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Report Template Version: V05 Report Template Revision Date: 2021-11-03

# EST REPORT

Report No.: CQASZ20231202222E-02 Hesung Innovation Limited **Applicant:** 

Room 803, Chevalier House, 45-51 Chatham Road South, Tsim Sha Tsui, Kowloon, **Address of Applicant:** 

HongKong

**Equipment Under Test (EUT):** 

**Product:** Air Circulator Fan

Model No.: DR-HPF004S, WDR-PF004S, DCPF04S, DBPF04S, DTPF04S, DWPF04S

Test Model No.: DR-HPF004S

**Brand Name: DREO** 

FCC ID: 2A3SYPF004

Standards: 47 CFR Part 15, Subpart C

Date of Receipt: 2023-12-05

**Date of Test:** 2023-12-05 to 2023-12-19

Date of Issue: 2024-1-12 Test Result: PASS\*

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

Tested By: Reviewed By: (Timo Lei) Approved By:

(Jack Ai)

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.



Report No.: CQASZ20231202222E-02

# 1 Version

# **Revision History Of Report**

Report No.	Version	Description	Issue Date
CQASZ20231202222E-02	Rev.01	Initial report	2024-1-12



# 2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15.203	N/A	PASS
AC Power Line Conducted Emission	47 CFR Part 15.207	ANSI C63.10-2013	PASS
Conducted Peak & Average Output Power	47 CFR Part 15.247	ANSI C63.10-2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15.247	ANSI C63.10-2013	PASS
Power Spectral Density	47 CFR Part 15.247	ANSI C63.10-2013	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15.247	ANSI C63.10-2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15.247	ANSI C63.10-2013	PASS
Radiated Spurious Emissions	47 CFR Part 15.209	ANSI C63.10-2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15.205/15.209	ANSI C63.10-2013	PASS

#### Remark:

The tested sample(s) and the sample information are provided by the client.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radiated Frequency.

CH: In this whole report CH means channel.

Volt: In this whole report Volt means Voltage.

Temp: In this whole report Temp means Temperature.

Humid: In this whole report Humid means humidity.

Press: In this whole report Press means Pressure.

N/A: In this whole report not application



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# 4 General Information

### 4.1 Client Information

Applicant:	Hesung Innovation Limited
Address of Applicant:  Room 803, Chevalier House, 45-51 Chatham Road South, Tsim Kowloon, HongKong	
Manufacturer:	Shenzhen Hesung Innovation Technology Co., LTD
Address of Manufacturer:	26F, Bldg A7, Creative City, Shenzhen, China
Factory:	Shenzhen Hesung Innovation Technology Co., LTD
Address of Factory:	26F, Bldg A7, Creative City, Shenzhen, China

# 4.2 General Description of EUT

Product Name:	Air Circulator Fan
Model No.:	DR-HPF004S, WDR-PF004S, DCPF04S, DBPF04S, DTPF04S, DWPF04S
Test Model No.:	DR-HPF004S
Trade Mark:	DREO
Software Version:	V0.2.0
Hardware Version:	GDRD230927-15G/GDRD231104-12G
Power Supply:	Model:BLJ24W240100P-U
	Input:100-240V~50/60Hz 0.6A
	Output:24V 1.0A
EUT Supports Radios	BLE: 2402-2480MHz
application:	2.4GHz: Wi-Fi: 802.11b/g/n(HT20): 2412MHz~2462MHz;
Simultaneous Transmission	☐ Simultaneous TX is supported and evaluated in this report.
	⊠ Simultaneous TX is not supported.

# 4.3 Product Specification subjective to this standard

Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK)
	IEEE for 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)
	IEEE for 802.11n(HT20) : OFDM (64QAM, 16QAM, QPSK, BPSK)
Transfer Rate:	IEEE for 802.11b:
	1Mbps/2Mbps/5.5Mbps/11Mbps
	IEEE for 802.11g :
	6Mbps/9Mbps/12Mbps/18Mbps/24Mbps/36Mbps/48Mbps/54Mbps
	IEEE for 802.11n(HT20):
	6.5Mbps/13Mbps/19.5Mbps/26Mbps/39Mbps/52Mbps/58.5Mbps/65Mbps
Product Type:	⊠ Mobile □ Portable
Test Software of EUT:	WIFI Test Tool V1.7.2
Antenna Type: FPC antenna	
Antenna Gain:	3.8dBi



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Operation I	Operation Frequency each of channel(802.11b/g/n HT20)						
Channel Frequency Channel Frequency Channel Frequency Channel Frequency					Frequency		
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

#### Note:

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

### For 802.11b/g/n (HT20):

Channel	Frequency
The Lowest channel	2412MHz
The Middle channel	2437MHz
The Highest channel	2462MHz

#### Note:

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.



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# 4.4 Test Environment and Mode

Operating Environment:		
Radiated Emissions:		
Temperature:	25.3 °C	
Humidity:	55 % RH	
Atmospheric Pressure:	1009 mbar	
Conducted Emissions:		
Temperature:	25.6 °C	
Humidity:	60 % RH	
Atmospheric Pressure:	1009 mbar	
Radio conducted item tes	t (RF Conducted test room):	
Temperature:	25.5 °C	
Humidity:	52 % RH	
Atmospheric Pressure:	1009 mbar	
Test mode:		
Transmitting mode:	EUT is set in RF test mode in all supported modulation types, bandwid and data rate, etc.	
Control  MAC Address  Channel  Wlan Mode  Bandwidth  Testing Item  Data Rate  OFE	Auto	



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### 4.5 Description of Support Units

The EUT has been tested with associated equipment below.

1) Support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
/	1	1	/	/

2) Cable

Cable No.	Description	Manufacturer	Cable Type/Length	Supplied by
/	1	/	1	/

### 4.6 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.

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

### 4.7 Test Facility

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

#### • A2LA (Certificate No. 4742.01)

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

#### • FCC Registration No.: 522263

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263



# 4.8 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd.** guality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CQA laboratory is reported:

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

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

#### 4.9 Deviation from Standards

None.

#### 4.10 Abnormalities from Standard Conditions

None.

### 4.11 Other Information Requested by the Customer

None.



# 4.12 Equipment List

			Instrument	Calibration	Calibration
Test Equipment	Manufacturer	Model No.	No.	Date	Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2023/09/08	2024/09/07
Spectrum analyzer	R&S	FSU26	CQA-038	2023/09/08	2024/09/07
Spectrum analyzer	R&S	FSU40	CQA-075	2023/09/08	2024/09/07
Preamplifier	MITEQ	AFS4-00010300-18- 10P-4	CQA-035	2023/09/08	2024/09/07
Preamplifier	MITEQ	AMF-6D-02001800- 29-20P	CQA-036	2023/09/08	2024/09/07
Preamplifier	EMCI	EMC184055SE	CQA-089	2023/09/08	2024/09/07
Loop antenna	Schwarzbeck	FMZB1516	CQA-060	2021/09/16	2024/09/15
Bilog Antenna	R&S	HL562	CQA-011	2021/09/16	2024/09/15
Horn Antenna	R&S	HF906	CQA-012	2021/09/16	2024/09/15
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2021/09/16	2024/09/15
Coaxial Cable (Above 1GHz)	CQA	N/A	C007	2023/09/08	2024/09/07
Coaxial Cable (Below 1GHz)	CQA	N/A	C013	2023/09/08	2024/09/07
RF					
cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2023/09/08	2024/09/07
Antenna Connector	CQA	RFC-01	CQA-080	2023/09/08	2024/09/07
Power Sensor N1918A Power Analysis Manager	KEYSIGHT Agilent	U2021XA N1918A	CQA-30 CQA-074	2023/09/08	2024/09/07
Power Panel				2023/09/08	2024/09/07
Power meter	R&S	NRVD	CQA-029	2023/09/08	2024/09/07
Power divider	MIDWEST	PWD-2533-02-SMA- 79	CQA-067	2023/09/08	2024/09/07
EMI Test Receiver	R&S	ESR7	CQA-005	2023/09/08	2024/09/07
LISN	R&S	ENV216	CQA-003	2023/09/08	2024/09/07
Coaxial cable	CQA	N/A	CQA-C009	2023/09/08	2024/09/07
DC power	KEYSIGHT	E3631A	CQA-028	2023/09/08	2024/09/07

### Test software:

1 GOT GOTTINGTO.		
	Manufacturer	Software brand
Radiated Emissions test software	Tonscend	JS1120-3
Conducted Emissions test software	Audix	e3
RF Conducted test software	Audix	e3





### 5 Test results and Measurement Data

### 5.1 Antenna Requirement

Standard requirement: 47 CFR Part 15C Section 15.203 /247(c)

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### **EUT Antenna:**



The antenna is FPC antenna.

The connection/connection type between the antenna to the EUT's antenna port is: unique coupling This is either permanently attachment or a unique coupling that satisfies the requirement.



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# 5.2 Conducted Emissions

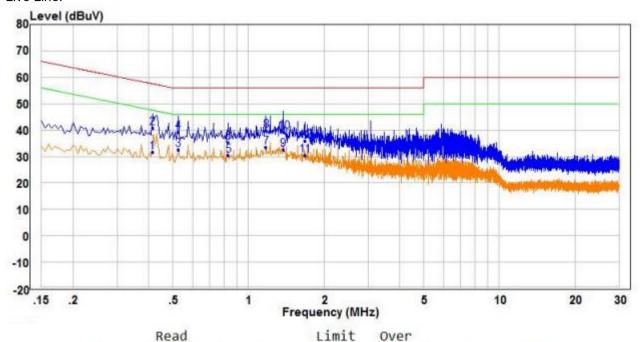
	Conducted Emis	3310113					
	Test Requirement:	47 CFR Part 15C Section 15.207					
	Test Method:	ANSI C63.10: 2013					
	Test Frequency Range:	150kHz to 30MHz					
	Limit:	- (AUL)	Limit (d	lBuV)			
		Frequency range (MHz)	Quasi-peak	Average			
		0.15-0.5	66 to 56*	56 to 46*			
		0.5-5	56	46			
		5-30	60	50			
		* Decreases with the logarithm	n of the frequency.				
	Test Procedure:	<ol> <li>The mains terminal disturb room.</li> <li>The EUT was connected to Impedance Stabilization Not impedance. The power call connected to a second reference plane in the same way as the multiple socket outlet strip a single LISN provided the reasonable to the same way as the multiple socket outlet strip a single LISN provided the reasonable to the same way as the multiple socket outlet strip a single LISN provided the reasonable to the same way as the multiple socket outlet strip a single LISN provided the reasonable to the same way as the</li></ol>	o AC power source throetwork) which provides oles of all other units of LISN 2, which was the LISN 1 for the unit leads as used to connect ating of the LISN was not be upon a non-metallished upon a non-metallished upon a ron-metallished for floor-standing and form the vertical ground reference plane, the a vertical ground reference of the upon a placed 0.8 m from the vertical ground reference plane. The total ground reference plane is of the LISN 1 and the quipment was at least 0 am emission, the relative terface cables must be	bugh a LISN 1 (Line a 50Ω/50μH + 5Ω line the EUT were bonded to the grobeing measured. A multiple power cable to texceeded. To table 0.8m above the rangement, the EUT verence plane. The ehorizontal ground om the boundary of the plane for LISNs his distance was EUT. All other units of the positions of	near bund es to ne was ar e		
	Test Setup:	Shielding Room  EUT  AC Mains  LISN1	AE Now the second secon	Test Receiver			



Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel.
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate of 802.11b at middle channel is the worst case.  Only the worst case is recorded in the report.
Test Voltage:	AC120V/60Hz
Test Results:	Pass

#### **Measurement Data**

#### Live Line:



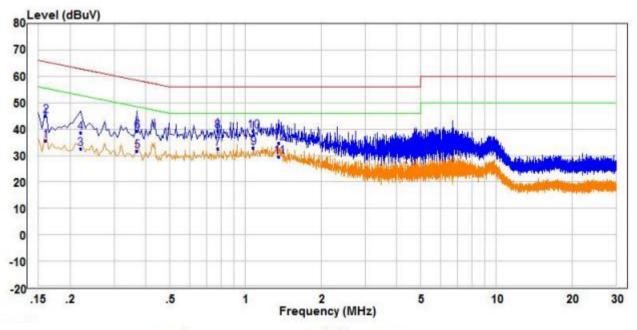
		Freq	Level	Factor	Level	Line	Limit	Remark	Pol/Phase
	_	MHZ	dBuV	dB	dBuV	dBuV	dB		
1		0.415	20.98	10.62	31.60	47.55	-15.95	Average	Line
2		0.415	30.09	10.62	40.71	57.55	-16.84	QP	Line
3		0.525	21.86	10.72	32.58	46.00	-13.42	Average	Line
3 4 5		0.525	28.63	10.72	39.35	56.00	-16.65	QP	Line
5		0.830	19.62	10.81	30.43	46.00	-15.57	Average	Line
6		0.830	24.63	10.81	35.44	56.00	-20.56	QP	Line
7	PP	1.175	22.30	11.15	33.45	46.00	-12.55	Average	Line
8	QP	1.175	28.60	11.15	39.75	56.00	-16.25	QP	Line
9		1.375	20.95	11.59	32.54	46.00	-13.46	Average	Line
10		1.375	27.56	11.59	39.15	56.00	-16.85	QP	Line
11		1.680	18.40	12.15	30.55	46.00	-15.45	Average	Line
12		1.680	23.71	12.15	35.86	56.00	-20.14	QP	Line

#### Remark:

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



#### Neutral Line:



	- Carreston	Read			Limit	Over	i de la compania del compania de la compania del compania de la compania del compania de la compania de la compania de la compania del compania de la compania del compania dela compania del compania del compania del compania del compania de	
	Freq	Level	Factor	Level	Line	Limit	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	1	- 00
1	0.160	25.06	10.68	35.74	55.46	-19.72	Average	Neutral
2	0.160	34.27	10.68	44.95	65.46	-20.51	QP	Neutral
3	0.220	22.02	10.58	32.60	52.82	-20.22	Average	Neutral
4	0.220	28.21	10.58	38.79	62.82	-24.03	QP	Neutral
5	0.370	21.26	10.57	31.83	48.50	-16.67	Average	Neutral
6	0.370	28.82	10.57	39.39	58.50	-19.11	QP	Neutral
7	0.775	21.81	10.85	32.66	46.00	-13.34	Average	Neutral
8	0.775	28.35	10.85	39.20	56.00	-16.80	QP	Neutral
9 PP	1.075	22.26	10.70	32.96	46.00	-13.04	Average	Neutral
10 QP	1.075	28.53	10.70	39.23	56.00	-16.77	QP	Neutral
11	1.360	18.86	10.72	29.58	46.00	-16.42	Average	Neutral
12	1.360	23.94	10.72	34.66	56.00	-21.34	OP	Neutral

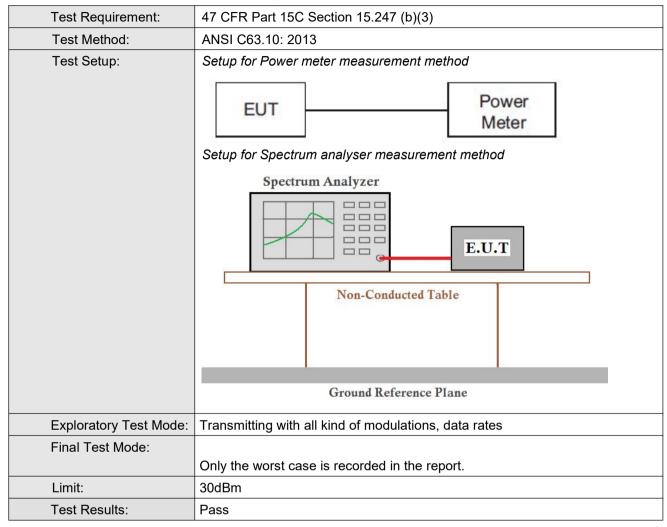
#### Remark:

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



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### 5.3 Conducted Peak & Average Output Power





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### **Test Result**

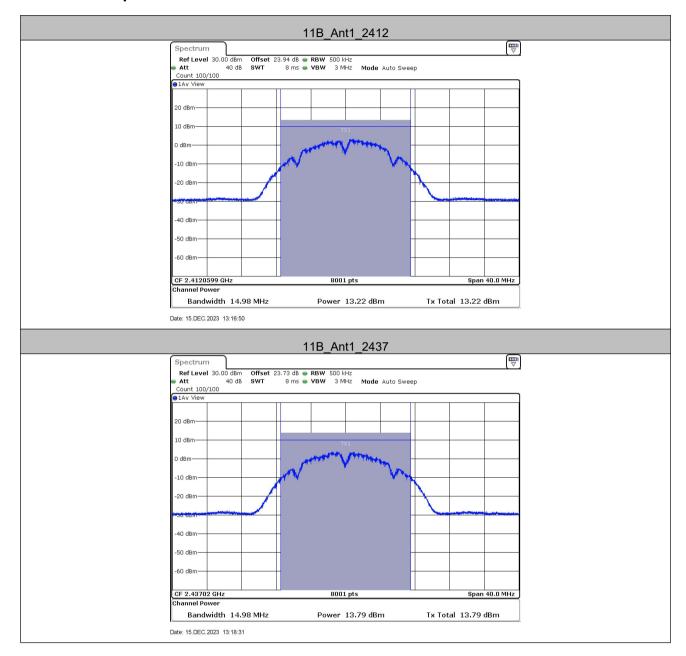
Test Mode	Frequency[MHz	Result [dBm]	Limit [dBm]	Verdict
	2412	13.22	≤30.00	PASS
11B	2437	13.79	≤30.00	PASS
	2462 15.01		≤30.00	PASS
11G	2412	7.78	≤30.00	PASS
	2437	8.82	≤30.00	PASS
	2462	10.38	≤30.00	PASS
	2412	7.39	≤30.00	PASS
11N20SISO	2437	8.49	≤30.00	PASS
	2462	9.86	≤30.00	PASS

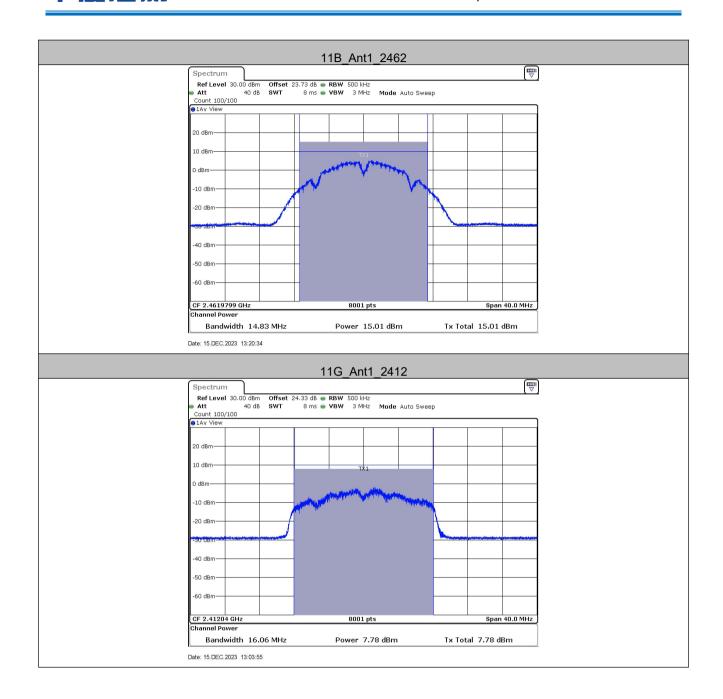
Note:

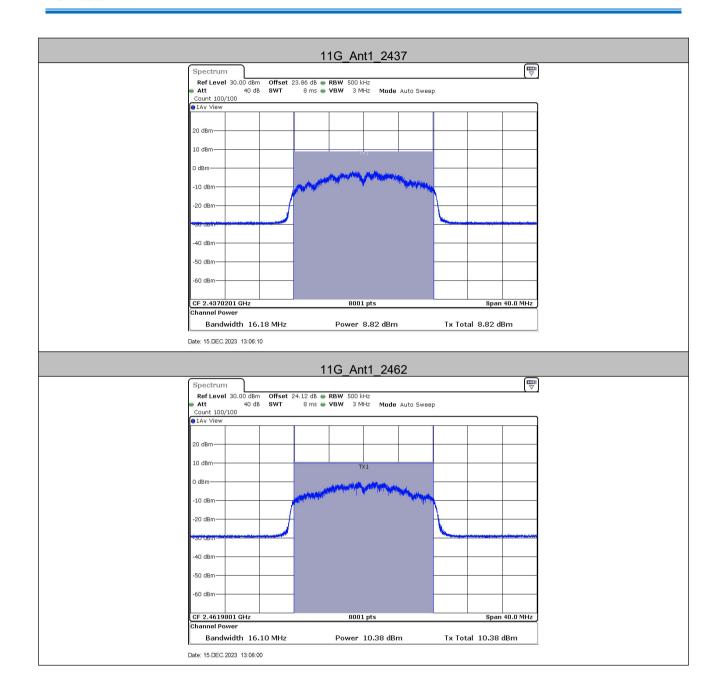
When Duty cycle >98%, D.C.F is not required.



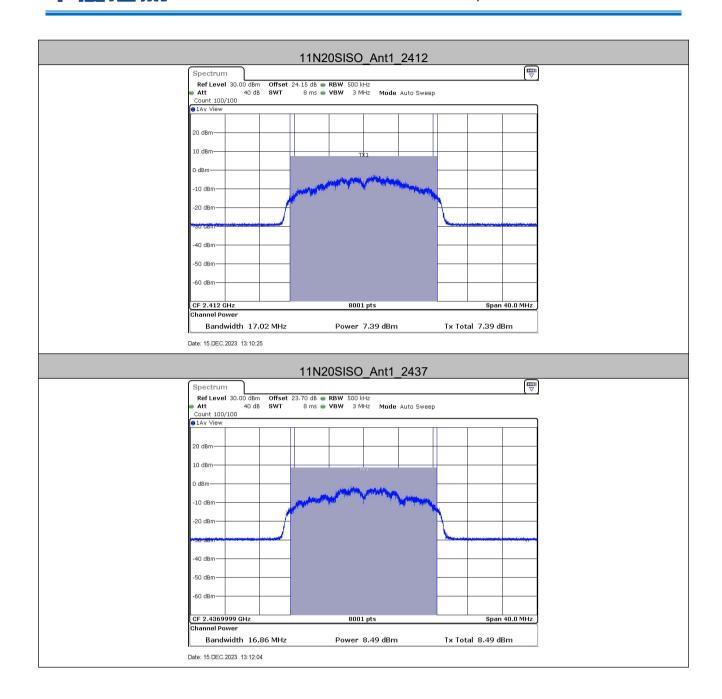
### **Test Graphs**



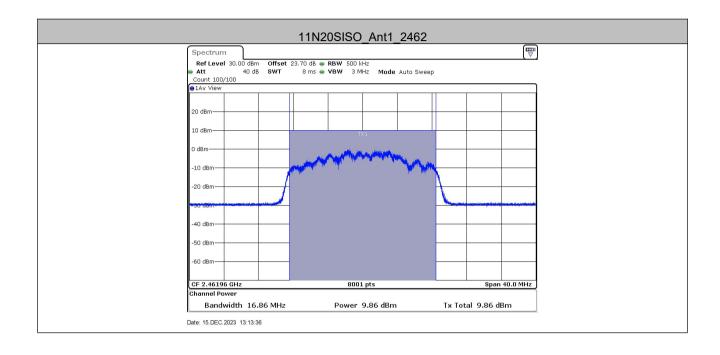








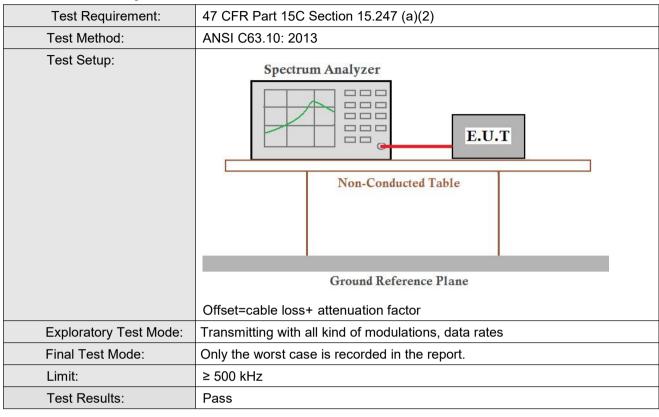








### 5.4 6dB Occupied Bandwidth





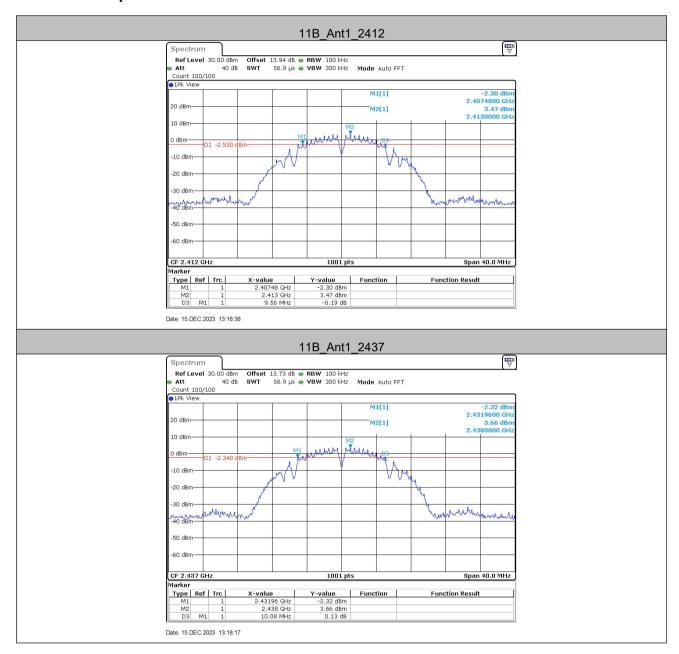
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### **Test Result**

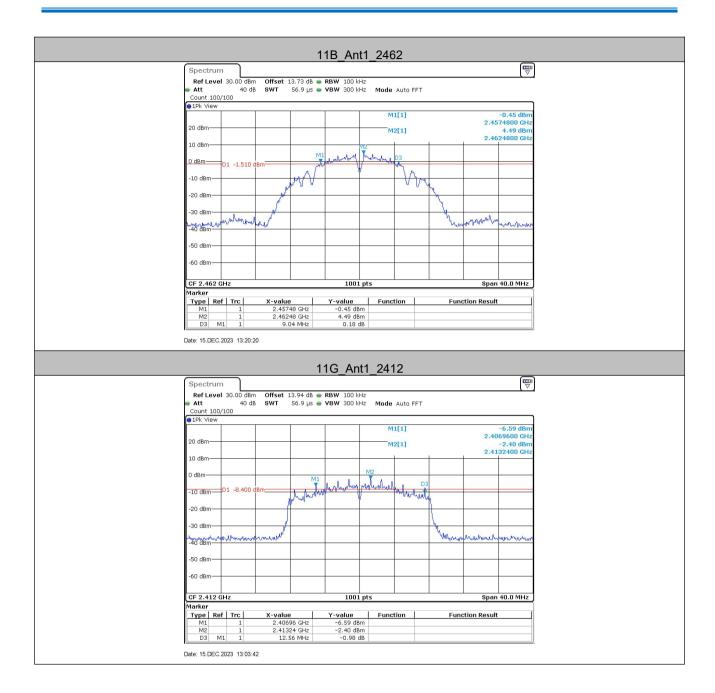
TestMode	Antenna	Channel	DTS BW [MHz]	Limit[MHz]	Verdict
		2412	9.56	0.5	PASS
11B	Ant1	2437	10.08	0.5	PASS
		2462	9.04	0.5	PASS
		2412	12.56	0.5	PASS
11G	Ant1	2437	15.04	0.5	PASS
		2462	10.12	0.5	PASS
		2412	15.12	0.5	PASS
11N20SISO	Ant1	2437	13.80	0.5	PASS
		2462	15.04	0.5	PASS



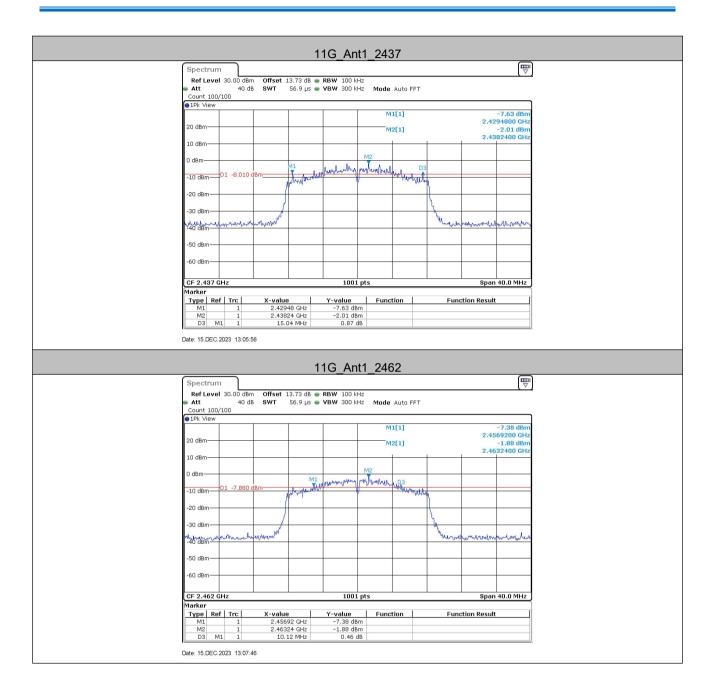
### **Test Graphs**



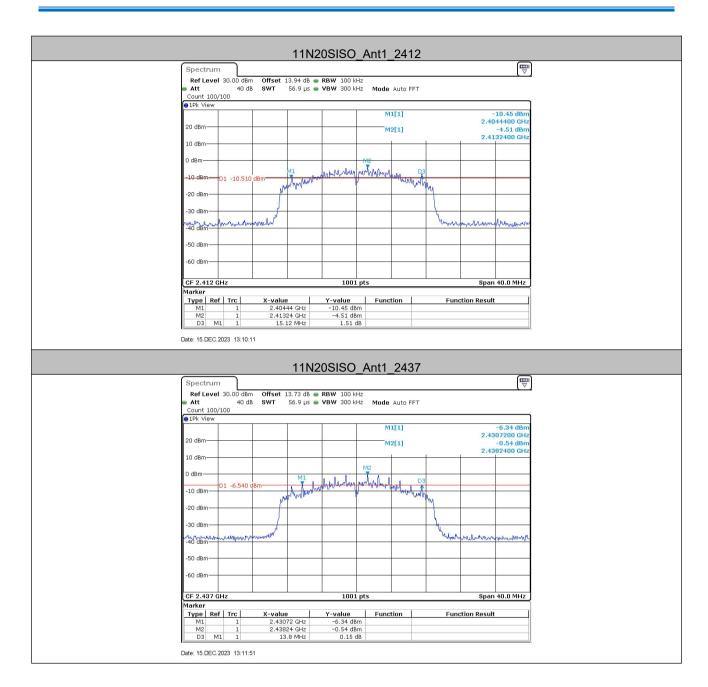




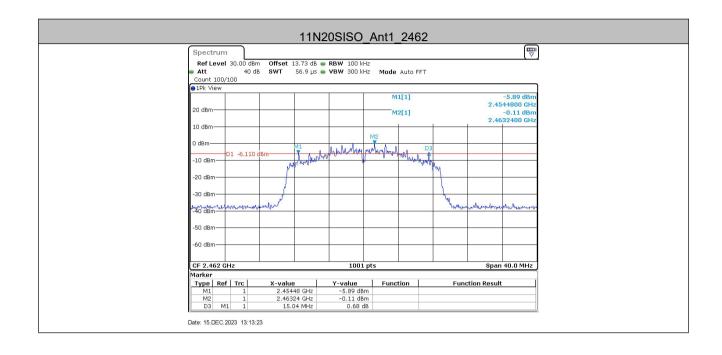














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# 5.5 Power Spectral Density

