



KSIGN (Guangdong) Testing Co., Ltd.

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TEST REPORT

Report No...... : **KS2005S00105E03**

FCC ID..... : **2AM8GVOREZA**

Applicant..... : **GUANGZHOU LIE DUN ELECTRONICS TECHNOLOGY CO., LIMITED**

Address..... : No.4 plant of No.43 South International Trade Avenue, Hualong Town, Panyu Dstrict, Guangzhou, China, 511434

Manufacturer..... : Guangzhou Lie Dun Electronics Technology CO.,Ltd

Address..... : Building 4, 43 International Trade Avenue South, Hualong, Panyu, Guangzhou, China, 511434

Factory : Guangzhou Lie Dun Electronics Technology CO.,Ltd

Address..... : Building 4, 43 International Trade Avenue South, Hualong, Panyu, Guangzhou, China, 511434

Product Name..... : **VOREZA II**

Trade Mark..... : VOREZA

Model/Type reference..... : VOR2-IEC2-X04

Listed Model(s)..... : /

Standard..... : **FCC CFR Title 47 Part 15 Subpart C Section 15.247**

Date of Receipt..... : Sep.15, 2020

Date of Test Date..... : Jan.18, 2021- June.11, 2021

Date of issue..... : June.11, 2021

Test result..... : **Pass**

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Approved by:
(Printed name+signature) Neil Wan

Rory Huang

Eder Zhan

Neil Wan



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.11, 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	Emiya Lin
Conducted Emission	15.207	Pass	Emiya Lin
Restricted Bands	15.205	Pass	Emiya Lin
Hopping Channel Separation	15.247(a)(1)	Pass	Emiya Lin
Dwell Time	15.247(a)(1)	Pass	Emiya Lin
Peak Output Power	15.247(b)(1)	Pass	Emiya Lin
Number of Hopping Frequency	15.247(b)(1)	Pass	Emiya Lin
Band Edge Emissions	15.247(d)	Pass	Emiya Lin
Radiated Spurious Emission	15.247(c)&15.209	Pass	Emiya Lin
99% Occupied Bandwidth & 20dB Bandwidth	15.247(a)	Pass	Emiya Lin
Pseudorandom Frequency Hopping Sequence	15.247 (a)(1)	Pass	Emiya Lin

Note: The measurement uncertainty is 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. Client Information

Applicant:	GUANGZHOU LIE DUN ELECTRONICS TECHNOLOGY CO., LIMITED
Address:	No.4 plant of No.43 South International Trade Avenue, Hualong Town, Panyu Dstrict, Guangzhou, China, 511434
Manufacturer:	Guangzhou Lie Dun Electronics Technology CO.,Ltd
Address:	Building 4, 43 International Trade Avenue South, Hualong, Panyu, Guangzhou, China, 511434
Factory :	Guangzhou Lie Dun Electronics Technology CO.,Ltd
Address:	Building 4, 43 International Trade Avenue South, Hualong, Panyu, Guangzhou, China, 511434

2.2. General Description of EUT

Test Sample Number 1:	1-1-1(Normal Sample),1-1-2(Engineering Sample)
Product Name:	VOREZA II
Marketing Name:	VOR2-IEC2-X04
Model/Type reference:	VOREZA
Listed Model(s):	/
Model Difference:	/
Power Source:	MODEL:SOY-1200300 INPUT: 100-240V~ 50/60Hz 1.2A max. OUTPUT: DC 12.0V 3.0A, 36.0W
Power supply(Battery):	DC 7.6V 13000mAh/98.8Wh
Hardware version:	ZA801 REV11
Software version:	EC: E7.CD.06 BIOS: E.ZA102_1.V10.048 Windows10 pro: 1803
Bluetooth 4.2+EDR	
Modulation:	GFSK, $\pi/4$ DQPSK, 8DPSK
Operation frequency:	2402MHz~2480MHz
Max Peak Output Power:	DH5:4.40dBm 2DH5:3.61dBm 3DH5:3.63dBm
Channel number:	79
Channel separation:	1MHz
Antenna type:	FPC Antenna
Antenna gain:	1.5dBi

2.3. 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)
00	2402
01	2403
:	:
38	2440
39	2441
40	2442
:	:
77	2479
78	2480

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

Test mode

NO.	TEST MODE DESCRIPTION
1	Low channel GFSK(DH5)
2	Middle channel GFSK(DH5)
3	High channel GFSK(DH5)
4	Low channel $\pi/4$ -DQPSK(2DH5)
5	Middle channel $\pi/4$ -DQPSK(2DH5)
6	High channel $\pi/4$ -DQPSK(2DH5)
7	Low channel 8DPSK(3DH5)
8	Middle channel 8DPSK(3DH5)
9	High channel 8DPSK(3DH5)
10	Hopping mode GFSK(DH5)
11	Hopping mode $\pi/4$ -DQPSK(2DH5)
12	Hopping mode 8DPSK(3DH5)

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.Only the worst data on the X axis recorded in the report.
3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.
- 4.The test software is the SecureCRTSecure_V7.0.0.326 which can set the EUT into the individual test modes.

2.4. 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	04/07/2021
2	Vector Signal Generator	Agilent	N5182A	MY50142520	04/07/2021
3	Analog Signal Generator	HP	83752A	3344A00337	04/07/2021
4	Power Sensor	Agilent	E9304A	MY50390009	04/07/2021
5	Power Sensor	Agilent	E9300A	MY41498315	04/07/2021
6	Wideband Radio Communication Tester	R&S	CMW500	157282	04/07/2021
7	Climate Chamber	Angul	AGNH80L	1903042120	04/07/2021
8	Dual Output DC Power Supply	Agilent	E3646A	MY40009992	04/07/2021
9	RF Control Unit	Tonscend	JS0806-2	/	04/07/2021

Transmitter spurious emissions & Receiver spurious emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	EMI Test Receiver	R&S	ESR	102525	04/07/2021
2	High Pass Filter	Chengdu E-Microwave	OHF-3-18-S	0E01901038	03/27/2021
3	High Pass Filter	Chengdu E-Microwave	OHF-6.5-18-S	0E01901039	03/27/2021
4	Spectrum Analyzer	HP	8593E	3831U02087	04/07/2021
5	Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	01230	03/29/2023
6	Loop Antenna	Beijin ZHINAN	ZN30900C	18050	03/25/2021
7	Spectrum Analyzer	R&S	FSV40-N	101798	04/07/2021
8	Horn Antenna	Schwarzbeck	BBHA 9120 D	2023	03/29/2023
9	Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	04/07/2021
10	Pre-Amplifier	EMCI	EMC051835SE	980662	04/07/2021

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	LISN	R&S	ENV432	1326.6105.02	03/27/2021
2	EMI Test Receiver	R&S	ESR	102524	04/07/2021
3	Manual RF Switch	JS TOYO	/	MSW-01/002	04/07/2021

Note:

1)The Cal. Interval was one year.

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

2.5. 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. Conducted Emission

Limit

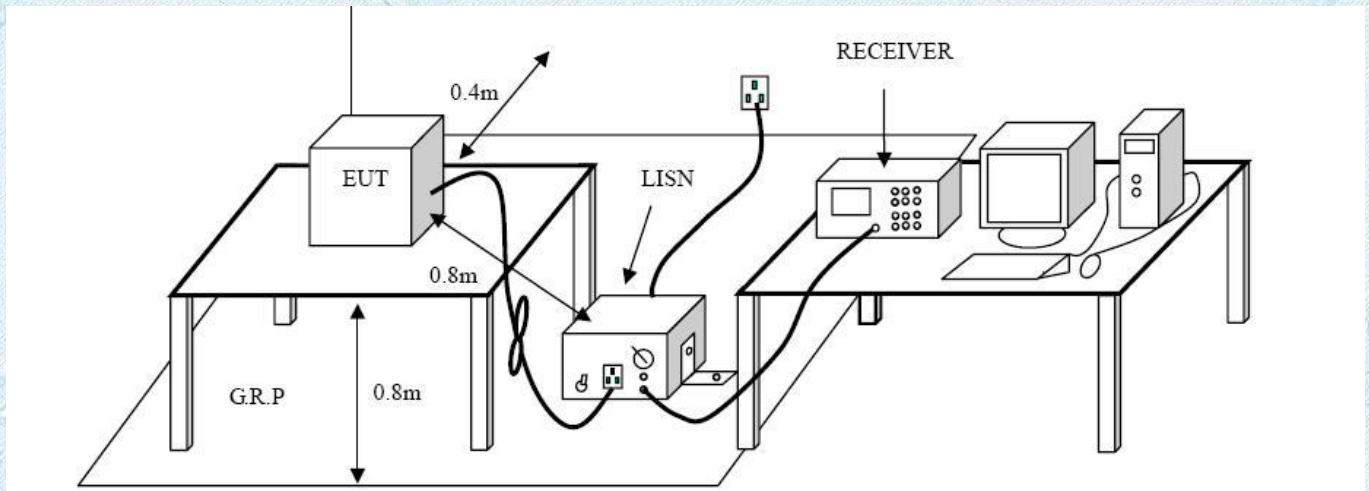
Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dB μ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Notes:

- (1) *Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Test Configuration



Test Procedure

1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 0.8 m by 1.6 m, raised 0.8 m above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
4. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
5. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
7. During the above scans, the emissions were maximized by cable manipulation.

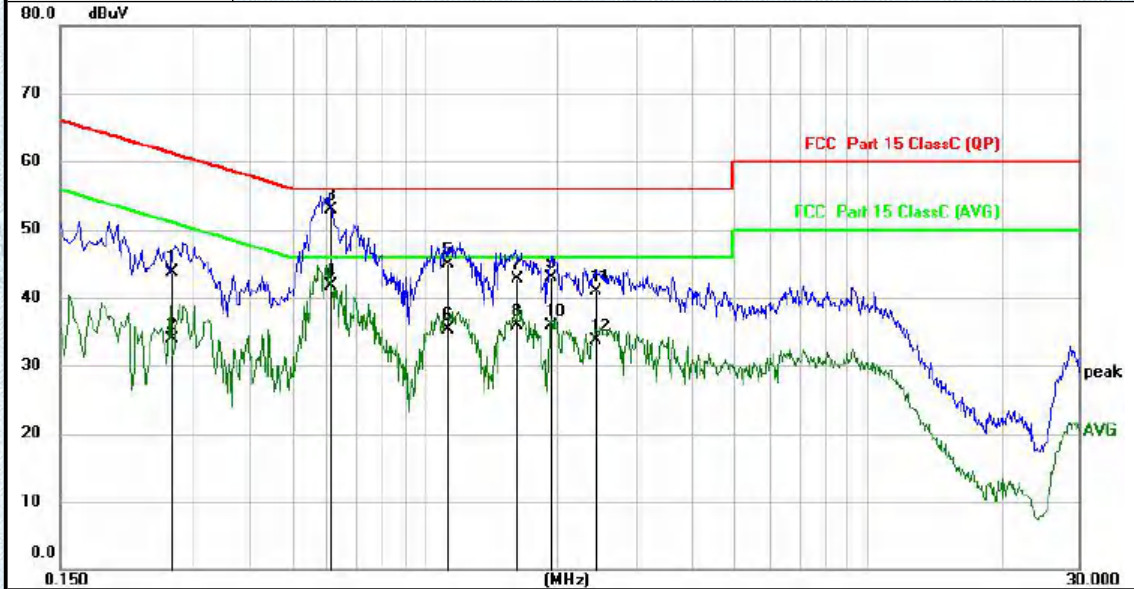
Test Mode:

Please refer to the clause 2.3.

Test Results

Pre-scan DH5, 2DH5, 3DH5 modulation, and found the DH5 modulation 2402MHz which it is worse case, so only show the test data for worse case.

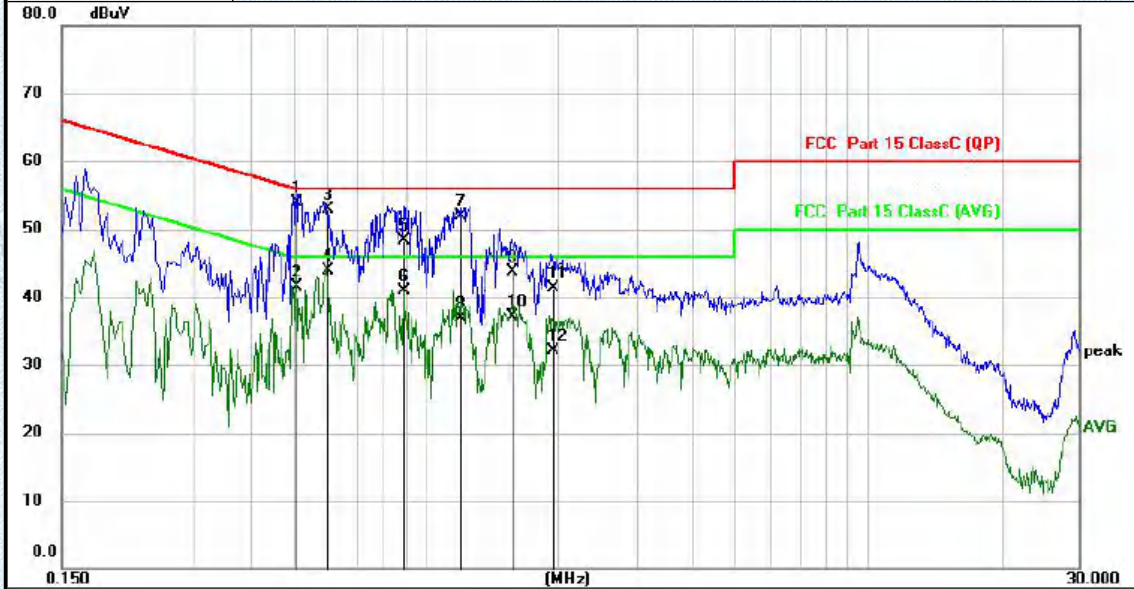
Test Voltage:	AC 120V/60 Hz
Terminal:	Line
Test Mode:	Charging+BT



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.2683	32.91	10.85	43.76	61.17	-17.41	QP
2		0.2683	22.99	10.85	33.84	51.17	-17.33	AVG
3	*	0.6134	41.97	10.87	52.84	56.00	-3.16	QP
4		0.6134	30.77	10.87	41.64	46.00	-4.36	AVG
5		1.1215	33.95	10.87	44.82	56.00	-11.18	QP
6		1.1215	24.47	10.87	35.34	46.00	-10.66	AVG
7		1.6076	31.76	10.88	42.64	56.00	-13.36	QP
8		1.6076	24.96	10.88	35.84	46.00	-10.16	AVG
9		1.9192	32.06	10.88	42.94	56.00	-13.06	QP
10		1.9192	24.96	10.88	35.84	46.00	-10.16	AVG
11		2.4300	29.97	10.90	40.87	56.00	-15.13	QP
12		2.4300	22.77	10.90	33.67	46.00	-12.33	AVG

Remarks:
 1.Measurement = Reading Level+ Correct Factor
 2.Over = Measurement -Limit

Test Voltage:	AC 120V/60 Hz
Terminal:	Neutral
Test Mode:	Charging+BT



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1	*	0.5084	42.96	10.88	53.84	56.00	-2.16	QP
2		0.5084	30.58	10.88	41.46	46.00	-4.54	AVG
3		0.5984	41.96	10.88	52.84	56.00	-3.16	QP
4		0.5984	32.96	10.88	43.84	46.00	-2.16	AVG
5		0.8903	37.37	10.87	48.24	56.00	-7.76	QP
6		0.8903	30.13	10.87	41.00	46.00	-5.00	AVG
7		1.1931	40.97	10.87	51.84	56.00	-4.16	QP
8		1.1931	25.97	10.87	36.84	46.00	-9.16	AVG
9		1.5613	32.77	10.87	43.64	56.00	-12.36	QP
10		1.5613	26.25	10.87	37.12	46.00	-8.88	AVG
11		1.9324	30.47	10.88	41.35	56.00	-14.65	QP
12		1.9324	21.19	10.88	32.07	46.00	-13.93	AVG

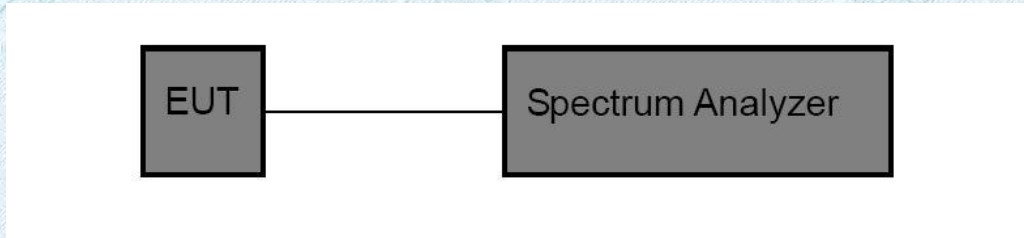
Remarks:
 1.Measurement = Reading Level+ Correct Factor
 2.Over = Measurement -Limit

3.3. 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. The 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 2.3

Test Result

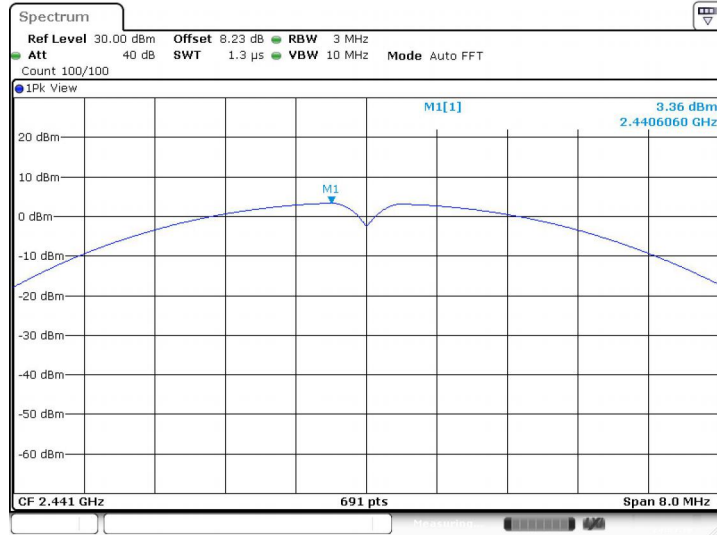
Test Mode:	DH5		
Channel frequency (MHz)	Test Result (dBm)	Limit (dBm)	
2402	4.40	30	
2441	3.36		
2480	2.99		

2402 MHz

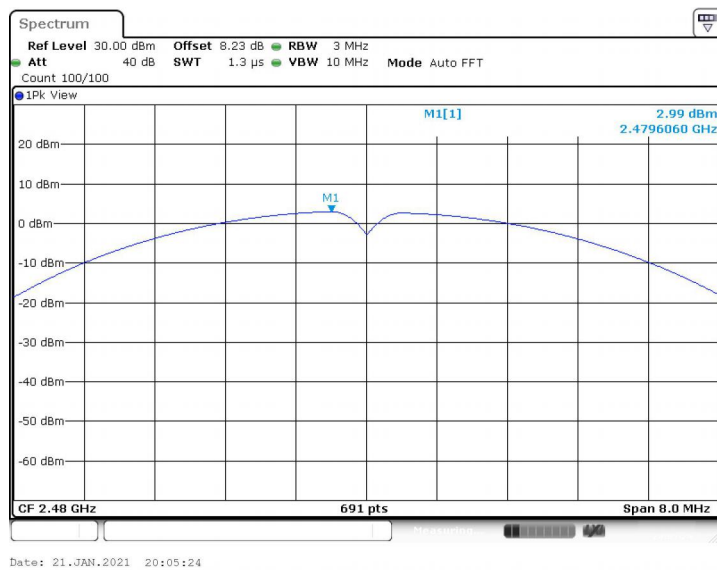


Date: 21.JAN.2021 20:04:54

2441 MHz

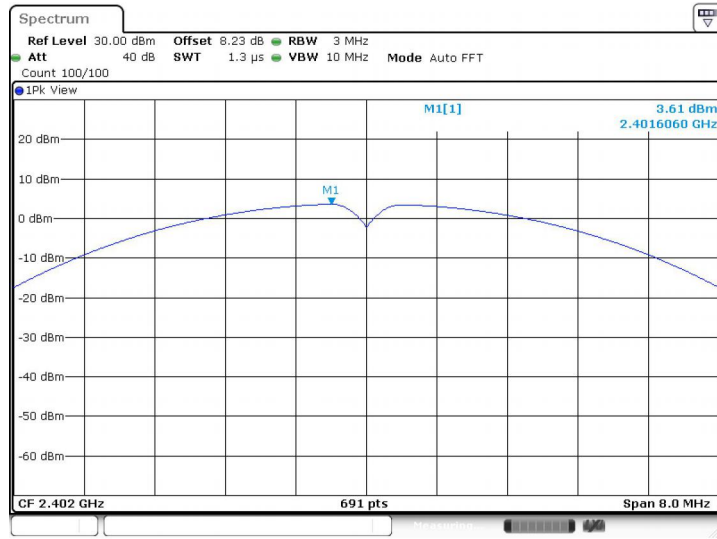


2480 MHz



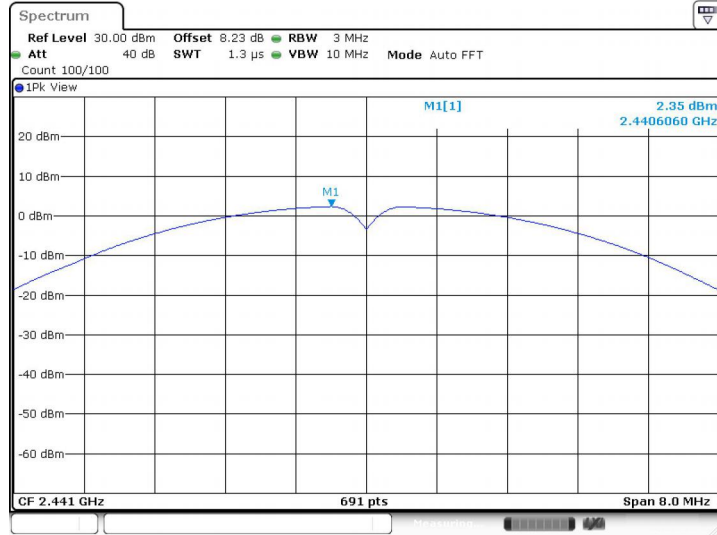
Test Mode:	2DH5	
Channel frequency (MHz)	Test Result (dBm)	Limit (dBm)
2402	3.61	30
2441	2.35	
2480	2.01	

2402 MHz

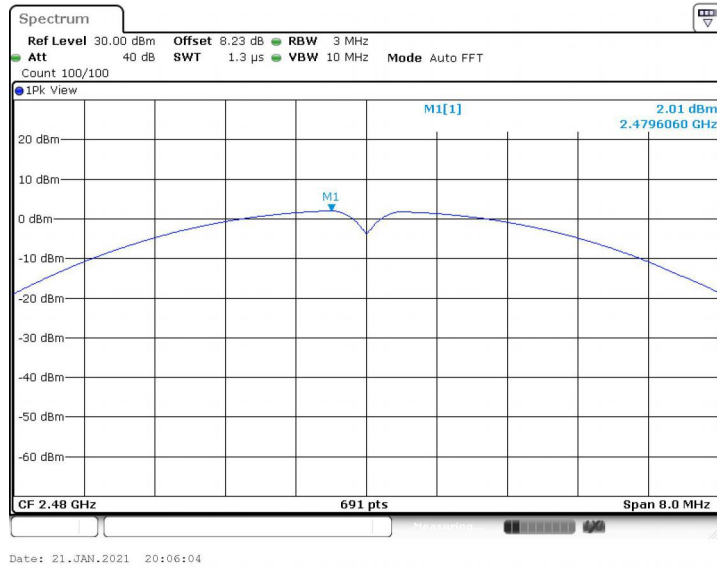


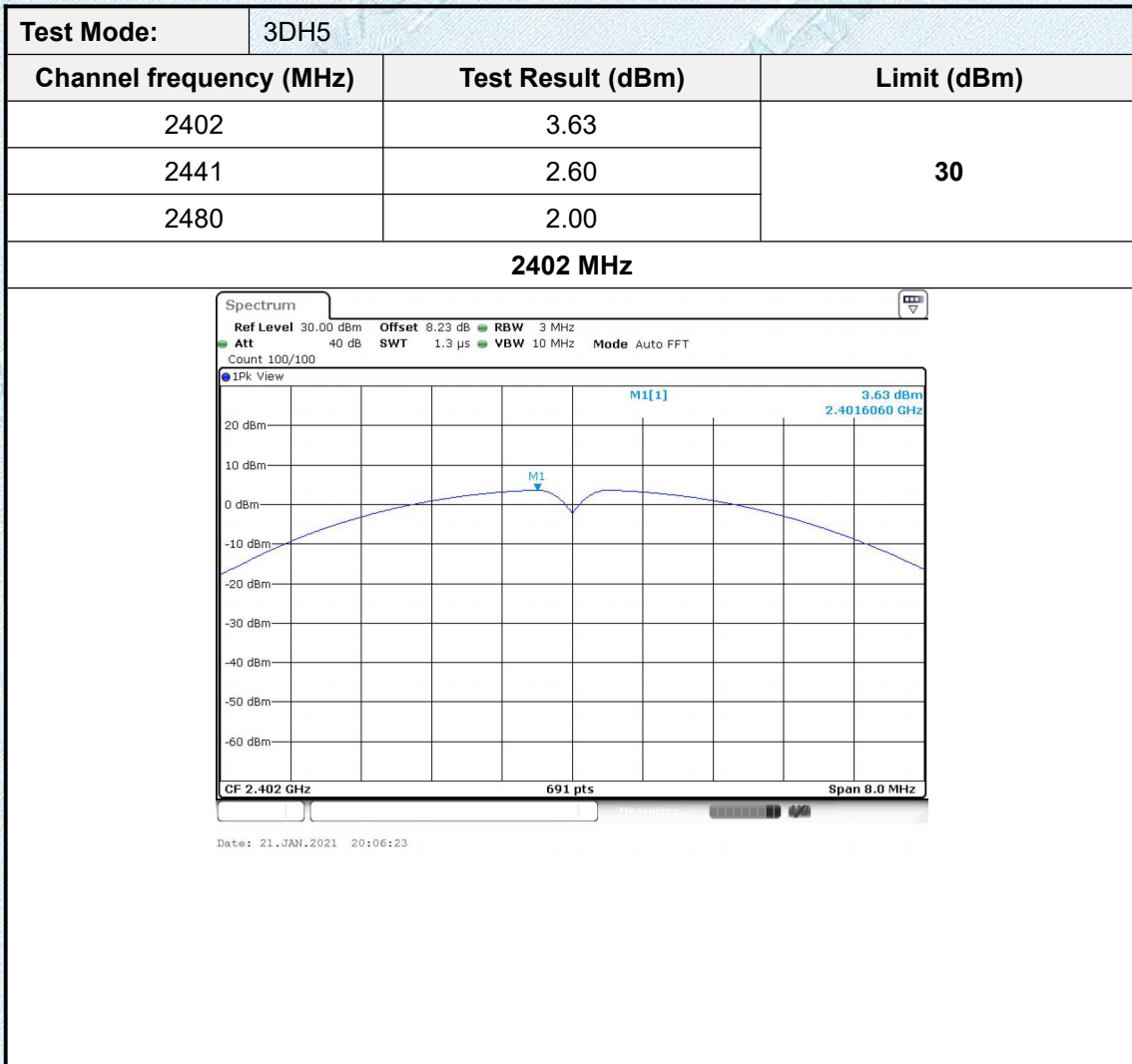
Date: 21.JAN.2021 20:05:40

2441 MHz

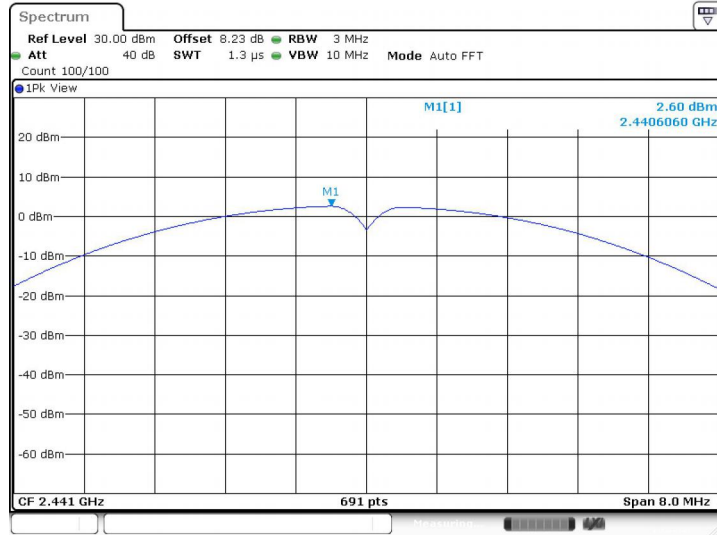


2480 MHz

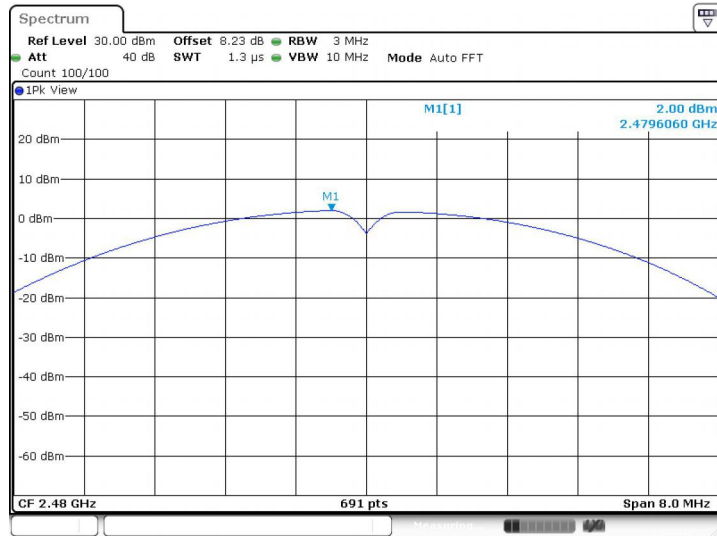




2441 MHz



2480 MHz

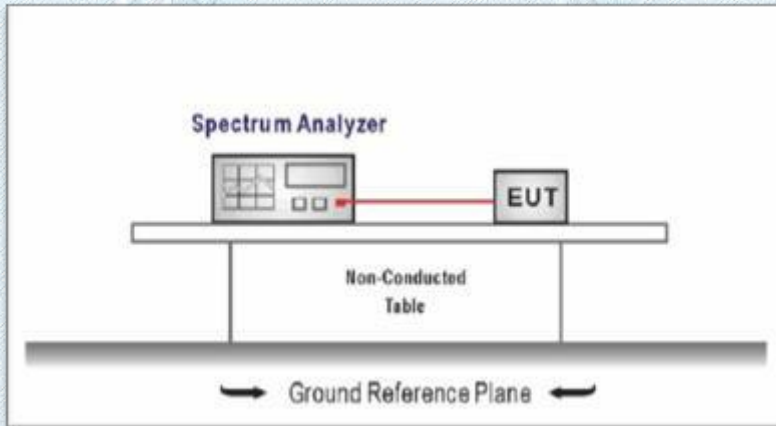


3.4. 99% Occupied Bandwidth & 20dB Bandwidth

Limit

Test Item	Limit	Frequency Range(MHz)
Bandwidth	<=1 MHz (20dB bandwidth)	2400~2483.5

Test Configuration



Test Procedure

1. The Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
2. Spectrum Setting:
 - 20dB Bandwidth
 - (1) Set RBW = 30 kHz.
 - (2) Set the video bandwidth (VBW) ≥ 3 RBW.
 - (3) Detector = Peak.
 - (4) Trace mode = Max hold.
 - (5) Sweep = Auto couple.

99% Occupied Bandwidth

- (1) Set RBW = 20 kHz.
- (2) Set the video bandwidth (VBW) =100 kHz.
- (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.

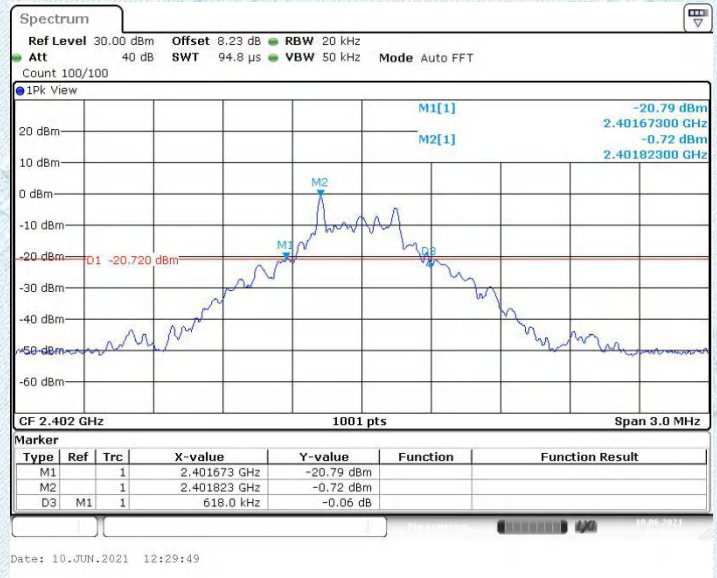
Test Mode

Please refer to the clause 2.3.

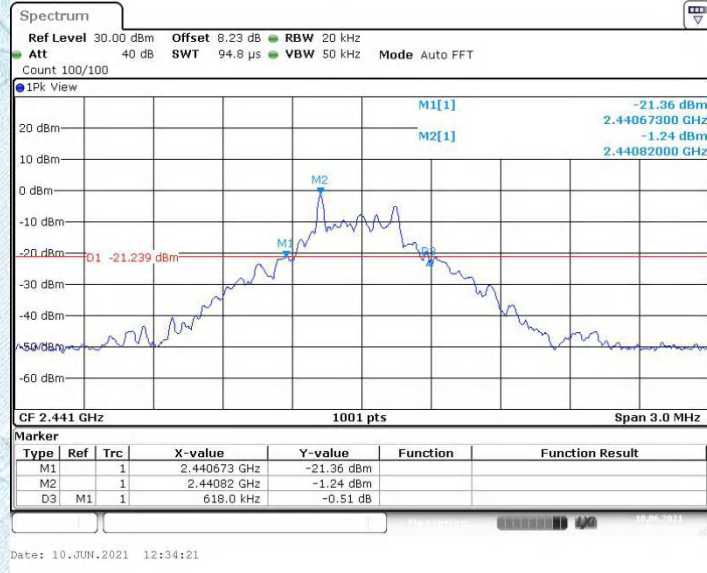
Test Results

Test Mode:	DH5			
Channel frequency (MHz)	20dB Bandwidth [MHz]	FL[MHz]	FH[MHz]	Result
2402	0.618	2401.673	2402.291	PASS
2441	0.618	2440.673	2441.291	PASS
2480	0.624	2479.667	2480.291	PASS

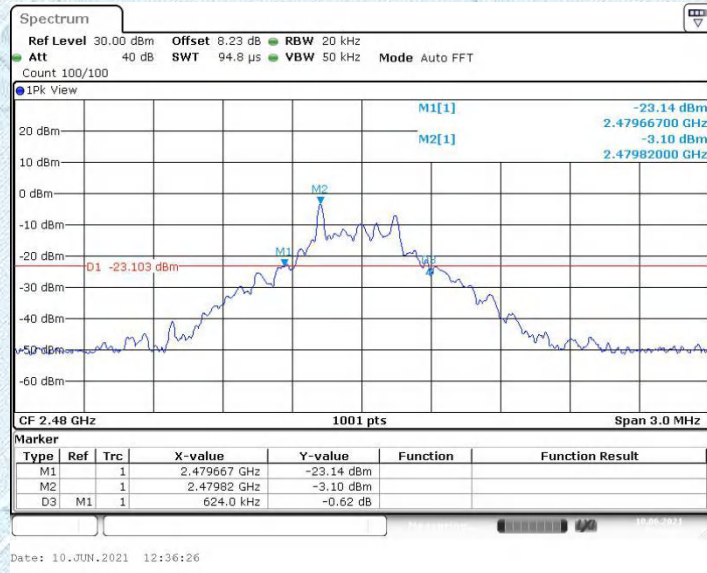
2402 MHz



2441 MHz



2480 MHz



Test Mode:	2DH5			
Channel frequency (MHz)	20dB Bandwidth [MHz]	FL[MHz]	FH[MHz]	Result
2402	1.092	2401.430	2402.522	PASS
2441	1.092	2440.430	2441.522	PASS
2480	1.095	2479.427	2480.522	PASS

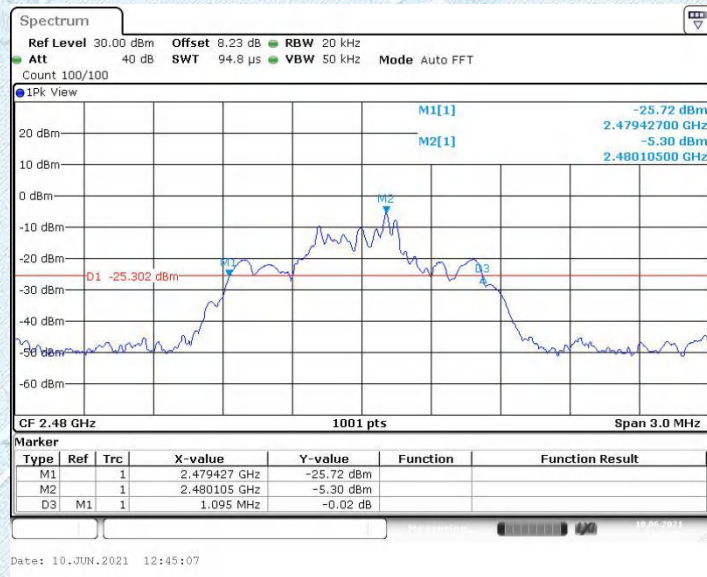
2402 MHz

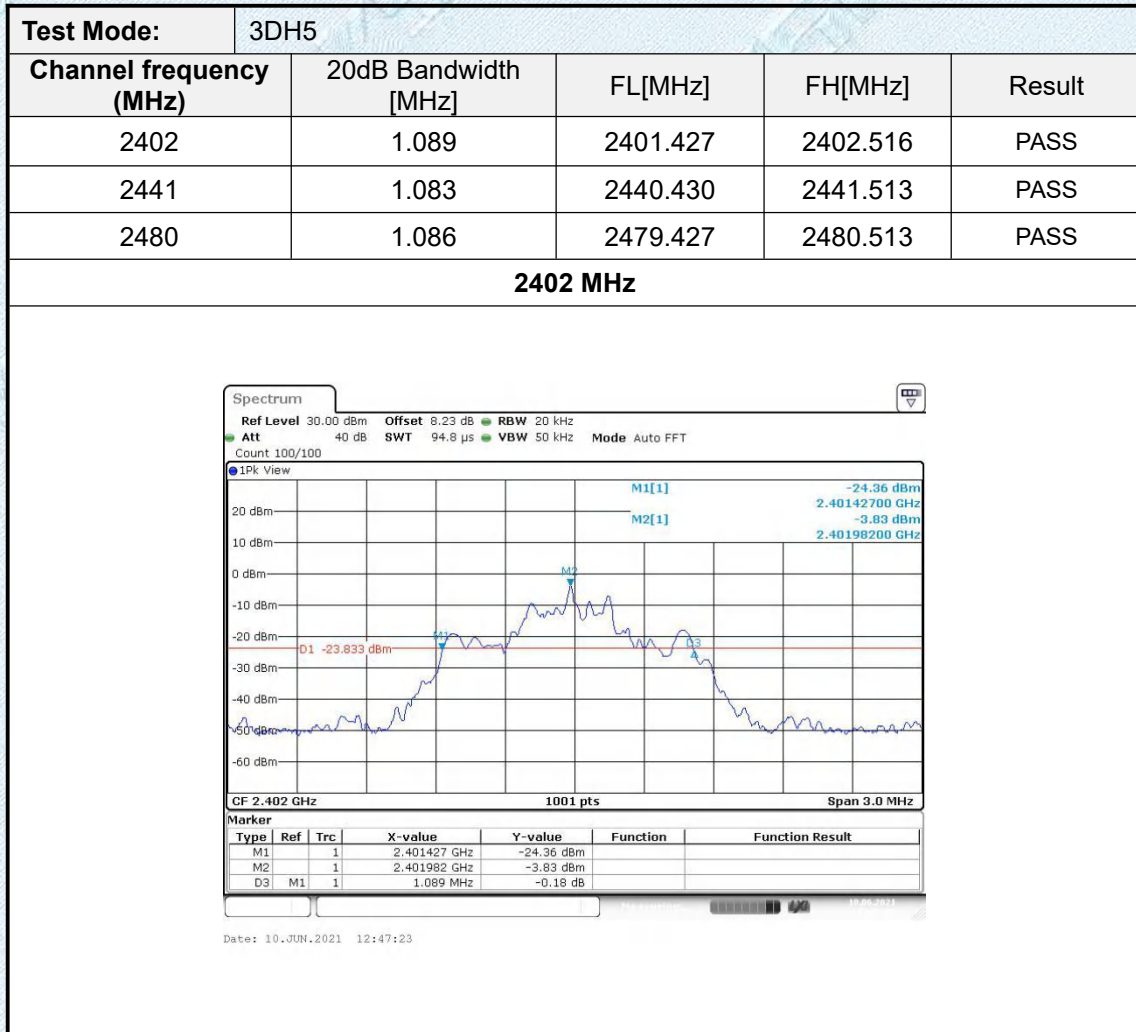


2441 MHz

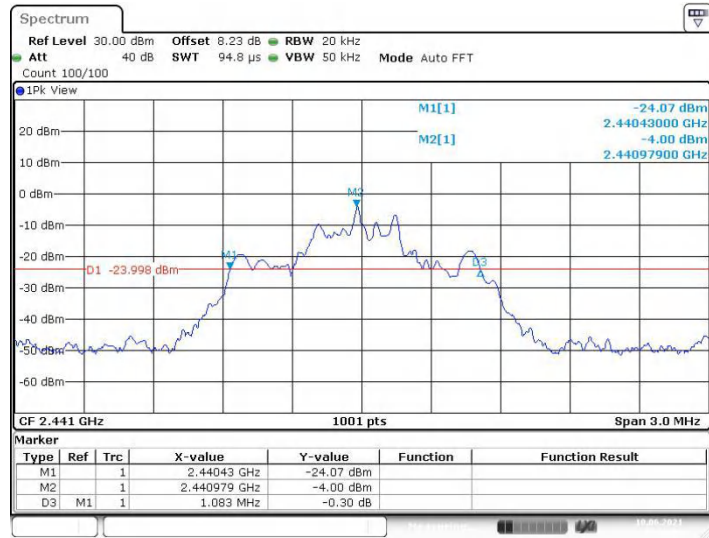


2480 MHz

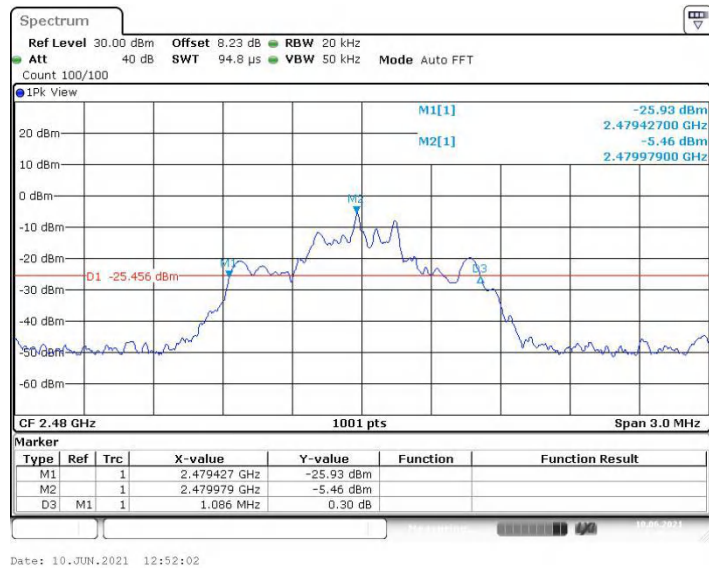




2441 MHz

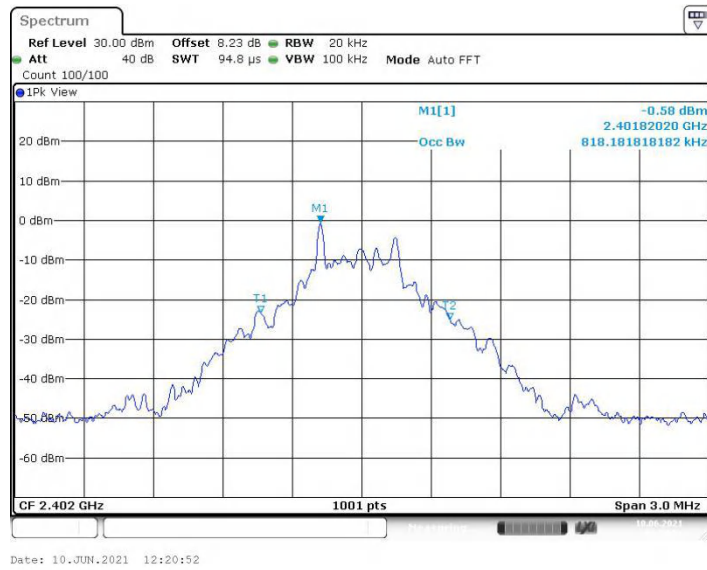


2480 MHz

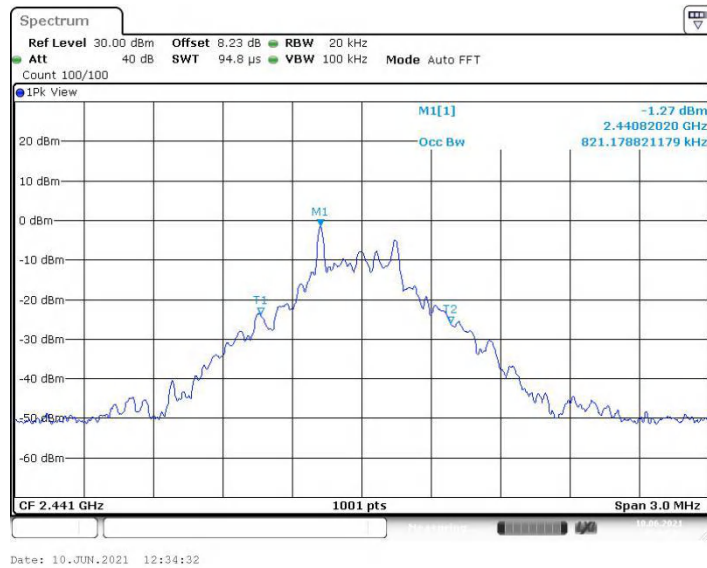


Test Mode:	DH5			
Channel frequency (MHz)	99% OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
2402	0.818	2401.562	2402.381	PASS
2441	0.821	2440.562	2441.384	PASS
2480	0.824	2479.559	2480.384	PASS

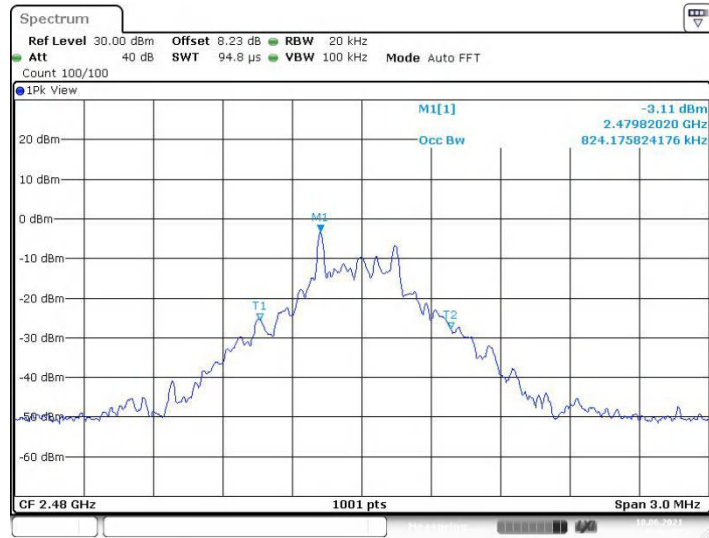
2402 MHz



2441 MHz



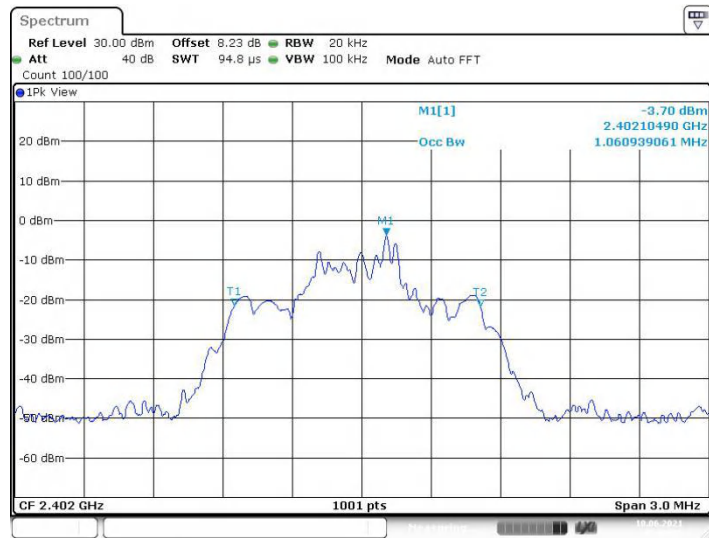
2480 MHz



Date: 10 JUN 2021 12:36:37

Test Mode:	2DH5			
Channel frequency (MHz)	99% OCB [MHz]	FL[MHz]	FH[MHz]	Result
2402	1.061	2401.452	2402.512	PASS
2441	1.064	2440.449	2441.512	PASS
2480	1.07	2479.446	2480.515	PASS

2402 MHz



Date: 10.JUN.2021 12:39:46

2441 MHz



Date: 10.JUN.2021 12:43:31

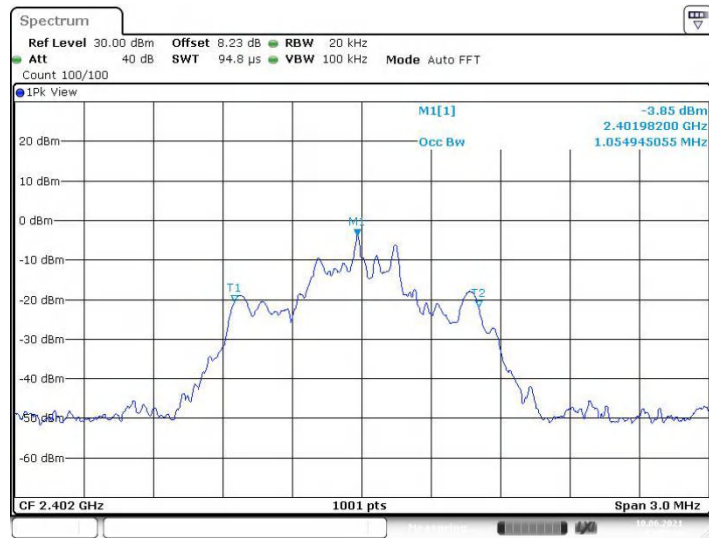
2480 MHz



Date: 10.JUN.2021 12:45:18

Test Mode:	3DH5			
Channel frequency (MHz)	99% OCB [MHz]	FL[MHz]	FH[MHz]	Result
2402	1.055	2401.449	2402.503	PASS
2441	1.055	2440.449	2441.503	PASS
2480	1.055	2479.446	2480.500	PASS

2402 MHz

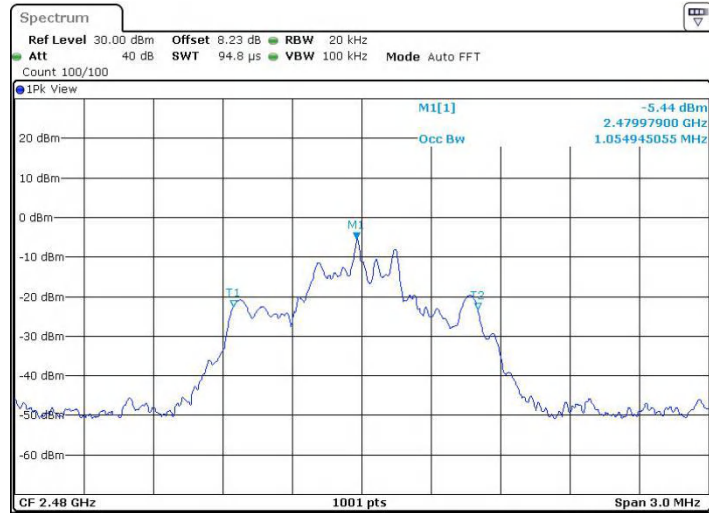


2441 MHz



Date: 10.JUN.2021 12:50:21

2480 MHz



Date: 10.JUN.2021 12:52:13

3.5. Carrier Frequencies Separation

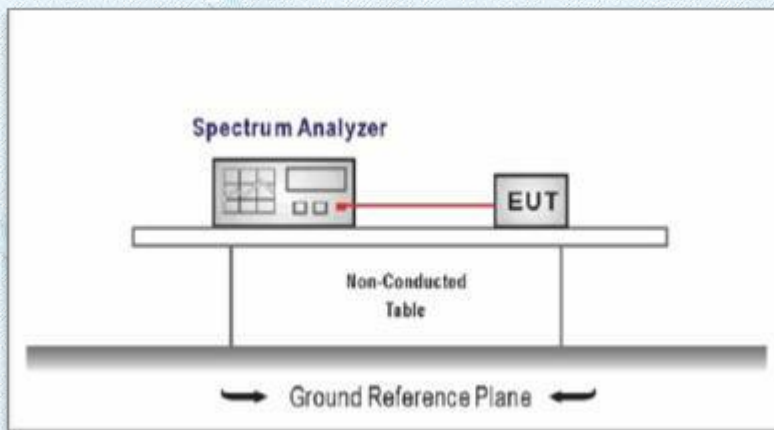
LIMIT

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 $\frac{2}{3} \times 20\text{dB}$ 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, and found the middle channel which is the worse case, so only show the test date for worse case.

Test Mode

Please refer to the clause 2.3.

Test Results

