# FCC PART 15C TEST REPORT FOR CERTIFICATION
On Behalf of

Guoguang Electric Co.,Ltd

Portable Wireless Speaker

Model Number: VIFA110

FCC ID: 2AAP8-VIFANORDIC4

| | |
|---|---|
| Prepared for: | Guoguang Electric Co.,Ltd |
| | No.8 Jinghu Road, Xinhua Street, Huadu Reg, Guangzhou, China |
| | |
| Prepared By: | EST Technology Co., Ltd. |
| | Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China |
| Tel: 86-769-83081888-808 | |

| | |
|---|---|
| Report Number: | ESTE-R1906001 |
| Date of Test: | Apr. 22~Jun. 02, 2019 |
| Date of Report: | Jun. 05, 2019 |

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# EST Technology Co., Ltd.

| | |
|---|---|
| **Applicant:**<br>**Address:** | Guoguang Electric Co.,Ltd<br>No.8 Jinghu Road, Xinhua Street, Huadu Reg, Guangzhou, China |
| **Manufacturer:**<br>**Address:** | Vifa Denmark A/S<br>Mariendalsvej 2A, 8800 Viborg, Denmark |
| **E.U.T:** | Portable Wireless Speaker |
| **Model Number:** | VIFA110 |
| **Power Supply:** | DC 5V From Adapter Input AC 100-240V, 50/60Hz<br>DC 3.7V From Battery |
| **Trade Name:** | Vifa Serial No.: ------ |
| **Date of Receipt:** | Apr. 22, 2019 Date of Test: Apr. 22~Jun. 02, 2019 |
| **Test Specification:** | FCC Part 15 Subpart C (15.247)<br>ANSI C63.10:2013<br>FCC KDB 558074 D01 15.247 Meas Guidance v05r02 |
| **Test Result:** | The device described above is tested by EST Technology Co., Ltd. The measurement results were contained in this test report and EST Technology Co., Ltd. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the FCC Rules and Regulations Part 15 Subpart C requirements.<br><br>This report applies to above tested sample only and shall not be reproduced in part without written approval of EST Technology Co., Ltd.<br><br>**Date:** Jun. 05, 2019 |

| Prepared by: | Reviewed by: | Approved by: |
|---|---|---|
| Ring / Assistant | Tony / Engineer | Iceman Hu / Manager |

**Other Aspects:**
None.

*Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested*

*This test report is based on a single evaluation of one sample of above mentioned products ,It is not permitted to be duplicated in extracts without written approval of EST Technology Co., Ltd.*

# 1. GENERAL INFORMATION

## 1.1. Description of Device (EUT)

| | | |
|---|---|---|
| Product Name | : | Portable Wireless Speaker |
| Model Number | : | VIFA110 |
| Software Version | : | V3.0 |
| Hardware Version | : | DV2 |
| Operation frequency | : | 2402MHz~2480MHz |
| Number of channel | : | 79 |
| Max Output Power (PEAK) | : | GFSK: 4.85 dBm |
| Modulation Type | : | BT BDR(1Mbps): GFSK<br>BT EDR(2Mbps): π/4-DQPSK<br>BT EDR(3Mbps): 8-DPSK |
| Sample Type | : | Prototype production |

Note:

1. The antenna information for EUT.

| Ant No. | Brand | Model Name | Antenna Type | Connector | Gain (dBi) |
|---|---|---|---|---|---|
| 1 | N/A | N/A | Internal | N/A | 0.73 |

2. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

# 2. SUMMARY OF TEST

## 2.1. Summary of test result

| Report Section | Description of Test Item | FCC Standard Section | Results |
|---|---|---|---|
| 3 | Maximum Peak Output Power | 15.247(a)(1) | PASS |
| 4 | 20dB Bandwidth | 15.247(a)(1) | PASS |
| 5 | Carrier Frequency Separation | 15.247(a)(1) | PASS |
| 6 | Number Of Hopping Channel | 15.247(a)(1)(iii) | PASS |
| 7 | Dwell Time | 15.247(a)(1)(iii) | PASS |
| 8 | Conducted Band Edge | 15.247(d) | PASS |
| 9 | Conducted Spurious Emissions | 15.247(d) | PASS |
| 10 | Radiated Spurious Emissions and Band Edge | 15.205<br>15.209<br>15.247(d) | PASS |
| 11 | AC Power Line Conducted Emissions | 15.207 | PASS |
| 12 | Antenna requirement | 15.203 | PASS |

Note:

(1) “N/A” denotes test is not applicable in this test report

## 2.2. Test Facilities

EMC Lab : Certificated by CNAS, CHINA
Registration No.: L5288
Date of registration: November 13, 2017

Certificated by FCC, USA
Designation Number: CN1215
Test Firm Registration Number: 722932
Date of registration: November 21, 2017

Certificated by A2LA, USA
Registration No.: 4366.01
Date of registration: November 07, 2017

Certificated by Industry Canada
CAB identifier No.: CN0035
Date of registration: January 04, 2019

Certificated by VCCI, Japan
Registration No.: R-13663; C-14103
Date of registration: July 25, 2017
This Certificate is valid until: July 24, 2020

Certificated by TUV Rheinland, Germany
Registration No.: UA 50413872 0001
Date of registration: July 31, 2018

Certificated by TUV/PS, Shenzhen
Registration No.: SCN1017
Date of registration: January 27, 2011

Certificated by Intertek ETL SEMKO
Registration No.: 2011-RTL-L2-64
Date of registration: April 28, 2011

Certificated by Nemko, Hong Kong
Registration No.: 175193
Date of registration: May 4, 2011

Name of Firm : EST Technology Co., Ltd.

Site Location : Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China

## 2.3. Measurement uncertainty

| Test Item | Uncertainty |
|---|---|
| Uncertainty for Conduction emission test | ±3.48dB |
| Uncertainty for spurious emissions test (30MHz-1GHz) | ±4.60 dB(Polarize: H) |
| | ±4.68 dB(Polarize: V) |
| Uncertainty for spurious emissions test (1GHz to 18GHz) | ±4.96dB |
| Uncertainty for radio frequency | $7\times10^{-8}$ |
| Uncertainty for conducted RF Power | 0.20dB |
| Uncertainty for Power density test | 0.26dB |

Note：This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

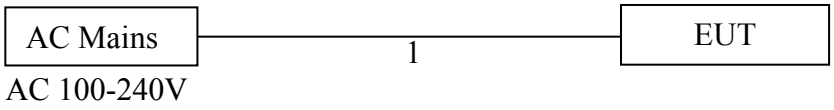
## 2.4. Assistant equipment used for test

| Item | Equipment | Brand | Model Name/Type No. | FCC ID | Series No. |
|---|---|---|---|---|---|
| - | Adapter | - | A1443 | - | - |

| Item | Shielded Type | Ferrite Core | Length | Note |
|---|---|---|---|---|
| 1 | NO | NO | 1.2m | DC Line |

## 2.5. Block Diagram

For radiated emissions test: EUT was placed on a turn table, which is 0.8 (or 1.5) meter high above ground. EUT was beset into Bluetooth test mode by software before test.




(EUT: Portable Wireless Speaker)

## 2.6. Test mode

Combining all the rates, modulations, and packet types, the Pre-scans had been carried out. The worst case test mode was selected for the final test as listed below.

| Test Item | Modulation Type | Operating Mode | Packet Type | Test Channel |
|---|---|---|---|---|
| Maximum Peak Output Power | GFSK&8-DPSK | Non Hopping | DH5 | Low/Middle/High |
| 20dB Bandwidth | GFSK&8-DPSK | Non Hopping | DH5 | Low/Middle/High |
| Carrier Frequency Separation | GFSK&8-DPSK | Hopping | DH5 | Low/Middle/High |
| Number Of Hopping Channel | GFSK&8-DPSK | Hopping | DH5 | All Channel Hopping |
| Dwell Time | GFSK&8-DPSK | Hopping | DH1/DH 3/DH5 | Middle( All Channel Hopping) |
| Conducted Band Edge | GFSK&8-DPSK | Non Hopping &Hopping | DH5 | Low/ High& All Channel Hopping |
| Conducted Spurious Emissions | GFSK&8-DPSK | Non Hopping | DH5 | Low/Middle/High |
| Radiated Spurious Emissions(Below 1GHz) | GFSK&8-DPSK | Non Hopping | DH5 | Low/Middle/High |
| Radiated Spurious Emissions(Above 1GHz) | GFSK&8-DPSK | Non Hopping | DH5 | Low/Middle/High |
| Radiated Band Edge | GFSK&8-DPSK | Non Hopping | DH5 | Low/High |
| AC Power Line Conducted Emissions | GFSK&8-DPSK | Non Hopping | DH5 | Low/Middle/High |

Note:

1. The “GFSK” and “8-DPSK” is worst case, Will be recorded in the report.
2. In radiated measurement,the EUT had been pre-scan on the positioned of each 3 axis(X,Y,Z), the worst case was found when positioned on **X-plane.**

## 2.7. Channel List

| Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) |
|---|---|---|---|---|---|---|---|
| 0 | 2402 | 1 | 2403 | 2 | 2404 | 3 | 2405 |
| 4 | 2406 | 5 | 2407 | 6 | 2408 | 7 | 2409 |
| 8 | 2410 | 9 | 2411 | 10 | 2412 | 11 | 2413 |
| 12 | 2414 | 13 | 2415 | 14 | 2416 | 15 | 2417 |
| 16 | 2418 | 17 | 2419 | 18 | 2420 | 19 | 2421 |
| 20 | 2422 | 21 | 2423 | 22 | 2424 | 23 | 2425 |
| 24 | 2426 | 25 | 2427 | 26 | 2428 | 27 | 2429 |
| 28 | 2430 | 29 | 2431 | 30 | 2432 | 31 | 2433 |
| 32 | 2434 | 33 | 2435 | 34 | 2436 | 35 | 2437 |
| 36 | 2438 | 37 | 2439 | 38 | 2440 | 39 | 2441 |
| 40 | 2442 | 41 | 2443 | 42 | 2444 | 43 | 2445 |
| 44 | 2446 | 45 | 2447 | 46 | 2448 | 47 | 2449 |
| 48 | 2450 | 49 | 2451 | 50 | 2452 | 51 | 2453 |
| 52 | 2454 | 53 | 2455 | 54 | 2456 | 55 | 2457 |
| 56 | 2458 | 57 | 2459 | 58 | 2460 | 59 | 2461 |
| 60 | 2462 | 61 | 2463 | 62 | 2464 | 63 | 2465 |
| 64 | 2466 | 65 | 2467 | 66 | 2468 | 67 | 2469 |
| 68 | 2470 | 69 | 2471 | 70 | 2472 | 71 | 2473 |
| 72 | 2474 | 73 | 2475 | 74 | 2476 | 75 | 2477 |
| 76 | 2478 | 77 | 2479 | 78 | 2480 | - | - |

## 2.8. Test Equipment

### 2.8.1. For conducted emission test

| Equipment | Manufacturer | Model No. | Serial No. | Calibration Body | Last Cal. | Next Cal. |
|---|---|---|---|---|---|---|
| EMI Test Receiver | Rohde & Schwarz | ESHS30 | 832354 | CEPREI | June 15,18 | 1 Year |
| Artificial Mains Network | Rohde & Schwarz | ENV216 | 101260 | CEPREI | June 15,18 | 1 Year |
| Pulse Limiter | Rohde & Schwarz | ESH3-Z2 | 101100 | CEPREI | June 15,18 | 1 Year |
| Test Software | Audix | e3-6.111221a | N/A | N/A | N/A | N/A |

### 2.8.2. For radiated emission test(9 kHz-30MHz)

| Equipment | Manufacturer | Model No. | Serial No. | Calibration Body | Last Cal. | Next Cal. |
|---|---|---|---|---|---|---|
| EMI Test Receiver | Rohde & Schwarz | ESR7 | 101780 | CEPREI | June 15,18 | 1 Year |
| Active Loop Antenna | SCHWAREBECK | FMZB 1519B | 1519B-088 | N/A | Aug. 01,18 | 1 Year |
| Test Software | Audix | e3-6.111221a | N/A | N/A | N/A | N/A |
| 9kHz-30MHz Cable | N/A | EST-001 | N/A | N/A | N/A | N/A |

### 2.8.3. For radiated emissions test (30-1000MHz)

| Equipment | Manufacturer | Model No. | Serial No. | Calibration Body | Last Cal. | Next Cal. |
|---|---|---|---|---|---|---|
| EMI Test Receiver | Rohde & Schwarz | ESR7 | 101780 | CEPREI | June 15,18 | 1 Year |
| Bilog Antenna | Teseq | CBL 6111D | 27090 | CEPREI | June 15,18 | 1 Year |
| Test Software | Audix | e3-6.111221a | N/A | N/A | N/A | N/A |
| 30-1000MHz Cable | N/A | EST-002 | N/A | N/A | N/A | N/A |

### 2.8.4. For radiated emission test(above 1GHz)

| Equipment | Manufacturer | Model No. | Serial No. | Calibration Body | Last Cal. | Next Cal. |
|---|---|---|---|---|---|---|
| Horn Antenna | SCHWARZBECK | BBHA9120D | BBHA9120D1002 | CEPREI | June 18,18 | 1 Year |
| Horn Antenna | SCHWARZBECK | BBHA9170 | BBHA9170242 | CEPREI | June 18,18 | 1Year |
| Signal Amplifier | SCHWARZBECK | BBV9718 | 9718-212 | CEPREI | June 15,18 | 1 Year |
| Spectrum Analyzer | Rohde &Schwarz | FSV | 103173 | CEPREI | June 15,18 | 1 Year |
| PSA Series Spertrum Analyzer | Agilent | E4447A | MY50180031 | CEPREI | June 15,18 | 1Year |
| Test Software | Audix | e3-6.111221a | N/A | N/A | N/A | N/A |
| Above 1GHz Cable | N/A | EST-003 | N/A | N/A | N/A | N/A |

### 2.8.5. For connect EUT antenna terminal test

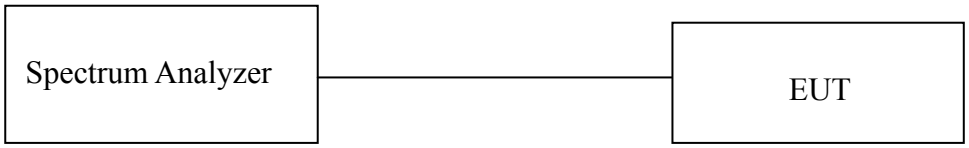
| Equipment | Manufacturer | Model No. | Serial No. | Calibration Body | Last Cal. | Next Cal. |
|---|---|---|---|---|---|---|
| Spectrum Analyzer | Rohde &Schwarz | FSV | 103173 | CEPREI | June 15,18 | 1 Year |

# 3. MAXIMUM PEAK OUTPUT POWER

## 3.1. Limit

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 2400-2483.5 MHz 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 125 mW.

## 3.2. Test Setup




## 3.3. Spectrum Analyzer Setting

| Spectrum Parameters | Setting |
|---|---|
| RBW | 3MHz |
| VBW | 3MHz |
| Span | 7.5MHz |
| Sweep Time | Auto |
| Detector | Peak |
| Trace Mode | Max Hold |

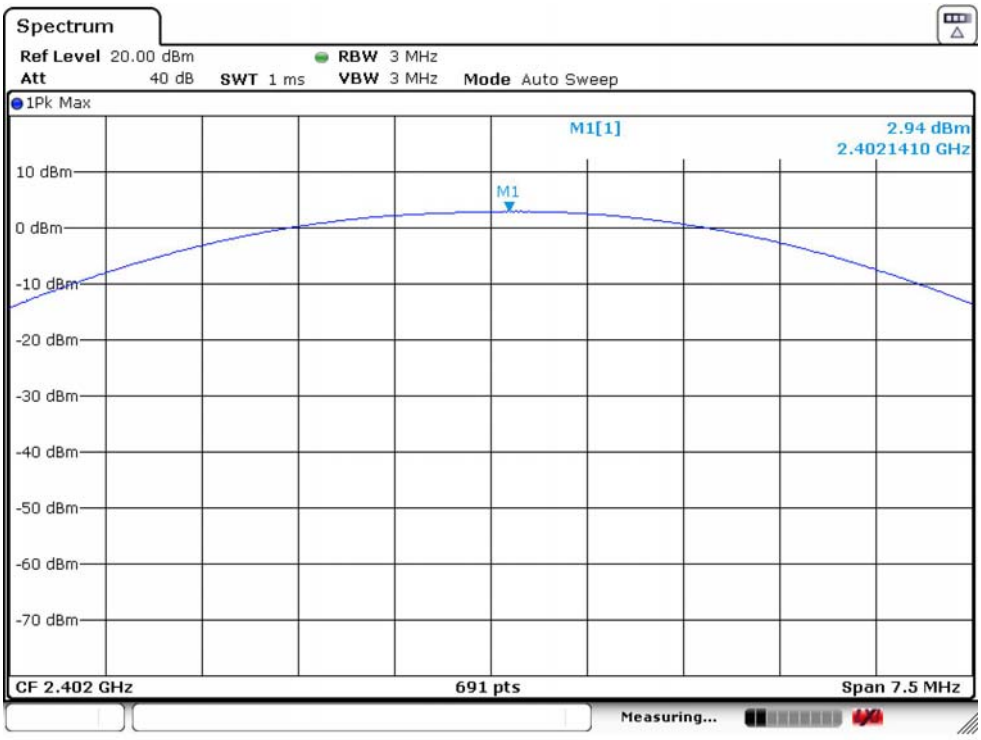
## 3.4. Test Procedure

a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
b. Spectrum analyzer setting parameters in accordance with section 3.3.
c. Set the EUT transmit continuously with maximum output power over fixed single hopping channel.
d. Allow trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission.
e. Repeat above procedures until all channels and test modes were measured.
f. Record the results in the test report.

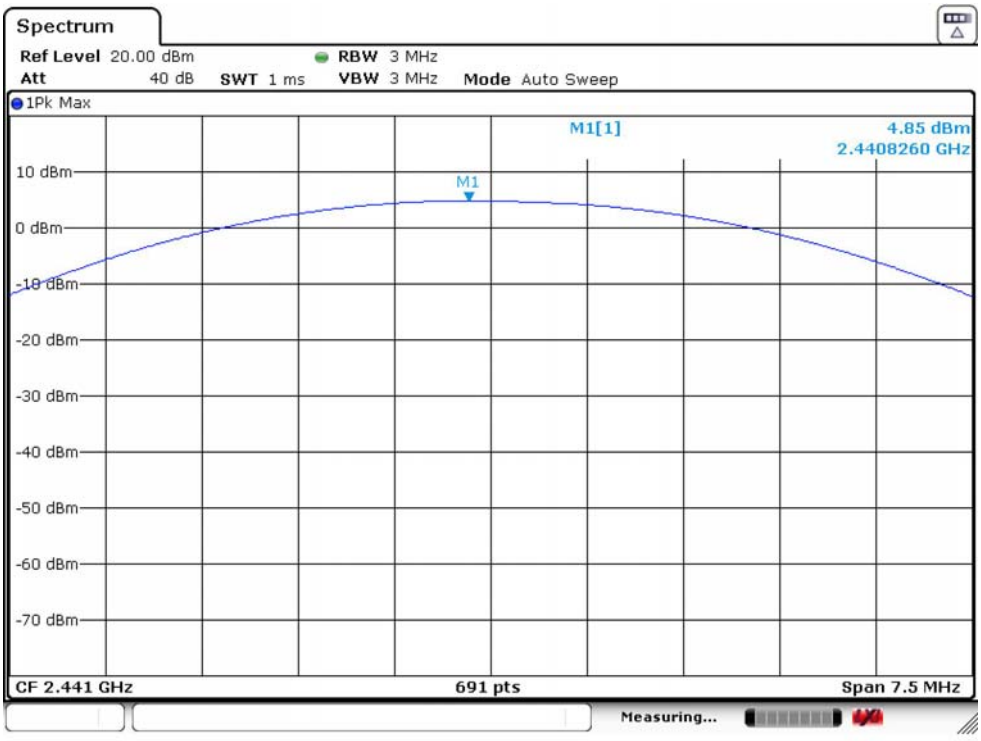
## 3.5. Test Result

| Temperature | 23.5℃ | Relative Humidity | 55% | Test Voltage | | DC 3.7V |
|---|---|---|---|---|---|---|
| Mode | Freq (MHz) | Peak Output Power | | Limit | | Result |
| | | dBm | W | dBm | W | |
| GFSK | 2402 | 2.94 | 0.0020 | 20.97 | 0.1250 | PASS |
| | 2441 | 4.85 | 0.0031 | 20.97 | 0.1250 | PASS |
| | 2480 | 4.74 | 0.0030 | 20.97 | 0.1250 | PASS |
| 8-DPSK | 2402 | 2.72 | 0.0019 | 20.97 | 0.1250 | PASS |
| | 2441 | 4.53 | 0.0028 | 20.97 | 0.1250 | PASS |
| | 2480 | 4.48 | 0.0028 | 20.97 | 0.1250 | PASS |

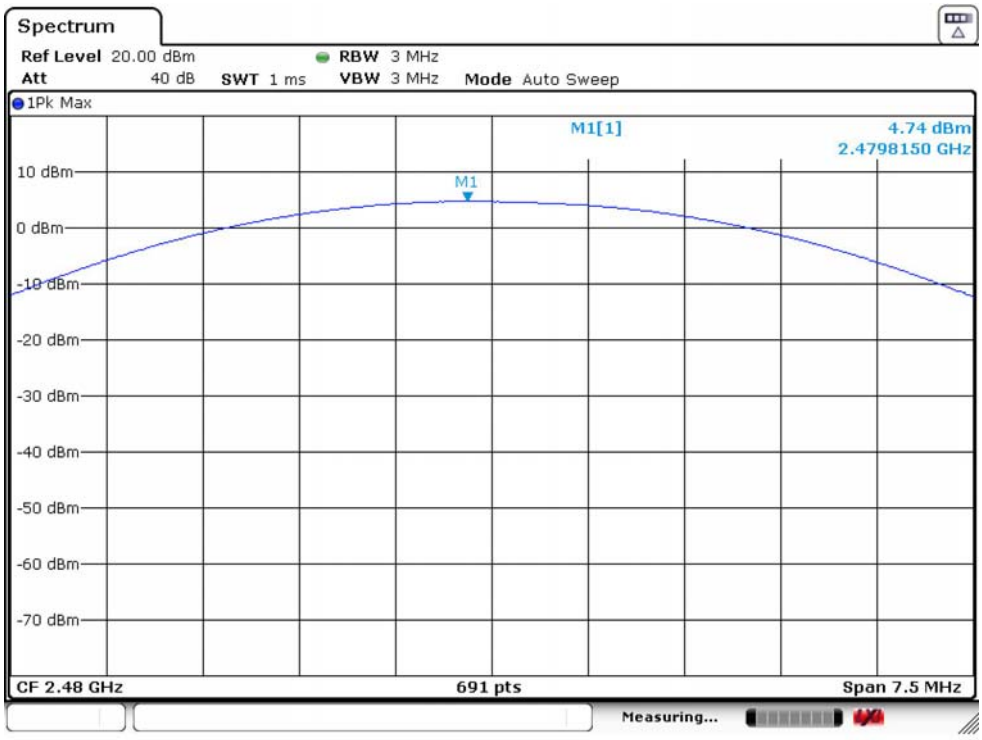
**GFSK 2402 MHz**



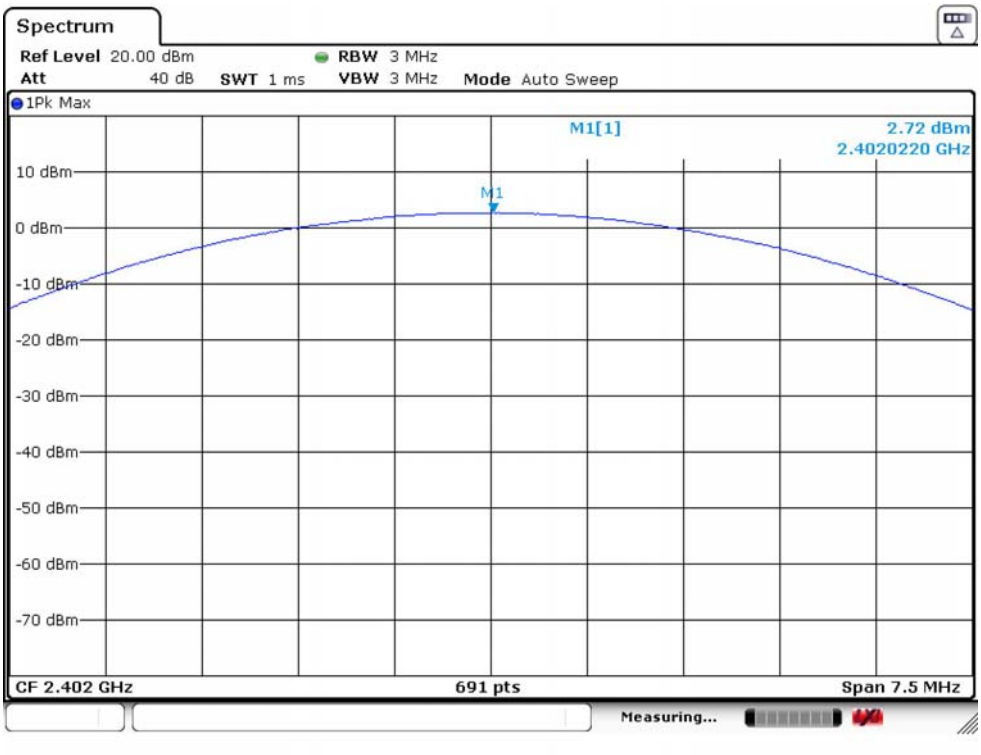

**GFSK 2441 MHz**



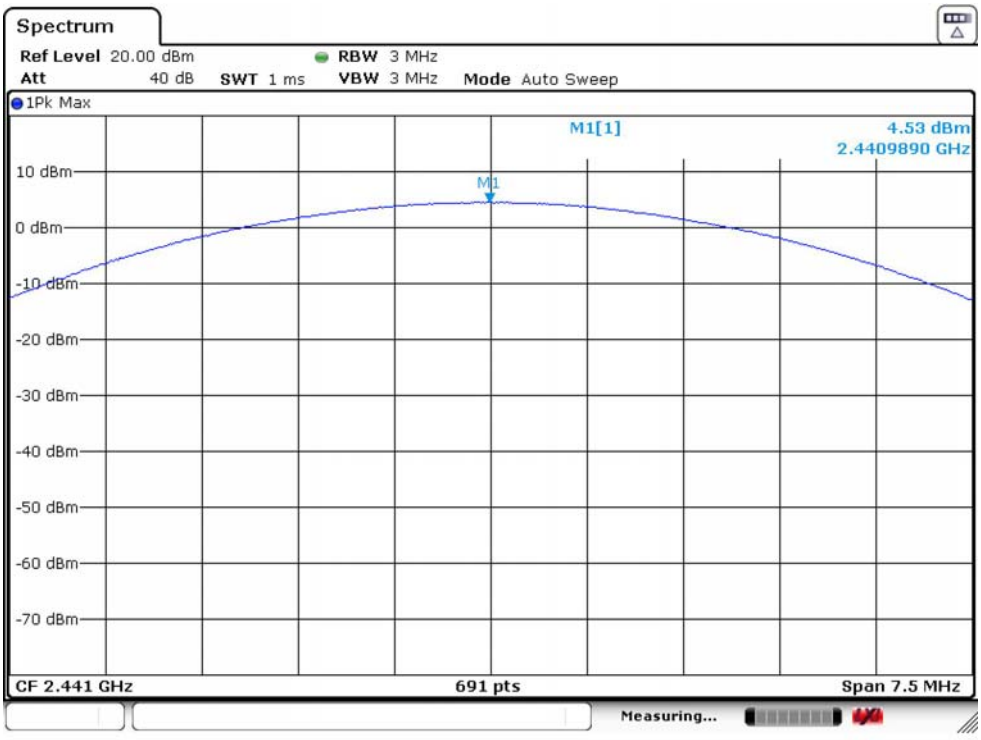
**GFSK 2480 MHz**



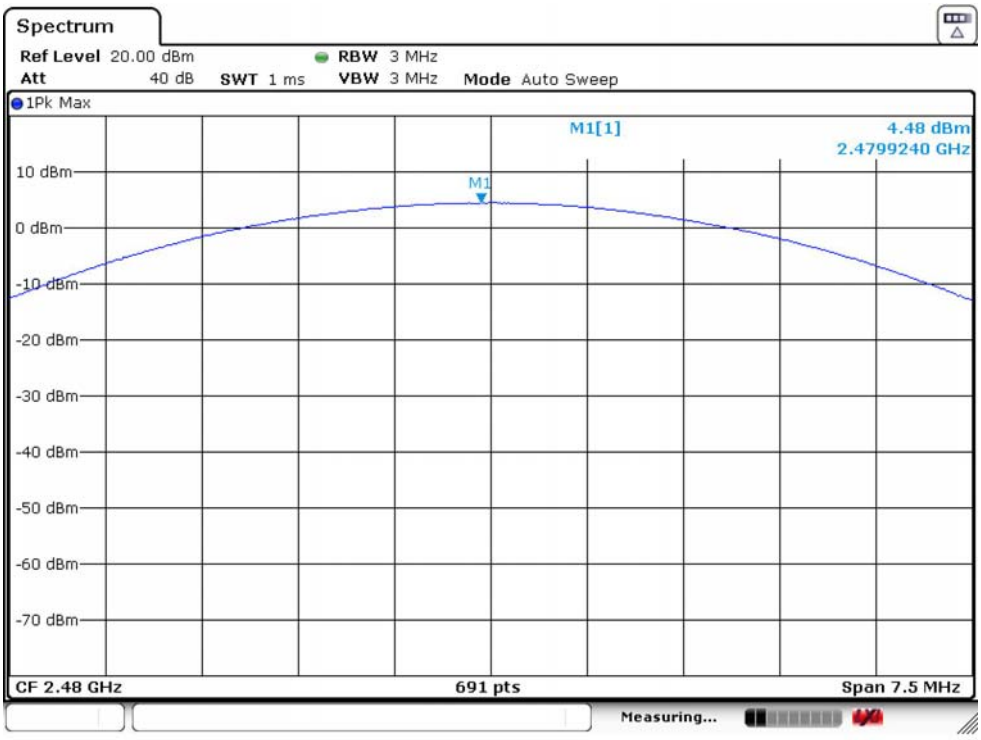
## 8-DPSK 2402 MHz




## 8-DPSK 2441 MHz



**8-DPSK 2480 MHz**

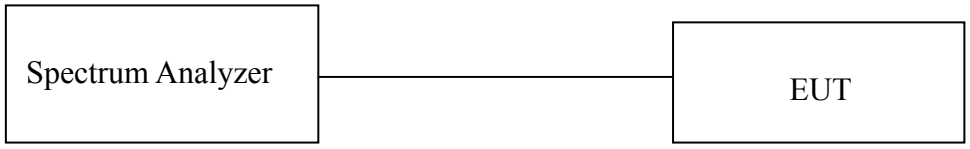


# 4. 20 DB BANDWIDTH

## 4.1. Limit

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 2400-2483.5 MHz 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 125 mW.

## 4.2. Test Setup




## 4.3. Spectrum Analyzer Setting

| Spectrum Parameters | Setting |
|---|---|
| RBW | 30KHz |
| VBW | 100KHz |
| Span | 3MHz |
| Sweep Time | Auto |
| Detector | Peak |
| Trace Mode | Max Hold |

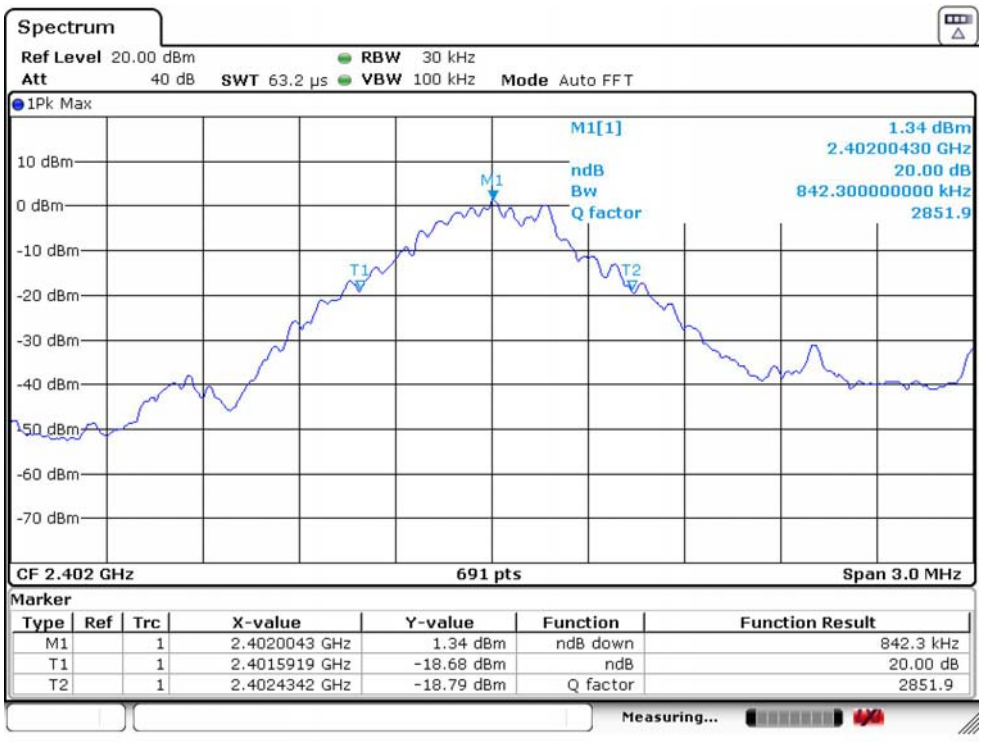
## 4.4. Test Procedure

a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
b. Spectrum analyzer setting parameters in accordance with section 4.3.
c. Set the EUT transmit continuously with maximum output power over fixed single hopping channel.
d. Allow trace to stabilize, use the ndB down function to measure 20dB Bandwidth.
e. Repeat above procedures until all channels and test modes were measured.
f. Record the results in the test report.

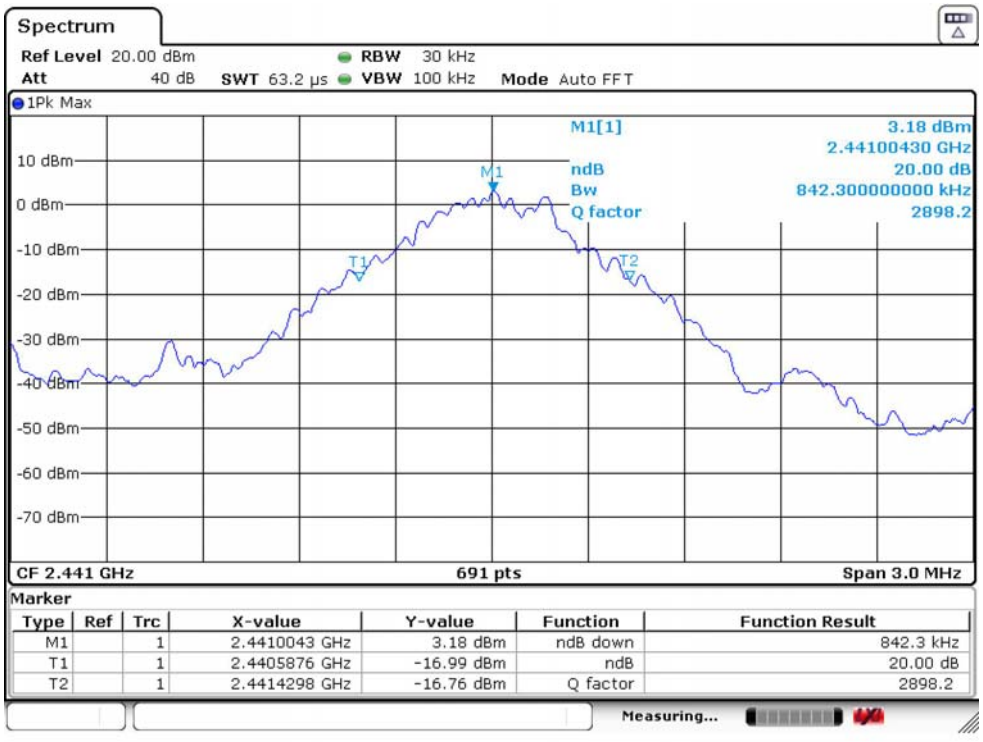
## 4.5. Test Result

| Temperature | 23.5℃ | Relative Humidity | 55% | |
|---|---|---|---|---|
| Test Voltage | DC 3.7V | | | |
| Mode | Freq (MHz) | 20dB Bandwidth (MHz) | Limit (MHz) | Result |
| GFSK | 2402 | 0.8423 | / | PASS |
| | 2441 | 0.8423 | / | PASS |
| | 2480 | 0.8423 | / | PASS |
| 8-DPSK | 2402 | 1.2547 | / | PASS |
| | 2441 | 1.2590 | / | PASS |
| | 2480 | 1.2590 | / | PASS |

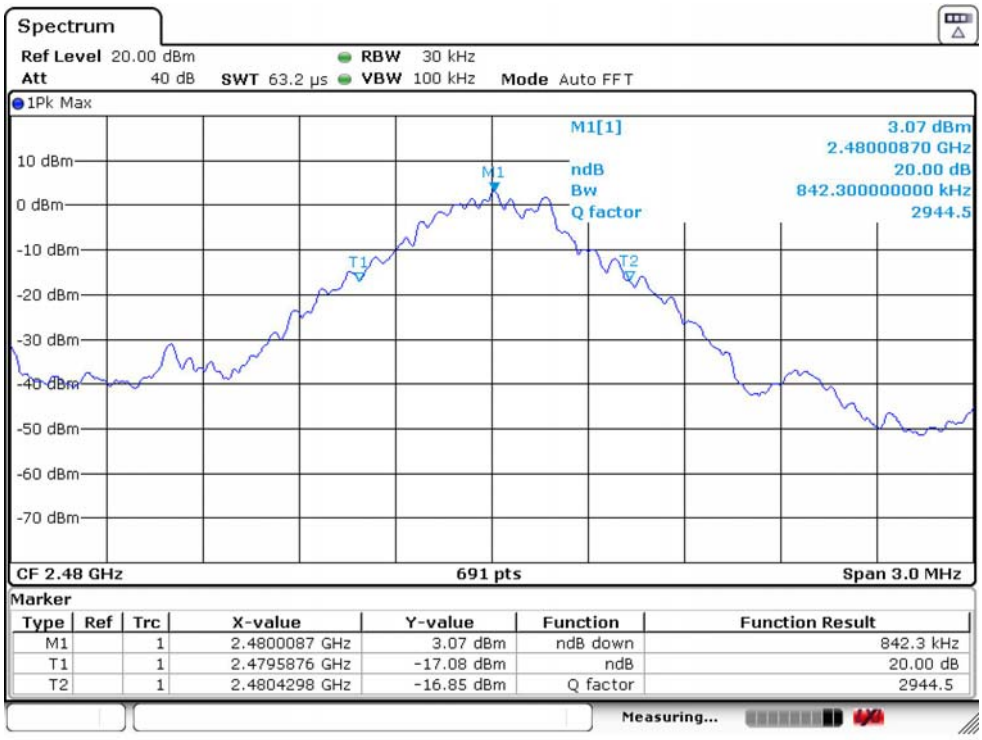
## GFSK 2402MHz



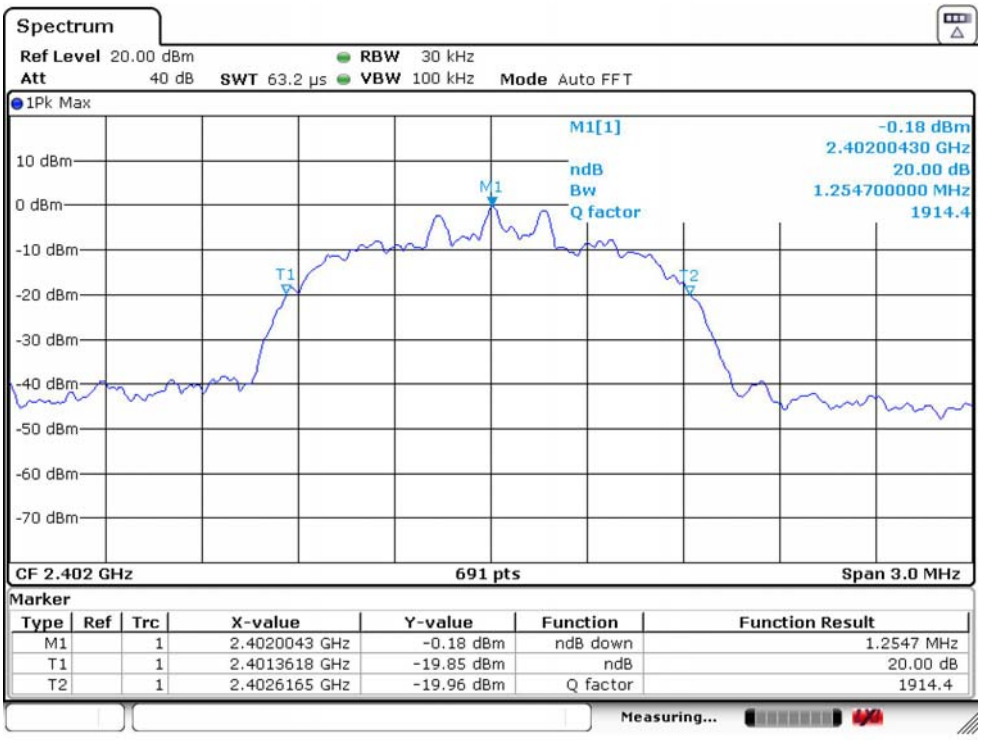

## GFSK 2441MHz



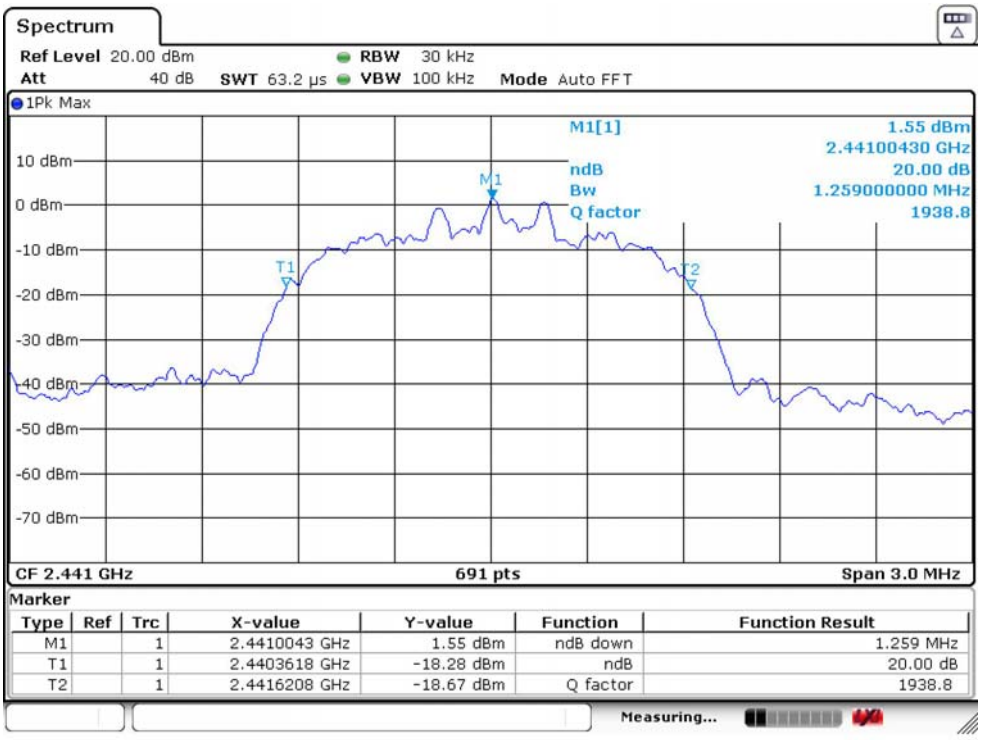
**GFSK 2480MHz**



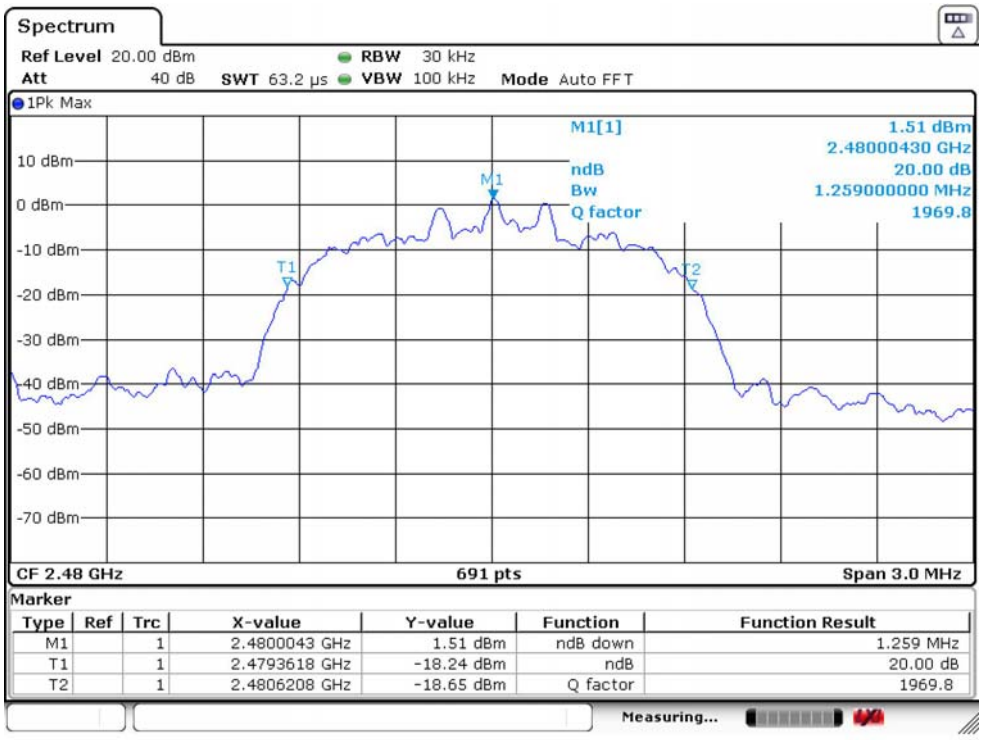
**8-DPSK 2402MHz**




**8-DPSK 2441MHz**



**8-DPSK 2480MHz**

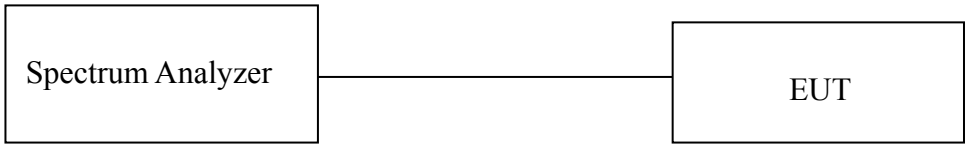


# 5. CARRIER FREQUENCY SEPARATION

## 5.1. Limit

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 2400-2483.5 MHz 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 125 mW.

## 5.2. Test Setup




## 5.3. Spectrum Analyzer Setting

| Spectrum Parameters | Setting |
|---|---|
| RBW | 30KHz |
| VBW | 100KHz |
| Span | 3MHz |
| Sweep Time | Auto |
| Detector | Peak |
| Trace Mode | Max Hold |

## 5.4. Test Procedure

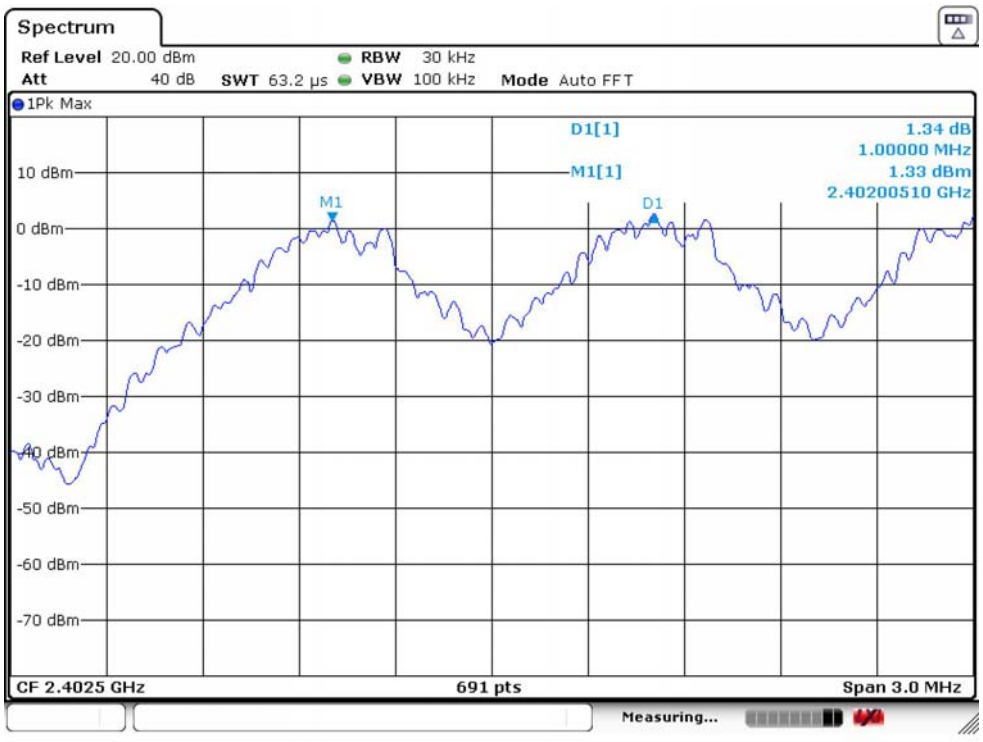
a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
b. Spectrum analyzer setting parameters in accordance with section 5.3.
c. Set the EUT transmit continuously with maximum output power in all channel hopping mode.
d. Allow trace to stabilize, use the marker-delta function to measure channel separation between two adjacent channels.
e. Repeat above procedures until all channels and test modes were measured.
f. Record the results in the test report.

## 5.5. Test Result

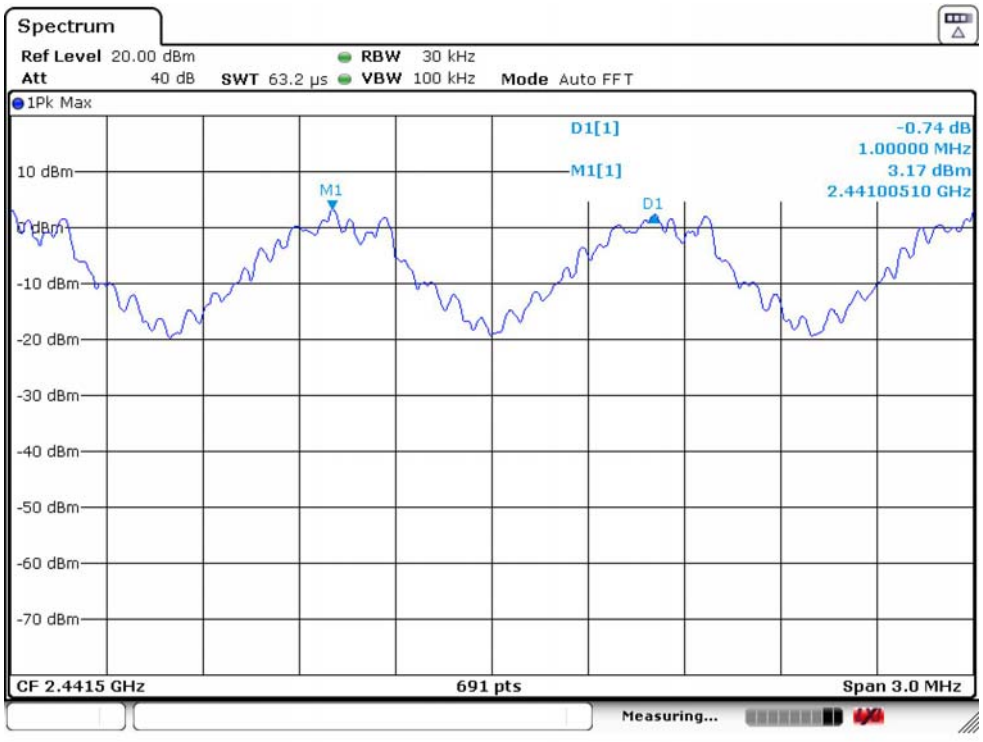
| Temperature | 23.5℃ | Relative Humidity | 55% | Test Voltage | DC 3.7V |
|---|---|---|---|---|---|

| Mode | Channel | Channel Separation (MHz) | 2/3 of 20dB Bandwidth Limit (MHz) | Result |
|---|---|---|---|---|
| GFSK | Low CH | 1.0000 | 0.5615 | PASS |
| | Mid CH | 1.0000 | 0.5615 | PASS |
| | High CH | 1.0000 | 0.5615 | PASS |
| 8-DPSK | Low CH | 1.0000 | 0.8365 | PASS |
| | Mid CH | 1.0000 | 0.8393 | PASS |
| | High CH | 1.0000 | 0.8393 | PASS |

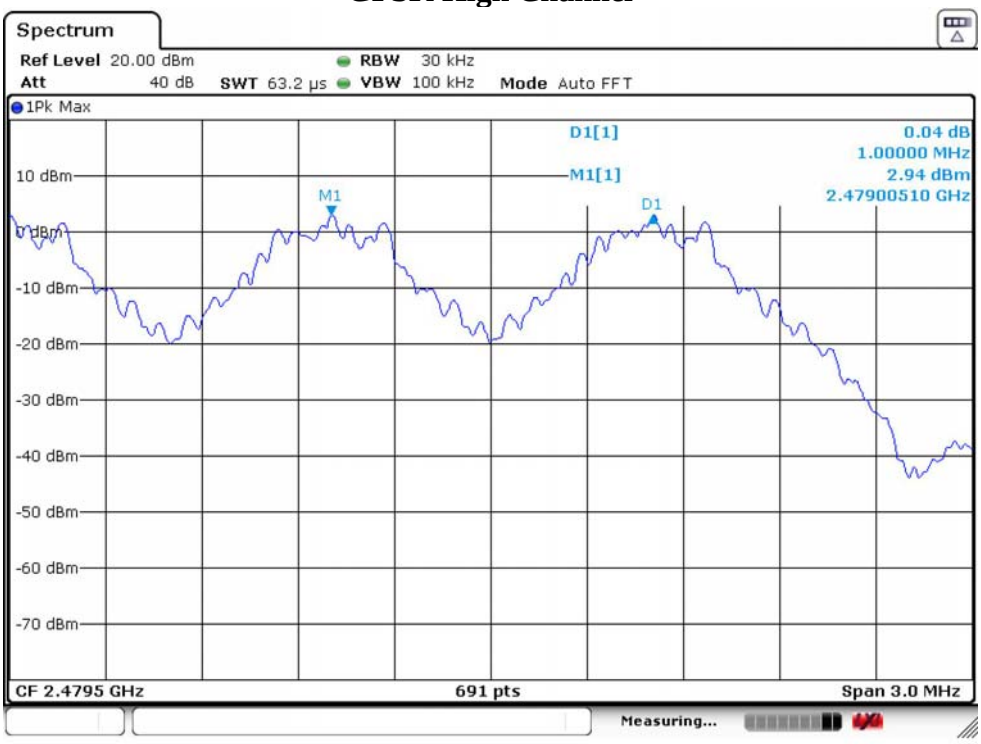
## GFSK Low Channel



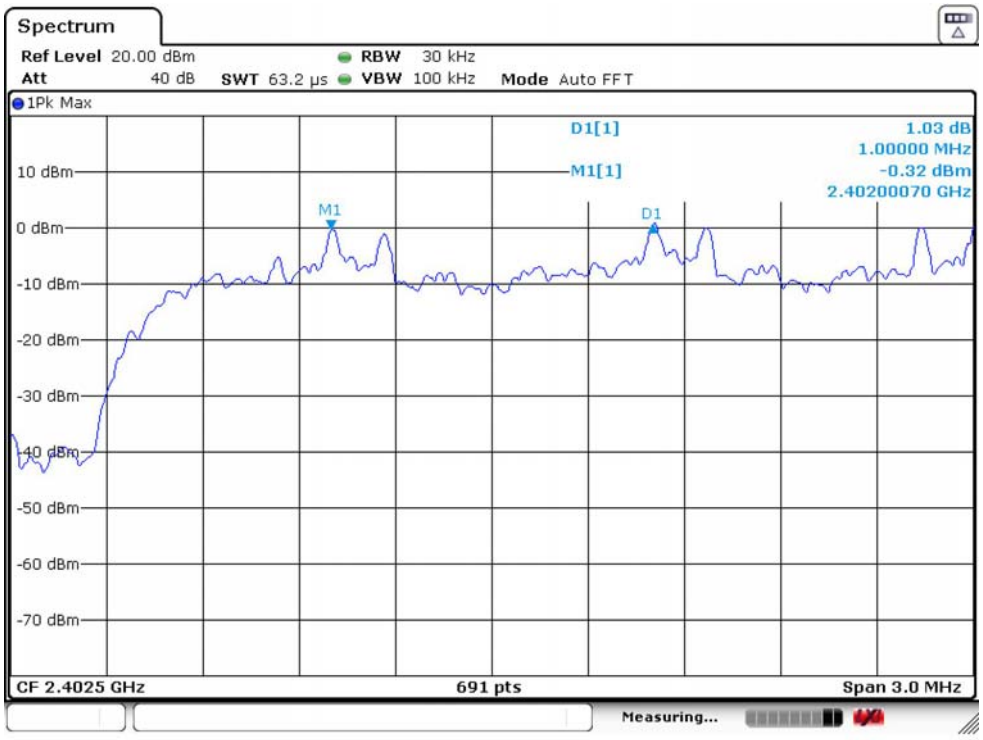

## GFSK Mid Channel



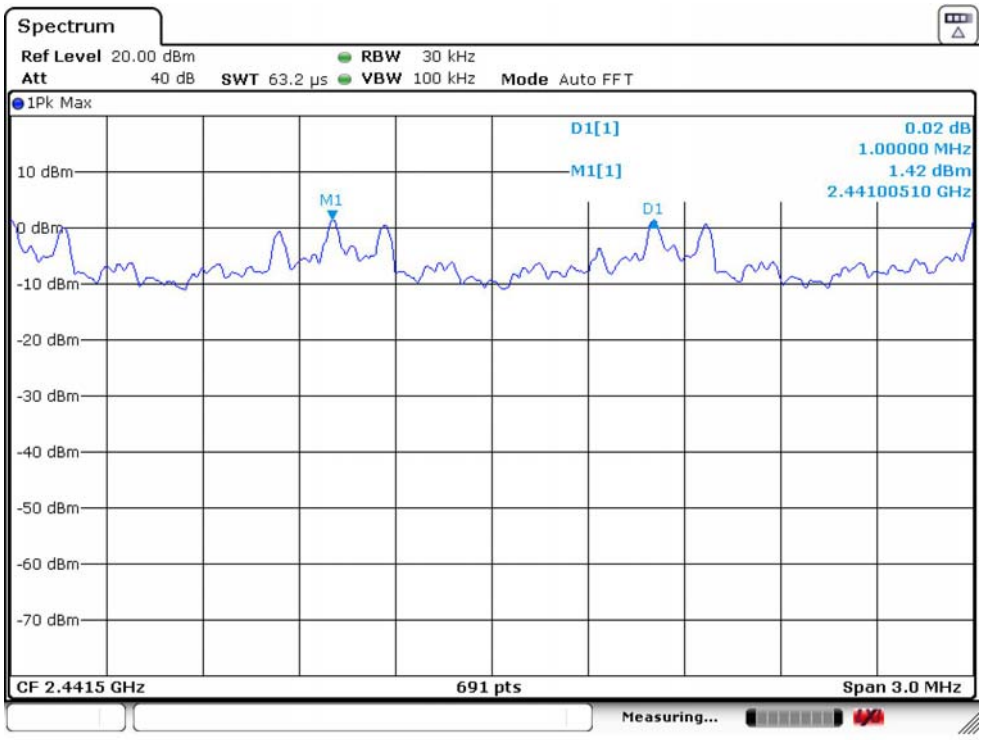
**GFSK High Channel**



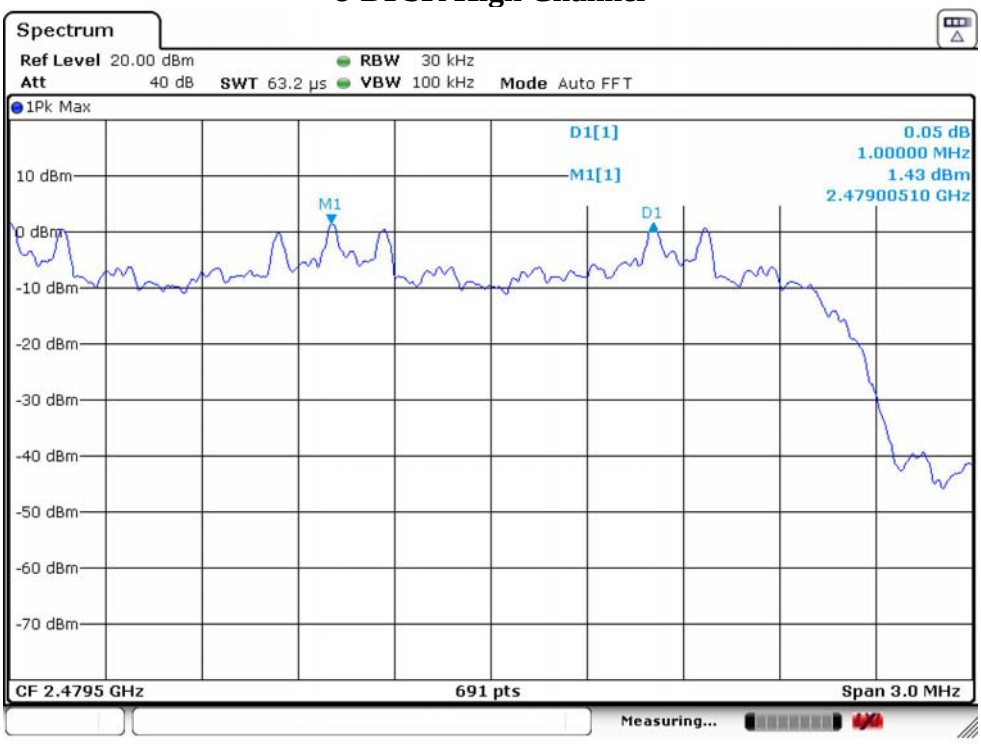
## 8-DPSK Low Channel




## 8-DPSK Mid Channel



**8-DPSK High Channel**

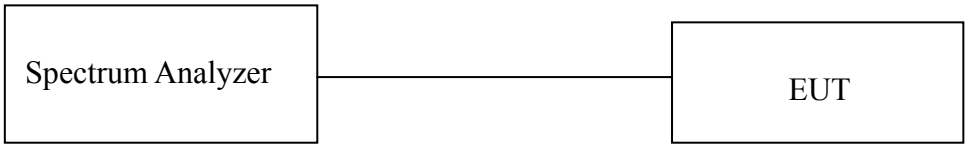


# 6. NUMBER OF HOPPING CHANNEL

## 6.1. Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

## 6.2. Test Setup




## 6.3. Spectrum Analyzer Setting

| Spectrum Parameters | Setting |
|---|---|
| RBW | 300KHz |
| VBW | 300KHz |
| Start frequency | 2400MHz |
| Stop frequency | 2483.5MHz |
| Sweep Time | Auto |
| Detector | Peak |
| Trace Mode | Max Hold |

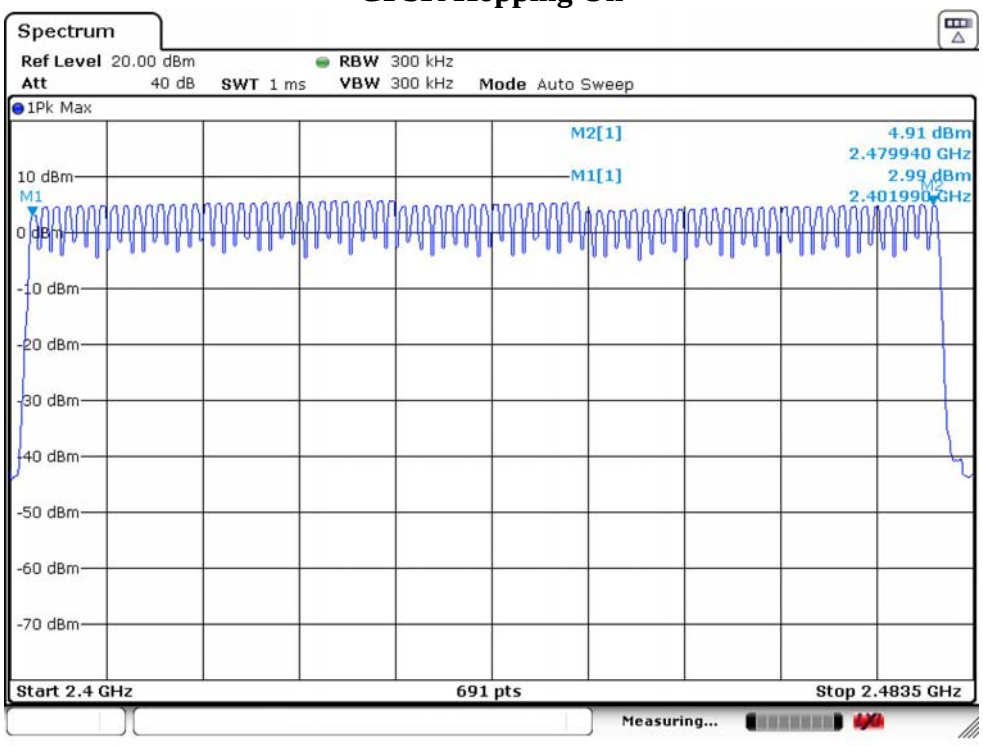
## 6.4. Test Procedure

a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
b. Spectrum analyzer setting parameters in accordance with section 6.3.
c. Set the EUT transmit continuously with maximum output power in all channel hopping mode.
d. Allow trace to stabilize, use the marker-peak function to mark the first and last frequency hopping channel.
e. Repeat above procedures until all test modes were measured.
f. Record the results in the test report.

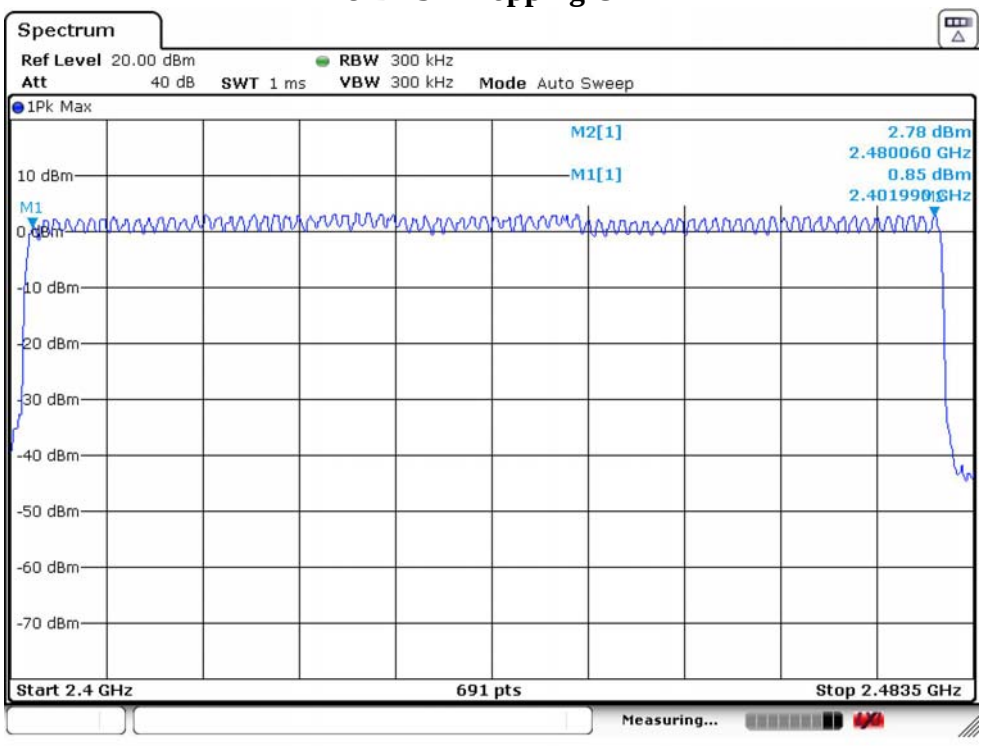
## 6.5. Test Result

| Temperature | 23.5℃ | Relative Humidity | 55% | Test Voltage | DC 3.7 |
|---|---|---|---|---|---|
| Mode | Number of Hopping Channel | | | Limit | Result |
| GFSK | 79 | | | ≥15 | PASS |
| 8-DPSK | 79 | | | ≥15 | PASS |

## GFSK Hopping On




## 8-DPSK Hopping On

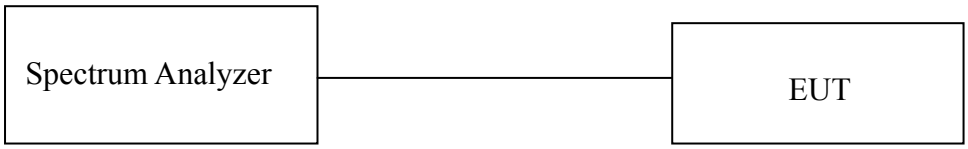


# 7. DWELL TIME

## 7.1. Limit

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.

## 7.2. Test Setup




## 7.3. Spectrum Analyzer Setting

| Spectrum Parameters | Setting |
|---|---|
| RBW | 1MHz |
| VBW | 1MHz |
| Span | Zero |
| Detector | Peak |
| Sweep Time | 2.5ms(DH1)/10ms(DH3)/20ms(DH5) |
| Sweep Mode | Single Sweep |

## 7.4. Test Procedure

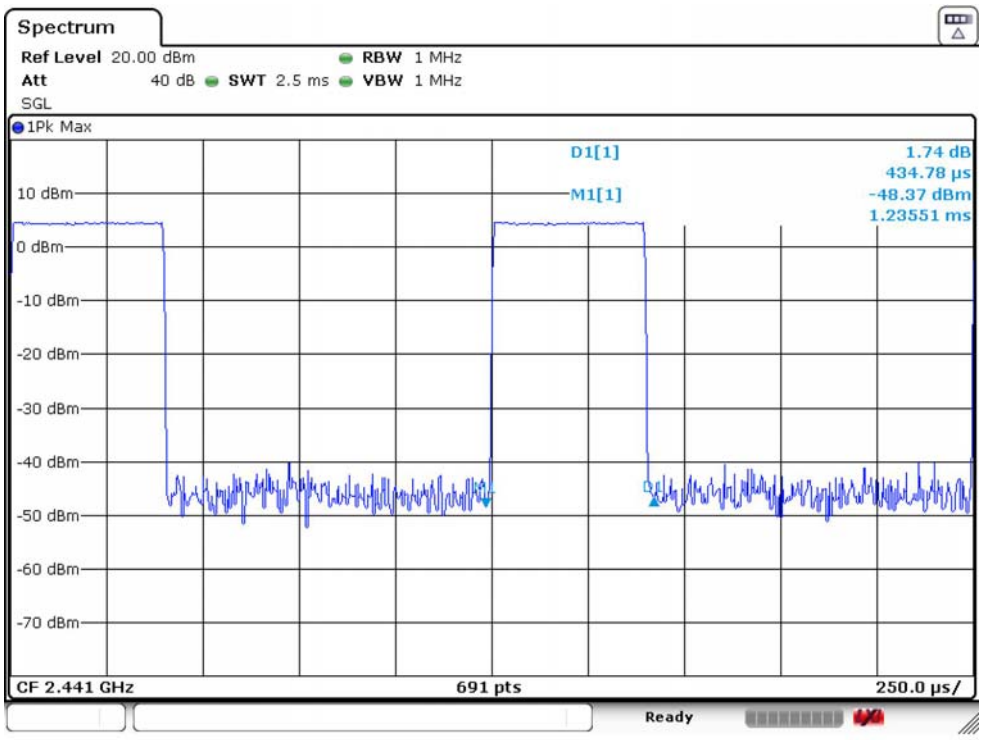
a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
b. Spectrum analyzer setting parameters in accordance with section 7.3.
c. Set the EUT transmit continuously with maximum output power in all channel hopping mode.
d. Allow trace to stabilize, use the marker-delta function to measure single pulse duration.
e. Repeat above procedures until all test modes were measured.
f. Record the results in the test report.

## 7.5. Test Result

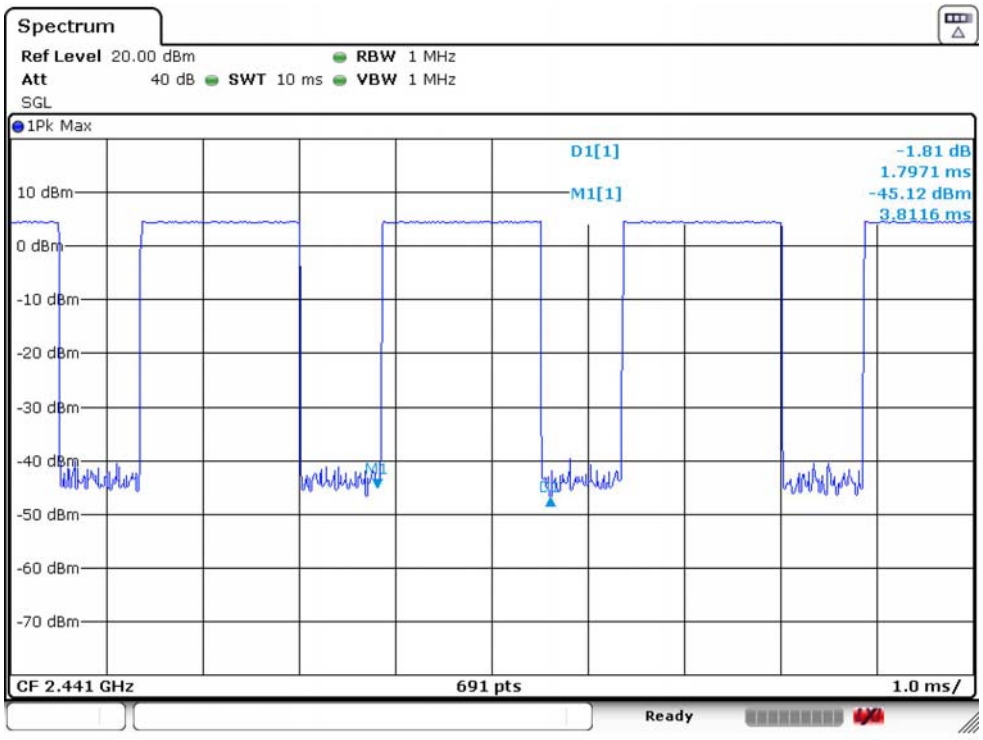
| Temperature | 23.5℃ | Relative Humidity | | 55% | Test Voltage | DC 3.7 |
|---|---|---|---|---|---|---|
| Mode | Freq (MHz) | Hops in Observation Period(hops) | Pulse Duration (ms) | Dwell time (ms) | Limit | Result |
| GFSK DH1 | 2441 | 320 | 0.4348 | 139.14 | <400ms | PASS |
| GFSK DH3 | 2441 | 160 | 1.7971 | 287.54 | <400ms | PASS |
| GFSK DH5 | 2441 | 106.67 | 3.0580 | 326.19 | <400ms | PASS |
| 8-DPSK 3DH1 | 2441 | 320 | 0.4674 | 149.57 | <400ms | PASS |
| 8-DPSK 3DH3 | 2441 | 160 | 1.8116 | 289.86 | <400ms | PASS |
| 8-DPSK 3DH5 | 2441 | 106.67 | 3.1304 | 333.91 | <400ms | PASS |

1. DH1 Packet permit maximum 1600 hops/s with 2 timeslot in 79 channels (1 timeslot TX, 1 timeslot RX),So the hops in Observation Period(0.4s×79 channel)=(1600/79/2)hops/s×0.4s×79=320 hops.
2. DH3 Packet permit maximum 1600 hops/s with 4 timeslot in 79 channels (3 timeslot TX, 1 timeslot RX),So the hops in Observation Period(0.4s×79 channel)=(1600/79/4)hops/s×0.4s×79=160 hops.
3. DH5 Packet permit maximum 1600 hops/s with 6 timeslot in 79 channels (5 timeslot TX, 1 timeslot RX),So the hops in Observation Period(0.4s×79 channel)=(1600/79/5)hops/s×0.4s×79=106.67 hops.
4.Dwell Time= Hops in Observation Period×Pulse Duration.

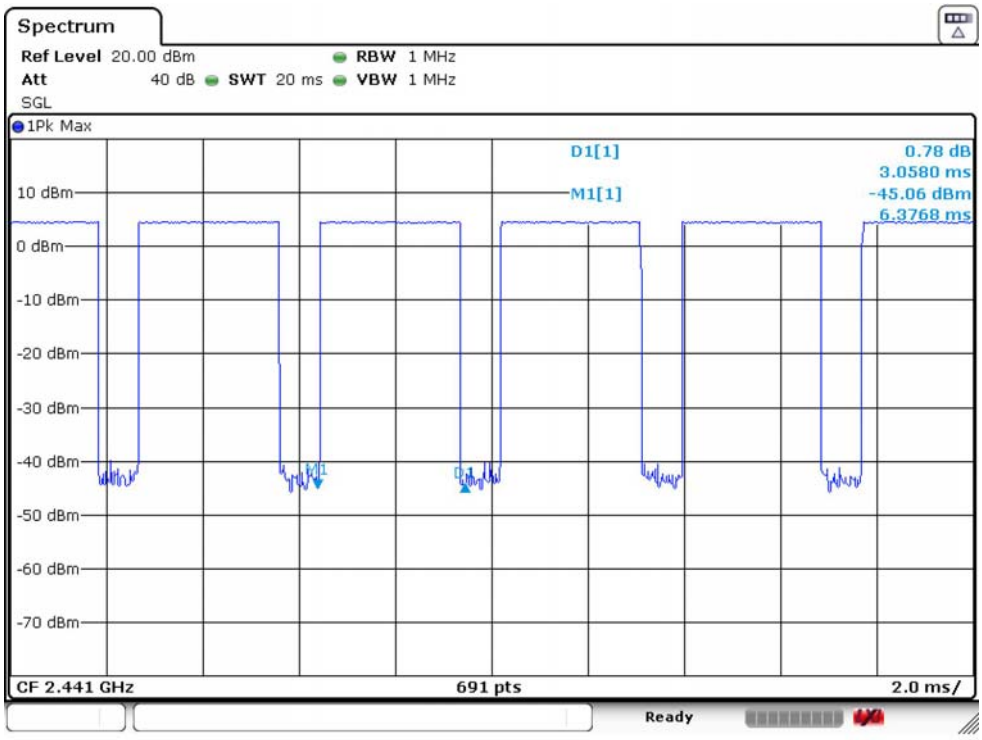
## GFSK DH1



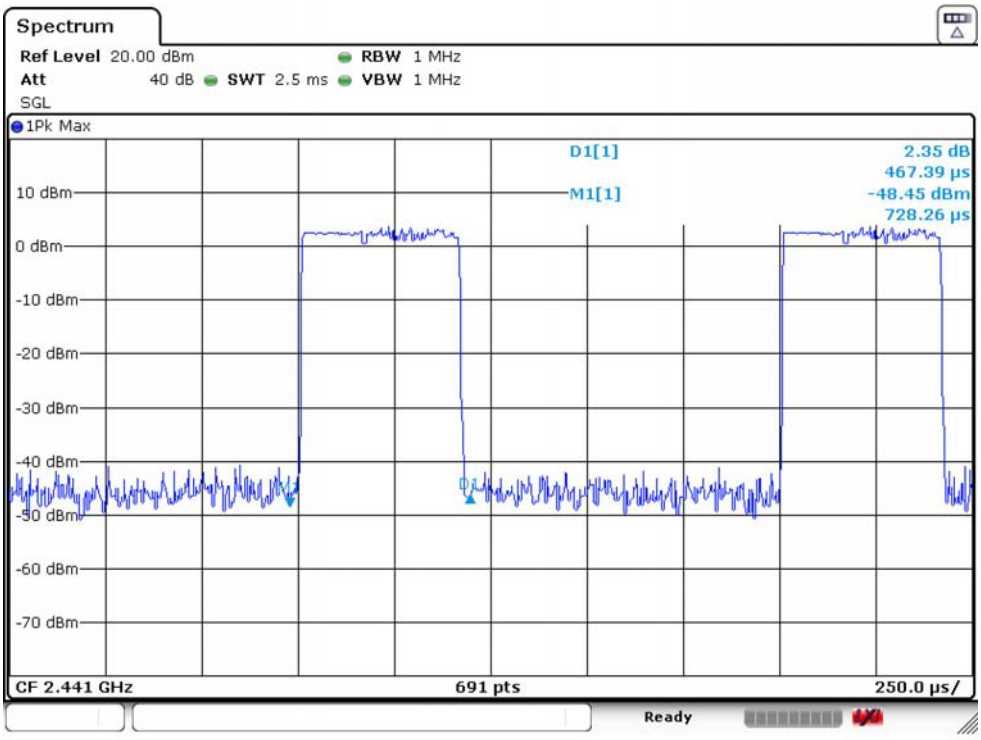

## GFSK DH3



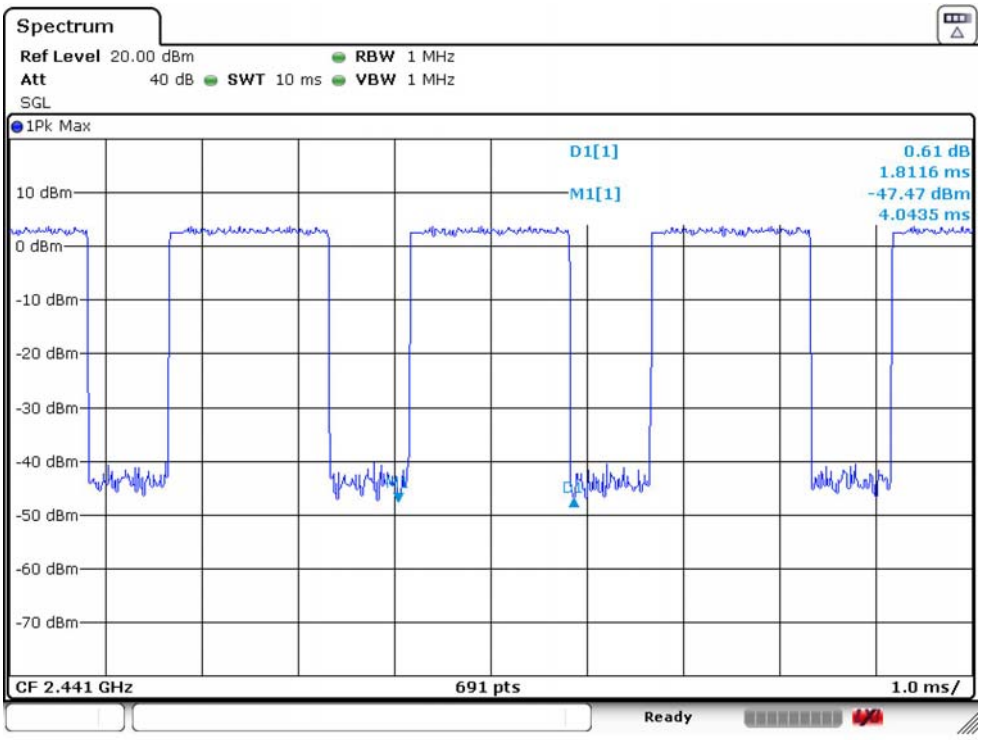
## GSFK DH5


Spectrum
Ref Level 20.00 dBm
RBW 1 MHz
Att 40 dB SWT 20 ms VBW 1 MHz
SGL
1Pk Max
D1[1] 0.78 dB
3.0580 ms
M1[1] -45.06 dBm
6.3768 ms
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.441 GHz
691 pts
2.0 ms/
Ready

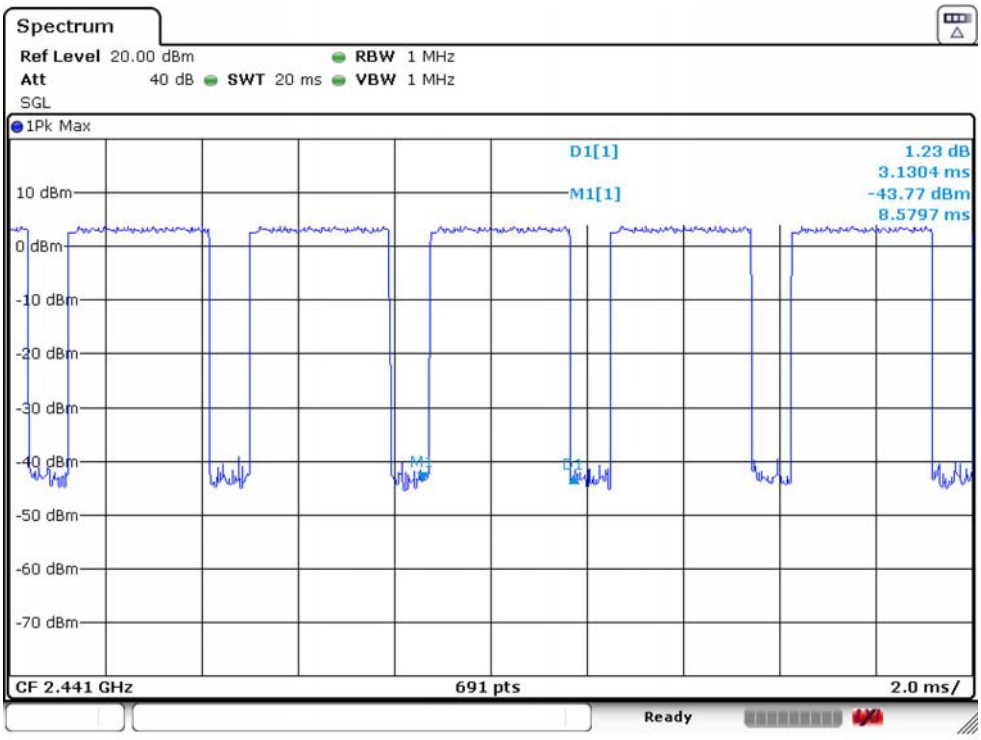
## 8-DPSK 3DH1




## 8-DPSK 3DH3



**8-DPSK 3DH5**

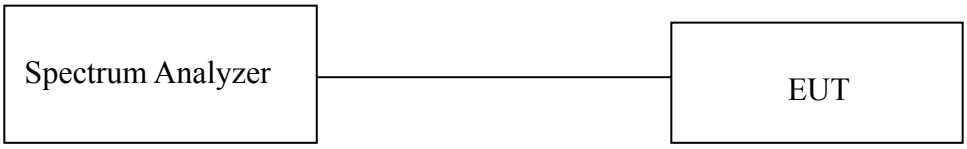

Spectrum
Ref Level 20.00 dBm
RBW 1 MHz
Att 40 dB SWT 20 ms VBW 1 MHz
SGL
1Pk Max
D1[1] 1.23 dB
3.1304 ms
M1[1] -43.77 dBm
8.5797 ms
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.441 GHz
691 pts
2.0 ms/
Ready

# 8. CONDUCTED BAND EDGE

## 8.1. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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 or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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)).

## 8.2. Test Setup




## 8.3. Spectrum Analyzer Setting

| Spectrum Parameters | Setting |
|---|---|
| RBW | 100KHz |
| VBW | 300KHz |
| Span | 100MHz |
| Sweep Time | Auto |
| Detector | Peak |
| Trace Mode | Max Hold |

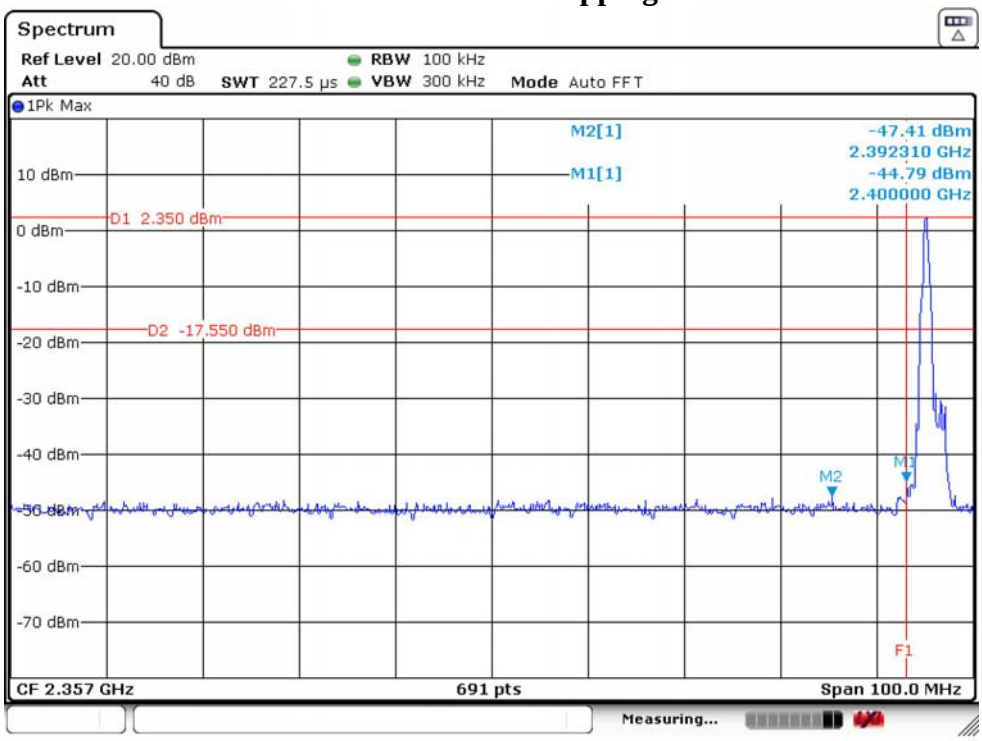
## 8.4. Test Procedure

a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
b. Spectrum analyzer setting parameters in accordance with section 8.3.
c. Set the EUT transmit continuously with maximum output power over fixed single hopping channel.
d. Allow trace to stabilize, use the marker function to mark the highest emission level outside the authorized band.
e. Repeat above procedures until all channels and test modes were measured(including frequency hopping off and frequency hopping on).
f. Record the results in the test report.

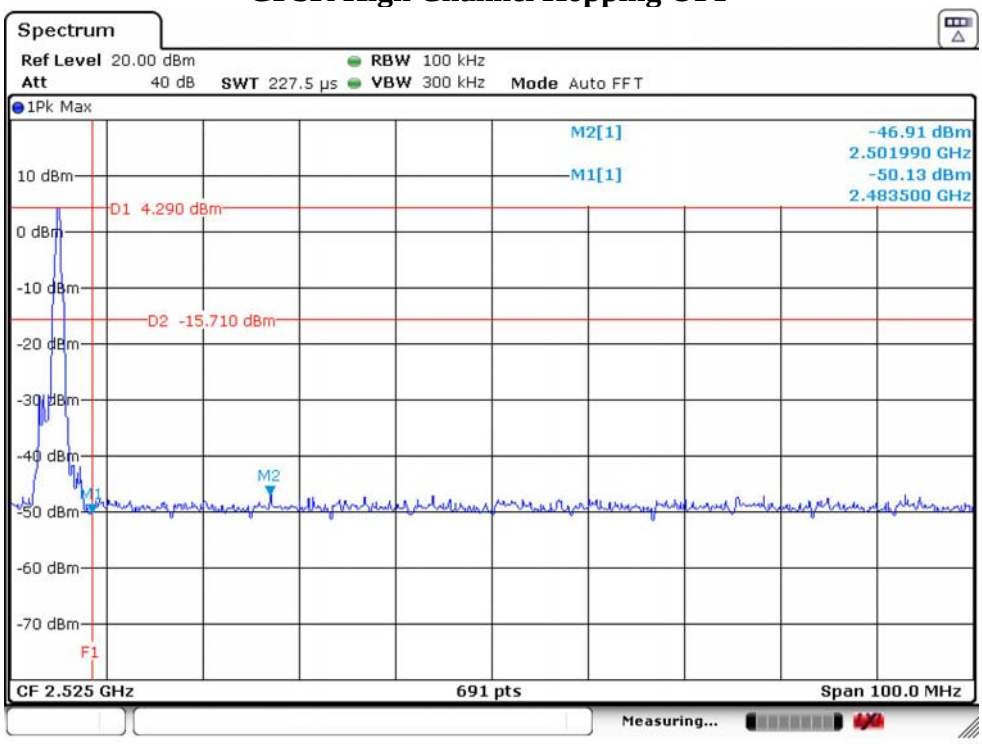
## 8.5. Test Result

| Temperature | 23.5℃ | Relative Humidity | 55% | Test Voltage | DC 3.7V |
|---|---|---|---|---|---|
| Result | PASS | | | | |

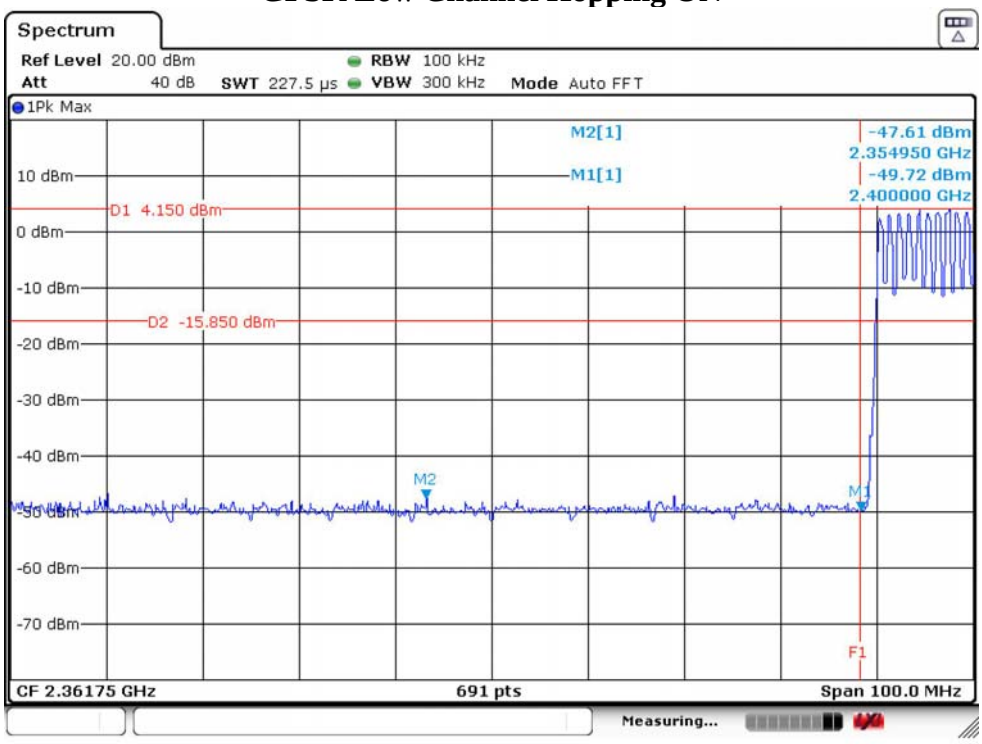
**GFSK Low Channel Hopping OFF**



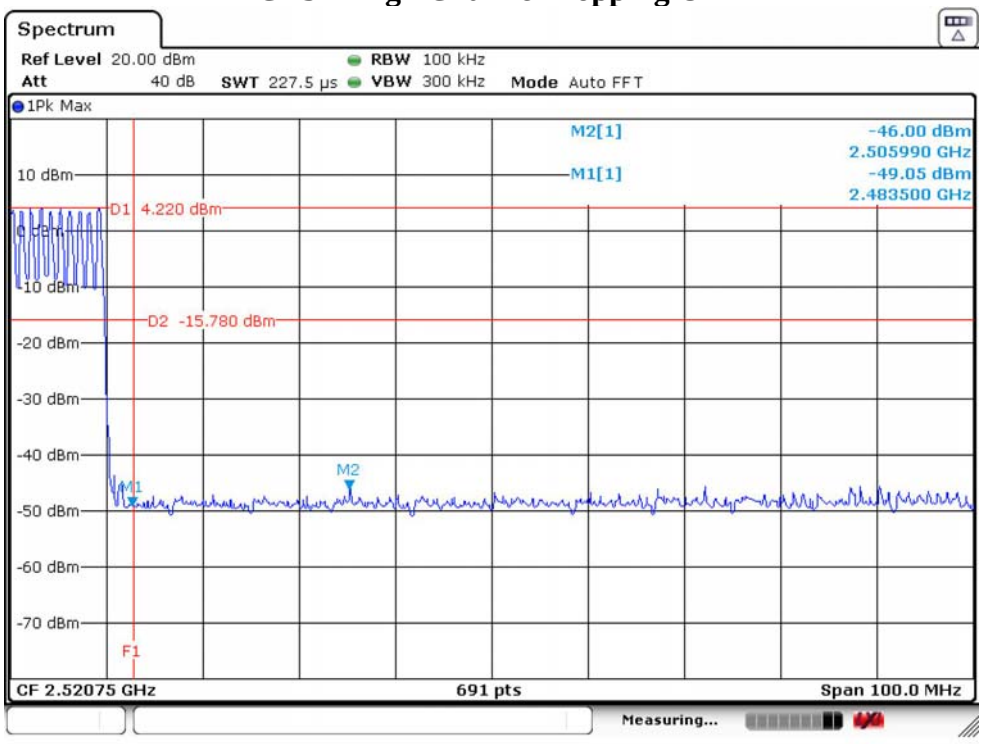

**GFSK High Channel Hopping OFF**



**GFSK Low Channel Hopping ON**




**GFSK High Channel Hopping ON**



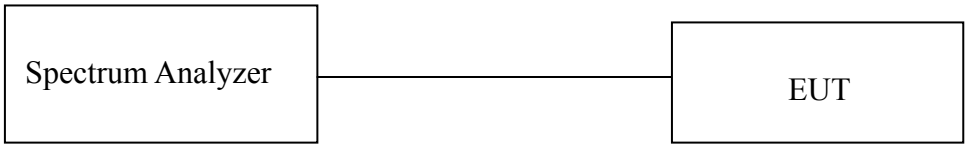

Note: all modes have been tested , only worse case is reported.

# 9. CONDUCTED SPURIOUS EMISSIONS

## 9.1. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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 or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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)).

## 9.2. Test Setup




## 9.3. Spectrum Analyzer Setting

| Spectrum Parameters | Setting |
|---|---|
| RBW | 100KHz |
| VBW | 300KHz |
| Start frequency | 30MHz |
| Stop frequency | 25GHz |
| Sweep Time | Auto |
| Detector | Peak |
| Trace Mode | Max Hold |

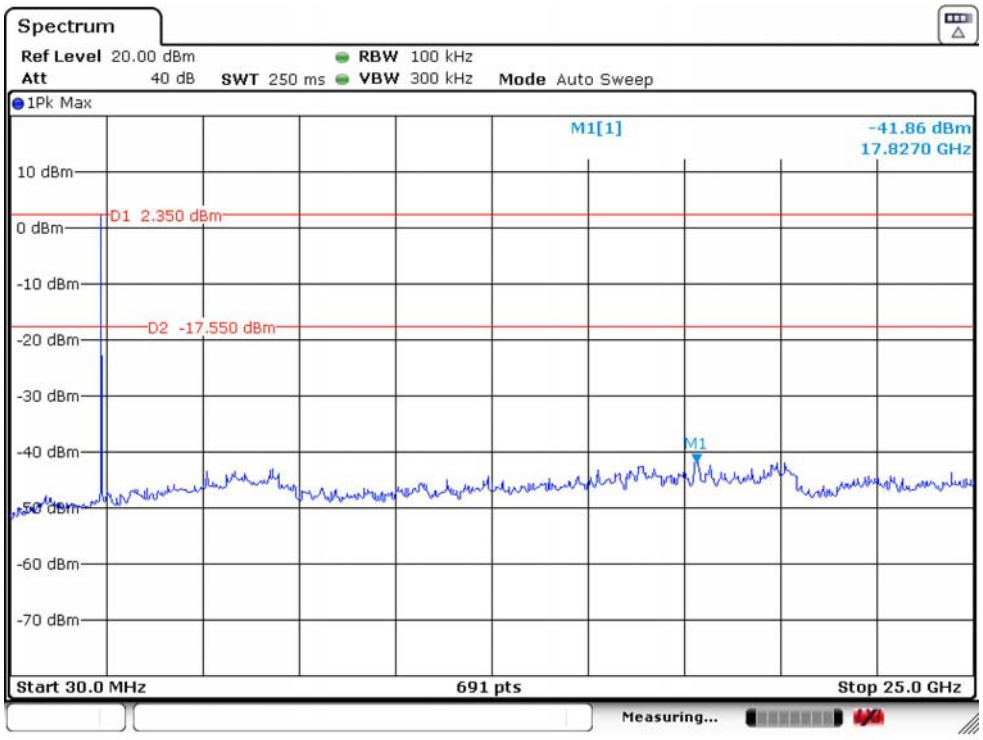
## 9.4. Test Procedure

a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
b. Spectrum analyzer setting parameters in accordance with section 8.3.
c. Set the EUT transmit continuously with maximum output power over fixed single hopping channel.
d. Allow trace to stabilize, use the marker function to mark the highest emission level outside the authorized band.
e. Repeat above procedures until all channels and test modes were measured.
f. Record the results in the test report.

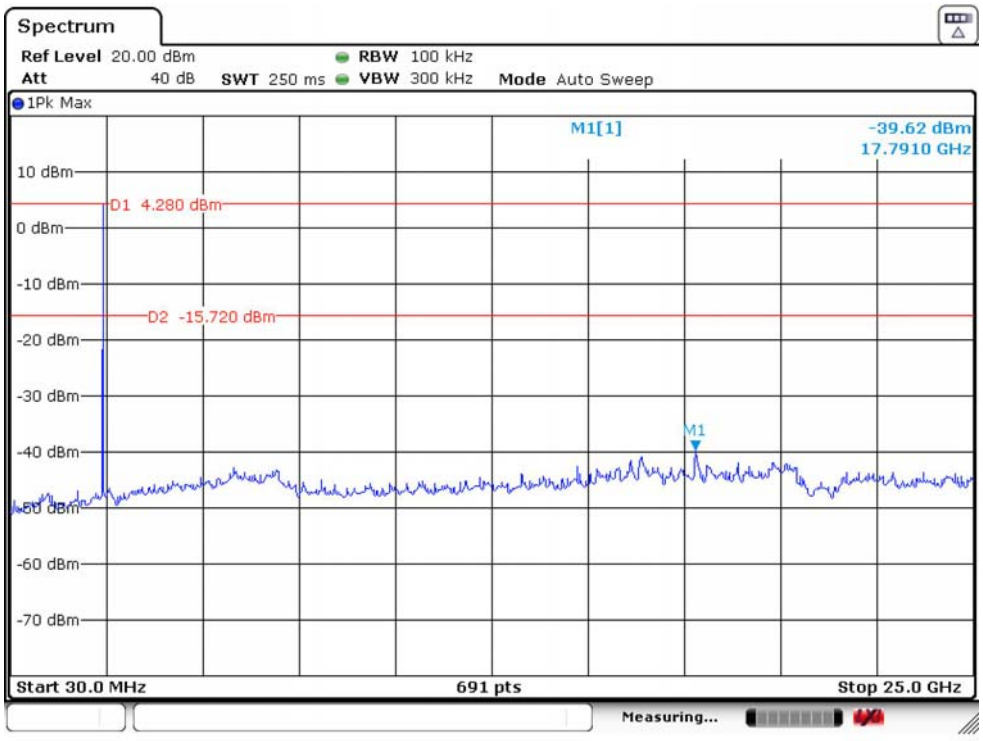
## 9.5. Test Result

| Temperature | 23.5℃ | Relative Humidity | 55% | Test Voltage | DC 3.7V |
|---|---|---|---|---|---|
| Result | PASS | | | | |

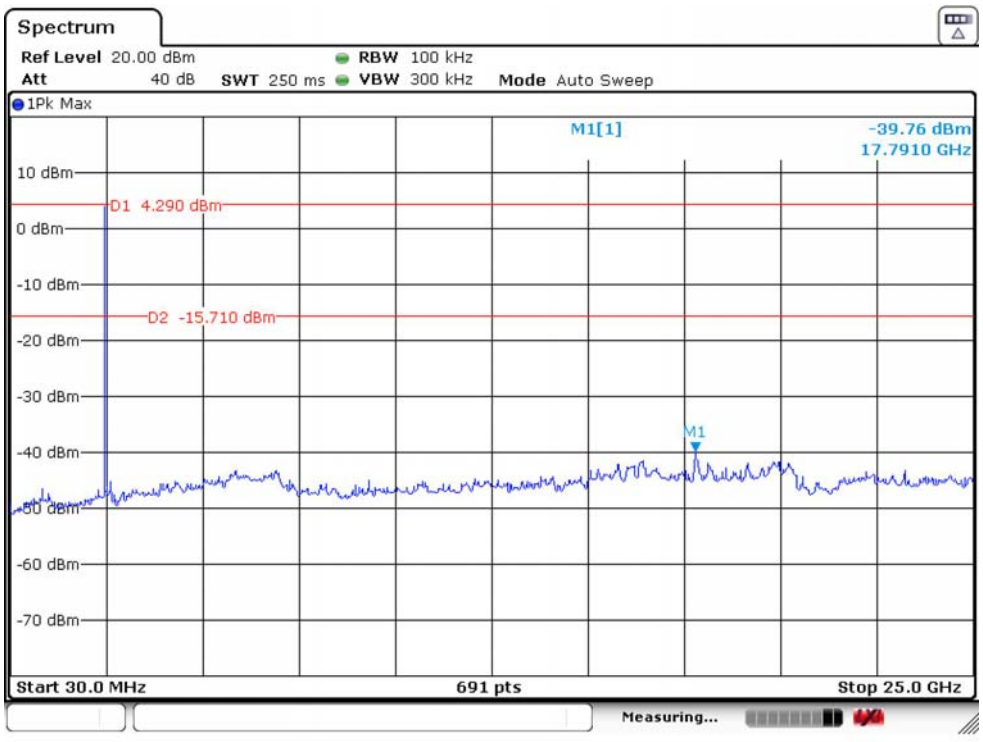
**GFSK 2402 MHz**




**GFSK 2441 MHz**



**GFSK 2480 MHz**




Note: all modes have been tested , only worse case is reported.

# 10. RADIATED SPURIOUS EMISSIONS AND BAND EDGE

## 10.1. Limit

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

15.205 Restricted frequency band

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| [1]0.495 - 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 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 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]) |

15.209 Limit

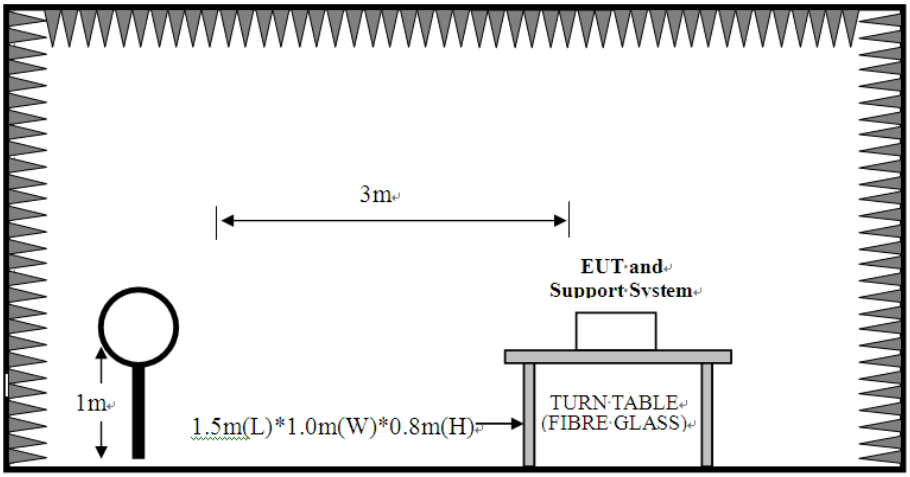
| Frequency (MHz) | Field Strength(μV/m) | Distance(m) |
|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | 300 |
| 0.490-1.705 | 24000/F(kHz) | 30 |
| 1.705-30 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

Note:

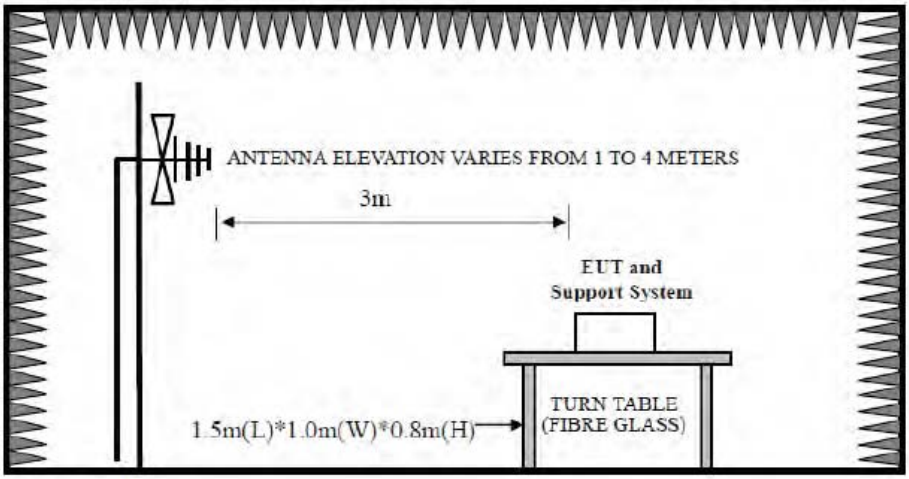
(1) Emission level dBμV = 20 log Emission level μV/m.
(2) The smaller limit shall apply at the cross point between two frequency bands.
(3) Distance is the distance in meters between the measuring instrument,antenna and the closest point of any part of the device or system.

## 10.2. Test Setup

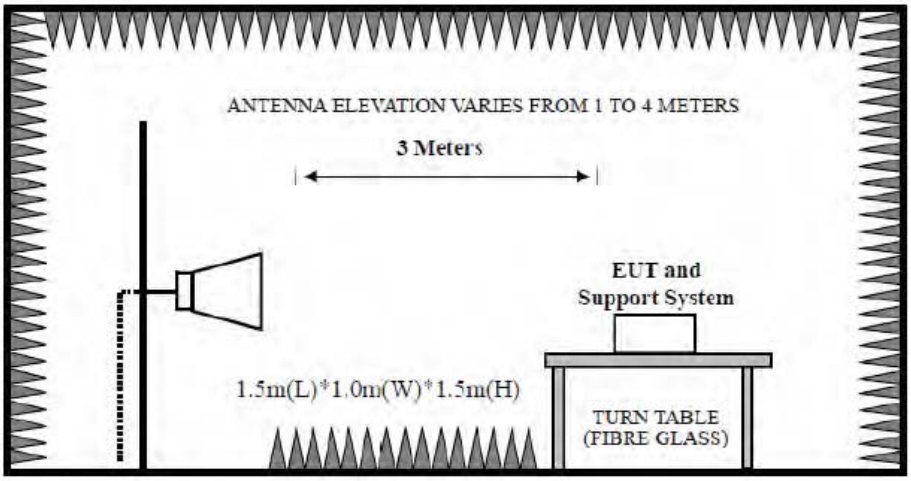
9kHz~30MHz




30~1000MHz




Above 1GHz



## 10.3. Spectrum Analyzer Setting

For 9KHz-150KHz

| Spectrum Parameters | Setting |
|---|---|
| RBW | 300Hz(for Peak&AVG)/CISPR 200Hz(for QP) |
| VBW | 300Hz(for Peak&AVG)/CISPR 200Hz(for QP) |
| Start frequency | 9KHz |
| Stop frequency | 150KHz |
| Sweep Time | Auto |
| Detector | PEAK/QP/AVG |
| Trace Mode | Max Hold |

For 150KHz-30MHz

| Spectrum Parameters | Setting |
|---|---|
| RBW | 9KHz |
| VBW | 9KHz |
| Start frequency | 150KHz |
| Stop frequency | 30MHz |
| Sweep Time | Auto |
| Detector | QP |
| Trace Mode | Max Hold |

For 30MHz-1GHz

| Spectrum Parameters | Setting |
|---|---|
| RBW | 120KHz |
| VBW | 300KHz |
| Start frequency | 30MHz |
| Stop frequency | 1GHz |
| Sweep Time | Auto |
| Detector | QP |
| Trace Mode | Max Hold |

For Above 1GHz

| Spectrum Parameters | Setting | |
|---|---|---|
| RBW | 1MHz | |
| VBW | PEAK Measurement | AVG Measurement |
| | 3MHz | Duty cycle≥98%,VBW=10Hz |
| | | Duty cycle＜98%,VBW≥1/T |
| Start frequency | 1GHz | |
| Stop frequency | 25GHz | |
| Sweep Time | Auto | |
| Detector | PEAK | |
| Trace Mode | Max Hold | |

## 10.4. Test Procedure

a. EUT was placed on a turn table, which is 0.8 meter high above ground for below 1GHz test, and which is 1.5 meter high above ground for above 1GHz test.
b. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower.
c. Set the EUT transmit continuously with maximum output power.
d. The turn table can rotate 360 degrees to determine the position of the maximum emission level.
e. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.
f. Spectrum analyzer setting parameters in accordance with section 10.3.
g. Repeat above procedures until all channels and test modes were measured.
h. Record the results in the test report.

Note:

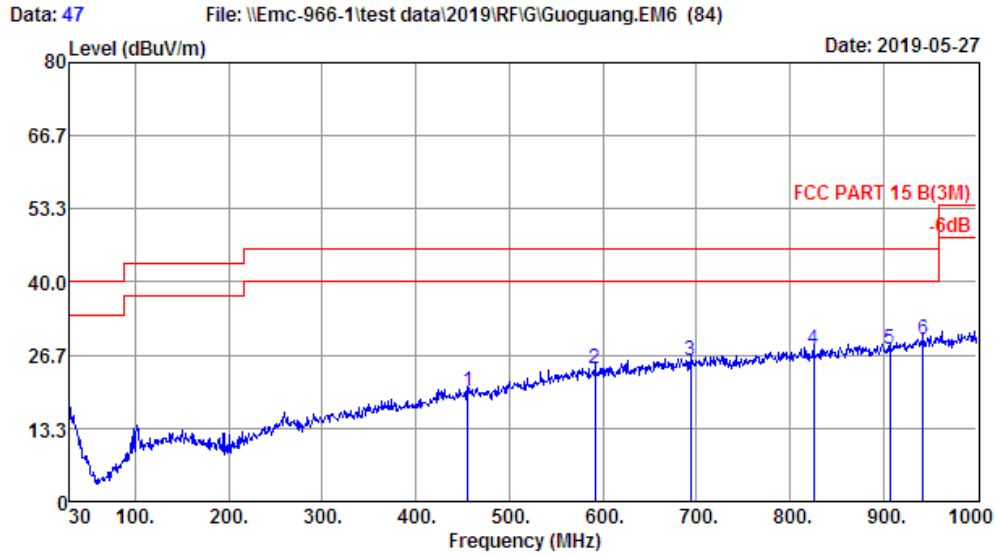
1. For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.
2. The frequency 2402MHz ,2441MHz and 2480MHz is fundamental frequency which no limit, the limit on plots is automatically generated by the software, it's not fundamental limit, we can't remove it.

## 10.5. Test Result

**Radiated Emissions Below 1GHz**

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878




Site no. : 1# 966 Chamber Data no. : 47
Dis. / Ant. : 3m 37062 Ant. pol. : VERTICAL
Limit : FCC PART 15 B(3M)
Env. / Ins. : Temp:24.9';Humi:52%;Press:101.52kPa
Engineer : Viking
EUT : Portable Wireless Speaker
Power : DC 3.7V
M/N : VIFA110
Test Mode : TX Mode

| | Freq. (MHz) | ANT Factor (dB/m) | Cable Loss (dB) | Reading (dBuV) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 455.83 | 17.32 | 2.56 | 0.05 | 19.93 | 46.00 | 26.07 | QP |
| 2 | 591.63 | 19.94 | 2.95 | 1.23 | 24.12 | 46.00 | 21.88 | QP |
| 3 | 693.48 | 21.50 | 3.22 | 0.85 | 25.57 | 46.00 | 20.43 | QP |
| 4 | 825.40 | 23.20 | 3.71 | 0.73 | 27.64 | 46.00 | 18.36 | QP |
| 5 | 906.88 | 23.84 | 3.90 | 0.13 | 27.87 | 46.00 | 18.13 | QP |
| 6 | 942.77 | 24.53 | 4.42 | 0.52 | 29.47 | 46.00 | 16.53 | QP |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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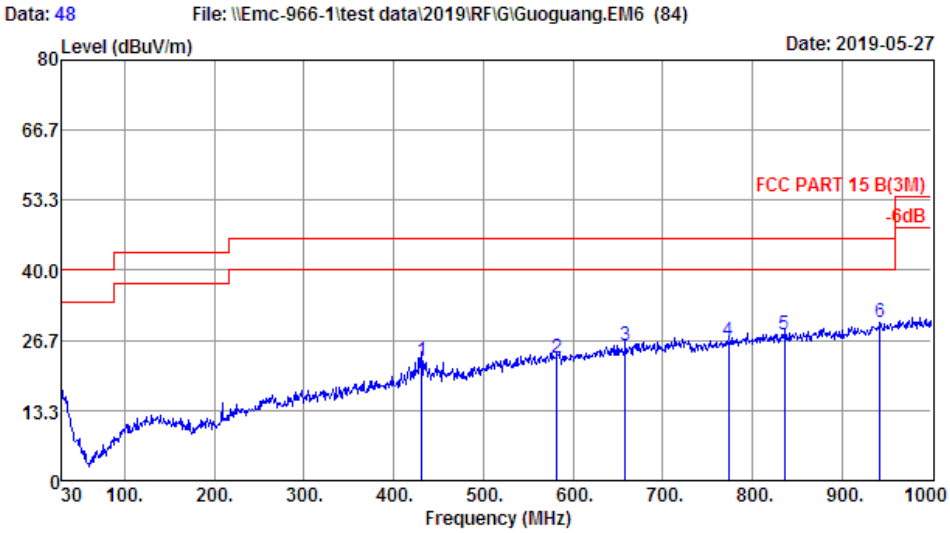


Site no. : 1# 966 Chamber Data no. : 48
Dis. / Ant. : 3m 37062 Ant. pol. : HORIZONTAL
Limit : FCC PART 15 B(3M)
Env. / Ins. : Temp:24.9';Humi:52%;Press:101.52kPa
Engineer : Viking
EUT : Portable Wireless Speaker
Power : DC 3.7V
M/N : VIFA110
Test Mode : TX Mode

| | Freq. (MHz) | ANT Factor (dB/m) | Cable Loss (dB) | Reading (dBuV) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 431.58 | 16.80 | 2.35 | 3.46 | 22.61 | 46.00 | 23.39 | QP |
| 2 | 581.93 | 19.82 | 2.94 | 0.64 | 23.40 | 46.00 | 22.60 | QP |
| 3 | 658.56 | 21.27 | 3.23 | 1.14 | 25.64 | 46.00 | 20.36 | QP |
| 4 | 773.99 | 22.64 | 3.54 | 0.28 | 26.46 | 46.00 | 19.54 | QP |
| 5 | 836.07 | 23.26 | 3.71 | 0.73 | 27.70 | 46.00 | 18.30 | QP |
| 6 | 942.77 | 24.53 | 4.42 | 1.03 | 29.98 | 46.00 | 16.02 | QP |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

Note:

1. The amplitude of 9KHz to 30MHz spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
2. All test mode had been pre-test,only the worst case was reported.

# Radiated Emissions Above 1G

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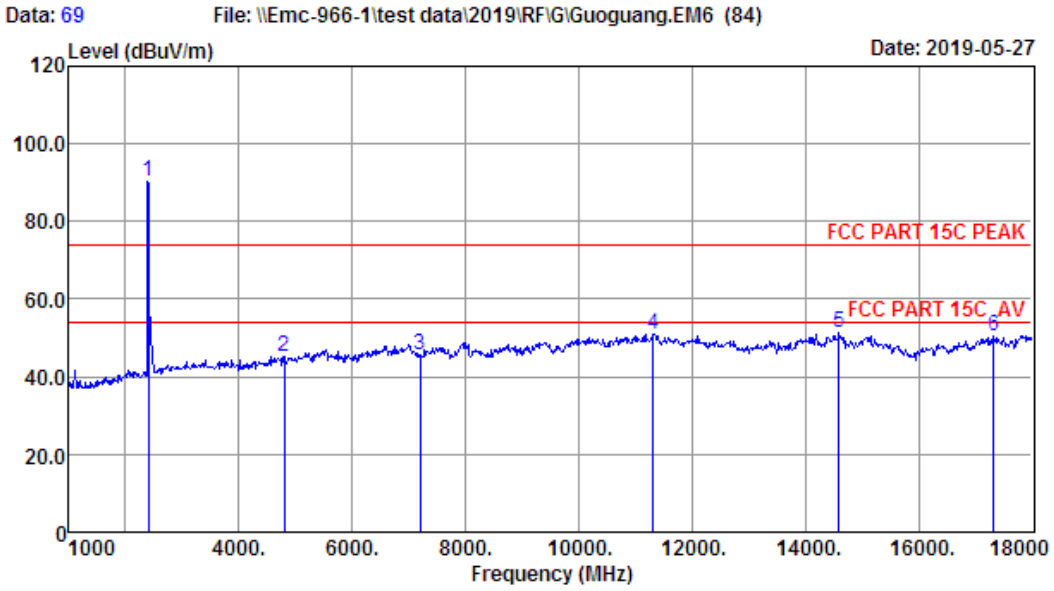


```
Site no.      : 1# 966 Chamber              Data no.  : 69
Dis. / Ant.   : 3m   ANT9120D 1-18G         Ant. pol. : HORIZONTAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : Temp:24.9';Humi:52%;Press:101.52kPa
Engineer      : Viking
EUT           : Portable Wireless Speaker
Power         : DC 3.7V
M/N           : VIFA110
Test Mode     : GFSK TX 2402MHz
```

| | Freq. (MHz) | Ant. Factor (dB/m) | Cable Loss (dB) | Amp Factor (dB) | Reading (dBuV) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2402.00 | 27.26 | 2.89 | 34.68 | 95.06 | 90.53 | 74.00 | -16.53 | Peak |
| 2 | 4804.00 | 31.16 | 4.51 | 34.68 | 44.16 | 45.15 | 74.00 | 28.85 | Peak |
| 3 | 7206.00 | 36.05 | 5.84 | 34.58 | 38.21 | 45.52 | 74.00 | 28.48 | Peak |
| 4 | 11319.00 | 39.77 | 7.36 | 34.39 | 38.25 | 50.99 | 74.00 | 23.01 | Peak |
| 5 | 14600.00 | 41.04 | 8.34 | 34.26 | 36.35 | 51.47 | 74.00 | 22.53 | Peak |
| 6 | 17320.00 | 43.49 | 9.27 | 34.23 | 32.12 | 50.65 | 74.00 | 23.35 | Peak |

```
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
         2. Margin= Limit - Emission Level.
         3. The emission levels that are 20dB below the official
            limit are not reported.
```

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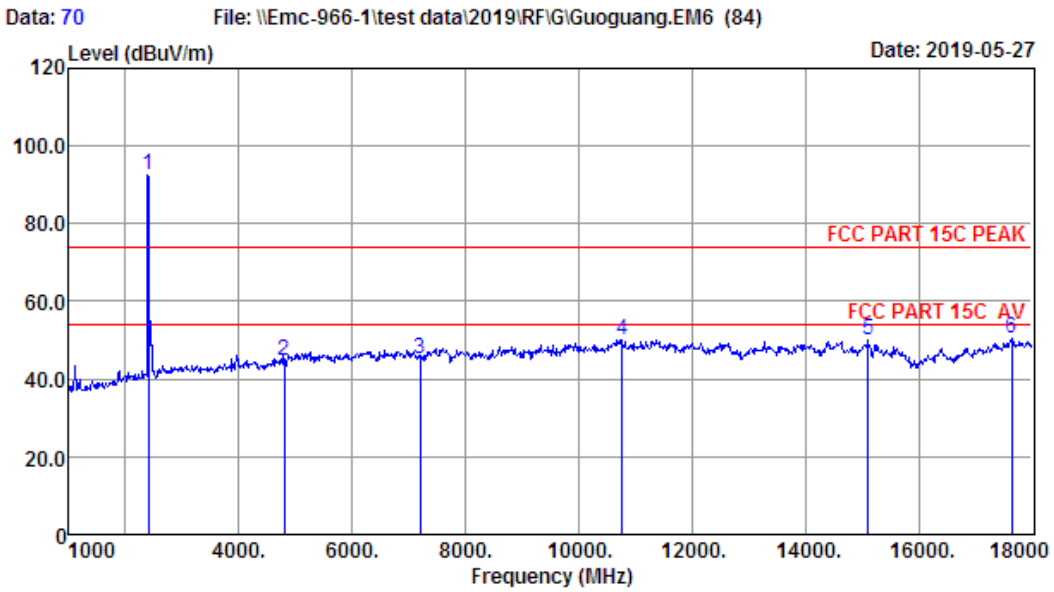


```
Site no.      : 1# 966 Chamber              Data no.  : 70
Dis. / Ant.   : 3m   ANT9120D 1-18G         Ant. pol. : VERTICAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : Temp:24.9';Humi:52%;Press:101.52kPa
Engineer      : Viking
EUT           : Portable Wireless Speaker
Power         : DC 3.7V
M/N           : VIFA110
Test Mode     : GFSK TX 2402MHz
```

| | Freq. (MHz) | Ant. Factor (dB/m) | Cable Loss (dB) | Amp Factor (dB) | Reading (dBuV) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2402.00 | 27.26 | 2.89 | 34.68 | 97.05 | 92.52 | 74.00 | -18.52 | Peak |
| 2 | 4804.00 | 31.16 | 4.51 | 34.68 | 43.72 | 44.71 | 74.00 | 29.29 | Peak |
| 3 | 7206.00 | 36.05 | 5.84 | 34.58 | 37.64 | 44.95 | 74.00 | 29.05 | Peak |
| 4 | 10775.00 | 39.67 | 7.01 | 34.37 | 37.84 | 50.15 | 74.00 | 23.85 | Peak |
| 5 | 15110.00 | 40.65 | 8.47 | 34.28 | 35.27 | 50.11 | 74.00 | 23.89 | Peak |
| 6 | 17643.00 | 45.68 | 9.53 | 34.26 | 29.62 | 50.57 | 74.00 | 23.43 | Peak |

```
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
         2. Margin= Limit - Emission Level.
         3. The emission levels that are 20dB below the official
            limit are not reported.
```

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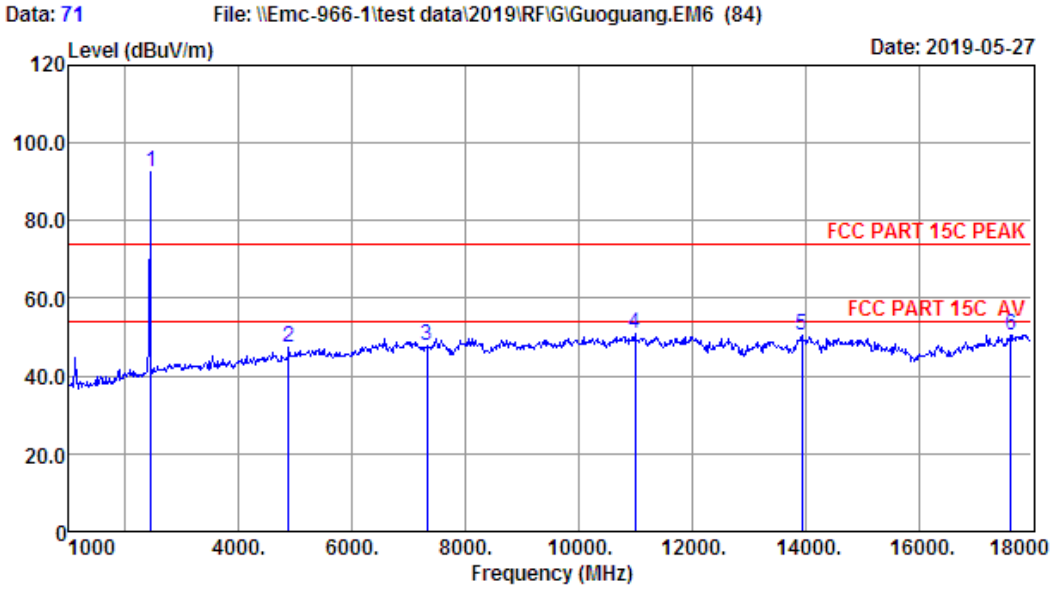


```
Site no.      : 1# 966 Chamber              Data no.  : 71
Dis. / Ant.   : 3m   ANT9120D 1-18G         Ant. pol. : VERTICAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : Temp:24.9';Humi:52%;Press:101.52kPa
Engineer      : Viking
EUT           : Portable Wireless Speaker
Power         : DC 3.7V
M/N           : VIFA110
Test Mode     : GFSK TX 2441MHz
```

| | Freq. (MHz) | Ant. Factor (dB/m) | Cable Loss (dB) | Amp Factor (dB) | Reading (dBuV) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2441.00 | 27.33 | 2.90 | 34.67 | 97.08 | 92.64 | 74.00 | -18.64 | Peak |
| 2 | 4882.00 | 31.39 | 4.71 | 34.69 | 45.82 | 47.23 | 74.00 | 26.77 | Peak |
| 3 | 7323.00 | 36.19 | 5.88 | 34.57 | 40.53 | 48.03 | 74.00 | 25.97 | Peak |
| 4 | 10996.00 | 40.00 | 7.11 | 34.30 | 38.03 | 50.84 | 74.00 | 23.16 | Peak |
| 5 | 13937.00 | 40.98 | 8.15 | 34.21 | 35.60 | 50.52 | 74.00 | 23.48 | Peak |
| 6 | 17626.00 | 45.56 | 9.52 | 34.26 | 29.83 | 50.65 | 74.00 | 23.35 | Peak |

```
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
         2. Margin= Limit - Emission Level.
         3. The emission levels that are 20dB below the official
            limit are not reported.
```

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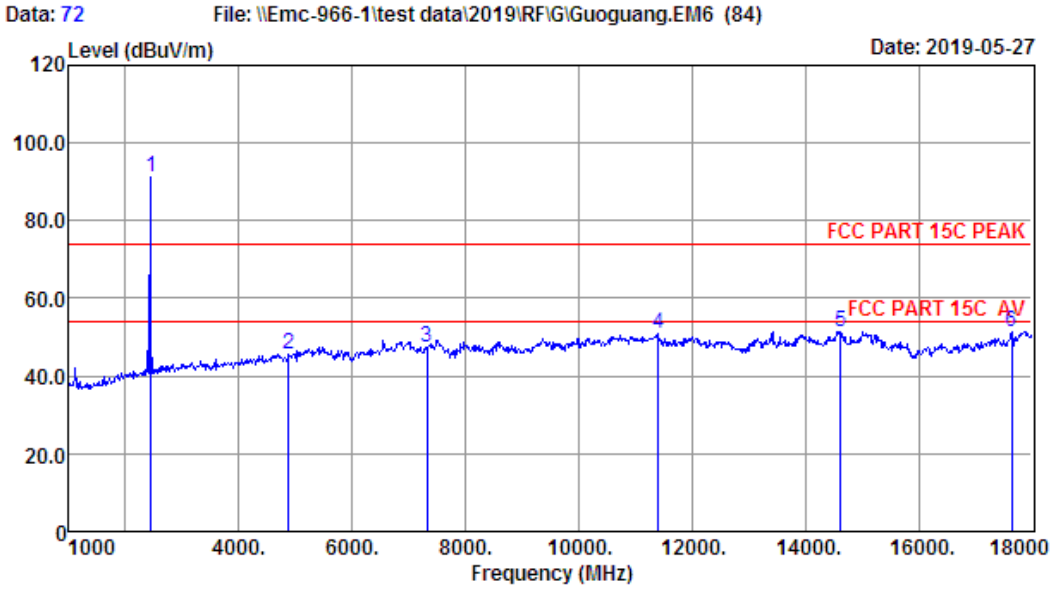


Site no. : 1# 966 Chamber Data no. : 72
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:24.9';Humi:52%;Press:101.52kPa
Engineer : Viking
EUT : Portable Wireless Speaker
Power : DC 3.7V
M/N : VIFA110
Test Mode : GFSK TX 2441MHz

| | Freq. (MHz) | Ant. Factor (dB/m) | Cable Loss (dB) | Amp Factor (dB) | Reading (dBuV) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2441.00 | 27.33 | 2.90 | 34.67 | 95.71 | 91.27 | 74.00 | -17.27 | Peak |
| 2 | 4882.00 | 31.39 | 4.71 | 34.69 | 44.02 | 45.43 | 74.00 | 28.57 | Peak |
| 3 | 7323.00 | 36.19 | 5.88 | 34.57 | 40.04 | 47.54 | 74.00 | 26.46 | Peak |
| 4 | 11404.00 | 39.72 | 7.38 | 34.42 | 38.16 | 50.84 | 74.00 | 23.16 | Peak |
| 5 | 14617.00 | 41.04 | 8.33 | 34.26 | 36.45 | 51.56 | 74.00 | 22.44 | Peak |
| 6 | 17643.00 | 45.68 | 9.53 | 34.26 | 30.48 | 51.43 | 74.00 | 22.57 | Peak |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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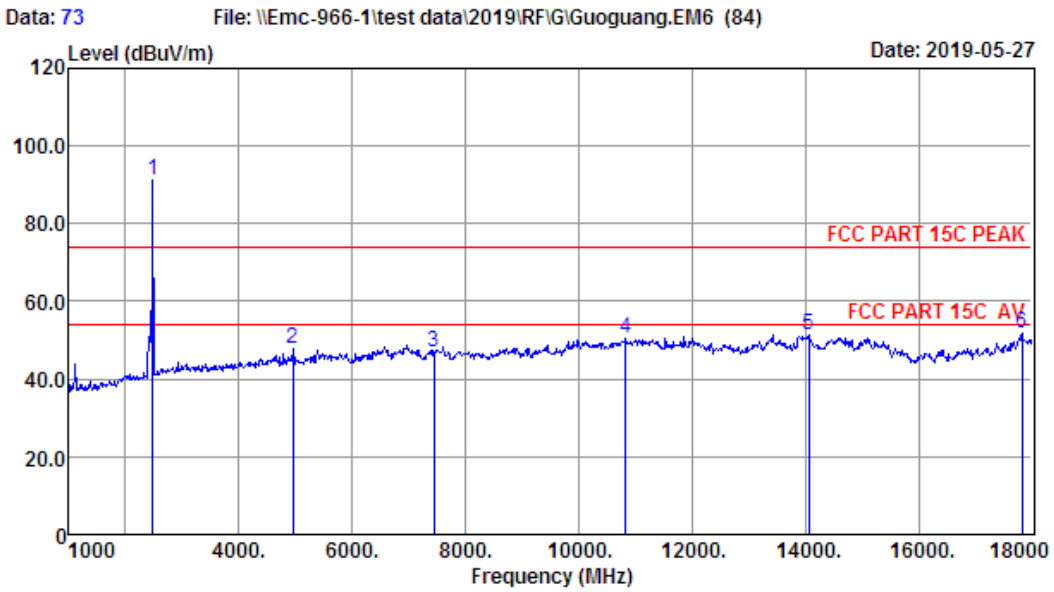


```
Site no.      : 1# 966 Chamber              Data no.  : 73
Dis. / Ant.   : 3m   ANT9120D 1-18G         Ant. pol. : HORIZONTAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : Temp:24.9';Humi:52%;Press:101.52kPa
Engineer      : Viking
EUT           : Portable Wireless Speaker
Power         : DC 3.7V
M/N           : VIFA110
Test Mode     : GFSK TX 2480MHz
```

| | Freq. (MHz) | Ant. Factor (dB/m) | Cable Loss (dB) | Amp Factor (dB) | Reading (dBuV) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2480.00 | 27.38 | 2.93 | 34.66 | 95.67 | 91.32 | 74.00 | -17.32 | Peak |
| 2 | 4960.00 | 31.68 | 4.60 | 34.70 | 46.33 | 47.91 | 74.00 | 26.09 | Peak |
| 3 | 7440.00 | 36.34 | 6.02 | 34.56 | 39.14 | 46.94 | 74.00 | 27.06 | Peak |
| 4 | 10826.00 | 39.75 | 7.03 | 34.35 | 38.07 | 50.50 | 74.00 | 23.50 | Peak |
| 5 | 14056.00 | 41.09 | 8.19 | 34.21 | 36.48 | 51.55 | 74.00 | 22.45 | Peak |
| 6 | 17830.00 | 46.95 | 9.66 | 34.28 | 29.44 | 51.77 | 74.00 | 22.23 | Peak |

```
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
         2. Margin= Limit - Emission Level.
         3. The emission levels that are 20dB below the official
            limit are not reported.
```

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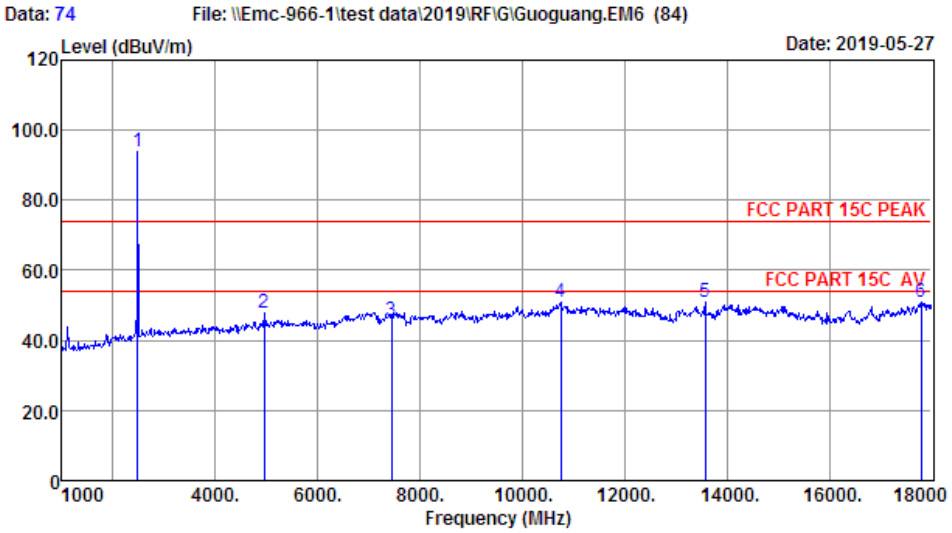


```
Site no.      : 1# 966 Chamber              Data no.  : 74
Dis. / Ant.   : 3m   ANT9120D 1-18G         Ant. pol. : VERTICAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : Temp:24.9';Humi:52%;Press:101.52kPa
Engineer      : Viking
EUT           : Portable Wireless Speaker
Power         : DC 3.7V
M/N           : VIFA110
Test Mode     : GFSK TX 2480MHz
```

| | Freq. (MHz) | Ant. Factor (dB/m) | Cable Loss (dB) | Amp Factor (dB) | Reading (dBuV) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2480.00 | 27.38 | 2.93 | 34.66 | 98.09 | 93.74 | 74.00 | -19.74 | Peak |
| 2 | 4960.00 | 31.68 | 4.60 | 34.70 | 46.12 | 47.70 | 74.00 | 26.30 | Peak |
| 3 | 7440.00 | 36.34 | 6.02 | 34.56 | 37.86 | 45.66 | 74.00 | 28.34 | Peak |
| 4 | 10758.00 | 39.64 | 7.01 | 34.37 | 38.81 | 51.09 | 74.00 | 22.91 | Peak |
| 5 | 13580.00 | 40.38 | 8.17 | 34.28 | 36.76 | 51.03 | 74.00 | 22.97 | Peak |
| 6 | 17796.00 | 46.72 | 9.64 | 34.28 | 28.64 | 50.72 | 74.00 | 23.28 | Peak |

```
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
         2. Margin= Limit - Emission Level.
         3. The emission levels that are 20dB below the official
            limit are not reported.
```

Note:

1. The amplitude of 18GHz to 25GHz spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
2. All test mode had been pre-test,only Low/Middle/High Channel of the worst case modulation mode was reported.

# Radiated Band Edge

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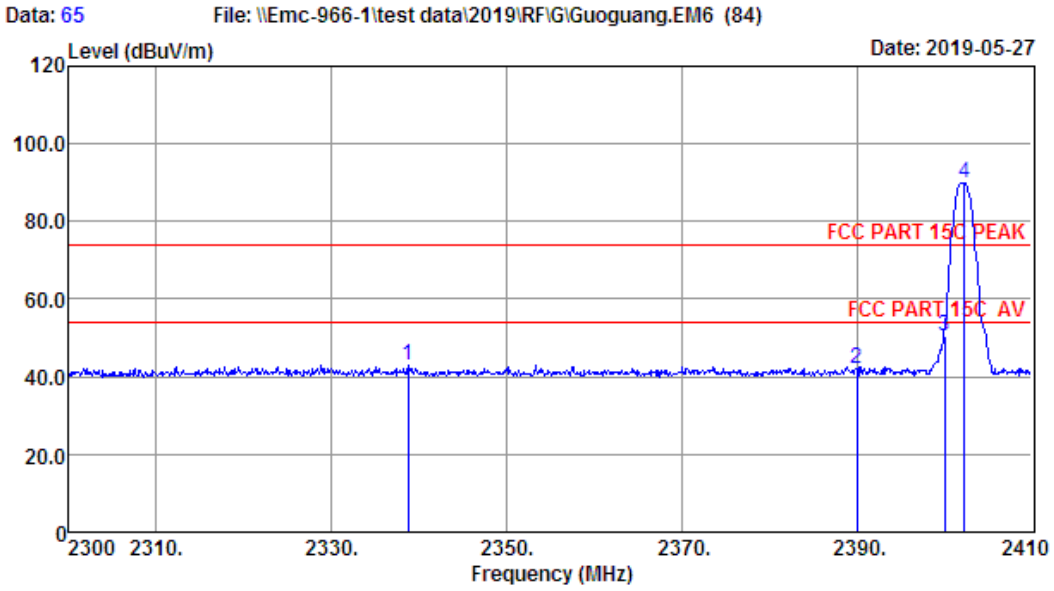


Site no. : 1# 966 Chamber Data no. : 65
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:24.9';Humi:52%;Press:101.52kPa
Engineer : Viking
EUT : Portable Wireless Speaker
Power : DC 3.7V
M/N : VIFA110
Test Mode : GFSK TX 2402MHz

| | Freq. (MHz) | Ant. Factor (dB/m) | Cable Loss (dB) | Amp Factor (dB) | Reading (dBuV) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2338.72 | 27.18 | 2.85 | 34.70 | 47.73 | 43.06 | 74.00 | 30.94 | Peak |
| 2 | 2390.00 | 27.26 | 2.89 | 34.68 | 46.38 | 41.85 | 74.00 | 32.15 | Peak |
| 3 | 2400.00 | 27.26 | 2.89 | 34.68 | 54.88 | 50.35 | 74.00 | 23.65 | Peak |
| 4 | 2402.30 | 27.26 | 2.89 | 34.68 | 94.54 | 90.01 | 74.00 | -16.01 | Peak |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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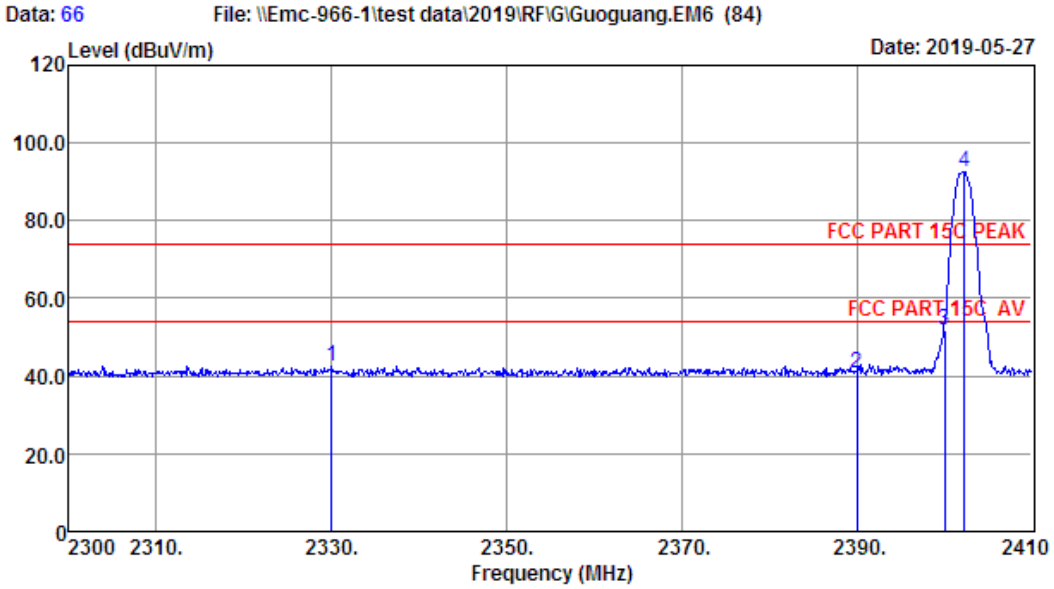


Site no. : 1# 966 Chamber Data no. : 66
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : Temp:24.9';Humi:52%;Press:101.52kPa
Engineer : Viking
EUT : Portable Wireless Speaker
Power : DC 3.7V
M/N : VIFA110
Test Mode : GFSK TX 2402MHz

| | Freq. (MHz) | Ant. Factor (dB/m) | Cable Loss (dB) | Amp Factor (dB) | Reading (dBuV) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2330.03 | 27.16 | 2.84 | 34.70 | 47.11 | 42.41 | 74.00 | 31.59 | Peak |
| 2 | 2390.00 | 27.26 | 2.89 | 34.68 | 45.31 | 40.78 | 74.00 | 33.22 | Peak |
| 3 | 2400.00 | 27.26 | 2.89 | 34.68 | 56.38 | 51.85 | 74.00 | 22.15 | Peak |
| 4 | 2402.30 | 27.26 | 2.89 | 34.68 | 97.10 | 92.57 | 74.00 | -18.57 | Peak |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

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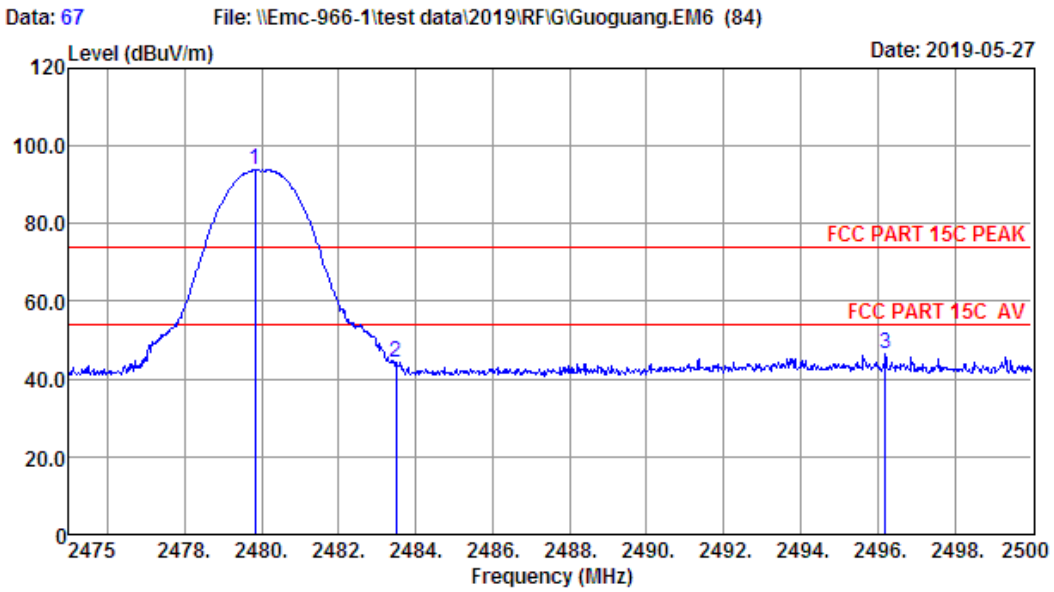


```
Site no.      : 1# 966 Chamber              Data no.  : 67
Dis. / Ant.   : 3m   ANT9120D 1-18G         Ant. pol. : VERTICAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : Temp:24.9';Humi:52%;Press:101.52kPa
Engineer      : Viking
EUT           : Portable Wireless Speaker
Power         : DC 3.7V
M/N           : VIFA110
Test Mode     : GFSK TX 2480MHz
```

| | Freq. (MHz) | Ant. Factor (dB/m) | Cable Loss (dB) | Amp Factor (dB) | Reading (dBuV) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2479.83 | 27.38 | 2.93 | 34.66 | 98.06 | 93.71 | 74.00 | -19.71 | Peak |
| 2 | 2483.50 | 27.38 | 2.93 | 34.66 | 48.53 | 44.18 | 74.00 | 29.82 | Peak |
| 3 | 2496.20 | 27.40 | 2.95 | 34.65 | 50.79 | 46.49 | 74.00 | 27.51 | Peak |

```
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
         2. Margin= Limit - Emission Level.
         3. The emission levels that are 20dB below the official
            limit are not reported.
```

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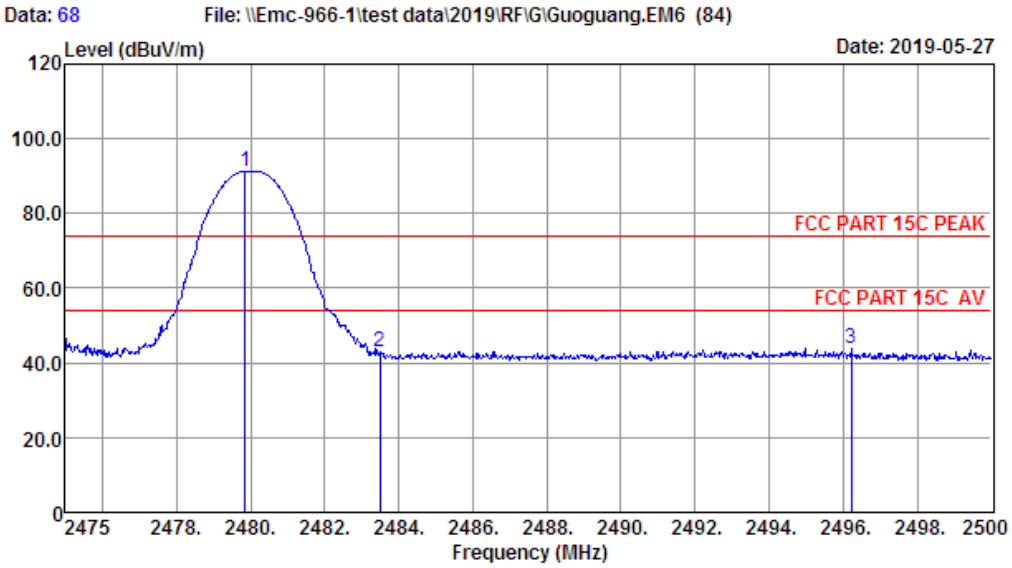



```
Site no.      : 1# 966 Chamber              Data no.  : 68
Dis. / Ant.   : 3m   ANT9120D 1-18G         Ant. pol. : HORIZONTAL
Limit         : FCC PART 15C PEAK
Env. / Ins.   : Temp:24.9';Humi:52%;Press:101.52kPa
Engineer      : Viking
EUT           : Portable Wireless Speaker
Power         : DC 3.7V
M/N           : VIFA110
Test Mode     : GFSK TX 2480MHz
```

| | Freq. (MHz) | Ant. Factor (dB/m) | Cable Loss (dB) | Amp Factor (dB) | Reading (dBuV) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2479.85 | 27.38 | 2.93 | 34.66 | 95.61 | 91.26 | 74.00 | -17.26 | Peak |
| 2 | 2483.50 | 27.38 | 2.93 | 34.66 | 47.13 | 42.78 | 74.00 | 31.22 | Peak |
| 3 | 2496.23 | 27.40 | 2.95 | 34.65 | 48.04 | 43.74 | 74.00 | 30.26 | Peak |

```
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
         2. Margin= Limit - Emission Level.
         3. The emission levels that are 20dB below the official
            limit are not reported.
```

Note:

1. All test mode had been pre-test,only Low/High Channel of the worst case modulation mode was reported.

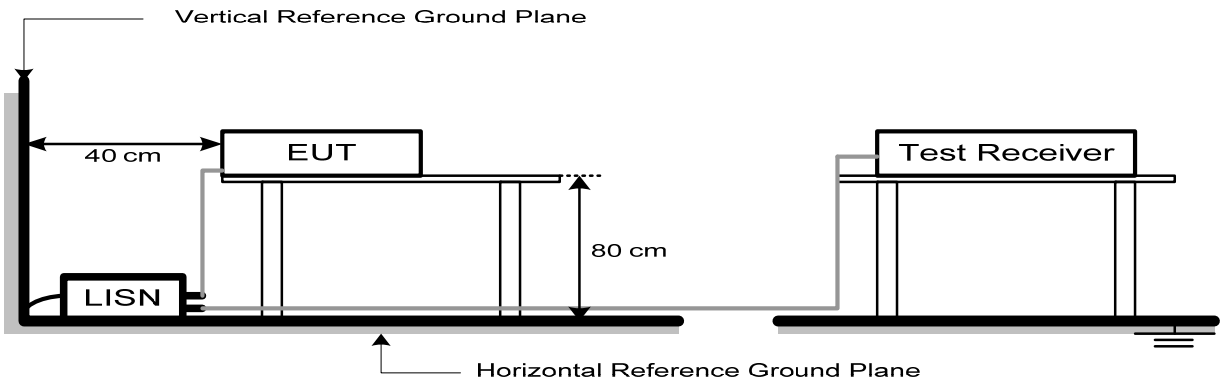
# 11. AC POWER LINE CONDUCTED EMISSIONS

## 11.1. Limit

| Frequency | Maximum RF Line Voltage | |
|---|---|---|
| | Quasi-Peak Level dB(μV) | Average Level dB(μV) |
| 150kHz ~ 500kHz | 66 ~ 56* | 56 ~ 46* |
| 500kHz ~ 5MHz | 56 | 46 |
| 5MHz ~ 30MHz | 60 | 50 |

Note:
1. * Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

## 11.2. Test Setup




## 11.3. Spectrum Analyzer Setting

| Spectrum Parameters | Setting |
|---|---|
| RBW | 9KHz |
| VBW | 9KHz |
| Start frequency | 150KHz |
| Stop frequency | 30MHz |
| Sweep Time | Auto |
| Detector | QP/AVG |
| Trace Mode | Max Hold |

## 11.4. Test Procedure

a. The EUT was placed on a non-metallic table, 80cm above the ground plane.
b. he EUT Power connected to the power mains through a line impedance stabilization network.
c. his provides a 50 ohm coupling impedance for the EUT (Please refer the block diagram of the test setup and photographs).
d. Set the EUT transmit continuously with maximum output power.
e. Spectrum analyzer setting parameters in accordance with section 11.3.
f. The AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Test.
g. Record the results in the test report.

## 11.5. Test Result

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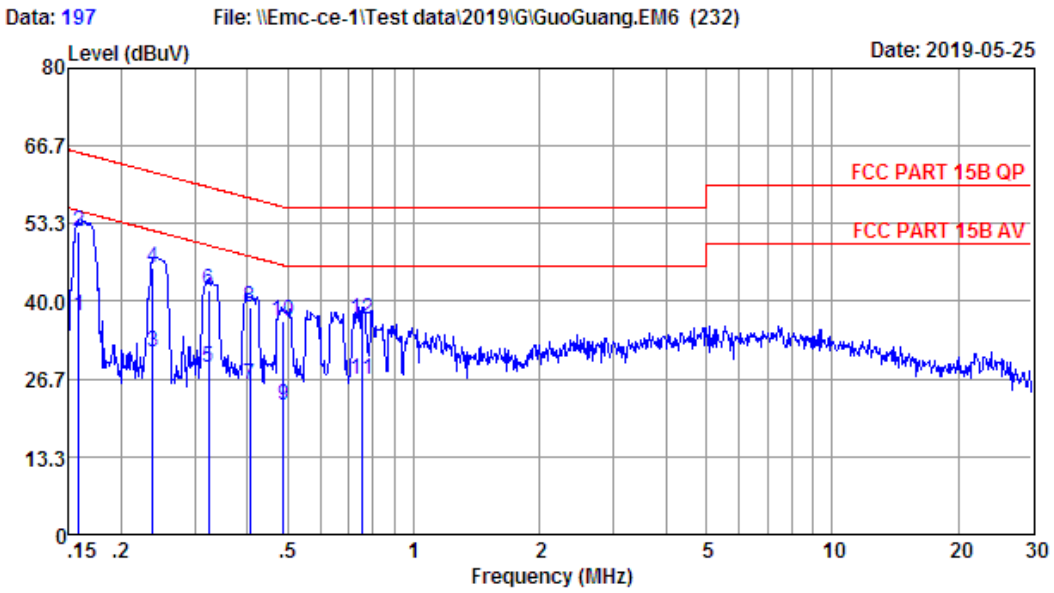


Site no : 844 Shield Room Data no. : 197
Env. / Ins. : Temp:24.1'C Humi:52% Press:101.50kPa LINE Phase : LINE
Limit : FCC PART 15B QP
Engineer : Viking
EUT : Portable Wireless Speaker
Power : DC 5V From Adapter Input AC 120V/60Hz
M/N : VIFA110
Test Mode : TX Mode

| | Freq. (MHz) | LISN Factor (dB) | Cable Loss (dB) | Reading (dBuV) | Emission Level (dBuv) | Limits (dBuv) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.16 | 9.59 | 9.69 | 18.20 | 37.48 | 55.56 | 18.08 | Average |
| 2 | 0.16 | 9.59 | 9.69 | 32.79 | 52.07 | 65.56 | 13.49 | QP |
| 3 | 0.24 | 9.61 | 9.92 | 11.90 | 31.43 | 52.17 | 20.74 | Average |
| 4 | 0.24 | 9.61 | 9.92 | 26.08 | 45.61 | 62.17 | 16.56 | QP |
| 5 | 0.32 | 9.62 | 9.92 | 9.03 | 28.57 | 49.62 | 21.05 | Average |
| 6 | 0.32 | 9.62 | 9.92 | 22.30 | 41.84 | 59.62 | 17.78 | QP |
| 7 | 0.41 | 9.63 | 9.92 | 6.13 | 25.68 | 47.73 | 22.05 | Average |
| 8 | 0.41 | 9.63 | 9.92 | 19.33 | 38.88 | 57.73 | 18.85 | QP |
| 9 | 0.49 | 9.63 | 9.92 | 2.67 | 22.22 | 46.19 | 23.97 | Average |
| 10 | 0.49 | 9.63 | 9.92 | 17.01 | 36.56 | 56.19 | 19.63 | QP |
| 11 | 0.75 | 9.63 | 9.93 | 6.99 | 26.55 | 46.00 | 19.45 | Average |
| 12 | 0.75 | 9.63 | 9.93 | 17.45 | 37.01 | 56.00 | 18.99 | QP |

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. If the average limit is met when useing a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

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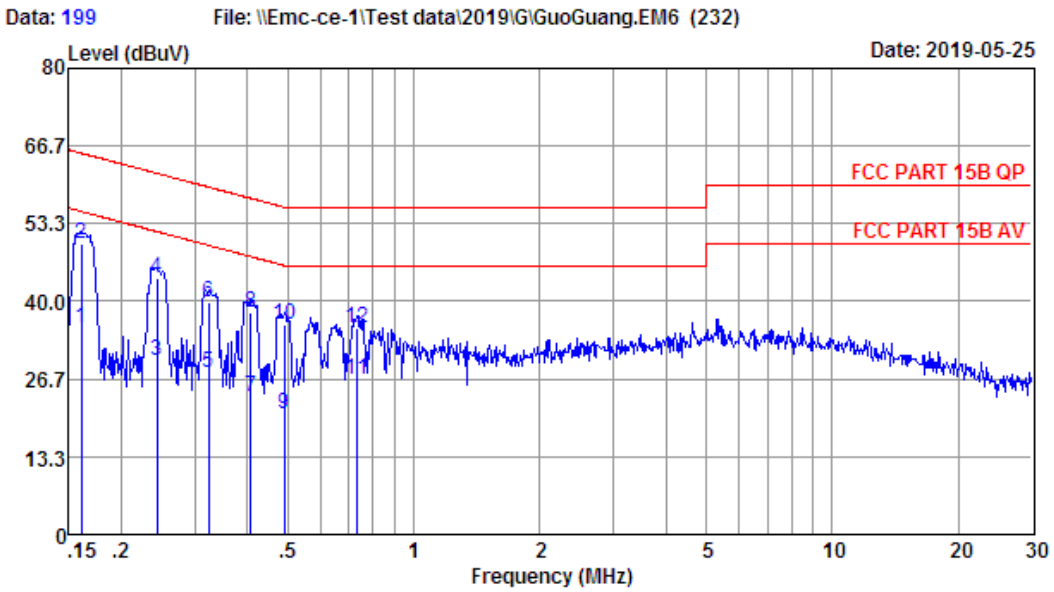


Site no : 844 Shield Room Data no. : 199
Env. / Ins. : Temp:24.1'C Humi:52% Press:101.50kPa LINE Phase : NEUTRAL
Limit : FCC PART 15B QP
Engineer : Viking
EUT : Portable Wireless Speaker
Power : DC 5V From Adapter Input AC 120V/60Hz
M/N : VIFA110
Test Mode : TX Mode

| | Freq. (MHz) | LISN Factor (dB) | Cable Loss (dB) | Reading (dBuV) | Emission Level (dBuv) | Limits (dBuv) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.16 | 9.50 | 9.69 | 16.20 | 35.39 | 55.43 | 20.04 | Average |
| 2 | 0.16 | 9.50 | 9.69 | 30.70 | 49.89 | 65.43 | 15.54 | QP |
| 3 | 0.24 | 9.53 | 9.92 | 10.41 | 29.86 | 52.00 | 22.14 | Average |
| 4 | 0.24 | 9.53 | 9.92 | 24.40 | 43.85 | 62.00 | 18.15 | QP |
| 5 | 0.32 | 9.54 | 9.92 | 8.23 | 27.69 | 49.62 | 21.93 | Average |
| 6 | 0.32 | 9.54 | 9.92 | 20.32 | 39.78 | 59.62 | 19.84 | QP |
| 7 | 0.41 | 9.56 | 9.92 | 4.13 | 23.61 | 47.68 | 24.07 | Average |
| 8 | 0.41 | 9.56 | 9.92 | 18.58 | 38.06 | 57.68 | 19.62 | QP |
| 9 | 0.49 | 9.55 | 9.92 | 1.07 | 20.54 | 46.14 | 25.60 | Average |
| 10 | 0.49 | 9.55 | 9.92 | 16.57 | 36.04 | 56.14 | 20.10 | QP |
| 11 | 0.73 | 9.56 | 9.93 | 7.07 | 26.56 | 46.00 | 19.44 | Average |
| 12 | 0.73 | 9.56 | 9.93 | 15.86 | 35.35 | 56.00 | 20.65 | QP |

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. If the average limit is met when useing a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

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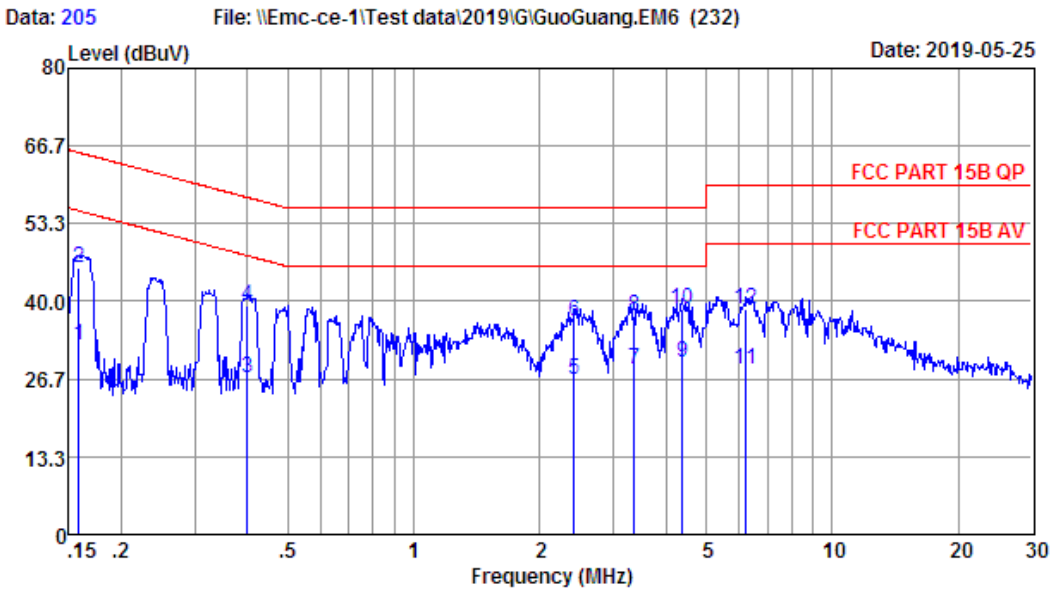


Site no : 844 Shield Room Data no. : 205
Env. / Ins. : Temp:24.1'C Humi:52% Press:101.50kPa LINE Phase : LINE
Limit : FCC PART 15B QP
Engineer : Viking
EUT : Portable Wireless Speaker
Power : DC 5V From Adapter Input AC 240V/60Hz
M/N : VIFA110
Test Mode : TX Mode

| | Freq. (MHz) | LISN Factor (dB) | Cable Loss (dB) | Reading (dBuV) | Emission Level (dBuv) | Limits (dBuv) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.16 | 9.59 | 9.69 | 13.20 | 32.48 | 55.56 | 23.08 | Average |
| 2 | 0.16 | 9.59 | 9.69 | 26.61 | 45.89 | 65.56 | 19.67 | QP |
| 3 | 0.40 | 9.63 | 9.92 | 7.33 | 26.88 | 47.86 | 20.98 | Average |
| 4 | 0.40 | 9.63 | 9.92 | 19.73 | 39.28 | 57.86 | 18.58 | QP |
| 5 | 2.42 | 9.66 | 9.96 | 6.98 | 26.60 | 46.00 | 19.40 | Average |
| 6 | 2.42 | 9.66 | 9.96 | 17.11 | 36.73 | 56.00 | 19.27 | QP |
| 7 | 3.36 | 9.67 | 9.98 | 8.64 | 28.29 | 46.00 | 17.71 | Average |
| 8 | 3.36 | 9.67 | 9.98 | 17.95 | 37.60 | 56.00 | 18.40 | QP |
| 9 | 4.38 | 9.68 | 10.00 | 9.73 | 29.41 | 46.00 | 16.59 | Average |
| 10 | 4.38 | 9.68 | 10.00 | 18.86 | 38.54 | 56.00 | 17.46 | QP |
| 11 | 6.22 | 9.71 | 10.03 | 8.62 | 28.36 | 50.00 | 21.64 | Average |
| 12 | 6.22 | 9.71 | 10.03 | 19.02 | 38.76 | 60.00 | 21.24 | QP |

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. If the average limit is met when useing a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

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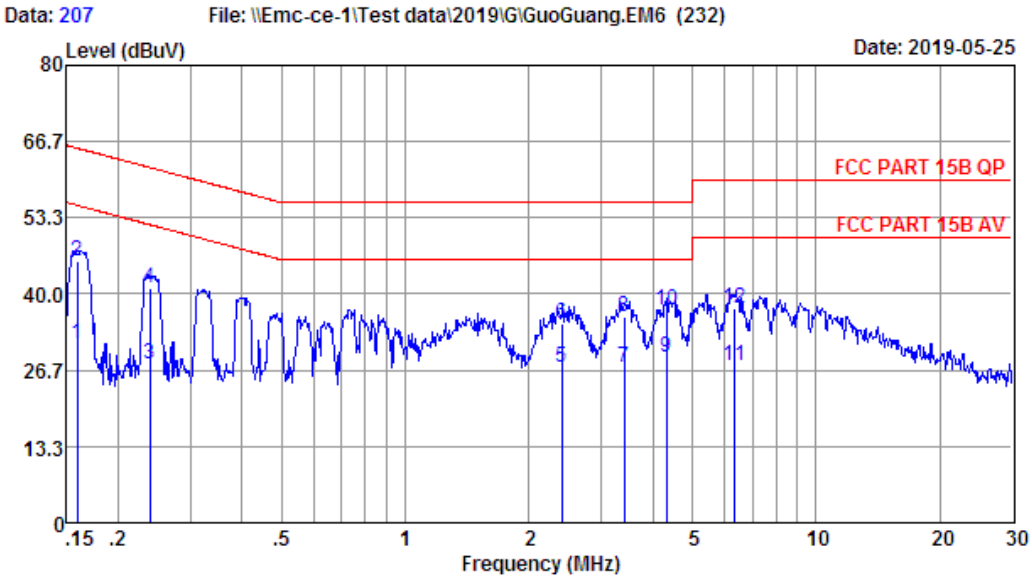



Site no : 844 Shield Room Data no. : 207
Env. / Ins. : Temp:24.1'C Humi:52% Press:101.50kPa LINE Phase : NEUTRAL
Limit : FCC PART 15B QP
Engineer : Viking
EUT : Portable Wireless Speaker
Power : DC 5V From Adapter Input AC 240V/60Hz
M/N : VIFA110
Test Mode : TX Mode

| | Freq. (MHz) | LISN Factor (dB) | Cable Loss (dB) | Reading (dBuV) | Emission Level (dBuv) | Limits (dBuv) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.16 | 9.50 | 9.69 | 12.20 | 31.39 | 55.52 | 24.13 | Average |
| 2 | 0.16 | 9.50 | 9.69 | 26.42 | 45.61 | 65.52 | 19.91 | QP |
| 3 | 0.24 | 9.53 | 9.92 | 8.41 | 27.86 | 52.13 | 24.27 | Average |
| 4 | 0.24 | 9.53 | 9.92 | 21.68 | 41.13 | 62.13 | 21.00 | QP |
| 5 | 2.41 | 9.57 | 9.96 | 7.53 | 27.06 | 46.00 | 18.94 | Average |
| 6 | 2.41 | 9.57 | 9.96 | 15.18 | 34.71 | 56.00 | 21.29 | QP |
| 7 | 3.42 | 9.59 | 9.98 | 7.71 | 27.28 | 46.00 | 18.72 | Average |
| 8 | 3.42 | 9.59 | 9.98 | 16.51 | 36.08 | 56.00 | 19.92 | QP |
| 9 | 4.31 | 9.60 | 9.99 | 9.35 | 28.94 | 46.00 | 17.06 | Average |
| 10 | 4.31 | 9.60 | 9.99 | 17.65 | 37.24 | 56.00 | 18.76 | QP |
| 11 | 6.35 | 9.62 | 10.03 | 7.73 | 27.38 | 50.00 | 22.62 | Average |
| 12 | 6.35 | 9.62 | 10.03 | 17.83 | 37.48 | 60.00 | 22.52 | QP |

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. If the average limit is met when useing a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

# 12. ANTENNA REQUIREMENTS

## 12.1. Limit

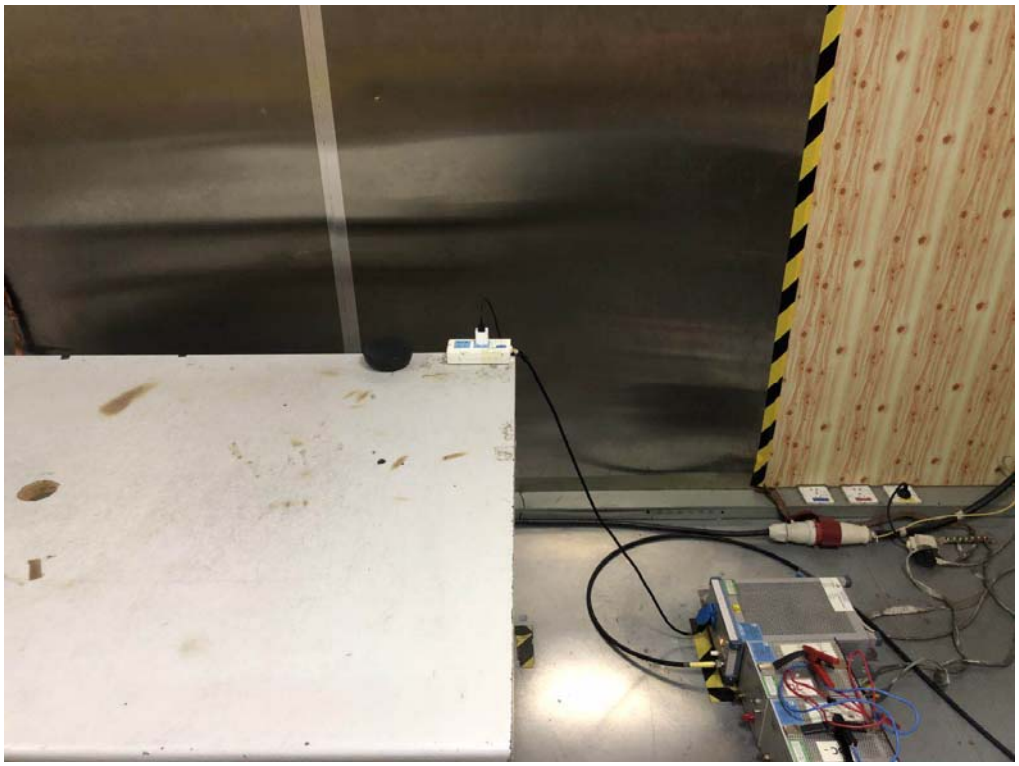
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply 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, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators 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.

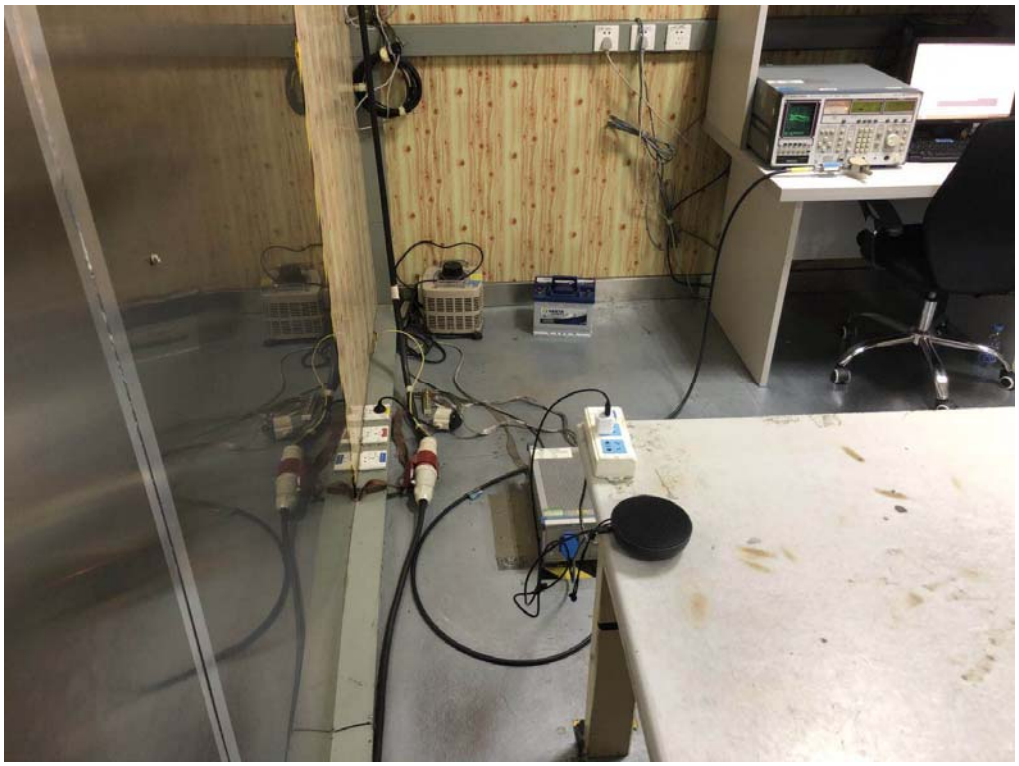
## 12.2. Test Result

The antennas used for this product compliance with antenna requirements.

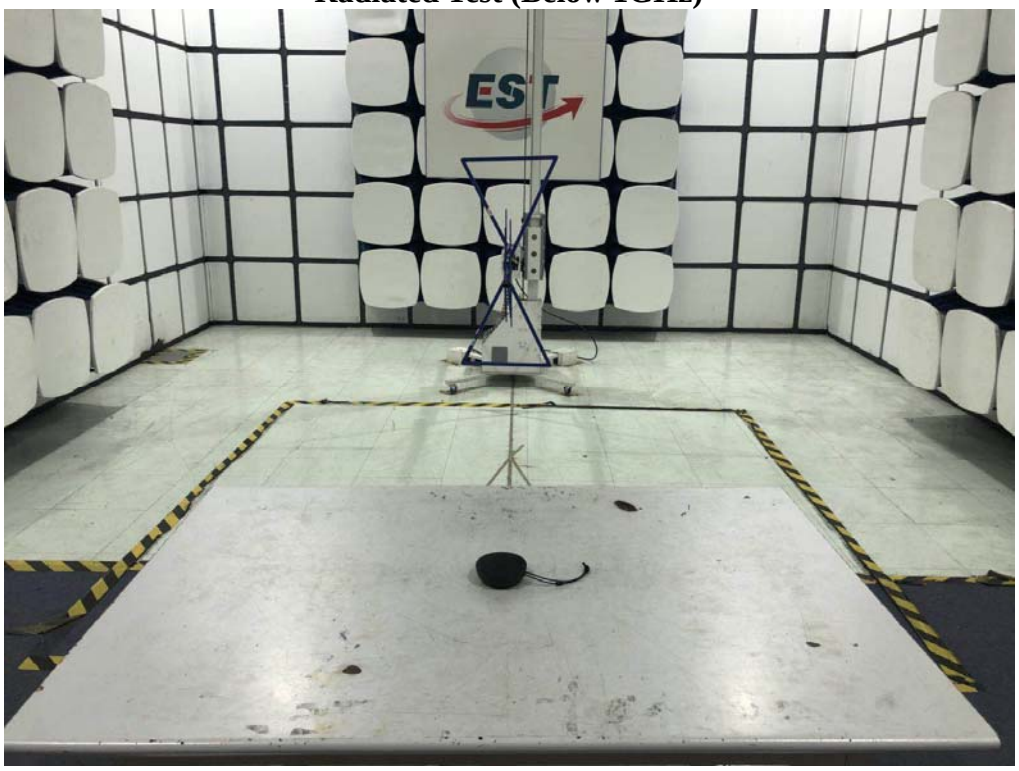
# 13. TEST SETUP PHOTO

**Conducted Test**

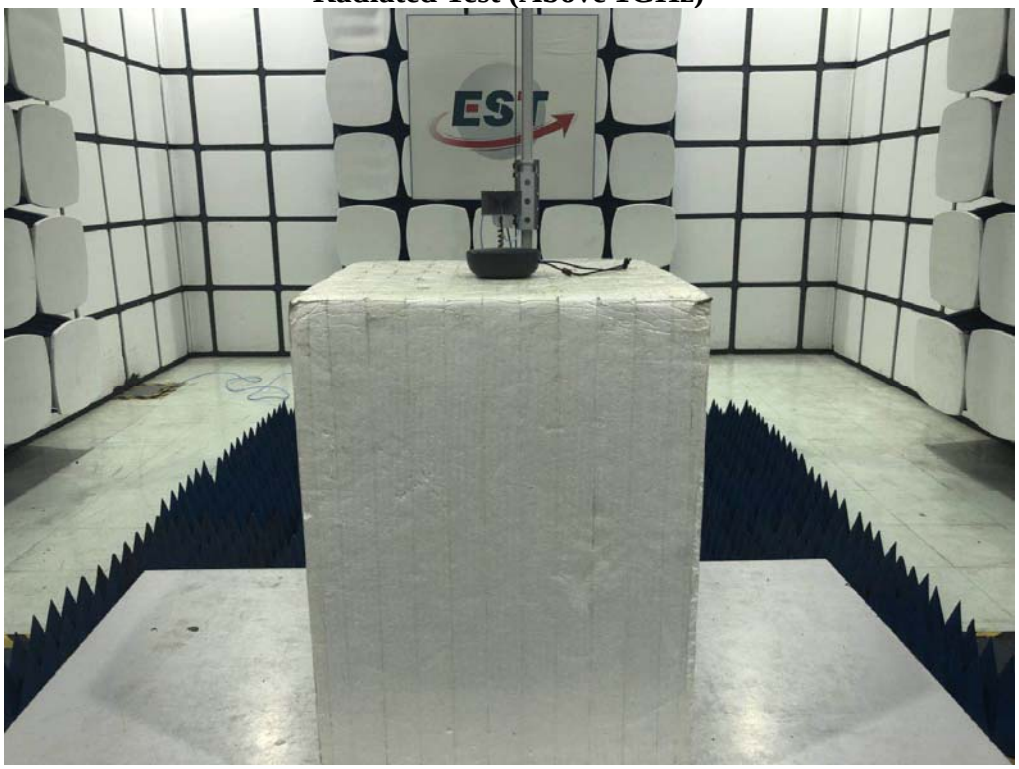




**Radiated Test (Below 1GHz)**



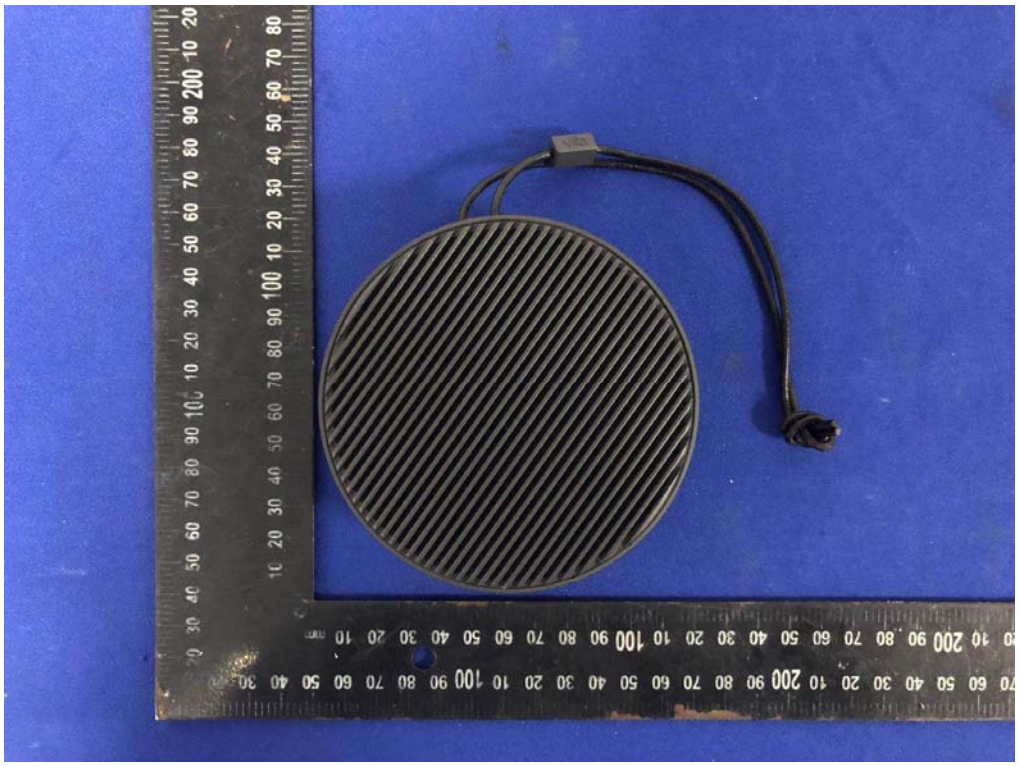
**Radiated Test (Above 1GHz)**

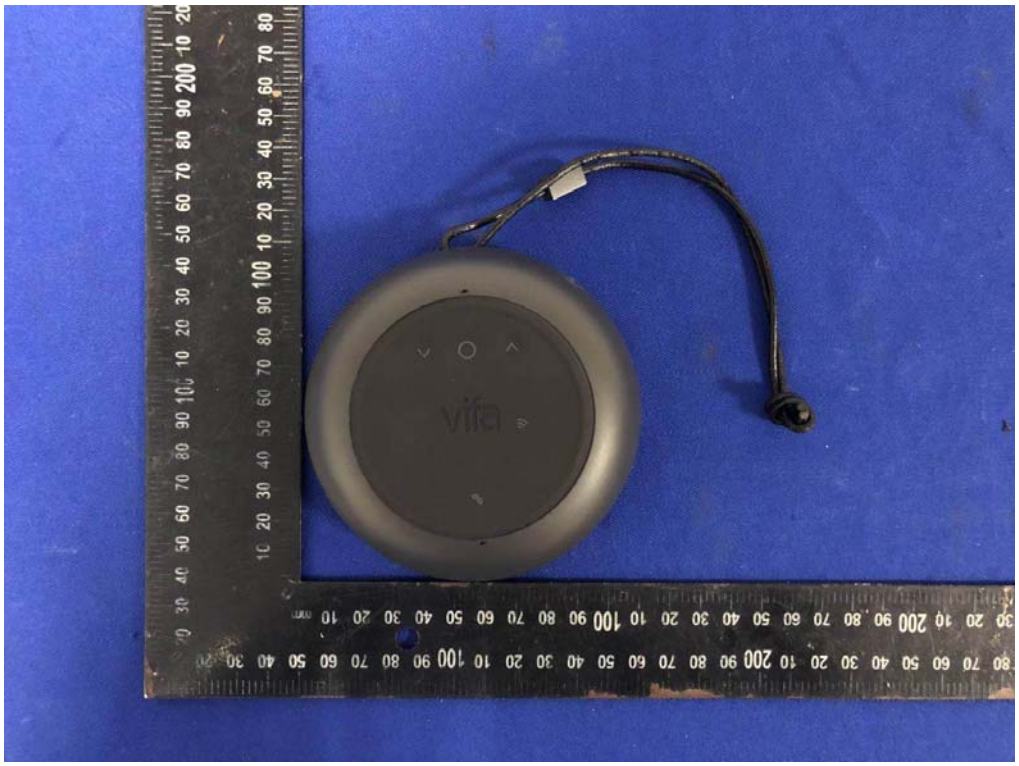


# 14.EUT PHOTO

**External Photos**

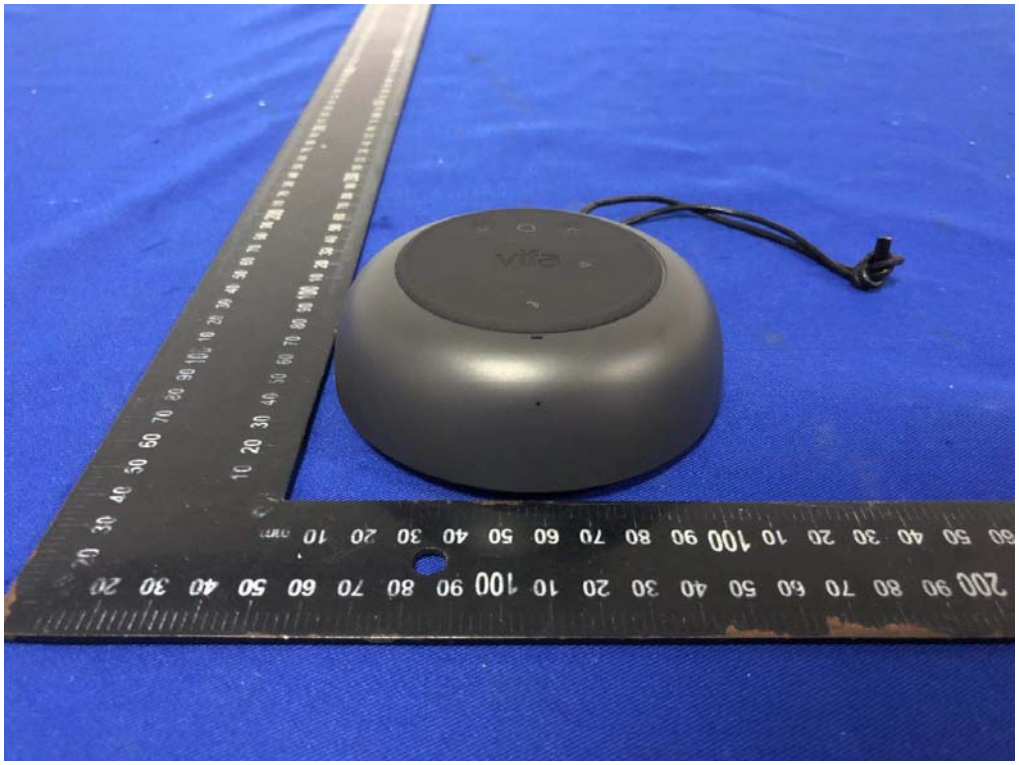
M/N: VIFA110





**External Photos**

M/N: VIFA110

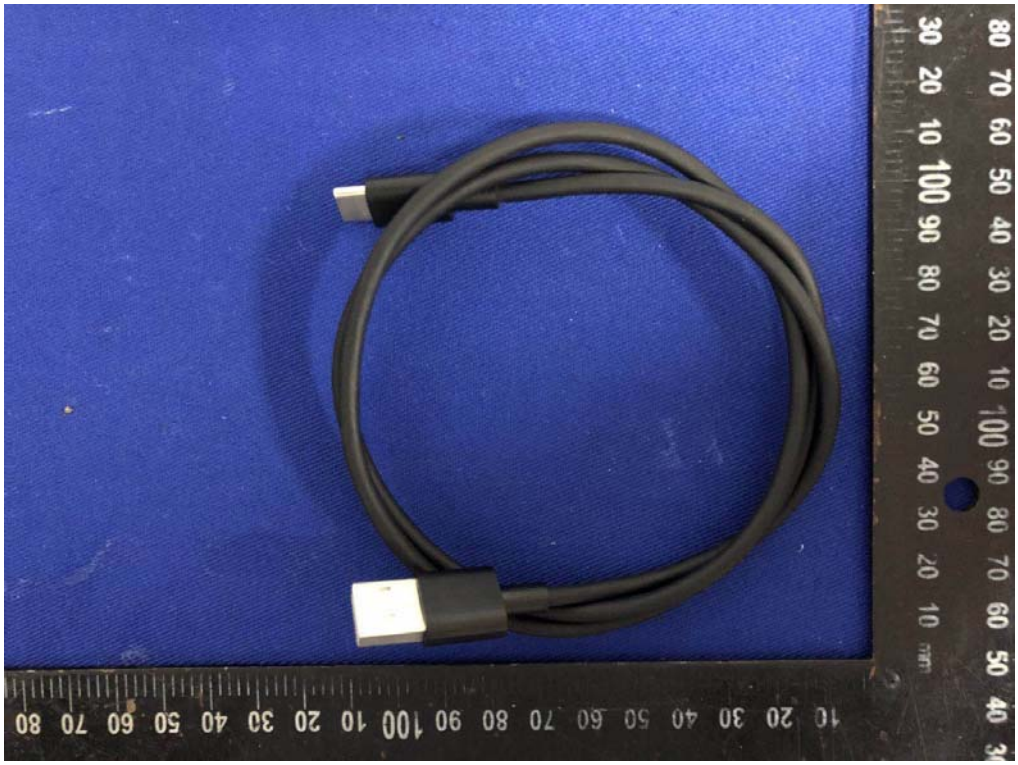


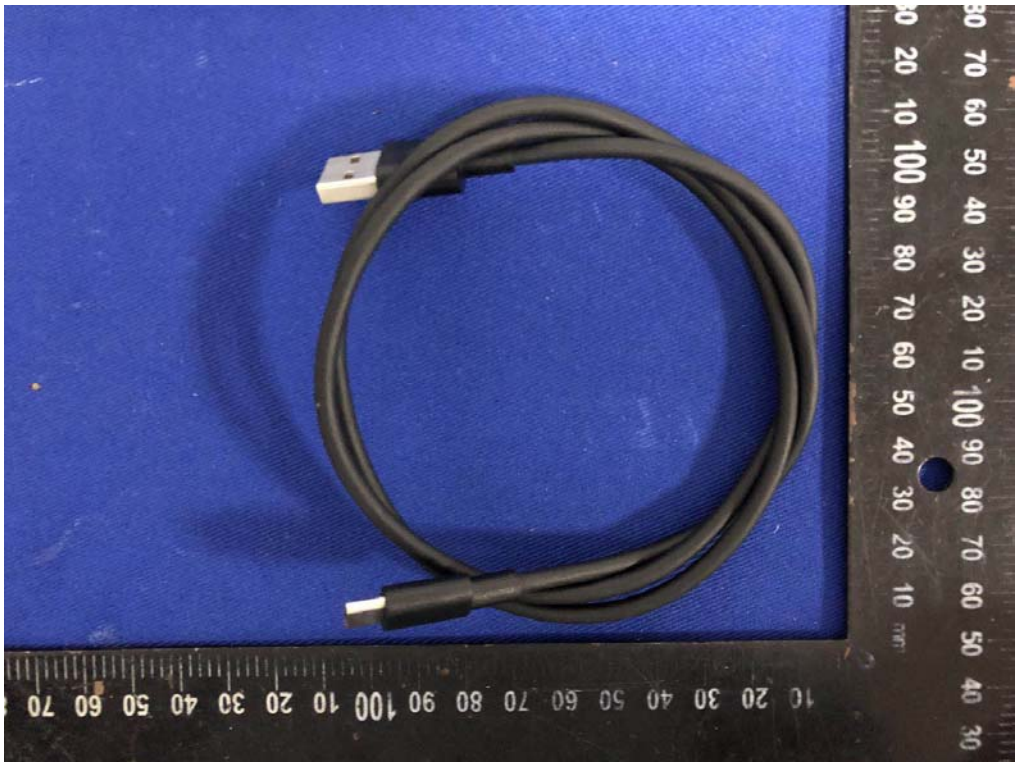
**External Photos**

M/N: VIFA110

**External Photos**

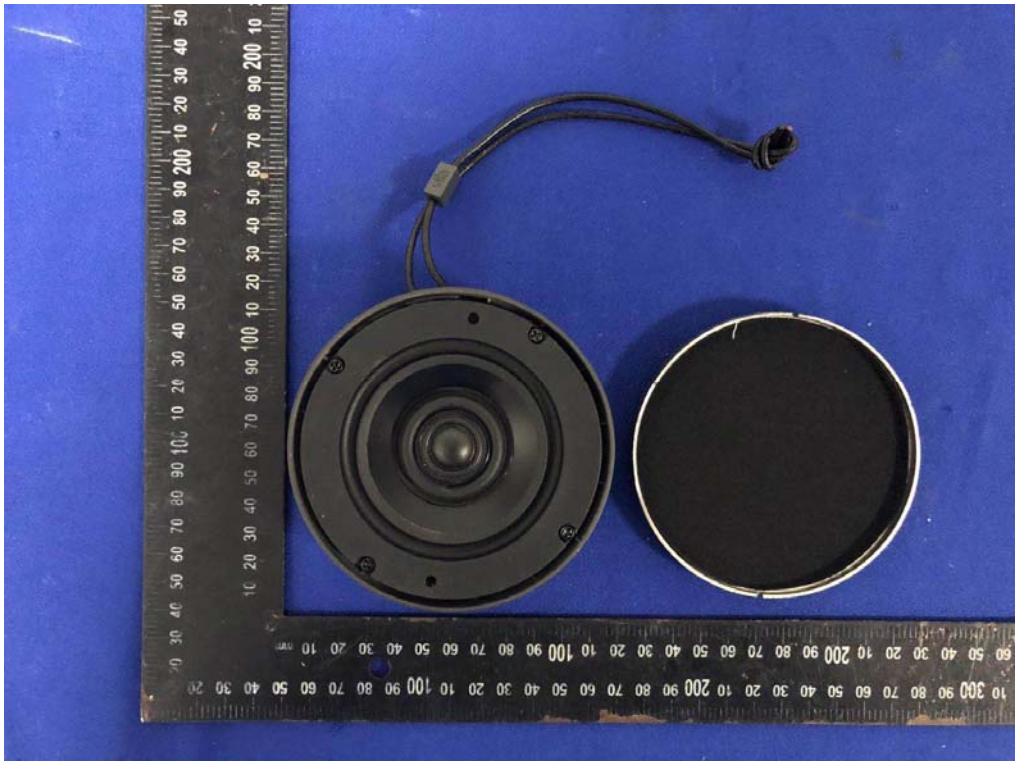
M/N: VIFA110

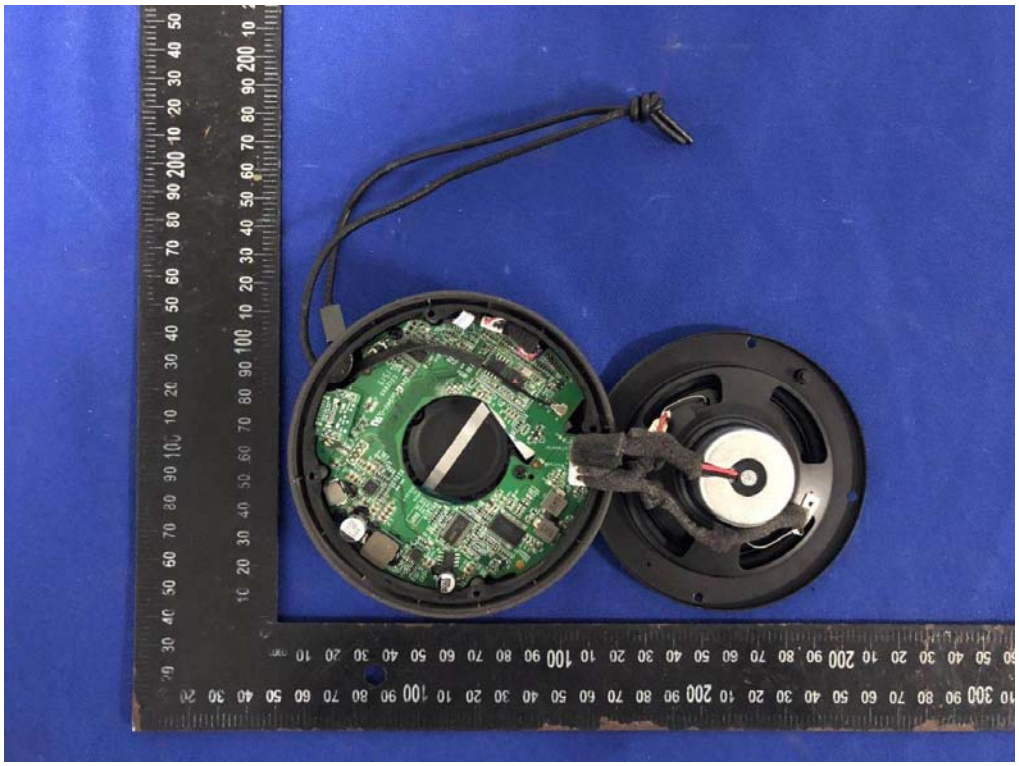




**External Photos**

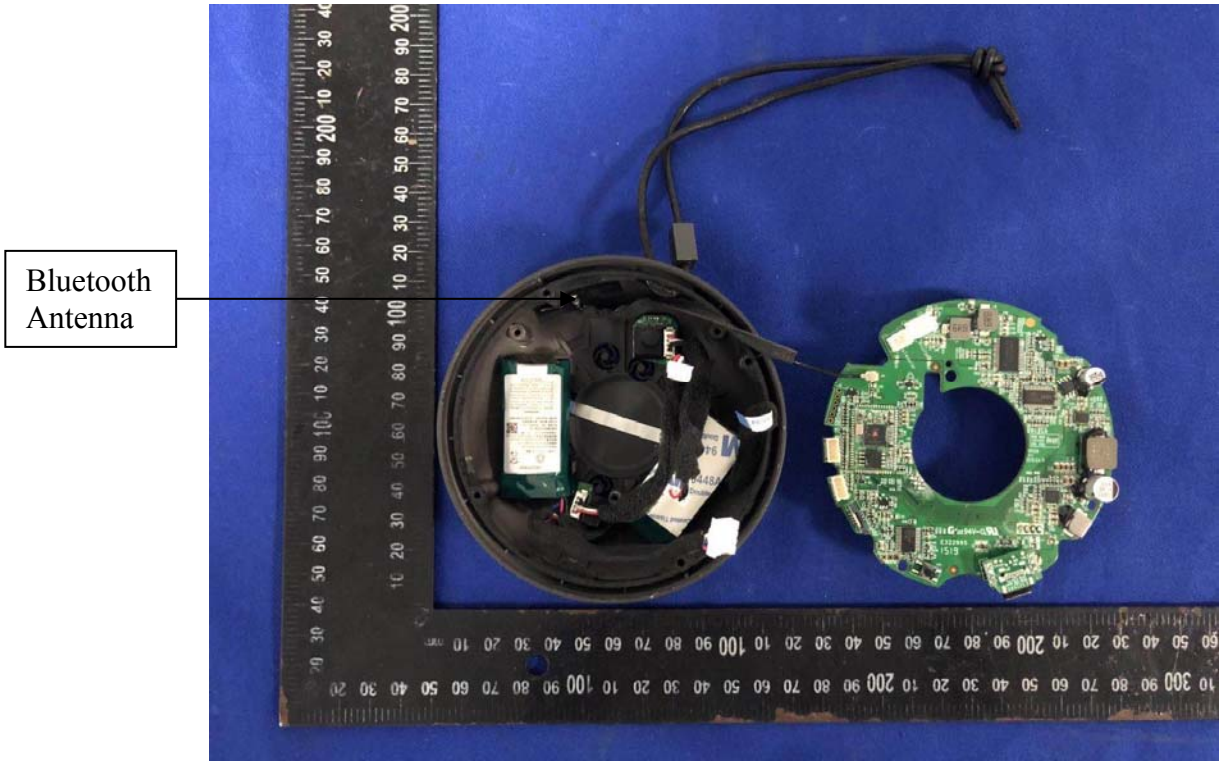
M/N: VIFA110

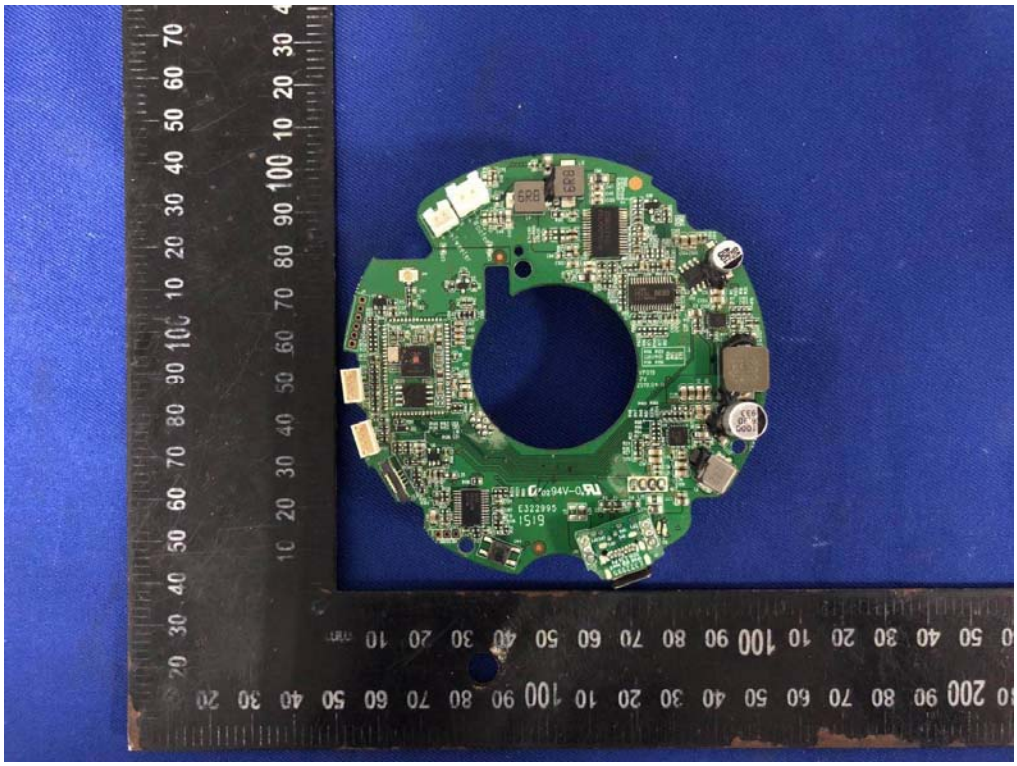




**Internal Photos**

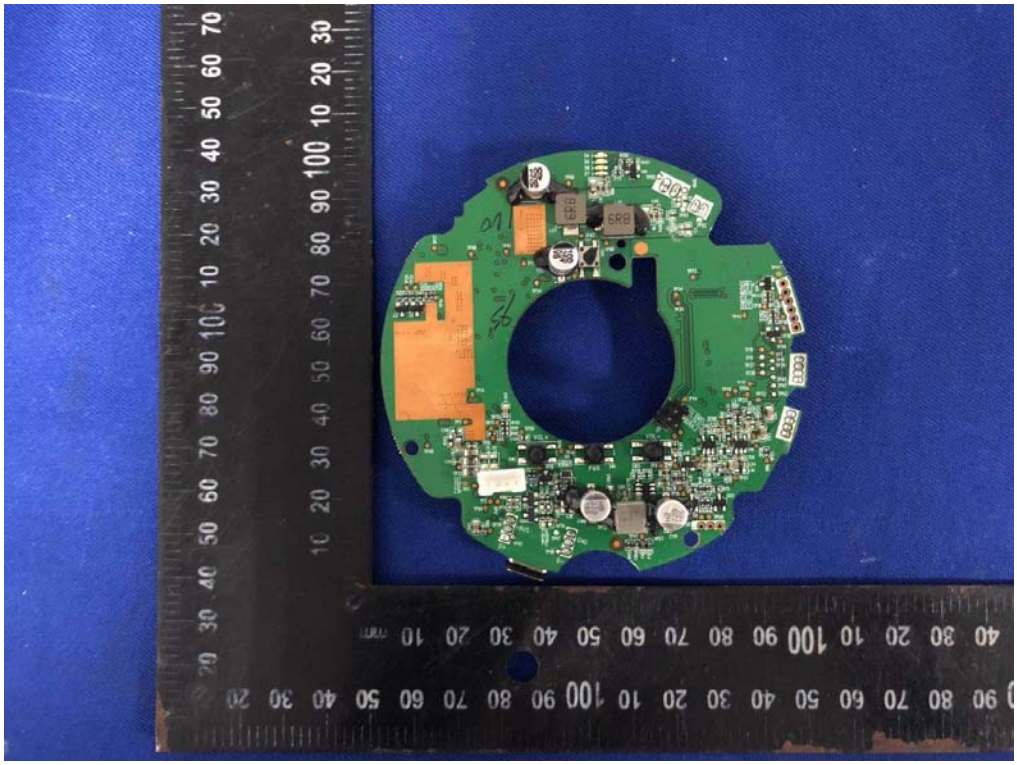
M/N: VIFA110

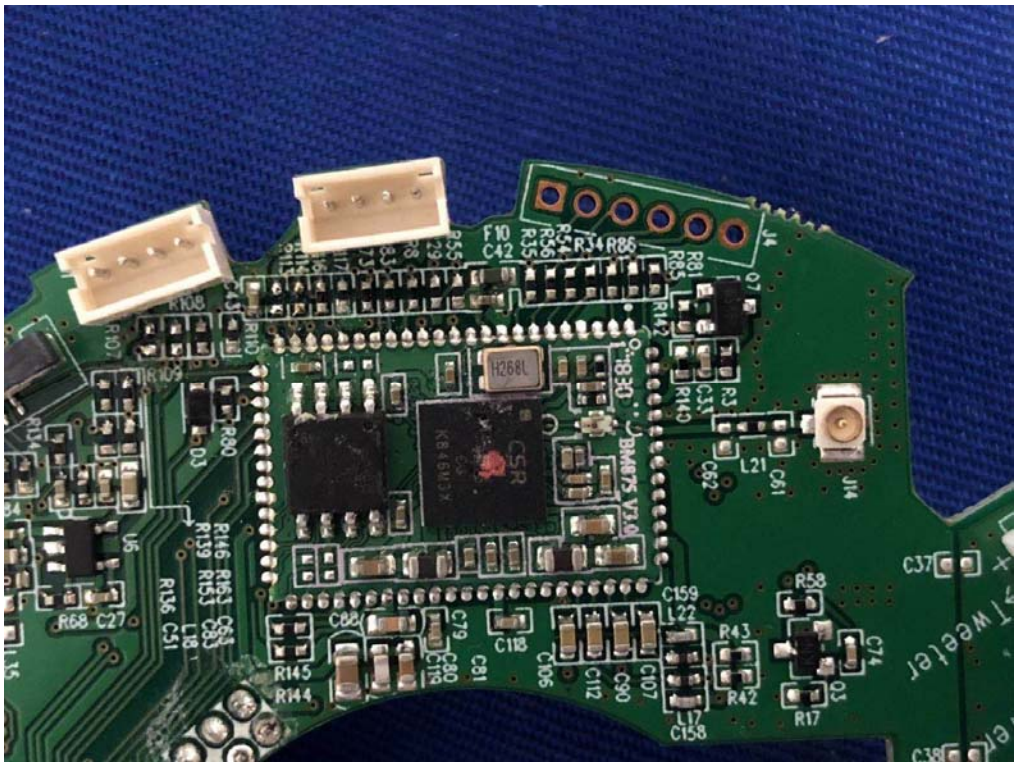


**Internal Photos**

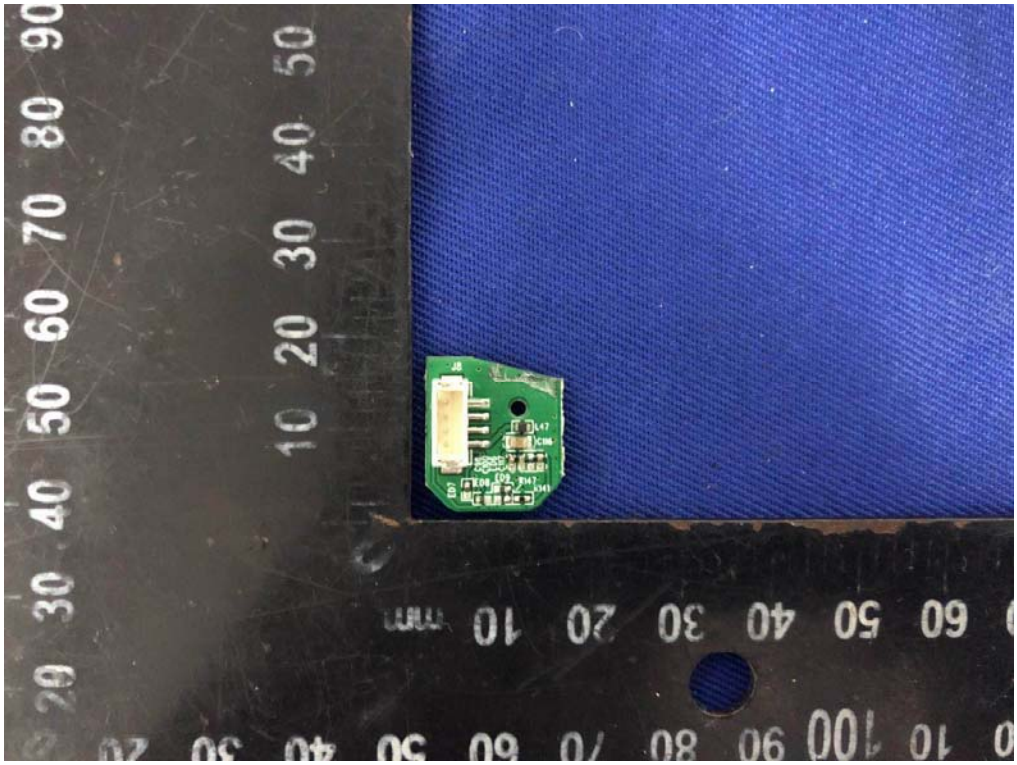
M/N: VIFA110





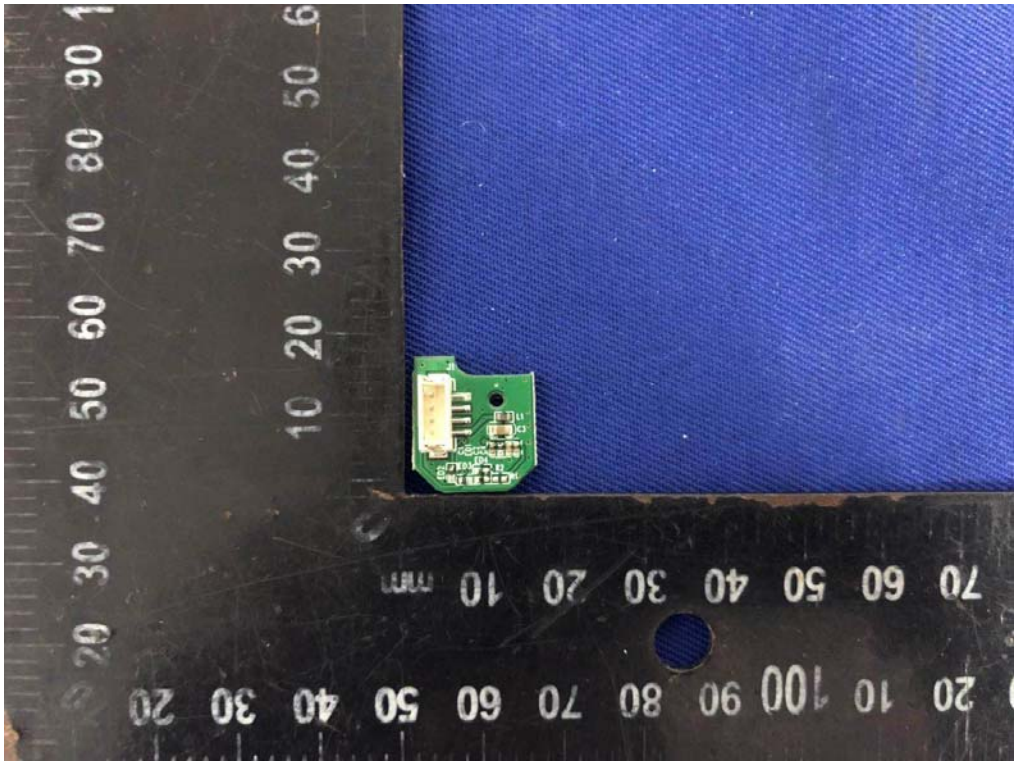
**Internal Photos**

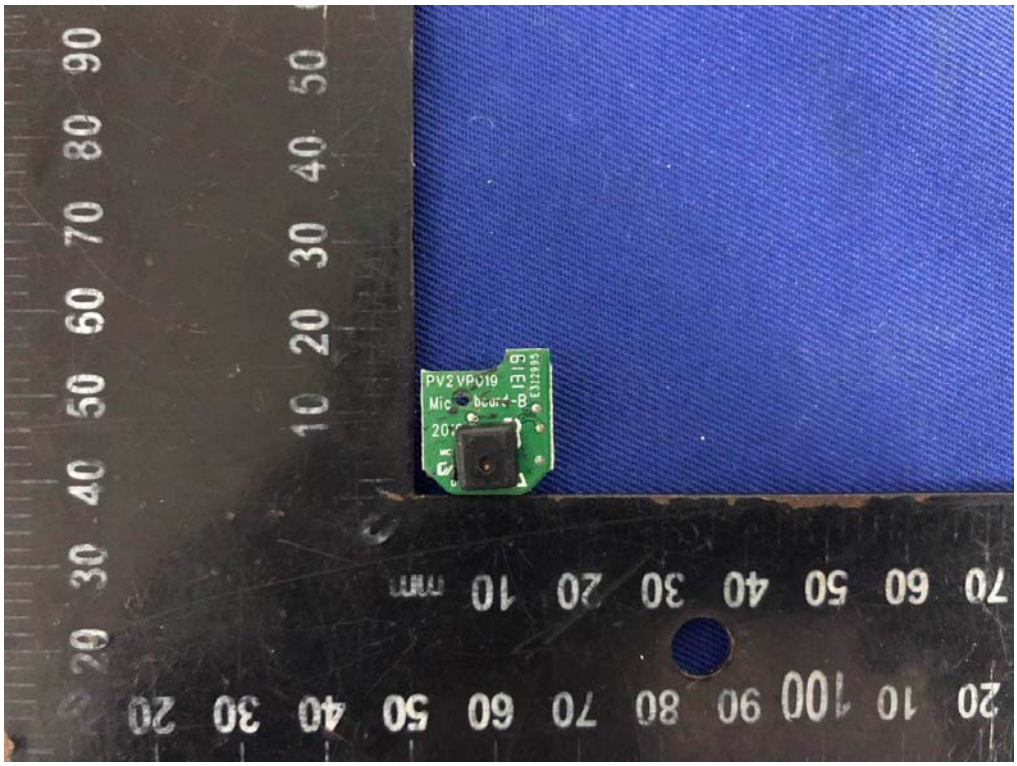
M/N: VIFA110



**Internal Photos**

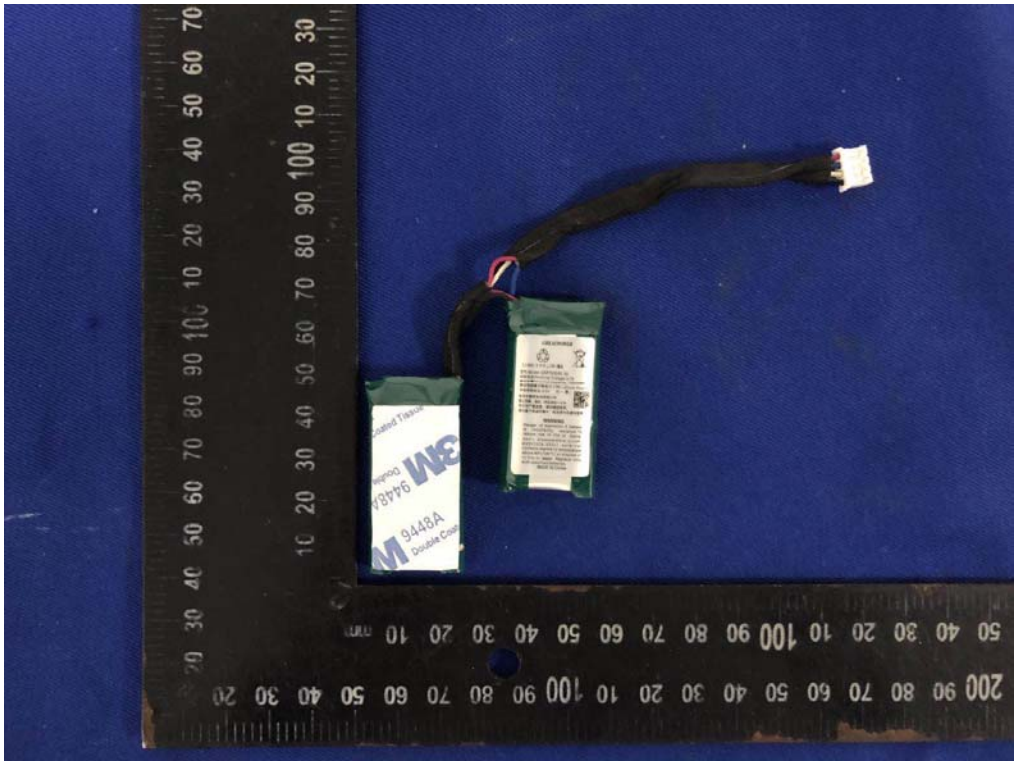
M/N: VIFA110

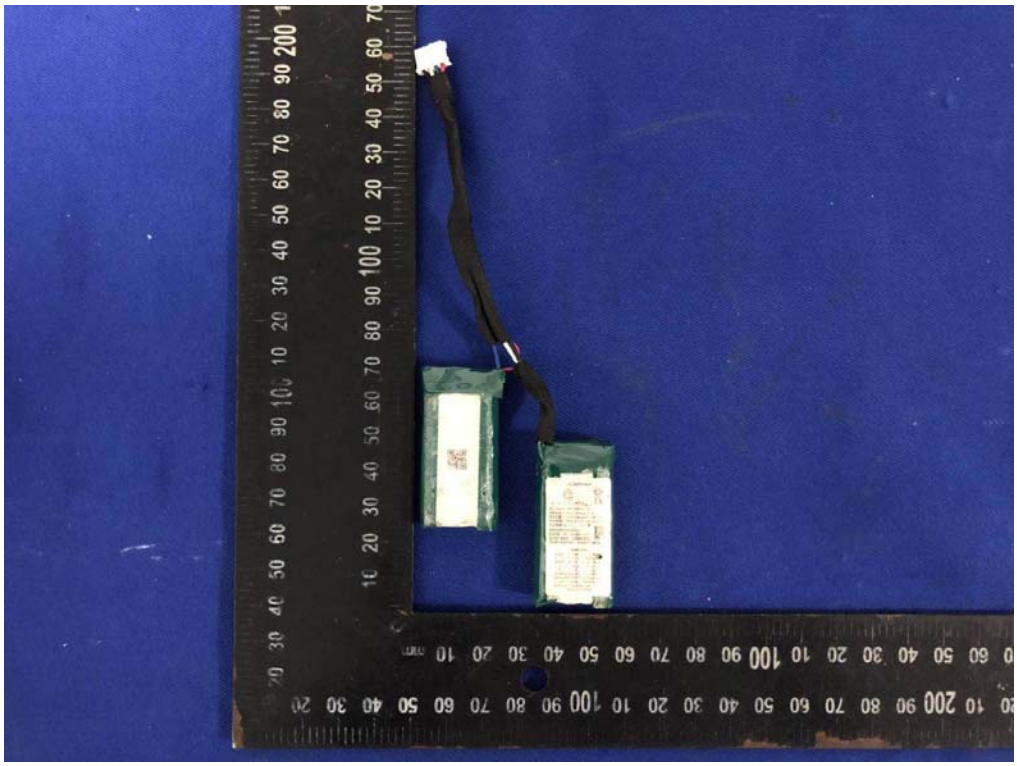




**Internal Photos**

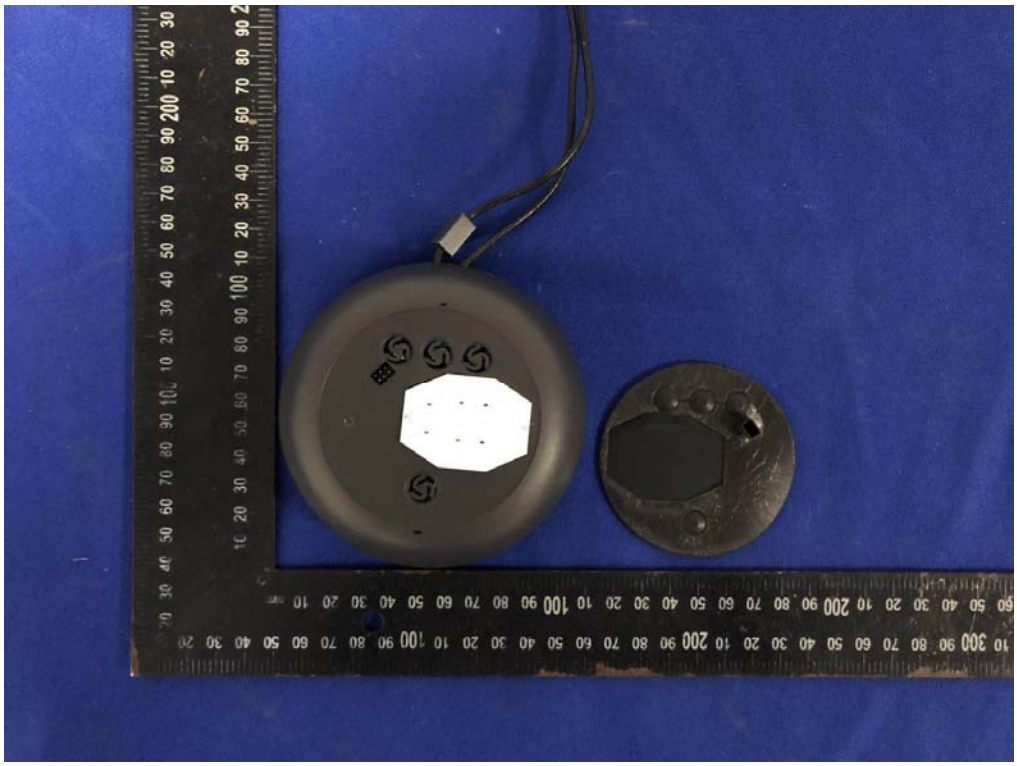
M/N: VIFA110



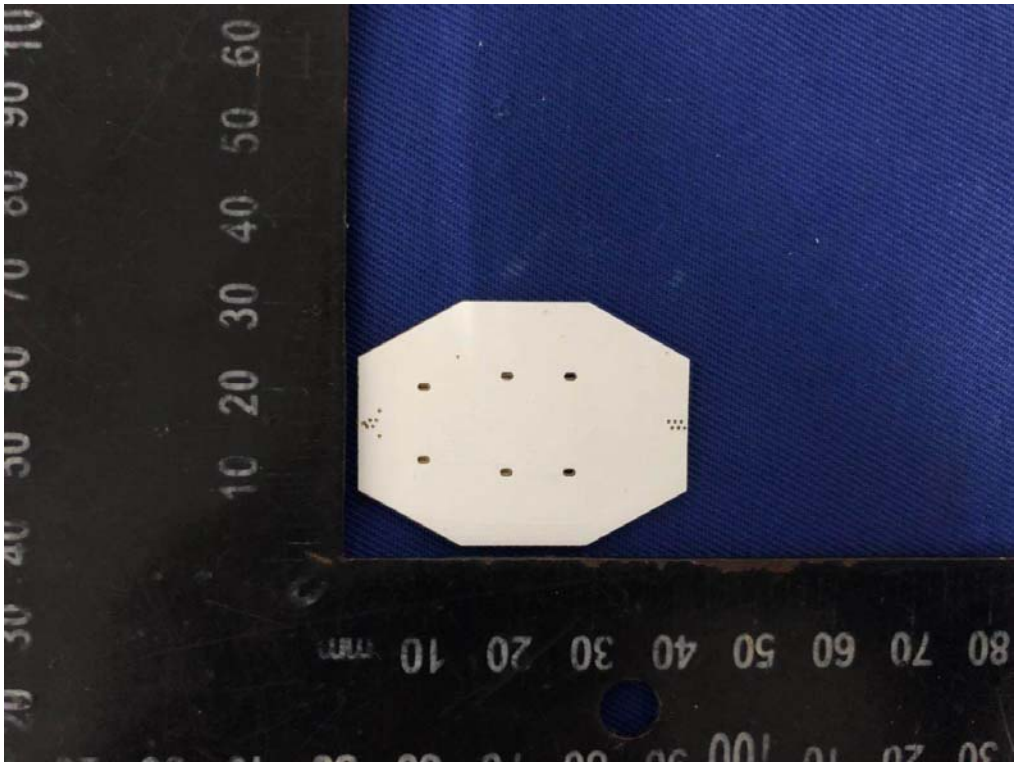
**Internal Photos**

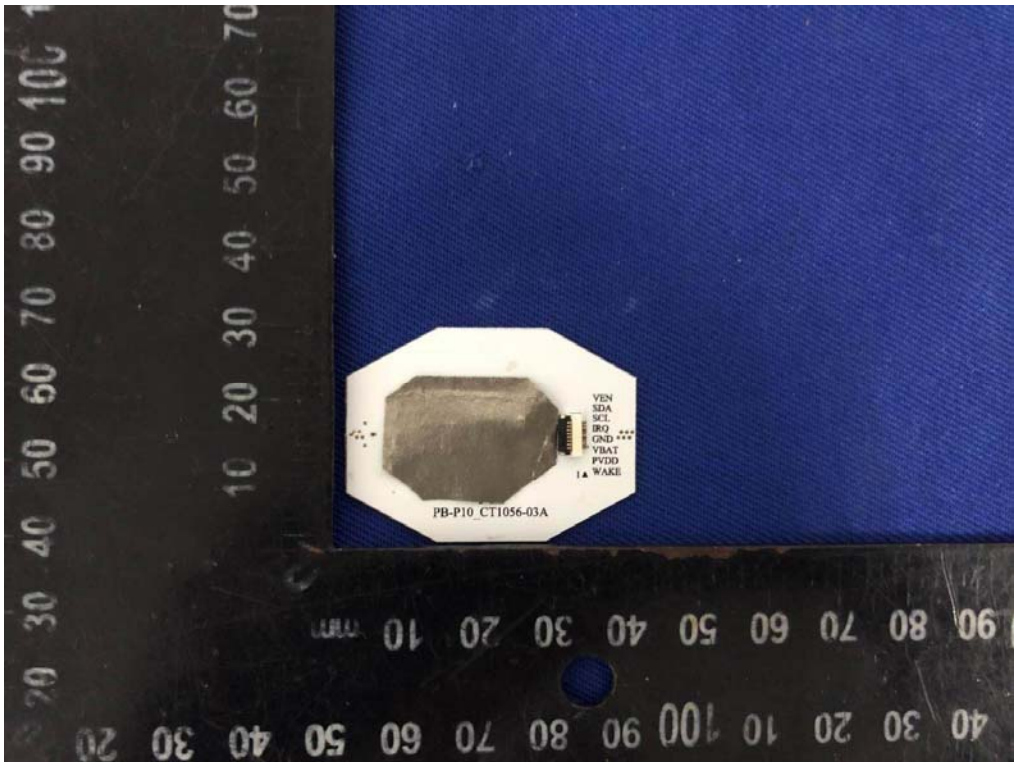
M/N: VIFA110

**Internal Photos**

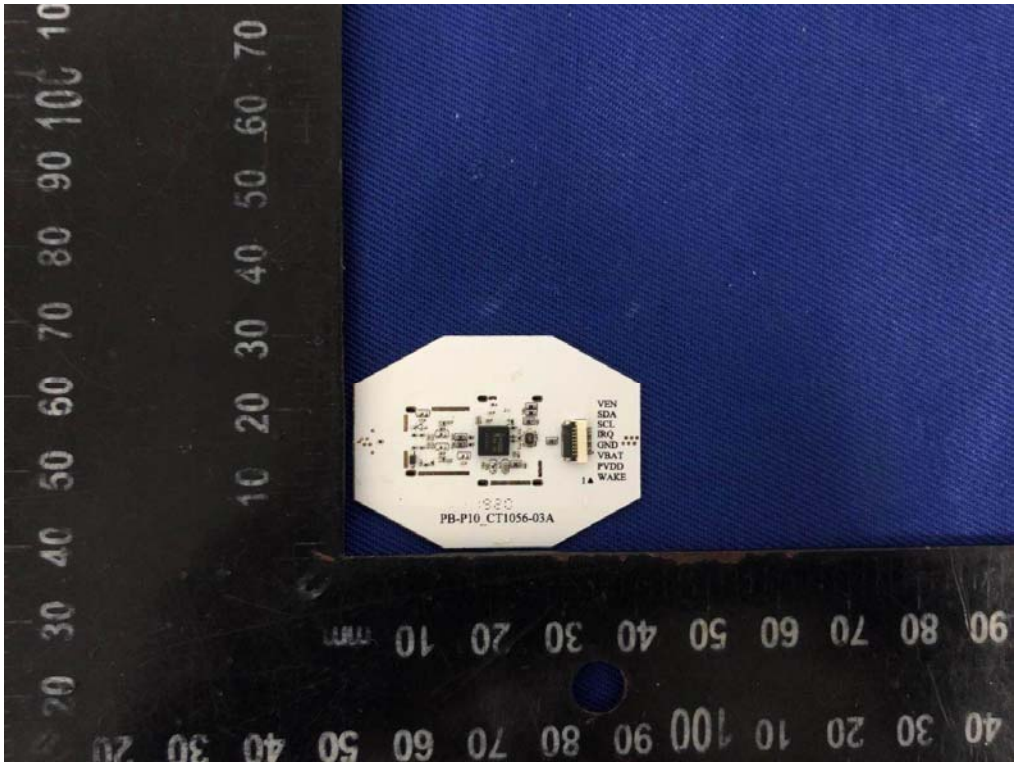
M/N: VIFA110

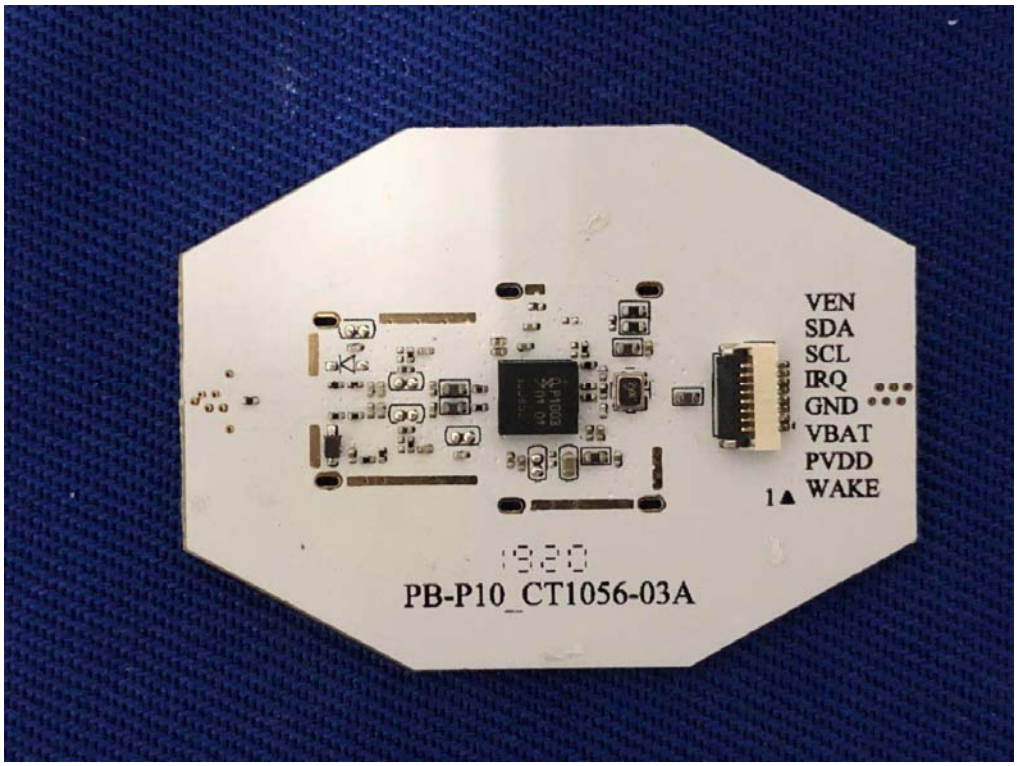




**Internal Photos**

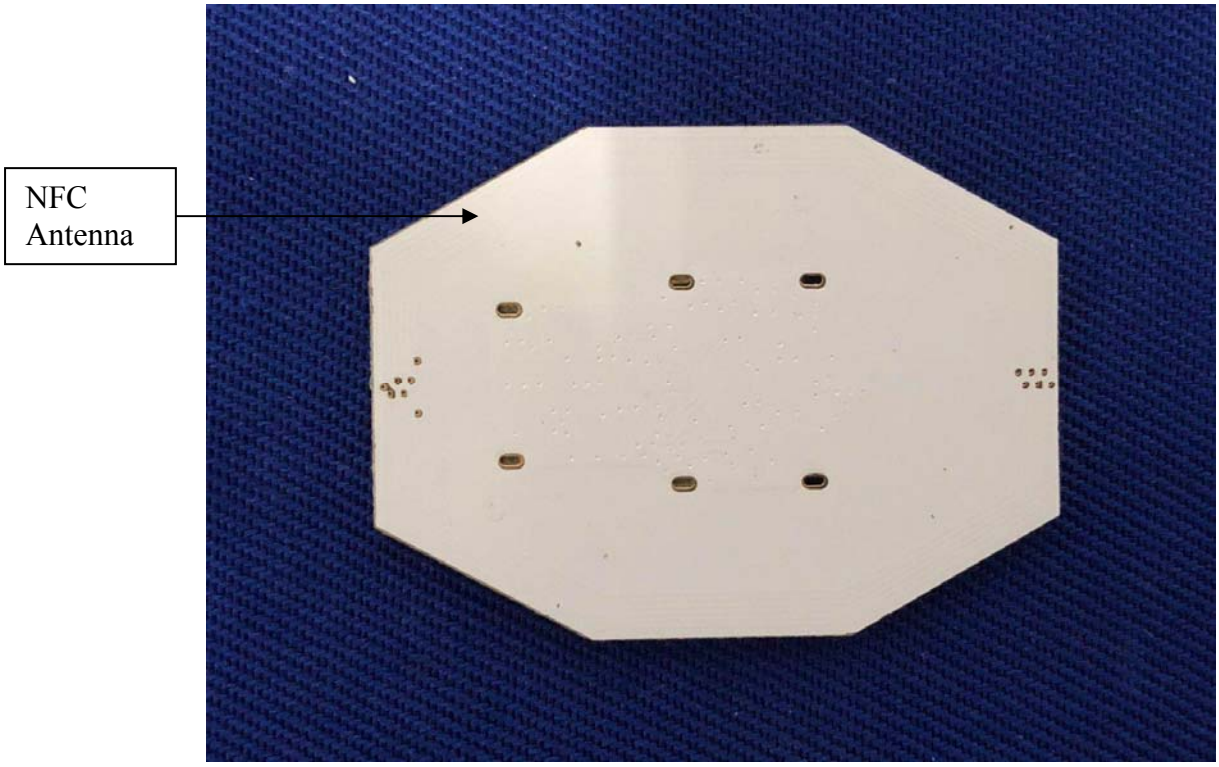
M/N: VIFA110



**Internal Photos**

M/N: VIFA110




**End of Test Report**