

APPLICATION CERTIFICATION FCC Part 15C

On Behalf of

Shenzhen Sanag Technology Co., Ltd.

Wireless bluetooth headset

Model No.: J1, J2, J3, J4, J5, J6, I12-C, I12-D, T3, P2

FCC ID: 2AQR8-J1

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Date of Report : July 26, 2018

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Test Report Certification

Applicant : Shenzhen Sanag Technology Co., Ltd.
Manufacturer : Shenzhen Sanag Technology Co., Ltd.
EUT Description : Wireless bluetooth headset
Model No. : J1, J2, J3, J4, J5, J6, I12-C, I12-D, T3, P2
Brand Name : sanag

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247
ANSI C63.10: 2013

The device described above is tested by Shenzhen Accurate Technology Co., Ltd to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.247 limits. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Accurate Technology Co., Ltd.

Date of Test : July 18-July 25, 2018

Date of Report : July 26, 2018

Prepared by :

Star Yang

(Star Yang, Engineer)

Approved & Authorized Signer :

Sean Liu
(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1.Description of Device (EUT)

Model Number	:	J1, J2, J3, J4, J5, J6, I12-C, I12-D, T3, P2 (Note: We hereby state that these models are identical in interior structure, electrical circuits and components, just appearance color are different . Therefore, only model J1 is tested for EMC tests.)
Bluetooth version	:	V5.0 Single mode This report is for BT classic mode
Frequency Range	:	2402MHz-2480MHz
Number of Channels	:	79
Antenna Gain(Max)	:	4dBi
Antenna type	:	Integral Antenna
Adapter Input Voltage	:	DC 3.7V (Power by Lithium battery) or DC 5.0V (Power by USB port)
Modulation mode	:	GFSK, $\pi/4$ DQPSK, 8DPSK
Applicant	:	Shenzhen Sanag Technology Co., Ltd.
Address	:	Room 501, Bldg. A, Rongfeng Packaging Ind. Park, Nanwan Street, Longgang Dist. Shenzhen City, Guangdong Province, China
Manufacturer	:	Shenzhen Sanag Technology Co., Ltd.
Address	:	Room 501, building A, rongfeng packaging industrial park, no. 3 xiangye road, nanwan street, longgang district, shenzhen city, guangdong province, china

1.2.Accessory and Auxiliary Equipment

AC/DC Power Adapter (provided by laboratory)	:	Model:TEKA006-0501000UKU
		Input: 100-240V~50/60Hz 0.3A
		Output: DC 5V/1A

1.3. Description of Test Facility

EMC Lab	:	Recognition of accreditation by Federal Communications Commission (FCC) The Designation Number is CN1189 The Registration Number is 708358 Listed by Innovation, Science and Economic Development Canada (ISED) The Registration Number is 5077A-2 Accredited by China National Accreditation Service for Conformity Assessment (CNAS) The Registration Number is CNAS L3193 Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01
Name of Firm	:	Shenzhen Accurate Technology Co., Ltd.
Site Location	:	1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

1.4. 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

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 06, 2018	1 Year
EMI Test Receiver	Rohde& Schwarz	ESR	101817	Jan. 06, 2018	1 Year
Spectrum Analyzer	Rohde&Schwarz	FSV40	101495	Jan. 06, 2018	1 Year
Pre-Amplifier	Rohde&Schwarz	CBLU1183540-01	3791	Jan. 06, 2018	1 Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 06, 2018	1 Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 06, 2018	1 Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 06, 2018	1 Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 06, 2018	1 Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18G-10SS	N/A	Jan. 06, 2018	1 Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2485-2375/2510-60/11SS	N/A	Jan. 06, 2018	1 Year

3. OPERATION OF EUT DURING TESTING

3.1. Operating Mode

The mode is used: Transmitting mode

Low Channel: 2402MHz

Middle Channel: 2441MHz

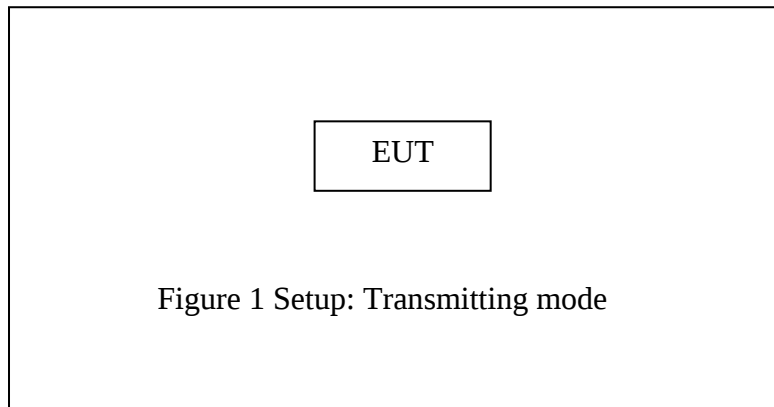
High Channel: 2480MHz

Hopping

Note: The equipment under test (EUT) was tested under fully-charged battery.
The Bluetooth has been tested under continuous transmission mode.

The PCB board of the left right sound channel of the product is identical, so only one bluetooth module is tested.

3.2. Configuration and peripherals



4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission Test	Compliant
Section 15.247(a)(1)	20dB Bandwidth Test	Compliant
Section 15.247(a)(1)	Carrier Frequency Separation Test	Compliant
Section 15.247(a)(1)(iii)	Number Of Hopping Frequency Test	Compliant
Section 15.247(a)(1)(iii)	Dwell Time Test	Compliant
Section 15.247(b)(1)	Maximum Peak Output Power Test	Compliant
Section 15.247(d) Section 15.209	Radiated Emission Test	Compliant
Section 15.247(d)	Band Edge Compliance Test	Compliant
Section 15.203	Antenna Requirement	Compliant

5. 20DB BANDWIDTH TEST

5.1. Block Diagram of Test Setup



5.2. The Requirement For Section 15.247(a)(1)

Section 15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

5.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.4. Operating Condition of EUT

5.4.1. Setup the EUT and simulator as shown as Section 5.1.

5.4.2. Turn on the power of all equipment.

5.4.3. Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

5.5. Test Procedure

5.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

5.5.2. Set RBW of spectrum analyzer to 30 kHz and VBW to 100 kHz.

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

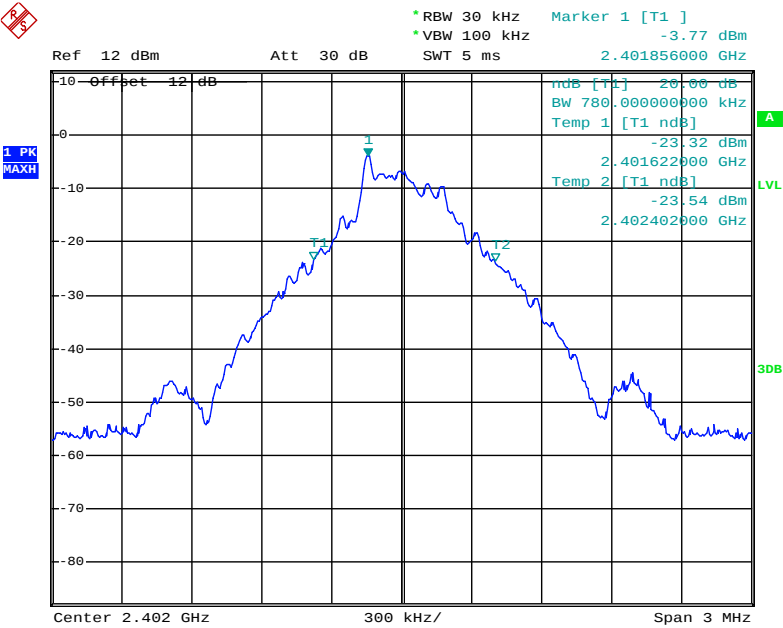
5.6.Test Result

Channel	Frequency (MHz)	GFSK 20dB Bandwidth (MHz)	$\Pi/4$ -DQPSK 20dB Bandwidth (MHz)	8DPSK 20dB Bandwidth (MHz)	Result
Low	2402	0.780	1.140	1.134	Pass
Middle	2441	0.750	1.140	1.152	Pass
High	2480	0.786	1.134	1.152	Pass

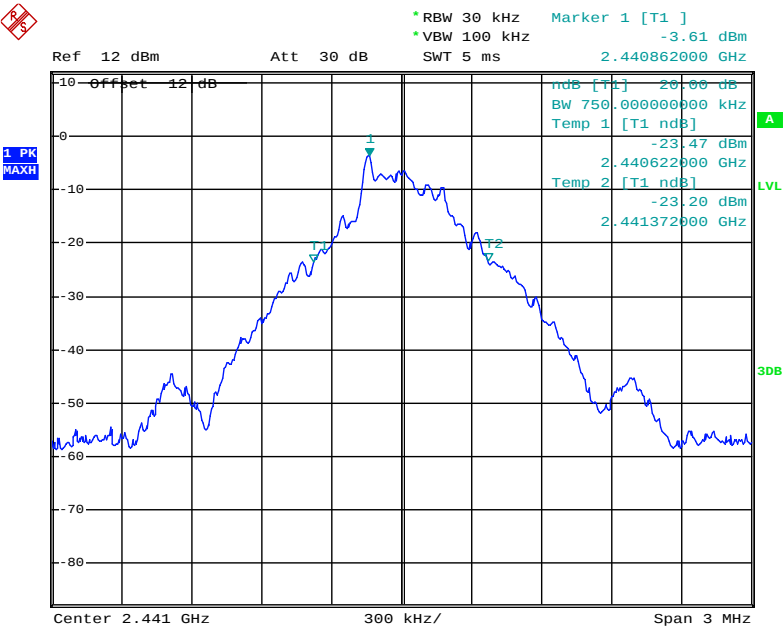
The spectrum analyzer plots are attached as below.

GFSK Mode

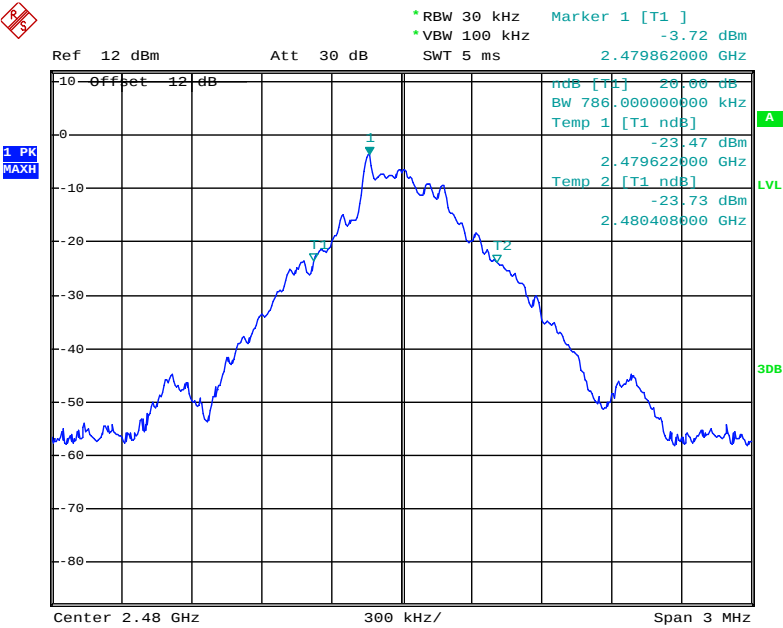
Low channel



Middle channel

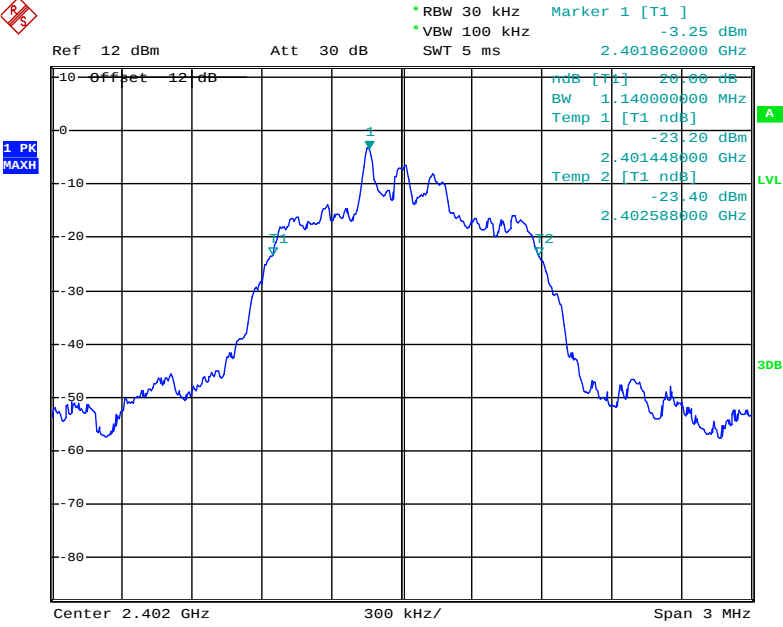


High channel

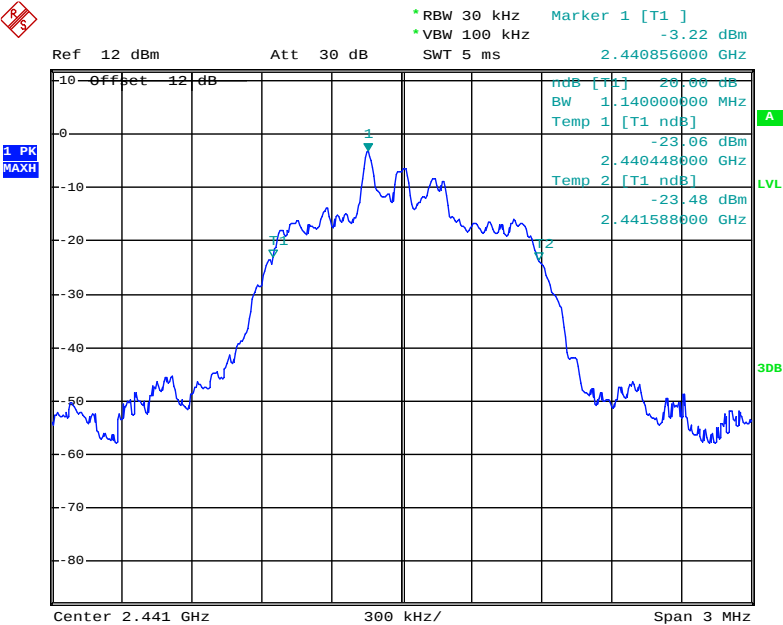


Π/4-DQPSK Mode

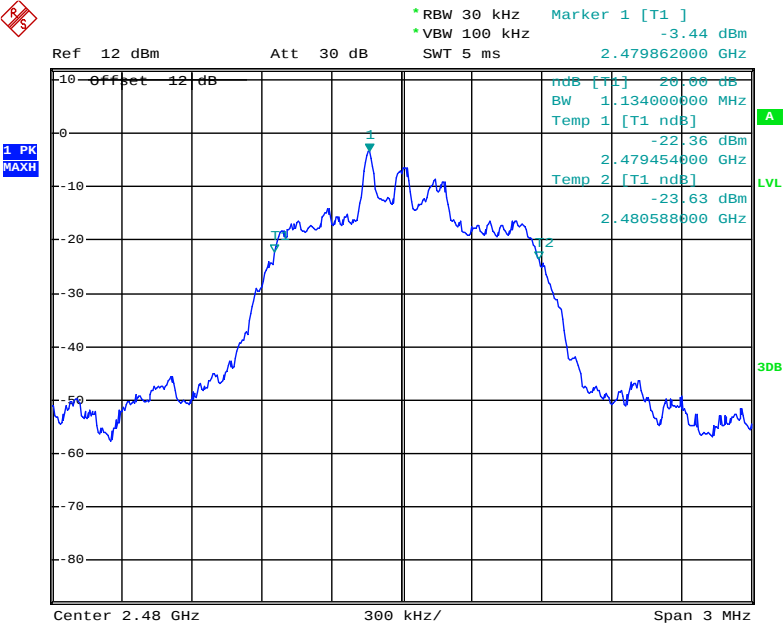
Low channel



Middle channel

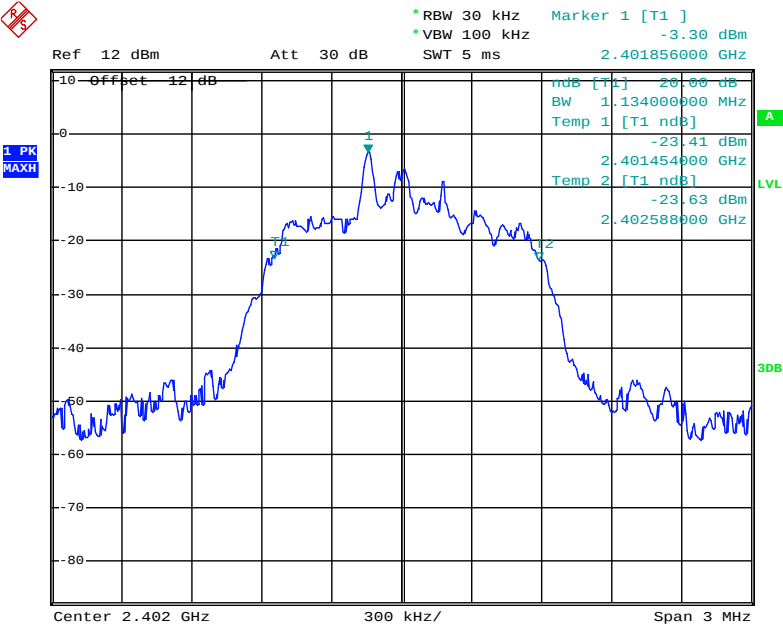


High channel

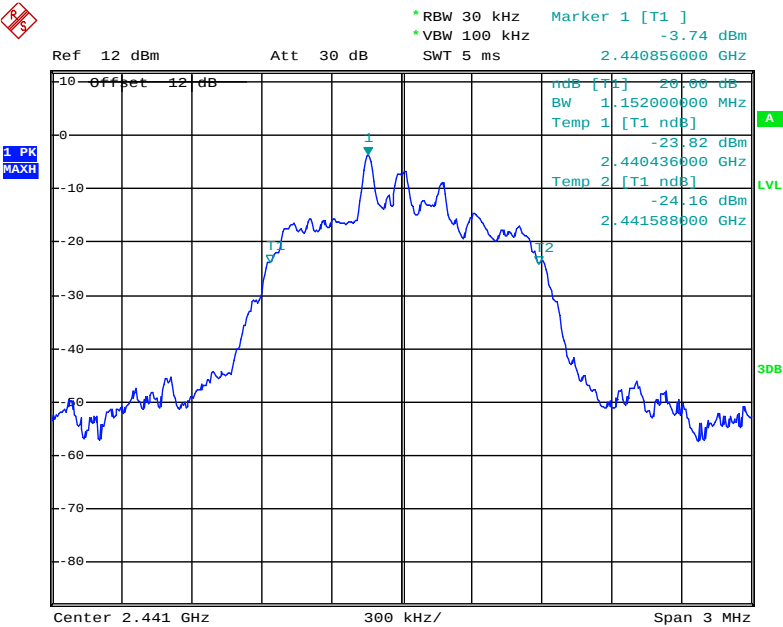


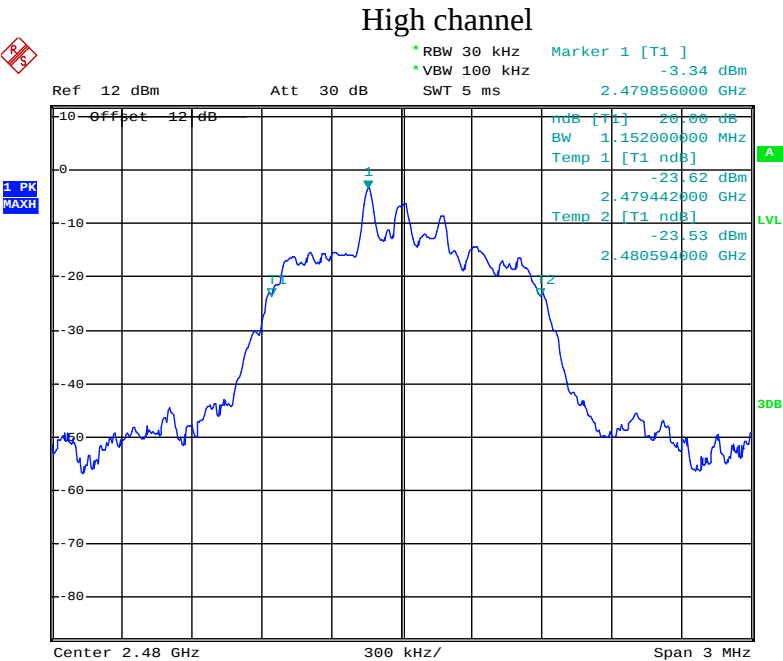
8DPSK Mode

Low channel



Middle channel





6. CARRIER FREQUENCY SEPARATION TEST

6.1. Block Diagram of Test Setup



6.2. The Requirement For Section 15.247(a)(1)

Section 15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

6.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.4. Operating Condition of EUT

6.4.1. Setup the EUT and simulator as shown as Section 6.1.

6.4.2. Turn on the power of all equipment.

6.4.3. Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

6.5. Test Procedure

6.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

6.5.2. Set RBW of spectrum analyzer to 30 kHz and VBW to 100 kHz. Adjust Span to 2MHz.

6.5.3. Set the adjacent channel of the EUT Maxhold another trace.

6.5.4. Measurement the channel separation

6.6. Test Result

GFSK Mode

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.002	≥ 0.780	Pass
	2403			
Middle	2440	1.002	≥ 0.750	Pass
	2441			
High	2479	1.002	≥ 0.786	Pass
	2480			

Π/4-DQPSK Mode

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.002	≥ 0.760	Pass
	2403			
Middle	2440	1.002	≥ 0.760	Pass
	2441			
High	2479	1.002	≥ 0.756	Pass
	2480			

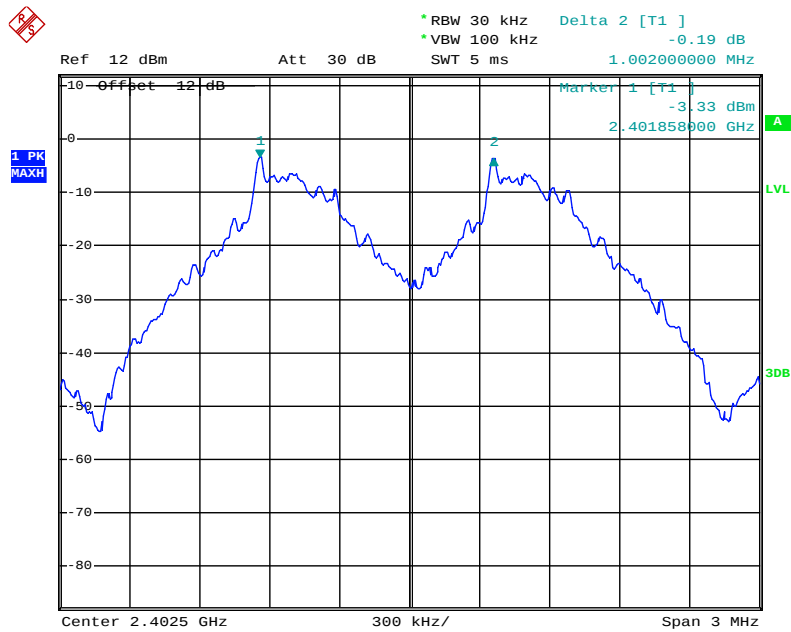
8DPSK Mode

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.002	≥ 0.756	Pass
	2403			
Middle	2440	1.002	≥ 0.768	Pass
	2441			
High	2479	1.002	≥ 0.768	Pass
	2480			

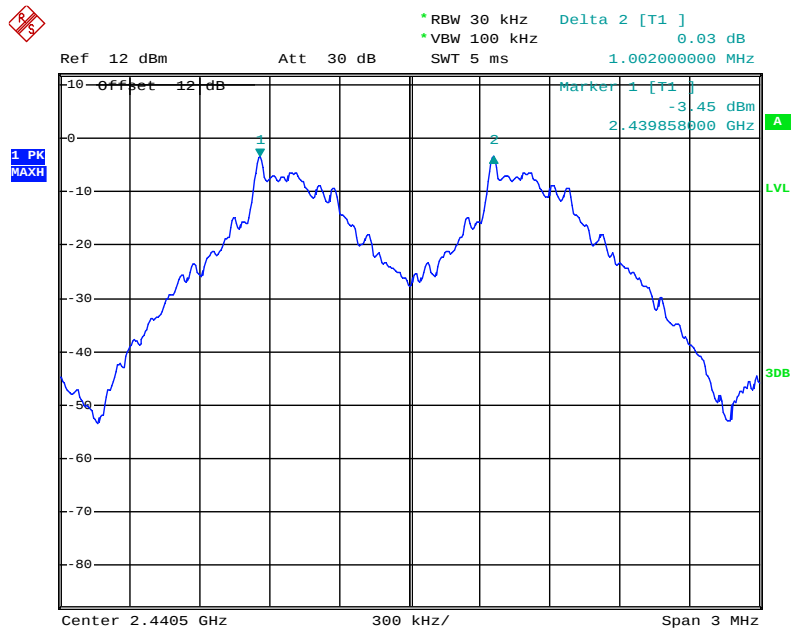
The spectrum analyzer plots are attached as below.

GFSK Mode

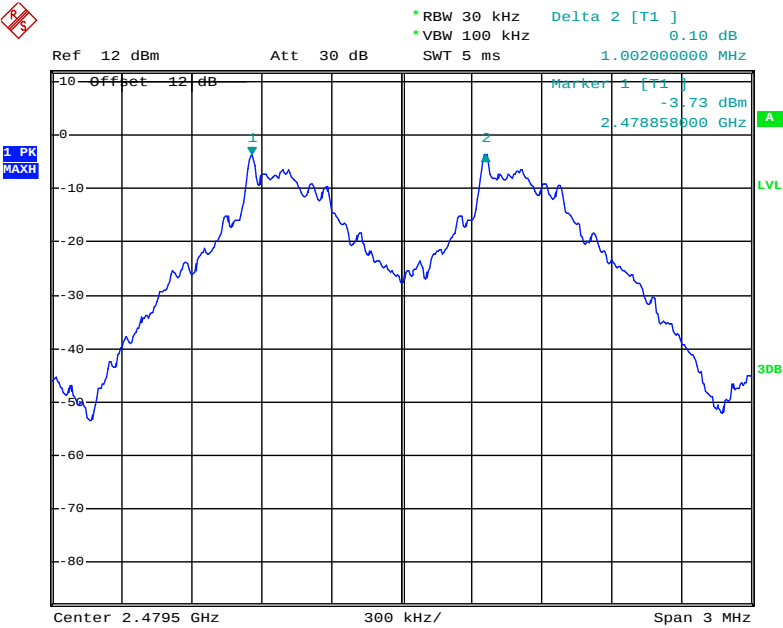
Low channel



Middle channel

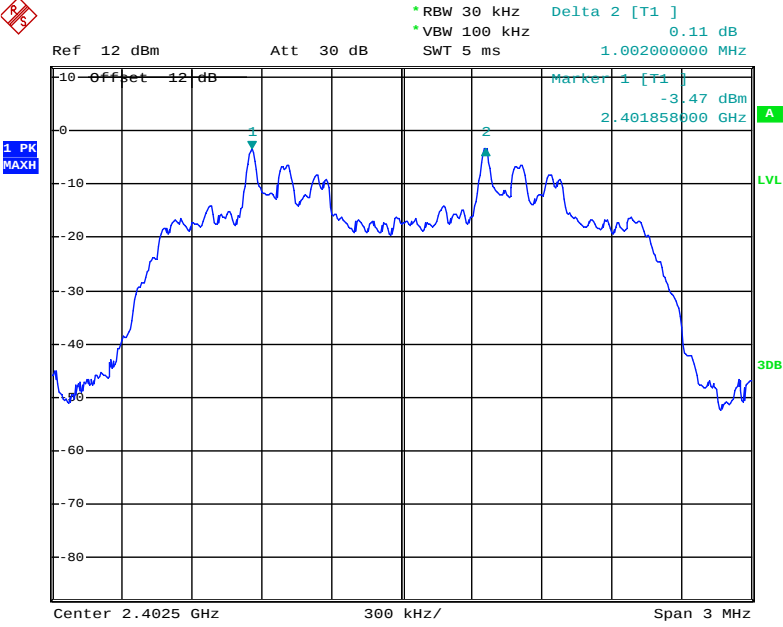


High channel

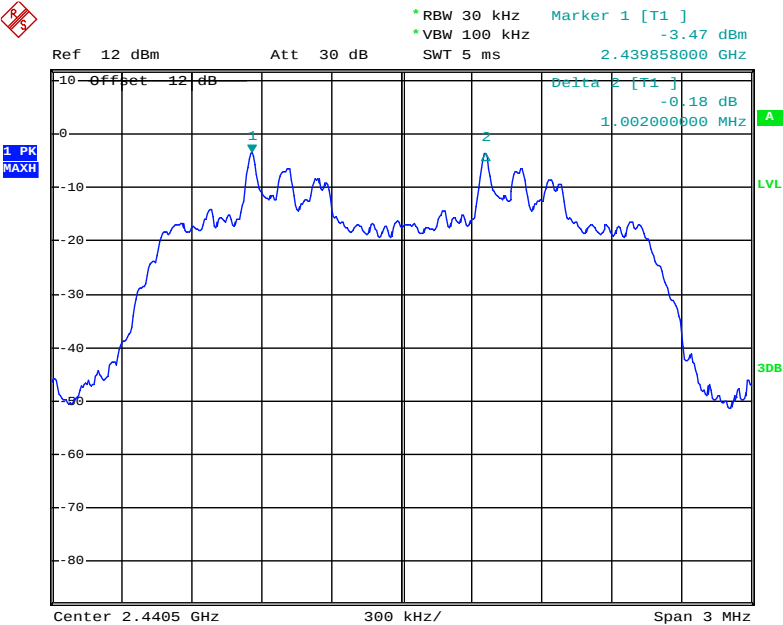


Π/4-DQPSK Mode

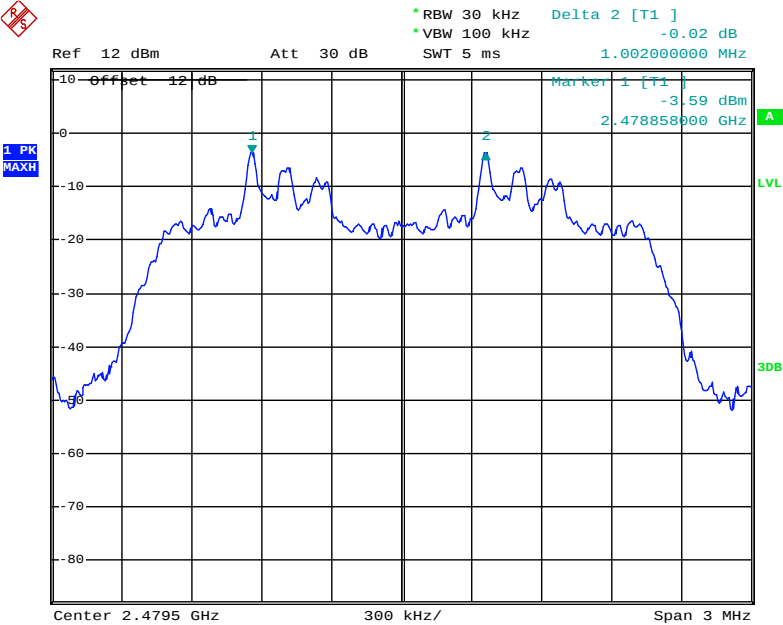
Low channel



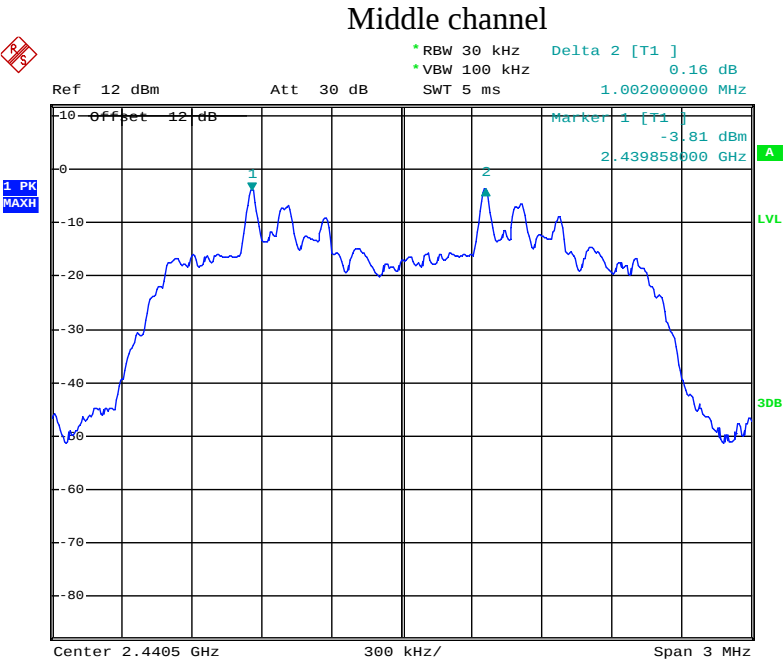
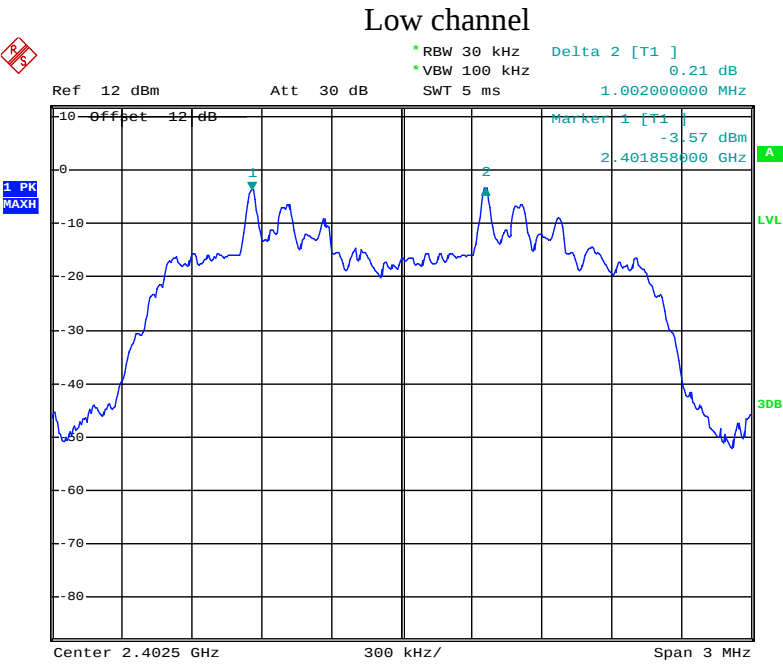
Middle channel

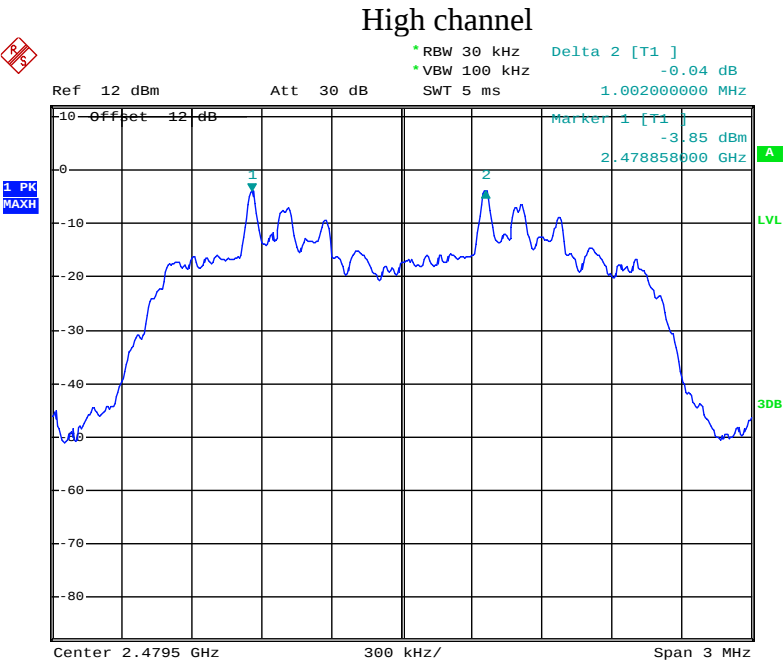


High channel



8DPSK Mode





7. NUMBER OF HOPPING FREQUENCY TEST

7.1. Block Diagram of Test Setup



7.2. The Requirement For Section 15.247(a)(1)(iii)

Section 15.247(a)(1)(iii): Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

7.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.4. Operating Condition of EUT

7.4.1. Setup the EUT and simulator as shown as Section 7.1.

7.4.2. Turn on the power of all equipment.

7.4.3. Let the EUT work in TX (Hopping on) modes measure it.

7.5. Test Procedure

7.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

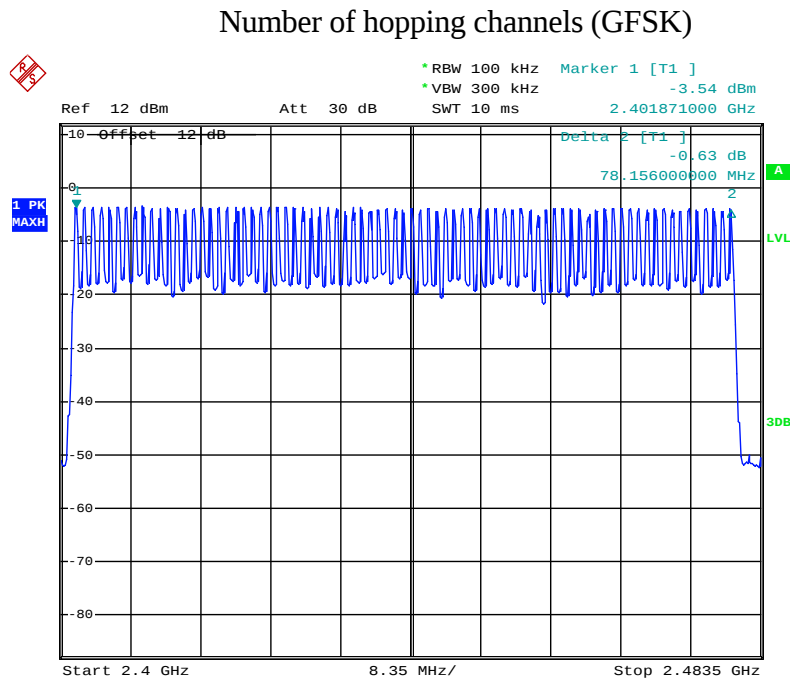
7.5.2. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz.

7.5.3. Max hold, view and count how many channel in the band.

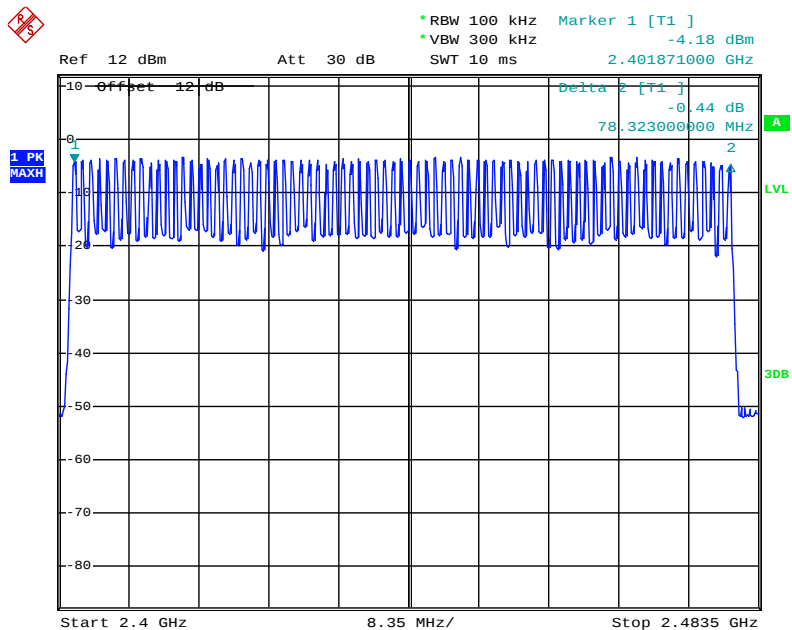
7.6.Test Result

Total number of hopping channel	Measurement result(CH)	Limit(CH)
	79	≥ 15

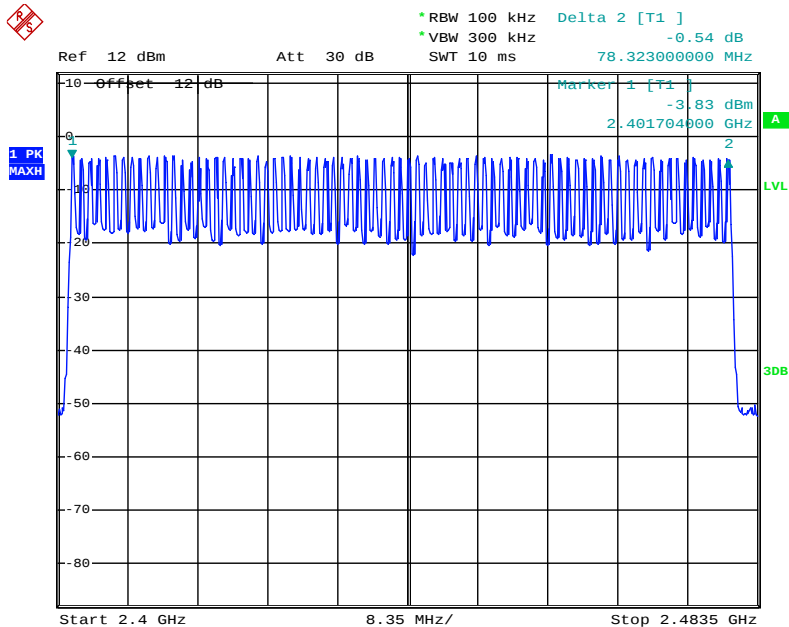
The spectrum analyzer plots are attached as below.



Number of hopping channels ($\Pi/4$ -DQPSK)



Number of hopping channels (8DPSK)



8. DWELL TIME TEST

8.1. Block Diagram of Test Setup



8.2. The Requirement For Section 15.247(a)(1)(iii)

Section 15.247(a)(1)(iii): Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

8.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

8.4. Operating Condition of EUT

8.4.1. Setup the EUT and simulator as shown as Section 8.1.

8.4.2. Turn on the power of all equipment.

8.4.3. Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

8.5. Test Procedure

8.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

8.5.2. Set center frequency of spectrum analyzer = operating frequency.

8.5.3. Set the spectrum analyzer as RBW=1MHz, VBW=3MHz, Span=0Hz, Adjust Sweep=5ms, 10ms, 15ms. Get the pulse time.

8.5.4. Repeat above procedures until all frequency measured were complete.

8.6.Test Result

GFSK Mode

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2441	0.450	144.00	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2 \times 79)) \times 31.6$				
DH3	2441	1.744	279.04	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4 \times 79)) \times 31.6$				
DH5	2441	3.041	324.37	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

$\Pi/4$ -DQPSK Mode

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
2-DH1	2441	0.470	150.40	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2 \times 79)) \times 31.6$				
2-DH3	2441	1.761	281.76	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4 \times 79)) \times 31.6$				
2-DH5	2441	3.041	324.37	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

8DPSK Mode

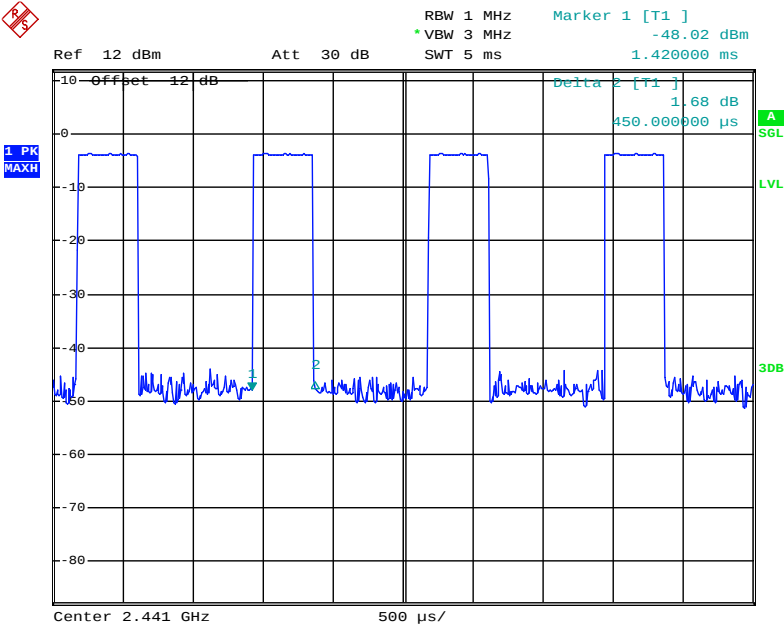
Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
3-DH1	2441	0.470	150.40	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2 \times 79)) \times 31.6$				
3-DH3	2441	1.741	279.04	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4 \times 79)) \times 31.6$				
3-DH5	2441	3.061	318.51	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

Note: We tested GFSK mode and $\Pi/4$ -DQPSK & 8DPSK mode the low, middle and high channel and recorded the worst case data for all test mode.

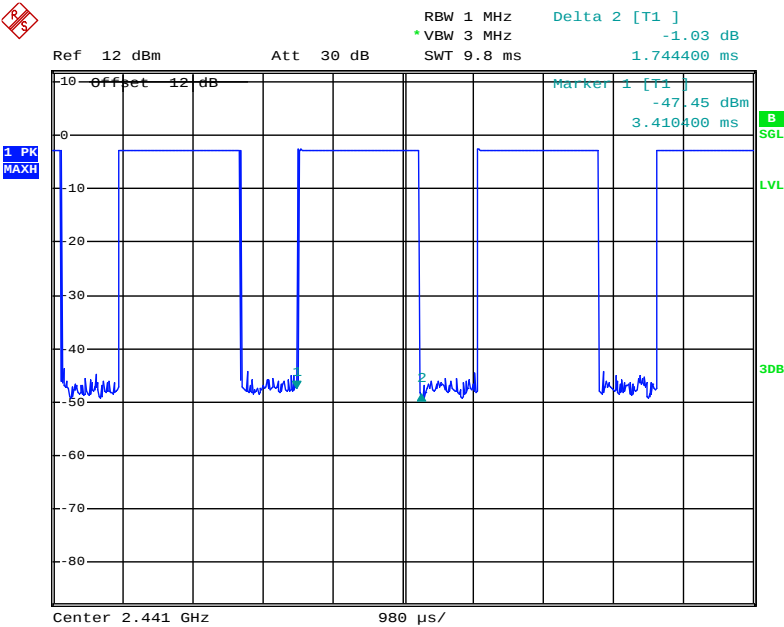
The spectrum analyzer plots are attached as below.

GFSK Mode

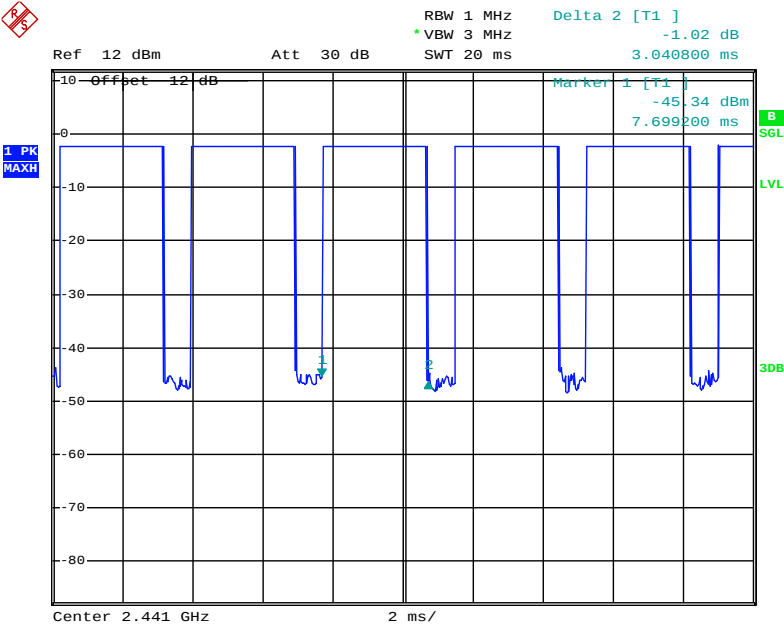
DH1 Middle channel



DH3 Middle channel

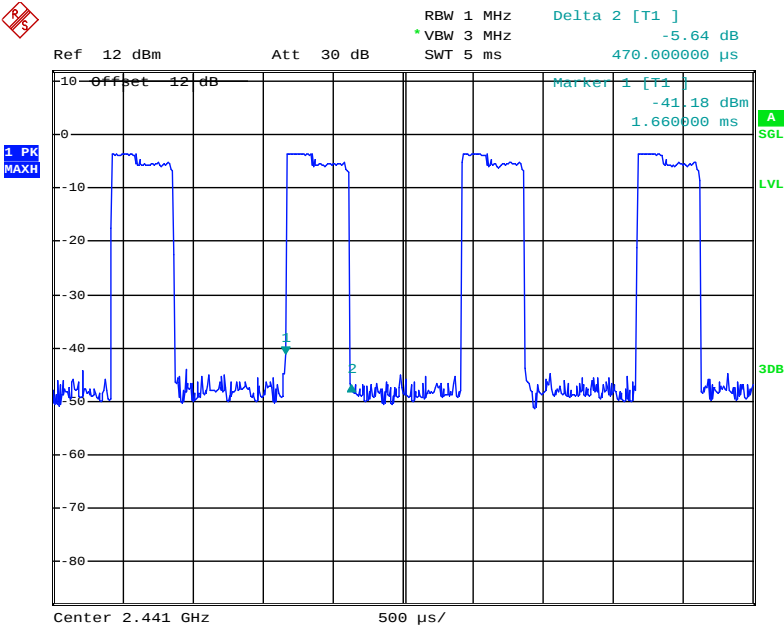


DH5 Middle channel

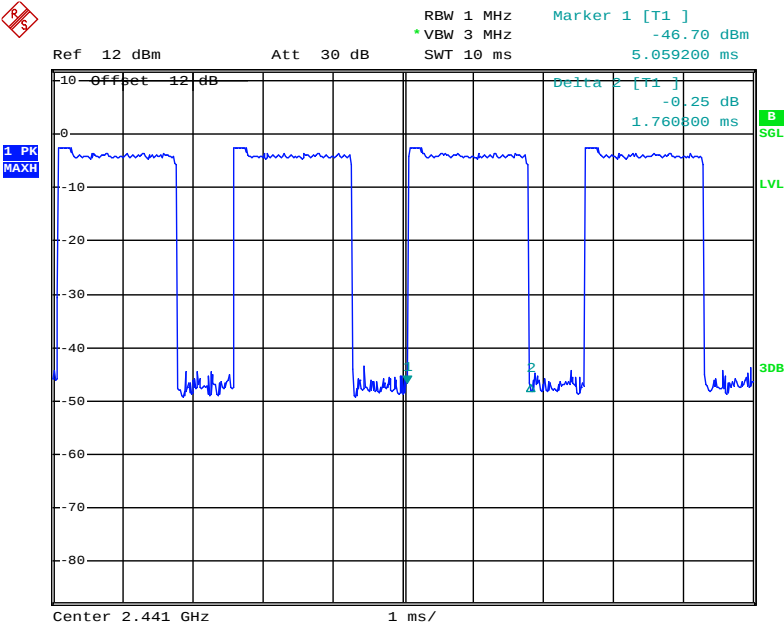


II/4-DQPSK Mode

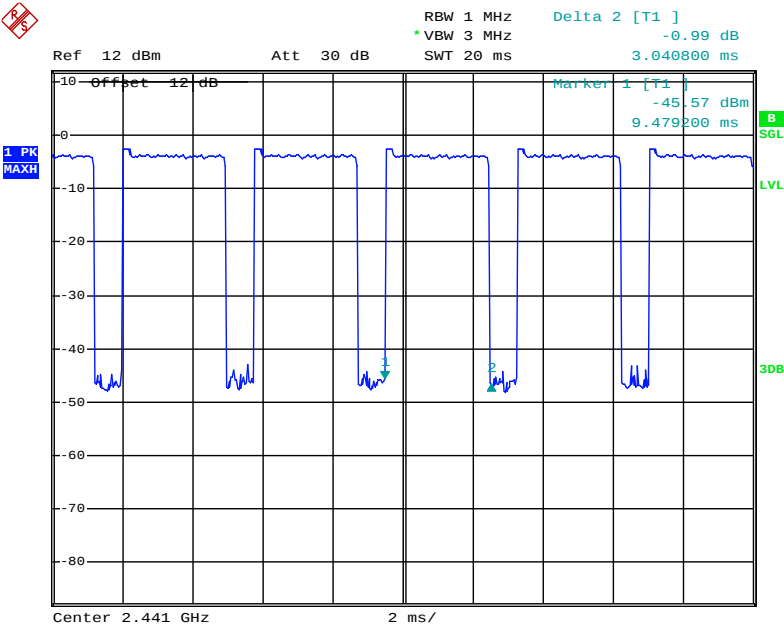
2DH1 Middle channel



2DH3 Middle channel

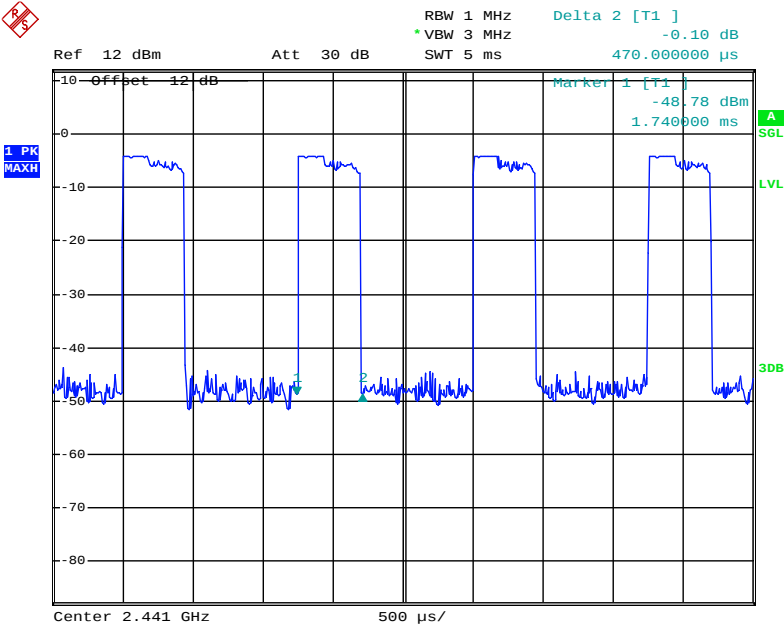


2DH5 Middle channel

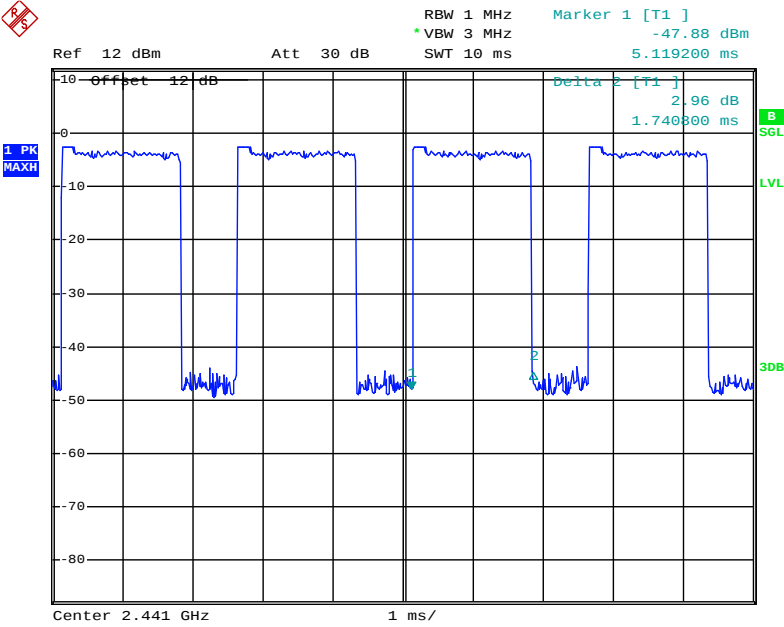


8DPSK Mode

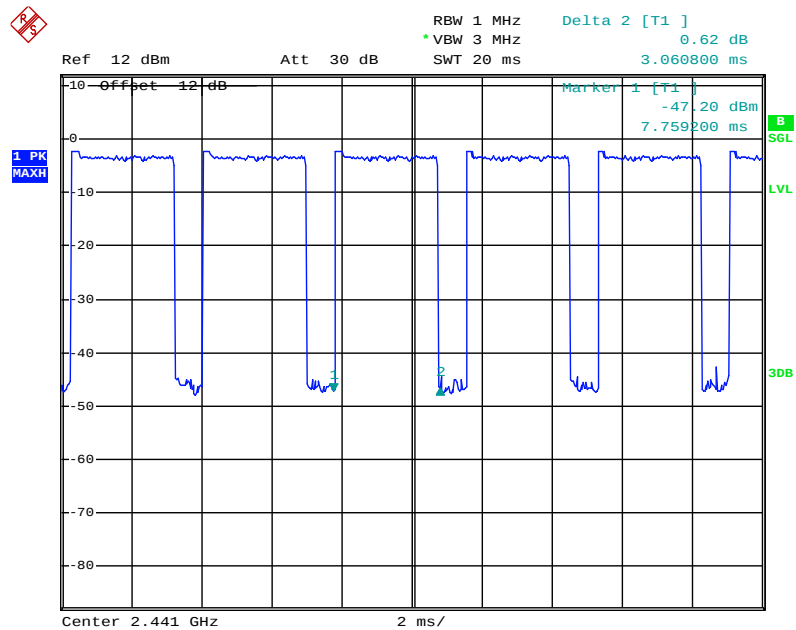
3DH1 Middle channel



3DH3 Middle channel



3DH5 Middle channel



9. MAXIMUM PEAK OUTPUT POWER TEST

9.1. Block Diagram of Test Setup



9.2. The Requirement For Section 15.247(b)(1)

Section 15.247(b)(1): For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

9.3. EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.4. Operating Condition of EUT

9.4.1. Setup the EUT and simulator as shown as Section 9.1.

9.4.2. Turn on the power of all equipment.

9.4.3. Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

9.5. Test Procedure

9.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

9.5.2. Set RBW of spectrum analyzer to 1MHz and VBW to 3MHz for GFSK mode

9.5.3. Set RBW of spectrum analyzer to 3MHz and VBW to 3MHz for other mode

9.5.4. Measurement the maximum peak output power.

9.6.Test Result

GFSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	-3.35/0.0005	30 / 1.0
Middle	2441	-3.75/0.0004	30 / 1.0
High	2480	-3.79/0.0004	30 / 1.0

II/4-DQPSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	-3.63/0.0004	21 / 0.125
Middle	2441	-3.65/0.0004	21 / 0.125
High	2480	-3.81/0.0004	21 / 0.125

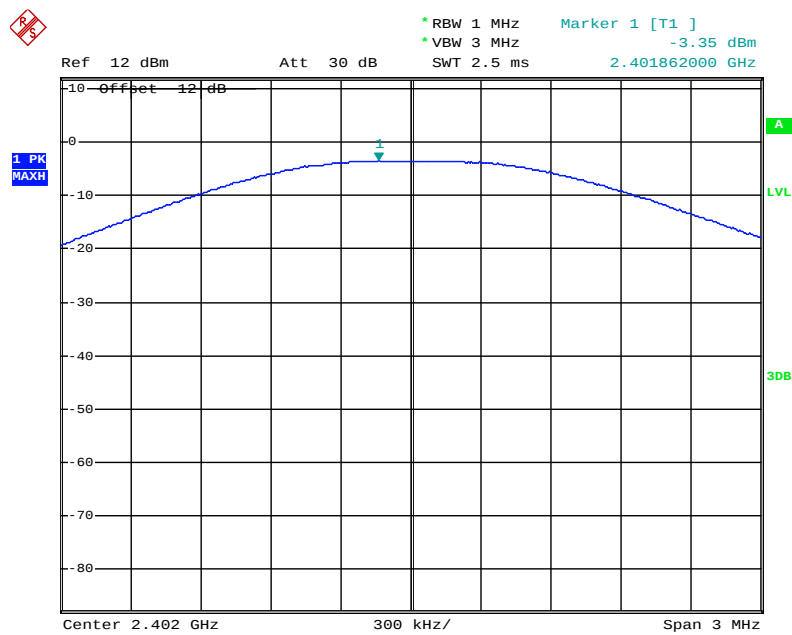
8DPSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	-3.12/0.0005	21 / 0.125
Middle	2441	-3.54/0.0004	21 / 0.125
High	2480	-3.87/0.0004	21 / 0.125

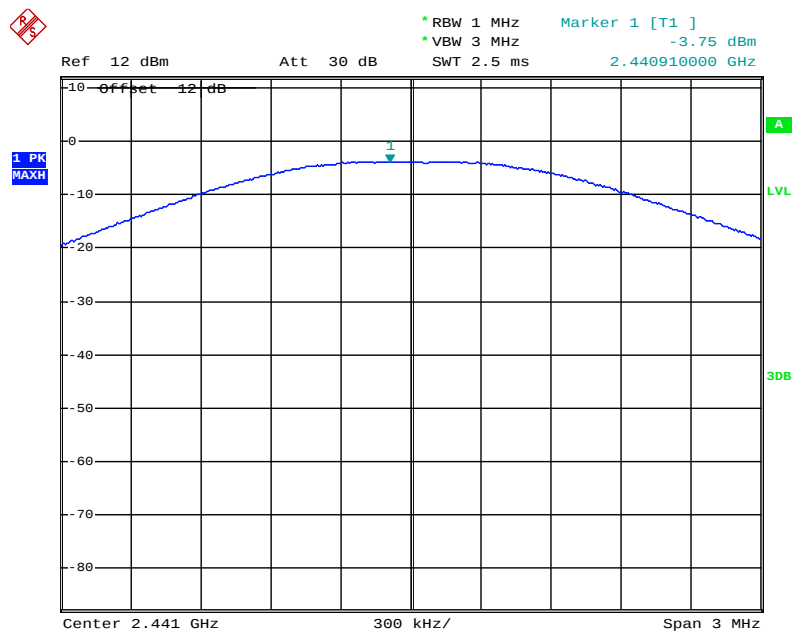
The spectrum analyzer plots are attached as below.

GFSK Mode

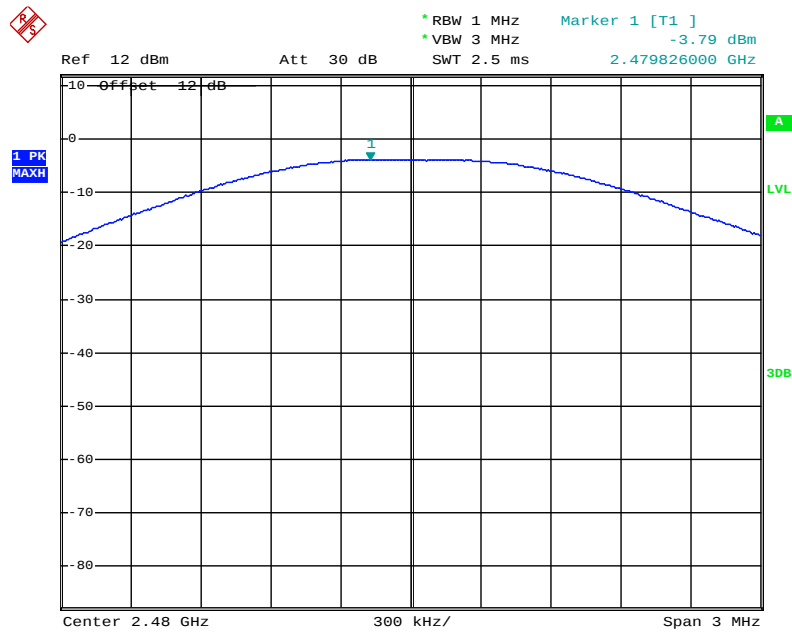
Low channel



Middle channel

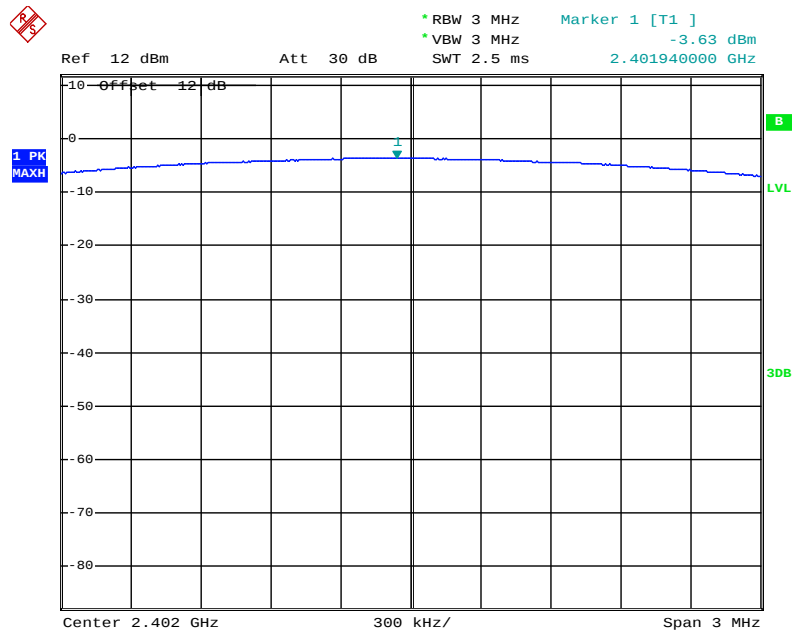


High channel

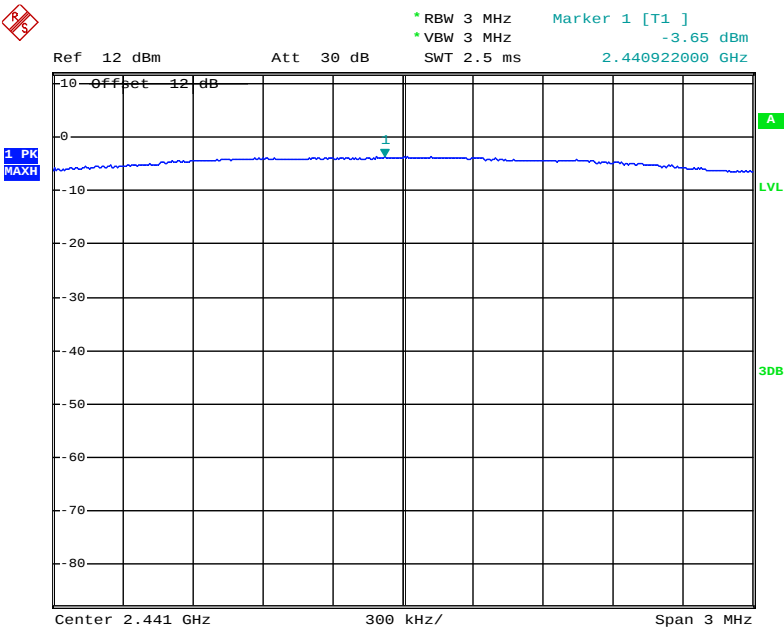


Π/4-DQPSK Mode

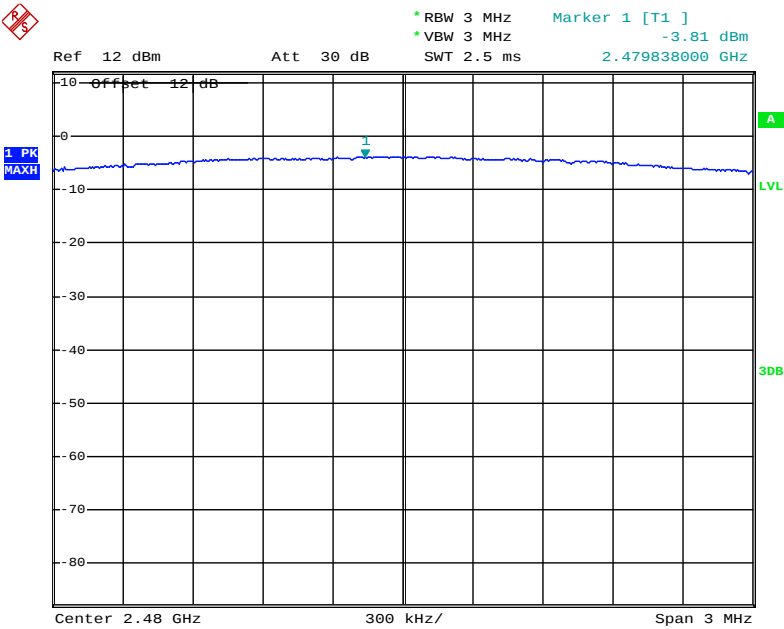
Low channel



Middle channel

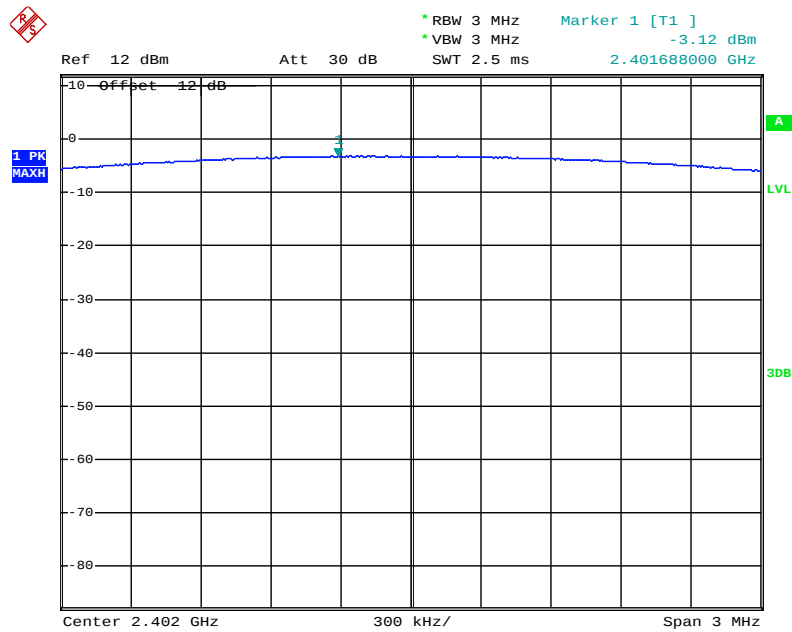


High channel

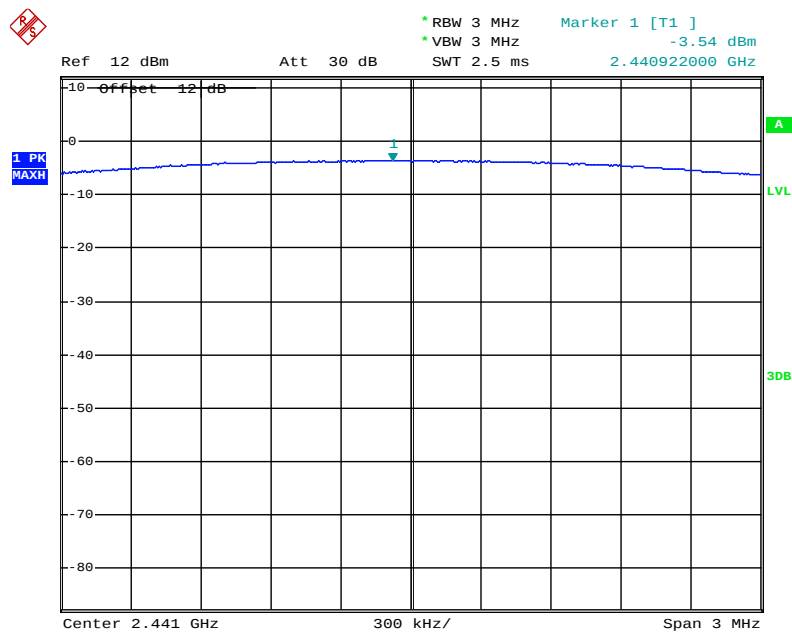


8DPSK Mode

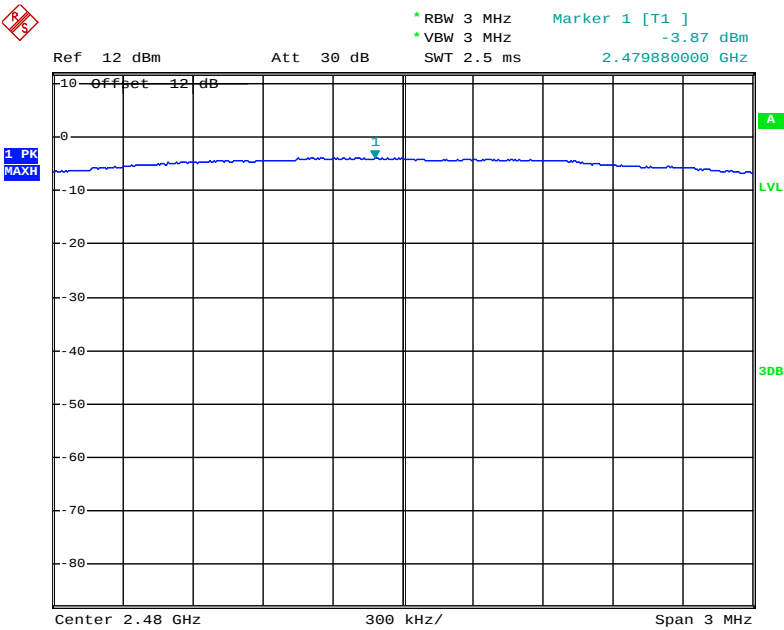
Low channel



Middle channel



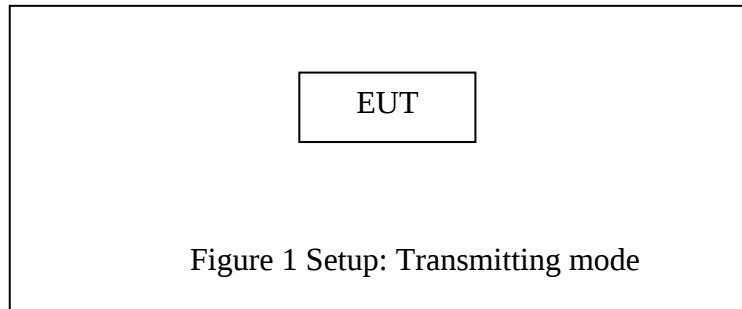
High channel



10.RADIATED EMISSION TEST

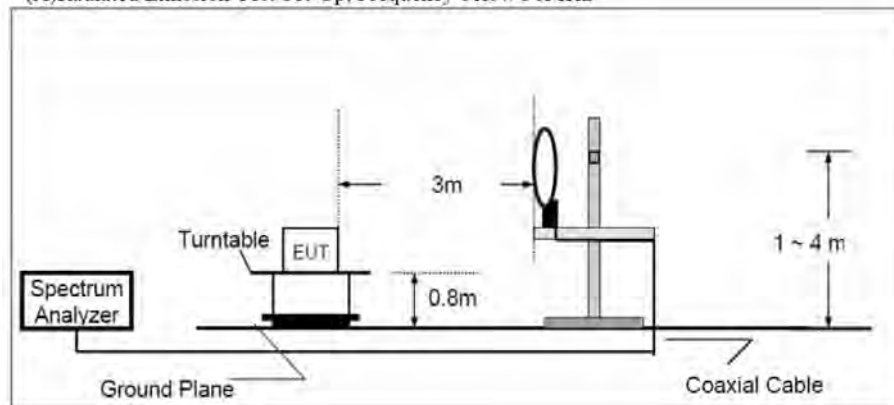
10.1.Block Diagram of Test Setup

10.1.1.Block diagram of connection between the EUT and peripherals

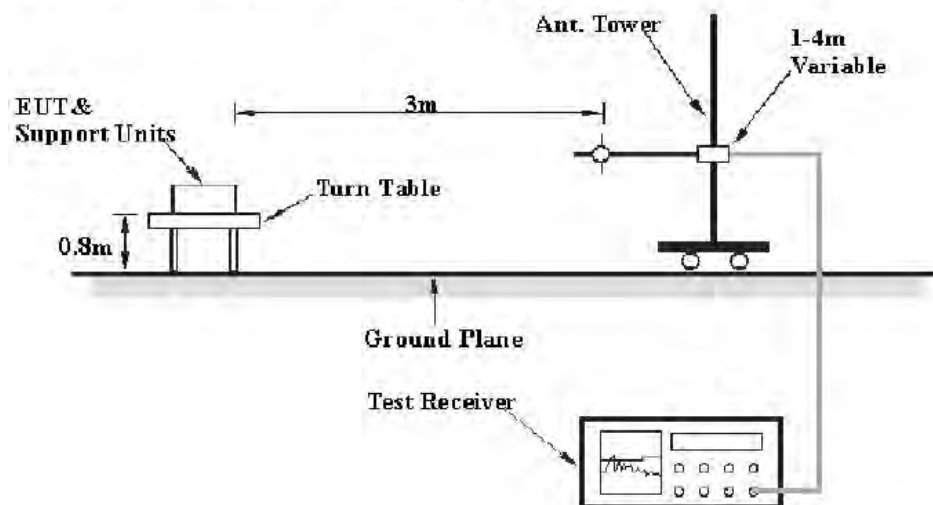


10.1.2.Semi-Anechoic Chamber Test Setup Diagram

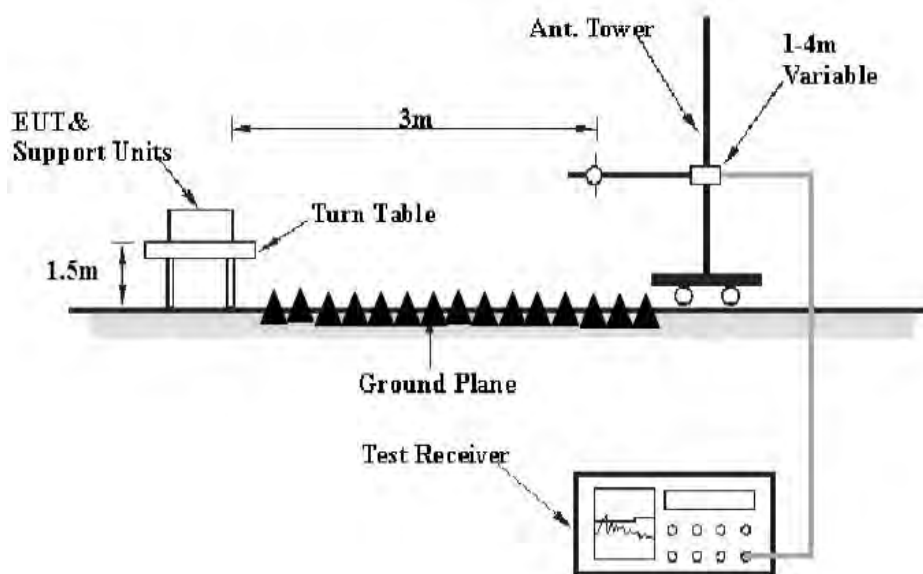
(A) Radiated Emission Test Set-Up, Frequency below 30MHz



(B) Radiated Emission Test Set-Up, Frequency 30MHz-1GHz



(C) Radiated Emission Test Set-Up. Frequency above 1GHz



10.2.The Limit For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

10.3.Restricted bands of operation

10.3.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹Until February 1, 1999, this restricted band shall be 0.490-0.510

²Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

10.4.Configuration of EUT on Measurement

The equipment is installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

10.5. Operating Condition of EUT

10.5.1. Setup the EUT and simulator as shown as Section 10.1.

10.5.2. Turn on the power of all equipment.

10.5.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

10.6. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground(Below 1GHz). The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground(Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

10.7.Data Sample

Frequency (MHz)	Reading (dB μ v)	Factor (dB/m)	Result (dB μ v/m)	Limit (dB μ v/m)	Margin (dB)	Remark
X.XX	48.69	-13.35	35.34	46	-10.66	QP

Frequency(MHz) = Emission frequency in MHz

Reading(dB μ v) = Uncorrected Analyzer/Receiver reading

Factor (dB/m) = Antenna factor + Cable Loss – Amplifier gain

Result(dB μ v/m) = Reading(dB μ v) + Factor(dB/m)

Limit (dB μ v/m) = Limit stated in standard

Margin (dB) = Result(dB μ v/m) - Limit (dB μ v/m)

QP = Quasi-peak Reading

Calculation Formula:

Margin(dB) = Result (dB μ V/m)–Limit(dB μ V/m)

Result(dB μ V/m)= Reading(dB μ V)+ Factor(dB/m)

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit.

10.8.The Field Strength of Radiation Emission Measurement Results

Pass.

Note: 1.We tested GFSK mode, $\Pi/4$ -DQPSK & 8DPSK Mode and recorded the worst case data (GFSK mode) for all test mode.

2. Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 3th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

The measurements greater than 20dB below the limit from 9kHz to 30MHz and 18 to 26.5GHz.

The spectrum analyzer plots are attached as below.

Below 1GHz



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Job No.: STAR2018 #389

Standard: FCC PART 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Wireless bluetooth headset

Mode: TX 2402MHz (GFSK)

Model: J1

Manufacturer: Sanag

Polarization: Horizontal

Power Source: DC 3.7V

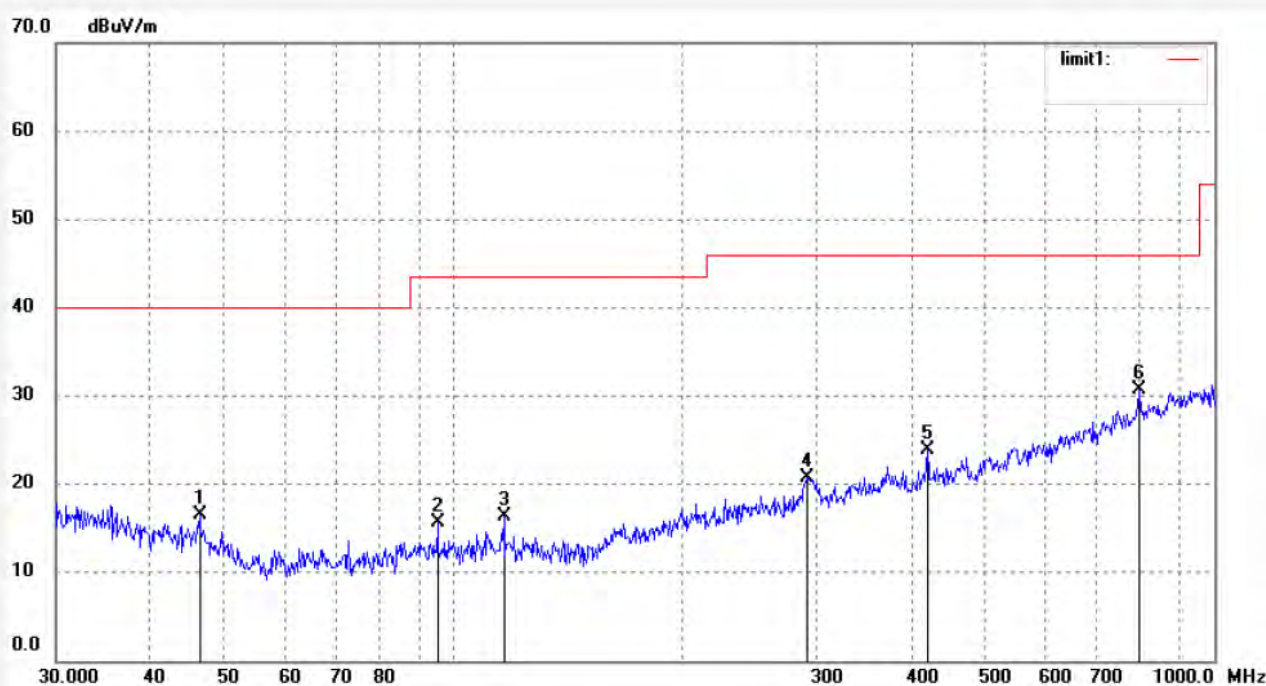
Date: 2018/07/18

Time: 15:26:22

Engineer Signature: star

Distance:

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	46.3806	36.25	-19.75	16.50	40.00	-23.50	peak	100	52	
2	95.3131	37.07	-21.49	15.58	43.50	-27.92	peak	100	111	
3	116.4475	37.61	-21.25	16.36	43.50	-27.14	peak	100	47	
4	291.3387	37.18	-16.47	20.71	46.00	-25.29	peak	100	328	
5	419.8509	37.62	-13.71	23.91	46.00	-22.09	peak	100	201	
6	798.6204	36.70	-5.92	30.78	46.00	-15.22	peak	100	199	



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Job No.: STAR2018 #388

Standard: FCC PART 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Wireless bluetooth headset

Mode: TX 2402MHz (GFSK)

Model: J1

Manufacturer: Sanag

Polarization: Vertical

Power Source: DC 3.7V

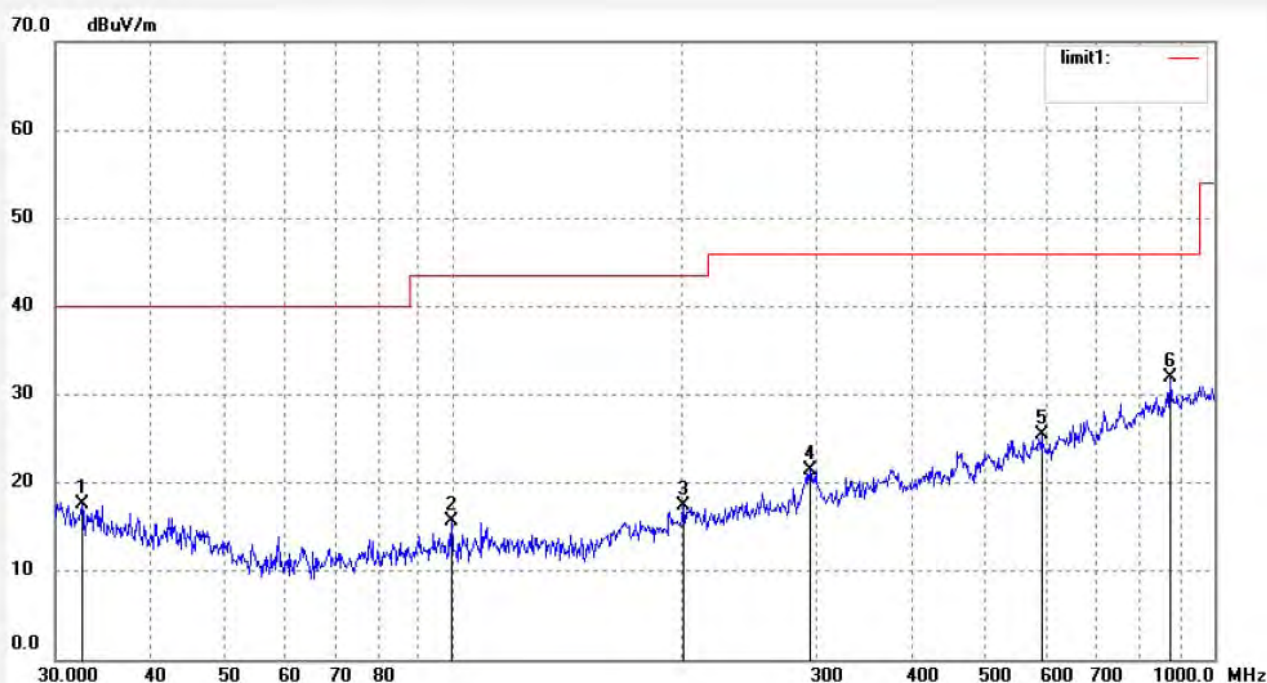
Date: 2018/07/18

Time: 15:25:38

Engineer Signature: star

Distance:

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	32.5250	34.78	-17.15	17.63	40.00	-22.37	peak	100	145	
2	99.4177	37.30	-21.67	15.63	43.50	-27.87	peak	100	256	
3	200.7473	36.04	-18.68	17.36	43.50	-26.14	peak	100	301	
4	294.4260	37.77	-16.38	21.39	46.00	-24.61	peak	100	25	
5	592.4290	35.53	-10.08	25.45	46.00	-20.55	peak	100	59	
6	875.0133	36.50	-4.61	31.89	46.00	-14.11	peak	100	117	



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Job No.: STAR2018 #390

Standard: FCC PART 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Wireless bluetooth headset

Mode: TX 2441MHz (GFSK)

Model: J1

Manufacturer: Sanag

Polarization: Horizontal

Power Source: DC 3.7V

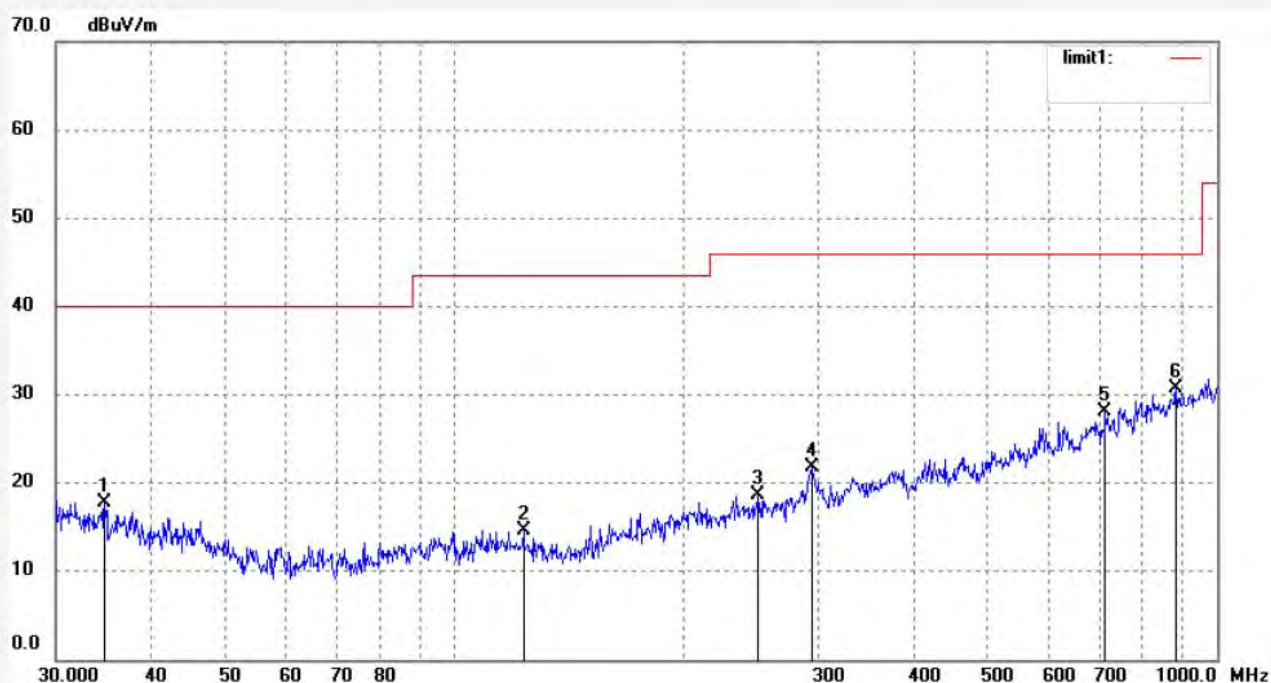
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Time: 15:27:03

Engineer Signature: star

Distance:

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	34.7704	35.27	-17.47	17.80	40.00	-22.20	peak	100	152	
2	123.1814	36.11	-21.46	14.65	43.50	-28.85	peak	100	139	
3	250.4858	36.76	-18.15	18.61	46.00	-27.39	peak	100	201	
4	294.4259	38.17	-16.38	21.79	46.00	-24.21	peak	100	244	
5	713.6916	35.73	-7.64	28.09	46.00	-17.91	peak	100	192	
6	884.2853	35.16	-4.44	30.72	46.00	-15.28	peak	100	109	



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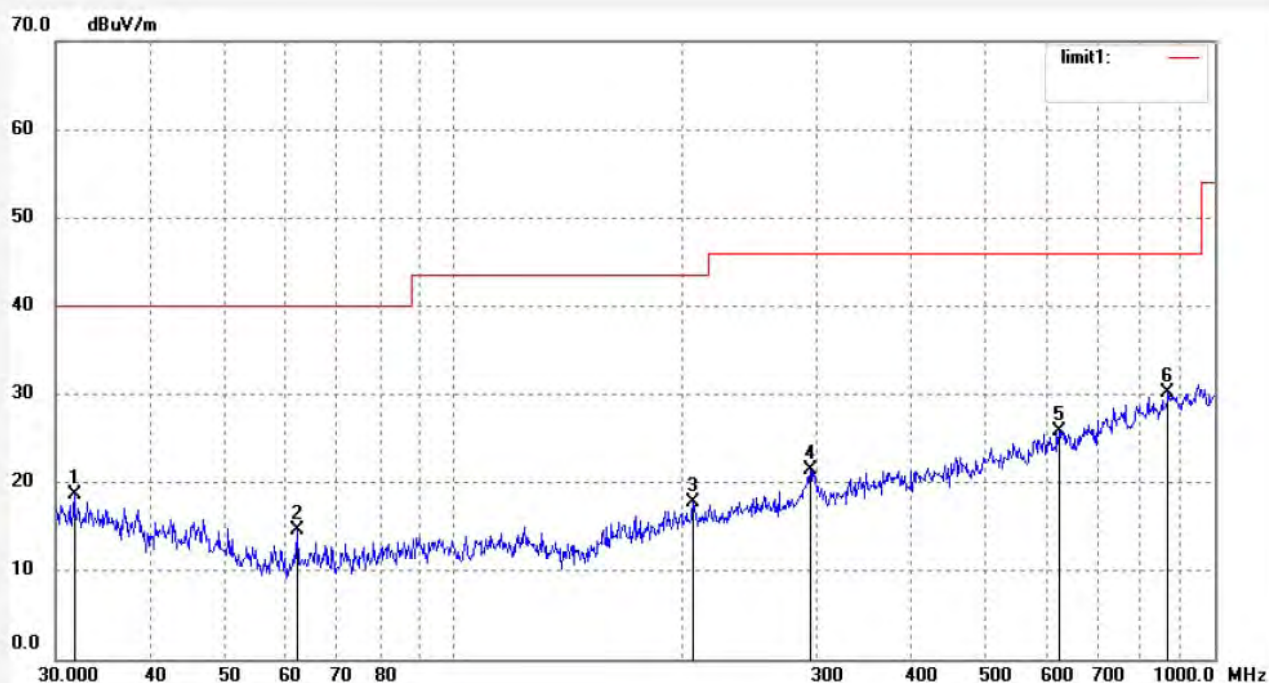
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
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Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: STAR2018 #391
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Wireless bluetooth headset
Mode: TX 2441MHz (GFSK)
Model: J1
Manufacturer: Sanag

Polarization: Vertical
Power Source: DC 3.7V
Date: 2018/07/18
Time: 15:27:51
Engineer Signature: star
Distance:

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	31.7347	35.76	-17.05	18.71	40.00	-21.29	peak	100	246	
2	62.3038	37.20	-22.64	14.56	40.00	-25.44	peak	100	163	
3	206.4701	36.29	-18.51	17.78	43.50	-25.72	peak	100	221	
4	294.4259	37.87	-16.38	21.49	46.00	-24.51	peak	100	91	
5	624.4896	35.18	-9.38	25.80	46.00	-20.20	peak	100	178	
6	868.8859	34.86	-4.72	30.14	46.00	-15.86	peak	100	133	



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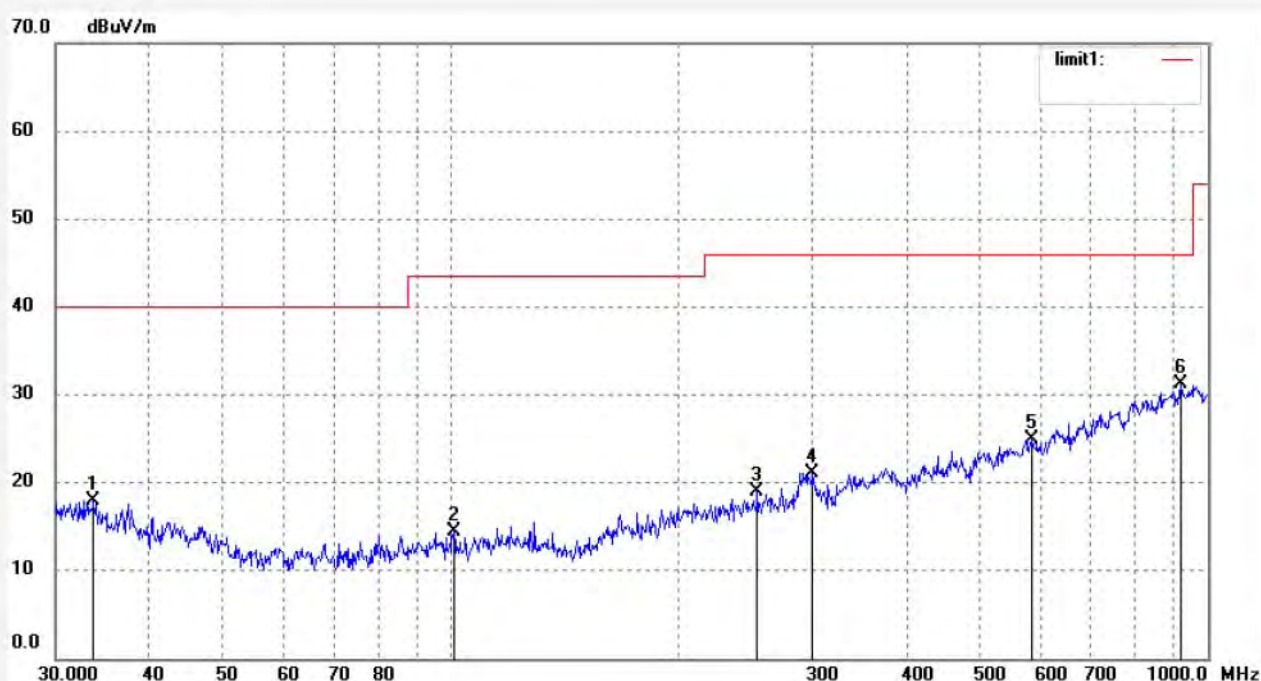
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2018 #393
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Wireless bluetooth headset
Mode: TX 2480MHz (GFSK)
Model: J1
Manufacturer: Sanag

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2018/07/18
Time: 15:30:00
Engineer Signature: star
Distance:

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	33.6881	35.30	-17.32	17.98	40.00	-22.02	peak	100	147	
2	100.8248	36.11	-21.73	14.38	43.50	-29.12	peak	100	103	
3	254.0312	37.00	-17.95	19.05	46.00	-26.95	peak	100	335	
4	300.6988	37.42	-16.27	21.15	46.00	-24.85	peak	100	169	
5	586.2172	35.22	-10.23	24.99	46.00	-21.01	peak	100	103	
6	922.3667	35.08	-3.83	31.25	46.00	-14.75	peak	100	46	



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Job No.: STAR2018 #392

Standard: FCC PART 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Wireless bluetooth headset

Mode: TX 2480MHz (GFSK)

Model: J1

Manufacturer: Sanag

Polarization: Vertical

Power Source: DC 3.7V

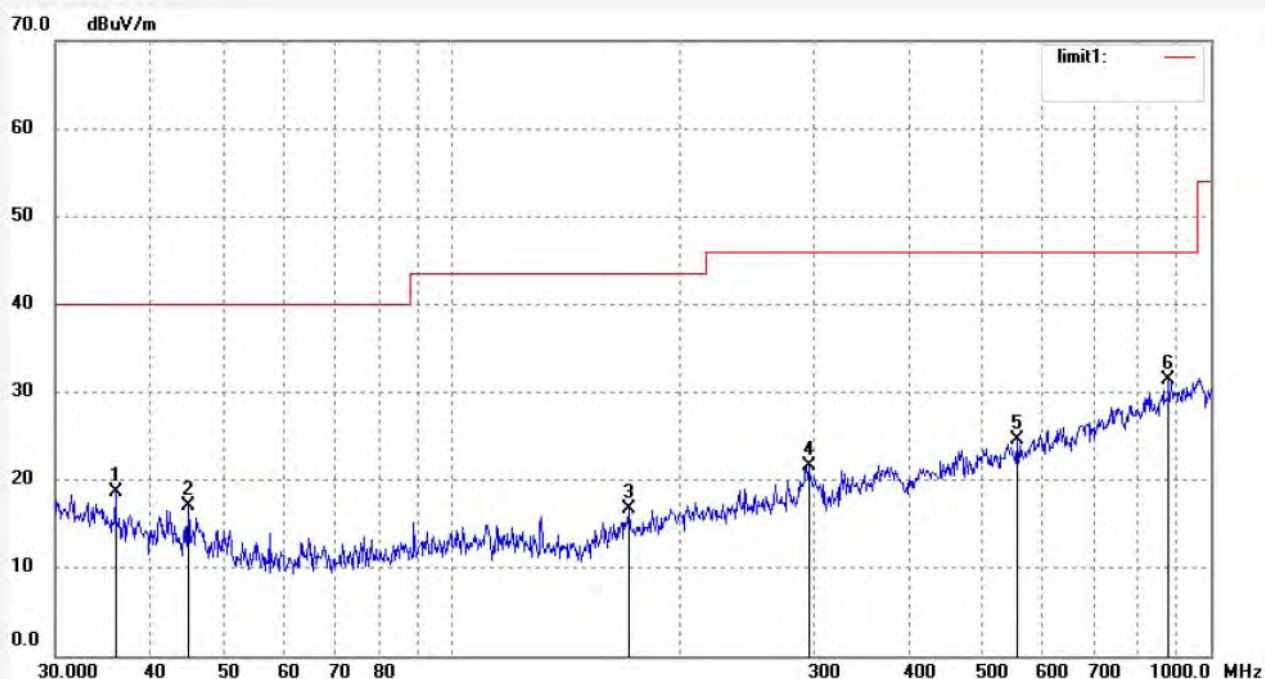
Date: 2018/07/18

Time: 15:28:35

Engineer Signature: star

Distance:

Note: Report No.:ATE20181265



Above 1GHz



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Site: 1# Chamber

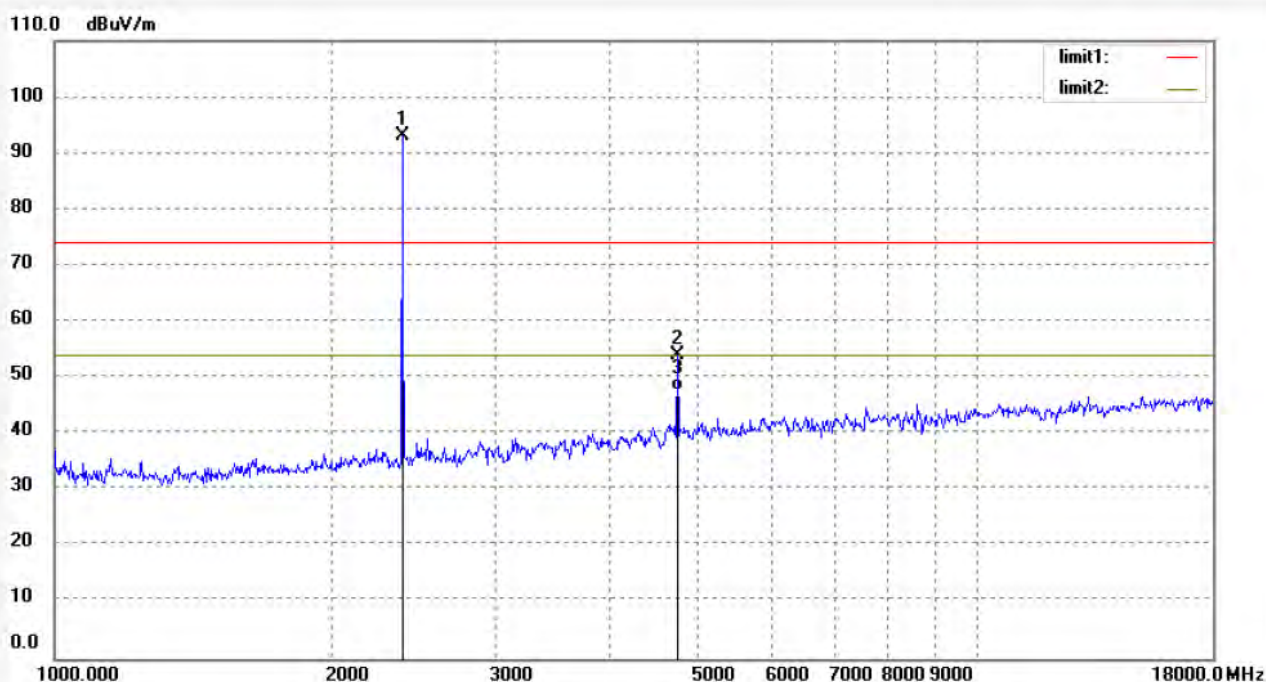
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2018 #1273
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Wireless bluetooth headset
Mode: TX 2402MHz (GFSK)
Model: J1
Manufacturer: Sanag

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2018/07/25
Time: 13:51:11
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.019	99.41	-6.37	93.04			peak	200	140	
2	4804.057	53.43	0.70	54.13	74.00	-19.87	peak	200	240	
3	4804.057	47.12	0.70	47.82	54.00	-6.18	AVG	200	311	

Note: Average measurement with peak detection at No.3



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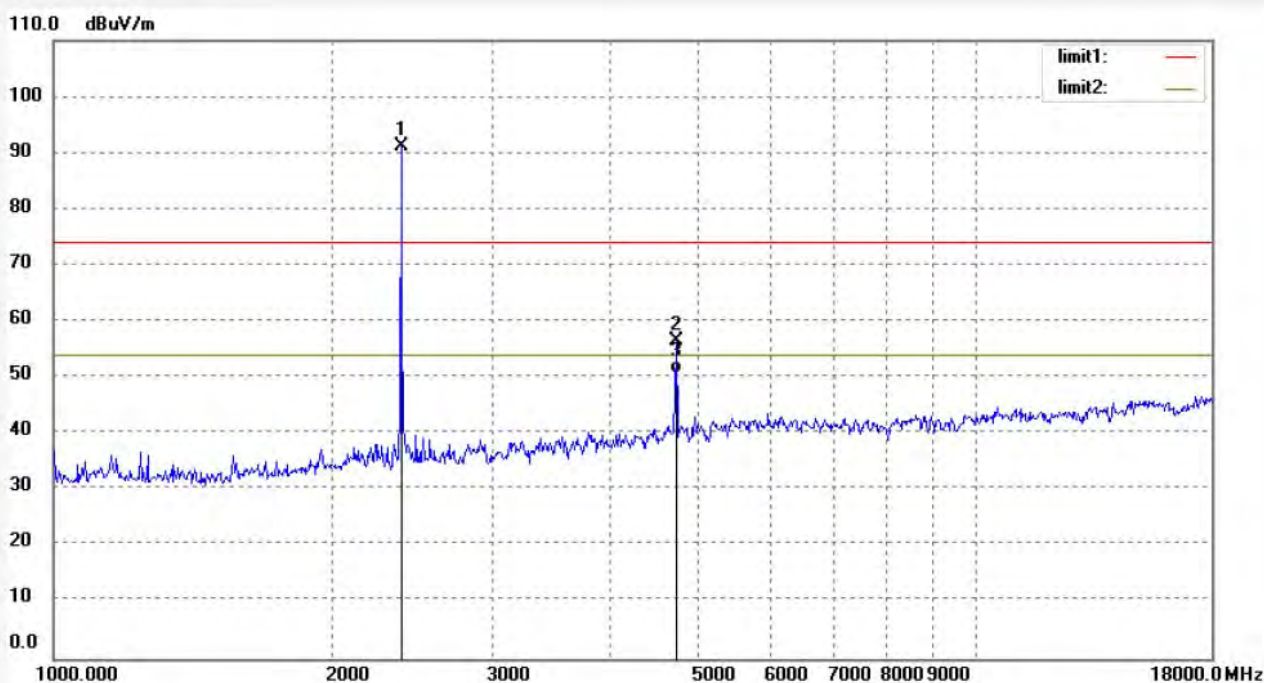
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: STAR2018 #1272
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Wireless bluetooth headset
Mode: TX 2402MHz (GFSK)
Model: J1
Manufacturer: Sanag

Polarization: Vertical
Power Source: DC 3.7V
Date: 2018/07/25
Time: 13:49:42
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.019	97.43	-6.37	91.06			peak	150	210	
2	4804.057	55.93	0.70	56.63	74.00	-17.37	peak	150	214	
3	4804.057	50.10	0.70	50.80	54.00	-3.20	AVG	150	200	

Note: Average measurement with peak detection at No.3



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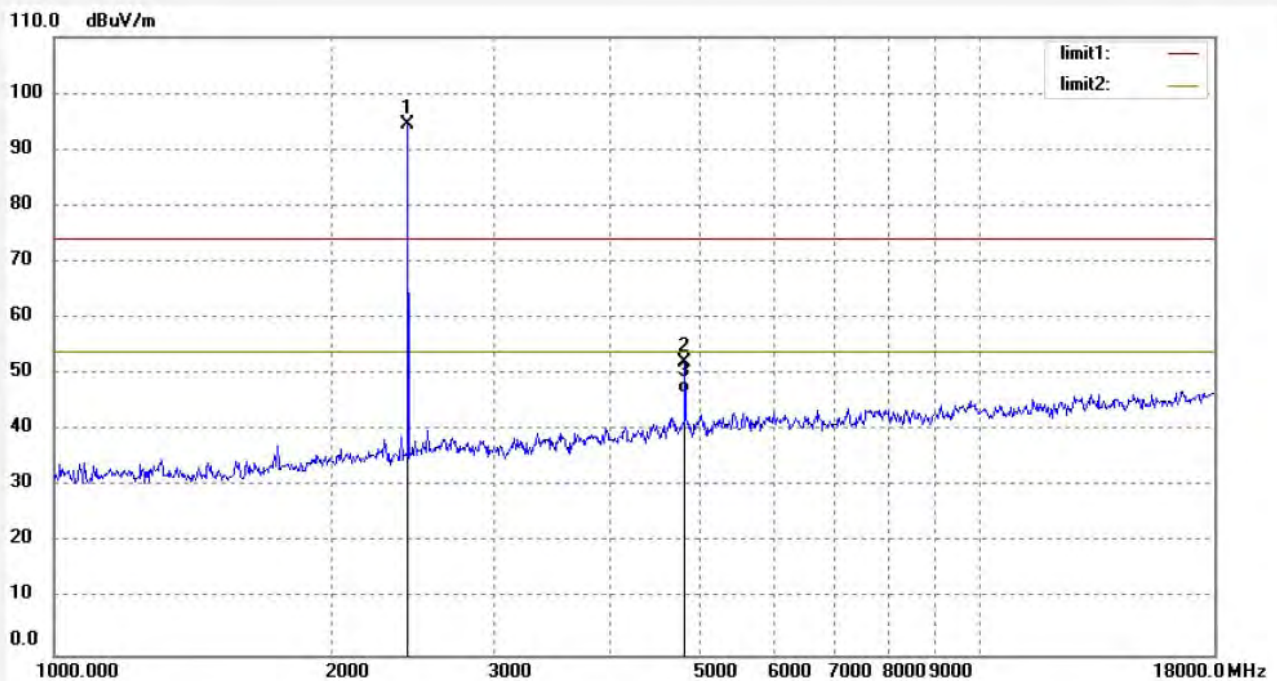
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: STAR2018 #1274
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Wireless bluetooth headset
Mode: TX 2441MHz (GFSK)
Model: J1
Manufacturer: Sanag

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2018/07/25
Time: 13:53:12
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2441.021	100.56	-6.20	94.36			peak	200	78	
2	4882.324	50.96	1.07	52.03	74.00	-21.97	peak	200	102	
3	4882.324	45.63	1.07	46.70	54.00	-7.30	AVG	200	116	

Note: Average measurement with peak detection at No.3



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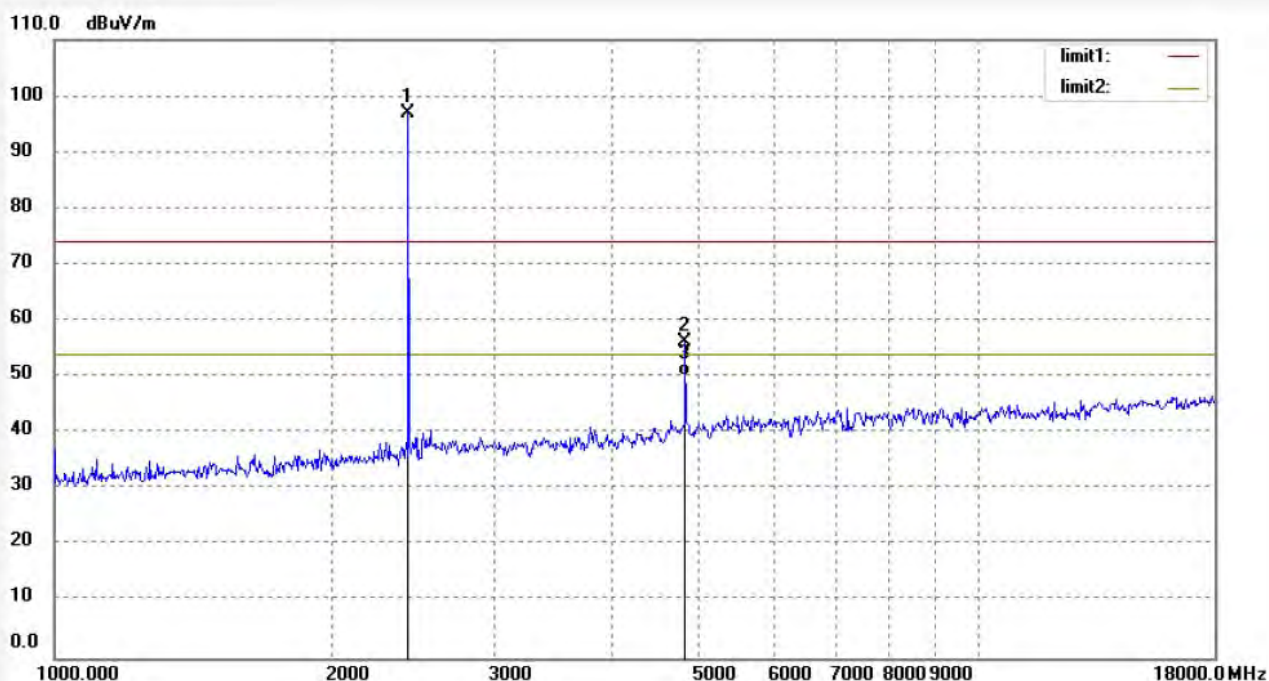
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: STAR2018 #1275
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Wireless bluetooth headset
Mode: TX 2441MHz (GFSK)
Model: J1
Manufacturer: Sanag

Polarization: Vertical
Power Source: DC 3.7V
Date: 2018/07/25
Time: 13:54:49
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2441.021	103.02	-6.20	96.82			peak	150	99	
2	4882.324	55.13	1.07	56.20	74.00	-17.80	peak	150	135	
3	4882.324	49.00	1.07	50.07	54.00	-3.93	AVG	150	251	

Note: Average measurement with peak detection at No.3



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Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2018 #1277

Standard: FCC PART 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Wireless bluetooth headset

Mode: TX 2480MHz (GFSK)

Model: J1

Manufacturer: Sanag

Polarization: Horizontal

Power Source: DC 3.7V

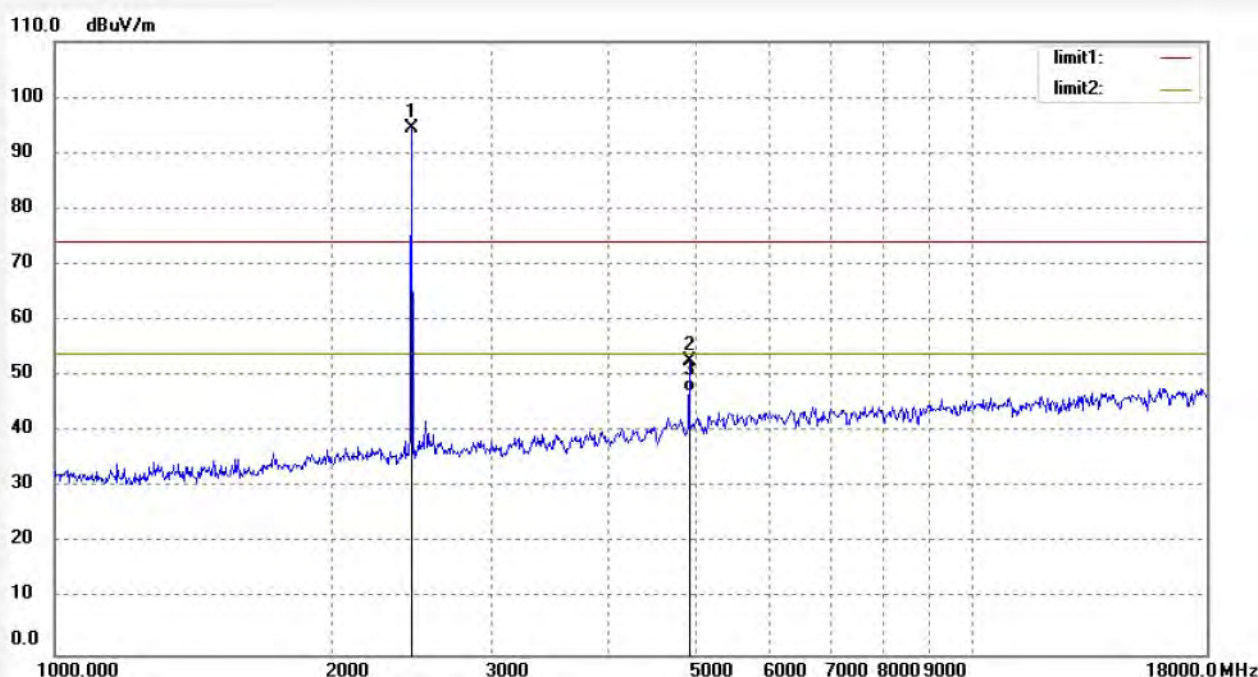
Date: 2018/07/25

Time: 13:59:49

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.034	100.42	-6.04	94.38			peak	200	110	
2	4960.044	51.03	1.50	52.53	74.00	-21.47	peak	200	123	
3	4960.044	45.59	1.50	47.09	54.00	-6.91	AVG	200	254	

Note: Average measurement with peak detection at No.3



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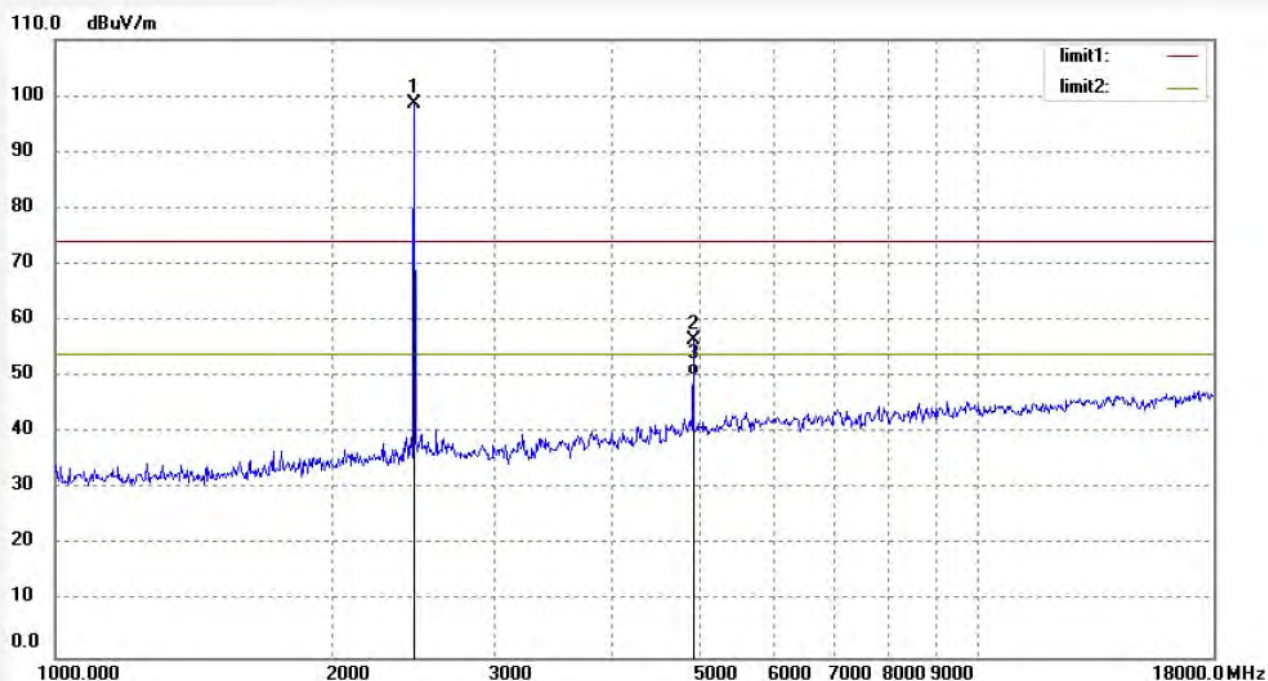
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: STAR2018 #1276
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Wireless bluetooth headset
Mode: TX 2480MHz (GFSK)
Model: J1
Manufacturer: Sanag

Polarization: Vertical
Power Source: DC 3.7V
Date: 2018/07/25
Time: 13:56:34
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.034	104.50	-6.04	98.46			peak	150	265	
2	4960.044	54.91	1.50	56.41	74.00	-17.59	peak	150	223	
3	4960.444	48.63	1.50	50.13	54.00	-3.87	AVG	150	244	

Note: Average measurement with peak detection at No.3

11.BAND EDGE COMPLIANCE TEST

11.1.Block Diagram of Test Setup



11.2.The Requirement For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

11.3.EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

11.4.Operating Condition of EUT

11.4.1.Setup the EUT and simulator as shown as Section 11.1.

11.4.2.Turn on the power of all equipment.

11.4.3.Let the EUT work in TX (Hopping off, Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2480MHz TX frequency to transmit.

11.5. Test Procedure

11.5.1. The transmitter output was connected to the spectrum analyzer via a low loss cable.

11.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz with convenient frequency span including 100 kHz bandwidth from band edge.

11.5.3. The band edges were measured and recorded.

11.6. Test Result

Pass.

Note: Both hopping-on mode and hopping-off mode had been pre-tested, and only the worst case was recorded in the test report.

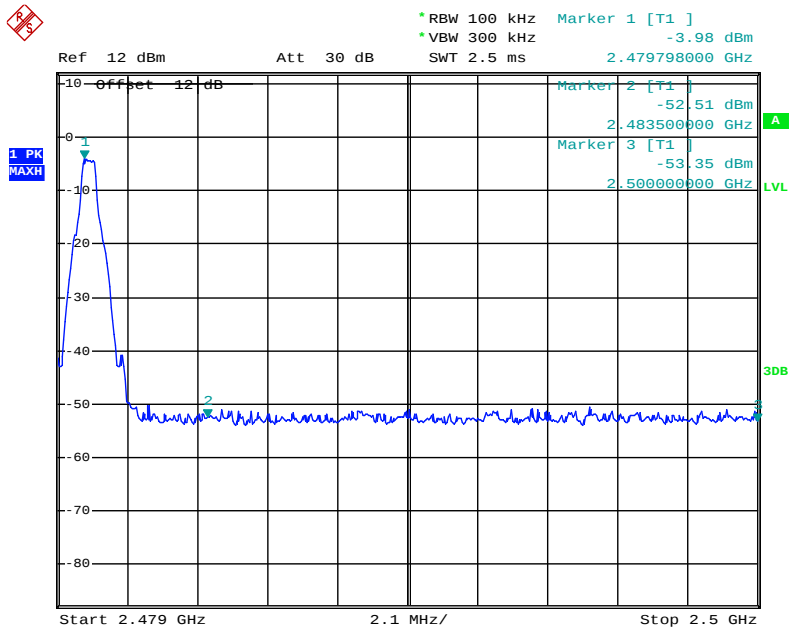
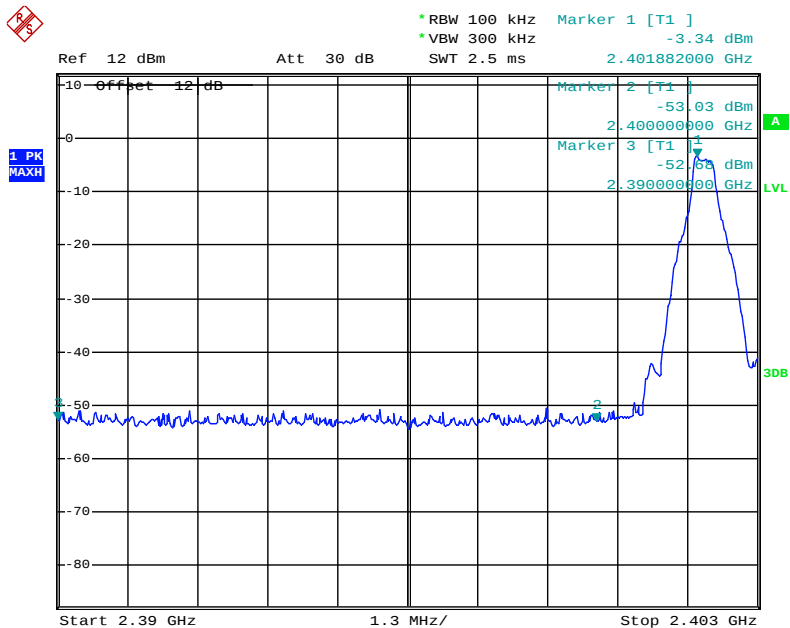
Conducted Band Edge Result:

Non-hopping mode

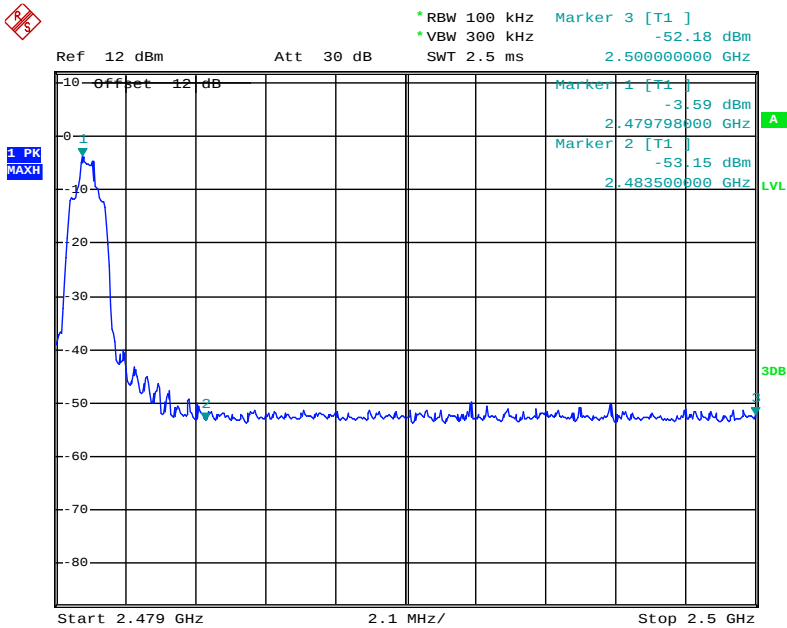
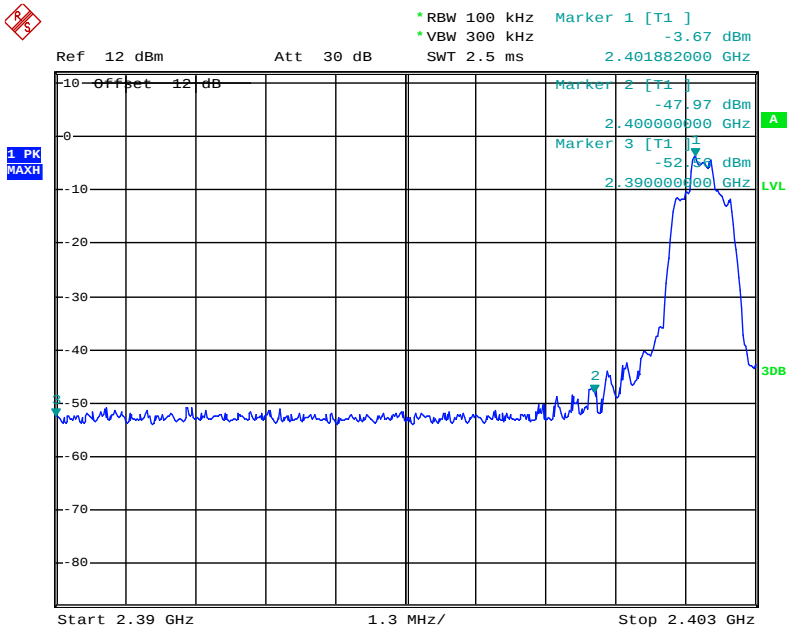
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
GFSK Mode		
2400.00	49.69	> 20dBc
2483.50	48.53	> 20dBc
Π/4-DQPSK Mode		
2400.00	44.30	> 20dBc
2483.50	49.56	> 20dBc
8DPSK Mode		
2400.00	43.98	> 20dBc
2483.50	48.55	> 20dBc

The spectrum analyzer plots are attached as below.

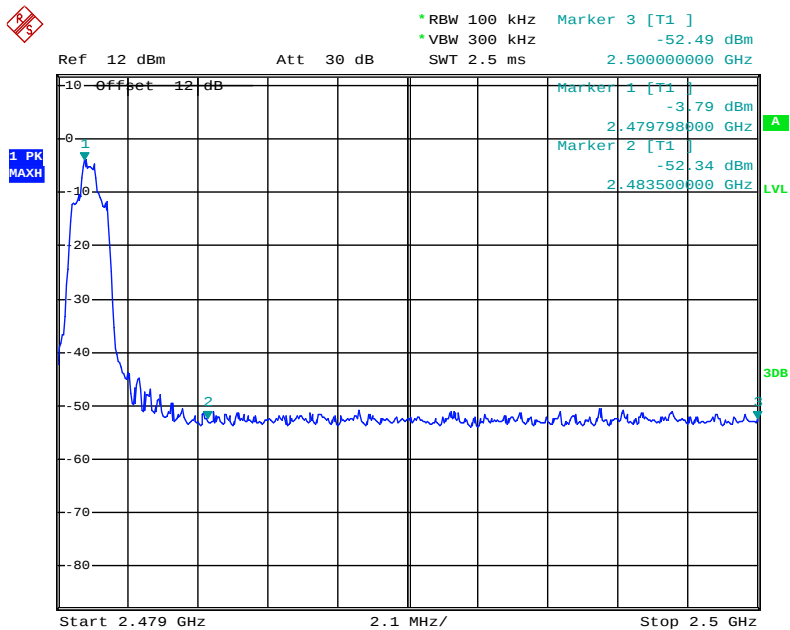
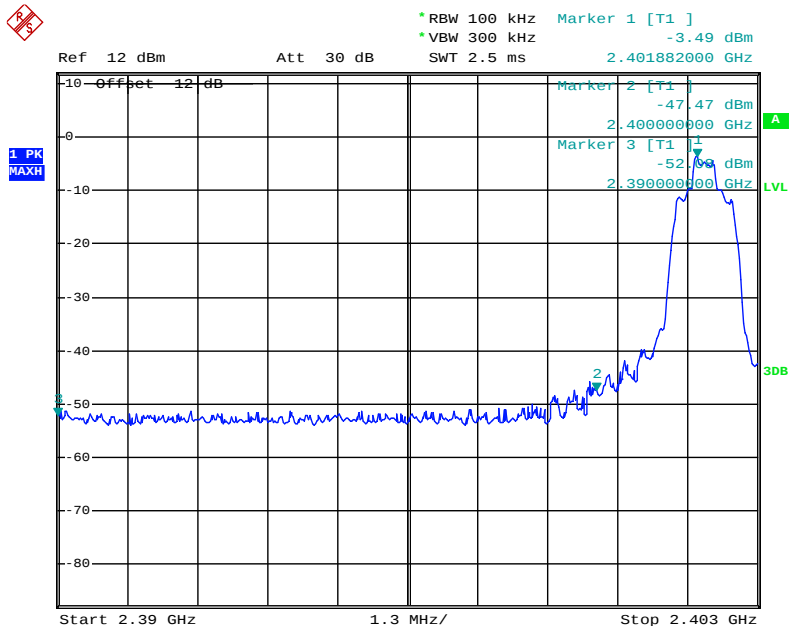
GFSK



Π/4-DQPSK Mode



8DPSK Mode



Radiated Band Edge Result:

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

3. Display the measurement of peak values.

Test Procedure:

The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground(Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. The EUT was tested in 3 orthogonal planes.

Let the EUT work in TX (Hopping off, Hopping on) modes measure it.

We select 2402MHz, 2480MHz TX frequency to transmit(Hopping off mode).

We select 2402-2480MHz TX frequency to transmit(Hopping on mode).

During the radiated emission test, the spectrum analyzer was set with the following configurations:

- 1.The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz.
- 2.The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
- 3.All modes of operation were investigated and the worst case(GFSK Mode) emissions are reported.

Non-hopping mode



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Site: 1# Chamber

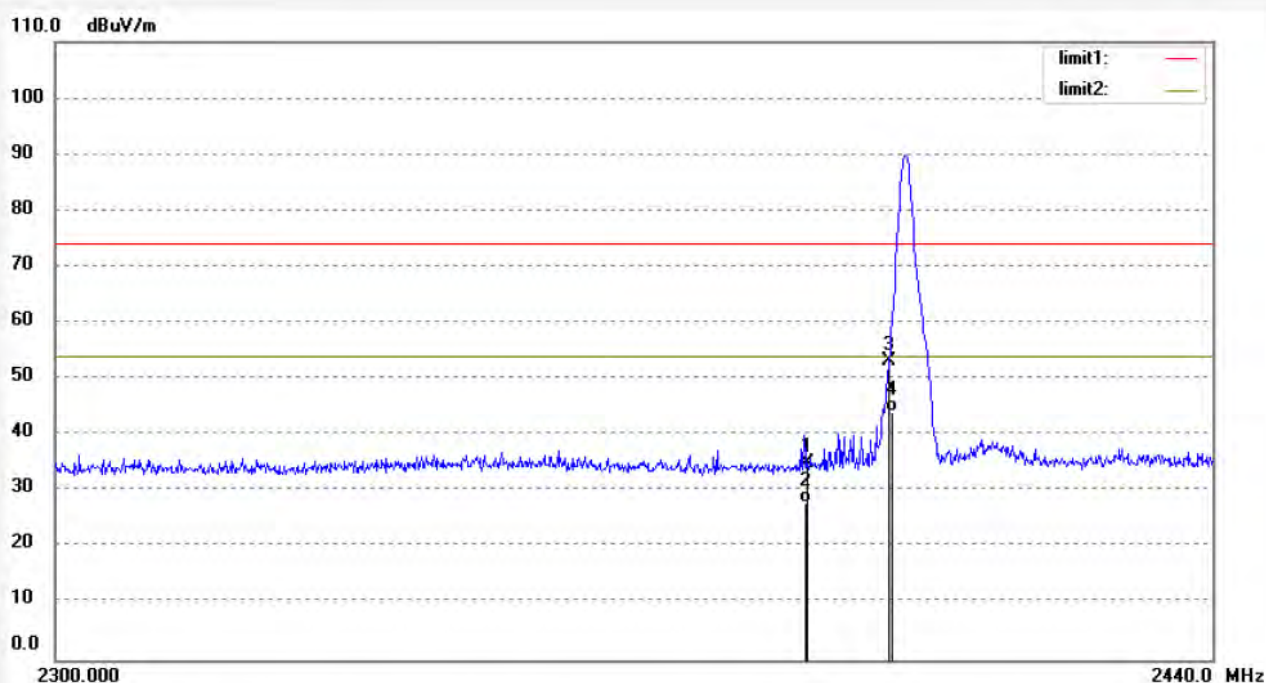
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2018 #1278
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Wireless bluetooth headset
Mode: TX 2402MHz (GFSK)
Model: J1
Manufacturer: Sanag

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2018/07/25
Time: 14:04:20
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	41.34	-6.32	35.02	74.00	-38.98	peak	200	140	
2	2390.000	34.25	-6.32	27.93	54.00	-26.07	AVG	200	236	
3	2400.000	59.42	-6.27	53.15	74.00	-20.85	peak	200	258	
4	2400.000	50.47	-6.27	44.20	54.00	-9.80	AVG	200	55	

Note: Average measurement with peak detection at No.2&4



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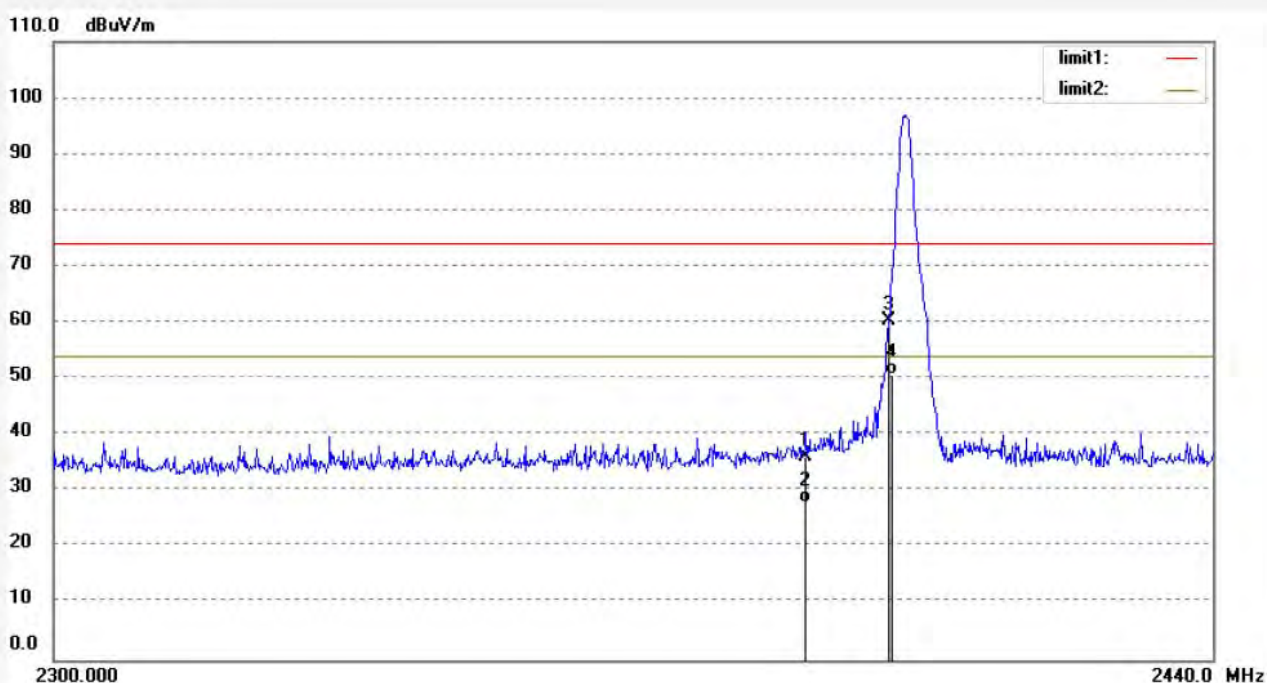
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: STAR2018 #1279
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Wireless bluetooth headset
Mode: TX 2402MHz (GFSK)
Model: J1
Manufacturer: Sanag

Polarization: Vertical
Power Source: DC 3.7V
Date: 2018/07/25
Time: 14:05:46
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	42.38	-6.32	36.06	74.00	-37.94	peak	150	222	
2	2390.000	34.25	-6.32	27.93	54.00	-26.07	AVG	150	325	
3	2400.000	66.69	-6.27	60.42	74.00	-13.58	peak	150	25	
4	2400.000	57.00	-6.27	50.73	54.00	-3.27	AVG	150	54	

Note: Average measurement with peak detection at No.2&4



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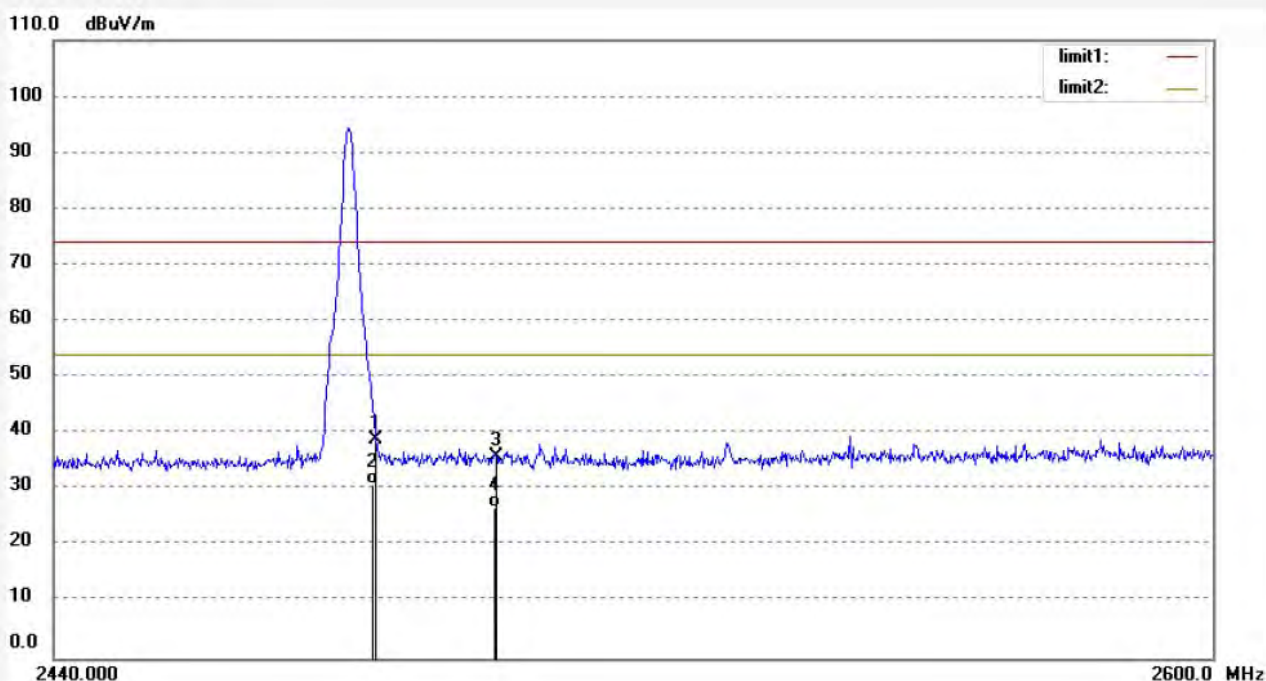
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: STAR2018 #1281
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Wireless bluetooth headset
Mode: TX 2480MHz (GFSK)
Model: J1
Manufacturer: Sanag

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2018/07/25
Time: 14:08:13
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	44.74	-5.89	38.85	74.00	-35.15	peak	200	355	
2	2483.500	36.88	-5.89	30.99	54.00	-23.01	AVG	200	265	
3	2500.000	41.61	-5.81	35.80	74.00	-38.20	peak	200	241	
4	2500.000	32.61	-5.81	26.80	54.00	-27.20	AVG	200	198	

Note: Average measurement with peak detection at No.2&4



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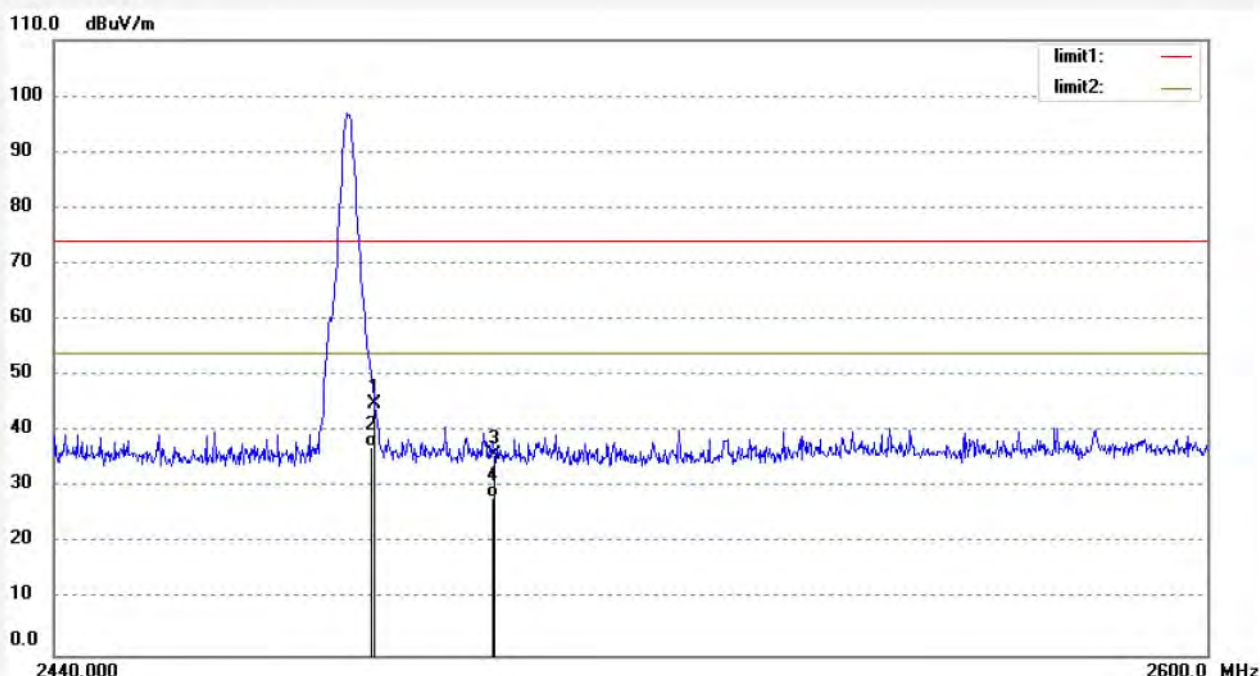
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: STAR2018 #1280
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Wireless bluetooth headset
Mode: TX 2480MHz (GFSK)
Model: J1
Manufacturer: Sanag

Polarization: Vertical
Power Source: DC 3.7V
Date: 2018/07/25
Time: 14:07:11
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	50.76	-5.89	44.87	74.00	-29.13	peak	150	255	
2	2483.500	43.14	-5.89	37.25	54.00	-16.75	AVG	150	117	
3	2500.000	41.63	-5.81	35.82	74.00	-38.18	peak	150	119	
4	2500.000	34.03	-5.81	28.22	54.00	-25.78	AVG	150	215	

Note: Average measurement with peak detection at No.2&4

Hopping mode



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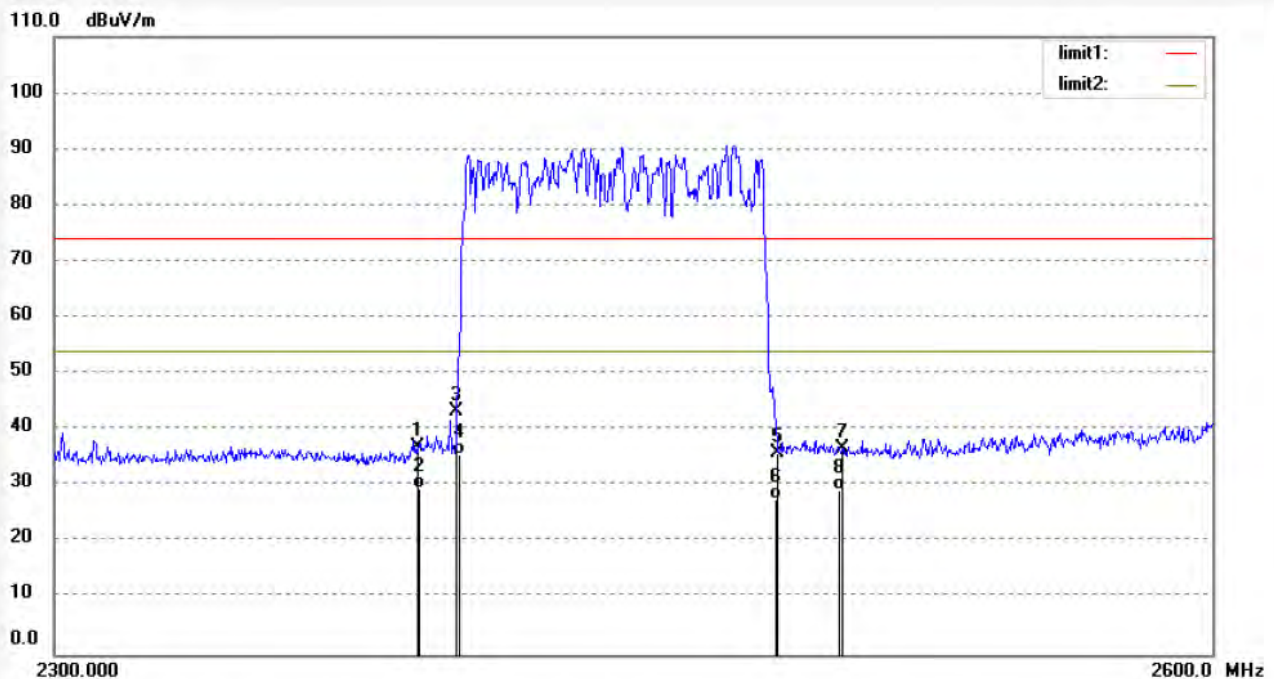
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: STAR2018 #1295
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Wireless bluetooth headset
Mode: Hopping (GFSK)
Model: J1
Manufacturer: Sanag

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2018/07/25
Time: 14:55:29
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	43.34	-6.32	37.02	74.00	-36.98	peak	200	178	
2	2390.000	35.99	-6.32	29.67	54.00	-24.33	AVG	200	156	
3	2400.000	49.54	-6.27	43.27	74.00	-30.73	peak	200	177	
4	2400.000	41.90	-6.27	35.63	54.00	-18.37	AVG	200	256	
5	2483.500	41.77	-5.89	35.88	74.00	-38.12	peak	200	147	
6	2483.500	33.57	-5.89	27.68	54.00	-26.32	AVG	200	239	
7	2500.000	42.52	-5.81	36.71	74.00	-37.29	peak	200	105	
8	2500.000	35.02	-5.81	29.21	54.00	-24.79	AVG	200	62	

Note: Average measurement with peak detection at No.2&4&6&8



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Site: 1# Chamber

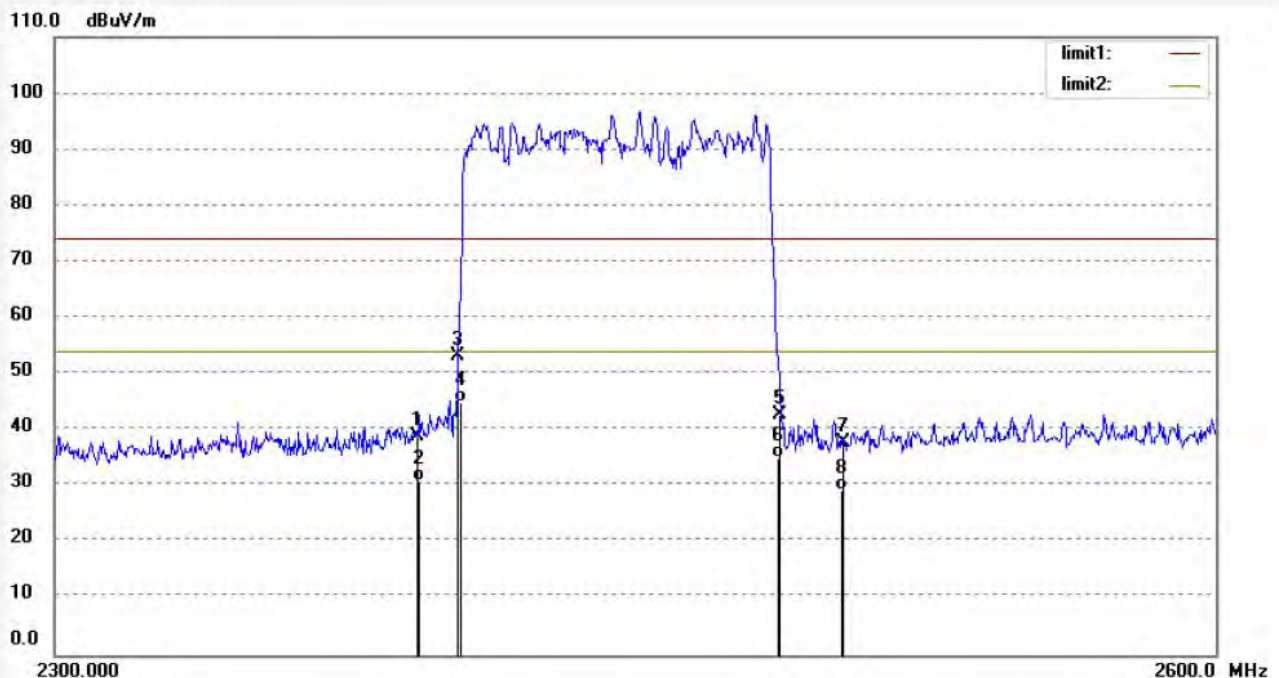
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2018 #1296
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Wireless bluetooth headset
Mode: Hopping (GFSK)
Model: J1
Manufacturer: Sanag

Polarization: Vertical
Power Source: DC 3.7V
Date: 2018/07/25
Time: 15:01:52
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181265



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	45.16	-6.32	38.84	74.00	-35.16	peak	150	135	
2	2390.000	37.25	-6.32	30.93	54.00	-23.07	AVG	150	245	
3	2400.000	59.44	-6.27	53.17	74.00	-20.83	peak	150	126	
4	2400.000	51.25	-6.27	44.98	54.00	-9.02	AVG	150	178	
5	2483.500	48.75	-5.89	42.86	74.00	-31.14	peak	150	268	
6	2483.500	40.92	-5.89	35.03	54.00	-18.97	AVG	150	56	
7	2500.000	43.56	-5.81	37.75	74.00	-36.25	peak	150	197	
8	2500.000	35.22	-5.81	29.41	54.00	-24.59	AVG	150	256	

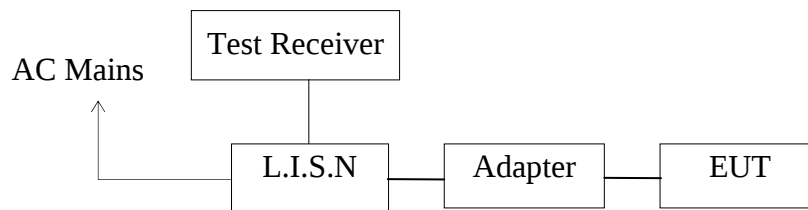
Note: Average measurement with peak detection at No.2&4&6&8

12.AC POWER LINE CONDUCTED EMISSION FOR FCC PART 15

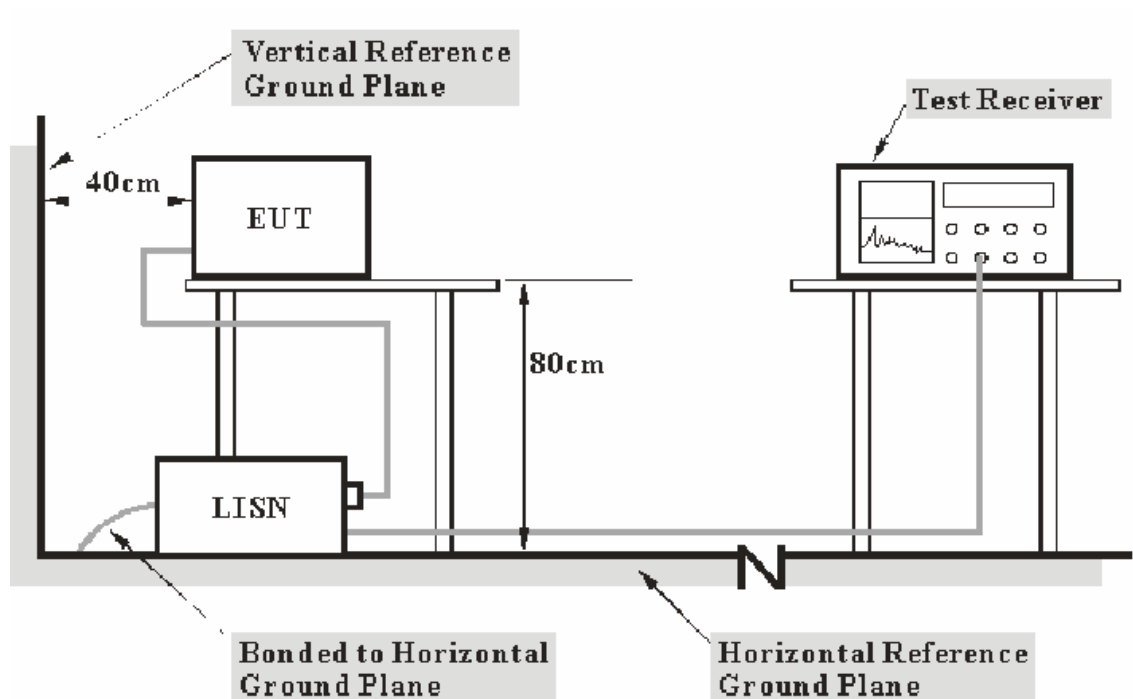
SECTION 15.207(A)

12.1.Block Diagram of Test Setup

12.1.1.Block diagram of connection between the EUT and simulators



12.1.2.Test System Setup



- Note:** 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

12.2.Power Line Conducted Emission Measurement Limits

Frequency (MHz)	Limit dB(μ V)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0
NOTE1: The lower limit shall apply at the transition frequencies.		
NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

12.3.Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

12.4.Operating Condition of EUT

12.4.1.Setup the EUT and simulator as shown as Section 12.1.

12.4.2.Turn on the power of all equipment.

12.4.3.Let the EUT work in test mode and measure it.

12.5.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

12.6.Data Sample

Frequency (MHz)	Transducer value (dB)	QuasiPeak Level (dBμV)	Average Level (dBμV)	QuasiPeak Limit (dBμV)	Average Limit (dBμV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XX	10.5	51.1	34.2	56.0	46.0	4.9	11.8	Pass

Frequency(MHz) = Emission frequency in MHz

Transducer value(dB) = Insertion loss of LISN + Cable Loss

Level(dBμV) = Quasi-peak Reading/Average Reading + Transducer value

Limit (dBμV) = Limit stated in standard

Margin = Limit (dBμV) - Level (dBμV)

Calculation Formula:

Margin = Limit (dBμV) - Level (dBμV)

12.7.Power Line Conducted Emission Measurement Results

Pass.

The frequency range from 150kHz to 30MHz is checked.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.
Emissions attenuated more than 20 dB below the permissible value are not reported.

All data was recorded in the Quasi-peak and average detection mode.

The spectral diagrams are attached as below.

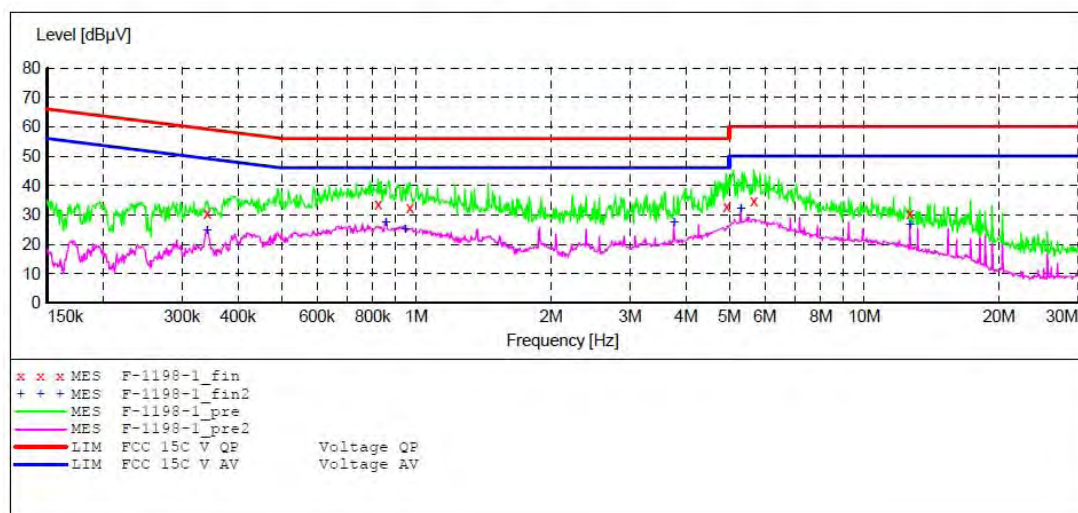
ACCURATE TECHNOLOGY CO.,LTD

CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Wireless bluetooth headset M/N:J1
 Manufacturer: Sanag
 Operating Condition: BT Communication
 Test Site: 1#Shielding Room
 Operator: Star
 Test Specification: L 240V/60Hz
 Comment: Report NO.:ATE20181265
 Start of Test: 7/19/2018 / 9:52:13AM

SCAN TABLE: "V 9K-30MHz fin"

Short Description:		_SUB_STD_VTERM2 1.70				
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	NSLK8126 2008
Average						
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008
Average						



MEASUREMENT RESULT: "F-1198-1_fin"

7/19/2018 9:54AM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.341378	30.50	10.6	59	28.7	QP	L1	GND
0.821586	33.60	10.8	56	22.4	QP	L1	GND
0.967688	32.50	10.8	56	23.5	QP	L1	GND
4.932760	32.80	11.2	56	23.2	QP	L1	GND
5.672440	34.80	11.2	60	25.2	QP	L1	GND
12.654535	30.60	11.3	60	29.4	QP	L1	GND

MEASUREMENT RESULT: "F-1198-1_fin2"

7/19/2018 9:54AM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.341378	24.50	10.6	49	24.7	AV	L1	GND
0.855047	27.50	10.8	46	18.5	AV	L1	GND
0.944785	25.10	10.8	46	20.9	AV	L1	GND
3.760084	27.50	11.1	46	18.5	AV	L1	GND
5.300255	32.00	11.2	50	18.0	AV	L1	GND
12.654535	26.70	11.3	50	23.3	AV	L1	GND

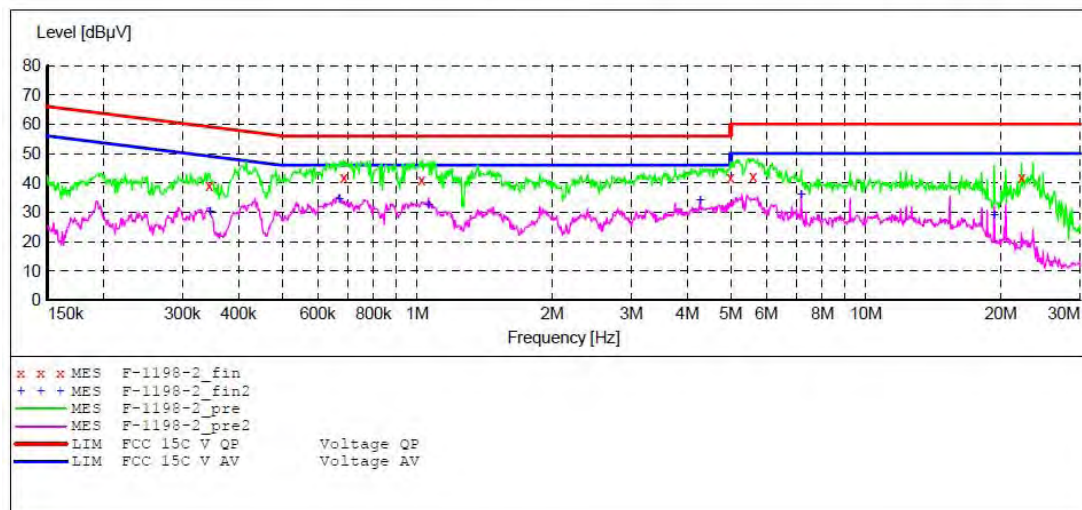
ACCURATE TECHNOLOGY CO.,LTD

CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Wireless bluetooth headset M/N:J1
 Manufacturer: Sanag
 Operating Condition: BT Communication
 Test Site: 1#Shielding Room
 Operator: Star
 Test Specification: N 240V/60Hz
 Comment: Report NO.:ATE20181265
 Start of Test: 7/19/2018 / 9:55:21AM

SCAN TABLE: "V 9K-30MHz fin"

Short Description: SUB STD VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 9.0 kHz 150.0 kHz 100.0 Hz QuasiPeak 1.0 s 200 Hz NSLK8126 2008
 Average
 150.0 kHz 30.0 MHz 5.0 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "F-1198-2_fin"

7/19/2018 9:58AM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.344115	38.90	10.6	59	20.2	QP	N	GND
0.686493	41.70	10.8	56	14.3	QP	N	GND
1.023310	41.10	10.8	56	14.9	QP	N	GND
4.992190	41.70	11.2	56	14.3	QP	N	GND
5.604912	42.20	11.2	60	17.8	QP	N	GND
22.217731	42.00	11.4	60	18.0	QP	N	GND

MEASUREMENT RESULT: "F-1198-2_fin2"

7/19/2018 9:58AM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.345491	30.00	10.6	49	19.1	AV	N	GND
0.670245	34.20	10.8	46	11.8	AV	N	GND
1.060744	32.30	10.9	46	13.7	AV	N	GND
4.272443	33.80	11.1	46	12.2	AV	N	GND
7.178918	36.10	11.2	50	13.9	AV	N	GND
19.320562	28.80	11.4	50	21.2	AV	N	GND

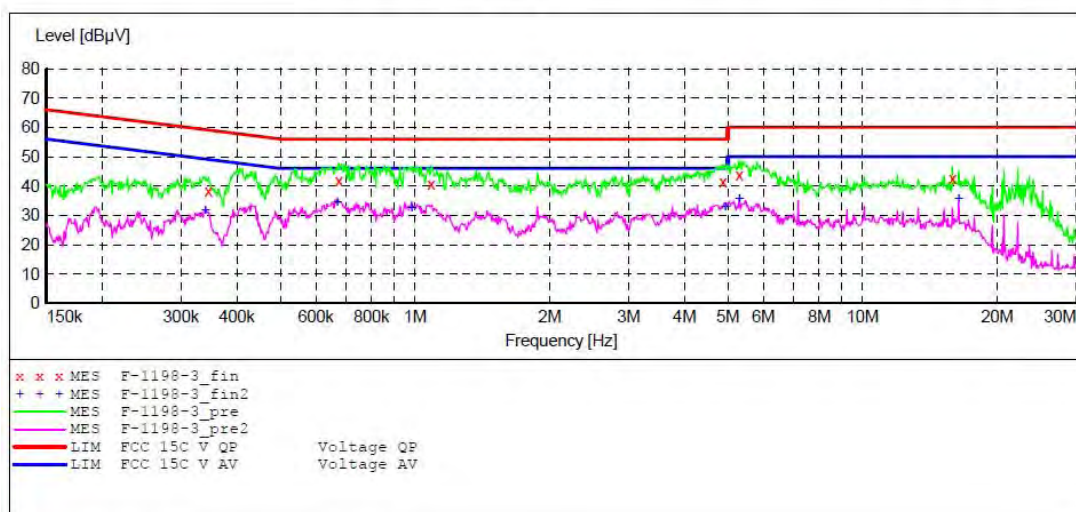
ACCURATE TECHNOLOGY CO.,LTD

CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Wireless bluetooth headset M/N:J1
 Manufacturer: Sanag
 Operating Condition: BT Communication
 Test Site: 1#Shielding Room
 Operator: Star
 Test Specification: N 120V/60Hz
 Comment: Report NO.:ATE20181265
 Start of Test: 7/19/2018 / 9:59:24AM

SCAN TABLE: "V 9K-30MHz fin"

Short Description:		_SUB_STD_VTERM2 1.70				
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	NSLK8126 2008
Average						
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008
Average						



MEASUREMENT RESULT: "F-1198-3_fin"

7/19/2018 10:01AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.345491	38.10	10.6	59	21.0	QP	N	GND
0.675618	41.90	10.8	56	14.1	QP	N	GND
1.086458	40.60	10.9	56	15.4	QP	N	GND
4.874037	41.30	11.1	56	14.7	QP	N	GND
5.300255	43.80	11.2	60	16.2	QP	N	GND
15.887948	42.60	11.4	60	17.4	QP	N	GND

MEASUREMENT RESULT: "F-1198-3_fin2"

7/19/2018 10:01AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.340018	31.70	10.6	49	17.5	AV	N	GND
0.670245	34.20	10.8	46	11.8	AV	N	GND
0.983264	32.60	10.8	46	13.4	AV	N	GND
4.932760	33.00	11.2	46	13.0	AV	N	GND
5.300255	35.70	11.2	50	14.3	AV	N	GND
16.403538	35.50	11.4	50	14.5	AV	N	GND

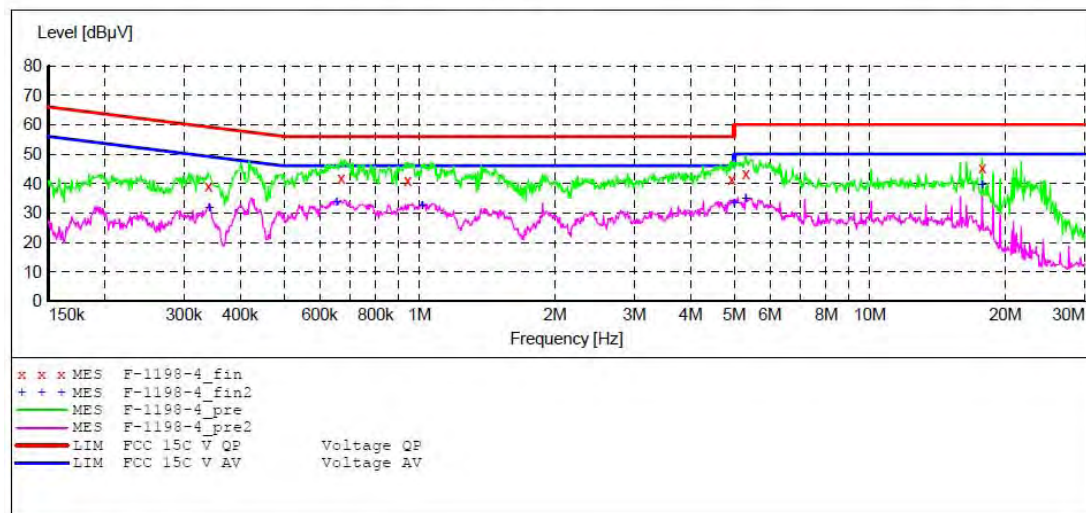
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Wireless bluetooth headset M/N:J1
 Manufacturer: Sanag
 Operating Condition: BT Communication
 Test Site: 1#Shielding Room
 Operator: Star
 Test Specification: L 120V/60Hz
 Comment: Report NO.:ATE20181265
 Start of Test: 7/19/2018 / 10:02:15AM

SCAN TABLE: "V 9K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 9.0 kHz 150.0 kHz 100.0 Hz QuasiPeak 1.0 s 200 Hz NSLK8126 2008
 Average
 150.0 kHz 30.0 MHz 5.0 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "F-1198-4_fin"

7/19/2018 10:05AM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.340018	39.20	10.6	59	20.0	QP	L1	GND
0.670245	41.90	10.8	56	14.1	QP	L1	GND
0.941021	41.00	10.8	56	15.0	QP	L1	GND
4.932760	41.50	11.2	56	14.5	QP	L1	GND
5.300255	43.30	11.2	60	16.7	QP	L1	GND
17.766905	45.20	11.4	60	14.8	QP	L1	GND

MEASUREMENT RESULT: "F-1198-4_fin2"

7/19/2018 10:05AM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.341378	31.70	10.6	49	17.5	AV	L1	GND
0.654382	33.60	10.8	46	12.4	AV	L1	GND
1.015172	32.60	10.8	46	13.4	AV	L1	GND
4.992190	33.20	11.2	46	12.8	AV	L1	GND
5.300255	34.80	11.2	50	15.2	AV	L1	GND
17.766905	39.60	11.4	50	10.4	AV	L1	GND

13.ANTENNA REQUIREMENT

13.1.The Requirement

According to 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.

13.2.Antenna Construction

Device is equipped with permanent attached antenna, which isn't displaced by other antenna. The Max Antenna gain of EUT is 4dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



----- THE END OF TEST REPORT -----