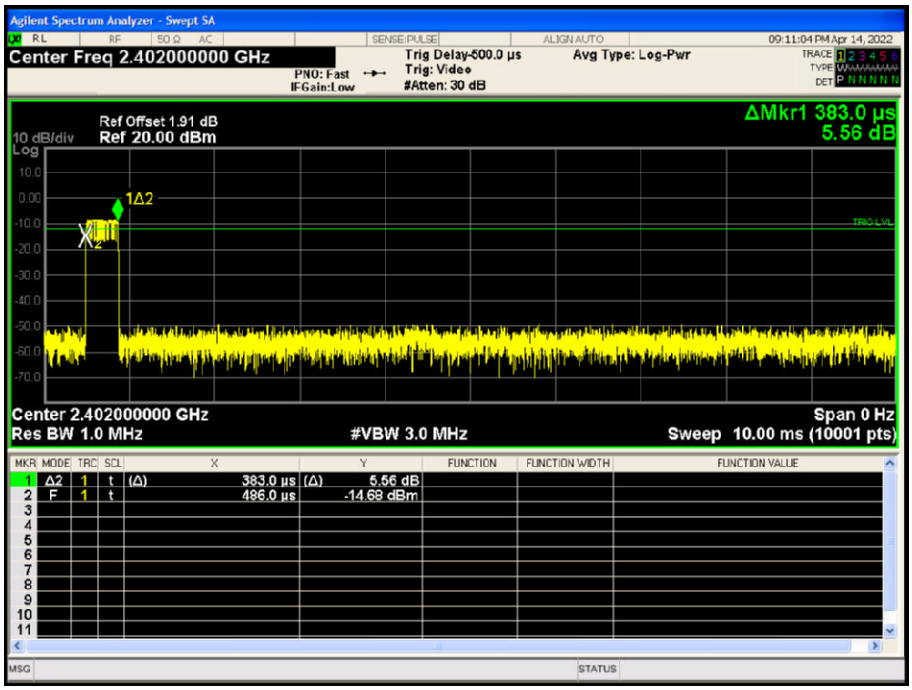
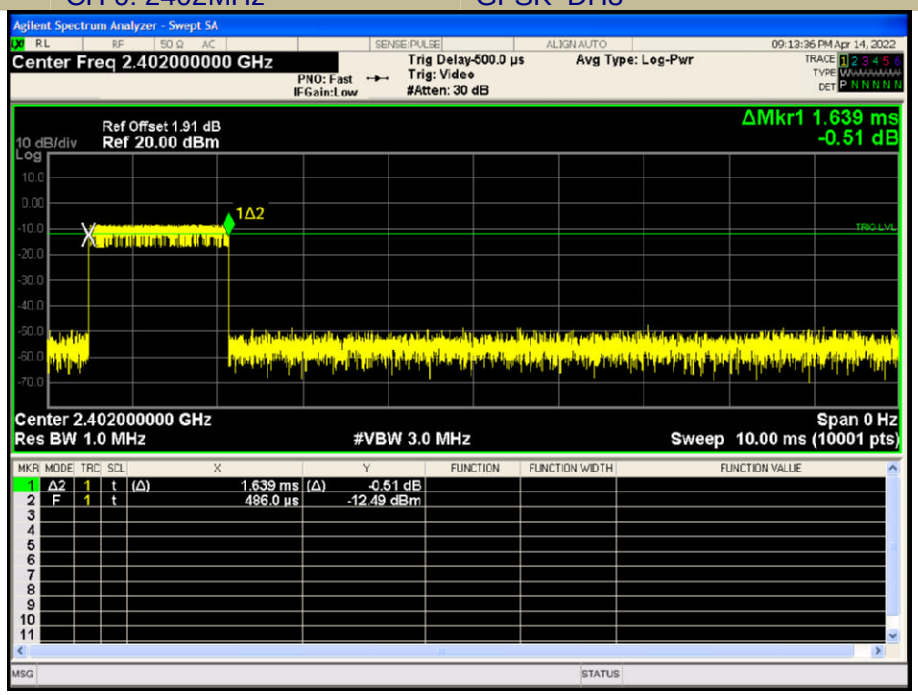
Bluetooth (GFSK,) mode have been tested:

Modulation Mode	Channel Number	Packet type	Pluse width (ms)	Dwell Time (ms)	Limit (ms)	Verdict
GFSK	0	DH1	0.383	122.560	<400	PASS
	0	DH3	1.639	262.240	<400	PASS
	0	DH5	2.888	308.053	<400	PASS
Note: Dwell Time(DH1)=PW*(1600/2/79)*31.6 Dwell Time(DH3)=PW*(1600/4/79)*31.6 Dwell Time(DH5)=PW*(1600/6/79)*31.6						

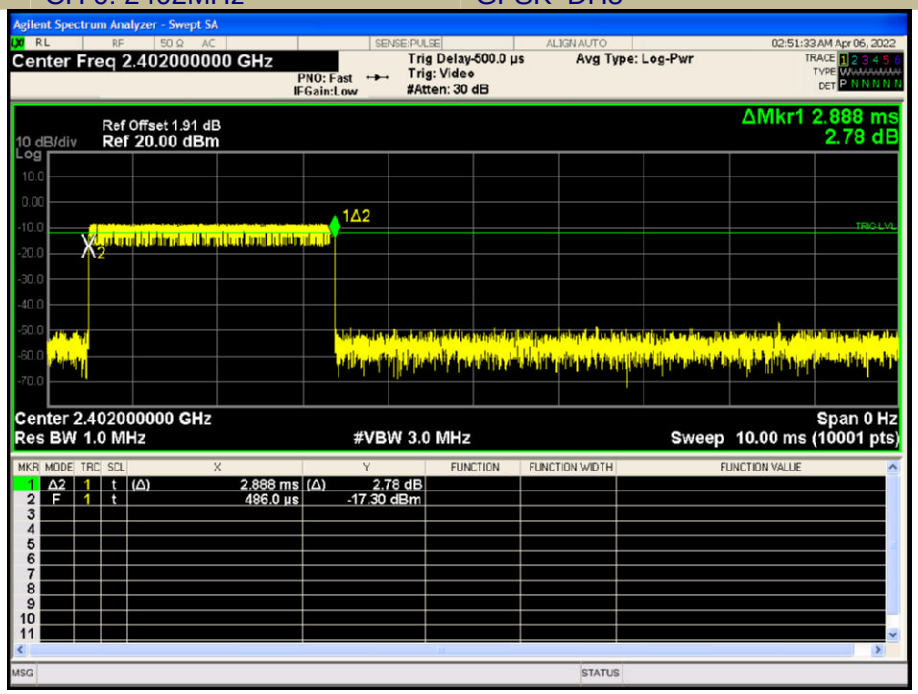
Test Model	Average Time Of Occupancy (Dwell Time)	
	Bluetooth V5.3	
	CH 0: 2402MHz	GFSK DH1



Test Model	Average Time Of Occupancy (Dwell Time)	
	Bluetooth V5.3	
	CH 0: 2402MHz	GFSK DH3



Test Model	Average Time Of Occupancy (Dwell Time)	
	Bluetooth V5.3	
	CH 0: 2402MHz	GFSK DH5



8.5 MAXIMUM PEAK CONDUCTED OUTPUT POWER

8.5.1 Applicable Standard

According to FCC Part 15.247(b)(1) and KDB 558074 D01 15.247 MEAS GUIDANCE v05r02

8.5.2 Conformance Limit

The max For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

8.5.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

8.5.4 Test Procedure

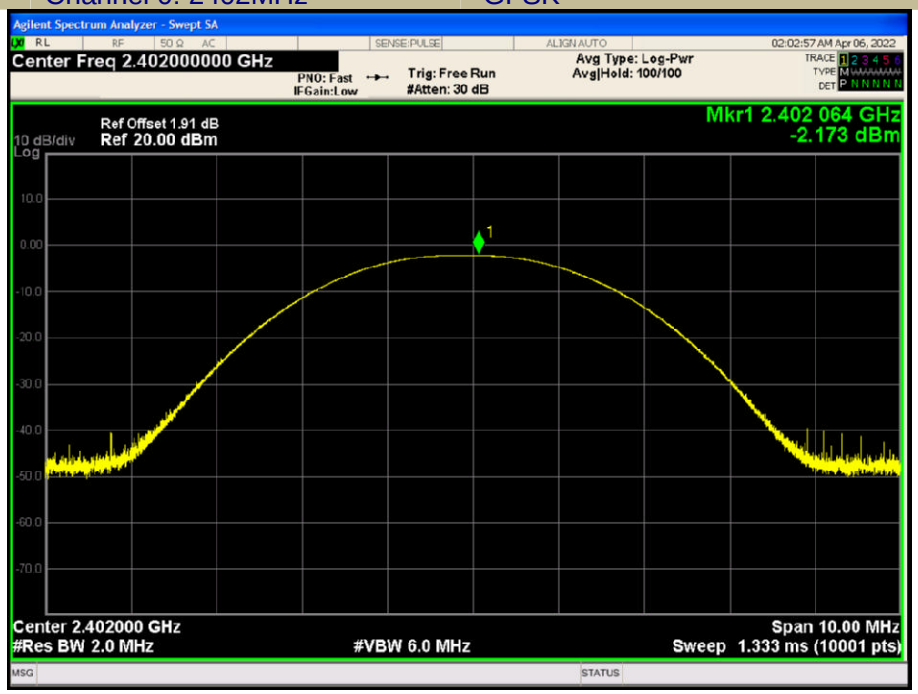
■ According to FCC Part15.247(b)(1)
As an alternative to a peak power measurement, compliance with the limit can be based on a measurement of the maximum conducted output power.
Use the following spectrum analyzer settings:
Set Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel (about 10MHz)
Set RBW > the 20 dB bandwidth of the emission being measured (about 3MHz)
Set VBW ≥ RBW
Set Sweep = auto
Set Detector function = peak
Set Trace = max hold
Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission to determine the peak amplitude level.

Test Results

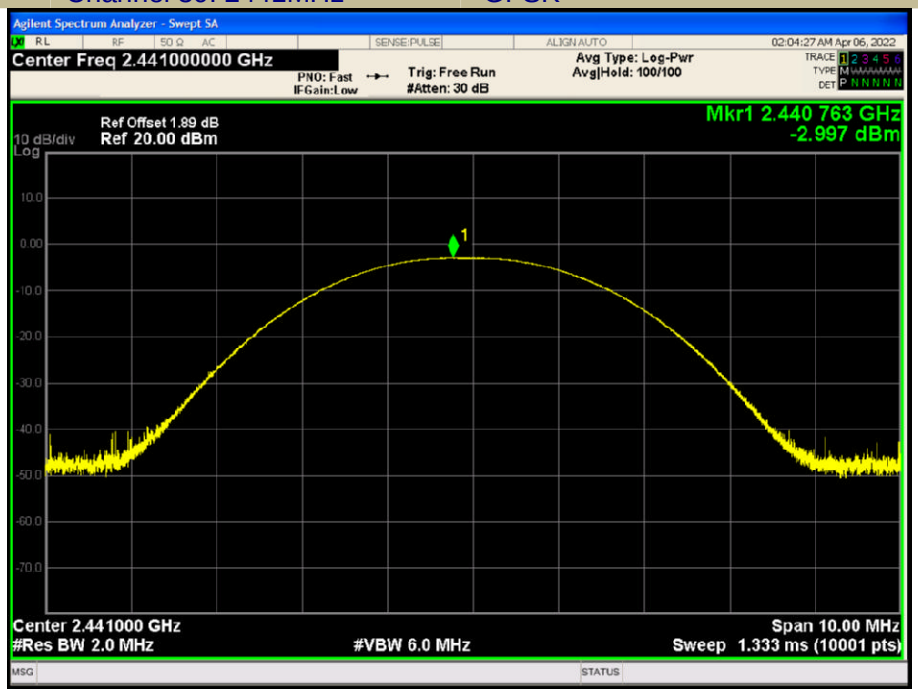
Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)	Limit (dBm)	Verdict
GFSK	0	2402	-2.17	21	PASS
	39	2441	-3.00	21	PASS
	78	2480	-4.40	21	PASS
pi/4-DQPSK	0	2402	-1.32	21	PASS
	39	2441	-2.15	21	PASS
	78	2480	-3.55	21	PASS
8DPSK	0	2402	-2.11	21	PASS
	39	2441	-2.93	21	PASS
	78	2480	-4.34	21	PASS
Note: N/A					

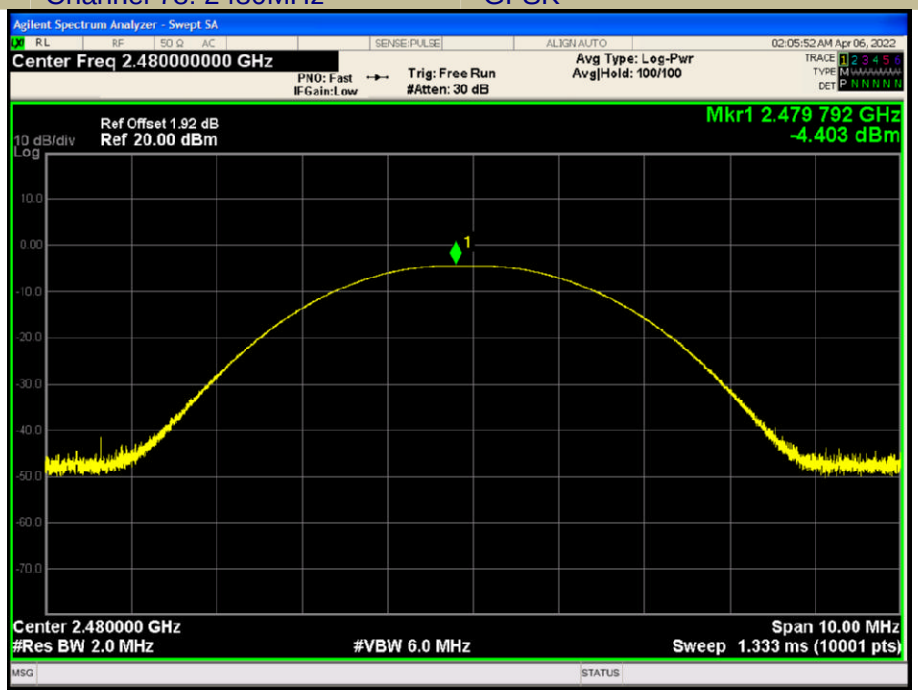
Test Model	Maximum Peak Conducted Output Power	
	Bluetooth V5.3	
	Channel 0: 2402MHz	GFSK



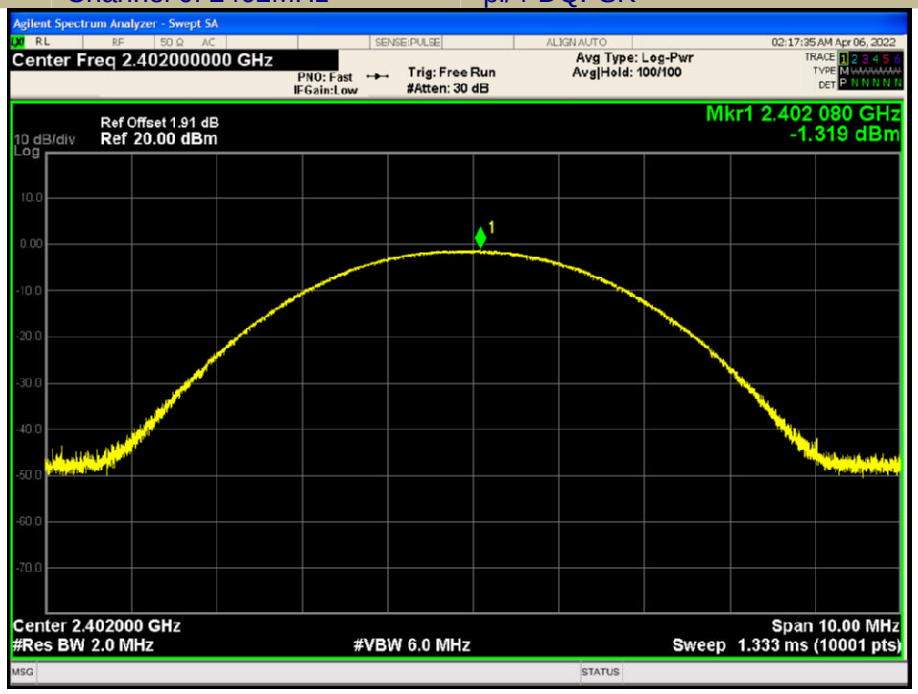
Test Model	Maximum Peak Conducted Output Power	
	Bluetooth V5.3	
	Channel 39: 2441MHz	GFSK



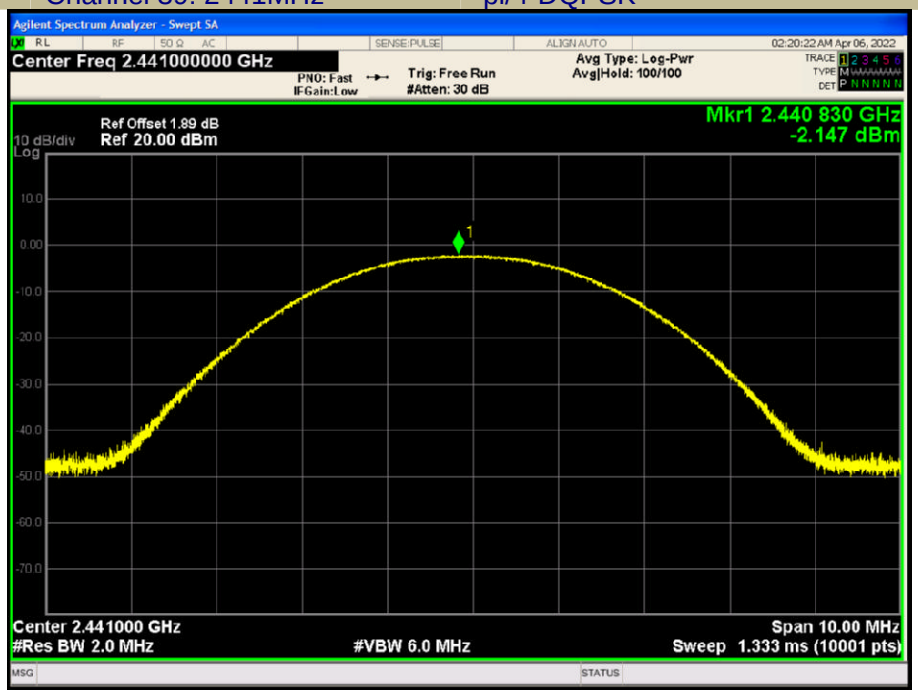
Test Model	Maximum Peak Conducted Output Power	
	Bluetooth V5.3	
	Channel 78: 2480MHz	GFSK



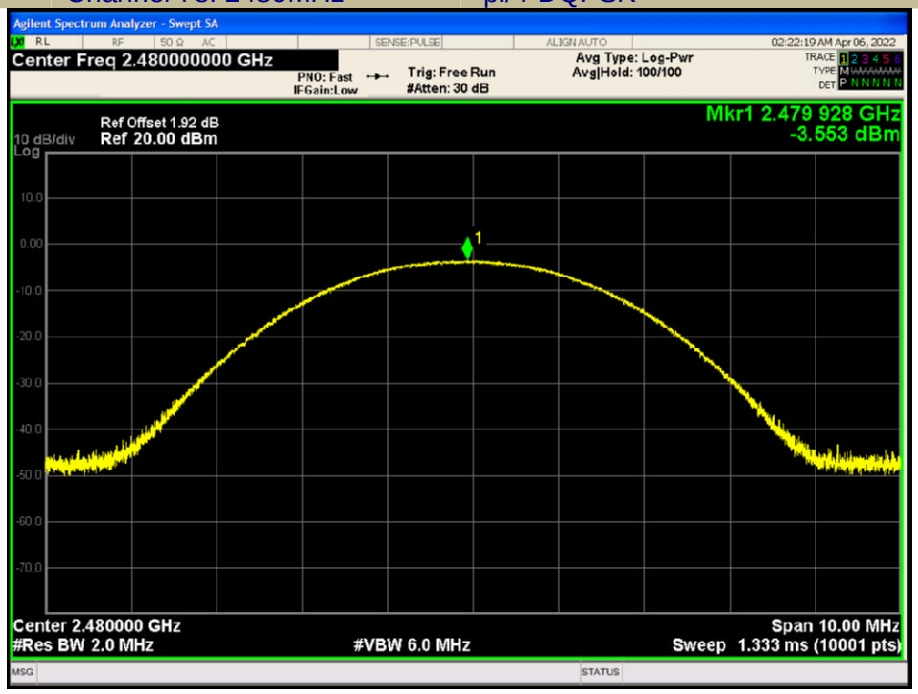
Test Model	Maximum Peak Conducted Output Power	
	Bluetooth V5.3	
	Channel 0: 2402MHz	pi/4-DQPSK



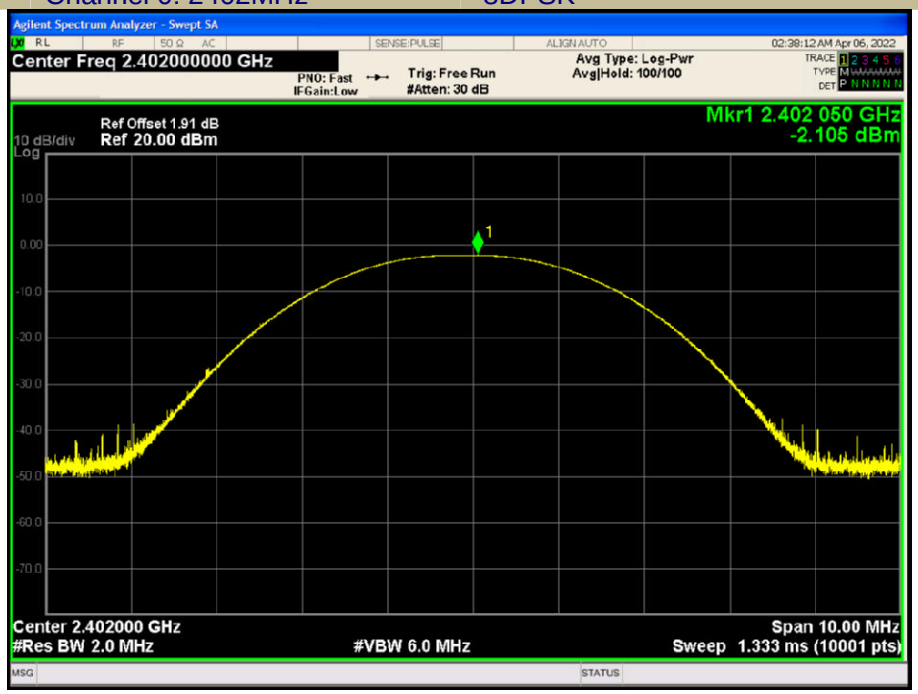
Test Model	Maximum Peak Conducted Output Power	
	Bluetooth V5.3	
	Channel 39: 2441MHz	pi/4-DQPSK



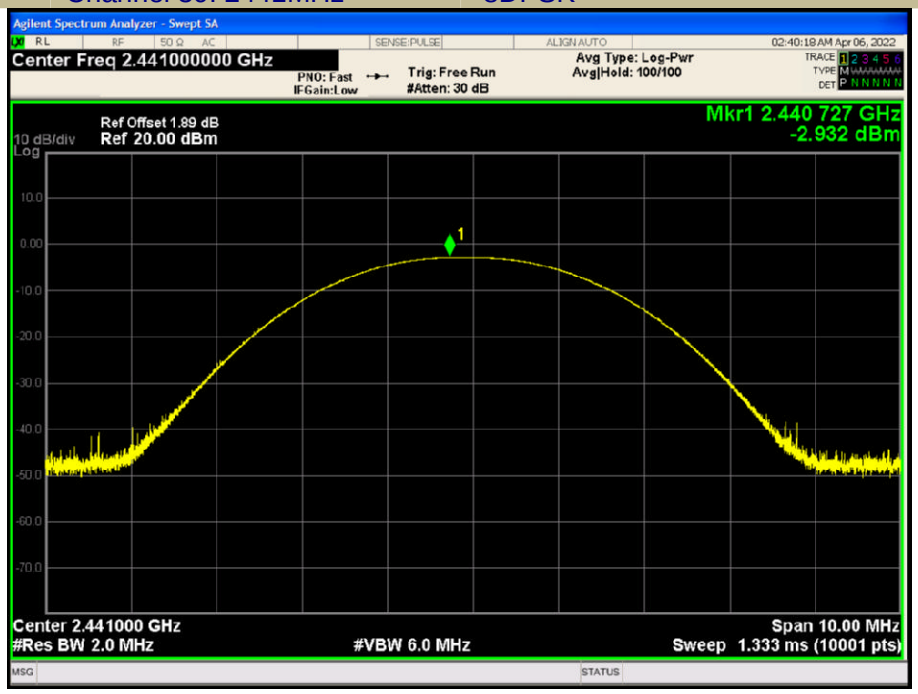
Test Model	Maximum Peak Conducted Output Power	
	Bluetooth V5.3	
	Channel 78: 2480MHz	pi/4-DQPSK



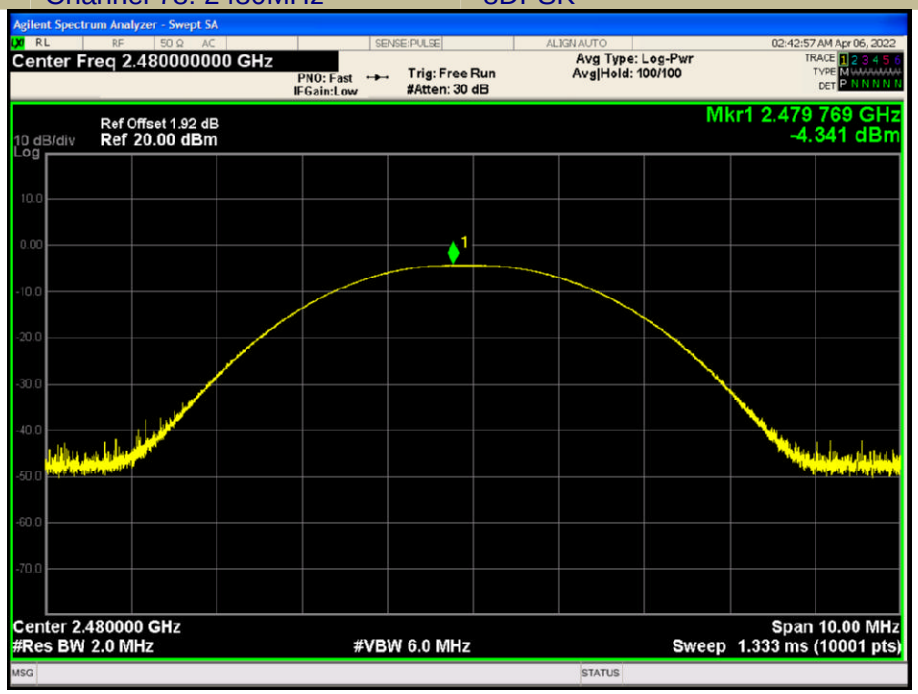
Test Model	Maximum Peak Conducted Output Power	
	Bluetooth V5.3	
	Channel 0: 2402MHz	8DPSK



Test Model	Maximum Peak Conducted Output Power	
	Bluetooth V5.3	
	Channel 39: 2441MHz	8DPSK



Test Model	Maximum Peak Conducted Output Power	
	Bluetooth V5.3	
	Channel 78: 2480MHz	8DPSK



8.6 CONDUCTED SUPRIOUS EMISSION

8.6.1 Applicable Standard

According to FCC Part 15.247(d) and KDB 558074 D01 15.247 MEAS GUIDANCE v05r02

8.6.2 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.

8.6.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

8.6.4 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 Maximum conduceted level.
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=100kHz Set VBW ≥ RBW
Set Sweep = auto Set Detector function = peak Set Trace = 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.

- **Conduceted Spurious RF Conducted Emission**

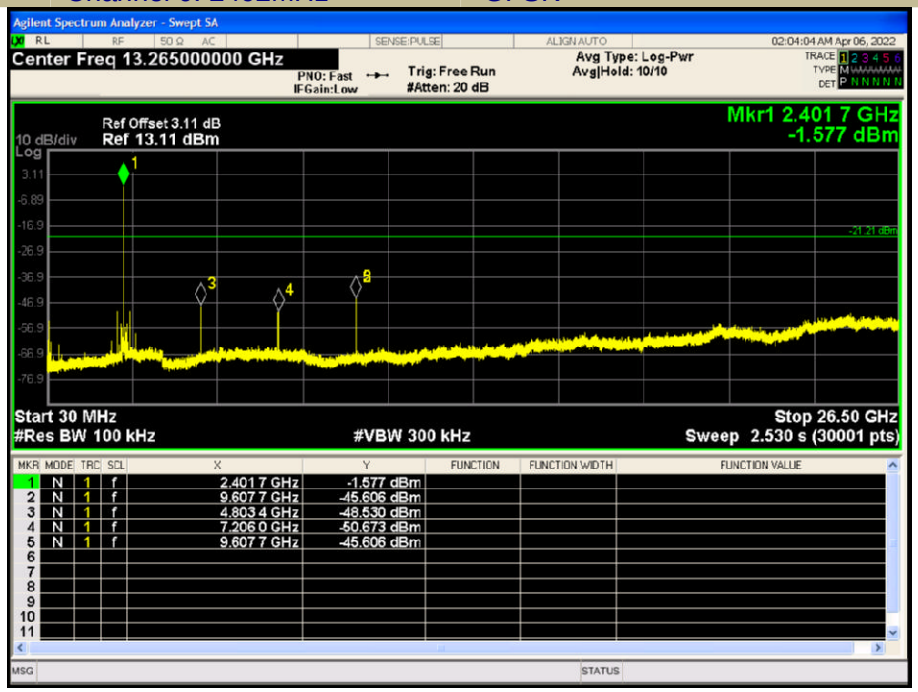
Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic.(30MHz to 25GHz). Set RBW = 100 kHz Set VBW ≥ RBW
Set Sweep = auto Set Detector function = peak Set Trace = 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.

8.6.5 Test Results

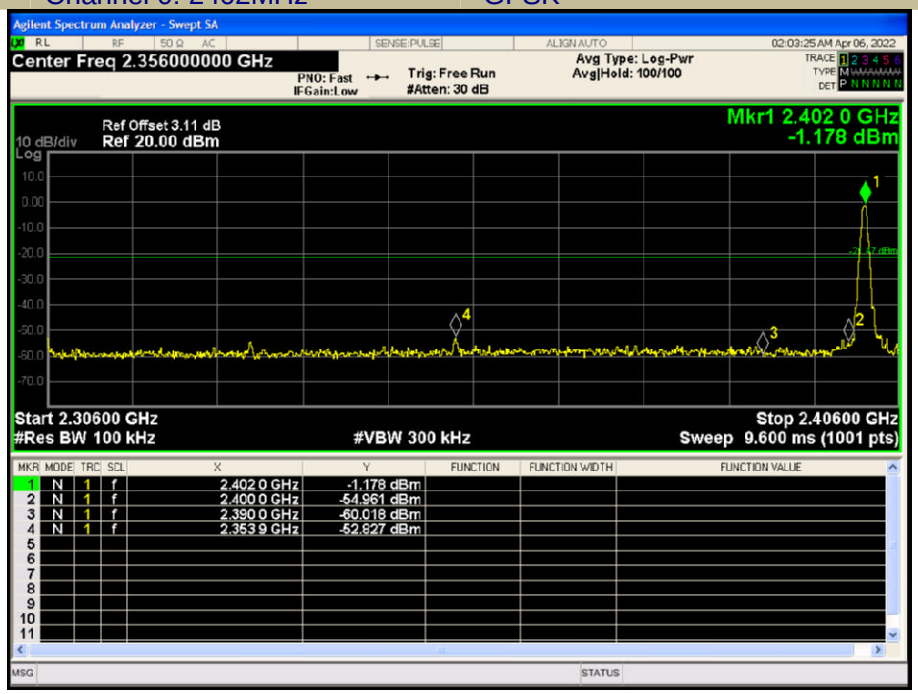
Bluetooth (GFSK, pi/4-DQPSK, 8DPSK) mode have been tested, and the worst result(GFSK) was report as below:

Test Model	Maximum Conduceted Level RBW=100kHz Bluetooth V5.3	
	Channel 0: 2402MHz	GFSK

Test Model	Conducted Spurious RF Conducted Emission Bluetooth V5.3	
	Channel 0: 2402MHz	GFSK

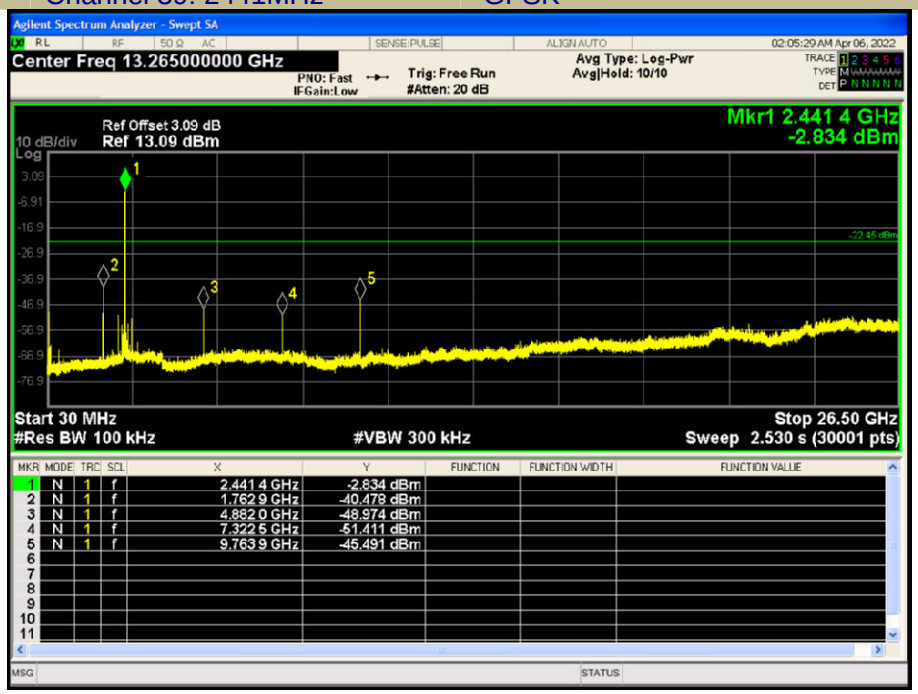


Test Model	Band-edge Conducted Emissions Bluetooth V5.3 Channel 0: 2402MHz GFSK



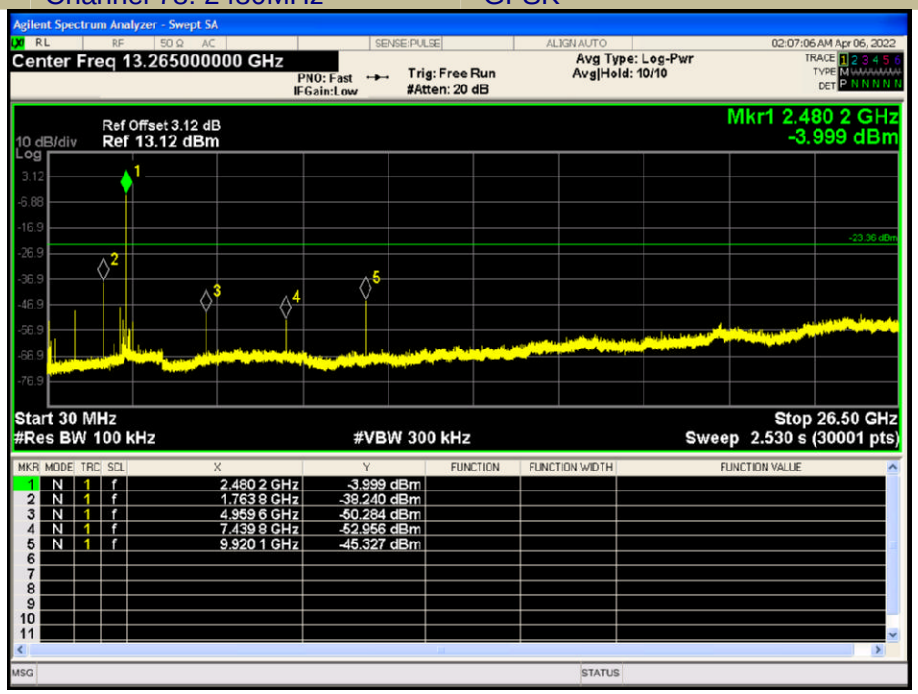
Test Model	Maximum Conduceted Level RBW=100kHz Bluetooth V5.3 Channel 39: 2441MHz GFSK

Test Model	Conducted Spurious RF Conducted Emission Bluetooth V5.3 Channel 39: 2441MHz GFSK

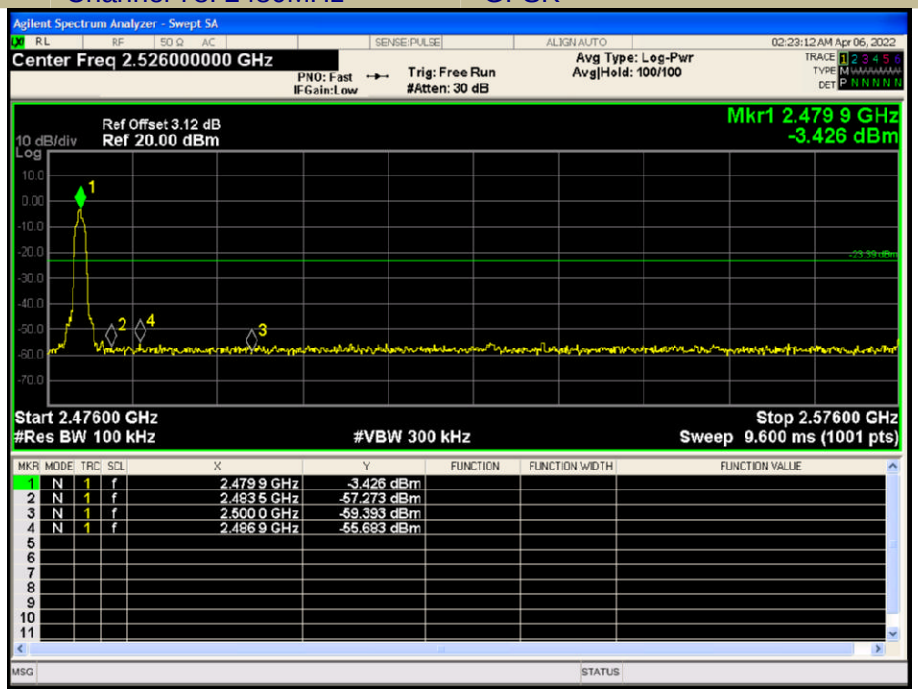


Test Model	Maximum Conducted Level RBW=100kHz Bluetooth V5.3 Channel 78: 2480MHz GFSK

Test Model	Conducted Spurious RF Conducted Emission Bluetooth V5.3 Channel 78: 2480MHz GFSK

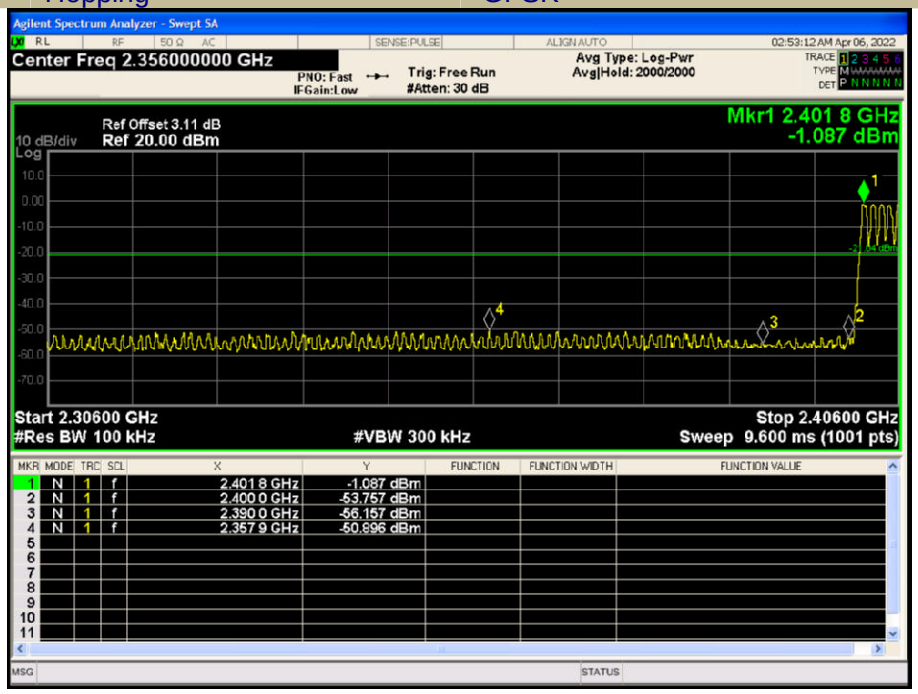


Test Model	Band-edge Conducted Emissions Bluetooth V5.3 Channel 78: 2480MHz GFSK



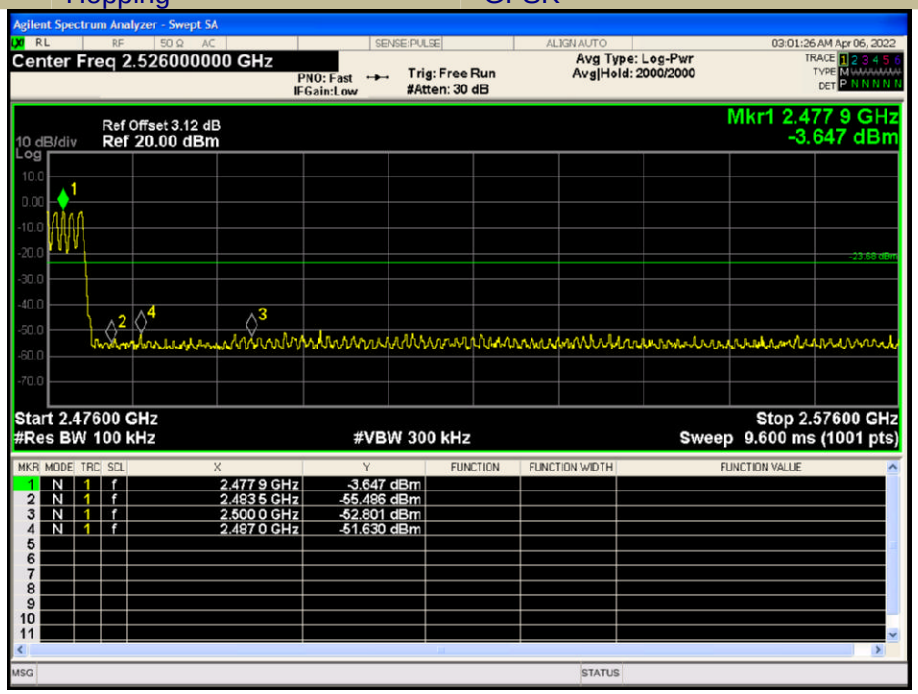
Test Model	Maximum Conduceted Level RBW=100kHz	
	Bluetooth V5.3	
	Hopping	GFSK

Test Model	Conduceted Spurious RF Conducted Emission	
	Bluetooth V5.3	
	Hopping	GFSK



Test Model	Band-edge Conducted Emissions	
	Bluetooth V5.3	
	Hopping	GFSK

Test Model	Band-edge Conducted Emissions	
	Bluetooth V5.3	
	Hopping	GFSK



8.7 RADIATED SPURIOUS EMISSION

8.7.1 Applicable Standard

According to FCC Part 15.247(d) and 15.209 and KDB 558074 D01 15.247 MEAS GUIDANCE v05r02

8.7.2 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	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

8.7.3 Test Configuration

Test according to clause 6.2 radio frequency test setup 2

8.7.4 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:
For Above 1GHz:
The EUT was placed on a turn table which is 1.5m 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
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
For Below 1GHz:
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 = 100 kHz for
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
For Below 30MHz:
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 = 9kHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
For Below 150KHz:
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 = 200Hz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Follow the guidelines in ANSI C63.10-2013 with 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.

8.7.5 Test Results

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

Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m) PK	Emission Level(dBuV/m) AV	Limit 3m(dBuV/m) PK	Limit 3m(dBuV/m) AV	Over(dB) PK	Over(dB) 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(GFSK) was report as below:

Test mode:	GFSK	Frequency:	Channel 0: 2402MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m) PK	Emission Level(dBuV/m) AV	Limit 3m(dBuV/m) PK	Limit 3m(dBuV/m) AV	Over(dB) PK	Over(dB) AV
4804.00	V	52.56	30.79	74	54	-21.44	-23.21
7206.00	V	50.33	30.72	74	54	-23.67	-23.28
10374.20	V	55.00	31.56	74	54	-19.00	-22.44
4007.23	H	65.89	38.93	74	54	-8.11	-15.07
4804.00	H	62.37	38.73	74	54	-11.63	-15.27
7206.00	H	57.36	37.28	74	54	-16.64	-16.72

Test mode:	GFSK	Frequency:	Channel 39: 2441MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m) PK	Emission Level(dBuV/m) AV	Limit 3m(dBuV/m) PK	Limit 3m(dBuV/m) AV	Over(dB) PK	Over(dB) AV
4882.00	V	57.25	34.45	74	54	-16.75	-19.55
7232.00	V	53.67	33.8	74	54	-20.33	-20.20
11987.21	V	56.58	33.28	74	54	-17.42	-20.72
4882.00	H	61.45	38.8	74	54	-12.55	-15.20
7323.25	H	60.73	35.4	74	54	-13.27	-18.60
11371.28	H	53.55	37.23	74	54	-20.45	-16.77

Test mode:	GFSK	Frequency:	Channel 78: 2480MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m) PK	Emission Level(dBuV/m) AV	Limit 3m(dBuV/m) PK	Limit 3m(dBuV/m) AV	Over(dB) PK	Over(dB) AV
4960.74	V	56.3	34.42	74	54	-17.70	-19.58
10065.54	V	53.12	32.79	74	54	-20.88	-21.21
14498.24	V	54.8	31.4	74	54	-19.20	-22.60
4960.02	H	66.38	44.1	74	54	-7.62	-9.90
7982.96	H	60.11	40.92	74	54	-13.89	-13.08
11284.52	H	56.38	34.52	74	54	-17.62	-19.48

Note: (1) All Readings are Peak Value (VBW=3MHz) and Peak Value (VBW=10Hz).
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.