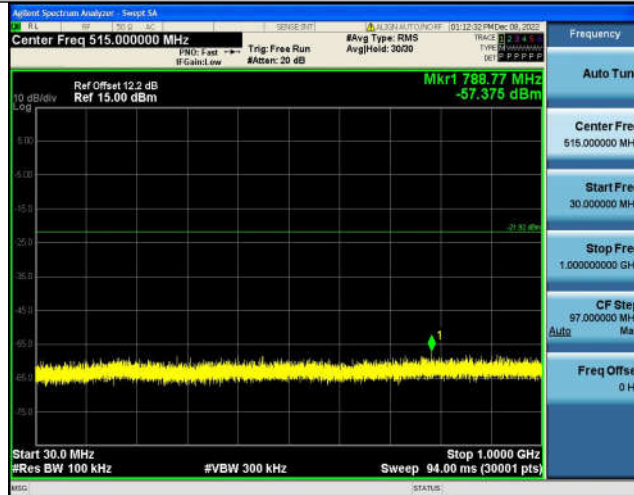
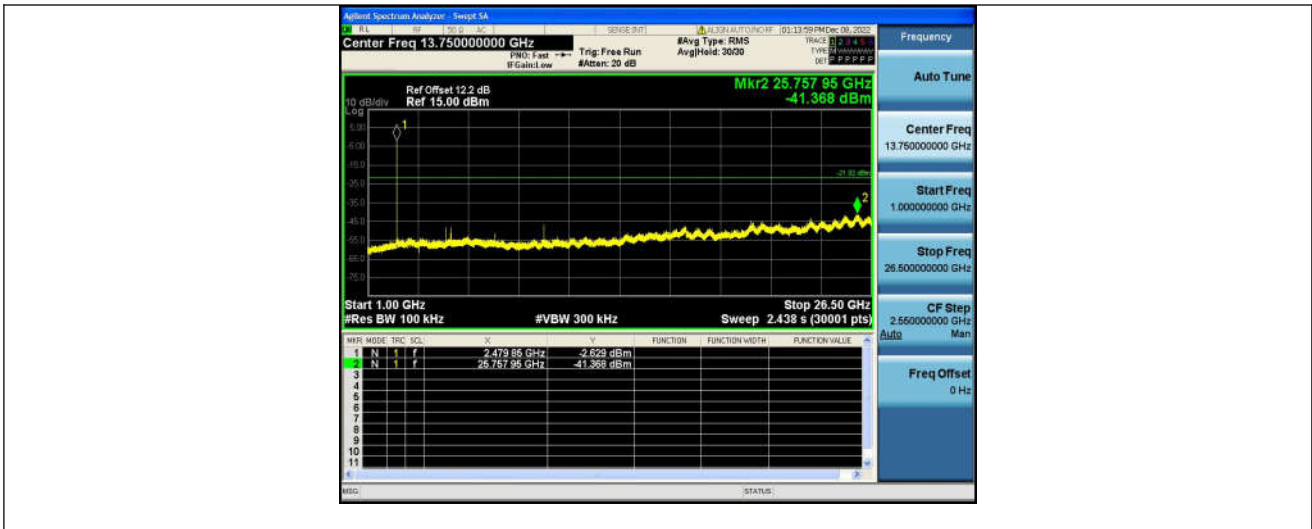




3DH5-Ant1-2480-30~1000-1.92



3DH5-Ant1-2480-1000-26500--1.92



Emissions in Restricted Bands

TestMode	Antenna	ChName	Frequenc y[MHz]	Detector	Freq [MHz]	Result [dBm]	Limit [dBm]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
DH5	Ant1	Low	2402	Peak	2390.000	-39.73	≤-21.20	55.47	≤74	PASS
DH5	Ant1	Low	2402	Peak	2310.000	-41.19	≤-21.20	54.01	≤74	PASS
DH5	Ant1	Low	2402	Peak	2345.570	-35.3	≤-21.20	59.90	≤74	PASS
DH5	Ant1	Low	2402	AV	2390.000	-44.99	≤-41.20	50.21	≤54	PASS
DH5	Ant1	Low	2402	AV	2310.000	-45.42	≤-41.20	49.78	≤54	PASS
DH5	Ant1	Low	2402	AV	2384.315	-44.91	≤-41.20	50.29	≤54	PASS
DH5	Ant1	High	2480	Peak	2483.500	-36.85	≤-21.20	58.35	≤74	PASS
DH5	Ant1	High	2480	Peak	2500.000	-41.63	≤-21.20	53.57	≤74	PASS
DH5	Ant1	High	2480	Peak	2496.720	-36.61	≤-21.20	58.59	≤74	PASS
DH5	Ant1	High	2480	AV	2483.500	-44.97	≤-41.20	50.23	≤54	PASS
DH5	Ant1	High	2480	AV	2500.000	-44.76	≤-41.20	50.44	≤54	PASS
DH5	Ant1	High	2480	AV	2499.680	-44.75	≤-41.20	50.45	≤54	PASS
2DH5	Ant1	Low	2402	Peak	2390.000	-40.01	≤-21.20	55.19	≤74	PASS
2DH5	Ant1	Low	2402	Peak	2310.000	-39.79	≤-21.20	55.41	≤74	PASS
2DH5	Ant1	Low	2402	Peak	2381.375	-33.53	≤-21.20	61.67	≤74	PASS
2DH5	Ant1	Low	2402	AV	2390.000	-44.92	≤-41.20	50.28	≤54	PASS
2DH5	Ant1	Low	2402	AV	2310.000	-45.38	≤-41.20	49.82	≤54	PASS
2DH5	Ant1	Low	2402	AV	2384.630	-44.85	≤-41.20	50.35	≤54	PASS
2DH5	Ant1	High	2480	Peak	2483.500	-39.66	≤-21.20	55.54	≤74	PASS
2DH5	Ant1	High	2480	Peak	2500.000	-38.75	≤-21.20	56.45	≤74	PASS
2DH5	Ant1	High	2480	Peak	2496.080	-34.7	≤-21.20	60.50	≤74	PASS
2DH5	Ant1	High	2480	AV	2483.500	-44.93	≤-41.20	50.27	≤54	PASS
2DH5	Ant1	High	2480	AV	2500.000	-44.73	≤-41.20	50.47	≤54	PASS
2DH5	Ant1	High	2480	AV	2499.760	-44.73	≤-41.20	50.47	≤54	PASS
3DH5	Ant1	Low	2402	Peak	2390.000	-39.74	≤-21.20	55.46	≤74	PASS
3DH5	Ant1	Low	2402	Peak	2310.000	-39.02	≤-21.20	56.18	≤74	PASS

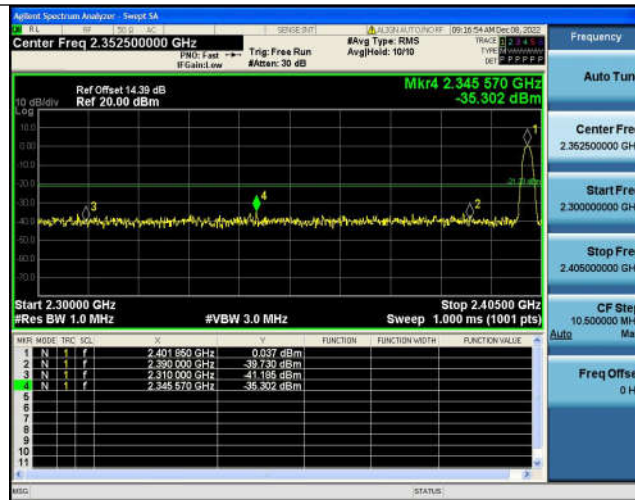


3DH5	Ant1	Low	2402	Peak	2374.970	-35.91	≤-21.20	59.29	≤74	PASS
3DH5	Ant1	Low	2402	AV	2390.000	-44.86	≤-41.20	50.34	≤54	PASS
3DH5	Ant1	Low	2402	AV	2310.000	-45.3	≤-41.20	49.90	≤54	PASS
3DH5	Ant1	Low	2402	AV	2383.475	-44.77	≤-41.20	50.43	≤54	PASS
3DH5	Ant1	High	2480	Peak	2483.500	-37.27	≤-21.20	57.93	≤74	PASS
3DH5	Ant1	High	2480	Peak	2500.000	-37.76	≤-21.20	57.44	≤74	PASS
3DH5	Ant1	High	2480	Peak	2489.680	-36.08	≤-21.20	59.12	≤74	PASS
3DH5	Ant1	High	2480	AV	2483.500	-44.82	≤-41.20	50.38	≤54	PASS
3DH5	Ant1	High	2480	AV	2500.000	-44.62	≤-41.20	50.58	≤54	PASS
3DH5	Ant1	High	2480	AV	2499.920	-44.61	≤-41.20	50.59	≤54	PASS
DH5	Ant1	Low	Hop_2402	Peak	2390.000	-35.93	≤-21.20	59.27	≤74	PASS
DH5	Ant1	Low	Hop_2402	Peak	2310.000	-37.09	≤-21.20	58.11	≤74	PASS
DH5	Ant1	Low	Hop_2402	Peak	2368.460	-34.54	≤-21.20	60.66	≤74	PASS
DH5	Ant1	High	Hop_2480	Peak	2483.500	-35.9	≤-21.20	59.30	≤74	PASS
DH5	Ant1	High	Hop_2480	Peak	2500.000	-36.28	≤-21.20	58.92	≤74	PASS
DH5	Ant1	High	Hop_2480	Peak	2498.640	-33.89	≤-21.20	61.31	≤74	PASS
2DH5	Ant1	Low	Hop_2402	Peak	2390.000	-35.87	≤-21.20	59.33	≤74	PASS
2DH5	Ant1	Low	Hop_2402	Peak	2310.000	-37.37	≤-21.20	57.83	≤74	PASS
2DH5	Ant1	Low	Hop_2402	Peak	2360.585	-34.56	≤-21.20	60.64	≤74	PASS
2DH5	Ant1	High	Hop_2480	Peak	2483.500	-35.37	≤-21.20	59.83	≤74	PASS
2DH5	Ant1	High	Hop_2480	Peak	2500.000	-36.89	≤-21.20	58.31	≤74	PASS
2DH5	Ant1	High	Hop_2480	Peak	2494.640	-33.69	≤-21.20	61.51	≤74	PASS
3DH5	Ant1	Low	Hop_2402	Peak	2390.000	-37.26	≤-21.20	57.94	≤74	PASS
3DH5	Ant1	Low	Hop_2402	Peak	2310.000	-35.52	≤-21.20	59.68	≤74	PASS
3DH5	Ant1	Low	Hop_2402	Peak	2382.635	-34.04	≤-21.20	61.16	≤74	PASS
3DH5	Ant1	High	Hop_2480	Peak	2483.500	-36.02	≤-21.20	59.18	≤74	PASS
3DH5	Ant1	High	Hop_2480	Peak	2500.000	-35.99	≤-21.20	59.21	≤74	PASS
3DH5	Ant1	High	Hop_2480	Peak	2491.760	-33.71	≤-21.20	61.49	≤74	PASS

Note:

1. The Antenna Gain is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

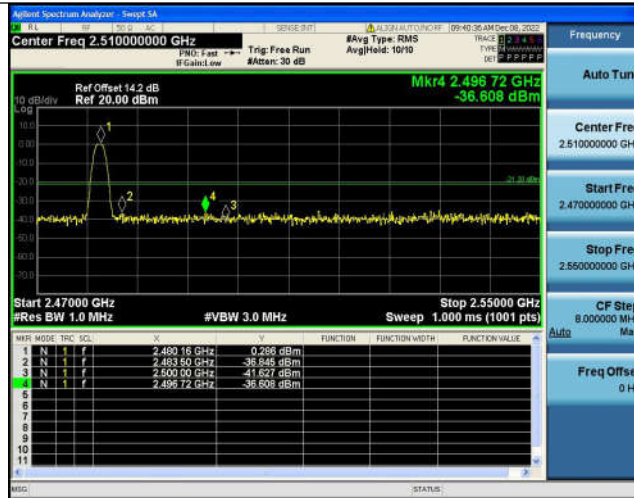
DH5-Ant1-Low-2402-Peak-2390.000



DH5-Ant1-Low-2402-AV-2390.000



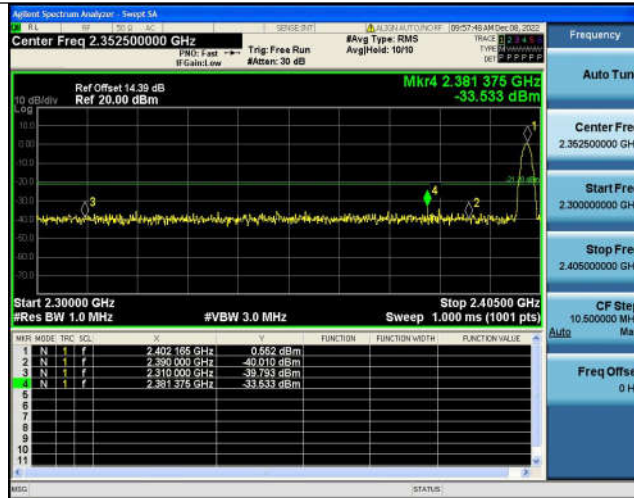
DH5-Ant1-High-2480-Peak-2483.500



DH5-Ant1-High-2480-AV-2483.500



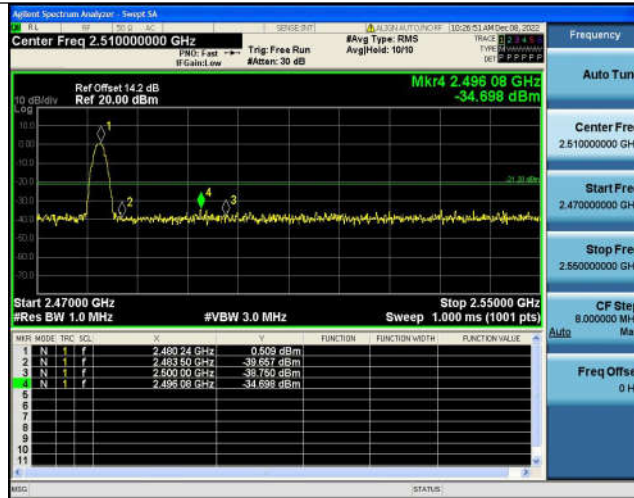
2DH5-Ant1-Low-2402-Peak-2390.000



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



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

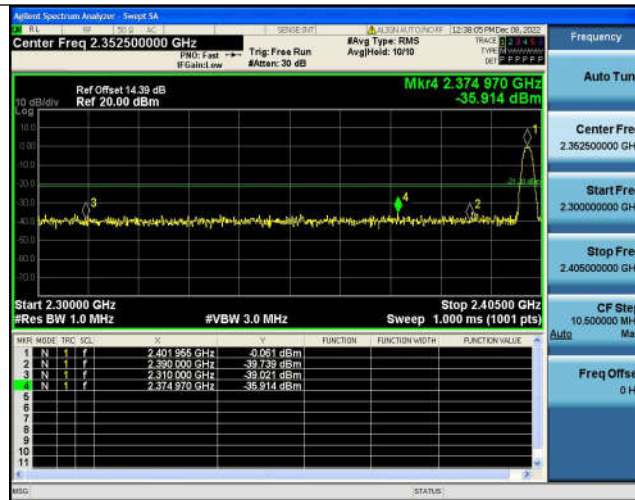


2DH5-Ant1-High-2480-AV-2483.500



3DH5-Ant1-Low-2402-Peak-2390.000



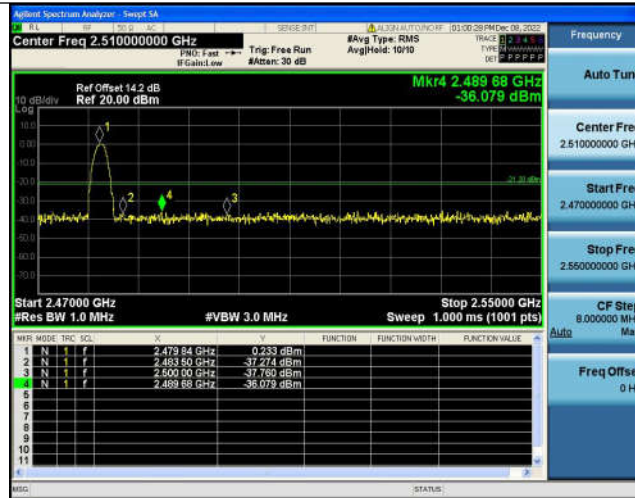


3DH5-Ant1-Low-2402-AV-2390.000



3DH5-Ant1-High-2480-Peak-2483.500





3DH5-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



2D5-Ant1-High-Hop\_2480-Peak-2483.500



3D5-Ant1-Low-Hop\_2402-Peak-2390.000



3DH5-Ant1-High-Hop\_2480-Peak-2483.500





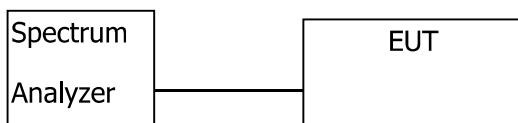
## 9 20 dB Bandwidth Measurement

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	0.942	2401.526	2402.468	--	--
DH5	Ant1	2441	1.005	2440.475	2441.480	--	--
DH5	Ant1	2480	1.005	2479.466	2480.471	--	--
2DH5	Ant1	2402	1.257	2401.361	2402.618	--	--
2DH5	Ant1	2441	1.344	2440.310	2441.654	--	--
2DH5	Ant1	2480	1.269	2479.355	2480.624	--	--
3DH5	Ant1	2402	1.362	2401.304	2402.666	--	--
3DH5	Ant1	2441	1.362	2440.301	2441.663	--	--
3DH5	Ant1	2480	1.314	2479.322	2480.636	--	--

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



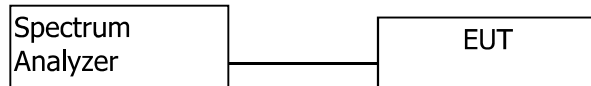


## 10 Maximum Peak Output Power

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 employing 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 Power[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant1	2402	-1.3	≤20.97	PASS
		2441	-1.21	≤20.97	PASS
		2480	-1.07	≤20.97	PASS
2DH5	Ant1	2402	-0.59	≤20.97	PASS
		2441	-0.67	≤20.97	PASS
		2480	-0.54	≤20.97	PASS
3DH5	Ant1	2402	-0.61	≤20.97	PASS
		2441	-0.65	≤20.97	PASS
		2480	-0.52	≤20.97	PASS



DH5-Ant1-2402



DH5-Ant1-2441



DH5-Ant1-2480



2DH5-Ant1-2402



2DH5-Ant1-2441



2DH5-Ant1-2480



3DH5-Ant1-2402

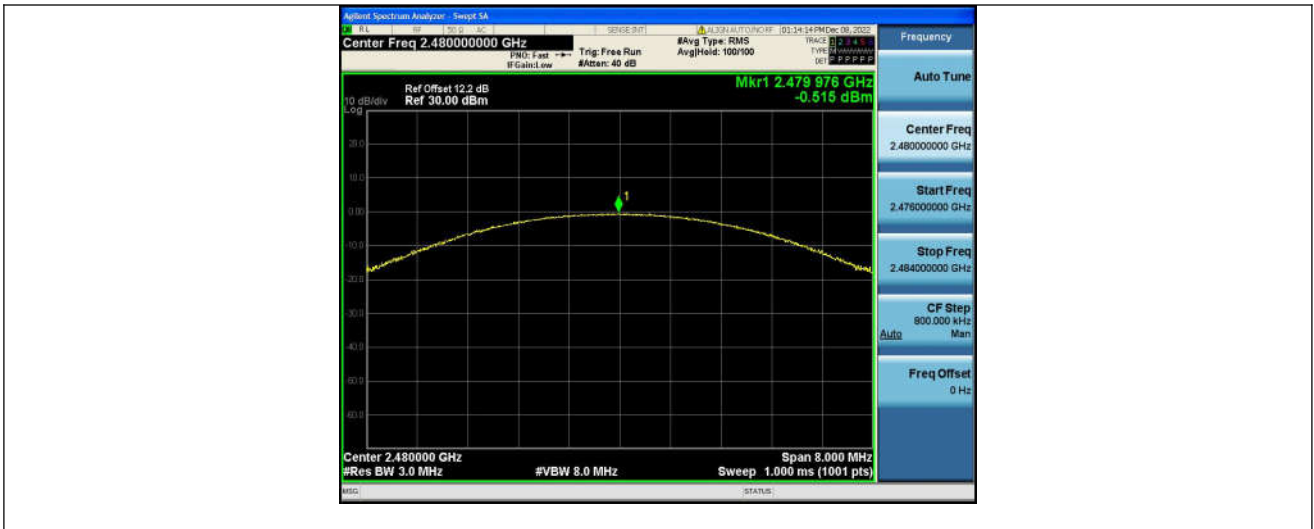




3DH5-Ant1-2441



3DH5-Ant1-2480





## 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

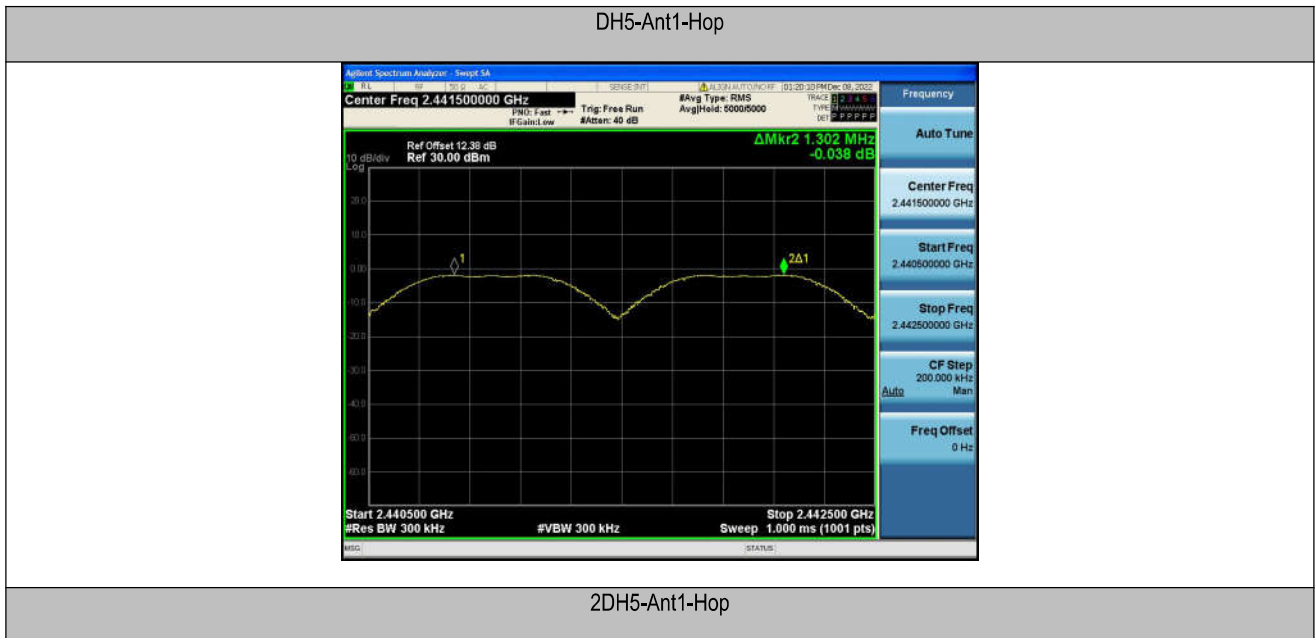
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 30KHz. VBW = 100KHz, Span = 2.0MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to 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:

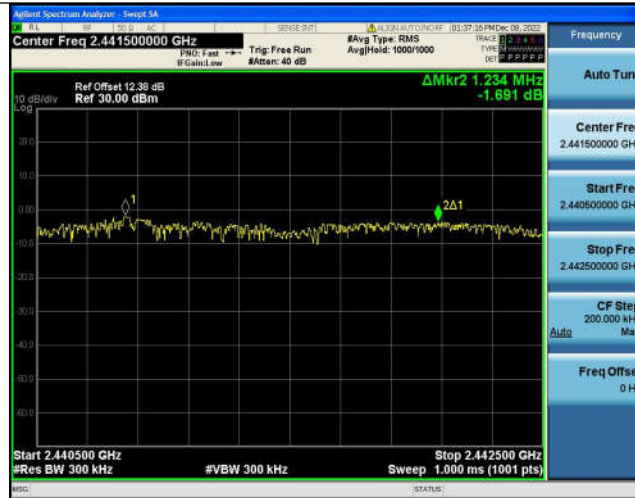




### 11.2 Test Result

TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	1.302	≥1.005	PASS
2DH5	Ant1	Hop	1.234	≥0.896	PASS
3DH5	Ant1	Hop	1.086	≥0.908	PASS





3DH5-Ant1-Hop



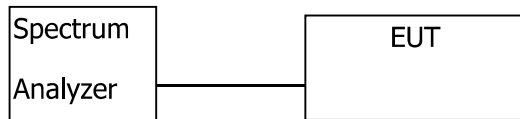


## 12 Number of Hopping Frequency

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

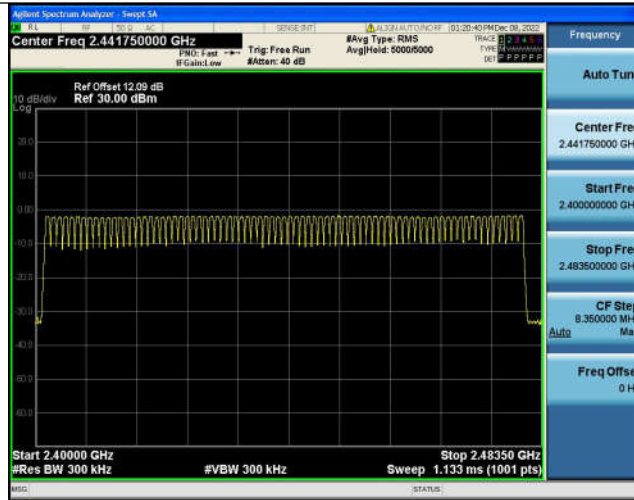
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100KHz. VBW = 300KHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to 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:



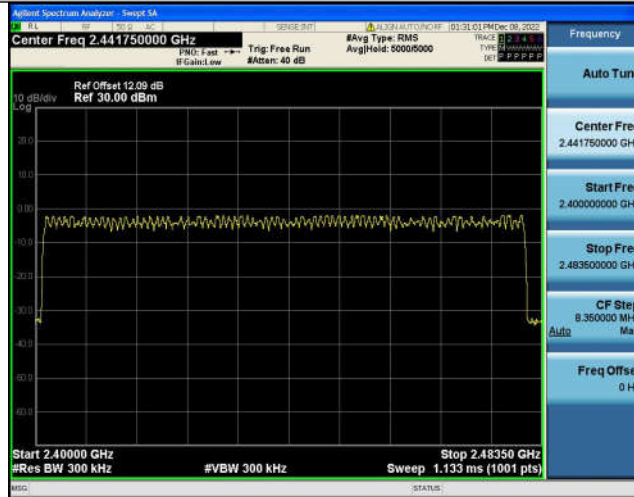
### 12.2 Test Result

TestMode	Antenna	Frequency[MHz]	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS
3DH5	Ant1	Hop	79	≥15	PASS

DH5-Ant1-Hop

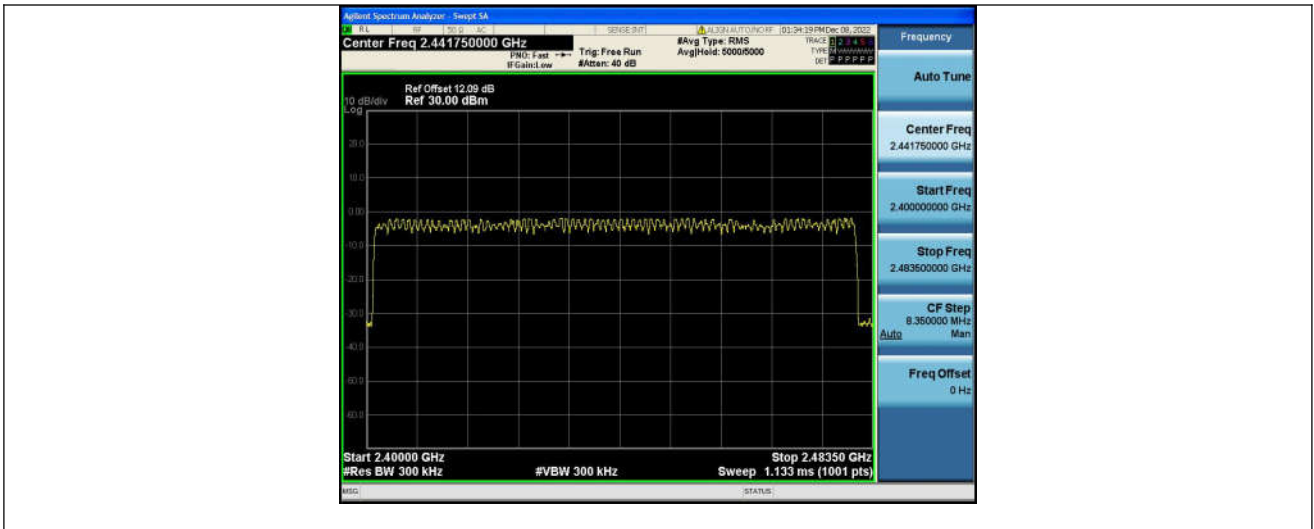


2DH5-Ant1-Hop



3DH5-Ant1-Hop





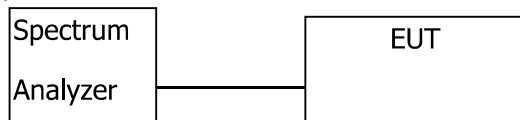


### 13 Dwell Time

- 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( $\pi/4$ -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
DH1	Ant1	Hop	2.885	106.67	0.308	≤0.4	PASS
DH3	Ant1	Hop	0.384	320	0.123	≤0.4	PASS
DH5	Ant1	Hop	1.639	160	0.262	≤0.4	PASS
2DH1	Ant1	Hop	2.891	106.67	0.308	≤0.4	PASS
2DH3	Ant1	Hop	2.891	106.67	0.308	≤0.4	PASS
2DH5	Ant1	Hop	0.393	320	0.126	≤0.4	PASS

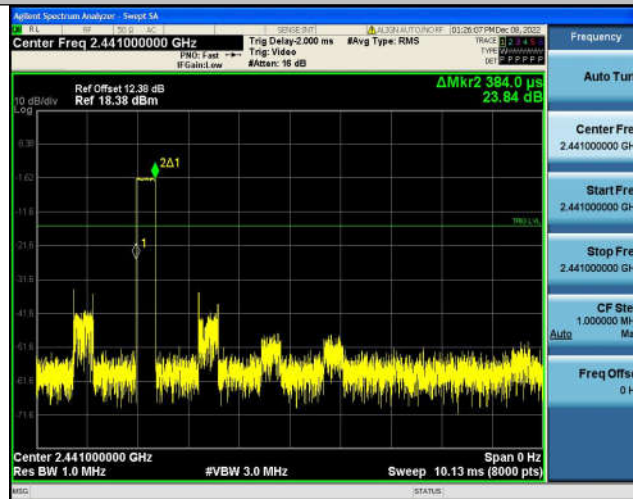


3DH1	Ant1	Hop	0.393	320	0.126	≤0.4	PASS
3DH3	Ant1	Hop	1.643	160	0.263	≤0.4	PASS
3DH5	Ant1	Hop	1.645	160	0.263	≤0.4	PASS

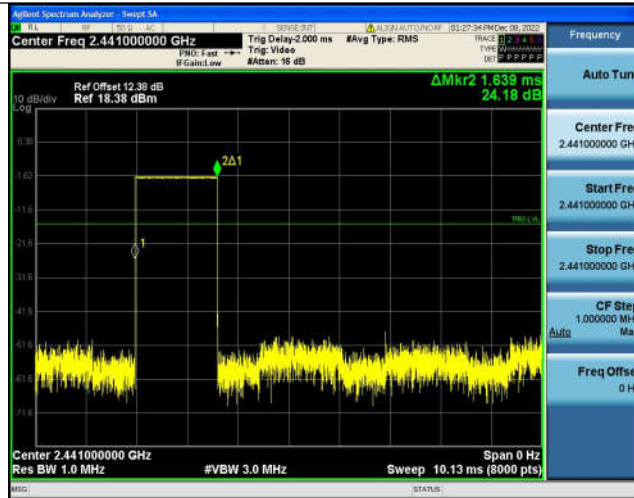
DH5-Ant1-Hop-2.885-106.67



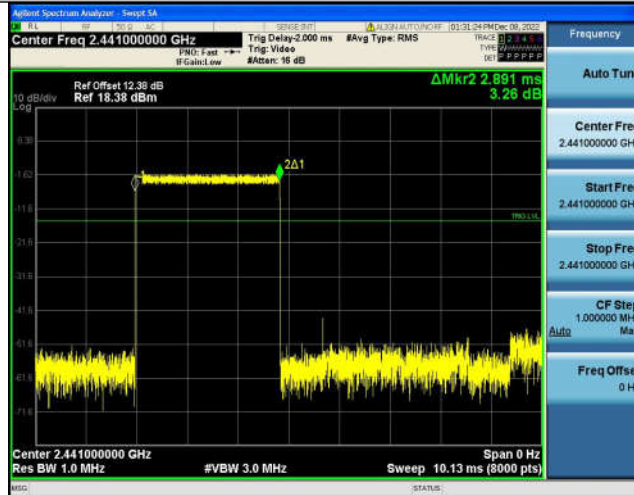
DH1-Ant1-Hop-0.384-320



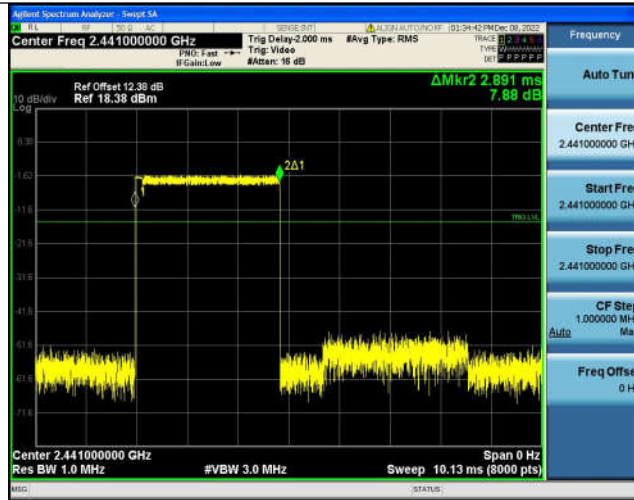
DH3-Ant1-Hop-1.639-160



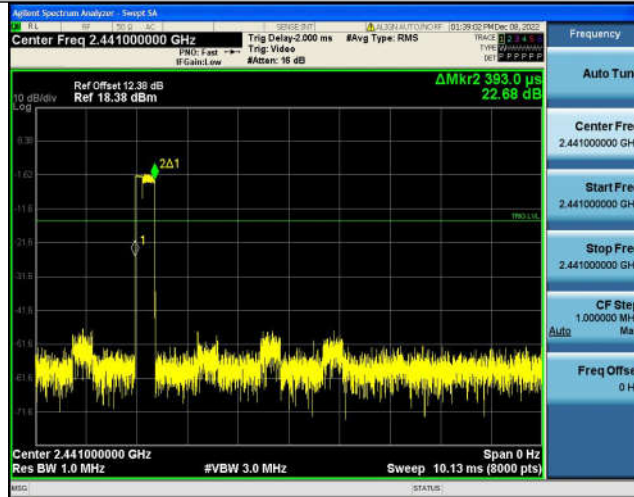
2DH5-Ant1-Hop-2.891-106.67



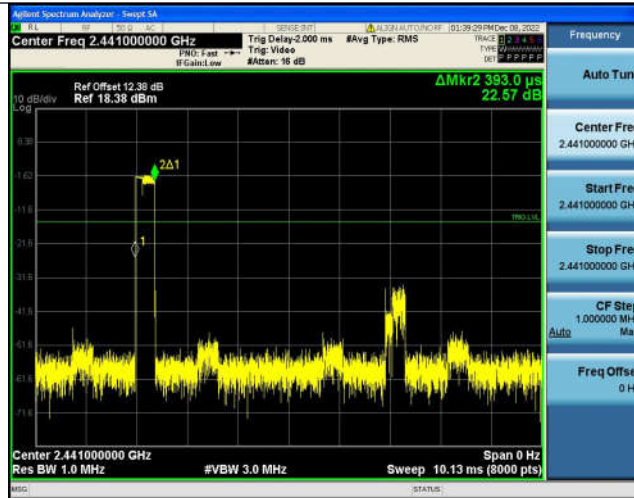
3DH5-Ant1-Hop-2.891-106.67



2DH1-Ant1-Hop-0.393-320



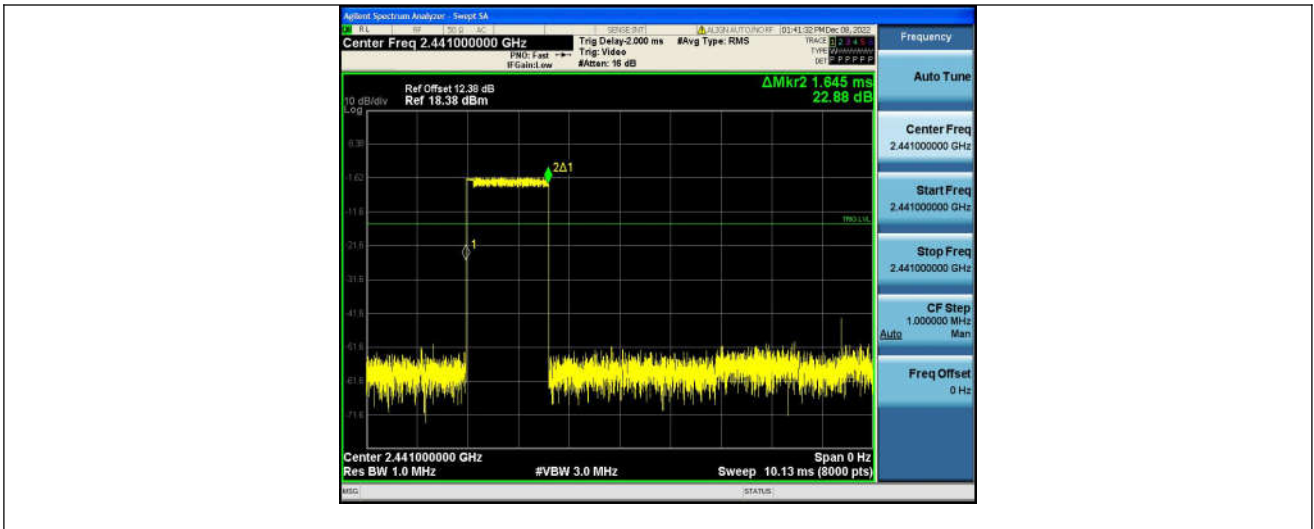
3DH1-Ant1-Hop-0.393-320



2DH3-Ant1-Hop-1.643-160



3DH3-Ant1-Hop-1.645-160







## **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**

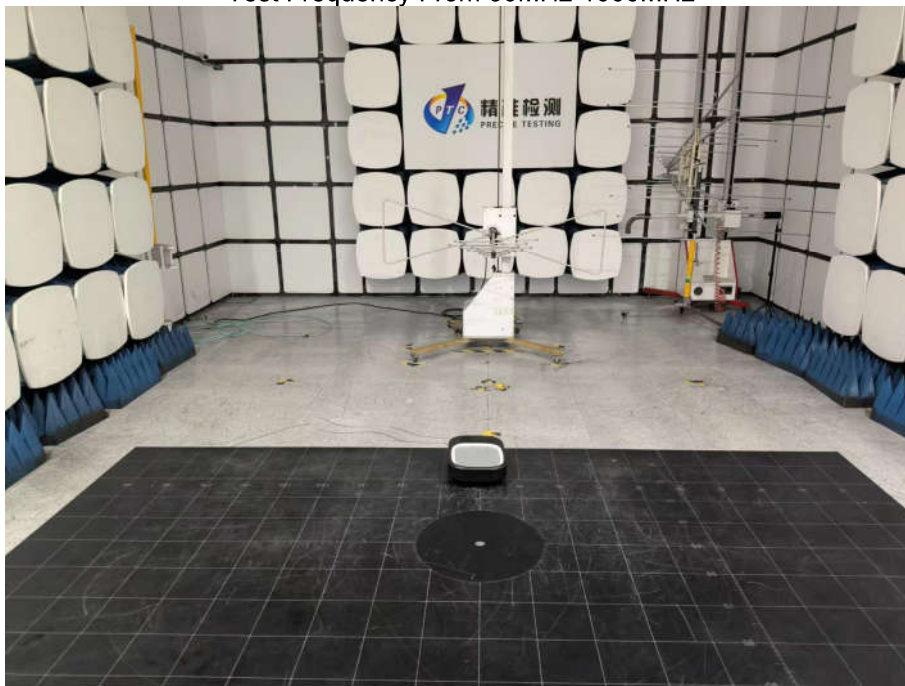
The EUT'S antenna, permanent attached antenna, is Pcb Antenna. The antenna's gain is -0.58dBi and meets the requirement.

## 15 TEST PHOTOS

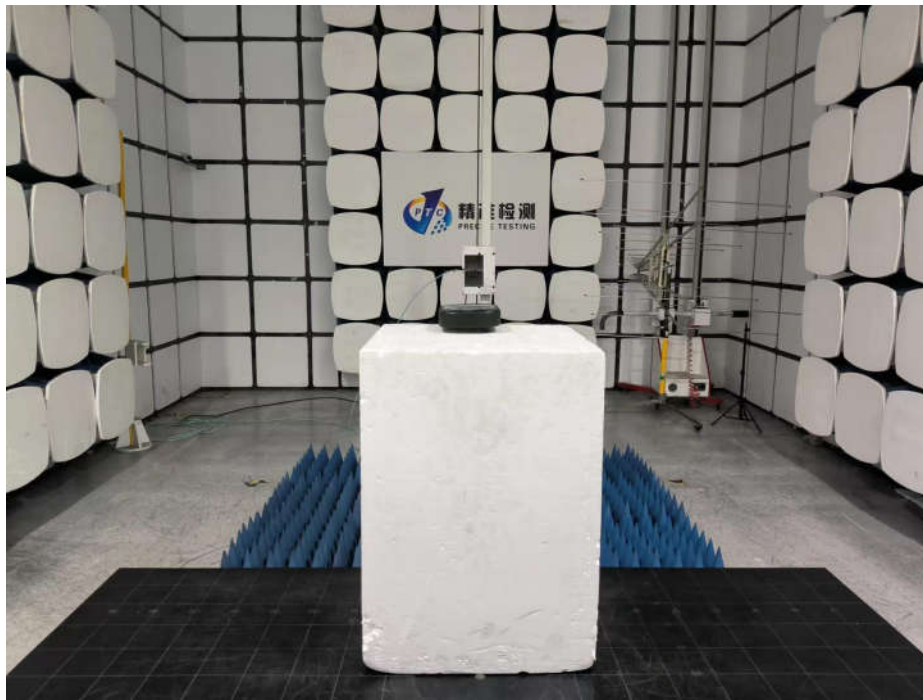
Conduction Emissions



Radiated Spurious Emissions  
Test Frequency From 30MHz-1000MHz



Test Frequency above 1G





Report No.: PTC22112207404E-FC01

## 16 EUT PHOTOS

Reference EUT Photos

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