

Test Report

Verified code: 340397

Report No.: E202210283700-01-1

Customer: Huizhou Desay SV Automotive Co., Ltd.

Address: 103, Hechang 5th Road West, Zhongkai National Hi-tech Industrial Development Zone,
Huizhou, Guangdong, P.R. China

Sample Name: Infotainment Head Unit

Sample Model: IC2592/18

Receive Sample Date: Nov.07,2022

Test Date: Dec.01,2022 ~ Dec.14,2022

Reference Document: CFR 47, FCC Part 15 Subpart C
RADIO FREQUENCY DEVICES:Subpart C—Intentional Radiators

Test Result: Pass

Prepared by: *Huang Lifang*

Reviewed by: *Wu Haoting*

Approved by: *Xiao Liang*

GUANGZHOU GRG METROLOGY & TEST CO., LTD

Issued Date: 2023-02-17

GUANGZHOU GRG METROLOGY & TEST CO., LTD.

Address: No.163, Pingyun Road, West of Huangpu Avenue, Guangzhou, Guangdong, China
Tel: (+86) 400-602-0999 FAX: (+86) 020-38698685 Web: <http://www.grgtest.com>



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.

———— The following blanks ————

TABLE OF CONTENTS

1.	TEST RESULT SUMMARY	6
2.	GENERAL DESCRIPTION OF EUT.....	7
2.1	APPLICANT	7
2.2	MANUFACTURER.....	7
2.3	FACTORY	7
2.4	BASIC DESCRIPTION OF EQUIPMENT UNDER TEST	7
2.5	TEST OPERATION MODE	8
2.6	LOCAL SUPPORTIVE	8
2.7	CONFIGURATION OF SYSTEM UNDER TEST	8
2.8	DUTY CYCLE.....	9
3.	LABORATORY AND ACCREDITATIONS	10
3.1	LABORATORY	10
3.2	ACCREDITATIONS	10
3.3	MEASUREMENT UNCERTAINTY	11
4.	LIST OF USED TEST EQUIPMENT AT GRGT	12
5.	TEST RESULTS.....	14
5.1	E.U.T. TEST CONDITIONS	14
6.	20dB BANDWIDTH.....	16
6.1	LIMITS.....	16
6.2	TEST PROCEDURES	16
6.3	TEST SETUP	16
6.4	TEST RESULTS.....	16
7.	CARRIER FREQUENCIES SEPARATED.....	22
7.1	LIMITS.....	22
7.2	TEST PROCEDURES	22
7.3	TEST SETUP	22
7.4	TEST RESULTS.....	22
8.	HOPPING CHANNEL NUMBER	25
8.1	LIMITS.....	25
8.2	TEST PROCEDURES	25
8.3	TEST SETUP	25
8.4	TEST RESULTS.....	25
9.	DWELL TIME	28
9.1	LIMITS.....	28
9.2	TEST PROCEDURES	28
9.3	TEST SETUP	28
9.4	TEST RESULTS.....	29
10.	MAXIMUM PEAK OUTPUT POWER	35
10.1	LIMITS.....	35
10.2	TEST PROCEDURES	35
10.3	TEST SETUP	35

10.4	TEST RESULTS	36
11.	CONDUCTED BAND EDGES AND SPURIOUS EMISSIONS	37
11.1	LIMITS.....	37
11.2	TEST PROCEDURES	37
11.3	TEST SETUP	37
11.4	TEST RESULTS	38
12.	RADIATED SPURIOUS EMISSIONS	58
12.1	LIMITS.....	58
12.2	TEST PROCEDURES	58
12.3	TEST SETUP	62
12.4	DATA SAMPLE	63
12.5	TEST RESULTS	64
13.	RESTRICTED BANDS OF OPERATION.....	78
13.1	LIMITS.....	78
13.2	TEST PROCEDURES	79
13.3	TEST SETUP	79
13.4	TEST RESULTS	80
	APPENDIX A. PHOTOGRAPH OF THE TEST CONNECTION DIAGRAM	94
	APPENDIX B. PHOTOGRAPH OF THE EUT	94

———— The following blanks ————

REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E202210283700-01-1	Original Issue	2022-12-22

----- The following blanks -----

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
	Conducted Emission	Section 15.207	NA ¹
	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)(iii)	PASS
	Dwell Time	Section 15.247(a)(1)(iii)	PASS
	Maximum Peak Output Power	Section 15.247(b)(1)	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

Note: 1.The EUT is power by DC source, not applicable.

2.The EUT antenna is PCB Antenna. Max Antenna gain is 1.0dBi .which accordance 15.203 is considered sufficient to comply with the provisions of this section

———— The following blanks ————

2. GENERAL DESCRIPTION OF EUT

2.1 APPLICANT

Name: Huizhou Desay SV Automotive Co., Ltd.
Address: 103, Hechang 5th Road West, Zhongkai National Hi-tech Industrial Development Zone, Huizhou, Guangdong, P.R. China

2.2 MANUFACTURER

Name: Huizhou Desay SV Automotive Co., Ltd.
Address: 103, Hechang 5th Road West, Zhongkai National Hi-tech Industrial Development Zone, Huizhou, Guangdong, P.R. China

2.3 FACTORY

Name: Huizhou Desay SV Automotive Co., Ltd.
Address: 103, Hechang 5th Road West, Zhongkai National Hi-tech Industrial Development Zone, Huizhou, Guangdong, P.R. China

2.4 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Infotainment Head Unit
Model No.: IC2592/18
Adding Model: /
Models discrepancy: /
Trade Name: DESAY SV
FCC ID: 2AEQTIC259218
Power Supply: DC 12V
Frequency Range: 2402MHz~2480MHz
Transmit Power: GFSK:9.78 dBm
 $\pi/4$ -DQPSK:8.39dBm
8DPSK:8.76dBm
Type of Modulation: GFSK for 1Mbps, $\pi/4$ -DQPSK for 2Mbps, 8DPSK for 3Mbps
Antenna Specification: PCB Antenna with 1dBi gain (Max)
Temperature Range: -30℃~80℃
Hardware Version: 1.0.0
Software Version: 00.01.00
Sample No: E202210283700-01-0001
E202210283700-01-0003
Note: /

2.5 TEST OPERATION MODE

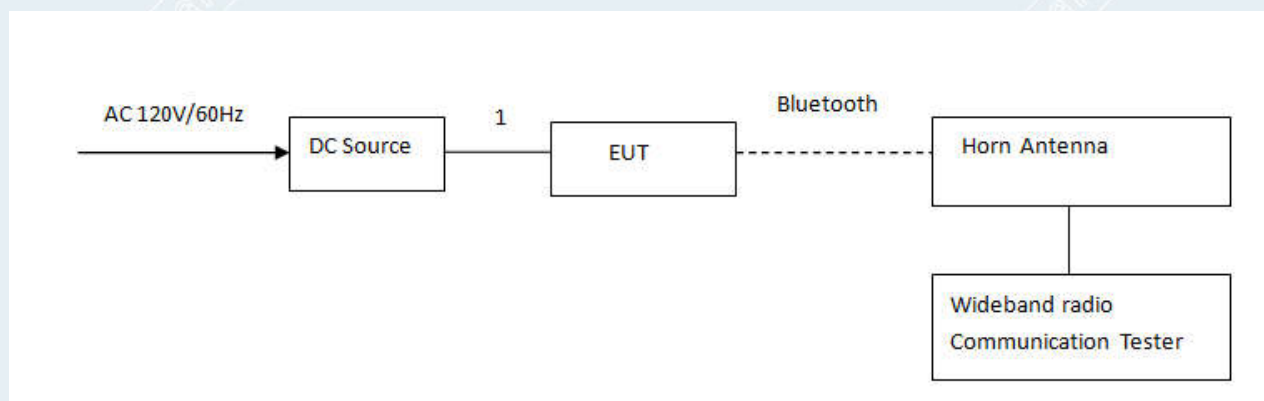
Mode No.	Description of the modes
1	Bluetooth(BT) fixed frequency transmitting

2.6 LOCAL SUPPORTIVE

Name of Equipment	Manufacturer	Model	Serial Number	Note
DC Source	Keysight	E36131A	/	/
Wideband radio Communication Tester	R&S	CMW500	/	/
Horn Antenna	Schwarzbeck	BBHA 9120D	/	/

No.	Cable Type	Qty.	Shielded Type	Ferrite Core(Qty.)	Length
1	DC Cable	1	No	0	1.5m

2.7 CONFIGURATION OF SYSTEM UNDER TEST



Test software:

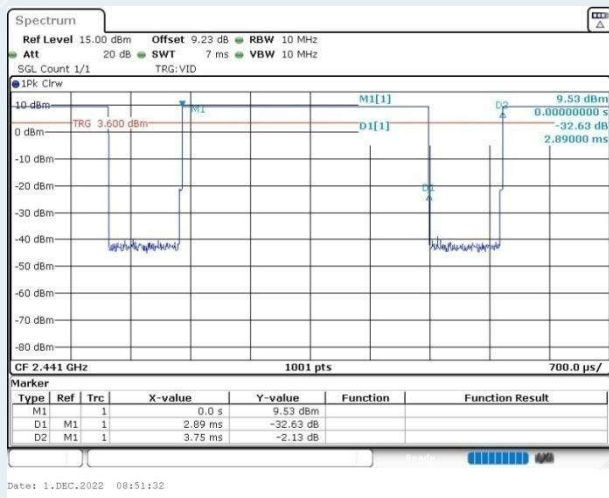
Software version	Test level
/	/

2.8 DUTY CYCLE

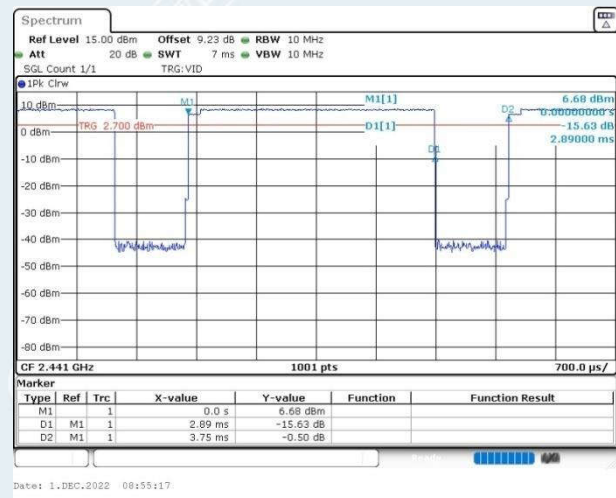
EUT Name	Infotainment Head Unit	Model	IC2592/18
Environmental Conditions	24.5°C/52%RH/101.0kPa	Test Voltage	DC 12V
Tested By	Yang Zhaoyun	Tested Date	2022-12-01

Test Mode	Antenna	Frequency [MHz]	ON Time [ms]	Period [ms]	DC [%]	T [s]
DH5	Ant1	2441	2.89	3.75	77.07	0.00289
2DH5	Ant1	2441	2.89	3.75	77.07	0.00289
3DH5	Ant1	2441	2.89	3.74	77.27	0.00289

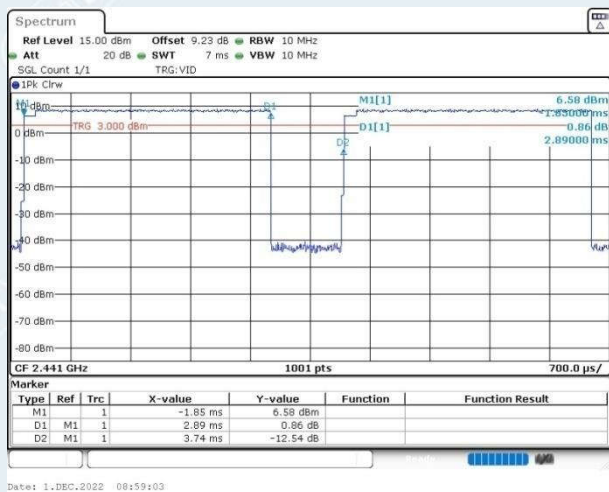
DH5_2441MHz



2DH5_2441MHz



3DH5_2441MHz



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. : 518110

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 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>

———— The following blanks ————

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	5.1dB
		30MHz~200MHz	4.5dB
		200MHz~1000MHz	4.4 dB
		1GHz~18GHz	5.6dB
		18GHz~26.5GHz	3.65dB
	Vertical	9kHz~30MHz	5.1dB
		30MHz~200MHz	4.4dB
		200MHz~1000MHz	4.5dB
		1GHz~18GHz	5.6dB
		18GHz~26.5GHz	3.65dB

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 °C

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

———— The following blanks ————

4. LIST OF USED TEST EQUIPMENT AT GRGT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Hopping Channel Number				
Spectrum Analyzer	R&S	FSV30	104381	2023-11-17
Simultaneous sampling DAQ	TONSCEND	JS0806-2	186060020	2023-07-24
Dwell Time				
Spectrum Analyzer	R&S	FSV30	104381	2023-11-17
Simultaneous sampling DAQ	TONSCEND	JS0806-2	186060020	2023-07-24
Radiated Spurious Emission&Restricted bands of operation				
Test S/W	EZ	CCS-2ANT	/	/
Loop Antenna	TESEQ	HLA6121	52599	2023-04-02
Test Receiver	R&S	ESR7	102444	2023-09-02
Preamplifier	EMEC	EM330	I00426	2023-03-05
Bi-log Antenna	TESEQ	CBL6143A	26039	2024-10-23
Horn Antenna	Schwarzbeck	BBHA 9120D	02143	2023-10-15
Test Receiver	R&S	ESR26	101758	2023-10-27
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	BBHA 9170-497	2023-10-14
Amplifier	Tonscend	TAP01018048	AP20E8060075	2023-05-05
Amplifier	Tonscend	TAP184050	AP20E806071	2023-05-05
Amplifier	SHIRONG ELECTRONIC	DLNA-1G18G-G40	20200928005	2023-05-08
Test S/W	Tonscend	JS32-RE/2.5.2.4		
20 dB Bandwidth				
Spectrum Analyzer	R&S	FSV30	104381	2023-11-17
Simultaneous sampling DAQ	TONSCEND	JS0806-2	186060020	2023-07-24
Maximum Peak Output Power				
Pulse power sensor	Agilent	MA2411B	1126150	2023-03-01
Power meter	Anritsu	ML2495A	1204003	2023-02-28

Conducted band edges and Spurious Emission				
Spectrum Analyzer	R&S	FSV30	104381	2023-11-17
Simultaneous sampling DAQ	TONSCEND	JS0806-2	186060020	2023-07-24
Carrier Frequencies Separated				
Spectrum Analyzer	R&S	FSV30	104381	2023-11-17
Simultaneous sampling DAQ	TONSCEND	JS0806-2	186060020	2023-07-24

Note: The calibration interval of the above test instruments is 12 months except Bi-log Antenna, The calibration interval of the Bi-log Antenna is 24 months.

5. TEST RESULTS

5.1 E.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)

———— The following blanks ————

6. 20dB BANDWIDTH

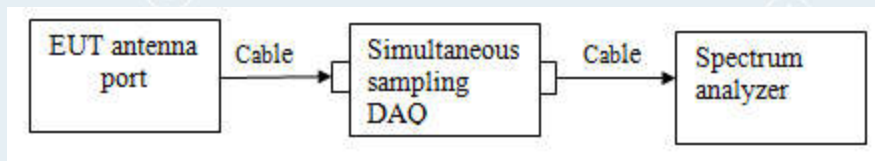
6.1 LIMITS

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=30kHz, VBW=100kHz, Span=3MHz, Sweep = auto. Allow the trace to stabilize, record 20dB bandwidth value
- 3) Repeat until all the test channels are investigated.

6.3 TEST SETUP



6.4 TEST RESULTS

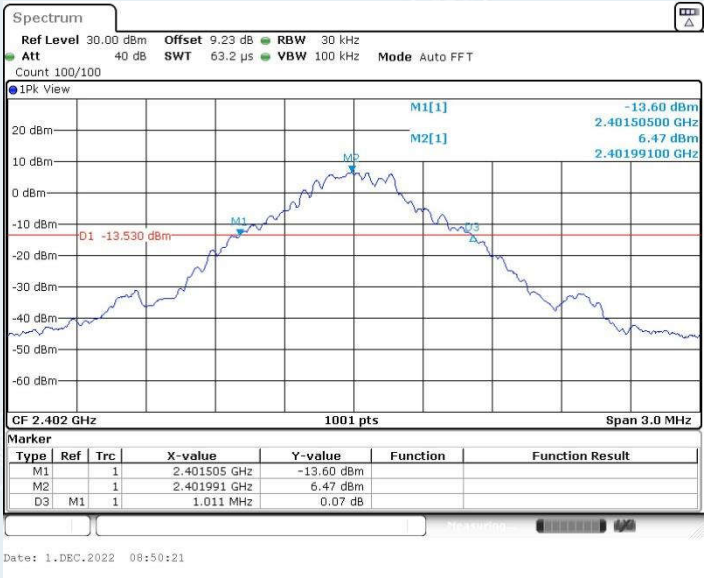
Environment: 24.5°C/52%RH/101.0kPa
 Tested By: Yang Zhaoyun

Voltage: DC 12V
 Date: 2022-12-01

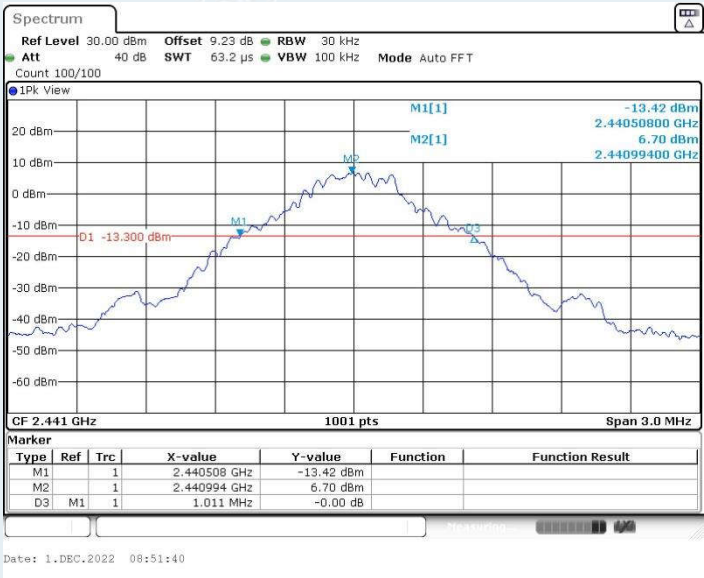
Test mode	Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
DH5	Lowest	2402	1011
	Middle	2441	1011
	Highest	2480	1011
Test mode	Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
2DH5	Lowest	2402	1353
	Middle	2441	1353
	Highest	2480	1353
Test mode	Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
3DH5	Lowest	2402	1338
	Middle	2441	1338
	Highest	2480	1338

Result plot as follows:

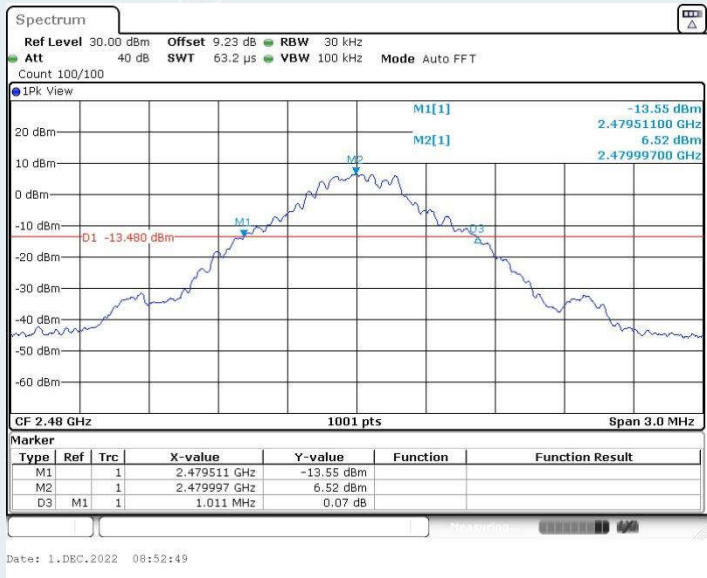
DH5
Lowest Channel



Middle Channel

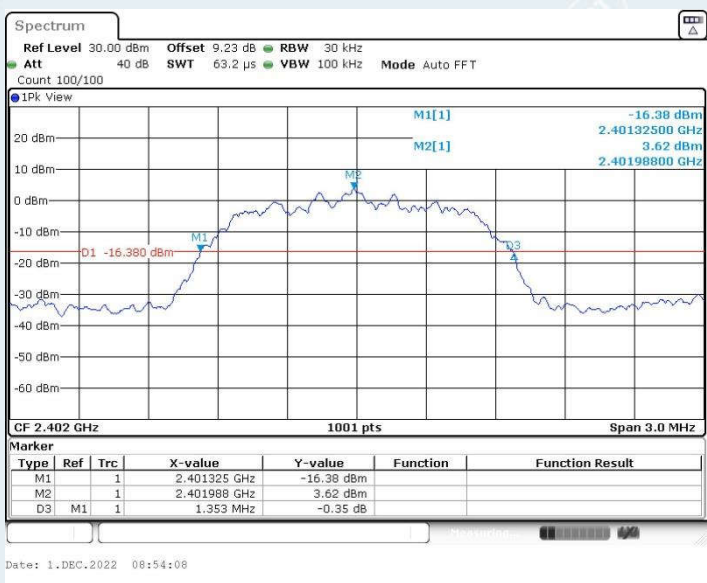


Highest Channel

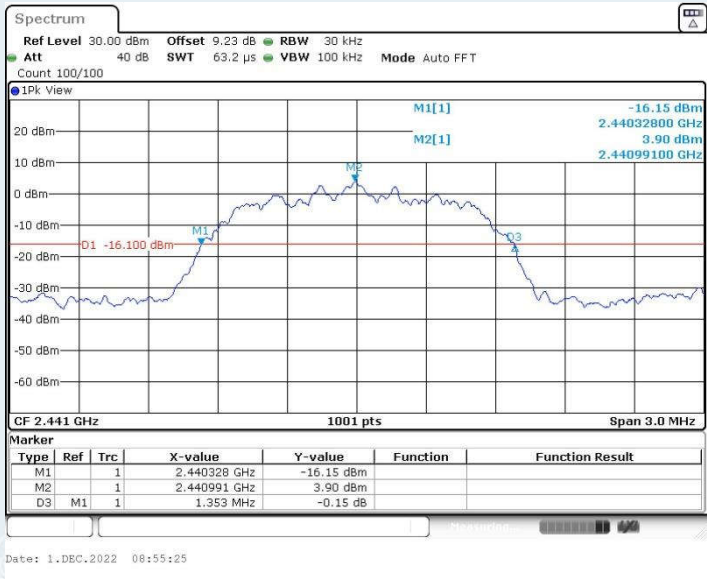


2DH5

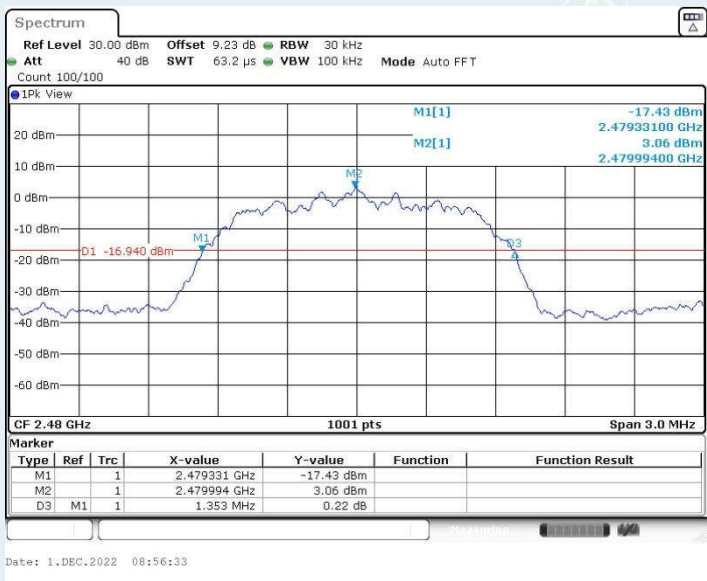
Lowest Channel



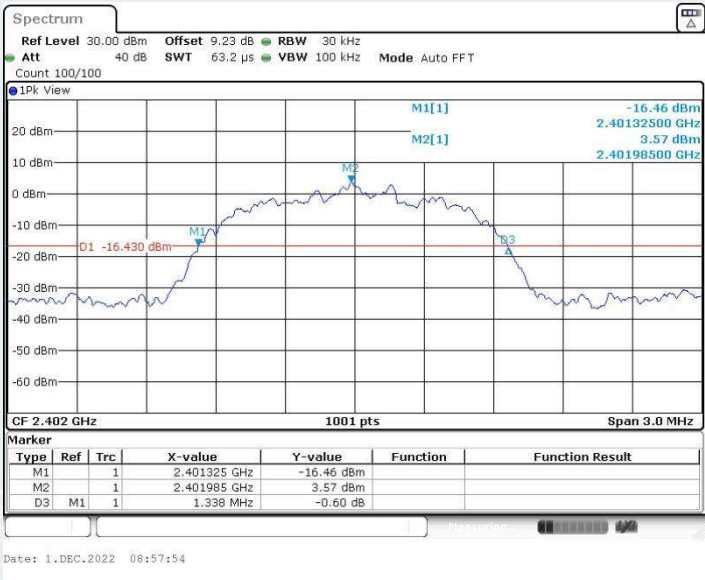
Middle Channel



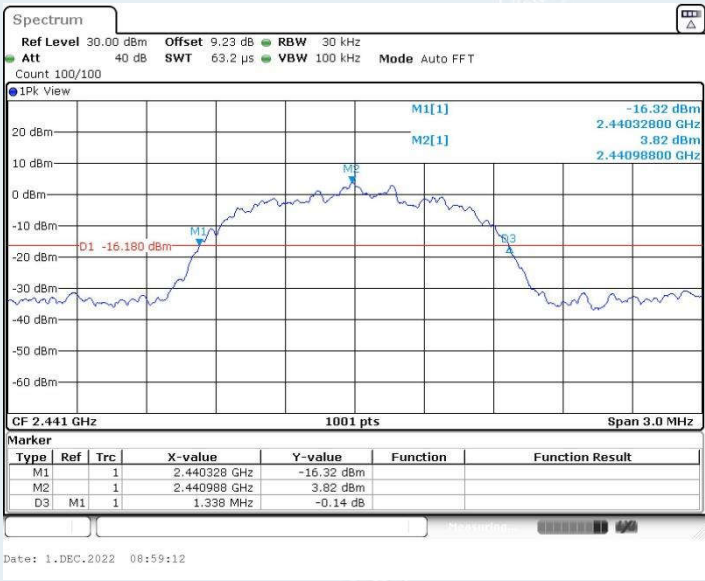
Highest Channel



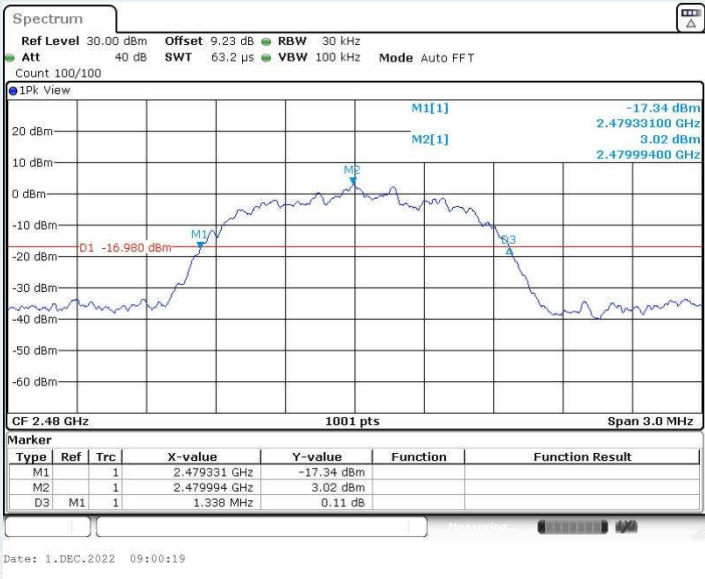
3DH5
Lowest Channel



Middle Channel



Highest Channel



———— The following blanks ————

7. CARRIER FREQUENCIES SEPARATED

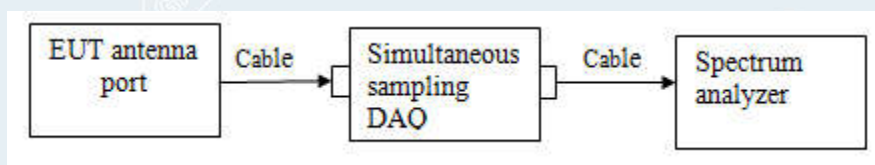
7.1 LIMITS

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.

7.2 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=300kHz, VBW=300kHz, Adjust Span to 2MHz, Sweep = auto
- 4) Use the marker-delta function to mark hopping channel carrier frequencies and record the channel separation.

7.3 TEST SETUP



7.4 TEST RESULTS

Environment: 24.5°C/52%RH/101.0kPa
 Tested By: Yang Zhaoyun

Voltage: DC 12V
 Date: 2022-12-01

DH5

Channel Separation (MHz)	Two-thirds of the 20 dB Bandwidth (MHz)	Channel Separation Limit	Result
1.000	0.674	> Two-thirds of the 20 dB Bandwidth	Pass

2DH5

Channel Separation (MHz)	Two-thirds of the 20 dB Bandwidth (MHz)	Channel Separation Limit	Result
1.000	0.902	> Two-thirds of the 20 dB Bandwidth	Pass

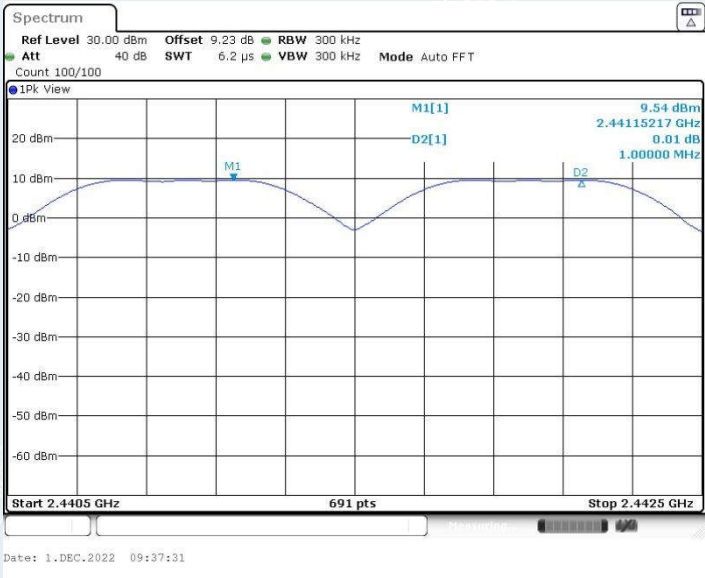
3DH5

Channel Separation (MHz)	Two-thirds of the 20 dB Bandwidth (MHz)	Channel Separation Limit	Result
0.9993	0.892	> Two-thirds of the 20 dB Bandwidth	Pass

Result plot as follows:

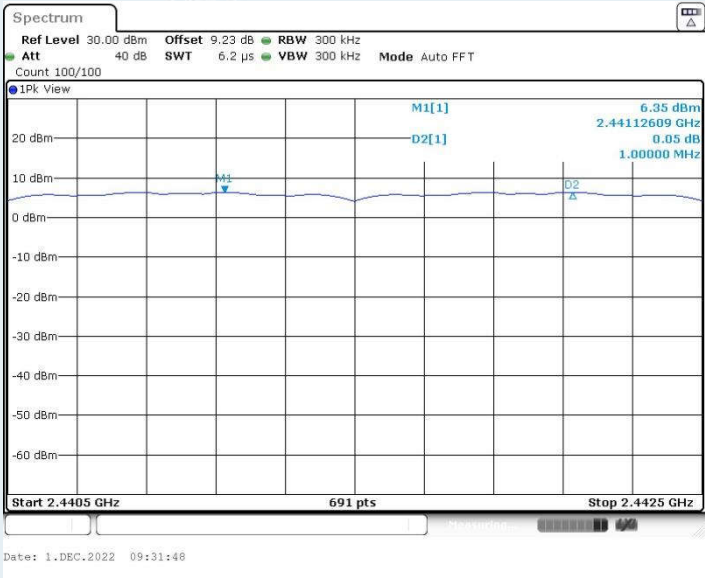
DH5

Measurement of Channel Separation

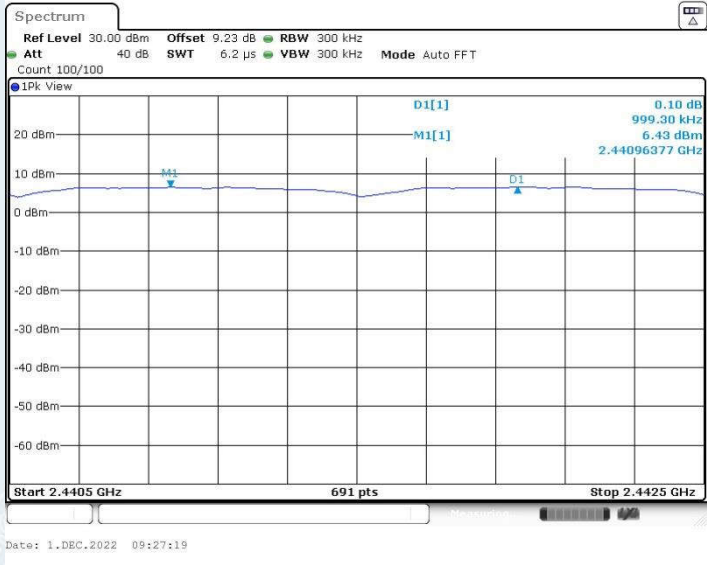


2DH5

Measurement of Channel Separation



3DH5
Measurement of Channel Separation



Test result: The unit does meet the FCC requirements.

_____ The following blanks _____

8. HOPPING CHANNEL NUMBER

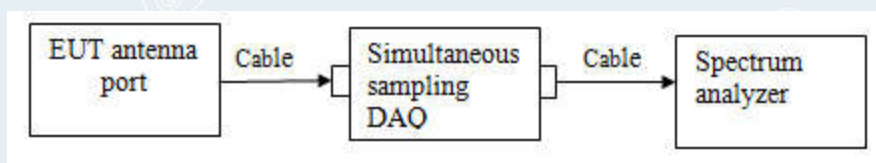
8.1 LIMITS

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

8.2 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=300kHz, VBW=300kHz.
- 3) Set the spectrum analyzer: start frequency = 2400MHz. stop frequency = 2483.5MHz. Submit the test result graph.

8.3 TEST SETUP



8.4 TEST RESULTS

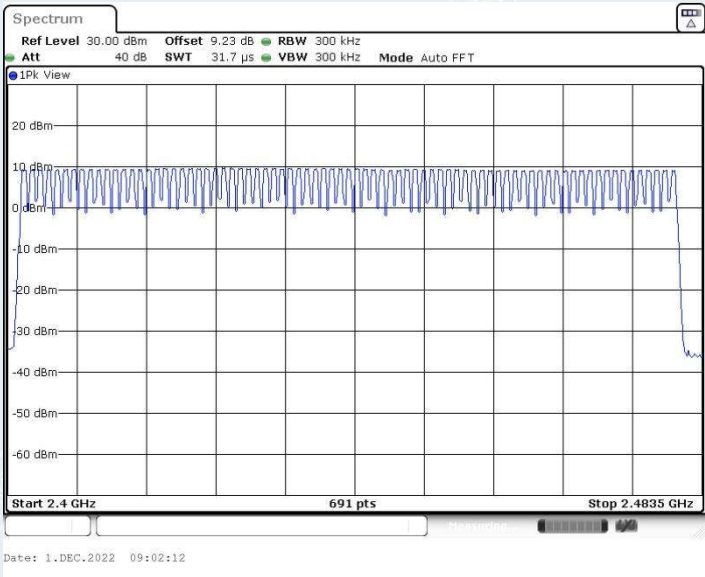
Environment: 24.5°C/52%RH/101.0kPa
Tested By: Yang Zhaoyun

Voltage: DC 12V
Date: 2022-12-01

Test mode	Result (No. of CH)	Limit (No. of CH)	Result
GFSK	79	≥ 15	PASS
$\pi/4$ -DQPSK	79	≥ 15	PASS
8DPSK	79	≥ 15	PASS

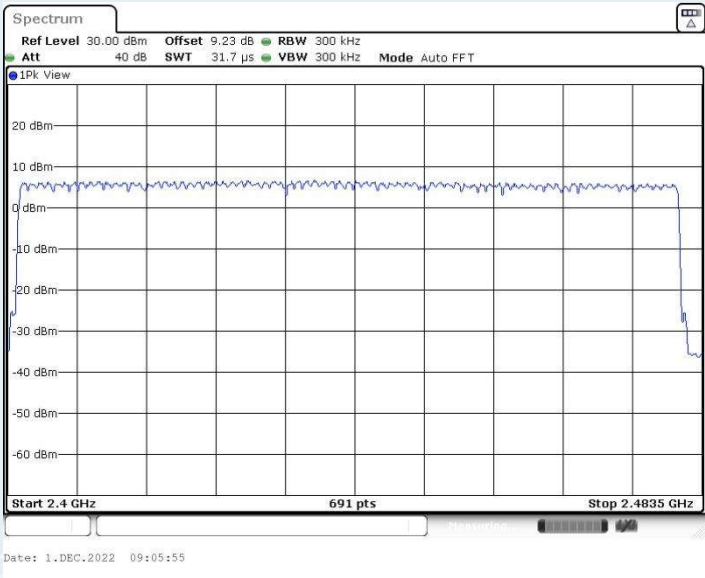
GFSK

2.400 GHz – 2.4835 GHz

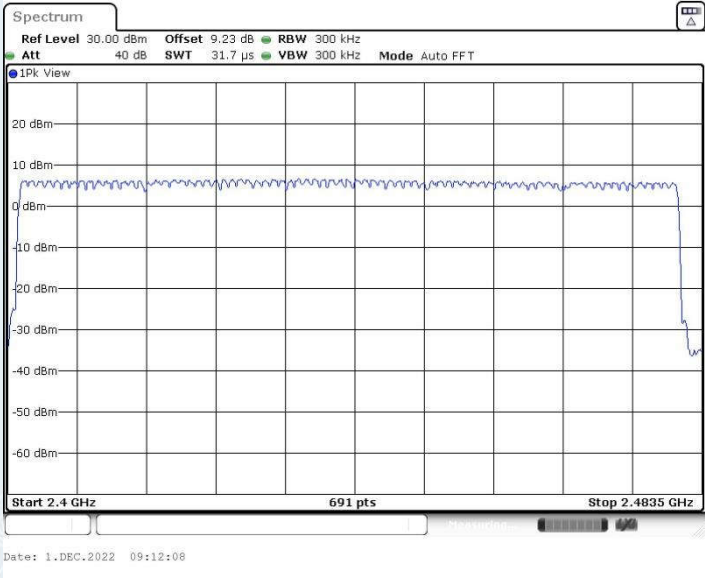


$\pi/4$ -DQPSK

2.400 GHz – 2.4835 GHz



8DPSK
2.400 GHz – 2.4835 GHz



Test result: The unit does meet the FCC requirements.

_____ The following blanks _____

9. DWELL TIME

9.1 LIMITS

Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483.5MHz 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.

9.2 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 = 3MHz. 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.
- 5) DH1 Packet permit maximum $1600 / 79 / 2 = 10.12$ hops per second in each channel (1 time slot TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times $10.12 \times 31.6 = 320$ within 31.6 seconds
- 6) DH3 Packet permit maximum $1600 / 79 / 4 = 5.06$ hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times $5.06 \times 31.6 = 160$ within 31.6 seconds
- 7) DH5 Packet permit maximum $1600 / 79 / 6 = 3.37$ hops per second in each channel (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times $3.37 \times 31.6 = 106.6$ within 31.6 seconds

9.3 TEST SETUP

