

# **FCC Test Report**

# Report No.: AGC02031201001FE02

FCC ID	8	OMCBTAUD2
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Bluetooth Module
BRAND NAME		C-chip
MODEL NAME	i	F-3320
APPLICANT	:	Icon Health and Fitness, Inc.
DATE OF ISSUE	® •	Nov. 04, 2020
STANDARD(S)	:	FCC Part 15.247
REPORT VERSION	:	V1.0



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#### Report No.: AGC02031201001FE02 Page 2 of 50

## **REPORT REVISE RECORD**

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0		Nov. 04, 2020	Valid	Initial Release

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# **1. VERIFICATION OF COMPLIANCE**

Applicant	Icon Health and Fitness, Inc.	
Address	1500 South 1000 West, Logan, Utah, United States, 84321, USA	
Manufacturer	SHENZHENSHI XINZHONGXIN TECHNOLOGY CO., LTD.	
Address	Block 3, Dong Huan Industrial Park, Sha Jing Town, Bao'an District, Shenzhen City, Guangdong, Province, China	
Factory	SHENZHENSHI XINZHONGXIN TECHNOLOGY CO., LTD.	
Address	Block 3, Dong Huan Industrial Park, Sha Jing Town, Bao'an District, Shenzhen City, Guangdong, Province, China	
Product Designation	Bluetooth Module	
Brand Name	C-chip	
Test Model	F-3320	
Date of test	Oct. 30, 2020 to Nov. 03, 2020	
Deviation	No any deviation from the test method	
Condition of Test Sample	Normal	
Test Result	Pass	
Report Template	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.

Prepared By

Reviewed By

Eddy · Liu

Eddy Liu Project Engineer

Nov. 03, 2020

Max Zhan

Max Zhang Reviewer

Nov. 04, 2020

Approved By

0WØ

Forrest Lei Authorized Officer

Nov. 04, 2020

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# 2. GENERAL INFORMATION

# 2.1. PRODUCT DESCRIPTION

The EUT is designed as a "Bluetooth 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	6.575dBm (Max)	
Bluetooth Version	V5.0	
Modulation	BR □GFSK, EDR □π /4-DQPSK, □8DPSK BLE ⊠GFSK 1Mbps □GFSK 2Mbps	
Number of channels	40 Channel	
Antenna Designation	PCB Antenna (Comply with requirements of the FCC part 15.203)	
Antenna Gain	0dBi	
Hardware Version	V1.0	
Software Version	V2.6	
Power Supply	DC 5V	

# 2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	0	2402 MHz
	1	2404 MHz
2400~2483.5MHz	G G C	
	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: OMCBTAUD2** 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 = ±3.1 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±4.0dB
- 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,  $Uc = \pm 2.7 \text{ dB}$
- 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.

#### Software Setting BlueTest3 - Test Command Mode Test Commands PAUSE RADIO STATUS RADIO STATUS FULL LO Freq. (MHz) Close Help (Atn. Mag. Exp) TISTART Execute TXDATA. TXDATA3 TXDATA4 Reset RXSTART1 Test Results Save to file Browse for f Display : @ Standard C BER C:\Users\agc\AppData\Local\QTIL\BlueTest3\testapplog.txt TXDATA

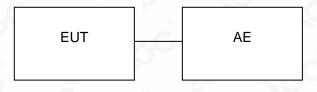
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# **5. SYSTEM TEST CONFIGURATION**

# 5.1. CONFIGURATION OF TESTED SYSTEM

Radiated Emission Configure:



Conducted Emission Configure:

EUT	AE

# 5.2. EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Bluetooth Module	F-3320	OMCBTAUD2	EUT
2	Control Box	N/A	F-3320	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	ESPI	101206	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. 21, 2019	Sep. 20, 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

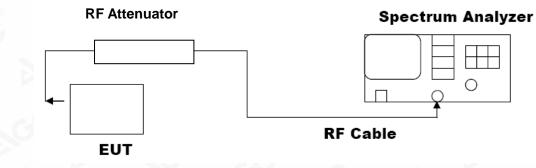
# 7.1. MEASUREMENT PROCEDURE

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	6.268	30	Pass			
2.440	6.342	30	Pass			
2.480	6.575	30	Pass			

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Agilent Spectrum Analyzer - Swept SA LXI R RF 50 Ω AC	CORREC SEN	ISE:INT	TO/NORF 02:20:56 PM Nov 02, 202	0
Center Freq 2.40200000	GHz	Avg Type: Log	-Pwr TRACE	Frequency
	PNO: Fast +++ Trig: Free IFGain:Low Atten: 30		100 TYPE MWWWM DET P N N N	
		1	Mkr1 2.401 905 GH	z Auto Tune
10 dB/div Ref 20.00 dBm Log			6.268 dBr	n
				Center Freq
10.0				2.402000000 GHz
0.00				
				Start Freq
-10.0				2.399500000 GHz
-20.0				
-20.0				<b>Stop Freq</b> 2.404500000 GHz
-30.0				2.404500000 GHz
				CF Step
-40.0				500.000 kHz
-50.0				<u>Auto</u> Man
				Freq Offset
-60.0				0 Hz
-70.0				
70.0				
Center 2.402000 GHz			Span 5.000 MH	
#Res BW 1.5 MHz	#VBW 5.0 MHz	Swe	ep 1.000 ms (1001 pts	5)
MSG			STATUS	

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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					
Appliachte Limite	Applicable Limits				
Applicable Limits	Test Data	Criteria			
	Low Channel	713.5	PASS		
>500KHZ	Middle Channel	710.5	PASS		
	High Channel	704.5	PASS		

#### SENSÉ:INT ALIGN AUTO/NORF Center Freq: 2.402000000 GHz Trig: Free Run Avg|Held:>100/100 #Atten: 30 dB 02:20:44 PM Nov 02, 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 Auto 12.8 dBm **Occupied Bandwidth** Total Power 1.0666 MHz Freq Offset 0 Hz Transmit Freq Error -71.348 kHz **OBW Power** 99.00 % -6.00 dB x dB Bandwidth 713.5 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 Re	sult			
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			

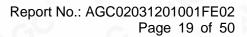
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# TEST RESULT FOR ENTIRE FREQUENCY RANGE GFSK MODULATION IN LOW CHANNEL

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Agilent Spectrum Analyzer - Swept SA				
	CORREC SENSE:	INT ALIGN AUTO/NORF Avg Type: Log-Pwr	02:22:33 PM Nov 02, 2020 TRACE 1 2 3 4 5 6	Frequency
Center Freq 13.74175000	PNO: East +++ Trig: Free Ru	un Avg Hold: 10/10	TYPE M MAAAAAAAAA	
	IFGain:Low Atten: 30 dB		DET P NNNN	
		Mki	1 4.804 3 GHz	Auto Tune
10 dB/div Ref 20.00 dBm			-48.663 dBm	
Log				
10.0				Center Freq
0.00				13.741750000 GHz
-10.0			-13.91 dBm	
-20.0				
				Start Freq
-30.0				2.483500000 GHz
-40.0				
-50.0		والمتحديد والمتحديد والمحدود والمحدود والمحدود والمحد	ter and the second s	Oton From
-60.0 Notes and a state of the state of the state	المواد والمتحالي والمرجع والمراجع			Stop Freq
-70.0				25.00000000 GHz
-70.0				
Start 2.48 GHz			Stop 25.00 GHz	CF Step
#Res BW 100 kHz	#VBW 300 kHz	Sweep 2	.152 s (30000 pts)	2.251650000 GHz
MKR MODE TRC SCL X	Y	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f 4	.804 3 GHz -48.663 dBm			
2				Freq Offset
4				0 Hz
5				
6				
8				
9				
11			<b>T</b>	
1				
MSG		STATUS		

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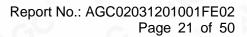
 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com
 Web: http://cn.agc-cert.com/



Agilent Spectrum Analyzer - Swep					
Center Freq 2.4400		SENSE:INT	ALIGN AUTO/NORF Avg Type: Log-Pwr Avg Hold: 10/10	02:31:29 PMNov 02, 2020 TRACE 1 2 3 4 5 6 TYPE MWWWWW	Frequency
10 dB/div Ref 20.00	IFGain:Low	Atten: 30 dB	Mkr1 2.	439 925 7 GHz 6.158 dBm	Auto Tune
Log 10.0 0.00					Center Freq 2.440000000 GHz
-10.0 -20.0 -30.0				~~	Start Freq 2.438500000 GHz
-40.0 -50.0 -60.0					<b>Stop Freq</b> 2.441500000 GHz
-70.0 Center 2.440000 GH: #Res BW 100 kHz		V 300 kHz	Sweep 2.0	Span 3.000 MHz 000 ms (30000 pts)	CF Step 300.000 kHz
MKR MODE TRC SCL 1 N 1 f 2 3 J J J J J J J J J J J J J J J J J J J	× 2.439 925 7 GHz	Y F 6.158 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	Auto Man Freq Offset 0 Hz
5 6 7 8 9 10					
11				•	
MSG			STATUS		
Agilent Spectrum Analyzer - Swep L <mark>XV</mark> R RF 50 :	Ω AC CORREC	SENSE:INT	ALIGN AUTO/NO RF	02:31:39 PM Nov 02, 2020	Frequency
	Ω AC CORREC	T.I. F. B	ALIGN AUTO/NO R/ Avg Type: Log-Pwr Avg Hold: 10/10	02:31:39 PMNov 02, 2020 TRACE 123456 TYPE MWWWW DET PNNNNN	Frequency
XM         R         S0:           Center Freq 1.2150         S0:           10 dB/div         Ref 20.00	Ω AC CORREC 000000 GHz PN0: Fast ↔ IFGain:Low	Trig: Free Run	ALIGN AUTO/NO R/ Avg Type: Log-Pwr Avg Hold: 10/10	02:31:39 PM Nov 02, 2020 TRACE 1 2 3 4 5 6	
M         R         S0:           Center Freq 1.2150           10 dB/div         Ref 20.00           10 dB/div         Ref 20.00	Ω AC CORREC 000000 GHz PN0: Fast ↔ IFGain:Low	Trig: Free Run	ALIGN AUTO/NO R/ Avg Type: Log-Pwr Avg Hold: 10/10	02:31:39 PMNov 02, 2020 TRACE 12:3 4 5 6 TYPE MMWWWW PET MMWWWW DET MMWWWW 1 2.220 11 GHz -57.020 dBm	Auto Tune Center Freq
M         R         RF         50;           Center Freq 1.2150         Ten freq 1.2150         Ten freq 1.2150           10 dB/div         Ref 20.00         Ref 20.00           10 dB/div         Ref 20.00         Ref 20.00	Ω AC CORREC 000000 GHz PN0: Fast ↔ IFGain:Low	Trig: Free Run	ALIGN AUTO/NO R/ Avg Type: Log-Pwr Avg Hold: 10/10	02:31:39 PMNov 02, 2020 TRACE 123456 TYPE MWWWW DET PNNNNN	Frequency Auto Tune Center Freq 1.21500000 GHz Start Freq 30.000000 MHz
XM         R         S0;           Center Freq 1.2150           10 dB/div         Ref 20.00           10 dB/div         Ref 20.00           10 dB/div         Ref 20.00	Ω AC CORREC 000000 GHz PN0: Fast ↔ IFGain:Low	Trig: Free Run	ALIGN AUTO/NO R/ Avg Type: Log-Pwr Avg Hold: 10/10	02:31:39 PMNov 02, 2020 TRACE 12:3 4 5 6 TYPE MMWWWW PET MMWWWW DET MMWWWW 1 2.220 11 GHz -57.020 dBm	Auto Tune Center Freq 1.21500000 GHz Start Freq 30.000000 MHz Stop Freq
W         R         RF         50;           Center Freq 1.2150         Ref 20.00           10         B/div         Ref 20.00           10.0	a AC CORREC 000000 GHz PR0:Fast → IFGain:Low dBm a AC CORREC AC CORREC	Trig: Free Run Atten: 30 dB	ALIGN AUTO/NOR Avg Type: Log-Pwr Avg Hold: 10/10 MKr	02:31:39 PM Nov 02, 2020 TRACE [] 2:3 4 5 6 Type PM Nov 02: 2020 TRACE [] 2:3 4 5 6 Type PM Nov 02: 2020 TRACE [] 2:4 5 6 Type PM Nov 02: 2020 TRACE [] 2:3 4 5 6 Type Type PM Nov 02: 2020 T	Auto Tune Center Freq 1.21500000 GHz Start Freq
M         R         RF         S0:           Center Freq 1.2150         Center Freq 1.2150           10 dB/div         Ref 20.00           10.0         Center Freq 1.2150           20.0         Center Freq 1.2150           -20.0         Center Freq 1.2150           -30.0         Center Freq 1.2150           -40.0         Center Freq 1.2150           -30.0         Center Freq 1.2150           -30.0         Center Freq 1.2150           -40.0         Center Freq 1.2150           -30.0         Center Freq 1.2150           -40.0         Center Freq1.2150 <td>a AC CORREC 000000 GHz PR0:Fast → IFGain:Low dBm a AC CORREC AC CORREC</td> <td>Trig: Free Run Atten: 30 dB</td> <td>Aug Type: Log-Pwr Avg Type: Log-Pwr Avg Hold: 10/10 Mkr'</td> <td>02:31:39 PM Nov 02, 2020 TRACE [] 2.3 4 5 6 TYPE MANAGEMENT PET PININN N 1 2.2220 11 GHz -57.020 dBm -13140 dBm -13140 dBm -13140 dBm -13140 dBm -13140 dBm -13140 dBm</td> <td>Auto Tune Center Freq 1.21500000 GHz Start Freq 30.000000 MHz Stop Freq 2.40000000 GHz CF Step 237.000000 MHz</td>	a AC CORREC 000000 GHz PR0:Fast → IFGain:Low dBm a AC CORREC AC CORREC	Trig: Free Run Atten: 30 dB	Aug Type: Log-Pwr Avg Type: Log-Pwr Avg Hold: 10/10 Mkr'	02:31:39 PM Nov 02, 2020 TRACE [] 2.3 4 5 6 TYPE MANAGEMENT PET PININN N 1 2.2220 11 GHz -57.020 dBm -13140 dBm -13140 dBm -13140 dBm -13140 dBm -13140 dBm -13140 dBm	Auto Tune Center Freq 1.21500000 GHz Start Freq 30.000000 MHz Stop Freq 2.40000000 GHz CF Step 237.000000 MHz
M         R         RF         SD:           Center Freq 1.2150         Center Freq 1.2150           10.0	AC CORREC 000000 GHZ PR0:Fast → IFGain:Low dBm dBm dBm dBm dBm dBm dBm dBm	Trig: Free Run Atten: 30 dB	ALIGN AUTO/NOR Avg Type: Log-Pwr Avg Hold: 10/10 MKr	02:31:39 PM Nov 02, 2020 TRACE [] 2:3 4 5 6 Type PM Nov 02: 2020 TRACE [] 2:3 4 5 6 Type PM Nov 02: 2020 TRACE [] 2:4 5 6 Type PM Nov 02: 2020 TRACE [] 2:3 4 5 6 Type Type PM Nov 02: 2020 T	Auto Tune Center Freq 1.215000000 GHz Start Freq 30.000000 MHz Stop Freq 2.400000000 GHz CF Step 237.000000 MHz Auto Man

#### GFSK MODULATION IN MIDDLE CHANNEL

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Agilent Spectrum Analyzer - Swept SA					
			GN AUTO/NORF 02:32:04 :: Log-Pwr 11	PMNov 02, 2020 RACE 1 2 3 4 5 6	Frequency
Center Freq 13.74175000	PNO: East +++ Irig: Free	Run Avg Hold:	10/10		
	IFGain:Low Atten: 30	dB		DET P N N N N N	
			Mkr1 4.8		Auto Tune
10 dB/div Ref 20.00 dBm			-46.	254 dBm	
Log					
10.0					Center Freq
0.00					13.741750000 GHz
-10.0				-15.84 dEm	
-20.0					
-30.0					Start Freq
					2.483500000 GHz
-40.0					
-50.0		and a start of the strength of the	and the state of the		Stop Freq
-60.0 the latest strength with the statest	and the second	and the second	Contraction of the local division of the loc		25.000000000 GHz
-70.0					25.00000000 GHZ
Start 2.48 GHz			Stop	25.00 GHz	CF Step
#Res BW 100 kHz	#VBW 300 kHz		Sweep 2.152 s	(30000 pts)	2.251650000 GHz Auto Man
MKR MODE TRC SCL X	Y	FUNCTION FUN	ICTION WIDTH FUNC	TION VALUE	<u>Auto</u> Man
	.879 3 GHz -46.254 dB	m			
2					Freq Offset
4					0 Hz
5					
7					
8					
10					
11					
MSG			STATUS		
Mou			SIAIUS		

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Agilent Spectrum Analyzer - Swej	pt <b>SA</b> Ω AC CORREC	SENSE:INT		02:34:04 PM Nov 02, 2020	
Center Freq 2.4800		Trig: Free Run	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 123456 TYPE MWWWW DET PNNNNN	Frequency
10 dB/div Ref 20.00	IFGain:Low	Atten: 30 dB	Mkr1 2.4	79 929 5 GHz 6.415 dBm	Auto Tune
10.0		1			Center Fred 2.480000000 GHz
-10.0 -20.0 -30.0 -40.0					Start Freq 2.478500000 GHz
-50.0 -60.0 -70.0					<b>Stop Fred</b> 2.481500000 GHz
Center 2.480000 GH #Res BW 100 kHz		V 300 kHz	Sweep 2.00	Span 3.000 MHz 0 ms (30000 pts)	CF Step 300.000 kHz
MKR MODE TRC SCL	× 2.479 929 5 GHz	Y F 6.415 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 3 4 5					Freq Offset 0 Hz
6 7 8 9					
				v	
MSG			STATUS		
Agilent Spectrum Analyzer - Swej IXI R RF 50	pt 5A Ω AC CORREC	SENSE:INT		02:34:13 PM Nov 02, 2020	Frequency
Center Freq 1.2150	000000 GHz PNO: Fast ↔ IFGain:Low	Trig: Free Run Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 123456 TYPE MWWWW DET PNNNNN	Frequency
10 dB/div Ref 20.00			Mkr1	2.330 24 GHz -56.576 dBm	Auto Tune
10.0 0.00 -10.0					Center Freq 1.215000000 GHz
-20.0					Start Freq 30.000000 MHz
-50.0				To say different music de la transmission d	<b>Stop Freq</b> 2.400000000 GHz
Start 30 MHz #Res BW 100 kHz	#VBV	V 300 kHz	Sweep 228.	Stop 2.400 GHz 0 ms (30000 pts)	CF Step 237.000000 MHz
MKR MODE TRC SCL	× 2.330 24 GHz	Y F -56.576 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f					En a Offerst
2 3 4 5					•
2 3 4 5 6 7 8 9					Freq Offset 0 Hz
2 3 4 5 6 7 8			STATUS	v V	•

## **GFSK MODULATION IN HIGH CHANNEL**

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Center Freq 13.750000000 GHz       Avg Type: Log-Pwr AvglHold: 10/10       Trace 12.3 4 5 5 Tree Run AvglHold: 10/10       Tree Run Type: Log-Pwr AvglHold: 10/10       Auto Tur Type: Run Type: Run Typ	Agilent Spectrum Analyzer - Swept S				
If Gain:Low       Atten: 30 dB       Det PININN         Mikri 4.960 1 GHz       -48.478 dBm       -48.478 dBm         10 dB/div       Ref 20.00 dBm       -48.478 dBm       -48.478 dBm         10 dB/div       Ref 20.00 dBm       -48.478 dBm       -48.478 dBm         10 dB/div       Ref 20.00 dBm       -48.478 dBm       -48.478 dBm         10 dB/div       Ref 20.00 dBm       -48.478 dBm       -48.478 dBm         10 dB/div       -48.478 dBm       -48.478 dBm       -48.478 dBm         200       -40.0       -49.478 dBm       -49.478 dBm       -49.478 dBm         200       -49.478 dBm       -49.478 dBm       -49.478 dBm       -49.478 dBm         200       -49.478 dBm       -49.478 dBm       -49.478 dBm       -49.478 dBm         200       -49.478 dBm       -49.478 dBm       -49.478 dBm       -49.478 dBm         21       -49.490 1 GHz		00000 GHz	Avg Type	: Log-Pwr TRACE	2 3 4 5 6 Frequency
100       Center Fre         100	10 dB/div Ref 20.00 d	IFGain:Low Atten:		Mkr1 4.960 1	GHz Auto Tune
30.0       1	0.00				Center Freq 13.750000000 GHz
60.0       Indicate the second s	-30.0 -40.0 1				Start Freq 2.500000000 GHz
#Res BW 100 kHz         #VBW 300 kHz         Sweep         2.152 s (30000 pts)           MKR MODE TRC SCL         X         Y         FUNCTION         FUNCTION WIDTH         FUNCTION VALUE         Auto           1         N         1         f         4.960 1 GHz         -48.478 dBm         Function         Function value         Freq Offs           2         3         -	-60.0 Health Annual and Annual Annua				25.000000000 GHz
2     3     Freq Offs       4     4     6	#Res BW 100 kHz	X Y	FUNCTION FUN	Sweep 2.152 s (300	00 pts) 2.250000000 GHz Auto Man
	2 3 4 5 5 6 6 7 7 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	4.960 1 GHz -48.478	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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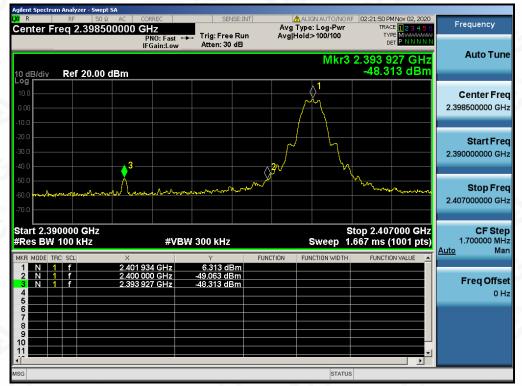
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 Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd

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

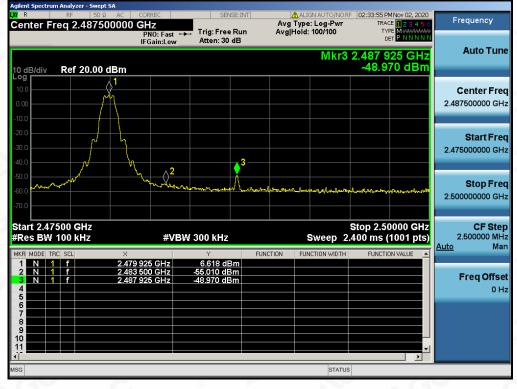
Web: http://cn.agc-cert.com/





# 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.

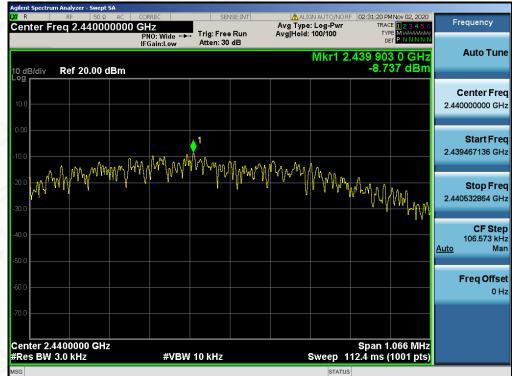
#### **10.4. LIMITS AND MEASUREMENT RESULT**

Channel No.	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	-8.855	8	Pass
Middle Channel	-8.737	8	Pass
High Channel	-8.500	8	Pass

# TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL

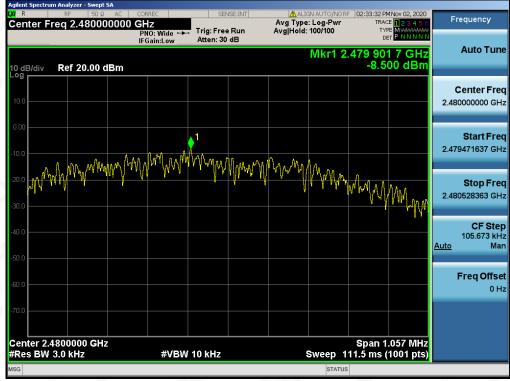


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# TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL

# TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



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# **11. RADIATED EMISSION**

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

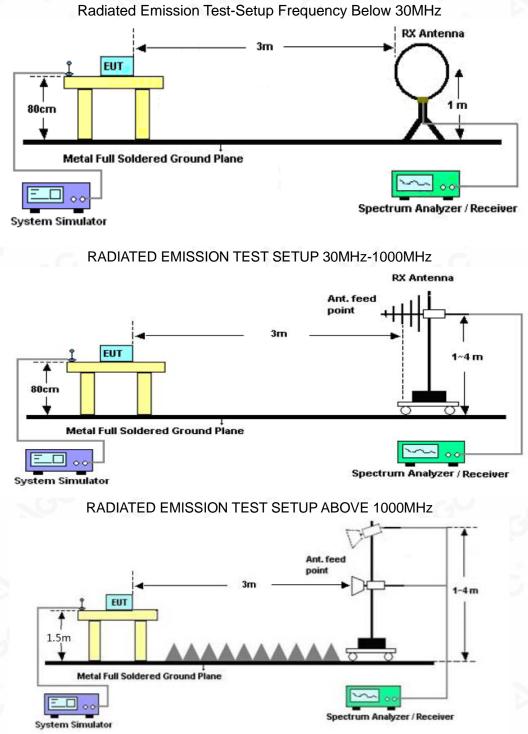
- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated 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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Report No.: AGC02031201001FE02 Page 28 of 50

### 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.

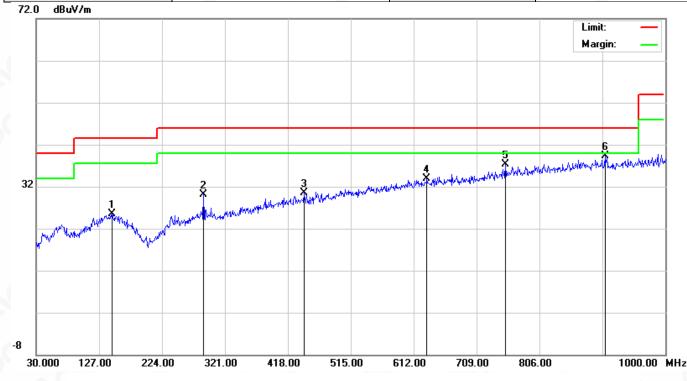
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#### Report No.: AGC02031201001FE02 Page 30 of 50

## **RADIATED EMISSION BELOW 1GHZ**

EUT	Bluetooth Module	ooth Module Model Name		
Temperature	25° C	Relative Humidity	55.4%	
Pressure	960hPa	Test Voltage	Normal Voltage	
Test Mode	Mode 3	Antenna	Horizontal	



No.	Mł	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		147.3700	6.36	19.22	25.58	43.50	-17.92	peak
2		288.0200	10.43	19.75	30.18	46.00	-15.82	peak
3		443.2200	6.59	23.85	30.44	46.00	-15.56	peak
4		632.3700	6.51	27.34	33.85	46.00	-12.15	peak
5		753.6200	7.97	29.36	37.33	46.00	-8.67	peak
6	*	906.8800	7.57	31.76	39.33	46.00	-6.67	peak

# **RESULT: PASS**

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