TEST REPORT

Applicant Name :	Bolt Modus Corp
Address :	Oficina N.33 Edificio Ofidepositos Central, Calidonia - Distrito Federal, Panama
Report Number :	SZNS220428-17186E-RF-00A
FCC ID:	2APW4EPIC3

Test Standard (s)

FCC PART 15.247

Sample Description

Product Type:	Tablet PC
Model No.:	EPIC 3
Multiple Model(s) No.:	N/A
Trade Mark:	yezz
Date Received:	2022/04/28
Report Date:	2022/06/14

Test Result:	Pass*

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

Prepared and Checked By:

Andy Yu
EMC Engineer

Approved By:

Robert Li
EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★ ".
Shenzhen Accurate Technology Co., Ltd. is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.
This report cannot be reproduced except in full, without prior written approval of the Company. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Frequency Range	Bluetooth: 2402~2480MHz
Maximum conducted Peak output power	Bluetooth: 8.84dBm
Modulation Technique	Bluetooth: GFSK, π/4-DQPSK, 8DPSK
Antenna Specification*	2 dBi (provided by the applicant)
Voltage Range	DC 3.8V from battery or DC 5.0V from adapter
Sample serial number	SZNS220428-17186E-RF-S1 for Conducted and Radiated Emissions SZNS220428-17186E-RF-S2 for RF Conducted Test (Assigned by ATC)
Sample/EUT Status	Good condition
Adapter information	Model: CEPIC3 Input: AC 110-240V, 50/60Hz Output: DC 5.0V, 1.5A

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF Frequency		$0.082*10^{-7}$
RF output power, conducted		0.73dB
Unwanted Emission, conducted		1.6dB
AC Power Lines Conducted Emissions		2.72dB
Emissions, Radiated	9kHz - 30MHz	2.66dB
	30MHz - 1GHz	4.28dB
	1GHz - 18GHz	4.98dB
	18GHz - 26.5GHz	5.06dB
	26.5GHz - 40GHz	4.72dB
Temperature		1℃
Humidity		6%
Supply voltages		0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

Listed by Innovation, Science and Economic Development Canada (ISEDC), the Registration Number is 5077A.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode.

EUT Exercise Software

“adb”* exercise software was used and the power level is default*. The software and power level was provided by applicant

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

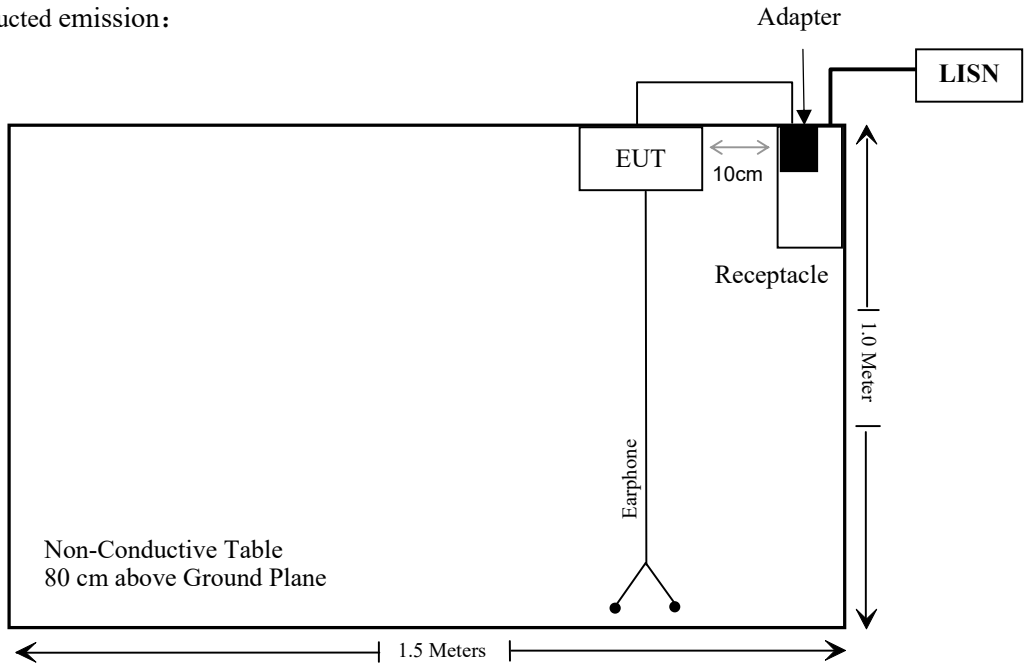
Manufacturer	Description	Model	Serial Number
Unknown	Earphone	Unknown	Unknown

External I/O Cable

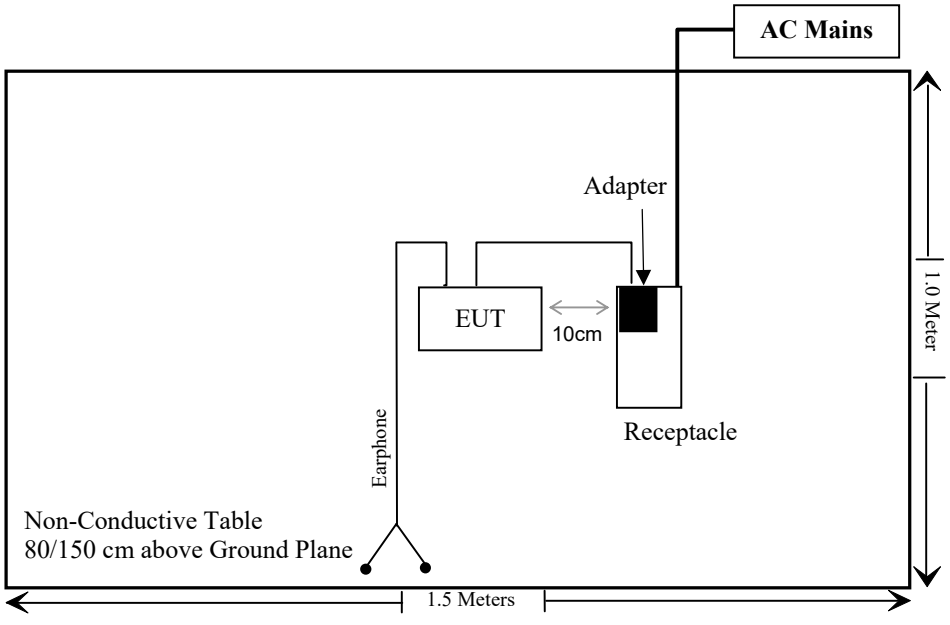
Cable Description	Length (m)	From/Port	To
Un-shielding Detachable USB Cable	1.0	EUT	Adapter

Block Diagram of Test Setup

For conducted emission：



For Radiated Emissions:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b) (3) &§2.1093	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207(a)	AC Line Conducted Emissions	Compliant
§15.205, §15.209 & §15.247(d)	Radiated Emissions	Compliant
§15.247(a)(1)	20 dB Emission Bandwidth & 99% Occupied Bandwidth	Compliant
§15.247(a)(1)	Channel Separation Test	Compliant
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliant
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliant
§15.247(b)(1)	Peak Output Power Measurement	Compliant
§15.247(d)	Band edges	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde& Schwarz	EMI Test Receiver	ESCI	100784	2021/12/13	2022/12/12
Rohde & Schwarz	L.I.S.N.	ENV216	101314	2021/12/13	2022/12/12
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2021/12/13	2022/12/12
Unknown	RF Coaxial Cable	No.17	N0350	2021/12/14	2022/12/13
Conducted Emission Test Software: e3 19821b (V9)					
Radiated Emissions Test					
Rohde& Schwarz	Test Receiver	ESR	102725	2021/12/13	2022/12/12
Rohde&Schwarz	Spectrum Analyzer	FSV40	101949	2021/12/13	2022/12/12
SONOMA INSTRUMENT	Amplifier	310 N	186131	2021/11/09	2022/11/08
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2021/11/09	2022/11/08
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2021/11/11	2022/11/10
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2020/01/05	2023/01/04
Radiated Emission Test Software: e3 19821b (V9)					
Unknown	RF Coaxial Cable	No.10	N050	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.11	N1000	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.12	N040	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.13	N300	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.14	N800	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.15	N600	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.16	N650	2021/12/14	2022/12/13
Wainwright	High Pass Filter	WHKX3.6/18G-10SS	5	2021/12/14	2022/12/13

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde&Schwarz	Spectrum Analyzer	FSV-40	101948	2021/12/13	2022/12/12
SPECTRUM ANALYZER	Rohde & Schwarz	FSU26	200982	2021/07/06	2022/07/05
WEINSCHEL	10dB Attenuator	5324	AU 3842	2021/12/14	2022/12/13
Unknown	RF Cable	Unknown	1	Each time	

*** Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC§15.247 (i), §1.1307 (b) (3) &§2.1093 – RF EXPOSURE

Applicable Standard

According to FCC §2.1093 and §1.1307(b) (3), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

Measurement Result

Please refer to SAR test report: SZNS220428-17186E-SA.

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 15.203, 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 shall be considered sufficient to comply with the provisions of this Section. 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.

Antenna Connector Construction

The EUT has one internal Antenna arrangement, which was permanently attached and the antenna gain is 2 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

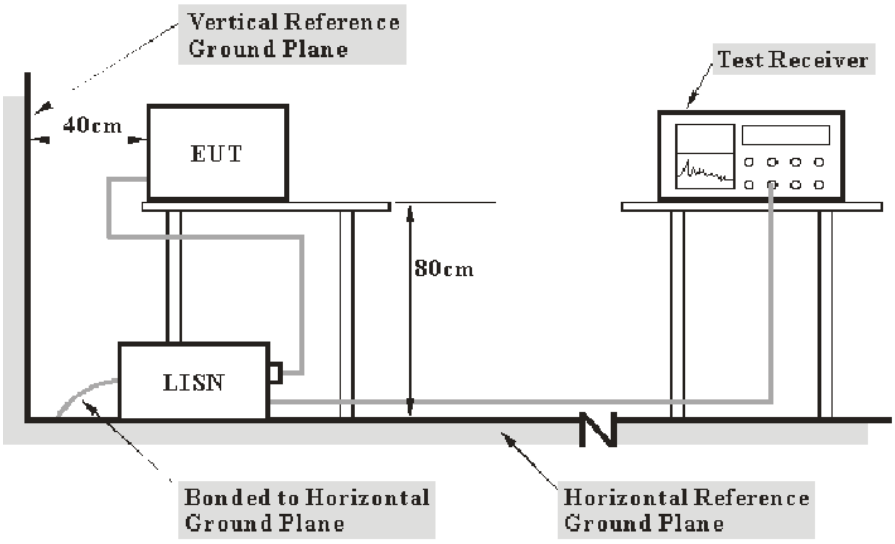
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Transd Factor & Margin Calculation

The Transd factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Transd Factor = LISN VDF + Cable Loss

The "**Over Limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a over limit of -7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Over Limit = level – Limit
Level= reading level+ Transd Factor

Test Data

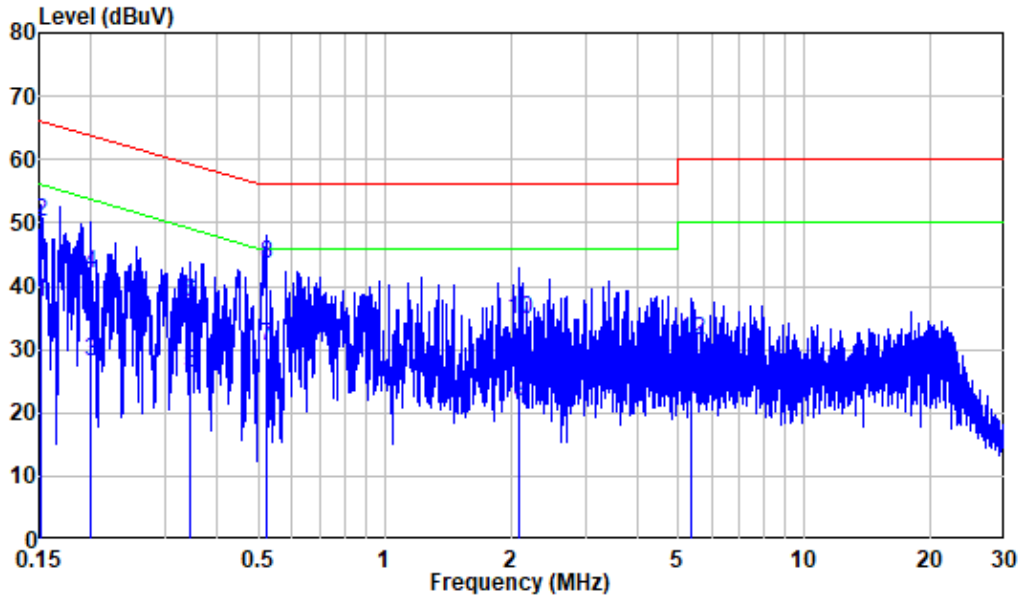
Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	53 %
ATM Pressure:	101.0 kPa

The testing was performed by Jason Liu on 2022-06-07.

EUT operation mode: Transmitting (the worst case for 8DPSK Mode, High channel)

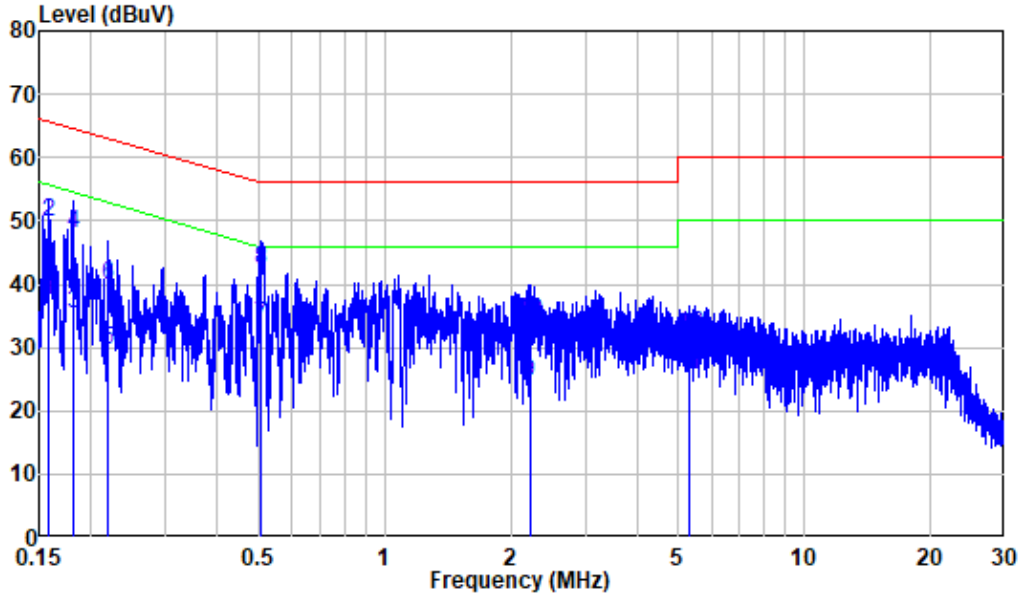
AC 120V/60 Hz, Line



Site : Shielding Room
Condition: Line
Job No. : SZNS220428-17186E-RF
Mode : BT
Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.152	9.80	27.58	37.38	55.91	-18.53	Average
2	0.152	9.80	40.28	50.08	65.91	-15.83	QP
3	0.200	9.80	18.22	28.02	53.62	-25.60	Average
4	0.200	9.80	32.06	41.86	63.62	-21.76	QP
5	0.343	9.80	16.33	26.13	49.12	-22.99	Average
6	0.343	9.80	27.60	37.40	59.12	-21.72	QP
7	0.521	9.81	20.77	30.58	46.00	-15.42	Average
8	0.521	9.81	33.66	43.47	56.00	-12.53	QP
9	2.081	9.82	11.84	21.66	46.00	-24.34	Average
10	2.081	9.82	25.02	34.84	56.00	-21.16	QP
11	5.354	9.85	10.40	20.25	50.00	-29.75	Average
12	5.354	9.85	21.63	31.48	60.00	-28.52	QP

AC 120V/60 Hz, Neutral



Site : Shielding Room
Condition: Neutral
Job No. : SZNS220428-17186E-RF
Mode : BT
Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.159	9.80	27.64	37.44	55.53	-18.09	Average
2	0.159	9.80	40.12	49.92	65.53	-15.61	QP
3	0.181	9.80	25.65	35.45	54.46	-19.01	Average
4	0.181	9.80	38.32	48.12	64.46	-16.34	QP
5	0.219	9.80	19.84	29.64	52.85	-23.21	Average
6	0.219	9.80	29.95	39.75	62.85	-23.10	QP
7	0.505	9.80	23.82	33.62	46.00	-12.38	Average
8	0.505	9.80	32.49	42.29	56.00	-13.71	QP
9	2.213	9.82	14.63	24.45	46.00	-21.55	Average
10	2.213	9.82	24.22	34.04	56.00	-21.96	QP
11	5.309	9.90	15.80	25.70	50.00	-24.30	Average
12	5.309	9.90	22.17	32.07	60.00	-27.93	QP

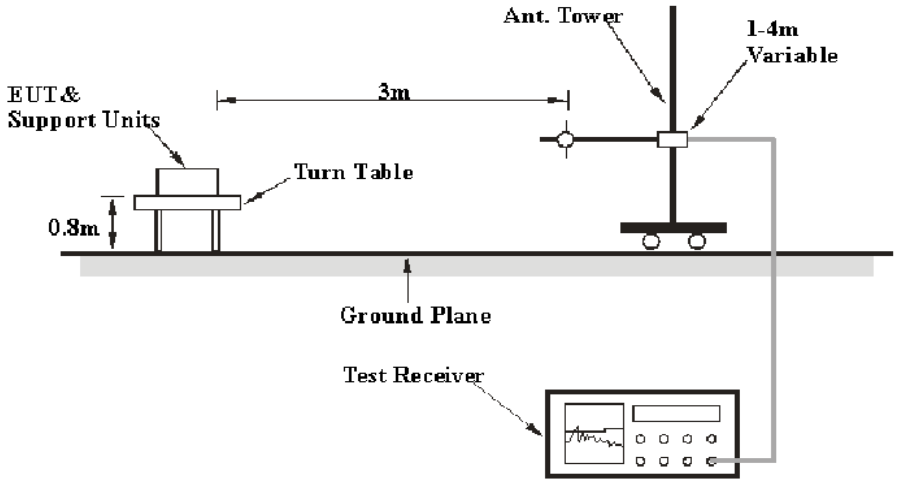
FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS

Applicable Standard

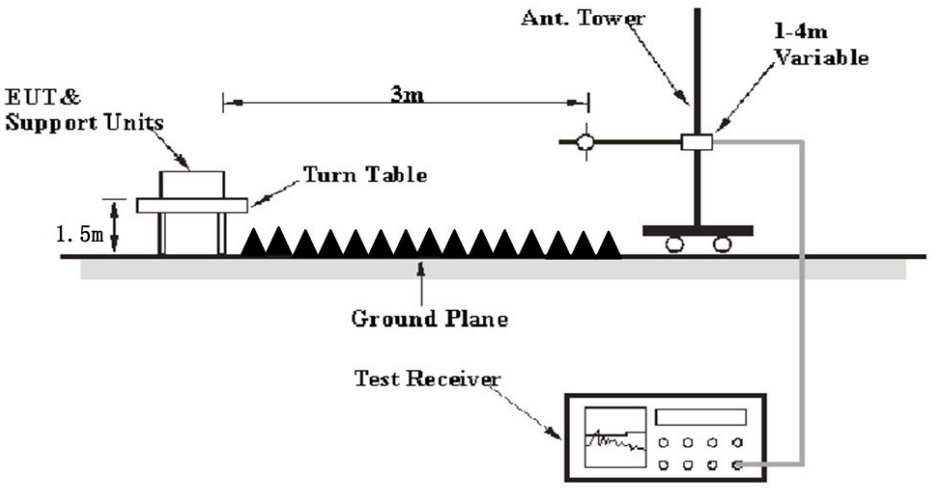
FCC §15.205; §15.209; §15.247(d)

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209 and FCC 15.247 limits.

EMI Test Receiver & Spectrum Analyzer Setup

The EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1 MHz	10 Hz	/	Average

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in Quasi-peak detection mode for frequency range of 30 MHz -1 GHz and peak and Average detection modes for frequencies above 1 GHz.

Corrected Factor & Margin Calculation

The Corrected Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit or Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a overlimit/margin of -7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin/Over Limit = Corrected Amplitude/Level-Limit
Corrected Amplitude/Level = Reading + Corrected Factor

Test Data

Environmental Conditions

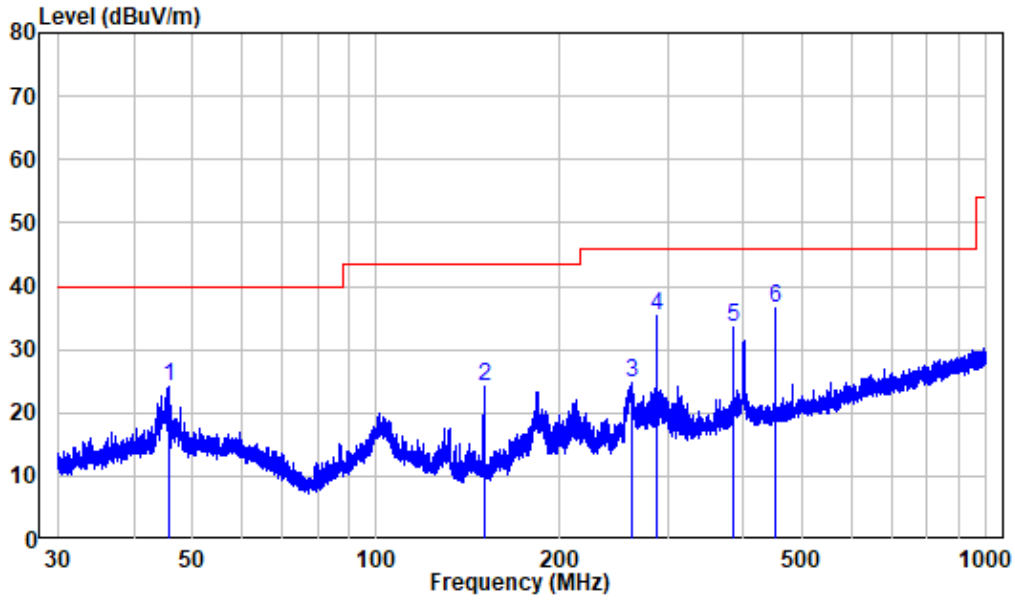
Temperature:	25.1~30 ℃
Relative Humidity:	52~62 %
ATM Pressure:	101.0 kPa

The testing was performed by Leo Li on 2022-06-07 for below 1GHz, Jeff Jiang on 2022-05-16 and Level Li on 2022-06-06 for above 1GHz.

EUT operation mode: Transmitting (Pre-scan in the X,Y and Z axes of orientation, the worst case X-axes orientation was recorded)

30MHz-1GHz: *(worst case is 8DPSK Mode, High channel)*

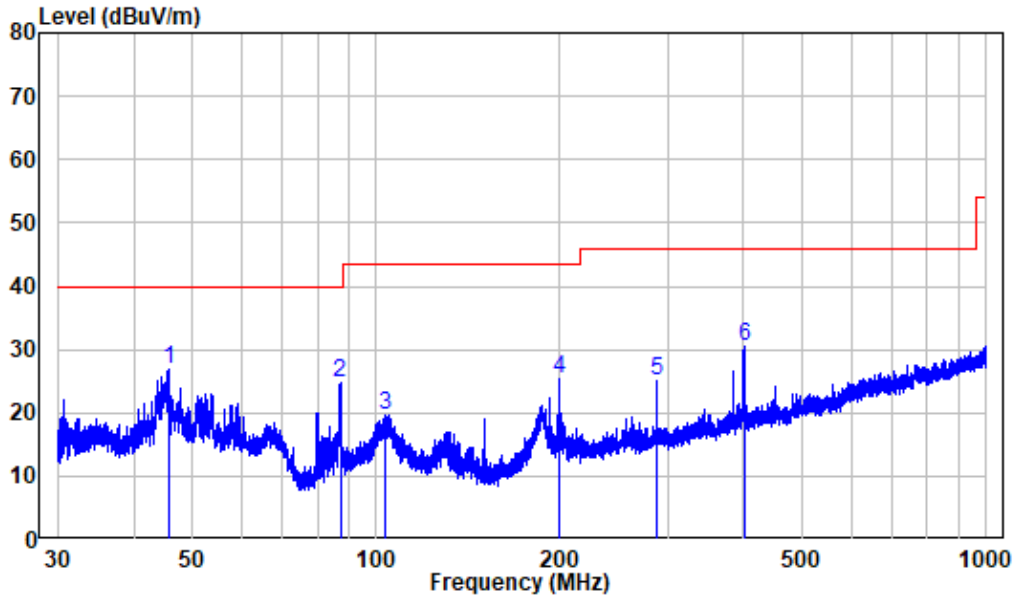
Horizontal:



Site : chamber
Condition: 3m HORIZONTAL
Job No. : SZNS220428-17186E-RF
Test Mode: BT

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	45.735	-9.98	34.25	24.27	40.00	-15.73	Peak
2	150.011	-15.27	39.52	24.25	43.50	-19.25	Peak
3	261.975	-10.53	35.27	24.74	46.00	-21.26	Peak
4	287.990	-9.36	44.80	35.44	46.00	-10.56	Peak
5	384.100	-7.08	40.46	33.38	46.00	-12.62	Peak
6	449.950	-5.63	42.20	36.57	46.00	-9.43	Peak

Vertical



Site : chamber
Condition: 3m VERTICAL
Job No. : SZNS220428-17186E-RF
Test Mode: BT

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	45.735	-9.98	36.80	26.82	40.00	-13.18	Peak
2	87.226	-14.81	39.63	24.82	40.00	-15.18	Peak
3	103.261	-11.68	31.36	19.68	43.50	-23.82	Peak
4	199.986	-11.40	36.82	25.42	43.50	-18.08	Peak
5	287.990	-9.36	34.49	25.13	46.00	-20.87	Peak
6	400.432	-6.73	37.21	30.48	46.00	-15.52	Peak

Above 1GHz: *(the worst case is 8DPSK Mode)*

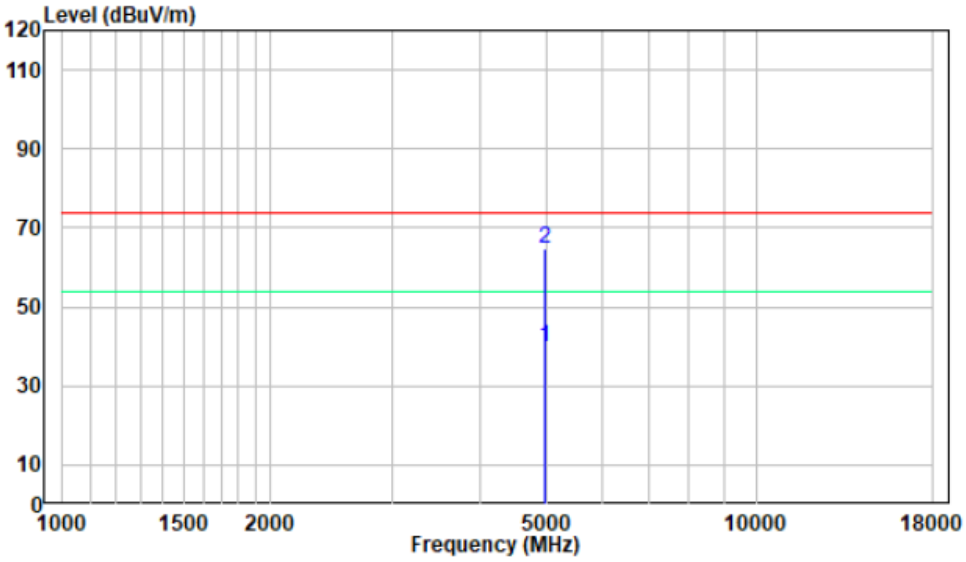
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
Low Channel (2402 MHz)									
2310	67.78	PK	348	2.5	H	-7.24	60.54	74	-13.46
2310	53.70	AV	348	2.5	H	-7.24	46.46	54	-7.54
2310	68.01	PK	88	1.2	V	-7.24	60.77	74	-13.23
2310	53.60	AV	88	1.2	V	-7.24	46.36	54	-7.64
2390	69.69	PK	275	2.2	H	-7.22	62.47	74	-11.53
2390	54.30	AV	275	2.2	H	-7.22	47.08	54	-6.92
2390	69.51	PK	308	2	V	-7.22	62.29	74	-11.71
2390	54.11	AV	308	2	V	-7.22	46.89	54	-7.11
4804	66.65	PK	313	1.2	H	-3.51	63.14	74	-10.86
4804	43.04	AV	313	1.2	H	-3.51	39.53	54	-14.47
4804	60.21	PK	256	1.1	V	-3.51	56.70	74	-17.30
4804	42.07	AV	256	1.1	V	-3.51	38.56	54	-15.44
Middle Channel(2441MHz)									
4882	67.65	PK	334	1.5	H	-3.37	64.28	74	-9.72
4882	43.42	AV	334	1.5	H	-3.37	40.05	54	-13.95
4882	62.18	PK	121	1.5	V	-3.37	58.81	74	-15.19
4882	42.38	AV	121	1.5	V	-3.37	39.01	54	-14.99
High Channel(2480 MHz)									
2483.5	70.06	PK	346	1.3	H	-7.20	62.86	74	-11.14
2483.5	54.99	AV	346	1.3	H	-7.20	47.79	54	-6.21
2483.5	70.16	PK	170	1.2	V	-7.20	62.96	74	-11.04
2483.5	54.92	AV	170	1.2	V	-7.20	47.72	54	-6.28
2500	68.76	PK	347	2.1	H	-7.18	61.58	74	-12.42
2500	54.88	AV	347	2.1	H	-7.18	47.7	54	-6.30
2500	68.48	PK	263	1	V	-7.18	61.3	74	-12.70
2500	54.94	AV	263	1	V	-7.18	47.76	54	-6.24
4960	67.66	PK	270	1.9	H	-3.01	64.65	74	-9.35
4960	42.96	AV	270	1.9	H	-3.01	39.95	54	-14.05
4960	61.84	PK	133	2	V	-3.01	58.83	74	-15.17
4960	42.07	AV	133	2	V	-3.01	39.06	54	-14.94

Note:
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Corrected. Amplitude - Limit
The other spurious emission which is 20dB to the limit or in noise floor was not recorded.
The test result of peak was less than the limit of average, so just peak value were recorded.

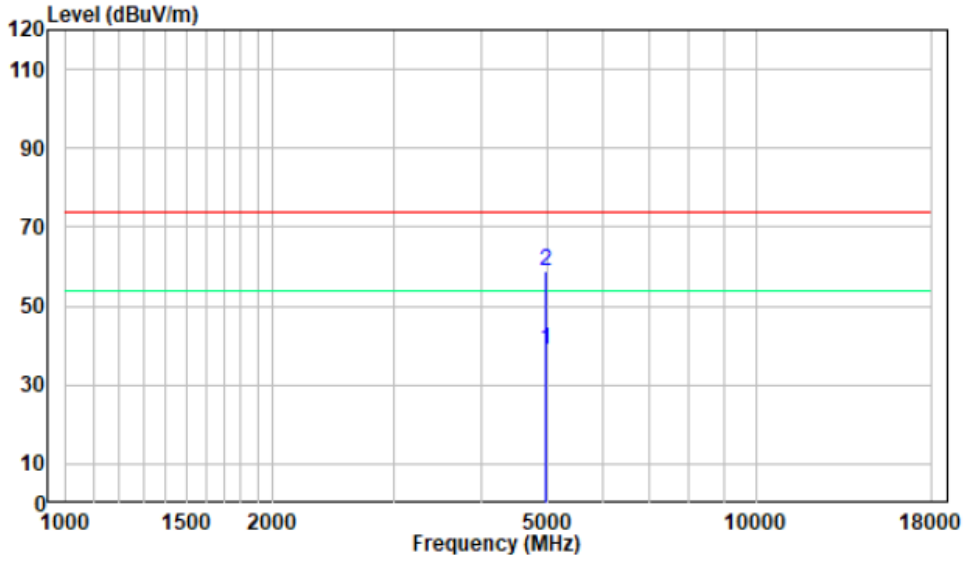
1-18GHz

Pre-scan for High Channel

Horizontal:



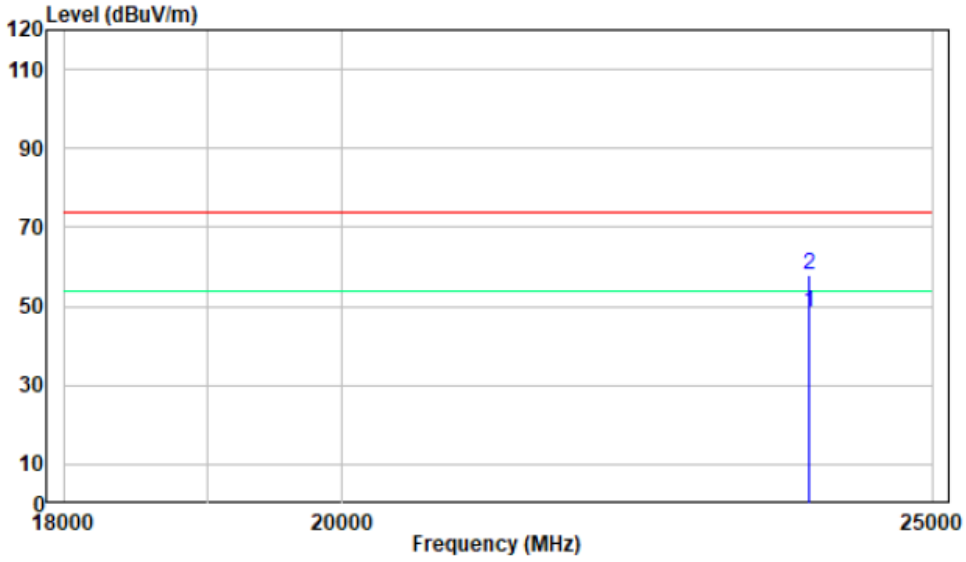
Vertical:



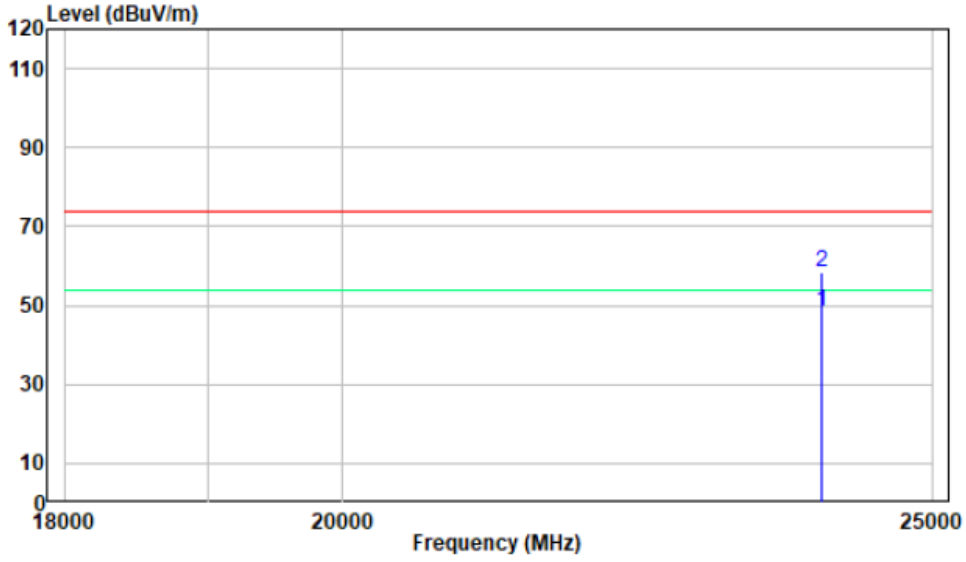
18-25GHz

Pre-scan for High Channel

Horizontal:



Vertical:



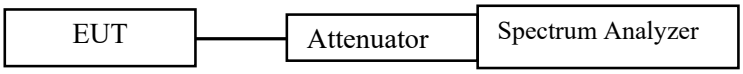
FCC §15.247(a) (1)-CHANNEL SEPARATION TEST

Applicable Standard

Frequency hopping systems shall have hoping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly 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.

Test Procedure

1. Set the EUT in transmitting mode, maxhold the channel.
2. Set the adjacent channel of the EUT and maxhold another trace.
3. Measure the channel separation.



Test Data

Environmental Conditions

Temperature:	27.9 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Andy Yu on 2022-05-17.

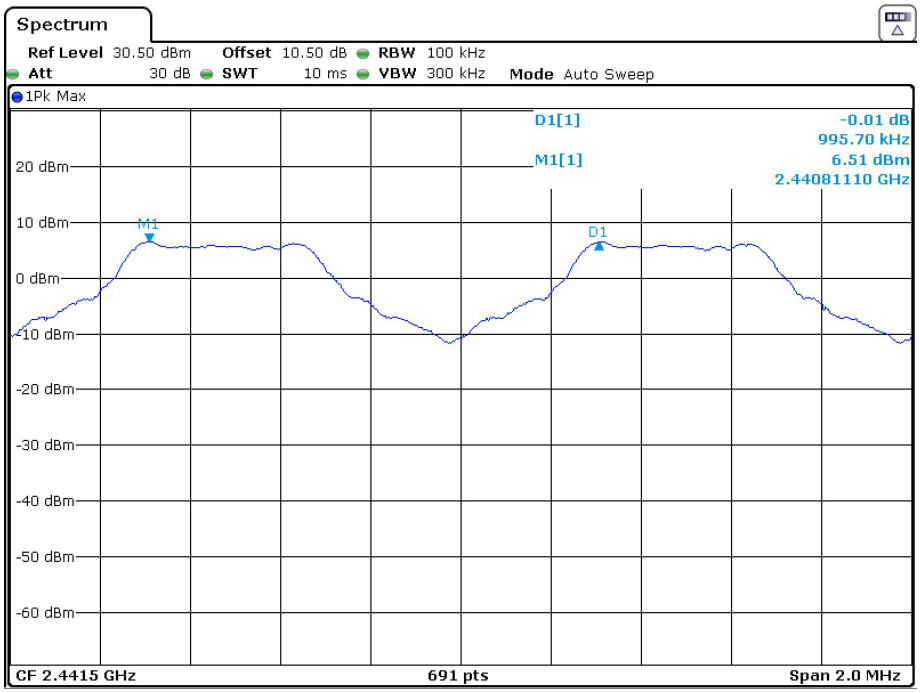
EUT operation mode: Transmitting

Test Result: Compliant.

Test Mode	Channel Separation (MHz)	20 dBc BW (MHz)	Two-thirds of the 20 dB bandwidth (MHz)	Channel Separation Limit	Result
BDR(GFSK)					
Hopping	0.996	0.880	0.587	> two-thirds of the 20 dB bandwidth	Compliance
EDR(π/4-DQPSK)					
Hopping	1.001	1.279	0.853	> two-thirds of the 20 dB bandwidth	Compliance
EDR(8DPSK)					
Hopping	0.999	1.250	0.833	> two-thirds of the 20 dB bandwidth	Compliance

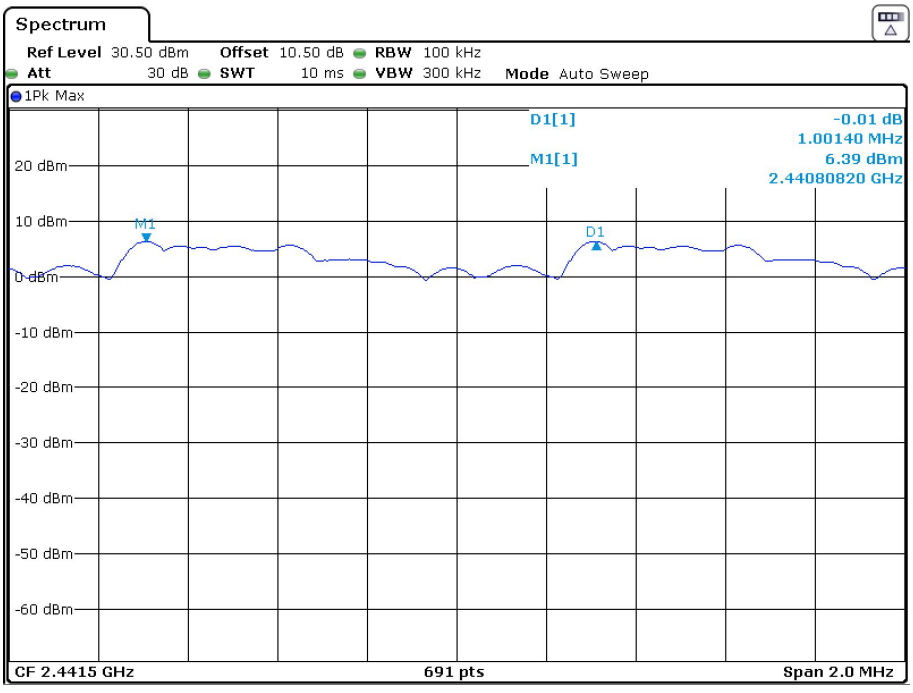
Please refer to the below plots:

DH1_Hop



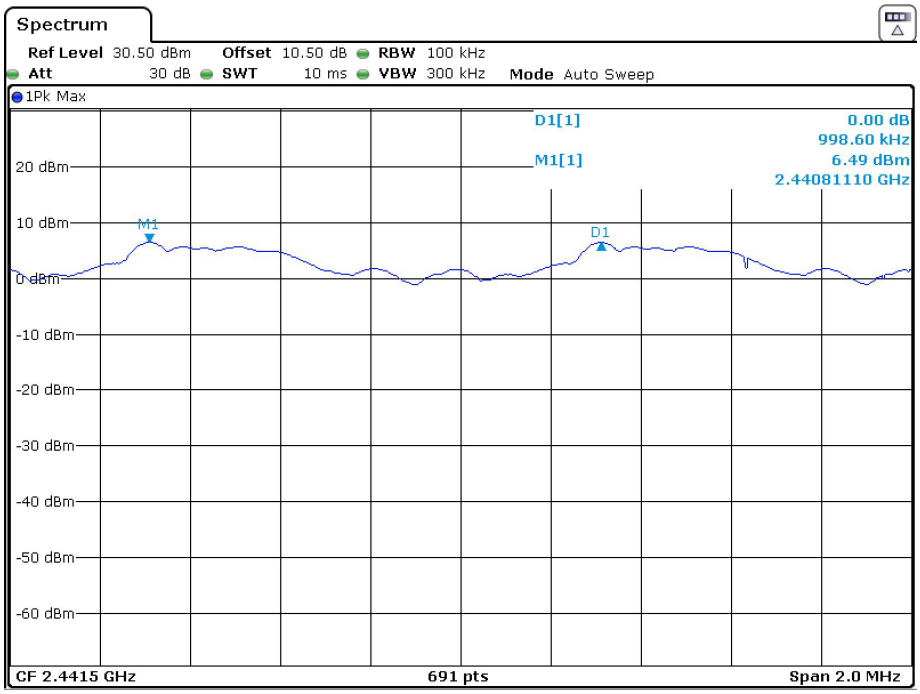
Date: 17.MAY.2022 13:12:05

2DH1_Hop



Date: 17.MAY.2022 12:07:32

3DH1_Hop


Spectrum
Ref Level 30.50 dBm Offset 10.50 dB RBW 100 kHz
Att 30 dB SWT 10 ms VBW 300 kHz Mode Auto Sweep
1Pk Max
D1[1] 0.00 dB
998.60 kHz
M1[1] 6.49 dBm
2.44081110 GHz
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
M1
D1
CF 2.4415 GHz
691 pts
Span 2.0 MHz
Date: 17.MAY.2022 13:24:11

FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH

Applicable Standard

Alternatively, 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.

Test Procedure

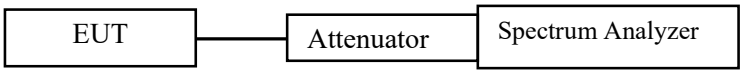
The following conditions shall be observed for measuring the occupied bandwidth and 20 dB bandwidth:
• The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

• The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.

• The detector of the spectrum analyzer shall be set to “Sample”. However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or “Max Hold”) may be necessary to determine the occupied / 20 dB bandwidth if the device is not transmitting continuously.

• The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / 20 dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.
For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).



Test Data

Environmental Conditions

Temperature:	27.9 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Andy Yu on 2022-05-17.

EUT operation mode: Transmitting

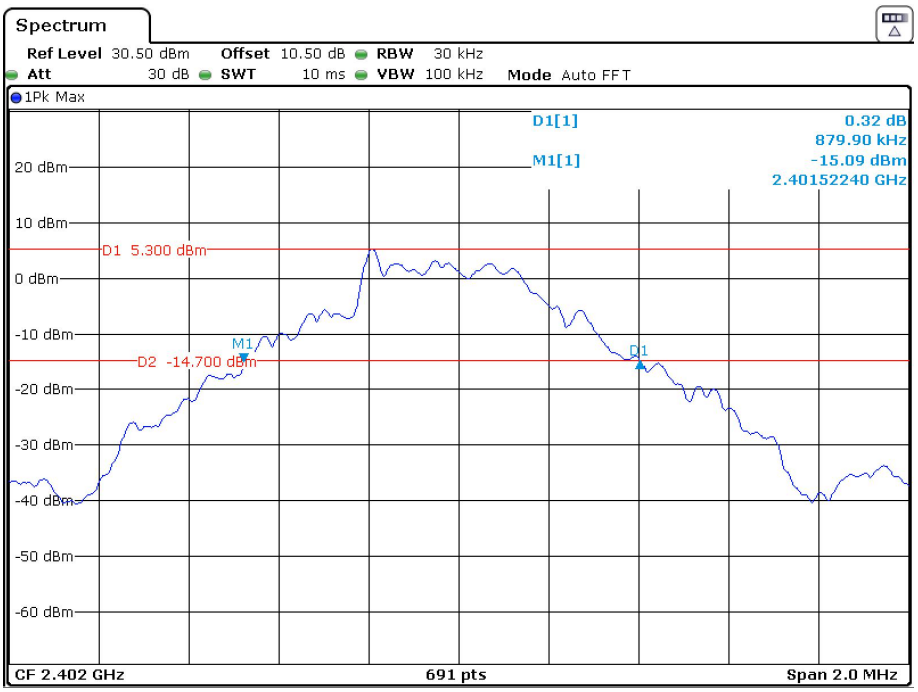
Test Result: Compliant.

Mode	Channel	Frequency (MHz)	20 dB Emission Bandwidth (MHz)
BDR (GFSK)	Low	2402	0.880
	Middle	2441	0.877
	High	2480	0.874
EDR (π/4-DQPSK)	Low	2402	1.279
	Middle	2441	1.236
	High	2480	1.239
EDR (8DPSK)	Low	2402	1.250
	Middle	2441	1.224
	High	2480	1.248

Please refer to the below plots:

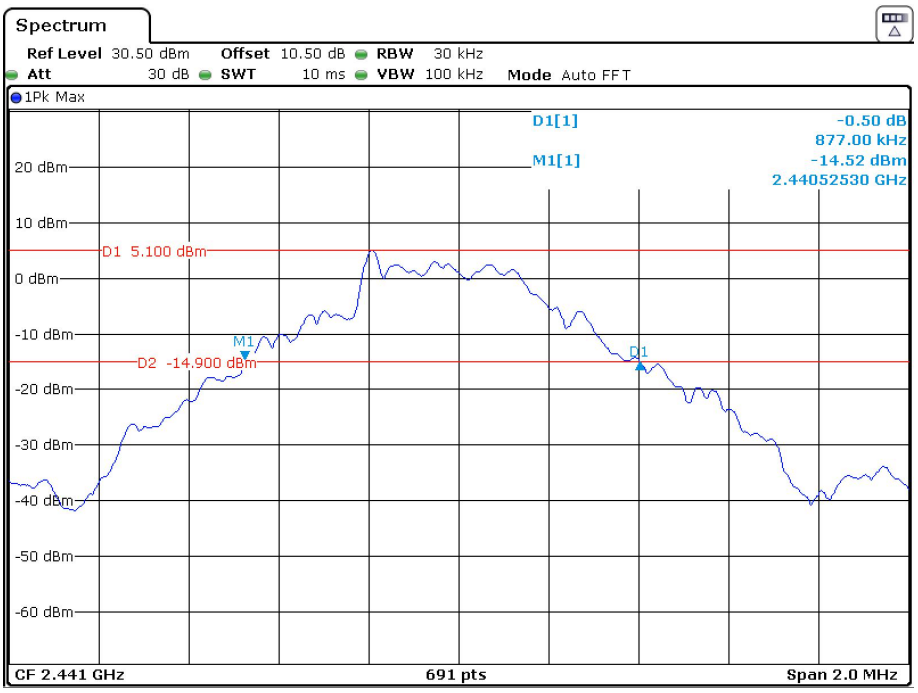
20 dB EMISSION BANDWIDTH

DH1_2402MHz



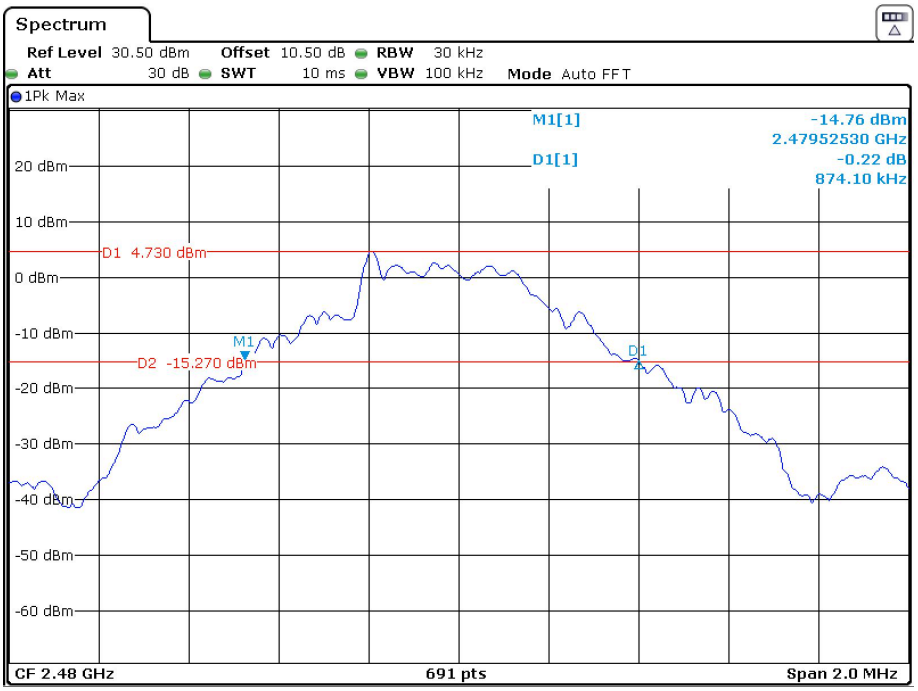
Date: 17.MAY.2022 11:06:16

DH1_2441MHz



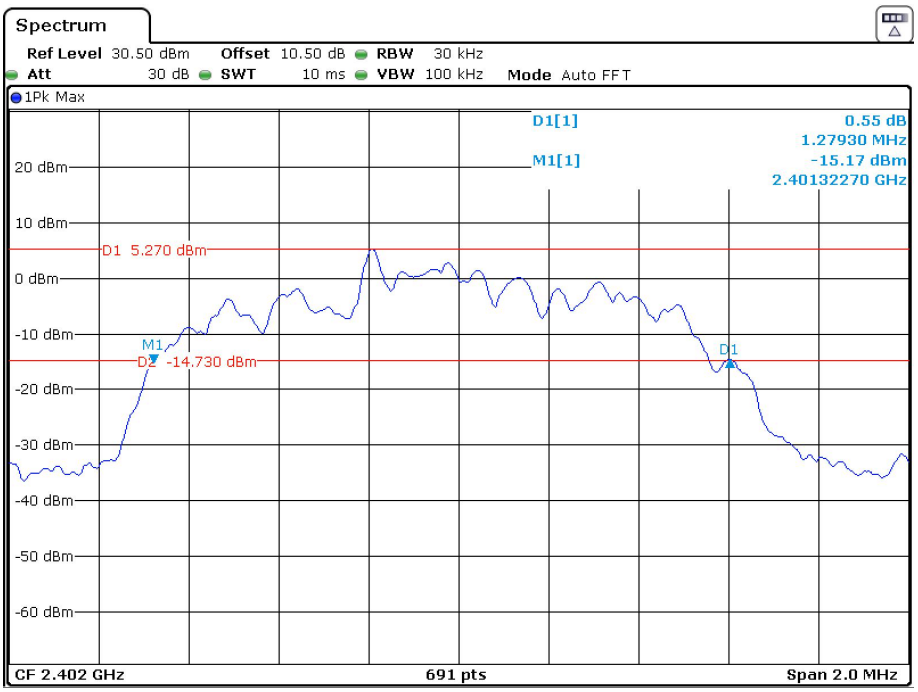
Date: 17.MAY.2022 11:14:51

DH1_2480MHz



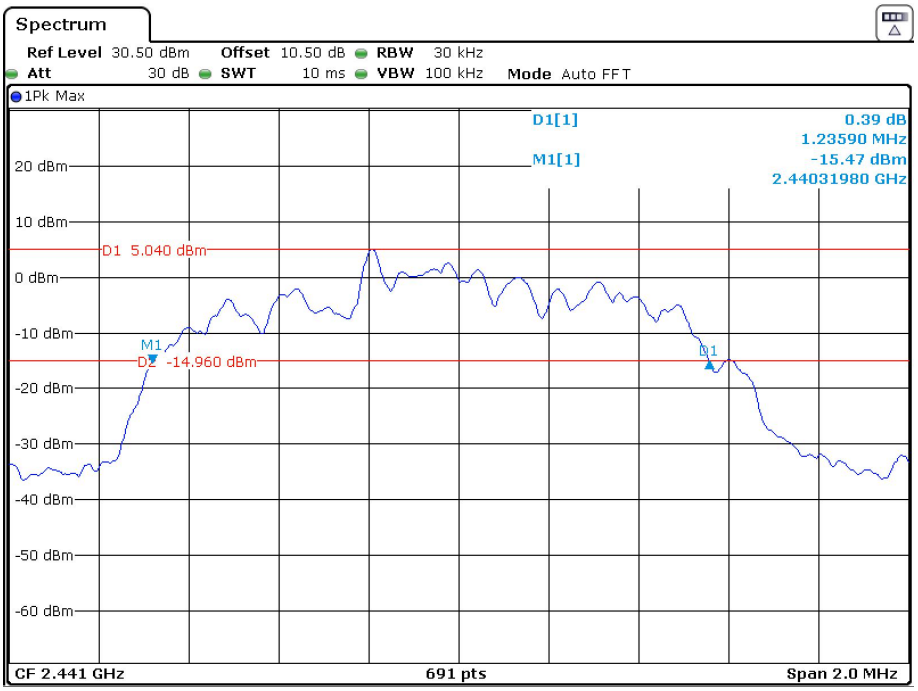
Date: 17.MAY.2022 11:11:15

2DH1_2402MHz



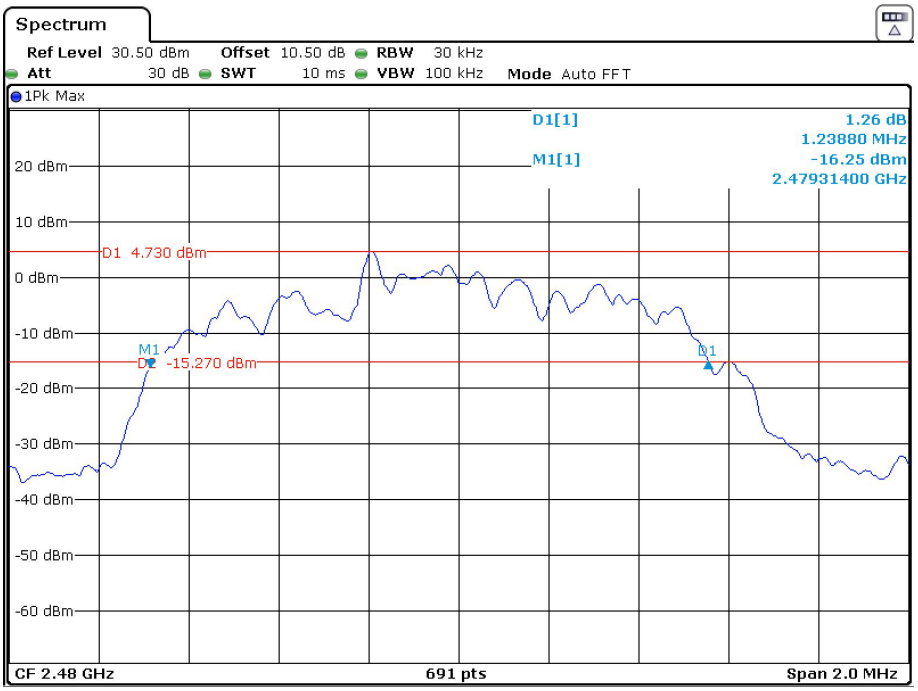
Date: 17.MAY.2022 11:25:37

2DH1_2441MHz



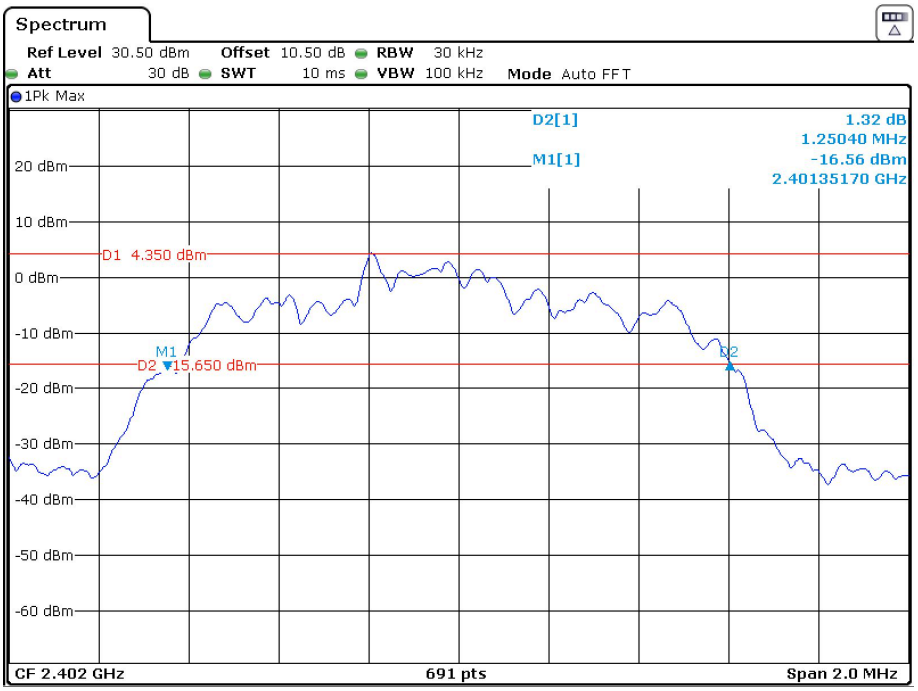
Date: 17.MAY.2022 11:28:52

2DH1_2480MHz



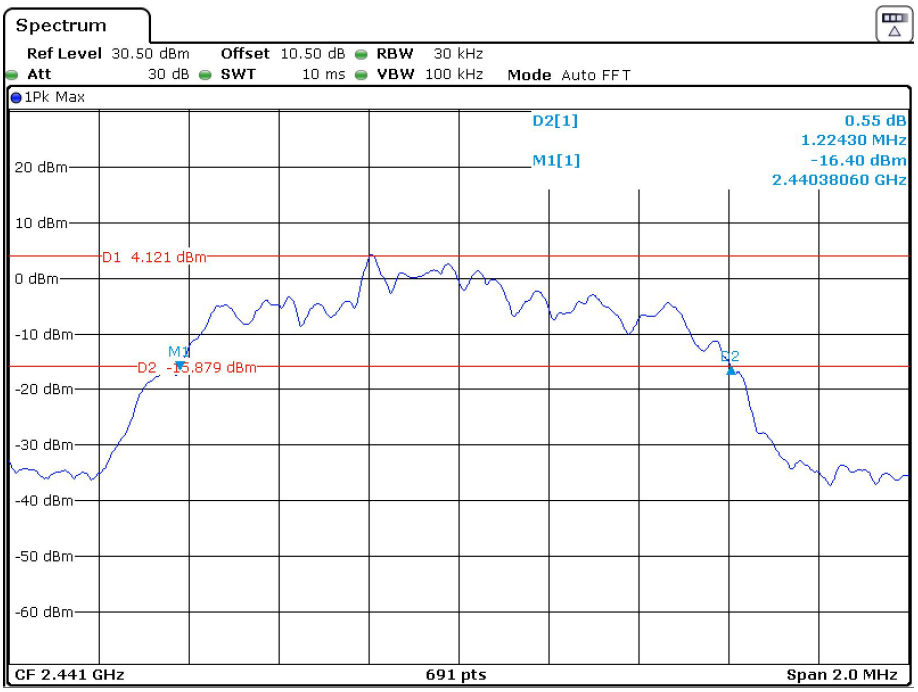
Date: 17.MAY.2022 11:21:35

3DH1_2402MHz



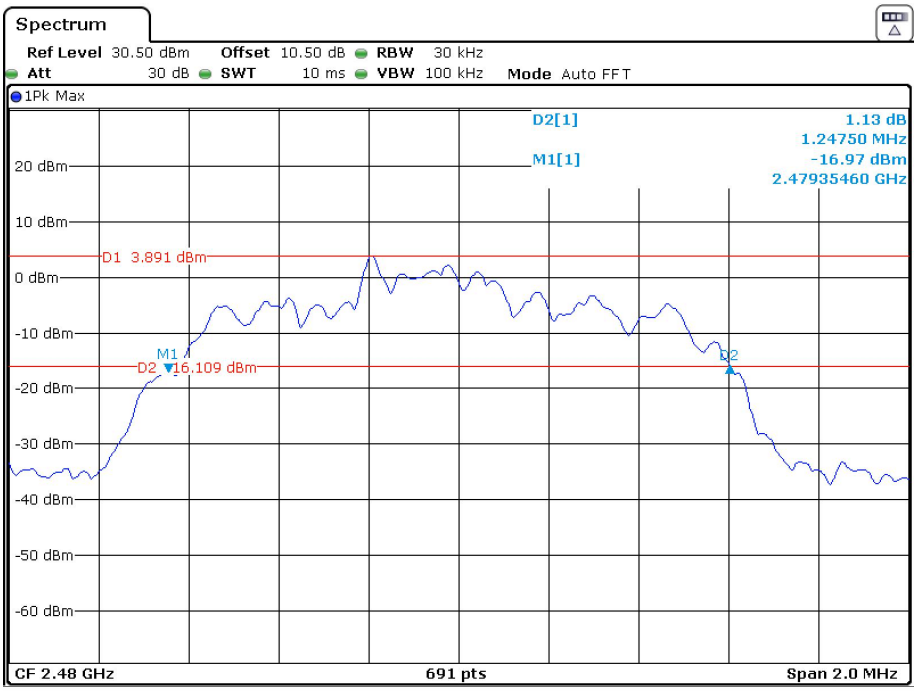
Date: 17.MAY.2022 11:30:55

3DH1_2441MHz



Date: 17.MAY.2022 11:36:05

3DH1_2480MHz



FCC §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL TEST

Applicable Standard

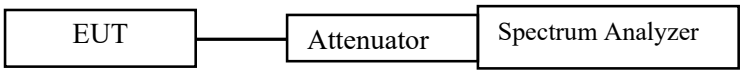
Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

2. Set the EUT in hopping mode from first channel to last.

3. By using the max-hold function record the quantity of the channel.



Test Data

Environmental Conditions

Temperature:	27.9 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

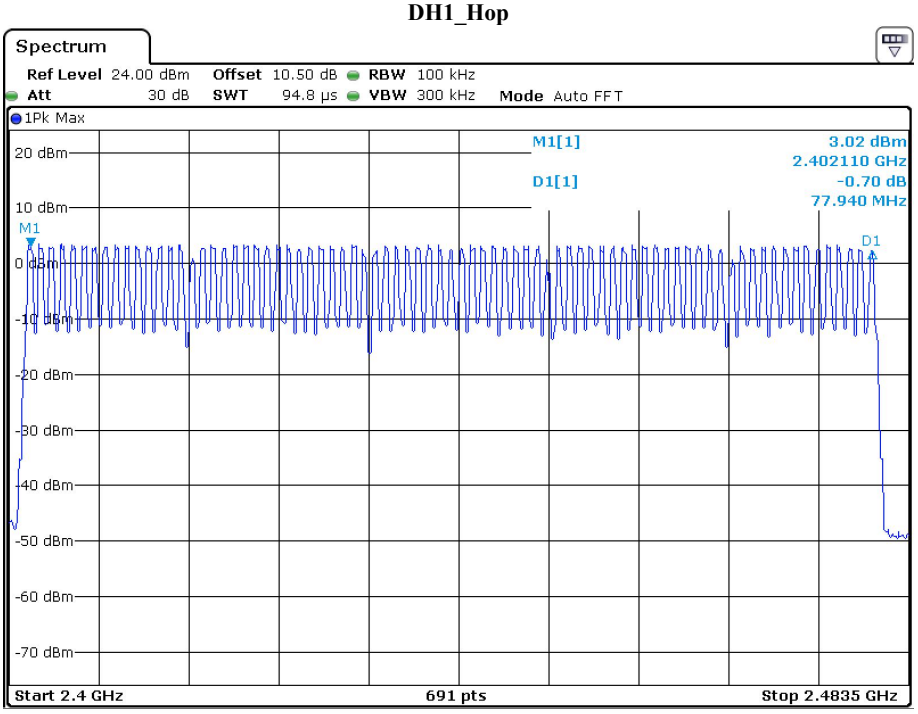
The testing was performed by Andy Yu on 2022-06-10.

EUT operation mode: Transmitting

Test Result: Compliant.

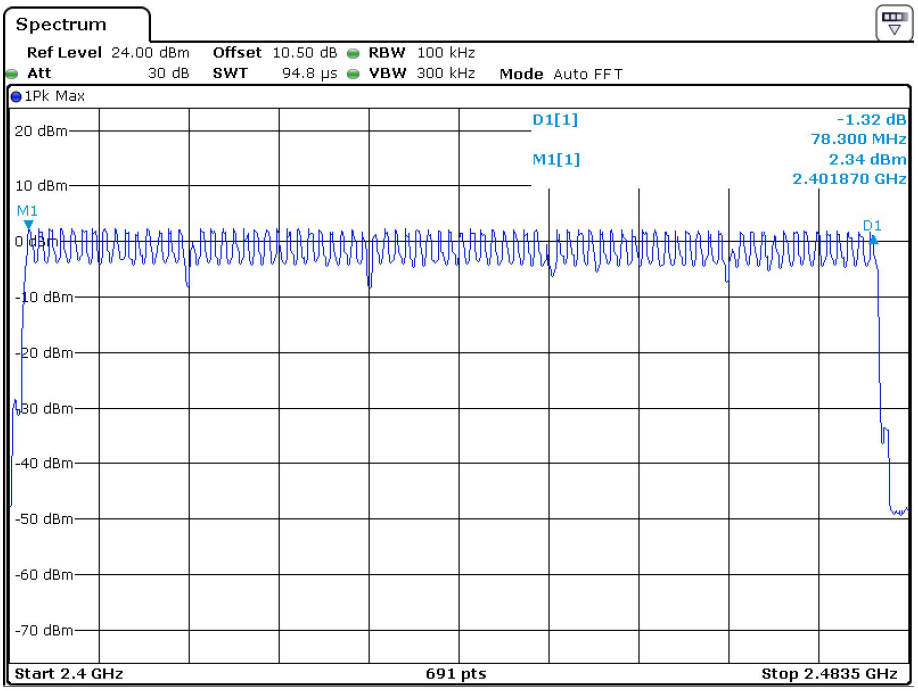
Mode	Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
BDR (GFSK)	2400-2483.5	79	≥15
EDR (π/4-DQPSK)	2400-2483.5	79	≥15
EDR (8DPSK)	2400-2483.5	79	≥15

DH1_Hop



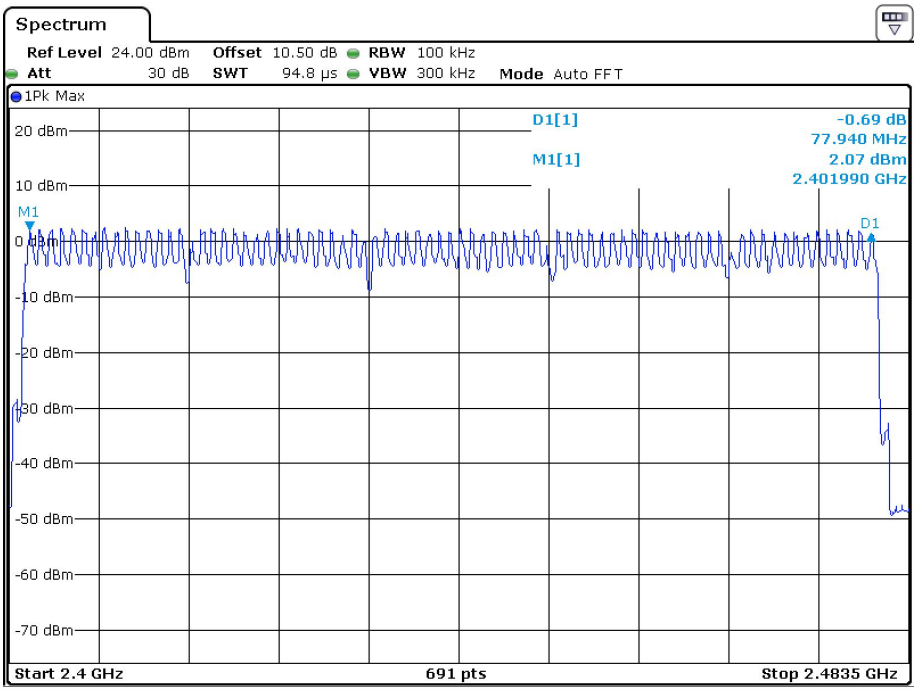
Date: 10.JUN.2022 20:11:50

2DH1_Hop



Date: 10.JUN.2022 20:14:29

3DH1_Hop


Spectrum
Ref Level 24.00 dBm Offset 10.50 dB RBW 100 kHz
Att 30 dB SWT 94.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.69 dB
77.940 MHz
M1[1] 2.07 dBm
2.401990 GHz
M1
D1
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
Start 2.4 GHz
691 pts
Stop 2.4835 GHz
Date: 10.JUN.2022 20:19:44

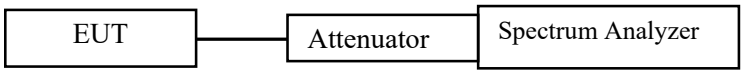
FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)

Applicable Standard

Frequency hopping systems in the 2400-2483.5 MHz 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.

Test Procedure

1. The EUT was worked in channel hopping.
2. Set the RBW to: 1MHz.
3. Set the VBW ≥ 3×RBW.
4. Set the span to 0Hz.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Recorded the time of single pulses



Test Data

Environmental Conditions

Temperature:	27.9 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Andy Yu from 2022-05-17 to 2022-06-11.

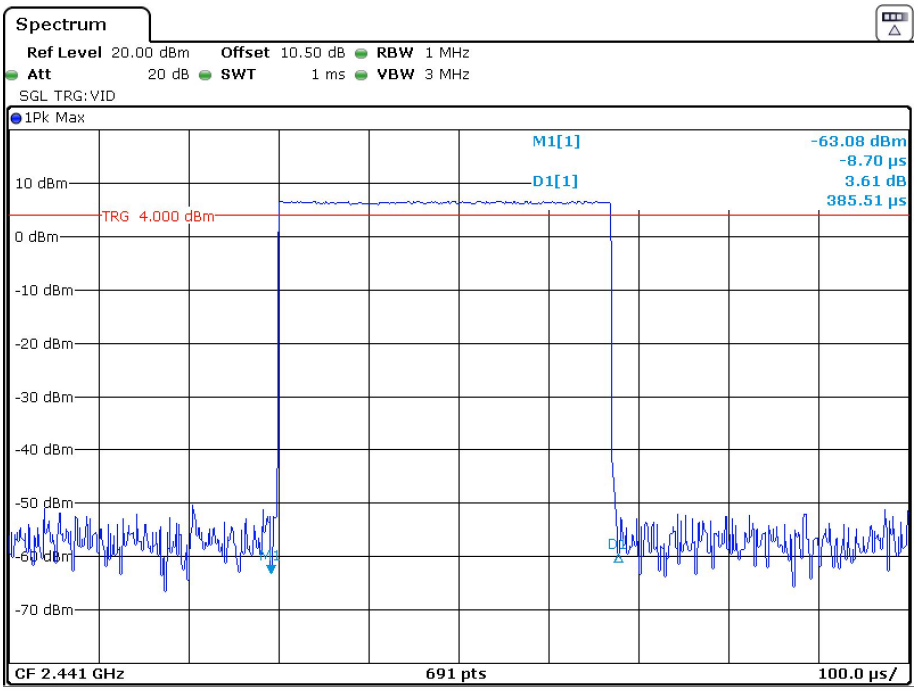
EUT operation mode: Transmitting

Test Result: Compliant.

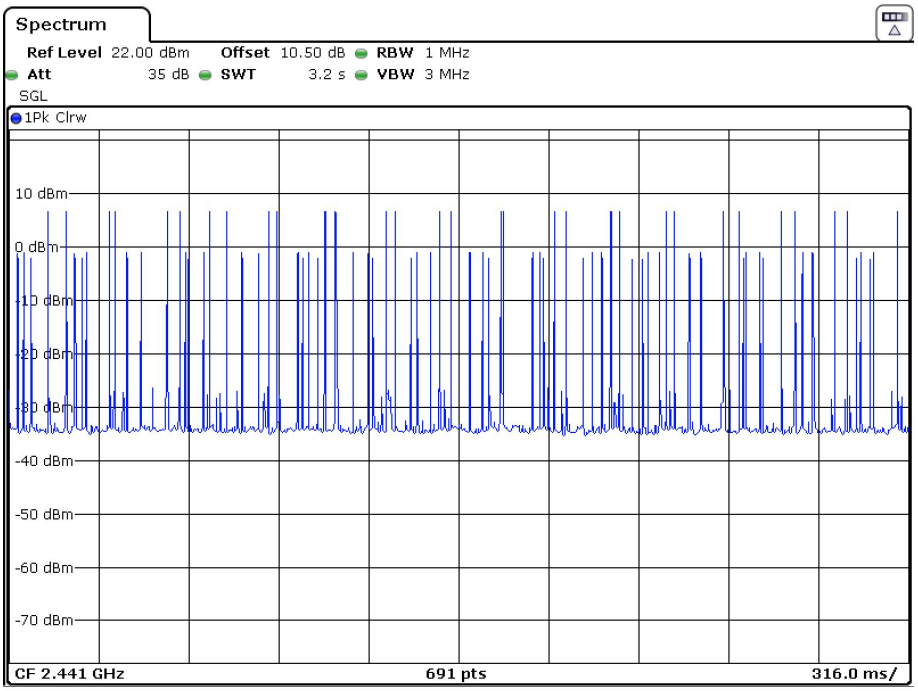
Test Mode	Channel	Pulse Time [ms]	Total Hops [Num]	Result[s]	Limit[s]	Verdict
DH1	Hop	0.386	300	0.116	<=0.4	PASS
DH3	Hop	1.646	180	0.296	<=0.4	PASS
DH5	Hop	2.900	110	0.319	<=0.4	PASS
2DH1	Hop	0.401	320	0.128	<=0.4	PASS
2DH3	Hop	1.649	170	0.280	<=0.4	PASS
2DH5	Hop	2.895	80	0.232	<=0.4	PASS
3DH1	Hop	0.386	320	0.124	<=0.4	PASS
3DH3	Hop	1.651	190	0.314	<=0.4	PASS
3DH5	Hop	2.912	90	0.262	<=0.4	PASS

Note 1: A period time=0.4*79=31.6(S), Result= Pulse Time *Total hops
Note 2: Total hops=Hopping Number in 3.16s*10
Note 3: Hopping Number in 3.16s=Total of highest signals in 3.16s (Second high signals were other channel)

DH1_Hop

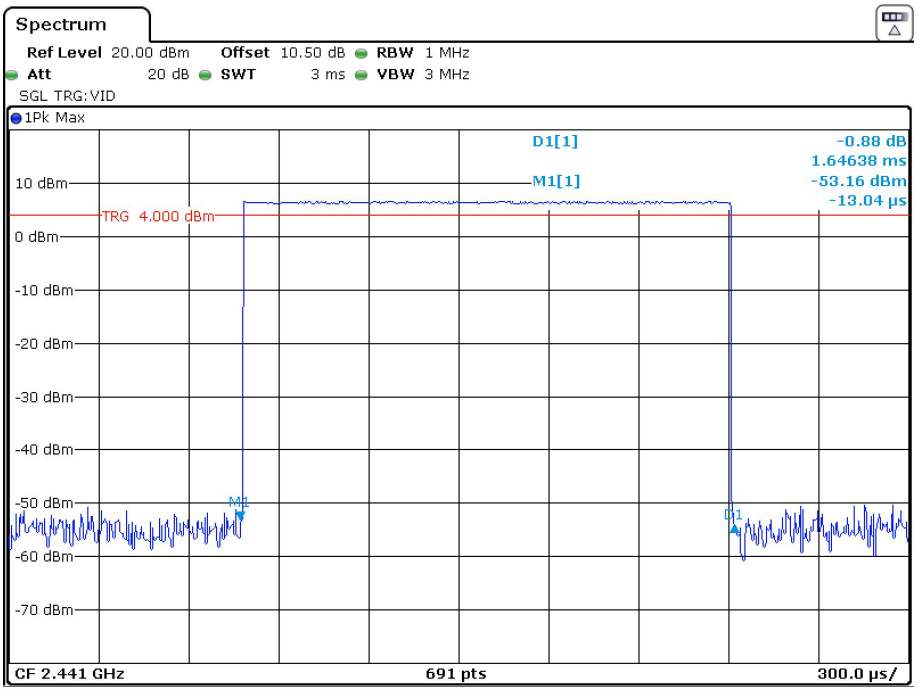


Date: 17.MAY.2022 14:48:04

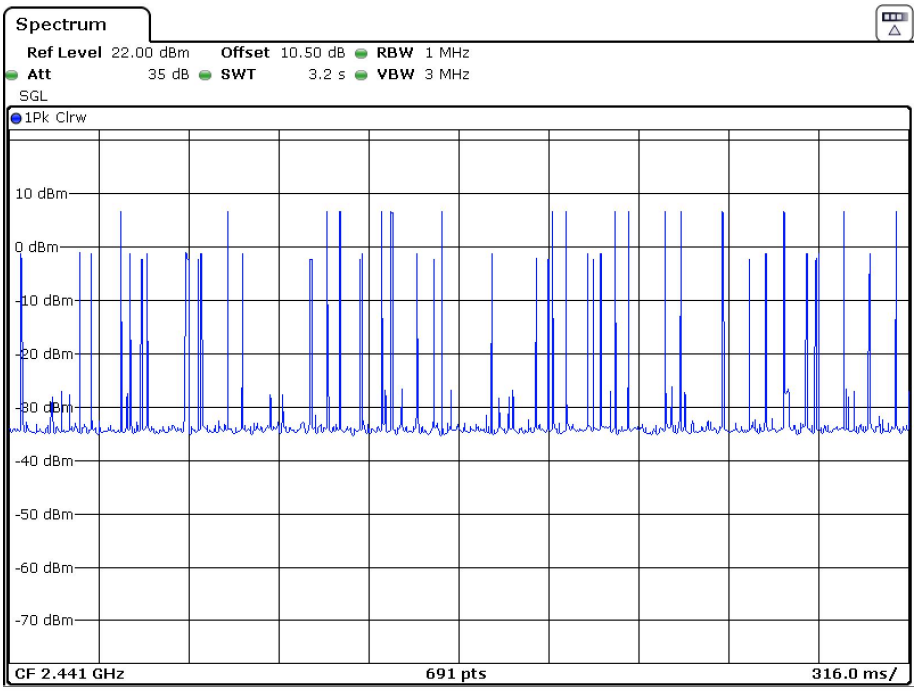


Date: 17.MAY.2022 15:41:39

DH3_ Hop

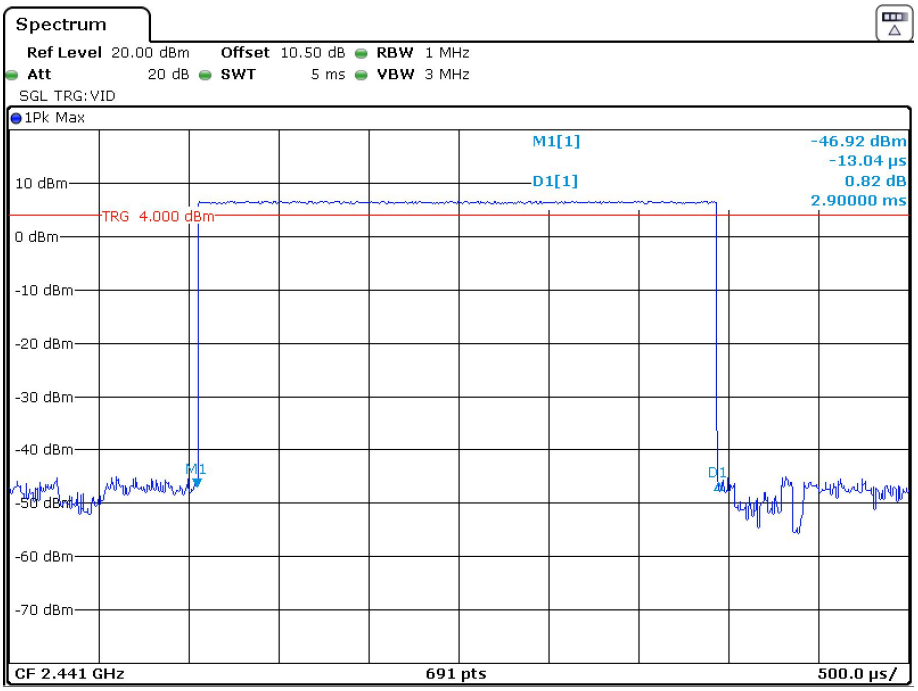


Date: 17.MAY.2022 14:51:53

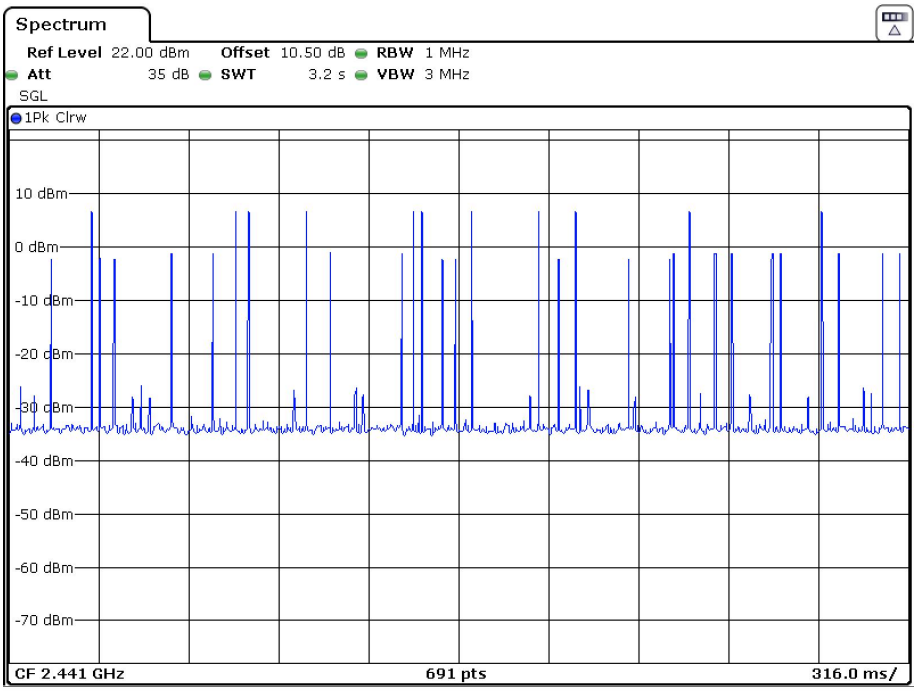


Date: 17.MAY.2022 15:42:19

DH5_ Hop

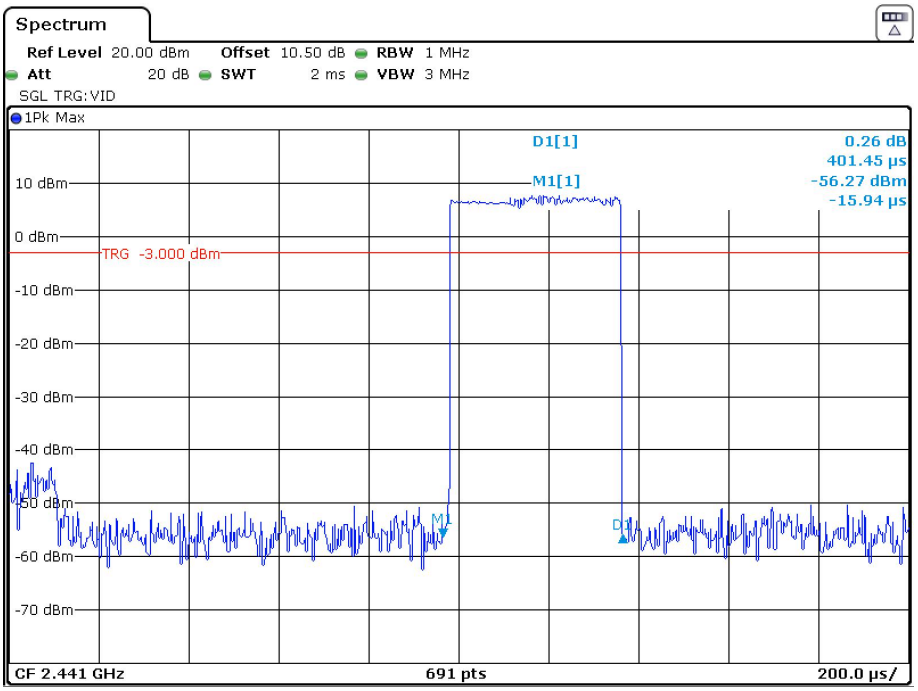


Date: 17.MAY.2022 14:54:15

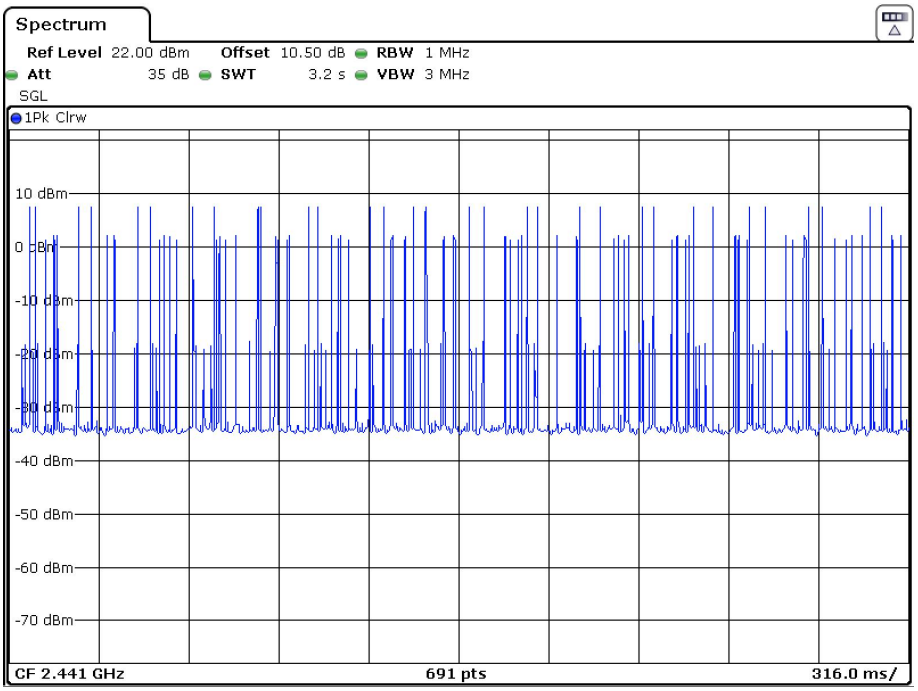


Date: 17.MAY.2022 15:42:59

2DH1_Hop



Date: 17.MAY.2022 14:58:30



Date: 17.MAY.2022 15:41:01