

# **FCC Test Report**

Report No.: AGC00806201006FE02

FCC ID	8	2AGPMHJ-131IMH
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Bluetooth 5.1 ultra-low power module
BRAND NAME		HongJia
MODEL NAME	i	НЈ-131ІМН, НЈ-130ІМН, НЈ-132ІМН, НЈ-133ІМН, НЈ-135ІМН
APPLICANT	:	Tangshan HongJia electronic technology co., LTD.
DATE OF ISSUE	© •	Nov. 26, 2020
STANDARD(S)	:	FCC Part 15.247
REPORT VERSION	:	V1.0



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#### **REPORT REVISE RECORD**

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0		Nov. 26, 2020	Valid	Initial Release

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## **1. VERIFICATION OF COMPLIANCE**

Tangshan HongJia electronic technology co., LTD.	
352 No. 2 # building power springs in Qianxi County, Tangshan City, Hebei Province, China	
Tangshan HongJia electronic technology co., LTD.	
352 No. 2 # building power springs in Qianxi County, Tangshan City, Hebei Province, China	
Tangshan HongJia electronic technology co., LTD.	
352 No. 2 # building power springs in Qianxi County, Tangshan City, Hebei Province, China	
Bluetooth 5.1 ultra-low power module	
HongJia	
HJ-131IMH	
HJ-130IMH, HJ-132IMH, HJ-133IMH, HJ-135IMH	
All the series models are the same as the test model except for the model names.	
Nov. 13, 2020 to Nov. 26, 2020	
No any deviation from the test method	
Normal	
Pass	
AGCRT-US-BLE/RF	

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC part 15.247.

John Zerry Prepared By John Zeng Nov. 26, 2020 (Project Engineer) Max Zham **Reviewed By** Max Zhang Nov. 26, 2020 (Reviewer) Approved By Forrest Lei Nov. 26, 2020 (Authorized Officer)

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## 2. GENERAL INFORMATION

## 2.1. PRODUCT DESCRIPTION

The EUT is designed as a "Bluetooth 5.1 ultra-low power module". It is designed by way of utilizing the GFSK technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480GHz		
RF Output Power -5.308dBm (Max)			
Bluetooth Version	V 5.1		
Modulation	BR □GFSK, EDR □π /4-DQPSK, □8DPSK BLE ⊠GFSK 1Mbps □GFSK 2Mbps		
Number of channels	40 Channel		
Antenna Designation	Integral Antenna (Comply with requirements of the FCC part 15.203)		
Antenna Gain	3.5dBi		
Hardware Version	V1.0		
Software Version	V2.6		
Power Supply	DC 3.3V		

## 2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	0	2402 MHz
	1	2404 MHz
2400~2483.5MHz		
	38	2478 MHz
	39	2480 MHz

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## 2.3. RELATED SUBMITTAL(S)/GRANT(S)

This submittal(s) (test report) is intended for FCC ID: 2AGPMHJ-131IMH filing to comply with the FCC Part 15.247 requirements.

#### 2.4. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

#### 2.5. SPECIAL ACCESSORIES

Refer to section 5.2.

## 2.6. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

#### 2.7. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device. For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

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## **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%.

- Uncertainty of Conducted Emission, Uc = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB
- Uncertainty of total RF power, conducted,  $Uc = \pm 0.8 dB$
- Uncertainty of RF power density, conducted, Uc = ±2.6 dB
- Uncertainty of spurious emissions, conducted,  $Uc = \pm 2.7 dB$
- Uncertainty of Occupied Channel Bandwidth:  $Uc = \pm 2 \%$

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## 4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION		
1	Low channel TX		
2	Middle channel TX		
3	High channel TX		

Note:

1. Only the result of the worst case was recorded in the report, if no other cases.

2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.

4. The test software is the SmartSnippets Toolbox v5.0.12.2786 which can set the EUT into the individual test modes.

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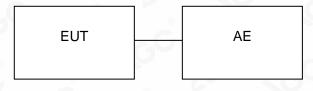
Web: http://cn.agc-cert.com/



## **5. SYSTEM TEST CONFIGURATION**

## 5.1. CONFIGURATION OF TESTED SYSTEM

Radiated Emission Configure:



Conducted Emission Configure:

EUT	AE

## 5.2. EQUIPMENT USED IN TESTED SYSTEM

ltem	Equipment	Model No.	ID or Specification	Remark
1	Bluetooth 5.1 ultra-low power module	HJ-131IMH	2AGPMHJ-131IMH	EUT
2	PC 1	N/A	N/A	AE
3	PC 2	N/A	N/A	AE
4	PC adapter 1	N/A	N/A	AE
5	PC adapter 2	N/A	N/A	AE
6	Charger line	G258	N/A	AE
7	control board	EPS-35-3.3	DC 3.3V	AE

#### **5.3. SUMMARY OF TEST RESULTS**

FCC RULES	DESCRIPTION OF TEST	RESULT
15.247 (b)(3)	Peak Output Power	Compliant
15.247 (a)(2)	6 dB Bandwidth	Compliant
15.247 (d)	Conducted Spurious Emission	Compliant
15.247 (e)	Maximum Conducted Output Power Density	Compliant
15.209	Radiated Emission	Compliant
15.207	Conducted Emission	Compliant

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## 6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd		
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China		
Designation Number	CN1259		
FCC Test Firm Registration Number	975832		
A2LA Cert. No.	5054.02		
Description	Attestation of Global Compliance (Shenzhen) Co., Ltd is accredited by A2LA		

## TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021
LISN	R&S	ESH2-Z5	100086	Jul. 03,2020	Jul. 02,2021
Test software	R&S	ES-K1(Ver.V1.71)	N/A	N/A	N/A

## TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 12, 2019	Dec. 11, 2020
2.4GHz Filter	EM Electronics	2400-2500MHz	N/A	Mar. 23, 2020	Mar. 22, 2022
Attenuator	ZHINAN	E-002	N/A	Sep. 03, 2020	Sep. 02, 2022
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 09, 2019	Sep. 08, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 17, 2019	May 16, 2021
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 03, 2020	Sep. 02, 2022
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 09, 2019	Jan. 08, 2021
Test software	Tonscend	JS32-RE (Ver.2.5)	C N/A	N/A	N/A

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## 7. PEAK OUTPUT POWER

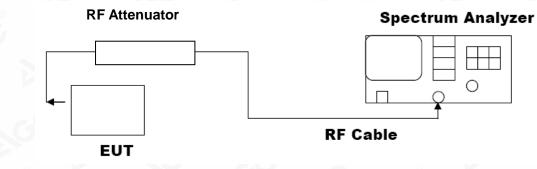
## 7.1. MEASUREMENT PROCEDURE

For peak power test:

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. RBW≥DTS bandwidth
- 3. VBW≥3\*RBW.
- 4. SPAN≥VBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: Max hold.

Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

## 7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) PEAK POWER TEST SETUP



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#### 7.3. LIMITS AND MEASUREMENT RESULT

PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION								
Frequency (GHz)Peak Power (dBm)Applicable Limits (dBm)Pass or Fail								
2.402	-5.308	30	Pass					
2.440	-6.197	30	Pass					
2.480	-6.938	30	Pass					

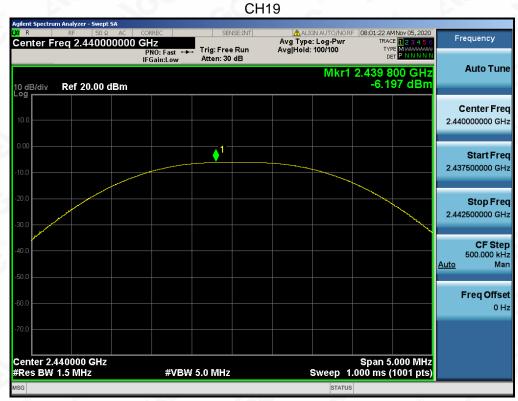
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## 8.6 DB BANDWIDTH

#### **8.1. MEASUREMENT PROCEDURE**

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 kHz, VBW $\ge$ 3×RBW.
- 4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

## 8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 7.2.

## **8.3. LIMITS AND MEASUREMENT RESULTS**

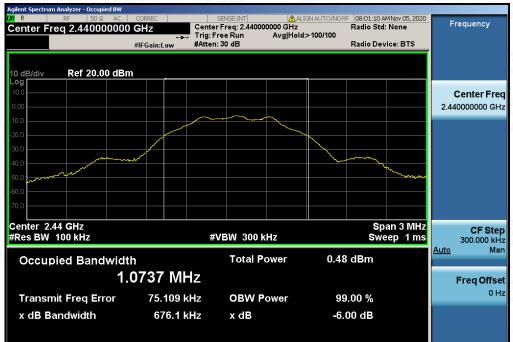
LIMITS AND MEASUREMENT RESULT									
Annicable Limite		Applicable Limits							
Applicable Limits	Test Data	Criteria							
ů.	Low Channel	670.8	PASS						
>500KHZ	Middle Channel	676.1	PASS						
	High Channel	680.0	PASS						

#### SENSE:INT ALIGN AUTO/NORF Center Freq: 2.402000000 GHz Trig: Free Run Avg|Held:>100/100 #Atten: 30 dB 07:57:10 AM Nov 05, 2020 Frequency Radio Std: None Radio Device: BTS #IFGain:Low Ref 20.00 dBm Center Frea 2.402000000 GHz Center 2.402 GHz #Res BW 100 kHz Span 3 MHz **CF** Step #VBW 300 kHz Sweep 1 ms 300.000 kHz <u>Auto</u> 1.34 dBm **Occupied Bandwidth** Total Power 1.0760 MHz **Freq Offset** 0 Hz Transmit Freq Error 74.917 kHz **OBW Power** 99.00 % -6.00 dB x dB Bandwidth 670.8 kHz x dB

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

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#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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## 9. CONDUCTED SPURIOUS EMISSION

#### 9.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

#### 9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 7.2.

#### 9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

#### 9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT								
Applicable Limite	Measurement Result							
Applicable Limits	Test Data	Criteria						
In any 100 kHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power.	At least -20dBc than the reference level	PASS						

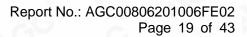
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## TEST RESULT FOR ENTIRE FREQUENCY RANGE GFSK MODULATION IN LOW CHANNEL

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Agilent Spectrum Analyzer - Swept SA W R RF 50 Ω AC Center Freq 13.741750	000 GHz PN0: East +++ Trig: F	Avg ree Run Avg l	ALIGN AUTO/NORF 0 Type: Log-Pwr Iold: 10/10	7:59:00 AM Nov 05, 2020 TRACE 123456 TYPE MWWWWW DET P NNNNN	Frequency
10 dB/div Ref 20.00 dBn	IFGain:Low Atten:	30 dB	Mkr1 2	20.601 6 GHz -48.261 dBm	Auto Tune
Log 10.0 0.00					Center Freq 13.741750000 GHz
-20.0			1	-25.37 dBm	<b>Start Freq</b> 2.483500000 GHz
-50.0 -60.0 -70.0					<b>Stop Freq</b> 25.000000000 GHz
Start 2.48 GHz #Res BW 100 kHz	#VBW 300 kł		Sweep 2.1	Stop 25.00 GHz 52 s (30000 pts)	<b>CF Step</b> 2.251650000 GHz <u>Auto</u> Man
	× ¥ 20.601 6 GHz 48.261	dBm	FUNCTION WIDTH	FUNCTION VALUE	Freq Offset 0 Hz
8 9 10 11 ↓ ↓ MSG			STATUS		

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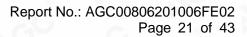
 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com



Agilent Spectrum Analyzer - Swep LXI R RF 50 G	2 AC CORREC	SENSE:INT		08:02:02 AM Nov 05, 2020	
Center Freq 2.4400		. Trig: Free Run	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P N N N N N	Frequency
0 dB/div Ref 20.00	IFGain:Low	Atten: 30 dB	Mkr1 2.4	40 069 9 GHz -6.256 dBm	Auto Tune
0.00		1			<b>Center Freq</b> 2.440000000 GHz
10.0 20.0 30.0 -40.0	and and a state of the state of				<b>Start Freq</b> 2.438500000 GHz
50.0 400 400 400 400 400 400 400 400 400					Stop Freq 2.441500000 GHz
Center 2.440000 GHz #Res BW 100 kHz		/ 300 kHz	Sweep 2.00	Span 3.000 MHz 0 ms (30000 pts)	CF Step 300.000 kHz Auto Man
MKR MODE TRC SCL 1 N 1 f 2 3 4 4 5 4	× 2.440 069 9 GHz	Y F -6.256 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offset 0 Hz
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1 ISG			STATUS		
Agilent Spectrum Analyzer - Swep					
R RF 50 G Center Freq 1.2150	ac correc COODOO GHZ PNO: Fast ↔ IFGain:Low	→ Trig: Free Run Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 10/10	08:02:11 AMNov 05, 2020 TRACE 1 2 3 4 5 6 TYPE M 12 3 4 5 N N N N N DET P N N N N N	Frequency
10 dB/div Ref 20.00	dBm		Mkr1	2.336 96 GHz -56.732 dBm	Auto Tune
0.00					Center Freq 1.215000000 GHz
-20.0				-26.26 dBm	Start Freq 30.000000 MHz
-50.0 -60.0 -70.0	l (personand) este la constante de la sobre de la constante de la constante de la constante de la constante de	n an han berti ya yang secilar ti an bita na berseta Mana kana sana kata barta an ana sana kata kata			<b>Stop Freq</b> 2.400000000 GHz
Start 30 MHz #Res BW 100 kHz	#VBV	/ 300 kHz		Stop 2.400 GHz .0 ms (30000 pts)	<b>CF Step</b> 237.000000 MHz <u>Auto</u> Man
MKR MODE TRC SCL 1 N 1 F 2 3 4 4 4 4 4 4 4 4 4 4	× 2.336 96 GHz	Y F -56.732 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offset
5 6 7 8 9 10					
11 11 MSG			STATUS	<b>▼</b>	

#### GFSK MODULATION IN MIDDLE CHANNEL

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Agilent Spect	-										
<mark>l,XI</mark> R Contor	RF Freq 13	50 Ω		REC	SEN	ISE:INT		ALIGN AUTO/NOF /pe: Log-Pwr		MNov 05, 2020	Frequency
Center	Freq 15	.74173		NO: Fast ↔	🕂 Trig: Free			ld: 10/10	TY		
			IFG	Gain:Low	Atten: 30	dB			C	ET I ET I ALIA I ALIA	Auto Tuno
								Mkr	1 24.43	0 3 GHz	Auto Tune
10 dB/div	Ref 2	0.00 dl	Bm						-48.8	28 dBm	
Log 10.0											
											Center Freq
0.00											13.741750000 GHz
-10.0											
-20.0										-26.26 dBm	Start Freq
-30.0				į						-26.26 ubm	2.483500000 GHz
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-50.0										• • • • • •	
		م. المروادان عان	man dahar sala kasa sa		and a differential descention	لىلەر رو <sup>1</sup> ار رولىدىلى	te attention of				Stop Freq
-60.0 <b>-</b> 0015		<b>State</b>			1	<del>التحديد (اللي يا العربي)</del>					25.00000000 GHz
-70.0											
Start 2.4									Stop 2	5.00 GHz	CF Step
	48 GHZ N 100 kH	17		#\/B\/	V 300 kHz			Sween	310 p 2 2 1 5 2 s (3	0000 pts)	2.251650000 GHz
		12									<u>Auto</u> Man
MKR MODE	TRC SCL		× 24.430 (	3 CH7	ү -48.828 dE		NCTION	FUNCTION WIDTH	FUNCTI	ON VALUE 🔺	
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3						_					0 Hz
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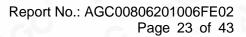
 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com
 Web: http://cn.agc-cert.com/



Agilent Spectrum Analyzer - Swe X R RF 50 Center Freq 2.4800	Ω AC CORREC 0000000 GHz PNO: Wide ↔	SENSE:INT	ALIGN AUTO/NORF Avg Type: Log-Pwr Avg Hold:>10/10	08:05:23 AMNov 05, 2020 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P N N N N N	Frequency
10 dB/div Ref 20.00	IFGain:Low	Atten. 30 dB	Mkr1 2.	480 070 6 GHz -7.013 dBm	Auto Tun
10.0 0.00 -10.0					Center Fre 2.480000000 GH
-20.0					<b>Start Fre</b> 2.478500000 GH
-40.0 -50.0 -60.0				and the state of t	<b>Stop Fre</b> 2.481500000 GH
- <sup>70.0</sup> Center 2.480000 GH #Res BW 100 kHz		V 300 kHz	Sweep 2.0	Span 3.000 MHz 00 ms (30000 pts)	CF Stej 300.000 kH
MKR MODE TRC SCL	×		FUNCTION FUNCTION WIDTH	FUNCTION VALUE	Auto Ma
1 N 1 f 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	2.480 070 6 GHz	-7.013 dBm			Freq Offse 0 H
6 7 8 9					
10					
11				<b>_</b>	
			STATUS	<b>▼</b>	
ALC	unt C0		STATUS	<b>▼</b>	
AISG AISG Agilent Spectrum Analyzer - Swe XI R RF 50	IΩ AC CORREC	SENSE:INT	ALIGN AUTO/NORF	08:05:32 AMNov 05, 2020	Frequency
ASG ASG Agilent Spectrum Analyzer - Swe	Ω AC CORREC 0000000 GHz PN0: Fast ↔	Trig: Free Run		08:05:32 AMNov 05, 2020	Frequency
AISG AISG	D AC CORREC DOOOOOO GHz PN0: Fast ↔ IFGain:Low	Talas Face Dave	ALIGN AUTO/NORF Avg Type: Log-Pwr Avg Hold: 10/10	08:05:32 AMNov 05, 2020	
AIG AIG Mark Spectrum Analyzer - Swe X R RF 50 Center Freq 1.2150	D AC CORREC DOOOOOO GHz PN0: Fast ↔ IFGain:Low	Trig: Free Run	ALIGN AUTO/NORF Avg Type: Log-Pwr Avg Hold: 10/10	08:05:32 AMNov 05, 2020 TRACE 2 3 4 5 6 TYPE MANANANA DET PINNIN N 1.941 07 GHZ	Auto Tun Center Fre
Also Also	D AC CORREC DOOOOOO GHz PN0: Fast ↔ IFGain:Low	Trig: Free Run	ALIGN AUTO/NORF Avg Type: Log-Pwr Avg Hold: 10/10	08:05:32 AMNov 05, 2020 TRACE 12:34 5 6 TYPE 14:56 TRACE 12:34 5 6 TYPE 14:56 TRACE 12:32 OFF 14:56 OFF 14:5	Auto Tun Center Fre 1.215000000 GH Start Fre
Arsg Arsg	0 AC CORREC 000000 GHZ PNO: Fast → IFGain:Low	Trig: Free Run	ALIGN AUTO/NORF Avg Type: Log-Pwr Avg Hold: 10/10	08:05:32 AMNov 05, 2020 TRACE 0.23 4 5 6 TYPE MANNANO OF PINNINN 1.941 07 GHz -44.174 dBm	Auto Tun Center Fre 1.215000000 GH Start Fre 30.000000 MH Stop Fre
Image: sector of the	0 AC CORREC 000000 GHZ PNO: Fast → IFGain:Low	Trig: Free Run	Aug Type: Log-Pwr Avg Type: Log-Pwr Avg Hold: 10/10 MKr1	08:05:32 AMNov 05, 2020 TRACE 12:3 4 5 6 TYPE MANNANN 1.941 07 GHz -44.174 dBm -27.01 dBm 1.941 07 GHz -27.01 dBm	Auto Tun Center Fre 1.215000000 GH Start Fre 30.000000 MH Stop Fre 2.400000000 GH
Image: sector of the	Q AC CORREC 000000 GHZ PNO: Fast → IFGain:Low 0 dBm 0 dBm	Trig: Free Run Atten: 30 dB	ALIGN AUTO/NORF Avg Type: Log-Pwr Avg Hold: 10/10 Mkr1	08:05:32 AMINOV 05, 2020 TRACE 12:33 4 5 6 TYPE 12:34 5 6 TYPE MANNANA 1.941 07 GHz -44.174 dBm -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm -27.01 dB	Auto Tun Center Fre 1.21500000 GH Start Fre 30.000000 MH Stop Fre 2.400000000 GH
Image: system in the	2 AC CORREC 0000000 GHZ PNO: Fast → IFGain:Low 0 dBm 0 dBm	Trig: Free Run Atten: 30 dB	Aug Type: Log-Pwr Avg Type: Log-Pwr AvgjHold: 10/10 MIKr/	06:05:32 AMNov 05, 2020 TRACE 12:2:4:5:6 TYPE 12:2:4:5:6 TYPE 14:5:6 TYPE 14:5:6 TYPE 12:2:4:5:6 TYPE 12:2:5:6 TYPE 12:2:4:5:6 TYPE 12:3:5:6 TYPE 12:3:5:6 TYPE 12:3:5:6 TYPE 12:3:5:6 TYPE 12:5:6 TYPE 12:5:6 TYPE 12:5:6 TYPE 12:5:6 TYPE 12:5:6 T	Auto Tun           Center Fre           1.215000000 GH           Start Fre           30.000000 MH           Stop Fre           2.400000000 GH           CF Ste           237.000000 MH           Auto           Ma           Freq Offset
Image: sector of the	Q     AC     CORREC       000000 GHZ     PN0: Fast →       IFGain:Low	Trig: Free Run Atten: 30 dB	ALIGN AUTO/NORF Avg Type: Log-Pwr Avg Hold: 10/10 Mkr1	08:05:32 AMINOV 05, 2020 TRACE 12:33 4 5 6 TYPE 12:34 5 6 TYPE MANNANA 1.941 07 GHz -44.174 dBm -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm -27.01 dB	Auto Tun           Center Fre           1.215000000 GH           Start Fre           30.000000 MH           Stop Fre           2.400000000 GH           CF Ste           237.000000 MH           Auto           Ma           Freq Offset
Image: sector of the	Q     AC     CORREC       000000 GHZ     PN0: Fast →       IFGain:Low	Trig: Free Run Atten: 30 dB	ALIGN AUTO/NORF Avg Type: Log-Pwr Avg Hold: 10/10 Mkr1	08:05:32 AMINOV 05, 2020 TRACE 12:33 4 5 6 TYPE 12:34 5 6 TYPE MANNANA 1.941 07 GHz -44.174 dBm -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm 1 -27.01 dBm -27.01 dB	Auto Tuno Center Free 1.21500000 GH Start Free 30.000000 MH Stop Free 2.400000000 GH

## **GFSK MODULATION IN HIGH CHANNEL**

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Center Freq 13.750000000 GHz         Avg Type: Log-Pwr ArgiHold: 10/10         Track Big 20.055 Track Big 20.055         Frequency           10 dB/div         Ref 20.00 dBm         48.895 dBm         Avg Type: Log-Pwr ArgiHold: 10/10         Track Big 20.055         Auto Tune           10 dB/div         Ref 20.00 dBm         48.895 dBm         48.895 dBm         Center Freq 13.750000000 GHz         Auto Tune           10 dB/div         Ref 20.00 dBm         227 01 dB         250000000 GHz         250000000 GHz         250000000 GHz         250000000 GHz         2500000000 GHz         250000000 GHz	Agilent Spectru												
PHO: Fast         Atten: 30 dB         Mikri 24.893 5 GHz         Auto Tune           10 dB/div         Ref 20.00 dBm         -48.895 dBm         -48.895 dBm         Center Freq           10 dB/div         Ref 20.00 dBm         -48.895 dBm         -48.895 dBm         Center Freq           10 dB/div         Ref 20.00 dBm         -48.895 dBm         -48.895 dBm         Center Freq           10 dB/div         -48.895 dBm         -48.895 dBm         -48.895 dBm         Center Freq           10 dB/div         -48.895 dBm         -48.895 dBm         -48.895 dBm         Center Freq           20 dB/div         -48.895 dBm         -48.895 dBm         -48.895 dBm         -48.895 dBm           20 dB/div         -48.895 dBm         -48.895 dBm         -48.895 dBm         -48.895 dBm           20 dB/div         -48.895 dBm         -48.895 dBm         -48.895 dBm         -48.895 dBm           1 f         24.893 5 GHz         -48.895 dBm         -48.895 dBm         -48.895 dBm         -48.895 dBm           1 f         24.893 5 GHz         -48.895 dBm         <	Center F	req 1	50 Ω 13.7500	00000 G	Hz			Avg	Type: L	og-Pwr	TRAG	E 123456	Frequency
Cog         N         1         f         24.893 5 GHz         Y         Function         Function         Value         Center Freq 13.75000000 GHz         Stop Freq 2.50000000 GHz           300	40 JD/Jiu	Pot	20.00/	IF				Avg			□ 1 24.89	<sup>P NNNNN</sup> 3 5 GHz	Auto Tune
200	Log 10.0 0.00	Ke	20.00 (										Center Freq 13.750000000 GHz
60.0       1	-20.0 -30.0											-27.01 dBm	Start Freq 2.50000000 GHz
#Res BW 100 kHz         #VBW 300 kHz         Sweep 2.152 s (30000 pts)         2.25000000 GHz           MKR MODE TRC SCL         X         Y         FUNCTION         FUNCTION WIDTH         FUNCTION VALUE         Auto           1         N         1         f         24.893 5 GHz         -48.895 dBm         Finction         Finction Value         Finction Value <t< td=""><td>-60.0 toolog</td><td></td><td></td><td></td><td><b>~~~</b></td><td></td><td>and an United in the</td><td></td><td></td><td></td><td></td><td></td><td><b>Stop Freq</b> 25.00000000 GHz</td></t<>	-60.0 toolog				<b>~~~</b>		and an United in the						<b>Stop Freq</b> 25.00000000 GHz
2     A <td>#Res BW</td> <td>100</td> <td>kHz</td> <td>×</td> <td>#VE</td> <td></td> <td>Iz</td> <td>FUNCTION</td> <td></td> <td></td> <td>2.152 s (3</td> <td>0000 pts)</td> <td><b>CF Step</b> 2.250000000 GHz <u>Auto</u> Man</td>	#Res BW	100	kHz	×	#VE		Iz	FUNCTION			2.152 s (3	0000 pts)	<b>CF Step</b> 2.250000000 GHz <u>Auto</u> Man
	2 3 4 5 6 7 8 9 9 10 11			24.893	5 GHz	-48.895	dBm						Freq Offset 0 Hz

Note: The peak emissions without marker on the above plots are fundamental wave and need not to compare with the limit.

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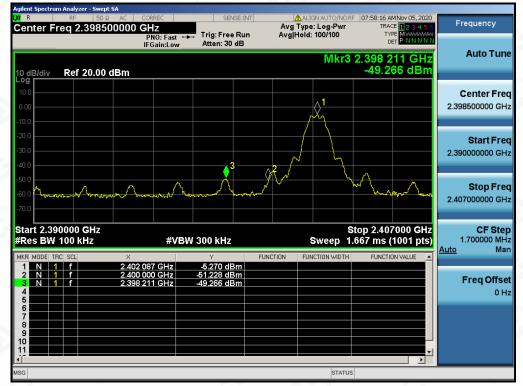
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 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com

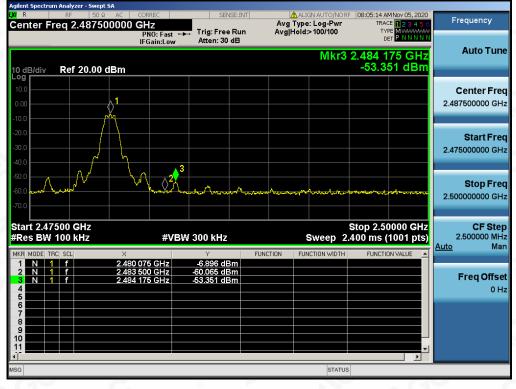
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## TEST RESULT FOR BAND EDGE GFSK MODULATION IN LOW CHANNEL

## GFSK MODULATION IN HIGH CHANNEL



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## **10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY**

#### **10.1. MEASUREMENT PROCEDURE**

- (1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (3). Set the SPA Trace 1 Max hold, then View.

Note: The method of PKPSD in the KDB 558074 item 10.2 was used in this testing.

#### **10.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)**

Refer to Section 7.2.

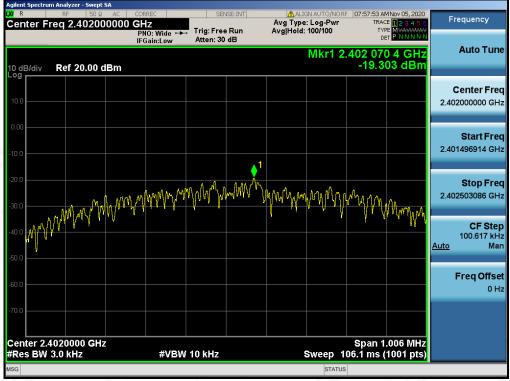
#### **10.3. MEASUREMENT EQUIPMENT USED**

Refer to Section 6.

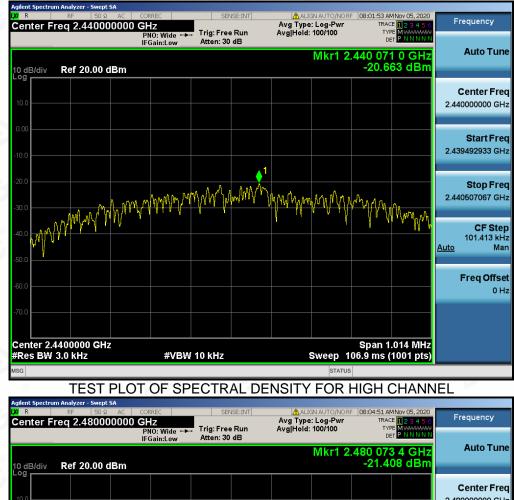
#### **10.4. LIMITS AND MEASUREMENT RESULT**

Channel No.	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	-19.303	8	Pass
Middle Channel	-20.663	8	Pass
High Channel	-21.408	8	Pass

## TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



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#### TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



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## **11. RADIATED EMISSION**

#### **11.1. MEASUREMENT PROCEDURE**

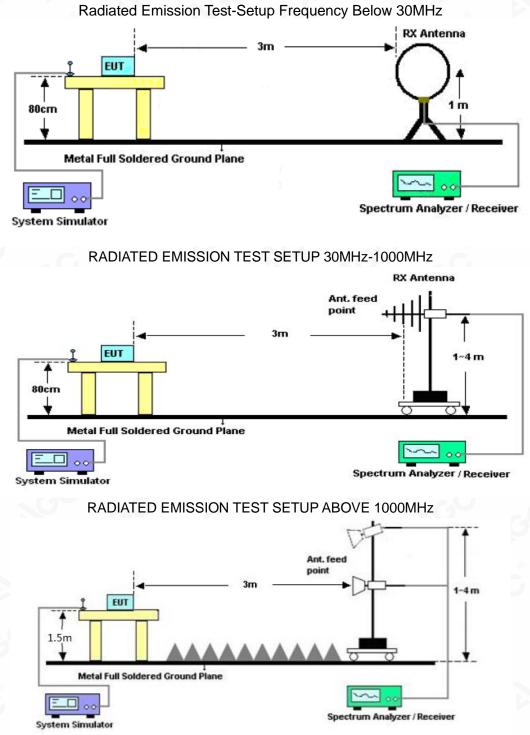
- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.

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#### 11.2. TEST SETUP



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## **11.3. LIMITS AND MEASUREMENT RESULT**

15.209 Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

## 11.4. TEST RESULT

## **RADIATED EMISSION BELOW 30MHz**

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

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## Report No.: AGC00806201006FE02 Page 30 of 43

EUT	EUT		Bluetooth 5.1 ultra-low power module			Model	Name		H,	J-13	31IN	ΛH	8						
Temp	eratu	re			25	°C					Relativ	e Hum	idity	60	)%				
Press	sure				960hPa Test Voltage Normal Voltage				Test Voltage		age	~							
Test N	Node				Mo	ode	1				Antenn	a		Horizontal					
P	1	30								FCC part 150									
		20						+											
		10 00			-														
		90																	
		80																	
	Level[dBµV/m]	70																	
	l[dBµ	60										-							
		50																	
		40											-		<b>6</b>	الإلىسىدى	مارستين		
		30 20	٨		\ <sup>₩</sup>		2			3.0	<b>8</b> <sup>4</sup>	mandeling	and the second second	- marine					
		10	_//		ND1	~~~~	$\sim$	~~	~~~~~~	and the second second									
		0						ļ											
	-	10																	
V		30M -		Limit Detector		– Hori	zontal	PK	100M	Frequency[H:	<u>z]</u>							1G	

## **RADIATED EMISSION BELOW 1GHZ**

N	Ю.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
	1	52.3100	26.69	11.49	40.00	13.31	100	130	Horizontal
	2	64.9200	22.77	10.09	40.00	17.23	100	5	Horizontal
	3	131.8500	19.97	14.28	43.50	23.53	100	164	Horizontal
	4	234.6700	23.76	14.40	46.00	22.24	100	356	Horizontal
	5	400.5400	28.84	19.81	46.00	17.16	100	307	Horizontal
	6	620.7300	31.32	24.67	46.00	14.68	100	195	Horizontal

#### **RESULT: PASS**

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#### Report No.: AGC00806201006FE02 Page 31 of 43

EUT	Bluetooth 5.1 ultr module	a-low power	Model Na	me	HJ-13	31IMH
Temperature	25° C		Relative I	Humidity	60%	©
Pressure	960hPa	60hPa Test Voltage Normal Volta			al Voltage	
Test Mode	Mode 1		Antenna		Vertic	al
130		FCC part 15C				
120 110 100 90 80 100 90 80 100 90 80 100 90 90 80 100 90 90 90 90 90 90 90 90 90						
20 <b>1</b> 0 <b>1</b>	100M					16
QP Limit QP Detect	Vertical PK	Frequency[Hz]				
NO. Freq. [MHz]	Level Factor [dBµV/m] [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	36.7900	26.47	11.16	40.00	13.53	100	1	Vertical
2	52.3100	31.16	11.49	40.00	8.84	100	280	Vertical
3	108.5700	22.10	12.27	43.50	21.40	100	166	Vertical
4	234.6700	23.36	14.40	46.00	22.64	100	164	Vertical
5	484.9300	27.73	21.83	46.00	18.27	100	52	Vertical
6	767.2000	33.44	27.63	46.00	12.56	100	119	Vertical

#### RESULT: PASS Note:

1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. All test modes had been tested. The mode 1 is the worst case and recorded in the report.

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## Report No.: AGC00806201006FE02 Page 32 of 43

## **RADIATED EMISSION ABOVE 1GHZ**

EUT	Bluetooth 5.1 ultra-low power module	Model Name	HJ-131IMH
Temperature	25° C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4804.000	44.36	0.08	44.44	74	-29.56	peak
4804.000	35.12	0.08	35.2	54	-18.8	AVG
7206.000	39.57	2.21	41.78	74	-32.22	peak
7206.000	30.45	2.21	32.66	54	-21.34	AVG
5	.C			NO Y	20	
emark:		) (	0			
actor = Anter	nna Factor + Cab	le Loss – Pre-	amplifier.	8		

EUT	Bluetooth 5.1 ultra-low power module	Model Name	HJ-131IMH
Temperature	25° C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical

	SV					
Meter Reading	Factor	Emission Level	Limits	Margin	Value Type	
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type	
45.39	0.08	45.47	74	-28.53	peak	
35.15	0.08	35.23	54	-18.77	AVG	
39.47	2.21	41.68	74	-32.32	peak	
30.15	2.21	32.36	54	-21.64	AVG	
			8			
		- CV	G			
-	(dBµV) 45.39 35.15 39.47	(dBµV)         (dB)           45.39         0.08           35.15         0.08           39.47         2.21	(dBµV)         (dB)         (dBµV/m)           45.39         0.08         45.47           35.15         0.08         35.23           39.47         2.21         41.68	(dBµV)         (dB)         (dBµV/m)         (dBµV/m)           45.39         0.08         45.47         74           35.15         0.08         35.23         54           39.47         2.21         41.68         74	(dBµV)         (dB)         (dBµV/m)         (dBµV/m)         (dB)           45.39         0.08         45.47         74         -28.53           35.15         0.08         35.23         54         -18.77           39.47         2.21         41.68         74         -32.32	

Factor = Antenna Factor + Cable Loss – Pre-amplifier

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## Report No.: AGC00806201006FE02 Page 33 of 43

EUT	Bluetooth 5.1 ultra-low power module	Model Name	HJ-131IMH
Temperature	25° C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4880.000	45.19	0.14	45.33	74	-28.67	peak
4880.000	36.47	0.14	36.61	54	-17.39	AVG
7320.000	39.87	2.36	42.23	74	-31.77	peak
7320.000	29.13	2.36	31.49	54	-22.51	AVG
0				C		
	8					

EUT	Bluetooth 5.1 ultra-low power module	Model Name	HJ-131IMH
Temperature	25° C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type	
4880.000	47.15	0.14	47.29	74 💿	-26.71	peak	
4880.000	38.27	0.14	38.41	54	-15.59	AVG	
7320.000	40.16	2.36	42.52	74	-31.48	peak	
7320.000	30.22	2.36	32.58	54	-21.42	AVG	
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#### Report No.: AGC00806201006FE02 Page 34 of 43

EUT	Bluetooth 5.1 ultra-low power module	Model Name	HJ-131IMH
Temperature	25° C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type	
4960.000	46.39	0.22	46.61	74	-27.39	peak	
4960.000	35.47	0.22	35.69	54	-18.31	AVG	
7440.000	38.27	2.64	0 40.91	74	-33.09	peak	
7440.000	29.34	2.64	31.98	54	-22.02	AVG	
8	0		1	3	©		
emark:	C C	8		100	60	6	
actor = Anter	nna Factor + Cable	Loss – Pre-	amplifier.				

EUT	Bluetooth 5.1 ultra-low power module	Model Name	HJ-131IMH
Temperature	25° C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin		
(MHz)	(dBµV)	(dB)	⊙ (dBµV/m)	(dBµV/m)	(dB)	Value Type	
4960.000	46.29	0.22	46.51	74	-27.49	peak	
4960.000	36.74	0.22	36.96	54	-17.04	AVG	
7440.000	41.23	2.64	43.87	74	-30.13	peak	
7440.000	30.55	2.64	33.19	54	-20.81	AVG	
		~60				6	
emark: 💿							

Factor = Antenna Factor + Cable Loss – Pre-amplifier

#### **RESULT: PASS**

#### Note:

The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit. The "Factor" value can be calculated automatically by software of measurement system.

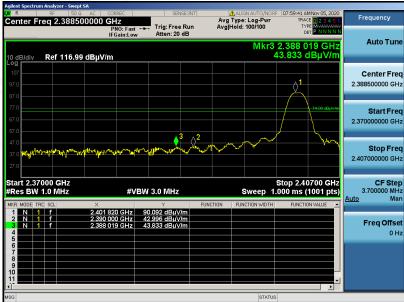
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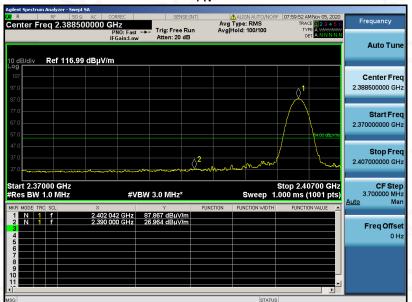
#### Report No.: AGC00806201006FE02 Page 35 of 43

EUT	Bluetooth 5.1 ultra-low power module	Model Name	HJ-131IMH
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

PK



AV



**RESULT: PASS** 

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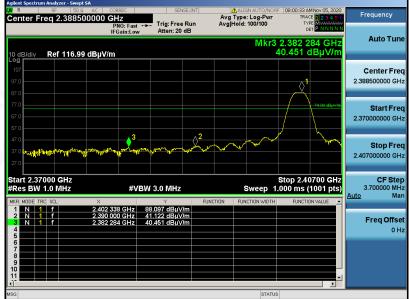
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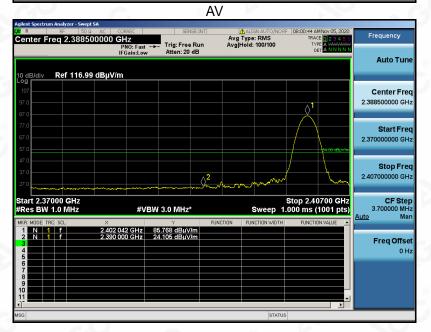


#### Report No.: AGC00806201006FE02 Page 36 of 43

EUT	Bluetooth 5.1 ultra-low power module	Model Name	HJ-131IMH
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical
	DI		







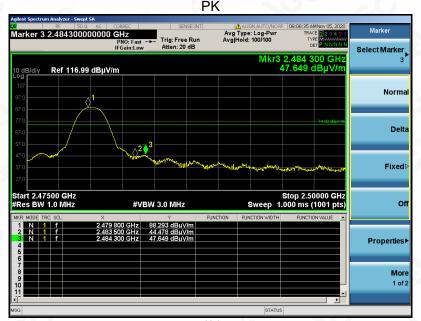
**RESULT: PASS** 

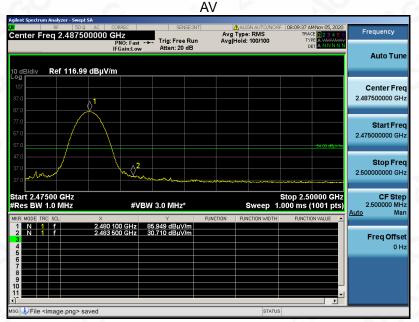
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#### Report No.: AGC00806201006FE02 Page 37 of 43

EUT	Bluetooth 5.1 ultra-low power module	Model Name	HJ-131IMH
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal





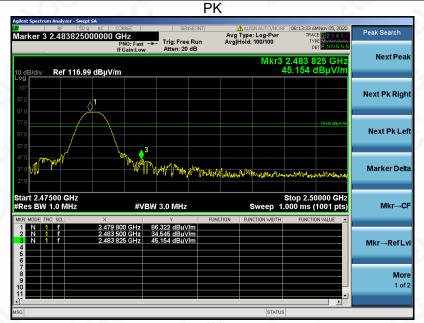
**RESULT: PASS** 

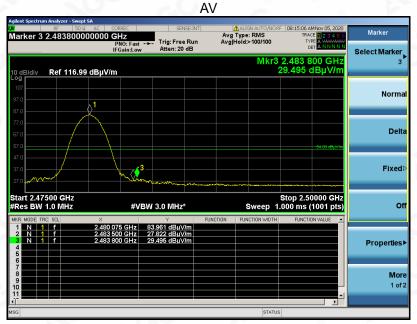
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#### Report No.: AGC00806201006FE02 Page 38 of 43

EUT	Bluetooth 5.1 ultra-low power module	Model Name	HJ-131IMH
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical





# **RESULT: PASS Note**: The factor had been edited in the "Input Correction" of the Spectrum Analyzer.

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## **12. FCC LINE CONDUCTED EMISSION TEST**

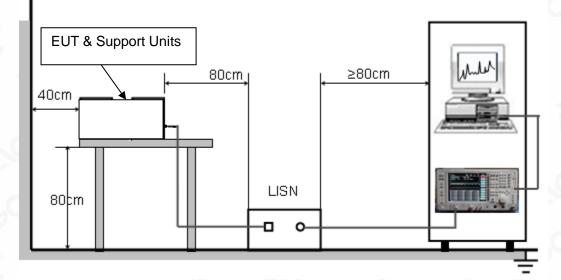
## **12.1. LIMITS OF LINE CONDUCTED EMISSION TEST**

<b>Francisco</b>	Maximum RF Line Voltage				
Frequency	Q.P.( dBuV)	Average( dBuV)			
150kHz~500kHz	66-56	56-46			
500kHz~5MHz	56	46			
5MHz~30MHz	60	50			

Note:

- 1. The lower limit shall apply at the transition frequency.
- 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

## 12.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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## 12.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

- The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2. Support equipment, if needed, was placed as per ANSI C63.10.
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4. All support equipment received AC120V/60Hz power from a LISN, if any.
- 5. The EUT received DC 3.3V power from control board which received AC120V/60Hz power from a LISN.
- 6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- 8. During the above scans, the emissions were maximized by cable manipulation.
- 9. The test mode(s) were scanned during the preliminary test.

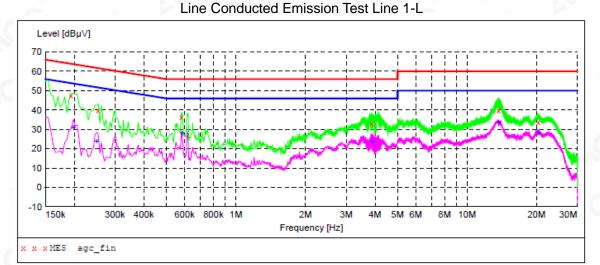
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

## 12.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

- 1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less – 2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
- 3. The test data of the worst case condition(s) was reported on the Summary Data page.

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#### 12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

#### MEASUREMENT RESULT: "agc\_fin"

2020/11/18 13:59 Frequency Level Transd Limit Margin Detector Line dBuV MHz dBµV dB dB 47.60 0.194000 11.3 64 16.3 QP г1 0.254000 39.80 11.3 62 21.8 QP ь1 0.582000 36.60 11.3 56 19.4 QP ь1 3.874000 33.20 11.4 56 22.8 г1 QP 13.702000 39.70 20.3 12.6 60 г1 QP 20.386000 33.80 13.3 60 26.2 г1 QP

#### MEASUREMENT RESULT: "agc fin2"

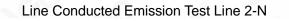
2020/11/18 13	:59					
Frequency MHz	Level dBµV		Limit dBµV	Margin dB	Detector	Line
0.198000	31.20 24.10	11.3 11.3	54 52	22.5		L1 L1
0.586000	28.10	11.3	46	17.9	AV	L1
3.902000 13.702000	23.90 33.80	11.4 12.6	46 50	22.1 16.2		L1 L1
20.410000	28.50	13.3	50	21.5	AV	L1

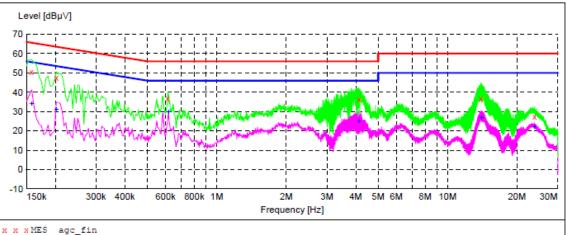
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#### MEASUREMENT RESULT: "agc fin"

2020/11/18 13:55

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.158000	50.30	11.3	66	15.3	QP	N
0.202000	47.50	11.3	64	16.0	QP	N
0.614000	36.70	11.3	56	19.3	QP	N
4.130000	36.30	11.4	56	19.7	QP	N
13.974000	36.80	12.7	60	23.2	QP	N
23.814000	27.50	13.5	60	32.5	QP	N

#### MEASUREMENT RESULT: "agc fin2"

2020/11/18 13:55							
	Frequency MHz	Level dBµV			Margin dB	Detector	Line
	0.158000	34.10	11.3	56	21.5	AV	N
	0.202000	31.40	11.3	54		AV	Ν
	0.618000	29.80	11.3	46	16.2	AV	Ν
	4.130000	25.20	11.4	46	20.8	AV	N
	13.994000	27.00	12.7	50	23.0	AV	Ν
	23.774000	22.20	13.5	50	27.8	AV	N

#### **RESULT: PASS**

Note: All the test modes had been tested, the mode 1 was the worst case. Only the data of the worst case would be record in this test report.

Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the bedicated fresh g/inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written approver, being a standard fresh g/inspection of AGC in the test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issues of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc-cert.com.



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# APPENDIX A: PHOTOGRAPHS OF TEST SETUP

Refer to the Report No.: AGC00806201006AP02

## **APPENDIX B: PHOTOGRAPHS OF EUT**

Refer to the Report No.: AGC00806201006AP02

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 Attestation of Global Compliance(Shenzhen)Co., Ltd

 Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd

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Web: http://cn.agc-cert.com/



#### Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

4. The non-CMA report issued by AGC is only permitted to be used by the client as internal reference use and shall not be used for public demonstration purpose.

5. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

6. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

7. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.

8. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

9. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.

10. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the Bedicated Perturn/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the writter authorization of AGC, the test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issues of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc~cert.com.

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