

# TEST REPORT

**Report No.** .....: **KS2105S1271E02**  
**FCC ID**.....: **2AZ5K-JT110G**  
**Applicant**.....: **Shenzhen Joyhong Technology Co. LTD.**  
**Address**.....: 5th Floor, Building 1, Zhongtai Road NO. 18, Loucun Second Industrial Park, Xihu Street, Guangming, Shenzhen, China.  
**Manufacturer**.....: Shenzhen Joyhong Technology Co. LTD.  
**Address**.....: 5th Floor, Building 1, Zhongtai Road NO. 18, Loucun Second Industrial Park, Xihu Street, Guangming, Shenzhen, China.  
**Product Name**.....: **Digital Photo Frame**  
**Trade Mark**.....: /  
**Model/Type reference**.....: JT110G-A05A  
**Listed Model(s)** .....: JT097G-A01, JT097G-A01W, JT097G-A01B-U, JT110G-B05A, JT110G-A05B, JT110G-B05B, JT110G-A02B-U, JT110G-B02B-U, JT110G-A02-U, JT110G-B02-U, TT-IH006  
**Standard**.....: **FCC CFR Title 47 Part 15 Subpart C Section 15.247**  
**Date of receipt of test sample**...: May 15, 2021  
**Date of testing**.....: May 15, 2021~June 08, 2021  
**Date of issue**.....: June 10, 2021  
**Test Result**.....: **Pass**

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Supervised by: (Printed name+signature)	Rory Huang	<i>Rory Huang</i>
Approved by: (Printed name+signature)	Neil Wan	<i>Neil Wan</i>



**Testing Laboratory Name**.....: **KSIGN(Guangdong) Testing Co., Ltd.**  
**Address**.....: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, People's Republic of China

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## 1. TEST SUMMARY

### 1.1. Test Standards

The tests were performed according to following standards:

**FCC Rules Part 15.247:** Operation within the bands of 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.

**KDB 558074 D01 :** The measurement guidance provided herein is applicable only to Digital Transmission System (DTS) devices operating in the 902-928 MHz. 2400-2483.5 MHz and/or 5725-5850 MHz bands under §15.247 of the FCC rules (Title 47 of the Code of Federal Regulations).

**ANSI C63.10-2013:** American National Standard for Testing Unlicensed Wireless Devices.

### 1.2. Report version

Revised No.	Date of issue	Description
01	June 10, 2021	Original



### 1.3. Test Description

FCC Part 15 Subpart C(15.247)			
Test Item	Standard Section	Result	Test Engineer
	FCC		
Antenna Requirement	15.203	Pass	Allen Li
Conducted Emission	15.207	Pass	Allen Li
Restricted Bands	15.205	Pass	Allen Li
Hopping Channel Separation	15.247(a)(1)	Pass	Allen Li
Dwell Time	15.247(a)(1)	Pass	Allen Li
Peak Output Power	15.247(b)(1)	Pass	Allen Li
Number of Hopping Frequency	15.247 (a)(1)	Pass	Allen Li
Band Edge Emissions	15.247(d)	Pass	Allen Li
Radiated Spurious Emission	15.247(c)&15.209	Pass	Allen Li
99% Occupied Bandwidth & 20dB Bandwidth	15.247(a)(1)	Pass	Allen Li
Pseudorandom Frequency Hopping Sequence	15.247 (a)(1)	Pass	Allen Li

Note: The measurement uncertainty is not included in the test result.



## 1.4. Test Facility

### Address of the report laboratory

#### **KSIGN(Guangdong) Testing Co., Ltd.**

West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, People's Republic of China

### Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

#### **CNAS-Lab Code: L13261**

KSIGN(Guangdong) Testing 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: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

#### **A2LA-Lab Cert. No.: 5457.01**

KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

#### **IC Registration No.: CN0096**

The 3m alternate test site of KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: CN0096

#### **FCC-Registration No.: CN1272**

KSIGN(Guangdong) Testing 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.



### 1.5. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the KSIGN(Guangdong) Testing Co., Ltd. system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device. Below is the best measurement capability for KSIGN(Guangdong) Testing Co., Ltd.

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.42 dB	(1)
Transmitter power Radiated	2.14 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.20 dB	(1)
Radiated Emissions 30~1000MHz	4.70 dB	(1)
Radiated Emissions 1~18GHz	5.00 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Occupied Bandwidth	2.80 dB	(1)

**Note (1):** This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

### 1.6. Environmental conditions

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

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba



## 2. GENERAL INFORMATION

### 2.1. General Description of EUT

Test Sample Number:	1-1-1(Normal Sample),1-1-2(Engineering Sample )
Product Name:	Digital Photo Frame
Trademark:	/
Model/Type reference:	JT110G-A05A
Listed Model(s):	JT097G-A01, JT097G-A01W, JT097G-A01B-U, JT110G-B05A, JT110G-A05B, JT110G-B05B, JT110G-A02B-U, JT110G-B02B-U, JT110G-A02-U, JT110G-B02-U, TT-IH006
Model Difference:	The difference between product models only depends on the appearance color,screen size and the model naming is different. Other power supply methods, safety structure and key components are the same, which do not affect the safety and electromagnetic compatibility performance.
Power supply(Adapter):	Input: 100-240V-50/60Hz 0.5A Output: 5V== 2.4A
Power supply(Battery):	/
Hardware version:	JH212-A63-U
Software version:	20201026
<b>Bluetooth V4.1</b>	
Modulation:	GFSK(DH5), $\pi/4$ -DQPSK(2DH5), 8DPSK(3DH5)
Operation frequency:	2402MHz~2480MHz
Max Peak Output Power:	DH5: 2.48 dBm 2DH5: 0.89 dBm 3DH5: 0.74 dBm
Channel number:	79
Channel separation:	1MHz
Antenna type:	FPC Antenna
Antenna gain:	2.0dBi



## 2.2. Operation State

Operation Frequency List: The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. BT EDR, 79 channels are provided to the EUT. Channels 00/39/78 were selected for testing.

Operation Frequency List:

Channel	Frequency (MHz)
<b>00</b>	<b>2402</b>
01	2403
⋮	⋮
38	2440
<b>39</b>	<b>2441</b>
40	2442
⋮	⋮
77	2479
<b>78</b>	<b>2480</b>

Note: The display in gray were the channel selected for testing.

Test mode

NO.	TEST MODE DESCRIPTION
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	Low channel $\pi/4$ -DQPSK
5	Middle channel $\pi/4$ -DQPSK
6	High channel $\pi/4$ -DQPSK
7	Low channel 8DPSK
8	Middle channel 8DPSK
9	High channel 8DPSK
10	Hopping mode GFSK
11	Hopping mode $\pi/4$ -DQPSK
12	Hopping mode 8DPSK

Note:

1. Only the result of the worst case was recorded in the report, if no other cases.
2. The test software is the Blue Test 3 which can set the EUT into the individual test modes.



### 2.3. Measurement Instruments List

Tonscend JS0806-2 Test system					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	Spectrum Analyzer	R&S	FSV40-N	101798	04/07/2022
2	Vector Signal Generator	Agilent	N5182A	MY50142520	04/07/2022
3	Analog Signal Generator	HP	83752A	3344A00337	04/07/2022
4	Power Sensor	Agilent	E9304A	MY50390009	04/07/2022
5	Power Sensor	Agilent	E9300A	MY41498315	04/07/2022
6	Wideband Radio Communication Tester	R&S	CMW500	157282	04/07/2022
7	Climate Chamber	Angul	AGNH80L	1903042120	04/07/2022
8	Dual Output DC Power Supply	Agilent	E3646A	MY40009992	04/07/2022
9	RF Control Unit	Tonscend	JS0806-2	/	04/07/2022

Transmitter spurious emissions & Receiver spurious emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	EMI Test Receiver	R&S	ESR	102525	04/07/2022
2	High Pass Filter	Chengdu E-Microwave	OHF-3-18-S	0E01901038	03/27/2022
3	High Pass Filter	Chengdu E-Microwave	OHF-6.5-18-S	0E01901039	03/27/2022
4	Spectrum Analyzer	HP	8593E	3831U02087	04/07/2022
5	Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	01230	03/29/2023
6	Loop Antenna	Beijin ZHINAN	ZN30900C	18050	03/25/2022
7	Spectrum Analyzer	R&S	FSV40-N	101798	04/07/2022
8	Horn Antenna	Schwarzbeck	BBHA 9120 D	2023	03/29/2023
9	Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	04/07/2022
10	Pre-Amplifier	EMCI	EMC051835SE	980662	04/07/2022
11	Pre-Amplifier	Schwarzbeck	BBV-9721	57	04/07/2022
12	Horn Antenna	Schwarzbeck	BBHA 9170	00939	03/29/2022

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	LISN	R&S	ENV432	1326.6105.02	03/27/2022
2	EMI Test Receiver	R&S	ESR	102524	04/07/2022
3	Manual RF Switch	JS TOYO	/	MSW-01/002	04/07/2022



Note:

1)The Cal. Interval was one year.

2)The cable loss has calculated in test result which connection between each test instruments.

## 2.4. Test Software

Software name	Model	Version
Conducted emission Measurement Software	EZ-EMC	EMC-Con 3A1.1
Radiated emission Measurement Software	EZ-EMC	FA-03A.2.RE
Bluetooth and WIFI Test System	JS1120-3	2.5.77.0418



### 3. TEST ITEM AND RESULTS

#### 3.1. Antenna requirement

##### Requirement

##### **FCC CFR Title 47 Part 15 Subpart C Section 15.203:**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

##### **FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):**

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

##### Test Result

The directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.

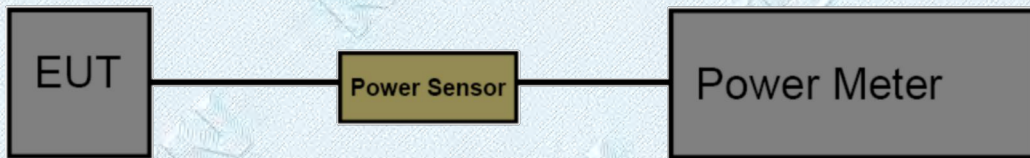


### 3.2. Peak Output Power

**Limit**

Test Item	Limit	Frequency Range(MHz)
Peak Output Power	Hopping Channels>75 Power<1W(30dBm) Other <125mW(21dBm)	2400~2483.5

**Test Configuration**



**Test Procedure**

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
2. Spectrum Setting:  
Peak Detector: RBW=1 MHz, VBW=3 MHz for bandwidth less than 1MHz.  
RBW=3 MHz, VBW=10 MHz for bandwidth more than 1MHz.

**Test Mode**

Please refer to the clause 2.2

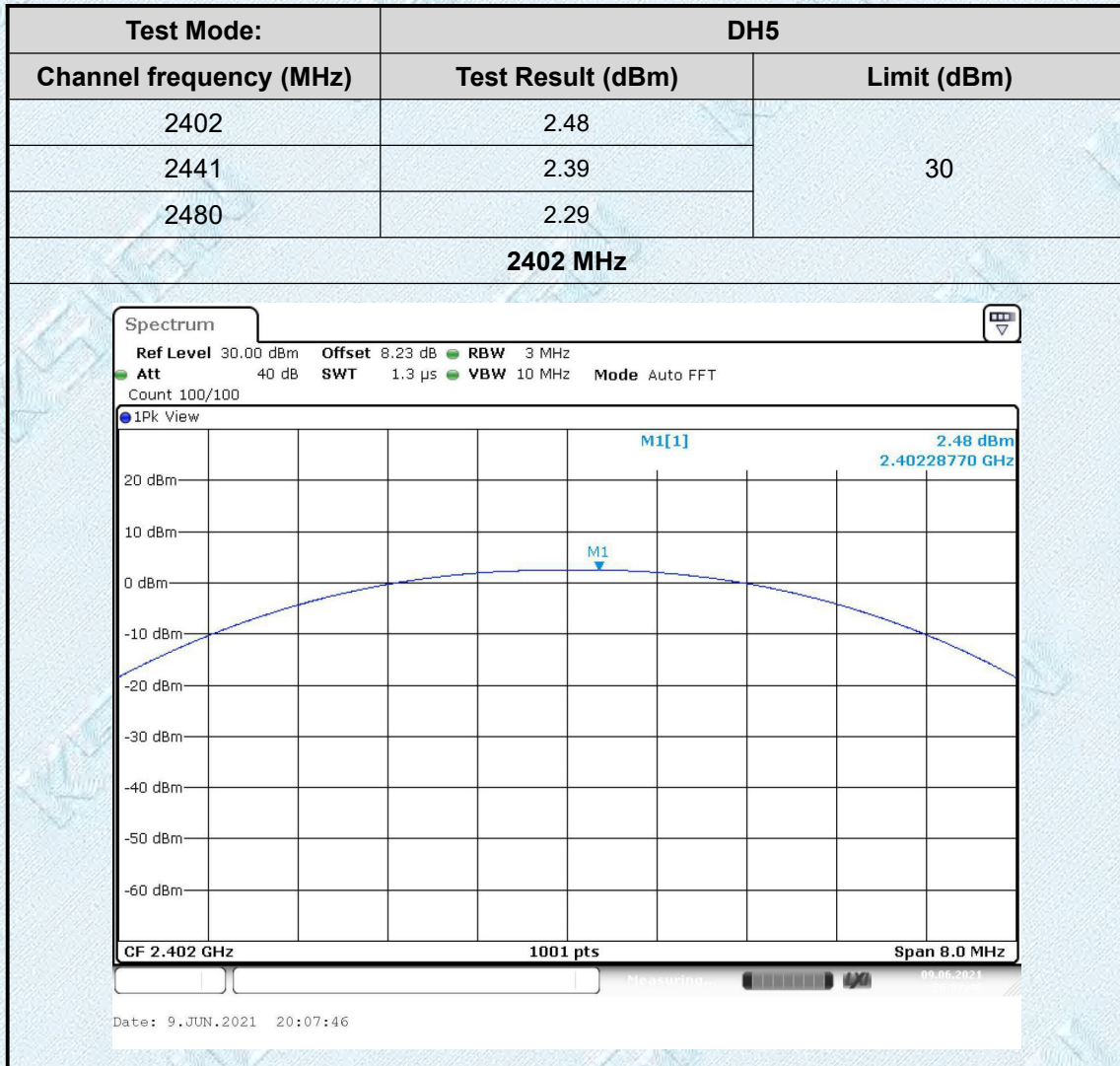
**Test Result**

TRF No. Part 15 Subpart C Section 15.247\_R1

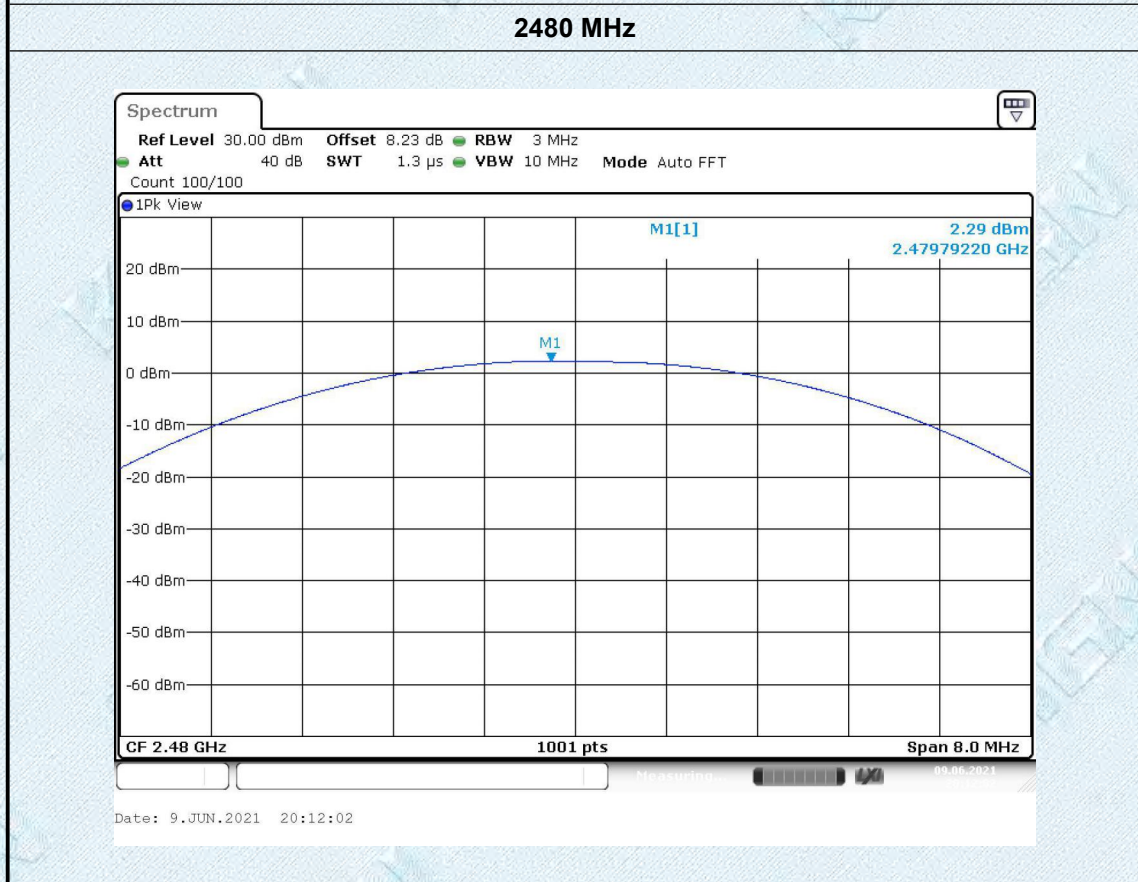
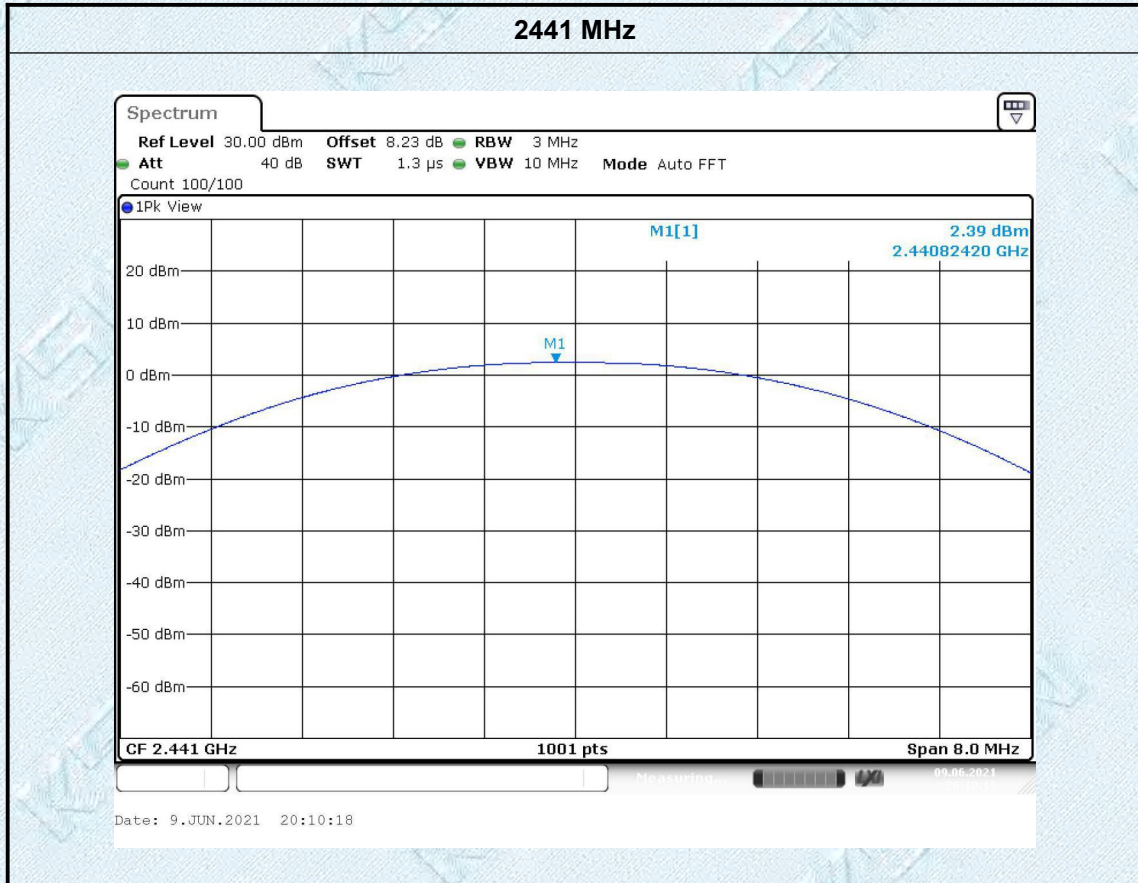
Add : West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel : +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail : info@gdksign.cn Web: www.gdksign.com

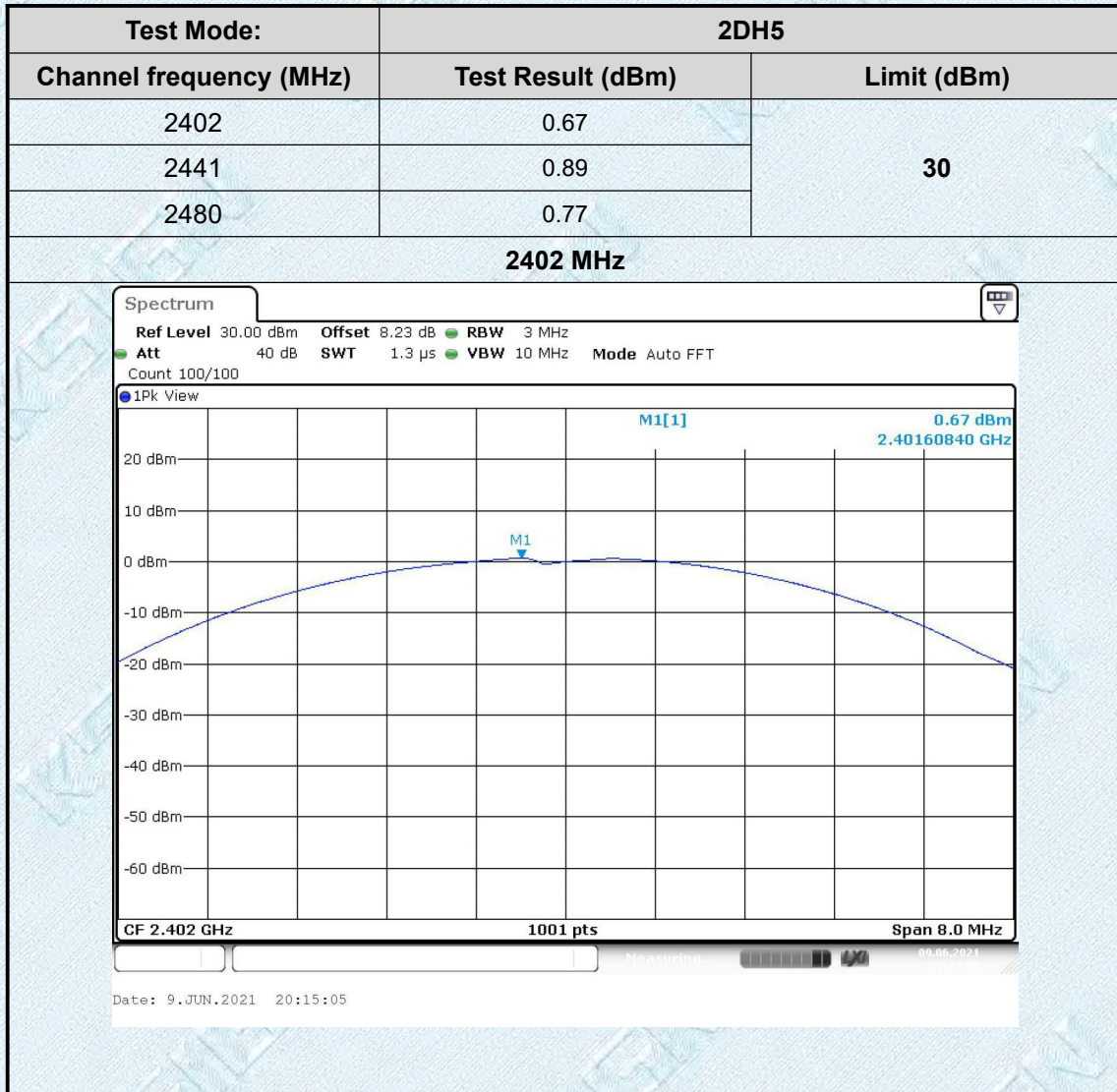




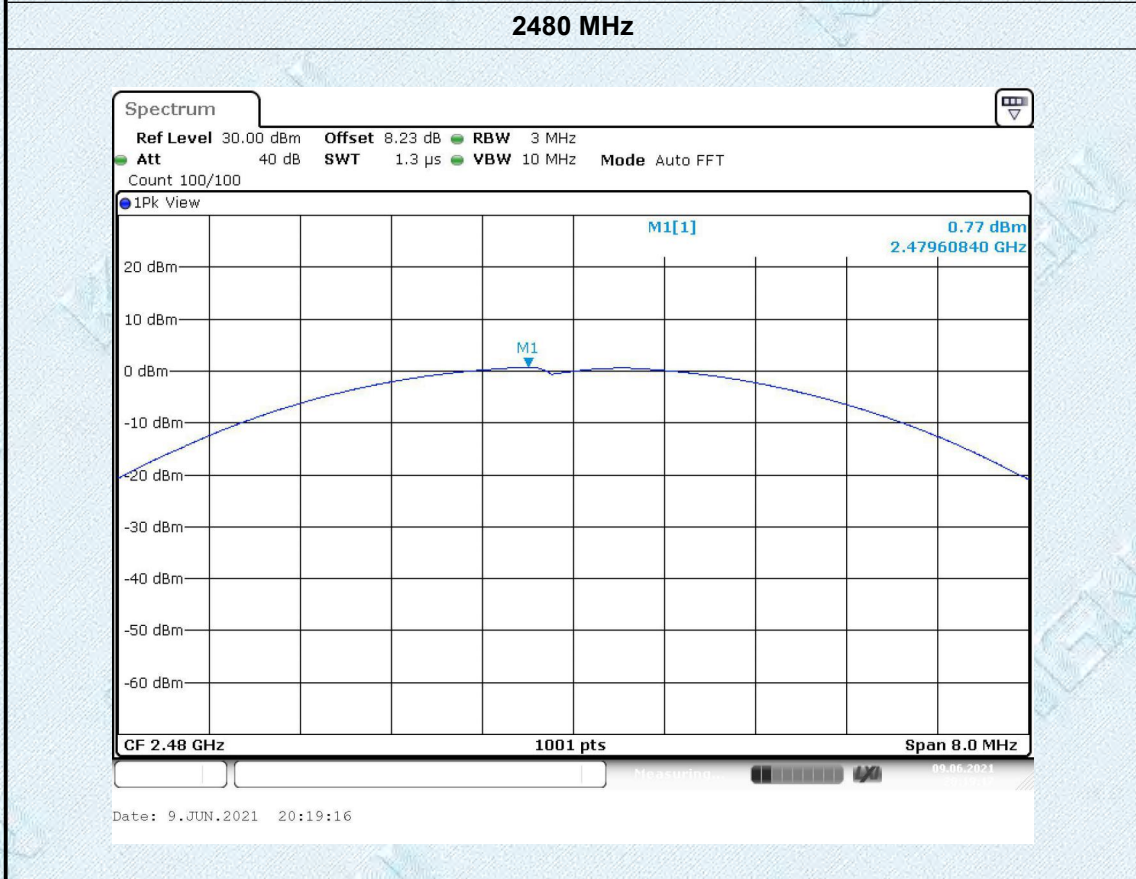




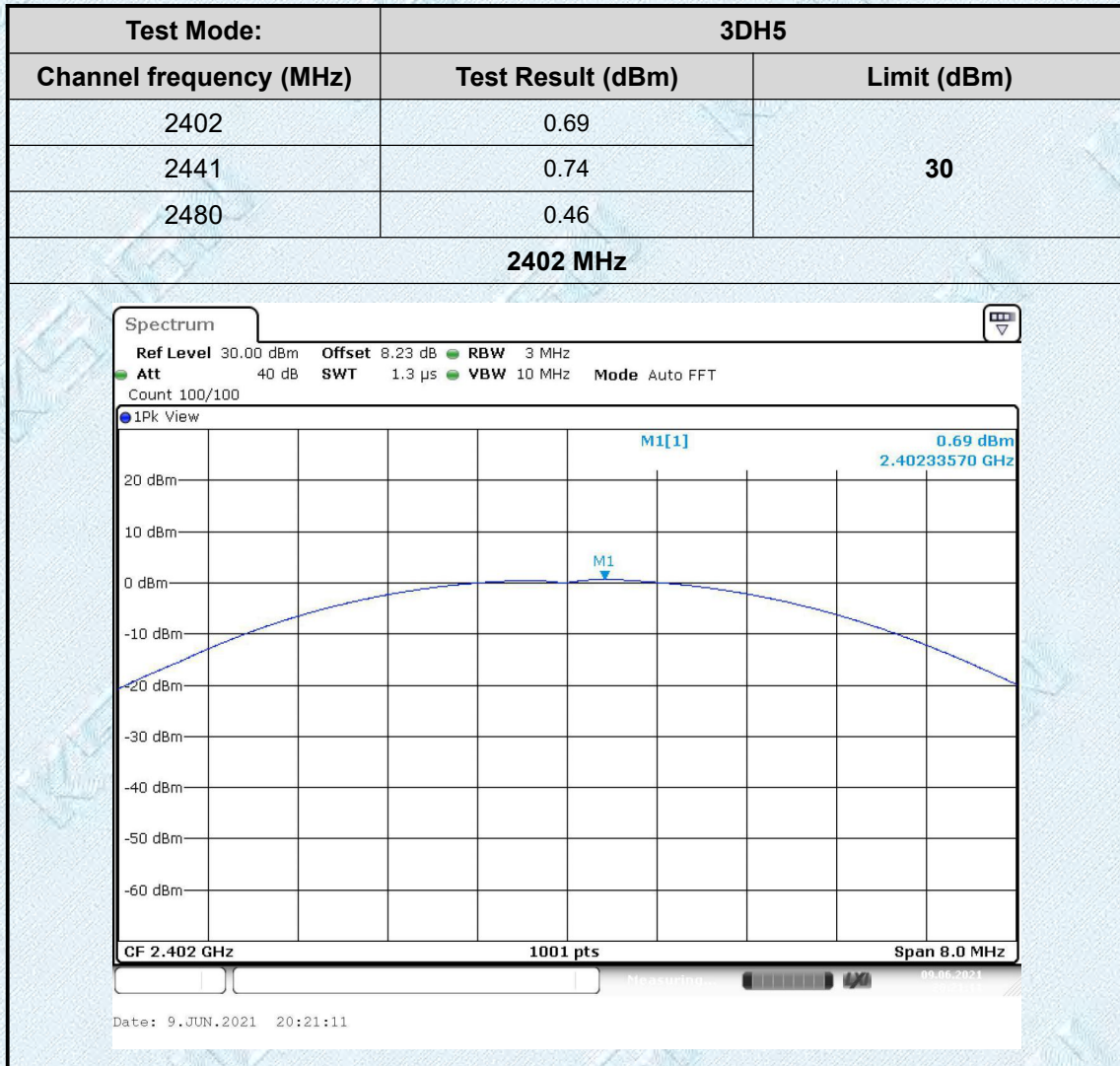




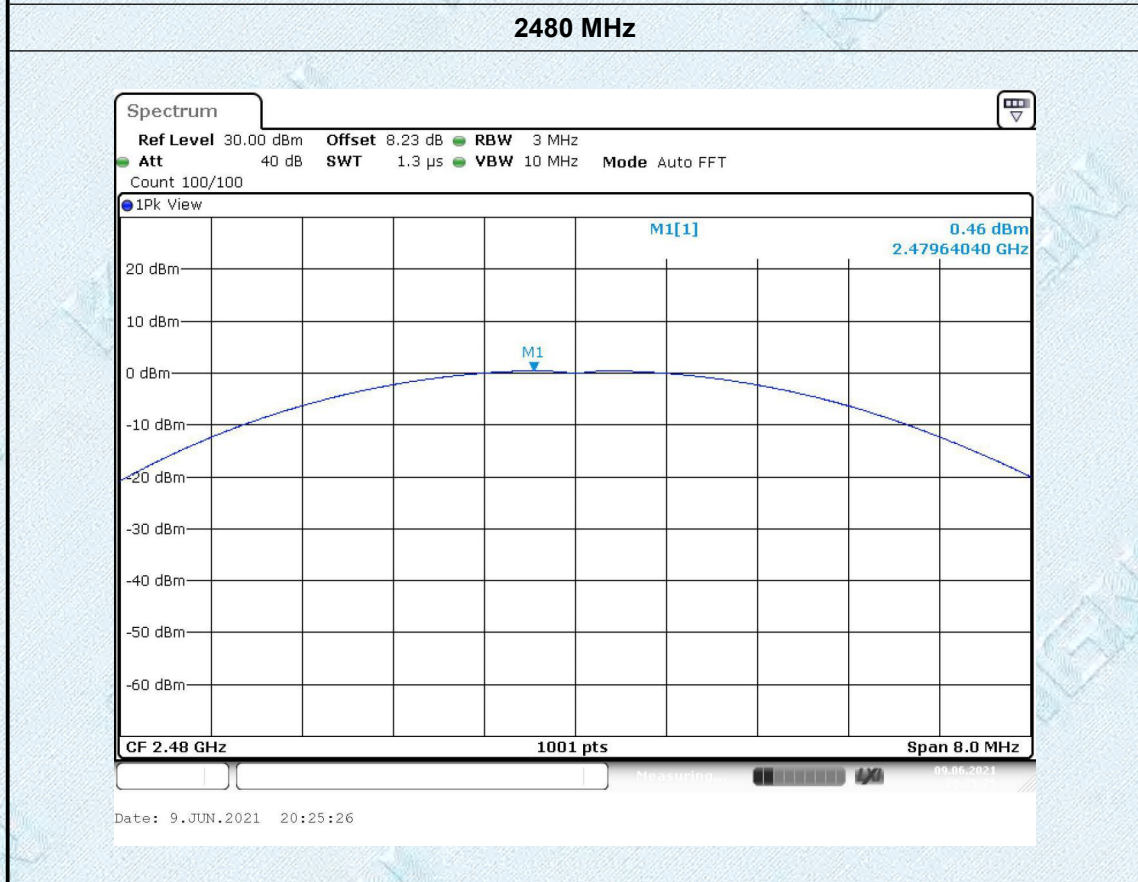












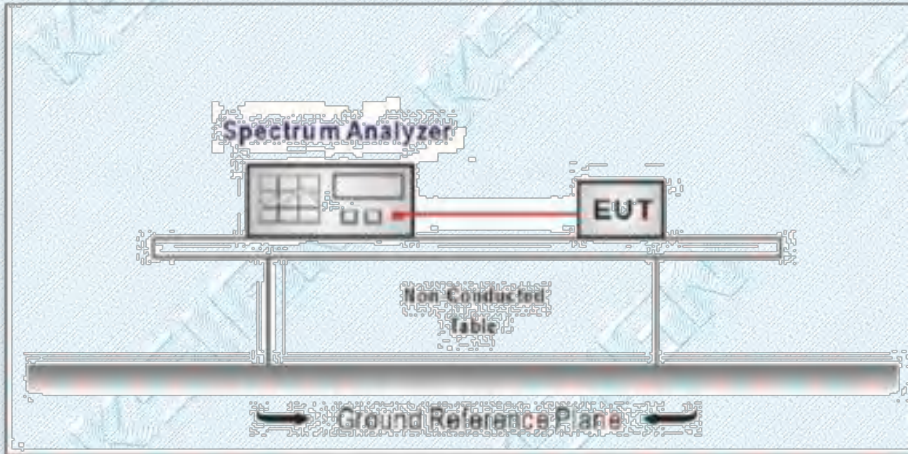


### 3.3. 20dB Bandwidth

**Limit**

Test Item	Limit	Frequency Range(MHz)
Bandwidth	N/A	2400~2483.5

**Test Configuration**



**Test Procedure**

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
2. Spectrum Setting:
  - (1) Set RBW = 30 kHz.
  - (2) Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
  - (3) Detector = Peak.
  - (4) Trace mode = Max hold.
  - (5) Sweep = Auto couple.

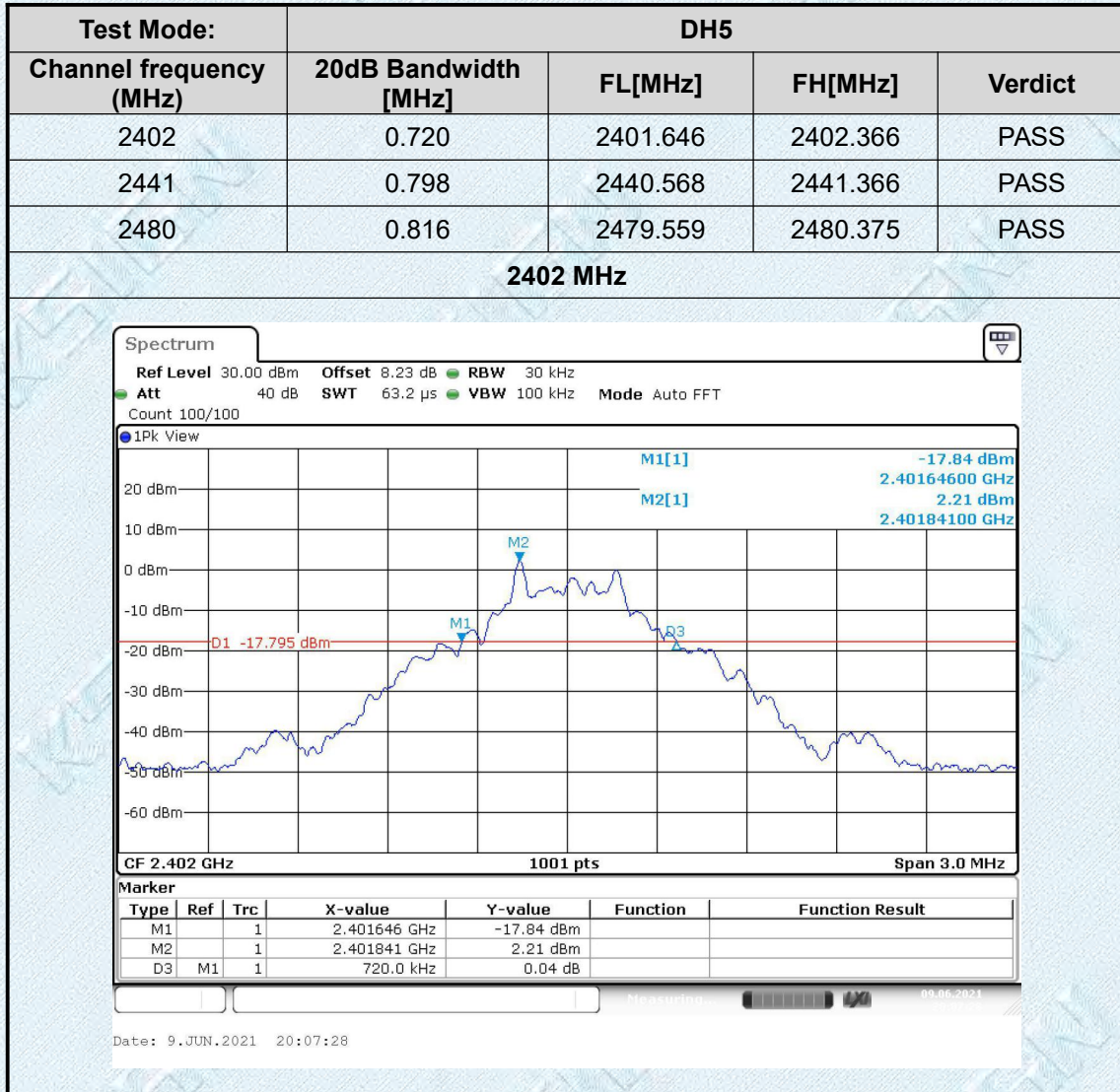
NOTE: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

**Test Mode**

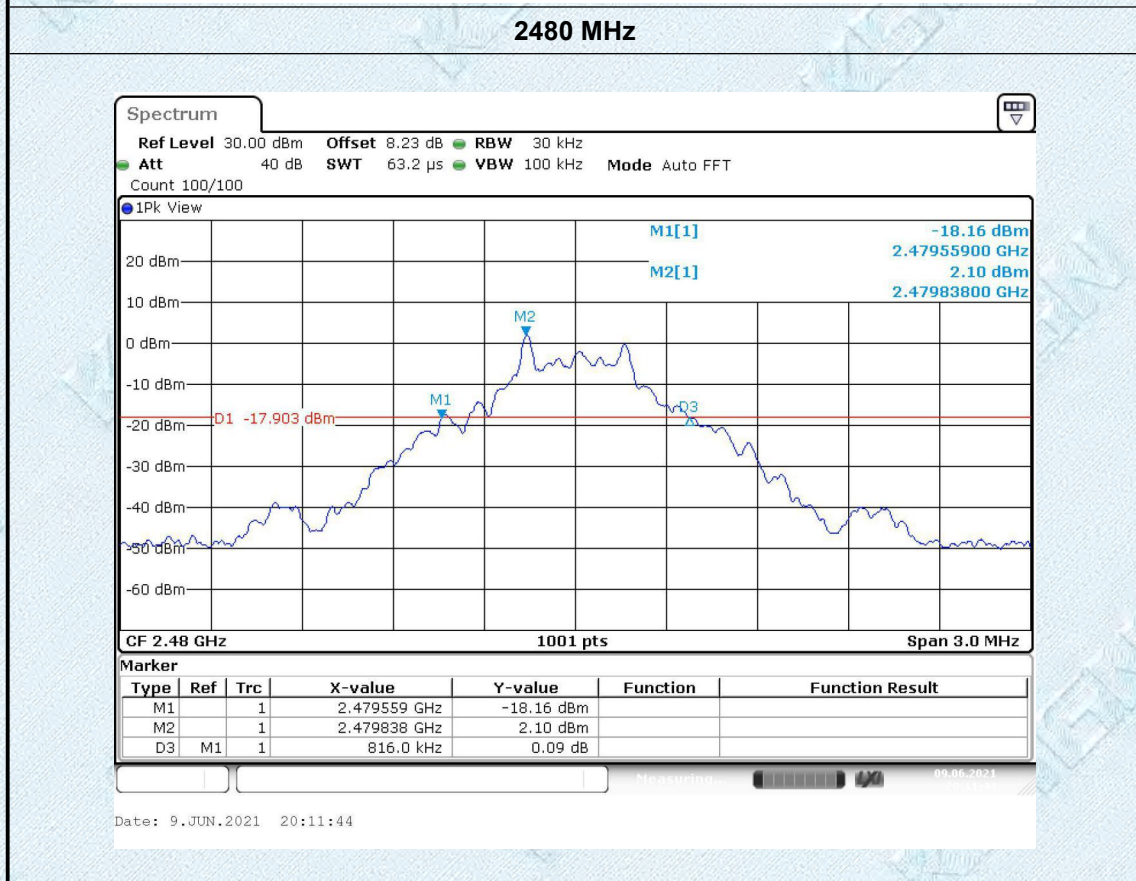
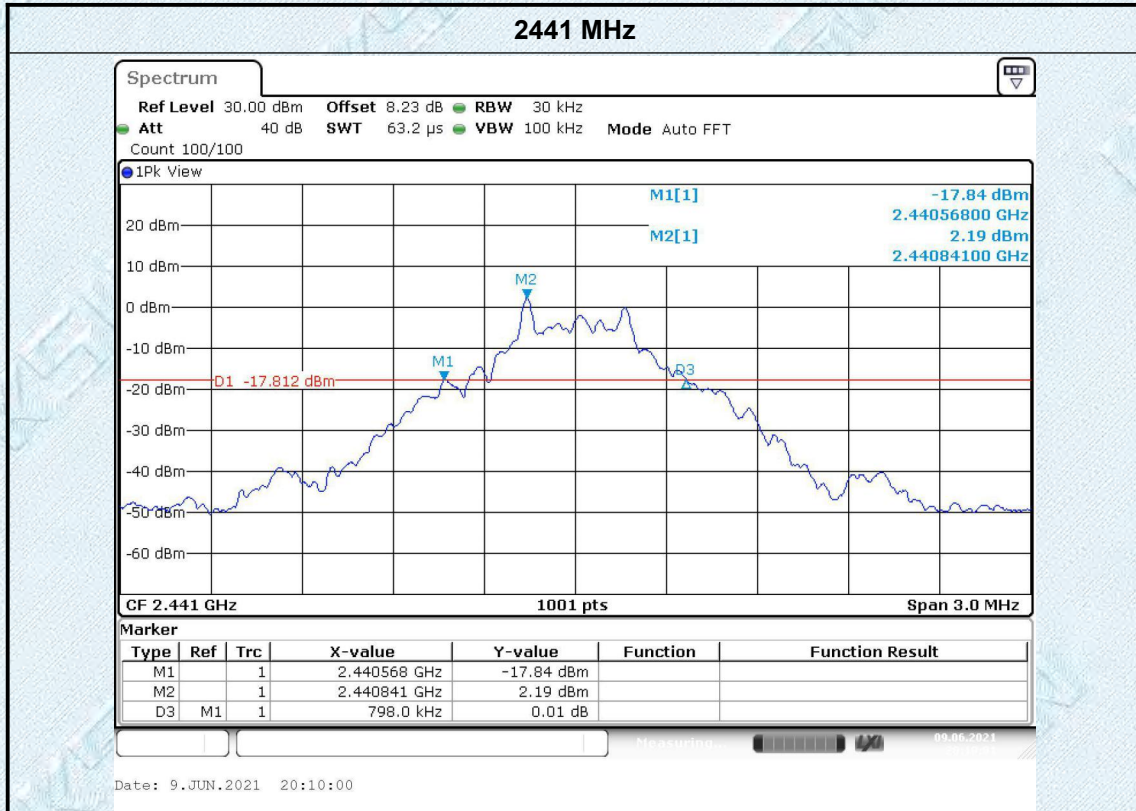
Please refer to the clause 2.2.



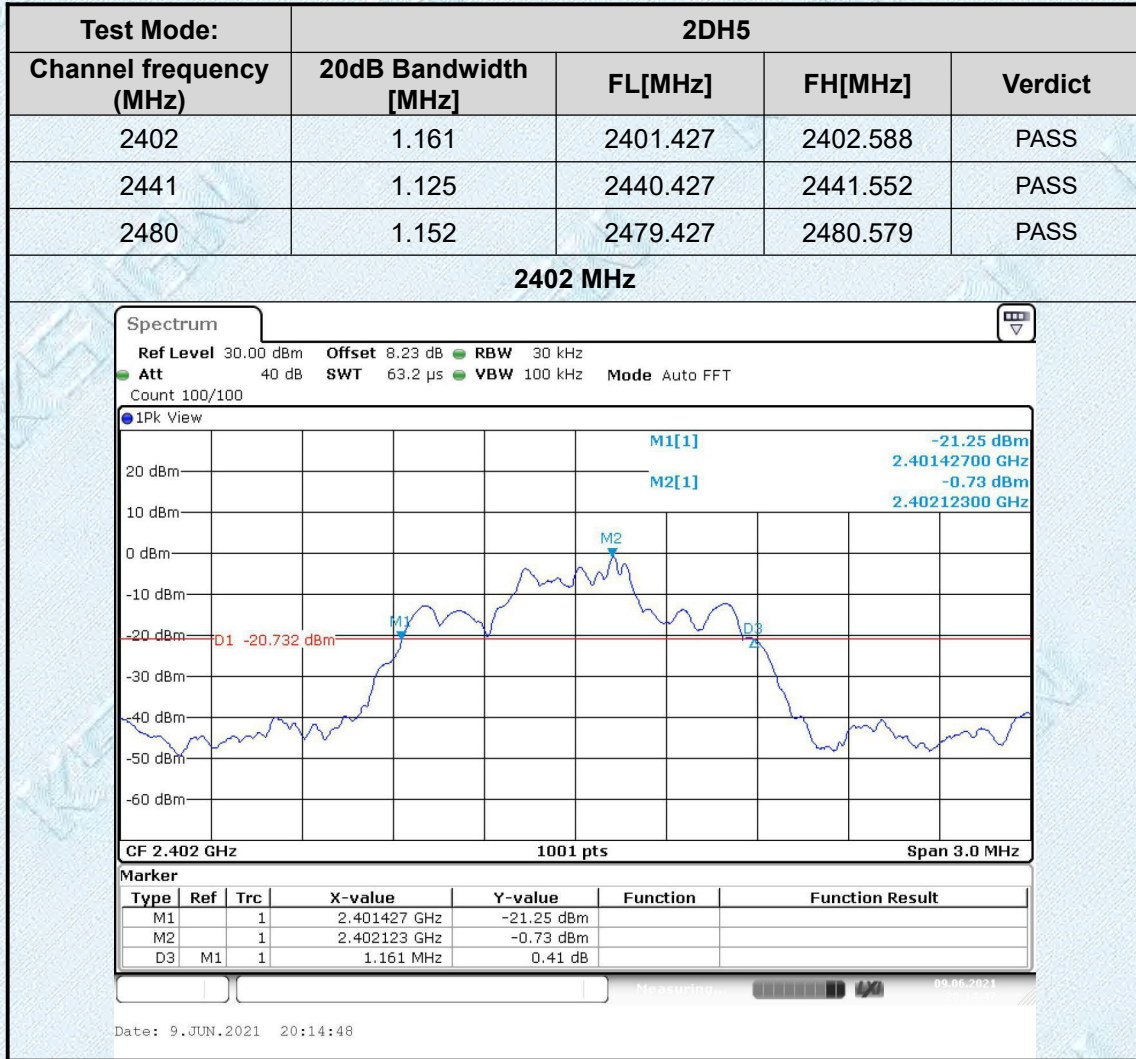
**Test Results**



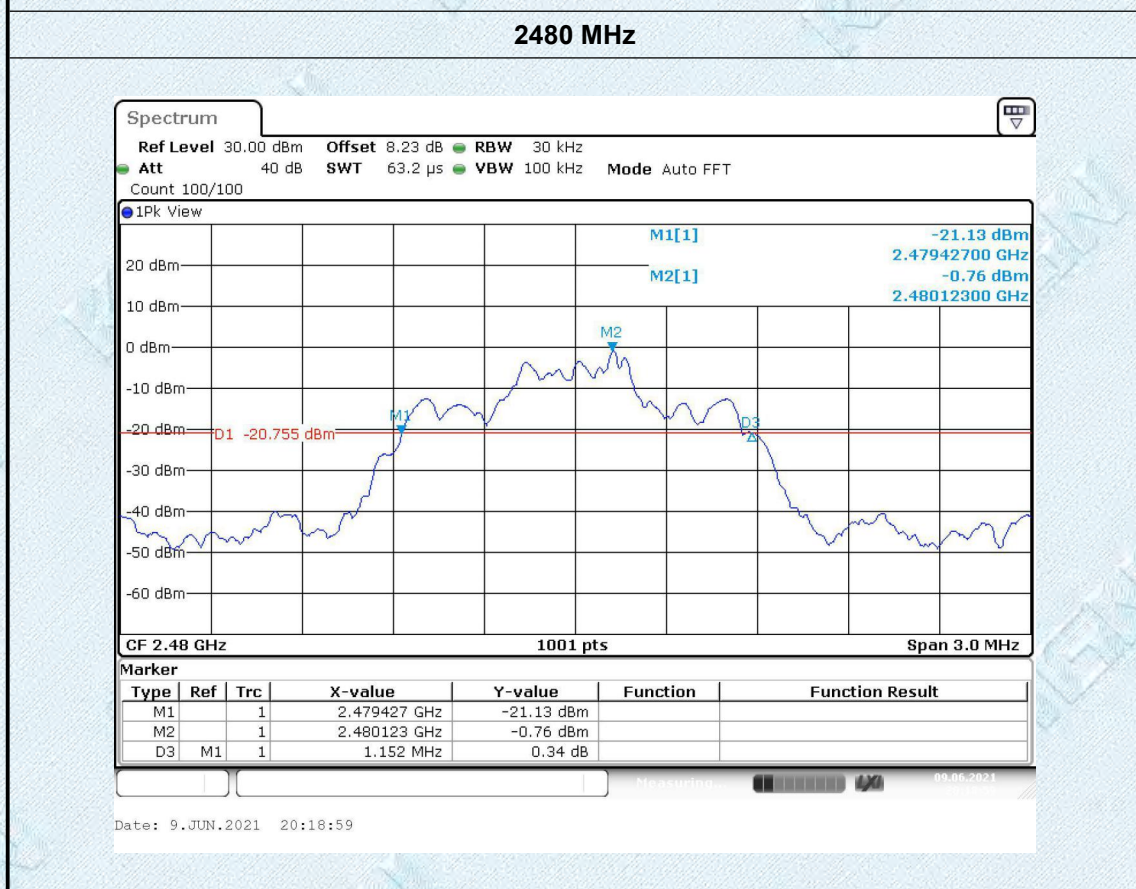
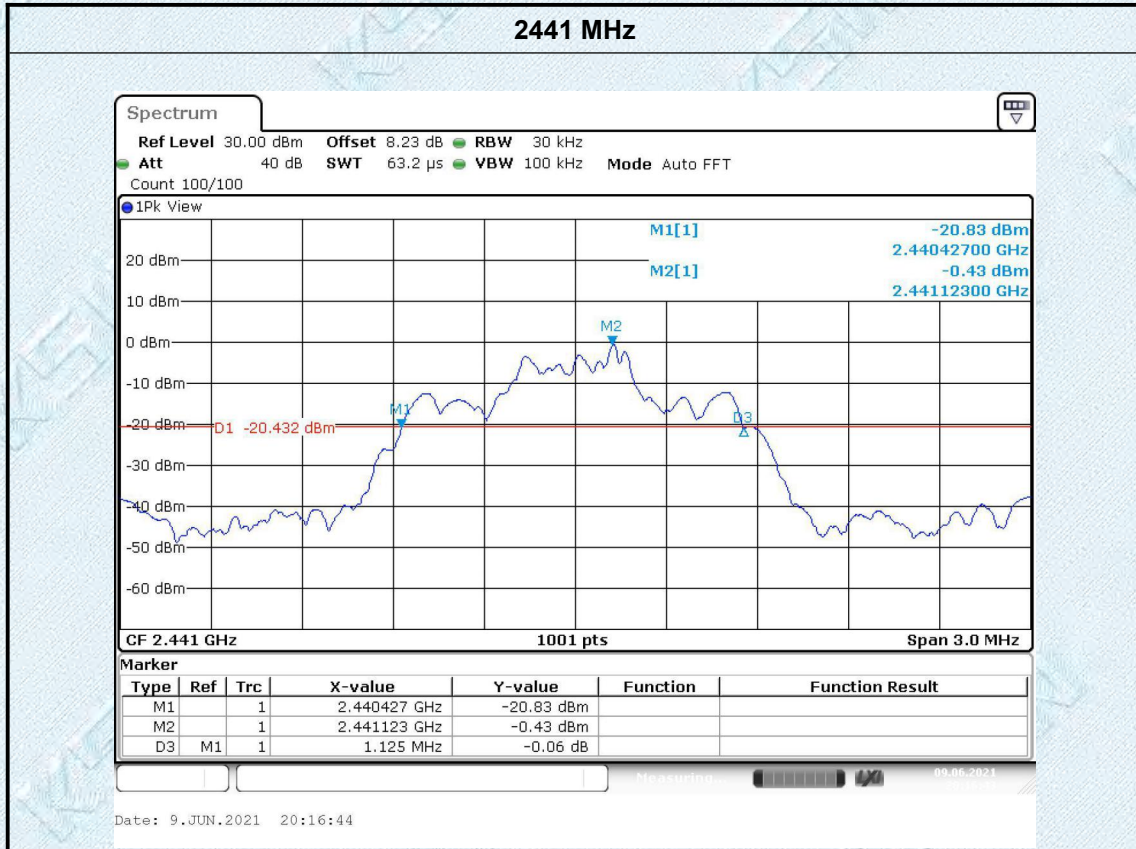




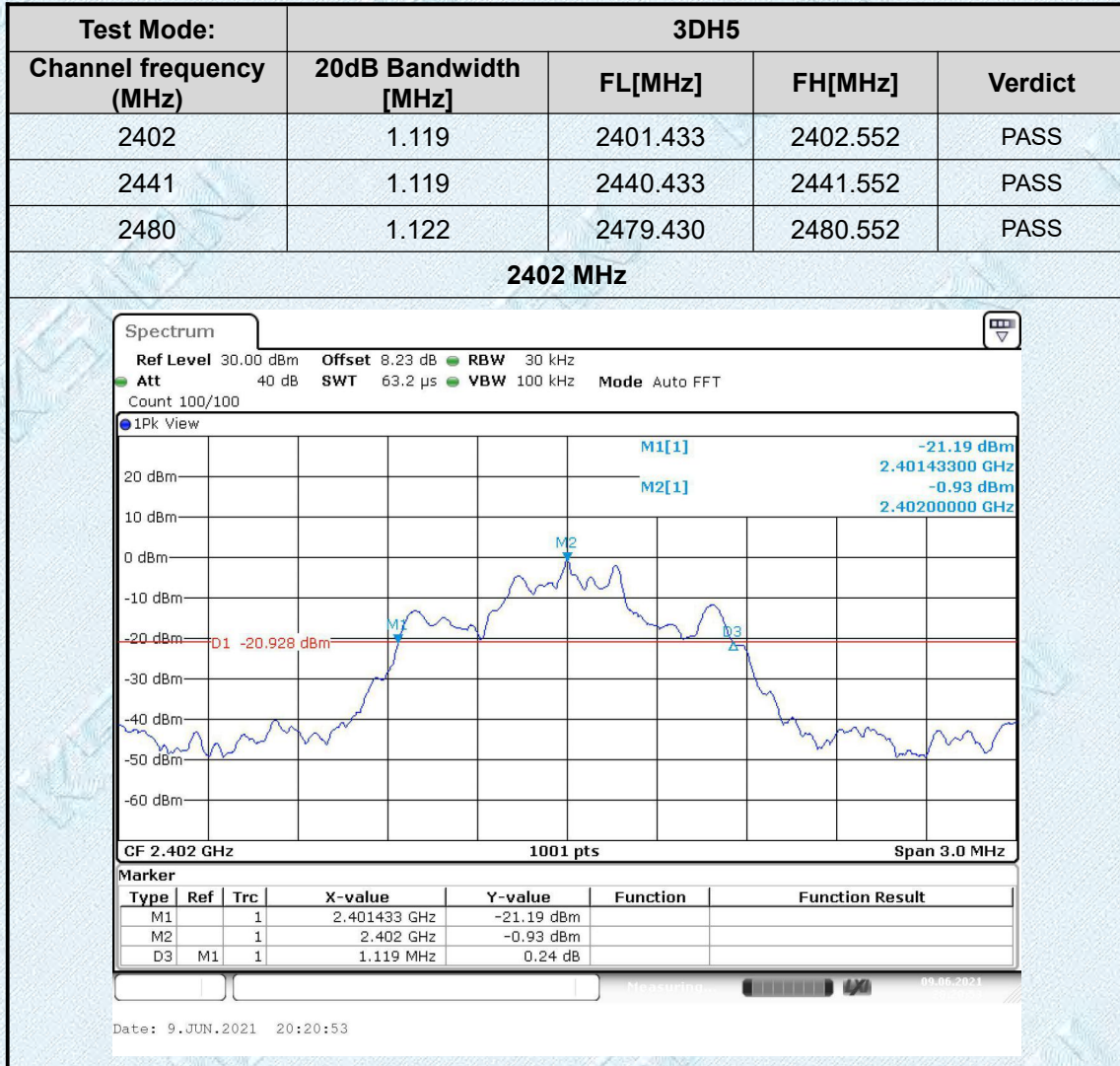




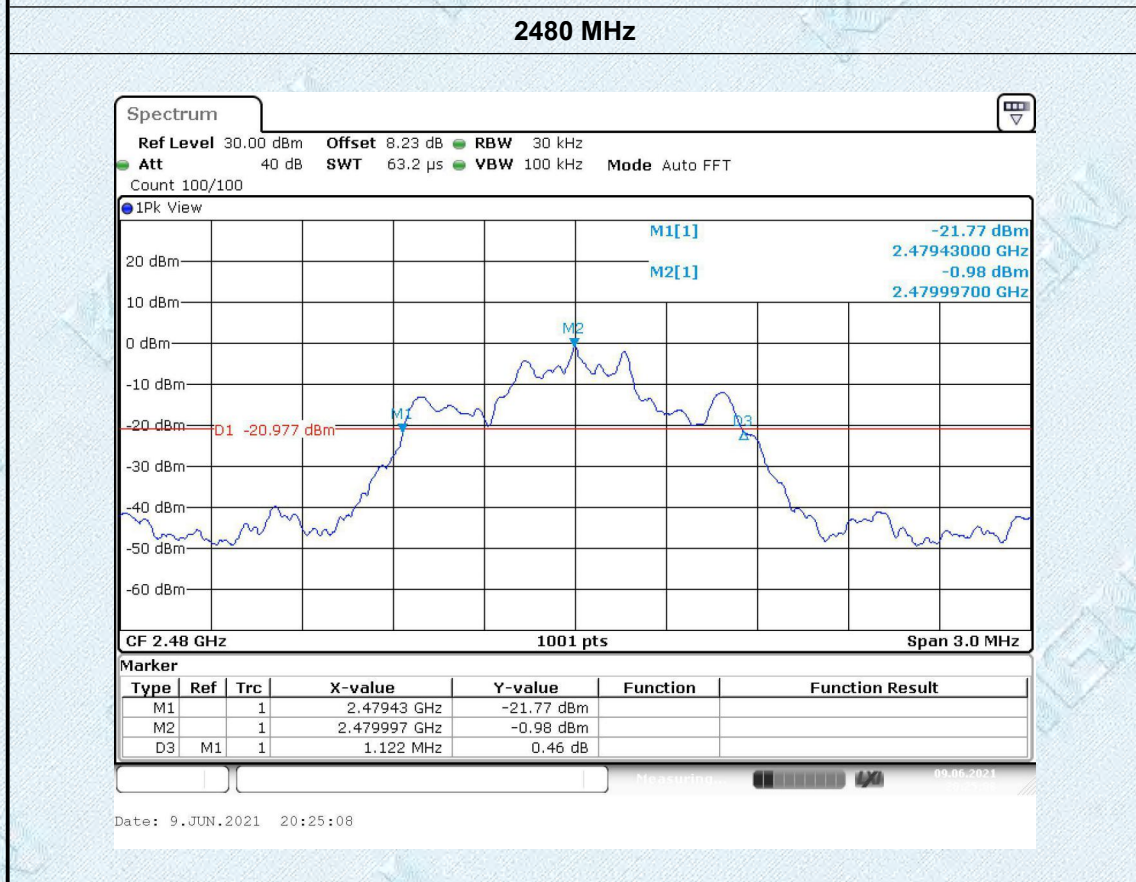
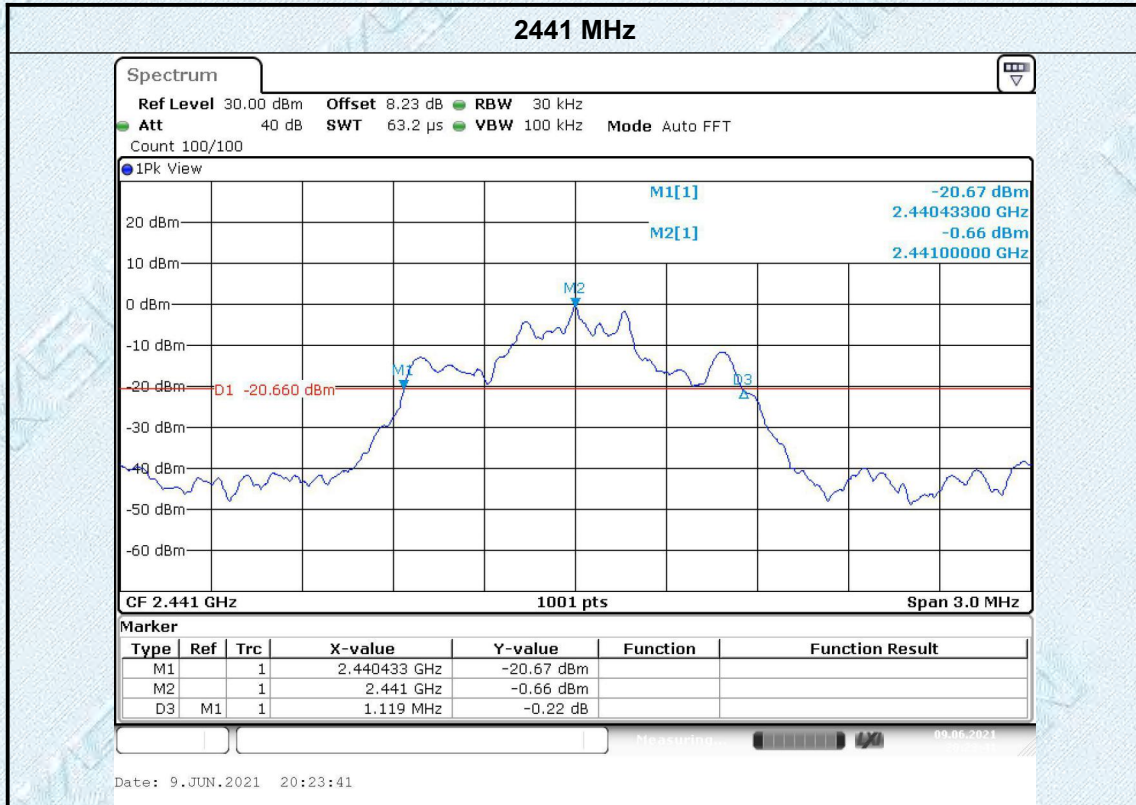




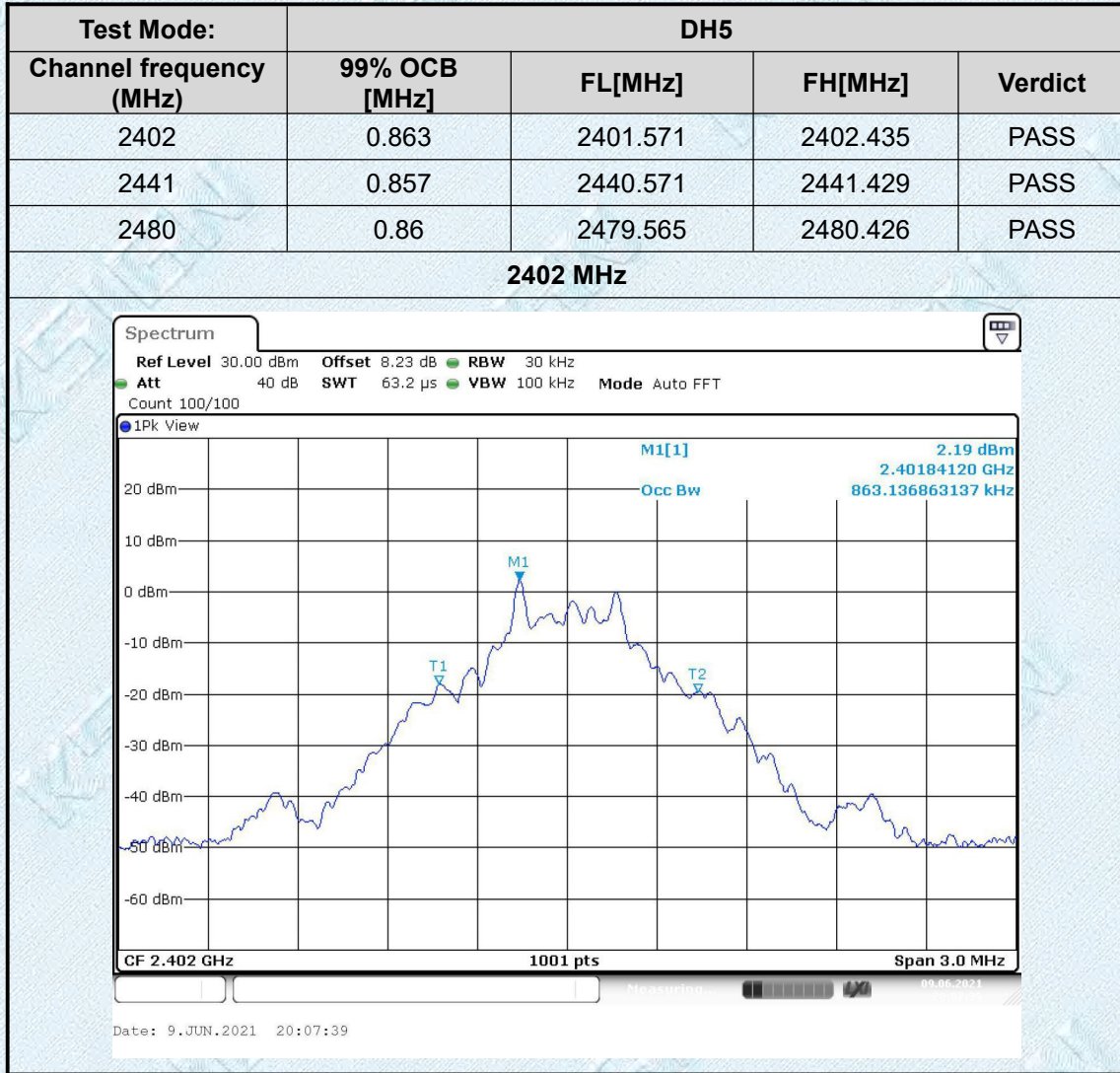




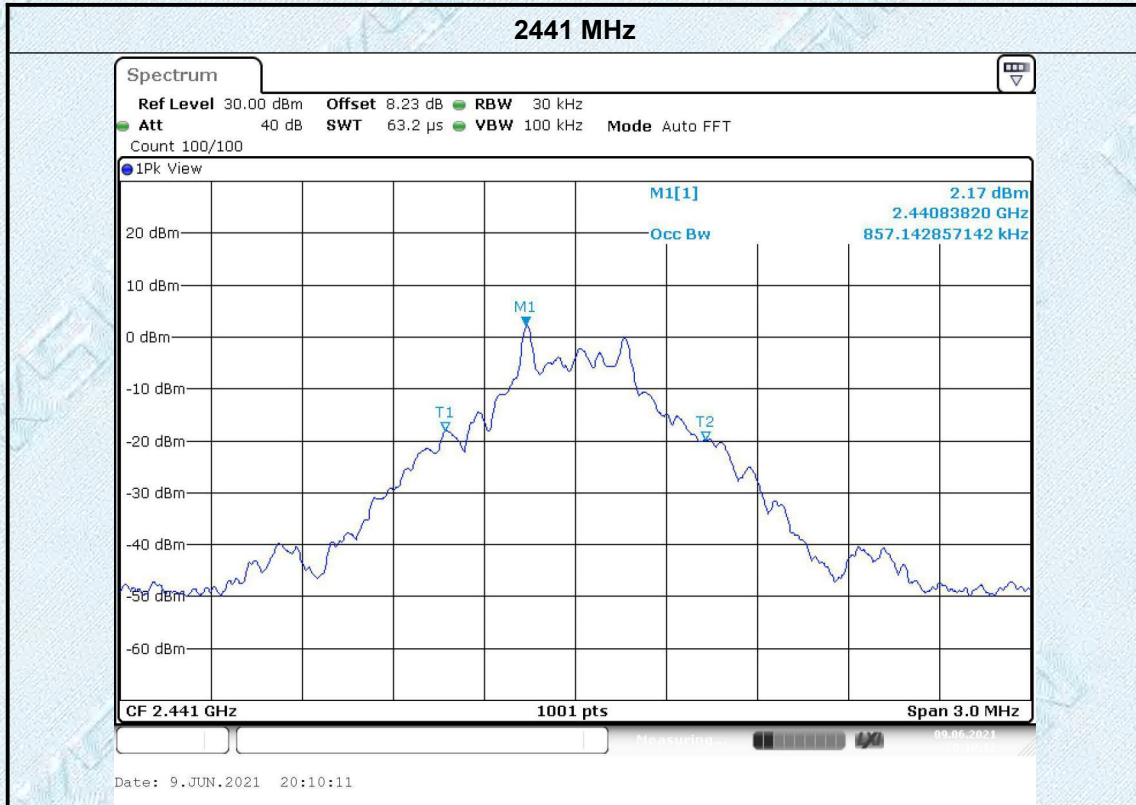




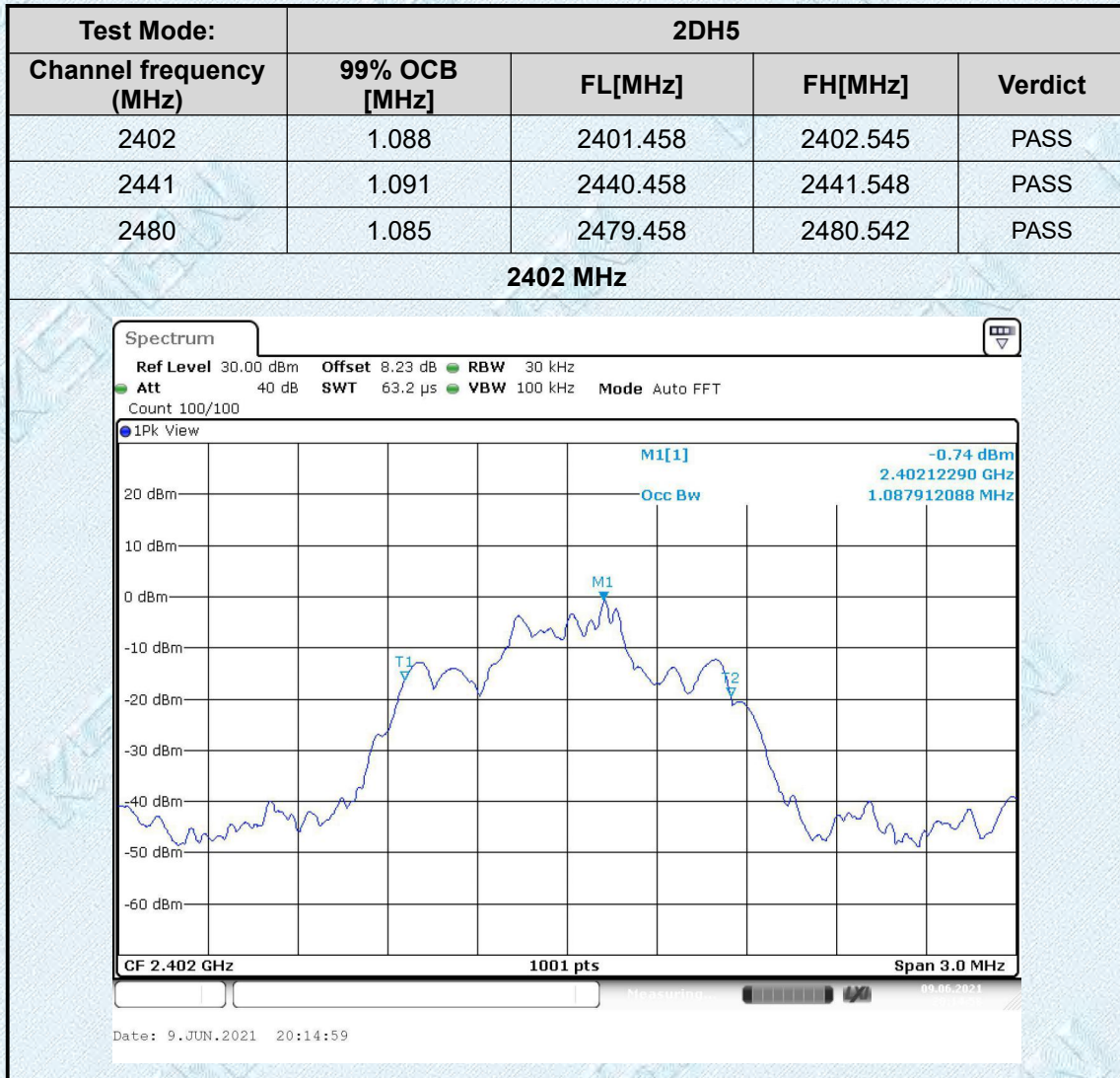




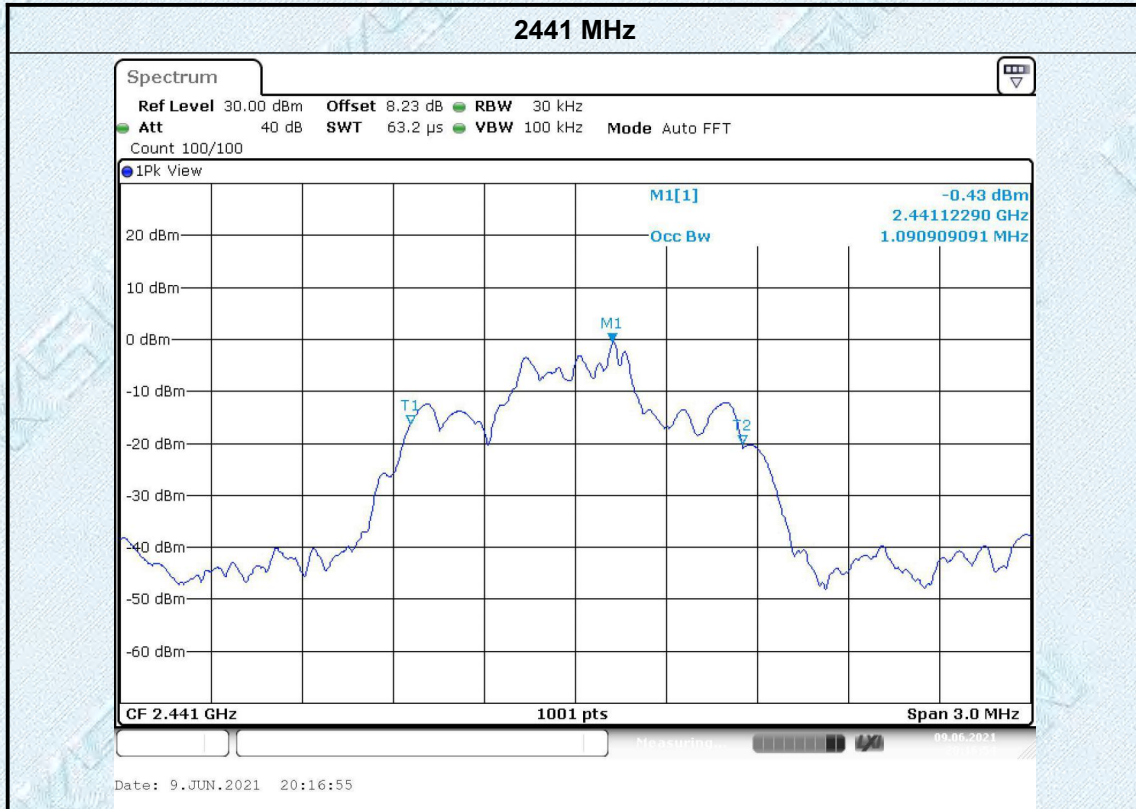




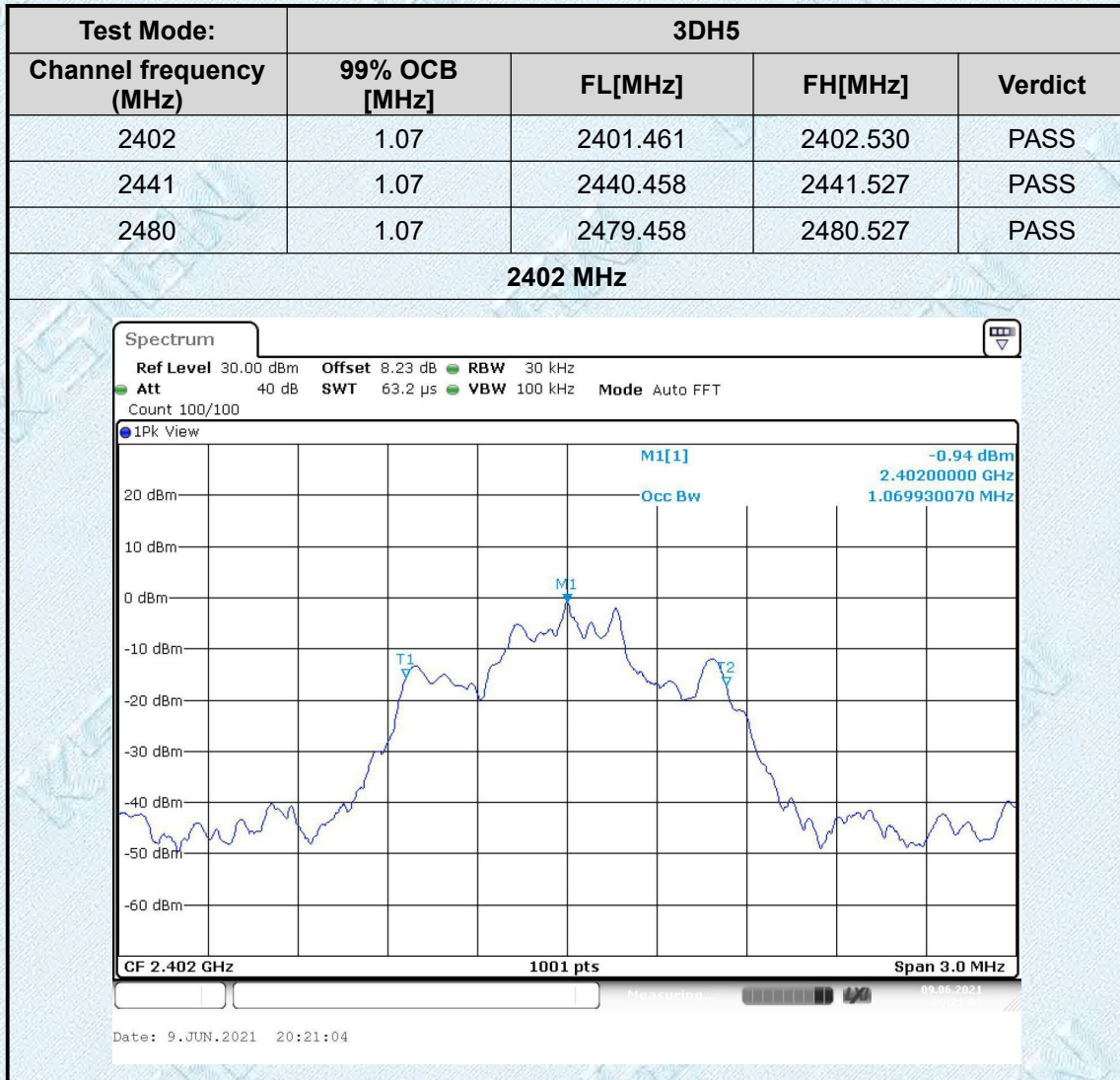


















### 3.4. Carrier Frequencies Separation

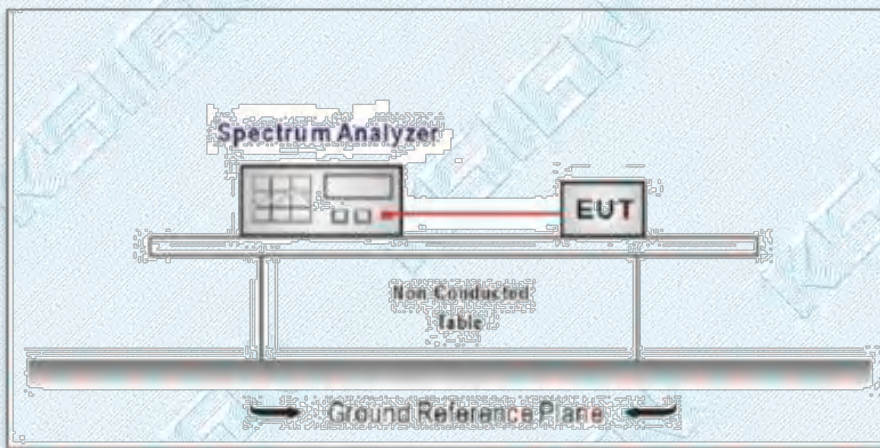
**LIMIT**

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):

frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25kHz or the 2/3\*20dB bandwidth of the hopping channel, whichever is greater.

Test Item	Limit	Frequency Range(MHz)
Channel Separation	>25KHz or >two-thirds of the 20 dB bandwidth Which is greater	2400~2483.5

**Test Configuration**



**Test Procedure**

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
2. Spectrum Setting:
  - (1) Set RBW = 100 kHz.
  - (2) Set the video bandwidth (VBW) ≥ 3 RBW.
  - (3) Detector = Peak.
  - (4) Trace mode = Max hold.
  - (5) Sweep = Auto couple.

NOTE: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

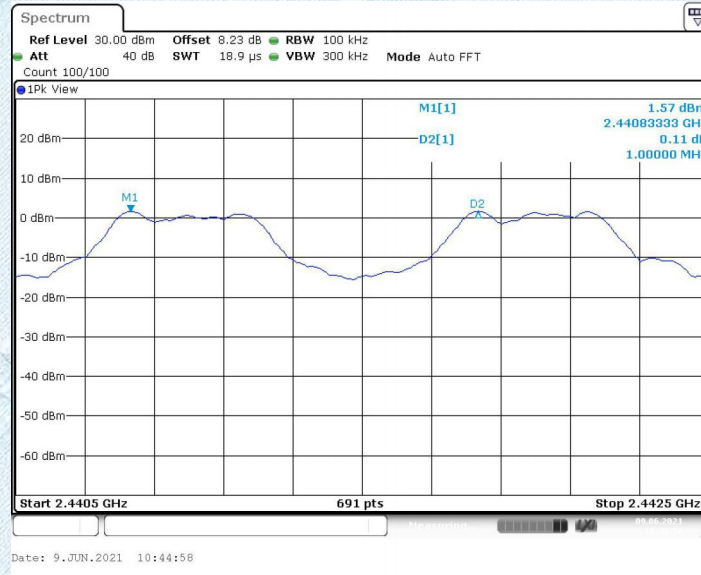
**Test Mode**

Please refer to the clause 2.2.

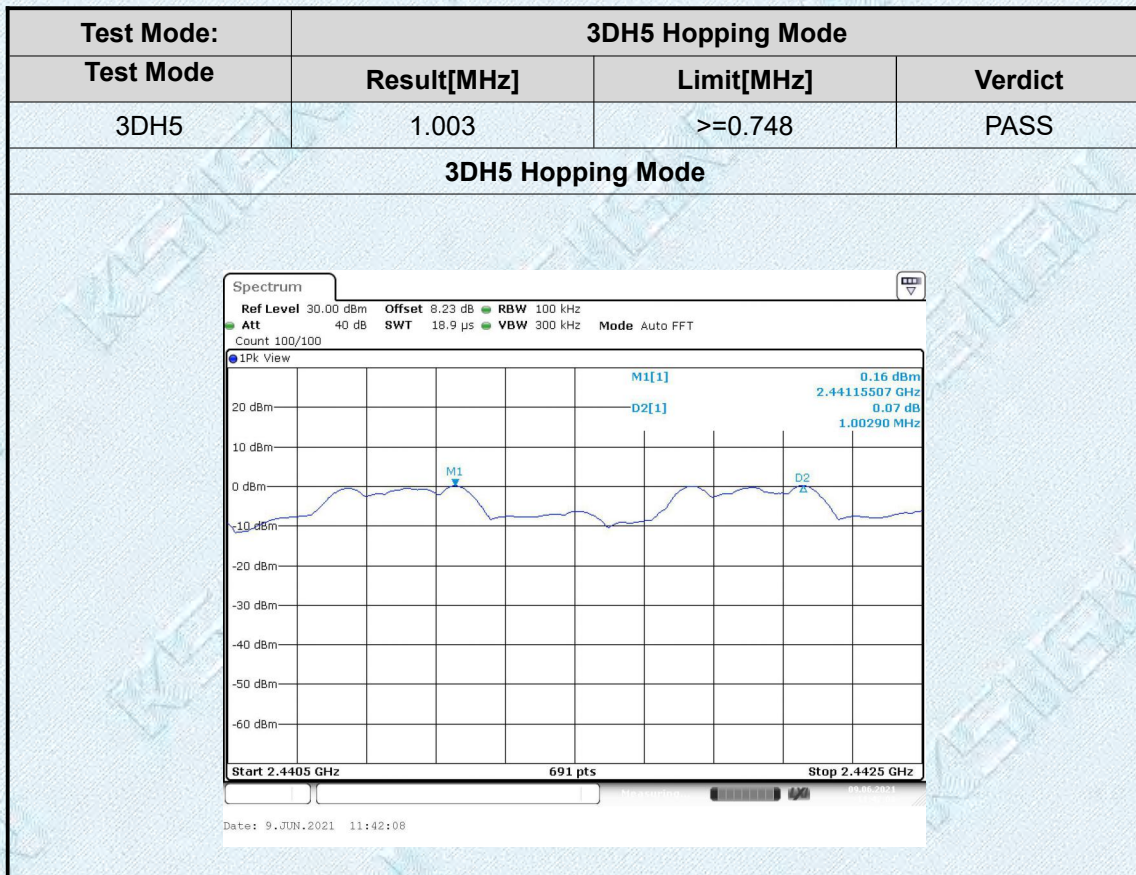
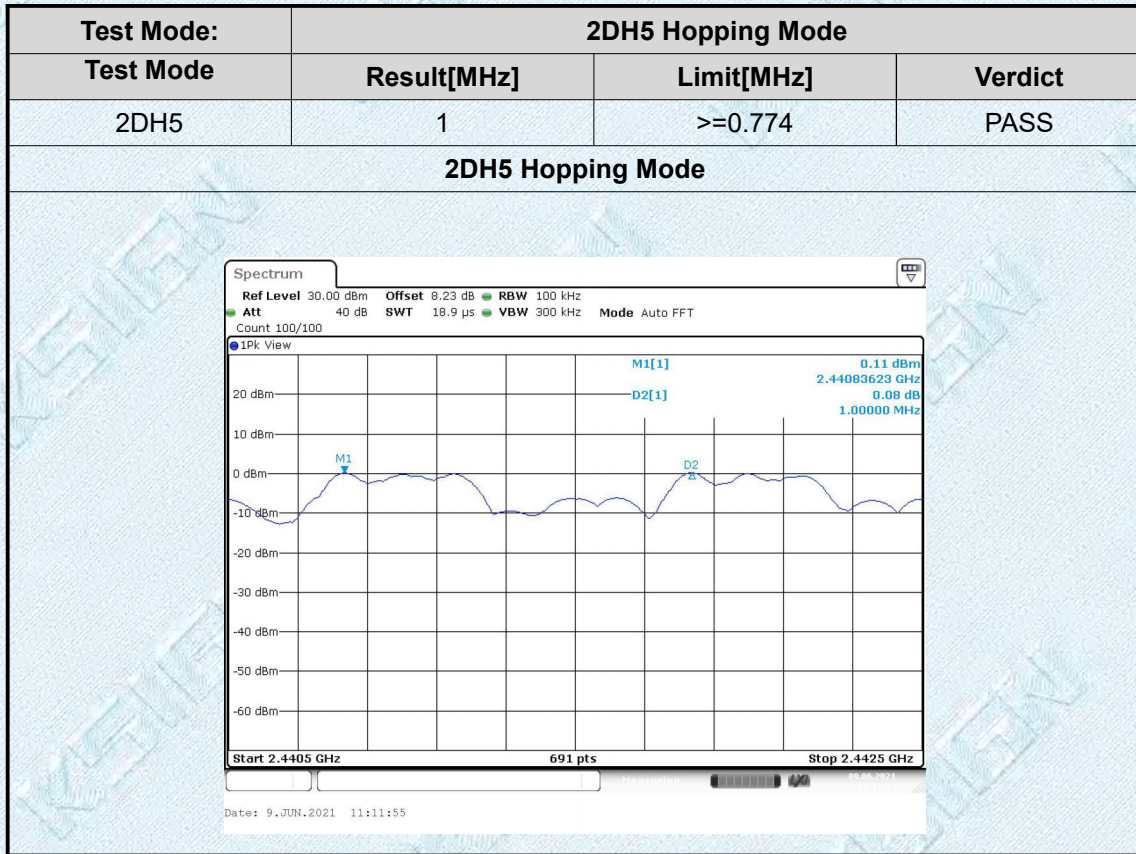


**Test Results**

<b>Test Mode:</b>	<b>DH5 Hopping Mode</b>		
<b>Channel</b>	<b>Result[MHz]</b>	<b>Limit[MHz]</b>	<b>Verdict</b>
DH5	1	>=0.544	PASS
<b>DH5 Hopping Mode</b>			







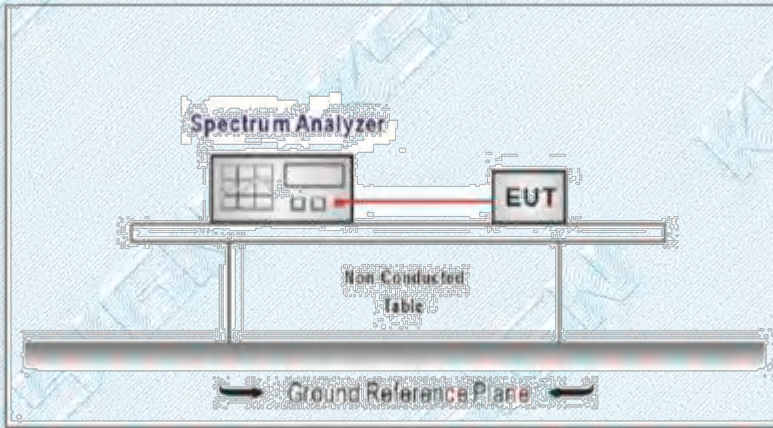


### 3.5. Number of Hopping Channel

**Limit**

Section	Test Item	Limit
15.247	Number of Hopping Channel	>15

**Test Configuration**



**Test Procedure**

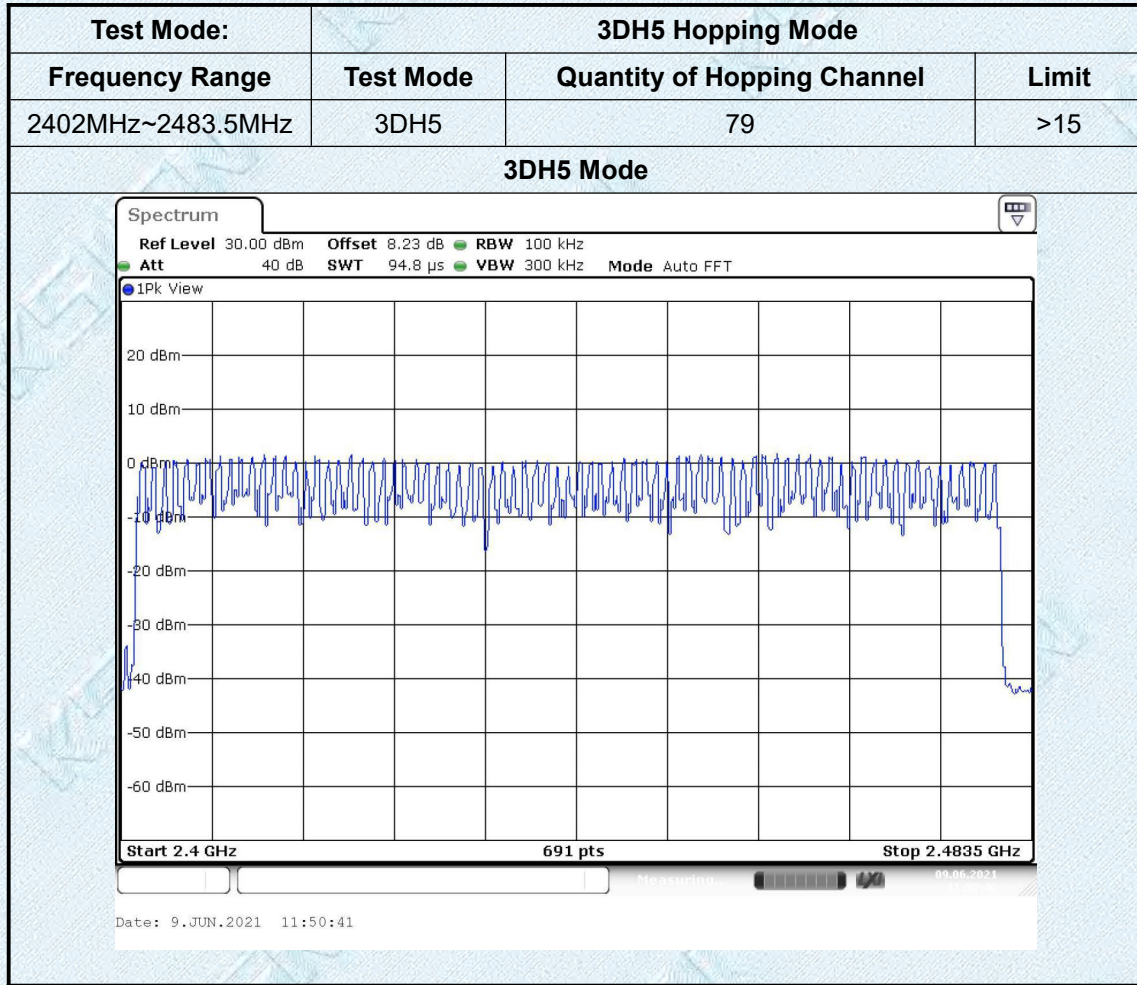
1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
2. Spectrum Setting:
  - (1) Peak Detector: RBW=100 kHz, VBW ≥ RBW, Sweep time= Auto.

**Test Mode**

Please refer to the clause 2.2.



**Test Result**



Note: The 8-DPSK ( 3DH5 ) modulation is the worst case and recorded in the report.

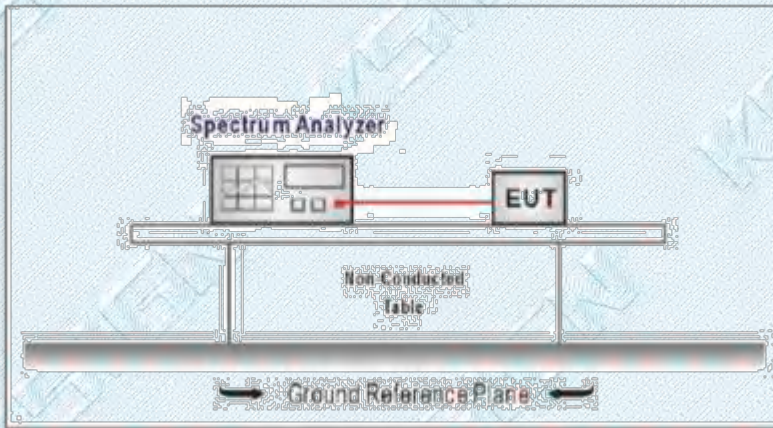


### 3.6. Dwell Time

**Limit**

Section	Test Item	Limit
15.247(a)(1)	Average Time of Occupancy	0.4 sec

**Test Configuration**



**Test Procedure**

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
2. Spectrum Setting:
  - (1) Spectrum Setting: RBW=1MHz, VBW ≥ RBW.
  - (2) Use video trigger with the trigger level set to enable triggering only on full pulses.
  - (3) Sweep Time is more than once pulse time.
  - (4) Set the center frequency on any frequency would be measure and set the frequency span to zero.
  - (5) Measure the maximum time duration of one single pulse.
  - (6) Set the EUT for packet transmitting.

**Test Mode**

Please refer to the clause 2.2



**=Test Result**

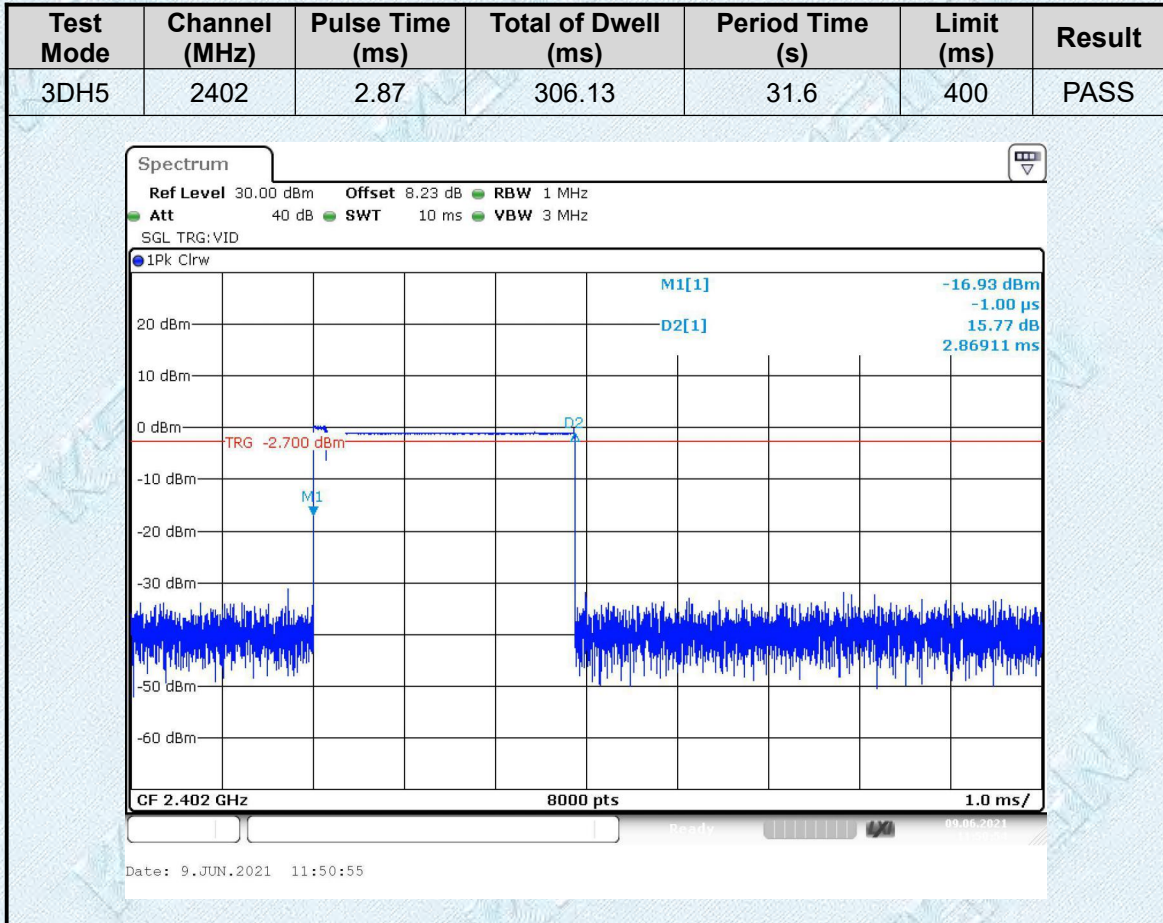
Note:

1. Dwell time = Pulse time (ms) × (1600 ÷ 2 ÷ 79) × 31.6 Second for DH1, 2DH1, 3DH1

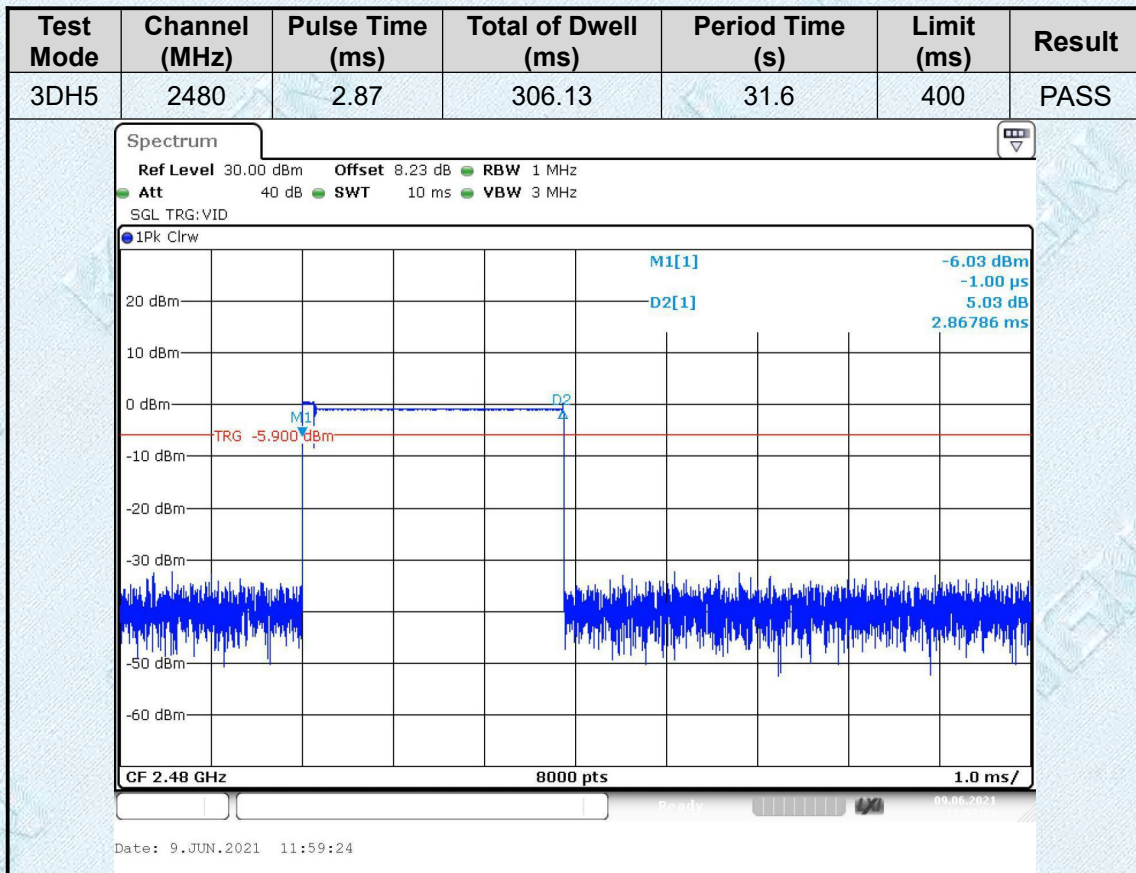
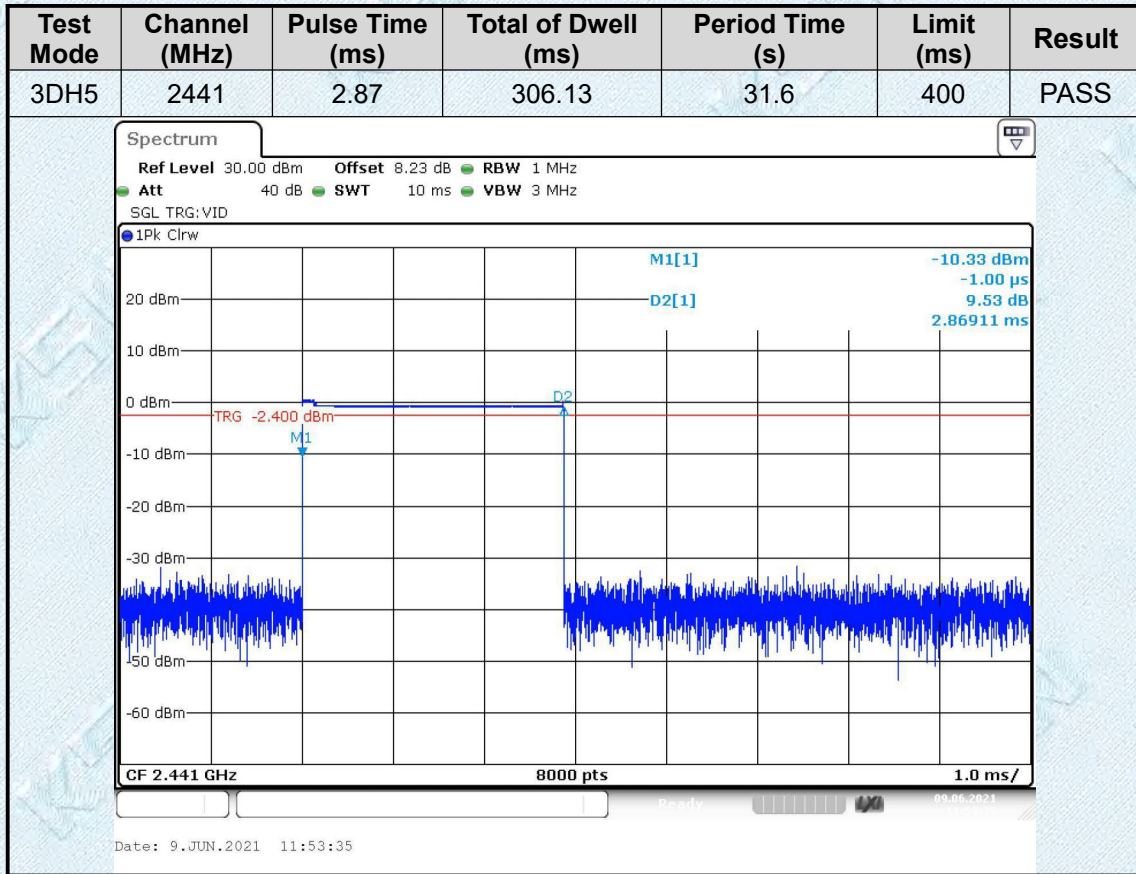
Dwell time = Pulse time (ms) × (1600 ÷ 4 ÷ 79) × 31.6 Second for DH3, 2DH3, 3DH3

Dwell time = Pulse time (ms) × (1600 ÷ 6 ÷ 79) × 31.6 Second for DH5, 2DH5, 3DH5

2. The 3DH5 modulation is the worst case and recorded in the report .









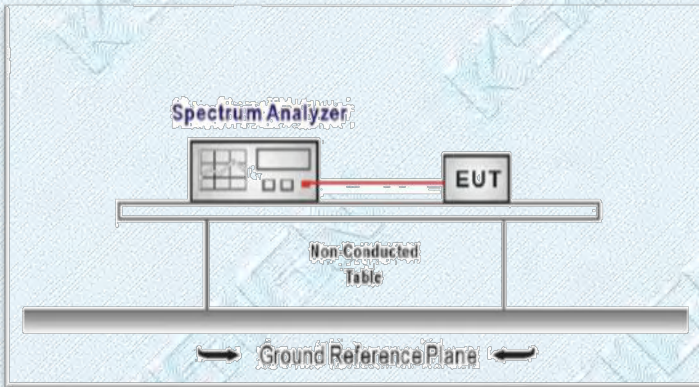
### 3.7. Band Edge and Spurious Emission (Conducted)

#### LIMIT

#### **FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

1. Connect EUT RF Output port to the Spectrum Analyzer through an RF attenuator.

2. Spectrum Setting:

RBW=100KHz

VBW=3\*RBW.

Detector function: Peak.

Trace: Max hold.

Sweep = Auto couple.

Allow the trace to stabilize.

#### **TEST MODE:**

Please refer to the clause 2.2.