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

EST REPORT

Report No.: CQASZ20240500775E-02 Hesung Innovation Limited **Applicant:**

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

Kowloon, HongKong 999077 China

Equipment Under Test (EUT):

Product: Smart Wall Mounted Heater

Model No.: DR-HSH017S, WDR-SH17S, DTSH17S, DKSH17S, DBSH17S, DOSH17S,

DWSH17S, DCSH17S, DR-HSH017AS, WDR-SH17AS, DTSH17AS, DKSH17AS,

DBSH17AS, DOSH17AS, DWSH17AS, DCSH17AS, DR-HSH017BS,

WDR-SH17BS, DTSH17BS, DKSH17BS, DBSH17BS, DOSH17BS, DWSH17BS,

DCSH17BS

Test Model No.: DR-HSH017S

Brand Name: DREO

FCC ID: 2A3SYHSH017

Standards: 47 CFR Part 15, Subpart C

Date of Receipt: 2024-05-08

2024-05-08 to 2024-05-15 **Date of Test:**

Date of Issue: 2024-07-01 Test Result: PASS*

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

Tested By:

(Lewis Zhou)

Reviewed By: _

(Timo Lei)

Approved By:

(Alex Wang)



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.: CQASZ20240500775E-02

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20240500775E-02	Rev.01	Initial report	2024-07-01



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 Sha Tsui , Kowloon, HongKong 999077 China
Manufacturer:	Shenzhen Hesung Innovation Technology Co., LTD
Address of Manufacturer:	26th Floor, Building A7, Chuangzhiyuncheng, Liuxian Avenue, NanshanDistrict, Shenzhen
Factory:	Shenzhen Hesung Innovation Technology Co., LTD
Address of Factory:	26th Floor, Building A7, Chuangzhiyuncheng, Liuxian Avenue, NanshanDistrict, Shenzhen

4.2 General Description of EUT

Product Name:	Smart Wall Mounted Heater		
Model No.:	DR-HSH017S, WDR-SH17S, DTSH17S, DKSH17S, DBSH17S, DOSH17S, DWSH17S, DCSH17S, DR-HSH017AS, WDR-SH17AS, DTSH17AS, DKSH17AS, DBSH17AS, DOSH17AS, DWSH17AS, DCSH17AS, DR-HSH017BS, WDR-SH17BS, DTSH17BS, DKSH17BS, DBSH17BS, DOSH17BS, DWSH17BS, DCSH17BS		
Test Model No.:	DR-HSH017S		
Trade Mark:	DREO		
Software Version:	V1.0		
Hardware Version:	PAI-051 V1.2 20210824		
Power Supply:	Power supply AC 120V		
EUT Supports Radios application:	BLE: 2402-2480MHz 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 Tool1.7.2



Antenna Type:	FPC antenna
Antenna Gain:	4.33dBi



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Operation I	Operation Frequency each of channel(802.11b/g/n HT20)						
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	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	1	/
2) Cable				
Cable No.	Description	Manufacturer	Cable Type/Length	Supplied by

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 ⁻⁸	(1)
5	Duty cycle	0.6 %.	(1)
6	Occupied Bandwidth	1.1%	(1)
7	RF conducted power	0.86dB	(1)
8	RF power density	0.74	(1)
9	Conducted Spurious emissions	0.86dB	(1)
10	Temperature test	0.8℃	(1)
11	Humidity test	2.0%	(1)
12	Supply voltages	0.5 %.	(1)
13	Frequency Error	5.5 Hz	(1)

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

4.9 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	KEYSIGHT	U2021XA	CQA-30	2023/09/08	2024/09/07
N1918A Power Analysis Manager Power Panel	Agilent	N1918A	CQA-074	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 GGt GGTtWare.		
	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)

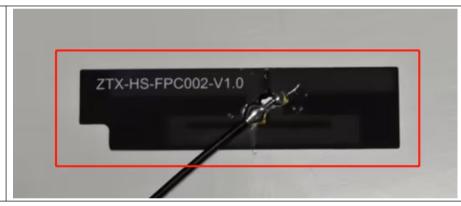
15.203 requirement:

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

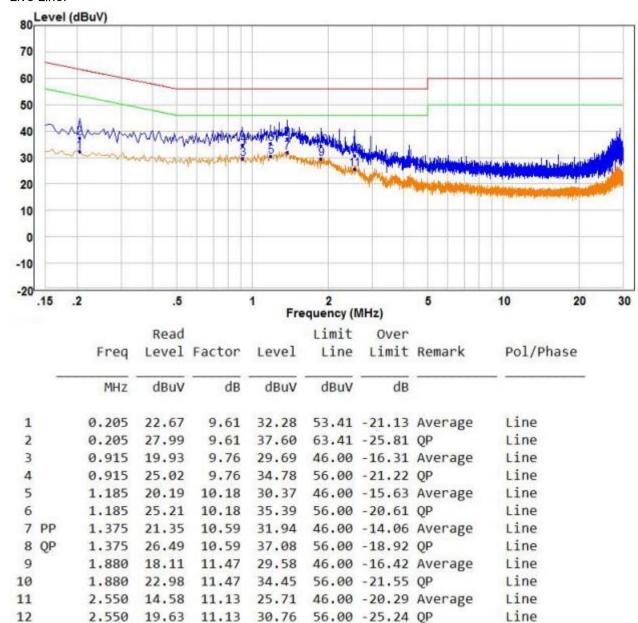
Test Requirement:	47 CFR Part 15C Section 15.2	207			
Test Method:	ANSI C63.10: 2013				
Test Frequency Range:	150kHz to 30MHz				
Limit:	(A411-)	Limit (d	lBuV)		
	Frequency range (MHz)	Quasi-peak	Average		
	0.15-0.5	66 to 56*	56 to 46*		
	0.5-5	56	46		
	5-30	60	50		
	* Decreases with the logarithn	n of the frequency.			
Test Procedure:	 The mains terminal disturb room. The EUT was connected to Impedance Stabilization Not impedance. The power call connected to a second reference plane in the same way as a multiple socket outlet strip a single LISN provided the reasonable of the EUT was placed on the horizontal ground reference plane. An placed on the horizontal ground reference plane of the EUT shall be 0.4 mm wertical ground reference preference plane. The LISN unit under test and bonded mounted on top of the ground between the closest points the EUT and associated experience to find the maximum equipment and all of the in ANSI C63.10: 2013 on contract. 	cance voltage test was bance voltage test was a AC power source throetwork) which provides oles of all other units of LISN 2, which was the LISN 1 for the unit less was used to connect ating of the LISN was not be upon a non-metallication of floor-standing and for floor-standing arround reference plane, the vertical ground reference of the vertical ground reference of the unit of the unit of the vertical ground reference plane. The total ground reference plane. The of the LISN 1 and the quipment was at least 0 arrows a transference cables must be united to the units of t	bugh a LISN 1 (Line to a 50Ω/50μH + 5Ω linear of the EUT were bonded to the ground being measured. A multiple power cables to not exceeded. In the EUT was been a series of the end of the end of the end of the end of the boundary of the end o		
Test Setup:	Shielding Room EUT AC Mains LISN1	Ground Reference Plane	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:

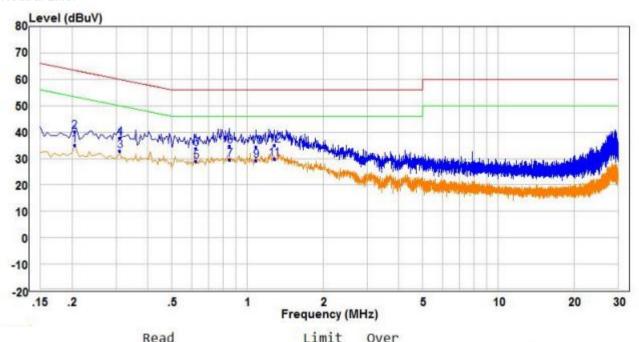


Remark:

- 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:



		Reau			LIMIT	over		
	Freq	Level	Factor	Level	Line	Limit	Remark	Pol/Phase
_	MHz	dBuV	dB	dBuV	dBuV	dB	-	
1	0.205	25.43	9.60	35.03	53.41	-18.38	Average	Neutral
2	0.205	30.44	9.60	40.04	63.41	-23.37	QP	Neutral
3	0.310	23.37	9.49	32.86	49.97	-17.11	Average	Neutral
4	0.310	28.16	9.49	37.65	59.97	-22.32	QP	Neutral
5	0.625	18.99	9.83	28.82	46.00	-17.18	Average	Neutral
6	0.625	24.06	9.83	33.89	56.00	-22.11	QP	Neutral
7	0.850	19.86	9.80	29.66	46.00	-16.34	Average	Neutral
8	0.850	24.98	9.80	34.78	56.00	-21.22	QP	Neutral
9	1.085	19.43	9.70	29.13	46.00	-16.87	Average	Neutral
10	1.085	24.74	9.70	34.44	56.00	-21.56	QP	Neutral
11 PP	1.280	20.01	9.71	29.72	46.00	-16.28	Average	Neutral
12 QP	1.280	25.23	9.71	34.94	56.00	-21.06	QP	Neutral

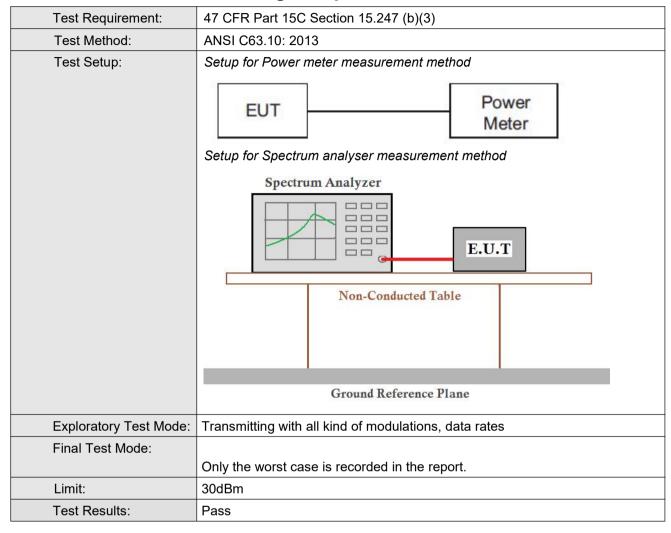
Remark:

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



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5.3 Conducted Peak & Average Output Power





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Test Result

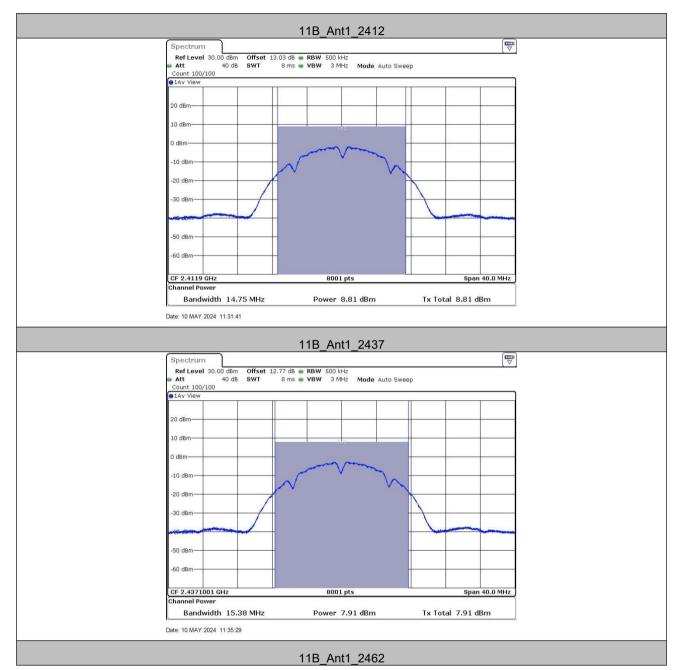
Test Mode	Frequency[MHz	Result [dBm]	Limit [dBm]	Verdict
	2412	8.81	≤30.00	PASS
11B	2437	7.91	≤30.00	PASS
	2462	9.44	≤30.00	PASS
	2412	3.26	≤30.00	PASS
11G	2437	3.16	≤30.00	PASS
	2462	5.41	≤30.00	PASS
	2412	3.14	≤30.00	PASS
11N20SISO	2437	2.88	≤30.00	PASS
	2462	4.64	≤30.00	PASS

Note:

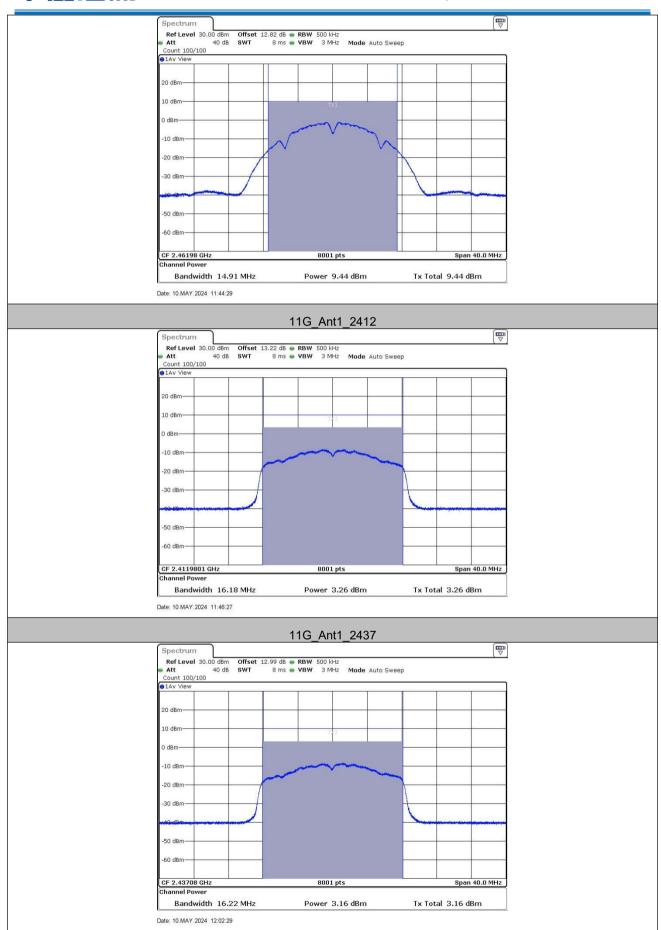
When Duty cycle >98%, D.C.F is not required.



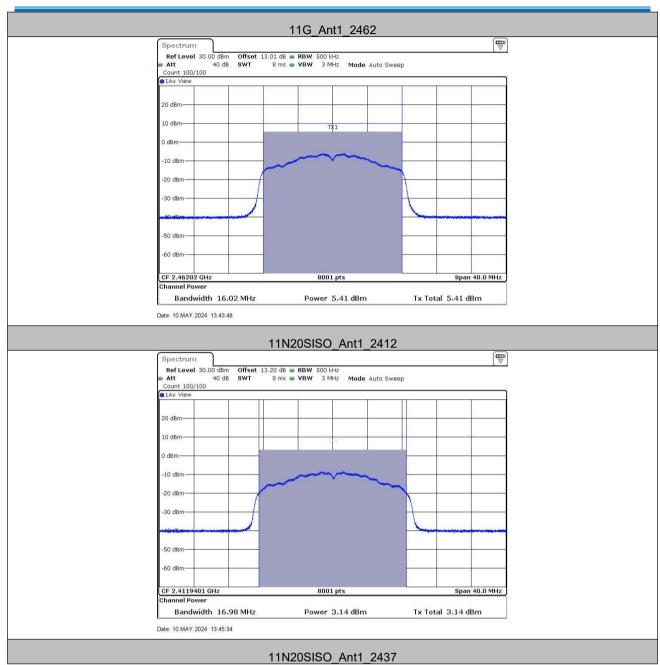
Test Graphs



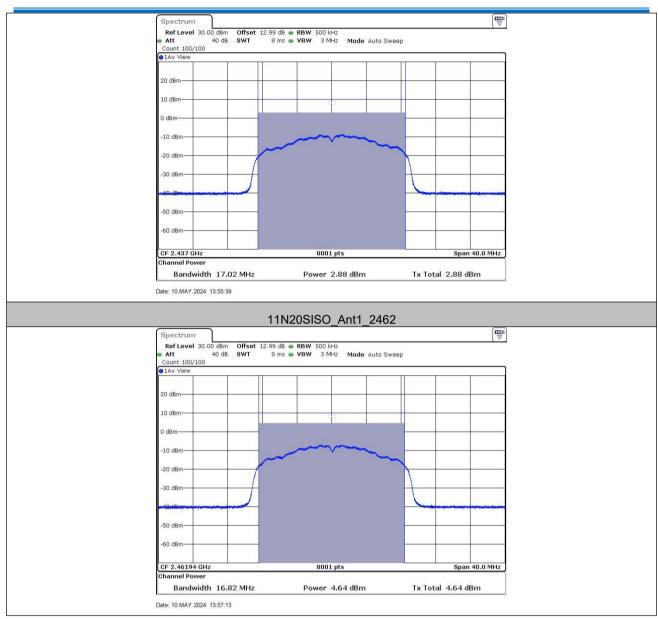








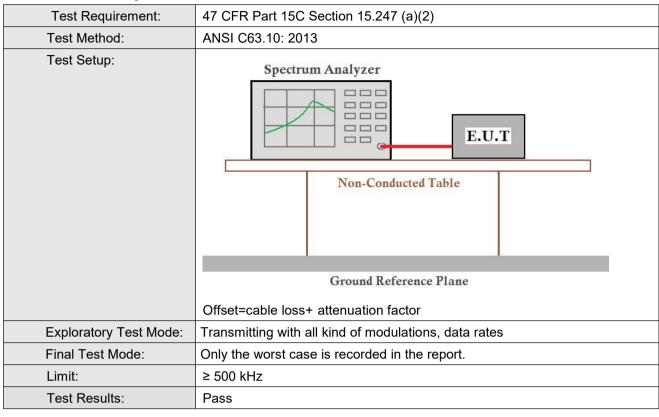








5.4 6dB Occupied Bandwidth





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Test Result

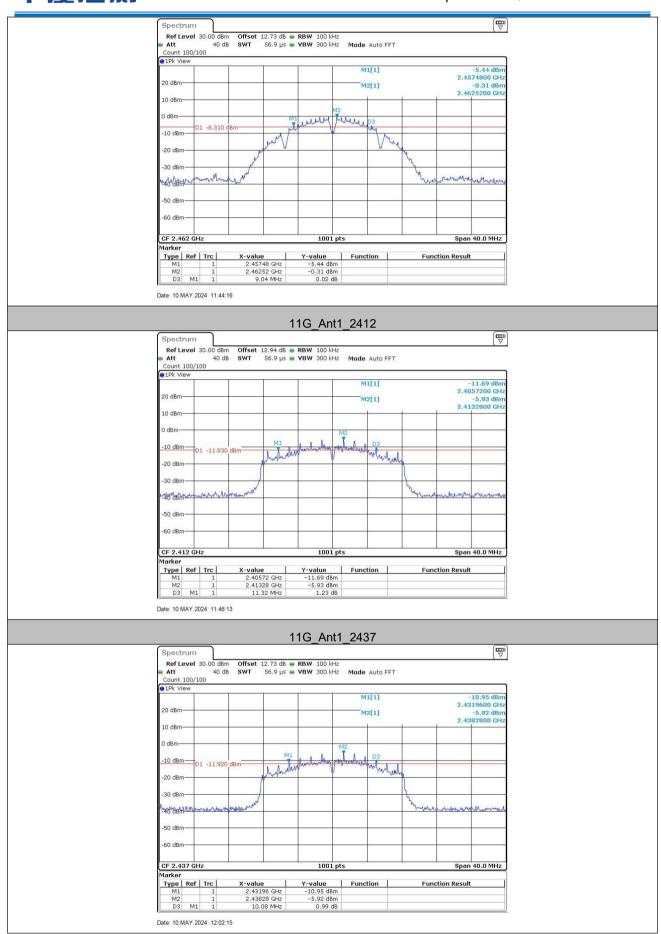
TestMode	Antenna	Channel	DTS BW [MHz]	Limit[MHz]	Verdict
		2412	9.08	0.5	PASS
11B	Ant1	2437	9.56	0.5	PASS
		2462	9.04	0.5	PASS
		2412	11.32	0.5	PASS
11G	Ant1	2437	10.08	0.5	PASS
		2462	11.32	0.5	PASS
		2412	11.32	0.5	PASS
11N20SISO	Ant1	2437	10.08	0.5	PASS
		2462	10.08	0.5	PASS



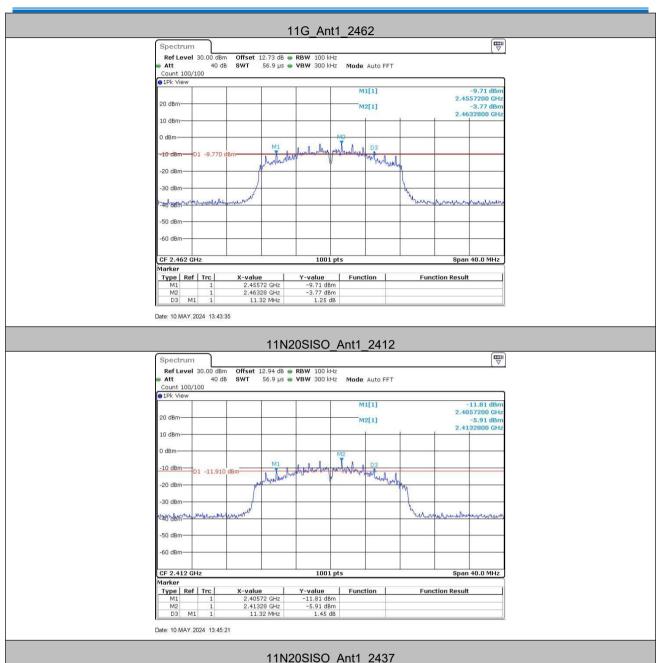
Test Graphs



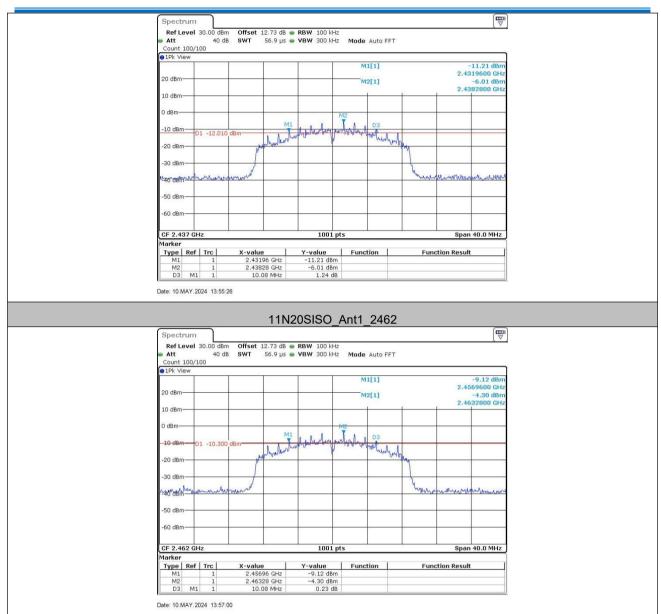








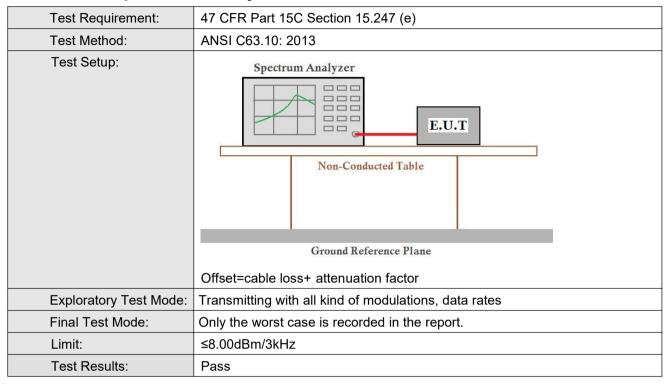






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5.5 Power Spectral Density





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Test Result

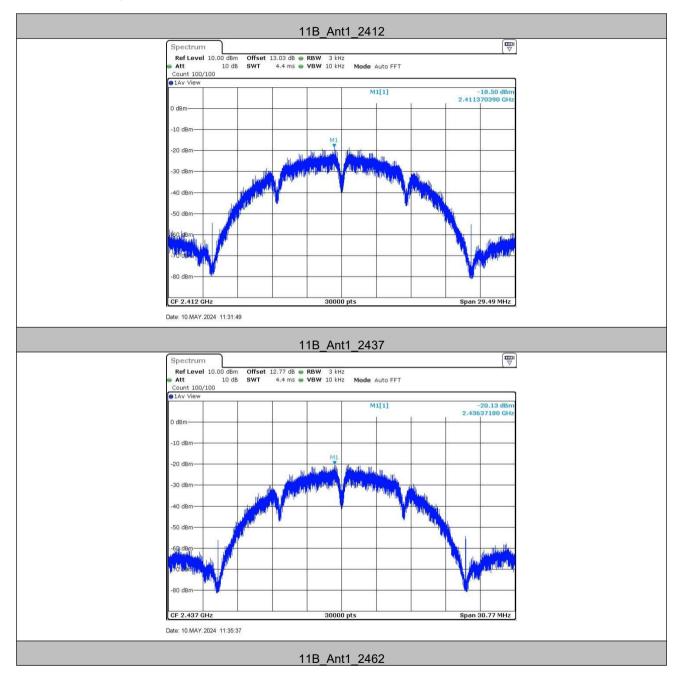
TestMode	Frequency[MHz]	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
	2412	-18.5	≤8.00	PASS
11B	2437	-20.13	≤8.00	PASS
	2462	-18.57	≤8.00	PASS
	2412	-21.87	≤8.00	PASS
11G	2437	-21.92	≤8.00	PASS
	2462	-19.86	≤8.00	PASS
	2412	-23.33	≤8.00	PASS
11N20SISO	2437	-22.86	≤8.00	PASS
	2462	-21.44	≤8.00	PASS

Note:

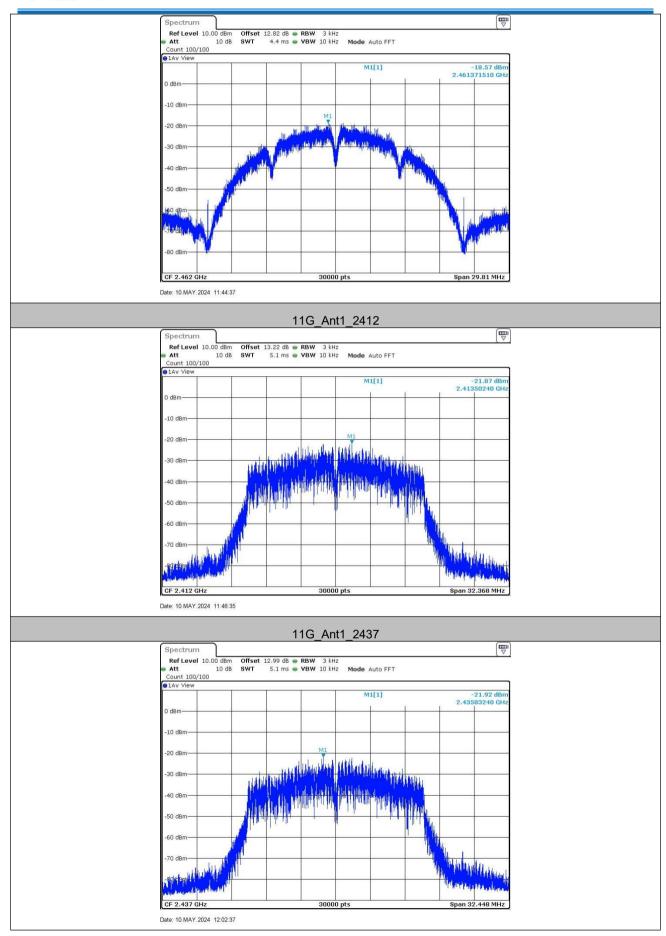
When Duty cycle >98%, D.C.F is not required.



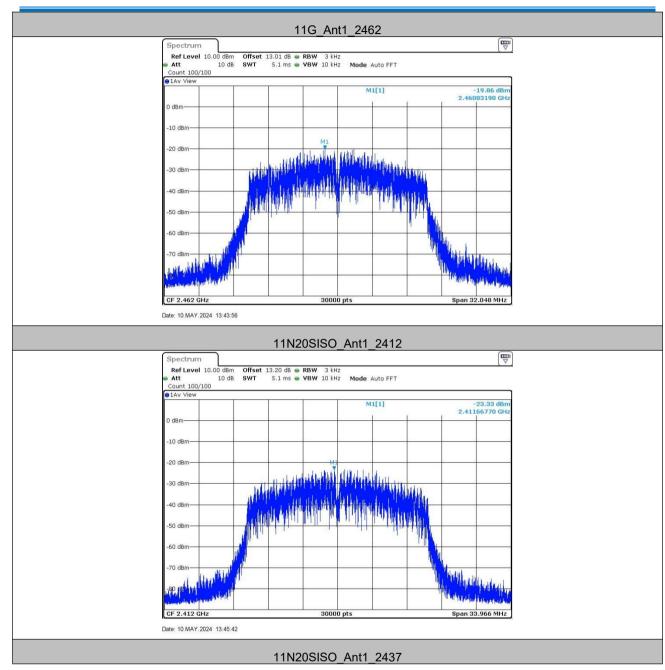
Test Graphs



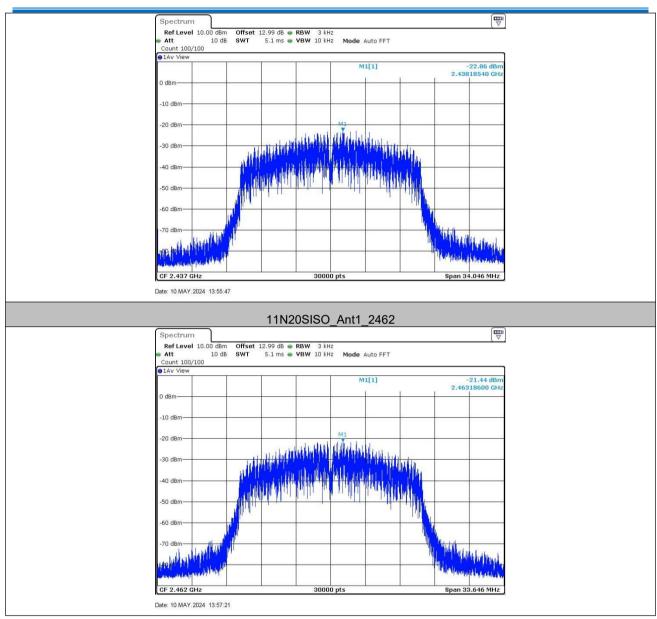








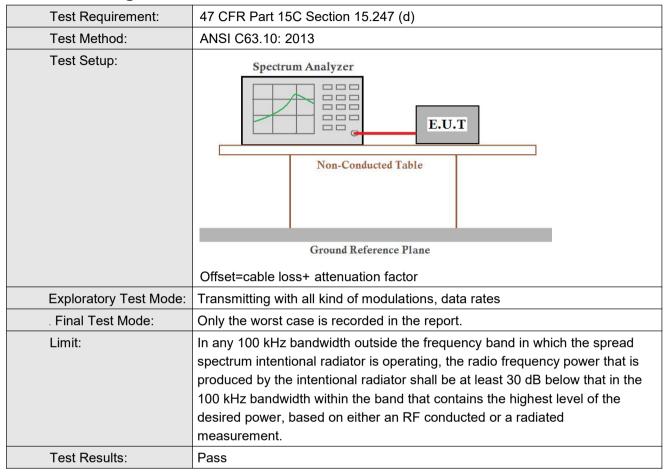








5.6 Band-edge for RF Conducted Emissions





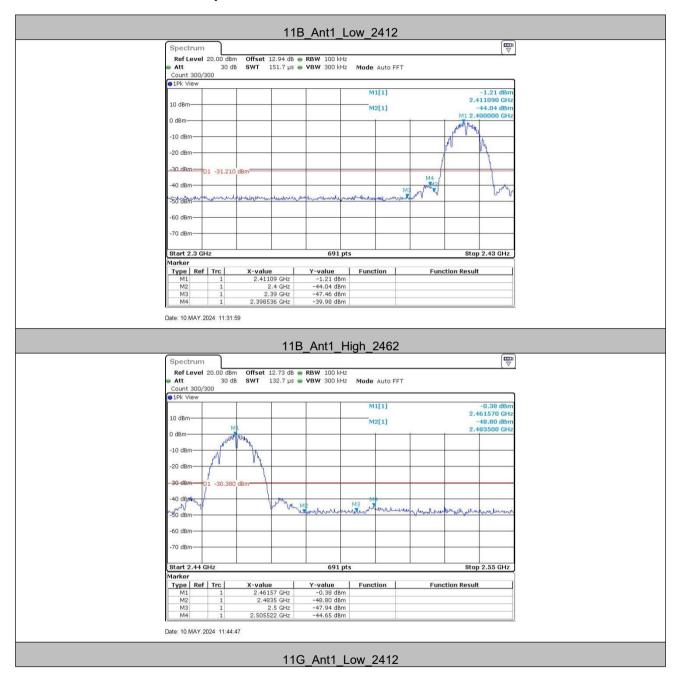
Report No.: CQASZ20240500775E-02

Test Result

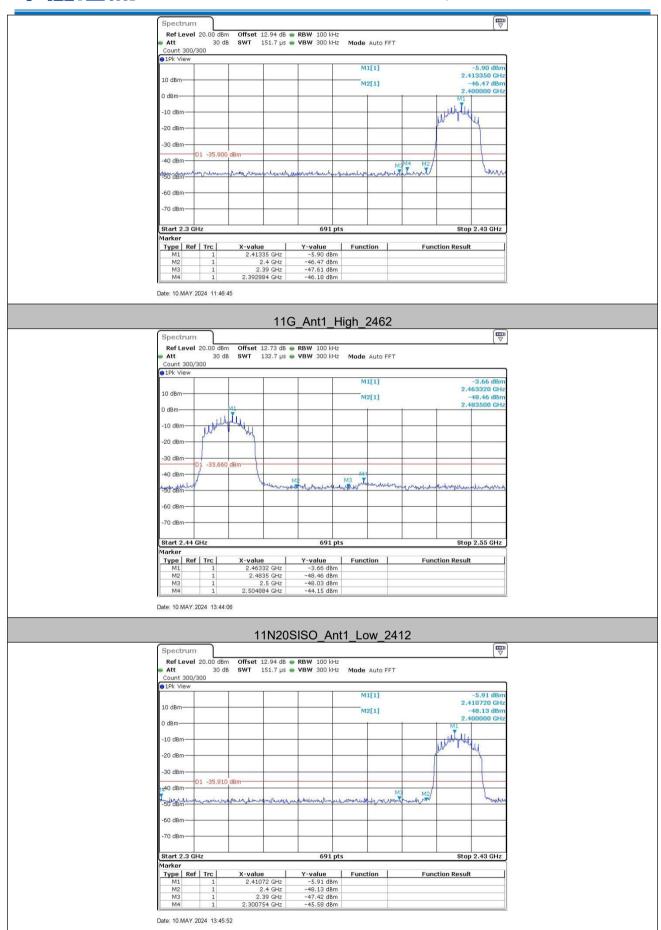
TestMode	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
115	Low	2412	-1.21	-39.98	≤-31.21	PASS
11B	High	2462	-0.38	-44.65	≤-30.38	PASS
	Low	2412	-5.90	-46.18	≤-35.9	PASS
11G	High	2462	-3.66	-44.15	≤-33.66	PASS
	Low	2412	-5.91	-45.58	≤-35.91	PASS
11N20SISO	High	2462	-4.22	-44.61	≤-34.22	PASS



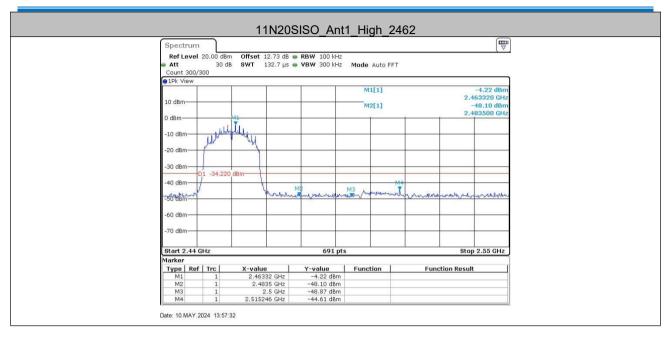
5.6.1 Test Graphs







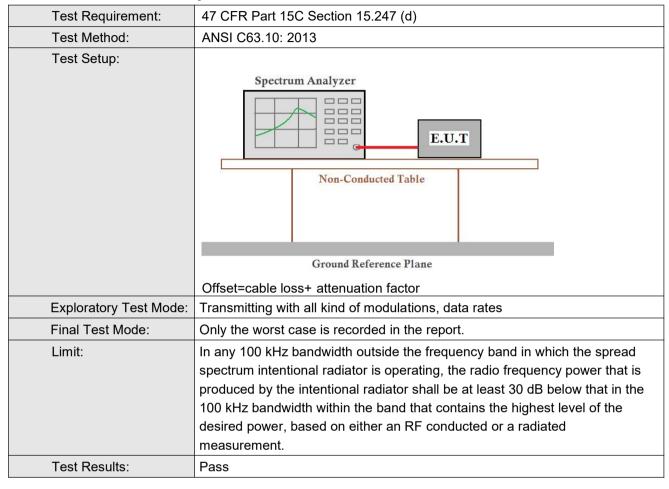






Report No.: CQASZ20240500775E-02

5.7 RF Conducted Spurious Emissions





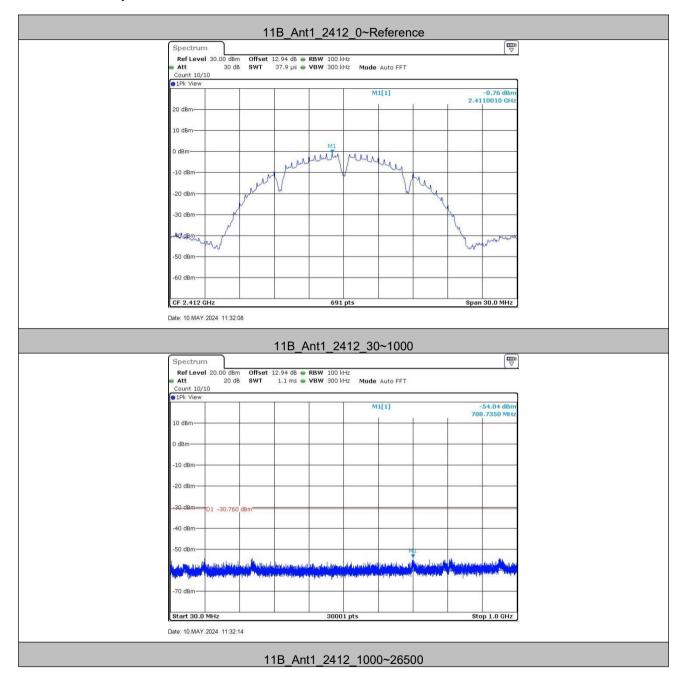
Report No.: CQASZ20240500775E-02

Test Result

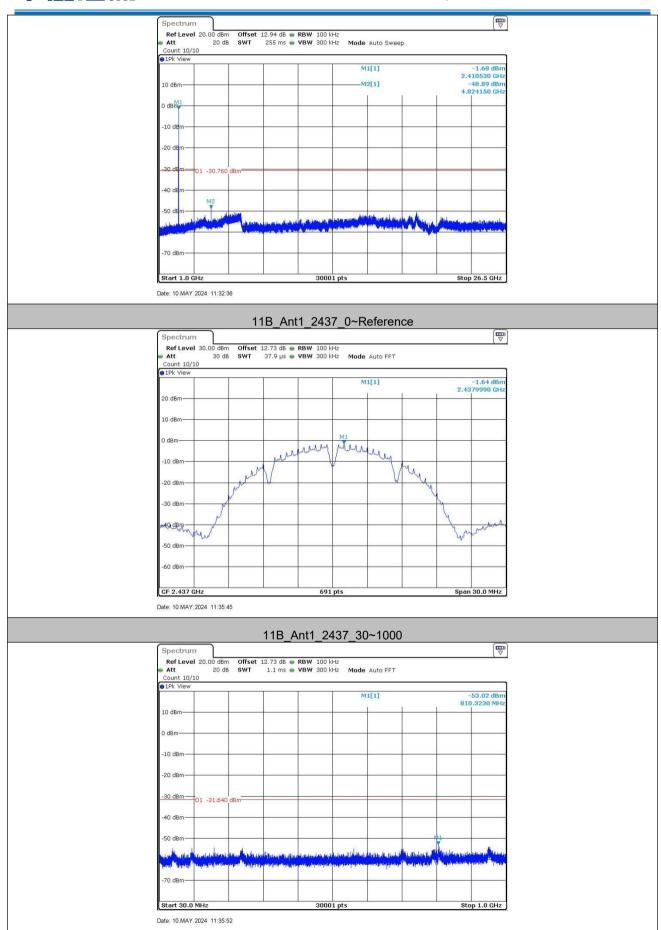
TestMode	Frague pov(MHz)	FreqRange	RefLevel	Result	Limit	Verdict
restiviode	Frequency[MHz]	[Mhz]	[dBm]	[dBm]	[dBm]	verdict
		Reference	-0.76	-0.76		PASS
	2412	30~1000	-0.76	-54.04	≤-30.76	PASS
		1000~26500	-0.76	-48.89	≤-30.76	PASS
		Reference	-1.64	-1.64		PASS
11B	2437	30~1000	-1.64	-53.02	≤-31.64	PASS
		1000~26500	-1.64	-47.04	≤-31.64	PASS
		Reference	-0.22	-0.22		PASS
	2462	30~1000	-0.22	-54.15	≤-30.22	PASS
		1000~26500	-0.22	-46.31	≤-30.22	PASS
		Reference	-5.89	-5.89		PASS
	2412	30~1000	-5.89	-54.21	≤-35.89	PASS
		1000~26500	-5.89	-50.6	≤-35.89	PASS
		Reference	-5.92	-5.92		PASS
11G	2437	30~1000	-5.92	-54.23	≤-35.92	PASS
		1000~26500	-5.92	-49.39	≤-35.92	PASS
		Reference	-4.40	-4.40		PASS
	2462	30~1000	-4.40	-53.52	≤-34.4	PASS
		1000~26500	-4.40	-50.67	≤-34.4	PASS
		Reference	-5.85	-5.85		PASS
	2412	30~1000	-5.85	-53.49	≤-35.85	PASS
		1000~26500	-5.85	-50.21	≤-35.85	PASS
		Reference	-6.04	-6.04		PASS
11N20SISO	2437	30~1000	-6.04	-53.97	≤-36.04	PASS
		1000~26500	-6.04	-50.15	≤-36.04	PASS
		Reference	-4.25	-4.25		PASS
	2462	30~1000	-4.25	-54.07	≤-34.25	PASS
		1000~26500	-4.25	-50.41	≤-34.25	PASS



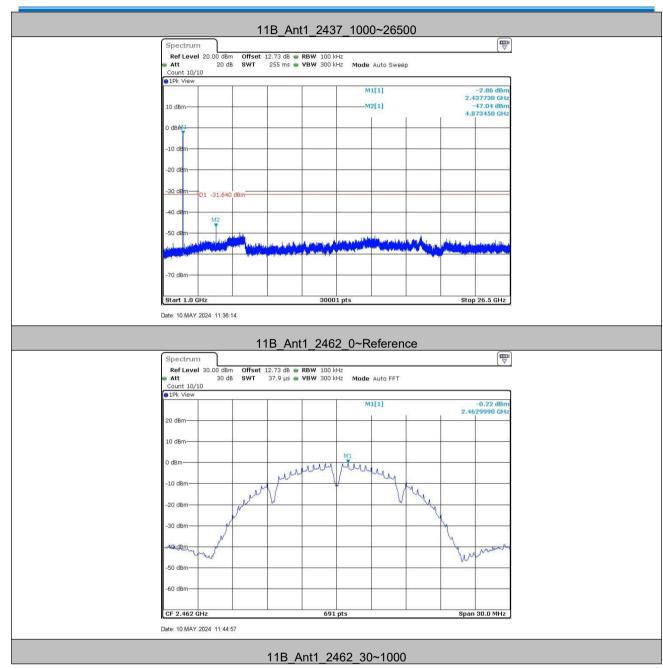
Test Graphs



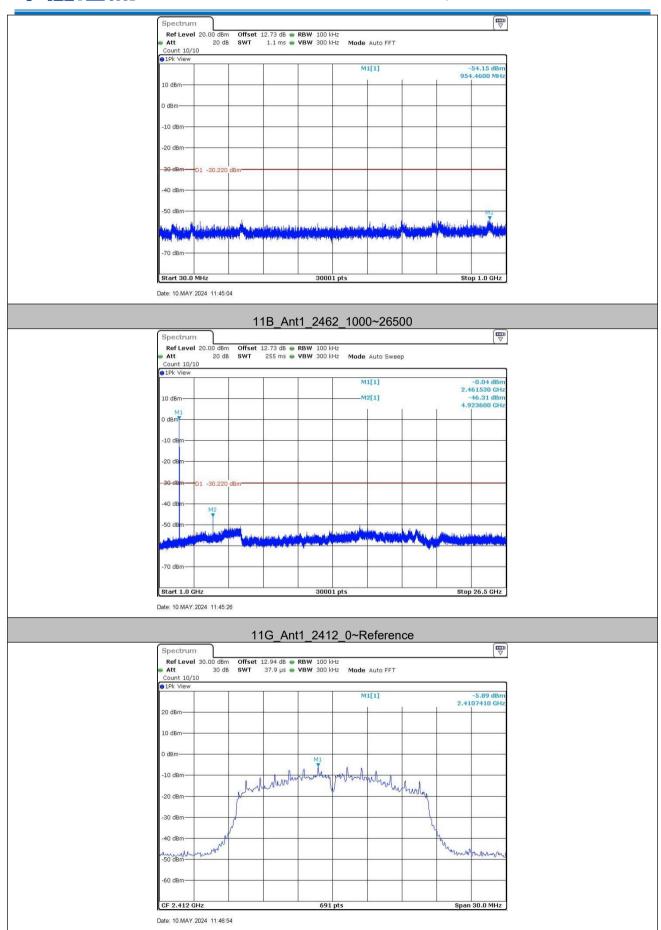




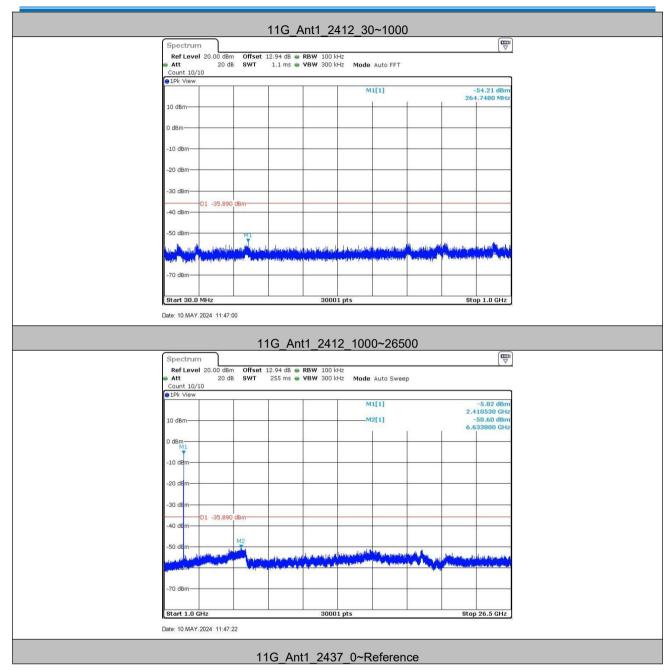




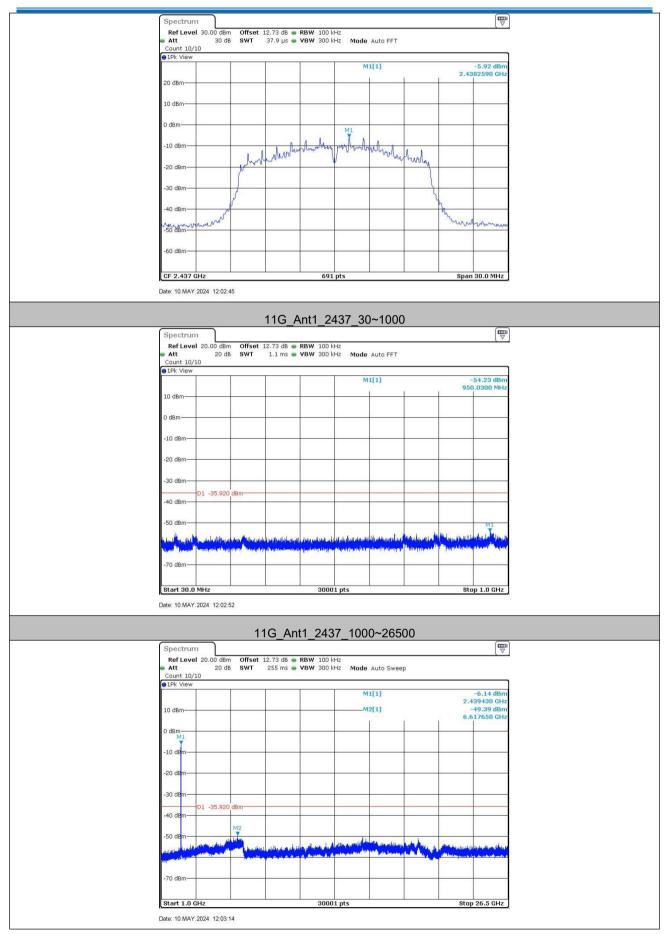




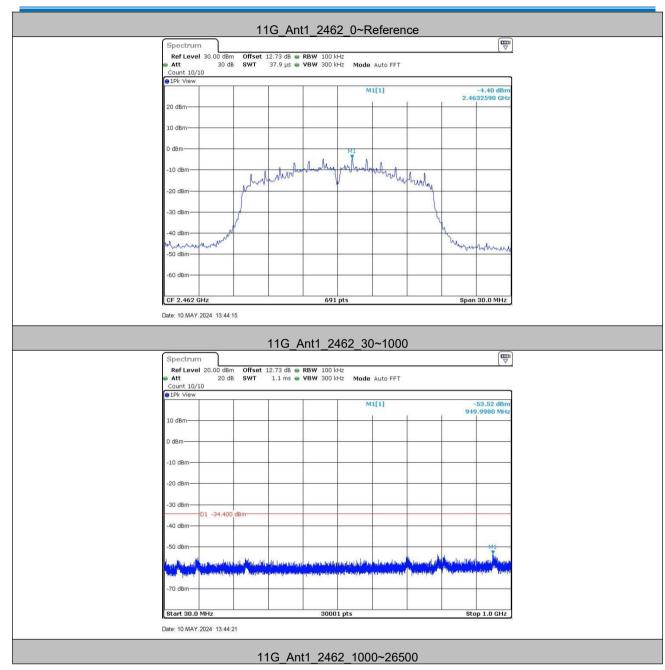




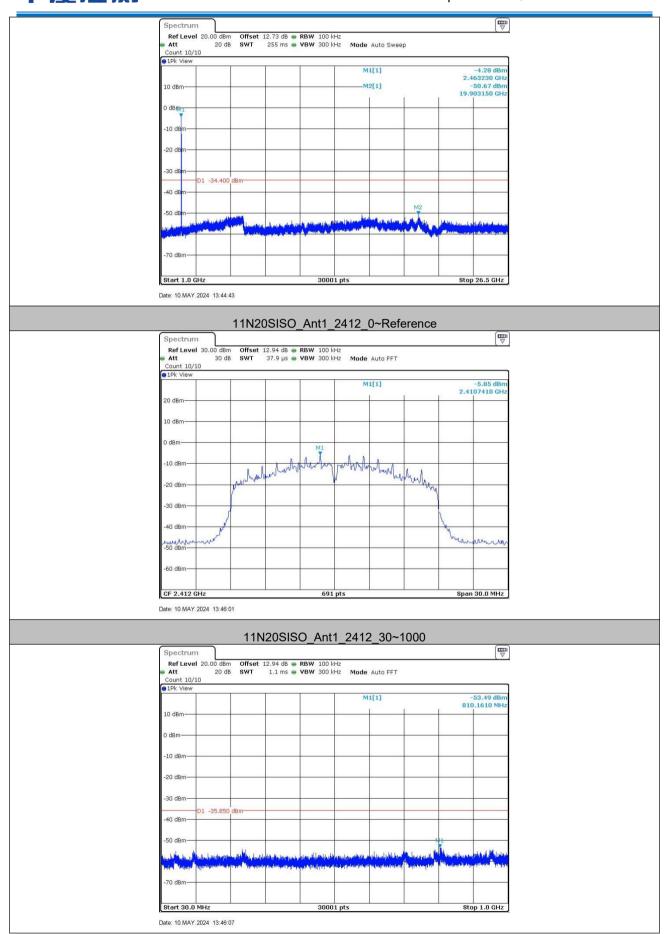




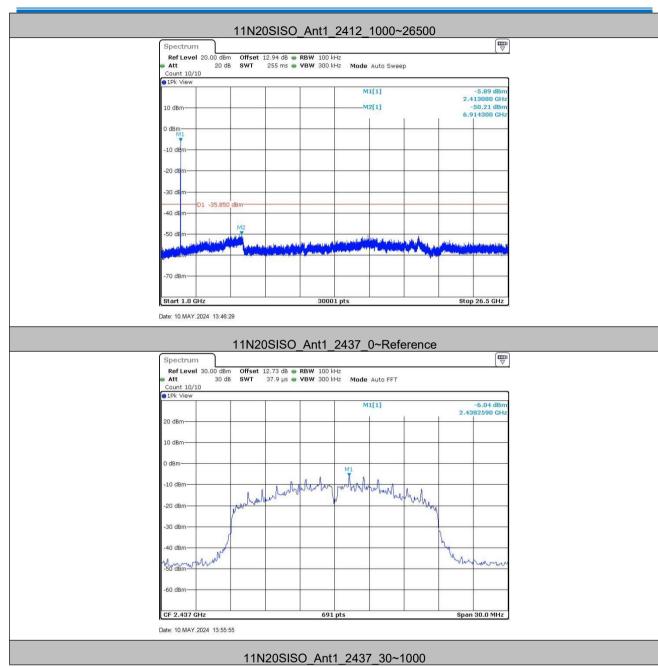




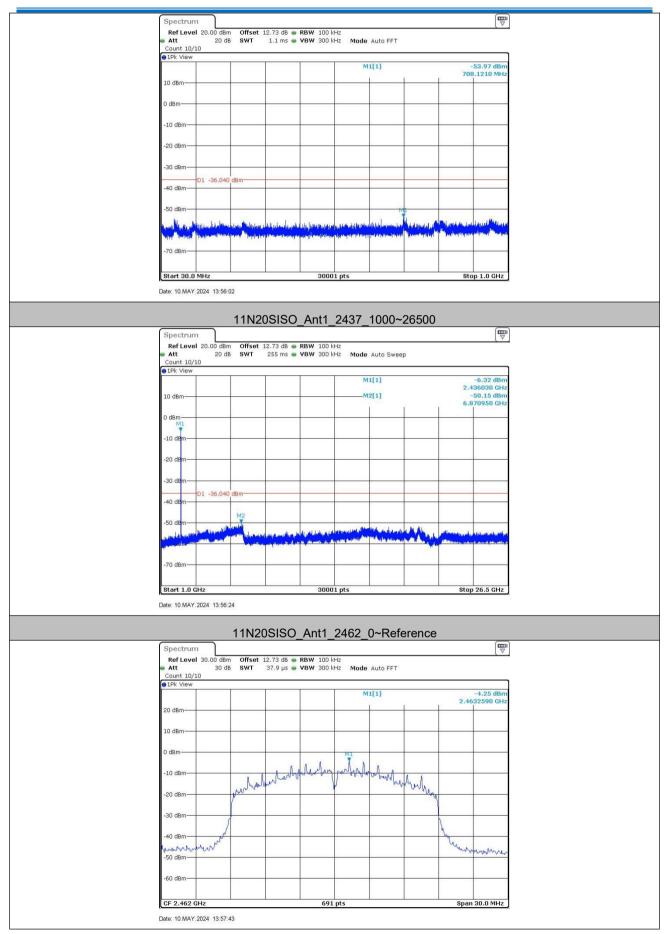






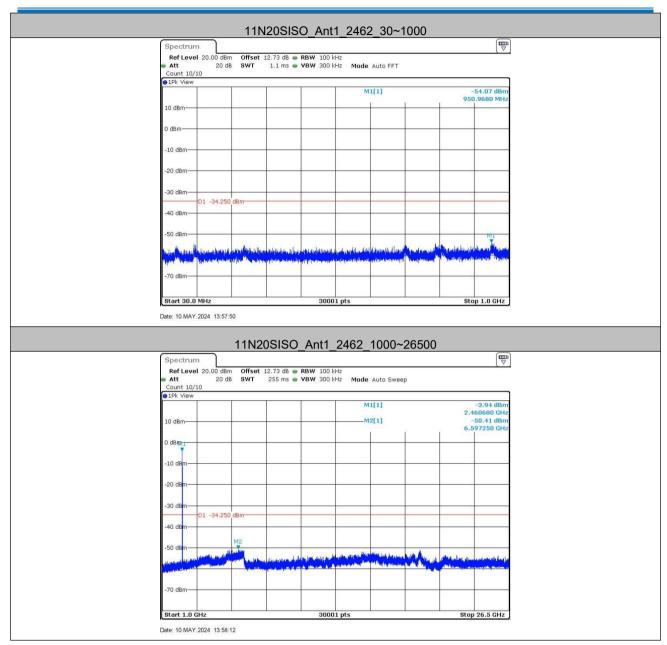








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Remark:

Pretest 9kHz to 25GHz, find the highest point when testing, so only the worst data were shown in the test report. Per FCC Part 15.33 (a) and 15.31 (o) ,The amplitude of spurious emissions from intentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.



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5.8 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205							
Test Method:	ANSI C63.10 2013							
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)							
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark			
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak			
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average			
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak			
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak			
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average			
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak			
	30MHz-1GHz	Quasi-peak	100 kHz	300kHz	Quasi-peak			
	Above 1GHz	Peak	1MHz	3MHz	Peak			
	Above IGHZ	Peak	1MHz	10Hz	Average			
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)			
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300			
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30			
	1.705MHz-30MHz	30	-	-	30			
	30MHz-88MHz	100	40.0	Quasi-peak	3			
	88MHz-216MHz	150	43.5	Quasi-peak	3			
	216MHz-960MHz	200	46.0	Quasi-peak	3			
	960MHz-1GHz	500	54.0	Quasi-peak	3			
	Above 1GHz	500	54.0	Average	3			
		above the maximu	um permitted st. This peak	average emi	ssion limit			



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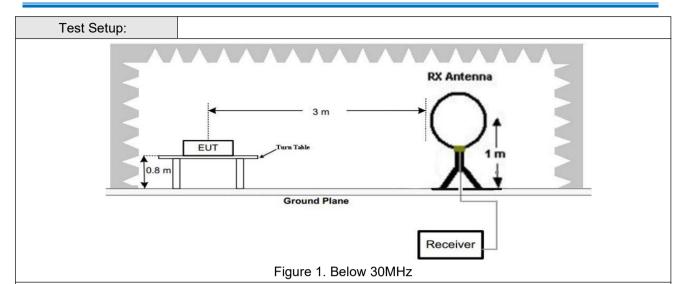


Figure 2. 30MHz to 1GHz

Figure 3. Above 1 GHz

Test Procedure:

- a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
 - 2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.

Note: For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

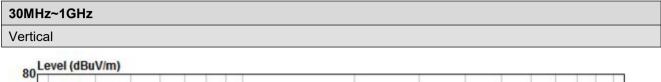
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

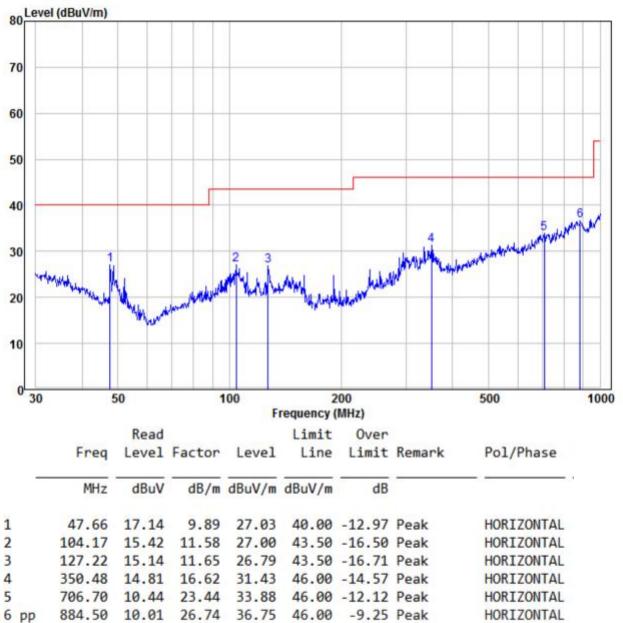


	d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters(for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
	e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
	f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
	g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
	h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case .
	i. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel.
Final Test Mode:	Only the worst case is recorded in the report.
Test Results:	Pass



5.8.1 Radiated emission below 1GHz





Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

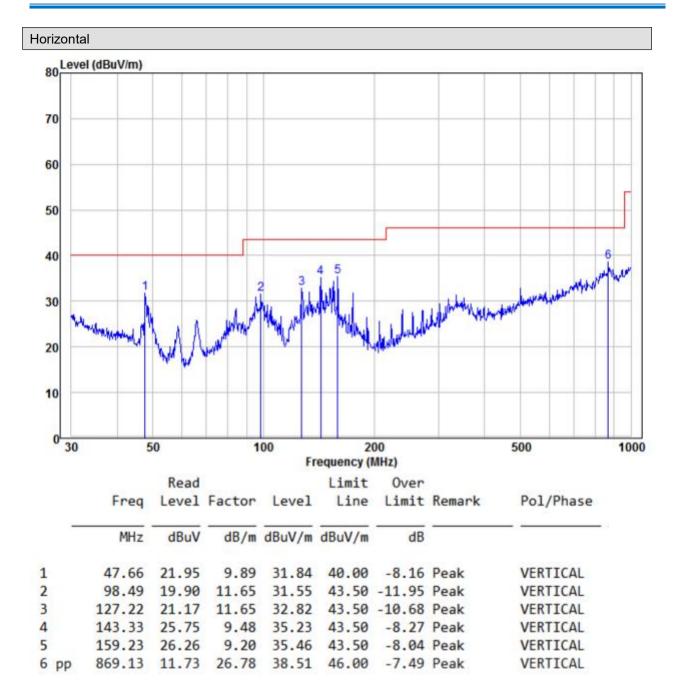
Factor = Antenna Factor + Cable Factor - Preamplifier Factor,

Level = Read Level + Factor,

Over Limit=Level-Limit Line.







Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Factor = Antenna Factor + Cable Factor - Preamplifier Factor,

Level = Read Level + Factor,

Over Limit=Level-Limit Line.



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5.8.2 Transmitter emission above 1GHz

Test mode:		802.11b(1	Mbps)	Test chann	el:	Lowest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type	H/V
4824.000	52.44	-4.26	48.18	74	-25.82	peak	Н
4824.000	37.94	-4.26	33.68	54	-20.32	AVG	Н
7236.000	50.86	1.18	52.04	74	-21.96	peak	Н
7236.000	38.10	1.18	39.28	54	-14.72	AVG	Н
4824.000	54.90	-4.26	50.64	74	-23.36	peak	V
4824.000	39.17	-4.26	34.91	54	-19.09	AVG	V
7236.000	52.05	1.18	53.23	74	-20.77	peak	V
7236.000	36.54	1.18	37.72	54	-16.28	AVG	V

Test mode:		802.11b(1	Mbps)	Test chann	el:	Middle	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type	H/V
4874.000	52.05	-4.12	47.93	74	-26.07	peak	Н
4874.000	37.96	-4.12	33.84	54	-20.16	AVG	Н
7311.000	48.45	1.46	49.91	74	-24.09	peak	Н
7311.000	36.88	1.46	38.34	54	-15.66	AVG	Н
4874.000	53.64	-4.12	49.52	74	-24.48	peak	V
4874.000	36.67	-4.12	32.55	54	-21.45	AVG	V
7311.000	49.82	1.46	51.28	74	-22.72	peak	V
7311.000	36.61	1.46	38.07	54	-15.93	AVG	V



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Test mode:		802.11b(1	Mbps)	Test chann	el:	Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type	H/V
4924.000	51.48	-4.03	47.45	74	-26.55	peak	Н
4924.000	38.44	-4.03	34.41	54	-19.59	AVG	Н
7386.000	49.60	1.66	51.26	74	-22.74	peak	Н
7386.000	37.74	1.66	39.40	54	-14.60	AVG	Н
4924.000	53.54	-4.03	49.51	74	-24.49	peak	V
4924.000	38.30	-4.03	34.27	54	-19.73	AVG	V
7386.000	49.28	1.66	50.94	74	-23.06	peak	V
7386.000	36.05	1.66	37.71	54	-16.29	AVG	V

Remark:

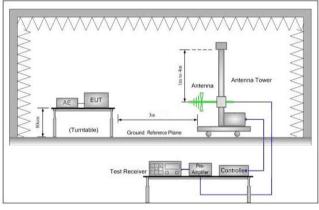
- 1) The 1Mbps of rate of 802.11b is the worst case.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
 - Final Test Level =Receiver Reading + Antenna Factor + Cable Factor Preamplifier Factor
- 3) Scan from 9kHz to 25GHz, The disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.



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5.9 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 1	47 CFR Part 15C Section 15.209 and 15.205						
Test Method:	ANSI C63.10 2013	ANSI C63.10 2013						
Test Site:	Measurement Distance: 3m	(Semi-Anechoic Chambe	r)					
Limit:	Frequency	Limit (dBuV/m @3m)	Remark					
	30MHz-88MHz	40.0	Quasi-peak Value					
	88MHz-216MHz	43.5	Quasi-peak Value					
	216MHz-960MHz	46.0	Quasi-peak Value					
	960MHz-1GHz	54.0	Quasi-peak Value					
	Above 1GHz	54.0	Average Value					
	Above IGHZ	74.0	Peak Value					
Test Setup:								



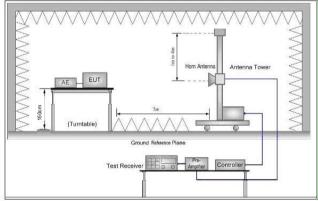


Figure 1. 30MHz to 1GHz

Figure 2. Above 1 GHz

Test Procedure:

a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. Note: For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and



	then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
	e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
	f. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel
	g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
	h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode,And found the X axis positioning which it is worse case.
	i. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates.
	Transmitting mode.
Final Test Mode:	Pretest the EUT at Transmitting mode, found the Transmitting mode which it is worse case.
	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 6.5Mbps of rate is the worst case of 802.11n(HT20); 13.5Mbps of rate is the worst case of 802.11n(HT40).
	Only the worst case is recorded in the report.
Test Results:	Pass



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Test data:

Worse case	mode:	802.11b(1M	Mbps)	Test channel:		Lowest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type	H/V
2390.000	58.86	-9.2	49.66	74	-24.34	peak	Н
2390.000	43.99	-9.2	34.79	54	-19.21	AVG	Н
2400.000	59.42	-9.39	50.03	74	-23.97	peak	Н
2400.000	46.82	-9.39	37.43	54	-16.57	AVG	Н
2390.000	58.39	-9.2	49.19	74	-24.81	peak	V
2390.000	44.86	-9.2	35.66	54	-18.34	AVG	V
2400.000	59.77	-9.39	50.38	74	-23.62	peak	V
2400.000	46.27	-9.39	36.88	54	-17.12	AVG	V

Worse case	Worse case mode:		802.11b(1Mbps)		Test channel:		Highest	
	Meter		Emission				Ant. Pol.	
Frequency	Reading	Factor	Level	Limits	Over	Detector		
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	H/V	
2483.500	58.03	-9.29	48.74	74	-25.26	peak	Н	
2483.500	44.22	-9.29	34.93	54	-19.07	AVG	Н	
2483.500	58.08	-9.29	48.79	74	-25.21	peak	V	
2483.500	45.97	-9.29	36.68	54	-17.32	AVG	V	



Worse case	mode:	802.11g(6N	Mbps)	Test chann	el:	Lowest	
	Meter		Emission				Ant. Pol.
Frequency	Reading	Factor	Level	Limits	Over	Detector	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	H/V
2390.000	59.19	-9.2	49.99	74	-24.01	peak	Н
2390.000	44.59	-9.2	35.39	54	-18.61	AVG	Н
2400.000	59.30	-9.39	49.91	74	-24.09	peak	Н
2400.000	46.15	-9.39	36.76	54	-17.24	AVG	Н
2390.000	59.08	-9.2	49.88	74	-24.12	peak	V
2390.000	44.91	-9.2	35.71	54	-18.29	AVG	V
2400.000	59.27	-9.39	49.88	74	-24.12	peak	V
2400.000	46.59	-9.39	37.20	54	-16.80	AVG	V

Worse case	Worse case mode:		Mbps)	Test channel:		Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type	H/V
2483.500	57.73	-9.29	48.44	74	-25.56	peak	Н
2483.500	43.70	-9.29	34.41	54	-19.59	AVG	Н
2483.500	57.44	-9.29	48.15	74	-25.85	peak	V
2483.500	46.43	-9.29	37.14	54	-16.86	AVG	V



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Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		Lowest	
	Meter		Emission				Ant. Pol.
Frequency	Reading	Factor	Level	Limits	Over	Detector	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	H/V
2390.000	58.72	-9.2	49.52	74	-24.48	peak	Н
2390.000	44.57	-9.2	35.37	54	-18.63	AVG	Н
2400.000	59.78	-9.39	50.39	74	-23.61	peak	Н
2400.000	46.11	-9.39	36.72	54	-17.28	AVG	Н
2390.000	58.90	-9.2	49.70	74	-24.30	peak	V
2390.000	44.75	-9.2	35.55	54	-18.45	AVG	V
2400.000	60.12	-9.39	50.73	74	-23.27	peak	V
2400.000	46.02	-9.39	36.63	54	-17.37	AVG	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type	H/V
2483.500	58.41	-9.29	49.12	74	-24.88	peak	Н
2483.500	43.72	-9.29	34.43	54	-19.57	AVG	Н
2483.500	58.12	-9.29	48.83	74	-25.17	peak	V
2483.500	46.20	-9.29	36.91	54	-17.09	AVG	V

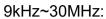
Note:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

6 Photographs - EUT Test Setup

6.1 Radiated Spurious Emission





30MHz~1GHz:





6.2 Conducted Emission







7 Photographs - EUT Constructional Details

Refer to PHOTOGRAPHS OF EUT for CQASZ20240500775E-01.

*** END OF REPORT ***