



FCC Test Report-EDR

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

Model Number: HUAWEI U5200

Report No: SYBH(Z-RF)018072011-2005

FCC ID:QISU5200

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Notice

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| | |
|-------------------------|---------------------------------------|
| REGULATION | FCC CFR47 Part 2: Subpart J; |
| | FCC CFR47 Part 15: Subpart C ; |
| | |
| | |
| | |
| | |
| | |
| START OF TEST | Jul.23, 2011 |
| END OF TEST | Jul.24, 2011 |
| | |
| Final Judgement: | Pass |

Approved By Jul.28, 2011 Dailinjun 
 Date Name Signature

Reviewed By Jul.28, 2011 CousyXu 
 Date Name Signature

Operator Jul.28, 2011 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) | 20dB 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

HSUPA/HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth HUAWEI U5200 is subscriber equipment in the WCDMA/GSM system. The HSUPA/HSDPA/UMTS frequency band includes Band II and AWS. 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, HSUPA/HSDPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video, MMS service, and GPS 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 exchange data with other Bluetooth devices.

2.1.2 Support function and Service

The Mobile Phone 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! | | | | |
| Not applicable! | | | | |
| 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***

3.1 Testing Period

The test have been performed during the period of

Jul.23, 2011 –Jul.24, 2011

3.2 General Set up Description

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

Bluetooth MODE:

TM1: π /4-DQPSK Modulation

TM2: 8DPSK Modulation



4 Product Description

4.1 Technical Characteristics

4.1.1 Frequency Range

Table 4 Frequency Range

| | | |
|------------------------|---|-----------------------------|
| Uplink band: | 2400 to 2483.5 MHz | |
| Downlink band: | 2400 to 2483.5 MHz | |
| Hop frequency support: | <input checked="" type="checkbox"/> YES | <input type="checkbox"/> NO |

4.1.2 Channel Spacing / Separation

Table 5 Channel Spacing / Separation

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

4.1.3 Type of Emission

Table 6 Type of Emission

| | |
|-----------------------|---------|
| Emission Designation: | 1M39G1D |
|-----------------------|---------|

According to CFR 47 (FCC) part 2, subpart C, section 2.201 and 2.202

4.1.4 Antenna Information

Table 7 Antenna Information

| | |
|--------------------|-----------------------------|
| Type: | Integrated / Internal |
| Maximum Gain(dBi): | 0 (from 2400MHz to 2500MHz) |

4.1.5 Environmental Requirements

Table 8 Environmental Requirements

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

4.1.6 Power Source

Table 9 Power Source

| | |
|---------------------|------------|
| AC voltage nominal: | ~120V |
| AC voltage range | ~100V-240V |
| AC current maximal: | 650mA |

4.1.7 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.

4.1.8 Applied DC Voltages and Currents

According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8).

The voltage and current in the final RF stage is:

Table 10 Applied RF module DC Voltages and Currents

| | |
|----------|---|
| Voltage: |  +3.6~4.2V |
| Current: | 1A According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8) |



4.2 EUT Identification List

4.2.1 Board Information

Table 11 Board Information

| | | |
|---|------------------|------------------|
| UMTS/GPRS/GSM Mobile Phone with Bluetooth | | |
| HUAWEI U5200 | | |
| Board and Module | | |
| Hardware Version | Serial Number | Software Version |
| Ver.C | G8P2A11131700125 | U5200CBTB208 |

4.2.2 Adapter Technical Data

| | |
|--------------------|---|
| AC/DCAdapter Model | HS-050040U6 |
| Manufacturer | Huawei Technologies Co., Ltd. |
| Input Voltage | ~100-240V 50/60Hz 0.2A |
| Output Voltage | 5V  0.4A |
| Rated Power | 2W |

4.2.3 Battery Technical Data

| | |
|-------------------|---|
| Battery Model: | HB4J1H |
| Rated capacity: | 1200 mAh |
| Nominal Voltage: |  3.7 V |
| Charging Voltage: |  4.2 V |

4.2.4 FCC Identification

Grantee Code: QIS
Product Code: U5200
FCC Identification: QISU5200



5 Main Test Instruments

Table 12 Main Test Equipments

| Equipment Description | Manufacturer | Model | Serial Number | Calibrated until |
|--------------------------------------|--------------|-------------------------|---------------|------------------|
| Power supply | KEITHLEY | 2303 | 1288003 | Sep.27,2011 |
| Universal Radio Communication Tester | R&S | CMU200 | 105822 | Oct.24.2011 |
| Wireless Communication Test set | Agilent | N4010A | MY49081592 | Dec.14.2011 |
| Universal Radio Communication Tester | Agilent | E5515C | MY50260239 | Aug.04,2011 |
| Spectrum Analyzer | Agilent | E4440A | MY49420179 | Apr.24,2012 |
| Signal Analyzer | R&S | FSQ31 | 200021 | Sep.27,2011 |
| Temperature Chamber | WEISS | WKL64 | 24600294 | Jan.03,2012 |
| Signal generator | Agilent | E8257D | MY49281095 | Jul.09.2012 |
| Vector Signal Generator | R&S | SMU200A | 104162 | Sep.07,2011 |
| Test receiver | R&S | ESIB26 | 100318 | May.04.2012 |
| Tunable Dipole | Schwarzbeck | D69250-UHAP/D69250-VHAP | 919/1009 | Dec.13.2011 |
| Tunable Dipole | Schwarzbeck | D69250-UHAP/D69250-VHAP | 979/917 | Dec.13.2011 |
| Horn Antenna | R & S | HF906 | 359287/005 | May.07, 2012 |
| Horn Antenna | R & S | HF906 | 359287/006 | April.27, 2012 |
| Broadband Antenna | SCHAFFNER | CBL 6112B | 2536 | Sep.21, 2011 |
| Broadband Antenna | SCHAFFNER | CBL 6112B | 2941 | Jun.11, 2012 |
| Horn Antenna | ETS-LINDGREN | 3160 | 60008 | Sep.20.2011 |
| Horn Antenna | ETS-LINDGREN | 3160 | 60006 | Oct.27.2011 |



6 Transmitter Measurements

6.1 20dB bandwidth measurement

6.1.1 Test Conditions

Table 13 Test Conditions

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

6.1.2 Test Specifications and Limits

6.1.2.1 Specification

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

6.1.2.2 Supporting Standards

Table 14 Supporting Standards:

| | |
|---------------------|--|
| ANSI/TIA-603-C:2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
|---------------------|--|

6.1.2.3 Limits

Not Applicable.

6.1.3 Test Method and Setup

- (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, then set the measured frequency number and test the 20dB bandwidth with universal communication tester.

Test setup

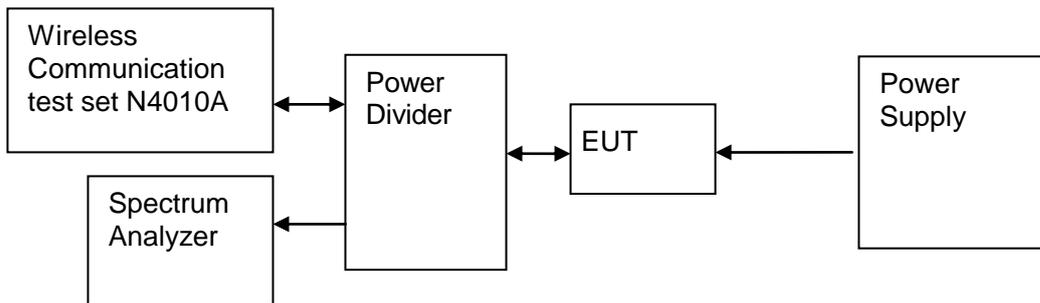


Figure 1. Test Set-up

6.1.4 Measurement Results

Table 15 Measurement Results (Modulation: $\pi/4$ -DQPSK)

| Bandwidth Type | Channel Position | Channel Number | Frequency [GHz] | Measured Bandwidth [MHz] | Result |
|----------------|------------------|----------------|-----------------|--------------------------|--------|
| 20dB | B | 0 | 2.402 | 1.286 | Pass |
| 20dB | M | 40 | 2.442 | 1.284 | Pass |
| 20dB | T | 78 | 2.480 | 1.281 | Pass |

Table 16 Measurement Results (Modulation: 8DPSK)

| Bandwidth Type | Channel Position | Channel Number | Frequency [GHz] | Measured Bandwidth [MHz] | Result |
|----------------|------------------|----------------|-----------------|--------------------------|--------|
| 20dB | B | 0 | 2.402 | 1.282 | Pass |
| 20dB | M | 40 | 2.442 | 1.288 | Pass |
| 20dB | T | 78 | 2.480 | 1.273 | Pass |

6.1.5 Conclusion

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

6.2 Carrier frequency separation measurement

6.2.1 Test Conditions

Table 17 Test Conditions

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

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

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

6.2.2.2 Supporting Standards

Table 18 Supporting Standards:

| | |
|---------------------|---|
| ANSI/TIA-603-C:2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
|---------------------|---|

6.2.2.3 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 19 Limits (Modulation: $\pi/4$ -DQPSK)

| | |
|-------------|--|
| Regulation: | ≥ 0.025 or $2/3$ of the 20 dB bandwidth |
| Limit: | $\geq 2/3 \times 1.284\text{M} = 0.571$ MHz |

Table 20 Limits (Modulation: 8DPSK)

| | |
|-------------|--|
| Regulation: | ≥ 0.025 or $2/3$ of the 20 dB bandwidth |
| Limit: | $\geq 2/3 \times 1.288\text{M} = 0.859$ MHz |

6.2.3 Test Method and Setup

- Connect test port of mobile phone to spectrum analyzer and universal communication tester.
- 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.

Test setup

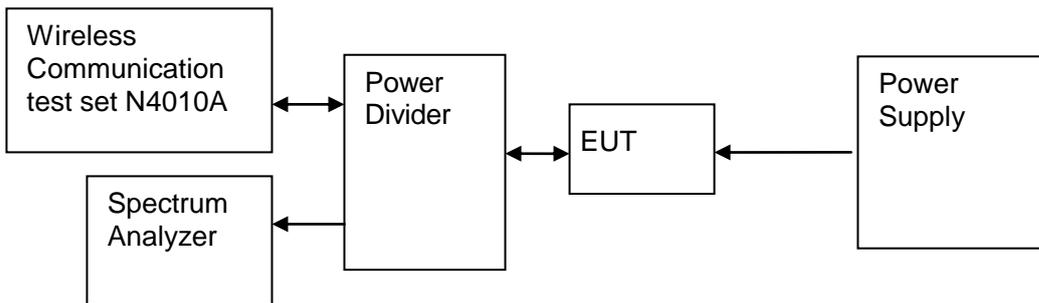


Figure 2. Test Set-up

6.2.4 Measurement Results

Table 21 Measurement Results (Modulation: $\pi/4$ -DQPSK)

| Channel No. | Frequency [GHz] | Channel No. | Frequency [GHz] | Measured frequency separation [MHz] | Limit [MHz] | Result |
|-------------|-----------------|-------------|-----------------|-------------------------------------|--------------|--------|
| 40 | 2.442 | 39 | 2.441 | 1.05 | ≥ 0.571 | Pass |
| 40 | 2.442 | 41 | 2.443 | 1.05 | ≥ 0.571 | Pass |

Table 22 Measurement Results (Modulation: 8DPSK)

| Channel No. | Frequency [GHz] | Channel No. | Frequency [GHz] | Measured frequency separation [MHz] | Limit [MHz] | Result |
|-------------|-----------------|-------------|-----------------|-------------------------------------|--------------|--------|
| 40 | 2.442 | 39 | 2.441 | 1.1 | ≥ 0.859 | Pass |
| 40 | 2.442 | 41 | 2.443 | 1.0 | ≥ 0.859 | Pass |

6.2.5 Conclusion

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

6.3 Number of hopping channel

6.3.1 Test Conditions

Table 23 Test Conditions

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

6.3.2 Test Specifications and Limits

6.3.2.1 Specification

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

6.3.2.2 Supporting Standards

Table 24 Supporting Standards:

| | |
|----------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
|----------------------|--|

6.3.2.3 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 |
|--------|-------------------------------------|

6.3.3 Test Method and Setup

- Connect test port of mobile phone to spectrum analyzer and universal communication tester.
- 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.
- Count the quantity of peaks to get the number of hopping channels.

Test setup

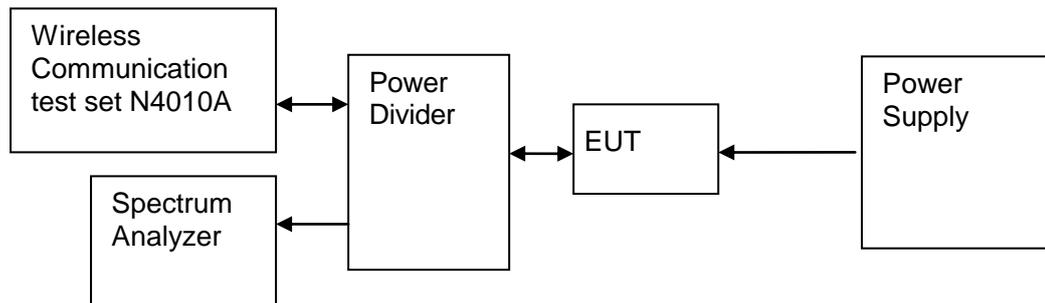


Figure 3. Test Set-up

6.3.4 Measurement Results

Table 26 Measurement Results (Modulation: $\pi/4$ -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 (Modulation: 8-DPSK)

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

6.3.5 Conclusion

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

6.4 Time of occupancy

6.4.1 Test Conditions

Table 28 Test Conditions

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

6.4.2 Test Specifications and Limits

6.4.2.1 Specification

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

6.4.2.2 Supporting Standards

Table 29 Supporting Standards:

| | |
|----------------------|---|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
|----------------------|---|

6.4.2.3 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 |
|------------------------------|--------|

6.4.3 Test Method and Setup

- (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.

Test setup

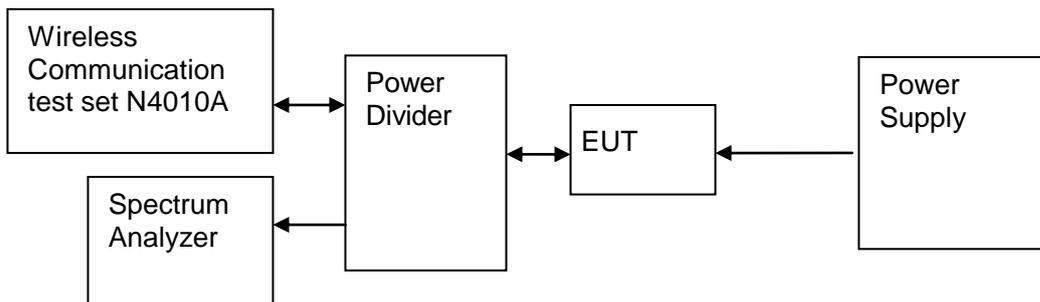


Figure 4. Test Set-up

6.4.4 Measurement Results

Table 31 Measurement Results (Modulation: $\pi/4$ -DQPSK)

| Time of Single Slot [ms] | Numbers of slots in a period | Time of occupied in a period [s] | Limit [s] | Result |
|--------------------------|------------------------------|----------------------------------|------------|--------|
| 3 | 106.7 | 0.3201 | ≤ 0.4 | Pass |

Table 32 Measurement Results (Modulation: 8DPSK)

| Time of Single Slot [ms] | Numbers of slots in a period | Time of occupied in a period [s] | Limit [s] | Result |
|--------------------------|------------------------------|----------------------------------|------------|--------|
| 3 | 106.7 | 0.3201 | ≤ 0.4 | Pass |

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

6.4.5 Conclusion

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

6.5 Peak output power

6.5.1 Test Conditions

Table 33 Test Conditions

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

6.5.2 Test Specifications and Limits

6.5.2.1 Specification

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

6.5.2.2 Supporting Standards

Table 34 Supporting Standards:

| | |
|----------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
|----------------------|--|

6.5.2.3 Limits

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.

Table 35 Limits

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

6.5.3 Test Method and Setup

- (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.

Test setup

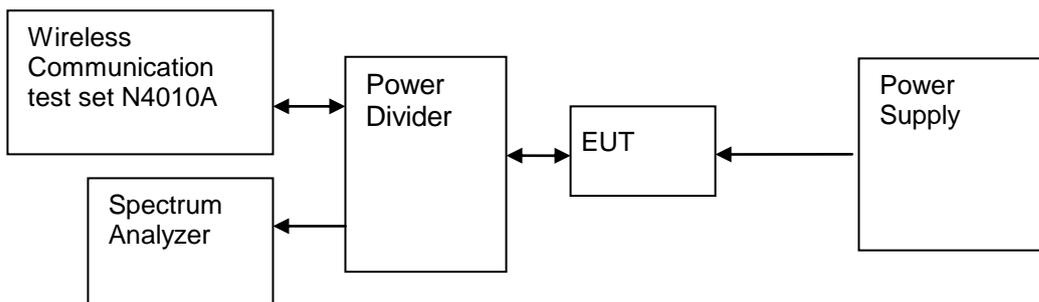


Figure 5. Test Set-up

6.5.4 Measurement Results

Table 36 Measurement Results (Modulation: $\pi/4$ -DQPSK)

| Channel | Channel No. | Center Freq.[MHz] | Meas. Level (Cond.) [dBm] | Limit [dBm] | Result |
|---------|-------------|-------------------|---------------------------|-------------|--------|
| Bottom | 0 | 2402 | 6.16 | < 30 | Pass |
| Middle | 40 | 2442 | 6.94 | < 30 | Pass |
| Top | 78 | 2480 | 6.46 | < 30 | Pass |

Table 37 Measurement Results (Modulation: 8DPSK)

| Channel | Channel No. | Center Freq.[MHz] | Meas. Level (Cond.) [dBm] | Limit [dBm] | Result |
|---------|-------------|-------------------|---------------------------|-------------|--------|
| Bottom | 0 | 2402 | 6.2 | < 30 | Pass |
| Middle | 40 | 2442 | 6.92 | < 30 | Pass |
| Top | 78 | 2480 | 6.51 | < 30 | Pass |

6.5.5 Conclusion

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

6.6 Band edge spurious emission

6.6.1 Test Conditions

Table 38 Test Conditions

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

6.6.2 Test Specifications and Limits

6.6.2.1 Specification

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

6.6.2.2 Supporting Standards

Table 39 Supporting Standards:

| | |
|----------------------|---|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
|----------------------|---|

6.6.2.3 Limits

Compliance 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 |
|---------------------|---------------|

6.6.3 Test Method and Setup

- Connect test port of mobile phone to spectrum analyzer and universal communication tester
- Set the mobile phone to transmit maximum output power at 2.4GHz and switch off frequency hopping function.
- Then set the mobile phone to transmit at high, low frequency and measure the conducted band edge spurious separately.
- Switch on the frequency hopping function, and repeat above measurement.

Test setup

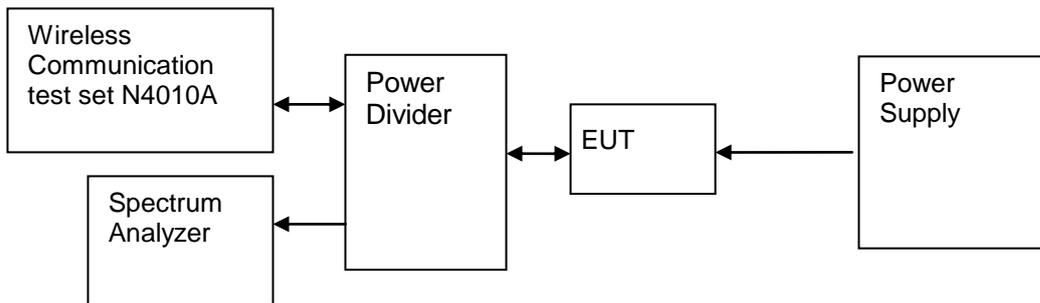


Figure 6. Test Set-up

6.6.4 Measurement Results

Table 41 Measurement Results for Band Edge immediately outside the 2.4GHz Band
(Modulation: $\pi/4$ -DQPSK)

| | Channel No. | Carrier Frequency [MHz] | Carrier Power [dBm] | Frequency Hopping | Max. Spurious Level [dBm] | Limit [dBm] | Result |
|-----------|-------------|-------------------------|---------------------|-------------------|---------------------------|-------------|--------|
| Low Edge | 0 | 2402 | 4.86 | Off | -46.84 | < -15.14 | Pass |
| | - | - | 4.73 | On | -51.94 | < -15.27 | Pass |
| High Edge | 78 | 2480 | 5.28 | Off | -54.21 | < -14.72 | Pass |
| | - | - | 4.78 | On | -50.58 | < -15.22 | Pass |

Table 42 Measurement Results for Band Edge immediately outside the 2.4GHz Band
(Modulation: 8DPSK)

| | Channel No. | Carrier Frequency [MHz] | Carrier Power [dBm] | Frequency Hopping | Max. Spurious Level [dBm] | Limit [dBm] | Result |
|-----------|-------------|-------------------------|---------------------|-------------------|---------------------------|-------------|--------|
| Low Edge | 0 | 2402 | 4.79 | Off | -48.77 | < -15.21 | Pass |
| | - | - | 4.51 | On | -51.33 | < -15.49 | Pass |
| High Edge | 78 | 2480 | 5.3 | Off | -51.76 | < -14.7 | Pass |
| | - | - | 5.23 | On | -50.35 | < -14.77 | Pass |

6.6.5 Conclusion

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

6.7 Conducted RF spurious

6.7.1 Test Conditions

Table 43 Test Conditions

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

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

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

6.7.2.2 Supporting Standards

Table 44 Supporting Standards:

| | |
|----------------------|---|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
|----------------------|---|

6.7.2.3 Limits

Compliance 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 45 Limits

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

6.7.3 Test Method and Setup

- Connect test port of mobile phone to spectrum analyzer and universal communication tester
- Set the mobile phone to transmit maximum output power at 2.4GHz and switch off frequency hopping function.
- Then set the mobile phone to transmit at high, middle and low frequency and measure the conducted band edge spurious separately.
- Switch on the frequency hopping function, and repeat above measurement.

Test setup

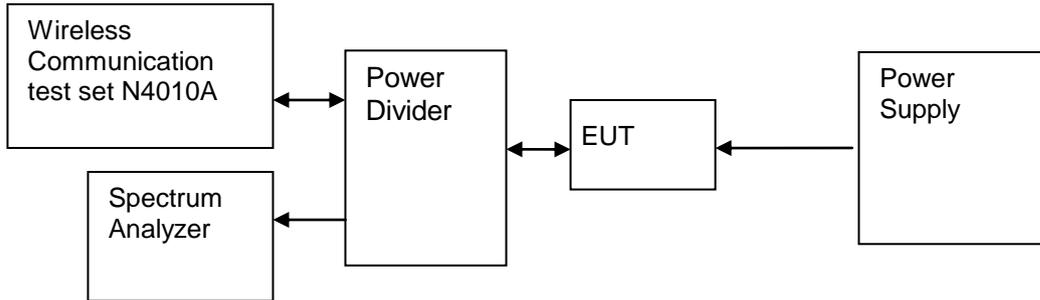


Figure 7. Test Set-up

6.7.4 Measurement Results

Table 46 Measurement Results (Modulation: $\pi/4$ -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 | 4.62 | Off | -41.67 | < -15.38 | Pass |
| 9kHz-25GHz | 40 | 2442 | 2.44 | Off | -45.94 | < -17.56 | Pass |
| 9kHz-25GHz | 78 | 2480 | 1.84 | Off | -46.46 | < -18.16 | Pass |

Table 47 Measurement Results (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 | 1.59 | Off | -41.3 | < -18.41 | Pass |
| 9kHz-25GHz | 40 | 2442 | 1.4 | Off | -46.8 | < -18.6 | Pass |
| 9kHz-25GHz | 78 | 2480 | 4.29 | Off | -47.03 | < -15.71 | Pass |

6.7.5 Conclusion

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

6.8 Radiated spurious emission & spurious in restricted band

6.8.1 Test Conditions

Table 48 Test Conditions

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

6.8.2 Test Specifications and Limits

6.8.2.1 Specification

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

6.8.2.2 Supporting Standards

Table 49 Supporting Standards:

| | |
|----------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| ANSI C63.4: 2003 | Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |

6.8.2.3 Limits

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

Table 50 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).

6.8.3 Test Method and Setup

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2009). The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4. 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, AV detector and Peak 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, the azimuth range of turntable was 0°to 360°, The receive antenna has two polarizations V and H.

The EUT was communicated with the BTS simulator through Air interface. The Mobile Phone 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

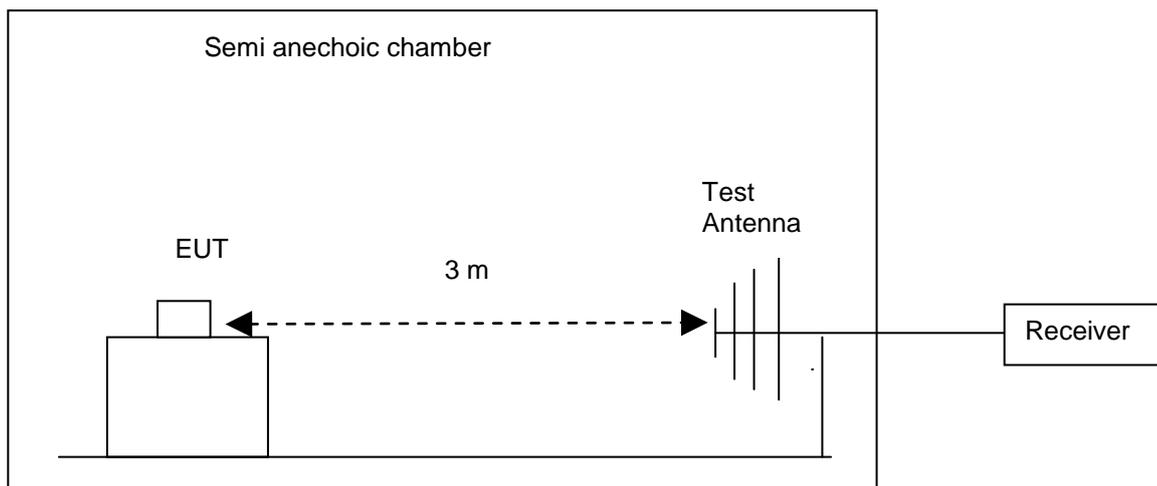


Figure 8. Test Set up

6.8.4 Measurement Results

Note: The following measurement results exceed the limit line is the carrier frequency.

Measured Result of channel: 0 (2402MHz) (30MHz-1GHz)

Table 51 MEASUREMENT RESULT

| Frequency (MHz) | Level (dBμV/m) | Transd (dB) | Limit (dBμV/m) | Margin (dB) | Height (cm) | Azimuth h (deg) | Polarisation |
|-----------------|----------------|-------------|----------------|-------------|-------------|-----------------|--------------|
| 38.600000 | 22.80 | 13.4 | 40.0 | 17.2 | 111.0 | 126.00 | VERTICAL |
| 145.510000 | 16.60 | 8.9 | 43.5 | 26.9 | 121.0 | 125.00 | HORIZONTAL |
| 213.900000 | 19.30 | 12.7 | 43.5 | 24.2 | 132.0 | 24.00 | VERTICAL |
| 222.600000 | 20.80 | 13.1 | 46.0 | 25.2 | 120.0 | 211.00 | HORIZONTAL |
| 300.660000 | 20.70 | 15.5 | 46.0 | 25.3 | 125.0 | 207.00 | VERTICAL |
| 630.180000 | 25.10 | 22.8 | 46.0 | 20.9 | 111.0 | 203.00 | HORIZONTAL |





(1GHz-18GHz)

Table 52 MEASUREMENT RESULT:PK DECTER

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 3644.000000 | 38.30 | -5.5 | 74.0 | 35.7 | 152.0 | 259.00 | VERTICAL |
| 5856.500000 | 41.80 | -1.0 | 74.0 | 32.2 | 129.0 | 20.00 | HORIZONTAL |
| 10301.000000 | 45.70 | 6.9 | 74.0 | 28.3 | 101.0 | 254.00 | VERTICAL |

Table 53 MEASUREMENT RESULT:AV DECTER

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 3531.000000 | 26.30 | -5.2 | 54.0 | 27.7 | 150.0 | 199.00 | VERTICAL |
| 5859.000000 | 30.20 | -1.0 | 54.0 | 23.8 | 139.0 | 320.00 | HORIZONTAL |
| 10300.500000 | 32.90 | 7.0 | 54.0 | 21.1 | 100.0 | 338.00 | VERTICAL |

(2.3GHz-2.51GHz)

Table 54 MEASUREMENT RESULT:PK DECTER

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 2310.000000 | 58.50 | 33.3 | 74.0 | 15.5 | 110.0 | 146.00 | VERTICAL |
| 2390.000000 | 59.80 | 33.5 | 74.0 | 14.2 | 152.0 | 349.00 | HORIZONTAL |
| 2483.500000 | 60.00 | 33.7 | 74.0 | 14.0 | 125.0 | 121.00 | HORIZONTAL |
| 2500.000000 | 59.30 | 33.8 | 74.0 | 14.7 | 124.0 | 121.00 | VERTICAL |

Table 55 MEASUREMENT RESULT:AV DECTER

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 2310.000000 | 47.40 | 33.3 | 54.0 | 6.6 | 112.0 | 250.00 | VERTICAL |
| 2390.000000 | 46.50 | 33.5 | 54.0 | 7.5 | 142.0 | 244.00 | HORIZONTAL |
| 2483.500000 | 46.10 | 33.7 | 54.0 | 7.9 | 127.0 | 129.00 | VERTICAL |
| 2500.000000 | 46.00 | 33.8 | 54.0 | 8.0 | 100.0 | 144.00 | HORIZONTAL |

Measured Result of channel: 40 (2442MHz)

(30MHz-1GHz)

Table 56 MEASUREMENT RESULT

| Frequency (MHz) | Level (dBµV/m) | Transd (dB) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Azimuth (deg) | Polarisation |
|-----------------|----------------|-------------|----------------|-------------|-------------|---------------|--------------|
| 38.400000 | 21.90 | 13.1 | 40.0 | 18.1 | 142.0 | 130.00 | VERTICAL |
| 53.500000 | 20.00 | 12.7 | 40.0 | 20.0 | 135.0 | 232.00 | HORIZONTAL |
| 79.900000 | 15.40 | 8.3 | 40.0 | 24.6 | 100.0 | 144.00 | HORIZONTAL |
| 303.500000 | 20.20 | 15.6 | 46.0 | 25.8 | 150.0 | 258.00 | VERTICAL |
| 926.100000 | 29.90 | 26.4 | 46.0 | 16.1 | 120.0 | 58.00 | HORIZONTAL |
| 979.200000 | 30.60 | 26.9 | 54.0 | 23.4 | 110.0 | 51.00 | HORIZONTAL |

(1GHz-18GHz)

Table 57 MEASUREMENT RESULT:PK DECTER

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 4883.000000 | 39.80 | -3.5 | 74.0 | 44.2 | 125.0 | 152.00 | VERTICAL |
| 10654.500000 | 45.20 | 6.6 | 74.0 | 28.8 | 140.0 | 129.00 | HORIZONTAL |
| 17825.100000 | 52.40 | 18.7 | 74.0 | 21.6 | 123.0 | 211.00 | VERTICAL |

Table 58 MEASUREMENT RESULT:AV DECTER

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 4882.500000 | 27.80 | -3.5 | 54.0 | 26.2 | 110.0 | 152.00 | VERTICAL |
| 10470.500000 | 32.20 | 6.1 | 54.0 | 21.8 | 123.0 | 124.00 | VERTICAL |
| 17987.000000 | 39.60 | 19.4 | 54.0 | 14.4 | 108.0 | 318.00 | HORIZONTAL |

Measured Result of channel: 78 (2480MHz)

(30MHz-1GHz)

Table 59 MEASUREMENT RESULT

| Frequency (MHz) | Level (dBµV/m) | Transd (dB) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Azimuth (deg) | Polarisation |
|-----------------|----------------|-------------|----------------|-------------|-------------|---------------|--------------|
| 33.500000 | 20.80 | 11.7 | 40.0 | 19.2 | 125.0 | 214.00 | VERTICAL |
| 42.020000 | 21.40 | 13.1 | 40.0 | 18.6 | 100.0 | 149.00 | HORIZONTAL |
| 58.020000 | 12.90 | 12.4 | 40.0 | 27.1 | 123.0 | 250.00 | VERTICAL |
| 80.020000 | 14.20 | 8.3 | 40.0 | 25.8 | 140.0 | 120.00 | HORIZONTAL |
| 373.080000 | 22.50 | 17.5 | 46.0 | 23.5 | 127.0 | 250.00 | VERTICAL |
| 515.580000 | 22.90 | 20.6 | 46.0 | 23.1 | 122.0 | 230.00 | HORIZONTAL |

(1GHz-18GHz)

Table 60 MEASUREMENT RESULT:PK DECTER

| Frequency MHz | Level dBμV/m | Transd dB | Limit dBμV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 4825.100000 | 39.70 | -3.6 | 74.0 | 34.3 | 151.0 | 343.00 | HORIZONTAL |
| 6738.200000 | 41.70 | 0.6 | 74.0 | 32.3 | 104.0 | 190.00 | VERTICAL |
| 16390.500000 | 50.20 | 15.9 | 74.0 | 23.8 | 121.0 | 123.00 | VERTICAL |

Table 61 MEASUREMENT RESULT:AV DECTER

| Frequency MHz | Level dBμV/m | Transd dB | Limit dBμV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 3531.200000 | 26.40 | -5.1 | 54.0 | 27.6 | 110.0 | 185.00 | VERTICAL |
| 6844.200000 | 29.40 | 0.9 | 54.0 | 24.6 | 124.0 | 152.00 | VERTICAL |
| 10301.500000 | 33.00 | 7.0 | 54.0 | 21.0 | 151.0 | 159.00 | VERTICAL |

(2.3GHz-2.51GHz)

Table 62 MEASUREMENT RESULT:PK DECTER

| Frequency MHz | Level dBμV/m | Transd dB | Limit dBμV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 2310.000000 | 58.80 | 33.3 | 74.0 | 15.2 | 140.0 | 179.00 | VERTICAL |
| 2390.000000 | 58.30 | 33.5 | 74.0 | 15.7 | 152.0 | 301.00 | VERTICAL |
| 2483.500000 | 59.00 | 33.7 | 74.0 | 15.0 | 182.0 | 36.00 | VERTICAL |
| 2500.000000 | 59.10 | 33.8 | 74.0 | 14.9 | 170.0 | 257.00 | HORIZONTAL |

Table 63 MEASUREMENT RESULT:AV DECTER

| Frequency MHz | Level dBμV/m | Transd dB | Limit dBμV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 2310.000000 | 44.40 | 33.3 | 54.0 | 9.6 | 195.0 | 315.00 | VERTICAL |
| 2390.000000 | 45.30 | 33.5 | 54.0 | 8.7 | 187.0 | 121.00 | HORIZONTAL |
| 2483.500000 | 46.20 | 33.8 | 54.0 | 7.8 | 175.0 | 233.00 | HORIZONTAL |
| 2500.000000 | 46.50 | 33.8 | 54.0 | 7.5 | 200.0 | 98.00 | HORIZONTAL |

6.8.5 Conclusion

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

6.9 Conducted Emission at Power Port

6.9.1 Test Conditions

Table 64 Test Conditions

| | |
|----------------------|-----------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Power port |
| Ambient temperature: | 23.5°C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1 at channel No. 40 |

6.9.2 Test Specifications and Limits

6.9.2.1 Specification

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

6.9.2.2 Supporting Standards

Table 65 Supporting Standards:

| | |
|------------------|--|
| ANSI C63.4: 2003 | Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |
|------------------|--|

6.9.2.3 Limits

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

Table 66 Limits

| Frequency of Emission (MHz) | Conducted Limit (dB μ V) | |
|-----------------------------|------------------------------|------------|
| | 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.

6.9.3 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 C63.4: 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 was communicated with the BTS simulator through Air interface, the BTS simulator controls the Mobile Phone to transmitter the maximum power which defined in specification of product. The Mobile Phone operated on the typical channel.

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

Test Set-up

The Mobile Phone was setup in the screened chamber and operated under nominal conditions.

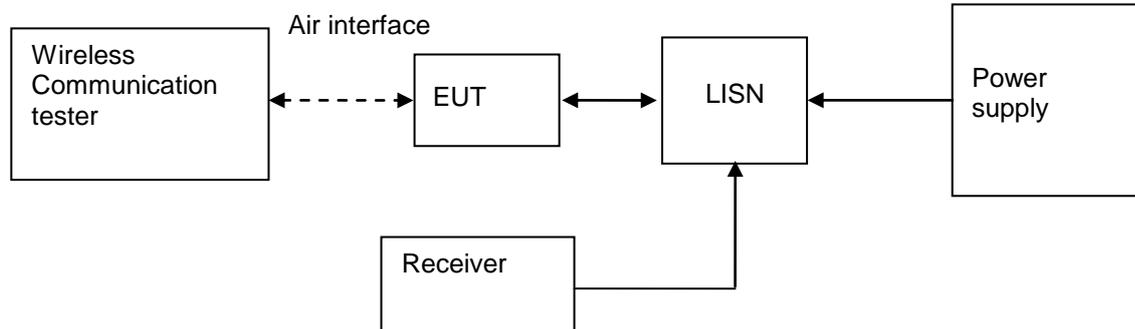


Figure 9. Test Set-up

6.9.4 Measurement Results

Table 67 MEASUREMENT RESULT:QP DECTER

| Frequency MHz | Level dB μ V | Transd dB | Limit dB μ V | Margin dB | Line | PE |
|---------------|------------------|-----------|------------------|-----------|------|-----|
| 0.430000 | 46.10 | 10.0 | 57 | 10.9 | N | FLO |
| 0.592000 | 45.10 | 10.1 | 56 | 10.9 | N | FLO |
| 1.014000 | 40.10 | 10.1 | 56 | 15.9 | N | FLO |
| 4.902000 | 40.40 | 10.2 | 56 | 15.6 | N | FLO |
| 5.652000 | 39.30 | 10.2 | 60 | 20.7 | N | FLO |
| 14.180000 | 28.20 | 10.3 | 60 | 31.8 | N | FLO |

Table 68 MEASUREMENT RESULT:AV DECTER

| Frequency MHz | Level dB μ V | Transd dB | Limit dB μ V | Margin dB | Line | PE |
|---------------|------------------|-----------|------------------|-----------|------|-----|
| 0.318000 | 29.80 | 10.0 | 50 | 20.2 | N | FLO |
| 0.480000 | 27.00 | 10.1 | 46 | 19.3 | N | FLO |
| 1.634000 | 24.70 | 10.1 | 46 | 21.3 | N | FLO |
| 4.586000 | 28.60 | 10.2 | 46 | 17.4 | N | FLO |
| 5.588000 | 29.10 | 10.2 | 50 | 20.9 | N | FLO |
| 13.940000 | 20.30 | 10.3 | 50 | 29.7 | N | FLO |

6.9.5 Conclusion

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

7 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 69 System Measurement Uncertainty

| Items | | Extended Uncertainty |
|---|---------------------------------|----------------------------|
| 20dB 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 (dB μ V/m) | U=2.2dB; k=2 U=5dB; k=2 |
| Conducted emission test for power port | Disturbance Voltage(dB μ V) | U=4dB; k=2 |



8 Appendices List

| | | |
|------------|--|----------|
| Appendix A | Measurement Results 20dB bandwidth measurement | 7 pages |
| Appendix B | Measurement Results Carrier frequency separation measurement | 3 pages |
| Appendix C | Measurement Results Number of hopping channel | 3 pages |
| Appendix D | Measurement Results Time of occupancy | 5 pages |
| Appendix E | Measurement Results Peak output power | 7 pages |
| Appendix F | Measurement Results Band edge compliance measurement | 9 pages |
| Appendix G | Measurement Results Conducted RF spurious | 25 pages |
| Appendix H | Measurement Results Radiated spurious emission | 7 pages |
| Appendix I | Measurement Results Conducted emission test for power port | 2 pages |
| Appendix J | Photos of Test Setup | 3 pages |

----- End of Report -----



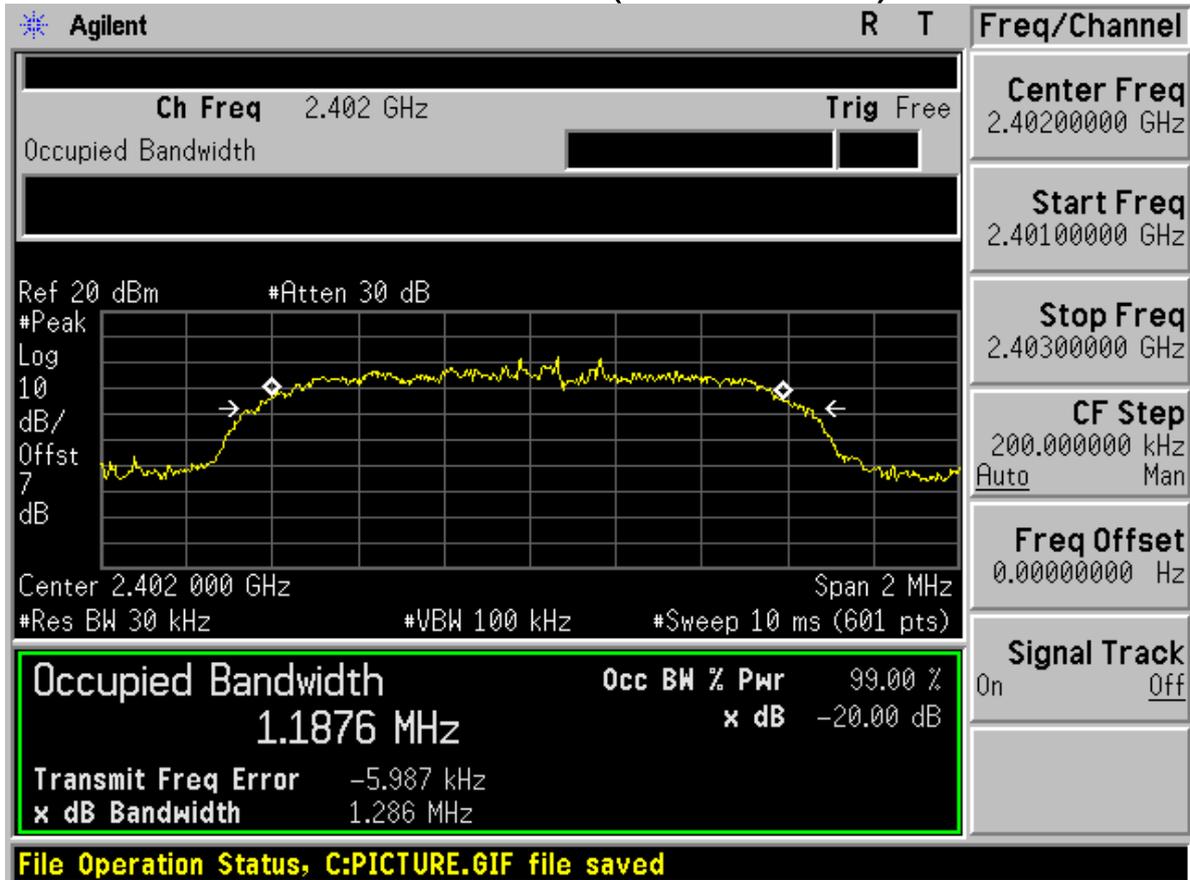
Appendix A

20dB bandwidth measurement

According to FCC Part 15.247 (a) (1)



Modulation: $\pi/4$ -DQPSK Channel 0 (2402MHz)





Channel 40 (2442MHz)

Agilent
R T

Ch Freq 2.442 GHz **Trig** Free

Occupied Bandwidth

Freq/Channel

Center Freq
2.44200000 GHz

Start Freq
2.44100000 GHz

Stop Freq
2.44300000 GHz

CF Step
200.000000 kHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

Ref 20 dBm #Atten 30 dB

Center 2.442 000 GHz Span 2 MHz

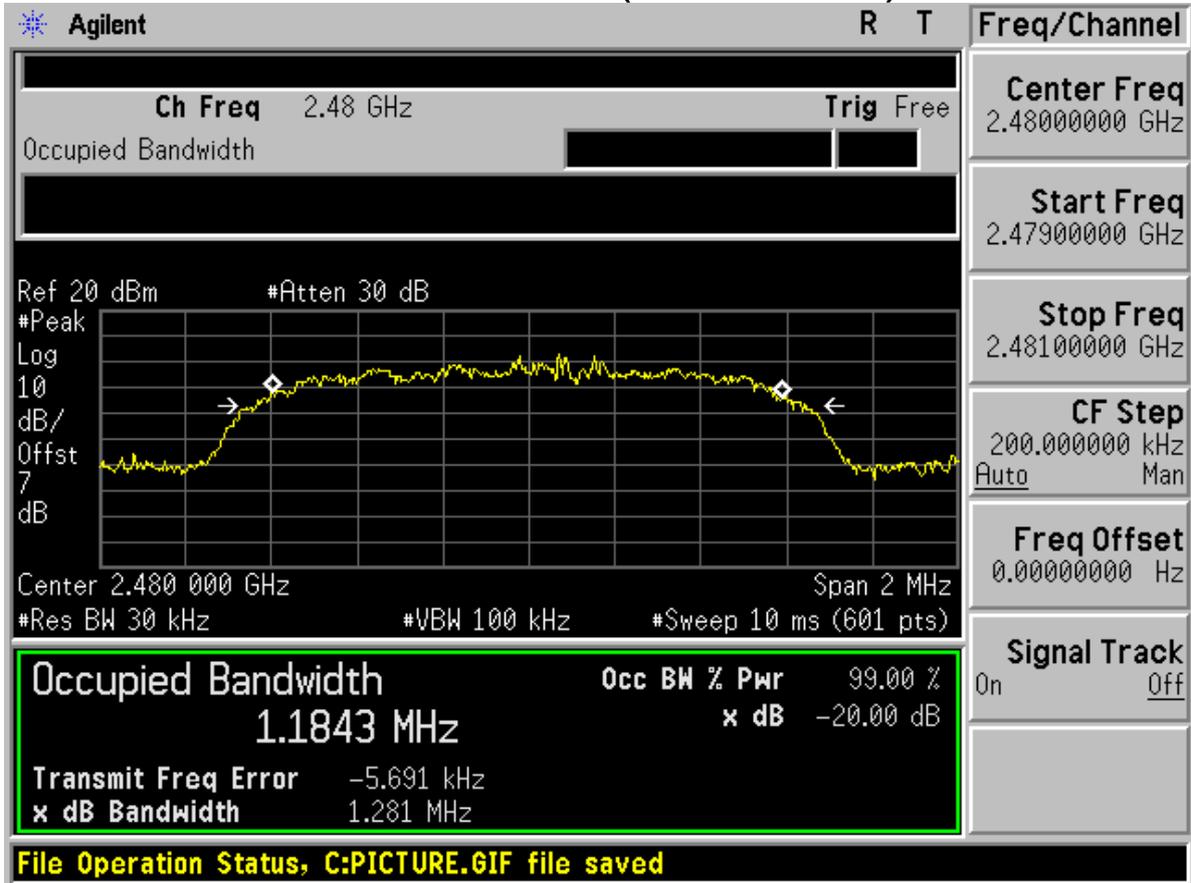
#Res BW 30 kHz #VBW 100 kHz #Sweep 10 ms (601 pts)

| | |
|----------------------------|-----------------------------|
| Occupied Bandwidth | Occ BW % Pwr 99.00 % |
| 1.1832 MHz | x dB -20.00 dB |
| Transmit Freq Error | -5.150 kHz |
| x dB Bandwidth | 1.284 MHz |

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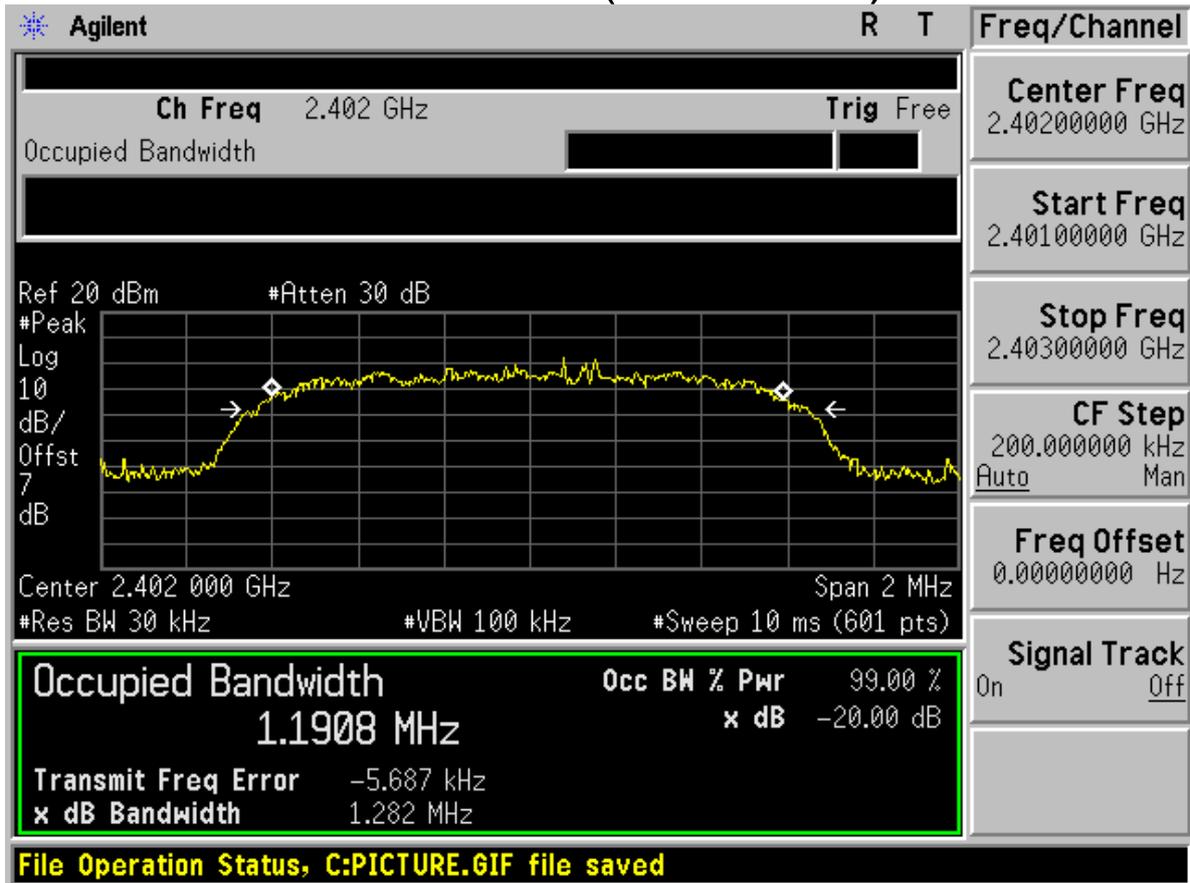


Channel 78 (2480MHz)



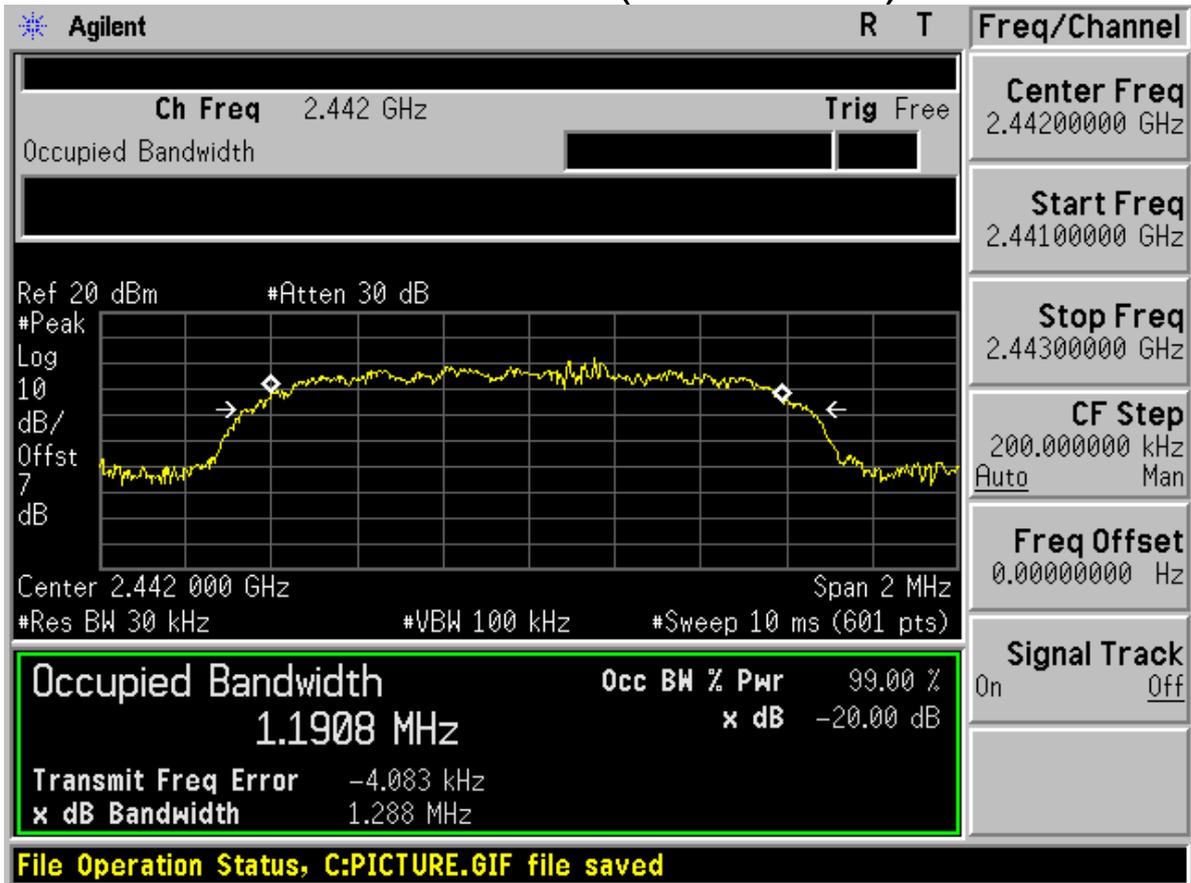


Modulation: 8DPSK Channel 0 (2402MHz)



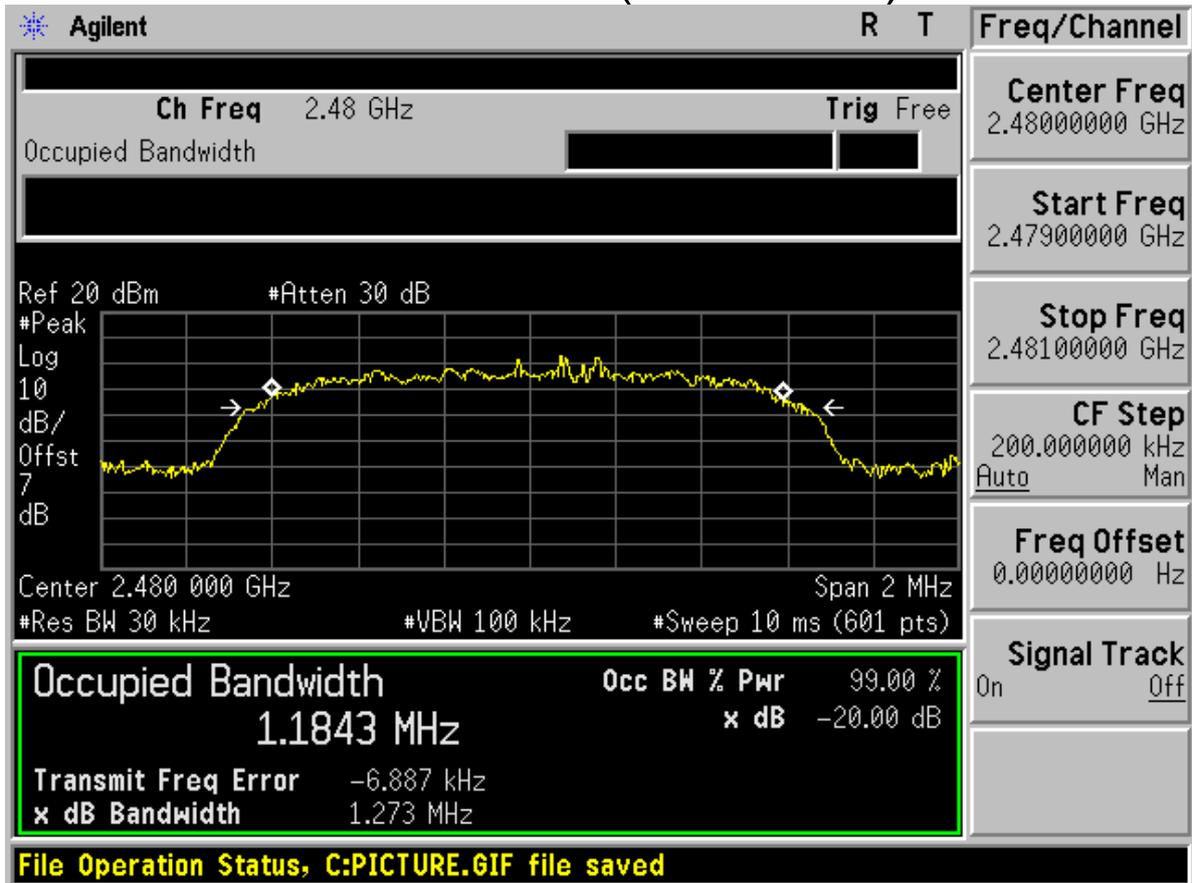


Channel 40 (2442MHz)





Channel 78 (2480MHz)





Appendix B

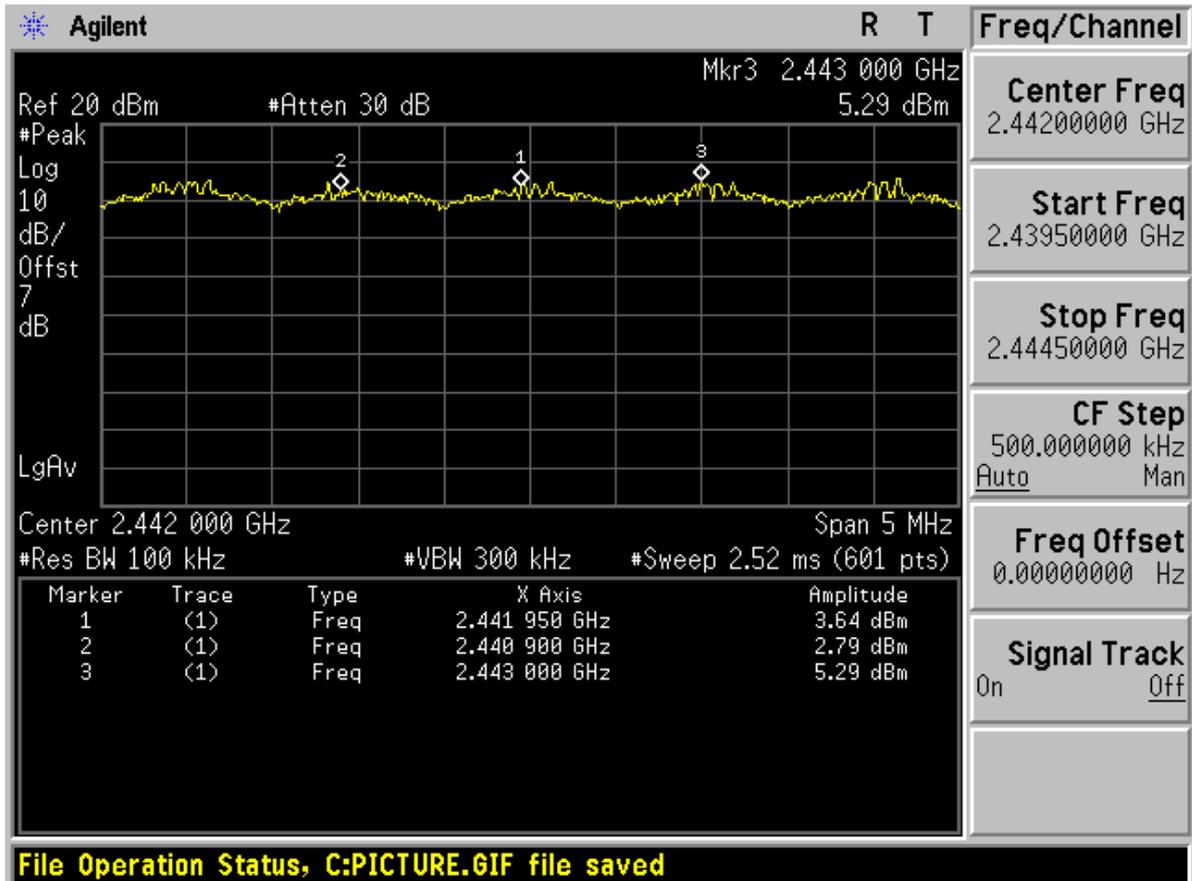
Carrier frequency separation measurement

According to FCC Part 15.247 (a) (1)



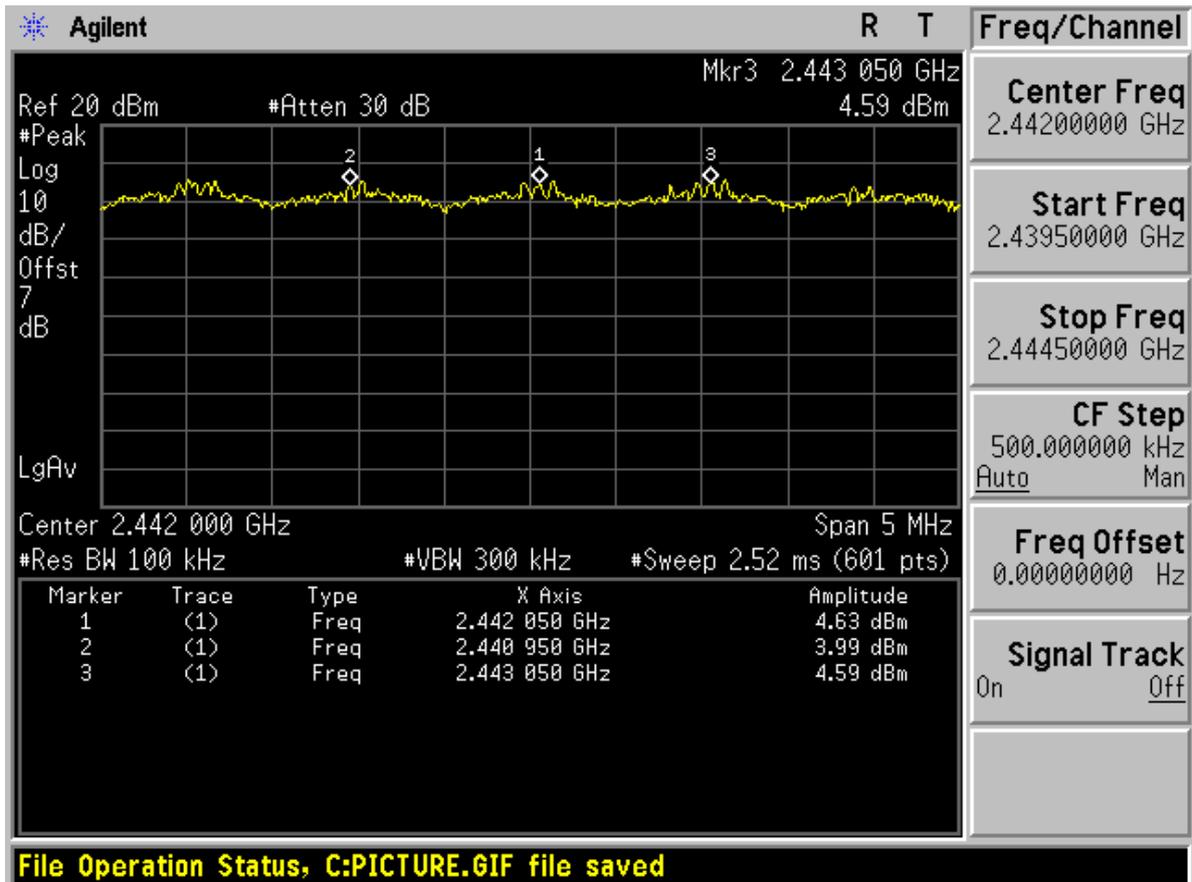
Modulation: $\pi/4$ -DQPSK

Centred at Channel 40





Modulation: 8DPSK Centred at Channel 40





Appendix C

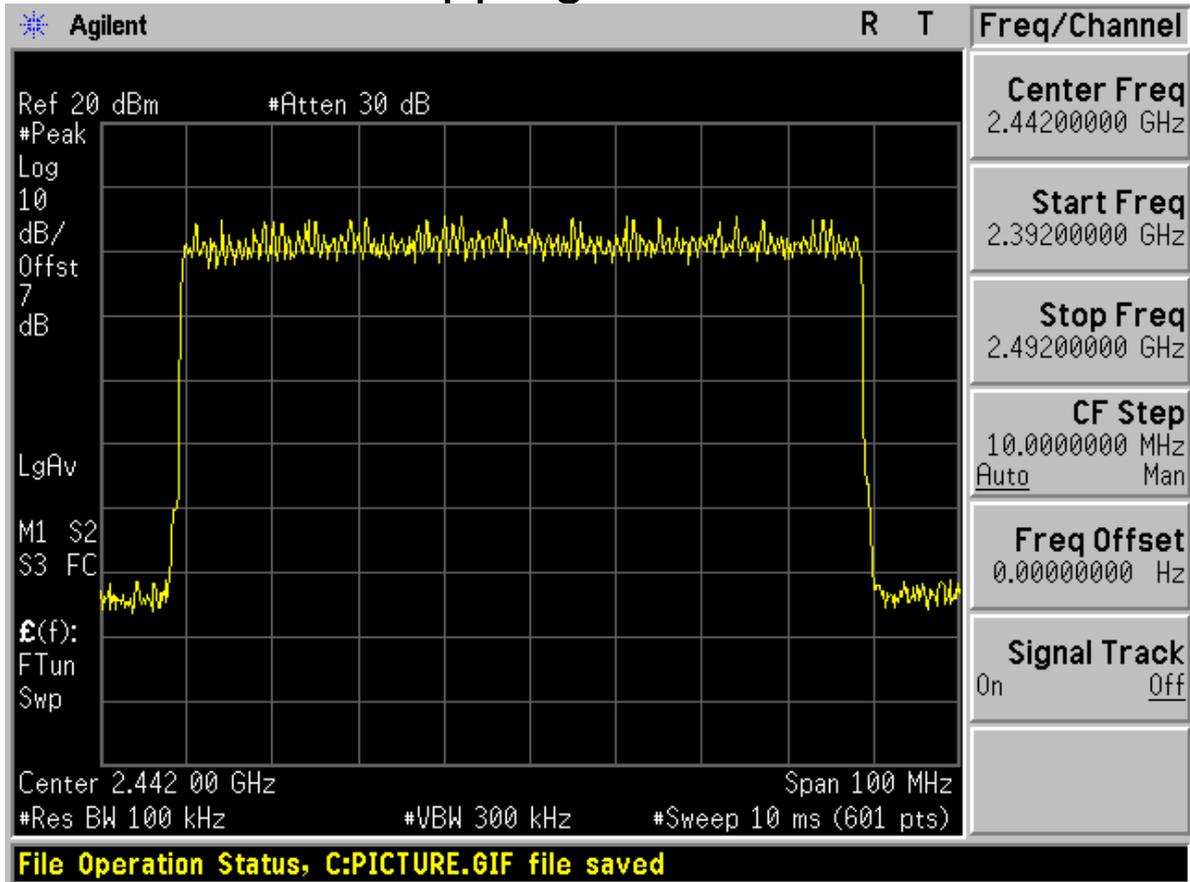
Number of hopping channel

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



Modulation: $\pi/4$ -DQPSK

Total hopping channels = 79





Appendix D

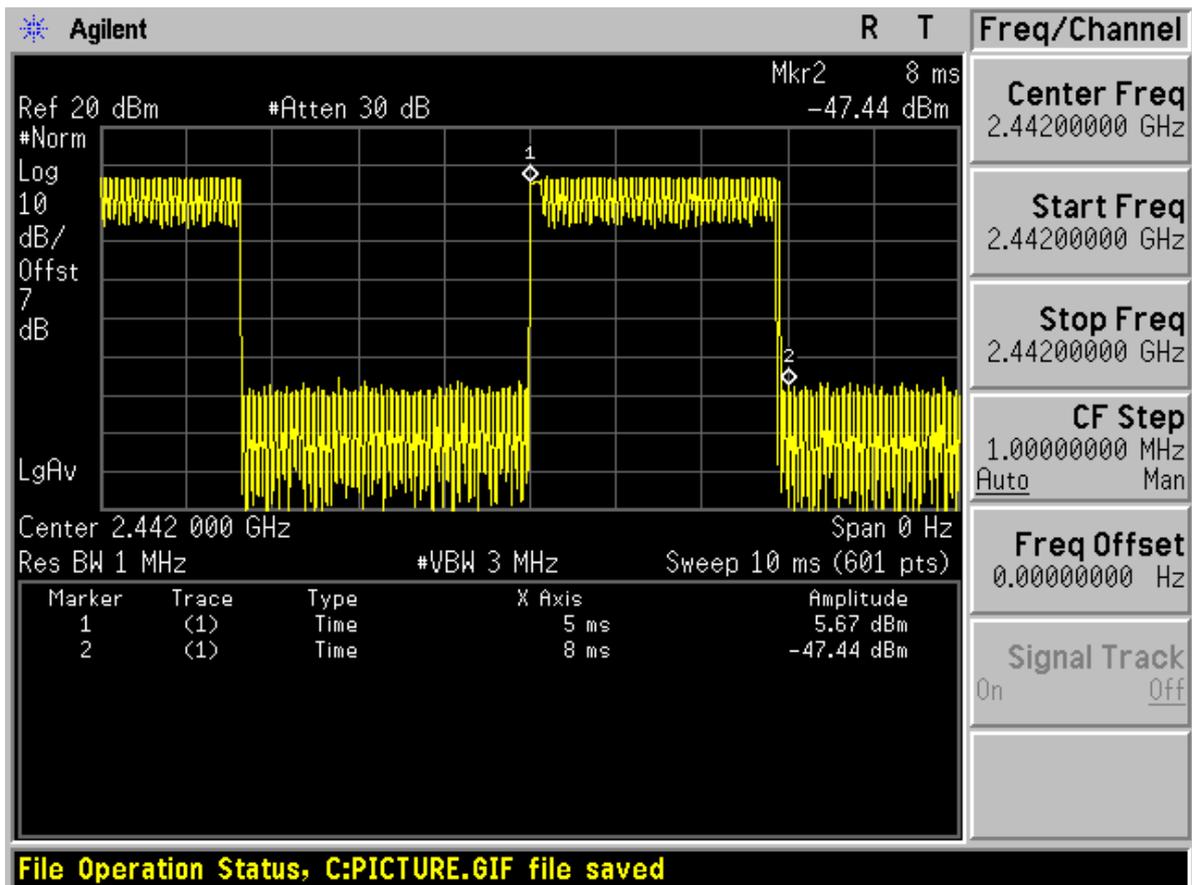
Time of occupancy

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



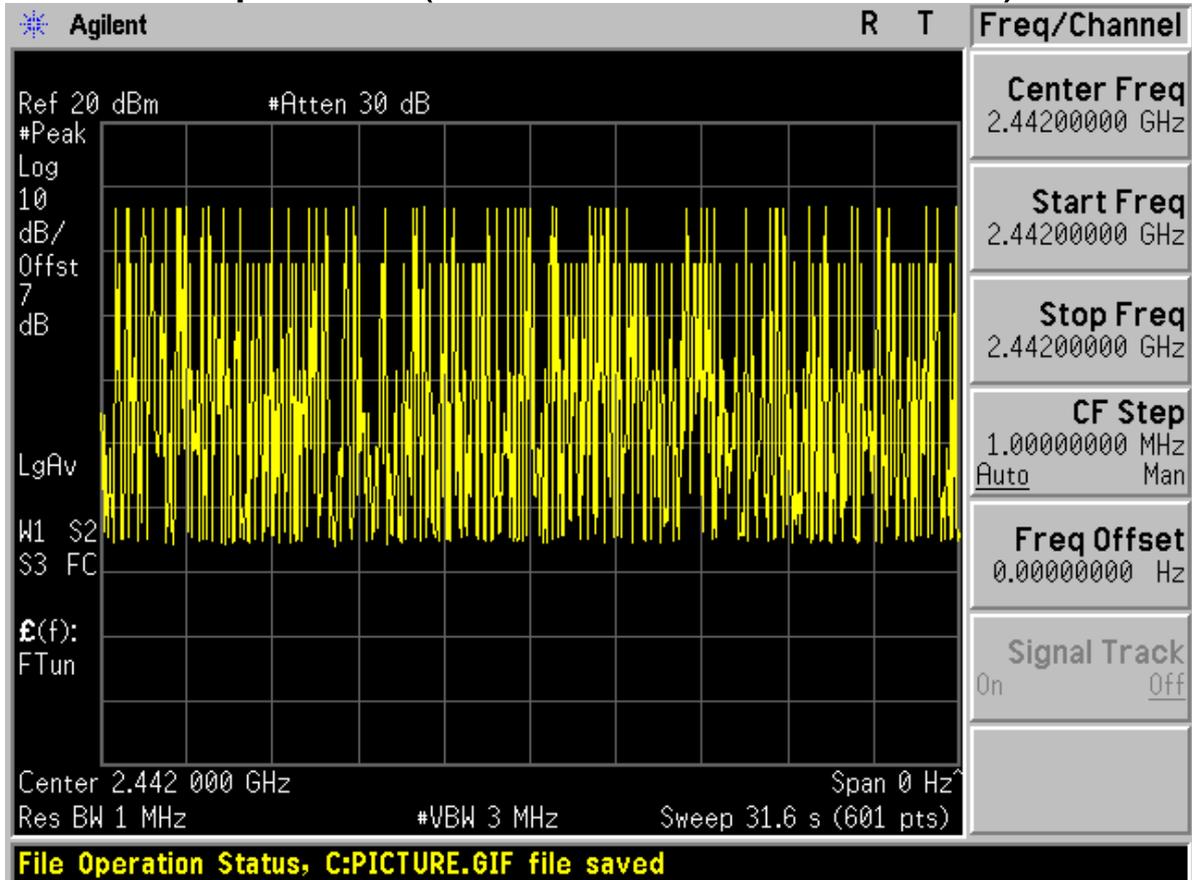
Modulation: $\pi/4$ -DQPSK

A burst (One time slot)





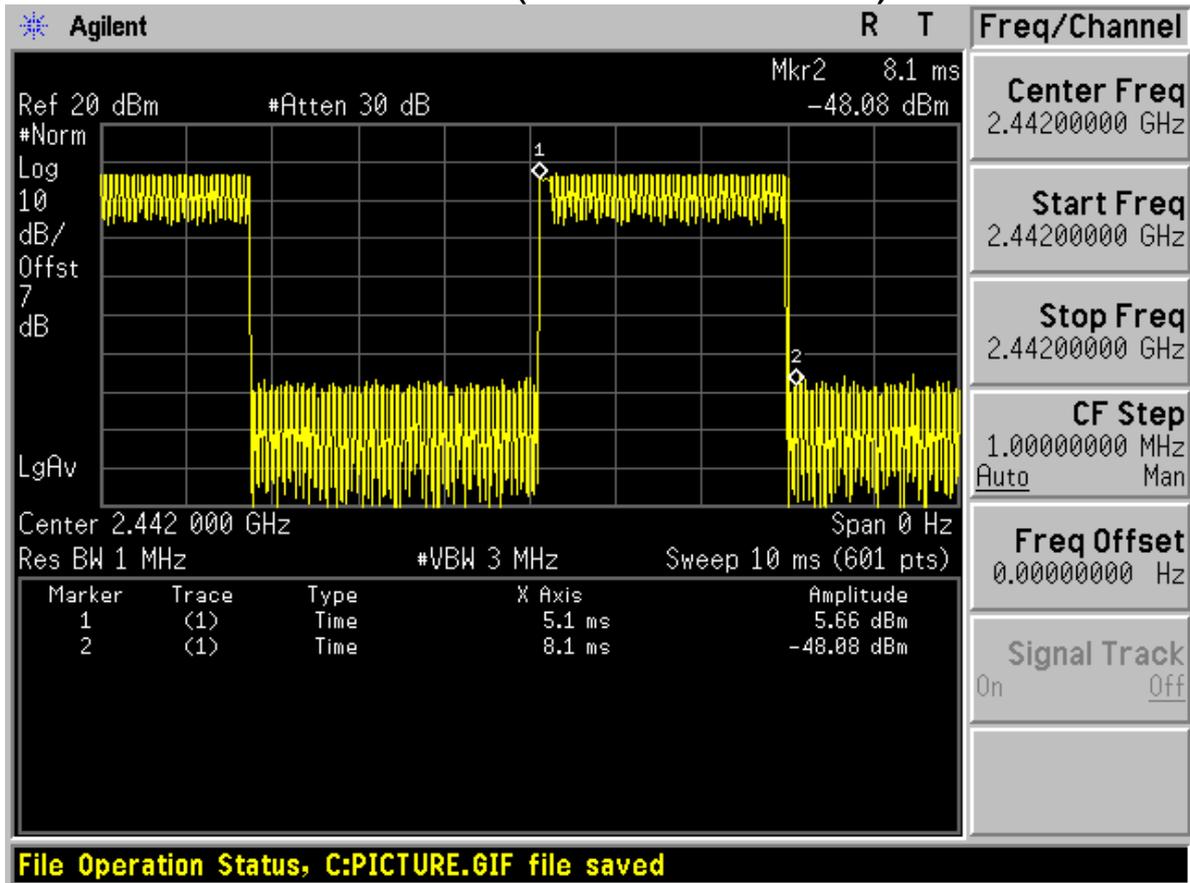
A period (Less than 106.7 burst)





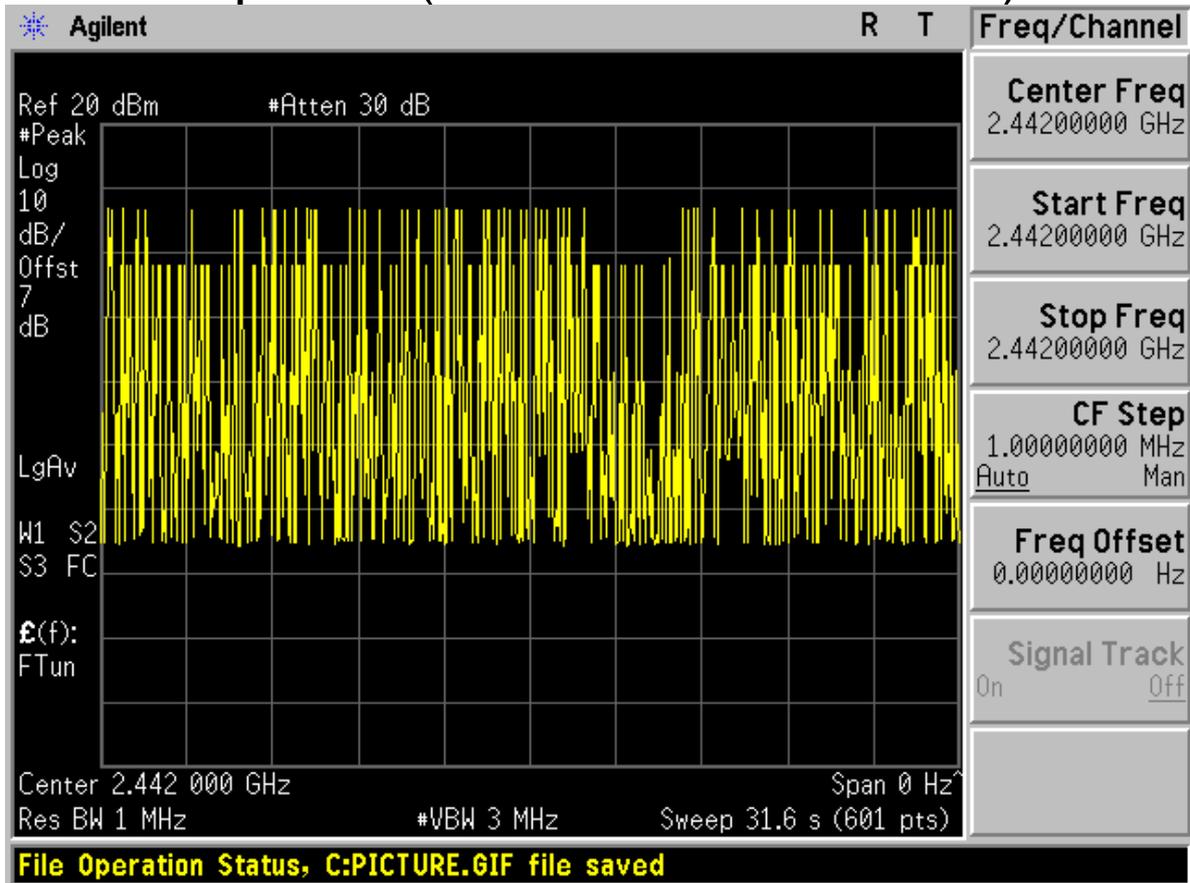
Modulation: 8DPSK

A burst (One time slot)





A period (Less than 106.7 burst)





Appendix E

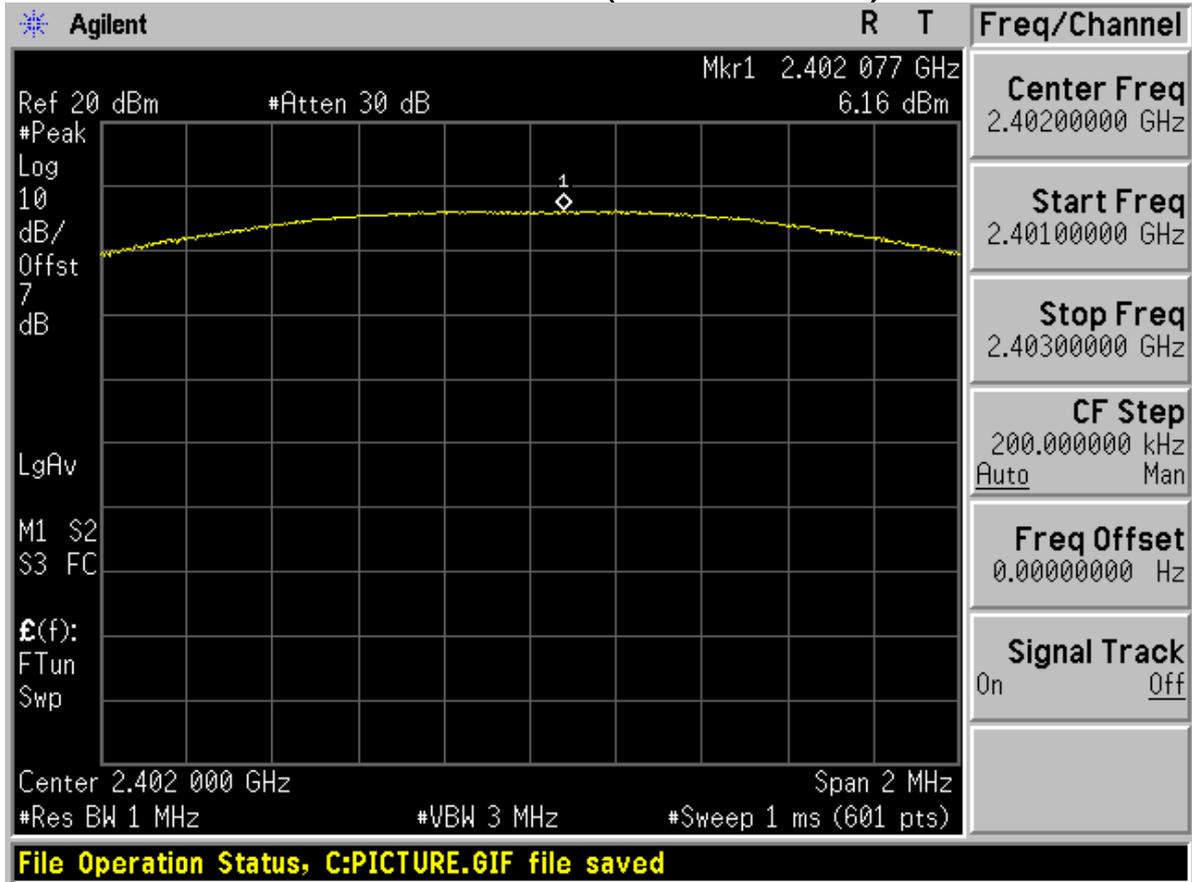
Peak output power

According to FCC Part 15.247 (b) (1)



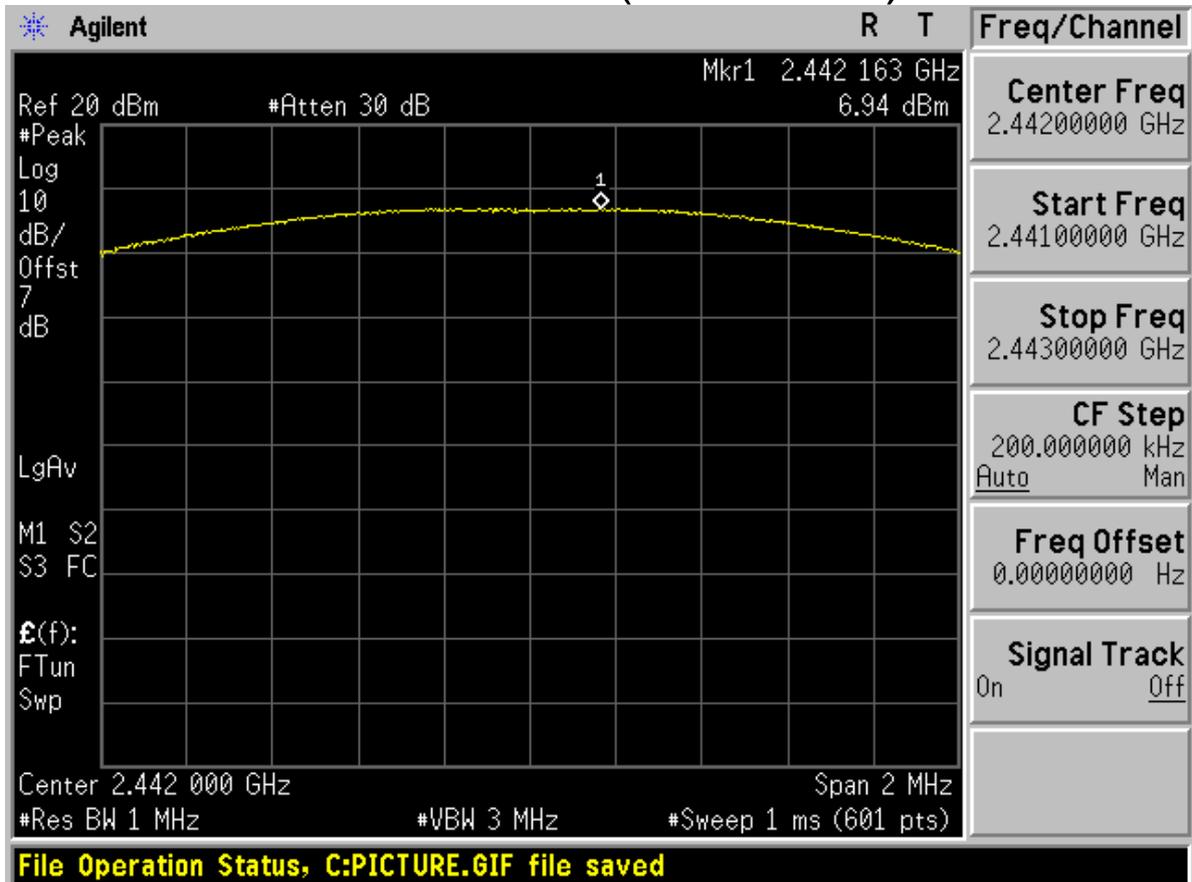
Modulation: $\pi/4$ -DQPSK

Channel 0 (2402MHz)



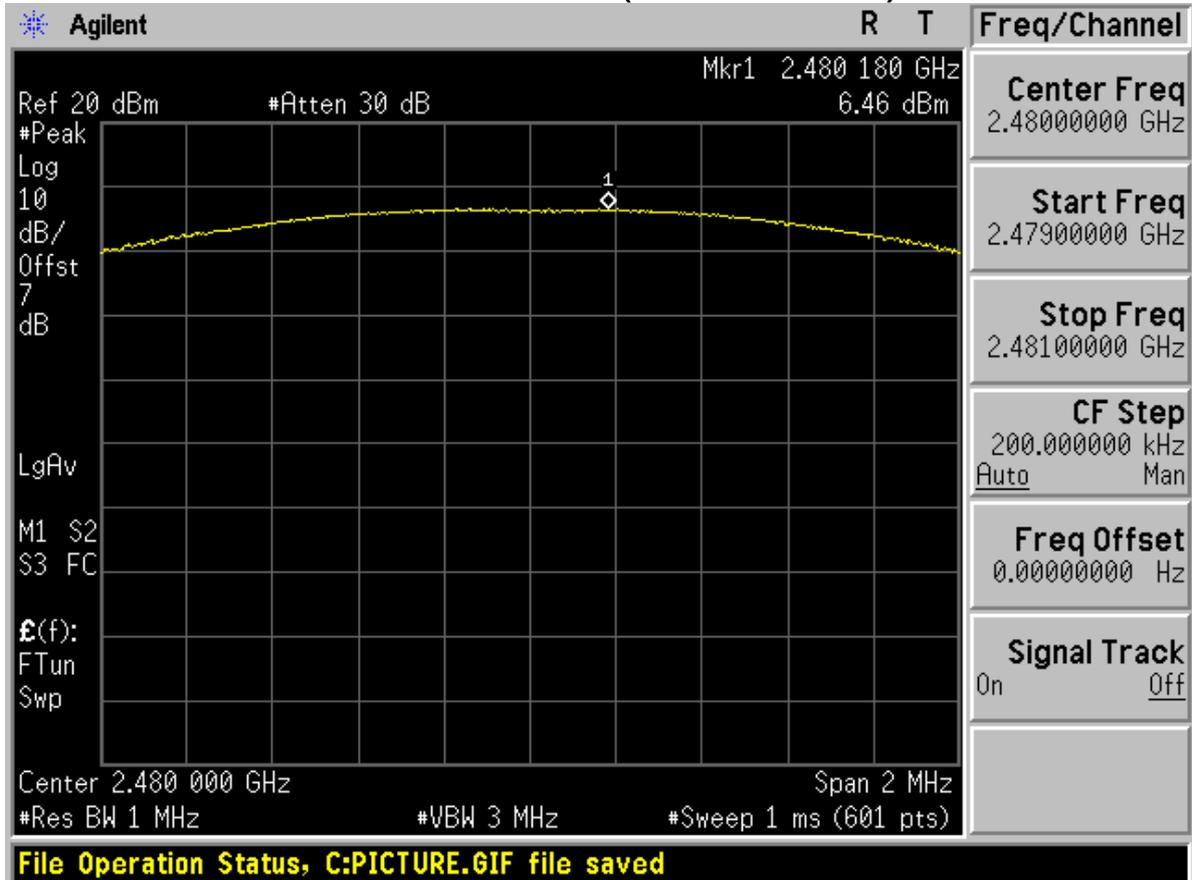


Channel 40 (2442MHz)



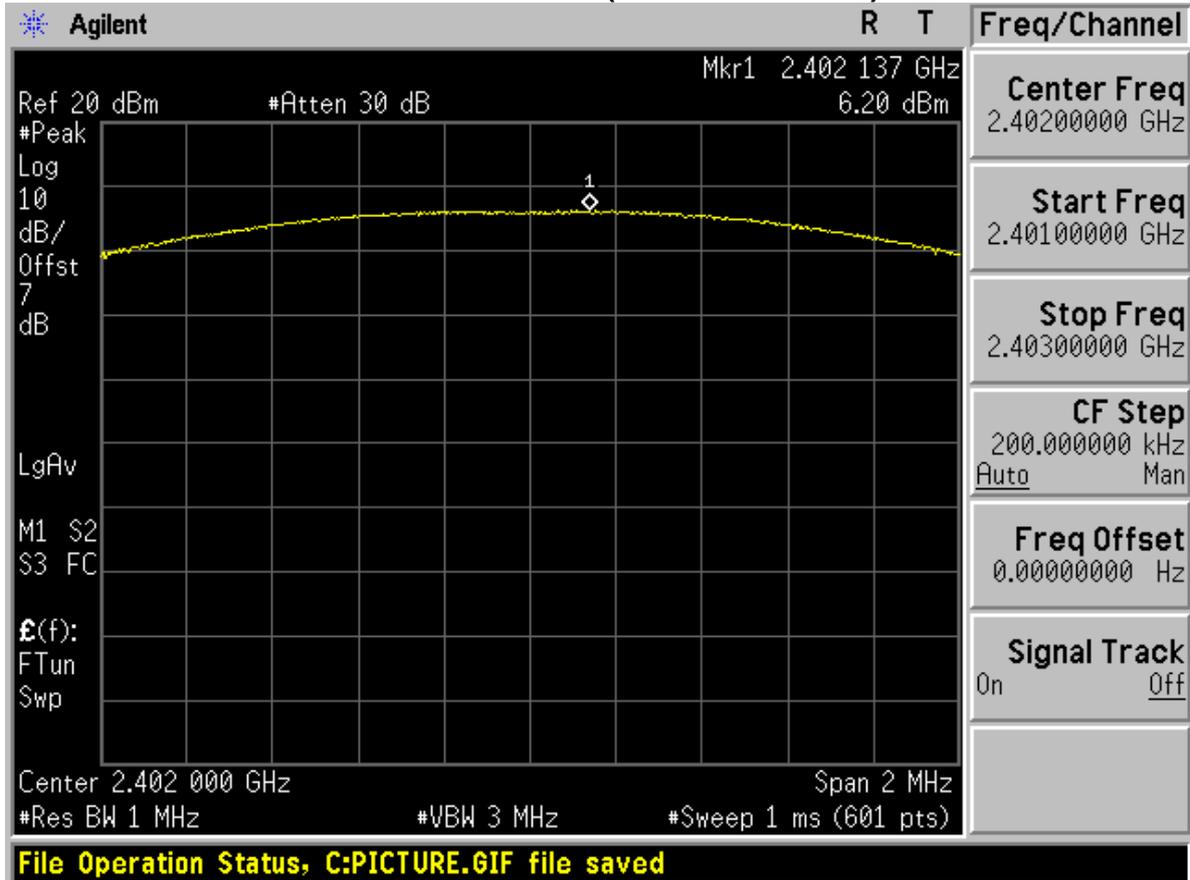


Channel 78 (2480MHz)



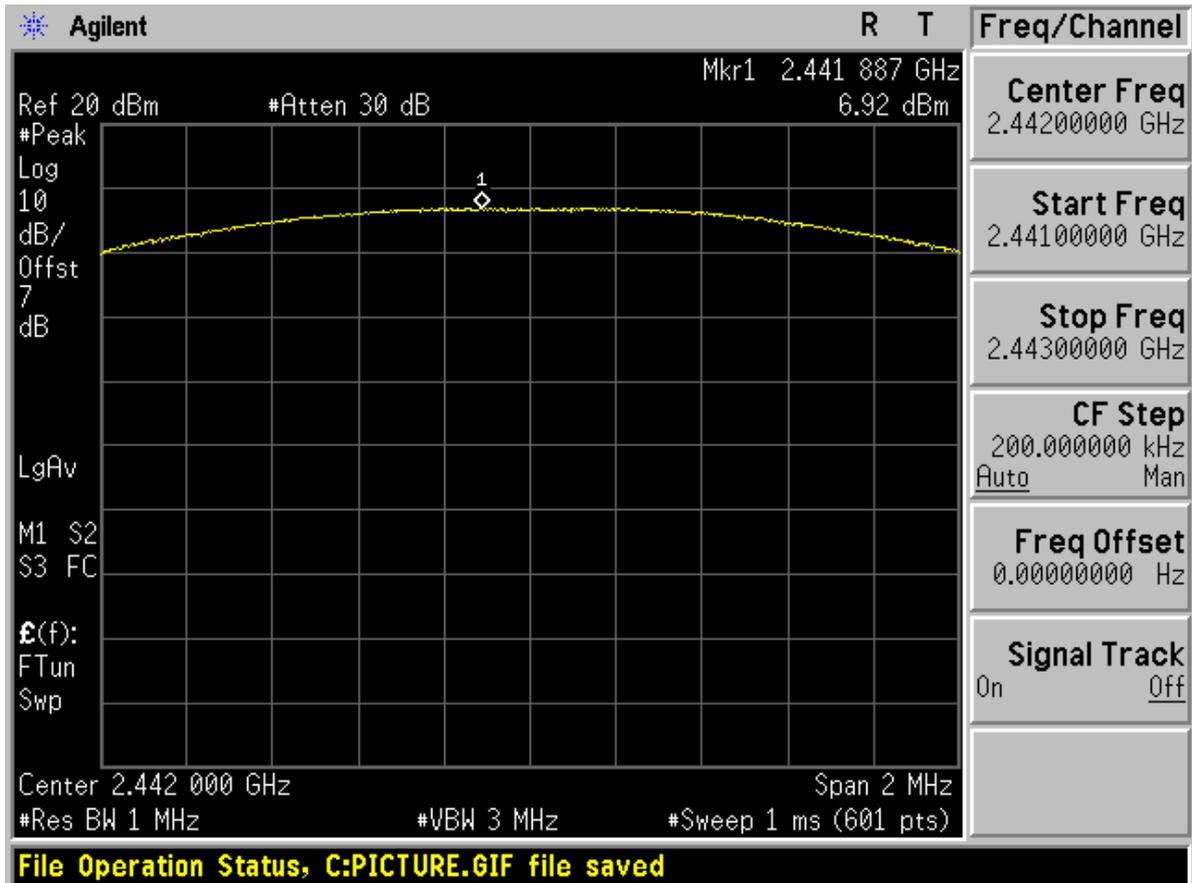


Modulation: 8DPSK Channel 0 (2402MHz)



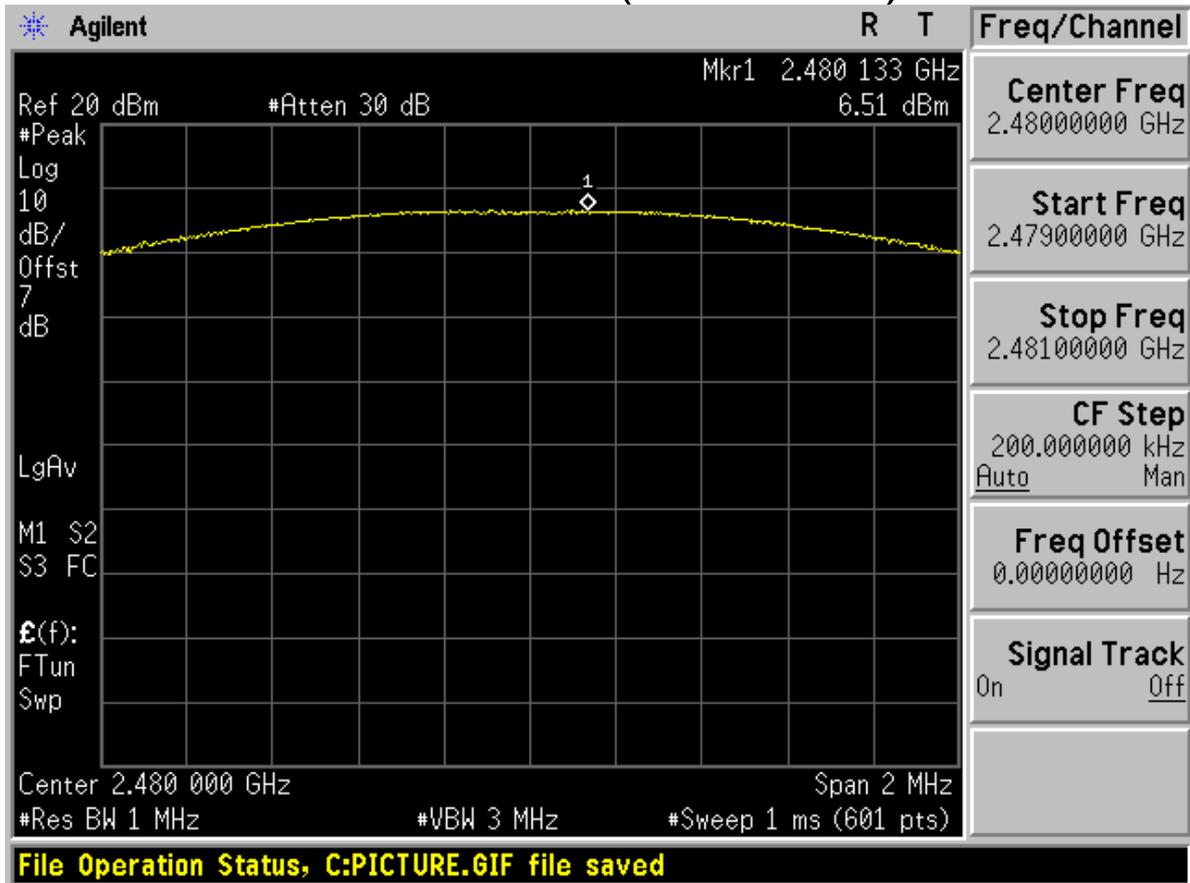


Channel 40 (2442MHz)





Channel 78 (2480MHz)





Appendix F

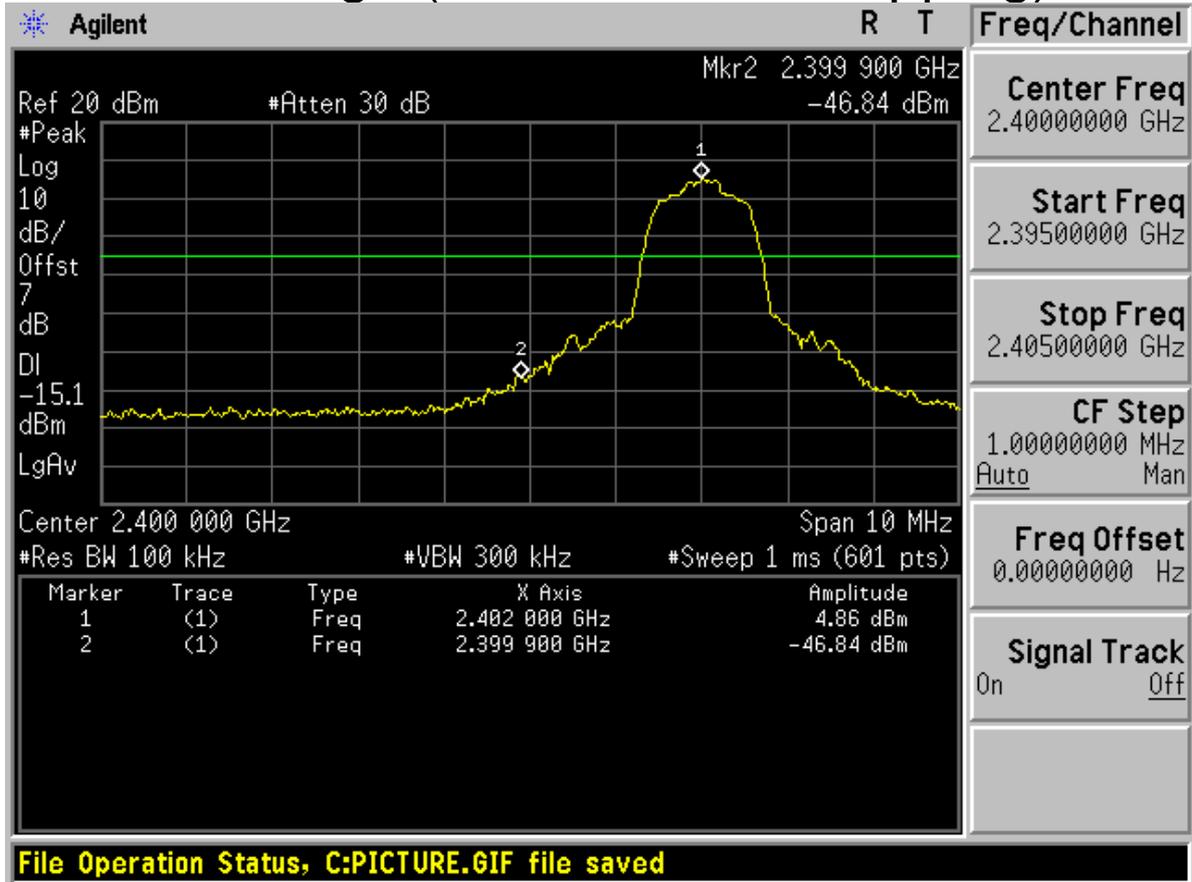
Band edge spurious emission

According to FCC Part 15.247 (d)



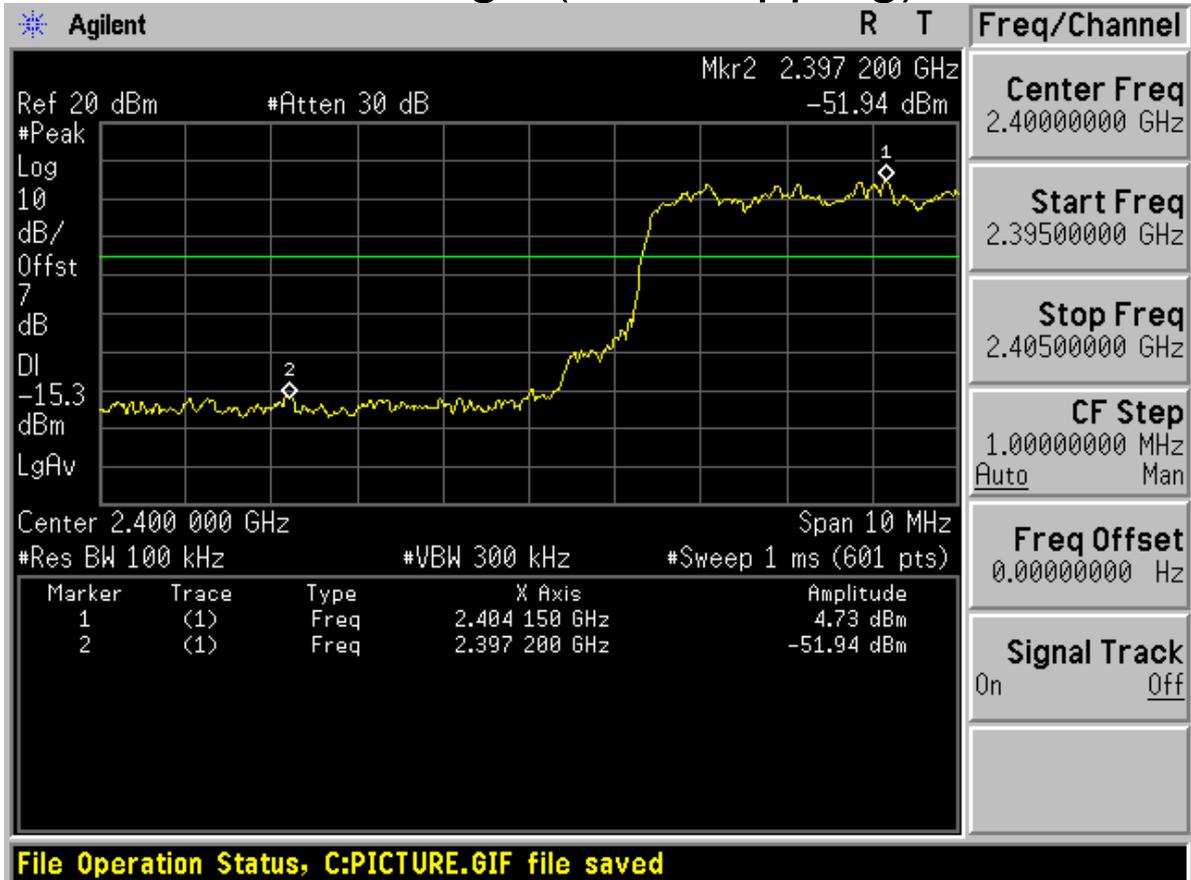
Modulation: $\pi/4$ -DQPSK

Low edge (Channel 0, no hopping)



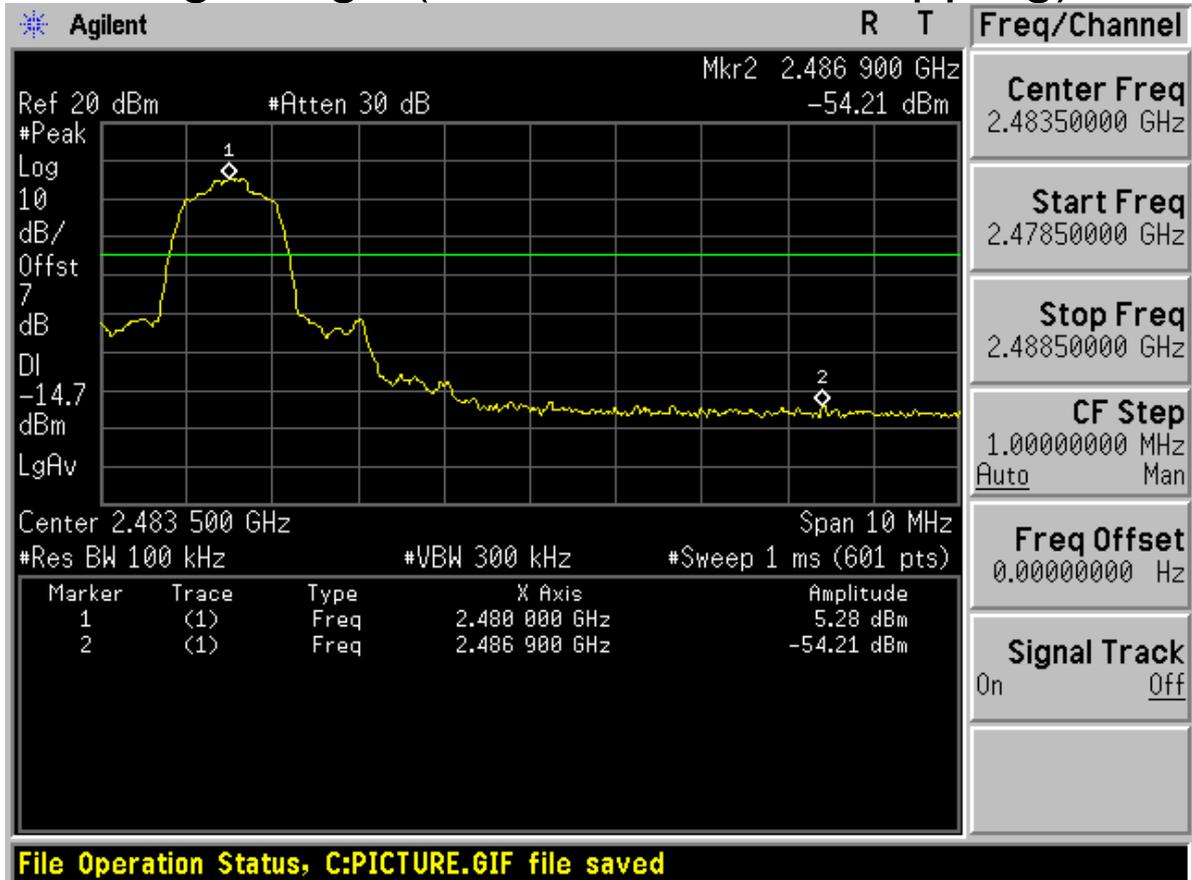


Low edge (with hopping)



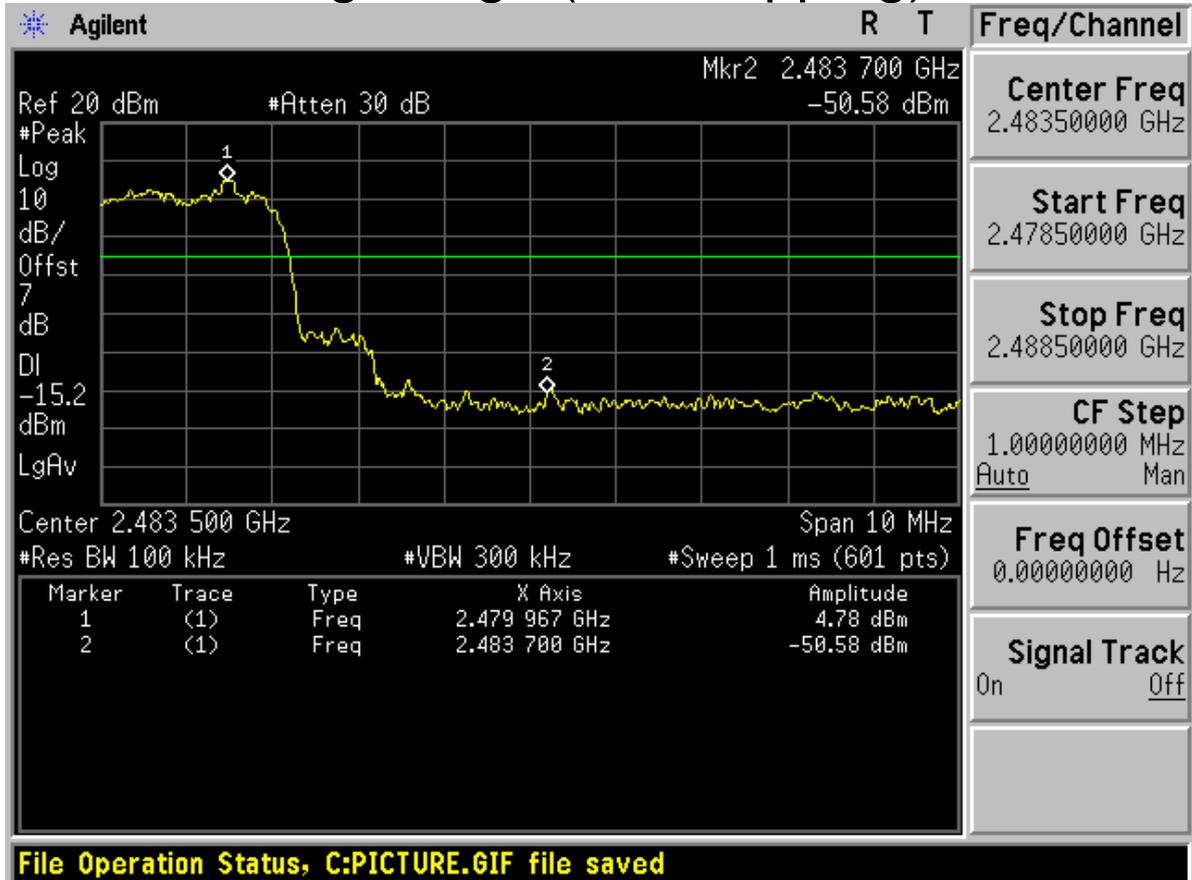


High edge (Channel 78, no hopping)



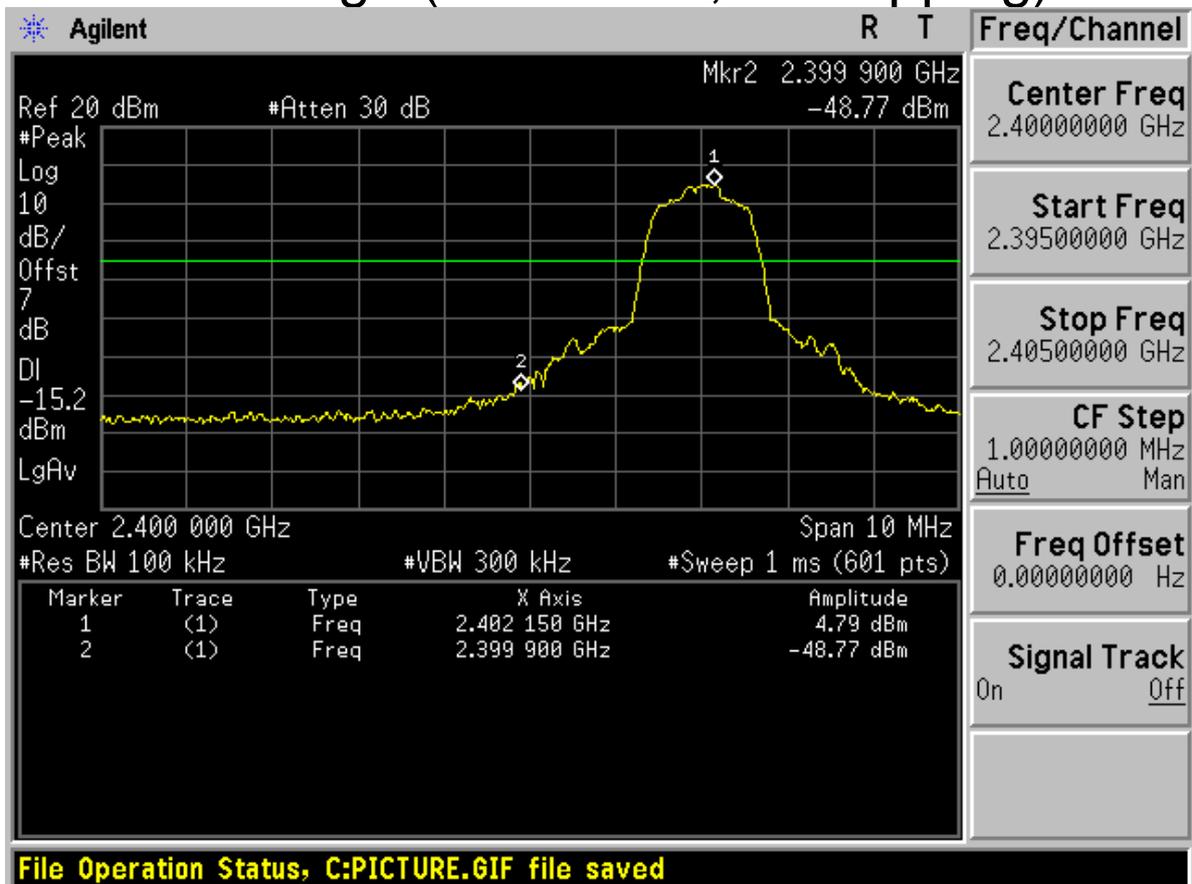


High edge (with hopping)



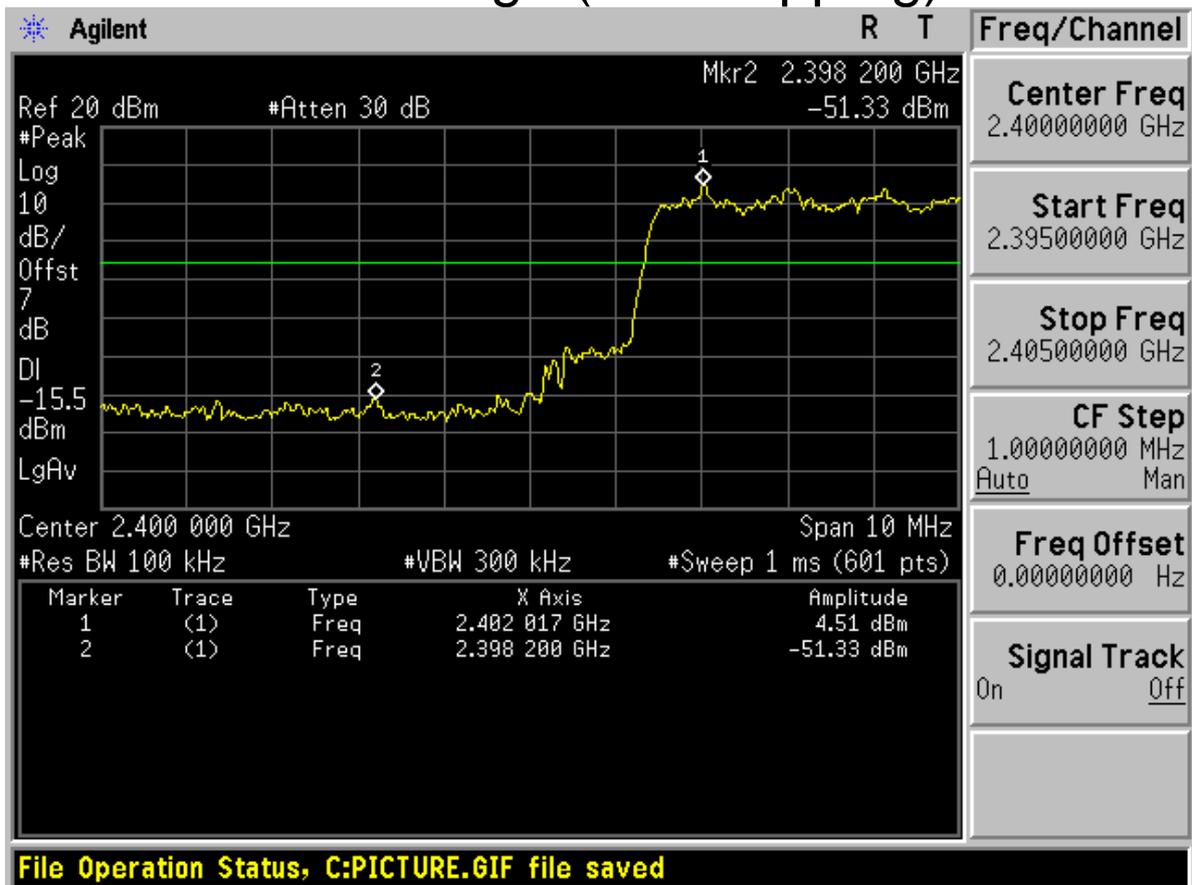


Modulation: 8DPSK Low edge (Channel 0, no hopping)



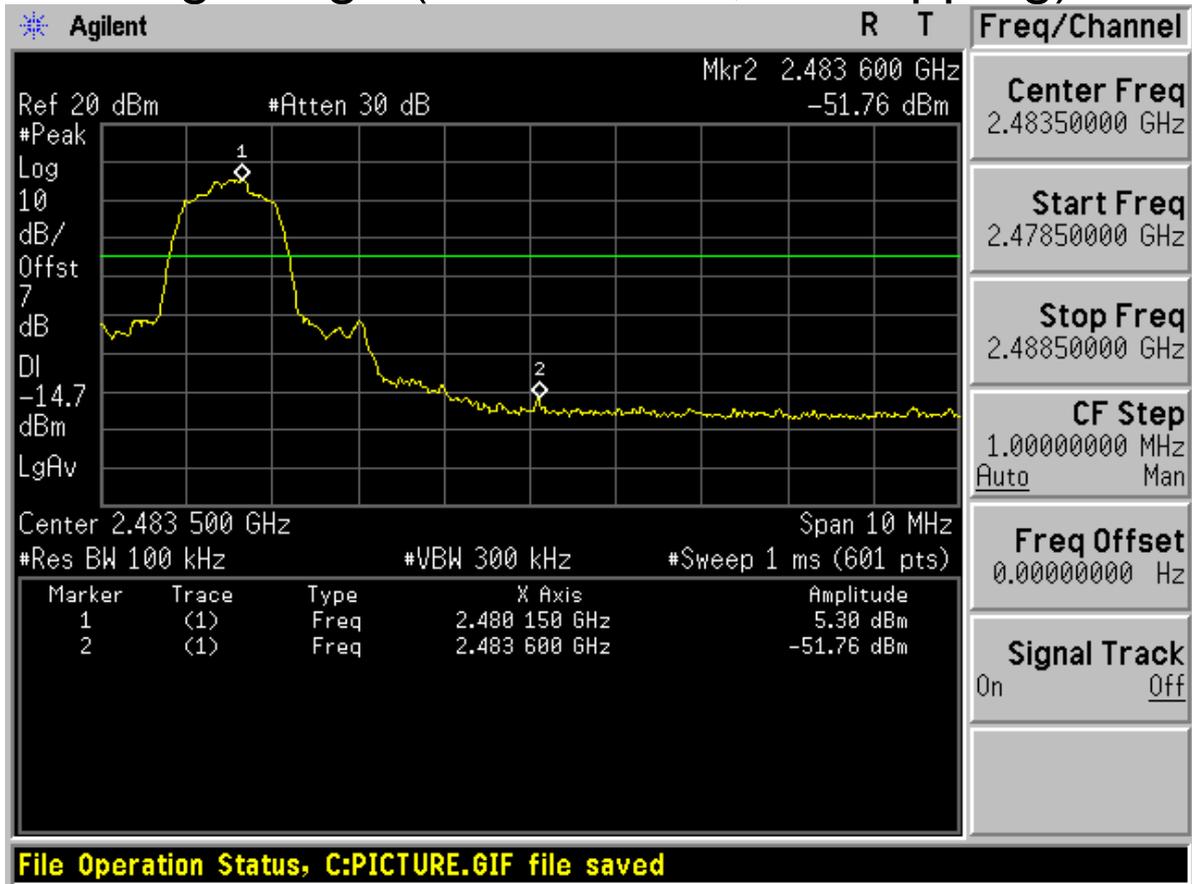


Low edge (with hopping)



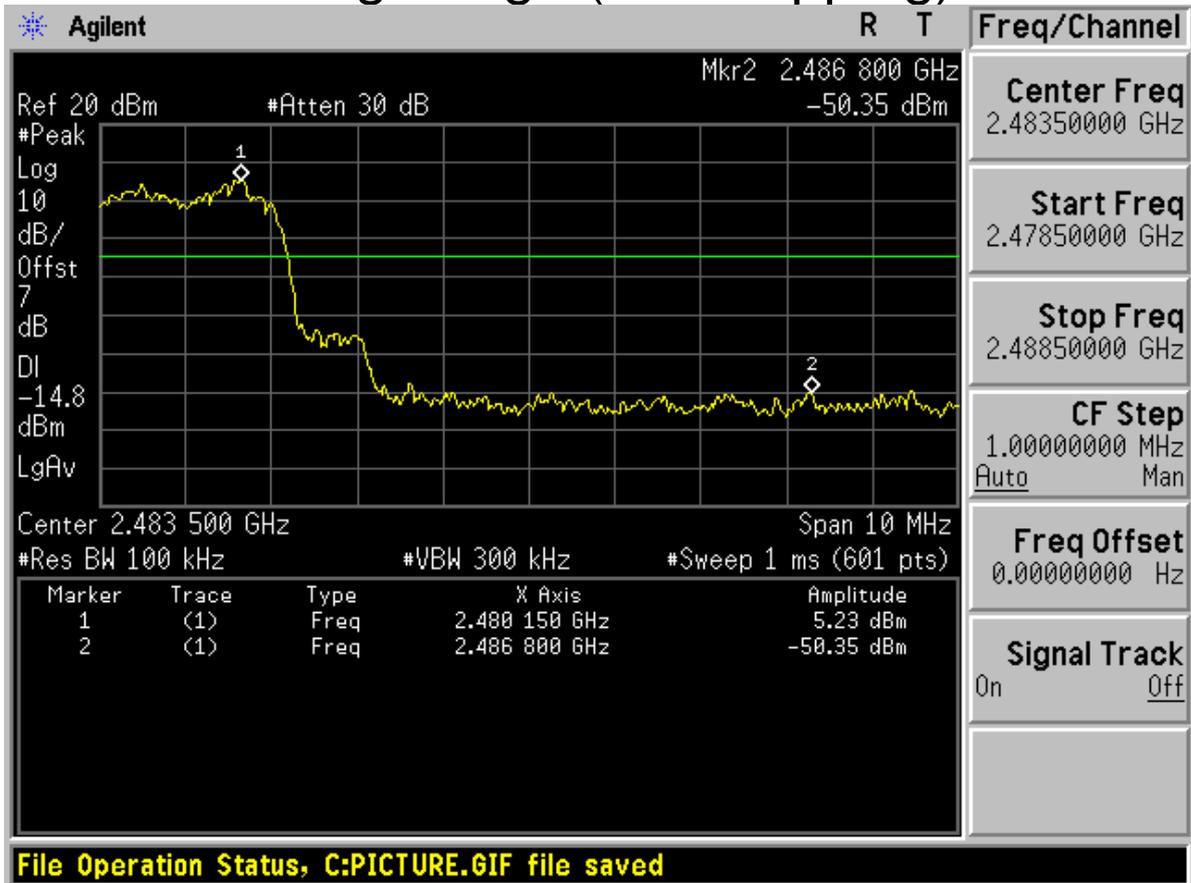


High edge (Channel 78, no hopping)





High edge (with hopping)





Appendix G

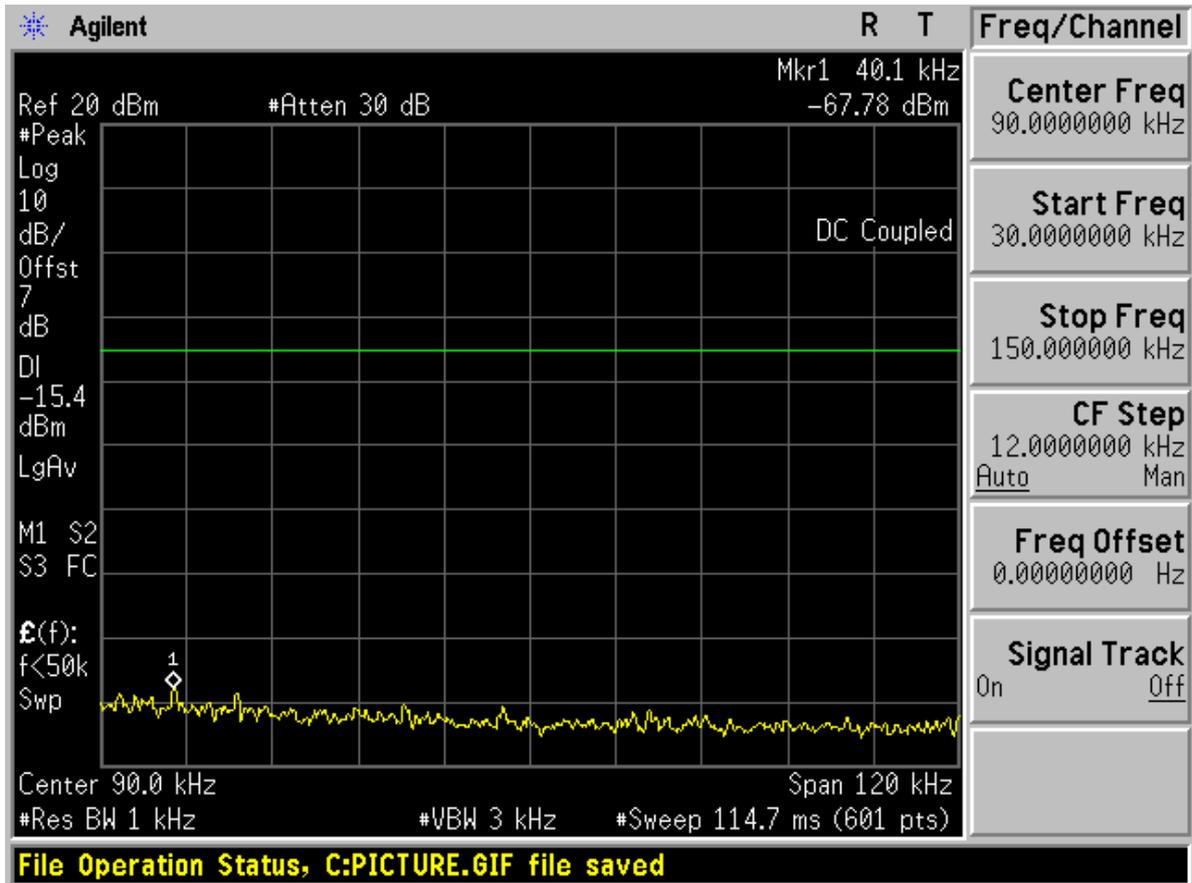
Conducted RF spurious

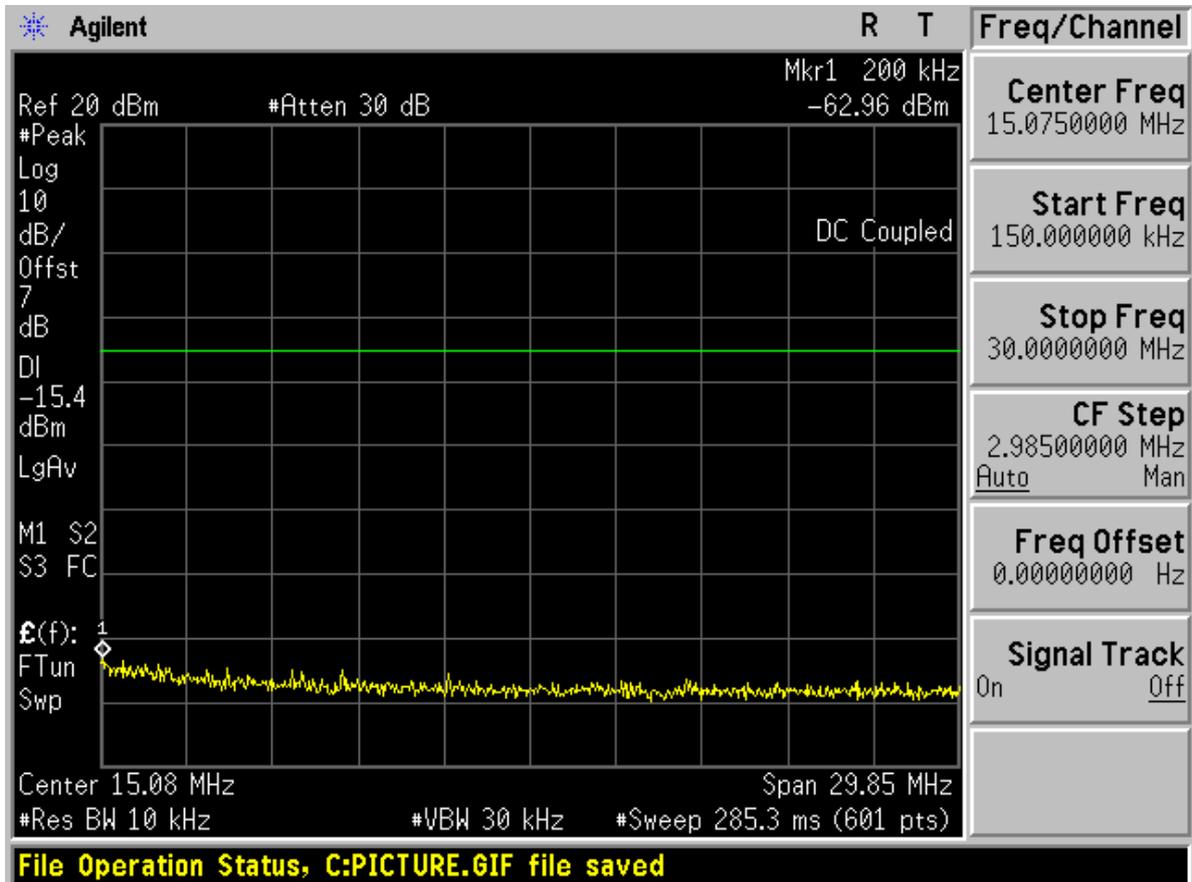
According to FCC Part 15.247 (d)

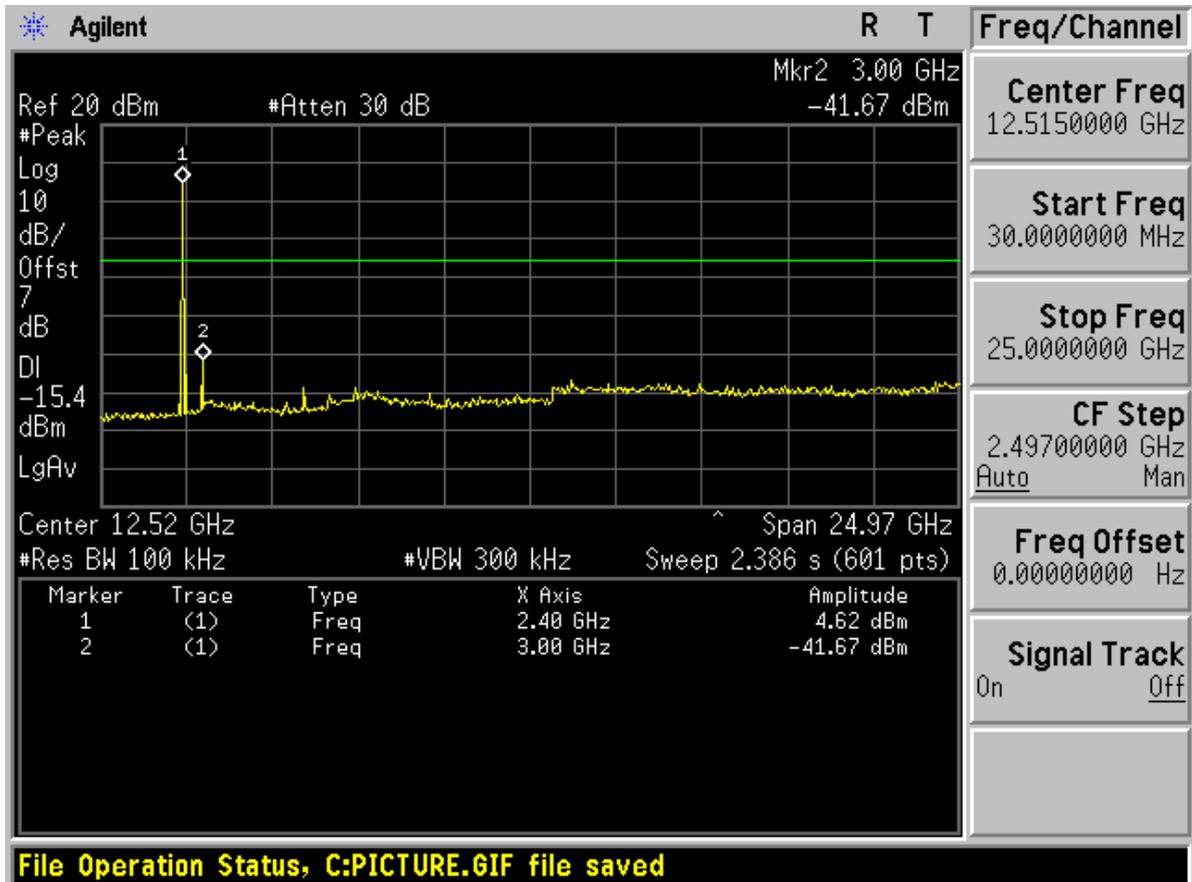


Modulation: $\pi/4$ -DQPSK

Channel 0

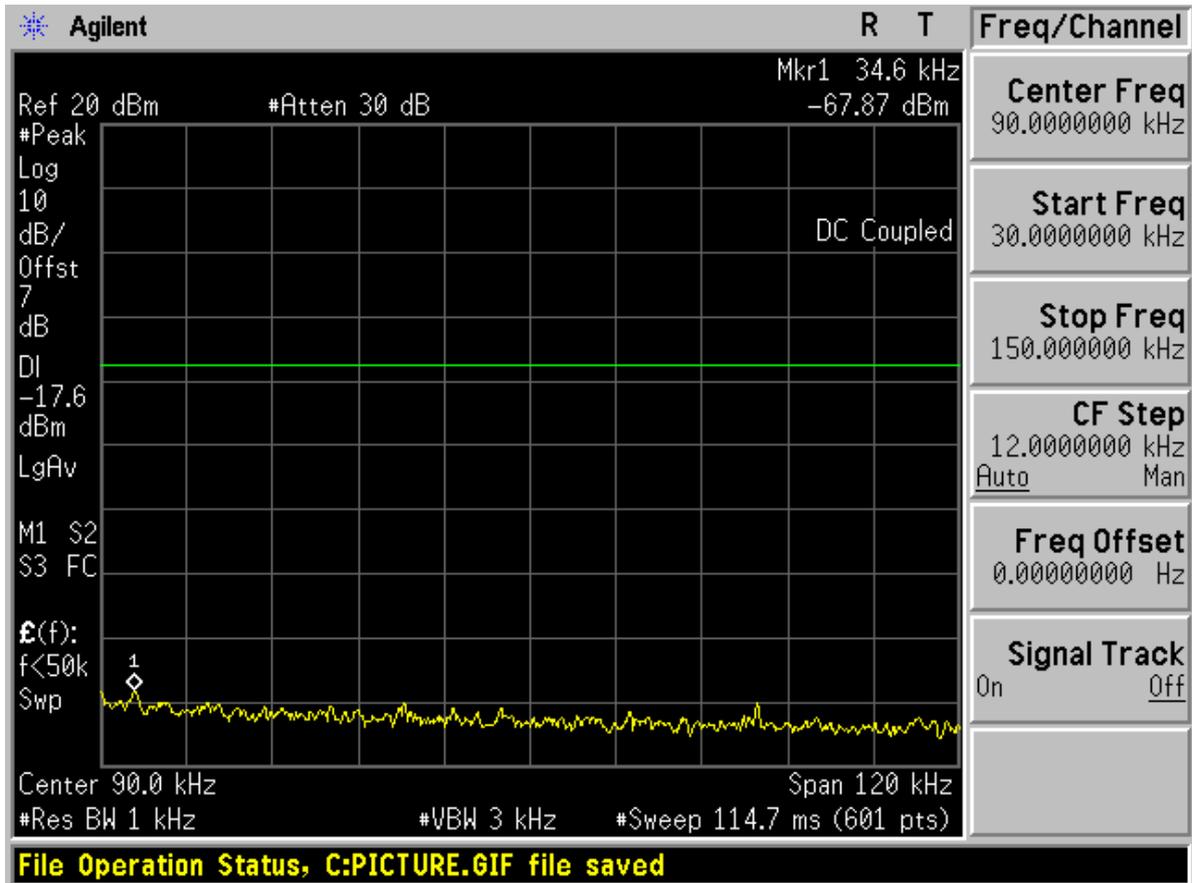


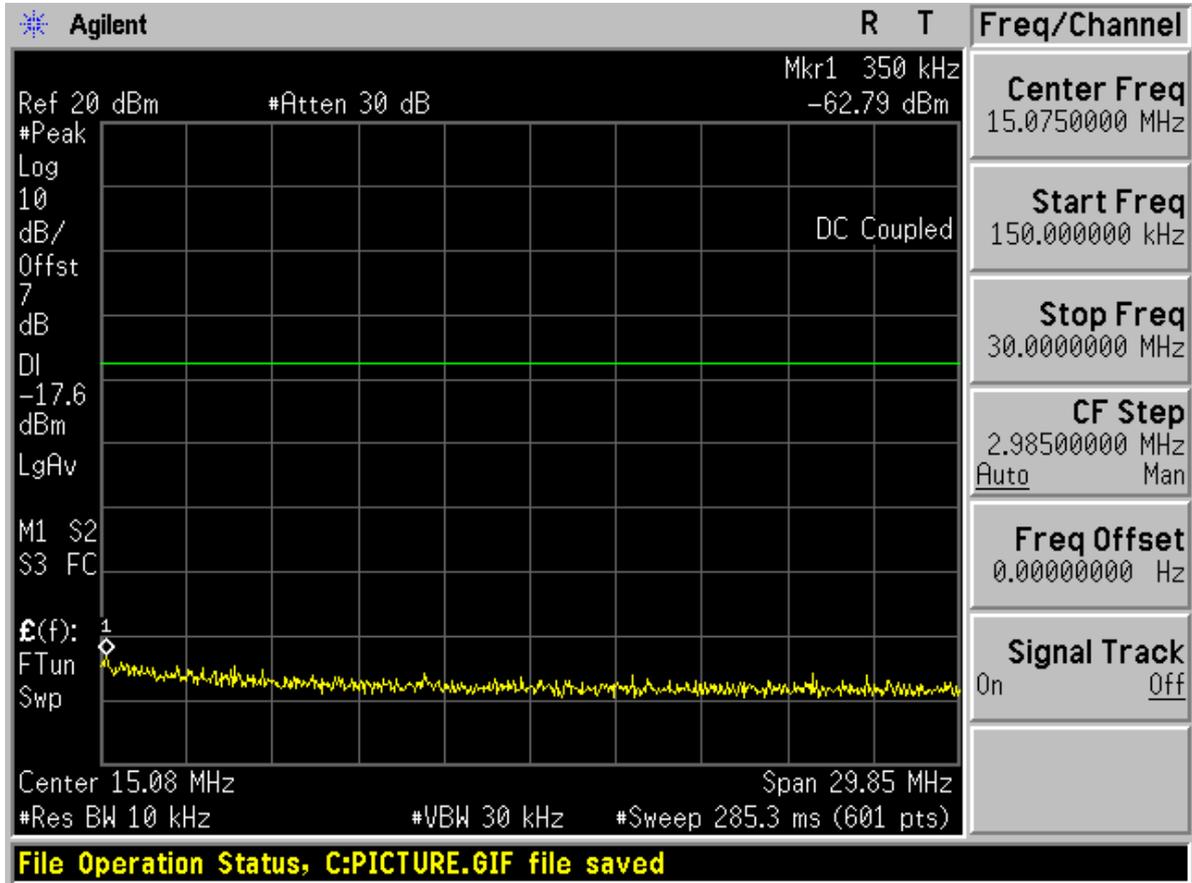


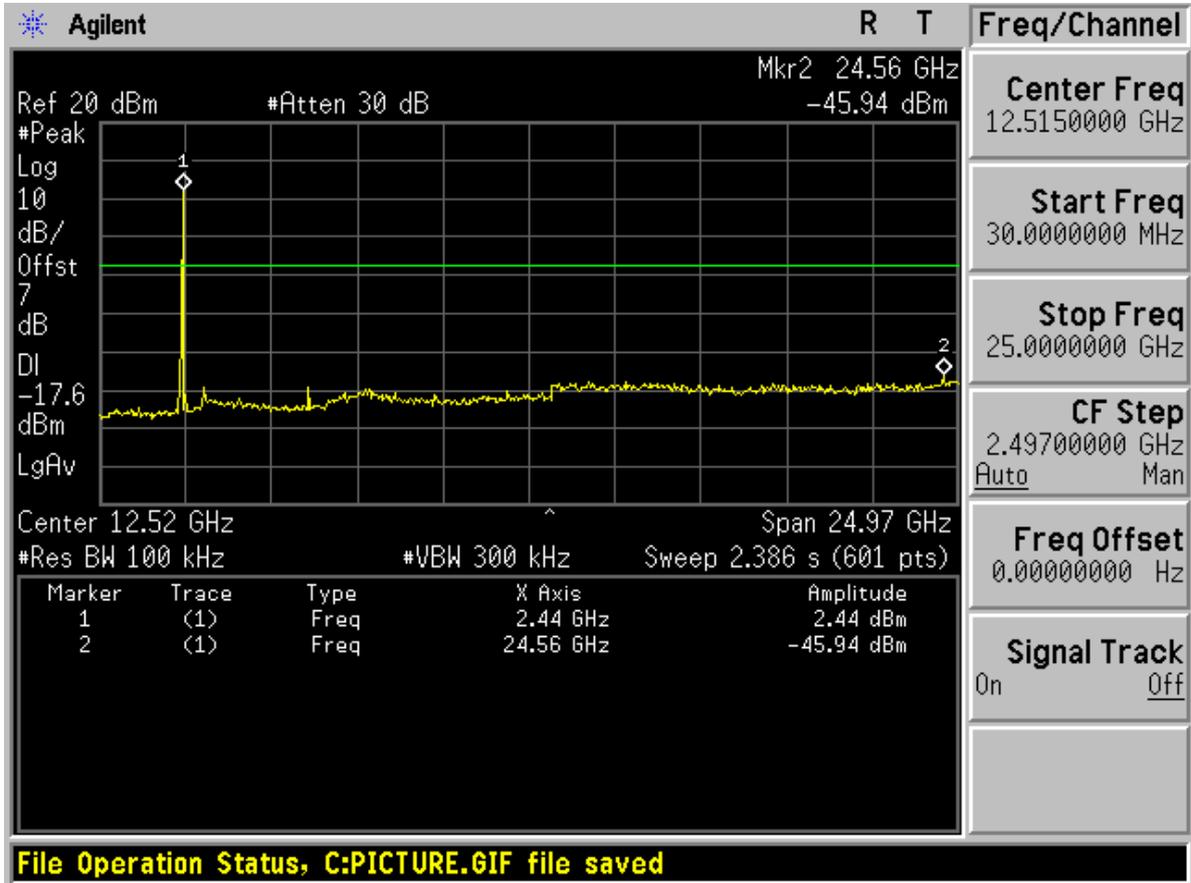




Channel 40

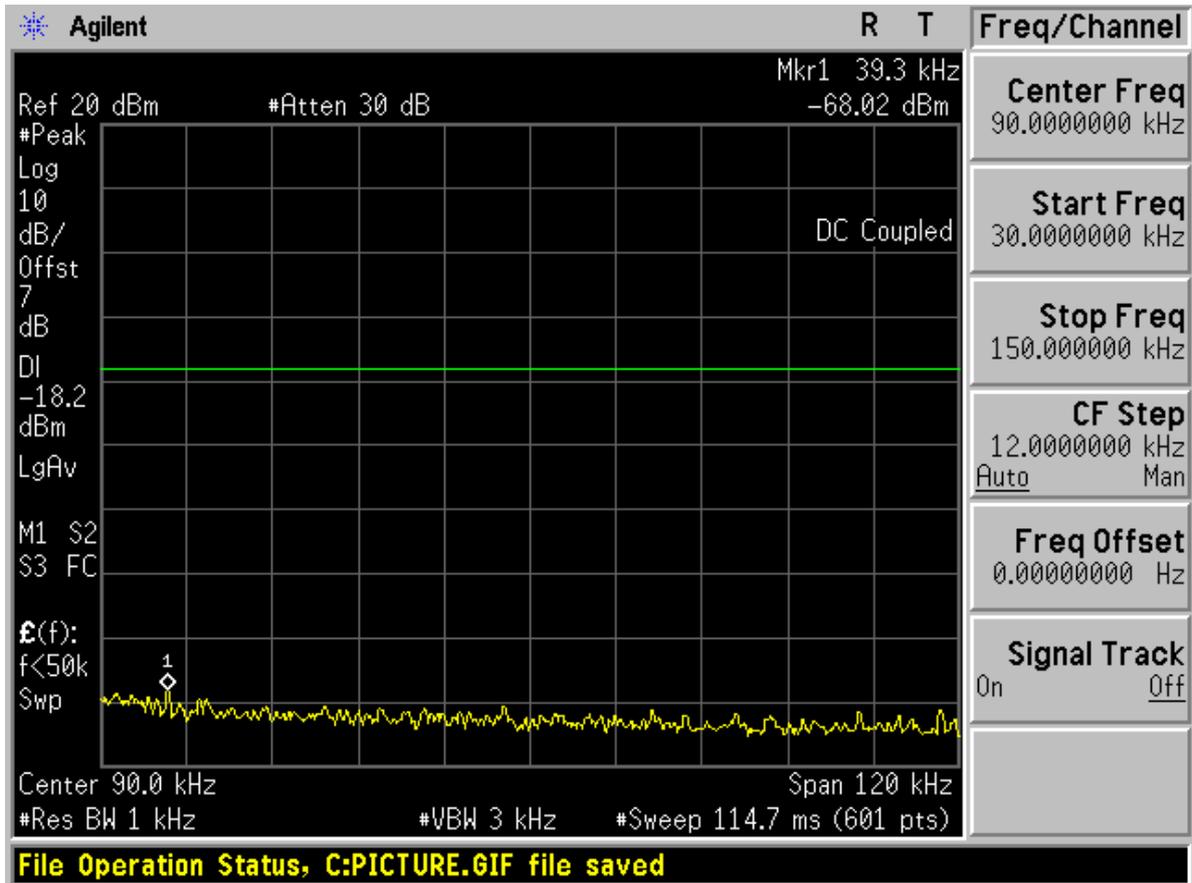


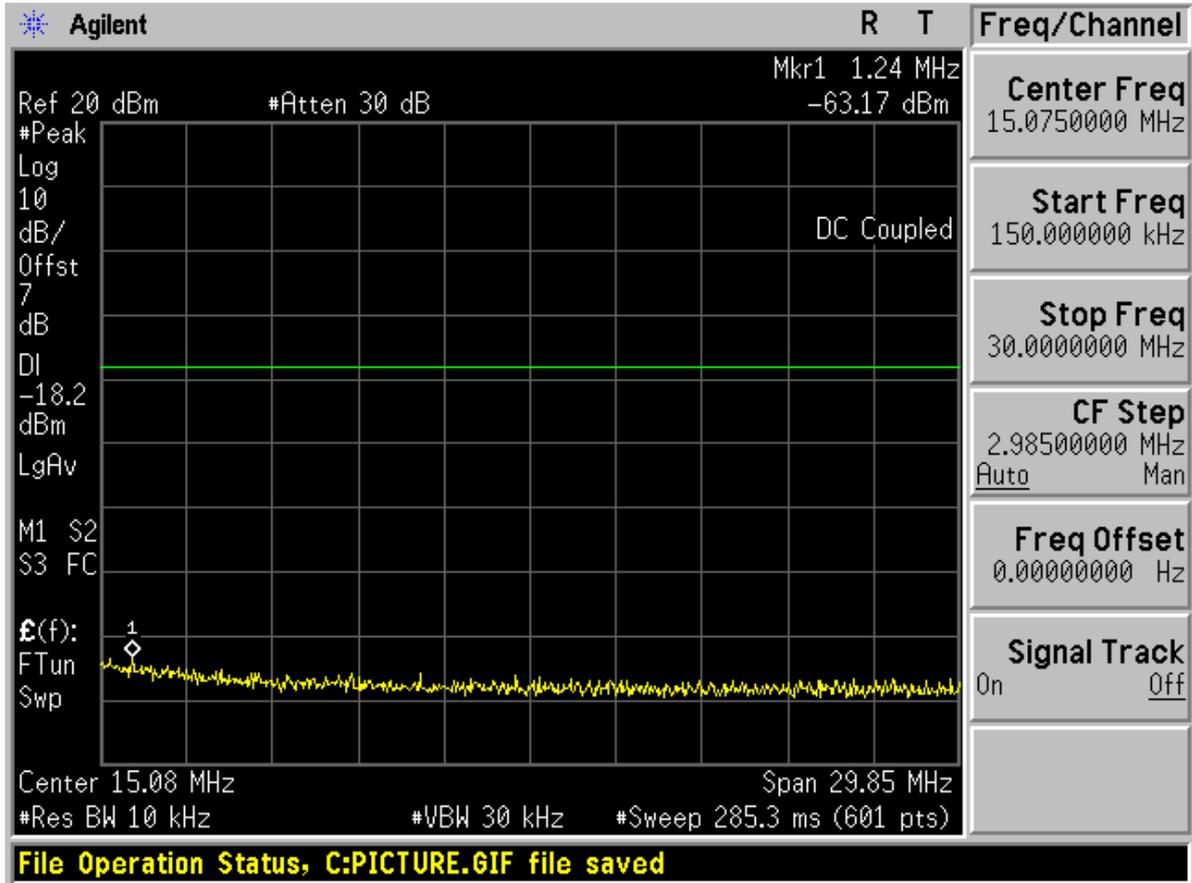


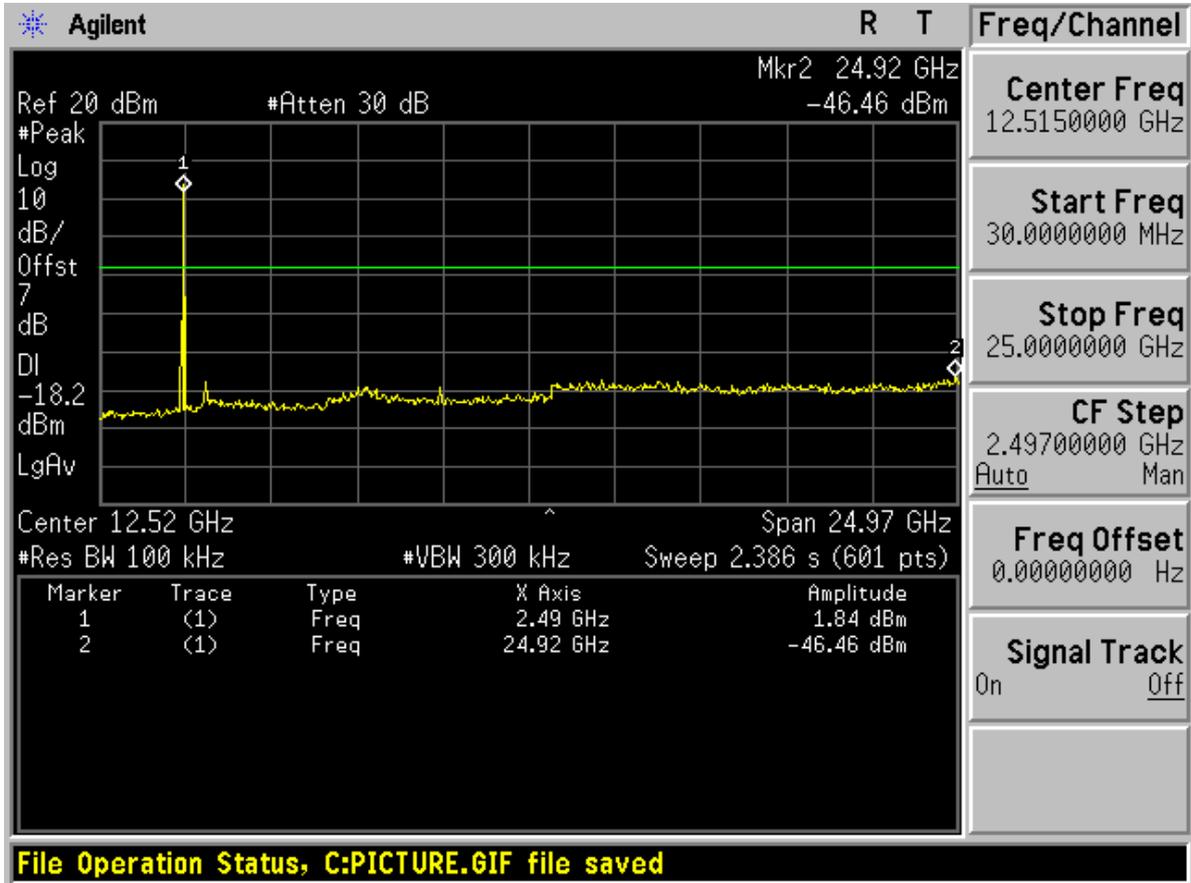




Channel 78

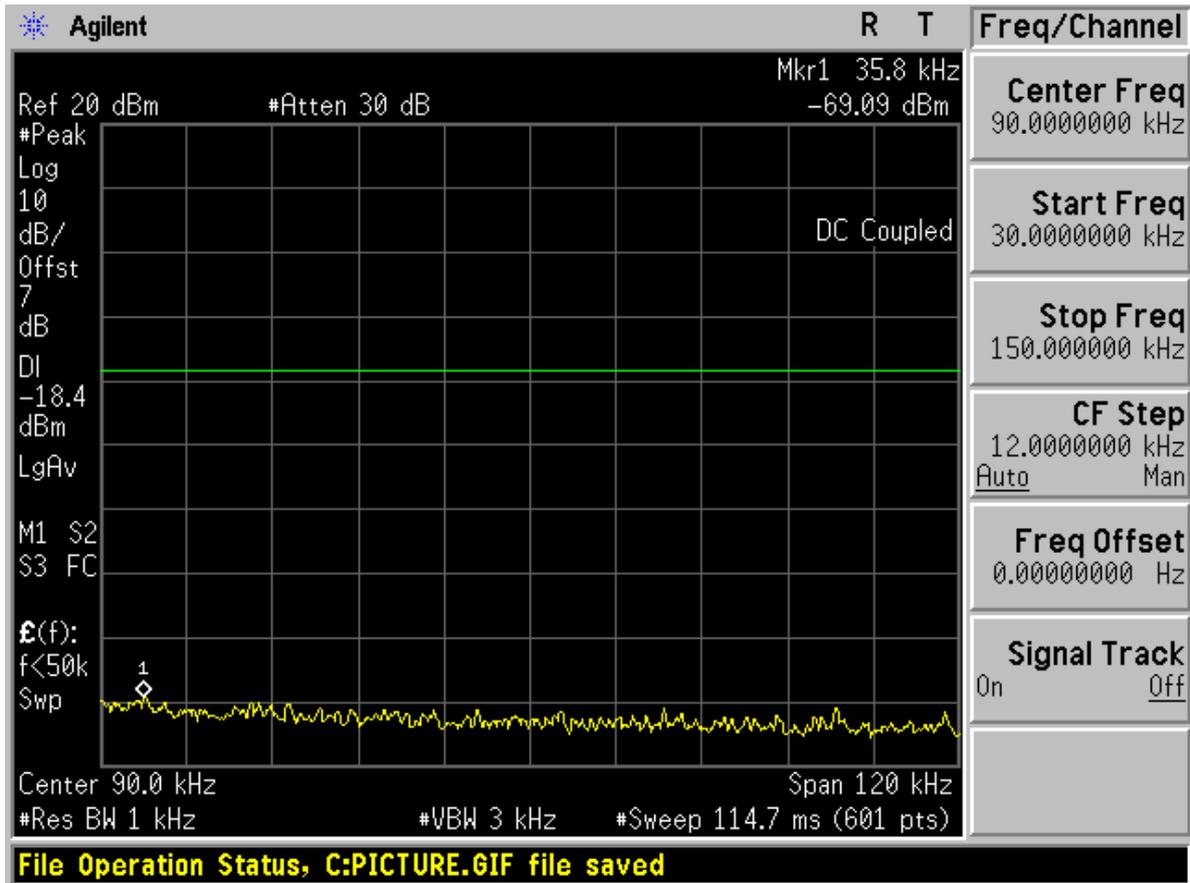


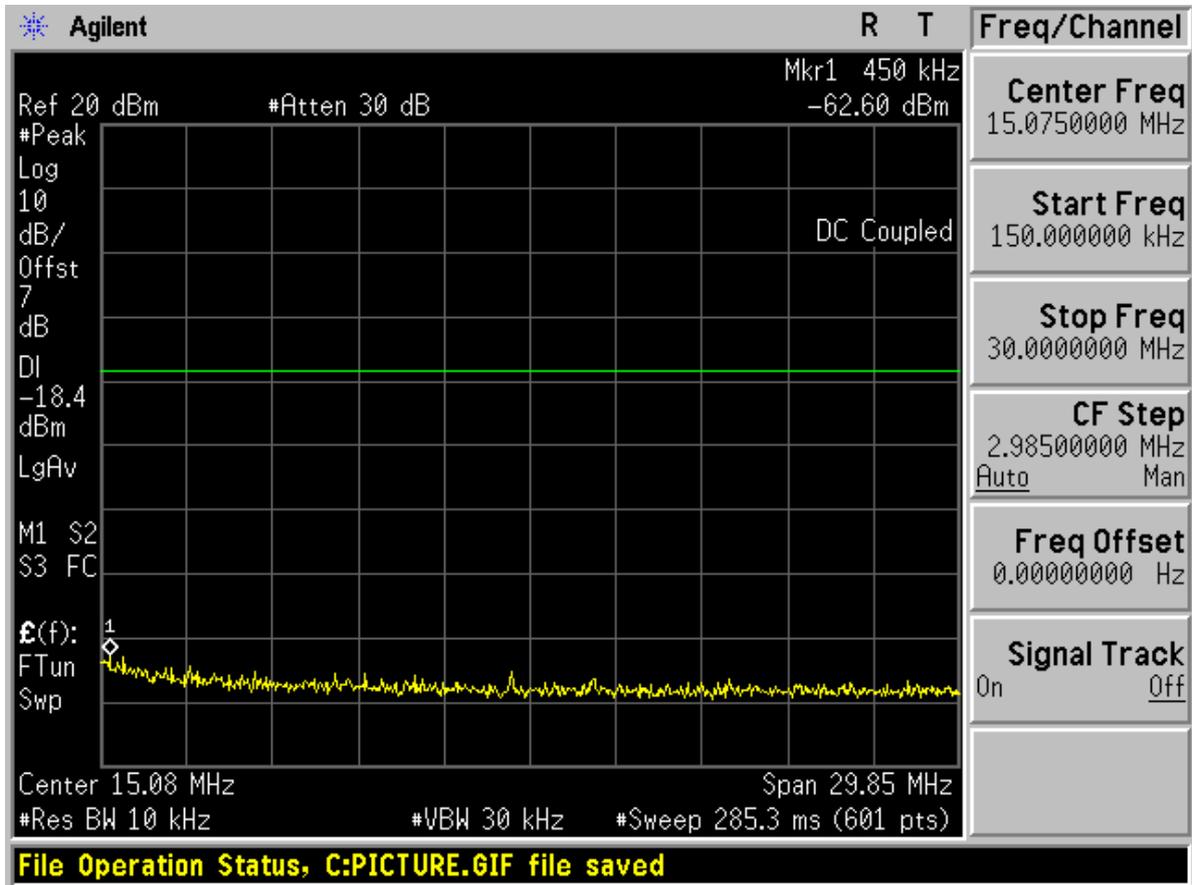


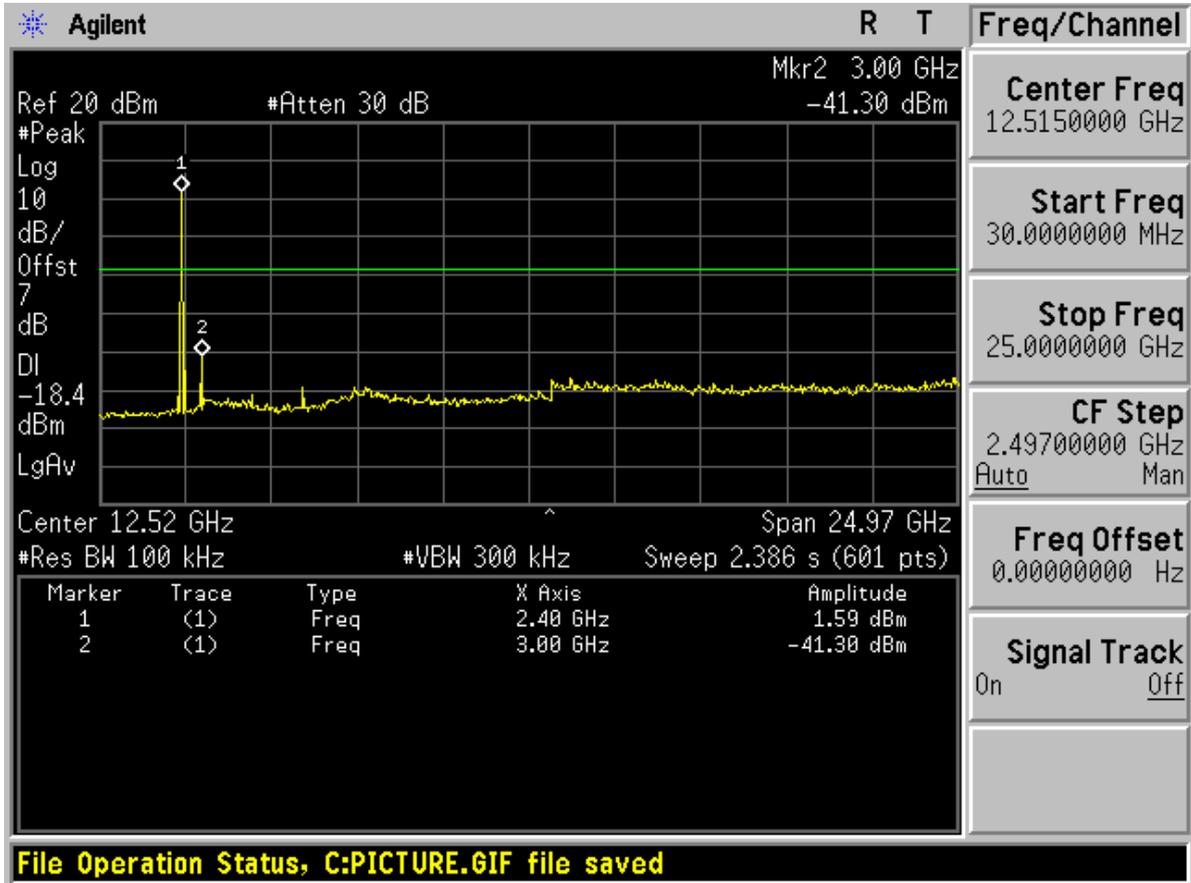




Modulation: 8DPSK Channel 0

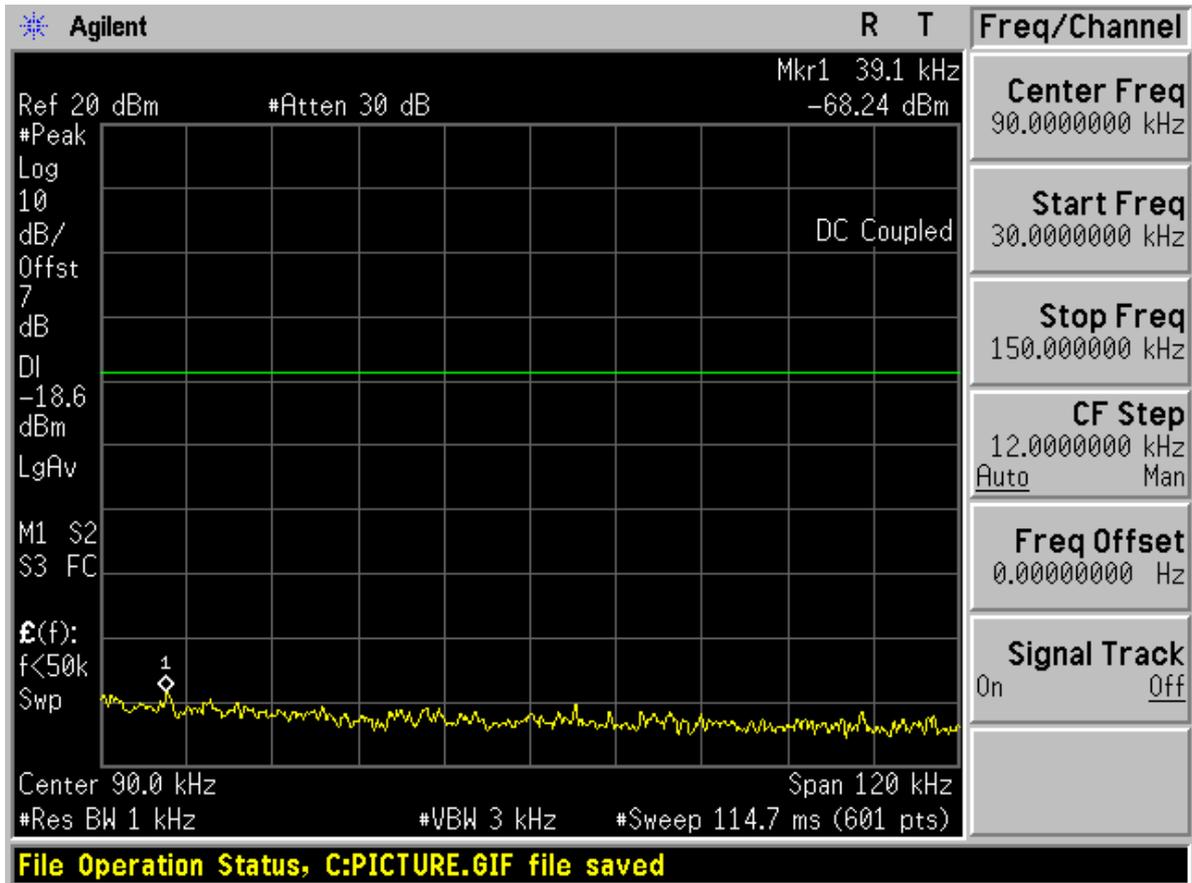


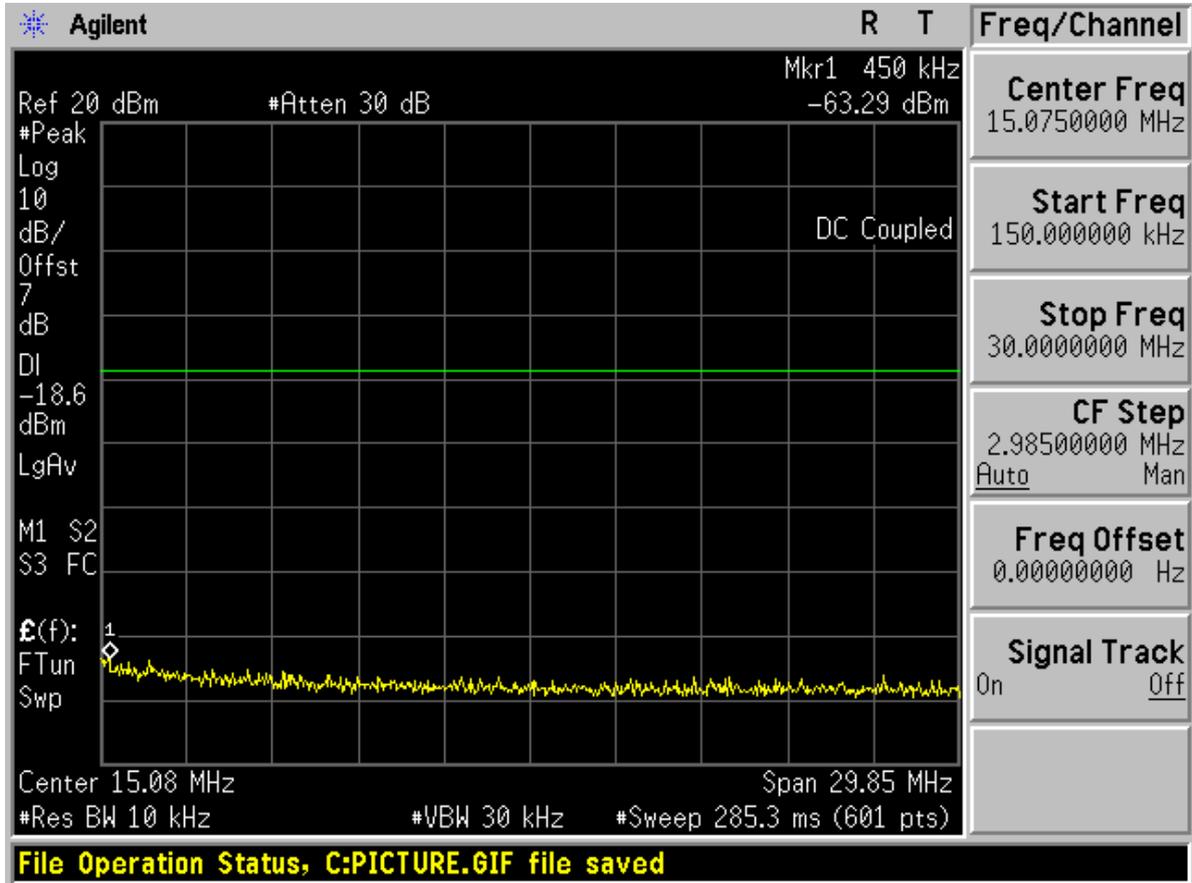


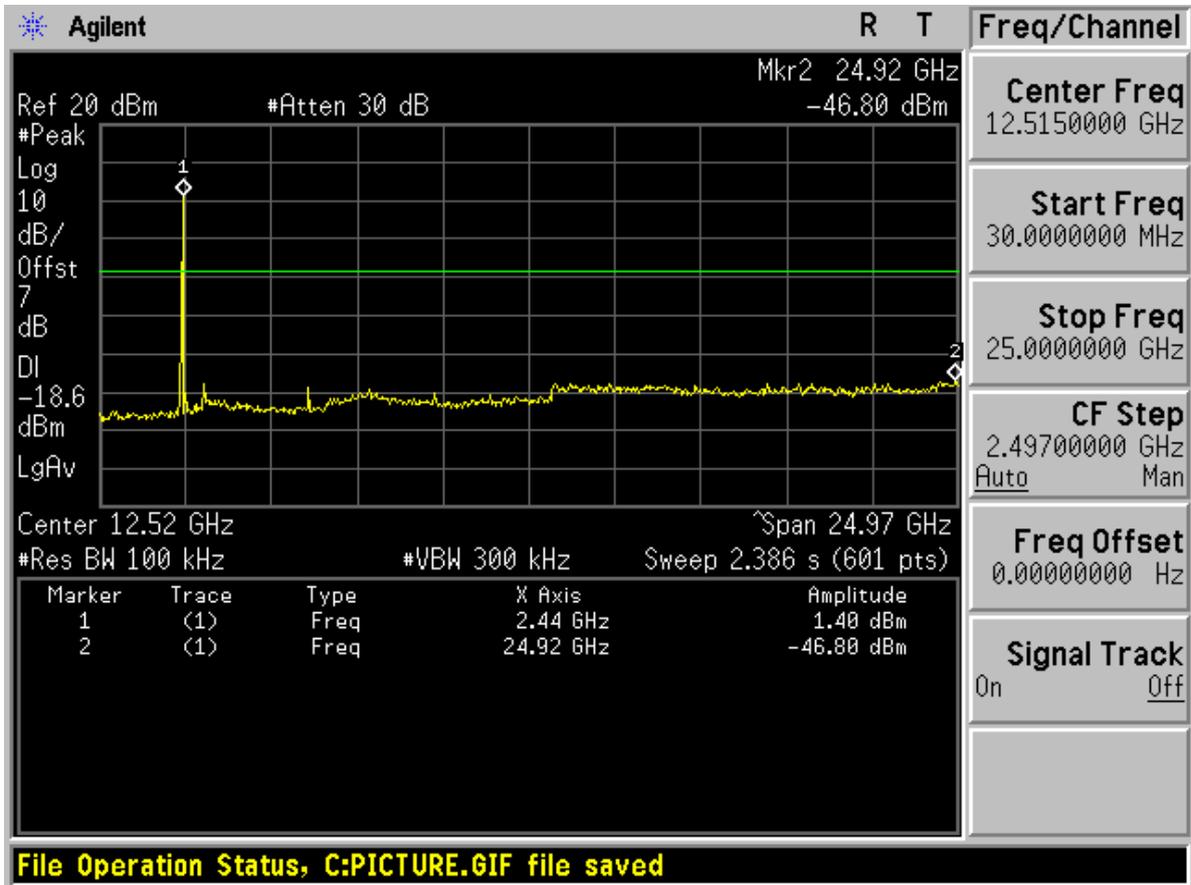




Channel 40

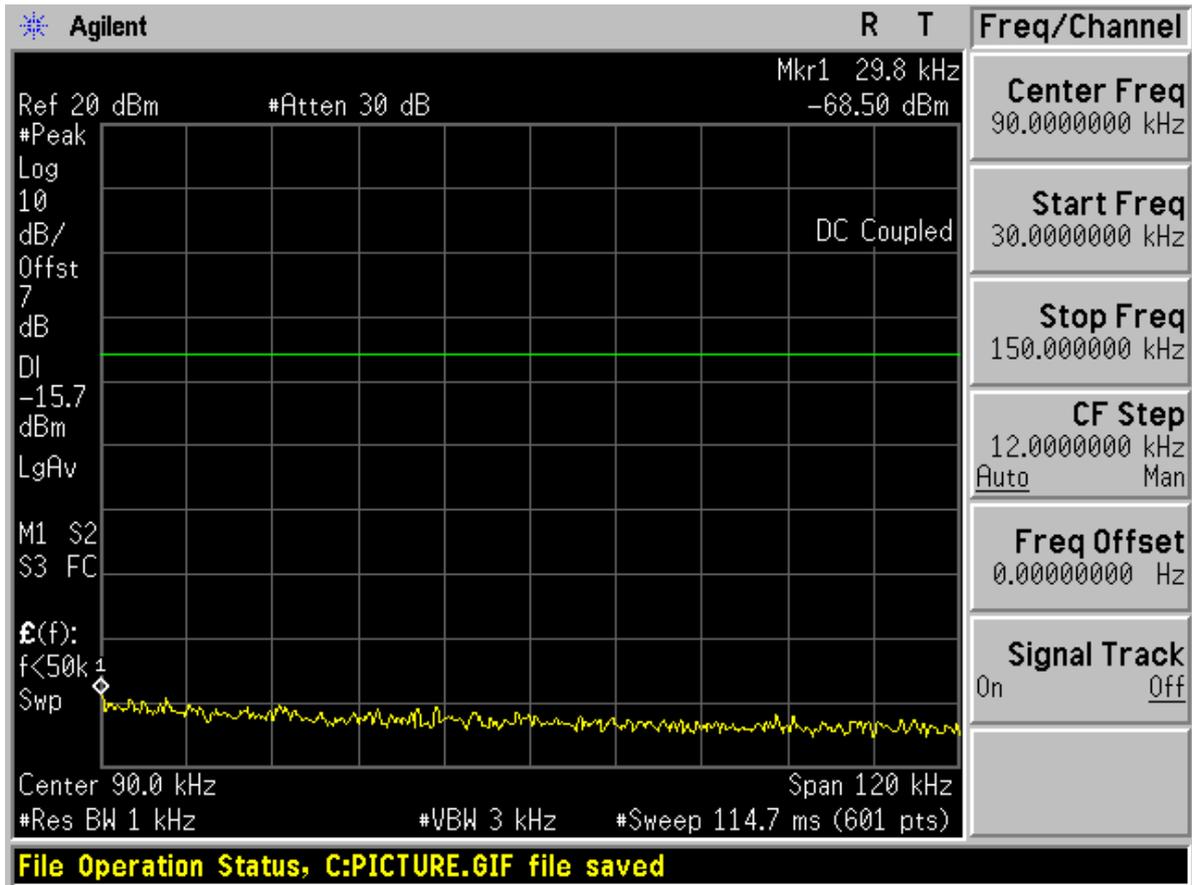


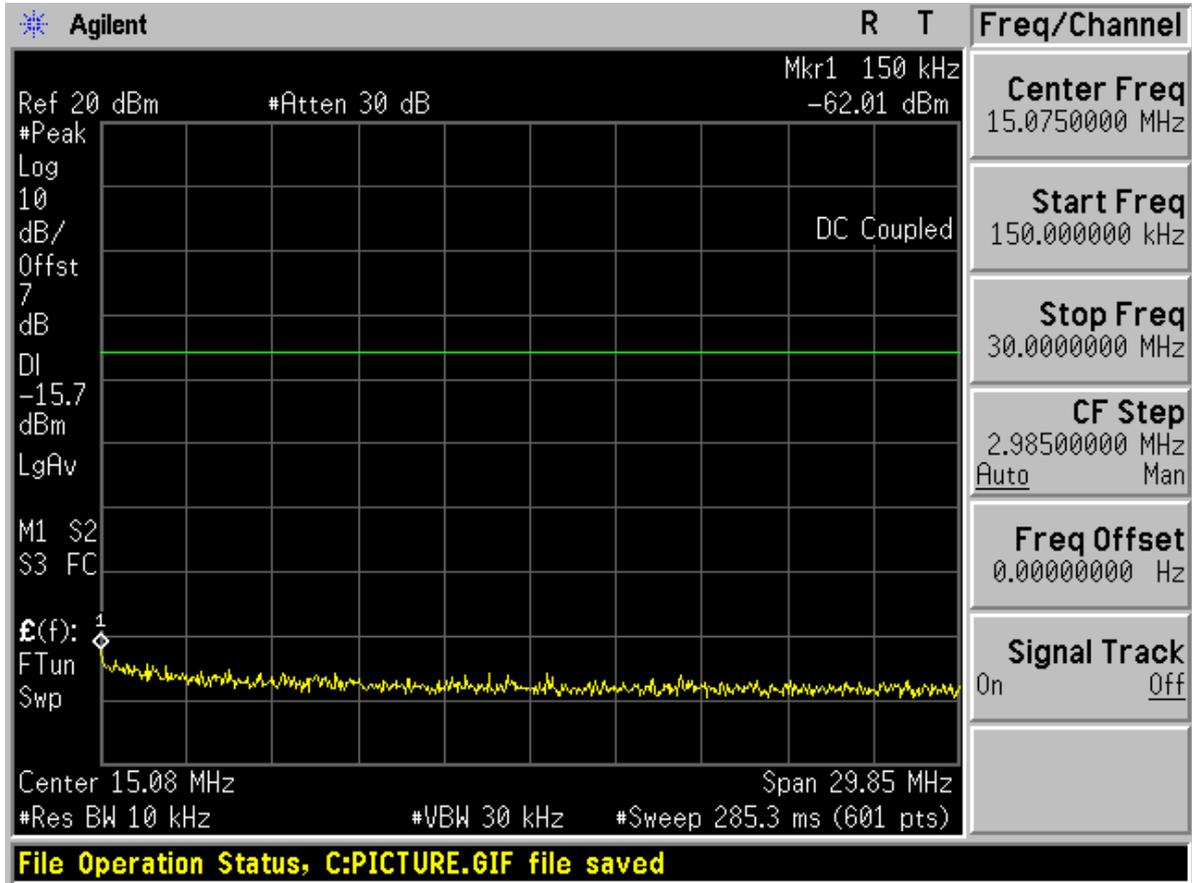


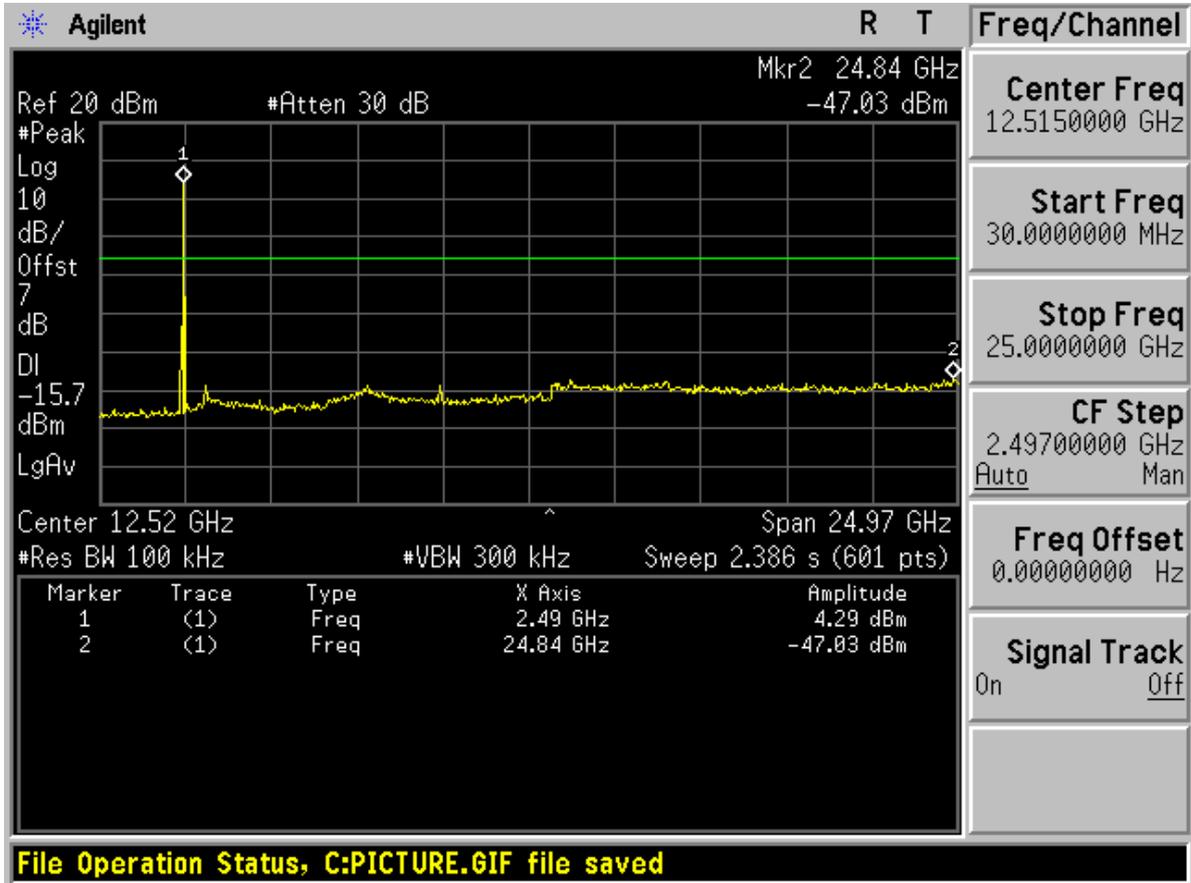




Channel 78









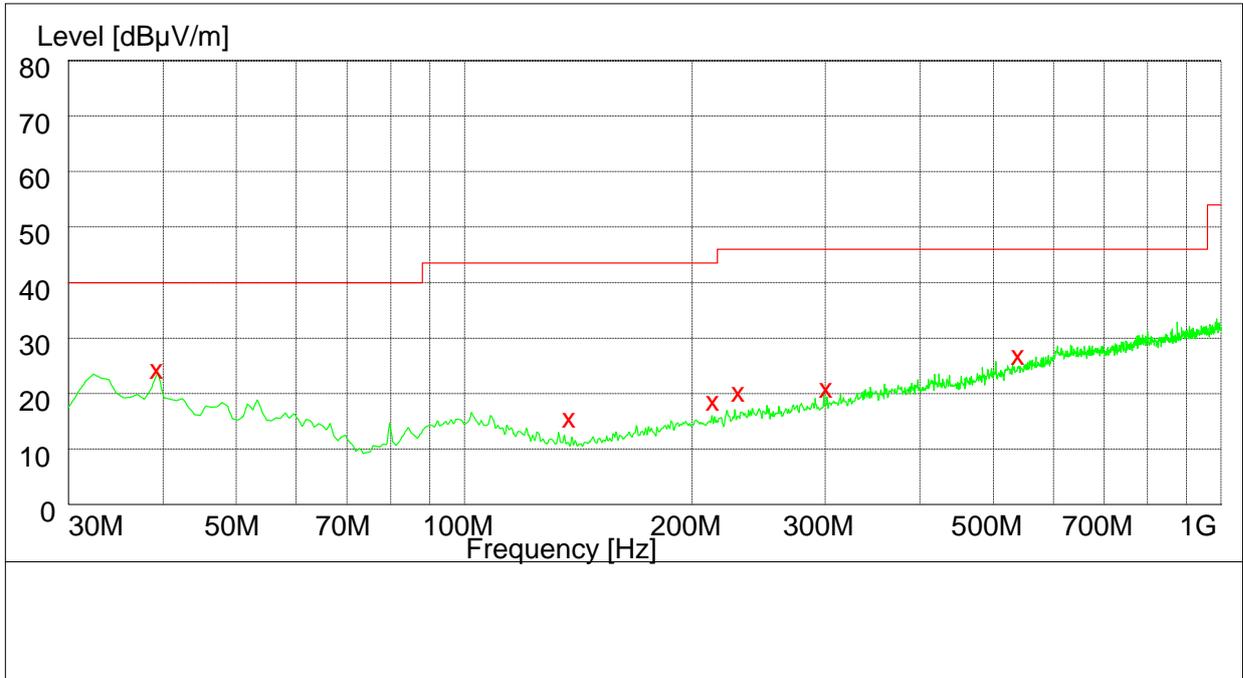
Appendix H

Radiated spurious emission

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



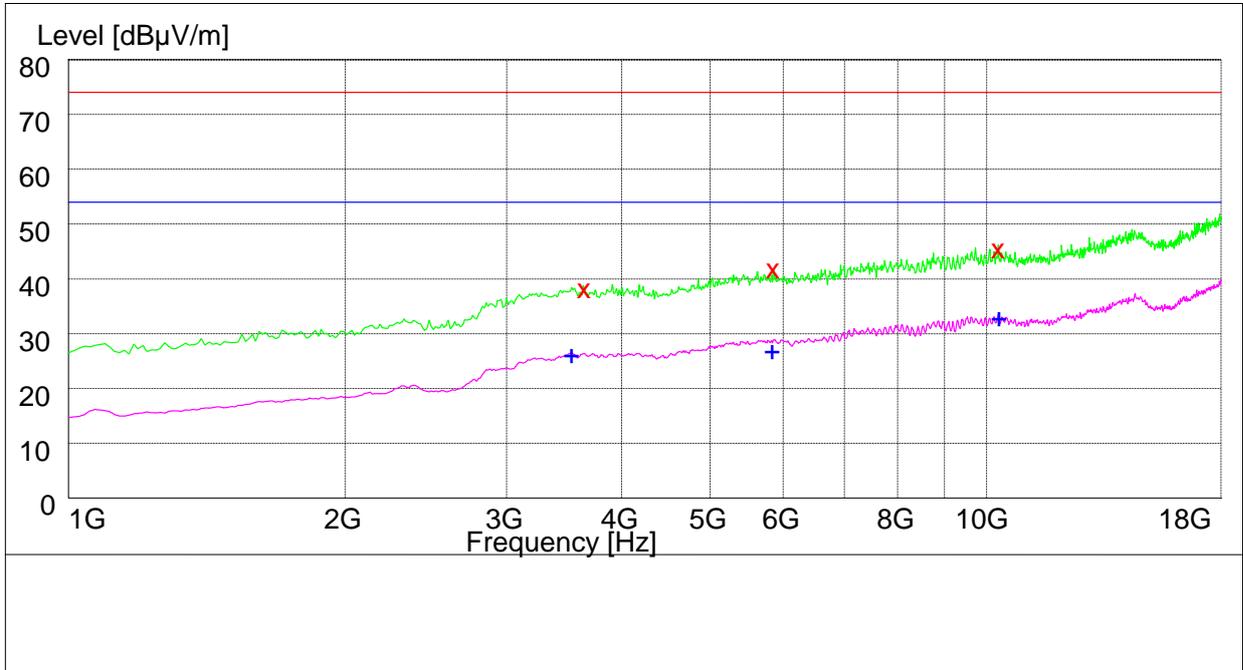
Channel 0 30MHz to 1GHz



| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Plarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|-------------|
| 38.600000 | 22.80 | 13.4 | 40.0 | 17.2 | 111.0 | 126.00 | VERTICAL |
| 145.510000 | 16.60 | 8.9 | 43.5 | 26.9 | 121.0 | 125.00 | HORIZONTAL |
| 213.900000 | 19.30 | 12.7 | 43.5 | 24.2 | 132.0 | 24.00 | VERTICAL |
| 222.600000 | 20.80 | 13.1 | 46.0 | 25.2 | 120.0 | 211.00 | HORIZONTAL |
| 300.660000 | 20.70 | 15.5 | 46.0 | 25.3 | 125.0 | 207.00 | VERTICAL |
| 630.180000 | 25.10 | 22.8 | 46.0 | 20.9 | 111.0 | 203.00 | HORIZONTAL |



1GHz to 18GHz



Note: Signal suppressed with a 2.4 GHz band rejection filter

MEASUREMENT RESULT: PK Detector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 3644.000000 | 38.30 | -5.5 | 74.0 | 35.7 | 152.0 | 259.00 | VERTICAL |
| 5856.500000 | 41.80 | -1.0 | 74.0 | 32.2 | 129.0 | 20.00 | HORIZONTAL |
| 10301.000000 | 45.70 | 6.9 | 74.0 | 28.3 | 101.0 | 254.00 | VERTICAL |

MEASUREMENT RESULT: AVDetector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 3531.000000 | 26.30 | -5.2 | 54.0 | 27.7 | 150.0 | 199.00 | VERTICAL |
| 5859.000000 | 30.20 | -1.0 | 54.0 | 23.8 | 139.0 | 320.00 | HORIZONTAL |
| 10300.500000 | 32.90 | 7.0 | 54.0 | 21.1 | 100.0 | 338.00 | VERTICAL |

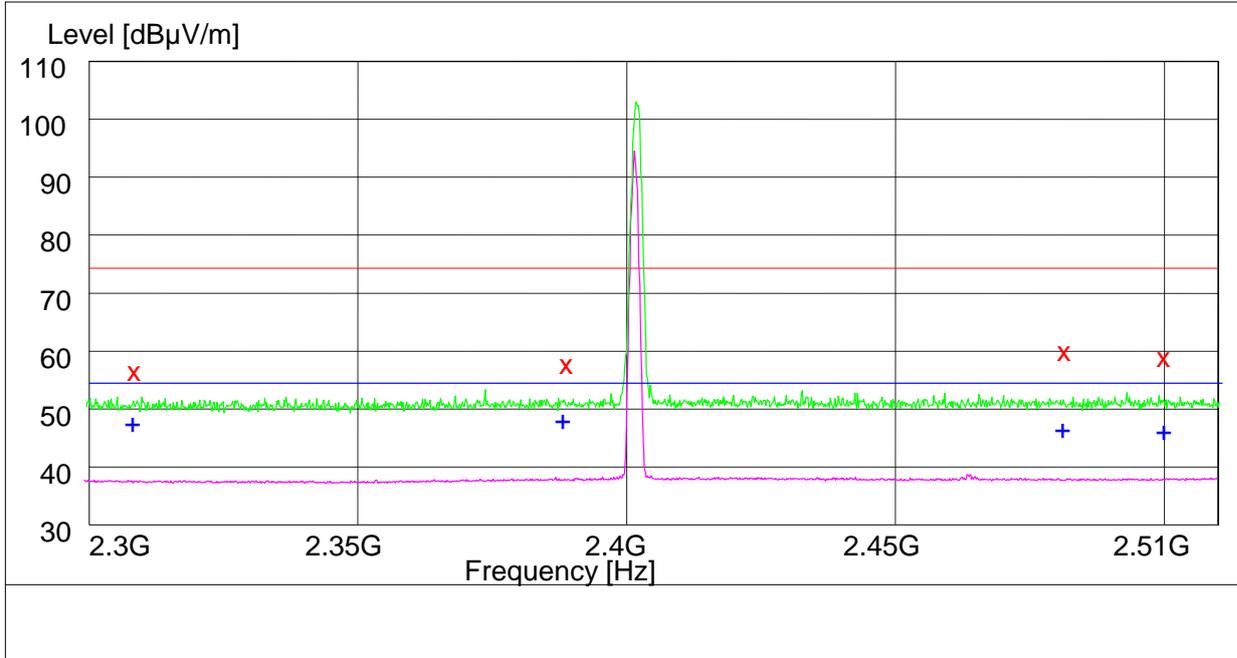


18GHz to 26GHz

Note: No peak found in pre- test.



2.30GHz to 2.51GHz



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

MEASUREMENT RESULT: PK Detector

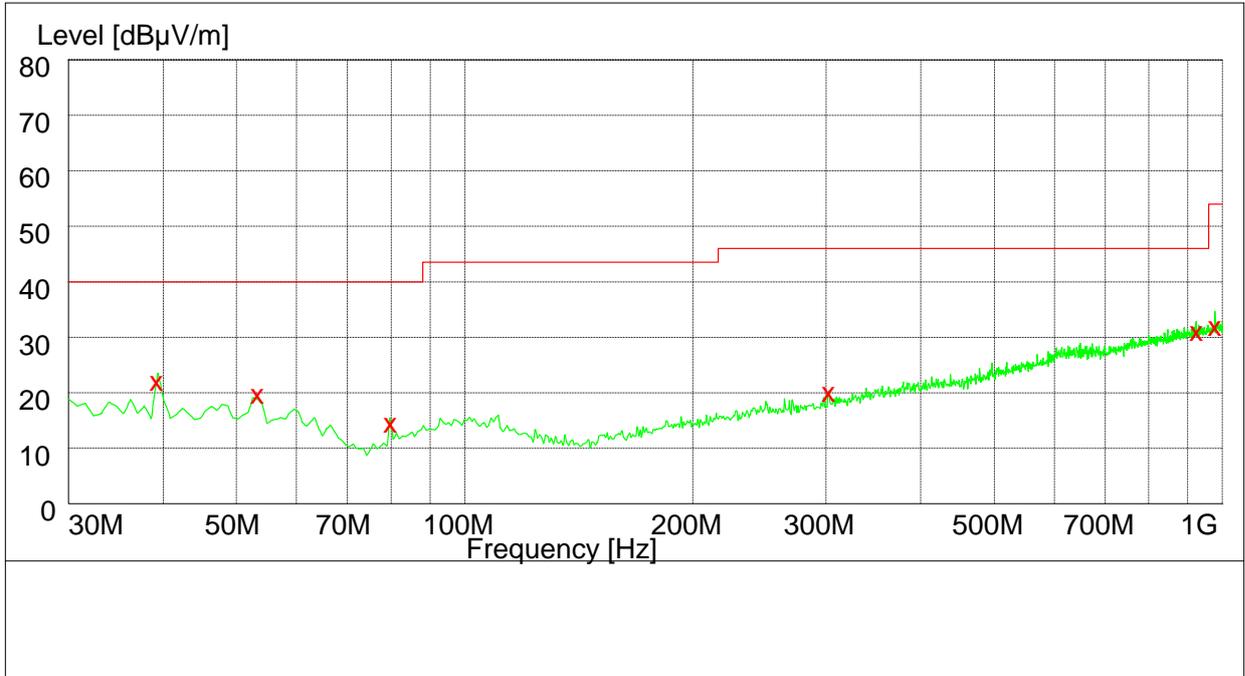
| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 2310.000000 | 58.50 | 33.3 | 74.0 | 15.5 | 110.0 | 146.00 | VERTICAL |
| 2390.000000 | 59.80 | 33.5 | 74.0 | 14.2 | 152.0 | 349.00 | HORIZONTAL |
| 2483.500000 | 60.00 | 33.7 | 74.0 | 14.0 | 125.0 | 121.00 | HORIZONTAL |
| 2500.000000 | 59.30 | 33.8 | 74.0 | 14.7 | 124.0 | 121.00 | VERTICAL |

MEASUREMENT RESULT: AVDetector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 2310.000000 | 47.40 | 33.3 | 54.0 | 6.6 | 112.0 | 250.00 | VERTICAL |
| 2390.000000 | 46.50 | 33.5 | 54.0 | 7.5 | 142.0 | 244.00 | HORIZONTAL |
| 2483.500000 | 46.10 | 33.7 | 54.0 | 7.9 | 127.0 | 129.00 | VERTICAL |
| 2500.000000 | 46.00 | 33.8 | 54.0 | 8.0 | 100.0 | 144.00 | HORIZONTAL |



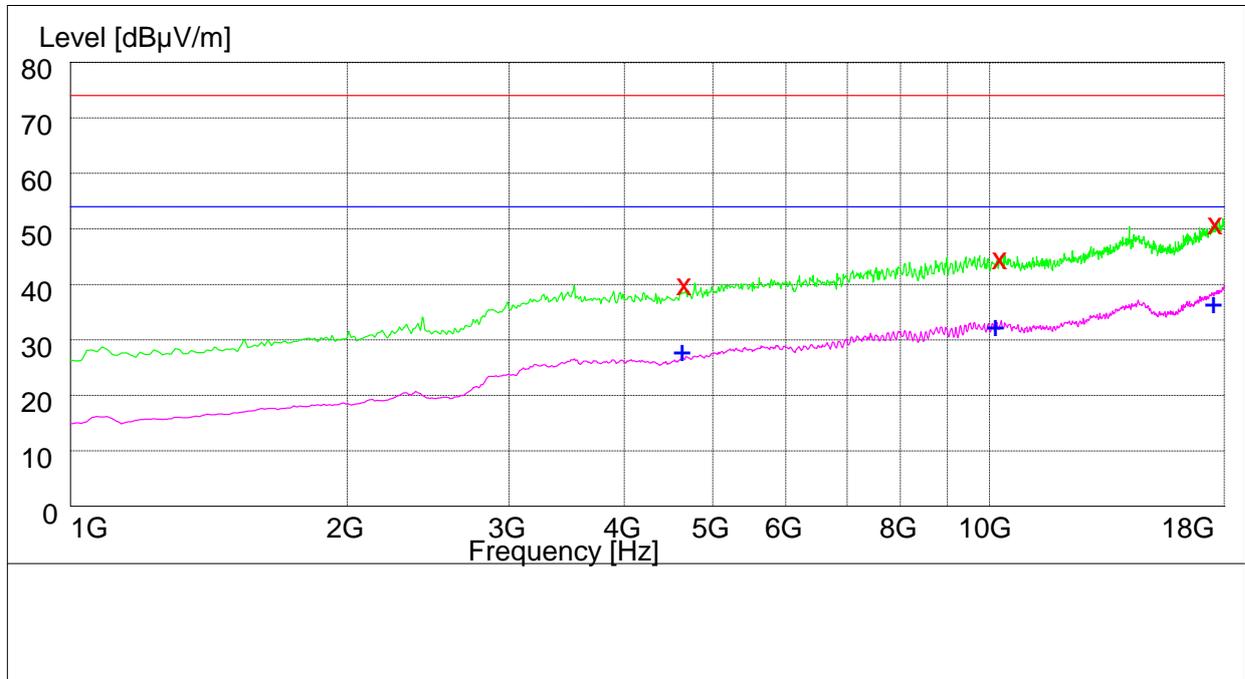
Channel 40 30MHz to 1GHz



| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 38.400000 | 21.90 | 13.1 | 40.0 | 18.1 | 142.0 | 130.00 | VERTICAL |
| 53.500000 | 20.00 | 12.7 | 40.0 | 20.0 | 135.0 | 232.00 | HORIZONTAL |
| 79.900000 | 15.40 | 8.3 | 40.0 | 24.6 | 100.0 | 144.00 | HORIZONTAL |
| 303.500000 | 20.20 | 15.6 | 46.0 | 25.8 | 150.0 | 258.00 | VERTICAL |
| 926.100000 | 29.90 | 26.4 | 46.0 | 16.1 | 120.0 | 58.00 | HORIZONTAL |
| 979.200000 | 30.60 | 26.9 | 54.0 | 23.4 | 110.0 | 51.00 | HORIZONTAL |



1GHz to 18GHz



Note: Signal suppressed with a 2.4 GHz band rejection filter

MEASUREMENT RESULT: PK Detector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 4883.000000 | 39.80 | -3.5 | 74.0 | 44.2 | 125.0 | 152.00 | VERTICAL |
| 10654.500000 | 45.20 | 6.6 | 74.0 | 28.8 | 140.0 | 129.00 | HORIZONTAL |
| 17825.100000 | 52.40 | 18.7 | 74.0 | 21.6 | 123.0 | 211.00 | VERTICAL |

MEASUREMENT RESULT: AVDetector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 4882.500000 | 27.80 | -3.5 | 54.0 | 26.2 | 110.0 | 152.00 | VERTICAL |
| 10470.500000 | 32.20 | 6.1 | 54.0 | 21.8 | 123.0 | 124.00 | VERTICAL |
| 17987.000000 | 39.60 | 19.4 | 54.0 | 14.4 | 108.0 | 318.00 | HORIZONTAL |

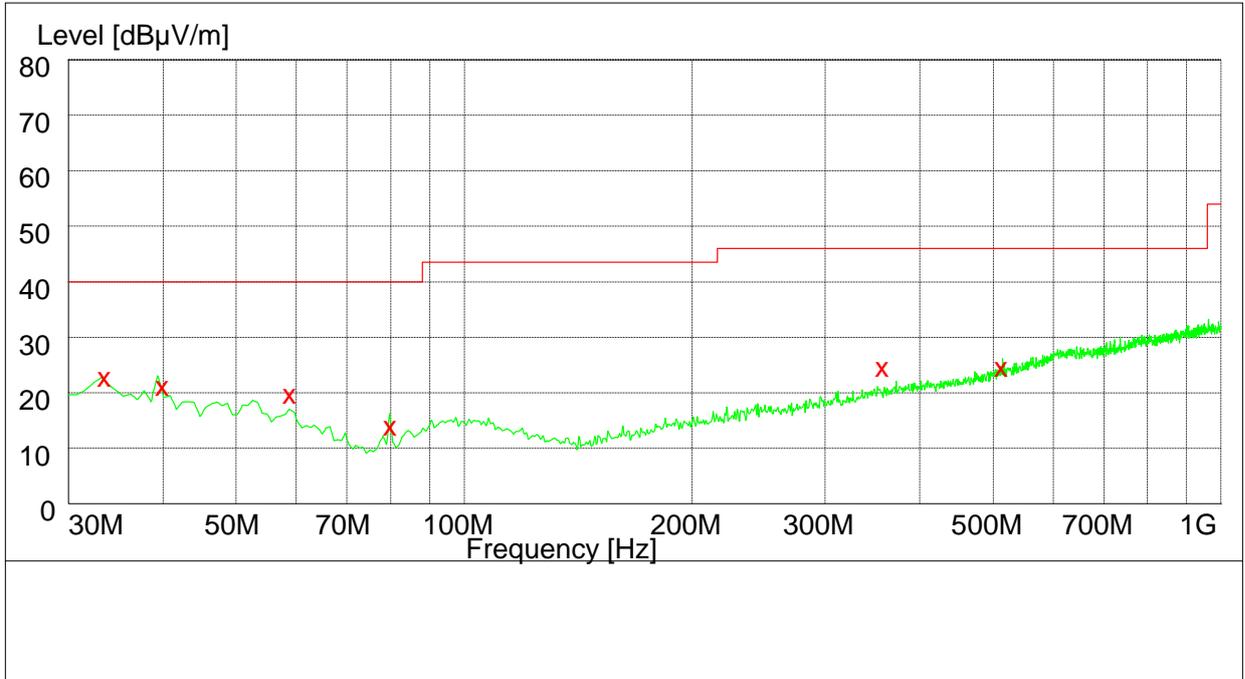


18GHz to 26GHz

Note: No peak found in pre- test.



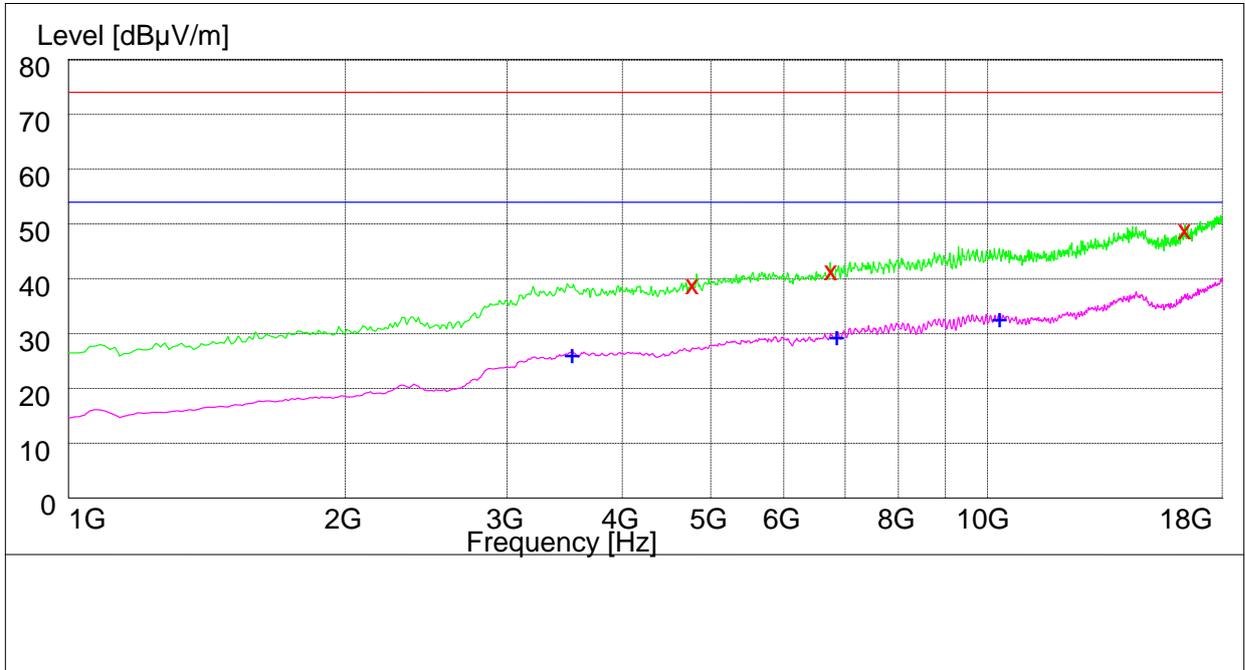
Channel 78 30MHz to 1GHz



| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 33.500000 | 20.80 | 11.7 | 40.0 | 19.2 | 125.0 | 214.00 | VERTICAL |
| 42.020000 | 21.40 | 13.1 | 40.0 | 18.6 | 100.0 | 149.00 | HORIZONTAL |
| 58.020000 | 12.90 | 12.4 | 40.0 | 27.1 | 123.0 | 250.00 | VERTICAL |
| 80.020000 | 14.20 | 8.3 | 40.0 | 25.8 | 140.0 | 120.00 | HORIZONTAL |
| 373.080000 | 22.50 | 17.5 | 46.0 | 23.5 | 127.0 | 250.00 | VERTICAL |
| 515.580000 | 22.90 | 20.6 | 46.0 | 23.1 | 122.0 | 230.00 | HORIZONTAL |



1GHz to 18GHz



Note: Signal suppressed with a 2.4 GHz band rejection filter

MEASUREMENT RESULT: PK Detector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 4825.100000 | 39.70 | -3.6 | 74.0 | 34.3 | 151.0 | 343.00 | HORIZONTAL |
| 6738.200000 | 41.70 | 0.6 | 74.0 | 32.3 | 104.0 | 190.00 | VERTICAL |
| 16390.500000 | 50.20 | 15.9 | 74.0 | 23.8 | 121.0 | 123.00 | VERTICAL |

MEASUREMENT RESULT: AV Detector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 3531.200000 | 26.40 | -5.1 | 54.0 | 27.6 | 110.0 | 185.00 | VERTICAL |
| 6844.200000 | 29.40 | 0.9 | 54.0 | 24.6 | 124.0 | 152.00 | VERTICAL |
| 10301.500000 | 33.00 | 7.0 | 54.0 | 21.0 | 151.0 | 159.00 | VERTICAL |

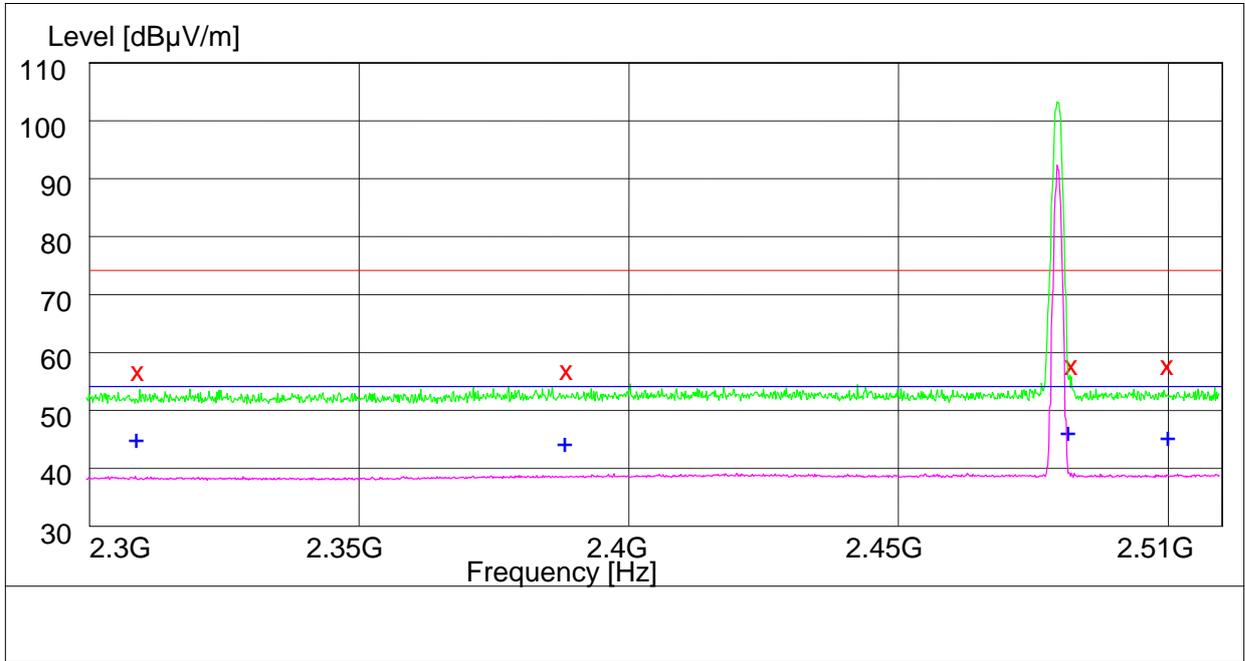


18GHz to 26GHz

Note: No peak found in pre- test.



2.30GHz to 2.51GHz



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 |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 2310.000000 | 58.80 | 33.3 | 74.0 | 15.2 | 140.0 | 179.00 | VERTICAL |
| 2390.000000 | 58.30 | 33.5 | 74.0 | 15.7 | 152.0 | 301.00 | VERTICAL |
| 2483.500000 | 59.00 | 33.7 | 74.0 | 15.0 | 182.0 | 36.00 | VERTICAL |
| 2500.000000 | 59.10 | 33.8 | 74.0 | 14.9 | 170.0 | 257.00 | HORIZONTAL |

MEASUREMENT RESULT: AVDetector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 2310.000000 | 44.40 | 33.3 | 54.0 | 9.6 | 195.0 | 315.00 | VERTICAL |
| 2390.000000 | 45.30 | 33.5 | 54.0 | 8.7 | 187.0 | 121.00 | HORIZONTAL |
| 2483.500000 | 46.20 | 33.8 | 54.0 | 7.8 | 175.0 | 233.00 | HORIZONTAL |
| 2500.000000 | 46.50 | 33.8 | 54.0 | 7.5 | 200.0 | 98.00 | HORIZONTAL |



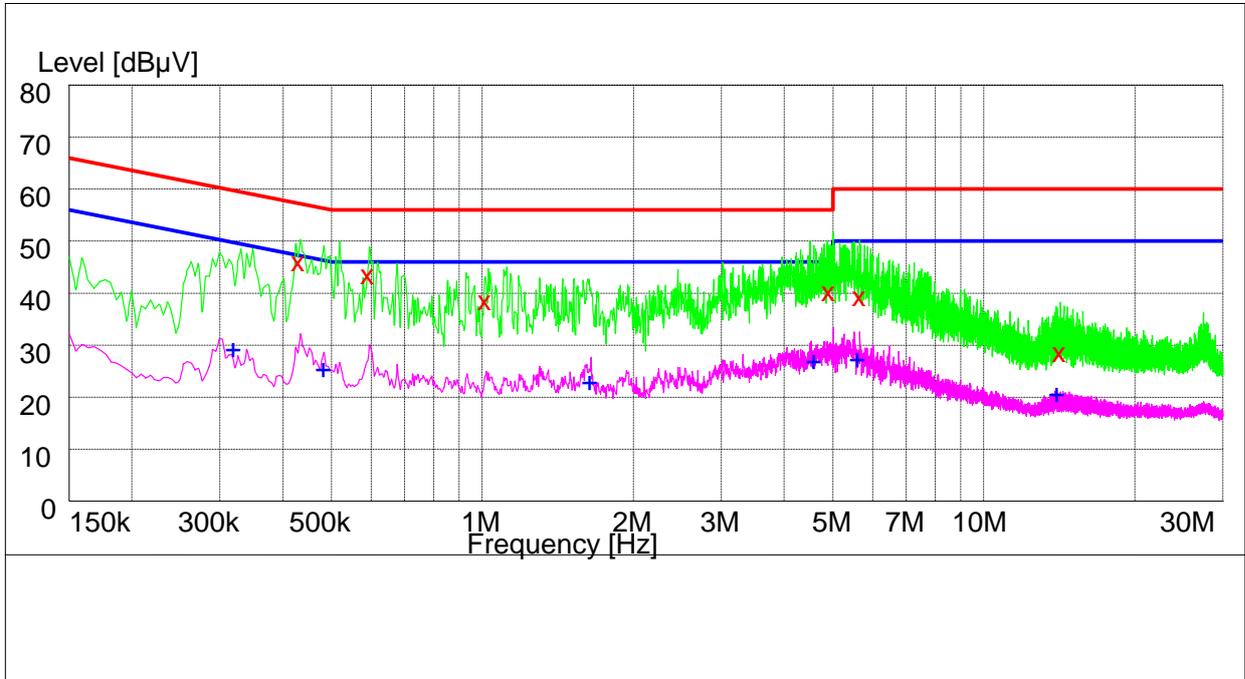
Appendix I

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 |
|---------------|------------|-----------|------------|-----------|------|-----|
| 0.430000 | 46.10 | 10.0 | 57 | 10.9 | N | FLO |
| 0.592000 | 45.10 | 10.1 | 56 | 10.9 | N | FLO |
| 1.014000 | 40.10 | 10.1 | 56 | 15.9 | N | FLO |
| 4.902000 | 40.40 | 10.2 | 56 | 15.6 | N | FLO |
| 5.652000 | 39.30 | 10.2 | 60 | 20.7 | N | FLO |
| 14.180000 | 28.20 | 10.3 | 60 | 31.8 | N | FLO |

MEASUREMENT RESULT: AV Detector

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Line | PE |
|---------------|------------|-----------|------------|-----------|------|-----|
| 0.318000 | 29.80 | 10.0 | 50 | 20.2 | N | FLO |
| 0.480000 | 27.00 | 10.1 | 46 | 19.3 | N | FLO |
| 1.634000 | 24.70 | 10.1 | 46 | 21.3 | N | FLO |
| 4.586000 | 28.60 | 10.2 | 46 | 17.4 | N | FLO |
| 5.588000 | 29.10 | 10.2 | 50 | 20.9 | N | FLO |
| 13.940000 | 20.30 | 10.3 | 50 | 29.7 | N | FLO |