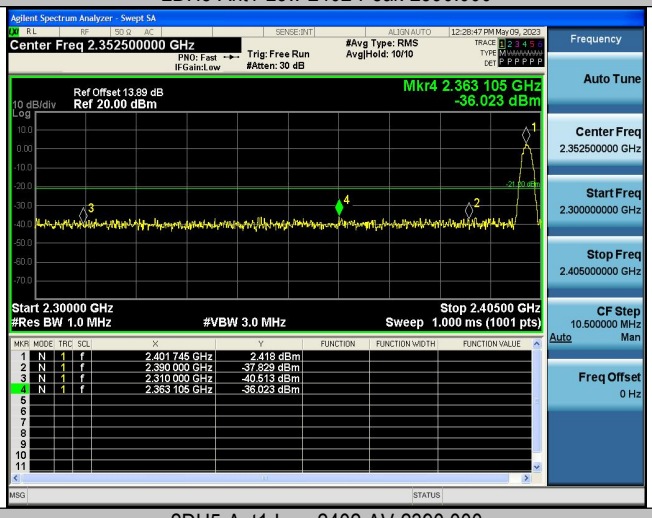
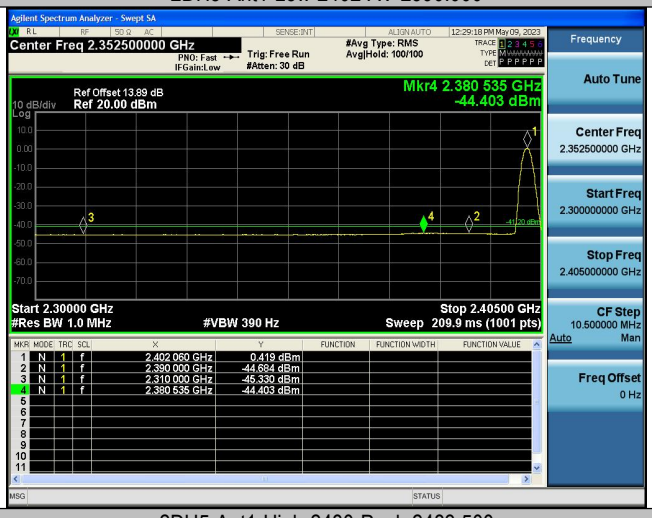
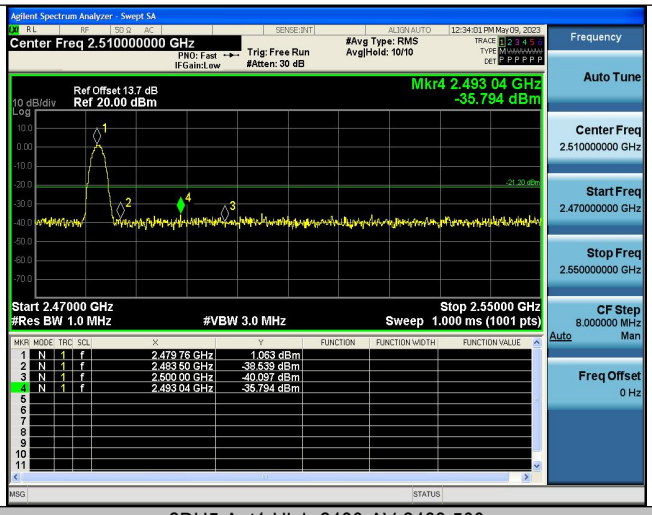
2DH5-Ant1-Low-2402-Peak-2390.000



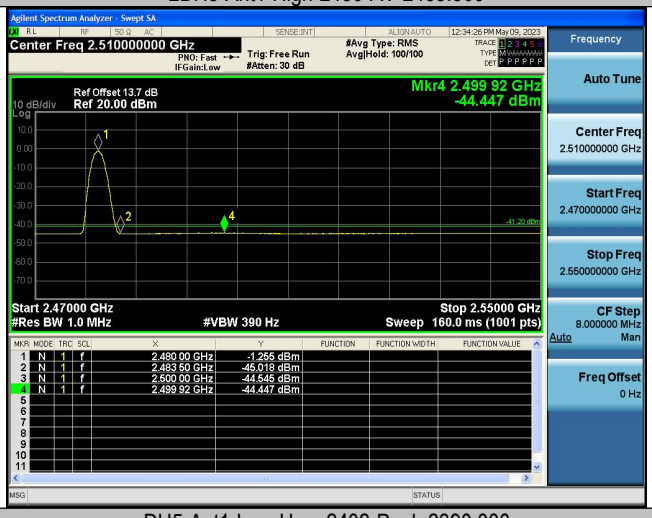
2DH5-Ant1-Low-2402-AV-2390.000



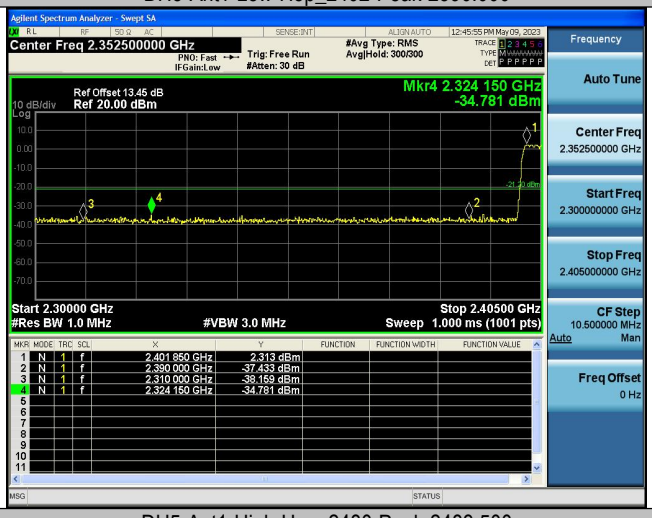
2DH5-Ant1-High-2480-Peak-2483.500



2DH5-Ant1-High-2480-AV-2483.500

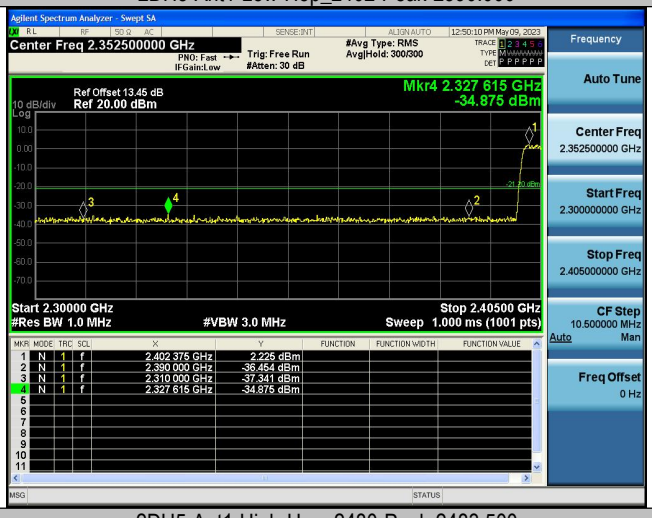


DH5-Ant1-Low-Hop_2402-Peak-2390.000



DH5-Ant1-High-Hop_2480-Peak-2483.500

2DH5-Ant1-Low-Hop_2402-Peak-2390.000



2DH5-Ant1-High-Hop_2480-Peak-2483.500

9 20 dB Bandwidth Measurement

Test Requirement : FCC CFR47 Part 15 Section 15.247

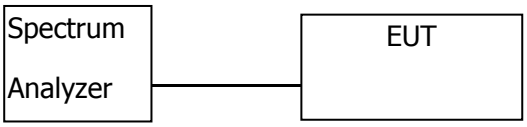
Test Method : ANSI C63.10:2013

9.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. Set the spectrum analyzer: RBW =30kHz, VBW = 100kHz

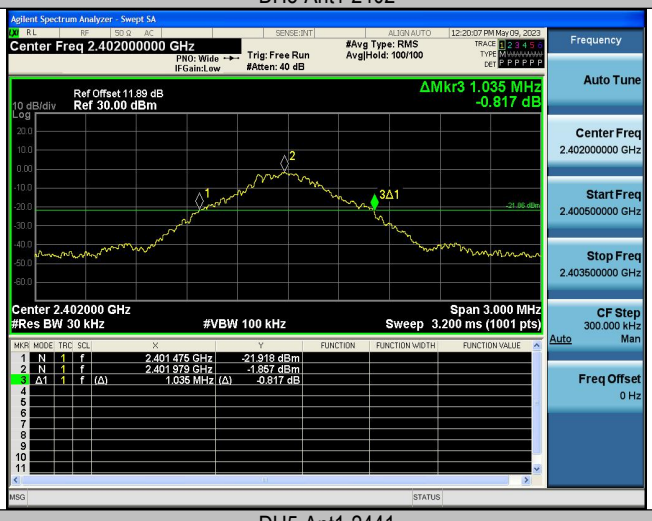
3.Set up:



9.2 Test Result

TestMode	Antenna	Frequency[MHz]	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	1.035	2401.475	2402.510	---	---
DH5	Ant1	2441	1.041	2440.466	2441.507	---	---
DH5	Ant1	2480	1.041	2479.466	2480.507	---	---
2DH5	Ant1	2402	1.347	2401.319	2402.666	---	---
2DH5	Ant1	2441	1.368	2440.301	2441.669	---	---
2DH5	Ant1	2480	1.404	2479.292	2480.696	---	---

DH5-Ant1-2402



DH5-Ant1-2441

DH5-Ant1-2480

2DH5-Ant1-2402

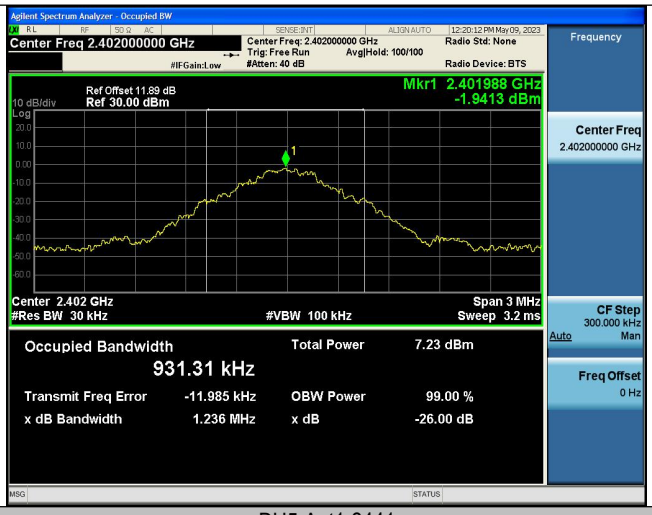
2DH5-Ant1-2441

2DH5-Ant1-2480

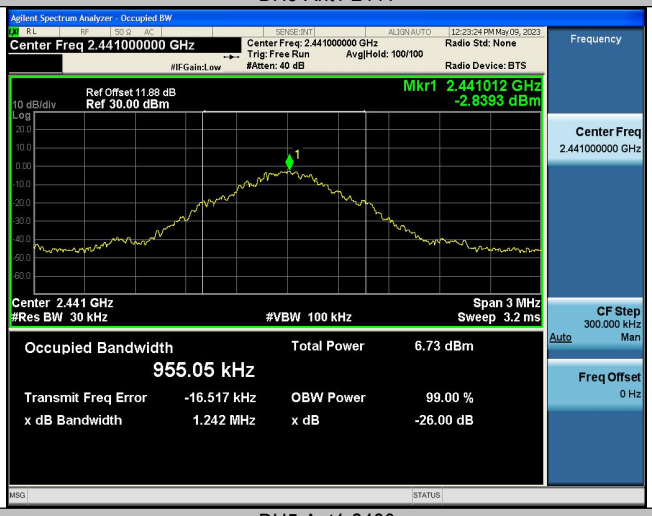
Occupied Channel Bandwidth

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.93131	2401.5224	2402.4537	---	---
DH5	Ant1	2441	0.95505	2440.5060	2441.4610	---	---
DH5	Ant1	2480	0.95586	2479.5066	2480.4624	---	---
2DH5	Ant1	2402	1.2343	2401.3731	2402.6074	---	---
2DH5	Ant1	2441	1.2492	2440.3739	2441.6231	---	---
2DH5	Ant1	2480	1.2245	2479.3786	2480.6031	---	---

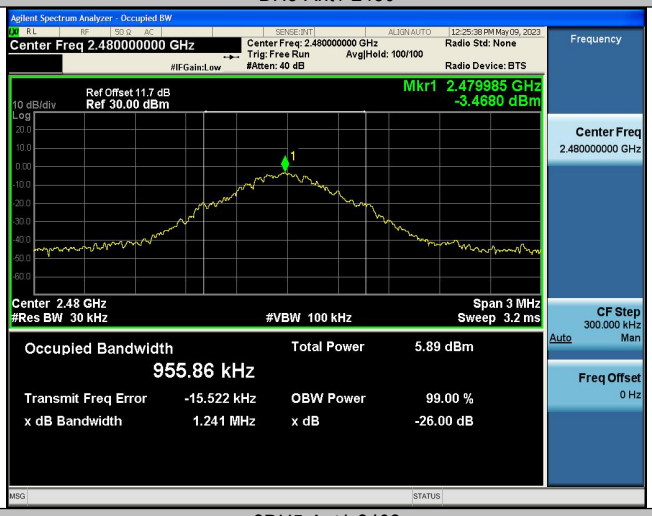
DH5-Ant1-2402



DH5-Ant1-2441

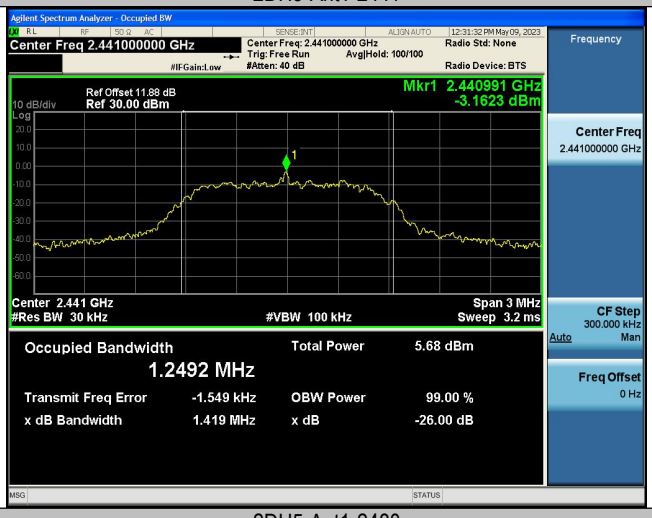


DH5-Ant1-2480



2DH5-Ant1-2402

2DH5-Ant1-2441



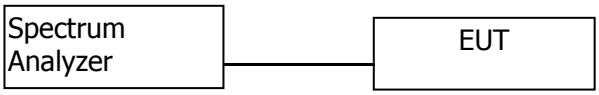
2DH5-Ant1-2480

10 Maximum Peak Output Power

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247 (b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band eploying at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt (30dBm). For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts. Refer to the result “Number of Hopping Frequency” of this document. The 0.125watts (20.97 dBm) limit applies.

10.1 Test Procedure

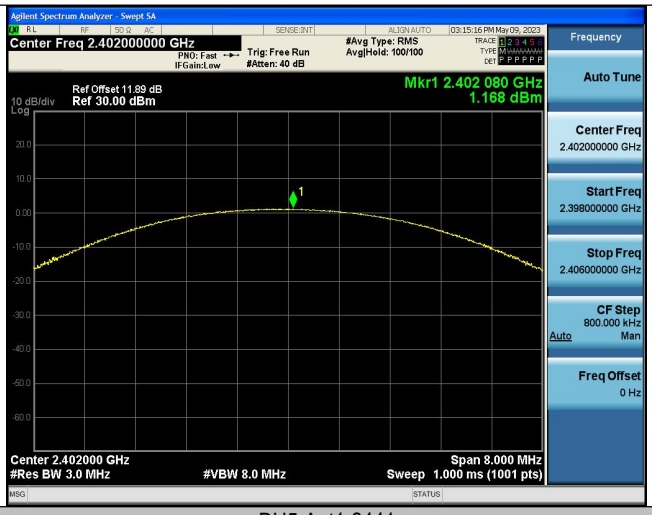
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyser: RBW = 3MHz. VBW =8MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.
4. Set up:



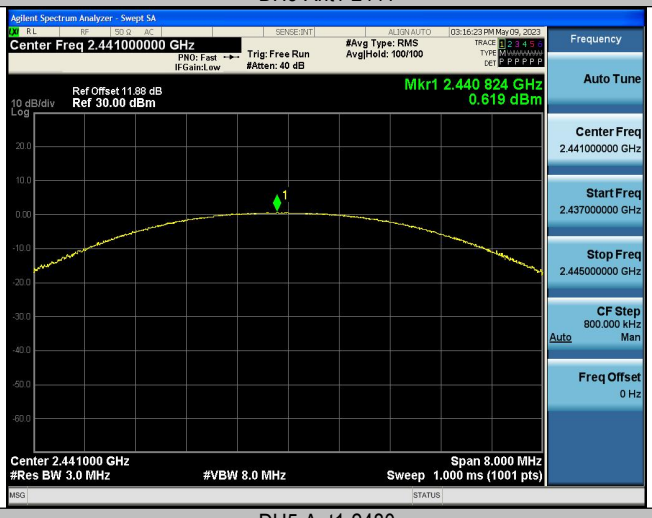
10.2 Test Result

Test Mode	Antenna	Frequency[MHz]	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant1	2402	1.17	≤20.97	PASS
DH5	Ant1	2441	0.62	≤20.97	PASS
DH5	Ant1	2480	-0.42	≤20.97	PASS
2DH5	Ant1	2402	1.77	≤20.97	PASS
2DH5	Ant1	2441	1.1	≤20.97	PASS
2DH5	Ant1	2480	0.06	≤20.97	PASS

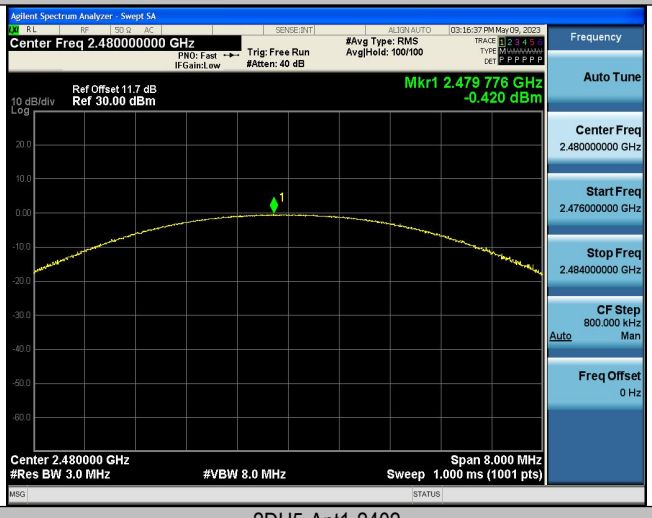
DH5-Ant1-2402



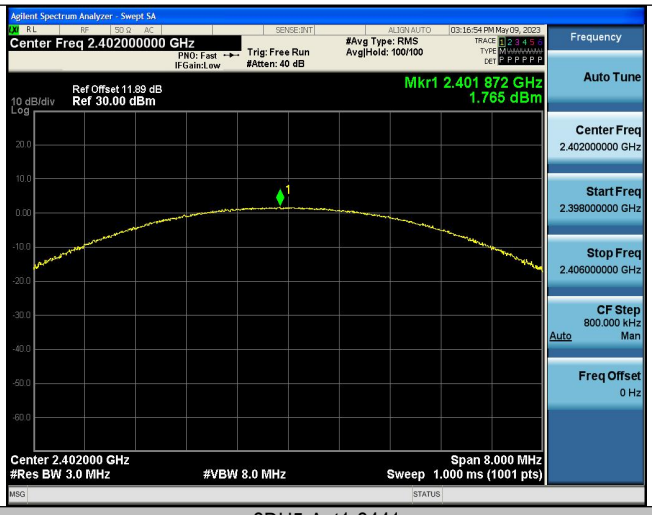
DH5-Ant1-2441



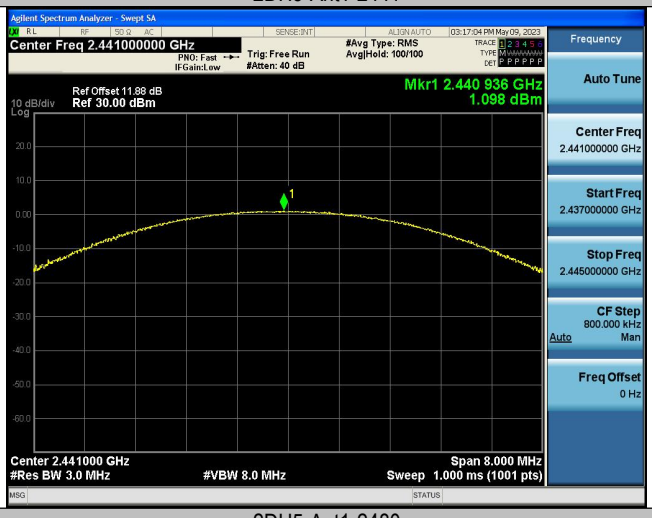
DH5-Ant1-2480



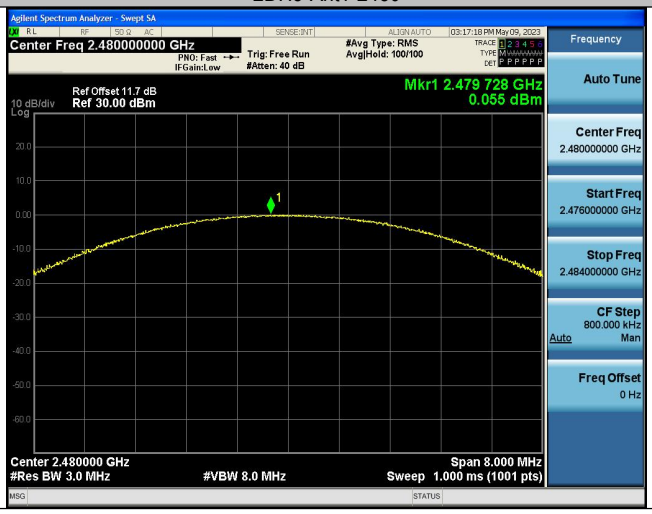
2DH5-Ant1-2402



2DH5-Ant1-2441



2DH5-Ant1-2480



11 Hopping Channel Separation

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 1W.
Test Mode	:	Hopping

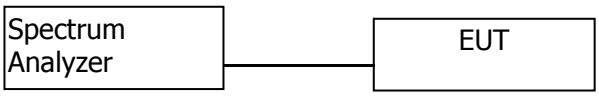
11.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer: RBW = 30KHz. VBW =100KHz, Span = 2.0MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

4. Set up:

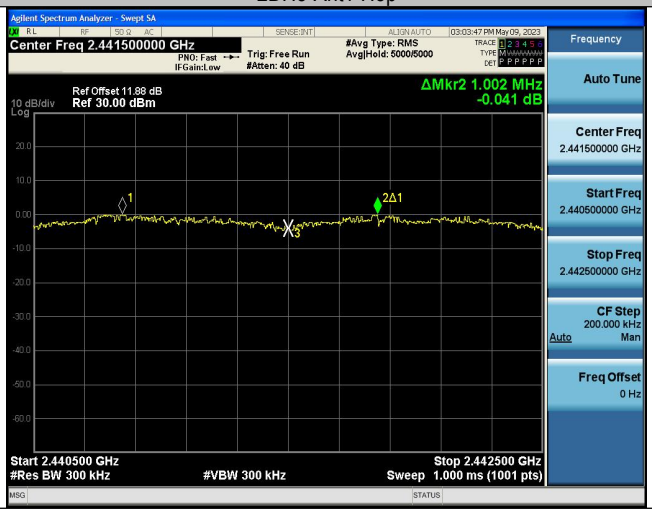


11.2 Test Result

TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	1.01	≥0.694	PASS
2DH5	Ant1	Hop	1.002	≥0.936	PASS

DH5-Ant1-Hop

2DH5-Ant1-Hop

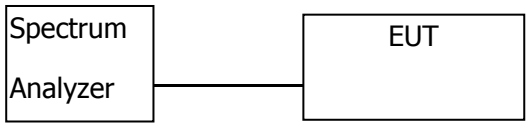


12 Number of Hopping Frequency

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247 (a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.
Test Mode	:	Hopping(GFSK)

12.1 Test Procedure

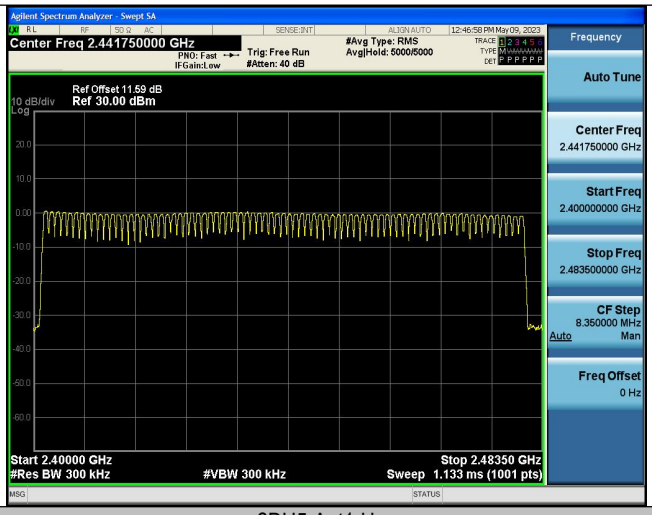
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100KHz. VBW = 300KHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.483GHz. Sweep=auto;
5. Set up:



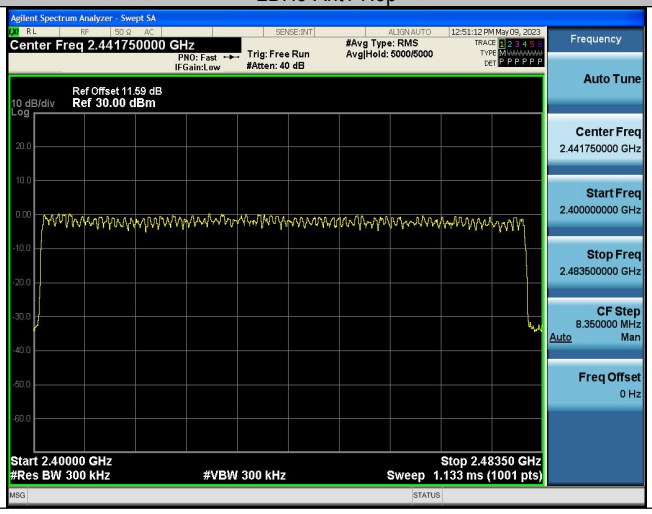
12.2 Test Result

TestMode	Antenna	Frequency[MHz]	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS

DH5-Ant1-Hop



2DH5-Ant1-Hop



13 Dwell Time

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.
Test Mode	:	The worst case(π/4-DQPSK) was recorded

13.1 Test Procedure

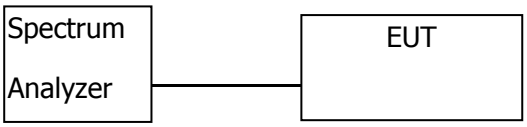
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set spectrum analyzer span = 0. Centred on a hopping channel;

3. Set RBW = 1MHz and VBW = 3MHz.Sweep = as necessary to capture the entire dwell time per hopping channel. Set the EUT for DH5, DH3 and DH1 packet transmitting.

4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

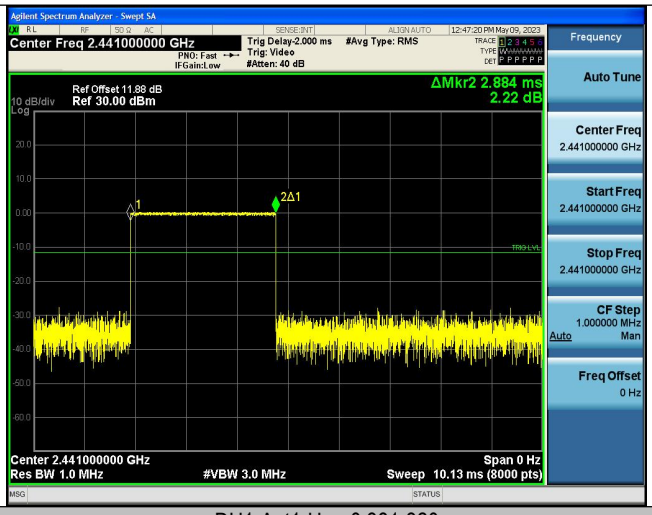
5. Set up:



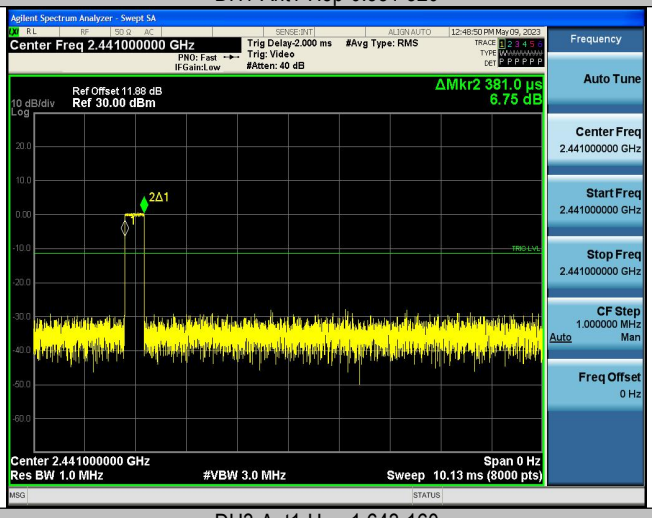
13.2 Test Result

TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.884	106.67	0.308	≤0.4	PASS
DH1	Ant1	Hop	0.381	320	0.122	≤0.4	PASS
DH3	Ant1	Hop	1.643	160	0.263	≤0.4	PASS
2DH5	Ant1	Hop	2.891	106.67	0.308	≤0.4	PASS
2DH1	Ant1	Hop	0.391	320	0.125	≤0.4	PASS
2DH3	Ant1	Hop	1.643	160	0.263	≤0.4	PASS

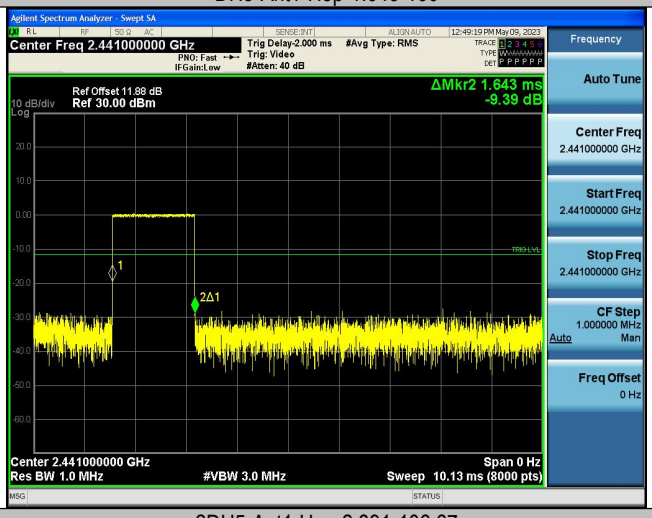
DH5-Ant1-Hop-2.884-106.67



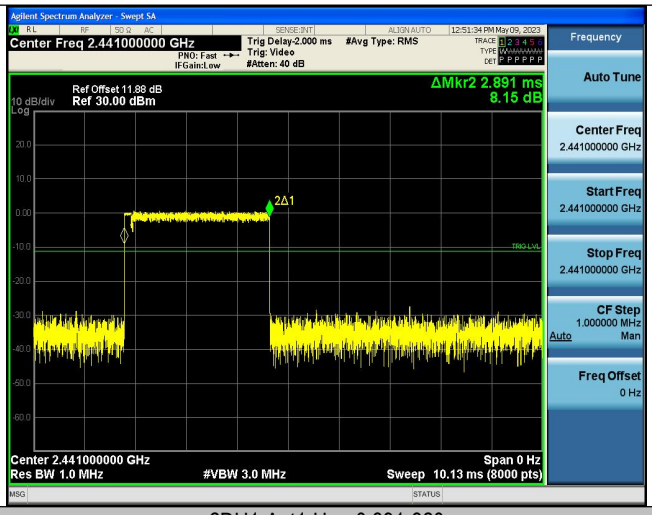
DH1-Ant1-Hop-0.381-320



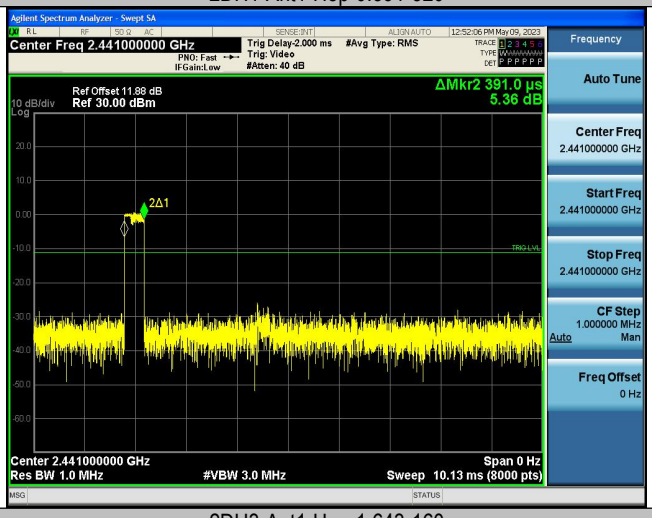
DH3-Ant1-Hop-1.643-160



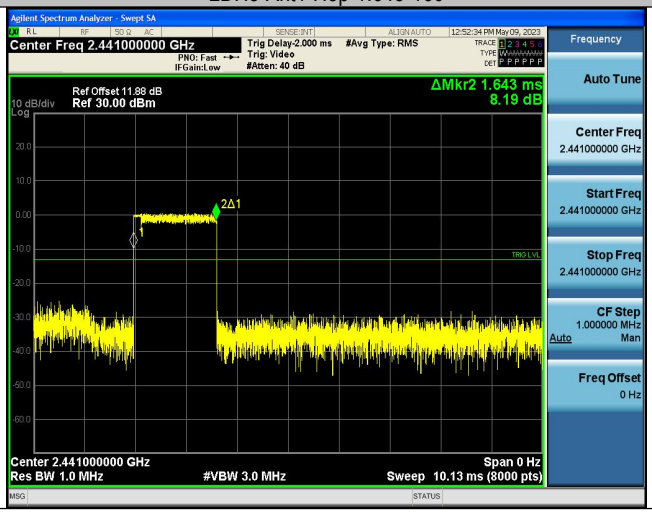
2DH5-Ant1-Hop-2.891-106.67



2DH1-Ant1-Hop-0.391-320



2DH3-Ant1-Hop-1.643-160



14 Antenna Requirement

14.1 Antenna Requirement

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.

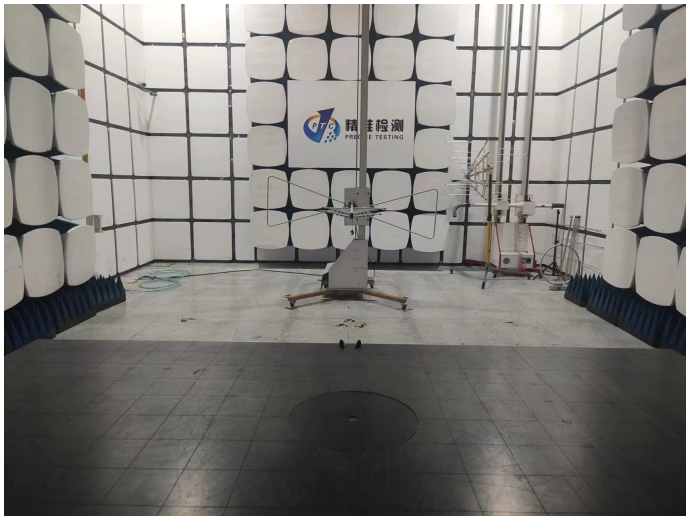
14.2 Result

The EUT'S antenna, permanent attached antenna, is Chip Antenna. The antenna's gain is 1.32dBi and meets the requirement.

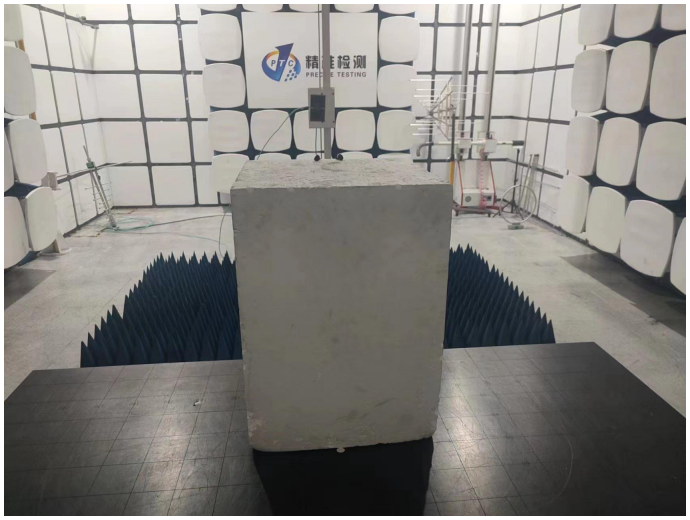
15 TEST PHOTOS

Conduction Emissions

Radiated Spurious Emissions
Test Frequency From 30MHz-1000MHz



Test Frequency above 1G



16 EUT PHOTOS

Reference EUT Photos

********THE END REPORT********