FCC PART 15 SUBPART C
IC RSS-210, ISSUE 8, DEC 2010

TEST AND MEASUREMENT REPORT

For

NVIDIA Corporation

2701 San Tomas Expressway, Santa Clara, CA 95050, USA

FCC ID: VOB-P1761W
IC: 7361A-P1761W

Report Type: Original Report	**Product Type:** 802.11a/b/g/n WLAN+BT Combo Radio Tablet PC	
Prepared By	Cipher Chu	
Report Number	R1405121-247 DSS Rev A	
Report Date	2014-07-11	
Reviewed By	Suhaila Khushzad Engineering Manager	
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1405121-247 DSS	Original Report	2014-06-16
1	R1405121-247 DSS Rev A	Revised Report	2014-07-11

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report has been compiled on behalf of NVIDIA Corporation, and their product, FCC ID: VOB-P1761W, IC: 7361A-P1761W, model number: P1761W, which henceforth is referred to as the EUT (Equipment Under Test), The EUT is a Tablet PC operates in 2.4 GHz and 5 GHz bands.

1.2 Mechanical Description of EUT

The EUT measures approximately 218 mm (L) x 123 mm (W) x 8 mm (H) and weighs approximately 350 g.

The data gathered are from a typical production sample provided by the manufacturer with serial number: 0411414000303

1.3 Objective

This report is prepared on behalf of *NVIDIA Corporation* in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commission's rules and IC RSS-210 Issue 8, Dec 2010.

The objective is to determine compliance with FCC Part 15.247 and IC RSS-210 rules.

1.4 Related Submittal(s)/Grant(s)

N/A.

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR16-4-2:2011, The Treatment of Uncertainty in EMC Measurements, the values ranging from $\pm$2.0 dB for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

1.7 Test Facility

Bay area compliance Laboratories Corp. (BACL) is:
1- An independent Commercial Test Laboratory accredited to **ISO 17025: 2005** by **A2LA**, in the fields of: Electromagnetic Compatibility & Telecommunications covering Emissions, Immunity, Radio, RF Exposure, Safety and Telecom. This includes NEBS (Network Equipment Building System), Wireless RF, Telecommunications Terminal Equipment (TTE); Network Equipment; Information Technology Equipment (ITE); Medical Electrical Equipment; Industrial, Commercial, and Medical Test Equipment; Professional Audio and Video Equipment; Electronic (Digital) Products; Industrial and Scientific Instruments; Cabled Distribution Systems and Energy Efficiency Lighting.

2- An ENERGY STAR Recognized Laboratory, for the LM80 Testing, a wide variety of Luminares and Computers.

3- A NIST Designated Phase-I and Phase-II CAB including: ACMA (Australian Communication and Media Authority), BSMI (Bureau of Standards, Metrology and Inspection of Taiwan), IDA (Infocomm Development Authority of Singapore), IC(Industry Canada), Korea (Ministry of Communications Radio Research Laboratory), NCC (Formerly DGT; Directorate General of Telecommunication of Chinese Taipei) OFTA (Office of the Telecommunications Authority of Hong Kong), Vietnam, VCCI - Voluntary Control Council for Interference of Japan and a designated EU CAB (Conformity Assessment Body) (Notified Body) for the EMC and R&TTE Directives.

4- A Product Certification Body accredited to **ISO Guide 65:1996** by **A2LA** to certify:
1- Unlicensed, Licensed radio frequency devices and Telephone Terminal Equipment for the FCC. Scope A1, A2, A3, A4, B1, B2, B3, B4 & C.
2. Radio Standards Specifications (RSS) in the Category I Equipment Standards List and All Broadcasting Technical Standards (BETS) in Category I Equipment Standards List for Industry Canada.
3. Radio Communication Equipment for Singapore.
4. Radio Equipment Specifications, GMDSS Marine Radio Equipment Specifications, and Fixed Network Equipment Specifications for Hong Kong.
5. Japan MIC Telecommunication Business Law (A1, A2) and Radio Law (B1, B2 and B3).
6. Audio/Video, Battery Charging Systems, Computers, Displays, Enterprise Servers, Imaging Equipment, Set-Top Boxes, Telephony, Televisions, Ceiling Fans, CFLs (Including GU24s),Decorative Light Strings, Integral LED Lamps, Luminaires, Residential Ventilating Fans.

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2009, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is an American Association for Laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at

http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.4-2009.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

2.2 EUT Exercise Software

The software "Android Debug Bridge version 1.0.31" is provided by customer. The EUT exercise program used during testing was designed to exercise the system components.

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 Local Support Equipment

Manufacturer	Description	Model No.	Serial No.
DELL	Monitor	U2410f FP63	-
-	Headset	-	-

2.5 EUT Internal Configuration Details

Manufacturer	Description	Type	Serial Number
NVIDIA	Main PCB Board	P1761	-
Yuko	Battery	027-0021-000	-

2.6 Power Supply and Line Filters

Manufacturer	Description	Model	Part Number
NVIDIA Corporation	Power Adapter	Switching Power Adapter	SPA011AU5W2

2.7 Interface Ports and Cabling

Cable Description	Length (m)	To	From
HDMI	1.5	Monitor	EUT
USB Cable	1.5	Adapter	EUT

3 Summary of Test Results

FCC & IC Rules	Description of Test	Results
FCC §15.247(i), §2.1093 IC RSS-102	RF Exposure	Compliant
FCC §15.203 IC RSS-Gen §7.1.2	Antenna Requirements	Compliant
FCC §15.207 (a) IC RSS-Gen §7.2.4	AC Line Conducted Emissions	Compliant
FCC §15.247(d) IC RSS-210 §A8.5	Spurious Emissions at Antenna Port	Compliant
FCC §15.205, §15.209, §15.247(d) IC RSS-210 §2.2, §A8.5	Restricted Bands, Spurious Radiated Emissions	Compliant
FCC §15.247 (a)(1) IC RSS-210 §A8.1	20 dB Channel Bandwidth	Compliant
FCC §15.247(a) IC RSS-210 §A8.4	Maximum Peak Output Power	Compliant
FCC §15.247(d) IC RSS-210 §A8.5	Band Edge	Compliant
FCC §15.247 (a)(1) IC RSS-210 §A8.1(b)	Hopping Channel Separation	Compliant
FCC §15.247 (a)(1) IC RSS-210 §A8.1(d)	Dwell Time	Compliant
FCC §15.247(b)(1) IC RSS-210 §A8.1	Number of Hopping Channels	Compliant

4 FCC §15.247(i), §2.1093 & IC RSS-102 – RF Exposure

4.1 Applicable Standard

FCC §2.1093, §15.247(i) and IC RSS-102

4.2 Test Result

Compliance, please refer to the SAR report: R1405121-SAR.

5 FCC §15.203 & IC RSS-Gen §7.1.2 – Antenna Requirements

5.1 Applicable Standard

According to FCC §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to IC RSS-Gen §7.1.2: A transmitter can only be sold or operated with antennas with which it was approved. Transmitter may be approved with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest gain antenna of each combination of transmitter and antenna type for which approval is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type having equal or lesser gain as an antenna that had been successfully tested with the transmitter, will also be considered approved with the transmitter, and may be used and marketed with the transmitter. For Category I transmitters, the manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. For transmitters of RF output power of 10 milliwatts or less, only the portion of the antenna gain that is in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power to demonstrate compliance with the radiated power limits specified in the applicable standard. For transmitters of output power greater than 10 milliwatts, the total antenna gain shall be added to the measured RF output power to demonstrate compliance to the specified radiated power limits.

5.2 Antenna Description

The antenna consists of non-standard (UFL) connectors with 1.6 dBi gain for Bluetooth; Antenna gain that exceeds 6 dBi was added to RF measurement therefore, it complies with the antenna requirement. Please refer to the internal photos.

6 FCC §15.207 & IC RSS-Gen §7.2.4 - Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207 and IC RSS-Gen §7.2.4 Conducted limits:

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 Note 1	56 to 46 Note 1
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency.

6.2 Test Setup

The measurement was performed in a P2450ed room. The test setup and measurement procedure was per ANSI C63.4-2009. The specification limits were in accordance with FCC §15.207 and IC RSS-Gen §7.2.4.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

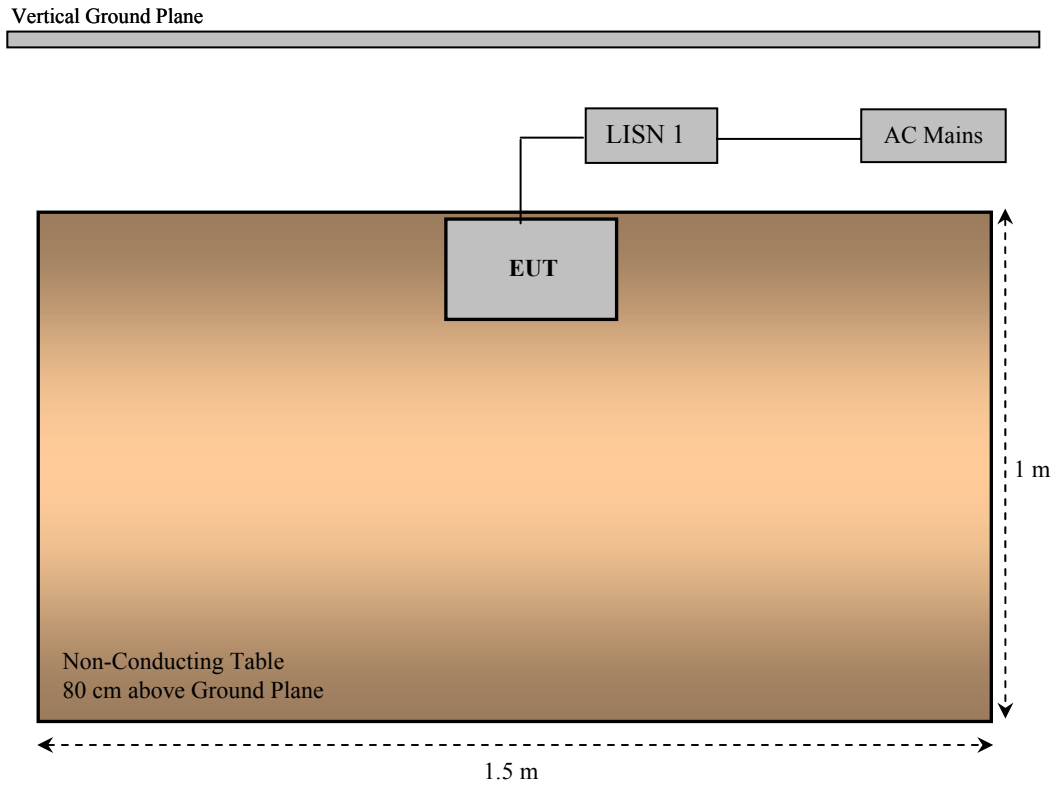
6.3 Test Procedure

During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-1.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with a “QP.” Average readings are distinguished with an “Ave”.

6.4 Test Setup Block Diagram



6.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Cable Loss (CL) plus the High Pass Filter/Attenuator value (HA) and subtracting the Amplifier Gain (Ga) to the indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + CL + HA – Ga

For example, a corrected amplitude (CA) of 36 dBuV = Indicated Amplitude reading (Ai) of 50.0 dBuV + Cable Loss (CL) 1.0 dB + High Pass Filter/Attenuator (IA) 5 dB - Amplifier Gain (Ga) 20 dB

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin (dB) = Corrected Amplitude (dBuV) - Limit (dBuV)

6.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2013-09-28	1 year
Solar Electronics	LISN	9252-50-R-24-N	511205	2013-06-25	1 year
TTE	Filter, High Pass	H962-150k-50-21378	K7133	2014-01-30	1 year

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.

6.7 Test Environmental Conditions

Temperature:	24º C
Relative Humidity:	41 %
ATM Pressure:	103.17 KPa

The testing was performed by Cipher Chu on 2014-05-19 in 5m chamber3.

6.8 Summary of Test Results

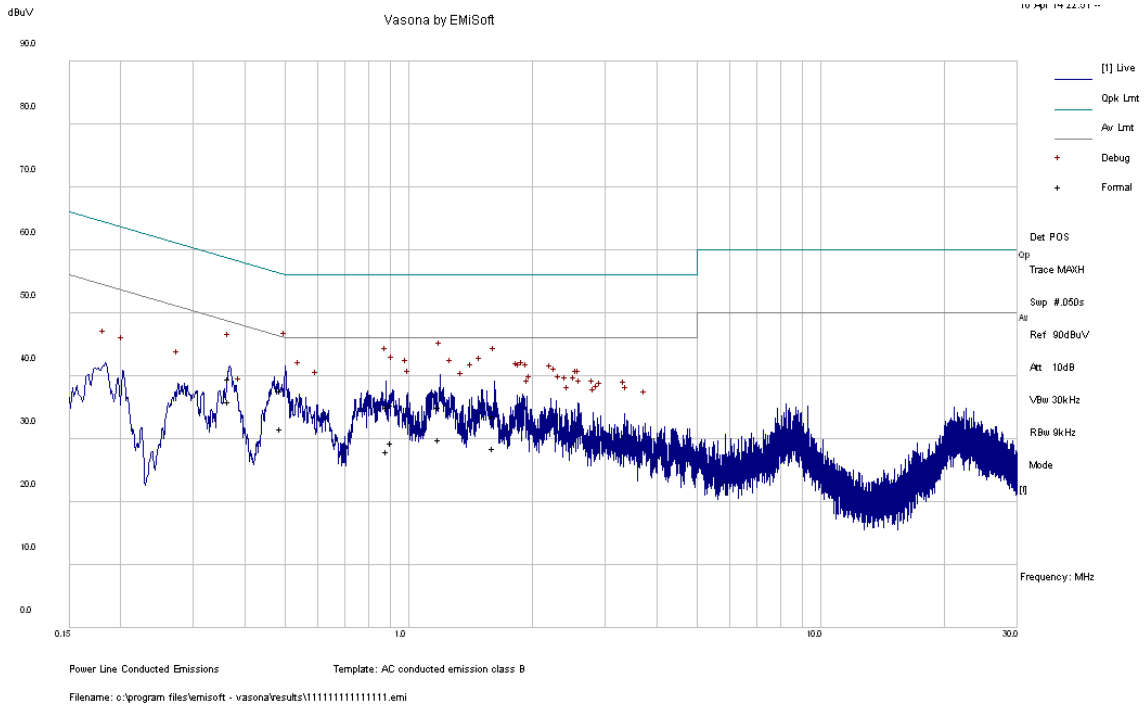
According to the recorded data in following table, the EUT complied with the FCC and IC standards' conducted emissions limits, with a worst case margin of:

Transmitting Mode Worst Case GFSK Middle Channel

Connection: 120V/60Hz			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-12.59	0.367137	Line	0.15-30

6.9 Conducted Emissions Test Plots and Data

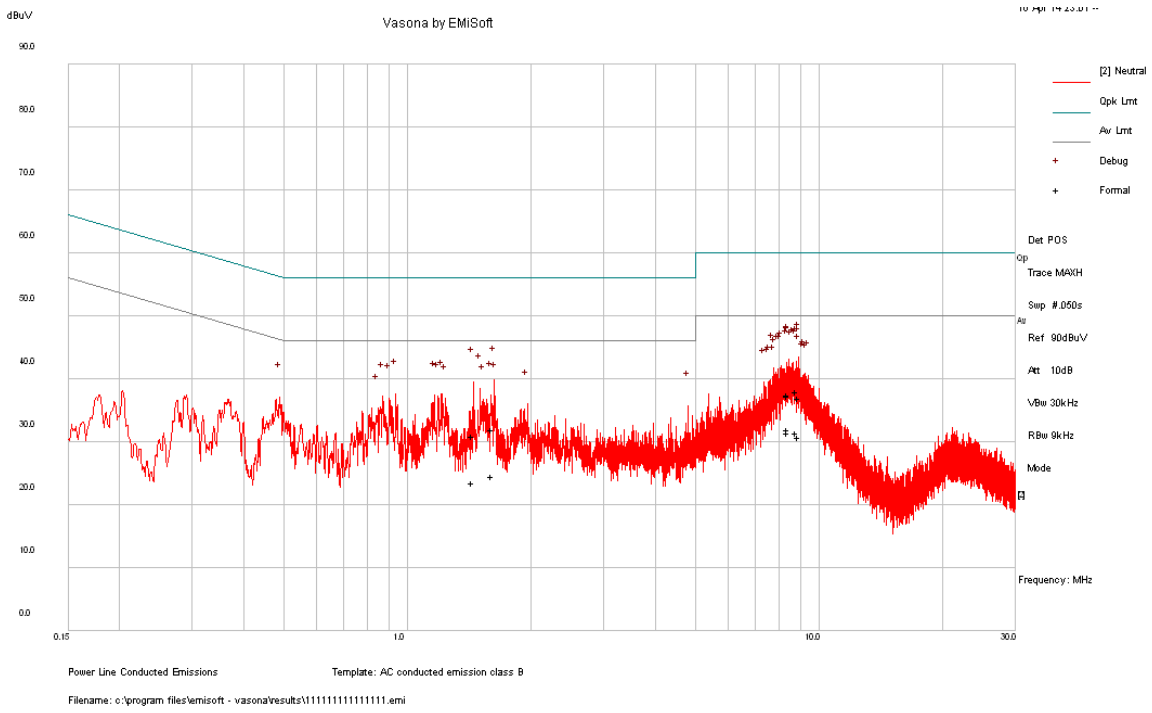
BT: GFSK, Middle Channel – 120 V, 60 Hz Line



Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (L/N)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave)
0.489288	37.65	L	56.18	-18.53	QP
0.367137	39.61	L	58.57	-18.96	QP
0.911082	35.51	L	56	-20.49	QP
1.189047	35.12	L	56	-20.88	QP
0.889251	35.12	L	56	-20.88	QP
1.602786	33.69	L	56	-22.31	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (L/N)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave)
0.367137	35.97	L	48.57	-12.59	Ave.
0.489288	31.72	L	46.18	-14.46	Ave.
1.189047	29.88	L	46	-16.12	Ave.
0.911082	29.33	L	46	-16.67	Ave.
1.602786	28.54	L	46	-17.46	Ave.
0.889251	28.04	L	46	-17.96	Ave.

BT: GFSK, Middle Channel – 120 V, 60 Hz Neutral



Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (L/N)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave)
8.821894	38.02	N	60	-21.98	QP
8.421657	37.45	N	60	-22.55	QP
8.407557	37.38	N	60	-22.62	QP
8.90401	36.95	N	60	-23.05	QP
1.609743	31.98	N	56	-24.02	QP
1.440327	30.91	N	56	-25.09	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (L/N)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave)
8.407557	32.04	N	50	-17.96	Ave.
8.421657	31.53	N	50	-18.47	Ave.
8.821894	31.4	N	50	-18.60	Ave.
8.90401	30.7	N	50	-19.30	Ave.
1.609743	24.55	N	46	-21.45	Ave.
1.440327	23.54	N	46	-22.46	Ave.

7 FCC §15.247(d) & IC RSS-210 §A8.5 - Spurious Emissions at Antenna Terminals

7.1 Applicable Standards

For FCC §15.247(d) and IC RSS-210 §A8.5 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.

7.2 Measurement Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-10-16	1 year

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

7.4 Test Environmental Conditions

Temperature:	24º C
Relative Humidity:	41 %
ATM Pressure:	103.17KPa

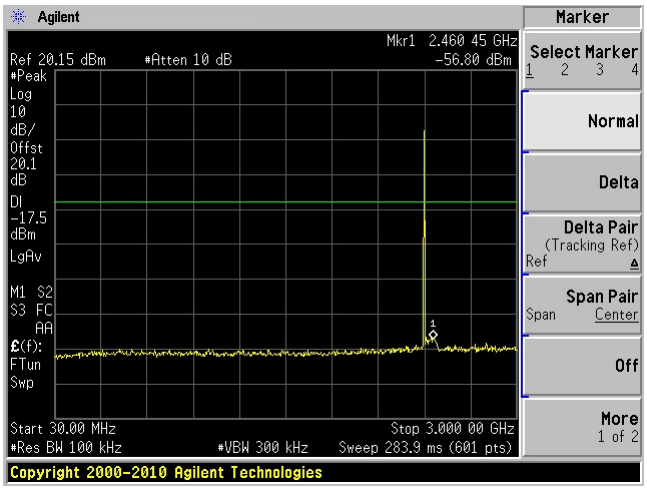
The testing was performed by Cipher Chu on 2014-05-19 in 5m chamber3.

7.5 Test Results

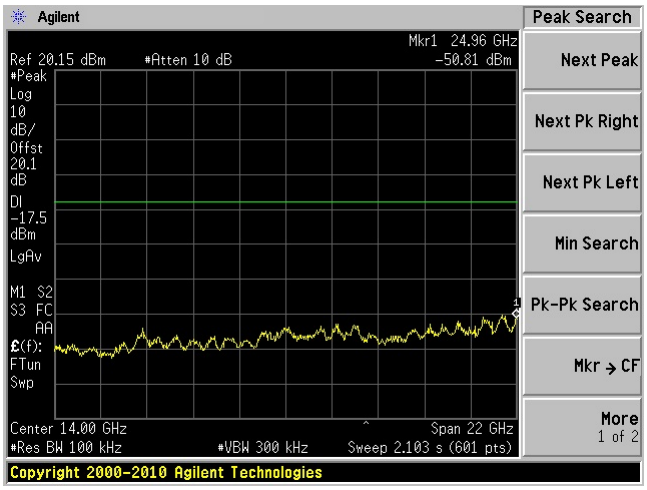
Please refer to the following plots.

GFSK, Low Channel 2402 MHz

30 MHz – 3 GHz

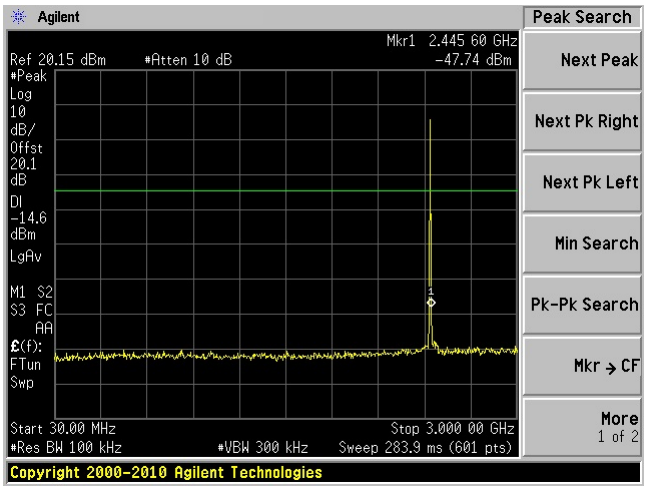


3 – 25 GHz

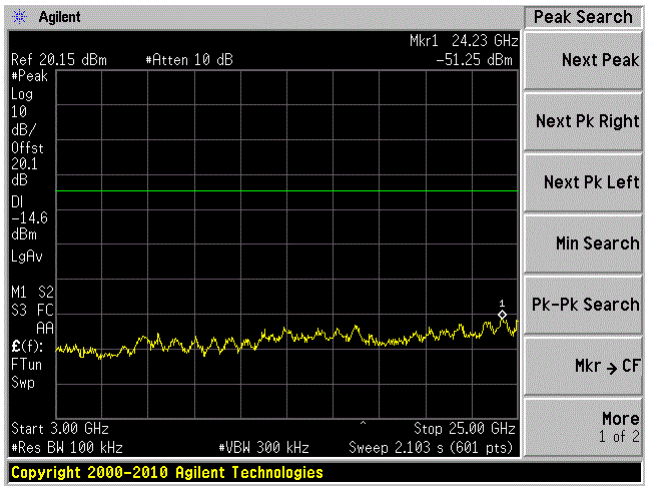


GFSK, Middle Channel 2441 MHz

30 MHz – 3 GHz

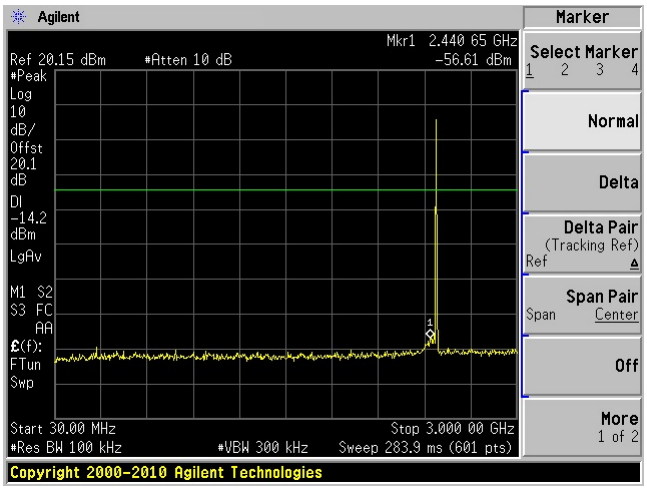


3 – 25 GHz

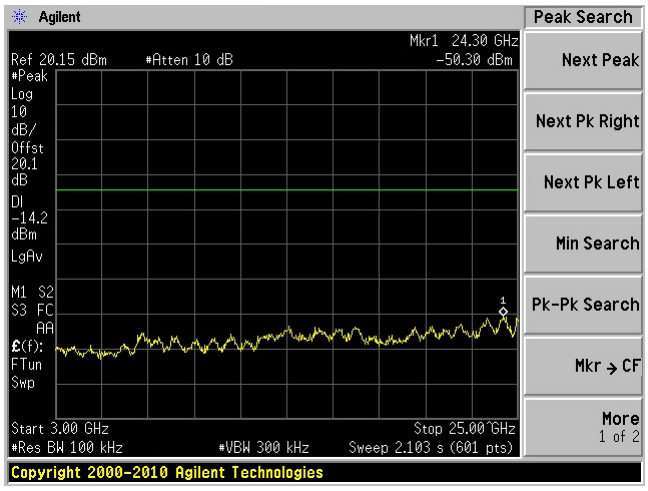


GFSK, High Channel 2480 MHz

30 MHz – 3 GHz

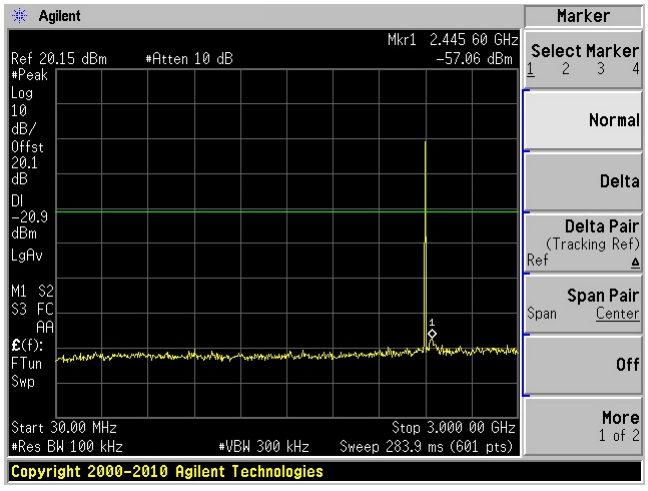


3 – 25GHz

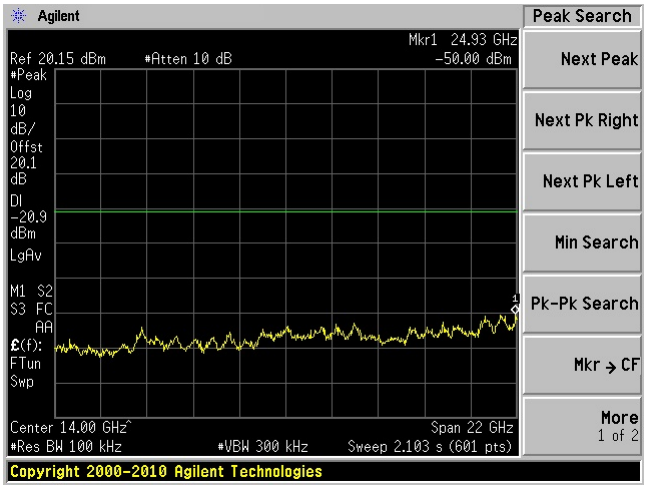


π/4-DQPSK, Low Channel 2402 MHz

30 MHz – 3 GHz

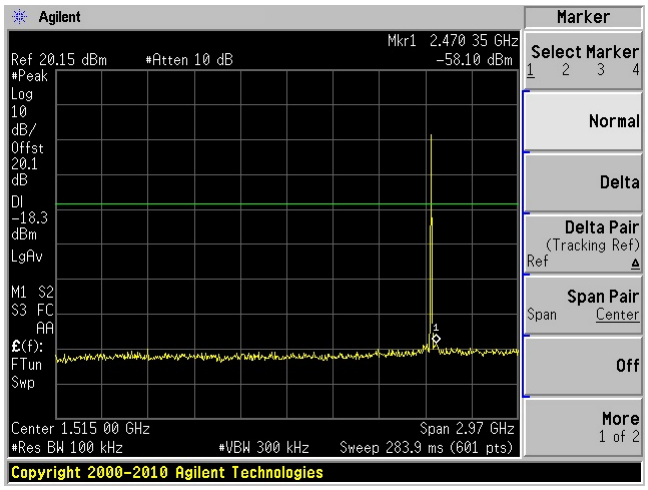


3 – 25 GHz

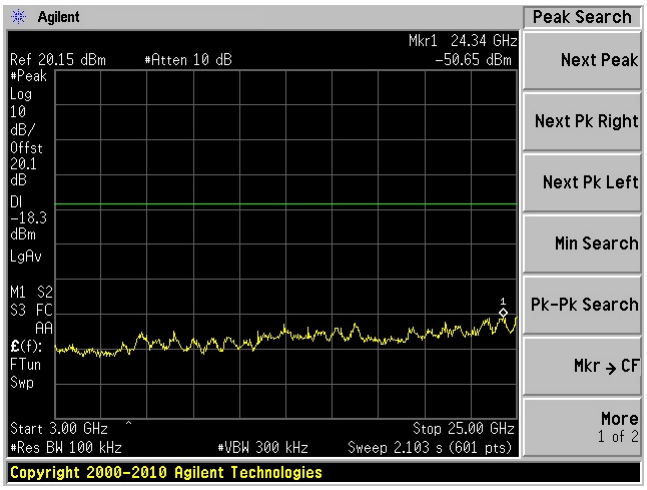


π/4-DQPSK, Middle Channel 2441 MHz

30 MHz – 3 GHz

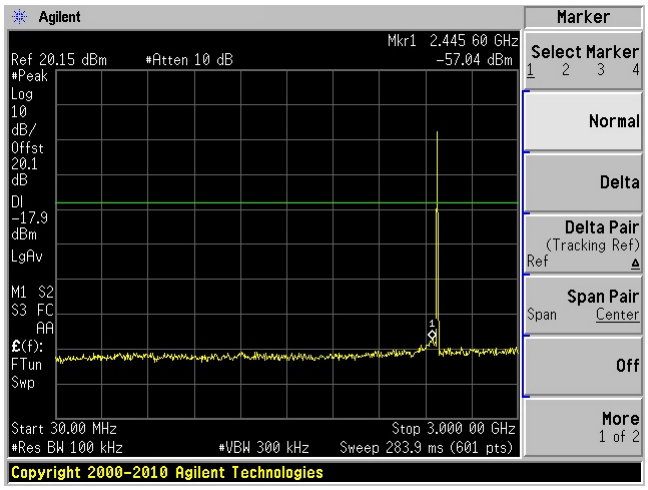


3 – 25 GHz

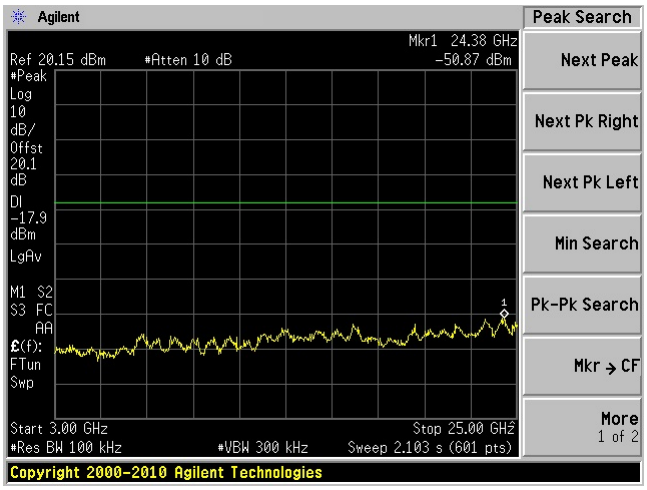


π/4-DQPSK, High Channel 2480 MHz

30 MHz – 3 GHz

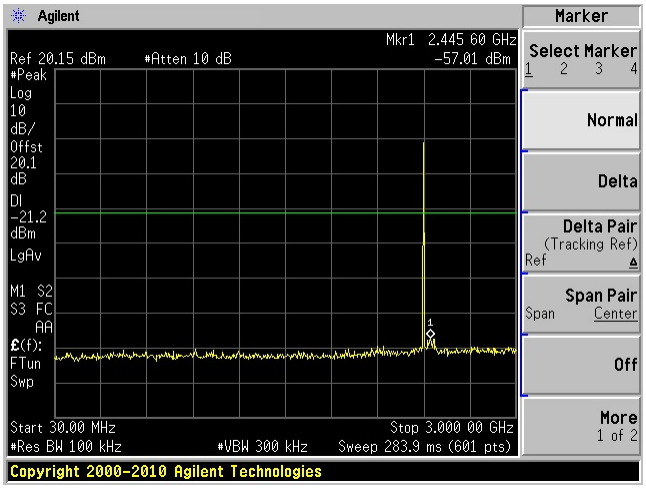


3 – 25 GHz

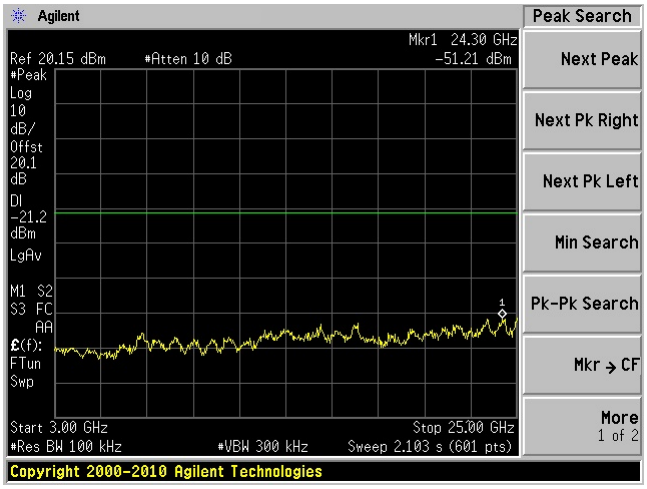


8DPSK, Low Channel 2402 MHz

30 MHz – 3 GHz

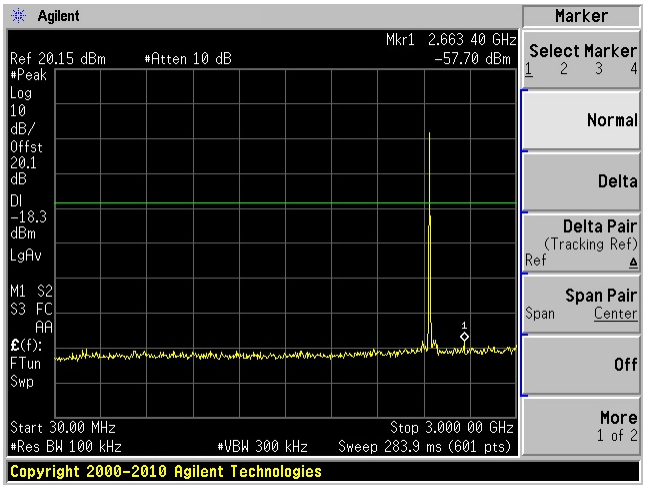


3 – 25 GHz

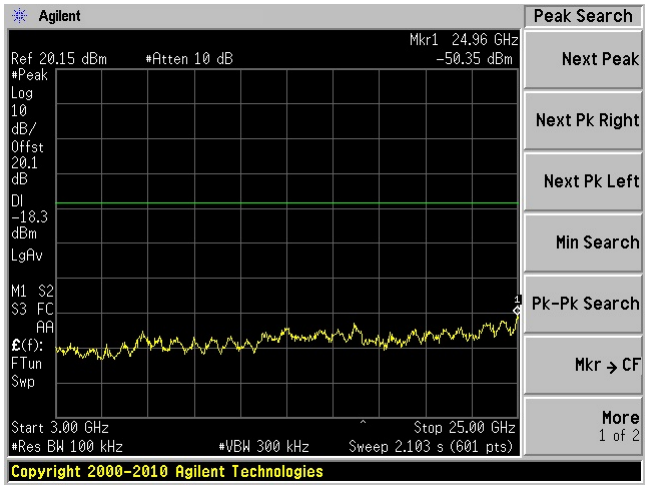


8DPSK, Middle Channel 2441 MHz

30 MHz – 3 GHz

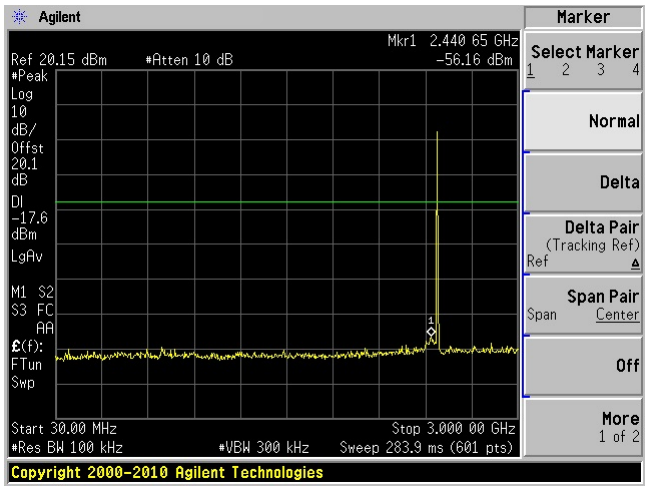


3 – 25 GHz

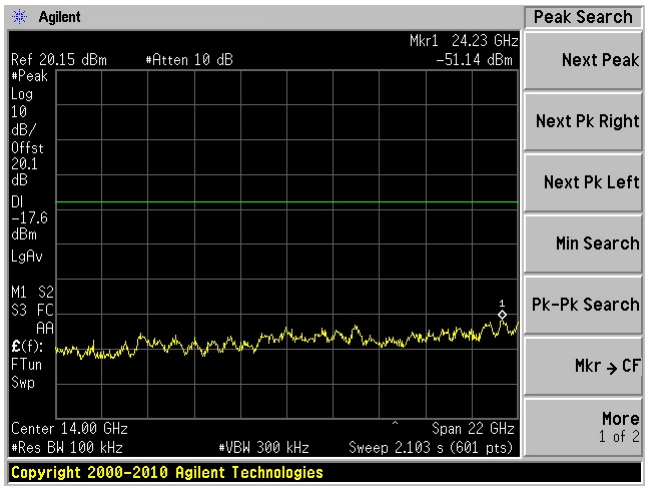


8DPSK, High Channel 2480 MHz

30 MHz – 3 GHz



3 – 25GHz



8 FCC §15.205, §15.209 & §15.247(d) & IC RSS-210 §A8.5 - Spurious Radiated Emissions

8.1 Applicable Standards

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As per FCC §15.209(a) and RSS-210: Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 Note 2	3
88 - 216	150 Note 2	3
216 - 960	200 Note 2	3
Above 960	500	3

Note 2: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	960 – 1240	4. 5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5. 35 – 5. 46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 –167.17	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3 3458 – 3 358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As per FCC §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 §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

As per IC RSS-210 §A8.5, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section A8.4 (4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

8.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.4-2009. The specification used was the FCC 15C and IC RSS-210 limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

8.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

8.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to the indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, the Corrected Amplitude (CA) of 40.3 dBuV/m = indicated Amplitude reading (Ai) 32.5 dBuV + Antenna Factor (AF) 23.5dB + Cable Loss (CL) 3.7 dB + Attenuator (Atten) 10 dB - Amplifier Gain (Ga) 29.4 dB

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin (dB) = Corrected Amplitude (dBuV/m) - Limit (dBuV/m)

8.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2013-09-28	1 year
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-10-16	1 year
Sunol Science Corp	System Controller	SC99V	011003-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2013-09-18	1 year
EMCO	Horn Antenna	3115	9511-4627	2013-10-17	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A10187	2013-08-08	1 year
Mini-Circuits	Pre-amplifier	ZVA-183-S	570400946	2013-07-09	1 year

Statement of Traceability: BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.

8.6 Test Environmental Conditions

Temperature:	24º C
Relative Humidity:	41 %
ATM Pressure:	103.17 KPa

The testing was performed by Cipher Chu on 2014-05-19 in 5m chamber3.

8.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15C and IC RSS-210 standard's radiated emissions limits, and had a worst case margin of:

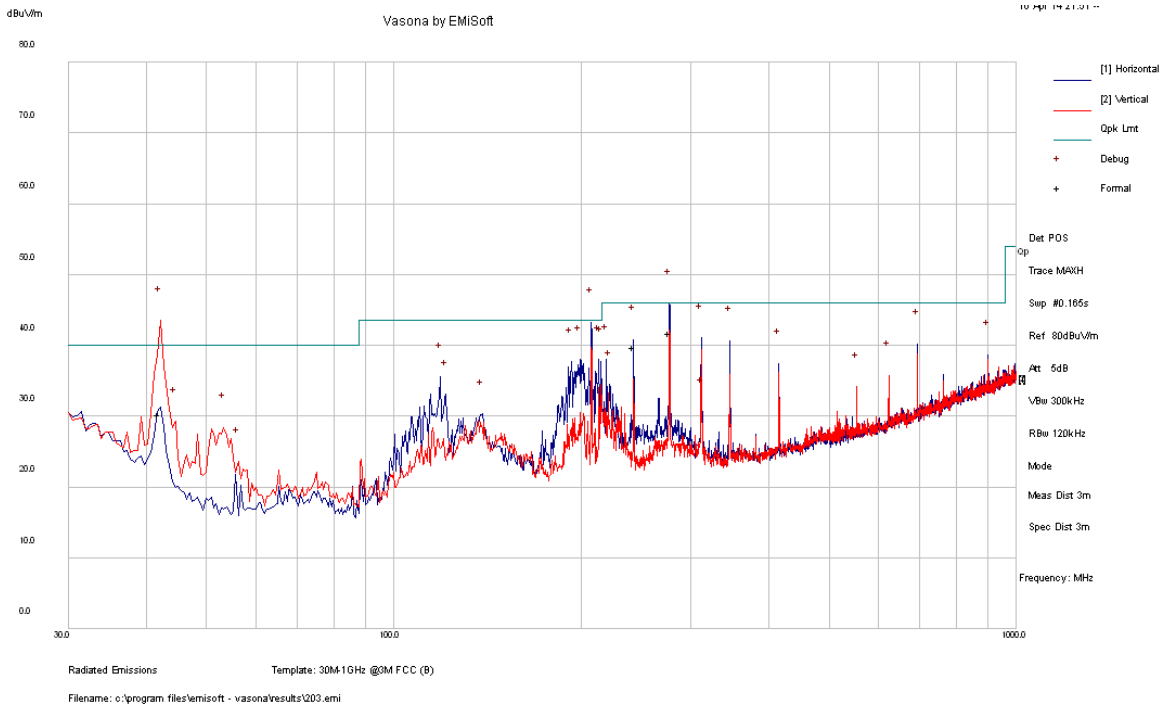
Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Worst Channel, Range**
-4.18	277.1063	Horizontal	GFSK Middle Channel 30 MHz-1 GHz

Please refer to the following table and plots for specific test result details.

8.8 Radiated Emissions Test Data and Plots

GFSK

30 MHz - 1 GHz



Frequency MHz	Cord. Reading (dBµV/m)	Measurement Type	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
277.1063	41.82	QP	H	111	79	46	-4.18
242.4998	39.76	QP	H	117	108	46	-6.24
41.944	30.26	QP	V	138	12	40	-9.74

1–25 GHz (Pretest all mode, the BDR mode was the worst)

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2402 MHz											
2402	76.9	167	100	V	28.556	2.94	-	108.396	-	-	Fund/Peak
2402	76.15	63	100	H	28.556	2.94	-	107.646	-	-	Fund/ Peak
2402	76.54	167	100	V	28.556	2.94	-	108.036	-	-	Fund/ Ave
2402	75.84	63	100	H	28.556	2.94	-	107.336	-	-	Fund/Ave
2390	27.27	0	100	V	28.556	2.87	-	58.696	74	-15.304	Spur/Peak
2390	26.91	0	100	H	28.556	2.87	-	58.336	74	-15.664	Spur/ Peak
2390	12.42	0	100	V	28.556	2.87	-	43.846	54	-10.154	Spur/ Ave
2390	12.34	0	100	H	28.556	2.87	-	43.766	54	-10.234	Spur/Ave
4804	46.69	0	100	V	33.79	4.06	36.5	48.04	74	-25.96	Harm/Peak
4804	45.35	0	100	H	33.79	4.06	36.5	46.7	74	-27.3	Harm/Peak
4804	32.15	0	100	V	33.79	4.06	36.5	33.5	54	-20.5	Harm/Ave
4804	32.21	0	100	H	33.79	4.06	36.5	33.56	54	-20.44	Harm/Ave
7206	45.5	0	100	V	37.97	4.93	36.7	51.7	88.396	-36.696	Harm/Peak
7206	46.01	0	100	H	37.97	4.93	36.7	52.21	87.646	-35.436	Harm/Peak
7206	31.1	0	100	V	37.97	4.93	36.7	37.3	88.036	-50.736	Harm/Ave
7206	31.04	0	100	H	37.97	4.93	36.7	37.24	87.336	-50.096	Harm/Ave
9608	44.82	0	100	V	38.37	5.82	36.9	52.11	88.396	-36.286	Harm/Peak
9608	45.1	0	100	H	38.37	5.82	36.9	52.39	87.646	-35.256	Harm/Peak
9608	30.62	0	100	V	38.37	5.82	36.9	37.91	88.036	-50.126	Harm/Ave
9608	30.64	0	100	H	38.37	5.82	36.9	37.93	87.336	-49.406	Harm/Ave

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Middle Channel 2441 MHz											
2441	77.08	157	100	V	28.556	2.94	-	108.576	-	-	Fund/Peak
2441	77.01	64	100	H	28.556	2.94	-	108.506	-	-	Fund/ Peak
2441	76.65	157	100	V	28.556	2.94	-	108.146	-	-	Fund/ Ave
2441	76.67	64	100	H	28.556	2.94	-	108.166	-	-	Fund/Ave
4882	46.57	0	100	V	33.79	4.06	36.5	47.92	74	-26.08	Harm/Peak
4882	46.18	0	100	H	33.79	4.06	36.5	47.53	74	-26.47	Harm/Peak
4882	32.26	0	100	V	33.79	4.06	36.5	33.61	54	-20.39	Harm/Ave
4882	31.42	0	100	H	33.79	4.06	36.5	32.77	54	-21.23	Harm/Ave
7323	44.91	0	100	V	37.97	4.93	36.7	51.11	74	-22.89	Harm/Peak
7323	46.25	0	100	H	37.97	4.93	36.7	52.45	74	-21.55	Harm/Peak
7323	31.51	0	100	V	37.97	4.93	36.7	37.71	54	-16.29	Harm/Ave
7323	31.29	0	100	H	37.97	4.93	36.7	37.49	54	-16.51	Harm/Ave
9764	44.52	0	100	V	38.37	5.82	36.9	51.81	88.576	-36.766	Harm/Peak
9764	44.47	0	100	H	38.37	5.82	36.9	51.76	88.506	-36.746	Harm/Peak
9764	30.61	0	100	V	38.37	5.82	36.9	37.9	88.146	-50.246	Harm/Ave
9764	30.52	0	100	H	38.37	5.82	36.9	37.81	88.166	-50.356	Harm/Ave

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2480 MHz											
2480	76.84	156	100	V	28.556	2.94	-	108.336	-	-	Fund/Peak
2480	77.54	64	100	H	28.556	2.94	-	109.036	-	-	Fund/ Peak
2480	76.37	156	100	V	28.556	2.94	-	107.866	-	-	Fund/ Ave
2480	77.28	64	100	H	28.556	2.94	-	108.776	-	-	Fund/Ave
2483.5	31.68	156	100	V	29.168	3.01	-	63.858	74	-10.142	Spur/Peak
2483.5	32.5	64	100	H	29.168	3.01	-	64.678	74	-9.322	Spur/ Peak
2483.5	15.53	156	100	V	29.168	3.01	-	47.708	54	-6.292	Spur/ Ave
2483.5	15.94	64	100	H	29.168	3.01	-	48.118	54	-5.882	Spur/Ave
4960	46.83	0	100	V	33.79	4.06	36.5	48.18	74	-25.82	Harm/Peak
4960	46.19	0	100	H	33.79	4.06	36.5	47.54	74	-26.46	Harm/Peak
4960	34.66	0	100	V	33.79	4.06	36.5	36.01	54	-17.99	Harm/Ave
4960	31.29	0	100	H	33.79	4.06	36.5	32.64	54	-21.36	Harm/Ave
7440	46.15	0	100	V	37.97	4.93	36.7	52.35	74	-21.65	Harm/Peak
7440	45.27	0	100	H	37.97	4.93	36.7	51.47	74	-22.53	Harm/Peak
7440	31.81	0	100	V	37.97	4.93	36.7	38.01	54	-15.99	Harm/Ave
7440	31.35	0	100	H	37.97	4.93	36.7	37.55	54	-16.45	Harm/Ave
9920	44.37	0	100	V	38.37	5.82	36.9	51.66	88.336	-36.676	Harm/Peak
9920	44.69	0	100	H	38.37	5.82	36.9	51.98	89.036	-37.056	Harm/Peak
9920	30.5	0	100	V	38.37	5.82	36.9	37.79	87.866	-50.076	Harm/Ave
9920	30.48	0	100	H	38.37	5.82	36.9	37.77	88.776	-51.006	Harm/Ave

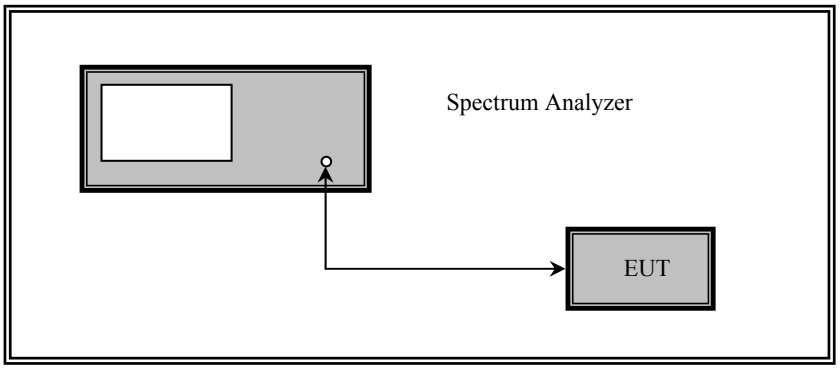
9 FCC §15.247(b) & IC RSS-210 §A8.4 - Peak Output Power Measurement

9.1 Applicable Standard

According to FCC §15.247(b) and IC RSS-210 §A8.4 (4) 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 watts.

9.2 Measurement Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to a spectrum analyzer.
3. Add a correction factor to the display.



9.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-10-16	1 year

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

9.4 Test Environmental Conditions

Temperature:	24º C
Relative Humidity:	41 %
ATM Pressure:	103.17 KPa

The testing was performed by Cipher Chu on 2014-05-19 at RF site.

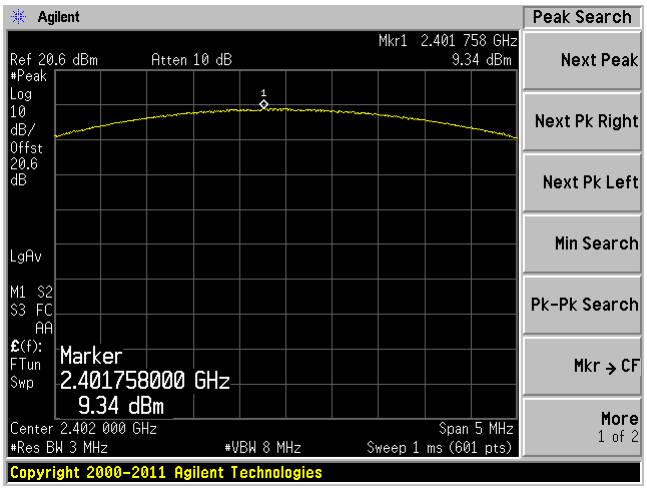
9.5 Test Results

Channel	Frequency (MHz)	Conducted Output Power (dBm)	FCC/IC Limit (dBm)
GFSK			
Low	2402	9.34	30
Middle	2441	9.84	30
High	2480	9.69	30
π/4-DQPSK			
Low	2402	8.74	30
Middle	2441	9.41	30
High	2480	9.19	30
8DPSK			
Low	2402	9.19	30
Middle	2441	9.82	30
High	2480	9.54	30

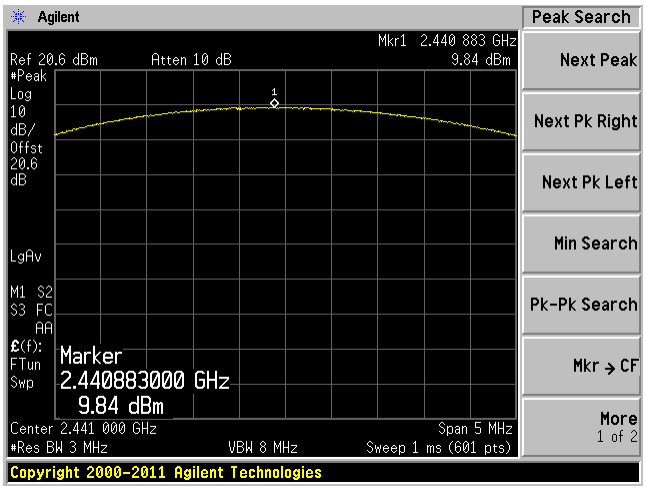
Please refer to the following plots.

GFSK

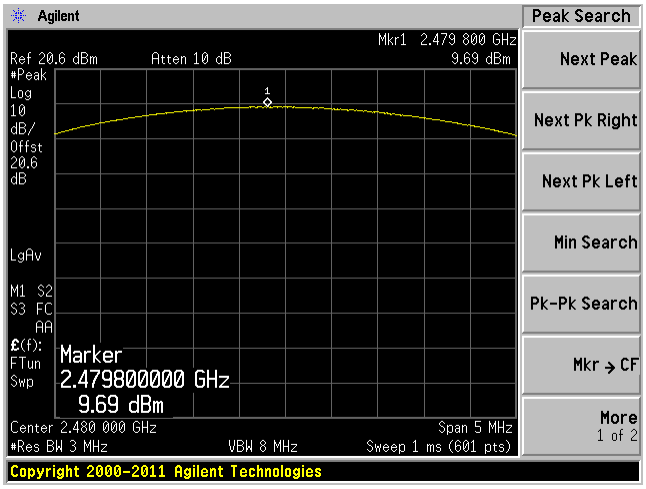
Low channel: 2402 MHz



Middle Channel: 2441 MHz

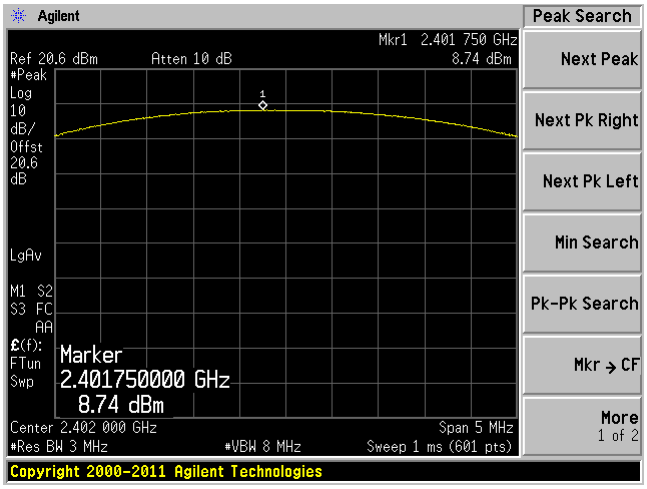


High Channel: 2480 MHz

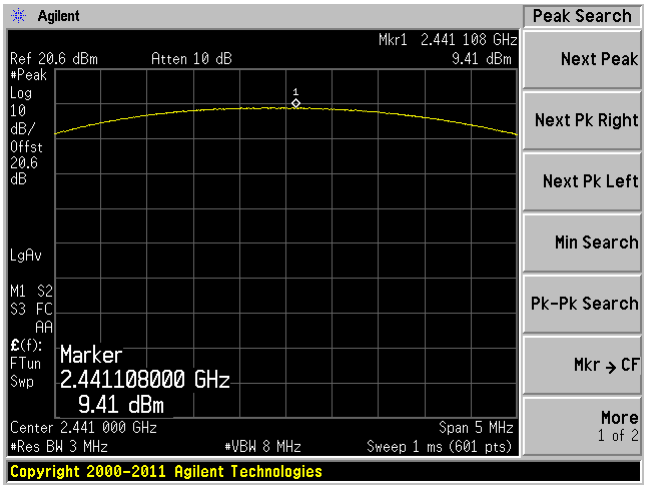


π/4-DQPSK

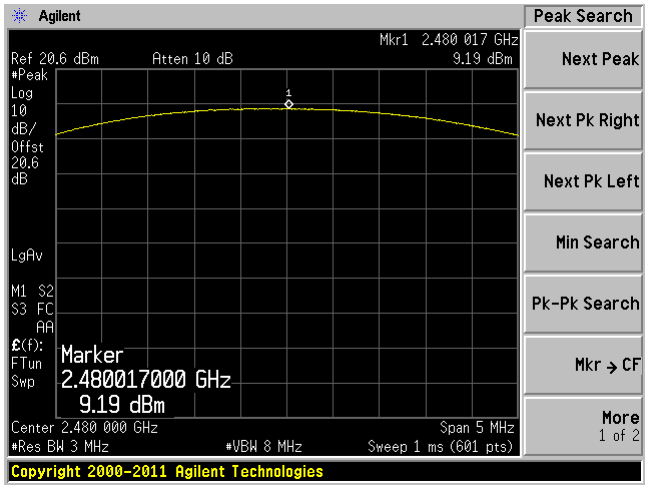
Low channel: 2402 MHz



Middle Channel: 2441 MHz

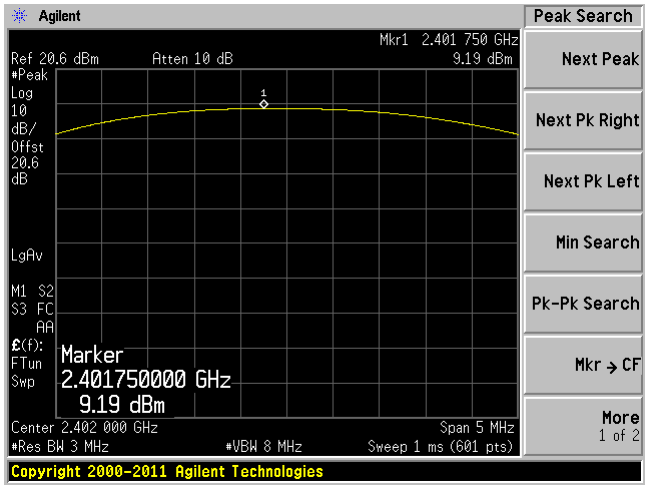


High Channel: 2480 MHz

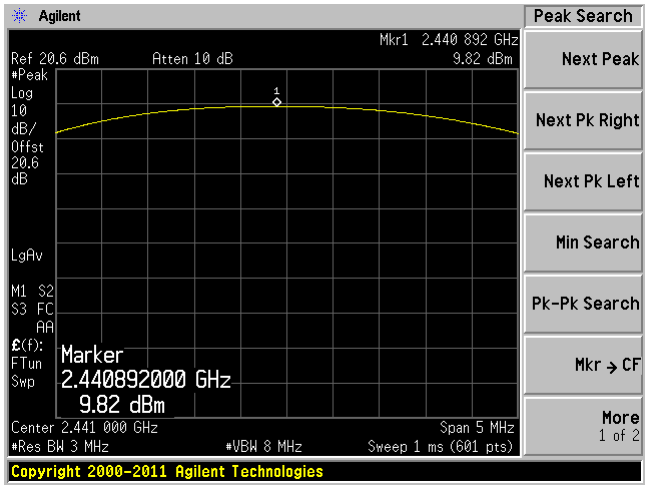


8DPSK

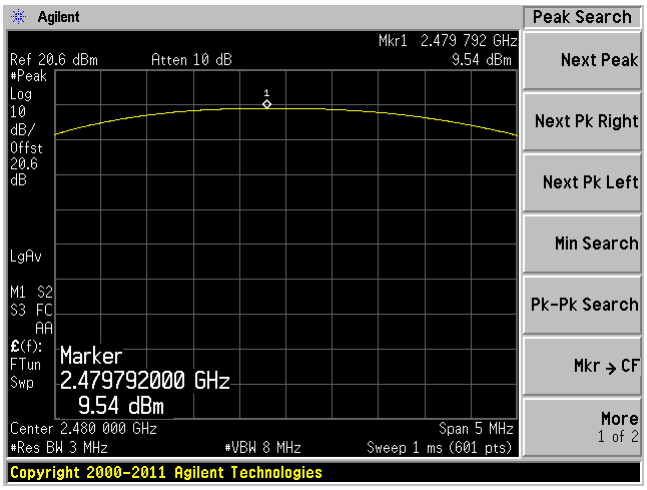
Low channel: 2402 MHz



Middle Channel: 2441 MHz



High Channel: 2480 MHz



10 FCC §15.247(d) & IC RSS-210§A8.5 - 100 kHz Bandwidth of Band Edges

10.1 Applicable Standard

According to FCC §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emissions limits specified in §15.209(a) see §15.205(c).

According to IC RSS-210 §A8.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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 section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

10.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

10.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-10-16	1 year

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

10.4 Test Environmental Conditions

Temperature:	24º C
Relative Humidity:	41 %
ATM Pressure:	103.17 KPa

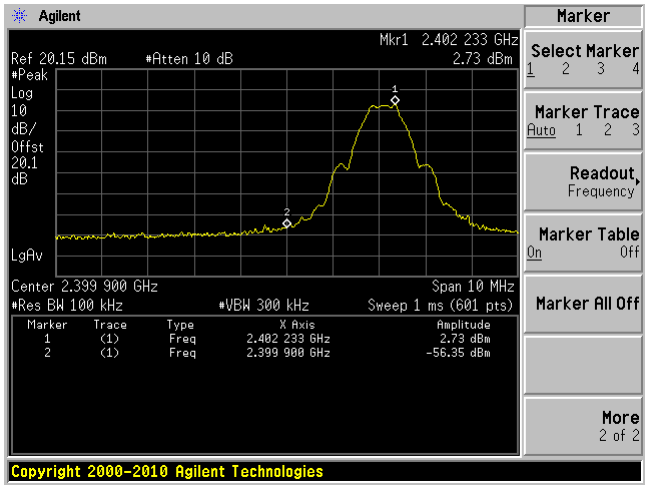
The testing was performed by Cipher Chu on 2014-05-19 at RF site.

10.5 Test Results

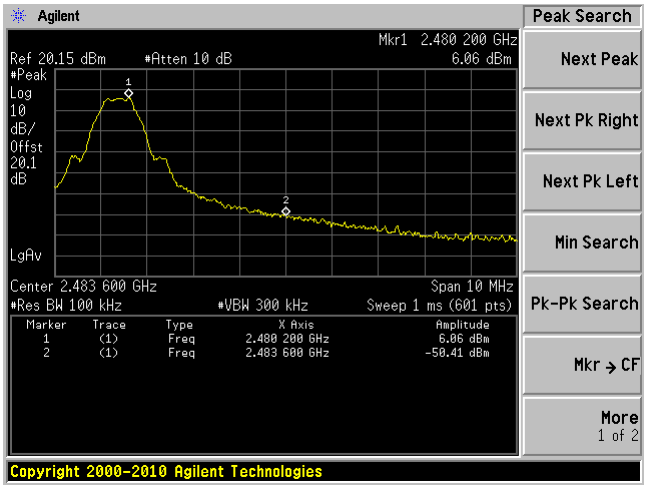
Please refer to following pages for plots of band edge.

GFSK

Low Band Edge

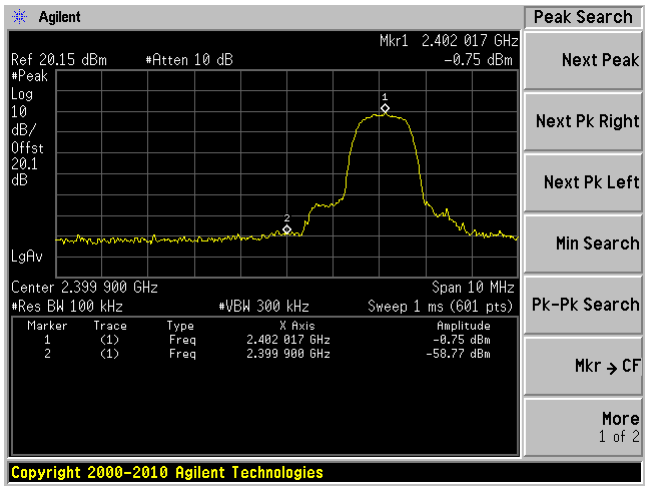


High Band Edge

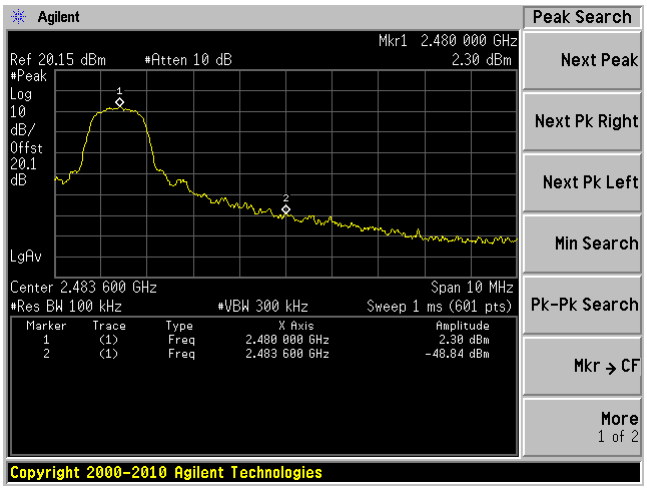


π/4-DQPSK

Low Band Edge

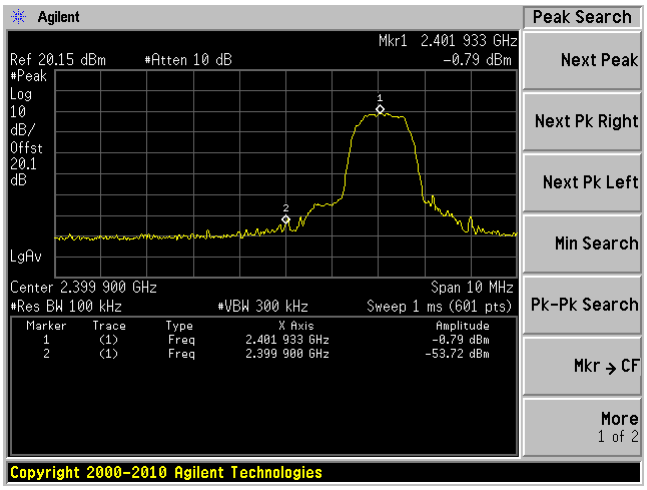


High Band Edge

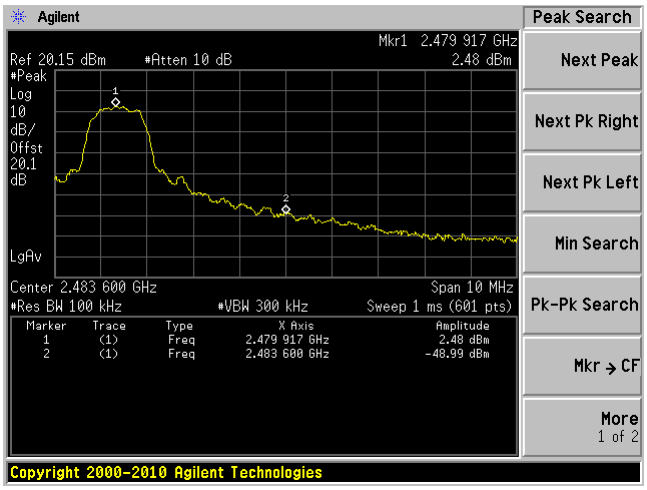


8DPSK

Low Band Edge



High Band Edge



Note: Low channel and high channel are the worst case.

11 FCC §15.247(a) & IC RSS-210 §A8.1 – Hopping Channel Bandwidth

11.1 Applicable Standard

According to FCC§15.247(a) (l) & RSS-210 §A8.1 (a), the maximum 20 dB bandwidth of the hopping channel shall be presented.

11.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emissions bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

11.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-10-16	1 year

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

11.4 Test Environmental Conditions

Temperature:	24º C
Relative Humidity:	41 %
ATM Pressure:	103.17 KPa

The testing was performed by Cipher Chu on 2014-05-19 at RF site.

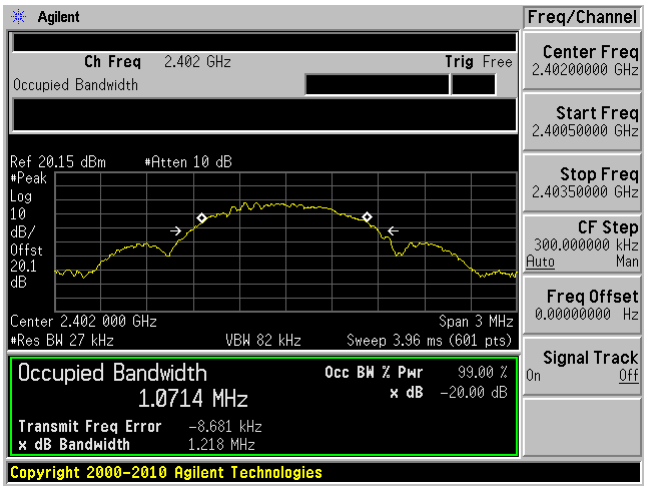
11.5 Test Results

Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	20 dB Emission Bandwidth (MHz)
GFSK			
Low	2402	1.0714	1.218
Middle	2441	1.0742	1.218
High	2480	1.0839	1.231
π/4-DQPSK			
Low	2402	1.2208	1.382
Middle	2441	1.2282	1.390
High	2480	1.2336	1.385
8DPSK			
Low	2402	1.2214	1.362
Middle	2441	1.2275	1.368
High	2480	1.2271	1.364

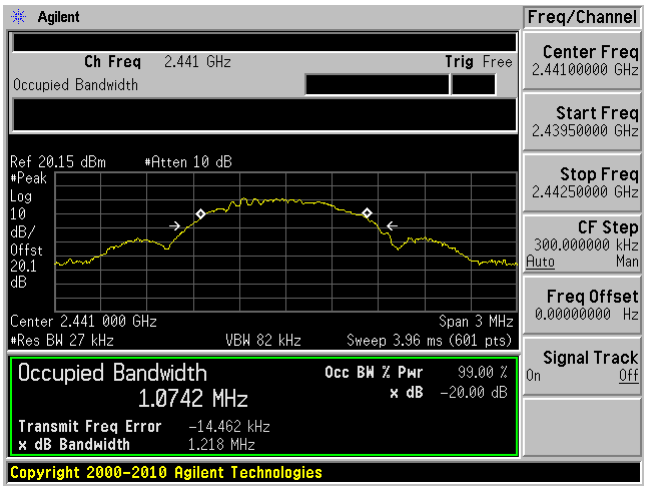
Please refer to the following plots.

GFSK

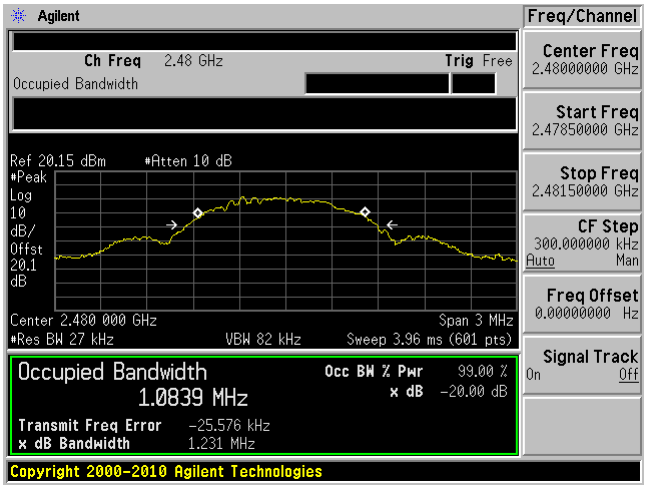
Low channel: 2402 MHz



Middle Channel: 2441 MHz

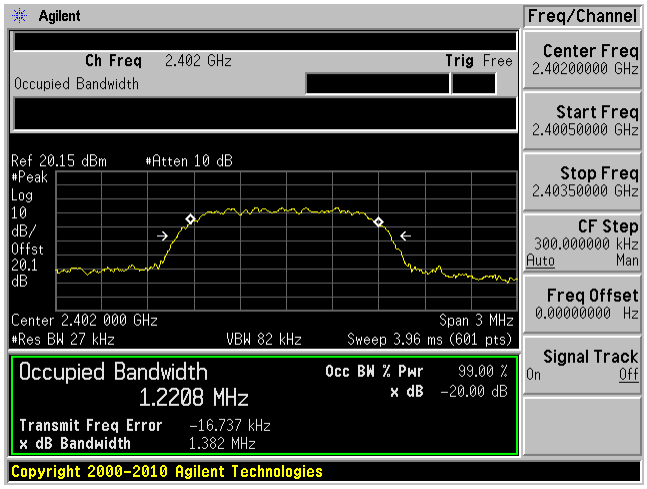


High Channel: 2480 MHz

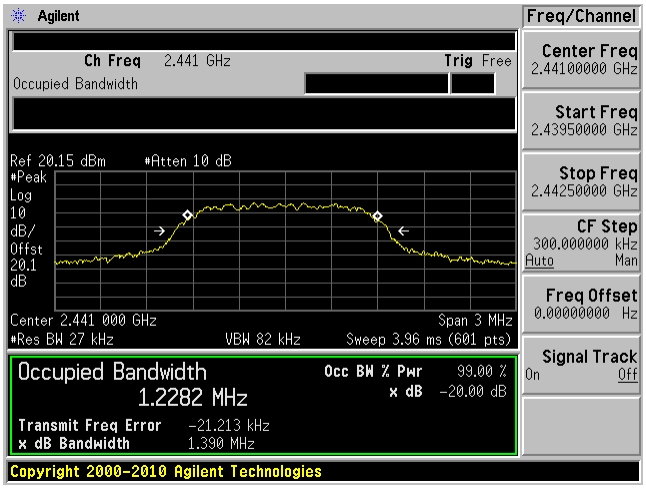


π/4-DQPSK

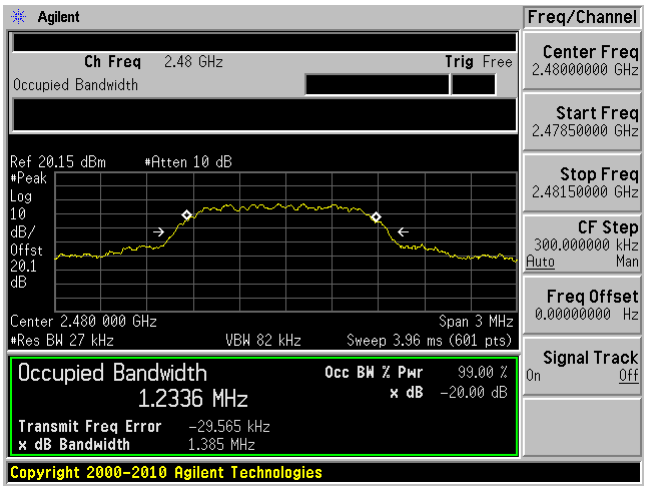
Low channel: 2402 MHz



Middle Channel: 2441 MHz

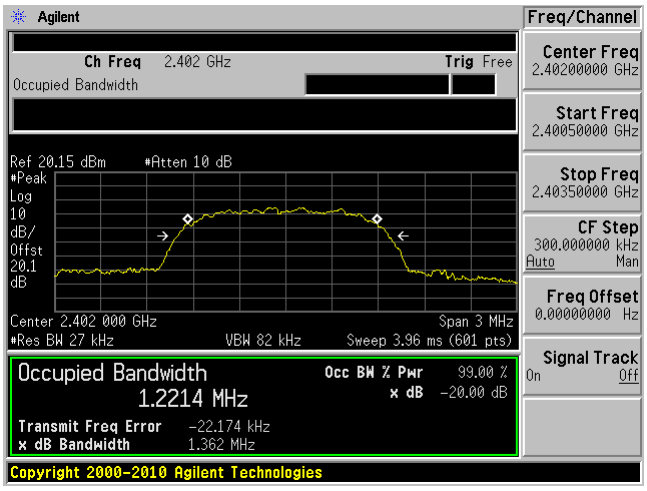


High Channel: 2480 MHz

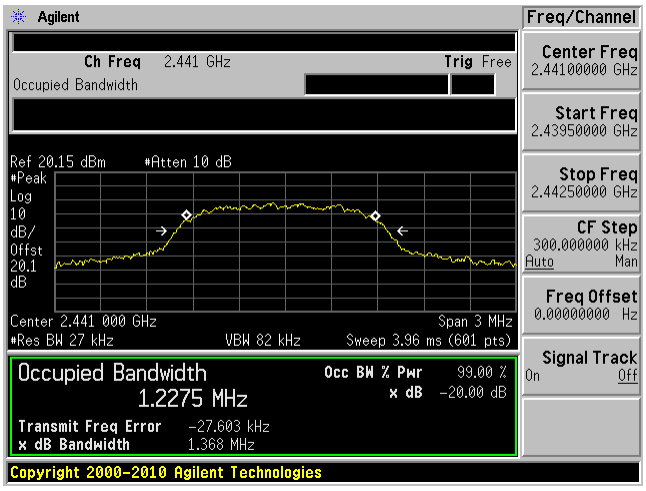


8DPSK

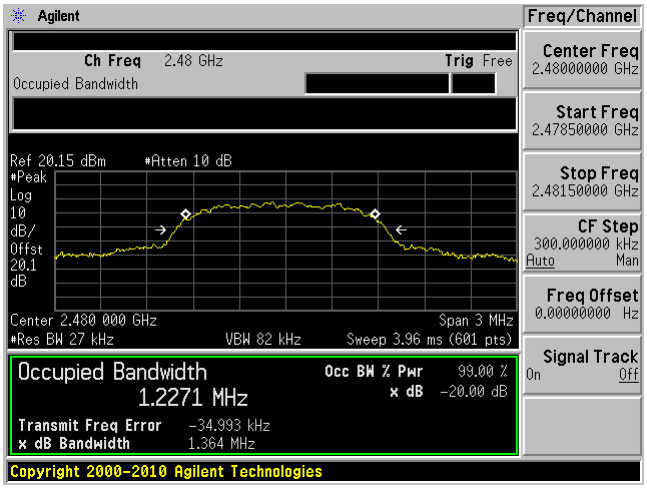
Low channel: 2402 MHz



Middle Channel: 2441 MHz



High Channel: 2480 MHz



12 FCC §15.247(a) & IC RSS-210 §A8.1 – Hopping Channel Separation

12.1 Applicable Standard

According to FCC §15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

According to IC RSS-210 §A8.1(b)(1)Frequency hopping systems shall have hoping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB 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 20dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

12.2 Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on a bench without connection to measurement instrument Turn on the EUT and set it to any one convenient frequency within its operating range.
3. By using the Max-Hold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function, and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

12.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-10-16	1 year

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

12.4 Test Environmental Conditions

Temperature:	24º C
Relative Humidity:	41 %
ATM Pressure:	103.17 KPa

The testing was performed by Cipher Chu on 2014-05-19 at RF site.

12.5 Test Results

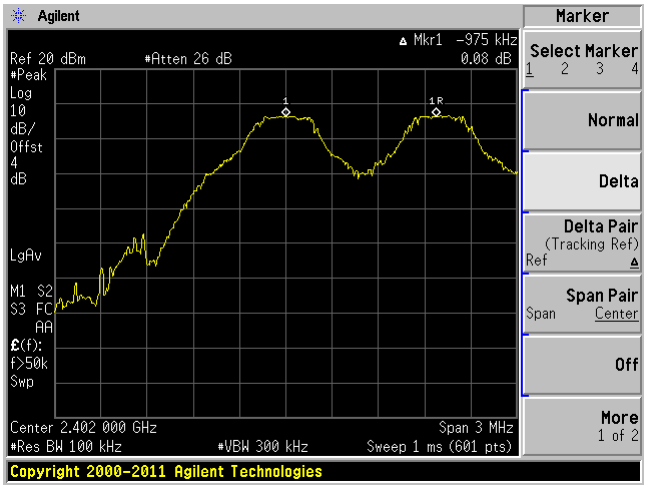
GFSK

Channel	Frequency (MHz)	Channel Separation (kHz)	Limit > 2/3 20 dB OBW (kHz)
GFSK			
Low	2402	975	812
Middle	2441	990	812
High	2480	1090	820
π/4-DQPSK			
Low	2402	975	921
Middle	2441	1075	926
High	2480	1005	923
8DPSK			
Low	2402	1010	908
Middle	2441	975	912
High	2480	970	909

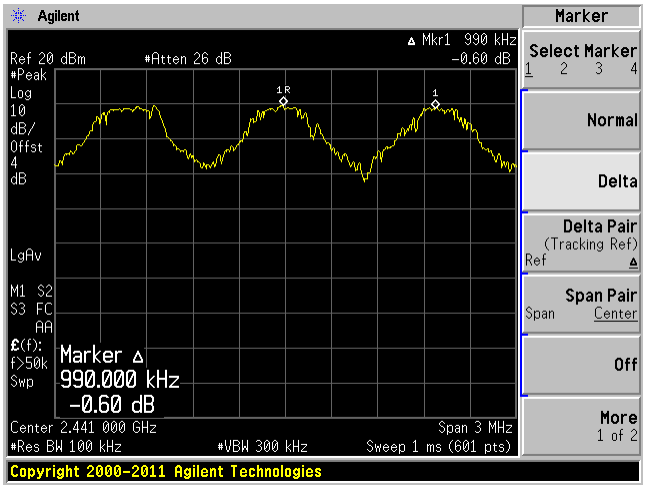
Please refer to the following plots.

GFSK

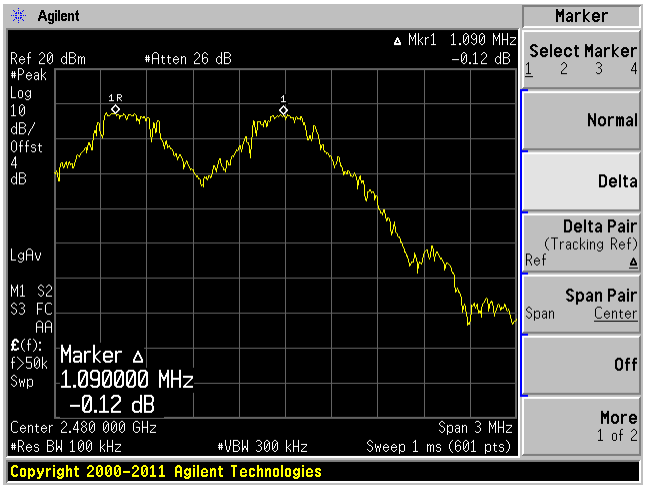
Low channel: 2402 MHz



Middle Channel: 2441 MHz

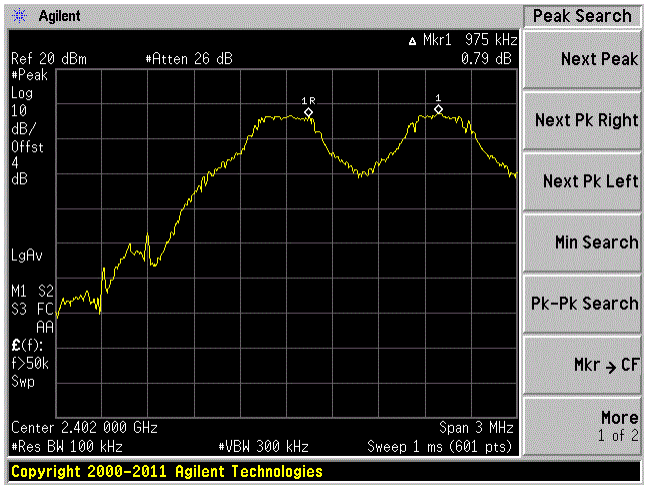


High Channel: 2480 MHz

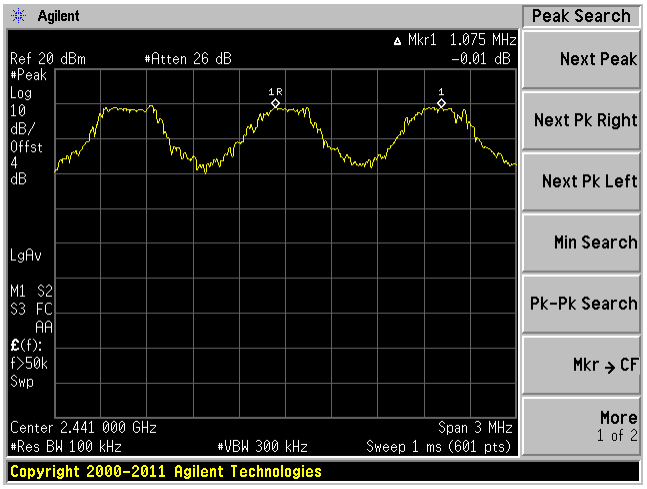


π/4-DQPSK

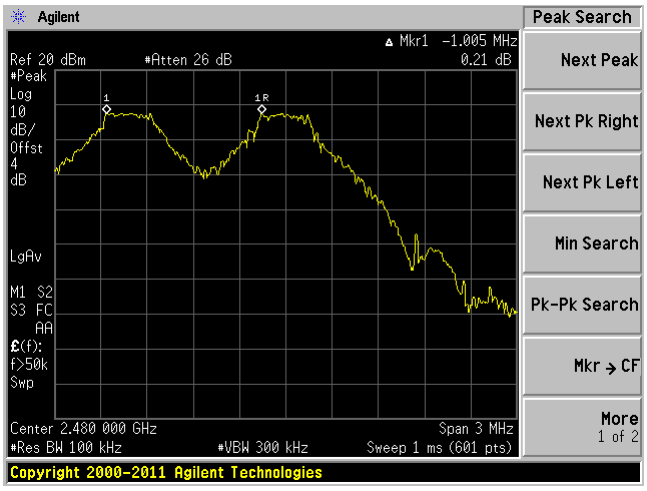
Low channel: 2402 MHz



Middle Channel: 2441 MHz

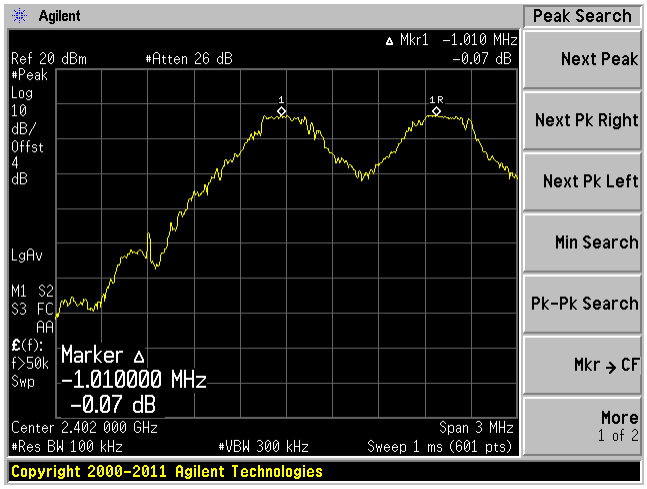


High Channel: 2480 MHz

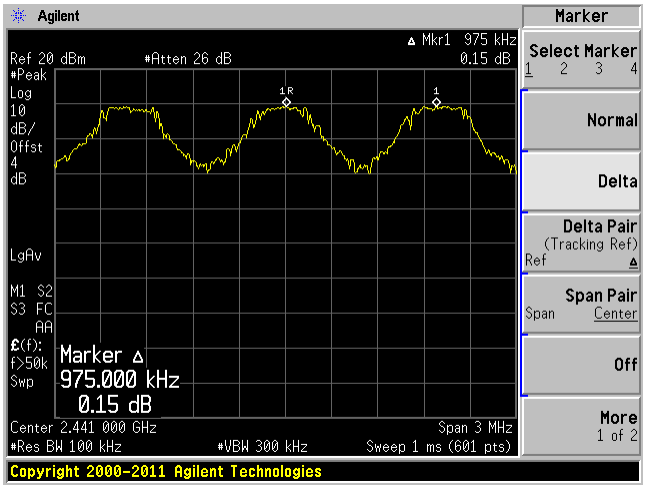


8DPSK

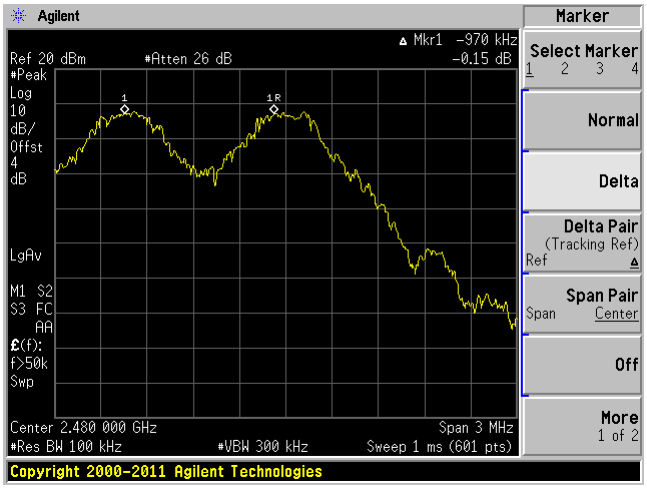
Low channel: 2402 MHz



Middle Channel: 2441 MHz



High Channel: 2480 MHz



13 FCC §15.247(a) & IC RSS-210 §A8.1 - Number of Hopping Channels

13.1 Applicable Standard

According to FCC §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

According to IC RSS-210 §A8.1 (d), Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. 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. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

13.2 Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the bench without connection to measurement instrument. Turn on the EUT and set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

13.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-10-16	1 year

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

13.4 Test Environmental Conditions

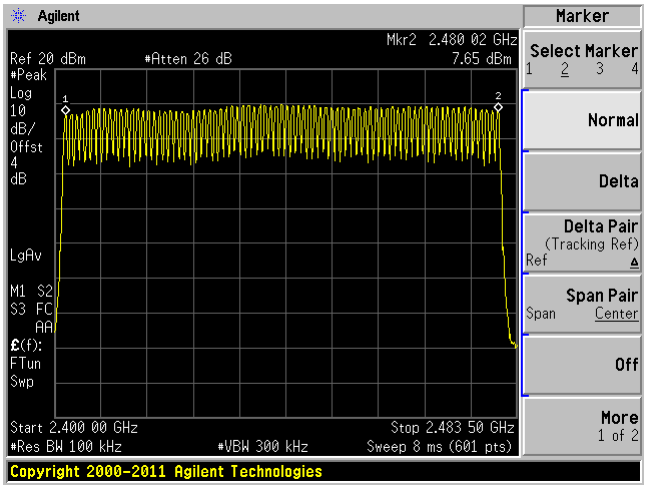
Temperature:	24º C
Relative Humidity:	41 %
ATM Pressure:	103.17 KPa

The testing was performed by Cipher Chu on 2014-05-19 at RF site.

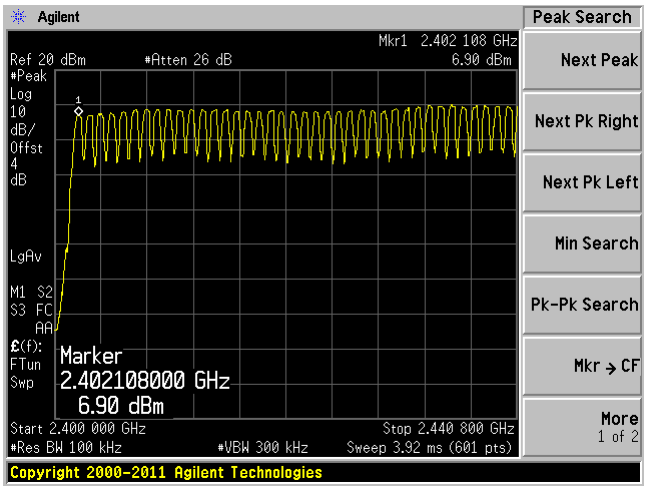
13.5 Test Results

Total 79 channels; please refer to the plots hereinafter.

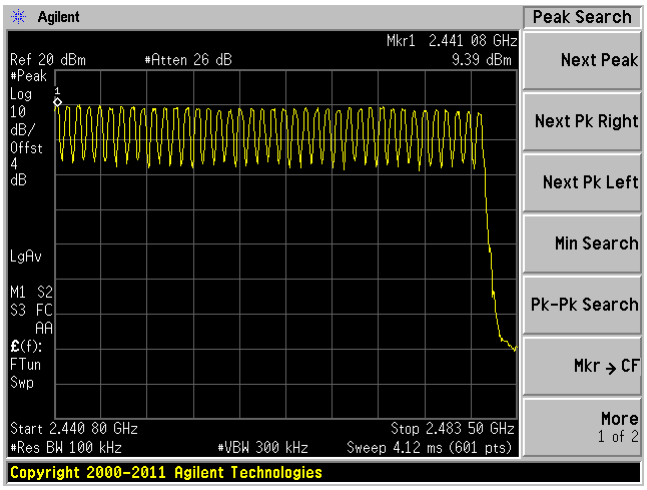
Hopping Channel Number: Total 79 Channels



39 Channels between 2400 to 2440.8 MHz



40 Channels between 2440.8 to 2483.5 MHz



14 FCC §15.247(a) & IC RSS-210 §A8.1 - Dwell Time

14.1 Applicable Standard

According to FCC §15.247 (a)(1)(iii), 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.

According to IC RSS-210 §A8.1 (d) ,Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. 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. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

14.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

14.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-10-16	1 year

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

14.4 Test Environmental Conditions

Temperature:	24º C
Relative Humidity:	41 %
ATM Pressure:	103.17 KPa

The testing was performed by Cipher Chu on 2014-05-19 at RF site.

14.5 Test Results

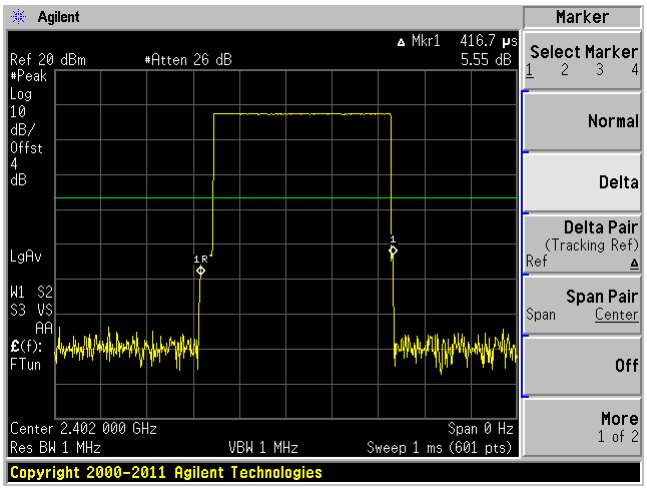
Channel	Pulse Width (ms)	Dwell time (sec)	Limit (sec)	Results
GFSK, DH1: Packet Size = 27 byte				
Low	0.4167	0.13	0.4	Pass
Mid	0.4183	0.13	0.4	Pass
High	0.415	0.13	0.4	Pass
GFSK, DH3: Packet Size = 183 bytes				
Low	1.676	0.27	0.4	Pass
Mid	1.676	0.27	0.4	Pass
High	1.672	0.27	0.4	Pass
GFSK, DH5: Packet Size = 339 bytes				
Low	2.92	0.31	0.4	Pass
Mid	2.933	0.31	0.4	Pass
High	2.927	0.31	0.4	Pass
DQPSK, DH1: Packet Size = 27 byte				
Low	0.3767	0.13	0.4	Pass
Mid	0.3783	0.13	0.4	Pass
High	0.3767	0.13	0.4	Pass
DQPSK, DH3: Packet Size = 183 bytes				
Low	1.777	0.28	0.4	Pass
Mid	1.772	0.28	0.4	Pass
High	1.772	0.28	0.4	Pass
DQPSK, DH5: Packet Size = 339 bytes				
Low	2.927	0.31	0.4	Pass
Mid	2.92	0.31	0.4	Pass
High	2.927	0.31	0.4	Pass
8DPSK, DH1: Packet Size = 27 byte				
Low	0.3767	0.13	0.4	Pass
Mid	0.3783	0.13	0.4	Pass
High	0.3783	0.13	0.4	Pass
8DPSK, DH3: Packet Size = 183 bytes				
Low	1.777	0.28	0.4	Pass
Mid	1.781	0.28	0.4	Pass
High	1.772	0.28	0.4	Pass
8DPSK, DH5: Packet Size = 339 bytes				
Low	2.927	0.31	0.4	Pass
Mid	2.927	0.31	0.4	Pass
High	2.927	0.31	0.4	Pass

Note: DH1: Dwell time = Pulse time*(1600/2/79)*31.6S
DH3: Dwell time = Pulse time*(1600/4/79)*31.6S
DH5: Dwell time = Pulse time*(1600/6/79)*31.6S

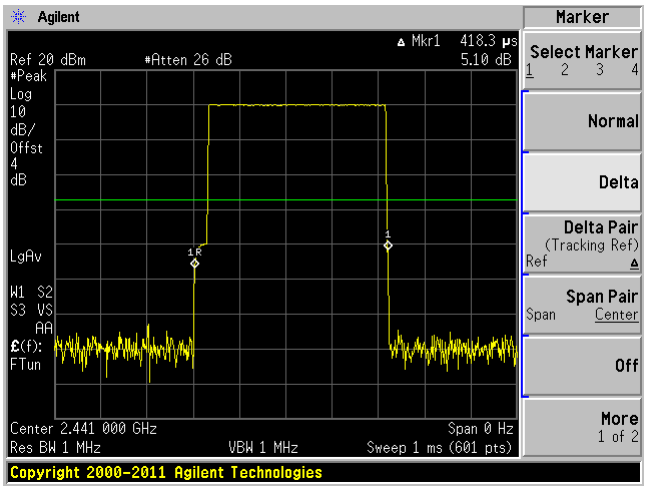
Please refer to following plots:

GFSK – DH1

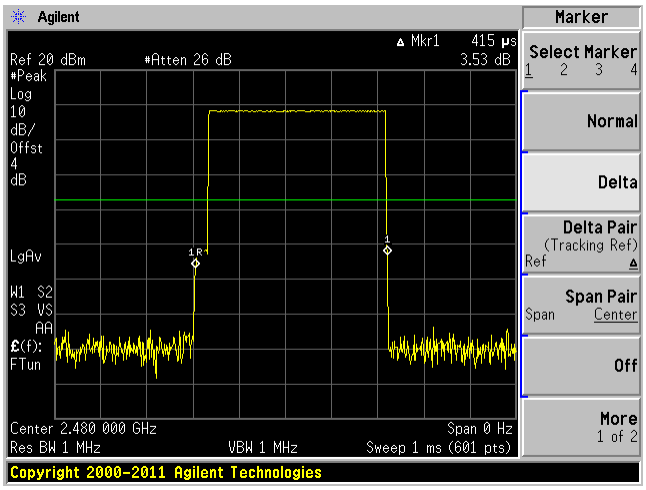
Low channel: 2402 MHz



Middle channel: 2441 MHz

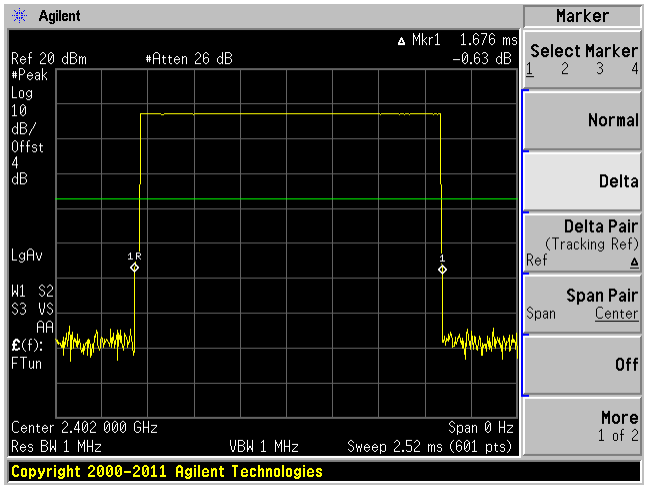


High channel: 2480 MHz

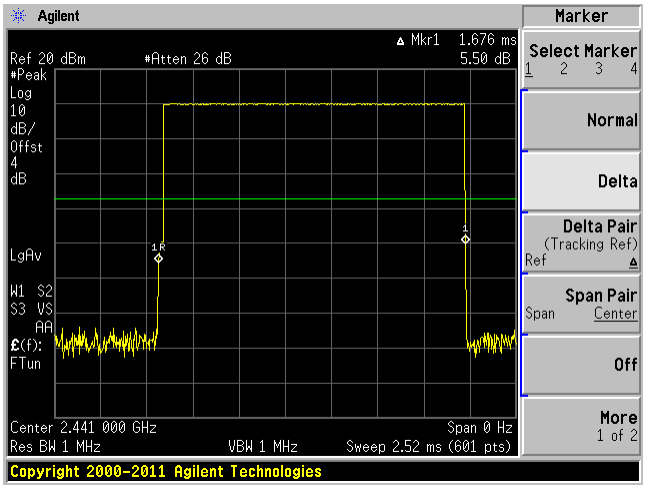


GFSK – DH3

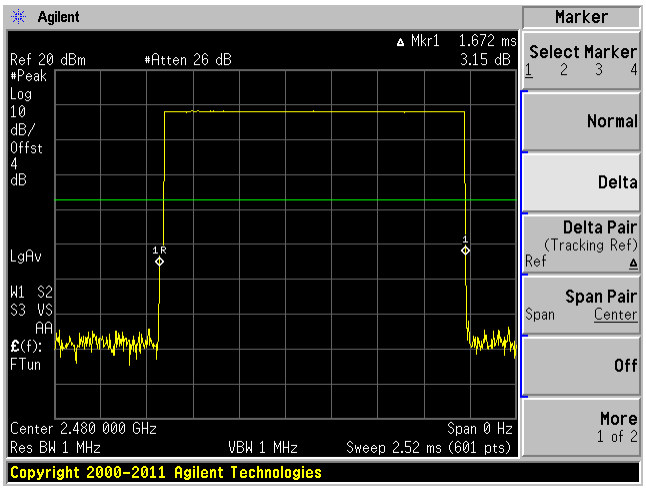
Low channel: 2402 MHz



Middle channel: 2441 MHz

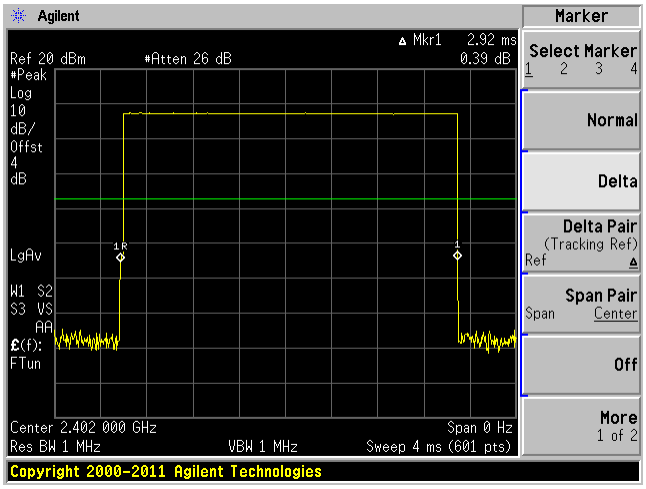


High channel: 2480 MHz

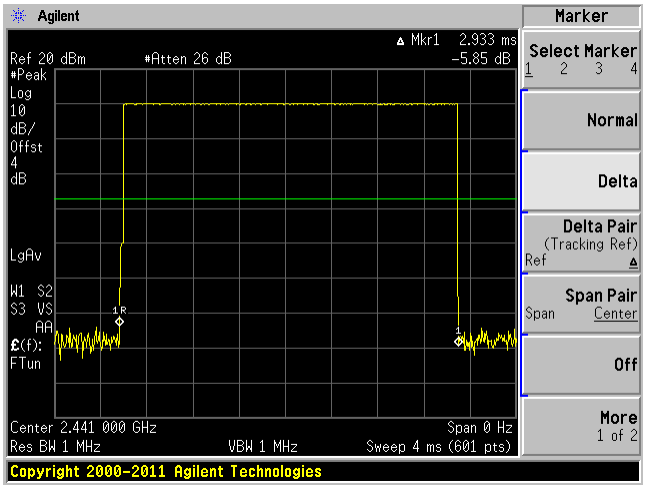


GFSK – DH5

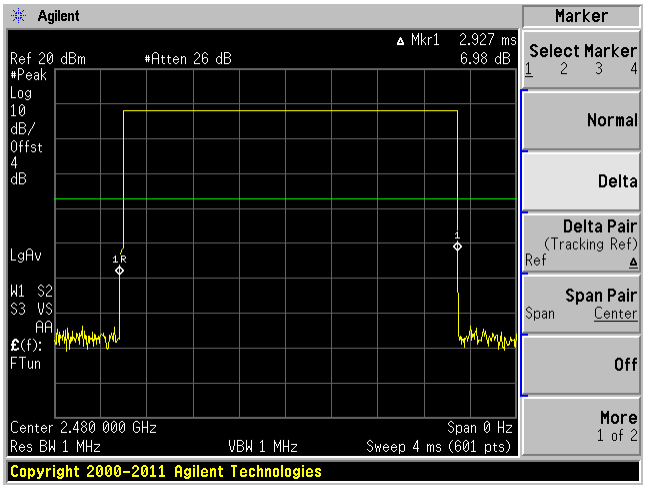
Low channel: 2402 MHz



Middle channel: 2441 MHz

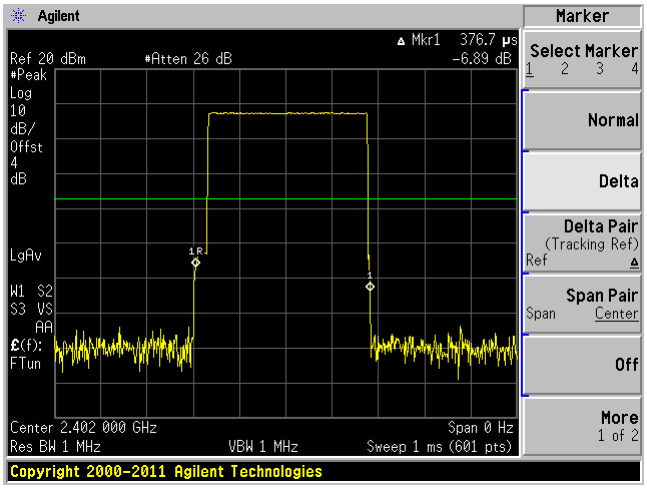


High channel: 2480 MHz

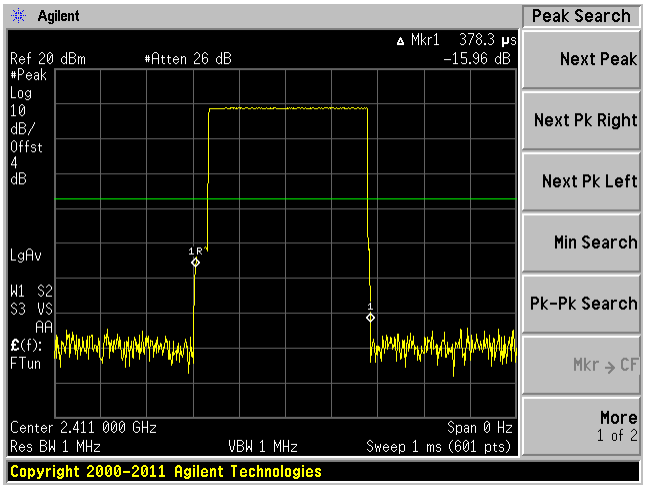


π/4-DQPSK – DH1

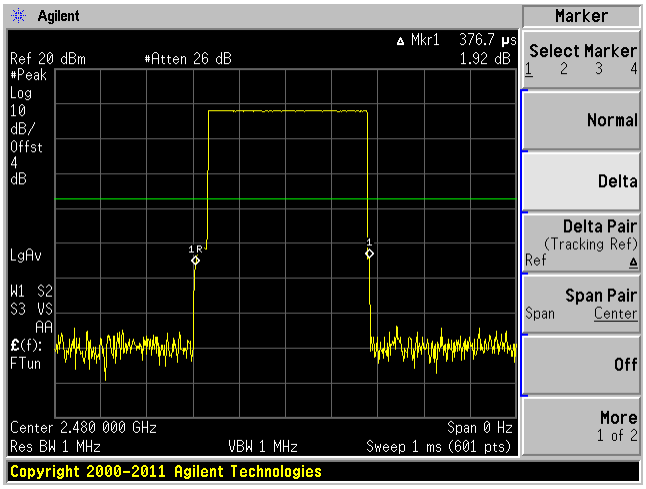
Low channel: 2402 MHz



Middle channel: 2441 MHz

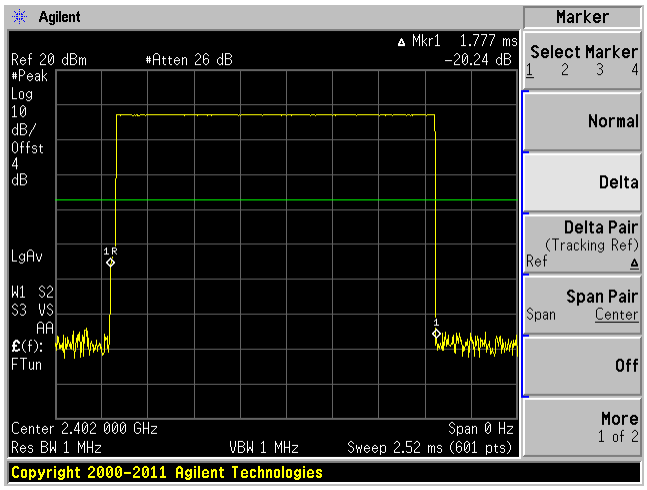


High channel: 2480 MHz

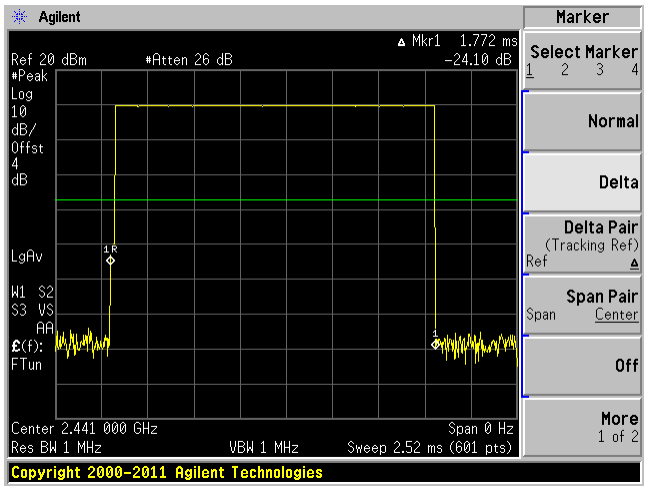


π/4-DQPSK – DH3

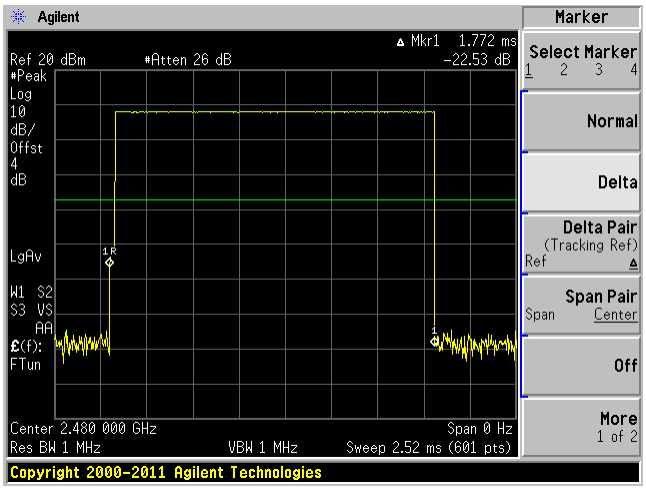
Low channel: 2402 MHz



Middle channel: 2441 MHz

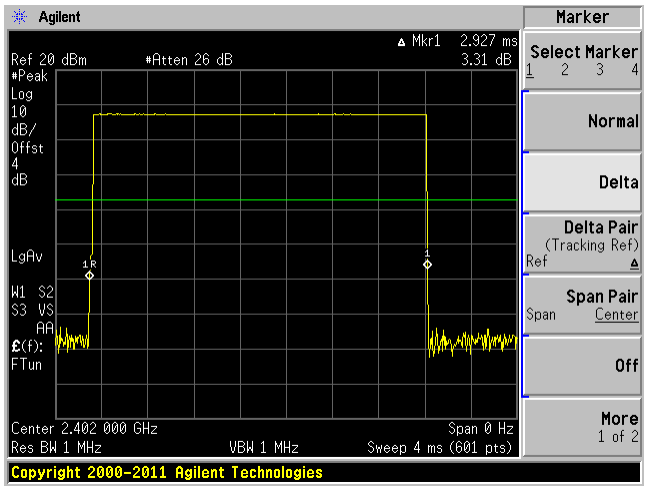


High channel: 2480 MHz

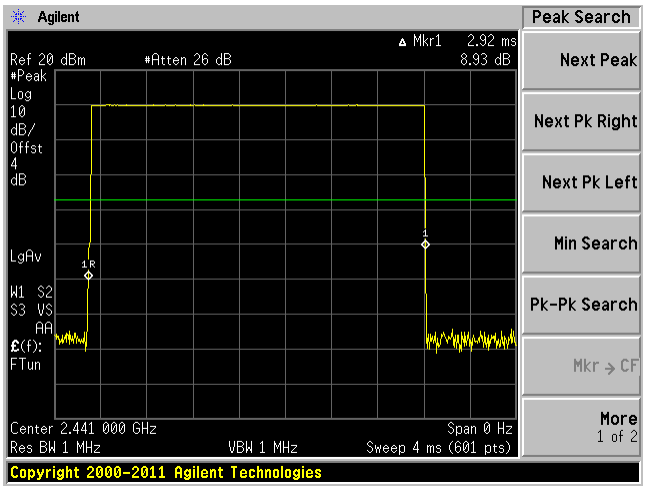


π/4-DQPSK – DH5

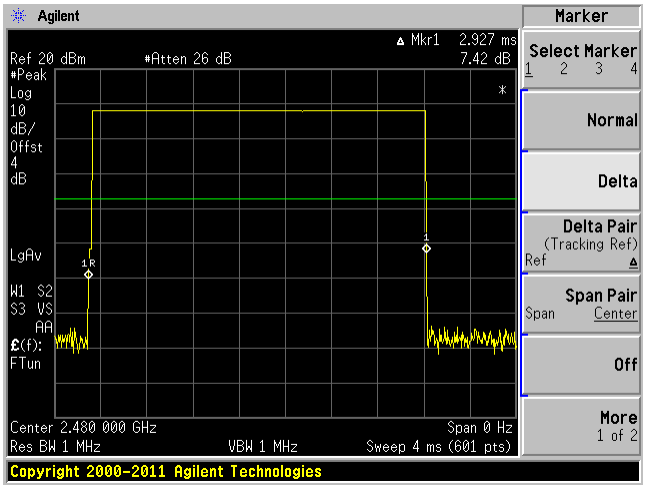
Low channel: 2402 MHz



Middle channel: 2441 MHz

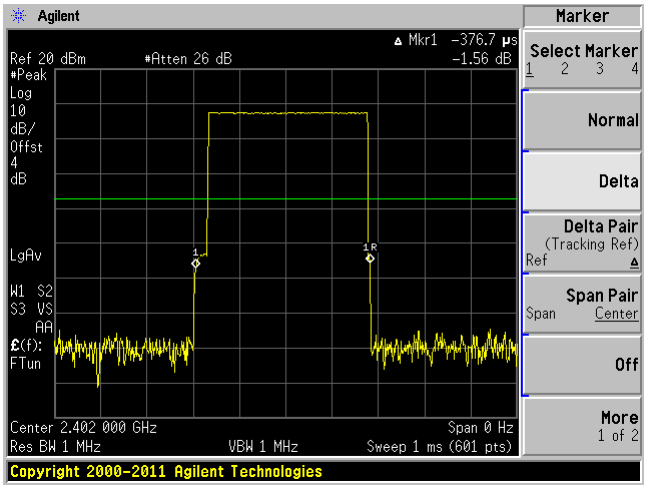


High channel: 2480 MHz

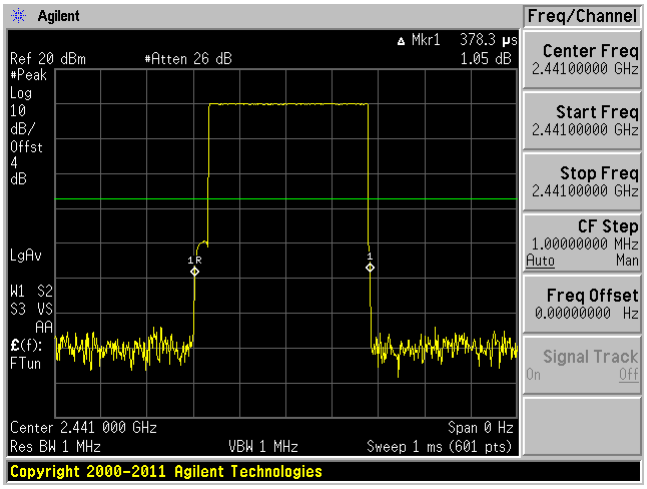


8DPSK – DH1

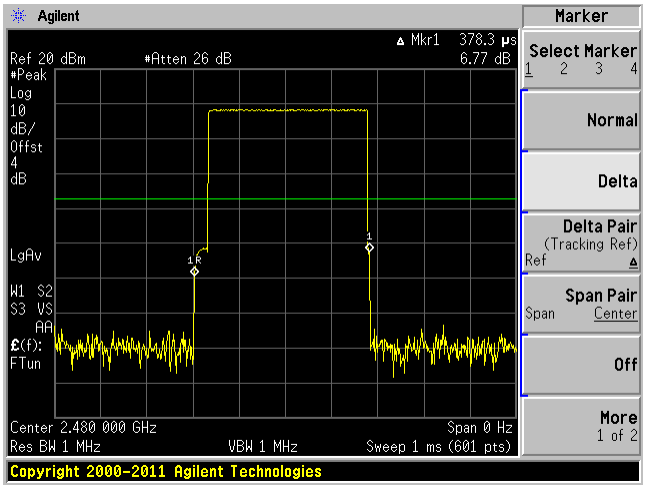
Low channel: 2402 MHz



Middle channel: 2441 MHz

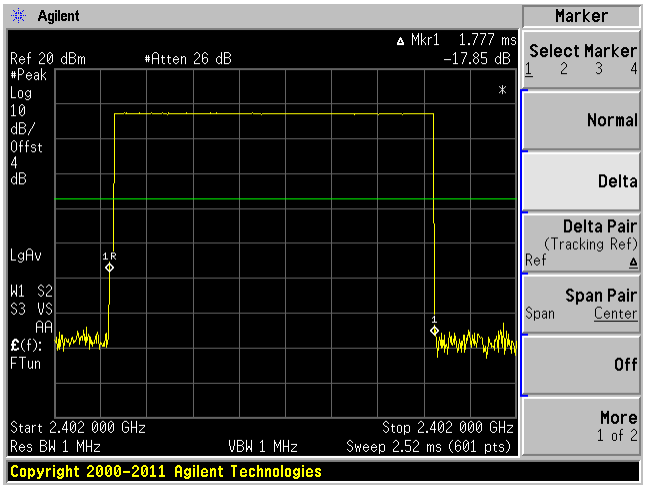


High channel: 2480 MHz

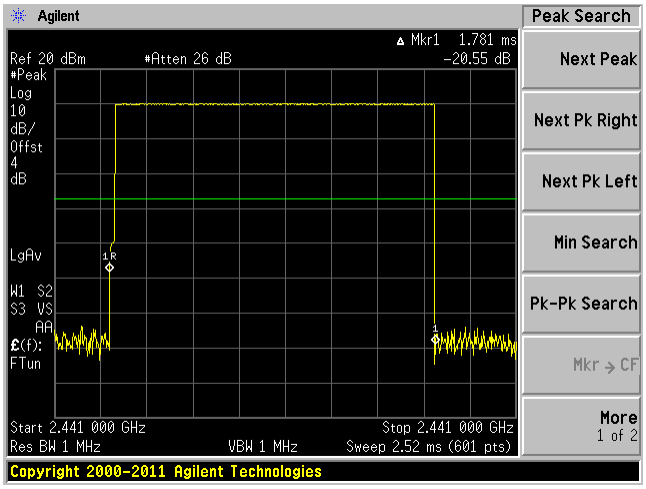


8DPSK – DH3

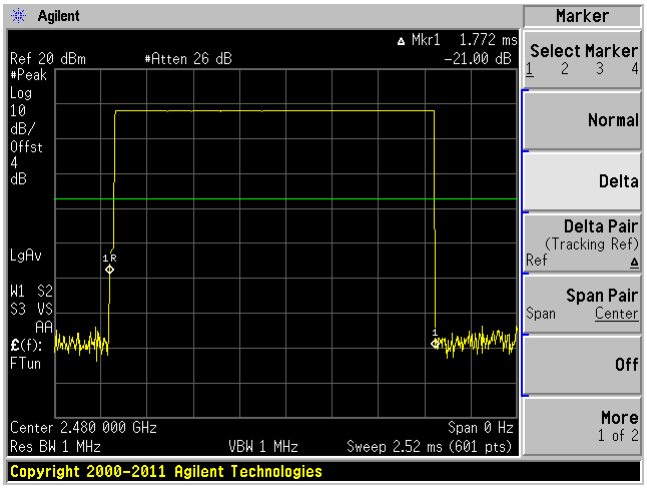
Low channel: 2402 MHz



Middle channel: 2441 MHz

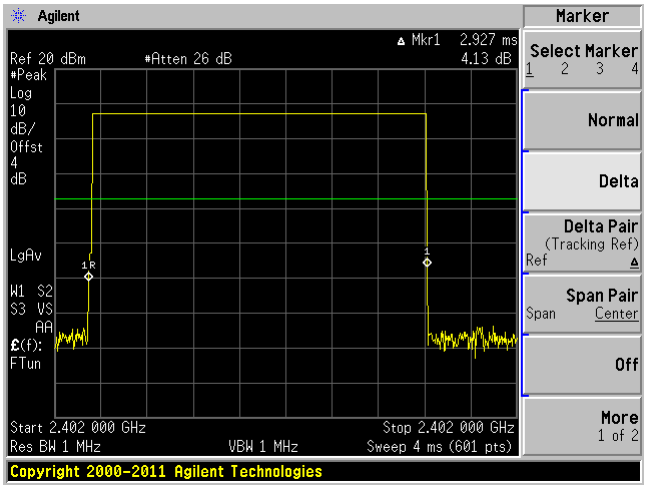


High channel: 2480 MHz

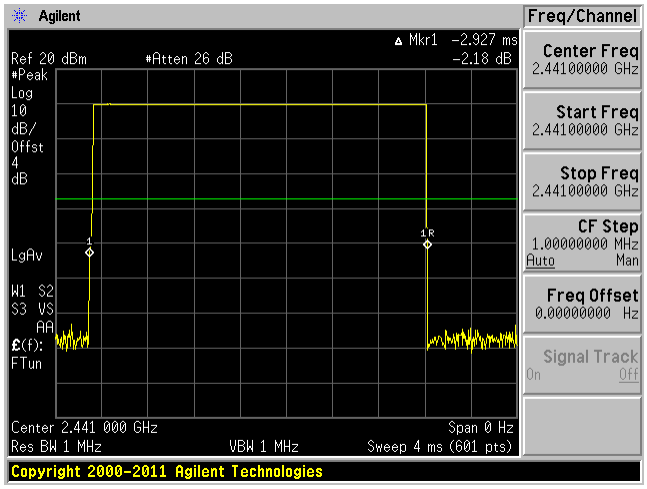


8DPSK – DH5

Low channel: 2402 MHz



Middle channel: 2441 MHz



High channel: 2480 MHz