

## TEST REPORT

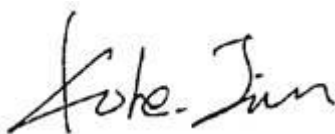
**Application No.:** GZCR2104020102AT  
**Applicant:** The House of Marley.LLC  
**Address of Applicant:** 3000 Pontiac Trail, Commerce Township, Michigan 48390 United States  
**Manufacturer:** The House of Marley.LLC  
**Address of Manufacturer:** 3000 Pontiac Trail, Commerce Township, Michigan 48390 United States  
**Factory:**  
 1. Dongguan Kailai Electronic Co., Ltd.  
 2. YING TONG (VIETNAM) ELECTRONIC TECHNOLOGY COMPANY LIMITED  
**Address of Factory:**  
 1. Building 2, No.6, Baisha Road, Changping, Dongguan City, Guangdong Province, China  
 2. Plot No. CN02-1-2, Lot No. CN02, Binh Xuyen II Industrial Park, Ba Hien Commune, Binh Xuyen District, Vinh Phuc Province, Vietnam

**Equipment Under Test (EUT):**

**EUT Name:** Rebel  
**Model No.:** EM-JE121R  
**Trade Mark:** MARLEY  
**Standard(s) :** 47 CFR Part 15, Subpart C 15.247  
**Date of Receipt:** 2021-04-12  
**Date of Test:** 2021-04-19 to 2021-05-12  
**Date of Issue:** 2021-05-14

<b>Test Result:</b>	<b>Pass*</b>
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\* In the configuration tested, the EUT complied with the standards specified above.



Kobe Jian  
EMC Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-05-14		Original

Authorized for issue by:			
Tested By		Kevin Zhang	
		Kevin Zhang/Project Engineer	
Reviewed By		Ricky Liu	
		Ricky Liu/Reviewer	

## 2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass
Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(1)	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.7	47 CFR Part 15, Subpart C 15.247(a)(1)	Pass
Carrier Frequencies Separation	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.2	47 CFR Part 15, Subpart C 15.247a(1)	Pass
Hopping Channel Number	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Dwell Time	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.6	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.8	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass

**Note:**

E.U.T./EUT means Equipment Under Test.

N/A: Not applicable.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.



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## 4 General Information

### 4.1 Details of E.U.T.

Power supply: DC 3.7 V powered by built-in battery as below for normal working:  
Model: Lir1254  
Rated: DC 3.6 V, 65 mAh  
DC 5 V for charging

Cable(s): DC input ports

Function: Earphone with BT function

Operation Frequency: 2402MHz to 2480MHz

Bluetooth Version: V5.1 Classic

Modulation Type: GFSK,  $\pi$ /4DQPSK, 8DPSK

Number of Channels: 79

Channel Spacing: 1MHz

Spectrum Spread Technology: Frequency Hopping Spread Spectrum(FHSS)

Antenna Type: FPC Antenna

Antenna Gain: 0.87 dBi declared by applicant

Software Version: V0T

Hardware Version: V0G

Testing Software: BlueTest3.exe

Sample NO.: GZ\_SP\_20210418060

Power Setting: 10 (11 dBm) can not changed by user

### 4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
MacBook Air	APPLE	Apple A1370	C02GR7BPDJYD



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#### 4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at AC Power Line (150kHz-30MHz)	3.12dB
Conducted Peak Output Power	± 0.75dB
20dB Bandwidth	± 3%
Carrier Frequencies Separation	± 7.25 x 10 <sup>-8</sup>
Hopping Channel Number	± 7.25 x 10 <sup>-8</sup>
Dwell Time	± 0.37%
Conducted Band Edges Measurement	± 0.75dB
Conducted Spurious Emissions	± 0.75dB
Radiated Emissions which fall in the restricted bands	± 4.5dB (Below 1GHz); ± 4.8dB (Above 1GHz)
Radiated Spurious Emissions	± 4.5dB (Below 1GHz); ± 4.8dB (Above 1GHz)
<p>Remark:</p> <p>The U<sub>lab</sub> (lab Uncertainty) is less than U<sub>cispr</sub> (CISPR Uncertainty), so the test results</p> <ul style="list-style-type: none"> <li>– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;</li> <li>– non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.</li> </ul>	

#### 4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,  
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,  
Guangzhou, China 510663

Tel: +86 20 82155555

Fax: +86 20 82075059

No tests were sub-contracted.

#### 4.5 Test Facility

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

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

- **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

#### 4.6 Deviation from Standards

None

#### 4.7 Abnormalities from Standard Conditions

None



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## 5 Equipment List

Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test Receiver(9kHz-2.75GHz)	Rohde & Schwarz	ESCS30	EMC0506	2020-11-13	2021-11-12
Shielding Room	ChangZhou ZhongYu	8m x 3m x 3.8m	EMC0306	N/A	N/A
Two-Line V-Network	Rohde & Schwarz	ENV216	EMC0118	2021-01-08	2022-01-06
Coaxial Cable	HangTianXing	2m	EMC0107	2020-09-09	2022-09-08
Test Software E3c	Audix	Ver. 5.4.1221b	GZE100-62	N/A	N/A

Conducted Peak Output Power					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01

20dB Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01

Carrier Frequencies Separation					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01



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**Hopping Channel Number**

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01

**Dwell Time**

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01

**Conducted Band Edges Measurement**

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01

**Conducted Spurious Emissions**

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01



**Radiated Emissions which fall in the restricted bands**

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Chamber cable	HangTianXing	N/A	EMC0542	2019-06-28	2021-06-27
Horn Antenna(1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2019-09-25	2022-09-24
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2021-01-08	2022-01-07
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2021-01-08	2022-01-07
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
MXE EMI Receiver(10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2020-11-13	2021-11-12
EXA Signal Analyzer(10Hz-44GHz)	Keysight	N9010A	EMC2138	2020-09-17	2021-09-16
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Notch Filter (5150-5880)	Mico-Tronics	BRM50716	EMC2168	2020-07-29	2021-07-28
Signal Analyzer (20Hz-26.5GHz)	Rohde & Schwarz	FISQ 26	EMC0069	2020/11/13	2021/11/12

**Radiated Spurious Emissions**

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test Receiver(10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-01-08	2022-01-07
Chamber cable	HangTianXing	N/A	EMC0542	2019-06-28	2021-06-27
Trilog Broadband Antenna(25MHz-1GHz)- Lab	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	SEM003-18	2019-02-22	2022-02-22
Amplifier(9kHz-1.3GHz)	HP	8447F	EMC2065	2020-05-26	2021-05-25
Active Loop Antenna- RED	ETS-Lindgren	6502	EMC2190	2019-12-27	2021-12-26
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

**General used equipment**

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2020-07-09	2021-07-08
DMM	Fluke	73	EMC0007	2020-07-09	2021-07-08



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## 6 Radio Spectrum Technical Requirement

### 6.1 Antenna Requirement

#### 6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

#### 6.1.2 Conclusion

Standard Requirement: Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level. When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer. 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 integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0.87 dBi.

Please refer to internal photos.



## 6.2 Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence

### 6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)

### 6.2.2 Conclusion

Standard Requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1):

According to Technical Specification, the pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones.

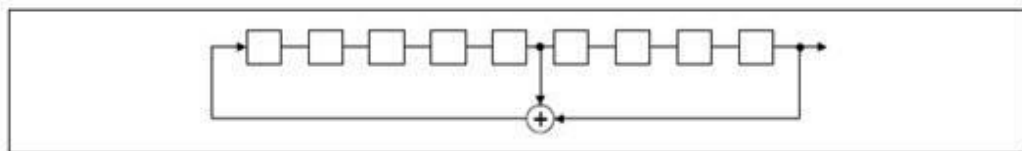
> Number of shift register stages: 9

> Length of pseudo-random sequence:  $2^9 - 1 = 511$  bits

> Longest sequence of zeros: 8 (non-inverted signal)

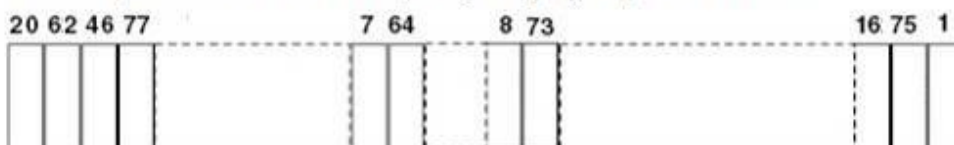
Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



*Linear Feedback Shift Register for Generation of the PRBS sequence*

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.

According to Technical Specification, the receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g):

According to Technical Specification, the system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

Compliance for section 15.247(h):

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels.

The system is designed not have the ability to coordinated with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.



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## 7 Radio Spectrum Matter Test Results

### 7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement: 47 CFR Part 15, Subpart C 15.247

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Frequency of emission(MHz)	Conducted limit(dBμV)	
	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.

Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

#### 7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 24.8 °C

Humidity: 51.9 % RH

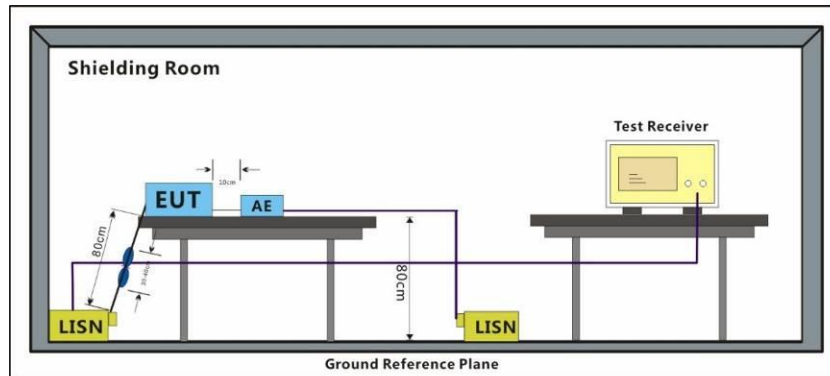
Atmospheric Pressure: 1010 mbar

#### 7.1.2 Test Mode Description

Pre-scan / Mode Description  
 Final test Code

Final test 01 Charging by USB ports of charger

#### 7.1.3 Test Setup Diagram



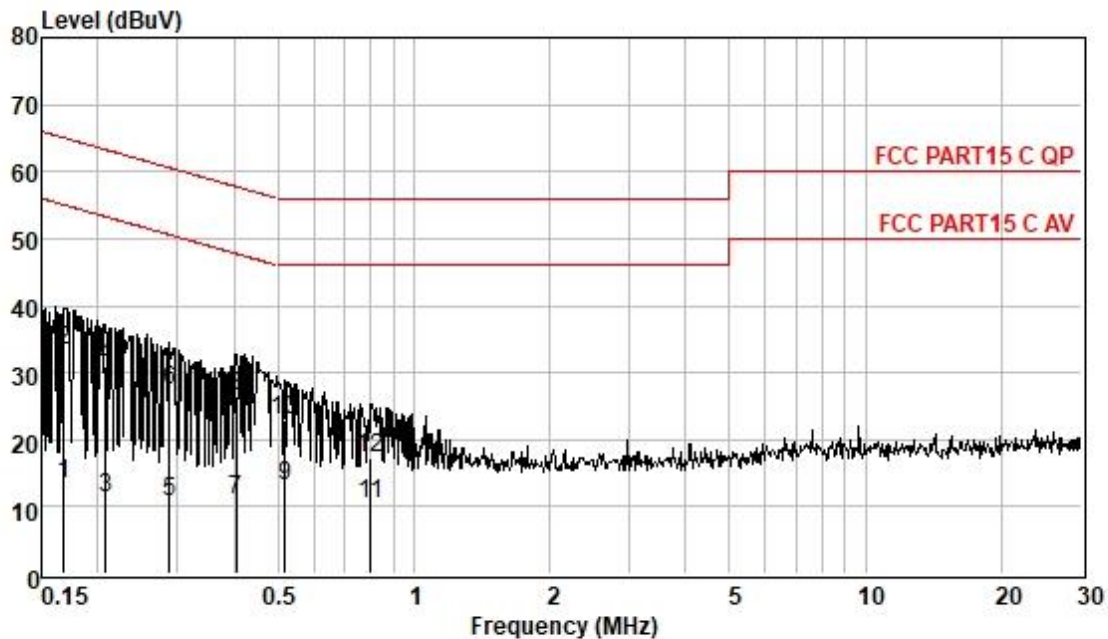
#### 7.1.4 Measurement Procedure and Data

- 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 50ohm/50μH + 5ohm 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 on conducted measurement.

Remark: LISN=Read Level+ Cable Loss+ LISN Factor



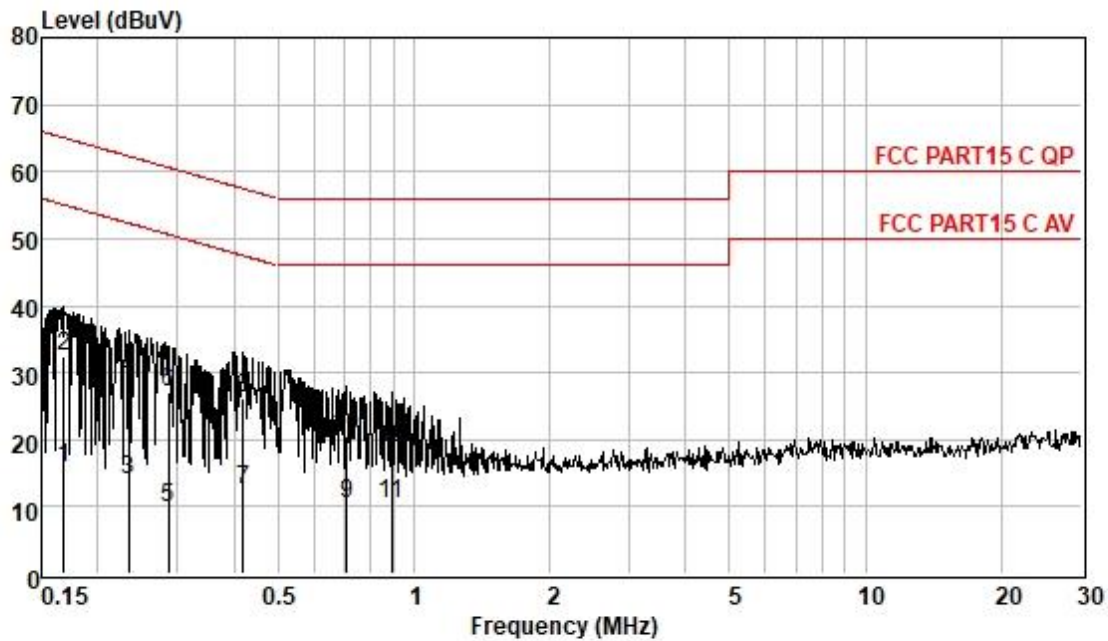
Test Mode: 01; Line: Live line



Pol : LINE  
Mode :  
Model :

Frequency MHz	Read Level dBUV	Cable Loss dB	LISN Factor dB	Measured Level dBUV	Limit Line dBUV	Over Limit dB	Remark
0.17	3.85	0.06	9.62	13.53	55.03	-41.50	Average
0.17	23.50	0.06	9.62	33.18	65.03	-31.85	QP
0.21	1.48	0.06	9.63	11.17	53.27	-42.10	Average
0.21	21.28	0.06	9.63	30.97	63.27	-32.30	QP
0.29	0.92	0.06	9.62	10.60	50.59	-39.99	Average
0.29	17.79	0.06	9.62	27.47	60.59	-33.12	QP
0.40	1.27	0.06	9.62	10.95	47.77	-36.82	Average
0.40	16.65	0.06	9.62	26.33	57.77	-31.44	QP
0.52	3.27	0.07	9.63	12.97	46.00	-33.03	Average
0.52	13.23	0.07	9.63	22.93	56.00	-33.07	QP
0.80	0.73	0.07	9.63	10.43	46.00	-35.57	Average
0.80	7.56	0.07	9.63	17.26	56.00	-38.74	QP

Test Mode: 01; Line: Neutral Line



Pol : NEUTRAL  
Mode :  
Model :

Frequency MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
0.17	6.27	0.06	9.55	15.88	55.03	-39.15	Average
0.17	22.71	0.06	9.55	32.32	65.03	-32.71	QP
0.23	4.36	0.06	9.55	13.97	52.30	-38.33	Average
0.23	19.57	0.06	9.55	29.18	62.30	-33.12	QP
0.29	0.35	0.06	9.54	9.95	50.63	-40.68	Average
0.29	17.57	0.06	9.54	27.17	60.63	-33.46	QP
0.42	2.74	0.06	9.56	12.36	47.46	-35.10	Average
0.42	16.43	0.06	9.56	26.05	57.46	-31.41	QP
0.71	0.85	0.07	9.55	10.47	46.00	-35.53	Average
0.71	10.92	0.07	9.55	20.54	56.00	-35.46	QP
0.89	0.80	0.07	9.55	10.42	46.00	-35.58	Average
0.89	9.20	0.07	9.55	18.82	56.00	-37.18	QP

### 7.2 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(1)

Test Method: ANSI C63.10 (2013) Section 7.8.5

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for $\geq 50$ hopping channels
	0.25 for $25 \leq$ hopping channels $< 50$
	1 for digital modulation
2400-2483.5	1 for $\geq 75$ non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

#### 7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 26.1 °C

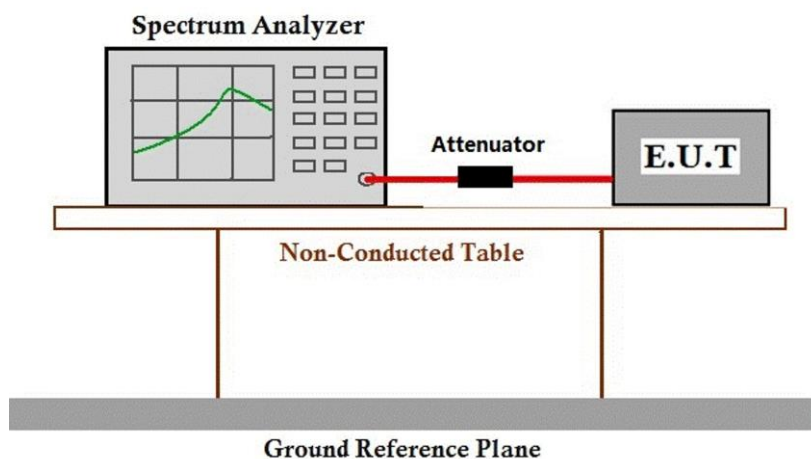
Humidity: 60.5 % RH

Atmospheric Pressure: 1010 mbar

#### 7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

#### 7.2.3 Test Setup Diagram



#### 7.2.4 Measurement Procedure and Data

Please Refer To Appendix For Details





### 7.3 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247(a)(1)  
Test Method: ANSI C63.10 (2013) Section 7.8.7

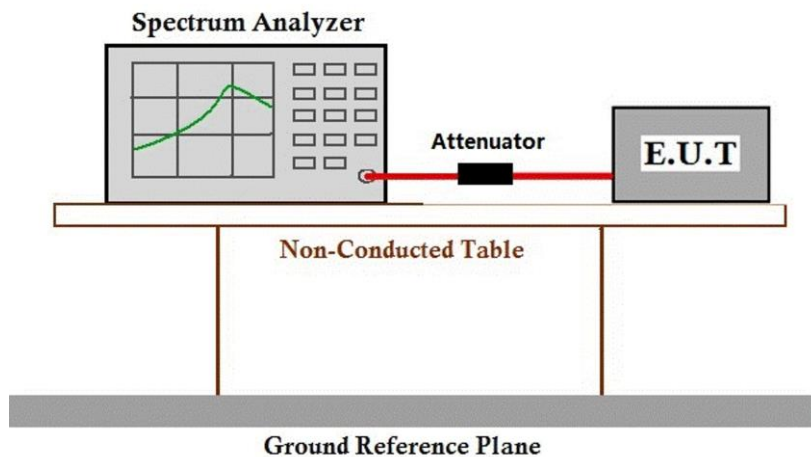
#### 7.3.1 E.U.T. Operation

Operating Environment:  
Temperature: 26.1 °C Humidity: 60.5 % RH Atmospheric Pressure: 1010 mbar

#### 7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, $\pi/4$ QPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

#### 7.3.3 Test Setup Diagram



#### 7.3.4 Measurement Procedure and Data

Please Refer To Appendix For Details



### 7.4 Carrier Frequencies Separation

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)

Test Method: ANSI C63.10 (2013) Section 7.8.2

Limit:

2/3 of the 20dB bandwidth base on the transmission power is less than 0.125W.

#### 7.4.1 E.U.T. Operation

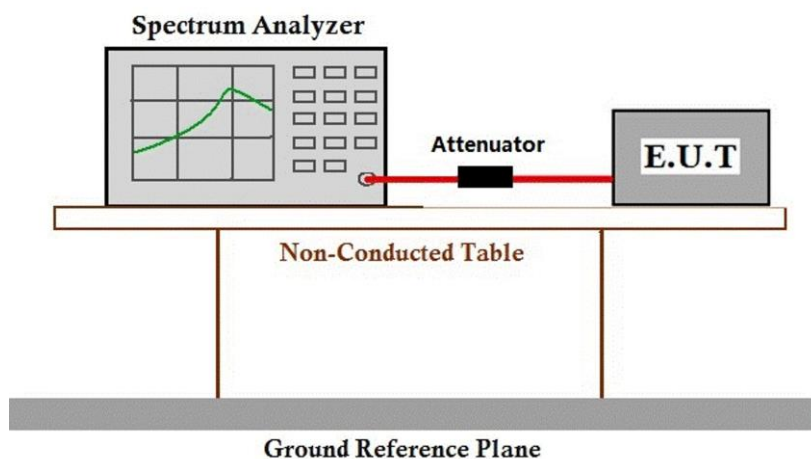
Operating Environment:

Temperature: 26.1 °C Humidity: 60.5 % RH Atmospheric Pressure: 1010 mbar

#### 7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

#### 7.4.3 Test Setup Diagram



#### 7.4.4 Measurement Procedure and Data

Please Refer To Appendix For Details

### 7.5 Hopping Channel Number

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)

Test Method: ANSI C63.10 (2013) Section 7.8.3

Limit:

Frequency range(MHz)	Number of hopping channels (minimum)
902-928	50 for 20dB bandwidth <250kHz
	25 for 20dB bandwidth ≥250kHz
2400-2483.5	15
5725-5850	75

#### 7.5.1 E.U.T. Operation

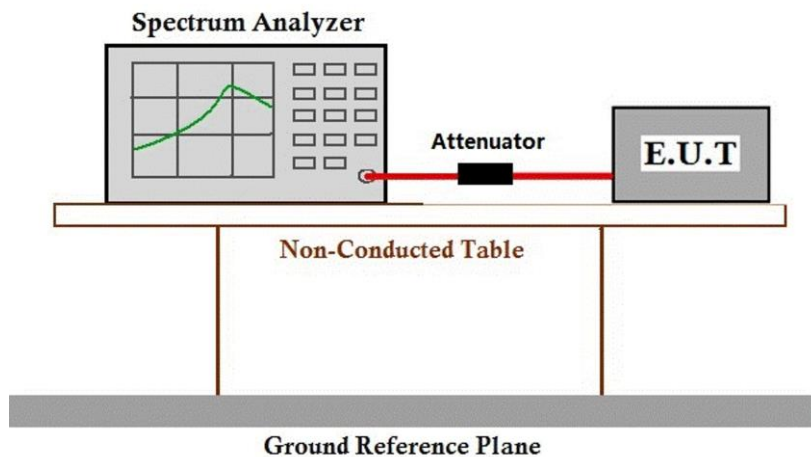
Operating Environment:

Temperature: 26.1 °C Humidity: 60.5 % RH Atmospheric Pressure: 1010 mbar

#### 7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

#### 7.5.3 Test Setup Diagram



#### 7.5.4 Measurement Procedure and Data

Please Refer To Appendix For Details

### 7.6 Dwell Time

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)

Test Method: ANSI C63.10 (2013) Section 7.8.4

Limit:

Frequency(MHz)	Limit
902-928	0.4s within a 20s period(20dB bandwidth<250kHz)
	0.4s within a 10s period(20dB bandwidth≥250kHz)
2400-2483.5	0.4s within a period of 0.4s multiplied by the number of hopping channels
5725-5850	0.4s within a 30s period

#### 7.6.1 E.U.T. Operation

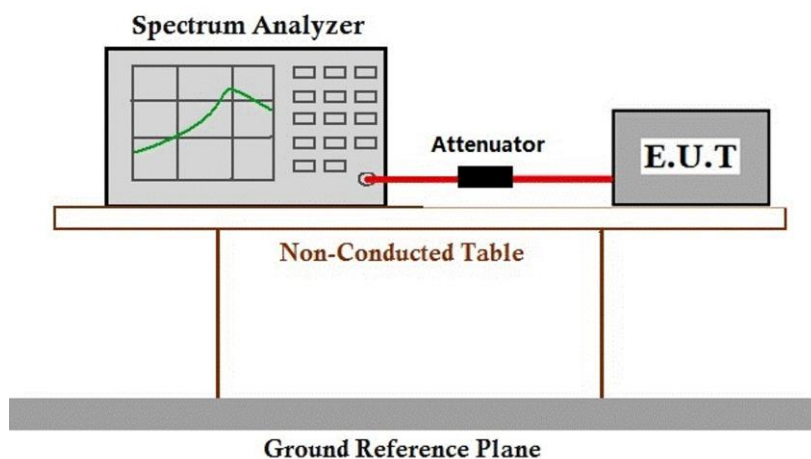
Operating Environment:

Temperature: 26.1 °C Humidity: 60.5 % RH Atmospheric Pressure: 1010 mbar

#### 7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

#### 7.6.3 Test Setup Diagram



#### 7.6.4 Measurement Procedure and Data

Please Refer To Appendix For Details



### 7.7 Conducted Band Edges Measurement

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)

Test Method: ANSI C63.10 (2013) Section 7.8.6

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

#### 7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 26.1 °C

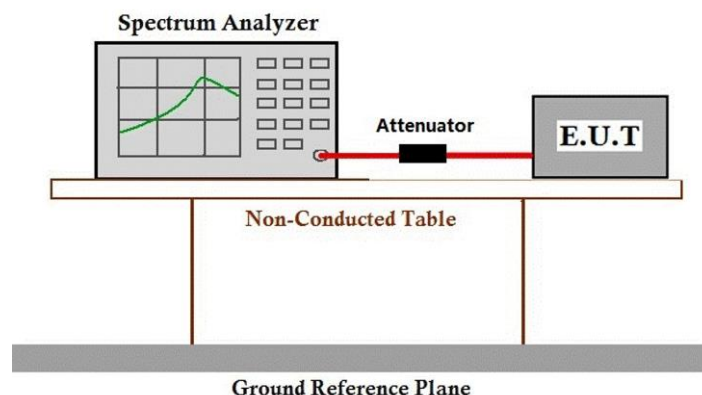
Humidity: 60.5 % RH

Atmospheric Pressure: 1010 mbar

#### 7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.
Final test	03	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

#### 7.7.3 Test Setup Diagram



#### 7.7.4 Measurement Procedure and Data

Please Refer To Appendix For Details



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### 7.8 Conducted Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)

Test Method: ANSI C63.10 (2013) Section 7.8.8

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

#### 7.8.1 E.U.T. Operation

Operating Environment:

Temperature: 26.1 °C

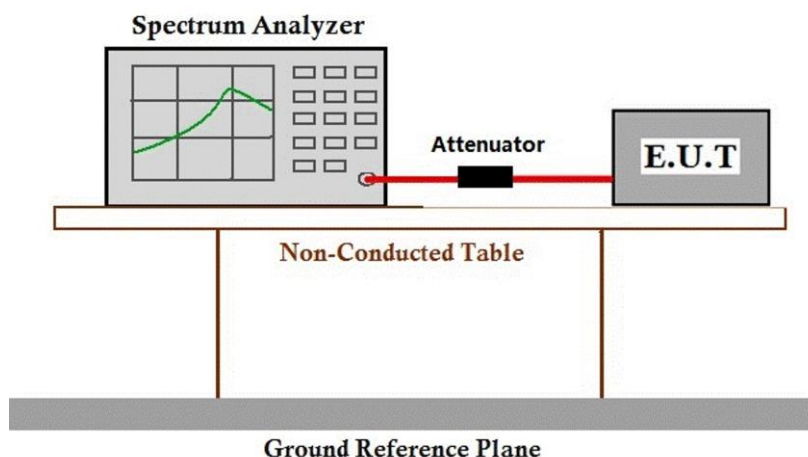
Humidity: 60.5 % RH

Atmospheric Pressure: 1010 mbar

#### 7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

#### 7.8.3 Test Setup Diagram



#### 7.8.4 Measurement Procedure and Data

Please Refer To Appendix For Details



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Guangzhou branch Technical Services EEC Laboratory. 中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

### 7.9 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.10.5

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

#### 7.9.1 E.U.T. Operation

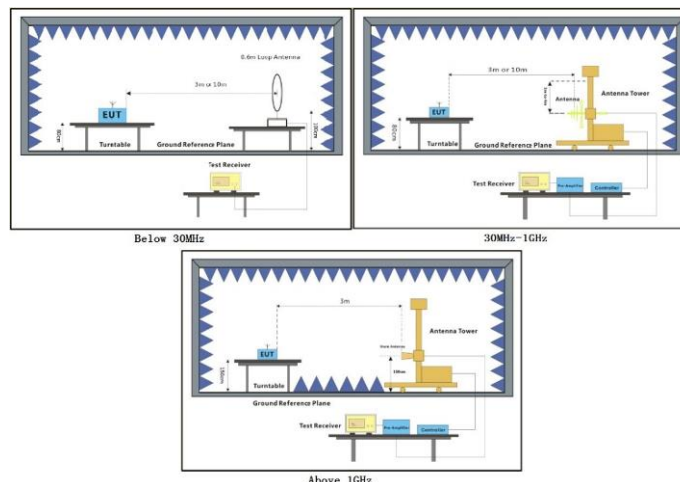
Operating Environment:

Temperature: 24.3 °C Humidity: 51.0 % RH Atmospheric Pressure: 1010 mbar

#### 7.9.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 02	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

#### 7.9.3 Test Setup Diagram



#### 7.9.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

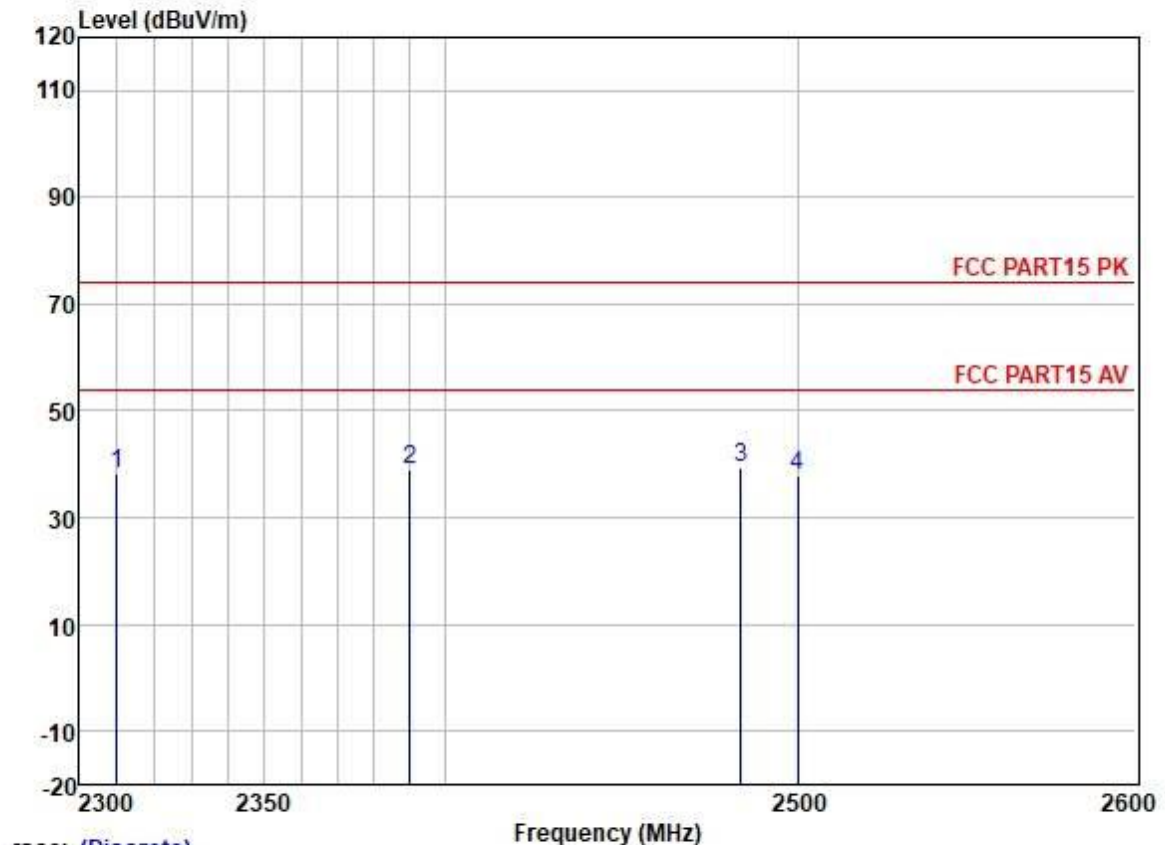
Remark 3: Antenna: 3 denotes the type of antenna for above 1000MHz.



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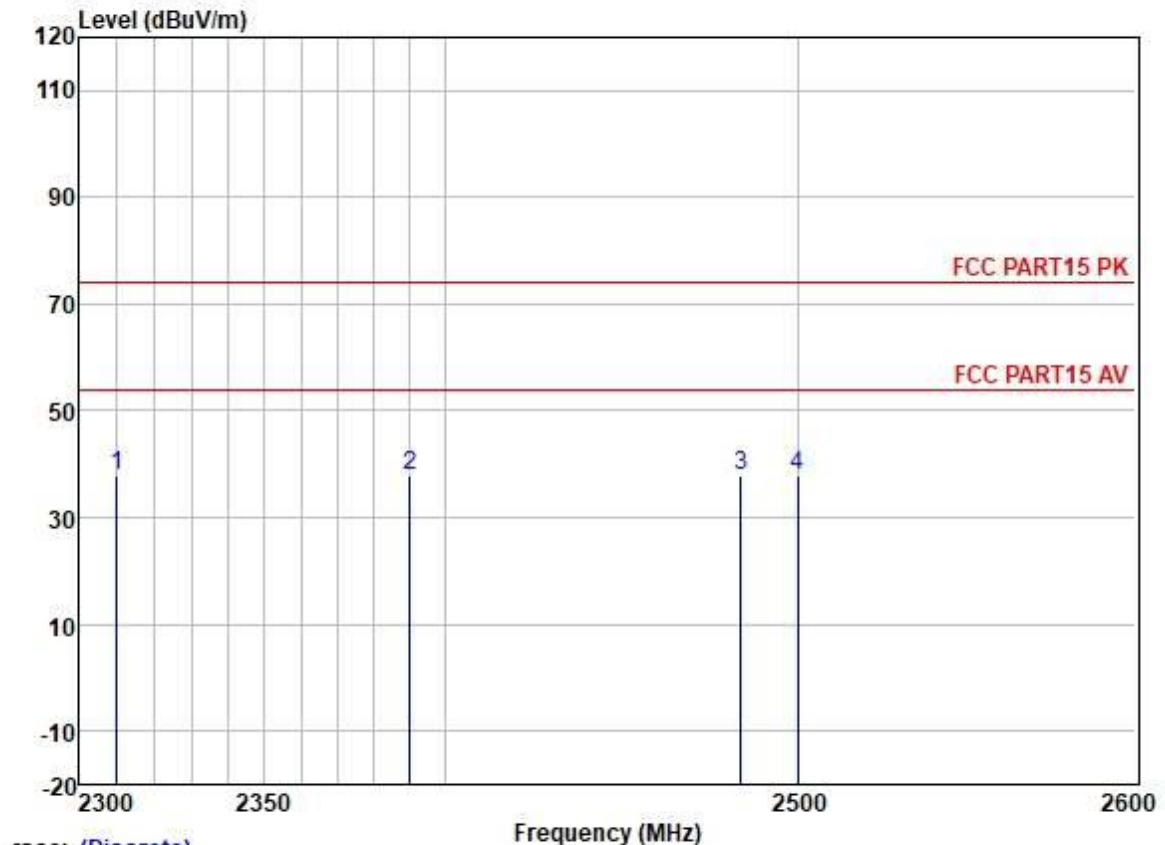
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; ; Channel:High; Antenna: 3





Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low; Antenna: 3



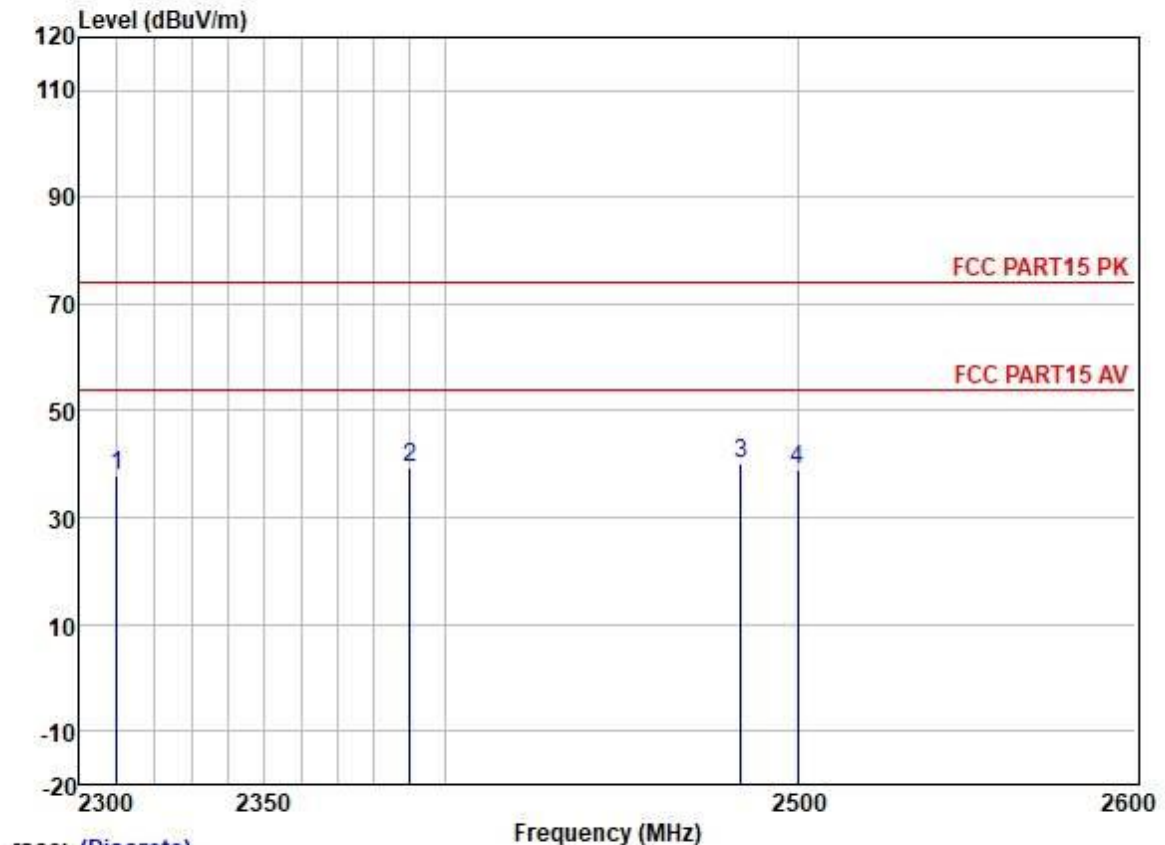
	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over		
	MHz	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2310.000	44.88	27.15	3.32	37.62	37.73	74.00	-36.27	HORIZONTAL Peak
2	2390.000	44.76	27.33	3.48	37.59	37.98	74.00	-36.02	HORIZONTAL Peak
3	2483.500	44.36	27.48	3.53	37.57	37.80	74.00	-36.20	HORIZONTAL Peak
4	2500.000	44.50	27.50	3.40	37.56	37.84	74.00	-36.16	HORIZONTAL Peak



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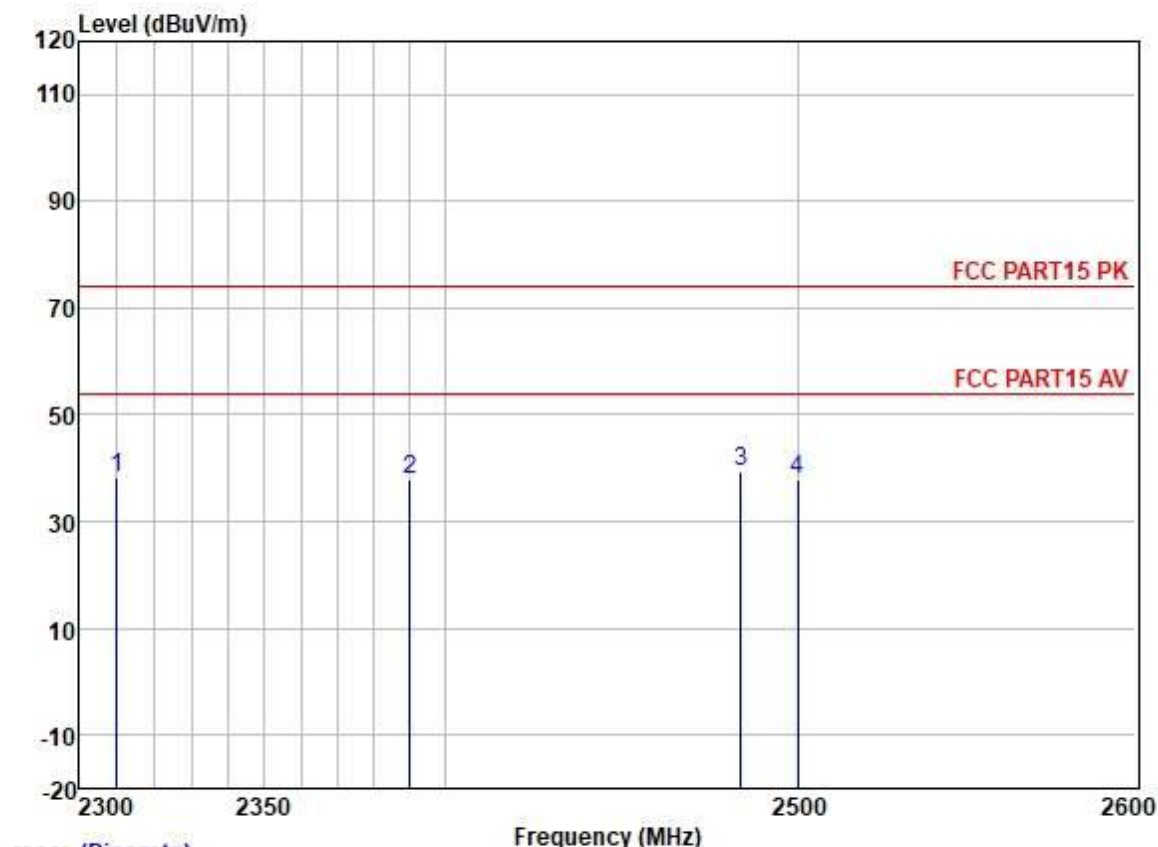
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; ; Channel:High; Antenna: 3



	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over		
	MHz	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2310.000	45.06	27.15	3.32	37.62	37.91	74.00	-36.09	VERTICAL Peak
2	2390.000	46.04	27.33	3.48	37.59	39.26	74.00	-34.74	VERTICAL Peak
3	2483.500	46.70	27.48	3.53	37.57	40.14	74.00	-33.86	VERTICAL Peak
4	2500.000	45.49	27.50	3.40	37.56	38.83	74.00	-35.17	VERTICAL Peak

Test Mode: 02; Polarity: Vertical; Modulation:GFSK; ; Channel:Low; Antenna: 3



	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over		
	MHz	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2310.000	45.48	27.15	3.32	37.62	38.33	74.00	-35.67	VERTICAL Peak
2	2390.000	44.75	27.33	3.48	37.59	37.97	74.00	-36.03	VERTICAL Peak
3	2483.500	45.79	27.48	3.53	37.57	39.23	74.00	-34.77	VERTICAL Peak
4	2500.000	44.65	27.50	3.40	37.56	37.99	74.00	-36.01	VERTICAL Peak



### 7.10 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

#### 7.10.1 E.U.T. Operation

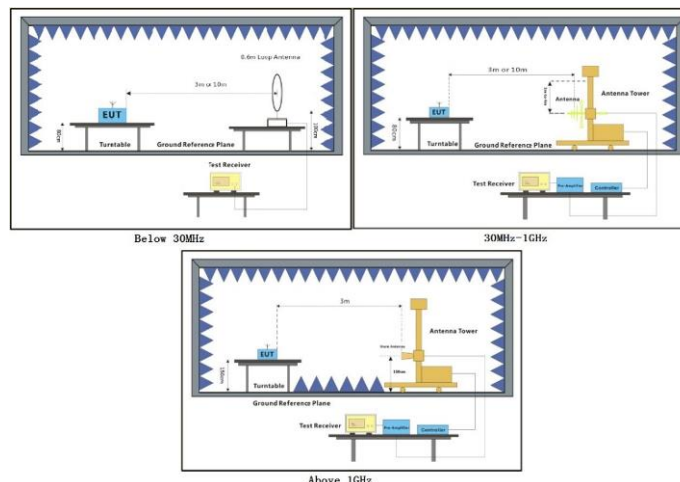
Operating Environment:

Temperature: 23.2 °C Humidity: 55.7 % RH Atmospheric Pressure: 1010 mbar

#### 7.10.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

#### 7.10.3 Test Setup Diagram





#### 7.10.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

#### Remark:

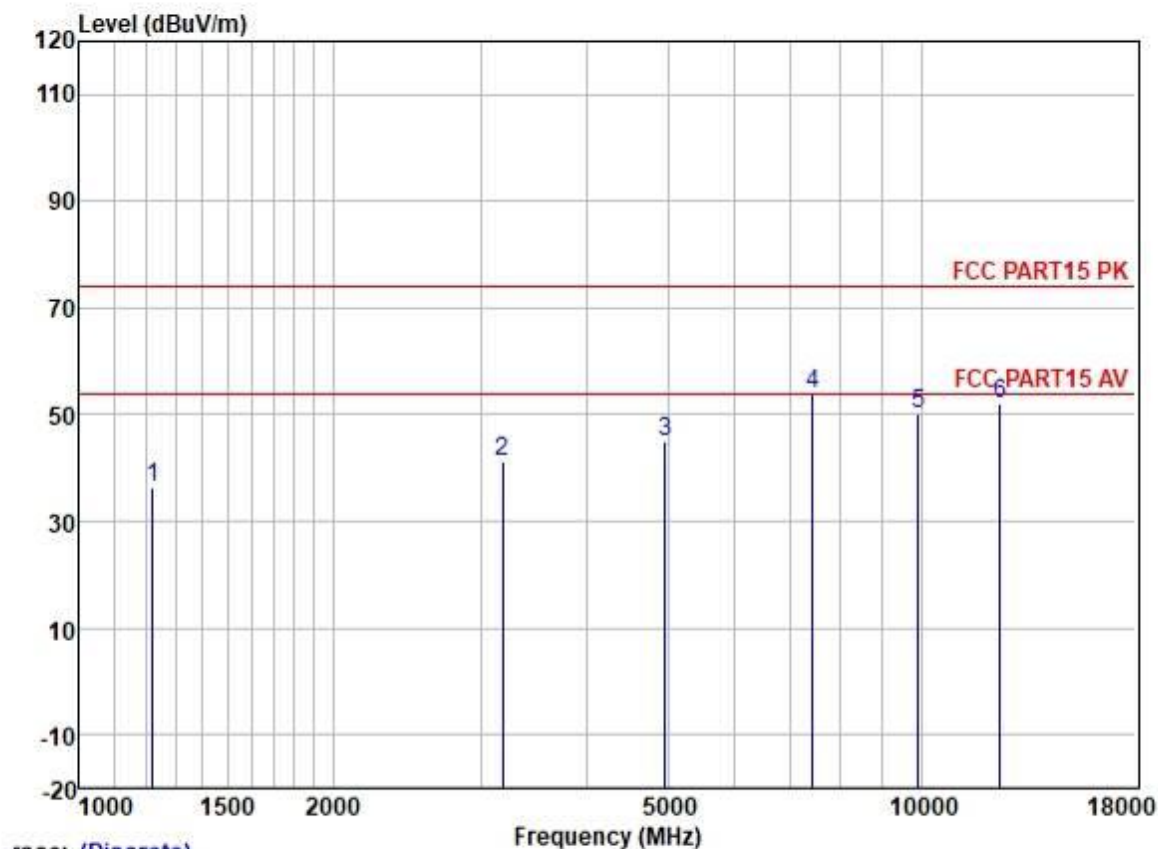
- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:  
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor
- 3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.
- 5) Antenna: 2 denotes the type of antenna for 30-1000MHz; Antenna: 3 denotes the type of antenna for above 1000MHz.



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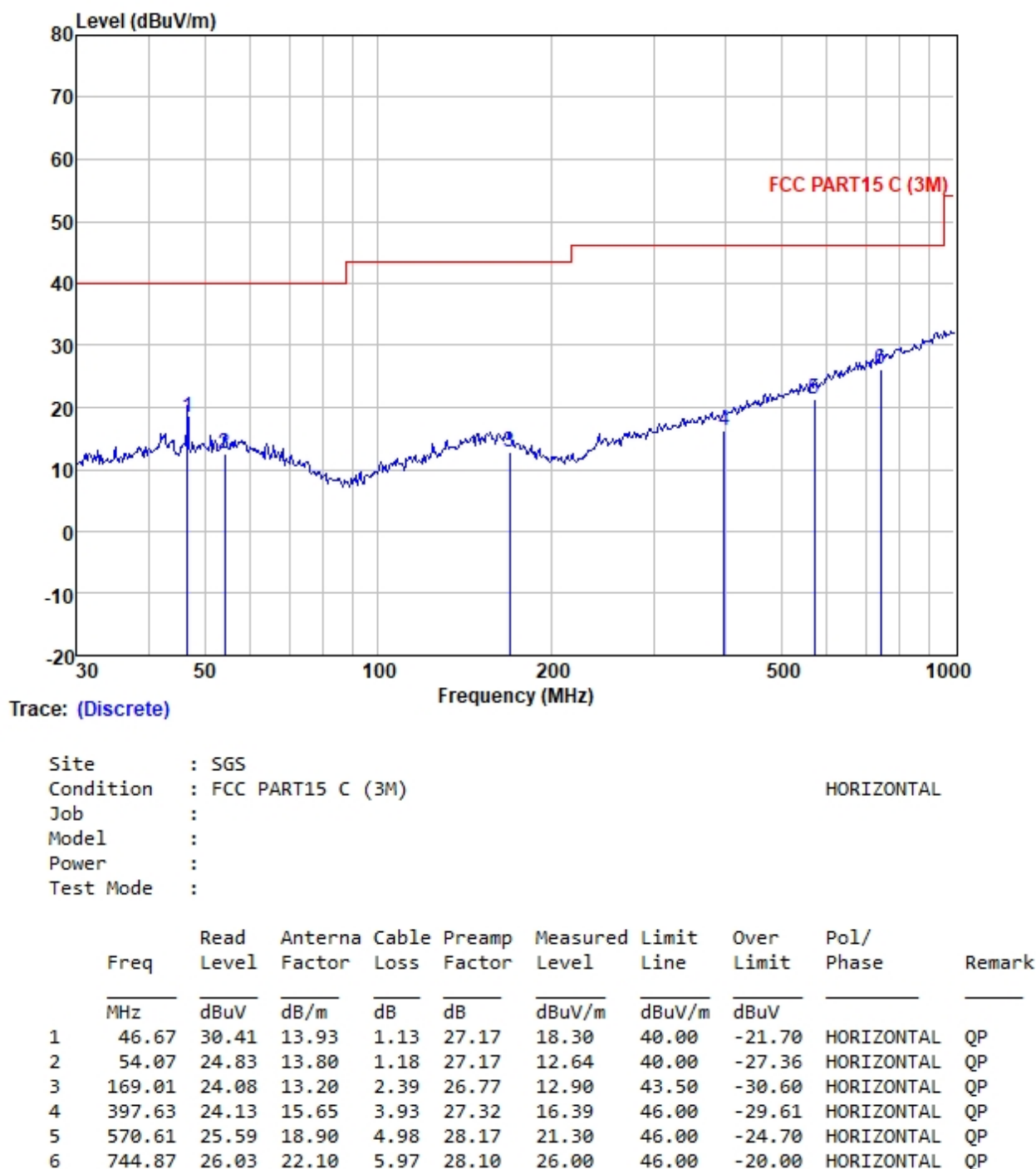
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; ; Channel:High; Antenna: 3



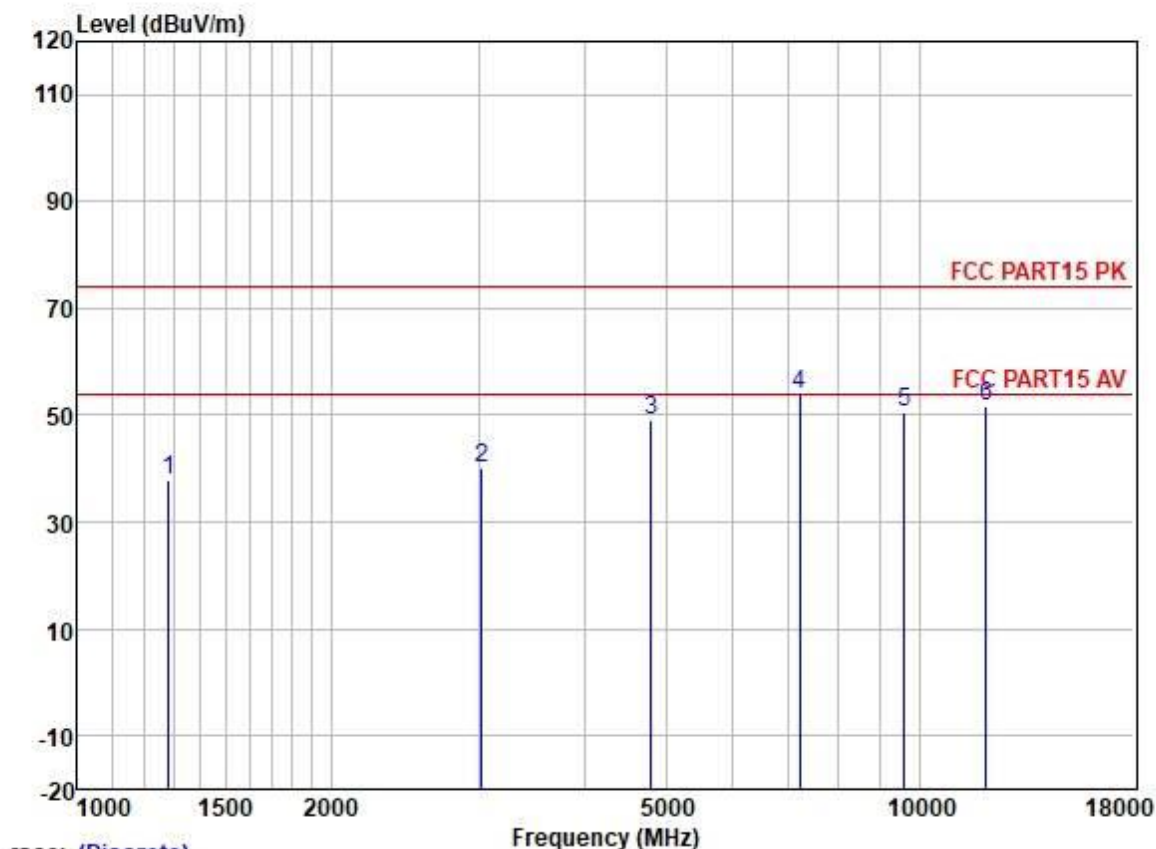
	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over		
	MHz	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1220.714	47.49	24.82	2.32	38.37	36.26	74.00	-37.74	HORIZONTAL Peak
2	3177.672	45.60	28.56	3.99	37.10	41.05	74.00	-32.95	HORIZONTAL Peak
3	4960.443	44.56	31.65	5.65	36.84	45.02	74.00	-28.98	HORIZONTAL Peak
4	7440.070	48.85	36.27	6.22	37.47	53.87	74.00	-20.13	HORIZONTAL Peak
5	9920.725	42.11	38.65	6.96	37.40	50.32	74.00	-23.68	HORIZONTAL Peak
6	12400.310	42.44	38.57	7.97	36.88	52.10	74.00	-21.90	HORIZONTAL Peak

Test Mode: 02; Polarity: Horizontal; Modulation: GFSK; ; Channel: Low; Antenna: 2





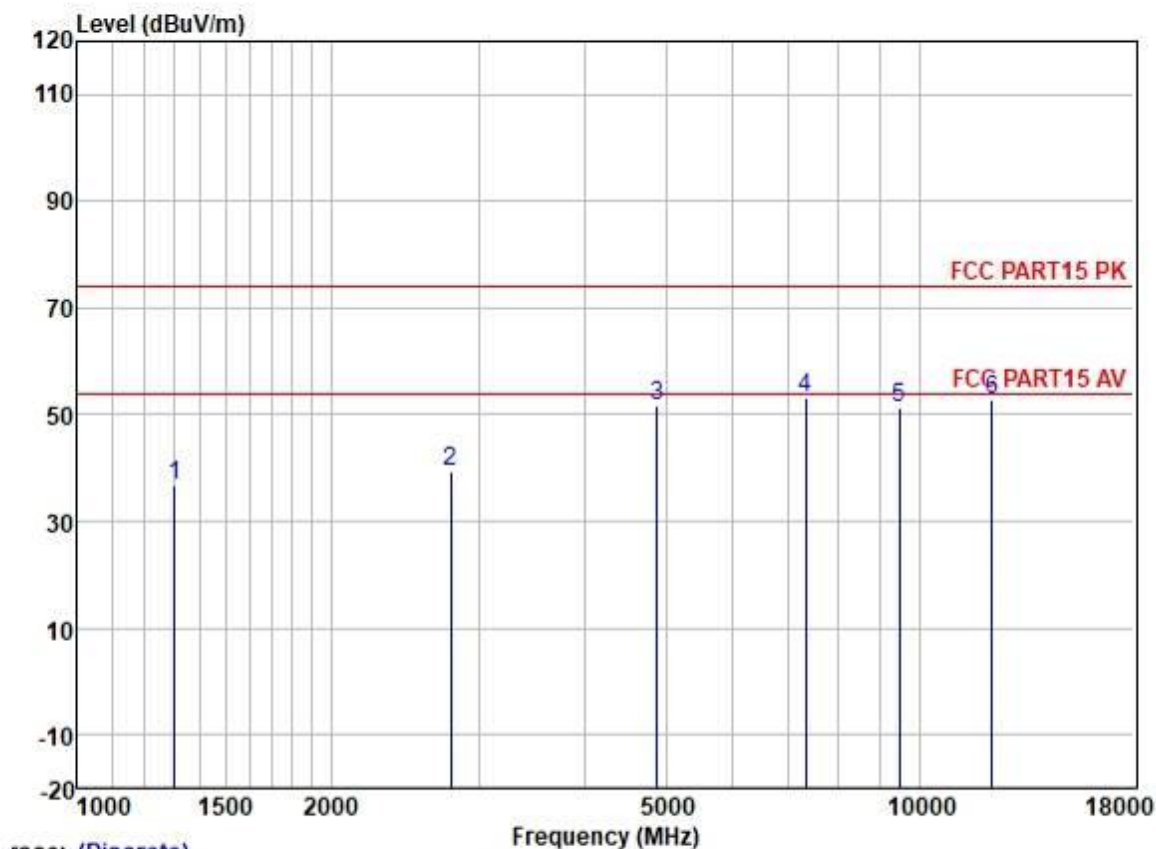
Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low; Antenna: 3



	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over		
	MHz	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1282.193	48.69	25.15	2.52	38.33	38.03	74.00	-35.97	HORIZONTAL Peak
2	3025.306	45.11	28.42	3.82	37.22	40.13	74.00	-33.87	HORIZONTAL Peak
3	4804.271	49.19	31.42	5.40	36.83	49.18	74.00	-24.82	HORIZONTAL Peak
4	7206.292	49.75	35.54	5.98	37.38	53.89	74.00	-20.11	HORIZONTAL Peak
5	9608.292	42.68	38.37	7.07	37.42	50.70	74.00	-23.30	HORIZONTAL Peak
6	12010.020	41.84	38.90	8.19	37.10	51.83	74.00	-22.17	HORIZONTAL Peak

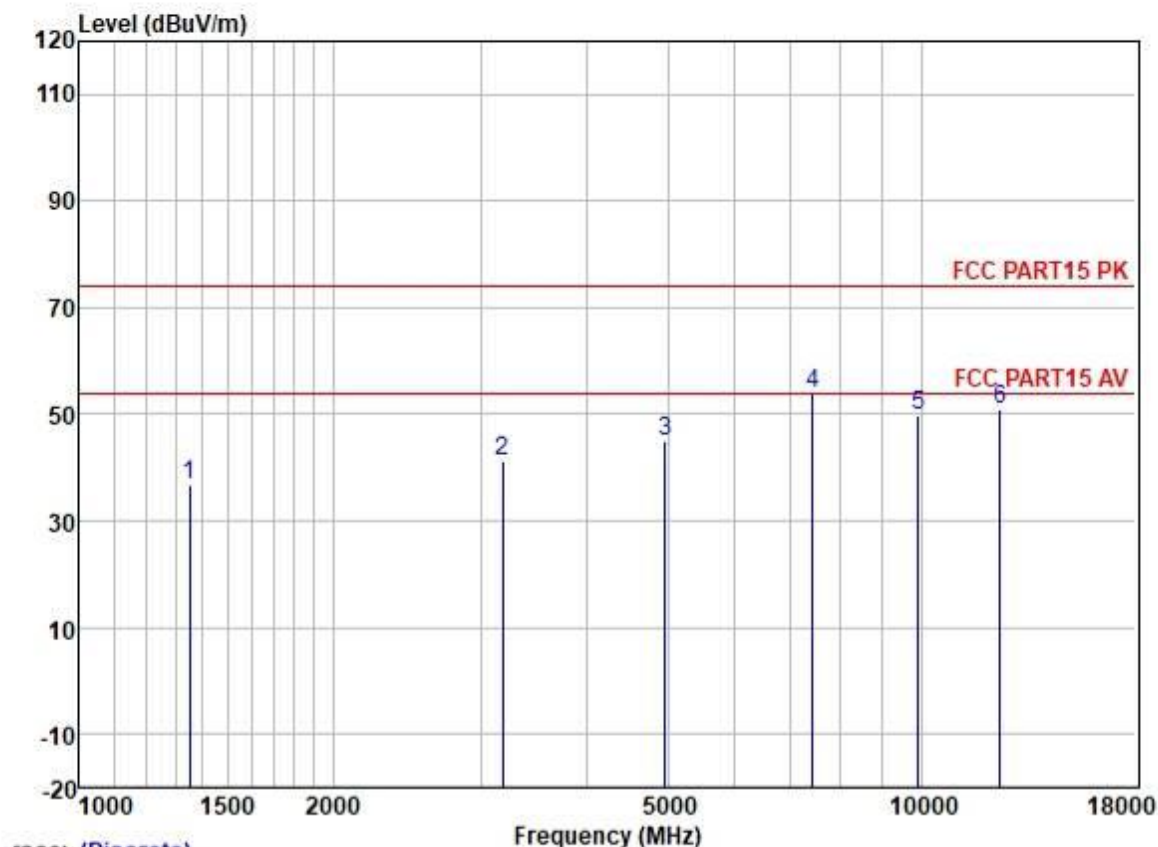


Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; ; Channel:middle; Antenna: 3



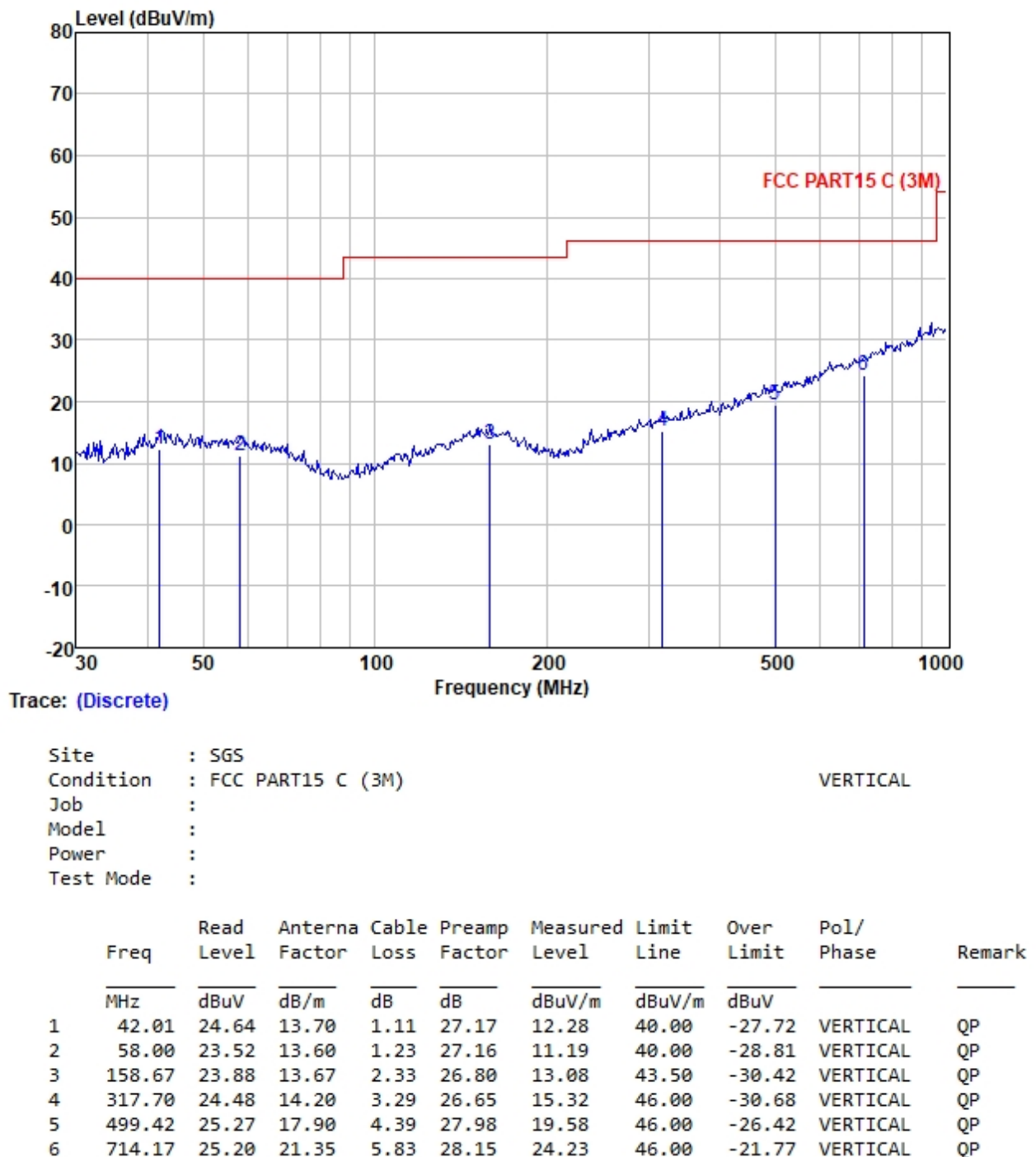
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	MHz	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1304.623	47.42	25.21	2.60	38.31	36.92	74.00	-37.08	HORIZONTAL Peak
2	2774.030	44.98	28.08	3.68	37.43	39.31	74.00	-34.69	HORIZONTAL Peak
3	4882.151	51.35	31.56	5.52	36.84	51.59	74.00	-22.41	HORIZONTAL Peak
4	7323.982	48.41	36.00	6.13	37.43	53.11	74.00	-20.89	HORIZONTAL Peak
5	9464.577	43.52	38.26	7.12	37.43	51.47	74.00	-22.53	HORIZONTAL Peak
6	12205.180	42.85	38.74	8.08	37.00	52.67	74.00	-21.33	HORIZONTAL Peak

Test Mode: 02; Polarity: Vertical; Modulation:GFSK; ; Channel:High; Antenna: 3



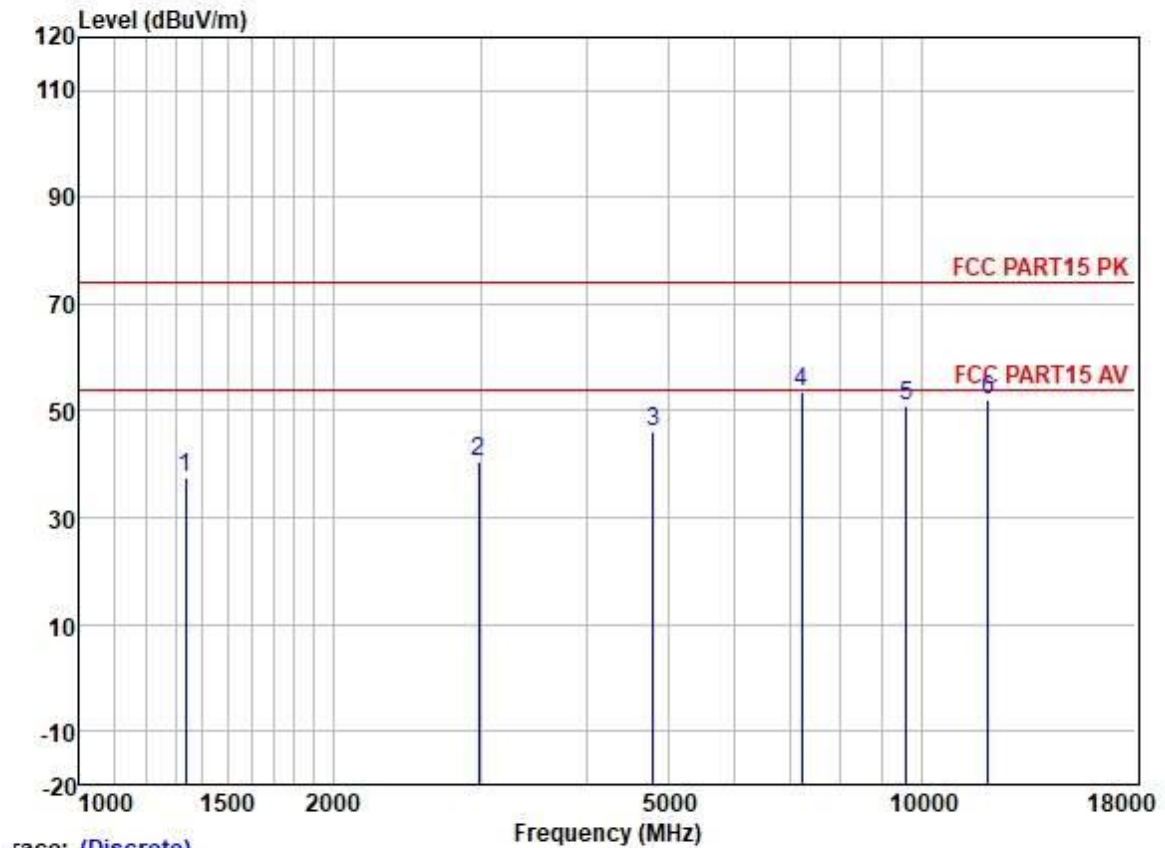
		ReadAntenna		Cable	Preamp		Limit	Over		
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1350.667	47.16	25.31	2.60	38.27	36.80	74.00	-37.20	VERTICAL	Peak
2	3177.672	45.74	28.56	3.99	37.10	41.19	74.00	-32.81	VERTICAL	Peak
3	4960.529	44.56	31.65	5.65	36.84	45.02	74.00	-28.98	VERTICAL	Peak
4	7440.542	48.79	36.27	6.22	37.47	53.81	74.00	-20.19	VERTICAL	Peak
5	9920.918	41.60	38.65	6.96	37.40	49.81	74.00	-24.19	VERTICAL	Peak
6	12400.160	41.11	38.57	7.97	36.88	50.77	74.00	-23.23	VERTICAL	Peak

Test Mode: 02; Polarity: Vertical; Modulation: GFSK; ; Channel: Low; Antenna: 2





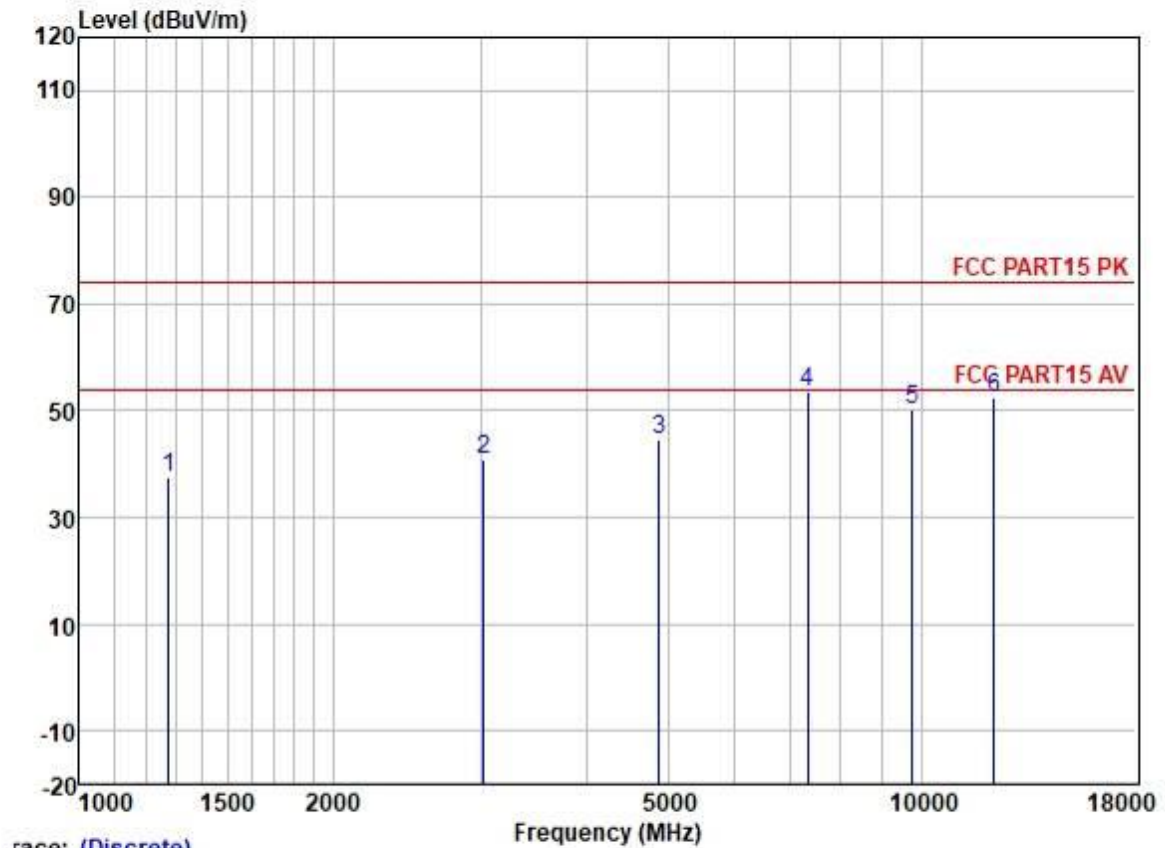
Test Mode: 02; Polarity: Vertical; Modulation:GFSK; ; Channel:Low; Antenna: 3



	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over		
	MHz	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1335.141	47.88	25.28	2.60	38.29	37.47	74.00	-36.53	VERTICAL Peak
2	2981.899	45.70	28.38	3.79	37.28	40.59	74.00	-33.41	VERTICAL Peak
3	4804.016	46.02	31.42	5.40	36.83	46.01	74.00	-27.99	VERTICAL Peak
4	7206.527	49.50	35.54	5.98	37.38	53.64	74.00	-20.36	VERTICAL Peak
5	9608.160	42.80	38.37	7.07	37.42	50.82	74.00	-23.18	VERTICAL Peak
6	12010.100	42.22	38.90	8.19	37.10	52.21	74.00	-21.79	VERTICAL Peak



Test Mode: 02; Polarity: Vertical; Modulation: GFSK; ; Channel: middle; Antenna: 3



	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over		
	MHz	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1274.802	48.40	25.12	2.48	38.33	37.67	74.00	-36.33	VERTICAL Peak
2	3025.306	45.72	28.42	3.82	37.22	40.74	74.00	-33.26	VERTICAL Peak
3	4882.887	44.53	31.56	5.52	36.84	44.77	74.00	-29.23	VERTICAL Peak
4	7323.195	48.80	36.00	6.13	37.43	53.50	74.00	-20.50	VERTICAL Peak
5	9764.456	42.23	38.50	7.02	37.41	50.34	74.00	-23.66	VERTICAL Peak
6	12205.350	42.48	38.74	8.08	37.00	52.30	74.00	-21.70	VERTICAL Peak



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## 8 Appendix

Cable Loss= 0.9 dB

### 8.1 Appendix A: 20dB Emission Bandwidth

#### 8.1.1 Test Result

TestMode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.939	2401.538	2402.477	---	PASS
		2441	0.948	2440.532	2441.480	---	PASS
		2480	0.942	2479.535	2480.477	---	PASS
2DH5	Ant1	2402	1.344	2401.334	2402.678	---	PASS
		2441	1.344	2440.334	2441.678	---	PASS
		2480	1.338	2479.334	2480.672	---	PASS
3DH5	Ant1	2402	1.350	2401.325	2402.675	---	PASS
		2441	1.314	2440.349	2441.663	---	PASS
		2480	1.341	2479.325	2480.666	---	PASS

#### 8.1.2 Test Graphs



DH5\_Ant1\_2441



DH5\_Ant1\_2480



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### 2DH5\_Ant1\_2402



### 2DH5\_Ant1\_2441



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### 2DH5\_Ant1\_2480



### 3DH5\_Ant1\_2402



### 3DH5\_Ant1\_2441



### 3DH5\_Ant1\_2480

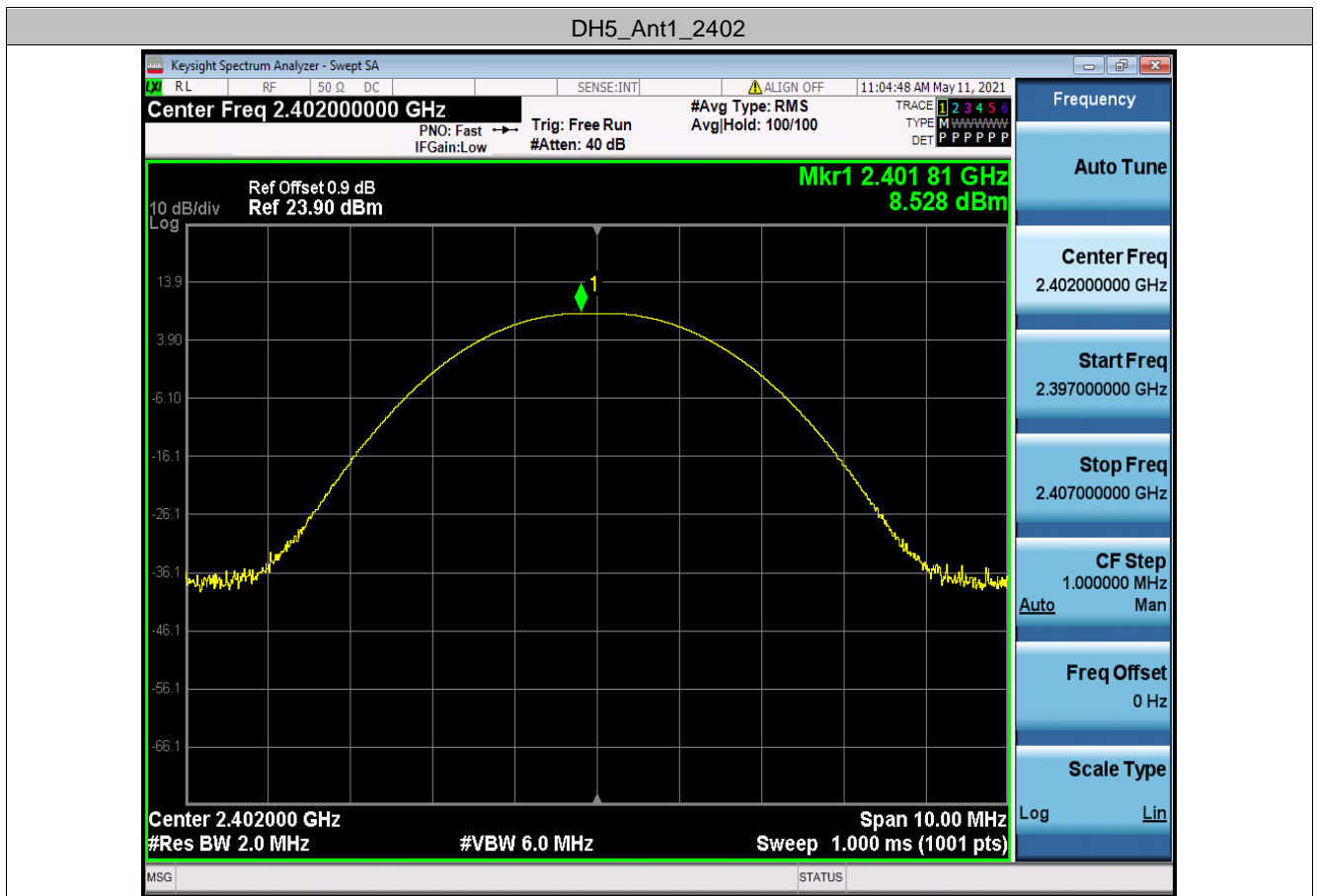


### 8.2 Appendix B: Maximum conducted output power

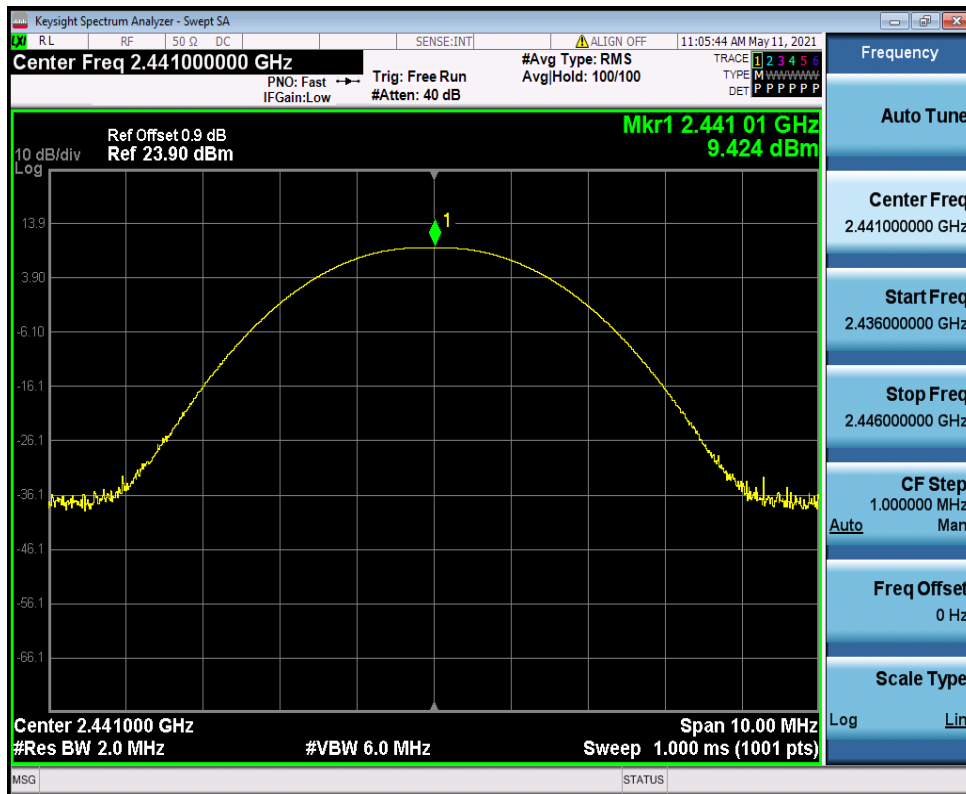
#### 8.2.1 Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	2402	8.53	<=20.97	PASS
		2441	9.42	<=20.97	PASS
		2480	9.2	<=20.97	PASS
2DH5	Ant1	2402	10.61	<=20.97	PASS
		2441	10.75	<=20.97	PASS
		2480	10.83	<=20.97	PASS
3DH5	Ant1	2402	11.41	<=20.97	PASS
		2441	11.47	<=20.97	PASS
		2480	11.61	<=20.97	PASS

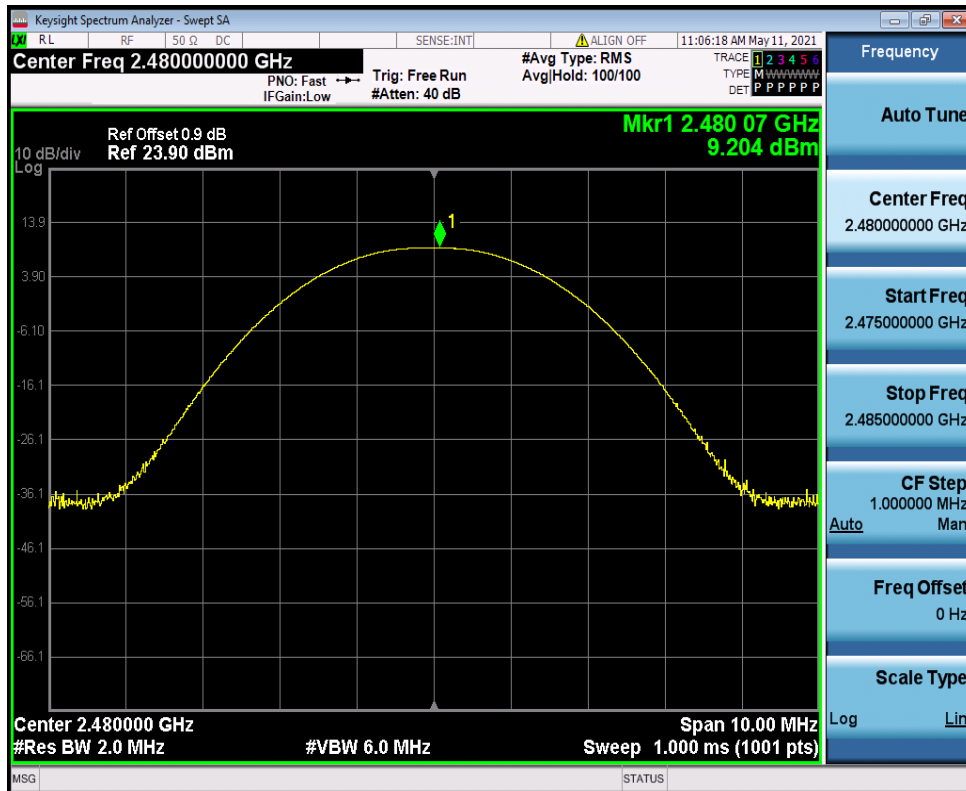
#### 8.2.2 Test Graphs



DH5\_Ant1\_2441

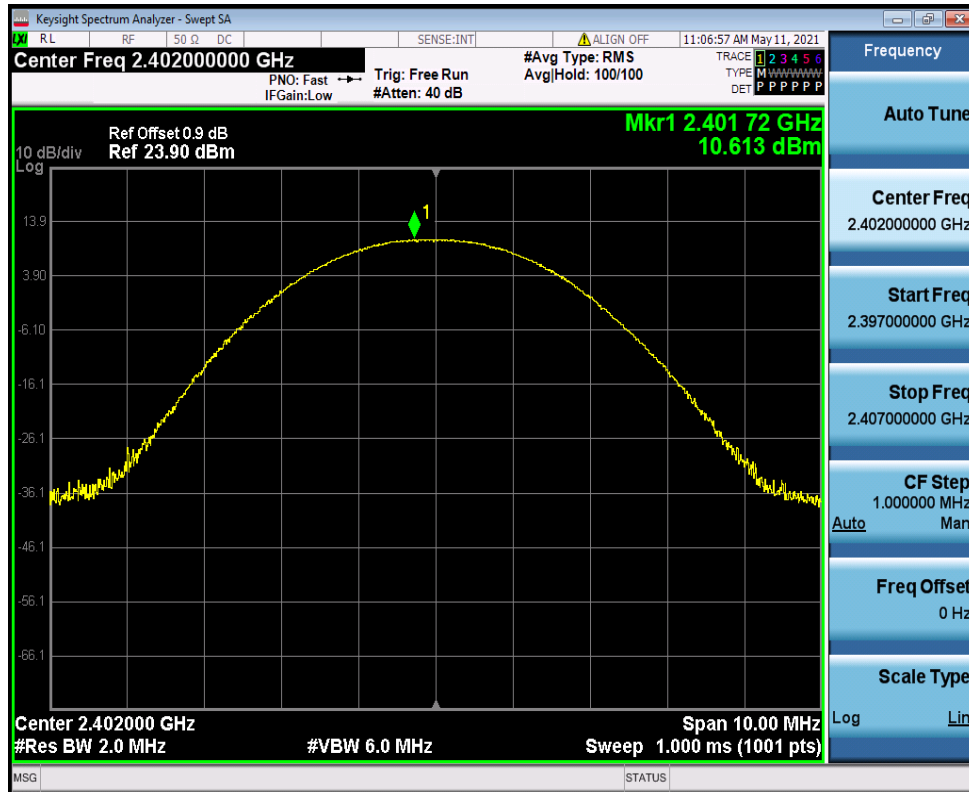


DH5\_Ant1\_2480

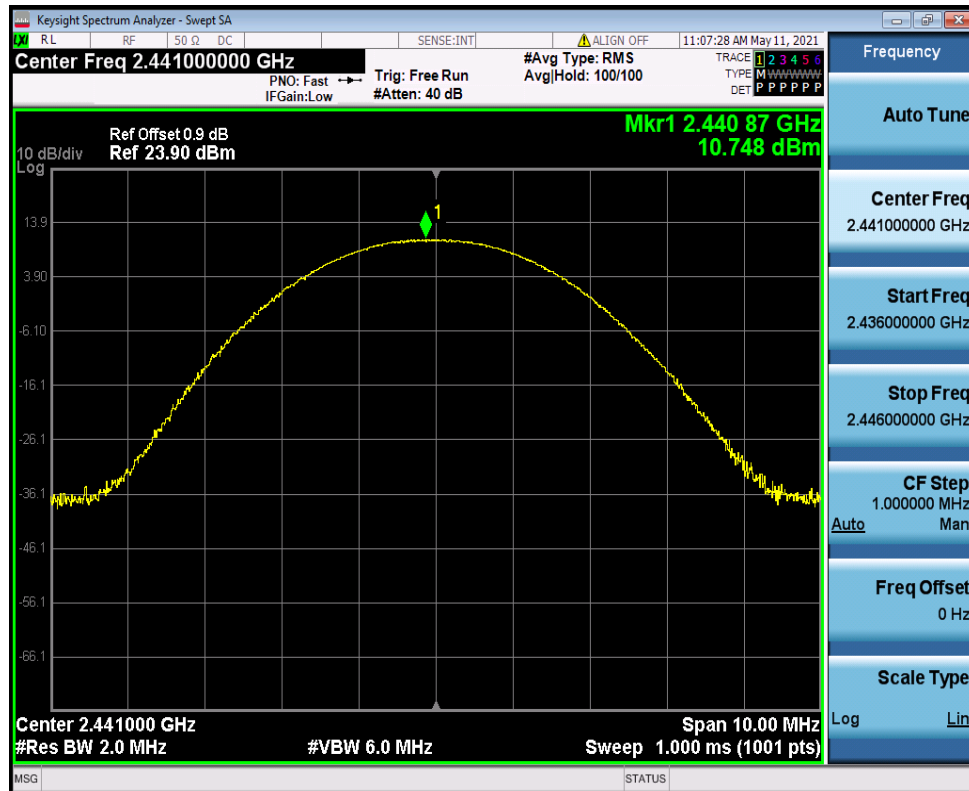




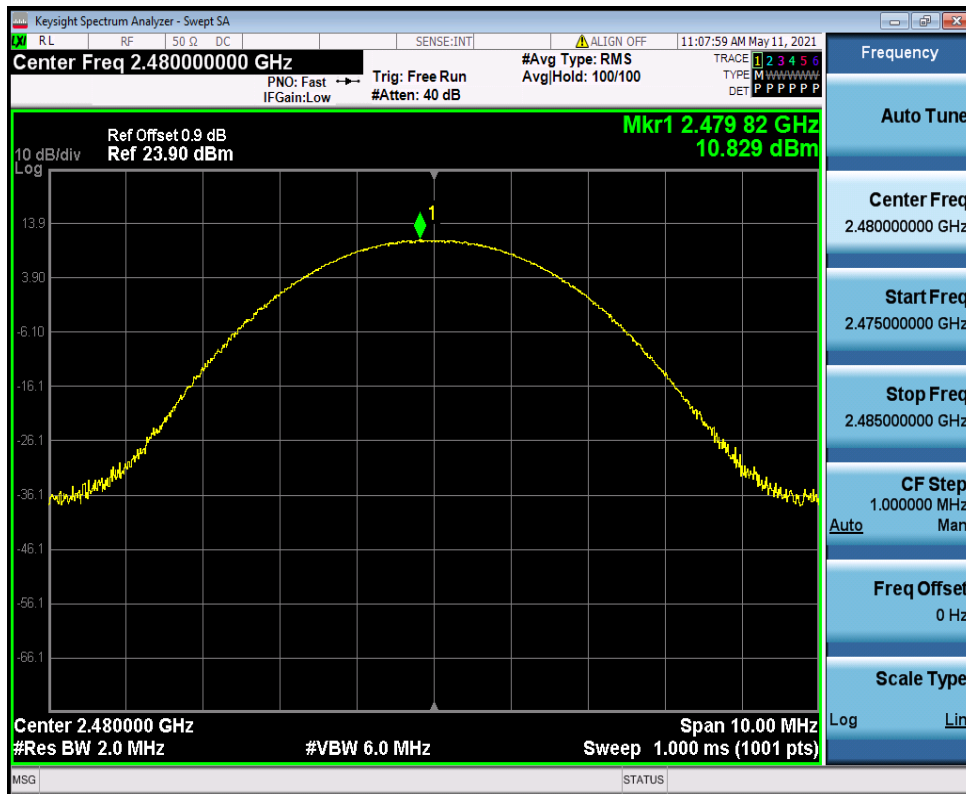
2DH5\_Ant1\_2402



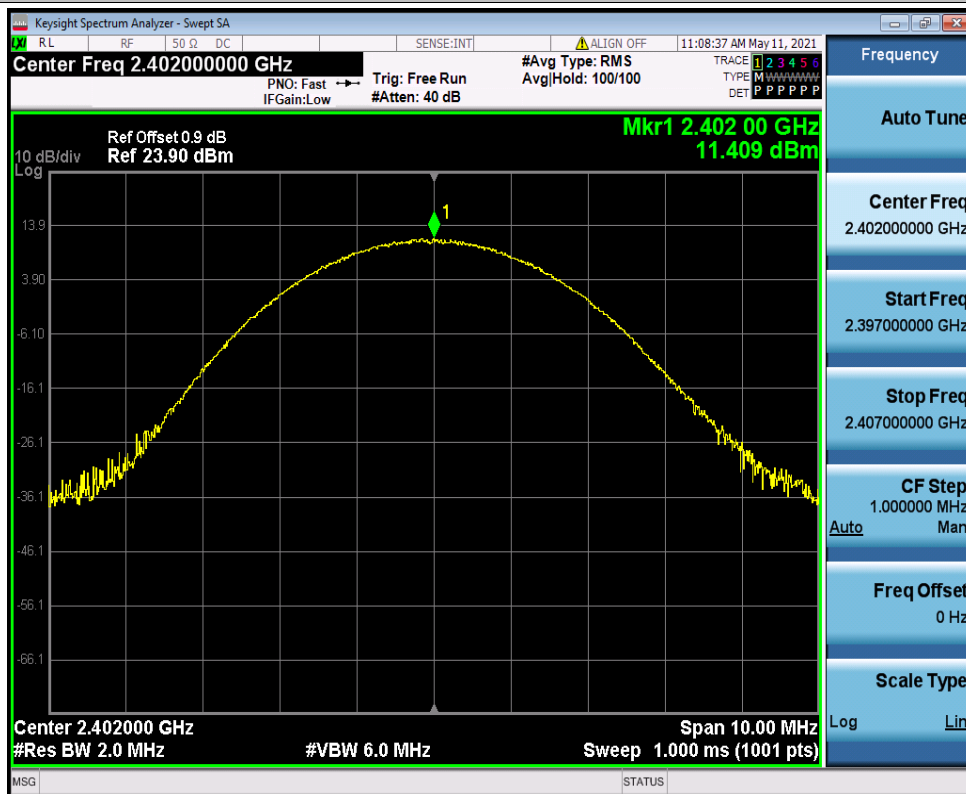
2DH5\_Ant1\_2441



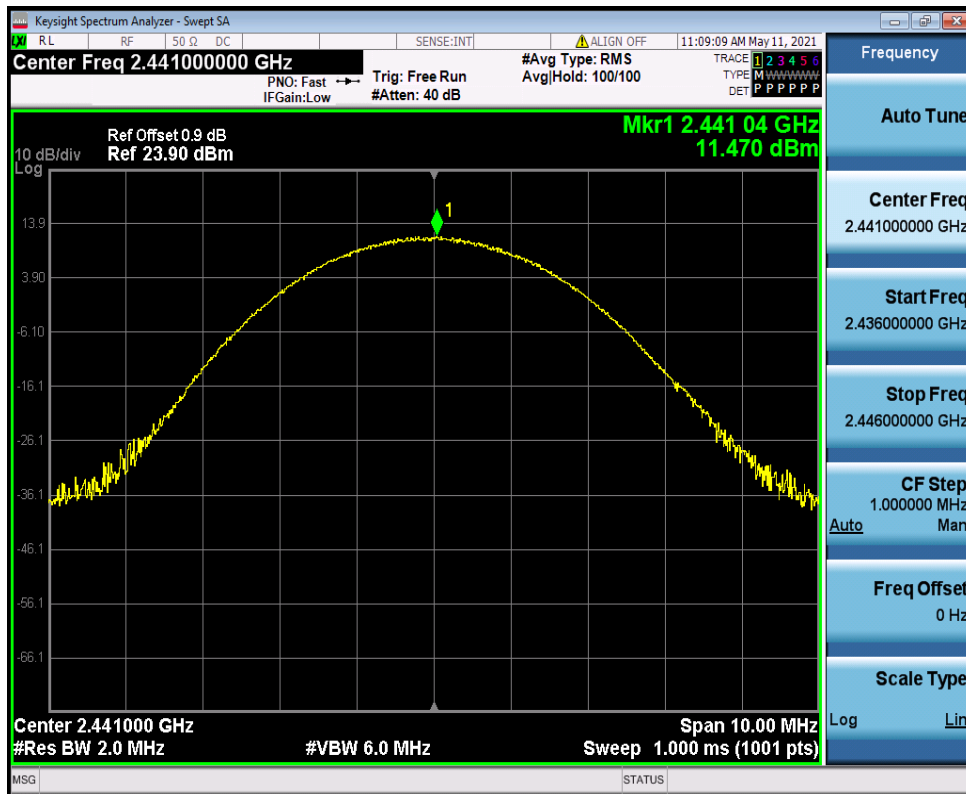
2DH5\_Ant1\_2480



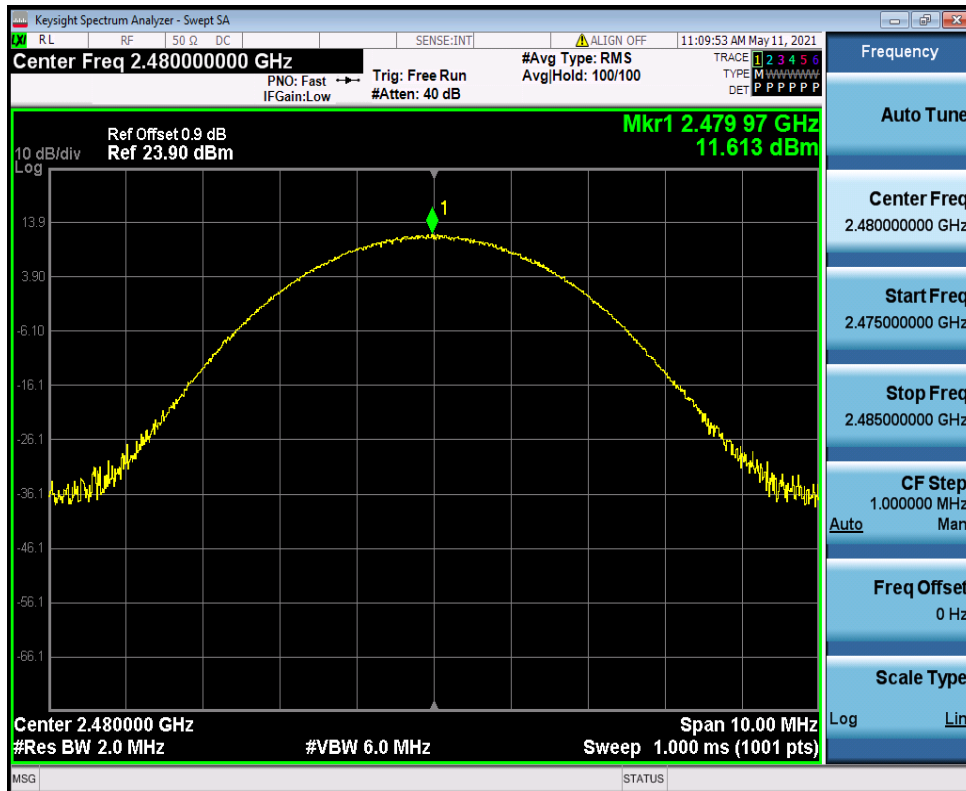
3DH5\_Ant1\_2402



3DH5\_Ant1\_2441



3DH5\_Ant1\_2480

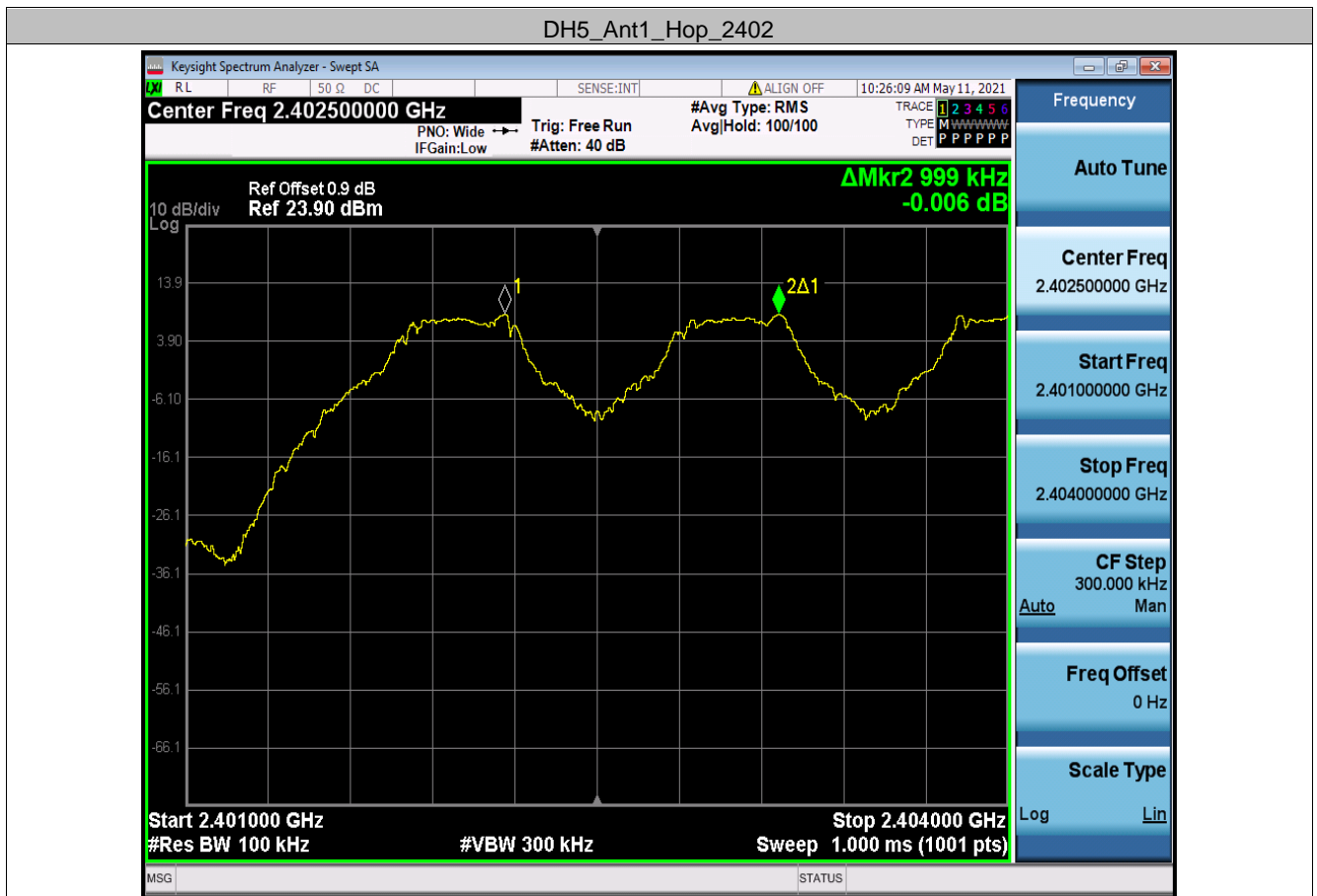


### 8.3 Appendix C: Carrier frequency separation

#### 8.3.1 Test Result

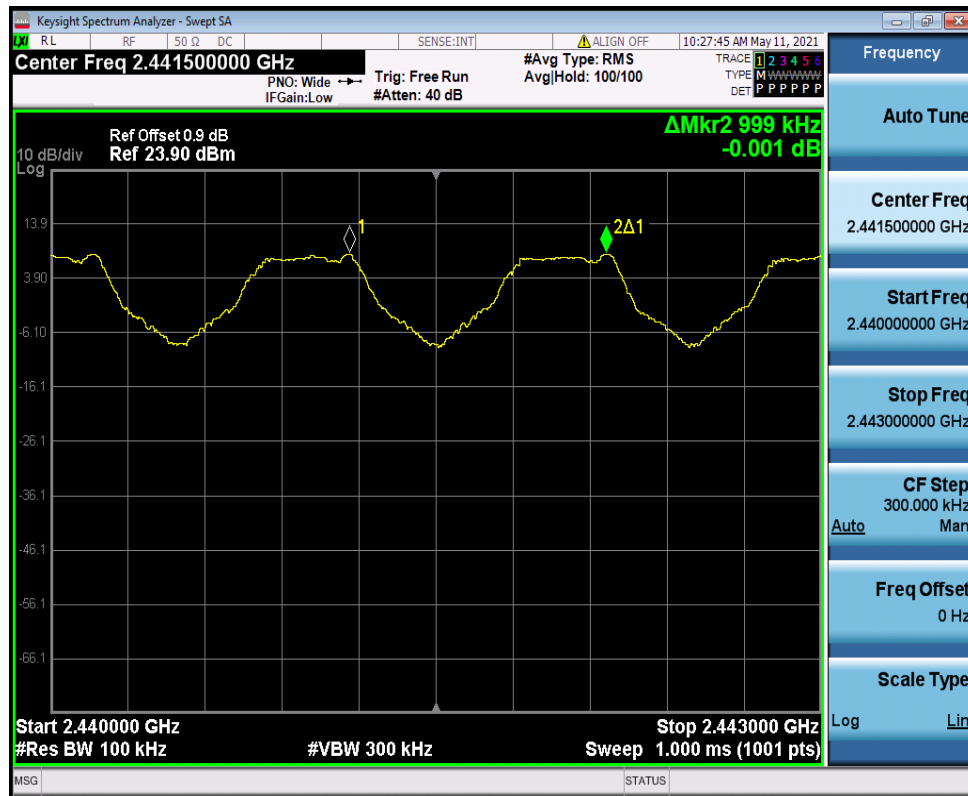
TestMode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop_2402	0.999	>=0.626	PASS
		Hop_2441	0.999	>=0.632	PASS
		Hop_2480	1	>=0.628	PASS

#### 8.3.2 Test Graphs





DH5\_Ant1\_Hop\_2441



DH5\_Ant1\_Hop\_2480



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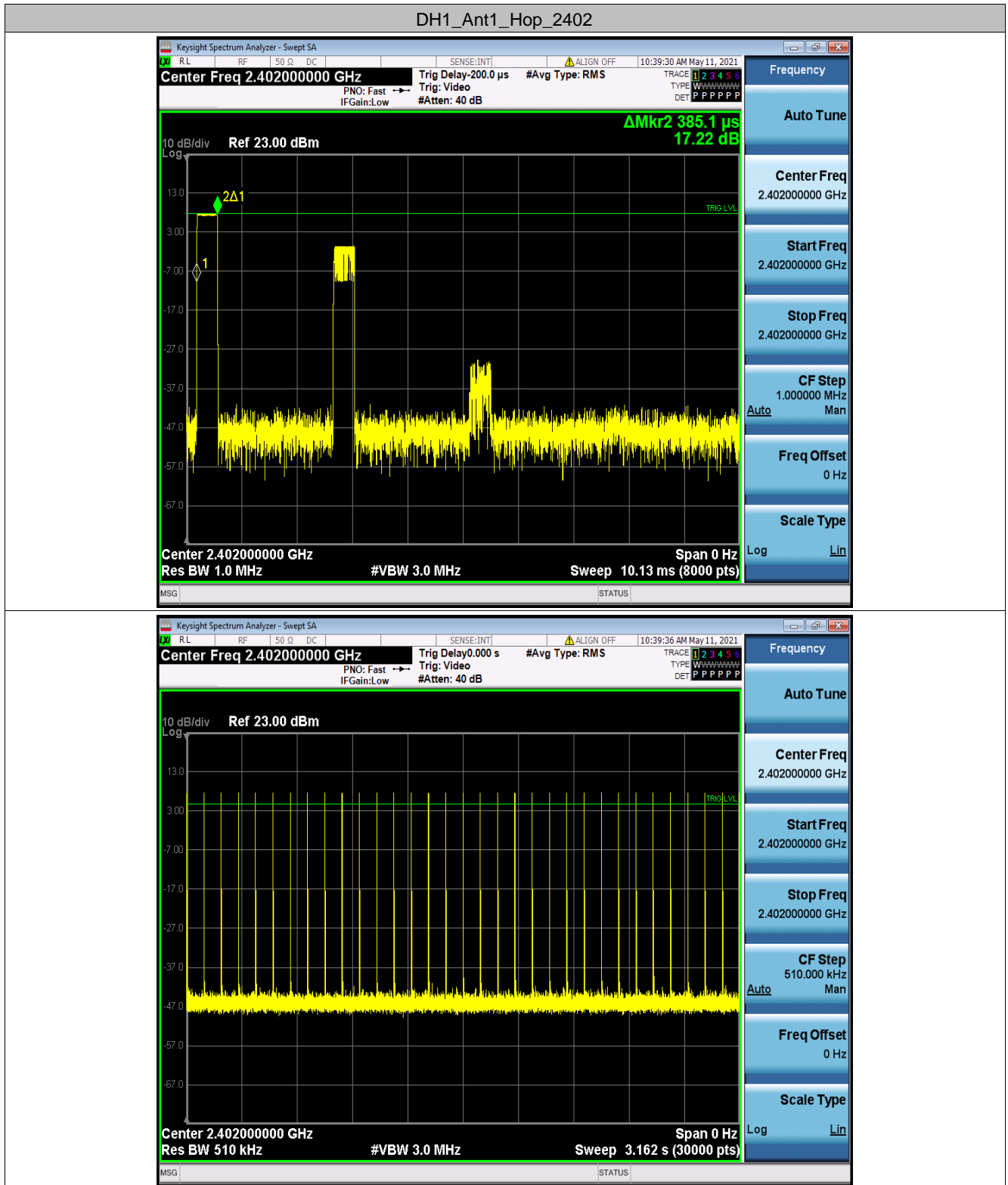
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**8.4 Appendix D: Time of occupancy****8.4.1 Test Result**

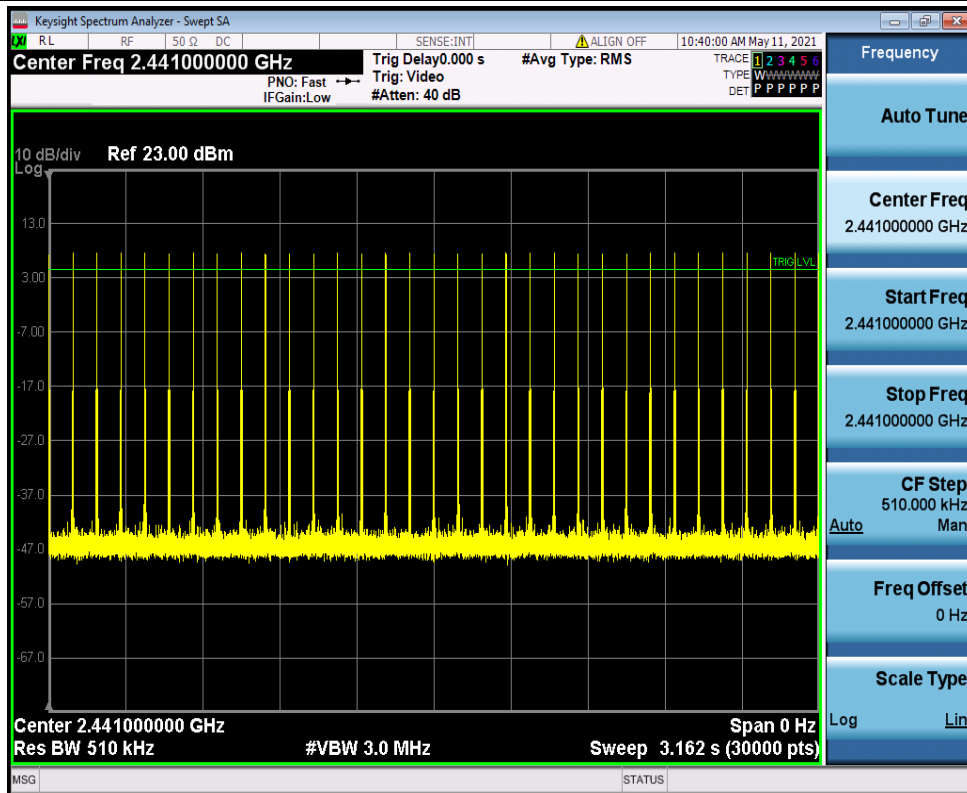
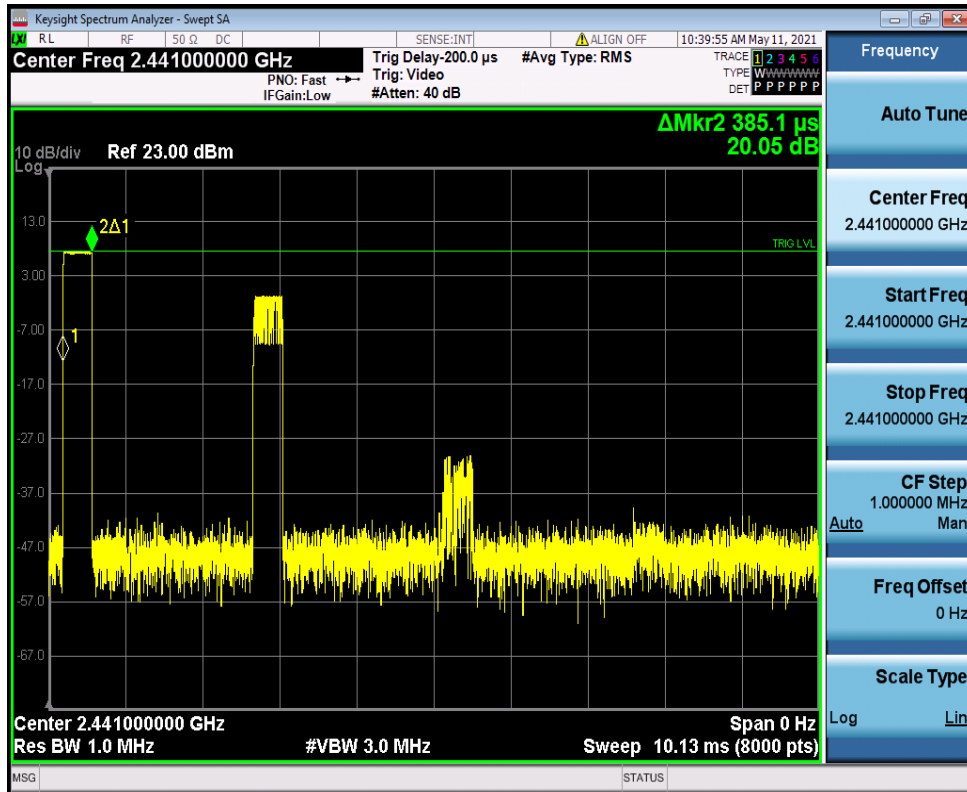
TestMode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop_2402	0.39	330	0.127	<=0.4	PASS
		Hop_2441	0.39	330	0.127	<=0.4	PASS
		Hop_2480	0.39	330	0.127	<=0.4	PASS
DH3	Ant1	Hop_2402	1.64	170	0.279	<=0.4	PASS
		Hop_2441	1.64	170	0.279	<=0.4	PASS
		Hop_2480	1.64	170	0.279	<=0.4	PASS
DH5	Ant1	Hop_2402	2.89	110	0.318	<=0.4	PASS
		Hop_2441	2.89	110	0.318	<=0.4	PASS
		Hop_2480	2.89	110	0.318	<=0.4	PASS
2DH1	Ant1	Hop_2402	0.40	330	0.13	<=0.4	PASS
		Hop_2441	0.40	330	0.131	<=0.4	PASS
		Hop_2480	0.40	330	0.13	<=0.4	PASS
2DH3	Ant1	Hop_2402	1.65	170	0.28	<=0.4	PASS
		Hop_2441	1.65	170	0.28	<=0.4	PASS
		Hop_2480	1.65	170	0.28	<=0.4	PASS
2DH5	Ant1	Hop_2402	2.90	110	0.319	<=0.4	PASS
		Hop_2441	2.90	110	0.319	<=0.4	PASS
		Hop_2480	2.90	110	0.319	<=0.4	PASS
3DH1	Ant1	Hop_2402	0.40	330	0.13	<=0.4	PASS
		Hop_2441	0.40	330	0.131	<=0.4	PASS
		Hop_2480	0.40	330	0.13	<=0.4	PASS
3DH3	Ant1	Hop_2402	1.65	170	0.28	<=0.4	PASS
		Hop_2441	1.65	170	0.28	<=0.4	PASS
		Hop_2480	1.65	170	0.28	<=0.4	PASS
3DH5	Ant1	Hop_2402	2.90	110	0.319	<=0.4	PASS
		Hop_2441	2.90	110	0.319	<=0.4	PASS
		Hop_2480	2.90	110	0.319	<=0.4	PASS

### 8.4.2 Test Graphs



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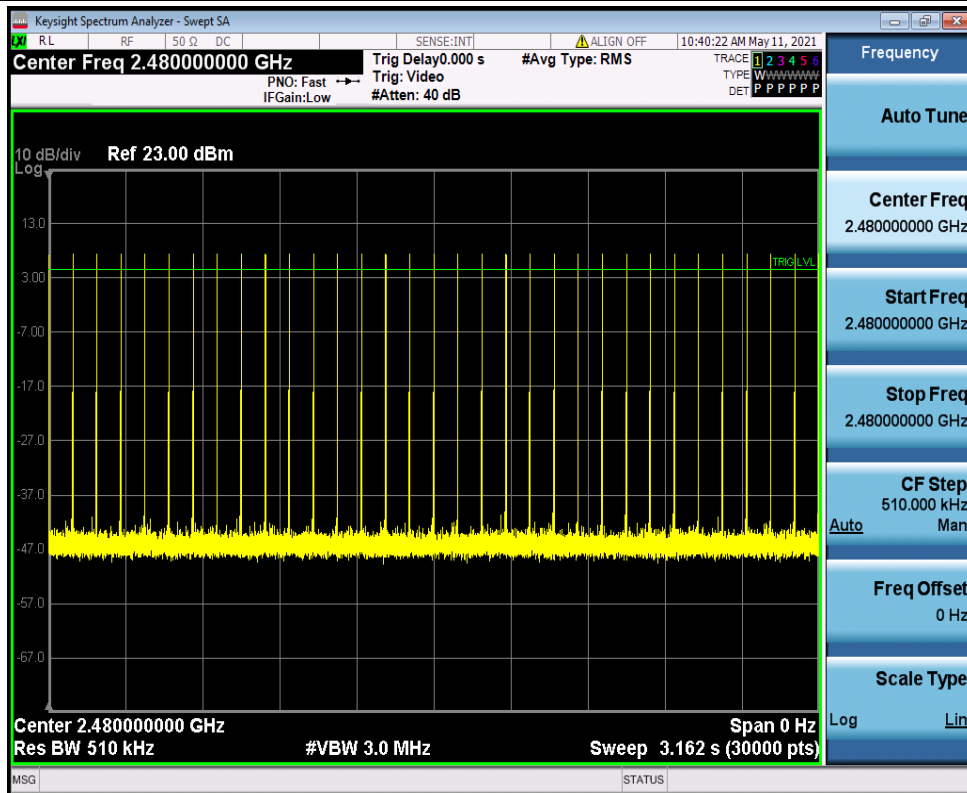
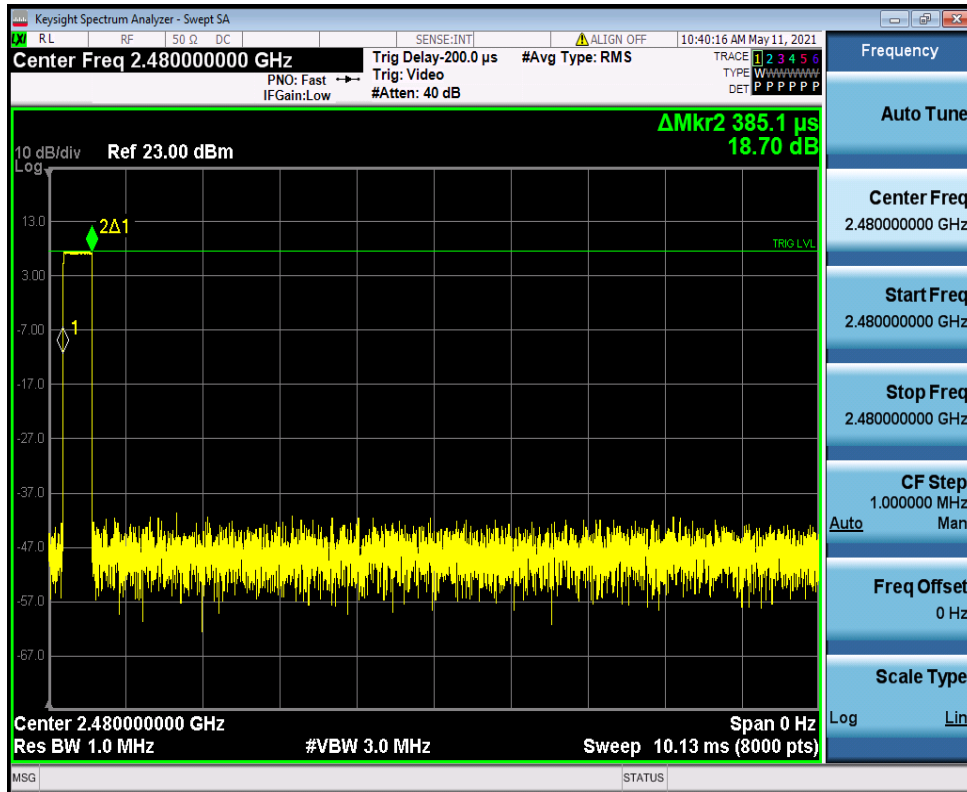
DH1\_Ant1\_Hop\_2441



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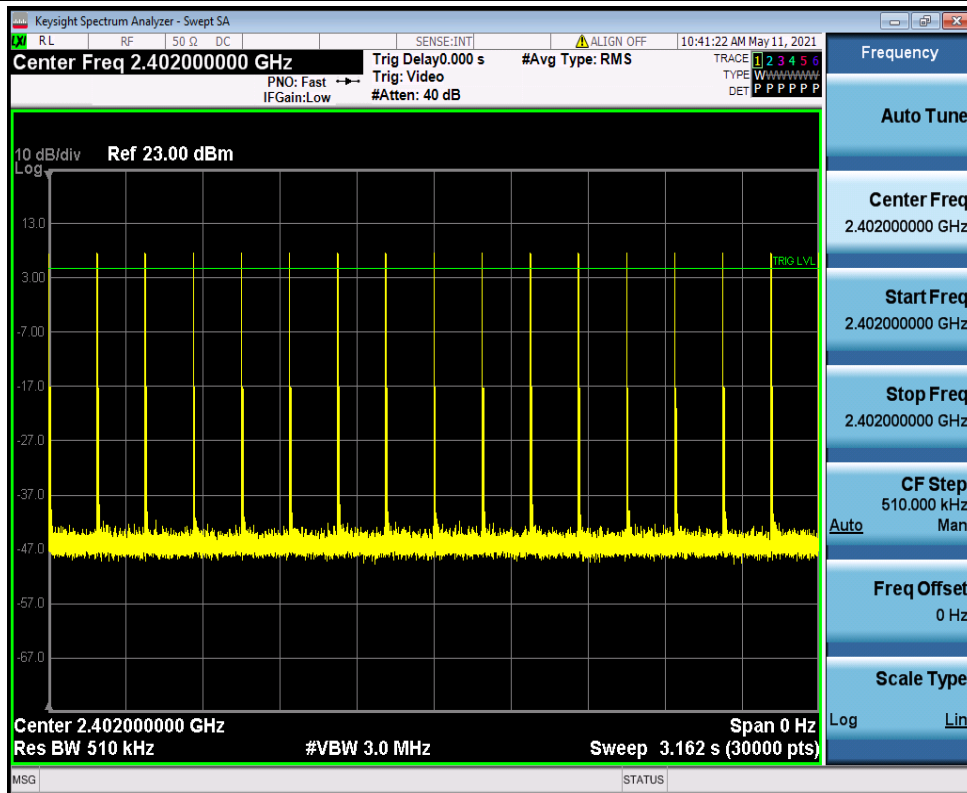
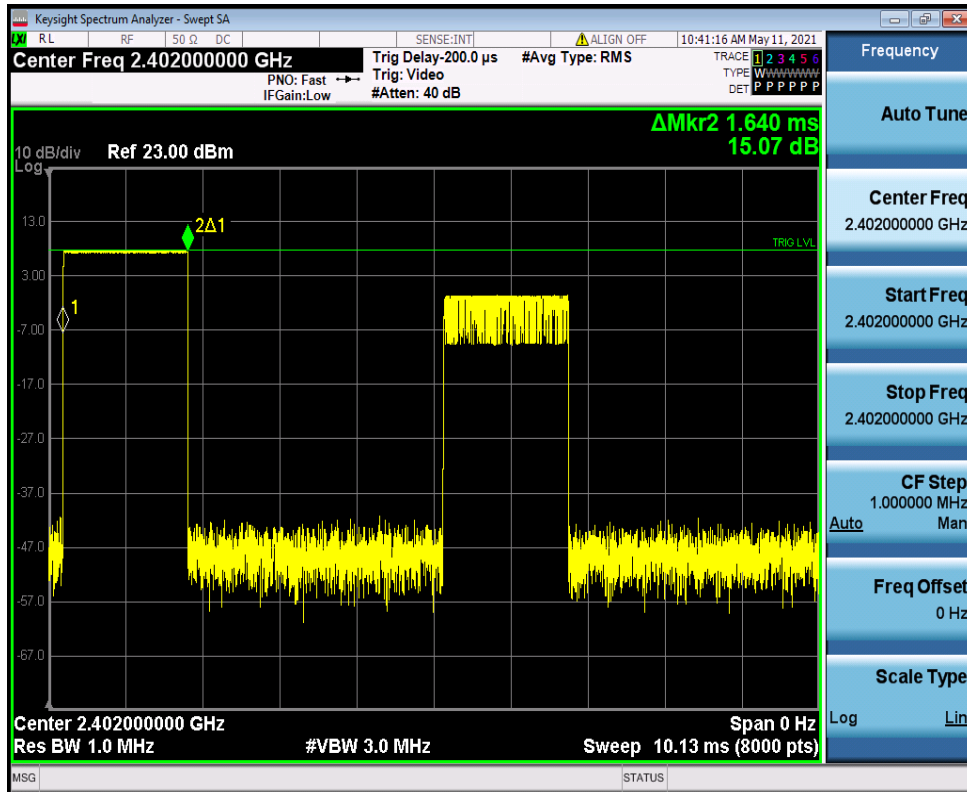
DH1\_Ant1\_Hop\_2480



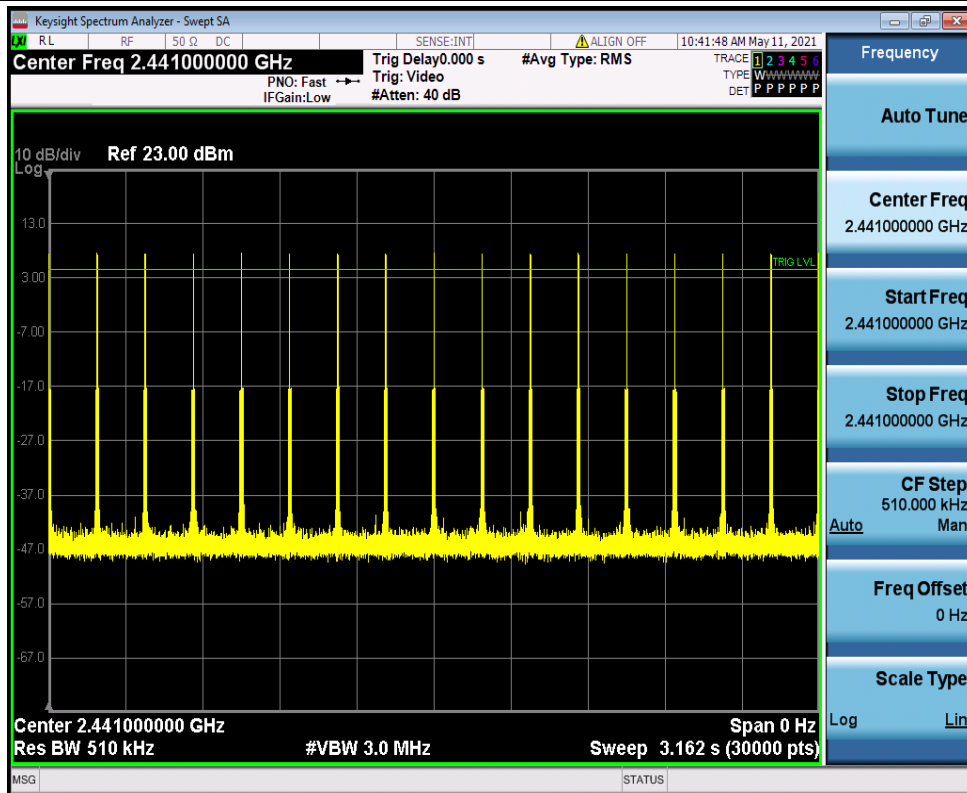
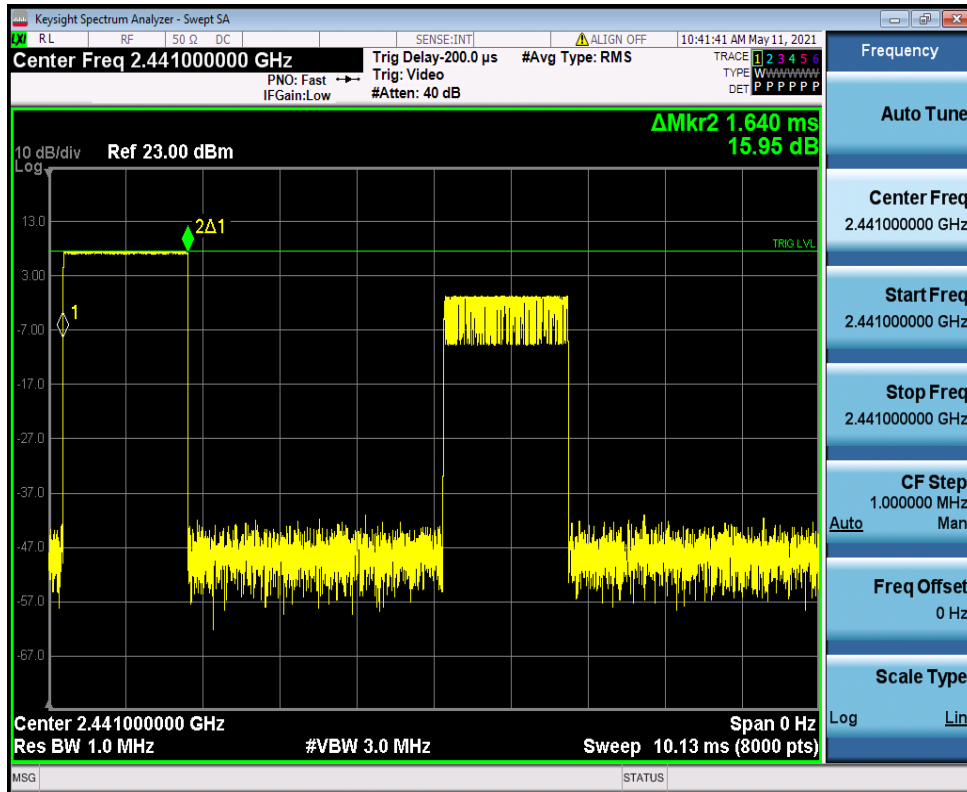
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### DH3\_Ant1\_Hop\_2402



DH3\_Ant1\_Hop\_2441



### DH3\_Ant1\_Hop\_2480

