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TESTING
CNAS L0446



Page 1 of 84

Test Report

Verified code: 489518

Report No.: E20210916762301-3

Customer: OnePlus Technology (Shenzhen) Co., Ltd.

Address: 18C02, 18C03, 18C04 and 18C05, Shum Yip Terra Building, Binhe Avenue North,
Futian District, Shenzhen, Guangdong, China

Sample Name: Watch

Sample Model: W301GB

Receive Sample Date: Sep.18,2021

Test Date: Sep.19,2021 ~ Oct.26,2021

Reference Document: CFR 47, FCC Part 15 Subpart C
RADIO FREQUENCY DEVICES:Subpart C—Intentional Radiators
ANSI C63.10-2013
KDB 558074 D01 15.247 Meas Guidance v05r02

Test Result: Pass

Prepared By: Yang ZhaoYun

Reviewed By: Jiang Tao

Approved By: Xiao Liang

GUANGZHOU GRG METROLOGY & TEST CO., LTD

Issued Date: 2021-11-30

GUANGZHOU GRG METROLOGY & TEST CO., LTD

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REVISION HISTORY

Report No.	Revisions	Effect Page	Revised By
E20200904990101-3-G2	Initial Issue	ALL	Xie Fang
E20210916762301-3	Updated	ALL	Yu Shanshan

Rev.01: E20210916762301-3

1. The hardware update is as follows: a.GPS 0.8V Power supply materials (buck changed from TPS62088YFP to SGM6033-ADJXG/TR) and the change of external resistance and capacitance material; b.The revision distinguishes PCB board ID device (resistance value) changes.All test data, EUT internal and external photos (model W301GB), test photos are all updated, and the rest remain unchanged.

2.The other information about product, please refer to initial report: E20200904990101-3-G2 (issue date: 2021-03-31) and this report.

Statement

1. The report is invalid without "special seal for inspection and testing"; some copies are invalid; The report is invalid if it is altered or missing; The report is invalid without the signature of the person who prepared, reviewed and approved it.
2. The sample information is provided by the client and responsible for its authenticity; The content of the report is only valid for the samples sent this time.
3. When there are reports in both Chinese and English, the Chinese version will prevail when the language problems are inconsistent.
4. If there is any objection concerning the report, please inform us within 15 days from the date of receiving the report.
5. Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.

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1. TEST RESULT SUMMARY

FCC 47 CFR Part 15 Subpart C 15.247, ANSI C63.10-2013 KDB 558074 D01 15.247 measurement guidance v05r02			
Standard	Item	Limit / Severity	Result
FCC 47 CFR Part 15 Subpart C (15.247)	Antenna Requirement	Section 15.203	PASS
	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	PASS
	Conducted band edges and Spurious Emission	Section 15.209 & 15.247(d)	PASS
	Radiated Spurious Emission	Section 15.209 & 15.247(d)	PASS
	Restricted bands of operation	Section 15.247 (d) & 15.205	PASS

The EUT antenna is internal antenna. Max Antenna gain is 1dBi .which accordance 15.203.is considered sufficient to comply with the provisions of this section

2. GENERAL DESCRIPTION OF EUT

2.1 APPLICANT

Name: OnePlus Technology (Shenzhen) Co., Ltd.
Address: 18C02,18C03,18C04 and 18C05, Shum Yip Terra Building, Binhe Avenue North, Futian District, Shenzhen,Guangdong, China

2.2 MANUFACTURER

Name: OnePlus Technology (Shenzhen) Co., Ltd.
Address: 18C02,18C03,18C04 and 18C05, Shum Yip Terra Building, Binhe Avenue North, Futian District, Shenzhen,Guangdong, China

2.3 FACTORY

Name : Longcheer Electronic (HuiZhou) Co., Ltd.
Address : Building 1, No.28 (west) Hechang Six Road, Zhongkai High-Tech Zone, Huizhou, Guangdong,China.

2.4 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Watch
Model No.: W301GB
Adding Model: /
Models discrepancy: /
Trade Name: ONEPLUS
FCC ID: 2ABZ2-W301GB
Power supply: DC3.87V power supplied by battery
DC5V power supplied by adapter
Rechargeable Li-ion Battery/XE202
Battery specification: Limited Charge Voltage: 4.45Vdc
Rated Capacity: 402mAh/1.56Wh
Nominal Voltage: 3.87Vdc
Typical Capacity: 410mAh/1.59Wh
Frequency Range: 2402MHz~2480MHz
Transmit Power: GFSK:12.31dBm
 $\pi/4$ -DQPSK:9.00dBm
8DPSK: 9.16dBm
Type of Modulation: FHSS (GFSK for 1Mbps, $\pi/4$ -DQPSK for 2Mbps,8DPSK for 3Mbps)

Antenna
Specification: Internal antenna with 1dBi gain (Max)
Temperature
Range: 0°C~35°C
Hardware
Version: LTAM281
Software
Version: W301GB_11_A.01
Sample No: E20210916762301-0002
E20210916762301-0003
Note: /

2.5 TEST OPERATION MODE

Mode No.	Description of the modes
1	Bluetooth(BT) fixed frequency transmitting

2.6 LOCAL SUPPORTIVE

Name of Equipment	Manufacturer	Model	Serial Number	Note
Notebook	DELL	/	/	/
Adapter	APPLE	A1443	/	/
DC power	Long wei	PS-305DM	180704473	/
Cable				
AC cable (DC power)	/	/	/	UnShielded, 1.0m
DC cable (DC power)	/	/	/	UnShielded, 1.2m

Test software:

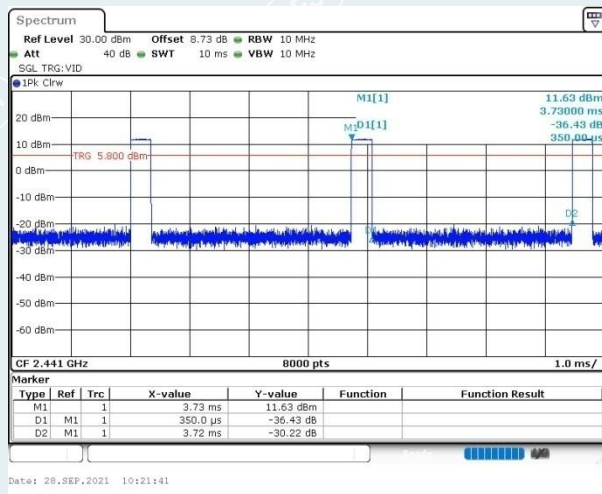
Software version	Test level
sscom5.13.1	0

2.7 DUTY CYCLE

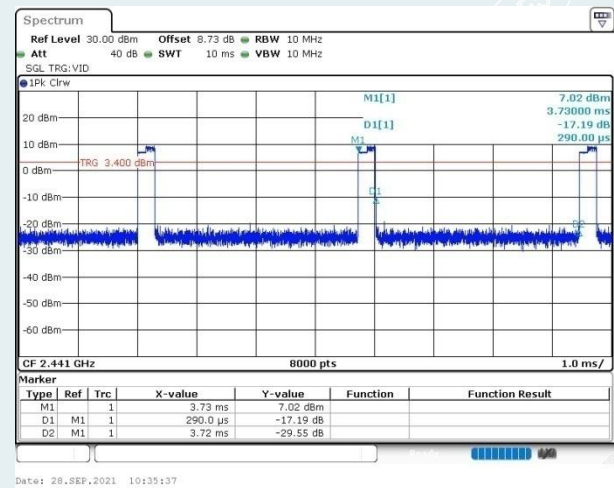
1. If duty cycle is $\geq 98\%$, duty factor is not required.
2. If duty cycle is $< 98\%$, duty factor shall be considered.

TestMode	Antenna	Channel	ON Time [ms]	Period [ms]	DC [%]	T [s]
DH5	Ant1	2441	0.35	3.72	9.41	0.00035
2DH5	Ant1	2441	0.29	3.72	7.80	0.00029
3DH5	Ant1	2441	0.25	3.73	6.70	0.00025

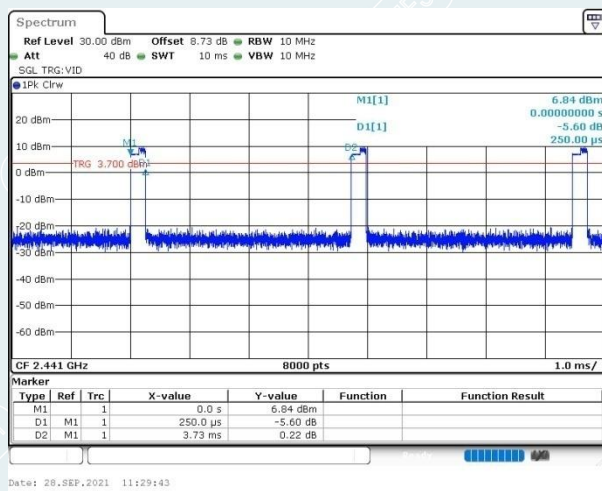
DH5_2441



2DH5_2441



3DH5_2441



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 : No.1301 Guanguang 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)

China CNAS(L0446)

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

Canada ISED (Company Number: 24897, CAB identifier:CN0069)

USA FCC (Registration Number: 759402, Designation Number:CN1198)

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	9kHz~30MHz	4.46dB
		30MHz~1000MHz	4.3dB
		1GHz~18GHz	5.6dB
	Vertical	9kHz~30MHz	4.46dB
		30MHz~1000MHz	4.3dB
		1GHz~18GHz	5.6dB
Conduction Emission		9kHz~150kHz	2.8dB
		150kHz~10MHz	2.8dB
		10MHz~30MHz	2.2dB
Measurement		Uncertainty	
RF frequency		6.0×10 ⁻⁶	
RF power conducted		0.78 dB	
Occupied channel bandwidth		0.4 dB	
Unwanted emission, conducted		0.68 dB	
Humidity		6 %	
Temperature		2℃	

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
Conducted Emissions				
EMI TEST RECEIVER	R&S	ESCI	100783	2022-09-13
LISN(EUT)	R&S	ENV216	101543	2022-02-25
Test S/W	EZ	CCS-3A1-CE		
Hopping Channel Number				
Spectrum Analyzer	R&S	FSV30	104381	2022-02-21
Dwell Time				
Spectrum Analyzer	R&S	FSV30	104381	2022-02-21
Radiated Spurious Emission&Restricted bands of operation				
Test S/W	EZ	CCS-2ANT	/	/
Test Receiver	R&S	ESCI	100088	2022-10-31
Preamplifier	EMEC	EM330	/	2022-03-21
Bi-log Antenna	TESEQ	CBL6143A	32399	2021-11-25
Spectrum Analyzer	Agilent	N9010A	MY52221469	2022-04-16
Horn Antenna	Schwarzbeck	BBHA9120D (1201)	02143	2021-12-27
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170-497	2021-11-05
Amplifier	Tonscend	TAP01018048	AP20E8060075	2022-05-09
Amplifier	Tonscend	TAP184050	AP20E806071	2022-05-17
Test S/W	Tonscend	JS36-RSE/2.5.1.5		
20 dB Bandwidth				
Spectrum Analyzer	R&S	FSV30	104381	2022-02-21
Maximum Peak Output Power				
Pulse power sensor	Agilent	MA2411B	1126150	2022-03-21
Power meter	Anritsu	ML2495A	1204003	2022-03-21
Conducted band edges and Spurious Emission				
Spectrum Analyzer	R&S	FSV30	104381	2022-02-21
Carrier Frequencies Separated				
Spectrum Analyzer	R&S	FSV30	104381	2022-02-21

5. TEST RESULTS

5.1E.U.T. TEST CONDITIONS

Type of antenna: Internal

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

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
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 frequency(2402MHz), middle channel: 39 frequency (2441MHz) and highest channel: 78 frequency(2480MHz)

6. 20dB BANDWIDTH

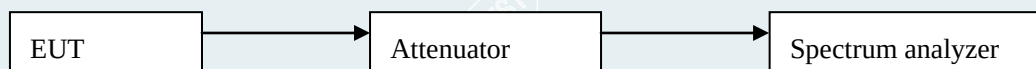
6.1 LIMITS

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.

6.2 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.

6.2.1 TEST SETUP



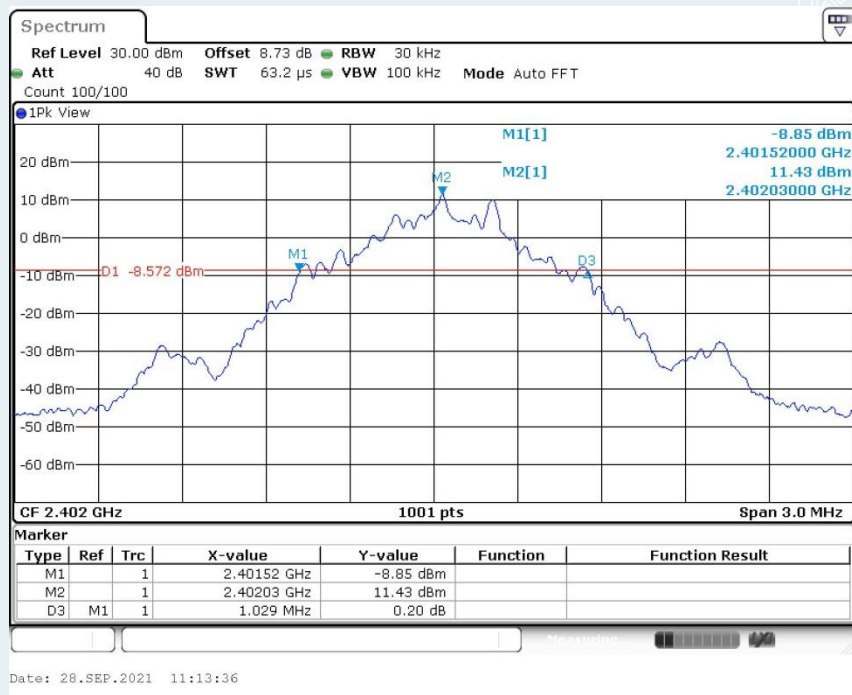
6.2.2 TEST RESULTS

Test mode	Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
DH5	Lowest	2402	1029
	Middle	2441	1032
	Highest	2480	1035
Test mode	Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
2DH5	Lowest	2402	1350
	Middle	2441	1350
	Highest	2480	1350
Test mode	Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
3DH5	Lowest	2402	1212
	Middle	2441	1221
	Highest	2480	1218

Result plot as follows:

DH5

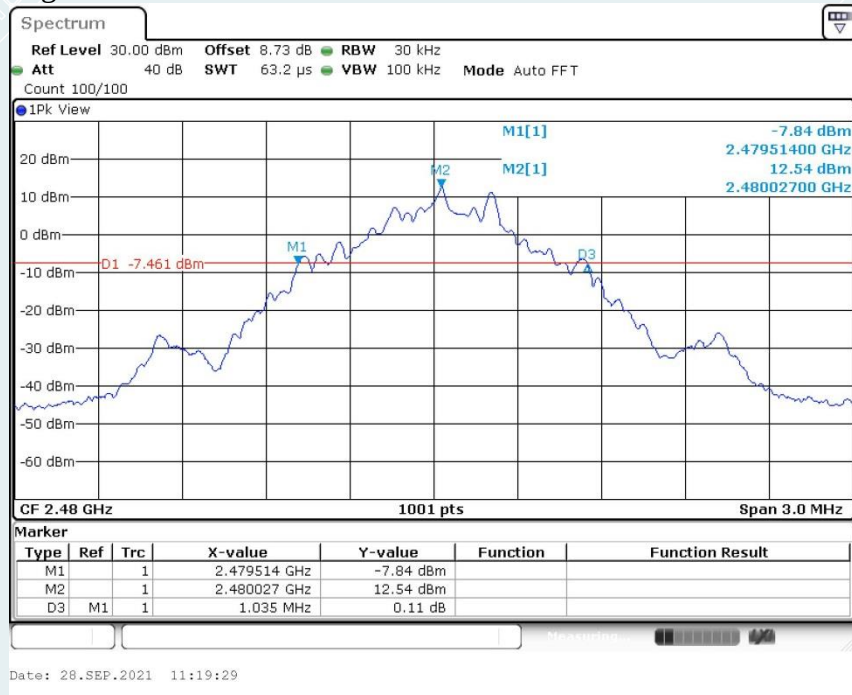
Lowest Channel



Middle Channel

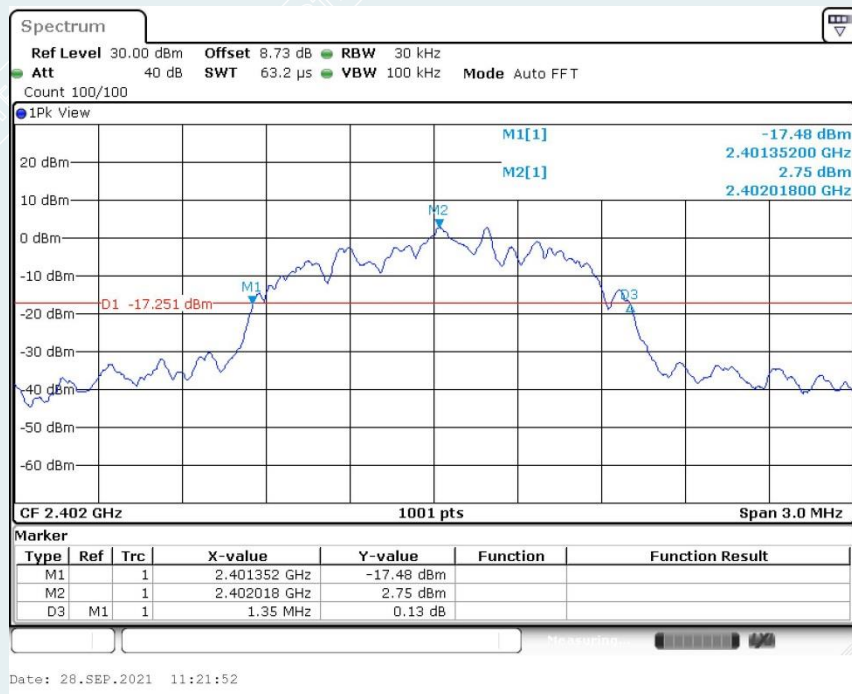


Highest Channel

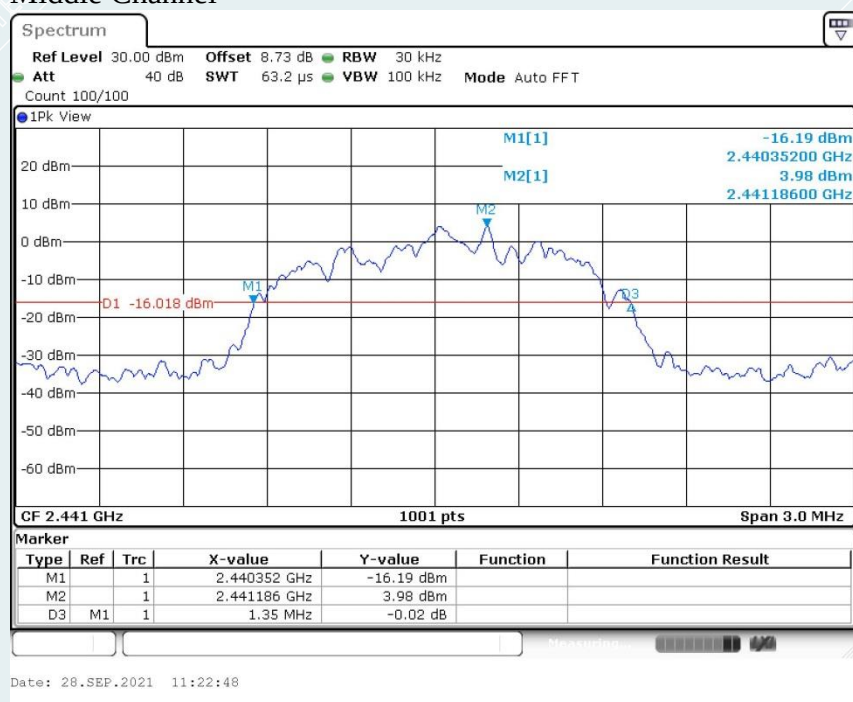


2DH5

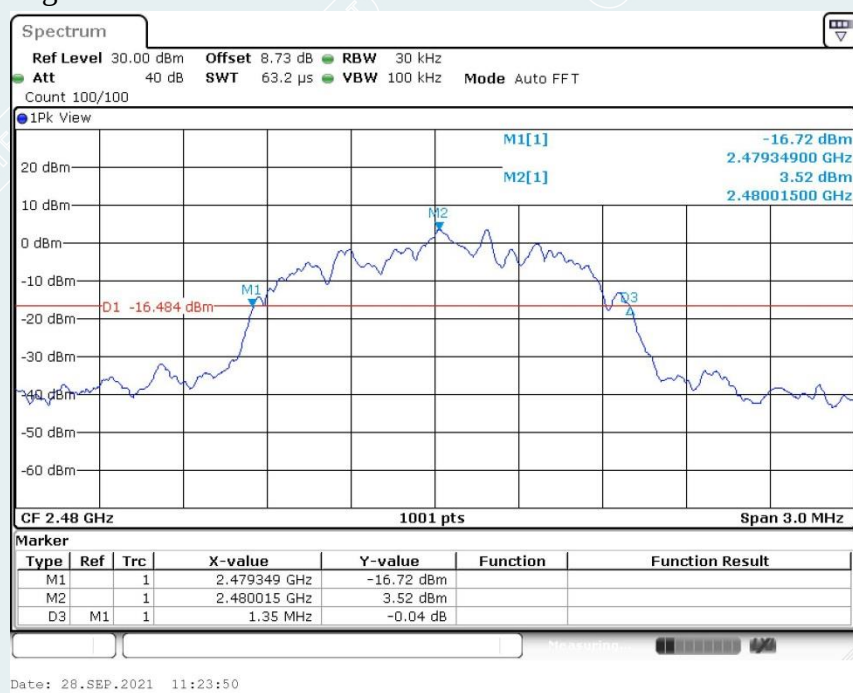
Lowest Channel



Middle Channel

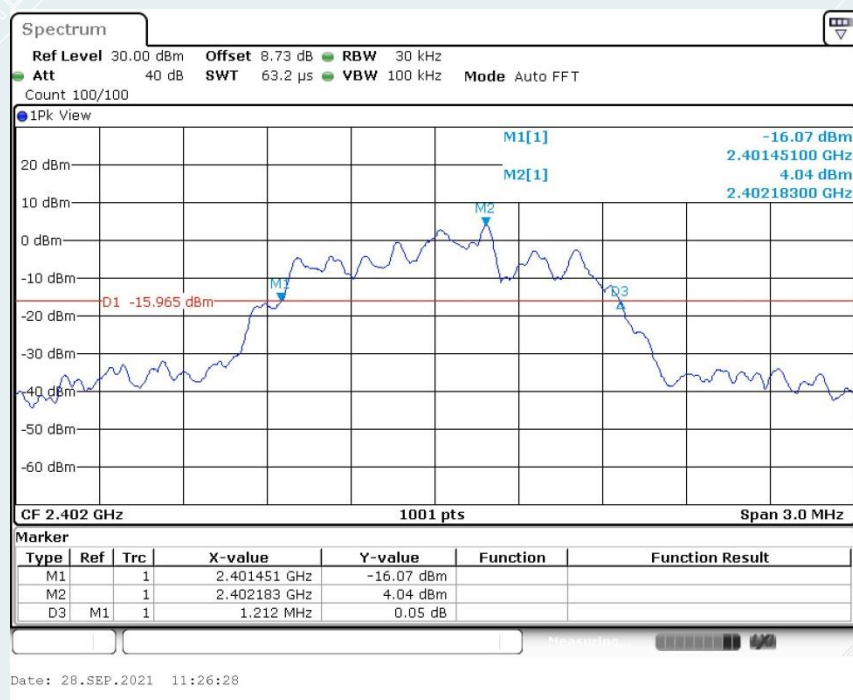


Highest Channel

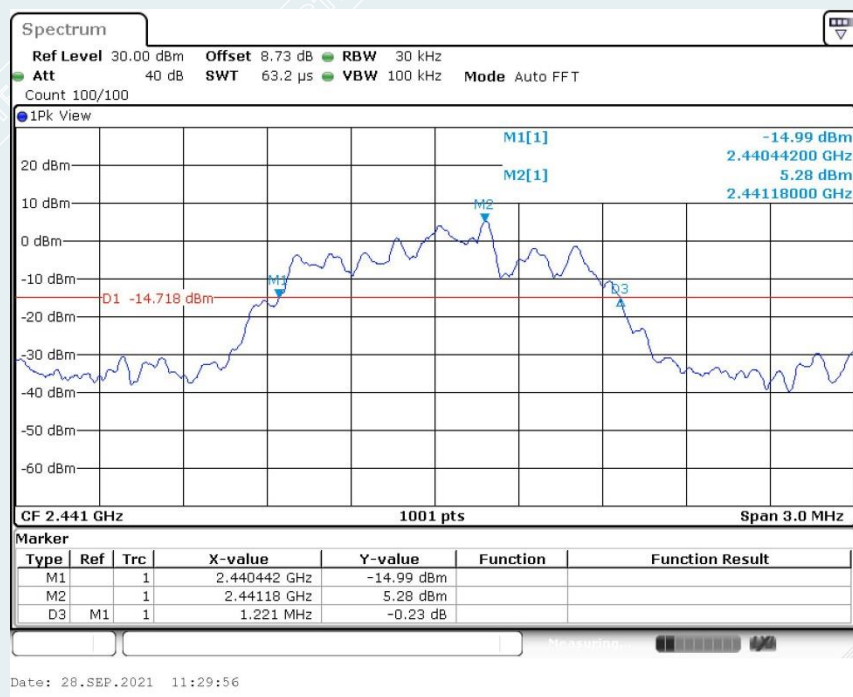


3DH5

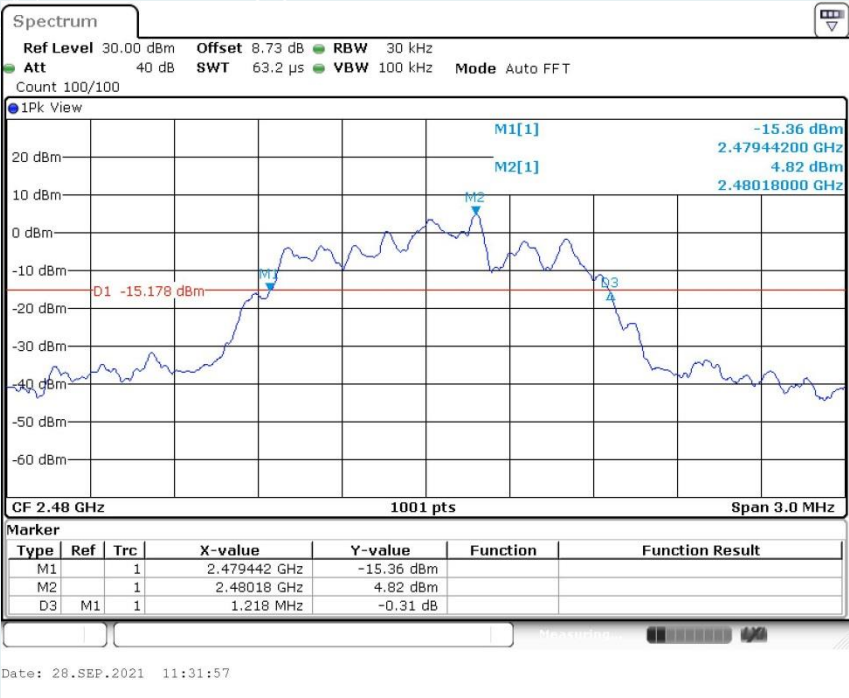
Lowest Channel



Middle Channel



Highest Channel



6.3 CARRIER FREQUENCIES SEPARATED

6.3.1 LIMITS

1) 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.

6.3.2 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 3 MHz, Sweep = auto
- 4) Use the marker-delta function to mark hopping channel carrier frequencies and record the channel separation.

6.3.3 TEST SETUP



6.3.4 TEST RESULTS

DH5

Channel Separation (MHz)	Two-thirds of the 20 dB Bandwidth (kHz)	Channel Separation Limit	Result
1.003	690	> Two-thirds of the 20 dB Bandwidth	Pass

2DH5

Channel Separation (MHz)	Two-thirds of the 20 dB Bandwidth (kHz)	Channel Separation Limit	Result
1.003	900	> Two-thirds of the 20 dB Bandwidth	Pass

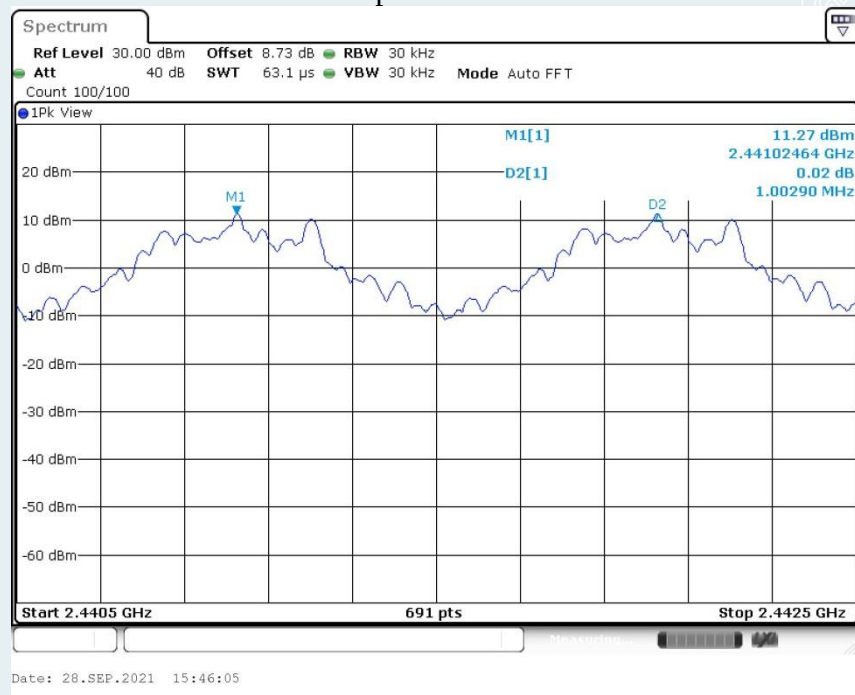
3DH5

Channel Separation (MHz)	Two-thirds of the 20 dB Bandwidth (kHz)	Channel Separation Limit	Result
1.000	814	> Two-thirds of the 20 dB Bandwidth	Pass

Result plot as follows:

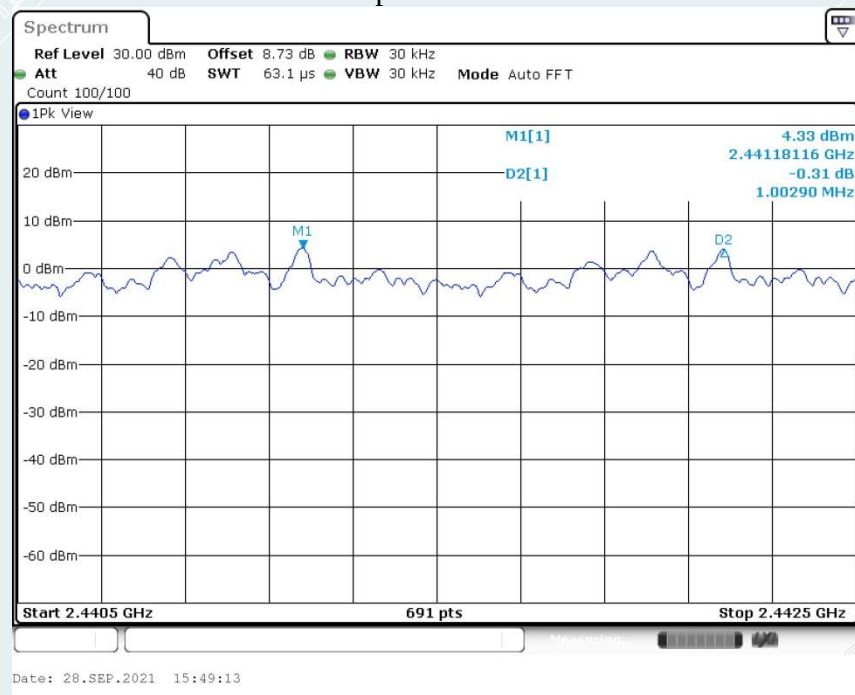
DH5

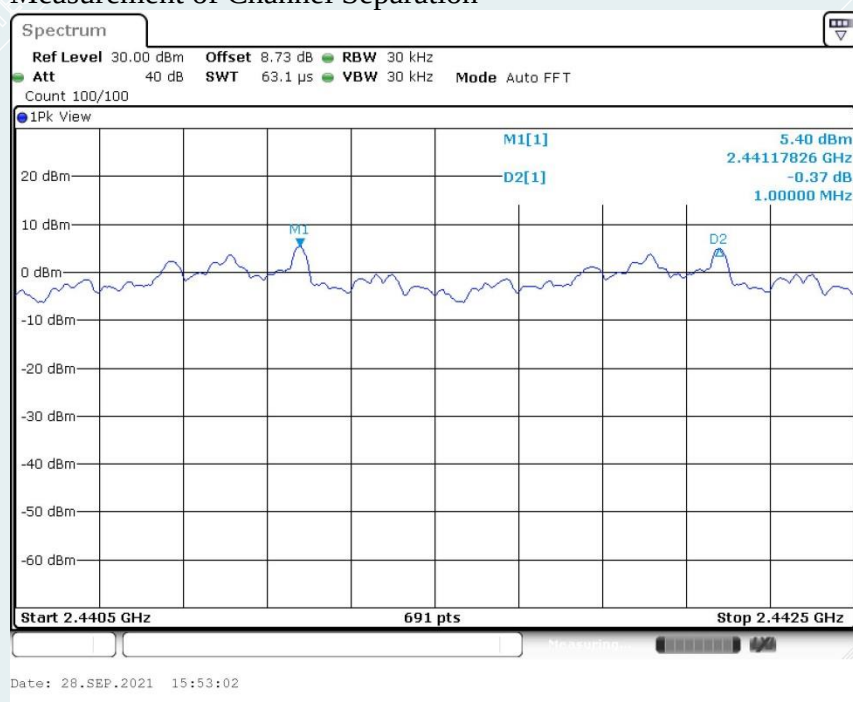
Measurement of Channel Separation



2DH5

Measurement of Channel Separation



3DH5**Measurement of Channel Separation**

Test result: The unit does meet the FCC requirements.

6.4 HOPPING CHANNEL NUMBER

6.4.1 LIMITS

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

6.4.2 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.

6.4.3 TEST SETUP

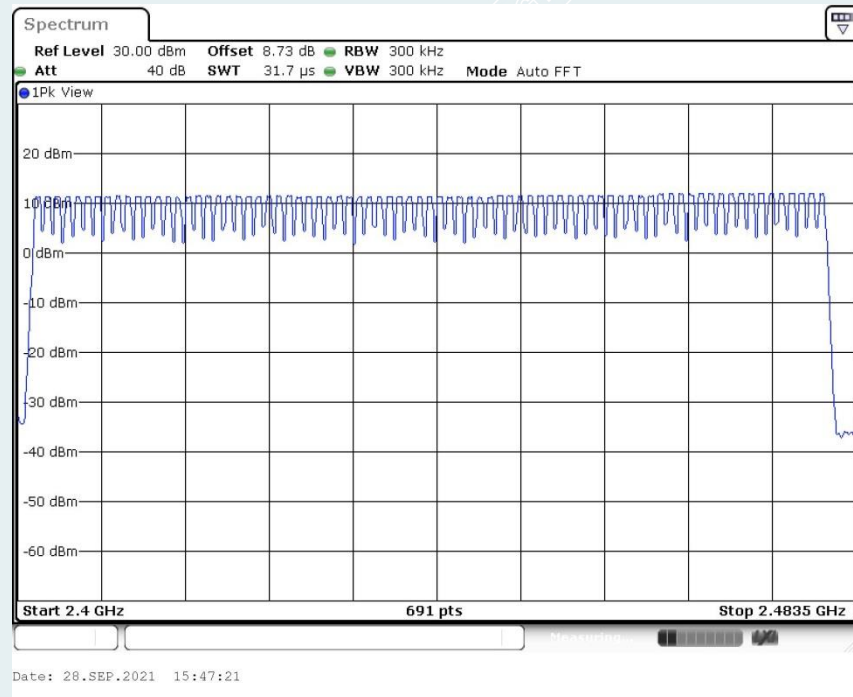


6.4.4 TEST RESULTS

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

GFSK

2.400 GHz – 2.4835 GHz

 $\pi/4$ -DQPSK

2.400 GHz – 2.4835 GHz

