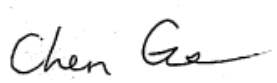
FCC PART 15.247
IC RSS-210, ISSUE 8, DECEMBER 2010
TEST AND MEASUREMENT REPORT

For

AnyDATA Corporation

5 Oldfield, Irvine, CA 92618, USA

FCC ID: P4M-ACT613
IC: 4594B-ACT613

Report Type: Original Report	**Product Type:** WCDMA Vehicle Tracker with Bluetooth and RKE Function	
Prepared By	Chen Ge Test Engineer	
Report Number	R1401021-247	
Report Date	2014-06-17	
Reviewed By	Suhaila Khushzad Engineering Manager	
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report must not be used by the customer to claim product certification, approval, or endorsement by A2LA* or any agency of the Federal Government. * This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "*" (Rev.3)

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1401021-247	Original Report	2014-06-17

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *AnyDATA Corporation*, and their product FCC ID: P4M-ACT613, IC: 4594B-ACT613, model: *ACT613*or the "EUT" as referred on this report is a vehicle tracker with Bluetooth and RKE function.

1.2 Mechanical Description of EUT

The "EUT" measures approximately *80 mm (L) x 45mm (W) x 22mm (H)*, and weighs approximately *66.5*g.

The test data gathered are from typical production sample, serial number: 20140227000306K for radiated and 20140227000308K for conducted provided by the manufacturer.

1.3 Objective

This report is prepared on behalf of *AnyDATA Corporation* in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commissions 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 for Output Power, Antenna Requirements, 6 dB Bandwidth, and power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Spurious Emissions, Conducted and Radiated Spurious Emissions.

1.4 Related Submittal(s)/Grant(s)

FCC Part 22H/24E and RSS-132/133 report No.: R1401021-2224
FCC Part 15.231 and RSS-210 report No.: R1401021-231

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.

Radio Mode	Modulation	Frequency/Data Rate		
		Low CH (MHz)	Mid CH (MHz)	High CH (MHz)
Bluetooth	GFSK	2402	2441	2480
Bluetooth	π/4-DQPSK	2402	2441	2480
Bluetooth	8DPSK	2402	2441	2480

2.2 EUT Exercise Software

The test utility used were BTCmd and XmtrCmd were provided by *AnyDATA Corporation*.

2.3 Special Equipment

There were no special accessories were required, included, or intended for use with EUT during these tests.

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 EUT Internal Configuration Details

Manufacturers	Descriptions	Models	Serial Numbers
AnyDATA Corporation	RKE Board	ACT613 TRANS V1.0	TDJ0064
AnyDATA Corporation	STN Board	ACT231 STN V1.2	SEA02649
AnyDATA Corporation	WCDMA Board	ACT613 MAIN V1.2	MEB00024

2.6 Interface Ports and Cabling

Cable Description	Length (m)	From	To
Power Cable	< 3	EUT	DC/AC

3 Summary of Test Results

Results reported relate only to the product tested.

FCC & IC Rules	Description of Test	Results
FCC §15.247(i), §2.1091 IC RSS-102	RF Exposure	Compliant
FCC §15.203 IC RSS-Gen §7.1.2	Antenna Requirement	Compliant
FCC §15.207(a) IC RSS-Gen §7.2.4	AC Line Conducted Emissions	N/A
FCC §15.247(d) IC RSS-210 §A8.5	Spurious Emissions at Antenna Port	Compliant
FCC §15.205 IC RSS-210 §2.2	Restricted Bands	Compliant
FCC §15.209, §15.247(d) IC RSS-210 §A8.5	Radiated Spurious Emissions	Compliant
FCC §15.247 (a)(2) IC RSS-210 §A8.1	Hopping Channel Bandwidth	Compliant
FCC §15.247(b)(3) IC RSS-210 §A8.4	Maximum Peak Output Power	Compliant
FCC §15.247(a) (1) IC RSS-210 §A8.1(b)	Hopping Channel Separation	Compliant
FCC §15.247(a)(1)(iii) IC RSS-210 §A8.1(d)	Number of Hopping Channels	Compliant
FCC §15.247(a)(1)(iii) IC RSS-210 §A8.1(d)	Dwell Time	Compliant
FCC §15.247(d) IC RSS-210 §A8.5	100 kHz Bandwidth of Frequency Band Edge	Compliant
FCC §15.109 IC RSS-Gen §4.10, §6	Receiver Spurious Emission	Compliant

Note: N/A: the EUT was powered by battery.

4 FCC §15.247 (i), § 2.1091 & IC RSS-102 - RF Exposure

4.1 Applicable Standard

According to FCC §15.247(i), §1.1307(b)(1) and IC RSS-102, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

4.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

4.3 MPE Results

Maximum peak output power at antenna input terminal (dBm):	10.27
Maximum peak output power at antenna input terminal (mW):	10.64
Prediction distance (cm):	20
Prediction frequency (MHz):	2480
Maximum Antenna Gain, typical (dBi):	-5.0
Maximum Antenna Gain (numeric):	0.32
Power density of prediction frequency at 20 cm (mW/cm^2):	0.0067
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0
Power density of prediction frequency at 20 cm (W/m^2):	0.067
MPE limit for uncontrolled exposure at prediction frequency (W/m^2):	10.0

The device is compliant with the requirement MPE limit for uncontrolled exposure.

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

5.1 Applicable Standard

According to FCC Part §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

Per IC RSS-Gen §7.1.2, A transmitter can only be sold or operated with antennas with which it was certified. A transmitter maybe certified 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 certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. 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. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in IC RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to IC RSS-210 Annex 8 or RSS-210 Annex 9, the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to IC RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

5.2 Result

The antenna is an internal antenna with -5 dBi gain, which in accordance to sections FCC Part 15.203 and IC RSS-Gen §7.1.2, is considered sufficient to comply with the provisions of these sections.

6 FCC §2.1051, §15.247(d) & IC RSS-210 §A8.5 – Conducted Emissions at Antenna Terminals

6.1 Applicable Standard

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.

6.2 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.

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4446A	MY48250238	2013-08-29	1 year

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

6.4 Test Environmental Conditions

Temperature:	23 °C
Relative Humidity:	48 %
ATM Pressure:	102.5 kPa

The testing was performed by Chen Ge on 2014-03-12 at RF Site.

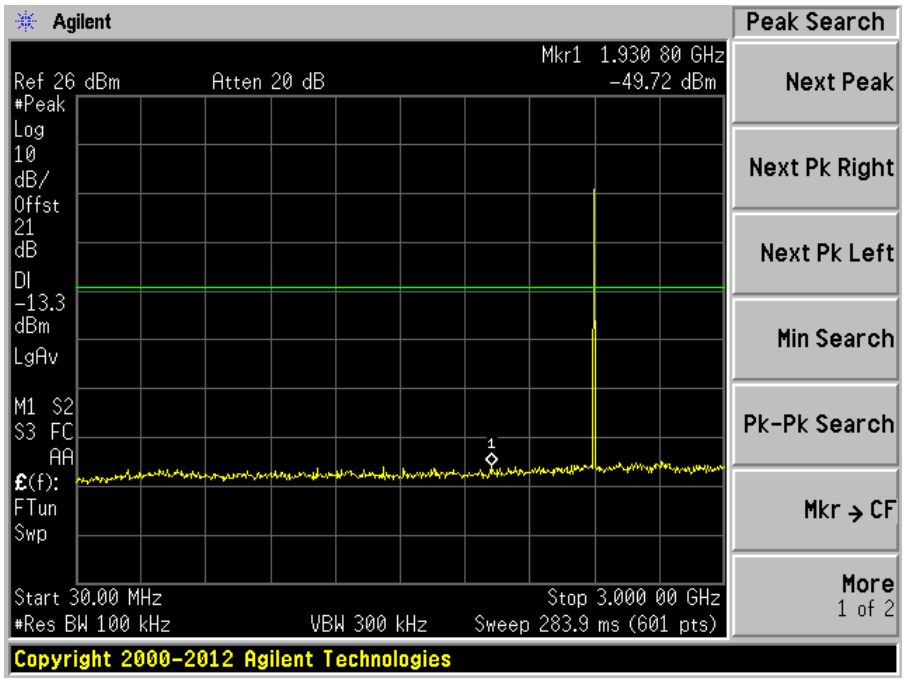
6.5 Test Results

Please refer to following plots of spurious emissions.

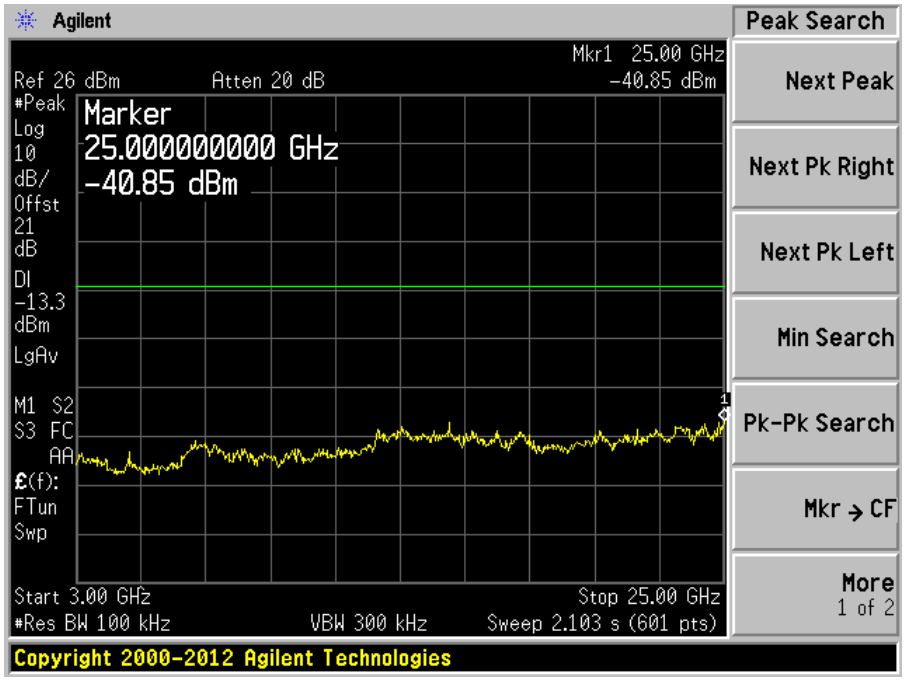
Modulation: GFSK

Low Channel 2402 MHz

Plot #1 30 MHz – 3 GHz

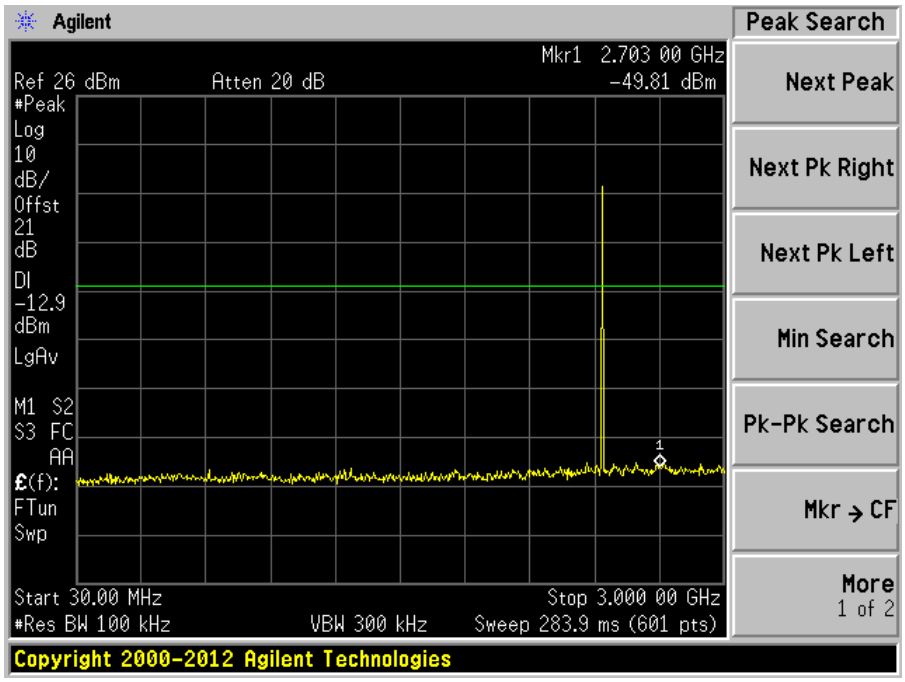


Plot #2 3 GHz – 25 GHz

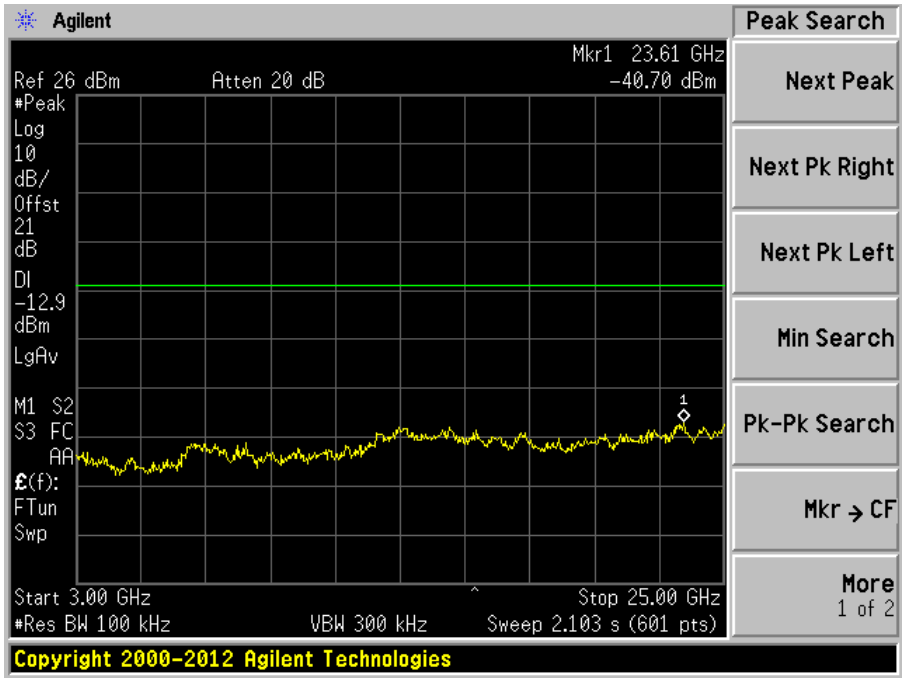


Middle Channel 2441 MHz

Plot #1 30 MHz – 3 GHz

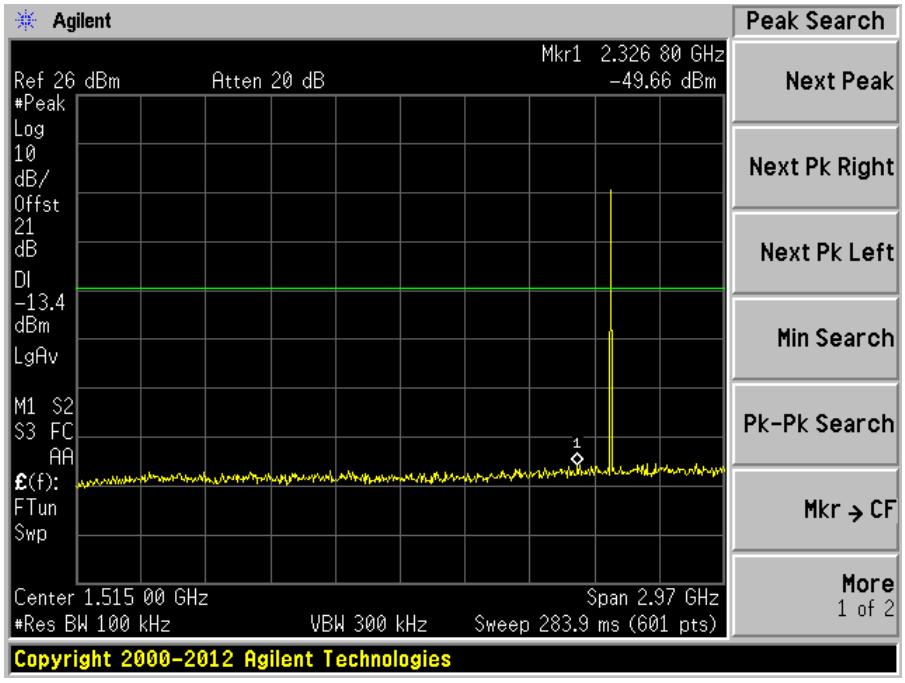


Plot #2 3 GHz – 25 GHz

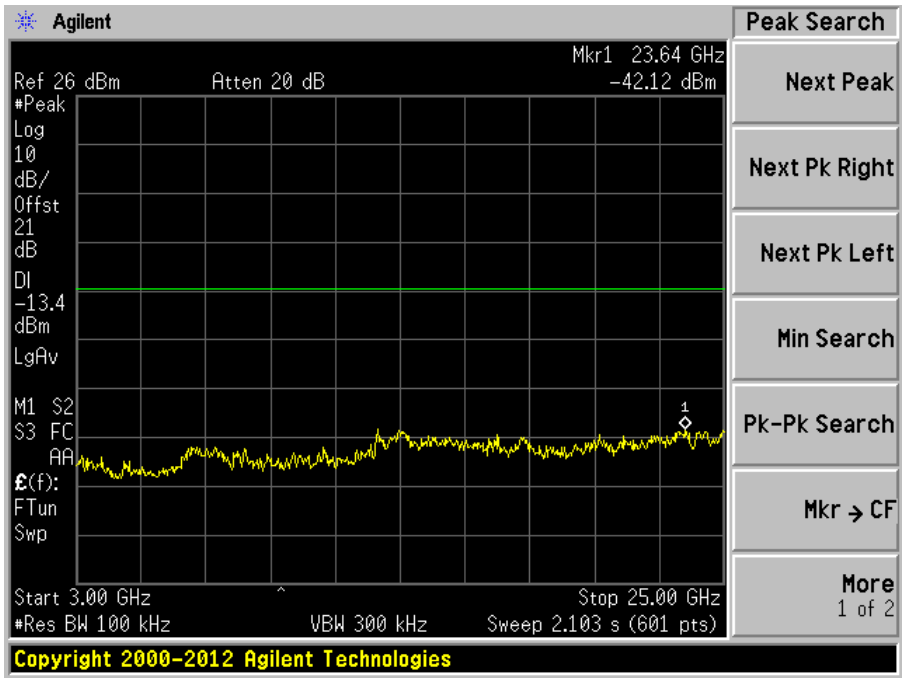


High Channel 2480 MHz

Plot #1 30 MHz – 3 GHz



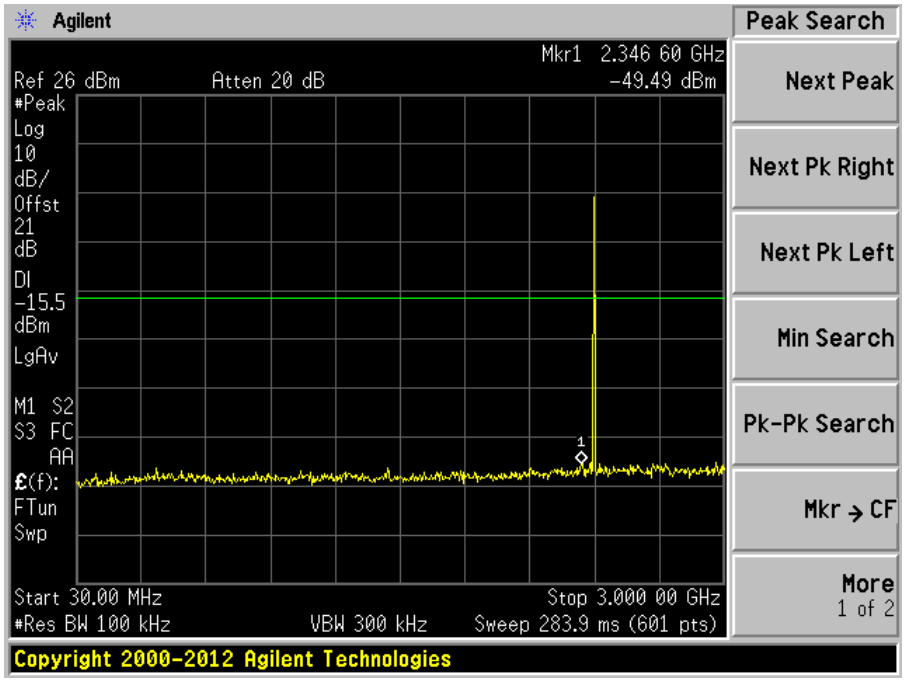
Plot #2 3 GHz – 25 GHz



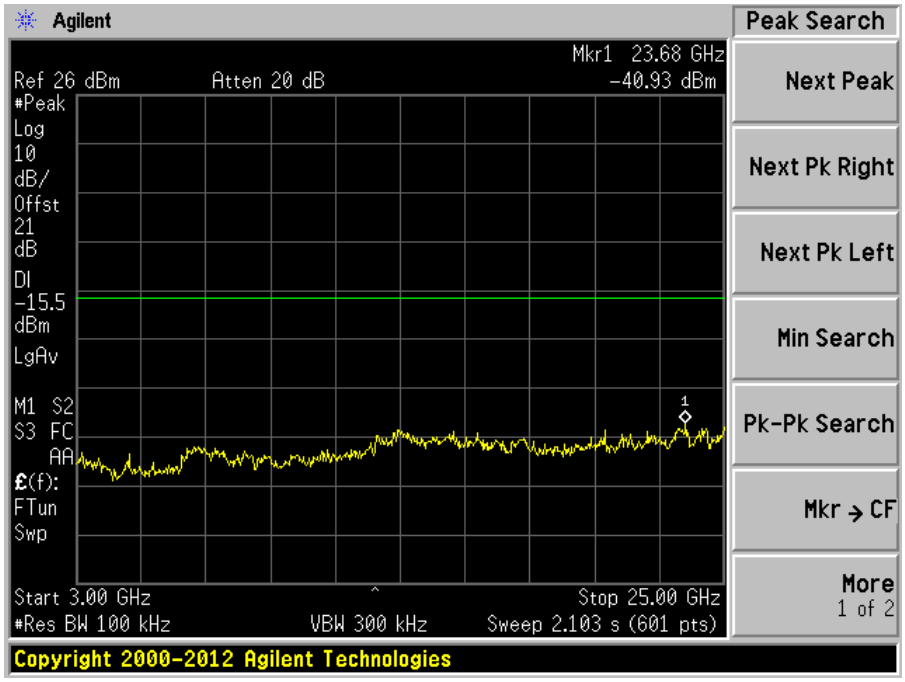
Modulation: 8DPSK

Low Channel 2402 MHz

Plot #1 30 MHz – 3 GHz

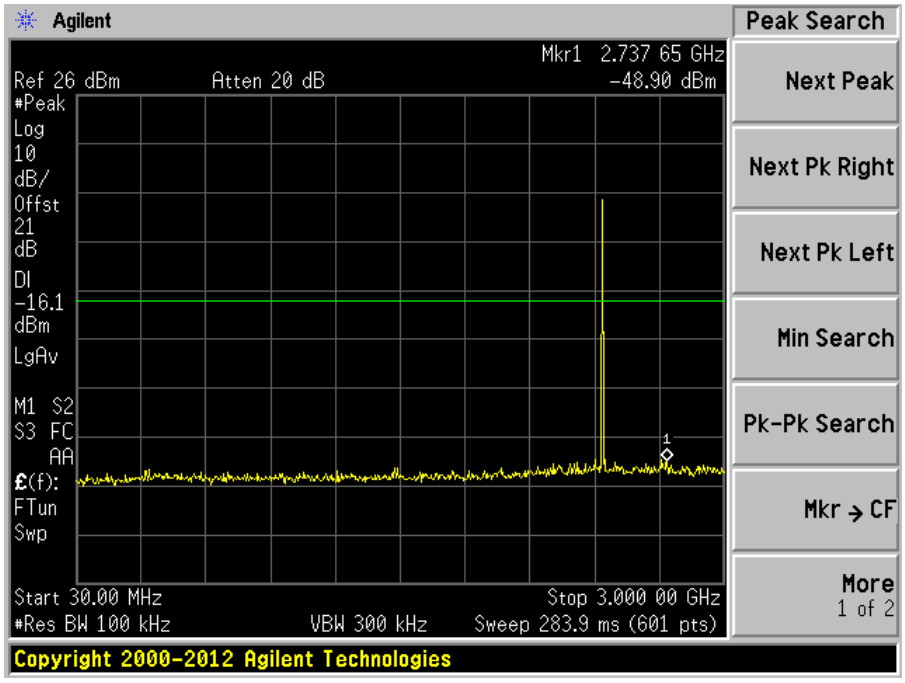


Plot #2 3 GHz – 25 GHz

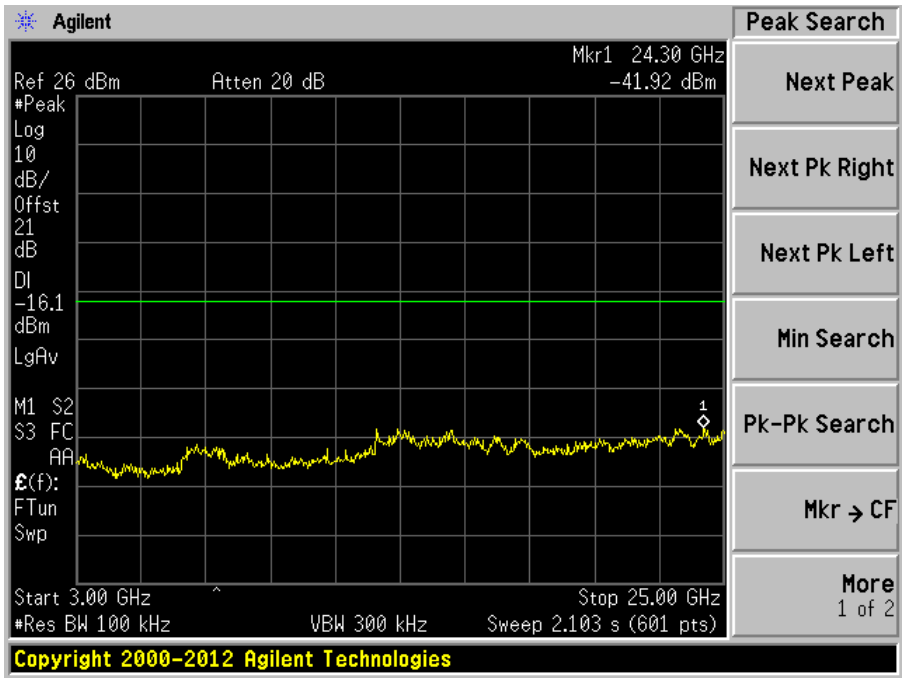


Middle Channel 2441 MHz

Plot #1 30 MHz – 3 GHz

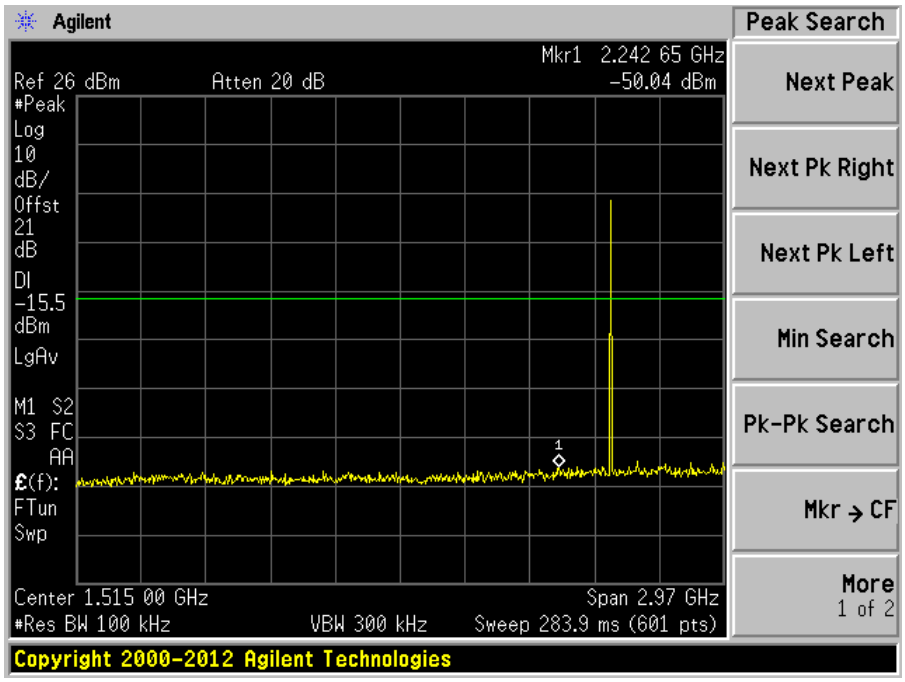


Plot #2 3 GHz – 25 GHz

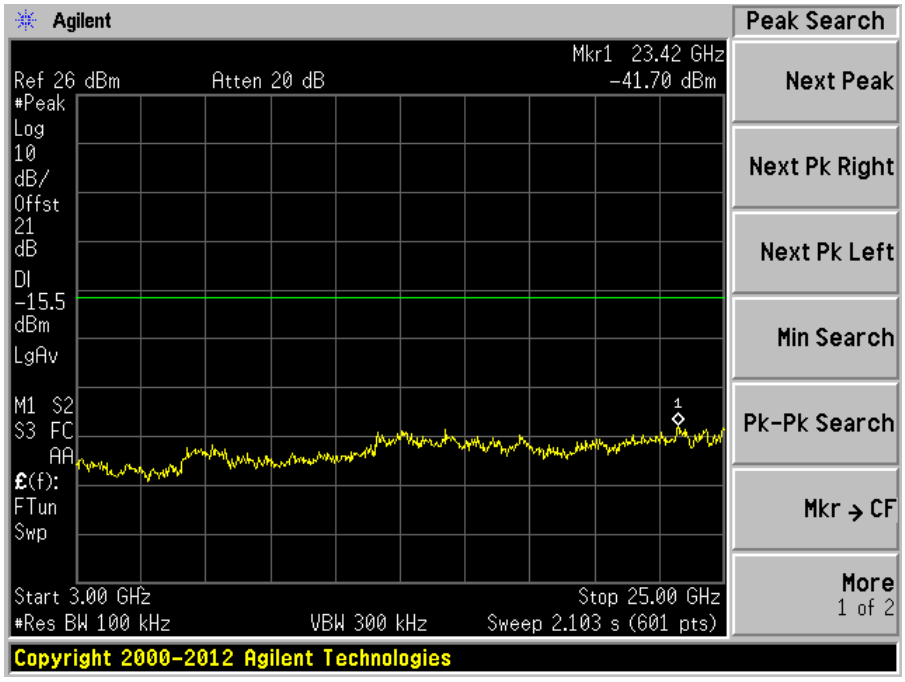


High Channel 2480 MHz

Plot #1 30 MHz – 3 GHz



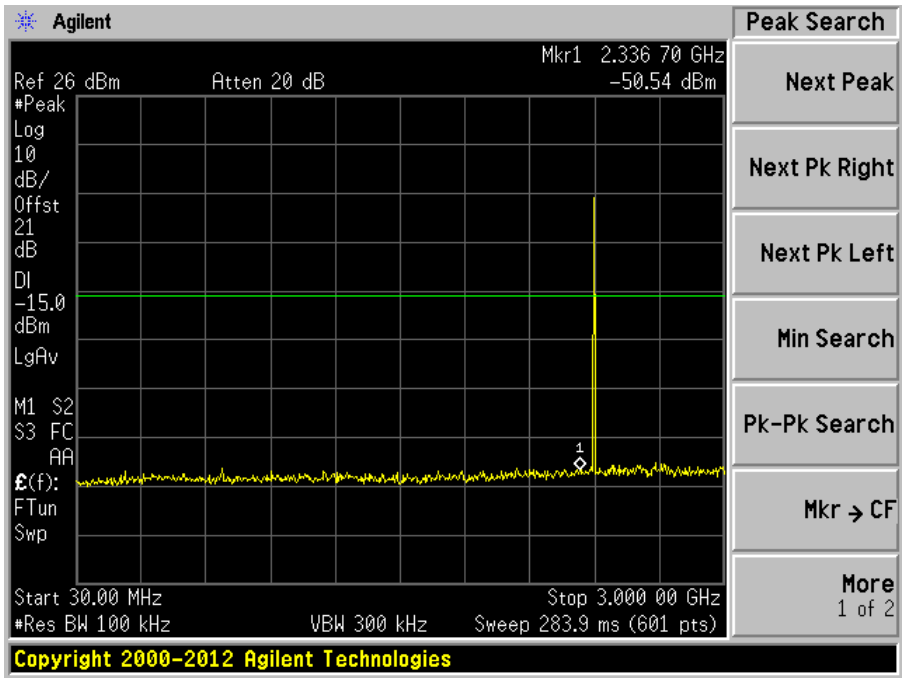
Plot #2 3 GHz – 25 GHz



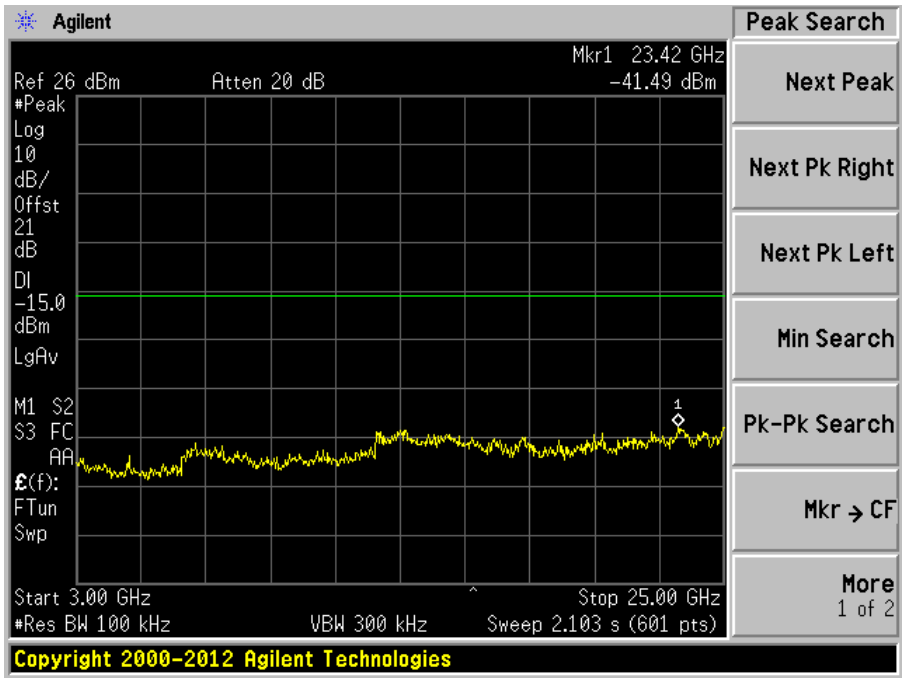
Modulation: Π/4-DQPSK

Low Channel 2402 MHz

Plot #1 30 MHz – 3 GHz

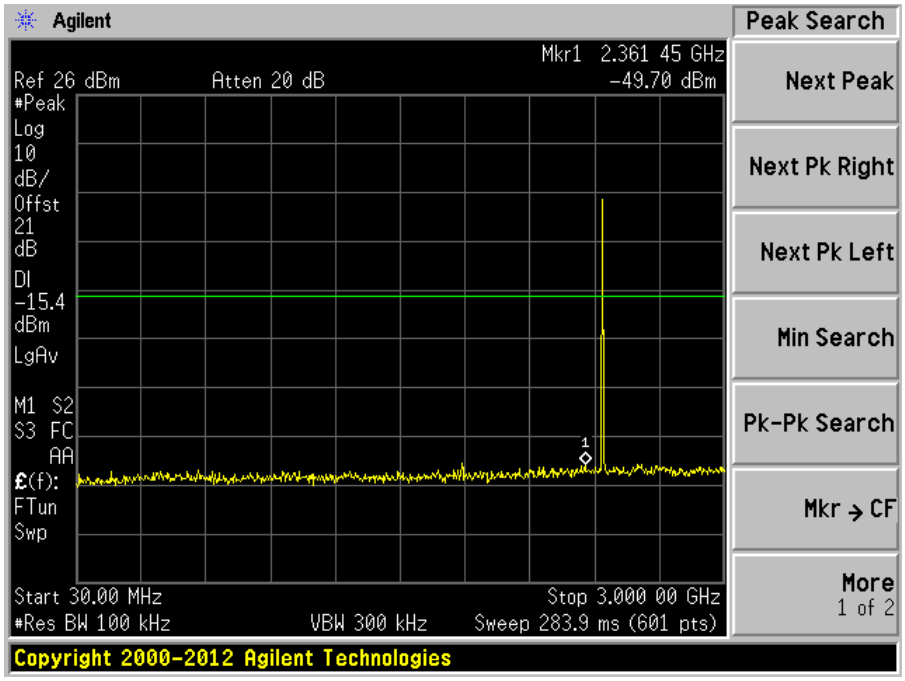


Plot #2 3 GHz – 25 GHz

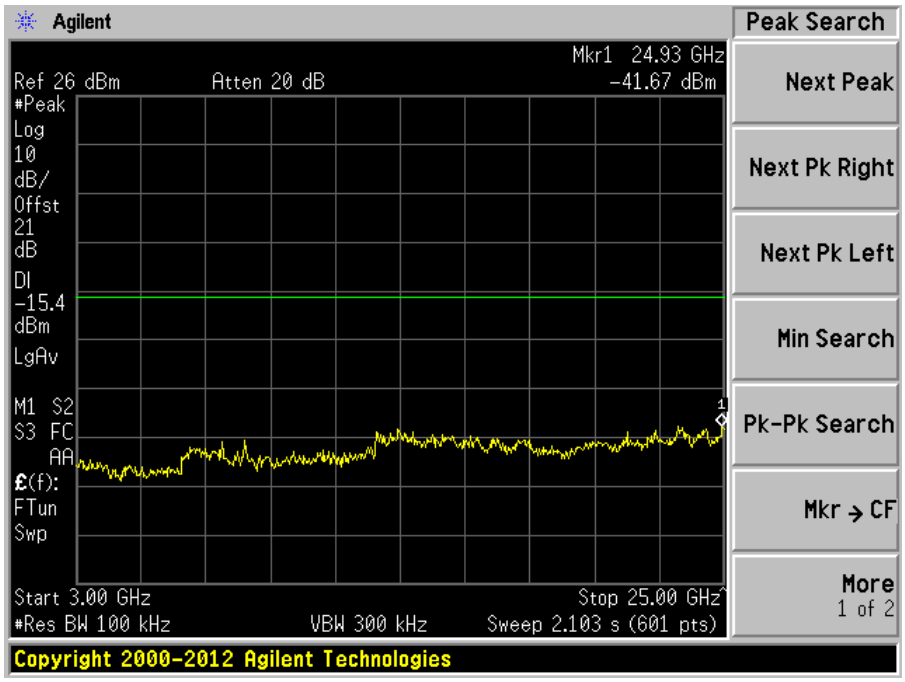


Middle Channel 2441 MHz

Plot #1 30 MHz – 3 GHz

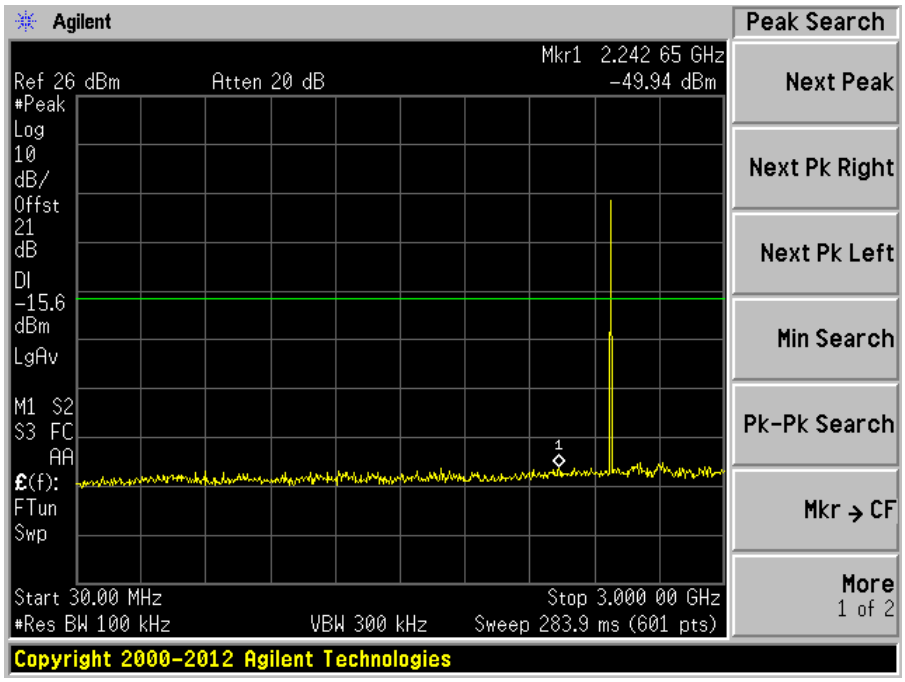


Plot #2 3 GHz – 25 GHz

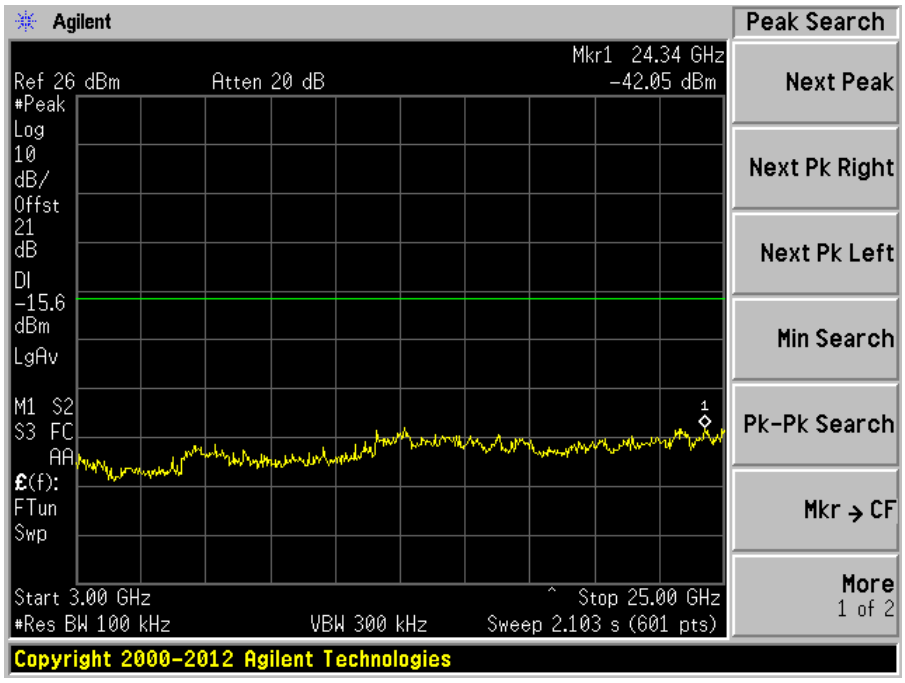


High Channel 2480 MHz

Plot #1 30 MHz – 3 GHz



Plot #2 3 GHz – 25 GHz



7 FCC §15.205, §15.209, §15.247(d) & IC RSS-210 §2.2, §2.6, §A8.5 – Spurious Radiated Emissions

7.1 Applicable Standard

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): 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**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** 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 the100 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.

7.2 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.

7.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords was connected to the DC Power Supply.

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

7.4 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)

7.5 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4446A	MY48250238	2013-08-29	1 year
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2013-07-11	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2013-06-09	1 year
EMCO	Horn antenna	3115	9511-4627	2014-1-7	1 year
Mini-Circuits	Pre Amplifier	ZVA-183-S	570400946	2013-05-09	1 year

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

7.6 Test Environmental Conditions

Temperature:	24° C
Relative Humidity:	49 %
ATM Pressure:	101.9 kPa

The testing was performed by Chen Ge on 2014-03-12 at 5 meter chamber 2.

7.7 Summary of Test Results

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

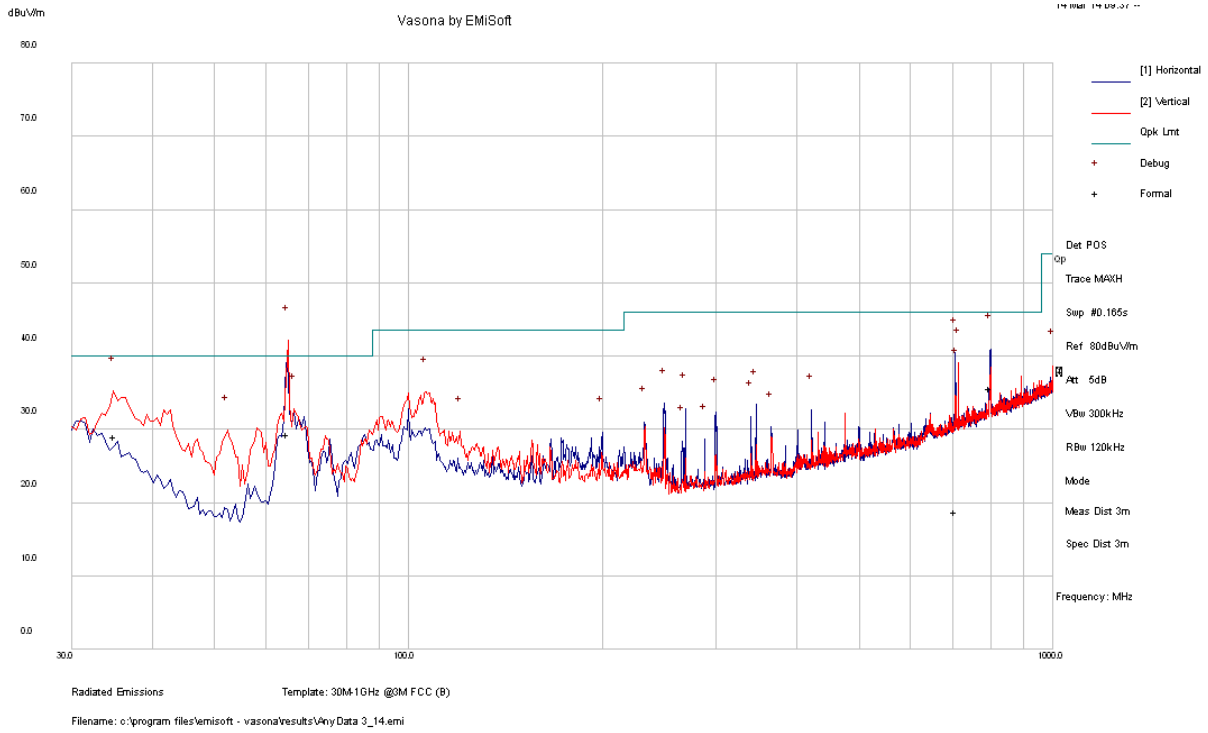
Bluetooth Worst mode: 8DPSK

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-8.825	2483.5	Horizontal	1000 MHz – 25 GHz
-10.43	799.4633	Horizontal	30 MHz – 1 GHz

Please refer to the following table for specific test result details

7.8 Radiated Emissions Test Results

1) Radiated Emission at 3 meters, below 1 GHz on the worst modulation: 8DPSK



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
64.9335	29.28	186	V	84	40	-10.72	QP
35.042	29.12	124	V	321	40	-10.88	QP
799.4633	35.57	167	H	74	46	-10.43	QP
705.2545	18.81	156	H	164	46	-27.19	QP

2) Radiated Emission at 3 meters, above 1 GHz on the worst modulation: 8DPSK

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	76.6	203	100	V	28.956	3.12	0.00	108.676	-	-	Fund/Peak
2402	76.12	157	100	H	28.956	3.12	0.00	108.196	-	-	Fund/Peak
2402	72.36	203	100	V	28.956	3.12	0.00	104.436	-	-	Fund/Ave
2402	71.44	157	100	H	28.956	3.12	0.00	103.516	-	-	Fund/Ave
2390	27.22	0	100	V	28.192	3.12	0.00	58.532	74	-15.468	Spur/Peak
2390	26.88	0	100	H	28.192	3.12	0.00	58.192	74	-15.808	Spur/Peak
2390	12.23	0	100	V	28.192	3.12	0.00	43.542	54	-10.458	Spur/Ave
2390	12.2	0	100	H	28.192	3.12	0.00	43.512	54	-10.488	Spur/Ave
4804	32.18	0	100	V	33.097	4.56	27.7	42.137	74	-31.863	Harm/Peak
4804	32.06	0	100	H	33.097	4.56	27.7	42.017	74	-31.983	Harm/Peak
4804	18.15	0	100	V	33.097	4.56	27.7	28.107	54	-25.893	Harm/Ave
4804	17.85	0	100	H	33.097	4.56	27.7	27.807	54	-26.193	Harm/Ave
7206	32.52	0	100	V	35.928	5.49	27.58	46.358	88.676	-42.318	Harm/Peak
7206	32.33	0	100	H	35.928	5.49	27.58	46.168	88.196	-42.028	Harm/Peak
7206	18.41	0	100	V	35.928	5.49	27.58	32.248	84.436	-52.188	Harm/Ave
7206	18.34	0	100	H	35.928	5.49	27.58	32.178	83.516	-51.338	Harm/Ave
9608	31.11	0	100	V	37.954	6.54	27.06	48.544	88.676	-40.132	Harm/Peak
9608	31.39	0	100	H	37.954	6.54	27.06	48.824	88.196	-39.372	Harm/Peak
9608	16.93	0	100	V	37.954	6.54	27.06	34.364	84.436	-50.072	Harm/Ave
9608	16.88	0	100	H	37.954	6.54	27.06	34.314	83.516	-49.202	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	77.05	192	100	V	28.956	3.12	0.00	109.126	-	-	Fund/Peak
2441	75.72	317	100	H	28.956	3.12	0.00	107.796	-	-	Fund/Peak
2441	72.22	192	100	V	28.956	3.12	0.00	104.296	-	-	Fund/Ave
2441	70.23	317	100	H	28.956	3.12	0.00	102.306	-	-	Fund/Ave
4882	31.71	0	100	V	33.327	4.54	27.76	41.817	74	-32.183	Harm/Peak
4882	31.85	0	100	H	33.327	4.54	27.76	41.957	74	-32.043	Harm/Peak
4882	17.63	0	100	V	33.327	4.54	27.76	27.737	54	-26.263	Harm/Ave
4882	17.65	0	100	H	33.327	4.54	27.76	27.757	54	-26.243	Harm/Ave
7323	32.68	0	100	V	36.369	5.57	27.51	47.109	74	-26.891	Harm/Peak
7323	32.53	0	100	H	36.369	5.57	27.51	46.959	74	-27.041	Harm/Peak
7323	18.17	0	100	V	36.369	5.57	27.51	32.599	54	-21.401	Harm/Ave
7323	18.1	0	100	H	36.369	5.57	27.51	32.529	54	-21.471	Harm/Ave
9764	31.3	0	100	V	38.287	6.62	26.98	49.227	89.126	-39.899	Harm/Peak
9764	30.99	0	100	H	38.287	6.62	26.98	48.917	87.796	-38.879	Harm/Peak
9764	16.79	0	100	V	38.287	6.62	26.98	34.717	84.296	-49.579	Harm/Ave
9764	16.75	0	100	H	38.287	6.62	26.98	34.677	82.306	-47.629	Harm/Ave
High channel 2480 MHz											
2480	76.88	198	100	V	29.155	3.25	0.00	109.285	-	-	Fund/Peak
2480	75.16	54	100	H	29.155	3.25	0.00	107.565	-	-	Fund/Peak
2480	72.72	198	100	V	29.155	3.25	0.00	105.125	-	-	Fund/Ave
2480	70.75	54	100	H	29.155	3.25	0.00	103.155	-	-	Fund/Ave
2483.5	27.1	0	100	V	29.155	3.25	0.00	59.505	74	-14.495	Spur/Peak
2483.5	27.12	0	100	H	29.155	3.25	0.00	59.525	74	-14.475	Spur/Peak
2483.5	12.63	0	100	V	29.155	3.25	0.00	45.035	54	-8.965	Spur/Ave
2483.5	12.77	0	100	H	29.155	3.25	0.00	45.175	54	-8.825	Spur/Ave
4960	32.42	0	100	V	33.327	4.52	27.75	42.517	74	-31.483	Harm/Peak
4960	31.77	0	100	H	33.327	4.52	27.75	41.867	74	-32.133	Harm/Peak
4960	17.73	0	100	V	33.327	4.52	27.75	27.827	54	-26.173	Harm/Ave
4960	17.55	0	100	H	33.327	4.52	27.75	27.647	54	-26.353	Harm/Ave
7440	32.12	0	100	V	36.565	5.62	27.51	46.795	74	-27.205	Harm/Peak
7440	31.88	0	100	H	36.565	5.62	27.51	46.555	74	-27.445	Harm/Peak
7440	18.42	0	100	V	36.565	5.62	27.51	33.095	54	-20.905	Harm/Ave
7440	18.28	0	100	H	36.565	5.62	27.51	32.955	54	-21.045	Harm/Ave
9920	30.33	0	100	V	38.287	6.55	26.98	48.187	89.285	-41.098	Harm/Peak
9920	30.08	0	100	H	38.287	6.55	26.98	47.937	87.565	-39.628	Harm/Peak
9920	16.23	0	100	V	38.287	6.55	26.98	34.087	85.125	-51.038	Harm/Ave
9920	16.39	0	100	H	38.287	6.55	26.98	34.247	83.155	-48.908	Harm/Ave

8 FCC §15.247(a)(2) & IC RSS-210 §A8.1 – Hopping Channel Bandwidth

8.1 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.

8.2 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 it to measurement instrument. Then 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 6 dB from the reference level. Record the frequency difference as the emissions bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

8.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4446A	MY48250238	2013-08-29	1 year

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

8.4 Test Environmental Conditions

Temperature:	23 °C
Relative Humidity:	48 %
ATM Pressure:	102.5 kPa

The testing was performed by Chen Ge on 2014-03-12 at RF Site.

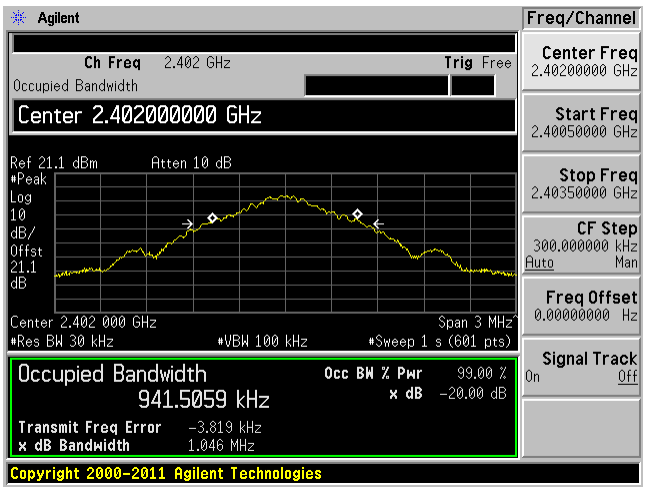
8.5 Test Results

Mode	Channel	Frequency (MHz)	20 dB Channel Bandwidth (MHz)	99% Occupied Bandwidth
GFSK	Low	2402	1.046	0.941
	Middle	2441	1.039	0.940
	High	2480	1.038	0.938
8DPSK	Low	2402	1.361	1.204
	Middle	2441	1.362	1.202
	High	2480	1.360	1.203
Π/4-DQPSK	Low	2402	1.351	1.204
	Middle	2441	1.353	1.206
	High	2480	1.350	1.202

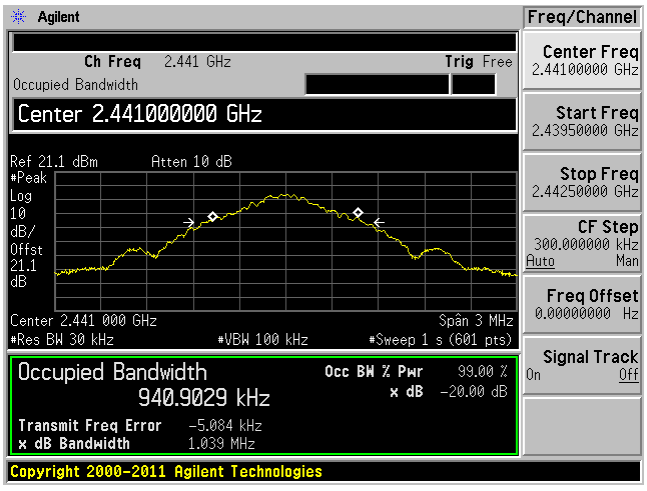
Please refer to the following plots for detailed test results:

GFSK

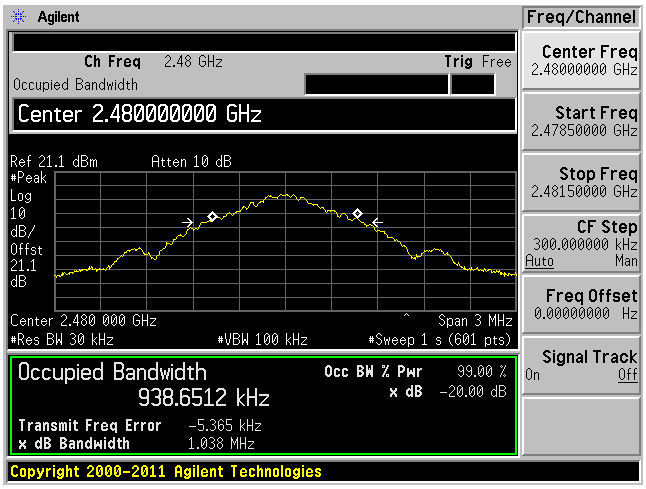
Low Channel 2402 MHz



Middle Channel 2441 MHz

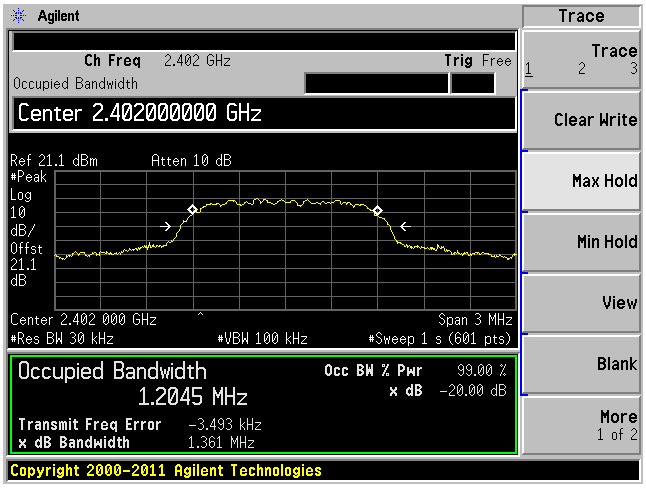


High Channel 2480 MHz

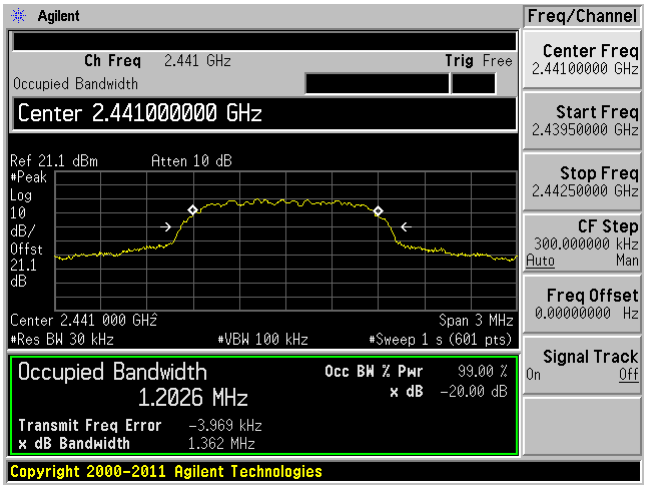


8DPSK

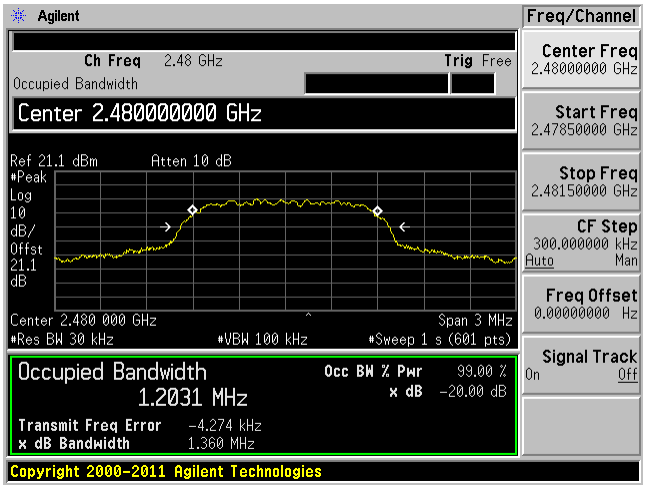
Low Channel 2402 MHz



Middle Channel 2441 MHz

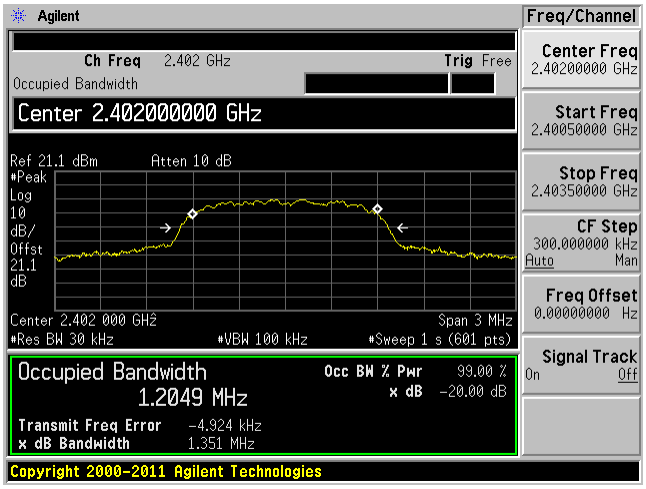


High Channel 2480 MHz

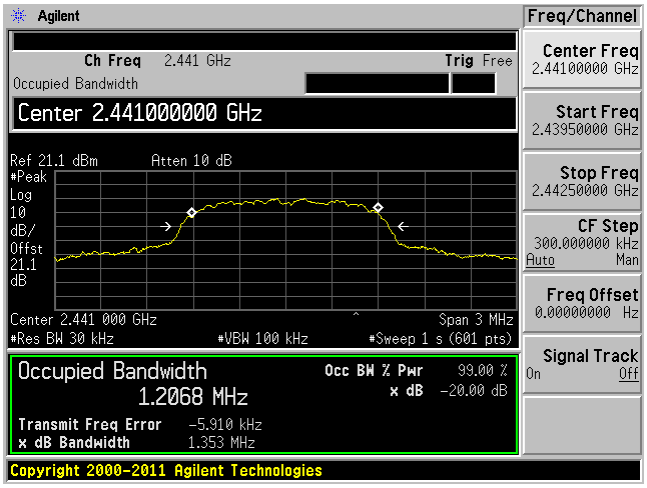


π/4-DQPSK

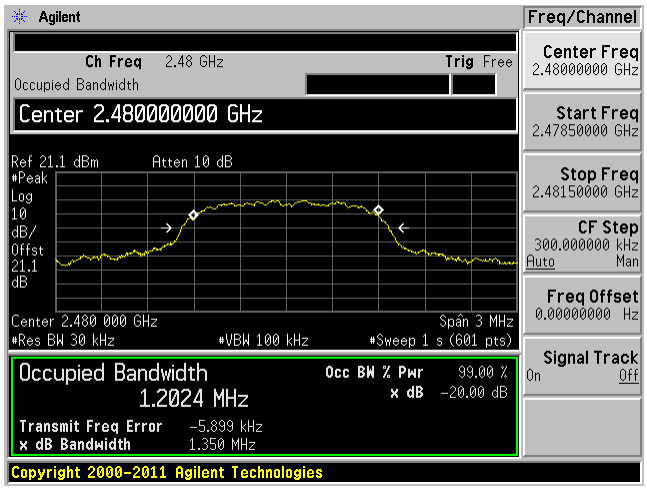
Low Channel 2402 MHz



Middle Channel 2441 MHz



High Channel 2480 MHz



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

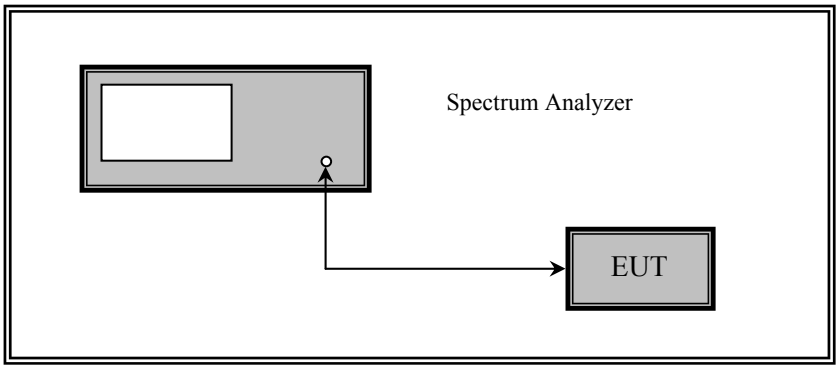
9.1 Applicable Standard

According to FCC §15.247(b) (1), for frequency hopping systems in the 2400-2483.5MHz band employing at least 75 hopping channels, and all direct sequence systems, the maximum peak output power of the transmitter shall not exceed 1 Watt. For all other frequency hopping system in the 2400 – 2483.5 MHz band, the maximum peak output power of the transmitter shall not exceed 0.125 Watt.

According to IC RSS-210 §8.4(2), For frequency hopping systems operating in the band 2400-2483.5 MHz employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W.

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 No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	MY48250238	2013-08-29	1 year

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

9.4 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	48 %
ATM Pressure:	102.5 kPa

The testing was performed by Chen Ge on 2014-03-12 at RF Site.

9.5 Test Results

Modulation GFSK:

Channel	Frequency (MHz)	Max Peak Output Power		Limit (mW)	Result
		(dBm)	(mW)		
Low	2402	7.75	5.95	1000	Pass
Mid	2441	8.13	6.50	1000	Pass
High	2480	8.00	6.30	1000	Pass

Modulation π/4-DQPSK:

Channel	Frequency (MHz)	Max Peak Output Power		Limit (mW)	Result
		(dBm)	(mW)		
Low	2402	9.70	9.33	1000	Pass
Mid	2441	10.04	10.09	1000	Pass
High	2480	9.84	9.63	1000	Pass

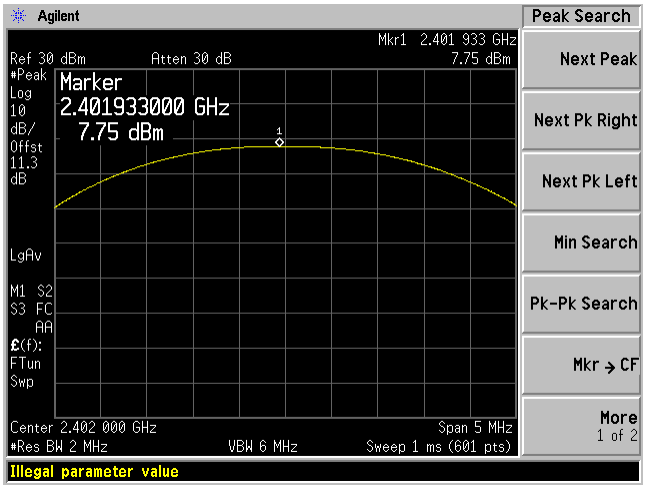
Modulation 8DPSK:

Channel	Frequency (MHz)	Max Peak Output Power		Limit (mW)	Result
		(dBm)	(mW)		
Low	2402	9.85	9.66	1000	Pass
Mid	2441	10.27	10.64	1000	Pass
High	2480	10.09	10.20	1000	Pass

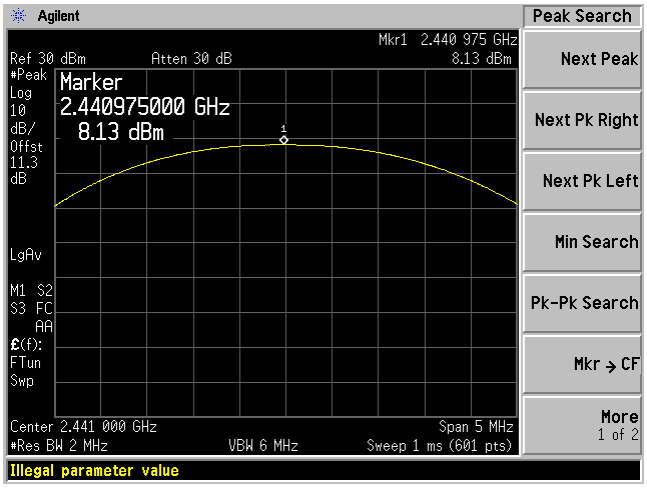
Please refer to the following plots for detailed test results:

GFSK

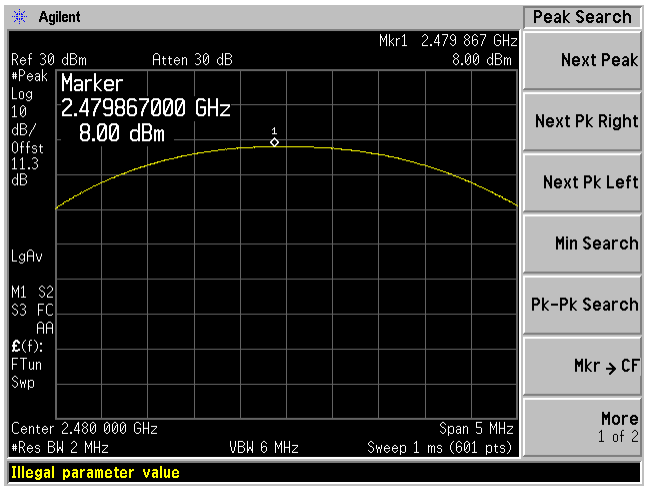
Low Channel 2402 MHz



Middle Channel 2441 MHz

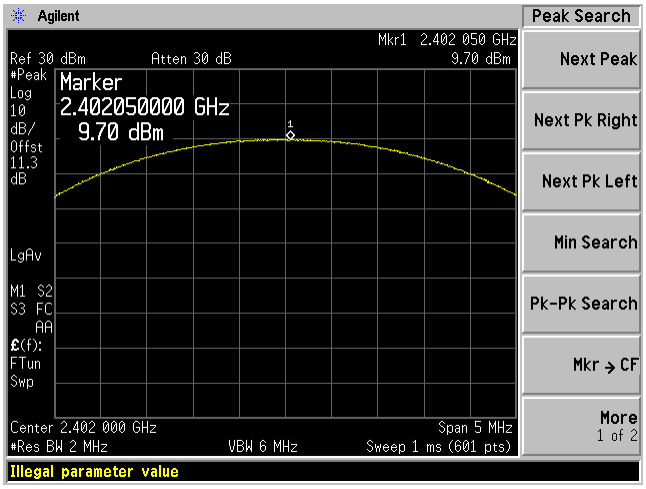


High Channel 2480 MHz

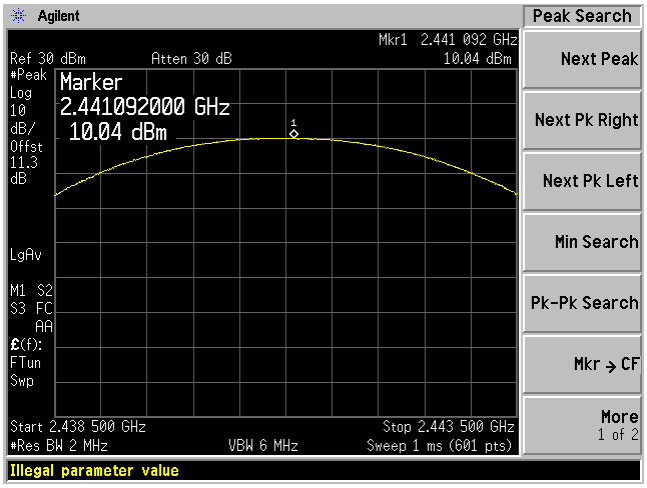


π/4-DQPSK

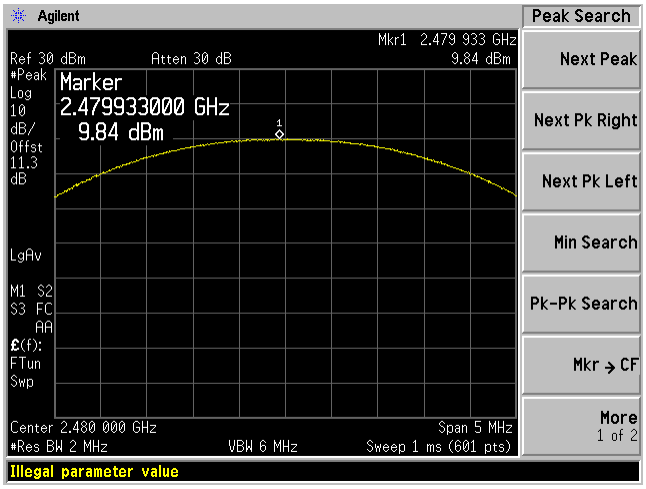
Low Channel 2402 MHz



Middle Channel 2441 MHz

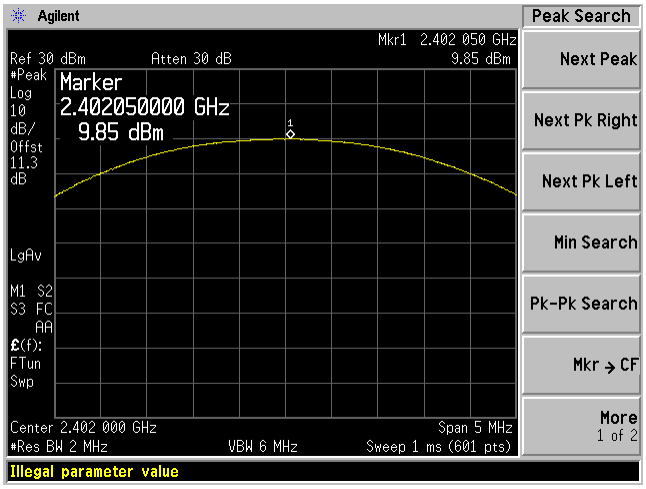


High Channel 2480 MHz

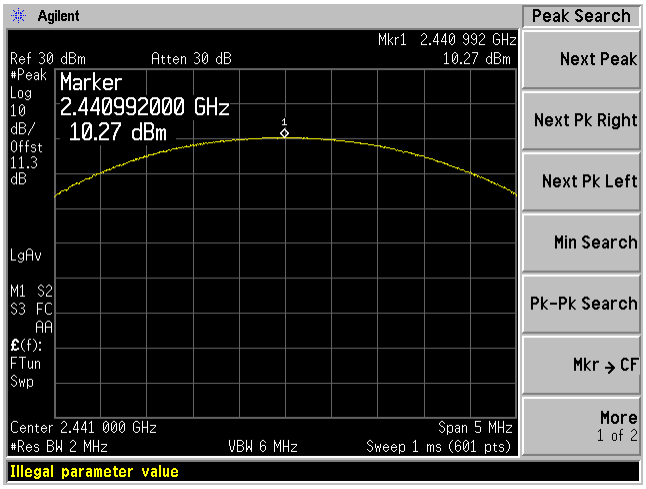


8DPSK

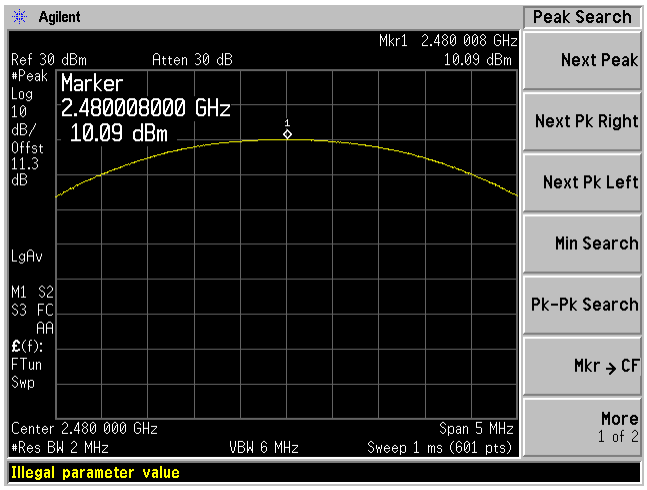
Low Channel 2402 MHz



Middle Channel 2441 MHz



High Channel 2480 MHz



10 FCC §15.247(d) & IC RSS-210 §A 8.5 – 100 kHz Bandwidth of Band Edges

10.1 Applicable Standard

According to FCC §15.247(d), in any 100 kHz bandwidth outside the frequency band 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. Attenuation below the general limits specified in §15.209(a) is not required.

According to IC RSS-210 §A 8.5.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 No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	MY48250238	2013-08-29	1 year

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

10.4 Test Environmental Conditions

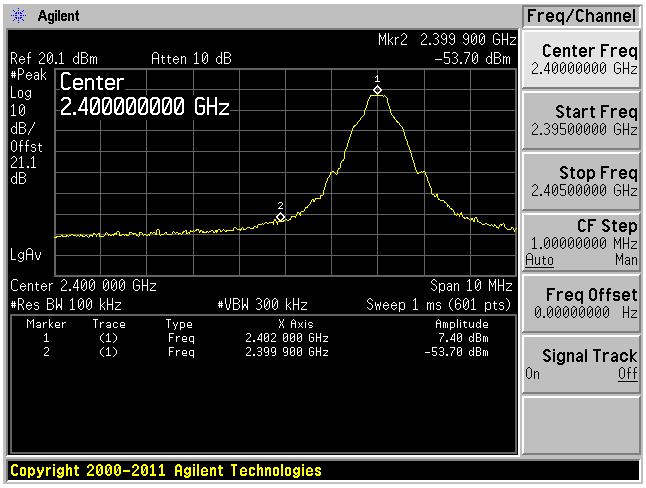
Temperature:	23 °C
Relative Humidity:	48 %
ATM Pressure:	102.5 kPa

The testing was performed by Chen Ge on 2014-03-12 at RF Site.

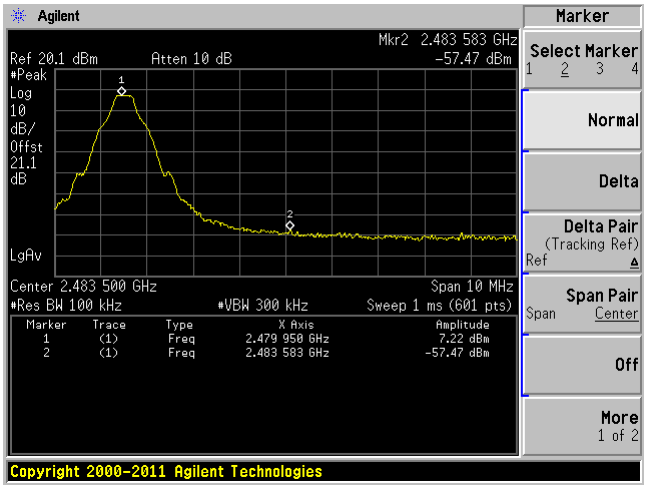
10.5 Test Results

GFSK

Low Band Edge

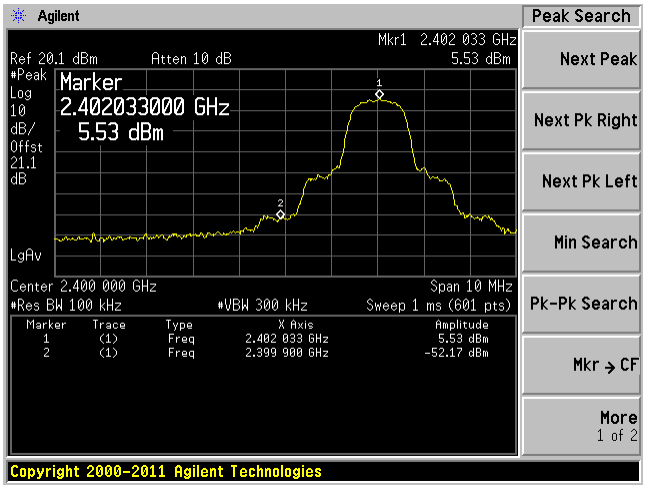


High Band Edge

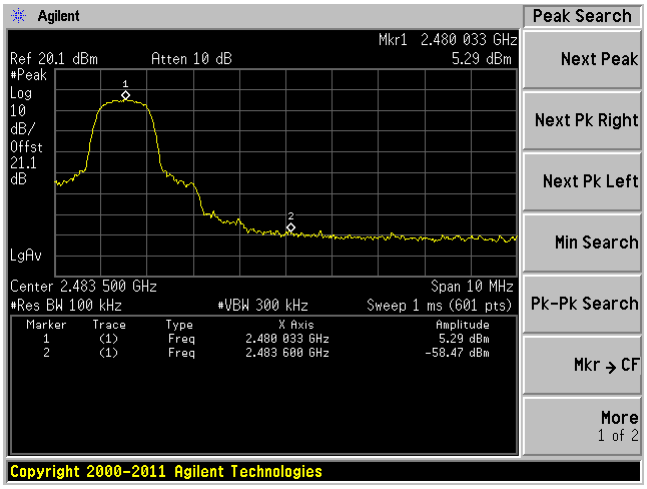


8DPSK

Low Band Edge

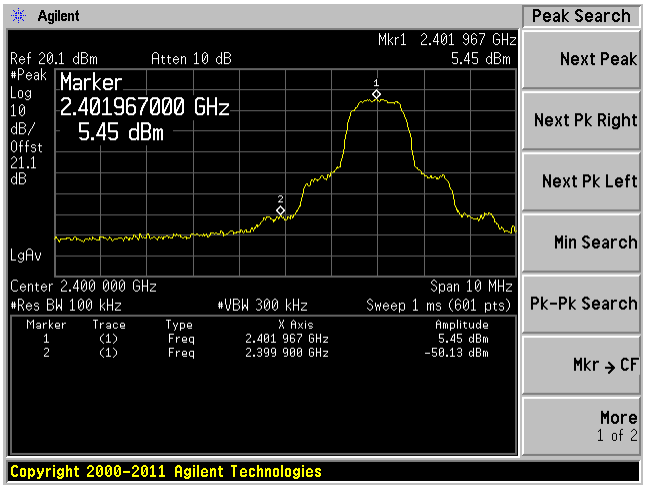


High Band Edge

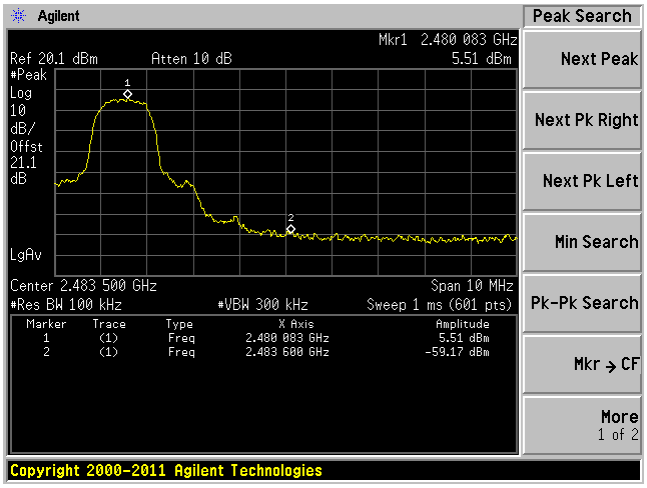


π/4-DQPSK

Low Band Edge



High Band Edge



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

11.1 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.

11.2 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.

11.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	MY48250238	2013-08-29	1 year

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

11.4 Test Environmental Conditions

Temperature:	23 °C
Relative Humidity:	48 %
ATM Pressure:	102.5 kPa

The testing was performed by Chen Ge on 2014-03-12 at RF Site.

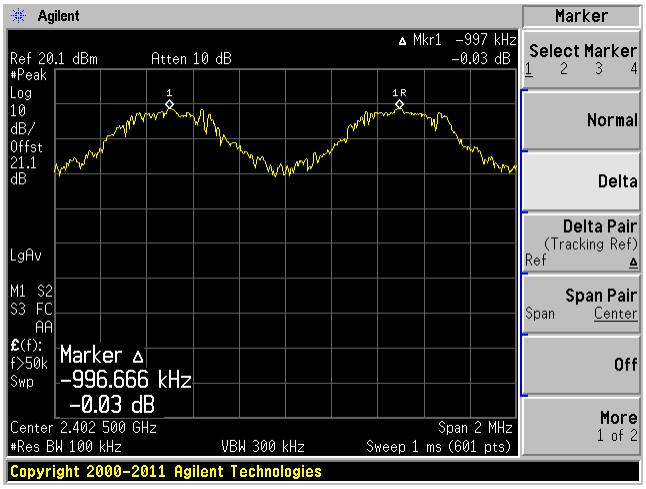
11.5 Test Results

Please refer to the following tables and plots.

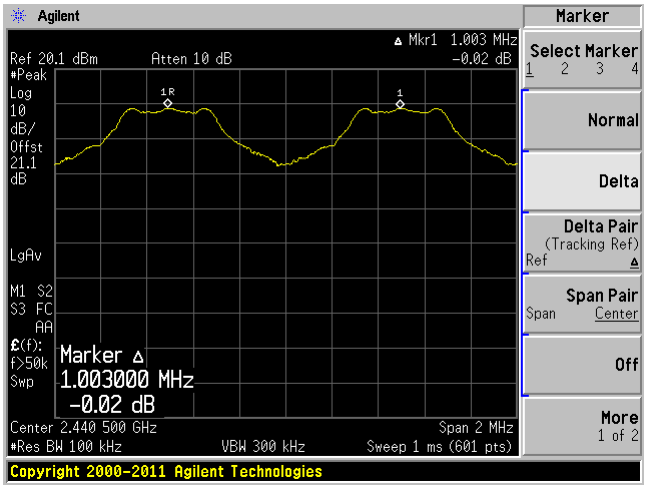
GFSK

Channel	Frequency (MHz)	Channel Separation (kHz)	Limit > 2/3 20 dB BW >(kHz)
Low	2402	996.666	627.604
Mid	2441	1003.000	626.639
High	2480	1000.000	625.141

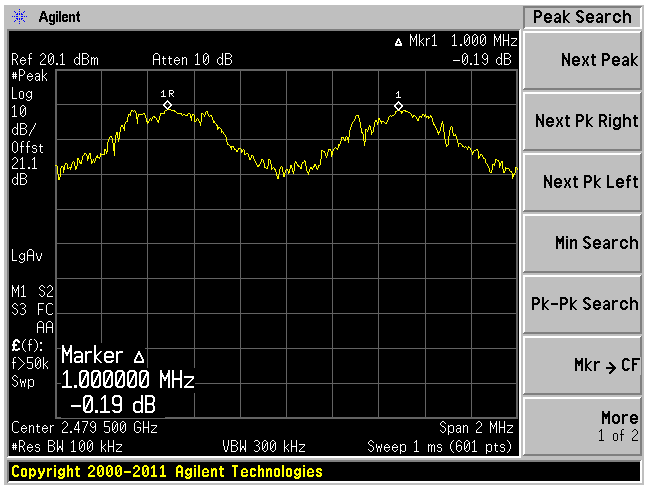
Low Channel



Middle Channel



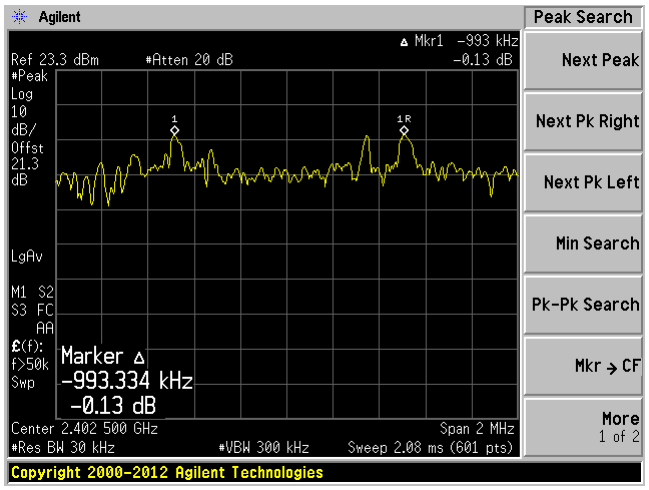
High Channel



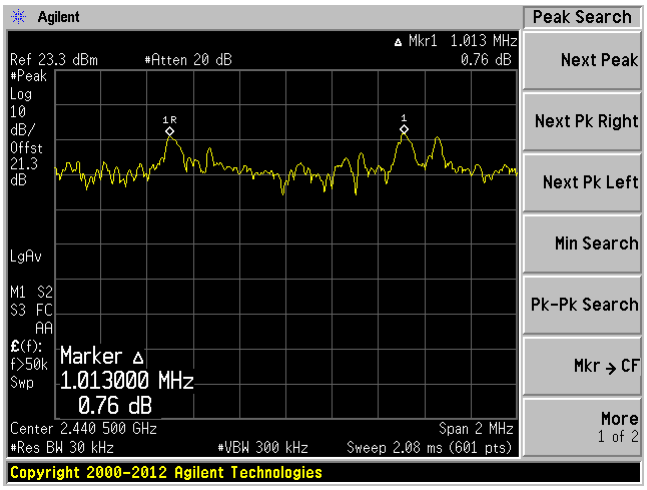
π/4-DQPSK

Channel	Frequency (MHz)	Channel Separation (kHz)	Limit > 2/3 20 dB BW >(kHz)
Low	2402	993.334	801.864
Mid	2441	1013.000	803.862
High	2480	1023.333	801.198

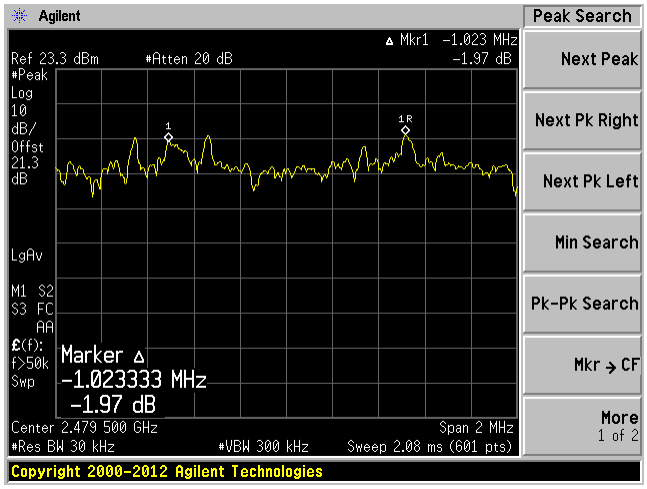
Low Channel



Middle Channel



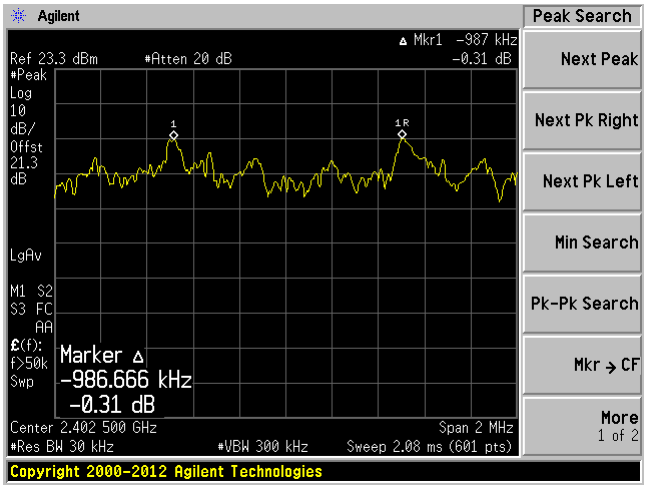
High Channel



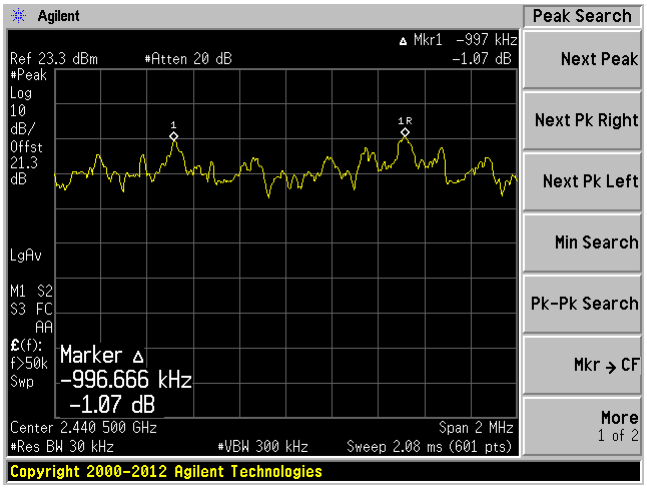
8DPSK

Channel	Frequency (MHz)	Channel Separation (kHz)	Limit > 2/3 20 dB BW >(kHz)
Low	2402	986.666	802.586
Mid	2441	996.666	801.198
High	2480	996.667	801.198

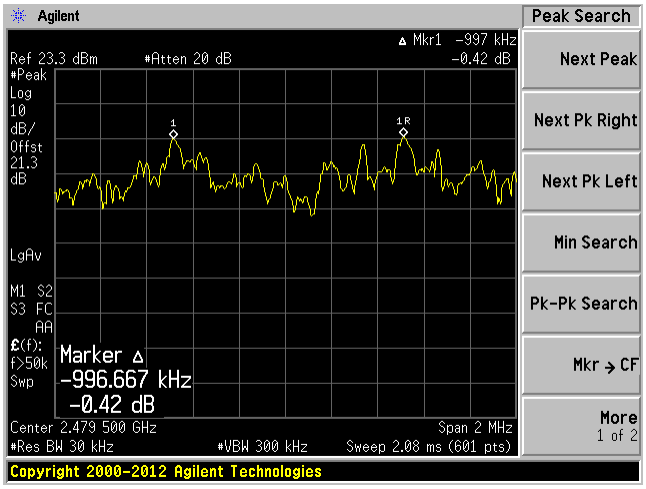
Low Channel



Middle Channel



High Channel



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

12.1 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.

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 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.

12.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	MY48250238	2013-08-29	1 year

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

12.4 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	48 %
ATM Pressure:	102.5 kPa

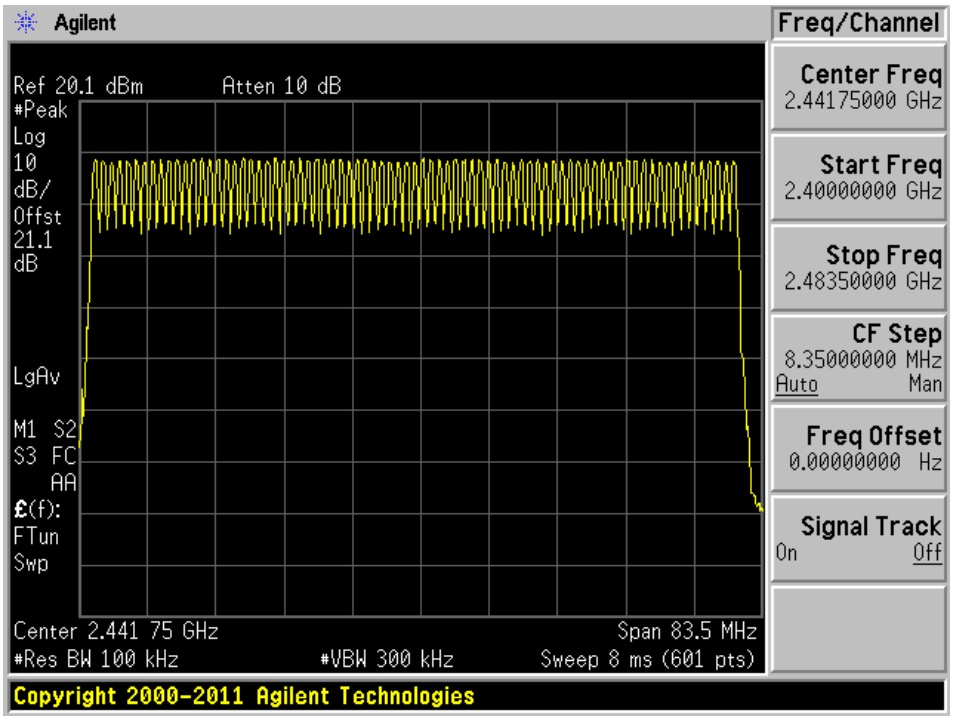
The testing was performed by Chen Ge on 2014-03-12 at RF Site.

12.5 Test Results

Please refer to the following plots.

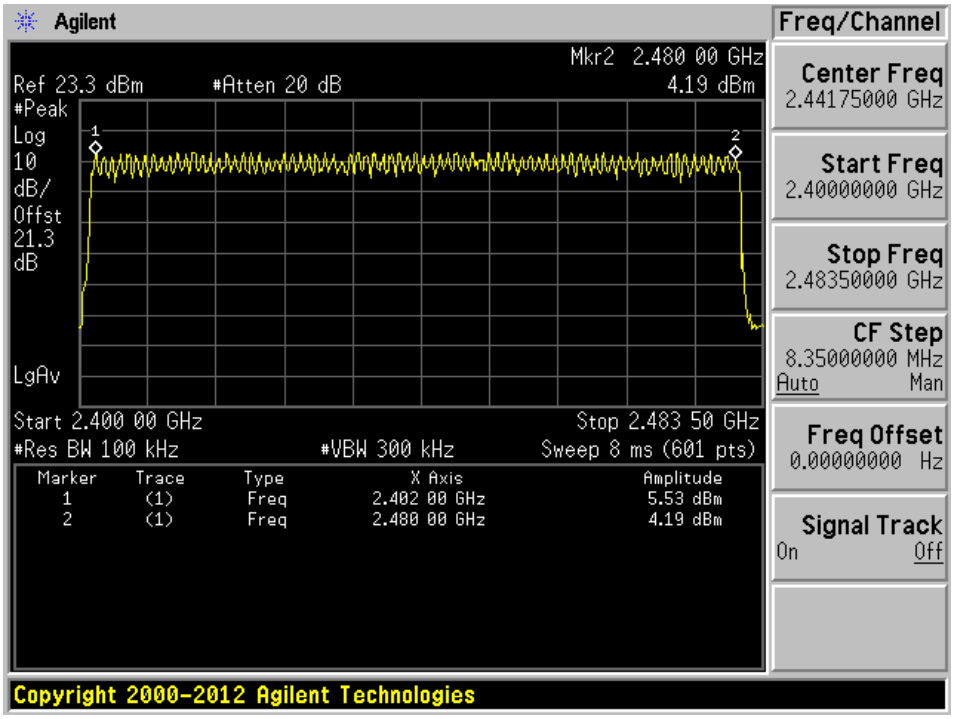
GFSK

Hopping Channel Number: Total 79 Channels



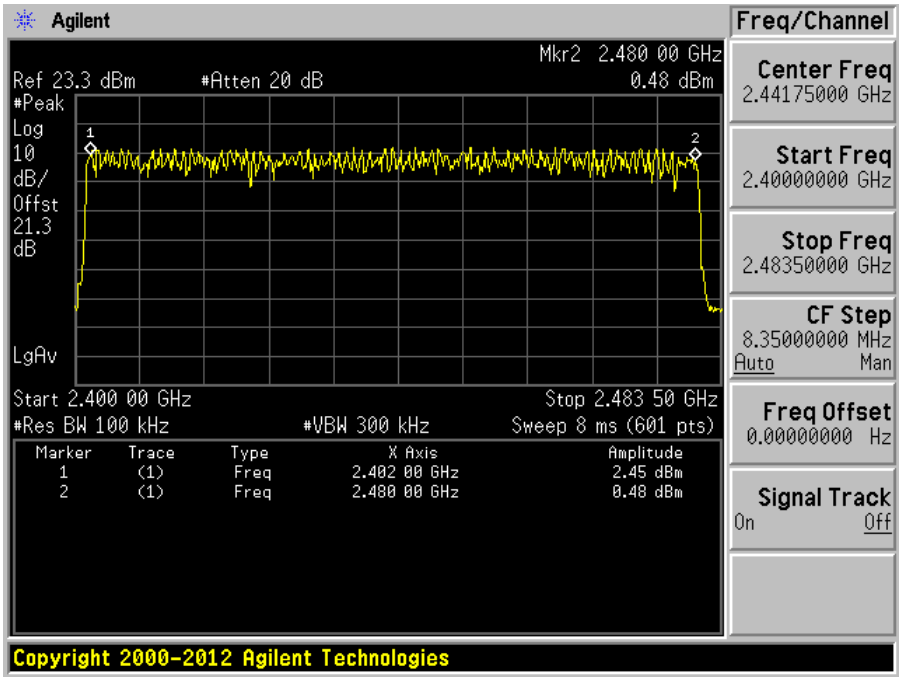
π/4-DQPSK

Hopping Channel Number: Total 79 Channels



8DPSK

Hopping Channel Number: Total 79 Channels



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

13.1 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.

13.2 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.

13.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	MY48250238	2013-08-29	1 year

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

13.4 Test Environmental Conditions

Temperature:	23 °C
Relative Humidity:	48 %
ATM Pressure:	102.5 kPa

The testing was performed by Chen Ge on 2014-03-12 at RF Site.

13.5 Test Results

GFSK

DH1: Packet Size = 27 byte

Channel	Pulse Width (ms)	Dwell time (sec)	Limit (sec)	Results
Low	0.390	0.1248	0.4	Pass
Mid	0.393	0.12576	0.4	Pass
High	0.396	0.12672	0.4	Pass

Note: Dwell time = Pulse time*(1600/2/79)*31.6S

DH3: Packet Size = 183 bytes

Channel	Pulse Width (ms)	Dwell time (sec)	Limit (sec)	Results
Low	1.650	0.264	0.4	Pass
Mid	1.645	0.2632	0.4	Pass
High	1.660	0.2656	0.4	Pass

Note: Dwell time = Pulse time*(1600/4/79)*31.6S

DH5: Packet Size = 339 bytes

Channel	Pulse Width (ms)	Dwell time (sec)	Limit (sec)	Results
Low	2.908	0.310187	0.4	Pass
Mid	2.900	0.309333	0.4	Pass
High	2.900	0.309333	0.4	Pass

Note: Dwell time = Pulse time*(1600/6/79)*31.6S

π/4-DQPSK

DH1: Packet Size = 27 byte

Channel	Pulse Width (ms)	Dwell time (sec)	Limit (sec)	Results
Low	0.393	0.12576	0.4	Pass
Mid	0.393	0.12576	0.4	Pass
High	0.393	0.12576	0.4	Pass

Note: Dwell time = Pulse time*(1600/2/79)*31.6S

DH3: Packet Size = 183 bytes

Channel	Pulse Width (ms)	Dwell time (sec)	Limit (sec)	Results
Low	1.650	0.264	0.4	Pass
Mid	1.645	0.2632	0.4	Pass
High	1.645	0.2632	0.4	Pass

Note: Dwell time = Pulse time*(1600/4/79)*31.6S

DH5: Packet Size = 339 bytes

Channel	Pulse Width (ms)	Dwell time (sec)	Limit (sec)	Results
Low	2.900	0.309333	0.4	Pass
Mid	2.900	0.309333	0.4	Pass
High	2.900	0.309333	0.4	Pass

Note: Dwell time = Pulse time*(1600/6/79)*31.6S

8DPSK

DH1: Packet Size = 27 byte

Channel	Pulse Width (ms)	Dwell time (sec)	Limit (sec)	Results
Low	0.406	0.12992	0.4	Pass
Mid	0.403	0.12896	0.4	Pass
High	0.393	0.12576	0.4	Pass

Note: Dwell time = Pulse time*(1600/2/79)*31.6S

DH3: Packet Size = 183 bytes

Channel	Pulse Width (ms)	Dwell time (sec)	Limit (sec)	Results
Low	1.655	0.2648	0.4	Pass
Mid	1.650	0.264	0.4	Pass
High	1.655	0.2648	0.4	Pass

Note: Dwell time = Pulse time*(1600/4/79)*31.6S

DH5: Packet Size = 339 bytes

Channel	Pulse Width (ms)	Dwell time (sec)	Limit (sec)	Results
Low	2.900	0.309333	0.4	Pass
Mid	2.900	0.309333	0.4	Pass
High	2.900	0.309333	0.4	Pass

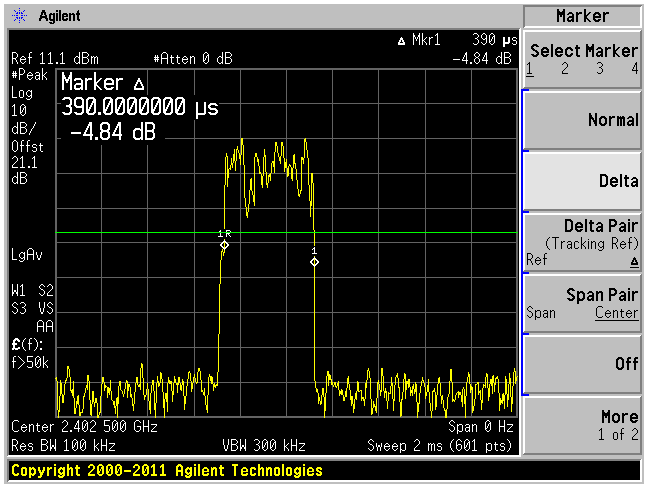
Note: Dwell time = Pulse time*(1600/6/79)*31.6S

Please refer the following plots.

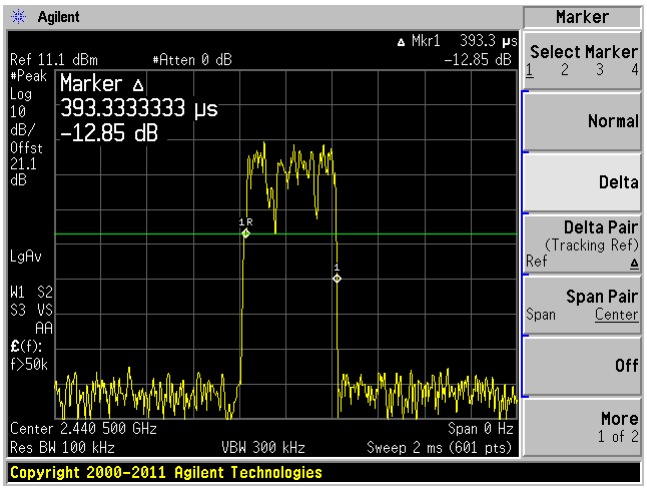
GFSK

DH1

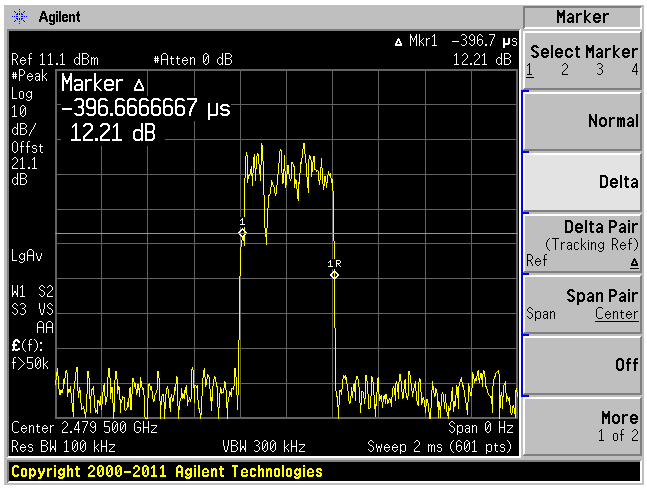
Low Channel



Middle Channel

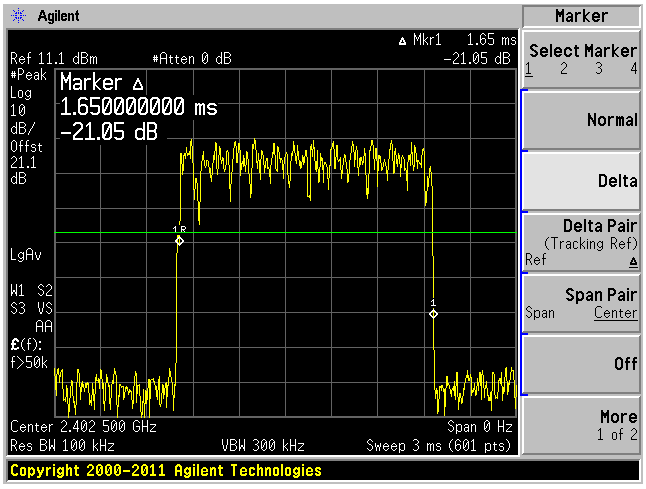


High Channel

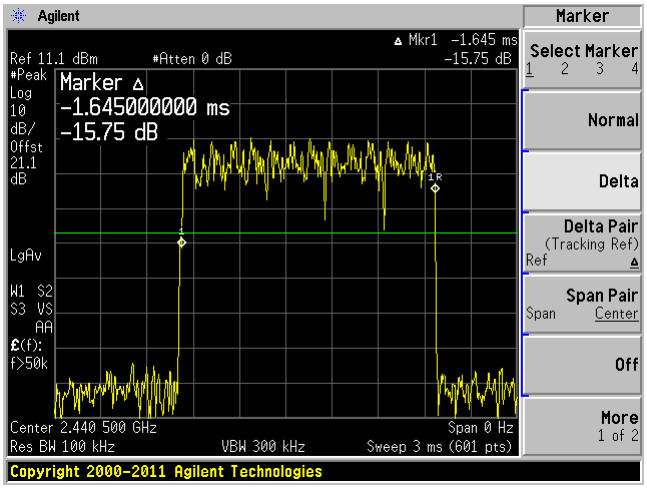


DH3

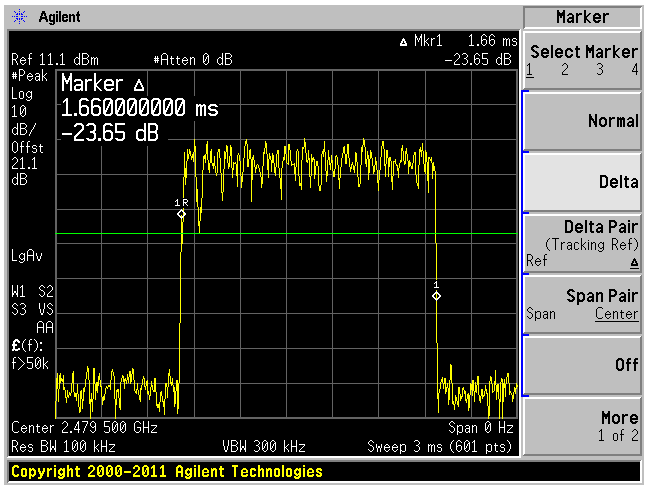
Low Channel



Middle Channel

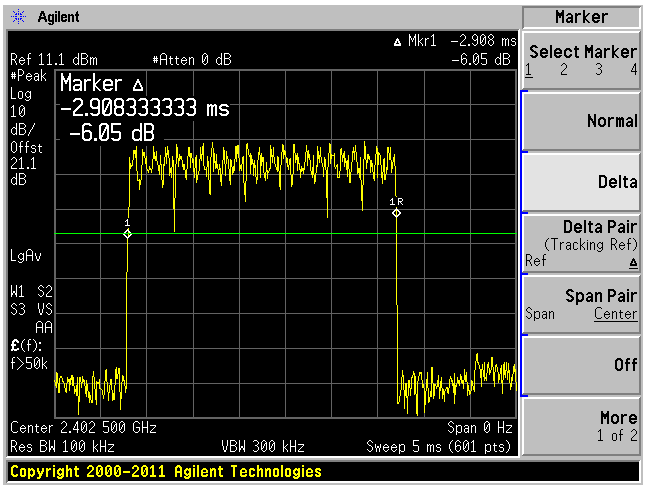


High Channel

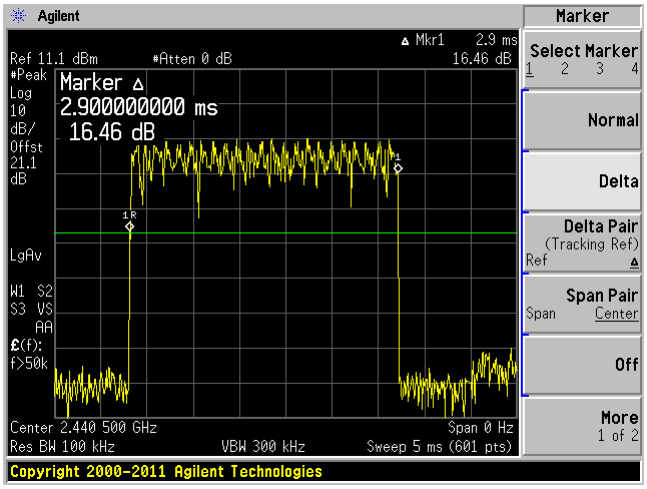


DH5

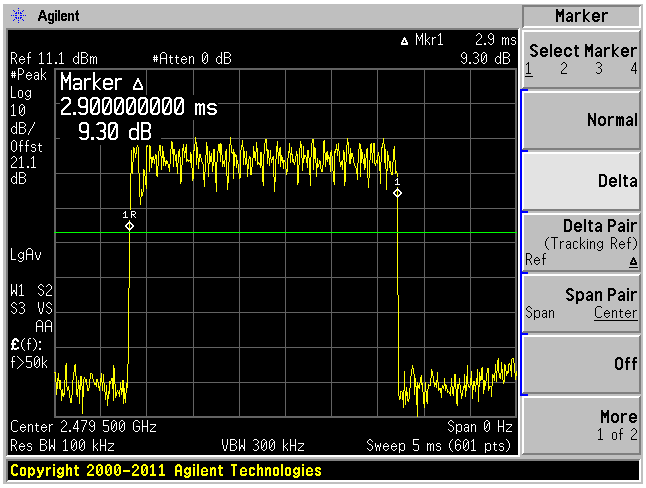
Low Channel



Middle Channel



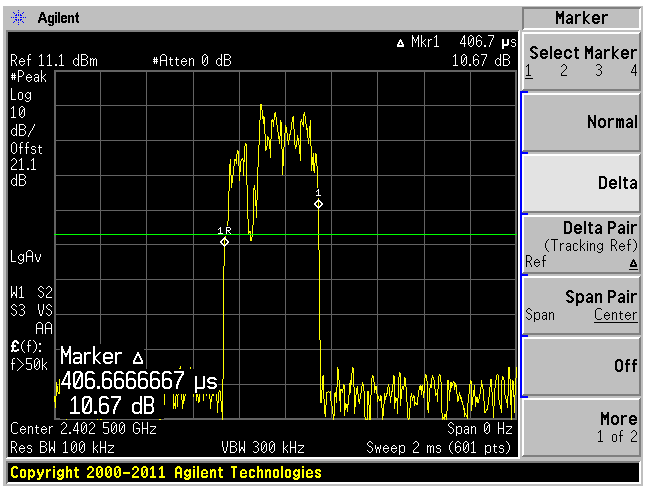
High Channel



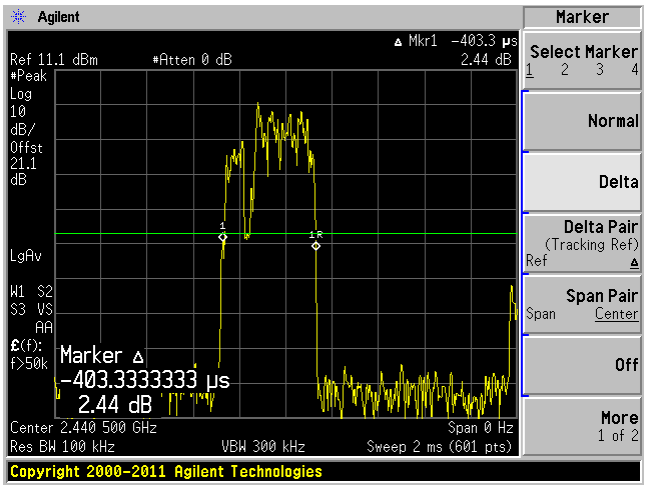
8DPSK

DH1

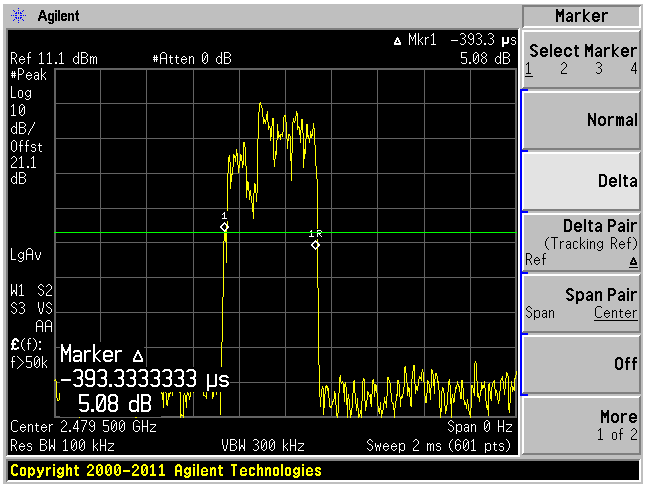
Low Channel



Middle Channel

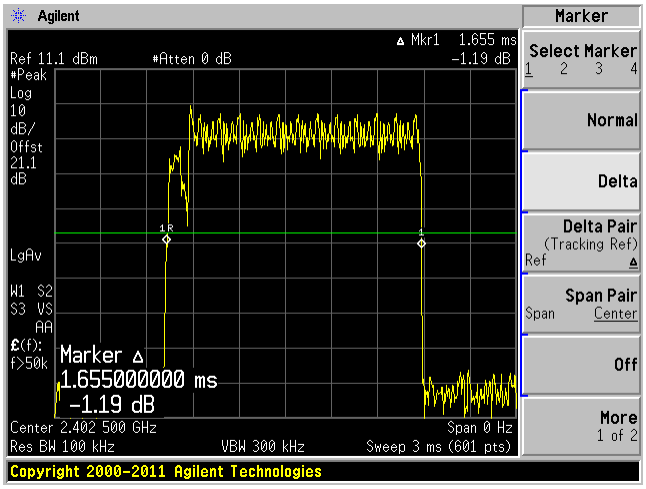


High Channel

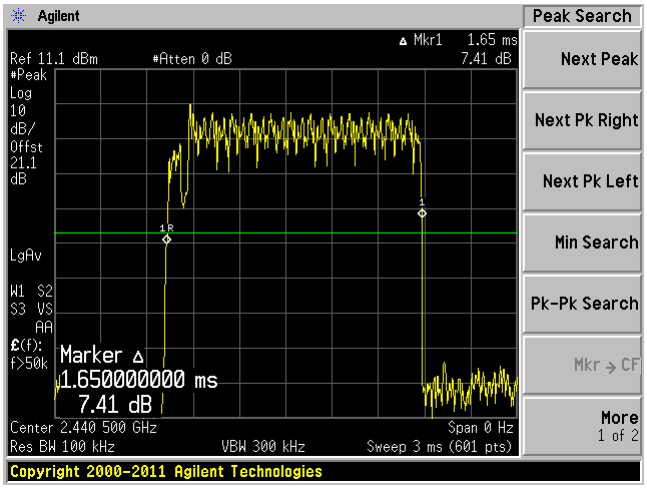


DH3

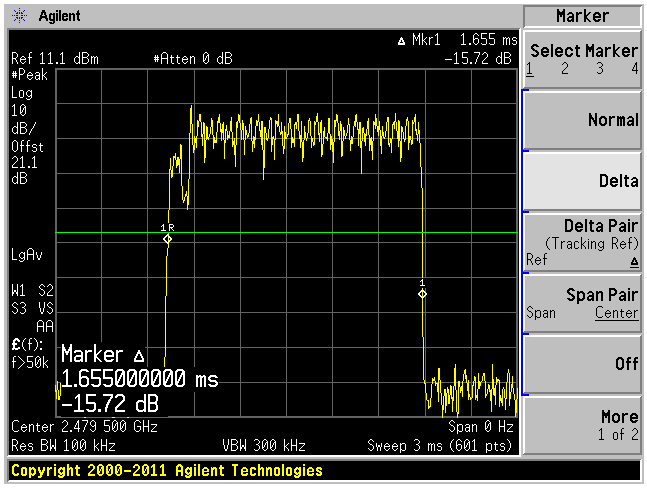
Low Channel



Middle Channel

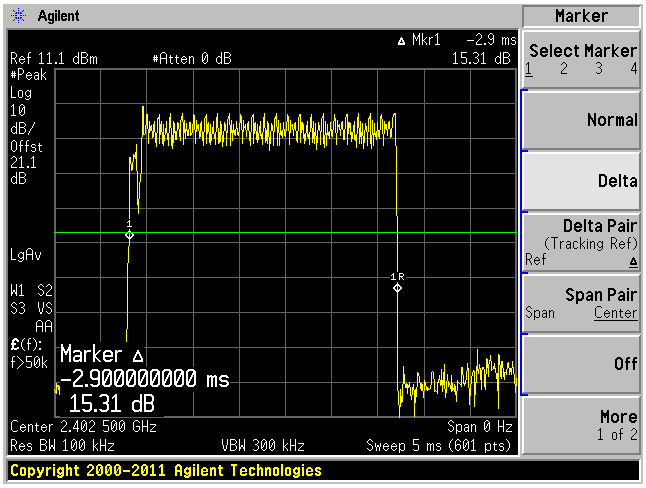


High Channel

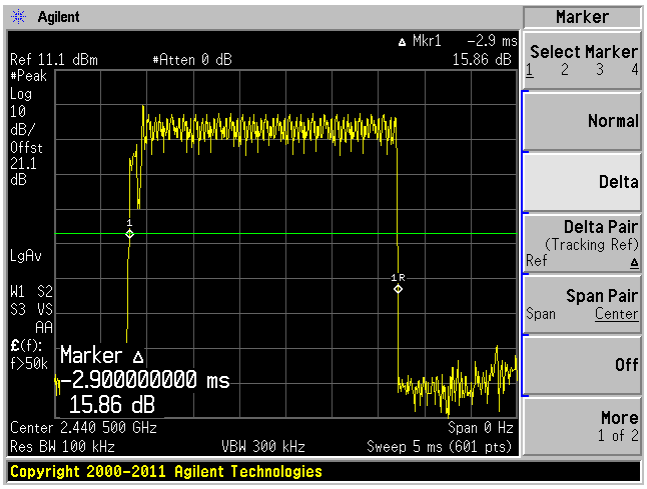


DH5

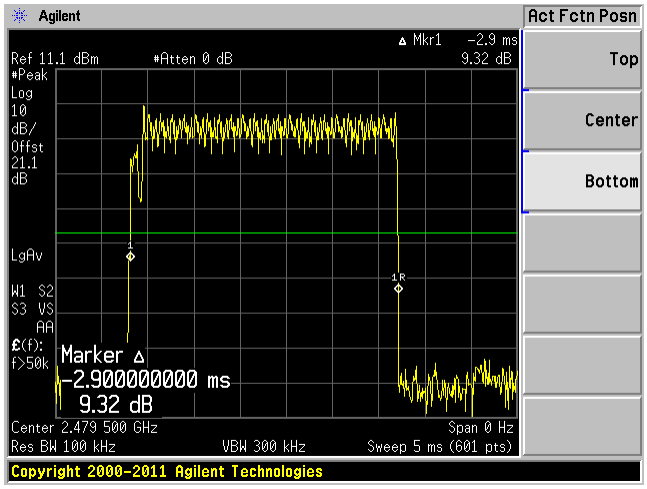
Low Channel



Middle Channel



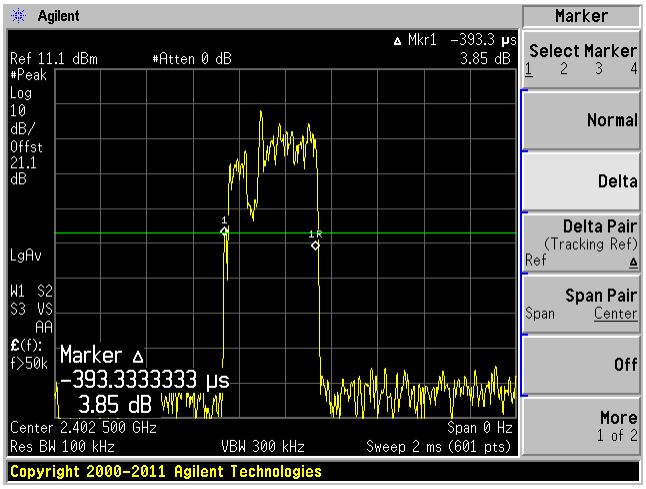
High Channel



π/4-DQPSK

DH1

Low Channel



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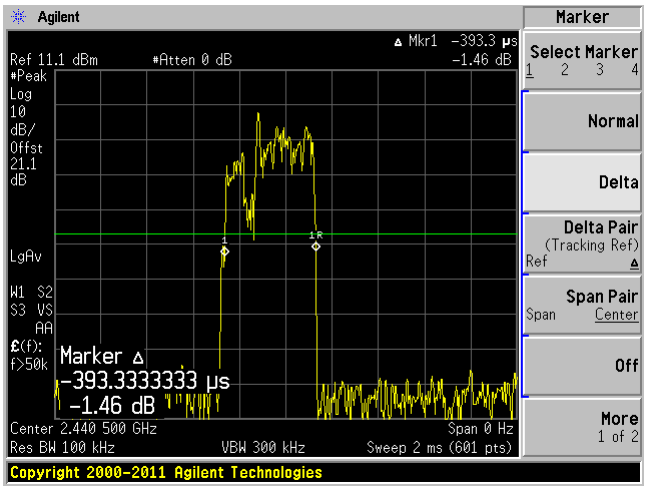

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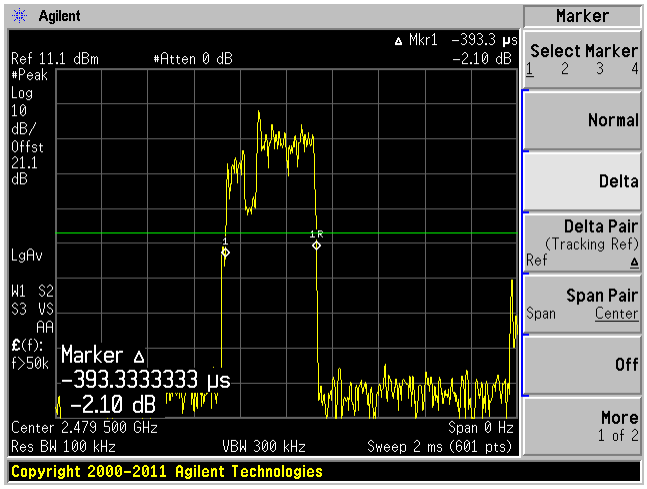
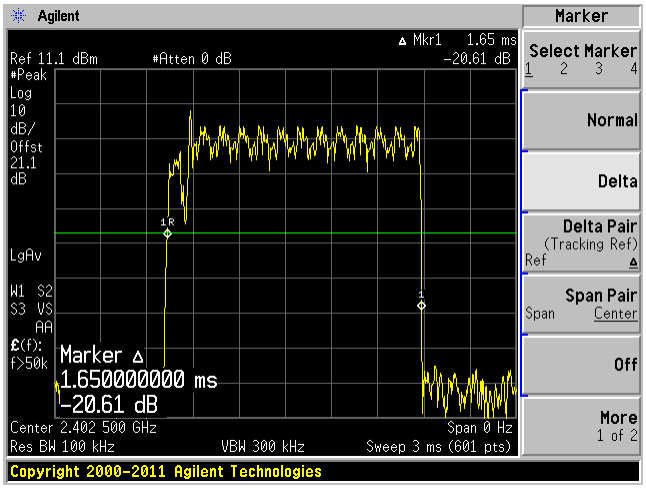


DH3

Low Channel



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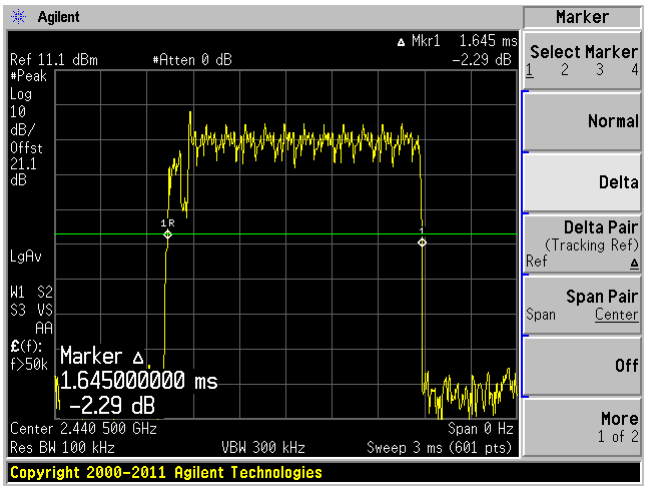

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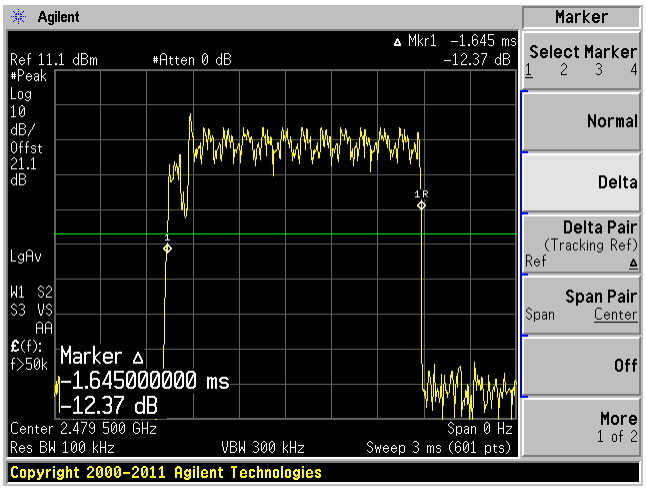
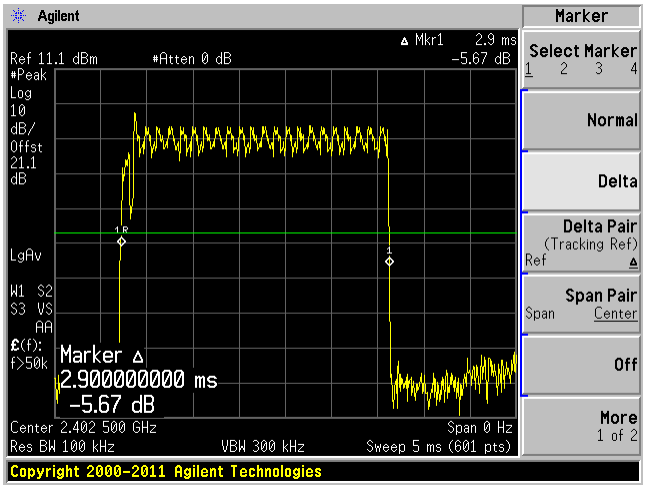


DH5

Low Channel



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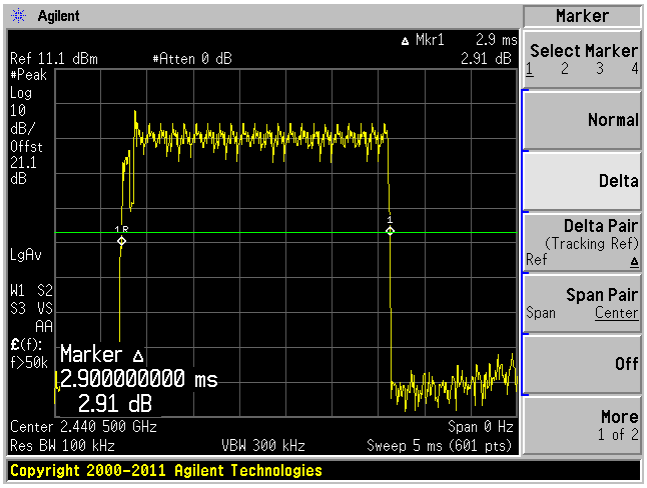
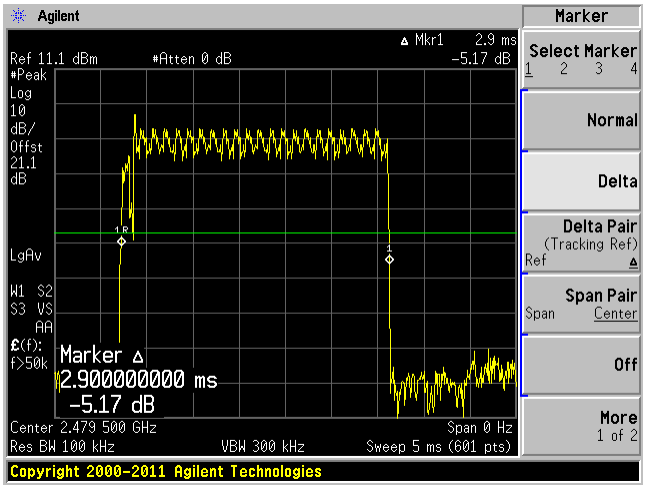


High Channel



14 FCC §15.109 & IC RSS-Gen §4.10, §6 – Receiver Radiated Spurious Emissions

14.1 Applicable Standards

FCC §15.109 and IC RSS-Gen §4.10, §6

14.2 EUT Setup

The radiated emissions tests were performed in the 3 meter chamber, using the setup in accordance with ANSI C63.4-2009.

14.3 Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

All data were recorded in the peak detection mode. Quasi-peak readings was performed only when an emissions was found to be marginal (within -4 dB of specification limits), and are distinguished with a "**QP**" in the data table.

14.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corrected Amplitude = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

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

Margin = Corrected Amplitude - Limit

14.5 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4446A	MY48250238	2013-08-29	1 year
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2013-07-11	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2013-06-09	1 year
EMCO	Horn antenna	3115	9511-4627	2014-1-7	1 year
Mini-Circuits	Pre Amplifier	ZVA-183-S	570400946	2013-05-09	1 year

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

14.6 Test Environmental Conditions

Temperature:	24 °C
Relative Humidity:	49 %
ATM Pressure:	101.9 kPa

The testing was performed by Chen Ge on 2014-03-12 at 5 meter chamber #2.

14.7 Summary of Test Results

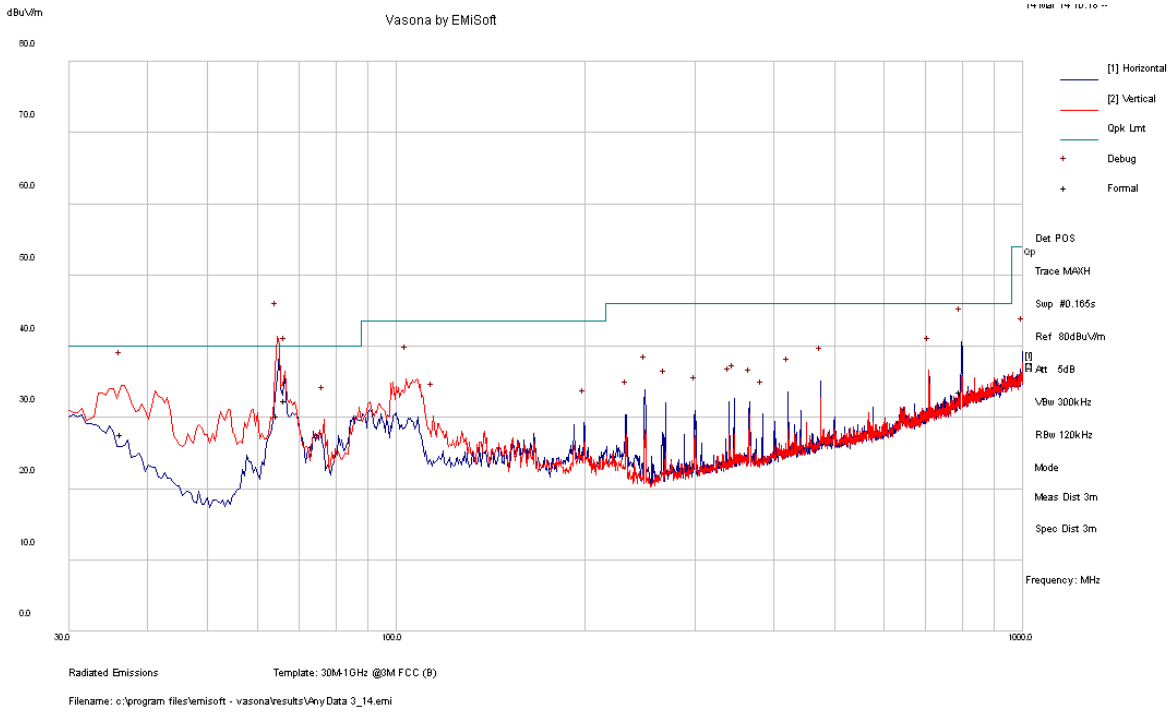
According to the test data,, the EUT complied with the FCC Part 15.109 and IC RSS-Gen, with the closest margins from the limit listed below:

Mode: Receiving			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range**
-7.58	66.50825	Vertical	30 MHz-1 GHz
-27.57	1330	Vertical	Above 1 GHz

14.8 Test Results

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

1) 30-1000 MHz, measured at 3 meters



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
64.58375	30.33	264	V	117	40	-9.67	QP
66.50825	32.42	329	V	128	40	-7.58	QP
796.5393	33.71	98	H	60	46	-12.29	QP
36.47025	27.6	98	V	12	40	-12.4	QP

2) Above 1 GHz, measured at 3 meters

Frequency (MHz)	Corrected Amplitude (dB)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector
1330	46.29	100	V	102	74	-28.03	Peak
1330	44.8	100	H	167	74	-29.54	Peak
1330	26.75	100	V	102	54	-27.57	Ave
1330	26.25	100	H	167	54	-28.09	Ave
1830	40.35	100	V	0	74	-32.78	Peak
1830	40.02	100	H	77	74	-33.01	Peak
1830	23.39	100	V	0	54	-29.74	Ave
1830	23.28	100	H	77	54	-29.75	Ave