

Test Report

Report No. : CQASZ20211202223E-02
Applicant: Shenzhen DO Intelligent Technology Co., Ltd
Address of Applicant: 11th Floor, 3# Building, Guole Tech Park, Lirong Road, Dalang, Longhua District, Shenzhen, China
Equipment Under Test (EUT):
Product: Smart Watch
Model No.: boAt Wave Connect RTL, boAt Wave Connect F, boAt Wave Connect A, boAt Wave Connect Plus, boAt Wave Connect Pro, boAt Wave Connect Max, boAt Wave Connect, ID208, ID208 BT
Test Model No.: ID208 BT
Brand Name: IDO
FCC ID: 2AHFT418
Standards: 47 CFR Part 15, Subpart C
Date of Receipt: 2021-12-23
Date of Test: 2021-12-23 to 2021-12-30
Date of Issue: 2022-03-02
Test Result : PASS*

*In the configuration tested, the EUT complied with the standards specified above.

Tested By: Lewis Zhou

(Lewis Zhou)

Reviewed By: Rock Huang

(Rock Huang)

Approved By: Jack Ai

(Jack Ai)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20211202223E-02	Rev.01	Initial report	2022-03-02

2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	ANSI C63.10 (2013)	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 (2013)	PASS
Conducted Peak Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(1)	ANSI C63.10 (2013)	PASS
20dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10 (2013)	PASS
Carrier Frequencies Separation	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10 (2013)	PASS
Hopping Channel Number	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10 (2013)	PASS
Dwell Time	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10 (2013)	PASS
Pseudorandom Frequency Hopping Sequence	47 CFR Part 15, Subpart C Section 15.247(b)(4)&TCB Exclusion List (7 July 2002)	ANSI C63.10 (2013)	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 (2013)	PASS
RF Conducted Spurious Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 (2013)	PASS
Radiated Spurious emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 (2013)	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 (2013)	PASS

3 Contents

	Page
1 VERSION.....	2
2 TEST SUMMARY.....	3
3 CONTENTS.....	4
4 GENERAL INFORMATION.....	5
4.1 CLIENT INFORMATION.....	5
4.2 GENERAL DESCRIPTION OF EUT.....	5
4.3 ADDITIONAL INSTRUCTIONS.....	7
4.4 TEST ENVIRONMENT.....	8
4.5 DESCRIPTION OF SUPPORT UNITS.....	8
4.6 STATEMENT OF THE MEASUREMENT UNCERTAINTY.....	9
4.7 TEST LOCATION.....	10
4.8 TEST FACILITY.....	10
4.9 ABNORMALITIES FROM STANDARD CONDITIONS.....	10
4.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER.....	10
4.11 EQUIPMENT LIST.....	11
5 TEST RESULTS AND MEASUREMENT DATA.....	12
5.1 ANTENNA REQUIREMENT.....	12
5.2 CONDUCTED EMISSIONS.....	13
5.3 CONDUCTED PEAK OUTPUT POWER.....	18
<i>Test Result.....</i>	<i>19</i>
<i>Test Graphs.....</i>	<i>20</i>
5.4 20DB OCCUPY BANDWIDTH.....	25
<i>Test Result.....</i>	<i>25</i>
<i>Test Graphs.....</i>	<i>26</i>
5.5 CARRIER FREQUENCIES SEPARATION.....	31
<i>Test Result.....</i>	<i>32</i>
<i>Test Graphs.....</i>	<i>32</i>
5.6 HOPPING CHANNEL NUMBER.....	34
<i>Test Result.....</i>	<i>34</i>
<i>Test Graphs.....</i>	<i>35</i>
5.7 DWELL TIME.....	37
<i>Test Result.....</i>	<i>38</i>
5.7.1 <i>Test Graphs.....</i>	<i>39</i>
5.8 BAND-EDGE FOR RF CONDUCTED EMISSIONS.....	46
<i>Test Result.....</i>	<i>47</i>
<i>Test Graphs.....</i>	<i>48</i>
5.9 SPURIOUS RF CONDUCTED EMISSIONS.....	54
5.9.1 <i>Test Result.....</i>	<i>55</i>
<i>Test Graphs.....</i>	<i>56</i>
5.10 OTHER REQUIREMENTS FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM.....	70
5.11 RADIATED SPURIOUS EMISSION & RESTRICTED BANDS.....	72
5.11.1 <i>Radiated Emission below 1GHz.....</i>	<i>75</i>
5.11.2 <i>Transmitter Emission above 1GHz.....</i>	<i>79</i>
6 PHOTOGRAPHS - EUT TEST SETUP.....	82
6.1 RADIATED EMISSION.....	82
6.2 CONDUCTED EMISSION.....	83
7 PHOTOGRAPHS - EUT CONSTRUCTIONAL DETAILS.....	84

4 General Information

4.1 Client Information

Applicant:	Shenzhen DO Intelligent Technology Co., Ltd
Address of Applicant:	11th Floor, 3# Building, Guole Tech Park, Lirong Road, Dalang, Longhua District, Shenzhen, China
Manufacturer:	Shenzhen DO Intelligent Technology Co., Ltd
Address of Manufacturer:	11th Floor, 3# Building, Guole Tech Park, Lirong Road, Dalang, Longhua District, Shenzhen, China
Factory:	Shenzhen DO Intelligent Technology Co., Ltd
Address of Factory:	11th Floor, 3# Building, Guole Tech Park, Lirong Road, Dalang, Longhua District, Shenzhen, China

4.2 General Description of EUT

Product Name:	Smart Watch
Model No.:	boAt Wave Connect RTL, boAt Wave Connect F, boAt Wave Connect A, boAt Wave Connect Plus, boAt Wave Connect Pro, boAt Wave Connect Max , boAt Wave Connect, ID208, ID208 BT
Test Model No.:	ID208 BT
Trade Mark:	IDO
Software Version:	V1
Hardware Version:	V1.1
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V5.1
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Transfer Rate:	1Mbps/2Mbps/3Mbps
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Product Type:	☐ Mobile ☒ Portable ☐ Fix Location
Test Software of EUT:	MainWindow
Antenna Type:	FPC antenna
Antenna Gain:	-0.61dBi
Power Supply:	lithium battery:DC3.8V, 300mAh, 1.140Wh, Charge by DC5.0V 280mA

Note:

Model No.:boAt Wave Connect RTL, boAt Wave Connect F, boAt Wave Connect A, boAt Wave Connect Plus, boAt Wave Connect Pro, boAt Wave Connect Max, boAt Wave Connect, ID208, ID208 BT

The model ID208 BT was tested, Their electrical circuit design, layout, components used and internal wiring are identical, Only the product model is different.

The difference between 1# and 2# is the vendor of the screen

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

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The Lowest channel	2402MHz
The Middle channel	2441MHz
The Highest channel	2480MHz

4.3 Additional Instructions

EUT Test Software Settings:		
Mode:	☒ Special software is used. ☐ Through engineering command into the engineering mode. engineering command: *##3646633##*	
EUT Power level:	Class2 (Power level is built-in set parameters and cannot be changed and selected)	
Use test software to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT.		
Mode	Channel	Frequency(MHz)
DH1/DH3/DH5	CH0	2402
	CH39	2441
	CH78	2480
2DH1/2DH3/2DH5	CH0	2402
	CH39	2441
	CH78	2480
3DH1/3DH3/3DH5	CH0	2402
	CH39	2441
	CH78	2480

Run Software:



The screenshot shows the 'Run Software' interface with the following sections:

- MainWindow**: Contains tabs for RF, DTM, and other tests. The RF test parameters are set to:
 - 包类型: PRBS9
 - 频段: CH78:2480
 - 功率: 0x16
- BT测试参数**:
 - 包类型: DM1
 - 频段: 跳频
 - 功率: 0x10
- 单载波测试参数**:
 - 频段: CH0:2402
 - 功率: 0x0a
- 测试选项**:
 - 模式: 发送
 - 测试BLE (selected) / 测试BT
- AT命令**: A text area for entering AT commands.
- 串口**:
 - 端口号: COM24
 - 波特率: 115200
 - 当前状态: 已经连接 (Flash)
- 配置**:
 - Buttons: 导入DAT文件, 导出DAT文件, 导入程序补丁, 导出程序补丁, 导入DSP_CODE, 导出DSP_CODE
 - 补丁大小: 0, dsp大小: 0
- 烧录**:
 - Buttons: 写入所有内容, 读取所有内容
- 版本**:
 - CHIP: [empty]
 - Version: [empty]
- 运行状态信息**: A log window showing test results, including:
 - [19:28:39]: BLE测试执行成功...
 - [19:29:03]: 测试停止成功...
 - [19:29:04]: BLE测试执行成功...
 - [19:38:56]: 测试停止成功...
 - [19:38:57]: BLE测试执行成功...
 - [19:40:18]: 测试停止成功...
 - [19:40:27]: 测试停止成功...
 - [19:40:28]: BLE测试执行成功...

4.4 Test Environment

Operating Environment:	
Temperature:	26 °C
Humidity:	59% RH
Atmospheric Pressure:	1009mbar
Test Mode:	Use test software to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT.

4.5 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Remark	FCC certification
/	/	/	/	/

4.6 Statement of the 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 CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd.** quality 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.

Hereafter the best measurement capability for CQA laboratory is reported:

No.	Item	Uncertainty	Notes
1	Radiated Emission (Below 1GHz)	±5.12dB	(1)
2	Radiated Emission (Above 1GHz)	±4.60dB	(1)
3	Conducted Disturbance (0.15~30MHz)	±3.34dB	(1)
4	Radio Frequency	3×10^{-8}	(1)
5	Duty cycle	0.6 %.	(1)
6	Occupied Bandwidth	1.1%	(1)
7	RF conducted power	0.86dB	(1)
8	RF power density	0.74	(1)
9	Conducted Spurious emissions	0.86dB	(1)
10	Temperature test	0.8℃	(1)
11	Humidity test	2.0%	(1)
12	Supply voltages	0.5 %.	(1)
13	time	0.6 %.	(1)
14	Frequency Error	5.5 Hz	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.7 Test Location

Shenzhen Huaxia Testing Technology Co., Ltd.

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

4.8 Test Facility

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

IC Registration No.: 22984-1

The 3m Semi-anechoic chamber of Shenzhen Huaxia Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

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

• **CNAS (No. CNAS L5785)**

CNAS has accredited Shenzhen Huaxia Testing Technology Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 4742.01)**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

• **FCC Registration No.: 522263**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen 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. Registration No.:522263

4.9 Abnormalities from Standard Conditions

None.

4.10 Other Information Requested by the Customer

None.

4.11 Equipment List

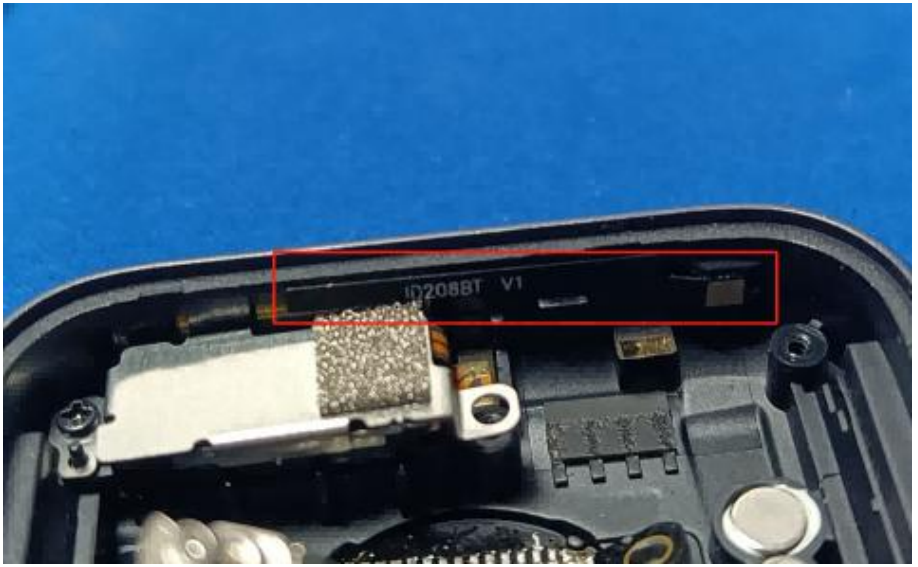
Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2021/9/10	2021/9/9
Spectrum analyzer	R&S	FSU26	CQA-038	2021/9/10	2021/9/9
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2021/9/10	2021/9/9
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2021/9/10	2021/9/9
Loop antenna	Schwarzbeck	FMZB1516	CQA-087	2021/9/16	2024/9/15
Bilog Antenna	R&S	HL562	CQA-011	2021/9/16	2024/9/15
Horn Antenna	R&S	HF906	CQA-012	2021/9/16	2024/9/15
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2021/9/16	2024/9/15
Coaxial Cable (Above 1GHz)	CQA	N/A	C019	2021/9/10	2021/9/9
Coaxial Cable (Below 1GHz)	CQA	N/A	C020	2021/9/10	2021/9/9
Antenna Connector	CQA	RFC-01	CQA-080	2021/9/10	2021/9/9
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2021/9/10	2021/9/9
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2021/9/10	2021/9/9
EMI Test Receiver	R&S	ESPI3	CQA-013	2021/9/10	2021/9/9
LISN	R&S	ENV216	CQA-003	2021/9/10	2021/9/9
Coaxial cable	CQA	N/A	CQA-C009	2021/9/10	2021/9/9

Note:

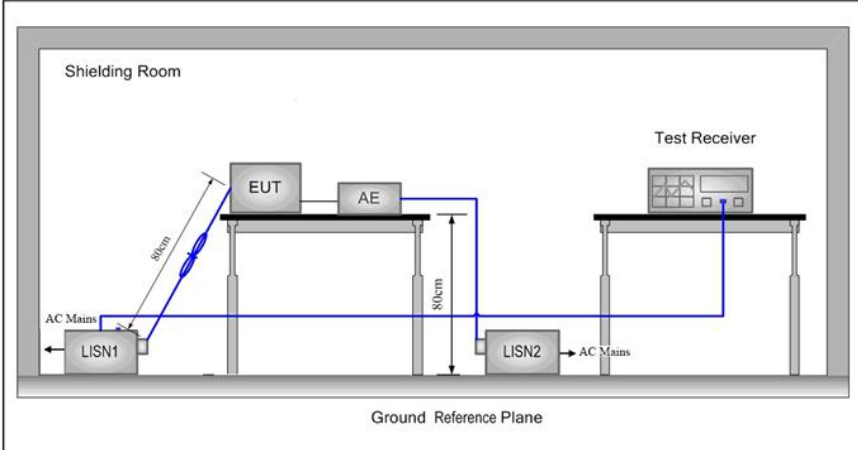
The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c)
	15.203 requirement: 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. 15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
EUT Antenna:	 The antenna is FPC antenna. The best case gain of the antenna is -0.61 dBi.

5.2 Conducted Emissions

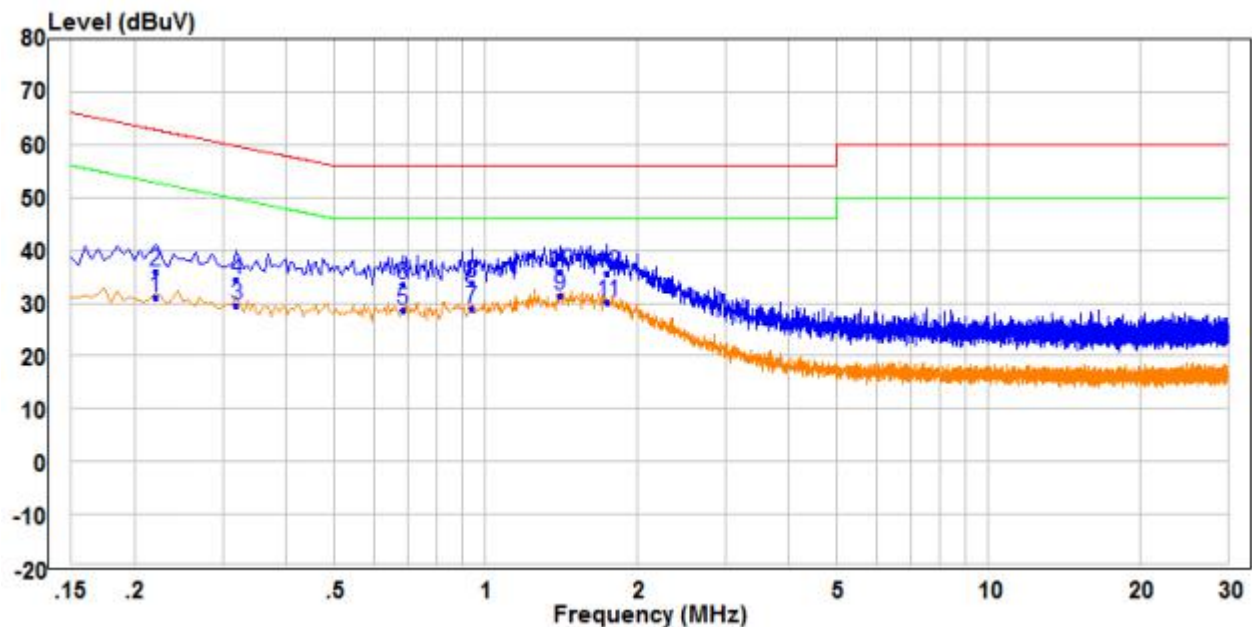
Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2013		
Test Frequency Range:	150kHz to 30MHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test Procedure:	1) The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.		
Test Setup:			

Exploratory Test Mode:	Non-hopping transmitting mode with all kind of modulation and all kind of data type at the lowest, middle, high channel.
Final Test Mode:	Through Pre-scan, find the DH5 of data type and GFSK modulation at the lowest channel is the worst case. Only the worst case is recorded in the report.
Test Voltage:	AC 120V/60Hz
Test Results:	Pass

Measurement Data

1#

Live line:

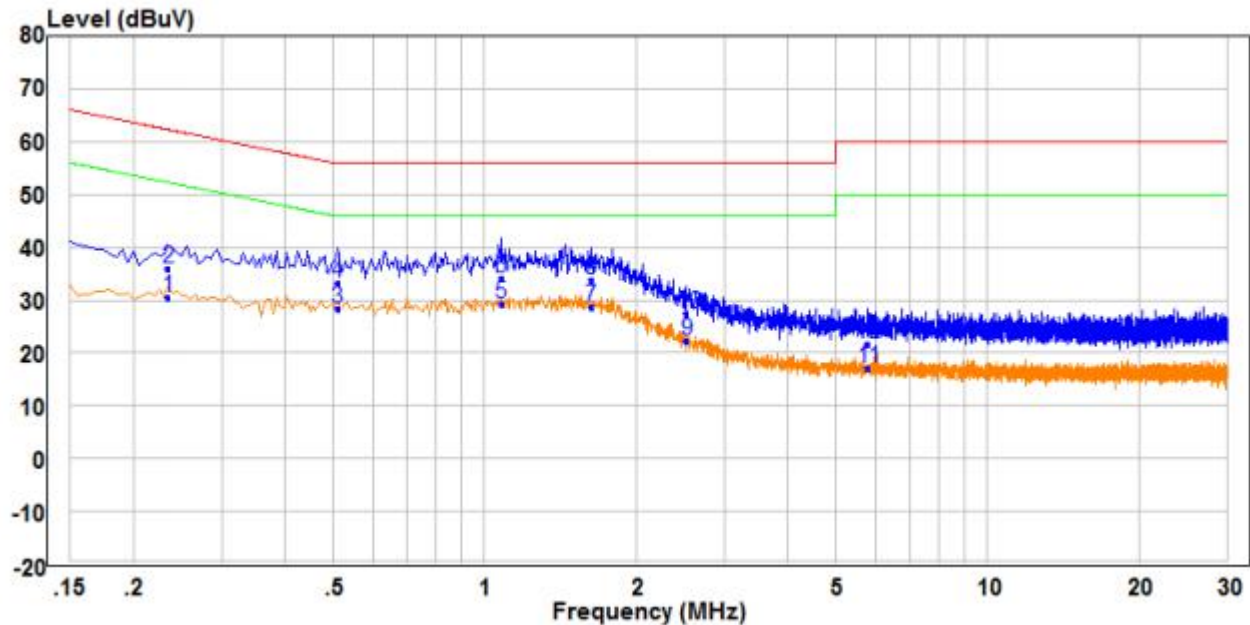


	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.220	21.41	9.58	30.99	52.82	-21.83	Average	Line
2	0.220	26.47	9.58	36.05	62.82	-26.77	QP	Line
3	0.320	19.93	9.52	29.45	49.71	-20.26	Average	Line
4	0.320	24.82	9.52	34.34	59.71	-25.37	QP	Line
5	0.685	18.72	9.89	28.61	46.00	-17.39	Average	Line
6	0.685	23.75	9.89	33.64	56.00	-22.36	QP	Line
7	0.940	19.19	9.74	28.93	46.00	-17.07	Average	Line
8	0.940	24.01	9.74	33.75	56.00	-22.25	QP	Line
9 PP	1.405	20.58	10.65	31.23	46.00	-14.77	Average	Line
10 QP	1.405	25.14	10.65	35.79	56.00	-20.21	QP	Line
11	1.750	19.00	11.27	30.27	46.00	-15.73	Average	Line
12	1.750	24.23	11.27	35.50	56.00	-20.50	QP	Line

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

Neutral line:



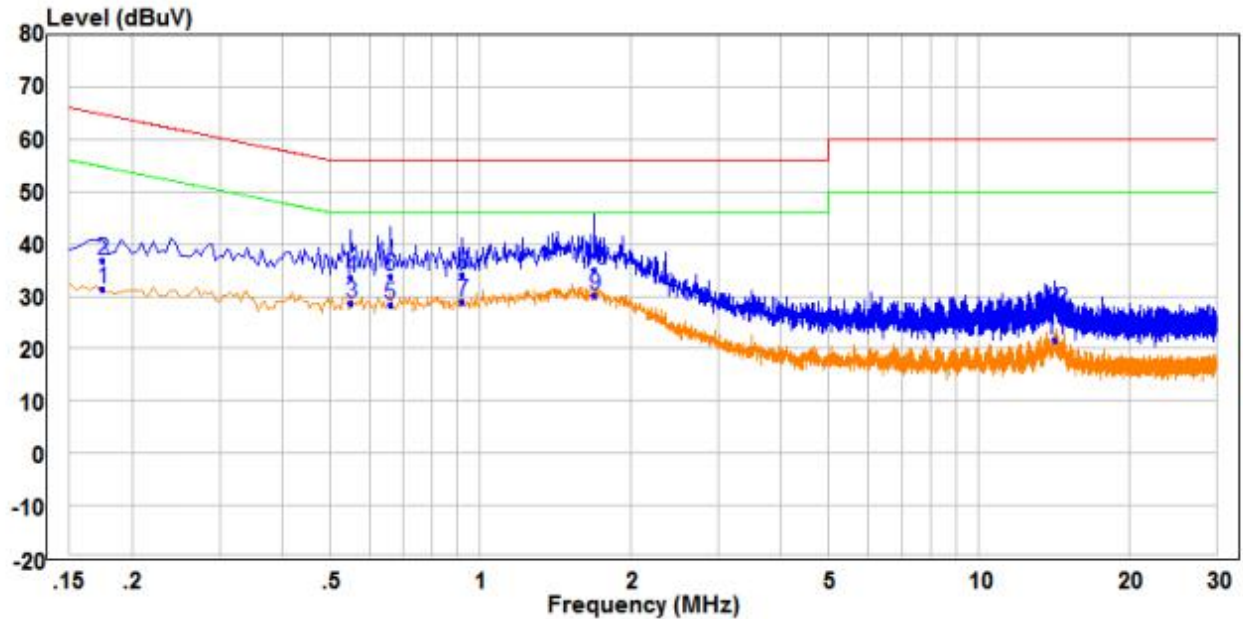
	Freq	Read	Factor	Level	Limit	Over	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.235	21.06	9.56	30.62	52.27	-21.65	Average	Neutral
2	0.235	26.35	9.56	35.91	62.27	-26.36	QP	Neutral
3	0.510	18.71	9.71	28.42	46.00	-17.58	Average	Neutral
4	0.510	23.64	9.71	33.35	56.00	-22.65	QP	Neutral
5 PP	1.080	19.43	9.70	29.13	46.00	-16.87	Average	Neutral
6 QP	1.080	24.54	9.70	34.24	56.00	-21.76	QP	Neutral
7	1.630	18.99	9.73	28.72	46.00	-17.28	Average	Neutral
8	1.630	23.93	9.73	33.66	56.00	-22.34	QP	Neutral
9	2.530	12.37	9.76	22.13	46.00	-23.87	Average	Neutral
10	2.530	17.73	9.76	27.49	56.00	-28.51	QP	Neutral
11	5.795	7.24	9.82	17.06	50.00	-32.94	Average	Neutral
12	5.795	11.89	9.82	21.71	60.00	-38.29	QP	Neutral

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

2#

Live line:

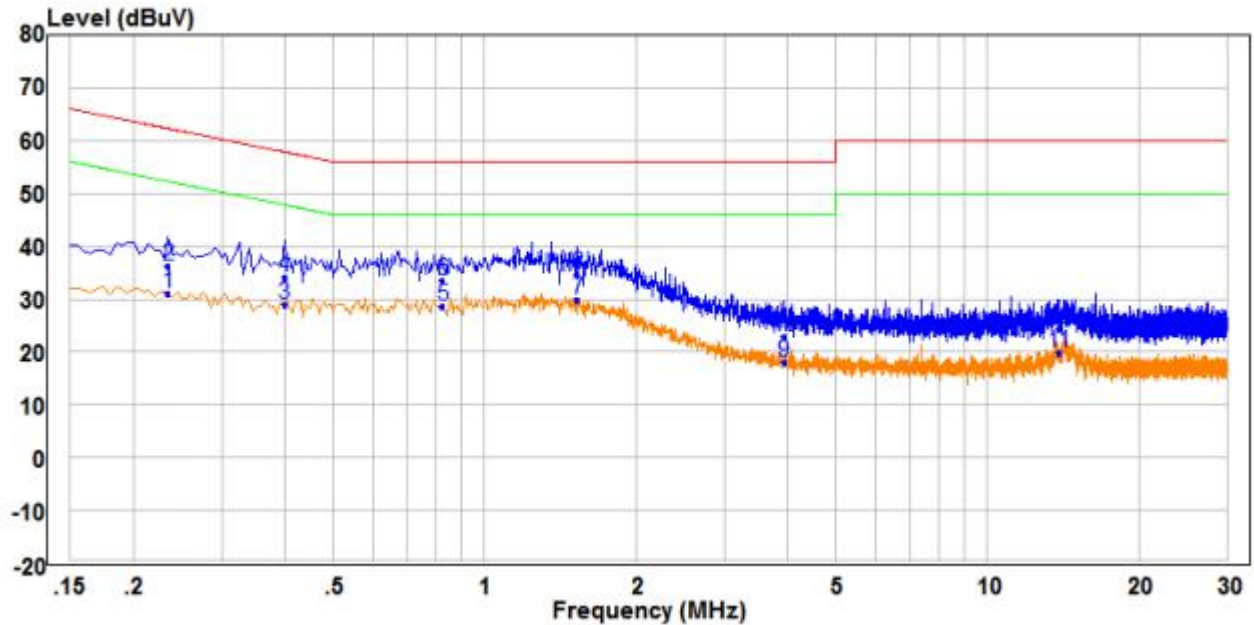


	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.175	21.82	9.65	31.47	54.72	-23.25	Average	Line
2	0.175	27.15	9.65	36.80	64.72	-27.92	QP	Line
3	0.550	18.96	9.75	28.71	46.00	-17.29	Average	Line
4	0.550	23.86	9.75	33.61	56.00	-22.39	QP	Line
5	0.660	18.60	9.86	28.46	46.00	-17.54	Average	Line
6	0.660	24.09	9.86	33.95	56.00	-22.05	QP	Line
7	0.920	19.16	9.75	28.91	46.00	-17.09	Average	Line
8	0.920	24.36	9.75	34.11	56.00	-21.89	QP	Line
9 PP	1.700	18.91	11.19	30.10	46.00	-15.90	Average	Line
10 QP	1.700	23.95	11.19	35.14	56.00	-20.86	QP	Line
11	14.215	11.91	9.75	21.66	50.00	-28.34	Average	Line
12	14.215	17.61	9.75	27.36	60.00	-32.64	QP	Line

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

Neutral line:

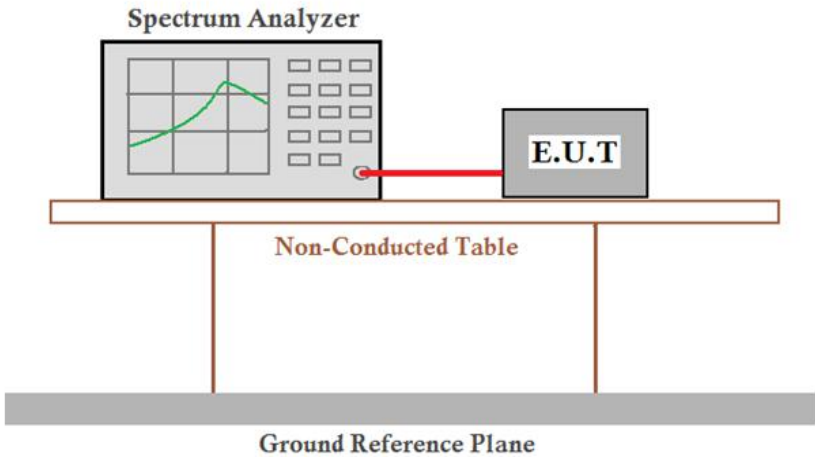


	Freq	Read	Factor	Level	Limit	Over	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.235	21.40	9.56	30.96	52.27	-21.31	Average	Neutral
2	0.235	26.62	9.56	36.18	62.27	-26.09	QP	Neutral
3	0.400	19.39	9.60	28.99	47.85	-18.86	Average	Neutral
4	0.400	24.47	9.60	34.07	57.85	-23.78	QP	Neutral
5	0.825	18.85	9.82	28.67	46.00	-17.33	Average	Neutral
6	0.825	23.81	9.82	33.63	56.00	-22.37	QP	Neutral
7 PP	1.530	20.04	9.73	29.77	46.00	-16.23	Average	Neutral
8 QP	1.530	25.15	9.73	34.88	56.00	-21.12	QP	Neutral
9	3.945	8.16	9.79	17.95	46.00	-28.05	Average	Neutral
10	3.945	13.14	9.79	22.93	56.00	-33.07	QP	Neutral
11	13.850	9.94	9.77	19.71	50.00	-30.29	Average	Neutral
12	13.850	14.49	9.77	24.26	60.00	-35.74	QP	Neutral

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

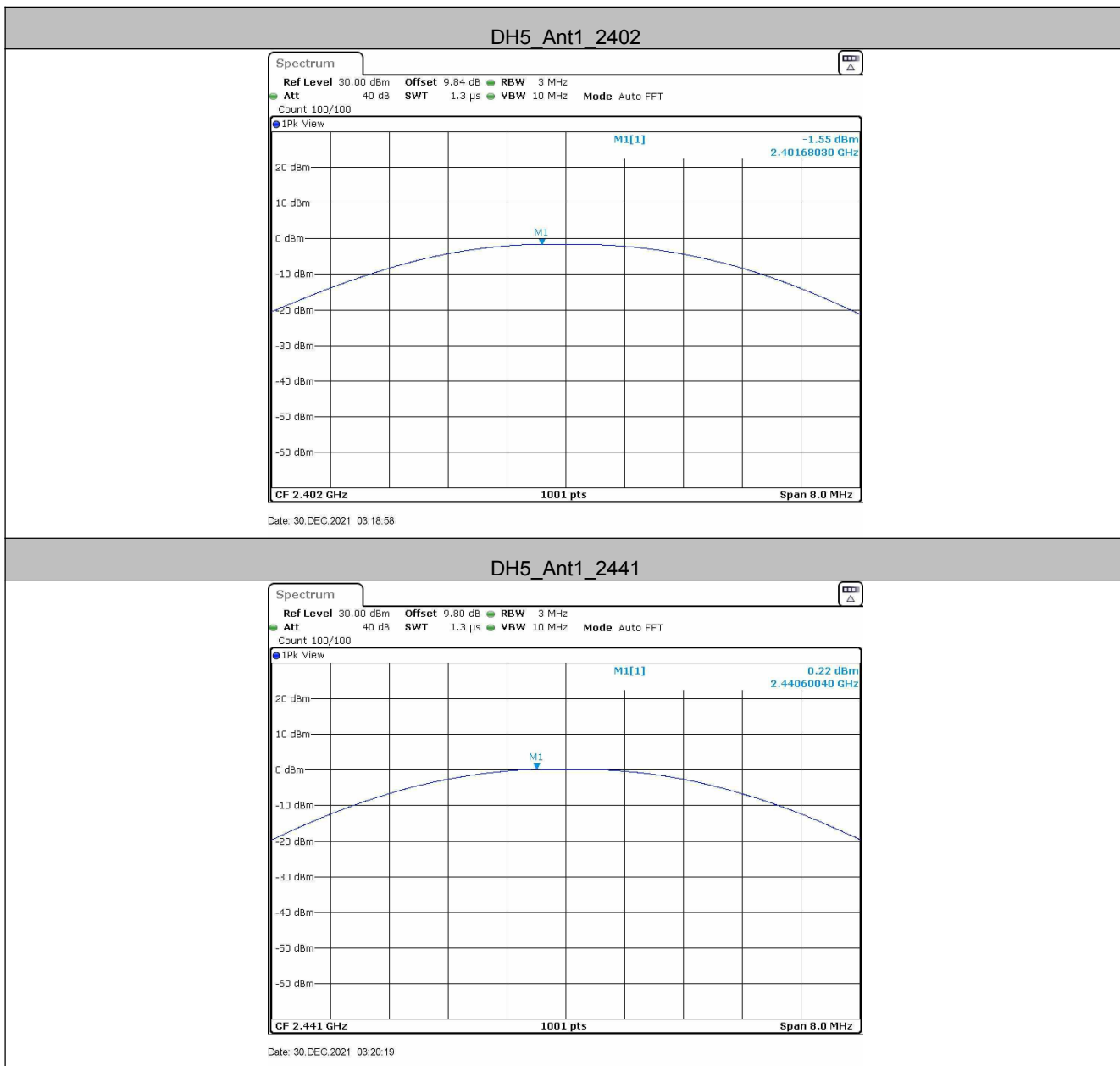
5.3 Conducted Peak Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 Remark: Offset=Cable loss+ attenuation factor.
Limit:	21dBm
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of $\pi/4$ DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type. Only the worst case is recorded in the report.
Test Results:	Pass

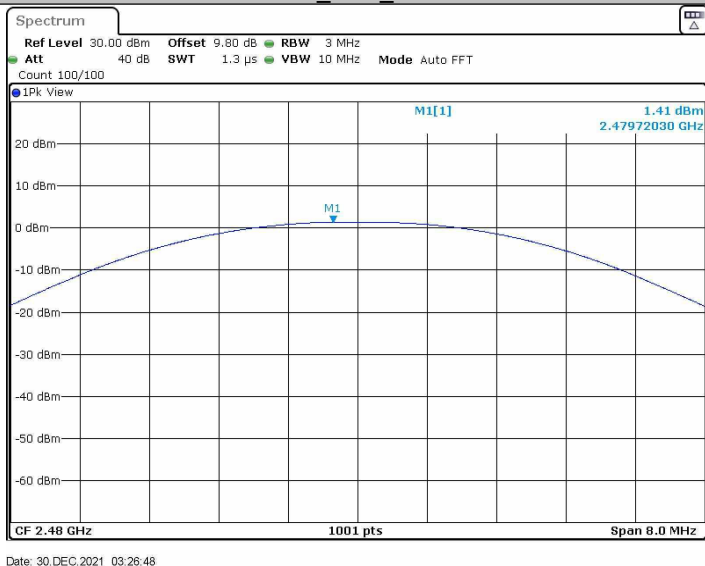
Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	2402	-1.55	≤ 21	PASS
		2441	0.22	≤ 21	PASS
		2480	1.41	≤ 21	PASS
2DH5	Ant1	2402	-1.86	≤ 21	PASS
		2441	-0.05	≤ 21	PASS
		2480	1.49	≤ 21	PASS
3DH5	Ant1	2402	-1.73	≤ 21	PASS
		2441	-0.06	≤ 21	PASS
		2480	1.32	≤ 21	PASS

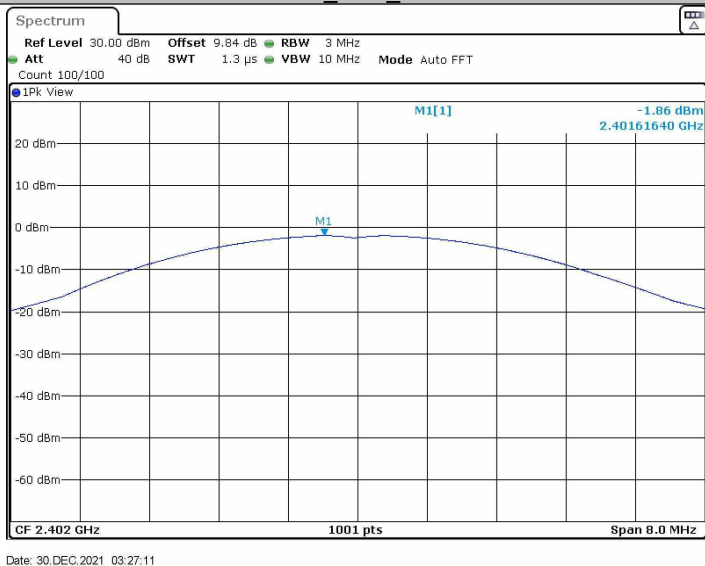
Test Graphs



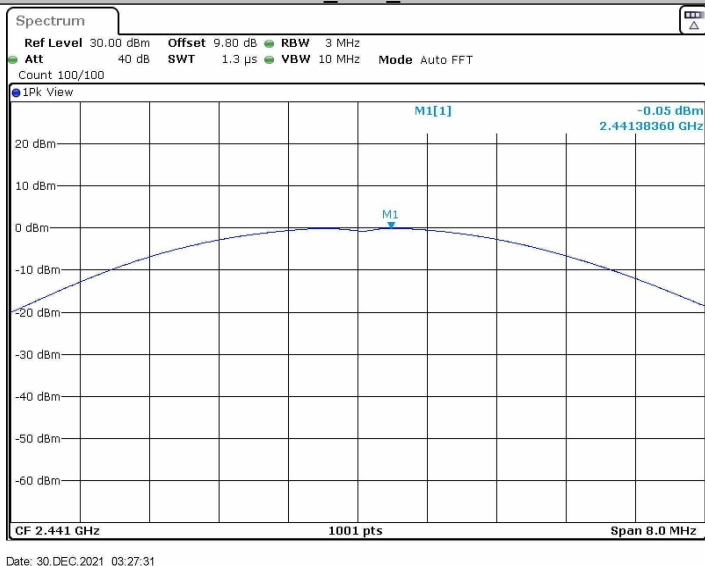
DH5_Ant1_2480



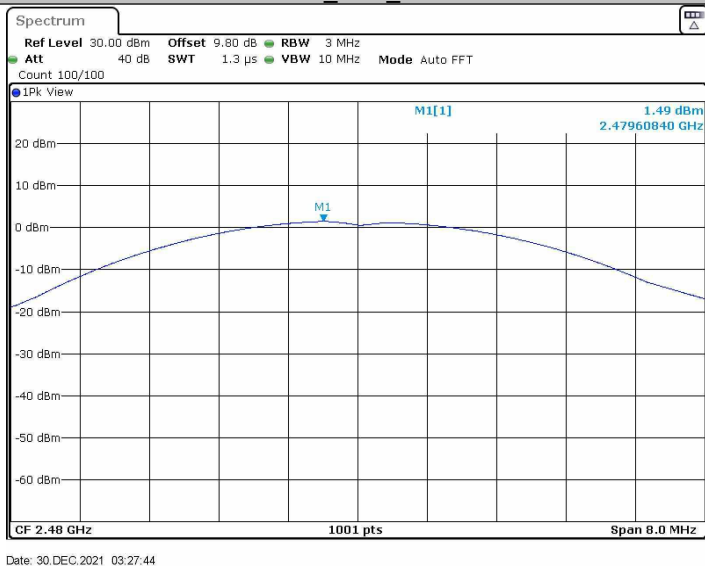
2DH5_Ant1_2402



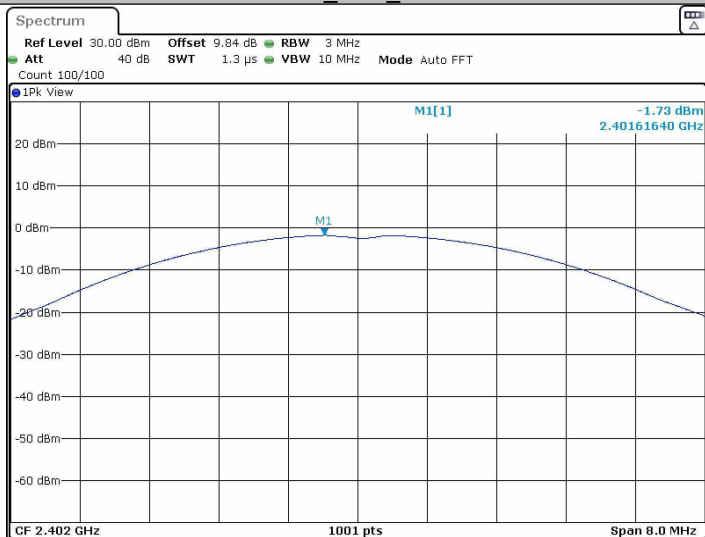
2DH5_Ant1_2441



2DH5_Ant1_2480

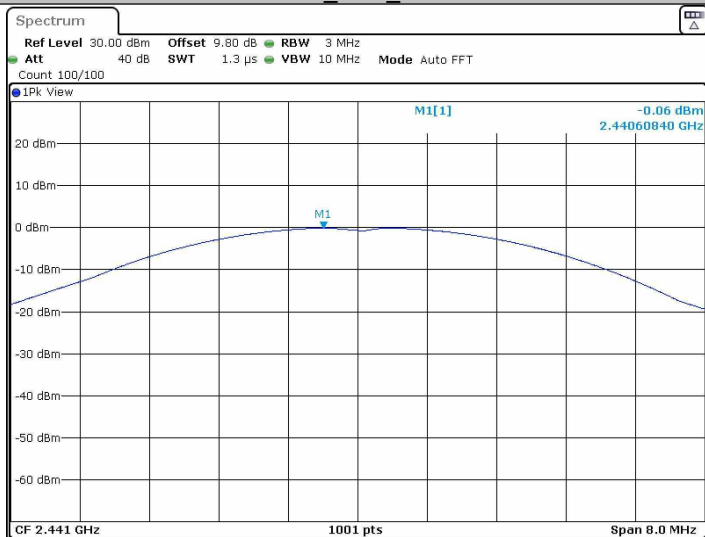


3DH5_Ant1_2402

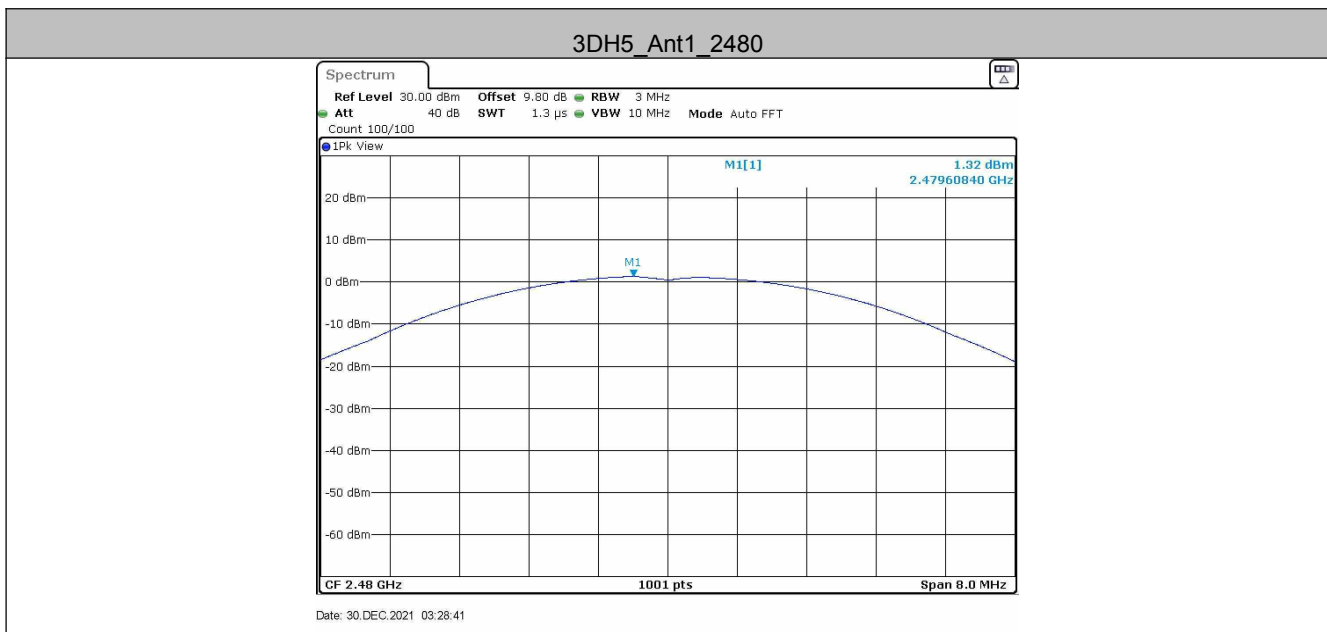


Date: 30.DEC.2021 03:28:07

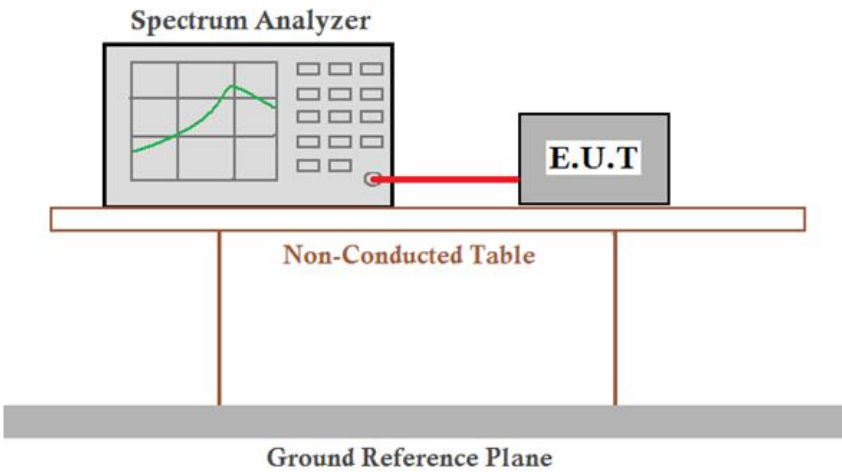
3DH5_Ant1_2441



Date: 30.DEC.2021 03:28:19



5.4 20dB Occupy Bandwidth

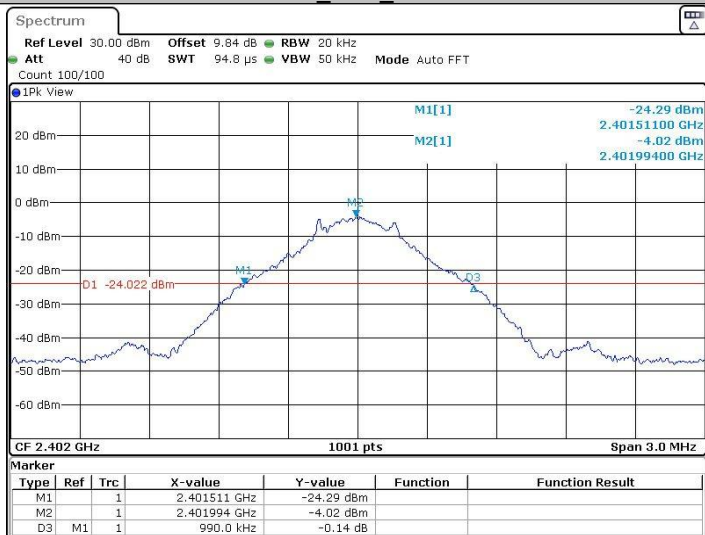
Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 Remark: Offset=Cable loss+ attenuation factor.
Limit:	NA
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of $\pi/4$ DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type. Only the worst case is recorded in the report.
Test Results:	Pass

Test Result

TestMode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.990	2401.511	2402.501	---	PASS
		2441	0.975	2440.505	2441.480	---	PASS
		2480	0.969	2479.520	2480.489	---	PASS
2DH5	Ant1	2402	1.254	2401.367	2402.621	---	PASS
		2441	1.269	2440.358	2441.627	---	PASS
		2480	1.266	2479.352	2480.618	---	PASS
3DH5	Ant1	2402	1.269	2401.352	2402.621	---	PASS
		2441	1.266	2440.355	2441.621	---	PASS
		2480	1.266	2479.358	2480.624	---	PASS

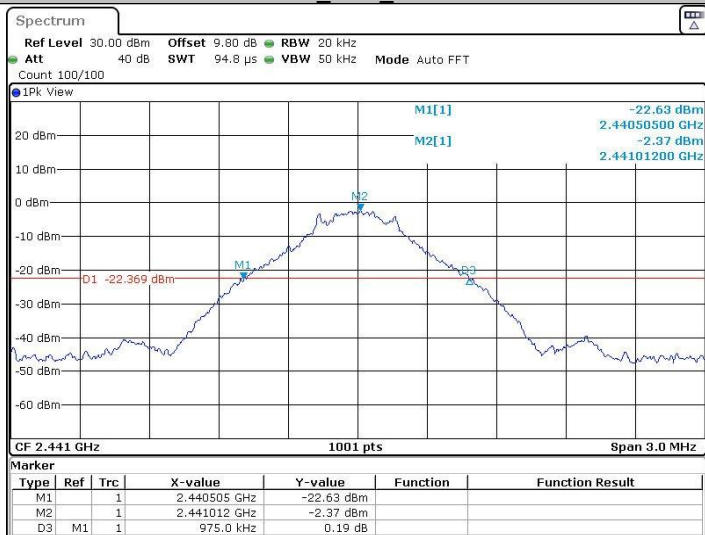
Test Graphs

DH5_Ant1_2402



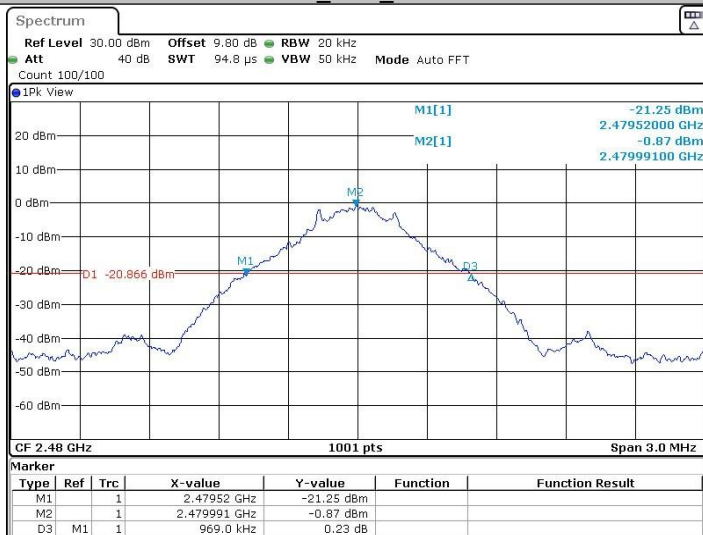
Date: 30 DEC 2021 02:06:15

DH5_Ant1_2441



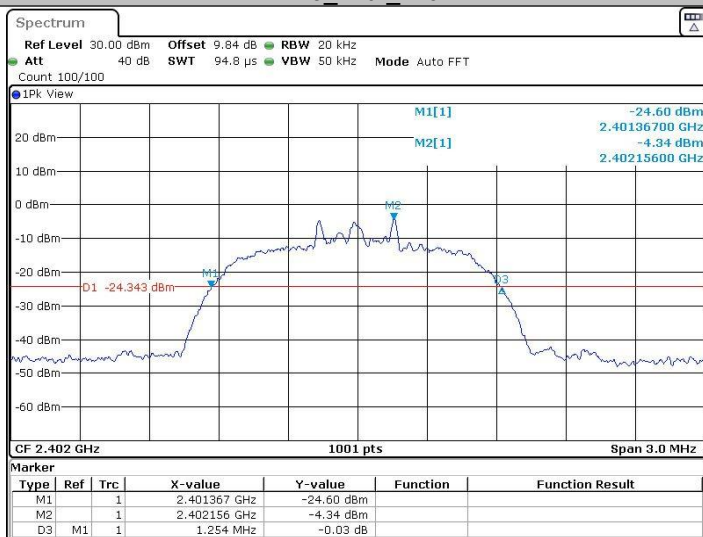
Date: 30 DEC 2021 02:09:30

DH5_Ant1_2480



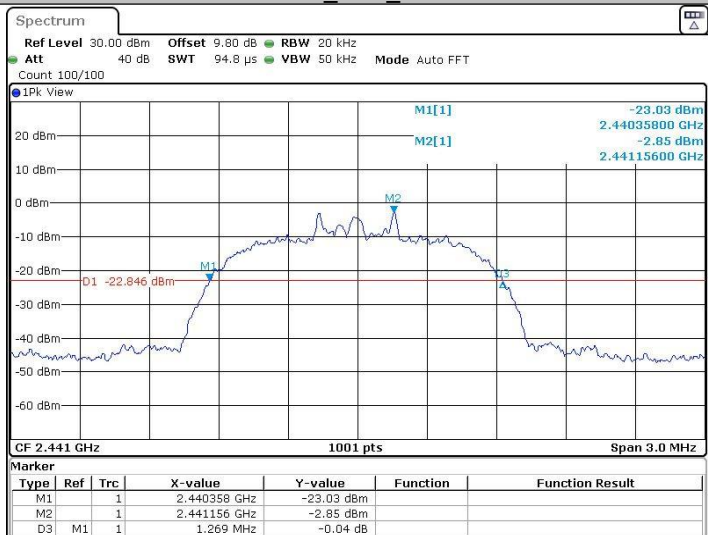
Date: 30.DEC.2021 02:12:07

2DH5_Ant1_2402



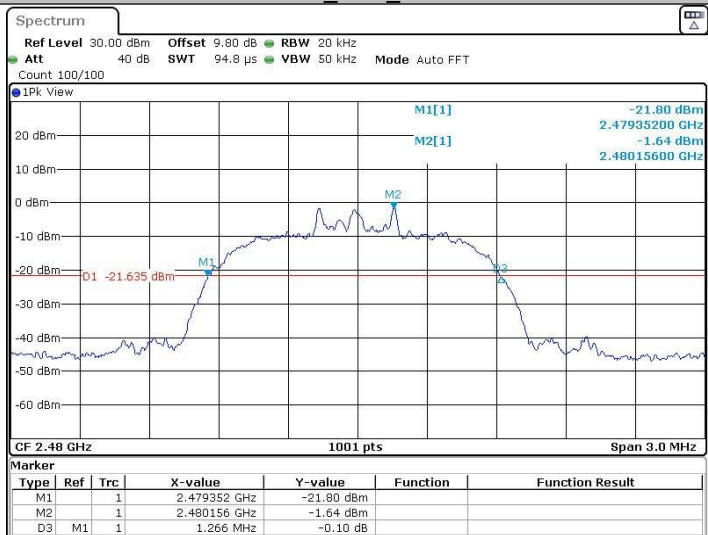
Date: 30.DEC.2021 02:14:32

2DH5_Ant1_2441



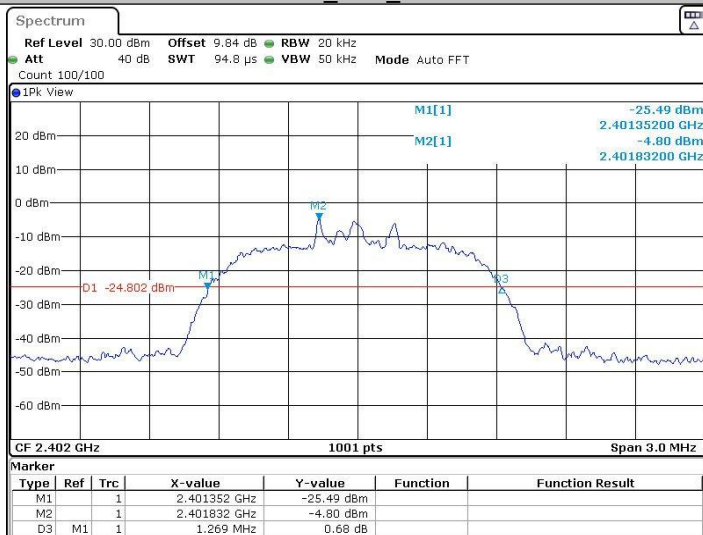
Date: 30.DEC.2021 02:17:11

2DH5_Ant1_2480



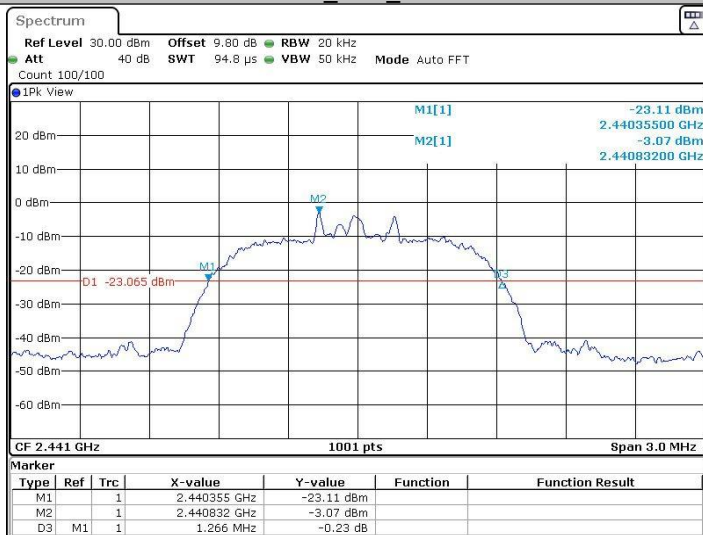
Date: 30.DEC.2021 02:18:25

3DH5_Ant1_2402



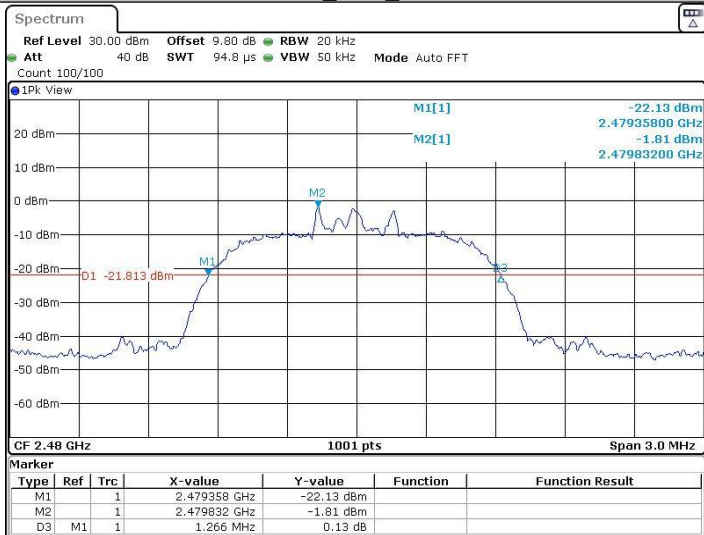
Date: 30.DEC.2021 02:23:10

3DH5_Ant1_2441



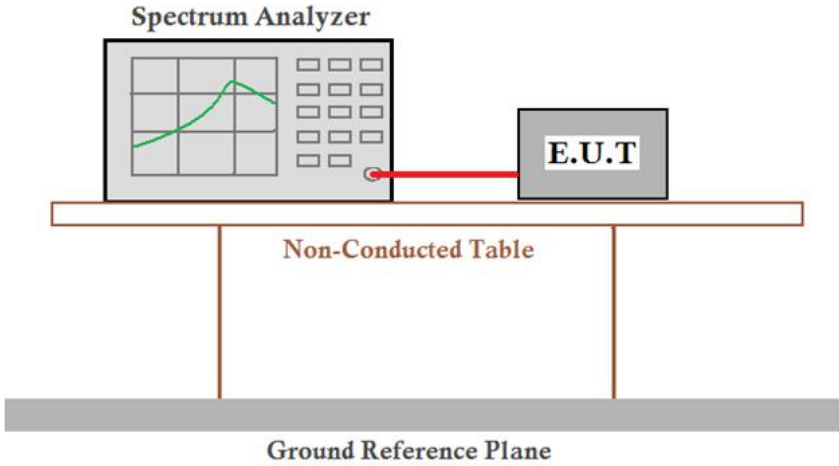
Date: 30.DEC.2021 02:26:01

3DH5_Ant1_2480



Date: 30 DEC 2021 02:27:21

5.5 Carrier Frequencies Separation

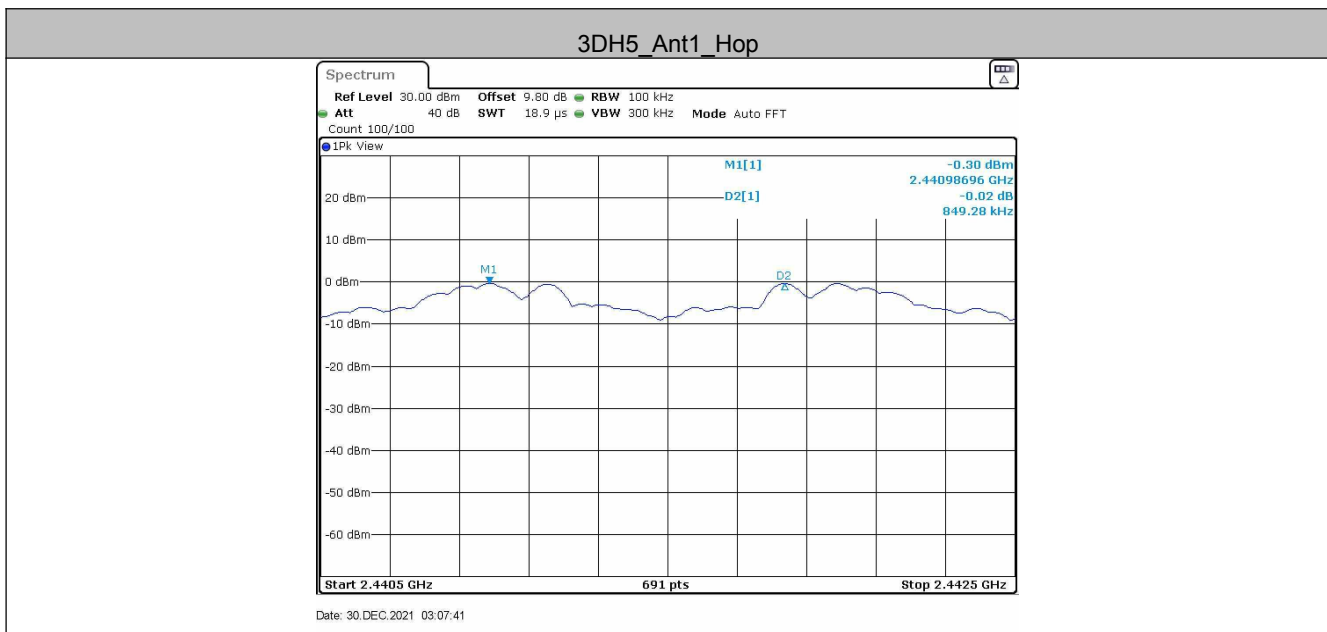
Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 Remark: Offset=Cable loss+ attenuation factor.
Limit:	2/3 of the 20dB bandwidth
	Remark: the transmission power is less than 0.125W.
Exploratory Test Mode:	Hopping transmitting with all kind of modulation and all kind of data type
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of $\pi/4$ DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type. Only the worst case is recorded in the report.
Test Results:	Pass

Test Result

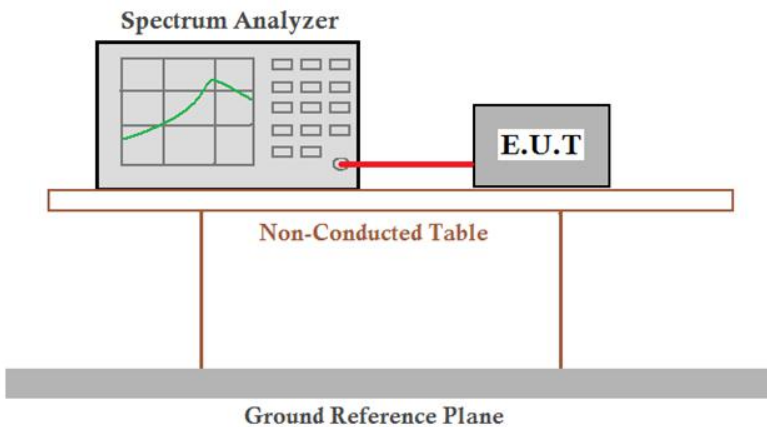
TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	Hop	1.171	≥0.660	PASS
2DH5	Ant1	Hop	1.148	≥0.846	PASS
3DH5	Ant1	Hop	0.849	≥0.846	PASS

Test Graphs





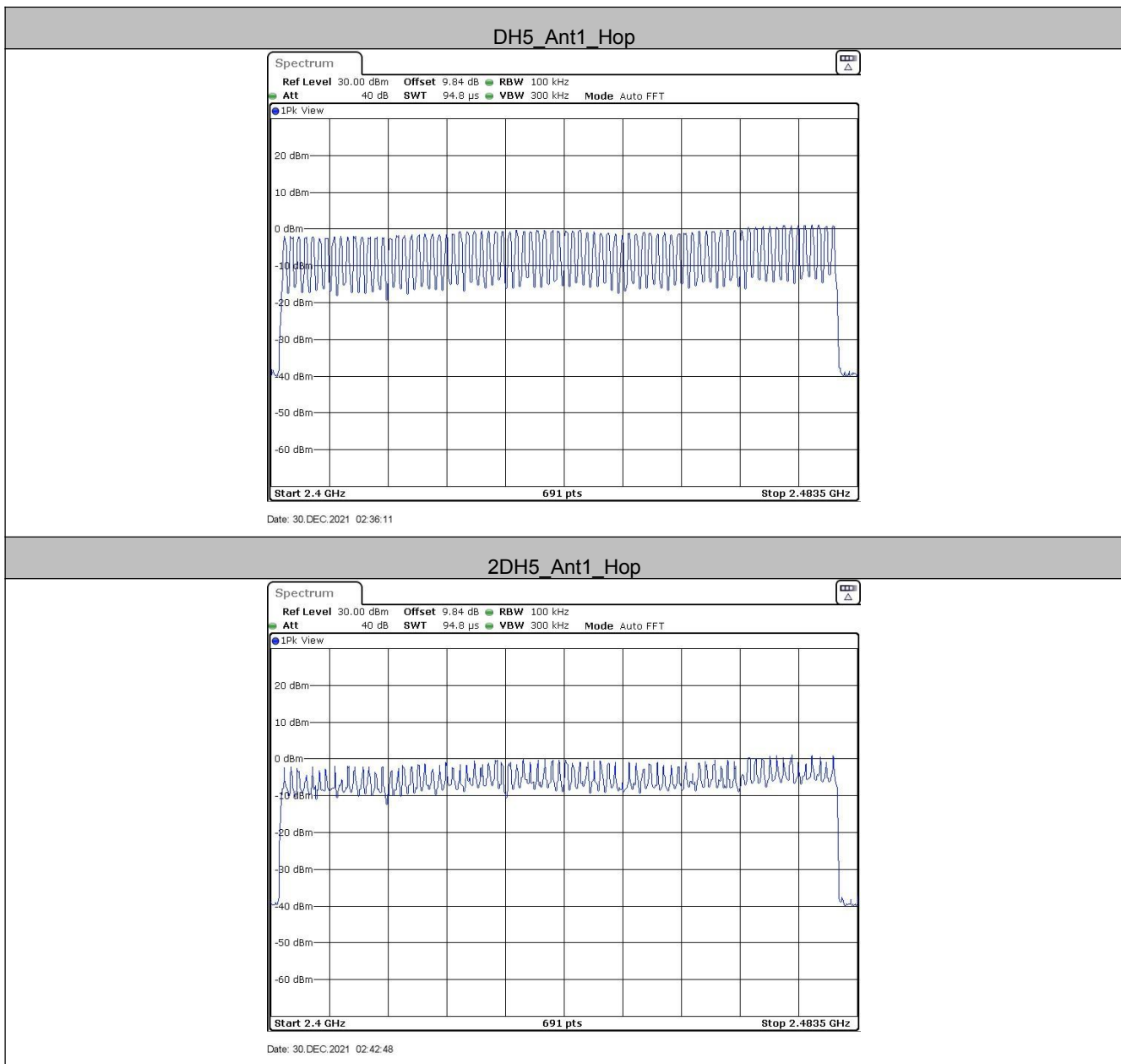
5.6 Hopping Channel Number

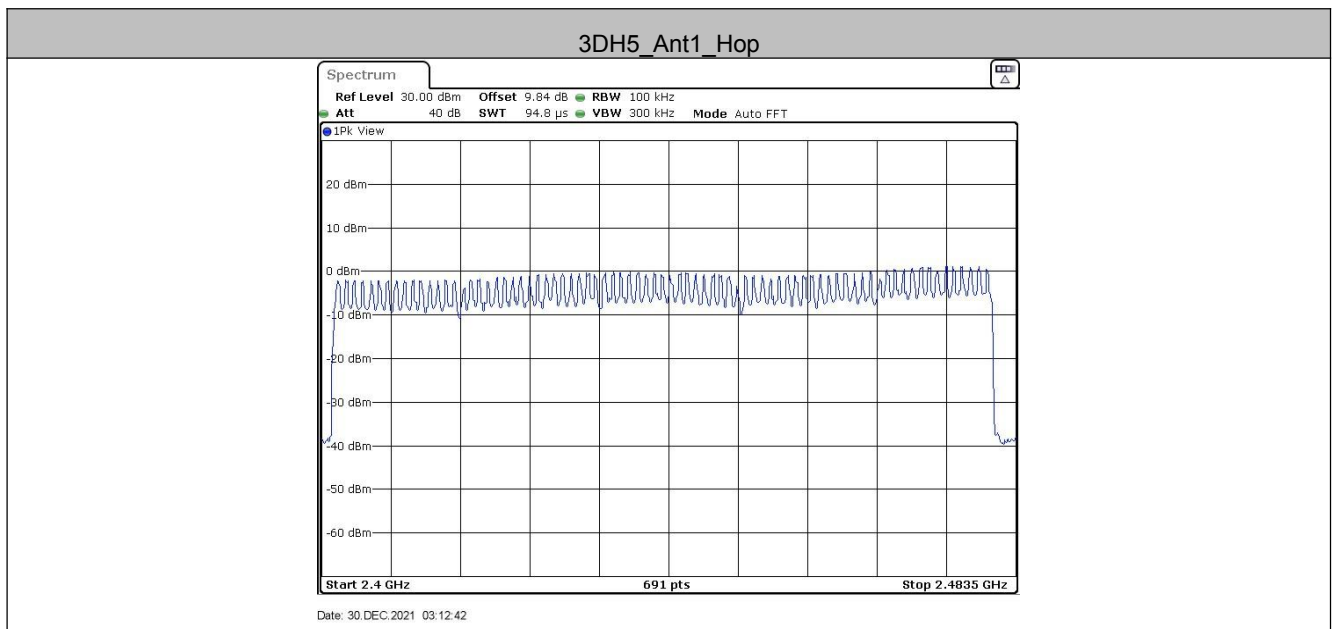
Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 Remark: Offset=Cable loss+ attenuation factor.
Limit:	At least 15 channels
Exploratory Test Mode:	hopping transmitting with all kind of modulation and all kind of data type
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of $\pi/4$ DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type. Only the worst case is recorded in the report.
Test Results:	Pass

Test Result

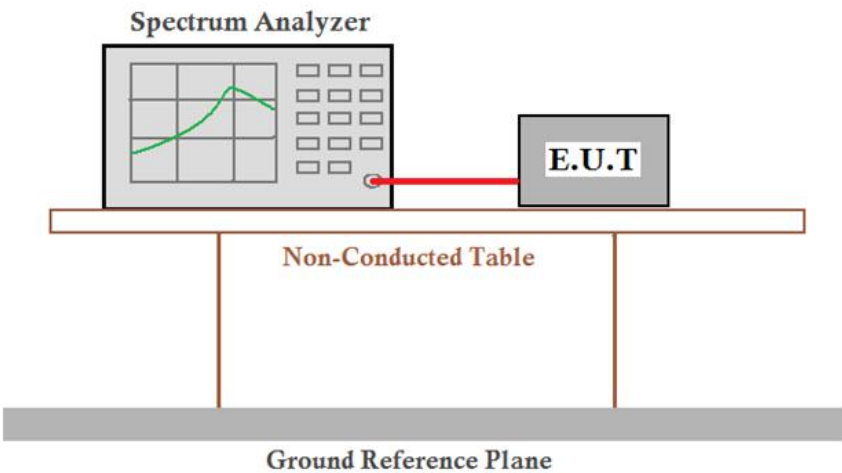
TestMode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥ 15	PASS
2DH5	Ant1	Hop	79	≥ 15	PASS
3DH5	Ant1	Hop	79	≥ 15	PASS

Test Graphs





5.7 Dwell Time

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 <i>Remark: Offset=Cable loss+ attenuation factor.</i>
Test Mode:	Hopping transmitting with all kind of modulation and all kind of data type.
Limit:	0.4 Second
Test Results:	Pass

Test Result

TestMode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.41	320	0.132	≤0.4	PASS
DH3	Ant1	Hop	1.58	150	0.236	≤0.4	PASS
DH5	Ant1	Hop	2.61	100	0.261	≤0.4	PASS
2DH1	Ant1	Hop	0.42	330	0.14	≤0.4	PASS
2DH3	Ant1	Hop	1.62	160	0.259	≤0.4	PASS
2DH5	Ant1	Hop	2.61	100	0.261	≤0.4	PASS
3DH1	Ant1	Hop	0.43	320	0.138	≤0.4	PASS
3DH3	Ant1	Hop	1.41	140	0.198	≤0.4	PASS
3DH5	Ant1	Hop	2.60	130	0.338	≤0.4	PASS

Remark:

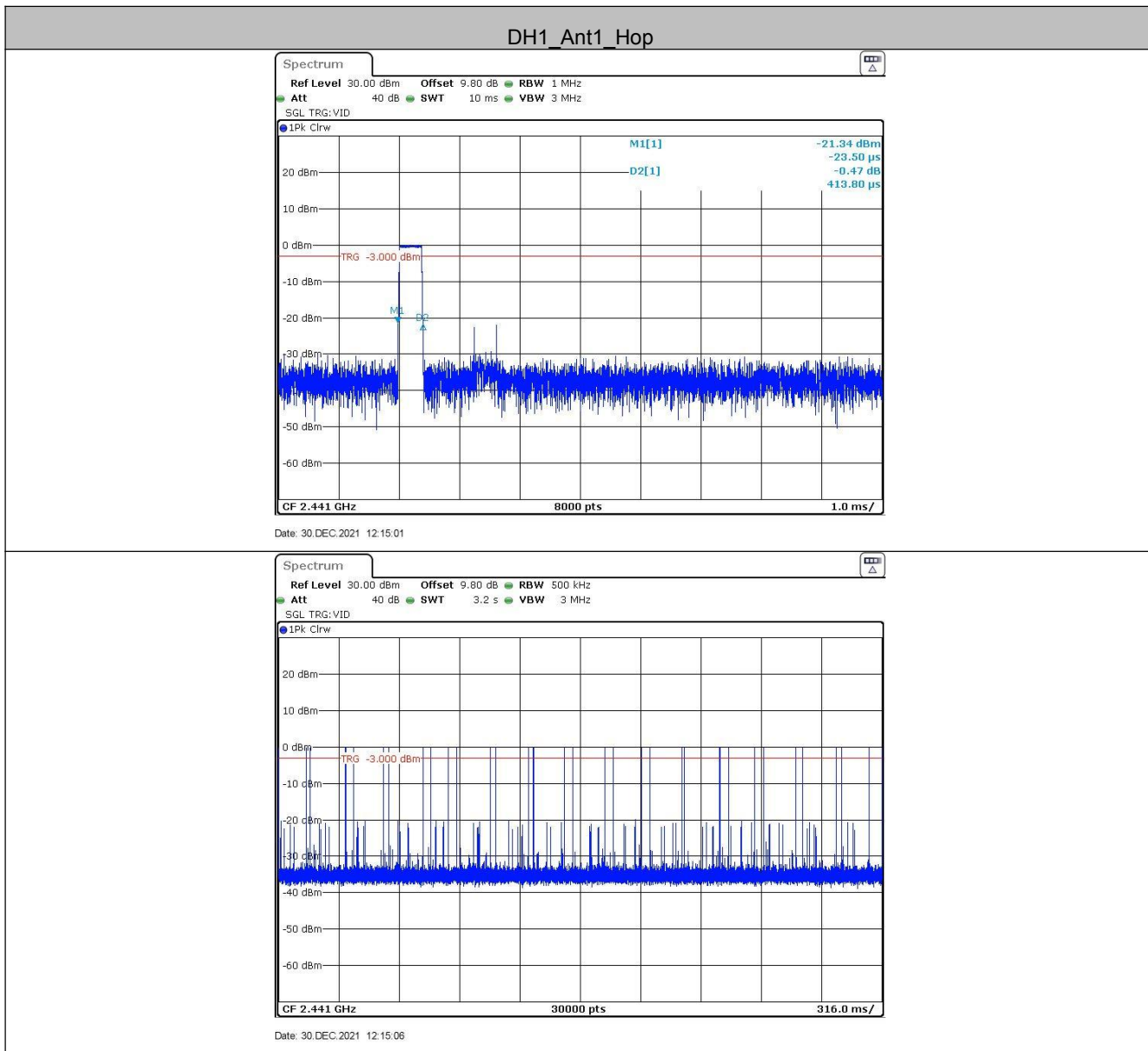
The test period: $T = 0.4 \text{ Second/Channel} \times 79 \text{ Channel} = 31.6 \text{ s}$

DH1/2DH1/3DH1 Dwell time = Burst Width(ms)*(1600/ (2*79))*31.6

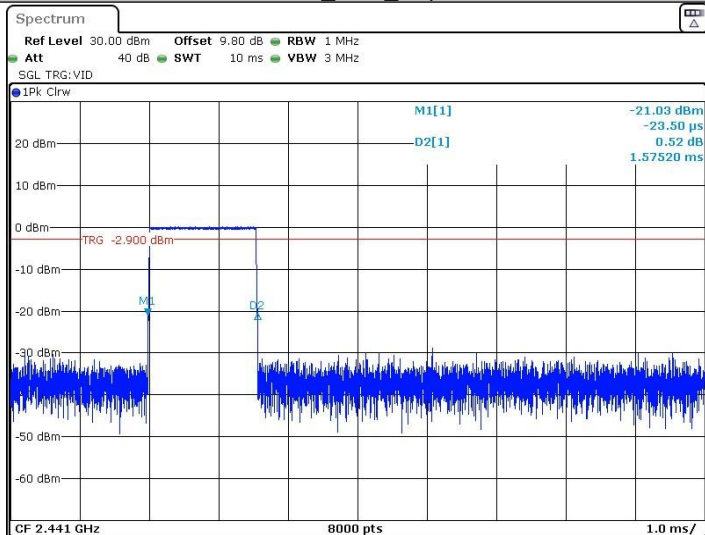
DH3/2DH3/3DH3 Dwell time = Burst Width (ms)*(1600/ (4*79))*31.6

DH5/2DH5/3DH5 Dwell time = Burst Width (ms)*(1600/ (6*79))*31.6

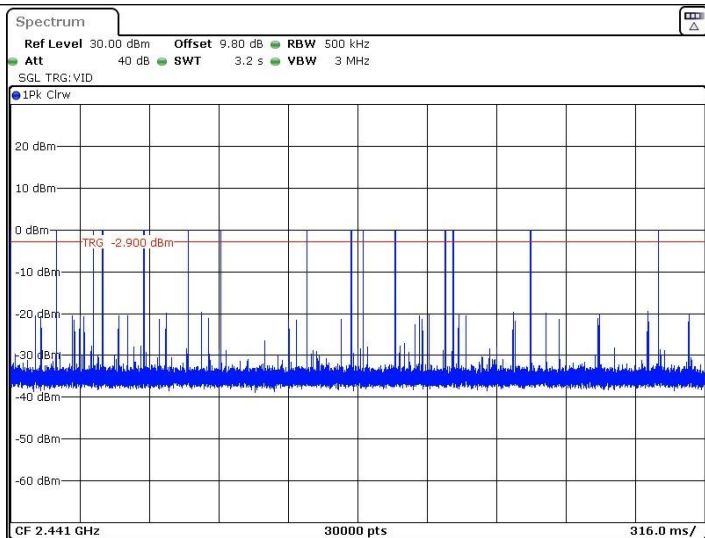
5.7.1 Test Graphs



DH3_Ant1_Hop

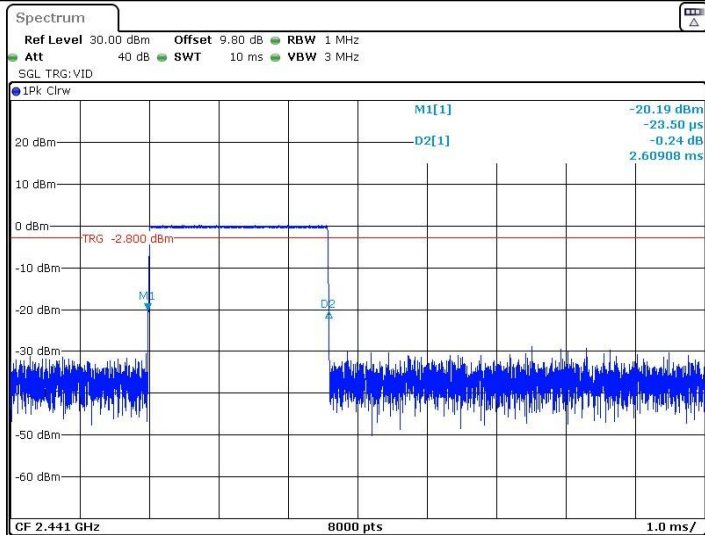


Date: 30.DEC.2021 02:37:29



Date: 30.DEC.2021 02:37:34

DH5_Ant1_Hop



Date: 30.DEC.2021 02:36:24