



# FCC RF Test Report

Product Type : WCDMA Mobile Phone  
Applicant : Sky Phone LLC  
Address : 1348 Washington Av., Miami Beach  
Trade Name : SKY DEVICE  
Model Number : SKY 5.0S  
Test Specification : FCC 47 CFR PART 15 SUBPART C: Oct., 2013  
ANSI C63.10:200  
Receive Date : 23 July, 2014  
Test Period : 23 July, 2014 to 23 Aug, 2014  
Issue Date : 23, Aug 2014

## Issue by

A Test Lab Techno Corp.  
No. 140-1, Changan Street, Bade City,  
Taoyuan County 334, Taiwan R.O.C.  
Tel : +886-3-2710188 / Fax : +886-3-2710190



Taiwan Accreditation Foundation accreditation number: 1330

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## Revision History

| Rev. | Issue Date   | Revisions     | Revised By |
|------|--------------|---------------|------------|
| 00   | 23 Aug, 2014 | Initial Issue |            |
|      |              |               |            |
|      |              |               |            |



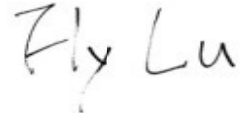
## Verification of Compliance

Issued Date: 08/23/2014

Product Type : WCDMA Mobile Phone  
Applicant : Sky Phone LLC  
Address : 1348 Washington Av., Miami Beach  
Trade Name : SKY DEVICE  
Model Number : SKY 5.0S  
FCC ID : 2ABOSGCSKY50S  
EUT Rated Voltage : AC 120V; DC 3.7V battery, DC 5.0V USB charge;  
Test Voltage : AC 120V; DC 3.7V;  
Applicable Standard : FCC 47 CFR PART 15 SUBPART C: Oct., 2013  
RSS-210 Issue 8 December 2010  
ANSI C63.10:2009  
Test Result : Complied  
Performing Lab. : Shenzhen Academy of Metrology and Quality Inspection  
No.4 Tongfa Road, Xili Town, Nanshan District, Shenzhen,  
Guangdong, China  
Tel : 0086-755-86928965 / Fax : 0086-755-86009898-31396  
Web: www.smq.com.cn

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

The test results of this report relate only to the tested sample identified in this report.

Approved By :  Reviewed By :   
(Manager) (Murphy Wang) (Testing Engineer) (Fly Lu)



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## 1. General Information

### 1.1 Applied Standard

Applied Rules: FCC 47 CFR PART 15 SUBPART C: Oct., 2013

Test Method: FCC PUBLIC NOTICE DA 00-705

Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems (Released March 30, 2000)

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

### 1.2 Test Location

Test Location 1: Shenzhen Academy of Metrology and quality Inspection

Address: No.4 Tongfa Road, Xili Town, Nanshan District, Shenzhen, Guangdong, China

### 1.3 Test Environment Condition

Ambient Temperature: 19.5 to 25°C

Ambient Relative Humidity: 40 to 55 %

Atmospheric Pressure: Not applicable

## 2. Test Summary

| Test Item                                  | FCC Part No.        | Requirements                                                                                                                    | Verdict |
|--------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------|---------|
| 20dB Emission Bandwidth (EBW)              | 15.247(a)(1)        | No limit.                                                                                                                       | PASS    |
| Carrier Frequency Separation               | 15.247(a)(1)        | $\geq \text{MAX}\{25\text{kHz}, \text{IF}\{\text{output power} \leq 125\text{mW}, 2/3 * 20\text{dB EBW}, 20\text{dB EBW}\}\}$ . | PASS    |
| Number of Hopping Channel                  | 15.247(a)(1)(iii)   | $\geq 15$ channels.                                                                                                             | PASS    |
| Time of Occupancy (Dwell Time)             | 15.247(a)(1)(iii)   | $< 0.4\text{s}$ within a period of $(0.4\text{s} * \text{hopping number})$ .                                                    | PASS    |
| Maximum Peak Conducted Output Power        | 15.247(b)(1)        | $< 1\text{W}$ if using $\geq 75$ Non-overlapping channels.                                                                      | PASS    |
| Band edge spurious emission                | 15.247(d)           | $< -20\text{ dBc}/100\text{kHz}$ if total peak power $\leq$ power limit.                                                        | PASS    |
| Conducted RF Spurious Emission             | 15.247(d)           | $< -20\text{ dBc}/100\text{kHz}$ if total peak power $\leq$ power limit.                                                        | PASS    |
| Radiated Emissions in the Restricted Bands | 15.247(d)<br>15.209 | FCC Part 15.209 field strength limit;                                                                                           | PASS    |
| AC Power Line Conducted Emissions          | 15.207              | FCC Part 15.207 conducted limit;                                                                                                |         |

## 3. Description of the Equipment under Test (EUT)



## 3.1 General Description

|                 |                                                                                                                                                    |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Product         | WCDMA Mobile Phone                                                                                                                                 |
| Trade Name      | SKY DEVICE                                                                                                                                         |
| Model Number    | SKY 5.0S                                                                                                                                           |
| Applicant       | Sky Phone LLC<br>1348 Washington Av., Miami Beach                                                                                                  |
| Manufacturer    | Shenzhen Malata Mobile Communication CO.,LTD<br>25/F, Malata Technology Building, NO9998 ShennanRd,Hi-techPark,Nanshan,Shenzhen,P.R. China 518057. |
| FCC ID          | 2ABOSGCSKY50S                                                                                                                                      |
| Frequency Range | 2402 ~ 2480 MHz                                                                                                                                    |
| Modulation Type | GFSK for 1Mbps                                                                                                                                     |
|                 | $\pi/4$ -DQPSK for 2Mbps                                                                                                                           |
|                 | 8DPSK for 3Mbps                                                                                                                                    |
| Antenna Type    | Internal                                                                                                                                           |
| Antenna Gain    | 0dBi                                                                                                                                               |

NOTE: Only Bluetooth test data included in this report.

## 3.2 EUT Identity

| IMEI No. |                 |
|----------|-----------------|
| SIM 1    | 883772029997780 |
| SIM 2    | 863772029998101 |

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

## 3.3 EUT Configurations

### 3.3.1 General Configurations

| Configuration       | Description                                                                                                                                                        |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Antenna Ports  | Until otherwise specified,<br>All TX tests are performed at all TX antenna ports of the EUT, and<br>All RX tests are performed at all RX antenna ports of the EUT. |
| Multiple RF Sources | Other than the tested RF source of the EUT, other RF source(s) are disabled or shutdown during measurements.                                                       |

Note: The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

## 3.4 Customized Configurations

| #EUT Conf.    | Signal Description                                         | Operating Frequency |
|---------------|------------------------------------------------------------|---------------------|
| TM1_DH5_Hop   | GFSK modulation, package type DH5, hopping on.             | ---                 |
| TM1_DH5_Ch0   | GFSK modulation, package type DH5, hopping off.            | Ch No. 00 /2402MHz  |
| TM1_DH5_Ch39  | GFSK modulation, package type DH5, hopping off.            | Ch No. 39/ 2441MHz  |
| TM1_DH5_Ch78  | GFSK modulation, package type DH5, hopping off.            | Ch No. 78/ 2480MHz  |
| TM2_2DH5_Hop  | $\pi/4$ -DQPSK modulation, package type 2DH5, hopping on.  | ---                 |
| TM2_2DH5_Ch0  | $\pi/4$ -DQPSK modulation, package type 2DH5, hopping off. | Ch No.00 /2402MHz   |
| TM2_2DH5_Ch39 | $\pi/4$ -DQPSK modulation, package type 2DH5, hopping off. | Ch No. 39/ 2441MHz  |
| TM2_2DH5_Ch78 | $\pi/4$ -DQPSK modulation, package type 2DH5, hopping off. | Ch No. 78/2480MHz   |
| TM3_3DH5_Hop  | 8DPSK modulation, package type 3DH5, hopping on.           | ---                 |
| TM3_3DH5_Ch0  | 8DPSK modulation, package type 3DH5, hopping off.          | Ch No. 00 /2402MHz  |
| TM3_3DH5_Ch39 | 8DPSK modulation, package type 3DH5, hopping off.          | Ch No. 39/ 2441MHz  |
| TM3_3DH5_Ch78 | 8DPSK modulation, package type 3DH5, hopping off.          | Ch No. 78/ 2480MHz  |

## 3.5 Test Environments

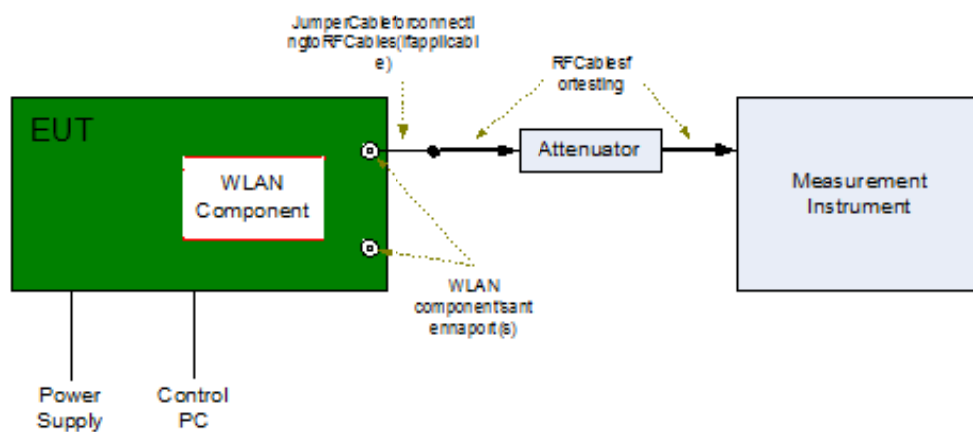
NOTE: The values used in the test report maybe stringent than the declared.

| Environment Parameter | Selected Values During Tests |         |                   |
|-----------------------|------------------------------|---------|-------------------|
| NTNV                  | Temperature                  | Voltage | Relative Humidity |
|                       | Ambient                      | 3.7VDC  | Ambient           |

## 3.6 Test Setups

### 3.6.1 Test Setup 1

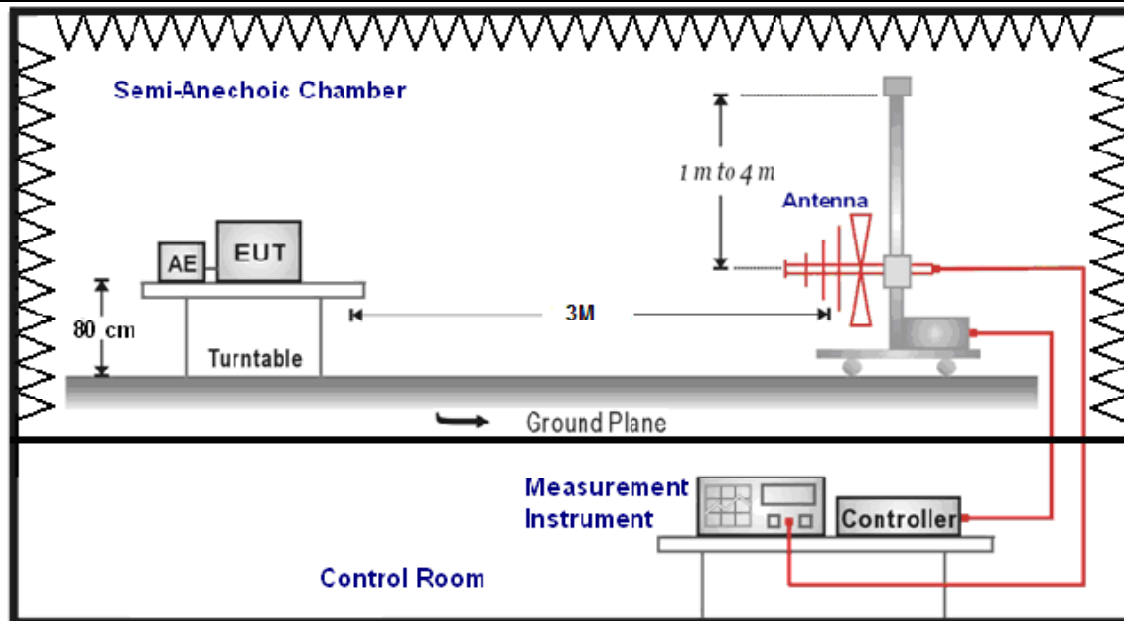
The BLE component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



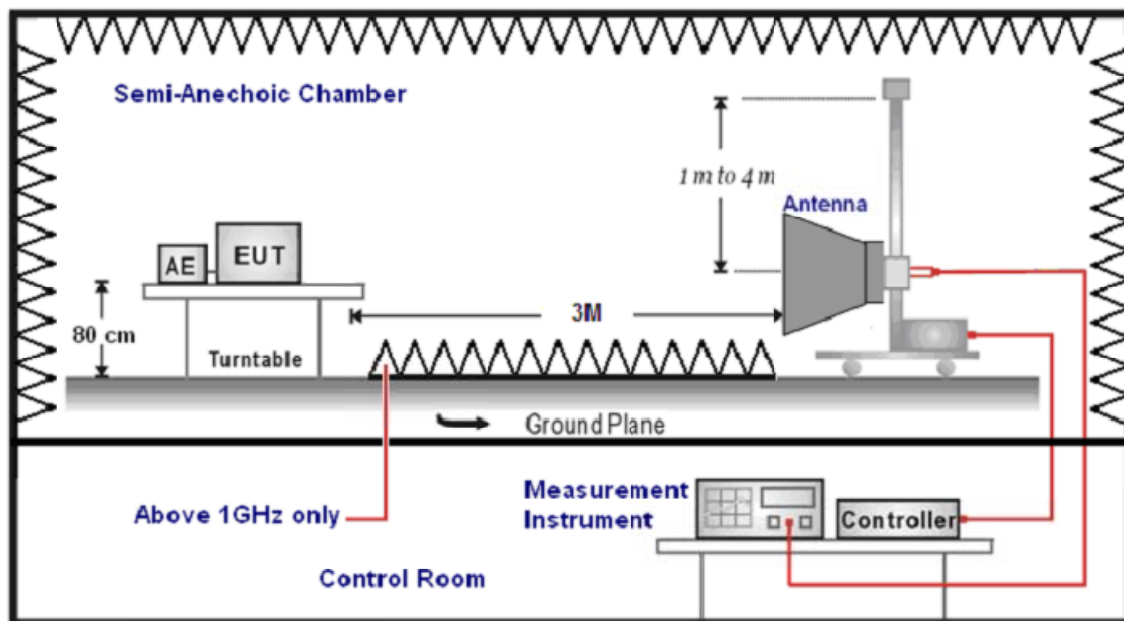
### 3.6.1 Test Setup 2

The test site anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4. The test distance is 3m. The setup is according to ANSI C63.4 and CAN/CSA-CEI/IEC CISPR 22.

The maximal emission value is acquired by adjusting the antenna height, polarization and turntable azimuth. Normally, the height range of antenna is 1m to 4m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).



(Below 1 GHz)

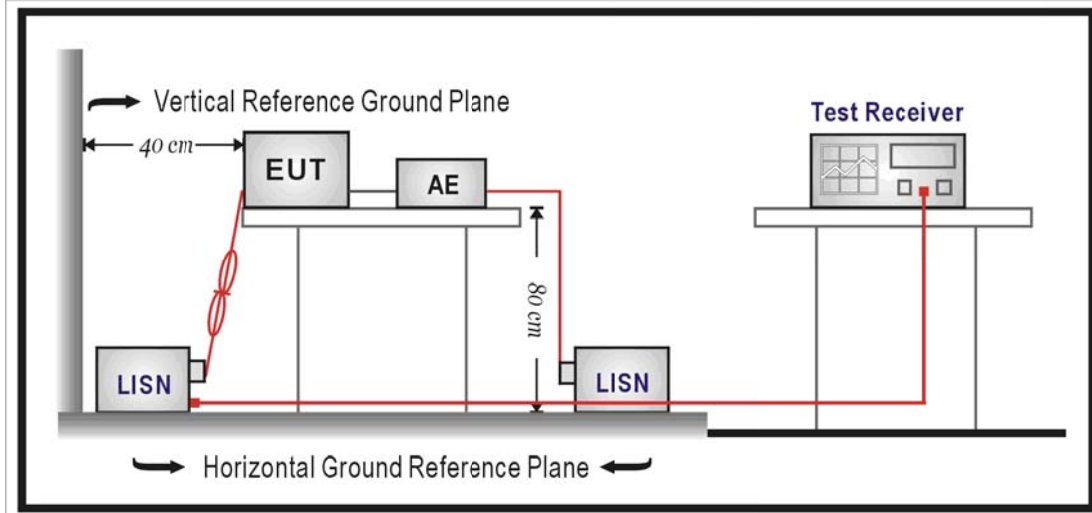


(Above 1GHz)

### 3.6.2 Test Setup 3

The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.



### 3.7 Test Conditions

| Test Case                              | Test Conditions  |                                                                                                                                                                    |
|----------------------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        | Configuration    | Description                                                                                                                                                        |
| 20dB Emission Bandwidth (EBW)          | Meas. Method     | ANSI C63.10:2009                                                                                                                                                   |
|                                        | Test Environment | NTNV                                                                                                                                                               |
|                                        | Test Setup       | Test Setup1                                                                                                                                                        |
|                                        | EUT Conf.        | TM1_DH5_Ch00,TM1_DH5_Ch39,TM1_DH5_Ch78,TM2_2DH5_Ch00,TM2_2DH5_Ch39,TM2_2DH5_Ch78,TM3_3DH5_Ch00,TM3_3DH5_Ch39,TM3_3DH5_Ch78,TM4_DH5_Ch00,TM4_DH5_Ch19,TM4_DH5_Ch39. |
| Carrier Frequency Separation           | Meas. Method     | ANSI C63.10:2009                                                                                                                                                   |
|                                        | Test Environment | NTNV                                                                                                                                                               |
|                                        | Test Setup       | Test Setup1                                                                                                                                                        |
|                                        | EUT Conf.        | TM1_DH5_Hop,TM2_2DH5_Hop,TM3_3DH5_Hop,                                                                                                                             |
| Number of Hopping Channel              | Meas. Method     | ANSI C63.10:2009                                                                                                                                                   |
|                                        | Test Environment | NTNV                                                                                                                                                               |
|                                        | Test Setup       | Test Setup1                                                                                                                                                        |
|                                        | EUT Conf.        | TM1_DH5_Hop,TM2_2DH5_Hop,TM3_3DH5_Hop,                                                                                                                             |
| Time of Occupancy (Dwell Time)         | Meas. Method     | ANSI C63.10:2009                                                                                                                                                   |
|                                        | Test Environment | NTNV                                                                                                                                                               |
|                                        | Test Setup       | Test Setup1                                                                                                                                                        |
|                                        | EUT Conf.        | TM1_DH5_Ch39,TM2_2DH5_Ch39,TM3_3DH5_Ch39.                                                                                                                          |
| Maximum Peak Conducted Output Power    | Meas. Method     | ANSI C63.10:2009                                                                                                                                                   |
|                                        | Test Environment | NTNV                                                                                                                                                               |
|                                        | Test Setup       | Test Setup1                                                                                                                                                        |
|                                        | EUT Conf.        | TM1_DH3_Ch00,TM1_DH3_Ch39,TM1_DH3_Ch78,TM2_2DH3_Ch00,TM2_2DH3_Ch39,TM2_2DH3_Ch78,TM3_3DH3_Ch00,TM3_3DH3_Ch39,TM3_3DH3_Ch78,TM4_DH3_Ch00,TM4_DH3_Ch19,TM4_DH3_Ch39. |
| Bandedge spurious emission (Conducted) | Meas. Method     | ANSI C63.10:2009                                                                                                                                                   |
|                                        | Test Environment | NTNV                                                                                                                                                               |
|                                        | Test Setup       | Test Setup1                                                                                                                                                        |
|                                        | EUT Conf.        | TM1_DH3_Ch00,TM1_DH3_Ch78,TM2_2DH3_Ch00,TM2_2DH3_Ch78,                                                                                                             |



|                                            |                  |                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                            |                  | TM3_3DH3_Ch00, TM3_3DH3_Ch78.<br>TM4_DH3_Ch00, TM4_DH3_Ch39.                                                                                                                                                                                                                                                                       |
| Conducted RF Spurious Emission             | Meas. Method     | ANSI C63.10:2009                                                                                                                                                                                                                                                                                                                   |
|                                            | Test Environment | NTNV                                                                                                                                                                                                                                                                                                                               |
|                                            | Test Setup       | Test Setup1                                                                                                                                                                                                                                                                                                                        |
|                                            | EUT Conf.        | TM1_DH5_Ch00, TM1_DH5_Ch39, TM1_DH5_Ch78,<br>TM2_2DH5_Ch00, TM2_2DH5_Ch39,<br>TM2_2DH5_Ch78, TM3_3DH5_Ch00,<br>TM3_3DH5_Ch39, TM3_3DH5_Ch78.<br>TM4_DH5_Ch00, TM4_DH5_Ch19, TM4_DH5_Ch39.                                                                                                                                          |
| Radiated Emissions in the Restricted Bands | Meas. Method     | ANSI C63.10:2009<br>30 MHz to 1 GHz:<br>Pre: RBW=100kHz; VBW=300kHz; Det. = Peak.<br>Final: RBW=120kHz; Det. = CISPR Quasi-Peak.<br>1 GHz to 26.5GHz:<br>Average: RBW=1 MHz; VBW= 10Hz; Det. = Peak;<br>Sweep-time= Auto; Trace = Single.<br>Peak: RBW=1 MHz; VBW= 3 MHz; Det. = Peak; Sweep-time= Auto;<br>Trace ≥ MaxHold * 100. |
|                                            | Test Environment | NTNV                                                                                                                                                                                                                                                                                                                               |
|                                            | Test Setup       | Test Setup2                                                                                                                                                                                                                                                                                                                        |
|                                            | EUT Conf.        | 30 MHz-1GHz TM1_DH5_Ch00 (Worst Conf.).<br>1-18 GHz: TM1_DH5_Ch00, TM1_DH5_Ch39,<br>TM1_DH5_Ch78, (Worst Conf.).                                                                                                                                                                                                                   |

| Test Case                         | Test Conditions    |                              |
|-----------------------------------|--------------------|------------------------------|
|                                   | Configuration      | Description                  |
| AC Power Line Conducted Emissions | Measurement Method | AC mains conducted.          |
|                                   | Test Environment   | NTNV                         |
|                                   | Test Setup         | TestSetup3                   |
|                                   | EUT Configuration  | TM1_DH5_Ch39. (Worst Conf.). |

Note: For Radiated Emissions, By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "Z axis" position was the worst, then the final test was executed the worst condition and test data were recorded in this report.

## 4. Measurement Uncertainty

| Test Item          | Frequency Range     | Uncertainty (dB) |
|--------------------|---------------------|------------------|
| Conducted Emission | 9kHz ~ 30MHz        | 3.50             |
| Radiated Emission  | 9kHz ~ 30MHz        | 4.12             |
|                    | 30MHz ~ 1000MHz     | 4.50             |
|                    | 1000MHz ~ 18000MHz  | 4.60             |
|                    | 18000MHz ~ 40000MHz | 5.12             |



## 5. Main Test Instruments

| AC Power Conducted Emission |              |         |               |            |            |
|-----------------------------|--------------|---------|---------------|------------|------------|
| Equipment Name              | Manufacturer | Model   | Serial Number | Cal Date   | Cal Period |
| Test Receiver               | R&S          | ESCS    | SB3319        | 01/20/2014 | 1 year     |
| LISN                        | R&S          | ESH2-Z5 | SB3321        | 01/20/2014 | 1 year     |
| LISN                        | R&S          | ESH3-Z5 | SB2604        | 01/20/2014 | 1 year     |
| Test Software               | R&S          | ESK1    | N/A           | N/A        | N/A        |

| Radiated Emission   |              |          |               |            |            |
|---------------------|--------------|----------|---------------|------------|------------|
| Equipment Name      | Manufacturer | Model    | Serial Number | Cal Date   | Cal Period |
| Loop Antenna        | Schwarzbeck  | FMZB1516 | SB3345        | 01/22/2014 | 1 year     |
| Horn Antenna        | AR           | AT4560   | SB3450/01     | 05/16/2014 | 1 year     |
| Amplifier(18-40GHz) | R&S          | ---      | SB3435/02     | 05/16/2014 | 1 year     |
| Amplifier(1-18GHz)  | R&S          | ---      | SB3435/01     | 01/22/2014 | 1 year     |
| Horn Antenna        | R&S          | HF907    | SB8501/01     | 05/13/2014 | 1 year     |
| Bilog Antenna       | Schwarzbeck  | VULB9163 | SB8501/04     | 01/20/2014 | 1 year     |
| EMI Test Receiver   | R&S          | ESU40    | SB85001/09    | 05/16/2014 | 1 year     |
| EMI Test Receiver   | R&S          | ESIB26   | SB3253        | 01/22/2014 | 1 year     |
| Test Software       | R&S          | ESK1     | N/A           | N/A        | N/A        |
| Test Software       | R&S          | EMC32    | N/A           | N/A        | N/A        |

| Maximum Peak Output Power / 20dB Bandwidth / Frequency Separation / Band Edge Compliance of RF Emission / Spurious RF Conducted Emission/ Number of hopping frequency/ Time of Occupancy |              |         |               |            |            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------|---------------|------------|------------|
| Equipment Name                                                                                                                                                                           | Manufacturer | Model   | Serial Number | Cal Date   | Cal Period |
| MXA Signal Analyzer                                                                                                                                                                      | Agilent      | N9020A  | MY53420615    | 05/12/2014 | 1 year     |
| Power Sensor                                                                                                                                                                             | Agilent      | U2021XA | MY53180015    | 09/27/2013 | 1 year     |
| Power Sensor                                                                                                                                                                             | Agilent      | U2021XA | MY53260040    | 09/27/2013 | 1 year     |
| Power Sensor                                                                                                                                                                             | Agilent      | U2021XA | MY53360002    | 09/27/2013 | 1 year     |
| Power Sensor                                                                                                                                                                             | Agilent      | U2021XA | MY53360006    | 09/27/2013 | 1 year     |
| USB Modular Simultaneous Data Acquisition                                                                                                                                                | Agilent      | U2531A  | TW53353509    | N/A        | N/A        |
| USB Modular Simultaneous Data Acquisition                                                                                                                                                | Agilent      | U2531A  | TW53353511    | N/A        | N/A        |



## 6. Test Conditions and Results

### 6.1 AC Power Conducted Emission

#### TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2009.
2. Support equipment, if needed, was placed as per ANSI C63.10-2009
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2009
4. The EUT received DC5V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

#### AC Power Conducted Emission Limit

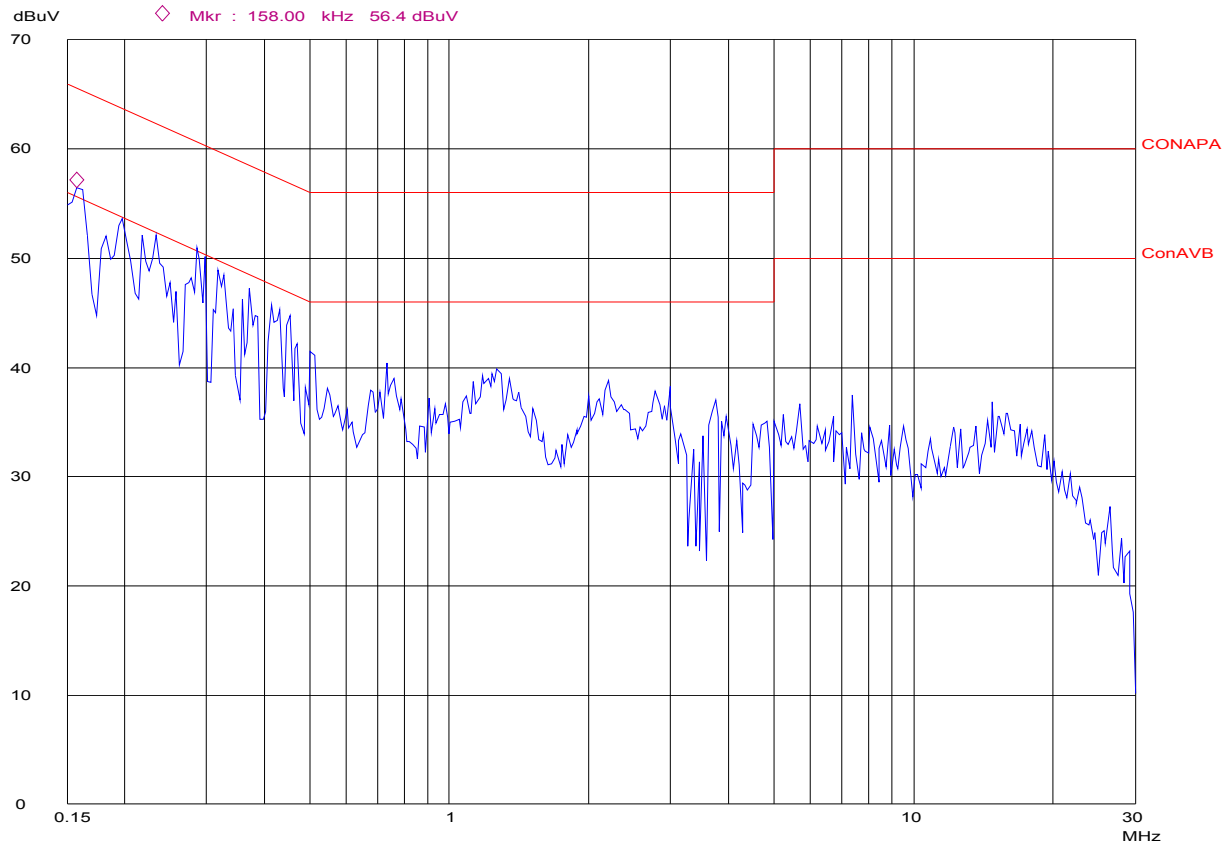
For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

| Frequency<br>(MHz) | Maximum RF Line Voltage (dBμV) |      |         |        |
|--------------------|--------------------------------|------|---------|--------|
|                    | CLASS A                        |      | CLASS B |        |
|                    | Q.P.                           | Ave. | Q.P.    | Ave.   |
| 0.15 - 0.50        | 79                             | 66   | 66-56*  | 56-46* |
| 0.50 - 5.00        | 73                             | 60   | 56      | 46     |
| 5.00 - 30.0        | 73                             | 60   | 60      | 50     |

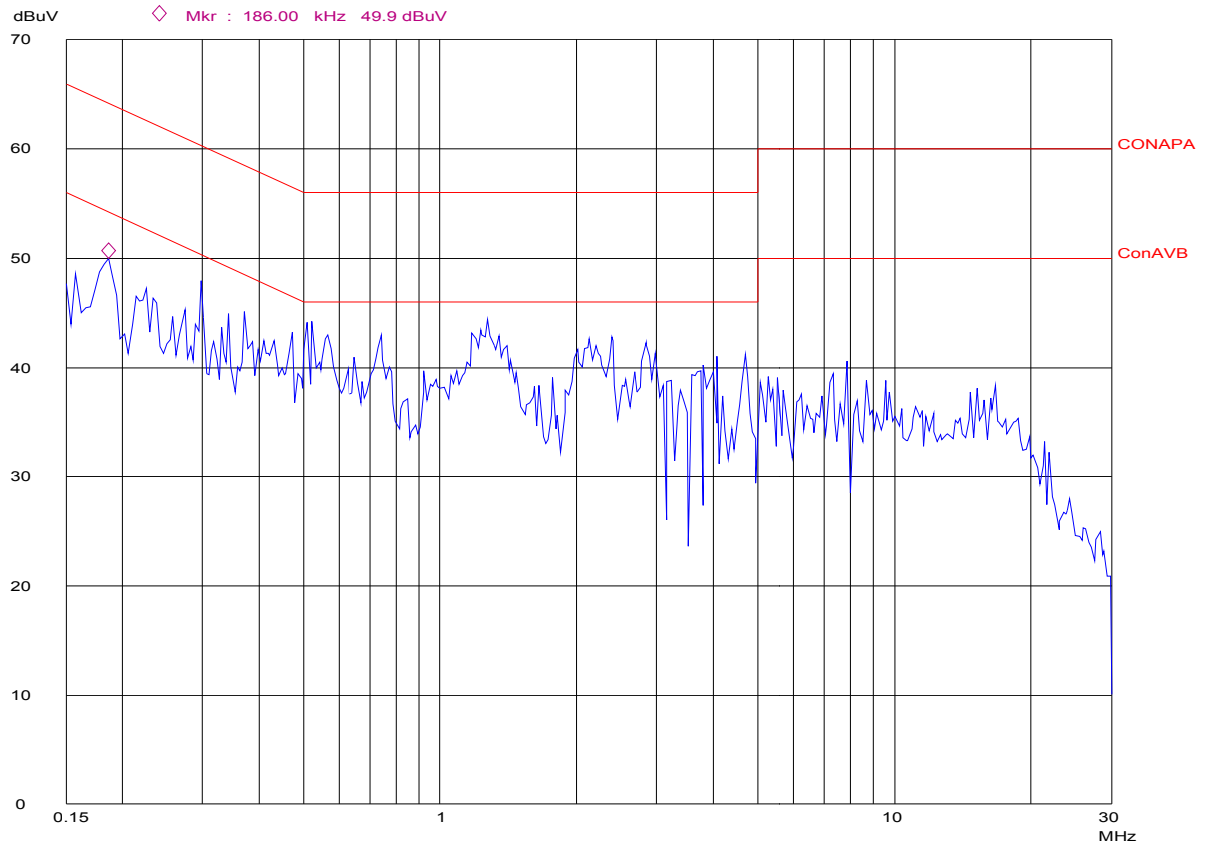
\* Decreasing linearly with the logarithm of the frequency

#### TEST RESULTS

*Note:* We tested Conducted Emission of GFSK,  $\pi/4$  DQPSK and 8DPSK mode from 0.15 KHz to 30MHz (DH1, DH3 and DH5) and all channels (low, middle and high), recorded the worst case data at GFSK DH5 middle channel.



|      | Frequency<br>(MHz) | Correction<br>Factor<br>(dB) | Quasi-Peak              |                                   |                        | Average                 |                                   |                        |
|------|--------------------|------------------------------|-------------------------|-----------------------------------|------------------------|-------------------------|-----------------------------------|------------------------|
|      |                    |                              | Reading<br>(dB $\mu$ V) | Emission<br>Level<br>(dB $\mu$ V) | Limits<br>(dB $\mu$ V) | Reading<br>(dB $\mu$ V) | Emission<br>Level<br>(dB $\mu$ V) | Limits<br>(dB $\mu$ V) |
| Line | 0.162              | 9.7                          | 29.6                    | 39.3                              | 65.4                   | 18.5                    | 28.2                              | 55.4                   |
|      | 0.198              | 9.7                          | 31.3                    | 41.0                              | 63.7                   | 18.9                    | 28.6                              | 53.7                   |
|      | 0.234              | 9.7                          | 27.5                    | 37.2                              | 62.3                   | 17.7                    | 27.4                              | 52.3                   |
|      | 0.288              | 9.7                          | 32.2                    | 41.9                              | 60.6                   | 16.3                    | 26.0                              | 50.6                   |
|      | 0.37               | 9.7                          | 27.5                    | 37.2                              | 58.5                   | 16.6                    | 26.3                              | 48.5                   |
|      | 0.422              | 9.7                          | 30.5                    | 40.2                              | 57.4                   | 11.4                    | 21.1                              | 47.4                   |



|         | Frequency<br>(MHz) | Correction<br>Factor<br>(dB) | Quasi-Peak        |                             |                  | Average           |                             |                  |
|---------|--------------------|------------------------------|-------------------|-----------------------------|------------------|-------------------|-----------------------------|------------------|
|         |                    |                              | Reading<br>(dBμV) | Emission<br>Level<br>(dBμV) | Limits<br>(dBμV) | Reading<br>(dBμV) | Emission<br>Level<br>(dBμV) | Limits<br>(dBμV) |
| Neutral | 0.158              | 9.7                          | 26.9              | 36.6                        | 65.6             | 21.8              | 31.5                        | 55.6             |
|         | 0.186              | 9.7                          | 26.6              | 36.3                        | 64.2             | 14.2              | 23.9                        | 54.2             |
|         | 0.298              | 9.7                          | 20.9              | 30.6                        | 60.3             | 10.1              | 19.8                        | 50.3             |
|         | 0.37               | 9.7                          | 21.8              | 31.5                        | 58.5             | 15.2              | 24.9                        | 48.5             |
|         | 0.522              | 9.8                          | 20.5              | 30.3                        | 56               | 13.3              | 23.1                        | 46.0             |
|         | 1.27               | 9.8                          | 33.3              | 43.1                        | 56               | 15.6              | 25.4                        | 46.0             |



## 6.2 Radiated Emissions

### TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT minimum operation frequency was 32.768 KHz and maximum operation frequency was 2462MHz.so radiated emission test frequency band from 9 KHz to 25GHz.

### Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

|                           |                                            |
|---------------------------|--------------------------------------------|
| Where FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude    | AG = Amplifier Gain                        |
| AF = Antenna Factor       |                                            |

### RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power.

The frequency spectrum above 1 GHz for Transmitter was investigated. All emission not reported are much lower than the prescribed limits. Set the RBW=1MHz, VBW=3MHz for Peak Detector while the RBW=1MHz, VBW=10Hz for Average Detector, Readings are both peak and average values.

| Frequency (MHz) | Distance (Meters) | Radiated (dBμV/m)         | Radiated (μV/m) |
|-----------------|-------------------|---------------------------|-----------------|
| 0.009-0.49      | 300               | $20\log(2400/F(KHz))+80$  | $2400/F(KHz)$   |
| 0.49-1.705      | 30                | $20\log(24000/F(KHz))+40$ | $24000/F(KHz)$  |
| 1.705-30        | 30                | $20\log(30)+40$           | 30              |
| 30-88           | 3                 | 40.0                      | 100             |
| 88-216          | 3                 | 43.5                      | 150             |
| 216-960         | 3                 | 46.0                      | 200             |
| Above 960       | 3                 | 54.0                      | 500             |

### TEST RESULTS

Remark:

1. The radiated measurement are performed the each channel (low/mid/high) at all Packet type (DH1, DH3 and DH5) also for difference modulation type (GFSK, 8DPSK and  $\pi/4$  DQPSK), recorded worst case at GFSK\_DH5\_Low channel (Channel 00) for below 1GHz and GFSK\_DH5\_Low channel (Channel



- 00), GFSK\_DH5\_Middle channel (Channel 39), GFSK\_DH5\_High channel (Channel 78).
2. ULTRA-BROADBAND ANTENNA for the radiation emission test below 1G.
3. HORN ANTENNA for the radiation emission test above 1G.
4. We tested both battery powered and powered by adapter charging mode at three orientate ones, recorded worst case at powered by adapter charging mode.
5. "---" means not recorded as emission levels lower than limit.

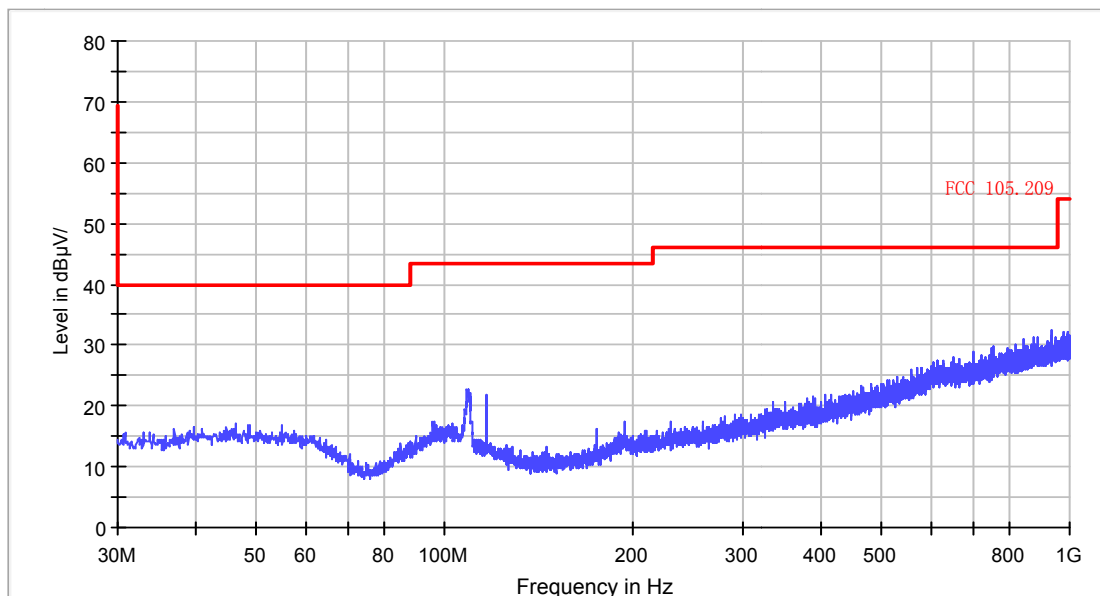
## For 9 KHz to 30MHz

| Frequency (MHz) | Corrected Reading (dBμV/m)@3m | FCC Limit (dBμV/m) @3m | Margin (dB) | Detector | Result |
|-----------------|-------------------------------|------------------------|-------------|----------|--------|
| 12.00           | 44.46                         | 69.54                  | 25.08       | QP       | PASS   |
| 24.00           | 41.27                         | 69.54                  | 28.27       | QP       | PASS   |

## For 30MHz to 1000MHz

### Channel 00 @ 2402 MHz @ GFSK\_DH5

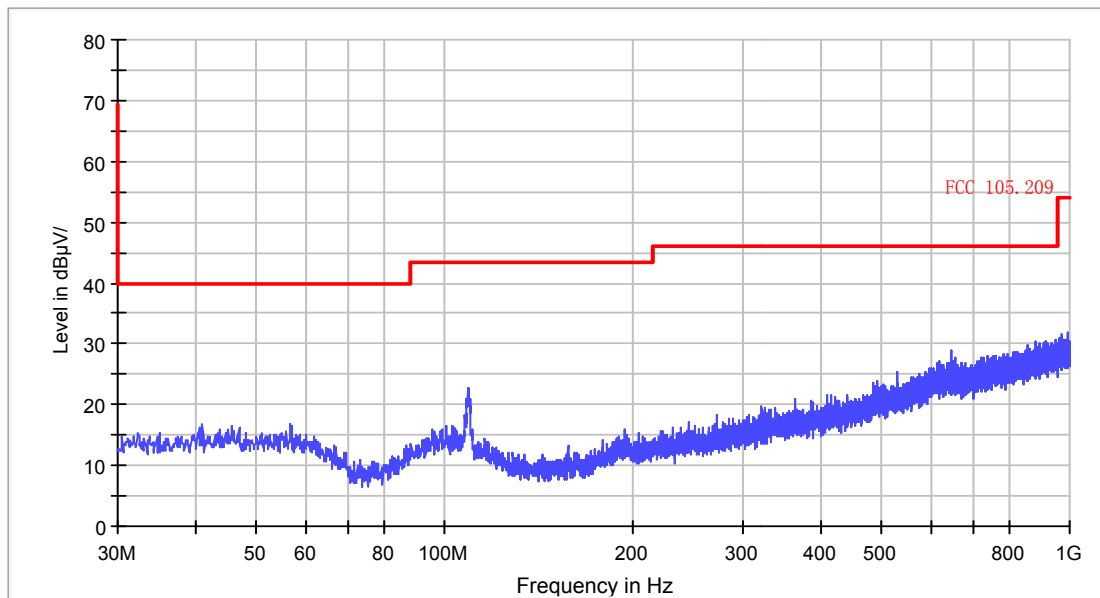
Electric Field Strength 30M-1GHz



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
|                 | ---            |                       |                 |                |             | Peak     | H                 |



## Electric Field Strength 30M-1GHz

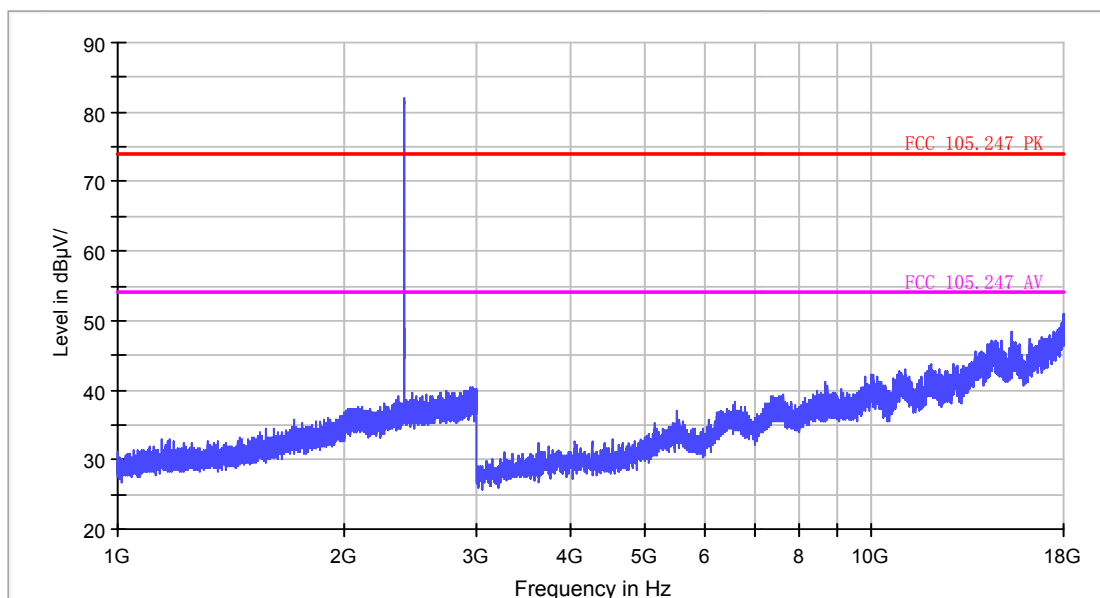


| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
|                 | ---            |                       |                 |                |             | Peak     | V                 |

For 1GHz to 25GHz

## Channel 00 @ 2402 MHz @ GFSK\_DH5

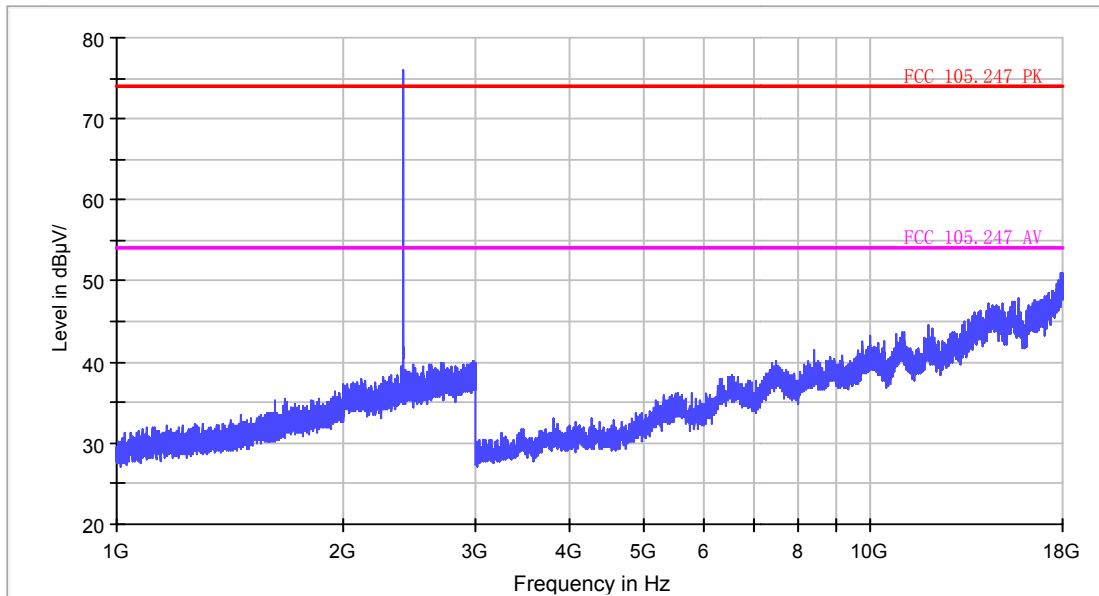
FCC Electric Field Strength 1-18GHz operate on 2.4GHz



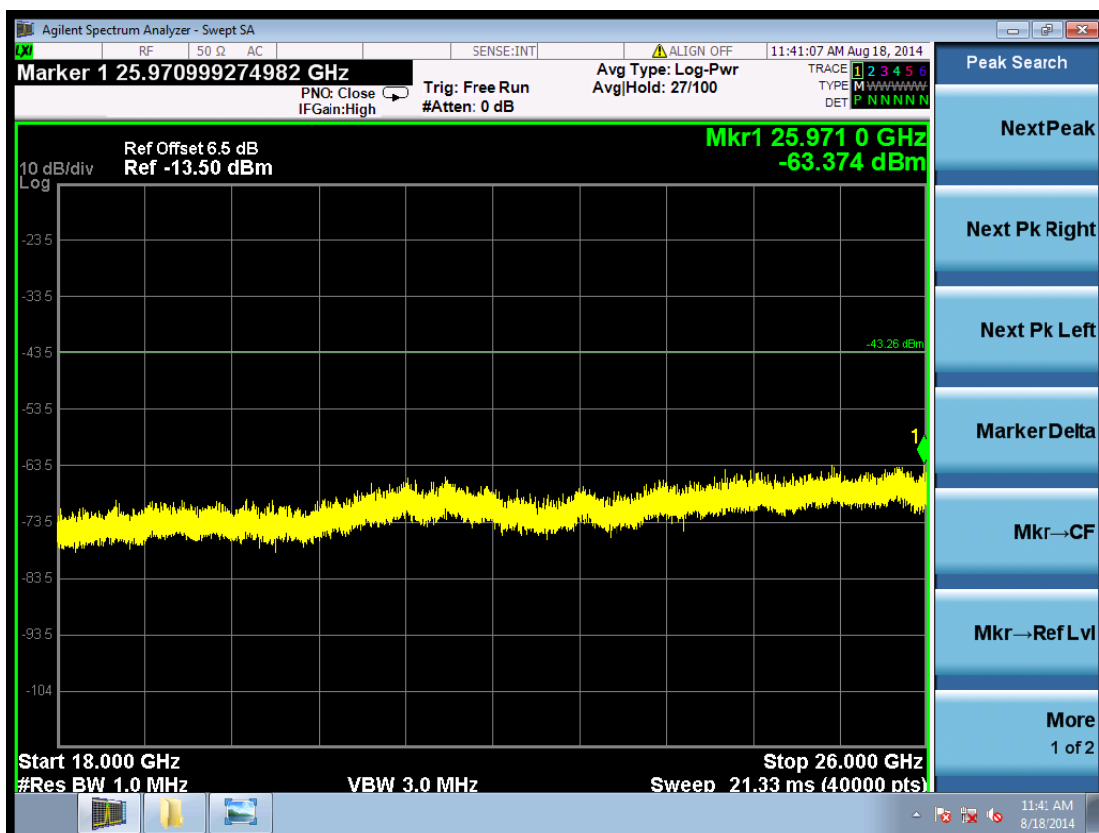
| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
|                 | ---            |                       |                 |                |             | AV       | V                 |



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



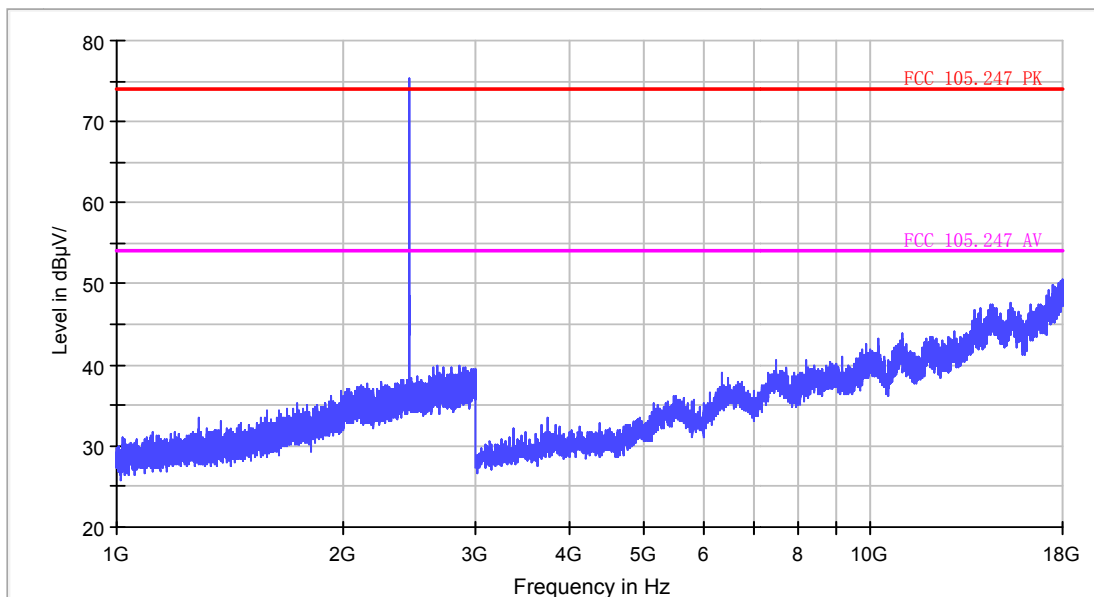
| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
|                 | ---            |                       |                 |                |             | AV       | V                 |





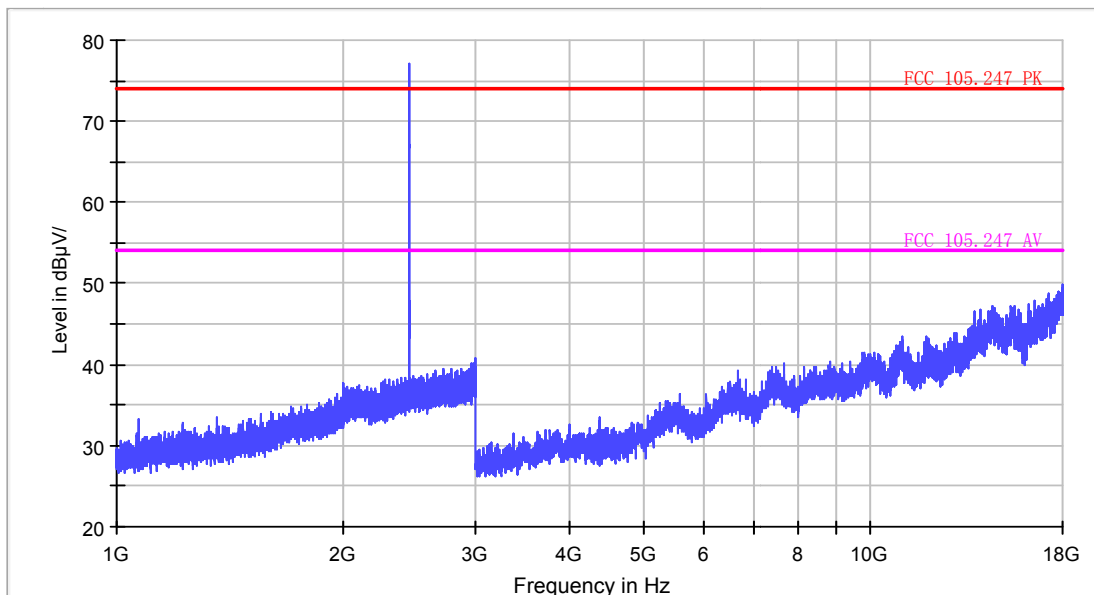
## Channel 39 @ 2441 MHz @ GFSK\_DH5

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

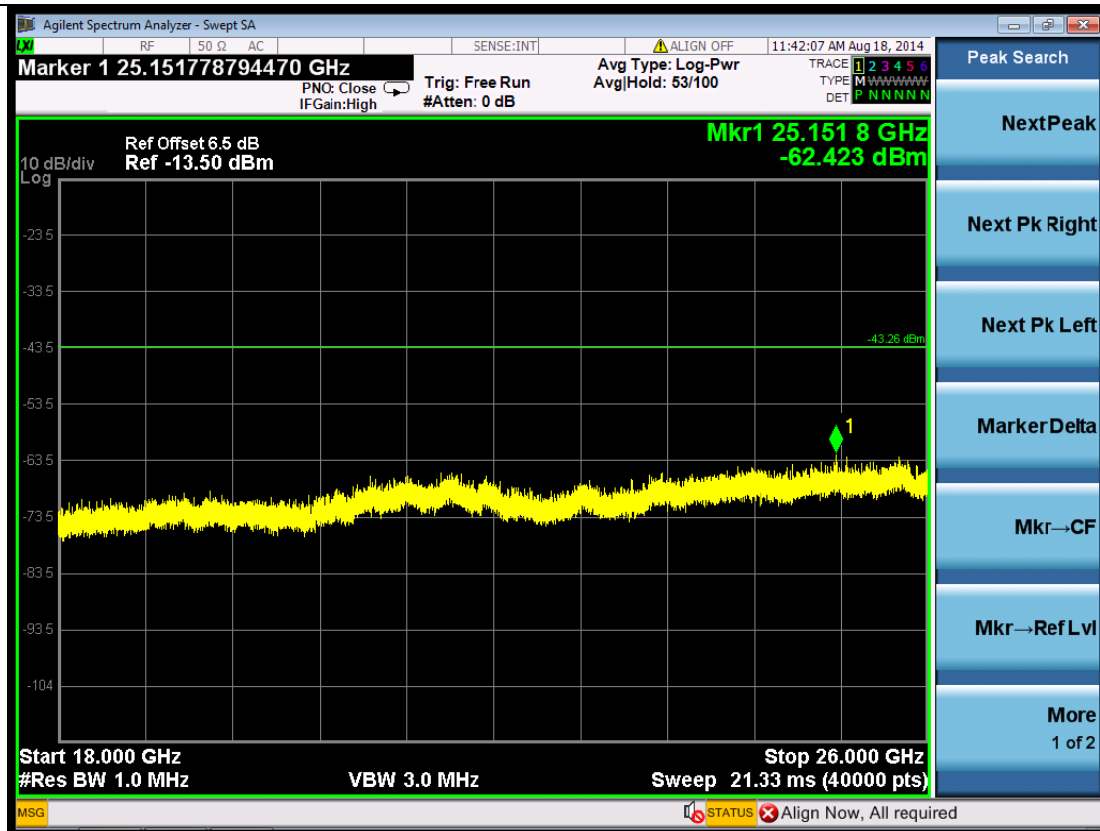


| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
|                 | ---            |                       |                 |                |             | AV       | V                 |

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

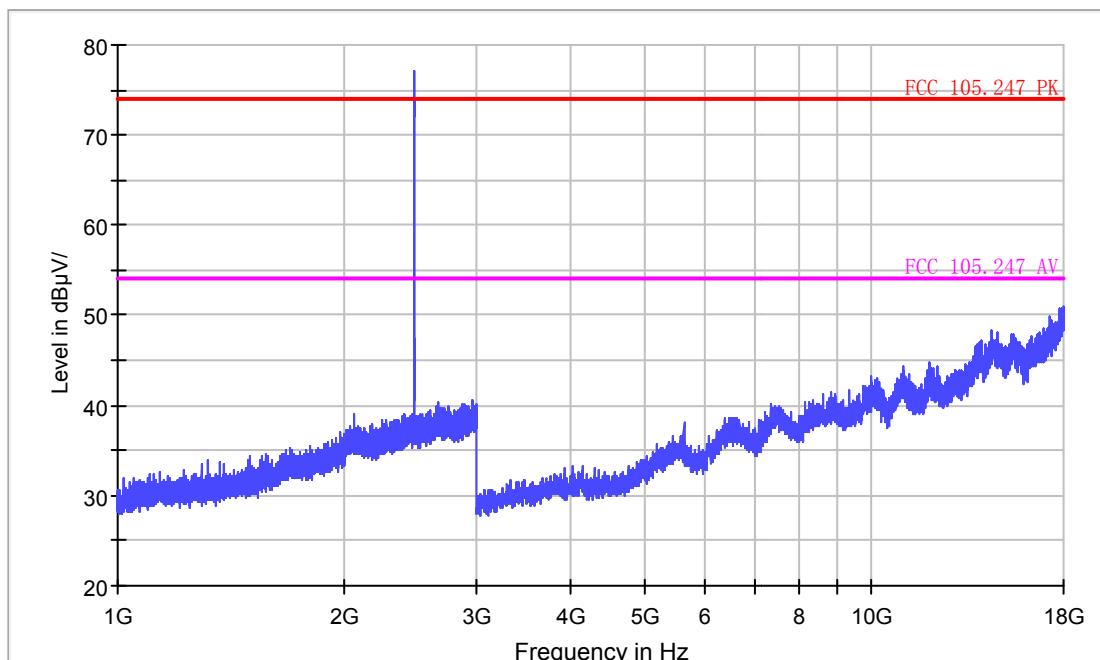


| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
|                 | ---            |                       |                 |                |             | AV       | V                 |



## Channel 78 @ 2480 MHz @ GFSK\_DH5

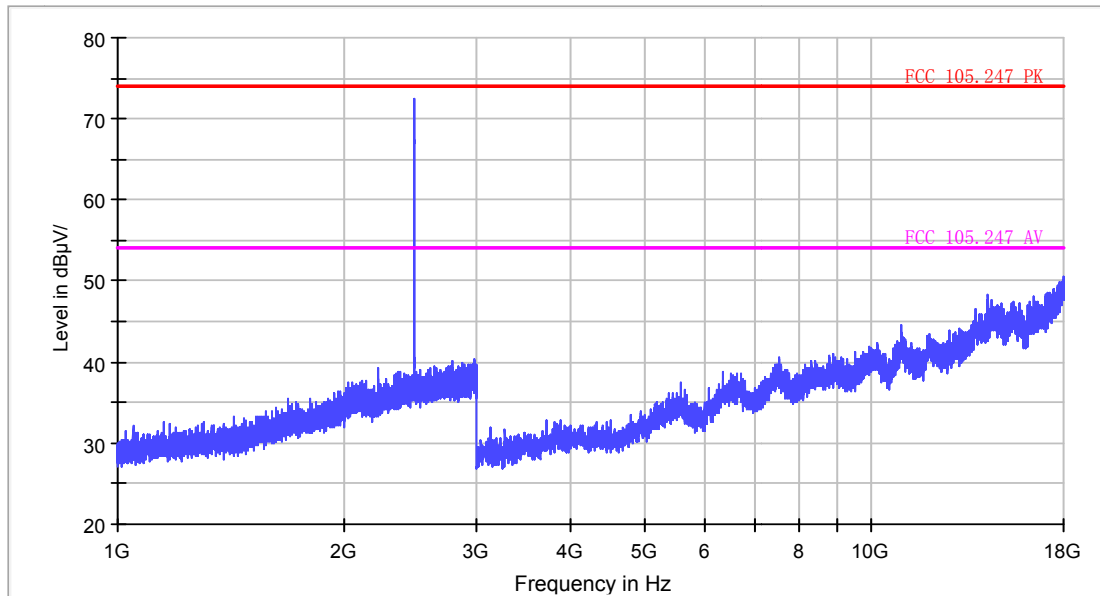
FCC Electric Field Strength 1-18GHz operate on 2.4GHz



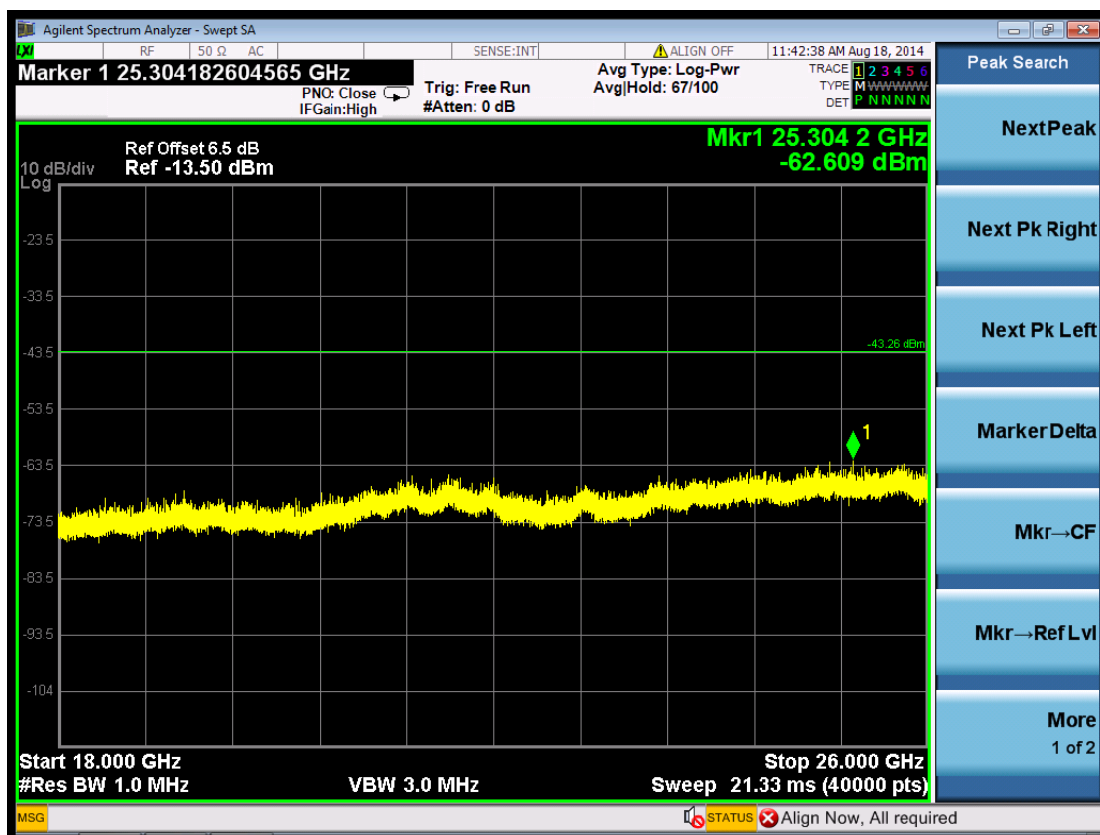
| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
|                 | ---            |                       |                 |                |             | AV       | V                 |



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



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
|                 | ---            |                       |                 |                |             | AV       | V                 |





## 6.3 Maximum Peak Output Power

### TEST PROCEDURE

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum.

### LIMIT

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.

### TEST RESULTS

Remark: We test maximum peak output power at difference Packet Type (DH1, DH3 and DH5), recorded worst case at DH3

#### 6.3.1 GFSK Test Mode

##### A. Test Verdict

| Channel | Frequency (MHz) | Measured Output Peak Power (dBm) | Limits (dBm) | Verdict |
|---------|-----------------|----------------------------------|--------------|---------|
| 00      | 2402            | 0.72                             | 30           | PASS    |
| 39      | 2441            | 2.11                             | 30           | PASS    |
| 78      | 2480            | 3.28                             | 30           | PASS    |

Note: 1.The test results including the cable lose.

#### 6.3.2 $\pi/4$ DQPSK Test Mode

##### A. Test Verdict

| Channel | Frequency (MHz) | Measured Output Peak Power (dBm) | Limits (dBm) | Verdict |
|---------|-----------------|----------------------------------|--------------|---------|
| 00      | 2402            | -0.91                            | 21           | PASS    |
| 39      | 2441            | 1.95                             | 21           | PASS    |
| 78      | 2480            | 2.34                             | 21           | PASS    |

Note: 1.The test results including the cable lose.

#### 6.3.3 8DPSK Test Mode

##### B. Test Verdict

| Channel | Frequency (MHz) | Measured Output Peak Power (dBm) | Limits (dBm) | Verdict |
|---------|-----------------|----------------------------------|--------------|---------|
| 00      | 2402            | -1.48                            | 21           | PASS    |
| 39      | 2441            | 1.63                             | 21           | PASS    |
| 78      | 2480            | 1.97                             | 21           | PASS    |

Note: 1.The test results including the cable lose.



## 6.4 20dB Bandwidth

### TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=30 KHz and VBW=100 KHz.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

### LIMIT

For frequency hopping systems operating in the 2400MHz-2483.5MHz no limit for 20dB bandwidth.

### TEST RESULTS

Remark: We test 20dB Bandwidth at difference Packet Type (DH1, DH3 and DH5), recorded worst case at DH5.

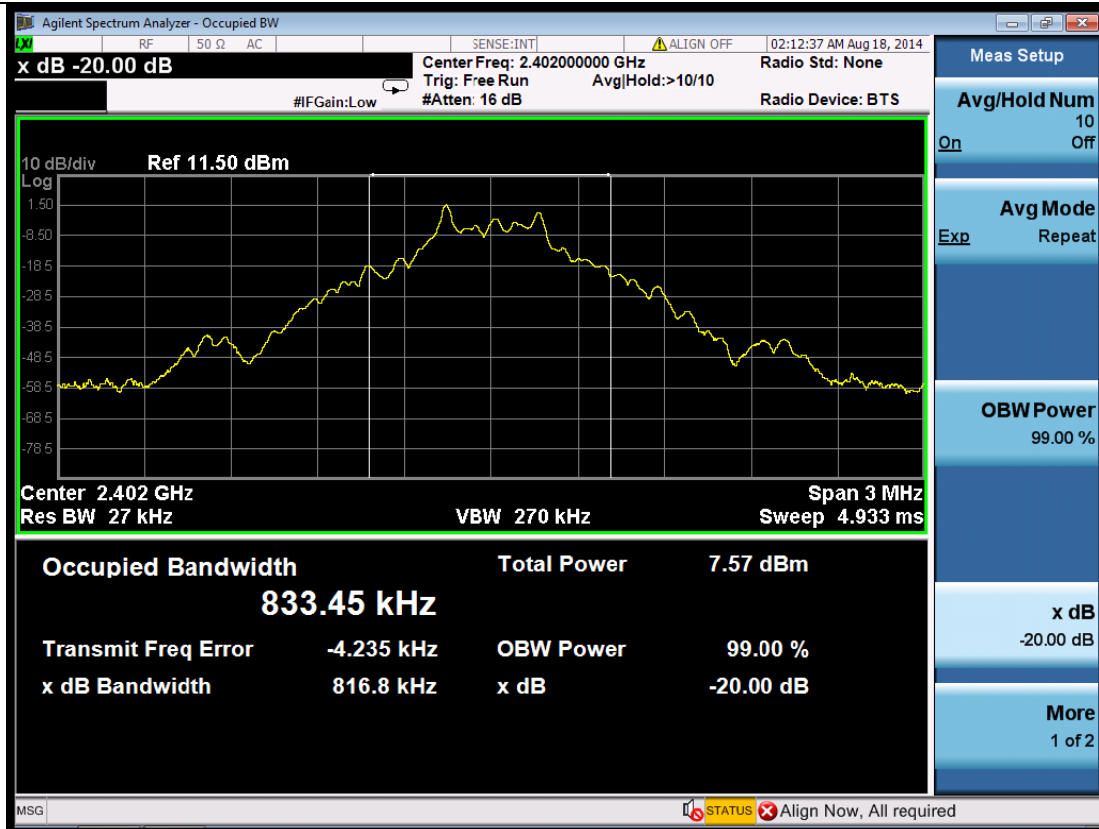
#### 6.4.1 GFSK Test Mode

##### A. Test Verdict

| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) | Refer to Plot | Limits (MHz) | Verdict |
|---------|-----------------|----------------------|---------------|--------------|---------|
| 00      | 2402            | 0.8168               | Plot 6.4.1 A  | /            | PASS    |
| 39      | 2441            | 0.7747               | Plot 6.4.1 B  | /            | PASS    |
| 78      | 2480            | 0.8168               | Plot 6.4.1 C  | /            | PASS    |

Note: 1.The test results including the cable lose.

##### B. Test Plots



(Plot 6.4.1 A: Channel 00: 2402MHz @ GFSK)



(Plot 6.4.1 B: Channel 39: 2441MHz @ GFSK)



(Plot 6.4.1 C: Channel 78: 2480MHz @ GFSK)

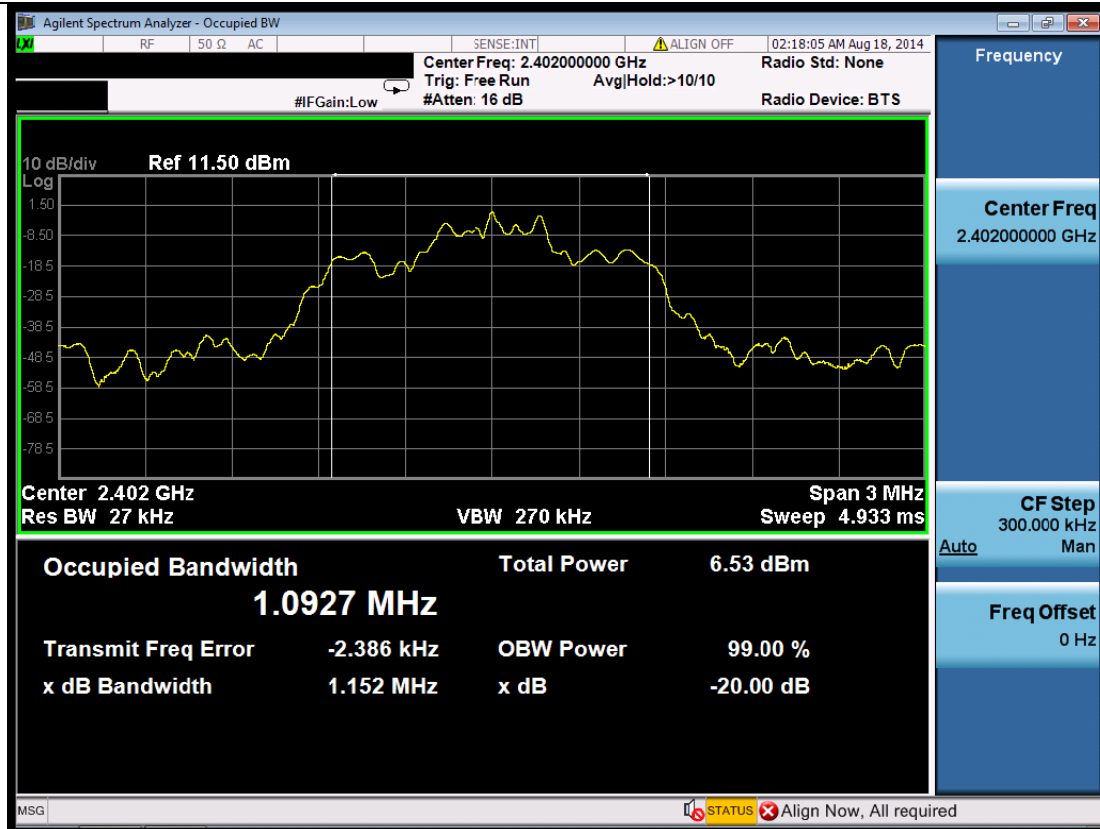
## 6.4.2 8DPSK Test Mode

### A. Test Verdict

| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) | Refer to Plot | Limits (MHz) | Verdict |
|---------|-----------------|----------------------|---------------|--------------|---------|
| 00      | 2402            | 1.152                | Plot 6.4.2 A  | /            | PASS    |
| 39      | 2441            | 1.147                | Plot 6.4.2 B  | /            | PASS    |
| 78      | 2480            | 1.148                | Plot 6.4.2 C  | /            | PASS    |

Note: 1.The test results including the cable lose.

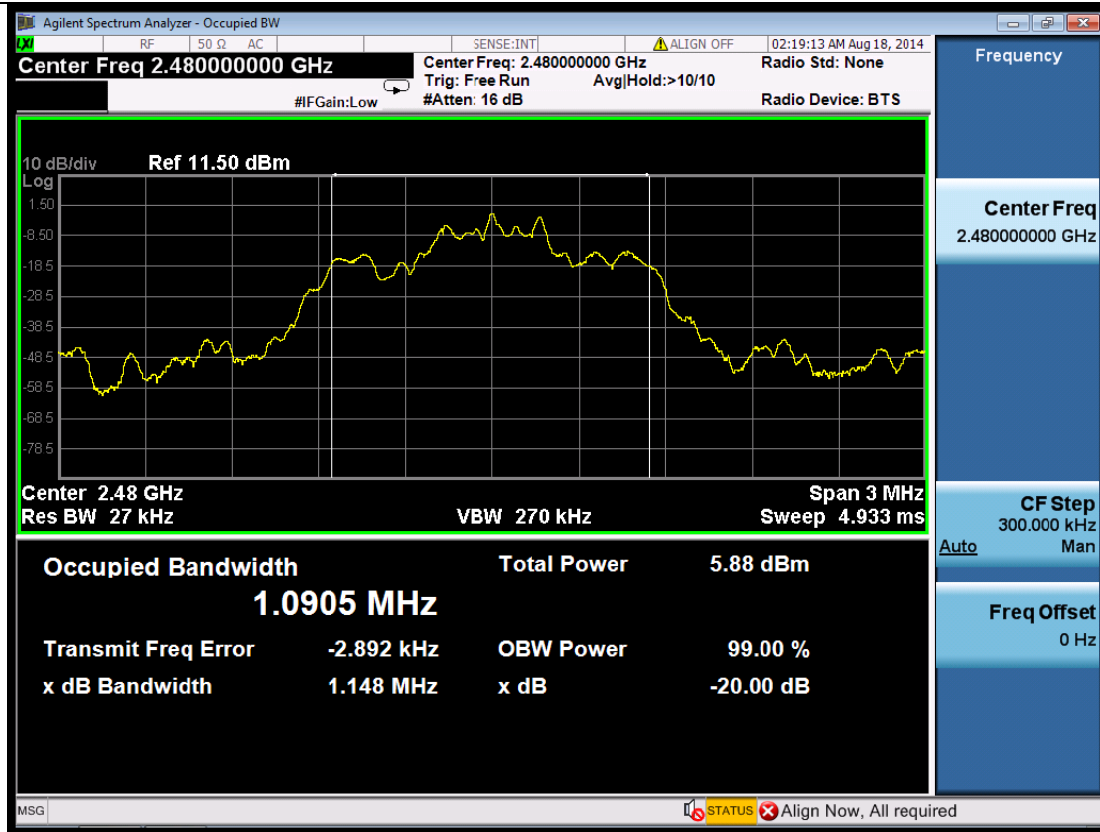
### B. Test Plots



(Plot 6.4.2 A: Channel 00: 2402MHz @ 8DPSK)



(Plot 6.4.2 B: Channel 39: 2441MHz @ 8DPSK)



(Plot 6.4.2 C: Channel 78: 2480MHz @ 8DPSK)

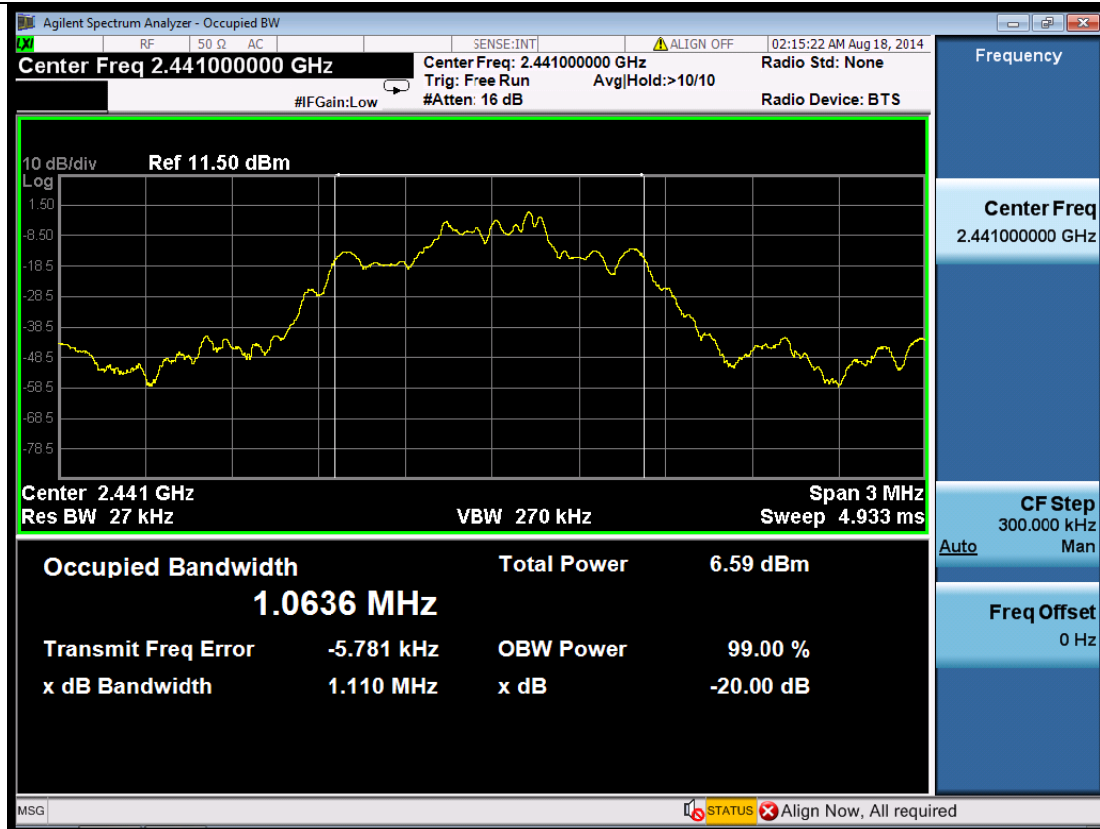
#### 4.4.3 $\pi/4$ DQPSK Test Mode

##### A. Test Verdict

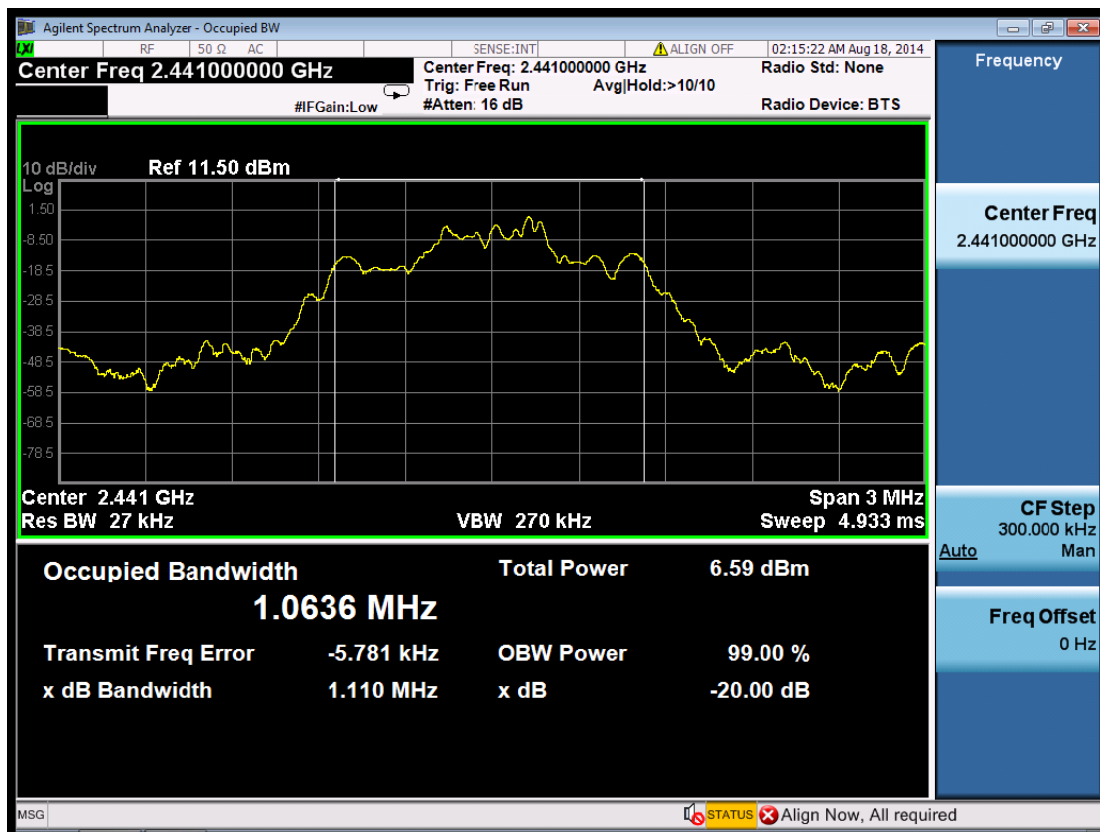
| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) | Refer to Plot | Limits (MHz) | Verdict |
|---------|-----------------|----------------------|---------------|--------------|---------|
| 00      | 2402            | 1.109                | Plot 6.4.3 A  | /            | PASS    |
| 39      | 2441            | 1.110                | Plot 6.4.3 B  | /            | PASS    |
| 78      | 2480            | 1.108                | Plot 6.4.3 C  | /            | PASS    |

Note: 1.The test results including the cable lose.

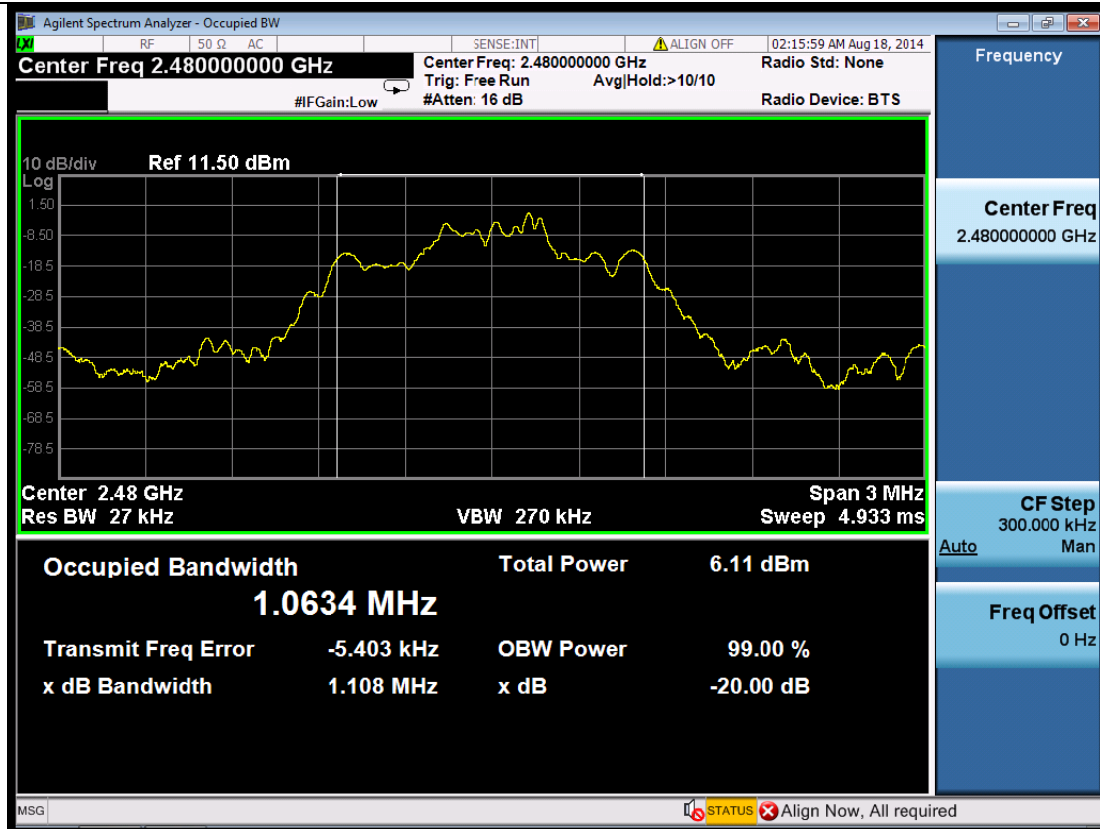
##### B. Test Plots



(Plot 6.4.3 A: Channel 00: 2402MHz @  $\pi/4$ DQPSK)



(Plot 6.4.3 B: Channel 39: 2441MHz @  $\pi/4$ DQPSK)



(Plot 6.4.3 C: Channel 78: 2480MHz @ $\pi/4$ DQPSK)



## 6.5 Band Edge

### Applicable Standard

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)).

### TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel 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 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz.
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.

### TEST RESULTS

Remark: 1. We test Band Edge at difference Packet Type (DH1, DH3 and DH5), recorded worst case at DH5.  
2. “---” means not recorded as emission levels lower than limit.

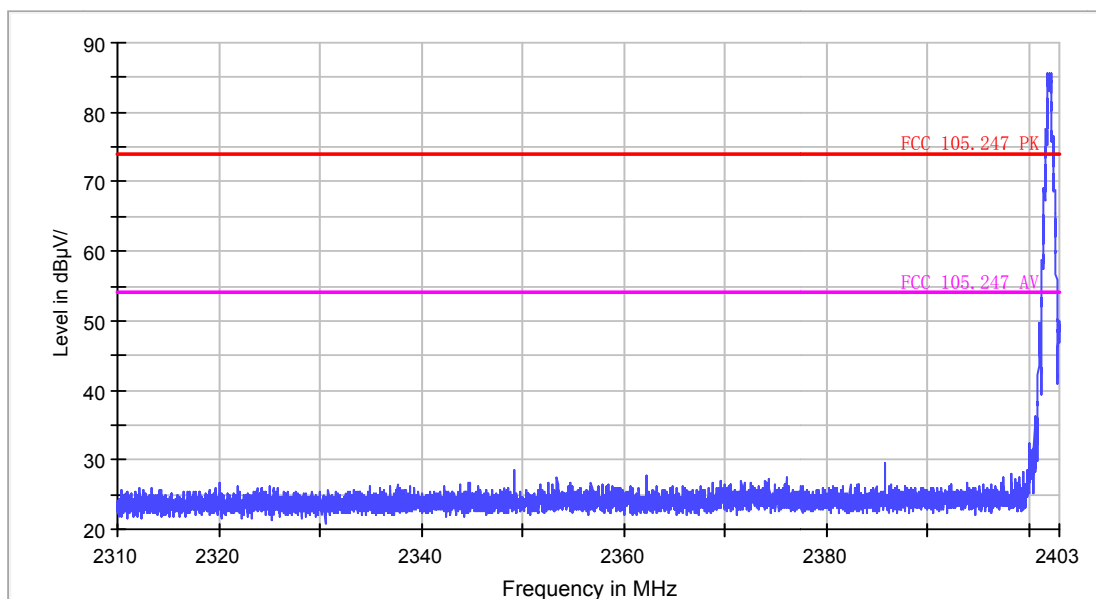
#### 6.5.1 For Radiated Bandedge Measurement

Remark: we tested radiated bandedge at both hopping and no-hopping modes, recorded worst case at no-hopping mode

##### 6.5.1.1 GFSK Test Mode

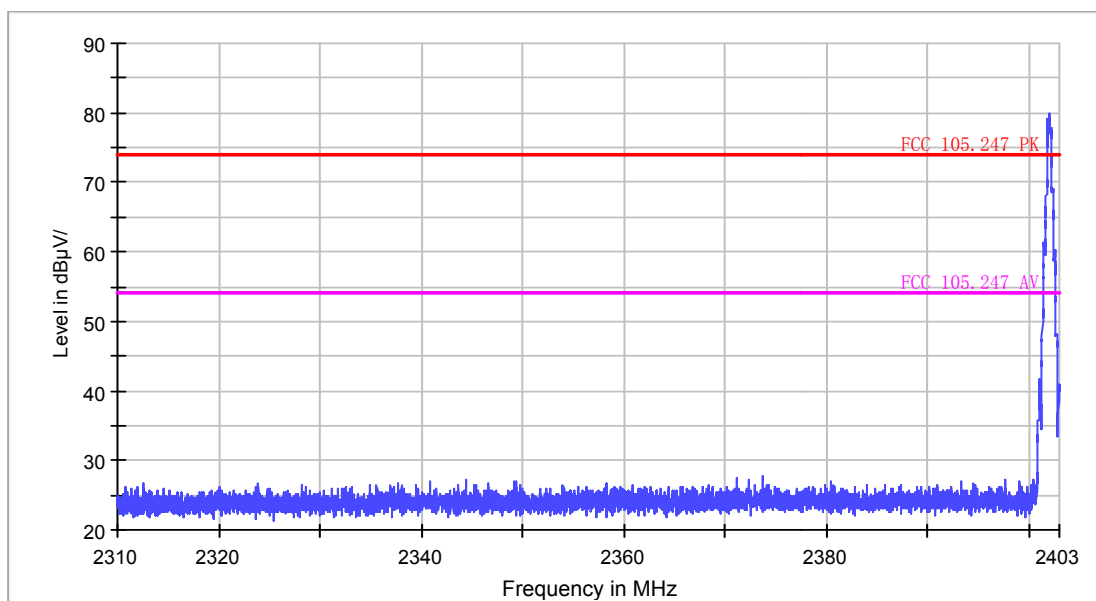


FCC Electric Field Strength 2.4GHz Bandedge-PK



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
| 2390.00         | ---            |                       |                 |                |             | Peak     | H                 |

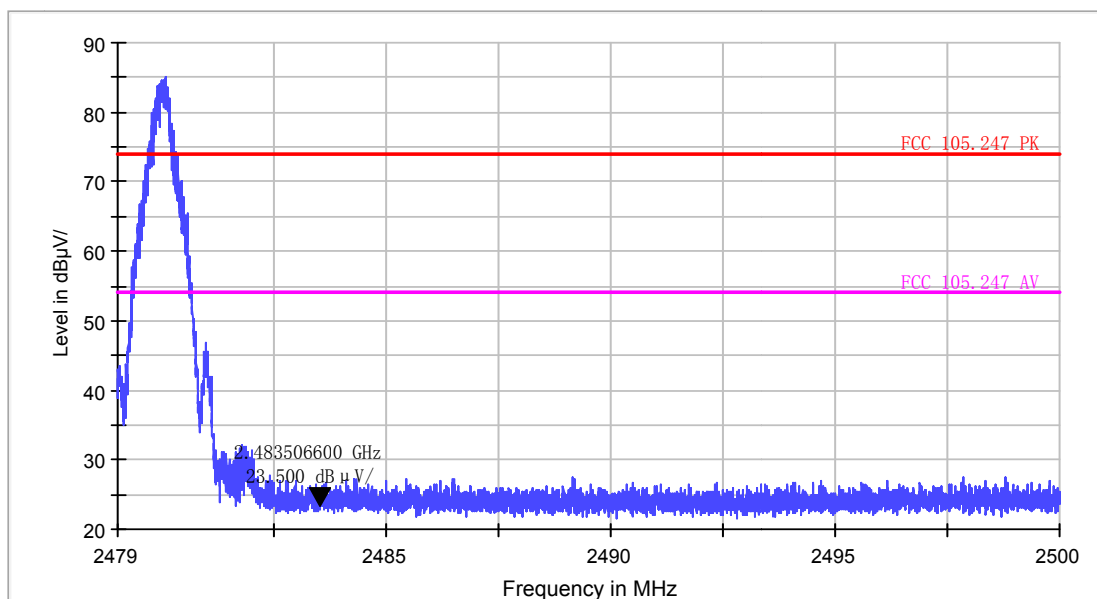
FCC Electric Field Strength 2.4GHz Bandedge-PK



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
| 2390.00         | ---            |                       |                 |                |             | Peak     | V                 |

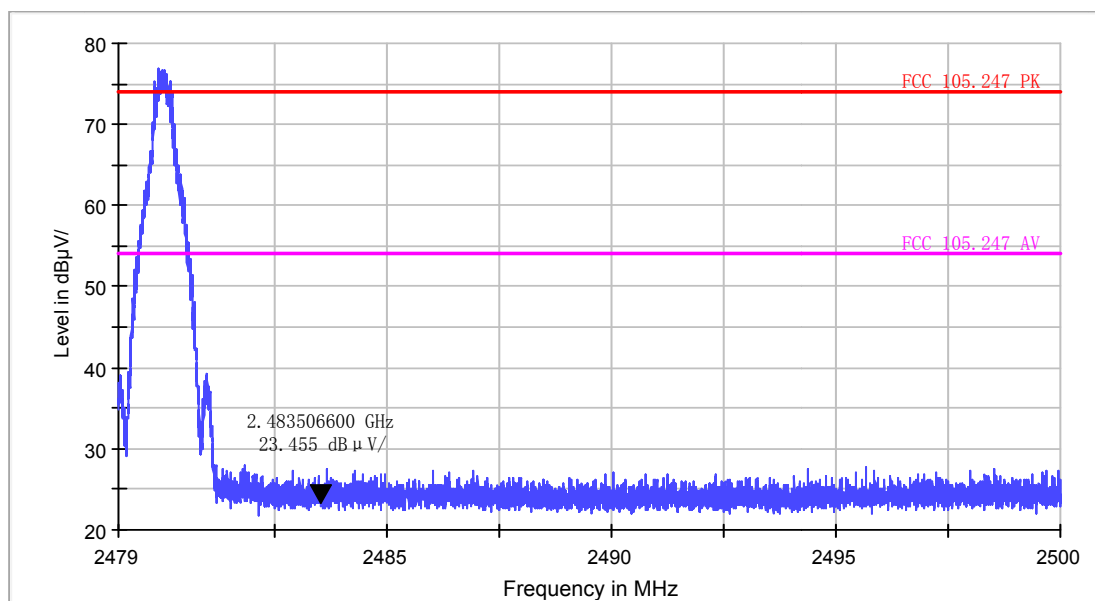


## FCC Electric Field Strength 2.4GHz Bandedge-PK



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
| 2483.50         | ---            |                       |                 |                |             | Peak     | H                 |

## FCC Electric Field Strength 2.4GHz Bandedge-PK

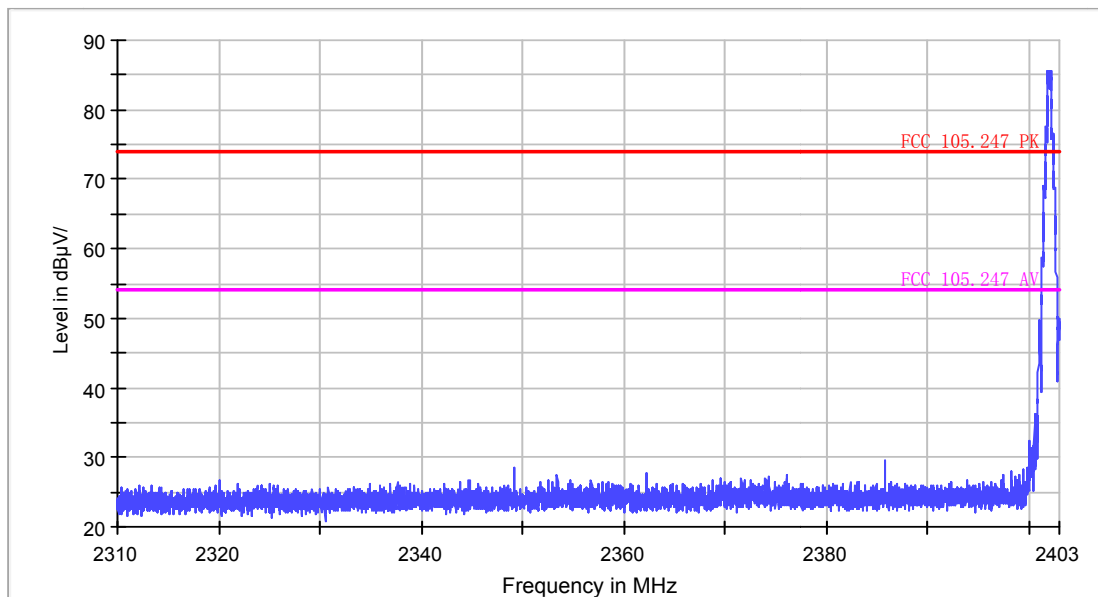


| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
| 2483.50         | ---            |                       |                 |                |             | Peak     | V                 |



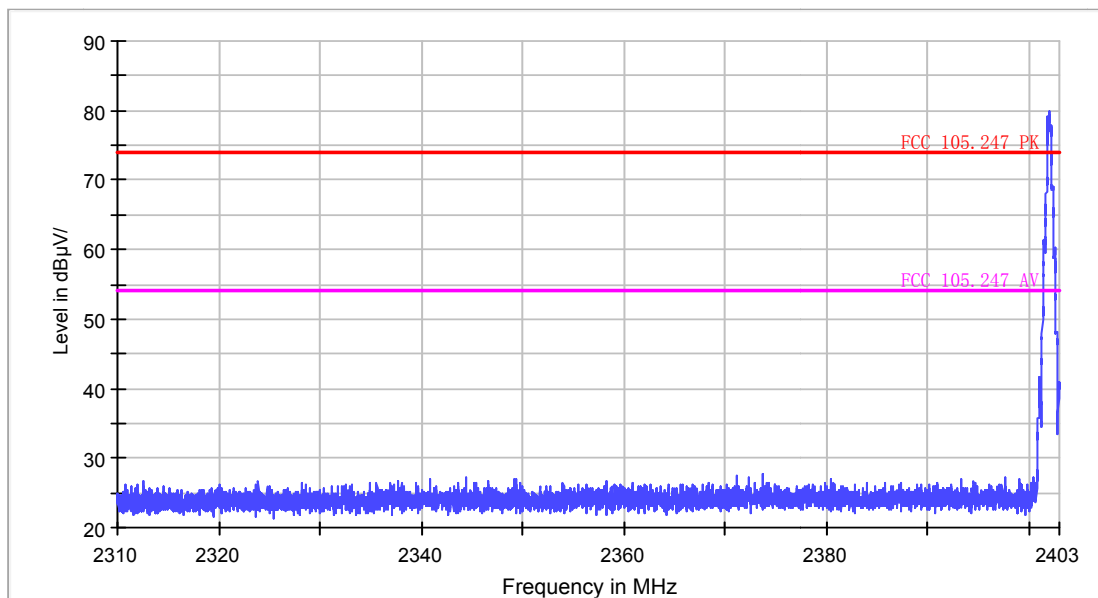
## 6.5.1.2 $\pi/4$ DQPSK Test Mode

FCC Electric Field Strength 2.4GHz Bandedge-PK



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
| 2390.00         | ---            |                       |                 |                |             | Peak     | H                 |

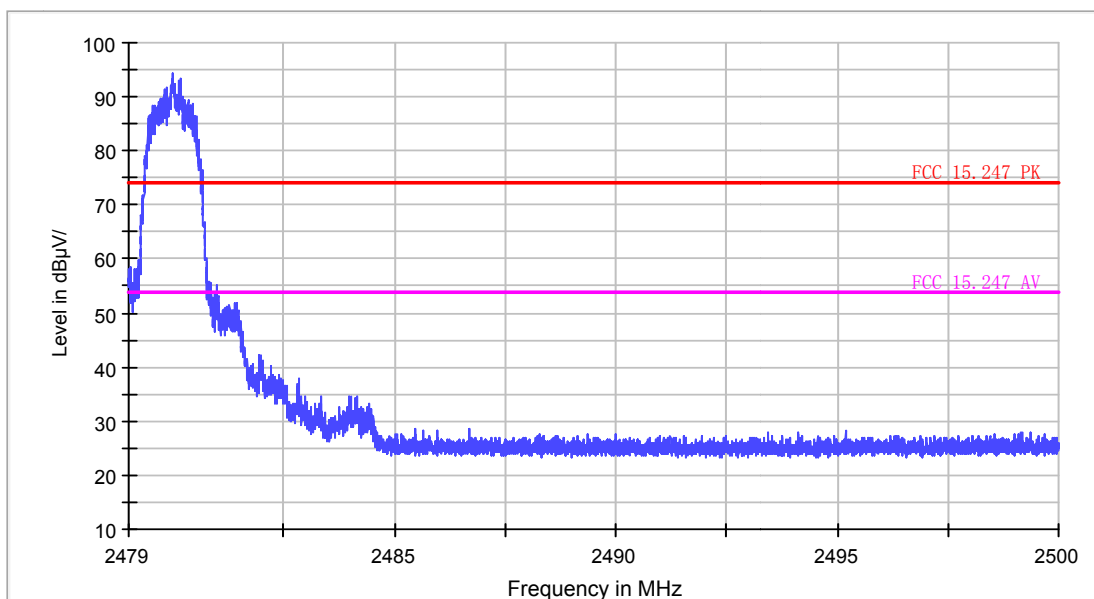
FCC Electric Field Strength 2.4GHz Bandedge-PK



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
| 2390.00         | ---            |                       |                 |                |             | Peak     | V                 |

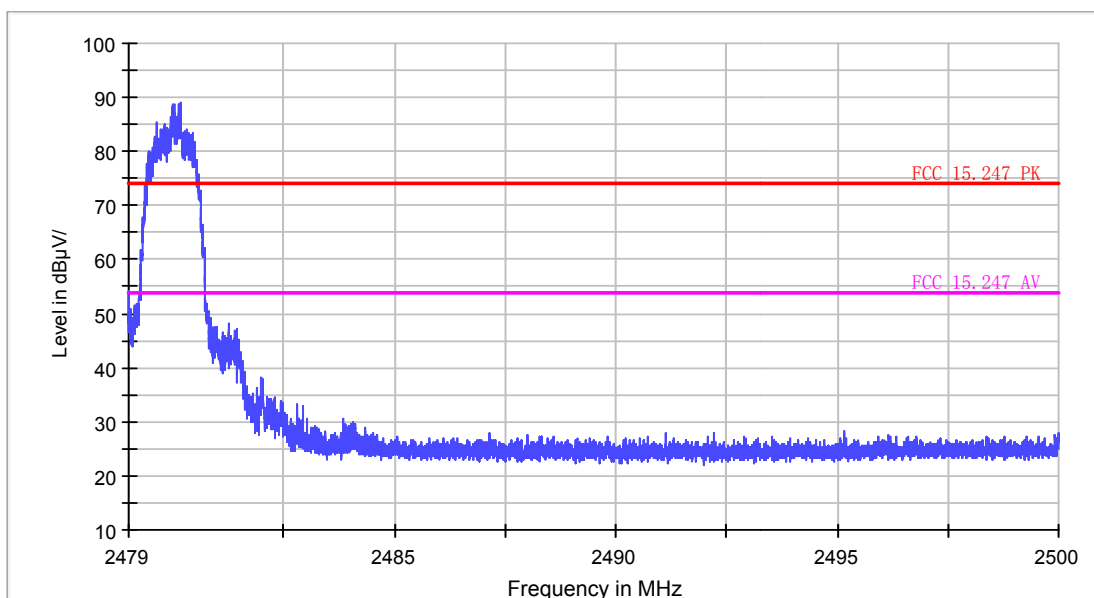


## FCC Electric Field Strength 2.4GHz Bandedge-PK



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
| 2483.50         | ---            |                       |                 |                |             | Peak     | H                 |

## FCC Electric Field Strength 2.4GHz Bandedge-PK

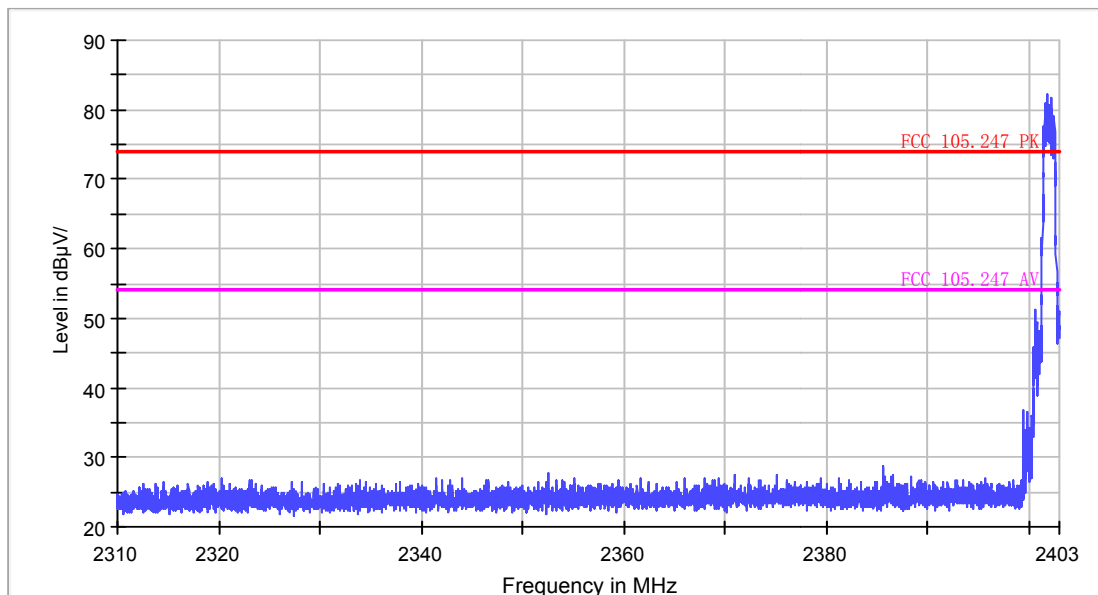


| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
| 2483.50         | ---            |                       |                 |                |             | Peak     | V                 |



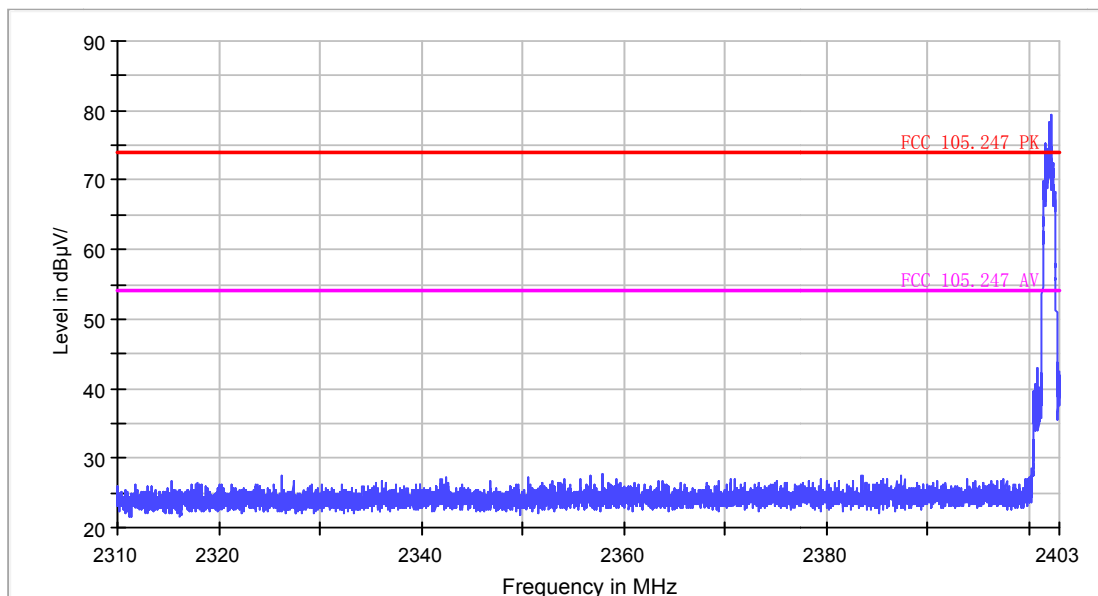
## 6.5.1.3 8DPSK Test Mode

FCC Electric Field Strength 2.4GHz Bandedge-PK



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
| 2390            | ---            |                       |                 |                |             | Peak     | H                 |

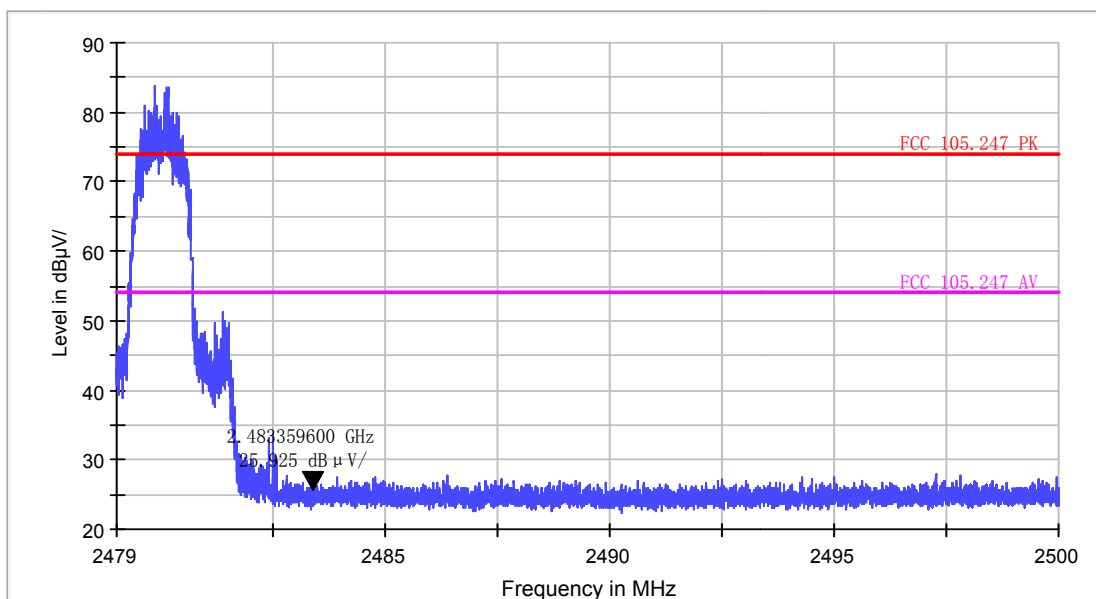
FCC Electric Field Strength 2.4GHz Bandedge-PK



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
| 2390            | ---            |                       |                 |                |             | Peak     | V                 |

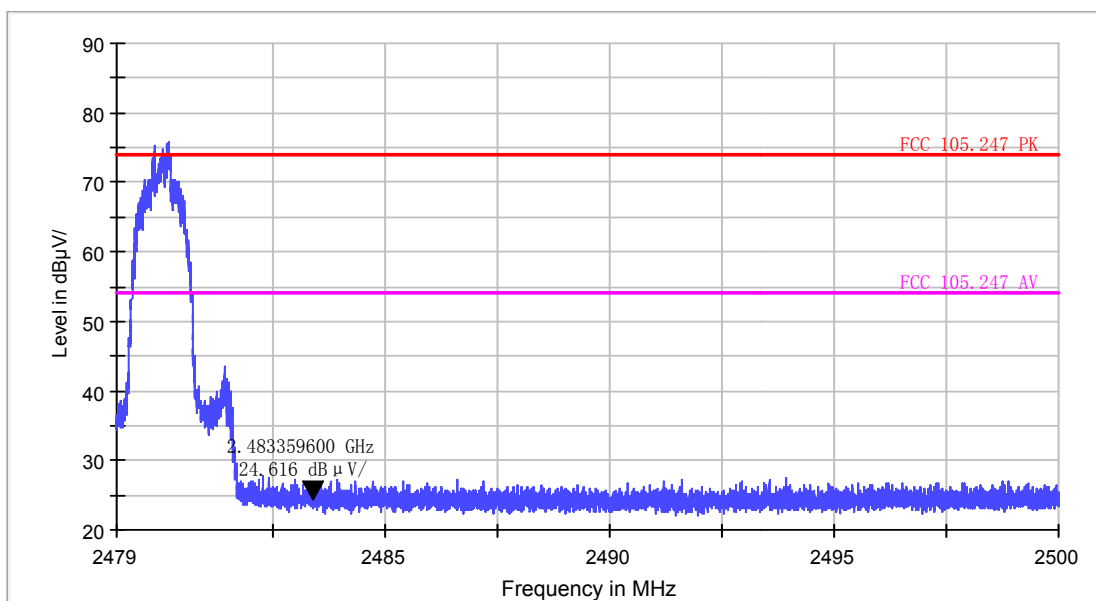


## FCC Electric Field Strength 2.4GHz Bandedge-PK



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
| 2483.50         | ---            |                       |                 |                |             | Peak     | H                 |

## FCC Electric Field Strength 2.4GHz Bandedge-PK



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Ant. Polar. H / V |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|----------|-------------------|
| 2483.50         | ---            |                       |                 |                |             | Peak     | V                 |



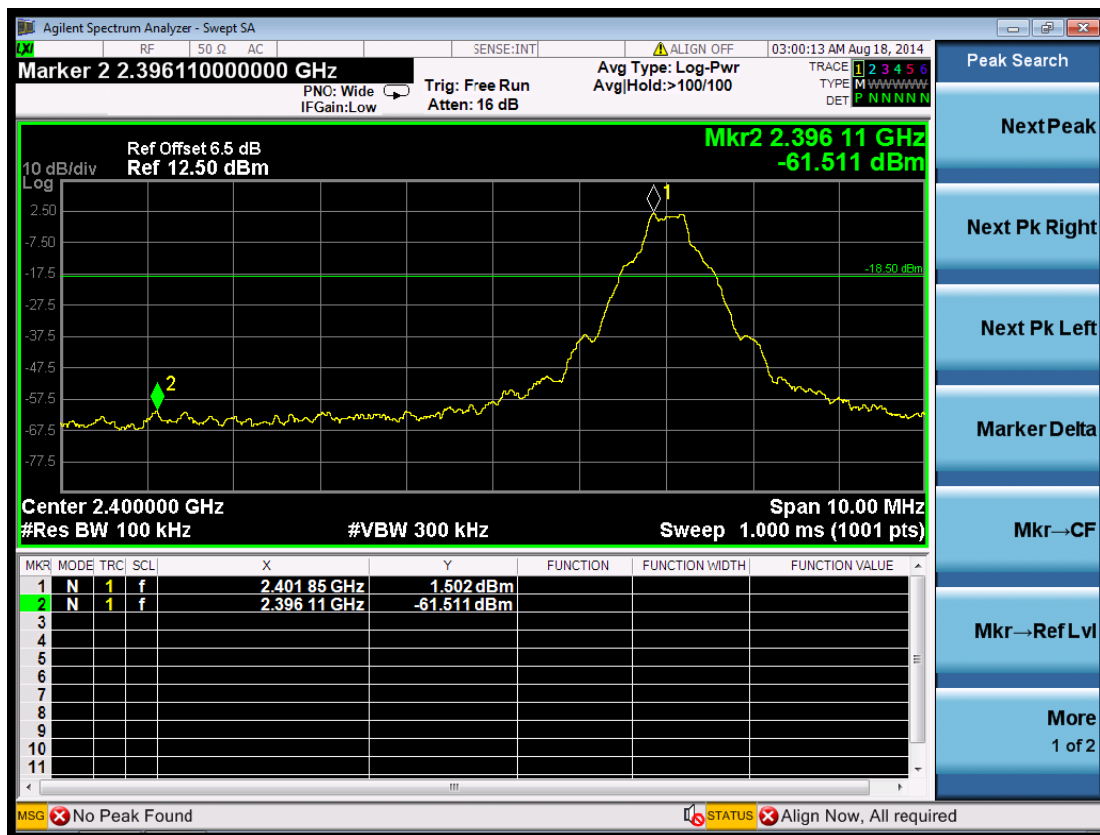
## 6.5.2 For Conducted Bandedge Measurement

### 6.5.2.1 GFSK Test Mode

#### A. Test Verdict

| Frequency (MHz) | Delta Peak to Band emission (dBc) | Hopping Mode | Detector | Limit (dBc) | Refer to Plot  | Verdict |
|-----------------|-----------------------------------|--------------|----------|-------------|----------------|---------|
| 2400.00         | -67.013                           | OFF          | Peak     | -20         | Plot 6.5.2.1 A | PASS    |
| 2400.00         | -63.427                           | ON           | Peak     | -20         | Plot 6.5.2.1 B | PASS    |
| 2483.50         | -62.128                           | OFF          | Peak     | -20         | Plot 6.5.2.1 C | PASS    |
| 2483.50         | -63.221                           | ON           | Peak     | -20         | Plot 6.5.2.1 D | PASS    |

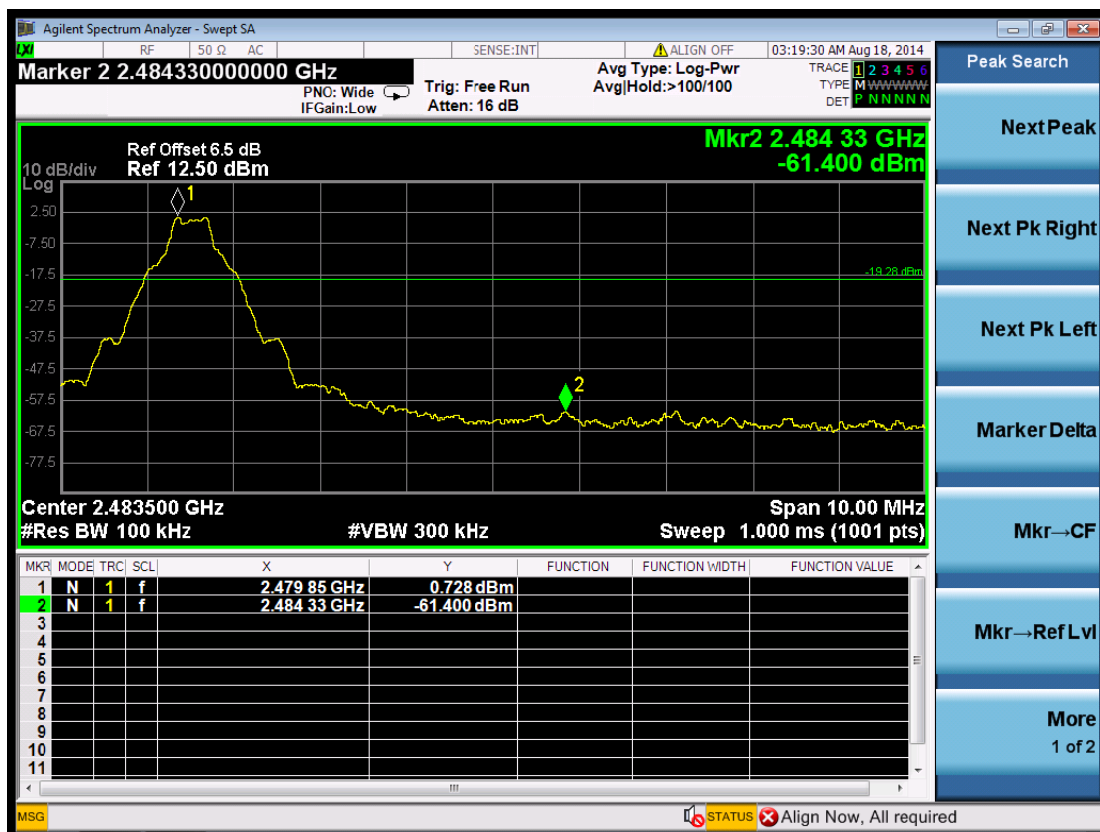
#### B. Test Plots



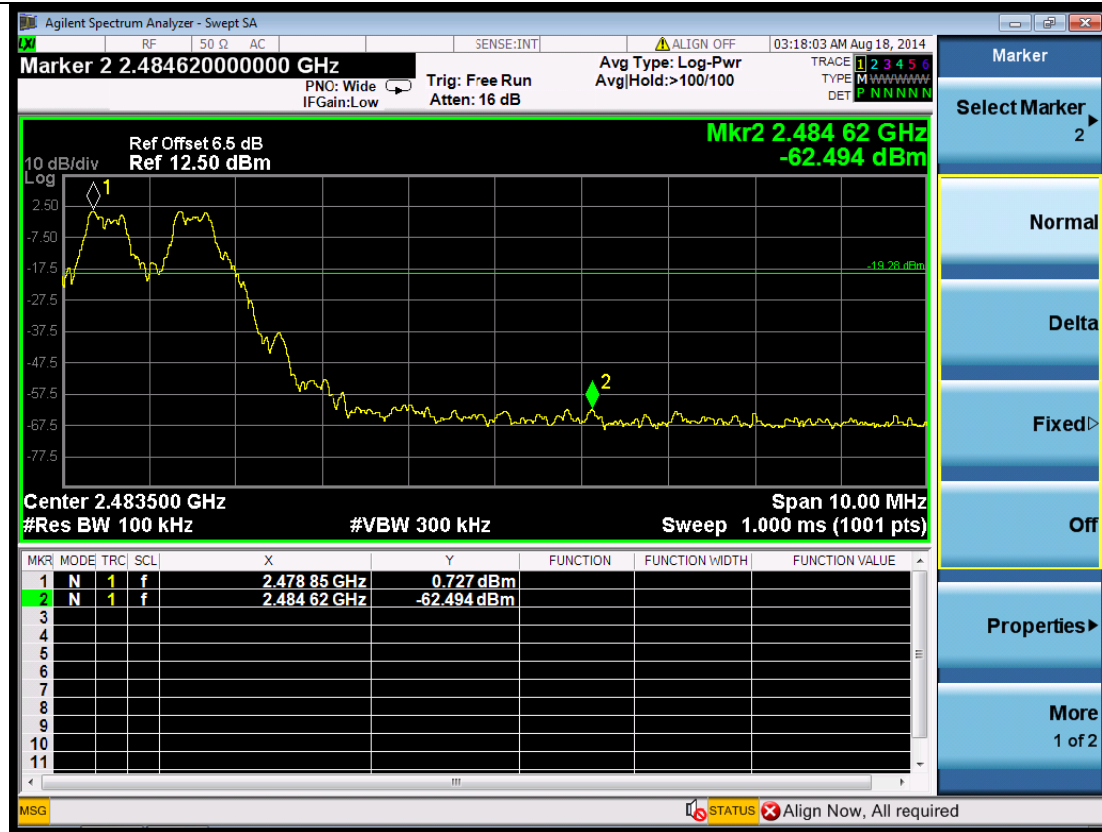
(Plot 6.5.2.1 A: Hopping Off @ GFSK)



(Plot 6.5.2.1 B: Hopping On @ GFSK)



(Plot 6.5.2.1 C: Hopping Off @ GFSK)



(Plot 6.5.2.1 D: Hopping On @ GFSK)

## 4.5.2.2 8DPSK Test Mode

### A. Test Verdict

| Frequency (MHz) | Delta Peak to Band emission (dBc) | Hopping Mode | Detector | Limit (dBc) | Refer to Plot  | Verdict |
|-----------------|-----------------------------------|--------------|----------|-------------|----------------|---------|
| 2400.00         | -56.531                           | OFF          | Peak     | -20         | Plot 6.5.2.2 A | PASS    |
| 2400.00         | -57.458                           | ON           | Peak     | -20         | Plot 6.5.2.2 B | PASS    |
| 2483.50         | -60.246                           | OFF          | Peak     | -20         | Plot 6.5.2.2 C | PASS    |
| 2483.50         | -61.200                           | ON           | Peak     | -20         | Plot 6.5.2.2 D | PASS    |

### B. Test Plots



(Plot 6.5.2.2 A: Hopping Off @ 8DPSK)



(Plot 6.5.2.2 B: Hopping On @ 8DPSK)



(Plot 6.5.2.2 C: Hopping Off @ 8DPSK)



(Plot 6.5.2.2 D: Hopping On @ 8DPSK)

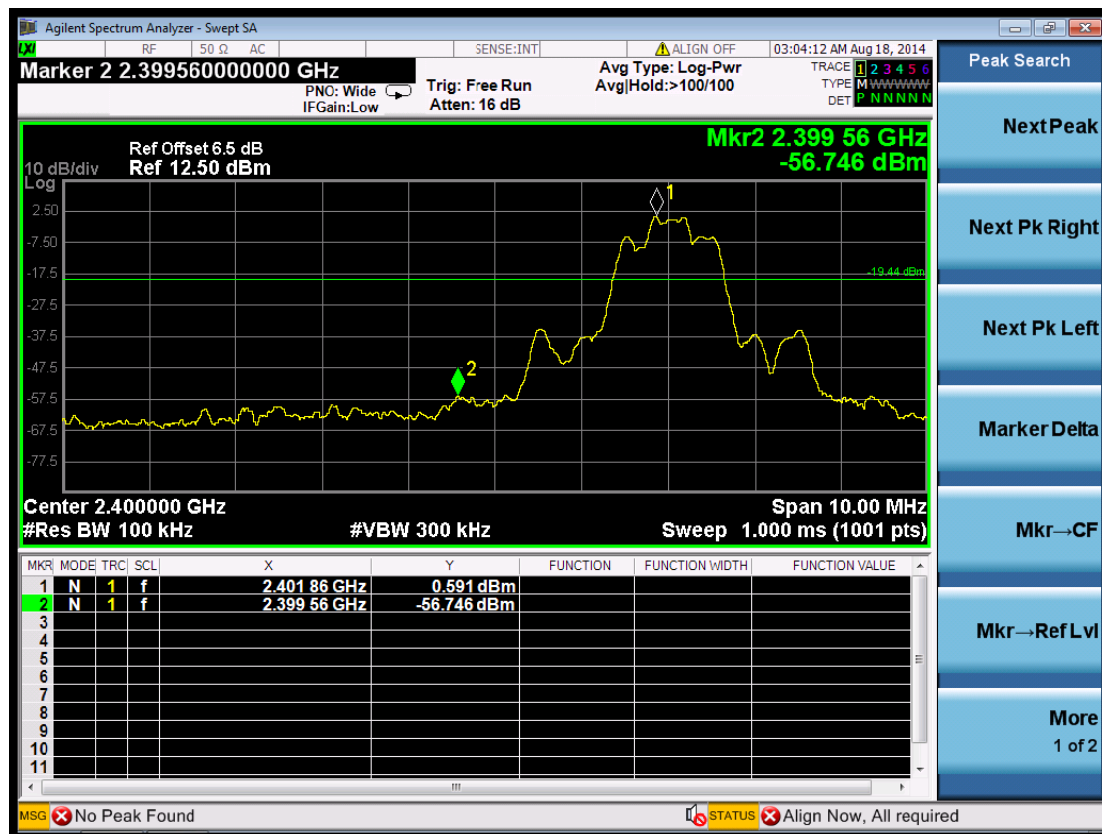


## 6.5.2.3 $\pi/4$ DQPSK Test Mode

### A. Test Verdict

| Frequency (MHz) | Delta Peak to Band emission (dBc) | Hopping Mode | Detector | Limit (dBc) | Refer to Plot  | Verdict |
|-----------------|-----------------------------------|--------------|----------|-------------|----------------|---------|
| 2400.00         | -57.337                           | OFF          | Peak     | -20         | Plot 6.5.2.3 A | PASS    |
| 2400.00         | -61.199                           | ON           | Peak     | -20         | Plot 6.5.2.3 B | PASS    |
| 2483.50         | -60.700                           | OFF          | Peak     | -20         | Plot 6.5.2.3 C | PASS    |
| 2483.50         | -61.918                           | ON           | Peak     | -20         | Plot 6.5.2.3 D | PASS    |

### B. Test Plots



(Plot 6.5.2.3 A: Hopping Off @  $\pi/4$ DQPSK)



(Plot 6.5.2.3 B: Hopping On @  $\pi/4$ DQPSK)



(Plot 6.5.2.3 C: Hopping Off @  $\pi/4$ DQPSK)



(Plot 6.5.2.3 D: Hopping On @ $\pi/4$ DQPSK)



## 6.6 Frequency Separation

### TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=30 KHz and VBW=100KHz.

### LIMIT

According to 15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the  $\frac{2}{3} \times 20\text{dB}$  bandwidth of the hopping channel, whichever is greater.

### TEST RESULTS

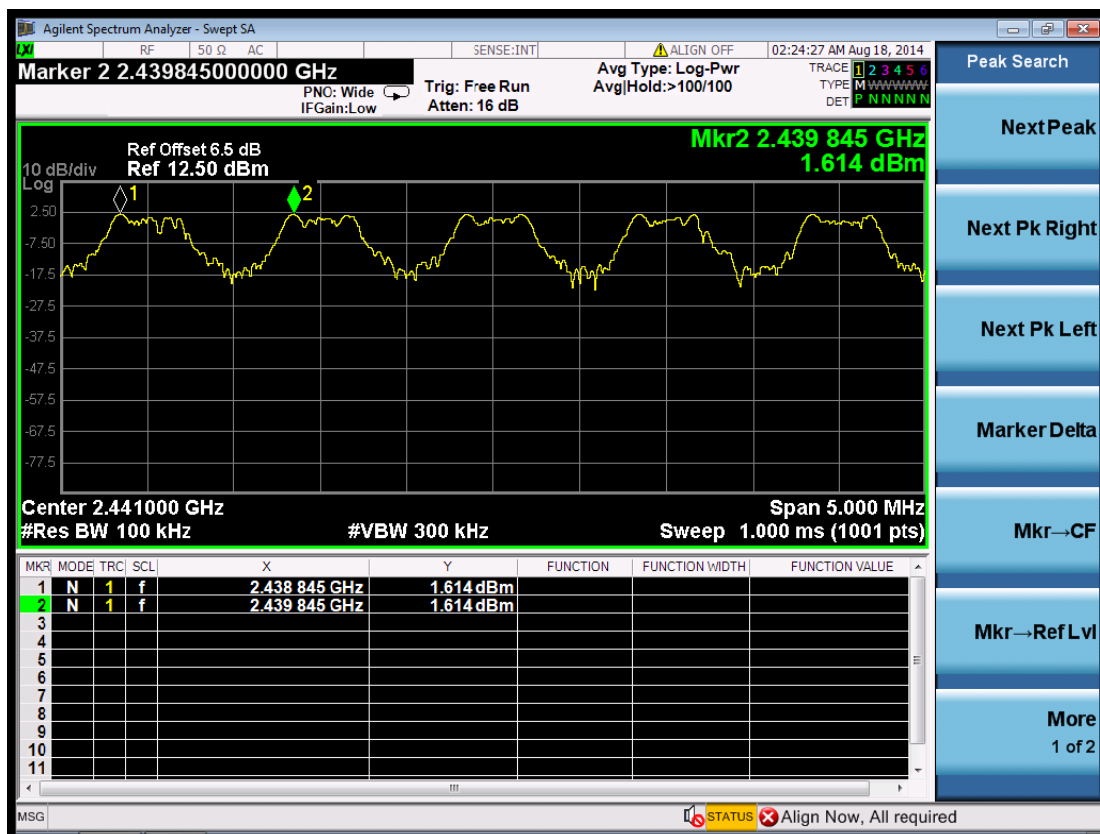
Remark: 1. We test Frequency Separation at difference Packet Type (DH1, DH3 and DH5) and all test channels, recorded worst case at DH5 and middle channel.

#### 6.6.1 GFSK Test Mode

##### A. Test Verdict

| Channel | Frequency (MHz) | Channel Separation (MHz) | Refer to Plot | Limits (MHz) | Verdict |
|---------|-----------------|--------------------------|---------------|--------------|---------|
| 38      | 2440            | 1.000                    | Plot 6.6.1 A  | 0.7747       | PASS    |
| 39      | 2441            |                          |               |              |         |

##### B. Test Plots



(Plot 6.6.1 A: Channel 39: 2441MHz @ GFSK)

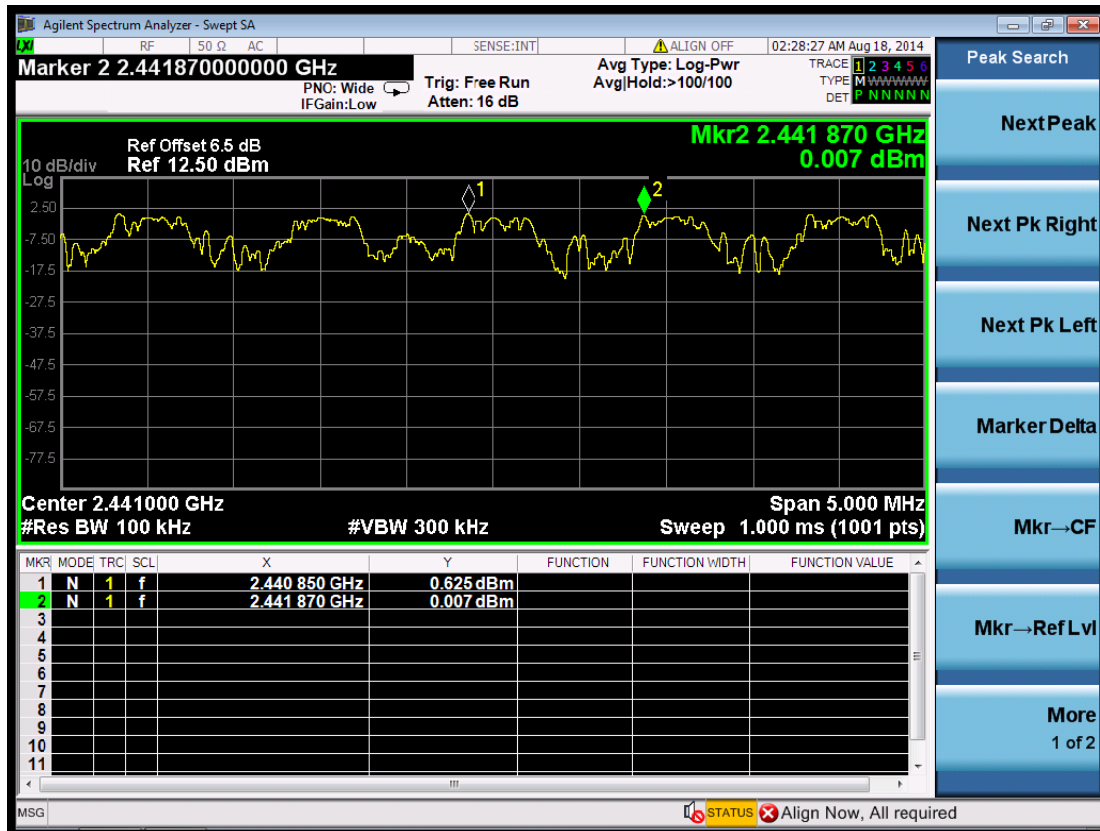


## 4.6.2 8DPSK Test Mode

### A. Test Verdict

| Channel | Frequency (MHz) | Channel Separation (MHz) | Refer to Plot | Limits (MHz) | Verdict |
|---------|-----------------|--------------------------|---------------|--------------|---------|
| 38      | 2440            | 1.020                    | Plot 6.6.2 A  | 0.7647       | PASS    |
| 39      | 2441            |                          |               |              |         |

### B. Test Plots



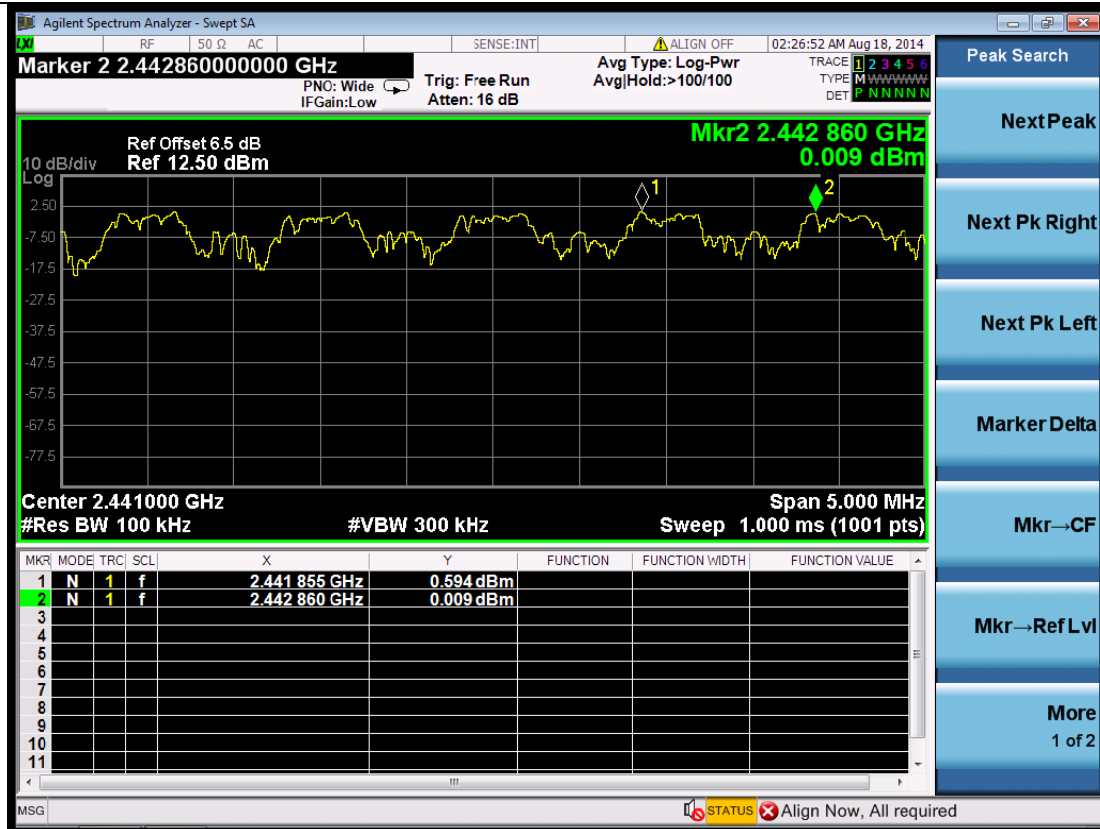
(Plot 6.6.2 A: Channel 39: 2441MHz @ 8DPSK)

## 6.6.3 $\pi/4$ DQPSK Test Mode

### A. Test Verdict

| Channel | Frequency (MHz) | Channel Separation (MHz) | Refer to Plot | Limits (KHz) | Verdict |
|---------|-----------------|--------------------------|---------------|--------------|---------|
| 38      | 2440            | 1.005                    | Plot 4.6.3 A  | 0.7334       | PASS    |
| 39      | 2441            |                          |               |              |         |

### B. Test Plots



(Plot 6.6.3 A: Channel 39: 2441MHz @  $\pi/4$ DQPSK)

## 6.7 Number of Hopping Channels

## TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. Set spectrum analyzer start 2400MHz to 2483.5MHz with RBW= 30 KHz and VBW=100 KHz.

**LIMIT**

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

## TEST RESULTS

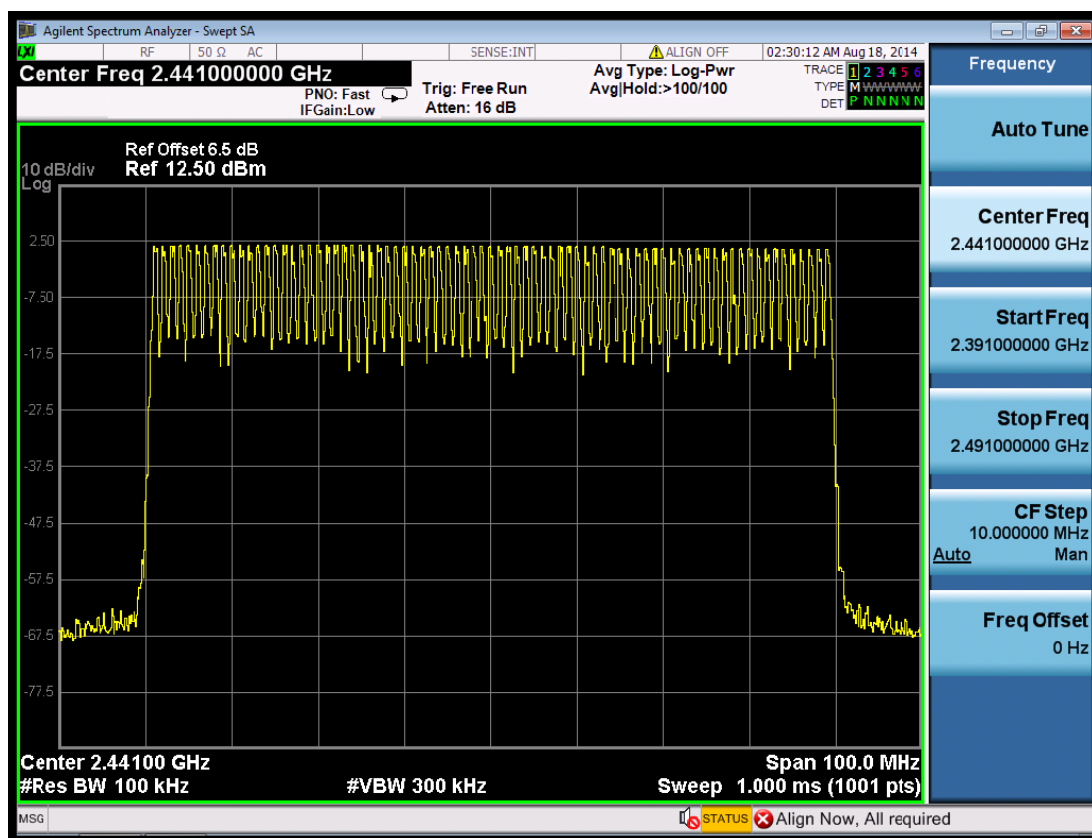
Remark: 1. We test Frequency Separation at difference Packet Type (DH1, DH3 and DH5), recorded worst case at DH5.

### 6.7.1 GFSK Test Mode

### A. Test Verdict

| Hopping Channel Frequency Range (MHz) | Number of Hopping Channel | Refer to Plot | Limit | Verdict |
|---------------------------------------|---------------------------|---------------|-------|---------|
| 2400-2483.5                           | 79                        | Plot 6.7.1 A  | ≥15   | PASS    |

## B. Test Plots



(Plot 6.7.1 A: @ GFSK)

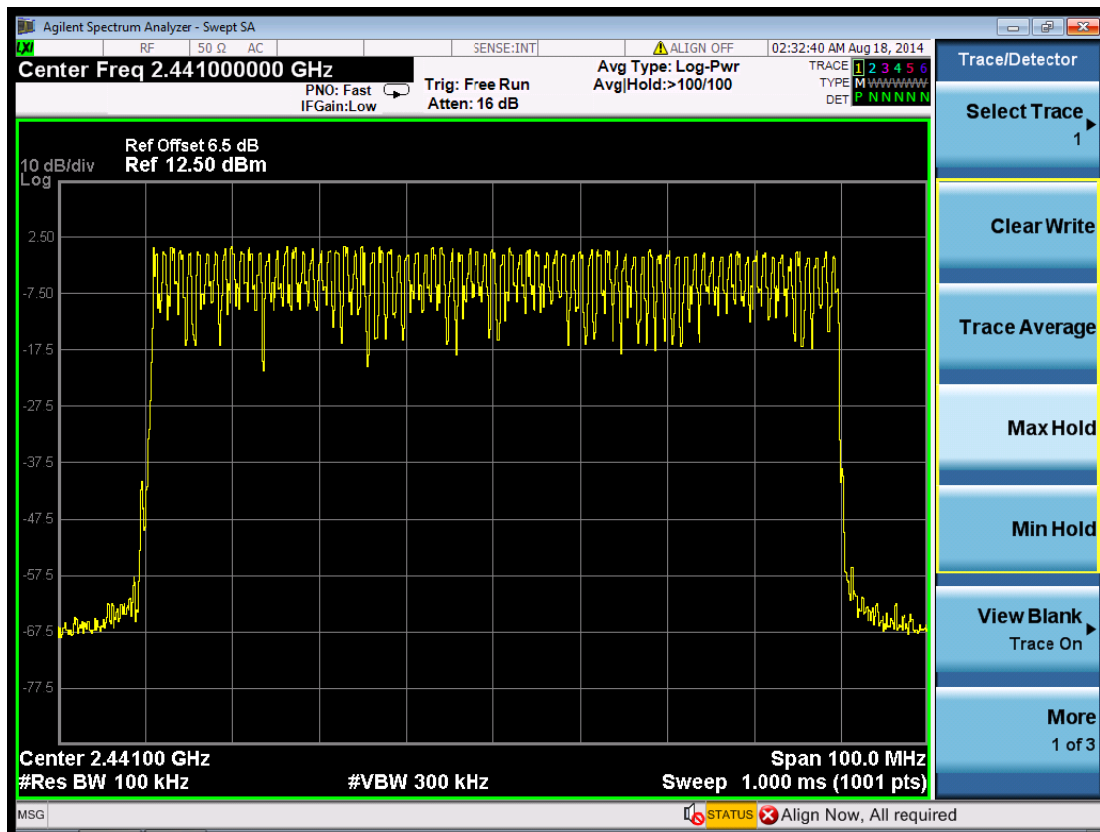


## 6.7.2 8DPSK Test Mode

### A. Test Verdict

| Hopping Channel Frequency Range (MHz) | Number of Hopping Channel | Refer to Plot | Limit | Verdict |
|---------------------------------------|---------------------------|---------------|-------|---------|
| 2400-2483.5                           | 79                        | Plot 6.7.2 A  | ≥15   | PASS    |

### B. Test Plots



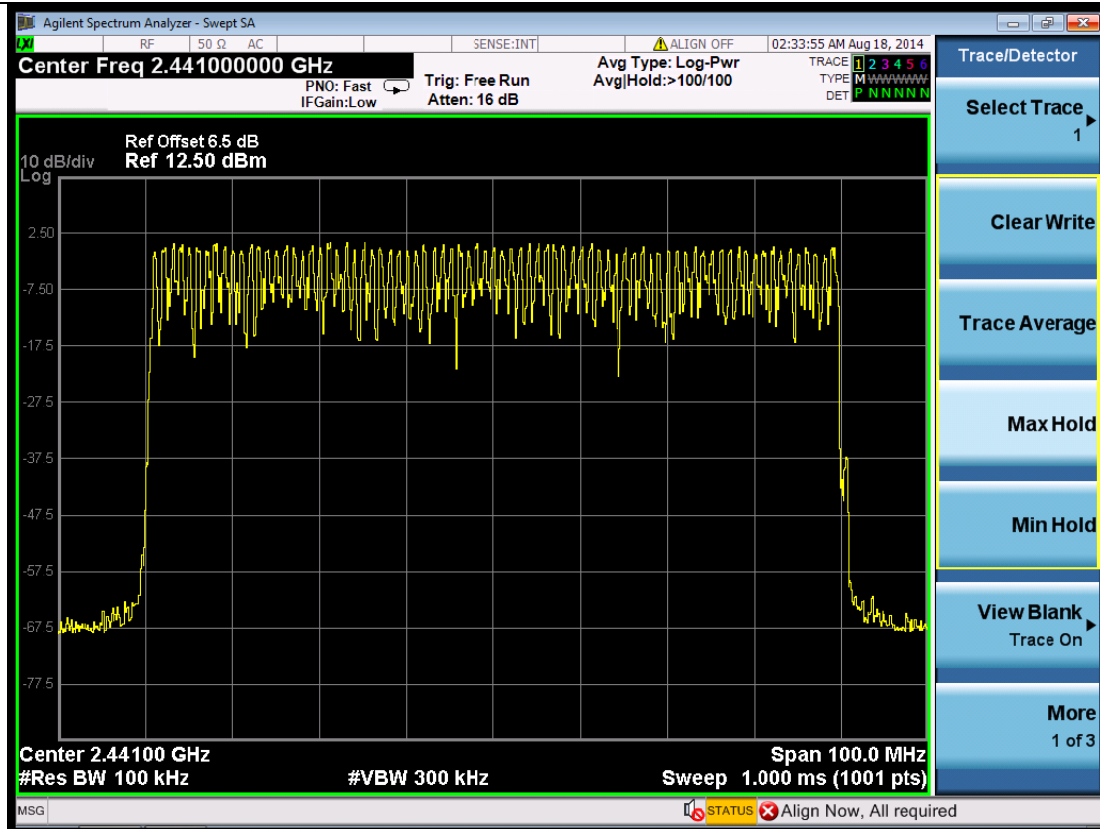
(Plot 6.7.2 A: @ 8DPSK)

## 4.7.3 $\pi/4$ DQPSK Test Mode

### A. Test Verdict

| Hopping Channel Frequency Range (MHz) | Number of Hopping Channel | Refer to Plot | Limit | Verdict |
|---------------------------------------|---------------------------|---------------|-------|---------|
| 2400-2483.5                           | 79                        | Plot 6.7.3 A  | ≥15   | PASS    |

### B. Test Plots



(Plot 6.7.3 A: @  $\pi/4$ DQPSK)



## 6.8 Time of Occupancy (Dwell Time)

### TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. Set center frequency of spectrum analyzer=operating frequency with RBW=1MHz and VBW=3MHz, Span=0Hz.

### LIMIT

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.

### TEST RESULTS

The Dwell Time=Burst Width\*Total Hops. The detailed calculations are showed as follows:

The duration for dwell time calculation:  $0.4[s] \times \text{hopping number} = 0.4[s] \times 79[\text{ch}] = 31.6[s \cdot \text{ch}]$ ;

The burst width [ms/hop/ch], which is directly measured, refers to the duration on one channel hop.

The hops per second for all channels: The selected EUT Conf uses a slot type of 5-Tx&1-Rx and a hopping rate of 1600 [ch\*hop/s] for all channels. So the final hopping rate for all channels is  $1600/6 = 266.67$  [ch\*hop/s]

The hops per second on one channel:  $266.67 [\text{ch} \cdot \text{hops/s}] / 79 [\text{ch}] = 3.38 [\text{hop/s}]$ ;

The total hops for all channels within the dwell time calculation duration:  $3.38 [\text{hop/s}] \times 31.6[s \cdot \text{ch}] = 106.67$  [hop\*ch];

The dwell time for all channels hopping:  $106.67 [\text{hop} \cdot \text{ch}] \times \text{Burst Width} [\text{ms/hop/ch}]$ .

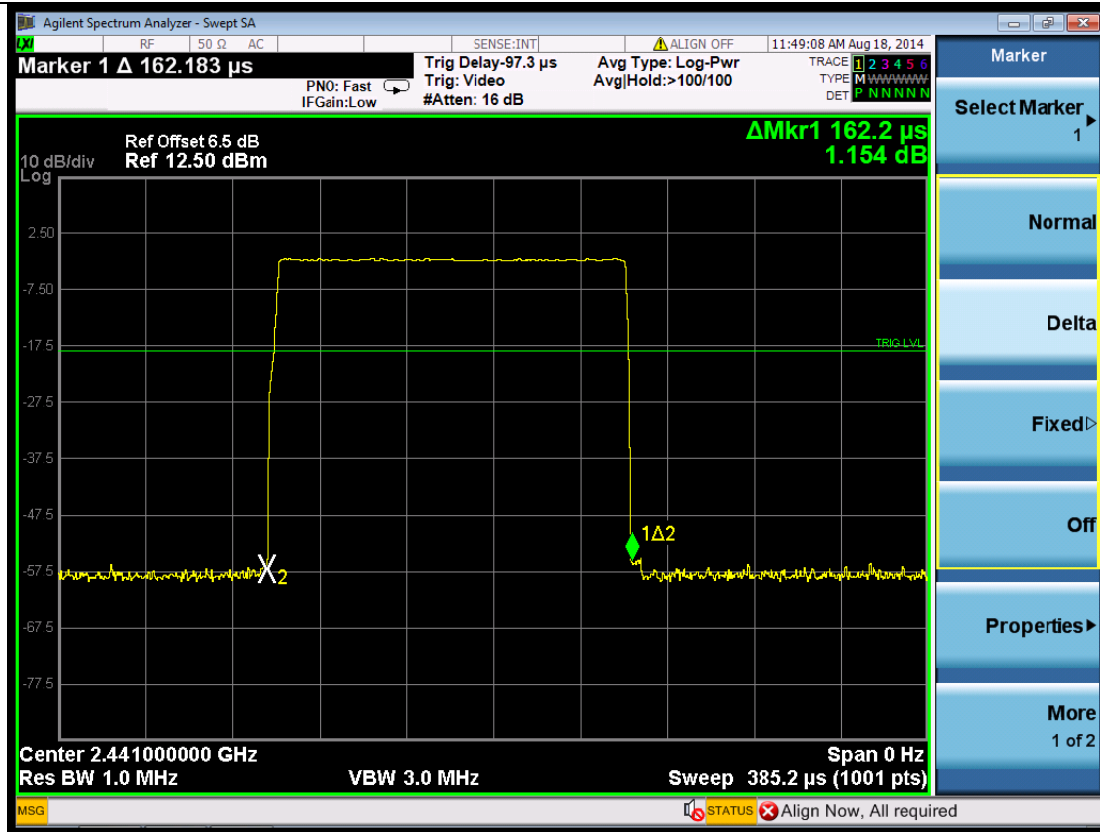
Remark: 1. We test Frequency Separation at all test channels, recorded worst case at middle channel.

### 6.8.1 GFSK Test Mode

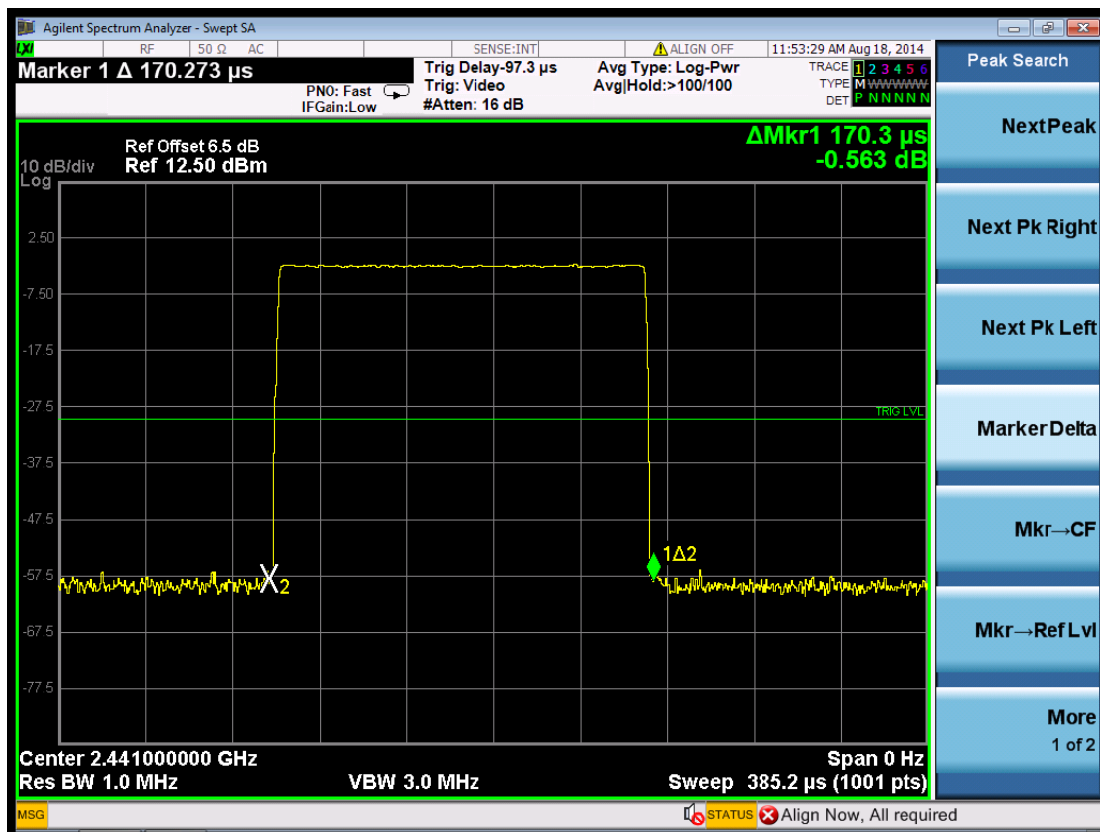
#### A. Test Verdict

| Mode | Frequency (MHz)                                                                                 | Pulse Width (ms) | Dwell Time (S) | Limit (S) | Refer to Plot | Verdict |
|------|-------------------------------------------------------------------------------------------------|------------------|----------------|-----------|---------------|---------|
| DH1  | 2441                                                                                            | 0.1622           | 0.051904       | 0.4       | Plot 6.8.1 A  | PASS    |
|      | <b>Note:</b> Dwell time=Pulse time (ms) $\times$ (1600 $\div$ 2 $\div$ 79) $\times$ 31.6 Second |                  |                |           |               |         |
| DH3  | 2441                                                                                            | 0.1730           | 0.02768        | 0.4       | Plot 6.8.1 B  | PASS    |
|      | <b>Note:</b> Dwell time=Pulse time (ms) $\times$ (1600 $\div$ 4 $\div$ 79) $\times$ 31.6 Second |                  |                |           |               |         |
| DH5  | 2441                                                                                            | 0.1687           | 0.01799        | 0.4       | Plot 6.8.1 C  | PASS    |
|      | <b>Note:</b> Dwell time=Pulse Time (ms) $\times$ (1600 $\div$ 6 $\div$ 79) $\times$ 31.6 Second |                  |                |           |               |         |

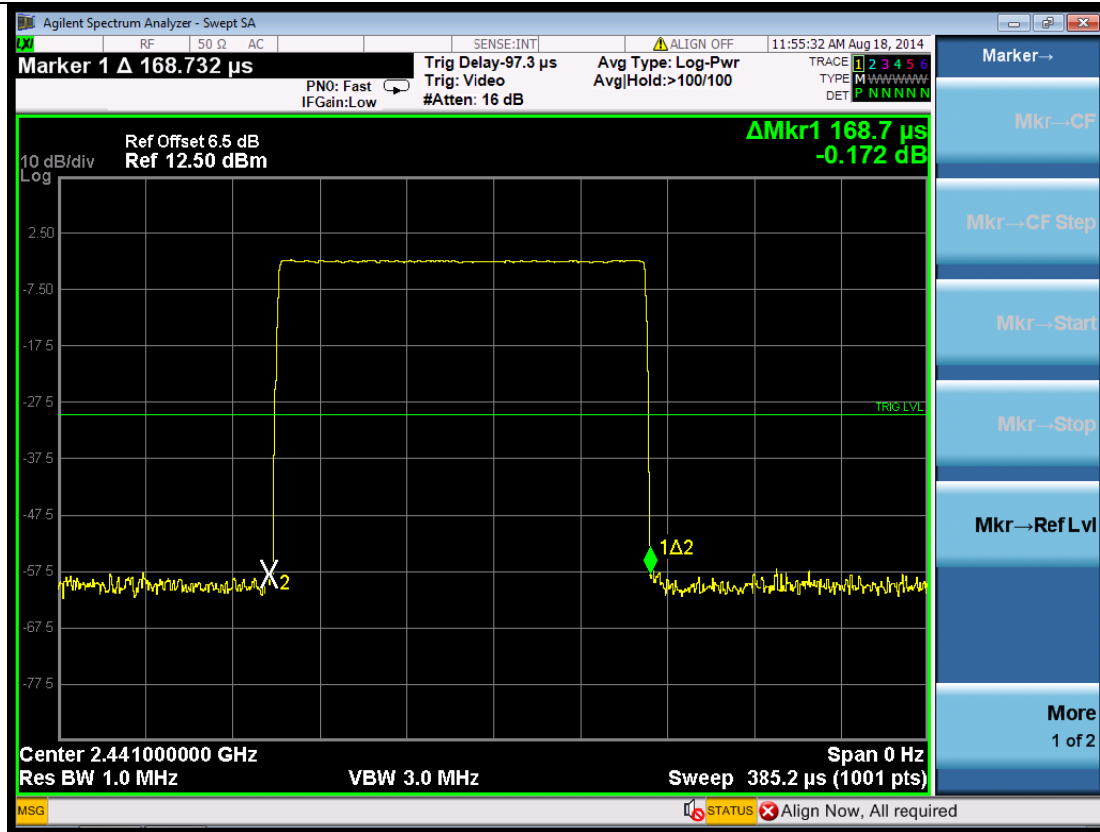
#### B. Test Plots



(Plot 6.8.1.A: Channel 39: 2441MHz @ GFSK @ DH1)



(Plot 6.8.1.B: Channel 39: 2441MHz @ GFSK @ DH3)



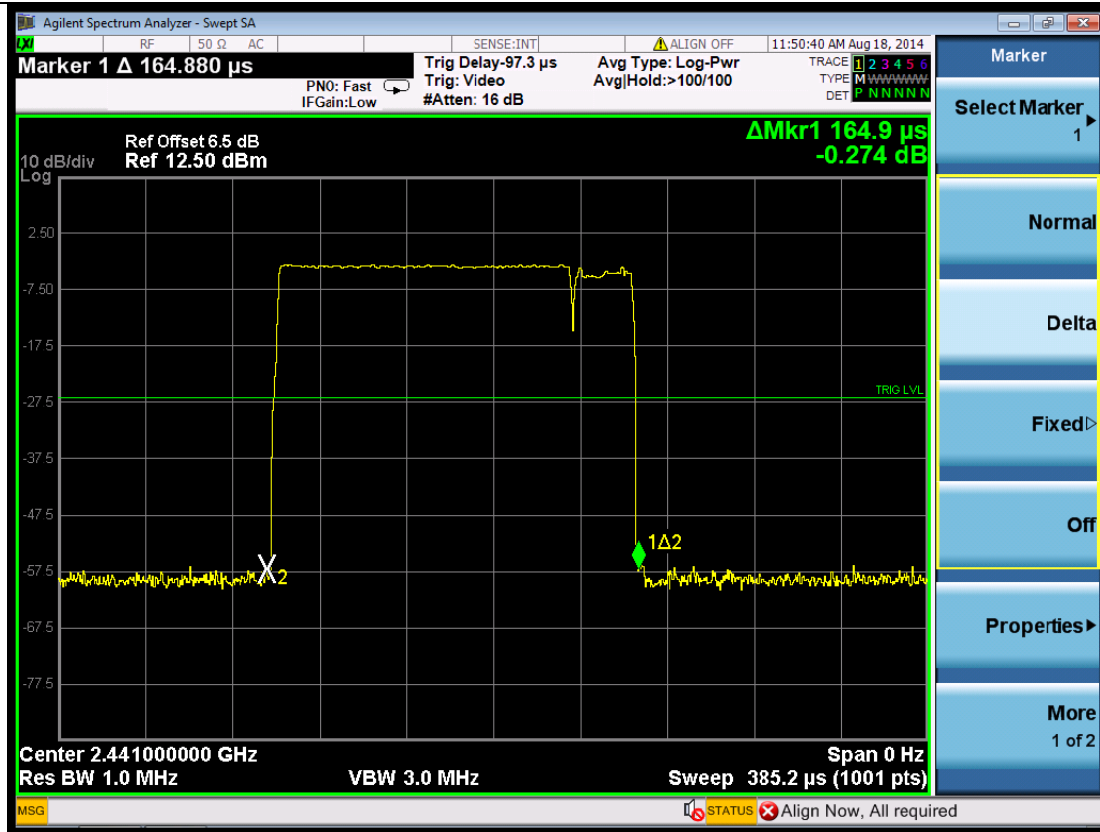
(Plot 6.8.1.C: Channel 39: 2441MHz @ GFSK @ DH5)

## 6.8.2 8DPSK Test Mode

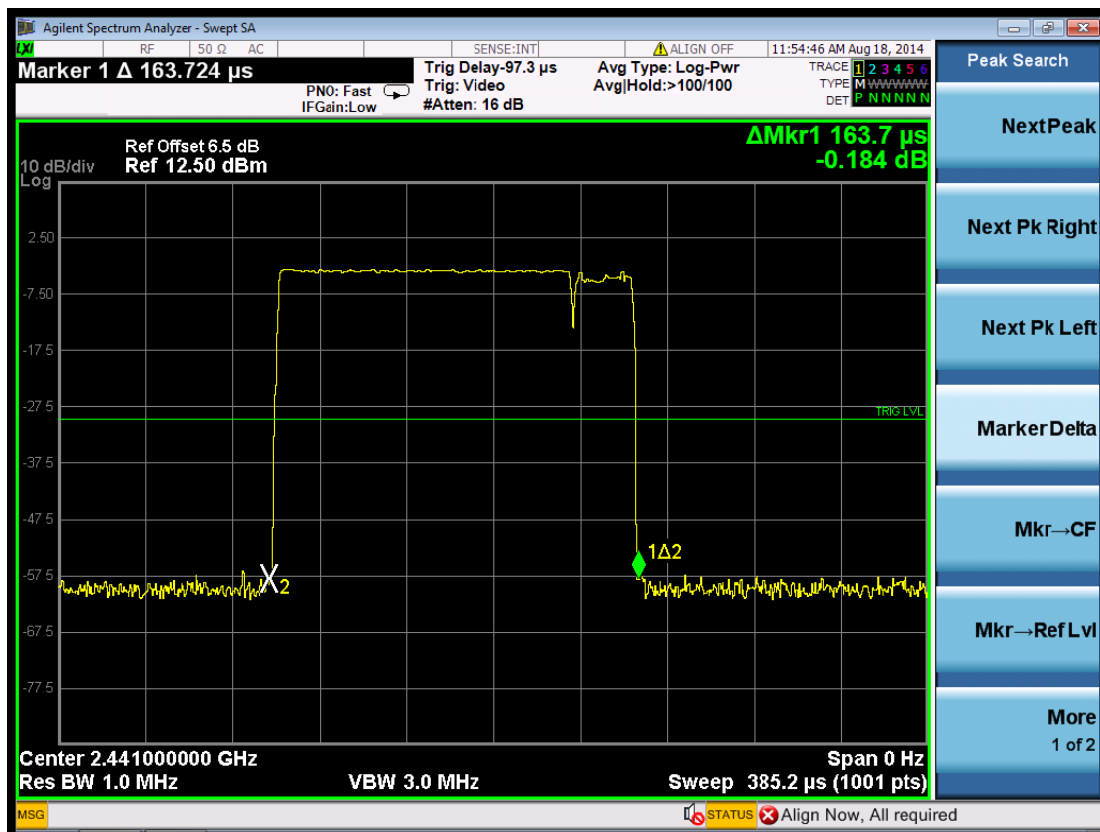
### A. Test Verdict

| Mode | Frequency (MHz)                                                        | Pulse Width (ms) | Dwell Time (S) | Limit (S) | Refer to Plot | Verdict |
|------|------------------------------------------------------------------------|------------------|----------------|-----------|---------------|---------|
| DH1  | 2441                                                                   | 0.1649           | 0.052768       | 0.4       | Plot 6.8.2 A  | PASS    |
|      | <b>Note:</b> Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second |                  |                |           |               |         |
| DH3  | 2441                                                                   | 0.1637           | 0.026192       | 0.4       | Plot 6.8.2 B  | PASS    |
|      | <b>Note:</b> Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second |                  |                |           |               |         |
| DH5  | 2441                                                                   | 0.1637           | 0.01746        | 0.4       | Plot 6.8.2 C  | PASS    |
|      | <b>Note:</b> Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second |                  |                |           |               |         |

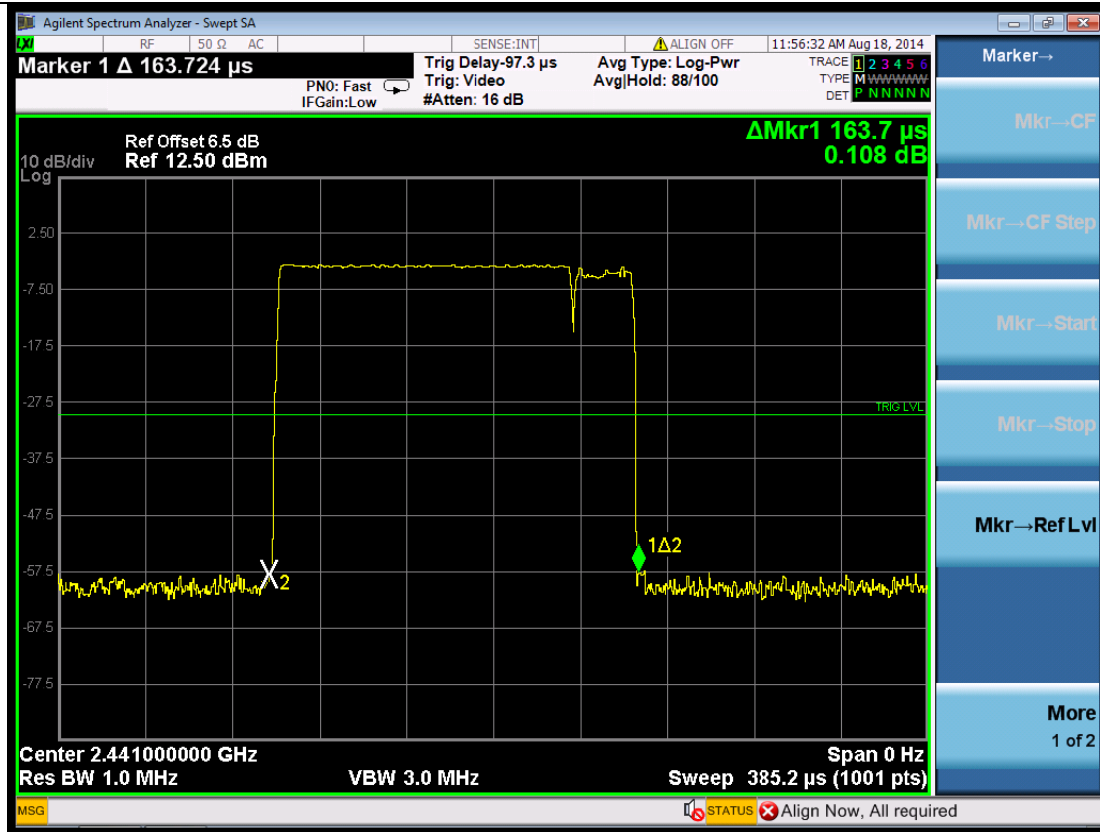
### B. Test Plots



(Plot 6.8.2.A: Channel 39: 2441MHz @ 8DPSK @ DH1)



(Plot 6.8.2.B: Channel 39: 2441MHz @ 8DPSK @ DH3)



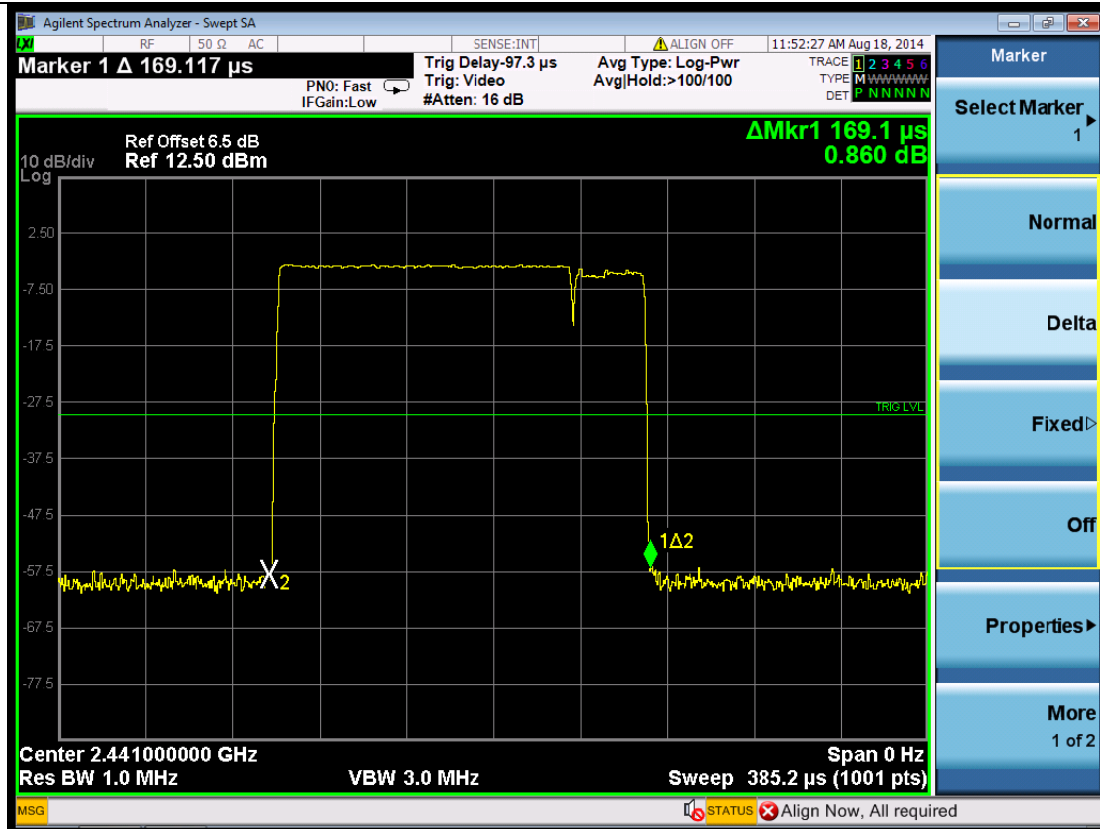
(Plot 6.8.2.C: Channel 39: 2441MHz @ 8DPSK @ DH5)

## 4.8.3 $\pi/4$ DQPSK Test Mode

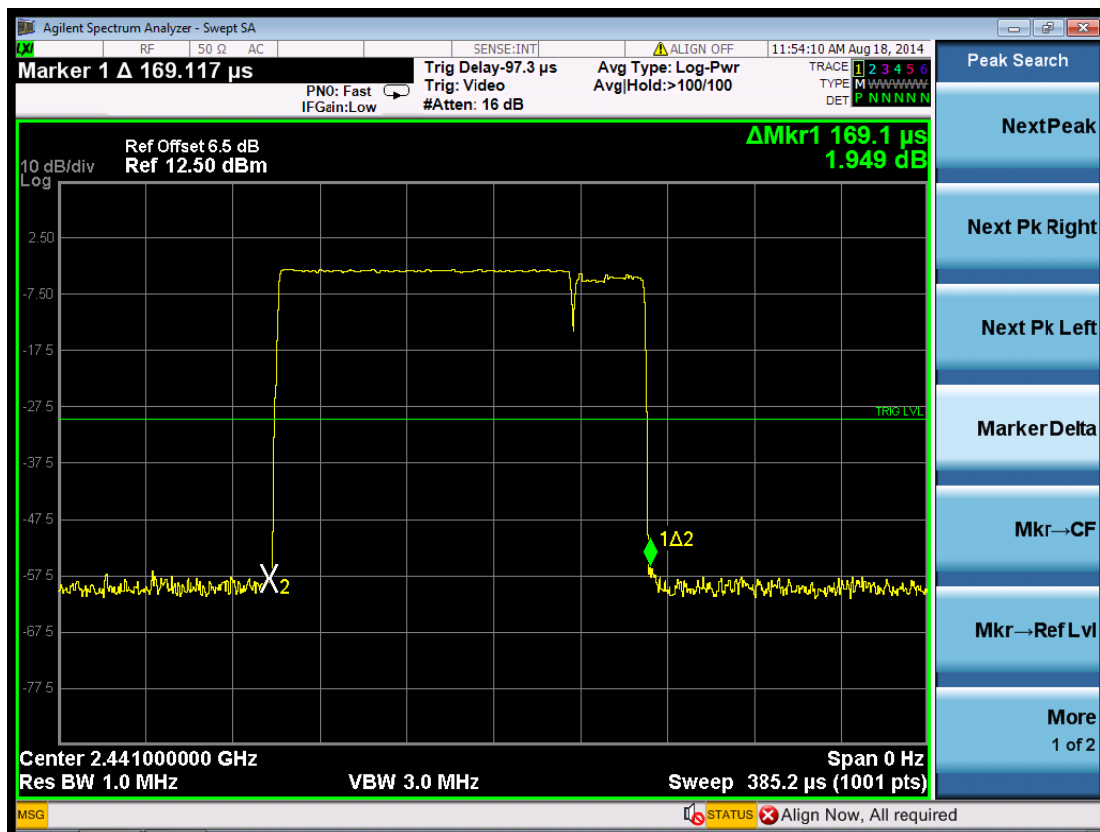
### A. Test Verdict

| Mode | Frequency (MHz)                                                        | Pulse Width (ms) | Dwell Time (S) | Limit (S) | Refer to Plot | Verdict |
|------|------------------------------------------------------------------------|------------------|----------------|-----------|---------------|---------|
| DH1  | 2441                                                                   | 0.1691           | 0.054112       | 0.4       | Plot 6.8.3 A  | PASS    |
|      | <b>Note:</b> Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second |                  |                |           |               |         |
| DH3  | 2441                                                                   | 0.1691           | 0.027056       | 0.4       | Plot 6.8.3 B  | PASS    |
|      | <b>Note:</b> Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second |                  |                |           |               |         |
| DH5  | 2441                                                                   | 0.1699           | 0.018123       | 0.4       | Plot 6.8.3 C  | PASS    |
|      | <b>Note:</b> Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second |                  |                |           |               |         |

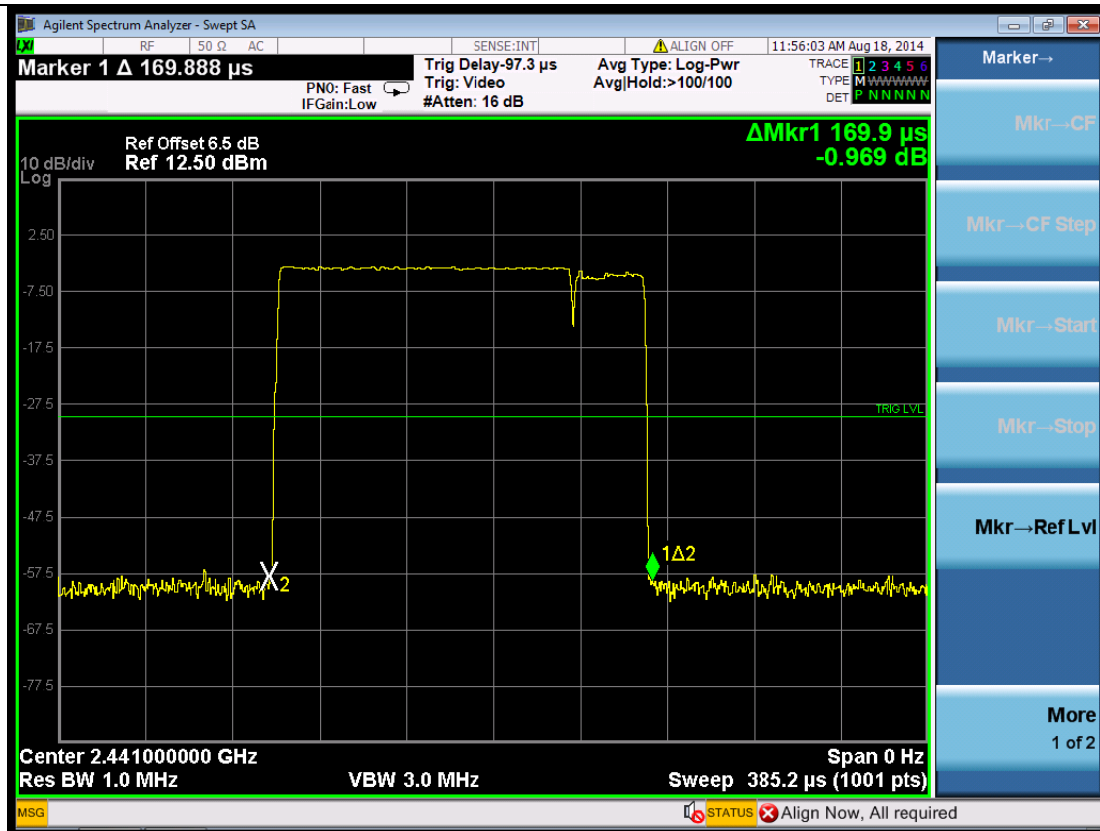
### B. Test Plots



(Plot 6.8.3.A: Channel 39: 2441MHz @  $\pi/4$ DQPSK @ DH1)



(Plot 6.8.3.B: Channel 39: 2441MHz @  $\pi/4$ DQPSK @ DH3)



(Plot 6.8.3.C: Channel 39: 2441MHz @  $\pi/4$ DQPSK @ DH5)



## 6.9 Spurious RF Conducted Emission

### TEST PROCEDURE

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2009 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBM= 300KHz to measure the peak field strength , and measurement frequency range from 9KHz to 26.5GHz.

### LIMIT

1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

### TEST RESULTS

Remark: 1. We test Frequency Separation at difference Packet Type (DH1, DH3 and DH5), recorded worst case at DH3.

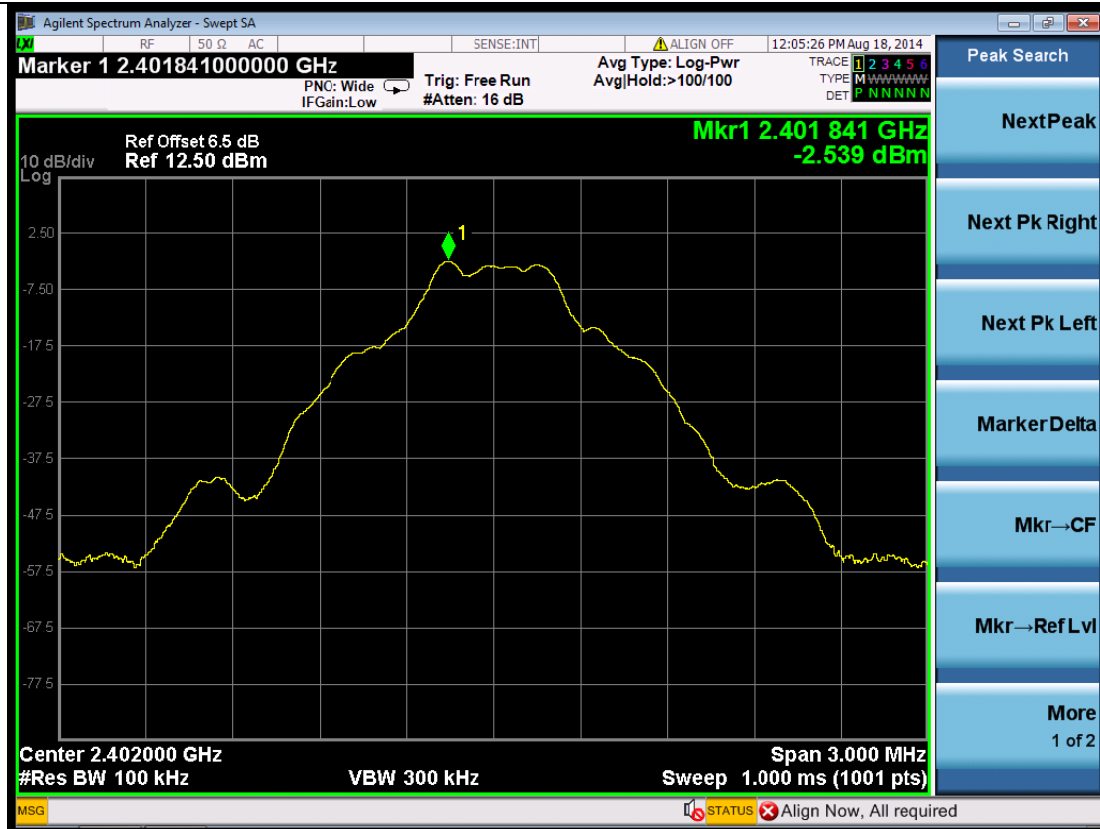
#### 6.9.1 GFSK Test Mode

##### A. Test Verdict

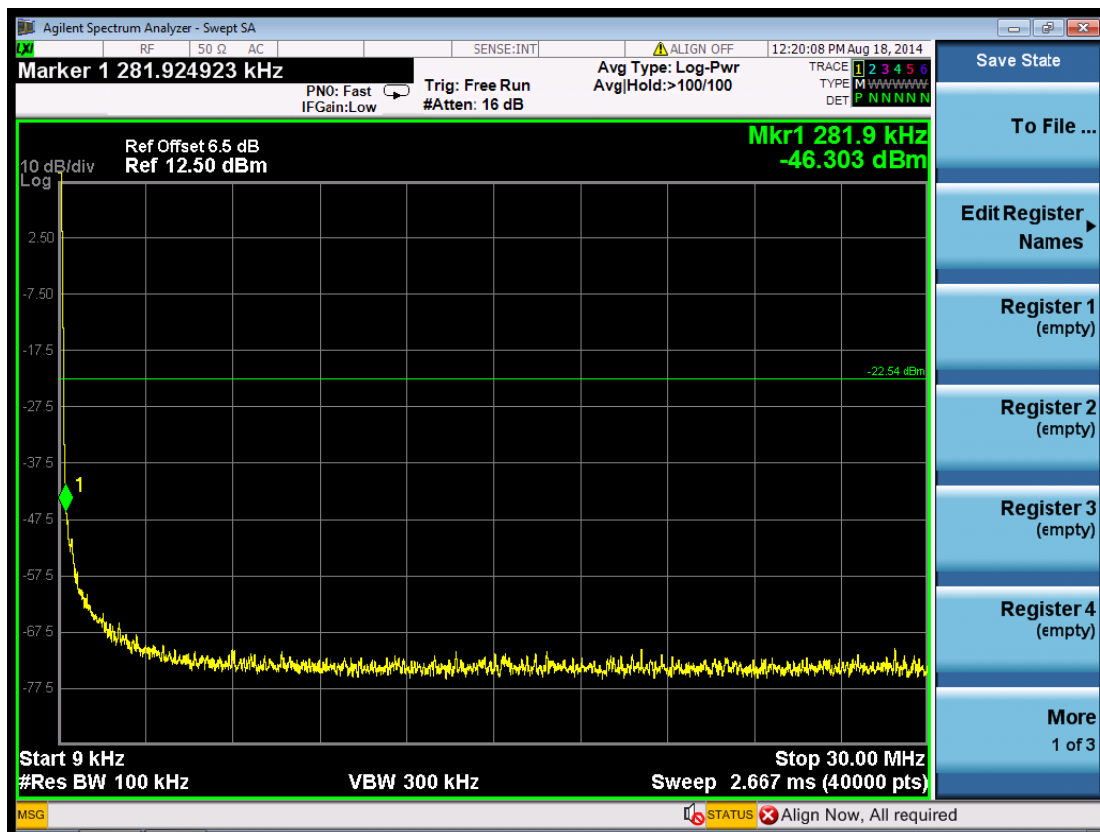
| Channel | Frequency (MHz) | Frequency Range | Refer to Plot | Limit (dBc) | Verdict |
|---------|-----------------|-----------------|---------------|-------------|---------|
| 00      | 2402            | 2.402 GHz       | Plot 6.9.1 A1 | ---         | PASS    |
|         |                 | 9KHz-30MHz      | Plot 6.9.1 A2 | -20         | PASS    |
|         |                 | 30MHz-3GHz      | Plot 6.9.1 A3 | -20         | PASS    |
|         |                 | 3GHz-10GHz      | Plot 6.9.1 A4 | -20         | PASS    |
|         |                 | 10GHz-18GHz     | Plot 6.9.1 A5 | -20         | PASS    |
|         |                 | 18GHz-26GHz     | Plot 6.9.1 A6 | -20         | PASS    |
| 39      | 2441            | 2.441 GHz       | Plot 6.9.1 B1 | ---         | PASS    |
|         |                 | 9KHz-30MHz      | Plot 6.9.1 B2 | -20         | PASS    |
|         |                 | 30MHz-3GHz      | Plot 6.9.1 B3 | -20         | PASS    |
|         |                 | 3GHz-10GHz      | Plot 6.9.1 B4 | -20         | PASS    |
|         |                 | 10GHz-18GHz     | Plot 6.9.1 B5 | -20         | PASS    |
|         |                 | 18GHz-26GHz     | Plot 6.9.1 B6 | -20         | PASS    |
| 78      | 2480            | 2.480 GHz       | Plot 6.9.1 C1 | ---         | PASS    |
|         |                 | 9KHz-30MHz      | Plot 6.9.1 C2 | -20         | PASS    |
|         |                 | 30MHz-3GHz      | Plot 6.9.1 C3 | -20         | PASS    |
|         |                 | 3GHz-10GHz      | Plot 6.9.1 C4 | -20         | PASS    |
|         |                 | 10GHz-18GHz     | Plot 6.9.1 C5 | -20         | PASS    |
|         |                 | 18GHz-26GHz     | Plot 6.9.1 C6 | -20         | PASS    |

Note: 1. The test results including the cable lose.

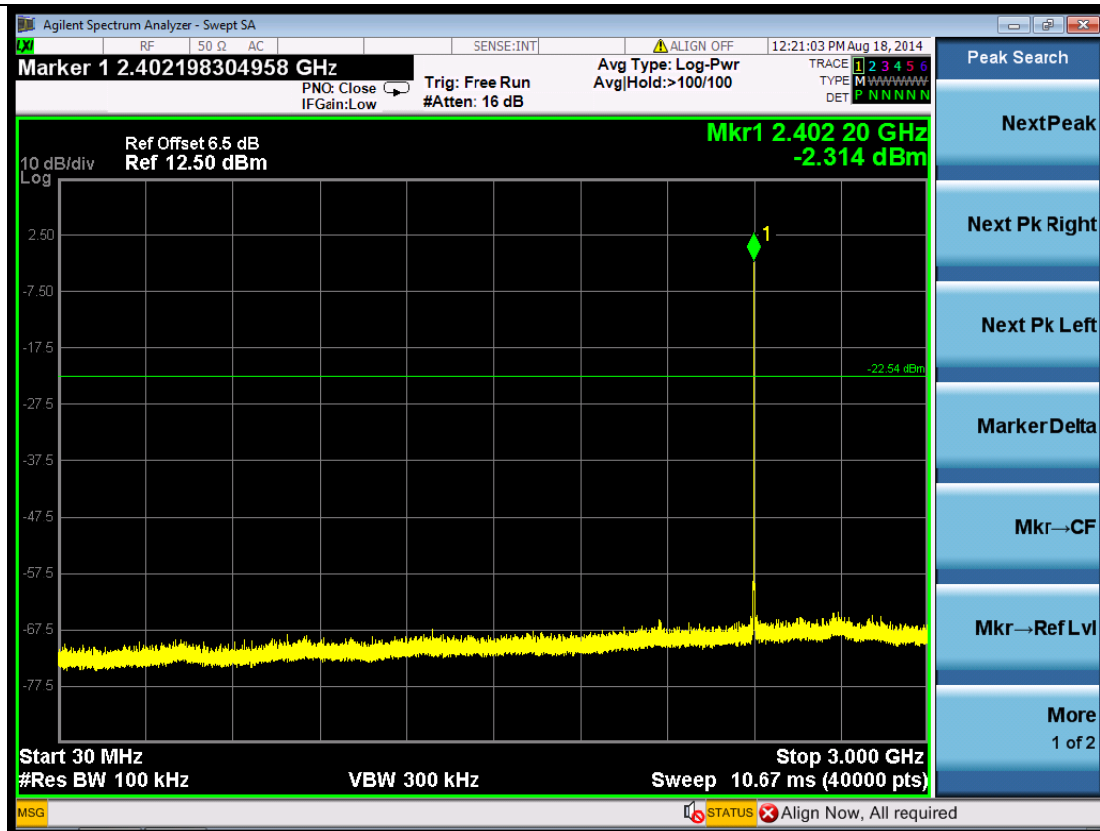
##### B. Test Plots



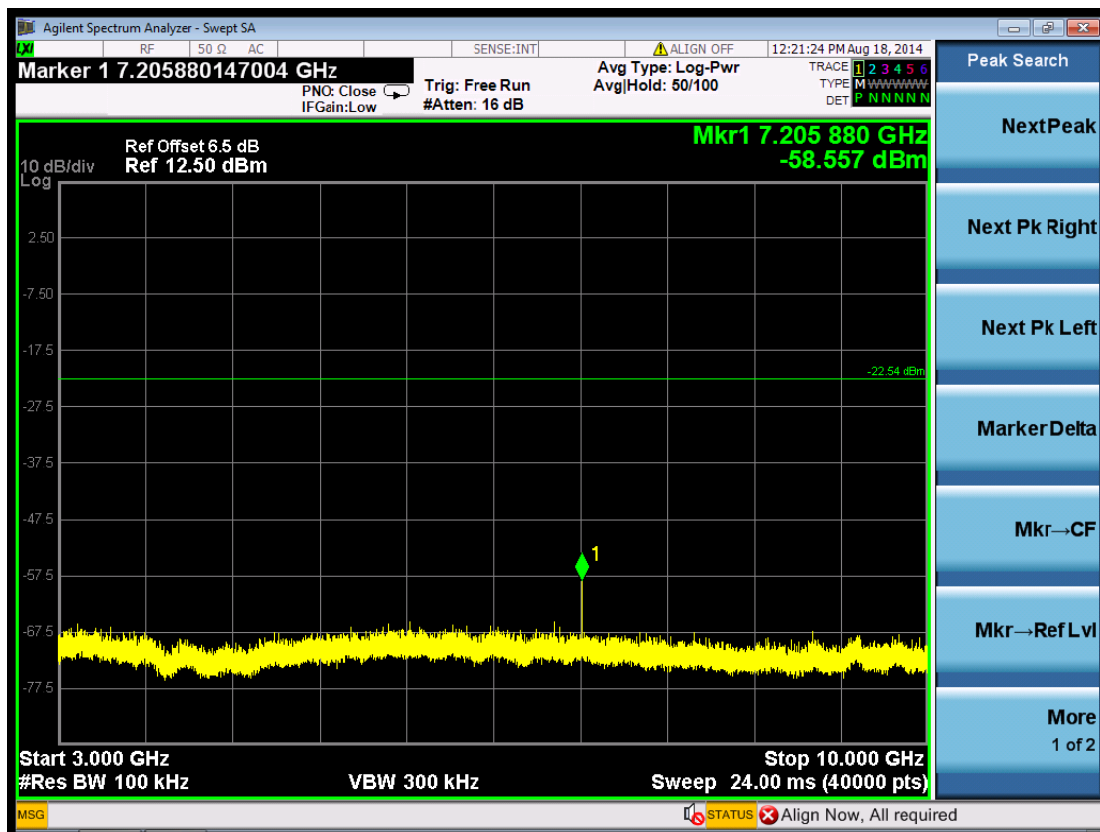
(Plot 6.9.1 A1: Channel 00: 2402MHz @ GFSK)



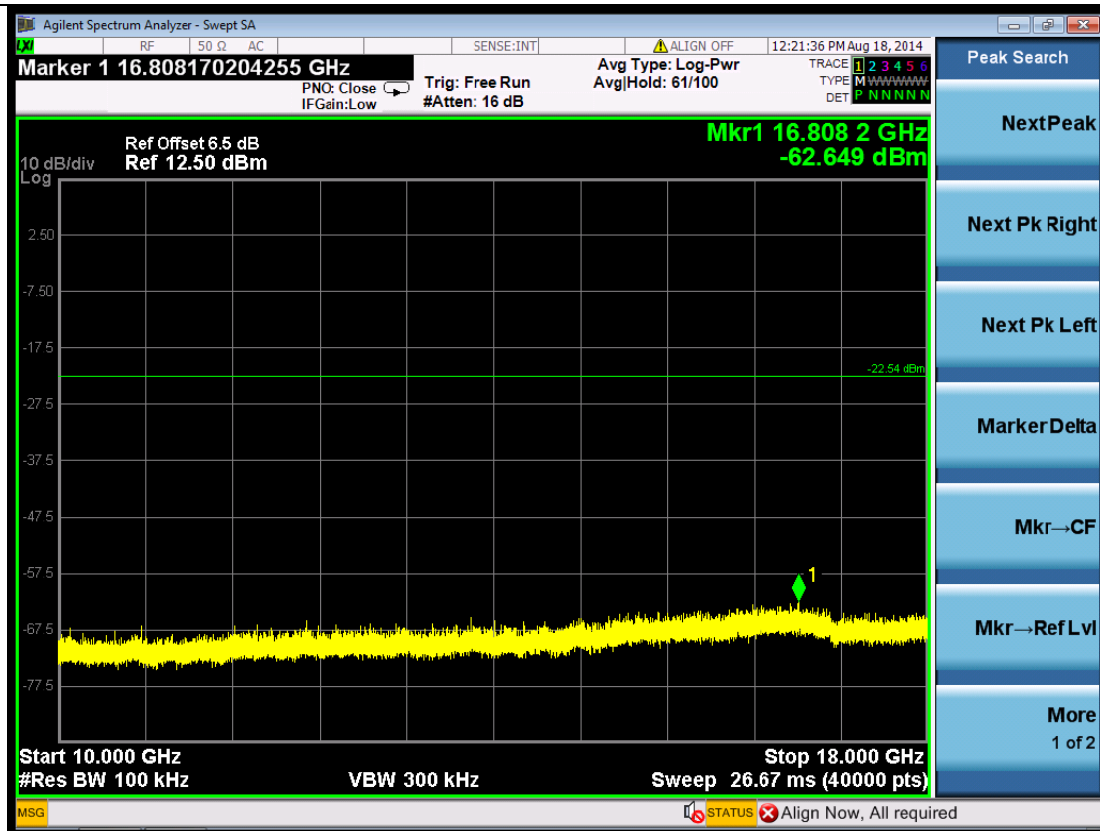
(Plot 6.9.1 A2: Channel 00: 2402MHz @ GFSK)



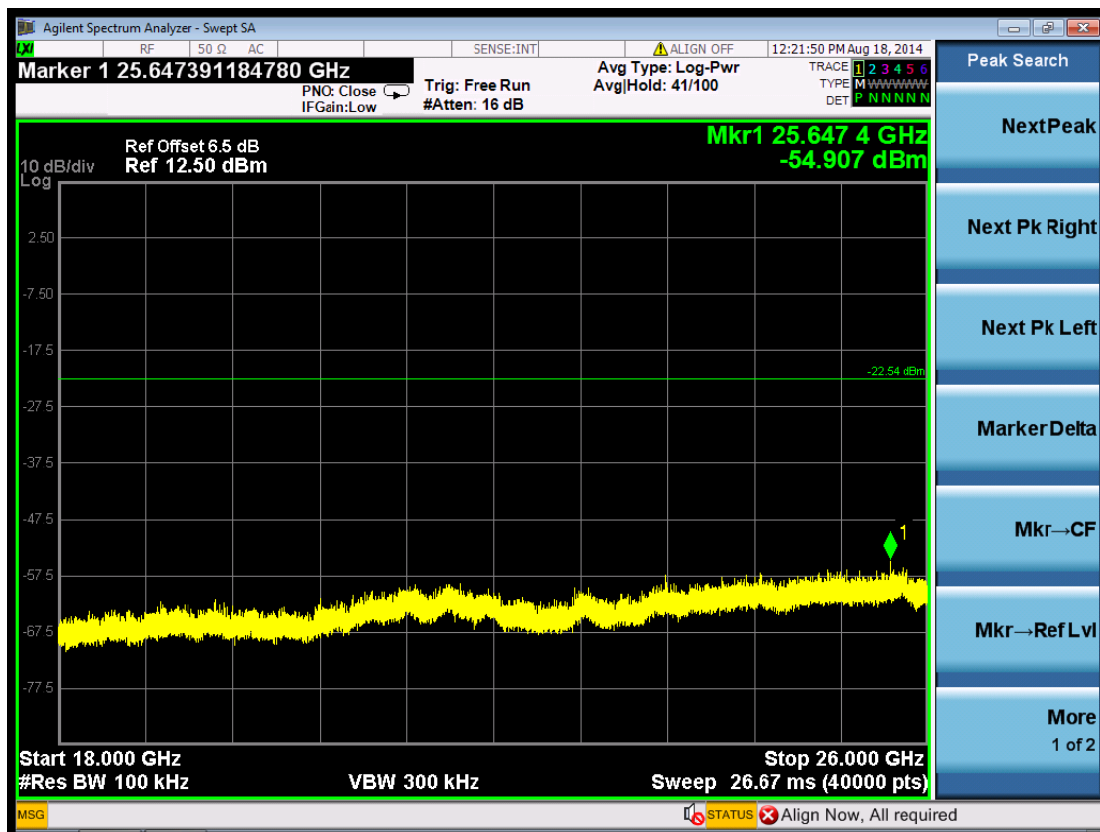
(Plot 6.9.1 A3: Channel 00: 2402MHz @ GFSK)



(Plot 6.9.1 A4: Channel 00: 2402MHz @ GFSK)



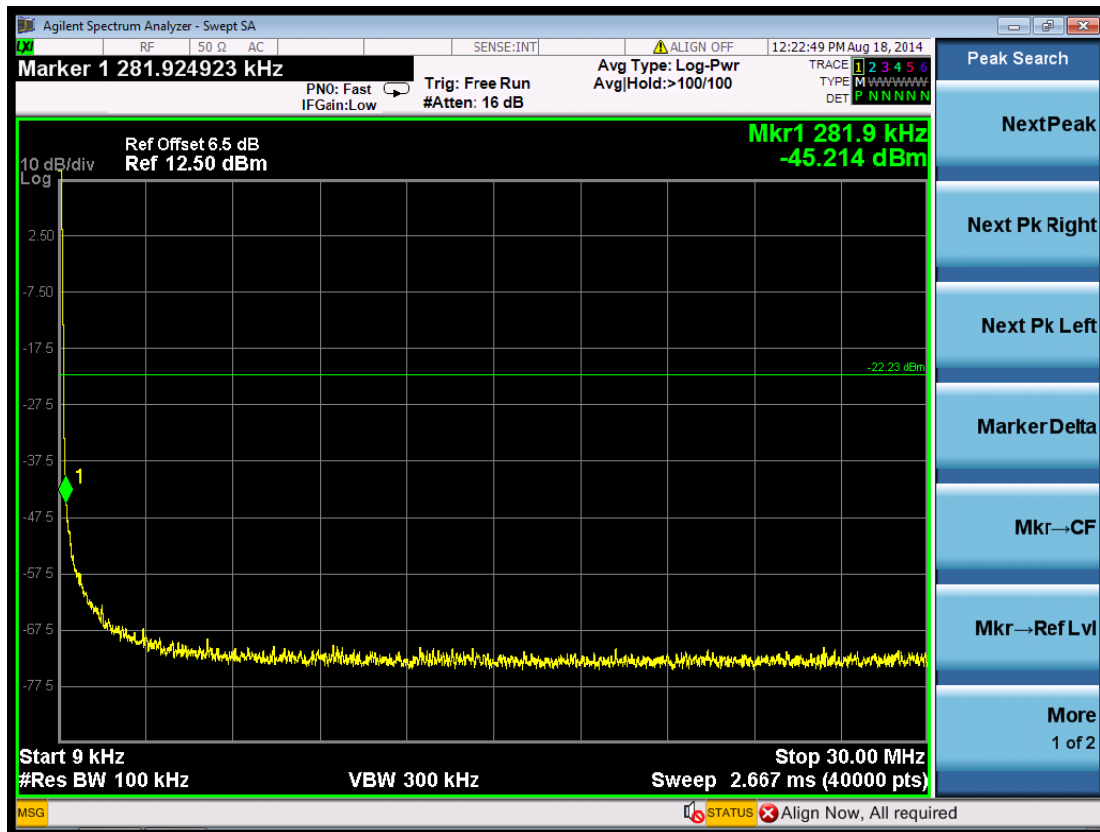
(Plot 6.9.1 A5: Channel 00: 2402MHz @ GFSK)



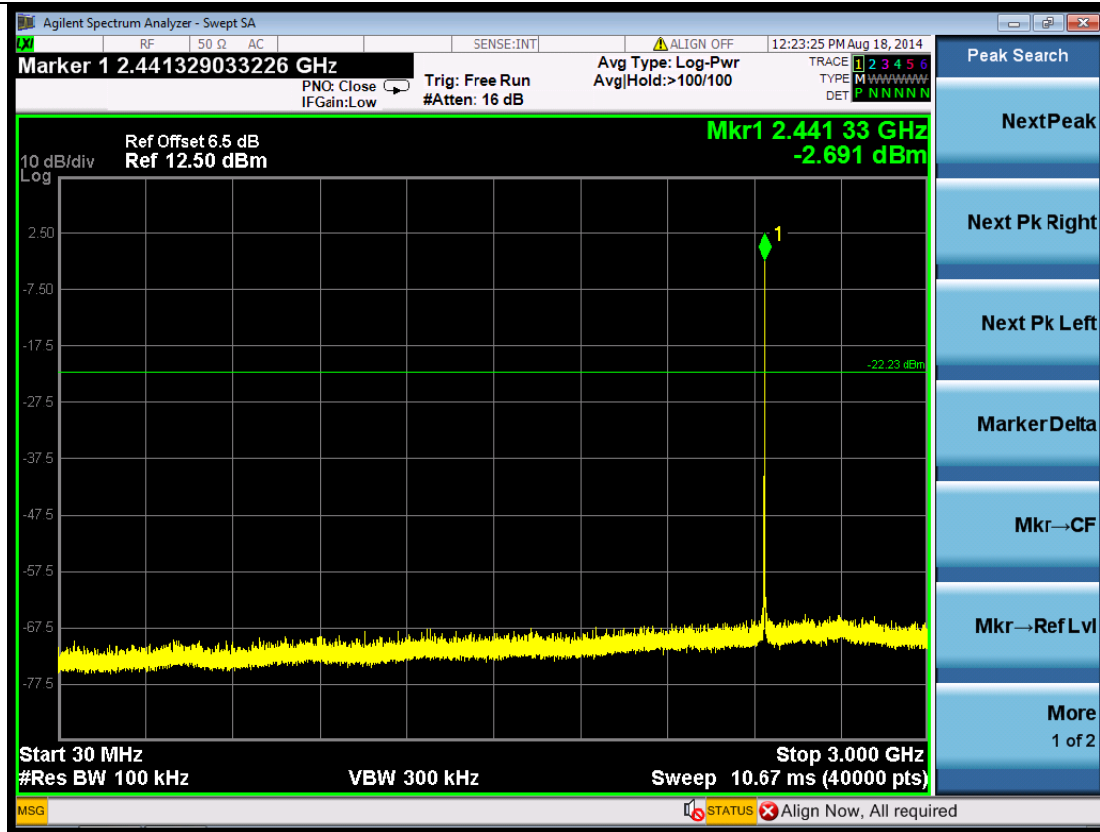
(Plot 6.9.1 A6: Channel 00: 2402MHz @ GFSK)



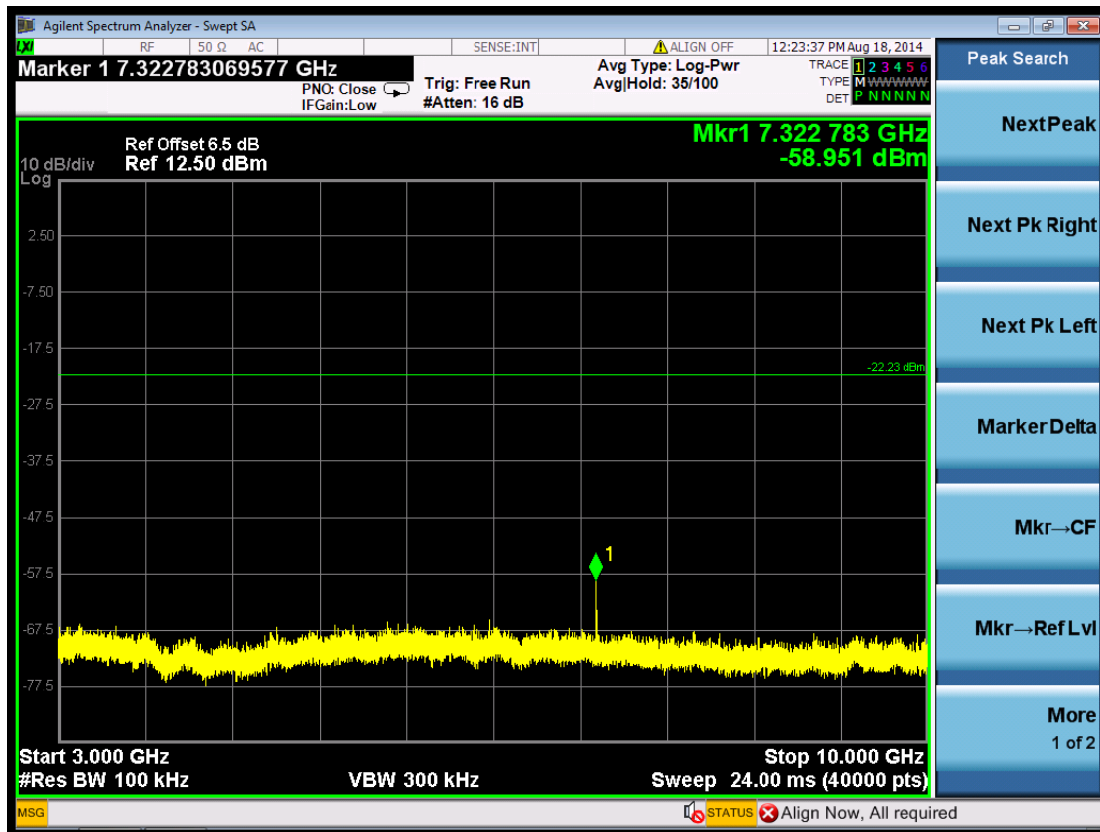
(Plot 6.9.1 B1: Channel 39: 2441MHz @ GFSK)



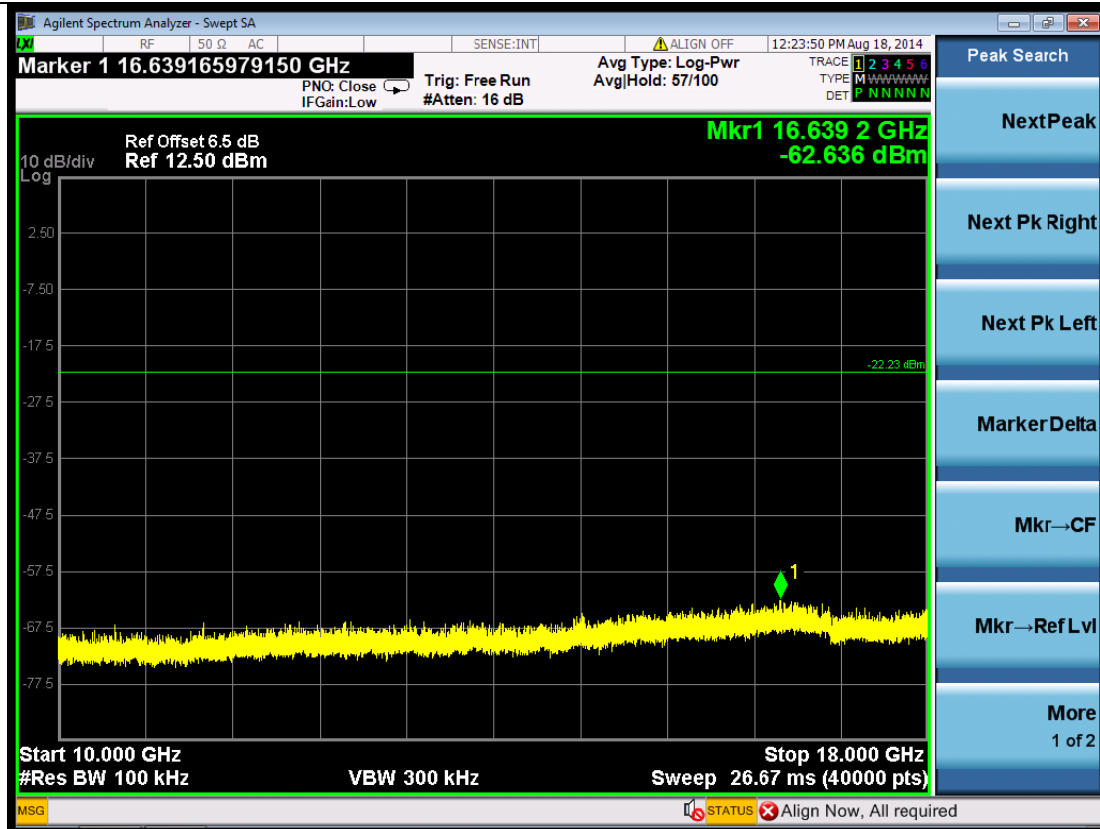
(Plot 6.9.1 B2: Channel 39: 2441MHz @ GFSK)



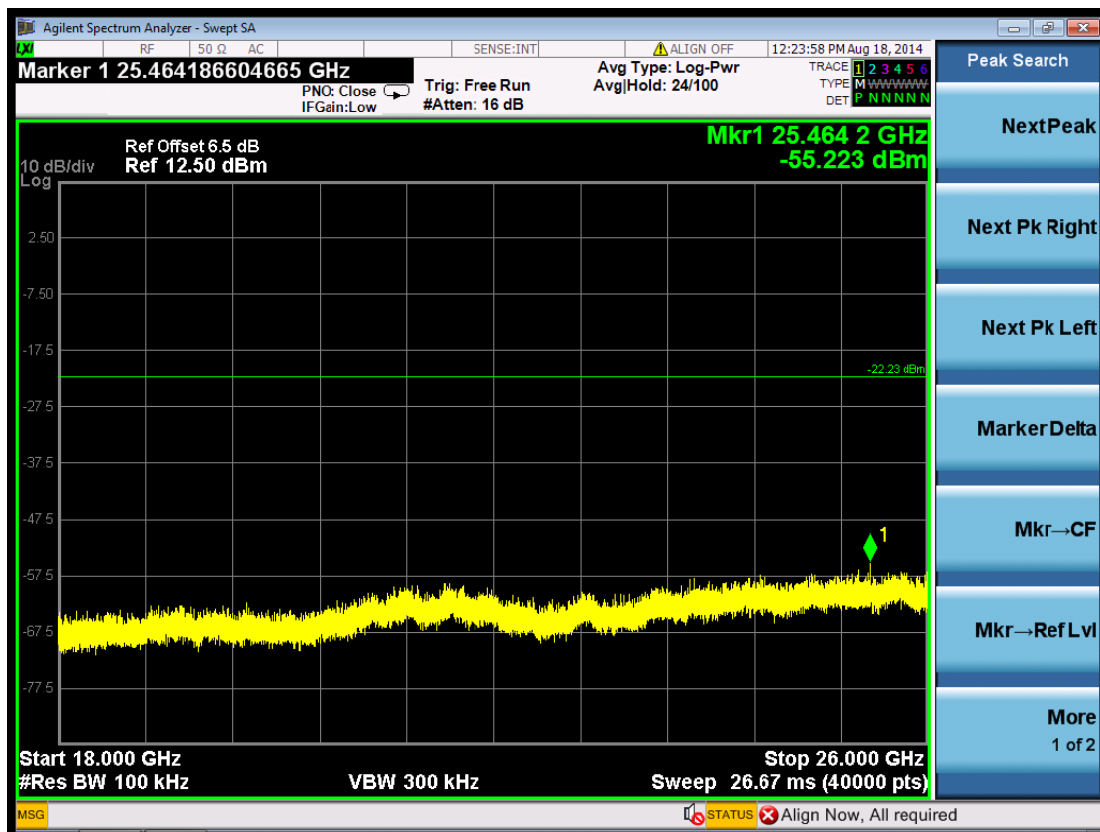
(Plot 6.9.1 B3: Channel 39: 2441MHz @ GFSK)



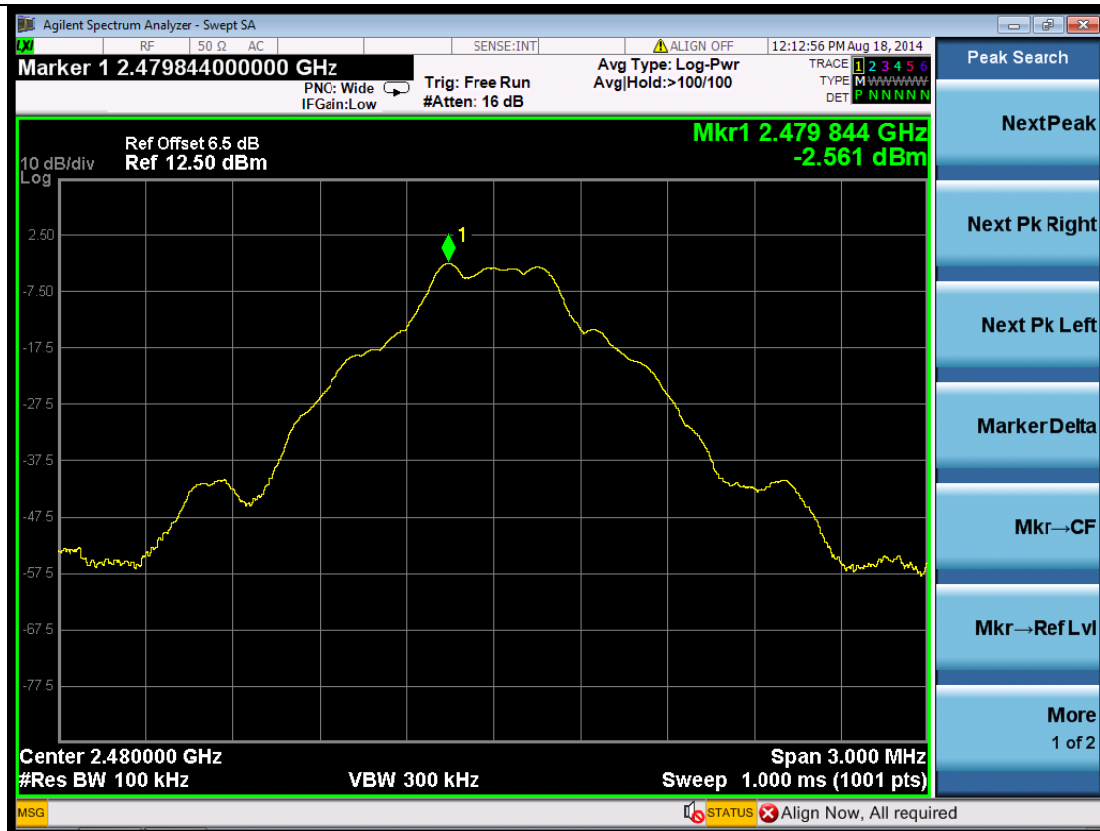
(Plot 6.9.1 B4: Channel 39: 2441MHz @ GFSK)



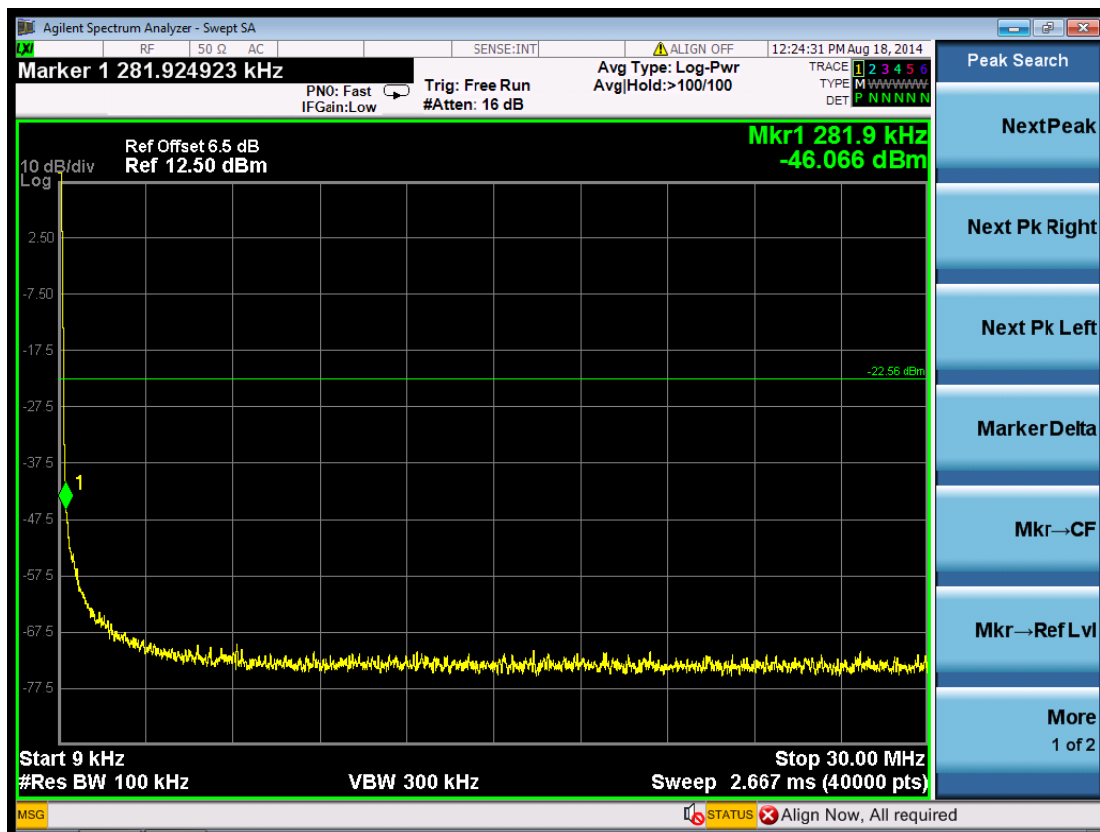
(Plot 6.9.1 B5: Channel 39: 2441MHz @ GFSK)



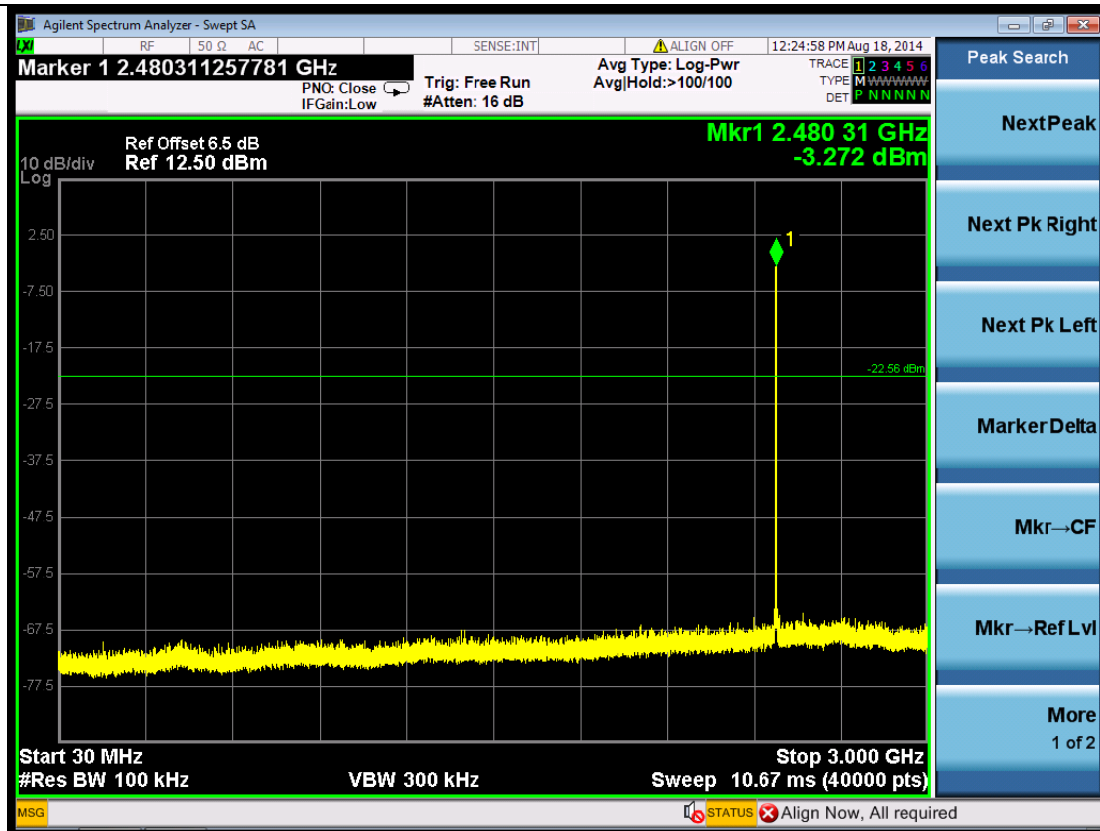
(Plot 6.9.1 B6: Channel 39: 2441MHz @ GFSK)



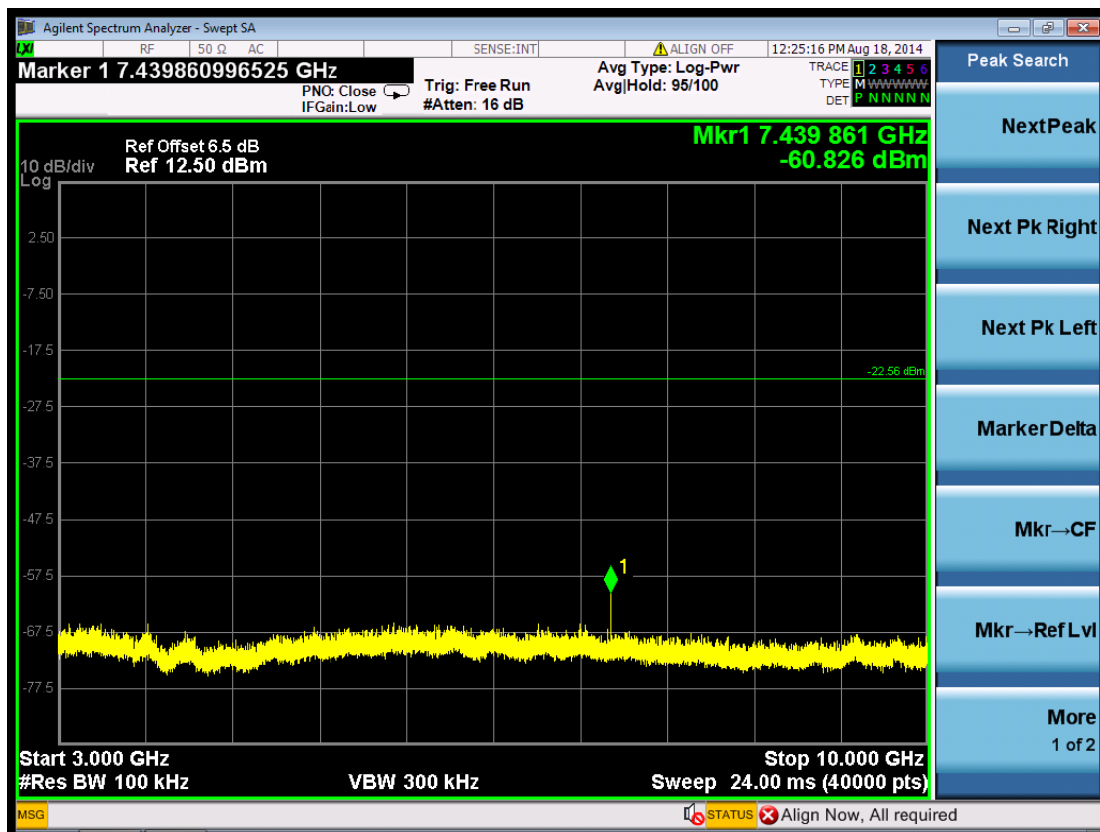
(Plot 6.9.1 C1: Channel 78: 2480MHz @ GFSK)



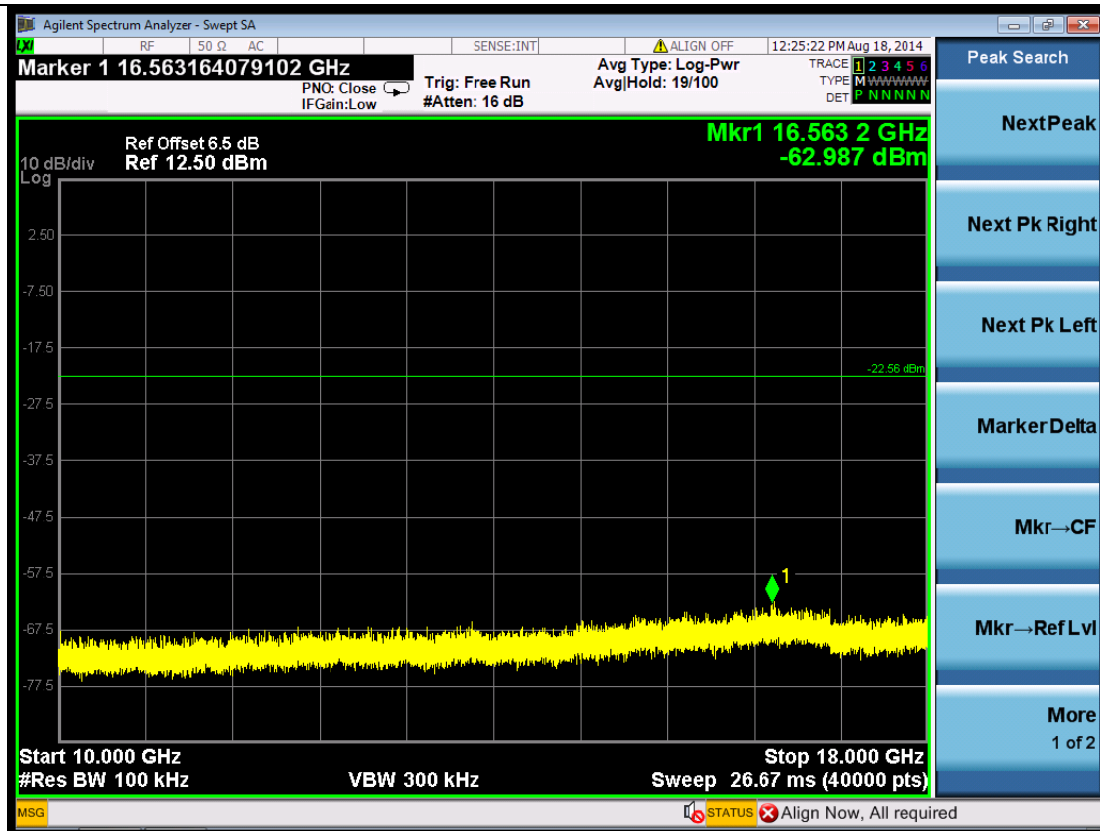
(Plot 6.9.1 C2: Channel 78: 2480MHz @ GFSK)



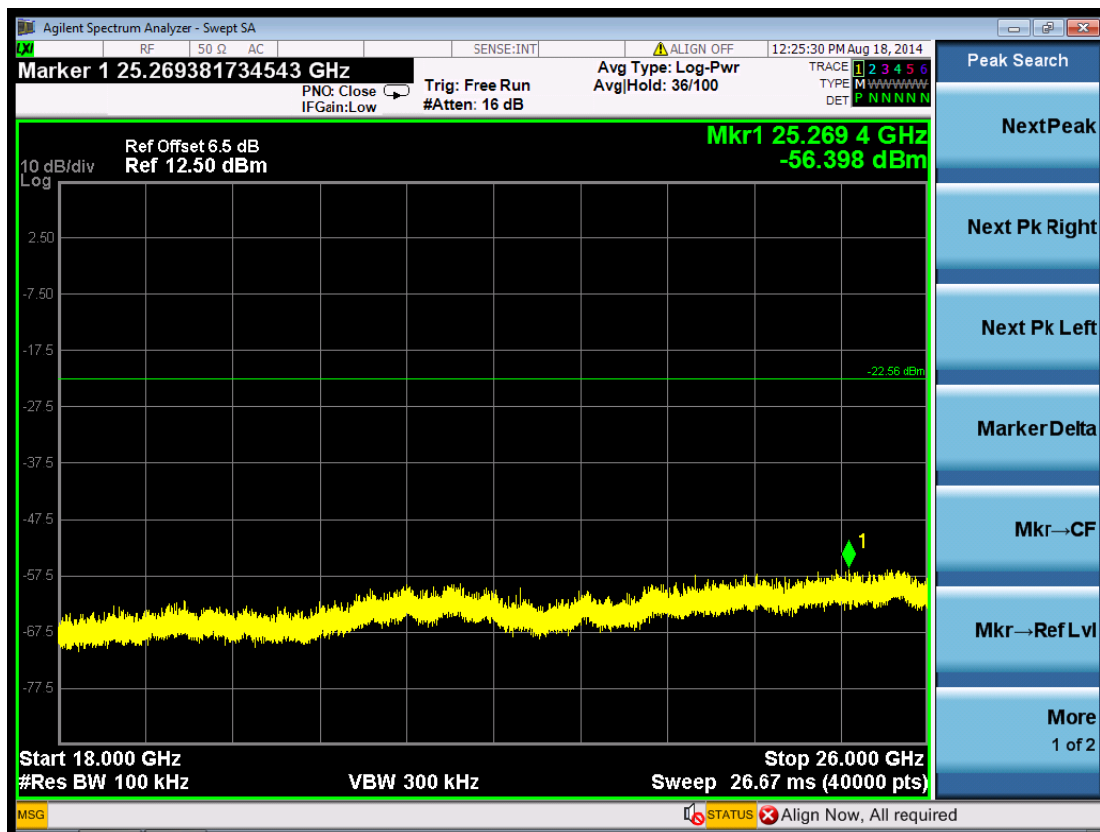
(Plot 6.9.1 C3: Channel 78: 2480MHz @ GFSK)



(Plot 6.9.1 C4: Channel 78: 2480MHz @ GFSK)



(Plot 6.9.1 C5: Channel 78: 2480MHz @ GFSK)



(Plot 6.9.1 C6: Channel 78: 2480MHz @ GFSK)



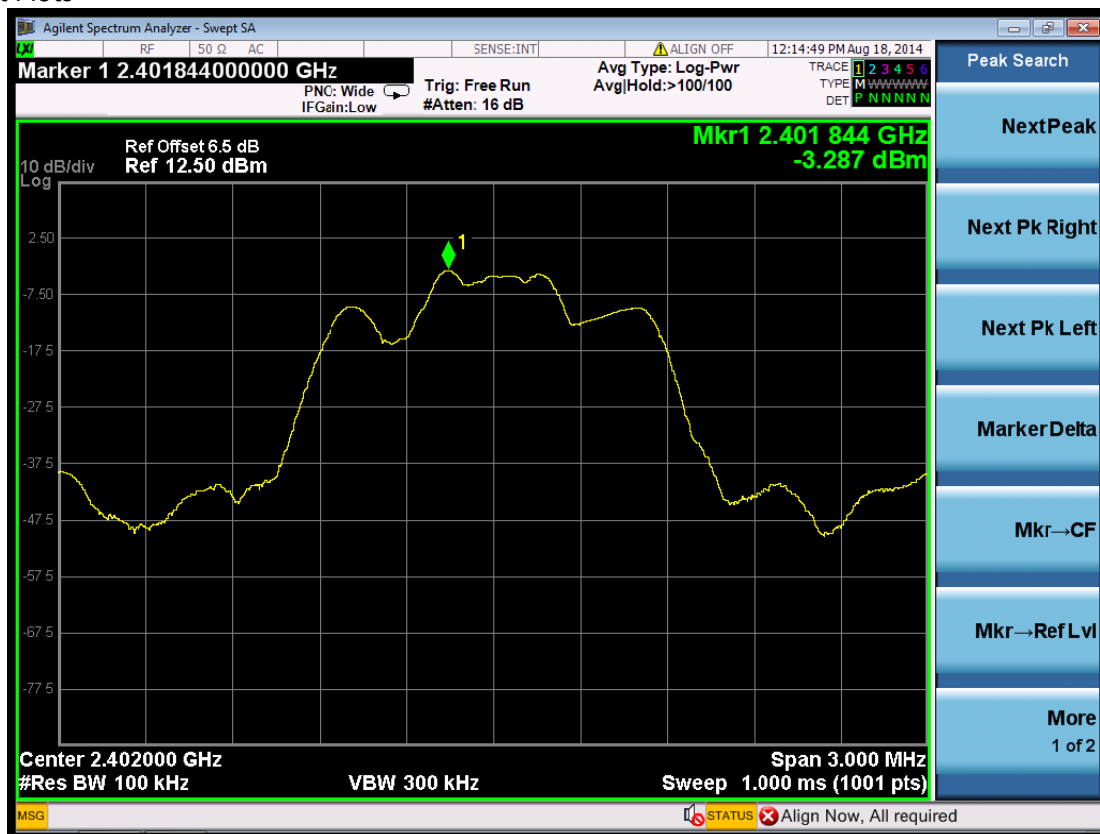
## 6.9.2 $\pi/4$ DQPSK Test Mode

### A. Test Verdict

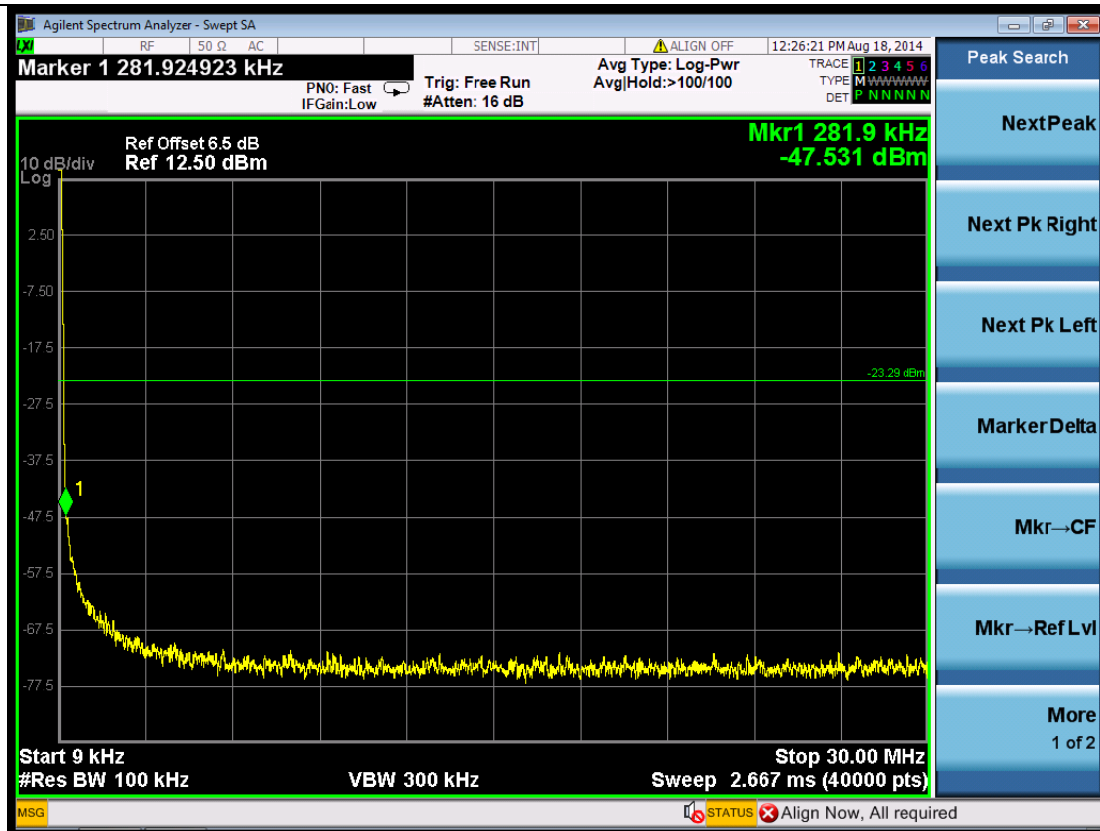
| Channel | Frequency (MHz) | Frequency Range | Refer to Plot | Limit (dBc) | Verdict |
|---------|-----------------|-----------------|---------------|-------------|---------|
| 00      | 2402            | 2.402 GHz       | Plot 6.9.2 A1 | ---         | PASS    |
|         |                 | 9KHz-30MHz      | Plot 6.9.2 A2 | -20         | PASS    |
|         |                 | 30MHz-3GHz      | Plot 6.9.2 A3 | -20         | PASS    |
|         |                 | 3GHz-10GHz      | Plot 6.9.2 A4 | -20         | PASS    |
|         |                 | 10GHz-18GHz     | Plot 6.9.2 A5 | -20         | PASS    |
|         |                 | 18GHz-26GHz     | Plot 6.9.2 A6 | -20         | PASS    |
| 39      | 2441            | 2.441 GHz       | Plot 6.9.2 B1 | ---         | PASS    |
|         |                 | 9KHz-30MHz      | Plot 6.9.2 B2 | -20         | PASS    |
|         |                 | 30MHz-3GHz      | Plot 6.9.2 B3 | -20         | PASS    |
|         |                 | 3GHz-10GHz      | Plot 6.9.2 B4 | -20         | PASS    |
|         |                 | 10GHz-18GHz     | Plot 6.9.2 B5 | -20         | PASS    |
|         |                 | 18GHz-26GHz     | Plot 6.9.2 B6 | -20         | PASS    |
| 78      | 2480            | 2.480 GHz       | Plot 6.9.2 C1 | ---         | PASS    |
|         |                 | 9KHz-30MHz      | Plot 6.9.2 C2 | -20         | PASS    |
|         |                 | 30MHz-3GHz      | Plot 6.9.2 C3 | -20         | PASS    |
|         |                 | 3GHz-10GHz      | Plot 6.9.2 C4 | -20         | PASS    |
|         |                 | 10GHz-18GHz     | Plot 6.9.2 C5 | -20         | PASS    |
|         |                 | 18GHz-26GHz     | Plot 6.9.2 C6 | -20         | PASS    |

Note: 1. The test results including the cable lose.

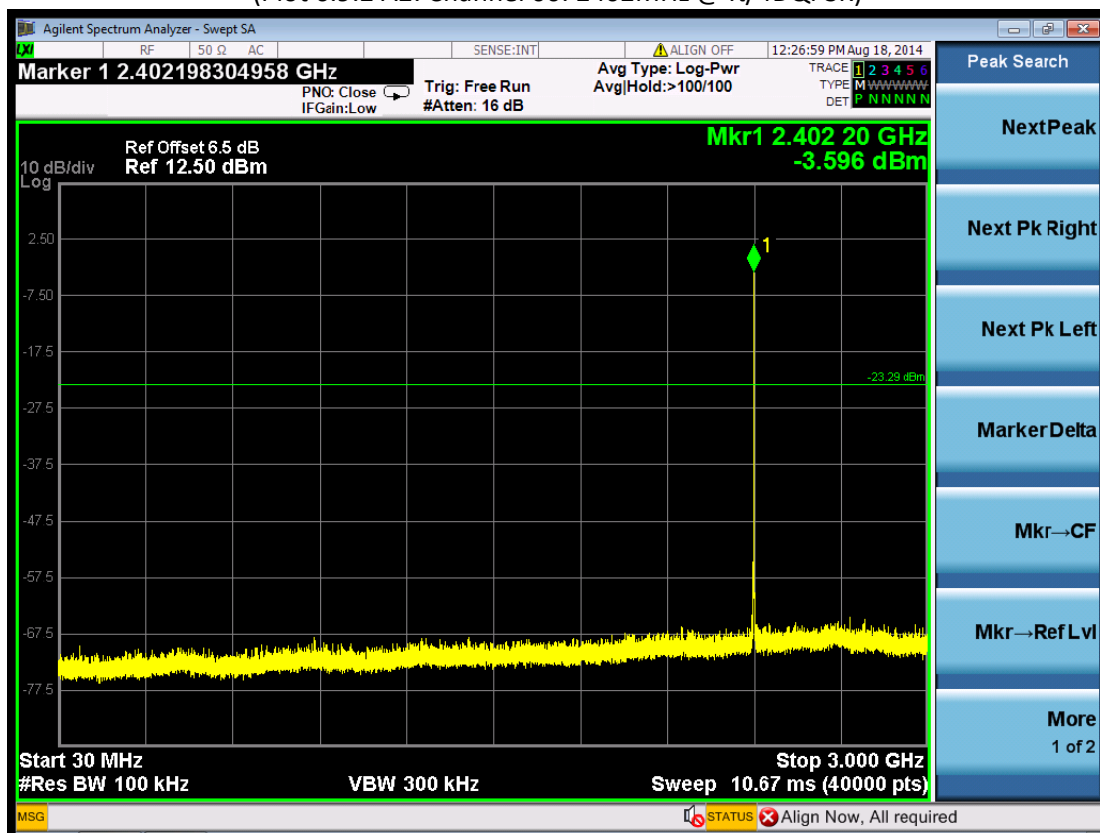
### B. Test Plots



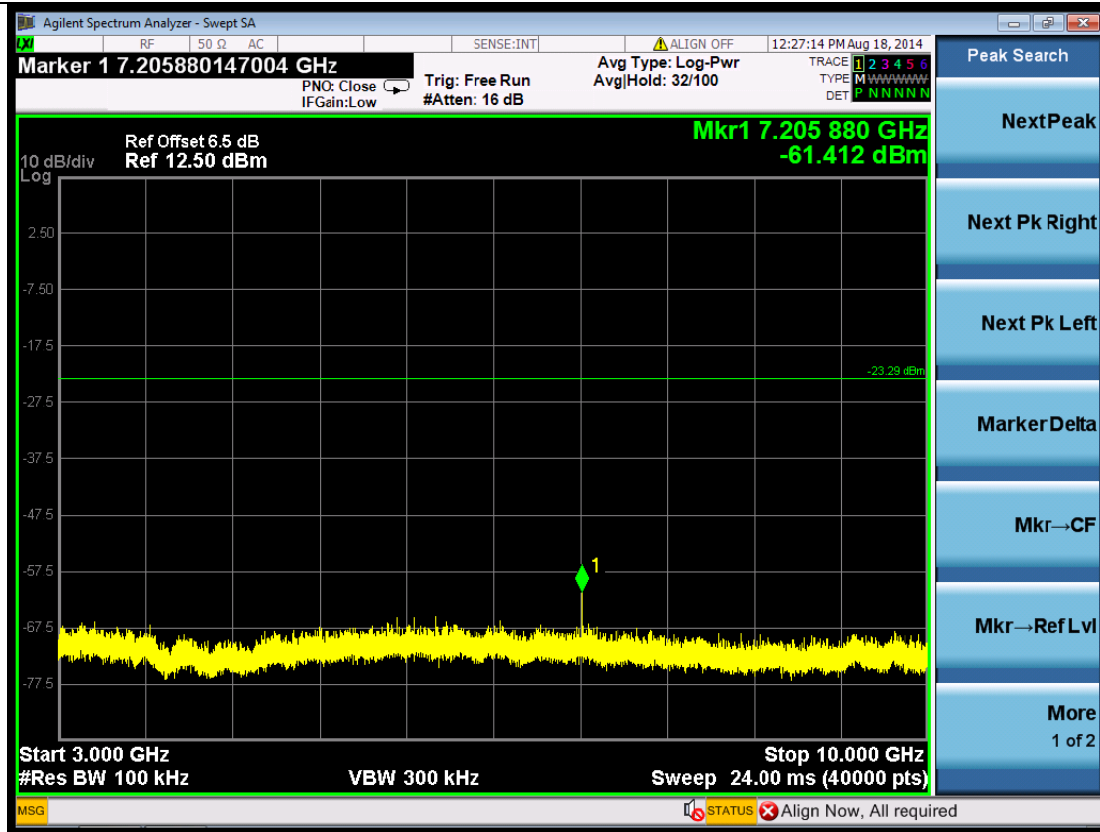
(Plot 6.9.2 A1: Channel 00: 2402MHz @  $\pi/4$ DQPSK)



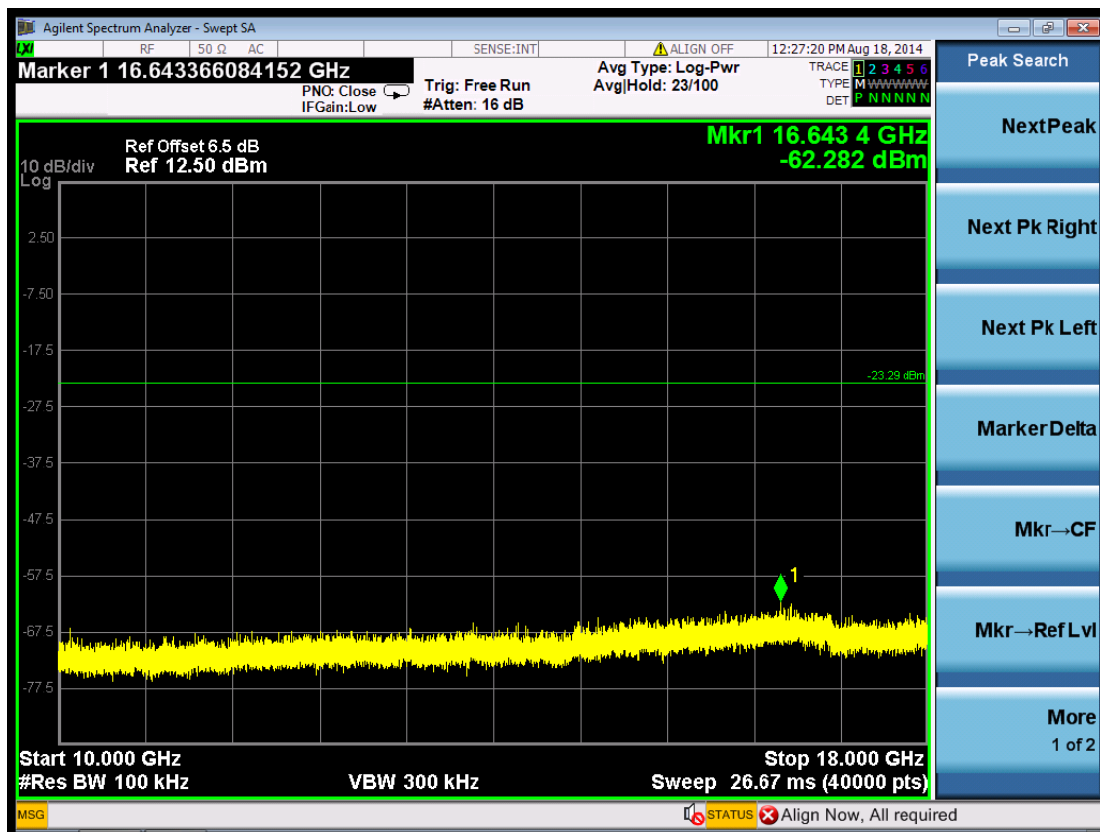
(Plot 6.9.2 A2: Channel 00: 2402MHz @  $\pi/4$ DQPSK)



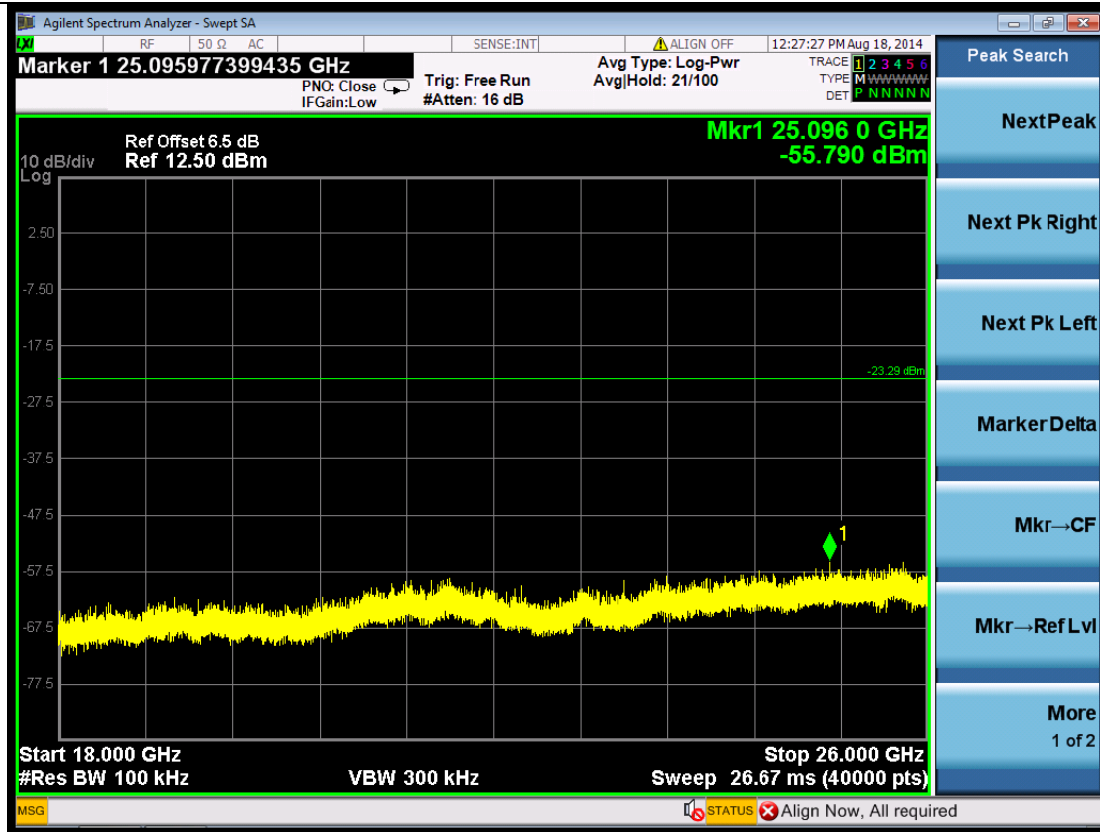
(Plot 6.9.2 A3: Channel 00: 2402MHz @  $\pi/4$ DQPSK)



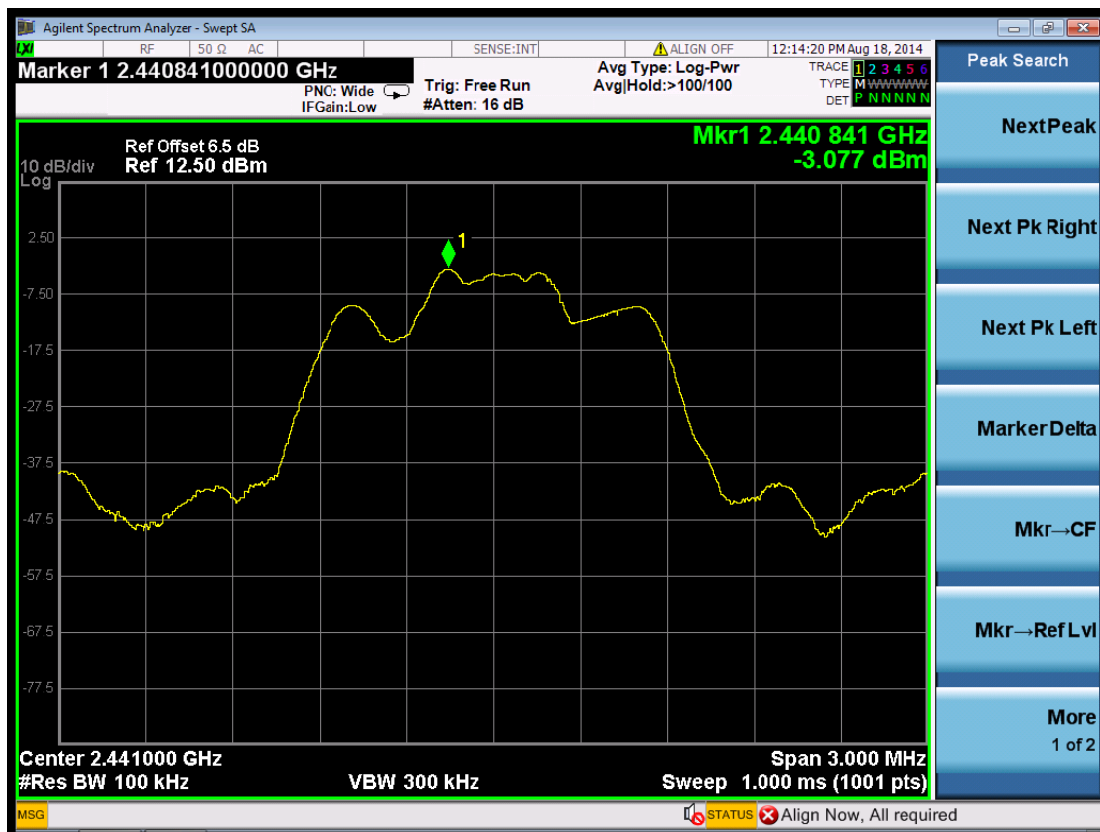
(Plot 6.9.2 A4: Channel 00: 2402MHz @  $\pi/4$ DQPSK)



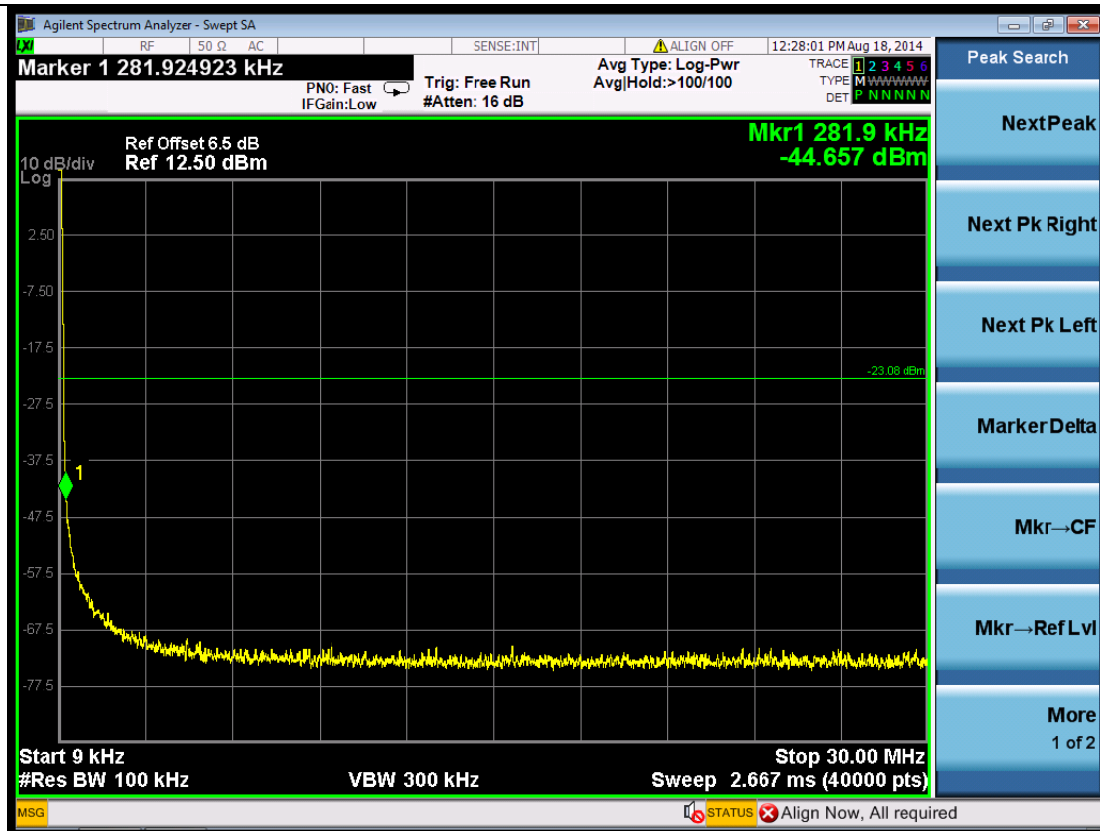
(Plot 6.9.2 A5: Channel 00: 2402MHz @  $\pi/4$ DQPSK)



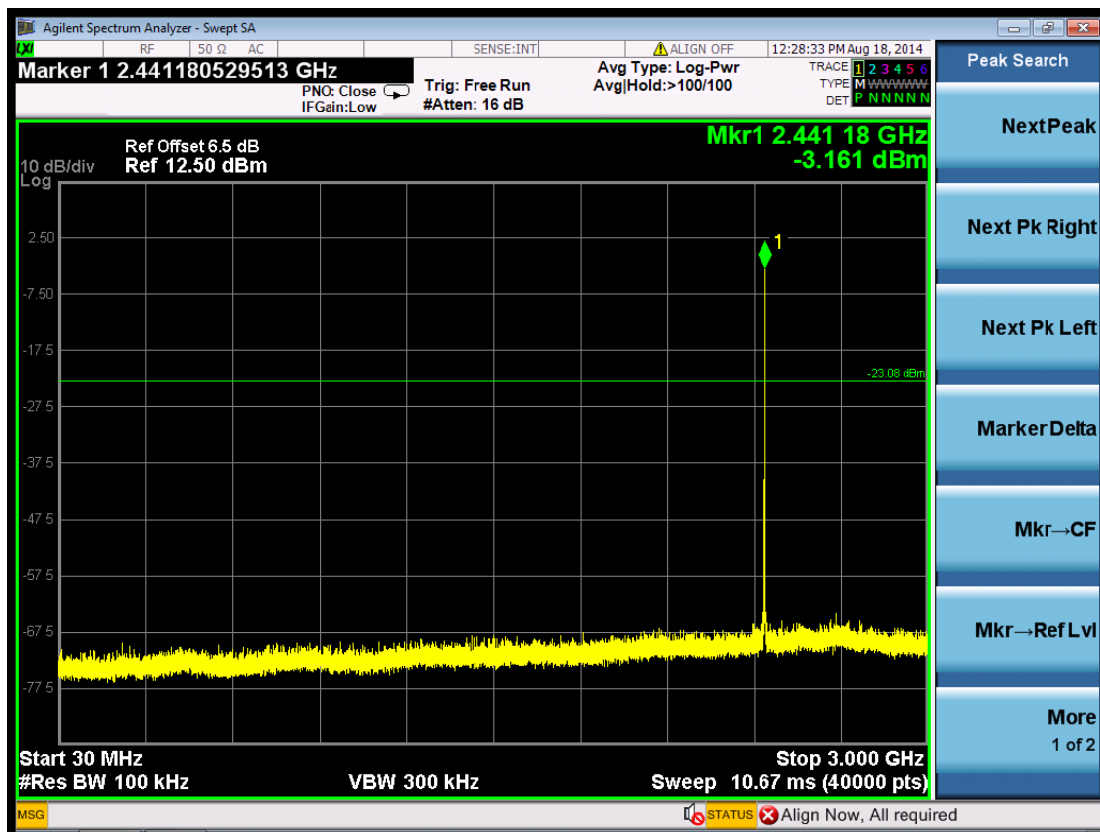
(Plot 6.9.2 A6: Channel 00: 2402MHz @  $\pi/4$ DQPSK)



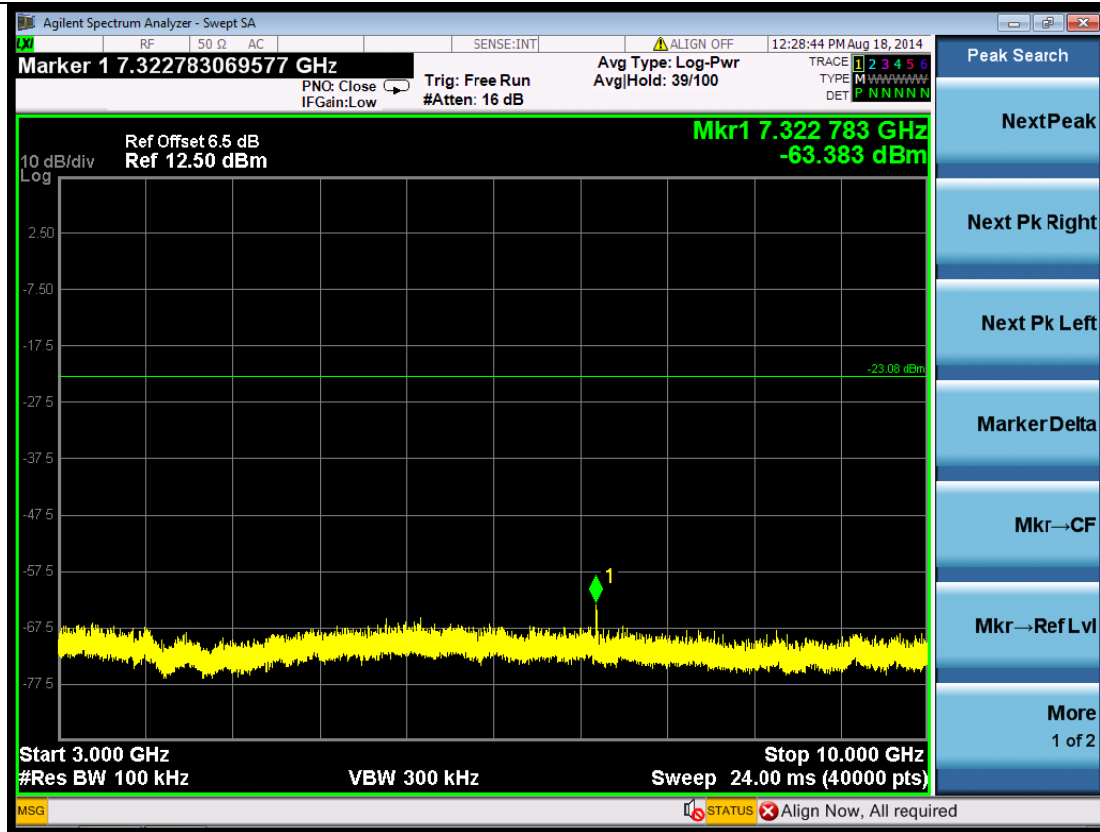
(Plot 6.9.2 B1: Channel 39: 2441MHz @  $\pi/4$ DQPSK)



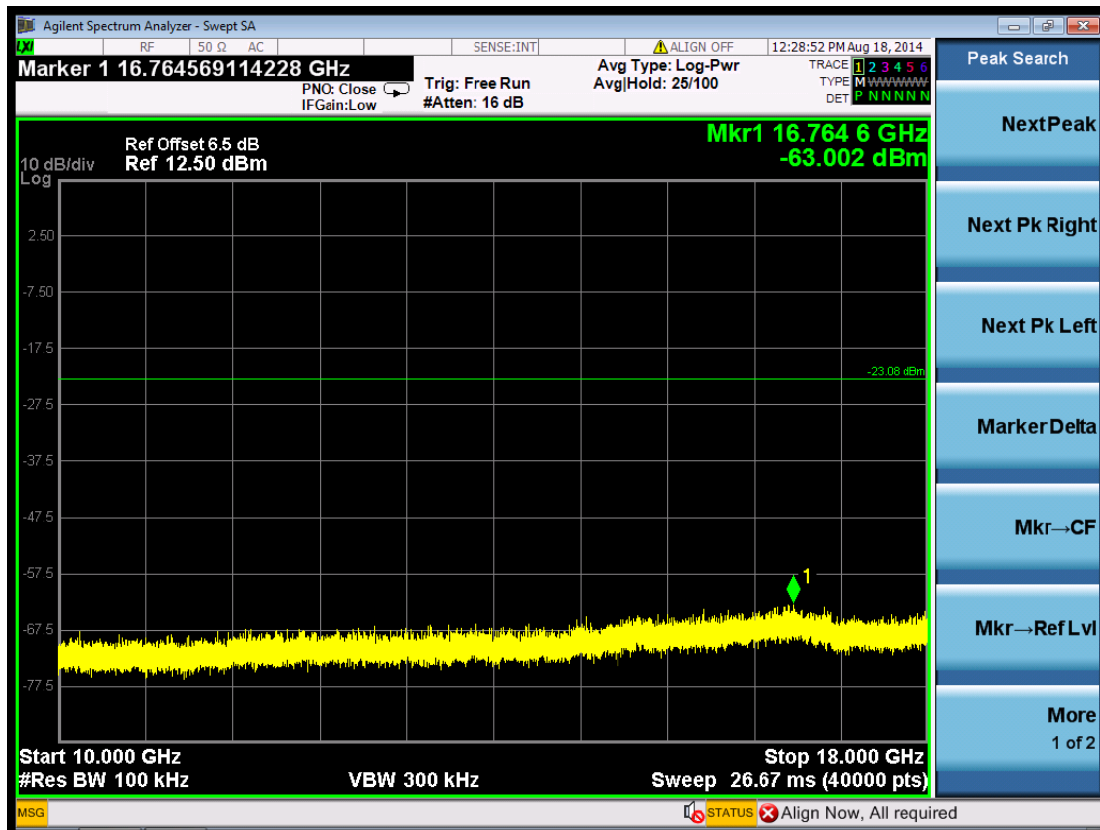
(Plot 6.9.2 B2: Channel 39: 2441MHz @  $\pi/4$ DQPSK)



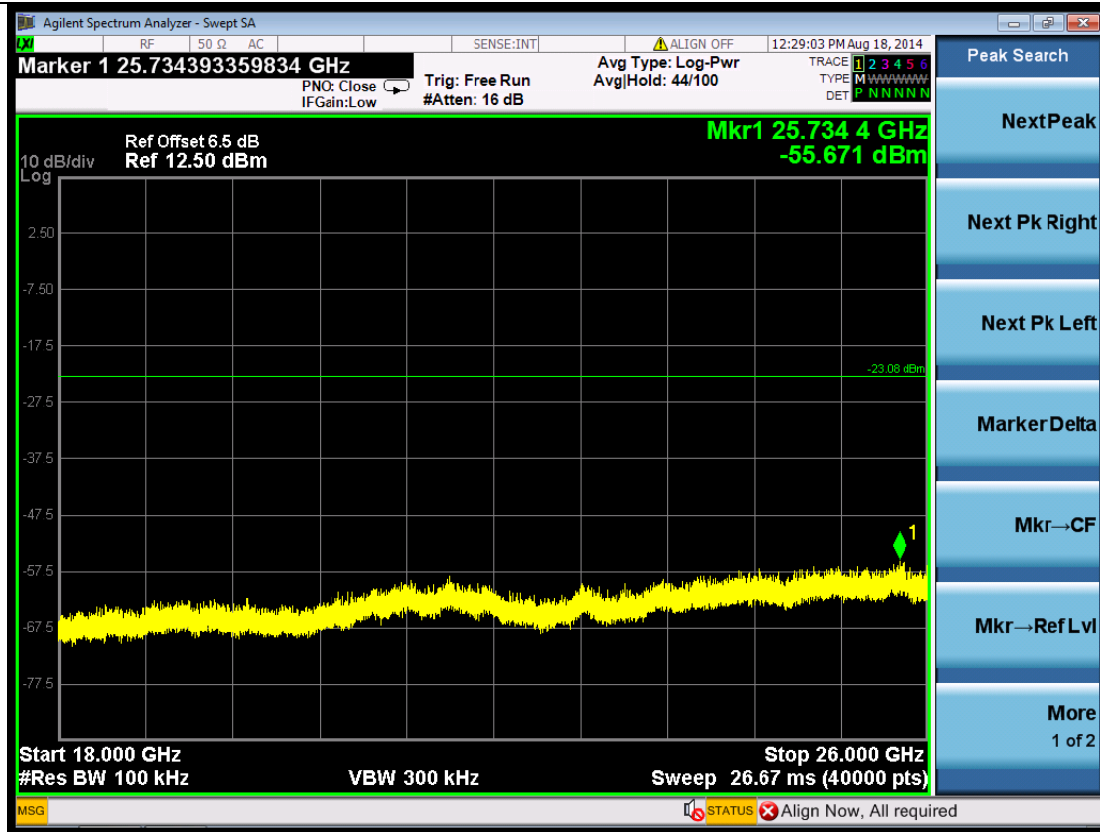
(Plot 6.9.2 B3: Channel 39: 2441MHz @  $\pi/4$ DQPSK)



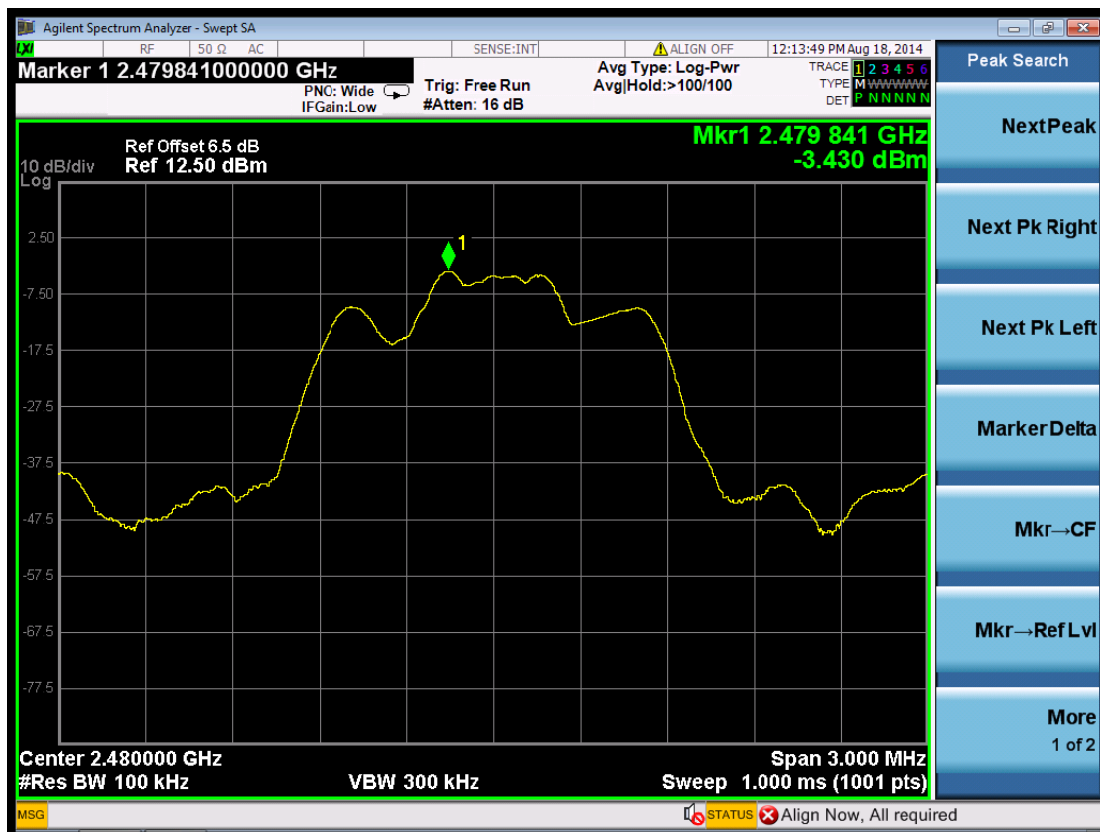
(Plot 6.9.2 B4: Channel 39: 2441MHz @  $\pi/4$ DQPSK)



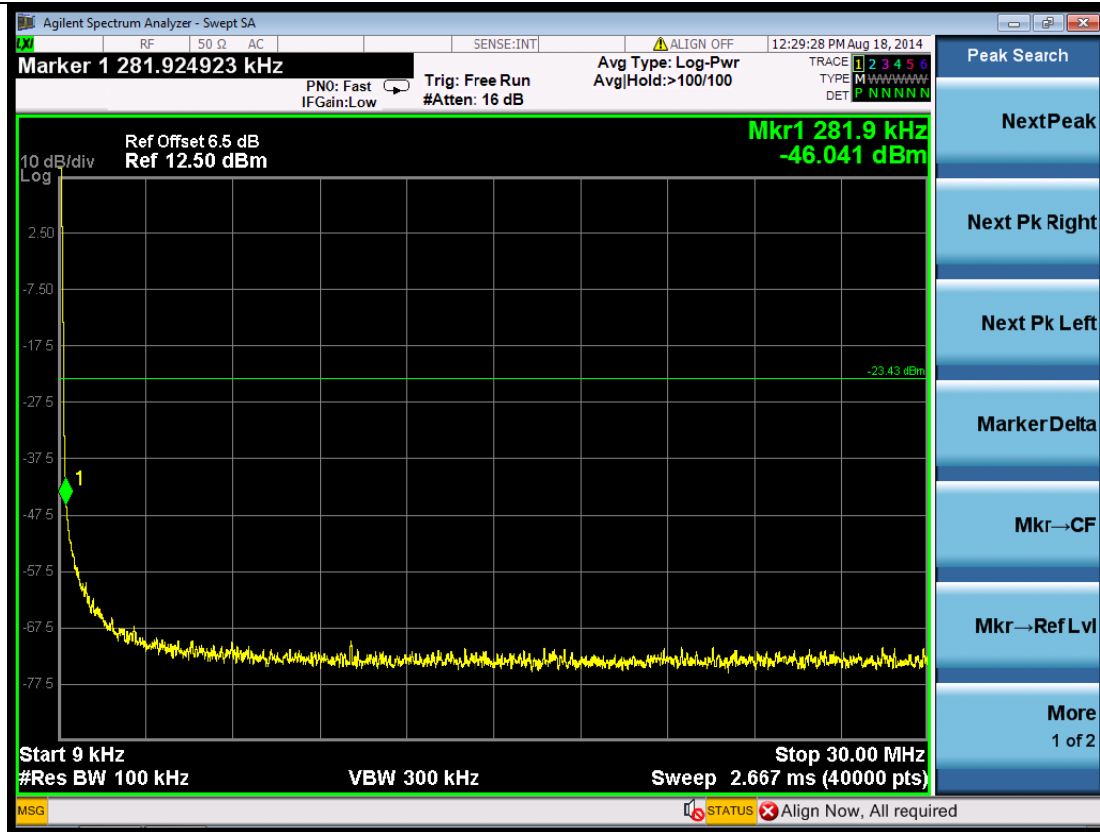
(Plot 6.9.2 B5: Channel 39: 2441MHz @  $\pi/4$ DQPSK)



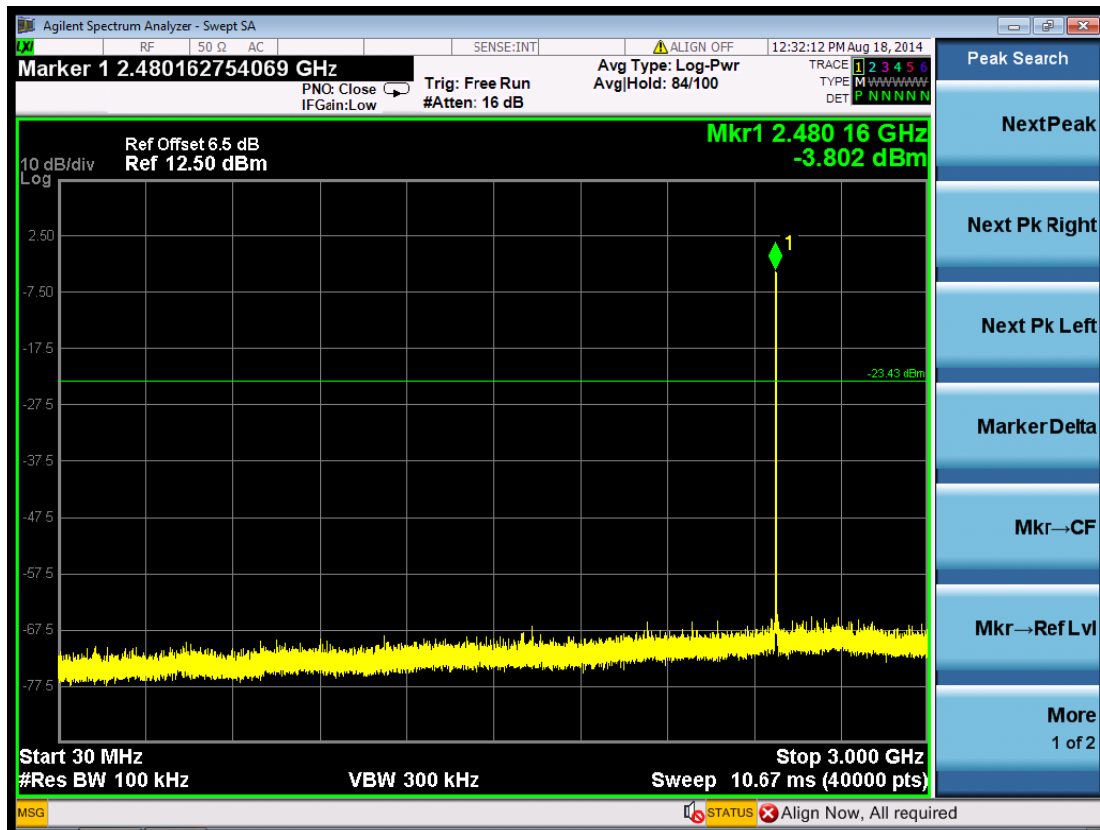
(Plot 6.9.2 B6: Channel 39: 2441MHz @  $\pi/4$ DQPSK)



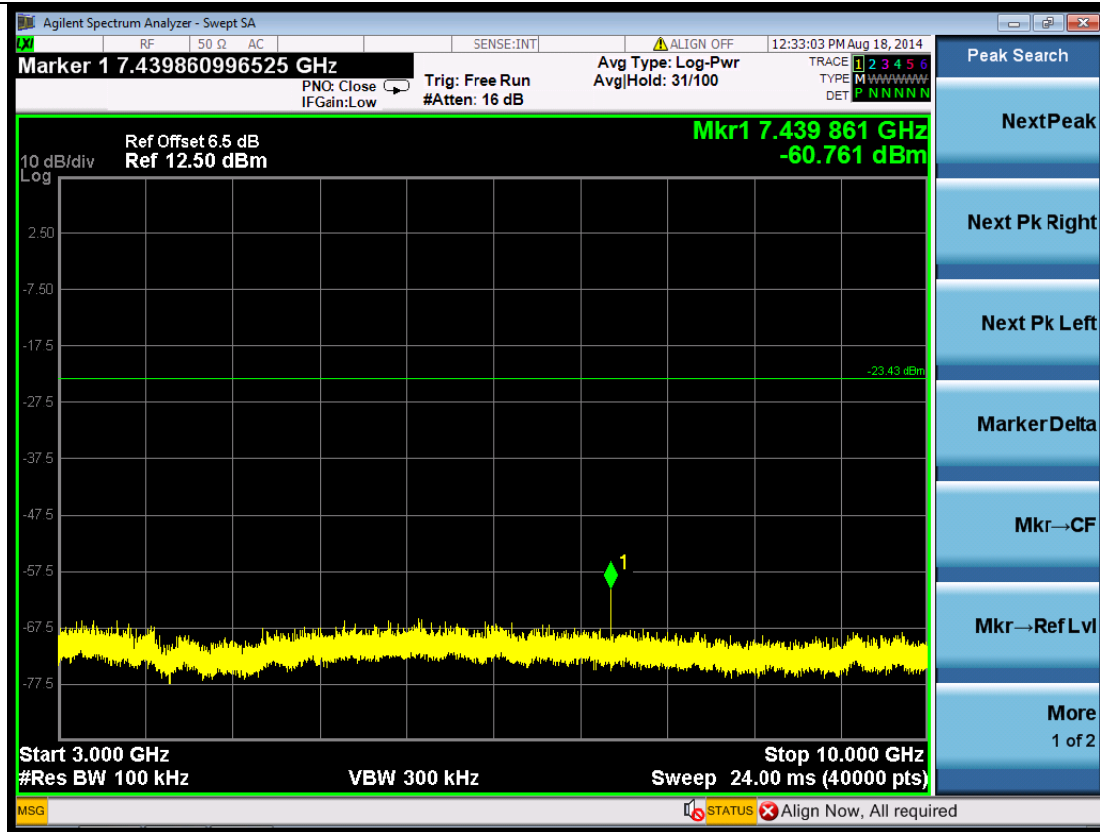
(Plot 6.9.2 C1: Channel 78: 2480MHz @  $\pi/4$ DQPSK)



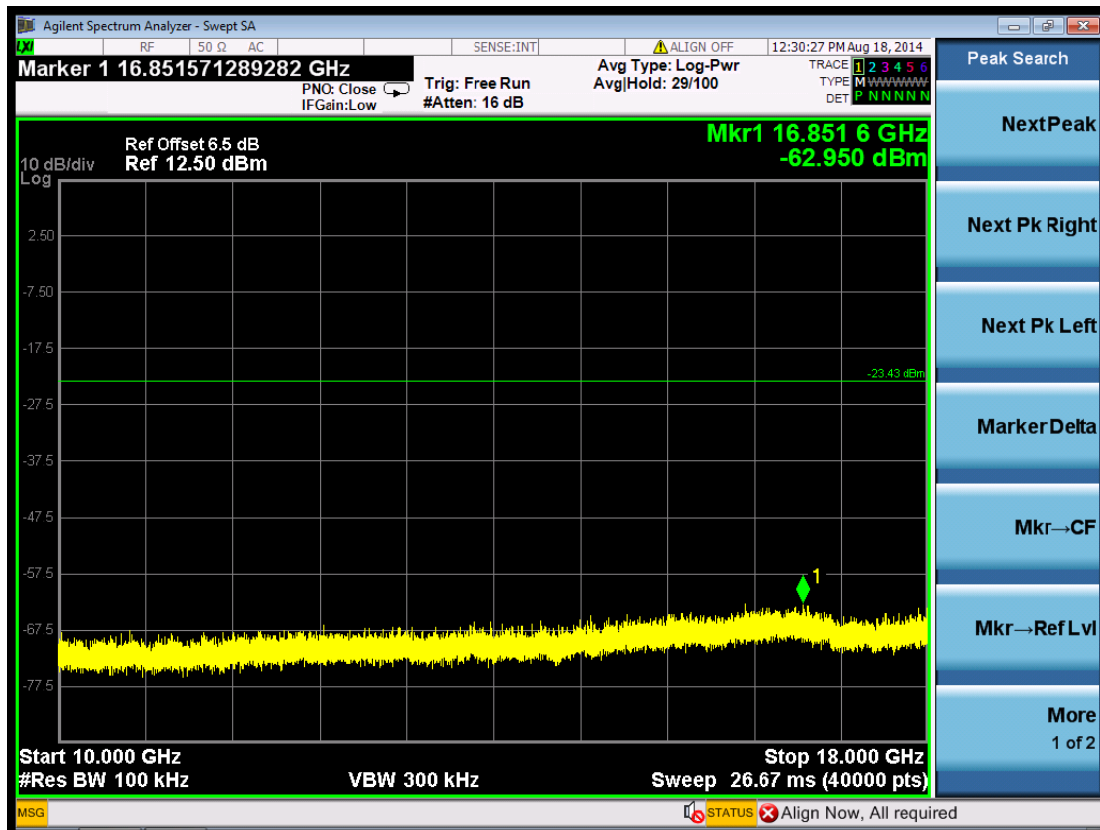
(Plot 6.9.2 C2: Channel 78: 2480MHz @  $\pi/4$ DQPSK)



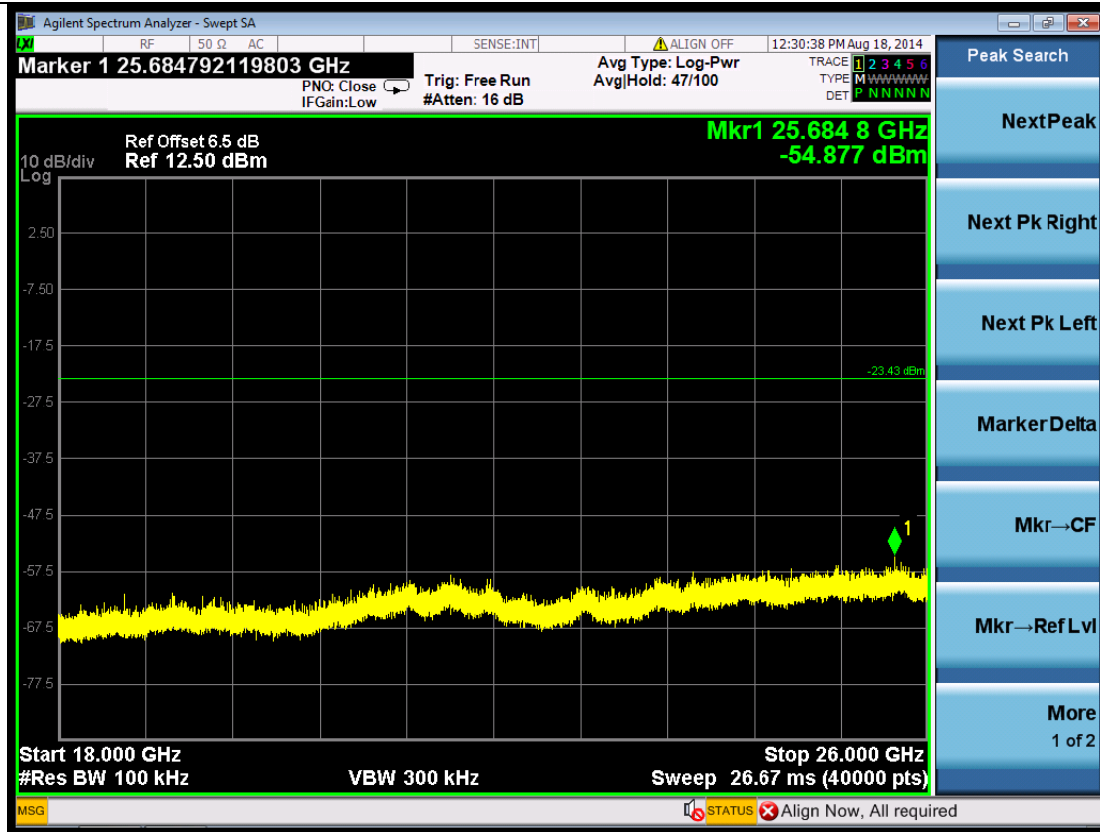
(Plot 6.9.2 C3: Channel 78: 2480MHz @  $\pi/4$ DQPSK)



(Plot 6.9.2 C4: Channel 78: 2480MHz @  $\pi/4$ DQPSK)



(Plot 6.9.2 C5: Channel 78: 2480MHz @  $\pi/4$ DQPSK)



(Plot 6.9.2 C6: Channel 78: 2480MHz @  $\pi/4$ DQPSK)

## 6.9.3 8DPSK Test Mode

### A. Test Verdict

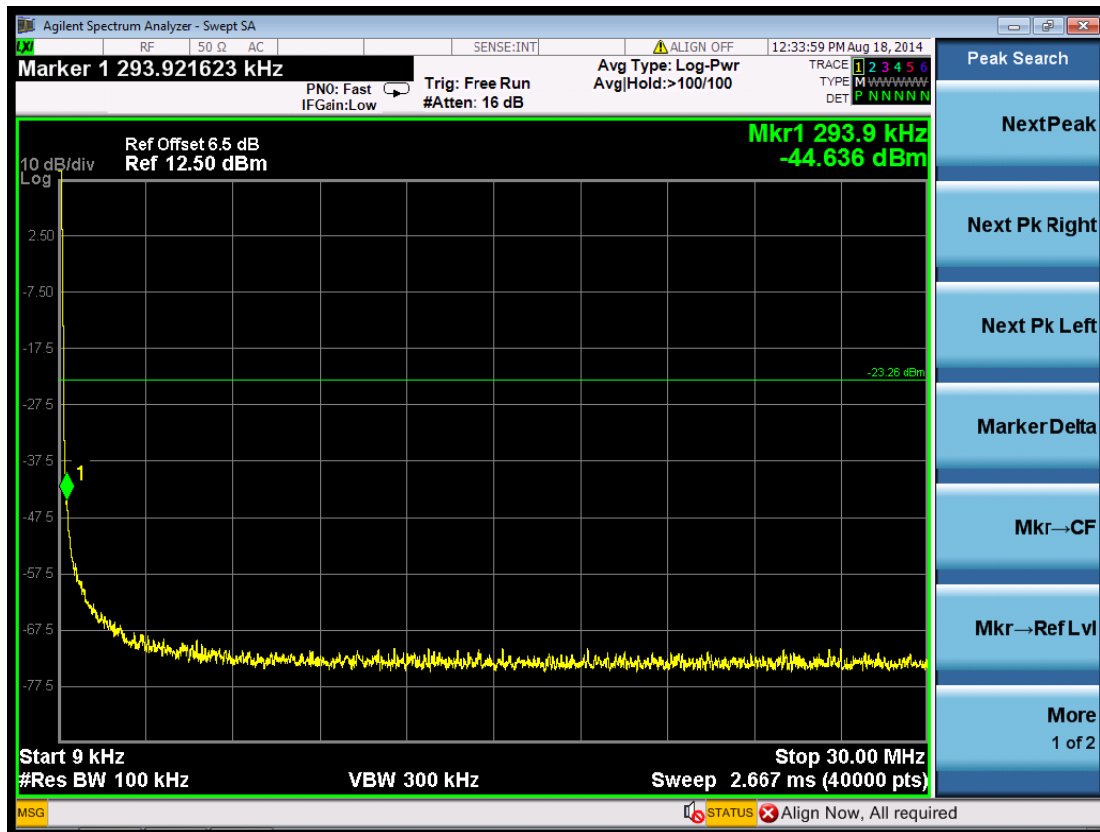
| Channel | Frequency (MHz) | Frequency Range | Refer to Plot | Limit (dBc) | Verdict |
|---------|-----------------|-----------------|---------------|-------------|---------|
| 00      | 2402            | 2.402 GHz       | Plot 6.9.3 A1 | ---         | PASS    |
|         |                 | 9KHz-30MHz      | Plot 6.9.3 A2 | -20         | PASS    |
|         |                 | 30MHz-3GHz      | Plot 6.9.3 A3 | -20         | PASS    |
|         |                 | 3GHz-10GHz      | Plot 6.9.3 A4 | -20         | PASS    |
|         |                 | 10GHz-18GHz     | Plot 6.9.3 A5 | -20         | PASS    |
|         |                 | 18GHz-26GHz     | Plot 6.9.3 A6 | -20         | PASS    |
| 39      | 2441            | 2.441 GHz       | Plot 6.9.3 B1 | ---         | PASS    |
|         |                 | 9KHz-30MHz      | Plot 6.9.3 B2 | -20         | PASS    |
|         |                 | 30MHz-3GHz      | Plot 6.9.3 B3 | -20         | PASS    |
|         |                 | 3GHz-10GHz      | Plot 6.9.3 B4 | -20         | PASS    |
|         |                 | 10GHz-18GHz     | Plot 6.9.3 B5 | -20         | PASS    |
|         |                 | 18GHz-26GHz     | Plot 6.9.3 B6 | -20         | PASS    |
| 78      | 2480            | 2.480 GHz       | Plot 6.9.3 C1 | ---         | PASS    |
|         |                 | 9KHz-30MHz      | Plot 6.9.3 C2 | -20         | PASS    |
|         |                 | 30MHz-3GHz      | Plot 6.9.3 C3 | -20         | PASS    |
|         |                 | 3GHz-10GHz      | Plot 6.9.3 C4 | -20         | PASS    |
|         |                 | 10GHz-18GHz     | Plot 6.9.3 C5 | -20         | PASS    |
|         |                 | 18GHz-26GHz     | Plot 6.9.3 C6 | -20         | PASS    |

Note: 1. The test results including the cable lose.

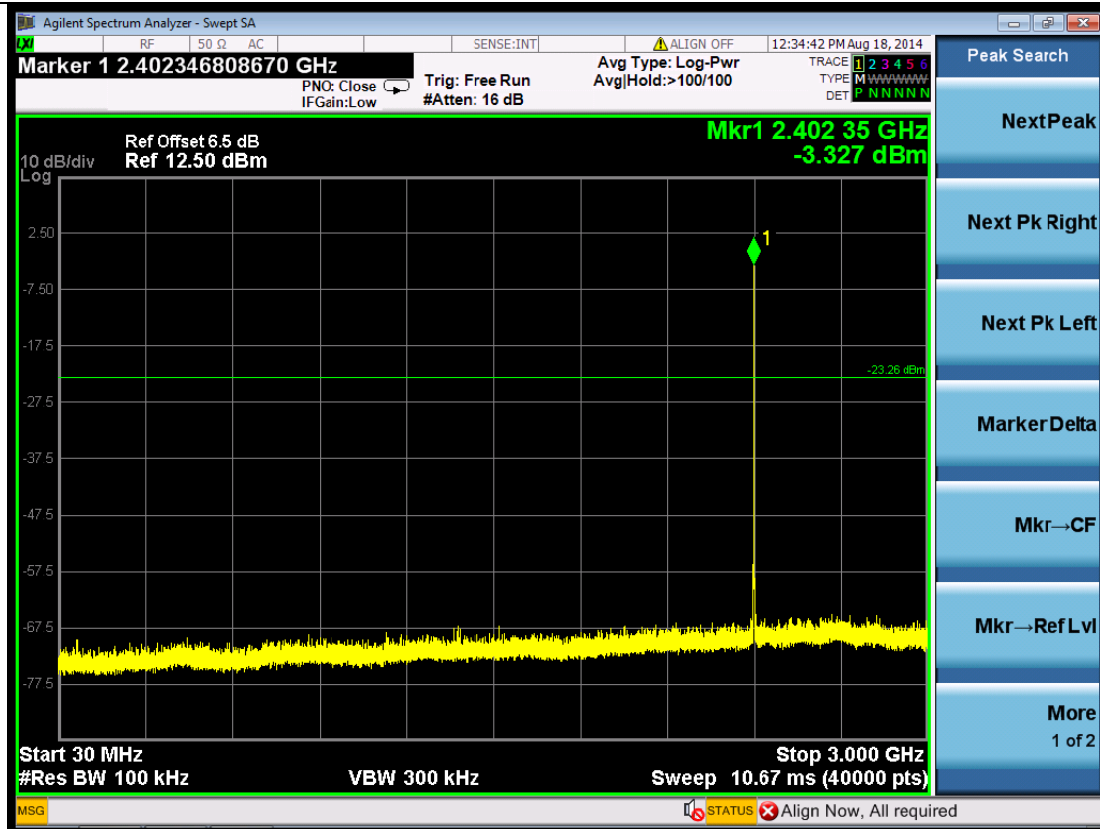
### B. Test Plots



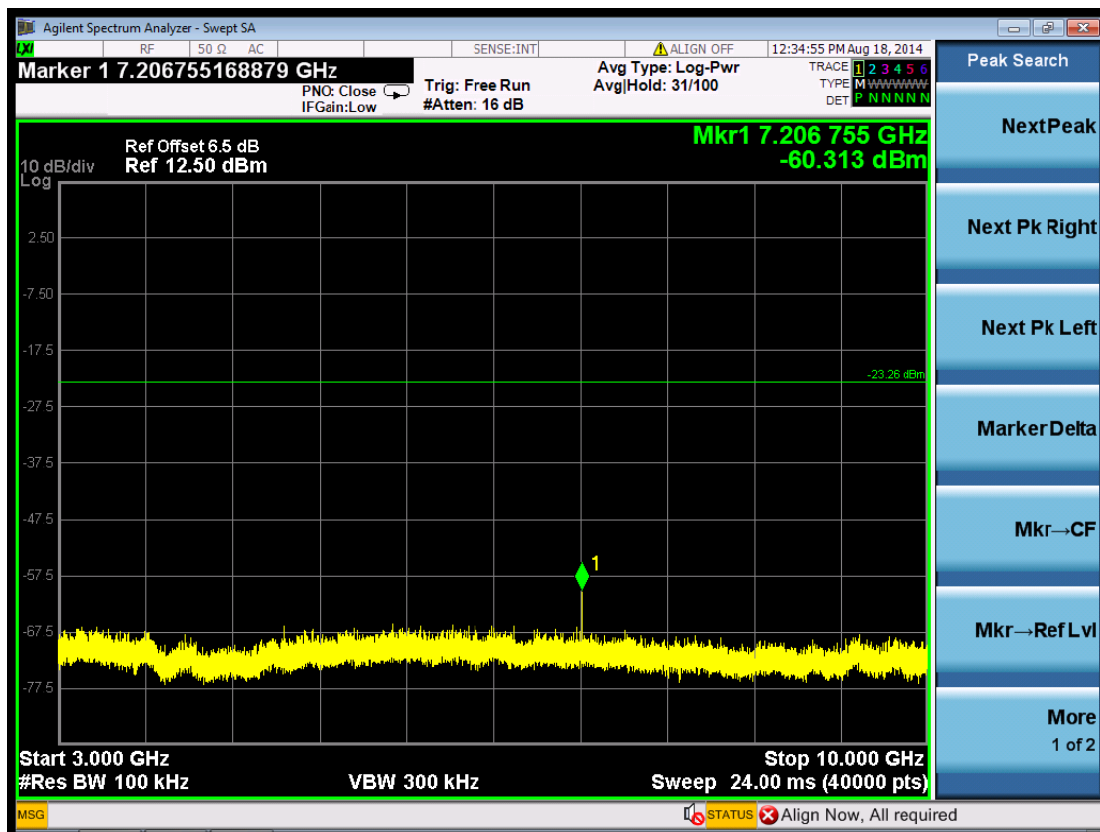
(Plot 6.9.3 A1: Channel 00: 2402MHz @ 8DPSK)



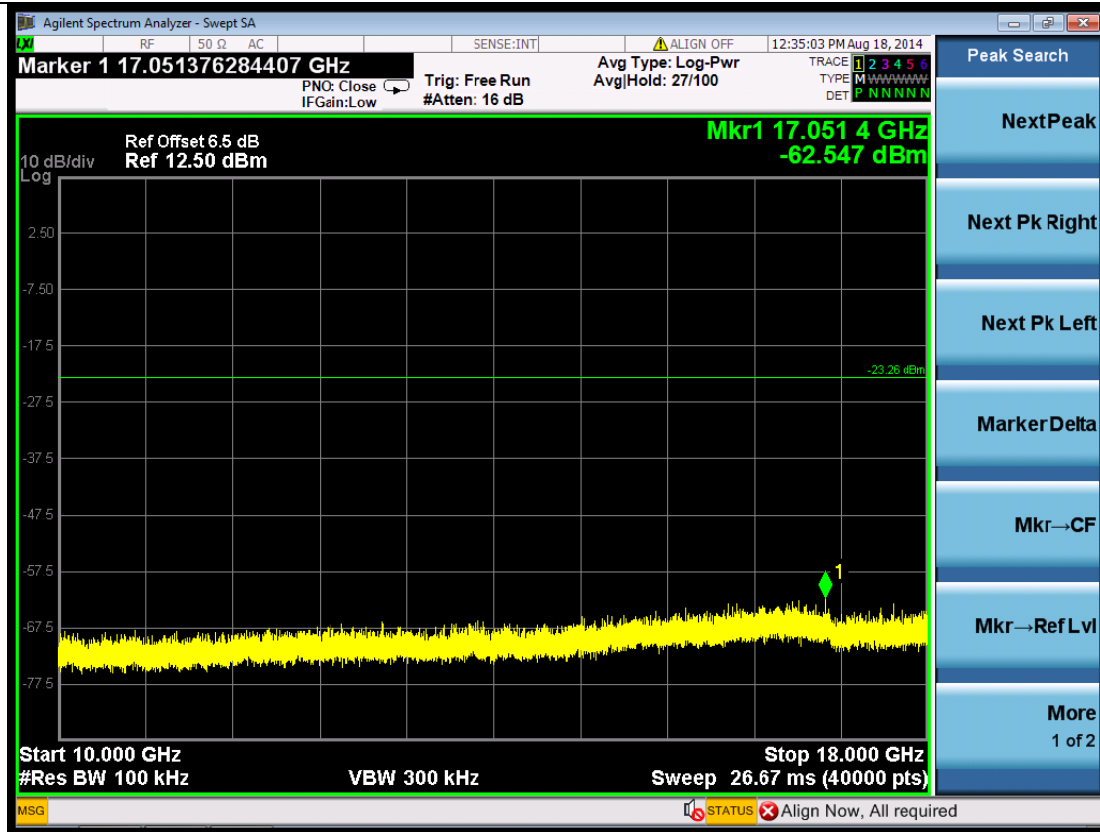
(Plot 6.9.3 A2: Channel 00: 2402MHz @ 8DPSK)



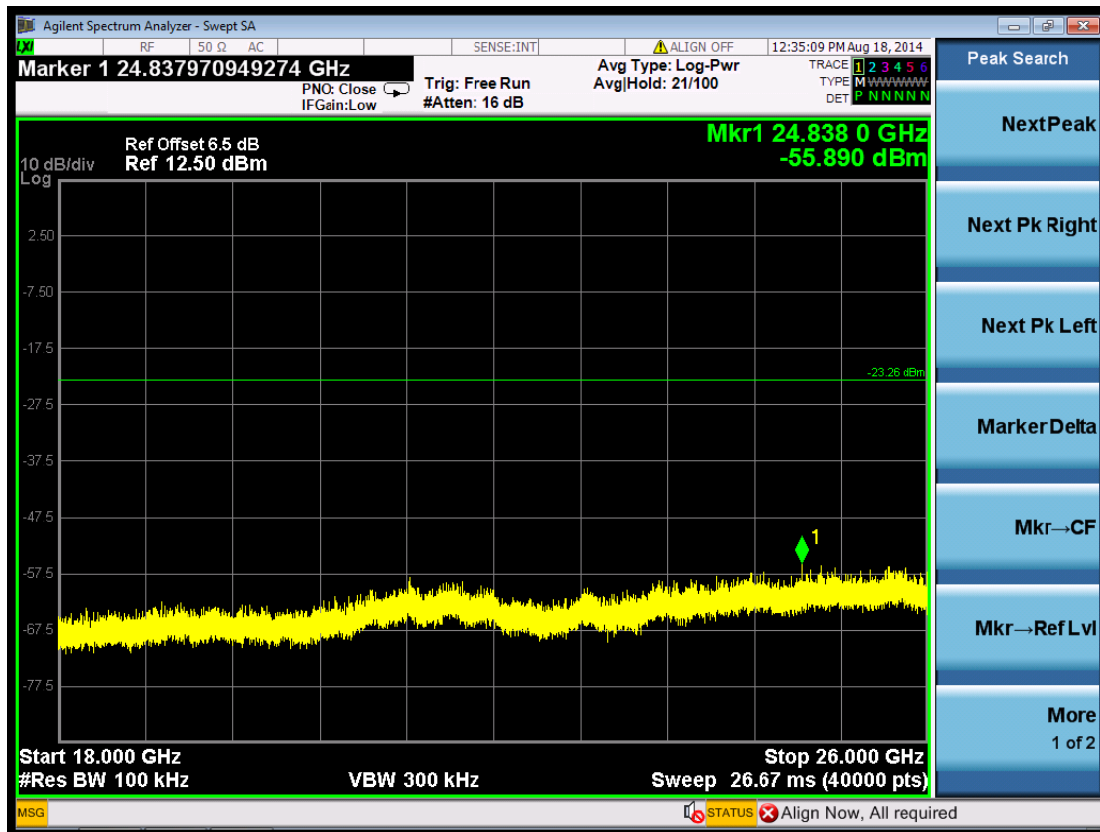
(Plot 6.9.3 A3: Channel 00: 2402MHz @ 8DPSK)



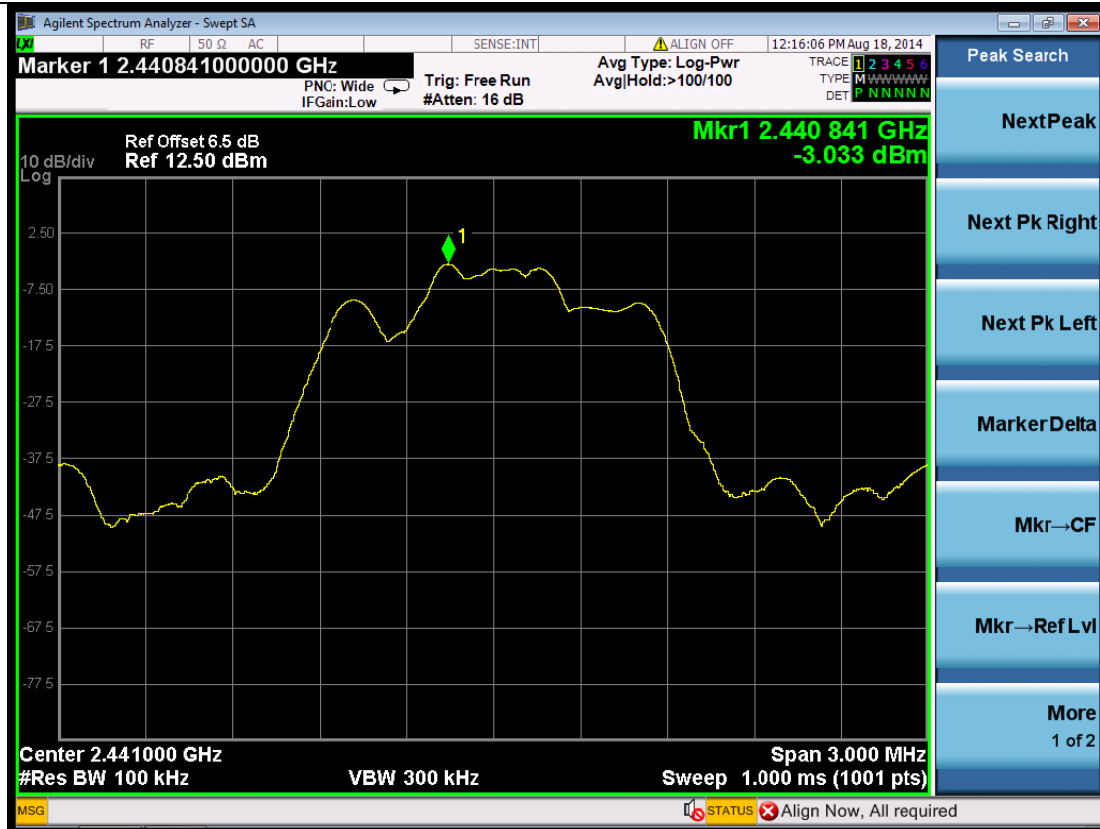
(Plot 6.9.3 A4: Channel 00: 2402MHz @ 8DPSK)



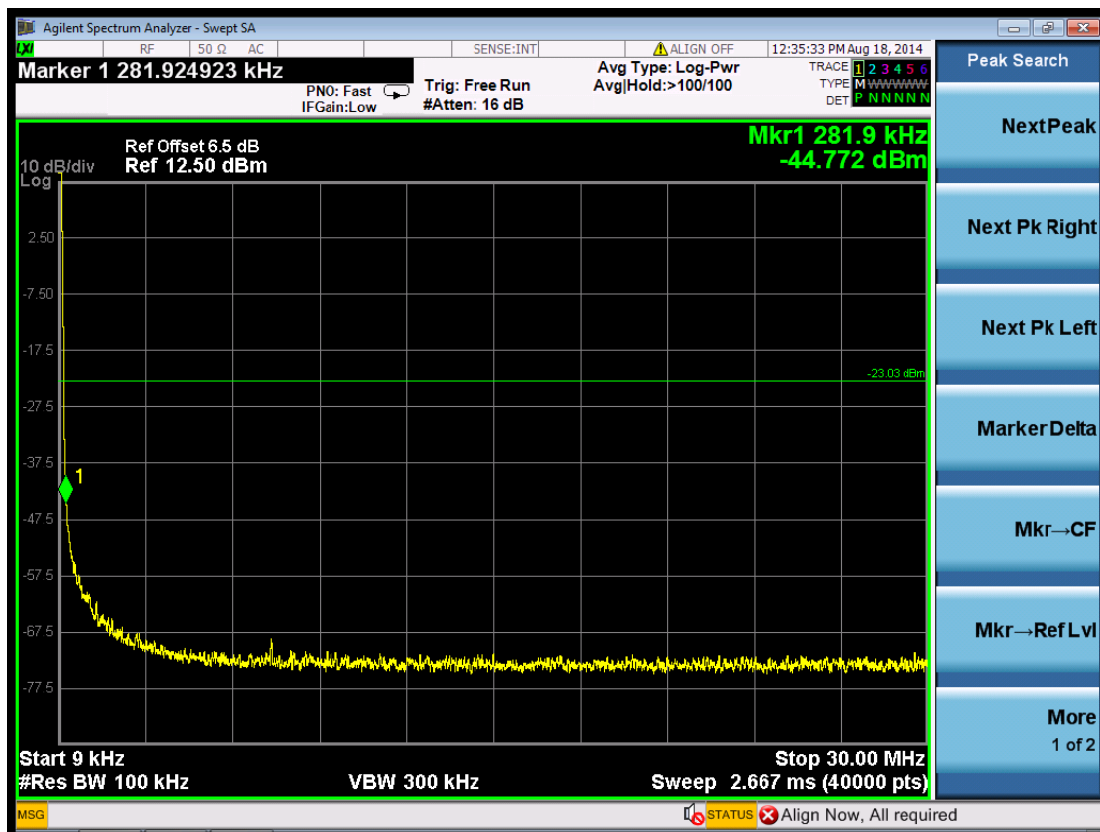
(Plot 6.9.3 A5: Channel 00: 2402MHz @ 8DPSK)



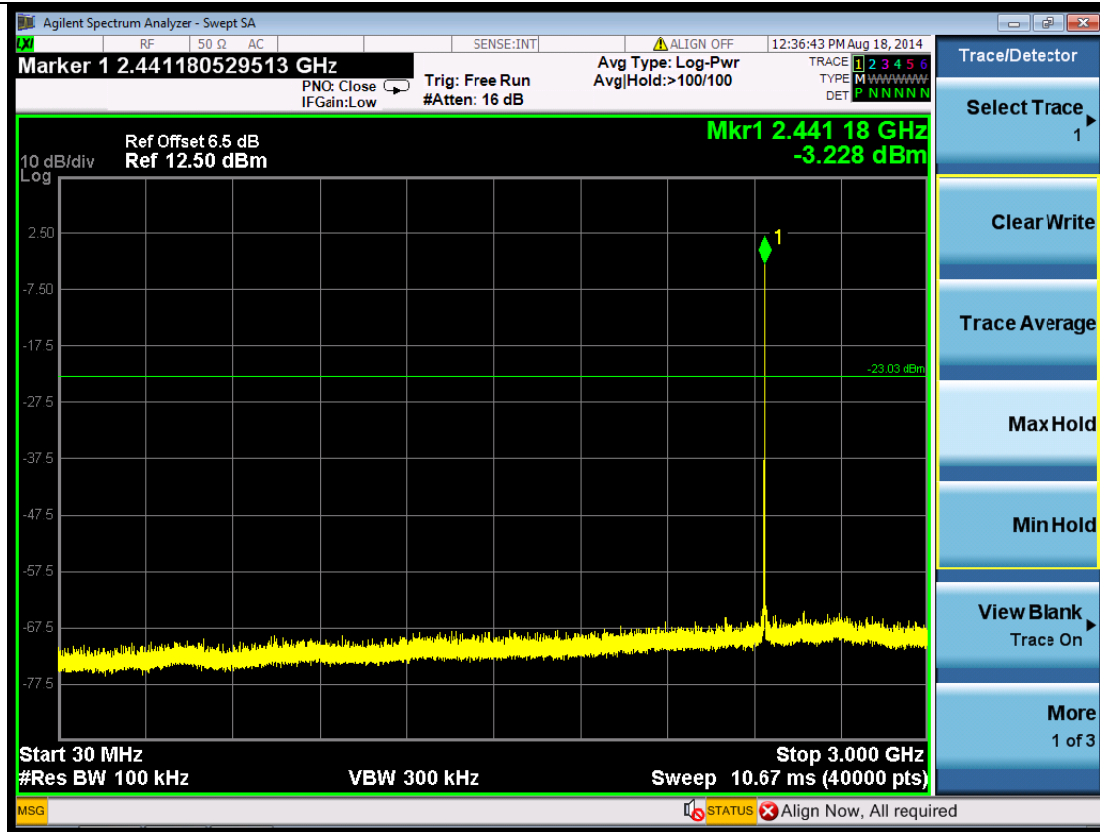
(Plot 6.9.3 A6: Channel 00: 2402MHz @ 8DPSK)



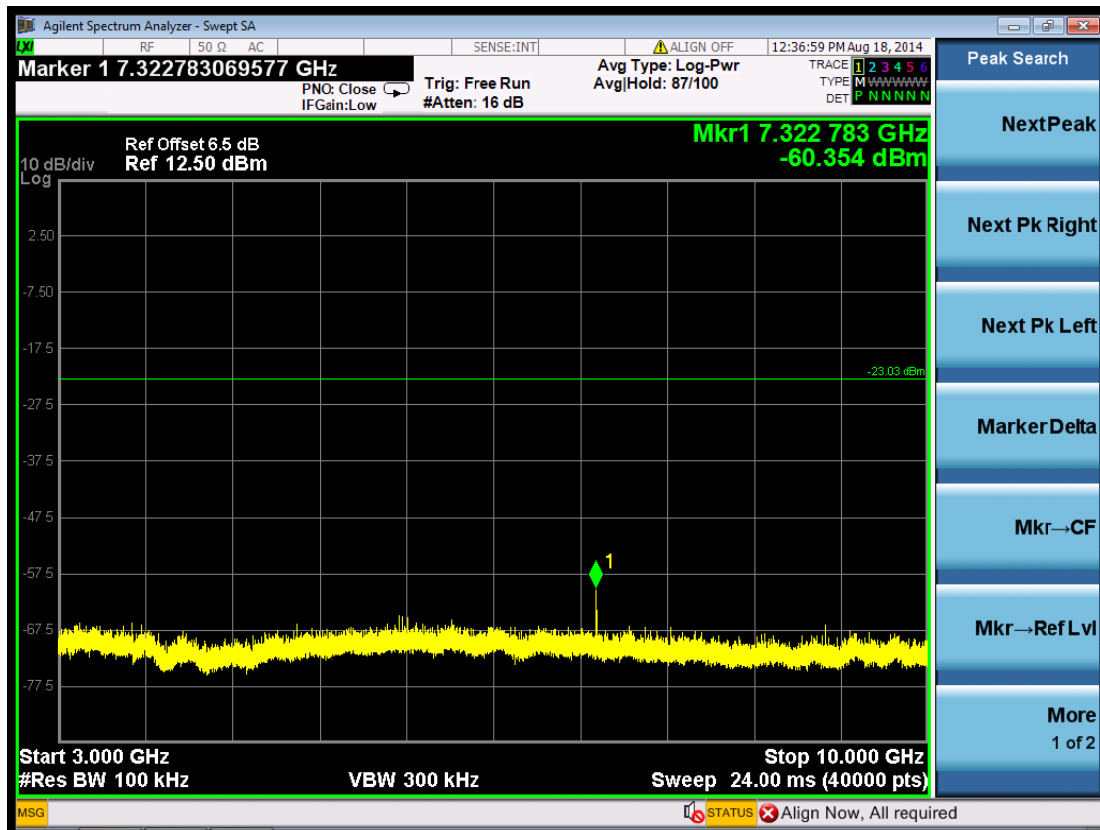
(Plot 6.9.3 B1: Channel 39: 2441MHz @ 8DPSK)



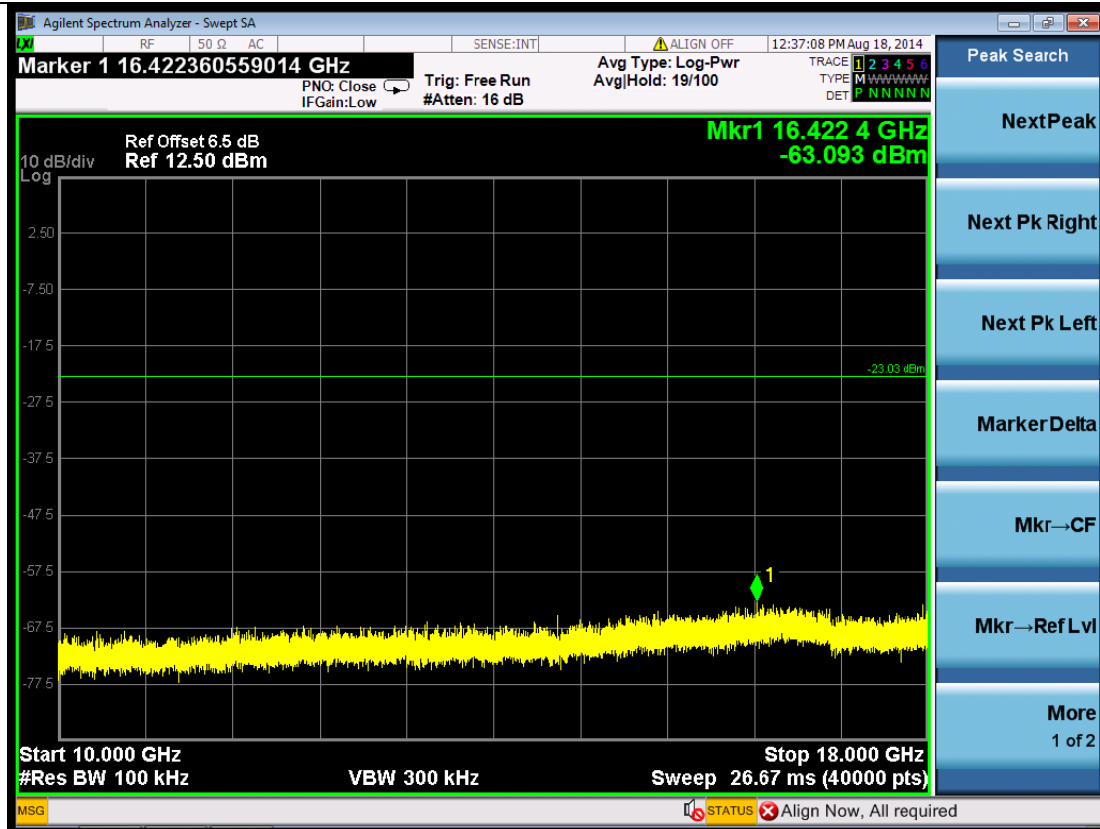
(Plot 6.9.3 B2: Channel 39: 2441MHz @ 8DPSK)



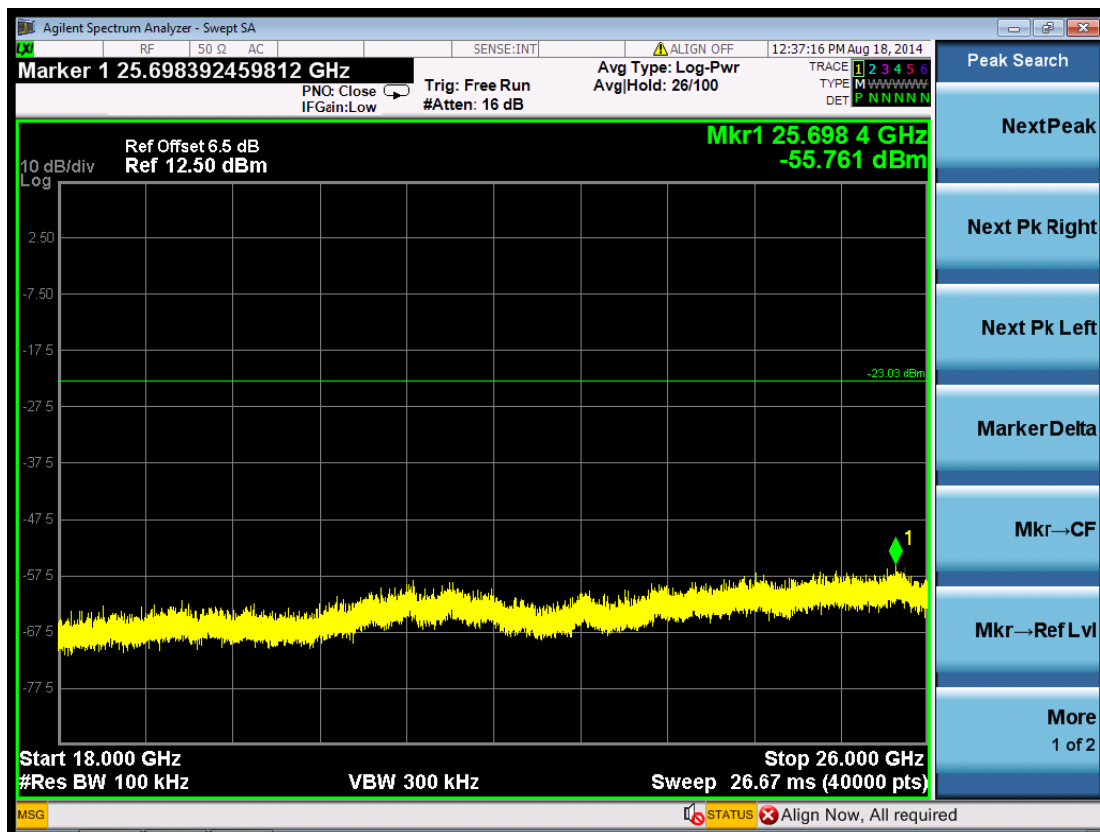
(Plot 6.9.3 B3: Channel 39: 2441MHz @ 8DPSK)



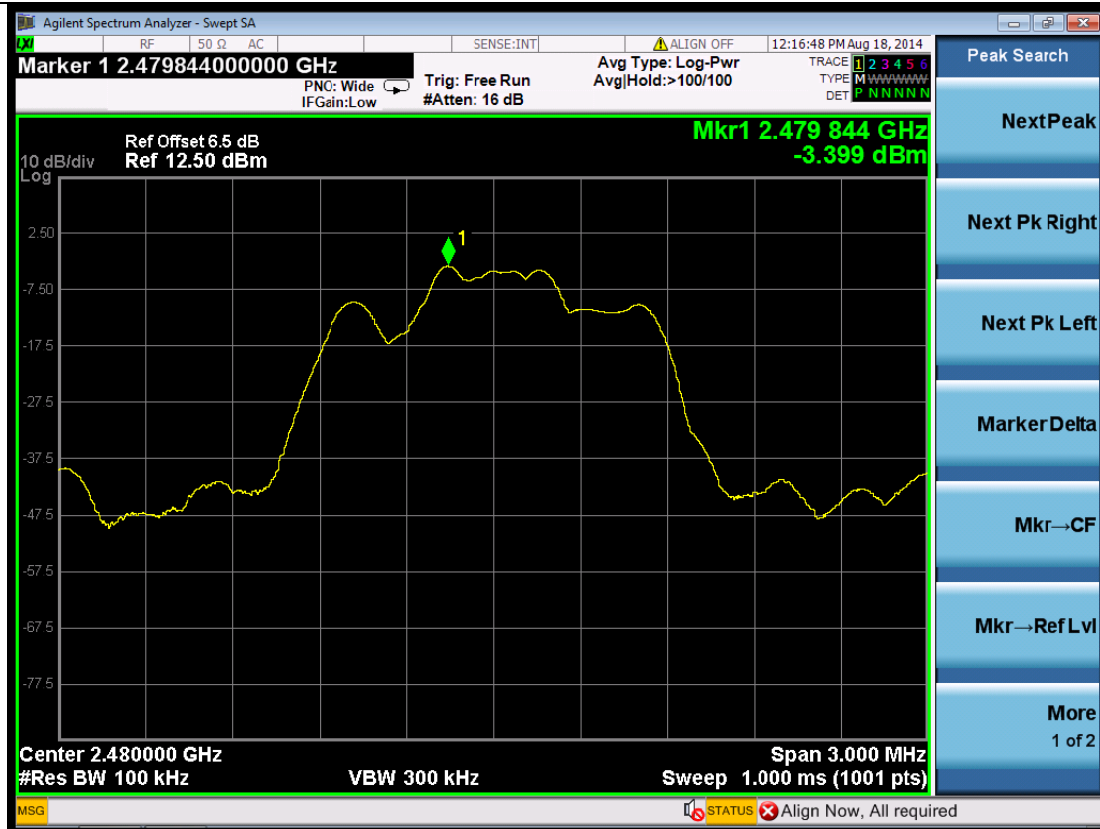
(Plot 6.9.3 B4: Channel 39: 2441MHz @ 8DPSK)



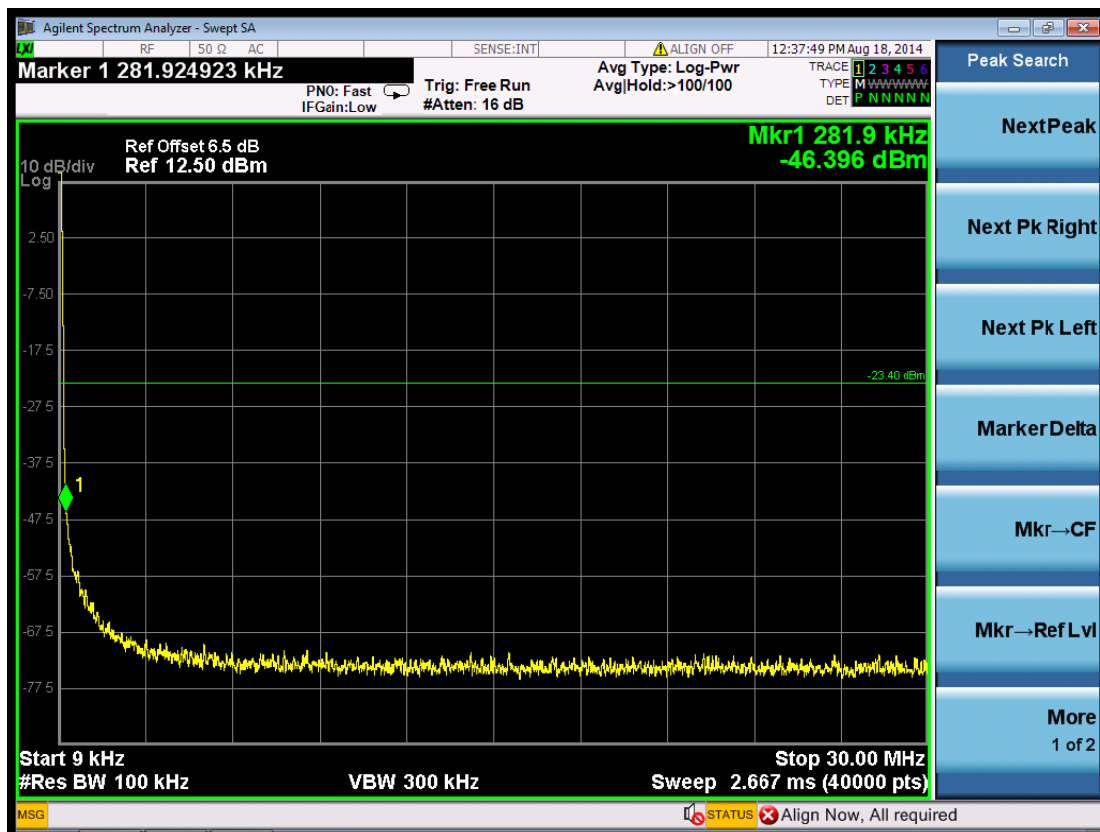
(Plot 6.9.3 B5: Channel 39: 2441MHz @ 8DPSK)



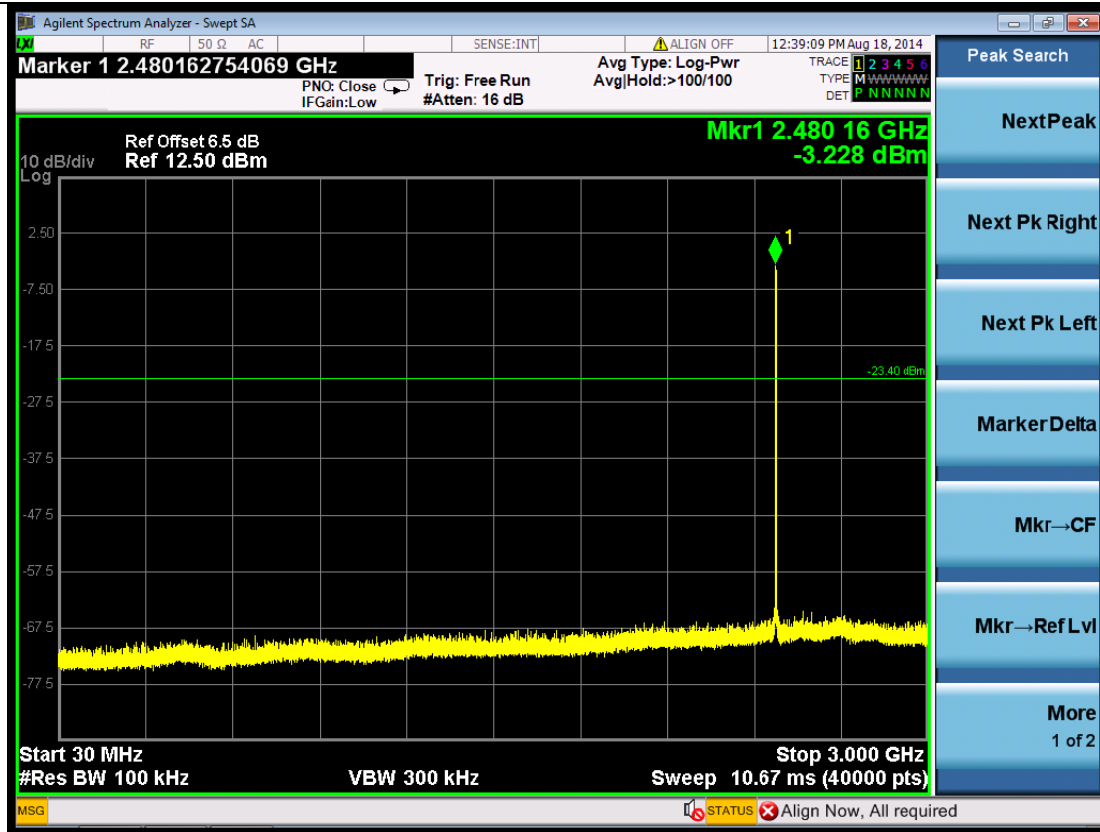
(Plot 6.9.3 B6: Channel 39: 2441MHz @ 8DPSK)



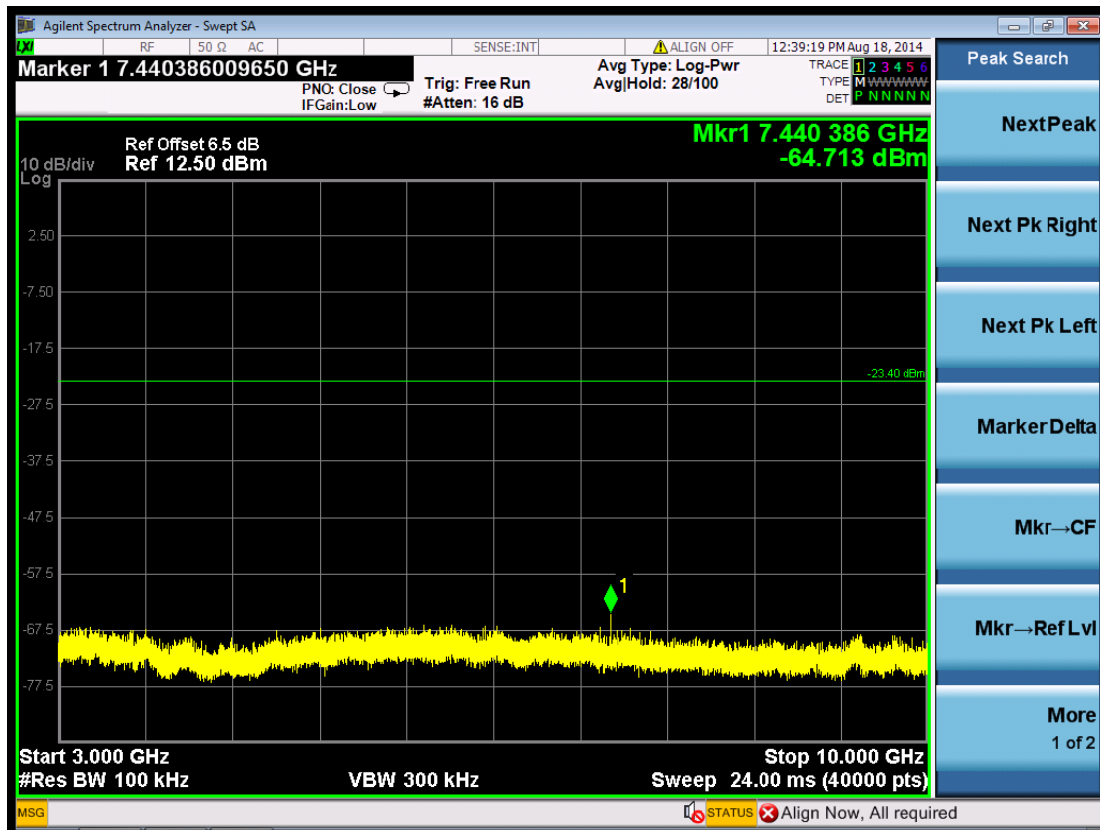
(Plot 6.9.3 C1: Channel 78: 2480MHz @ 8DPSK)



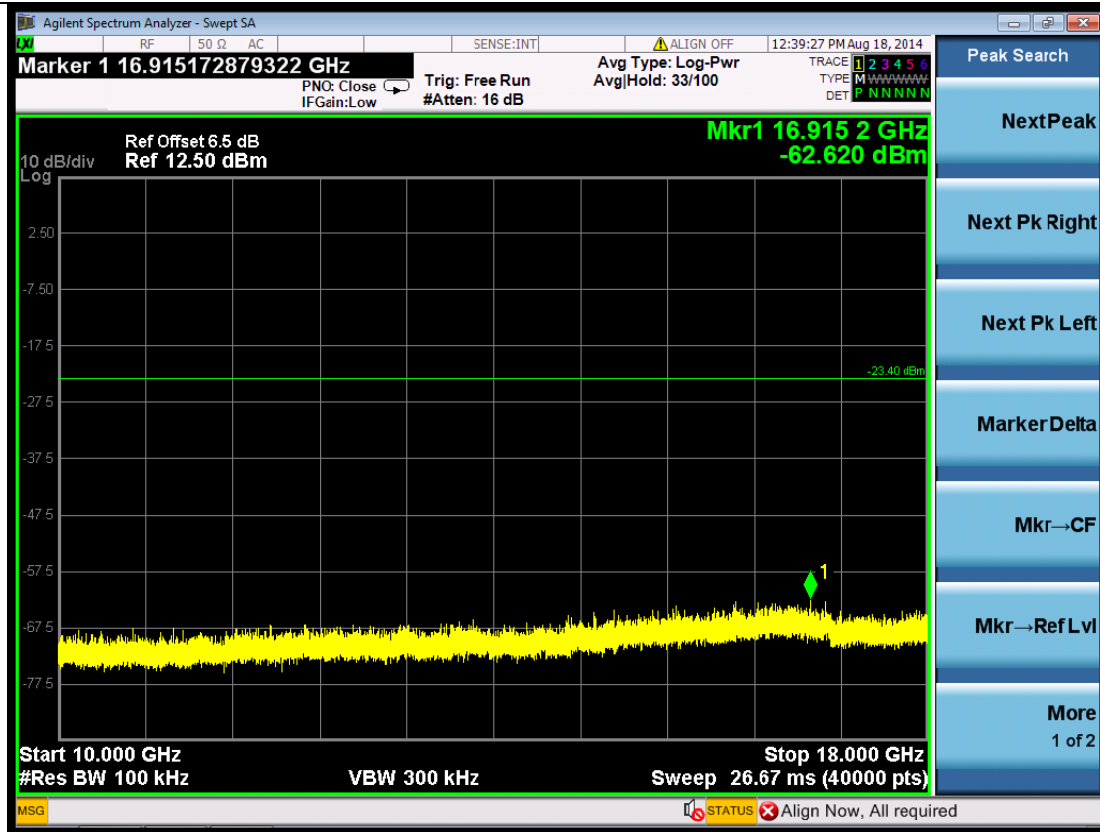
(Plot 6.9.3 C2: Channel 78: 2480MHz @ 8DPSK)



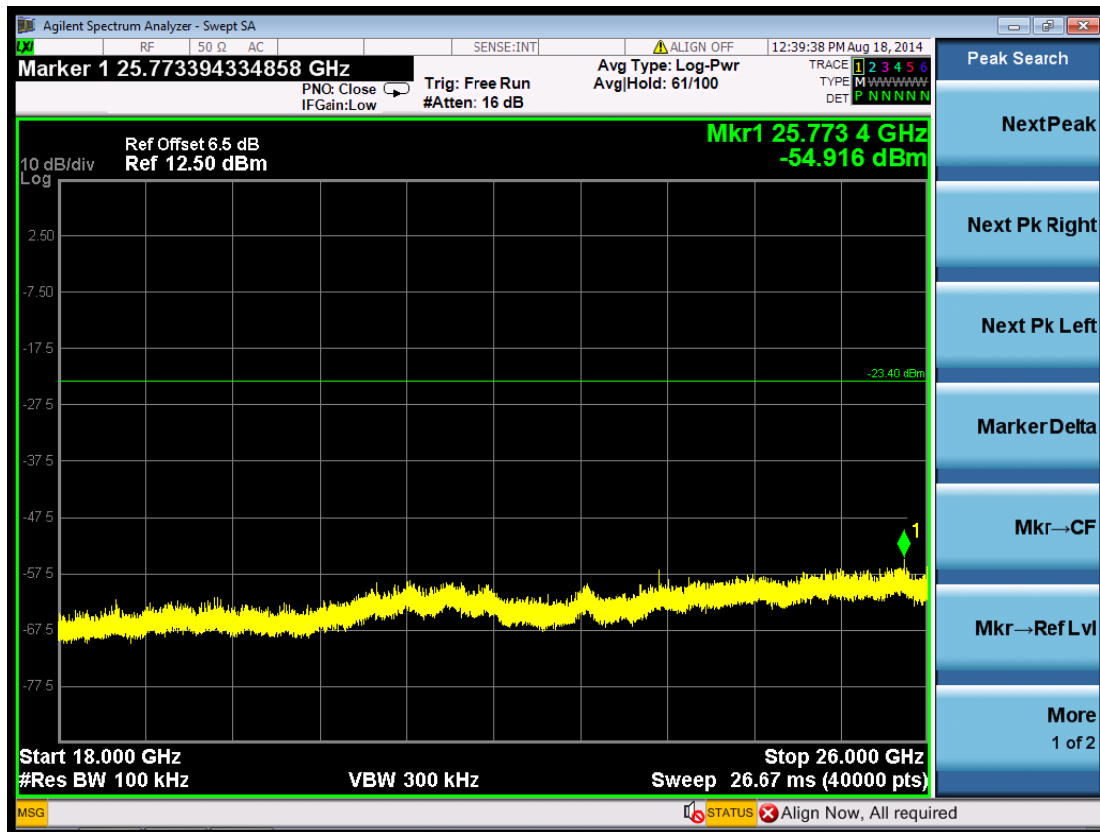
(Plot 6.9.3 C3: Channel 78: 2480MHz @ 8DPSK)



(Plot 6.9.3 C4: Channel 78: 2480MHz @ 8DPSK)



(Plot 6.9.3 C5: Channel 78: 2480MHz @ 8DPSK)



(Plot 6.9.3 C6: Channel 78: 2480MHz @ 8DPSK)

## 6.10 Pseudorandom Frequency Hopping Sequence

### TEST APPLICABLE

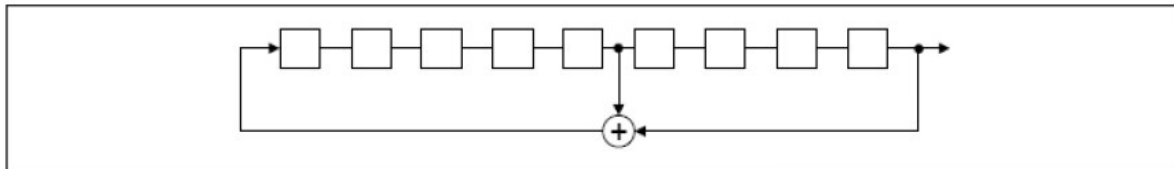
For 47 CFR Part 15C section 15.247 (a)(1) requirement:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hop-ping channel, whichever is greater. Al-tentatively, 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 hop-ping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

### EUT Pseudorandom Frequency Hopping Sequence Requirement

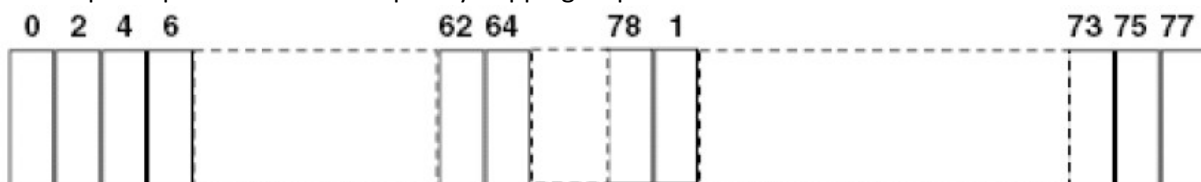
The pseudorandom frequency hopping sequence may be generated in a nine-stage shift register whose 5<sup>th</sup> and 9<sup>th</sup> stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first one of 9 consecutive ones, for example: the shift register is initialized with nine ones.

- Number of shift register stages:9
- Length of pseudo-random sequence:2<sup>9</sup>-1=511 bits
- Longest sequence of zeros:8(non-inverted signal)



*Linear Feedback Shift Register for Generation of the PRBS sequence*

An example of pseudorandom frequency hopping sequence as follows:



Each frequency used equally one the average by each transmitter.

The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shift frequencies in synchronization with the transmitted signals.



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## 6.11 Antenna Requirement

### Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### Refer to statement below for compliance

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

### Antenna Connected Construction

The WLAN and Bluetooth sharing same antenna and the maximum antenna gain of BT used was 0.00 dBi.

---

END