# KSIGN (Guangdong) Testing Co., Ltd.

KSIGN

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	TEST REPORT			
Report No. ·····	KS2102S00365E02			
FCC ID:	2AM8GCHAMELEONH			
Applicant	GUANGZHOU LIE DUN ELECTRONICS TECHNOLOGY CO. LIMITED			
Address	No.4 plant of No.43 South International Trade Avenue,Hualong Town,Panyu District,Guangzhou,Guangdong,China			
Manufacturer	GUANGZHOU LIE DUN ELECTRONICS TECHNOLOGY CO. LIMITED			
Address	No.4 plant of No.43 South International Trade Avenue,Hualong Town,Panyu District,Guangzhou,Guangdong,China			
Product Name:	Chameleon-H			
Trade Mark······	CHAMELEON			
Model/Type reference······	E9XG-A05-M			
Listed Model(s) ·····:	1			
Standard ·····:	FCC Part 15, Subpart E (15.407:2017)			
Date of receipt of test sample:	Mar. 02, 2021			
Date of testing	Mar. 02, 2021~Mar. 17, 2021			
Date of issue	Mar. 17, 2021			
Result:	Pass			
Compiled by:	ngdong) Tar in Human			
(Printed name+signature)	Rory Huang			
Supervised by:	E E 8 1			
(Printed name+signature)	Eder Zhan KSIGN Ger. Man			
Approved by:	Tom Cont Lus			
(Printed name+signature)	Cary Luo			
Testing Laboratory Name······:	KSIGN(Guangdong) Testing Co., Ltd.			
Address	West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, People's Republic of China			

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# **1. TEST SUMMARY**

# 1.1. Test Standards

The tests were performed according to following standards:

**FCC Part 15, Subpart E(15.407)** - for 802.11a/n/ac, the test procedure follows the FCC KDB 789033 D02 General UNII Test Procedures New Rules V02r01.

**KDB 789033:** GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E .

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

# 1.2. Report version

01 Mar. 17, 2021 Original	Revised No.	Date of issue	Description
	01	Mar. 17, 2021	Original
	AND A	N/Y	
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		N/Y	
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# **1.3. Test Description**

FCC Part 15 Subpart E(15.407)							
Test Item	Test require	Result	Test Engineer				
Antenna Requirement	15.203	Pass	Rory Huang				
Conducted Emission	15.207	Pass	Rory Huang				
Band Edge Emissions	15.407(b)	Pass	Rory Huang				
26dB Bandwidth & 99% Bandwidth	15.407(a)	Pass	Rory Huang				
6dB Bandwidth (only for UNII-3)	15.407(e)	N/A	N/A				
Maximum Conducted Output Power	15.407(a)	Pass	Rory Huang				
Maximum Power Spectral Density	15.407(a)	Pass	Rory Huang				
Transmitter Radiated Spurious Emission	15.407(b)	Pass	Rory Huang				
Peak Excursion	15.407(a)	Pass	Rory Huang				
Frequency Stability	15.407(g)	Pass	Rory Huang				
Transmitter Power Control	15.407(h)(1)	N/A	N/A				
Conducted Spurious Emission	15.407	Pass	Rory Huang				

Note:

1. The measurement uncertainty is not included in the test result.

- 2. Transmit Power Control was not tested as the maximum EIRP is less than 500mW (27dBm) in U-NII Bands 2&3.
- 3. "N/A" is an abbreviation for "Not Applicable".



# 1.4. Test Facility

### Address of the report laboratory

### KSIGN(Guangdong) Testing Co., Ltd.

West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, People's Republic of China

### Laboratory accreditation

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

### CNAS-Lab Code: L13261

KSIGN(Guangdong) Testing Co., Ltd. has been assessed and proved to be in Compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

### A2LA-Lab Cert. No.: 5457.01

KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

### IC Registration No.: CN0096

The 3m alternate test site of KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: CN0096

### FCC-Registration No.: CN1272

KSIGN(Guangdong) Testing Co., Ltd. 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.



# 1.5. 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 TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the KSIGN(Guangdong) Testing Co., Ltd. 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. Below is the best measurement capability for KSIGN(Guangdong) Testing Co., Ltd.

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.42 dB	(1)
Transmitter power Radiated	2.14 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.20 dB	(1)
Radiated Emissions 30~1000MHz	4.70 dB	(1)
Radiated Emissions 1~18GHz	5.00 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Occupied Bandwidth	2.80 dB	(1)

**Note (1):** This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

# 1.6. Environmental conditions

	Temperature	15 °C to +35 °C
Normal	Relative humidity	20 % to 75 %.
	Voltage	The equipment shall be the nominal voltage for which the equipment was designed.
Extreme Condition	Temperature	Measurements shall be made over the extremes of the operating temperature range as declared by the manufacturer
	Voltage	Measurements shall be made over the extremes of the operating temperature range as declared by the manufacturer

Normal Condition	T <sub>N</sub> =Normal Temperature	25 °C
Extreme Condition	T <sub>L</sub> =Lower Temperature	-20 °C
	T <sub>H</sub> =Higher Temperature	50 °C



# 2. GENERAL INFORMATION

# 2.1. General Description of EUT

Test Sample Number:	1-1-1(Normal Sample),1-1-2(Engineering Sample )	So
Product Name:	Chameleon-H	
Trademark:	CHAMELEON	
Model/Type reference:	E9XG-A05-M	
Listed models:		
Model Difference:		
Power Supply(Adapter):	AC/DC ADAPTER MODEL:AD018A120150UV INPUT:100-240V~ 50/60Hz 0.5A Max OUTPUT:DC 12V1.5A	-
Power supply(Battery):	DC 3.7V 10000mAh 37Wh	
Hardware version:	V1.0	
Software version:	V1.0.0	

## Technical index for 5G WIFI

Operation Band:	⊠U-NII-1	U-NII-2A U-NII-2C U-NII-3			-NII-3		
	U-NII-1:	5150MHz~5250MHz					
Operation Frequency Pange:	U-NII-2A:	1	1				
	U-NII-2C:	1					
	U-NII-3:	1 X-					Se.
	802.11a	🛛 20MHz				P	5
Support bandwidth:	802.11n	🛛 20MHz		40MHz			
	802.11ac	20MHz	$\boxtimes$	40MHz	⊠ 80M	1Hz	□ 160MHz
Modulation:	802.11a: OFDM (QPSK, BPSK, 16QAM, 64QAM) 802.11n: OFDM (QPSK, BPSK, 16QAM, 64QAM) 802.11ac: OFDM (QPSK, BPSK, 16QAM, 64QAM)						
Bit Rate of Transmitter:	802.11a: 6/9/12/18/24/36/48/54 Mbps 802.11n: up to 150Mbps 802.11ac: at most 433.3 Mbps						
Max Peak Output Power:	802.11a: 8.27 dBm 802.11n (HT20): 8.03 dBm 802.11n (HT40): 6.81 dBm 802.11ac (HT20):7.85 dBm 802.11ac (HT40): 6.77 dBm 802.11ac (HT80): 5.03 dBm						
Antenna type:	FPC Antenna						
Antenna gain:	0.9dBi						



# 2.2. Operation state

### Frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channel which were tested. the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the above gray bottom.

Band Test Channel	Teet	20MHz		40MHz		80MHz	
	Channel	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
and Contraction	CH∟	36	5180	38	5190		
T	СНм	44	5220	-		42	5210
	CH <sub>H</sub>	48	5240	46	5230	-	- 6

### > Data Rated

Preliminary tests were performed in different data rate, and found which the below bit rate is worst case mode, so only show data which it is a worst case mode.

Mode	Data rate (worst mode)	
802.11a	6Mbps	
802.11n(HT20)	MCSO	
802.11n(HT40)	MCS0	
802.11ac(HT20)/(HT40)/(HT80)	MCS0	

#### Test mode

For RF test items

The engineering test program was provided and enabled to make EUT continuous transmit (duty cycle>98%).

For AC power line conducted emissions:

The EUT was set to connect with the WLAN AP under large package sizes transmission.

For Radiated spurious emissions test item:

The engineering test program was provided and enabled to make EUT continuous transmit(duty cycle>98%). The EUT in each of three orthogonal axis emissions had been tested ,but only the worst case (X axis) data Recorded in the report.

2.3.	Meas	urement	t Instru	ments	List
1. 1. 1.		dienen			

Tonscend JS0806-2 Test system									
Item	Test Equipment Manufacturer Model No. Serial No. Cal. Until								
1	Spectrum Analyzer	R&S	FSV40-N	101798	04/07/2021				
2	Vector Signal Generator	Agilent	N5182A	MY50142520	04/07/2021				
3	Analog Signal Generator	HP	83752A	3344A00337	04/07/2021				
4	Power Sensor	Agilent	E9304A	MY50390009	04/07/2021				
5	Power Sensor	Agilent	E9300A	MY41498315	04/07/2021				
6	Wideband Radio Communication Tester	R&S	CMW500	157282	04/07/2021				
7	Climate Chamber	Angul	AGNH80L	1903042120	04/07/2021				
8	Dual Output DC Power Supply	Agilent	E3646A	MY40009992	04/07/2021				
9	RF Control Unit	Tonscend	JS0806-2	1	04/07/2021				

Transmitter spurious emissions & Receiver spurious emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	EMI Test Receiver	R&S	ESR	102525	04/07/2021
2	High Pass Filter	Chengdu E-Microwave	OHF-3-18-S	0E01901038	03/27/2021
3	High Pass Filter	Chengdu E-Microwave	OHF-6.5-18- S	0E01901039	03/27/2021
4	Spectrum Analyzer	HP	8593E	3831U02087	04/07/2021
5	Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	01230	03/29/2023
6	Loop Antenna	Beijin ZHINAN	ZN30900C	18050	03/25/2021
7	Spectrum Analyzer	R&S	FSV40-N	101798	04/07/2021
8	Horn Antenna	Schwarzbeck	BBHA 9120 D	2023	03/29/2023
9	Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	04/07/2021
10	Pre-Amplifier	EMCI	EMC051835S E	980662	04/07/2021

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	LISN	R&S	ENV432	1326.6105.02	03/28/2021
2	EMI Test Receiver	R&S	ESR	102524	04/06/2021
3	Manual RF Switch	JS TOYO 🔊		MSW-01/002	04/06/2021

Note:

1)The Cal. Interval was one year.2)The cable loss has calculated in test result which connection between each test instruments.

# 2.4. Test Software

Software name	Model	Version
Conducted emission Measurement Software	EZ-EMC	EMC-Con 3A1.1
Radiated emission Measurement Software	EZ-EMC	FA-03A.2.RE
Bluetooth and WIFI Test System	JS1120-3	2.5.77.0418



# 3. TEST ITEM AND RESULTS

# 3.1. Antenna Requirement

## **Standard Requirement**

#### FCC CFR Title 47 Part 15 Subpart C 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. 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.

### Test Result

The directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.



# 3.2. Conducted Output Power Test

## <u>Limit</u>

# FCC CFR Title 47 Part 15 Subpart E Section 15.407(a):

FCC Part 15 Subpart E(15.407)						
Test Item	Limit	Frequency Range(MHz)				
	Fixed: 1 Watt (30dBm) Mobile and Portable: 250mW (24dBm)	5150~5250				
Conducted Output Power	250mW (24dBm)	5250~5350				
	250mW (24dBm)	5470~5725				
	1 Watt (30dBm)	5725~5850				

# **Test Configuration**



#### Test Procedure

- The EUT was tested according to according to section 3 of KDB 789033 D02 General UNII Test Procedures New Rules V02r01.
- 2. The maximum conducted output power may be measured using a broadband AVG RF power meter.
- 3. Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor.
- 4. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.
- 5. Record the measurement data.

#### Test Mode

Please refer to the clause 2.2.

#### Test Result



Band	Test Mode	Channel (MHz)	Output Power (dBm)	Limit(MHz)	Result
		5180	6.70		315
	802.11a	5220	7.45		
		5240	8.27		
S. C.		5180	6.39	S.S.	
~	802.11n(HT20)	5220	7.22		
		5240	8.03		
	802.11n(HT40)	5190	5.79	x	80
U-NII-1		5230	6.81	24	Pass
150		5180	6.23	2	
	802.11ac(HT20)	5220	7.08		
		5240	7.85		5
4	802.11ac(HT40)	5190	5.54		S.
		5230	6.77	N. P	
	802.11ac(HT80)	5210	5.03		
	10 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -				Station States and the

Remark: The EUT provides one antennas for transmitting and receiving. Gain=0.90dBi< 6dBi So P<sub>out</sub>=P<sub>limit</sub>



# 3.3. Maximum Power Spectral Density Test

### Limit

FCC CFR Title 47 Part 15 Subpart E Section 15.407(a):

FCC Part 15 Subpart E(15.407)						
Test Item	Limit	Frequency Range(MHz)				
	Other than Mobile and Portable : 17dBm/MHz Mobile and Portable : 11dBm/MHz	5150~5250				
Power Spectral Density	11dBm/MHz	5250~5350				
X	11dBm/MHz	5470~5725				
	30dBm/500kHz	5725~5850				

### **Test Configuration**



### Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement is according to KDB 789033 D02 General UNII Test Procedures New Rules V02r01.

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.

- (2) Set analyser centre frequency to transmitting frequency.
- (3) Set the span to encompass the entire emissions bandwidth (EBW)(alternatively, the entire 99% OBW) of the signal.
- (4) Set the RBW to: 1 MHz
- (5) Set the VBW to: 3 MHz
- (6) Detector: RMS
- (7) Trace: Max Hold
- (7) Sweep time: auto
- (8) Trace average at least 100 traces in power averaging.
- (9) User the peak marker function to determine the maximum amplitude level within the RBW. Apply correction to the result if different RBW is used.

NOTE: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

#### Test Mode

Please refer to the clause 2.2.

#### Test Result

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Band	Test Mode	Channel (MHz)	Power Spectral Density (dBm/MHz)	Limit(dBm/MHz)	Result
	100 A	5180	5.51		N.S.
	802.11a	5220	5.79		
	Sec.	5240	7.37		
		5180	4.7		
100	802.11n(HT20)	5220	5.43	11	
		5240	5.9		
	802.11n(HT40)	5190	1.97		Dees
U-INII-I		5230	3.38		rass
	802.11ac(HT20)	5180	5.13		- Nor
		5220	6.48		
		5240	7.04	100 State	
	802.11ac(HT40)	5190	2.94		
		5230	3.34		
	802.11ac(HT80)	5210	0.63	120	



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# 3.4. 26dB Bandwidth and 99% Occupied Bandwidth Test

### Limit

The bandwidth at 26dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in KDB 789033 D02, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth.

FCC Part 15 Subpart C(15.407)					
Test Item Limit Frequency Range (MHz)					
	N/A	5150~5250			
26 dB Bandwidth		5250~5350			
		5470~5725			
6 dB Bandwidth	>500kHz	5725~5850			

# **Test Configuration**



### Test Procedure

- 1. According KDB 789033 D02 Section C
- 2. Connect the antenna port(s) to the spectrum analyzer input.
- 3. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).

Center Frequency = Channel center frequency

Span=2 x emission bandwidth

RBW = 1% to 5% of the emission bandwidth

VBW>3 x RBW

Sweep time= auto couple

Detector = Peak

Trace mode = max hold

- 4. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter wave form on the spectrum analyzer.
- 5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission, and use the 99 % power bandwidth function of the instrument

# The setting of the spectrum analyser as below:

26dB Bandwidth Test				
Spectrum Parameters	Setting			
Attenuation	Auto			
Span	>26 dB Bandwidth			
RBW	Approximately 1% of the emission bandwidth			
VBW	VBW>RBW			
Detector	Peak			
Trace	Max Hold			
Sweep Time	Auto			
99%	Occupied Bandwidth Test			
Spectrum Parameters	Setting			
Attenuation	Auto			
RBW	1% to 5% of the OBW			
VBW	≥ 3RBW			
Detector	Peak			
Trace	Max Hold			

NOTE: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

### Test Mode

Please refer to the clause 2.2.

# **Test Results**

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11P		No. 10 Carlos Marca a construction of the			
Band	Test Mode	Channel (MHz)	26dB Bandwidth [MHz]	99% Occupied bandwidth (MHz)	Result
	200 B	5180	19.600	16.983	Pass
	802.11a	5220	19.680	17.023	Pass
	S.	5240	20.080	16.863	Pass
- 12NS	£	5180	20.280	18.022	Pass
Nov.	802.11n(HT20)	5220	19.600	17.942	Pass
		5240	20.160	18.382	Pass
	802.11n(HT40)	5190	40.400	36.044	Pass
U-NII-1		5230	40.720	36.284	Pass
	802.11ac(HT20)	5180	20.080	17.782	Pass
		5220	20.120	18.022	Pass
		5240	19.960	17.862	Pass
	902 11cc/UT40)	5190	40.320	36.523	Pass
20 Deland	002.11ac(H140)	5230	40.880	36.044	Pass
No.	802.11ac(HT80)	5210	79.680	75.764	Pass







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