



# **TEST REPORT**

to 2023-04-26

Applicant Name : Address : SHENZHEN MOCLOUD TECHNOLOGY CO., LTD. Rm 1401-02, Huatong Bldg., Ganli 2nd Road, Jihua Town, Longgang Dist., Shenzhen, China RA230329-15458E-RF 2AXUU-ZS-VIBIN-SPKR

Report Number : FCC ID:

**Test Standard (s)** FCC PART 15.247

#### **Sample Description**

Product Type:	Bluetooth Speaker
Model No.:	ZS-VIBIN-SPKR
Trade Mark:	N/A
Date Received:	2023-03-29
Date of Test:	2023-04-02 to 2023
Report Date:	2023-04-26

Test Result:

Pass\*

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

## Prepared and Checked By:

Dave Liang

Dave Liang EMC Engineer

**Approved By:** 

Candry . Li

Candy Li EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk " $\star$ ".

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Version 7: 2023-01-30

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Shenzhen Accurate Technology Co., Ltd.	Report No.: RA230329-15458E-RF
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# **DOCUMENT REVISION HISTORY**

Revision Number	Revision NumberReport NumberDescription of Revis		Date of Revision
0	RA230329-15458E-RF	Original Report	2023-04-26

# **GENERAL INFORMATION**

Product Type	Bluetooth Speaker	
Tested Model	ZS-VIBIN-SPKR	
Frequency Range	Bluetooth:2402~2480MHz	
Maximum Conducted Peak Output Power	5.21dBm	
Modulation Technique	BDR(GFSK)/EDR(π/4-DQPSK)/EDR(8DPSK)	
Antenna Specification*	Internal Antenna: 1.08443 dBi(provided by the applicant)	
Voltage Range	DC5V from USB port or 3.7V from battery	
Sample number	RA230329-15458E-RF-S1(CE&RE) RA230329-15458E-RF-S2(RF Conducted Test) (Assigned by ATC, Shenzhen)	
Sample/EUT Status	Good condition	

## **Product Description for Equipment under Test (EUT)**

## 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.

## **Measurement Uncertainty**

Parameter		Uncertainty	
Occupied Cha	nnel Bandwidth	5%	
RF Fre	equency	$0.082^{*}10^{-7}$	
RF output por	wer, conducted	0.71dB	
Unwanted Emi	ssion, conducted	1.6dB	
AC Power Lines Conducted Emissions		2.92dB	
	30MHz - 1GHz	5.08dB	
Emissions, Radiated	1GHz - 18GHz	4.96dB	
Radiated	18GHz - 26.5GHz	5.16dB	
Temperature		1 °C	
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 Floor 1, KuMaKe Building, Dongzhou Community, Guangming Street, Guangming District, Shenzhen, Guangdong, 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 4297.01

Listed by Innovation, Science and Economic Development Canada (ISEDC), the Registration Number is 30241.

# SYSTEM TEST CONFIGURATION

## **Description of Test Configuration**

The system was configured for testing in an engineering mode.

## **EUT Exercise Software**

Software "bt\_tool\_v1.1.0 \*" was used during testing and the power level was 7\*.

## **Special Accessories**

N/A.

## **Equipment Modifications**

No modification was made to the EUT tested.

## **Support Equipment List and Details**

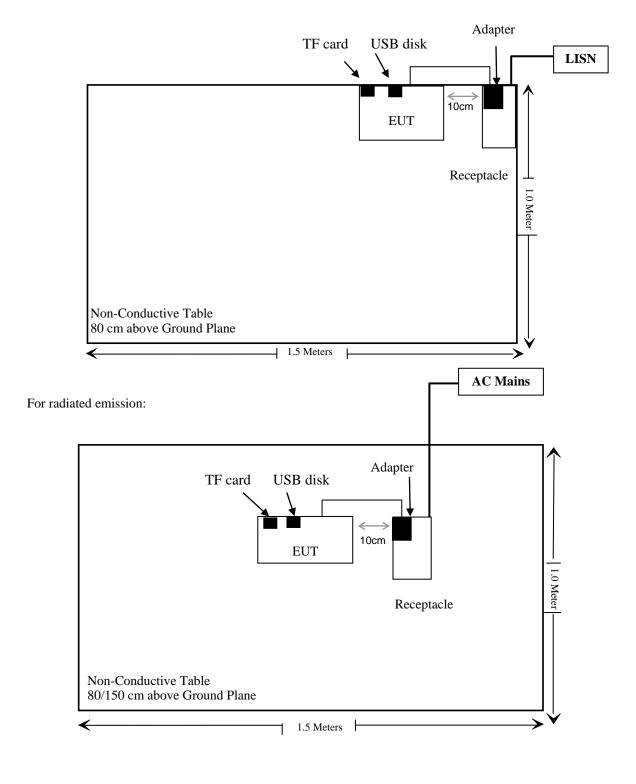
Manufacturer	Description	Model	Serial Number
Unknown	Adapter	KA06E-0501000US	Unknown
Unknown	USB flash disk	Unknown	Unknown
Unknown	TF card	Unknown	Unknown

#### External I/O Cable

Cable Description	Length(m)	From/Port	То
USB Cable	1.0	EUT	Adapter

## **Block Diagram of Test Setup**

For conducted emission:



## SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307 (b)	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 Emission	Test		
Rohde & Schwarz	EMI Test Receiver	ESCI	100784	2022/11/25	2023/11/24
Rohde & Schwarz	L.I.S.N.	ENV216	101314	2022/11/25	2023/11/24
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2022/12/07	2023/12/06
Unknown	RF Coaxial Cable	No.17	N0350	2022/11/25	2023/11/24
	Conducte	d Emission Test Softwar	e: e3 191218 (V	9)	
		<b>Radiated Emissions</b>	Test		
Rohde & Schwarz	Test Receiver	ESR	102725	2022/11/25	2023/11/24
Rohde & Schwarz	Spectrum Analyzer	FSV40	101949	2022/11/25	2023/11/24
SONOMA INSTRUMENT	Amplifier	310 N	186131	2022/11/08	2023/11/07
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2022/11/08	2023/11/07
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2022/11/08	2023/11/07
Schwarzbeck	Bilog Antenna	VULB9163	9163-194	2023/02/14	2026/02/13
Schwarzbeck	Horn Antenna	BBHA9120D	837	2023/02/22	2026/02/21
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2022/12/26	2025/12/25
Unknown	RF Coaxial Cable	No.10	N050	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.11	N1000	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.12	N040	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.13	N300	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.14	N800	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.15	N600	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.16	N650	2022/11/25	2023/11/24
Wainwright	High Pass Filter	WHKX3.6/18G-10SS	5	2022/11/25	2023/11/24
Wainwright	Band Reject Filter	WRCG2400/2485-237 5/2510-60/11SS	10	2022/11/25	2023/11/24
Radiated Emission Test Software: e3 191218 (V9)					
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101495	2022/11/25	2023/11/24
Rohde & Schwarz	Open Switch and Control Unit	OSP120 + OSP-B157	101244 + 100866	2022/11/25	2023/11/24
WEINSCHEL	10dB Attenuator	5324	AU 3842	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.33	RF-03	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 §1.1307 (b)-RF EXPOSURE

#### **Applicable Standard**

According to FCC §1.1307(b), 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.

According to KDB 447498 D04 Interim General RF Exposure Guidance v01, clause 2.1.4 – MPE-Based Exemption:

An alternative to the SAR-based exemption is provided in § 1.1307(b)(3)(i)(C), for a much wider frequency range, from 300 kHz to 100 GHz, applicable for separation distances greater or equal to  $\lambda/2\pi$ , where  $\lambda$  is the free-space operating wavelength in meters. The MPE-based test exemption condition is in terms of ERP, defined as the product of the maximum antenna gain and the delivered maximum time-averaged power. For this case, a RF source is an RF exempt device if its ERP (watts) is no more than a frequency-dependent value, as detailed tabular form in Appendix B. These limits have been derived based on the basic specifications on Maximum Permissible Exposure (MPE) considered for the FCC rules in § 1.1310(e)(1).

Table to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R <sup>2</sup> .
1.34-30	3,450 R <sup>2</sup> /f <sup>2</sup> .
30-300	3.83 R <sup>2</sup> .
300-1,500	0.0128 R <sup>2</sup> f.
1,500-100,000	19.2R <sup>2</sup> .

f = frequency in MHz;

R = minimum separation distance from the body of a nearby person (appropriate units, e.g., m);

#### **Test result**

For worst case:

Mode	Frequency	Tune-up Output Power		Antenna Gain		ERP		Evaluation Distance	MPE-Based Exemption
	Range (MHz)	(dBm)	(mW)	(dBi)	(dBd)	(dBm)	(mW)	(cm)	Threshold (mW)
BT	2402-2480	5.5	3.55	1.08443	-1.06557	4.43443	2.7762	20	768

Note 1: The tune-up power was declared by the applicant. Note 2: 0dBd=2.15dBi.

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

#### **Result:** Compliant.

# 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 1.08443dBi, fulfill the requirement of this section. Please refer to the EUT photos.

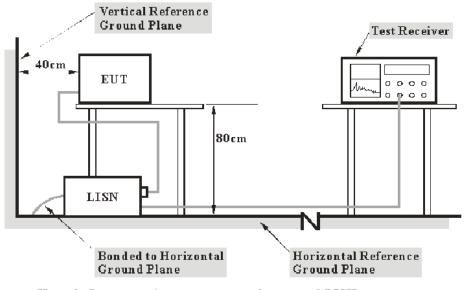
Result: Compliant.

# 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.

## **Factor & Margin Calculation**

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

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, an Over limit of -7 dB means the emission is 7 dB below the limit. The equation for calculation is as follows:

Over Limit = Level – Limit Level = Read Level + Factor

## **Test Data**

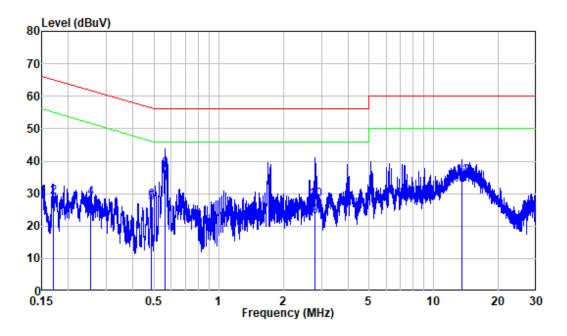
#### **Environmental Conditions**

Temperature:	23°C			
Relative Humidity:	50%			
ATM Pressure:	101kPa			

The testing was performed by Lipa Wu on 2023-04-03.

EUT operation mode: Charging+ BT Transmitting (worst case 8DPSK high channel)

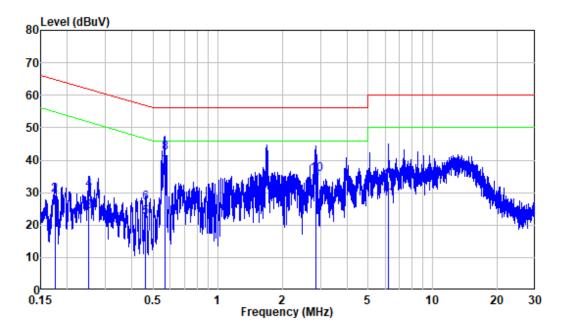
## AC 120V/60 Hz, Line



Site	:	Shielding Room
Condition	1:	Line
Job No.	:	RA230329-15458E-RF
Mode	:	Charging+BT Transmitting
Power	:	AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.170	10.12	13.47	23.59	54.97	-31.38	Average
2	0.170	10.12	18.99	29.11	64.97	-35.86	QP
3	0.253	10.20	12.94	23.14	51.67	-28.53	Average
4	0.253	10.20	18.48	28.68	61.67	-32.99	QP
5	0.486	10.27	16.85	27.12	46.24	-19.12	Average
6	0.486	10.27	17.45	27.72	56.24	-28.52	QP
7	0.564	10.31	22.92	33.23	46.00	-12.77	Average
8	0.564	10.31	27.01	37.32	56.00	-18.68	QP
9	2.800	10.42	12.44	22.86	46.00	-23.14	Average
10	2.800	10.42	17.80	28.22	56.00	-27.78	QP
11	13.515	10.41	22.51	32.92	50.00	-17.08	Average
12	13.515	10.41	24.79	35.20	60.00	-24.80	QP

## AC 120V/60 Hz, Neutral



	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.175	9.68	13.94	23.62	54.73	-31.11	Average
2	0.175	9.68	19.52	29.20	64.73	-35.53	QP
3	0.252	9.70	14.48	24.18	51.69	-27.51	Average
4	0.252	9.70	21.09	30.79	61.69	-30.90	QP
5	0.462	9.76	12.43	22.19	46.65	-24.46	Average
6	0.462	9.76	17.00	26.76	56.65	-29.89	QP
7	0.567	9.77	27.96	37.73	46.00	-8.27	Average
8	0.567	9.77	32.49	42.26	56.00	-13.74	QP
9	2.848	9.82	23.57	33.39	46.00	-12.61	Average
10	2.848	9.82	25.78	35.60	56.00	-20.40	QP
11	6.223	9.89	18.22	28.11	50.00	-21.89	Average
12	6.223	9.89	23.68	33.57	60.00	-26.43	QP

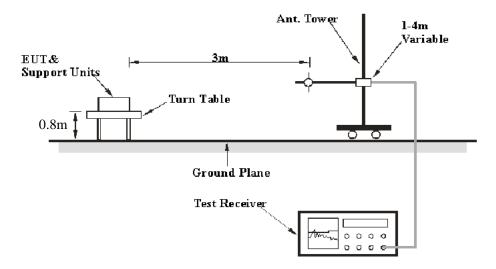
# FCC §15.205, §15.209 & §15.247(d)-RADIATED EMISSIONS

## **Applicable Standard**

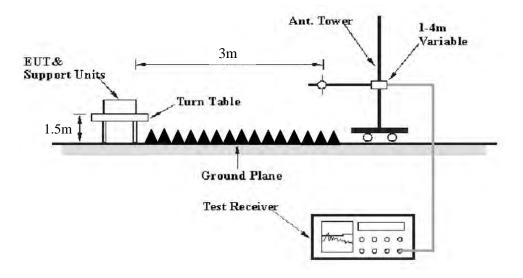
FCC §15.205; §15.209; §15.247(d)

## **EUT Setup**

Below 1 GHz:



Above 1GHz:



The radiated emission performed in the 3 meters, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, 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	/	РК	

For average measurement:

Use the duty cycle factor correction factor method per 15.35(c). Duty cycle=On time/100milliseconds, On time=N1\*L1+N2\*L2+...Nn-1\*Ln-1+Nn\*Ln, Where N1 is number of type 1 pulses, L1 is length of type 1 pulse, etc. Average Emission Level=Peak Emission Level+20\*log(Duty cycle)

#### **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.

If the maximized peak measured value complies with the limit, then it is unnecessary to perform an QP/Average measurement

## **Factor & Margin Calculation**

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

Factor = Antenna Factor + Cable Loss - Amplifier Gain

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

Over Limit/Margin = Level / Corrected Amplitude – Limit Level / Corrected Amplitude = Read Level + Factor

#### **Test Data**

#### **Environmental Conditions**

Temperature:	24°C			
<b>Relative Humidity:</b>	56-57%			
ATM Pressure:	101.0kPa			

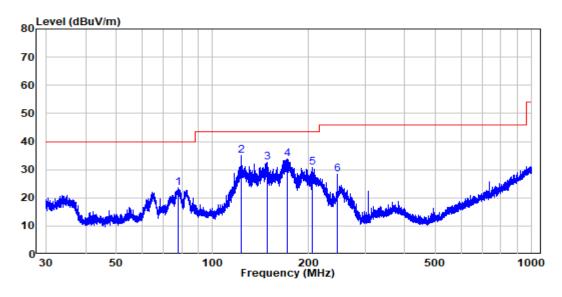
The testing was performed by Jimi Zheng from 2023-04-02 to 2023-04-06.

EUT operation mode: Charging+ BT Transmitting

(Scan with GFSK,  $\pi/4$ -DQPSK, 8DPSK mode at X axis, Y axis, Z axis, the worst case is 8DPSK Mode at Y axis)

## Below 1GHz:

## Worst case for 8DPSK, High Channel:

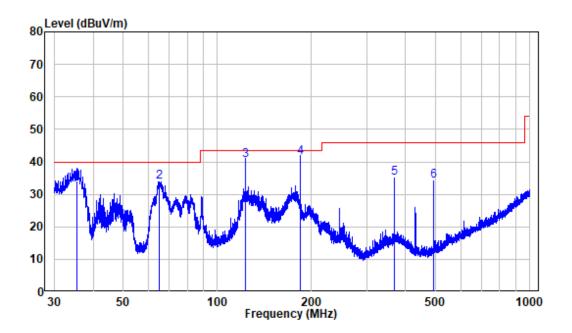


Horizontal

Site : chamber Condition: 3m HORIZONTAL Job No. : RA230329-15458E-RF Test Mode: Charging+BT Transmitting

	Freq	Factor			Limit Line		Remark
-	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	77.797	-13.31	36.86	23.55	40.00	-16.45	Peak
2	122.834	-10.92	46.00	35.08	43.50	-8.42	Peak
3	148.246	-10.38	43.02	32.64	43.50	-10.86	Peak
4	171.242	-10.28	44.21	33.93	43.50	-9.57	Peak
5	205.315	-10.75	41.53	30.78	43.50	-12.72	Peak
6	245.735	-12.23	40.61	28.38	46.00	-17.62	Peak





Site : chamber Condition: 3m VERTICAL Job No. : RA230329-15458E-RF Test Mode: Charging+BT Transmitting

	Freq	Factor			Limit Line		Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	35.406	-14.47	48.51	34.04	40.00	-5.96	QP
2	65.229	-13.76	47.67	33.91	40.00	-6.09	Peak
3	122.942	-10.92	51.50	40.58	43.50	-2.92	QP
4	184.409	-10.29	51.70	41.41	43.50	-2.09	QP
5	368.758	-11.27	46.33	35.06	46.00	-10.94	Peak
6	491.821	-14.10	48.25	34.15	46.00	-11.85	Peak

## Shenzhen Accurate Technology Co., Ltd.

## Above 1GHz (worst case for 8DPSK):

Frequency	Receiver		Turntable Angle	Rx Antenna		Factor	Corrected	Limit	Margin	
(MHz)	Reading (dBuV)	PK/Ave	Degree	Height (m)	Polar (H/V)	( <b>dB/m</b> )	Amplitude (dBuV/m)	(dBuV/ m)	( <b>dB</b> )	
Low Channel										
2310	43.55	РК	273	1.4	Н	-7.23	36.32	74	-37.68	
2310	45.55	PK	34	1.7	V	-7.23	38.32	74	-35.68	
2390	47.98	PK	90	1.0	Н	-7.21	40.77	74	-33.23	
2390	47.41	PK	184	2.1	V	-7.21	40.2	74	-33.80	
4804	67.82	PK	273	1.4	Н	-3.52	64.30	74	-9.70	
4804	59.37	PK	90	1.0	V	-3.52	55.85	74	-18.15	
				Middle Cha	nnel					
4882	67.63	PK	104	1.3	Н	-3.37	64.26	74	-9.74	
4882	58.80	PK	103	1.3	V	-3.37	55.43	74	-18.57	
				High Char	nnel					
2483.5	57.40	РК	34	1.3	Н	-7.2	50.2	74	-23.80	
2483.5	51.36	PK	38	2.0	V	-7.2	44.16	74	-29.84	
2500	46.39	РК	263	1.9	Н	-7.18	39.21	74	-34.79	
2500	43.54	РК	184	1.1	V	-7.18	36.36	74	-37.64	
4960	67.58	PK	34	1.3	Н	-3.01	64.57	74	-9.43	
4960	62.99	РК	263	1.9	V	-3.01	59.98	74	-14.02	

Field Strength of Average									
Energy and an are	Peak	Polar	Duty Cycle Correction	Corrected	FCC Part 15.247				
Frequency (MHz)	Measurement @3m (dBµV/m)	(H/V)	Factor (dB)	Ampitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)			
			Low Channe	[					
4804	64.30	Н	-24.7	39.60	54	-14.40			
4804	55.85	V	-24.7	31.15	54	-22.85			
			Middle Chann	el					
4882	64.26	Н	-24.7	39.56	54	-14.44			
4882	55.43	V	-24.7	30.73	54	-23.27			
	High Channel								
4960	64.57	Н	-24.7	39.87	54	-14.13			
4960	59.98	V	-24.7	35.28	54	-18.72			

#### Shenzhen Accurate Technology Co., Ltd.

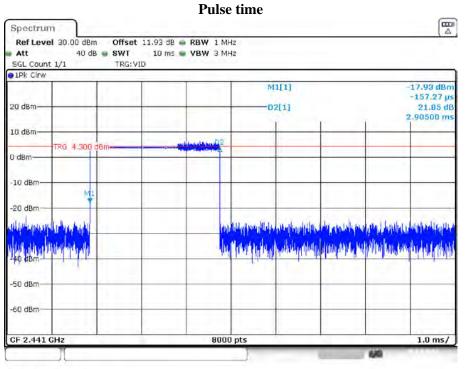
#### Note:

Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor Corrected Amplitude = Factor + Reading Margin = Corrected Amplitude – Limit Average level= Peak level+ Duty Cycle Corrected Factor The other spurious emission which is in the noise floor level was not recorded. For above 1GHz, when the test result of peak was 20dB below to the limit of peak, which can be compliant to the average limit, just peak value was recorded

The worst case duty cycle as below:

Duty cycle = Ton/100ms = (2.91\*2)/100=0.0582

Duty Cycle Corrected Factor = 20\*lg (Duty cycle) = 20\*lg(0.0582) = -24.7



Date: 6.APR,2023 20:08:22

1Rm Cirw							0			
lo dBm	-	-	-	_	-	-	1			
dBm-	-		F			-	<u> </u>		-	
10 dBm	_									
20 dBm						-	-			
30 dBm					-					
40 dBm	MARINA		min	Constant of	manuel		a and an a	manundaria		minun
50 dBm		Jacob a					A COLOR			
60 dBm			-	-						
70 dBm				_		-				

Hops in 100ms

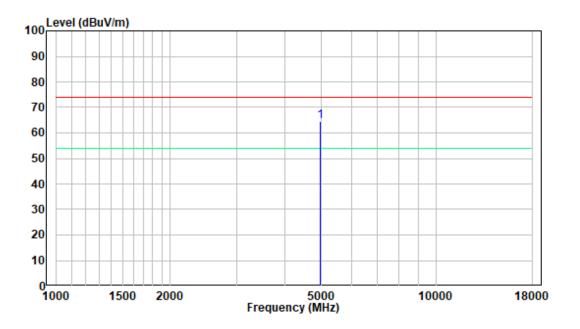
Date: 2.APR.2023 10:07:40

Shenzhen Accurate Technology Co., Ltd.

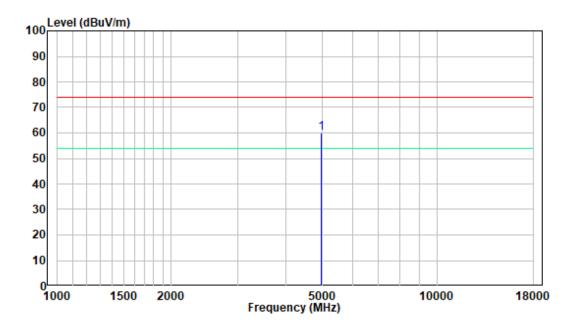
#### 1 GHz - 18 GHz: (Pre-Scan plots)

## Worst case for 8DPSK, High Channel:

## Horizontal



## Vertical



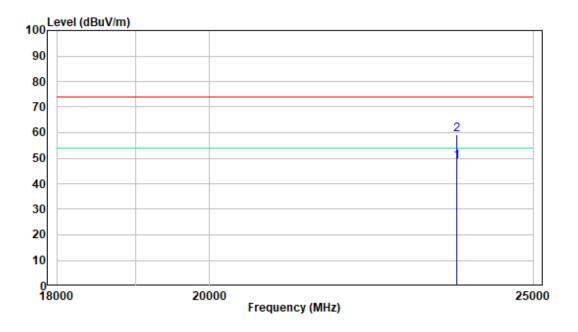
Shenzhen Accurate Technology Co., Ltd.

Report No.: RA230329-15458E-RF

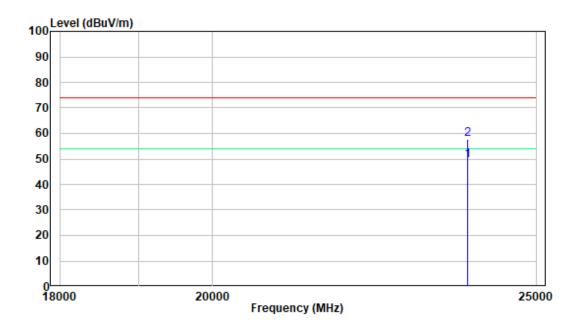
## 18-25GHz: (Pre-Scan plots)

## Worst case for 8DPSK, High Channel:

Horizontal



Vertical



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

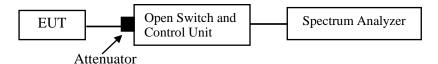
## **Applicable Standard**

Frequency hopping systems shall have hopping 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**

According to ANSI C63.10-2013, section 7.8.2

- 1. Set the EUT in TX 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:	24°C
Relative Humidity:	48%
ATM Pressure:	101kPa

The testing was performed by Dave Liang on 2023-04-26.

#### EUT operation mode: Transmitting

Test Result: Compliant.

Test Mode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Нор	0.988	≥0.512	PASS
2DH5	Ant1	Нор	0.997	≥0.756	PASS
3DH5	Ant1	Нор	1	≥0.860	PASS

Note: The limit = (2/3) \* 20dB bandwidth

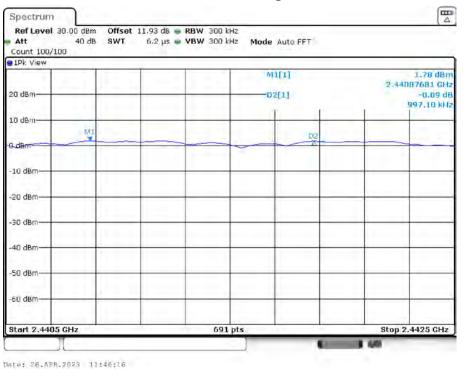
Please refer to the below plots:

Count 100/10 1Pk View	00	_		_				_
20 dBm	-					1[1] 2[1]	2.44	1.76 dBn 088261 GH: 0.02 dB 988.41 kH
10 dBm	MI	-			-			
0 dBm	*	-			-	02		-
-19 dBm-								1
-20 dBm					_		_	
-30 dBm	_				_		_	
-40 dBm							-	-
-50 dBm					_			
-60 dBm								
Start 2.4405	GHz	-	-	691 (	ots	1	Stop	2.4425 GHz

#### DH5\_Ant1\_Hop

Date: 26.APR.2023 11:06:18

#### 2DH5\_Ant1\_Hop



## Shenzhen Accurate Technology Co., Ltd.

Att 40 Count 100/100	B SWT	6.2 µs 🖷 VBW 300 l	kHz Mode Auto FFT		
1Pk View	1 T		M1[1]		1.78 dBr
20 dBm			02[1]		2.441D3623 GH -0.03 di 1.00000 MH
10 dBm					
1.d8m	IW			20	
-10 dBm		1			
-20 dBm					
-30 dBm					
-40 dBm	-				
-50 dBm	-				
-60 dBm					
Start 2.4405 GHz		691	L pts	-	Stop 2.4425 GHz

3DH5\_Ant1\_Hop

# FCC §15.247(a) (1) -20 dB EMISSION BANDWIDTH & 99% OCCUPIED 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**

According to ANSI C63.10-2013, section 7.8.7 and section 6.9.2

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.

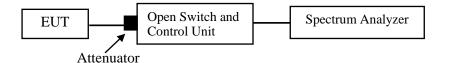
• The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.

• 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 TX 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:	24°C
Relative Humidity:	48%
ATM Pressure:	101kPa

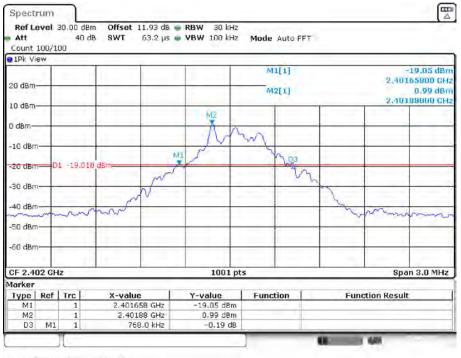
The testing was performed by Dave Liang on 2023-04-26.

EUT operation mode: Transmitting

Test Result: Compliant.

Test Mode	Antenna	Channel	20db EBW[MHz]	OCB [MHz]	Verdict
		2402	0.768	0.776	PASS
DH5	Ant1	2441	0.720	0.773	PASS
		2480	0.720	0.776	PASS
2DH5	Ant1	2402	1.131	1.088	PASS
		2441	1.119	1.088	PASS
		2480	1.134	1.088	PASS
3DH5		2402	1.272	1.190	PASS
	Ant1	2441	1.251	1.190	PASS
		2480	1.290	1.187	PASS

Please refer to the below plots:



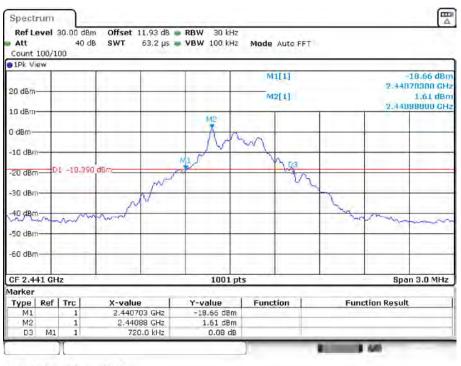
#### 20 dB EMISSION BANDWIDTH\_DH5\_Ant1\_2402

Date: 26.APR.2023 10:58:49

## 99% OCCUPIED BANDWIDTH\_DH5 \_Ant1\_2402



Date: 26.APR.2023 10:58:55



## 20 dB EMISSION BANDWIDTH\_DH5 \_Ant1\_2441

Date: 26.APR.2023 10:39:27

#### 99% OCCUPIED BANDWIDTH\_DH5 \_Ant1\_2441



Date: 26.APR.2023 10:59:32

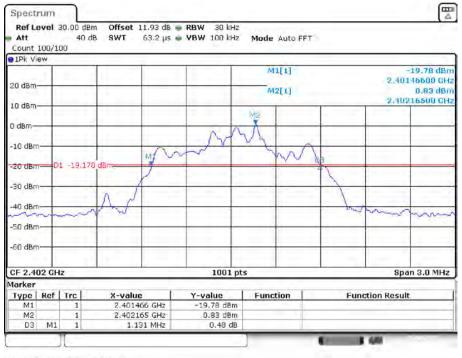


## 20 dB EMISSION BANDWIDTH\_DH5 \_Ant1\_2480

#### 99% OCCUPIED BANDWIDTH\_DH5 \_Ant1\_2480



Date: 26.APR.2023 11:00:06



#### 20 dB EMISSION BANDWIDTH\_2DH5 \_Ant1\_2402

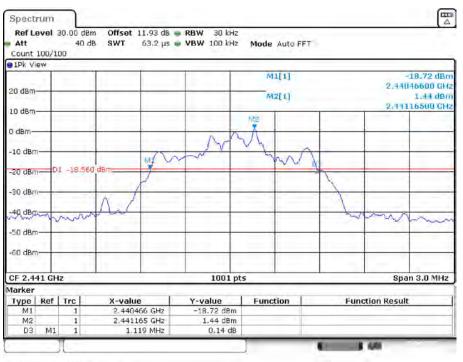
Date: 26.APR.2023 11:00:44

#### 99% OCCUPIED BANDWIDTH\_2DH5 \_Ant1\_2402



Date: 26.APR.2023 11:00:50

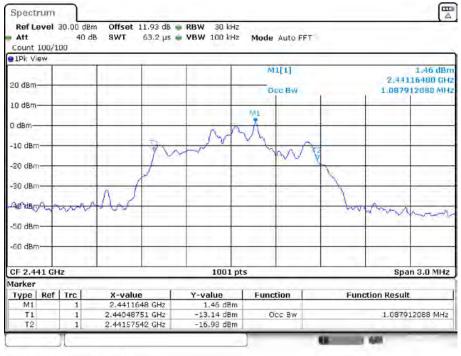
Version 7: 2023-01-30



#### 20 dB EMISSION BANDWIDTH\_2DH5 \_Ant1\_2441

Date: 26.APR.2023 11:01:21

#### 99% OCCUPIED BANDWIDTH\_2DH5 \_Ant1\_2441



Date: 26.APR.2023 11:01:26



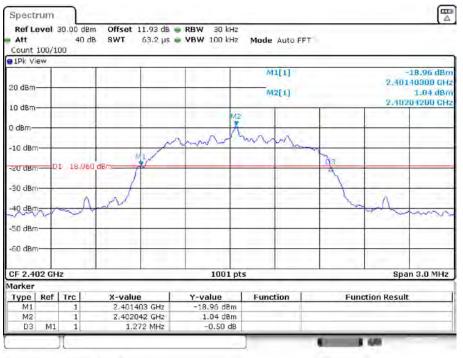
## 20 dB EMISSION BANDWIDTH \_2DH5\_Ant1\_2480

Date: 26.APR.2023 11:31:49

#### 99% OCCUPIED BANDWIDTH \_2DH5\_Ant1\_2480



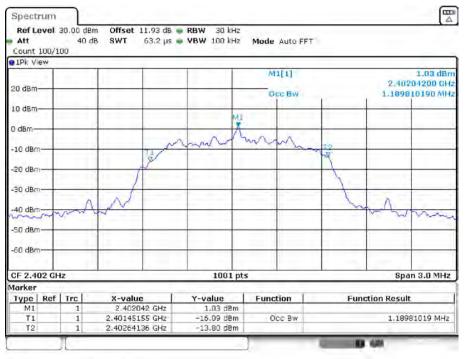
Version 7: 2023-01-30



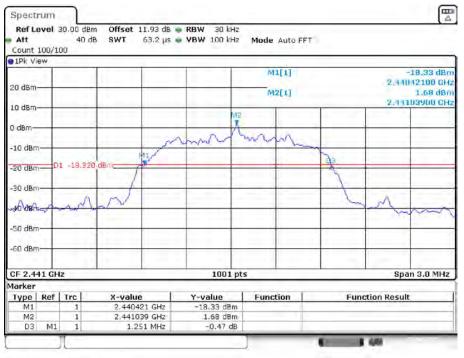
### 20 dB EMISSION BANDWIDTH \_3DH5\_Ant1\_2402

Date: 26.APR.2023 11:02:28

## 99% OCCUPIED BANDWIDTH \_3DH5\_Ant1\_2402



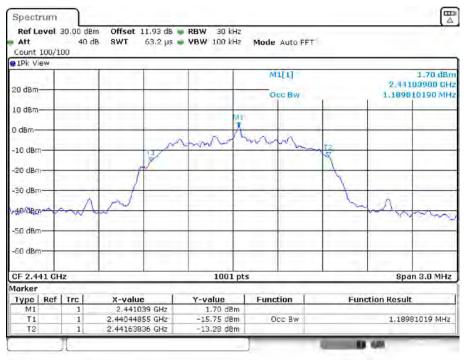
Date: 26.APR.2023 11:02:34



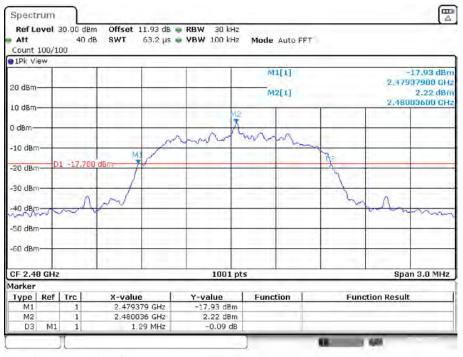
### 20 dB EMISSION BANDWIDTH \_3DH5\_Ant1\_2441

Date: 26.APR.2023 11:03:06

## 99% OCCUPIED BANDWIDTH \_3DH5\_Ant1\_2441



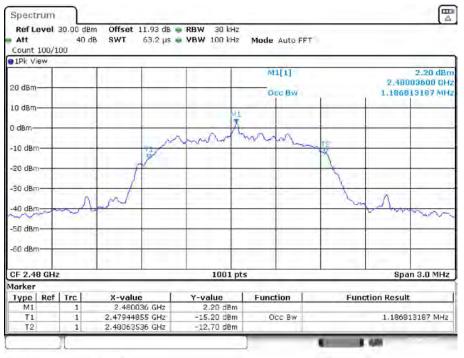
Date: 26.APR.2023 11:03:01



### 20 dB EMISSION BANDWIDTH \_3DH5\_Ant1\_2480

Date: 26.APR.2023 11:03:44

### 99% OCCUPIED BANDWIDTH \_3DH5\_Ant1\_2480



Date: 26.APR.2023 11:53:49

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

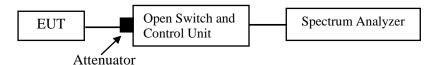
## **Applicable Standard**

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**

According to ANSI C63.10-2013, section 7.8.3

- 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:	24°C
<b>Relative Humidity:</b>	48%
ATM Pressure:	101kPa

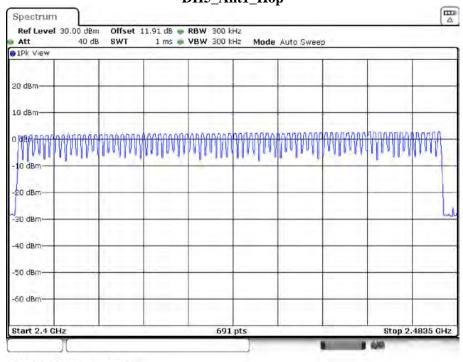
The testing was performed by Dave Liang on 2023-04-26.

#### EUT operation mode: Transmitting

Test Result: Compliant.

Test Mode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Нор	79	>=15	PASS
2DH5	Ant1	Нор	79	>=15	PASS
3DH5	Ant1	Нор	79	>=15	PASS

Please refer to the below plots:



DH5\_Ant1\_Hop

Date: 26.APR.2023 11:43:55

## 2DH5\_Ant1\_Hop

Ref Level 30.00 dBn Att 40 dB		11.91 dB 🖷 1 ms 👼	RBW 300 k		Auto Sweep		
1Pk View							
20 d8m							-
10 dBm							
BBARANAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	hudbar	propries	www.	own	hovereder	www.hum	Britishard
10 dBm							
20 dBm							
30. dBm		-					lan
40 dBm		-					-
-50 dBm						-	
60 dBm							

Date: 26.APR.2023 11:15:49

Ref Level 30.00 dBm Att 40 dB		• • RBW 300 kHz • • VBW 300 kHz	Mode Auto Sweep	
IPk View	~~~~			
20 d8m				
10 dBm		_	_	
BBWARDANNAV	Managerage	uinnannann	www.mananane	monterent
10 dBm				
20 dBm				
30 dBm				1
40 dBm				
SO dBm				
-60 dBm			_	
Start 2.4 GHz		691 pts		Stop 2.4835 GHz

3DH5\_Ant1\_Hop

Date: 26.APR.2023 11:25:24

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

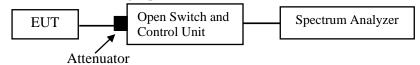
## **Applicable Standard**

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**

According to ANSI C63.10-2013, section 7.8.4

- 1. The EUT was worked in channel hopping.
- 2. Set the RBW to: 1MHz.
- 3. Set the VBW  $\geq$  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:	24°C
Relative Humidity:	48%
ATM Pressure:	101kPa

*The testing was performed by Dave Liang on 2023-04-26. EUT operation mode: Transmitting* 

#### Test Result: Compliant.

Test Mode	Antenna	Channel	Burst Width [ms]	Total Hops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Нор	0.408	330	0.135	<=0.4	PASS
DH3	Ant1	Нор	1.656	220	0.364	<=0.4	PASS
DH5	Ant1	Нор	2.895	100	0.29	<=0.4	PASS
2DH1	Ant1	Нор	0.418	320	0.134	<=0.4	PASS
2DH3	Ant1	Нор	1.661	190	0.316	<=0.4	PASS
2DH5	Ant1	Нор	2.903	110	0.319	<=0.4	PASS
3DH1	Ant1	Нор	0.420	320	0.134	<=0.4	PASS
3DH3	Ant1	Нор	1.663	160	0.266	<=0.4	PASS
3DH5	Ant1	Нор	2.907	60	0.174	<=0.4	PASS

Note 1: A period time=0.4\*79=31.6(s), Result=Burst Width\*Total Hops

Note 2: Total Hops =Hopping Number in 3.16s\*10

Note 3: Hoping Number in 3.16s=Total of highest signals in 3.16s (Second high signals were other channel)

Please refer to the below plots:

Ref Level 30.00 dBm	Offset 1	1.93 dB 😑	RAW 1 M	12				
Att 40 dB	SWT	10 ms 🖷	VBW 3 M					
SGL Count 1/1	TRG: VID	9						
				M	1[1]			-16.60 dB
20 d8m	11		10 C 10		6110			-11.00
20 UBIN				0	2[1]			18,12
10 dBm					1		1	
	02							
dem TRG 0.100	dBm-				-	-	-	-
10 dBm	1							
20 dBm-								
Sine war 1	w. k		. Jack		1.1. 100	Sec. 1	1 1 1	and the state
Purch Dian profiling left	PHILIPPINE P	. Manal Janu	und Minuster	red galilyer	Antomical	a and a state of	nalimiterativ	un sensalem
anthiation is antibiotich.	dia léhati	lain la paile, table	L. And Disk	in bellete the	labland Mild.	dilitis Made la	difeteed by July	dimensio di la
10 dBm		- Intra-		de de	and the	the state	Williad of L	the states in
FO dam								
-50 dBm								
-60 dBm					-			_
	1.0.1							
CF 2.441 GHz			8000	nts				1.0 ms
Y					_	-	2.95	
	1:07:22							ſ
spectrum	Offset 1	1.93 dB 🖷						[
Spectrum Ref Level 30.00 dBm Att 40 dB	Offset 1	3.2 5 💻	RBW 500 VBW 31					[
Spectrum Ref Level 30.00 dBm Att 40 dB SGL Count 1/1	Offset 1	3.2 5 💻						[
Spectrum Ref Level 30.00 dBm Att 40 dB	Offset 1	3.2 5 💻					1	[
Spectrum Ref Level 30.00 dBm Att 40 dB SGL Count 1/1 1Pk Cirw	Offset 1	3.2 5 💻						[
Spectrum Ref Level 30.00 dBm Att 40 dB SGL Count 1/1	Offset 1	3.2 5 💻						[
Spectrum Ref Level 30.00 dBm Att 40 dB SGL Count 1/1 1Pk Cirw	Offset 1	3.2 5 💻						[
Spectrum Ref Level 30.00 dBm Att 40 dB SGL Count 1/1 1Pk Cirw 20 dBm 10 dBm	Offset 1 SWT TRG:VID	3.2 5 💻						
Spectrum	Offset 1 SWT TRG:VID	3.2 5 💻						
Spectrum Ref Level 30.00 dBm Att 40 dB SGL Count 1/1 1Pk Cirw 20 dBm 10 dBm TRG 0.100 s	Offset 1 SWT TRG:VID	3.2 5 💻						
Spectrum Ref Level 30.00 dBm Att 40 dB SGL Count 1/1 1Pk Cirw 20 dBm 10 dBm	Offset 1 SWT TRG:VID	3.2 5 💻						
Spectrum Ref Level 30.00 dBm Att 40 dB SGL Count 1/1 11Pk Cirw 20 dBm 10 dBm 10 dBm 10 dBm	Offset 1 SWT TRG:VID	3.2 5 💻						
Spectrum Ref Level 30.00 dBm Att 40 dB SGL Count 1/1 11Pk Cirw 20 dBm 10 dBm 10 dBm 10 dBm	Offset 1 SWT TRG:VID	3.2 5 💻						
Spectrum           Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1           1Pk Clrw           20 dBm           10 dBm           10 dBm           10 dBm           20 dBm           20 dBm	Brn	3.2 5						
Spectrum	Brn	3.2 5	VBW 31	MHz				
Spectrum	Brn	3.2 5	VBW 31	MHz				
Spectrum         40 dBm           Att         40 dB           SGL Count 1/1         11/k Cinw           11Pk Cinw         20 dBm           10 dBm         7RG 0.100 mm           10 dBm         7RG 0.100 mm           10 dBm         7RG 0.100 mm           40 dBm         40 mm	Brn	3.2 5	VBW 31	MHz				
Spectrum	Brn	3.2 5	VBW 31	MHz				
Spectrum         40 dBm           Att         40 dB           SGL Count 1/1         11Pk Cirw           11Pk Cirw         20 dBm           20 dBm         786 0,100 dBm           10 dBm         786 0,100 dBm           20 dBm         786 0,100 dBm           40 dBm         786 0,100 dBm           50 dBm         50 dBm	Brn	3.2 5	VBW 31	MHz				
Spectrum           Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1           11Pk Clrw           20 dBm           10 dBm           3 dBm           10 dBm           20 dBm	Brn	3.2 5	VBW 31					

DH1\_Ant1\_Hop

Date: 26.APR.2023 11:07:27

Att 40 dB 🖷 5	Offset 11,93 dB 🖷 SWT 10 ms 🖷	VBW 3 MHz					
SGL Count 1/1	TRG: VID						
1Pk Cirw				143			17.00 -
			m	[1]			-17.80 di -11.00
20 dBm			02	[1]			19,38
						1	1,65600
l0 dBm							
	D2						
dBm TRG 0.000 dBm						-	-
10 dBm-					-	+	
M		_					
20 dBm		1.1					-
as the difference of the the section	1.11	. Hereiteld	Baddings A.	L. Ashakas	LANGIN	a hall alle	too we with
		hill	al a state of the	alu I.		10	and appropriate
and the states of		Ma P P Ph	AndA A	A PERM	Star a C	nan ' An	WIP Inela P
10 dBm					h. H.	-	11 . 1
100							
60 dBm						1	
50 dBm						1	
F 2.441 GHz		8000 1	ots				1.0 ms
						6,60	
	:59						6
te: 26.APR.2023 11:07							ſ
Spectrum Ref Level 30.00 dBm	Offset 11.93 dB						ľ
Ref Level 30.00 dBm ( Att 40 dB 4 5	Offset 11.93 dB	RBW 500 kł VBW 3 Mł					ľ
Ref Level 30.00 dBm ( Att 40 dB 4 5	Offset 11.93 dB SWT 3.2 5						[
Spectrum Ref Level 30.00 dBm d Att 40 dB 45 56L Count 1/1	Offset 11.93 dB SWT 3.2 5					1	[
Ref Level 30.00 dBm d Att 40 dB 4 5 SGL Count 1/1 1Pk Cirw	Offset 11.93 dB SWT 3.2 5						[
Ref Level 30.00 dBm d Att 40 dB 4 5 SGL Count 1/1 1Pk Cirw	Offset 11.93 dB SWT 3.2 5						[
Bpectrum         Ref Level 30.00 dBm         0           Att         40 dB         9           SGL Count 1/1         1Pk Cirw         0           0 dBm         0         0	Offset 11.93 dB SWT 3.2 5						[
Bpectrum         Ref Level 30.00 dBm         0           Att         40 dB         9           SGL Count 1/1         1Pk Cirw         0           0 dBm         0         0	Offset 11.93 dB SWT 3.2 5						[
Spectrum           Ref Level 30.00 dBm           Att         40 dB           3GL Count 1/1           IPk Cirw           0 dBm           0 dBm	Offset 11.93 dB SWT 3.2 5						[
Spectrum           Ref Level 30.00 dBm           Att         40 dB           3GL Count 1/1           IPk Cirw           0 dBm           0 dBm	Offset 11.93 dB SWT 3.2 5						[
Beectrum Ref Level 30.00 dBm 0 Att 40 dB 3 SGL Count 1/1 IPk Cirw 0 dBm 0 dBm TRG 0.000 dBm	Offset 11.93 dB SWT 3.2 5						[
Bpectrum Ref Level 30.00 dBm 0 Att 40 dB 3 SGL Count 1/1 1Pk Cirw 0 dBm 0 dBm TRG 0.000 dBm	Offset 11.93 dB SWT 3.2 5						
Spectrum Ref Level 30.00 dBm Att 40 dB 3 SGL Count 1/1 IPk Cirw 0 dBm 0 dBm 0 dBm 10 dBm 10 dBm	Offset 11.93 dB SWT 3.2 5						
Ref Level 30.00 dBm O Att 40 dB 3 GGL Count 1/1 1Pk Clrw 0 dBm 0 dBm 10 dBm	Offset 11.93 dB SWT 3.2 5						
Bpectrum           Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1           IPk Cirw           0 dBm	Difset 11.93 dB SWT 9.2 5 TRG:VID	VBW 3 Mi					
Bpectrum           Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1           IPk Cirw           0 dBm	Difset 11.93 dB SWT 9.2 5 TRG:VID						
Spectrum           Ref Level 30.00 dBm           Att         40 dB           5GL Count 1/1           IPk Cirw           0 dBm	Difset 11.93 dB SWT 9.2 5 TRG:VID	VBW 3 Mi					
Spectrum           Ref Level 30.00 dBm           Att         40 dB           5GL Count 1/1           IPk Cirw           0 dBm	Difset 11.93 dB SWT 9.2 5 TRG:VID	VBW 3 Mi					
Bpectrum         Ref Level 30.00 dBm         Att         40 dB = 5           SGL Count 1/1         IPk Cirw         IPk Cirw         IPk Cirw           0 dBm         0 dBm         IPk Cirw         IPk Cirw           0 dBm         IPk Cirw         IPk Cirw         IPk Cirw           10 dBm         IPk Cirw         IPk Cirw         IPk Cirw           20 dBm         IPk Cirw         IPk Cirw         IPk Cirw           40 dBm         IPk Cirw         IPk Cirw         IPk Cirw	Difset 11.93 dB SWT 9.2 5 TRG:VID	VBW 3 Mi					
Bpectrum         Ref Level 30.00 dBm         Att         40 dB = 5           SGL Count 1/1         IPk Cirw         IPk Cirw         IPk Cirw           0 dBm         0 dBm         IPk Cirw         IPk Cirw           0 dBm         IPk Cirw         IPk Cirw         IPk Cirw           10 dBm         IPk Cirw         IPk Cirw         IPk Cirw           20 dBm         IPk Cirw         IPk Cirw         IPk Cirw           40 dBm         IPk Cirw         IPk Cirw         IPk Cirw	Difset 11.93 dB SWT 9.2 5 TRG:VID	VBW 3 Mi					
Bpectrum         Ref Level 30.00 dBm         0           Att         40 dB         \$           SGL Count 1/1         1         1           IPk Cirw         0         0           0 dBm         0         0	Difset 11.93 dB SWT 9.2 5 TRG:VID	VBW 3 Mi					
Spectrum           Ref Level 30.00 dBm           Att         40 dB = 3           SGL Count 1/1           IPk Cinw           0 dBm           0 dBm           0 dBm           0 dBm           20 dBm           10 dBm           20 dBm           10 dBm           10 dBm           20 dBm           30 dBm	Difset 11.93 dB SWT 9.2 5 TRG:VID	VBW 3 Mi					
pectrum           Ref Level 30.00 dBm           Att         40 dB = 3           SGL Count 1/1           IPk Cirw           0 dBm	Difset 11.93 dB SWT 9.2 5 TRG:VID	VBW 3 Mi	12 1				

DH3\_Ant1\_Hop

Date: 26.APR.2023 11:08:04

	11.02 J0 - DDW 1 MU		
	11.93 dB - RBW 1 MHz 10 ms VBW 3 MHz		
SGL Count 1/1 TRG:VI 1Pk Cirw	D		
IPK CITW	M	[1]	-15.01 dBn
	a second law of the second		-9.75 µ
20 dBm	- D2	[1]	16.74 di 2.89500 m
.0 dBm			
	D2		
HIG 0.100 dBm			
10 10-			
10 dBm Mh			
20 dBm-			
Connection Content	and ask a	weberle kunkerier	
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40'¢8m		11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1. 1.
50 dBm			
-60 dBm			
CF 2.441 GHz	8000 pts		1.0 ms/
		A Real Property lies and the	640
			(m)
	11.93 dB <b>RBW</b> 500 kHz		(III)
Spectrum Ref Level 30.00 dBm Offset Att 40 dB SWT SGL Count 1/1 TRG:VI	3.2 s 🛋 VBW 3 MHz		
Spectrum Ref Level 30.00 dBm Offset Att 40 dB SWT SGL Count 1/1 TRG:VI	3.2 s 🛋 VBW 3 MHz		(m
Spectrum Ref Level 30.00 dBm Offset Att 40 dB SWT SGL Count 1/1 TRG:VI	3.2 s 🛋 VBW 3 MHz		
Spectrum Ref Level 30.00 dBm Offset Att 40 dB SWT SGL Count 1/1 TRG:VI 1Plk Cirw	3.2 s 🛋 VBW 3 MHz		
Spectrum         Offset           Ref Level 30.00 dBm         Offset           Att         40 dB         SWT           SGL Count 1/1         TRG:VI           PIPk Cirw         20 dBm	3.2 s 🛋 VBW 3 MHz		
Spectrum         Offset           Ref Level 30.00 dBm         Offset           Att         40 dB         SWT           SGL Count 1/1         TRG:VI           1Pk Cirw         20 dBm	3.2 s 🛋 VBW 3 MHz		
Spectrum Ref Level 30.00 dBm Offset Att 40 dB SWT SGL Count 1/1 TRG:VI 1Pk Cirw 20 dBm 10 dBm	3.2 s 🛋 VBW 3 MHz		
Spectrum Ref Level 30.00 dBm Offset Att 40 dB SWT SGL Count 1/1 TRG:VI 1Pk Cirw 20 dBm 10 dBm RG: 0.100 dBm	3.2 s 🛋 VBW 3 MHz		
Spectrum Ref Level 30.00 dBm Offset Att 40 dB SWT SGL Count 1/1 TRG:VI 1Pk Cirw 20 dBm 0 dBm TRG: 0.100 dBm	3.2 s 🛋 VBW 3 MHz		
Spectrum         Offset           Ref Level 30.00 dBm         Offset           Att         40 dB         SWT           SGL Count 1/1         TRG: VI           1Pk Cirw         20 dBm           20 dBm         RG: 0.100 dBm           10 dBm         TRG: 0.100 dBm	3.2 s VBW 3 MHz		
Spectrum         Offset           Ref Level 30.00 dBm         Offset           Att         40 dB         SWT           SGL Count 1/1         TRG: VI           1Pk Cirw         20 dBm           20 dBm         7RG: 0.100 dBm           10 dBm         7RG: 0.100 dBm	3.2 s VBW 3 MHz		
Spectrum         Offset           Ref Level 30.00 dBm         Offset           Att         40 dB         SWT           SGL Count 1/1         TRG: VI           1Pk Cirw         20 dBm           20 dBm         7RG: 0.100 dBm           10 dBm         7RG: 0.100 dBm	3.2 s VBW 3 MHz		
Spectrum         Offset           Att         40 dB         SWT           SGL Count 1/1         TRG: VI           1Pk Cinw         20 dBm           20 dBm         TRG: 0.100 dBm           10 dBm         TRG: 0.100 dBm           20 dBm         TRG: 0.100 dBm	3.2 s VBW 3 MHz		
Spectrum         Offset           Att         40 dB         SWT           SGL Count 1/1         TRG: VI           1Pk Cinw         20 dBm           20 dBm         TRG: 0.100 dBm           10 dBm         TRG: 0.100 dBm           20 dBm         TRG: 0.100 dBm	3.2 s VBW 3 MHz		
Spectrum Ref Level 30.00 dBm Offset Att 40 dB SWT SGL Count 1/1 TRG:VI 1Pk Cirw 20 dBm 0 dBm TRG: 0.100 dBm	3.2 s VBW 3 MHz		
Spectrum Ref Level 30.00 dBm Offset Att 40 dB SWT SGL Count 1/1 TRG: VI 10 IPIk Cinw 20 dBm 10 dBm 10 dBm 20 dBm 10 dBm 20 dBm 40 dBm 40 dBm	3.2 s VBW 3 MHz		
Spectrum         Offset           Ref Level 30.00 dBm         Offset           Att         40 dB = SWT           SGL Count 1/1         TRG: VI           1Pk Cinw         1Pk Cinw           20 dBm         7RG: 0.100 dBm           10 dBm         7RG: 0.100 dBm           20 dBm         7RG: 0.100 dBm           10 dBm         7RG: 0.100 dBm           20 dBm         7RG: 0.100 dBm           10 dBm         7RG: 0.100 dBm           20 dBm         7RG: 0.100 dBm	3.2 s VBW 3 MHz		
Spectrum         Offset           Ref Level 30.00 dBm         Offset           Att         40 dB         SWT           SGL Count 1/1         TRG: VI           1Pk Cinw         20 dBm           20 dBm         TRG: 0.100 dBm           10 dBm         7RG: 0.100 dBm           -10 dBm         -10 dBm           -20 dBm         -20 dBm           -40 dBm         -10 dBm	3.2 s VBW 3 MHz		
Spectrum         Offset           Ref Level 30.00 dBm         Offset           Att         40 dB         SWT           SGL Count 1/1         TRG: VI           1Pk Cinw         20 dBm           20 dBm         TRG: 0.100 dBm           10 dBm         7RG: 0.100 dBm           -10 dBm         -10 dBm           -20 dBm         -10 dBm           -10 dBm         -10 dBm           -20 dBm         -10 dBm           -10 dBm         -10 dBm           -20 dBm         -10 dBm	3.2 s VBW 3 MHz		1. J.

DH5\_Ant1\_Hop

Date: 26.APR.2023 11:44:14

Ref Level 30.00 dBm			RBW 1 MH					[
Att 40 dB SGL Count 1/1	SWT TRG: VID	10 ms 🖷	VBW 3 MH	IZ				
1Pk Cirw	TKG: VID	_				_	_	
		-	-	M	1[1]			-16.09 dE
dia dia mandri dia dia dia dia dia dia dia dia dia di	1.0.00							-16.00
0 dBm				0	2[1]			17.31 418.00
0 dBm				h		1	1	1
1. mar						1		
dBm-TRG 1.400 c	Bm <sup>92</sup>					-		
10 dBm-								
M	1							
20 dBm	-	_						
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to dem	- desited	Call . Ille	South Party	for the order	Lut to a	al parage	101	al al a ball a
					6			
50 dBm								
50 dBm	-					-		
F 2.441 GHz			8000	nts		_	-	1.0 ms
				-		_	2.945	
	1:16:40							ſ
te: 26.APR.2023 11 Spectrum Ref Level 30.00 dBm	Offset 1		RBW 500					ſ
Spectrum Ref Level 30.00 dBm Att 40 dB	Offset 1		RBW 500 VBW 3 h				_	[
Spectrum Ref Level 30.00 dBm Att 40 dB SGL Count 1/1	Offset 1						_	[
Ref Level 30.00 dBm Att 40 dB	Offset 1							[
Ref Level 30.00 dBm Att 40 dB SGL Count 1/1 1Pk Cirw	Offset 1							[
Ref Level 30.00 dBm Att 40 dB SGL Count 1/1 1Pk Cirw	Offset 1							[
Spectrum         Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1         1Pk Cirw           0 dBm         0 dBm	Offset 1							[*
Spectrum         Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1         1Pk Cirw           0 dBm         0 dBm	Offset 1							[
Spectrum         Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1         19k Cirw           0 dBm         0 dBm	Offset 1: SWT TRG:VID							[
Spectrum         Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1         1Pk Cirw           0 dBm         0 dBm	Offset 1: SWT TRG:VID							[
Spectrum           Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1           IPk Cirw           0 dBm           0 dBm           0 dBm	Offset 1: SWT TRG:VID							[
Spectrum         Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1         1Pk Cirw           0 dBm         0 dBm	Offset 1: SWT TRG:VID							
Spectrum           Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1           IPk Cirw           0 dBm           0 dBm           0 dBm	Offset 1: SWT TRG:VID							
Spectrum         Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1         1Pk Cinw           0 dBm         0 dBm           0 dBm         TRG           10 dBm         10 dBm	Offset 1: SWT TRG:VID							
Spectrum	Offset 1: SWT TRG: VID	3.2 5	VBW 3h					
Spectrum	Offset 1: SWT TRG: VID	3.2 5						
Spectrum	Offset 1: SWT TRG: VID	3.2 5	VBW 3h					
Spectrum	Offset 1: SWT TRG: VID	3.2 5	VBW 3h					
Spectrum	Offset 1: SWT TRG: VID	3.2 5	VBW 3h					
Spectrum	Offset 1: SWT TRG: VID	3.2 5	VBW 3h					
Spectrum	Offset 1: SWT TRG: VID	3.2 5	VBW 3h					
Spectrum	Offset 1: SWT TRG: VID	3.2 5	VBW 3h					
Spectrum	Offset 1: SWT TRG: VID	3.2 5	VBW 3h					

2DH1\_Ant1\_Hop

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Spectrum			
Att 40 dB 📾 SW	set 11.93 dB 💀 RBW 1 MHz T 10 ms 📟 VBW 3 MHz		
SGL Count 1/1 TR	G: VID		
PIPK CRW		M1[1]	-17.21 dBm
00 40 40			-157.27 µs
20 dBm		02[1]	18.52 dB 1.66100 ms
10 dBm-		1	
	DE		
0 dBm			
10 40-			
-10 dBm			
-20 dBm			
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	A she was a horal dahara	A BALLAN AND AND ADDAY	A DAMAGE AND A DAMA
-40 dBm			
-50 dBm-			
-60 dBm-			
CF 2.441 GHz	8000 pts	10 No.	1.0 ms/
			 []]
Spectrum Ref Level 30.00 dBm Offs	set 11.93 dB 👄 RBW 500 kHz		
Spectrum Ref Level 30.00 dBm Offs Att 40 dB SW SGL Count 1/1 TR	set 11.93 dB 🖷 RBW 500 kHz		
Spectrum Ref Level 30.00 dBm Offs Att 40 dB SW SGL Count 1/1 TR	set 11.93 dB 👄 RBW 500 kHz T 3.2 s 🖷 VBW 3 MHz		
Spectrum Ref Level 30.00 dBm Offs Att 40 dB SW SGL Count 1/1 TR( 1Pk Cirw	set 11.93 dB 👄 RBW 500 kHz T 3.2 s 🖷 VBW 3 MHz		
Spectrum Ref Level 30.00 dBm Offs Att 40 dB SW SGL Count 1/1 TR	set 11.93 dB 👄 RBW 500 kHz T 3.2 s 🖷 VBW 3 MHz		
Spectrum Ref Level 30.00 dBm Offs Att 40 dB SW SGL Count 1/1 TR( 1Pk Cirw	set 11.93 dB 👄 RBW 500 kHz T 3.2 s 🖷 VBW 3 MHz		
Ref Level         30.00 dBm         Offs           Att         40 dB         SW           SGL Count 1/1         TRI           1Pk Cirw         20 dBm	set 11.93 dB 👄 RBW 500 kHz T 3.2 s 🖷 VBW 3 MHz		
Spectrum Ref Level 30.00 dBm Offs Att 40 dB SW SGL Count 1/1 TRO 1Pk Cirw 20 dBm	set 11.93 dB 👄 RBW 500 kHz T 3.2 s 🖷 VBW 3 MHz		
Spectrum         Offs           Ref Level 30.00 dBm         Offs           Att         40 dB         SW           SGL Count 1/1         TR0           1Pk Cirw         20 dBm         20 dBm           10 dBm         TR6         0.800 dBm	set 11.93 dB 👄 RBW 500 kHz T 3.2 s 🖷 VBW 3 MHz		
Spectrum         Offs           Ref Level 30.00 dBm         Offs           Att         40 dB         SW           SGL Count 1/1         TR0           1Pk Cirw         20 dBm         10 dBm	set 11.93 dB 👄 RBW 500 kHz T 3.2 s 🖷 VBW 3 MHz		
Spectrum         Offs           Ref Level 30.00 dBm         Offs           Att         40 dB         SW           SGL Count 1/1         TR0           1Pk Cirw         20 dBm         20 dBm           10 dBm         TR6         0.800 dBm	set 11.93 dB 👄 RBW 500 kHz T 3.2 s 🖷 VBW 3 MHz		
Spectrum         Offs           Ref Level 30.00 dBm         Offs           Att         40 dB         SW           SGL Count 1/1         TR0           1Pk Cirw         20 dBm           10 dBm         TR6         0.800 dBm           -10 dBm         TR6         0.800 dBm	set 11.93 dB 👄 RBW 500 kHz T 3.2 s 🖷 VBW 3 MHz		
Spectrum         Offs           Ref Level 30.00 dBm         Offs           Att         40 dB         SW           SGL Count 1/1         TR0           1Pk Cirw         20 dBm           20 dBm         10 dBm           0 dBm         TR6           -10 dBm         TR6	set 11.93 dB 👄 RBW 500 kHz T 3.2 s 🖷 VBW 3 MHz		
Spectrum         Offs           Ref Level 30.00 dBm         Offs           Att         40 dB         SW           SGL Count 1/1         TR0           1Pk Cirw         20 dBm           20 dBm         20 dBm           10 dBm         7R6           0 dBm         0 dBm           -10 dBm         40 dBm           -20 dBm         40 dBm           -20 dBm         40 dBm	set 11.93 dB RBW 500 kHz T 3.2 s VBW 3 MHz G:VID		
Spectrum         Offs           Ref Level 30.00 dBm         Offs           Att         40 dB         SW           SGL Count 1/1         TRG           1Pk Cinw         20 dBm           20 dBm         10 dBm           10 dBm         TRG           -10 dBm         TRG           -20 dBm         -20 dBm	set 11.93 dB RBW 500 kHz T 3.2 s VBW 3 MHz G:VID		
Spectrum         Offs           Ref Level 30.00 dBm         Offs           Att         40 dB         SW           SGL Count 1/1         TR0           1Pk Cirw         20 dBm           20 dBm         20 dBm           10 dBm         7R6           0 dBm         0 dBm           -10 dBm         40 dBm           -20 dBm         10 dBm	set 11.93 dB RBW 500 kHz T 3.2 s VBW 3 MHz G:VID		
Spectrum         Offs           Ref Level 30.00 dBm         Offs           Att         40 dB         SW           SGL Count 1/1         TRG           1Pk Cinw         20 dBm         20 dBm           10 dBm         7RG         0.800 dBm           -10 dBm         7RG         0.800 dBm           -20 dBm         900 dBm         10 dBm	set 11.93 dB RBW 500 kHz T 3.2 s VBW 3 MHz G:VID		
Spectrum         Offs           Ref Level 30.00 dBm         Offs           Att         40 dB         SW           SGL Count 1/1         TR           1Pk Cirw         20 dBm         20 dBm           10 dBm         7P.G. 0.800 dBm         10 dBm           -10 dBm         7P.G. 0.800 dBm         -10 dBm           -40 dBm         10 dBm         10 dBm	set 11.93 dB RBW 500 kHz T 3.2 s VBW 3 MHz G:VID		
Spectrum         Offs           Ref Level 30.00 dBm         60 Bm           SGL Count 1/1         TR           10 dBm         20 dBm           10 dBm         7RG 0.800 dBm           -10 dBm         7RG 0.800 dBm           -20 dBm         9 per k base           -40 dBm         9 per k base	set 11.93 dB RBW 500 kHz T 3.2 s VBW 3 MHz G:VID		

## 2DH3\_Ant1\_Hop

Date: 26.APR.2023 11:17:23

Ref Level 30.00 dBm Att 40 dB		11.93 dB -						
SGL Count 1/1	TRG: VI							
1Pk Cirw				M	1[1]			-20.61 dB
	1							-11.00
20 dBm				0	2[1]			21,72 c 2,90300 n
10 dBm				1	11	E	t	2.90300 1
to upin								
TRG. 0.900	Bm			2	-	-	*	_
10 dBm-								_
M								
20 dBm					-	-		-
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50 dBm-								
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F 2.441 GHz			800	0 pts			<u></u>	1.0 ms
pectrum		11.93 dB 🖷	RBW 500	kHz				(
	Offset SWT		RBW 500 VBW 3					[
Spectrum Ref Level 30.00 dBm Att 40 dB SGL Count 1/1	Offset	3.2 5 🖷						[
Spectrum Ref Level 30.00 dBm	Offset SWT	3.2 5 🖷				1		٦
Ref Level 30.00 dBm Att 40 dB SGL Count 1/1 1Pk Cirw	Offset SWT	3.2 5 🖷						(r
Ref Level 30.00 dBm Att 40 dB SGL Count 1/1 1Pk Cirw	Offset SWT	3.2 5 🖷						[ 
Spectrum           Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1           IPk Cirw           0 dBm	Offset SWT	3.2 5 🖷						[
Spectrum         Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1         1Pk Clrw           0 dBm         0 dBm	Offset SWT	3.2 5 🖷						[
Spectrum         Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1         1Pk Cirw           0 dBm         0 dBm	Offset	3.2 5 🖷						[
Spectrum         Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1         1Pk Cirw           0 dBm         0 dBm	Offset	3.2 5 🖷						[
Spectrum           Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1           1Pk Cirw           0 dBm           0 dBm           0 dBm	Offset	3.2 5 🖷						[
Spectrum         Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1         1Pk Cirw           0 dBm         0 dBm	Offset	3.2 5 🖷						[
Spectrum         Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1         1Pk Cirw           0 dBm         0 dBm           0 dBm         TRG 0.900 c           10 dBm         10 dBm	Offset	3.2 5 🖷						
Spectrum         Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1         1Pk Cirw           0 dBm         0 dBm           0 dBm         TRG 0.900 c           10 dBm         TRG 0.900 c	Offset	3.2 5 🖷						
Spectrum         Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1         1Pk Cirw           0 dBm         0 dBm           0 dBm         TRG 0.900 c           10 dBm         10 dBm	Offset	3.2 5 🖷						
Spectrum         Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1         1Pk Cirw           0 dBm         0 dBm           0 dBm         7RG           0 dBm         7RG           10 dBm         7RG           20 dBm         40 dB	Offset	3.2 5 🖷	VBW 3	MHz				
Spectrum         Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1         1Pk Cirw           0 dBm         0 dBm           0 dBm         7RG           0 dBm         7RG           10 dBm         7RG           20 dBm         40 dB	Offset	3.2 5 🖷	VBW 3	MHz				
Spectrum	Offset	3.2 5 🖷	VBW 3	MHz				
Spectrum	Offset	3.2 5 🖷	VBW 3	MHz				
Spectrum	Offset	3.2 5 🖷	VBW 3	MHz				
Spectrum           Ref Level 30.00 dBm           Att         40 dB           SGL Count 1/1           1Pk Cirw           0 dBm           0 dBm           0 dBm	Offset	3.2 5 🖷	VBW 3	MHz				
Spectrum	Offset	3.2 5 🖷	VBW 3	MHz				216.0 ms

2DH5\_Ant1\_Hop

Date: 26.APR.2023 11:16:08

pectrum	9m Offerst	11.93 dB 🖷	0011 1 14	la.				_	
Ref Level 30.00 d Att 40 GL Count 1/1	dB a SWT TRG:VI	10 ms 🖷 '							
1Pk Cirw	169:01	2		_					
				M	1[1]				6.30 dB
0 dBm					E+3			-	157.27
J GBII				0.	2[1]				420.00
0 dBm					1	[	1	-	
dBmTRG 1.60	IO dBm						-	-	
0 dBm									_
	11								
0 dBm	1					-			
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Shounds to shift the	No. Hould Albert	PANAMA	dired by hereit, i	Jo d M. Hill	n de tabli tradid		a hi ka ka sa	dillo u	нd
d demission			· rdul	COLUMN FORM	1.1.	11	11	- pro-	- 11
1.0		1							
0 dBm						1		-	
0 dBm						1			
								_	
F 2.441 GHz			8000	pts			-		1.0 ms
	11:26:18								٩
Ref Level 30.00 d	Bm Offset	11.93 dB 🖷 I							[
	Bm Offset dB <b>e SWT</b>	3.2 5 🖷 🤊							[
Ref Level 30.00 d Att 40 GGL Count 1/1	Bm Offset	3.2 5 🖷 🤊			_			_	[
pectrum Ref Level 30.00 d Att 40	Bm Offset dB <b>e SWT</b>	3.2 5 🖷 🤊							[
pectrum Ref Level 30.00 d Att 40 IGL Count 1/1 IPK Cirw	Bm Offset dB <b>e SWT</b>	3.2 5 🖷 🤊							[
pectrum Ref Level 30.00 d Att 40 IGL Count 1/1 IPK Cirw	Bm Offset dB <b>e SWT</b>	3.2 5 🖷 🤊							[
pectrum	Bm Offset dB <b>e SWT</b>	3.2 5 🖷 🤊							[
Ref Level 30.00 d Att 40 GL Count 1/1 IPk Cirw	Bm Offset dB <b>e SWT</b>	3.2 5 🖷 🤊							[
pectrum Ref Level 30.00 d Att 40 GL Count 1/1 IPk Cirw 0 dBm 0 dBm	Bm Offset dB SWT TRG:VI	3.2 5 🖷 🤊							(
pectrum Ref Level 30.00 d Att 40 GL Count 1/1 IPk Cirw 0 dBm 0 dBm	Bm Offset dB SWT TRG:VI	3.2 5 🖷 🤊							(
pectrum	Bm Offset dB SWT TRG:VI	3.2 5 🖷 🤊							
pectrum Ref Level 30.00 d Att 40 IGL Count 1/1 IPk Cirw D dBm D dBm	Bm Offset dB SWT TRG:VI	3.2 5 🖷 🤊							
pectrum Ref Level 30.00 d Att 40 GL Count 1/1 IPk Cirw 0 dBm dBm TRG 1.60 0 dBm	Bm Offset dB SWT TRG:VI	3.2 5 🖷 🤊							
pectrum Ref Level 30.00 d Att 40 GL Count 1/1 IPk Cirw 0 dBm dBm TRG 1.60 0 dBm	Bm Offset dB SWT TRG:VI	3.2 5 🖷 🤊							
pectrum	Bm Offset dB SWT TRG:VI	3.2 5 • •							
pectrum	Bm Offset dB SWT TRG:VI	3.2 5 • •							
pectrum	Bm Offset dB SWT TRG:VI	3.2 5 • •							
pectrum	Bm Offset dB SWT TRG:VI	3.2 5 • •							
pectrum	Bm Offset dB SWT TRG:VI	3.2 5 • •							
pectrum	Bm Offset dB SWT TRG:VI	3.2 5 • •							
pectrum Ref Level 30.00 d Att 40 IGL Count 1/1 IPK Cirw D dBm dBm TRG 1.60	Bm Offset dB SWT TRG:VI	3.2 5 • •							
pectrum	Bm Offset dB SWT TRG:VI	3.2 5 • •							

3DH1\_Ant1\_Hop

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AND - OLUT	10 mc - VBW					
Att 40 dB = SWT GL Count 1/1 TRG:		3 MHz				
1Pk Cirw		- 1				
		M	11[1]			-17.50 di -21.00
) dBm		D	2[1]			19.21
				¢		1.66300
) dBm			-			-
	42					
dBm-TRG 1.300 dBm						
0 dBm						
0 dBm-						
Charles I and a second	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	and the second	denne 1	w	and a	di stati
na what we would be able	1645-006-004	lated another days	A Real Address	all applied as	11 and 12	And Associated a
Laborate and the state of the state	Lablad bi	All Managhada da Ma	li della della	Alla and Addi	date of the	10 Miletani
0 dBm	dat in	o the leader that	10.5 -0.0	i directo	No. 12	L I Cable
i0 dBm	-	-	*		-	
0 dBm		-			-	
F 2.441 GHz		8000 pts		-		1.0 ms
pectrum						ſ
pectrum Ref Level 30.00 dBm Offse	et 11.93 dB 🖷 RBW					(
pectrum Ref Level 30.00 dBm Offse Att 40 dB @ SWT	3.2 5 🗮 VBW					[
pectrum Ref Level 30.00 dBm Offse	3.2 5 🗮 VBW					
pectrum Ref Level 30.00 dBm Offse Att 40 dB SWT GL Count 1/1 TRG:	3.2 5 🗮 VBW		r			[
Pectrum Ref Level 30.00 dBm Offse Att 40 dB SWT IGL Count 1/1 TRG: IPK Cirw	3.2 5 🗮 VBW					[
pectrum Ref Level 30.00 dBm Offse Att 40 dB SWT GL Count 1/1 TRG:	3.2 5 🗮 VBW					(
Pectrum Ref Level 30.00 dBm Offse Att 40 dB SWT IGL Count 1/1 TRG: IPK Cirw	3.2 5 🗮 VBW					(
pectrum         Offse           Ref Level 30.00 dBm         Offse           Att         40 dB         SWT           iGL Count 1/1         TRG:           IPk Cirw         0 dBm           0 dBm         0 dBm	3.2 5 🗮 VBW					
pectrum         Offse           Ref Level 30.00 dBm         Offse           Att         40 dB         SWT           IGL Count 1/1         TRG:           IPk Cirw         0 dBm	3.2 5 🗮 VBW					
pectrum           Ref Level 30.00 dBm         Offse           Att         40 dB         SWT           iGL Count 1/1         TRG:           IPk Cirw         0           0 dBm         0           0 dBm         0           0 dBm         0	3.2 5 🗮 VBW					
pectrum           Ref Level 30.00 dBm         Offse           Att         40 dB         SWT           iGL Count 1/1         TRG:           IPk Cirw         0           0 dBm         0	3.2 5 🗮 VBW					
pectrum           Ref Level 30.00 dBm         Offse           Att         40 dB         SWT           iGL Count 1/1         TRG:           IPk Cirw         0           0 dBm         0           0 dBm         0           0 dBm         0	3.2 5 🗮 VBW					
pectrum           Ref Level 30.00 dBm         Offse           Att         40 dB         SWT           iGL Count 1/1         TRG:           IPk Cirw         0           0 dBm         0           0 dBm         0           0 dBm         0	3.2 5 🗮 VBW					
pectrum           Ref Level 30.00 dBm         Offse           Att         40 dB         SWT           IGL Count 1/1         TRG:           IPk Cirw         0           0 dBm         0	3.2 5 • VBW	3 MHz				
pectrum           Ref Level 30.00 dBm         Offse           Att         40 dB         SWT           IGL Count 1/1         TRG:           IPk Cirw         0           0 dBm         0	3.2 5 🗮 VBW	3 MHz				
pectrum           Ref Level 30.00 dBm         Offse           Att         40 dB         SWT           IGL Count 1/1         TRG:           IPk Cirw         0           0 dBm         0	3.2 5 • VBW	3 MHz				
pectrum Ref Level 30.00 dBm Offse Att 40 dB SWT GL Count 1/1 TRG: IPk Cirw  0 dBm  0 d	3.2 5 • VBW	3 MHz				
pectrum           Ref Level 30.00 dBm         Offse           Att         40 dB         SWT           iGL Count 1/1         TRG:           IPk Cirw         3 dBm         3 dBm           0 dBm         3 dBm         3 dBm           0 dBm         7R6         1.300 dBm           0 dBm         7R6         1.300 dBm           0 dBm         7R6         1.300 dBm	3.2 5 • VBW	3 MHz				
pectrum  Ref Level 30.00 dBm Offse Att 40 dB SWT  GL Count 1/1 TRG:  IPk Cirw  D dBm  dBm  TRG 1.300 dBm  0	3.2 5 • VBW	3 MHz				
pectrum Ref Level 30.00 dBm Offse Att 40 dB SWT GL Count 1/1 TRG: IPk Cirw  0 dBm  0 d	3.2 5 • VBW	3 MHz				
pectrum  Ref Level 30.00 dBm Offse Att 40 dB SWT  GL Count 1/1 TRG:  IPk Cirw  D dBm  dBm  TRG 1.300 dBm  0	3.2 5 VBW	3 MHz				316.0 ms

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		11.93 dB 🖷	RBW 1	MHz				
Att 40 c SGL Count 1/1	B SWT TRG:V		VBW 3	MHz				
1Pk Cirw	160.1							
				M	1[1]			-18.48 dB
20 dBm	-		-	0	2[1]			-158.52 µ 20.23 d
				1.0	10	T	t	2.90700 m
l0 dBm	-				-		-	
TRG 2.200	) dBm	-	Commence	2				
dBm-							-	
10 dBm-								
64	1	-						
20 dBm								-
the testing of a wide shall				realized as his	dia bar		Li du in	derechor in
The second second		-			an inder une	a na ma ma	ii a cas di la	at charling to Lib
whether the these of the				MAN SHALL	to Public and		all a All the	Uprohibility, A
10 dBm							1	
50 dBm-			-					
50 dBm-	+				-		-	-
		10.00		1		1.00		
F 2.441 GHz	-		80	100 pts			-	1.0 ms
Spectrum	11:25:38							ſ
Spectrum Ref Level 30.00 dB Att 40 d	m Offset dB <b>e SWT</b>		RBW 50 VBW					[
Spectrum Ref Level 30.00 dB Att 40 d SGL Count 1/1	m Offset	3.2 5						[ [
Spectrum Ref Level 30.00 dB Att 40 d SGL Count 1/1	m Offset dB <b>e SWT</b>	3.2 5			1	1	1	[#
Spectrum Ref Level 30.00 dB Att 40 of SGL Count 1/1 1Pk Cirw	m Offset dB <b>e SWT</b>	3.2 5						[ <u></u>
Spectrum Ref Level 30.00 dB Att 40 of SGL Count 1/1 1Pk Cirw	m Offset dB <b>e SWT</b>	3.2 5						
Spectrum Ref Level 30.00 dB Att 40 of SGL Count 1/1 1PK Cinw 10 dBm	m Offset dB <b>e SWT</b>	3.2 5						
Spectrum Ref Level 30.00 dB Att 40 of SGL Count 1/1 1PK Cinw 10 dBm	m Offset dB <b>e SWT</b>	3.2 5						
Spectrum Ref Level 30.00 dB Att 40 of SGL Count 1/1 11Pk Cirw 20 dBm 0 dBm	Offset dB SWT TRG:V:	3.2 5						
Spectrum	Offset dB SWT TRG:V:	3.2 5						
Spectrum	Offset dB SWT TRG:V:	3.2 5						
Spectrum           Ref Level 30.00 dB           Att         40 d           SGL Count 1/1           11Pk Cirw           20 dBm           0 dBm           10 dBm           10 dBm	Offset dB SWT TRG:V:	3.2 5						
Spectrum Ref Level 30.00 dB Att 40 of SGL Count 1/1 1Pk Cirw 0 dBm 0 dBm TRG 1.200	Offset dB SWT TRG:V:	3.2 5						
Spectrum           Ref Level 30.00 dB           Att         40 d           SGL Count 1/1           11Pk Cinw           20 dBm           10 dBm           10 dBm	Offset dB SWT TRG:V:	3.2 5						
Spectrum           Ref Level 30.00 dB           Att         40 d           SGL Count 1/1           11Pk Cirw           20 dBm           0 dBm           10 dBm           10 dBm	Offset dB SWT TRG:V:	3.2 5						
Spectrum	Offset dB SWT TRG:V:	3.2 5						
Spectrum Ref Level 30.00 dB Att 40 o SGL Count 1/1 IPk Cirw 0 dBm 0 dBm TRG 1.200 10 dBm 20 dBm 10 d	Offset dB SWT TRG:V:	3.2 5						
Spectrum	Offset dB SWT TRG:V:	3.2 5						
Spectrum	Offset dB SWT TRG:V:	3.2 5						
Spectrum	Offset dB SWT TRG:V:	3.2 5						
Spectrum	Offset dB SWT TRG:V:	3.2 5						
Spectrum           Ref Level 30.00 dB           Att         40 d           SGL Count 1/1           1PK Cirw           20 dBm           10 dBm           10 dBm	Offset dB SWT TRG:V:	3.2 5						115.0 ms/

3DH5\_Ant1\_Hop

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# FCC §15.247(b) (1)-PEAK OUTPUT POWER MEASUREMENT

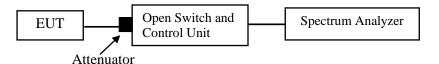
## **Applicable Standard**

According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. And for all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

## **Test Procedure**

According to ANSI C63.10-2013, section 7.8.5

- 1. Place the EUT on a bench and set in TX mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
- 3. Add a correction factor to the display.



## **Test Data**

#### **Environmental Conditions**

Temperature:	24°C
Relative Humidity:	48%
ATM Pressure:	101kPa

The testing was performed by Dave Liang on 2023-04-26.

EUT operation mode: Transmitting

Test Result: Compliant.

Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
		2402	1.60	$\leq 20.97$	PASS
DH5	Ant1	2441	2.24	$\leq 20.97$	PASS
		2480	2.66	$\leq$ 20.97	PASS
		2402	3.34	$\leq$ 20.97	PASS
2DH5	Ant1	2441	4.02	$\leq$ 20.97	PASS
		2480	4.58	$\leq$ 20.97	PASS
		2402	4.18	$\leq$ 20.97	PASS
3DH5	Ant1	2441	4.70	$\leq$ 20.97	PASS
		2480	5.21	$\leq$ 20.97	PASS

Please refer to the below plots:

Count 100/100 1Pk View						
				M1[1]	-	1.60 dBn
20 dBm					1 1	2,40176020 GHz
10 dBm	-					
0 dBm			EM.			
-10 dBm						-
administration of the second s	1.1.1.1					and the second
-20 dBm						
-30 dBm						
-40 dBm	-					_
-50 dBm	_					_
-60 dBm			_			
6112						
CF 2.402 GHz	-	2	1001 p	ts		Span 8.0 MHz
			_	1	B 4	

DH5\_Ant1\_2402

Spectrum RefLevel 30.00 dBm Offset 11.93 dB 
RBW 3 MHz Att 40 dB SWT 1 ms VBW 10 MHz Mode Auto Sweep Spectrum Δ Att Count 100/100 2.24 dBm 2.44111998 GHz M1[1] 20 dBm-10 dBm M1 0 dBm--10 dBm -20 dBm -30 dBm -40 dBm--S0 dBm -60 dBm-Span 8.0 MHz CF 2.441 GHz 1001 pts B B 6/6

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		93 dB 💭 RBW 3 MHz 1 ms 💭 VBW 10 MHz	Mode Auto Sween	
Count 100/100	ous on,		Mode Auto Sweep	
1Pk View			AAAL AL	2.66 dB
			M1[1]	2.48005590 GF
0 dBm				
0 d8m-		INT		
dBm				
ubm				
10 dBm				
- Aller - Contraction				
20 dBm				
	1111000			the second second
30 dBm				
1 million 1				
40 dBm				
S0 dBm	1111111			
60 dBm				
F 2.48 GHz	1.1	1001 pts	s	Span 8.0 MH:
pectrum		2DH5_Ant	1_2402	
Spectrum Ref Level 30.00	dBm Offset 11.9	93 dB 💼 RBW 3 MHz	11-10 CC (C. 1.)	
Spectrum Ref Level 30.00 Att 4 Count 100/100	dBm Offset 11.9		11-10 CC (C. 1.)	(II.)
Spectrum Ref Level 30.00 Att 4 Count 100/100	dBm Offset 11.9	93 dB 💼 RBW 3 MHz	Mode Auto Sweep	
	dBm Offset 11.9	93 dB 💼 RBW 3 MHz	11-10 CC (C. 1.)	3.34 dB)
Spectrum Ref Level 30.00 Att 4 Count 100/100 IPk View	dBm Offset 11.9	93 dB 💼 RBW 3 MHz	Mode Auto Sweep	3.34 dB
Spectrum Ref Level 30.00 Att 4 Count 100/100	dBm Offset 11.9	93 dB 💼 RBW 3 MHz	Mode Auto Sweep	3.34 dB)
Spectrum Ref Level 30.00 Att 4 Sount 100/100 IPk View	dBm Offset 11.9	93 dB <b>RBW</b> 3 MHz 1 ms <b>VBW</b> 10 MHz	Mode Auto Sweep	3.34 dB)
Spectrum Ref Level 30.00 Att 4 Count 100/100 1Pk View 0 dBm 0 dBm	dBm Offset 11.9	93 dB 💼 RBW 3 MHz	Mode Auto Sweep	3.34 dB)
Spectrum Ref Level 30.00 Att 4 Count 100/100 IPk View 0 dBm	dBm Offset 11.9	03 dB • RBW 3 MHz 1 ms • VBW 10 MHz	Mode Auto Sweep	3.34 dB) 2.40174430 GH
Spectrum	dBm Offset 11.9	03 dB • RBW 3 MHz 1 ms • VBW 10 MHz	Mode Auto Sweep	3.34 dBi 2.40174430 GF
Spectrum	dBm Offset 11.9	03 dB • RBW 3 MHz 1 ms • VBW 10 MHz	Mode Auto Sweep	3.34 dB)
Spectrum           Ref Level 30.00           Att         4           Count 100/100           IPk View           0 dBm           0 dBm           0 dBm           10 dBm	dBm Offset 11.9	03 dB • RBW 3 MHz 1 ms • VBW 10 MHz	Mode Auto Sweep	3.34 dBi 2.40174430 GF
Spectrum           Ref Level 30.00           Att         4           Count 100/100           IPk View           0 dBm           0 dBm           0 dBm           10 dBm	dBm Offset 11.9	03 dB • RBW 3 MHz 1 ms • VBW 10 MHz	Mode Auto Sweep	3.34 dB 2.40174430 GF
Spectrum           Ref Level 30.00           Att         4           Count 100/100           IPk View           0 dBm           0 dBm           dBm           dBm           20 dBm           20 dBm	dBm Offset 11.9	03 dB • RBW 3 MHz 1 ms • VBW 10 MHz	Mode Auto Sweep	3.34 dB 2.40174430 GF
Spectrum           Ref Level 30.00           Att         4           Count 100/100           IPk View           0 dBm           0 dBm           dBm           dBm           20 dBm           20 dBm	dBm Offset 11.9	03 dB • RBW 3 MHz 1 ms • VBW 10 MHz	Mode Auto Sweep	3.34 dB 2.40174430 GF
Spectrum           Ref Level 30.00           Att           Count 100/100           IPk View           0 dBm           0 dBm           0 dBm           20 dBm           30 dBm	dBm Offset 11.9	03 dB • RBW 3 MHz 1 ms • VBW 10 MHz	Mode Auto Sweep	3.34 dBi 2.40174430 GF
Spectrum           Ref Level 30.00           Att         4           count 100/100           IPk View           0 dBm           0 dBm           10 dBm           20 dBm           20 dBm           30 dBm	dBm Offset 11.9	03 dB • RBW 3 MHz 1 ms • VBW 10 MHz	Mode Auto Sweep	3.34 dBi 2.40174430 GF
Spectrum Ref Level 30.00 Att 4 Count 100/100 IPk View 0 dBm 0 dBm	dBm Offset 11.9	03 dB • RBW 3 MHz 1 ms • VBW 10 MHz	Mode Auto Sweep	3.34 dBi 2.40174430 GF
Spectrum           Ref Level 30.00           Att         4           Count 100/100         1           IPk View         0           0 dBm         0           dBm         0           20 dBm         0           30 dBm         30 dBm           50 dBm         50 dBm	dBm Offset 11.9	03 dB • RBW 3 MHz 1 ms • VBW 10 MHz	Mode Auto Sweep	3.34 dBi 2.40174430 GF
Spectrum           Ref Level 30.00           Att           Count 100/100           IPk View           0 dBm           0 dBm           0 dBm           20 dBm           30 dBm           40 dBm	dBm Offset 11.5	23 dB RBW 3 MHz 1 ms VBW 10 MHz M1	Mode Auto Sweep	3.34 dBi 2.40174430 GF
Spectrum           Ref Level 30.00           Att         4           count 100/100           IPk View           0 dBm           0 dBm           0 dBm           20 dBm           30 dBm           30 dBm           40 dBm           50 dBm	dBm Offset 11.5	03 dB • RBW 3 MHz 1 ms • VBW 10 MHz	Mode Auto Sweep	3.34 dBi 2.40174430 GF

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Spectrum						
Ref Level 30.00 Att Count 100/100		11.93 dB 🗰 RBW 1 ms 🗰 VBW		e Auto Sweep		
1Pk View		1	1	M1[1]		4.02 dB)
				MT[1]	2.4	1095200 GH
20 dBm			-			
10 dBm-				-		
		1 million	- Marine	1		
dBm-	- amandar	the second s				
10 dBrowner	astrone					-
10 agine						and the second s
20 dBm-						
	11111					
-30 dBm	-					-
40 dBm-						_
-S0 dBm				-		-
1.5						
-60 dBm						
CF 2.441 GHz			1001 pts			an 8.0 MHz
JL.	3 11:29:49		}			
JL.	3 11:29:49	2DH5	5_Ant1_24	480		_
	dBm Offset	11.93 dB 🖷 RBW	3 MHz			[ <u></u>
Spectrum Ref Level 30.00 Att	dBm Offset		3 MHz			(The second seco
Spectrum Ref Level 30.00 Att Count 100/100	dBm Offset	11.93 dB 🖷 RBW	3 MHz			(III)
	dBm Offset	11.93 dB 🖷 RBW	3 MHz 10 MHz Mod		2.4	4.58 dBr
Spectrum Ref Level 30.00 Att Count 100/100	dBm Offset	11.93 dB 🖷 RBW	3 MHz 10 MHz Mod	e Auto Sweep	2.4	4.58 dBr
Spectrum Ref Level 30.00 Att Count 100/100 11Pk View 20 dBm	dBm Offset	11.93 dB 🖷 RBW	3 MHz 10 MHz Mod	e Auto Sweep	2.4	4.58 dBr
Spectrum Ref Level 30.00 Att Count 100/100 11Pk View 20 dBm	dBm Offset	11.93 dB 🖷 RBW	3 MHz 10 MHz Mod	e Auto Sweep	2.4	4.58 dBr
Spectrum Ref Level 30.00 Att Count 100/100 1Pk View 20 dBm 10 dBm	dBm Offset	11.93 dB 🖷 RBW	3 MHz 10 MHz Mod	e Auto Sweep	2.4	4.58 dBr
Spectrum Ref Level 30.00 Att Count 100/100 11Pk View 20 dBm 10 dBm	dBm Offset	11.93 dB 🖷 RBW	3 MHz 10 MHz Mod	e Auto Sweep		4.58 dB/ 7997600 GH
Spectrum Ref Level 30.00 Att Count 100/100 1Pk View 20 dBm 10 dBm	0 dBm Offset 40 dB SWT	11.93 dB 🖷 RBW	3 MHz 10 MHz Mod	e Auto Sweep		4.58 dB/ 7997600 GH
Spectrum Ref Level 30.00 Att Count 100/100 1Pk View 20 dBm 10 dBm 10 dBm 10 dBm	0 dBm Offset 40 dB SWT	11.93 dB 🖷 RBW	3 MHz 10 MHz Mod	e Auto Sweep		4.58 dB/ 7997600 GH
Spectrum Ref Level 30.00 Att Count 100/100 1Pk View 20 dBm 10 dBm 10 dBm 10 dBm	0 dBm Offset 40 dB SWT	11.93 dB 🖷 RBW	3 MHz 10 MHz Mod	e Auto Sweep		4.58 dB) 7997600 GH
Spectrum Ref Level 30.00 Att Count 100/100 1Pk View 20 dBm 10 dBm 10 dBm 20 dBm 20 dBm	0 dBm Offset 40 dB SWT	11.93 dB 🖷 RBW	3 MHz 10 MHz Mod	e Auto Sweep		4.58 dB) 7997600 GH
Spectrum Ref Level 30.00 Att Count 100/100 1Pk View 20 dBm 10 dBm 10 dBm 20 dBm 20 dBm	0 dBm Offset 40 dB SWT	11.93 dB 🖷 RBW	3 MHz 10 MHz Mod	e Auto Sweep		4.58 dB/ 7997600 GH
Spectrum           Ref Level 30.00           Att           Count 100/100           1Pk View           20 dBm           10 dBm           10 dBm           20 dBm           30 dBm	0 dBm Offset 40 dB SWT	11.93 dB 🖷 RBW	3 MHz 10 MHz Mod	e Auto Sweep		4.58 dB) 7997600 GH
Spectrum           Ref Level 30.00           Att           Count 100/100           11Pk View           20 dBm           10 dBm           10 dBm           20 dBm           30 dBm           30 dBm	0 dBm Offset 40 dB SWT	11.93 dB 🖷 RBW	3 MHz 10 MHz Mod	e Auto Sweep		4.58 dB/ 7997600 GH
Spectrum Ref Level 30.00 Att Count 100/100 11Pk View 20 dBm 10 dBm -10 dBm -10 dBm -30 dBm -40 dBm	0 dBm Offset 40 dB SWT	11.93 dB 🖷 RBW	3 MHz 10 MHz Mod	e Auto Sweep		4.58 dB/ 7997600 GH
Spectrum           Ref Level 30.00           Att           Count 100/100           11Pk View           20 dBm           10 dBm           10 dBm           20 dBm           30 dBm           30 dBm           40 dBm	0 dBm Offset 40 dB SWT	11.93 dB 🖷 RBW	3 MHz 10 MHz Mod	e Auto Sweep		4.58 dB/ 7997600 GH
Spectrum Ref Level 30.00 Att Count 100/100 1Pk View	0 dBm Offset 40 dB SWT	11.93 dB 🖷 RBW	3 MHz 10 MHz Mod	e Auto Sweep		4.58 dBr 7997608 GH
Spectrum           Ref Level 30.00           Att           Count 100/100           1Dk View           20 dBm           10 dBm           -10 dBm           -30 dBm           -30 dBm           -40 dBm	3 dBm Offset 40 dB SWT	11.93 dB • RBW 1 ms • VBW	3 MHz 10 MHz Mod	e Auto Sweep		4.58 dB/ 7997600 GH

2DH5\_Ant1\_2441

Spectrum		
Att 40 dB S	Offset 11.93 dB 🖝 RBW 3 MHz SWT 1 ms 🖝 VBW 10 MHz Mode Auto Sweep	
Count 100/100 1Pk View		
	M1[1]	4.18 dB/
20 dBm		2.40192810 GH
10 dBm-	EM	
0 dBm		
-10 dBm		all and a second and
		and the second se
-20 dBm		
		· · · · · · · · · · · · · · · · · · ·
-30 dBm		
-40 dBm		· · · · · · · · · · · · · · · · · · ·
40 000		
-S0 dBm		
-60 dBm-		
CF 2.402 GHz	1001 pts	Span 8.0 MHz
	3DH5_Ant1_2441	
Spectrum Ref Level 30.00 dBm 0	3DH5_Ant1_2441	
Spectrum Ref Level 30.00 dBm 0 Att 40 dB S Count 100/100	3DH5_Ant1_2441	E C
Spectrum Ref Level 30.00 dBm 0 Att 40 dB S Count 100/100	3DH5_Ant1_2441	
Spectrum Ref Level 30:00 dBm O Att 40 dB S Count 100/100 1Pk View	3DH5_Ant1_2441	4.70 dBn
Spectrum Ref Level 30:00 dBm O Att 40 dB S Count 100/100 1Pk View	3DH5_Ant1_2441	4.70 dBn
Spectrum Ref Level 30.00 dBm 0 Att 40 dB S Count 100/100 1Pk View 20 dBm	3DH5_Ant1_2441	4.70 dBn
Spectrum         0.00 dBm         0           Ref Level         30:00 dBm         0           Att         40 dB         S           Count         100/100         0           1Pk View         0         0           20 dBm         0         0	3DH5_Ant1_2441	4.70 dBn
Spectrum         Ref Level 30.00 dBm O           Att         40 dB S           Count 100/100         100/100           1Pk View         20 dBm           10 dBm         10 dBm	3DH5_Ant1_2441	4.70 dBn
Spectrum           Ref Level 30.00 dBm           Att           40 dB           Count 100/100           1Pk View           20 dBm           10 dBm           0 dBm	3DH5_Ant1_2441	4.70 dBn 2.44113590 GH
Spectrum           Ref Level 30.00 dBm           Att           40 dB           Count 100/100           1Pk View           20 dBm           10 dBm           0 dBm	3DH5_Ant1_2441	4.70 dBn 2.44113590 GH
Spectrum         Ref Level 30.00 dBm         O           Att         40 dB         S           Count 100/100         IPk View         IPk View           20 dBm         IPk View         IPk View           10 dBm         IPk View         IPk View	3DH5_Ant1_2441	4.70 dBn 2.44113590 GH
Spectrum         Ref Level 30.00 dBm         O           Att         40 dB         S           Count 100/100         IPk View         IPk View           20 dBm         IPk View         IPk View           10 dBm         IPk View         IPk View	3DH5_Ant1_2441	4.70 dBn 2.44113590 GH
Spectrum         Ref Level 30.00 dBm         O           Att         40 dB         S           Count 100/100         IPk View         IPk View           20 dBm         IPk View         IPk View           10 dBm         IPk View         IPk View           20 dBm         IPk View         IPk View           20 dBm         IPk View         IPk View           20 dBm         IPk View         IPk View	3DH5_Ant1_2441	4.70 dBr 2.44113590 GH
Spectrum         0           Ref Level 30:00 dBm         0           Att         40 dB         8           Count 100/100         10         8           10 dBm         0         0	3DH5_Ant1_2441	4.70 dBr 2.44113590 GH
Spectrum         0           Ref Level 30:00 dBm         0           Att         40 dB         8           Count 100/100         10         8           10 dBm         0         0	3DH5_Ant1_2441	4.70 dBr 2.44113590 GH
Spectrum         0.00 dBm         0           Att         40 dB         8           Count 100/100         100/100         10           1Pk View         20 dBm         10           10 dBm         0         0           10 dBm         0         0	3DH5_Ant1_2441	4.70 dBn 2.44113590 GH
Spectrum         Ref Level 30:00 dBm         O           Att         40 dB         S           Count 100/100         IPk View         IPk View           20 dBm         IPk View         IPk View           10 dBm         IPk View         IPk View           20 dBm         IPk View         IPk View           20 dBm         IPk View         IPk View           20 dBm         IPk View         IPk View           30 dBm         IPk View         IPk View	3DH5_Ant1_2441	4.70 dBn 2.44113590 GH
Spectrum         Ref Level 30.00 dBm         O           Att         40 dB         S           Count 100/100         IPk View         IPk View           20 dBm         0         dBm           10 dBm         0         dBm           -10 dBm	3DH5_Ant1_2441	4.70 dBn 2.44113590 GH
Spectrum         Ref Level 30.00 dBm         O           Att         40 dB         S           Count 100/100         DPk View         D           20 dBm         D         DBm           10 dBm         D         DBm           -10 dBm         D         DBm           -20 dBm         D         DBm           -30 dBm	3DH5_Ant1_2441	4.70 dBn 2.44113590 GH
Att         40 dB         S           Count 100/100         100/100         100/100           1Pk View         20 dBm         10 dBm           10 dBm         0 dBm         10 dBm           -20 dBm         -30 dBm         -40 dBm           -50 dBm         -60 dBm         -60 dBm	3DH5_Ant1_2441	4.70 dBn 2.44113590 GH

3DH5\_Ant1\_2402

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1Pk View						_	
				M	1[1]		5.21 dBr 2.48009590 GH
20 dBm			-				
10 dBm		_		11			_
0 dBm	-			_			-
-10 dBm				_			
-20 dBm	-						
-30 dBm		_					
40 dBm	-						_
S0 dBm							
-60 dBm							

3DH5\_Ant1\_2480

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## FCC §15.247(d)-BAND EDGES TESTING

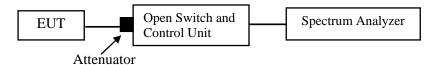
## **Applicable Standard**

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)).

## **Test Procedure**

According to ANSI C63.10-2013, section 7.8.6 and section 6.10

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in TX mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
- 3. Set RBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- 5. Repeat above procedures until all measured frequencies were complete.



## **Test Data**

#### **Environmental Conditions**

Temperature:	24°C
Relative Humidity:	48%
ATM Pressure:	101kPa

The testing was performed by Brian Li on 2023-04-15.

EUT operation mode: Transmitting

Test Result: Compliant

Please refer to the below plots:

```
Version 7: 2023-01-30
```

#### Spectrum Ref Level 20.00 dBm Offset 11.91 dB 🖷 RBW 100 kHz Att 30 dB 8WT 132.7 µs 🖝 VBW 300 kHz Mode Auto FFT BIPk View M1[1] 1.03 dBr 2.4038460 GHz 10 dBm--47.30 dBg 2\_4000000 GM M2[1] 0 dBm--10 dBm VY -20 dBm D1 -18,970 dB -30 dBm 40 dBm MB 125 .L. -50 dBm--60 dBm -70 dBm-Start 2.35 GHz 691 pts Stop 2.405 GHz Marker X-value 2.403846 GHz 2.4 GHz 2.39 GHz Type | Ref | Trc | Function Result Y-value Function 1.03 dBm -47.30 dBm -48.82 dBm M1 M2 1 1 M3 1 2.3693696 GHz M4 1 -45.71 dBm 58. 1.64

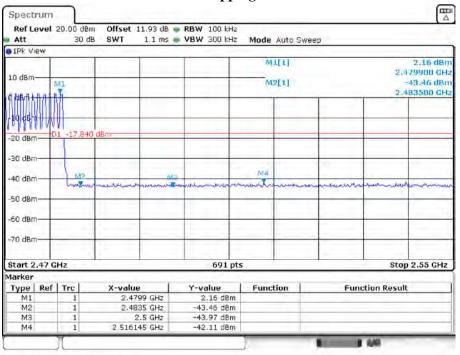
#### DH5: Band Edge-Left Side Hopping

Date: 26.APR.2023 11:06:01

## Single

Att	CVCI	20.00 dBr 30 d			Mode Auto P	FT	
SIPk Vi	ew						
10 dBm 0 dBm-					M1[1] M2[1]		0.95 dBn 2.4018560 GH =49.11 dBn 2.4000000 GH
-10 dBr							
-10 ubn				_			
-20 dBn		1 -19,05	) dBm				
-30 dBr	+	-					
40 dBm		_					
SUNBR	angle	marchen	an indremens		باللار ما حد بالما ما	M3	magner the
-60 dBr	-						
-70 dBn	-						
Start 2	.35 G	Hz		691 pts			Stop 2.405 GHz
Marker		I was D					and the second se
Type M1	Kel	Trc 1	2.401856 GHz	Y-value 0.95 d8m	Function	Functi	ion Result
M2	_	1	2.4 GHz	-49.11 dBm			
MB		1	2.39 GHz	-49.80 dBm			
M4		1	2.3501594 GHz	-46.56 dBm			

Date: 26.APR.2023 10:59:03



## DH5: Band Edge- Right Side Hopping

Date: 26.APR.2023 11:08:56

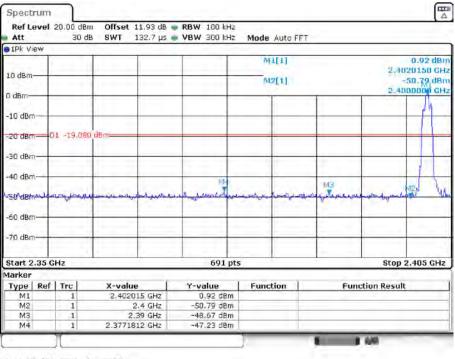
		30 d	B SWT 1.1 ms	VBW 300 kHz	Mode Auto S	weep			
DIPK V	iew	_							
10 d8m			11.1.1.1.1.		WT[1]		2.15 dB 2.479900 GF		
20 000	1	11		-	M2[1]		-43.49 dB		
0 dBm-	-	1		1		2_483500 G			
6						· · · · ·			
-10 dBn	n	1							
-20 dBn	D D	1 -17.85	0 dBm						
		1							
-30 dBr	n -			_		-			
		MA		-			M4		
-40 dBr		turker	re-actually Margaret	-	in a grant	un approved when the	aning the magne		
-50 dBr			1 million to a second	AL	and the second second	and a second and			
-JU UBI									
						-			
-60 dBr									
	n					-			
-60 dBr -70 dBr	n								
	n								
-70 dBr	n	Hz		691 pts			Stop 2.55 GH:		
-70 dBr Start 2 Marker	n	No.V							
-70 dBn Start 2 Marker Type	n	Trc	X-value	Y-value	Function	Func	Stop 2.55 GH; tion Result		
-70 dBr Start 2 Marker Type M1	n	Trc 1	2.4799 GHz	Y-value 2.15 dBm		Func			
-70 dBr Start 2 Marker Type M1 M2	n	Trc 1 1	2,4799 GHz 2,4835 GHz	Y-value 2.15 dBm -43.49 dBm		Func			
-70 dBr Start 2 Marker Type M1	n 2.47 G	Trc 1	2.4799 GHz	Y-value 2.15 dBm		Func			

## Single

Ref Le	evel :	20.00 dBr 30 d			<ul> <li>RBW 100 kHz</li> <li>VBW 300 kHz</li> </ul>		Auto FF	т			
a 1Pk Vi	ew										
10 dBm-						M1 M2		0.95 dB; 2.40 0050 GF -47.79 dB; 2.4000000 GF			
0 dBm-										IN	
-10 dBm	-		-					_		P.	
-20 dBm	-0	1 -19.05	0 dEm		_			-	-		
-30 dBm	+	_						_	-		
-40 dBm	+	-	1	1	Ma			M3		112	
-S0 dBm	mon	harman	monther	manne	internet in the second	wenter	in the	monterman	andrewyer.	and the second s	
-60 dBm	-	_	-	-		_	_	-			
-70 dBm	+			-							
Start 2	.35 G	Hz	1		691 pt	5			Stop	2.405 GHz	
Marker	20	George		V					1.1.1		
Туре	Ref		X-value		Y-value	Funct	ion	Function Result			
M1 M2		1	2.404005 GHz 2.4 GHz		0.95 dBm -47.79 dBm	-					
M3		1	2.4 GHz		-47.76 dBm	-	-				
M4		1	2.3727971 GHz		-46.20 dBm	-					

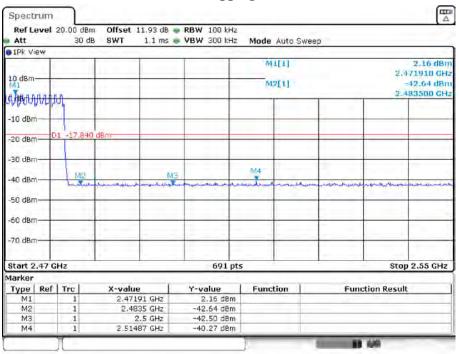
### 2DH5: Band Edge-Left Side Hopping

Date: 26.APR.2073 11:12:04



## Single

Date: 26.APR.2023 11:00:58



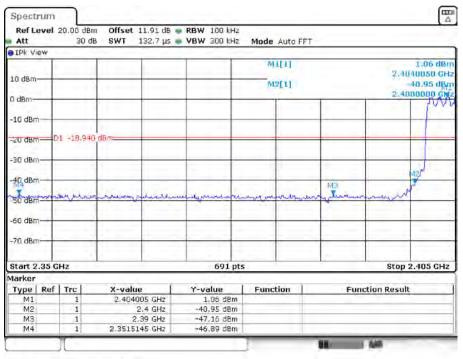
## 2DH5: Band Edge- Right Side Hopping

Date: 26.APR.2023 11:22:57

#### Spectrum Ref Level 20.00 dBm Offset 11.93 dB 🖷 RBW 100 kHz 1.1 ms 👼 VBW 300 kHz 30 dB SWT Att Mode Auto Sweep 31Pk View M1[1] 2.09 dBn 2.480010 GHz 10 dBm M2[1] 44.36 dBn ME 2.483500 GHz 0 dBm -10 dBm 17.918 dBm -20 dBm--30 dBm 40 dBm un hour the anos 1. Carlo manut Anna march A all -01in march mar mondered -50 dBm -60 dBn -70 dBm Start 2.47 GHz 691 pts Stop 2.55 GHz Marker Type | Ref | Trc X-value Function Function Result Y-value 2.09 dBm -44.36 dBm 2.48001 GHz M1 M2 1 2.4835 GHz M3 2.5 GHz 2.508841 GHz -44.48 dBm M4 -41.83 dBm 1 58. Date: 26.APR.2073 11:02:03

#### Single

Version 7: 2023-01-30



#### 3DH5: Band Edge-Left Side Hopping

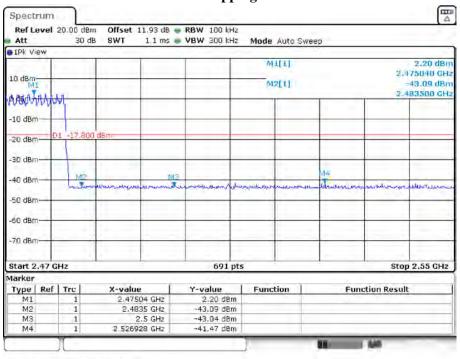
Date: 26.APR.2073 11:24:37

#### Single

Spectrum Ref Level 20.00 dBm Offset 11.93 dB 🖷 RBW 100 kHz Att 30 dB 8WT 132.7 µs 🖝 VBW 300 kHz Mode Auto FFT SIPk View M1[1] 1.03 dBn 2.4020150 GHz 10 dBm =43.711dBm 2.4000000 GHz M2[1] 0 dBm -10 dBm -20 dBm D1 -18,970 dB -30 dBm 40 dBm MB Berden -60 dBm -70 dBm Start 2.35 GHz 691 pts Stop 2.405 GHz Marker Function Result Type Ref Trc X-value Y-value Function 2.402015 GHz M1 M2 1.03 dBm -43.71 dBm 1 2.4 GHz 2.39 GHz 1 MЗ -48.64 dBm 1 M4 1 2.3996594 GHz -42.31 dBm 1.64

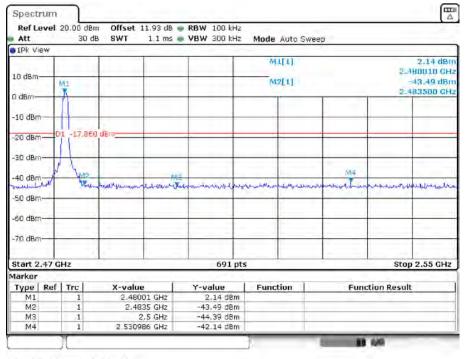
Date: 26.APR.2073 11:52:43

Version 7: 2023-01-30



## 3DH5: Band Edge- Right Side Hopping

Date: 26.APR.2023 11:27:37



Single

Date: 26.APR.2023 11:C3:58

#### \*\*\*\*\* END OF REPORT \*\*\*\*\*

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