

TEST REPORT

Verified Code: 852737

Report No.:	E202101126468-2	Application No.:	E202101126468
Client:	GUANGZHOU LIUHUAN INFORMATION TECHNOLOGY CO., LTD.		
Address:	ROOM 1101 OF BUILDING 2, ROOM 802 OF BUILDING 1, NO.6, YUNPU FOUR ROAD, HUANGPU DISTRICT, GUANGZHOU CITY, GUANGDONG PROVINCE, CHINA		
Sample Description:	Multimedia player		
Model:	San Andres 970		
Test Specification:	CFR 47, FCC Part 15 Subpart C RADIO FREQUENCY DEVICES: Subpart C—Intentional Radiators		
Receipt Date:	2021-01-20		
Test Date:	2021-02-25 to 2021-03-12		
Issue Date:	2021-04-14		
Test Result:	Pass		
Prepared By: Test Engineer <i>Xie Jiang</i>	Reviewed By: Technical Manager <i>Jiang Tao</i>	Approved By: Manager <i>Yong Dai</i>	
Other Aspects:			
Note: Note			
Abbreviations: ok / P = passed; fail / F = failed; n.a. / N = not applicable;			
The test result in this test report refers exclusively to the presented test sample. This report shall not be reproduced except in full, without the written approval of GRGT.			



DIRECTIONS OF TEST

- 1. This station carries out test task according to the national regulation of verifications which can be traced to National Primary Standards and BIPM.**
- 2. The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory.**
- 3. If there is any objection concerning the test, the client should inform the laboratory within 15 days from the date of receiving the test report.**

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1. TEST RESULT SUMMARY

Standard	Item	Limit / Severity	Result
CFR 47, FCC Part 15 Subpart C (§15.247)	Antenna Requirement	Section 15.247 (b)(1)	Note ²
	20dB Bandwidth	Section 15.247(a)(1)	PASS
	Carrier Frequencies Separated	Section 15.247(a)(1)	PASS
	Hopping Channel Number	Section 15.247(a)(1)(ii)	PASS
	Dwell Time	Section 15.247(a)(1)(iii)	PASS
	Maximum Peak Output Power	Section 15.247(b)(1)	PASS
	Conducted Emission	Section 15.207	Note ¹
	Conducted band edges and Spurious Emission (30MHz to 25GHz)	Section 15.209 &15.247(d)	PASS
	Radiated Spurious Emission (30MHz to 25GHz)	Section 15.209 &15.247(d)	PASS
	Restricted bands of operation	Section 15.247 (d) &15.205	PASS

Note ¹: Not applicable. The EUT received DC12V power from DC source

Note ²: The EUT antenna is internal antenna. Max antenna gain is 2dBi .which accordance 15.203.is considered sufficient to comply with the provisions of this section

2. GENERAL DESCRIPTION OF EUT

2.1. APPLICANT

Name: GUANGZHOU LIUHUAN INFORMATION TECHNOLOGY CO., LTD.
Address: ROOM 1101 OF BUILDING 2, ROOM 802 OF BUILDING 1, NO.6, YUNPU FOUR ROAD, HUANGPU DISTRICT, GUANGZHOU CITY, GUANGDONG PROVINCE, CHINA

2.2. MANUFACTURER

Name: GUANGZHOU LIUHUAN INFORMATION TECHNOLOGY CO., LTD.
Address: ROOM 1101 OF BUILDING 2, ROOM 802 OF BUILDING 1, NO.6, YUNPU FOUR ROAD, HUANGPU DISTRICT, GUANGZHOU CITY, GUANGDONG PROVINCE, CHINA

2.3. FACTORY

Name : GUANGZHOU LIUHUAN INFORMATION TECHNOLOGY CO., LTD.
Address : ROOM 1101 OF BUILDING 2, ROOM 802 OF BUILDING 1, NO.6, YUNPU FOUR ROAD, HUANGPU DISTRICT, GUANGZHOU CITY, GUANGDONG PROVINCE, CHINA

2.4. BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Multimedia player
Model No.: San Andres 970
Adding Model: /
Trade Name: /
FCC ID: 2AQZN-SA970-1
Power Supply: DC12V power supplied by DC source
Frequency Range: 2402MHz~2480MHz
Transmit Power: DH5: 0.45dBm
2DH5: 0.87dBm
3DH5: 1.59dBm
Type of Modulation: FHSS (GFSK for 1Mbps, $\pi/4$ -DQPSK for 2Mbps, 8DPSK for 3Mbps)
Antenna Specification: Internal antenna 2dBi gain (Max.)
Temperature Range: -20 °C ~ +70 °C
Hardware: V1.0.5

Version:

Software Version: C78_V1.0.1.0_T

Version:

Sample No: E202101126468-0002

Note: /

2.5. TEST OPERATION MODE

Mode No.	Description of the modes
1	Bluetooth BR+EDR fixed Transmitting

2.6. LOCAL SUPPORTIVE

Name of Equipment	Manufacturer	Model	Serial Number	Note
Radio communication tester	R&S	CMW500	144611-nC	/
/	/	/	/	/
Cable				
/	/	/	/	/
/	/	/	/	/

Test software:

Software version	Test level
/	/

3. LABORATORY AND ACCREDITATIONS

3.1. LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of Guangzhou GRG Metrology & Test Co., Ltd.

Add : Address: No.1301 Guangguang Road Xinlan Community, Guanlan Street,
Longhua District Shenzhen, 518110, People's Republic of China

P.C. : 518000

Tel : 0755-61180008

Fax : 0755-61180008

3.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to GB/T 27025(ISO/IEC 17025:2017)

USA A2LA(Certificate #:2861.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada Industry Canada
USA FCC

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.grgtest.com>

3.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement		Frequency	Uncertainty
Radiated Emission	Horizontal	30MHz~1000MHz	4.30dB
		1GHz~18GHz	5.60dB
		18GHz~26GHz	3.65dB
	Vertical	30MHz~1000MHz	4.30dB
		1GHz~18GHz	5.60dB
		18GHz~26GHz	3.65dB

This uncertainty represents an expanded uncertainty factor of k=2.

4. LIST OF USED TEST EQUIPMENT AT GRGT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Hopping Channel Number				
Spectrum Analyzer	Agilent	N9010A	MY52221469	2021-05-16
Radio communication tester	R&S	CMW500	144611-nC	2021-07-16
Dwell Time				
Spectrum Analyzer	Agilent	N9010A	MY52221469	2021-05-16
Radio communication tester	R&S	CMW500	144611-nC	2021-07-16
Radiated Spurious Emission& Restricted bands of operation				
Spectrum Analyzer	Agilent	N9010A	MY52221469	2021-05-16
Radio communication tester	R&S	CMW500	144611-nC	2021-07-16
Horn Antenna	Schwarzbeck	BBHA 9120D(1201)	02143	2021-12-27
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	BBHA 9170-497	2021-11-05
Amplifier	Tonscend	TAP01018048	AP20E8060075	2021-06-28
Amplifier	Tonscend	TAP037030	AP20E8060081	2021-06-28
Amplifier	Tonscend	TAP184050	AP20E806071	2021-06-15
Test receiver	R&S	ESCI	100145	2021-10-07
Amplifier	EMEC	EM330	/	2021-04-01
Bilog Antenna	Schwarzbeck	CBL6143A	26039	2021-11-25
Test S/W	EZ	CCS-2ANT	/	/
Test S/W	Tonscend	JS362-RSE/2.5.1.5		
20 dB Bandwidth				
Spectrum Analyzer	Agilent	N9010A	MY52221469	2021-05-16
Radio communication tester	R&S	CMW500	144611-nC	2021-07-16
Maximum Peak Output Power				
Spectrum Analyzer	Agilent	N9010A	MY52221469	2021-05-16
Radio communication tester	R&S	CMW500	144611-nC	2021-07-16
Conducted band edges and Spurious Emission				
Spectrum Analyzer	Agilent	N9010A	MY52221469	2021-05-16
Radio communication	R&S	CMW500	144611-nC	2021-07-16

tester				
Carrier Frequencies Separated				
Spectrum Analyzer	Agilent	N9010A	MY52221469	2021-05-16
Radio communication tester	R&S	CMW500	144611-nC	2021-07-16

5. TEST RESULTS

5.1. E.U.T. TEST CONDITIONS

Test frequencies:

According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

EUT channels and frequencies list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	14	2416	28	2430
1	2403	15	2417	29	2431
2	2404	16	2418	30	2432
3	2405	17	2419	31	2433
4	2406	18	2420	32	2434
5	2407	19	2421	33	2435
6	2408	20	2422	34	2436
7	2409	21	2423	35	2437
8	2410	22	2424	36	2438
9	2411	23	2425	37	2439
10	2412	24	2426	38	2440
11	2413	25	2427	39	2441
12	2414	26	2428	40	2442
13	2415	27	2429	41	2443
42	2444	55	2457	68	2470
43	2445	56	2458	69	2471
44	2446	57	2459	70	2472
45	2447	58	2460	71	2473
46	2448	59	2461	72	2474
47	2449	60	2462	73	2475
48	2450	61	2463	74	2476
49	2451	62	2464	75	2477
50	2452	63	2465	76	2478
51	2453	64	2466	77	2479
52	2454	65	2467	78	2480
53	2455	66	2468	/	/
54	2456	67	2469	/	/

Test frequency is the lowest channel: 0 channel(2402MHz), middle channel: 39channel(2441MHz) and highest channel: 78 channel(2480MHz)

5.2. 20dB BANDWIDTH

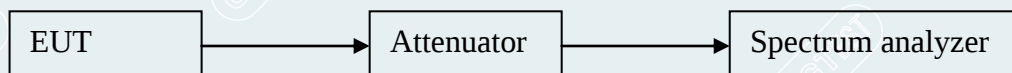
5.2.1. LIMITS

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.

5.2.2. TEST PROCEDURES

- 1) Remove the antenna from the EUT, and then connect a low loss RF cable from antenna port to the spectrum analyzer.
- 2) Set the spectrum analyzer as RBW=30 kHz, VBW=100 kHz, Span=3MHz, Sweep = auto.
Allow the trace to stabilize, record 20dB bandwidth value
- 3) Repeat until all the test channels are investigated.

5.2.3. TEST SETUP



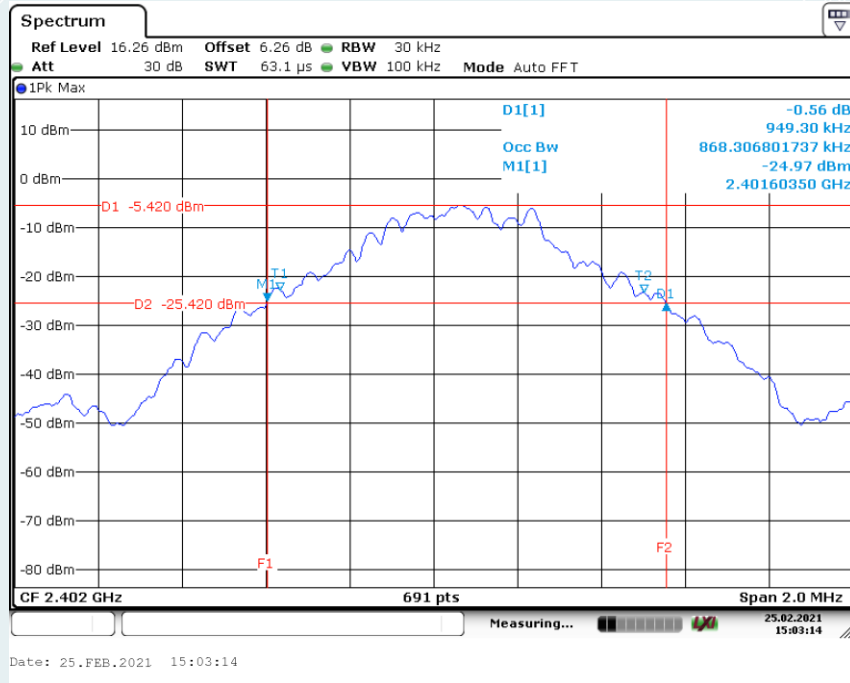
5.2.4. TEST RESULTS

Test mode	Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
DH5	Low	2402	868.307
	Mid	2441	871.201
	High	2480	874.096
Test mode	Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
2DH5	Low	2402	1163.531
	Mid	2441	1169.320
	High	2480	1190.810
Test mode	Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
3DH5	Low	2402	1163.531
	Mid	2441	1166.425
	High	2480	1169.320

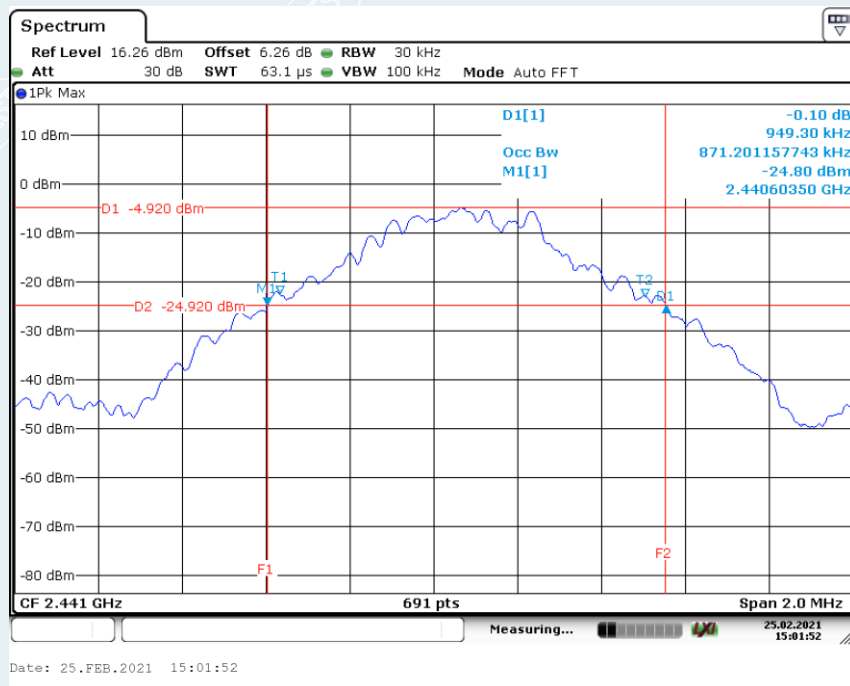
Result plot as follows:

DH5

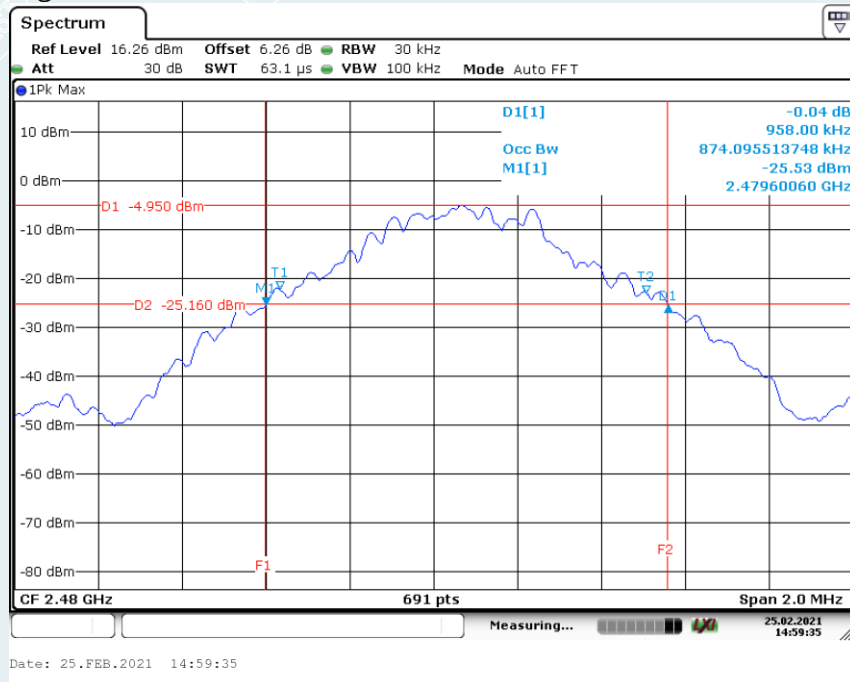
Low Channel



Mid Channel

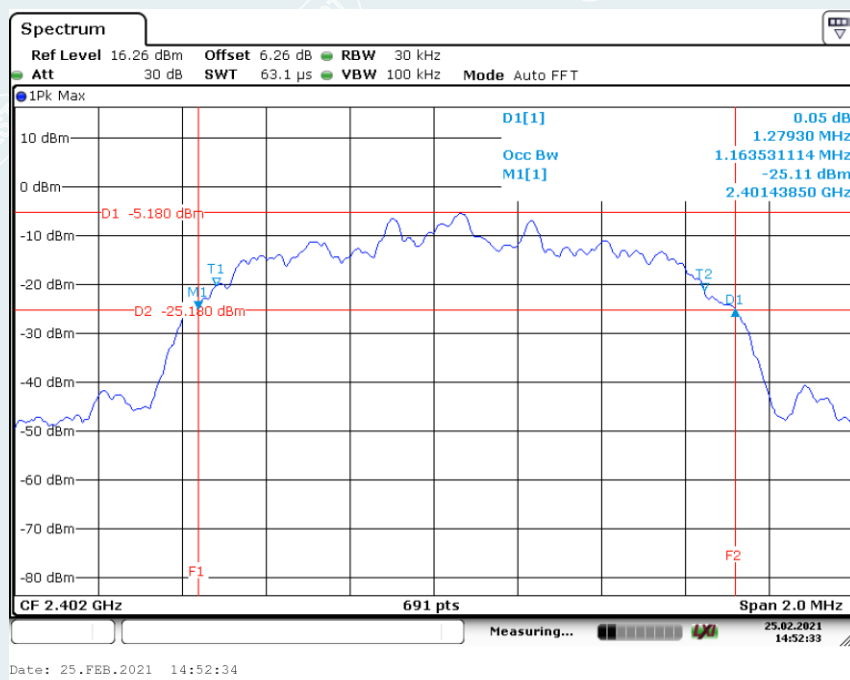


High Channel

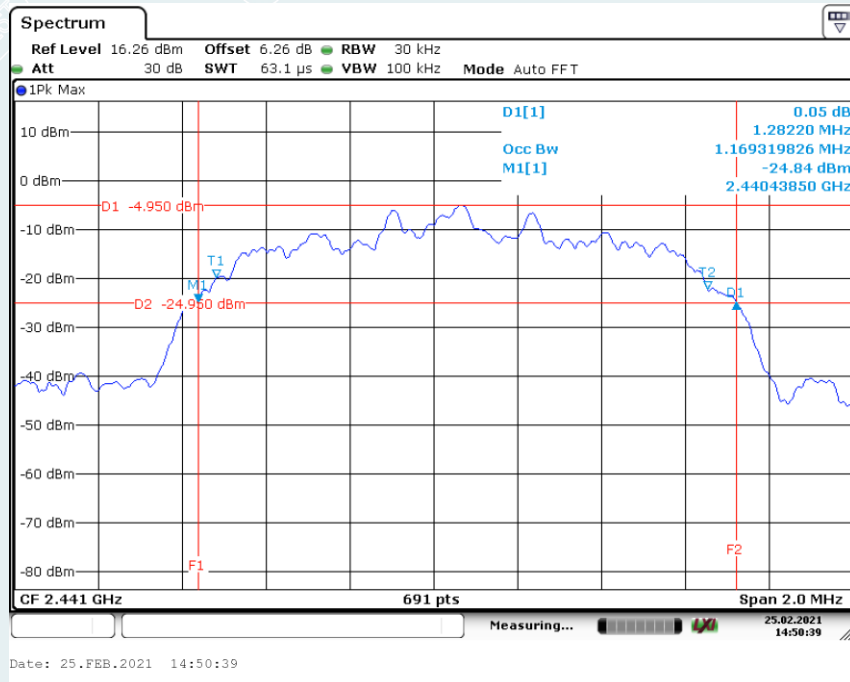


2DH5

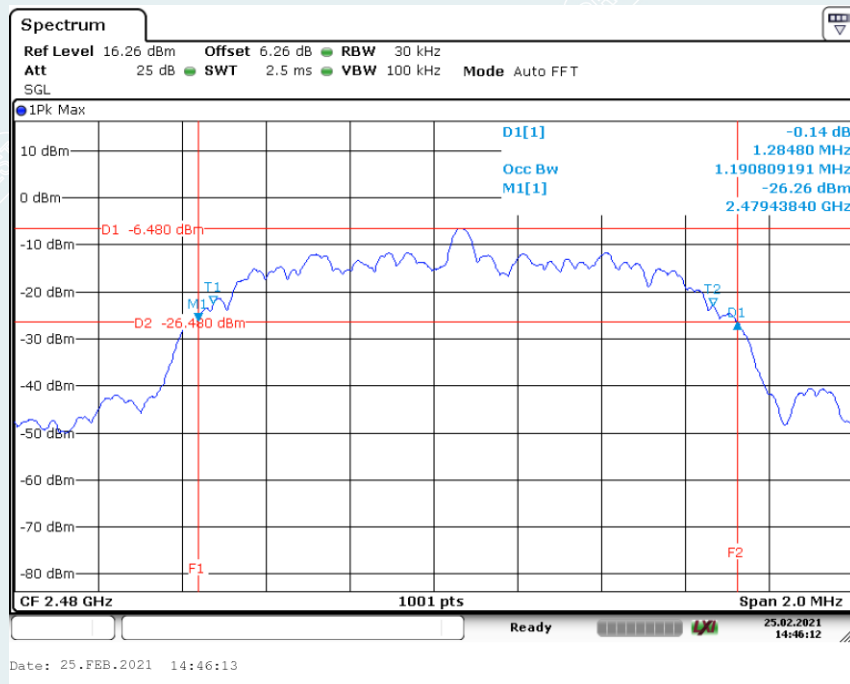
Low Channel



Mid Channel

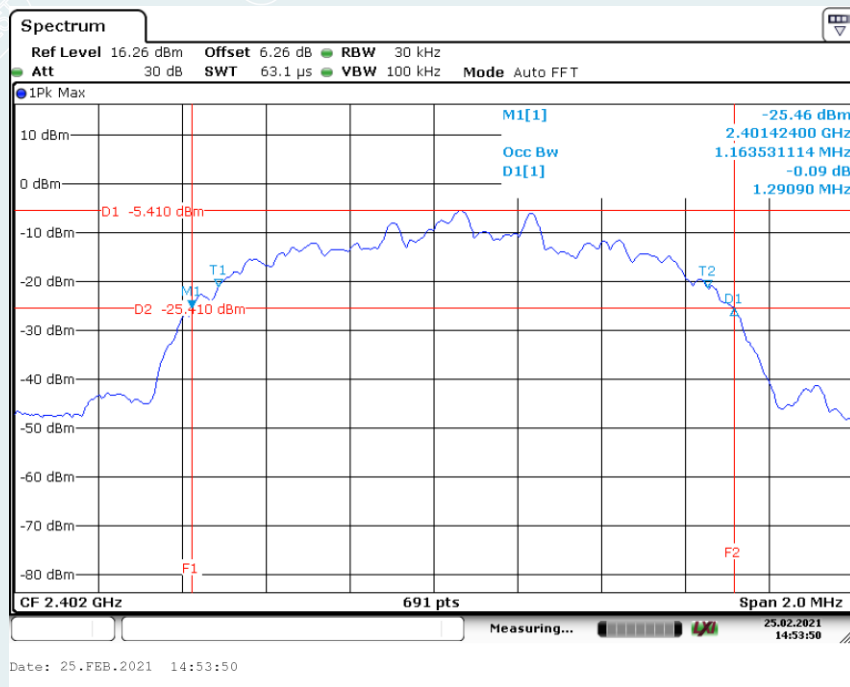


High Channel

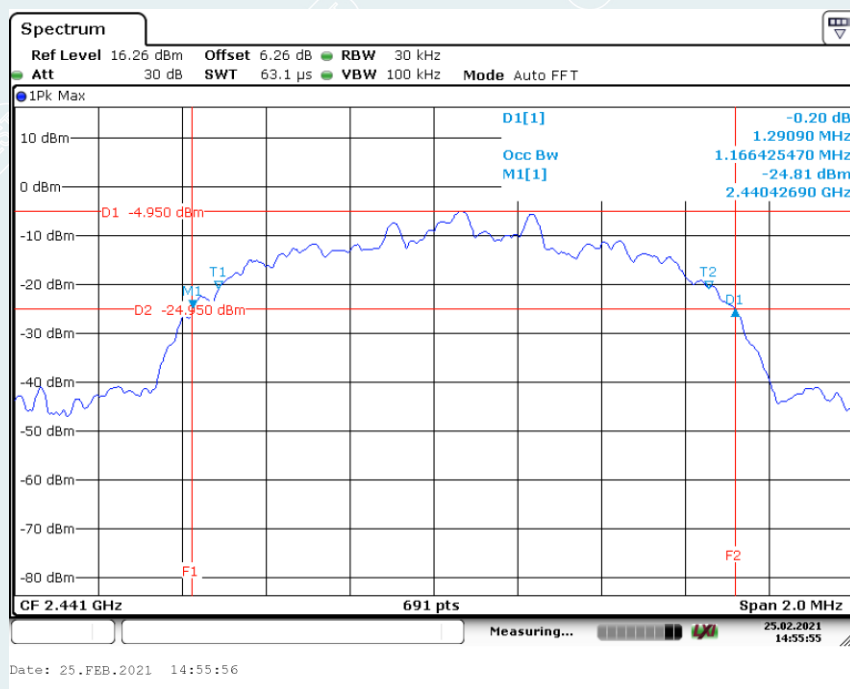


3DH5

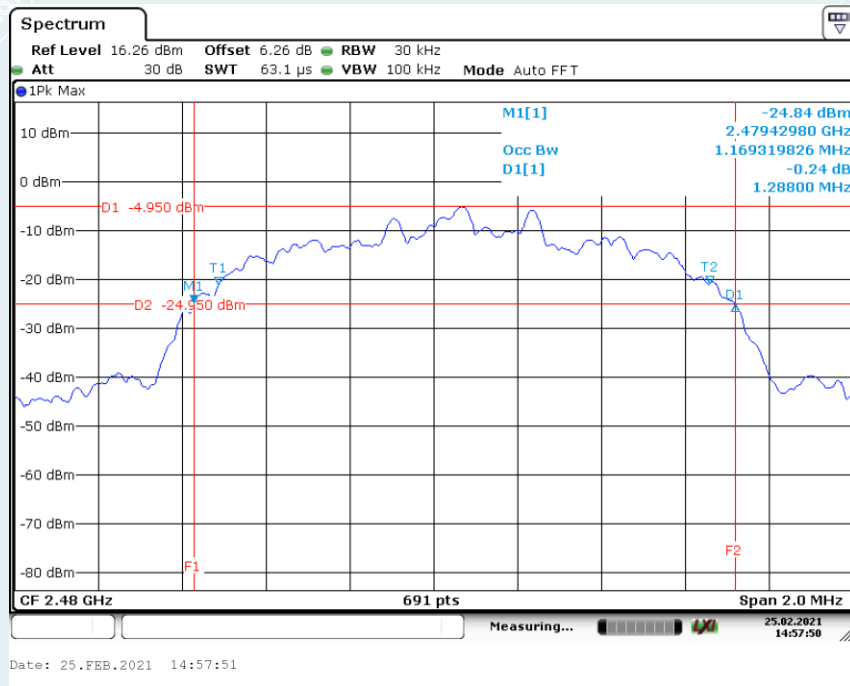
Low Channel



Mid Channel



High Channel



5.3. CARRIER FREQUENCIES SEPARATED

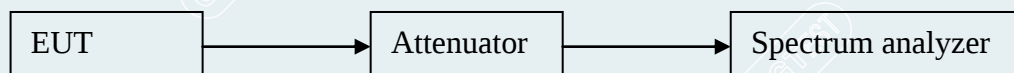
5.3.1. LIMITS

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.

5.3.2. TEST PROCEDURES

- 1) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 2) Set center frequency of spectrum analyzer = middle of hopping channel.
- 3) Set the spectrum analyzer as RBW=30kHz, VBW=30kHz, Adjust Span to 2 MHz, Sweep = auto
- 4) Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

5.3.3. TEST SETUP



5.3.4. TEST RESULTS

DH5

Channel Separation (MHz)	Two-thirds of the 20 dB Bandwidth (kHz)	Channel Separation Limit	Result
1.000	582.731	> Two-thirds of the 20 dB Bandwidth	Pass

2DH5

Channel Separation (MHz)	Two-thirds of the 20 dB Bandwidth (kHz)	Channel Separation Limit	Result
1.000	793.873	> Two-thirds of the 20 dB Bandwidth	Pass

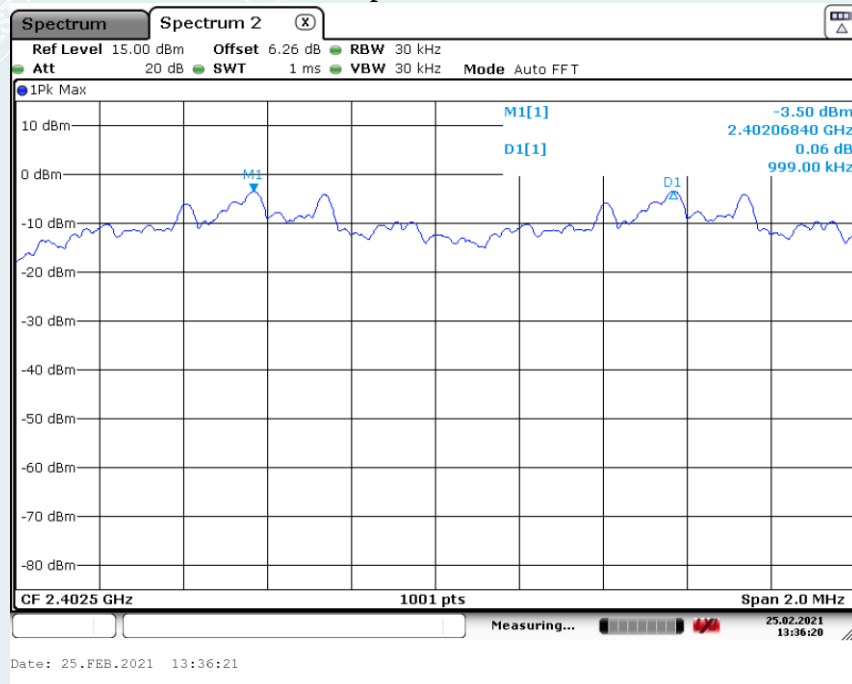
3DH5

Channel Separation (MHz)	Two-thirds of the 20 dB Bandwidth (kHz)	Channel Separation Limit	Result
1.000	779.547	> Two-thirds of the 20 dB Bandwidth	Pass

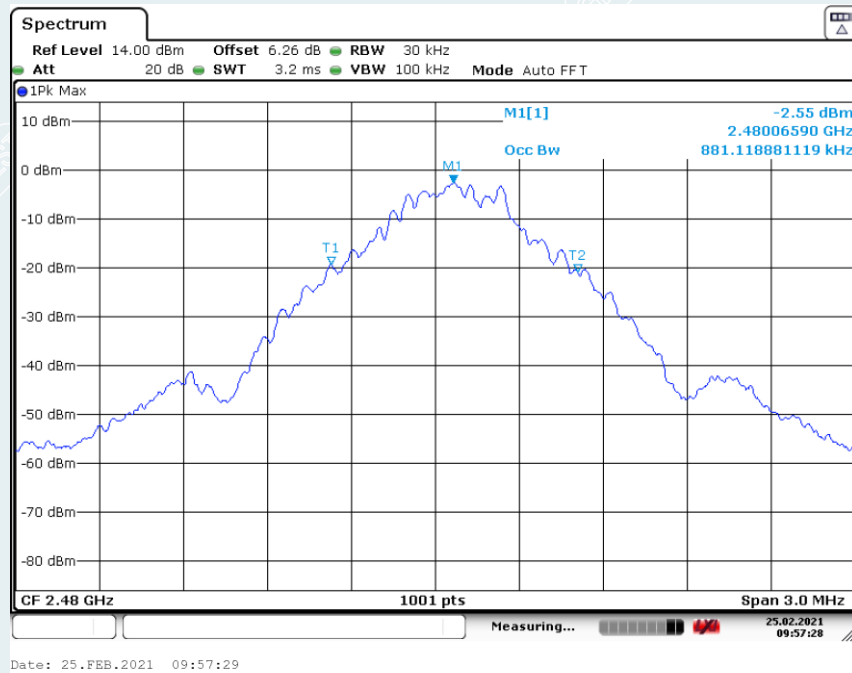
Result plot as follows:

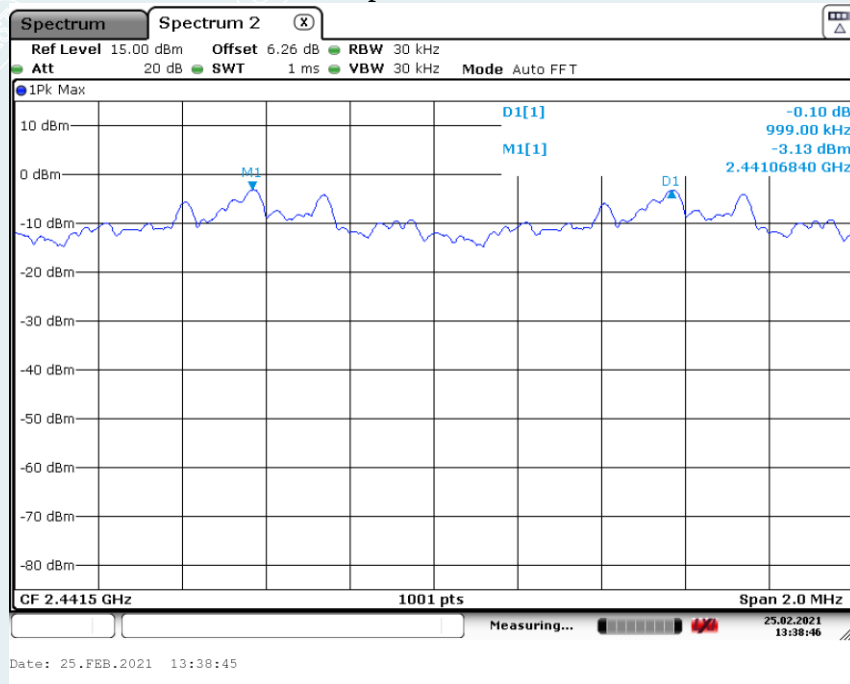
DH5

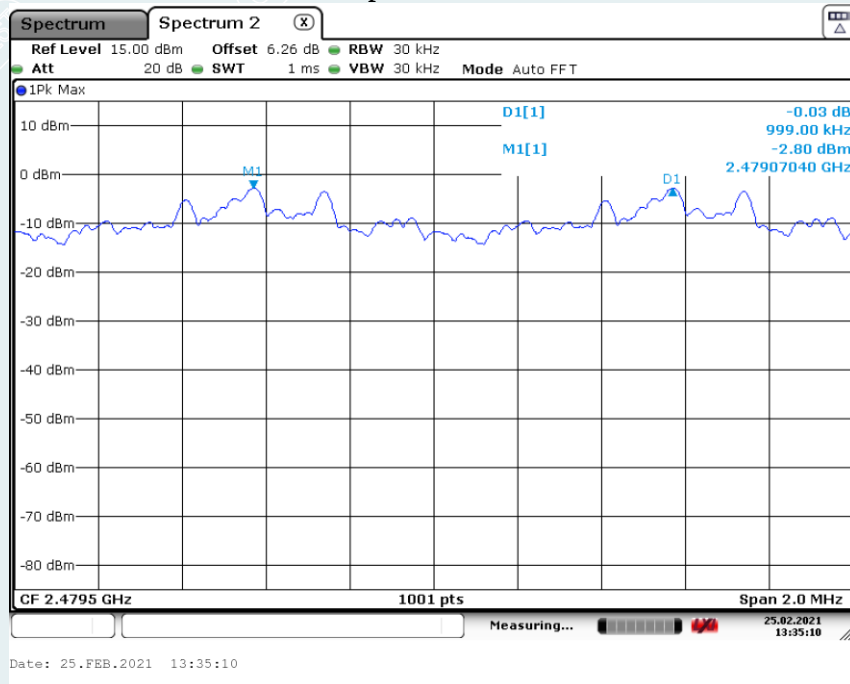
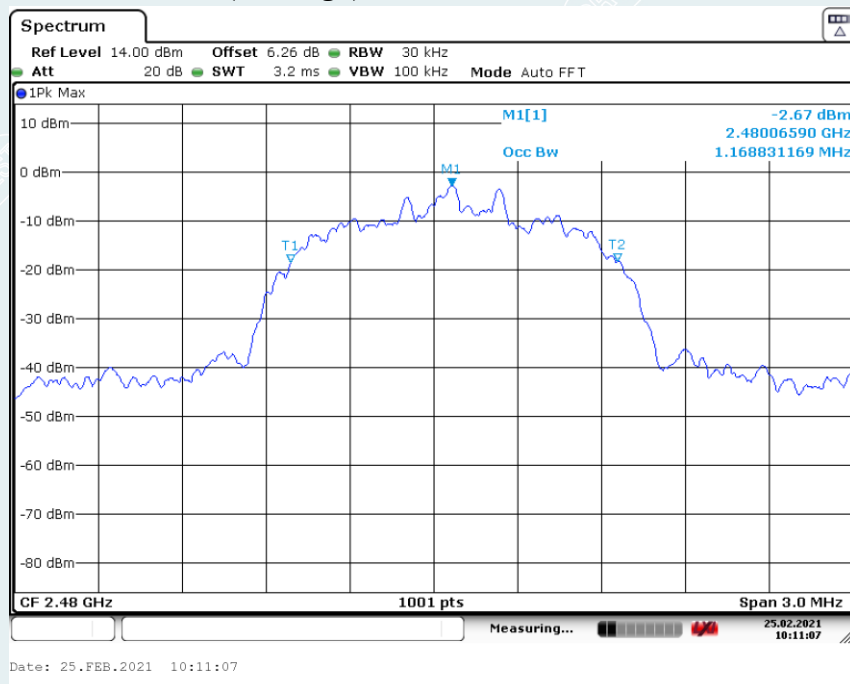
Measurement of Channel Separation



20 dB bandwidth(CH High)



2DH5**Measurement of Channel Separation****20 dB bandwidth(CH High)**

3DH5**Measurement of Channel Separation****20 dB bandwidth(CH High)**

Test result: The unit does meet the FCC requirements.

5.4. HOPPING CHANNEL NUMBER

5.4.1. LIMITS

Regulation 15.247 (a) (1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

5.4.2. TEST PROCEDURES

- 1) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 2) Set the spectrum analyzer as RBW, VBW=300kHz,
- 3) Set the spectrum analyzer: start frequency = 2400MHz. stop frequency = 2483.5MHz. Submit the test result graph.

5.4.3. TEST SETUP

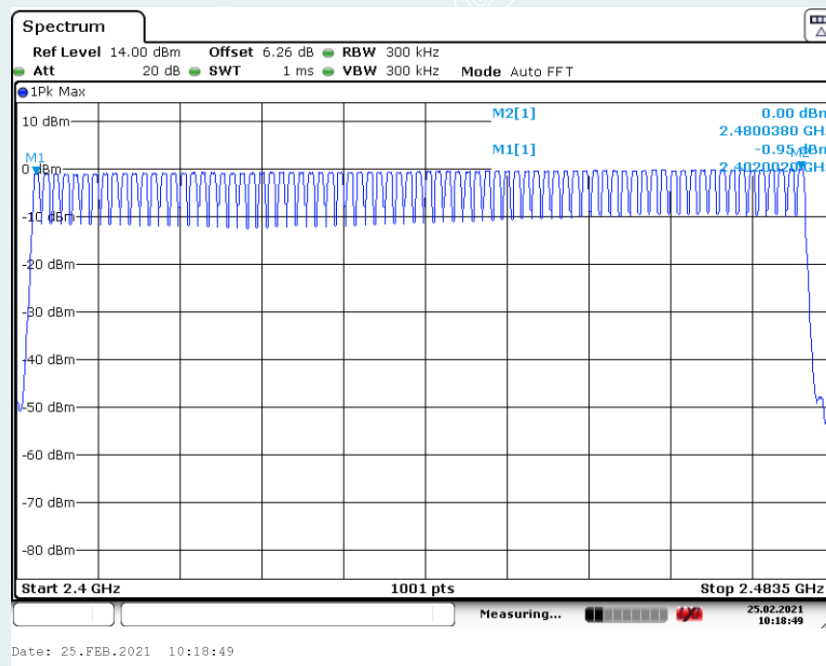


5.4.4. TEST RESULTS

Result (No. of CH)	Limit (No. of CH)	Result
79	>15	PASS

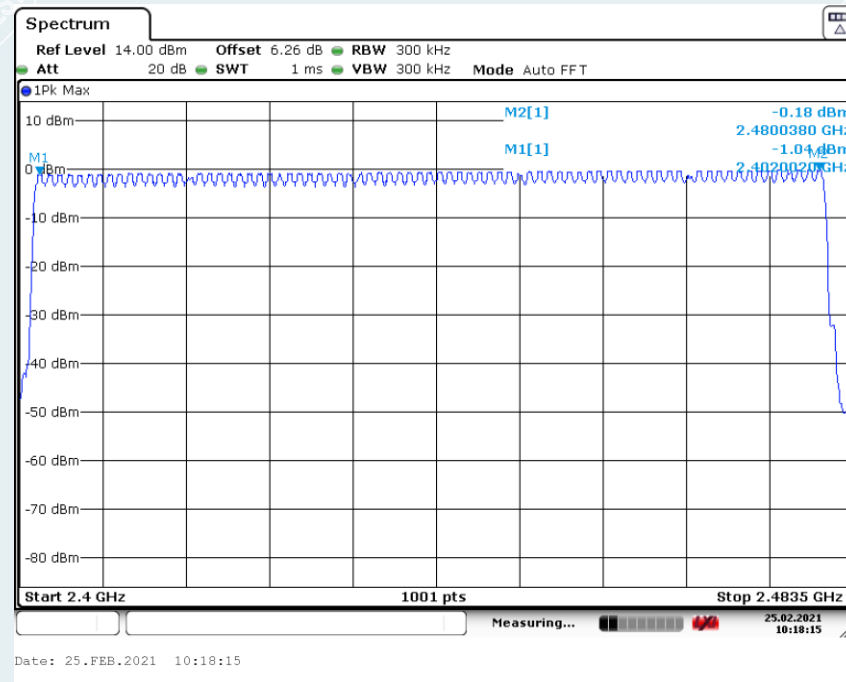
DH5

2.400 GHz – 2.4835 GHz



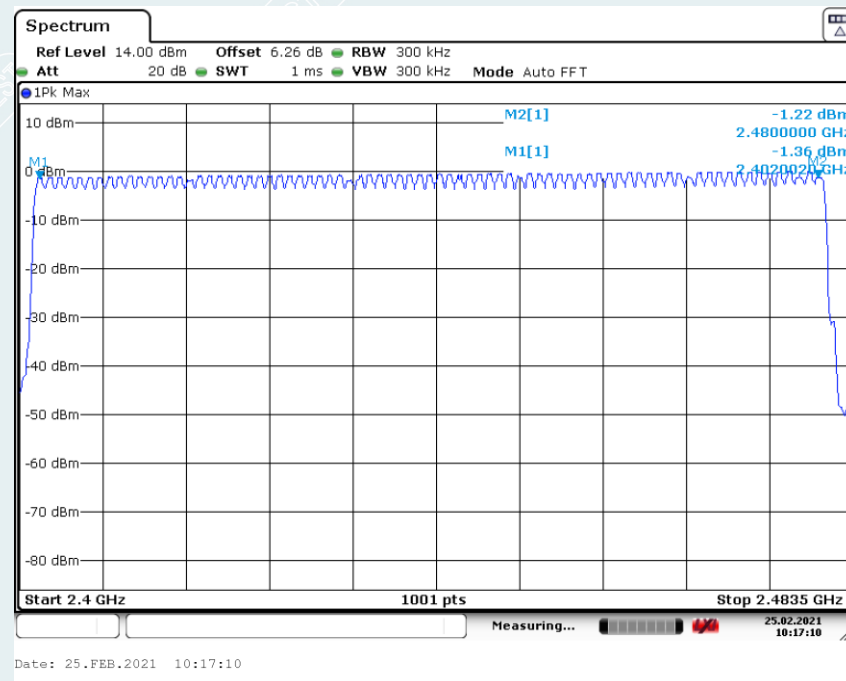
2DH5

2.400 GHz – 2.4835 GHz



3DH5

2.400 GHz – 2.4835 GHz

**Test result: The unit does meet the FCC requirements.**

5.5. DWELL TIME

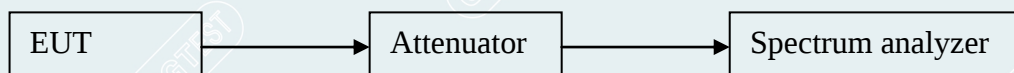
5.5.1. LIMITS

Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

5.5.2. TEST PROCEDURES

- 1) Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
- 2) Set spectrum analyzer span = 0. centered on a hopping channel;
- 3) Set RBW = 1MHz and VBW = 1MHz. Sweep = as necessary to capture the entire dwell time per hopping channel. Detector Function = Peak. Trace = Max hold;
- 4) Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.). Repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s). An oscilloscope may be used instead of a spectrum analyzer.

5.5.3. TEST SETUP



5.5.4. TEST RESULTS

The test period: $T = 0.4 \text{ Second/Channel} \times 79 \text{ Channel} = 31.6 \text{ s}$

GFSK: Mid Channel (2.441GHz)

DH1	time slot=	0.385	(ms)*	(1600/(2*79))	*	31.6	=	123.2	ms
DH3	time slot=	1.645	(ms)*	(1600/(4*79))	*	31.6	=	263.2	ms
DH5	time slot=	2.865	(ms)*	(1600/(6*79))	*	31.6	=	305.6	ms

$\pi/4$ -DQPSK: Mid Channel (2.441GHz)

2DH1	time slot=	0.38	(ms)*	(1600/(2*79))	*	31.6	=	121.6	ms
2DH3	time slot=	1.64	(ms)*	(1600/(4*79))	*	31.6	=	262.4	ms
2DH5	time slot=	2.87	(ms)*	(1600/(6*79))	*	31.6	=	306.13	ms

8DPSK: Mid Channel (2.441GHz)

3DH1	time slot=	0.38	(ms)*	(1600/(2*79))	*	31.6	=	121.6	ms
3DH3	time slot=	1.64	(ms)*	(1600/(4*79))	*	31.6	=	262.4	ms
3DH5	time slot=	2.88	(ms)*	(1600/(6*79))	*	31.6	=	307.2	ms

The results are not greater than 0.4 seconds.

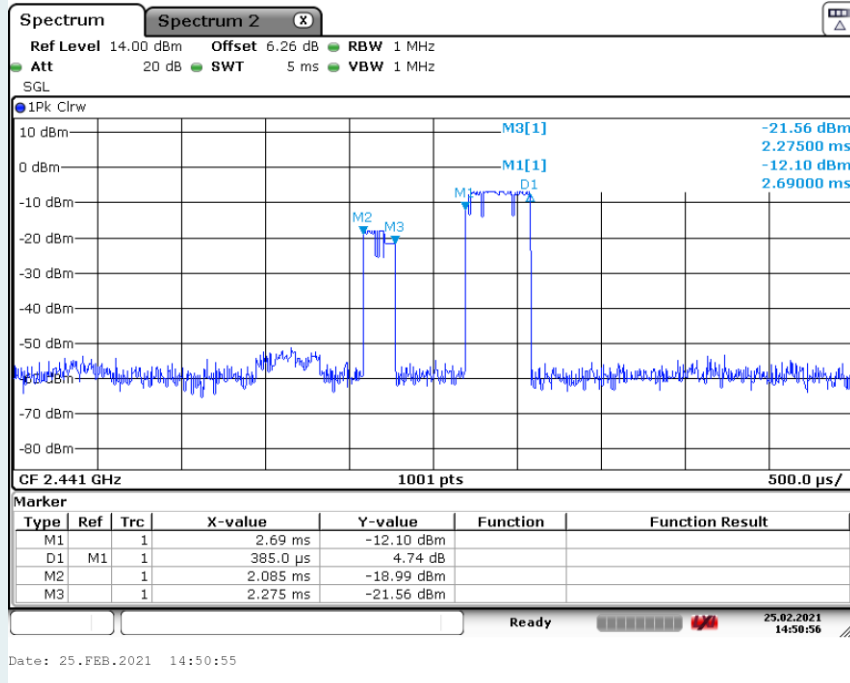
The unit does meet the requirements.

Please refer the graph as below:

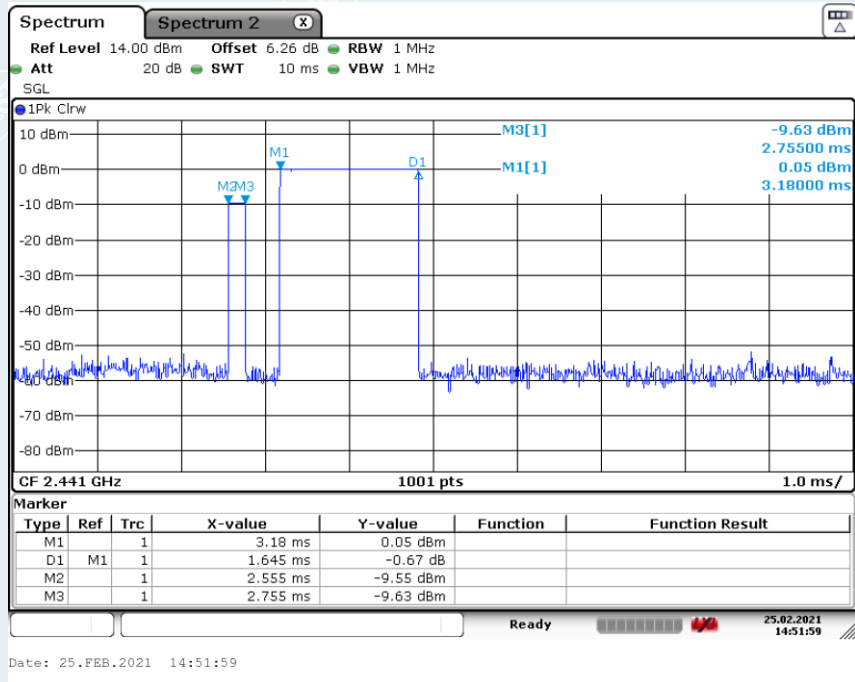
GFSK

Mid Channel (2.441GHz)

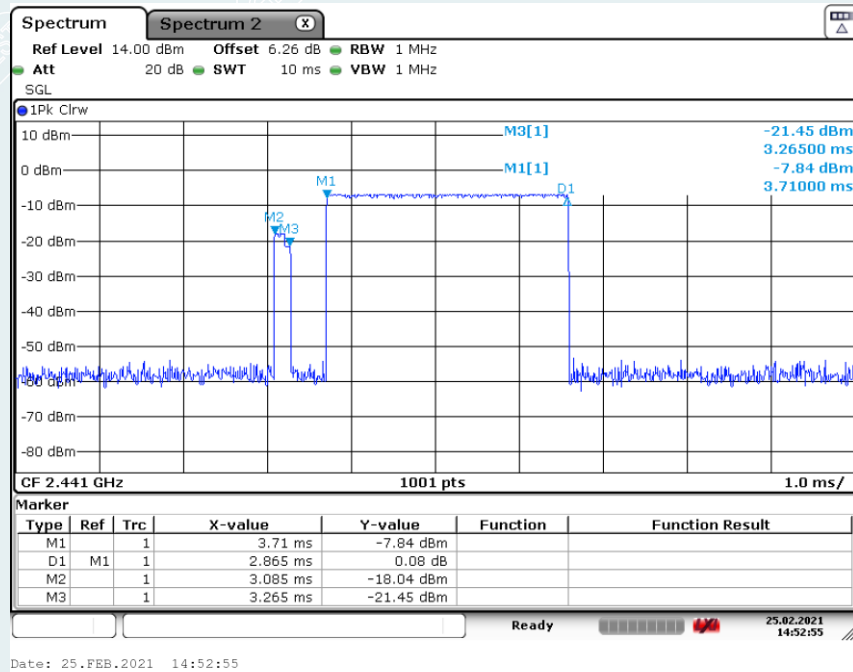
DH1



DH3

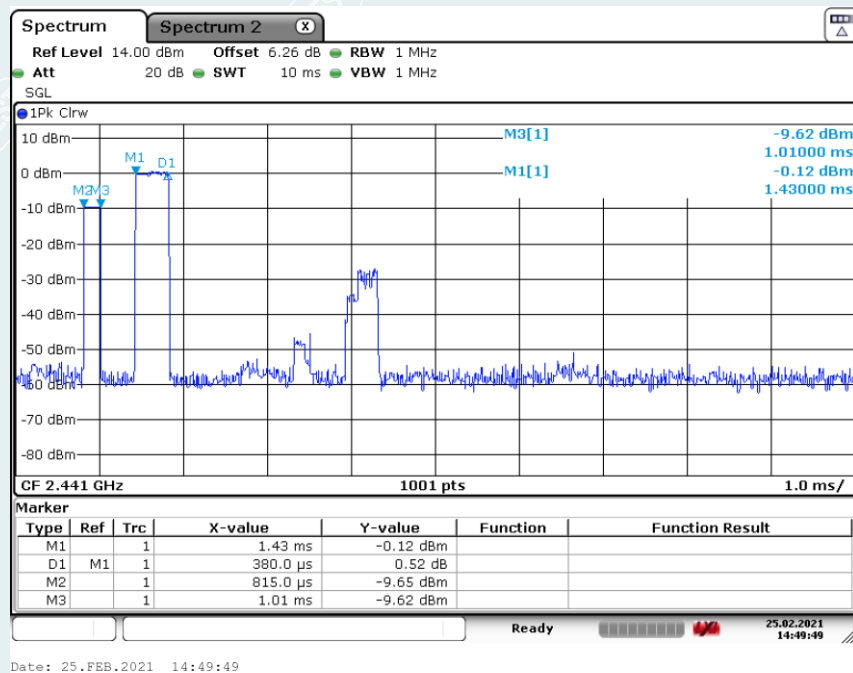


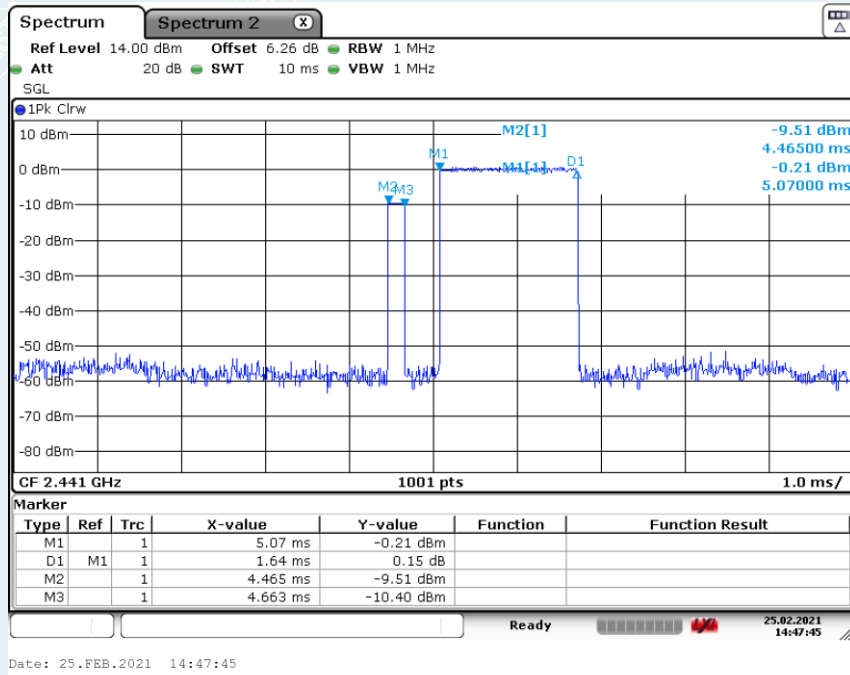
DH5

 $\pi/4$ -DQPSK

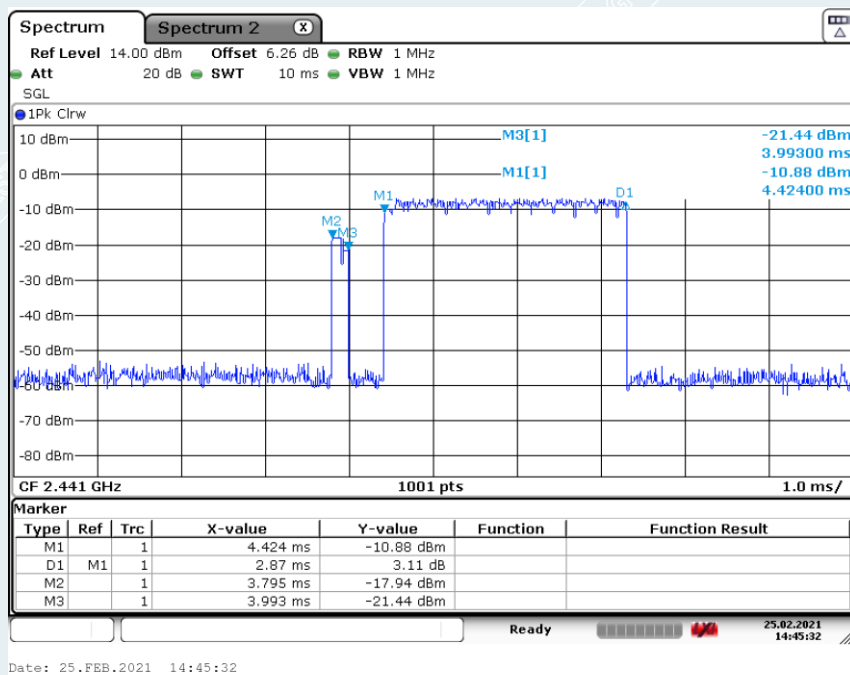
Mid Channel (2.441GHz)

2DH1



Mid Channel (2.441GHz)
2DH3

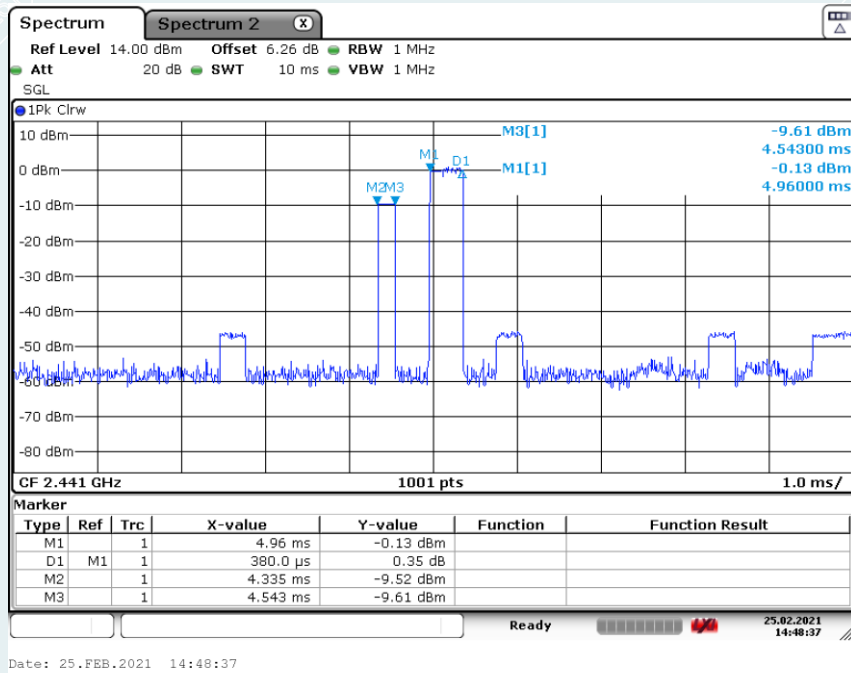
2DH5



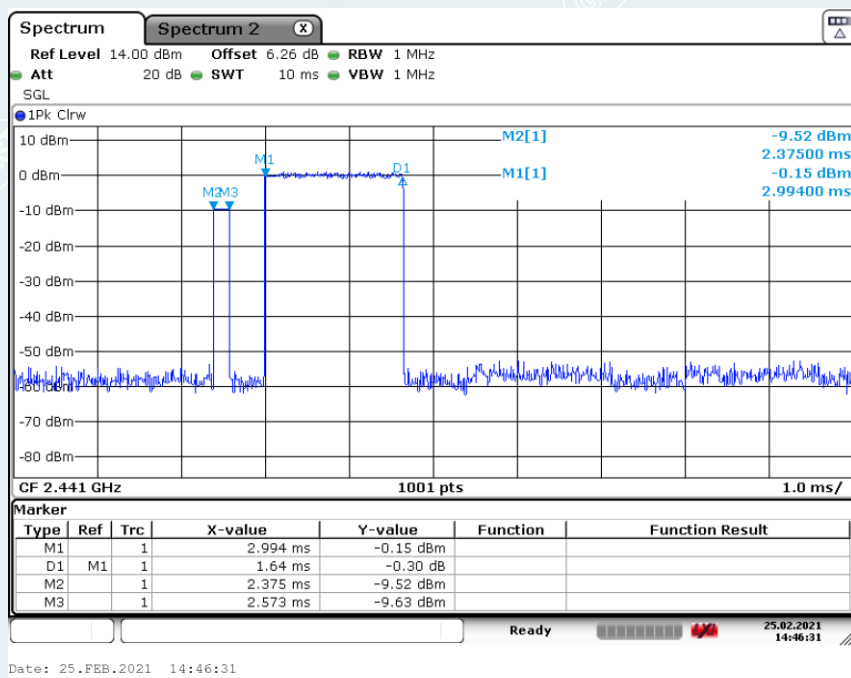
8DPSK

Mid Channel (2.441GHz)

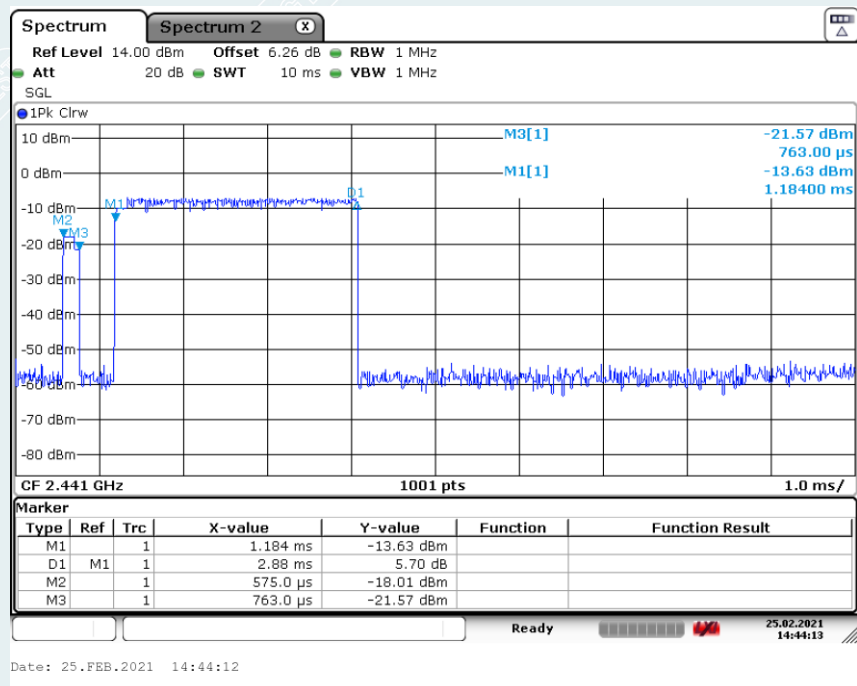
3DH1



3DH3



3DH5



5.6. MAXIMUM PEAK OUTPUT POWER

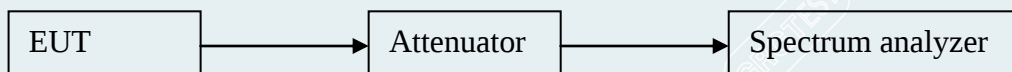
5.6.1. LIMITS

Regulation 15.247 (b)(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.

5.6.2. TEST PROCEDURES

- 1) Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
- 2) Set the spectrum analyzer: RBW = 3 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak.
- 3) Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

5.6.3. TEST SETUP



5.6.4. TEST RESULTS

DH5

Test Channel	Fundamental Frequency (GHz)	Max Output Power(dBm)	Limit (dBm)	Peak/Average	Pass/Fail
Lowest	2.402	-1.44	20.97	Peak	Pass
Middle	2.441	-0.85			Pass
Highest	2.480	-0.24			Pass

2DH5

Test Channel	Fundamental Frequency (GHz)	Max Output Power(dBm)	Limit (dBm)	Peak/Average	Pass/Fail
Lowest	2.402	0.08	20.97	Peak	Pass
Middle	2.441	0.48			Pass
Highest	2.480	1.15			Pass