TEST REPORT

Report Reference No. .....:	**TRE1708000802** R/C…….: 31689
FCC ID .....:	2AMHN1001055
IC .....:	21797-1001055
Applicant's name .....:	Cellnovo Limited
Address.....:	Pencoed Technology Park, Pencoed, CF35 5HZ. United Kingdom
Manufacturer.....:	CK Telecom Limited
Address.....:	Room 802/901/902 Building 4C, Software Industry Base, Keyuan Road, Nanshan Dist, Shenzhen, Guangdong, China
Test item description.....:	Cellnovo OTS Handset
Trade Mark .....:	Cellnovo
Model/Type reference .....:	1001055
Standard .....:	**FCC CFR Title 47 Part 15 Subpart C Section 15.247** **RSS-247: Issue 2, February 2017 / RSS-GEN: Issue 4, November 2014**
Date of receipt of test sample……..:	Jun. 16, 2017
Date of testing……:	Jun. 21, 2017 - Jul. 05, 2017
Date of issue……...:	Jul. 06, 2017
Result ..... ……...:	**PASS**

Compiled by (position+printedname+signature).....:	File administrators Shayne Zhu
Supervised by (position+printedname+signature).....:	Project Engineer Lion Cai
Approved by (position+printedname+signature).....:	RF Manager Hans Hu
Testing Laboratory Name :	**Shenzhen Huatongwei International Inspection Co., Ltd.**
Address :	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

TABLE OF CONTENTS

Change History		
Issue	Date	Reason for change
1.0	2017.07.06	First edition

1. General Information

1.1. EUT Description

EUT Type	Cellnovo OTS Handset
Hardware Version	MIRAGE03A-V1.0
Software Version	MIRAGE03A-S00B_CKT_L142EN_V101_150724
EUT supports Radios application	BT3.0+EDR
Frequency Range	2402MHz~2480MHz
Channel Number	79
Bit Rate of Transmitter	1/2/3Mbps
Modulation Type	GFSK,π /4-DQPSK,8DPSK
Antenna Type	PIFA Antenna
Antenna Gain	1dBi

Note 1: The EUT is a Cellnovo OTS Handset, it contains Bluetooth Module operating at 2.4GHz ISM band; the frequencies allocated for the Bluetooth Module is F(MHz)=2402+1*n (0<=n<=78). The lowest, middle, highest channel numbers of the Bluetooth Module used and tested in this report are separately 0 (2402MHz), 39 (2441MHz) and 78 (2480MHz).

Note 2: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

Note 3: a. When power on, the EUT will scan the whole frequency until a Connection command from the other BT devices.

b. When receiving the signal from the other BT devices, The EUT transmit are sponse signal.

c. The other devices receive the response signal and recognize it, then send a connection command to establish the connection.

d. After the connection establish successfully, the data transmission is beginning. At the same time, the both devices will shift frequencies in synchronization per a same pseudo randomly ordered list of hopping frequencies, the hopping rate is1600 times per second. This device conforms to the criteria in FCC Public Notice DA 00-705.

e. The bandwidth of the receiver, which is set to a fixed width by the software.

Note 4: Bluetooth signal has 9 packages DH1, DH3, DH5, 3DH1, 3DH3, 3DH5, 5DH1, 5DH3, 5DH5, DH5 package is largest, we are testing DH5 in the document.

1.2. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (Bluetooth, 2.4GHz ISM band radiators) for the EUT FCC / IC Certification:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart C 2017	Radio Frequency Devices
2	ANSI C63.10 2013	American National Standard for Testing Unlicensed Wireless Devices
3	RSS-GEN: Issue 4,November 2014	General Requirements and Information for the Certification of Radio Apparatus
4	RSS-247: Issue 2, February 2017	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Standard(s) Section		Description	Result
	FCC	IC		
1	15.203	8.3	Antenna Requirement	PASS
2	15.247(a)	RSS-247 Issue2 - 5.1	Number of Hopping Frequency	PASS
3	15.247(b)	RSS-247 Issue2 - 5.4	Peak Output Power	PASS
4	15.247(a)	RSS-247 Issue2 - 5.1	Bandwidth	PASS
5	15.247(a)	RSS-247 Issue2 - 5.1	Carrier Frequency Separation	PASS
6	15.247(a)	RSS-247 Issue2 - 5.1	Time of Occupancy (Dwell time)	PASS
7	15.247(d)	RSS-247 Issue2 - 5.5	Conducted Spurious Emission	PASS
8	15.247(d)	RSS-247 Issue2 - 5.5 RSS - Gen	Conducted Band Edge	PASS
9	15.207	RSS-GEN	Conducted Emission	PASS
10	15.209 15.247(c)	RSS-247 Issue2 - 5.5 RSS - Gen	Radiated Band Edges and Spurious Emission	PASS

Note 1: The tests were performed according to the method of measurements prescribed in DA-00-705.

Note 2: The test of Radiated Emission was performed according to the method of measurements prescribed in ANSI C63.10 2013.

1.3. Frequency Hopping System Requirements

1.3.1. Standard Applicable

According to FCC Part 15.247(a)(1), The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

(h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

1.3.2. Frequency Hopping System

This transmitter device is frequency hopping device, and complies with FCC part 15.247 rule.

This device uses Bluetooth radio which operates in 2400-2483.5 MHz band. Bluetooth uses a radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 79 bands (1 MHz each; centred from 2402 to 2480 MHz) in the range 2,400-2,483.5 MHz. The transmitter switches hop frequencies 1,600 times per second to assure a high degree of data security. All Bluetooth devices participating in a given piconet are synchronized to the frequency-hopping channel for the piconet. The frequency hopping sequence is determined by the master's device address and the phase of the hopping sequence (the frequency to hop at a specific time) is determined by the master's internal clock. Therefore, all slaves in a piconet must know the master's device address and must synchronize their clocks with the master's clock.

Adaptive Frequency Hopping (AFH) was introduced in the Bluetooth specification to provide an effective way for a Bluetooth radio to counteract normal interference. AFH identifies "bad" channels, where either other wireless devices are interfering with the Bluetooth signal or the Bluetooth signal is interfering with another device. The AFH-enabled Bluetooth device will then communicate with

other devices within its piconet to share details of any identified bad channels. The devices will then switch to alternative available "good" channels, away from the areas of interference, thus having no impact on the bandwidth used.

This device was tested with a bluetooth system receiver to check that the device maintained hopping synchronization, and the device complied with these requirements for DA 00-705 and FCC Part 15.247 rule.

1.3.3. EUT Pseudorandom Frequency Hopping Sequence

Pseudorandom Frequency Hopping Sequence Table as below:
Channel: 08, 24, 40, 56, 40, 56, 72, 09, 01, 09, 33, 41, 33, 41, 65, 73, 53, 69, 06, 22, 04, 20, 36, 52, 38, 46, 70, 78,68, 76, 21, 29, 10, 26, 42, 58, 44, 60, 76, 13, 03, 11, 35, 43, 37, 45, 69, 77, 55, 71, 08, 24, 08, 24, 40, 56, 40, 48,72, 01, 72, 01, 25, 33, 12, 28, 44, 60, 42, 58, 74, 11, 05, 13, 37, 45 etc.
The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

1.4. Facilities and Accreditations

1.4.1. Facilities

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: February 28, 2015. Valid time is until February 27, 2018.

FCC-Registration No.: 317478
Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 317478, Renewal date Jul. 18, 2014, valid time is until Jul. 18, 2017.

IC-Registration No.: 5377B

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377B on Dec.03, 2014, valid time is until Dec.03, 2017.

1.4.2. Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (℃):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86KPa-106KPa

2. 47 CFR Part 15C Requirements

2.1. Antenna requirement

2.1.1. Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

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.

2.1.2. Antenna Information

Antenna Category: PIFA antenna

A PIFA antenna was soldered to the antenna port of EUT via an adaptor cable can't be removed.

Antenna General Information:

No.	EUT	Ant. Cat.	Gain(dBi)
1	WIRELESS HEADPHONES	PIFA Antenna	1

2.1.3. Result: comply

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

2.2. Number of Hopping Frequency

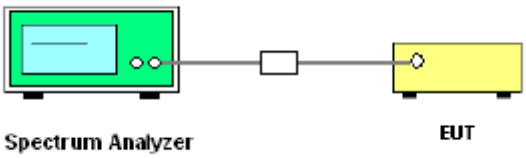
2.2.1. Limit of Number of Hopping Frequency

Frequency hopping systems operating in the 2400MHz to 2483.5MHz bands shall use at least 15 hopping frequencies.

2.2.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.2.3. Test Setup



2.2.4. Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = the frequency band of operation;

   RBW≥1% of the span; VBW≥RBW; Sweep = auto; Detector function = peak;

   Trace = max hold.
6. The number of hopping frequency used is defined as the number of total channel.
7. Record the measurement data derived from spectrum analyzer.

2.2.5. Test Results of Number of Hopping Frequency

Please refer to Appendix A for detail

2.3. Peak Output Power

2.3.1. Limit of Peak Output Power

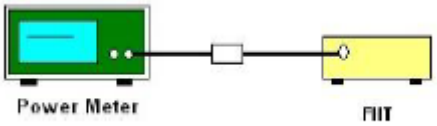
Section 15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts.

Requency hopping systems operating in the 2400-2483.5 MHz band may have hopping chann el carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hoppi ng channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

2.3.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.3.3. Test Setup



2.3.4. Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power with cable loss and record the results in the test report.
5. Measure and record the results in the test report.

2.3.5. Test Result

Test Mode	Channel	Frequency (MHz)	RF Power(dBm)	Limit (dBm)	Verdict
GFSK	0	2402	5.17	30	PASS
	39	2441	5.41		PASS
	78	2480	5.56		PASS
π/4-DQPSK	0	2402	5.23		PASS
	39	2441	5.48		PASS
	78	2480	5.50		PASS
8- DPSK	0	2402	5.46		PASS
	39	2441	5.50		PASS
	78	2480	5.56		PASS

2.4. 20dB& 99% Bandwidth

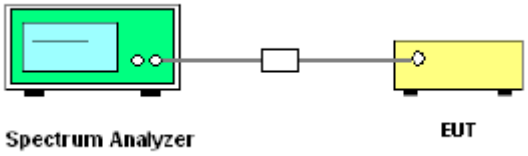
2.4.1. Definition

According to FCC §15.247(a)(1), the 20dB bandwidth is known as the 99% emission bandwidth, or 20dB bandwidth (10*log1% = 20dB) taking the total RF output power.

2.4.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.4.3. Test Setup



2.4.4. Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Use the following spectrum analyzer settings for 20dB Bandwidth measurement.

   Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel;

   RBW≥1% of the 20 dB bandwidth; VBW≥RBW; Sweep = auto; Detector function = peak;

   Trace = max hold.
5. Use the following spectrum analyzer setting for 99% Bandwidth measurement.

   For 99% Bandwidth measurement, the RBW=100kHz, and VBW=300kHz, Sweep=auto

   Detector function=sample, Trace = max. hold
6. Measure and record the results in the test report.

2.4.5. Test Results of 20dB and 99% Bandwidth

Please refer to Appendix A for detail

2.5. Carried Frequency Separation

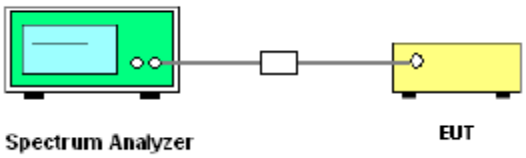
2.5.1. Limit of Carried Frequency Separation

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

2.5.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.5.3. Test Setup



2.5.4. Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.

2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

3. Set to the maximum power setting and enable the EUT transmit continuously.

4. Enable the EUT hopping function.

5. Use the following spectrum analyzer settings:

   Span = wide enough to capture the peaks of two adjacent channels; RBW≥1% of the span;

   VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold.

6. Measure and record the results in the test report.

2.5.5. Test Results of Carried Frequency Separation

Please refer to Appendix A for detail

2.6. Dwell time

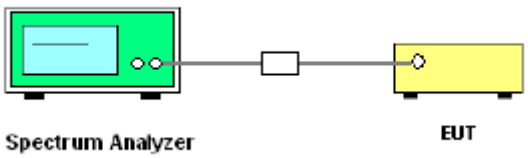
2.6.1. Limit of Dwell Time

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.

2.6.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.6.3. Test Setup



2.6.1. Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

   The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW≥RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

2.6.2. Test Result

Please refer to Appendix A for detail

2.7. Conducted Spurious Emissions

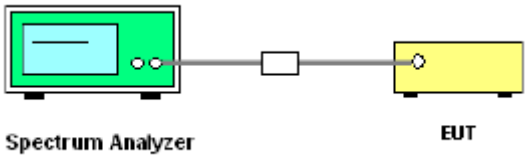
2.7.1. Limit of Spurious Emission

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

2.7.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.7.3. Test Setup



2.7.4. Test Procedure

1. The testing follows the guidelines in Spurious RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines

2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

3. Set to the maximum power setting and enable the EUT transmit continuously.

4. Set RBW = 100 kHz, VBW = 300 kHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

5. Measure and record the results in the test report.

6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

2.7.5. Test Result

Please refer to Appendix A for detail

2.8. Conducted Band Edge

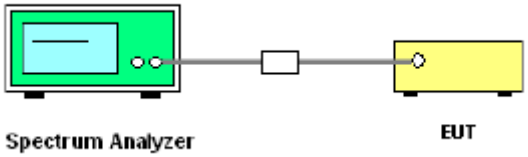
2.8.1. Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

2.8.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.8.3. Test Setup



2.8.4. Test Procedure

1. The testing follows the guidelines in Band-edge Compliance of RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 100kHz (≥1% span=10MHz), VBW = 300kHz (≥RBW). Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
4. Enable hopping function of the EUT and then repeat step 2. and 3.
5. Measure and record the results in the test report.

2.8.5. Test Results of Conducted Band Edge

Please refer to Appendix A for detail

2.9. Conducted Emission

2.9.1. Limit of Conducted Emission

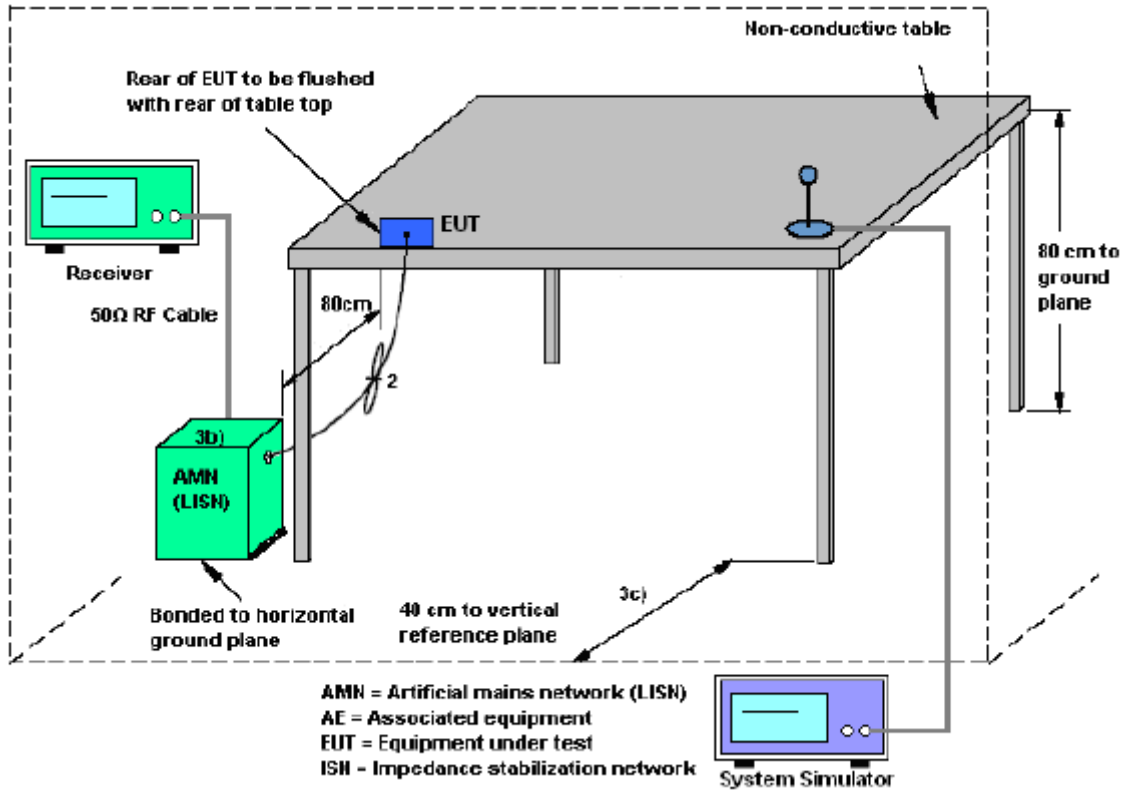
For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

2.9.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.9.3. Test Setup

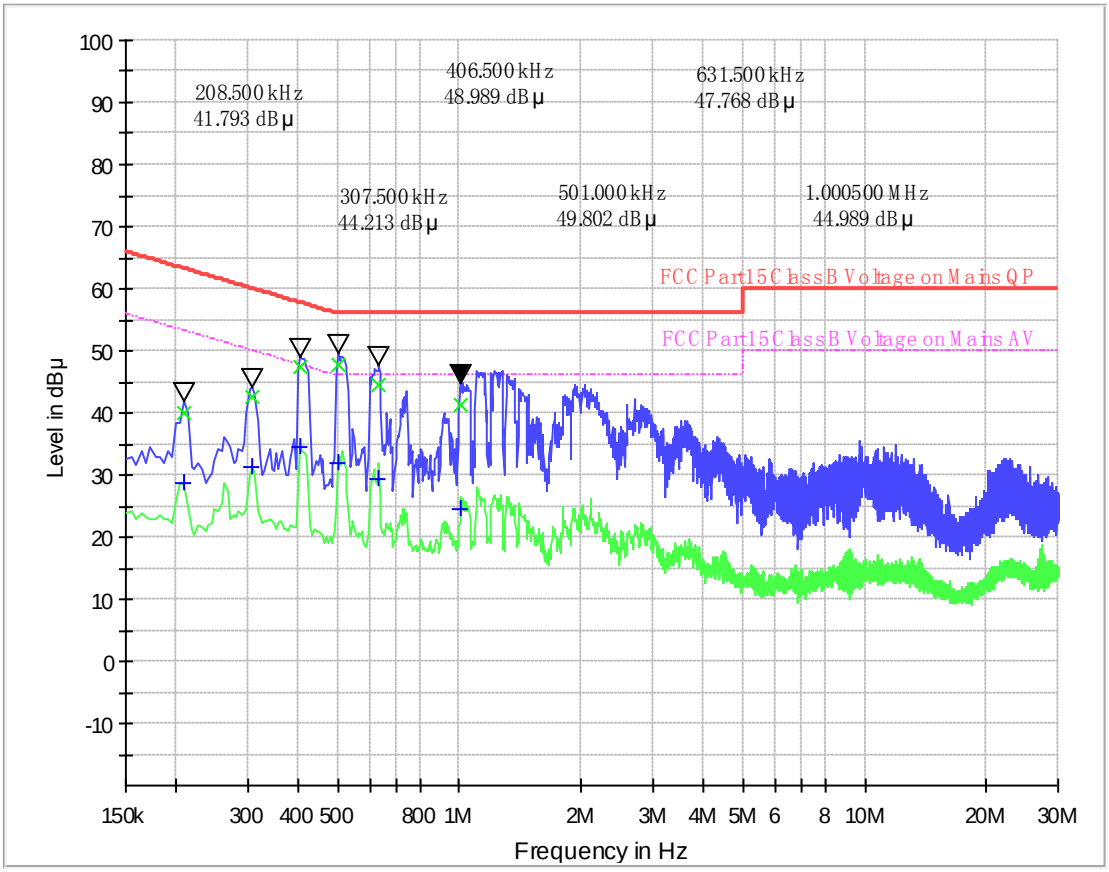


2.9.4. Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 micrometry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

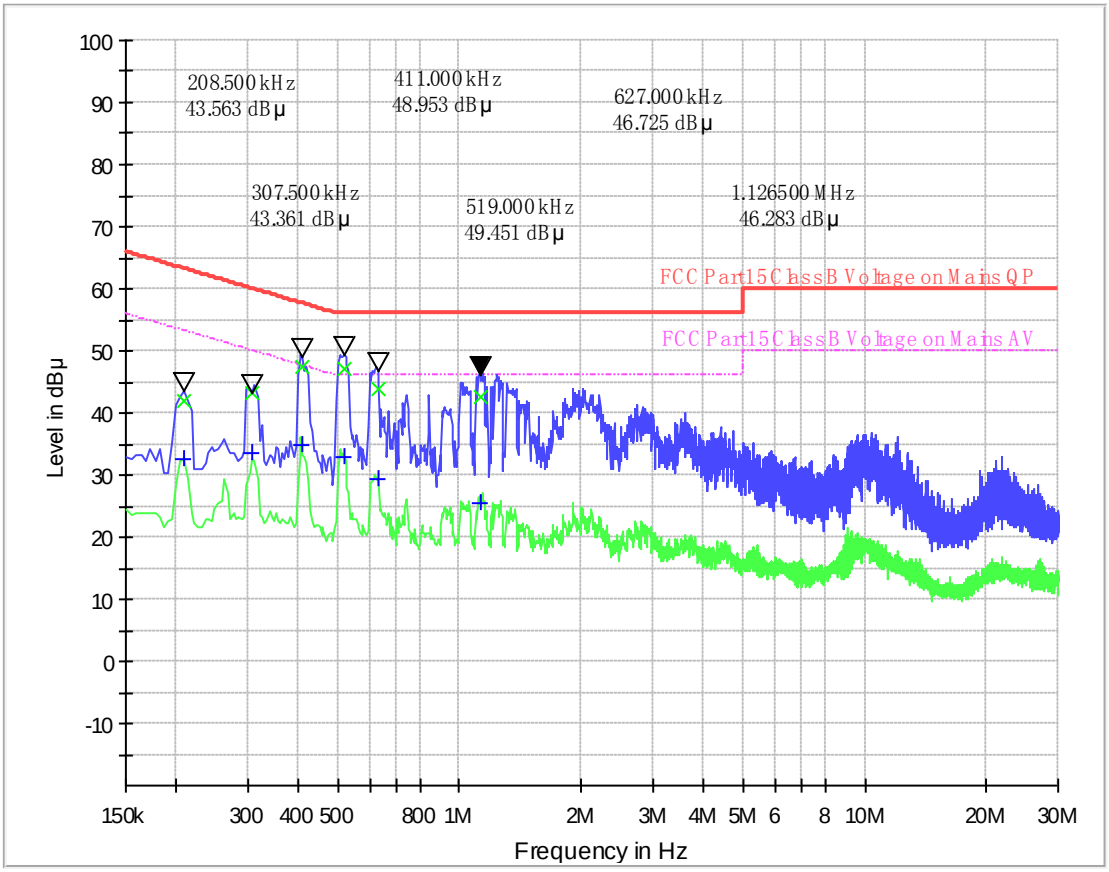
2.9.3. Test Results of Conducted Emission

The EUT configuration of the emission tests is Bluetooth Link + USB Cable (Charging from PC).



(Plot A: L Phase)

Conducted Disturbance at Mains Terminals					
L Test Data					
QP			**AV**		
Frequency (MHz)	**Limits (dBµV)**	**Measurement Value (dBµV)**	**Frequency (MHz)**	**Limits (dBµV)**	**Measurement Value (dBµV)**
0.208500	63.3	40.03	0.208500	53.3	28.58
0.307500	60.0	42.43	0.307500	50.0	31.33
0.406500	57.7	47.53	0.406500	47.7	34.39
0.501000	56.0	47.72	0.501000	46.0	31.90
0.631500	56.0	44.52	0.631500	46.0	29.28
1.000500	56.0	41.31	1.000500	46.0	24.64
L Test Curve					



(Plot B: N Phase)

Conducted Disturbance at Mains Terminals					
N Test Data					
QP			**AV**		
Frequency (MHz)	**Limits (dBµV)**	**Measurement Value (dBµV)**	**Frequency (MHz)**	**Limits (dBµV)**	**Measurement Value (dBµV)**
0.208500	63.3	42.07	0.208500	53.3	32.54
0.307500	60.0	43.26	0.307500	50.0	33.52
0.411000	57.6	47.31	0.411000	47.6	34.71
0.519000	56.0	46.94	0.519000	46.0	32.87
0.627000	56.0	43.84	0.627000	46.0	29.21
1.126500	56.0	42.46	1.126500	46.0	25.64
N Test Curve					

Test Result: PASS

2.10. Radiated Band Edges and Spurious Emission

2.10.1. Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

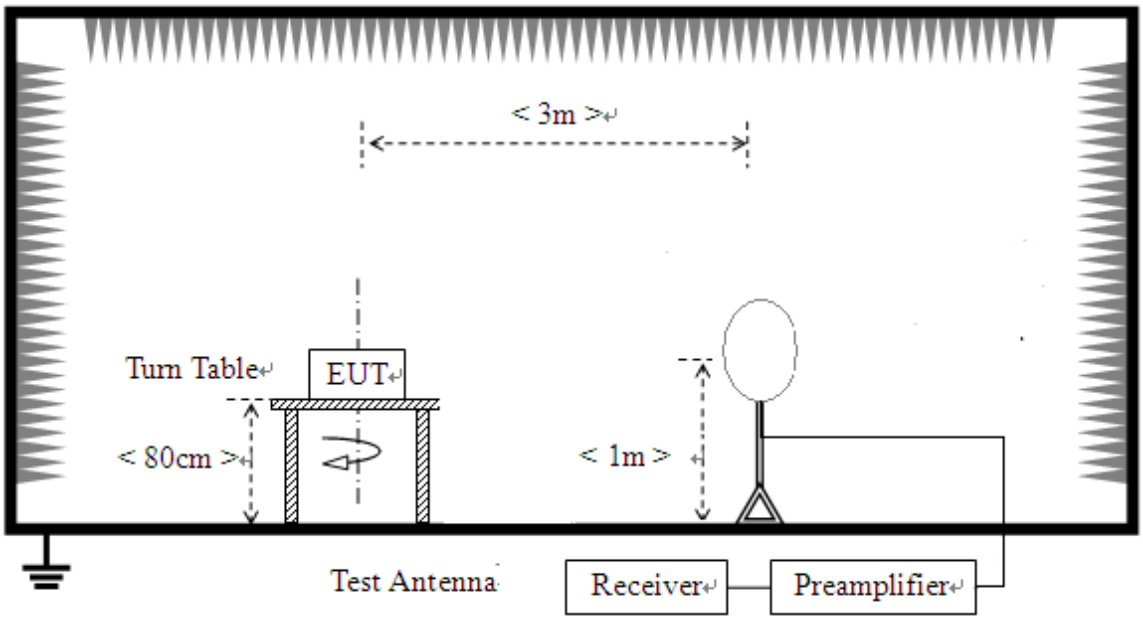
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

2.10.2. Measuring Instruments

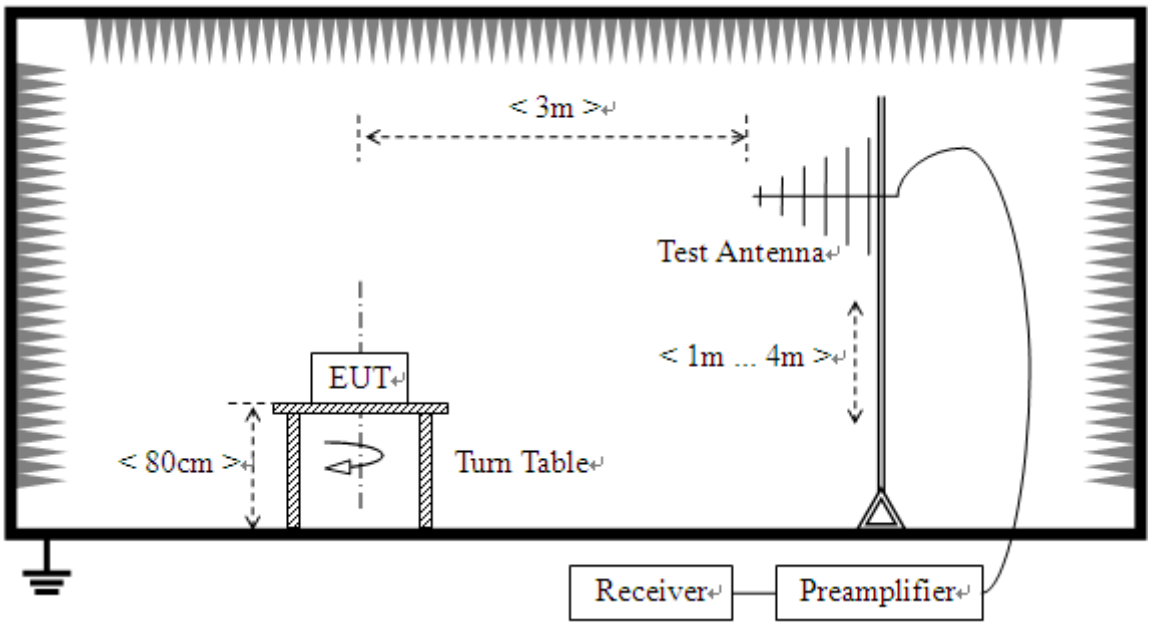
The measuring equipment is listed in the section 3 of this test report.

2.10.3. Test Setup

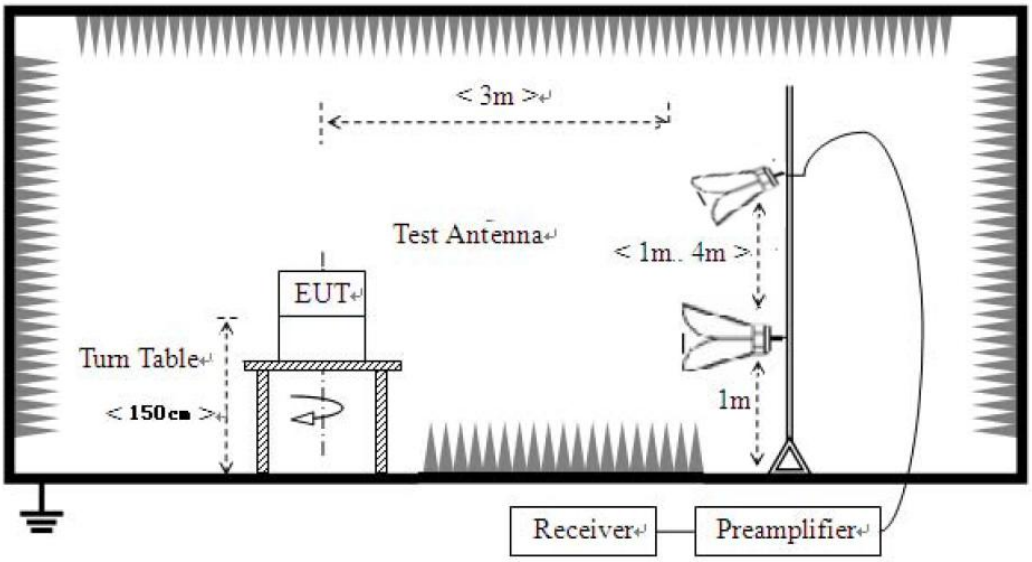
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



2.10.4. Test Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of FCC Public Notice DA 00-705 Measurement Guidelines.
2. The EUT was placed on a turntable with 0.8 meter for below 1GHz and 1.5 meter for above 1GHz above ground.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings:

(1) Span shall wide enough to fully capture the emission being measured;

(2) Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak

(3) For average measurement: use duty cycle correction factor method per 15.35(c).

Duty cycle = On time/100 milliseconds

On time = $N_1*L_1+N_2*L_2+...+N_{n-1}*LN_{n-1}+Nn*Ln$

Where N_1 is number of type 1 pulses, L1 is length of type 1 pulses, etc.

Average Emission Level = Peak Emission Level + 20*log(Duty cycle)

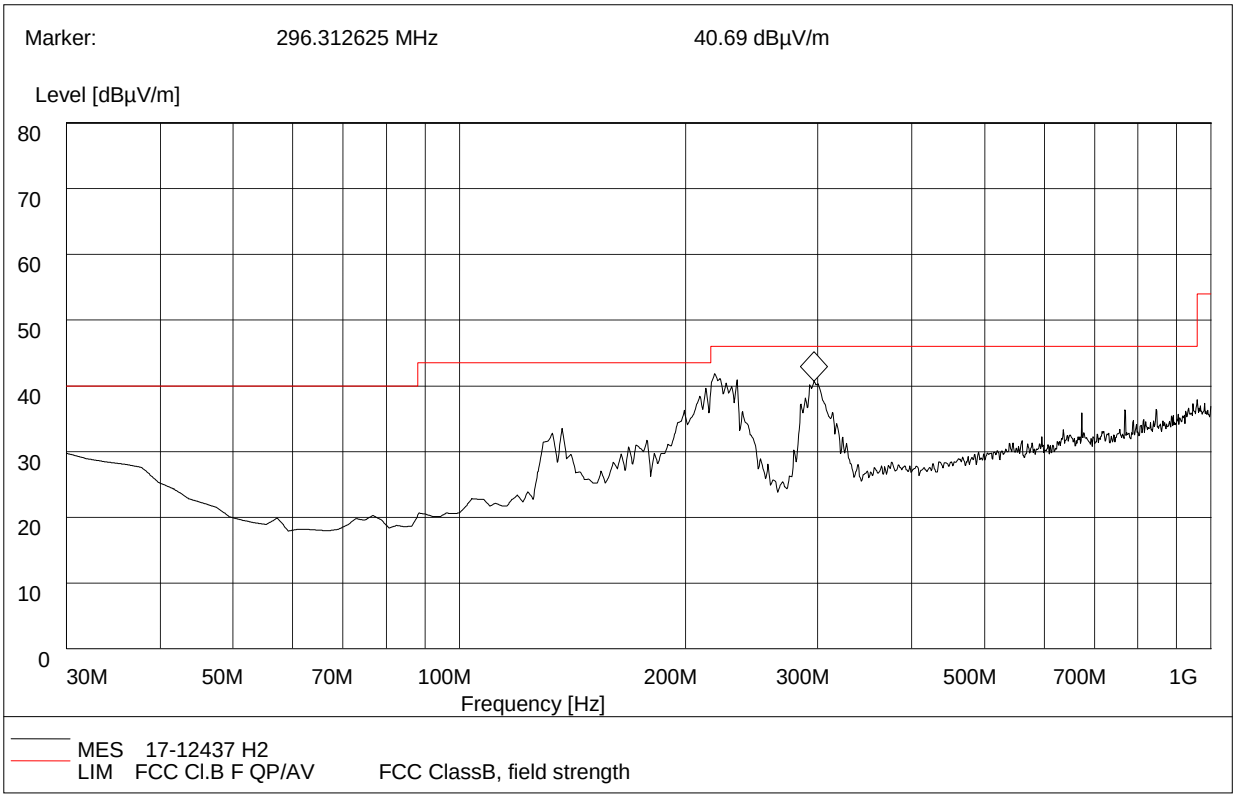
7. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
8. All modes (three orthogonal orientations) of operation were investigated and the worst-case emissions are reported.

2.10.5. Test Results of Radiated Band Edge and Spurious Emission

For 9 KHz to 30 MHz

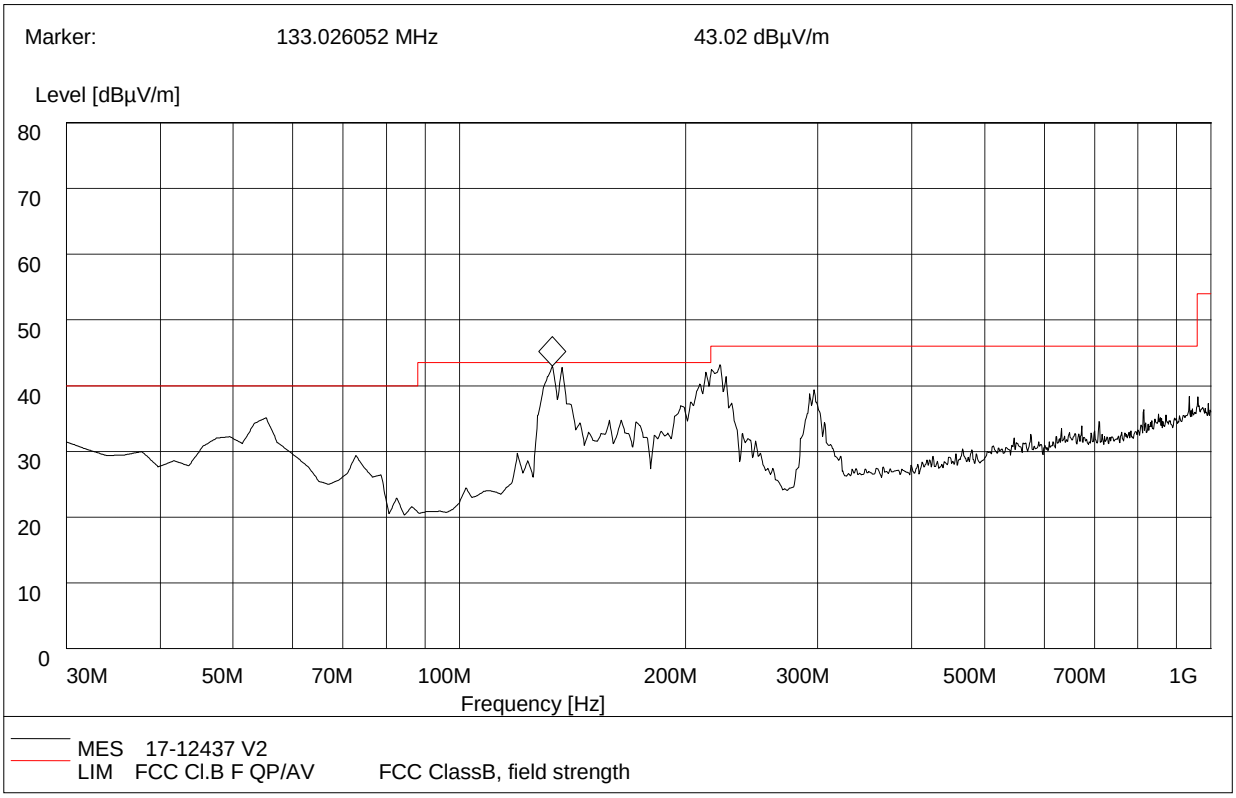
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

For 30MHz to 1000MHz



Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Antenna	Verdict
30.570000	27.34	120.000	100.0	40.0	Horizontal	Pass
137.260000	31.51	120.000	100.0	43.5	Horizontal	Pass
177.890000	29.58	120.000	100.0	43.5	Horizontal	Pass
213.500000	37.39	120.000	100.0	43.5	Horizontal	Pass
234.570000	38.55	120.000	100.0	46.0	Horizontal	Pass
296.960000	38.59	120.000	100.0	46.0	Horizontal	Pass

(Plot A: 30MHz to 1GHz, Antenna Horizontal)



Frequency (MHz)	QuasiPeak (dBµ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµ V/m)	Antenna	Verdict
30.880000	28.51	120.0	100.0	40.0	Vertical	Pass
55.970000	33.54	120.0	100.0	40.0	Vertical	Pass
133.850000	41.46	120.0	100.0	43.5	Vertical	Pass
213.840000	40.52	120.0	100.0	43.5	Vertical	Pass
222.510000	41.68	120.0	100.0	46.0	Vertical	Pass
297.460000	37.89	120.0	100.0	46.0	Vertical	Pass

(Plot B: 30MHz to 1GHz, Antenna Vertical)

For 1GHz to 25 GHz

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（GFSK-2402MHz）												
No.	Fre. (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	2390.18	49.57	PK	74.00	-24.43	1.30 H	26	48.27	5.2	28.6	32.5	1.3
2	2390.18	36.56	AV	54.00	-17.44	1.30 H	26	35.26	5.2	28.6	32.5	1.3
3	4799.60	48.60	PK	74.00	-25.40	1.50 H	20	42.20	7.4	30.4	31.4	6.4
4	4799.60	36.35	AV	54.00	-17.65	1.50 H	20	29.95	7.4	30.4	31.4	6.4
5	5786.87	51.37	PK	74.00	-22.63	1.00 H	35	42.07	9.9	31.5	32.1	9.3
6	5786.87	40.14	AV	54.00	-13.86	1.00 H	35	30.84	9.9	31.5	32.1	9.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（GFSK-2402MHz）												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	2390.18	48.98	PK	74.00	-25.02	1.20 V	30	47.68	5.2	28.6	32.5	1.3
2	2390.18	37.06	AV	54.00	-16.94	1.20 V	30	35.76	5.2	28.6	32.5	1.3
3	4799.60	48.29	PK	74.00	-25.71	1.50 V	35	41.89	7.4	30.4	31.4	6.4
4	4799.60	36.35	AV	54.00	-17.65	1.50 V	35	29.95	7.4	30.4	31.4	6.4
5	5786.87	50.98	PK	74.00	-23.02	1.50 V	35	41.68	9.9	31.5	32.1	9.3
6	5786.87	40.02	AV	54.00	-13.98	1.50 V	35	30.72	9.9	31.5	32.1	9.3

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（GFSK-2441MHz）												
No.	Fre. (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	1198.13	46.15	PK	74.00	-27.85	1.00 H	55	46.75	1.8	29.5	31.9	-0.6
2	1198.13	34.57	AV	54.00	-19.43	1.00 H	55	35.17	1.8	29.5	31.9	-0.6
3	2003.58	46.38	PK	74.00	-27.62	1.50 H	60	46.98	2.8	28.7	32.1	-0.6
4	2003.58	34.81	AV	54.00	-19.19	1.50 H	60	35.41	2.8	28.7	32.1	-0.6
5	4883.77	49.05	PK	74.00	-24.95	1.50 H	62	42.65	6.7	31.2	31.5	6.4
6	4883.77	37.01	AV	54.00	-16.99	1.50 H	62	30.61	6.7	31.2	31.5	6.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（GFSK-2441MHz）												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	1198.13	46.11	PK	74.00	-27.89	1.00 V	46	46.71	1.8	29.5	31.9	-0.6
2	1198.13	34.42	AV	54.00	-19.58	1.00 V	46	35.02	1.8	29.5	31.9	-0.6
3	2003.58	46.44	PK	74.00	-27.56	1.00 V	50	47.04	2.8	28.7	32.1	-0.6
4	2003.58	34.77	AV	54.00	-19.23	1.00 V	50	35.37	2.8	28.7	32.1	-0.6
5	4883.77	49.15	PK	74.00	-24.85	1.50 V	56	42.75	6.7	31.2	31.5	6.4
6	4883.77	37.01	AV	54.00	-16.99	1.50 V	56	30.61	6.7	31.2	31.5	6.4

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（GFSK _2480MHz）												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	1002.12	46.38	PK	74.00	-27.62	1.00 H	36	47.18	1.5	29.6	31.9	-0.8
2	1002.12	34.53	AV	54.00	-19.47	1.00 H	36	35.33	1.5	29.6	31.9	-0.8
3	2483.37	49.31	PK	74.00	-24.69	1.50 H	42	46.71	5.7	28.7	31.8	2.6
4	2483.37	38.31	AV	54.00	-15.69	1.50 H	42	35.71	5.7	28.7	31.8	2.6
5	4955.91	49.49	PK	74.00	-24.51	1.50 H	30	42.79	7	31.2	31.5	6.7
6	4955.91	37.06	AV	54.00	-16.94	1.50 H	30	30.36	7	31.2	31.5	6.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（GFSK _2480MHz）												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	1002.12	46.13	PK	74.00	-27.87	1.00 V	30	46.93	1.5	29.6	31.9	-0.8
2	1002.12	34.42	AV	54.00	-19.58	1.00 V	30	35.22	1.5	29.6	31.9	-0.8
3	2483.37	50.02	PK	74.00	-23.98	1.50 V	40	47.42	5.7	28.7	31.8	2.6
4	2483.37	37.40	AV	54.00	-16.60	1.50 V	40	34.80	5.7	28.7	31.8	2.6
5	4955.91	49.11	PK	74.00	-24.89	1.50 V	40	42.41	7	31.2	31.5	6.7
6	4955.91	37.07	AV	54.00	-16.93	1.50 V	40	30.37	7	31.2	31.5	6.7

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（π/4-DQPSK -2402MHz）												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	2390.18	49.34	PK	74.00	-24.66	1.50 H	62	48.04	5.2	28.6	32.5	1.3
2	2390.18	37.06	AV	54.00	-16.94	1.50 H	62	35.76	5.2	28.6	32.5	1.3
3	4883.77	48.75	PK	74.00	-25.25	1.50 H	55	42.35	6.7	31.2	31.5	6.4
4	4883.77	37.01	AV	54.00	-16.99	1.50 H	55	30.61	6.7	31.2	31.5	6.4
5	11148.63	53.74	PK	74.00	-20.26	1.50 H	60	38.84	16	30.9	32	14.9
6	11148.63	41.06	AV	54.00	-12.94	1.50 H	60	26.16	16	30.9	32	14.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（π/4-DQPSK -2402MHz）												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	2390.18	49.57	PK	74.00	-24.43	1.50 V	58	48.27	5.2	28.6	32.5	1.3
2	2390.18	37.06	AV	54.00	-16.94	1.50 V	58	35.76	5.2	28.6	32.5	1.3
3	4883.77	48.54	PK	74.00	-25.46	1.50 V	55	42.14	6.7	31.2	31.5	6.4
4	4883.77	37.01	AV	54.00	-16.99	1.50 V	55	30.61	6.7	31.2	31.5	6.4
5	11148.63	53.88	PK	74.00	-20.12	1.50 V	62	38.98	16	30.9	32	14.9
6	11148.63	41.21	AV	54.00	-12.79	1.50 V	62	26.31	16	30.9	32	14.9

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（π/4-DQPSK _2441MHz）												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	1496.34	45.84	PK	74.00	-28.16	1.50 H	36	47.34	2	29	32.5	-1.5
2	1496.34	34.16	AV	54.00	-19.84	1.50 H	36	35.66	2	29	32.5	-1.5
3	3002.11	47.13	PK	74.00	-26.87	1.50 H	45	42.38	6.2	30.05	31.5	4.75
4	3002.11	35.34	AV	54.00	-18.66	1.50 H	45	30.59	6.2	30.05	31.5	4.75
5	4955.91	49.21	PK	74.00	-24.79	1.50 H	45	42.51	7	31.2	31.5	6.7
6	4955.91	37.07	AV	54.00	-16.93	1.50 H	45	30.37	7	31.2	31.5	6.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（π/4-DQPSK _2441MHz）												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	1496.34	45.76	PK	74.00	-28.24	1.50 V	40	47.26	2	29	32.5	-1.5
2	1496.34	34.23	AV	54.00	-19.77	1.50 V	40	35.73	2	29	32.5	-1.5
3	3002.11	46.96	PK	74.00	-27.04	1.50 V	42	42.21	6.2	30.05	31.5	4.75
4	3002.11	35.28	AV	54.00	-18.72	1.50 V	42	30.53	6.2	30.05	31.5	4.75
5	4955.91	49.01	PK	74.00	-24.99	1.50 V	45	42.31	7	31.2	31.5	6.7
6	4955.91	37.07	AV	54.00	-16.93	1.50 V	45	30.37	7	31.2	31.5	6.7

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（π/4-DQPSK _2480MHz）												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	1502.87	45.86	PK	74.00	-28.14	1.50 H	66	47.36	2	29	32.5	-1.5
2	1502.87	34.71	AV	54.00	-19.29	1.50 H	66	36.21	2	29	32.5	-1.5
3	2483.37	49.91	PK	74.00	-24.09	1.50 H	60	47.31	5.7	28.7	31.8	2.6
4	2483.37	37.87	AV	54.00	-16.13	1.50 H	60	35.27	5.7	28.7	31.8	2.6
5	4955.91	48.81	PK	74.00	-25.19	1.50 H	58	42.11	7	31.2	31.5	6.7
6	4955.91	37.07	AV	54.00	-16.93	1.50 H	58	30.37	7	31.2	31.5	6.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（π/4-DQPSK _2480MHz）												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	1502.87	45.71	PK	74.00	-28.29	1.50 V	60	47.21	2	29	32.5	-1.5
2	1502.87	34.52	AV	54.00	-19.48	1.50 V	60	36.02	2	29	32.5	-1.5
3	2483.37	49.67	PK	74.00	-24.33	1.50 V	55	47.07	5.7	28.7	31.8	2.6
4	2483.37	37.39	AV	54.00	-16.61	1.50 V	55	34.79	5.7	28.7	31.8	2.6
5	4955.91	48.60	PK	74.00	-25.40	1.50 V	55	41.90	7	31.2	31.5	6.7
6	4955.91	37.07	AV	54.00	-16.93	1.50 V	55	30.37	7	31.2	31.5	6.7

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（8-DPSK -2402MHz）												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	1203.52	45.63	PK	74.00	-28.37	1.50 H	36	46.23	1.8	29.5	31.9	-0.6
2	1203.52	34.16	AV	54.00	-19.84	1.50 H	36	34.76	1.8	29.5	31.9	-0.6
3	2390.18	49.10	PK	74.00	-24.90	1.50 H	42	47.80	5.2	28.6	32.5	1.3
4	2390.18	37.06	AV	54.00	-16.94	1.50 H	42	35.76	5.2	28.6	32.5	1.3
5	4799.60	48.50	PK	74.00	-25.50	1.50 H	45	42.10	7.4	30.4	31.4	6.4
6	4799.60	35.93	AV	54.00	-18.07	1.50 H	45	29.53	7.4	30.4	31.4	6.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（8-DPSK -2402MHz）												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	1203.52	45.41	PK	74.00	-28.59	1.50 V	33	46.01	1.8	29.5	31.9	-0.6
2	1203.52	34.22	AV	54.00	-19.78	1.50 V	33	34.82	1.8	29.5	31.9	-0.6
3	2390.18	48.85	PK	74.00	-25.15	1.50 V	45	47.55	5.2	28.6	32.5	1.3
4	2390.18	36.56	AV	54.00	-17.44	1.50 V	45	35.26	5.2	28.6	32.5	1.3
5	4799.60	48.08	PK	74.00	-25.92	1.50 V	45	41.68	7.4	30.4	31.4	6.4
6	4799.60	35.93	AV	54.00	-18.07	1.50 V	45	29.53	7.4	30.4	31.4	6.4

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（8-DPSK _2441MHz）												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	1803.20	45.31	PK	74.00	-28.69	1.50 H	52	45.81	2.5	29.4	32.4	-0.5
2	1803.20	34.83	AV	54.00	-19.17	1.50 H	52	35.33	2.5	29.4	32.4	-0.5
3	4883.77	48.65	PK	74.00	-25.35	1.50 H	62	42.25	6.7	31.2	31.5	6.4
4	4883.77	37.01	AV	54.00	-16.99	1.50 H	62	30.61	6.7	31.2	31.5	6.4
5	5852.15	51.96	PK	74.00	-22.04	1.50 H	74	43.16	9.9	31	32.1	8.8
6	5852.15	40.07	AV	54.00	-13.93	1.50 H	74	31.27	9.9	31	32.1	8.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（8-DQPSK _2441MHz）												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	1803.20	45.42	PK	74.00	-28.58	1.50 V	55	45.92	2.5	29.4	32.4	-0.5
2	1803.20	34.63	AV	54.00	-19.37	1.50 V	55	35.13	2.5	29.4	32.4	-0.5
3	4883.77	48.65	PK	74.00	-25.35	1.50 V	73	42.25	6.7	31.2	31.5	6.4
4	4883.77	37.01	AV	54.00	-16.99	1.50 V	73	30.61	6.7	31.2	31.5	6.4
5	5852.15	51.82	PK	74.00	-22.18	1.50 V	60	43.02	9.9	31	32.1	8.8
6	5852.15	39.94	AV	54.00	-14.06	1.50 V	60	31.14	9.9	31	32.1	8.8

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（8-DPSK _2480MHz）												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	2483.37	50.46	PK	74.00	-23.54	1.50 H	56	47.86	5.7	28.7	31.8	2.6
2	2483.37	38.31	AV	54.00	-15.69	1.50 H	56	35.71	5.7	28.7	31.8	2.6
3	4859.72	49.78	PK	74.00	-24.22	1.50 H	52	43.38	6.7	31.2	31.5	6.4
4	4859.72	36.40	AV	54.00	-17.60	1.50 H	52	30.00	6.7	31.2	31.5	6.4
5	11153.65	52.86	PK	74.00	-21.14	1.50 H	35	37.96	16	30.9	32	14.9
6	11153.65	41.04	AV	54.00	-12.96	1.50 H	35	26.14	16	30.9	32	14.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（8-DPSK _2480MHz）												
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Cab. Loss (dB)	Ant. Factor (dB)	Pre. Amp. (dB)	Cor. Factor (dB/m)
1	2483.37	49.19	PK	74.00	-24.81	1.50 V	48	46.59	5.7	28.7	31.8	2.6
2	2483.37	37.39	AV	54.00	-16.61	1.50 V	48	34.79	5.7	28.7	31.8	2.6
3	4859.72	48.60	PK	74.00	-25.40	1.50 V	53	42.20	6.7	31.2	31.5	6.4
4	4859.72	37.07	AV	54.00	-16.93	1.50 V	53	30.67	6.7	31.2	31.5	6.4
5	11153.65	51.94	PK	74.00	-22.06	1.50 V	36	37.04	16	30.9	32	14.9
6	11153.65	41.23	AV	54.00	-12.77	1.50 V	36	26.33	16	30.9	32	14.9

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable loss(dB)
   - Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level - Limit value
5. " * ": Fundamental frequency.

3. List of measuring equipment

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal
1	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	538	11/13/2016
2	EMI TEST RECEIVER	Rohde&Schwarz	ESI 26	100009	11/13/2016
3	EMI TEST Software	Audix	E3	N/A	N/A
4	TURNTABLE	ETS	2088	2149	N/A
5	ANTENNA MAST	ETS	2075	2346	N/A
6	EMI TEST Software	Rohde&Schwarz	ESK1	N/A	N/A
7	HORNANTENNA	ShwarzBeck	9120D	1011	11/13/2016
8	Amplifer	Sonoma	310N	E009-13	11/13/2016
9	JS amplifer	Rohde&Schwarz	JS4-00101800-28-5A	F201504	11/13/2016
10	High pass filter	Compliance Direction systems	BSU-6	34202	11/13/2016
11	HORNANTENNA	ShwarzBeck	9120D	1012	11/13/2016
12	Amplifer	Compliance Direction systems	PAP1-4060	120	11/13/2016
13	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	11/13/2016
14	TURNTABLE	MATURO	TT2.0	----	N/A
15	ANTENNA MAST	MATURO	TAM-4.0-P	----	N/A
16	Horn Antenna	SCHWARZBECK	BBHA9170	25841	11/13/2016
17	ULTRA-BROADBAND ANTENNA	Rohde&Schwarz	HL562	100015	11/13/2016

Maximum Peak Output Power / Power Spectral Density / 6dB Bandwidth / Band Edge Compliance of RF Emission / Spurious RF Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal
1	Spectrum Analyzer	Rohde&Schwarz	FSV-40	101008	05/04/2017
2	Switch Unit with OSP-B157	Rohde&Schwarz	OSP120	101130	05/04/2017
2	Power Meter	Anritsu	ML2480B	100798	11/13/2016
3	Power Sensor	Anritsu	MA2411B	100258	11/13/2016
Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI TEST RECEIVER	Rohde & Schwarz	ESCI	100106	11/13/2016
2	ARTIFICIAL MAINS	Rohde & Schwarz	ESH2-Z5	100028	11/13/2016
3	PULSE LIMITER	Rohde & Schwarz	ESHSZ2	100044	11/13/2016
4	EMI TEST SOFTWARE	Rohde & Schwarz	ES-K1	N/A	N/A

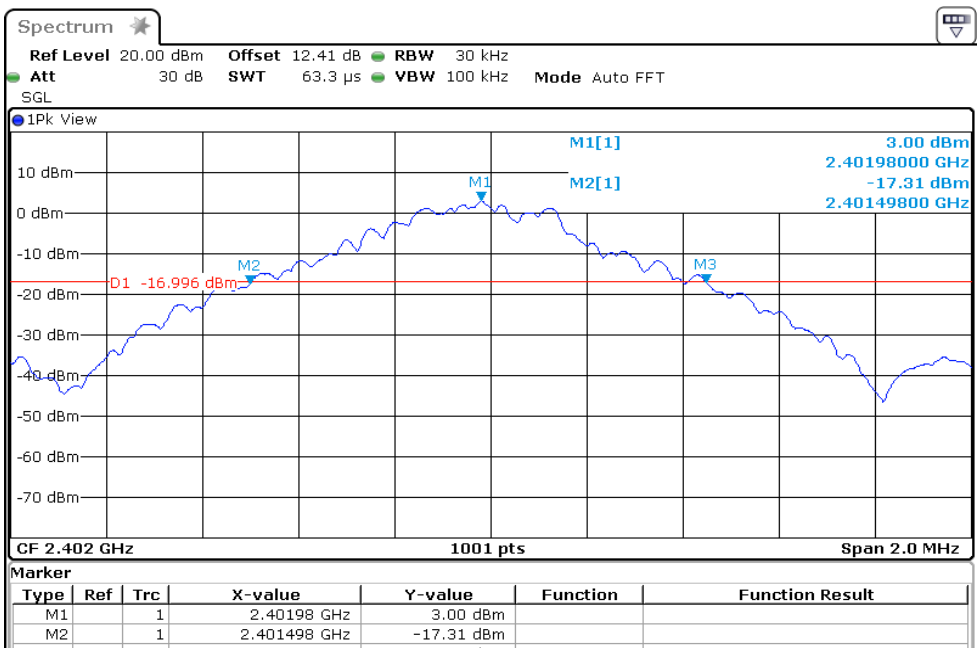
Appendix A: Test result of Conducted test

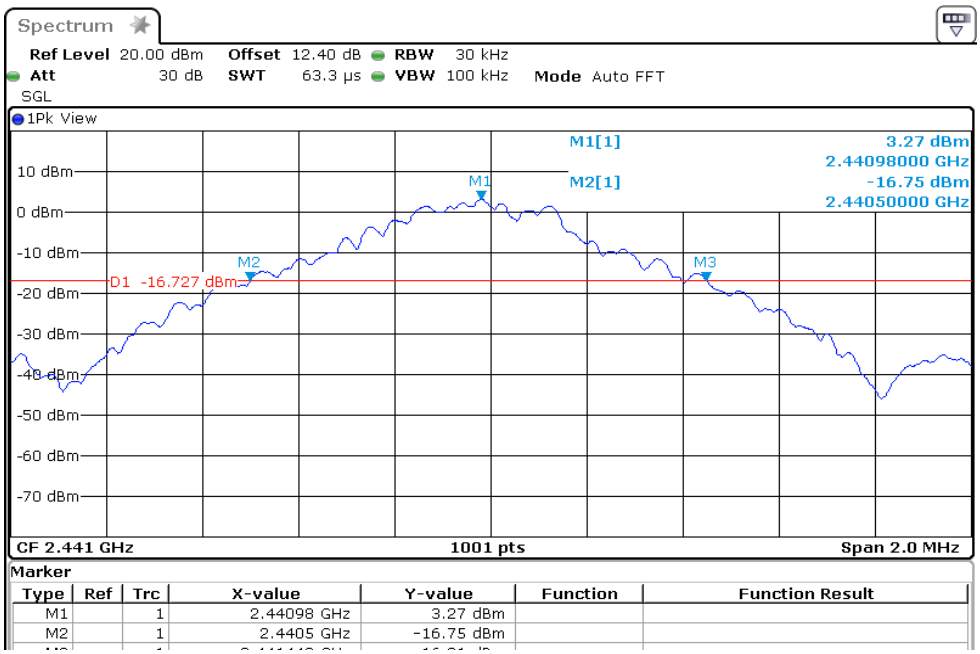
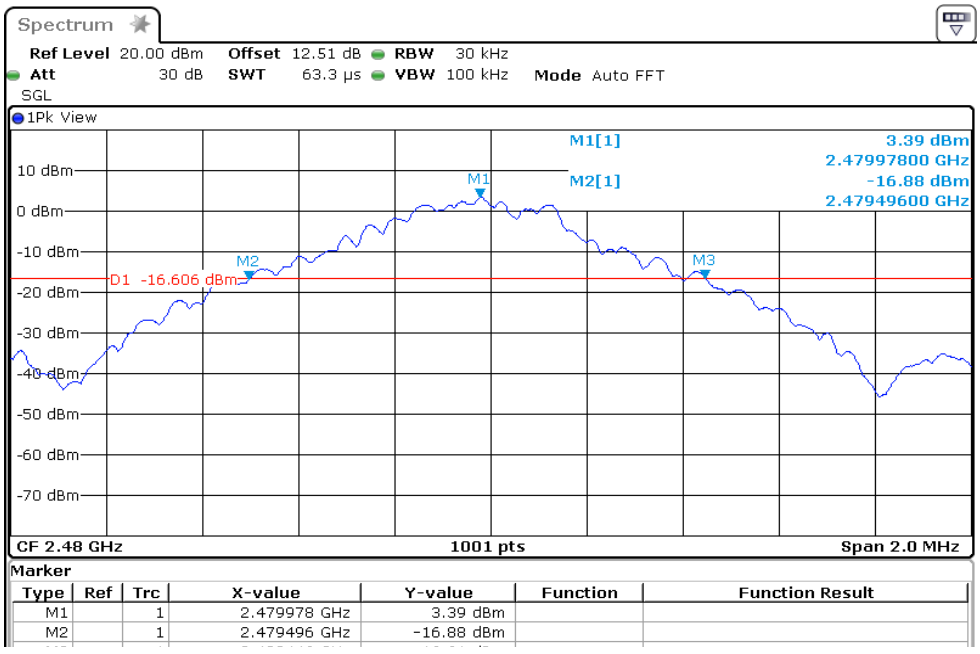
20dB Bandwidth

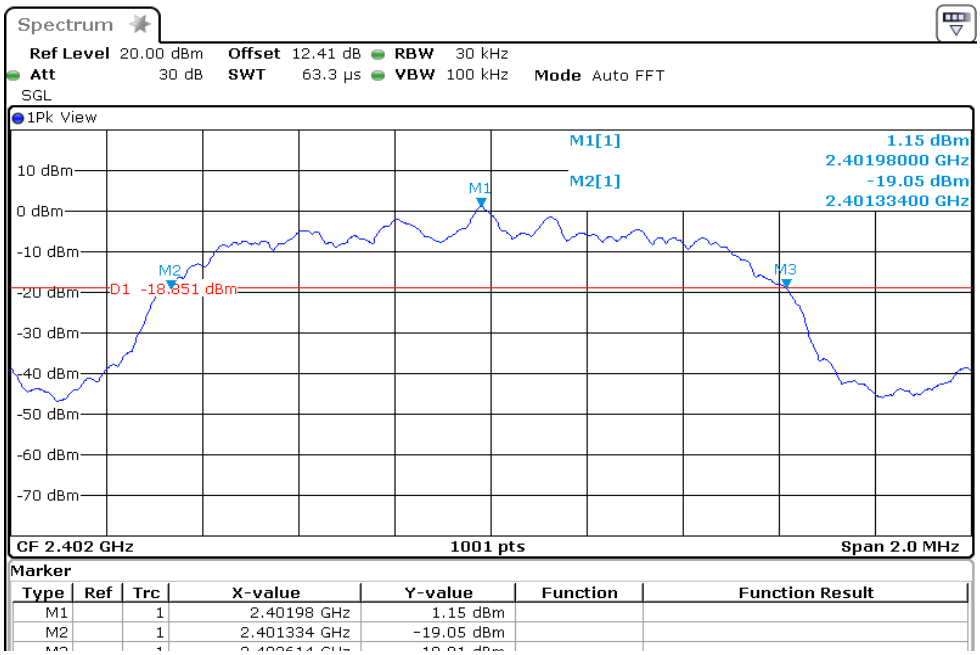
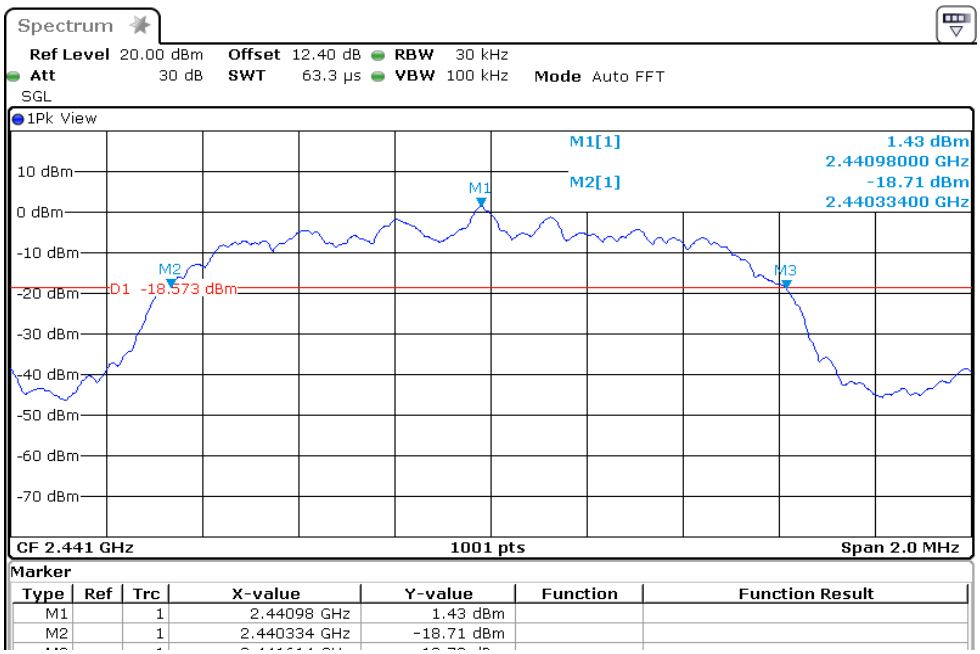
Test Result

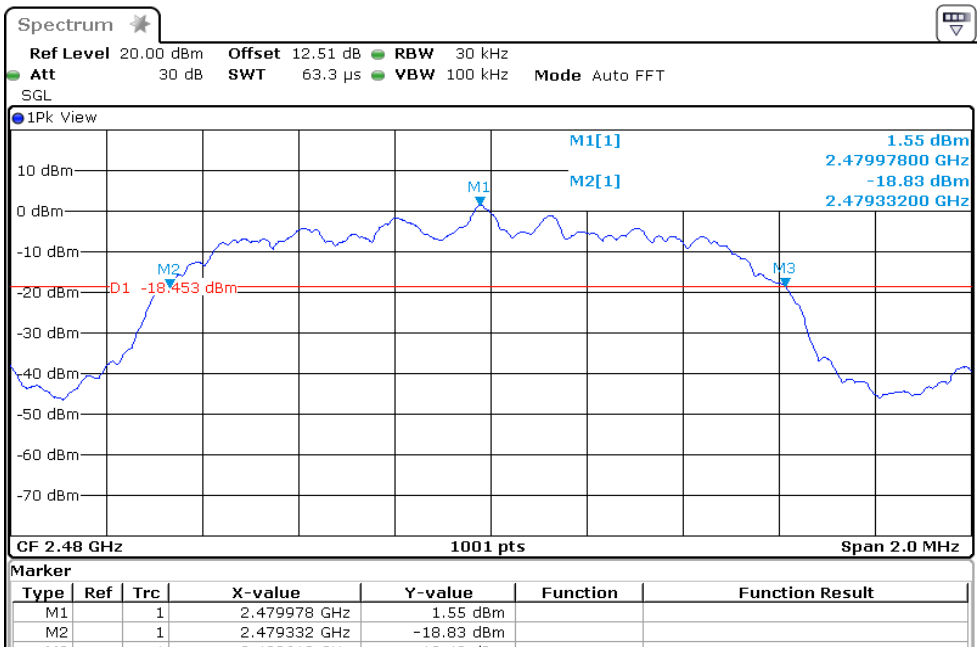
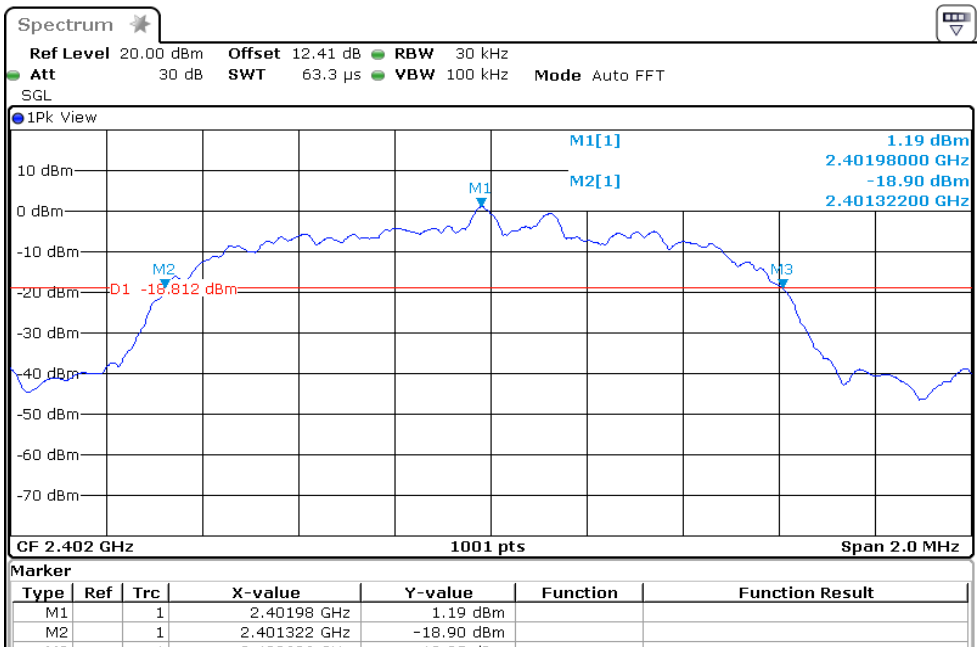
Mode	Channel.	20dB Bandwidth [MHz]	Verdict
GFSK	LCH	0.950	PASS
GFSK	MCH	0.948	PASS
GFSK	HCH	0.950	PASS
π/4DQPSK	LCH	1.280	PASS
π/4DQPSK	MCH	1.280	PASS
π/4DQPSK	HCH	1.280	PASS
8DPSK	LCH	1.284	PASS
8DPSK	MCH	1.286	PASS
8DPSK	HCH	1.282	PASS

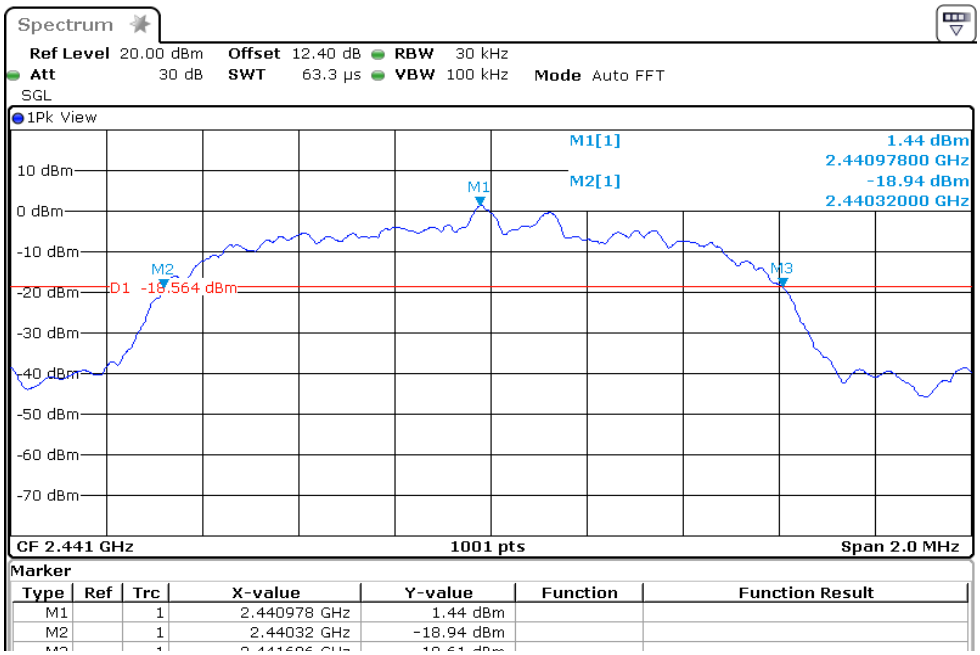
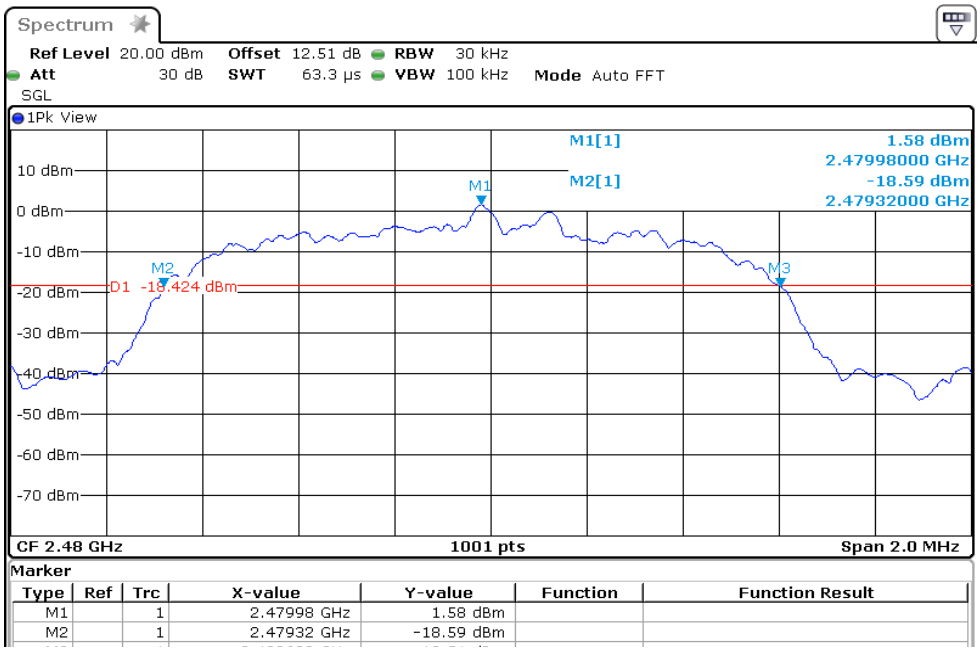
Test Graph

Graphs	
GFSK/LCH	

GFSK/MCH	
GFSK/HCH	

π/4DQPSK/LCH	
π/4DQPSK/MCH	

π/4DQPSK/HCH	
8DPSK/LCH	

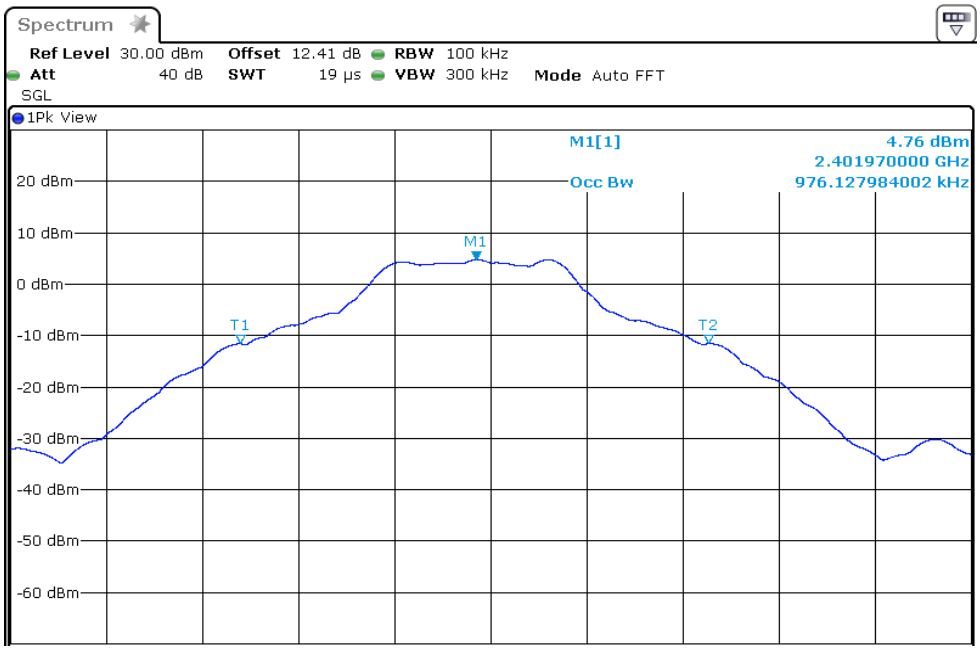
8DPSK/MCH	
8DPSK/HCH	

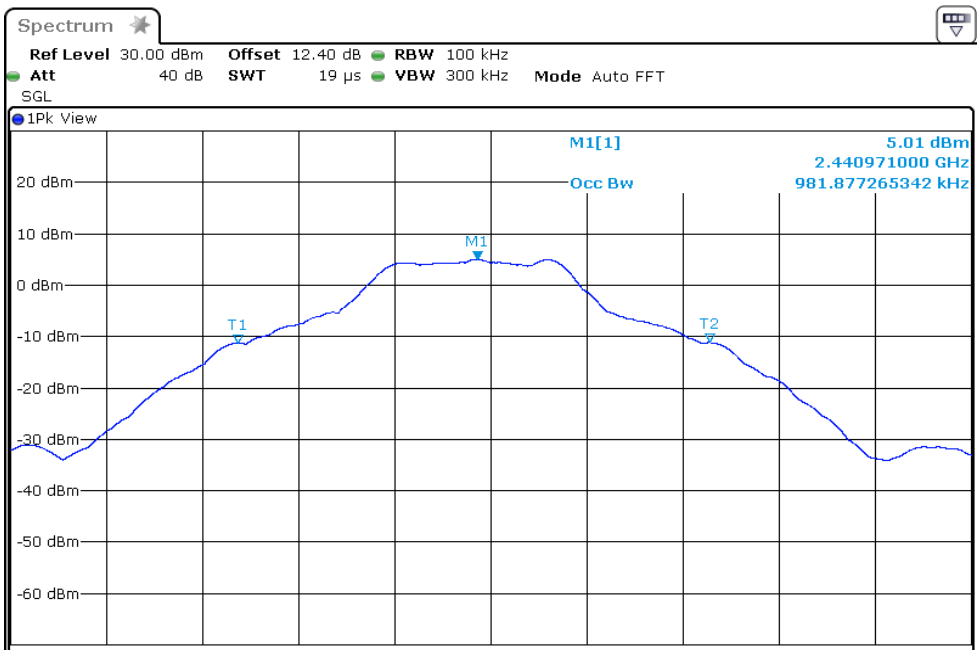
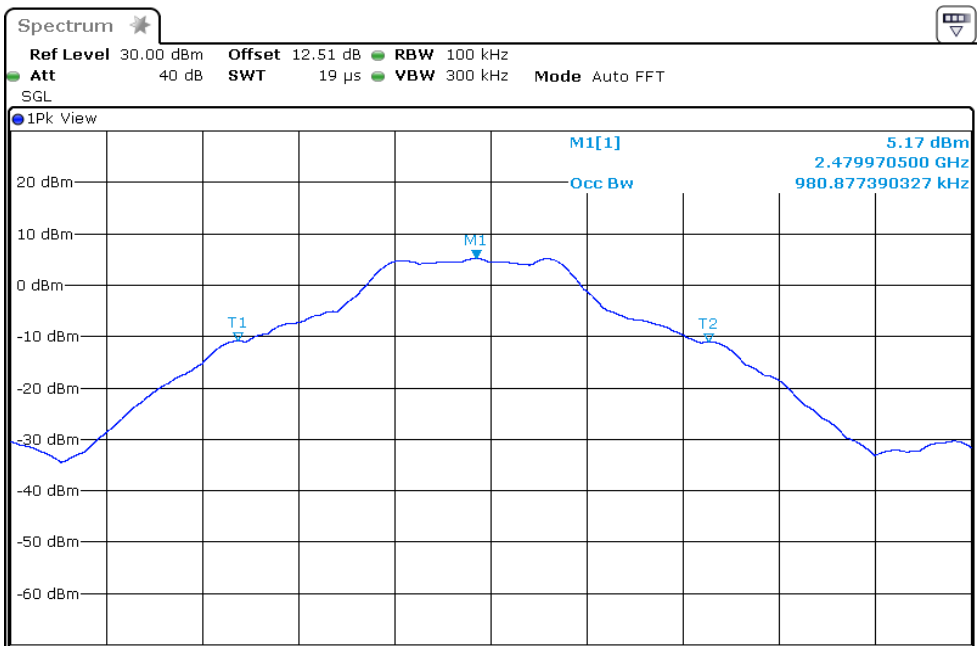
99% Occupied Bandwidth

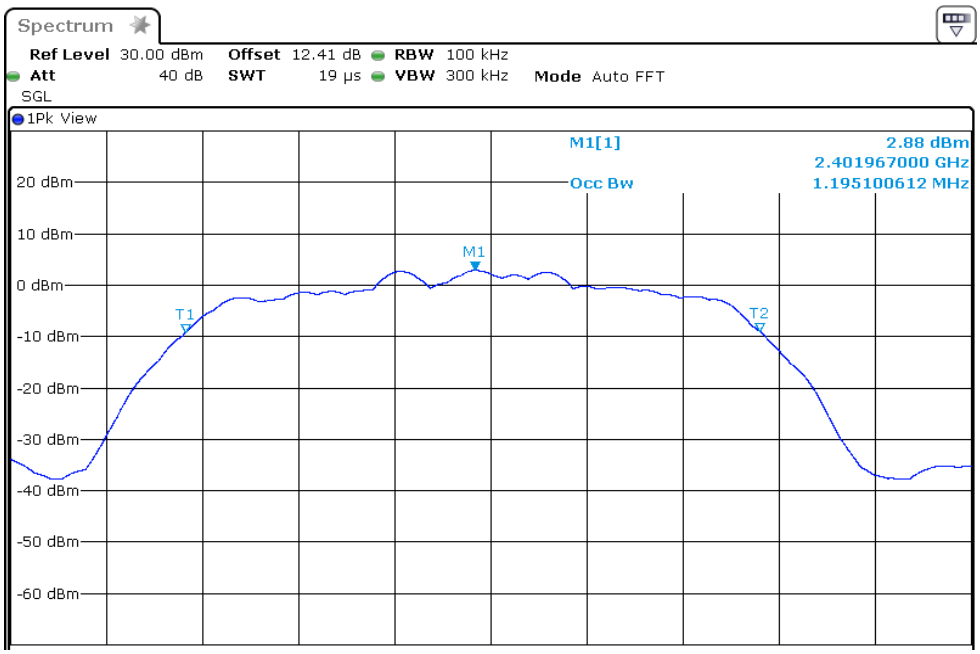
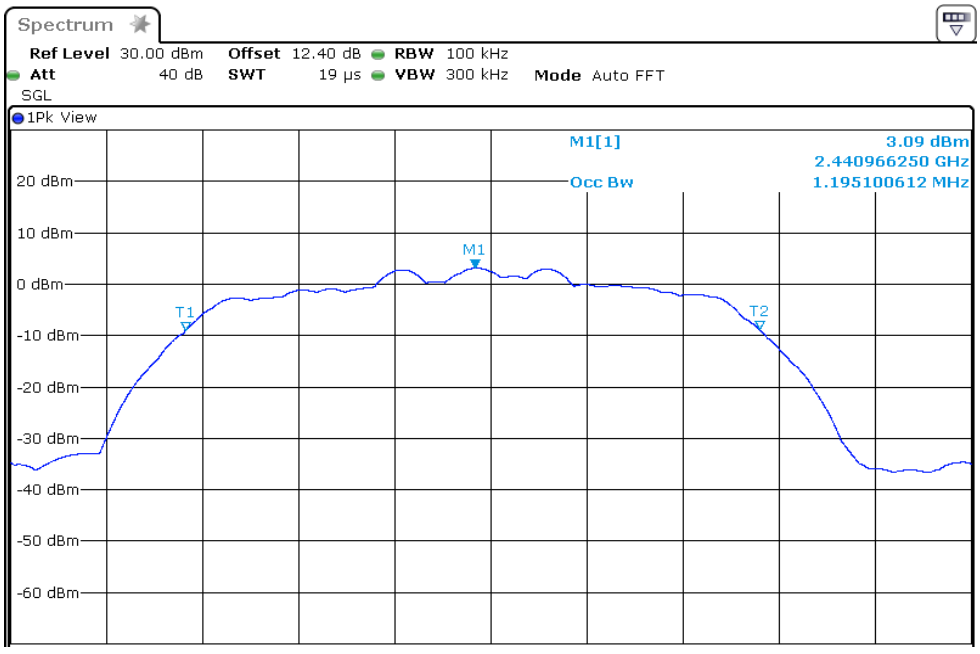
Test Result

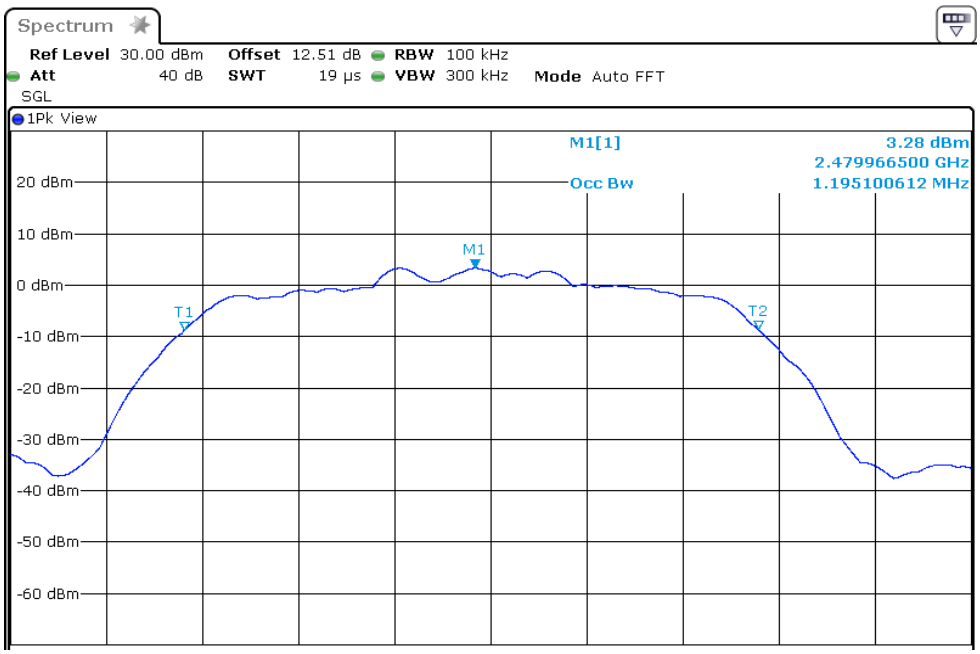
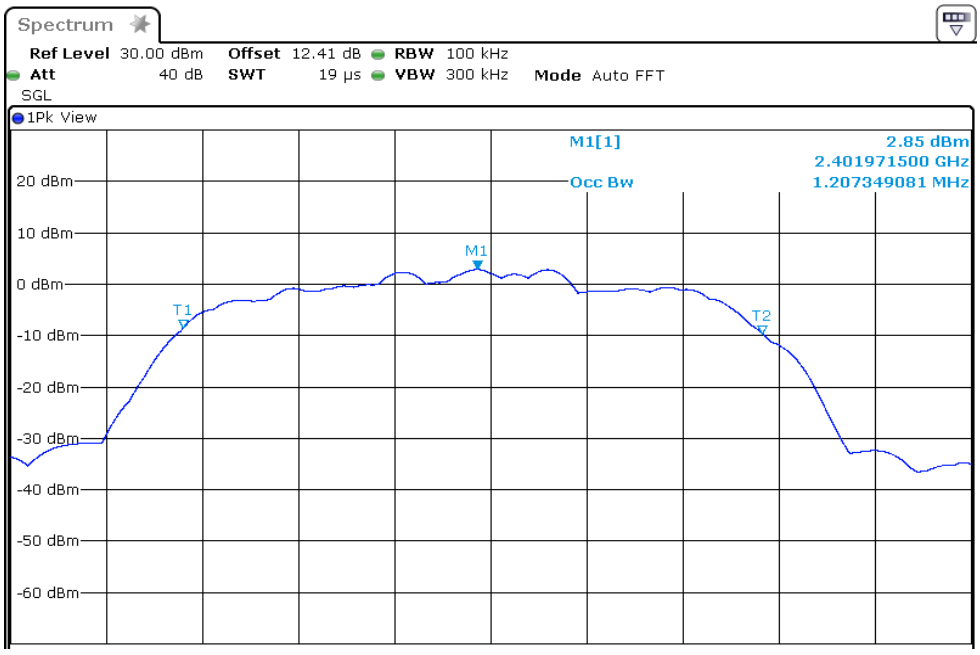
Mode	Channel.	99% OBW [MHz]	Verdict
GFSK	LCH	0.976	PASS
GFSK	MCH	0.982	PASS
GFSK	HCH	0.981	PASS
π/4DQPSK	LCH	1.195	PASS
π/4DQPSK	MCH	1.195	PASS
π/4DQPSK	HCH	1.195	PASS
8DPSK	LCH	1.207	PASS
8DPSK	MCH	1.209	PASS
8DPSK	HCH	1.205	PASS

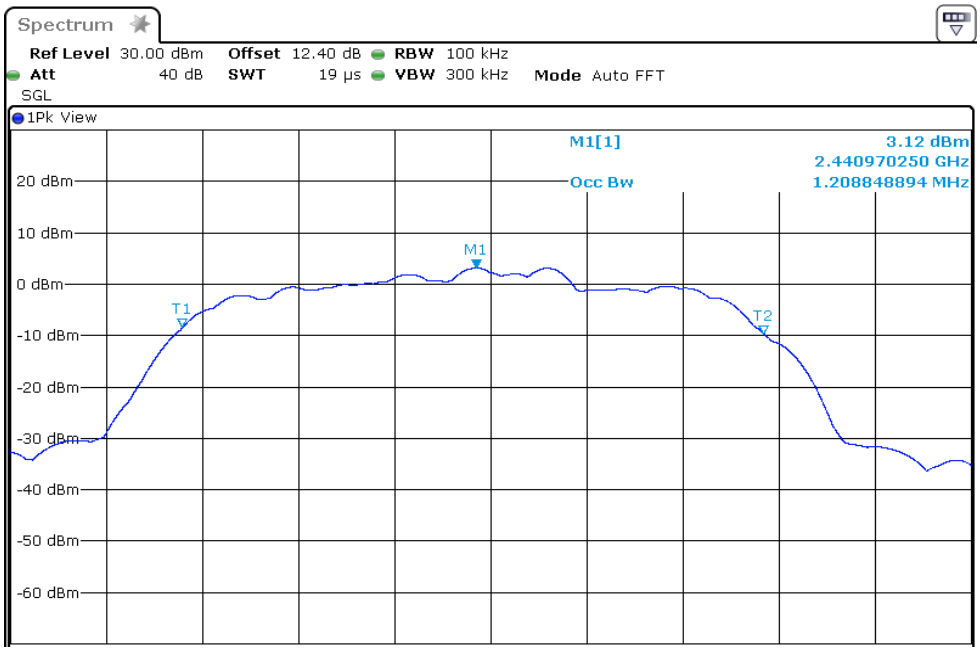
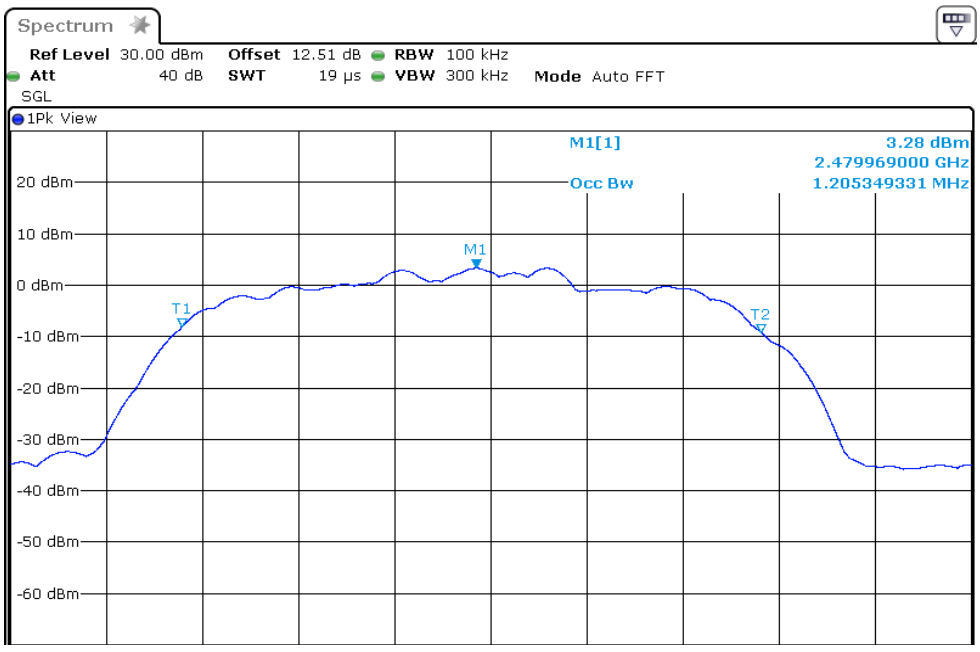
Test Graph

Graphs	
GFSK/LCH	

GFSK/MCH	
GFSK/HCH	

π/4DQPSK/LCH	
π/4DQPSK/MCH	

π/4DQPSK/HCH	
8DPSK/LCH	

8DPSK/MCH	
8DPSK/HCH	

Dwell Time

For DH1 package type:

{Total of Dwell} = {Pulse Time} * (1600 / 2) / {Number of Hopping Frequency} * {Period}

{Period} = 0.4s * {Number of Hopping Frequency}

For DH3 package type:

{Total of Dwell} = {Pulse Time} * (1600 / 4) / {Number of Hopping Frequency} * {Period}

{Period} = 0.4s * {Number of Hopping Frequency}

For DH5 package type:

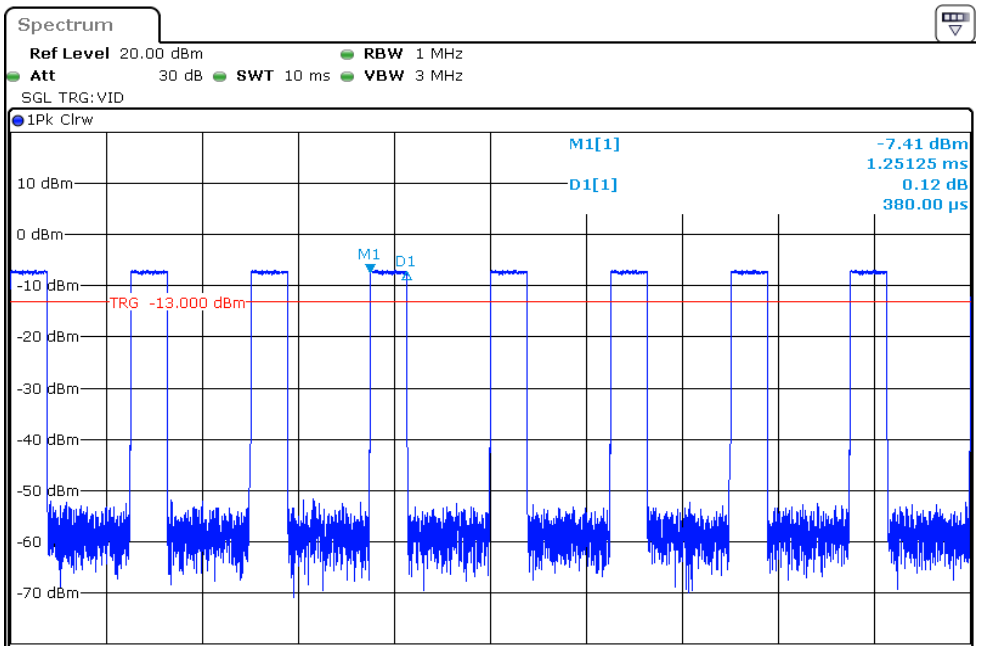
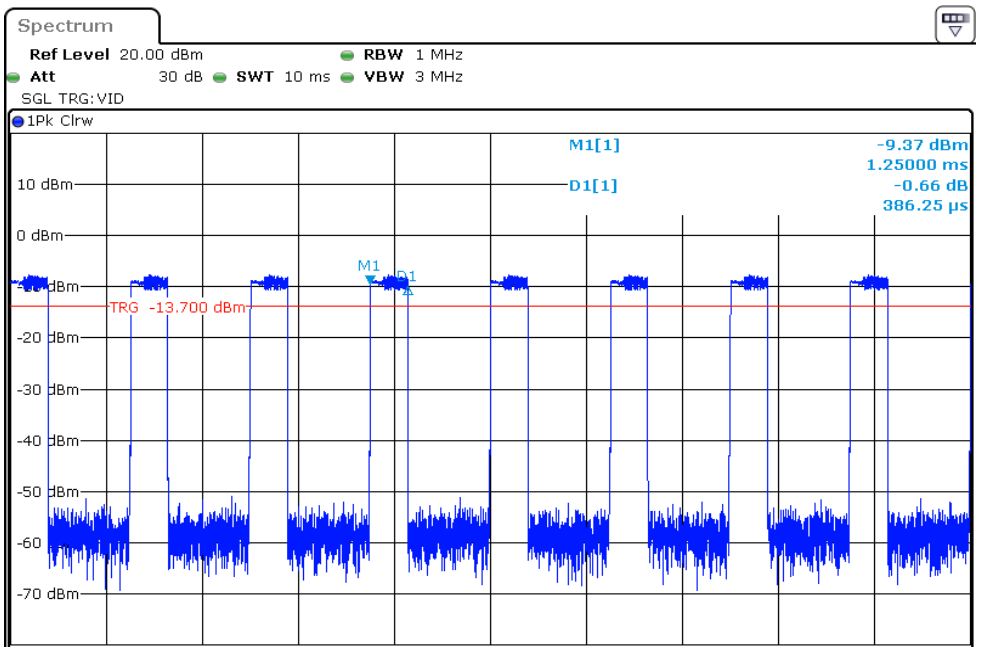
{Total of Dwell} = {Pulse Time} * (1600 / 6) / {Number of Hopping Frequency} * {Period}

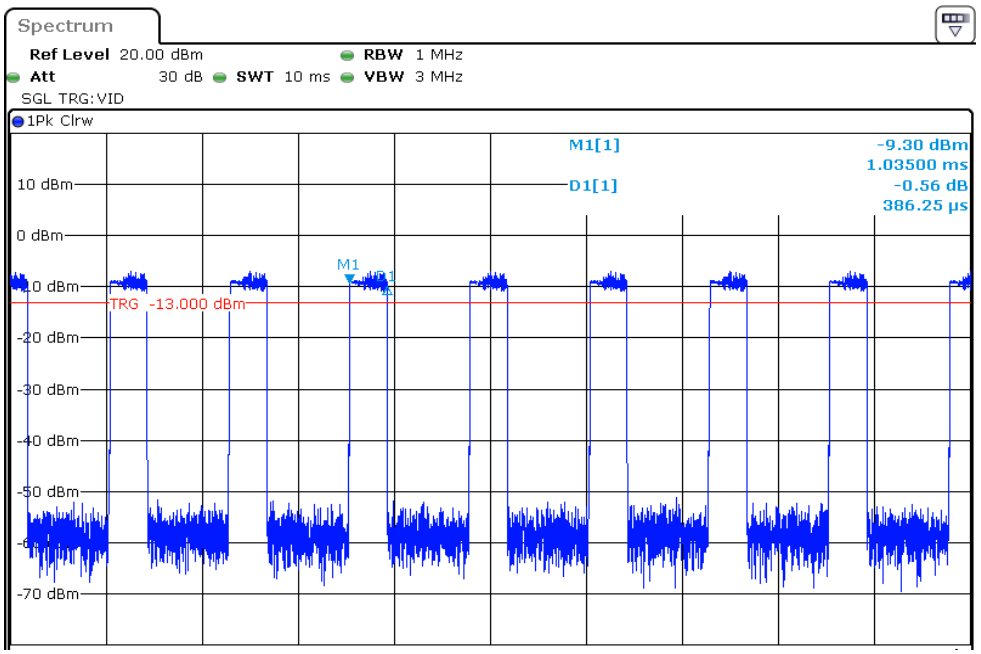
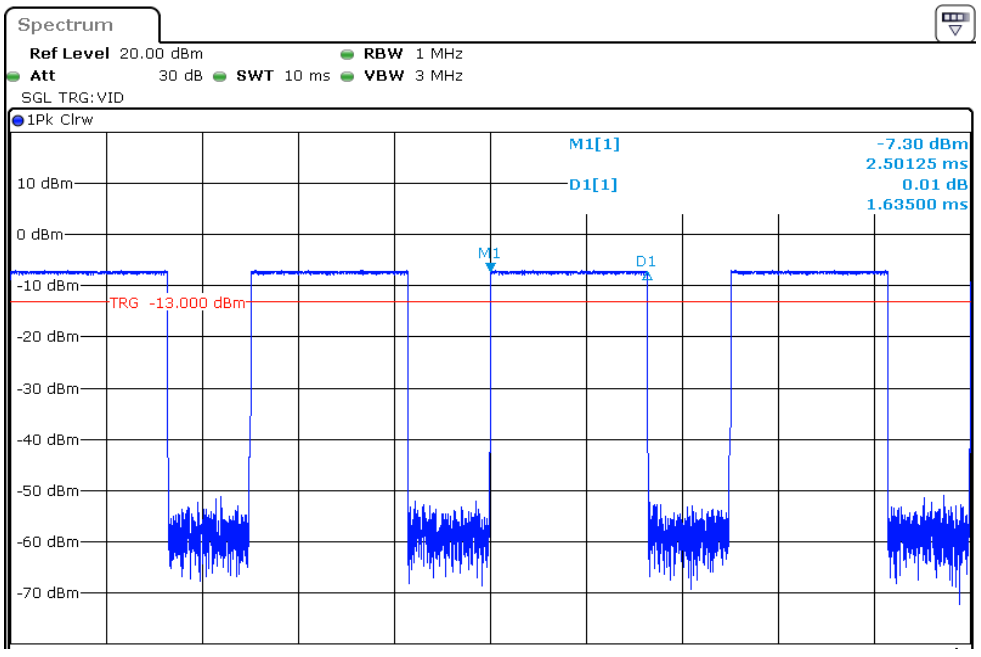
{Period} = 0.4s * {Number of Hopping Frequency}

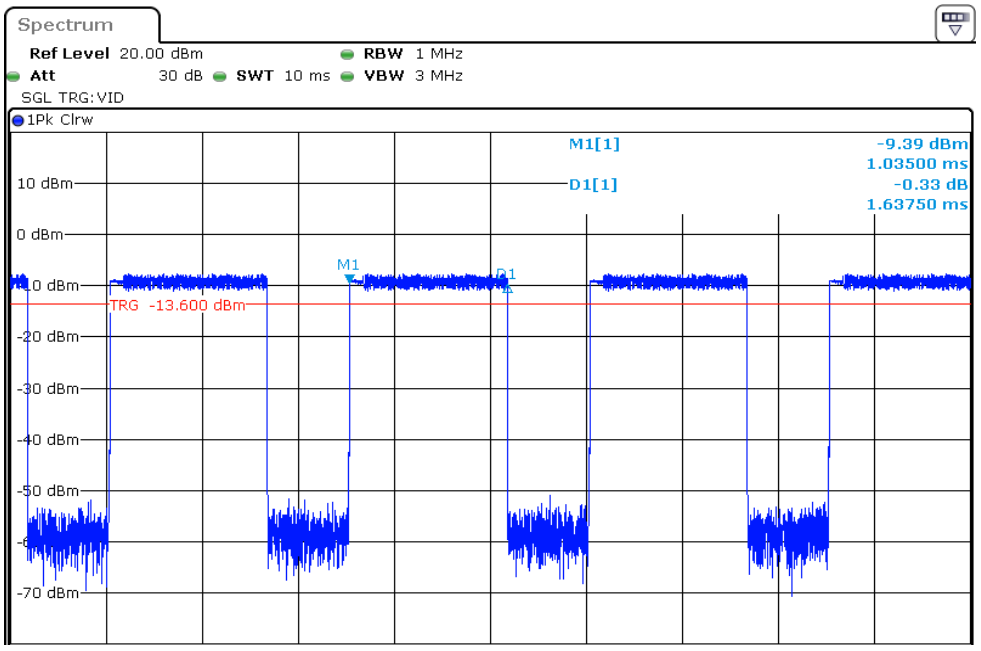
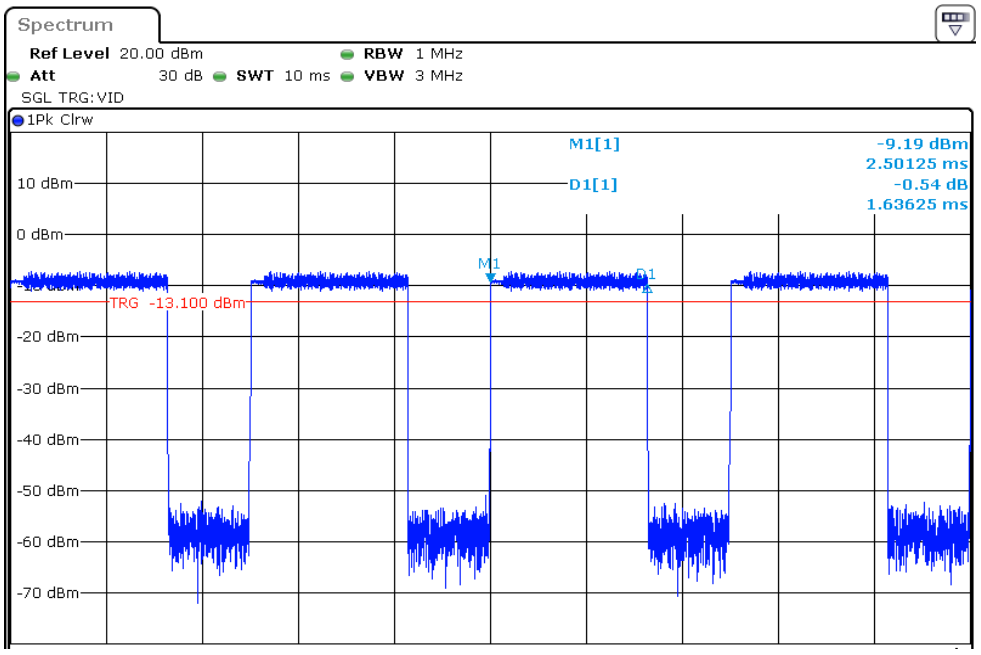
Result Table

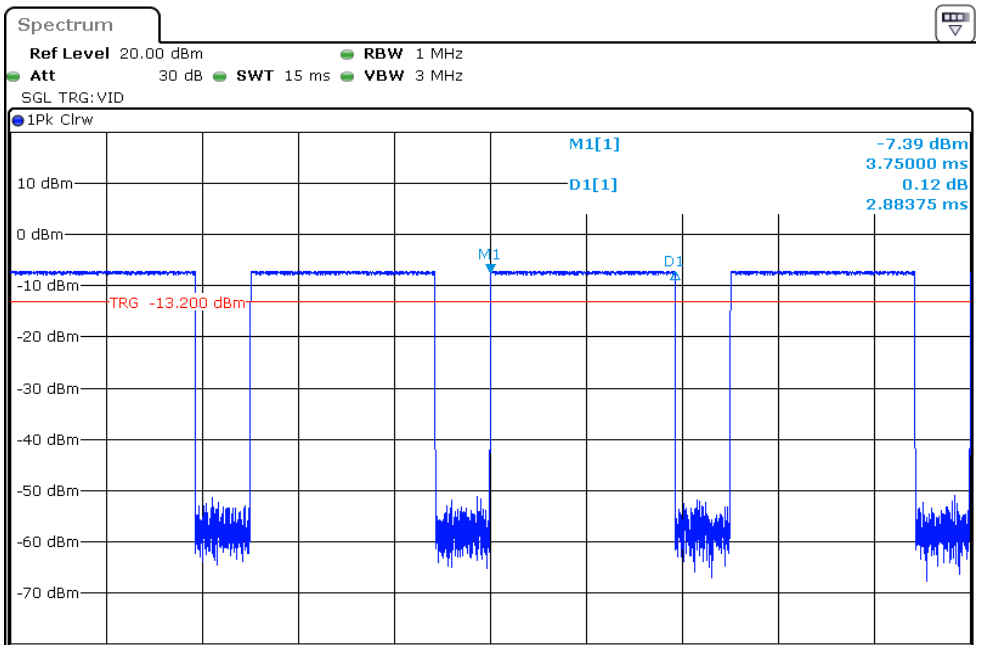
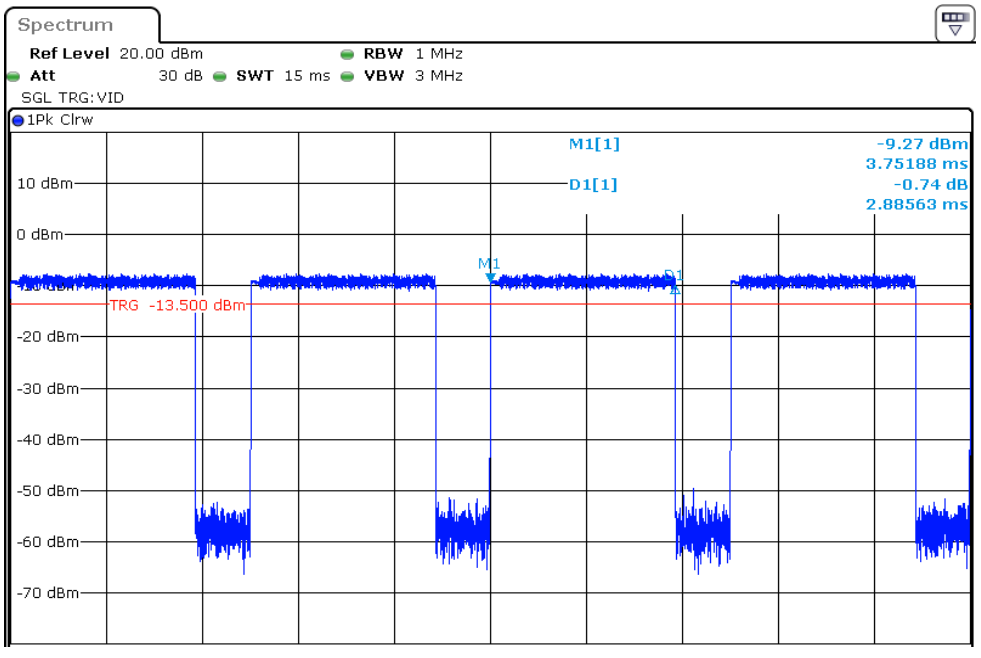
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Duty Cycle [%]	Verdict
GFSK	DH1	MCH	0.38	320	0.122	0.00	PASS
GFSK	2DH1	MCH	0.39	320	0.125	0.00	PASS
GFSK	3DH1	MCH	0.39	320	0.125	0.00	PASS
GFSK	DH3	MCH	1.64	160	0.262	0.00	PASS
GFSK	2DH3	MCH	1.64	160	0.262	0.00	PASS
GFSK	3DH3	MCH	1.64	160	0.262	0.00	PASS
GFSK	DH5	MCH	2.88	106.7	0.307	0.00	PASS
GFSK	3DH5	MCH	2.89	106.7	0.308	0.00	PASS
GFSK	3DH5	MCH	2.89	106.7	0.308	0.00	PASS

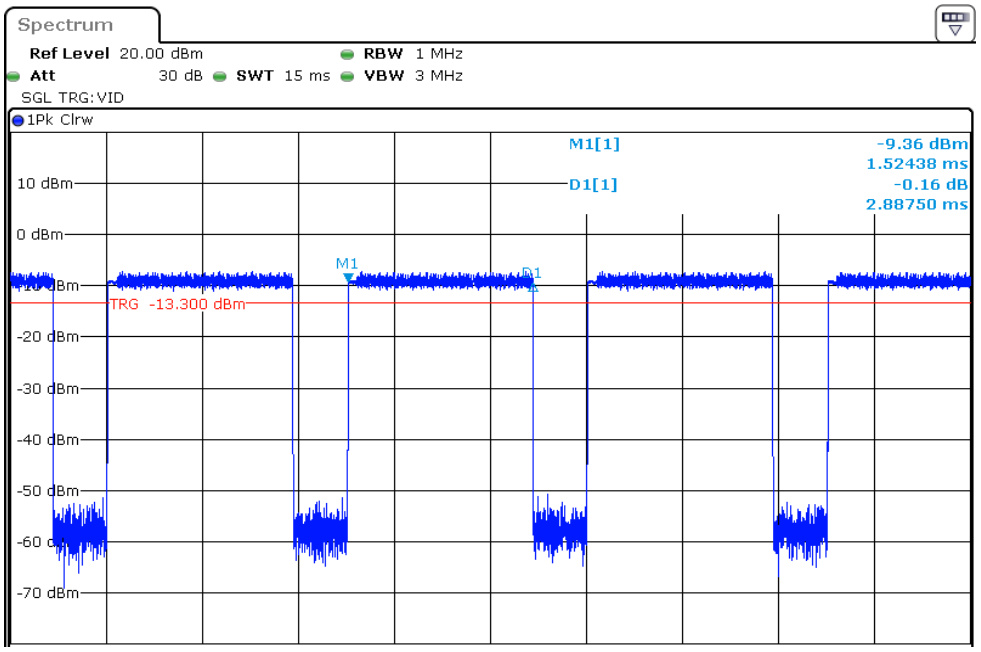
Test Graph

Graphs	
GFSK_DH1/MCH	
GFSK_2DH1/MCH	

GFSK_3DH1/MCH	
GFSK_DH3/MCH	

GFSK_2DH3/MCH	
GFSK_3DH3/MCH	

GFSK_DH5/MCH	
GFSK_2DH5/MCH	

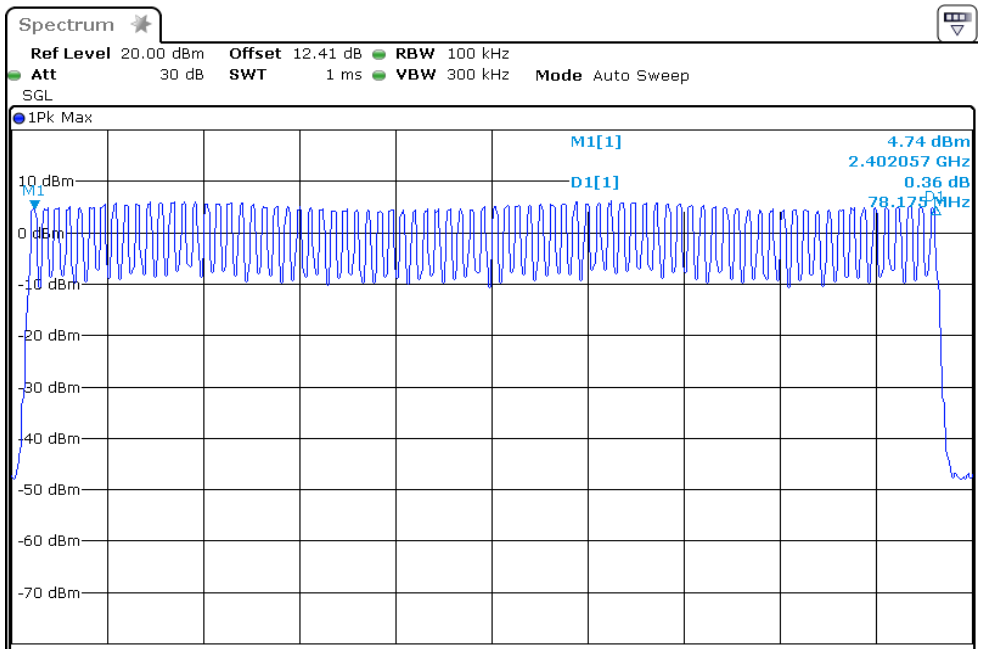
GFSK_3DH5/MCH	

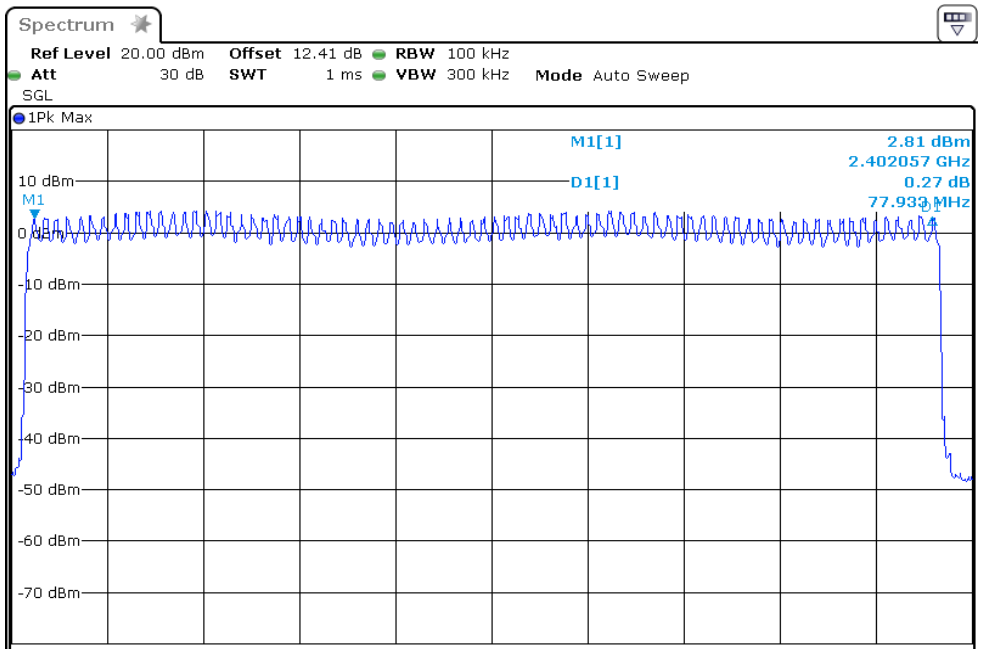
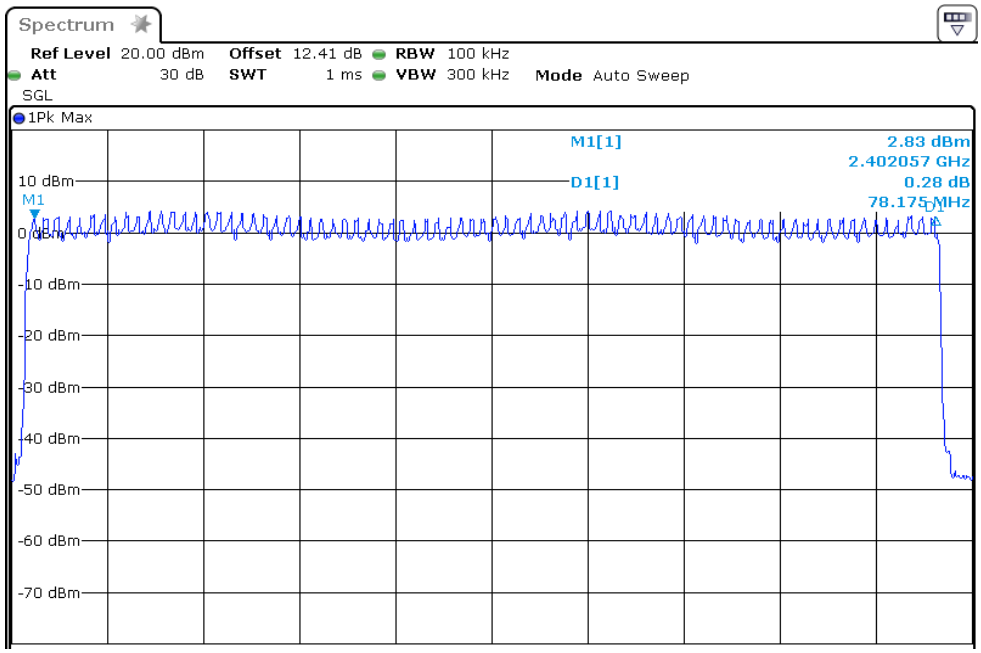
Hopping Channel Number

Result Table

Mode	Channel.	Number of Hopping Channel	Verdict
GFSK	Hop	79	PASS
π/4DQPSK	Hop	79	PASS
8DPSK	Hop	79	PASS

Test Graph

Graphs	
GFSK/Hop	

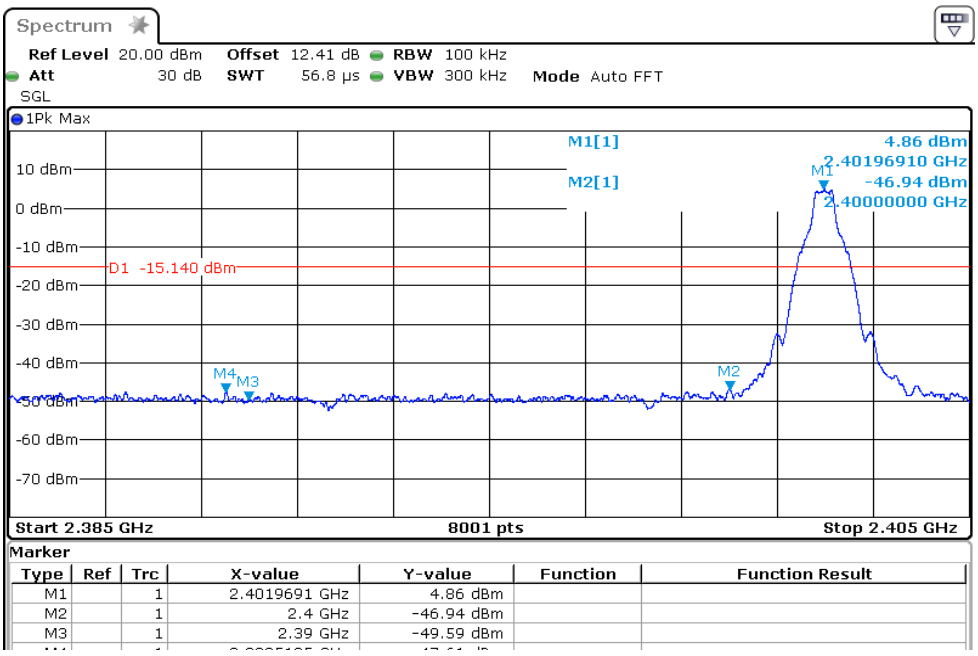
π/4DQPSK/Hop	
8DPSK/Hop	

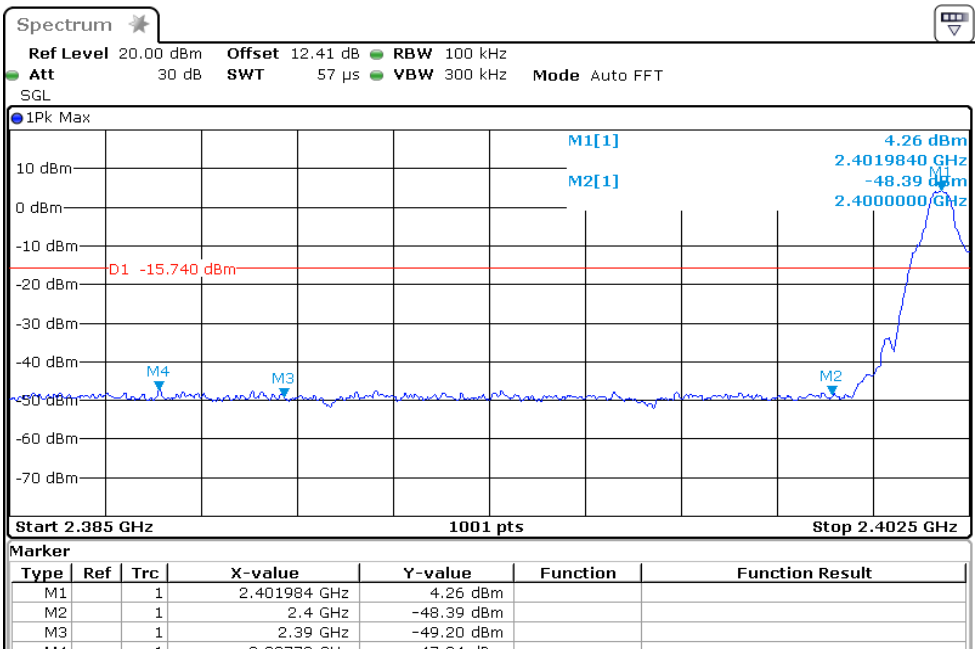
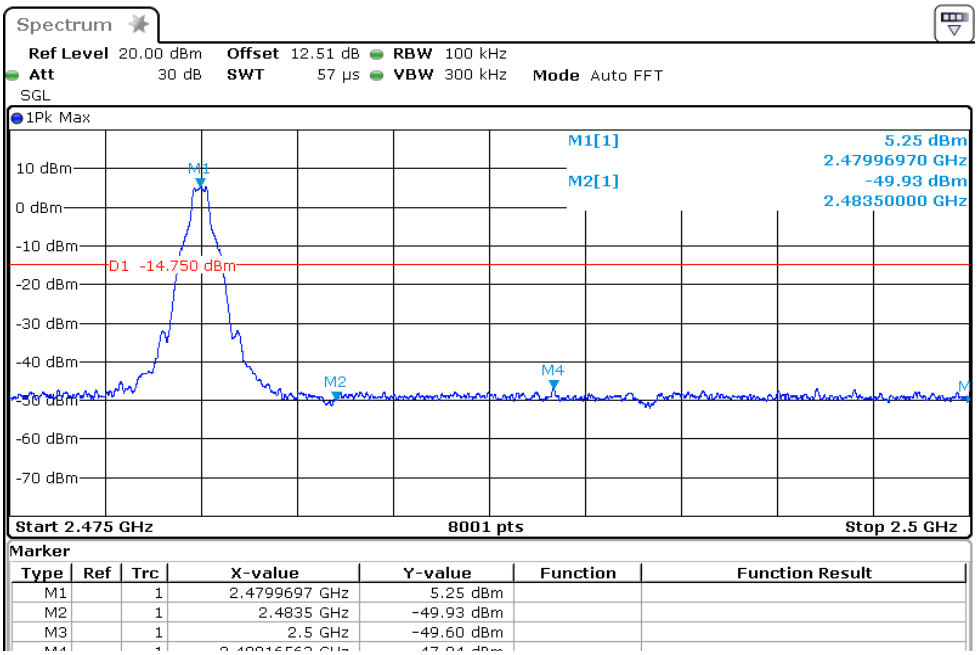
Band-edge for RF Conducted Emissions

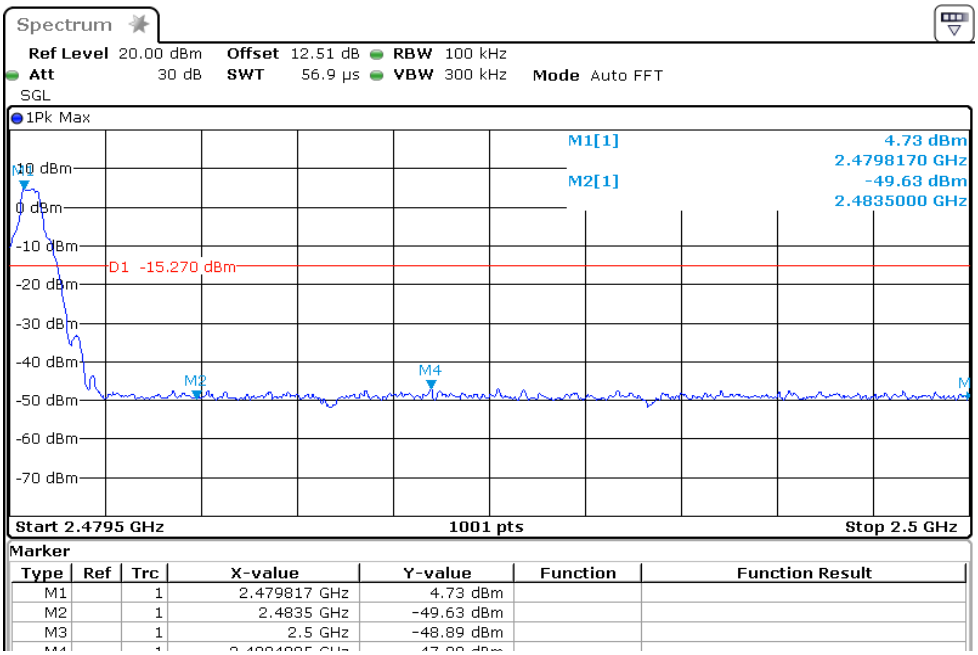
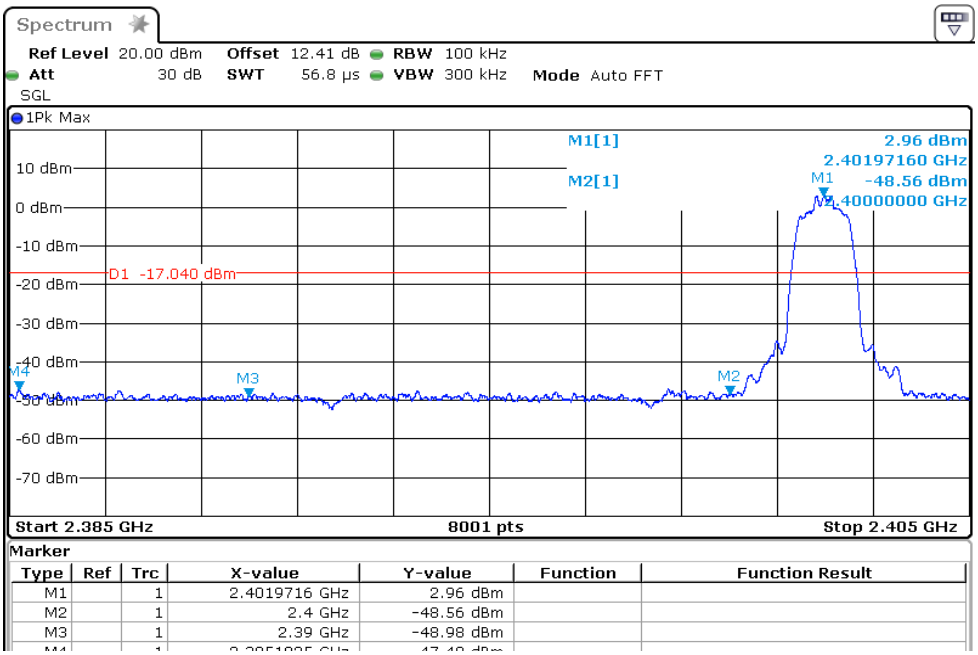
Result Table

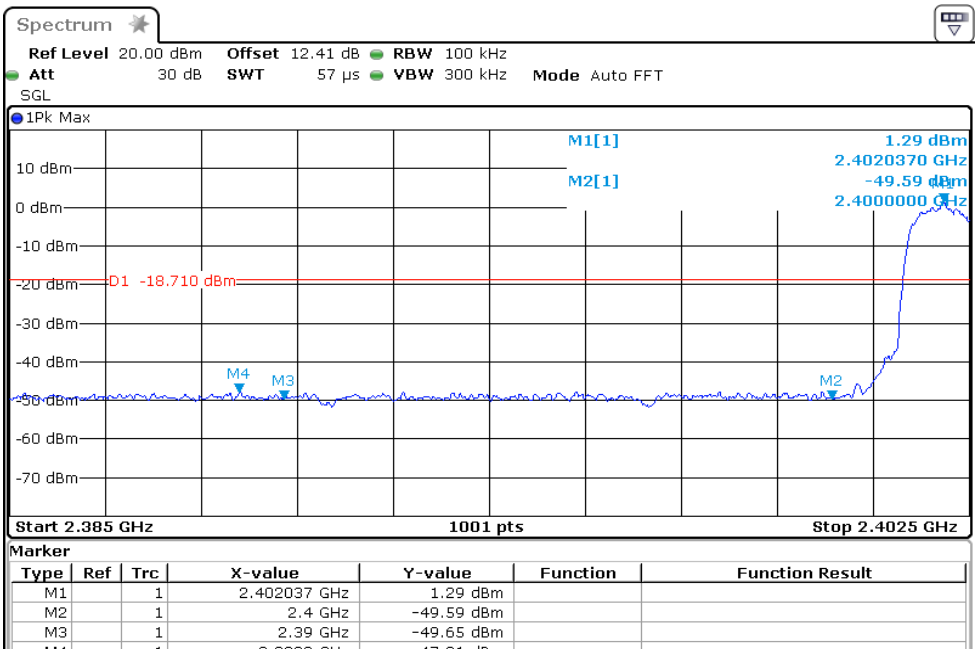
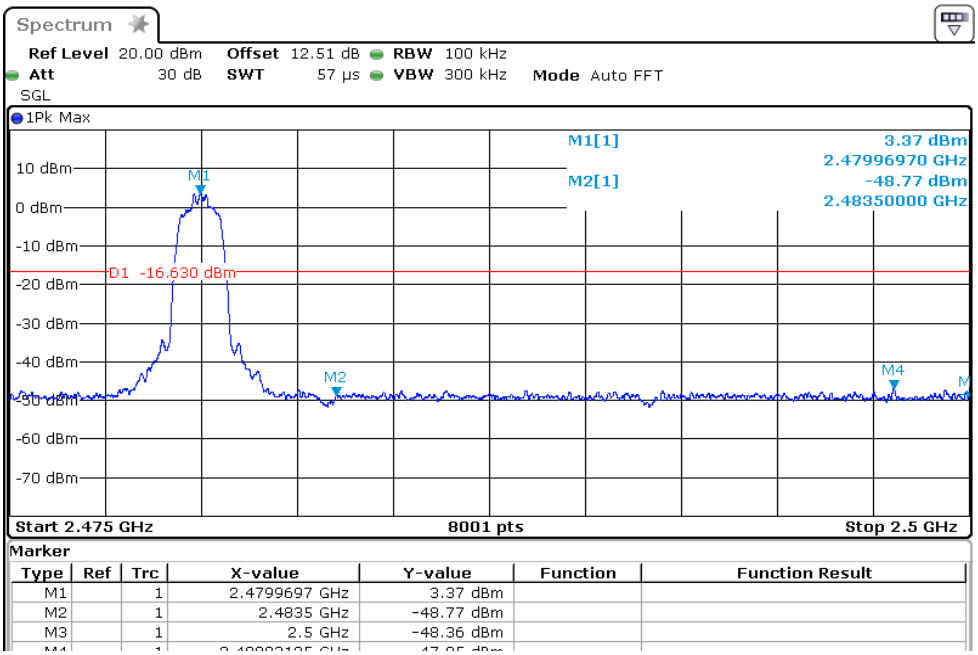
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	4.860	Off	-47.609	-15.14	PASS
			4.260	On	-47.237	-15.74	PASS
GFSK	HCH	2480	5.250	Off	-47.037	-14.75	PASS
			4.730	On	-47.004	-15.27	PASS
π/4DQPSK	LCH	2402	2.960	Off	-47.400	-17.04	PASS
			1.290	On	-47.907	-18.71	PASS
π/4DQPSK	HCH	2480	3.370	Off	-47.048	-16.63	PASS
			2.490	On	-46.677	-17.51	PASS
8DPSK	LCH	2402	2.990	Off	-47.902	-17.01	PASS
			2.750	On	-47.769	-17.25	PASS
8DPSK	HCH	2480	3.370	Off	-46.303	-16.63	PASS
			3.100	On	-46.747	-16.9	PASS

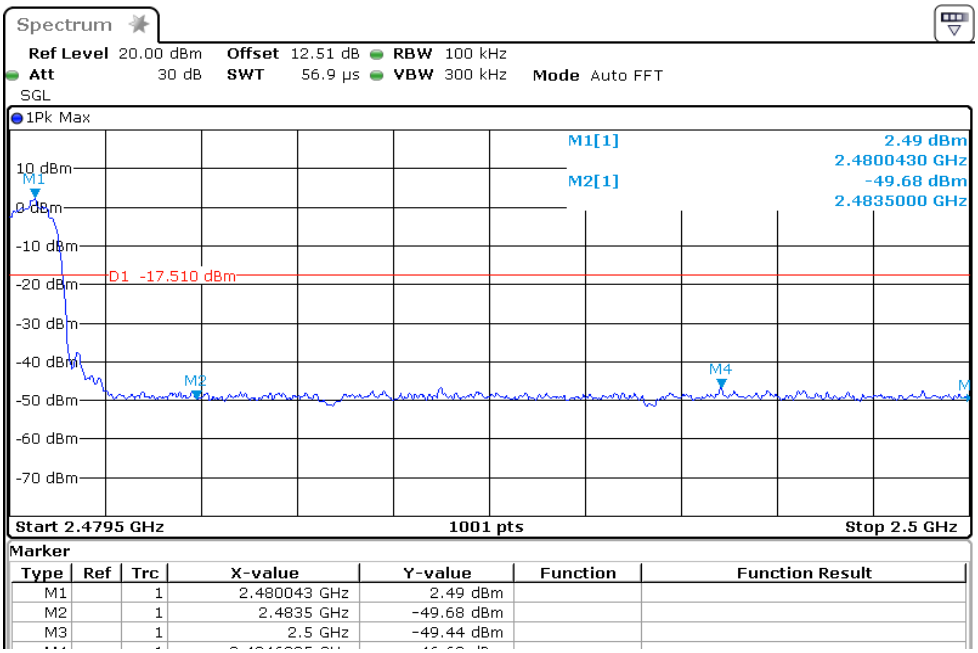
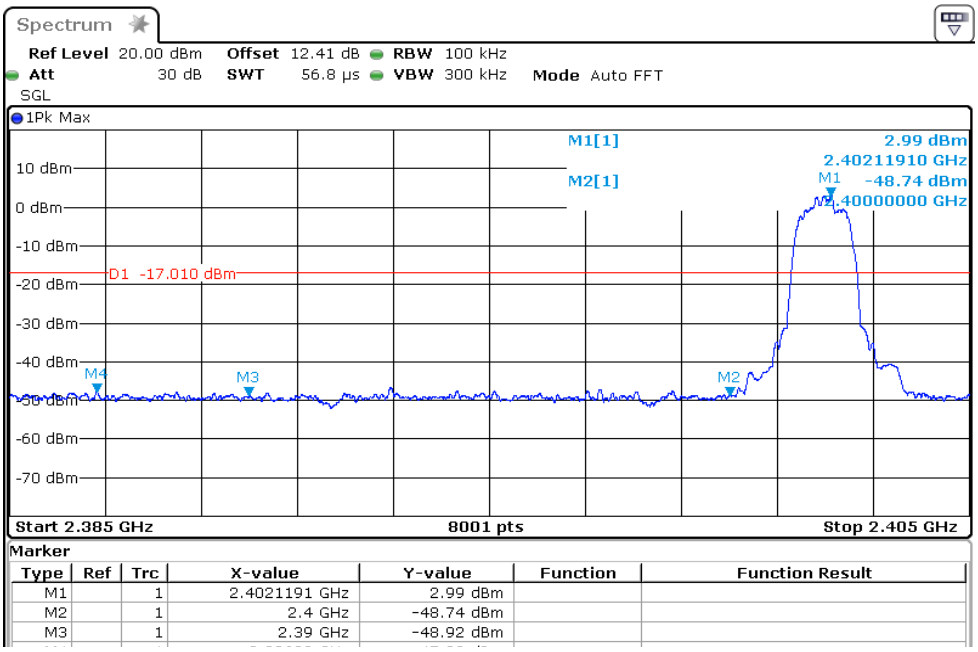
Test Graph

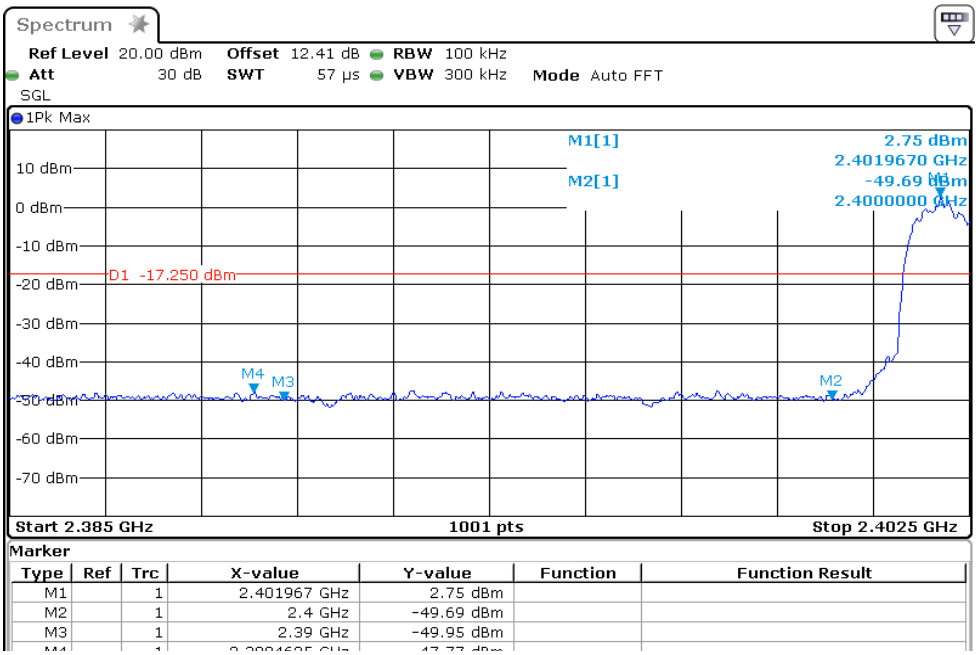
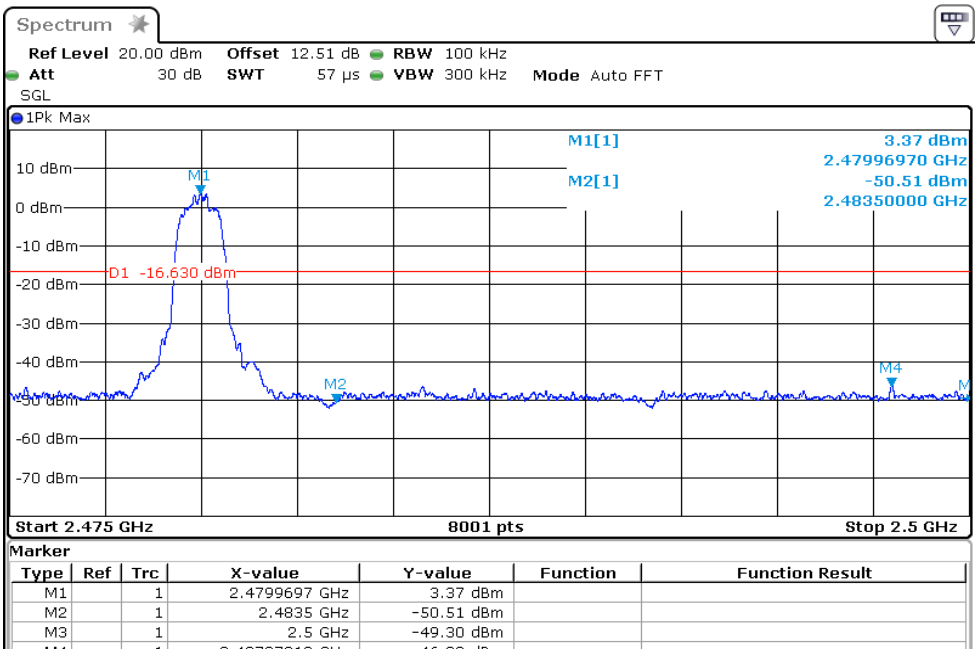
Graphs	
GFSK/LCH/No Hop	

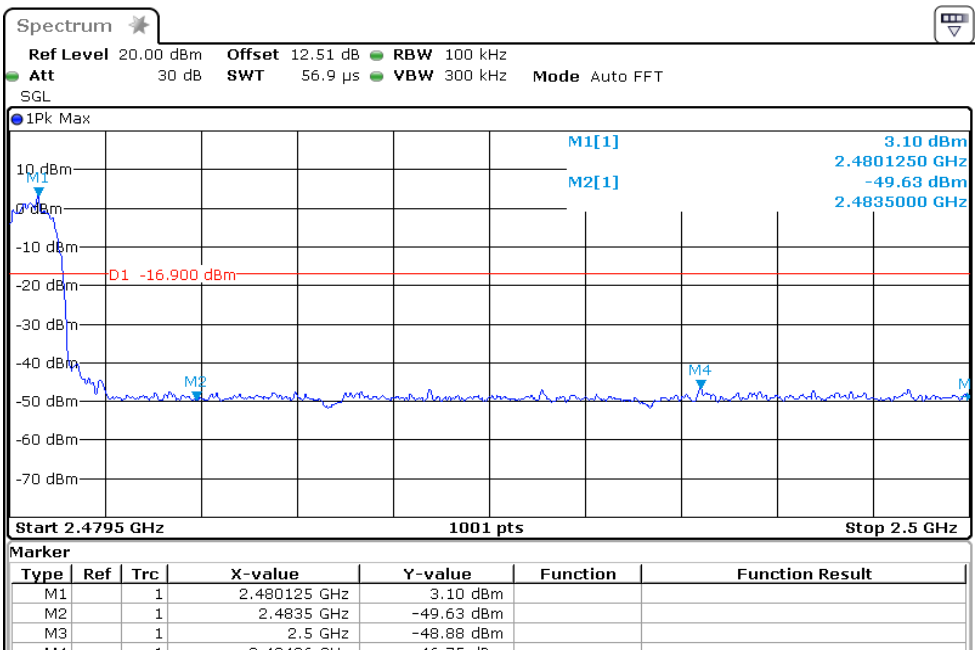
GFSK/LCH/Hop	
GFSK/HCH/No Hop	

GFSK/HCH/Hop	
π/4DQPSK/LCH/No Hop	

π/4DQPSK/LCH/Hop	
π/4DQPSK/HCH/No Hop	

π/4DQPSK/HCH/Hop	
8DPSK/LCH/No Hop	

8DPSK/LCH/Hop	
8DPSK/HCH/No Hop	

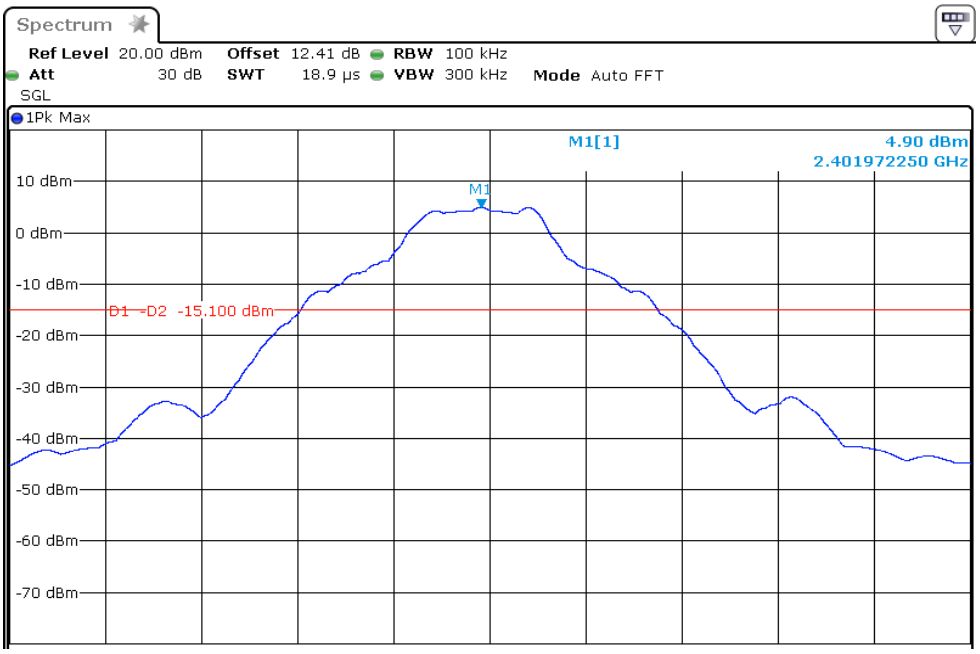
8DPSK/HCH/Hop	 Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.480125 GHz 3.10 dBm M2 1 2.4835 GHz -49.63 dBm M3 1 2.5 GHz -48.88 dBm

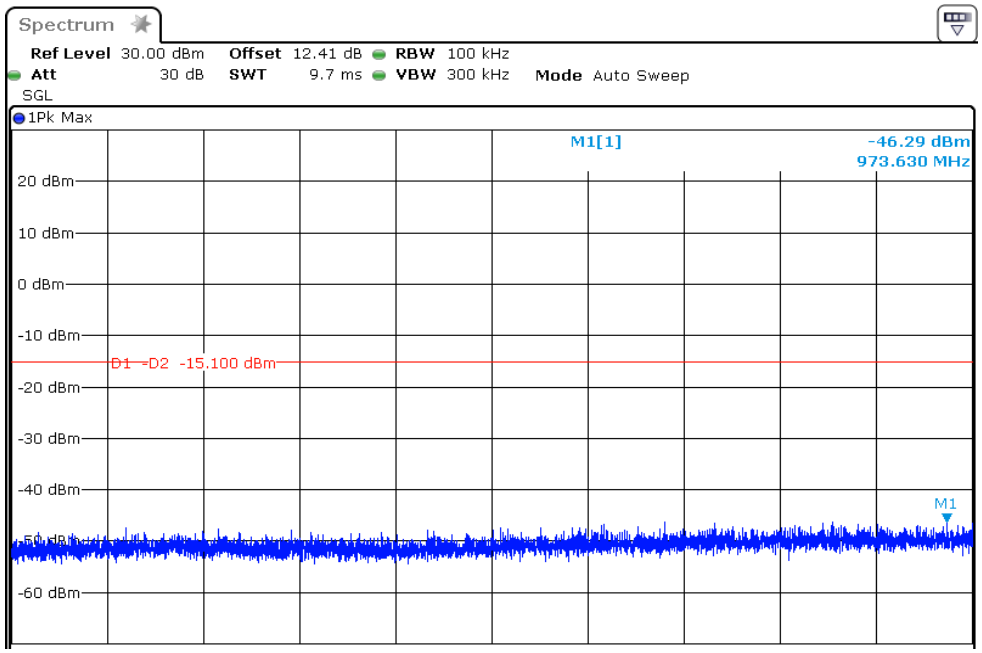
RF Conducted Spurious Emissions

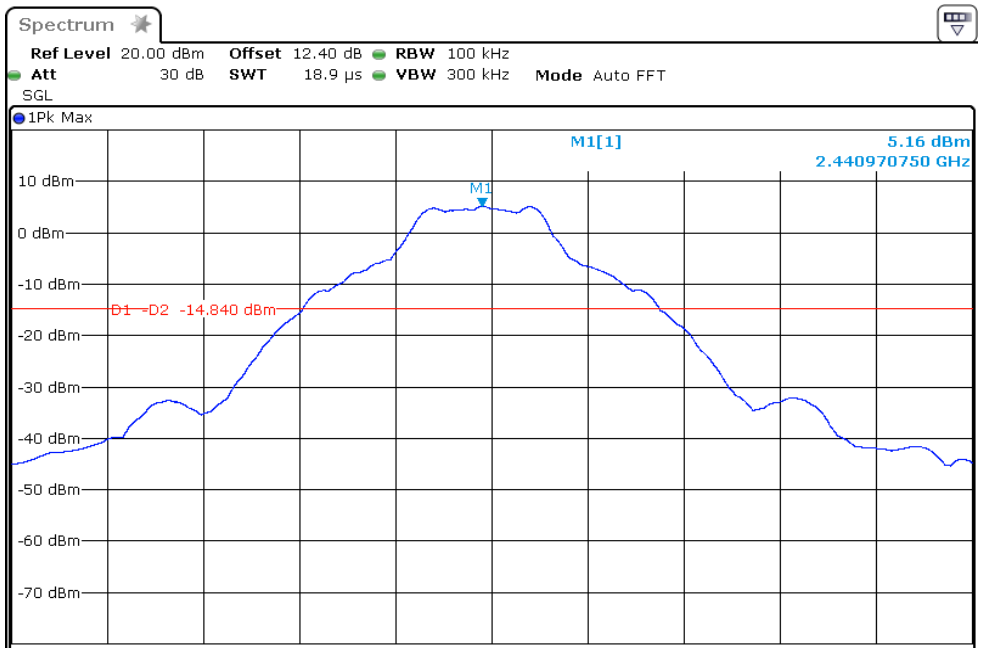
Result Table

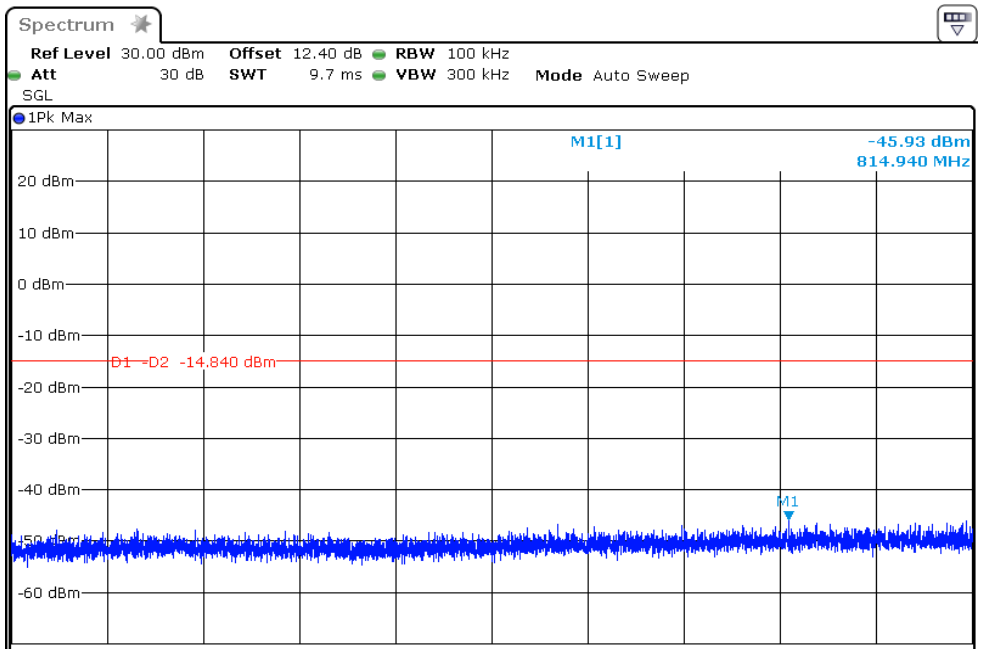
Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
GFSK	LCH	4.90	<Limit	PASS
GFSK	MCH	5.16	<Limit	PASS
GFSK	HCH	5.28	<Limit	PASS
π/4DQPSK	LCH	2.95	<Limit	PASS
π/4DQPSK	MCH	3.23	<Limit	PASS
π/4DQPSK	HCH	3.38	<Limit	PASS
8DPSK	LCH	3.00	<Limit	PASS
8DPSK	MCH	3.26	<Limit	PASS
8DPSK	HCH	3.39	<Limit	PASS

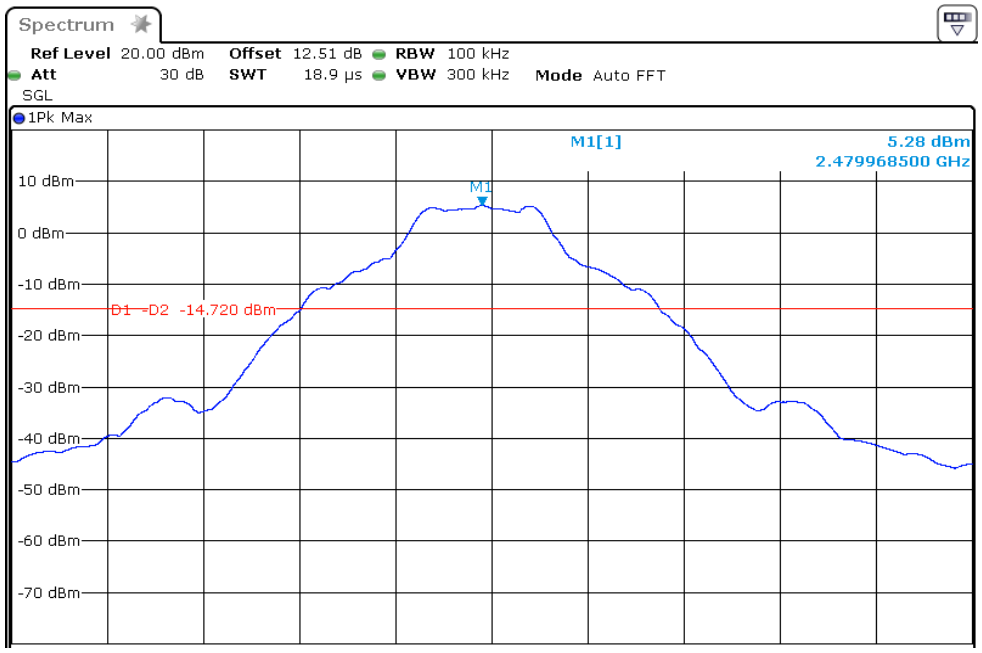
Test Graph

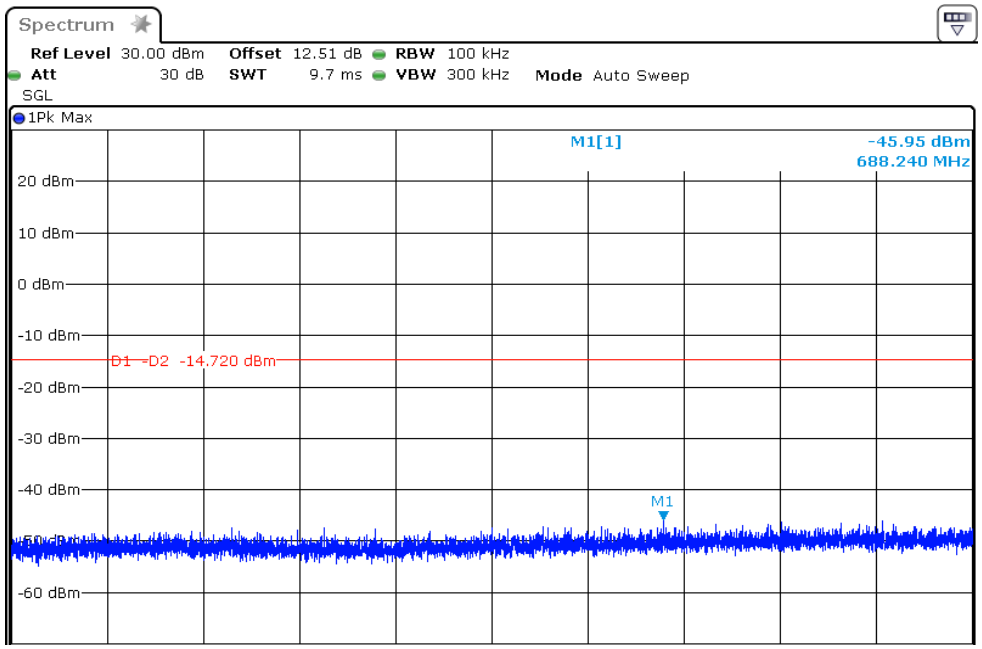
GFSK_LCH_Graphs	
Pref	

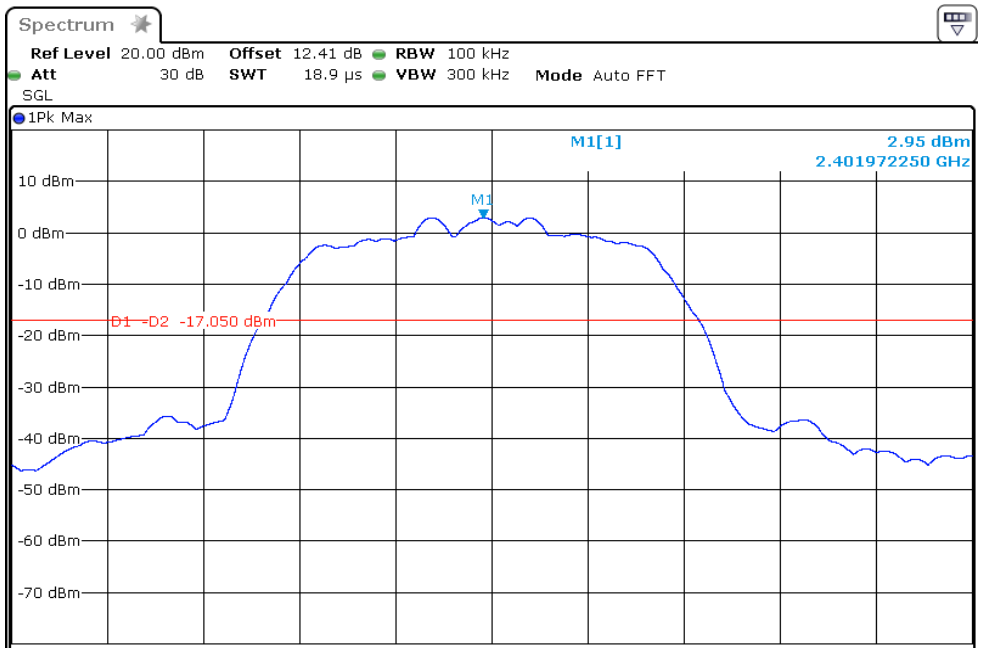
Puw	

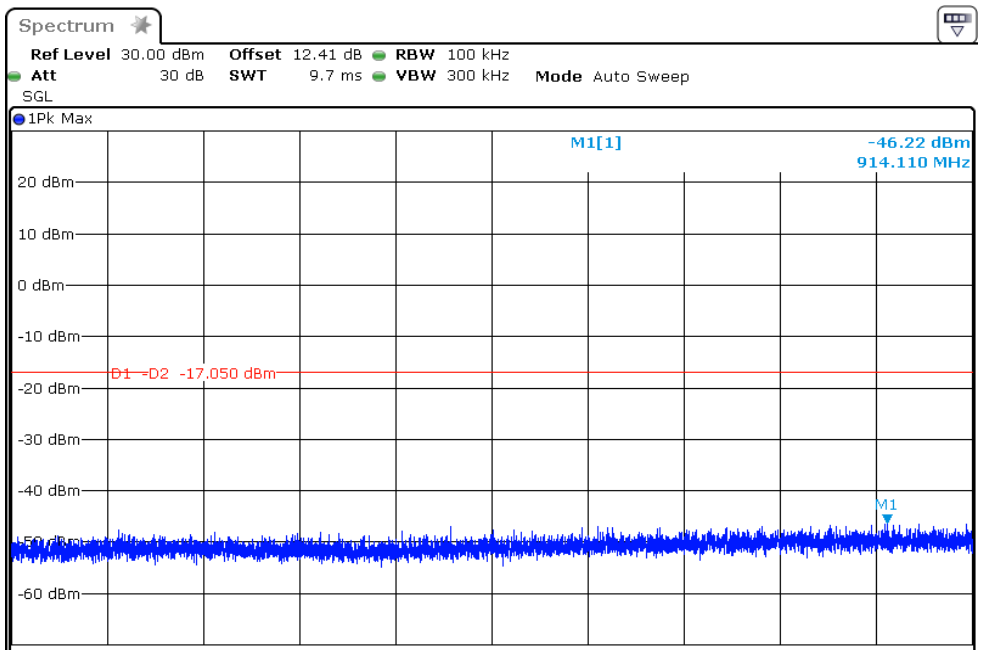
GFSK_MCH_Graphs	
Pref	

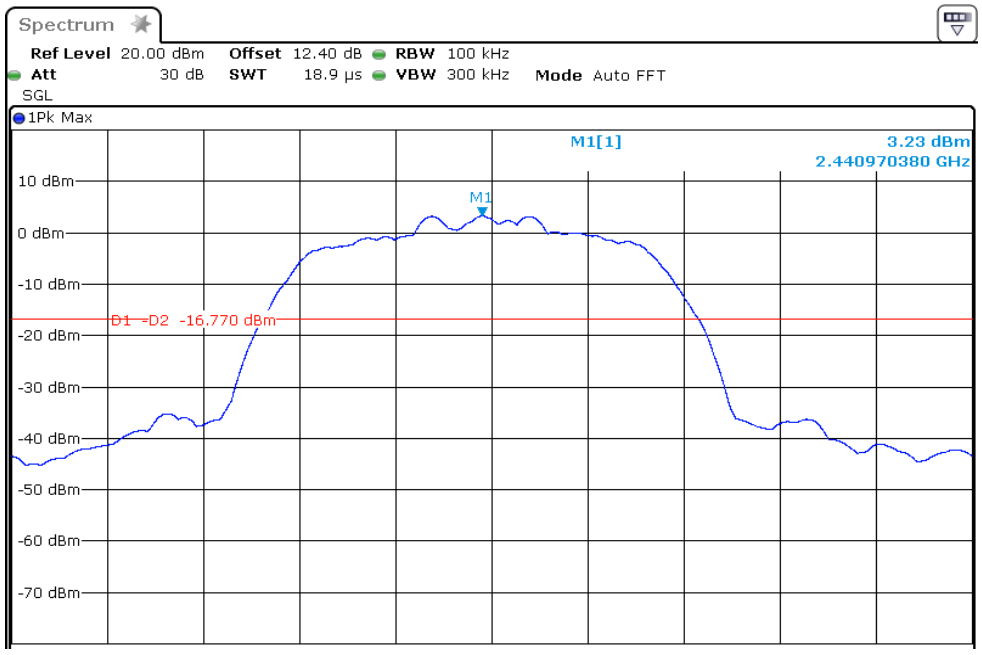
Puw	

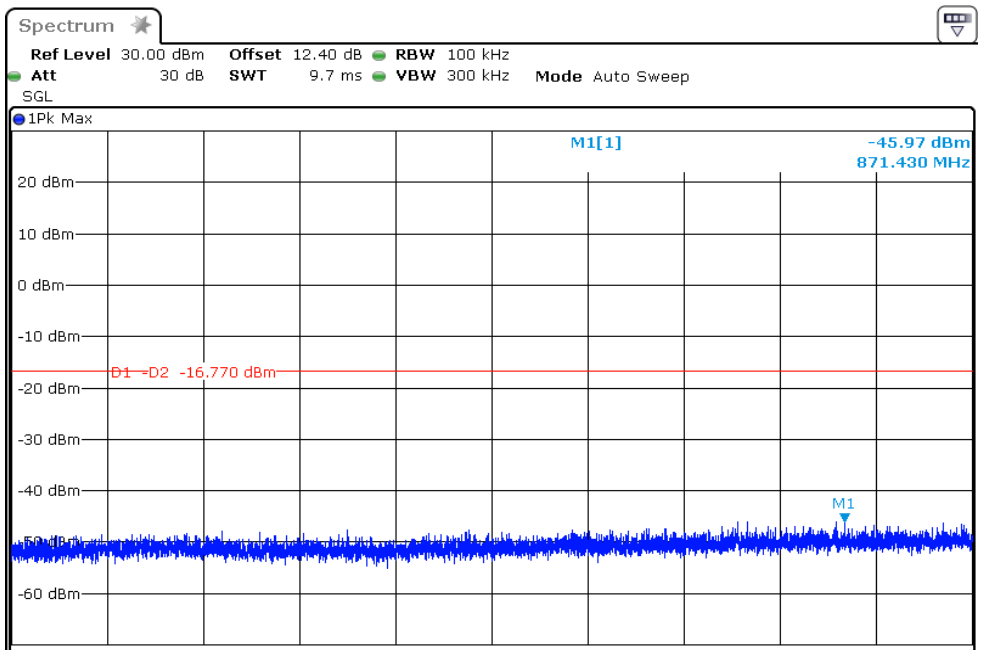
GFSK_HCH_Graphs	
Pref	

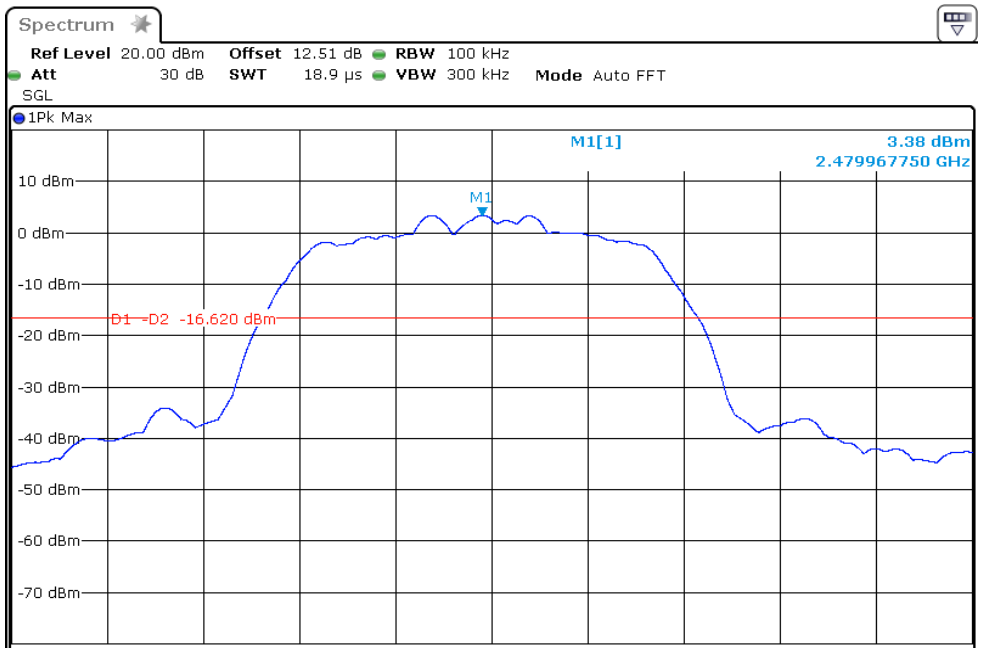
Puw	

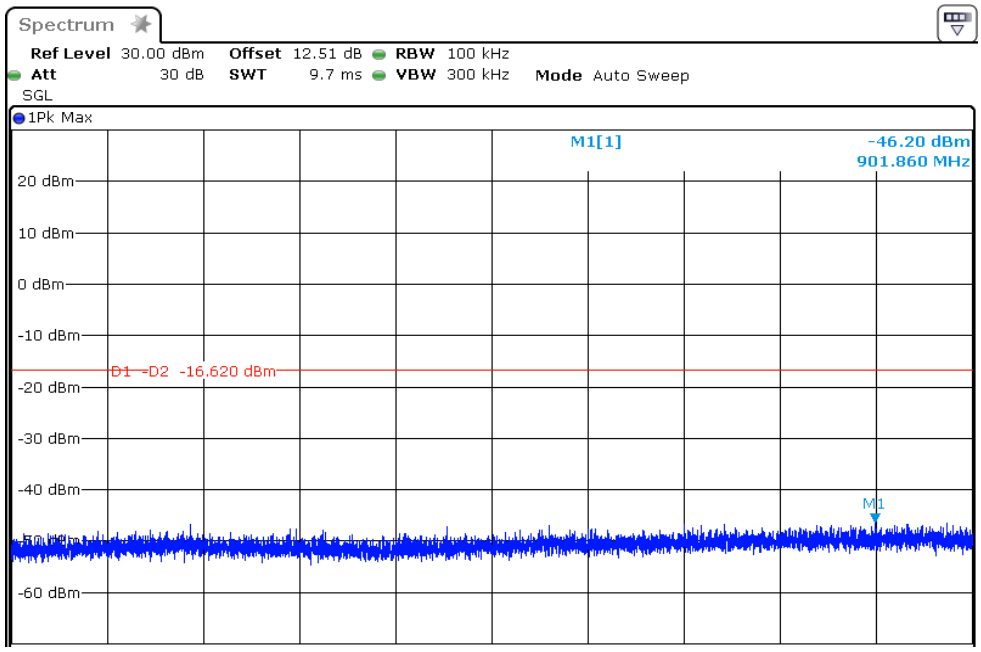
π/4DQPSK_LCH_Graphs	
Pref	

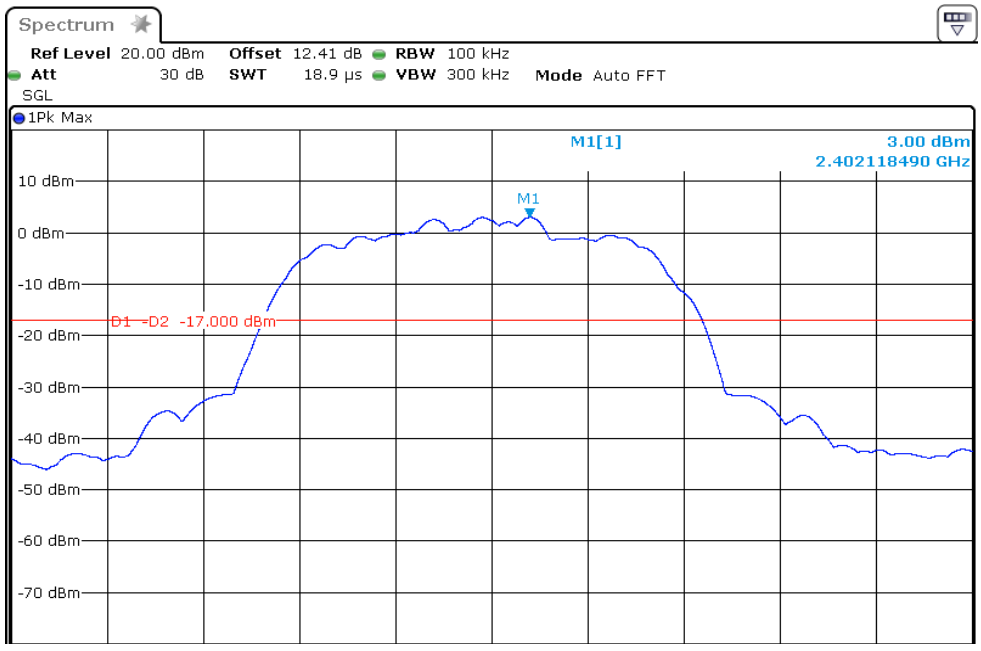
Puw	

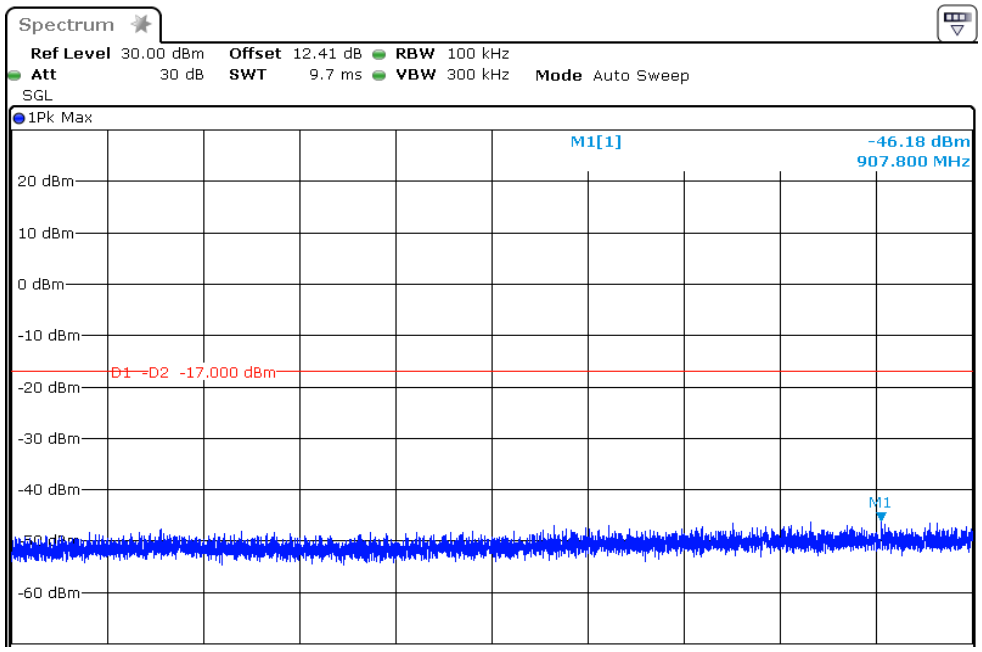
π/4DQPSK_MCH_Graphs	
Pref	

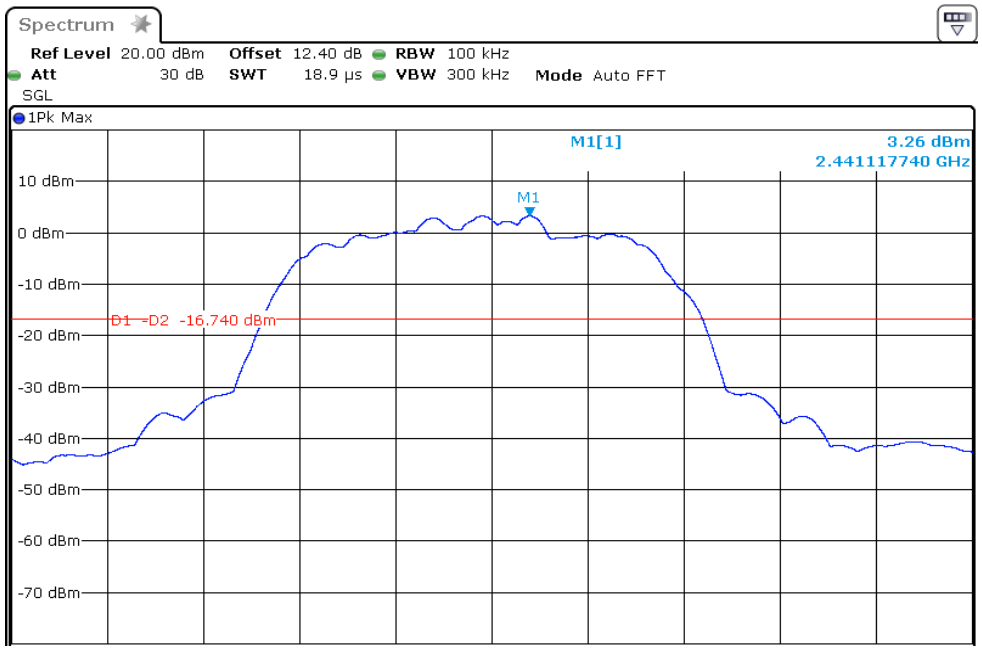
Puw	

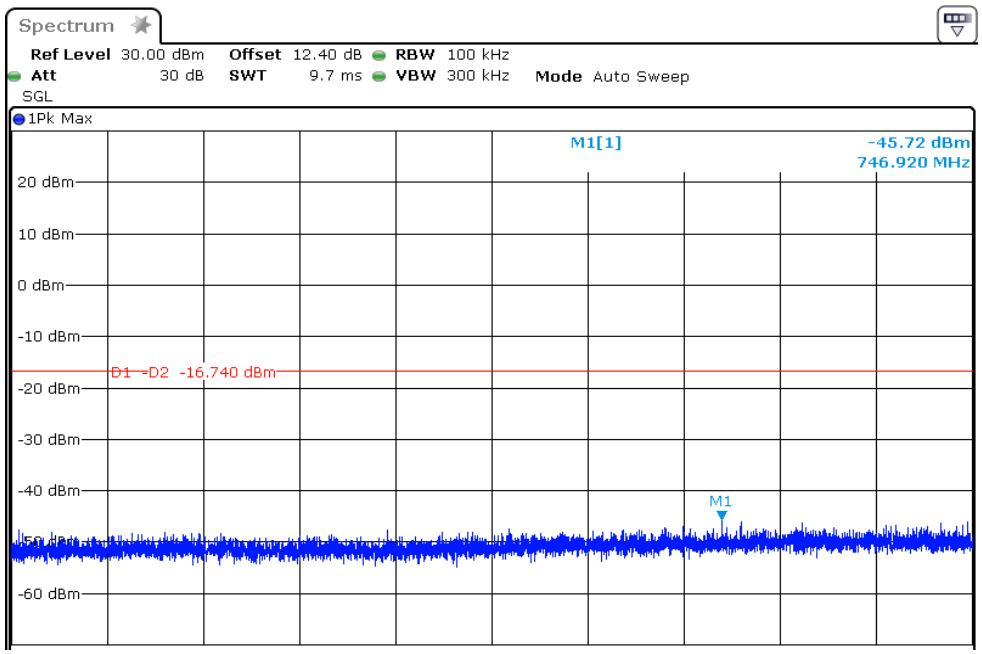
π/4DQPSK_HCH_Graphs	
Pref	

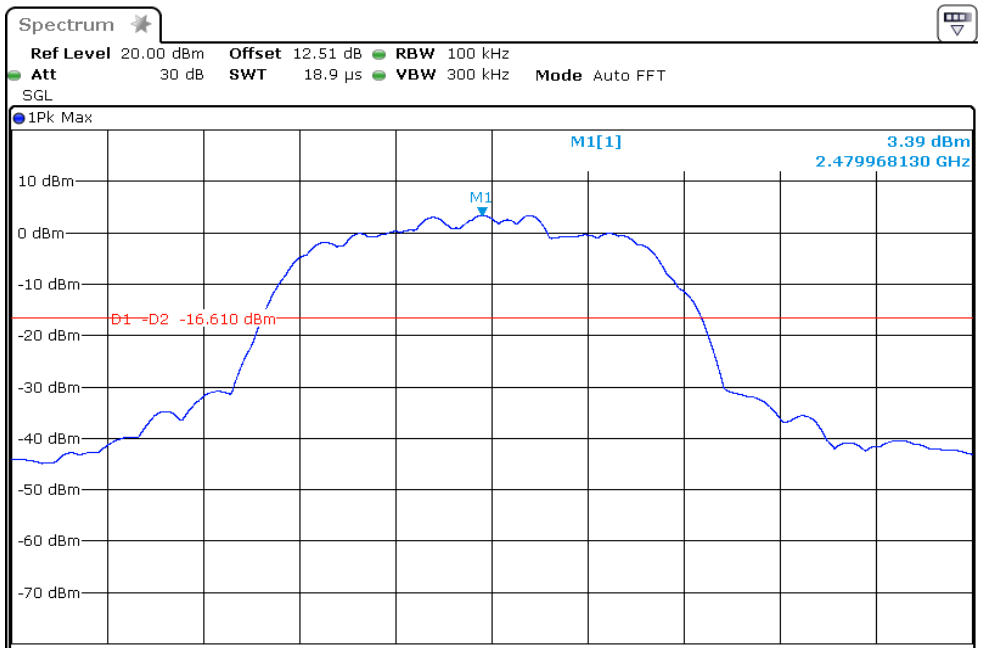
Puw	

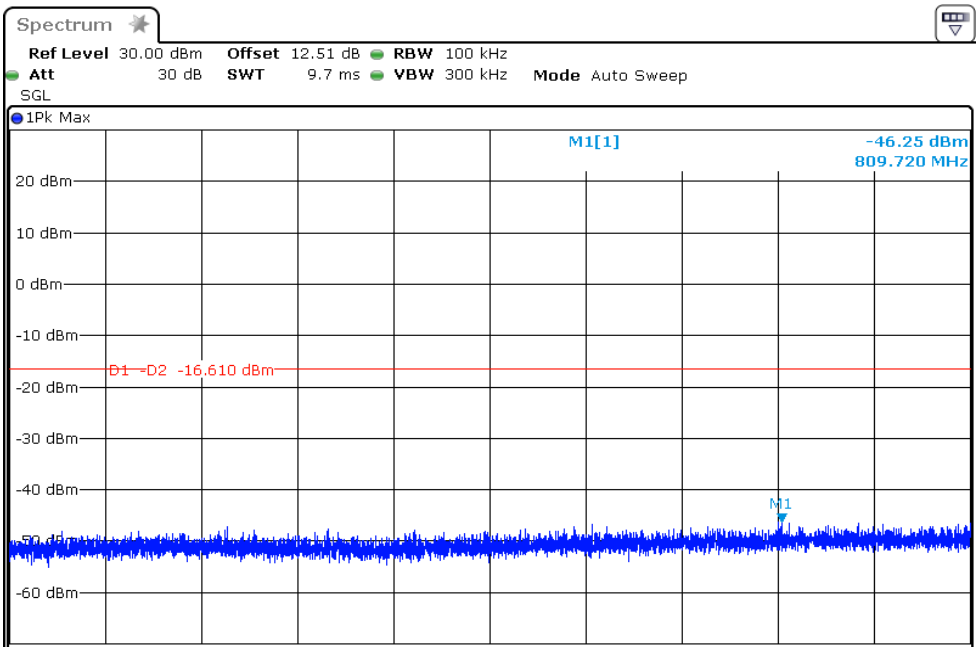
8DPSK_LCH_Graphs	
Pref	

Puw	

8DPSK_MCH_Graphs	
Pref	

Puw	

8DPSK_HCH_Graphs	
Pref	

Puw	

** END OF REPORT **