



RF TEST REPORT

Report No.: SET2018-05457

Product Name: Smart POS Payment Terminal

FCC ID: SWSI9000S

Model No. : i9000S

Applicant: Shenzhen Urovo Technology Co., Ltd.

Address: A7, Zondy Cyber Building, Nanshan, Shenzhen, China

Dates of Testing: 05/7/2018 — 05/12/2018

Issued by: CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

Lab Location: Building 28/29, East of Shigu Xili Industrial Zone, Nanshan District
Shenzhen, Guangdong 518055, China

Tel: 86 755 26627338 **Fax:** 86 755 26627238

This test report consists of **69** pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by CCIC-SET. The test results in the report only apply to the tested sample. The test report shall be invalid without all the signatures of testing engineers, reviewer and approver. Any objections must be raised to CCIC-SET within 20 days since the date when the report is received. It will not be taken into consideration beyond this limit.



Test Report

Product Name: Smart POS Payment Terminal

Brand Name: UROVO

Trade Name: N.A

Applicant.....: Shenzhen Urovo Technology Co., Ltd.

Applicant Address.....: A7, Zondy Cyber Building, Nanshan, Shenzhen, China

Manufacturer: Shenzhen Urovo Technology Co., Ltd.

Manufacturer Address: A7, Zondy Cyber Building, Nanshan, Shenzhen, China

Test Standards.....: 47 CFR Part 15 Subpart C 2017: Radio Frequency Devices
ANSI C63.10:2013: American National Standard for
Testing Unlicensed Wireless Devices
DA 00-705: Filing and Measurement Guidelines
for Frequency Hopping Spread Spectrum Systems

Test Result: PASS

Tested by: 
2018.05.12
Shallwe Yang, Test Engineer

Reviewed by: 
2018.05.12
Zhu Qi, Senior Engineer

Approved by: 
2018.05.12
Smart Li, Manager

Table of contents

RF TEST REPORT	1
1. GENERAL INFORMATION	4
1.1. EUT Description	4
1.2. Test Standards and Results.....	5
1.3. Frequency Hopping System Requirements.....	6
1.4. Facilities and Accreditations	8
2. 47 CFR PART 15C REQUIREMENTS.....	9
2.1. Antenna requirement.....	9
2.2. Number of Hopping Frequency	10
2.3. Peak Output Power.....	12
2.4. 20dB Bandwidth	14
2.5. Carried Frequency Separation.....	16
2.6. Dwell time.....	18
2.7. Conducted Spurious Emissions.....	20
2.8. Conducted Band Edge.....	22
2.9. Conducted Emission	24
2.10. Radiated Band Edges and Spurious Emission	28
3. LIST OF MEASURING EQUIPMENT	42
APPENDIX A	43

Change History		
Issue	Date	Reason for change
1.0	2018.05.12	First edition

1. General Information

1.1. EUT Description

EUT Type	Smart POS Payment Terminal	
Hardware Version	SQ27TW_MB_V01	
Software Version	3.10.49	
Frequency Range	Bluetooth EDR	2402MHz~2480MHz
Channel Number	Bluetooth EDR	79
Bit Rate of Transmitter	Bluetooth EDR	1/2/3Mbps
Modulation Type	Bluetooth EDR	GFSK, $\pi/4$ DQPSK, 8DPSK
Antenna Type	IFA antenna	
Antenna Gain	2.5dBi	

- Note 1: The EUT is a Smart POS Payment Terminal , it contains Bluetooth Module operating at 2.4GHz ISM band; the frequencies allocated for the Bluetooth Module is $F(\text{MHz})=2402+1*n$ ($0 \leq n \leq 78$). 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 is 1600 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 1DH1, 1DH3, 1DH5, 2DH1, 2DH3, 2DH5, 3DH1, 3DH3, 3DH5, 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 ID 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

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

No.	Section in CFR 47	Description	Result
1	15.203	Antenna Requirement	PASS
2	15.247(a)	Number of Hopping Frequency	PASS
3	15.247(b)	Peak Output Power	PASS
4	15.247(a)	20dB Bandwidth	PASS
5	15.247(a)	Carrier Frequency Separation	PASS
6	15.247(a)	Time of Occupancy (Dwell time)	PASS
7	15.247(d)	Conducted Spurious Emission	PASS
8	15.247(d)	Conducted Band Edge	PASS
9	15.207	Conducted Emission	PASS
10	15.209 15.247(c)	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.

Carrier Frequency and channel List:

Channel	Frequency(MHz)
0	2402
1	2403
...	...
39	2441
40	2442
...	...
77	2479
78	2480

Note: $F(\text{MHz}) = 2402 + 1 * n$ ($0 \leq n \leq 78$)

1.4. Facilities and Accreditations

1.4.1. Facilities

CNAS-Lab Code: L1659

CCIC-SET is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659.

FCC-Registration No.: CN5031

CCIC Southern Electronic Product Testing (Shenzhen) 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. Designation Number: CN5031, valid time is until December 31, 2018.

ISED Registration: 11185A-1

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on Aug. 04, 2016, valid time is until Aug. 03, 2019.

NVLAP Lab Code: 201008-0

CCIC-SET is a third party testing organization accredited by NVLAP according to ISO/IEC 17025. The accreditation certificate number is 201008-0.

1.4.2. Test Environment Conditions

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

Temperature (°C):	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: Internal antenna

An Internal antenna was soldered to the antenna port of EUT via an adaptor cable, can't be removed.

Antenna General Information:

No.	EUT	Ant. Type	Gain(dBi)
1	Smart POS Payment Terminal	IFA	2.5

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

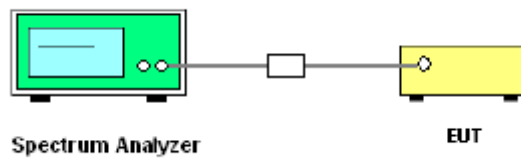
2.2.1. Limit of Number of Hopping Frequency

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 $\geq$ 100KHz; VBW $\geq$ 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

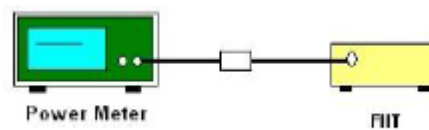
Section 15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz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

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

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 of Output Power

Please refer to Appendix A for detail

2.4. 20dB Bandwidth

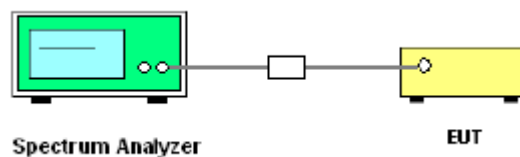
2.4.1. Definition

According to FCC §15.247(a)(1), the 20dB bandwidth is known as the 99% emission bandwidth, or 20dB bandwidth ($10 \cdot \log 1\% = 20\text{dB}$) 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 $\geq$ 1% of the 20 dB bandwidth; VBW $\geq$ RBW; Sweep = auto; Detector function = peak;

Trace = max hold.

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

2.4.5. Test Results of 20dB Bandwidth

Please refer to Appendix A for detail

2.5. Carried Frequency Separation

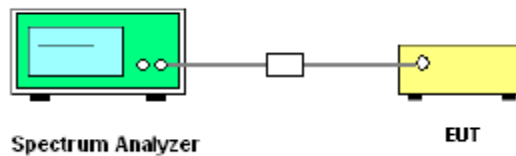
2.5.1. Limit of Carried Frequency Separation

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; $RBW \geq 1\%$ of the span;

 $VBW \geq RBW$; 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

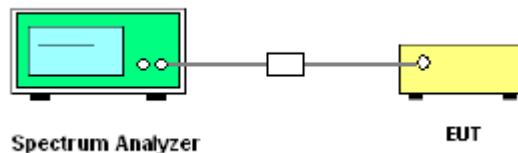
2.6.1. Limit of Dwell Time

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



2.6.4. 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 = zero span, centered on a hopping channel; RBW = 1 MHz; VBW $\geq$ 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.

2.6.5. Test Results of Dwell Time

Please refer to Appendix A for detail

2.7. Conducted Spurious Emissions

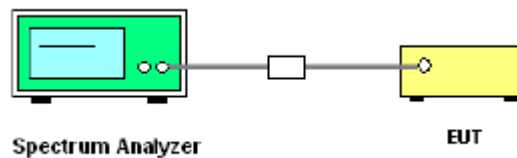
2.7.1. Limit of Spurious Emission

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 Results of Conducted Spurious Emissions

Please refer to Appendix A for detail

2.8. Conducted Band Edge

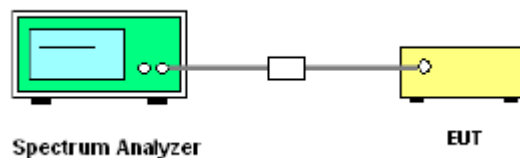
2.8.1. Limit of Band Edges

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



2.8.1. 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 $RBW = 100\text{kHz}$ ($\geq 1\%$ span=10MHz), $VBW = 300\text{kHz}$ ($\geq RBW$). 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.

2.8.2. Test Results of Conducted Band Edge

Please refer to Appendix A for detail

2.9. Conducted Emission

2.9.1. Limit of Conducted Emission

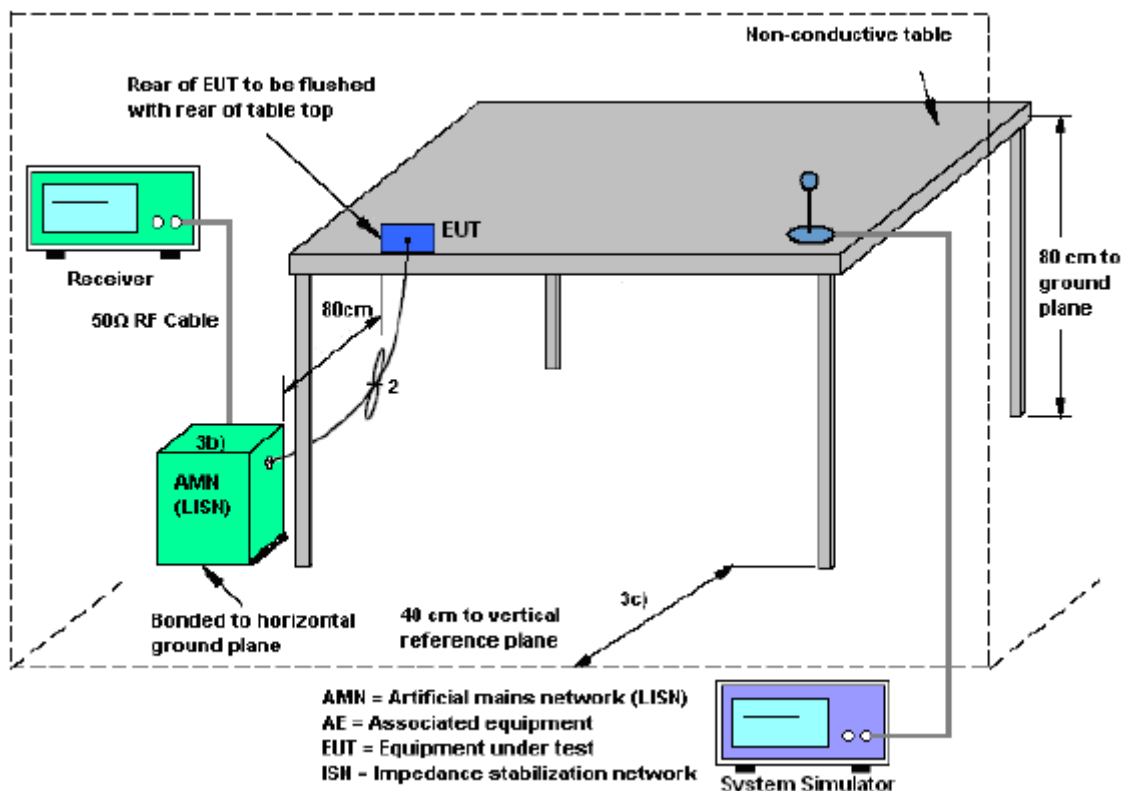
For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency range (MHz)	Conducted Limit (dB μ V)	
	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

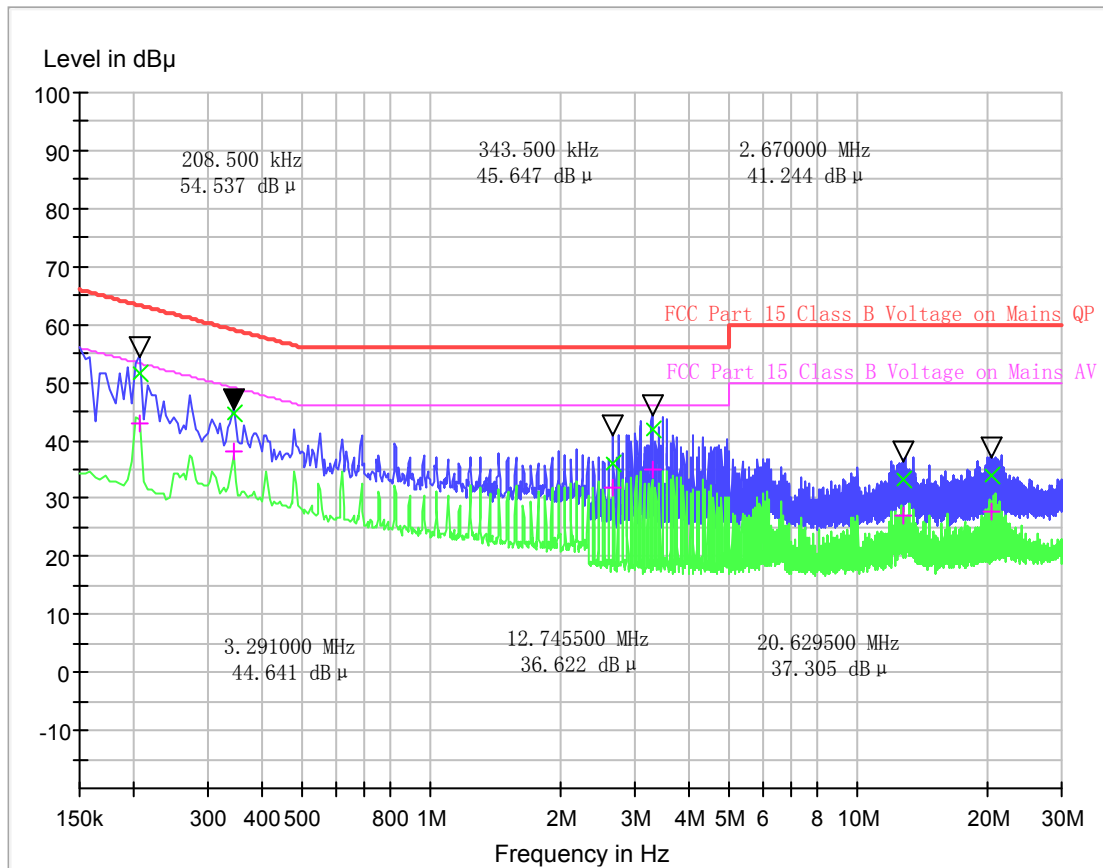


2.9.4. Test Procedures

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.

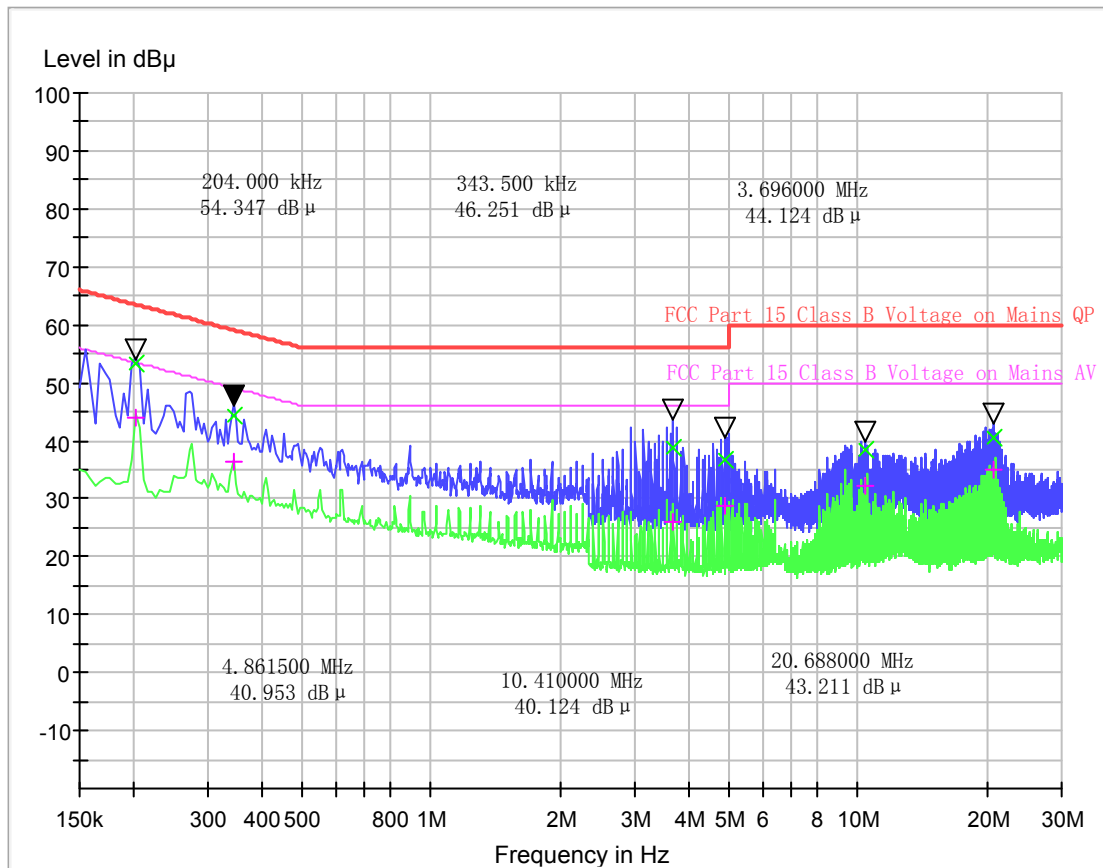
2.9.3. Test Results of Conducted Emission

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



(Plot A: L Phase)

Conducted Disturbance at Mains Terminals					
L Test Data					
QP			AV		
Frequency (MHz)	Limits (dB μ V)	Measurement Value (dB μ V)	Frequency (MHz)	Limits (dB μ V)	Measurement Value (dB μ V)
0.208500	63.3	51.69	0.208500	53.3	43.05
0.343500	59.1	44.62	0.343500	49.1	38.02
2.670000	56.0	35.97	2.670000	46.0	31.97
3.291000	56.0	41.79	3.291000	46.0	35.06
12.745500	60.0	33.37	12.745500	50.0	26.86
20.629500	60.0	33.81	20.629500	50.0	27.80



(Plot B: N Phase)

Conducted Disturbance at Mains Terminals					
N Test Data					
QP			AV		
Frequency (MHz)	Limits (dB μ V)	Measurement Value (dB μ V)	Frequency (MHz)	Limits (dB μ V)	Measurement Value (dB μ V)
0.204000	63.4	53.23	0.204000	53.4	43.92
0.343500	59.1	44.23	0.343500	49.1	36.25
3.696000	56.0	38.72	3.696000	46.0	25.87
4.861500	56.0	36.81	4.861500	46.0	28.68
10.410000	60.0	38.29	10.410000	50.0	32.29
20.688000	60.0	40.68	20.688000	50.0	34.92

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.

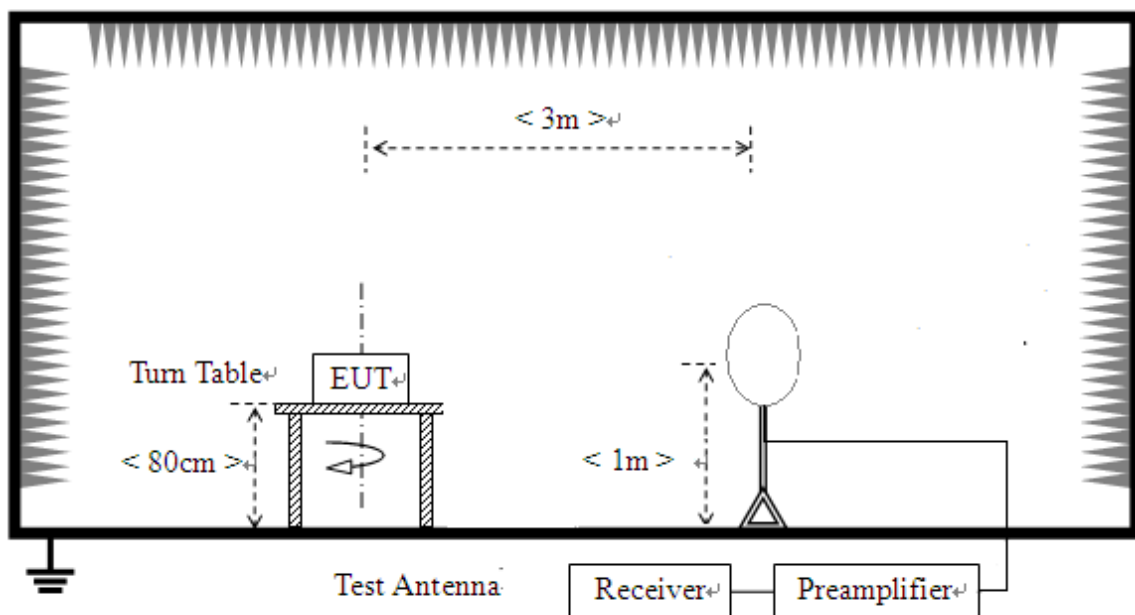
Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 - 0.490	$2400/F(\text{kHz})$	300
0.490 - 1.705	$24000/F(\text{kHz})$	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

2.10.2. Measuring Instruments

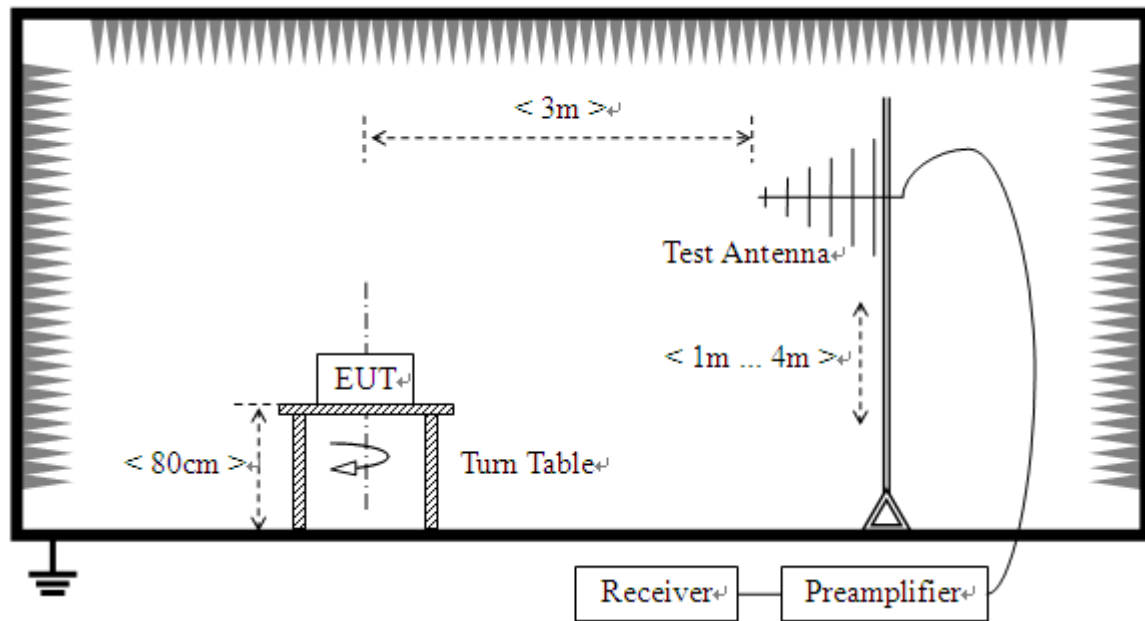
The measuring equipment is listed in the section 3 of this test report.

2.10.3. Test Setup

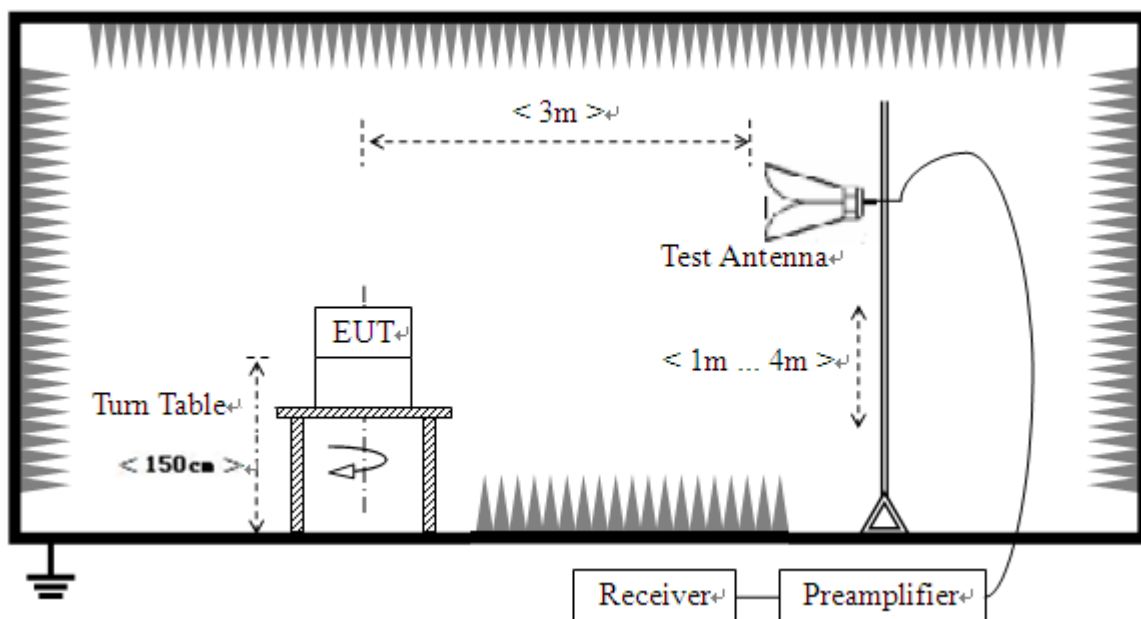
- 1) For radiated emissions from 9kHz to 30MHz



- 2) For radiated emissions from 30MHz to 1GHz



- 3) For radiated emissions above 1GHz



2.10.4. Test Procedure

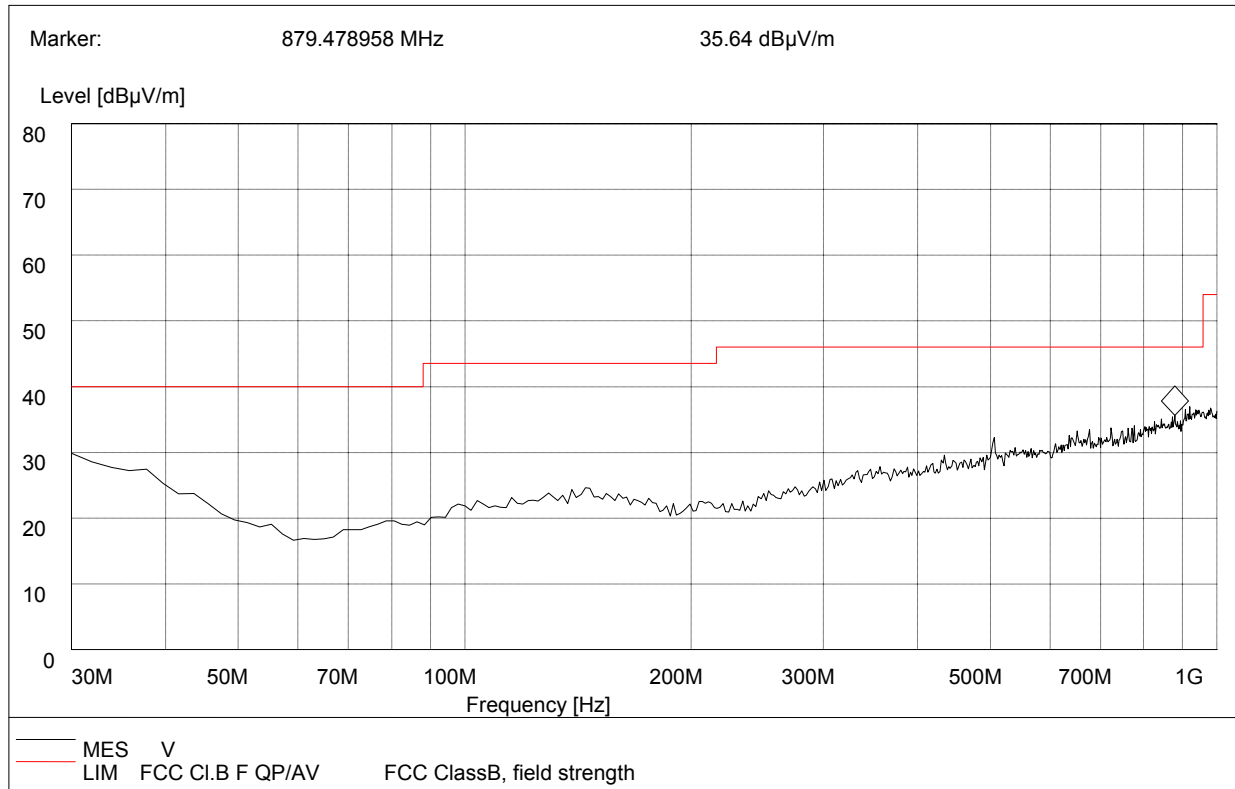
1. The testing follows the guidelines in Spurious Radiated Emissions of FCC Public Notice DA 00-705 Measurement Guidelines.
2. The EUT was placed on a turntable with 0.8 m for below 1GHz and 1.5m for above 1GHz, above the ground.
3. The EUT was set 3 meters from the interference receiving antenna, which 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 $f > 1$ GHz ; VBW $\geq$ 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 = $N_1 * L_1 + N_2 * L_2 + \dots + N_{n-1} * L_{N_{n-1}} + N_n * L_n$
Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc.
Average Emission Level = Peak Emission Level + $20 * \log(\text{Duty cycle})$
7. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

2.10.5. Test Results of Radiated Band Edge and Spurious Emission

For 9 KHz to 30MHz

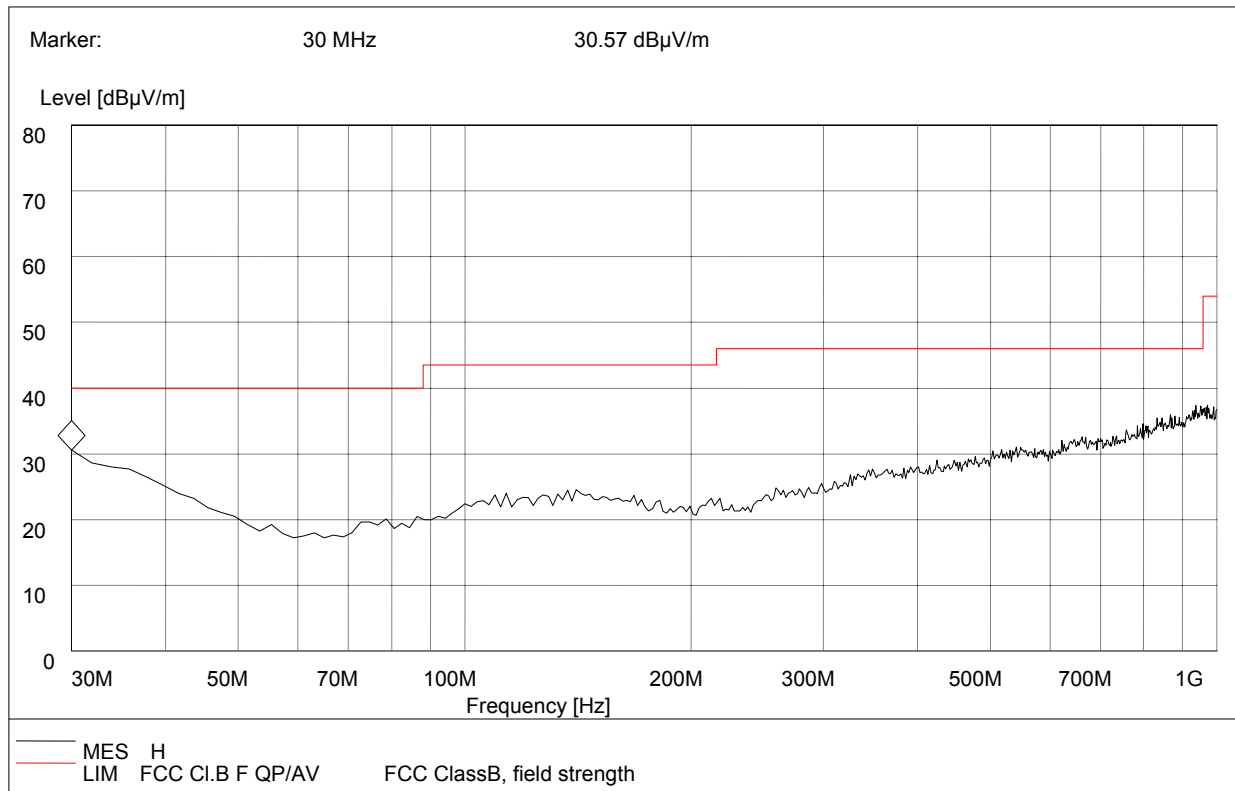
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

For 30MHz to 1000MHz



Frequency (MHz)	QuasiPeak (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Antenna	Verdict
30.380000	28.15	120.000	100.0	40.0	Vertical	Pass
36.570000	25.46	120.000	100.0	40.0	Vertical	Pass
147.850000	22.52	120.000	100.0	43.5	Vertical	Pass
357.340000	25.85	120.000	100.0	46.0	Vertical	Pass
506.890000	30.56	120.000	100.0	46.0	Vertical	Pass
880.270000	33.54	120.000	100.0	46.0	Vertical	Pass

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



Frequency (MHz)	QuasiPeak (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Antenna	Verdict
30.150000	28.55	120.000	100.0	40.0	Horizontal	Pass
36.540000	24.69	120.000	100.0	40.0	Horizontal	Pass
115.530000	21.54	120.000	100.0	43.5	Horizontal	Pass
141.580000	23.55	120.000	100.0	43.5	Horizontal	Pass
833.910000	33.85	120.000	100.0	46.0	Horizontal	Pass
938.660000	35.49	120.000	100.0	46.0	Horizontal	Pass

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

For 1GHz to 25GHz
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (GFSK-2402MHz)

No.	Fre. (MHz)	Emission 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	49.1	PK	74	-24.9	1.50 H	120	47.8	5.2	28.6	32.5	1.3
2	2390	40.69	AV	54	-13.31	1.50 H	100	39.39	5.2	28.6	32.5	1.3
3	4804	50.21	PK	74	-23.79	1.50 H	180	43.81	7.4	30.4	31.4	6.4
4	4804	41.36	AV	54	-12.64	1.50 H	90	34.96	7.4	30.4	31.4	6.4
5	9608	50.33	PK	74	-23.67	1.00 H	90	41.03	9.9	31.5	32.1	9.3
6	9608	40.16	AV	54	-13.84	1.00 H	360	30.86	9.9	31.5	32.1	9.3

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (GFSK-2402MHz)

No.	Frequency (MHz)	Emission 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	55.35	PK	74	-18.65	1.50 V	130	54.05	5.2	28.6	32.5	1.3
2	2390	46.25	AV	54	-7.75	1.50 V	130	44.95	5.2	28.6	32.5	1.3
3	4804	49.65	PK	74	-24.35	1.49 V	90	43.25	7.4	30.4	31.4	6.4
4	4804	40.33	AV	54	-13.67	1.48 V	90	33.93	7.4	30.4	31.4	6.4
5	9608	48.69	PK	74	-25.31	1.37 V	270	39.39	9.9	31.5	32.1	9.3
6	9608	38.15	AV	54	-15.85	1.30 V	270	28.85	9.9	31.5	32.1	9.3

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (GFSK-2441MHz)

No.	Fre. (MHz)	Emission 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	1200.05	45.62	PK	74	-28.38	1.00 H	155	46.22	1.8	29.5	31.9	-0.6
2	1200.05	35.26	AV	54	-18.74	1.00 H	155	35.86	1.8	29.5	31.9	-0.6
3	2010.58	48.36	PK	74	-25.64	1.50 H	60	48.96	2.8	28.7	32.1	-0.6
4	2010.58	38.47	AV	54	-15.53	1.50 H	60	39.07	2.8	28.7	32.1	-0.6
5	4882	50.36	PK	74	-23.64	1.50 H	62	43.96	6.7	31.2	31.5	6.4
6	4882	41.75	AV	54	-12.25	1.50 H	62	35.35	6.7	31.2	31.5	6.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (GFSK-2441MHz)

No.	Frequency (MHz)	Emission 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	1200.05	47.36	PK	74	-26.64	1.30 V	46	47.96	1.8	29.5	31.9	-0.6
2	1200.05	37.25	AV	54	-16.75	1.39 V	46	37.85	1.8	29.5	31.9	-0.6
3	2010.58	46.68	PK	74	-27.32	1.09 V	50	47.28	2.8	28.7	32.1	-0.6
4	2010.58	35.95	AV	54	-18.05	1.48 V	50	36.55	2.8	28.7	32.1	-0.6
5	4882	51.08	PK	74	-22.92	1.50 V	56	44.68	6.7	31.2	31.5	6.4
6	4882	40.98	AV	54	-13.02	1.50 V	56	34.58	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	1002.05	48.96	PK	74	-25.04	1.00 H	36	49.76	1.5	29.6	31.9	-0.8
2	1002.05	37.95	AV	54	-16.05	1.00 H	36	38.75	1.5	29.6	31.9	-0.8
3	2483.5	51.26	PK	74	-22.74	1.50 H	42	48.66	5.7	28.7	31.8	2.6
4	2483.5	44.95	AV	54	-9.05	1.50 H	42	42.35	5.7	28.7	31.8	2.6
5	4960	50.12	PK	74	-23.88	1.50 H	30	43.42	7	31.2	31.5	6.7
6	4960	43.19	AV	54	-10.81	1.50 H	30	36.49	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	1002.5	46.26	PK	74	-27.74	1.50 V	130	47.06	1.5	29.6	31.9	-0.8
2	1002.5	36.60	AV	54	-17.4	1.50 V	230	37.4	1.5	29.6	31.9	-0.8
3	2483.5	51.96	PK	74	-22.04	1.60 V	140	49.36	5.7	28.7	31.8	2.6
4	2483.5	45.26	AV	54	-8.74	1.61 V	140	42.66	5.7	28.7	31.8	2.6
5	4960	50.24	PK	74	-23.76	1.40 V	180	43.54	7	31.2	31.5	6.7
6	4960	41.26	AV	54	-12.74	1.45 V	90	34.56	7	31.2	31.5	6.7

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M ($\pi/4$ -PI/4DQPSK

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	49.36	PK	74	-24.64	1.50 H	100	48.06	5.2	28.6	32.5	1.3
2	2390	41.78	AV	54	-12.22	1.50 H	100	40.48	5.2	28.6	32.5	1.3
3	4804	51.06	PK	74	-22.94	1.27 H	270	44.66	6.7	31.2	31.5	6.4
4	4804	44.28	AV	54	-9.72	1.26 H	270	37.88	6.7	31.2	31.5	6.4
5	9608	50.16	PK	74	-23.84	1.55 H	180	35.26	16	30.9	32	14.9
6	9608	40.09	AV	54	-13.91	1.62 H	180	25.19	16	30.9	32	14.9

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M ($\pi/4$ -PI/4DQPSK -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	51.36	PK	74	-22.64	1.50 V	50	50.06	5.2	28.6	32.5	1.3
2	2390	44.01	AV	54	-9.99	1.50 V	150	42.71	5.2	28.6	32.5	1.3
3	4804	50.36	PK	74	-23.64	1.64 V	150	43.96	6.7	31.2	31.5	6.4
4	4804	40.15	AV	54	-13.85	1.61 V	47	33.75	6.7	31.2	31.5	6.4
5	9608	51.26	PK	74	-22.74	1.51 V	64	36.36	16	30.9	32	14.9
6	9608	40.98	AV	54	-13.02	1.45 V	150	26.08	16	30.9	32	14.9

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M ($\pi/4$ -PI/4DQPSK)

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	1500.05	46.28	PK	74	-27.72	1.50 H	36	47.78	2	29	32.5	-1.5
2	1500.05	36.19	AV	54	-17.81	1.50 H	36	37.69	2	29	32.5	-1.5
3	3000.68	46.38	PK	74	-27.62	1.50 H	45	41.63	6.2	30.05	31.5	4.75
4	3000.68	37.25	AV	54	-16.75	1.50 H	45	32.5	6.2	30.05	31.5	4.75
5	4882	50.15	PK	74	-23.85	1.52 H	45	43.45	7	31.2	31.5	6.7
6	4882	41.36	AV	54	-12.64	1.53 H	45	34.66	7	31.2	31.5	6.7

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M ($\pi/4$ -PI/4DQPSK _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	1500	44.36	PK	74	-29.64	1.50 V	40	45.86	2	29	32.5	-1.5
2	1500	34.29	AV	54	-19.71	1.51 V	40	35.79	2	29	32.5	-1.5
3	3000.55	48.18	PK	74	-25.82	1.50 V	42	43.43	6.2	30.05	31.5	4.75
4	3000.55	38.89	AV	54	-15.11	1.54 V	42	34.14	6.2	30.05	31.5	4.75
5	4882	50.26	PK	74	-23.74	1.50 V	45	43.56	7	31.2	31.5	6.7
6	4882	41.39	AV	54	-12.61	1.51 V	45	34.69	7	31.2	31.5	6.7

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M ($\pi/4$ -PI/4DQPSK

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	1507.88	46.36	PK	74	-27.64	1.60 H	66	47.86	2	29	32.5	-1.5
2	1507.88	36.58	AV	54	-17.42	1.50 H	66	38.08	2	29	32.5	-1.5
3	2483.5	51.25	PK	74	-22.75	1.41 H	60	48.65	5.7	28.7	31.8	2.6
4	2483.5	42.00	AV	54	-12	1.30 H	60	39.4	5.7	28.7	31.8	2.6
5	4960	51.19	PK	74	-22.81	1.50 H	58	44.49	7	31.2	31.5	6.7
6	4960	42.39	AV	54	-11.61	1.50 H	58	35.69	7	31.2	31.5	6.7

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M ($\pi/4$ -PI/4DQPSK _ 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	1507.55	44.95	PK	74	-29.05	1.36 V	60	46.45	2	29	32.5	-1.5
2	1507.55	35.26	AV	54	-18.74	1.41 V	60	36.76	2	29	32.5	-1.5
3	2483.5	51.28	PK	74	-22.72	1.50 V	55	48.68	5.7	28.7	31.8	2.6
4	2483.5	42.26	AV	54	-11.74	1.50 V	55	39.66	5.7	28.7	31.8	2.6
5	4960	50.36	PK	74	-23.64	1.51 V	55	43.66	7	31.2	31.5	6.7
6	4960	42.58	AV	54	-11.42	1.50 V	55	35.88	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	1200.65	46.62	PK	74	-27.38	1.40 H	100	47.22	1.8	29.5	31.9	-0.6
2	1200.65	36.25	AV	54	-17.75	1.50 H	100	36.85	1.8	29.5	31.9	-0.6
3	2390	54.36	PK	74	-19.64	1.61 H	150	53.06	5.2	28.6	32.5	1.3
4	2390	46.25	AV	54	-7.75	1.44 H	150	44.95	5.2	28.6	32.5	1.3
5	4804	50.36	PK	74	-23.64	1.40 H	180	43.96	7.4	30.4	31.4	6.4
6	4804	41.26	AV	54	-12.74	1.60 H	180	34.86	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	1200.58	45.41	PK	74	-28.59	1.50 V	230	46.01	1.8	29.5	31.9	-0.6
2	1200.58	34.22	AV	54	-19.78	1.42 V	230	34.82	1.8	29.5	31.9	-0.6
3	2390	51.26	PK	74	-22.74	1.50 V	70	49.96	5.2	28.6	32.5	1.3
4	2390	42.36	AV	54	-11.64	1.50 V	70	41.06	5.2	28.6	32.5	1.3
5	4804	51.99	PK	74	-22.01	1.00 V	150	45.59	7.4	30.4	31.4	6.4
6	4804	41.84	AV	54	-12.16	1.00 V	150	35.44	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	1800.98	48.68	PK	74	-25.32	1.50 H	52	49.18	2.5	29.4	32.4	-0.5
2	1800.98	39.58	AV	54	-14.42	1.50 H	52	40.08	2.5	29.4	32.4	-0.5
3	4882	52.19	PK	74	-21.81	1.50 H	62	45.79	6.7	31.2	31.5	6.4
4	4882	43.71	AV	54	-10.29	1.50 H	62	37.31	6.7	31.2	31.5	6.4
5	9764	51.36	PK	74	-22.64	1.50 H	74	42.56	9.9	31	32.1	8.8
6	9764	43.25	AV	54	-10.75	1.50 H	74	34.45	9.9	31	32.1	8.8

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (8-PI/4DQPSK_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	1800.98	44.52	PK	74	-29.48	1.33 V	55	45.02	2.5	29.4	32.4	-0.5
2	1800.98	34.54	AV	54	-19.46	1.19 V	55	35.04	2.5	29.4	32.4	-0.5
3	4882	51.15	PK	74	-22.85	1.45 V	73	44.75	6.7	31.2	31.5	6.4
4	4882	41.26	AV	54	-12.74	1.64 V	73	34.86	6.7	31.2	31.5	6.4
5	9764	50.25	PK	74	-23.75	1.41 V	120	41.45	9.9	31	32.1	8.8
6	9764	40.38	AV	54	-13.62	1.25 V	120	31.58	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	2483.5	53.36	PK	74	-20.64	1.52 H	156	50.76	5.7	28.7	31.8	2.6
2	2483.5	42.57	AV	54	-11.43	1.48 H	156	39.97	5.7	28.7	31.8	2.6
3	4960	50.65	PK	74	-23.35	1.29 H	52	44.25	6.7	31.2	31.5	6.4
4	4960	41.29	AV	54	-12.71	1.35 H	52	34.89	6.7	31.2	31.5	6.4
5	9920	51.11	PK	74	-22.89	1.50 H	100	36.21	16	30.9	32	14.9
6	9920	40.87	AV	54	-13.13	1.50 H	100	25.97	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	2483.5	52.24	PK	74	-21.76	1.46 V	120	49.64	5.7	28.7	31.8	2.6
2	2483.5	41.97	AV	54	-12.03	1.47 V	120	39.37	5.7	28.7	31.8	2.6
3	4960	50.08	PK	74	-23.92	1.20 V	270	43.68	6.7	31.2	31.5	6.4
4	4960	40.29	AV	54	-13.71	1.61 V	270	33.89	6.7	31.2	31.5	6.4
5	9920	49.95	PK	74	-24.05	1.50 V	36	35.05	16	30.9	32	14.9
6	9920	40.67	AV	54	-13.33	1.50 V	36	25.77	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 Factor(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	11/12/2017
2	EMI TEST RECEIVER	Rohde&Schwarz	ESI 26	100009	11/12/2017
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	11/12/2017
8	Amplifer	Sonoma	310N	E009-13	11/12/2017
9	JS amplifer	Rohde&Schwarz	JS4-00101800-28-5A	F201504	11/12/2017
10	High pass filter	Compliance Direction systems	BSU-6	34202	11/12/2017
11	HORNANTENNA	ShwarzBeck	9120D	1012	11/12/2017
12	Amplifer	Compliance Direction systems	PAP1-4060	120	11/12/2017
13	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	11/12/2017
14	TURNTABLE	MATURO	TT2.0	----	N/A
15	ANTENNA MAST	MATURO	TAM-4.0-P	----	N/A
16	Horn Antenna	SCHWARZBECK	BBHA9170	25841	11/12/2017
17	ULTRA-BROADBAND ANTENNA	Rohde&Schwarz	HL562	100015	11/12/2017
18	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal
19	Spectrum Analyzer	Rohde&Schwarz	FSP	1164.4391.40	11/12/2017
20	Spectrum Analyzer	Keysight	N9030A	ATO-67098	10/09/2017
21	Power Meter	Anritsu	ML2480B	100798	11/12/2017
22	Power Sensor	Anritsu	MA2411B	100258	11/12/2017

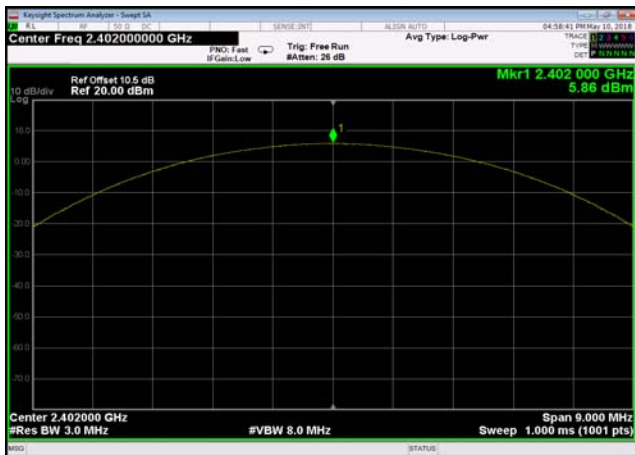
Appendix A

RF Output Power Test Result and Data

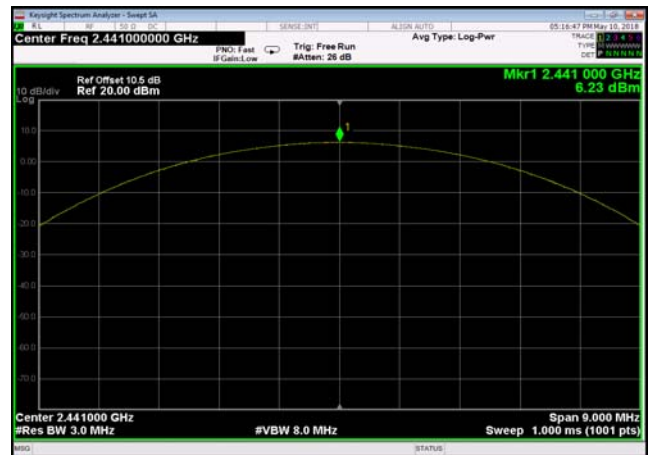
BT Maximum Output Power

Mode	Test Frequency	Packet Type	Power(dBm)	Result
GFSK	2402	DH5	5.454	Pass
GFSK	2441	DH5	5.835	Pass
GFSK	2480	DH5	6.306	Pass
PI/4DQPSK	2402	2DH5	5.486	Pass
PI/4DQPSK	2441	2DH5	5.881	Pass
PI/4DQPSK	2480	2DH5	6.304	Pass
8DPSK	2402	3DH5	5.855	Pass
8DPSK	2441	3DH5	6.230	Pass
8DPSK	2480	3DH5	6.731	Pass

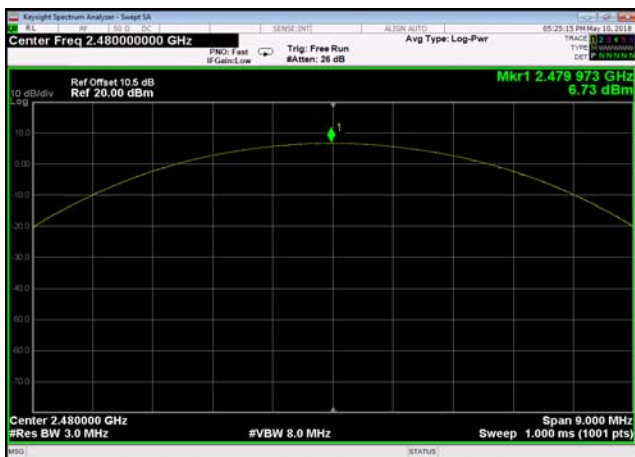
Output Power: 8DPSK,2402MHz,3DH5



Output Power: 8DPSK,2441MHz,3DH5



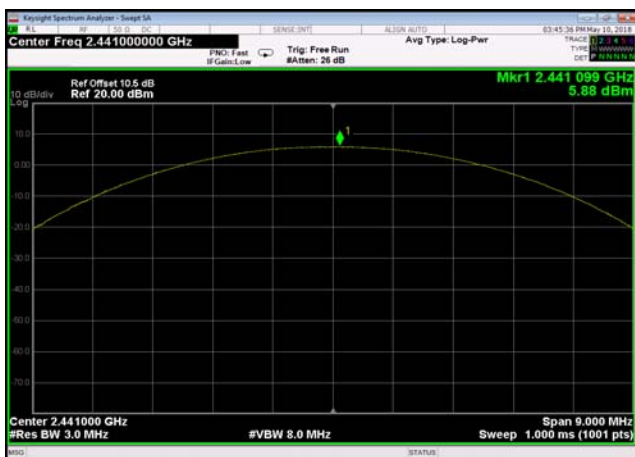
Output Power: 8DPSK,2480MHz,3DH5



Output Power: PI/4DQPSK,2402MHz,2DH5



Output Power: PI/4DQPSK,2441MHz,2DH5

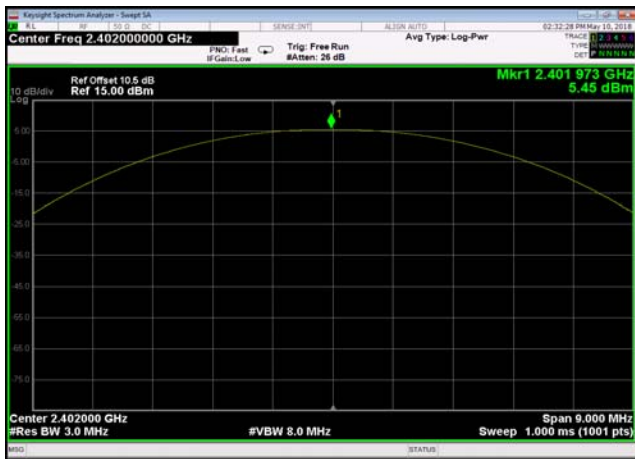


Output Power: PI/4DQPSK,2480MHz,2DH5

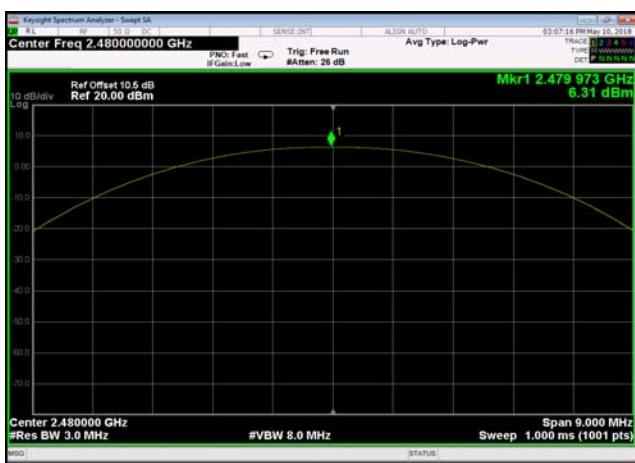
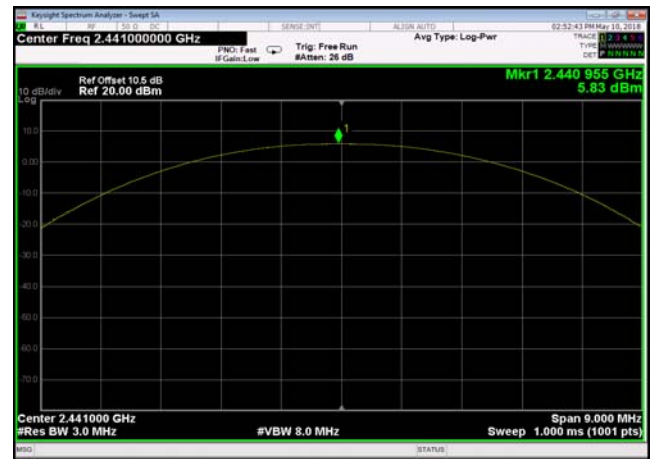


Output Power: GFSK,2402MHz,DH5

Output Power: GFSK,2441MHz,DH5



Output Power: GFSK,2480MHz,DH5

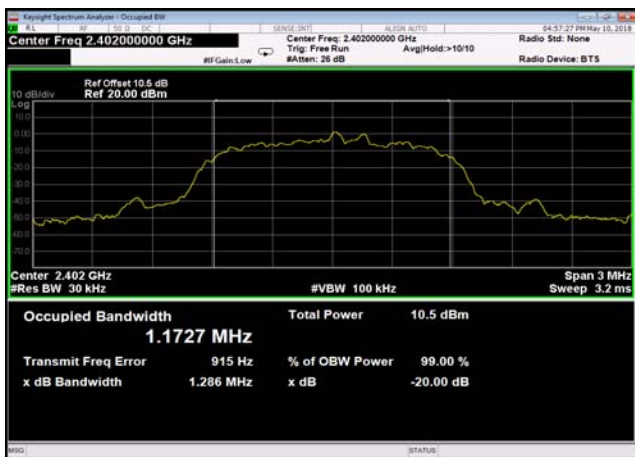


20dB Bandwidth Test Result and Data

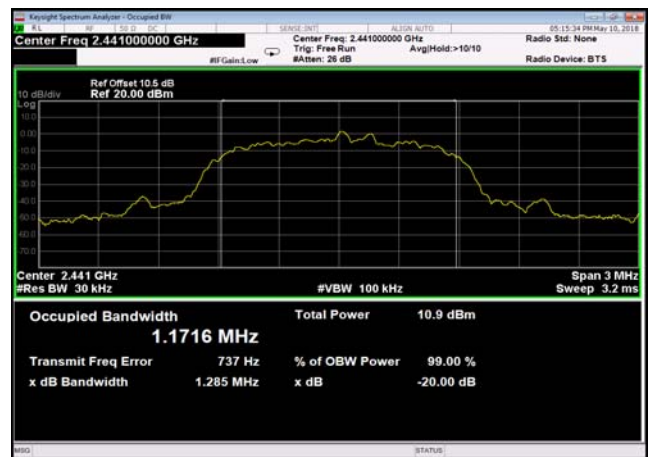
BT Occupied 20dB Bandwidth

Mode	Test Frequency	Packet Type	-20db Occupy Bandwidth(KHz)	Result
GFSK	2402	DH5	953.135	Pass
GFSK	2441	DH5	951.935	Pass
GFSK	2480	DH5	952.204	Pass
PI/4DQPSK	2402	2DH5	1282.377	Pass
PI/4DQPSK	2441	2DH5	1282.002	Pass
PI/4DQPSK	2480	2DH5	1282.384	Pass
8DPSK	2402	3DH5	1285.564	Pass
8DPSK	2441	3DH5	1284.967	Pass
8DPSK	2480	3DH5	1284.665	Pass

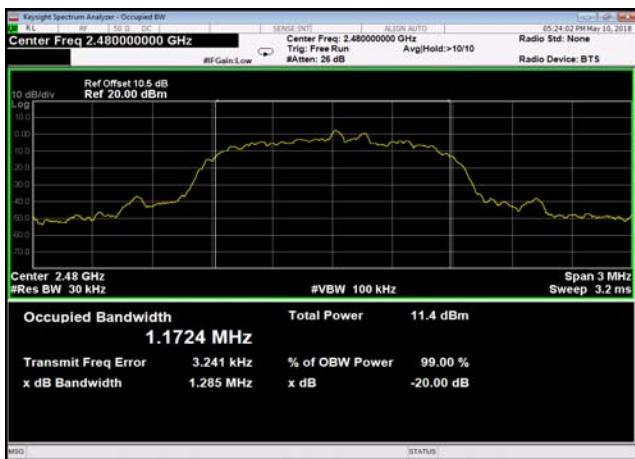
20dB Bandwidth: 8DPSK,2402Mhz,3DH5



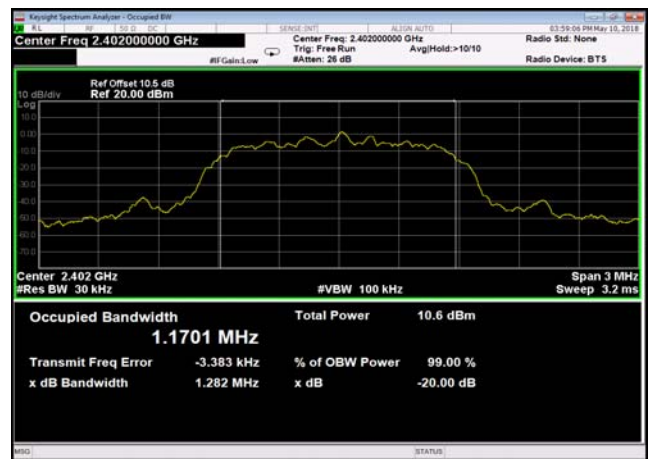
20dB Bandwidth: 8DPSK,2441Mhz,3DH5



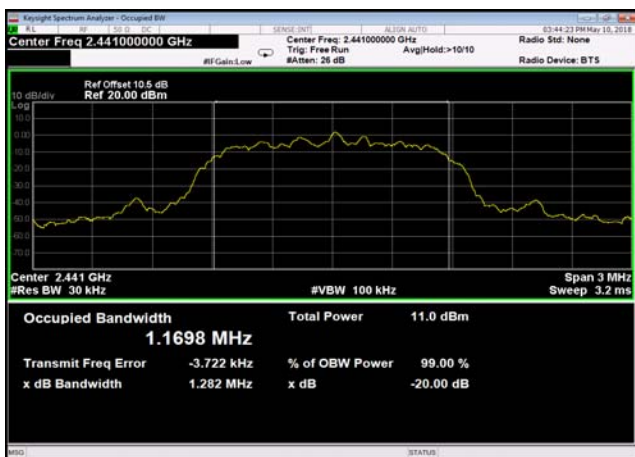
20dB Bandwidth: 8DPSK,2480Mhz,3DH5



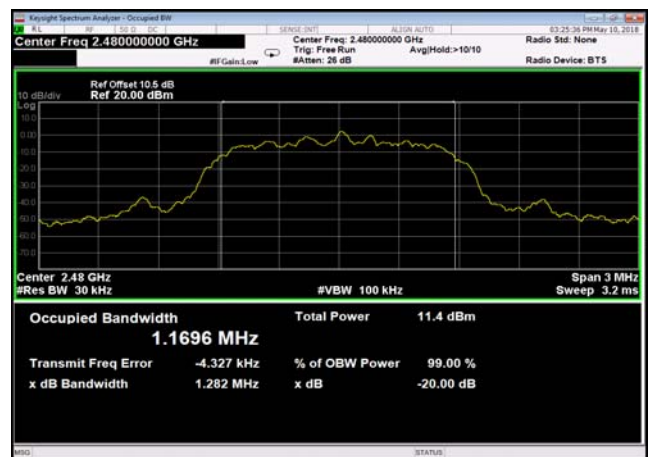
20dB Bandwidth: PI/4DQPSK,2402Mhz,2DH5



20dB Bandwidth: PI/4DQPSK,2441Mhz,2DH5

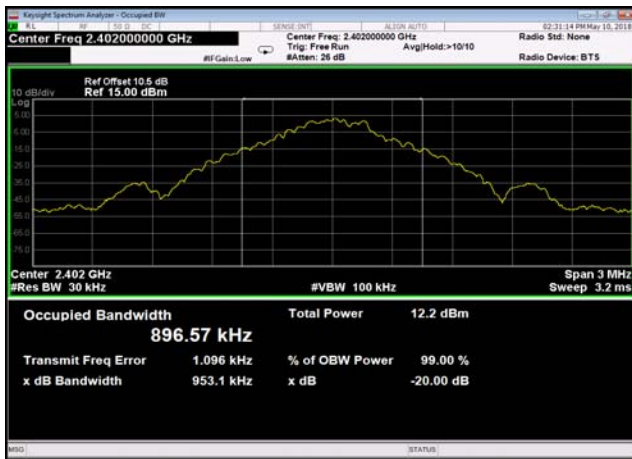


20dB Bandwidth: PI/4DQPSK,2480Mhz,2DH5

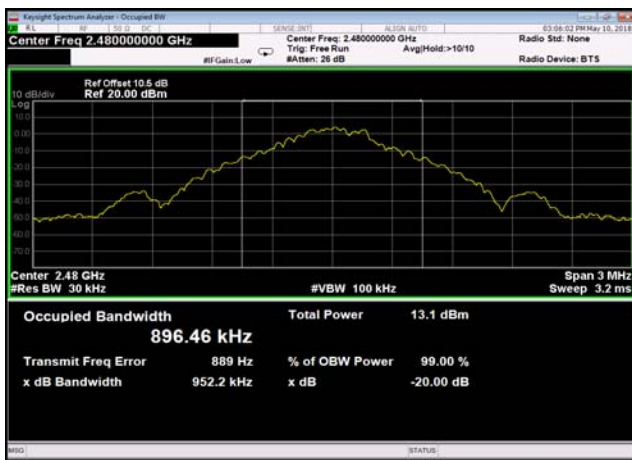
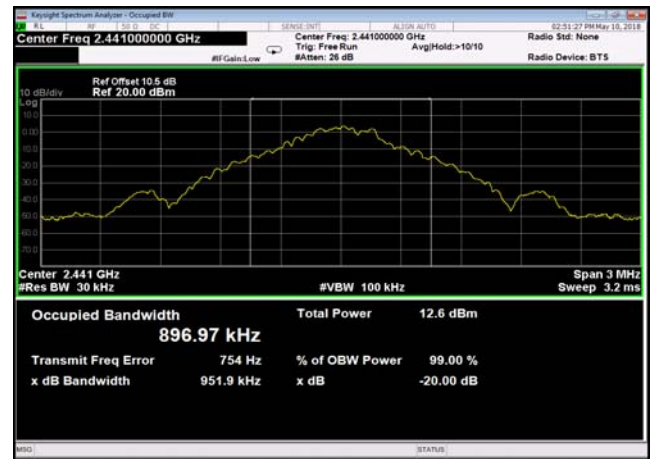


20dB Bandwidth: GFSK,2402Mhz,DH5

20dB Bandwidth: GFSK,2441Mhz,DH5



20dB Bandwidth: GFSK,2480Mhz,DH5

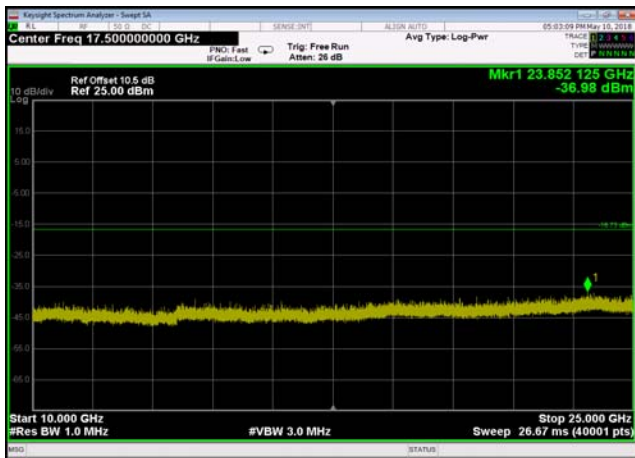


Transmitter Spurious Emission Test Result and Data

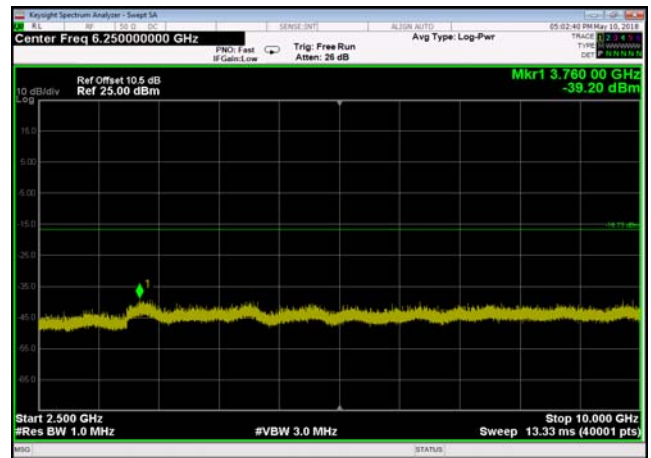
BT Transmitter Spurious Emission

Mode	Test Frequency	Packet Type	Frequency Range	Limit(dBm)	Result
GFSK	2402	DH5	Reference Level	-14.81	Pass
GFSK	2441	DH5	Reference Level	-14.42	Pass
GFSK	2480	DH5	Reference Level	-13.93	Pass
PI/4DQPSK	2402	2DH5	Reference Level	-16.79	Pass
PI/4DQPSK	2441	2DH5	Reference Level	-16.39	Pass
PI/4DQPSK	2480	2DH5	Reference Level	-15.99	Pass
8DPSK	2402	3DH5	Reference Level	-16.73	Pass
8DPSK	2441	3DH5	Reference Level	-16.38	Pass
8DPSK	2480	3DH5	Reference Level	-15.88	Pass

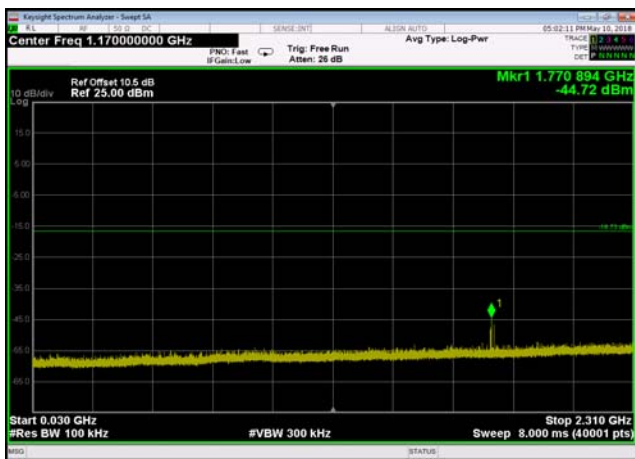
Conducted Emission: 8DPSK,2402,3DH5,10
000Mhz~25000Mhz



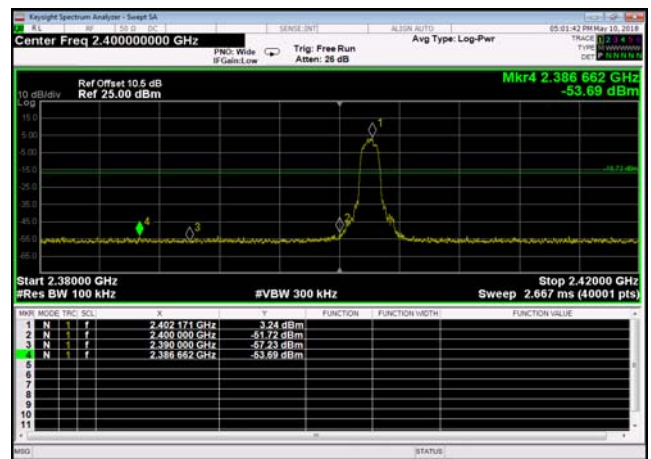
Conducted Emission: 8DPSK,2402,3DH5,25
00Mhz~10000Mhz



Conducted Emission: 8DPSK,2402,3DH5,30
Mhz~2310Mhz



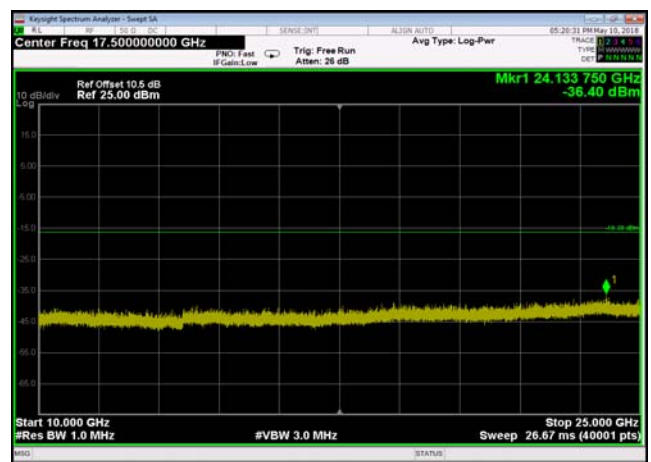
Conducted Emission: 8DPSK,2402,3DH5,
Band Edge Hopping OFF



Conducted Emission: 8DPSK,2402,3DH5,
Reference Level

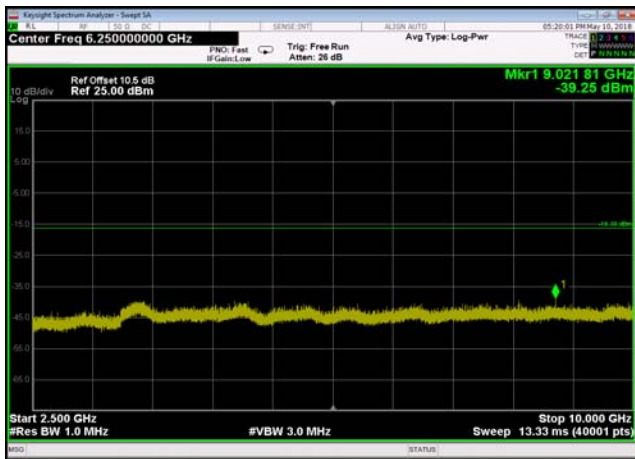


Conducted Emission: 8DPSK,2441,3DH5,10
000Mhz~25000Mhz

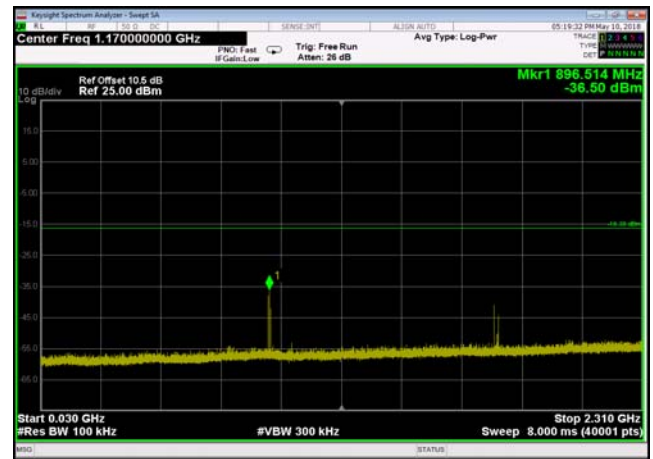


Conducted Emission: 8DPSK,2441,3DH5,
2500Mhz~10000Mhz

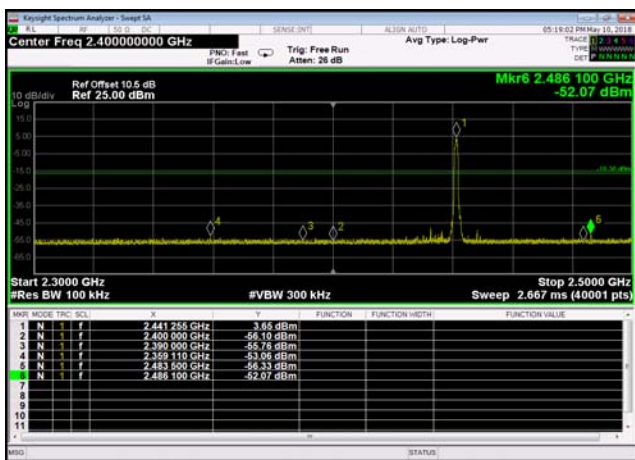
Conducted Emission: 8DPSK,2441,3DH5,
30Mhz~2310Mhz



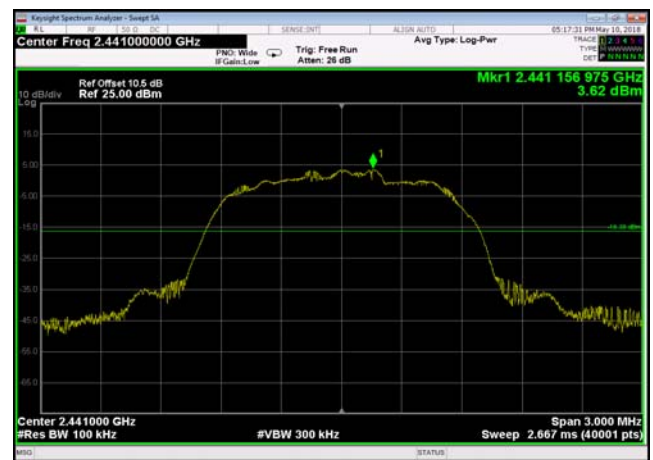
Conducted Emission: 8DPSK,2441,3DH5,
Band Edge Hopping OFF



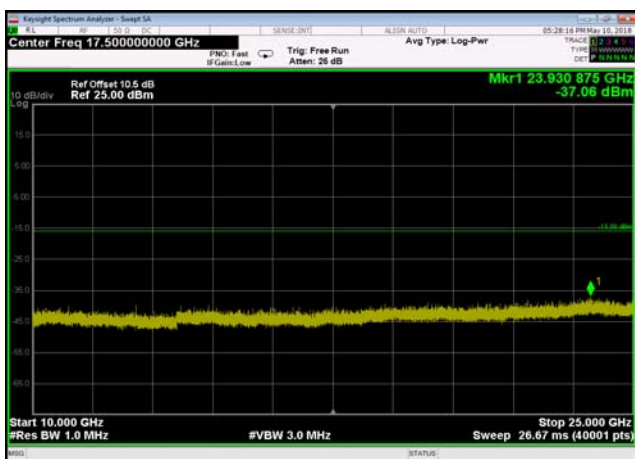
Conducted Emission: 8DPSK,2441,3DH5,
Reference Level



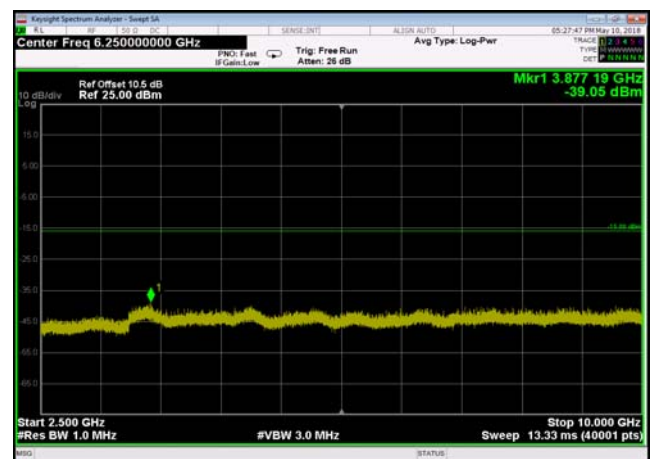
Conducted Emission: 8DPSK,2480,3DH5,10
000Mhz~25000Mhz



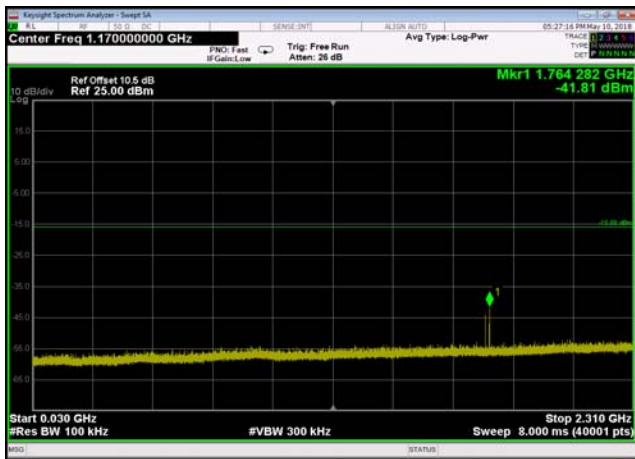
Conducted Emission: 8DPSK,2480,3DH5,25
00Mhz~10000Mhz



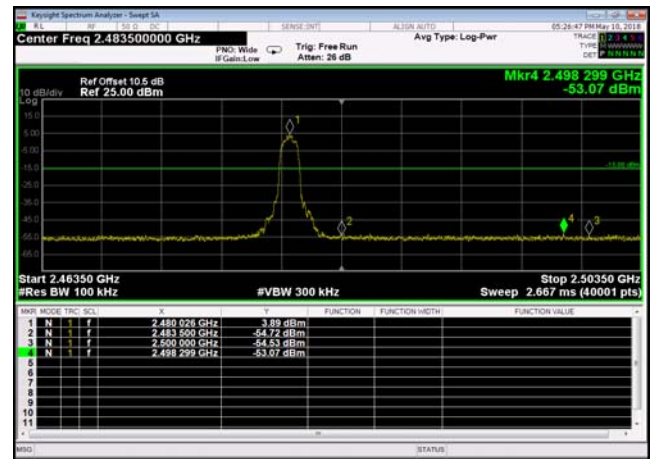
Conducted Emission: 8DPSK,2480,3DH5,
30Mhz~2310Mhz



Conducted Emission: 8DPSK,2480,3DH5,
Band Edge Hopping OFF



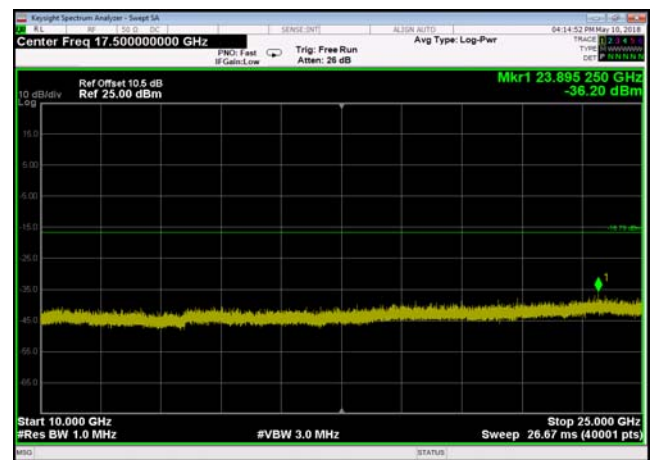
Conducted Emission: 8DPSK,2480,3DH5,
Reference Level



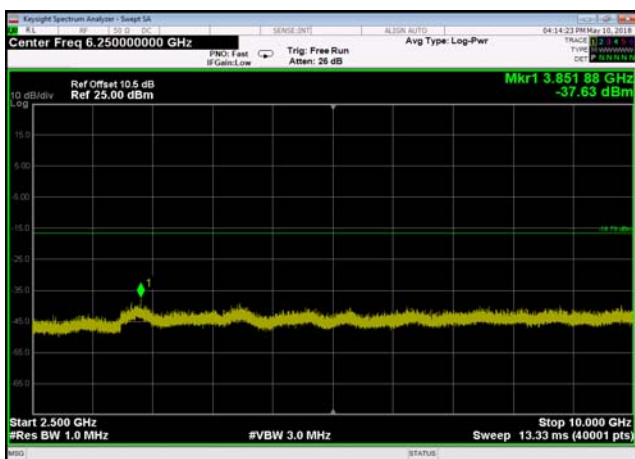
Conducted Emission: PI/4DQPSK,2402,2DH5,
10000Mhz~25000Mhz



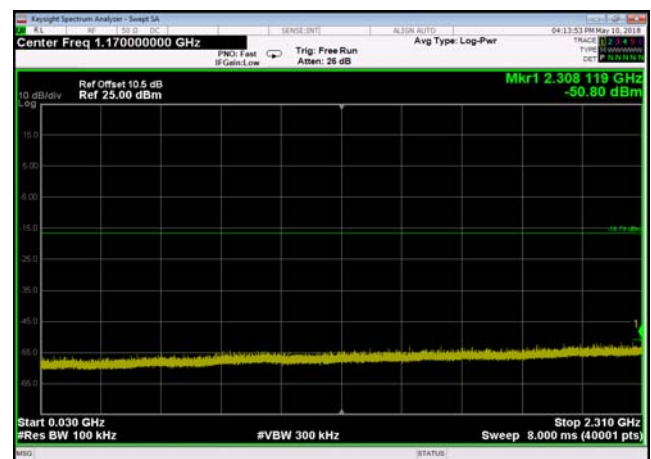
Conducted Emission: PI/4DQPSK,2402,2DH5,
2500Mhz~10000Mhz



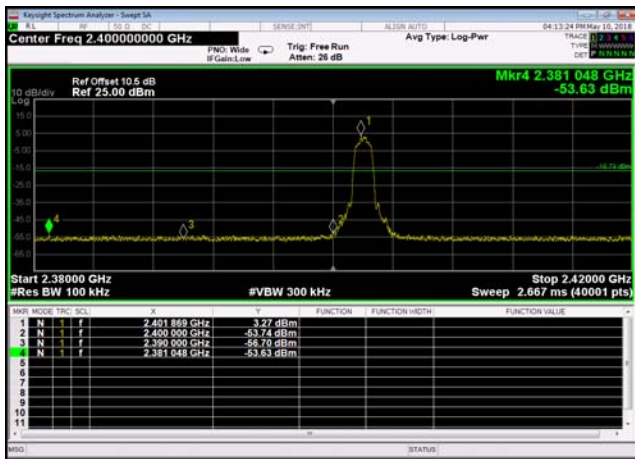
Conducted Emission: PI/4DQPSK,2402,2DH5,
30Mhz~2310Mhz



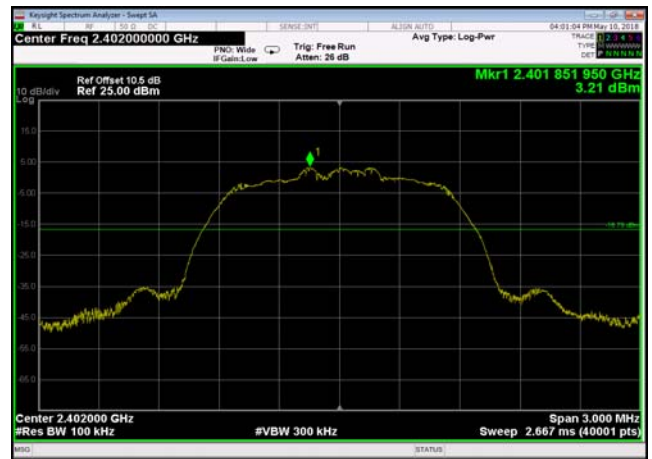
Conducted Emission: PI/4DQPSK,2402,2DH5,
Band Edge Hopping OFF



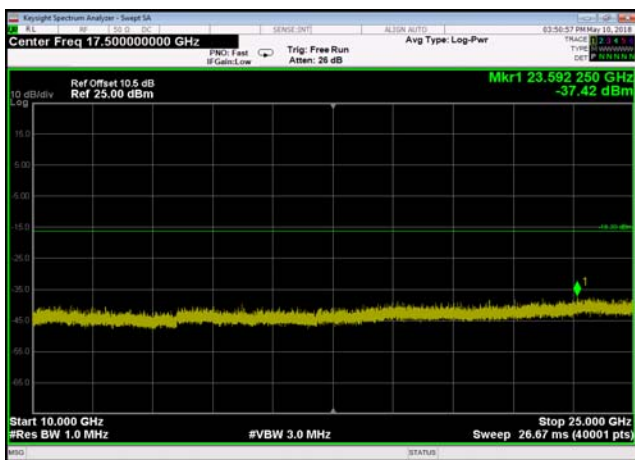
Conducted Emission: PI/4DQPSK,2402,2DH5,
Reference Level



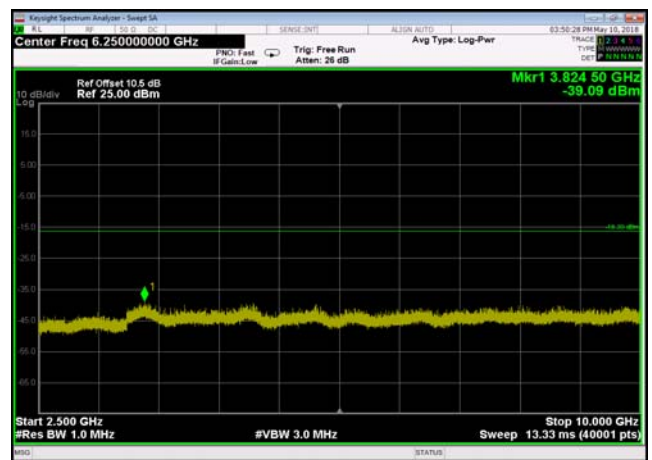
Conducted Emission: PI/4DQPSK,2441,2DH5,
10000Mhz~25000Mhz



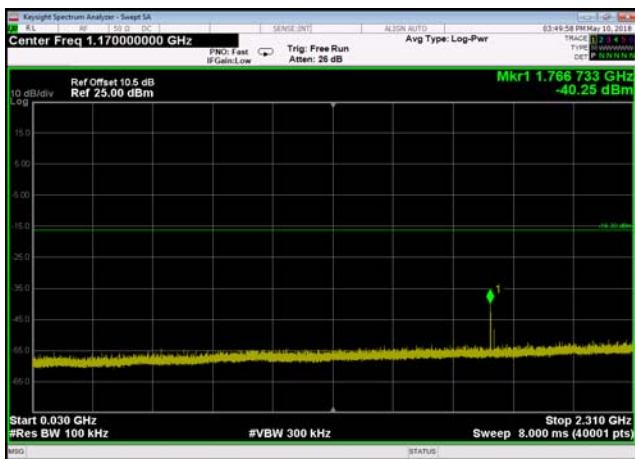
Conducted Emission: PI/4DQPSK,2441,2DH5,
2500Mhz~10000Mhz



Conducted Emission: PI/4DQPSK,2441,2DH5,
30Mhz~2310Mhz



Conducted Emission: PI/4DQPSK,2441,2DH5,
Band Edge Hopping OFF



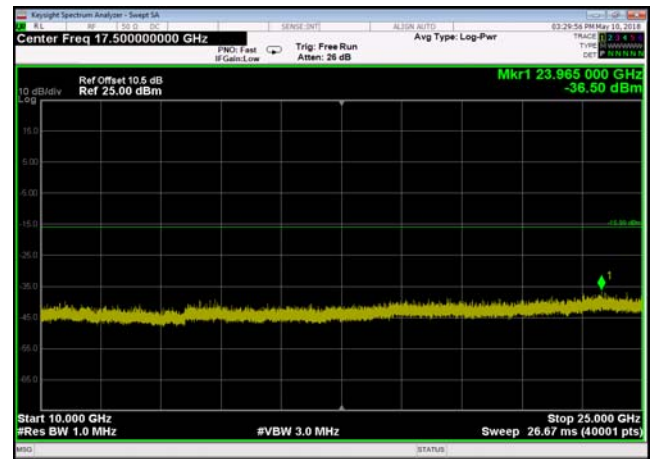
Conducted Emission: PI/4DQPSK,2441,2DH5,
Reference Level



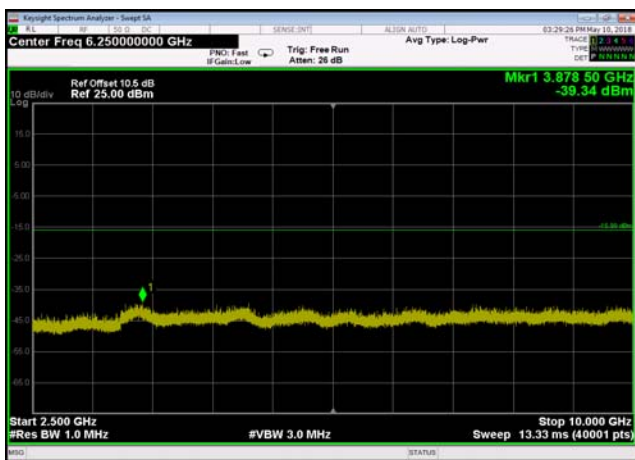
Conducted Emission: PI/4DQPSK,2480,2DH5,
10000Mhz~25000Mhz



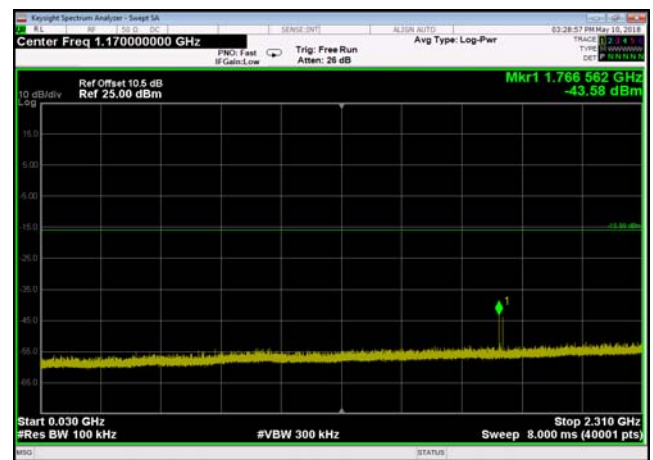
Conducted Emission: PI/4DQPSK,2480,2DH5,
2500MHz~10000MHz



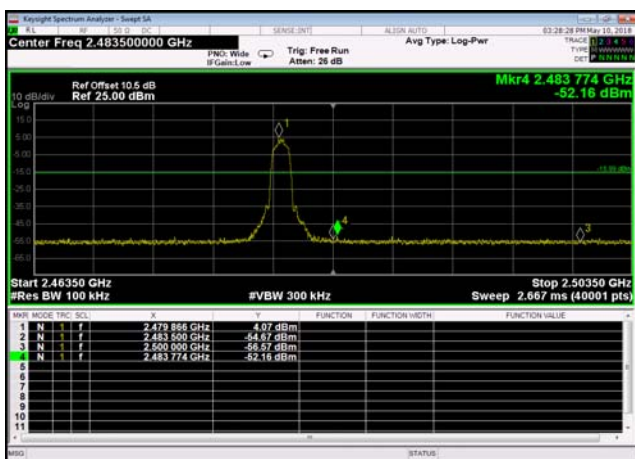
Conducted Emission: PI/4DQPSK,2480,2DH5,
30MHz~2310MHz



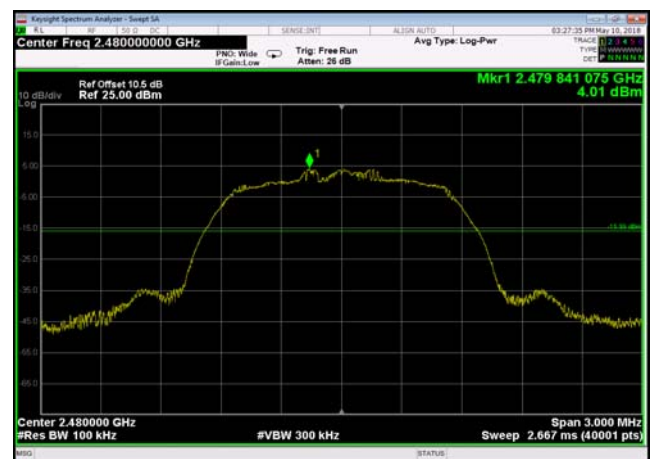
Conducted Emission: PI/4DQPSK,2480,2DH5,
Band Edge Hopping OFF



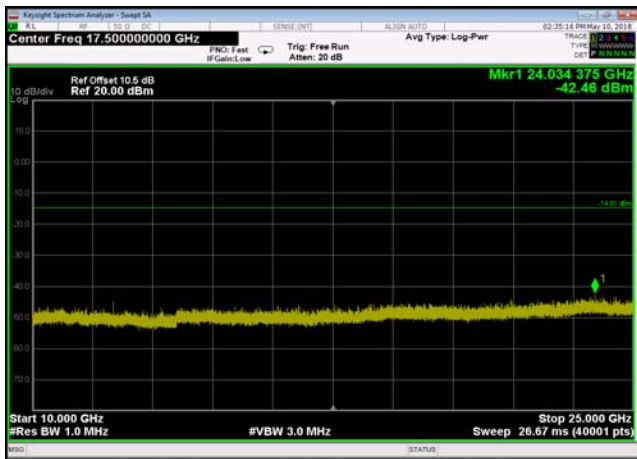
Conducted Emission: PI/4DQPSK,2480,2DH5,
Reference Level



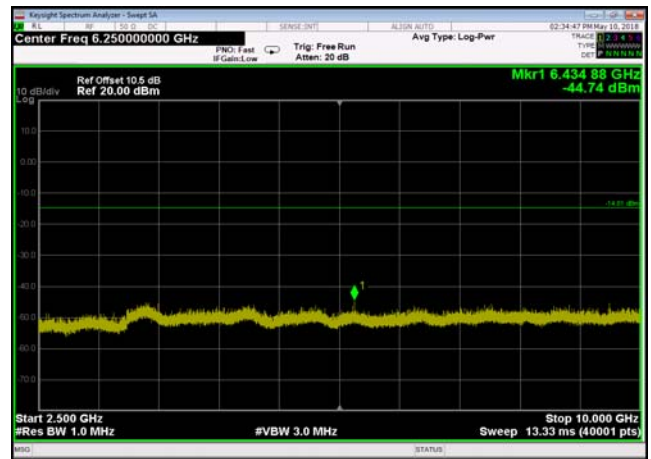
Conducted Emission: GFSK,2402,DH5,
10000MHz~25000MHz



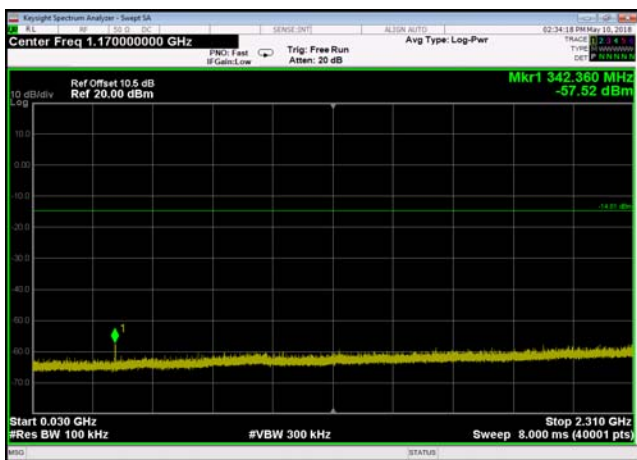
Conducted Emission: GFSK,2402,DH5,
2500MHz~10000MHz



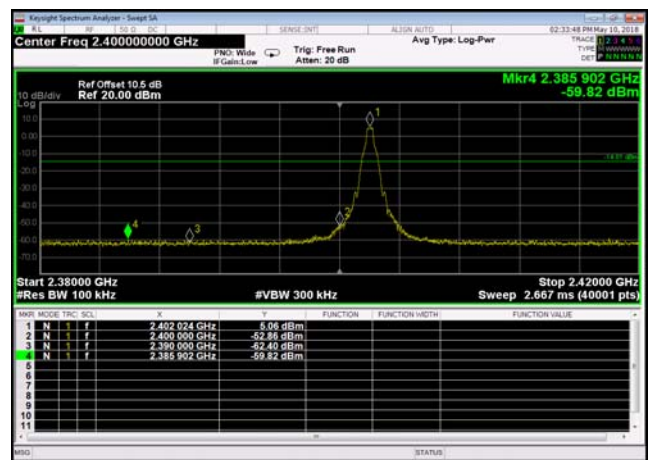
Conducted Emission: GFSK,2402,DH5,
30Mhz~2310Mhz



Conducted Emission: GFSK,2402,DH5,
Band Edge Hopping OFF



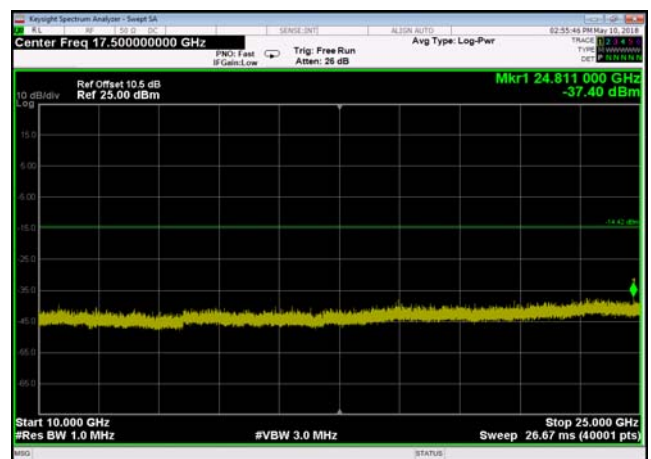
Conducted Emission: GFSK,2402,DH5,Reference
Level



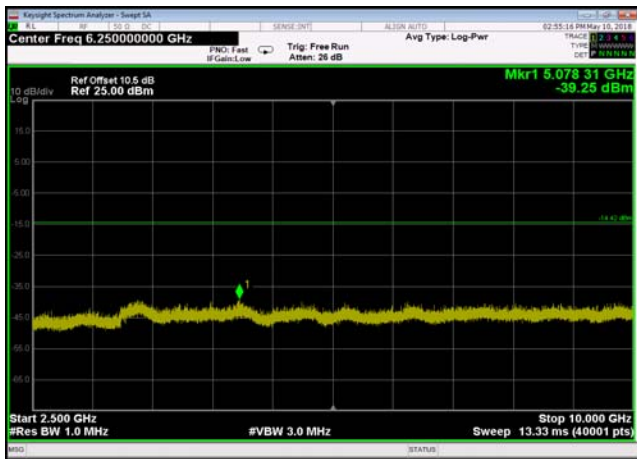
Conducted Emission: GFSK,2441,DH5,
10000Mhz~25000Mhz



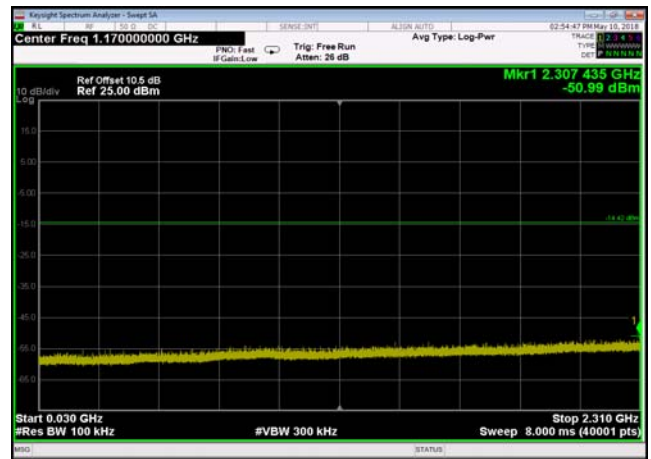
Conducted Emission: GFSK,2441,DH5,
2500Mhz~10000Mhz



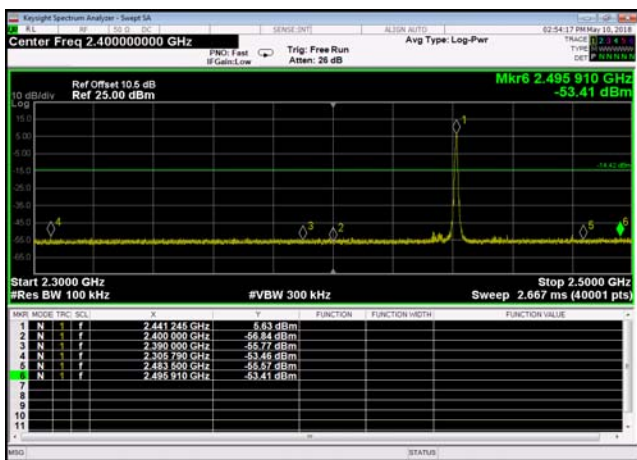
Conducted Emission: GFSK,2441,DH5,
30Mhz~2310Mhz



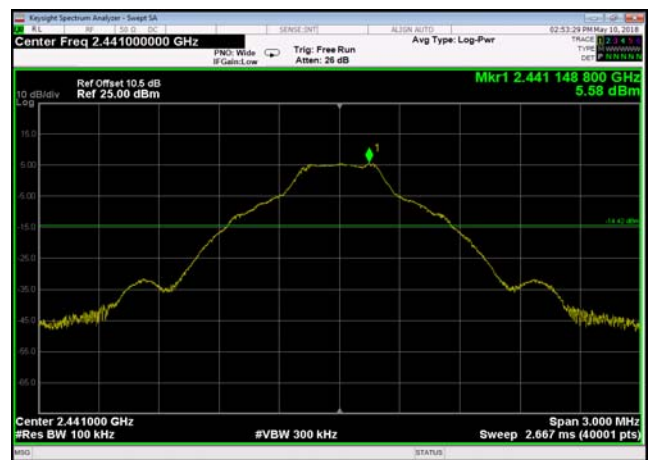
Conducted Emission: GFSK,2441,DH5,Band
Edge Hopping OFF



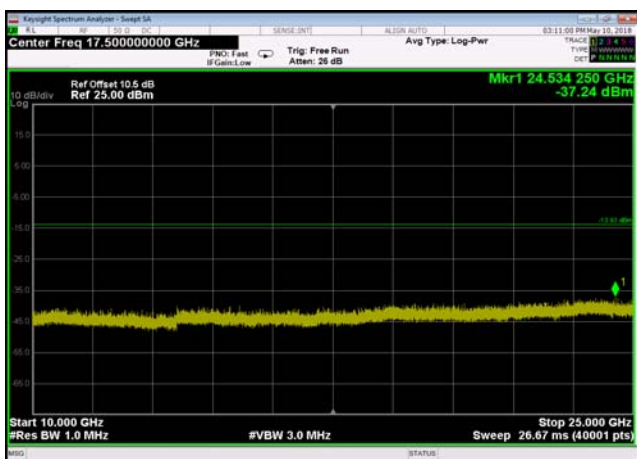
Conducted Emission: GFSK,2441,DH5,
Reference Level



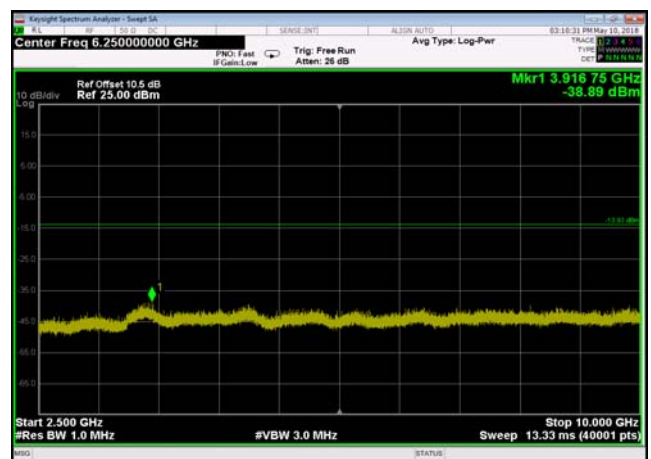
Conducted Emission: GFSK,2480,DH5,1000
0Mhz~25000Mhz



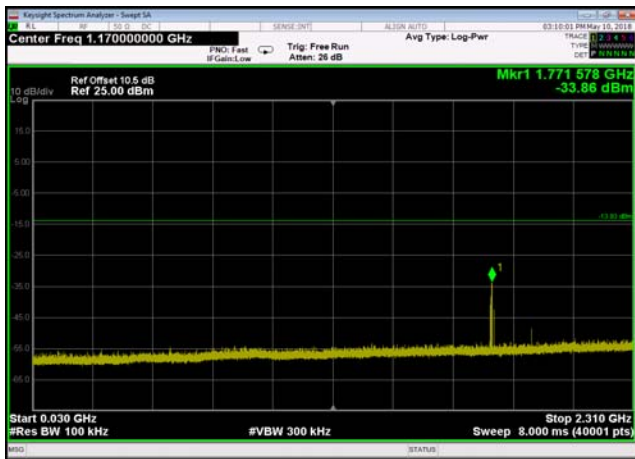
Conducted Emission: GFSK,2480,DH5,2500
Mhz~10000Mhz



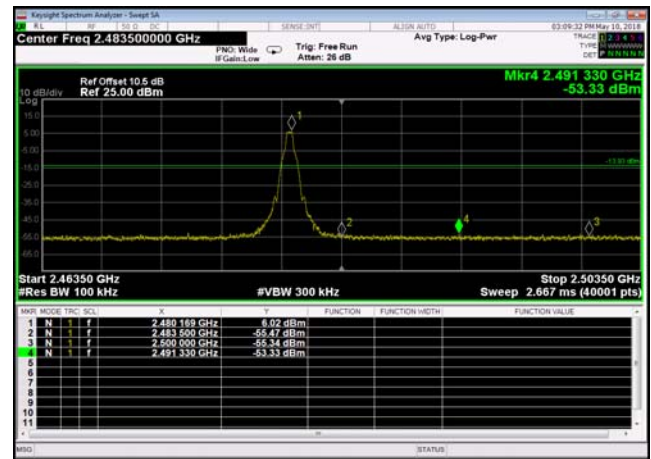
Conducted Emission: GFSK,2480,DH5,
30Mhz~2310Mhz



Conducted Emission: GFSK,2480,DH5,
Band Edge Hopping OFF



Conducted Emission: GFSK,2480,DH5,
Reference Level

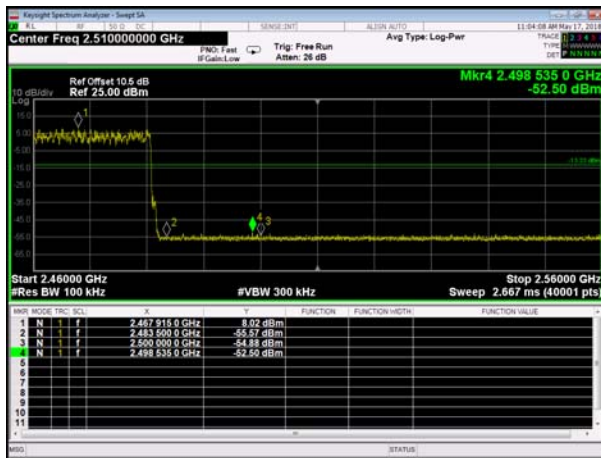




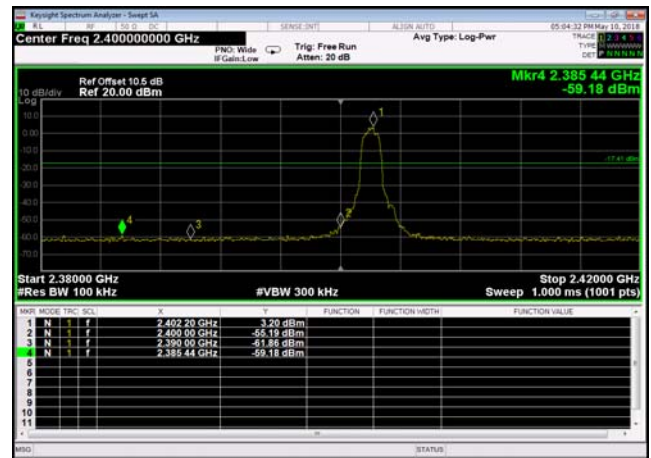
BT Frequency Band Edges-Conducted

Mode	Test Frequency	Packet Type	Hopping Mode	Band Edge(dBm)	Limit	Result
GFSK	2402	DH5	Hopping Off	-52.87	-15.017	Pass
GFSK	2480	DH5	Hopping Off	-57.28	-14.366	Pass
PI/4DQPSK	2402	2DH5	Hopping Off	-52.84	-16.832	Pass
PI/4DQPSK	2480	2DH5	Hopping Off	-58.60	-16.578	Pass
8DPSK	2402	3DH5	Hopping Off	-54.25	-17.407	Pass
8DPSK	2480	3DH5	Hopping Off	-58.27	-15.973	Pass

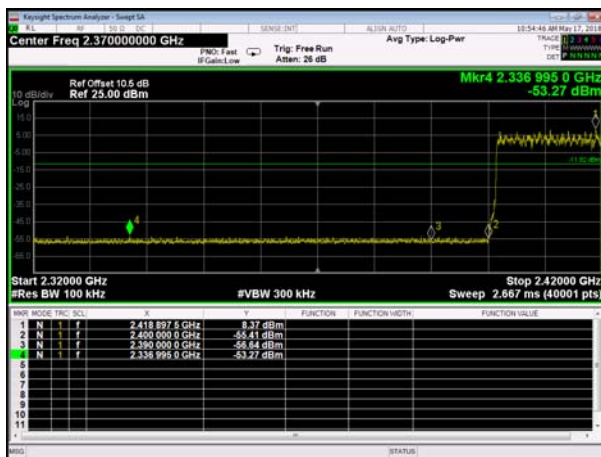
Conducted Emission: 8DPSK,2402,3DH5,Band Edge Hopping On



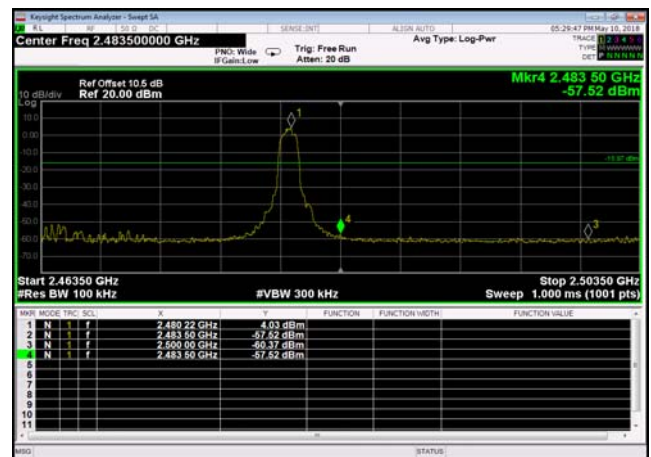
Conducted Emission: 8DPSK,2402,3DH5,Band Edge Hopping Off



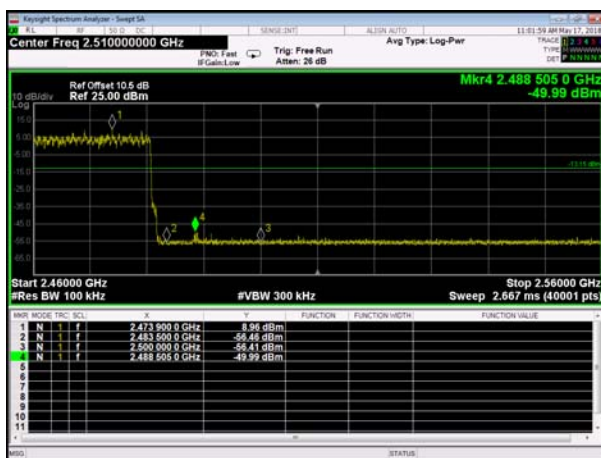
Conducted Emission: 8DPSK,2480,3DH5,Band Edge Hopping On



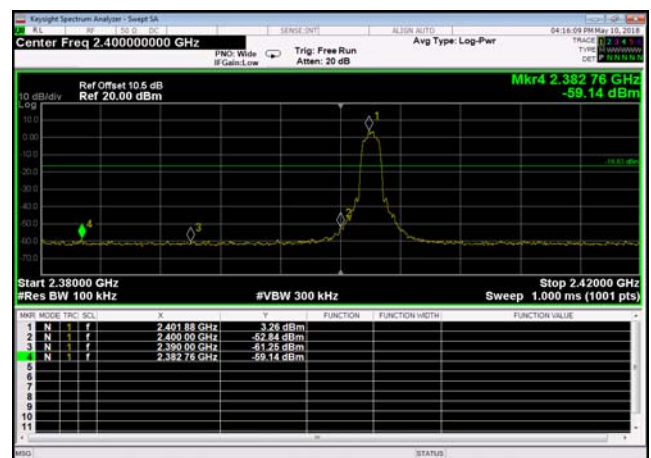
Conducted Emission: 8DPSK,2480,3DH5,Band Edge Hopping Off



Conducted Emission: PI/4DQPSK,2402,2DH5,Band Edge Hopping On



Conducted Emission: PI/4DQPSK,2402,2DH5,Band Edge Hopping Off

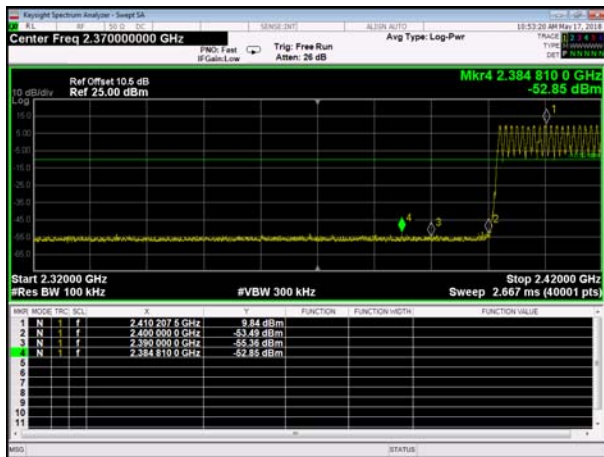


Conducted Emission: PI/4DQPSK,2480,2DH5,Band Edge Hopping On

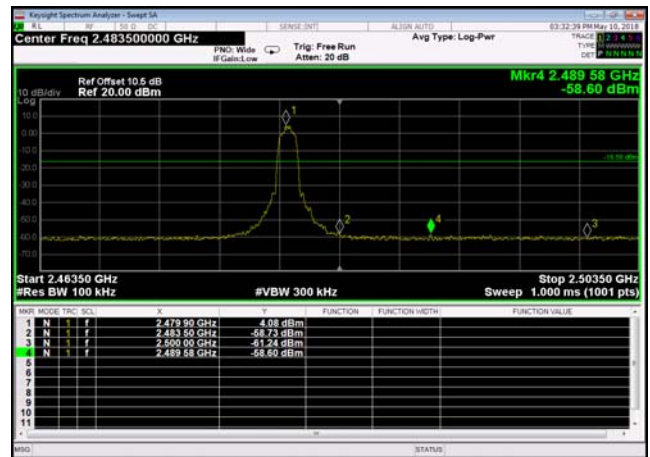


Conducted Emission: PI/4DQPSK,2480,2DH5,Band Edge Hopping Off

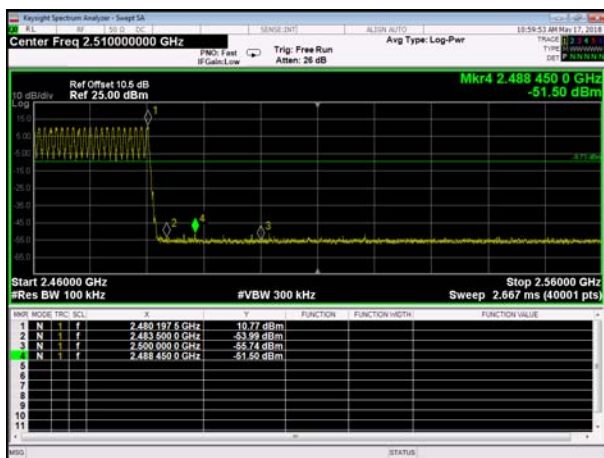




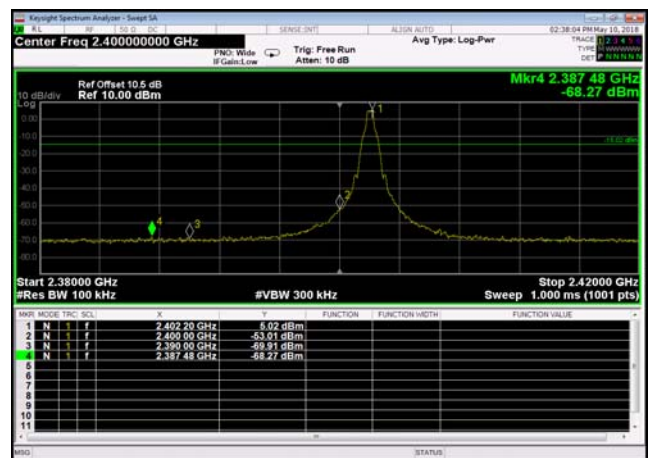
Conducted Emission: GFSK,2402,DH5,Band
Edge Hopping On



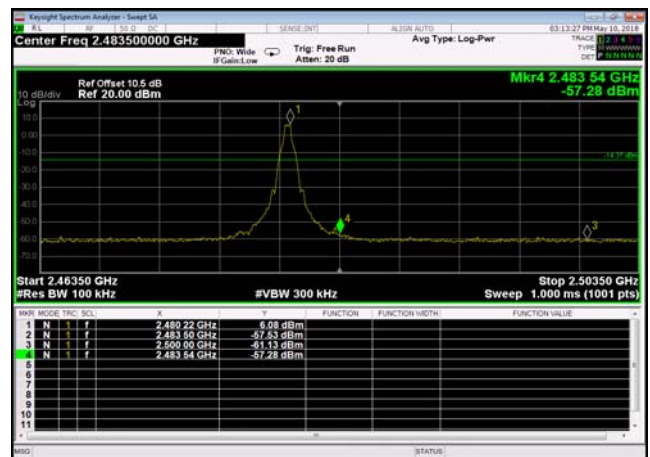
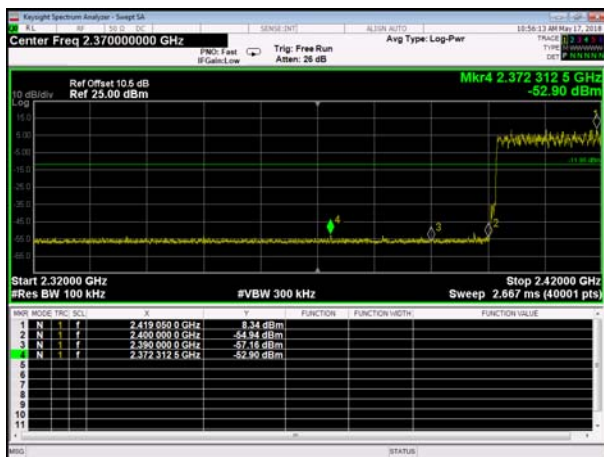
Conducted Emission: GFSK,2402,DH5,Band
Edge Hopping Off



Conducted Emission: GFSK,2480,DH5,Band
Edge Hopping On



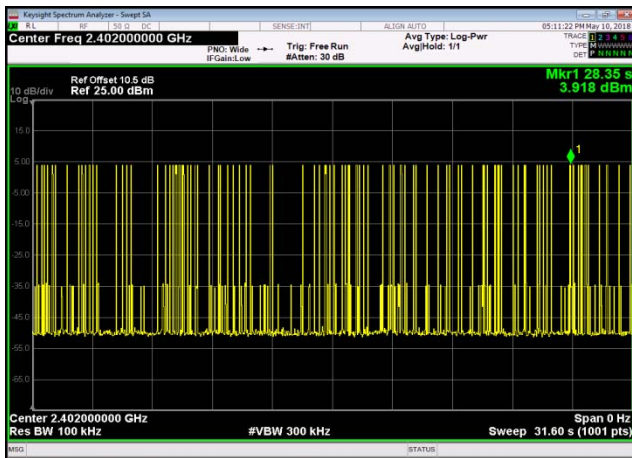
Conducted Emission: GFSK,2480,DH5,Band
Edge Hopping Off



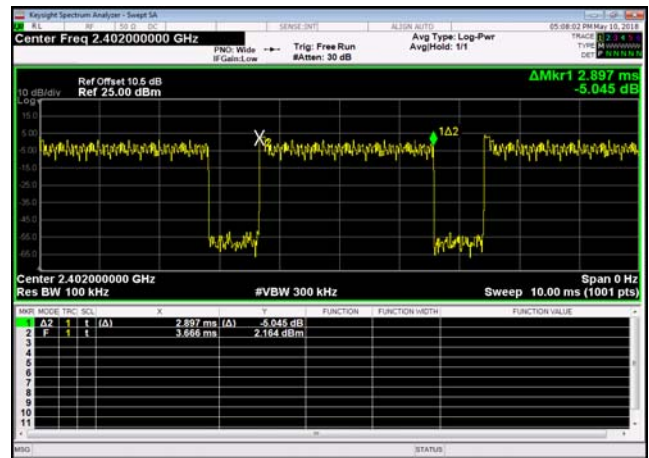
**Dwell Time
Test Result and Data**

BT Dwell Time						
Mode	Test Frequency	Packet Type	Transmission Time(ms)	Number	Dwell Time(ms)	Result
GFSK	2402	DH5	2.8971028971029	99	286.81	Pass
GFSK	2441	DH5	2.88711288711289	97	280.05	Pass
GFSK	2480	DH5	2.8971028971029	78	225.97	Pass
PI/4DQPSK	2402	2DH5	2.8971028971029	104	301.3	Pass
PI/4DQPSK	2441	2DH5	2.88711288711289	89	256.95	Pass
PI/4DQPSK	2480	2DH5	2.8971028971029	92	266.53	Pass
8DPSK	2402	3DH5	2.8971028971029	98	283.92	Pass
8DPSK	2441	3DH5	2.8971028971029	82	237.56	Pass
8DPSK	2480	3DH5	2.8971028971029	85	246.25	Pass

Dwell Time: 8DPSK,2402,3DH5,Transmissi
on Number



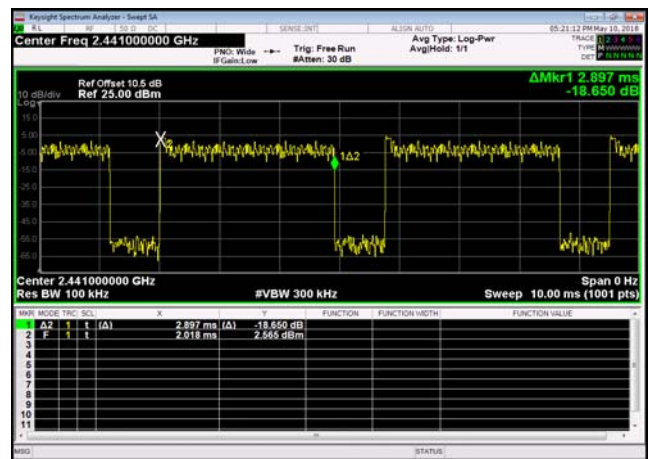
Dwell Time: 8DPSK,2402,3DH5,Transmissi
on Time



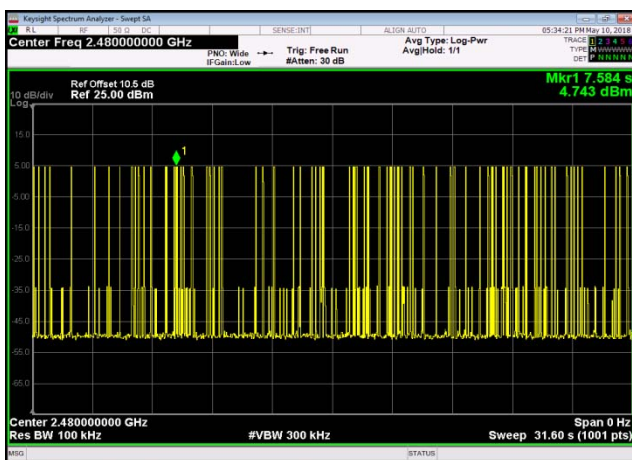
Dwell Time: 8DPSK,2441,3DH5,Transmissi
on Number



Dwell Time: 8DPSK,2441,3DH5,Transmissi
on Time



Dwell Time: 8DPSK,2480,3DH5,Transmissi
on Number

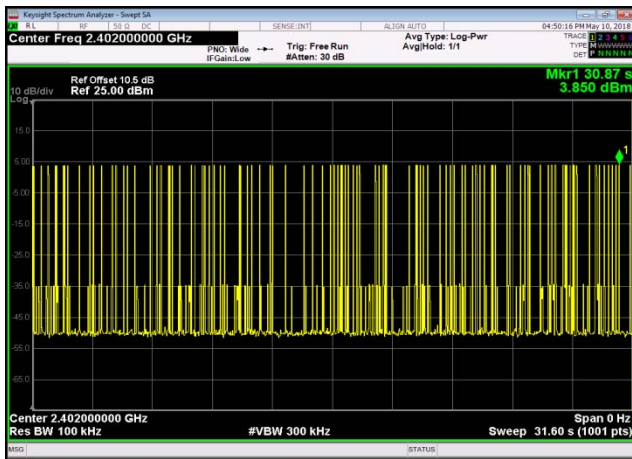


Dwell Time: 8DPSK,2480,3DH5,Transmissi
on Time

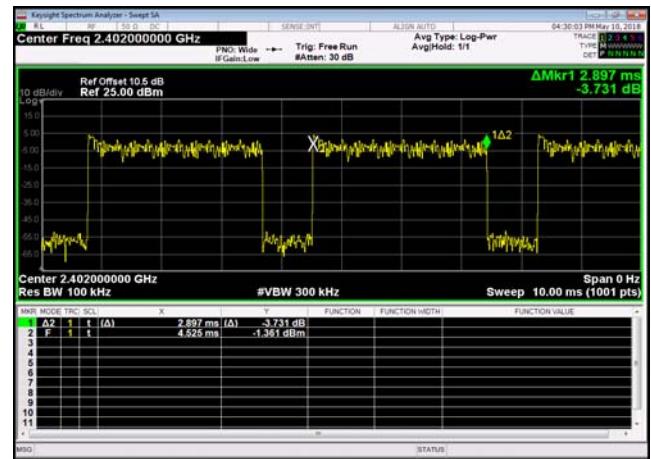


Dwell Time: PI/4DQPSK,2402,2DH5,Transmissi
on Number

Dwell Time: PI/4DQPSK,2402,2DH5,Transmissi
on Time



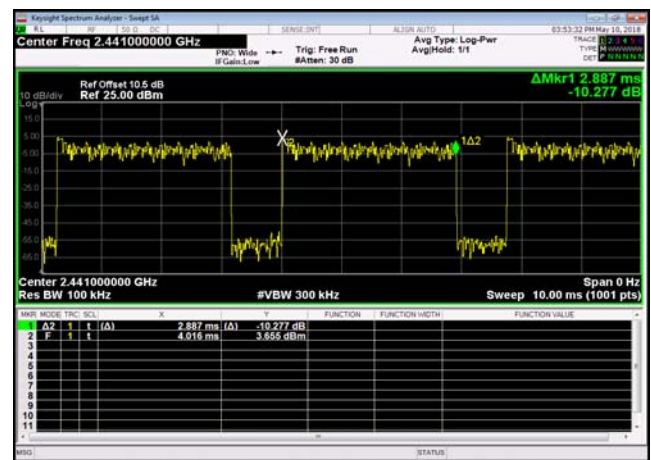
Dwell Time: PI/4DQPSK,2441,2DH5,Transmission Number



Dwell Time: PI/4DQPSK,2441,2DH5,Transmission Time



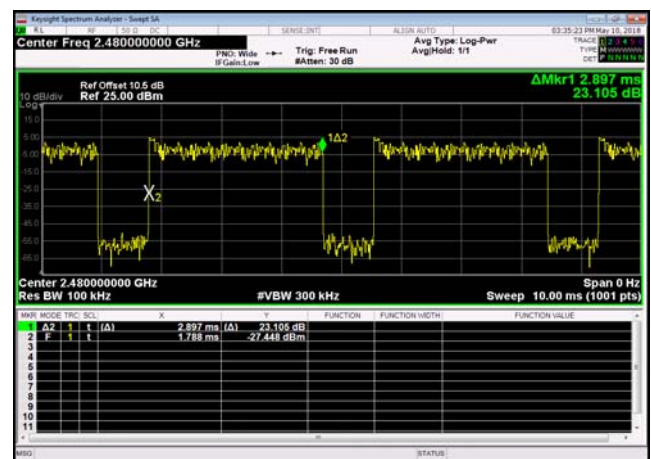
Dwell Time: PI/4DQPSK,2480,2DH5,Transmission Number



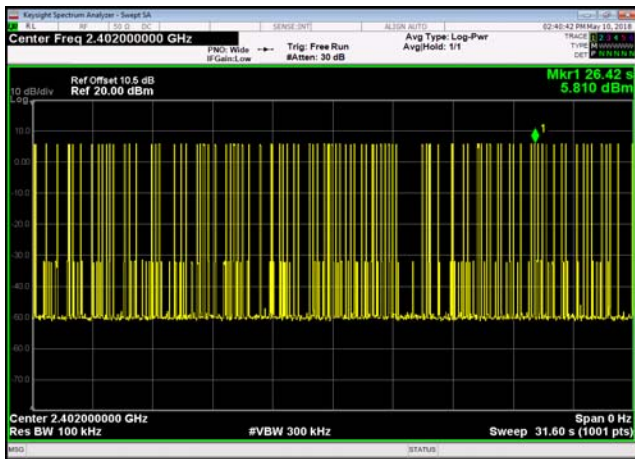
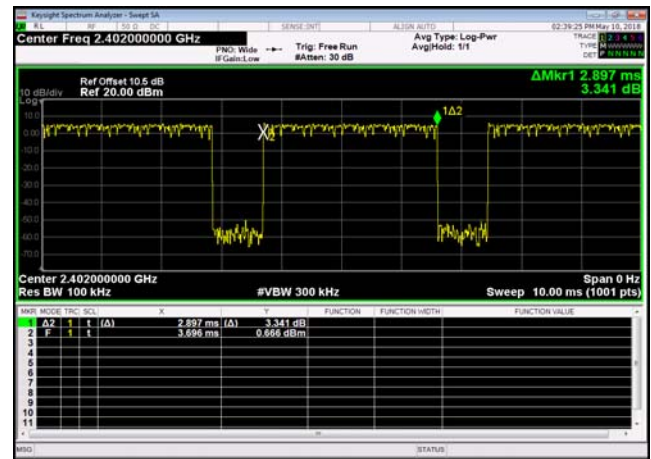
Dwell Time: PI/4DQPSK,2480,2DH5,Transmission Time

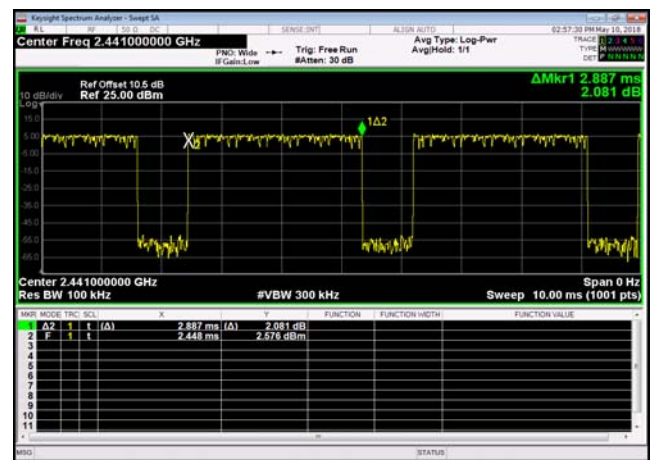
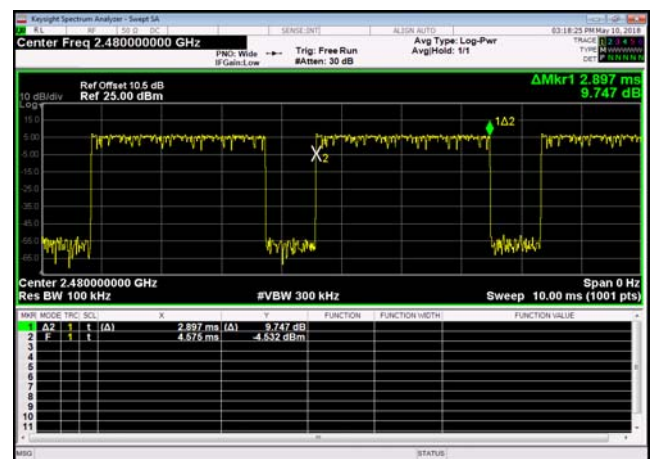


Dwell Time: GFSK,2402,DH5,Transmission Number



Dwell Time: GFSK,2402,DH5,Transmission Time


Dwell Time: GFSK,2441,DH5,Transmission
Number

Dwell Time: GFSK,2441,DH5,Transmission
Time

Dwell Time: GFSK,2480,DH5,Transmission
Number

Dwell Time: GFSK,2480,DH5,Transmission
Time


**Carrier Frequency Separation
Test Result and Data**

BT Carrier Frequency Separation

Mode	Test Frequency	Packet Type	Range(MHz~MHz)	Separation(kHz)	Result
GFSK	Hopping	DH5	2401.5Mhz~2403.5Mhz	957.04	Pass
PI/4DQPSK	Hopping	2DH5	2401.5Mhz~2403.5Mhz	1160.84	Pass
8DPSK	Hopping	3DH5	2401.5Mhz~2403.5Mhz	1088.91	Pass

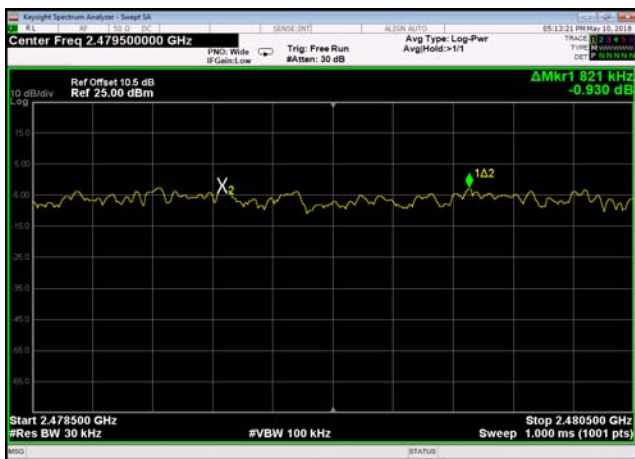
Carrier Frequency Separation: 8DPSK, Hopping 3DH5 2401.5~2403.5



Carrier Frequency Separation: 8DPSK, Hopping 3DH5 2440.5~2442.5



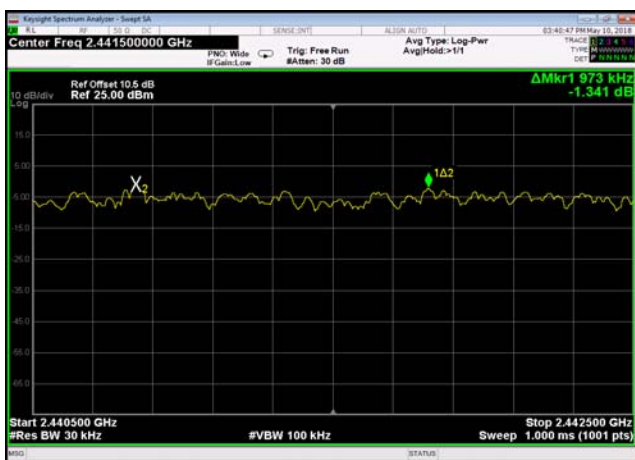
Carrier Frequency Separation: 8DPSK, Hopping 3DH5 2478.5~2480.5



Carrier Frequency Separation: PI/4DQPSK, Hopping 2DH5 2401.5~2403.5



Carrier Frequency Separation: PI/4DQPSK, Hopping 2DH5 2440.5~2442.5



Carrier Frequency Separation: PI/4DQPSK, Hopping 2DH5 2478.5~2480.5



Carrier Frequency Separation: GFSK, Hopping DH5 2401.5~2403.5

Carrier Frequency Separation: GFSK, Hopping DH5 2440.5~2442.5



Carrier Frequency Separation: GFSK,
Hopping DH5 2478.5~2480.5

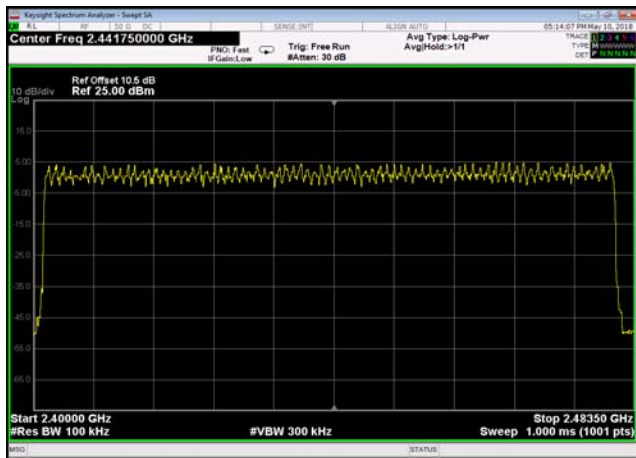


**Hopping Channel Numbers
Test Result and Data**

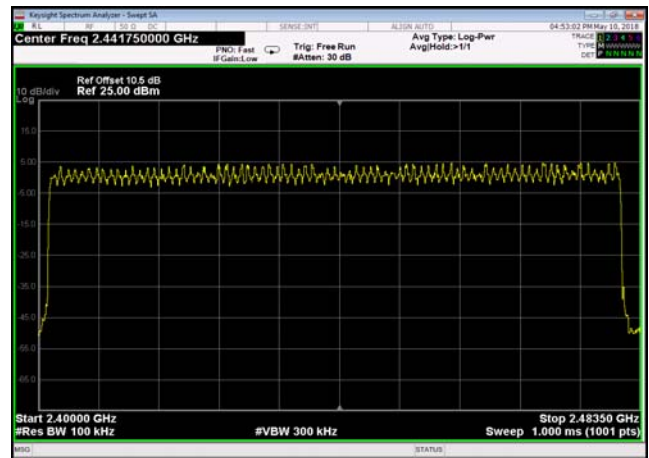
BT Number Of Hopping Channels

Mode	Test Frequency	Packet Type	Test Range(MHz~MHz)	Result
GFSK	Hopping	DH5	2400~2483.5	Pass
PI/4DQPSK	Hopping	2DH5	2400~2483.5	Pass
8DPSK	Hopping	3DH5	2400~2483.5	Pass

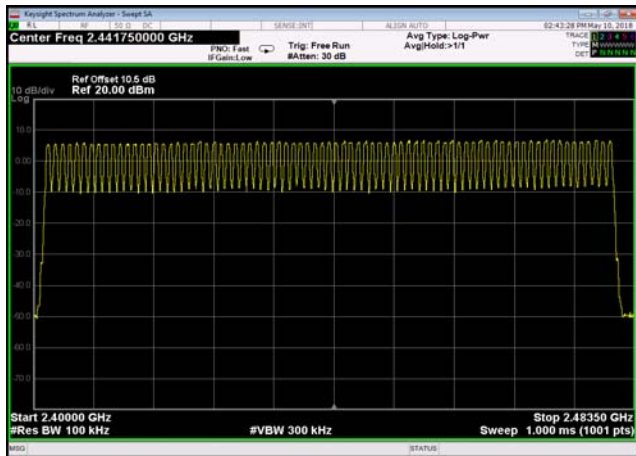
Number Of Hopping Channels: 8DPSK,
HoppingMhz,3DH5__2400~2483.5



Number Of Hopping Channels: PI/4DQPSK,
Hopping Mhz,2DH5__2400~2483.5



Number Of Hopping Channels: GFSK,
HoppingMhz,DH5__2400~2483.5



** END OF REPORT **