# FCC
# RF Test Report - EDR

**Product Name: HSDPA/HSUPA/UMTS/GSM/GPRS/EDGE Mobile Phone with Bluetooth**

**Model Number: U6020**

**Report No: SYBH(Z-RF)022062012-2005**
**FCC ID: QISU6020**


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# Notice

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| | |
|---|---|
| **REGULATION** | **FCC CFR47 Part 2:2011: Subpart J;** |
| | **FCC CFR47 Part 15:2011: Subpart C;** |
| | **ANSI C63.10:2009** |
| | |
| **START OF TEST** | **Jun., 25, 2012** |
| **END OF TEST** | **Jun., 30, 2012** |
| | |
| **Final Judgement:** | **Pass** |

| | | | |
|---|---|---|---|
| Approved By Senior Engineer | Aug., 13, 2012 | Dai Linjun | Dai Linjun |
| | Date | Name | Signature |
| Reviewed By | Aug., 13, 2012 | | Cousy Xu |
| | Date | Name | Signature |
| Operated By | Aug., 13, 2012 | Huang Qiuliang | Huang Qiuliang |
| | Date | Name | Signature |

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# 1 Summary

The table below summarizes the measurements and results for the EUT. Detailed results and descriptions are shown in the following pages.

Table 1 Summary of results

| FCC Measurement Specification | Description | Result |
|---|---|---|
| 15.247 (a) (1) | Bandwidth measurement | PASS |
| 15.247 (a) (1) | Carrier frequency separation measurement | PASS |
| 15.247 (a) (1) III | Number of hopping channel | PASS |
| 15.247 (a) (1) III | Time of occupancy | PASS |
| 15.247 (b) (1) | Peak output power | PASS |
| 15.247 (d) | Band edge compliance measurement | PASS |
| 15.247 (d) | Conducted RF spurious | PASS |
| 15.247 (d) / 15.205 & 15.209 | Radiated spurious emission & Radiated restricted band measurement | PASS |
| 15.207 | Conducted emission test for power port | PASS |

# 2 Product Description

## 2.1 Production Information

### 2.1.1 General Description

HSDPA/HSUPA/UMTS/GSM/GPRS/EDGE Mobile Phone with Bluetooth U6020 is subscriber equipment in the WCDMA/GSM system. The UMTS frequency band includes Band I and Band II and Band IV. The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900. The Mobile Phone implements such functions as RF signal receiving/transmitting, UMTS and GSM/GPRS/EDGE protocol processing, voice, MMS service, AGPS etc. Externally it provides micro SD card interface, earphone port (to provide voice service) and USIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

**Note: Only the Bluetooth test data included in this report.**

### 2.1.2 Support function and Service

The EUT support the Bluetooth's function and service as follows:

Table 2 Service and Test mode List

| Service Name | Characteristic | Corresponding Test Mode | Note |
|---|---|---|---|
| Data and Voice | Modulation: π /4-DQPSK | TM1 | / |
| Data and Voice | Modulation: 8DPSK | TM2 | / |

## 2.2 Modification Information

For original equipment, following table is not application.

Table 3 Modification Information

| Model Number | Board/Module | Original Version | New Version | Modify Information |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Not applicable!

# 3 Test Site Description

The test site of:

***Huawei Technologies Co. Ltd.***
***P.O. Box 518129***
***Huawei base, bantian,***
***Longgang District, Shenzhen, China***

# 4 General Setup Description

The Bluetooth hopping frequency system of EUT can Support 2.4GHz Band. For compliance with FCC regulation 47CFR part15 subpart C, we set the EUT as in the following test mode to do all compliance tests.

**Bluetooth MODE:**

**TM1:**π /4-DQPSK Modulation
**TM2:** 8DPSK Modulation

# 5 Product Description

## 5.1 Technical Characteristics

### 5.1.1 Frequency Range

Table 4 Frequency Range

| | | |
|---|---|---|
| Uplink band: | 2400 to 2483.5 MHz | |
| Downlink band: | 2400 to 2483.5 MHz | |
| Hop frequency support: | ☒ YES | ☐ NO |

### 5.1.2 Channel Spacing / Separation

Table 5 Channel Spacing / Separation

| | |
|---|---|
| Channel spacing: | 1 MHz |
| Channel separation: | 1 MHz |

### 5.1.3 Antenna Information

Table 6 Antenna Information

| | |
|---|---|
| Type: | Integrated / Internal |
| Maximum Gain(dBi): | 1.83(from 2400MHz to 2500MHz) |

### 5.1.4 Environmental Requirements

Table 7 Environmental Requirements

| | |
|---|---|
| Minimum temperature: | - 10 °C |
| Maximum temperature: | + 55 °C |
| Relative Humidity: | 5%-95% |

### 5.1.5 Power Source

Table 8 Power Source

| | |
|---|---|
| AC voltage nominal: | ~120V |
| AC voltage range | ~100V-240V |

### 5.1.6 Tune-up Procedure

According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (9).

Please reference the document Tune-up Procedure in TCF.

## 5.2 EUT Identification List

### 5.2.1 Board Information

Table 9 Board Information

| HSDPA/HSUPA/UMTS/GSM/GPRS/EDGE Mobile Phone with Bluetooth | | |
|---|---|---|
| U6020 | | |
| Board and Module | | |
| Hardware Version | Software Version | Description |
| Ver.B | HUAWEI U6020 V100R001CCUB301 | Main board of Mobile Phone |

### 5.2.2 Adapter Technical Data

| | |
|---|---|
| AC/DCAdapter Model | HS-050040U6(02130875) |
| Manufacturer | Huawei Technologies Co., Ltd. |
| Input Voltage | ~ 100-240V 50/60Hz |
| Output Voltage | ⎓ 5.0 V |
| Rated Power | 2W |

### 5.2.3 Battery Technical Data

| Name | Manufacture | Description |
|---|---|---|
| Rechargeable Li-ion | Huawei Technologies Co., Ltd. | Battery Model: HB5A2(24021106)<br>Rated capacity: 1000mAh<br>Nominal Voltage: ⎓ +3.7V<br>Charging Voltage: ⎓ +4.2V |

### 5.2.4 Cables Used during Test

| Cable | Quantity | Length | Type of Cable |
|---|---|---|---|
| USB | 1 | <3m | shielded |
| Earphone | 1 | <3m | unshielded |
| Lan | 1 | <3m | unshielded |

Table 10

### 5.2.5 Associated Equipment Used during Test

| Name | Model | Manufacturer | S/N | Calibrated Deadline | Cal interval (month) |
|---|---|---|---|---|---|
| Notebook | X200 | Lenovo | 3108052581 | / | / |

### 5.2.6 FCC Identification

**Grantee Code:QIS**
**Product Code: U6020**
**FCC Identification: QISU6020**

# 6 Main Test Instruments

Table 11 Main Test Equipments

| Equipment Description | Manufacturer | Model | Serial Number | Calibrated until |
|---|---|---|---|---|
| Power supply | KEITHLEY | 2303 | 1288003 | Sept., 27, 2012 |
| Wireless Communication Test set | Agilent | N4010A | MY49081592 | Nov., 26, 2012 |
| Spectrum Analyzer | Agilent | E4440A | MY48250119 | Jul., 17, 2012 |
| Signal Analyzer | R&S | FSQ31 | 200021 | Sept., 27, 2012 |
| Spectrum Analyzer | Agilent | N9030A | MY49431698 | Oct., 16, 2012 |
| Temperature Chamber | WEISS | WKL64 | 24600294 | Feb., 13, 2013 |
| Signal generator | Agilent | E8257D | MY49281095 | Jul., 09, 2012 |
| Test receiver | R&S | ESU26 | 100150 | May., 29, 2013 |
| Spectrum analyzer | R&S | FSU3 | 200474 | Mar., 05, 2013 |
| Spectrum analyzer | R&S | FSU43 | 100144 | Mar., 05, 2013 |
| Double-Ridged Waveguide Horn Antenna (1G~18GHz) | R&S | HF907 | 100304 | Apr., 05, 2013 |
| Double-Ridged Waveguide Horn Antenna (1G~18GHz) | R&S | HF907 | 100391 | Apr., 05, 2013 |
| Trilog Broadband Antenna (30M~3GHz) | SCHWARZBECK | VULB 9163 | 9163-521 | Jul., 07, 2012 |
| Pyramidal Horn Antenna(26GHz-40GHz) | ETS-Lindgren | 3160-10 | 00123940 | Feb., 27, 2013 |
| Pyramidal Horn Antenna(18GHz-26.5GHz) | ETS-Lindgren | 3160-09 | 00125912 | Feb.,27, 2013 |
| EMI Test receiver | R&S | ESCI | 101163 | Mar.05, 2013 |
| Artificial Mains Network | R&S | ENV216 | 100382 | Mar.21, 2013 |

Note: All the equipments are calibrated once a year. When it's almost due, we will arrange calibration again before the calibration deadline.

# 7 Transmitter Measurements

## 7.1 Bandwidth measurement

### 7.1.1 Test Conditions

Table 12 Test Conditions

| | |
|---|---|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25 °C |
| Relative humidity: | 55% |
| Test Configurations: | TM1/TM2 at channel No.0, 40, 78 |

### 7.1.2 Test Specifications and Limits

#### 7.1.2.1 Specification

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

#### 7.1.2.2 Supporting Standards

Table 13 Supporting Standards:

| | |
|---|---|
| ANSI C63.10-2009 | American National Standard for Testing Unlicensed Wireless Devices |

#### 7.1.2.3 Limits

Not Applicable.

### 7.1.3 Test Method and Setup

(a) Connect EUT test port to universal communication tester.
(b) Set the EUT to transmit maximum output power at 2.4GHz and switch off frequency hopping function, then set the measured frequency number and test the bandwidth with universal communication tester.

## Test setup

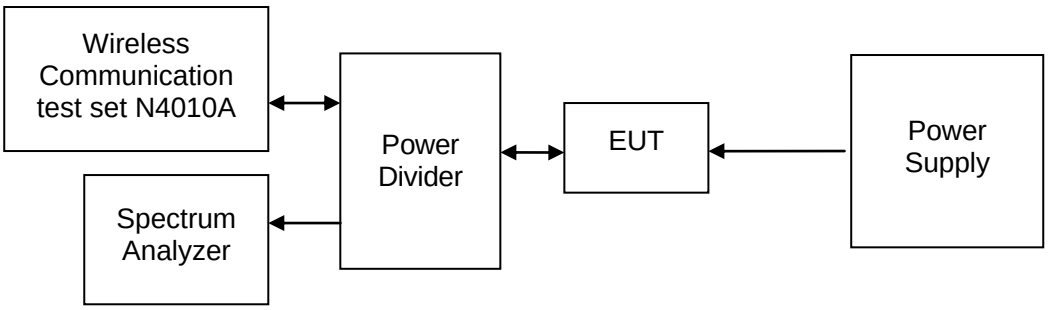



Figure 1. Test Set-up

### 7.1.4 Measurement Results

Table 14 Measurement Results TM1（Modulation: π /4-DQPSK）

| Channel Position | Channel Number | Frequency [MHz] | Bandwidth Type | Measured Bandwidth [MHz] | Result |
|---|---|---|---|---|---|
| L | 0 | 2402 | 20dB | 1.327 | Pass |
| | | | 99% | 1.188 | Pass |
| M | 40 | 2442 | 20dB | 1.286 | Pass |
| | | | 99% | 1.174 | Pass |
| H | 78 | 2480 | 20dB | 1.307 | Pass |
| | | | 99% | 1.177 | Pass |

Table 15 Measurement Results TM2（Modulation: 8DPSK）

| Channel Position | Channel Number | Frequency [MHz] | Bandwidth Type | Measured Bandwidth [MHz] | Result |
|---|---|---|---|---|---|
| L | 0 | 2402 | 20dB | 1.301 | Pass |
| | | | 99% | 1.174 | Pass |
| M | 40 | 2442 | 20dB | 1.302 | Pass |
| | | | 99% | 1.192 | Pass |
| H | 78 | 2480 | 20dB | 1.310 | Pass |
| | | | 99% | 1.198 | Pass |

### 7.1.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix A.

## 7.2 Carrier frequency separation measurement

### 7.2.1 Test Conditions

Table 16 Test Conditions

| | |
|---|---|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25 °C |
| Relative humidity: | 55% |
| Test Configurations: | TM1/TM2 at channel No.39, 40, 41 |

### 7.2.2 Test Specifications and Limits

#### 7.2.2.1 Specification

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

#### 7.2.2.2 Supporting Standards

Table 17 Supporting Standards:

| | |
|---|---|
| ANSI C63.10-2009 | American National Standard for Testing Unlicensed Wireless Devices |

#### 7.2.2.3 Limits

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.

Table 18 Limits TM1（Modulation: π/4-DQPSK）

| | |
|---|---|
| Regulation: | ≥ 0.025 or 2/3 of the 20 dB bandwidth |
| Limit: | ≥ 2/3 × 1.286M = 0.857 MHz |

Table 19

Table 20 Limits TM2（Modulation: 8DPSK）

| | |
|---|---|
| Regulation: | ≥ 0.025 or 2/3 of the 20 dB bandwidth |
| Limit: | ≥ 2/3 × 1.302M = 0.868 MHz |

### 7.2.3 Test Method and Setup

(a) Connect EUT test port to spectrum analyzer and universal communication tester.
(b) Set the EUT 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.

## Test setup

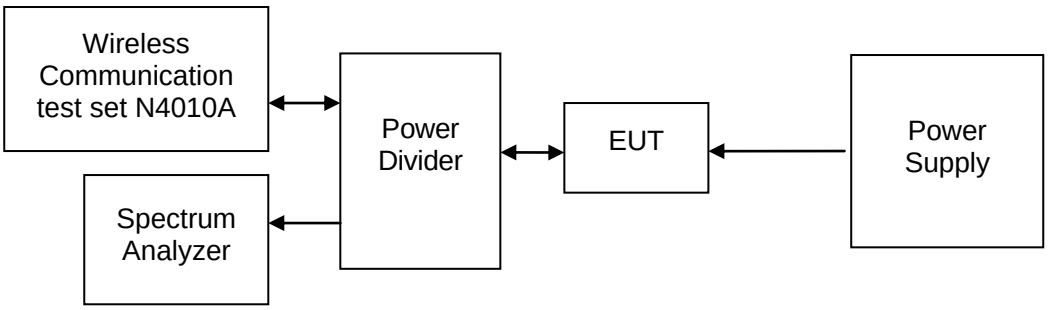



Figure 2. Test Set-up

### 7.2.4 Measurement Results

Table 21 Measurement Results TM1（Modulation: π /4-DQPSK）

| Channel No. | Frequency [MHz] | Channel No. | Frequency [MHz] | Measured frequency separation [MHz] | Limit [MHz] | Result |
|---|---|---|---|---|---|---|
| 40 | 2442 | 39 | 2441 | 0.867 | ≥0.857 | Pass |
| 40 | 2442 | 41 | 2443 | 1.125 | ≥0.857 | Pass |

Table 22Measurement Results TM2（Modulation: 8DPSK）

| Channel No. | Frequency [MHz] | Channel No. | Frequency [MHz] | Measured frequency separation [MHz] | Limit [MHz] | Result |
|---|---|---|---|---|---|---|
| 40 | 2442 | 39 | 2441 | 1.050 | ≥0.868 | Pass |
| 40 | 2442 | 41 | 2443 | 1.158 | ≥0.868 | Pass |

### 7.2.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix B.

## 7.3 Number of hopping channel

### 7.3.1 Test Conditions

Table 23 Test Conditions

| | |
|---|---|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25 °C |
| Relative humidity: | 55% |
| Test Configurations: | TM1/TM2 at hopping frequency state |

### 7.3.2 Test Specifications and Limits

#### 7.3.2.1 Specification

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

#### 7.3.2.2 Supporting Standards

Table 24 Supporting Standards:

| | |
|---|---|
| ANSI C63.10-2009 | American National Standard for Testing Unlicensed Wireless Devices |

#### 7.3.2.3 Limits

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

Table 25 Limits

| | |
|---|---|
| Limits | ≥ 15 hopping frequency channel |

### 7.3.3 Test Method and Setup

(a) Connect EUT test port to spectrum analyzer and universal communication tester.
(b) Set the EUT 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.

## Test setup

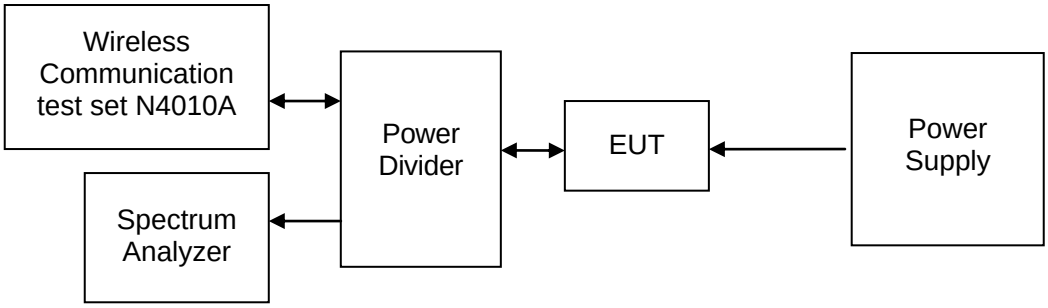



Figure 3. Test Set-up

### 7.3.4 Measurement Results

Table 26 Measurement Results TM1（Modulation: π /4-DQPSK）

| Measured frequency range [MHz] | Channel No. range | Measured Channel No. | Limit | Result |
|---|---|---|---|---|
| 2400 to 2483.5 | 0-78 | 79 | ≥ 15 | Pass |

Table 27 Measurement Results TM2（Modulation: 8-DPSK）

| Measured frequency range [MHz] | Channel No. range | Measured Channel No. | Limit | Result |
|---|---|---|---|---|
| 2400 to 2483.5 | 0-78 | 79 | ≥ 15 | Pass |

### 7.3.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix C.

## 7.4 Time of occupancy

### 7.4.1 Test Conditions

Table 28 Test Conditions

| | |
|---|---|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25°C |
| Relative humidity: | 55% |
| Test Configurations: | TM1/TM2 at hopping frequency state |

### 7.4.2 Test Specifications and Limits

#### 7.4.2.1 Specification

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

#### 7.4.2.2 Supporting Standards

Table 29 Supporting Standards:

| | |
|---|---|
| ANSI C63.10-2009 | American National Standard for Testing Unlicensed Wireless Devices |

#### 7.4.2.3 Limits

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.

Table 30 Limits

| | |
|---|---|
| Limits for time of occupancy | ≤ 0.4s |

### 7.4.3 Test Method and Setup

(a) Connect EUT test port to spectrum analyzer and universal communication tester.
(b) Set the EUT 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 to1 MHz and the video bandwidth to 1 MHz, then get the time domain measured diagram. 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 to1 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.

## Test setup

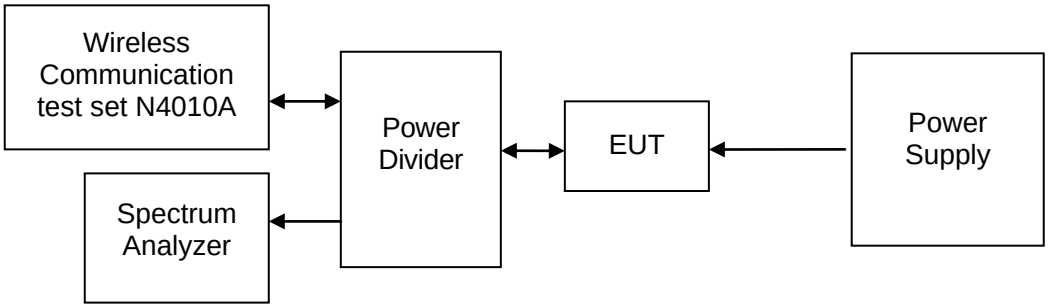



Figure 4. Test Set-up

### 7.4.4 Measurement Results

Table 31 Measurement Results TM1（Modulation: π /4-DQPSK）

| Time of Single Slot [ms] | Numbers of slots in a period | Time of occupied in a period [s] | Limit [s] | Result |
|---|---|---|---|---|
| 2.9 | 106.7 | 0.30943 | ≤ 0.4 | Pass |

Table 32 Measurement Results TM2（Modulation: 8DPSK）

| Time of Single Slot [ms] | Numbers of slots in a period | Time of occupied in a period [s] | Limit [s] | Result |
|---|---|---|---|---|
| 3.0 | 106.7 | 0.3201 | ≤ 0.4 | Pass |

Note: The result is measured at 2-DH5\3-DH5 mode in π /4-DQPSK\8DPSK modulation, which has the longest time in one transmission burst.

### 7.4.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix D.

## 7.5 Peak output power

### 7.5.1 Test Conditions

Table 33 Test Conditions

| | |
|---|---|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25 °C |
| Relative humidity: | 55% |
| Test Configurations: | TM1/TM2 at channel No.0, 40, 78 |

### 7.5.2 Test Specifications and Limits

#### 7.5.2.1 Specification

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

#### 7.5.2.2 Supporting Standards

Table 34 Supporting Standards:

| | |
|---|---|
| ANSI C63.10-2009 | American National Standard for Testing Unlicensed Wireless Devices |

#### 7.5.2.3 Limits

Comply 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.

Table 35 Limits

| | |
|---|---|
| 2.4GHz and 5.8GHz hopping frequency system | 1 Watt (=30 dBm) |

### 7.5.3 Test Method and Setup

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

## Test setup

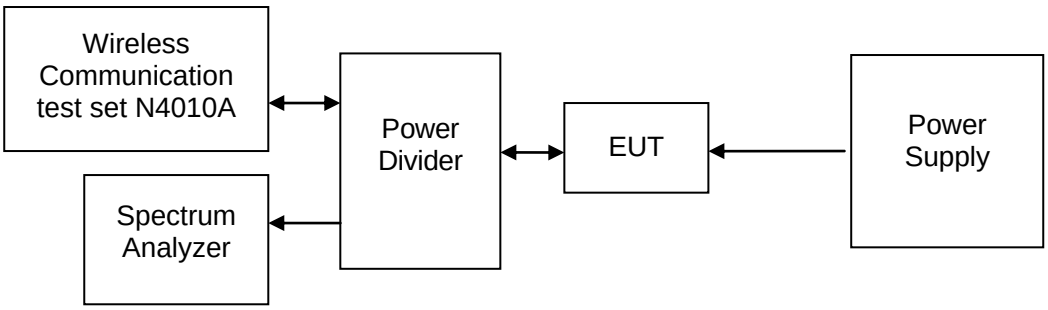



Figure 5. Test Set-up

### 7.5.4 Measurement Results

Table 36 Measurement Results TM1（Modulation: π /4-DQPSK）

| Channel | Channel No. | Center Freq.[MHz] | Meas. Level (Cond.) [dBm] | Limit [dBm] | Result |
|---|---|---|---|---|---|
| L | 0 | 2402 | 7.27 | < 30 | Pass |
| M | 40 | 2442 | 7.41 | < 30 | Pass |
| H | 78 | 2480 | 7.34 | < 30 | Pass |

Table 37 Measurement Results TM2（Modulation: 8DPSK）

| Channel | Channel No. | Center Freq.[MHz] | Meas. Level (Cond.) [dBm] | Limit [dBm] | Result |
|---|---|---|---|---|---|
| L | 0 | 2402 | 7.28 | < 30 | Pass |
| M | 40 | 2442 | 7.44 | < 30 | Pass |
| H | 78 | 2480 | 7.35 | < 30 | Pass |

### 7.5.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix E.

## 7.6 Band edge spurious emission

### 7.6.1 Test Conditions

Table 38 Test Conditions

| | |
|---|---|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25°C |
| Relative humidity: | 55% |
| Test Configurations: | TM1/TM2 at channel No. 0, 78 and frequency hopping state |

### 7.6.2 Test Specifications and Limits

#### 7.6.2.1 Specification

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

#### 7.6.2.2 Supporting Standards

Table 39 Supporting Standards:

| | |
|---|---|
| ANSI C63.10-2009 | American National Standard for Testing Unlicensed Wireless Devices |

#### 7.6.2.3 Limits

Comply with part 15.247 (d), 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 Section 15.209(a) is not required.
.

Table 40 Limits

| | |
|---|---|
| Band edge spurious: | 20 dBc/100kHz |

### 7.6.3 Test Method and Setup

(a) Connect EUT test port to spectrum analyzer and universal communication tester
(b) Set the EUT to transmit maximum output power at 2.4GHz and switch off frequency hopping function.
(c) Then set the EUT to transmit at high, low frequency and measure the conducted band edge spurious separately.
(d) Switch on the frequency hopping function, and repeat above measurement.

## Test setup

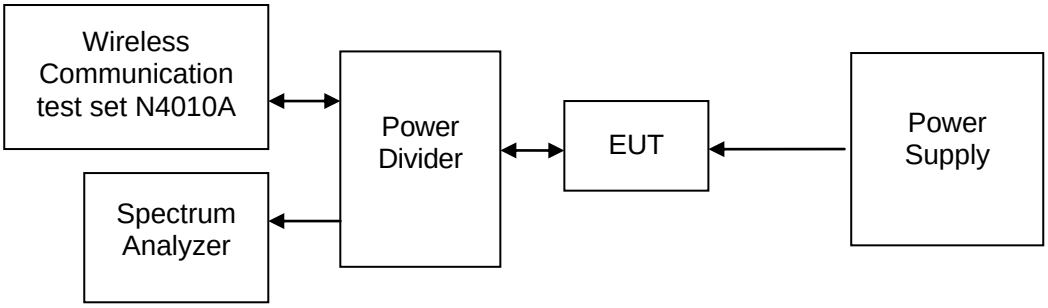



Figure 6. Test Set-up

### 7.6.4 Measurement Results

Table 41 Measurement Results for Band Edge immediately outside the 2.4GHz Band

Table 42TM1（Modulation: π /4-DQPSK）

| | Channel No. | Carrier Frequency [MHz] | Carrier Power [dBm] | Frequency Hopping | Max. Spurious Level [dBm] | Limit [dBm] | Result |
|---|---|---|---|---|---|---|---|
| Low Edge | 0 | 2402 | 6.13 | Off | -45.53 | -13.9 | Pass |
| | - | - | 5.59 | On | -50.19 | -14.1 | Pass |
| High Edge | 78 | 2480 | 6.12 | Off | -53.03 | -13.9 | Pass |
| | - | - | 5.55 | On | -54.13 | -14.4 | Pass |

Table 43 Measurement Results for Band Edge immediately outside the 2.4GHz Band

Table 44TM2（Modulation: 8DPSK）

| | Channel No. | Carrier Frequency [MHz] | Carrier Power [dBm] | Frequency Hopping | Max. Spurious Level [dBm] | Limit [dBm] | Result |
|---|---|---|---|---|---|---|---|
| Low Edge | 0 | 2402 | 6.15 | Off | -45.02 | -13.9 | Pass |
| | - | - | 6.02 | On | -51.37 | -14.0 | Pass |
| High Edge | 78 | 2480 | 6.11 | Off | -53.76 | -13.9 | Pass |
| | - | - | 5.63 | On | -53.40 | -14.4 | Pass |

### 7.6.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix F.

## 7.7 Conducted RF Spurious

### 7.7.1 Test Conditions

Table 45 Test Conditions

| | |
|---|---|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25 °C |
| Relative humidity: | 55% |
| Test Configurations: | TM1/TM2 at channel No.0, 40, 78 |

### 7.7.2 Test Specifications and Limits

#### 7.7.2.1 Specification

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

#### 7.7.2.2 Supporting Standards

Table 46 Supporting Standards:

| | |
|---|---|
| ANSI C63.10-2009 | American National Standard for Testing Unlicensed Wireless Devices |

#### 7.7.2.3 Limits

Comply with part 15.247 (d), 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 Section 15.209(a) is not required.
.

Table 47 Limits

| | |
|---|---|
| Band edge spurious: | 20 dBc/100kHz |

### 7.7.3 Test Method and Setup

(a) Connect EUT test port to spectrum analyzer and universal communication tester
(b) Set the EUT to transmit maximum output power at 2.4GHz and switch off frequency hopping function.
(c) Then set the EUT to transmit at high, middle and low frequency and measure the conducted band edge spurious separately.
(d) Switch on the frequency hopping function, and repeat the above measurement.

## Test setup

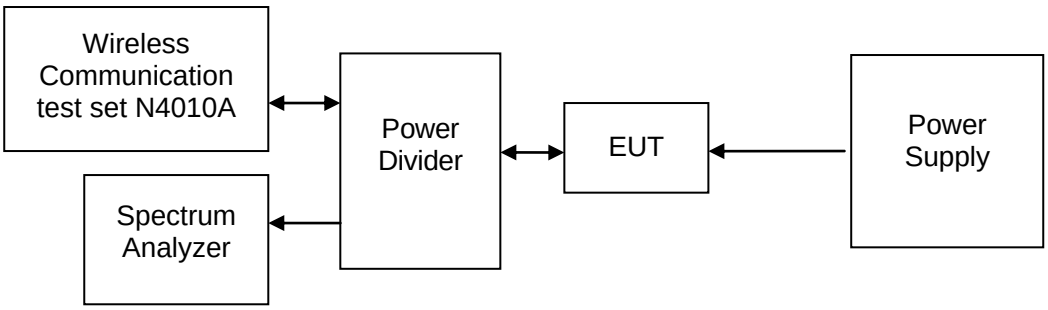



Figure 7. Test Set-up

### 7.7.4 Measurement Results

Table 48 Measurement Results TM1（Modulation：π /4-DQPSK）

| Test Frequency Range | Channel No. | Carrier Frequency [MHz] | Carrier Power [dBm] | Frequency Hopping | Max. Spurious Level [dBm] | Limit [dBm] | Result |
|---|---|---|---|---|---|---|---|
| 9kHz-25GHz | 0 | 2402 | 5.18 | Off | -46.69 | -14.8 | Pass |
| 9kHz-25GHz | 40 | 2442 | 3.19 | Off | -44.63 | -16.8 | Pass |
| 9kHz-25GHz | 78 | 2480 | 2.82 | Off | -44.87 | -17.2 | Pass |

Table 49 Measurement Results TM2 （Modulation：8DPSK）

| Test Frequency Range | Channel No. | Carrier Frequency [MHz] | Carrier Power [dBm] | Frequency Hopping | Max. Spurious Level [dBm] | Limit [dBm] | Result |
|---|---|---|---|---|---|---|---|
| 9kHz-25GHz | 0 | 2402 | 4.40 | Off | -46.00 | -15.6 | Pass |
| 9kHz-25GHz | 40 | 2442 | 2.89 | Off | -43.34 | -17.1 | Pass |
| 9kHz-25GHz | 78 | 2480 | 5.09 | Off | -45.34 | -14.9 | Pass |

### 7.7.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix G.

## 7.8 Radiated spurious emission & spurious in restricted band

### 7.8.1 Test Conditions

Table 50 Test Conditions

| | |
|---|---|
| Preconditioning: | 0.5 hour |
| Measured at: | Enclosure |
| Ambient temperature: | 25 °C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2 at channel No.0, 40, 78 |

### 7.8.2 Test Specifications and Limits

#### 7.8.2.1 Specification

CFR 47 (FCC) part 15.247 (d), 15.205 & 15.209 and DA 00-705

#### 7.8.2.2 Supporting Standards

Table 51 Supporting Standards:

| | |
|---|---|
| ANSI C63.10-2009 | American National Standard for Testing Unlicensed Wireless Devices |

#### 7.8.2.3 Limits

According to part 15.247 (d) / 15.205 & 15.209, all spurious emission in the frequency range from 30MHz to 10$^{th}$ harmonics of carrier frequency should be meet the requirement of following table.

Table 52 Limits

| Frequency (MHz) | Field Strength (μV/m) | Field Strength (dBμV/m) | Measurement Distance (meters) | Detector |
|---|---|---|---|---|
| 30 - 88 | 100 | 40 | 3 | QP |
| 88 - 216 | 150 | 43.5 | 3 | QP |
| 216 - 960 | 200 | 46 | 3 | QP |
| 960 -1000 | 500 | 54 | 3 | QP |
| Above 1000 | 500 | 54 | 3 | AV |
| Above 1000 | 500 | 74 | 3 | PK |

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a) (see above table).

### 7.8.3 Test Method and Setup

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.10 (2009). The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.10:2009.The Radiated Disturbance measurements were made using a Rohde and Schwarz Test Receiver and control software.

A preliminary scan and a final scan of the emissions were made by using test script of software; the emissions were measured using a Quasi-Peak Detector below 1GHz, Peak Detector and AV detector above 1GHz. The maximal emission value was acquired by adjusting the antenna height, polarisation and turntable azimuth in accordance with the software setup. Normally, the height range of antenna was 1m to 4m, and the azimuth range of turntable was 0°to 360°. The receive antenna has two polarizations V and H.

A portable or small unlicensed wireless device shall be placed on a non-metallic test fixture or other nonmetallic support during testing. The supporting fixture shall permit orientation of the EUT in each of three orthogonal (x, y, z) axis positions such that emissions from the EUT are maximized.

The EUT communicates with the BTS simulator through Air interface. The EUT transmits maximum output power at 2.4GHz and switch off frequency hopping function.

Measurement bandwidth: 30 MHz - 1000 MHz: 120 kHz
Measurement bandwidth: 1000 MHz - 10th Carrier Frequency: 1 MHz

## Test set up

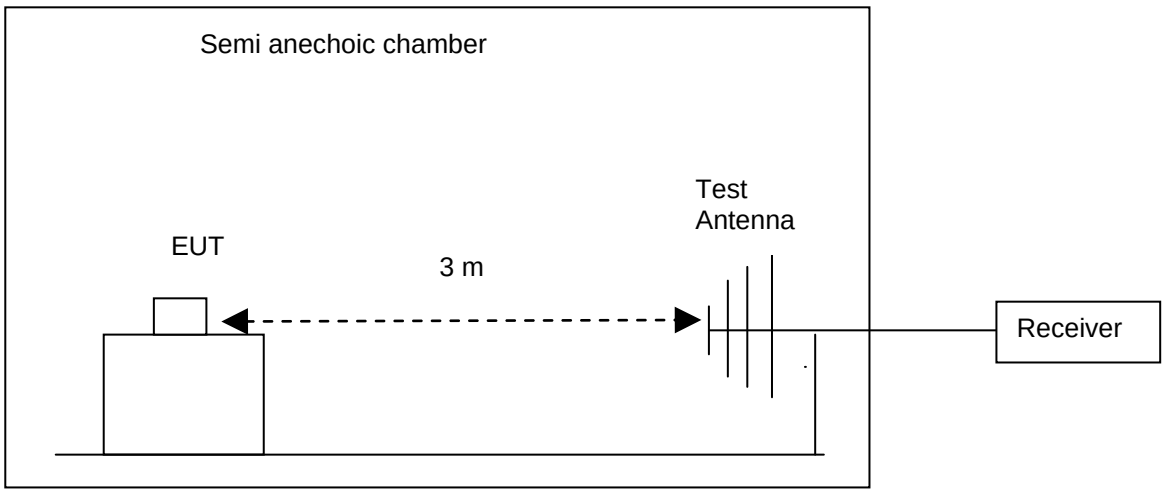



Figure 8. Test Set up

### 7.8.4 Measurement Results

Note 1: The following measurement results exceed the limit line is the carrier frequency.
Note 2: This test was carried out in all test modes, here only the worst test result was shown.

| Test Frequency Range | Channel No. | Carrier Frequency [MHz] | Measured | Result |
|---|---|---|---|---|
| 30MHz-26.5GHz | 0 | 2402 | Refer to Appendix H | Pass |
| 30MHz-26.5GHz | 40 | 2442 | Refer to Appendix H | Pass |
| 30MHz-26.5GHz | 78 | 2480 | Refer to Appendix H | Pass |

### 7.8.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix H.

## 7.9 Conducted Emission at Power Port

### 7.9.1 Test Conditions

Table 53 Test Conditions

| | |
|---|---|
| Preconditioning: | 0.5 hour |
| Measured at: | Power port |
| Ambient temperature: | 25°C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2 at channel No. 40 |

### 7.9.2 Test Specifications and Limits

#### 7.9.2.1 Specification

CFR 47 (FCC) part 15.207 and DA 00-705

#### 7.9.2.2 Supporting Standards

Table 54 Supporting Standards:

| | |
|---|---|
| ANSI C63.10-2009 | American National Standard for Testing Unlicensed Wireless Devices |

#### 7.9.2.3 Limits

Comply with part15.207, conducted emission must meet the requirement of following table.

Table 55 Limits

| Frequency of Emission (MHz) | Conducted Limit (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56 * | 56 to 46 * |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

Note: * Decreases with the logarithm of the frequency.

### 7.9.3 Test Method and Setup

The Table-top EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2009.

Conducted Disturbance at AC Port measurements were undertaken on the L and N Lines. The emissions were measured using a Quasi-Peak Detector and Average Detector.

The EUT communicates with the BTS simulator through Air interface, the BTS simulator controls the EUT to transmitter the maximum power which defined in specification of product. The EUT operated on the typical channel.

Measurement bandwidth (RBW) for 150kHz to 30 MHz: 9 kHz;

## Test Set-up

The EUT was set in the screened chamber and operated under nominal conditions.

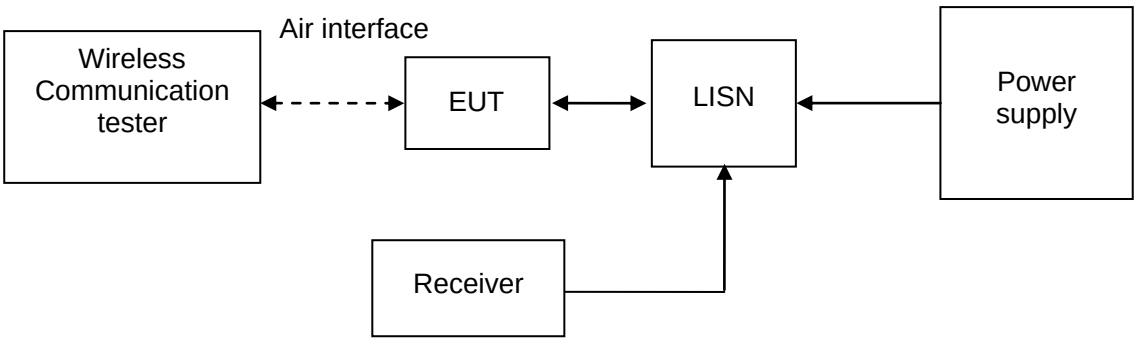



Figure 9. Test Set-up

### 7.9.4 Measurement Results

Table 56 MEASUREMENT RESULT:QP DECTER

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Line | PE |
|---|---|---|---|---|---|---|
| 0.174000 | 46.2 | 9.7 | 64.8 | 18.6 | L1 | FLO |
| 0.384000 | 30.4 | 9.7 | 58.2 | 27.8 | L1 | FLO |
| 1.656000 | 40.1 | 9.7 | 56.0 | 15.9 | N | FLO |
| 2.212000 | 45.1 | 9.7 | 56.0 | 10.9 | N | FLO |
| 4.356000 | 33.2 | 9.8 | 56.0 | 22.8 | N | FLO |
| 29.376000 | 35.7 | 10.4 | 60.0 | 24.3 | N | FLO |

Table 57 MEASUREMENT RESULT:AV DECTER

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Line | PE |
|---|---|---|---|---|---|---|
| 0.150000 | 35.1 | 9.7 | 56.0 | 20.9 | L1 | FLO |
| 0.352000 | 21.8 | 9.7 | 48.9 | 27.1 | L1 | FLO |
| 1.776000 | 28.4 | 9.7 | 46.0 | 17.6 | N | FLO |
| 2.196000 | 35.1 | 9.7 | 46.0 | 10.9 | N | FLO |
| 4.340000 | 15.4 | 9.8 | 46.0 | 30.6 | L1 | FLO |
| 23.260000 | 23.9 | 10.2 | 50.0 | 26.1 | N | FLO |

### 7.9.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix I.

# 8 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

Table 58 System Measurement Uncertainty

| Items | | Extended Uncertainty |
|---|---|---|
| Bandwidth measurement | Magnitude (%) | U＝0.2%; k=2 |
| Carrier frequency separation measurement | Magnitude (%) | U＝0.2%; k=2 |
| Time of occupancy | Magnitude (%) | U＝0.2%; k=2 |
| Peak output power | Power(dBm) | U=0.39dB; k=2 |
| Band edge compliance measurement | Disturbance Power(dBm) | U＝2.0dB; k=2 |
| Conducted RF spurious | Disturbance Power(dBm) | U＝2.0dB; k=2 |
| Radiated spurious emission & Radiated restricted band measurement | Field strength (dBμV/m) | U=2.2dB; k=2<br>U=5dB; k=2 |
| Conducted emission test for power port | Disturbance Voltage(dBμV) | U=4dB; k=2 |

# 9 Appendices List

| | |
|---|---|
| Appendix A | Measurement Results  Bandwidth measurement |
| Appendix B | Measurement Results Carrier frequency separation measurement |
| Appendix C | Measurement Results Number of hopping channel |
| Appendix D | Measurement Results Time of occupancy |
| Appendix E | Measurement Results Peak output power |
| Appendix F | Measurement Results Band edge compliance measurement |
| Appendix G | Measurement Results Conducted RF spurious |
| Appendix H | Measurement Results Radiated spurious emission |
| Appendix I | Measurement Results Conducted emission test for power port |
| Appendix J | Photos of Test Setup |

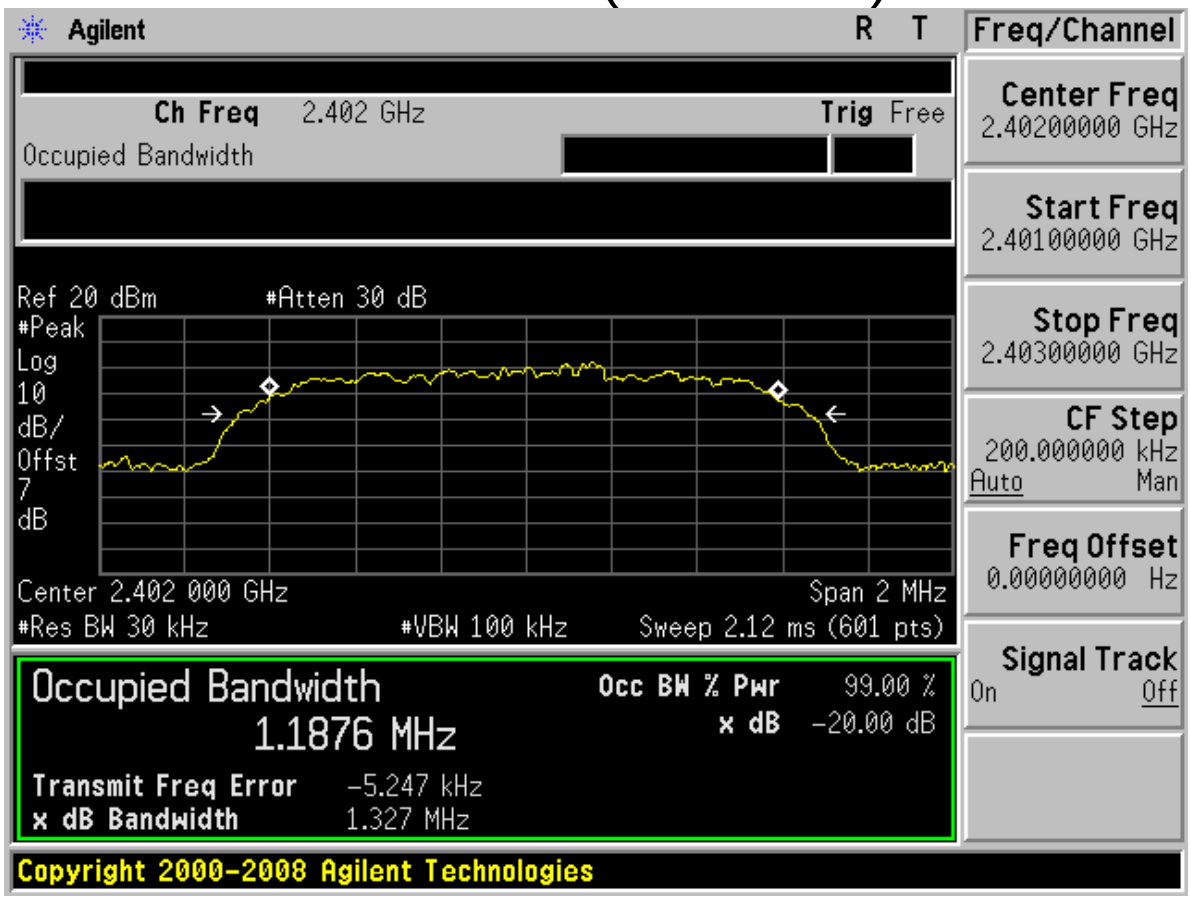
----------The END----------

# Appendix A

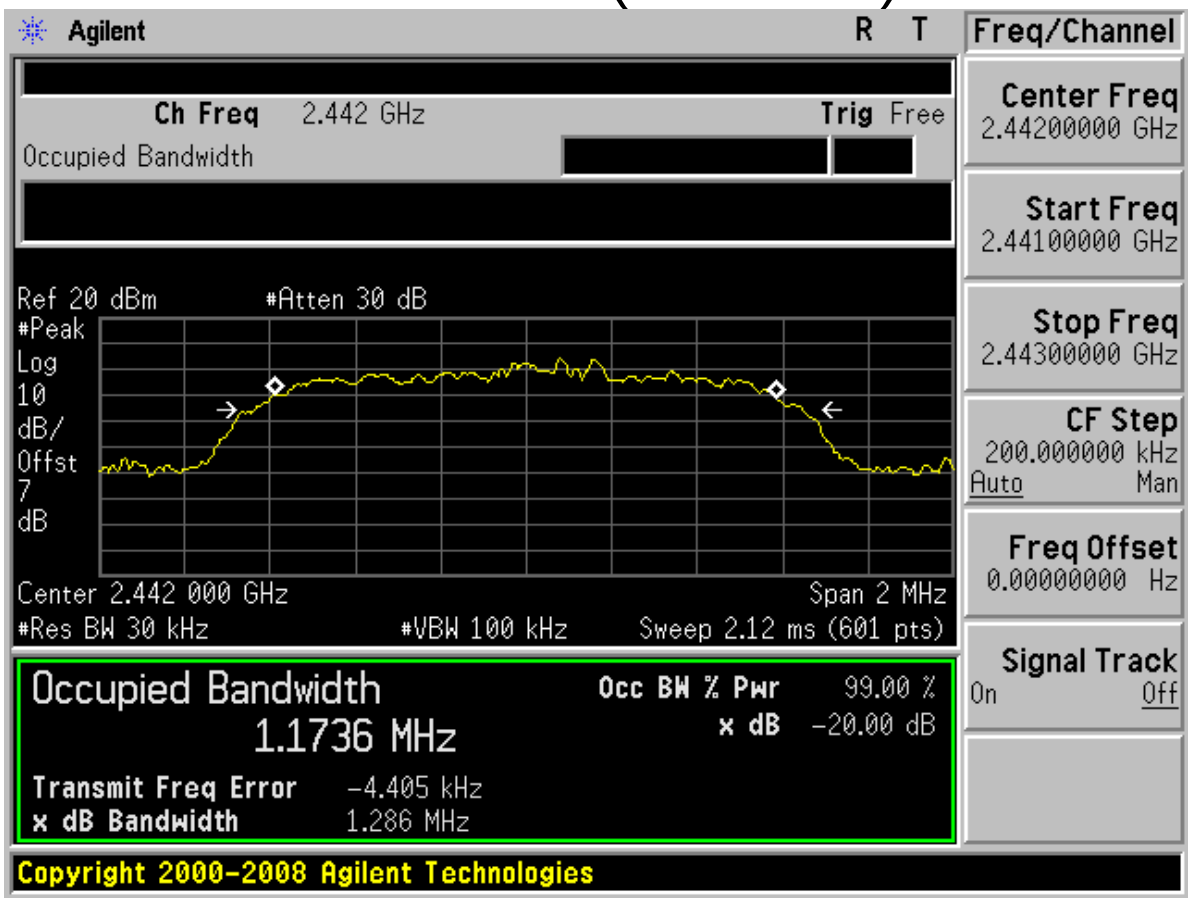
## Bandwidth measurement

According to FCC Part 15.247 (a) (1)

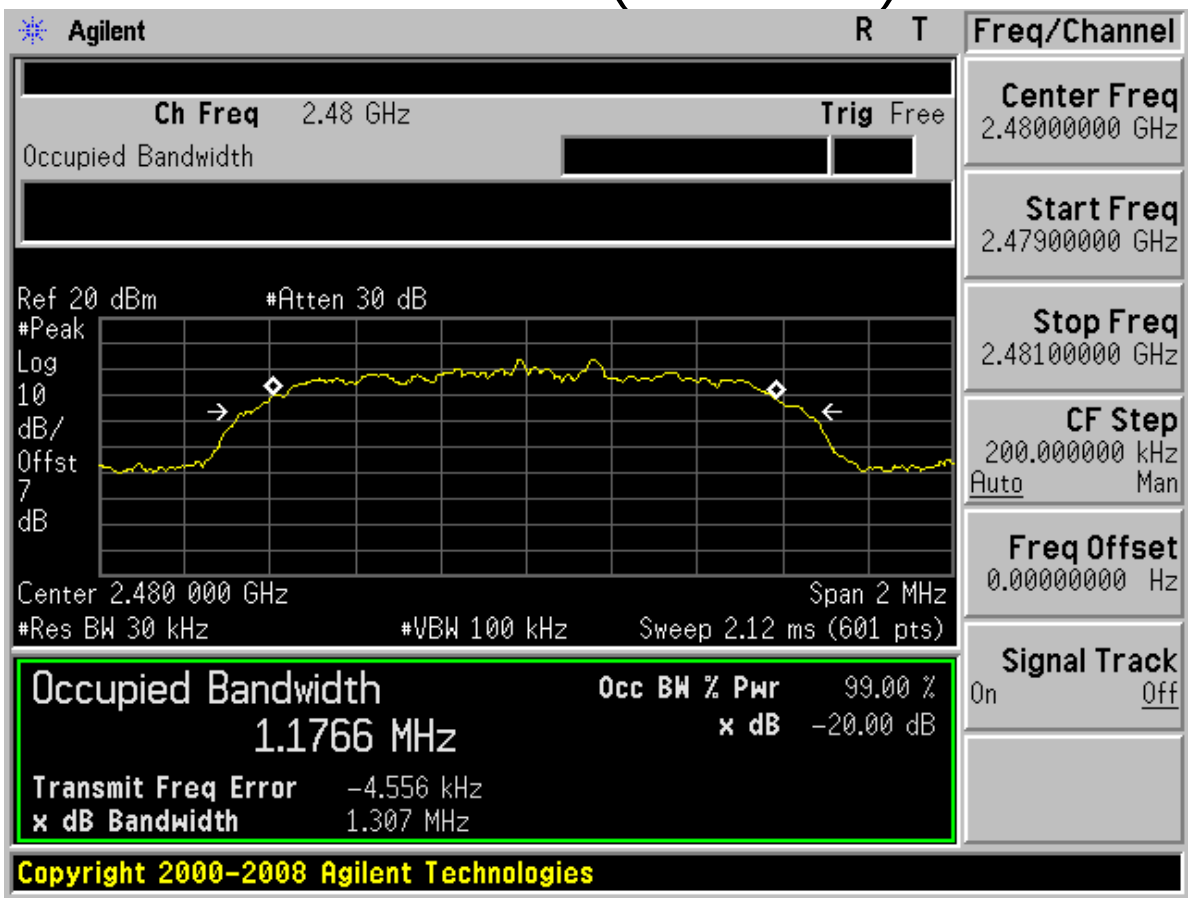
# Modulation:π/4-DQPSK
# Channel 0 (2402MHz)



# Channel 40 (2442MHz)

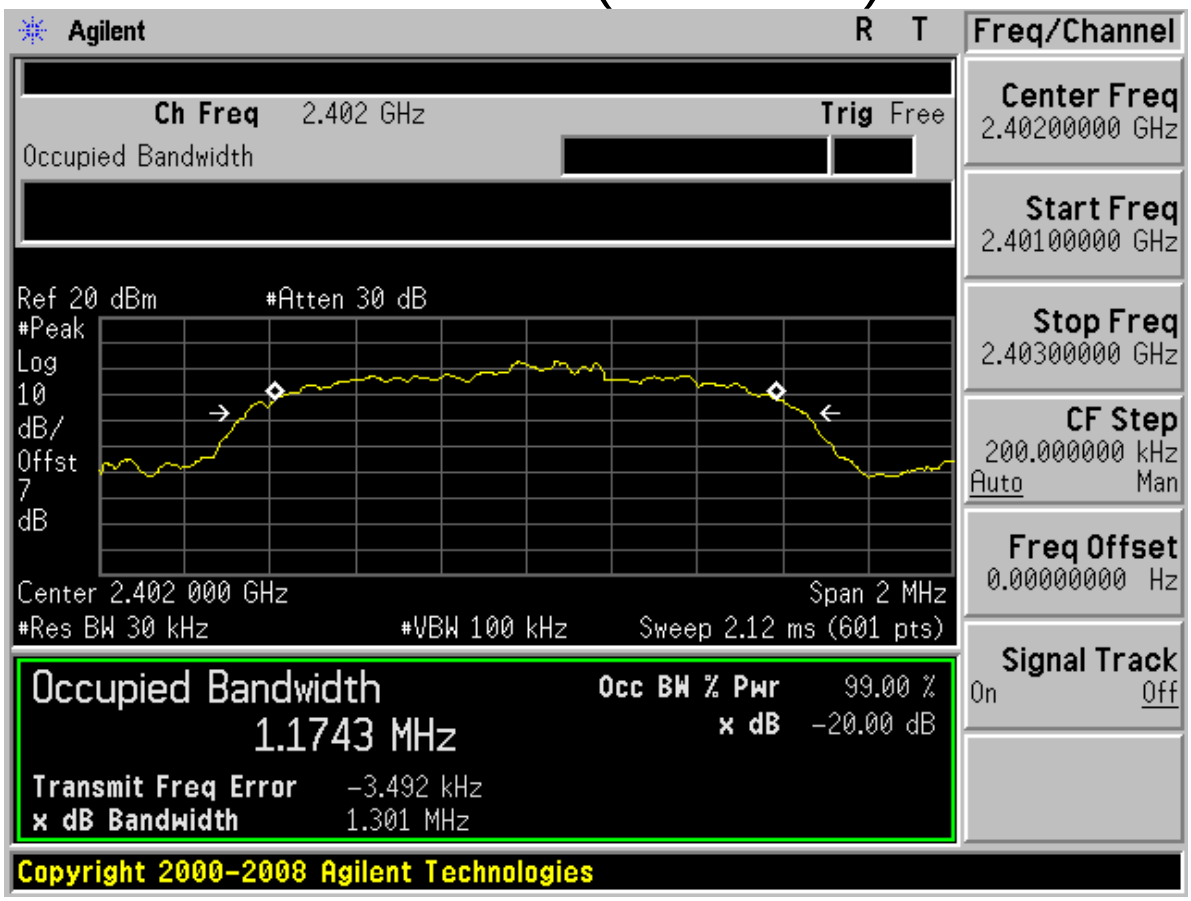


# Channel 78 (2480MHz)

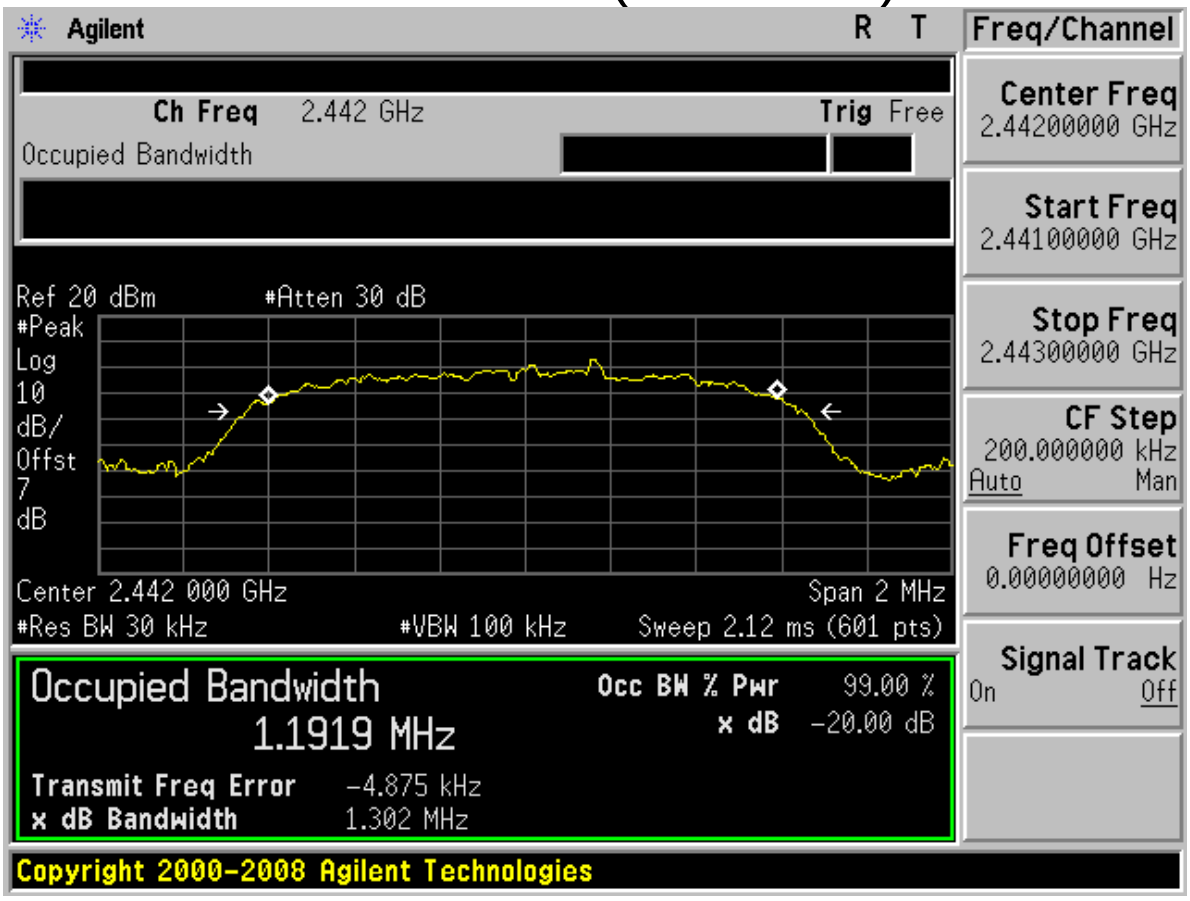


# Modulation:8DPSK

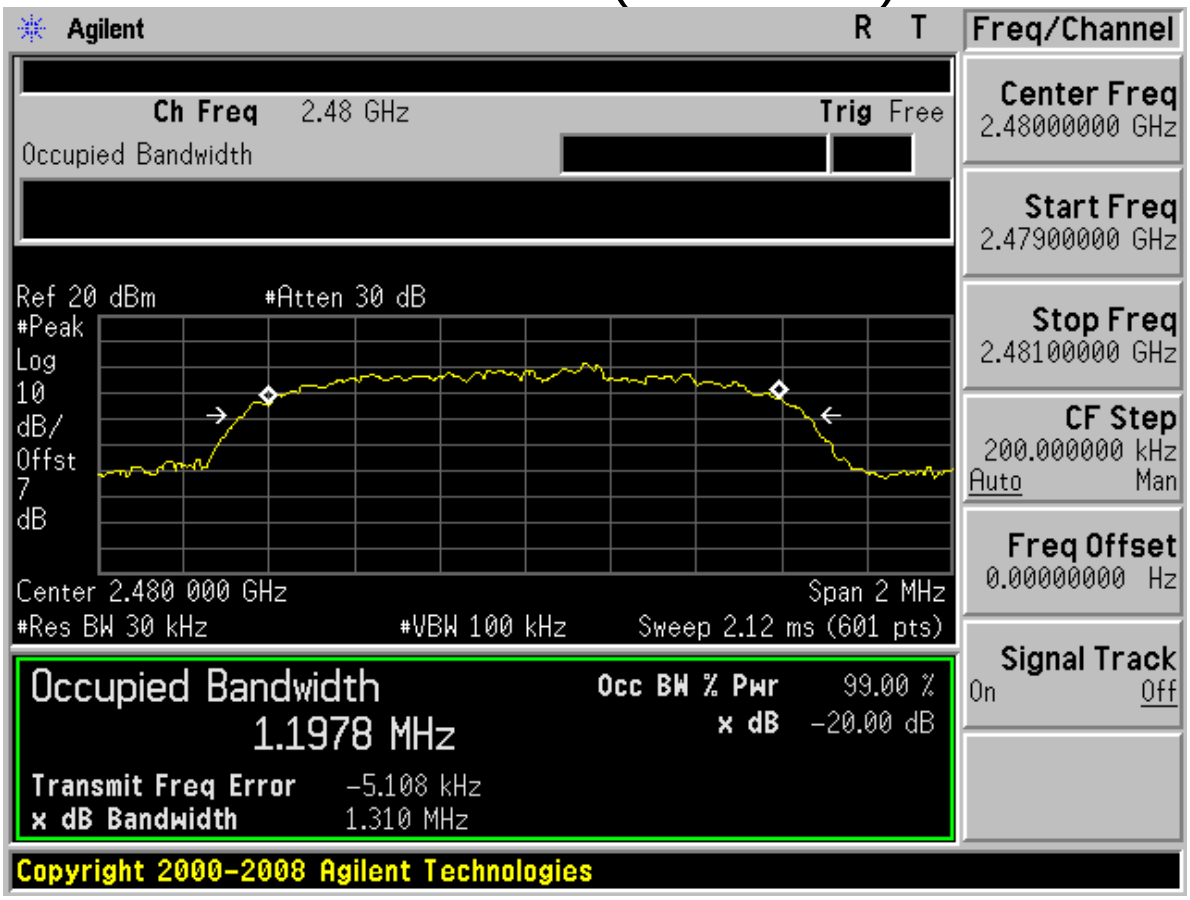
# Channel 0 (2402MHz)



# Channel 40 (2442MHz)



# Channel 78 (2480MHz)




----------The END----------

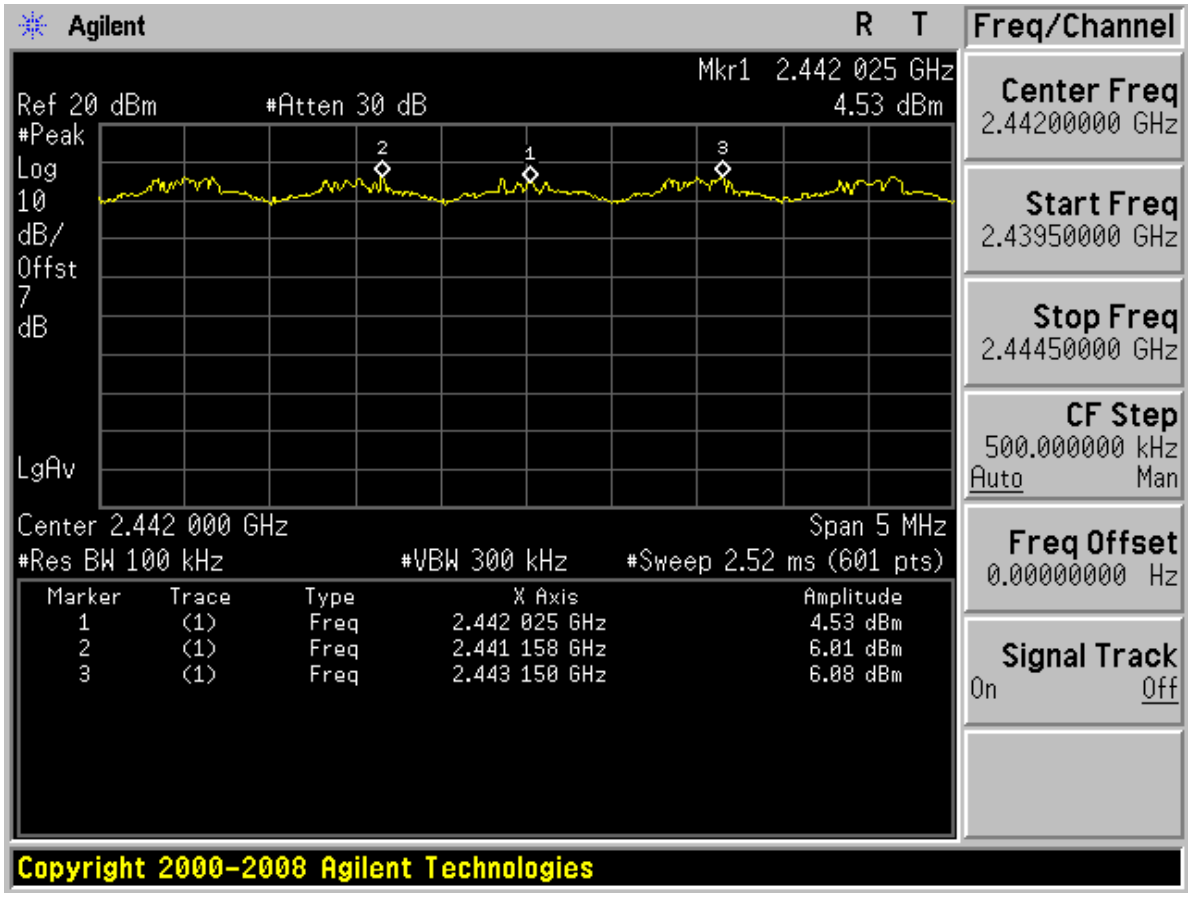
# Appendix B

## Carrier frequency separation measurement

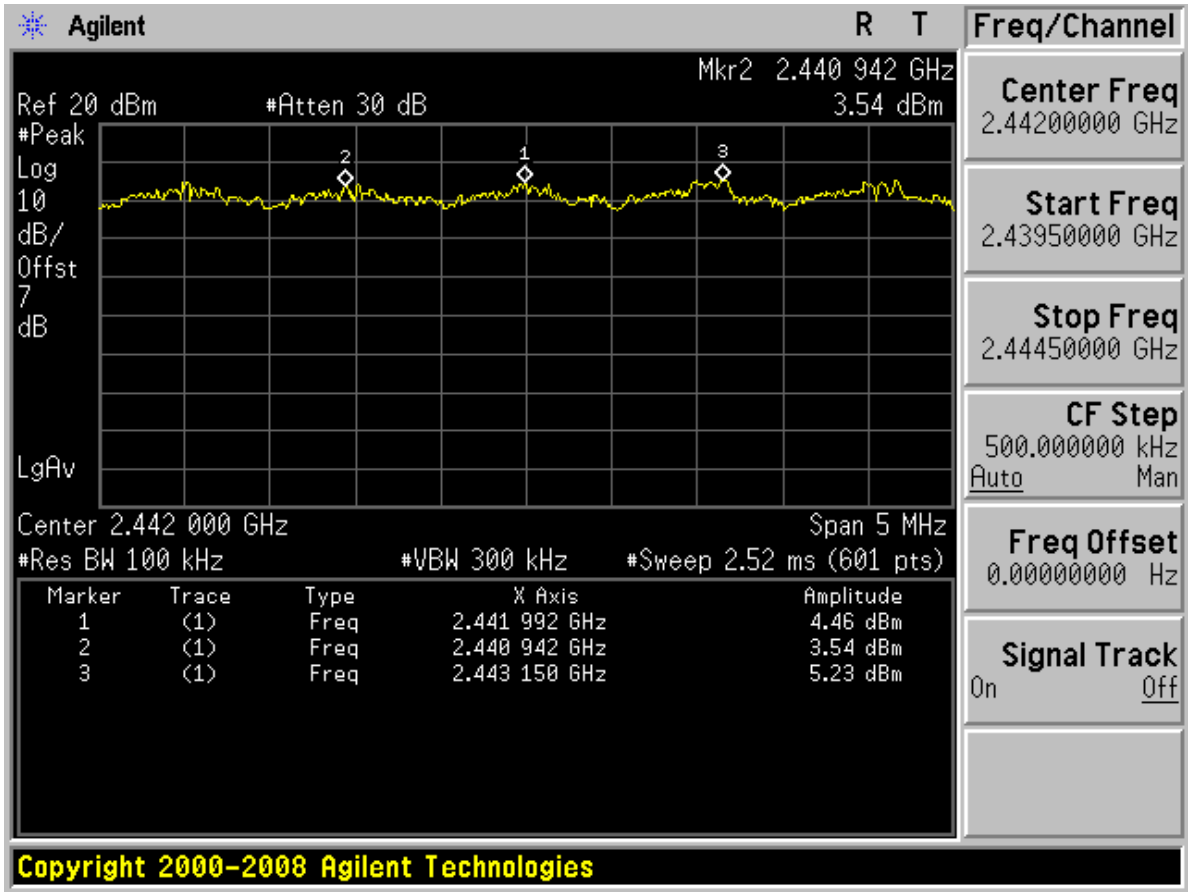
According to FCC Part 15.247 (a) (1)

# Modulation:π/4-DQPSK

# Centred at Channel 40



# Modulation:8DPSK
# Centred at Channel 40




----------The END----------

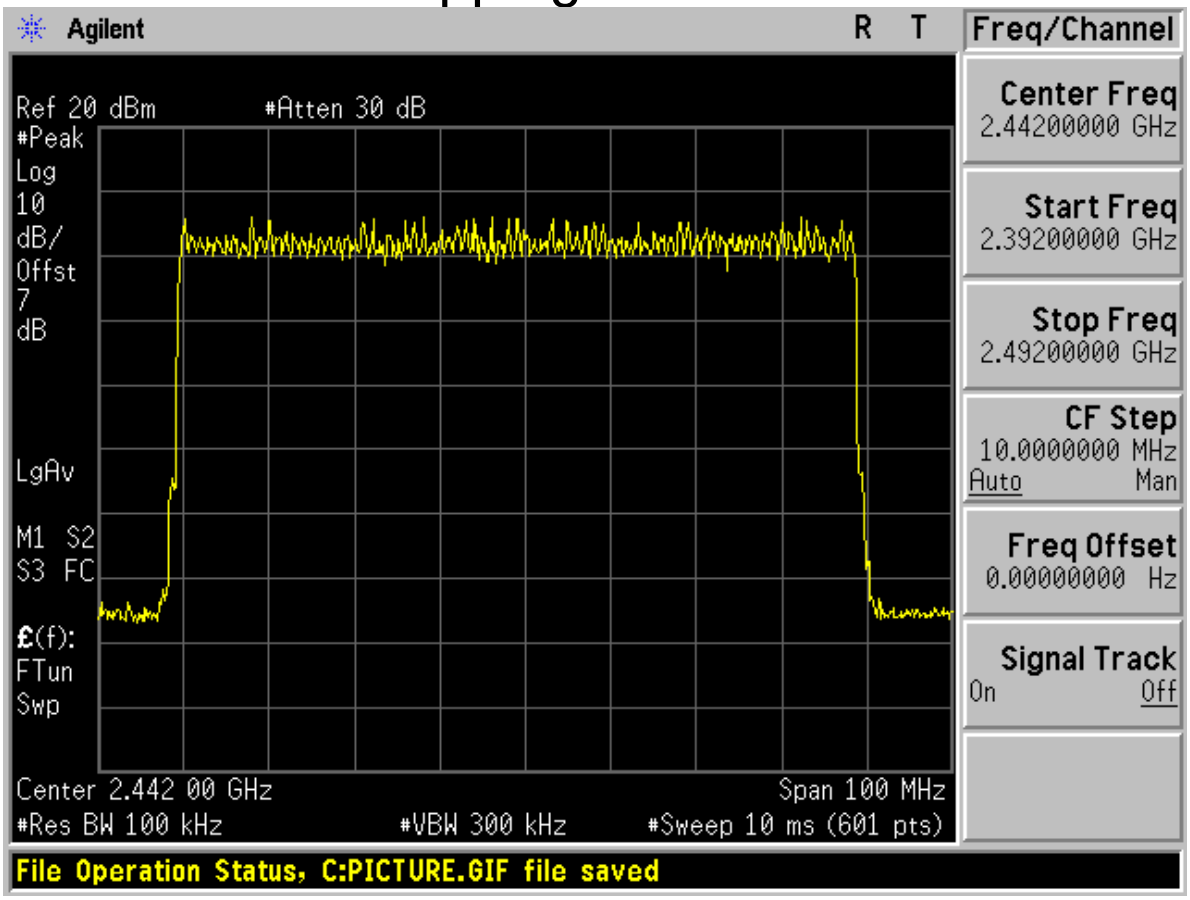
# Appendix C

## Number of hopping channel

According to FCC Part 15.247 (a) (1) iii

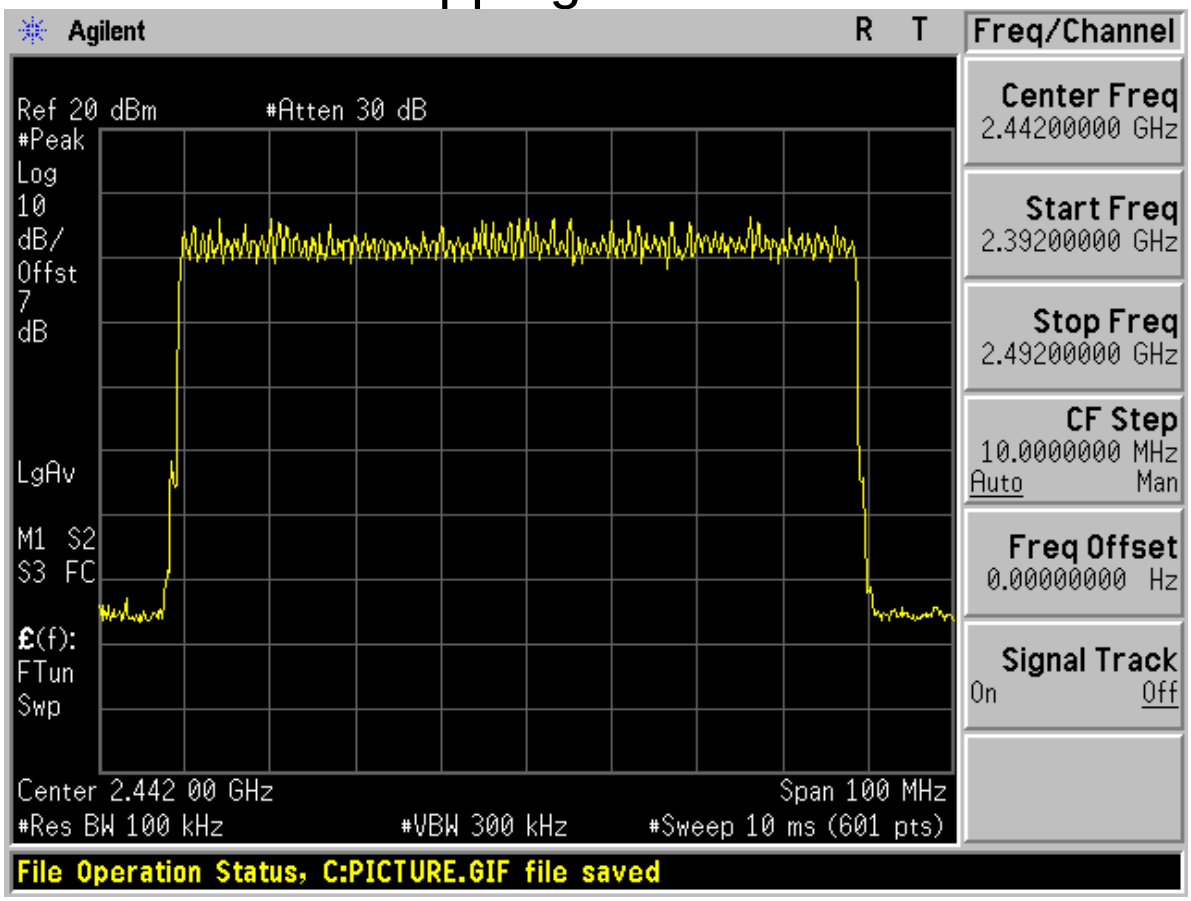
# Modulation:π/4-DQPSK

# Total hopping channels = 79



# Modulation:8DPSK

# Total hopping channels = 79




----------The END----------

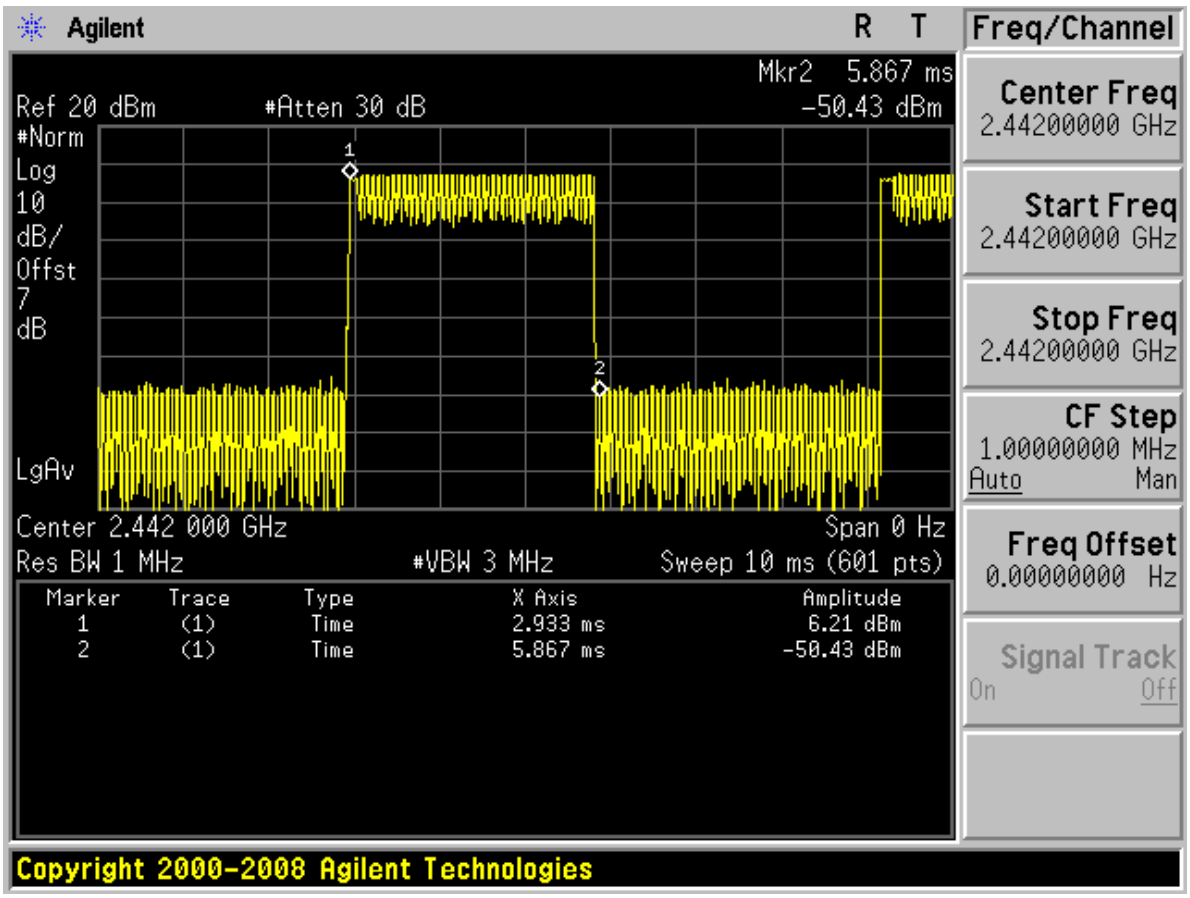
# Appendix D

## Time of occupancy

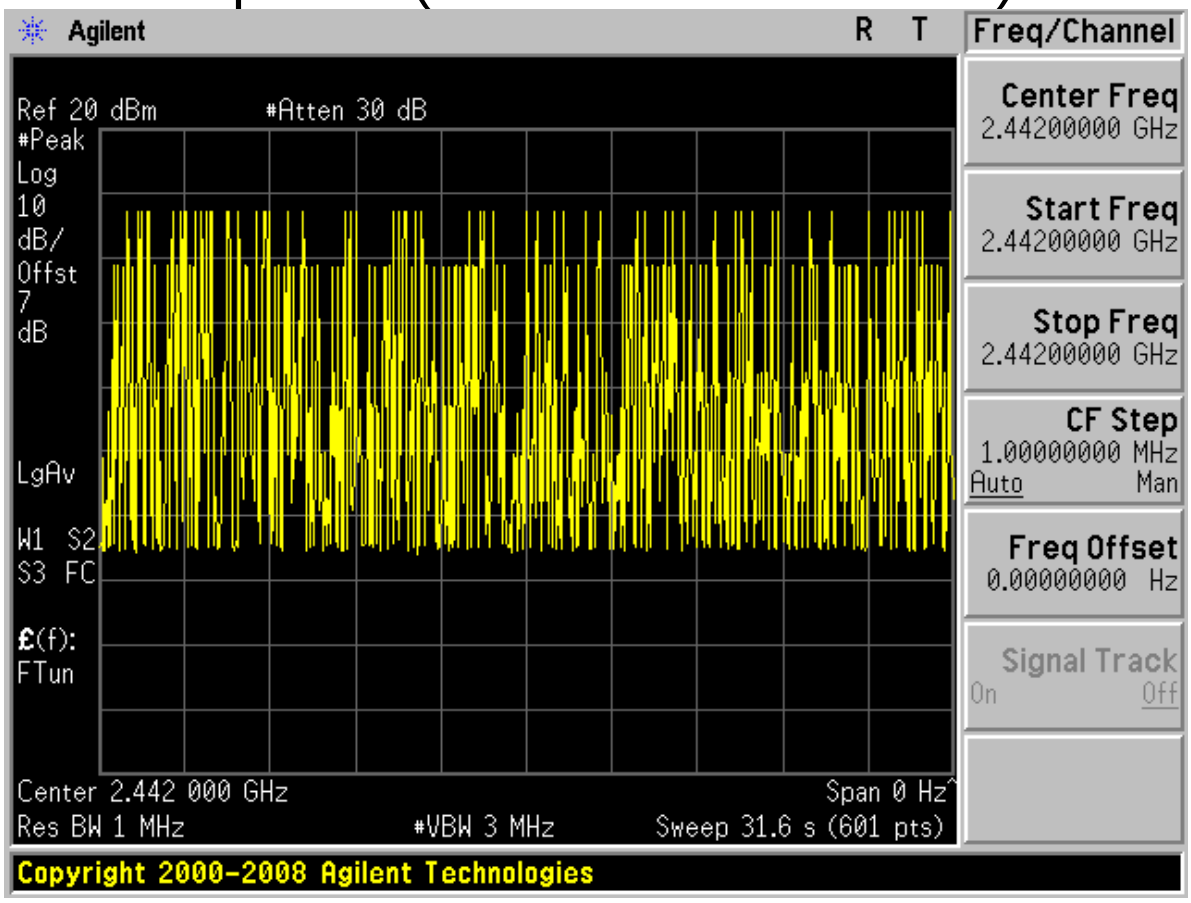
According to FCC Part 15.247 (a) (1) iii

# Modulation:π/4-DQPSK

# A burst (One time slot)

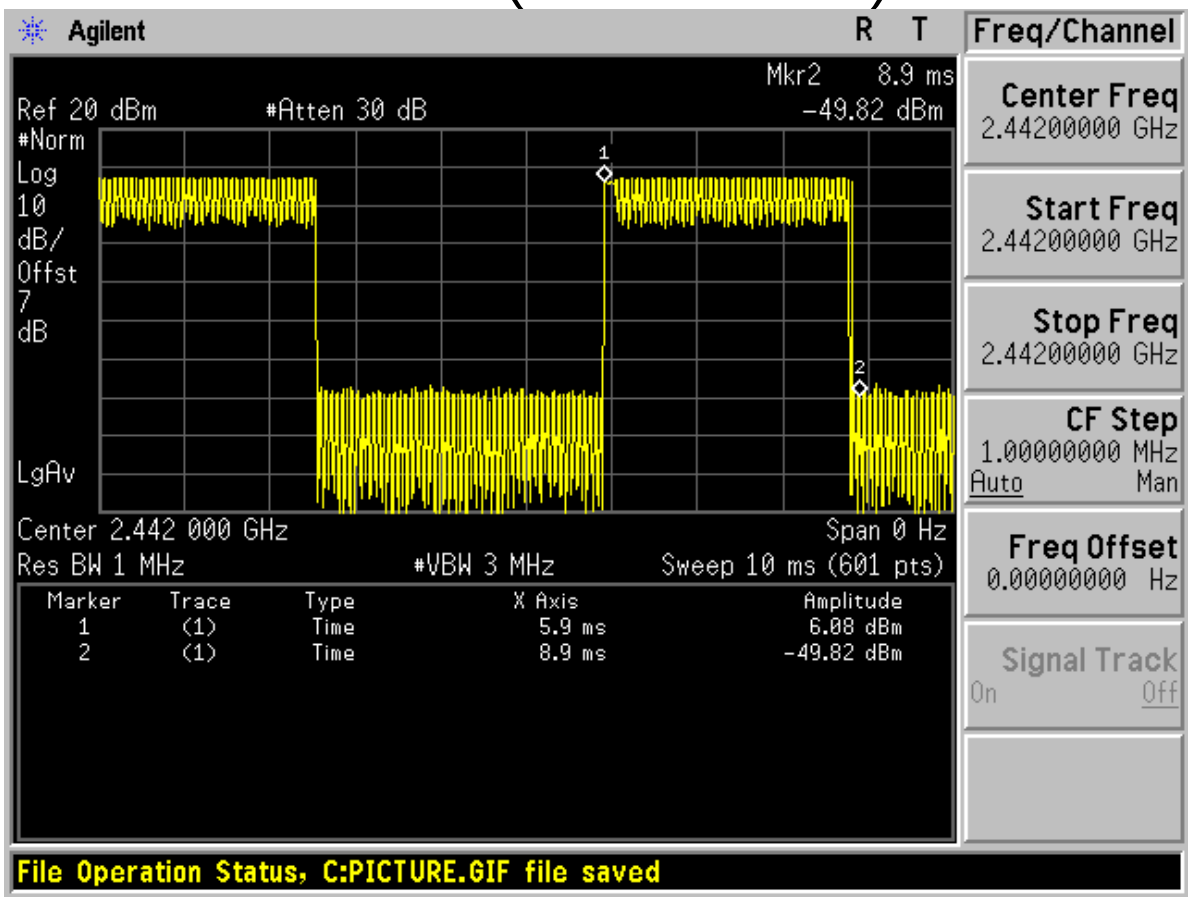


# A period (Less than 106.7 burst)

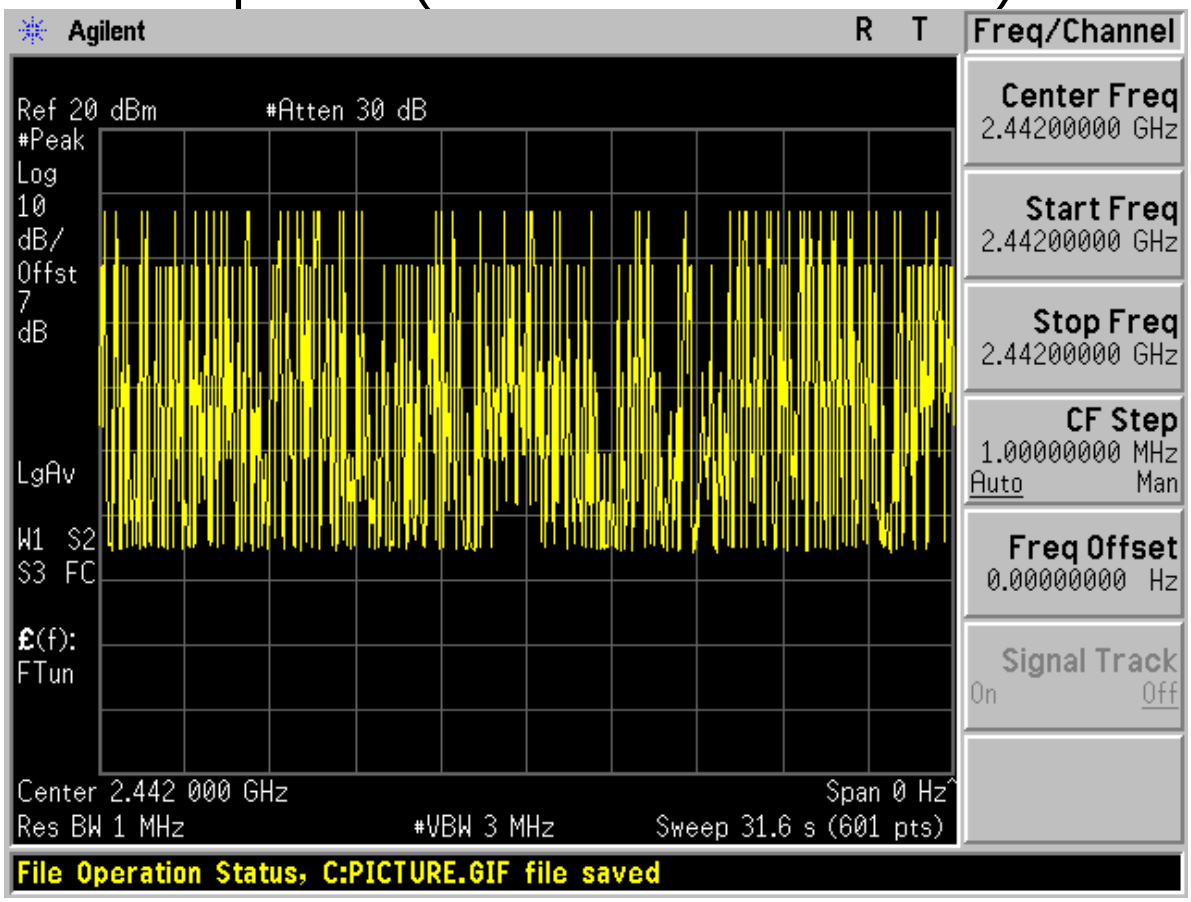


# Modulation:8DPSK

## A burst (One time slot)



# A period (Less than 106.7 burst)

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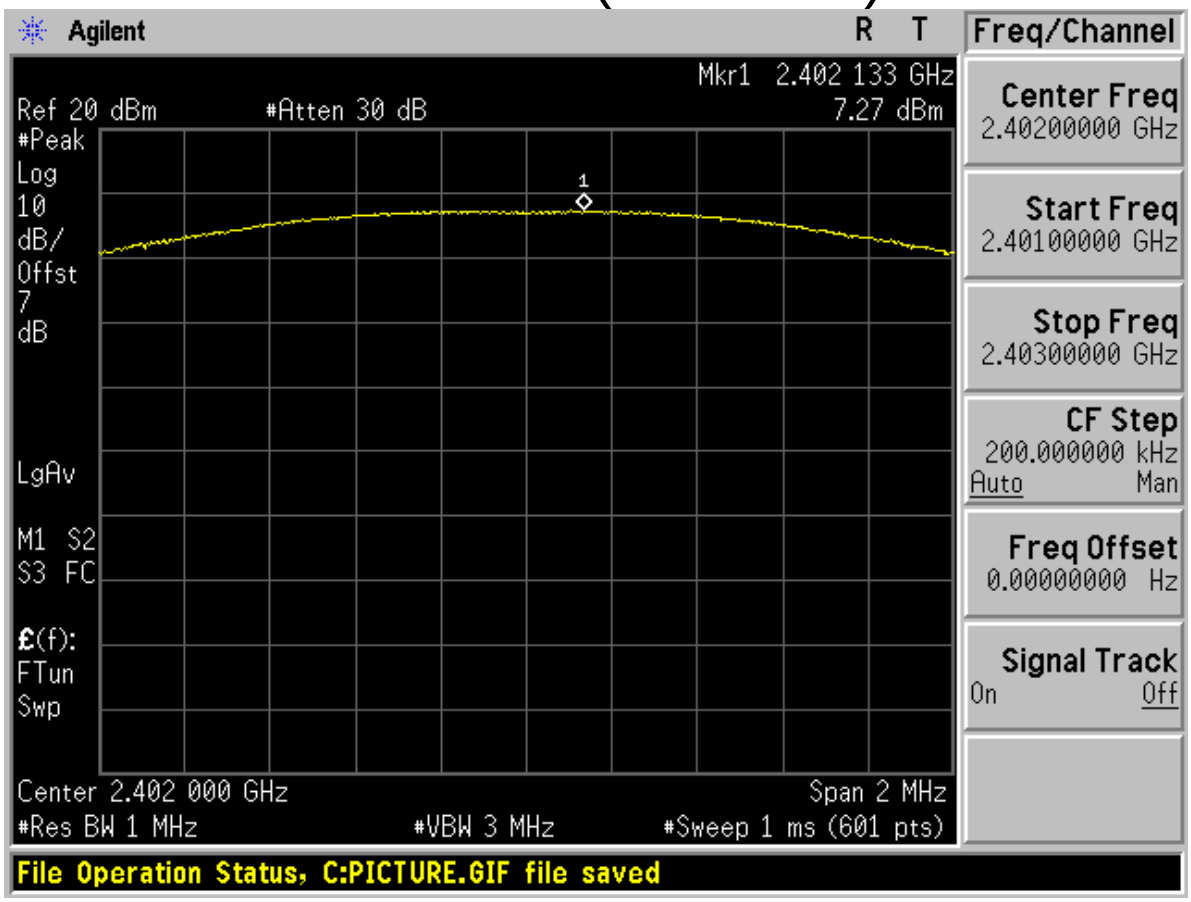
# Appendix E

## Peak output power

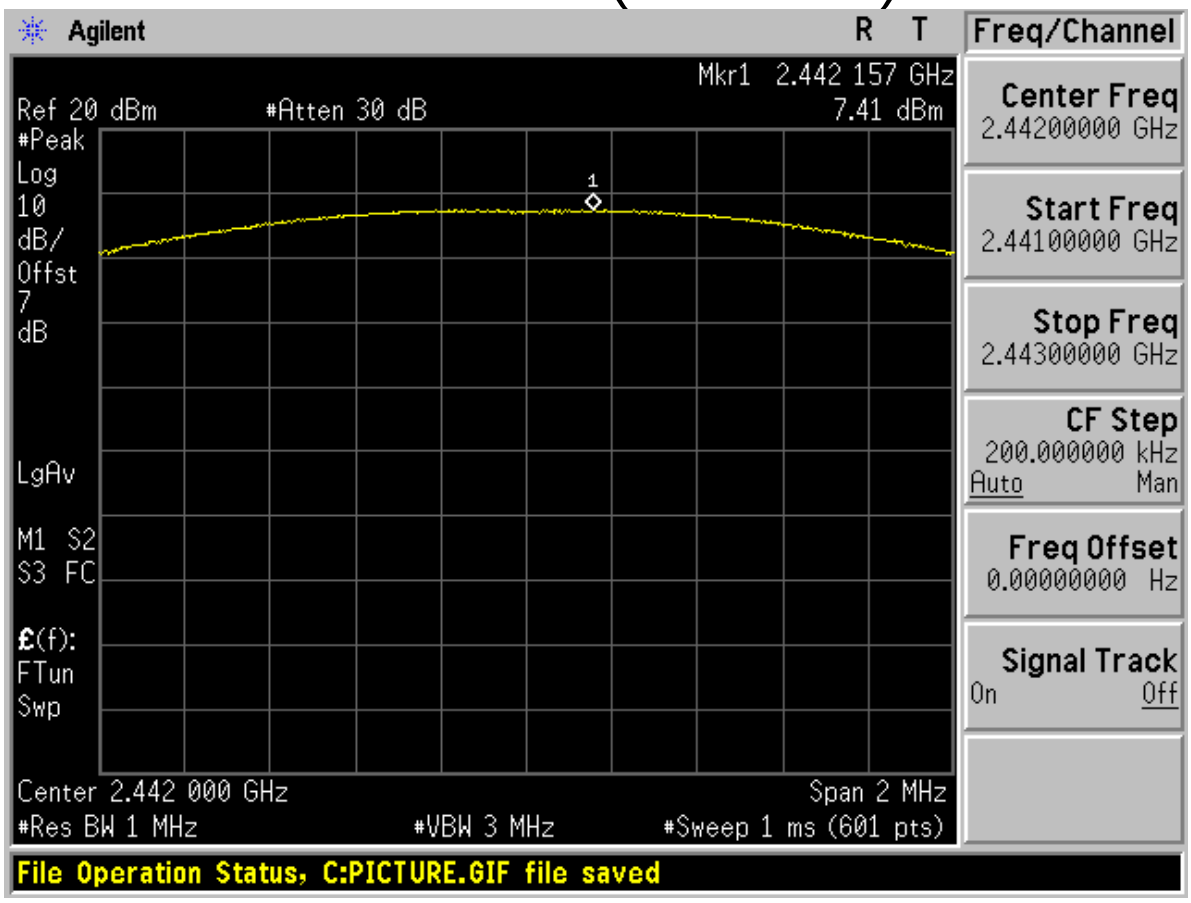
According to FCC Part 15.247 (b) (1)

# Modulation:π/4-DQPSK

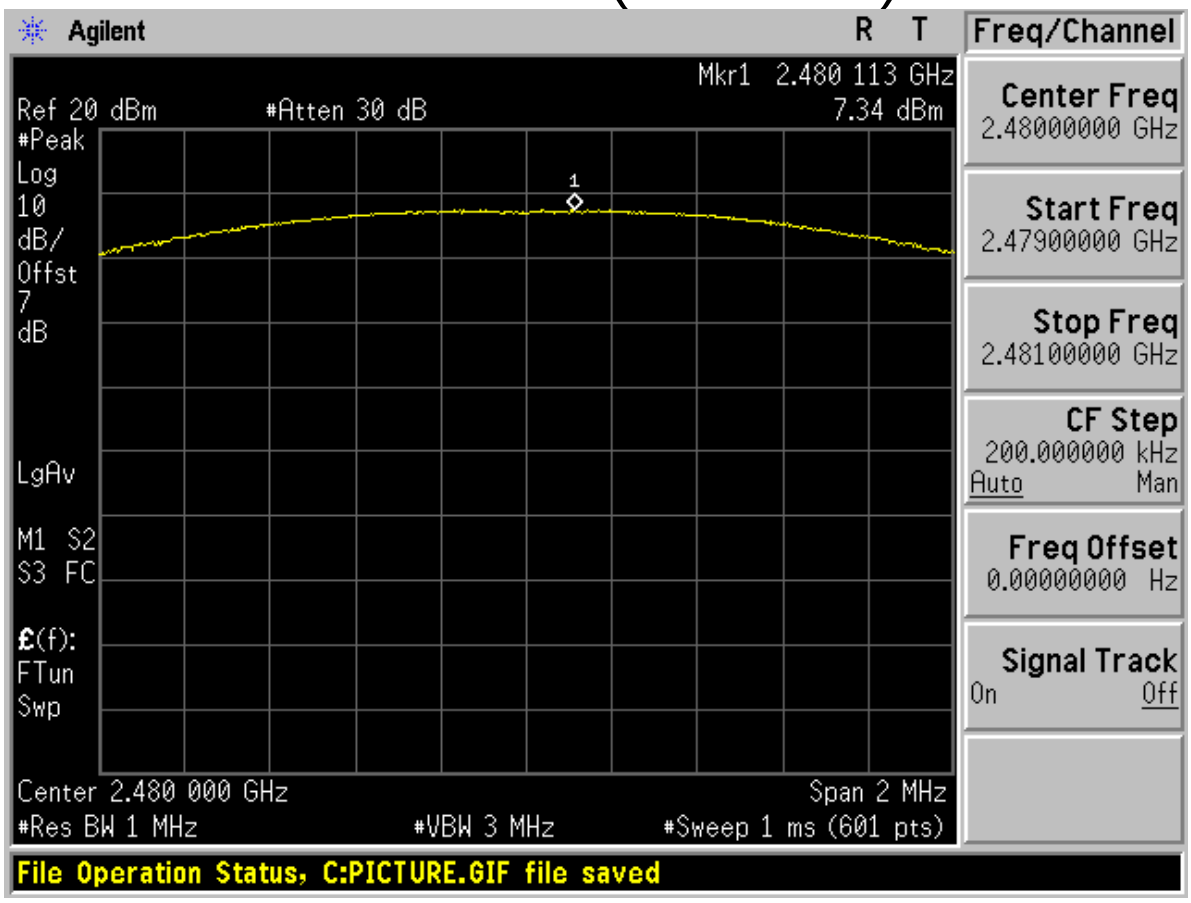
# Channel 0 (2402MHz)



# Channel 40 (2442MHz)

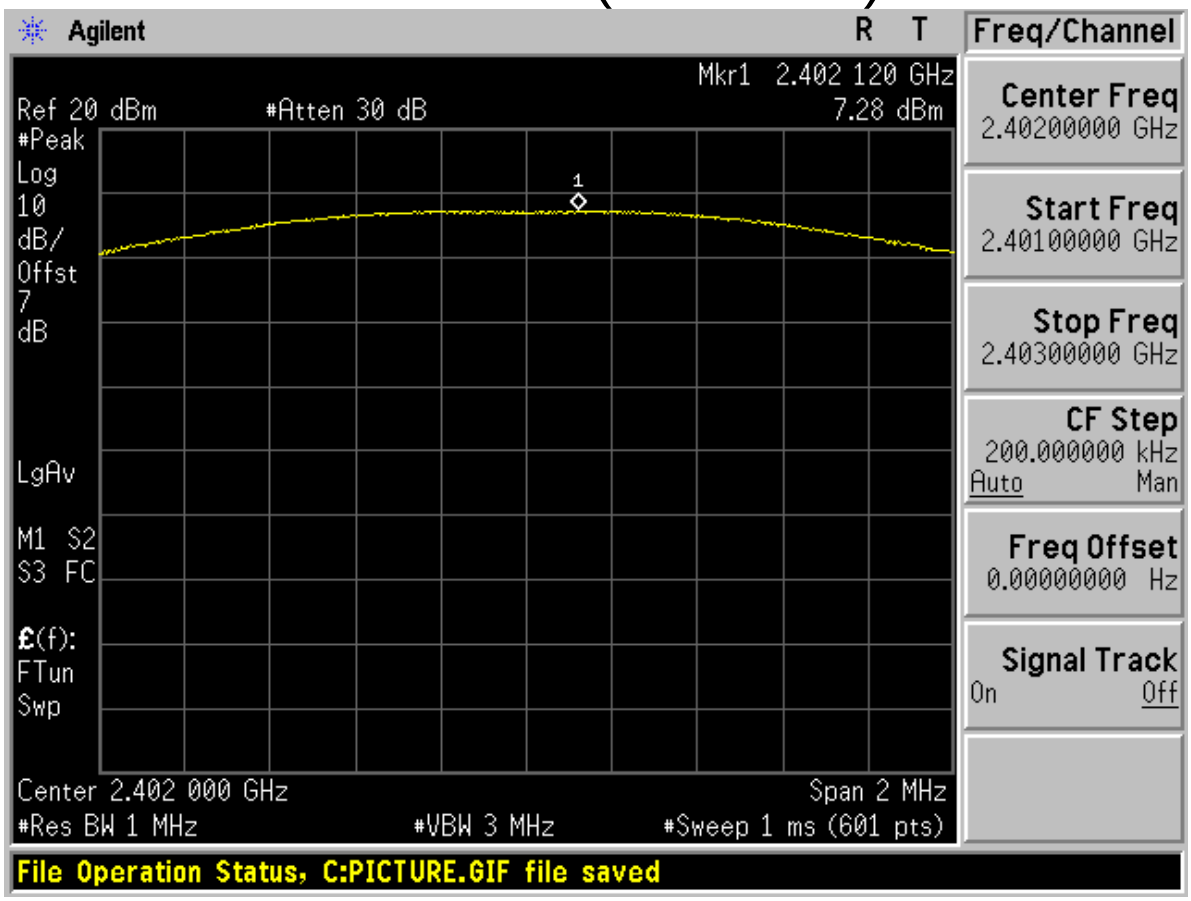


# Channel 78 (2480MHz)

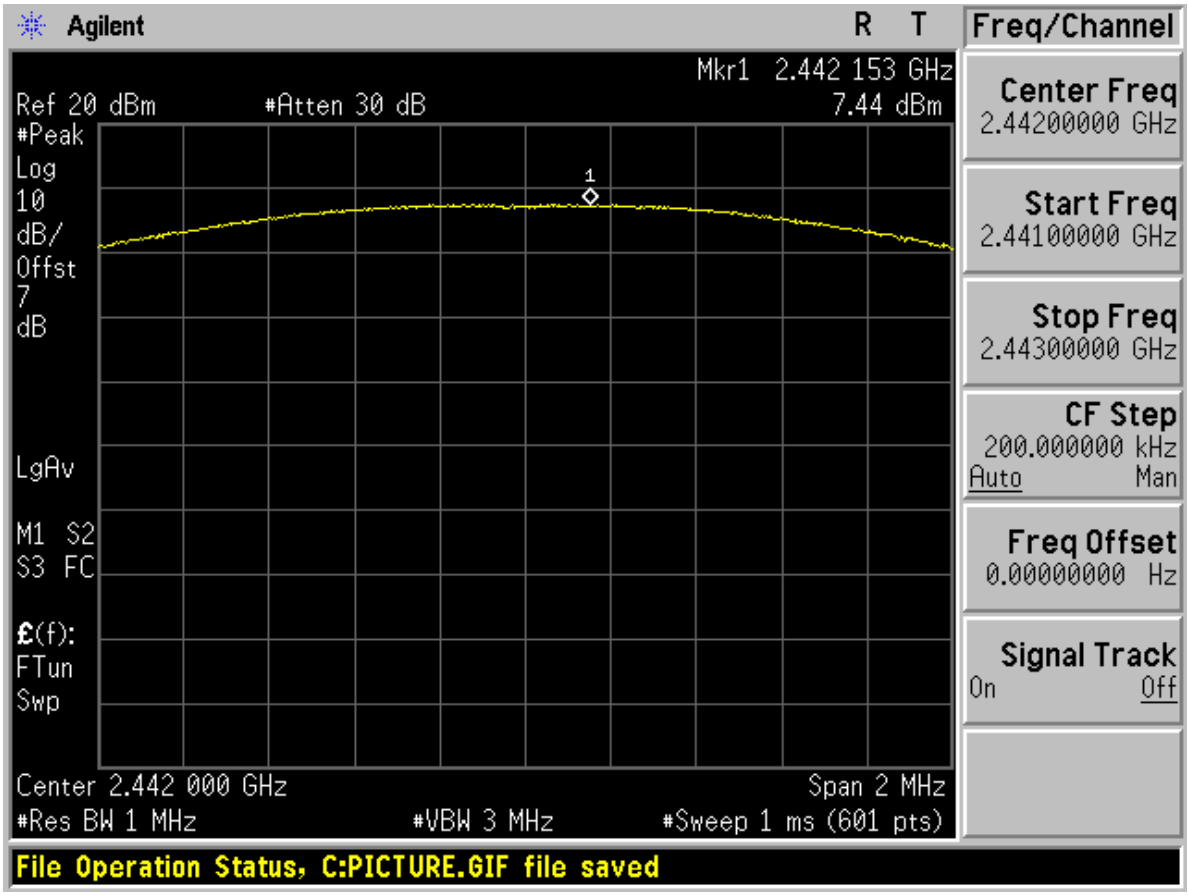


# Modulation:8DPSK

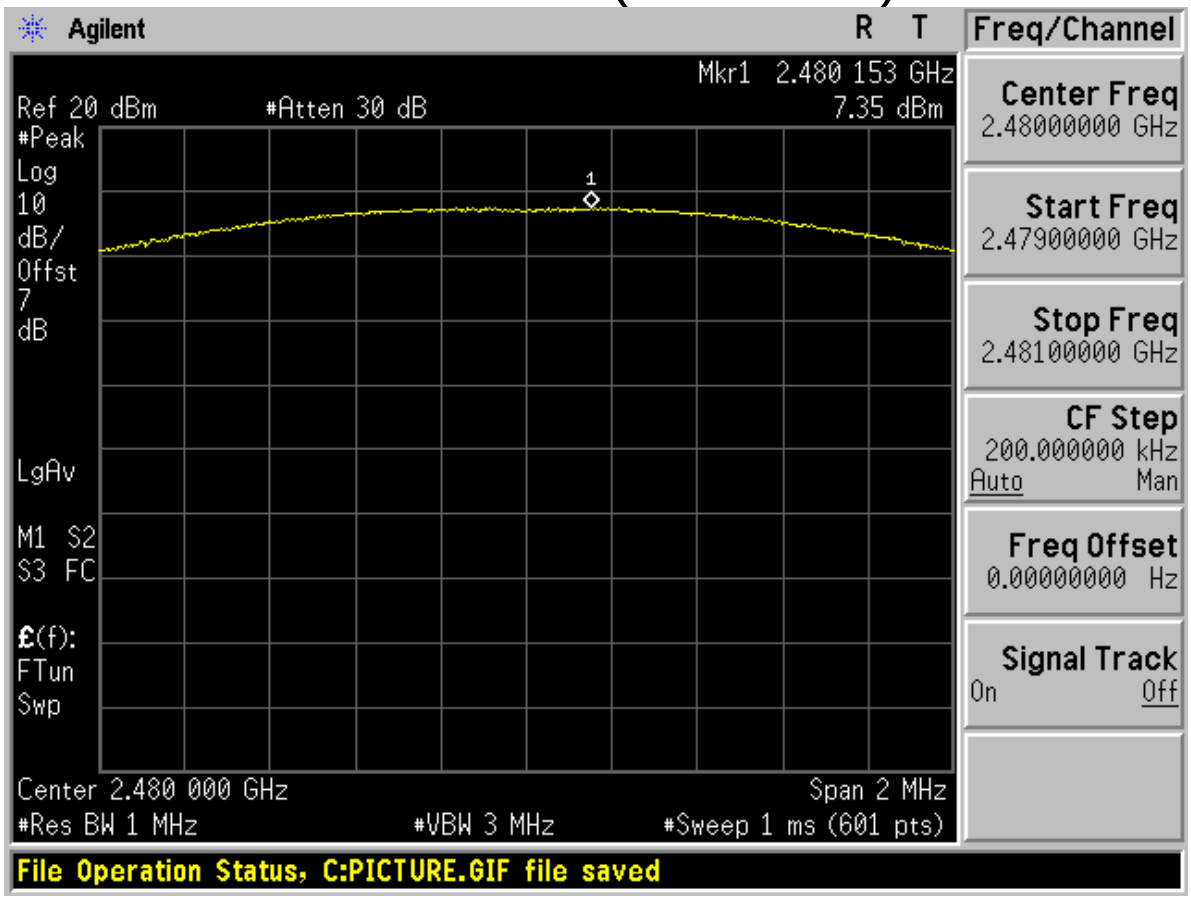
# Channel 0 (2402MHz)



# Channel 40 (2442MHz)



# Channel 78 (2480MHz)




----------The END----------

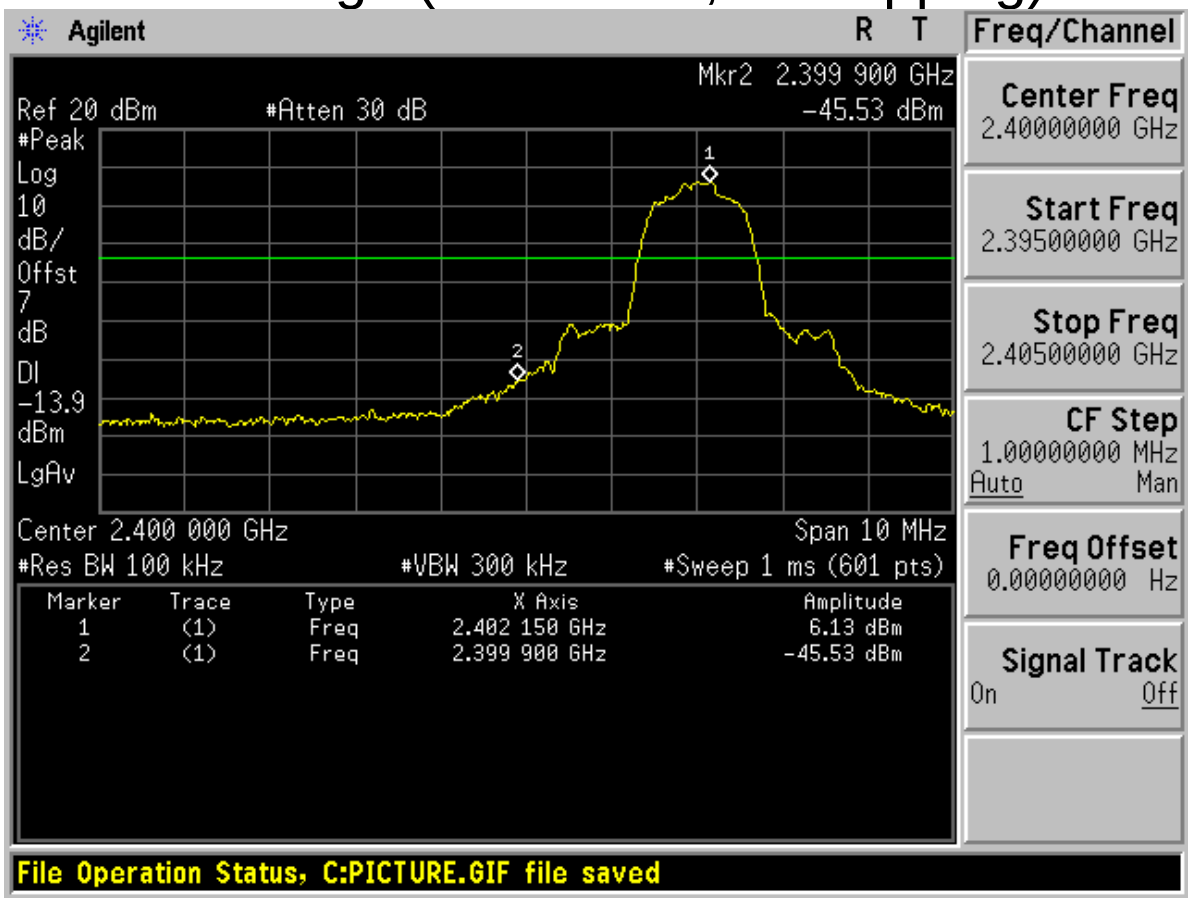
# Appendix F

## Band edge spurious emission

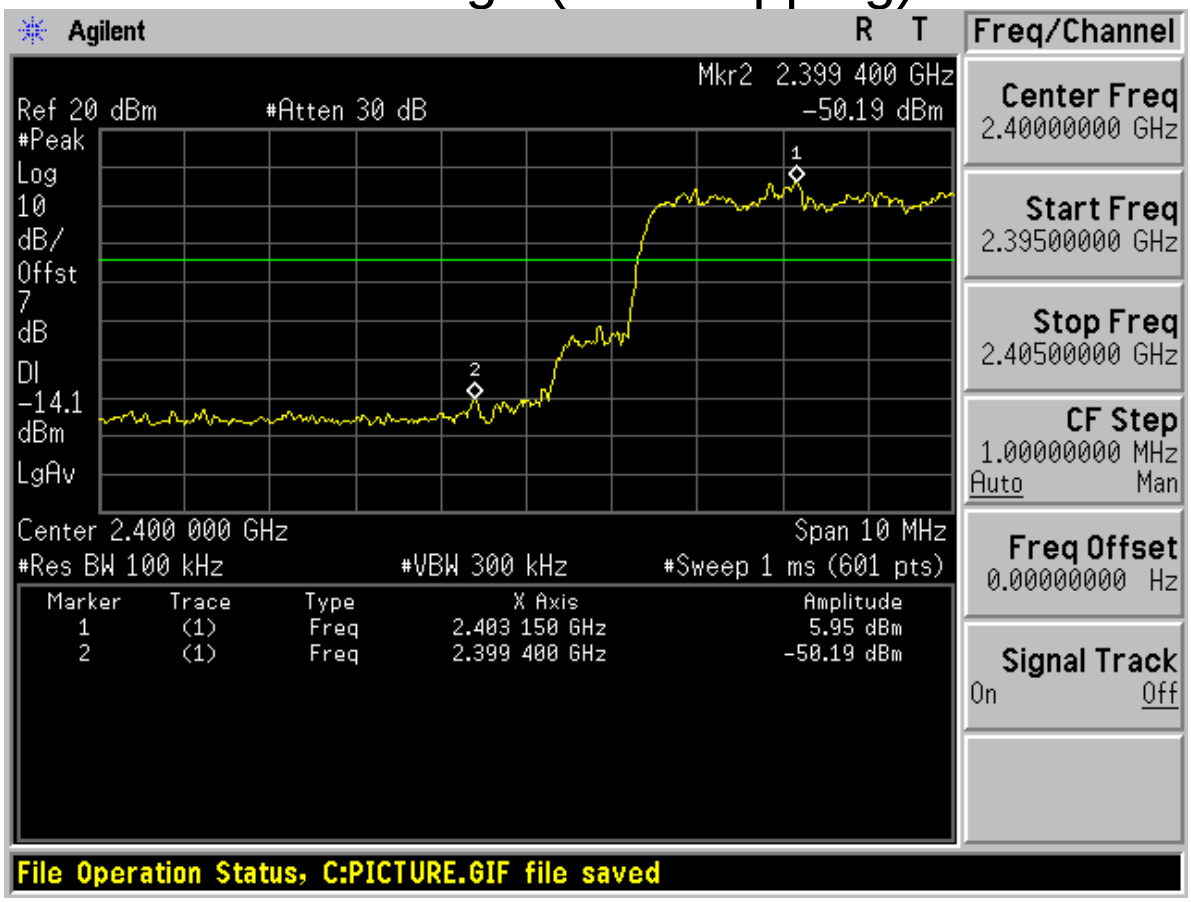
According to FCC Part 15.247 (d)

# Modulation:π/4-DQPSK

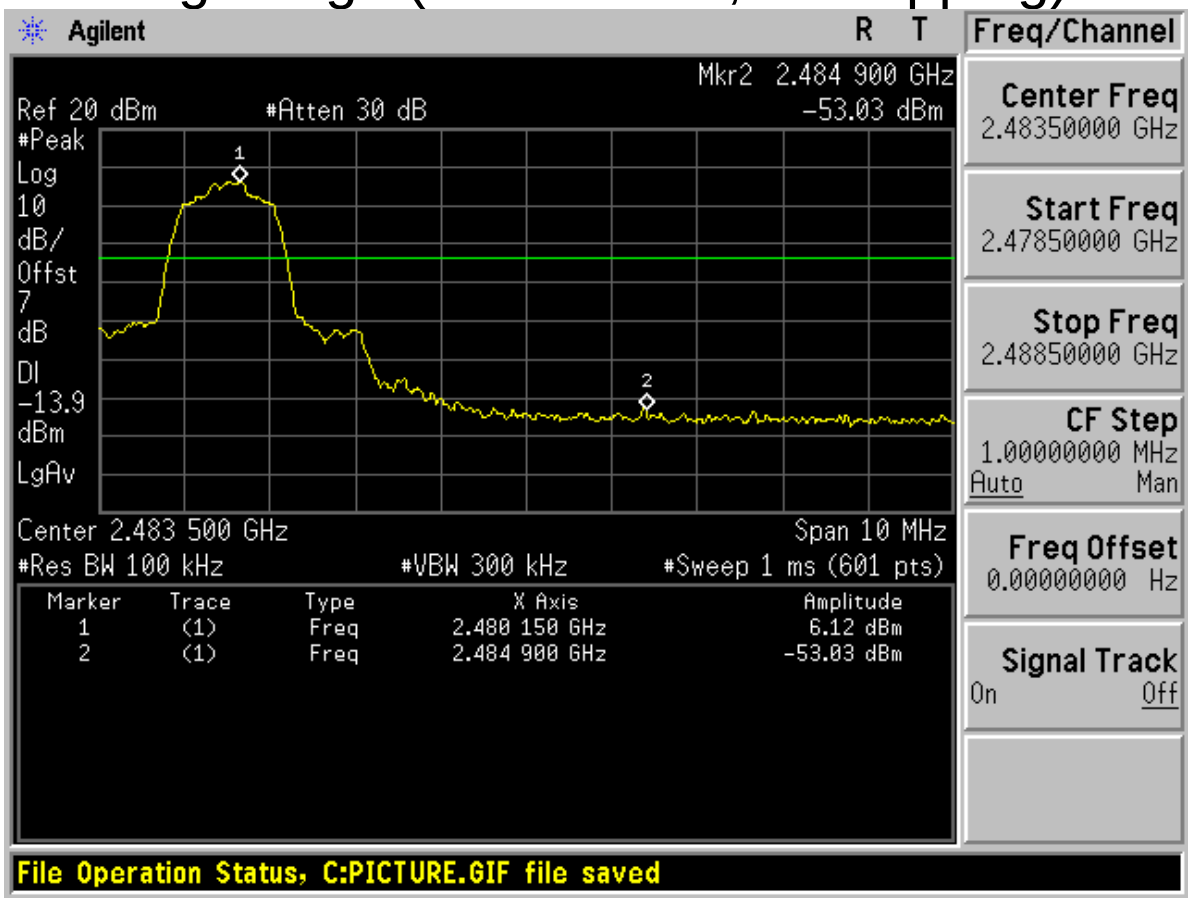
## Low edge (Channel 0, no hopping)



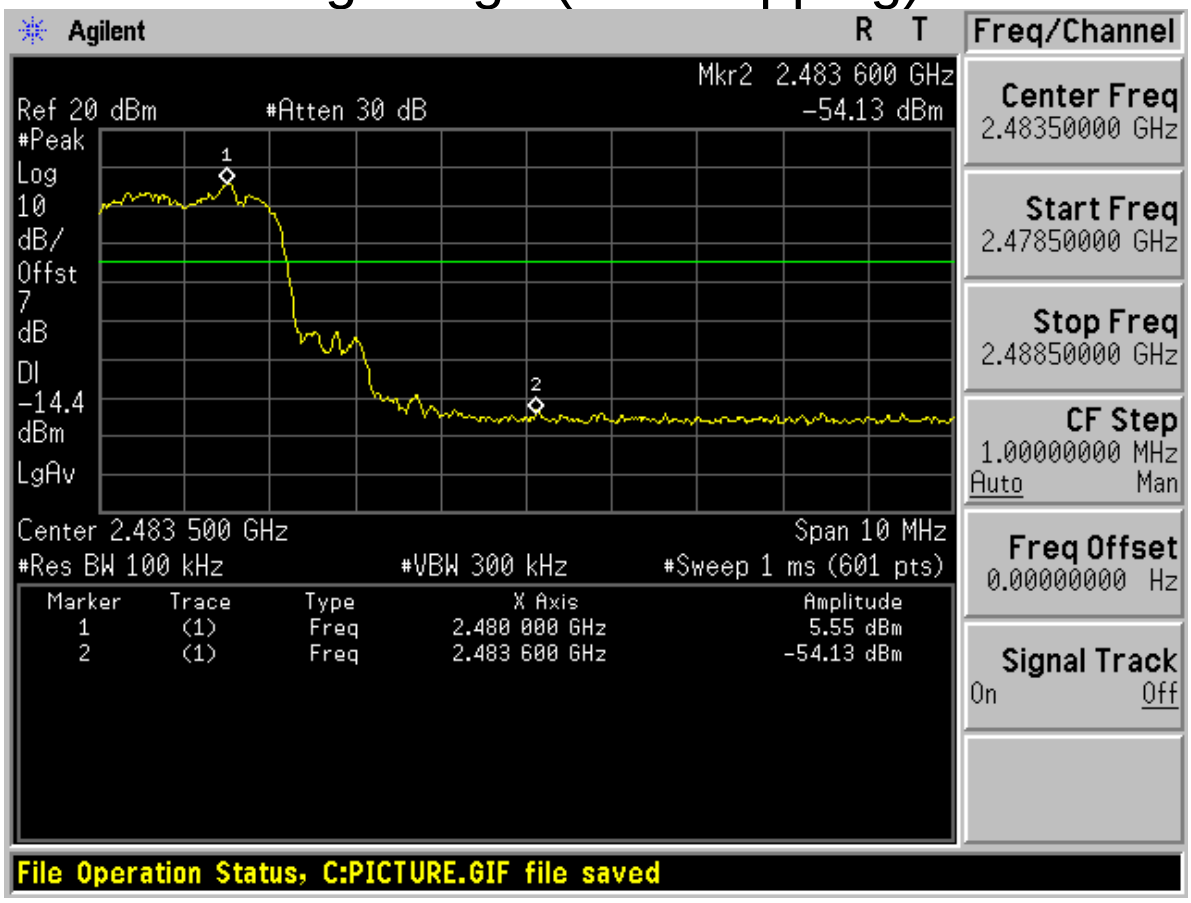
# Low edge (with hopping)



# High edge (Channel 78, no hopping)

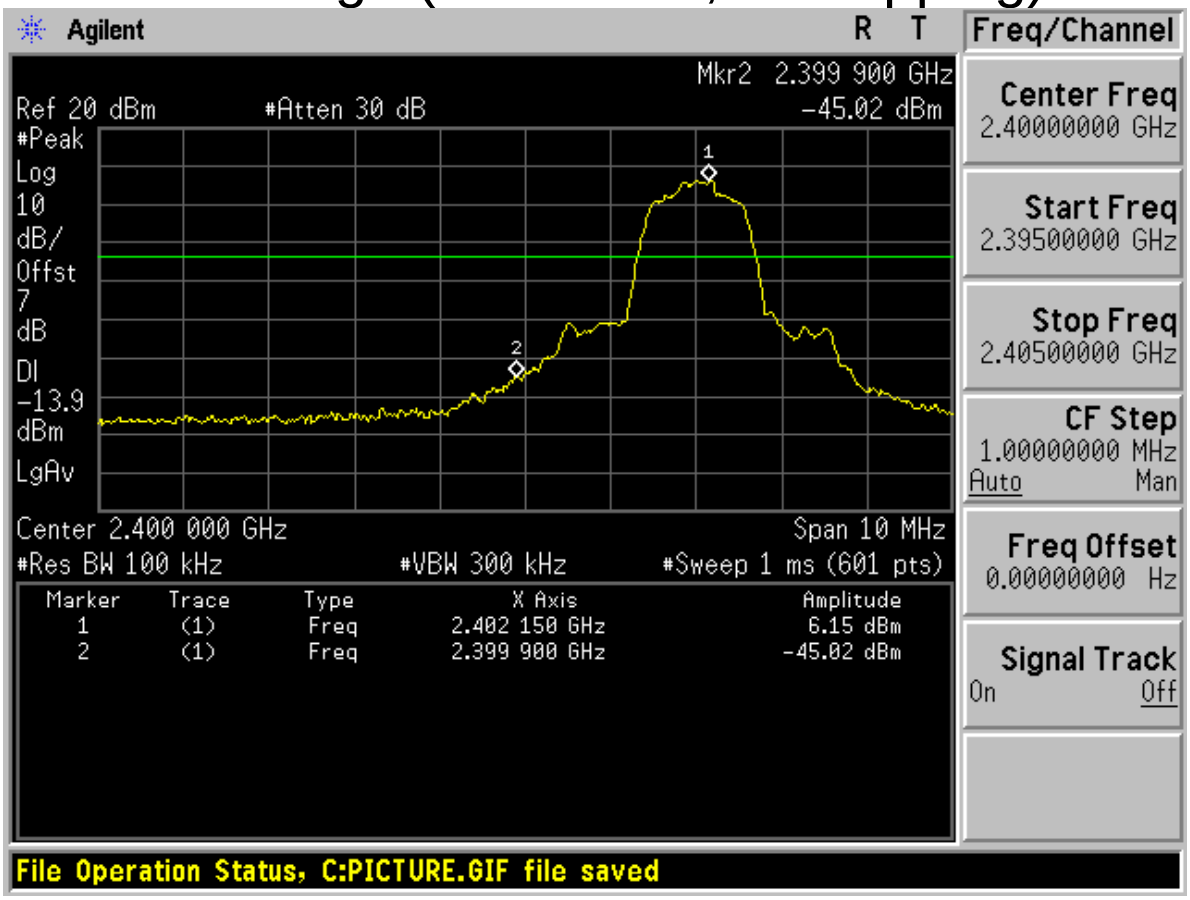


# High edge (with hopping)

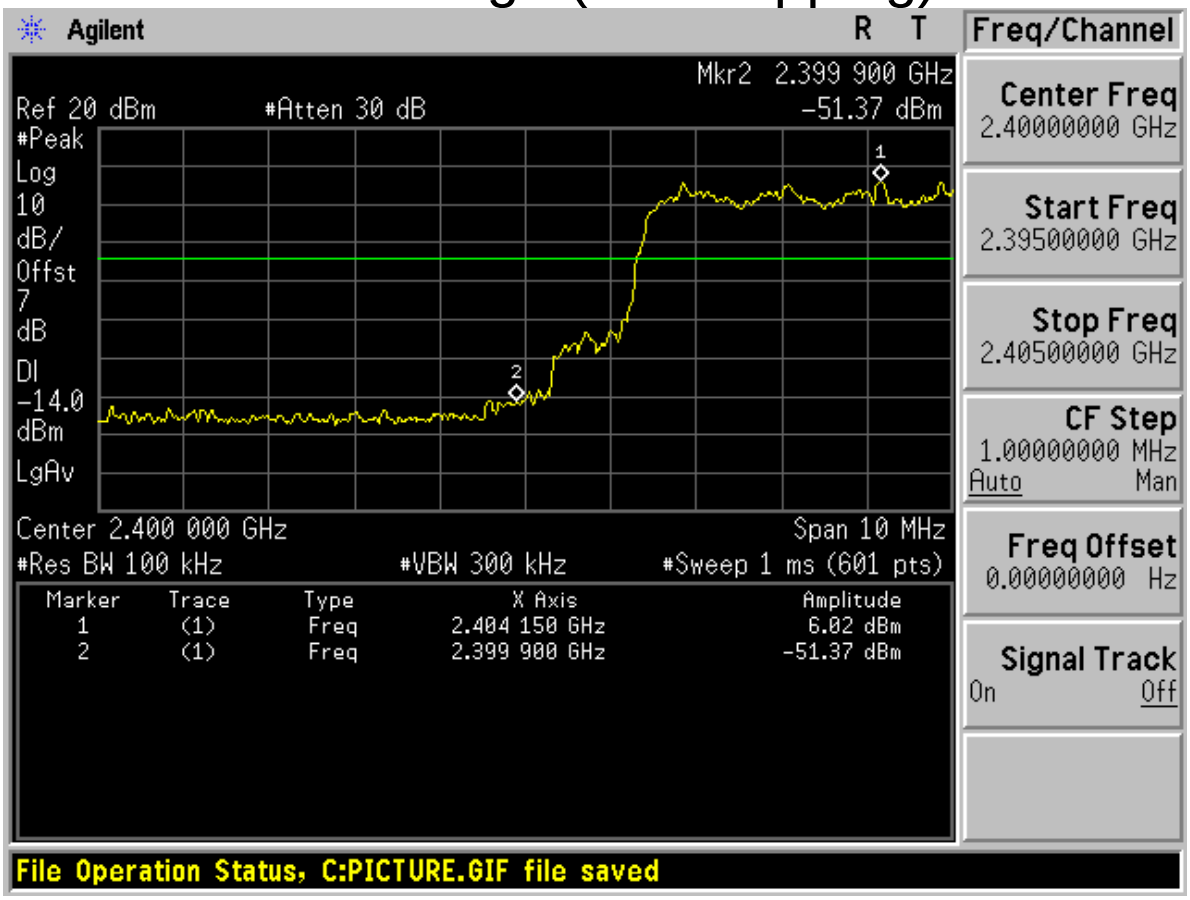


Modulation:8DPSK

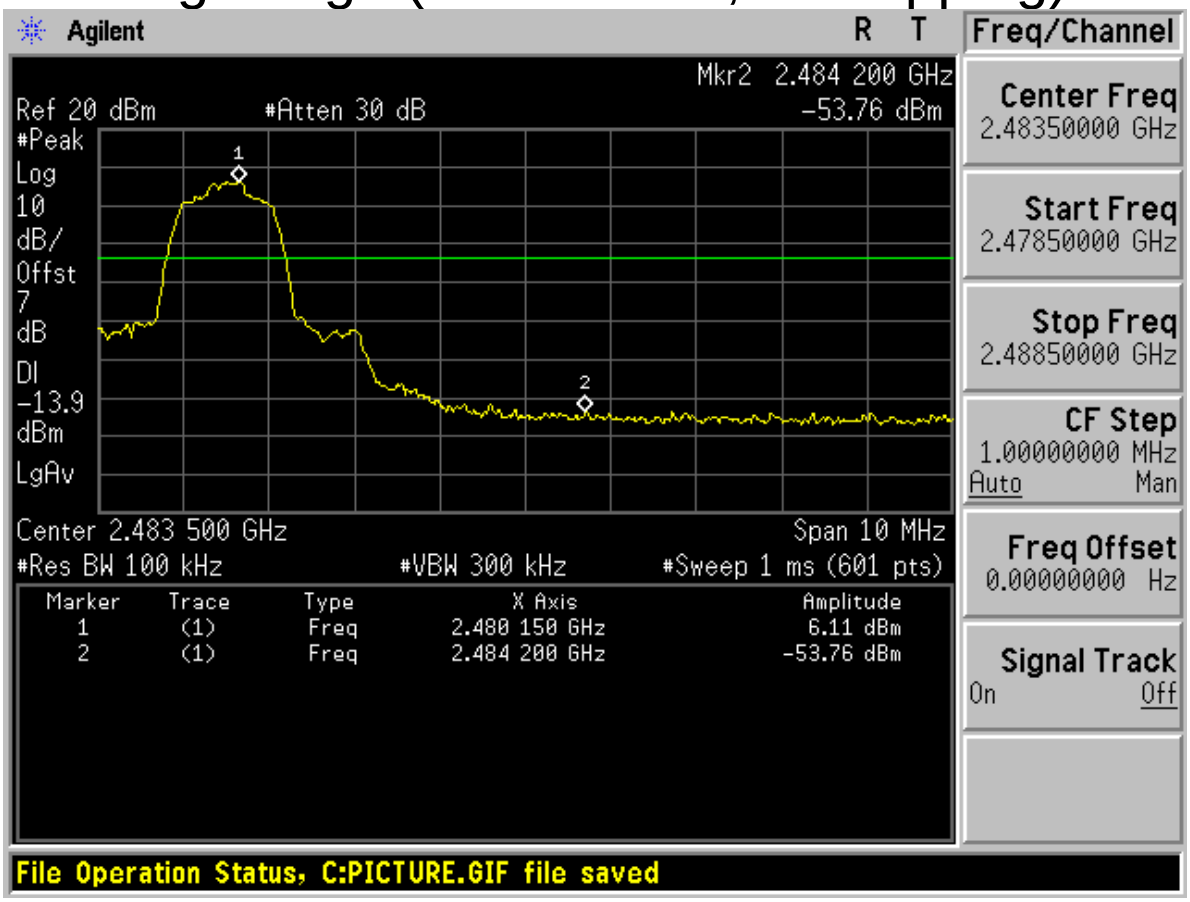
# Low edge (Channel 0, no hopping)



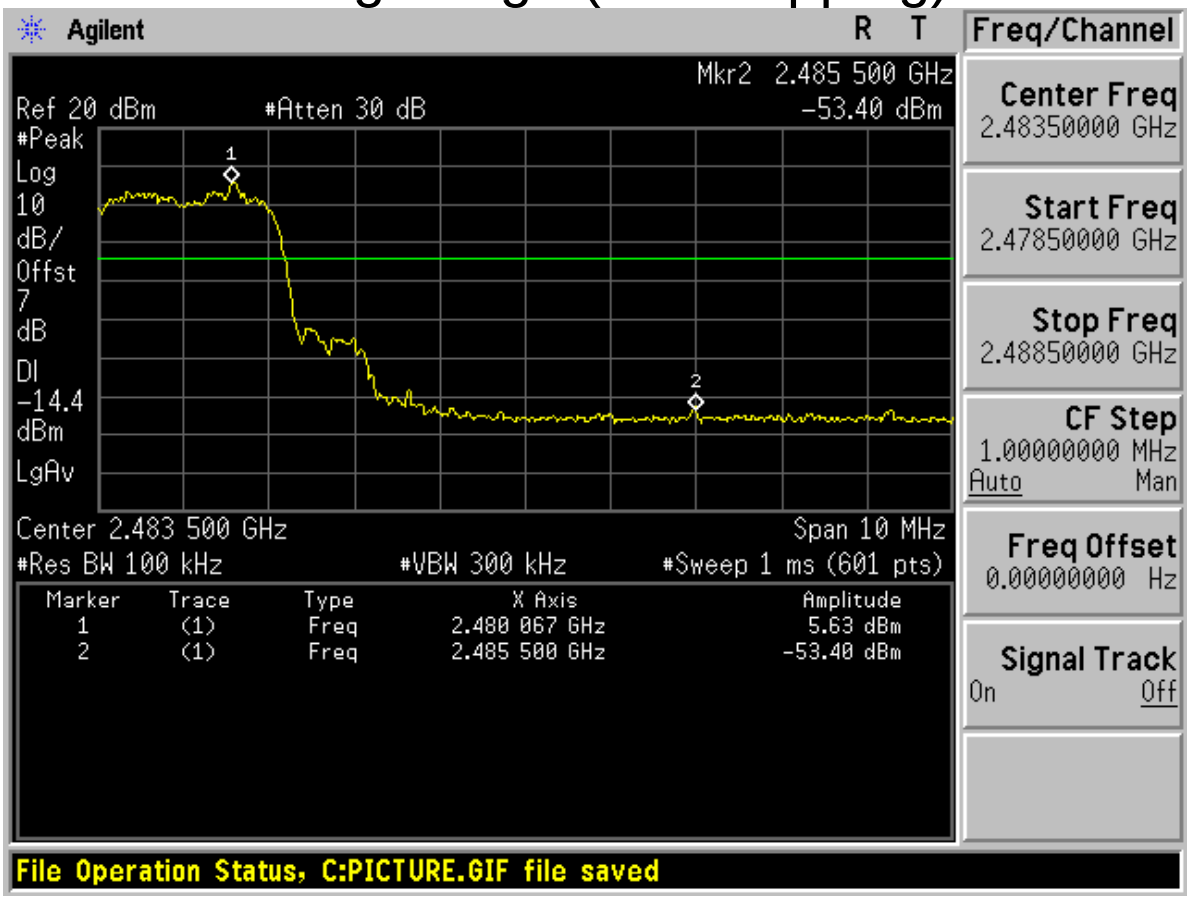
# Low edge (with hopping)



# High edge (Channel 78, no hopping)



# High edge (with hopping)




----------The END----------

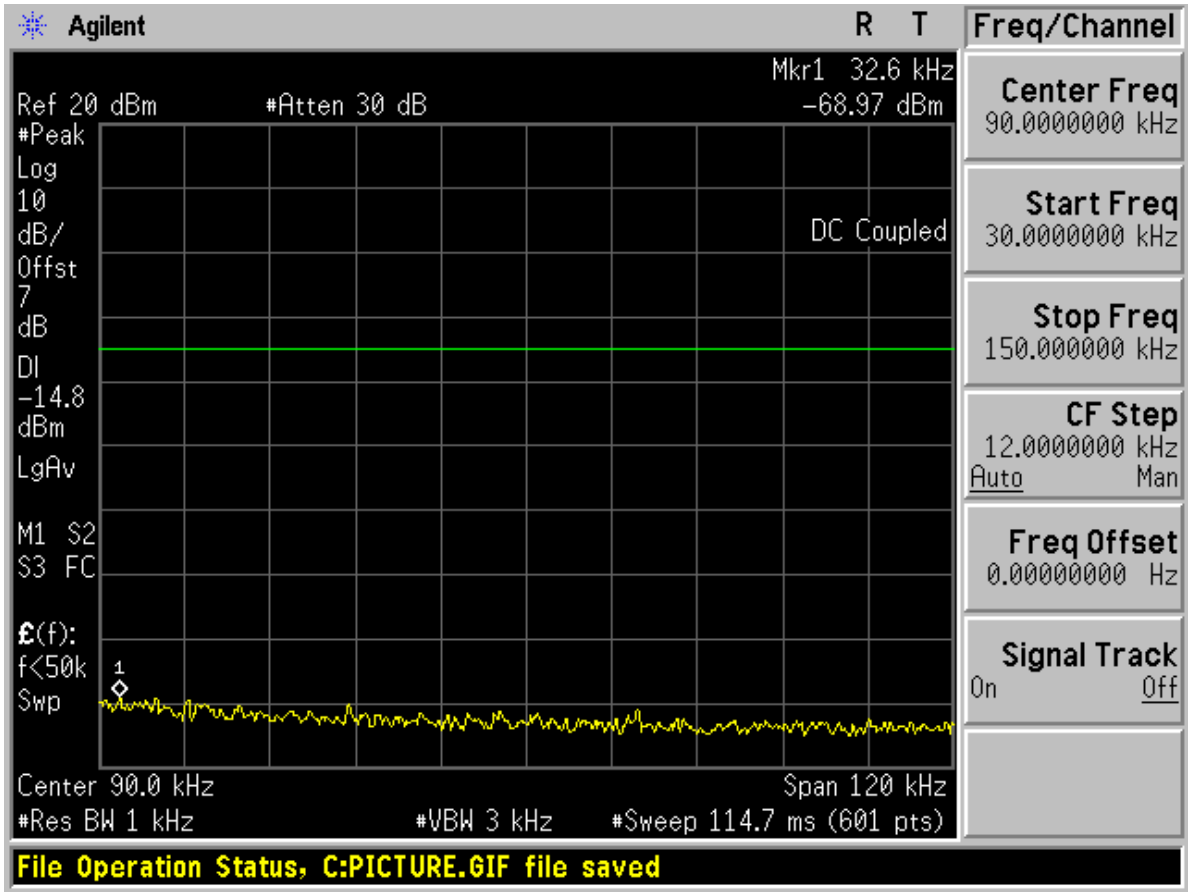
# Appendix G

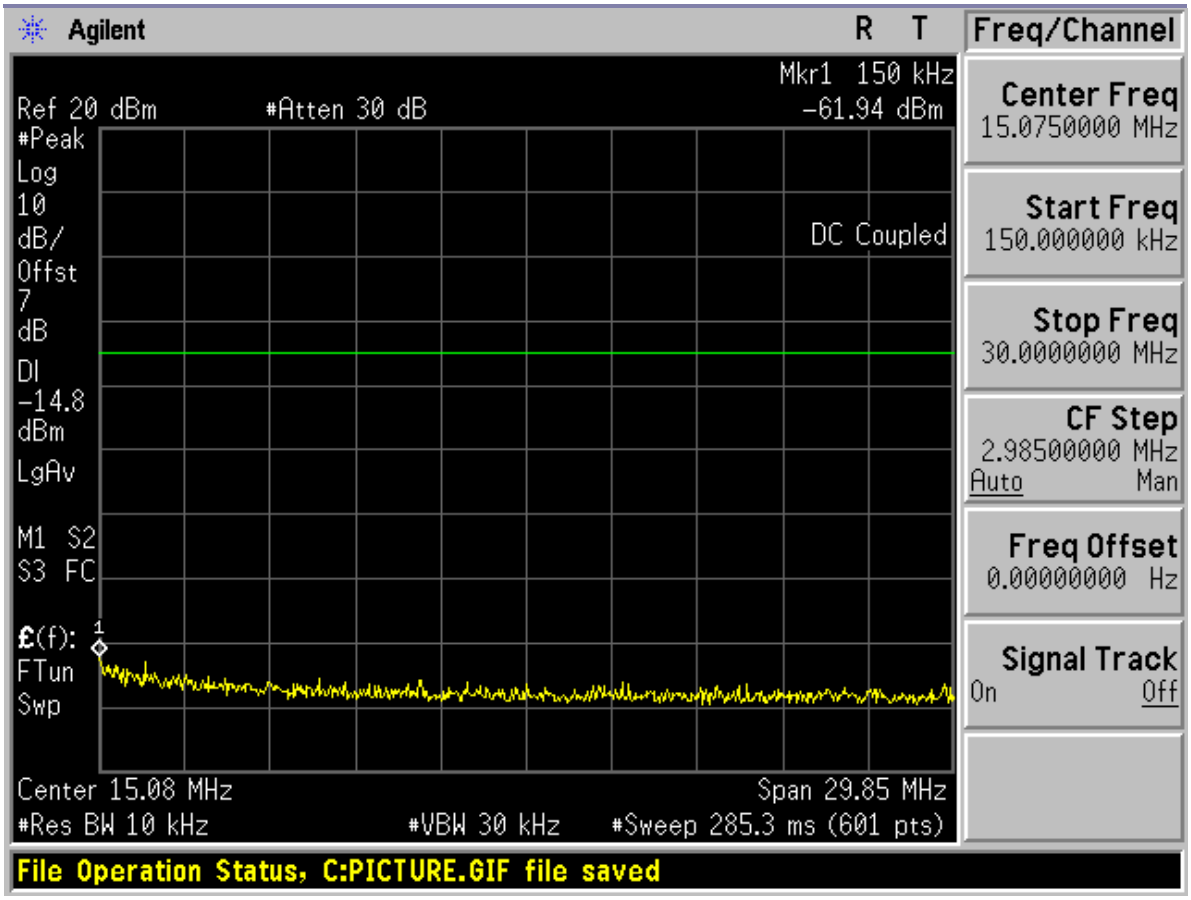
## Conducted RF spurious

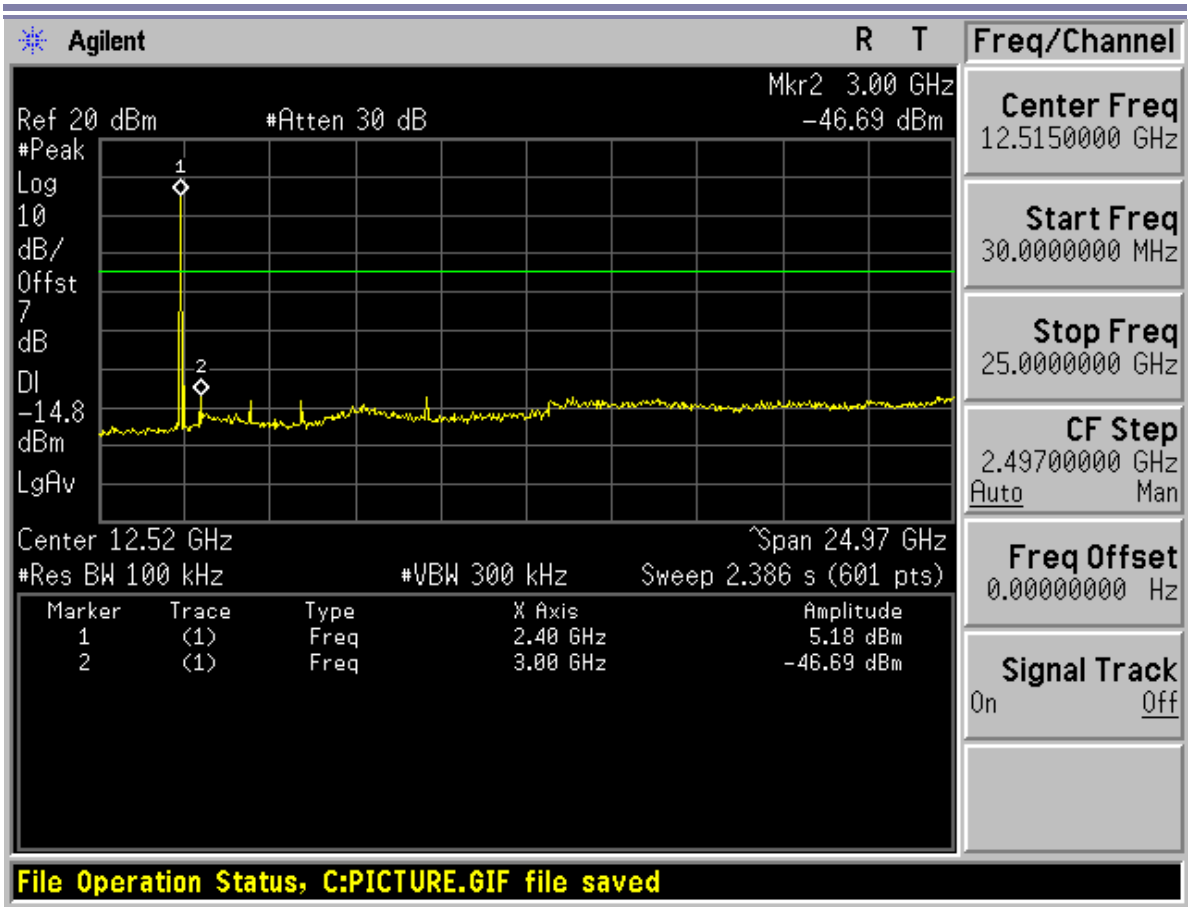
According to FCC Part 15.247 (d)

# Modulation:π/4-DQPSK

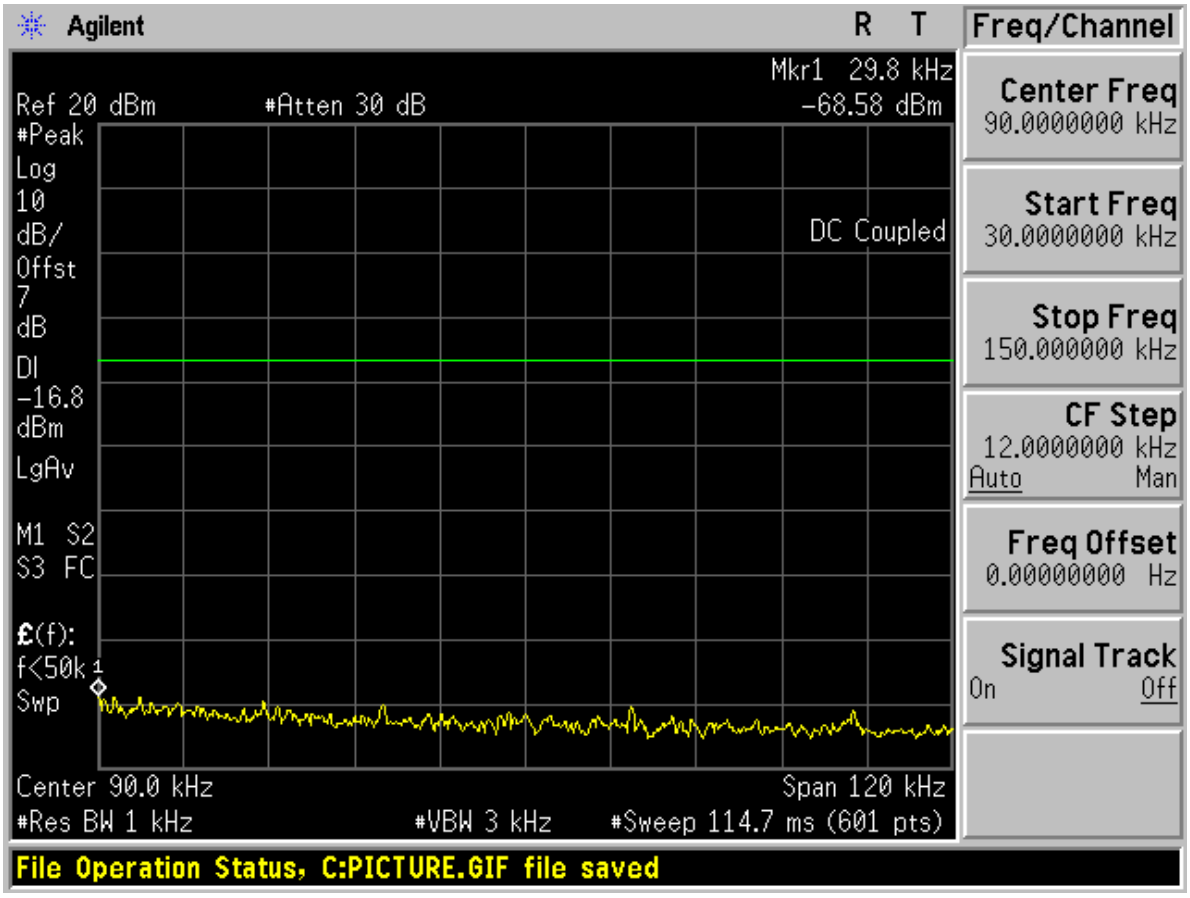
# Channel 0

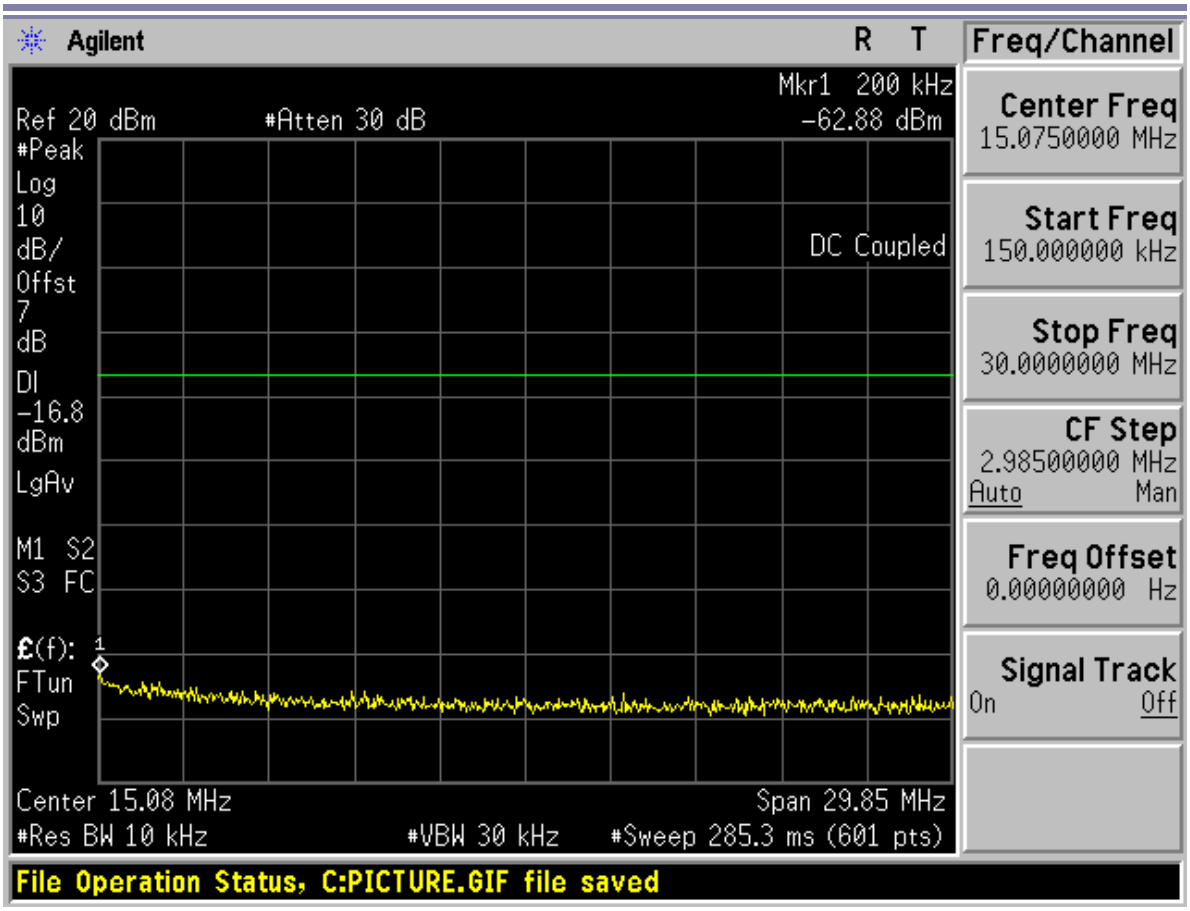


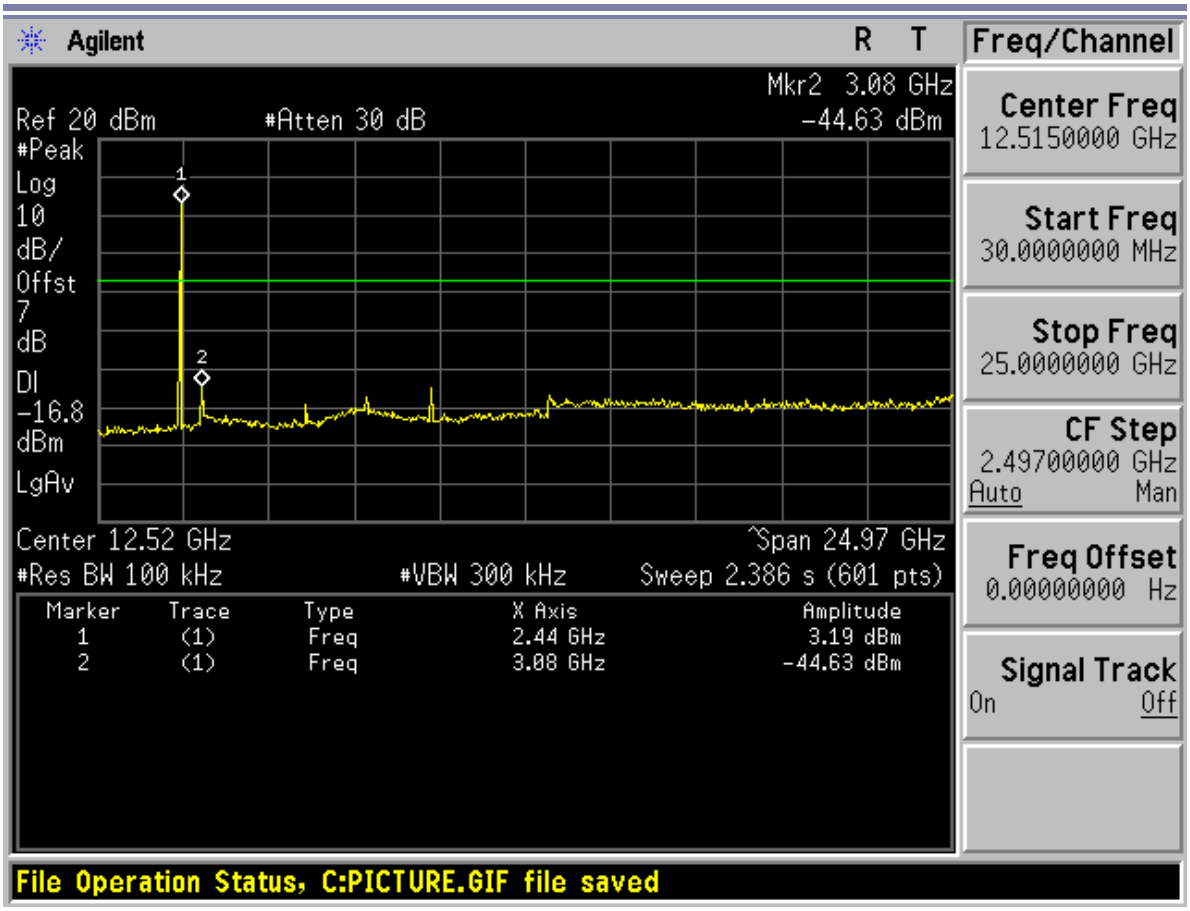

Agilent
R T
Freq/Channel
Mkr1 150 kHz
Ref 20 dBm
#Atten 30 dB
-61.94 dBm
#Peak
Log
10
dB/
Offst
7
dB
DC Coupled
Center Freq
15.0750000 MHz
Start Freq
150.000000 kHz
Stop Freq
30.0000000 MHz
CF Step
2.98500000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Dl
-14.8
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Center 15.08 MHz
Span 29.85 MHz
#Res BW 10 kHz
#VBW 30 kHz
#Sweep 285.3 ms (601 pts)
File Operation Status, C:PICTURE.GIF file saved


Agilent
R T
Freq/Channel
Mkr2 3.00 GHz
Ref 20 dBm
#Atten 30 dB
-46.69 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-14.8
dBm
LgAv
1
2
Center 12.52 GHz
^Span 24.97 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 2.386 s (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.40 GHz 5.18 dBm
2 (1) Freq 3.00 GHz -46.69 dBm
Center Freq
12.5150000 GHz
Start Freq
30.0000000 MHz
Stop Freq
25.0000000 GHz
CF Step
2.49700000 GHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
File Operation Status, C:PICTURE.GIF file saved

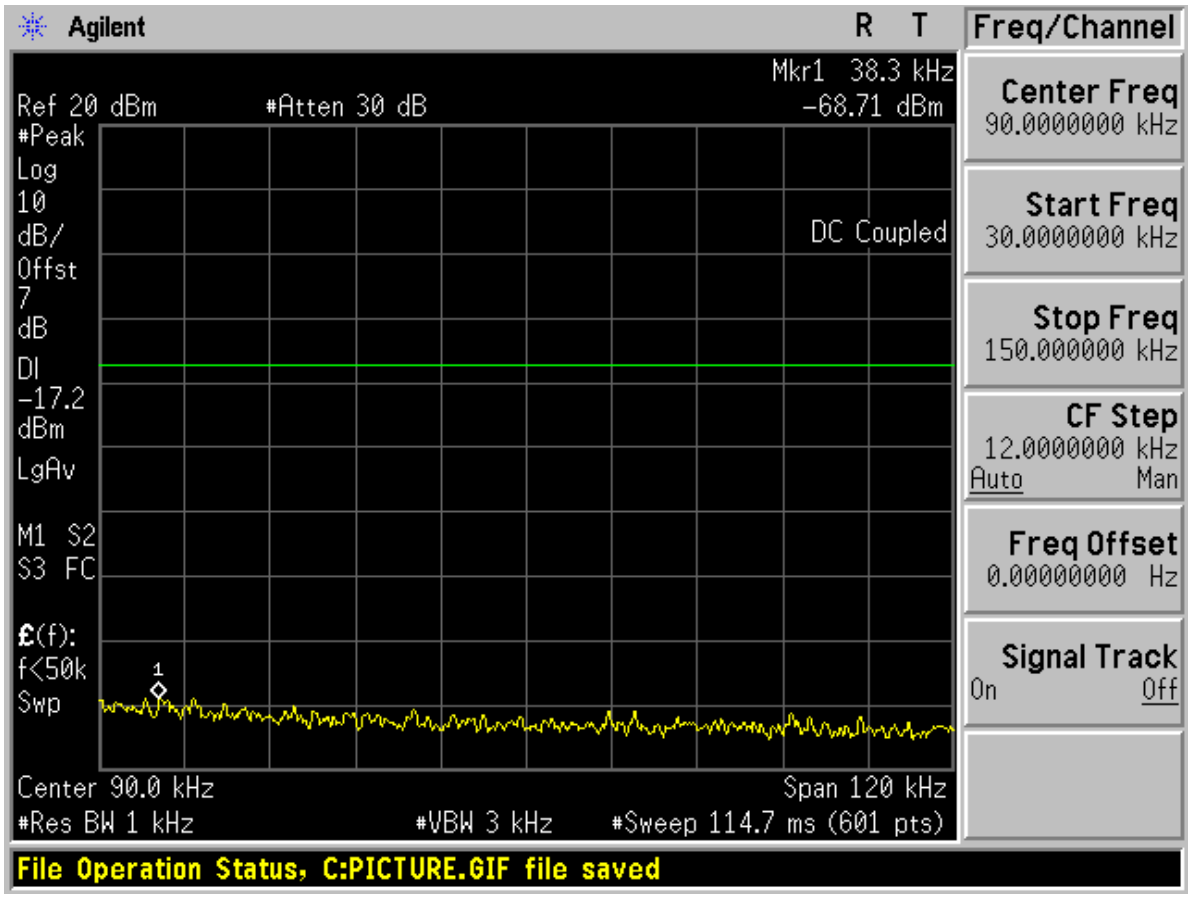
# Channel 40

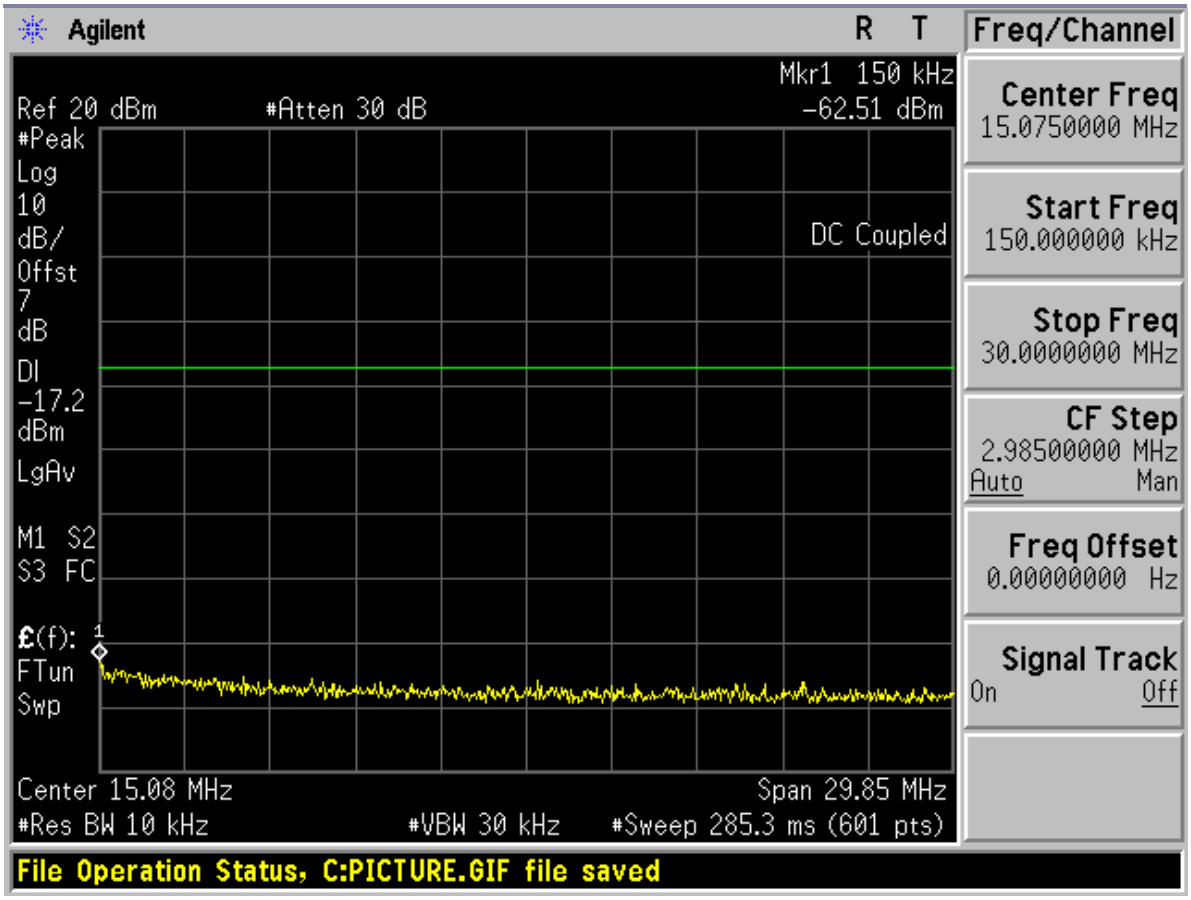

Agilent
R T
Freq/Channel
Mkr1 29.8 kHz
Ref 20 dBm
#Atten 30 dB
-68.58 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-16.8
dBm
LgAv
DC Coupled
M1 S2
S3 FC
£(f):
f<50k 1
Swp
Center 90.0 kHz
Span 120 kHz
#Res BW 1 kHz
#VBW 3 kHz
#Sweep 114.7 ms (601 pts)
Center Freq
90.0000000 kHz
Start Freq
30.0000000 kHz
Stop Freq
150.000000 kHz
CF Step
12.0000000 kHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
File Operation Status, C:PICTURE.GIF file saved

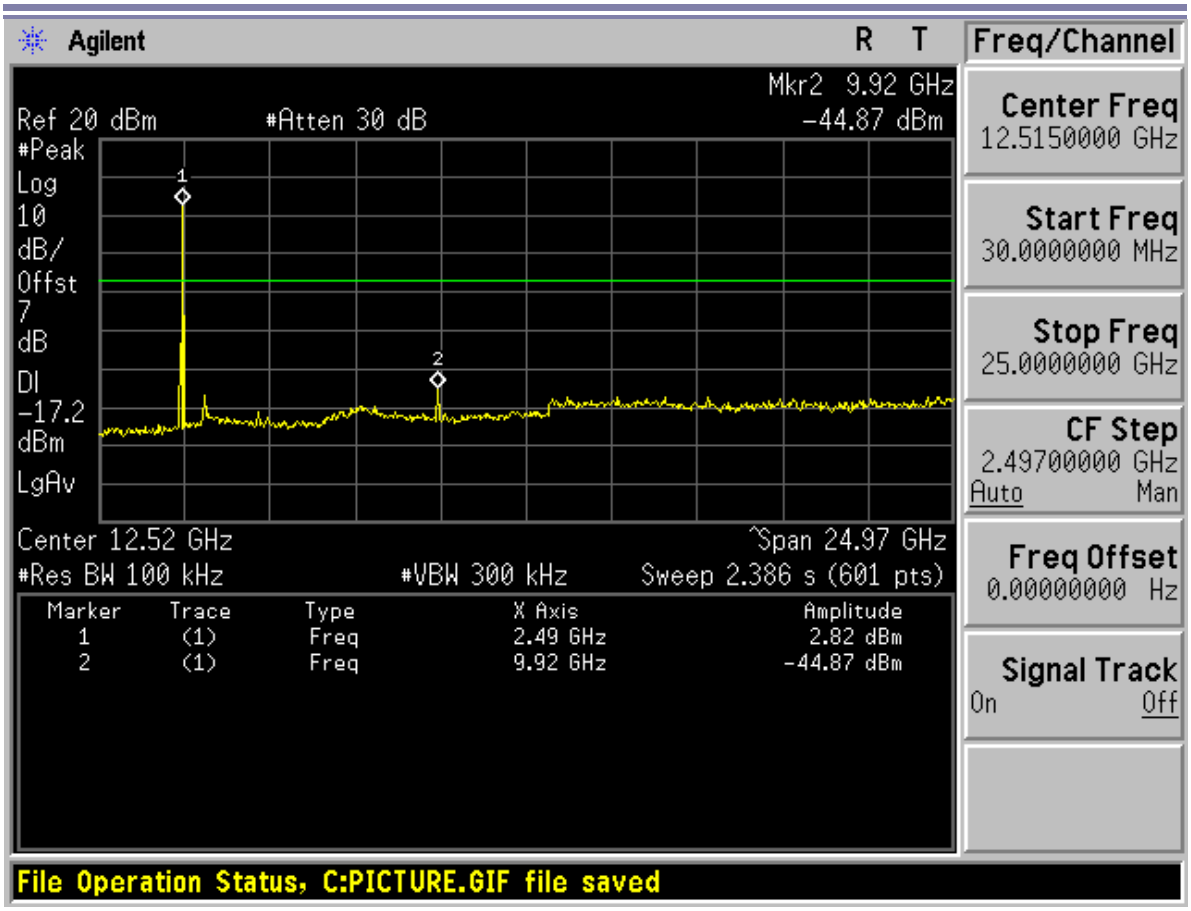

Agilent
R T
Freq/Channel
Mkr1 200 kHz
Ref 20 dBm
#Atten 30 dB
-62.88 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-16.8
dBm
LgAv
M1 S2
S3 FC
£(f): 1
FTun
Swp
DC Coupled
Center Freq
15.0750000 MHz
Start Freq
150.000000 kHz
Stop Freq
30.0000000 MHz
CF Step
2.98500000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 15.08 MHz
Span 29.85 MHz
#Res BW 10 kHz
#VBW 30 kHz
#Sweep 285.3 ms (601 pts)
File Operation Status, C:PICTURE.GIF file saved


Agilent
R T
Freq/Channel
Mkr2 3.08 GHz
Ref 20 dBm
#Atten 30 dB
-44.63 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-16.8
dBm
LgAv
1
2
Center 12.52 GHz
^Span 24.97 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 2.386 s (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.44 GHz 3.19 dBm
2 (1) Freq 3.08 GHz -44.63 dBm
Center Freq
12.5150000 GHz
Start Freq
30.0000000 MHz
Stop Freq
25.0000000 GHz
CF Step
2.49700000 GHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
File Operation Status, C:PICTURE.GIF file saved

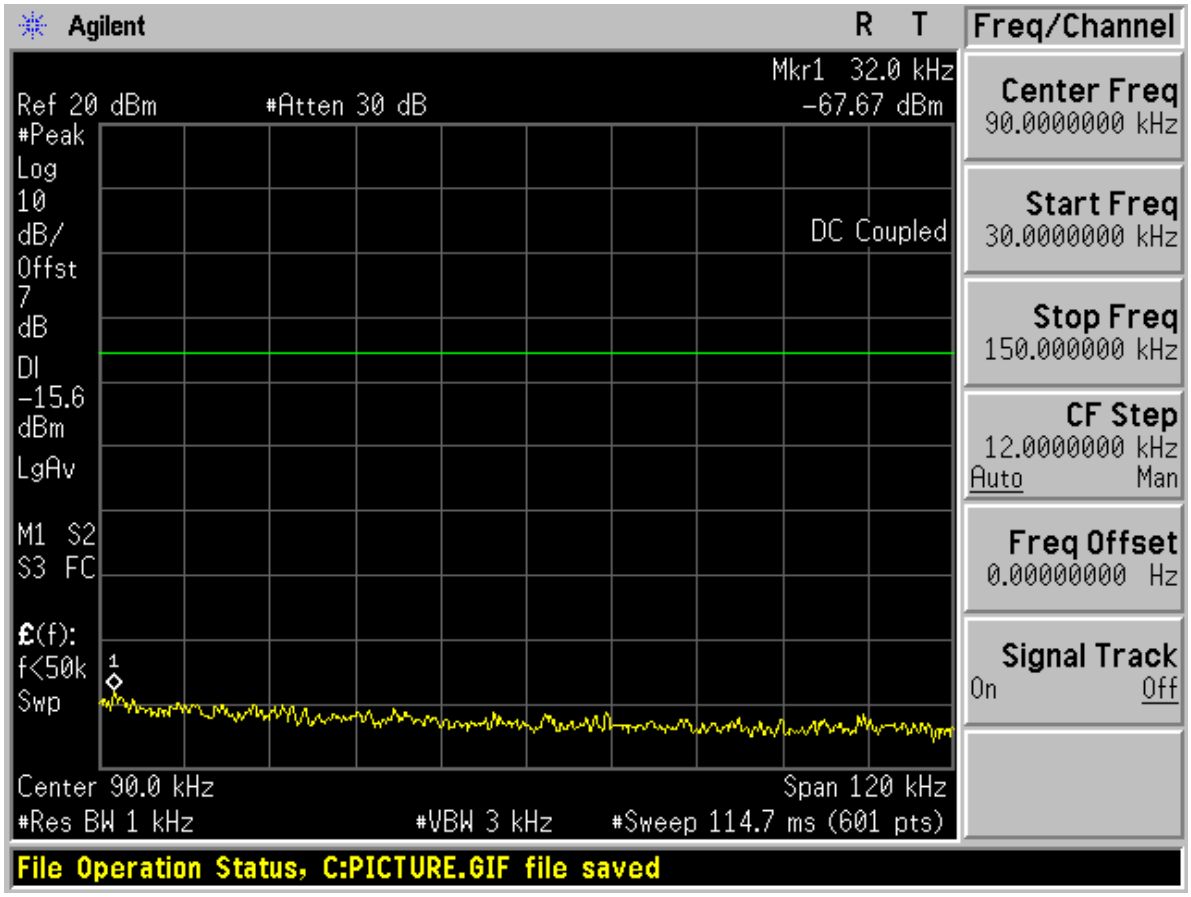
# Channel 78

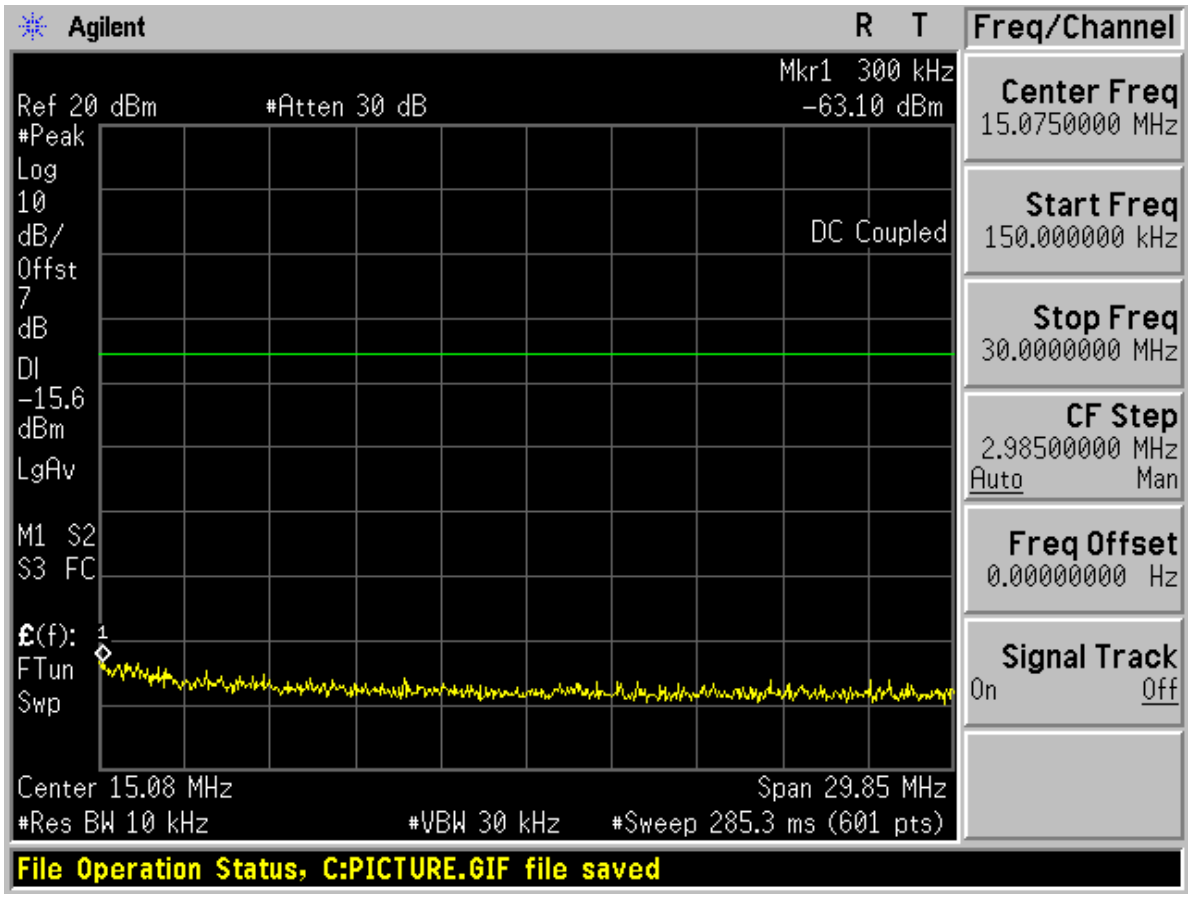

Agilent
R T
Freq/Channel
Mkr1 38.3 kHz
Ref 20 dBm
#Atten 30 dB
-68.71 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-17.2
dBm
LgAv
M1 S2
S3 FC
£(f):
f<50k
Swp
DC Coupled
Center Freq
90.0000000 kHz
Start Freq
30.0000000 kHz
Stop Freq
150.000000 kHz
CF Step
12.0000000 kHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Center 90.0 kHz
Span 120 kHz
#Res BW 1 kHz
#VBW 3 kHz
#Sweep 114.7 ms (601 pts)
File Operation Status, C:PICTURE.GIF file saved

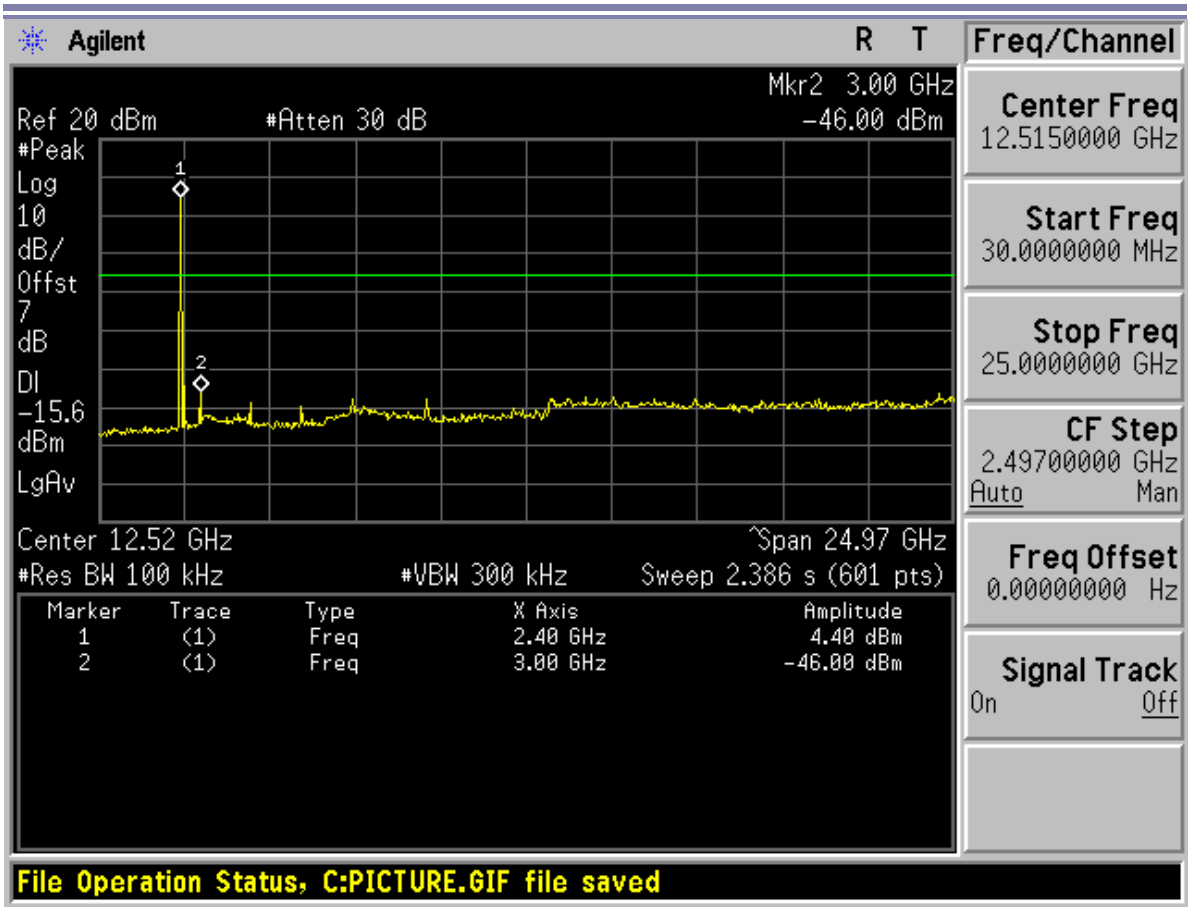

Agilent
R T
Freq/Channel
Mkr1 150 kHz
Ref 20 dBm
#Atten 30 dB
-62.51 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-17.2
dBm
LgAv
M1 S2
S3 FC
£(f): 1
FTun
Swp
DC Coupled
Center Freq
15.0750000 MHz
Start Freq
150.000000 kHz
Stop Freq
30.0000000 MHz
CF Step
2.98500000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 15.08 MHz
Span 29.85 MHz
#Res BW 10 kHz
#VBW 30 kHz
#Sweep 285.3 ms (601 pts)
File Operation Status, C:PICTURE.GIF file saved


Agilent
R T
Freq/Channel
Mkr2 9.92 GHz
Ref 20 dBm
#Atten 30 dB
-44.87 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-17.2
dBm
LgAv
1
2
Center 12.52 GHz
^Span 24.97 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 2.386 s (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.49 GHz 2.82 dBm
2 (1) Freq 9.92 GHz -44.87 dBm
Center Freq
12.5150000 GHz
Start Freq
30.0000000 MHz
Stop Freq
25.0000000 GHz
CF Step
2.49700000 GHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
File Operation Status, C:PICTURE.GIF file saved

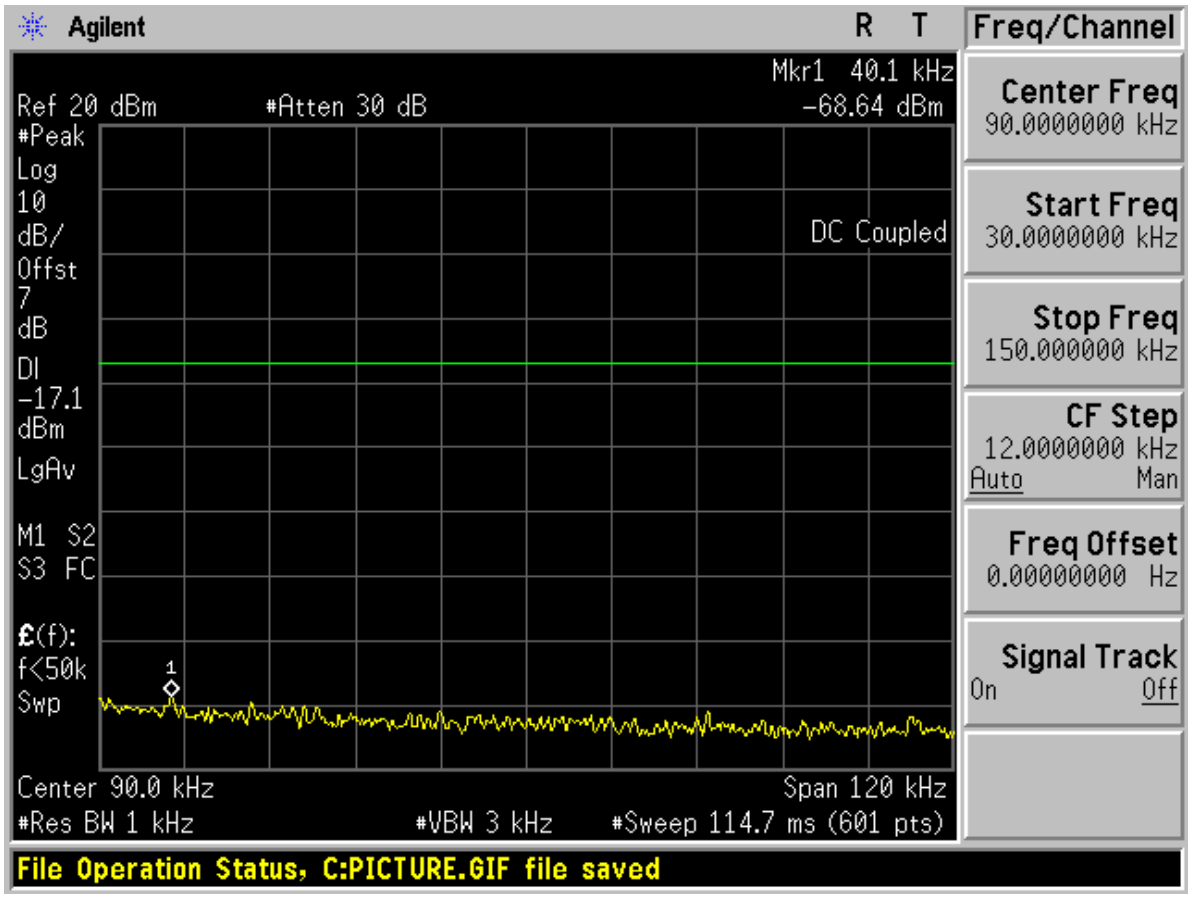
# Modulation:8DPSK
# Channel 0

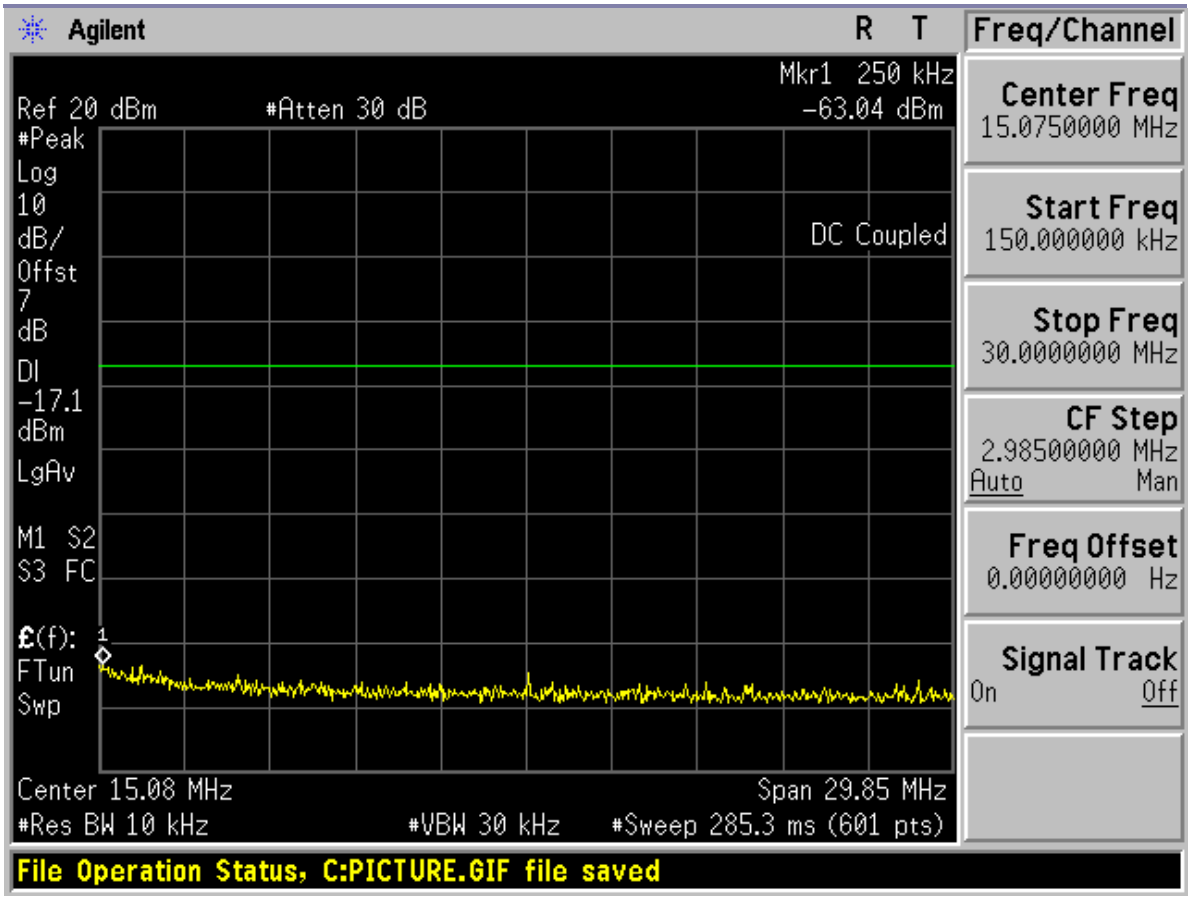


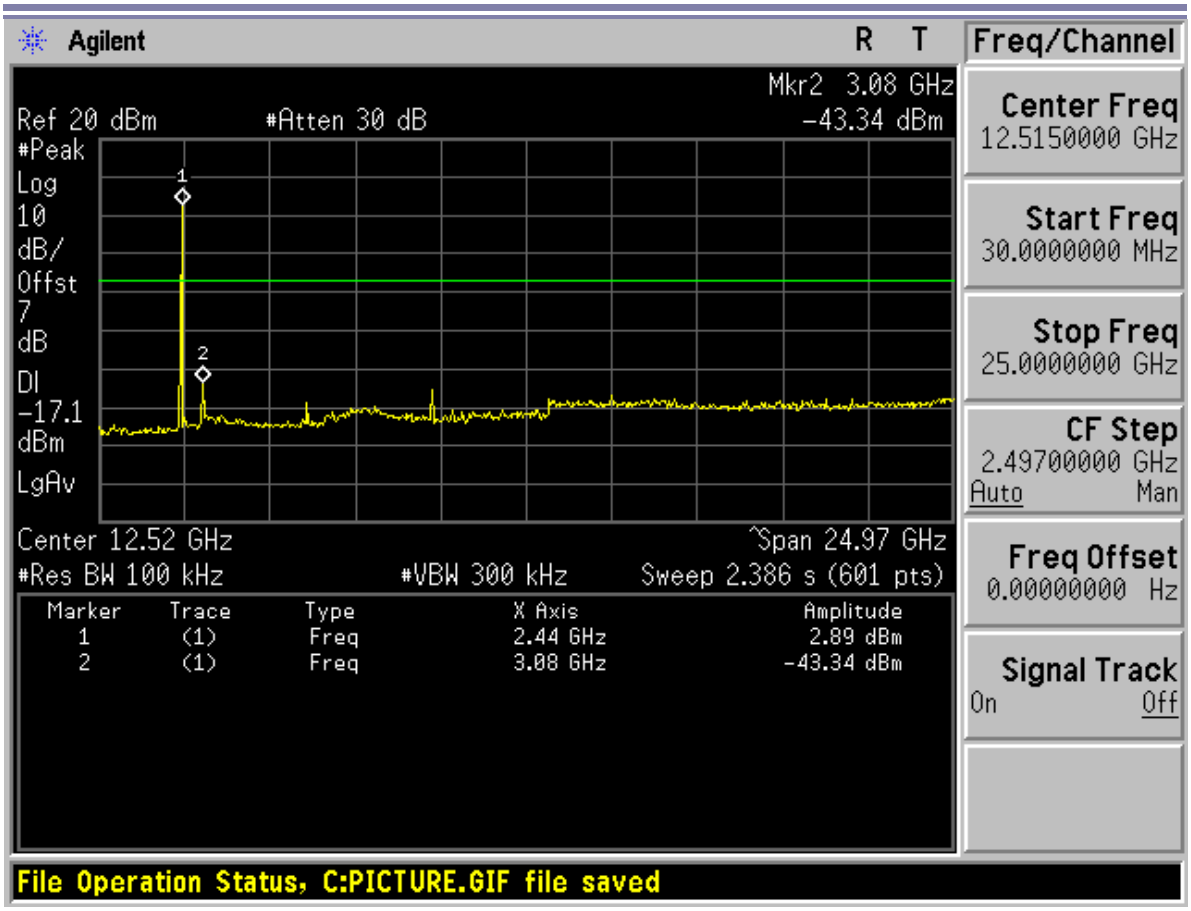

Agilent
R T
Freq/Channel
Mkr1 300 kHz
Ref 20 dBm
#Atten 30 dB
-63.10 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-15.6
dBm
LgAv
DC Coupled
M1 S2
S3 FC
£(f): 1
FTun
Swp
Center 15.08 MHz
Span 29.85 MHz
#Res BW 10 kHz
#VBW 30 kHz
#Sweep 285.3 ms (601 pts)
Center Freq
15.0750000 MHz
Start Freq
150.000000 kHz
Stop Freq
30.0000000 MHz
CF Step
2.98500000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
File Operation Status, C:PICTURE.GIF file saved


Agilent
R T
Freq/Channel
Mkr2 3.00 GHz
Ref 20 dBm
#Atten 30 dB
-46.00 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-15.6
dBm
LgAv
1
2
Center 12.52 GHz
^Span 24.97 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 2.386 s (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.40 GHz 4.40 dBm
2 (1) Freq 3.00 GHz -46.00 dBm
Center Freq
12.5150000 GHz
Start Freq
30.0000000 MHz
Stop Freq
25.0000000 GHz
CF Step
2.49700000 GHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
File Operation Status, C:PICTURE.GIF file saved

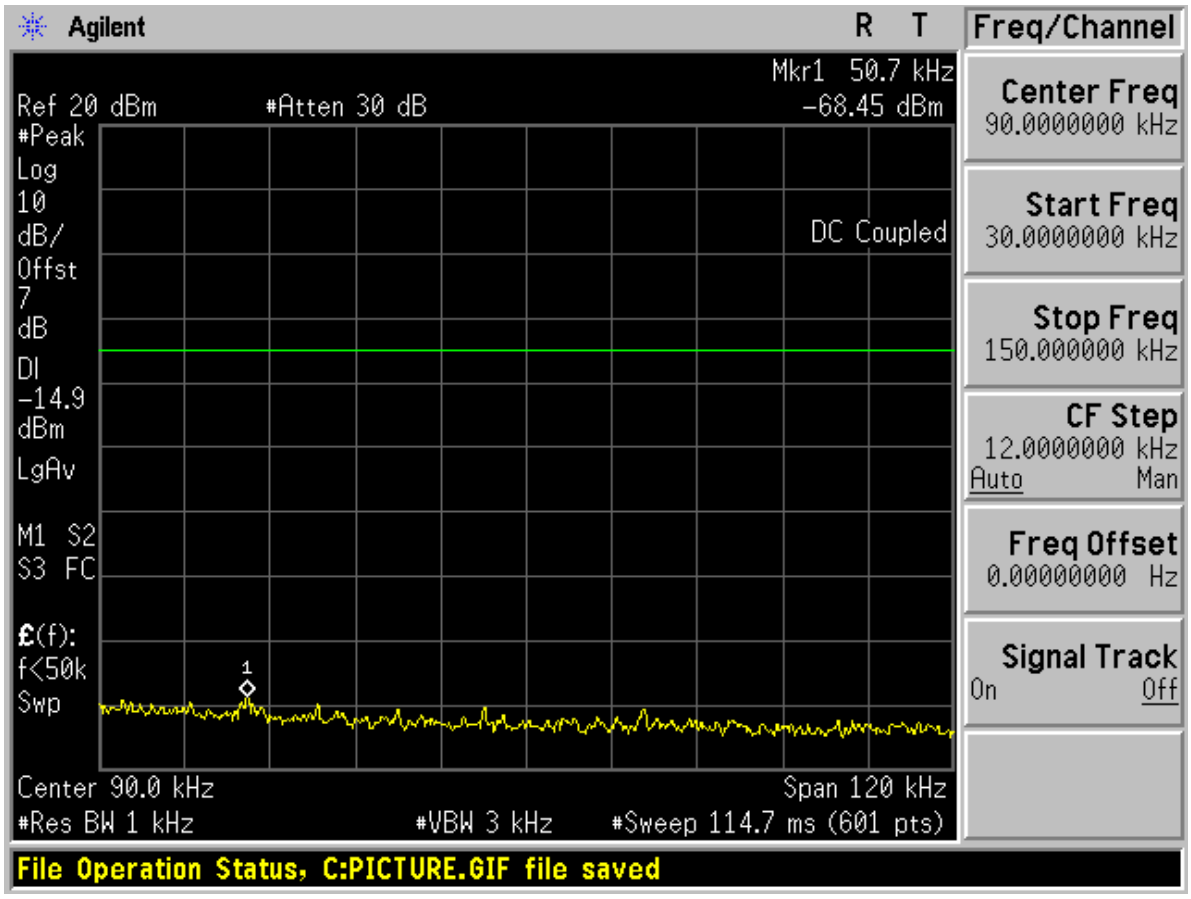
# Channel 40

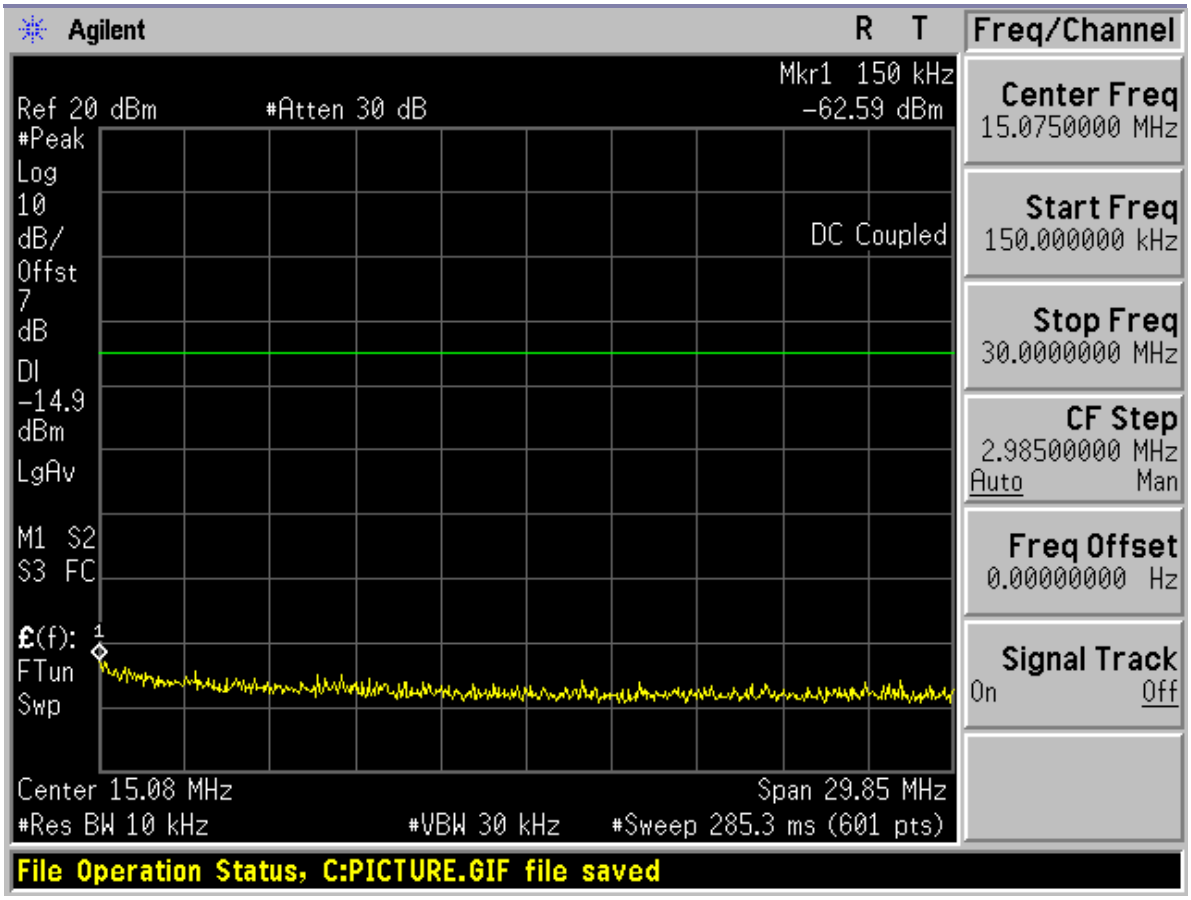

Agilent
R T
Freq/Channel
Mkr1 40.1 kHz
Ref 20 dBm
#Atten 30 dB
-68.64 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-17.1
dBm
LgAv
M1 S2
S3 FC
£(f):
f<50k
Swp
DC Coupled
Center Freq
90.0000000 kHz
Start Freq
30.0000000 kHz
Stop Freq
150.000000 kHz
CF Step
12.0000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 90.0 kHz
Span 120 kHz
#Res BW 1 kHz
#VBW 3 kHz
#Sweep 114.7 ms (601 pts)
File Operation Status, C:PICTURE.GIF file saved

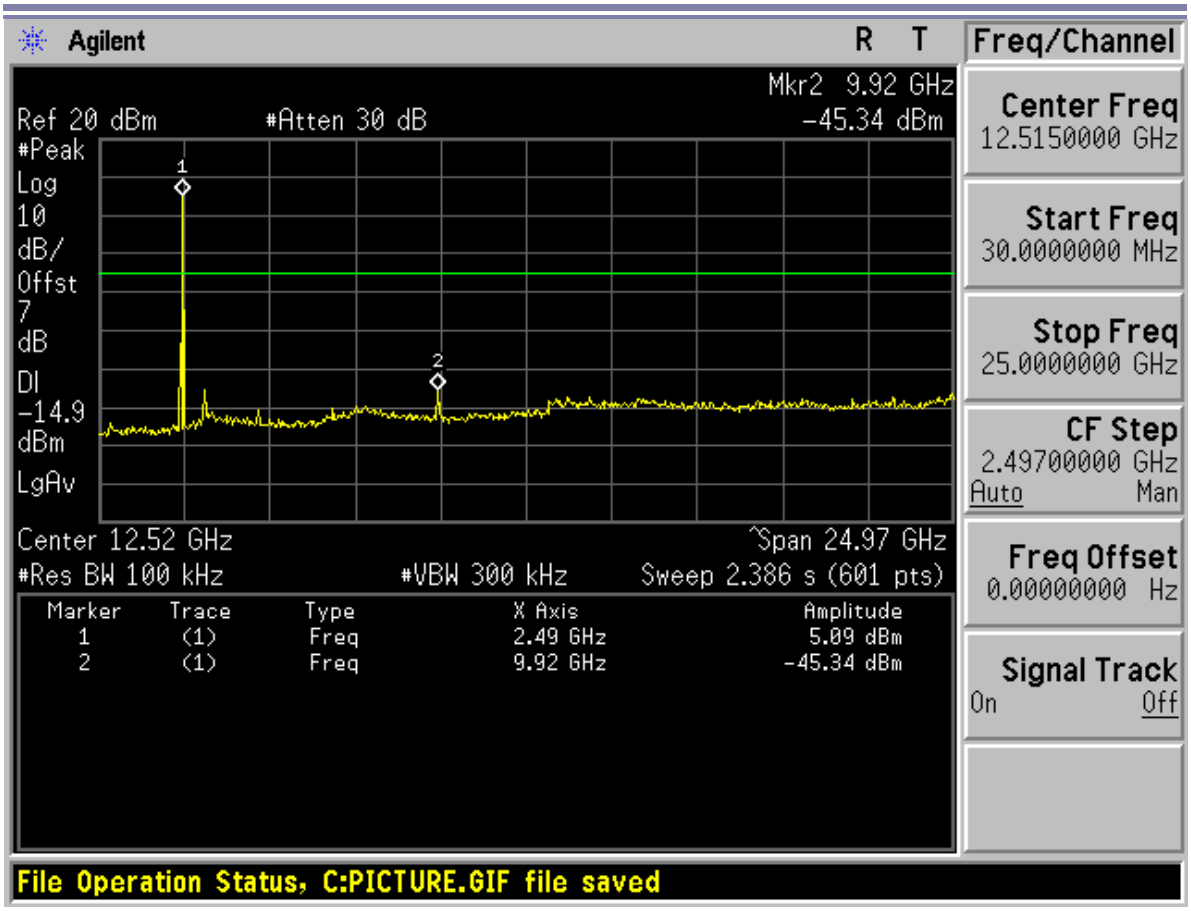

Agilent
R T
Freq/Channel
Mkr1 250 kHz
Ref 20 dBm
#Atten 30 dB
-63.04 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-17.1
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
DC Coupled
Center Freq
15.0750000 MHz
Start Freq
150.000000 kHz
Stop Freq
30.0000000 MHz
CF Step
2.98500000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 15.08 MHz
Span 29.85 MHz
#Res BW 10 kHz
#VBW 30 kHz
#Sweep 285.3 ms (601 pts)
File Operation Status, C:PICTURE.GIF file saved


Agilent
R T
Freq/Channel
Mkr2 3.08 GHz
Ref 20 dBm
#Atten 30 dB
-43.34 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-17.1
dBm
LgAv
Center Freq
12.5150000 GHz
Start Freq
30.0000000 MHz
Stop Freq
25.0000000 GHz
CF Step
2.49700000 GHz
Auto
Man
Center 12.52 GHz
^Span 24.97 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 2.386 s (601 pts)
Freq Offset
0.00000000 Hz
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.44 GHz 2.89 dBm
2 (1) Freq 3.08 GHz -43.34 dBm
Signal Track
On
Off
File Operation Status, C:PICTURE.GIF file saved

# Channel 78


Agilent
R T
Freq/Channel
Mkr1 50.7 kHz
Ref 20 dBm
#Atten 30 dB
-68.45 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-14.9
dBm
LgAv
M1 S2
S3 FC
£(f):
f<50k
Swp
DC Coupled
1
Center 90.0 kHz
Span 120 kHz
#Res BW 1 kHz
#VBW 3 kHz
#Sweep 114.7 ms (601 pts)
Center Freq
90.0000000 kHz
Start Freq
30.0000000 kHz
Stop Freq
150.000000 kHz
CF Step
12.0000000 kHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
File Operation Status, C:PICTURE.GIF file saved


Agilent
R T
Freq/Channel
Mkr1 150 kHz
Ref 20 dBm
#Atten 30 dB
-62.59 dBm
#Peak
Log
10
dB/
Offst
7
dB
DC Coupled
Center Freq
15.0750000 MHz
Start Freq
150.000000 kHz
Stop Freq
30.0000000 MHz
CF Step
2.98500000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Dl
-14.9
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Center 15.08 MHz
Span 29.85 MHz
#Res BW 10 kHz
#VBW 30 kHz
#Sweep 285.3 ms (601 pts)
File Operation Status, C:PICTURE.GIF file saved


Agilent
R T
Freq/Channel
Mkr2 9.92 GHz
Ref 20 dBm
#Atten 30 dB
-45.34 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-14.9
dBm
LgAv
Center Freq
12.5150000 GHz
Start Freq
30.0000000 MHz
Stop Freq
25.0000000 GHz
CF Step
2.49700000 GHz
Auto
Man
Center 12.52 GHz
^Span 24.97 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 2.386 s (601 pts)
Freq Offset
0.00000000 Hz
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.49 GHz 5.09 dBm
2 (1) Freq 9.92 GHz -45.34 dBm
Signal Track
On
Off
File Operation Status, C:PICTURE.GIF file saved

----------The END----------

# Appendix H

## Radiated spurious emission

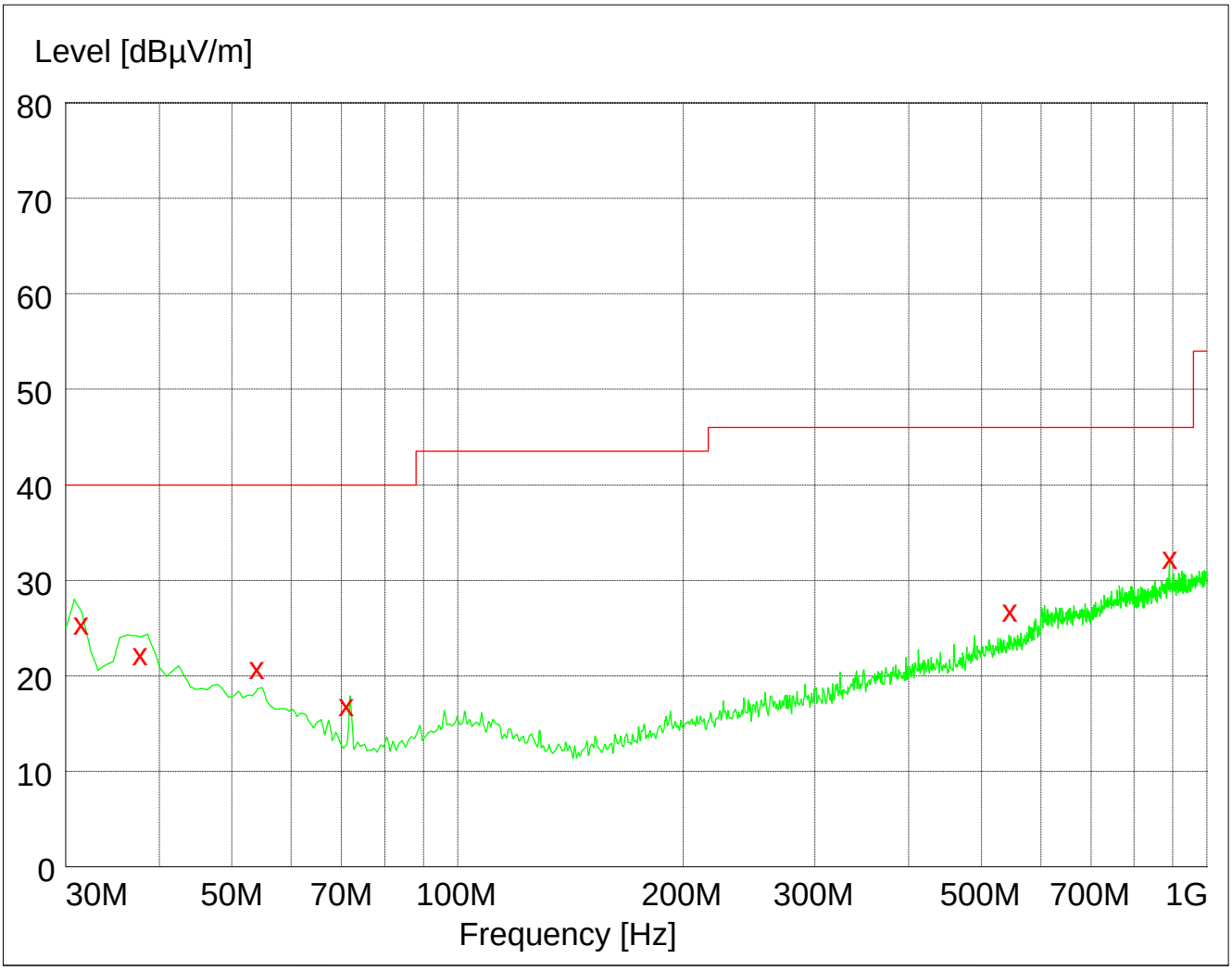
According to FCC Part 15.247 (d) & 15.205 & 15.209

Note: Simultaneous transmission was investigated and no new emissions were found.

**Part 1: Testing Range of "30 MHz to 1 GHz"**

Note 1: The test results and plot for testing range of "30 MHz to 1 GHz" showed as below is the WORST case for all Test Modes and Channels. This range will not be presented for each Test Mode and each Channel.

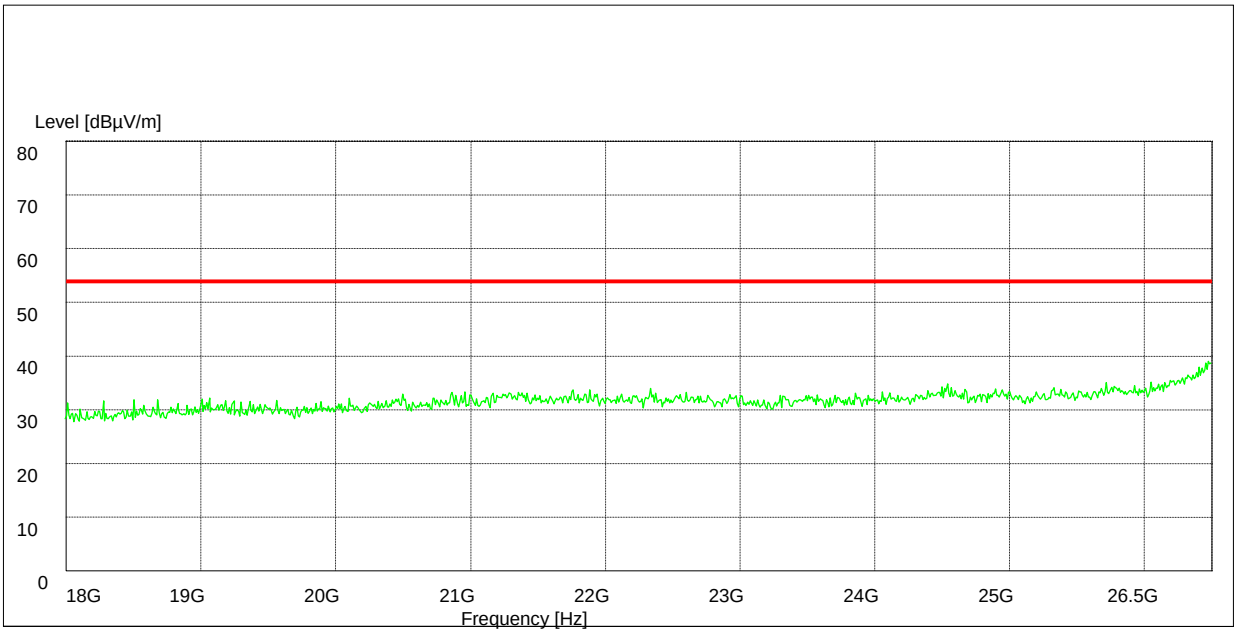
Note 2: The emissions in this range are mainly from the Platform Device (Notepad PC and its ancillary components).




| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Plarization |
|---|---|---|---|---|---|---|---|
| 31.440000 | 25.90 | 14.6 | 40.0 | 14.1 | 100.0 | 36.00 | VERTICAL |
| 37.680000 | 22.60 | 15.2 | 40.0 | 17.4 | 100.0 | 83.00 | VERTICAL |
| 53.940000 | 21.20 | 14.7 | 40.0 | 18.8 | 100.0 | 199.00 | HORIZONTAL |
| 71.040000 | 17.30 | 10.8 | 40.0 | 22.7 | 136.0 | 78.00 | VERTICAL |
| 545.340000 | 27.20 | 19.8 | 46.0 | 18.8 | 113.0 | 274.00 | VERTICAL |
| 891.240000 | 32.70 | 24.8 | 46.0 | 13.3 | 194.0 | 238.00 | HORIZONTAL |

**Part 2: Testing Range of "18 GHz to 26.5 GHz"**

Note: No peak found in pre- test.



## Part 3: Testing Range of "2.3GHz to 2.5GHz"

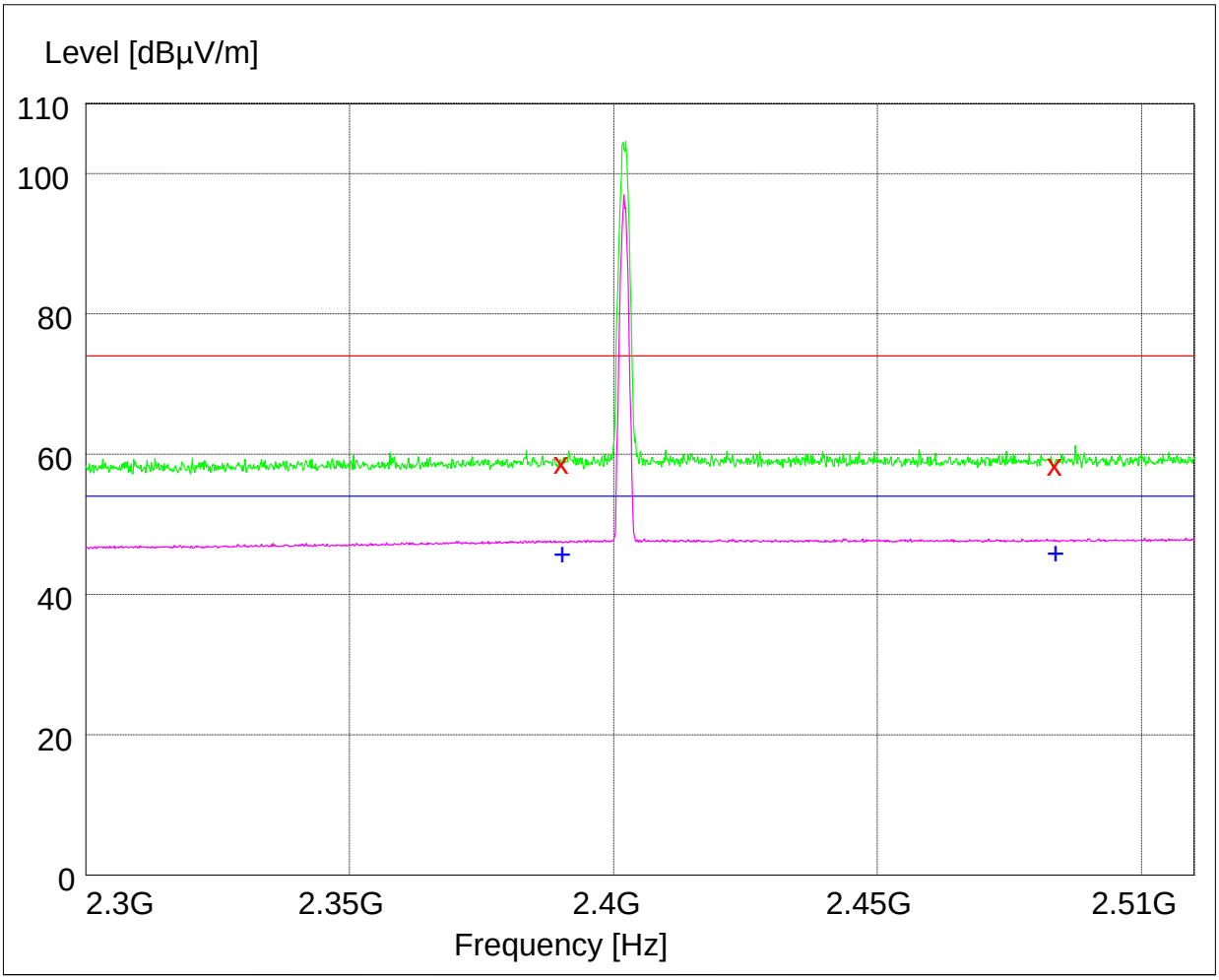
Note 1: The testing range of "2.3 GHz to 2.5 GHz" is for checking radiated emissions located in restricted bands near the EUT operating bands.

Note 2: Two limits are required in the testing range above 1 GHz, that is Peak limit (74 dBµV/m) and Average Limit (54 dBµV/m).

Note 3: The peak spike exceeds the limit line is EUT's operating frequency.

### 1 Test Mode:

### 1.1 Channel 00




Note: The peak exceeds the limit line is carrier frequency.

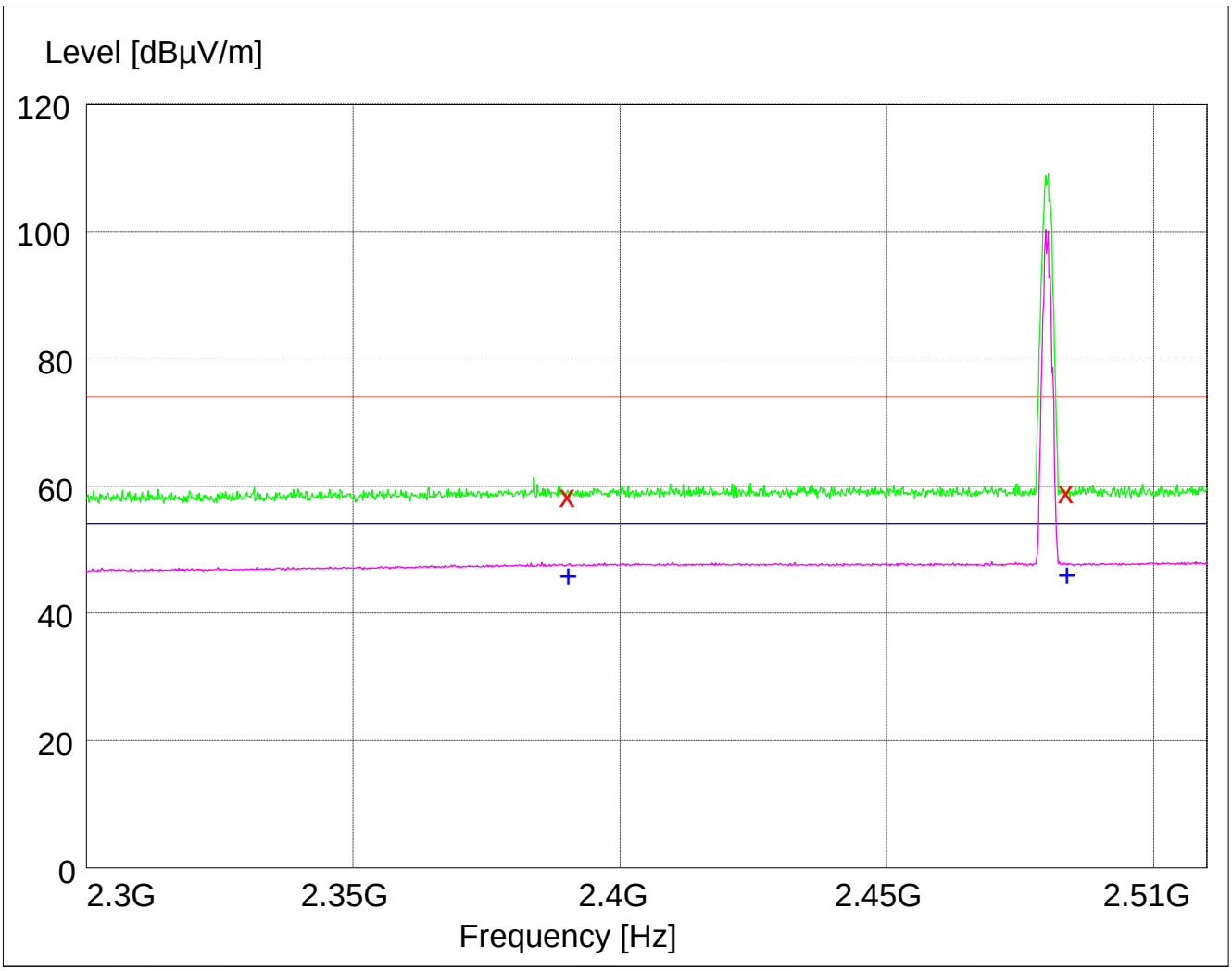
MEASUREMENT RESULT: PK Detector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---|---|---|---|---|---|---|---|
| 2390.000000 | 60.20 | 33.5 | 74.0 | 13.8 | 194.0 | 344.00 | HORIZONTAL |
| 2483.500000 | 60.10 | 33.8 | 74.0 | 13.9 | 100.0 | 231.00 | VERTICAL |

MEASUREMENT RESULT: AVDetector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---|---|---|---|---|---|---|---|
| 2390.000000 | 46.40 | 33.5 | 54.0 | 7.6 | 185.0 | 90.00 | HORIZONTAL |
| 2483.500000 | 46.50 | 33.8 | 54.0 | 7.5 | 144.0 | 210.00 | VERTICAL |

## 1.2 Channel 78




Note: The peak exceeds the limit line is carrier frequency.

MEASUREMENT RESULT: PK Detector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---|---|---|---|---|---|---|---|
| 2390.000000 | 58.90 | 33.5 | 74.0 | 15.1 | 200.0 | 59.00 | HORIZONTAL |
| 2483.500000 | 59.40 | 33.8 | 74.0 | 14.6 | 194.0 | 3.00 | VERTICAL |

MEASUREMENT RESULT: AVDetector

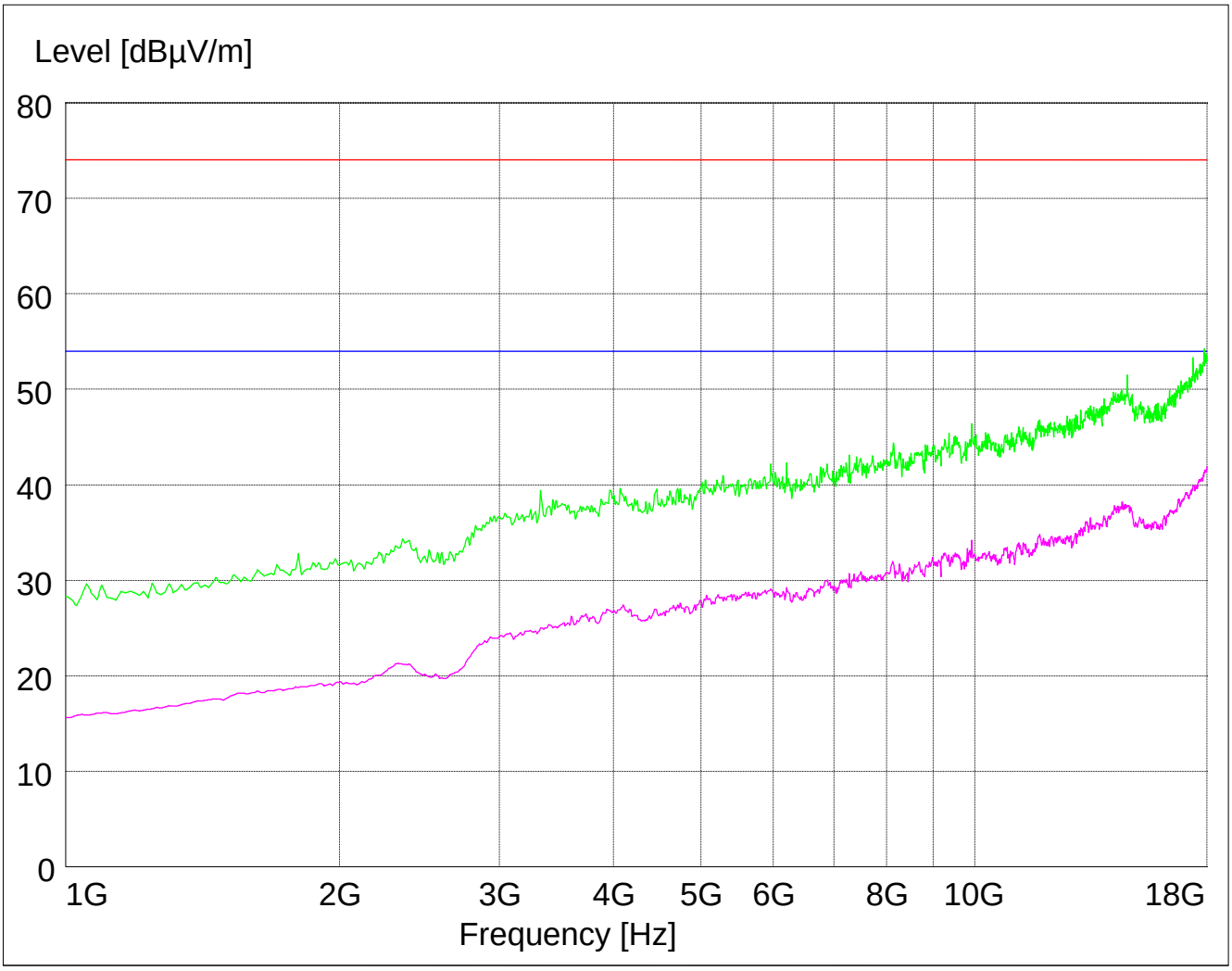
| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---|---|---|---|---|---|---|---|
| 2390.000000 | 46.40 | 33.5 | 54.0 | 7.6 | 121.0 | 145.00 | VERTICAL |
| 2483.500000 | 46.50 | 33.8 | 54.0 | 7.5 | 197.0 | 287.00 | VERTICAL |

### 1.3 Part 4: Testing Range of "1 GHz to 18 GHz"

Note 1: The test results and plot for testing range of "1 GHz to 18 GHz" showed as below is the WORST case for all Test Modes and Channels. This range will not be presented for each Test Mode and each Channel.

Note 2: The testing range of "1 GHz to 18 GHz" is for checking radiated emissions located in restricted bands faraway from the EUT operating bands.

Note 3: Two limits are required in the testing range above 1 GHz, that is Peak limit (74 dBµV/m) and Average Limit (54 dBµV/m).



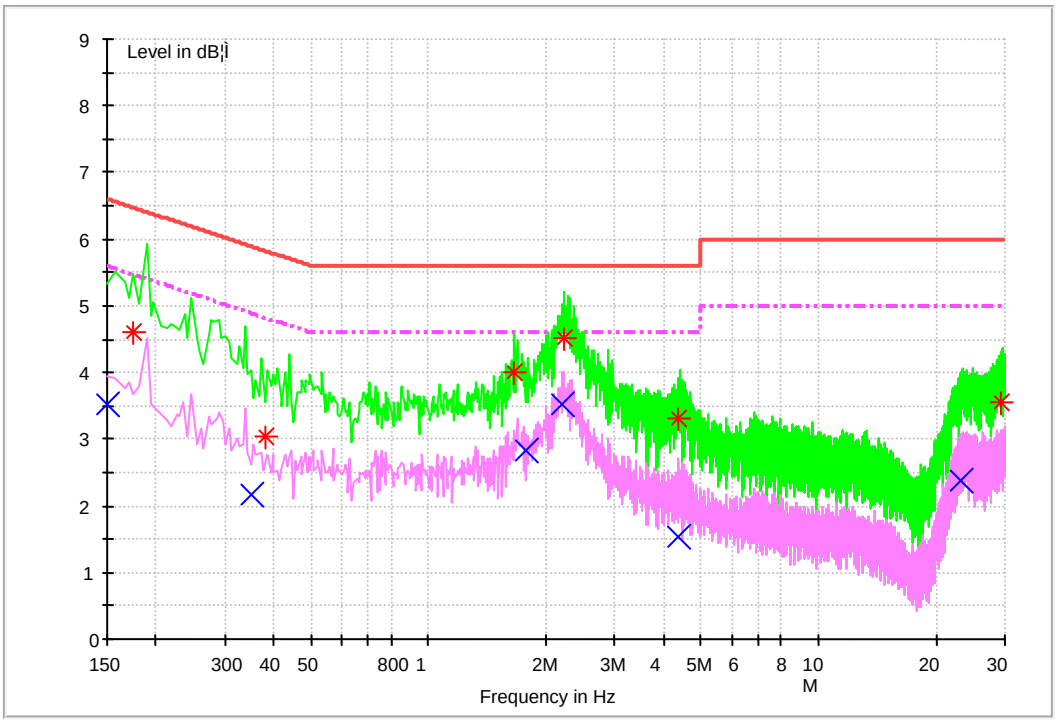

The END

# Appendix I

## Conducted Emission at Power Port

According to FCC Part 15.207

# Channel 40




MEASUREMENT RESULT: QP Detector

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Line | PE |
|---|---|---|---|---|---|---|
| 0.174000 | 46.2 | 9.7 | 64.8 | 18.6 | L1 | FLO |
| 0.384000 | 30.4 | 9.7 | 58.2 | 27.8 | L1 | FLO |
| 1.656000 | 40.1 | 9.7 | 56.0 | 15.9 | N | FLO |
| 2.212000 | 45.1 | 9.7 | 56.0 | 10.9 | N | FLO |
| 4.356000 | 33.2 | 9.8 | 56.0 | 22.8 | N | FLO |
| 29.376000 | 35.7 | 10.4 | 60.0 | 24.3 | N | FLO |

MEASUREMENT RESULT: AV Detector

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Line | PE |
|---|---|---|---|---|---|---|
| 0.150000 | 35.1 | 9.7 | 56.0 | 20.9 | L1 | FLO |
| 0.352000 | 21.8 | 9.7 | 48.9 | 27.1 | L1 | FLO |
| 1.776000 | 28.4 | 9.7 | 46.0 | 17.6 | N | FLO |
| 2.196000 | 35.1 | 9.7 | 46.0 | 10.9 | N | FLO |
| 4.340000 | 15.4 | 9.8 | 46.0 | 30.6 | L1 | FLO |
| 23.260000 | 23.9 | 10.2 | 50.0 | 26.1 | N | FLO |

----------The END----------