

FCC TEST REPORT

For

Tablet

Model Number: ilium PAD E7 3G

FCC ID: ZC4E7

Report Number : WT138003307

Test Laboratory : Shenzhen Academy of Metrology and Quality
Inspection
National Digital Electronic Product Testing Center
Site Location : No.4 Tongfa Road, Xili Town, Nanshan District,
Shenzhen, Guangdong, China
Tel : 0086-755-86928965
Fax : 0086-755-86009898-31396
Web : www.smq.com.cn

Test report declaration

Applicant : : Corporativo LANIX S.A de C.V.
Address : : Carretera International a Nogales Km8.5, Colonia: SAN LUIS
Hermosillo , Sonora , C.P. 83160 Mexico
Manufacturer : : Shenzhen Skyworth Wireless Technology Limited
Address : : Unit3A01, Block A Skyworth Building, Gaoxin Ave.1.S.,
Nanshan District, Shenzhen, China.
EUT : : Tablet
Description : :
Model No : : ilium PAD E7 3G
Trade mark : : /
Serial Number : : /
FCC ID : : ZC4E7

Test Standards:

FCC Part 15 15.207, 15.209, 15.247(2012)

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with FCC Rules Part 15.207, 15.209 and 15.247.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.


| | | | |
|-------------------|--|-------|--------------------|
| Project Engineer: |  (Liu Zheng) | Date: | <u>Oct.30,2013</u> |
| Checked by: |  (Chen QiChun) | Date: | <u>Oct.30,2013</u> |
| Approved by: |  (Lin Bin) | Date: | <u>Oct.30,2013</u> |

TABLE OF CONTENTS

| | |
|--|-----------|
| TEST REPORT DECLARATION..... | 2 |
| 1. TEST RESULTS SUMMARY..... | 6 |
| 2. GENERAL INFORMATION..... | 7 |
| 2.1. Report information..... | 7 |
| 2.2. Laboratory Accreditation and Relationship to Customer | 7 |
| 2.3. Measurement Uncertainty..... | 8 |
| 3. PRODUCT DESCRIPTION..... | 9 |
| 3.1. EUT Description | 9 |
| 3.2. Related Submittal(s) / Grant (s) | 9 |
| 3.3. Block Diagram of EUT Configuration | 9 |
| 3.4. Operating Condition of EUT | 10 |
| 3.5. Support Equipment List..... | 10 |
| 3.6. Test Conditions..... | 10 |
| 3.7. Special Accessories..... | 10 |
| 3.8. Equipment Modifications | 10 |
| 4. TEST EQUIPMENT USED..... | 11 |
| 5. CONDUCTED DISTURBANCE TEST | 12 |
| 5.1. Test Standard and Limit..... | 12 |
| 5.2. Test Procedure | 12 |
| 5.3. Test Arrangement | 12 |
| 5.4. Test Data | 13 |
| 6. RADIATED DISTURBANCE TEST | 15 |
| 6.1. Test Standard and Limit..... | 15 |
| 6.2. Test Procedure | 15 |
| 6.3. Test Arrangement | 16 |
| 6.4. Test Data | 16 |
| 7. 20DB BANDWIDTH MEASUREMENT | 28 |
| 7.1. LIMITS OF 20dB BANDWIDTH MEASUREMENT | 28 |
| 7.2. TEST PROCEDURE..... | 28 |
| 7.3. TEST SETUP | 28 |

| | | |
|------------|--|-----------|
| 7.4. | EUT OPERATING CONDITIONS..... | 错误！未定义书签。 |
| 7.5. | Test Data | 28 |
| 8. | CARRIER FREQUENCY SEPARATION MEASUREMENT | 31 |
| 8.1. | LIMITS OF Carrier frequency separation measurement | 31 |
| 8.2. | TEST PROCEDURES | 31 |
| 8.3. | TEST SETUP | 31 |
| 8.4. | EUT OPERATING CONDITIONS..... | 错误！未定义书签。 |
| 8.5. | Test Data | 32 |
| 9. | NUMBER OF HOPPING CHANNEL..... | 34 |
| 9.1. | LIMITS OF 9. NUMBER OF HOPPING CHANNEL..... | 34 |
| 9.2. | TEST PROCEDURE..... | 34 |
| 9.3. | TEST SETUP | 34 |
| 9.4. | EUT OPERATING CONDITION | 错误！未定义书签。 |
| 9.5. | Test Data | 35 |
| 10. | TIME OF OCCUPANCY | 37 |
| 10.1. | LIMITS OF TIME OF OCCUPANCY | 37 |
| 10.2. | TEST PROCEDURE..... | 37 |
| 10.3. | EUT OPERATING CONDITION | 错误！未定义书签。 |
| 10.4. | TEST RESULTS..... | 38 |
| 11. | PEAK POWER | 41 |
| 11.1. | LIMITS OF Peak Power | 41 |
| 11.2. | TEST PROCEDURE..... | 41 |
| 11.3. | EUT OPERATING CONDITION | 错误！未定义书签。 |
| 11.4. | TEST RESULTS..... | 41 |
| 12. | BAND EDGES MEASUREMENT | 44 |
| 12.1. | Limits of Band Edges Measurement | 44 |
| 12.2. | TEST PROCEDURE..... | 44 |
| 12.3. | Test Results | 44 |
| 13. | CONDUCTED SPURIOUS EMISSIONS..... | 48 |
| 13.1. | Limits of Band Edges Measurement | 48 |
| 13.2. | Test Procedure | 49 |
| 13.3. | TEST RESULTS..... | 49 |

14. ANTENNA REQUIREMENT57

1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

| Test Items | FCC Rules | Test Results |
|---|------------------------------|--------------|
| 20dB bandwidth measurement | 15.247 (a) (1) | Pass |
| Carrier frequency separation measurement | 15.247 (a) (1) | Pass |
| Number of hopping channel | 15.247 (a) (1) III | Pass |
| Time of occupancy | 15.247 (a) (1) III | Pass |
| Peak output power | 15.247 (b) (1) | Pass |
| Band edge compliance measurement | 15.247 (d) | Pass |
| Radiated spurious emission & Radiated restricted band measurement | 15.247 (d) / 15.205 & 15.209 | Pass |
| Conducted emission test for power port | 15.207 | Pass |

Remark: “ N/A” means “ Not applicable.”

2. GENERAL INFORMATION

2.1. Report information

2.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.

2.1.2. The sample/s mentioned in this report is/are supplied by Applicant, SMQ therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

2.1.3. Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through SMQ, unless the applicant has authorized SMQ in writing to do so.

2.2. Laboratory Accreditation and Relationship to Customer

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at Bldg. of Metrology & Quality Inspection, Longzhu Road, Nanshan District, Shenzhen, Guangdong, China. At the time of testing, Laboratory is accredited by the following organizations:

China National Accreditation Service for Conformity Assessment (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579.

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number are 446246 806614 994606(semi anechoic chamber).

The Laboratory is listed in Voluntary Control Council for Interference by Information Technology Equipment (VCCI), and the registration number are R-1974(open area test site) , R-1966(semi anechoic chamber),C-2117(mains ports conducted interference measurement) and T-180(telecommunication ports conducted interference measurement).

The Laboratory is registered to perform emission tests with Industry Canada (IC), and the registration number is 11177A-1 11177A-2.

TUV Rhineland accredits the Laboratory for conformance to IEC and EN standards, the registration number is E2024086Z02.

2.3.Measurement Uncertainty

Conducted Emission

9kHz~30MHz 3.5dB

Radiated Emission

30MHz~1000MHz 4.5dB

1GHz~18GHz 4.6dB

3. PRODUCT DESCRIPTION

3.1.EUT Description

Description : Tablet
Manufacturer : Shenzhen Skyworth Wireless Technology Limited
Model Number : ilium PAD E7 3G
Operate : 2.402GHz~2.480GHz
Frequency
Antenna : PCB Antenna
Designation 2dBi

3.2.Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: ZC4E7, filing to comply with Section 15.207 , 15.209 , 15.247 of the FCC Part 15, Subpart C Rules.

3.3.Block Diagram of EUT Configuration

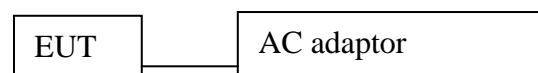


Figure 1 EUT setup

3.4. Operating Condition of EUT

The transmitter has a maximum peak conducted output power of Basic rate GFSK modulation and EDR mode 8DPSK modulation. Tests were performed with Basic rate GFSK modulation and EDR mode 8DPSK modulation.

The Radiated spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission (X plane).

3.5. Support Equipment List

Table 2 Support Equipment List

| Name | Model No | S/N | Manufacturer |
|---------|----------|-----|---------------------------------------|
| Adaptor | SW-5220 | -- | XIAMEN KELI ELECTRONICS CO. LTD |

3.6. Test Conditions

Date of test : Oct. 15-Oct 22, 2013

Date of EUT Receive : Oct. 15, 2013

Temperature: 22-24 °C

Relative Humidity: 53-57%

3.7. Special Accessories

Not available for this EUT intended for grant.

3.8. Equipment Modifications

Not available for this EUT intended for grant.

4. TEST EQUIPMENT USED

Table 3 Test Equipment

| No. | Equipment | Manufacturer | Model No. | Last Cal. | Cal. Interval |
|-----------|--------------------------|--------------------|-----------|--------------|---------------|
| SB2603 | EMI Test Receiver | Rohde & Schwarz | ESCS30 | Jan.21, 2013 | 1 Year |
| SB3321 | AMN | Rohde & Schwarz | ESH2-Z5 | Jan.21, 2013 | 1 Year |
| SB2604 | AMN | Rohde & Schwarz | ESH3-Z5 | Jan.21, 2013 | 1 Year |
| SB8501/09 | EMI Test Receiver | Rohde & Schwarz | ESU40 | May.17, 2013 | 1 Year |
| SB8501/04 | Bilog Antenna | Schwarzbeck | VULB9163 | Jan.21, 2013 | 1 Year |
| SB3435 | Horn Antenna | Rohde & Schwarz | HF906 | Jan.21, 2013 | 1 Year |
| SB3435/01 | Amplifier(1-18GHz) | Rohde & Schwarz | --- | Jan.21, 2013 | 1 Year |
| SB3435/02 | Amplifier(18-40GHz) | Rohde & Schwarz | --- | May.17, 2013 | 1 Year |
| SB5392/02 | Horn Antenna | Amplifier Research | AT4560 | May.17, 2013 | 1 Year |
| SB3450/01 | 3m Semi-anechoic chamber | Albatross Projects | 9X6X6 | Oct.12, 2012 | 2 Years |
| SB3345 | Loop Antenna | Schwarzbeck | FMZB1516 | Jan.23, 2012 | 2 Years |

5. CONDUCTED DISTURBANCE TEST

5.1. Test Standard and Limit

5.1.1. Test Standard

FCC Part 15 15.207

5.1.2. Test Limit

Table 4 Conducted Disturbance Test Limit

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

* Decreasing linearly with logarithm of the frequency

* The lower limit shall apply at the transition frequency.

5.2. Test Procedure

The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI test receiver (R&S Test Receiver ESCS30) is used to test the emissions from both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

The bandwidth of EMI test receiver is set at 9kHz.

5.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

5.4. Test Data

The emissions don't show in below are too low against the limits. Refer to the test curves.

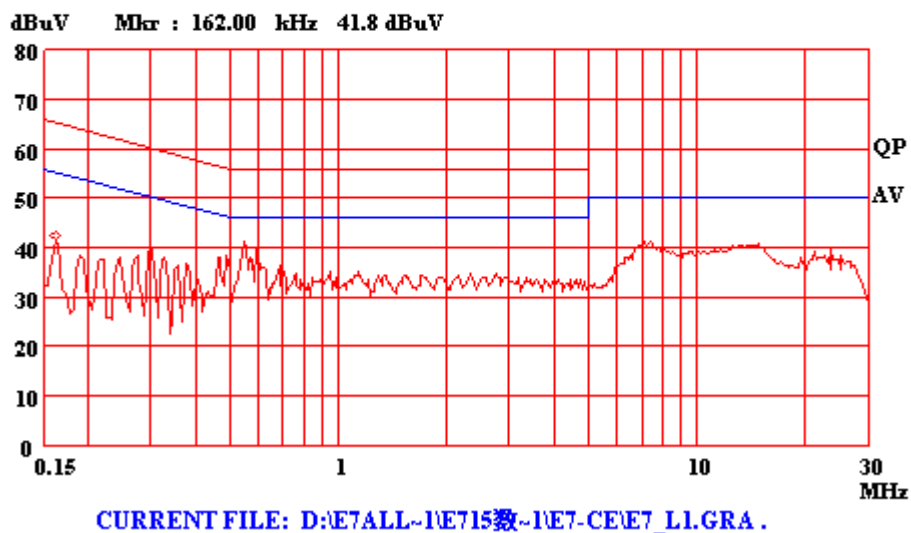
Table 5 Conducted Disturbance Test Data

| Model No.: E7 | | | | | | | | |
|---------------------|--------------------|------------------------------|-------------------------|-----------------------------------|------------------------|-------------------------|-----------------------------------|------------------------|
| Test mode: Charging | | | | | | | | |
| | Frequency (MHz) | Correction Factor (dB) | Quasi-Peak | | | Average | | |
| | | | Reading (dB μ V) | Emission Level (dB μ V) | Limits (dB μ V) | Reading (dB μ V) | Emission Level (dB μ V) | Limits (dB μ V) |
| Line | 0.163 | 9.7 | 29.2 | 38.9 | 65.3 | 19.7 | 29.4 | 55.3 |
| | 0.245 | 9.7 | 26.2 | 35.9 | 61.9 | 19.5 | 29.2 | 51.9 |
| | 0.298 | 9.7 | 28.2 | 37.9 | 60.3 | 23.1 | 32.8 | 50.3 |
| | 0.490 | 9.7 | 25.7 | 35.4 | 56.2 | 22.7 | 32.4 | 46.2 |
| | 0.542 | 9.8 | 29.7 | 39.5 | 56 | 26.0 | 35.8 | 46 |
| | 7.376 | 10.0 | 26.4 | 36.4 | 60 | 20.1 | 30.1 | 50 |
| Neutral | 0.165 | 9.7 | 26.0 | 35.7 | 65.2 | 15.9 | 25.6 | 55.2 |
| | 0.246 | 9.7 | 24.9 | 34.6 | 61.9 | 16.4 | 26.1 | 51.9 |
| | 0.306 | 9.7 | 23.2 | 32.9 | 60.1 | 17.5 | 27.2 | 50.1 |
| | 0.554 | 9.8 | 26.5 | 36.3 | 56 | 18.9 | 28.7 | 46 |
| | 0.602 | 9.8 | 22.9 | 32.7 | 56 | 19.3 | 29.1 | 46 |
| | 6.582 | 10.0 | 23.9 | 33.9 | 60 | 14.5 | 24.5 | 50 |

REMARKS: 1. Emission level(dBuV)=Read Value(dBuV) + Correction Factor(dB)
 2. Correction Factor(dB) =LISN Factor (dB) + Cable Factor (dB)+Limiter Factor(dB)
 3. The other emission levels were very low against the limit.

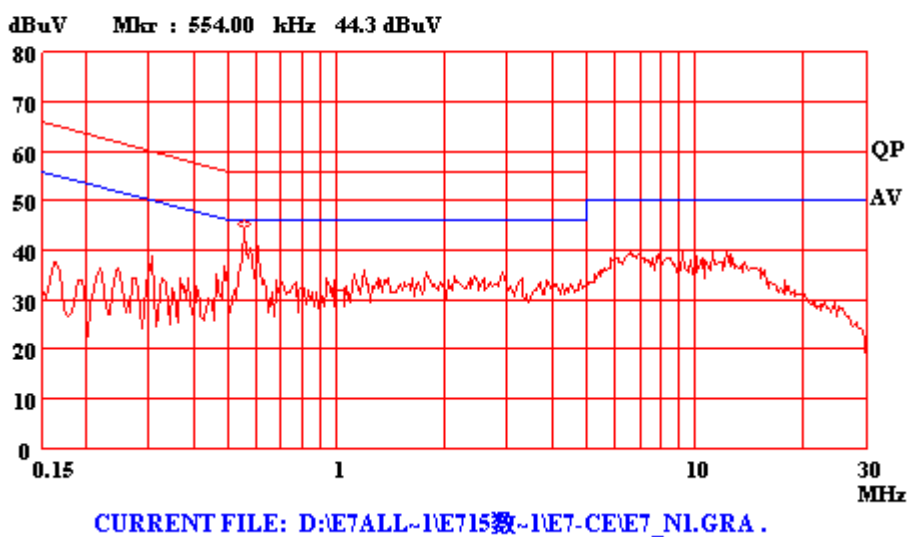
Conducted disturbance

EUT: M/N:E7
Op Cond: Run test program
Test Spec: L
Comment: AC 120V/60Hz



Conducted disturbance

EUT: M/N:E7
Op Cond: Run test program
Test Spec: N
Comment: AC 120V/60Hz



6. RADIATED DISTURBANCE TEST

6.1. Test Standard and Limit

6.1.1. Test Standard

FCC Part 15 15.209

6.1.2. Test Limit

Table 6 Radiated Disturbance Test Limit

| FREQUENCY MHz | FIELD STRENGTHS LIMITS ($\mu\text{V/m}$) | FIELD STRENGTHS LIMITS dB ($\mu\text{V/m}$) |
|------------------|--|---|
| Fundamental | 50000 | 94.0 |
| Harmonics | 500 | 54.0 |
| 30 ~ 88 | 100 | 40.0 |
| 88 ~ 216 | 150 | 43.5 |
| 216 ~ 960 | 200 | 46.0 |
| 960 ~ | 500 | 54.0 |

* The lower limit shall apply at the transition frequency.

* The test distance is 3m.

6.2. Test Procedure

The EUT is placed on a turntable, which is 0.8 meter above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test. In order to find out the max emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 8 and 13 of ANSI C63.4-2003.

Radiated measurements were performed on the frequency range from 30MHz to 25GHz. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz , VBW \geq RBW. All readings above 1 GHz are AV and PK values. RBW=1MHz and VBW=10Hz for AV value ,RBW=1MHz and VBW \geq RBW for peak value.

Measurements were made at 3 meters

6.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

6.4. Test Data

The emissions don't show in following result tables are more than 20dB below the limits.

Bluetooth basic rate and Bluetooth EDR mode were tested, below only shows worst case result of Bluetooth basic rate.

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was

20dB lower than the limit line per 15.31(o) was not reported.

Table 7 General Radiated Emission Data

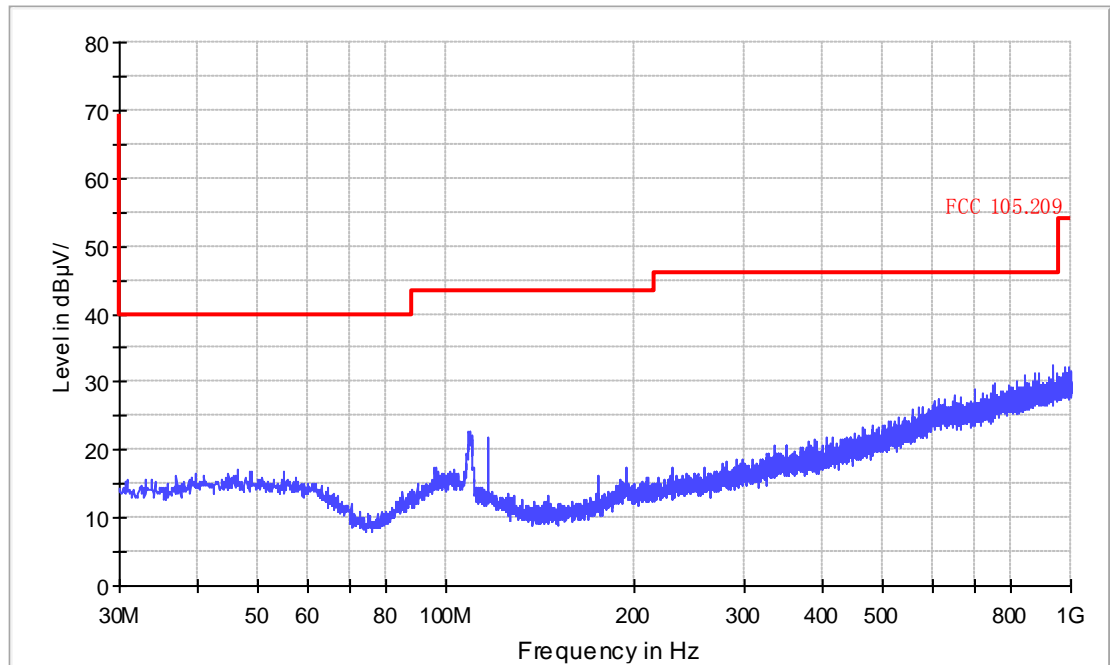
| Model No.: E7 | | | | | | |
|----------------------|----------------------|----------------------|--------------------------------|--------------|--------------------|------|
| Test mode: Channel B | | | | | | |
| Below 1GHz | | | | | | |
| Frequency MHz | Emission (dBuV/m) | Read Value (dBuV) | Correction Factor (dB/m) | Polarization | Limits (dBuV/m) | Note |
| -- | | | | | | |
| -- | | | | | | |
| -- | | | | | | |
| Above 1GHz | | | | | | |

| Frequency MHz | Emission (dBuV/m) | Read Value (dBuV) | Correction Factor (dB/m) | Polarization | Limits (dBuV/m) | Note |
|------------------|----------------------|----------------------|--------------------------------|--------------|--------------------|------|
| -- | | | | | | |
| -- | | | | | | |
| -- | | | | | | |

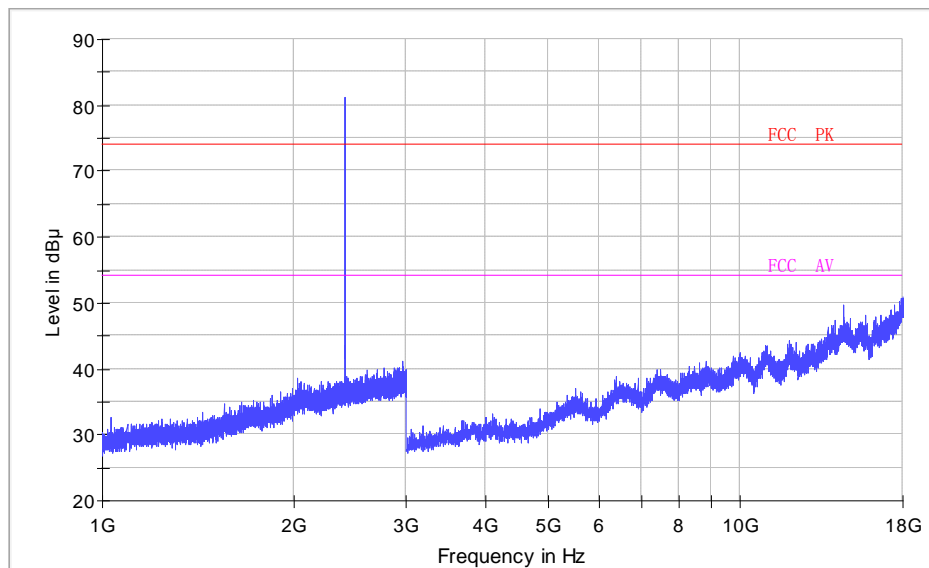
- REMARKS: 1. Emission level(dBuV/m)=Read Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were 20dB lower than the limit line per 15.31(o) was not reported.

Horizontal

Electric Field Strength 30M-1GHz

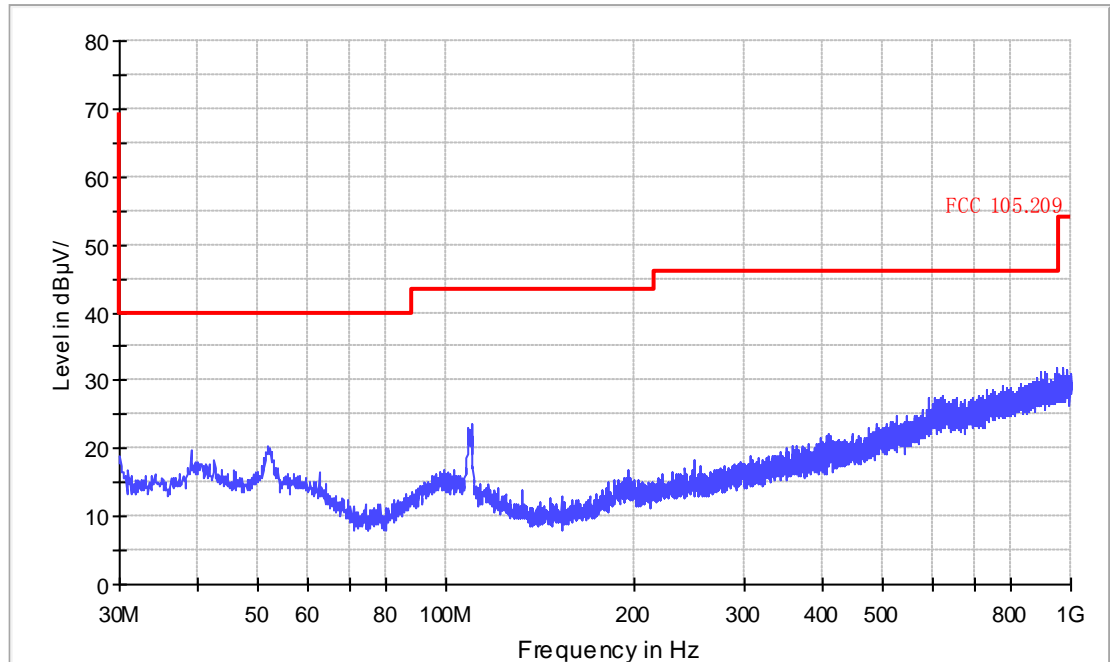


FCC Electric Field Strength 1-18GHz operate on 2.4GHz

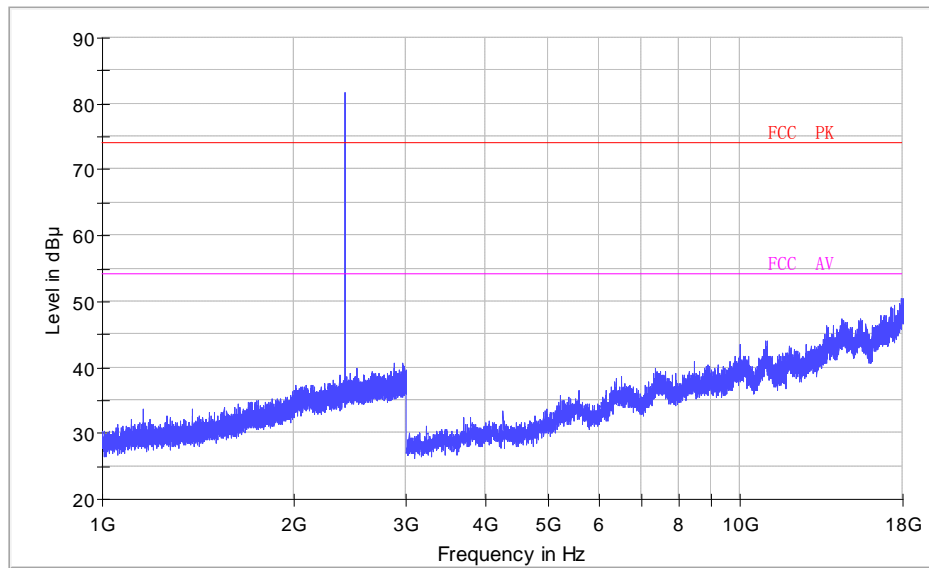


Vertical

Electric Field Strength 30M-1GHz



FCC Electric Field Strength 1-18GHz operate on 2.4GHz



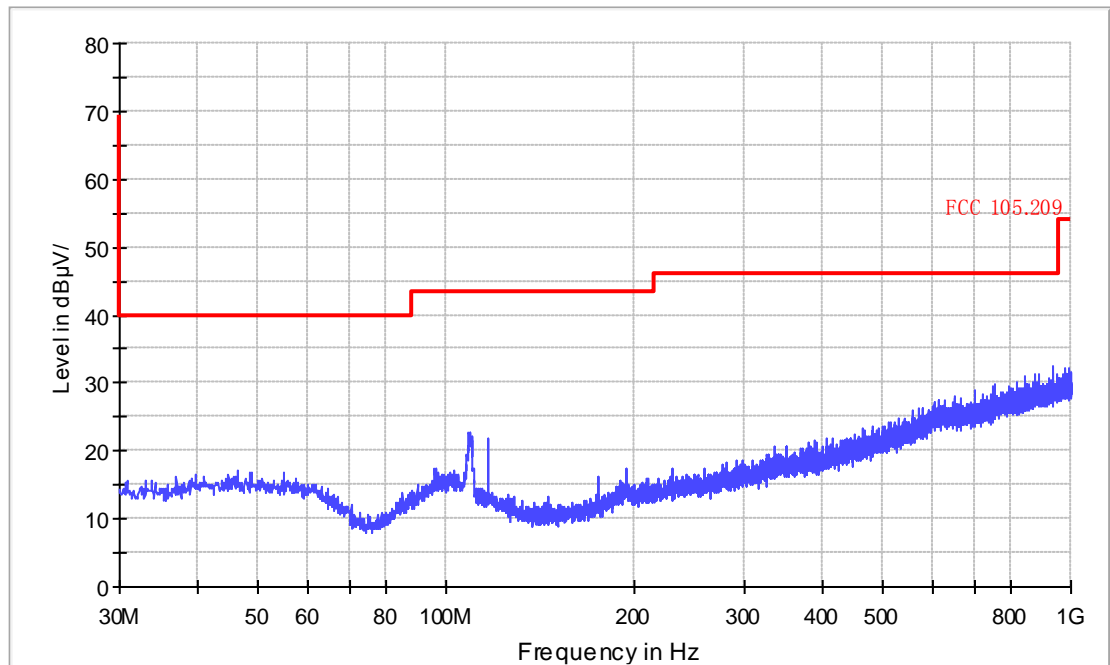
| Model No.: E7 | | | | | | |
|----------------------|----------------------|----------------------|--------------------------------|--------------|--------------------|------|
| Test mode: Channel M | | | | | | |
| Below 1GHz | | | | | | |
| Frequency MHz | Emission (dBuV/m) | Read Value (dBuV) | Correction Factor (dB/m) | Polarization | Limits (dBuV/m) | Note |
| -- | | | | | | |
| -- | | | | | | |
| -- | | | | | | |
| Above 1GHz | | | | | | |

| Frequency MHz | Emission (dBuV/m) | Read Value (dBuV) | Correction Factor (dB/m) | Polarization | Limits (dBuV/m) | Note |
|------------------|----------------------|----------------------|--------------------------------|--------------|--------------------|------|
| -- | | | | | | |
| -- | | | | | | |
| -- | | | | | | |

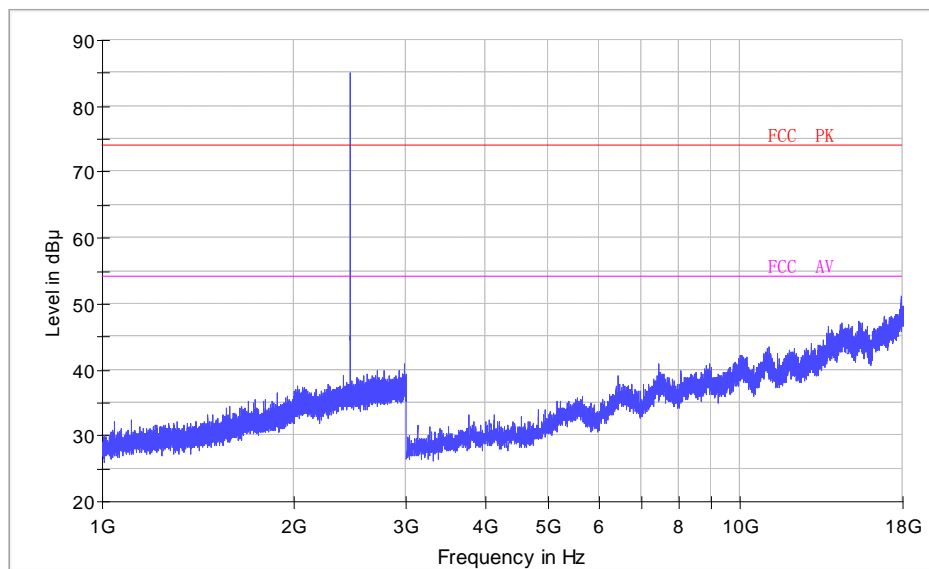
REMARKS: 1. Emission level(dBuV/m)=Read Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were 20dB lower than the limit line per 15.31(o) was not reported.

Horizontal

Electric Field Strength 30M-1GHz

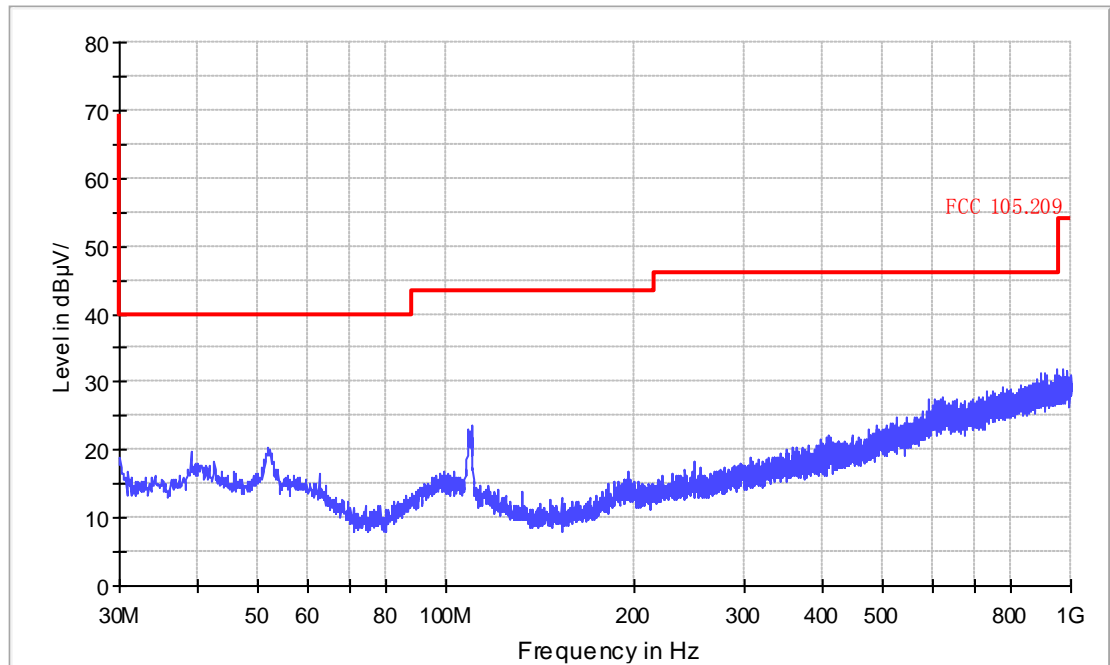


FCC Electric Field Strength 1-18GHz operate on 2.4GHz

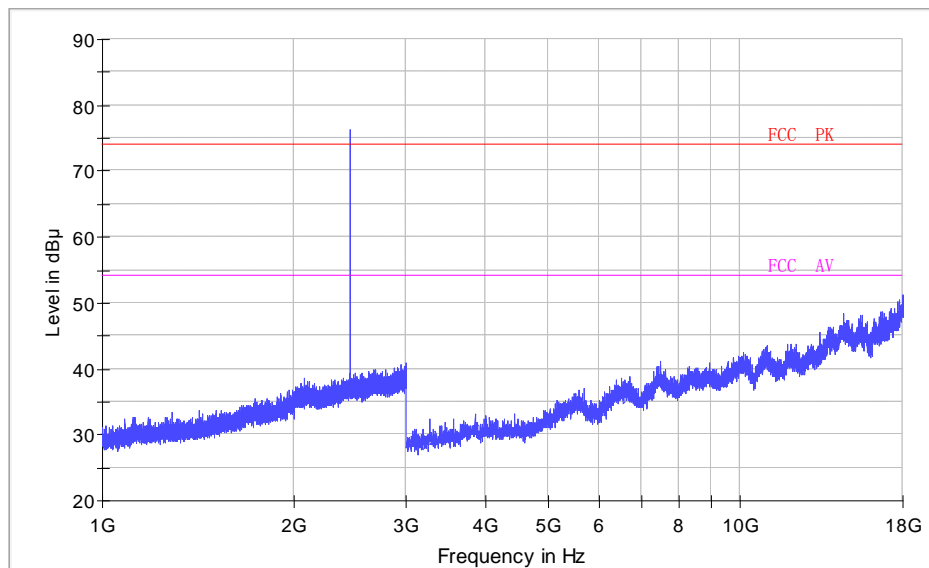


Vertical

Electric Field Strength 30M-1GHz



FCC Electric Field Strength 1-18GHz operate on 2.4GHz



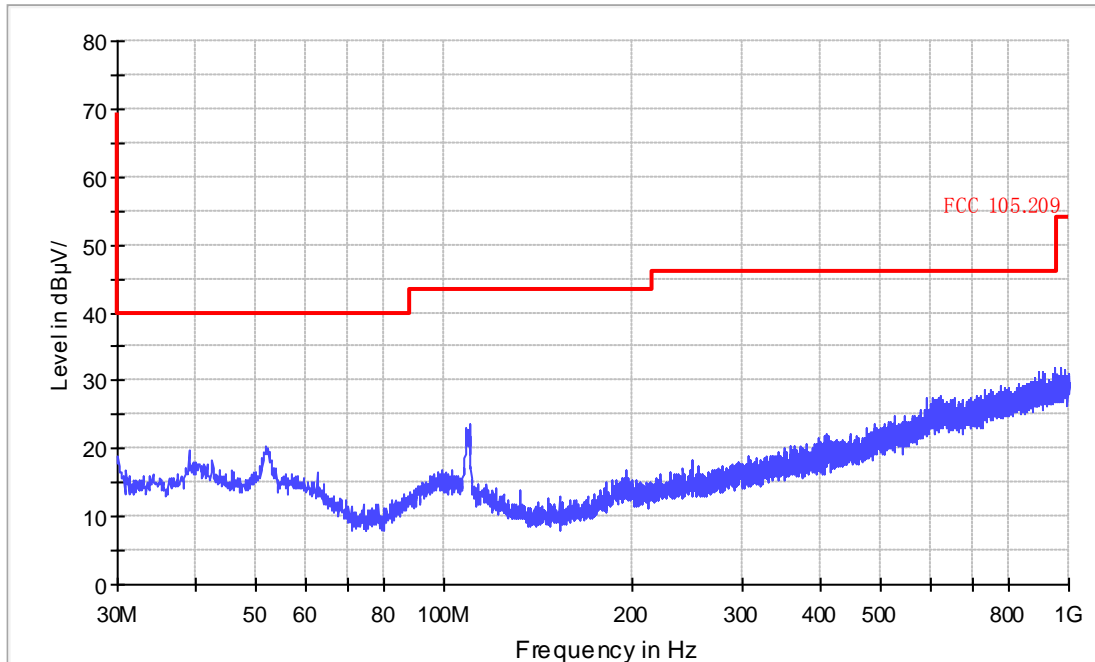
| Model No.: E7 | | | | | | |
|----------------------|----------------------|----------------------|--------------------------------|--------------|--------------------|------|
| Test mode: Channel T | | | | | | |
| Below 1GHz | | | | | | |
| Frequency MHz | Emission (dBuV/m) | Read Value (dBuV) | Correction Factor (dB/m) | Polarization | Limits (dBuV/m) | Note |
| -- | | | | | | |
| -- | | | | | | |
| -- | | | | | | |
| Above 1GHz | | | | | | |

| Frequency MHz | Emission (dBuV/m) | Read Value (dBuV) | Correction Factor (dB/m) | Polarization | Limits (dBuV/m) | Note |
|------------------|----------------------|----------------------|--------------------------------|--------------|--------------------|------|
| -- | | | | | | |
| -- | | | | | | |
| -- | | | | | | |

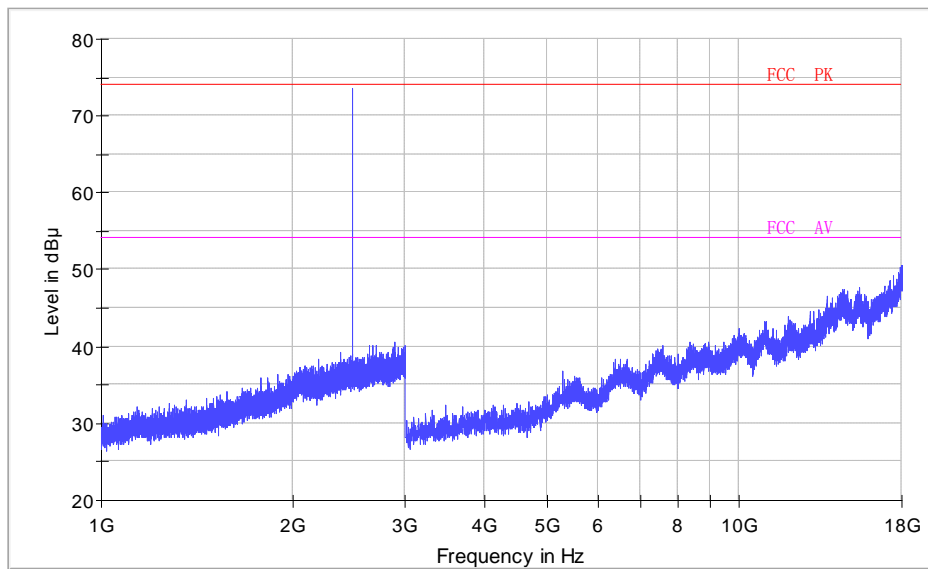
- REMARKS: 1. Emission level(dBuV/m)=Read Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were 20dB lower than the limit line per 15.31(o) was not reported.

Horizontal

Electric Field Strength 30M-1GHz

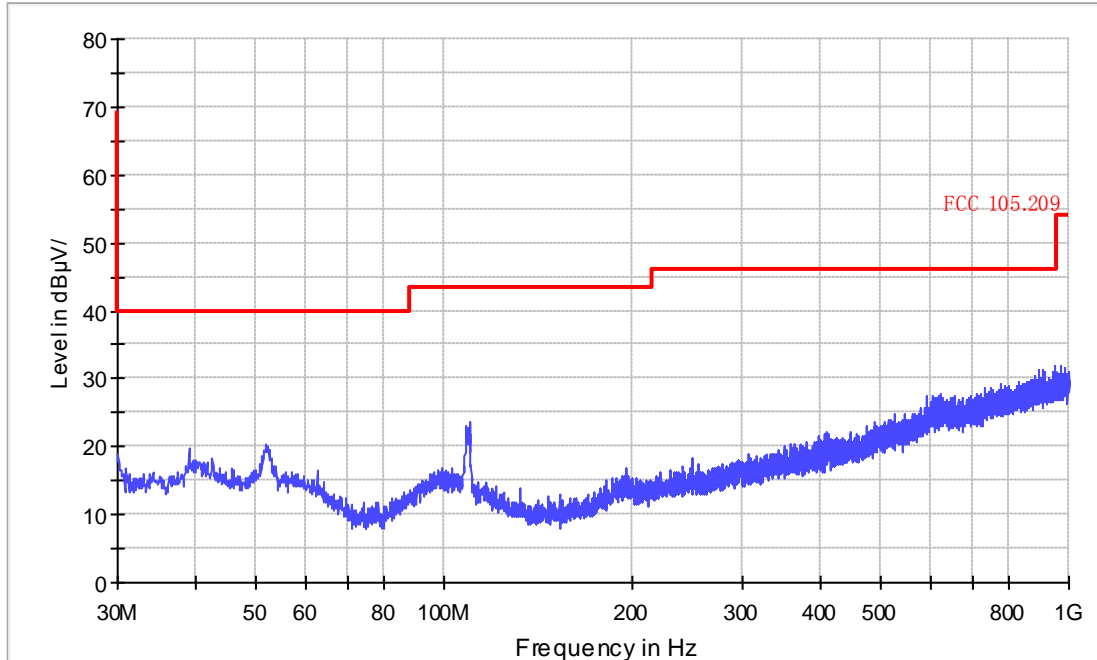


FCC Electric Field Strength 1-18GHz operate on 2.4GHz

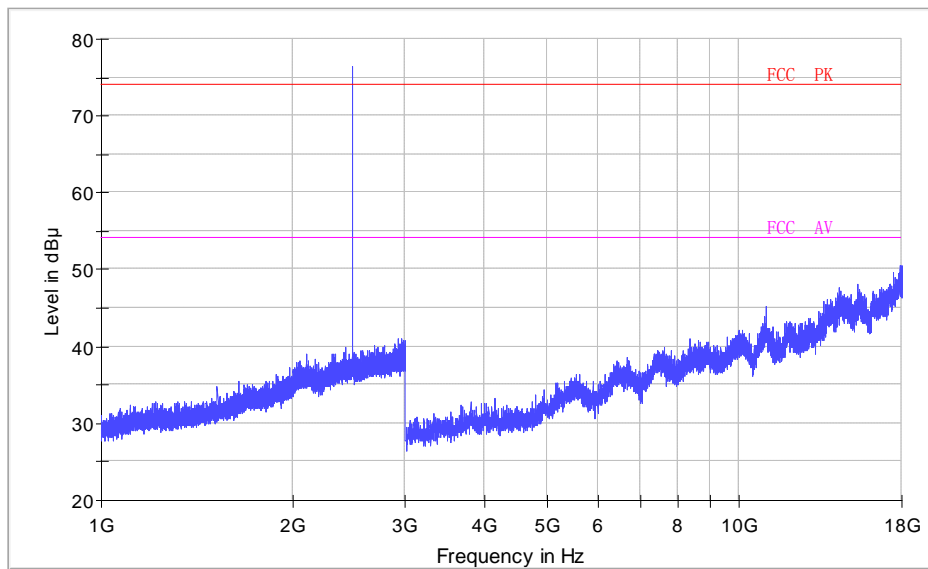


Vertical

Electric Field Strength 30M-1GHz



FCC Electric Field Strength 1-18GHz operate on 2.4GHz



18-26.5GHz

No Peak found in pre-scan, only worst case result is listed in this report.

Electric Field Strength 18-26.5GHz

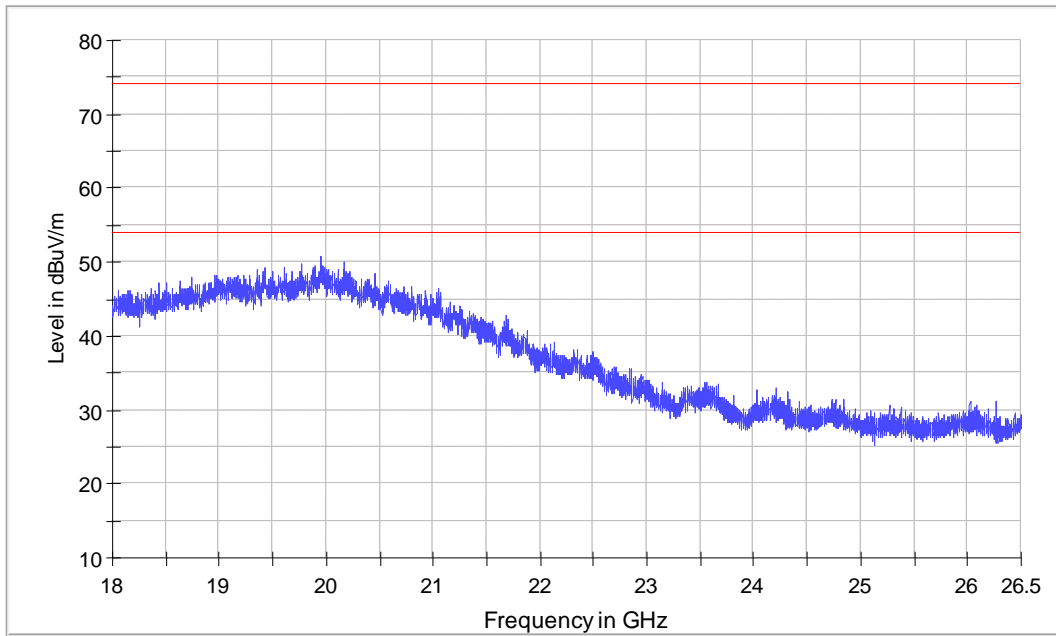


Table 8 Restricted Band Radiated Emission Data

| MHz | MHz | MHz | GHz |
|-------------------|-----------------------|-----------------|-------------|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| 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 | |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 - 2390 | |
| 8.362 - 8.366 | 156.52475 - 156.52525 | 2483.5 - 2500 | |
| 8.37625 - 8.38675 | 156.7 - 156.9 | 2655 - 2900 | |
| 8.41425 - 8.41475 | 162.0125 - 167.17 | 3260 - 3267 | |
| 12.29 - 12.293 | 167.72 - 173.2 | 3332 - 3339 | |
| 12.51975 - | 240 - 285 | 3345.8 - 3358 | |
| 12.52025 | 322 - 335.4 | 3600 - 4400 | |
| 12.57675 - | | | |
| 12.57725 | | | |
| 13.36 - 13.41 | | | |

Except as shown in table 9 to table 15, all other emission of the above band were less than the limit 20dB.

7. 20DB BANDWIDTH MEASUREMENT

7.1.LIMITS OF 20dB BANDWIDTH MEASUREMENT

CFR 47 (FCC) part 15.247 (a) (1) and DA 00-705

7.2.TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30kHz RBW and $VBW \geq RBW$. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

7.3.TEST SETUP



7.4.Test Data

Table 9 20dB Bandwidth Test Data Modulation: Basic rate

| CHANNEL FREQUENCY (MHz) | 20dB BANDWIDTH (MHz) | results |
|-------------------------------|----------------------------|---------|
| 2402 | 0.959 | Pass |
| 2441 | 0.957 | Pass |
| 2480 | 0.959 | Pass |

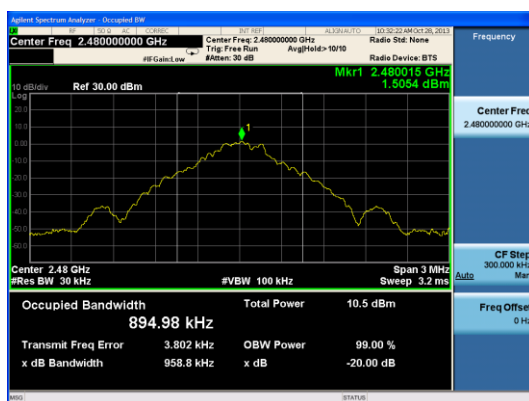
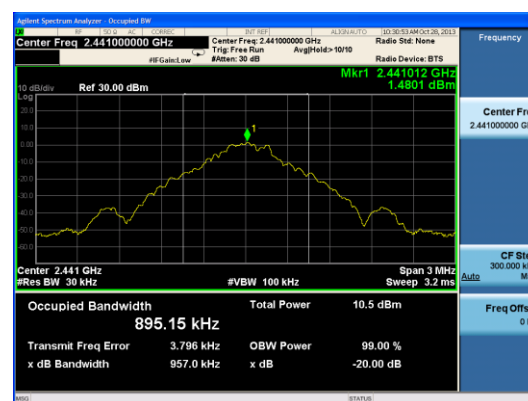
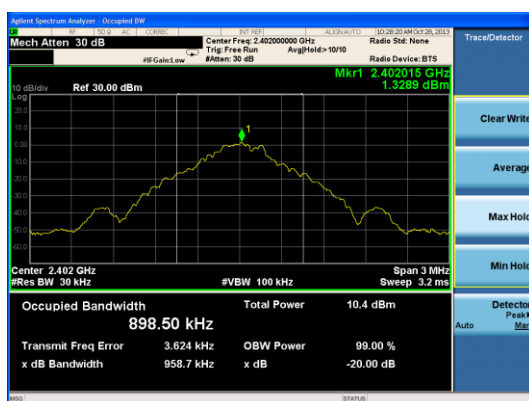
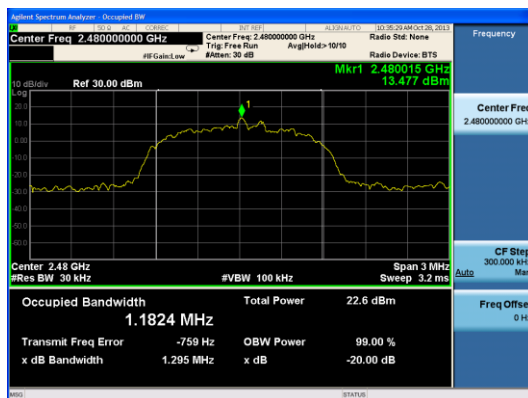
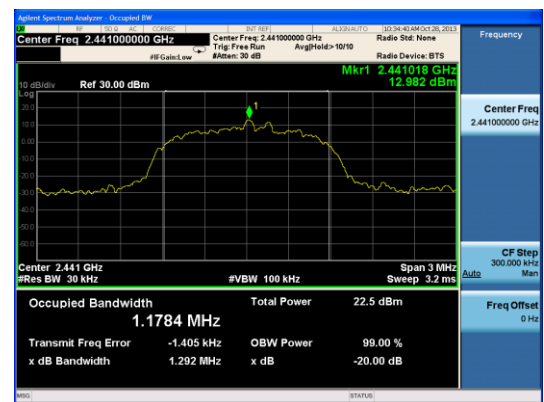
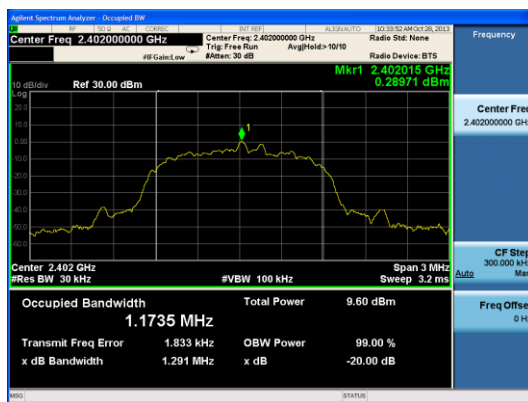


Table 10 20dB Bandwidth Test Data Modulation: Modulation: EDR

| CHANNEL FREQUENCY (MHz) | 20dB BANDWIDTH (MHz) | results |
|-------------------------------|----------------------------|---------|
| 2402 | 1.291 | Pass |
| 2441 | 1.292 | Pass |
| 2480 | 1.295 | Pass |



8. CARRIER FREQUENCY SEPARATION MEASUREMENT

8.1.LIMITS OF Carrier frequency separation measurement

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.

8.2.TEST PROCEDURES

(a) Connect test port of mobile phone to spectrum analyzer and universal communication tester.

(b) Set the mobile phone to transmit maximum output power at 2.4GHz and switch off frequency

hopping function, then set the measured frequency number to two adjacent channels separately and

test the carrier frequency separation with spectrum analyzer.

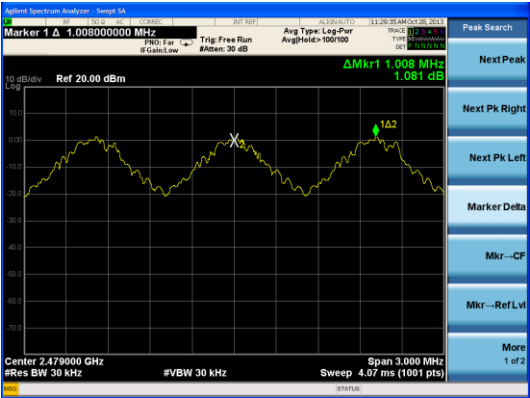
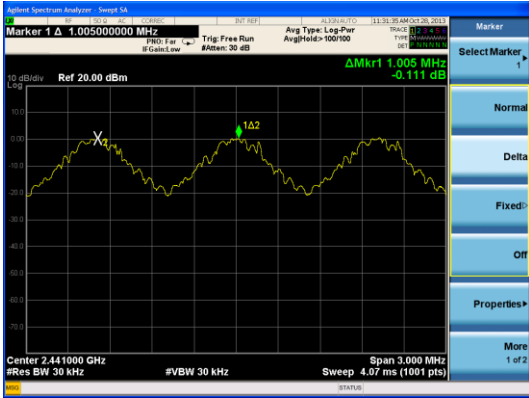
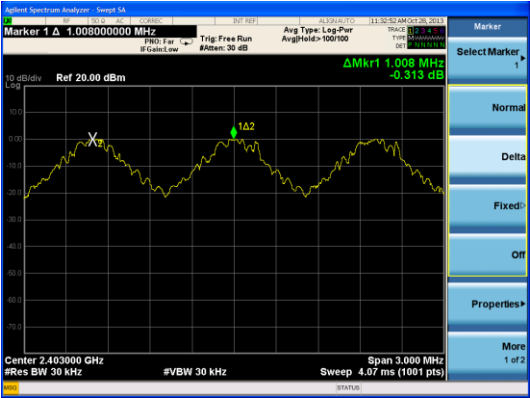
8.3.TEST SETUP



8.4. Test Data

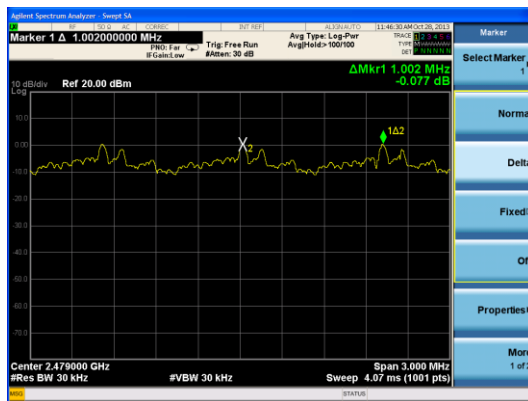
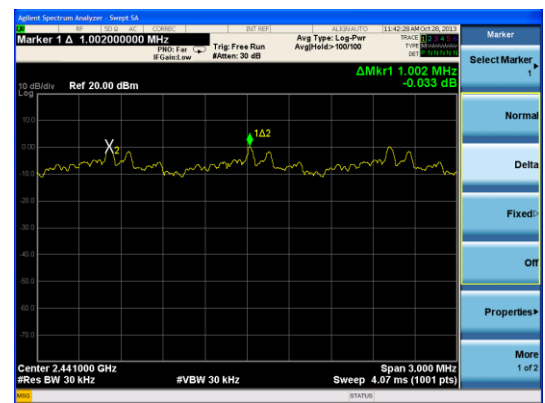
Basic Rate

| Frequency | Frequency | frequency | Limit | Result |
|-----------|-----------|------------|--------|--------|
| [GHz] | [GHz] | separation | | |
| | | [MHz] | [MHz] | |
| 2. 402 | 2. 403 | 1. 008 | 0. 639 | Pass |
| 2. 441 | 2. 442 | 1. 005 | 0. 638 | Pass |
| 2. 479 | 2. 480 | 1. 008 | 0. 639 | Pass |



EDR

| Frequency | Frequency | frequency | Limit | Result |
|-----------|-----------|------------|--------|--------|
| [GHz] | [GHz] | separation | | |
| | | [MHz] | [MHz] | |
| 2. 402 | 2. 403 | 1. 002 | 0. 861 | Pass |
| 2. 441 | 2. 442 | 1. 002 | 0. 861 | Pass |
| 2. 479 | 2. 480 | 1. 002 | 0. 863 | Pass |



9. NUMBER OF HOPPING CHANNEL

9.1.LIMITS OF 9. NUMBER OF HOPPING CHANNEL

Number of hopping channel should be compliance with the requirements in part15.247 (a) (1) iii.

9.2.TEST PROCEDURE

(a) Connect test port of mobile phone to spectrum analyzer and universal communication tester.

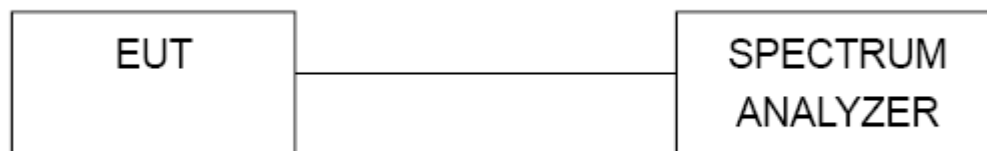
(b) Set the mobile phone to transmit maximum output power at 2.4GHz and switch on frequency

hopping function, then set enough count time (larger than 5000 times) to get all the hopping frequency

channel displayed on the screen of spectrum analyzer.

(c) Count the quantity of peaks to get the number of hopping channels.

9.3.TEST SETUP

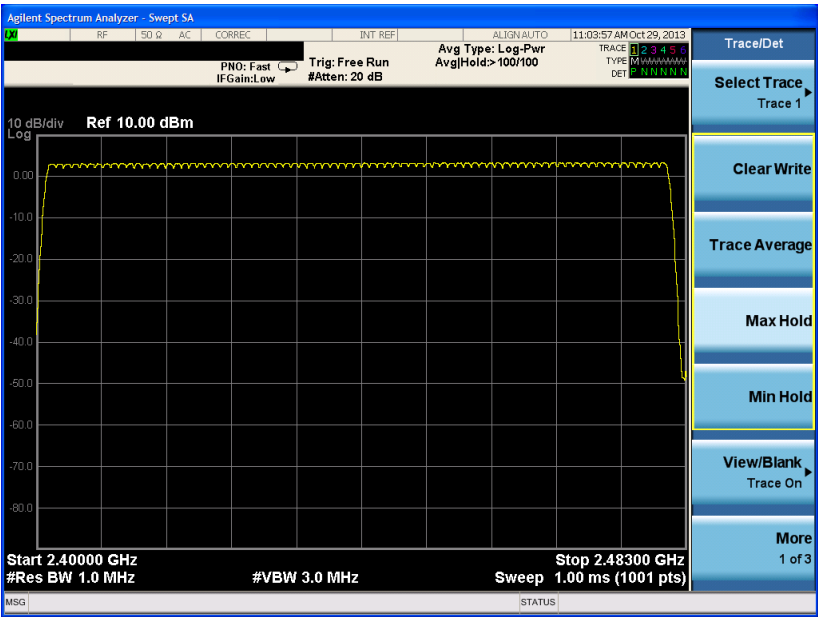


9.4. Test Data

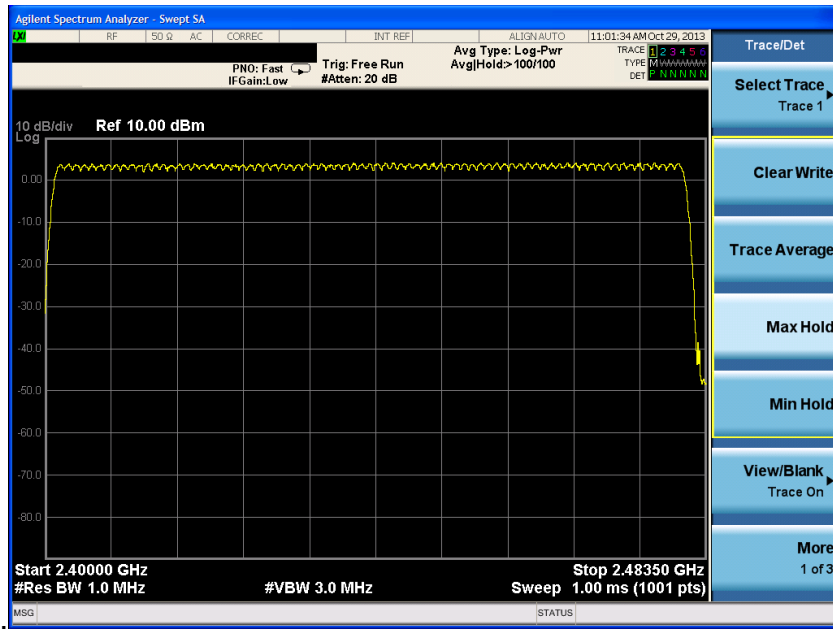
Table 11 Hopping channel number Test Data

| Hopping numbers | LIMIT | results |
|-----------------|-------|---------|
| 79 | >15 | Pass |

Basic



EDR



10. TIME OF OCCUPANCY

10.1. LIMITS OF TIME OF OCCUPANCY

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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

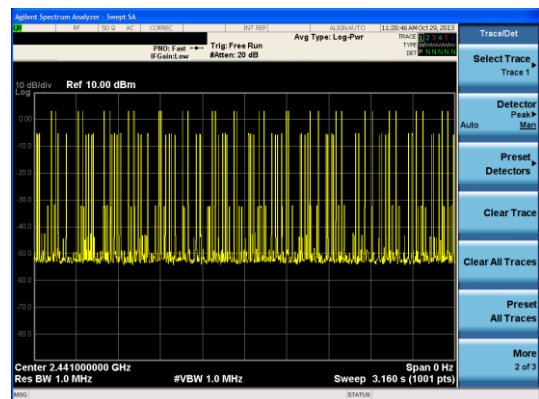
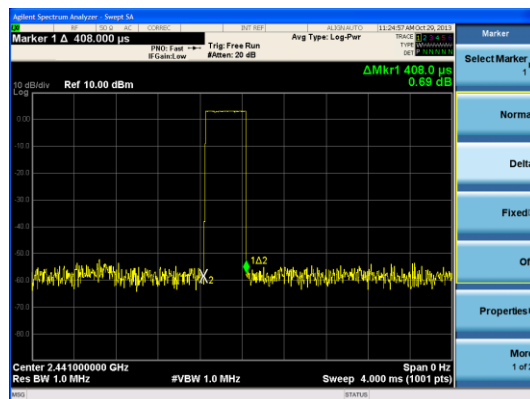
10.2. TEST PROCEDURE

- (a) Connect test port of mobile phone to spectrum analyzer and universal communication tester.
- (b) Set the mobile phone to transmit maximum output power at 2.4GHz and switch on frequency hopping function.
- (c) Set the span of spectrum analyzer to 0 Hz, and set the resolution bandwidth to 1 MHz and the video bandwidth to 1 MHz, then get the time domain measured diagram. and set sweep time to 2 times of one burst occupancy time, and measure the time of occupancy of one burst.
- (d) Set the resolution bandwidth to 1 MHz and the video bandwidth to 3 MHz, and set the sweep time to a period (0.4 seconds multiplied by the number of hopping channels employed), and count the number of the bursts.
- (e) Calculate the time of occupancy in a period with time occupancy of a burst and quantity of bursts.

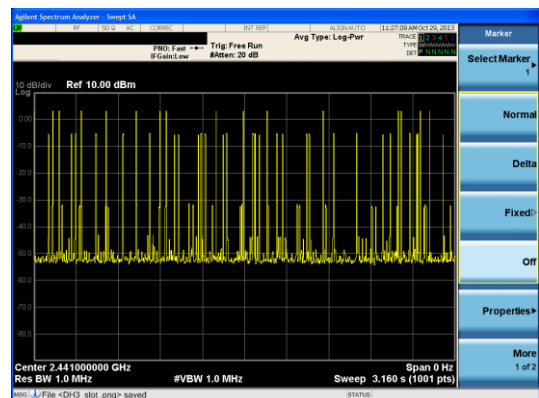
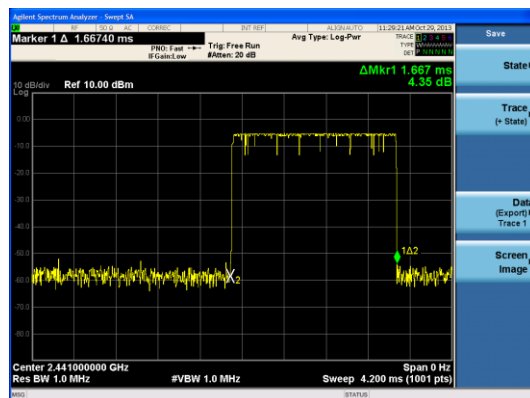
10.3.TEST RESULTS

| | Time of Single Slot [ms] | Numbers of slots in a period | Time of occupied in a period [s] | Limit [s] | Result |
|-----|--------------------------|------------------------------|----------------------------------|------------|--------|
| DH1 | 0.408 | 32 | 0.131 | ≤ 0.4 | Pass |
| DH3 | 1.667 | 16 | 0.267 | ≤ 0.4 | Pass |
| DH5 | 2.940 | 13 | 0.382 | ≤ 0.4 | Pass |

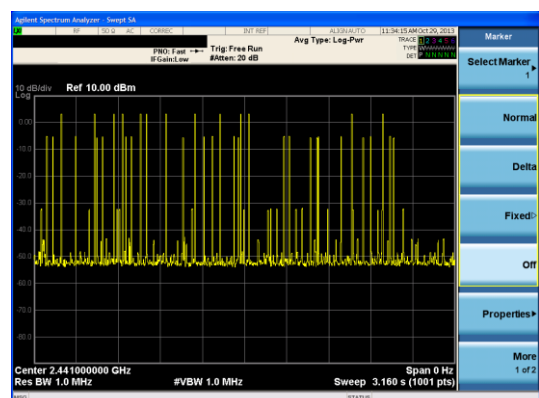
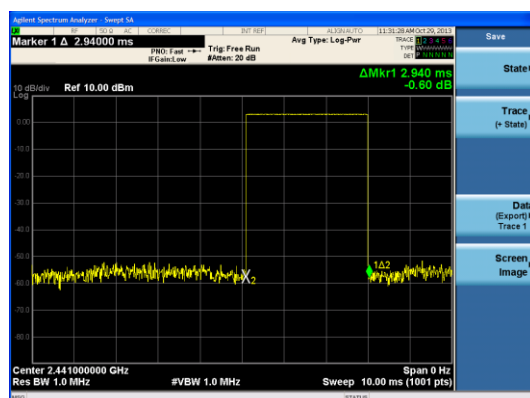
DH1



DH3



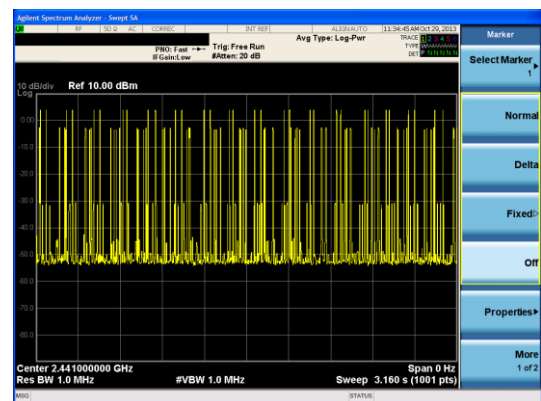
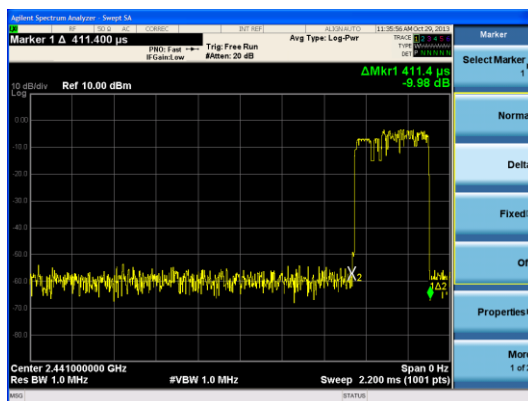
DH5



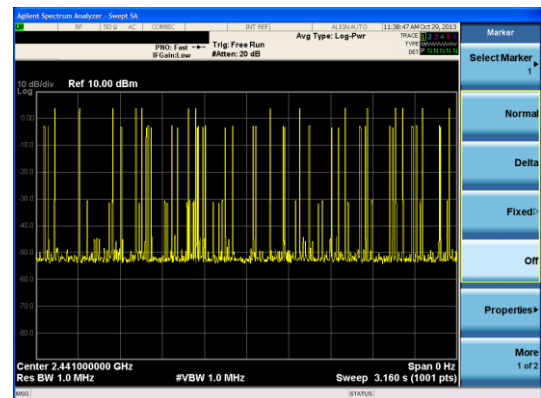
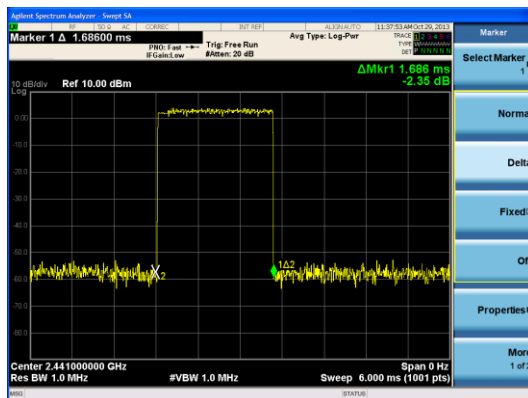
8DPSK

| | Time of Single Slot [ms] | Numbers of slots in a period | Time of occupied in a period [s] | Limit [s] | Result |
|-------|--------------------------|------------------------------|----------------------------------|------------|--------|
| 3-DH1 | 0.411 | 31 | 0.127 | ≤ 0.4 | Pass |
| 3-DH3 | 1.686 | 15 | 0.253 | ≤ 0.4 | Pass |
| 3-DH5 | 2.950 | 10 | 0.295 | ≤ 0.4 | Pass |

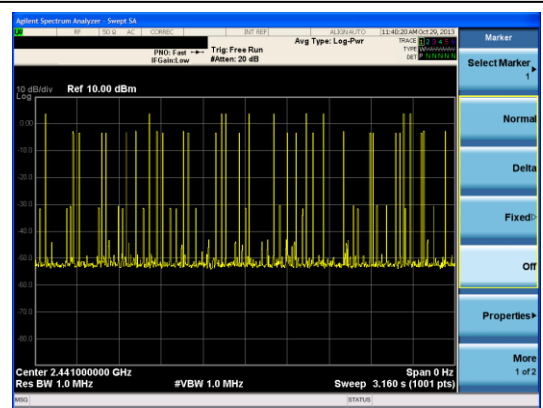
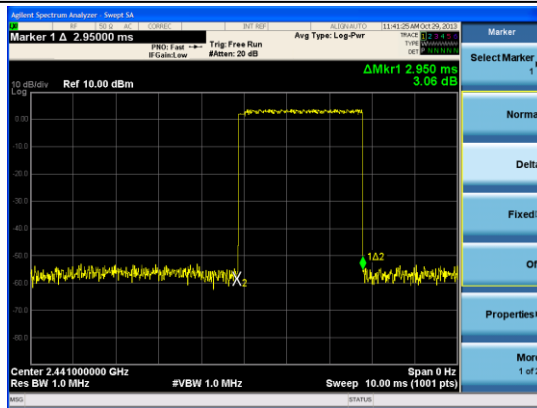
3-DH1



3-DH3



3-DH5



11. PEAK POWER

11.1. LIMITS OF Peak Power

Compliance with part 15.247 (b) (1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt.

For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watt.

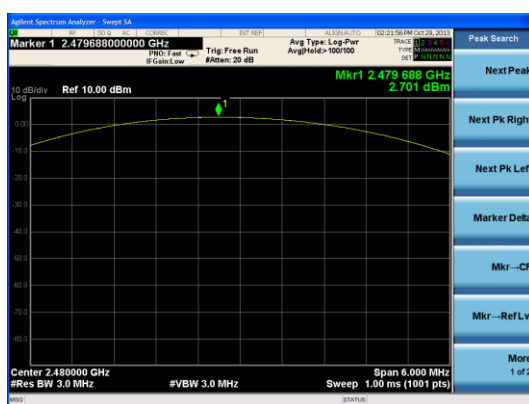
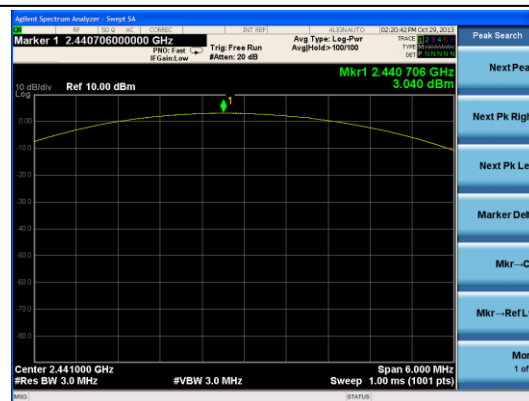
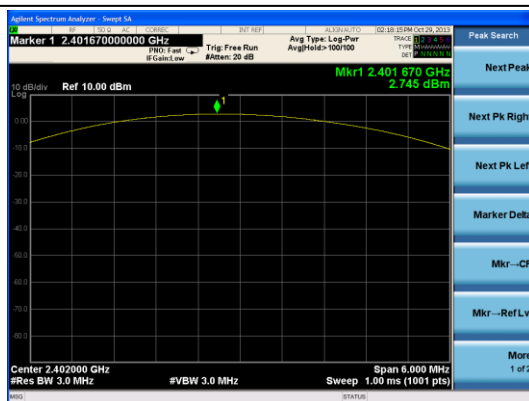
11.2. TEST PROCEDURE

- (a) Connect test port of mobile phone to universal communication tester.
- (b) Set the mobile phone to transmit maximum output power at 2.4GHz and switch off frequency hopping function.
- (c) Then set the mobile phone to transmit at high, middle and low frequency and measure the conducted output power separately.

11.3. TEST RESULTS

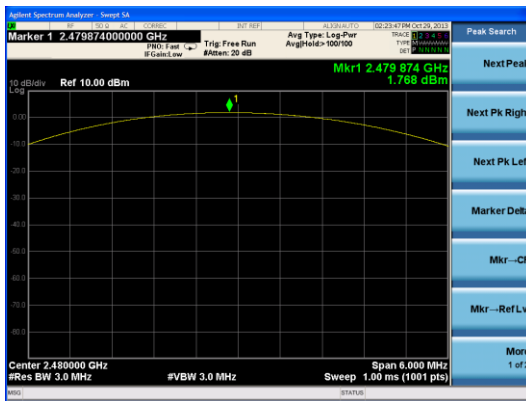
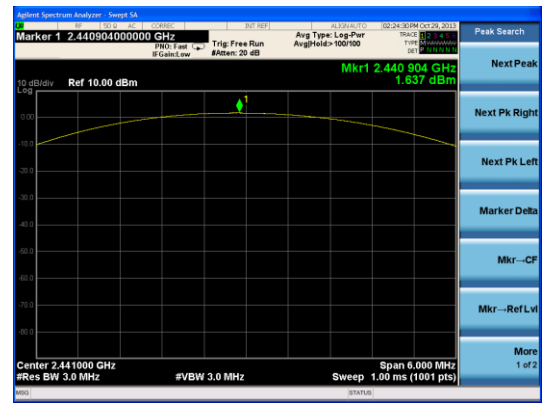
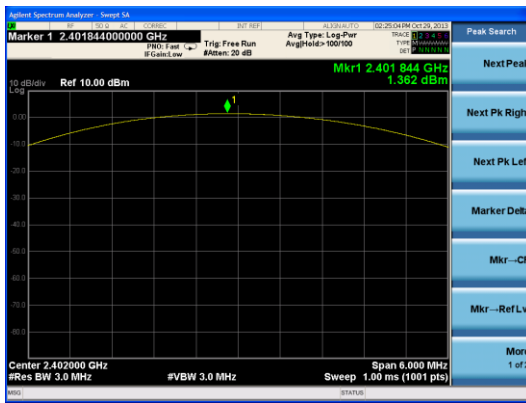
Measurement Results (Modulation:Basic)

| Channel | Channel No. | Center Freq. [MHz] | Meas. Level (Cond.) [dBm] | Limit [dBm] | Result |
|---------|-------------|--------------------|---------------------------|-------------|--------|
| Bottom | 0 | 2402 | 2.75 | < 30 | Pass |
| Middle | 39 | 2441 | 3.04 | < 30 | Pass |
| Top | 78 | 2480 | 2.70 | < 30 | Pass |



Measurement Results (Modulation: 8DQPSK)

| Channel | Channel No. | Center Freq. [MHz] | Meas. Level (Cond.) [dBm] | Limit [dBm] | Result |
|---------|-------------|--------------------|---------------------------|-------------|--------|
| Bottom | 0 | 2402 | 1.36 | < 21 | Pass |
| Middle | 39 | 2441 | 1.64 | < 21 | Pass |
| Top | 78 | 2480 | 1.79 | < 21 | Pass |



12. BAND EDGES MEASUREMENT

12.1.Limits of Band Edges Measurement

Below – 20dB of the highest emission level of operating band (in 100kHz resolution bandwidth).

12.2.TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

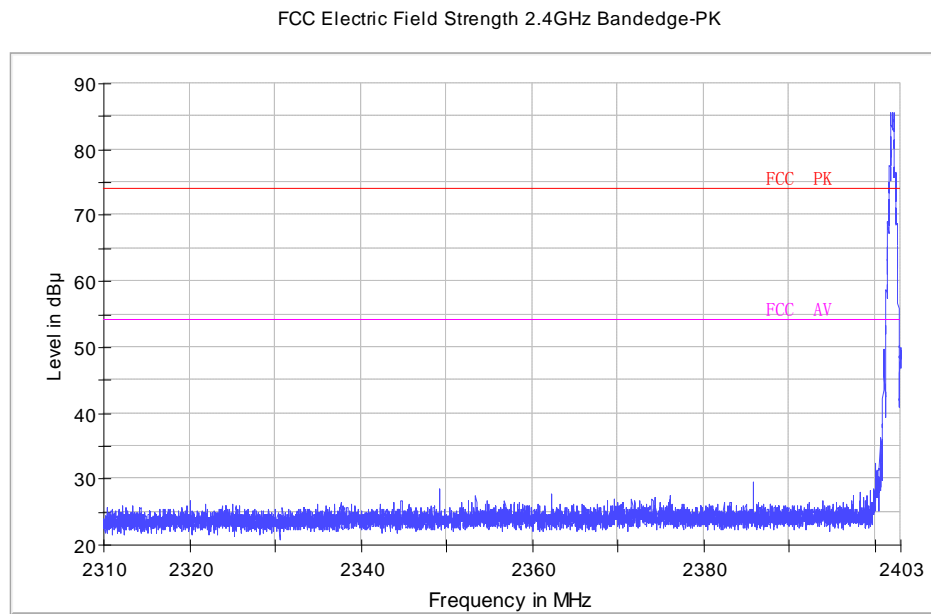
12.3.Test Results

The measured plots are attached on the following. Test data shows compliance with the band edge requirement in part 15.247(d).

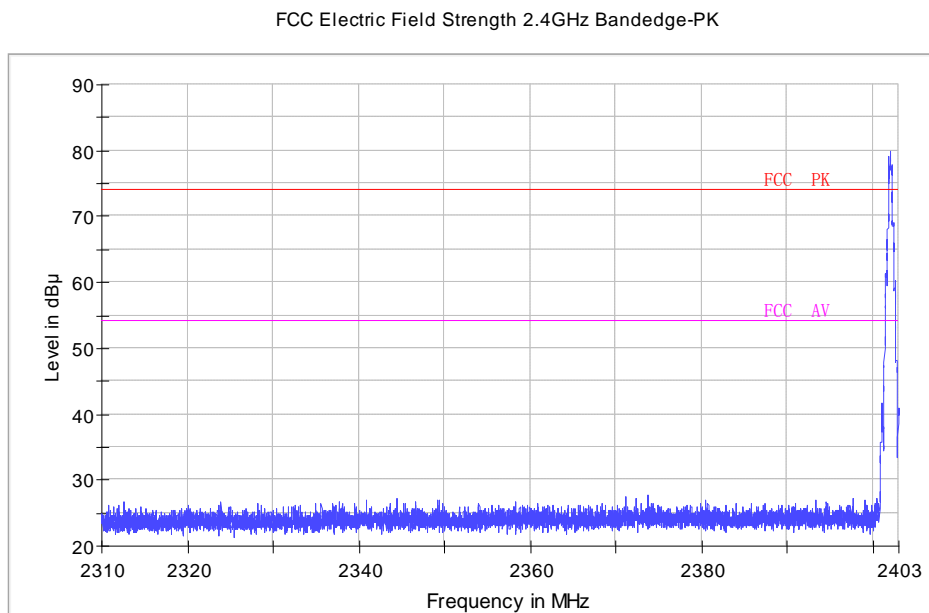
Bluetooth Basic Rate

Low edge

Horizontal

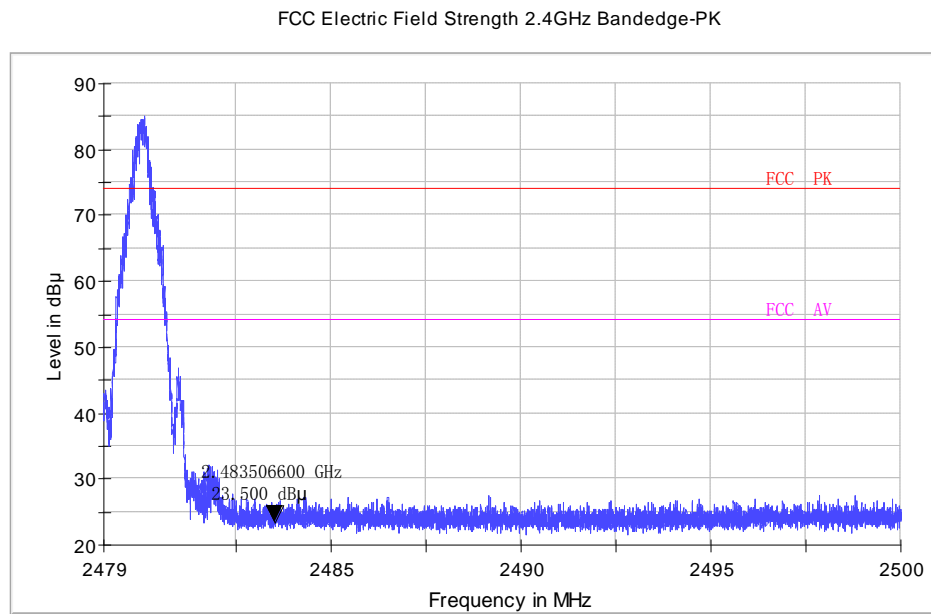


Vertical

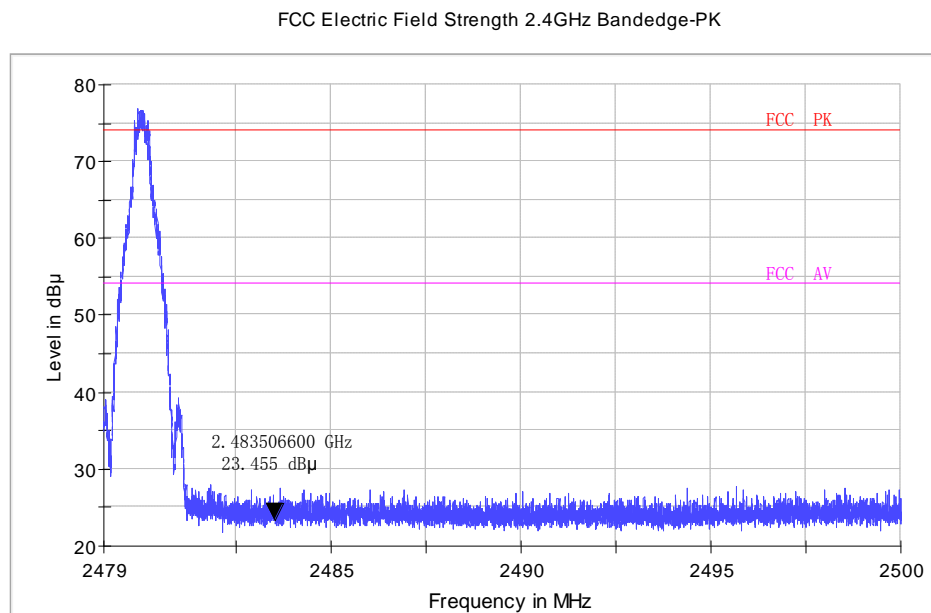


Upper Edge

Horizontal



Vertical

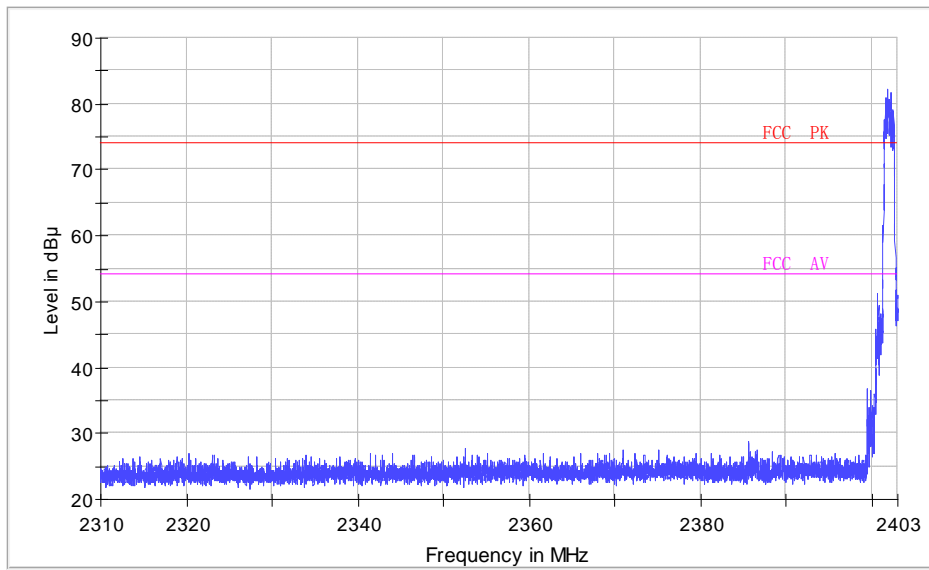


Bluetooth EDR

Low edge

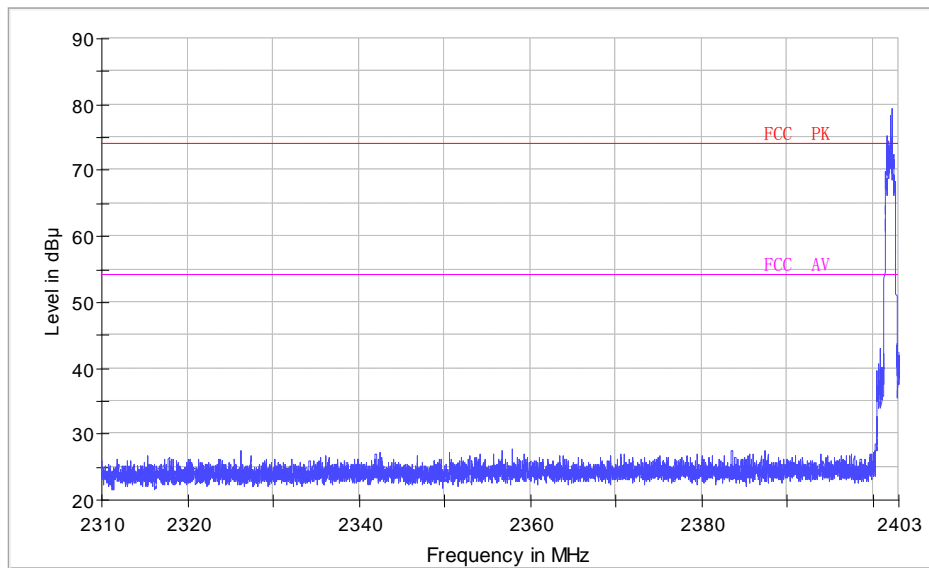
Horizontal

FCC Electric Field Strength 2.4GHz Bandedge-PK



Vertical

FCC Electric Field Strength 2.4GHz Bandedge-PK

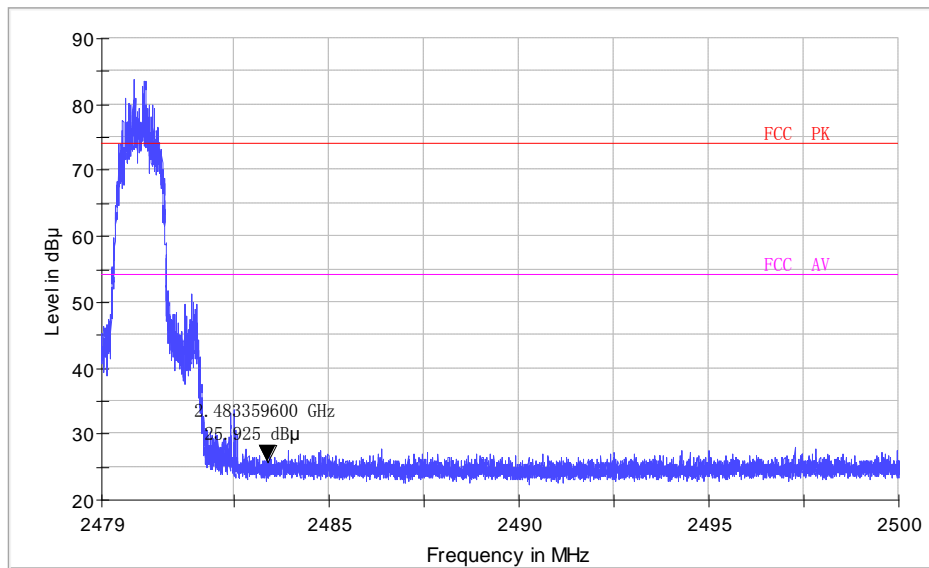


Bluetooth EDR

Upper edge

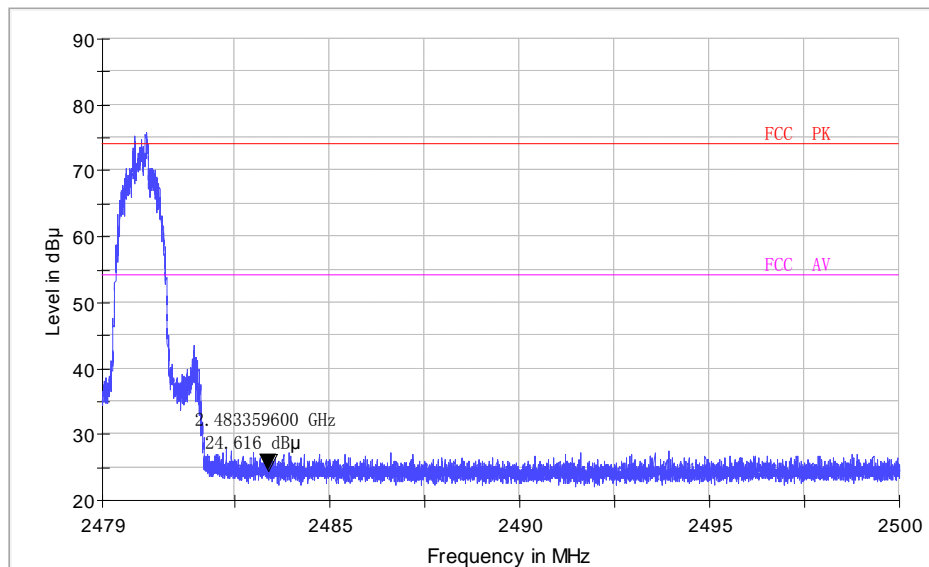
Horizontal

FCC Electric Field Strength 2.4GHz Bandedge-PK



Vertical

FCC Electric Field Strength 2.4GHz Bandedge-PK



13. CONDUCTED SPURIOUS EMISSIONS

13.1. Limits of Band Edges Measurement

Below – 20dB of the highest emission level of operating band (in 100kHz resolution bandwidth).

13.2.Test Procedure

The transmitter output and CBT output were connected to the spectrum analyzer through a power divider. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

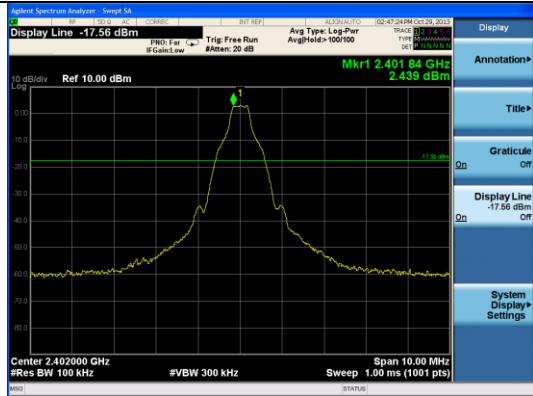
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The band edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal

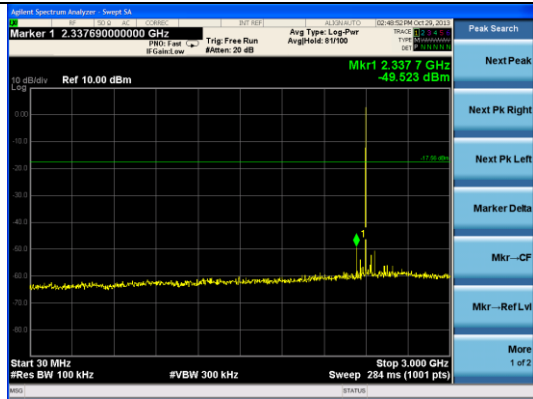
13.3.TEST RESULTS

Bluetooth Basic
Low channel

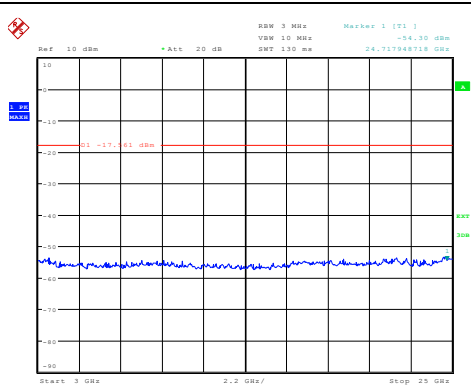
Pref



30MHz-3GHz

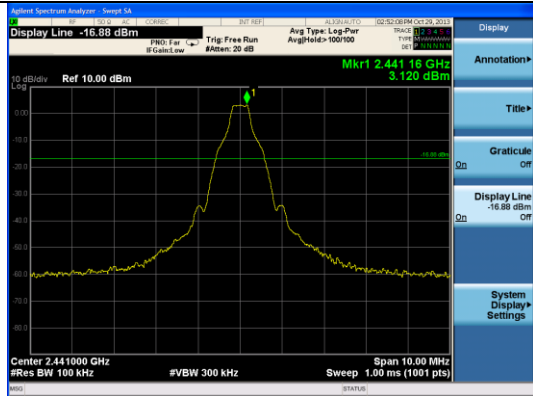


3GHz-25GHz

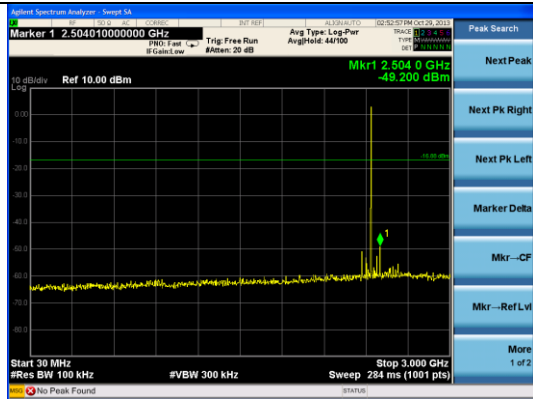


Bluetooth Basic
Mid channel

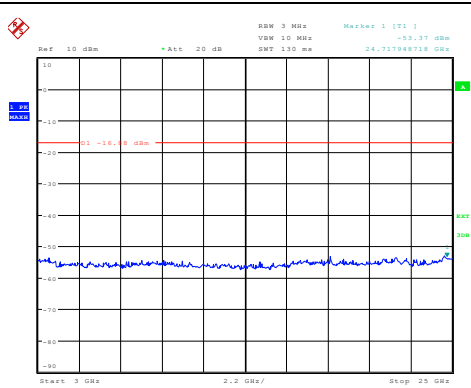
Pref



30MHz-3GHz

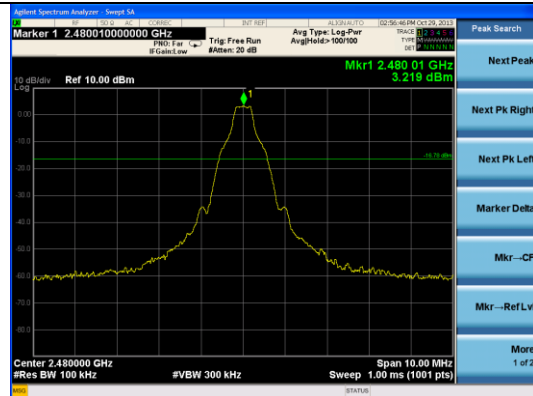


3GHz-25GHz

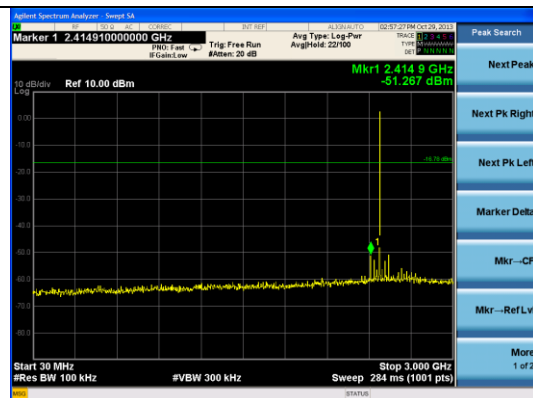


Bluetooth Basic High Channel

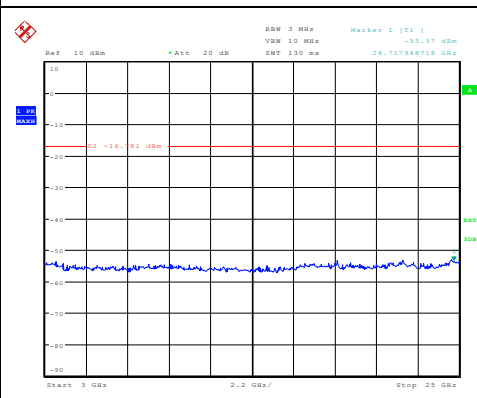
Pref



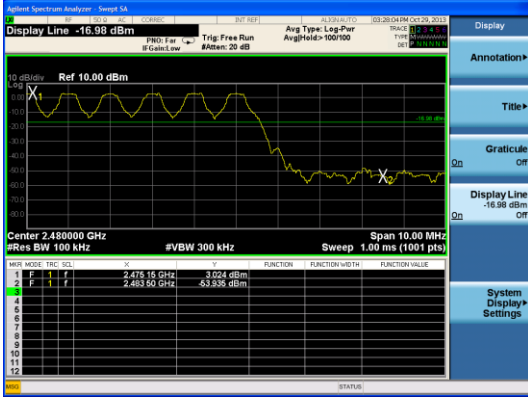
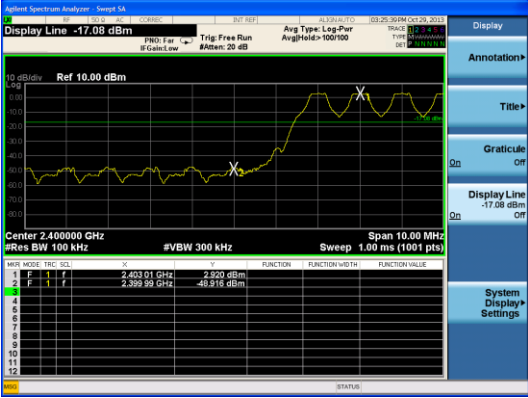
30MHz-3GHz



3GHz-25GHz

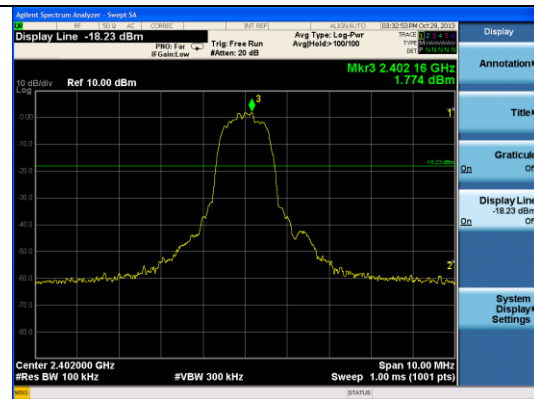


Bluetooth Basic
Bandedge hopping On

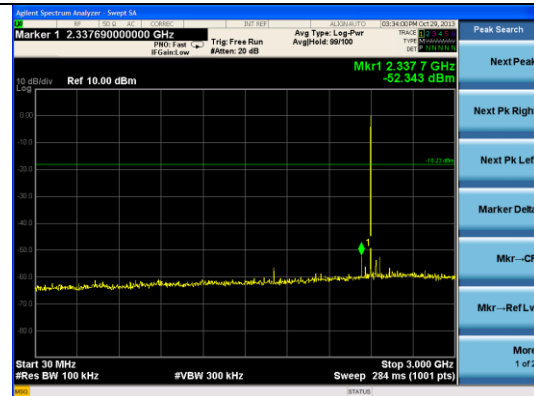


Bluetooth EDR Low Channel

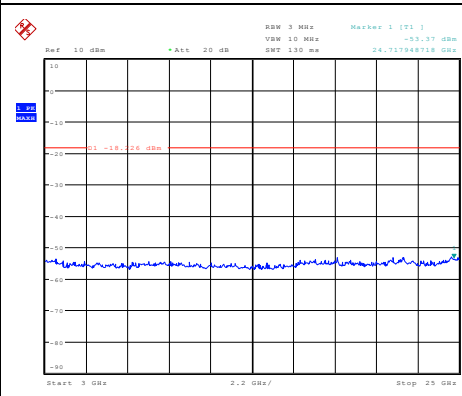
Pref



30MHz-3GHz



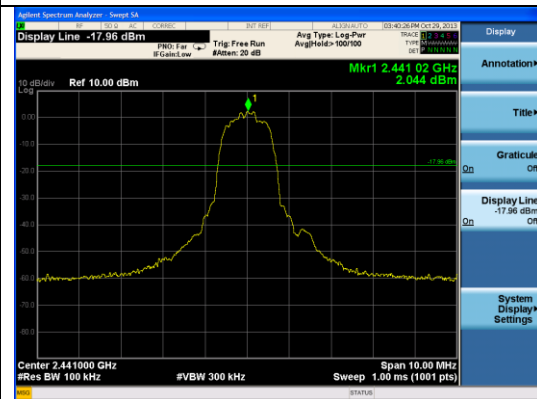
3GHz-25GHz



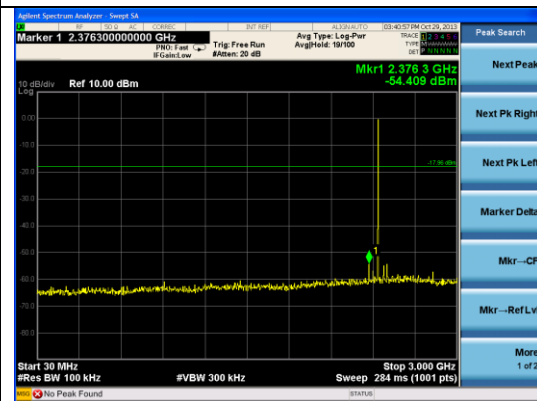
Bluetooth EDR

Mid Channel

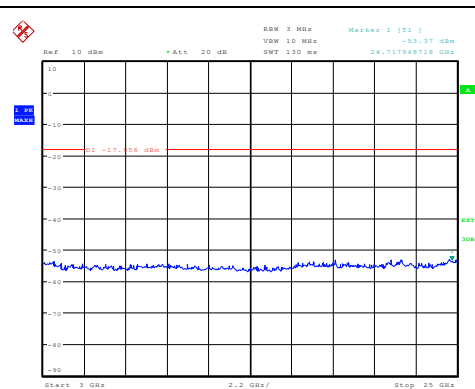
Pref



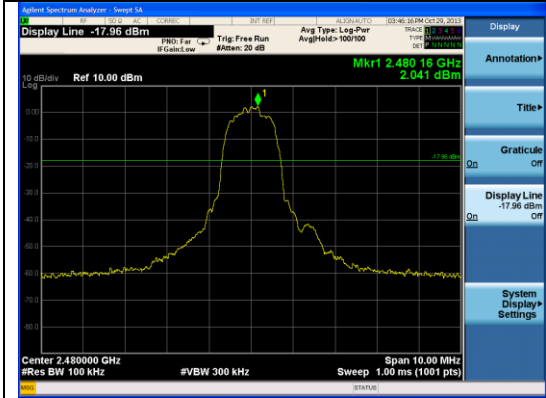
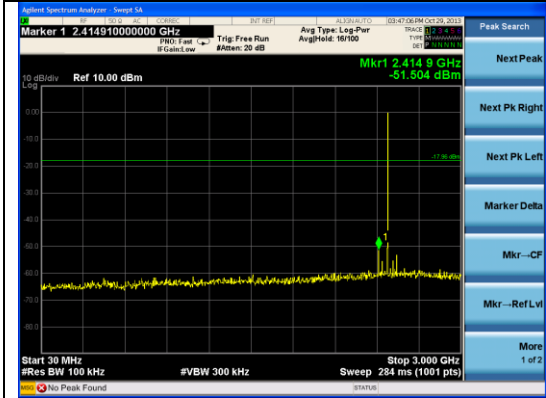
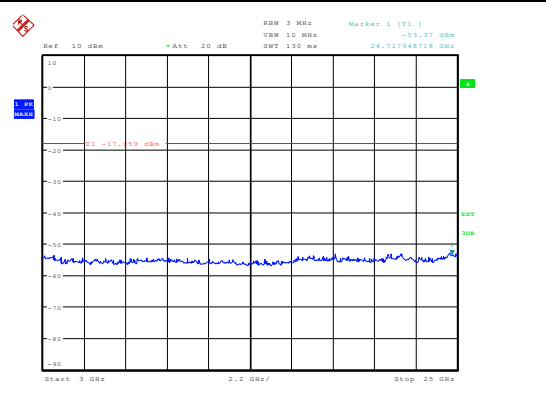
30MHz-3GHz



3GHz-25GHz



Bluetooth EDR
High Channel

| | |
|---|--|
| Pref | |
|  | |
| 30MHz-3GHz | 3GHz-25GHz |
|  |  |

Bluetooth EDR Bandedge



14. ANTENNA REQUIREMENT

According to Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

The EUT has a built in antenna which is integrated inside the enclosure, this is permanently attached antenna and meets the requirements of this section.