

# FCC PART 15C TEST REPORT FOR CERTIFICATION

## On Behalf of

### KYE SYSTEMS CORP.

### Multimedia Speaker

### Model Number: SP-HF280 BT

### Additional Model: SP-Q180BT, SoundBar100BT, SP-HFXXX XX, SP-QXXX XX (X can be 0-9 & A-Z)

### FCC ID: FSUGG00A5

|               |                                                                       |
|---------------|-----------------------------------------------------------------------|
| Prepared for: | KYE SYSTEMS CORP.                                                     |
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|               | Taiwan (R.O.C.)                                                       |
|               |                                                                       |
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|                 |                             |
|-----------------|-----------------------------|
| Report Number:  | ESTE-R2001093               |
| Date of Test:   | Nov. 22, 2019~Jan. 09, 2020 |
| Date of Report: | Jan. 10, 2020               |

# TABLE OF CONTENTS

| Description                                 | Page |
|---------------------------------------------|------|
| TEST REPORT VERIFICATION .....              | 3    |
| 1. GENERAL INFORMATION.....                 | 5    |
| 1.1. Description of Device (EUT) .....      | 5    |
| 1.2. Antenna Information .....              | 5    |
| 2. SUMMARY OF TEST .....                    | 6    |
| 2.1. Summary of test result.....            | 6    |
| 2.2. Test Facilities.....                   | 7    |
| 2.3. Measurement uncertainty .....          | 8    |
| 2.4. Assistant equipment used for test..... | 8    |
| 2.5. Block Diagram.....                     | 8    |
| 2.6. Test mode .....                        | 9    |
| 2.7. Channel List.....                      | 10   |
| 2.8. Power Setting of Test Software.....    | 10   |
| 2.9. Test Equipmen.....                     | 11   |
| 3. MAXIMUM PEAK OUTPUT POWER.....           | 12   |
| 3.1. Limit.....                             | 12   |
| 3.2. Test Setup .....                       | 12   |
| 3.3. Spectrum Analyzer Setting.....         | 12   |
| 3.4. Test Procedure .....                   | 12   |
| 3.5. Test Result .....                      | 13   |
| 4. 20 DB BANDWIDTH .....                    | 18   |
| 4.1. Limit.....                             | 18   |
| 4.2. Test Setup .....                       | 18   |
| 4.3. Spectrum Analyzer Setting.....         | 18   |
| 4.4. Test Procedure .....                   | 18   |
| 4.5. Test Result .....                      | 19   |
| 5. CARRIER FREQUENCY SEPARATION.....        | 24   |
| 5.1. Limit.....                             | 24   |
| 5.2. Test Setup .....                       | 24   |
| 5.3. Spectrum Analyzer Setting.....         | 24   |
| 5.4. Test Procedure .....                   | 24   |
| 5.5. Test Result .....                      | 25   |
| 6. NUMBER OF HOPPING CHANNEL .....          | 30   |
| 6.1. Limit.....                             | 30   |
| 6.2. Test Setup .....                       | 30   |
| 6.3. Spectrum Analyzer Setting.....         | 30   |
| 6.4. Test Procedure .....                   | 30   |
| 6.5. Test Result .....                      | 31   |
| 7. DWELL TIME.....                          | 33   |
| 7.1. Limit.....                             | 33   |
| 7.2. Test Setup .....                       | 33   |
| 7.3. Spectrum Analyzer Setting.....         | 33   |
| 7.4. Test Procedure .....                   | 33   |
| 7.5. Test Result .....                      | 34   |

|       |                                                 |    |
|-------|-------------------------------------------------|----|
| 8.    | CONDUCTED BAND EDGE .....                       | 39 |
| 8.1.  | Limit .....                                     | 39 |
| 8.2.  | Test Setup .....                                | 39 |
| 8.3.  | Spectrum Analyzer Setting .....                 | 39 |
| 8.4.  | Test Procedure .....                            | 39 |
| 8.5.  | Test Result .....                               | 40 |
| 9.    | CONDUCTED SPURIOUS EMISSIONS .....              | 42 |
| 9.1.  | Limit .....                                     | 42 |
| 9.2.  | Test Setup .....                                | 42 |
| 9.3.  | Spectrum Analyzer Setting .....                 | 42 |
| 9.4.  | Test Procedure .....                            | 42 |
| 9.5.  | Test Result .....                               | 43 |
| 10.   | RADIATED SPURIOUS EMISSIONS AND BAND EDGE ..... | 45 |
| 10.1. | Limit .....                                     | 45 |
| 10.2. | Test Setup .....                                | 46 |
| 10.3. | Spectrum Analyzer Setting .....                 | 47 |
| 10.4. | Test Procedure .....                            | 48 |
| 10.5. | Test Result .....                               | 49 |
| 11.   | AC POWER LINE CONDUCTED EMISSIONS .....         | 61 |
| 11.1. | Limit .....                                     | 61 |
| 11.2. | Test Setup .....                                | 61 |
| 11.3. | Spectrum Analyzer Setting .....                 | 61 |
| 11.4. | Test Procedure .....                            | 61 |
| 11.5. | Test Result .....                               | 62 |
| 12.   | ANTENNA REQUIREMENTS .....                      | 66 |
| 12.1. | Limit .....                                     | 66 |
| 12.2. | Test Result .....                               | 66 |
| 13.   | TEST SETUP PHOTO .....                          | 67 |
| 14.   | EUT PHOTO .....                                 | 69 |

## EST Technology Co., Ltd.

|                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                            |                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| <b>Applicant:</b>                                                                                                                                                                                 | KYE SYSTEMS CORP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                            |                             |
| <b>Address:</b>                                                                                                                                                                                   | No. 492, Sec. 5, Chongxin Rd., Sanchong Dist., New Taipei City 24160, Taiwan (R.O.C.)                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                            |                             |
| <b>Manufacturer:</b>                                                                                                                                                                              | Dongguan Kunying Computer Products Co., Ltd                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                            |                             |
| <b>Address:</b>                                                                                                                                                                                   | Baodun Industrial District, Houjie Town, Dongguan City, Guangdong Province, 523961 China                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                            |                             |
| <b>E.U.T:</b>                                                                                                                                                                                     | Multimedia Speaker                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                            |                             |
| <b>Model Number:</b>                                                                                                                                                                              | SP-HF280 BT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                            |                             |
| <b>Additional Model:</b>                                                                                                                                                                          | SP-Q180BT, SoundBar100BT, SP-HFXXX XX, SP-QXXX XX<br>(X can be 0-9 & A-Z)<br>Note: They are identical except model name only; X can be any one number or character (such as 0 to 9, or A to Z, or other special character "-", ect. )                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                            |                             |
| <b>Power Supply:</b>                                                                                                                                                                              | DC 5V From Adapter Input AC 100-240V, 50/60Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                            |                             |
| <b>Trade Name:</b>                                                                                                                                                                                | Genius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Serial No.:</b>                                                                                                                                                         | -----                       |
| <b>Date of Receipt:</b>                                                                                                                                                                           | Nov. 22, 2019                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Date of Test:</b>                                                                                                                                                       | Nov. 22, 2019~Jan. 09, 2020 |
| <b>Test Specification:</b>                                                                                                                                                                        | FCC Part 15 Subpart C (15.247)<br>ANSI C63.10:2013<br>FCC KDB 558074 D01 15.247 Meas Guidance v05r02                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                            |                             |
| <b>Test Result:</b>                                                                                                                                                                               | <p>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.</p> <p>This report applies to above tested sample only and shall not be reproduced in part without written approval of EST Technology Co., Ltd.</p> |                                                                                                                                                                            |                             |
| <b>Prepared by:</b>                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Reviewed by:</b>                                                                                                                                                        |                             |
| <br>_____<br>Ring / Assistant                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <br>_____<br>Shawn / Engineer                                                           |                             |
|                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Date:</b> Jan. 10, 2020<br><b>Approved by:</b><br><br>_____<br>Iceman Hu / Manager |                             |
| <b>Other Aspects:</b>                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                            |                             |
| 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            | : | Multimedia Speaker                                   |
| Model Number            | : | SP-HF280 BT                                          |
| Software Version        | : | 2.3.1                                                |
| Hardware Version        | : | REV:A                                                |
| Operation frequency     | : | 2402MHz~2480MHz                                      |
| Number of channel       | : | 79                                                   |
| Max Output Power (PEAK) | : | 2.13dBm                                              |
| Modulation Type         | : | BT BDR(1Mbps): GFSK<br>BT EDR(2Mbps): $\pi/4$ -DQPSK |
| Sample Type             | : | Prototype production                                 |

Note:

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

### 1.2. Antenna Information

| Ant No. | Brand | Model Name | Antenna Type     | Connector | Gain (dBi) |
|---------|-------|------------|------------------|-----------|------------|
| 1       | N/A   | N/A        | Internal antenna | N/A       | -0.58      |

## 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

: Certified 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                   | $\pm 3.48\text{dB}$               |
| Uncertainty for spurious emissions test<br>(30MHz-1GHz)    | $\pm 4.60\text{ dB(Polarize: H)}$ |
|                                                            | $\pm 4.68\text{ dB(Polarize: V)}$ |
| Uncertainty for spurious emissions test<br>(1GHz to 18GHz) | $\pm 4.96\text{dB}$               |
| Uncertainty for radio frequency                            | $7 \times 10^{-8}$                |
| Uncertainty for conducted RF Power                         | $0.20\text{dB}$                   |
| Uncertainty for Power density test                         | $0.26\text{dB}$                   |

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

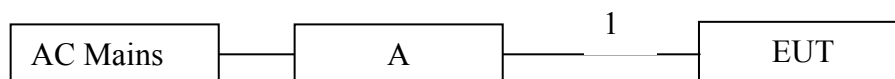
### 2.4. Assistant equipment used for test

| Item | Equipment | Brand  | Model Name/Type No. | FCC ID | Series No. |
|------|-----------|--------|---------------------|--------|------------|
| A    | Adapter   | XIAOMI | MDY-08-EV           | -      | -          |

| Item | Shielded Type | Ferrite Core | Length | Note     |
|------|---------------|--------------|--------|----------|
| 1    | NO            | NO           | 1.8m   | DC Cable |

### 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: Multimedia 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& $\pi$ /4-DQPSK | Non Hopping    | DH5         | Low/Middle/High                |
| 20dB Bandwidth                          | GFSK& $\pi$ /4-DQPSK | Non Hopping    | DH5         | Low/Middle/High                |
| Carrier Frequency Separation            | GFSK& $\pi$ /4-DQPSK | Hopping        | DH5         | Low/Middle/High                |
| Number Of Hopping Channel               | GFSK& $\pi$ /4-DQPSK | Hopping        | DH5         | All Channel Hopping            |
| Dwell Time                              | GFSK& $\pi$ /4-DQPSK | Hopping        | DH1/DH3/DH5 | Middle( All Channel Hopping)   |
| Conducted Band Edge                     | GFSK& $\pi$ /4-DQPSK | Non Hopping    | DH5         | Low/ High& All Channel Hopping |
| Conducted Spurious Emissions            | GFSK& $\pi$ /4-DQPSK | Non Hopping    | DH5         | Low/Middle/High                |
| Radiated Spurious Emissions(Below 1GHz) | GFSK& $\pi$ /4-DQPSK | Non Hopping    | DH5         | Low/Middle/High                |
| Radiated Spurious Emissions(Above 1GHz) | GFSK& $\pi$ /4-DQPSK | Non Hopping    | DH5         | Low/Middle/High                |
| Radiated Band Edge                      | GFSK& $\pi$ /4-DQPSK | Non Hopping    | DH5         | Low/High                       |
| AC Power Line Conducted Emissions       | GFSK& $\pi$ /4-DQPSK | Non Hopping    | DH5         | Low/Middle/High                |

Note:

1. 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. Power Setting of Test Software

| Software Name                 | FCCAssist 2.4 |      |      |
|-------------------------------|---------------|------|------|
| Frequency(MHz)                | 2402          | 2441 | 2480 |
| GFSK(1Mbps) Setting           | 10            | 10   | 10   |
| $\pi/4$ -DQPSK(2Mbps) Setting | 10            | 10   | 10   |

## 2.9. Test Equipmen

| For conducted emission test |                 |              |            |                  |            |           |
|-----------------------------|-----------------|--------------|------------|------------------|------------|-----------|
| Equipment                   | Manufacturer    | Model No.    | Serial No. | Calibration Body | Last Cal.  | Next Cal. |
| EMI Test Receiver           | Rohde & Schwarz | ESHS30       | EST-E001   | LISAI            | June 14,19 | 1 Year    |
| Artificial Mains Network    | Rohde & Schwarz | ENV216       | EST-E002   | LISAI            | June 14,19 | 1 Year    |
| Pulse Limiter               | Rohde & Schwarz | ESH3-Z2      | EST-E078   | LISAI            | June 14,19 | 1 Year    |
| Test Software               | Audix           | e3-6.111221a | N/A        | N/A              | N/A        | N/A       |

| 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         | EST-E047   | LISAI            | June 14,19 | 1 Year    |
| Active Loop Antenna                     | SCHWARZB ECK    | FMZB 1519B   | EST-E054   | LISAI            | June 14,19 | 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       |

| For radiated emissions test (30-1000MHz) |                 |              |            |                  |            |           |
|------------------------------------------|-----------------|--------------|------------|------------------|------------|-----------|
| Equipment                                | Manufacturer    | Model No.    | Serial No. | Calibration Body | Last Cal.  | Next Cal. |
| EMI Test Receiver                        | Rohde & Schwarz | ESR7         | EST-E047   | LISAI            | June 14,19 | 1 Year    |
| Bilog Antenna                            | Teseq           | CBL 6111D    | EST-E034   | LISAI            | June 14,19 | 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       |

| For radiated emission test(Above 1000MHz) |                |              |            |                  |            |           |
|-------------------------------------------|----------------|--------------|------------|------------------|------------|-----------|
| Equipment                                 | Manufacturer   | Model No.    | Serial No. | Calibration Body | Last Cal.  | Next Cal. |
| Horn Antenna                              | SCHWARZB ECK   | BBHA9120D    | EST-E031   | LISAI            | June 14,19 | 1 Year    |
| Signal Amplifier                          | SCHWARZB ECK   | BBV9718      | EST-E032   | LISAI            | June 14,19 | 1 Year    |
| Spectrum Analyzer                         | Rohde &Schwarz | FSV40        | EST-E069   | LISAI            | June 14,19 | 1 Year    |
| 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       |

| For connect EUT antenna terminal test |                |           |            |                  |            |           |
|---------------------------------------|----------------|-----------|------------|------------------|------------|-----------|
| Equipment                             | Manufacturer   | Model No. | Serial No. | Calibration Body | Last Cal.  | Next Cal. |
| Spectrum Analyzer                     | Rohde &Schwarz | FSV40     | EST-E069   | LISAI            | June 14,19 | 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 |

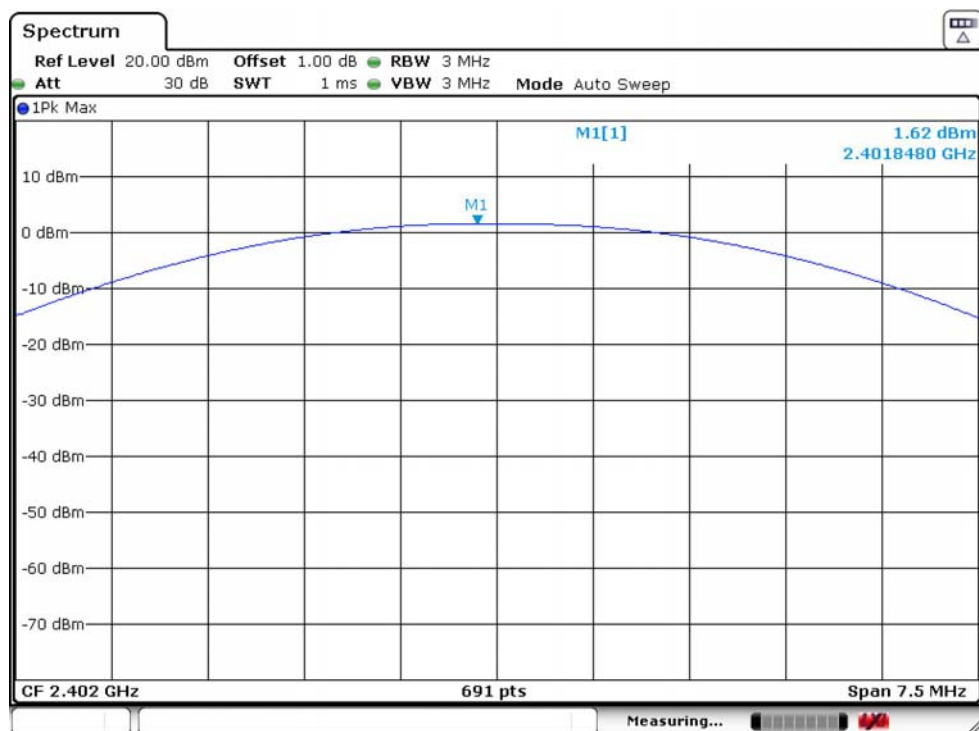
#### 3.4. Test Procedure

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

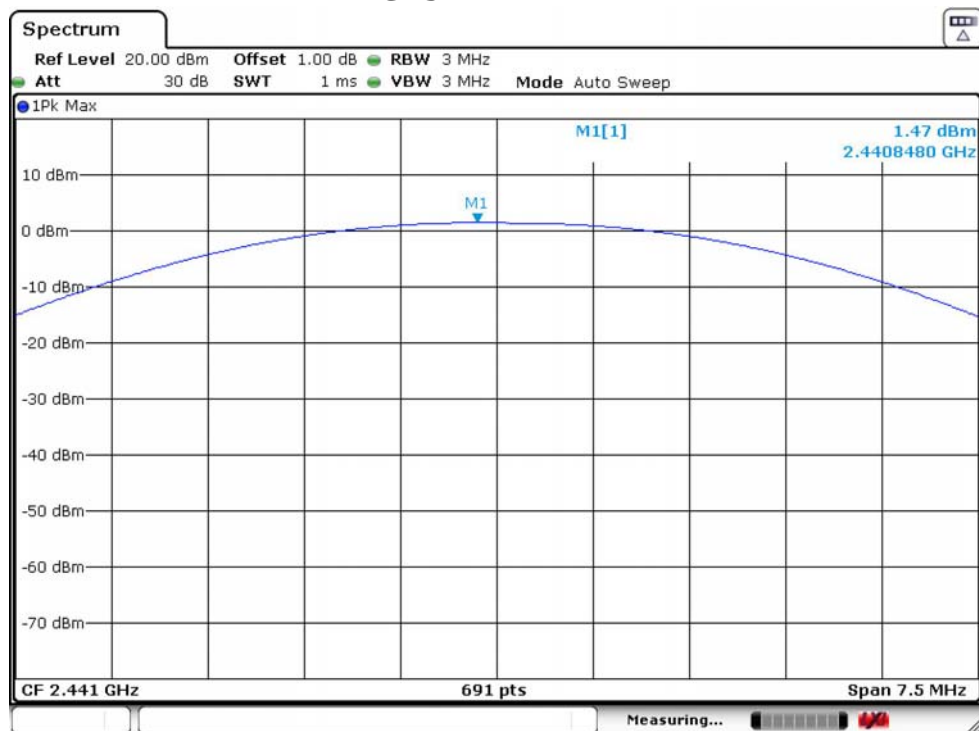
## 3.5. Test Result

| Temperature        | 25.1 °C    | Relative Humidity | 55%    | Test Voltage |        | 120V/60Hz |
|--------------------|------------|-------------------|--------|--------------|--------|-----------|
| Mode               | Freq (MHz) | Peak Output Power |        | Limit        |        | Result    |
|                    |            | dBm               | W      | dBm          | W      |           |
| GFSK               | 2402       | 1.62              | 0.0015 | 20.97        | 0.1250 | PASS      |
|                    | 2441       | 1.47              | 0.0014 | 20.97        | 0.1250 | PASS      |
|                    | 2480       | 1.28              | 0.0013 | 20.97        | 0.1250 | PASS      |
| $\pi$ /<br>4-DQPSK | 2402       | 2.13              | 0.0016 | 20.97        | 0.1250 | PASS      |
|                    | 2441       | 2.06              | 0.0016 | 20.97        | 0.1250 | PASS      |
|                    | 2480       | 1.91              | 0.0016 | 20.97        | 0.1250 | PASS      |

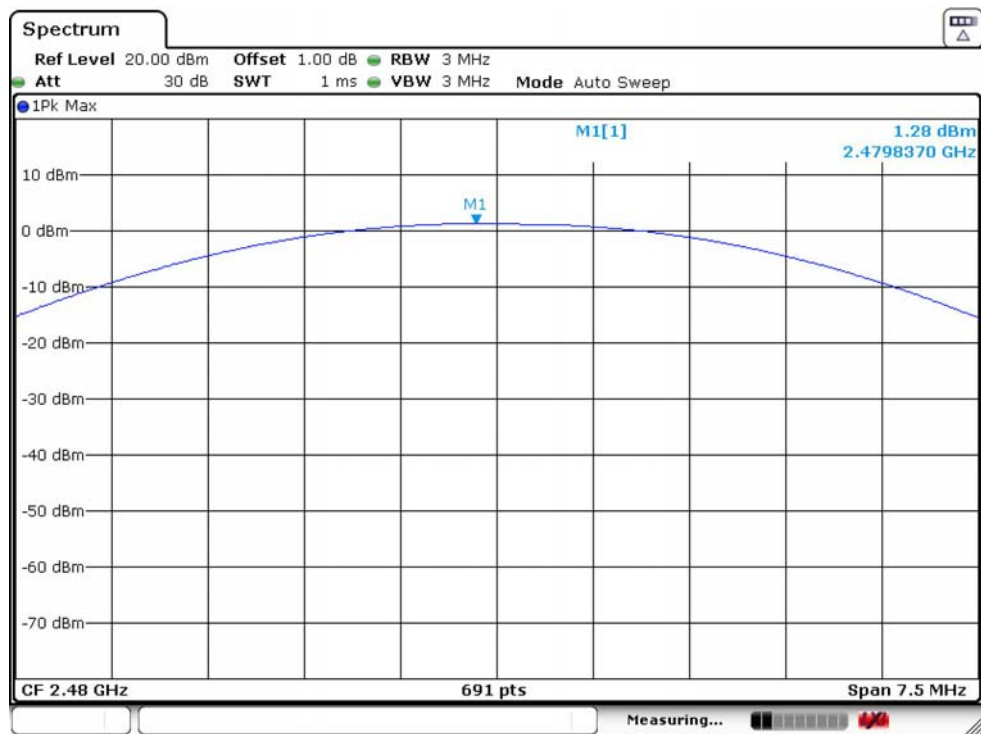
## GFSK 2402 MHz

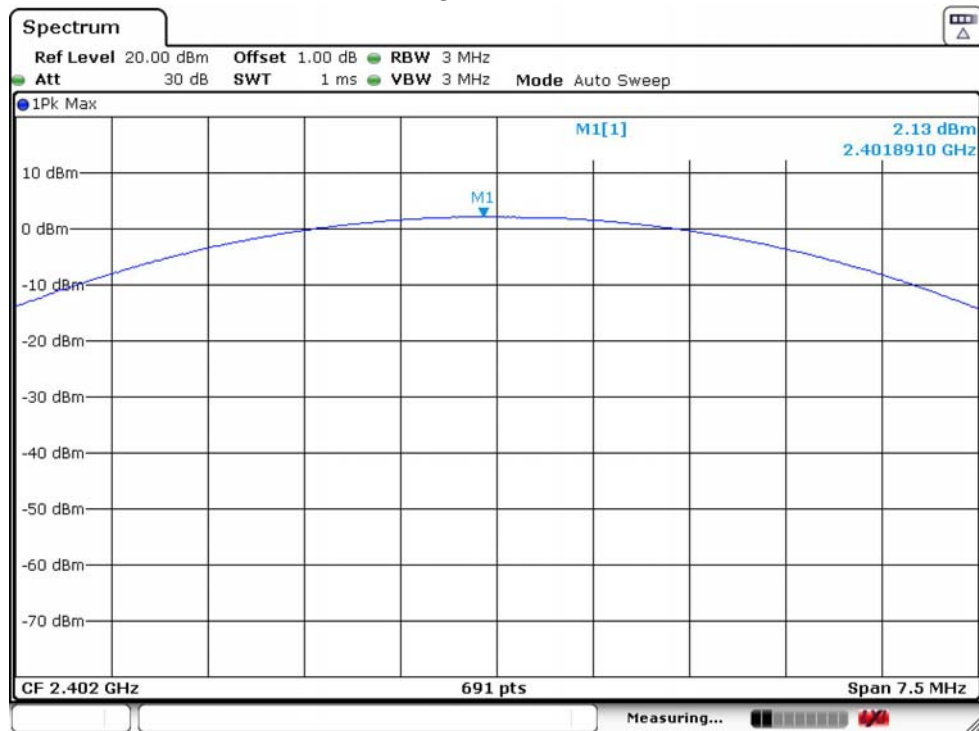
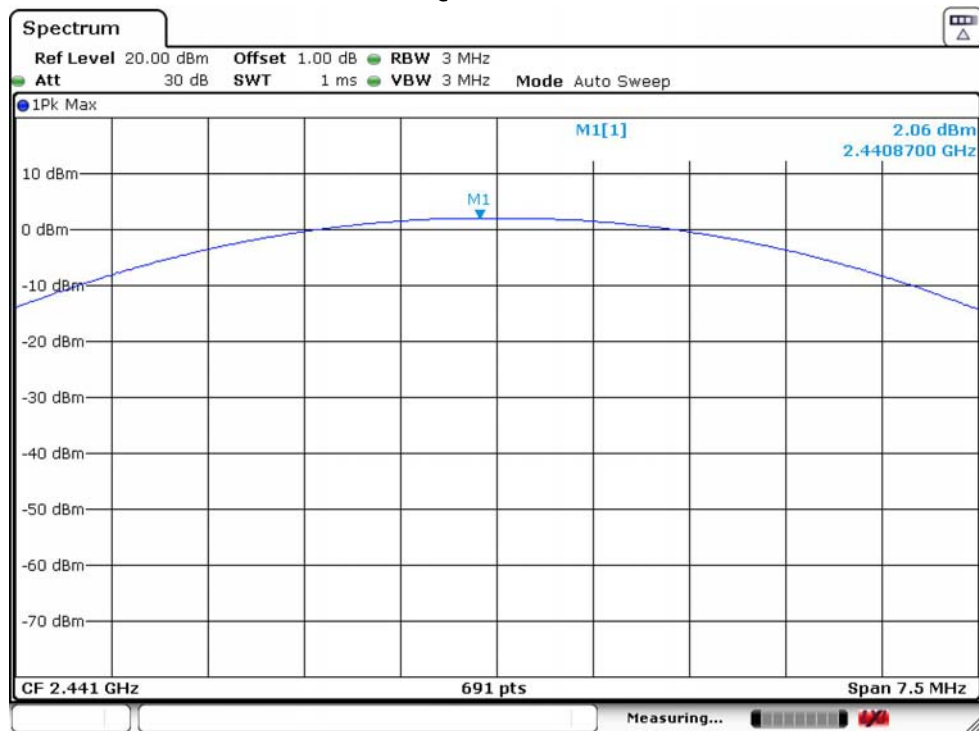


## GFSK 2441 MHz

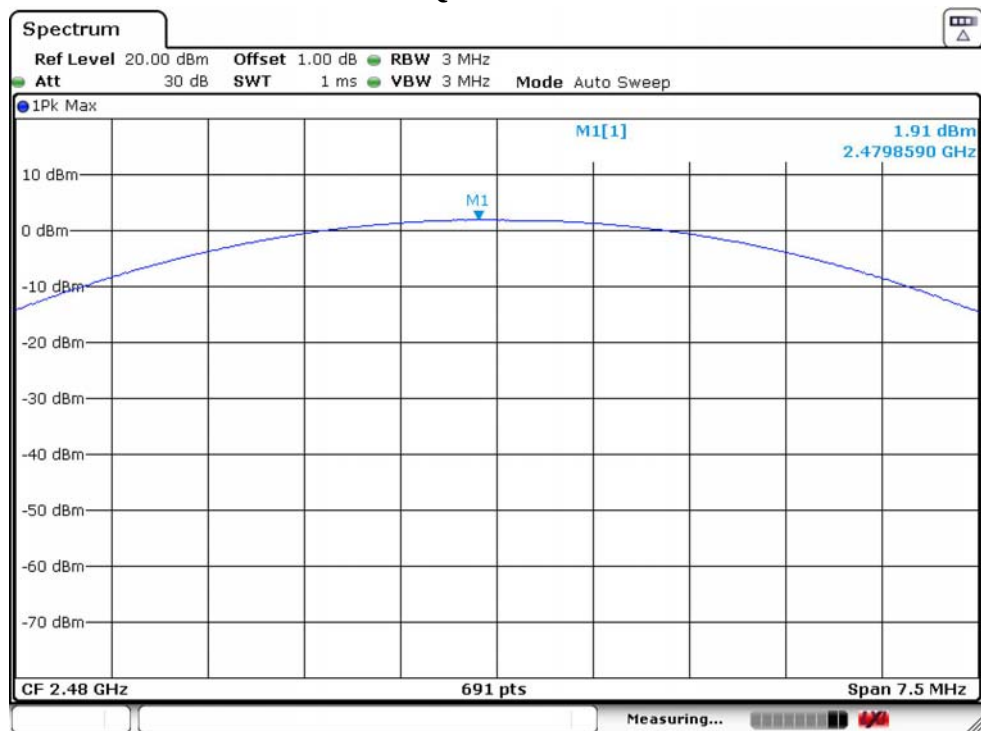


## GFSK 2480 MHz



$\pi/4$ -DQPSK 2402 MHz $\pi/4$ -DQPSK 2441 MHz



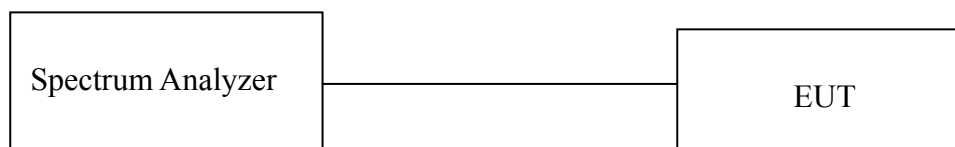
$\pi/4$ -DQPSK 2480 MHz

## 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 |

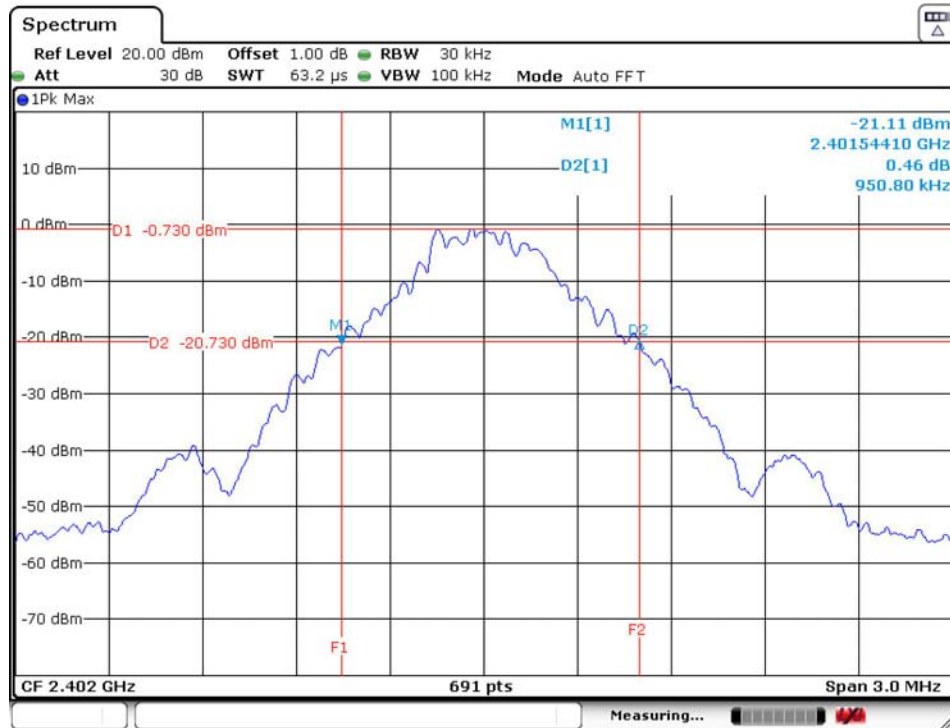
### 4.4. Test Procedure

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

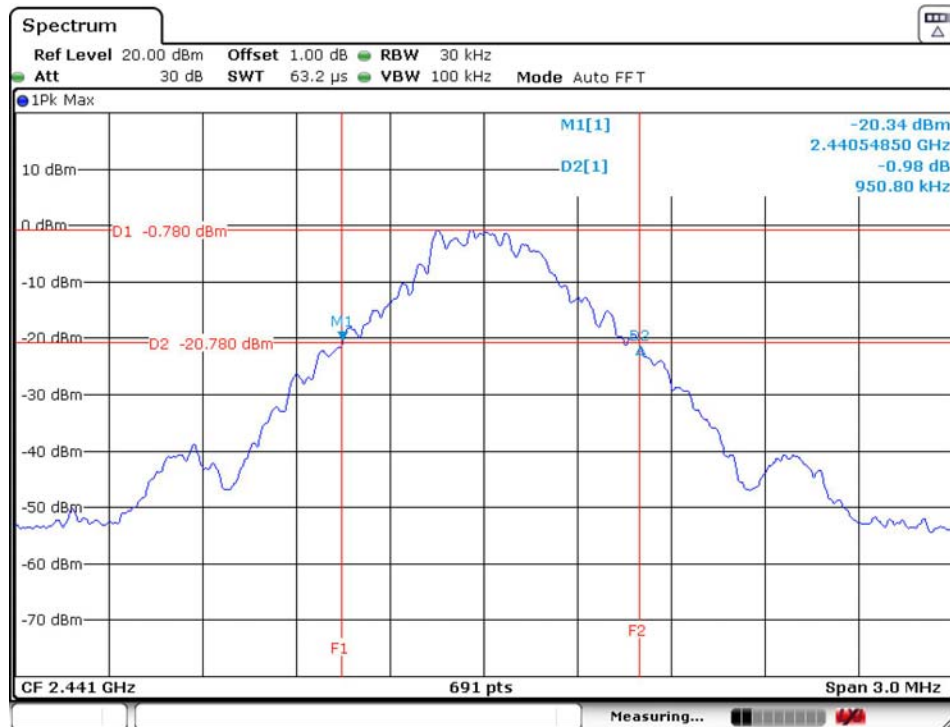
## 4.5. Test Result

|                |               |                         |                |        |
|----------------|---------------|-------------------------|----------------|--------|
| Temperature    | 25.1℃         | Relative Humidity       | 55%            |        |
| Test Voltage   | 120V/60Hz     |                         |                |        |
| Mode           | Freq<br>(MHz) | 20dB Bandwidth<br>(MHz) | Limit<br>(MHz) | Result |
| GFSK           | 2402          | 0.9508                  | /              | PASS   |
|                | 2441          | 0.9508                  | /              | PASS   |
|                | 2480          | 0.9508                  | /              | PASS   |
| $\pi$ /4-DQPSK | 2402          | 1.3155                  | /              | PASS   |
|                | 2441          | 1.3111                  | /              | PASS   |
|                | 2480          | 1.3111                  | /              | PASS   |

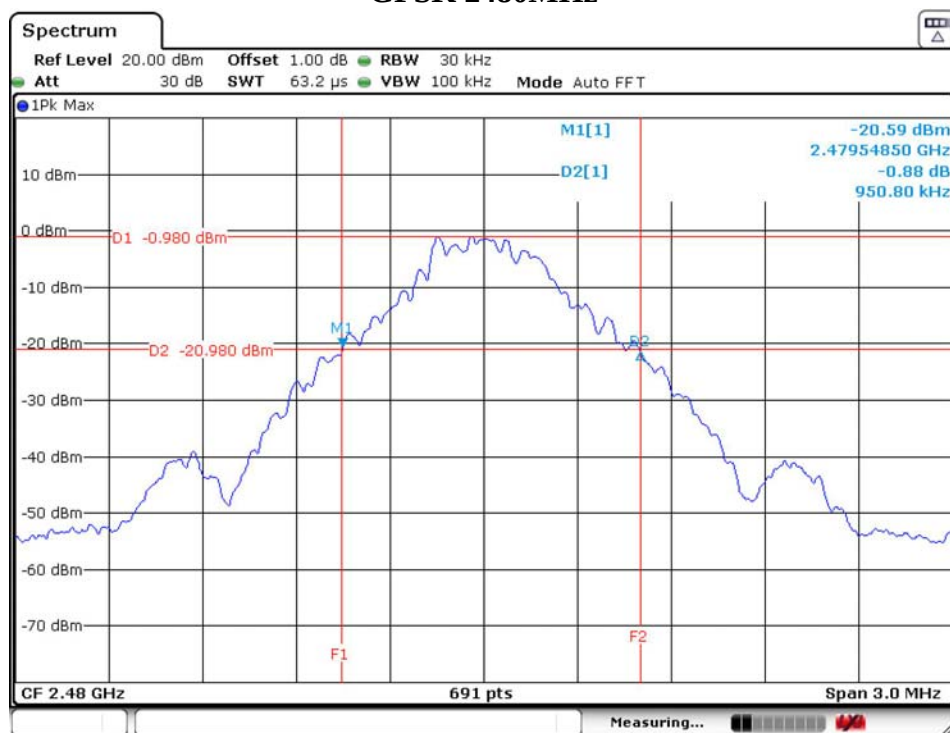
## GFSK 2402MHz

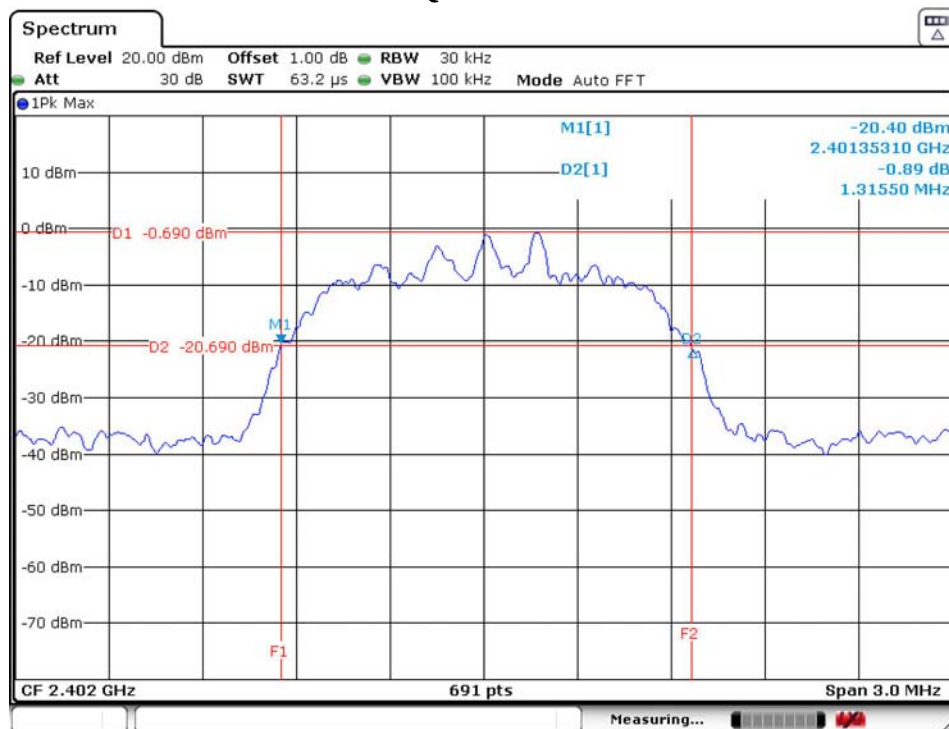
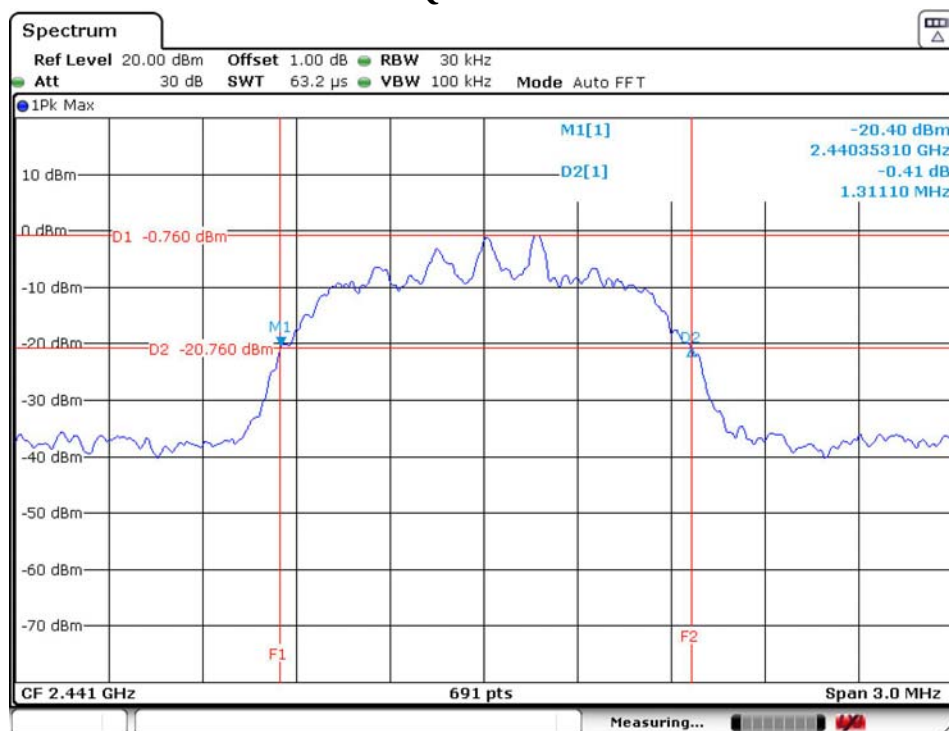


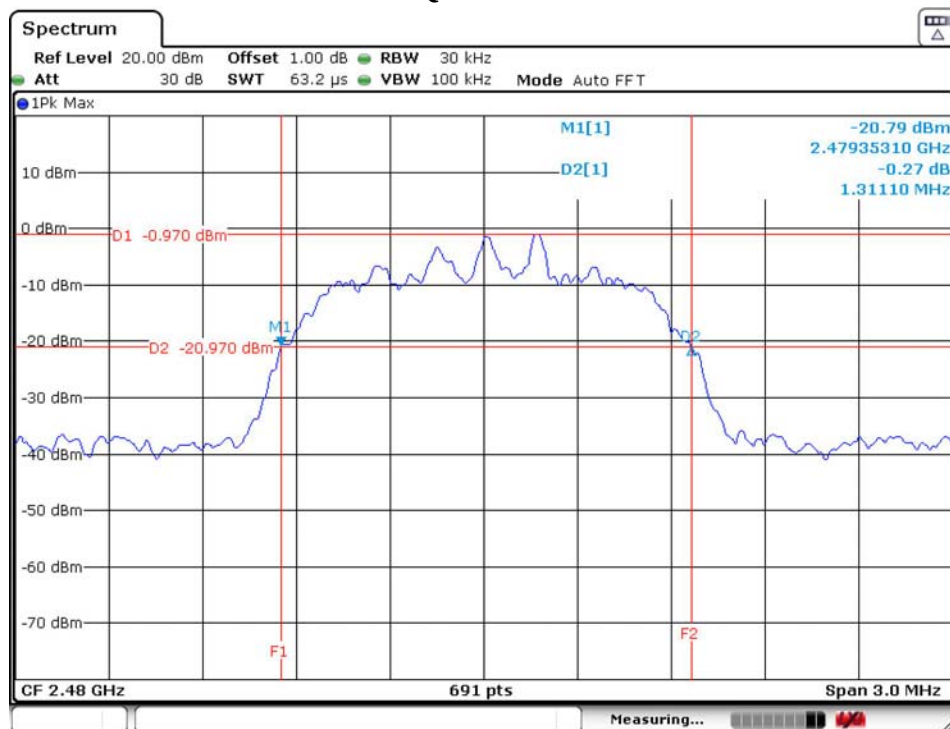
## GFSK 2441MHz



## GFSK 2480MHz



$\pi$  /4-DQPSK 2402MHz $\pi$  /4-DQPSK 2441MHz

$\pi$  /4-DQPSK 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

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



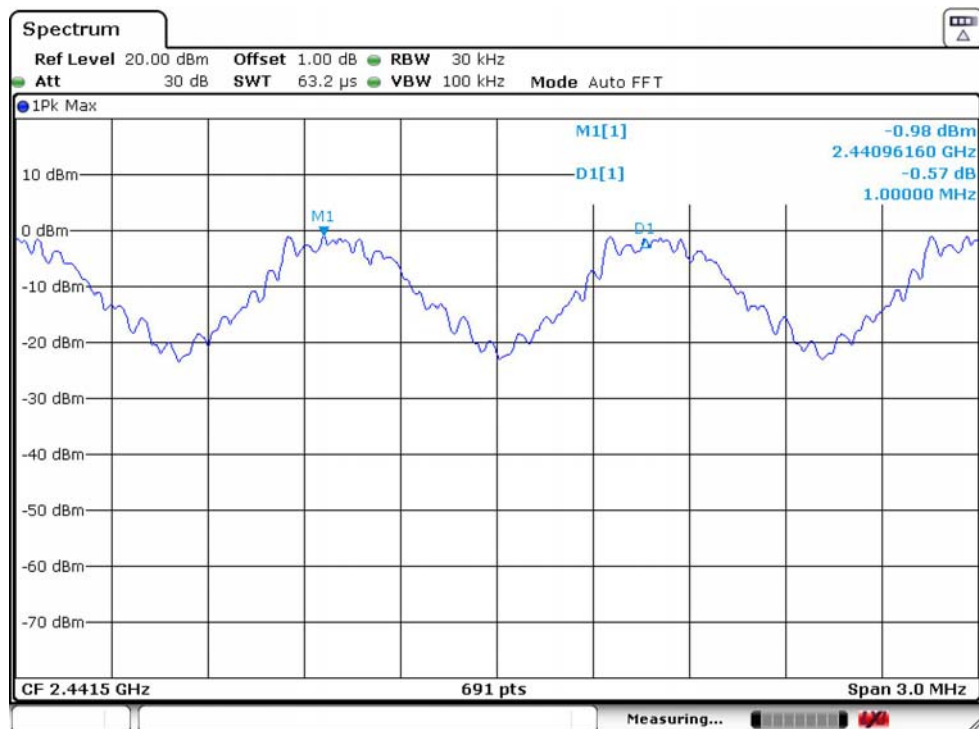
## 5.5. Test Result

|                |         |                          |                                   |              |           |
|----------------|---------|--------------------------|-----------------------------------|--------------|-----------|
| Temperature    | 25.1 °C | Relative Humidity        | 55%                               | Test Voltage | 120V/60Hz |
| Mode           | Channel | Channel Separation (MHz) | 2/3 of 20dB Bandwidth Limit (MHz) |              | Result    |
| GFSK           | Low CH  | 1.0000                   | 0.6339                            |              | PASS      |
|                | Mid CH  | 1.0000                   | 0.6339                            |              | PASS      |
|                | High CH | 1.0000                   | 0.6339                            |              | PASS      |
| $\pi/4$ -DQPSK | Low CH  | 1.0000                   | 0.8770                            |              | PASS      |
|                | Mid CH  | 1.0000                   | 0.8741                            |              | PASS      |
|                | High CH | 1.0000                   | 0.8741                            |              | PASS      |

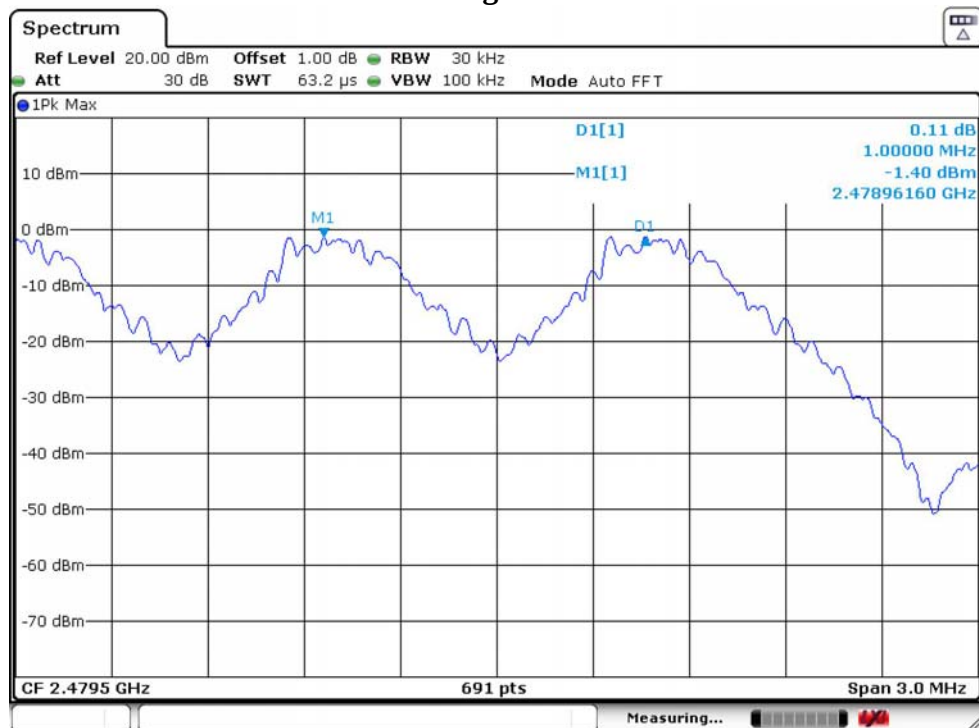
## GFSK Low Channel

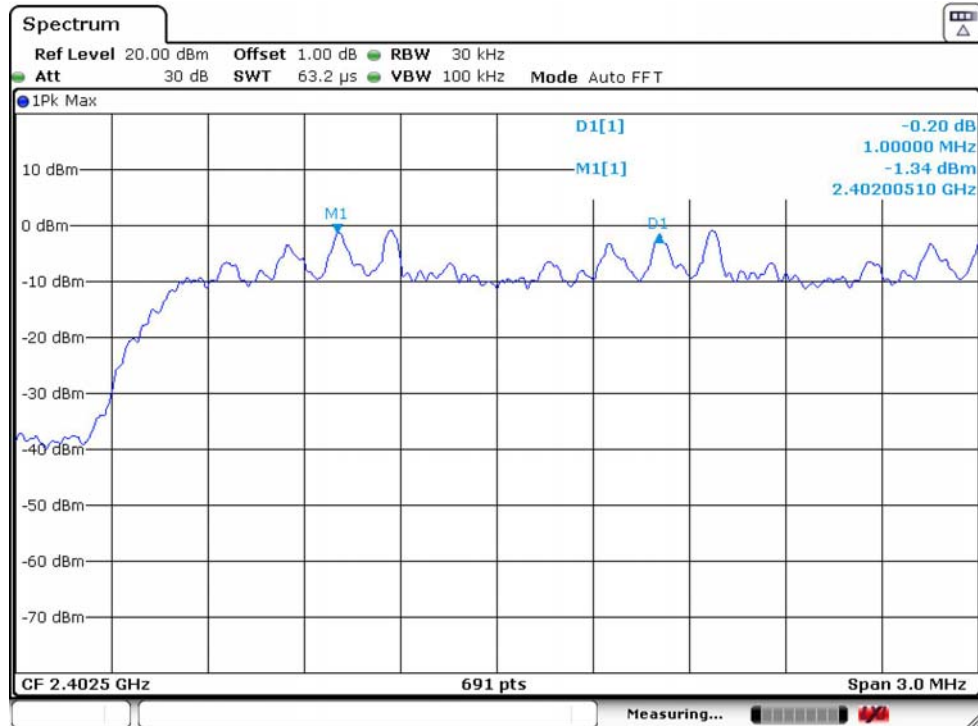
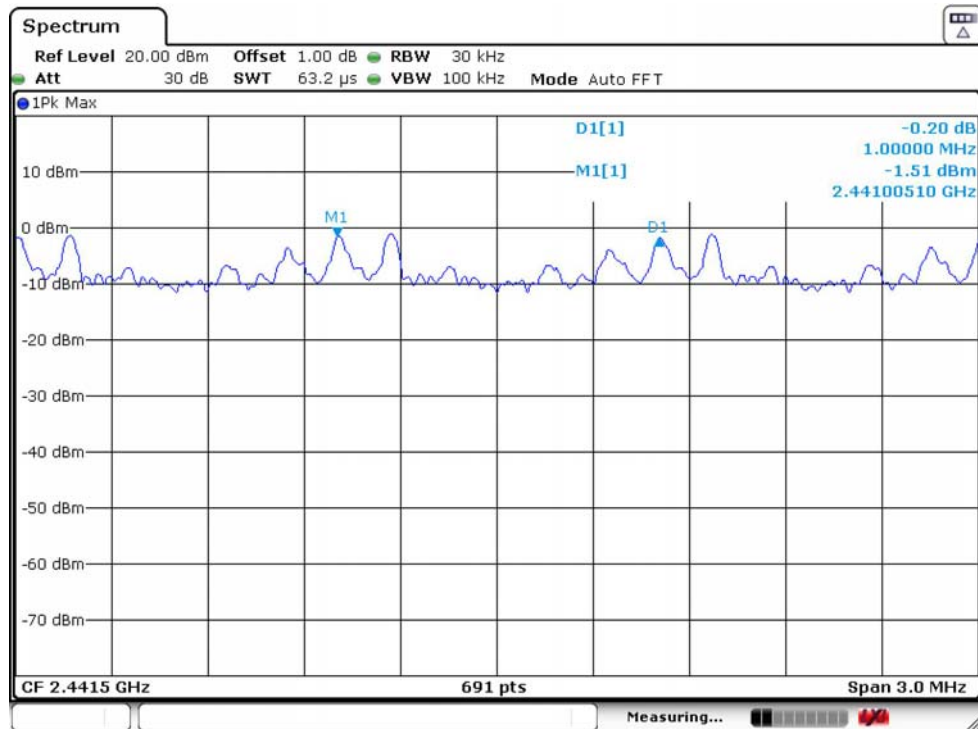


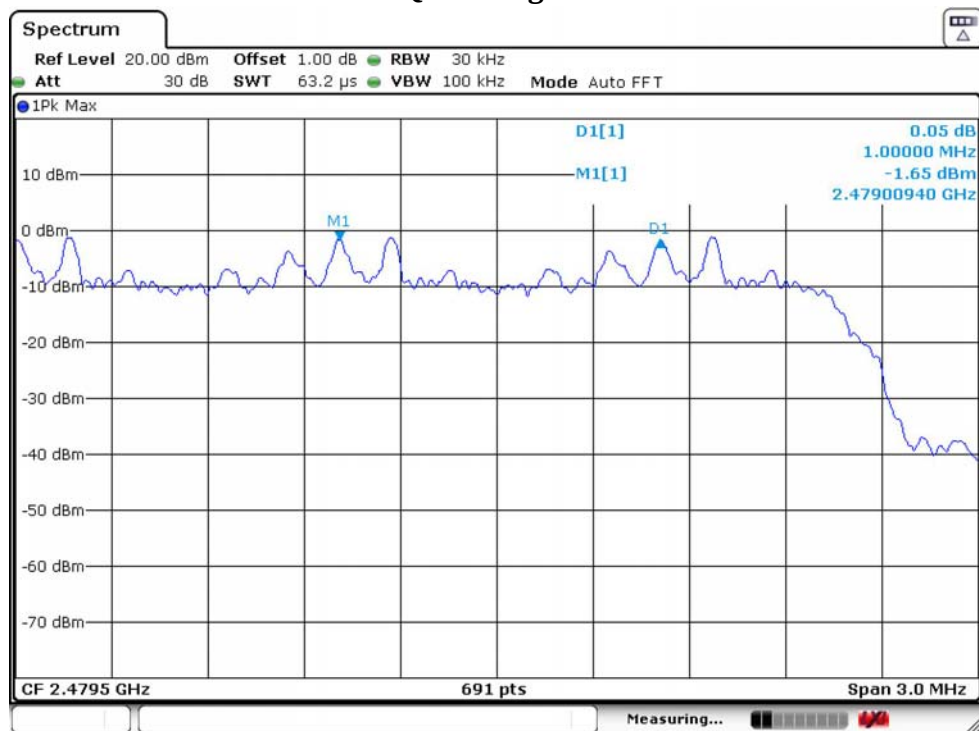
## GFSK Mid Channel



## GFSK High Channel



$\pi/4$ -DQPSK Low Channel $\pi/4$ -DQPSK Mid Channel

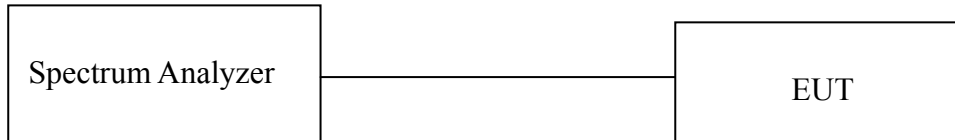
$\pi$  /4-DQPSK High Channel

## 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  |

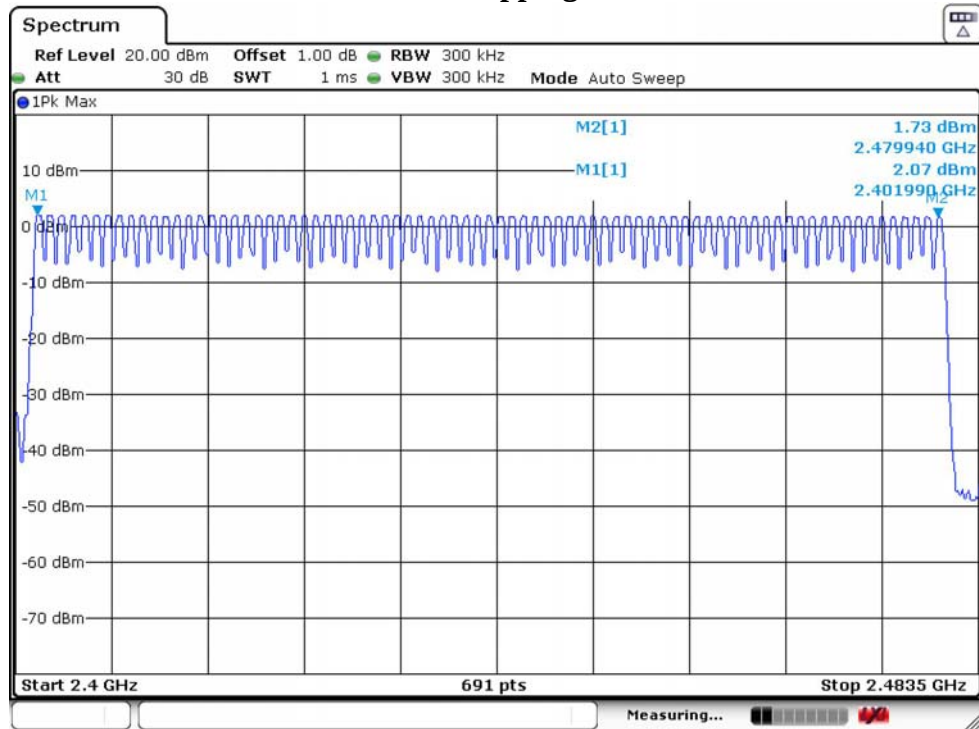
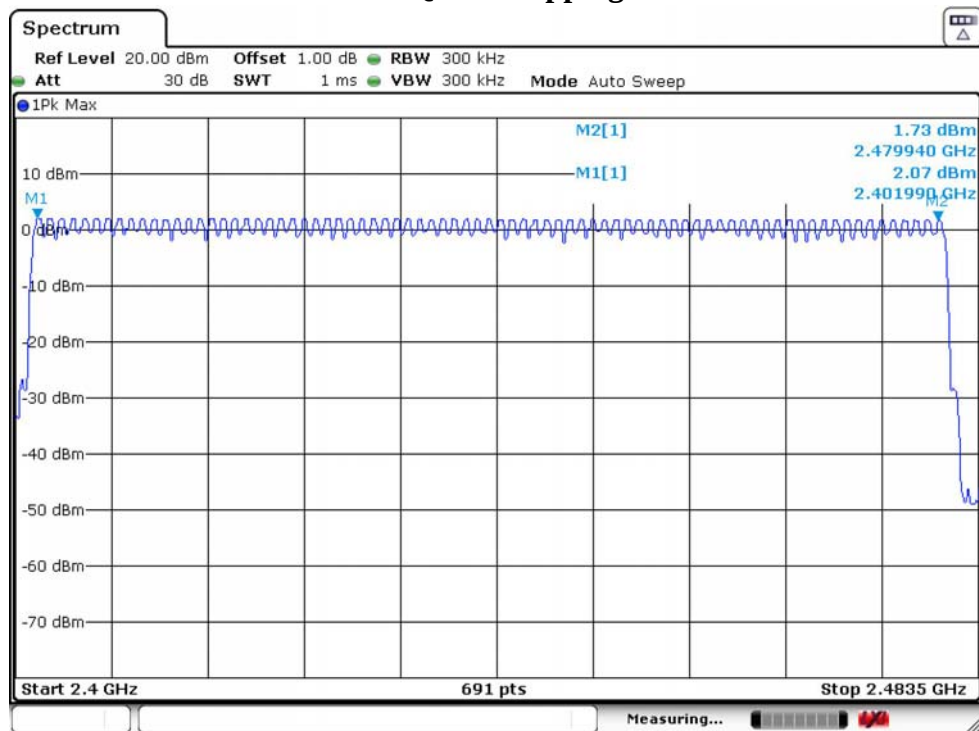
### 6.4. Test Procedure

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

## 6.5. Test Result

|                |                           |                   |     |              |           |
|----------------|---------------------------|-------------------|-----|--------------|-----------|
| Temperature    | 25.1 °C                   | Relative Humidity | 55% | Test Voltage | 120V/60Hz |
| Mode           | Number of Hopping Channel |                   |     | Limit        | Result    |
| GFSK           | 79                        |                   |     | $\geq 15$    | PASS      |
| $\pi$ /4-DQPSK | 79                        |                   |     | $\geq 15$    | PASS      |

## GFSK Hopping On

 $\pi/4$ -DQPSK Hopping On

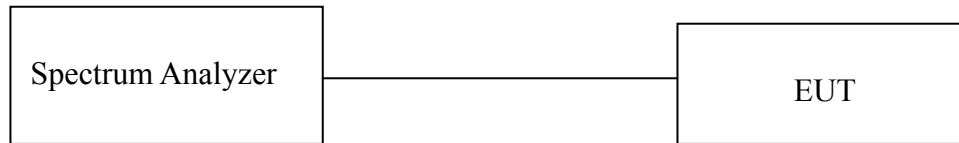


## 7. DWELL TIME

### 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                   |

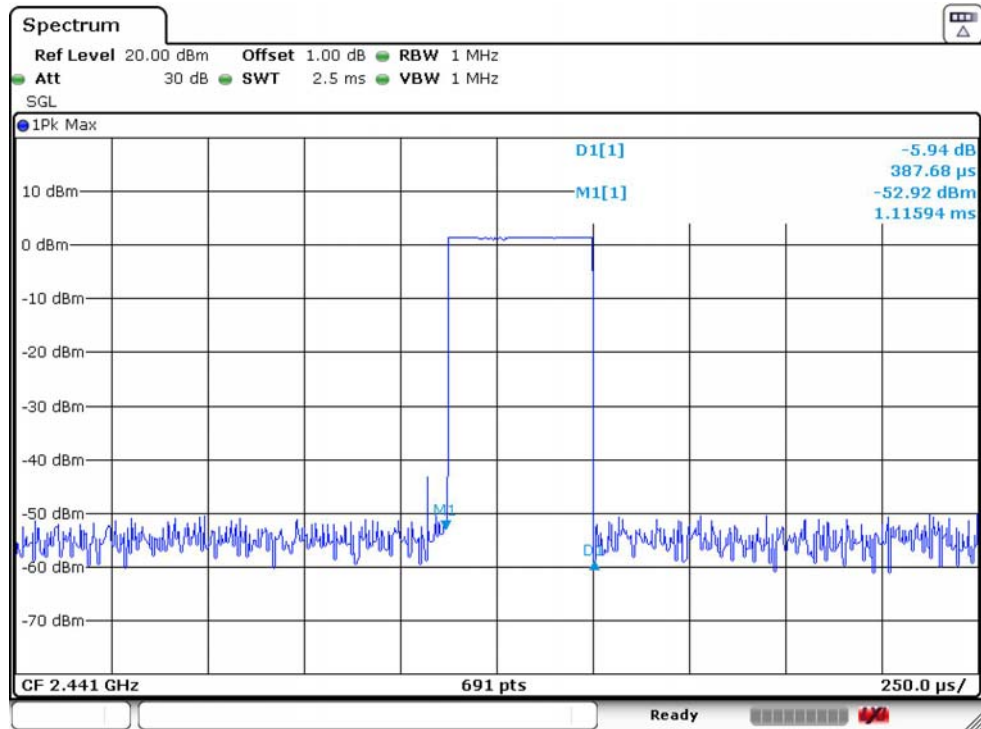
### 7.4. Test Procedure

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

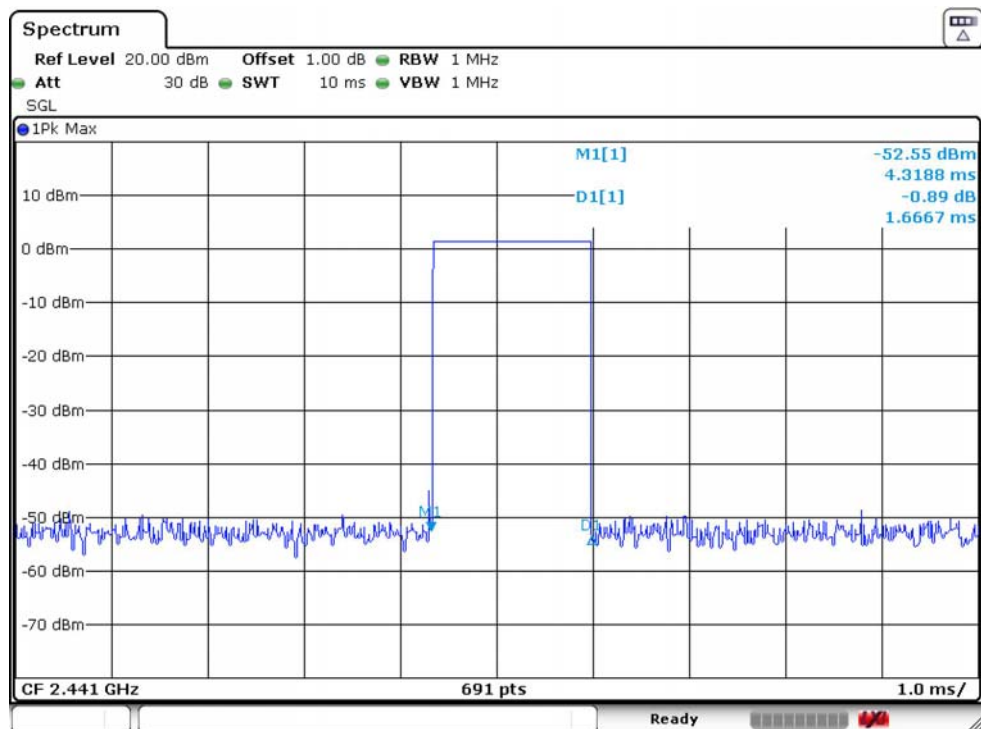
## 7.5. Test Result

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |                                  |                     |                 |              |           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------------------------|---------------------|-----------------|--------------|-----------|
| Temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 25.1℃      | Relative Humidity                |                     | 55%             | Test Voltage | 120V/60Hz |
| Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Freq (MHz) | Hops in Observation Period(hops) | Pulse Duration (ms) | Dwell time (ms) | Limit        | Result    |
| GFSK DH1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2441       | 320                              | 0.3877              | 124.06          | <400ms       | PASS      |
| GFSK DH3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2441       | 160                              | 1.6667              | 266.67          | <400ms       | PASS      |
| GFSK DH5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2441       | 106.67                           | 2.9275              | 312.27          | <400ms       | PASS      |
| $\pi/4$ -DQPSK 2DH1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2441       | 320                              | 0.3949              | 126.38          | <400ms       | PASS      |
| $\pi/4$ -DQPSK 2DH3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2441       | 160                              | 1.6667              | 266.67          | <400ms       | PASS      |
| $\pi/4$ -DQPSK 2DH5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2441       | 106.67                           | 2.9275              | 312.27          | <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( $0.4s \times 79 \text{ channel}$ )= $(1600/79/2)\text{hops/s} \times 0.4s \times 79=320 \text{ hops}$ .<br>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( $0.4s \times 79 \text{ channel}$ )= $(1600/79/4)\text{hops/s} \times 0.4s \times 79=160 \text{ hops}$ .<br>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( $0.4s \times 79 \text{ channel}$ )= $(1600/79/5)\text{hops/s} \times 0.4s \times 79=106.67 \text{ hops}$ .<br>4. Dwell Time= Hops in Observation Period $\times$ Pulse Duration. |            |                                  |                     |                 |              |           |

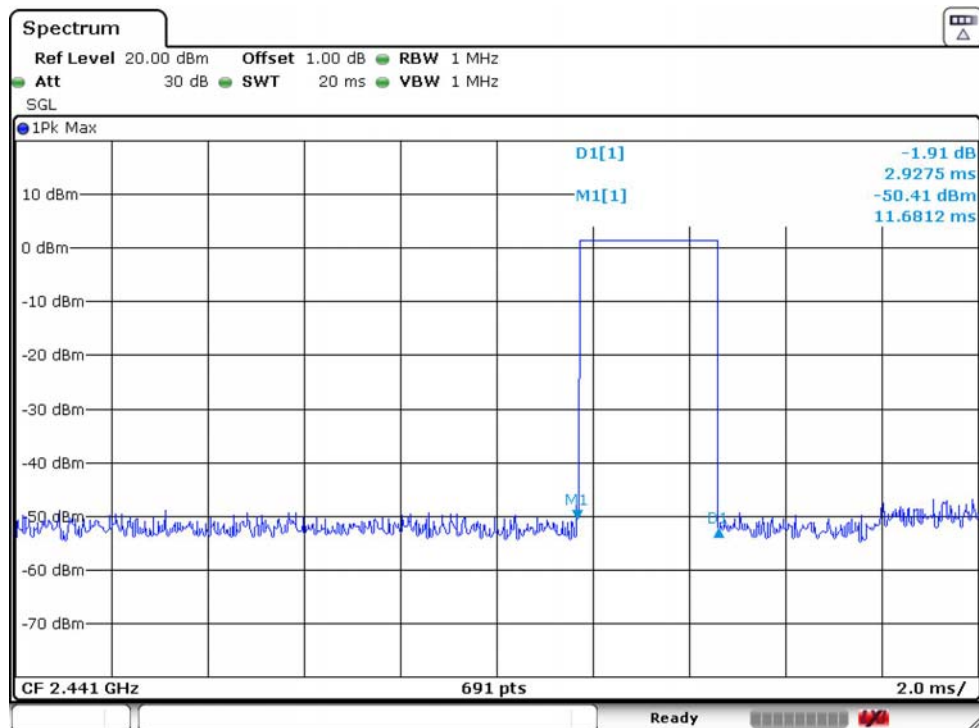
## GFSK DH1

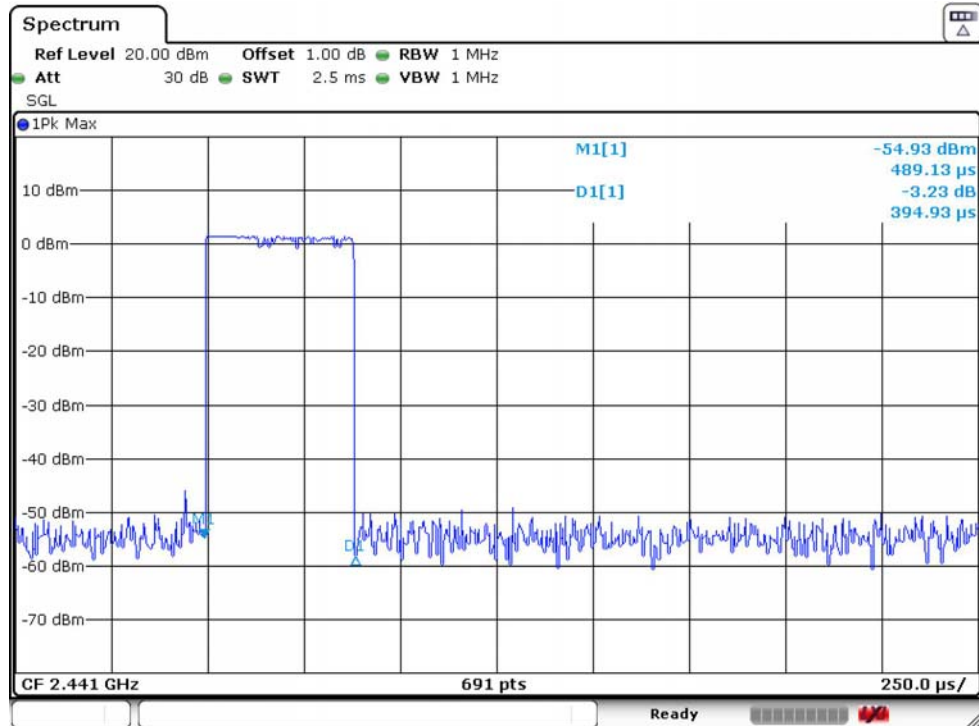
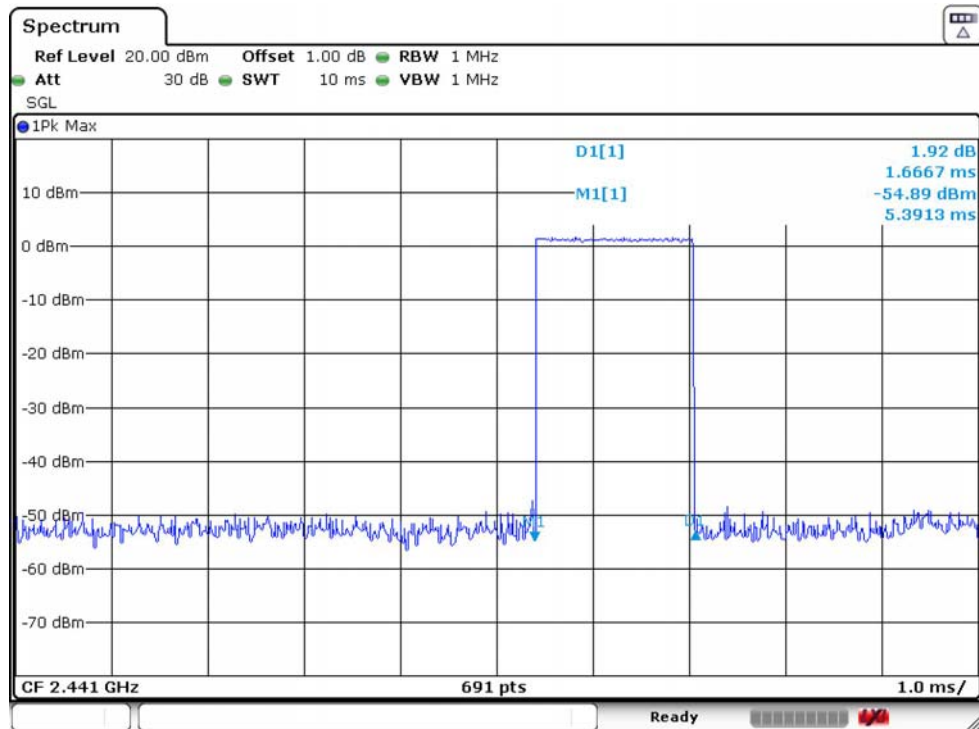


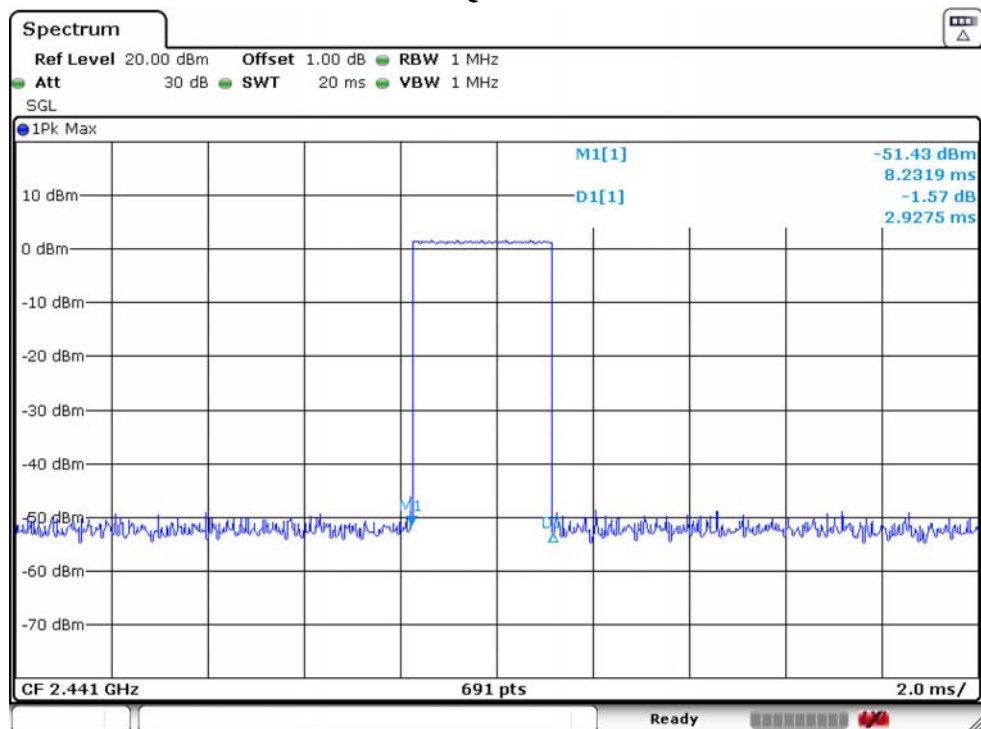
## GFSK DH3



## GFSK DH5



$\pi/4$ -DQPSK 2DH1 $\pi/4$ -DQPSK 2DH3

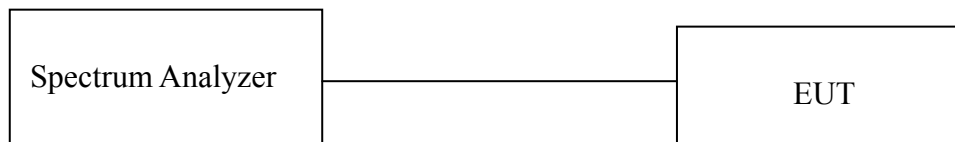
$\pi/4$ -DQPSK 2DH5

## 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

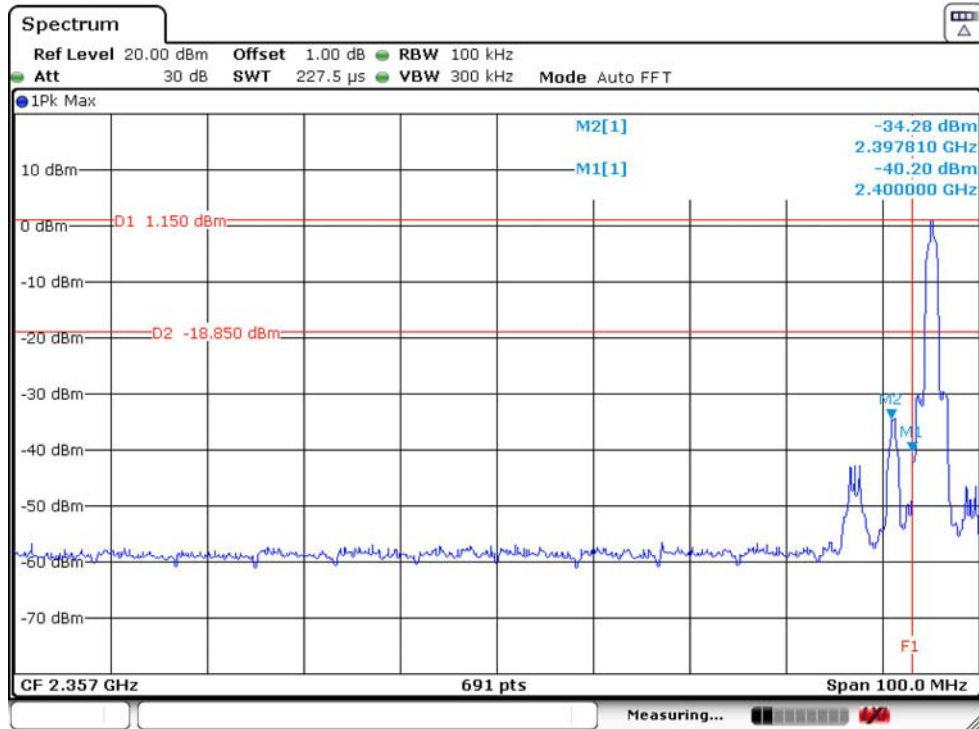
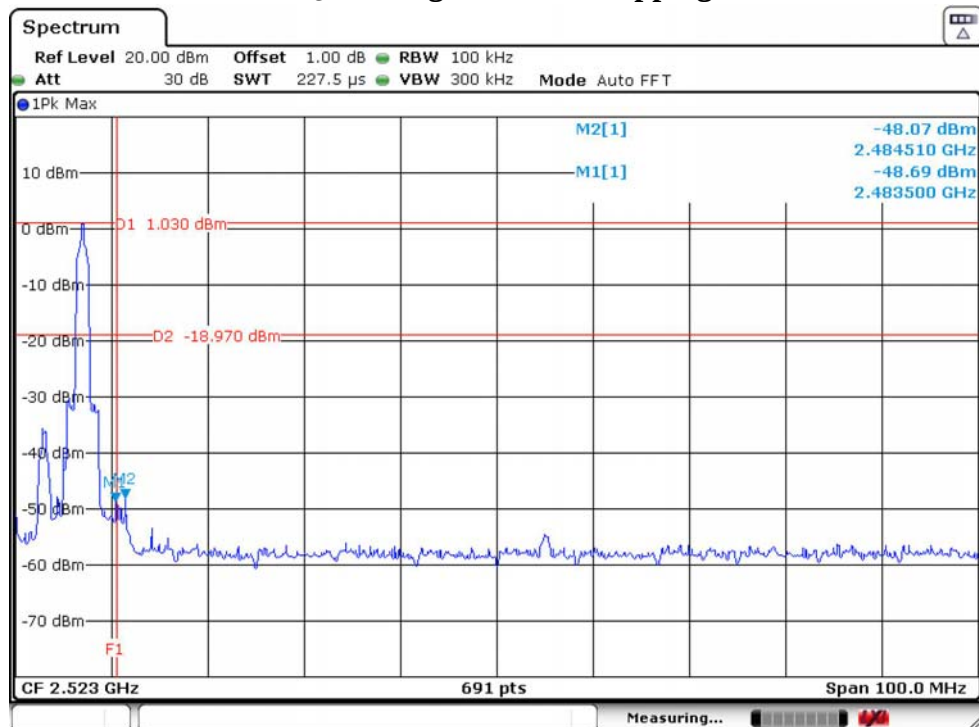
| Spectrum Parameters | Setting  |
|---------------------|----------|
| RBW                 | 100KHz   |
| VBW                 | 300KHz   |
| Span                | 100MHz   |
| Sweep Time          | Auto     |
| Detector            | Peak     |
| Trace Mode          | Max Hold |

### 8.4. Test Procedure

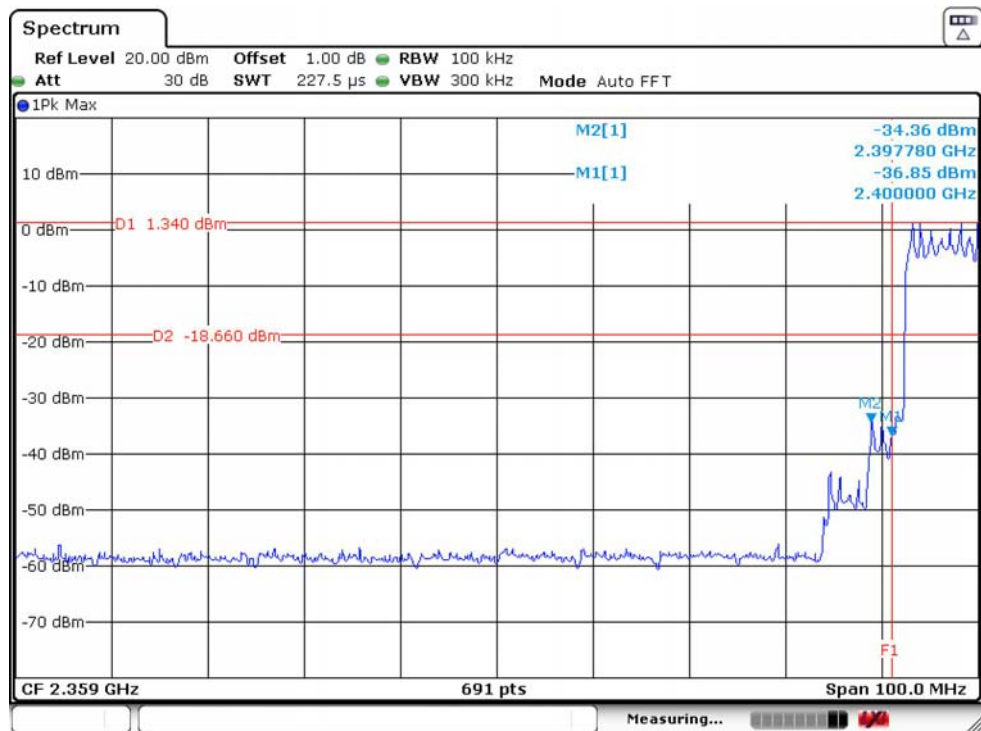
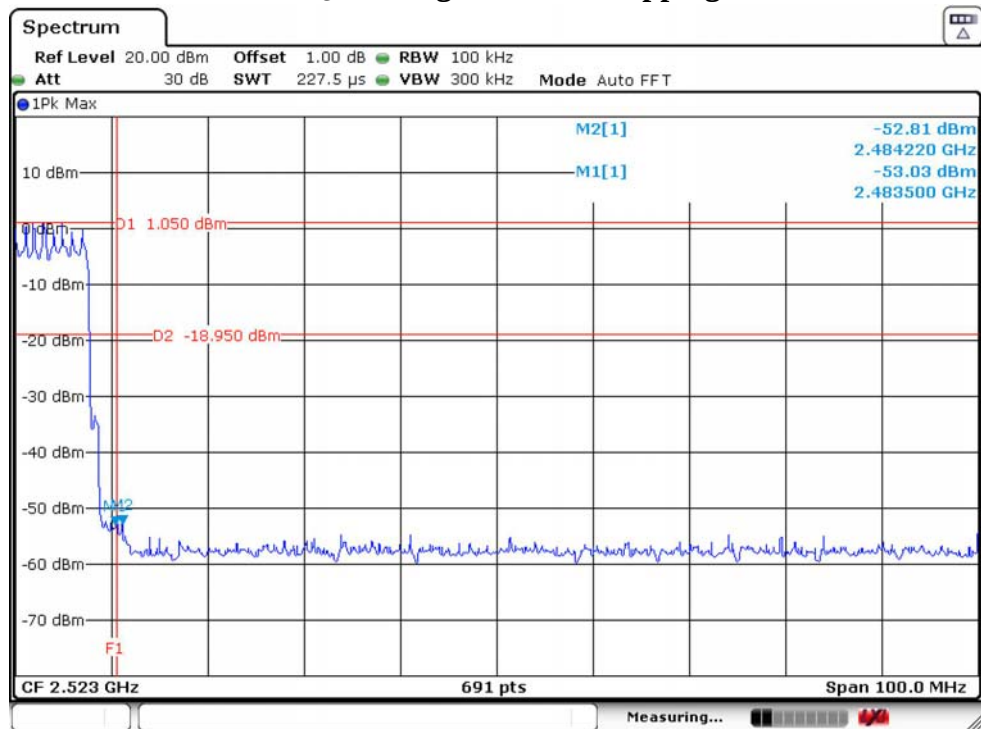
- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 8.3.
- Set the EUT transmit continuously with maximum output power over fixed single hopping channel.
- Allow trace to stabilize, use the marker function to mark the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

## 8.5. Test Result

|             |         |                   |     |              |           |
|-------------|---------|-------------------|-----|--------------|-----------|
| Temperature | 25.1 °C | Relative Humidity | 55% | Test Voltage | 120V/60Hz |
| Result      | PASS    |                   |     |              |           |

 $\pi/4$ -DQPSK Low Channel Hopping OFF $\pi/4$ -DQPSK High Channel Hopping OFF



$\pi/4$ -DQPSK Low Channel Hopping ON $\pi/4$ -DQPSK High Channel Hopping ON

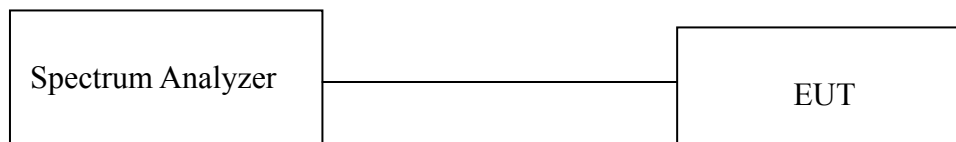
All modulations are all tested ,only worse case is reported

## 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

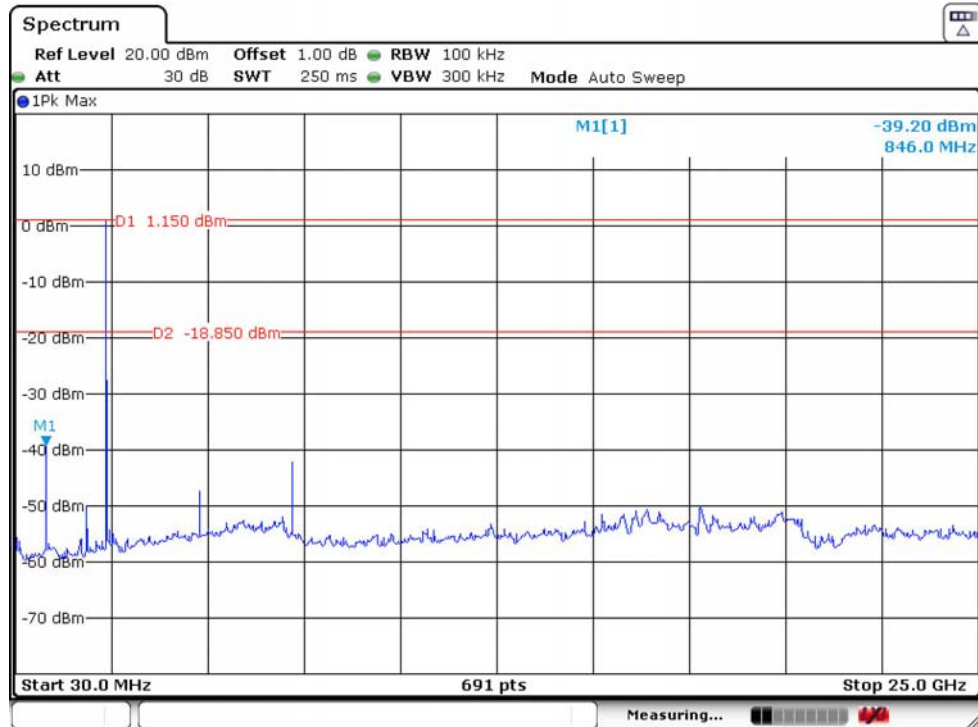
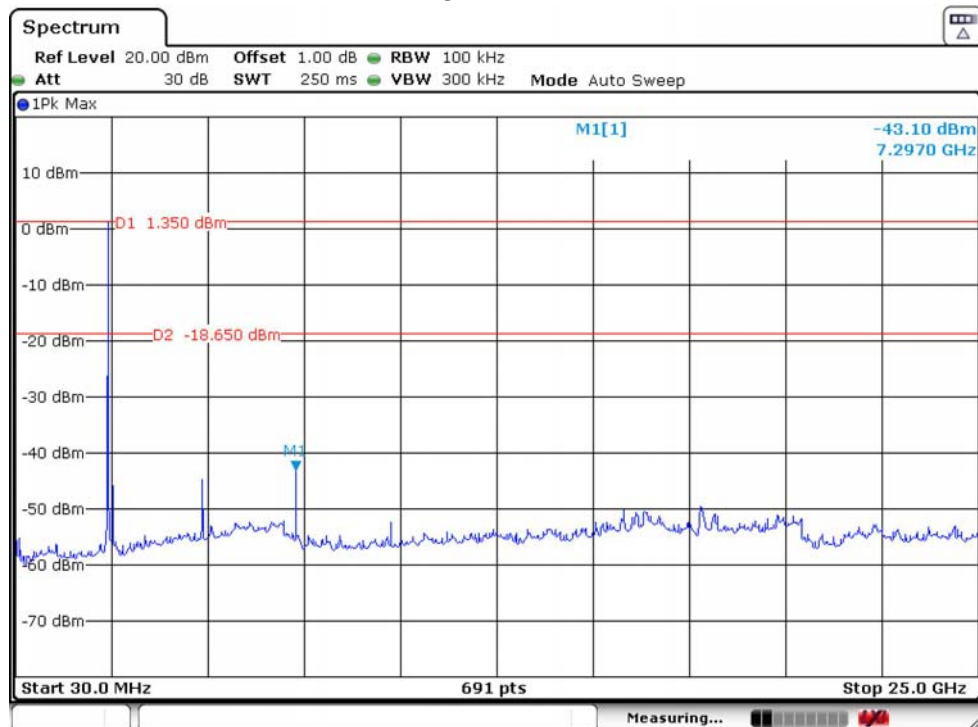
| Spectrum Parameters | Setting  |
|---------------------|----------|
| RBW                 | 100KHz   |
| VBW                 | 300KHz   |
| Start frequency     | 30MHz    |
| Stop frequency      | 25GHz    |
| Sweep Time          | Auto     |
| Detector            | Peak     |
| Trace Mode        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

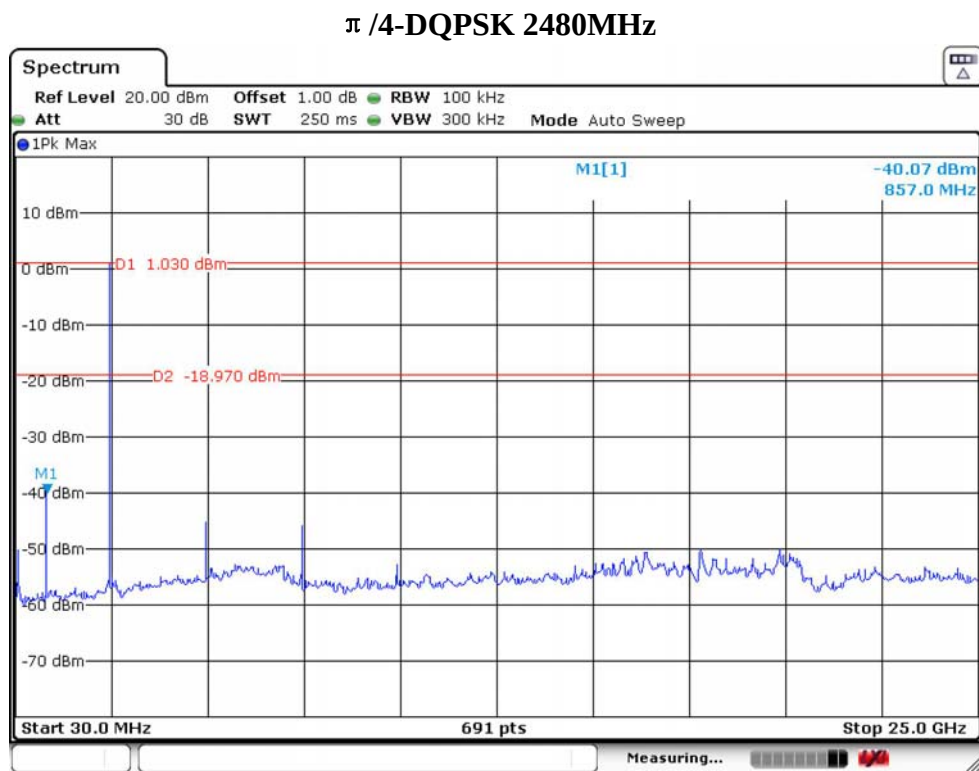
### 9.4. Test Procedure

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 9.3.
- Set the EUT transmit continuously with maximum output power over fixed single hopping channel.
- Allow trace to stabilize, use the marker function to mark the highest emission level outside the authorized band.
- Repeat above procedures until all channels and test modes were measured.
- Record the results in the test report.

## 9.5. Test Result

|             |         |                   |     |              |           |
|-------------|---------|-------------------|-----|--------------|-----------|
| Temperature | 25.1 °C | Relative Humidity | 55% | Test Voltage | 120V/60Hz |
| Result      | PASS    |                   |     |              |           |

 $\pi$  /4-DQPSK 2402MHz $\pi$  /4-DQPSK 2441MHz



All modulations are all 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       |
| <sup>1</sup> 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     | ( <sup>2</sup> ) |

#### 15.209 Limit

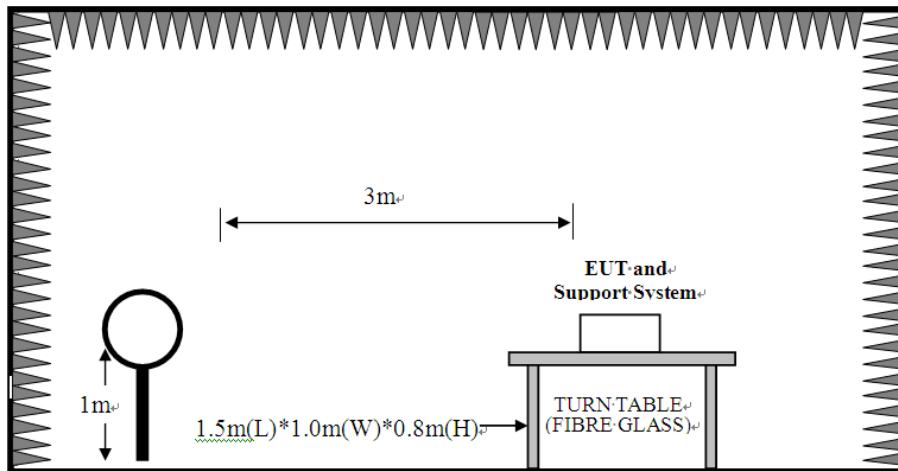
| Frequency (MHz) | Field Strength( $\mu$ V/m) | Distance(m) |
|-----------------|----------------------------|-------------|
| 0.009-0.490     | 2400/F(kHz)                | 300         |
| 0.490-1.705     | 24000/F(kHz)               | 30          |
| 1.705-30        | 30                         |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

Note:

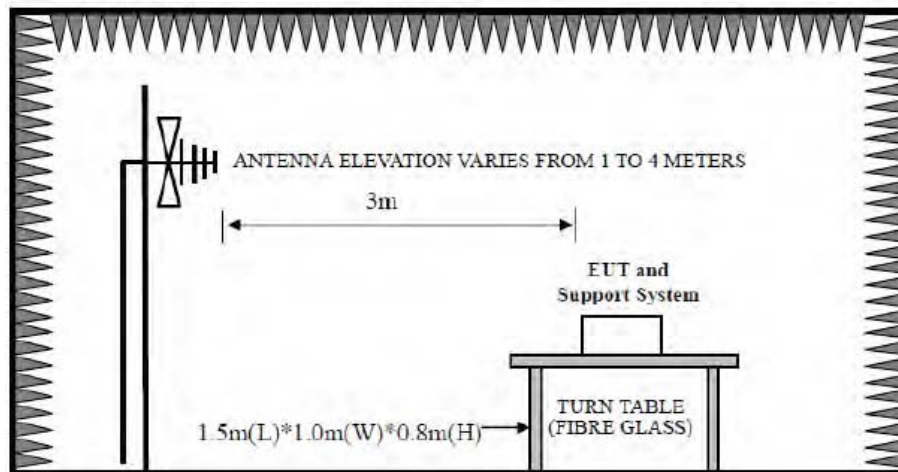
- (1) Emission level dB $\mu$ V = 20 log Emission level  $\mu$ V/m.
- (2) The smaller limit shall apply at the cross point between two frequency bands.
- (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

## 10.2. Test Setup

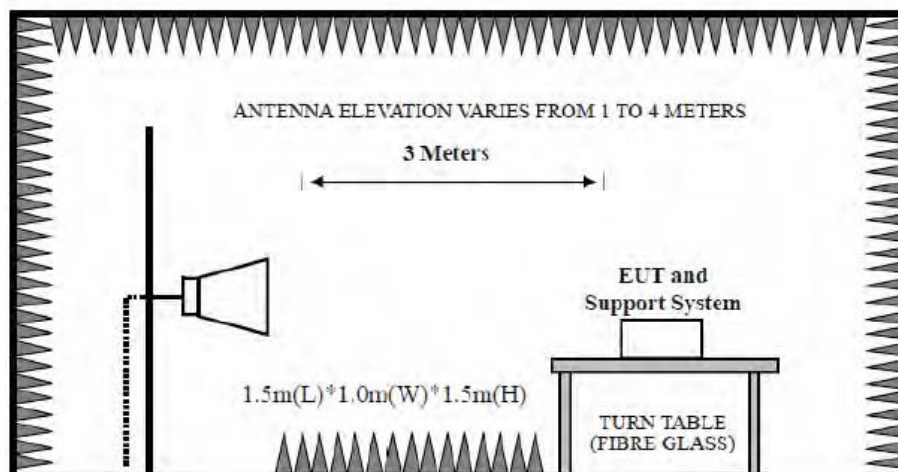
9kHz~30MHz



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 $\geq 98\%$ , VBW=10Hz    |
|                     |                  | Duty cycle $< 98\%$ , VBW $\geq 1/T$ |
| 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.

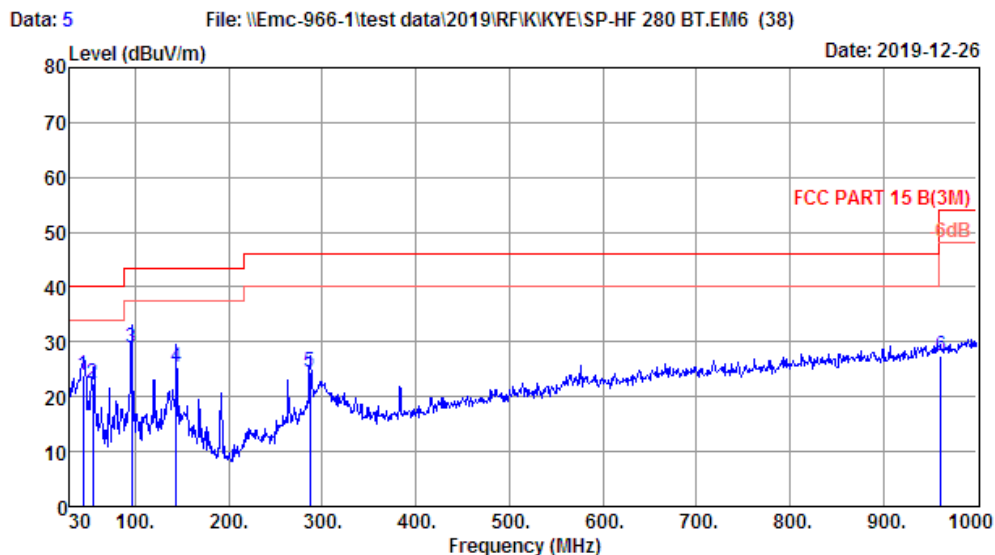


## 10.5. Test Result

## Radiated Emissions Below 1GHz

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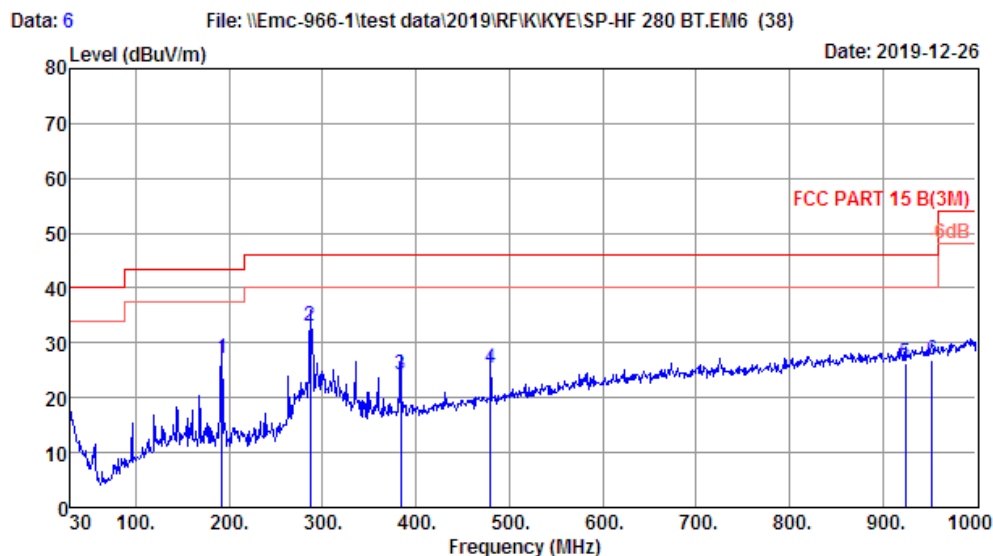
Site no. : 1# 966 Chamber Data no. : 5  
Dis. / Ant. : 3m 37062 Ant. pol. : VERTICAL  
Limit : FCC PART 15 B(3M)  
Env. / Ins. : Temp:25.4';Humi:56%;Press:101.54kPa  
Engineer : Boris  
EUT : Multimedia Speaker  
Power : DC 5V From Adapter Input AC 120V/60Hz  
M/N : SP-HF280 BT  
Test Mode : TX Mode

| Freq.<br>(MHz) | ANT<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|----------------|-------------------------|-----------------------|-------------------|-------------------------------|-------------------|----------------|--------|
| 44.55          | 10.15                   | 0.25                  | 13.49             | 23.89                         | 40.00             | 16.11          | QP     |
| 54.25          | 6.60                    | 0.34                  | 15.53             | 22.47                         | 40.00             | 17.53          | QP     |
| 95.96          | 9.54                    | 0.82                  | 18.59             | 28.95                         | 43.50             | 14.55          | QP     |
| 143.49         | 11.97                   | 1.06                  | 12.46             | 25.49                         | 43.50             | 18.01          | QP     |
| 287.05         | 13.20                   | 1.82                  | 9.50              | 24.52                         | 46.00             | 21.48          | QP     |
| 961.20         | 24.70                   | 4.61                  | -1.87             | 27.44                         | 54.00             | 26.56          | 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. : 6  
Dis. / Ant. : 3m 37062 Ant. pol. : HORIZONTAL  
Limit : FCC PART 15 B(3M)  
Env. / Ins. : Temp:25.4';Humi:56%;Press:101.54kPa  
Engineer : Boris  
EUT : Multimedia Speaker  
Power : DC 5V From Adapter Input AC 120V/60Hz  
M/N : SP-HF280 BT  
Test Mode : TX Mode

| Freq.<br>(MHz) | ANT<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|----------------|-------------------------|-----------------------|-------------------|-------------------------------|-------------------|----------------|--------|
| 191.99         | 8.86                    | 1.26                  | 17.00             | 27.12                         | 43.50             | 16.38          | QP     |
| 287.05         | 13.20                   | 1.82                  | 17.98             | 33.00                         | 46.00             | 13.00          | QP     |
| 384.05         | 15.96                   | 2.13                  | 6.24              | 24.33                         | 46.00             | 21.67          | QP     |
| 480.08         | 17.90                   | 2.63                  | 4.85              | 25.38                         | 46.00             | 20.62          | QP     |
| 924.34         | 24.04                   | 4.08                  | -1.98             | 26.14                         | 46.00             | 19.86          | QP     |
| 952.47         | 24.63                   | 4.57                  | -2.28             | 26.92                         | 46.00             | 19.08          | 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

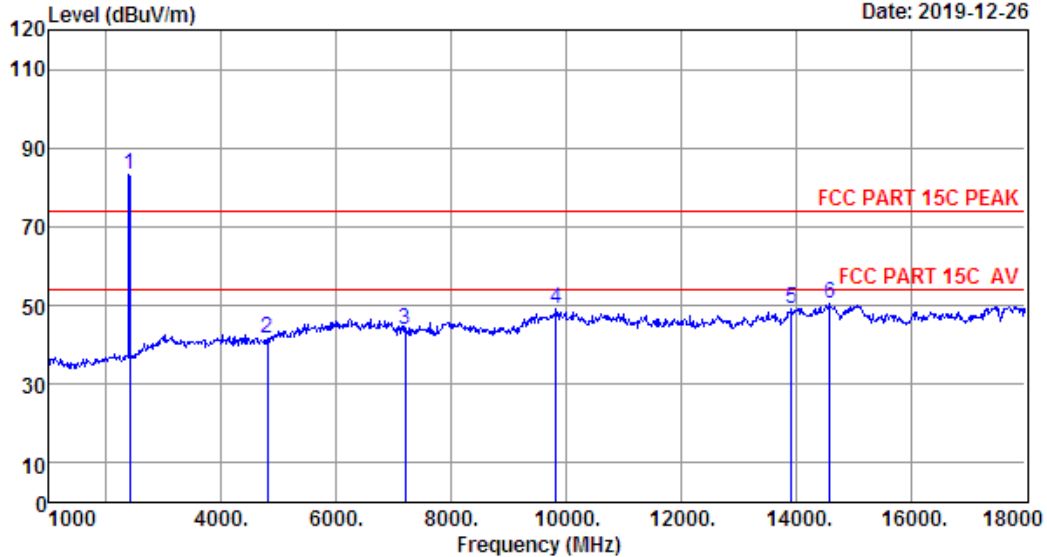
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Data: 29

File: \\Emc-966-1\test data\2019\RF\K\KYE\SP-HF 280 BT.EM6 (38)

Date: 2019-12-26



Site no. : 1# 966 Chamber Data no. : 29  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:25.4'; Humi:56%; Press:101.54kPa  
 Engineer : Boris  
 EUT : Multimedia Speaker  
 Power : DC 5V From Adapter Input AC 120V/60Hz  
 M/N : SP-HF280 BT  
 Test Mode : n/4-DQPSK TX 2402MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2402.00        | 27.26                    | 1.45                  | 34.64                 | 89.18             | 83.25                         | 74.00              | -9.25          | Peak   |
| 2 | 4804.00        | 31.12                    | 3.25                  | 34.66                 | 41.95             | 41.66                         | 74.00              | 32.34          | Peak   |
| 3 | 7206.00        | 36.21                    | 5.19                  | 34.82                 | 37.09             | 43.67                         | 74.00              | 30.33          | Peak   |
| 4 | 9823.00        | 38.56                    | 5.76                  | 34.23                 | 39.07             | 49.16                         | 74.00              | 24.84          | Peak   |
| 5 | 13920.00       | 40.96                    | 6.50                  | 34.31                 | 36.21             | 49.36                         | 74.00              | 24.64          | Peak   |
| 6 | 14600.00       | 40.98                    | 6.88                  | 34.48                 | 37.09             | 50.47                         | 74.00              | 23.53          | 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.

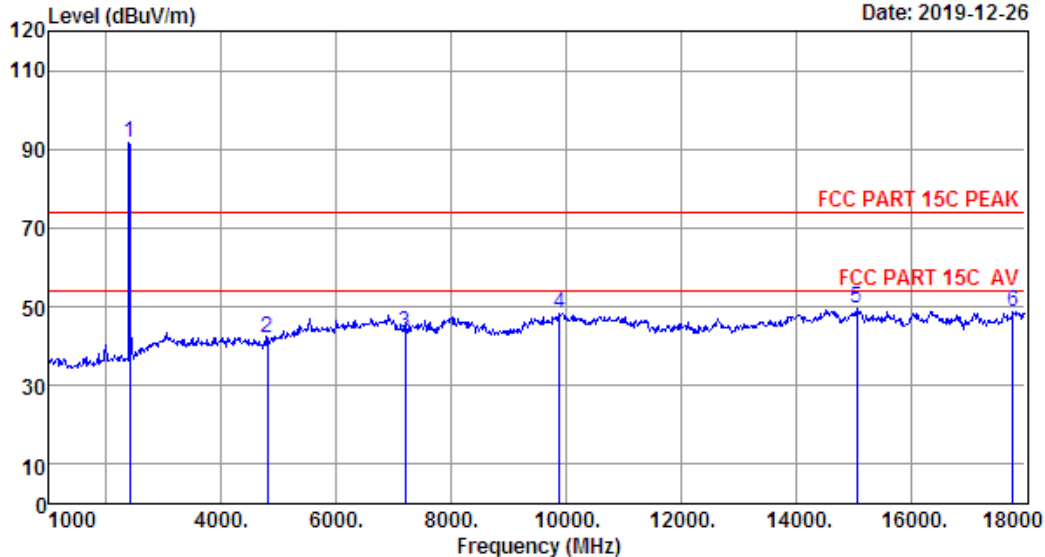
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Data: 30

File: \\Emc-966-1\\test data\\2019\\RF\\K\\KYE\\SP-HF 280 BT.EM6 (38)

Date: 2019-12-26



Site no. : 1# 966 Chamber Data no. : 30  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:25.4'; Humi:56%; Press:101.54kPa  
 Engineer : Boris  
 EUT : Multimedia Speaker  
 Power : DC 5V From Adapter Input AC 120V/60Hz  
 M/N : SP-HF280 BT  
 Test Mode : n/4-DQPSK TX 2402MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2402.00        | 27.26                    | 1.45                  | 34.64                 | 97.68             | 91.75                         | 74.00              | -17.75         | Peak   |
| 2 | 4804.00        | 31.12                    | 3.25                  | 34.66                 | 42.25             | 41.96                         | 74.00              | 32.04          | Peak   |
| 3 | 7206.00        | 36.21                    | 5.19                  | 34.82                 | 36.75             | 43.33                         | 74.00              | 30.67          | Peak   |
| 4 | 9891.00        | 38.69                    | 5.81                  | 34.22                 | 38.13             | 48.41                         | 74.00              | 25.59          | Peak   |
| 5 | 15059.00       | 40.84                    | 6.77                  | 34.58                 | 36.36             | 49.39                         | 74.00              | 24.61          | Peak   |
| 6 | 17779.00       | 47.14                    | 8.10                  | 34.32                 | 27.94             | 48.86                         | 74.00              | 25.14          | 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.

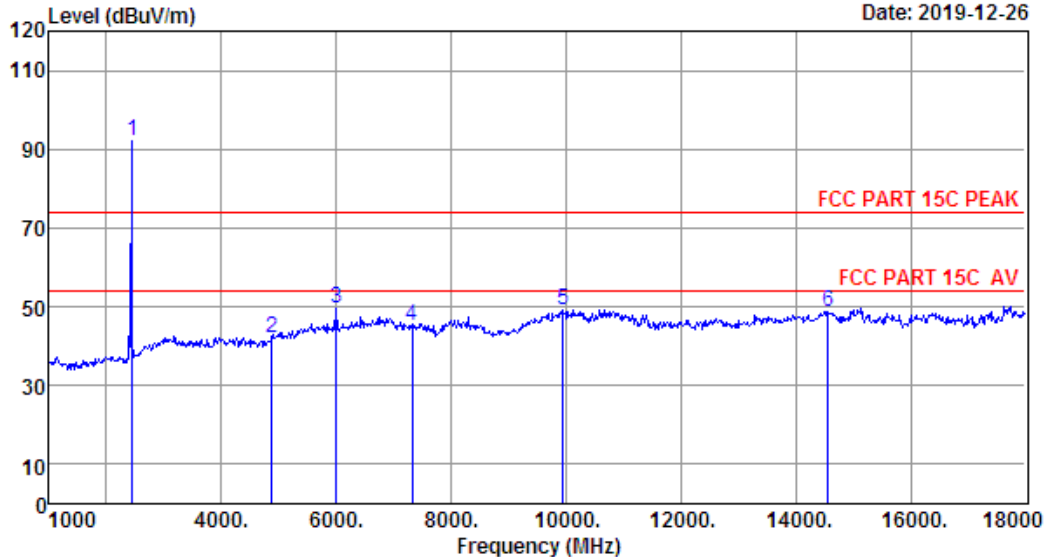
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Data: 33

File: \\Emc-966-1\\test data\\2019\\RF\\K\\KYE\\SP-HF 280 BT.EM6 (38)

Date: 2019-12-26



Site no. : 1# 966 Chamber Data no. : 33  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:25.4'; Humi:56%; Press:101.54kPa  
 Engineer : Boris  
 EUT : Multimedia Speaker  
 Power : DC 5V From Adapter Input AC 120V/60Hz  
 M/N : SP-HF280 BT  
 Test Mode : n/4-DQPSK TX 2441MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2441.00        | 27.33                    | 1.47                  | 34.62                 | 98.08             | 92.26                         | 74.00              | -18.26         | Peak   |
| 2 | 4882.00        | 31.37                    | 3.31                  | 34.68                 | 42.25             | 42.25                         | 74.00              | 31.75          | Peak   |
| 3 | 5998.00        | 32.80                    | 4.32                  | 34.30                 | 46.65             | 49.47                         | 74.00              | 24.53          | Peak   |
| 4 | 7323.00        | 36.46                    | 5.22                  | 34.83                 | 38.42             | 45.27                         | 74.00              | 28.73          | Peak   |
| 5 | 9942.00        | 38.80                    | 5.85                  | 34.21                 | 38.61             | 49.05                         | 74.00              | 24.95          | Peak   |
| 6 | 14566.00       | 40.99                    | 6.89                  | 34.47                 | 35.44             | 48.85                         | 74.00              | 25.15          | 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.

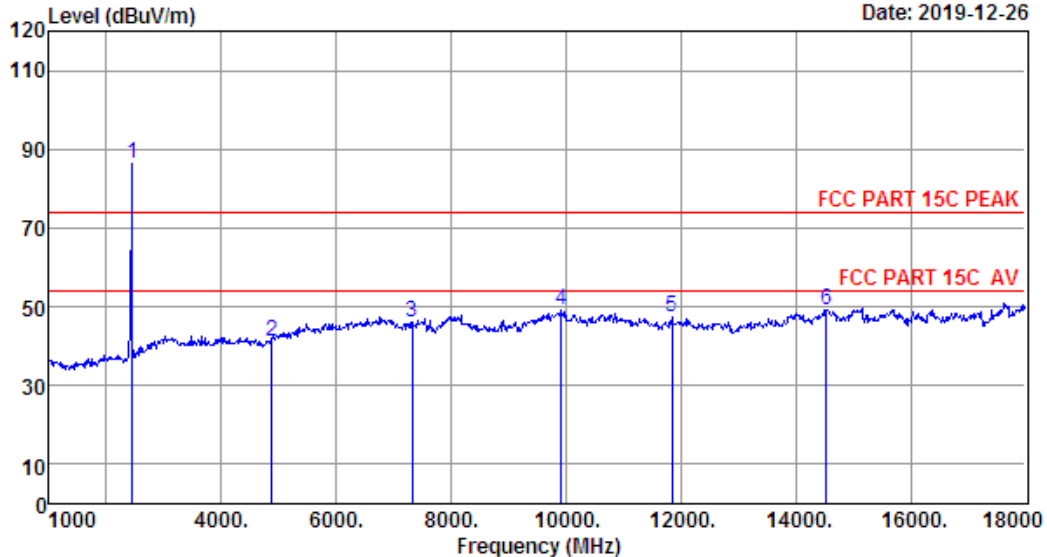
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Data: 34

File: \\Emc-966-1\\test data\\2019\\RF\\K\\KYE\\SP-HF 280 BT.EM6 (38)

Date: 2019-12-26



Site no. : 1# 966 Chamber Data no. : 34  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:25.4'; Humi:56%; Press:101.54kPa  
 Engineer : Boris  
 EUT : Multimedia Speaker  
 Power : DC 5V From Adapter Input AC 120V/60Hz  
 M/N : SP-HF280 BT  
 Test Mode : n/4-DQPSK TX 2441MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2441.00        | 27.33                    | 1.47                  | 34.62                 | 92.05             | 86.23                         | 74.00              | -12.23         | Peak   |
| 2 | 4882.00        | 31.37                    | 3.31                  | 34.68                 | 41.25             | 41.25                         | 74.00              | 32.75          | Peak   |
| 3 | 7323.00        | 36.46                    | 5.22                  | 34.83                 | 39.13             | 45.98                         | 74.00              | 28.02          | Peak   |
| 4 | 9925.00        | 38.76                    | 5.84                  | 34.21                 | 38.77             | 49.16                         | 74.00              | 24.84          | Peak   |
| 5 | 11846.00       | 39.90                    | 5.98                  | 34.75                 | 36.20             | 47.33                         | 74.00              | 26.67          | Peak   |
| 6 | 14532.00       | 40.99                    | 6.89                  | 34.46                 | 35.94             | 49.36                         | 74.00              | 24.64          | 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.

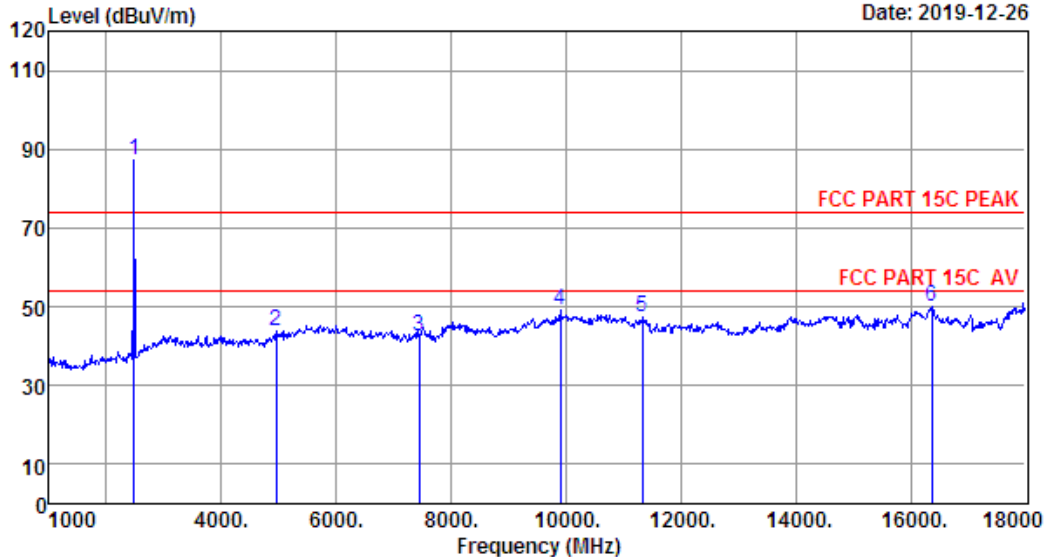
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Data: 35

File: \\Emc-966-1\\test data\\2019\\RF\\K\\KYE\\SP-HF 280 BT.EM6 (38)

Date: 2019-12-26



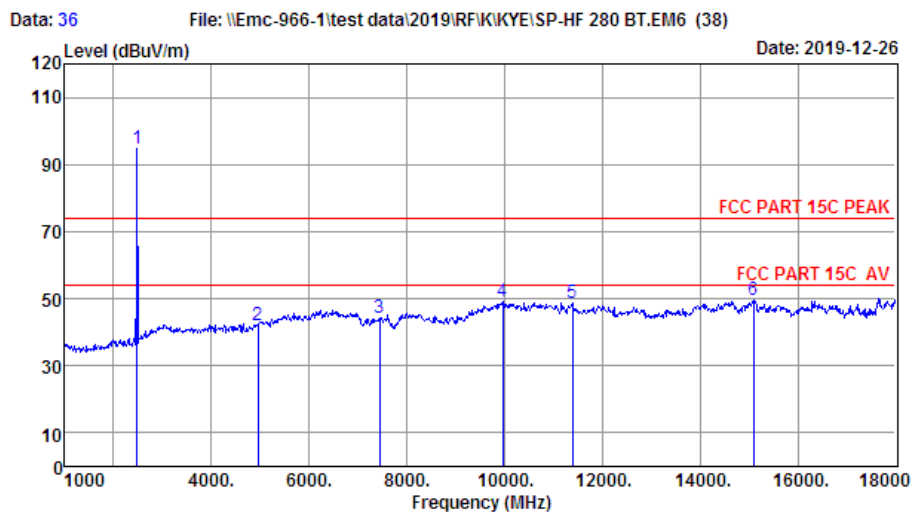
Site no. : 1# 966 Chamber Data no. : 35  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:25.4'; Humi:56%; Press:101.54kPa  
 Engineer : Boris  
 EUT : Multimedia Speaker  
 Power : DC 5V From Adapter Input AC 120V/60Hz  
 M/N : SP-HF280 BT  
 Test Mode : n/4-DQPSK TX 2480MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2480.00        | 27.38                    | 1.48                  | 34.61                 | 92.88             | 87.13                         | 74.00              | -13.13         | Peak   |
| 2 | 4960.00        | 31.68                    | 3.38                  | 34.69                 | 43.30             | 43.67                         | 74.00              | 30.33          | Peak   |
| 3 | 7440.00        | 36.70                    | 5.26                  | 34.84                 | 35.17             | 42.29                         | 74.00              | 31.71          | Peak   |
| 4 | 9908.00        | 38.73                    | 5.82                  | 34.22                 | 38.79             | 49.12                         | 74.00              | 24.88          | Peak   |
| 5 | 11336.00       | 39.90                    | 6.14                  | 34.60                 | 36.02             | 47.46                         | 74.00              | 26.54          | Peak   |
| 6 | 16368.00       | 40.21                    | 7.06                  | 34.27                 | 37.04             | 50.04                         | 74.00              | 23.96          | 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. : 36  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:25.4';Humi:56%;Press:101.54kPa  
 Engineer : Boris  
 EUT : Multimedia Speaker  
 Power : DC 5V From Adapter Input AC 120V/60Hz  
 M/N : SP-HF280 BT  
 Test Mode : n/4-DQPSK TX 2480MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2480.00        | 27.38                    | 1.48                  | 34.61                 | 100.61            | 94.86                         | 74.00              | -20.86         | Peak   |
| 2 | 4960.00        | 31.68                    | 3.38                  | 34.69                 | 41.77             | 42.14                         | 74.00              | 31.86          | Peak   |
| 3 | 7440.00        | 36.70                    | 5.26                  | 34.84                 | 36.96             | 44.08                         | 74.00              | 29.92          | Peak   |
| 4 | 9959.00        | 38.83                    | 5.86                  | 34.21                 | 38.53             | 49.01                         | 74.00              | 24.99          | Peak   |
| 5 | 11387.00       | 39.90                    | 6.14                  | 34.62                 | 37.47             | 48.89                         | 74.00              | 25.11          | Peak   |
| 6 | 15093.00       | 40.81                    | 6.74                  | 34.57                 | 36.42             | 49.40                         | 74.00              | 24.60          | 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

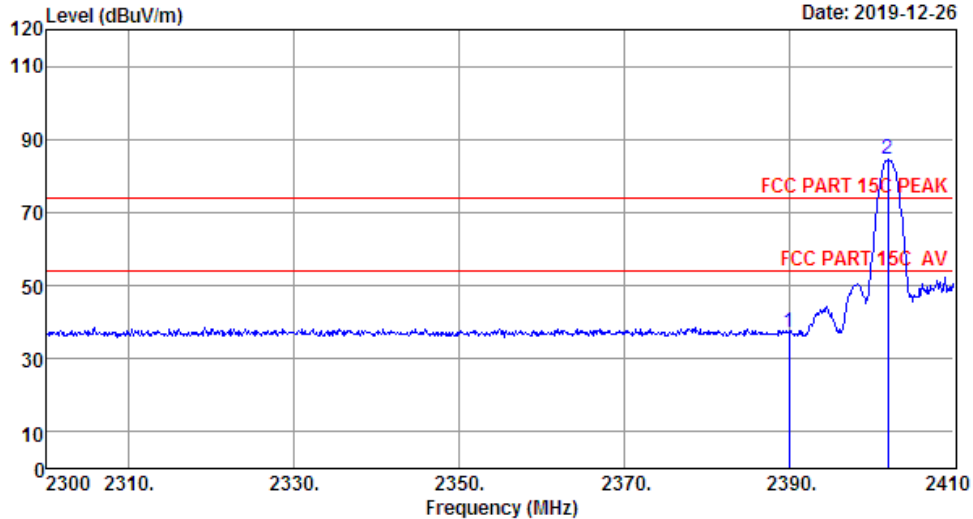
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Data: 31

File: \\Emc-966-1\test data\2019\RF\K\KYE\SP-HF 280 BT.EM6 (38)

Date: 2019-12-26



Site no. : 1# 966 Chamber Data no. : 31  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:25.4';Humi:56%;Press:101.54kPa  
 Engineer : Boris  
 EUT : Multimedia Speaker  
 Power : DC 5V From Adapter Input AC 120V/60Hz  
 M/N : SP-HF280 BT  
 Test Mode : n/4-DQPSK TX 2402MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2390.00        | 27.26                    | 1.45                  | 34.64                 | 42.97             | 37.04                         | 74.00              | 36.96          | Peak   |
| 2 | 2401.97        | 27.26                    | 1.45                  | 34.64                 | 90.29             | 84.36                         | 74.00              | -10.36         | 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.

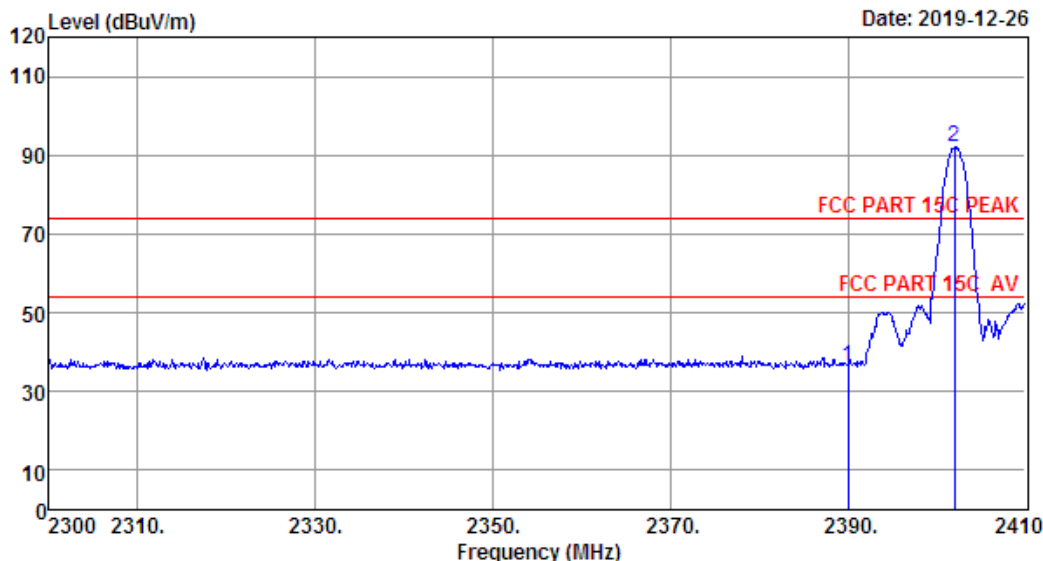
## EST Technology

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Data: 32

File: \\Emc-966-1\\test data\\2019\\RF\\K\\KYE\\SP-HF 280 BT.EM6 (38)

Date: 2019-12-26



Site no. : 1# 966 Chamber Data no. : 32  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:25.4'; Humi:56%; Press:101.54kPa  
 Engineer : Boris  
 EUT : Multimedia Speaker  
 Power : DC 5V From Adapter Input AC 120V/60Hz  
 M/N : SP-HF280 BT  
 Test Mode : m/4-DQPSK TX 2402MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2390.00        | 27.26                    | 1.45                  | 34.64                 | 42.33             | 36.40                         | 74.00              | 37.60          | Peak   |
| 2 | 2401.97        | 27.26                    | 1.45                  | 34.64                 | 97.94             | 92.01                         | 74.00              | -18.01         | 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.

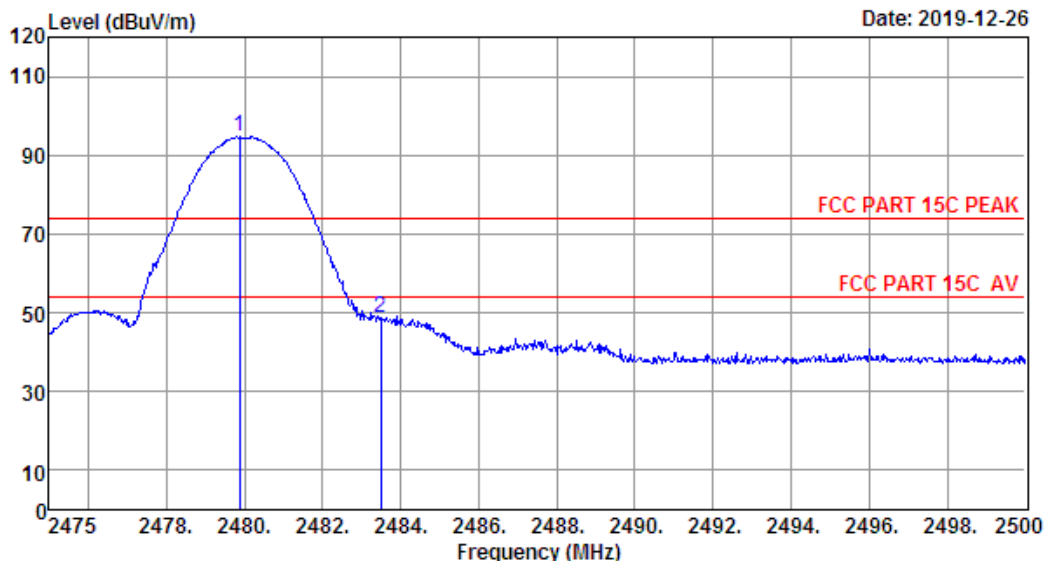
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Data: 37

File: \\Emc-966-1\\test data\\2019\\RF\\K\\KYE\\SP-HF 280 BT.EM6 (38)

Date: 2019-12-26



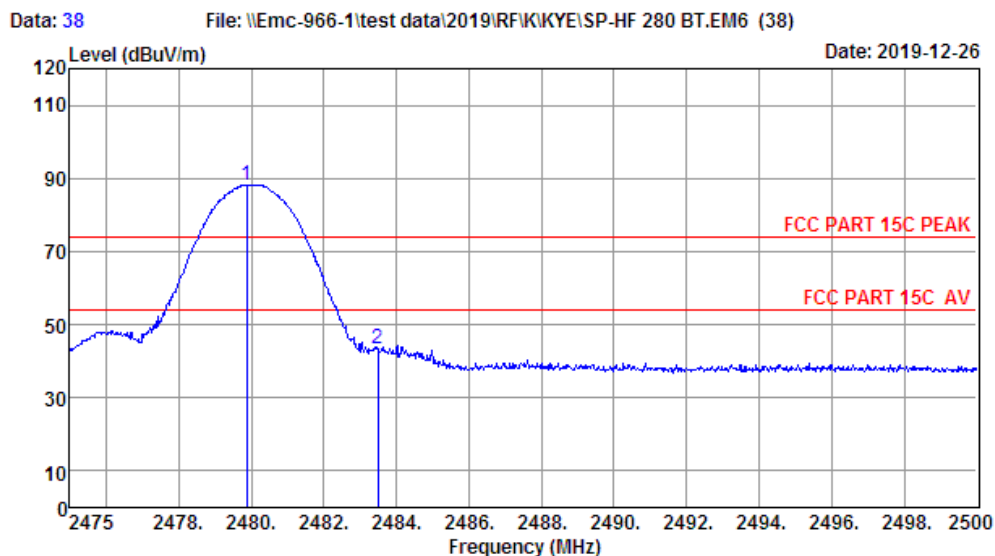
Site no. : 1# 966 Chamber Data no. : 37  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:27.3';Humi:54%;Press:101.52kPa  
 Engineer : Boris  
 EUT : Multimedia Speaker  
 Power : DC 5V From Adapter Input AC 120V/60Hz  
 M/N : SP-HF280 BT  
 Test Mode : m/4-DQPSK TX 2480MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2479.88        | 27.38                    | 1.48                  | 34.61                 | 100.40            | 94.65                         | 74.00              | -20.65         | Peak   |
| 2 | 2483.50        | 27.38                    | 1.48                  | 34.61                 | 54.57             | 48.82                         | 74.00              | 25.18          | 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. : 38  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:27.3';Humi:54%;Press:101.52kPa  
 Engineer : Boris  
 EUT : Multimedia Speaker  
 Power : DC 5V From Adapter Input AC 120V/60Hz  
 M/N : SP-HF280 BT  
 Test Mode : n/4-DQPSK TX 2480MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2479.88        | 27.38                    | 1.48                  | 34.61                 | 93.92             | 88.17                         | 74.00              | -14.17         | Peak   |
| 2 | 2483.50        | 27.38                    | 1.48                  | 34.61                 | 49.04             | 43.29                         | 74.00              | 30.71          | 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

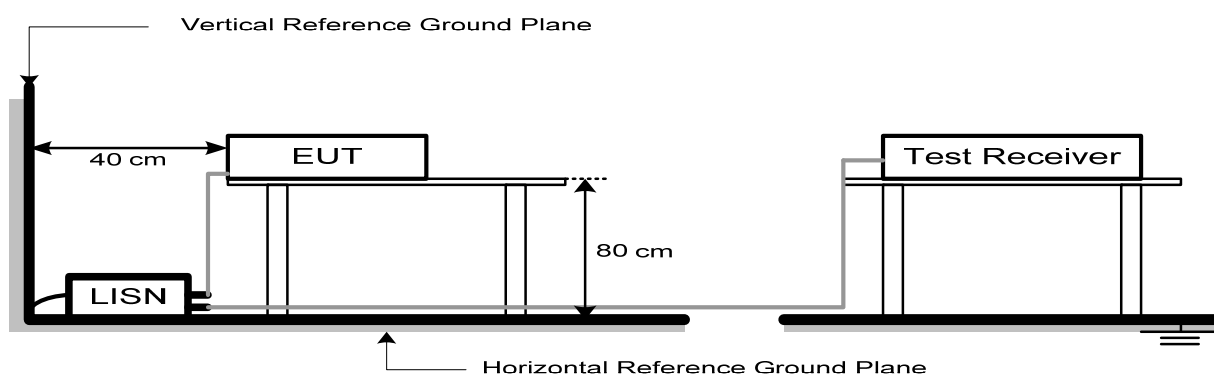
### 11.1. Limit

| Frequency |   |        | Maximum RF Line Voltage          |                               |
|-----------|---|--------|----------------------------------|-------------------------------|
|           |   |        | Quasi-Peak Level<br>dB( $\mu$ V) | Average Level<br>dB( $\mu$ V) |
| 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 |

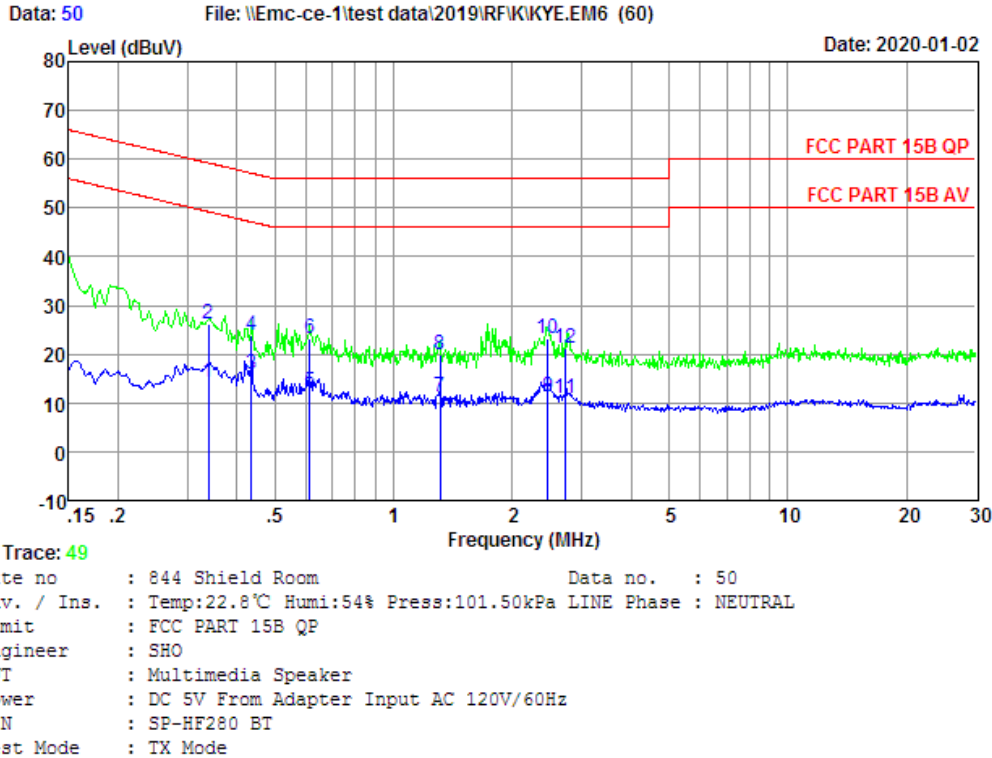
### 11.4. Test Procedure

- a. The EUT was placed on a non-metallic table, 80cm above the ground plane.
- b. The EUT Power connected to the power mains through a line impedance stabilization network.
- c. 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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|    | Freq.<br>(MHz) | LISN<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV) | Limits<br>(dBuV) | Margin<br>(dB) | Remark  |
|----|----------------|------------------------|-----------------------|-------------------|-----------------------------|------------------|----------------|---------|
| 1  | 0.339          | 9.67                   | 0.05                  | 4.58              | 14.30                       | 49.22            | 34.92          | Average |
| 2  | 0.339          | 9.67                   | 0.05                  | 16.44             | 26.16                       | 59.22            | 33.06          | QP      |
| 3  | 0.435          | 9.69                   | 0.05                  | 6.22              | 15.96                       | 47.15            | 31.19          | Average |
| 4  | 0.435          | 9.69                   | 0.05                  | 14.12             | 23.86                       | 57.15            | 33.29          | QP      |
| 5  | 0.614          | 9.71                   | 0.05                  | 2.42              | 12.18                       | 46.00            | 33.82          | Average |
| 6  | 0.614          | 9.71                   | 0.05                  | 13.34             | 23.10                       | 56.00            | 32.90          | QP      |
| 7  | 1.310          | 9.77                   | 0.06                  | 1.29              | 11.12                       | 46.00            | 34.88          | Average |
| 8  | 1.310          | 9.77                   | 0.06                  | 10.11             | 19.94                       | 56.00            | 36.06          | QP      |
| 9  | 2.461          | 9.85                   | 0.07                  | 1.42              | 11.34                       | 46.00            | 34.66          | Average |
| 10 | 2.461          | 9.85                   | 0.07                  | 13.23             | 23.15                       | 56.00            | 32.85          | QP      |
| 11 | 2.736          | 9.88                   | 0.07                  | 1.12              | 11.07                       | 46.00            | 34.93          | Average |
| 12 | 2.736          | 9.88                   | 0.07                  | 11.11             | 21.06                       | 56.00            | 34.94          | QP      |

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

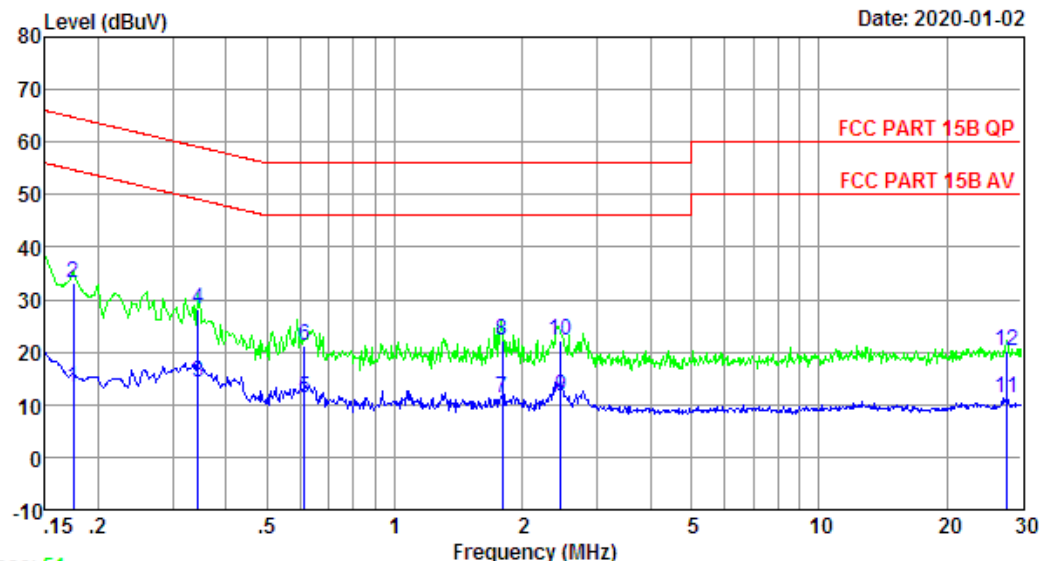
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Data: 52

File: \\Emc-ce-1\\test data\\2019\\RF\\K\\KYE.EM6 (60)

Date: 2020-01-02



Trace: 51

Site no : 844 Shield Room Data no. : 52  
 Env. / Ins. : Temp:22.8°C Humi:54% Press:101.50kPa LINE Phase : LINE  
 Limit : FCC PART 15B QP  
 Engineer : SHO  
 EUT : Multimedia Speaker  
 Power : DC 5V From Adapter Input AC 120V/60Hz  
 M/N : SP-HF280 BT  
 Test Mode : TX Mode

|    | Freq.<br>(MHz) | LISN<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV) | Limits<br>(dBuV) | Margin<br>(dB) | Remark  |
|----|----------------|------------------------|-----------------------|-------------------|-----------------------------|------------------|----------------|---------|
| 1  | 0.175          | 9.69                   | 0.04                  | 3.38              | 13.11                       | 54.72            | 41.61          | Average |
| 2  | 0.175          | 9.69                   | 0.04                  | 23.31             | 33.04                       | 64.72            | 31.68          | QP      |
| 3  | 0.345          | 9.74                   | 0.05                  | 4.60              | 14.39                       | 49.09            | 34.70          | Average |
| 4  | 0.345          | 9.74                   | 0.05                  | 18.45             | 28.24                       | 59.09            | 30.85          | QP      |
| 5  | 0.614          | 9.81                   | 0.05                  | 1.41              | 11.27                       | 46.00            | 34.73          | Average |
| 6  | 0.614          | 9.81                   | 0.05                  | 11.35             | 21.21                       | 56.00            | 34.79          | QP      |
| 7  | 1.790          | 9.85                   | 0.06                  | 1.27              | 11.18                       | 46.00            | 34.82          | Average |
| 8  | 1.790          | 9.85                   | 0.06                  | 12.15             | 22.06                       | 56.00            | 33.94          | QP      |
| 9  | 2.461          | 9.86                   | 0.07                  | 1.75              | 11.68                       | 46.00            | 34.32          | Average |
| 10 | 2.461          | 9.86                   | 0.07                  | 12.24             | 22.17                       | 56.00            | 33.83          | QP      |
| 11 | 27.708         | 10.04                  | 0.09                  | 1.25              | 11.38                       | 50.00            | 38.62          | Average |
| 12 | 27.708         | 10.04                  | 0.09                  | 10.14             | 20.27                       | 60.00            | 39.73          | QP      |

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

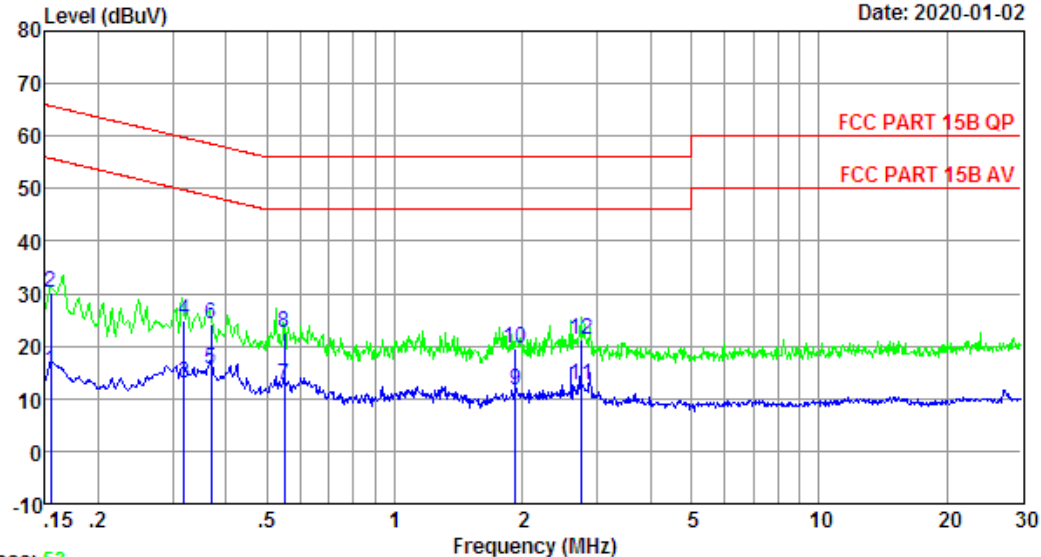
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Data: 54

File: \\Emc-ce-1\test data\2019\RF\K\KYE.EM6 (60)

Date: 2020-01-02



Trace: 53

Site no : 844 Shield Room Data no. : 54  
 Env. / Ins. : Temp:22.8°C Humi:54% Press:101.50kPa LINE Phase : LINE  
 Limit : FCC PART 15B QP  
 Engineer : SHO  
 EUT : Multimedia Speaker  
 Power : DC 5V From Adapter Input AC 240V/50Hz  
 M/N : SP-HF280 BT  
 Test Mode : TX Mode

|    | Freq.<br>(MHz) | LISN<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV) | Limits<br>(dBuV) | Margin<br>(dB) | Remark  |
|----|----------------|------------------------|-----------------------|-------------------|-----------------------------|------------------|----------------|---------|
| 1  | 0.155          | 9.68                   | 0.04                  | 5.48              | 15.20                       | 55.74            | 40.54          | Average |
| 2  | 0.155          | 9.68                   | 0.04                  | 20.34             | 30.06                       | 65.74            | 35.68          | QP      |
| 3  | 0.318          | 9.73                   | 0.05                  | 3.00              | 12.78                       | 49.75            | 36.97          | Average |
| 4  | 0.318          | 9.73                   | 0.05                  | 15.00             | 24.78                       | 59.75            | 34.97          | QP      |
| 5  | 0.369          | 9.75                   | 0.05                  | 5.65              | 15.45                       | 48.52            | 33.07          | Average |
| 6  | 0.369          | 9.75                   | 0.05                  | 14.46             | 24.26                       | 58.52            | 34.26          | QP      |
| 7  | 0.549          | 9.80                   | 0.05                  | 2.71              | 12.56                       | 46.00            | 33.44          | Average |
| 8  | 0.549          | 9.80                   | 0.05                  | 12.56             | 22.41                       | 56.00            | 33.59          | QP      |
| 9  | 1.928          | 9.84                   | 0.06                  | 1.74              | 11.64                       | 46.00            | 34.36          | Average |
| 10 | 1.928          | 9.84                   | 0.06                  | 9.57              | 19.47                       | 56.00            | 36.53          | QP      |
| 11 | 2.750          | 9.87                   | 0.07                  | 2.71              | 12.65                       | 46.00            | 33.35          | Average |
| 12 | 2.750          | 9.87                   | 0.07                  | 11.16             | 21.10                       | 56.00            | 34.90          | QP      |

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



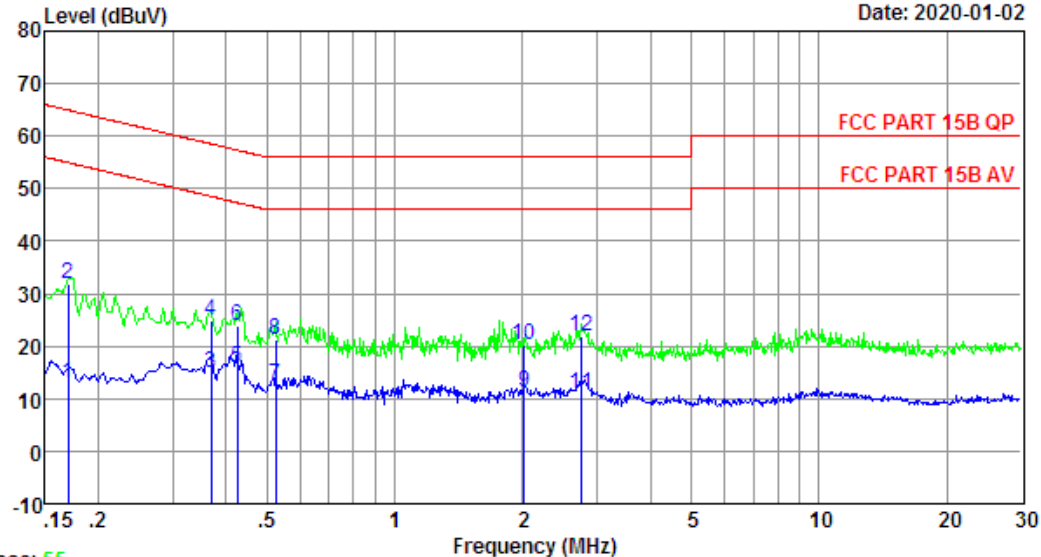
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Data: 56

File: \\Emc-ce-1\\test data\\2019\\RF\\K\\KYE.EM6 (60)

Date: 2020-01-02



Trace: 55

Site no : 844 Shield Room Data no. : 56  
 Env. / Ins. : Temp:22.8°C Humi:54% Press:101.50kPa LINE Phase : NEUTRAL  
 Limit : FCC PART 15B QP  
 Engineer : SHO  
 EUT : Multimedia Speaker  
 Power : DC 5V From Adapter Input AC 240V/50Hz  
 M/N : SP-HF280 BT  
 Test Mode : TX Mode

|    | Freq.<br>(MHz) | LISN<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV) | Limits<br>(dBuV) | Margin<br>(dB) | Remark  |
|----|----------------|------------------------|-----------------------|-------------------|-----------------------------|------------------|----------------|---------|
| 1  | 0.170          | 9.64                   | 0.04                  | 3.19              | 12.87                       | 54.94            | 42.07          | Average |
| 2  | 0.170          | 9.64                   | 0.04                  | 22.13             | 31.81                       | 64.94            | 33.13          | QP      |
| 3  | 0.369          | 9.67                   | 0.05                  | 5.19              | 14.91                       | 48.52            | 33.61          | Average |
| 4  | 0.369          | 9.67                   | 0.05                  | 15.05             | 24.77                       | 58.52            | 33.75          | QP      |
| 5  | 0.426          | 9.69                   | 0.05                  | 6.04              | 15.78                       | 47.33            | 31.55          | Average |
| 6  | 0.426          | 9.69                   | 0.05                  | 14.02             | 23.76                       | 57.33            | 33.57          | QP      |
| 7  | 0.524          | 9.70                   | 0.05                  | 2.94              | 12.69                       | 46.00            | 33.31          | Average |
| 8  | 0.524          | 9.70                   | 0.05                  | 11.47             | 21.22                       | 56.00            | 34.78          | QP      |
| 9  | 2.023          | 9.79                   | 0.06                  | 1.55              | 11.40                       | 46.00            | 34.60          | Average |
| 10 | 2.023          | 9.79                   | 0.06                  | 10.35             | 20.20                       | 56.00            | 35.80          | QP      |
| 11 | 2.750          | 9.88                   | 0.07                  | 1.09              | 11.04                       | 46.00            | 34.96          | Average |
| 12 | 2.750          | 9.88                   | 0.07                  | 12.01             | 21.96                       | 56.00            | 34.04          | QP      |

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.  
 2. Margin=Limit - Emission Level.  
 3. If the average limit is met when using 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

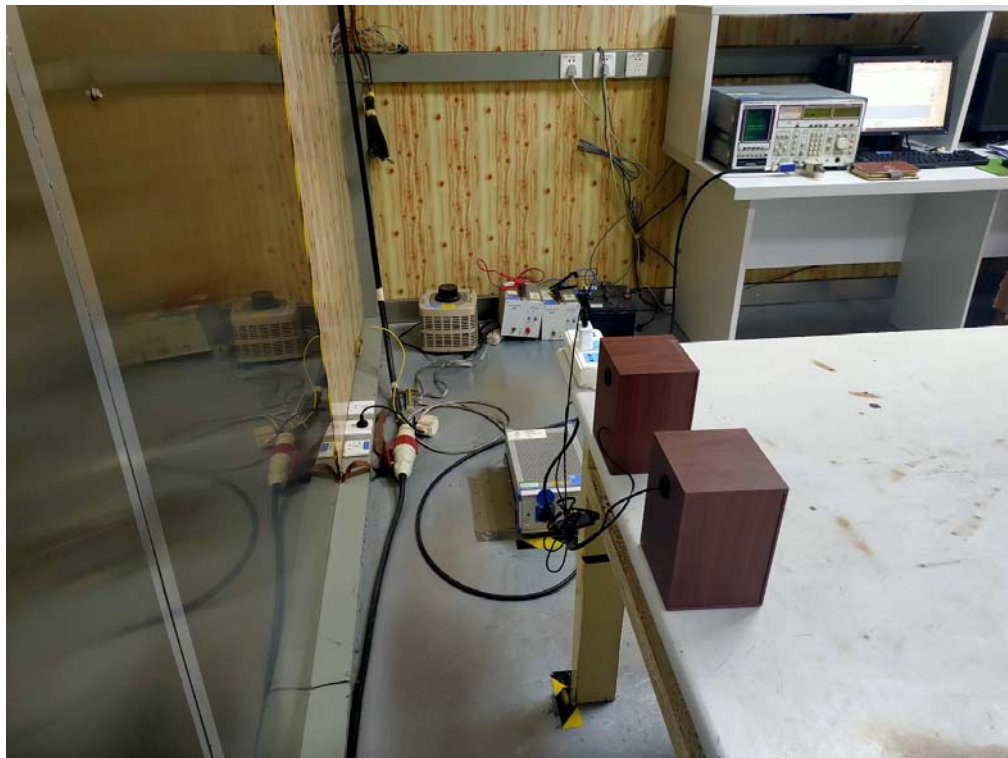
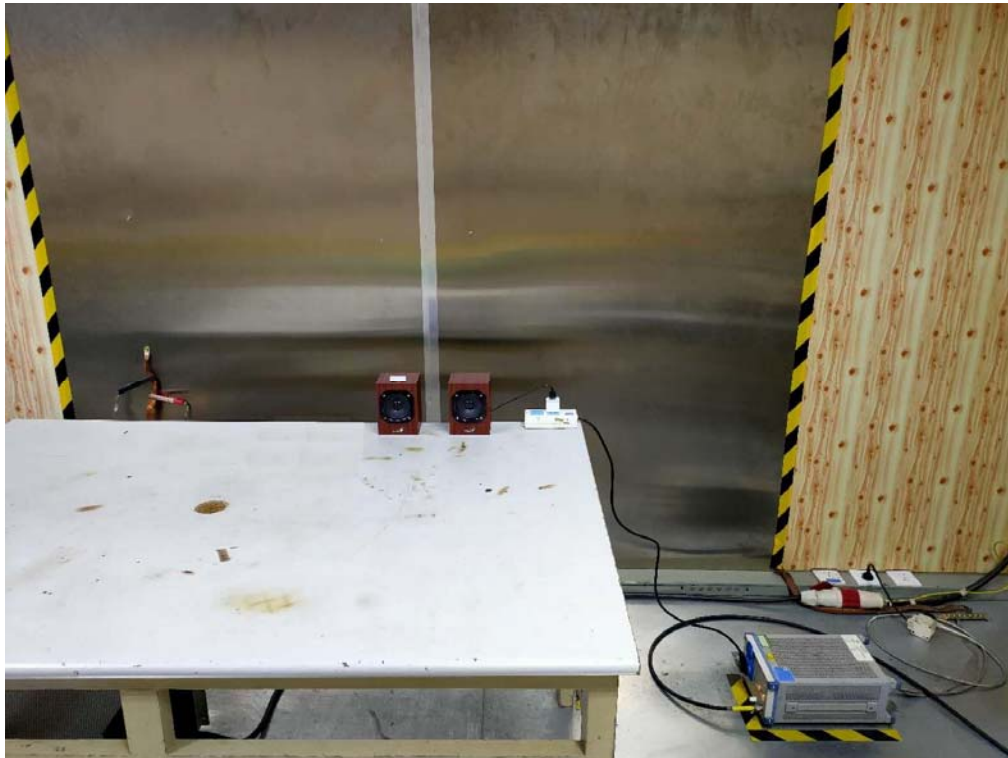
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply 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

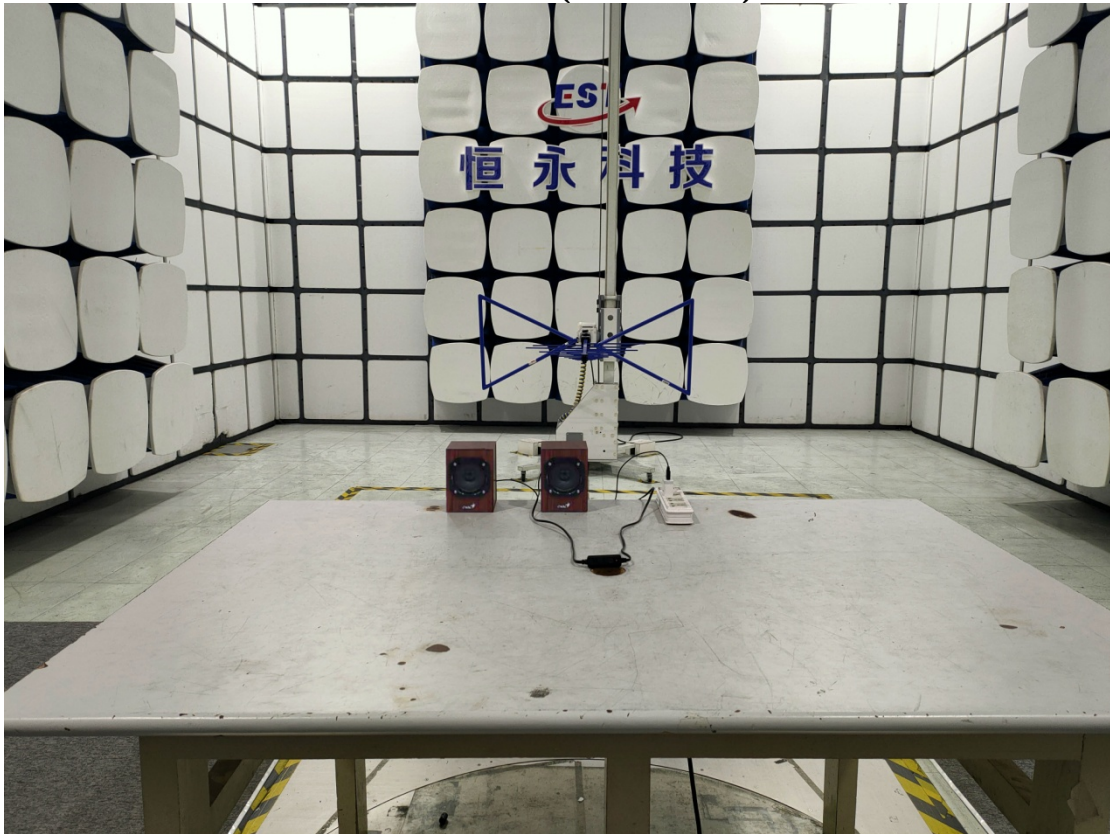
The antennas used for this product is Internal antenna so compliance with antenna requirements.  
( Please refer to the EUT photo for details)

## 13. TEST SETUP PHOTO

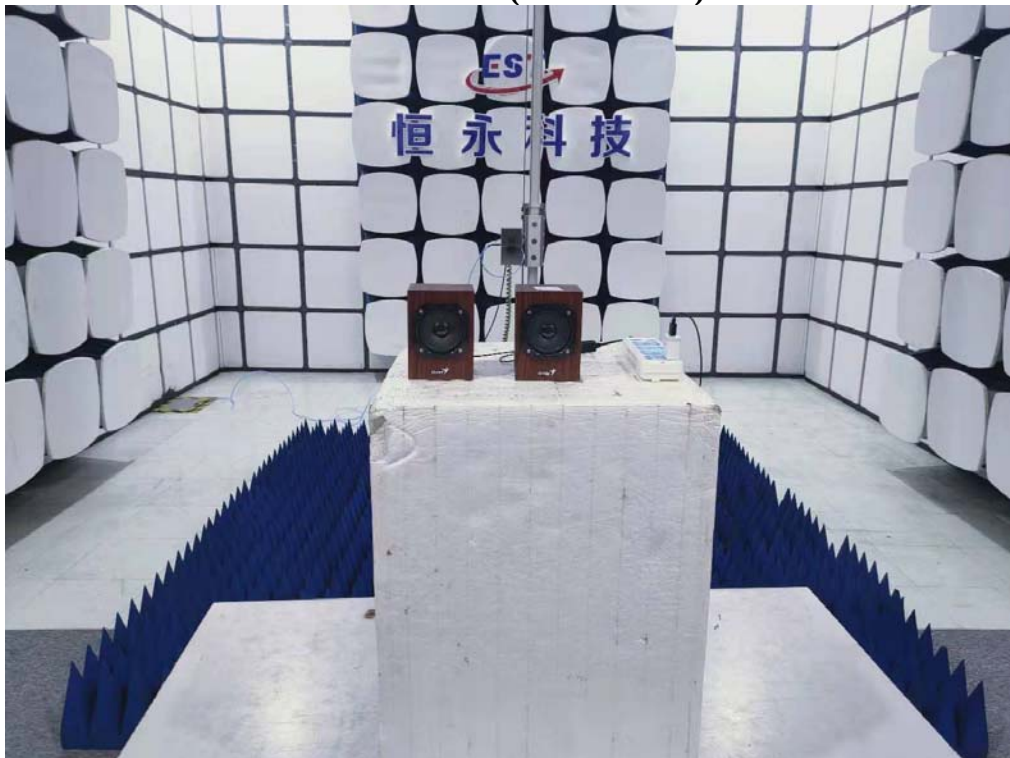
Conducted Test



**Radiated Test (Below 1GHz)**



**Radiated Test (Above 1GHz)**



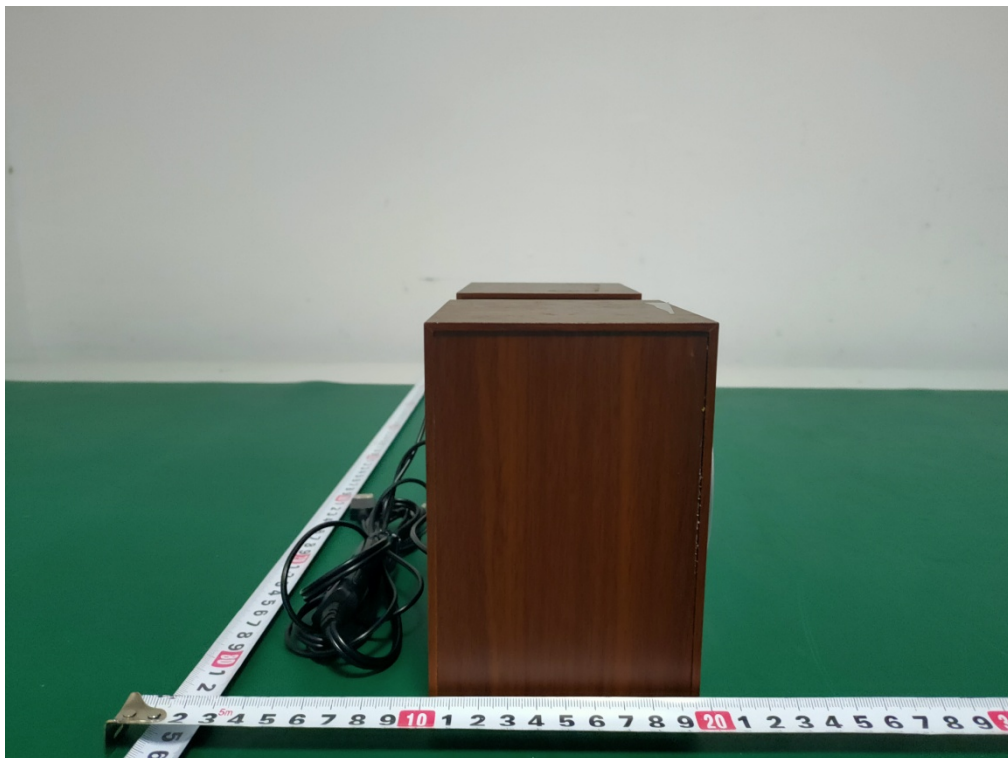
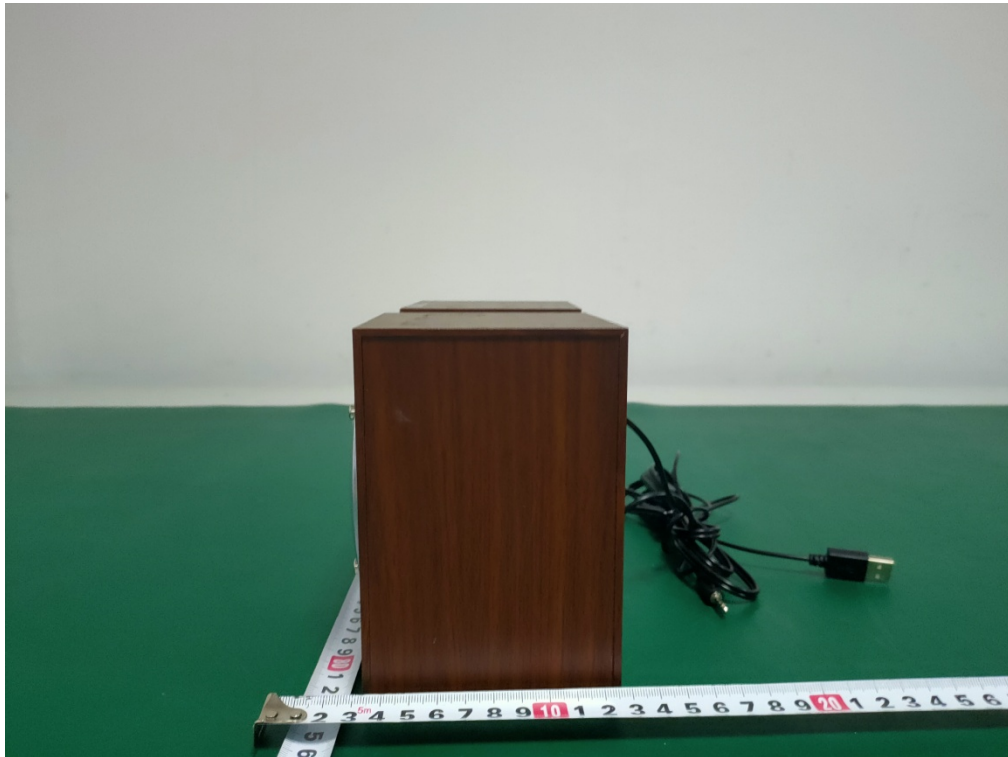


## 14. EUT PHOTO

**External Photos**  
M/N: SP-HF280 BT



**External Photos**  
M/N: SP-HF280 BT



**External Photos**  
M/N: SP-HF280 BT





**External Photos**  
M/N: SP-HF280 BT

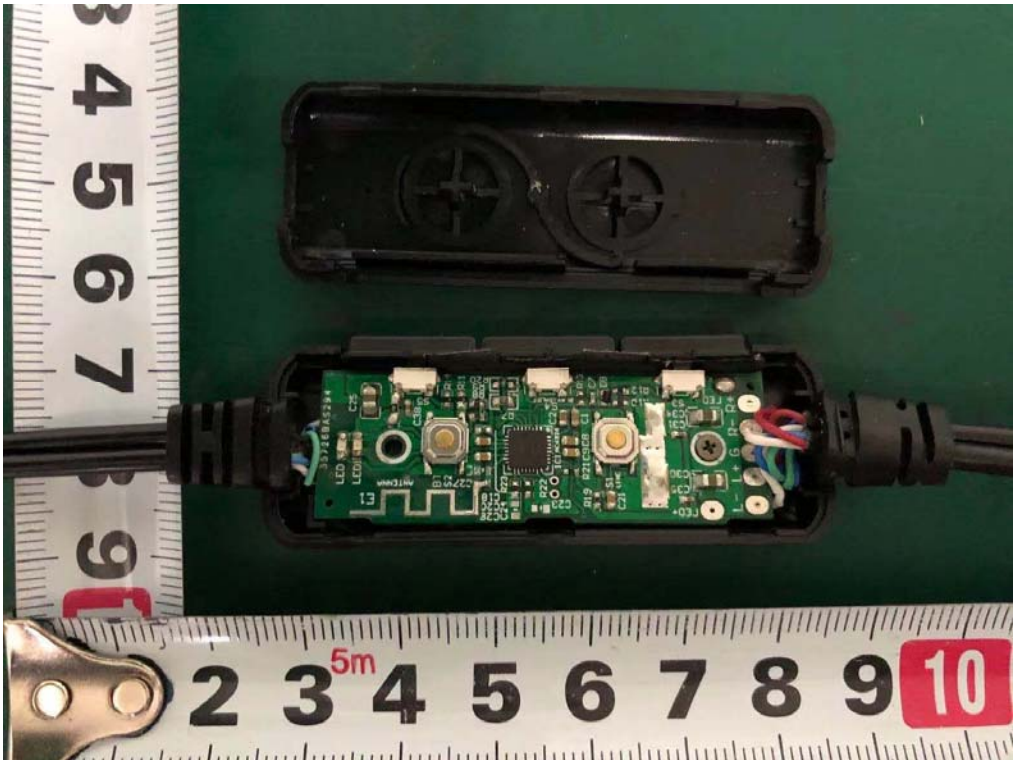




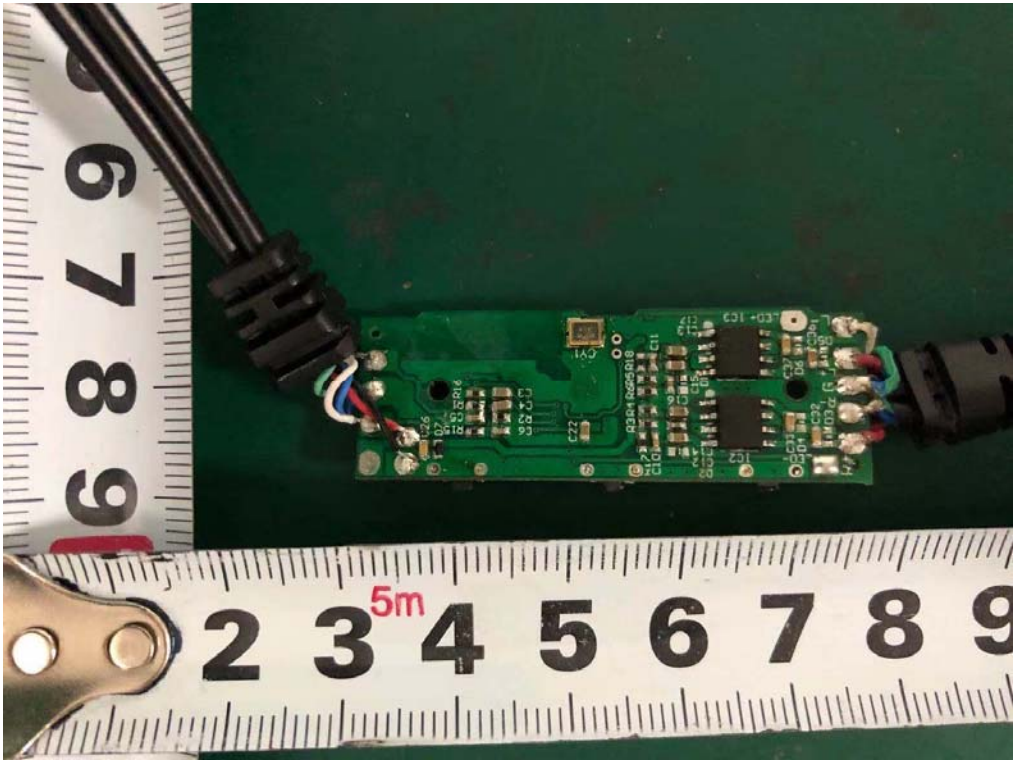
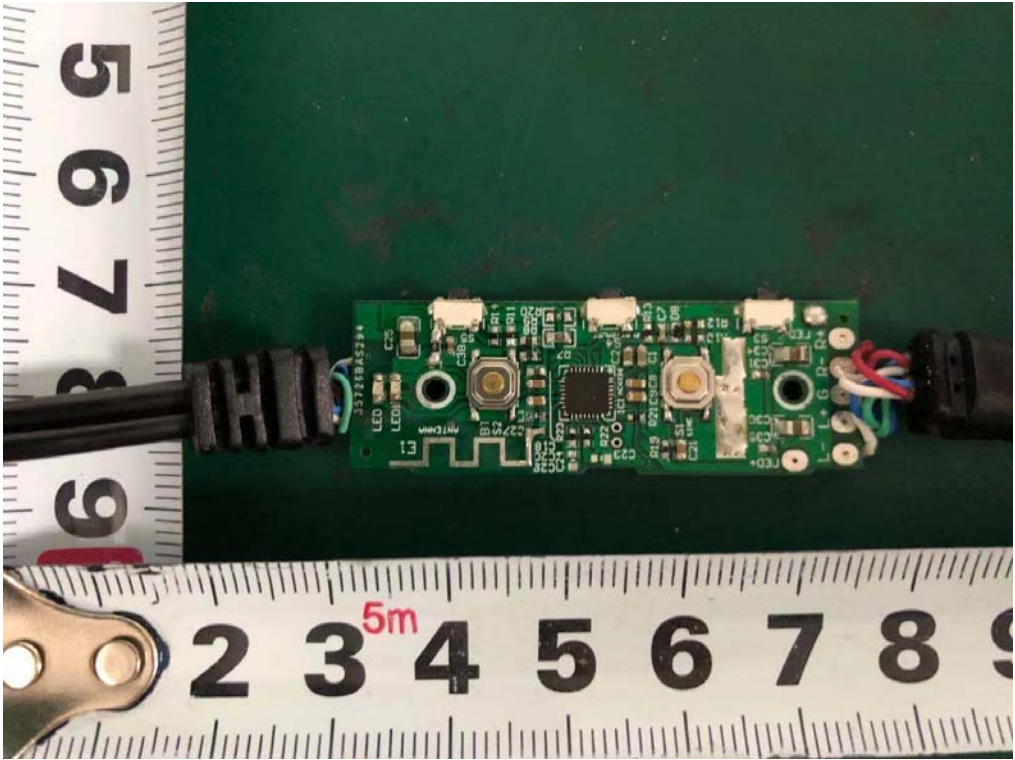
**External Photos**  
M/N: SP-HF280 BT



Internal Photos  
M/N: SP-HF280 BT

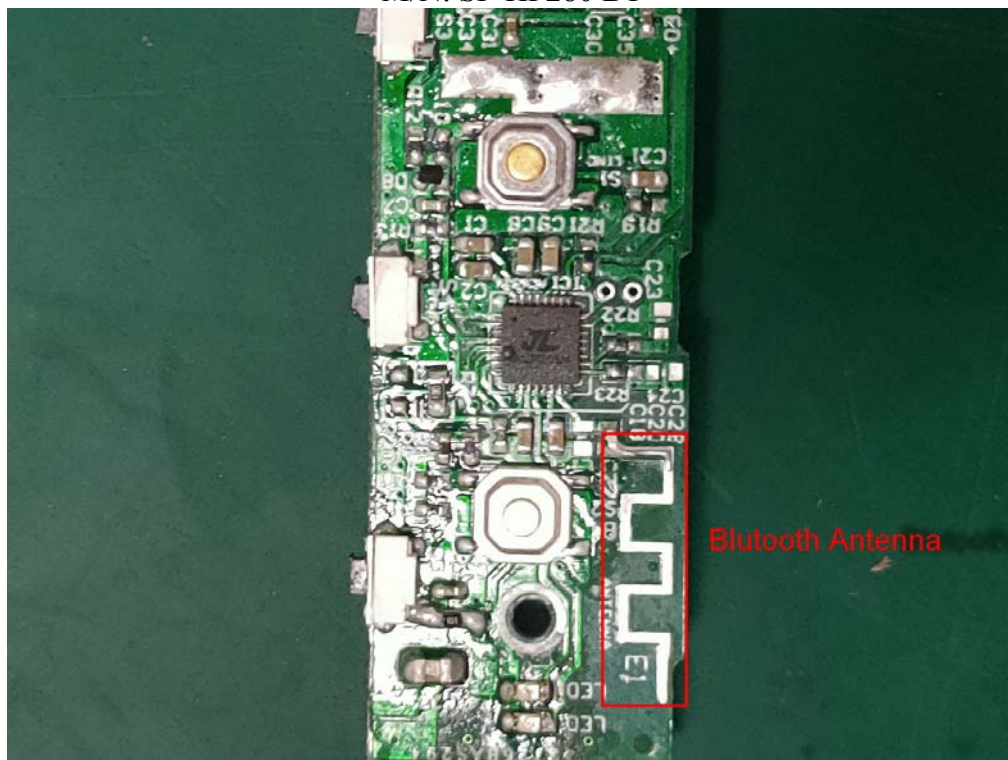


Internal Photos  
M/N: SP-HF280 BT





**Internal Photos**  
M/N: SP-HF280 BT



**End of Test Report**