has to be professionally installed (please provide method of installation)

which in accordance to section 15.203, please refer to the internal photos.

*** End of Report ***

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Statement

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   Objections shall be raised within 20 days from the date receiving the report.