

# TEST REPORT

**Applicant:** TIT INTERNATIONAL LIMITED

**Address of Applicant:** MARKET STALL NO.M65, WO CHE MARKET, WO CHE ESTATE SHATIN, NT, HONG KONG

**Manufacturer:** Shenzhen Runfeng Digital Technology Co., LTD

**Address of Manufacturer:** Chuanghui Building, Intersection of Banxuegang Boulevard and Yongxiang Road, Bantian Subdistrict, Longgang District, Shenzhen,China

**Equipment Under Test (EUT)**

Product Name: Renpho A1, AI-Powered Bike

Model No.: R-Q002

Trade Mark: RENPHO

**FCC ID:** 2APXU-RQ002

**IC ID:** 26173-RQ002

**Applicable standards:** RSS-247 Issue 2, February 2017  
RSS-Gen Issue 4, November 2014  
FCC Part15.247  
ANSI C63.10-2013

**Date of sample receipt:** Oct. 16, 2020

**Date of Test:** Oct. 16, 2020 - Oct. 22, 2020

**Date of report issued:** Oct. 22, 2020

**Test Result :** PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



**Robinson Lo**

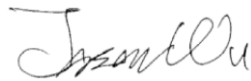
**Laboratory Manager**

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

## 2 Version

Version No.	Date	Description
00	Oct. 22, 2020	Original

Prepared By:



Date:

Oct. 22, 2020

Project Engineer

Check By:



Date:

Oct. 22, 2020

Reviewer

Authorized Signature:



**Robinson Lo**

**Laboratory Manager**

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

## 3 Contents

	Page
1 COVER PAGE.....	1
2 VERSION .....	2
3 CONTENTS .....	3
4 TEST SUMMARY .....	4
4.1 MEASUREMENT UNCERTAINTY .....	4
5 GENERAL INFORMATION .....	5
5.1 GENERAL DESCRIPTION OF EUT .....	5
5.2 TEST MODE .....	7
5.3 DESCRIPTION OF SUPPORT UNITS .....	7
5.4 DEVIATION FROM STANDARDS .....	7
5.5 ABNORMALITIES FROM STANDARD CONDITIONS .....	7
5.6 TEST FACILITY .....	7
5.7 TEST LOCATION .....	7
5.8 ADDITIONAL INSTRUCTIONS .....	7
6 TEST INSTRUMENTS LIST .....	8
7 TEST RESULTS AND MEASUREMENT DATA.....	10
7.1 ANTENNA REQUIREMENT.....	10
7.2 CONDUCTED EMISSIONS .....	11
7.3 RADIATED EMISSION METHOD.....	14
7.3.1 Spurious emissions.....	16
7.3.2 Bandedge emissions.....	22
7.4 CHANNEL BANDWIDTH.....	23
7.5 POWER SPECTRAL DENSITY .....	26
7.6 CONDUCTED OUTPUT POWER .....	29
7.7 BAND EDGES.....	32
8 TEST SETUP PHOTO .....	34
9 EUT CONSTRUCTIONAL DETAILS .....	36

## 4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203 RSS-247	Pass
AC Power Line Conducted Emission	15.203 RSS-247	Pass
6dB Bandwidth	15.247 (a)(2) RSS-247	Pass
Peak Output Power	15.247 (b) RSS-247	Pass
Radiated Spurious Emission	15.247 (c) RSS-247 RSS-GEN	Pass
Power Spectral Density	15.247 (d) RSS-247	Pass
Band Edge Emission	15.205 RSS-247	Pass

*Pass: The EUT complies with the essential requirements in the standard.*

*Remark: Test according to ANSI C63.10:2013.*

### 4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

## 5 General Information

### 5.1 General Description of EUT

Product Name:	Renpho A1, AI-Powered Bike
Model No.:	R-Q002
Test Model:	R-Q002
Product SW/HW version:	HV01
Radio SW/HW version:	SV01
Test SW Version:	V1.1
Test sample(s) ID:	GTS202010000083
Sample(s) Status	Engineered sample
Operation Frequency:	2402MHz~2480MHz
Channel numbers:	40
Channel separation:	2MHz
Modulation type:	GFSK
Antenna Type:	PCB Antenna
Antenna gain:	0dBi(declare by applicant)
Power supply:	DC 12V from charger

Operation Frequency each of channel							
Channel	Frequency MHz	Channel	Frequency MHz	Channel	Frequency MHz	Channel	Frequency MHz
1	2402	11	2424	21	2444	31	2464
2	2404	12	2426	22	2446	32	2466
3	2406	13	2428	23	2448	33	2468
4	2408	14	2430	24	2450	34	2470
5	2410	15	2432	25	2452	35	2472
6	2412	16	2434	26	2454	36	2474
7	2414	17	2436	27	2456	37	2476
8	2416	18	2438	28	2458	38	2478
9	2418	19	2440	29	2460	39	2480
10	2420	20	2442	30	2462		

**Note:**

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency	Mode
The lowest channel	2402MHz	GFSK
The middle channel	2440MHz	
The Highest channel	2480MHz	

## 5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
<i>Remark: During the test, the duty cycle &gt;98%, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i>	

## 5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number

## 5.4 Deviation from Standards

None.
-------

## 5.5 Abnormalities from Standard Conditions

None.
-------

## 5.6 Test Facility

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"> <li>● <b>FCC —Registration No.: 381383</b> Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383.</li> <li>● <b>IC —Registration No.: 9079A</b> The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A</li> <li>● <b>NVLAP (LAB CODE:600179-0)</b> Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0d by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0</li> </ul>
--

## 5.7 Test Location

All tests were performed at:
<p>Global United Technology Services Co., Ltd. No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102 Tel: 0755-27798480 Fax: 0755-27798960</p>

## 5.8 Additional Instructions

Test Software	Special test command provided by manufacturer
Power level setup	Default

## 6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 02 2020	July. 01 2025
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 25 2020	June. 24 2021
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 25 2020	June. 24 2021
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 25 2020	June. 24 2021
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 25 2020	June. 24 2021
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 25 2020	June. 24 2021
9	Coaxial Cable	GTS	N/A	GTS211	June. 25 2020	June. 24 2021
10	Coaxial cable	GTS	N/A	GTS210	June. 25 2020	June. 24 2021
11	Coaxial Cable	GTS	N/A	GTS212	June. 25 2020	June. 24 2021
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 25 2020	June. 24 2021
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 25 2020	June. 24 2021
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 25 2020	June. 24 2021
15	Band filter	Amindeon	82346	GTS219	June. 25 2020	June. 24 2021
16	Power Meter	Anritsu	ML2495A	GTS540	June. 25 2020	June. 24 2021
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 25 2020	June. 24 2021
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 25 2020	June. 24 2021
19	Splitter	Agilent	11636B	GTS237	June. 25 2020	June. 24 2021
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 25 2020	June. 24 2021
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 19 2019	Oct. 18 2020
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 19 2019	Oct. 18 2020
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 19 2019	Oct. 18 2020
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 25 2020	June. 24 2021



Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.15 2019	May.14 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 25 2020	June. 24 2021
4	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June. 25 2020	June. 24 2021
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 25 2020	June. 24 2021
8	Absorbing clamp	Elektronik- Feinmechanik	MDS21	GTS229	June. 25 2020	June. 24 2021
9	ISN	SCHWARZBECK	NTFM 8158	GTD565	June. 25 2020	June. 24 2021

RF Conducted Test:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 25 2020	June. 24 2021
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 25 2020	June. 24 2021
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 25 2020	June. 24 2021
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 25 2020	June. 24 2021
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 25 2020	June. 24 2021
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 25 2020	June. 24 2021
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 25 2020	June. 24 2021

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 25 2020	June. 24 2021
2	Barometer	ChangChun	DYM3	GTS255	June. 25 2020	June. 24 2021

## 7 Test results and Measurement Data

### 7.1 Antenna requirement

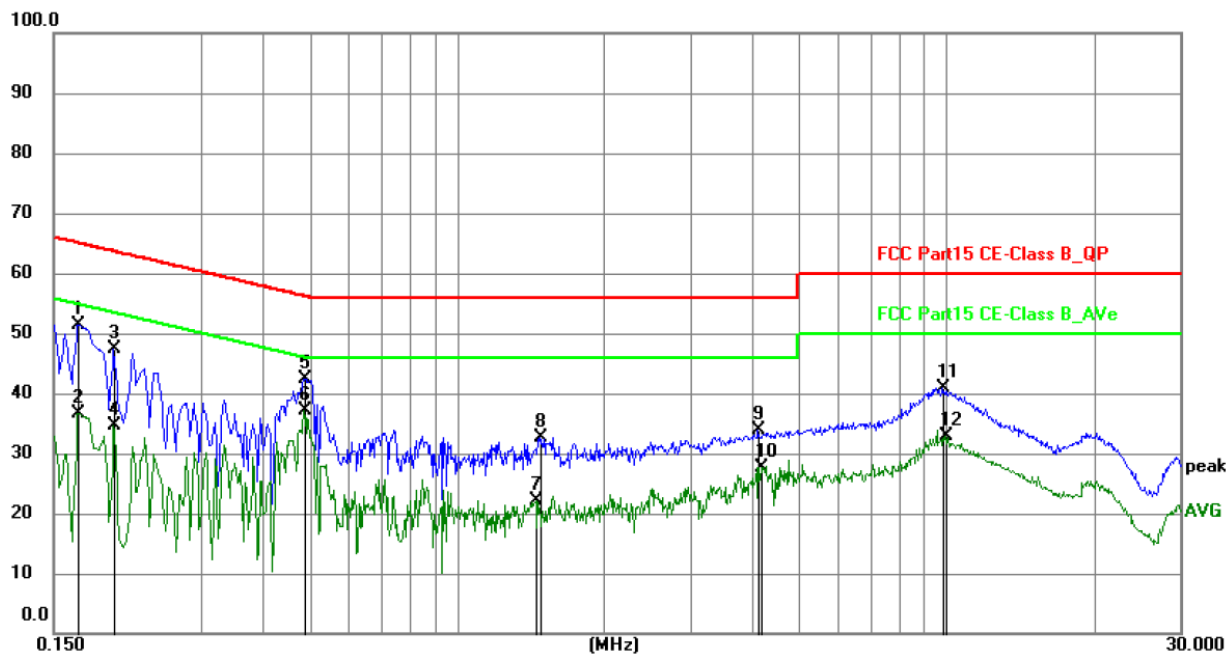
<b>Standard requirement:</b>	FCC Part15 C Section 15.203
<p><b>15.203 requirement:</b></p> <p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p> <p><b>15.247(c) (1)(i) requirement:</b></p> <p>(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.</p>	
<b>EUT Antenna:</b>	
<p><i>The antenna is PCB antenna, the best case gain of the antenna is 0dBi, reference to the appendix II for details</i></p>	

## 7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207					
Test Method:	ANSI C63.10:2013					
Test Frequency Range:	150KHz to 30MHz					
Class / Severity:	Class B					
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto					
Limit:	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 setup:	<p>Remark  E.U.T: Equipment Under Test  LISN: Line Impedance Stabilization Network  Test table height=0.8m</p>					
Test procedure:	<ol style="list-style-type: none"> <li>1. The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</li> </ol>					
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	/					
Test results:	Pass					

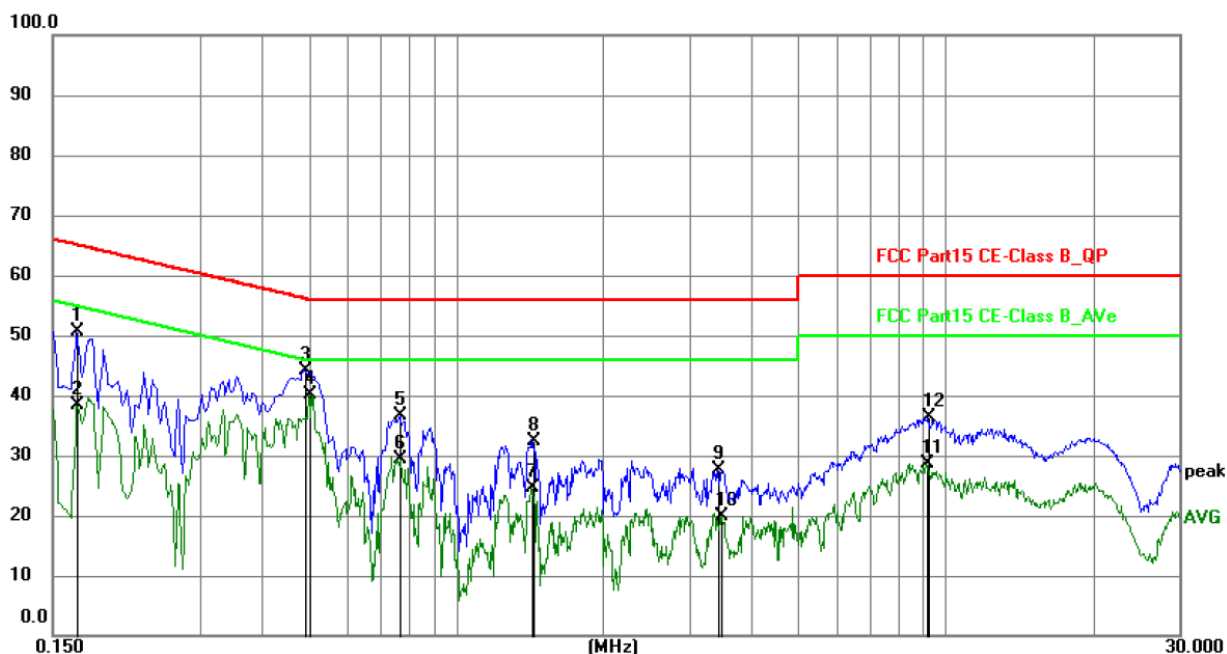
## Measurement data

Line:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1680	40.94	10.51	51.45	65.06	-13.61	QP
2	0.1680	26.16	10.51	36.67	55.06	-18.39	AVG
3	0.1995	36.90	10.51	47.41	63.63	-16.22	QP
4	0.1995	24.17	10.51	34.68	53.63	-18.95	AVG
5	0.4875	31.89	10.52	42.41	56.21	-13.80	QP
6	0.4875	26.66	10.52	37.18	46.21	-9.03	AVG
7	1.4549	11.98	10.25	22.23	46.00	-23.77	AVG
8	1.4729	22.33	10.25	32.58	56.00	-23.42	QP
9	4.1325	23.50	10.31	33.81	56.00	-22.19	QP
10	4.1865	17.25	10.31	27.56	46.00	-18.44	AVG
11	9.8385	30.33	10.66	40.99	60.00	-19.01	QP
12	9.9420	22.33	10.67	33.00	50.00	-17.00	AVG

**Neutral:**

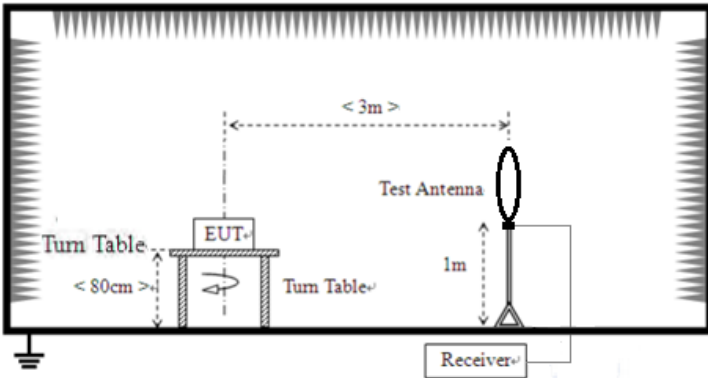


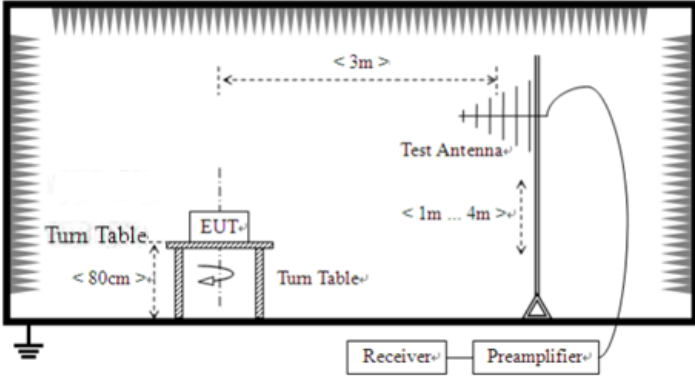
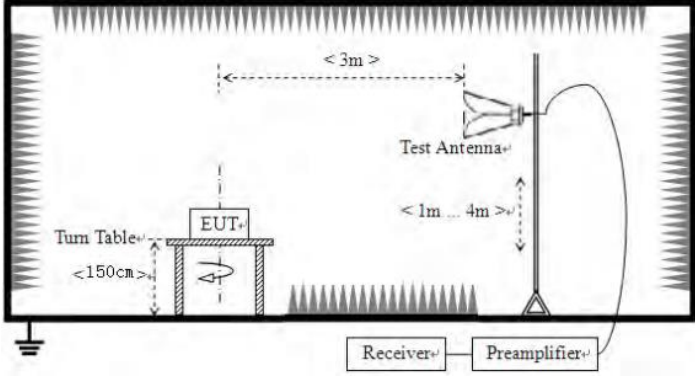
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1680	40.00	10.51	50.51	65.06	-14.55	QP
2	0.1680	27.91	10.51	38.42	55.06	-16.64	AVG
3	0.4920	33.71	10.52	44.23	56.13	-11.90	QP
4	0.5010	29.51	10.52	40.03	46.00	-5.97	AVG
5	0.7709	26.30	10.37	36.67	56.00	-19.33	QP
6	0.7709	19.03	10.37	29.40	46.00	-16.60	AVG
7	1.4279	14.39	10.24	24.63	46.00	-21.37	AVG
8	1.4369	22.22	10.24	32.46	56.00	-23.54	QP
9	3.4305	17.33	10.29	27.62	56.00	-28.38	QP
10	3.4755	9.67	10.29	19.96	46.00	-26.04	AVG
11	9.1500	18.13	10.61	28.74	50.00	-21.26	AVG
12	9.2355	25.77	10.62	36.39	60.00	-23.61	QP

*Notes:*

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + Factor(LISN Factor + Cable Loss)
4. *If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.*

## 7.3 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	9kHz-150kHz	Quasi-peak	200Hz	300Hz	Quasi-peak Value
	150kHz-30MHz	Quasi-peak	9kHz	10kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Peak		1MHz	10Hz	Average Value	
Limit: (Field strength of the fundamental signal)	Frequency	Limit (dBuV/m @3m)		Remark	
	2400MHz-2483.5MHz	94.00		Average Value	
		114.00		Peak Value	
Limit: (Spurious Emissions)	Frequency	Limit (uV/m)		Remark	
	0.009MHz-0.490MHz	2400/F(kHz) @300m		Quasi-peak Value	
	0.490MHz-1.705MHz	24000/F(kHz) @30m		Quasi-peak Value	
	1.705MHz-30.0MHz	30 @30m		Quasi-peak Value	
	30MHz-88MHz	100 @3m		Quasi-peak Value	
	88MHz-216MHz	150 @3m		Quasi-peak Value	
	216MHz-960MHz	200 @3m		Quasi-peak Value	
	960MHz-1GHz	500 @3m		Quasi-peak Value	
	Above 1GHz	500 @3m		Average Value	
5000 @3m		Peak Value			
Limit: (band edge)	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 Section 15.209, whichever is the lesser attenuation.				
Test setup:	<p>For radiated emissions from 9kHz to 30MHz</p>  <p>For radiated emissions from 30MHz to 1GHz</p>				

	 <p>For radiated emissions above 1GHz</p> 						
<p>Test Procedure:</p>	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> </ol>						
<p>Test Instruments:</p>	<p>Refer to section 6.0 for details</p>						
<p>Test mode:</p>	<p>Refer to section 5.2 for details</p>						
<p>Test environment:</p>	<table border="1"> <tr> <td>Temp.:</td> <td>25 °C</td> <td>Humid.:</td> <td>52%</td> <td>Press.:</td> <td>1012mbar</td> </tr> </table>	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar		
<p>Test voltage:</p>	<p>DC 12.0V</p>						
<p>Test results:</p>	<p>Pass</p>						

**Measurement data:**

**7.3.1 Spurious emissions**

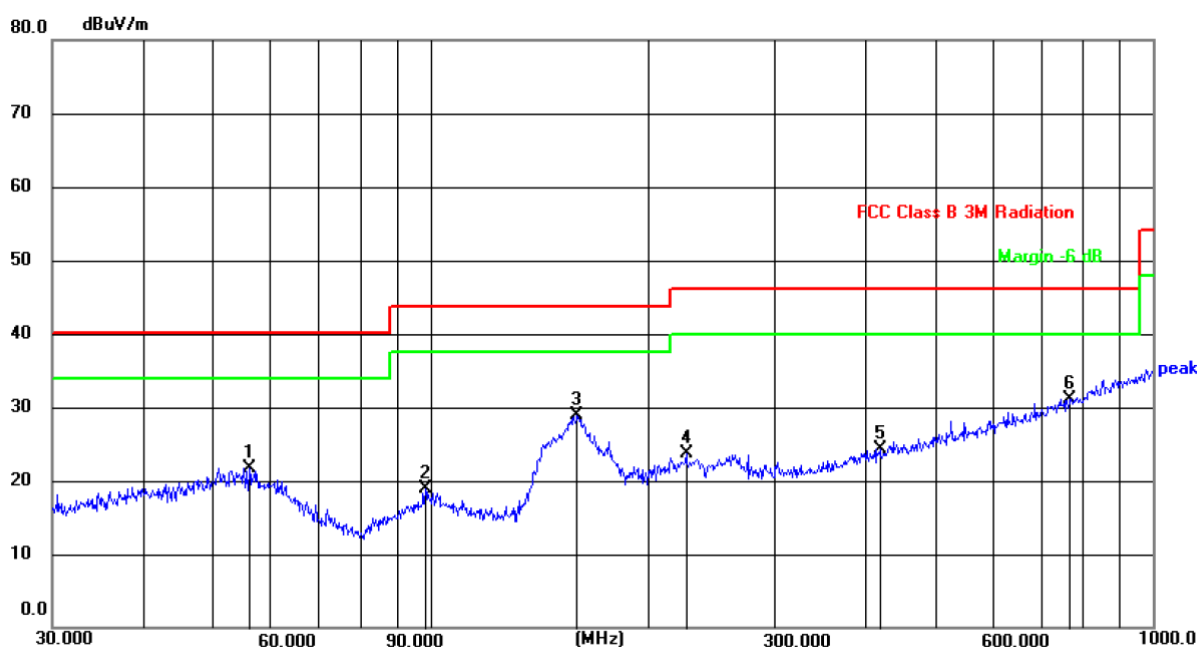
■ Below 30MHz

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o), the test result no need to reported.

■ Below 1GHz

We pretest all mode, the GFSK low channel was worst mode, and the data recording in the report.

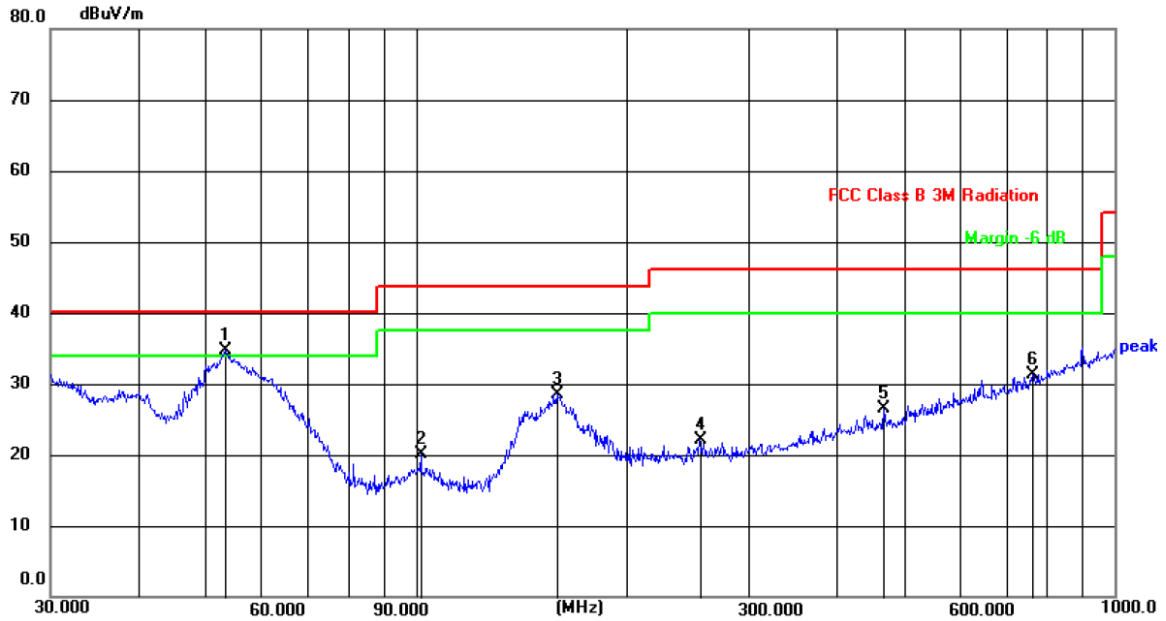
**Horizontal:**



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Margin dB	Detector	Comment
1		56.1974	36.06	-14.29	21.77	40.00	-18.23	QP	
2		98.4866	34.99	-16.03	18.96	43.50	-24.54	QP	
3	*	159.7844	47.30	-18.36	28.94	43.50	-14.56	QP	
4		226.0994	38.51	-14.79	23.72	46.00	-22.28	QP	
5		419.1081	34.60	-10.23	24.37	46.00	-21.63	QP	
6		768.7481	34.96	-3.78	31.18	46.00	-14.82	QP	



**Vertical:**



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Margin dB	Detector	Comment
1	*	53.3179	48.74	-13.96	34.78	40.00	-5.22	QP	
2		101.6443	36.01	-15.92	20.09	43.50	-23.41	QP	
3		159.2251	46.97	-18.39	28.58	43.50	-14.92	QP	
4		254.7284	36.05	-13.89	22.16	46.00	-23.84	QP	
5		467.2349	35.93	-9.37	26.56	46.00	-19.44	QP	
6		763.3757	35.25	-3.87	31.38	46.00	-14.62	QP	

■ Above 1GHz

Test channel:	GFSK Lowest channel
---------------	---------------------

**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	36.43	31.78	8.60	32.09	44.72	74.00	-29.28	Vertical
7206.00	31.35	36.15	11.65	32.00	47.15	74.00	-26.85	Vertical
9608.00	31.10	37.95	14.14	31.62	51.57	74.00	-22.43	Vertical
12010.00	*							Vertical
14412.00	*							Vertical
4804.00	35.76	31.78	8.60	32.09	44.05	74.00	-29.95	Horizontal
7206.00	31.12	36.15	11.65	32.00	46.92	74.00	-27.08	Horizontal
9608.00	30.54	37.95	14.14	31.62	51.01	74.00	-22.99	Horizontal
12010.00	*							Horizontal
14412.00	*							Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	25.31	31.78	8.60	32.09	33.60	54.00	-20.40	Vertical
7206.00	21.49	36.15	11.65	32.00	37.29	54.00	-16.71	Vertical
9608.00	21.73	37.95	14.14	31.62	42.20	54.00	-11.80	Vertical
12010.00	*							Vertical
14412.00	*							Vertical
4804.00	24.29	31.78	8.60	32.09	32.58	54.00	-21.42	Horizontal
7206.00	21.41	36.15	11.65	32.00	37.21	54.00	-16.79	Horizontal
9608.00	20.53	37.95	14.14	31.62	41.00	54.00	-13.00	Horizontal
12010.00	*							Horizontal
14412.00	*							Horizontal

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. “\*”, means this data is the too weak instrument of signal is unable to test.

Test channel:	GFSK Middle channel
---------------	---------------------

**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4880.00	36.61	31.85	8.67	32.12	45.01	74.00	-28.99	Vertical
7320.00	32.82	36.37	11.72	31.89	49.02	74.00	-24.98	Vertical
9760.00	31.97	38.35	14.25	31.62	52.95	74.00	-21.05	Vertical
12200.00	*							Vertical
14646.00	*							Vertical
4880.00	36.84	31.85	8.67	32.12	45.24	74.00	-28.76	Horizontal
7320.00	31.90	36.37	11.72	31.89	48.10	74.00	-25.90	Horizontal
9760.00	31.11	38.35	14.25	31.62	52.09	74.00	-21.91	Horizontal
12200.00	*							Horizontal
14646.00	*							Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4880.00	25.53	31.85	8.67	32.12	33.93	54.00	-20.07	Vertical
7320.00	21.85	36.37	11.72	31.89	38.05	54.00	-15.95	Vertical
9760.00	22.03	38.35	14.25	31.62	43.01	54.00	-10.99	Vertical
12200.00	*							Vertical
14640.00	*							Vertical
4880.00	25.77	31.85	8.67	32.12	34.17	54.00	-19.83	Horizontal
7320.00	21.83	36.37	11.72	31.89	38.03	54.00	-15.97	Horizontal
9760.00	21.75	38.35	14.25	31.62	42.73	54.00	-11.27	Horizontal
12200.00	*							Horizontal
14640.00	*							Horizontal

**Remark:**

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *“\*”, means this data is the too weak instrument of signal is unable to test.*

Test channel:	GFSK Highest channel
---------------	----------------------

**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	36.84	31.93	8.73	32.16	45.34	74.00	-28.66	Vertical
7440.00	32.48	36.59	11.79	31.78	49.08	74.00	-24.92	Vertical
9920.00	31.29	38.81	14.38	31.88	52.60	74.00	-21.40	Vertical
12400.00	*							Vertical
14880.00	*							Vertical
4960.00	36.62	31.93	8.73	32.16	45.12	74.00	-28.88	Horizontal
7440.00	32.10	36.59	11.79	31.78	48.70	74.00	-25.30	Horizontal
9920.00	31.82	38.81	14.38	31.88	53.13	74.00	-20.87	Horizontal
12400.00	*							Horizontal
14880.00	*							Horizontal

**Average value:**

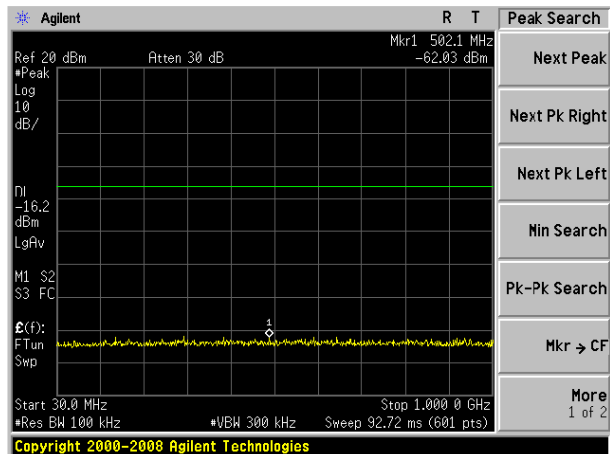
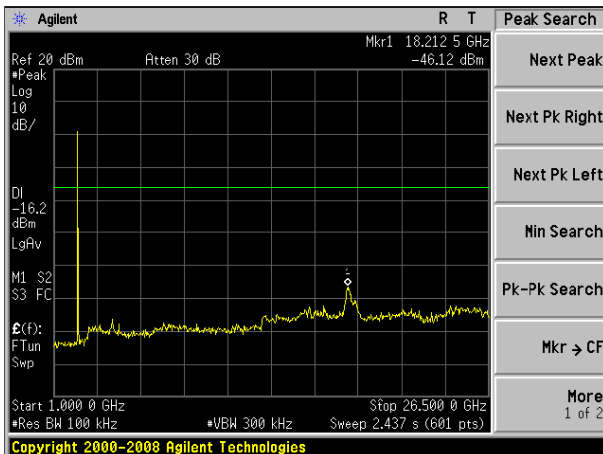
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	24.77	31.93	8.73	32.16	33.27	54.00	-20.73	Vertical
7440.00	21.02	36.59	11.79	31.78	37.62	54.00	-16.38	Vertical
9920.00	20.81	38.81	14.38	31.88	42.12	54.00	-11.88	Vertical
12400.00	*							Vertical
14880.00	*							Vertical
4960.00	25.02	31.93	8.73	32.16	33.52	54.00	-20.48	Horizontal
7440.00	21.09	36.59	11.79	31.78	37.69	54.00	-16.31	Horizontal
9920.00	20.91	38.81	14.38	31.88	42.22	54.00	-11.78	Horizontal
12400.00	*							Horizontal
14880.00	*							Horizontal

**Remark:**

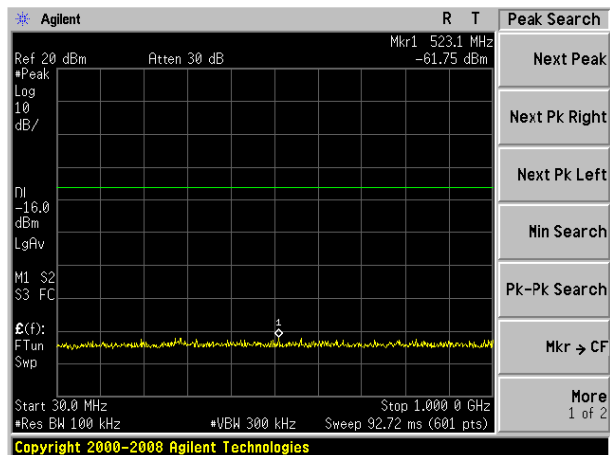
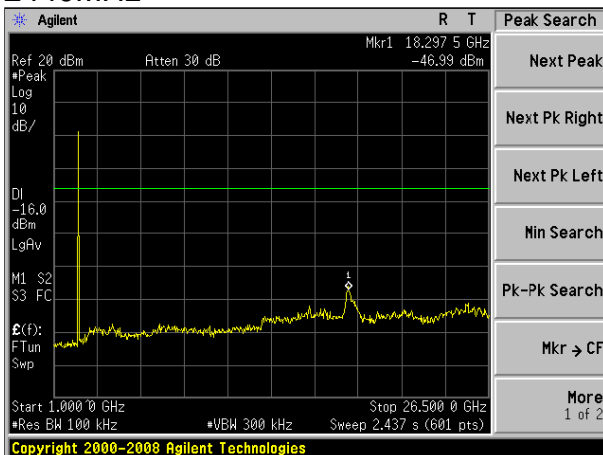
1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *“\*”, means this data is the too weak instrument of signal is unable to test.*

For conducted

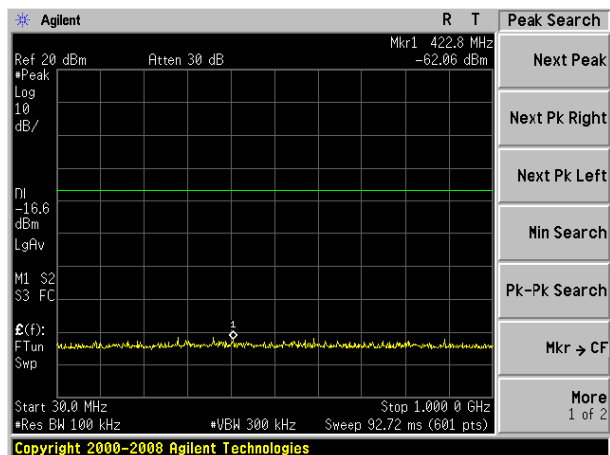
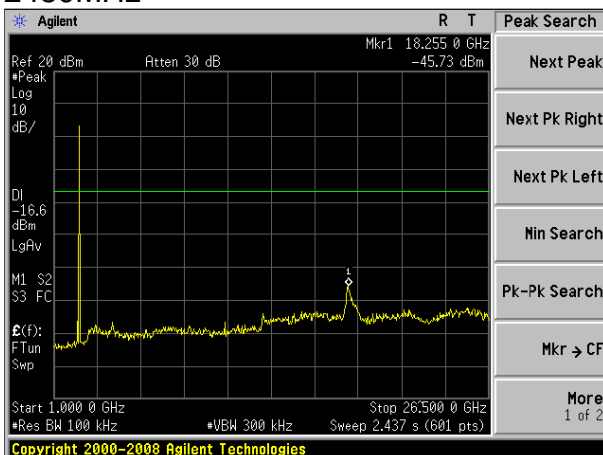
## 2402MHz



## 2440MHz



## 2480MHz



## 7.3.2 Bandedge emissions

All of the restriction bands were tested, and only the GFSK data of worst case was exhibited.

Test channel:	GFSK Lowest channel
---------------	---------------------

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	40.13	27.59	5.38	30.18	42.92	74.00	-31.08	Horizontal
2400.00	55.04	27.58	5.39	30.18	57.83	74.00	-16.17	Horizontal
2390.00	40.11	27.59	5.38	30.18	42.90	74.00	-31.10	Vertical
2400.00	55.99	27.58	5.39	30.18	58.78	74.00	-15.22	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	30.36	27.59	5.38	30.18	33.15	54.00	-20.85	Horizontal
2400.00	44.99	27.58	5.39	30.18	47.78	54.00	-6.22	Horizontal
2390.00	30.87	27.59	5.38	30.18	33.66	54.00	-20.34	Vertical
2400.00	46.07	27.58	5.39	30.18	48.86	54.00	-5.14	Vertical

Test channel:	GFSK Highest channel
---------------	----------------------

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	43.28	27.53	5.47	29.93	46.35	74.00	-27.65	Horizontal
2500.00	41.83	27.55	5.49	29.93	44.94	74.00	-29.06	Horizontal
2483.50	42.98	27.53	5.47	29.93	46.05	74.00	-27.95	Vertical
2500.00	41.88	27.55	5.49	29.93	44.99	74.00	-29.01	Vertical

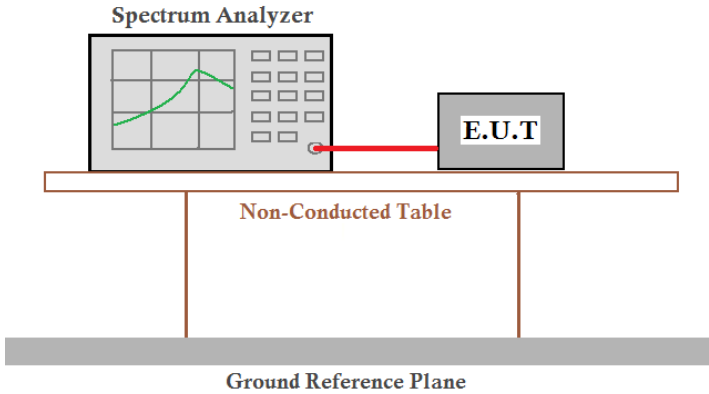
Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	31.92	27.53	5.47	29.93	34.99	54.00	-19.01	Horizontal
2500.00	31.82	27.55	5.49	29.93	34.93	54.00	-19.07	Horizontal
2483.50	31.49	27.53	5.47	29.93	34.56	54.00	-19.44	Vertical
2500.00	31.68	27.55	5.49	29.93	34.79	54.00	-19.21	Vertical

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor

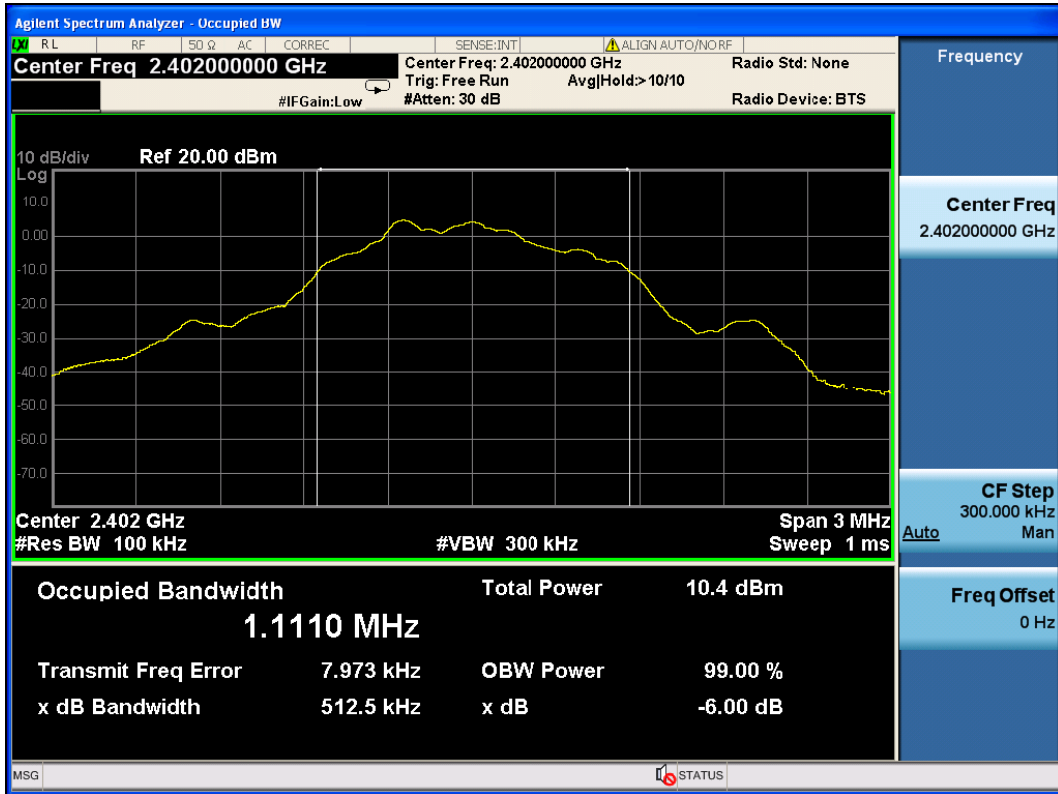
## 7.4 Channel Bandwidth

Test Requirement:	FCC Part15 C Section 15.247(a)(2) RSS-247
Test Method:	ANSI C63.10:2013
Limit:	>= 500KHz (6dB bandwidth)
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

### Measurement Data

Mode	Test channel	6dB bandwidth (kHz)	99%dB bandwidth (MHz)	Limit (kHz)	Result
GFSK	Lowest	512.5	1.1110	>500	Pass
	Middle	509.9	1.1099	>500	Pass
	Highest	509.3	1.1096	>500	Pass

Test plot as follows:

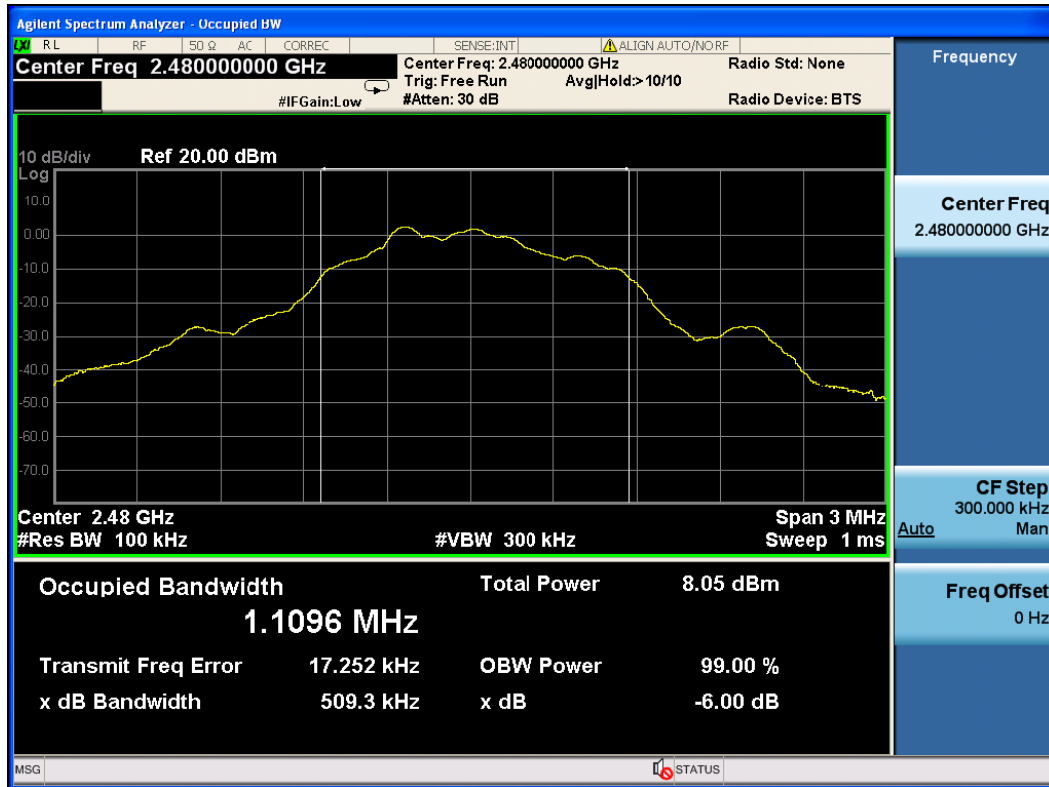


GFSK Lowest channel



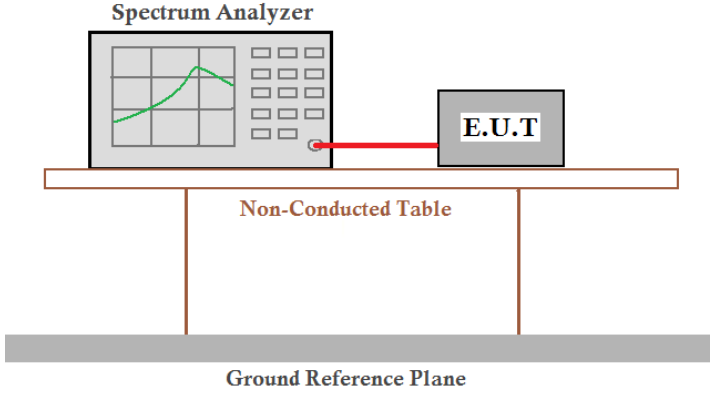
GFSK Middle channel





GFSK Highest channel

## 7.5 Power Spectral Density

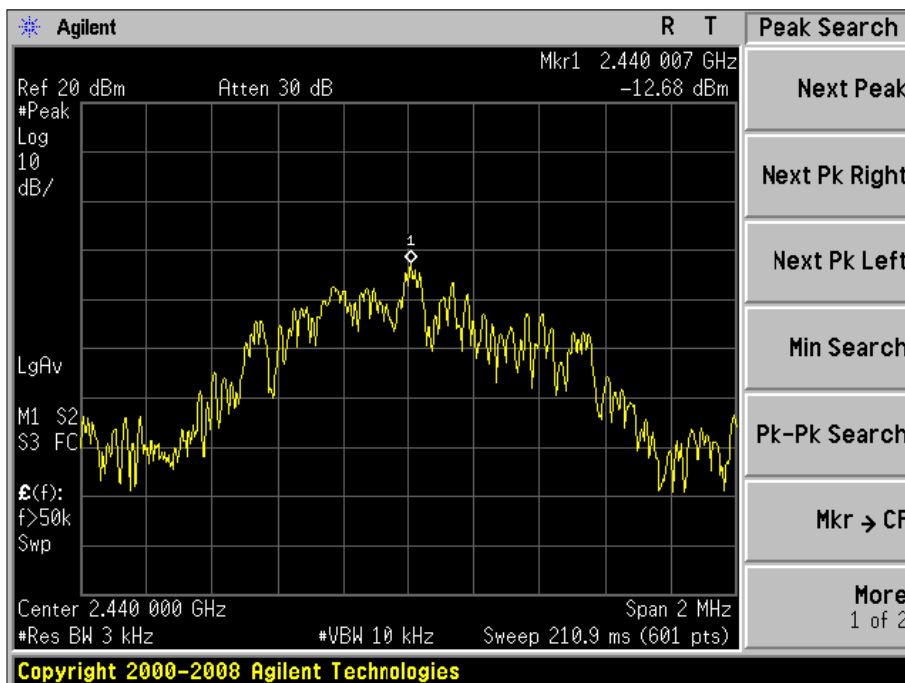
Test Requirement:	FCC Part15 C Section 15.247 RSS-247
Test Method:	ANSI C63.10:2013
Limit:	Below 8 dBm (in any 3KHz)
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

### Measurement Data

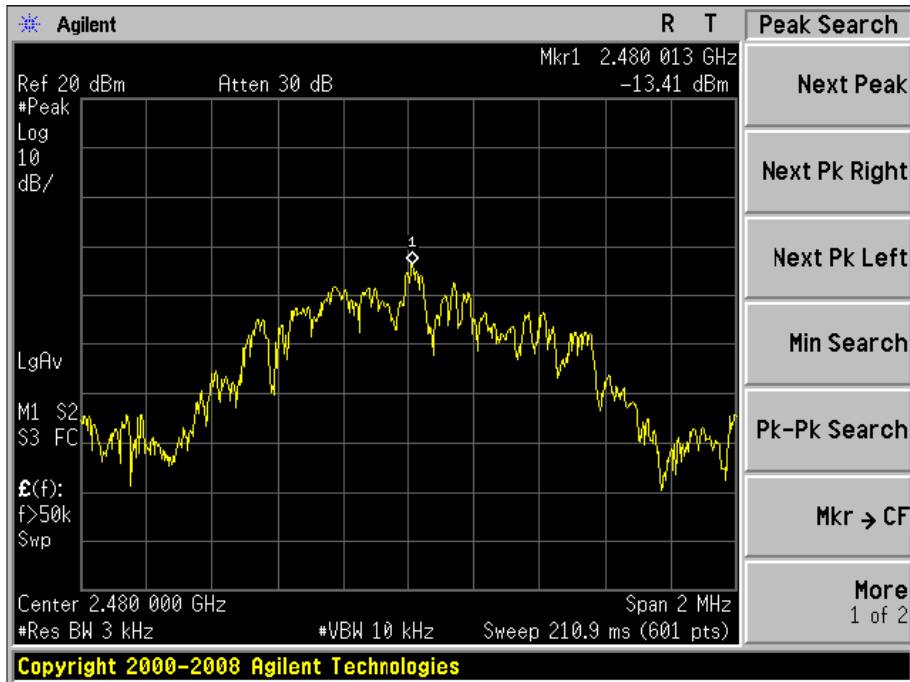
Mode	Test channel	Power Density (dBm)	Limit (dBm/3kHz)	Result
GFSK	Lowest	-12.73	<8	Pass
	Middle	-12.68	<8	Pass
	Highest	-13.41	<8	Pass



GFSK Lowest channel

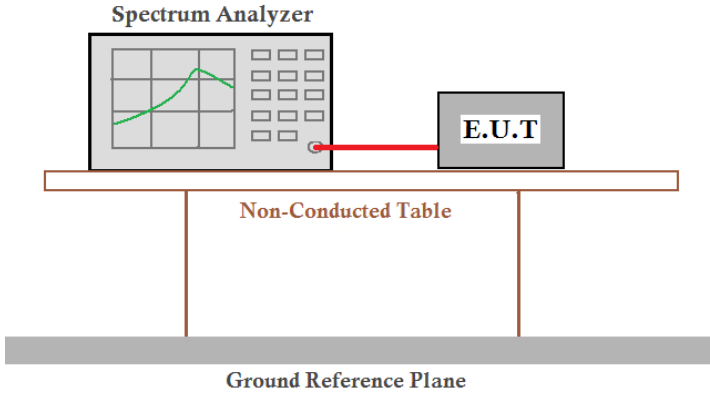


GFSK Middle channel



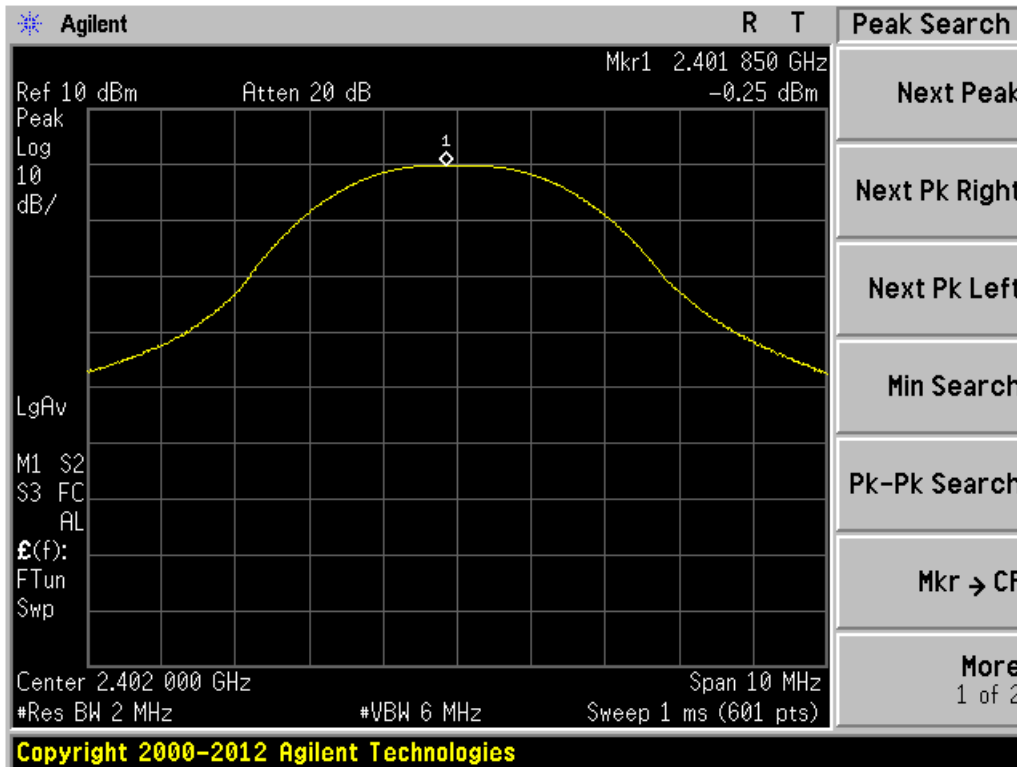
GFSK Highest channel

## 7.6 Conducted Output Power

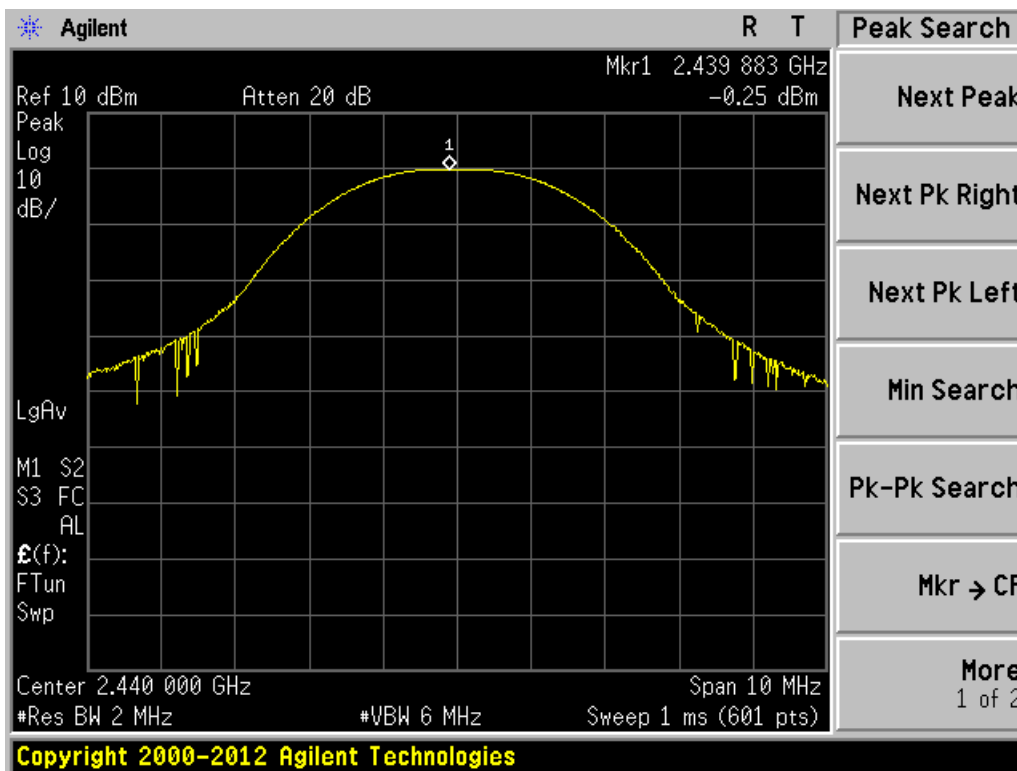
Test Requirement:	FCC Part15 C Section 15.247(b) (3) RSS-247
Test Method:	ANSI C63.10:2013
Limit:	30dBm
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

### Measurement Data

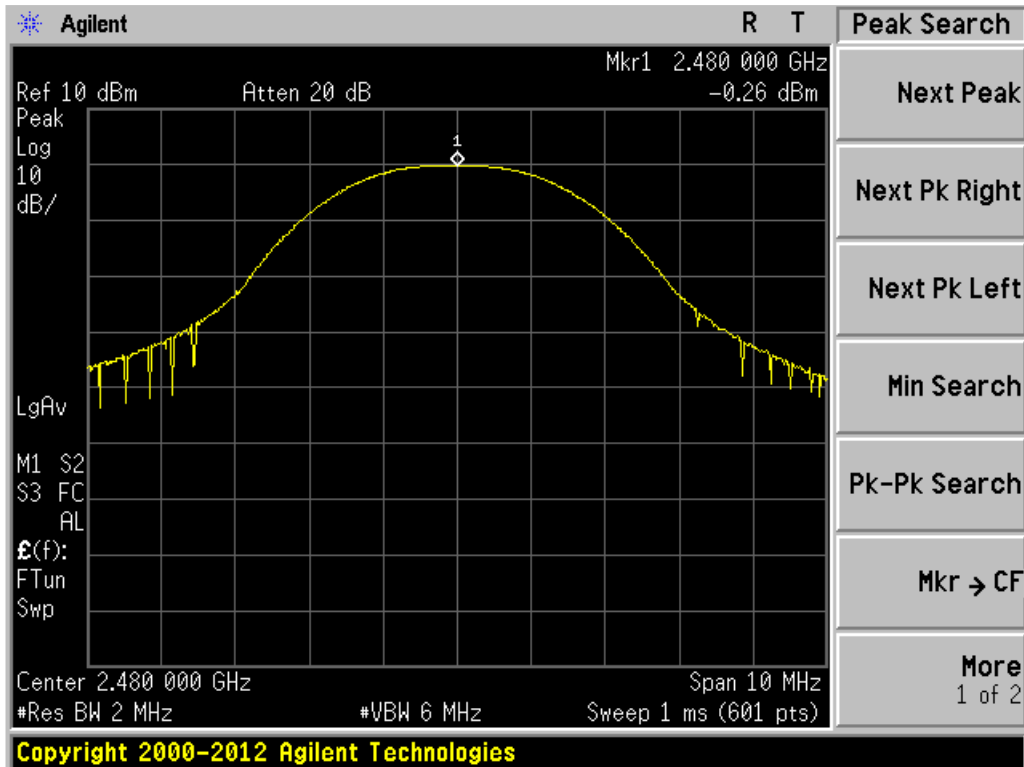
Mode	Test channel	Output Power(PK)	EIRP Power (dBm)	Limit (dBm)	Result
GFSK	Lowest	-0.25	-0.25	<30	Pass
	Middle	-0.25	-0.25	<8	Pass
	Highest	-0.26	-0.26	<8	Pass



GFSK Lowest channel

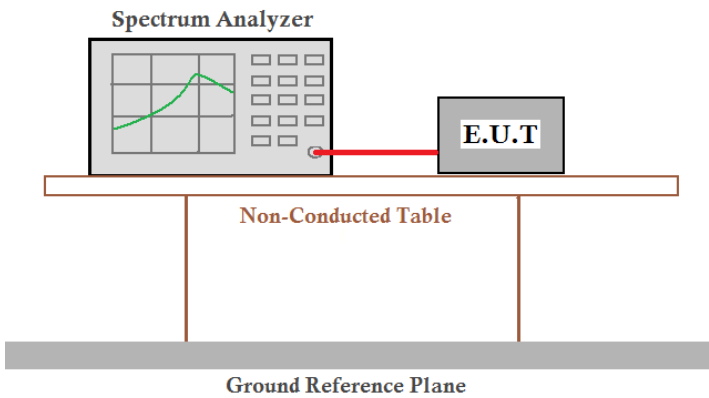


GFSK Middle channel



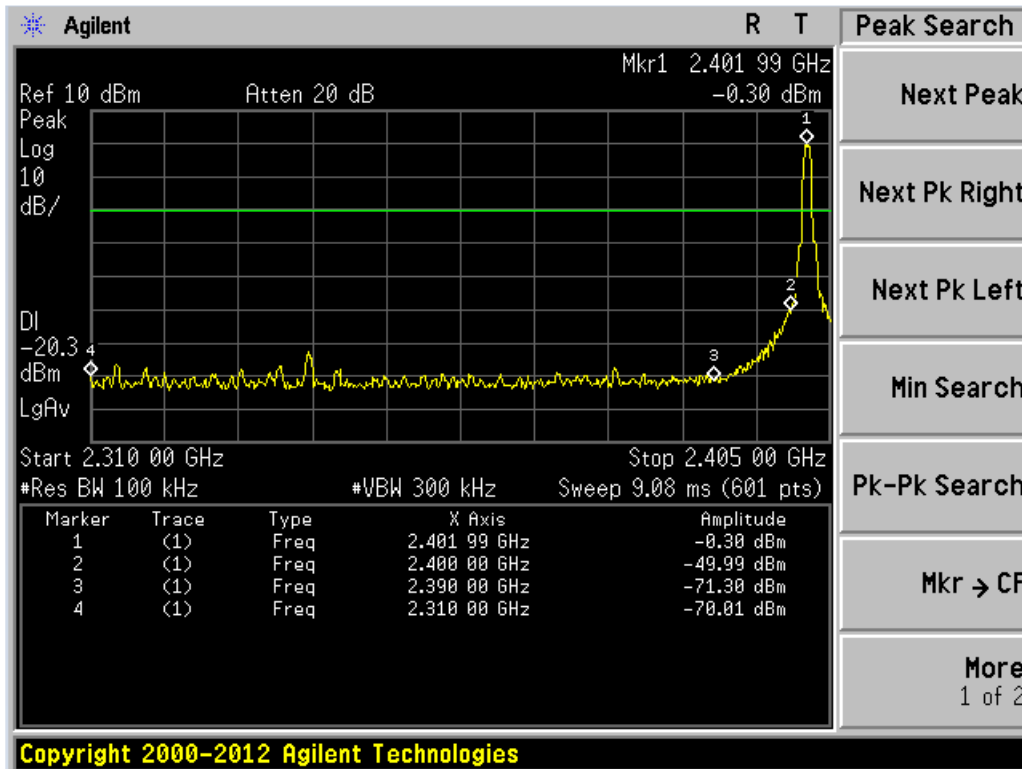
GFSK Highest channel

## 7.7 Band edges

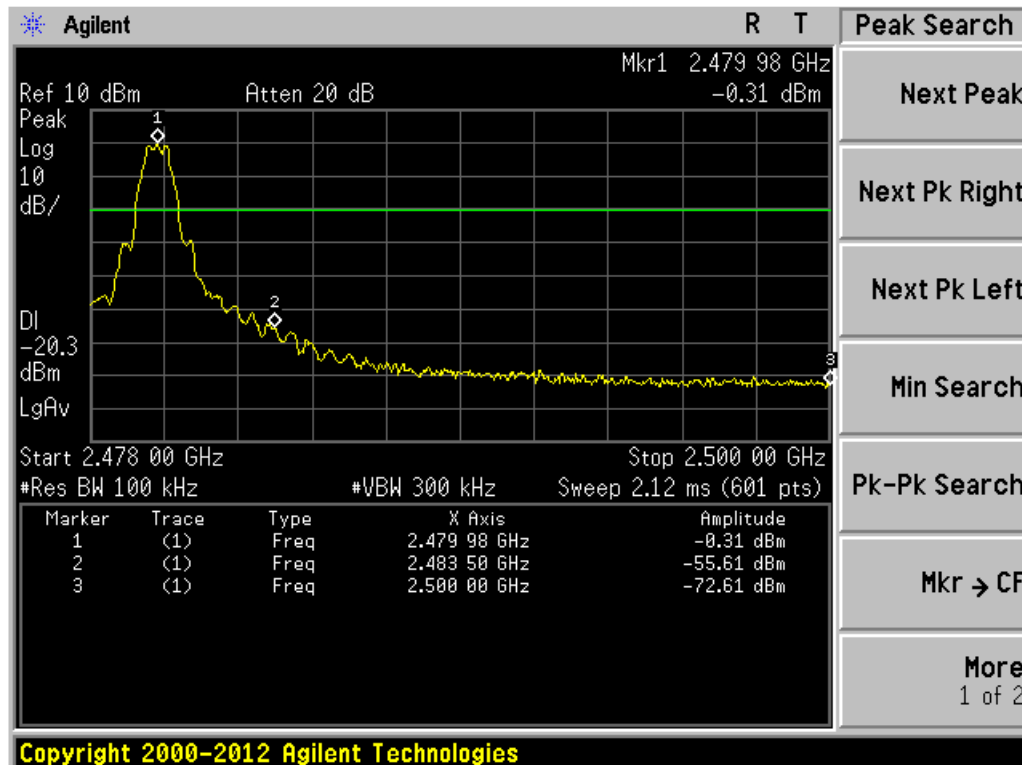
Test Requirement:	FCC Part15 C Section 15.247(d) RSS-247
Test Method:	ANSI C63.10:2013
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer and an E.U.T. (Equipment Under Test) are positioned on a Non-Conducted Table. A red cable connects the Spectrum Analyzer to the E.U.T. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

## Measurement Data





GFSK Lowest channel



GFSK Highest channel

## 8 Test Setup Photo

### Radiated Emission



## Conducted Emission

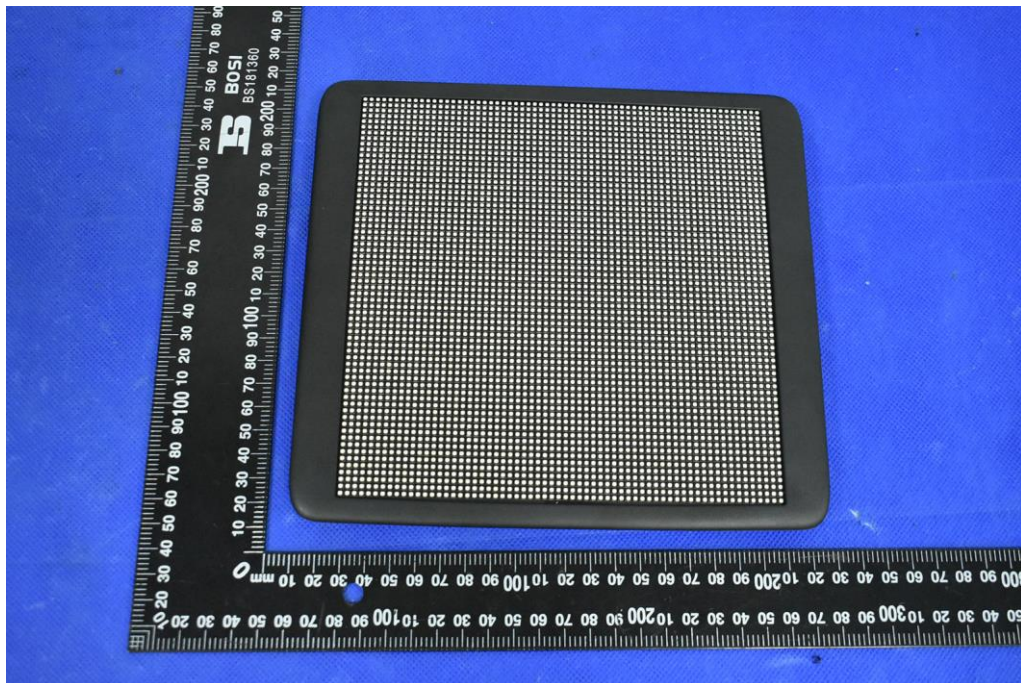


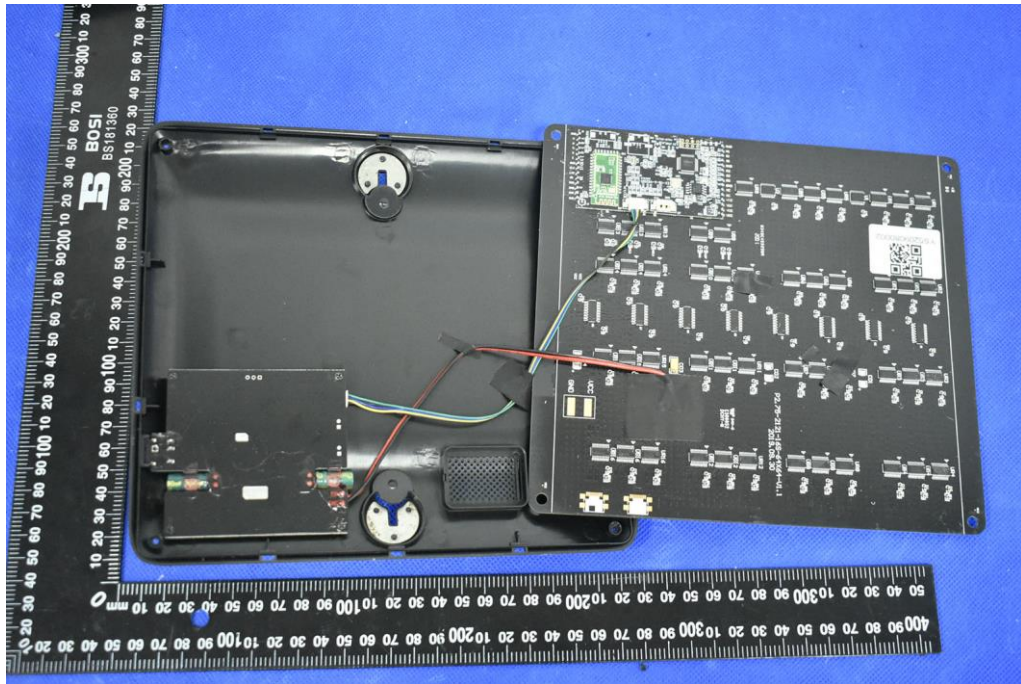


## 9 EUT Constructional Details









-----End-----