

# **FCC TEST REPORT**

Test report
On Behalf of
Shenzhen Fowke Innovation Technology Co., Ltd
For
4K High Definition Video Camera

Model No.: X60S, AC09, X61S, X62S, X63S

FCC ID: 2AQKA-UHD4K

Prepared For: Shenzhen Fowke Innovation Technology Co., Ltd

4F, No.15 Building, Watao 4th Road, Wulian Community, Longgang District,

Shenzhen, China

Prepared By: Shenzhen HUAK Testing Technology Co., Ltd.

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Date of Test: Jul. 11, 2023 ~ Jul. 18, 2023

Date of Report: Jul. 18, 2023

Report Number: HK2307102927-E



TEST RESULT CERTIFICATION

Applicant's name	Shenzhen	Fowke	Innovation	Technology	Co.,	Ltd
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4F, No.15 Building, Watao 4th Road, Wulian Community, Longgang

District, Shenzhen, China

Manufacture's Name .....: Shenzhen Fowke Innovation Technology Co., Ltd

4F, No.15 Building, Watao 4th Road, Wulian Community, Longgang

District, Shenzhen, China

**Product description** 

Trade Mark: N/A

Model and/or type reference : X60S, AC09, X61S, X62S, X63S

FCC Rules and Regulations Part 15 Subpart C Section 15.247

ANSI C63.10: 2013

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Date of Test .....:

Date (s) of performance of tests...... Jul. 11, 2023 ~ Jul. 18, 2023

Date of Issue ...... Jul. 18, 2023

Test Result : Pass

Testing Engineer ::

(Gary Qian)

Technical Manager

(Eden Hu)

Authorized Signatory:

(Jason Zhou)



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\*\* Modified History \*\*

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Jul. 18, 2023	Jason Zhou
TNG	-mG	THE THE	G ING

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# 1. TEST RESULT SUMMARY

#### 1.1. TEST PROCEDURES AND RESULTS

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203/§15.247(b)(4)	PASS
AC Power Line Conducted Emission	§15.207	PASS
Conducted Peak Output Power	§15.247(b)(3)	PASS
6dB Emission Bandwidth	§15.247(a)(2)	PASS
Power Spectral Density	§15.247(e)	PASS
Band Edge	§15.247(d)	PASS
Spurious Emission	§15.205/§15.209	PASS

#### Note:

- 1. PASS: Test item meets the requirement.
- 2. Fail: Test item does not meet the requirement.
- 3. N/A: Test case does not apply to the test object.
- 4. The test result judgment is decided by the limit of test standard.

#### 1.2. INFORMATION OF THE TEST LABORATORY

Shenzhen HUAK Testing Technology Co., Ltd. Add.: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Testing Laboratory Authorization:

A2LA Accreditation Code is 4781.01. FCC Designation Number is CN1229. Canada IC CAB identifier is CN0045. CNAS Registration Number is L9589.

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### 1.3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	±2.71dB
2	RF power, conducted	±0.37dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1G)	±3.90dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%

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# 2. EUT DESCRIPTION

# 2.1. GENERAL DESCRIPTION OF EUT

Equipment:	4K High Definition Video Camera	
Model Name:	X60S	(ii)
Series Model:	AC09, X61S, X62S, X63S	TNG
Model Difference:	All model's the function, software and electri same, only with model named different. Test X60S.	
FCC ID:	2AQKA-UHD4K	
Antenna Type:	FPC Antenna	(1) HOLE
Antenna Gain:	1.5dBi	
Operation frequency:	802.11b/g/n 20:2412~2462 MHz 802.11n 40: 2422~2452MHz	MAK TEST
Number of Channels:	802.11b/g/n20: 11CH 802.11n 40: 7CH	m/G
Modulation Type:	CCK/OFDM/DBPSK/DAPSK	HUAKTESI
Power Source:	DC 5V from Type-C or DC 3.7 from battery	
Power Rating:	DC 5V from Type-C or DC 3.7 from battery	TING HUAKTESTING
Hardware Version	V03	
Software Version	V03	i -GTM

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## 2.2. Carrier Frequency of Channels

Channel List For 802.11b/802.11g/802.11n (HT20)							
Channel ' ' ' Channel ' ' Channel ' ' Channel ' ' Channel ' '							Frequency (MHz)
01	2412	04	2427	07	2442	10	2457
02	2417	05	2432	08	2447	11	2462
03	2422	06	2437	09	2452	STING	

Channel List For 802.11n (HT40)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
ESTING	X TESTING	04	2427	07	2442	- TESTIN	KTES
W H		05	2432	08	2447	HUAN	W HOW
03	2422	06	2437	09	2452		

#### 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

#### 2.3. OPERATION OF EUT DURING TESTING

**Operating Mode** 

The mode is used: Transmitting mode for 802.11b/802.11g/802.11n (HT20)

Low Channel: 2412MHz Middle Channel: 2437MHz High Channel: 2462MHz

The mode is used: Transmitting mode for 802.11n (HT40)

Low Channel: 2422MHz Middle Channel: 2437MHz High Channel: 2452MHz

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3. ENERA INFORMATION

#### 3.1. TEST ENVIRONMENT AND MODE

Operating Environment:			
Temperature:	25.0 °C	HUAKTESIII	HUAKTES
Humidity:	56 % RH		
Atmospheric Pressure:	1010 mbar	LAKTESTING	, NG

The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. For the full battery state and The output power to the maximum state.

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

# Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

TING	Mode	TING	ESTING	Data rate	G STR
JK TES	802.11b	HUAKTES	HUAK	1Mbps	HUAK
	802.11g			6Mbps	
C	802.11n(H20)	.c.	.6	6.5Mbps	
STIME	802.11n(H40)	MAKTESTING	MAKTESTING	13.5Mbps	MAKTES

#### **Final Test Mode:**

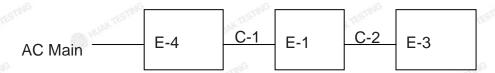
Operation mode:	Keep the EUT in continuous transmitting
Operation mode.	with modulation

- 1. For WIFI function, the engineering test program was provided and enabled to make EUT continuous transmit/receive.
- 2.According to ANSI C63.10 standards, the test results are both the "worst case" and "worst setup" 1Mbps for 802.11b, 6Mbps for 802.11g, 6.5Mbps for 802.11n(H20), 13.5Mbps for 802.11(H40). Duty cycle setting during the transmission is 98.5% with maximum power setting for all modulations.

### 3.2. DESCRIPTION OF SUPPORT UNITS

Description of test setup:

Operation of EUT during conducted and under 1GHz radiation testing:



Operation of EUT Above1GHz Radiation testing:

E-1

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Specification	Note
E-1	4K High Definition Video Camera	N/A	X60S	N/A N/A	EUT
E-2	Microphone	N/A	N/A	N/A	Peripherals
E-3	Display	N/A	24PFF3661/T3	Input: AC 120V/60Hz	EUT
E-4	Adapter	N/A	HW-059200CHQ	Input: 100-240V~, 50/60Hz 0.5A Max Output: 5VDC, 2A	EUT
WG.			5		

Item	Shielded Type	Ferrite Core	Length	Note
C-1	USB Cable	NO	1m	Peripherals
C-2	HDMI Cable	NO	0.83m	Peripherals
TESTIN	3 TESTING		TESTING V TES	THE THE WESTERS

#### Note:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
- 3. For conducted measurements (Output Power, 6dB Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

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# 4. TEST RESULTS AND MEASUREMENT DATA

### 4.1. CONDUCTED EMISSION

#### **Test Specification**

-TING	TING	TING	TING	711			
Test Requirement:	FCC Part15 C Section	ion 15.207	AK TE	HUAKTES			
Test Method:	ANSI C63.10:2013		TING				
Frequency Range:	150 kHz to 30 MHz	150 kHz to 30 MHz					
Receiver setup:	RBW=9 kHz, VBW=	=30 kHz, Sweep	time=auto				
Limits:	Frequency range (MHz) 0.15-0.5 0.5-5 5-30	(MHz)         Quasi-peak         Average           0.15-0.5         66 to 56*         56 to 46*           0.5-5         56         46					
	Refe	erence Plane	NK TESTING	NY TESTI			
Test Setup:	E.U.T AC  Test table/Insulation  Remark E.U.T. Equipment Under Test	Test table/Insulation plane  Remark E.U.T. Equipment Under Test LISN: Line impedence Stabilization Network					
Test Mode:	Charging + transmit	ting with modula	tion				
Test Procedure:	line impedance so provides a 50ohr measuring equipmed. The peripheral despower through a coupling impedar refer to the bloophotographs).  3. Both sides of A conducted interfer emission, the relationship impedaring the conducted interference in the sides of the conducted interference in the sides of the conducted interference in the sides of the sides of the conducted interference in the sides of the sides	<ol> <li>Charging + transmitting with modulation</li> <li>The E.U.T is connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to</li> </ol>					
Test Result:	PASS	w TE	STING	-6-			
~7114	- 10,00	- 1/1/2/2/		71143			

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#### **Test Instruments**

	Conducted Emission Shielding Room Test Site (843)							
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due			
Receiver	R&S	ESR-7	HKE-010	Feb. 17, 2023	Feb. 16, 2024			
LISN	R&S	ENV216	HKE-002	Feb. 17, 2023	Feb. 16, 2024			
Coax cable (9KHz-30MHz)	Times	381806-002	N/A	Feb. 17, 2023	Feb. 16, 2024			
Conducted test software	Tonscend	TS+ Rev 2.5.0.0	HKE-081	N/A	N/A			
10dB Attenuator	Schwarzbeck	VTSD9561F	HKE-153	Feb. 17, 2023	Feb. 16, 2024			

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

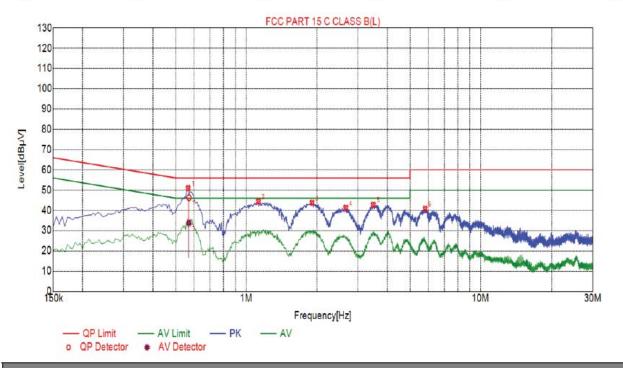
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4.2. TEST RESULT

Remark: All the test modes completed for test. only the worst result of 802.11b(High Channel: 2462MHz) was reported as below:

Test Specification: Line



	Suspected List								
100000	NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Туре
	1	0.5640	50.94	20.06	56.00	5.06	30.88	PK	L
82	2	1.1265	44.42	20.08	56.00	11.58	24.34	PK	L
	3	1.9095	43.71	20.14	56.00	12.29	23.57	PK	L
7	4	2.6610	41.23	20.21	56.00	14.77	21.02	PK	L
	5	3.4845	42.76	20.25	56.00	13.24	22.51	PK	L
	6	5.8065	40.73	20.24	60.00	19.27	20.49	PK	L

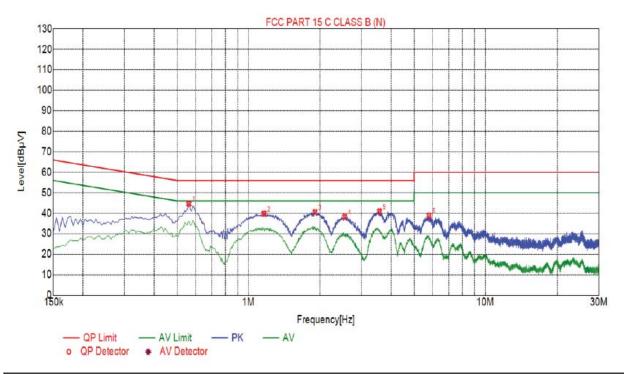
Final Data List											
NO.	Freq. [MHz]	Correction factor[dB]	QP Value [dBµV]	QP Limit [dΒμV]	QP Margin [dB]	QP Reading [dBμV]	ΑV Value [dBμV]	ΑV Limit [dBμV]	AV Margin [dB]	AV Reading [dBµV]	Туре
1	0.5688	20.05	46.28	56.00	9.72	26.23	33.78	46.00	12.22	13.73	L

Remark: Margin = Limit - Level

Correction factor = Cable lose + LISN insertion loss Level=Test receiver reading + correction factor

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Test Specification: Neutral



S	Suspected List								
١	NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Туре
	1	0.5595	44.63	20.06	56.00	11.37	24.57	PK	N
	2	1.1625	39.81	20.09	56.00	16.19	19.72	PK	N
si .	3	1.9095	40.55	20.14	56.00	15.45	20.41	PK	N
	4	2.5485	38.25	20.20	56.00	17.75	18.05	PK	N
5	5	3.5700	40.86	20.25	56.00	15.14	20.61	PK	N
	6	5.7885	38.82	20.24	60.00	21.18	18.58	PK	N

Remark: Margin = Limit - Level

Correction factor = Cable lose + LISN insertion loss

Level=Test receiver reading + correction factor



# 4.3. MAXIMUM CONDUCTED OUTPUT POWER

## **Test Specification**

Test Requirement:	FCC Part15 C Section 15.247	(b)(3)	4 TESTIN
Test Method:	KDB 558074	MONTH HOME	(C) HUAN
Limit:	30dBm	AKTESTING	-Dia
Test Setup:	Power meter	EUT	THIS HUAKTESTING
Test Mode:	Transmitting mode with modu	lation	
Test Procedure:	1. The testing follows the Mea FCC KDB 558074 D01 15 v05r02.  2. The RF output of EUT was meter by RF cable and attocompensated to the results.  3. Set to the maximum power EUT transmit continuously.  4. Measure the Peak output poin the test report.	connected to connected to enuator. The s for each m setting and	Guidance o the power e path loss was easurement. enable the
Test Result:	PASS	O HUM	0,00

#### **Test Instruments**

AND HOME	HOL	* HOM	HUM HUM	HUM HUM	HOM HOM				
	RF Test Room								
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due				
Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	Feb. 16, 2024				
Power meter	Agilent	E4419B	HKE-085	Feb. 17, 2023	Feb. 16, 2024				
Power Sensor	Agilent	E9300A	HKE-086	Feb. 17, 2023	Feb. 16, 2024				
RF cable	Times	1-40G	HKE-034	Feb. 17, 2023	Feb. 16, 2024				
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	Feb. 16, 2024				

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

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### **Test Data**

-alle	TING	- TINE		TIME	TIME
CTES.	HUAK TES	TX 80	2.11b Mode	HUAKT	HUAKT
Test Channel	Frequency	Reading Conducted Output Power	Cable loss	Maximum Peak Conducted Output Power	LIMIT
	(MHz)			(dBm)	dBm
CH01	2412	6.98	0.8	7.78	30
CH06	2437	6.22	0.8	7.02	30
CH11	2462	6.50	0.8	7.30	30
		TX 80	2.11g Mode		
CH01	2412	6.19	0.8	6.99	30
CH06	2437	6.53	0.8	7.33	30
CH11	2462	6.69	0.8	7.49	30
0	HINKTES	TX 802	.11n20 Mode	9	HUAKTES
CH01	2412	6.51	0.8	7.31	30
CH06	2437	6.84	0.8	7.64	30 MKTES
CH11	2462	6.47	0.8	7.27	30
·		TX 802	.11n40 Mode	1	
CH03	2422	6.60	0.8	7.40	30
CH06	2437	6.69	0.8	7.49	30
CH09	2452	6.76	0.8	7.56	30

Note: Maximum Peak Conducted Output Power(dBm)= Reading Conducted Output Power(dBm)+ Cable loss

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# 4.4. EMISSION BANDWIDTH

### **Test Specification**

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)					
Test Method:	KDB 558074	● HOWEN	MONTH OF THE PARTY			
Limit:	>500kHz	AK TESTING	A)G			
Test Setup:	Spectrum Analyzer	EUT	ANG HUAKTESTING			
Test Mode:	Transmitting mode with	modulation				
Test Procedure:	1. The testing follows FC 15.247 Meas Guidan 2. Set to the maximum p EUT transmit continu 3. Make the measureme resolution bandwidth Video bandwidth (VB an accurate measure be greater than 500 k 4. Measure and record t	oce v05r02. bower setting and cously. ent with the spectro (RBW) = 100 kHz BW) = 300 kHz. In ement. The 6dB backHz.	enable the um analyzer's z. Set the order to make andwidth must			
Test Result:	PASS	O HUA	0			

### **Test Instruments**

ATTENDED TO ATTEND	NO.	or Mr.	ALL HO.	ALL HO.	ALL HO.				
	RF Test Room								
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due				
Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	Feb. 16, 2024				
RF cable	Times	1-40G	HKE-034	Feb. 17, 2023	Feb. 16, 2024				
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	Feb. 16, 2024				

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

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### **Test data**

Toot shannel	6dB Emission Bandwidth (MHz)						
Test channel	802.11b	802.11g	802.11n(H20)	802.11n(H40)			
Lowest	10.040	16.400	17.520	35.040			
Middle	9.640	16.400	17.600	35.280			
Highest	10.000	16.320	17.560	35.120			
Limit:	S HUAKTES!		>500k	- O O			
Test Result:	- LOX	TESTING WUAKTESTI	PASS	TING WAYTESTING			

Test plots as follows:

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#### 802.11b Modulation

#### Lowest channel



#### Middle channel



#### Highest channel



#### 802.11g Modulation

#### Lowest channel



#### Middle channel



Highest channel



#### 802.11n (HT20) Modulation

#### Lowest channel



#### Middle channel



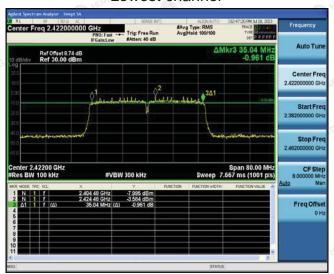
Highest channel



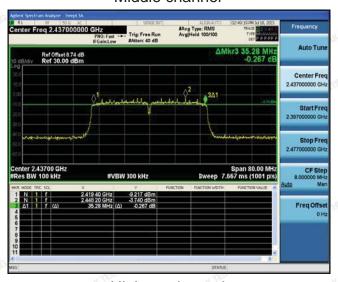


#### 802.11n (HT40) Modulation

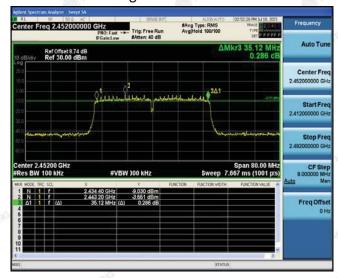
#### Lowest channel



#### Middle channel



#### Highest channel





# 4.5. POWER SPECTRAL DENSITY

# **Test Specification**

Test Requirement:	FCC Part15 C Section 15.247 (e)					
Test Method:	KDB 558074					
Limit:	The average power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.					
Test Setup:	Spectrum Analyzer  EUI					
Test Mode:	Transmitting mode with modulation					
Test Procedure:	<ol> <li>Transmitting mode with modulation</li> <li>The testing follows Measurement procedure 10.2 method PKPSD of FCC KDB Publication 558074 D01 15.247 Meas Guidance v05r02.</li> <li>The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.</li> <li>Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>Make the measurement with the spectrum analyzer's resolution bandwidth (RBW): 3 kHz ≤ RBW ≤ 100 kHz. Video bandwidth VBW ≥ 3 x RBW. Set the span to at least 1.5 times the OBW.</li> <li>Detector = Peak, Sweep time = auto couple.</li> <li>Employ trace averaging (Peak) mode over a minimum of 100 traces. Use the peak marker function to determine the maximum power level.</li> <li>Measure and record the results in the test report.</li> </ol>					
Test Result:	PASS (MACTES IN COLUMN TO THE					

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#### **Test Instruments**

RF Test Room					
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	Feb. 16, 2024
RF Cable (9KHz-26.5GHz)	Tonscend	170660	N/A	Feb. 17, 2023	Feb. 16, 2024
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	Feb. 16, 2024
RF test software	Tonscend	JS1120-B Version 2.6	HKE-083	N/A	N/A

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

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#### Test data

EUT Set Mode	Channel	Result (dBm/30kHz)	Offset	Result (dBm/30kHz)	Result (dBm/3kHz)
802.11b	Lowest	-10.7	9.44	-1.26	-11.26
	Middle	-8.85	9.44	0.59	-9.41
	Highest	-8.59	9.44	0.85	-9.15
802.11g	Lowest	-15.33	9.44	-5.89	-15.89
	Middle	-15.94	9.44	-6.5	-16.5
	Highest	-14.53	9.44	-5.09	-15.09
802.11n(H20)	Lowest	-16.56	9.44	-7.12	-17.12
	Middle	-15.53	9.44	-6.09	-16.09
	Highest	-15.16	9.44	-5.72	-15.72
802.11n(H40)	Lowest	-18.22	9.44	-8.78	-18.78
	Middle	-18.64	9.44	-9.2	-19.2
	Highest	-18.07	9.44	-8.63	-18.63

PSDTest Result (dBm/30kHz)= Result +Offset

Offset= Instrument attenuation +cable loss=8.64 dB +0.8 dB =9.44dB

PSD test result (dBm/3kHz)= PSD test result (dBm/30kHz)-10

Limit: 8dBm/3kHz

Test Result: PASS

Test plots as follows:

#### 802.11b Modulation

#### Lowest channel



#### Middle channel

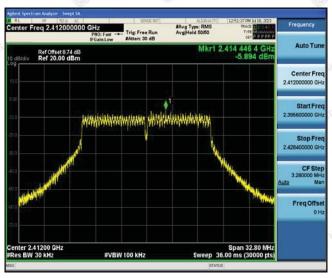


#### **Highest channel**

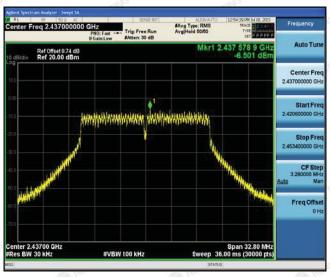


#### 802.11g Modulation

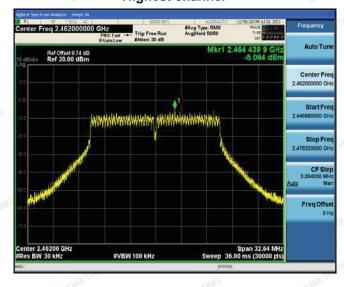
#### Lowest channel



#### Middle channel



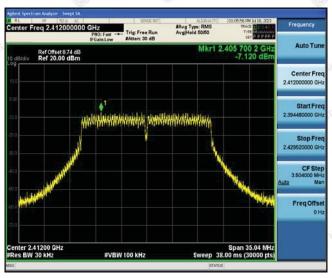
#### **Highest channel**





#### 802.11n (HT20) Modulation

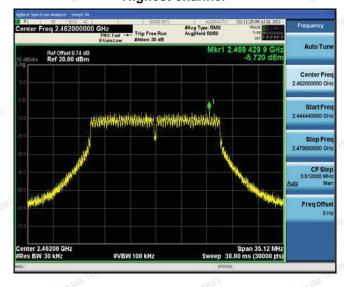
#### Lowest channel



#### Middle channel

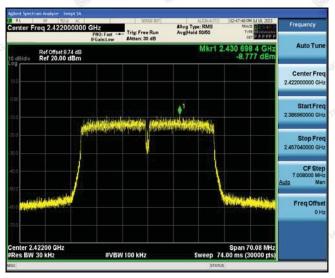


#### **Highest channel**

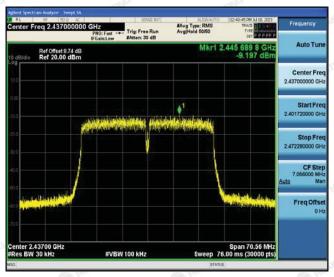


#### 802.11n (HT40) Modulation

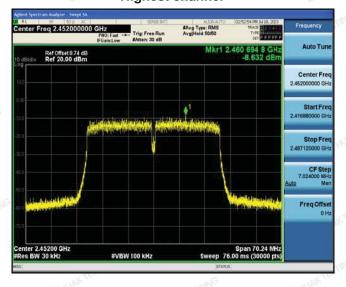
#### Lowest channel



#### Middle channel



#### **Highest channel**



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## 4.6. CONDUCTED BAND EDGE AND SPURIOUS EMISSION **MEASUREMENT**

#### **Test Specification**

Test Requirement:	FCC Part15 C Section 15.247 (d)				
Test Method:	KDB558074				
Limit:	In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement and radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).				
Test Setup:	Spectrum Analyzer  EUT				
Test Mode:	Transmitting mode with modulation				
Test Procedure:	<ol> <li>Transmitting mode with modulation</li> <li>The testing follows FCC KDB Publication 558074 D01 15.247 Meas Guidance v05r02.</li> <li>The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.</li> <li>Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).</li> <li>Measure and record the results in the test report.</li> <li>The RF fundamental frequency should be excluded against the limit line in the operating frequency band.</li> </ol>				
Test Result:	PASS				

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#### **Test Instruments**

RF Test Room					
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	Feb. 16, 2024
High pass filter unit	Tonscend	JS0806-F	HKE-055	Feb. 17, 2023	Feb. 16, 2024
RF Cable (9KHz-26.5GHz)	Tonscend	170660	N/A	Feb. 17, 2023	Feb. 16, 2024
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	Feb. 16, 2024
RF test software	Tonscend	JS1120-B Version 2.6	HKE-083	N/A	N/A

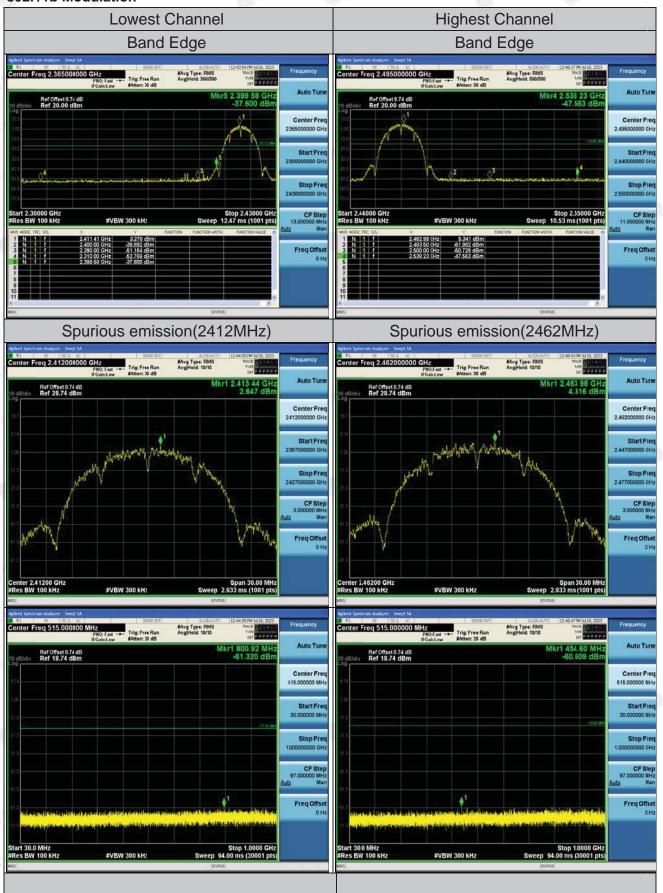
**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

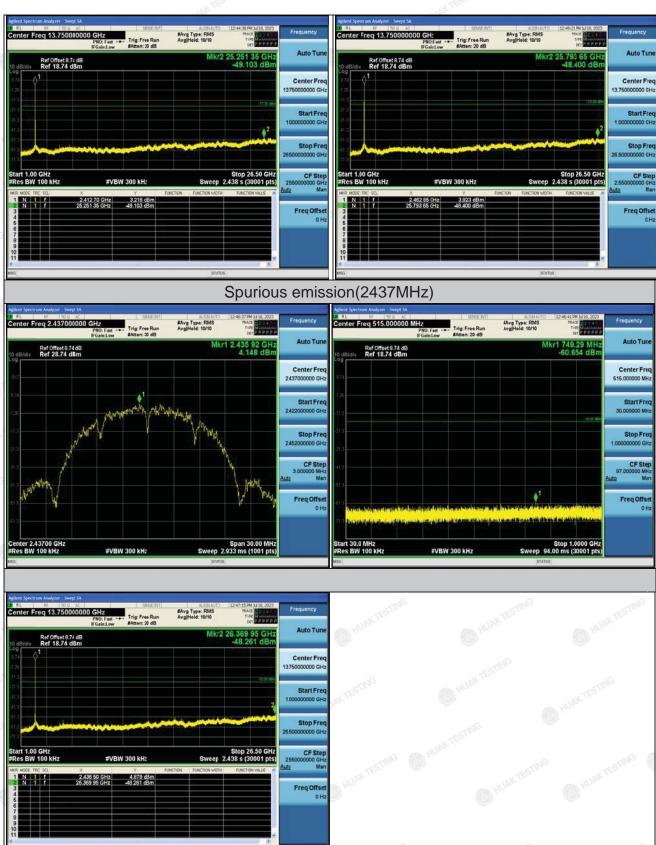
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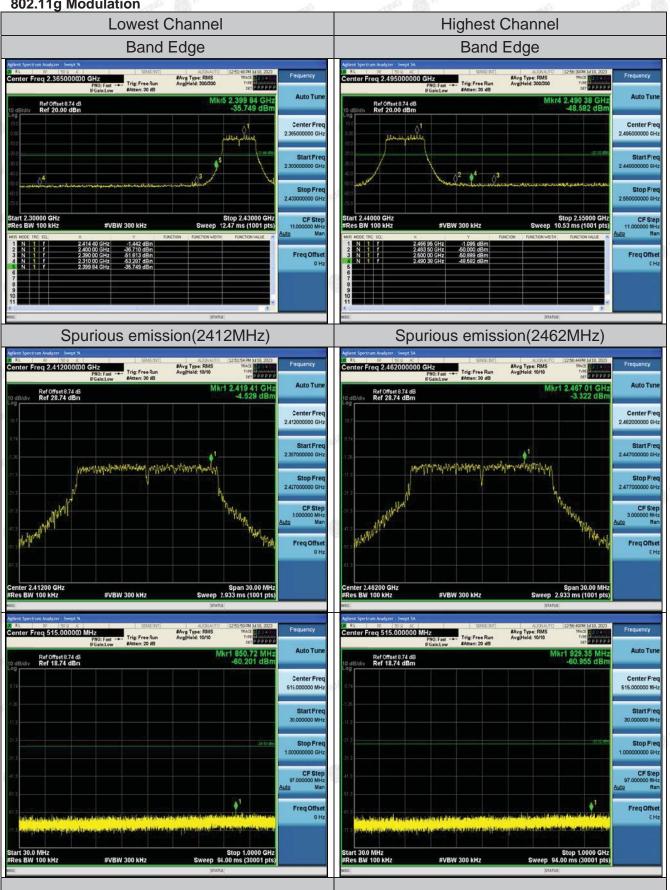
#### **Test Data**

#### 802.11b Modulation

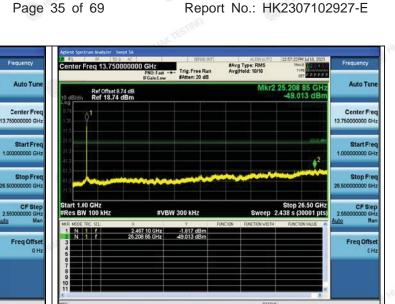




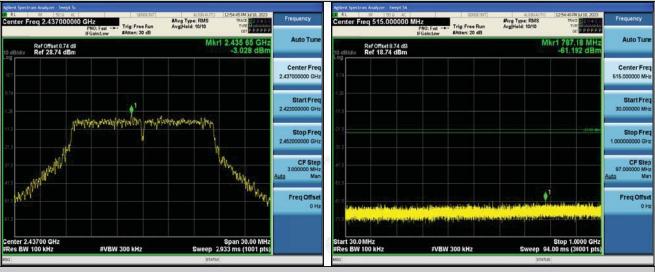
802.11g Modulation

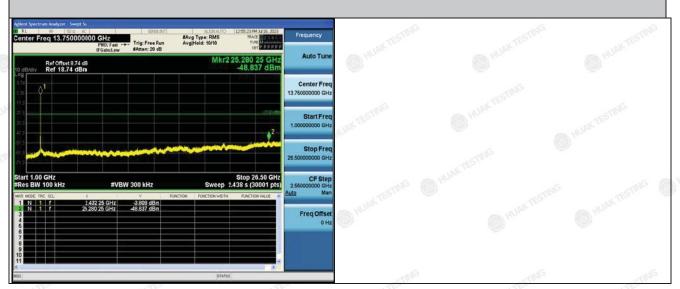


Ref Offset 8.74 cB Ref 18.74 dBn

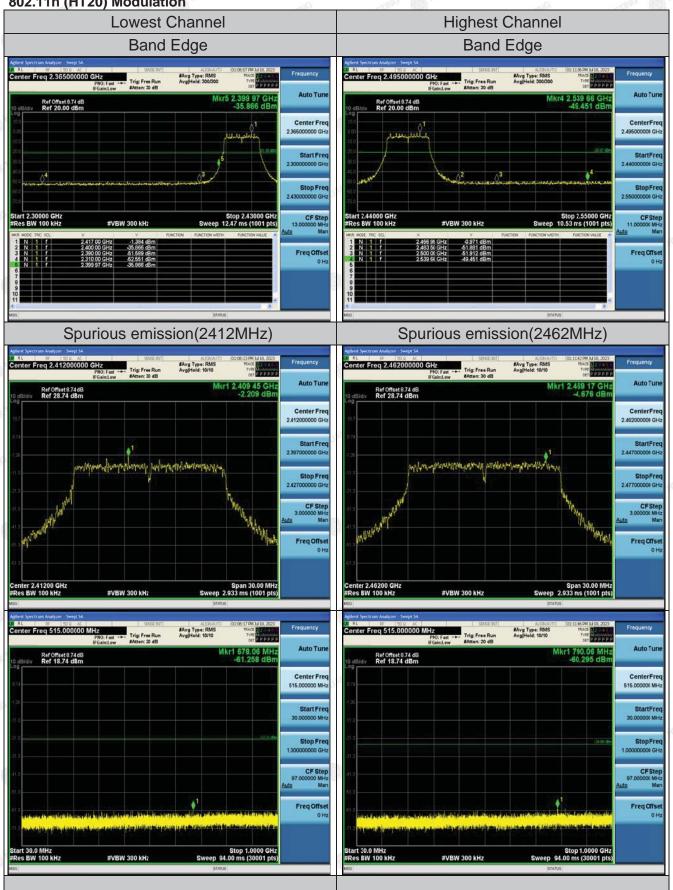




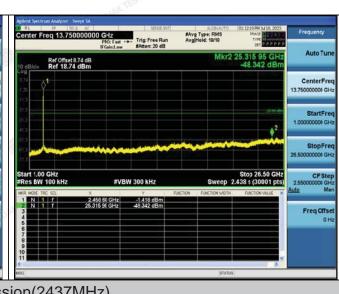


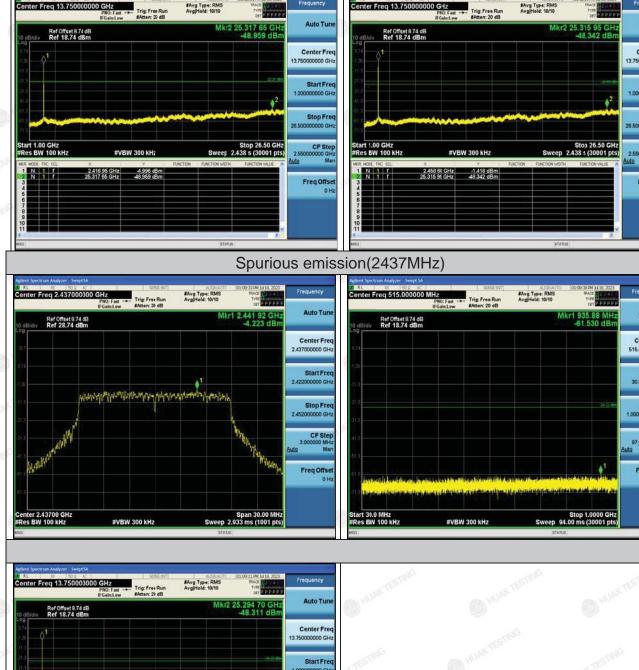


802.11n (HT20) Modulation



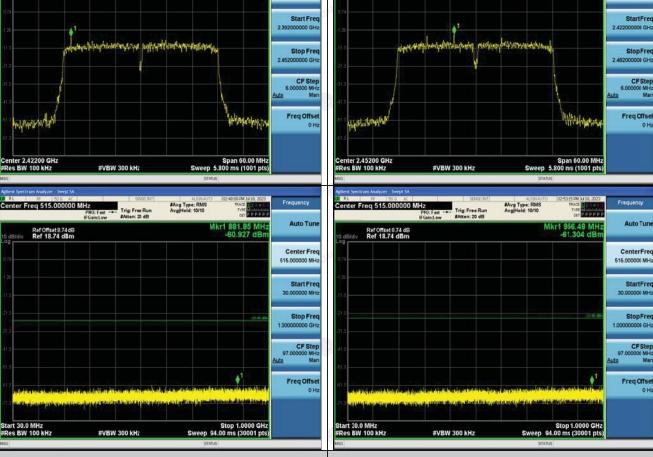
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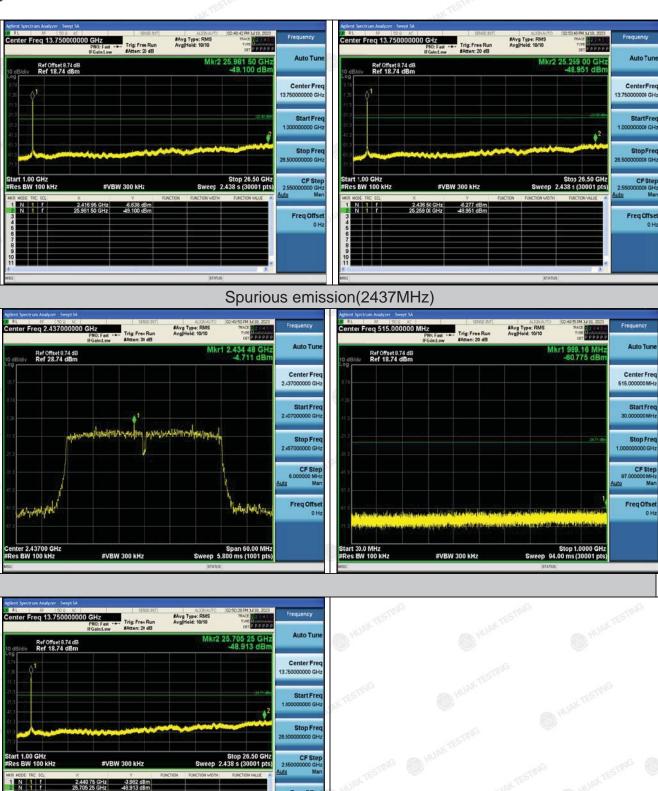






# 802.11n (HT40) Modulation **Highest Channel Lowest Channel** Band Edge Band Edge #Avg Type: RMS Avg|Hold: 300/30 Trig: Free Run Trig: Free Run Ref Offset 8.74 dB Ref 20.00 dBm Center Fre Stop Free CFSte CF Step 13.000000 M Freq Offse Spurious emission(2422MHz) Spurious emission(2452MHz) PNO: Fast --- Trig: Free Run #Avg Type: RMS AvgiHold: 10/10 #Avg Type: RMS Avg|Hold: 10/10 Auto Tur 2.446 96 GH -3.981 dBn Ref Offset 8.74 dB Ref 28.74 dBm Ref Offset 8.74 dB Ref 28.74 dBm







4.7. RADIATED SPURIOUS EMISSION MEASUREMENT

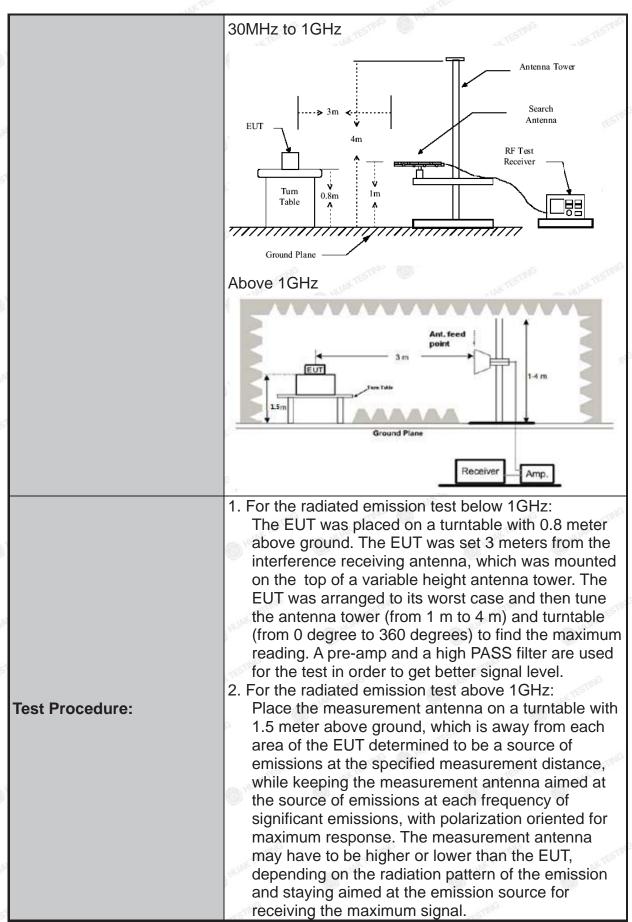
# **Test Specification**

Test Requirement:	FCC Part15	C Section	n 1	5.209	ESTI	yG	-ESTIN
Test Method:	ANSI C63.10	): 2013		6	HUAK		(1) HUAK'IL
Frequency Range:	9 kHz to 25 (	GHz			TING		
Measurement Distance:	3 m	TESTING		M HU	AK TES!		TESTING
Antenna Polarization:	Horizontal &	Vertical			To the state of th	6)	HIDAK
Operation mode:	Transmitting	mode w	ith :	modulat	ion		
	Frequency	Detecto	r	RBW	VBW	1	Remark
Receiver Setup:	9kHz- 150kHz 150kHz- 30MHz	53(9)		200Hz 9kHz	1kHz 30kHz		si-peak Value si-peak Value
	30MHz-1GHz Above 1GHz	30MHz-1GHz Quasi-peak Above 1GHz		120KHz 1MHz 1MHz	300KHz 3MHz 10Hz	P	si-peak Value eak Value erage Value
	Frequen 0.009-0.4	Frequency Peak		Field Stre (microvolts, 2400/F(l	ength /meter)	Me	asurement nce (meters)
	0.490-1.705			24000/F(		30	
	1.705-30			30	MC	<b>(9)</b>	30
Limit:	30-88 88-216			100			3
	216-960			150 200		-TING	3
	Above 960			500	HUAKT		3
	Frequency		rovo	eld Strength Dista rovolts/meter) Measur Dista (met		се	Detector
	Above 1GHz	Z @ KONING	500 5000		3		Average Peak
Test setup:	For radiated	Tun		pelow 30	-NG		NUAR STR
	30MHz to 10	SHz Maria		O HU	AK TES I		LAK TESTING

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	that verification means from grour 3. Correct Read 4. For most of the lower level means detect 5. Use the (1) Specification of the correct for average of the correct for a correct for	which maximum are surement and sions shall be and plane. It can be a surement with the appropriate than the appropriate following ban shall with the appropriate following bands and the appropriate following bands are appropriated by the appropriate following the appropriate following bands are appropriated by the appropriate following the appropriate fo	g: Antenna Famp Factor below 1GH: ured by the oplicable limi rted. Otherw I be repeate orted. spectrum ar de enough to g measured; kHz for f < ; Detector fu  MHz, VBW=	issions. The tion for many to a range round or reference to the empeak detect, the peak rise, the empeak dusing the entity of the empeak detect of the empea	e kimum of heights of ference able Loss + ission level tor is 3 dB emission equasi-peak ings: are the W ≥ RBW; eak; Trace = f 1 GHz for to the ch the maximum
Test results:	PASS				

FICATION



### **Test Instruments**

100	Rad	iated Emission	Test Site (966	)	
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Receiver	R&S	ESCI-7	HKE-010	Feb. 17, 2023	Feb. 16, 2024
Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	Feb. 16, 2024
Spectrum analyzer	R&S	FSP40	HKE-025	Feb. 17, 2023	Feb. 16, 2024
High gain antenna	Schwarzbeck	LB-180400KF	HKE-054	Feb. 17, 2023	Feb. 16, 2024
Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Feb. 17, 2023	Feb. 16, 2024
Preamplifier	EMCI	EMC051845S E	HKE-015	Feb. 17, 2023	Feb. 16, 2024
Preamplifier	Agilent	83051A	HKE-016	Feb. 17, 2023	Feb. 16, 2024
Loop antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Feb. 17, 2023	Feb. 16, 2024
Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	Feb. 17, 2023	Feb. 16, 2024
Horn antenna	Schwarzbeck	9120D	HKE-013	Feb. 17, 2023	Feb. 16, 2024
High pass filter unit	Tonscend	JS0806-F	HKE-055	Feb. 17, 2023	Feb. 16, 2024
Antenna Mast	Keleto	CC-A-4M	N/A	N/A	N/A
Position controller	Taiwan MF	MF7802	HKE-011	Feb. 17, 2023	Feb. 16, 2024
Radiated test software	Tonscend	TS+ Rev 2.5.0.0	HKE-082	N/A	N/A
RF cable	Times	9kHz-1GHz	HKE-117	Feb. 17, 2023	Feb. 16, 2024
RF cable	Times	1-40G	HKE-034	Feb. 17, 2023	Feb. 16, 2024
Horn Antenna	Schewarzbeck	BBHA 9170	HKE-017	Feb. 17, 2023	Feb. 16, 2024

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

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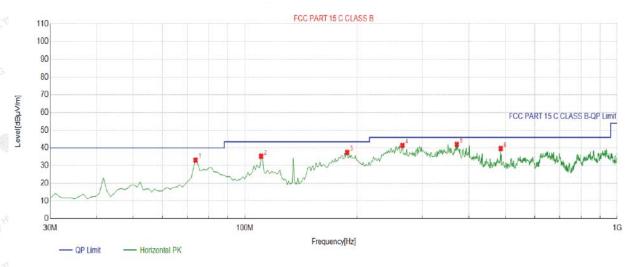
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### **Test Data**

All the test modes completed for test. only the worst result of (802.11b at 2412MHz) was reported as below:

#### **Below 1GHz**

### Horizontal

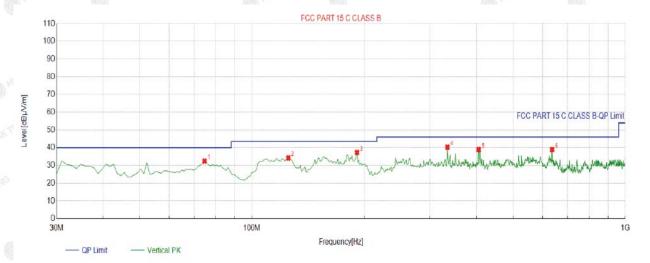


QP Detector

	Suspe	cted List								
3	NO	Freq.	Factor	Reading	Level	Limit	Margin	Height	Angle	Delevity
	NO.	[MHz]	[dB]	[dBµV/m]	[dBµV/m]	[dBµV/m]	[dB]	[cm]	[°]	Polarity
	1	73.6937	-16.44	49.56	33.12	40.00	6.88	100	2	Horizontal
	2	110.5906	-14.98	50.25	35.27	43.50	8.23	100	359	Horizontal
	3	188.2683	-16.92	54.40	37.48	43.50	6.02	100	211	Horizontal
	4	264.9750	-12.71	54.20	41.49	46.00	4.51	100	158	Horizontal
	5	370.8108	-11.01	53.05	42.04	46.00	3.96	100	124	Horizontal
	6	486.3564	-7.62	47.23	39.61	46.00	6.39	100	295	Horizontal

Remark: Factor = Cable loss + Antenna factor - Preamplifier; Level = Reading + Factor; Margin = Limit - Level





QP Detector

Suspe	Suspected List										
NO.	Freq.	Factor	Reading	Level	Limit	Margin	Height	Angle	Delevite		
	[MHz]	[dB]	[dBµV/m]	[dBµV/m]	[dBµV/m]	[dB]	[cm]	[°]	Polarity		
1	74.6647	-16.61	49.12	32.51	40.00	7.49	100	5	Vertical		
2	125.1552	-16.10	50.31	34.21	43.50	9.29	100	102	Vertical		
3	191.1812	-16.86	54.17	37.31	43.50	6.19	100	192	Vertical		
4	333.9139	-11.53	51.79	40.26	46.00	5.74	100	165	Vertical		
5	404.7948	-9.33	48.32	38.99	46.00	7.01	100	163	Vertical		
6	636.8569	-4.40	43.37	38.97	46.00	7.03	100	197	Vertical		

Remark: Factor = Cable loss + Antenna factor - Preamplifier; Level = Reading + Factor; Margin = Limit - Level

# **Harmonics and Spurious Emissions**

### Frequency Range (9kHz-30MHz)

	Frequency (MHz)	Level@3m (dBµV/m)	Limit@3m (dBµV/m)
NG		G	Din
370	Olar.	ak TEST!"	MY TESTIN
	LAKTES!"	AKTEST	O PRO JAK TEST
	<b>O</b> ***	<u> </u>	

**Note:** 1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor.

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement.



# **Above 1GHz**

### RADIATED EMISSION TEST

LOW CH1 (802.11b Mode)/2412

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	
4824	58.23	-3.64	54.59	74	-19.41	peak	
4824	43.24	-3.64	39.6	54	-14.4	AVG	
7236	53.52	-0.95	52.57	74	-21.43	peak	
7236	39.89	-0.95	38.94	54	-15.06	AVG	

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

#### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type
4824	60.92	-3.64	57.28	74	-16.72	peak
4824	42.64	-3.64	39	54	-15	AVG
7236	54.51	-0.95	53.56	74	-20.44	peak
7236	37.78	-0.95	36.83	54	-17.17	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifierr; Level = Reading + Factor; Margin = Level - Limit

### MID CH6 (802.11b Mode)/2437

### Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type
4874	60.68	-3.51	57.17	74	-16.83	peak
4874	42.87	-3.51	39.36	54	-14.64	AVG
7311	52.88	-0.82	52.06	74	-21.94	peak
7311	40.03	-0.82	39.21	54	-14.79	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level -

### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	
4874	60.52	-3.51	57.01	74	-16.99	peak	
4874	41.53	-3.51	38.02	54	-15.98	AVG	
7311	53.82	-0.82	53	74	-21	peak	
7311	37.72	-0.82	36.9	54	-17.1	AVG	

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level -

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HIGH CH11 (802.11b Mode)/2462

#### Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	
4924	58.4	-3.43	54.97	74	-19.03	peak	
4924	42.96	-3.43	39.53	54	-14.47	AVG	
7386	52.76	-0.75	52.01	74	-21.99	peak	
7386	39.85	-0.75	39.1	54	-14.9	AVG	

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

#### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	.∞ (dBμV/m)	(dB)	Туре
4924	59.37	-3.43	55.94	74	-18.06	peak
4924	41.69	-3.43	38.26	54	-15.74	AVG
7386	53.58	-0.75	52.83	74 HUM	-21.17	peak
7386	39.75	-0.75	39	54	-15	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

#### Remark

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency; "E" denotes band edge frequency
- (3) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) The emissions are attenuated more than 20dB below the permissible limits are not recorded in the report.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54dBuV/m(AV Limit), the Average Detected not need to completed.



LOW CH1 (802.11g Mode)/2412

### Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type
4824	60.78	-3.64	57.14	74	-16.86	peak
4824	43.69	-3.64	40.05	54	-13.95	AVG
7236	54	-0.95	53.05	74	-20.95	peak
7236	39.2	-0.95	38.25	54	-15.75	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
4824	60.13	-3.64	56.49	74 HUAY	-17.51	peak
4824	43.47	-3.64	39.83	54	-14.17	AVG
7236	53.58	-0.95	52.63	74	-21.37	peak
7236	38.73	-0.95	37.78	54	-16.22	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

MID CH6 (802.11g Mode)/2437

### Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
4874	58.27	-3.51	54.76	74	-19.24	peak
4874	42.91	-3.51	39.4	54	-14.6	AVG
7311	53.9	-0.82	53.08	74	-20.92	peak
7311	39.26	-0.82	38.44	54	-15.56	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
4874	60.27	-3.51	56.76	74	-17.24	peak
4874	42.49	-3.51	38.98	54	-15.02	AVG
7311	53.88	-0.82	53.06	74	-20.94	peak
7311	39.02	-0.82	38.2	54	-15.8	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

HIGH CH11 (802.11g Mode)/2462

#### Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
4924	59.92	-3.43	56.49	74	-17.51	peak
4924	42.79	-3.43	39.36	54	-14.64	AVG
7386	54.31	-0.75	53.56	74	-20.44	peak
7386	37.7	-0.75	36.95	54	-17.05	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

#### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type
4924	58.34	-3.43	54.91	74	-19.09	peak
4924	41.9	-3.43	38.47	54	-15.53	AVG
7386	52.47	-0.75	51.72	74	-22.28	peak
7386	37.44	-0.75	36.69	54	-17.31	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

#### Remark:

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency; "E" denotes band edge frequency.
- (3) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) The emissions are attenuated more than 20dB below the permissible limits are not recorded in the report.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54dBuV/m(AV Limit), the Average Detected not need to completed.



LOW CH1 (802.11n/H20 Mode)/2412

### Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
4824	59.28	-3.64	55.64	74	-18.36	peak
4824	42.28	-3.64	38.64	54	-15.36	AVG
7236	53.44	-0.95	52.49	74	-21.51	peak
7236	37.93	-0.95	36.98	54	-17.02	AVG

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type
4824	58.85	-3.64	55.21	74	-18.79	peak
4824	43.07	-3.64	39.43	54	-14.57	AVG
7236	52.47	-0.95	51.52	74	-22.48	peak
7236	37.75	-0.95	36.8	54	-17.2	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

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MID CH6 (802.11n/H20 Mode)/2437

#### Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
4874.00	60.88	-3.51	57.37	74.00	-16.63	peak
4874.00	41.22	-3.51	37.71	54.00	-16.29	AVG
7311.00	54.67	-0.82	53.85	74.00	-20.15	peak
7311.00	40.03	-0.82	39.21	54.00	-14.79	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

#### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type
4874.00	61.00	-3.51	57.49	74.00	-16.51	peak
4874.00	42.58	-3.51	39.07	54.00	-14.93	AVG
7311.00	54.29	-0.82	53.47	74.00	-20.53	peak
7311.00	38.51	-0.82	37.69	54.00	-16.31	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

HIGH CH11 (802.11n/H20 Mode)/2462

#### Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Data eta a Toma
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
4924	60.05	-3.43	56.62	74	-17.38	peak
4924	42.71	-3.43	39.28	54	-14.72	AVG
7386	53.39	-0.75	52.64	74	-21.36	peak
7386	37.77	-0.75	37.02	54	-16.98	AVG

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
4924	59.5	-3.43	56.07	74	-17.93	peak
4924	43.09	-3.43	39.66	54	-14.34	AVG
7386	54.3	-0.75	53.55	74	-20.45	peak
7386	39.26	-0.75	38.51	54	-15.49	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

#### Remark:

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency; "E" denotes band edge frequency.
- (3) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) The emissions are attenuated more than 20dB below the permissible limits are not recorded in the report.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.





# LOW CH3 (802.11n/H40 Mode)/2422

### Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Data staly Truns
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
4844	59.85	-3.63	56.22	74	-17.78	peak
4844	42.29	-3.63	38.66	54	-15.34	AVG
7266	53.46	-0.94	52.52	74	-21.48	peak
7266	39.40	-0.94	38.46	54	-15.54	AVG

### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
4844	59.13	-3.63	55.5	74	-18.5	peak
4844	42.16	-3.63	38.53	54	-15.47	AVG
7266	53.70	-0.94	52.76	74	-21.24	peak
7266	38.11	-0.94	37.17	54	-16.83	AVG
700	9	1000	(0)		105(0)	(39)

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit



MID CH6 (802.11n/H40 Mode)/2437

### Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Data atom Tumo
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	- Detector Type
4874	60.71	-3.51	57.2	74	-16.8	peak
4874	43.15	-3.51	39.64	54	-14.36	AVG
7311	51.94	-0.82	51.12	74	-22.88	peak
7311	38.25	-0.82	37.43	54	-16.57	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Data eter Tuna
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
4874	58.92	-3.51	55.41	74	-18.59	peak
4874	40.95	-3.51	37.44	54	-16.56	AVG
7311	52.91	-0.82	52.09	74	-21.91	peak
7311	38.36	-0.82	37.54	54	-16.46	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

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HIGH CH9 (802.11n/H40 Mode)/2452 Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
4904	60.89	-3.43	57.46	74	-16.54	peak
4904	41.34	-3.43	37.91	54	-16.09	AVG
7356	52.56	-0.75	51.81	74	-22.19	peak
7356	39.49	-0.75	38.74	54	-15.26	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

#### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Turo
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
4904	59.2	-3.43	55.77	74	-18.23	peak
4904	42.1	-3.43	38.67	54	-15.33	AVG
7356	53.72	-0.75	52.97	74	-21.03	peak
7356	39.19	-0.75	38.44	54	-15.56	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

#### Remark:

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency; "E" denotes band edge frequency.
- (3) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) The emissions are attenuated more than 20dB below the permissible limits are not recorded in the report
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.



### Test Result of Radiated Spurious at Band edges

Operation Mode: 802.11b Mode TX CH Low (2412MHz)

### Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Data et al Tura
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
2310	53.47	-5.81	47.66	74 TESTING	-26.34	peak
2310	STING/ MHUA	-5.81	NG / STING	54	/NG	AVG
2390	52.69	-5.84	46.85	74	-27.15	peak
2390	/	-5.84	/	54	/	AVG
2400	54.19	-5.84	48.35	<sub>5</sub> 74	-25.65	peak
2400	ALIAK IL	-5.84	HUAK TE	54	WAKTE	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

#### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Data at a Time
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
2310	55.02	-5.81	49.21	74	-24.79	peak
2310	This said	-5.81	uG /	54	TING	AVG
2390	56.34	-5.84	50.5	74	-23.5	peak
2390	/	-5.84	/	54	TIME /	AVG
2400	55.72	-5.84	49.88	74	-24.12	peak
2400	1	-5.84	My Hope	54	/ (6)	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

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Operation Mode: TX CH High (2462MHz)

### Horizontal

277	27.11	27/12	- 1		277	27
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
2483.50	54.16	-5.65	48.51	74 HUAK	-25.49	peak
2483.50	/	-5.65	@ HUDA	54	1	AVG
2500.00	53.26	-5.65	47.61	74	-26.39	peak
2500.00	LEK TESTING	-5.65	ING / TESTIN	54	NY TETING	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

### Vertical:

	DESIGN .	THE PARTY AND ADDRESS OF THE PARTY AND ADDRESS	25007		100 ×	WASHIV.
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Dotostor Typo
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
2483.50	55.28	-5.65	49.63	74	-24.37	peak
2483.50	I W	-5.65	1	54	1	AVG
2500.00	55.37	-5.65	49.72	74	-24.28	peak
2500.00	1	-5.65	1	54	9 /	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

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Operation Mode: 802.11g Mode TX CH Low (2412MHz)

### Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Data ata u Tura
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
2310	53.16	-5.81	47.35	74	-26.65	peak
2310	TING /	-5.81	1 mg	54	ESTING /	AVG
2390	54.25	-5.84	48.41	74	-25.59	peak
2390	1	-5.84	1	54	1	AVG
2400	54.92	-5.84	49.08	74	-24.92	peak
2400	1	-5.84	(1) 1 m	54	HUAK	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
2310	54.29	-5.81	48.48	74	-25.52	peak
2310	WIESTING O HO	-5.81	STAG / NESTAV	54	TESTAG	AVG
2390	54.16	-5.84	48.32	74	-25.68	peak
2390	/	-5.84	/	54	/	AVG
2400	54.72	-5.84	48.88	74	-25.12	peak
2400	1	-5.84	D House	54	1	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit





Operation Mode: TX CH High (2462MHz)

### Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
2483.50	56.02	-5.65	50.37	74	-23.63	peak
2483.50	STIME /	-5.65	THE THUS	54	/	AVG
2500.00	55.27	-5.65	49.62	74	-24.38	peak
2500.00	MIC WHILE	-5.65	1	54	1	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Data star Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
2483.50	54.16	-5.65	48.51	74	-25.49	peak
2483.50	/	-5.65	1	54	s 1	AVG
2500.00	55.38	-5.65	49.73	74	-24.27	peak
2500.00	HUAN /	-5.65	1 HOUSE	54	MUAK I	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.



Operation Mode: 802.11n/H20 Mode TX CH Low (2412MHz)

### Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Data da Santa
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
2310	54.16	-5.81	48.35	74	-25.65	peak
2310	STIME /	-5.81	LOW/ESTING	54	/	AVG
2390	56.23	-5.84	50.39	74	-23.61	peak
2390	NG MUAN	-5.84	1	54	1	AVG
2400	53.16	-5.84	47.32	74	-26.68	peak
2400	1	-5.84	/	54	1	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
2310	56.38	-5.81	50.57	74	-23.43	peak
2310	AKTESTIN /	-5.81	STATES THE	54	TAK TE TIME	AVG
2390	55.14	-5.84	49.3	74	-24.7	peak
2390	/	-5.84	/	54	/	AVG
2400	54.28	-5.84	48.44	74	-25.56	peak
2400	1	-5.84	7	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit



Operation Mode: TX CH High (2462MHz)

### Horizontal

4012	Mar.		6300	4839	412
Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
54.16	-5.65	48.51	74 <sub>HUAK</sub>	-25.49	peak
/	-5.65	@ HUDA	54	1	AVG
55.92	-5.65	50.27	74	-23.73	peak
TOR TESTING	-5.65	ING / LAKTESTIN	54	N TSTING	AVG
	(dBµV) 54.16	(dBµV) (dB) 54.16 -5.65  / -5.65  55.92 -5.65	(dBμV)     (dB)     (dBμV/m)       54.16     -5.65     48.51       /     -5.65     /       55.92     -5.65     50.27	(dBμV)     (dB)     (dBμV/m)     (dBμV/m)       54.16     -5.65     48.51     74       /     -5.65     /     54       55.92     -5.65     50.27     74	(dBμV)     (dB)     (dBμV/m)     (dBμV/m)     (dBμV/m)       54.16     -5.65     48.51     74     -25.49       /     -5.65     /     54     /       55.92     -5.65     50.27     74     -23.73

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

### Vertical:

200		District .	ACCURA.	Diction		ASSESSA .
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	- Detector Type
2483.50	54.16	-5.65	48.51	74	-25.49	peak
2483.50	I HUI	-5.65	/	54	1	AVG
2500.00	52.39	-5.65	46.74	74	-27.26	peak
2500.00	/	-5.65	1	54	<i>)</i>	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.



Operation Mode: 802.11n/H40 Mode TX CH Low (2422MHz)

### Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Datasta Tura
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
2310	55.02	-5.81	49.21	74	-24.79	peak
2310	STINE /	-5.81	- WAY /ESTINE	54	1	AVG
2390	54.16	-5.84	48.32	74	-25.68	peak
2390	STING MUAN	-5.84	NG / STIM	54	1	AVG
2400	56.56	-5.84	50.72	74	-23.28	peak
2400	/	-5.84	/	54	1	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

### Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
2310	53.25	-5.81	47.44	74	-26.56	peak
2310	1	-5.81	(1) / (1)	54	MILLAN /	AVG
2390	52.34	-5.84	46.5	74	-27.5	peak
2390	LAK TESTING	-5.84	/ JAKTEST	54	CANTESTING	AVG
2400	54.02	-5.84	48.18	74	-25.82	peak
2400	-TING /	-5.84	1 TING	54	ESTING /	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit



Operation Mode: TX CH High (2452MHz)

#### Horizontal

-alla-	ALD IN			40.00	Ular.
Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
56.37	-5.65	50.72	74 <sub>HUAK</sub>	-23.28	peak
/	-5.65	MUNK,	54	1	AVG
55.64	-5.65	49.99	74	-24.01	peak
VEX LESTING	-5.65	ING LAKTESTIN	54	AK T STING	AVG
	(dBµV) 56.37	(dBµV) (dB) 56.37 -5.65  / -5.65 55.64 -5.65	(dBμV)     (dB)     (dBμV/m)       56.37     -5.65     50.72       /     -5.65     /       55.64     -5.65     49.99	(dBμV)     (dB)     (dBμV/m)     (dBμV/m)       56.37     -5.65     50.72     74       /     -5.65     /     54       55.64     -5.65     49.99     74	(dBμV)     (dB)     (dBμV/m)     (dBμV/m)     (dBμV/m)       56.37     -5.65     50.72     74     -23.28       /     -5.65     /     54     /       55.64     -5.65     49.99     74     -24.01

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

### Vertical:

	**	COSSET ,	1000 V	(2000)		(2000)
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Detector Type
2483.50	52.14	-5.65	46.49	74	-27.51	peak
2483.50	I HUAK	-5.65	1	54	1	AVG
2500.00	55.39	-5.65	49.74	74	-24.26	peak
2500.00	1	-5.65	1	54	1	AVG

Remark: Factor = Antenna Factor + Cable Loss - Pre-amplifier; Level = Reading + Factor; Margin = Level - Limit

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.

### Remark:

- 1. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.
- 2. In restricted bands of operation, the spurious emissions below the permissible value more than 20dB.
- 3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



### 4.8. ANTENNA REQUIREMENT

#### Standard Applicable

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247, if transmitting antennas of directional gain greater than6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

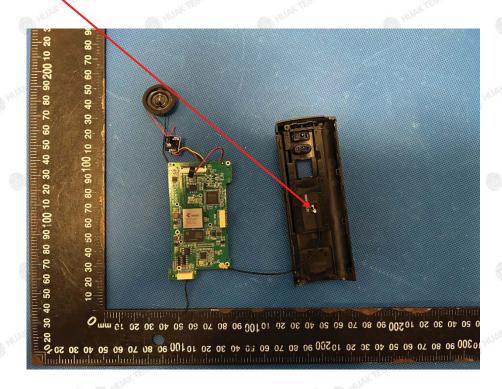
#### Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

#### **Antenna Connected Construction**

The antenna used in this product is a FPC Antenna, need professional installation. It conforms to the standard requirements. The directional gains of antenna used for transmitting is 1.5dBi.

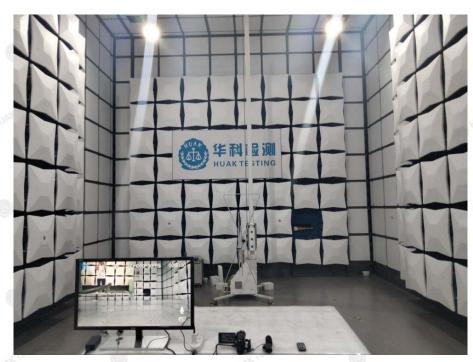
### WIFI ANTENNA

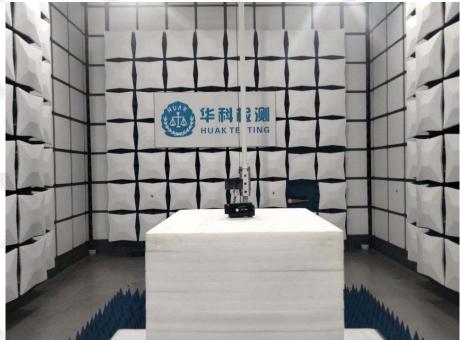




# 5. PHOTOGRAPH OF TEST

### Radiated Emissions





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# Conducted Emission





6. PHOTOS OF THE EUT

Reference to the report: ANNEX A of external photos and ANNEX B of internal photos.

-----End of test report-----

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