



TEST REPORT
FCC Rules and Regulations Part PART 15.249
RSS-210 Issue 9/ RSS-GEN Issue 5

Report Reference No.: HK1812292065-1E
FCC ID: 2AR94-IBC-FC330
IC: 24663-IBCFC330
Compiled by: File administrators Gary Qian

Gary Qian

Supervised by: Technique principal Eden Hu

Eden Hu

Approved by: Manager Jason Zhou

Jason Zhou

Date of issue: Jan. 21, 2019

Testing Laboratory Name: Shenzhen HUAK Testing Technology Co., Ltd.
Address: 1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, China

Applicant's name: SHANGHAI HONGYAN RETURNABLE TRANSIT PACKAGINGS CO., LTD.
Address: 487 Tianlin Rd, 20-1105 Zone Caohejing Hi-Tech Park, Shanghai, P.R China, 200233

Standard: FCC Rules and Regulations Part PART 15.249
RSS-210 Issue 9/ RSS-GEN Issue 5

Shenzhen HUAK Testing Technology Co., Ltd. All rights reserved.
This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen HUAK Testing Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen HUAK Testing Technology Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Test item description: IOT Module
Trade Mark: /
Manufacturer: SHANGHAI HONGYAN RETURNABLE TRANSIT PACKAGINGS CO., LTD.
Model/Type reference: IBC-FC330
Listed Models: IBC-FC1040
Ratings: DC 3.6 V From DC Power;
Modulation: GMSK
GPRS: Supported
Hardware version: Horen\_IBC\_V1.4
Software version: Horen\_IBC\_V1.4
Frequency: GPRS 850MHz;GPRS 1900MHz;
Result: PASS

**TEST REPORT**

<b>Test Report No. :</b>	<b>HK1812292065-1E</b>	Jan. 21, 2019
		Date of issue

Equipment under Test : IOT Module

Model /Type : IBC-FC330

Listed Models : IBC-FC1040

**Applicant** : **SHANGHAI HONGYAN RETURNABLE TRANSIT PACKAGINGS CO., LTD.**

Address : 487 Tianlin Rd, 20-1105 Zone Caohejing Hi-Tech Park, Shanghai, P.R China, 200233

**Manufacturer** : **SHANGHAI HONGYAN RETURNABLE TRANSIT PACKAGINGS CO., LTD.**

Address : 487 Tianlin Rd, 20-1105 Zone Caohejing Hi-Tech Park, Shanghai, P.R China, 200233

<b>Test Result:</b>	<b>PASS</b>
---------------------	-------------

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



## Contents

<b>1.</b>	<b><u>..TEST STANDARDS .....</u></b>	<b><u>4</u></b>
<b>2.</b>	<b><u>..SUMMARY .....</u></b>	<b><u>5</u></b>
2.1.	General Remarks	5
2.2.	Product Description	5
2.3.	Equipment Under Test	5
2.4.	Short description of the Equipment under Test (EUT)	5
2.5.	EUT operation mode	5
2.6.	Block Diagram of Test Setup	6
2.7.	Modifications	6
<b>3.</b>	<b><u>..TEST ENVIRONMENT .....</u></b>	<b><u>7</u></b>
3.1.	TEST FACILITY	7
3.2.	Environmental conditions	7
3.3.	Summary of measurement results	7
3.4.	Statement of the measurement uncertainty	7
3.5.	Equipments Used during the Test	8
<b>4.</b>	<b><u>..TEST CONDITIONS AND RESULTS .....</u></b>	<b><u>9</u></b>
4.1.	AC Power Conducted Emission .....	9
4.2.	Radiated Emission and Band Edges .....	10
4.3.	Occupied Bandwidth Measurement .....	15
4.4.	Antenna Requirement.....	17
<b>5.</b>	<b><u>..TEST SETUP PHOTOS OF THE EUT .....</u></b>	<b><u>18</u></b>



## **1. TEST STANDARDS**

The tests were performed according to following standards:

**FCC Rules Part 15.249:** Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz.

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

**ANSI C63.4: 2014:** –American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz  
Range of 9 kHz to 40GHz

**RSS-210 Issue 9:**–Licence-exempt Radio Apparatus: Category I Equipment

**RSS-GEN Issue 5:** General Requirements for Compliance of Radio Apparatus



## 2. SUMMARY

### 2.1. General Remarks

Date of receipt of test sample	:	Dec.29, 2018
Testing commenced on	:	Dec.29, 2018
Testing concluded on	:	Jan.21, 2019

### 2.2. Product Description

Name of EUT	IOT Module
Model Number	IBC-FC330
List Model:	IBC-FC1040
Power Rating	DC 3.6V From Battery
Operation frequency	915MHz
Modulation	GFSK
Antenna Type	Internal antenna

### 2.3. Equipment Under Test

#### Power supply system utilised

Power supply voltage	:	<input checked="" type="radio"/> 230V / 50 Hz	<input type="radio"/> 120V / 60Hz
		<input type="radio"/> 12 V DC	<input type="radio"/> 24 V DC
		<input type="radio"/> Other (specified in blank below)	

DC 3.60V

### 2.4. Short description of the Equipment under Test (EUT)

This is a IOT Module

For more details, refer to the user's manual of the EUT.

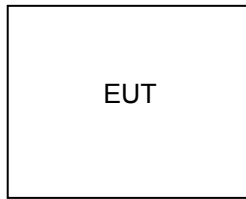
### 2.5. EUT operation mode

The Applicant provides test software to control the EUT for staying in continuous transmitting and receiving mode for testing .There is 1 channels provided to the EUT. Channel 00 was selected to test.

Channel	Frequency(MHz)
00	915



## 2.6. Block Diagram of Test Setup



## 2.7. Modifications

No modifications were implemented to meet testing criteria.



### 3. TEST ENVIRONMENT

#### 3.1. TEST FACILITY

Test Firm : Shenzhen HUAKE Testing Technology Co., Ltd.

Address 1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China

#### 3.2. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

#### 3.3. Summary of measurement results

FCC PART 15.249		
FCC Part 15.249(a)/ RSS-210 Annex A.1.2/RSS-Gen 8.9	Field Strength of Fundamental	PASS
FCC Part 15.209/ RSS-210 Annex A.1.2/RSS-Gen 8.9	Spurious Emission	PASS
FCC Part 15.215(c)/ RSS-210 Annex A.1.3	20dB bandwidth	PASS
FCC Part 15.207/ RSS-Gen 8.8	Conducted Emission	N/A
FCC Part 15.203/ RSS-Gen 8.3	Antenna Requirement	PASS
FCC Part 15.247(d) RSS-Gen 8.10	Band Edge Compliance of RF Emission	PASS

Remark:

1. The measurement uncertainty is not included in the test result.
2. NA = Not Applicable; NP = Not Performed
3. We tested all test mode and recorded worst case in report

#### 3.4. Statement of the measurement uncertainty

Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty(9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty(30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty(Above 1GHz)	=	4.06dB, k=2



### 3.5. Equipments Used during the Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Dec. 28, 2018	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Dec. 28, 2018	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 28, 2018	1 Year
4.	Spectrum analyzer	R&S	FSP40	HKE-025	Dec. 28, 2018	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2018	1 Year
6.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 28, 2018	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 28, 2018	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 28, 2018	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 28, 2018	1 Year
10.	Horn Antenna	Schwarzbeck	9120D	HKE-013	Dec. 28, 2018	1 Year
11.	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	HKE-017	Dec. 28, 2018	1 Year
12.	Pre-amplifier	EMCI	EMC051845 SE	HKE-015	Dec. 28, 2018	1 Year
13.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 28, 2018	1 Year
14.	EMI Test Software EZ-EMC	Tonscend	JS1120-B Version	HKE-083	Dec. 28, 2018	N/A
15.	Power Sensor	Agilent	E9300A	HKE-086	Dec. 28, 2018	1 Year
16.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2018	1 Year
17.	Signal generator	Agilent	N5182A	HKE-029	Dec. 28, 2018	1 Year
18.	Signal Generator	Agilent	83630A	HKE-028	Dec. 28, 2018	1 Year
19.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 28, 2018	3 Year
20.	RF Cable(below 1GHz)	HUBER+SUHNER	RG214	HKE-055	Dec. 28, 2018	1 Year
21.	RF Cable(above 1GHz)	HUBER+SUHNER	RG214	HKE-056	Dec. 28, 2018	1 Year

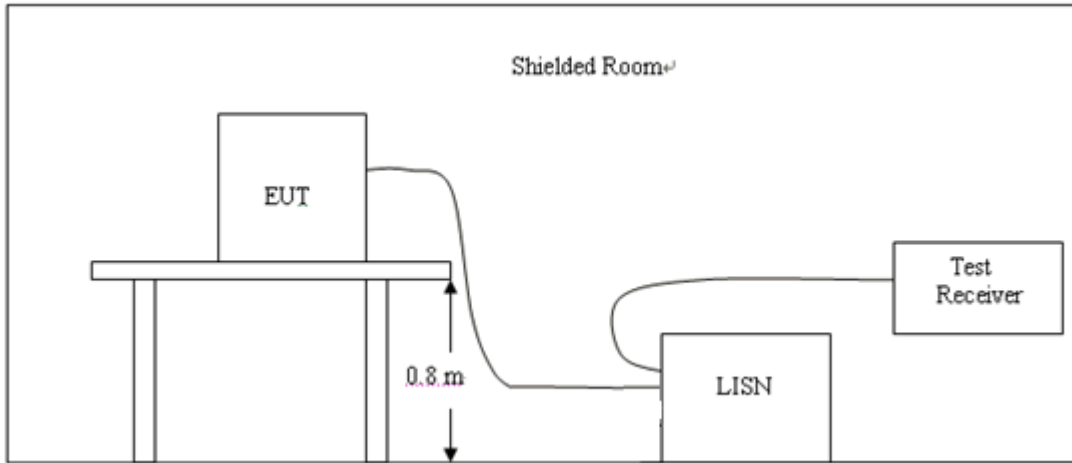
Note: 1. The Cal.Interval was one year.



## 4. TEST CONDITIONS AND RESULTS

### 4.1. AC Power Conducted Emission

#### TEST CONFIGURATION



#### TEST PROCEDURE

- 1, The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. 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.
- 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, If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5, All support equipments received AC power from a second LISN, if any.
- 6, The EUT 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.

#### AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\* Decreases with the logarithm of the frequency.

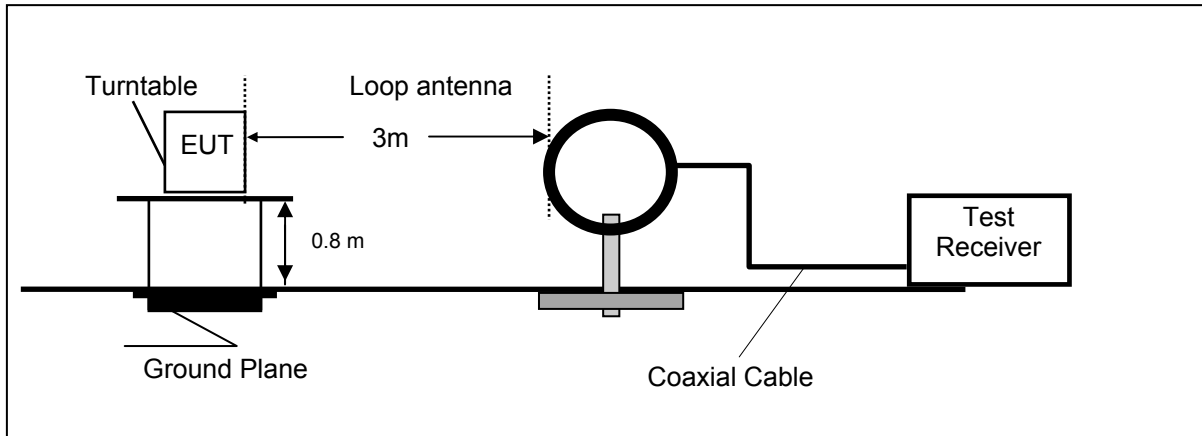
#### TEST RESULTS

Note applicable to this device.

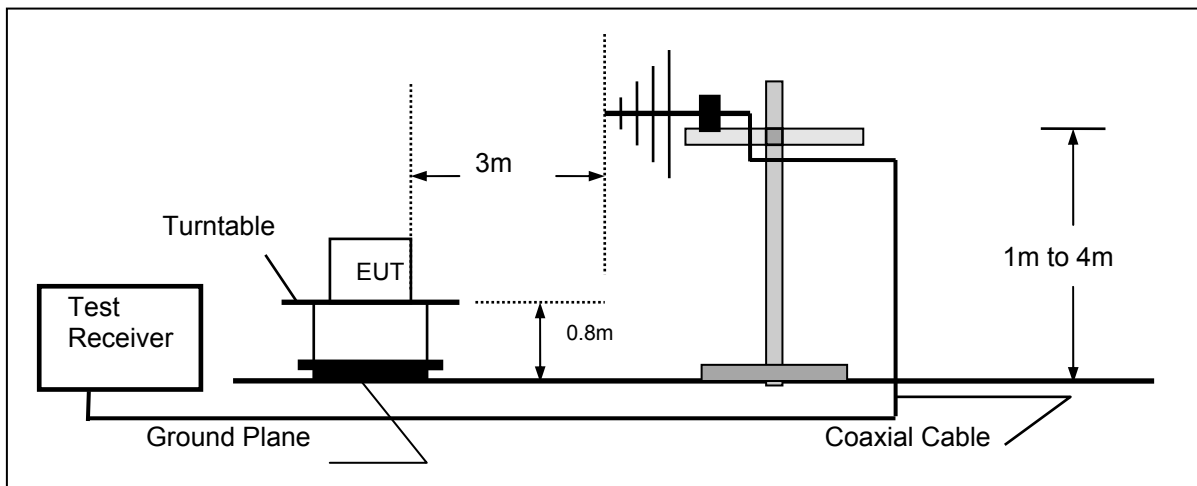
## 4.2. Radiated Emission and Band Edges

### TEST CONFIGURATION

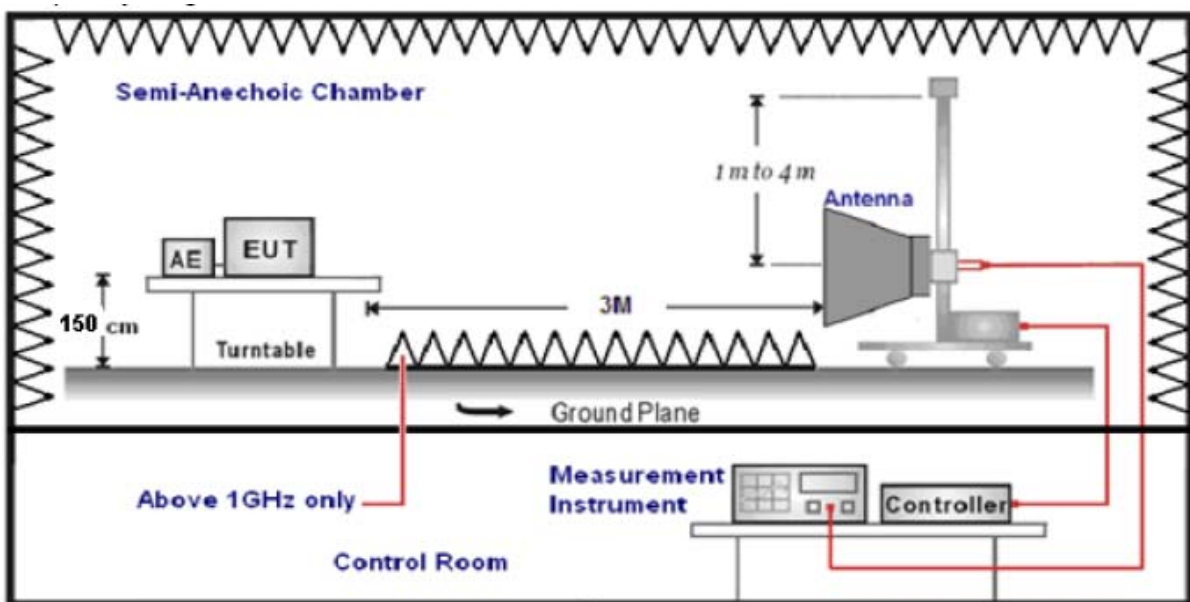
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



**TEST PROCEDURE**

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT minimum operation frequency was 26MHz and maximum operation frequency was 1910MHz.so radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Ultra-Broadband Antenna	3
1GHz-18GHz	Double Ridged Horn Antenna	3
18GHz-25GHz	Horn Antenna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz, Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz, Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz, Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

**Field Strength Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

$$\text{Transd} = \text{AF} + \text{CL} - \text{AG}$$

**RADIATION LIMIT**

Accordinging 15.249, the field strength of emissions from intentional radiators operated within 902MHz-928 MHz shall not exceed 94dB $\mu$ V/m (50mV/m):

FCC PART 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

Frequency (MHz)	Distance (Meters)	Radiated (dB $\mu$ V/m)	Radiated ( $\mu$ V/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

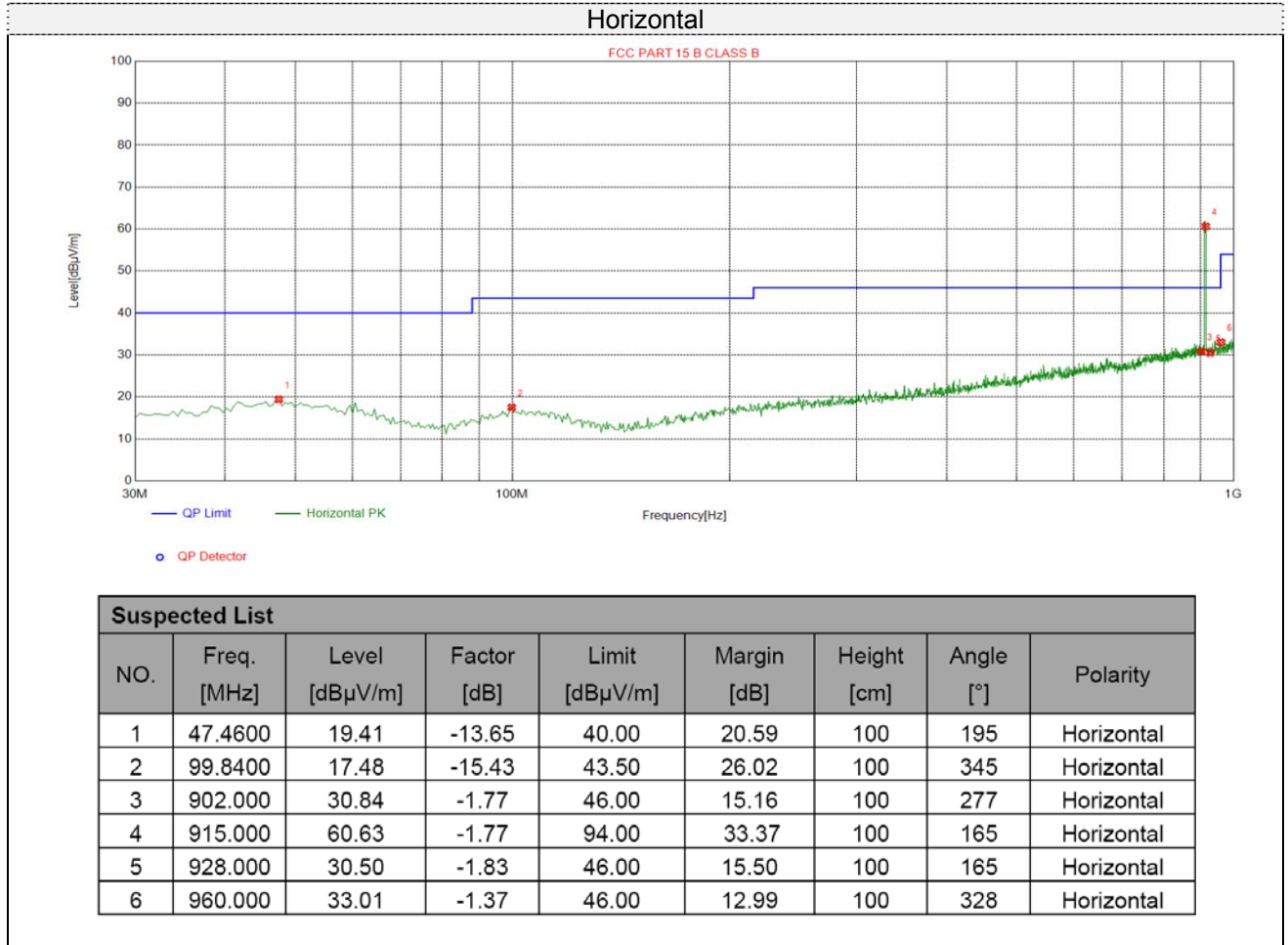


**TEST RESULTS**

**For 9 KHz-30MHz**

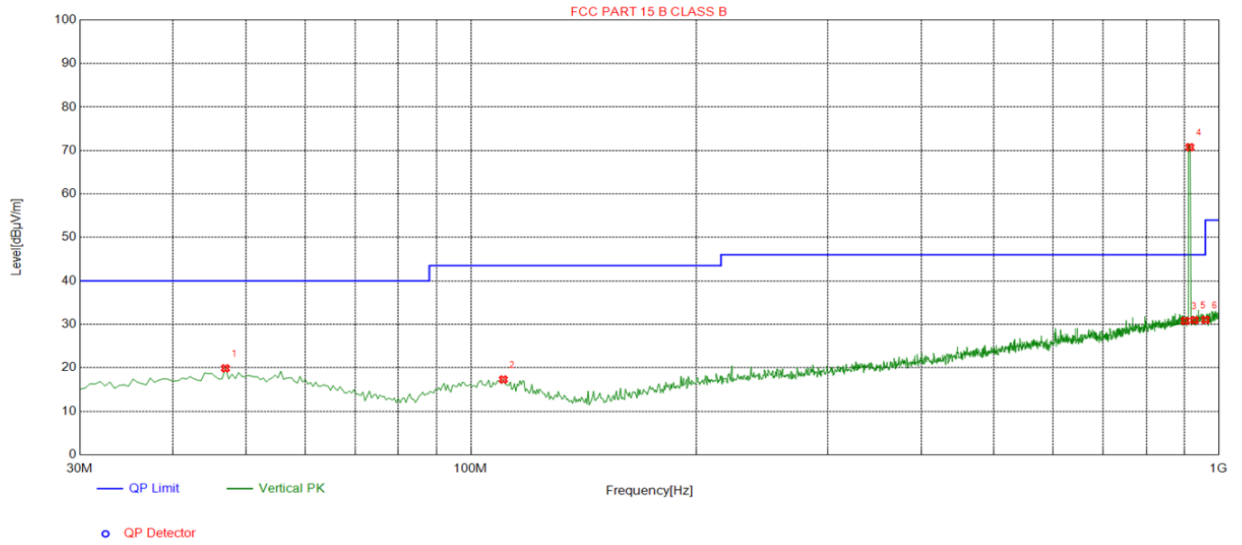
Frequency (MHz)	Corrected Reading (dBuV/m)@3m	FCC Limit (dBuV/m) @3m	Margin (dB)	Detector	Result
0.38	46.79	96.01	49.22	QP	PASS
1.55	51.68	63.80	12.12	QP	PASS
19.68	56.73	69.54	12.81	QP	PASS
24.62	40.92	69.54	28.62	QP	PASS

**For 30MHz-1GHz**





Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	46.9750	19.87	-13.65	40.00	20.13	100	142	Vertical
2	110.510	17.30	-15.52	43.50	26.20	100	0	Vertical
3	902.000	30.79	-1.77	46.00	15.21	100	138	Vertical
4	915.000	70.75	-1.77	94.00	23.25	100	328	Vertical
5	928.000	30.96	-1.83	46.00	15.04	100	287	Vertical
6	960.000	31.03	-1.37	46.00	14.97	100	169	Vertical

**For 1GHz to 25GHz**

Remark: For test above 1GHz GFSK, were test at Low, Middle, and High channel;

## Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
1240	58.32	-9.12	49.2	74	-24.8	peak
1240	44.26	-9.12	35.14	54	-18.86	AVG
1830	60.47	-8.64	51.83	74	-22.17	peak
1830	46.82	-8.64	38.18	54	-15.82	AVG
2745	56.32	-3.95	52.37	74	-21.63	peak
2745	42.49	-3.95	38.54	54	-15.46	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

## Vertical:

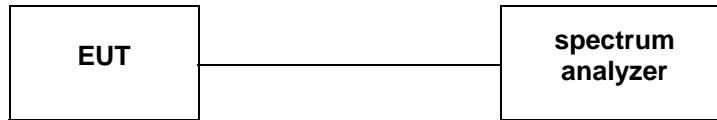
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
1240	57.62	-9.12	48.5	74	-25.5	peak
1240	42.16	-9.12	33.04	54	-20.96	AVG
1830	61.58	-8.64	52.94	74	-21.06	peak
1830	44.72	-8.64	36.08	54	-17.92	AVG
2745	55.77	-3.95	51.82	74	-22.18	peak
2745	42.69	-3.95	38.74	54	-15.26	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



### 4.3. Occupied Bandwidth Measurement

#### TEST CONFIGURATION



#### TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100KHz RBW and 300KHz VBW.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

#### LIMIT

N/A

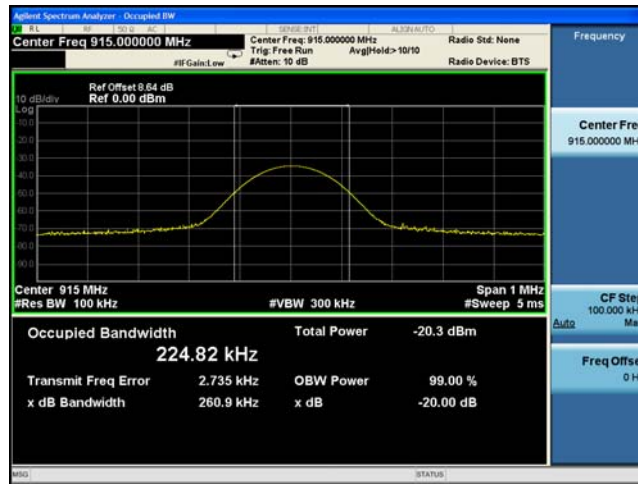
#### TEST RESULTS

Modulation	Channel	99% OBW (kHz)	20dB bandwidth (kHz)	Result
GFSK	CH00	224.82	260.9	Pass

Note: 1.The test results including the cable lose.



### GFSK Modulation



CH00





#### **4.4. Antenna Requirement**

##### **Standard Applicable**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

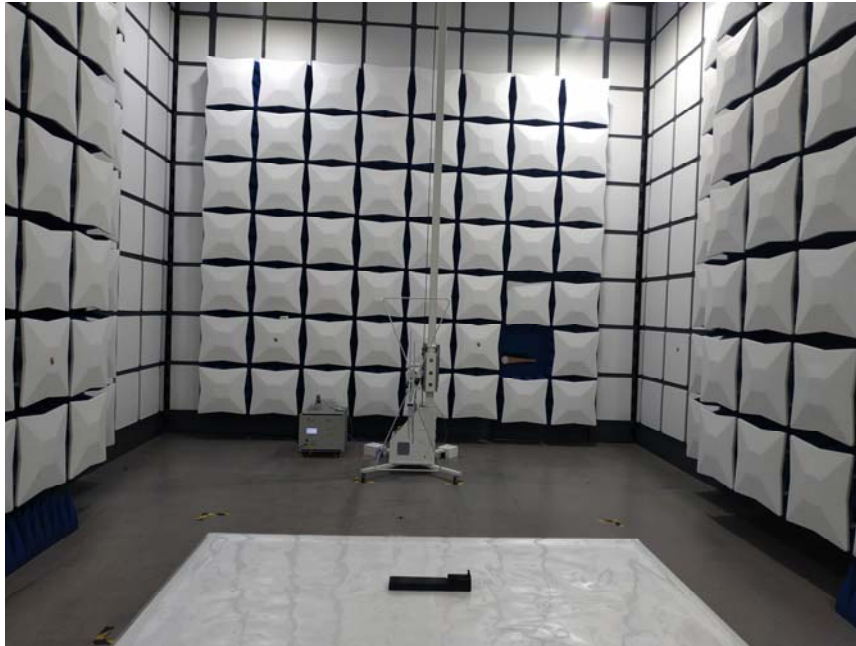
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

##### **Antenna Information**

The directional gains of antenna used for transmitting is 2.00 dBi.



## 5. Test Setup Photos of the EUT



.....End of Report.....