



3DH5-Ant1-High-Hop_2480-Peak-2483.500





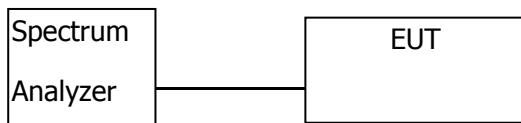
9 20 dB Bandwidth Measurement

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 | 0.960 | 2401.520 | 2402.480 | --- | --- |
| DH5 | Ant1 | 2441 | 0.960 | 2440.511 | 2441.471 | --- | --- |
| DH5 | Ant1 | 2480 | 0.969 | 2479.514 | 2480.483 | --- | --- |
| 2DH5 | Ant1 | 2402 | 1.284 | 2401.352 | 2402.636 | --- | --- |
| 3DH5 | Ant1 | 2402 | 1.287 | 2401.349 | 2402.636 | --- | --- |
| 2DH5 | Ant1 | 2441 | 1.311 | 2440.325 | 2441.636 | --- | --- |
| 3DH5 | Ant1 | 2441 | 1.332 | 2440.316 | 2441.648 | --- | --- |
| 2DH5 | Ant1 | 2480 | 1.377 | 2479.295 | 2480.672 | --- | --- |
| 3DH5 | Ant1 | 2480 | 1.278 | 2479.352 | 2480.630 | --- | --- |

DH5-Ant1-2402



DH5-Ant1-2441



DH5-Ant1-2480



2DH5-Ant1-2402



3DH5-Ant1-2402



2DH5-Ant1-2441



3DH5-Ant1-2441



2DH5-Ant1-2480



3DH5-Ant1-2480



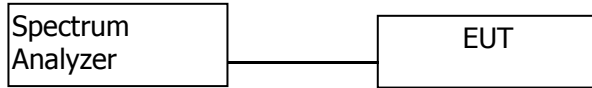


10 Maximum Peak Output Power

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 | -1.37 | ≤20.97 | PASS |
| DH5 | Ant1 | 2441 | -1.31 | ≤20.97 | PASS |
| DH5 | Ant1 | 2480 | -1.1 | ≤20.97 | PASS |
| 2DH5 | Ant1 | 2402 | -0.67 | ≤20.97 | PASS |
| 3DH5 | Ant1 | 2402 | -0.66 | ≤20.97 | PASS |
| 2DH5 | Ant1 | 2441 | -0.62 | ≤20.97 | PASS |
| 3DH5 | Ant1 | 2441 | -0.58 | ≤20.97 | PASS |
| 2DH5 | Ant1 | 2480 | -0.52 | ≤20.97 | PASS |



| | | | | | |
|------|------|------|-------|--------|------|
| 3DH5 | Ant1 | 2480 | -0.58 | ≤20.97 | PASS |
|------|------|------|-------|--------|------|

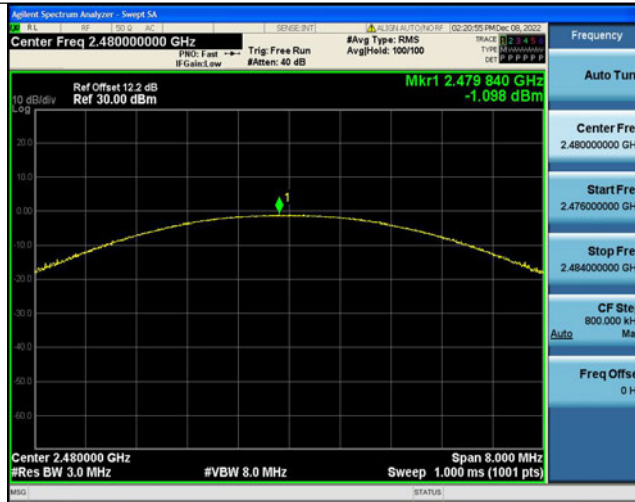
DH5-Ant1-2402



DH5-Ant1-2441



DH5-Ant1-2480



2DH5-Ant1-2402



3DH5-Ant1-2402



2DH5-Ant1-2441



3DH5-Ant1-2441



2DH5-Ant1-2480



3DH5-Ant1-2480



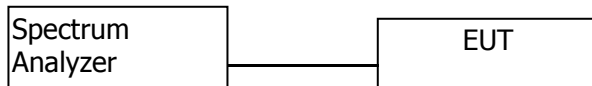


11 Hopping Channel Separation

| | |
|------------------|---|
| 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 | 0.674 | ≥0.646 | PASS |
| 2DH5 | Ant1 | Hop | 1.032 | ≥0.918 | PASS |
| 3DH5 | Ant1 | Hop | 1.024 | ≥0.888 | PASS |

DH5-Ant1-Hop



2DH5-Ant1-Hop



3DH5-Ant1-Hop



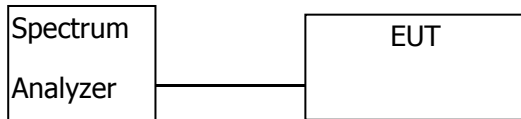


12 Number of Hopping Frequency

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

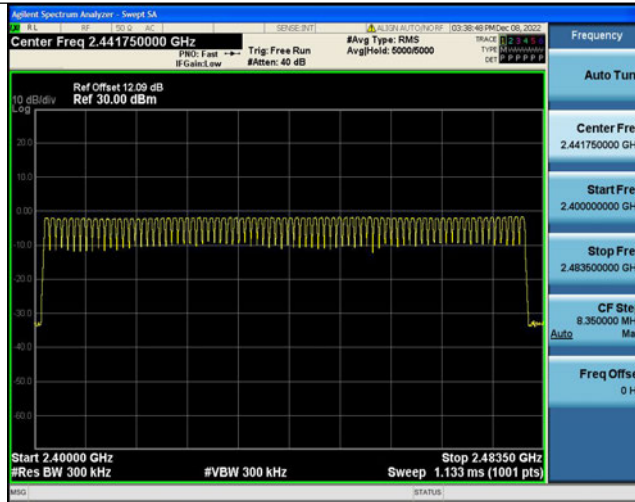
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100KHz. VBW = 300KHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to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



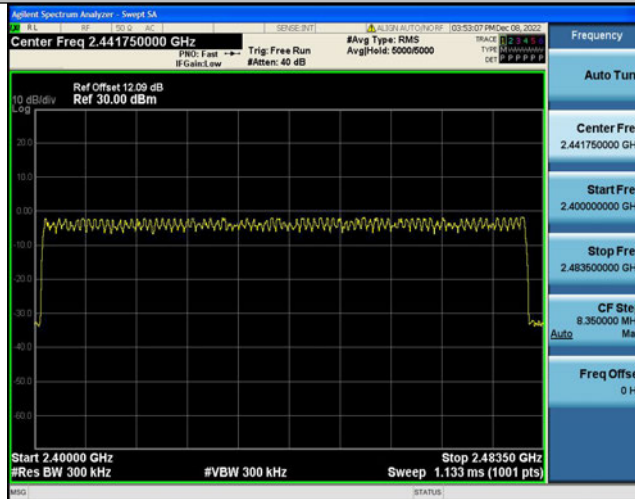
12.2 Test Result

| 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 |

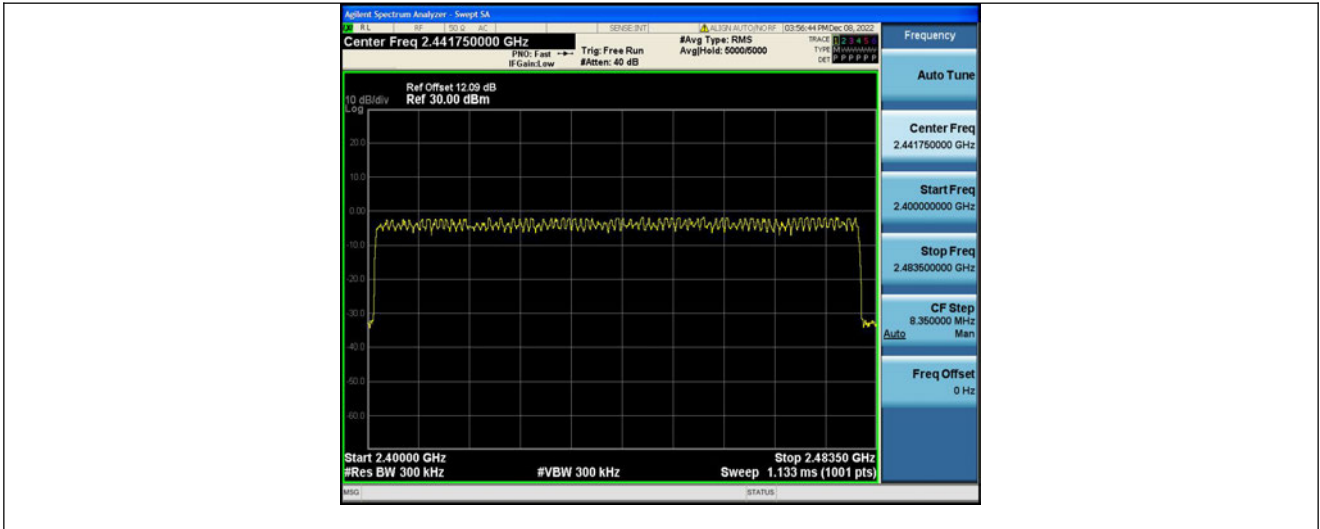
DH5-Ant1-Hop



2DH5-Ant1-Hop



3DH5-Ant1-Hop



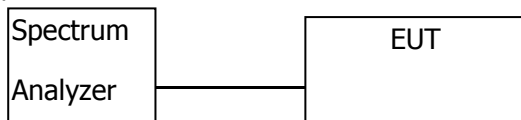


13 Dwell Time

- 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:



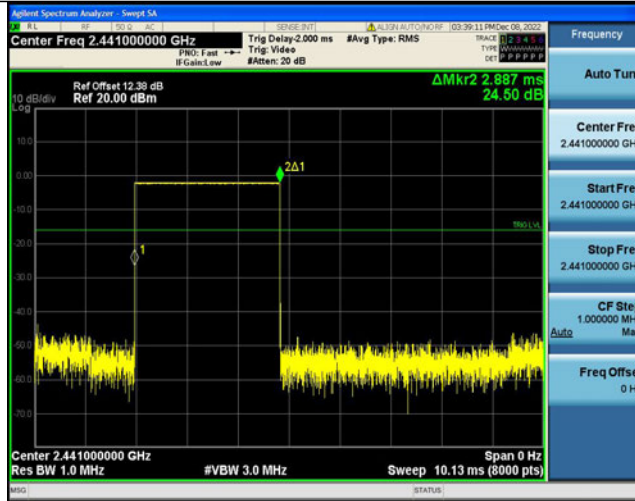
13.2 Test Result

| TestMode | Antenna | Frequency[MHz] | BurstWidth [ms] | TotalHops [Num] | Result[s] | Limit[s] | Verdict |
|----------|---------|----------------|-----------------|-----------------|-----------|----------|---------|
| DH5 | Ant1 | Hop | 2.887 | 106.67 | 0.308 | ≤0.4 | PASS |
| DH1 | Ant1 | Hop | 0.380 | 320 | 0.122 | ≤0.4 | PASS |
| DH3 | Ant1 | Hop | 1.637 | 160 | 0.262 | ≤0.4 | PASS |
| 2DH5 | Ant1 | Hop | 2.892 | 106.67 | 0.308 | ≤0.4 | PASS |
| 3DH5 | Ant1 | Hop | 2.891 | 106.67 | 0.308 | ≤0.4 | PASS |
| 2DH1 | Ant1 | Hop | 0.390 | 320 | 0.125 | ≤0.4 | PASS |
| 3DH1 | Ant1 | Hop | 0.390 | 320 | 0.125 | ≤0.4 | PASS |

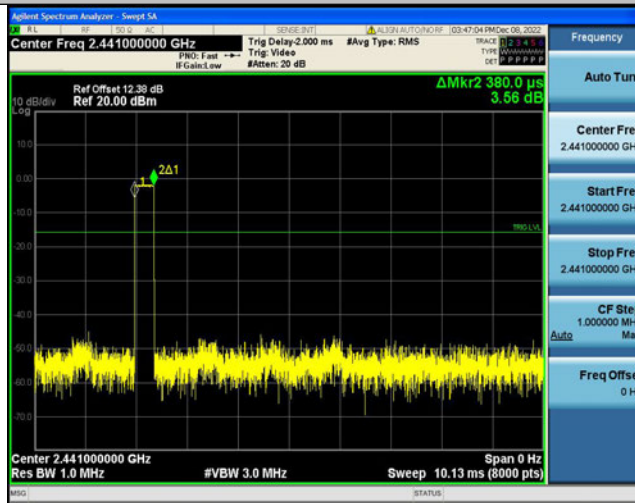


| | | | | | | | |
|------|------|-----|-------|-----|-------|------|------|
| 2DH3 | Ant1 | Hop | 1.643 | 160 | 0.263 | ≤0.4 | PASS |
| 3DH3 | Ant1 | Hop | 1.643 | 160 | 0.263 | ≤0.4 | PASS |

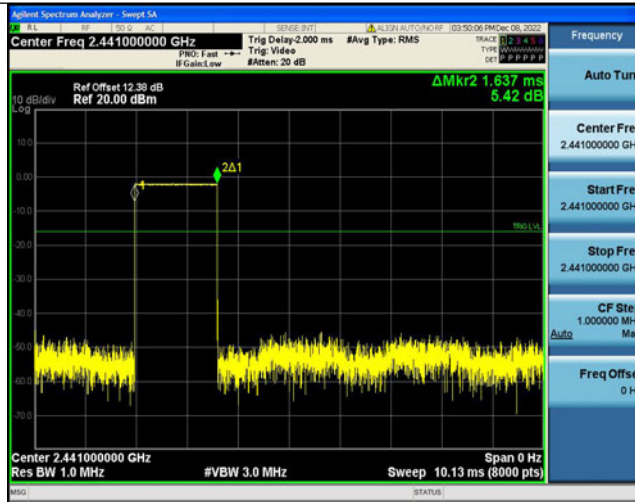
DH5-Ant1-Hop-2.887-106.67



DH1-Ant1-Hop-0.380-320



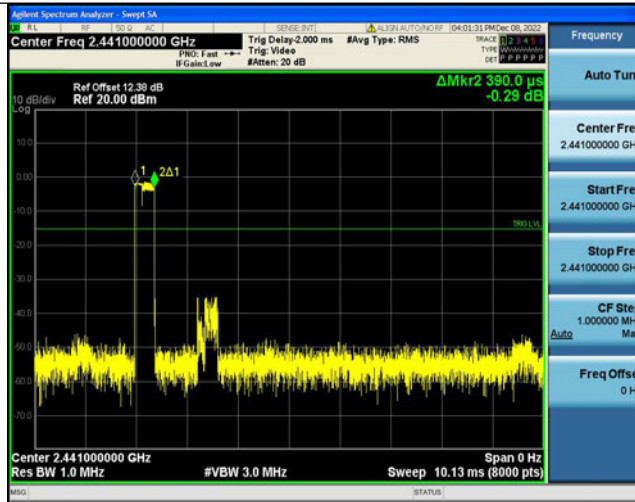
DH3-Ant1-Hop-1.637-160



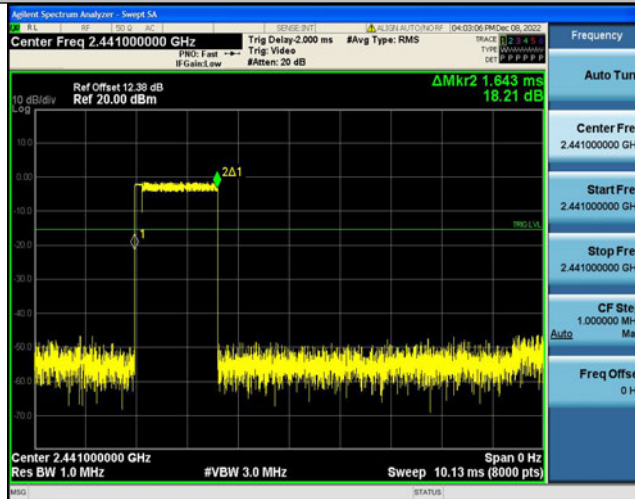
2DH5-Ant1-Hop-2.892-106.67



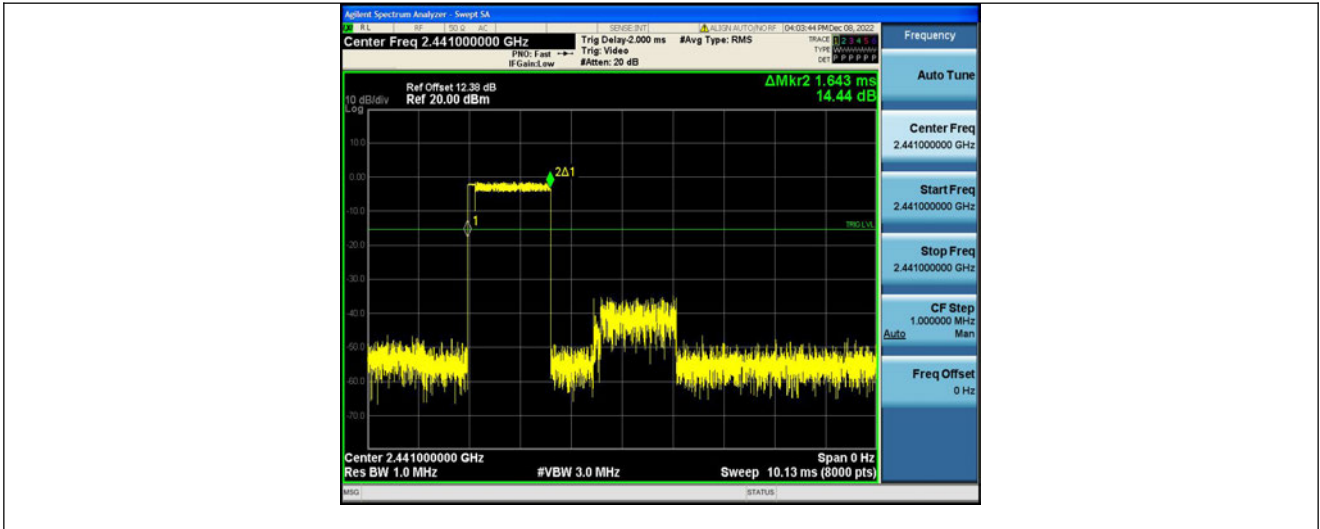
3DH5-Ant1-Hop-2.891-106.67



2DH3-Ant1-Hop-1.643-160



3DH3-Ant1-Hop-1.643-160





14 Antenna Requirement

14.1 Antenna Requirement

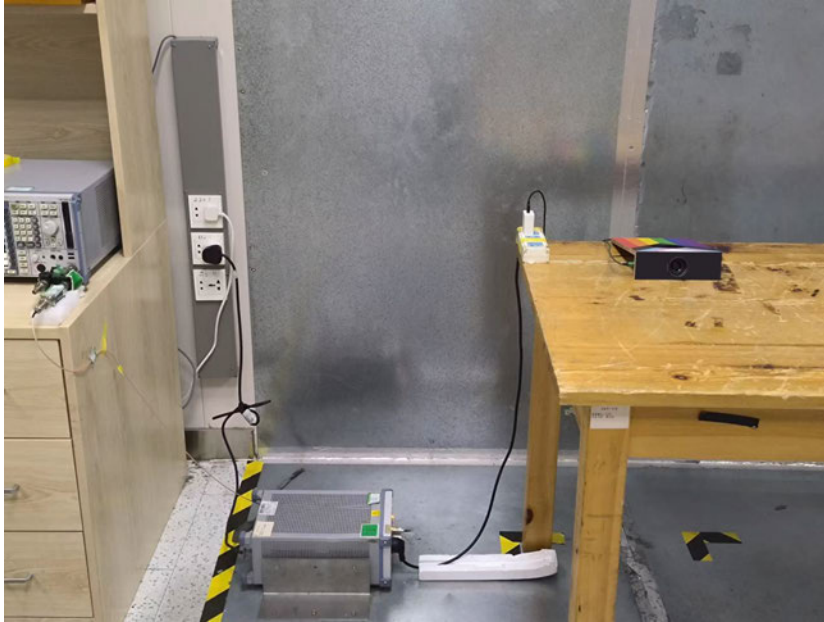
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional 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

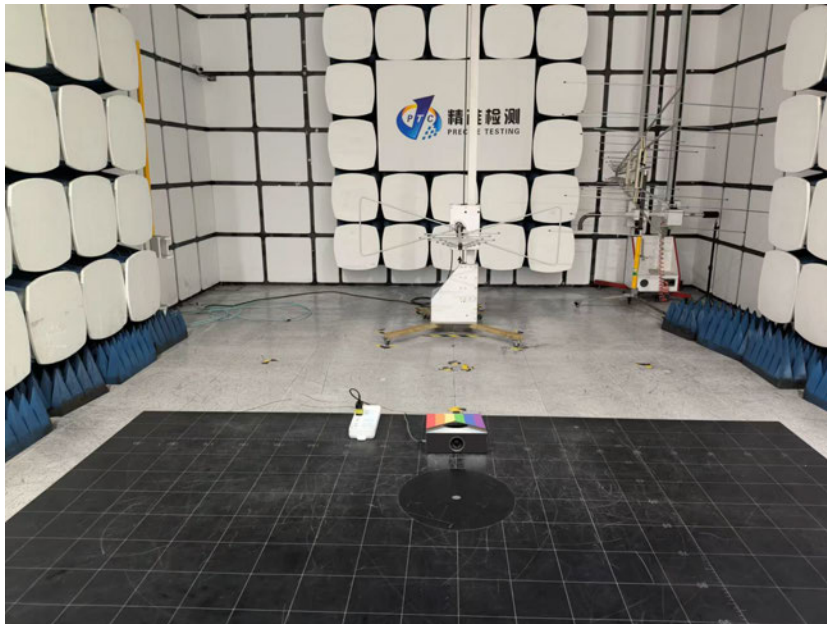
The EUT'S antenna, permanent attached antenna, is Pcb Antenna. The antenna's gain is -0.58dBi and meets the requirement.

15 TEST PHOTOS

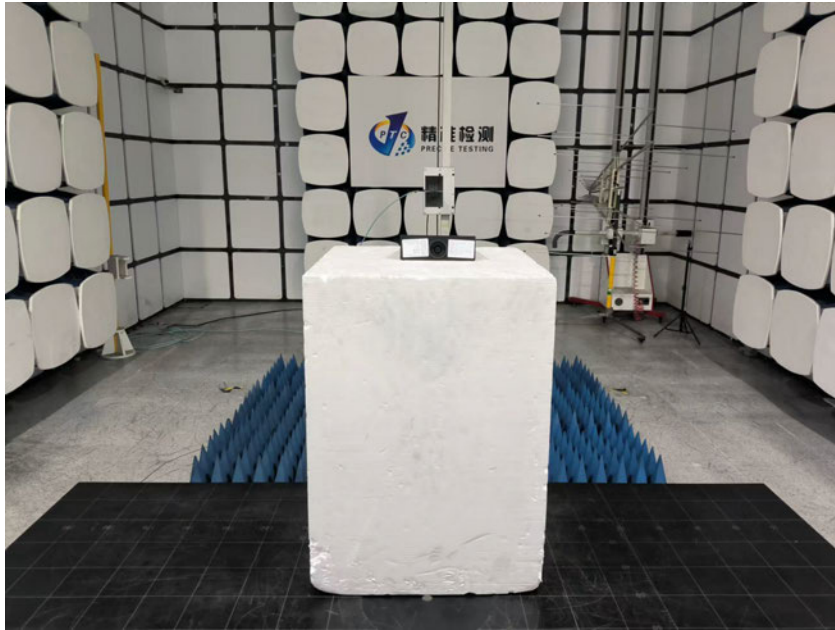
Conduction Emissions



Radiated Spurious Emissions
Test Frequency From 30MHz-1000MHz



Test Frequency above 1G





Report No.: PTC22112207405E-FC01

16 EUT PHOTOS

Reference EUT Photos

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