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# TEST REPORT

**Report No.:** CQASZ20231102142E-02

Applicant: Guangzhou Havit Technology Co.,LTD

Address of Applicant: ROOM 1307,13F,PHASE 2 B,C BUILDING OF POLY WORLD TRADE

CENTER, NO. 1000, XINGANG EAST ROAD, HAIZHU, GUANGDONG, China 510000

**Equipment Under Test (EUT):** 

**Product:** Projector

Model No.: PJ209 PRO, PJ209, PJ202 PRO, PJ205 PRO, PJ206 PRO, PJ207, PJ207 PRO,

PJ208, PJ210 PRO, PJ211, PJ211 PRO, PJ212, PJ212 PRO, PJ216 PRO, PJ217,

PJ217 PRO, PJ218 PRO, PJ219 PRO

Test Model No.: PJ209 PRO

Brand Name: HAVIT

FCC ID: 2Al6I-PJ209PRO

**Standards:** 47 CFR Part 15, Subpart C

**Date of Receipt**: 2023-11-28

**Date of Test:** 2023-11-28 to 2023-12-25

Date of Issue: 2023-12-28
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:

( 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.: CQASZ20231102142E-02

# 1 Version

# **Revision History Of Report**

Report No.	Version	Description	Issue Date
CQASZ20231102142E-02	Rev.01	Initial report	2023-12-28



# 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



# 3 Contents

	Page
1 VERSION	
2 TEST SUMMARY	
3 CONTENTS	4
4 GENERAL INFORMATION	5
4.1 CLIENT INFORMATION	
4.7 TEST FACILITY	
5 TEST RESULTS AND MEASUREMENT DATA	12
5.1 ANTENNA REQUIREMENT 5.2 CONDUCTED EMISSIONS 5.3 CONDUCTED PEAK & AVERAGE OUTPUT POWER.  Test Result.  Note:  When Duty cycle >98%, D.C.F is not required.  Test Graphs.  5.4 6DB OCCUPIED BANDWIDTH.  Test Result.  Test Graphs.  5.5 POWER SPECTRAL DENSITY.  Test Result.  Test Graphs.  5.6 BAND-EDGE FOR RF CONDUCTED EMISSIONS.  Test Result.  5.6.1 Test Graphs.  5.7 RF CONDUCTED SPURIOUS EMISSIONS.  Test Result.  Test Graphs.  5.8 RADIATED SPURIOUS EMISSIONS.  5.8.1 Radiated emission below 1GHz.  5.9 RESTRICTED BANDS AROUND FUNDAMENTAL FREQUENCY.	13 17 18 18 18 19 25 26 27 33 34 34 41 42 43 47 48 50 68 71
6 PHOTOGRAPHS - EUT TEST SETUP	
6.1 RADIATED SPURIOUS EMISSION	88
7 PHOTOGRAPHS - FUT CONSTRUCTIONAL DETAILS	80



# 4 General Information

## 4.1 Client Information

Applicant:	Guangzhou Havit Technology Co.,LTD	
Address of Applicant:	ROOM 1307,13F,PHASE 2 B,C BUILDING OF POLY WORLD TRADE CENTER,NO.1000,XINGANG EAST ROAD,HAIZHU,GUANGDONG,China 510000	
Manufacturer: Guangzhou Havit Technology Co.,LTD		
Address of Manufacturer:	ROOM 1307,13F,PHASE 2 B,C BUILDING OF POLY WORLD TRADE CENTER,NO.1000,XINGANG EAST ROAD,HAIZHU,GUANGDONG,China 510000	
Factory:	Guangzhou Havit Technology Co.,LTD	
Address of Factory:	ROOM 1307,13F,PHASE 2 B,C BUILDING OF POLY WORLD TRADE CENTER,NO.1000,XINGANG EAST ROAD,HAIZHU,GUANGDONG,China 510000	

# 4.2 General Description of EUT

Product Name:	Projector
Model No.:	PJ209 PRO, PJ209, PJ202 PRO, PJ205 PRO, PJ206 PRO, PJ207, PJ207 PRO, PJ208, PJ210 PRO, PJ211, PJ211 PRO, PJ212, PJ212 PRO, PJ216 PRO, PJ217, PJ217 PRO, PJ218 PRO, PJ219 PRO
Test Model No.:	PJ209 PRO
Trade Mark:	HAVIT
Software Version:	PJ209 PRO
Hardware Version:	20231122-105508
Power Supply:	Power supply AC100V~240V
EUT Supports Radios application:	BT: 2402-2480MHz 2.4GHz: Wi-Fi: 802.11b/g/n(HT20): 2412MHz~2462MHz; 802.11n(HT40): 2422MHz~2452MHz 5GHz: Wi-Fi: U-NII-1: 5.15-5.25GHz; U-NII-3: 5.725-5.850GHz
Simultaneous Transmission	<ul><li>☐ Simultaneous TX is supported and evaluated in this report.</li><li>☒ Simultaneous TX is not supported.</li></ul>

# 4.3 Product Specification subjective to this standard

Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels IEEE 802.11n HT40: 7 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 and HT40): 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
	IEEE for 802.11n(HT40):
	13.5Mbps/27Mbps/40.5Mbps/54Mbps/81Mbps/108Mbps/121.5Mbps/135Mbps
Product Type:	
Test Software of EUT:	adb
Antenna Type:	FPC antenna
Antenna Gain:	3.77dBi



Report No.: CQASZ20231102142E-02

Operation Frequency each of channel(802.11b/g/n HT20)										
Channel		equency	Channe	1	Channel	Fre	quency Chan		nel	Frequency
1	24	112MHz	4	2427MHz	7	244	l2MHz 1			2457MHz
2	24	117MHz	5	2432MHz	8	244	17MHz	Hz 11		2462MHz
3	24	122MHz	6	2437MHz	9	2452MHz				
Operation Frequency each of channel(802.11n HT40)										
Channel Frequ		ency	Channel	Frequen	су	Chan	nel	F	-requency	
3		2422	ИНz	6	2437MF	lz 9		9		2452MHz
4		24271	MHz	7	2442MHz					
5		2432	MHz	8	2447MHz					

#### 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

#### For 802.11n (HT40):

1 61 662.1 111 (111 16).			
Channel	Frequency		
The Lowest channel	2422MHz		
The Middle channel	2437MHz		
The Highest channel	2452MHz		

#### Note:

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



Report No.: CQASZ20231102142E-02

# 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	st (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, bandwidth and data rate, etc.					
Run Software:	×					
adb get-serialno - print adb status-window - conti adb remount - remot adb reboot [bootloader recovery] - re adb reboot-bootloader - rebot adb root - rest adb usb - rest	As: offline   bootloader   device cs: \( \serial - number \) inuously print device status for a specified device ants the /system partition on the device read-write reboots the device, optionally into the bootloader or recovery program outs the device into the bootloader arts the addb daemon with root permissions arts the adbd daemon listening on USB arts the adbd daemon listening on TCP on the specified port  PPP over USB.  Cart a PPP connection.  Imp. Eg. dev:/dev/omap_csmi_ttyl					
adb sync notes: adb sync [ <directory, <localdir=""> can be interpreted in sev</directory,>	adb sync notes: adb sync [ <directory> ]   <li><localdir> can be interpreted in several ways:</localdir></li></directory>					
- If <directory> is not specified, }</directory>	ooth /system and /data partitions will be updated.					
- If it is "system" or "data", only is updated.	the corresponding partition					
environmental variables:  ADB_TRACE - Print debug information. A comma separated list of the following values  1 or all, adb, sockets, packets, rwx, usb, sync, sysdeps, transport, jdwp  ANDROID_SERIAL - The serial number to connect tos takes priority over this if given.  ANDROID_LOG_TAGS - When used with the logcat option, only these debug tags are printed.						



Report No.: CQASZ20231102142E-02

## 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	/

### 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	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.	Tool Collinato.							
	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)

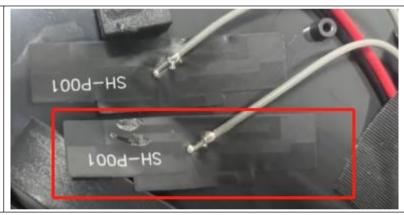
15.203 requirement:

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.



Report No.: CQASZ20231102142E-02

# **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:	Limit (dBuV)			
	Frequency range (MHz)	Quasi-peak	Average	l
	0.15-0.5	66 to 56*	56 to 46*	l
	0.5-5	56	46	l
	5-30	60	50	l
	* 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 reason of the tabletop EUT was placed on the horizontal ground reference plane. An placed on the horizontal ground reference plane. An evertical 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 plane and all of the in ANSI C63.10: 2013 on contract.</li> </ol>	pance voltage test was pance voltage test was pance voltage test was pance voltage test was pance voltage test of all other units of LISN 2, which was the LISN 1 for the unit was used to connect ating of the LISN was reced upon a non-metalling of floor-standing arround reference plane, the a vertical ground reference plane was bonded to the 1 was placed 0.8 m from the vertical ground reference plane. The total ground reference plane was at least 0 to the LISN 1 and the quipment was at least 0 terface cables must be	bugh a LISN 1 (Line is a 50Ω/50μH + 5Ω line is a 50Ω/50μH + 5Ω line is a 50Ω/50μH + 5Ω line is the EUT were bonded to the grobeing measured. A multiple power cable not exceeded. In the case of the	near bund es to ne was ar ne of 2.
Test Setup:	Shielding Room  EUT  AC Mains  LISN1	AE WOOM	Test Receiver	

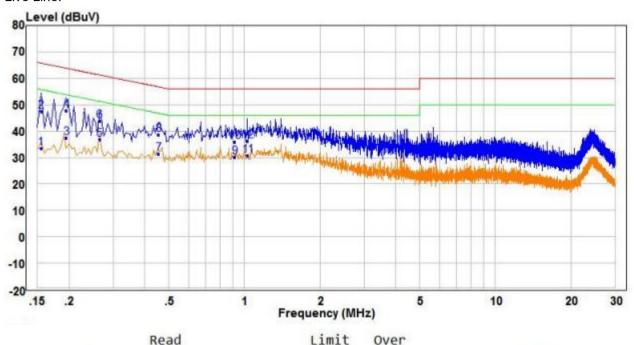


Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel.
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate of 802.11b at middle channel is the worst case.  Only the worst case is recorded in the report.
Test Voltage:	AC120V/60Hz
Test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



#### **Measurement Data**

#### Live Line:



		Freq	Level	Factor	Level	Line	Limit	Remark	Pol/Phase
	1	MHz	dBuV	dB	dBuV	dBuV	dB	1	
1		0.155	22.68	10.69	33.37	55.73	-22.36	Average	Line
2		0.155	36.65	10.69	47.34	65.73	-18.39	QP	Line
3		0.195	26.72	10.62	37.34	53.82	-16.48	Average	Line
4	QP	0.195	37.10	10.62	47.72	63.82	-16.10	QP	Line
5	PP	0.265	26.32	10.53	36.85	51.27	-14.42	Average	Line
6		0.265	33.37	10.53	43.90	61.27	-17.37	QP	Line
7		0.455	20.87	10.66	31.53	46.78	-15.25	Average	Line
8		0.455	27.87	10.66	38.53	56.78	-18.25	QP	Line
9		0.915	19.40	10.76	30.16	46.00	-15.84	Average	Line
10		0.915	25.25	10.76	36.01	56.00	-19.99	QP	Line
11		1.030	19.98	10.78	30.76	46.00	-15.24	Average	Line
12		1.030	25.55	10.78	36.33	56.00	-19.67	QP	Line

#### Remark:

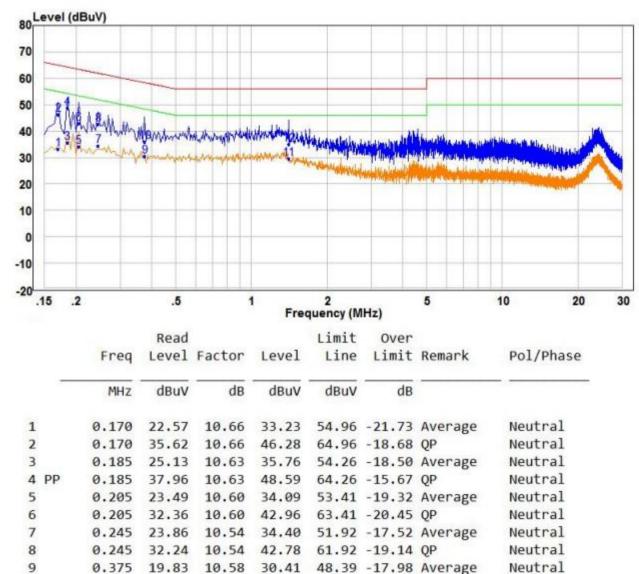
- 1. The following Quasi-Peak and Average measurements were performed on the EUT:
- 2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
- 3. If the Peak value under Average limit, the Average value is not recorded in the report.



Neutral Neutral

Neutral

#### Neutral Line:



#### Remark:

10

12

11 AV

0.375

1.405

1. The following Quasi-Peak and Average measurements were performed on the EUT:

1.405 24.25 10.72 34.97 56.00 -21.03 QP

25.36 10.58 35.94 58.39 -22.45 QP

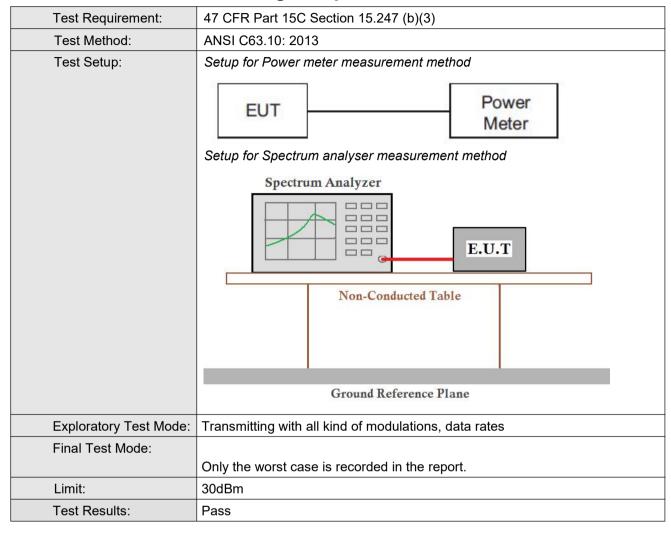
18.88 10.72 29.60 46.00 -16.40 Average

- 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.



Report No.: CQASZ20231102142E-02

## 5.3 Conducted Peak & Average Output Power





Report No.: CQASZ20231102142E-02

### **Test Result**

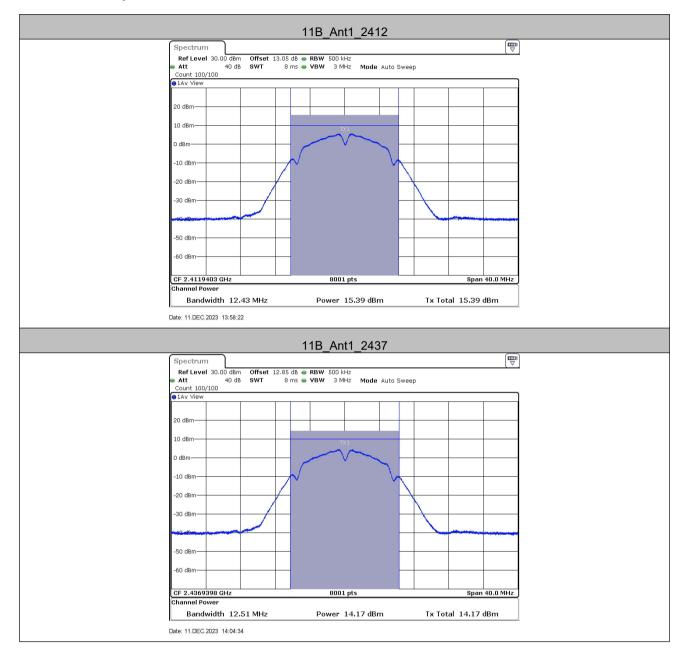
Test Mode	Frequency[MHz	Result [dBm]	Limit [dBm]	Verdict
	2412	15.39	≤30.00	PASS
11B	2437	14.17	≤30.00	PASS
	2462	13.34	≤30.00	PASS
	2412	9.08	≤30.00	PASS
11G	2437	8.02	≤30.00	PASS
	2462	8.40	≤30.00	PASS
	2412	9.42	≤30.00	PASS
11N20SISO	2437	8.02	≤30.00	PASS
	2462	7.64	≤30.00	PASS
	2422	8.39	≤30.00	PASS
11N40SISO	2437	8.11	≤30.00	PASS
	2452	7.54	≤30.00	PASS

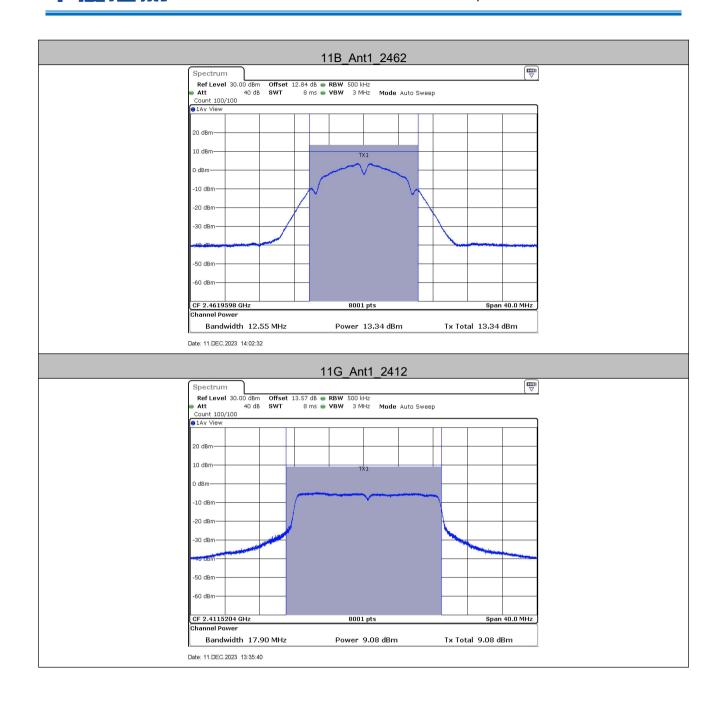
Note:

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

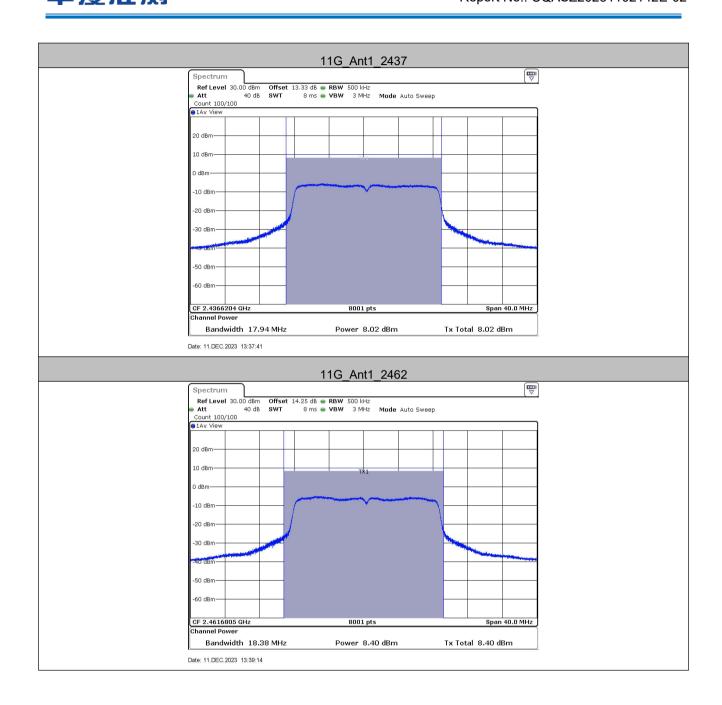


## **Test Graphs**

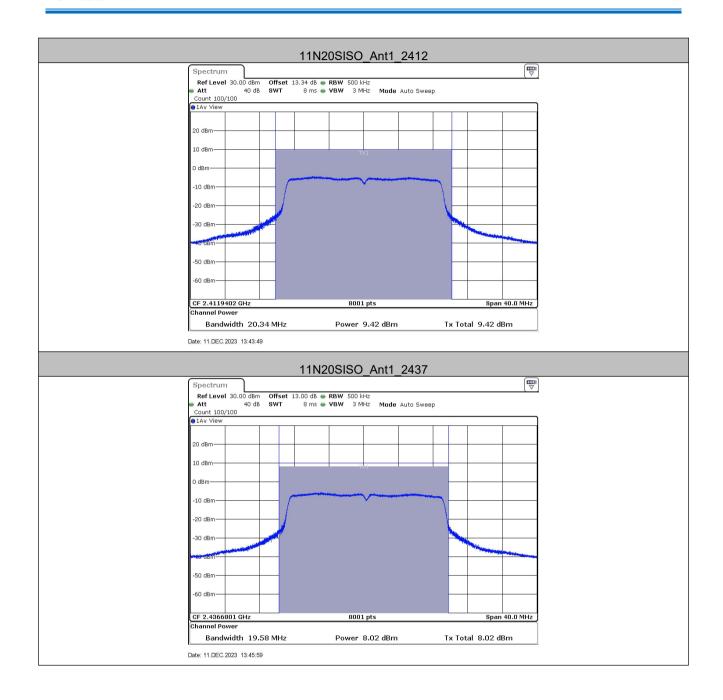




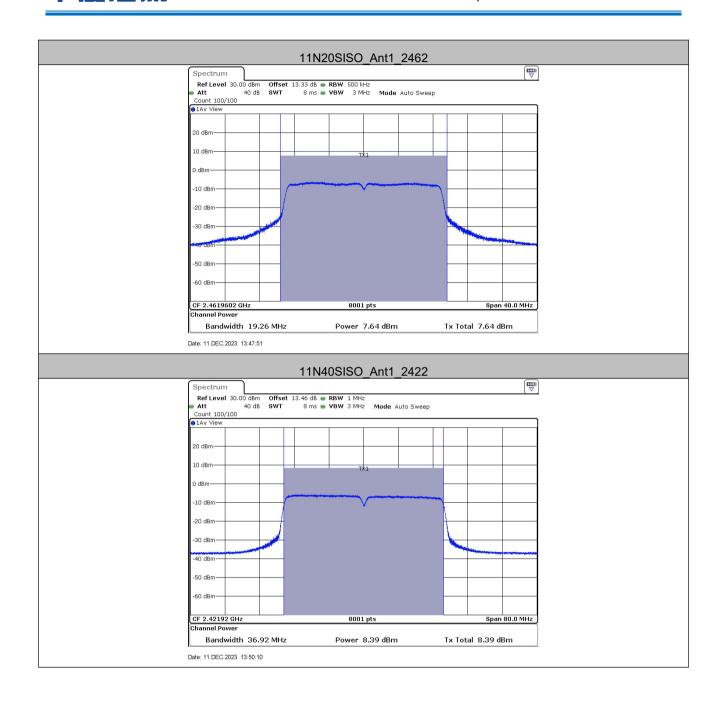




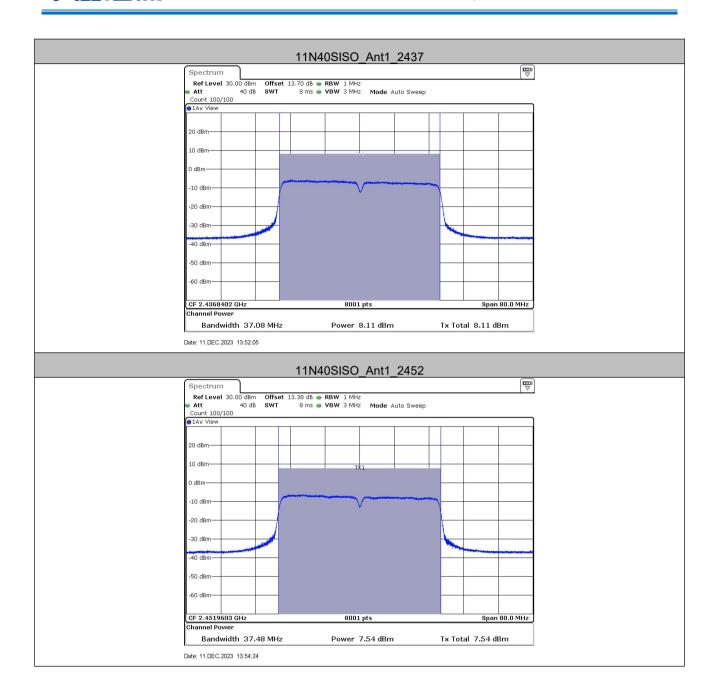








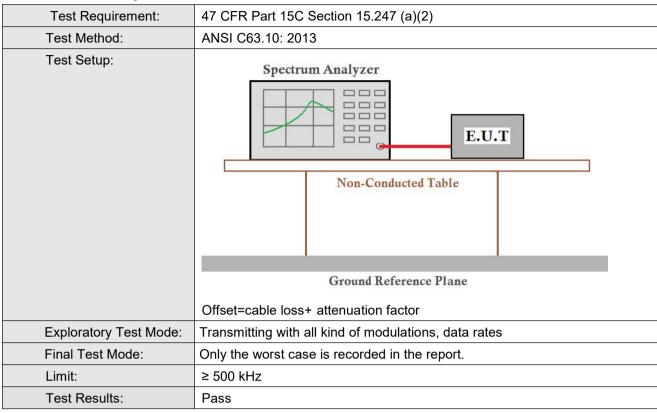








## 5.4 6dB Occupied Bandwidth





Report No.: CQASZ20231102142E-02

## **Test Result**

TestMode	Antenna	Channel	DTS BW [MHz]	Limit[MHz]	Verdict
		2412	7.80	0.5	PASS
11B	Ant1	2437	8.04	0.5	PASS
		2462	8.04	0.5	PASS
		2412	16.36	0.5	PASS
11G	Ant1	2437	16.32	0.5	PASS
		2462	16.36	0.5	PASS
		2412	17.60	0.5	PASS
11N20SISO	Ant1	2437	17.56	0.5	PASS
		2462	17.56	0.5	PASS
		2422	36.32	0.5	PASS
11N40SISO	Ant1	2437	35.76	0.5	PASS
		2452	36.40	0.5	PASS



## **Test Graphs**

