

FCC Test Report

Report No.: AGC00793190201FE02

FCC ID : 2AQN2-V6PLUST20S
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : Bluetooth Headset
BRAND NAME : N/A
MODEL NAME : V6 PLUS_T20S
CLIENT : Shenzhen Winnerelec Industrial CO., LTD
DATE OF ISSUE : Mar. 06, 2019
STANDARD(S) : FCC Part 15.247
REPORT VERSION : V1.0

Attestation of Global Compliance(Shenzhen) Co., Ltd

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Mar. 06, 2019	Valid	Initial Release

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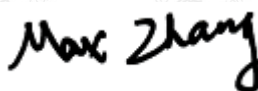
1. VERIFICATION OF CONFORMITY

Applicant	Shenzhen Winnerelec Industrial CO., LTD
Address	411-416 Room Social security building, Honghua Bei Road Gongming Street Guangming New District, Shenzhen, China
manufacturer	Shenzhen Winnerelec Industrial CO., LTD
Address	411-416 Room Social security building, Honghua Bei Road Gongming Street Guangming New District, Shenzhen, China
Factory	Shenzhen Winnerelec Industrial CO., LTD
Address	411-416 Room Social security building, Honghua Bei Road Gongming Street Guangming New District, Shenzhen, China
Product Designation	Bluetooth Headset
Brand Name	N/A
Test Model	V6 PLUS_T20S
Date of test	Mar. 22, 2019 to Feb. 28, 2019
Deviation	None
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC PART 15.247.

Tested By



Max Zhang(Zhang Yi)

Feb. 28, 2019

Reviewed By



Bart Xie(Xie Xiaobin)

Feb. 28, 2019

Approved By



Forrest Lei(Lei Yonggang)
Authorized Officer

Feb. 28, 2019

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2. GENERAL INFORMATION

2.1. Product Description

The EUT is designed as "Bluetooth Headset". It is designed by way of utilizing the GFSK, $\pi/4$ DQPSK and 8DPSK technology to achieve the system operation.

A major technical description of EUT is described as following

Operating Frequency	2402MHz~2480MHz
Bluetooth Version	V3.0
Modulation	GFSK, $\pi/4$ -DQPSK, 8DPSK
Hardware Version	V6 PLUS_T20S_V3
Software Version	V6 PLUS_T20S_REV:02
Antenna Type	Chip Antenna
Number of channels	79 for BR/EDR
Antenna Gain	0dBi
Power Supply	DC 3.7V by battery

2.2. Table Of Carrier Frequencies

Frequency Band	Channel Number	Frequency
2402~2480MHZ	0	2402MHZ
	1	2403MHZ
	:	:
	38	2440 MHZ
	39	2441 MHZ
	40	2442 MHZ
	:	:
	77	2479 MHZ
	78	2480 MHZ

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2.3. Receiver Input Bandwidth

The input bandwidth of the receiver is 1.3MHz. In every connection one Bluetooth device is the master and the other one is slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection (e.g. single or multislot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings.

Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be sent on the same frequency, it is sent on the next frequency of the hopping sequence.

2.4. Example Of A Hopping Sequence In Data Mode

Example of a 79 hopping sequence in data mode:

40,21,44,23,42,53,46,55,48,33,52,35,50,65,54,67
56,37,60,39,58,69,62,71,64,25,68,27,66,57,70,59
72,29,76,31,74,61,78,63,01,41,05,43,03,73,07,75
09,45,13,47,11,77,15,00,64,49,66,53,68,02,70,06
01,51,03,55,05,04

2.5. Equally Average Use Of Frequencies And Behaviour

The generation of the hopping sequence in connection mode depends essentially on two input values:

1. LAP/UAP of the master of the connection.
2. Internal master clock

The LAP (lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24 MSB's of the 48 BD_ADDRESS.

The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For synchronization with other units only offset are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5us. The clock has a cycle of about one day (23h30). In most cases it is implemented as a 28-bit counter. For the deriving of the hopping sequence the entire LAP (24 bits), 4 LSB's (4 bits) (Input 1) and the 27 MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate the sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following behavior:

The first connection between the two devices is established, a hopping sequence was generated. For transmitting the wanted data the complete hopping sequence was not used. The connection ended.

The second connection will be established. A new hopping sequence is generated. Due to the fact the Bluetooth clock has a different value, because the period between the two transmissions is longer (and it cannot be shorter) than the minimum resolution of the clock (312.5us). The hopping sequence will always differ from the first one.

2.6. Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for **FCC ID: 2AQN2-V6PLUST20S** filing to comply with the FCC PART 15.247 requirements.

2.7. Test Method

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

2.8. Special Accessories

Refer to section 5.2.

2.9. Equipment Modifications

Not available for this EUT intended for grant.

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3. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in measurement" (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, $U_c = \pm 3.2$ dB
- Uncertainty of Radiated Emission below 1GHz, $U_c = \pm 3.9$ dB
- Uncertainty of Radiated Emission above 1GHz, $U_c = \pm 4.8$ dB

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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX
4	Normal Operating (BT)

Note:

1. Only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.

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5. SYSTEM TEST CONFIGURATION

5.1. Configuration Of Eut System



5.2 Equipment Used In Tested System

Item	Equipment	Model No.	ID or Specification	Remark
1	Bluetooth Headset	V6 PLUS_T20S	2AQN2-V6PLUST20S	EUT

5.3. Summary Of Test Results

FCC RULES	DESCRIPTION OF TEST	RESULT
15.247	Peak Output Power	Compliant
15.247	20 dB Bandwidth	Compliant
15.247	Spurious Emission	Compliant
15.247&15.209	Radiated Emission	Compliant
15.247	Number of Hopping Frequency	Compliant
15.247	Time of Occupancy	Compliant
15.247	Frequency Separation	Compliant
15.207	Line Conducted Emission	N/A

NOTE: N/A stands for not applicable. The device is only used in the motor car, so the conducted emission is not applicable.

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6. TEST FACILITY

TestSite	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun. 12, 2018	Jun. 11, 2019
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 20, 2018	Dec. 19, 2019
2.4GHz Fliter	Micro-tronics	087	N/A	Jun. 12, 2018	Jun. 11, 2019
Attenuator	Weinachel Corp	58-30-33	N/A	Jun. 12, 2018	Jun. 11, 2019
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 21, 2017	Sep. 20, 2020
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Jun. 14, 2018	Jun. 13, 2020
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May. 26, 2018	May. 25, 2020
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Oct. 25, 2018	Oct. 24, 2019
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep. 28, 2017	Sep. 27, 2019

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7. PEAK OUTPUT POWER

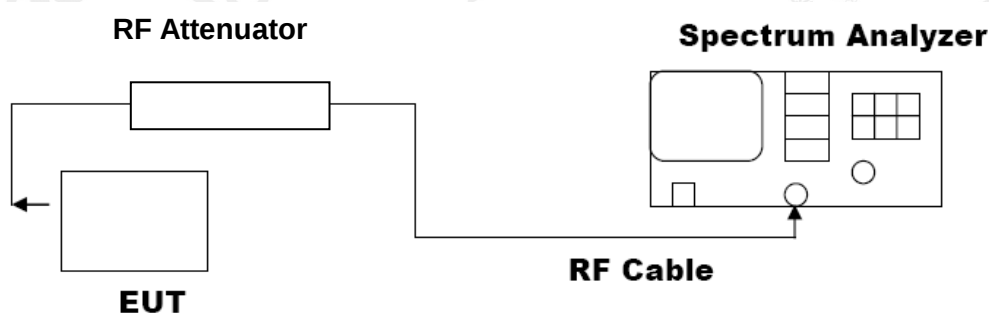
7.1 Measurement Procedure

For peak power test:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
3. RBW > 20 dB bandwidth of the emission being measured.
4. VBW $\geq$ RBW.
5. Sweep: Auto.
6. Detector function: Peak.
7. Trace: Max hold.

Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

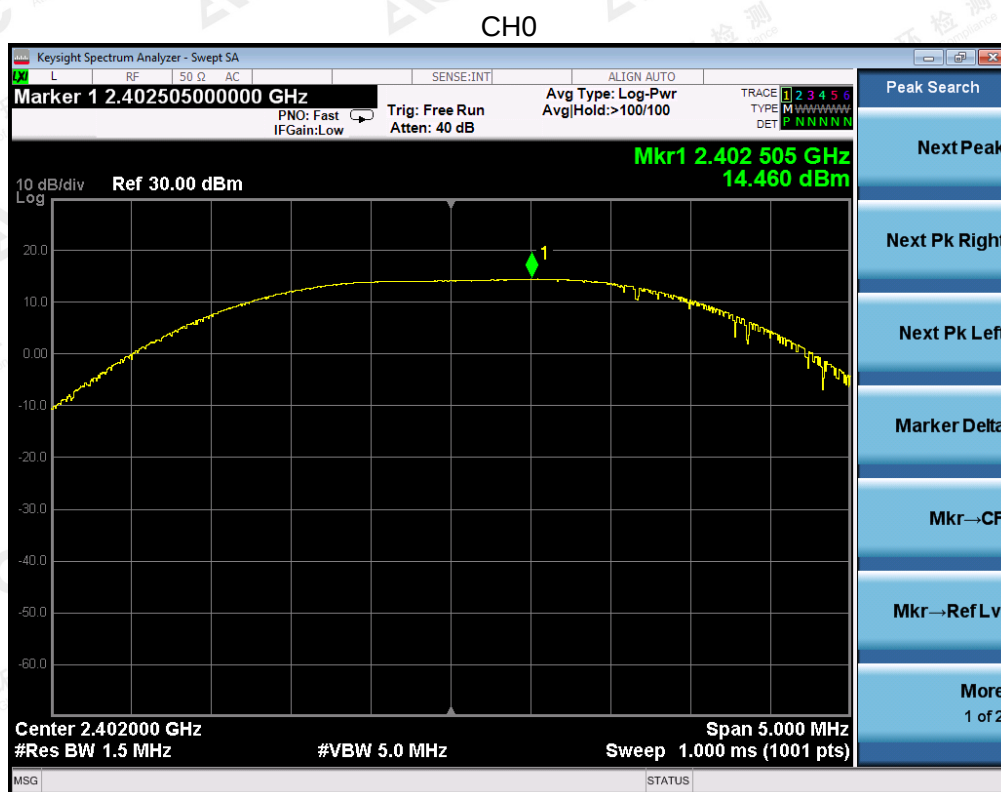
7.2 Test Set-Up (Block Diagram Of Configuration)



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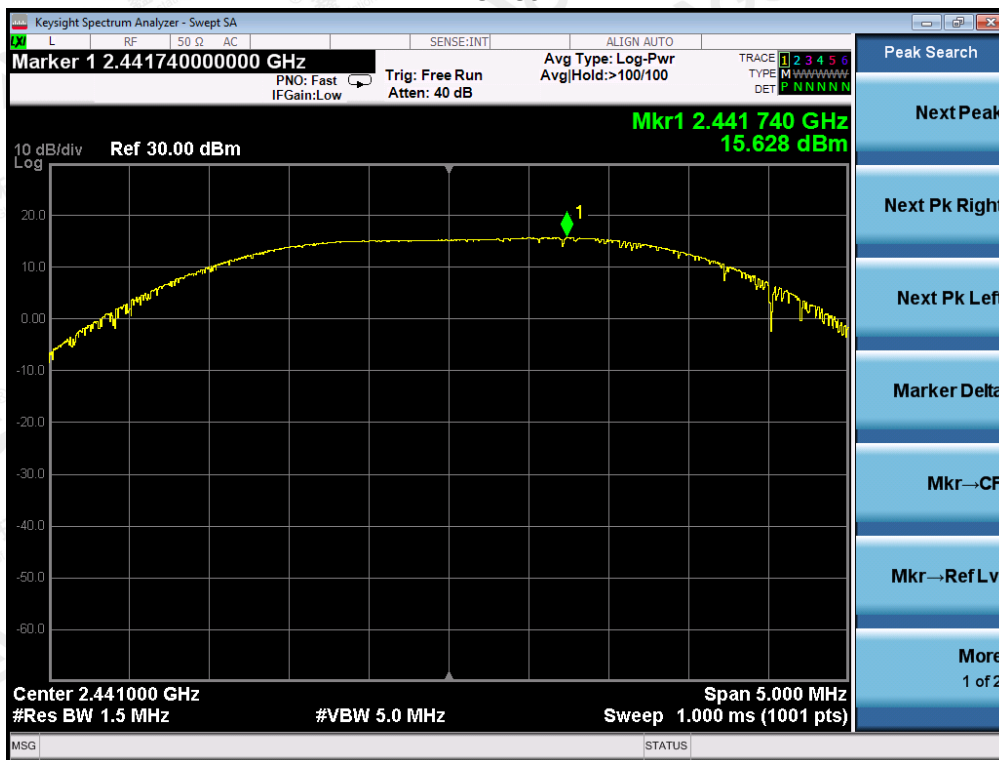
7.3 Limits And Measurement Result

PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION			
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.402	14.460	30	Pass
2.441	15.628	30	Pass
2.480	16.142	30	Pass

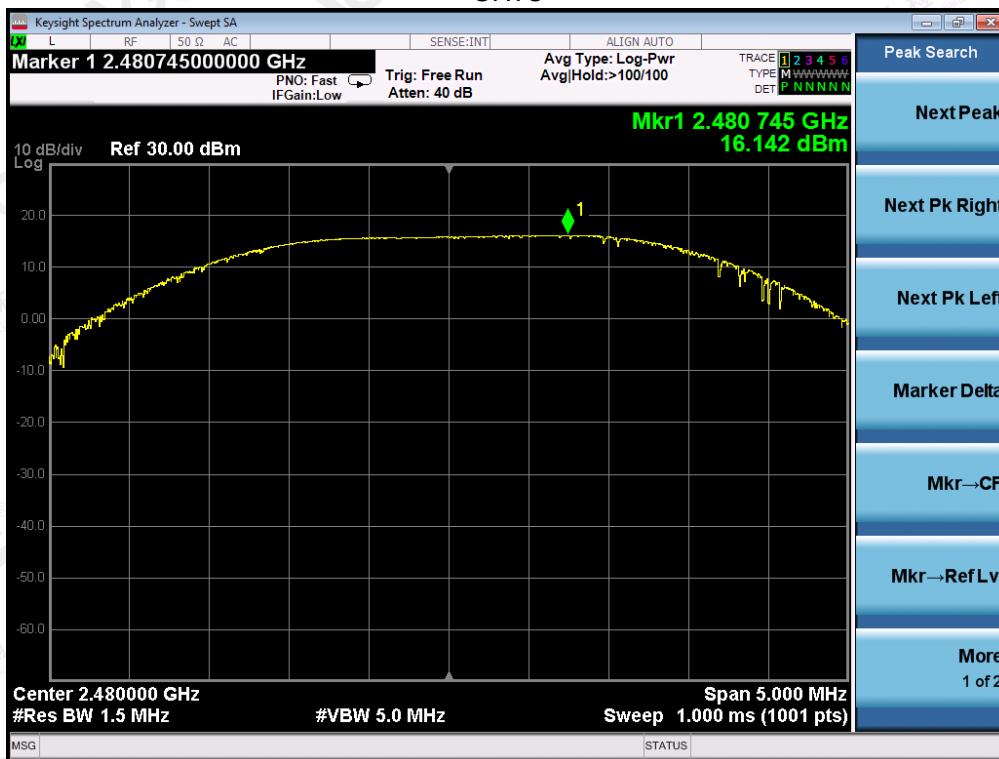


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CH39

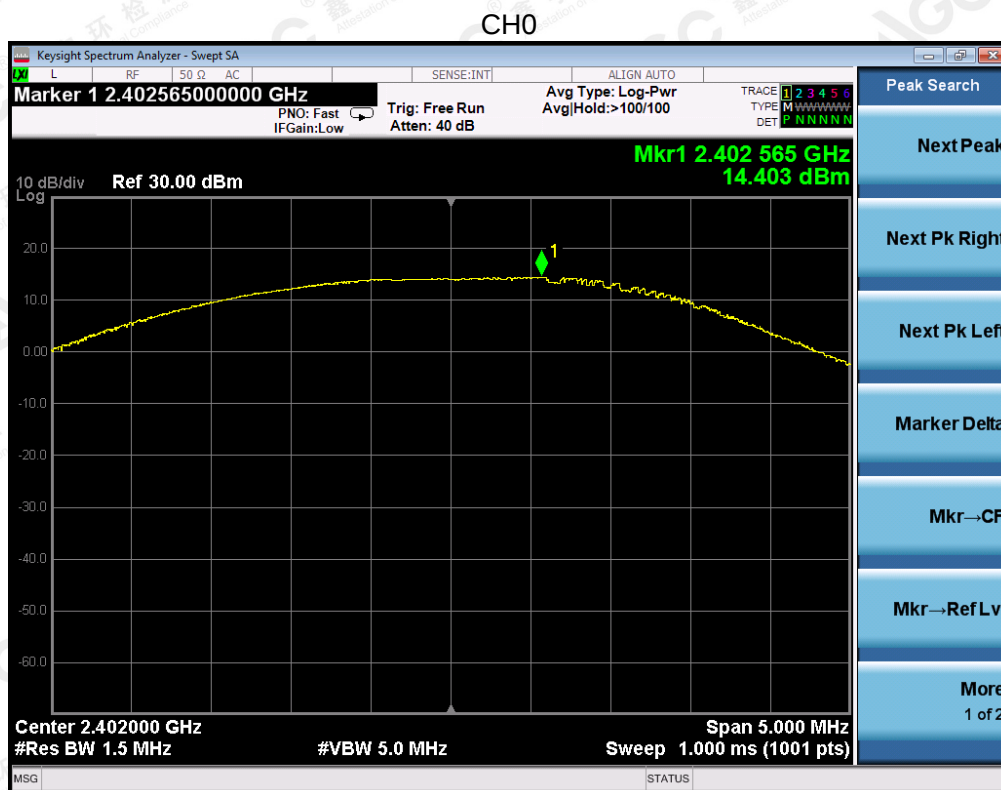


CH78



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PEAK OUTPUT POWER MEASUREMENT RESULT FOR Π /4-DQPSK MODULATION			
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.402	14.403	30	Pass
2.441	15.355	30	Pass
2.480	15.801	30	Pass



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CH39



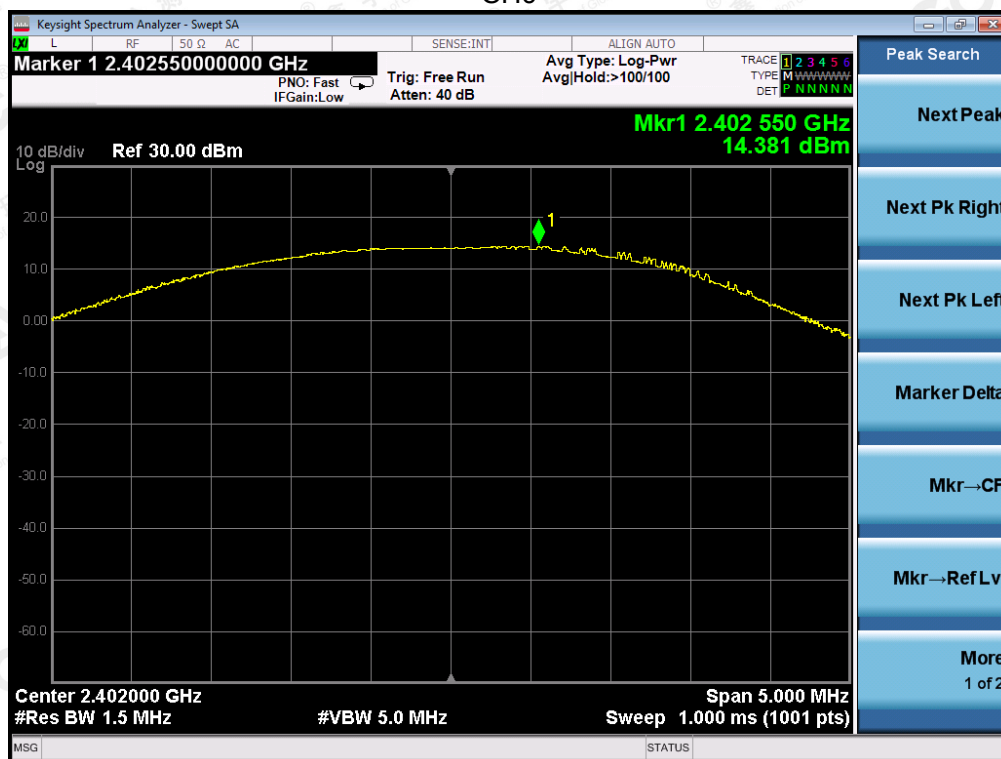
CH78



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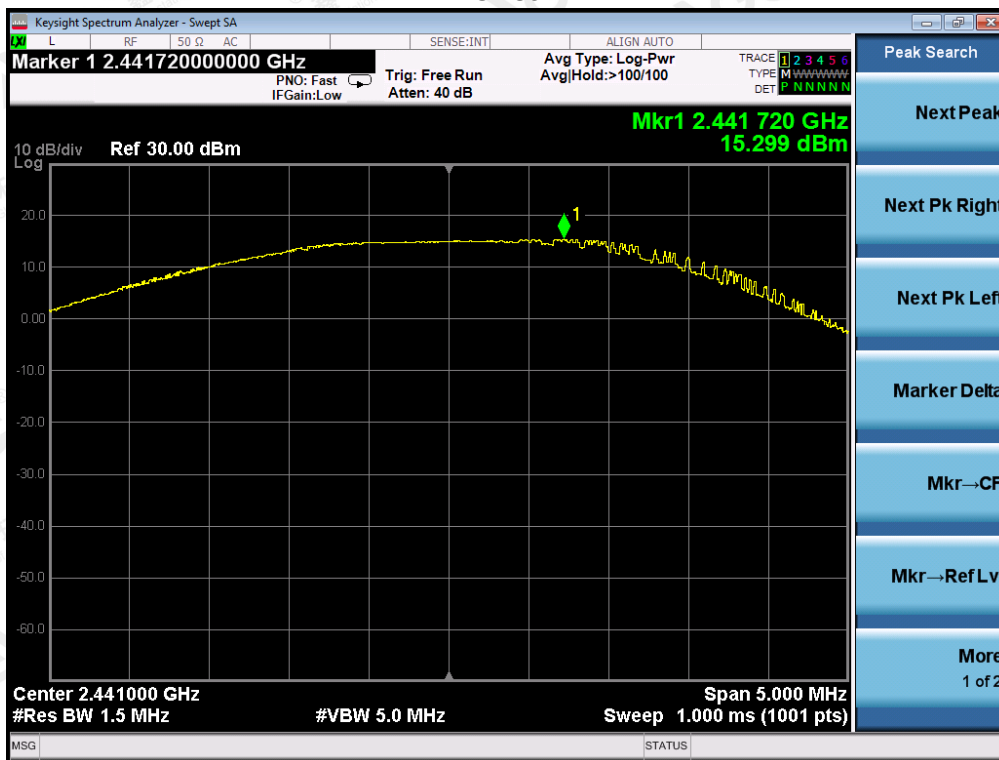
PEAK OUTPUT POWER MEASUREMENT RESULT FOR 8-DPSK MODULATION			
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.402	14.381	30	Pass
2.441	15.299	30	Pass
2.480	15.812	30	Pass

CH0

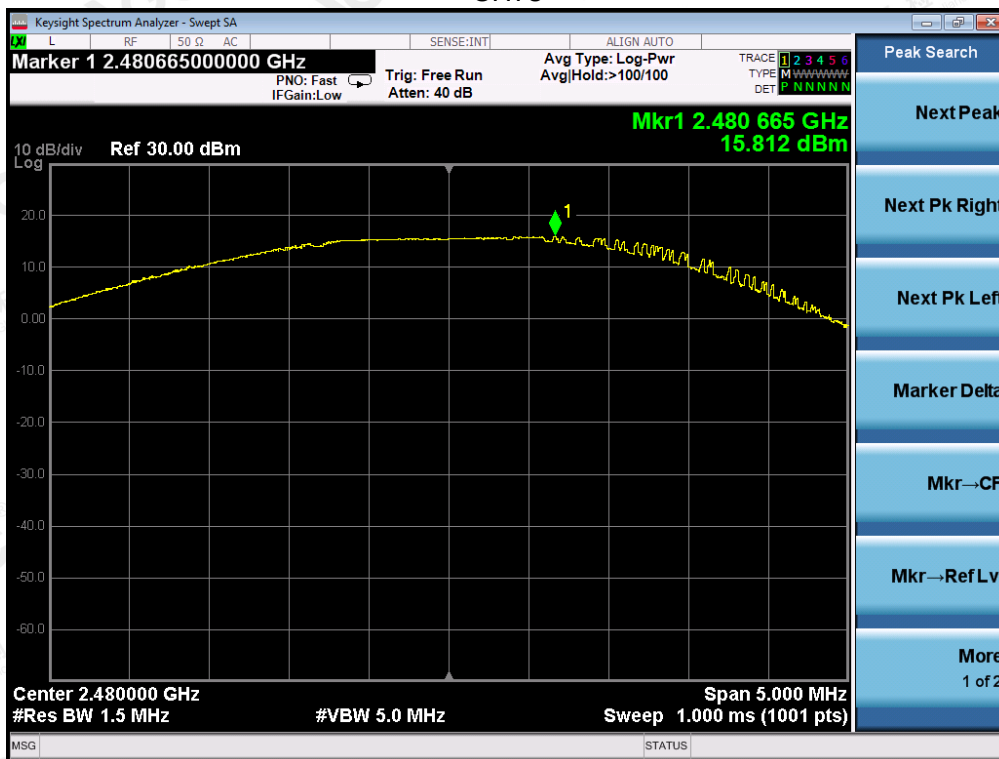


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CH39



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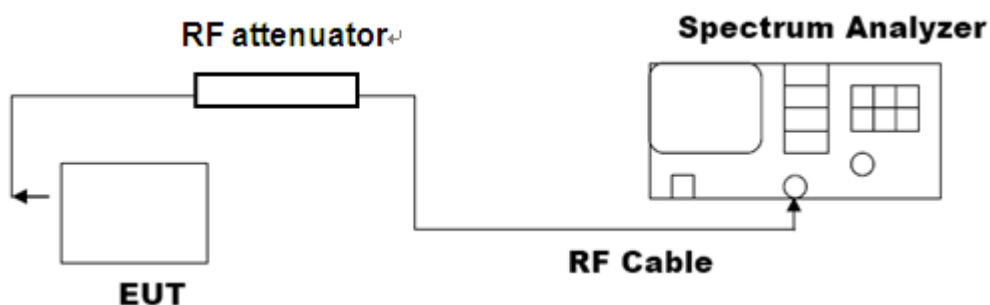
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8. 20DB BANDWIDTH

8.1 Measurement Procedure

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hoping channel
The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

8.2 Test Set-Up (Block Diagram Of Configuration)

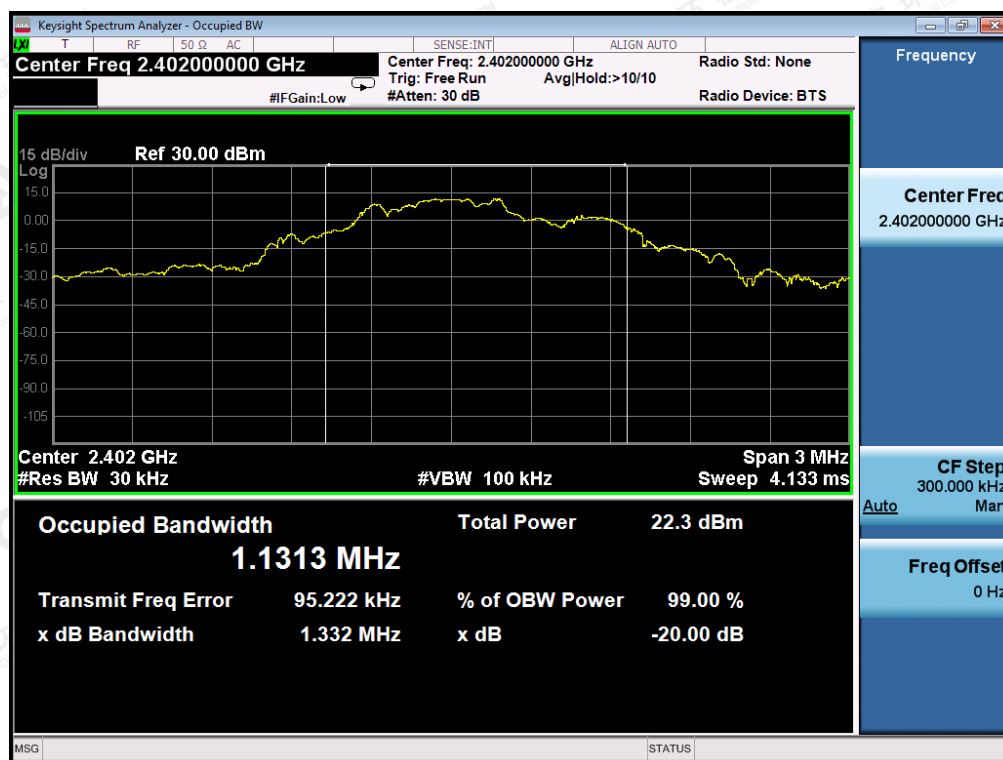


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8.3 Limits And Measurement Results

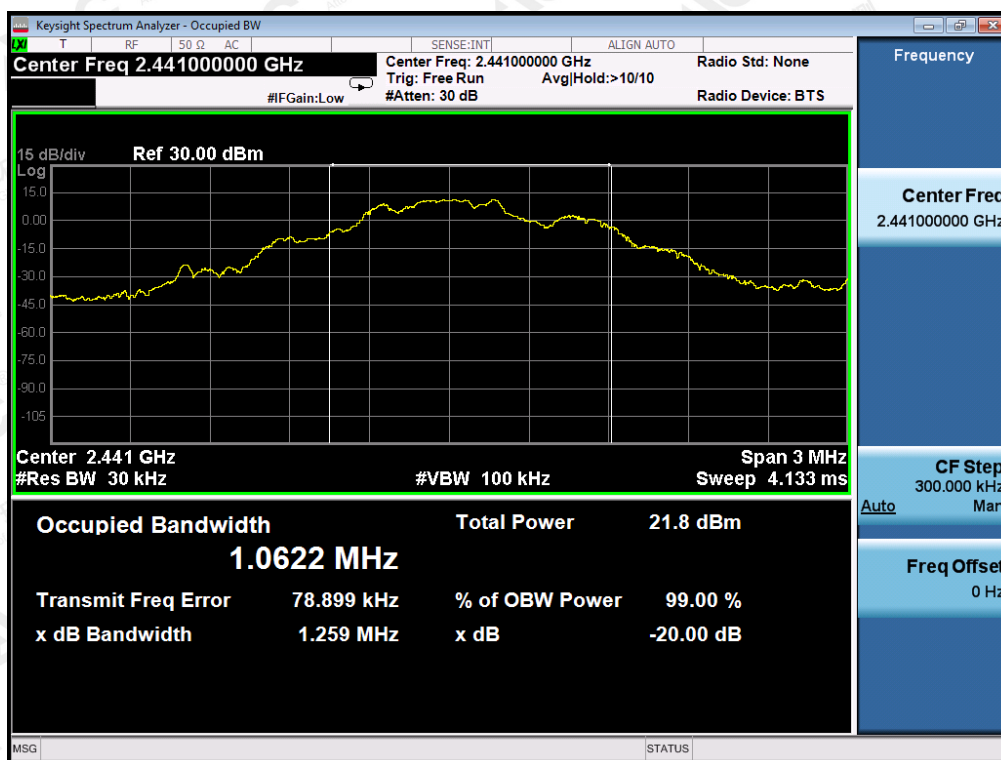
MEASUREMENT RESULT FOR GFSK MOUDULATION			
Applicable Limits	Measurement Result		
	Test Data (MHz)		Criteria
N/A	Low Channel	1.332	PASS
	Middle Channel	1.259	PASS
	High Channel	1.369	PASS

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

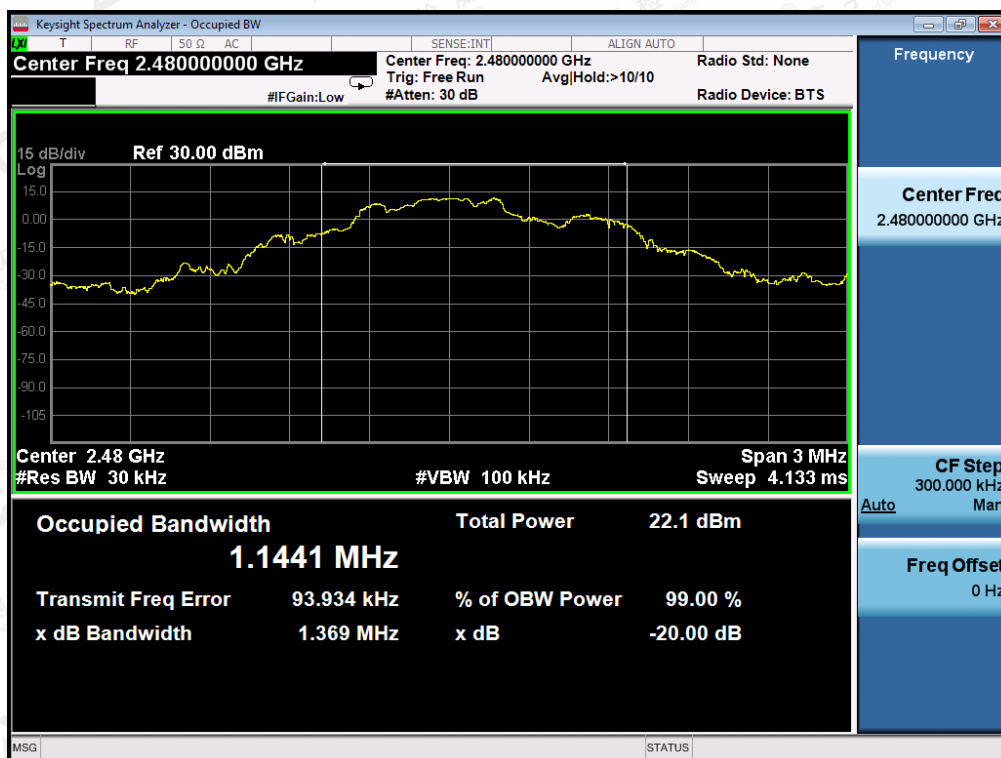


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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

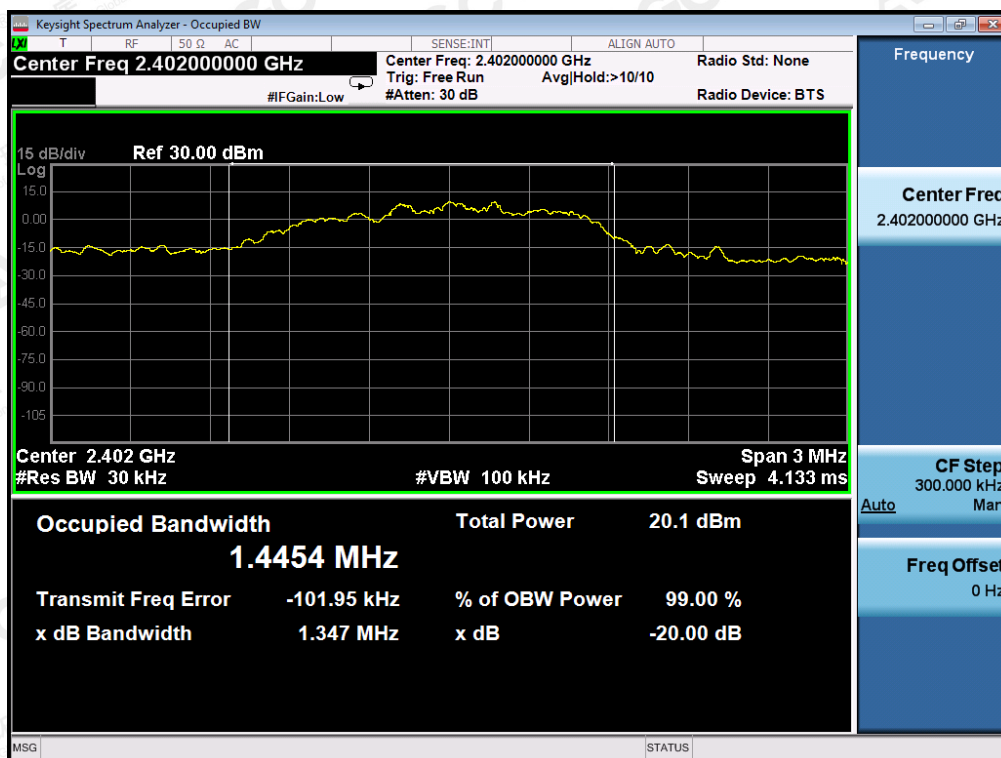


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MEASUREMENT RESULT FOR II /4-DQPSK MODULATION

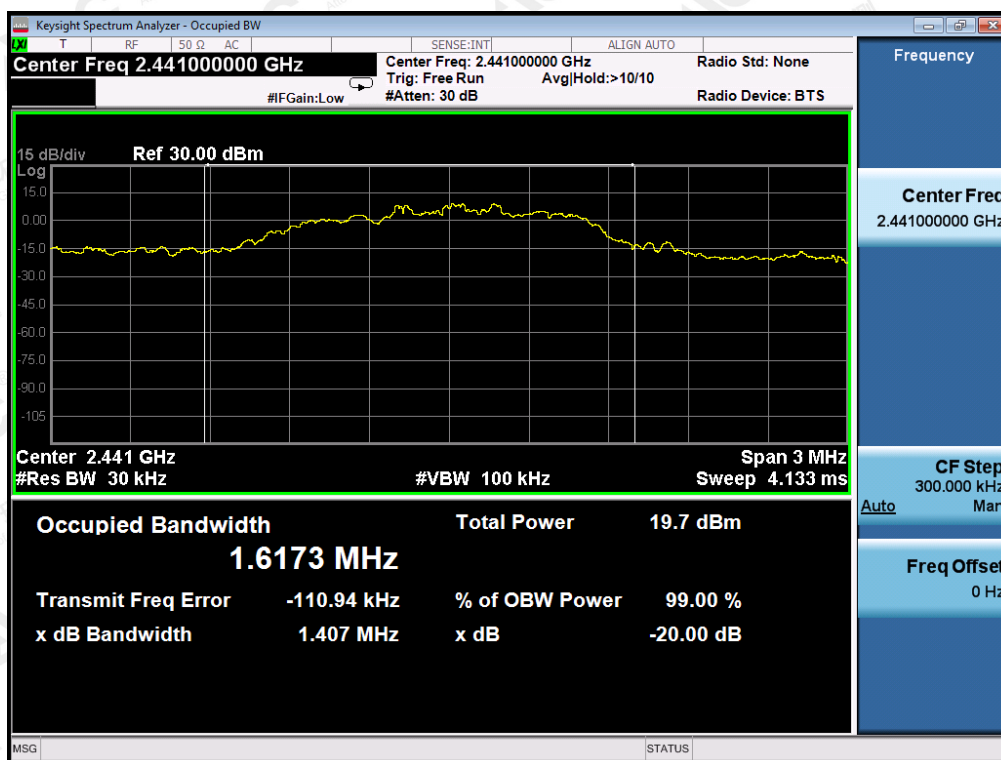
Applicable Limits	Measurement Result		
	Test Data (MHz)		Criteria
N/A	Low Channel	1.347	PASS
	Middle Channel	1.407	PASS
	High Channel	1.363	PASS

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

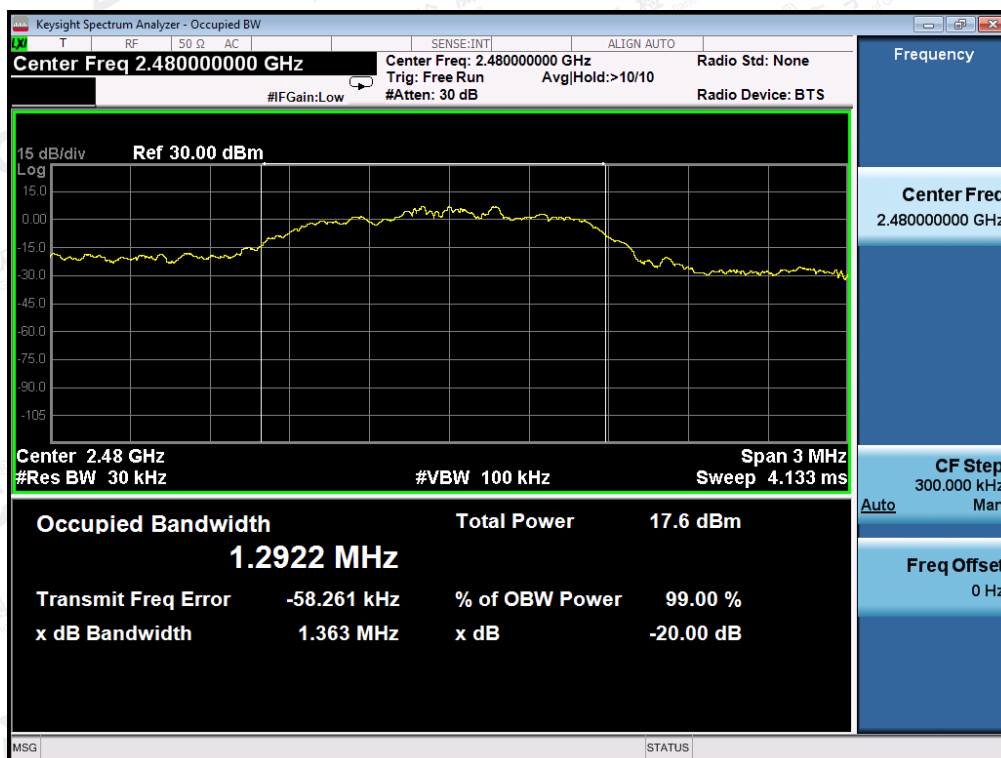


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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

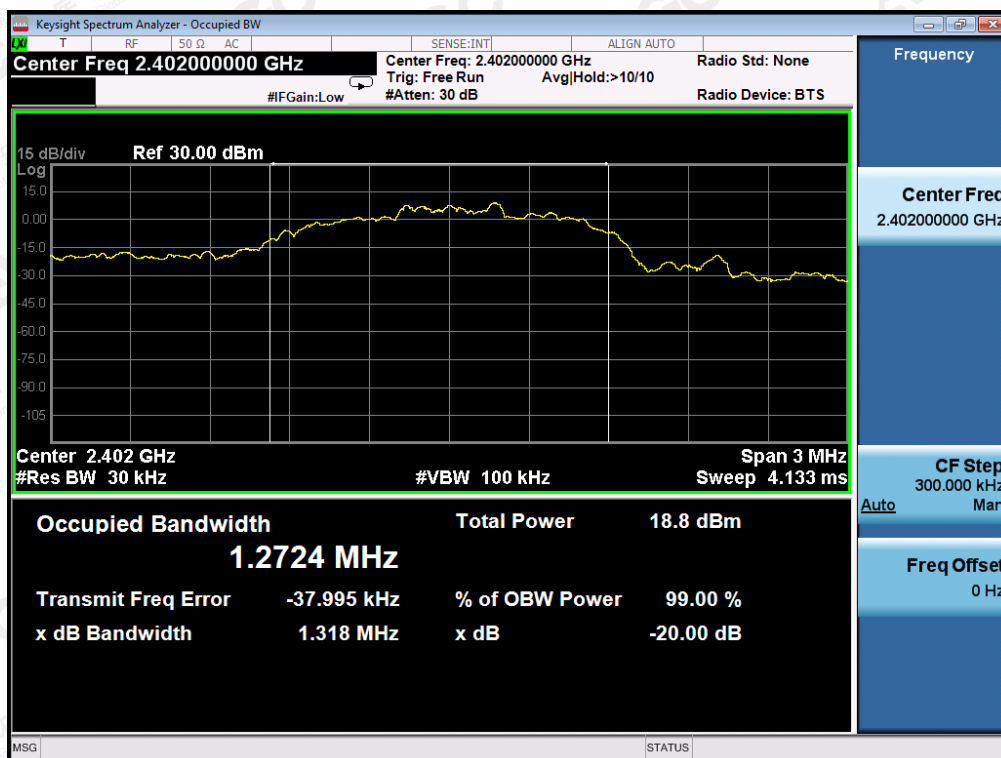


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MEASUREMENT RESULT FOR 8-DPSK MODULATION

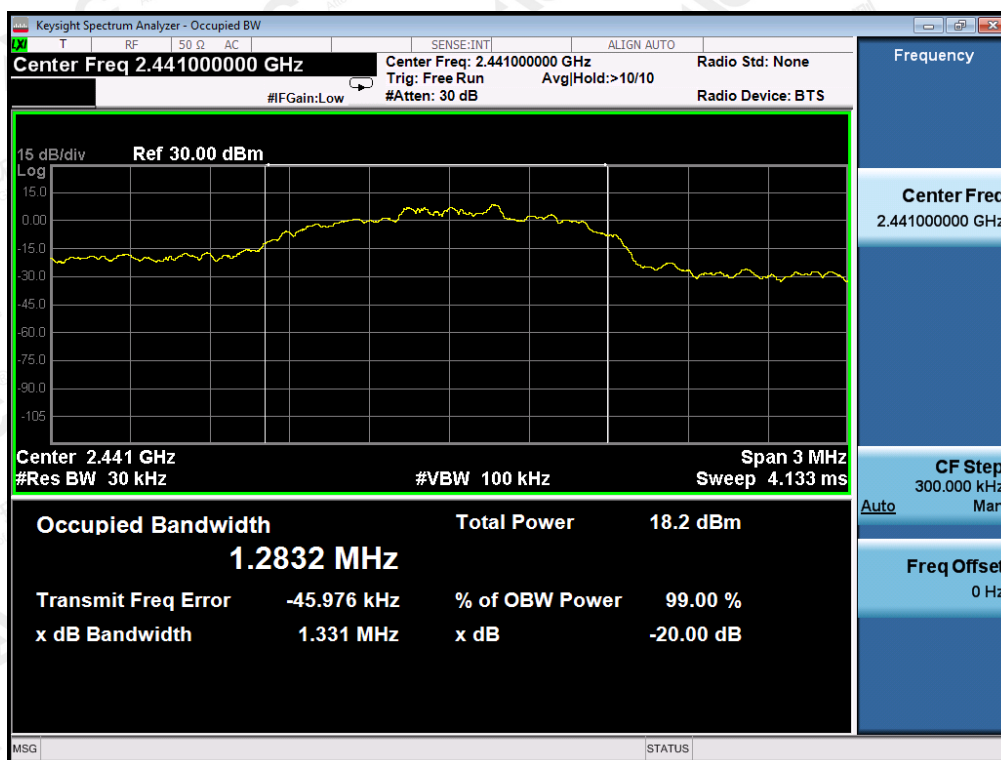
Applicable Limits	Measurement Result		
	Test Data (MHz)		Criteria
N/A	Low Channel	1.318	PASS
	Middle Channel	1.331	PASS
	High Channel	1.325	PASS

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

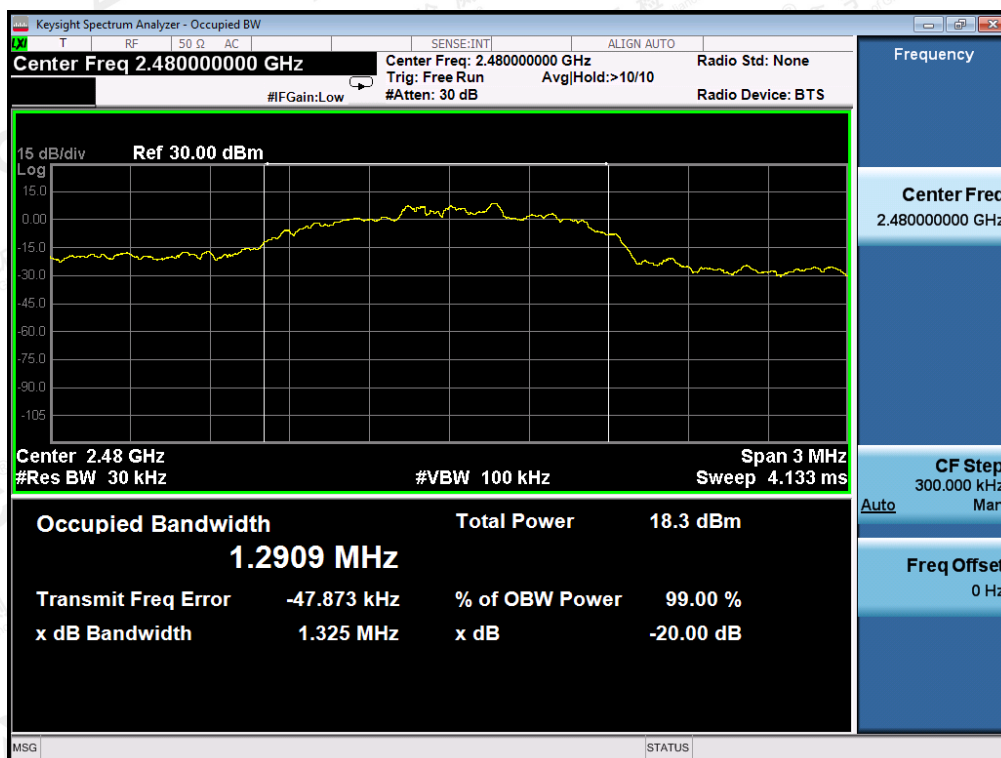


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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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9. CONDUCTED SPURIOUS EMISSION

9.1 Measurement Procedure

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the Middle and the bottom operation frequency individually.
3. Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.
RBW = 100 kHz; VBW= 300 kHz; Sweep = auto; Detector function = peak.
4. Set SPA Trace 1 Max hold, then View.

9.2 Test Set-Up (Block Diagram Of Configuration)

The same as described in section 4.2

9.3 Limits And Measurement Result

LIMITS AND MEASUREMENT RESULT		
Applicable Limits	Measurement Result	
	Test Data	Criteria
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a)	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS
	At least -20dBc than the limit Specified on the TOP Channel	PASS

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TEST RESULT FOR ENTIRE FREQUENCY RANGE
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE
OF GFSK MODULATION IN LOW CHANNEL



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TEST PLOT OF OUT OF BAND EMISSIONS
OF GFSK MODULATION IN MIDDLE CHANNEL



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TEST PLOT OF OUT OF BAND EMISSIONS
OF GFSK MODULATION IN HIGH CHANNEL



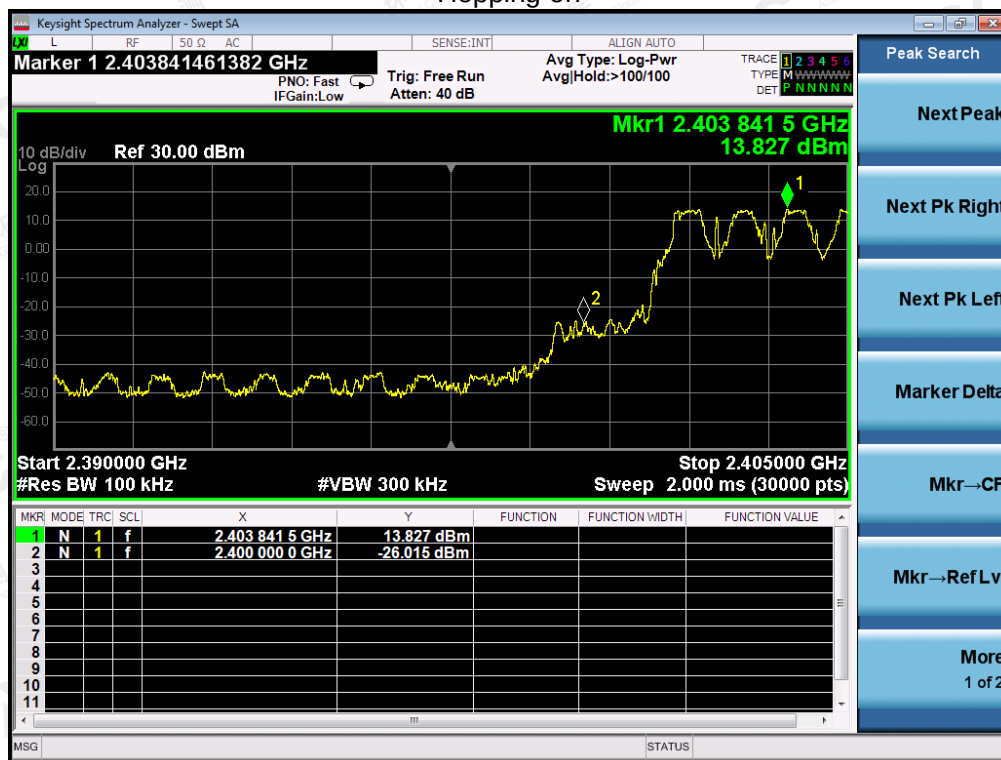
Note: The peak emissions without marker on the above plots are fundamental wave and need not to compare with the limit. The GFSK modulation is the worst case and only those data recorded in the report.

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TEST RESULT FOR BAND EDGE
GFSK MODULATION IN LOW CHANNEL
Hopping off

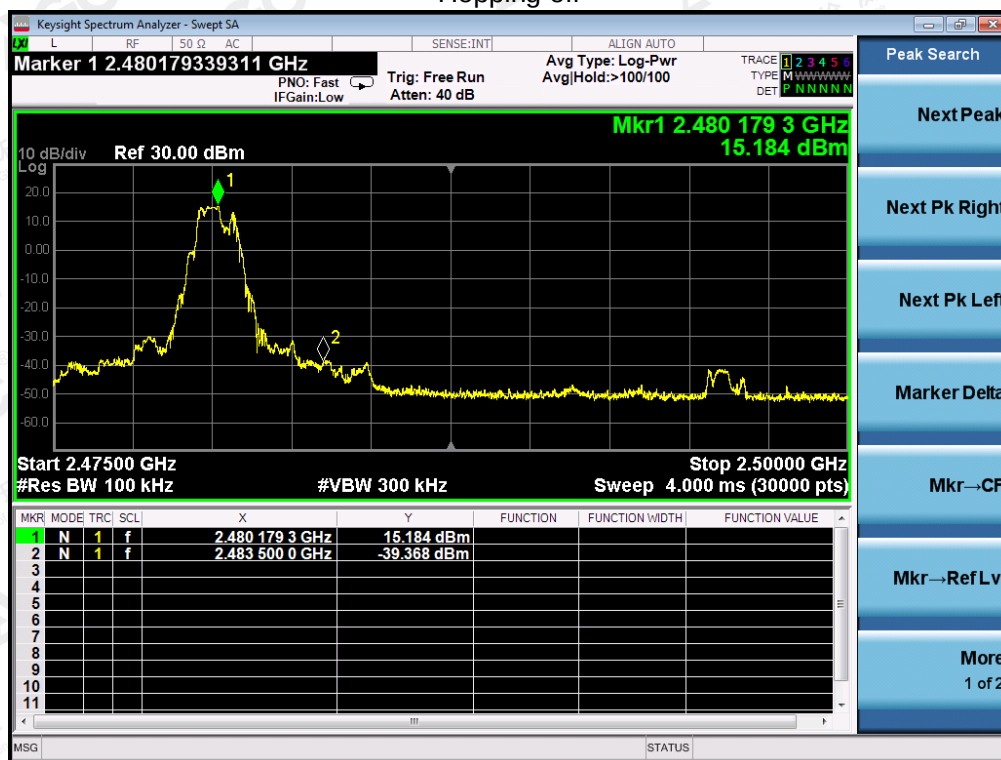


Hopping on

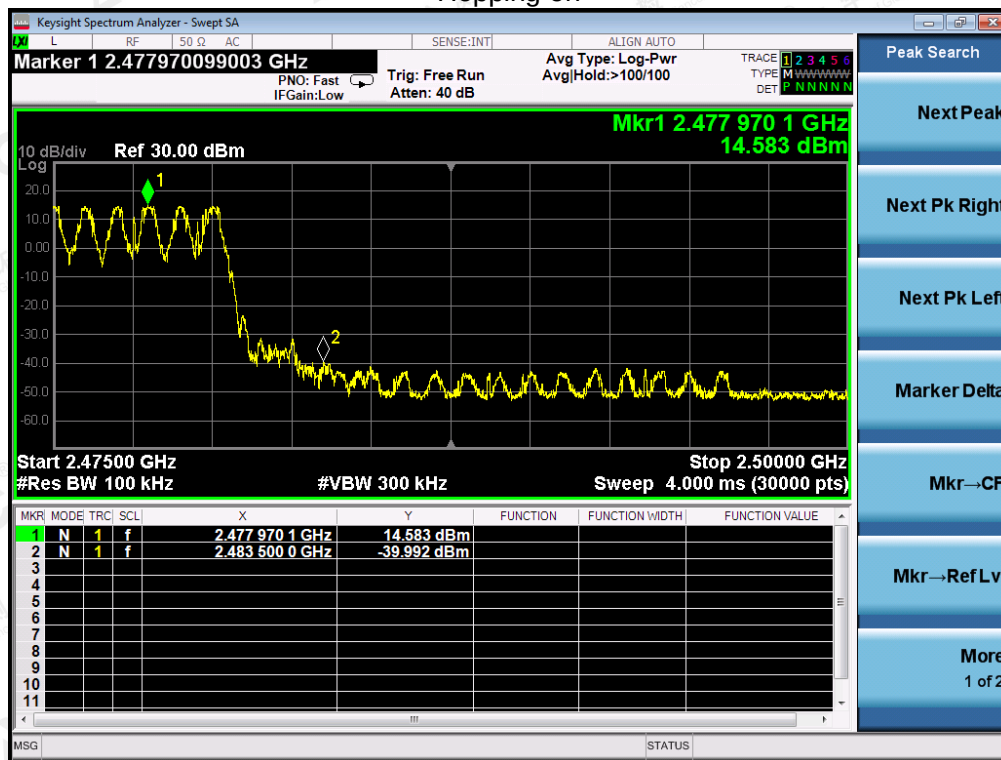


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GFSK MODULATION IN HIGH CHANNEL Hopping off



Hopping on

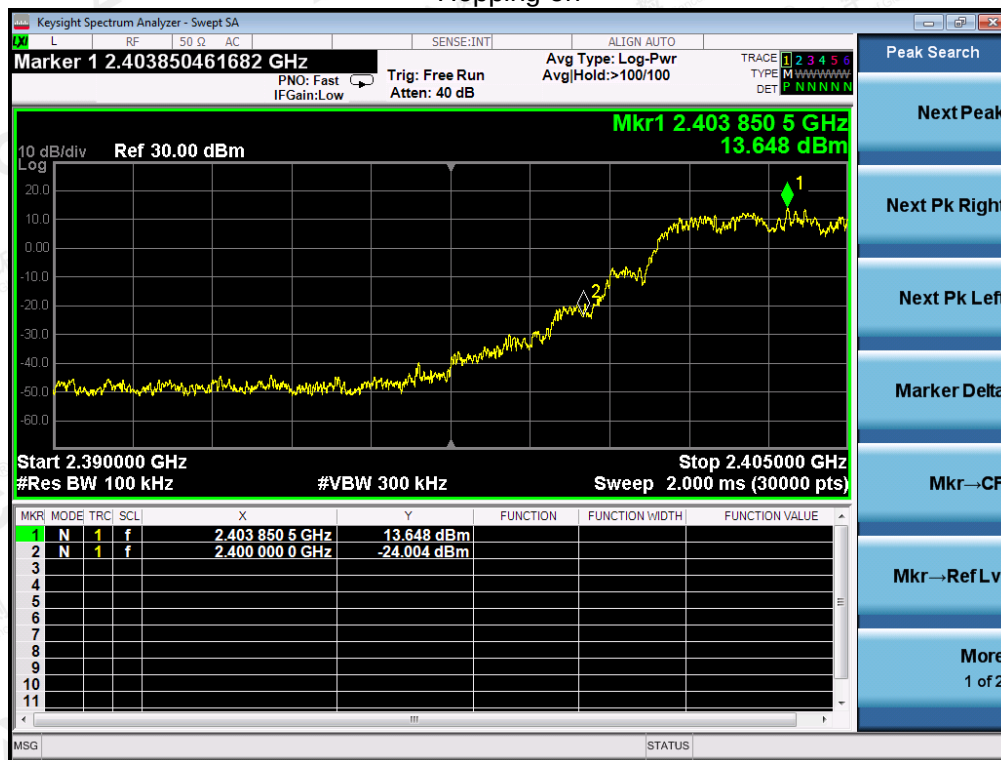


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π /4-DQPSK MODULATION IN LOW CHANNEL
Hopping off



Hopping on

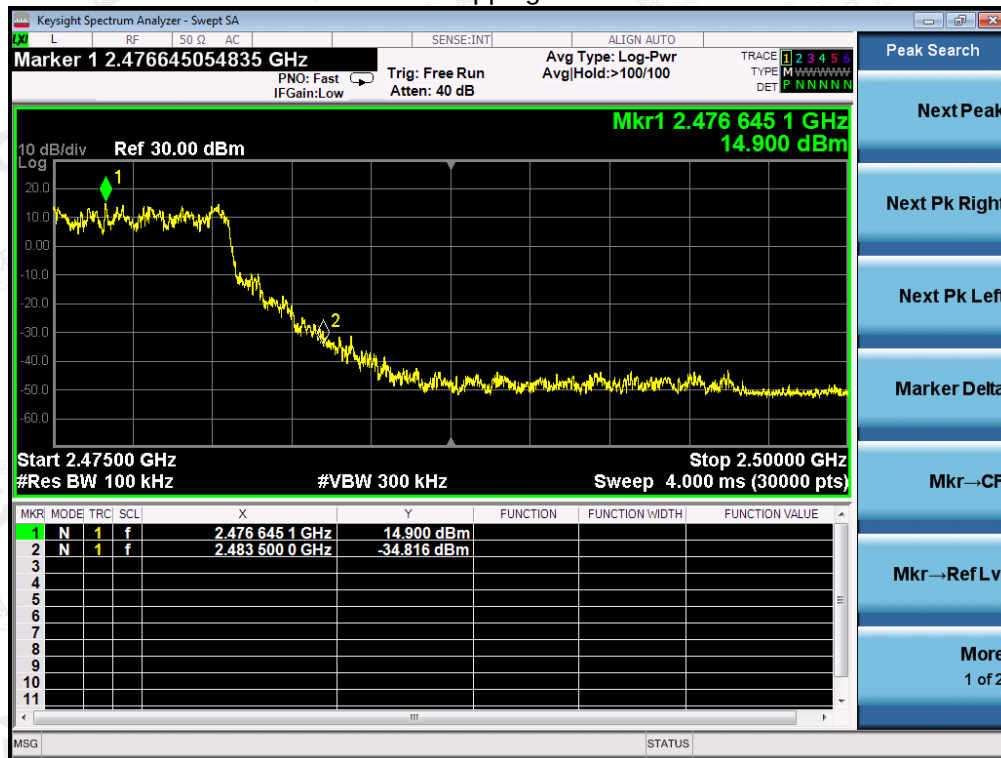


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π /4-DQPSK MODULATION IN HIGH CHANNEL
Hopping off

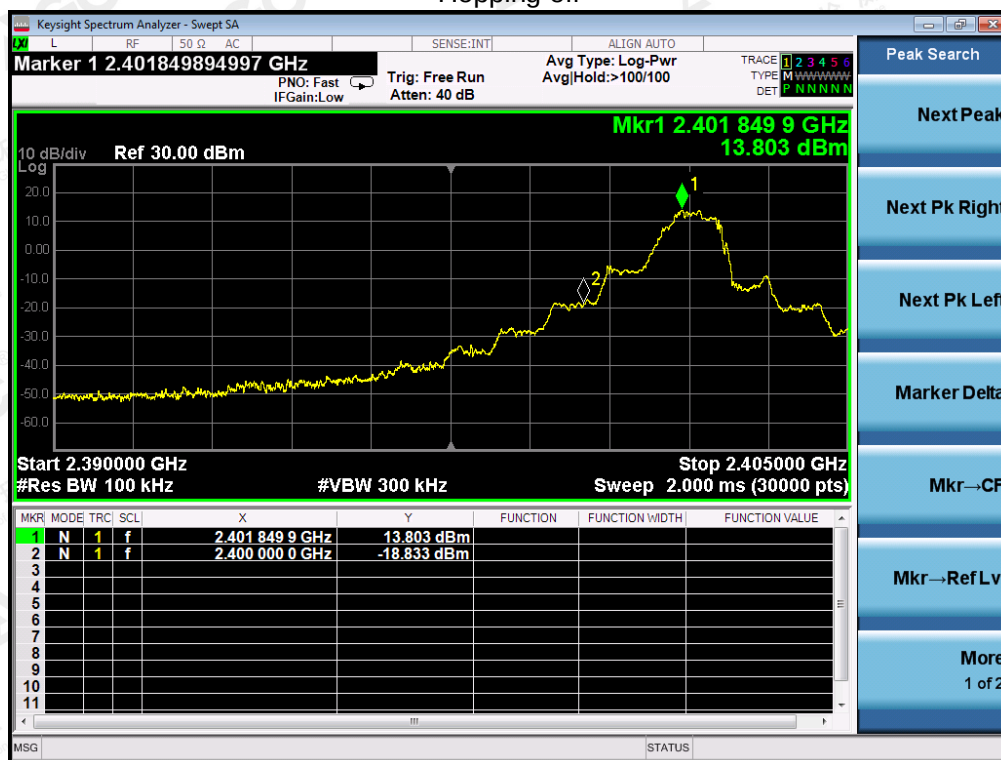


Hopping on



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8-DPSK MODULATION IN LOW CHANNEL Hopping off



Hopping on

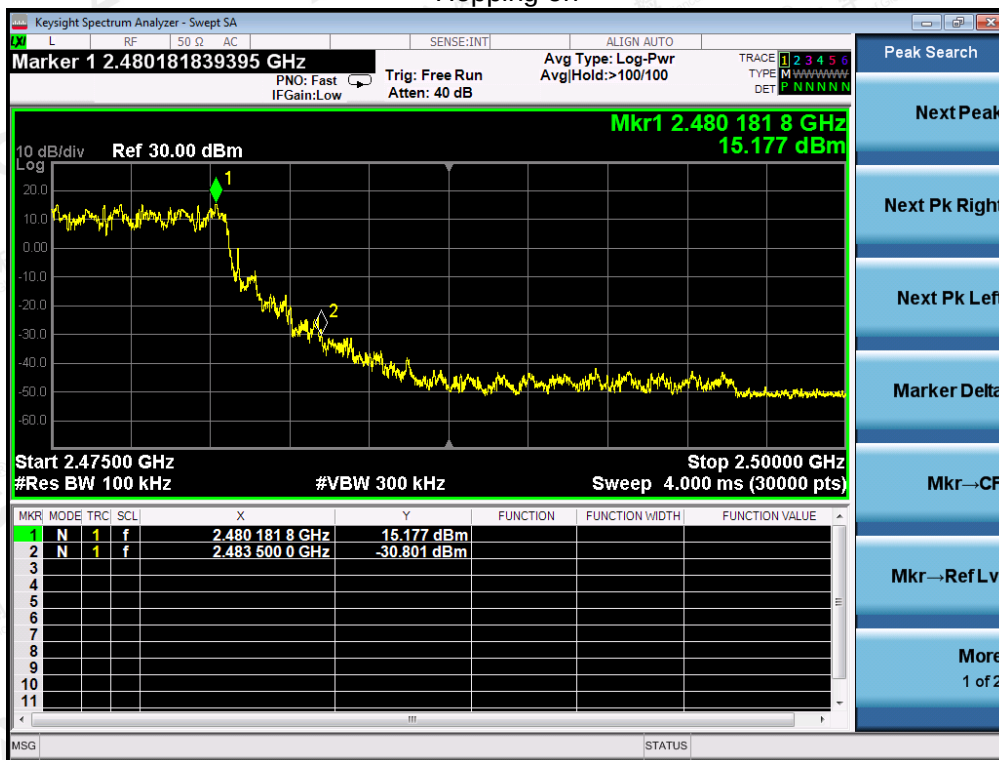


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8-DPSK MODULATION IN HIGH CHANNEL Hopping off



Hopping on



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