APPLICATION CERTIFICATION FCC Part 15C
On Behalf of

Shenzhen Kinlan Technology Company Limited

Bluetooth Earbuds
Model No.: 4880, BE1020

FCC ID: 2AE3CBE1020

Prepared for	:	Shenzhen Kinlan Technology Company Limited
Address	:	West of 3F, Building A4, Yinlong Industrial Park, No.292 Shenshan Road, Longgang District, Shenzhen, Guangdong, China
Prepared by	:	Shenzhen Accurate Technology Co., Ltd.
Address	:	1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China
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Report No.	:	ATE20181722
Date of Test	:	Sep. 21-Sep. 23, 2018
Date of Report	:	Sep. 23, 2018

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Description Page

Test Report Certification

Applicant	:	Shenzhen Kinlan Technology Company Limited
Manufacturer	:	Shenzhen Kinlan Technology Company Limited
EUT Description	:	Bluetooth Earbuds
Model No.	:	4880, BE1020

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 : Sep. 21-Sep. 23, 2018
Date of Report : Sep. 23, 2018

Test Engineer : 
(Star Yang, Engineer)

Prepared by : 
(Star Yang, Engineer)

Approved & Authorized Signer :
(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1.Description of Device (EUT)

Model Number	:	4880, BE1020 (Note: Above models are identical in schematic, structure and critical components except for model name different, So we prepare BE1020 for test.)
Bluetooth version	:	V4.2 (BR+EDR)
Frequency Range	:	2402MHz-2480MHz
Number of Channels	:	79
Antenna Gain(Max)	:	2dBi
Antenna type	:	Ceramic antenna
Modulation mode	:	GFSK, π/4 DQPSK, 8DPSK
Hardware version	:	V1.0
Software version	:	V1.0
Power Supply	:	DC 3.7V (Powered by Lithium battery) or DC 5V (Powered by charging port)
Applicant	:	Shenzhen Kinlan Technology Company Limited
Address	:	West of 3F, Building A4, Yinlong Industrial Park, No.292 Shenshan Road, Longgang District, Shenzhen, Guangdong, China
Manufacturer	:	Shenzhen Kinlan Technology Company Limited
Address	:	West of 3F, Building A4, Yinlong Industrial Park, No.292 Shenshan Road, Longgang District, Shenzhen, Guangdong, 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 (ISEDC) 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
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	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
RF COAXIAL CABLE	SUHNER	N-5m(Frequency range:9KHz-26.5GHz)	NO.3	Jan. 06, 2018	1 Year
RF COAXIAL CABLE	SUHNER	N-5m(Frequency range:9KHz-26.5GHz)	NO.4	Jan. 06, 2018	1 Year
RF COAXIAL CABLE	SUHNER	N-1m(Frequency range:9KHz-26.5GHz)	NO.5	Jan. 06, 2018	1 Year
RF COAXIAL CABLE	SUHNER	N-1m(Frequency range:9KHz-26.5GHz)	NO.6	Jan. 06, 2018	1 Year
Temporary antenna connector	NTGS	14AE	N/A	Sep. 21, 2018	N/A

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

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.

EUT is connected to a computer through the usb-serial controller tool and Use test software to set the test mode.
Test software is (Airoha.AB152x_verC_LabTestTool)

3.2.Configuration and peripherals

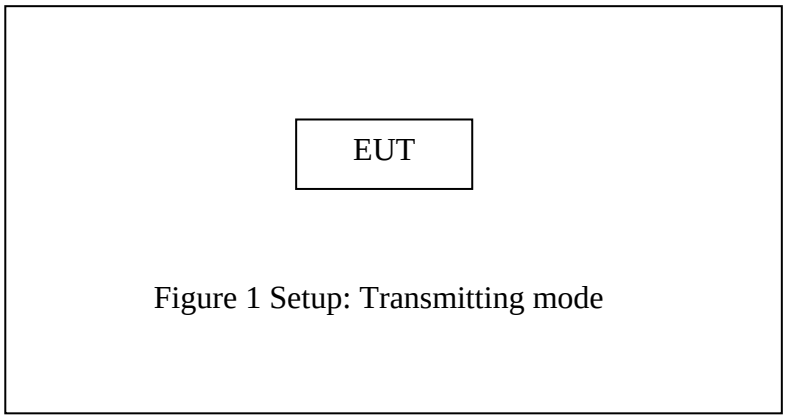


Figure 1 Setup: Transmitting mode

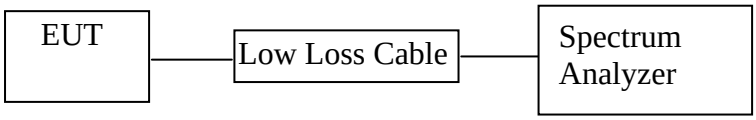
Note: The PCB board of the left right sound channel of the product is identical, So we only tested one of the earbuds.

4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
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 15.207	AC Power Line Conducted Emissions Limits 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 100 kHz and VBW to 300 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

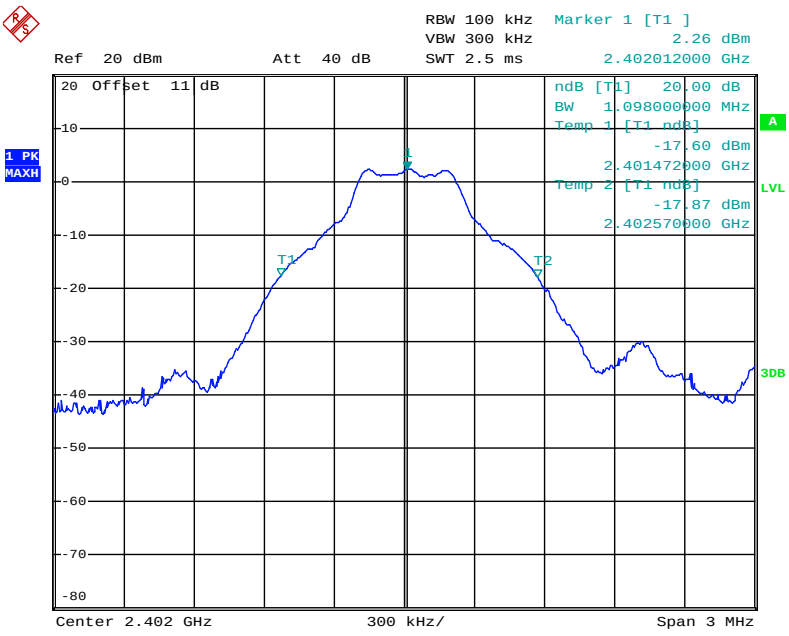
Test Lab: Shielding room
Test Engineer: Star

Channel	Frequency (MHz)	GFSK 20dB Bandwidth (MHz)	Π/4-DQPSK 20dB Bandwidth (MHz)	8DPSK 20dB Bandwidth (MHz)	Result
Low	2402	1.098	1.362	1.350	Pass
Middle	2441	1.098	1.356	1.344	Pass
High	2480	1.110	1.356	1.344	Pass

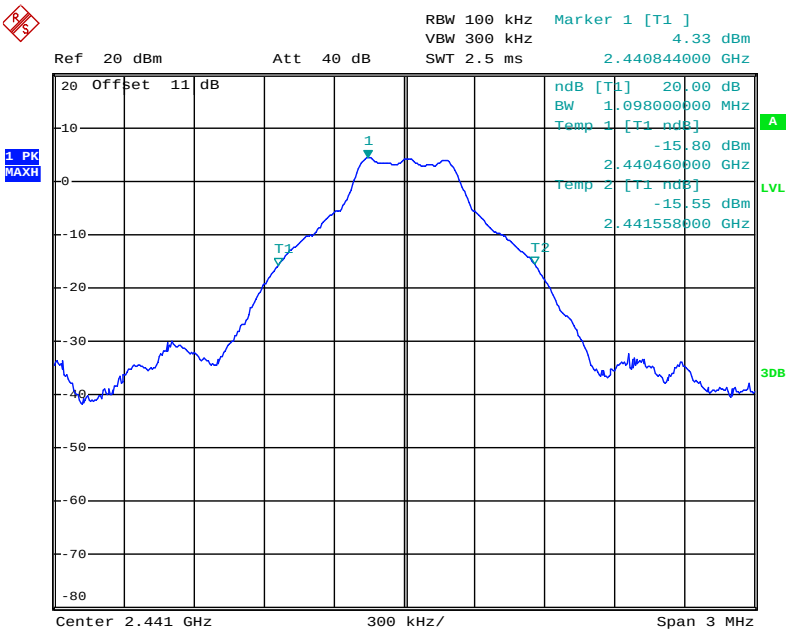
The spectrum analyzer plots are attached as below.

GFSK Mode

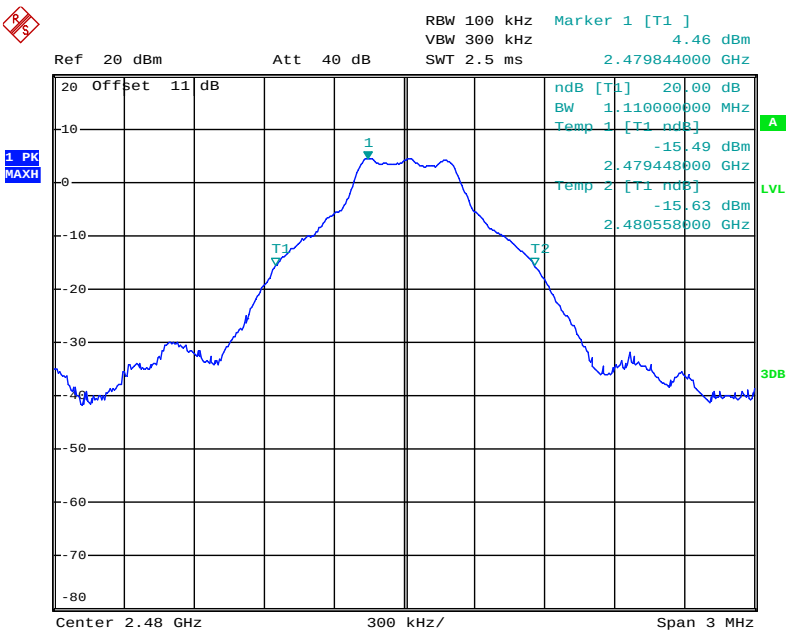
Low channel



Middle channel

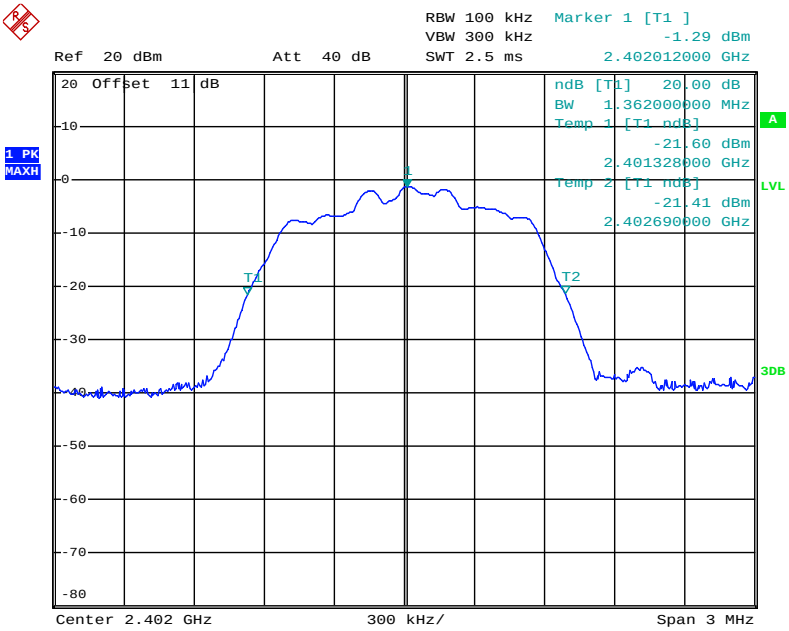


High channel

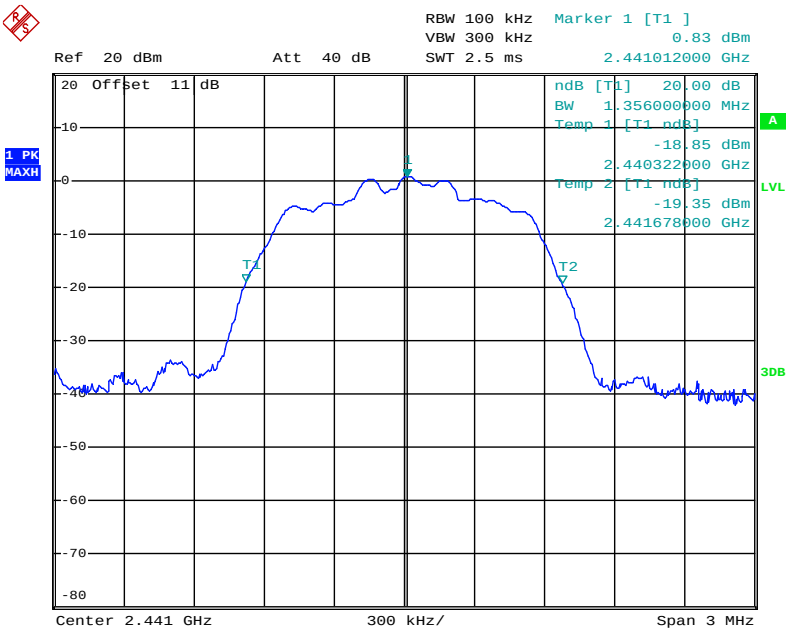


Π/4-DQPSK Mode

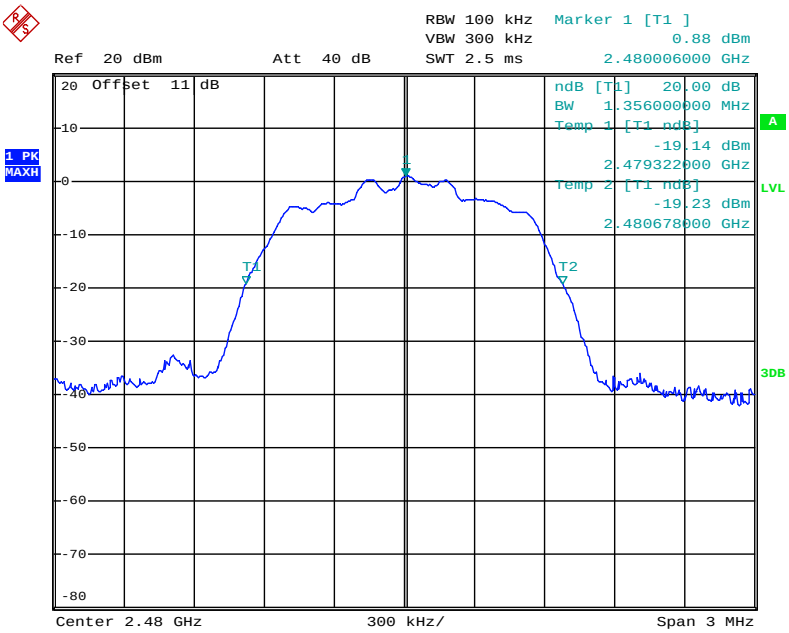
Low channel



Middle channel

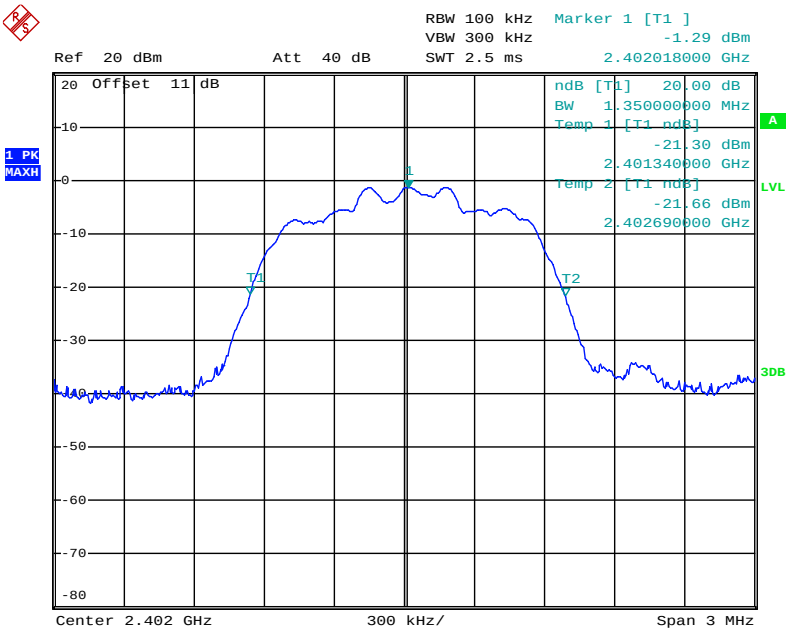


High channel

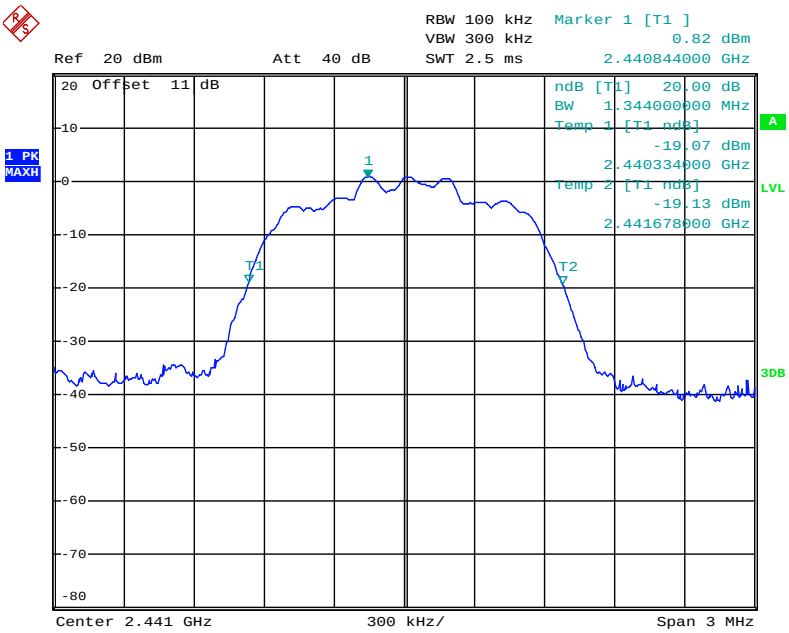


8DPSK Mode

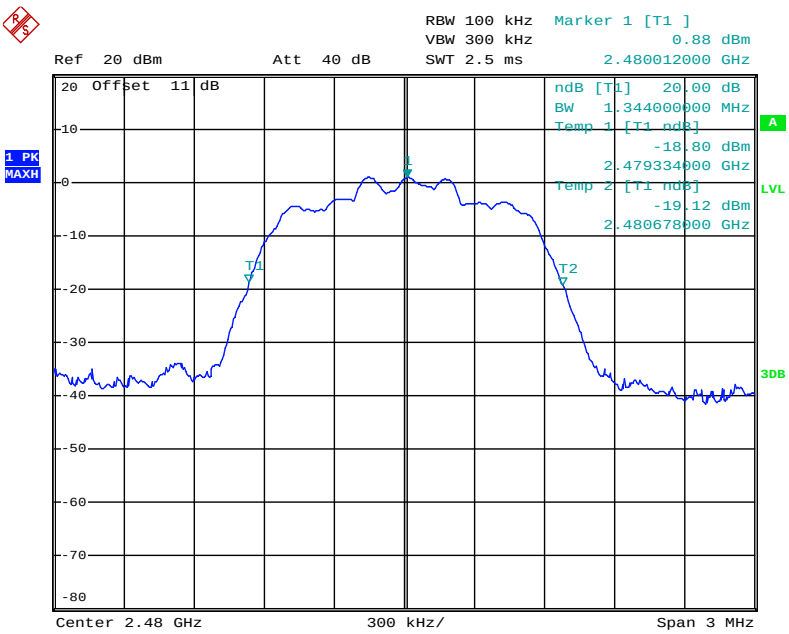
Low channel



Middle channel

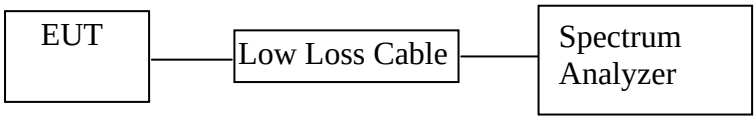


High channel



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 3 MHz.

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

6.5.4.Measurement the channel separation

6.6.Test Result

Test Lab: Shielding room
Test Engineer: Star

GFSK

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.002	25KHz or 2/3*20dB bandwidth	PASS
	2403			
Middle	2440	1.002	25KHz or 2/3*20dB bandwidth	PASS
	2441			
High	2479	1.002	25KHz or 2/3*20dB bandwidth	PASS
	2480			

Π/4-DQPSK

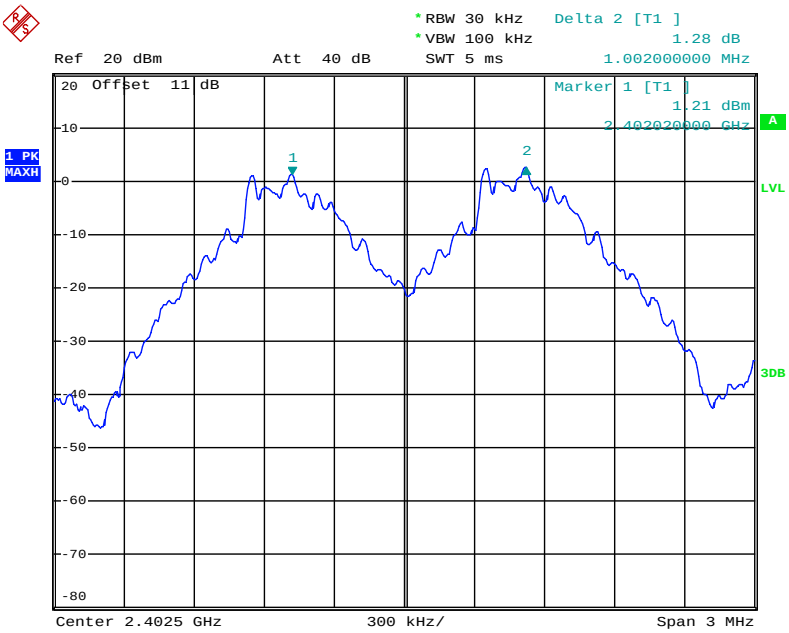
Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.008	25KHz or 2/3*20dB bandwidth	PASS
	2403			
Middle	2440	1.002	25KHz or 2/3*20dB bandwidth	PASS
	2441			
High	2479	1.008	25KHz or 2/3*20dB bandwidth	PASS
	2480			

8DPSK

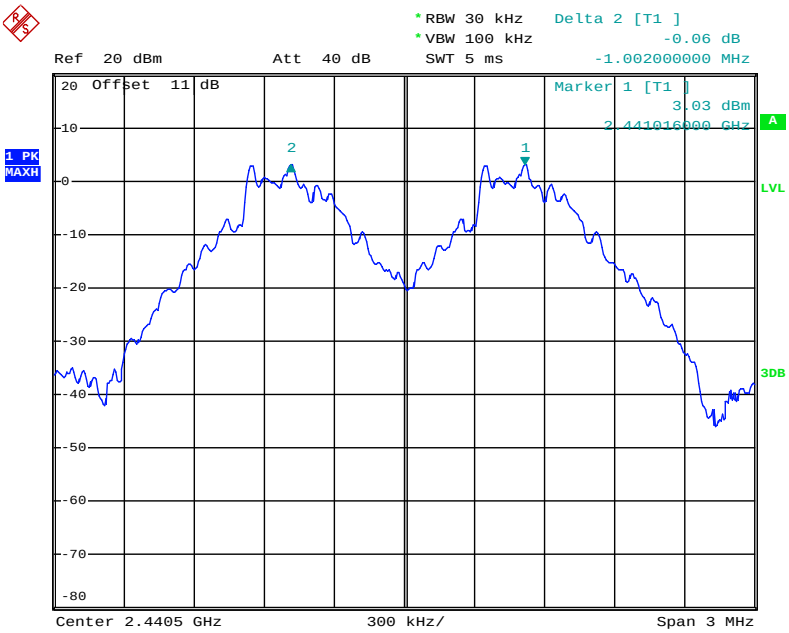
Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.002	25KHz or 2/3*20dB bandwidth	PASS
	2403			
Middle	2440	1.002	25KHz or 2/3*20dB bandwidth	PASS
	2441			
High	2479	1.002	25KHz or 2/3*20dB bandwidth	PASS
	2480			

GFSK Mode

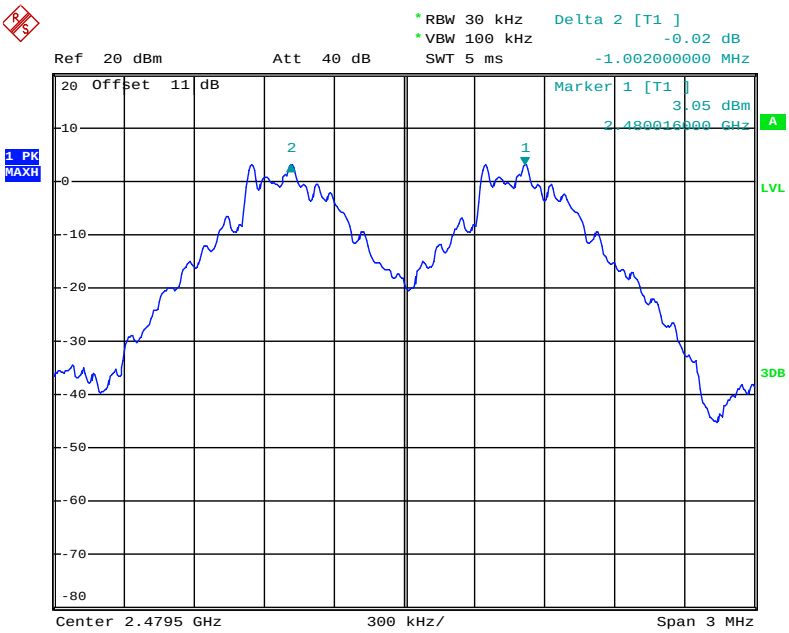
Low channel



Middle channel

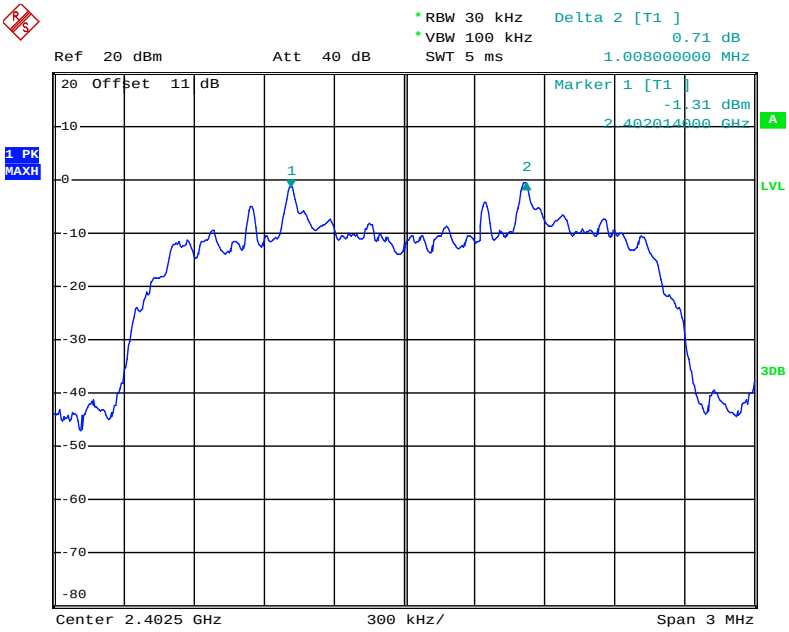


High channel

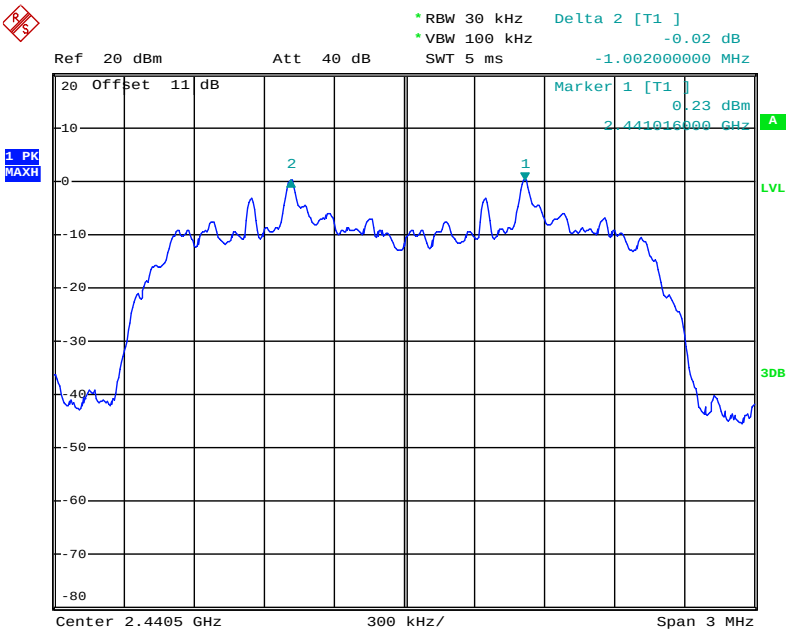


Π/4-DQPSK Mode

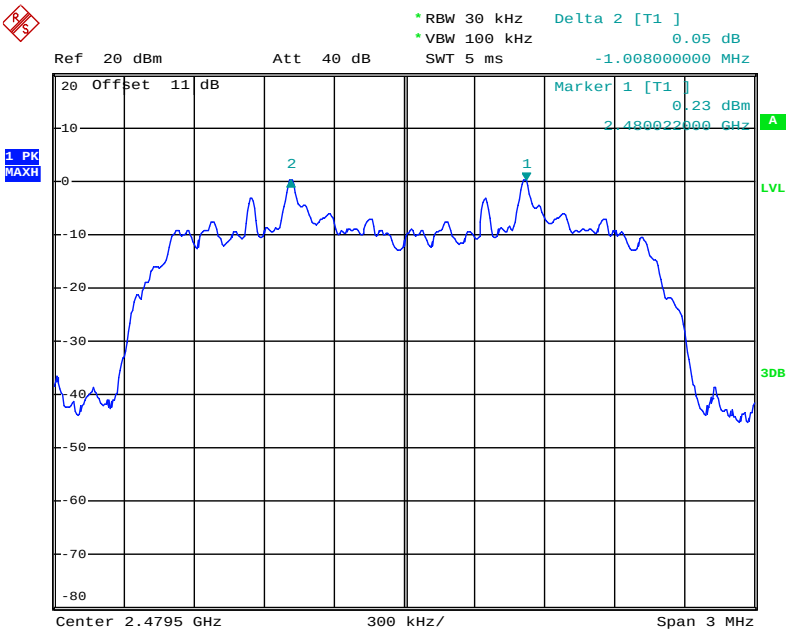
Low channel



Middle channel

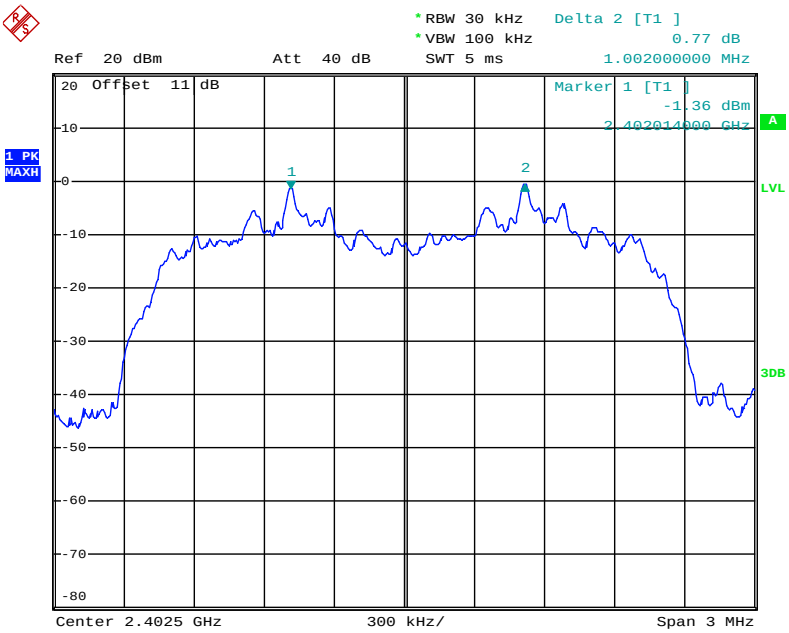


High channel

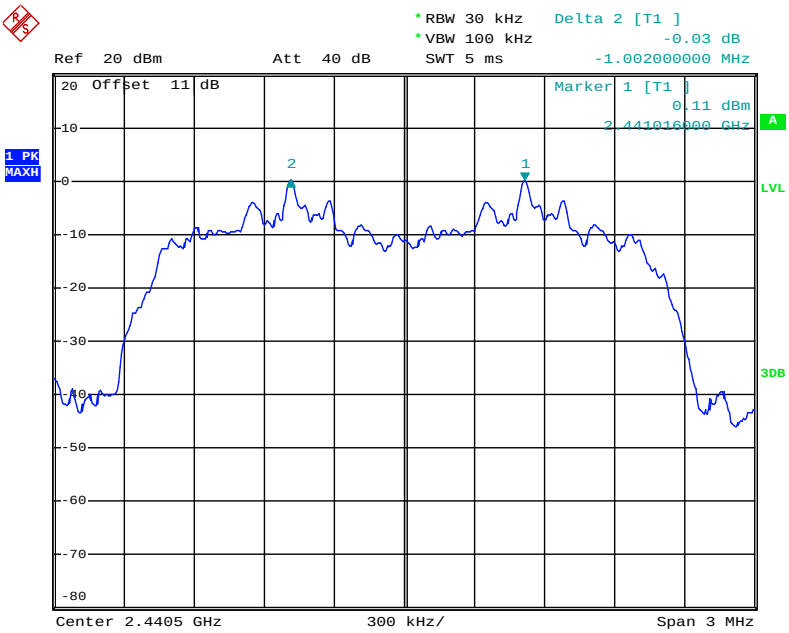


8DPSK Mode

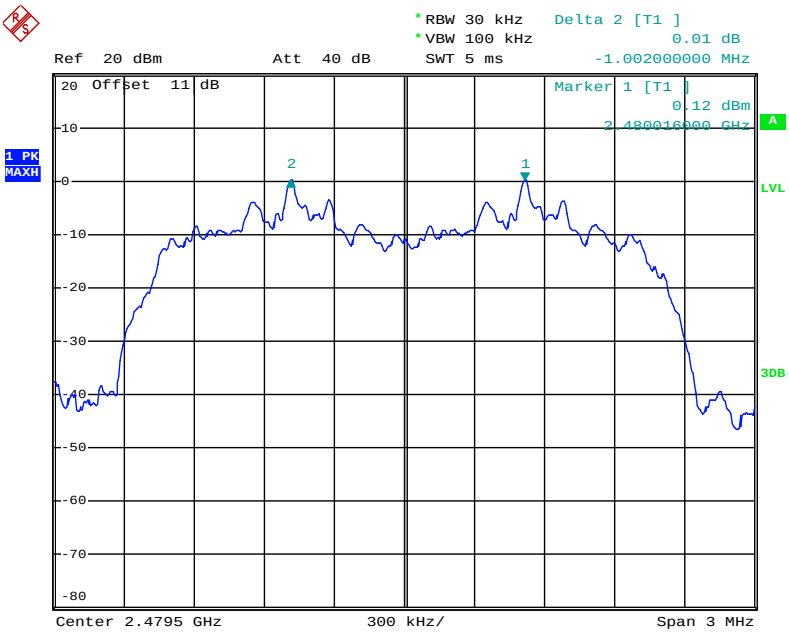
Low channel



Middle channel

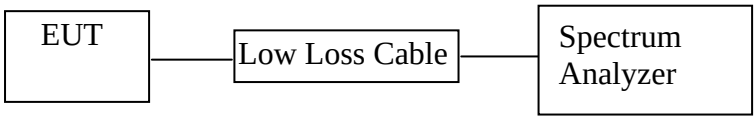


High channel



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.

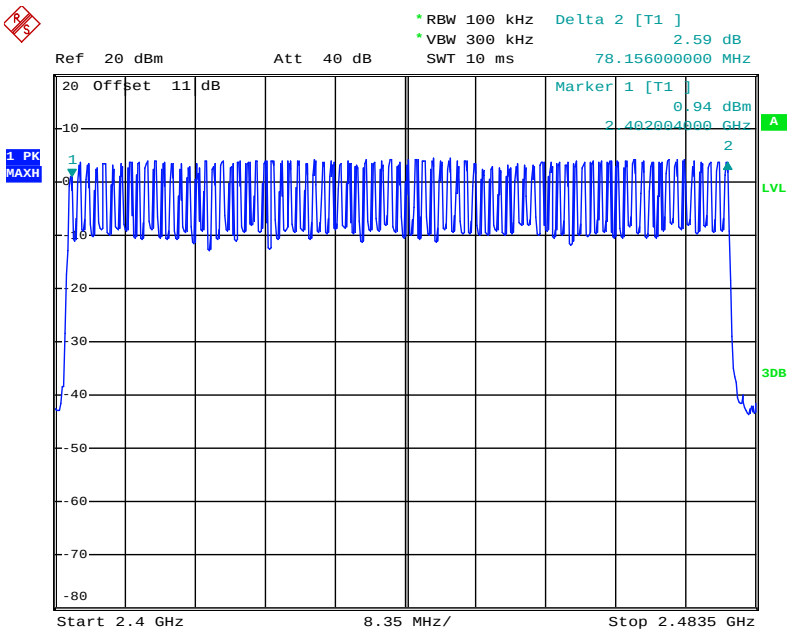
7.6.Test Result

Test Lab: Shielding room
Test Engineer: Star

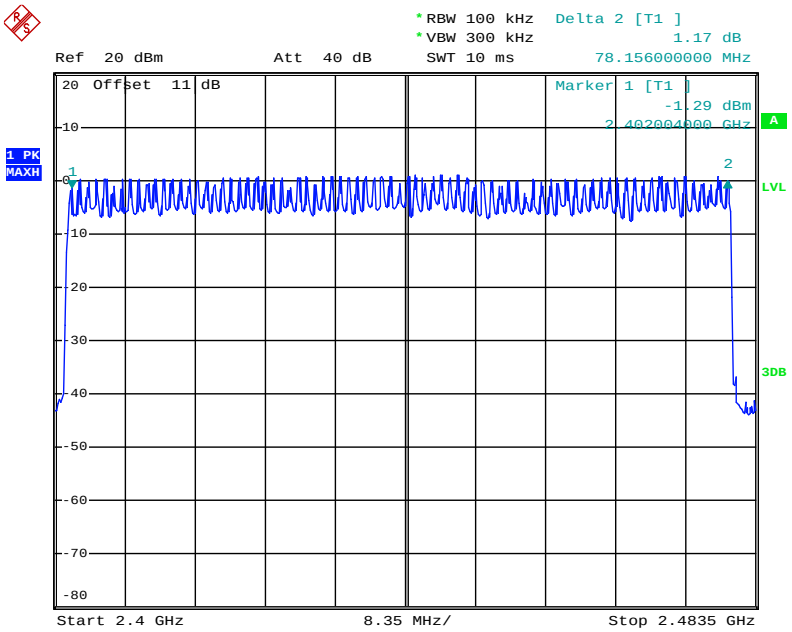
Total number of hopping channel	Measurement result(CH)	Limit(CH)	Result
	79	⩾15	Pass

The spectrum analyzer plots are attached as below.

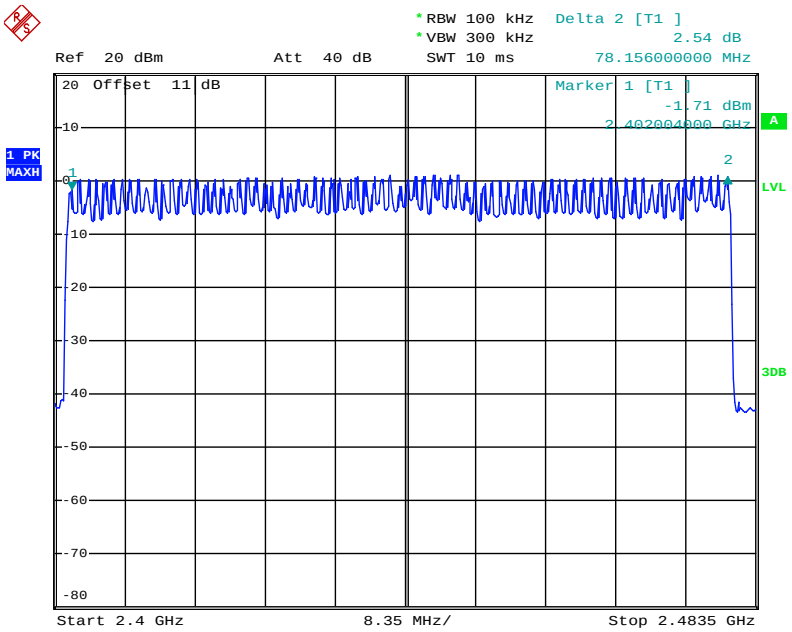
Number of hopping channels (GFSK Mode)



Number of hopping channels (Π/4-DQPSK Mode)

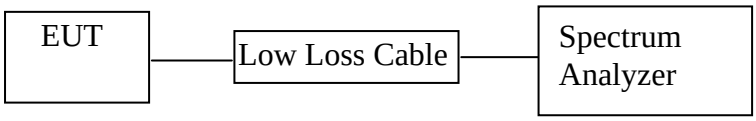


Number of hopping channels (8DPSK Mode)



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

Test Lab: Shielding room
Test Engineer: Star

GFSK Mode (Worst case)

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2441	0.440	140.80	400
A period transmit time = 0.4 × 79 = 31.6		Dwell time = pulse time × (1600/(2*79))×31.6		
DH3	2441	1.720	275.20	400
A period transmit time = 0.4 × 79 = 31.6		Dwell time = pulse time × (1600/(4*79))×31.6		
DH5	2441	2.980	317.87	400
A period transmit time = 0.4 × 79 = 31.6		Dwell time = pulse time × (1600/(6*79))×31.6		

Π/4-DQPSK (Worst case)

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 × 79 = 31.6		Dwell time = pulse time × (1600/(2*79))×31.6		
DH3	2441	1.750	280.00	400
A period transmit time = 0.4 × 79 = 31.6		Dwell time = pulse time × (1600/(4*79))×31.6		
DH5	2441	2.990	318.93	400
A period transmit time = 0.4 × 79 = 31.6		Dwell time = pulse time × (1600/(6*79))×31.6		

8DPSK Mode (Worst case)

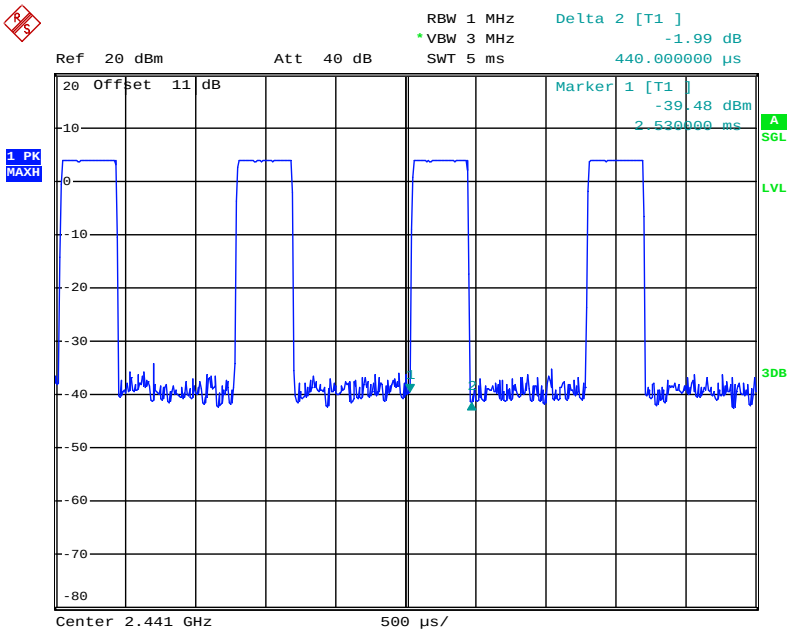
Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2441	0.450	144.00	400
A period transmit time = 0.4 × 79 = 31.6		Dwell time = pulse time × (1600/(2*79))×31.6		
DH3	2441	1.710	273.60	400
A period transmit time = 0.4 × 79 = 31.6		Dwell time = pulse time × (1600/(4*79))×31.6		
DH5	2441	3.000	320.00	400
A period transmit time = 0.4 × 79 = 31.6		Dwell time = pulse time × (1600/(6*79))×31.6		

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

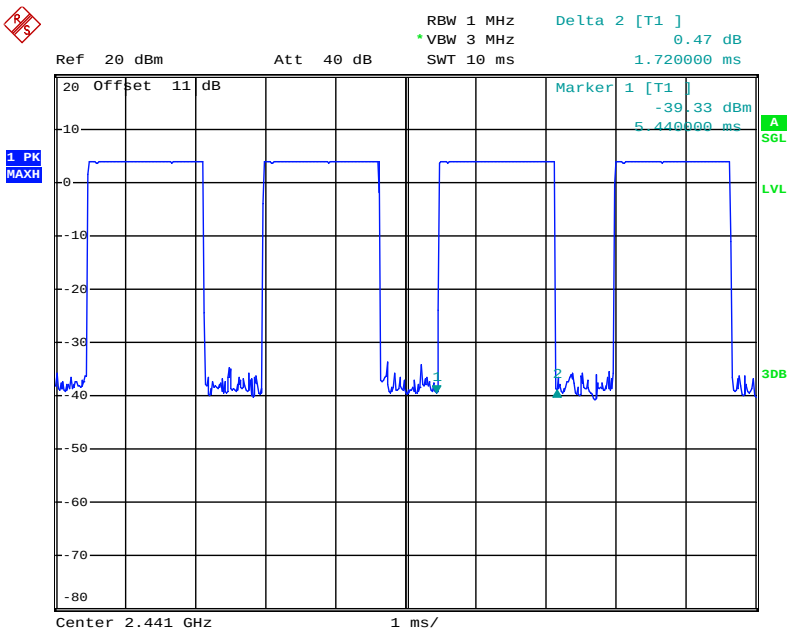
The spectrum analyzer plots are attached as below.

GFSK Mode

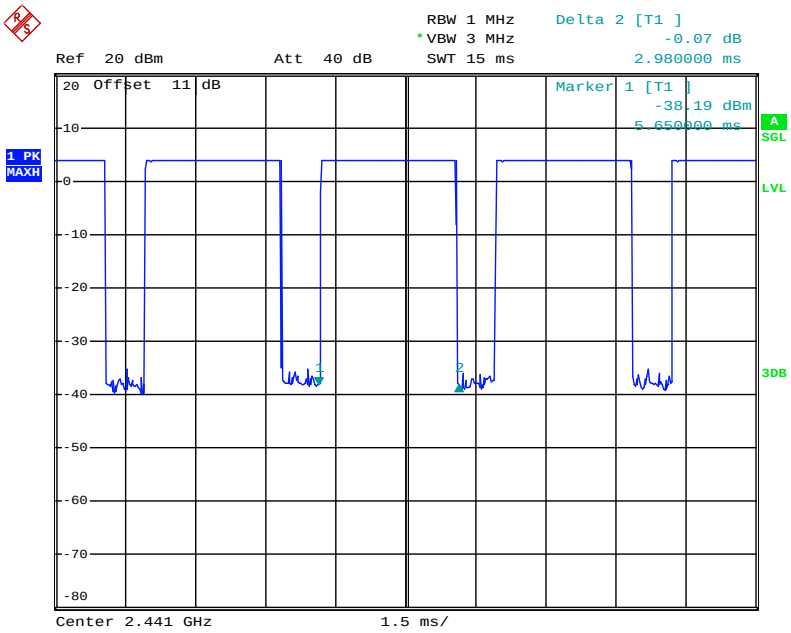
DH1 Middle channel



DH3 Middle channel

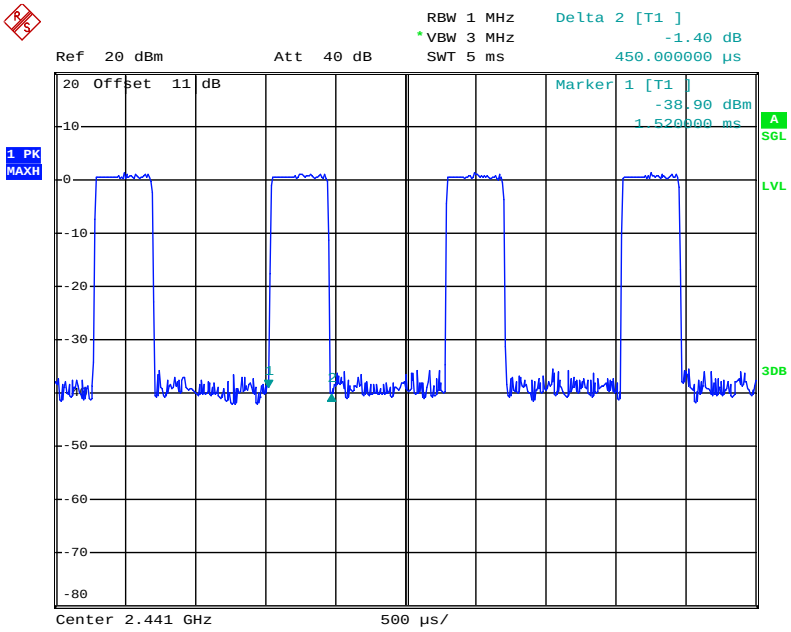


DH5 Middle channel

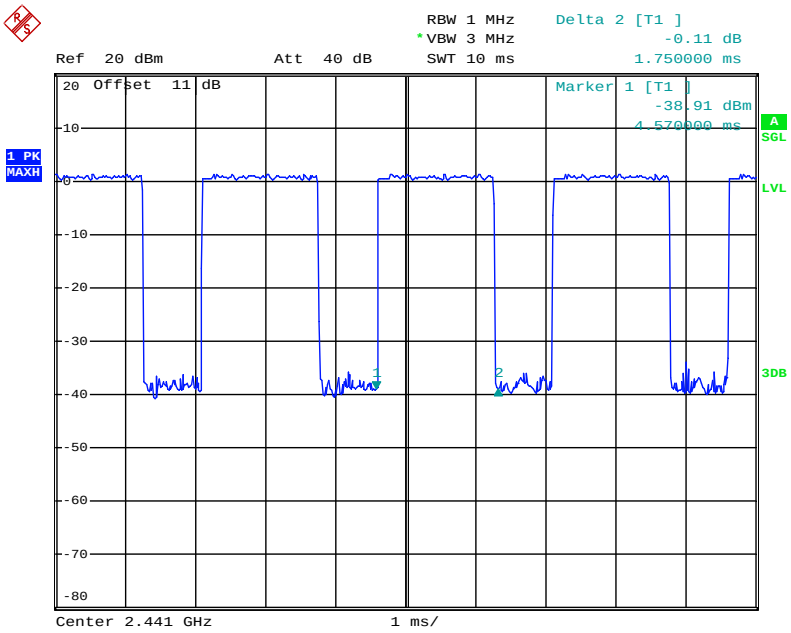


Π/4-DQPSK

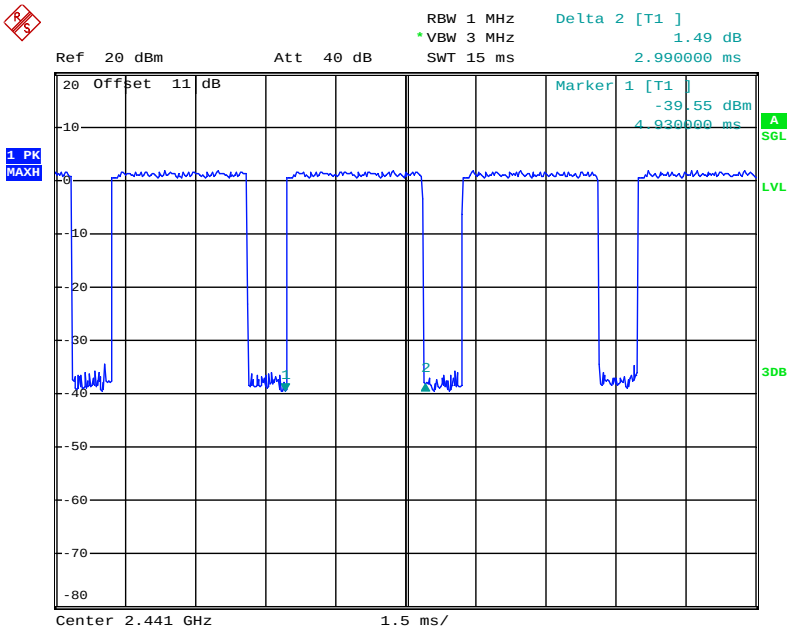
2DH1 Middle channel



2DH3 Middle channel

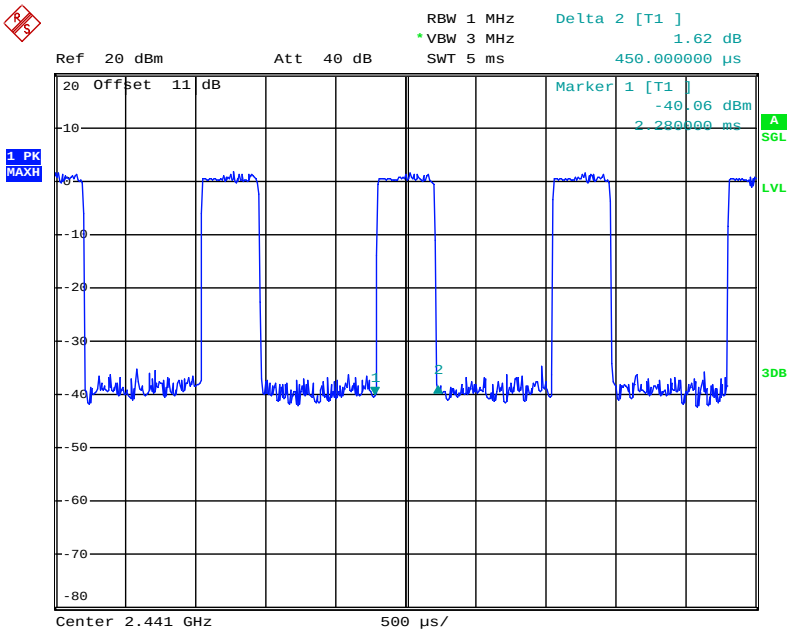


2DH5 Middle channel

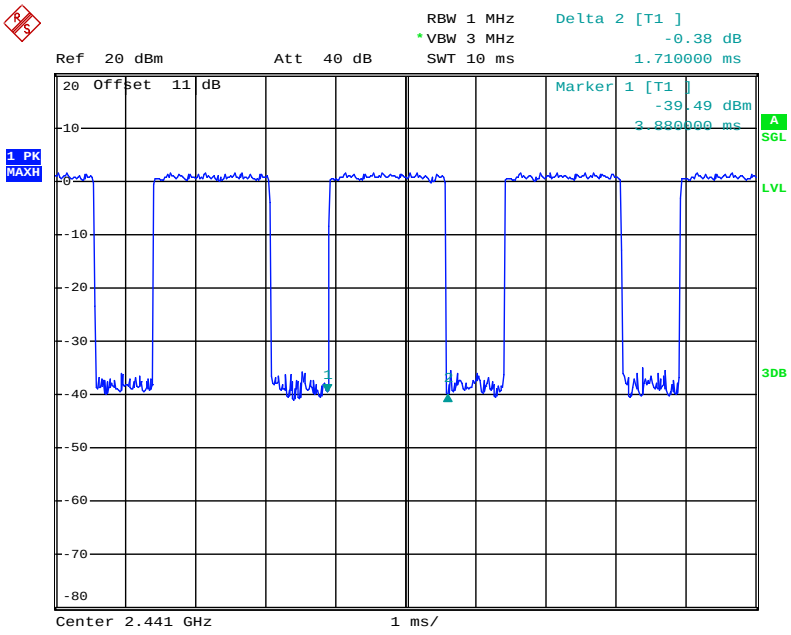


8DPSK Mode

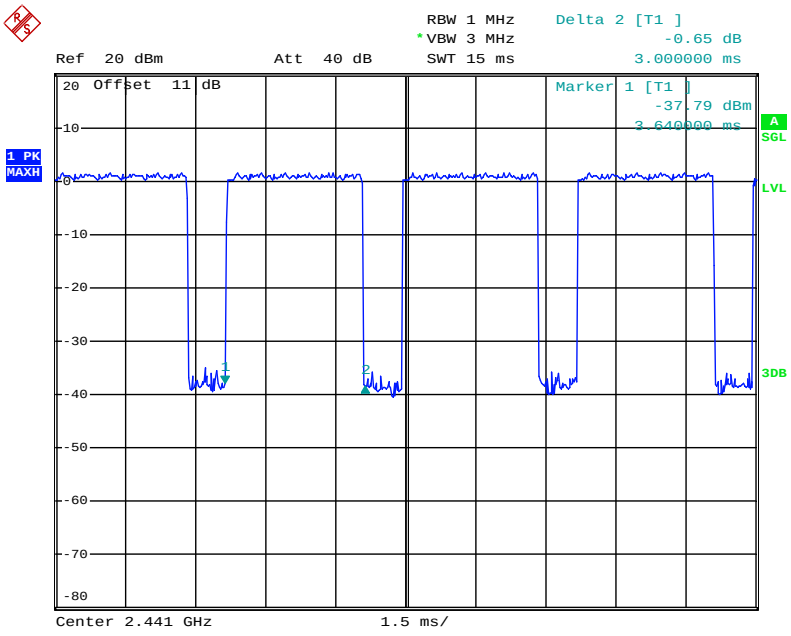
3DH1 Middle channel



3DH3 Middle channel

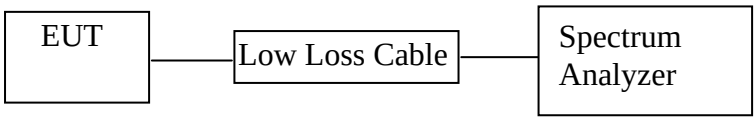


3DH5 Middle channel



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 3MHz and VBW to 3MHz.

9.5.3.Measurement the maximum peak output power.

9.6.Test Result

Test Lab: Shielding room
Test Engineer: Star

GFSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	3.03/0.0020	21 / 0.125
Middle	2441	4.16/0.0026	21 / 0.125
High	2480	4.20/0.0026	21 / 0.125

∏/4-DQPSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	0.56/0.0011	21 / 0.125
Middle	2441	2.69/0.0019	21 / 0.125
High	2480	2.67/0.0018	21 / 0.125

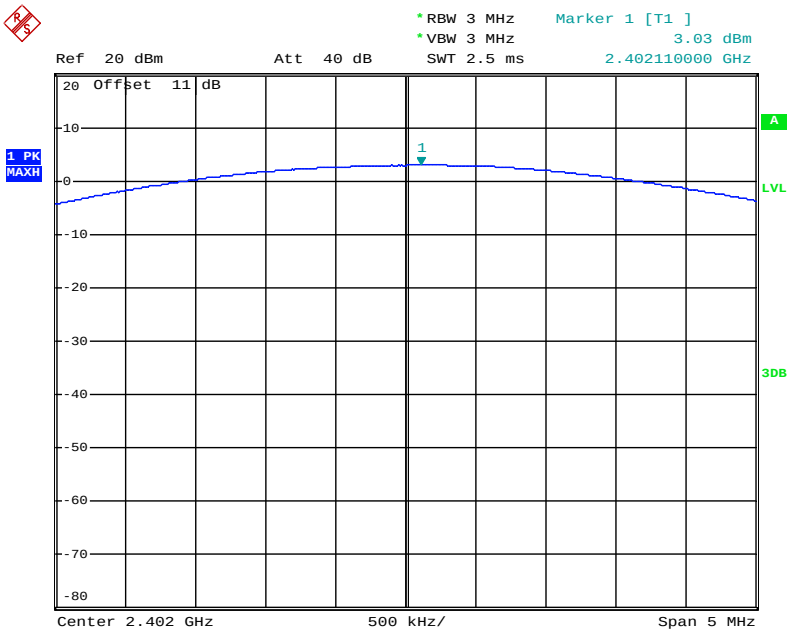
8DPSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	0.64/0.0012	21 / 0.125
Middle	2441	2.42/0.0017	21 / 0.125
High	2480	2.27/0.0017	21 / 0.125

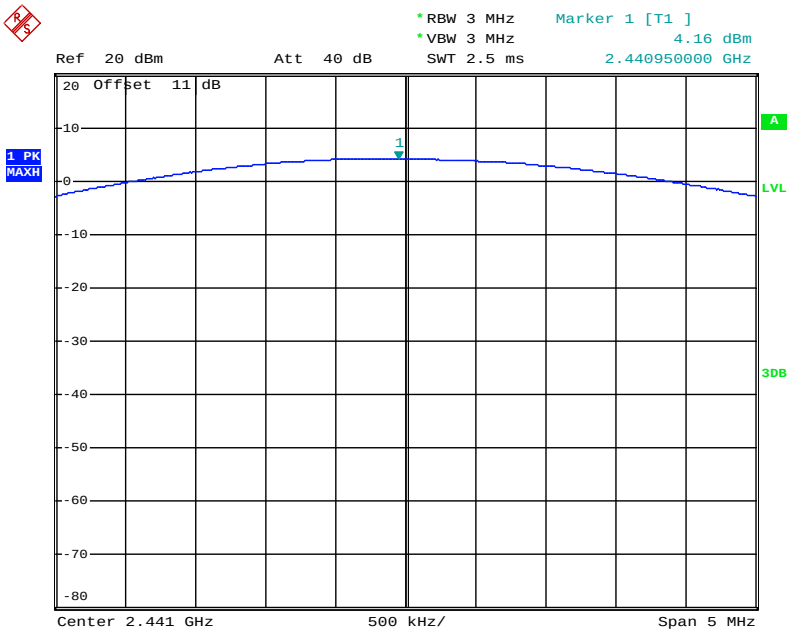
The spectrum analyzer plots are attached as below.

GFSK Mode

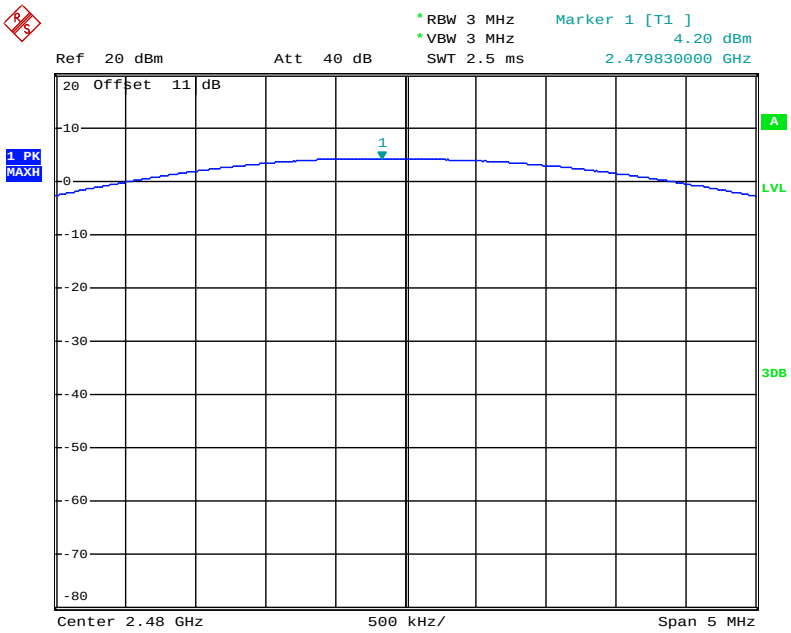
Low channel



Middle channel

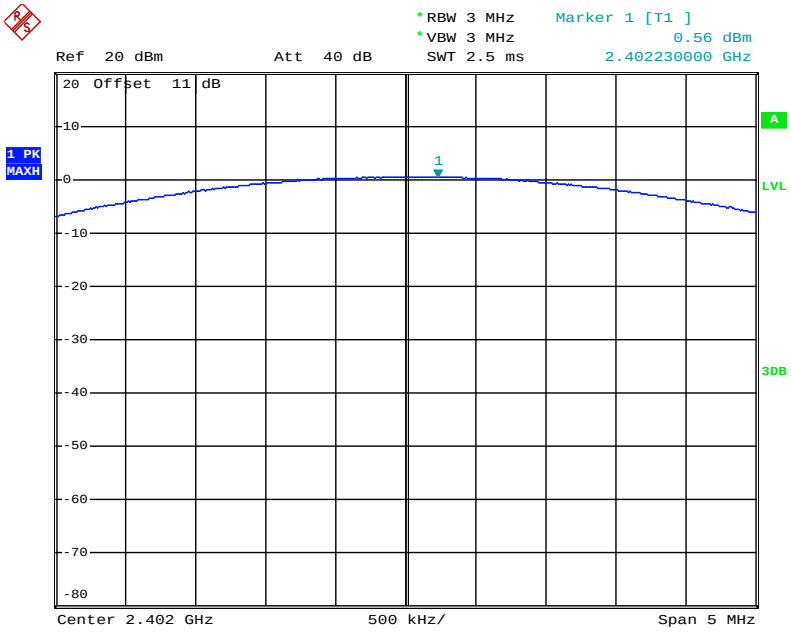


High channel

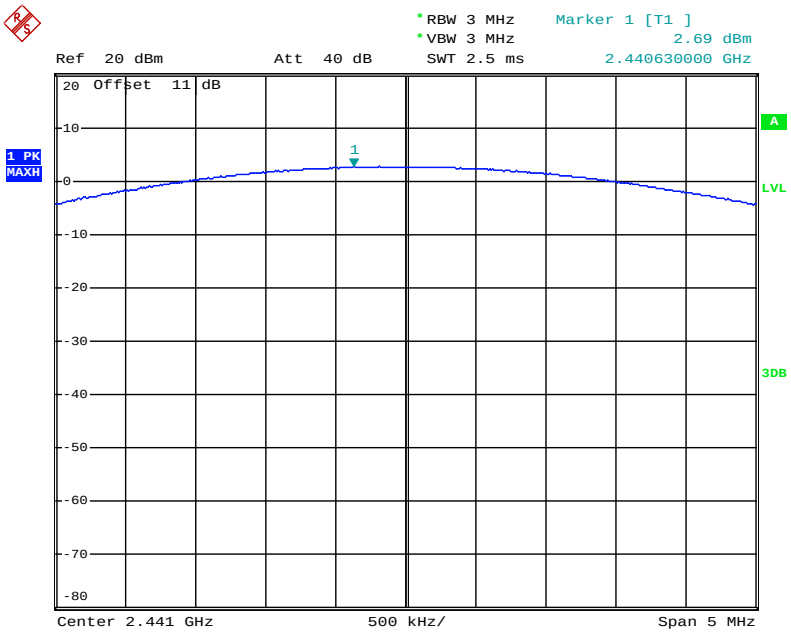


Π/4-DQPSK Mode

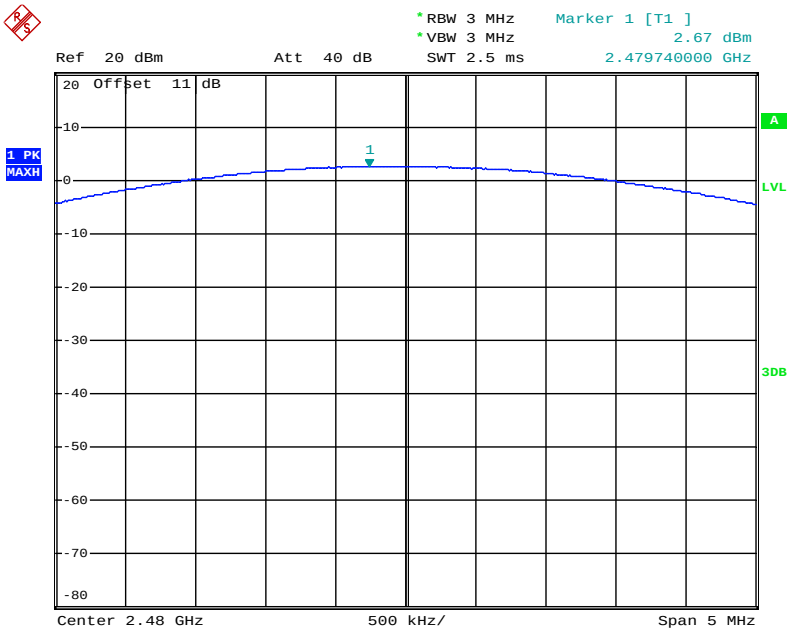
Low channel



Middle channel

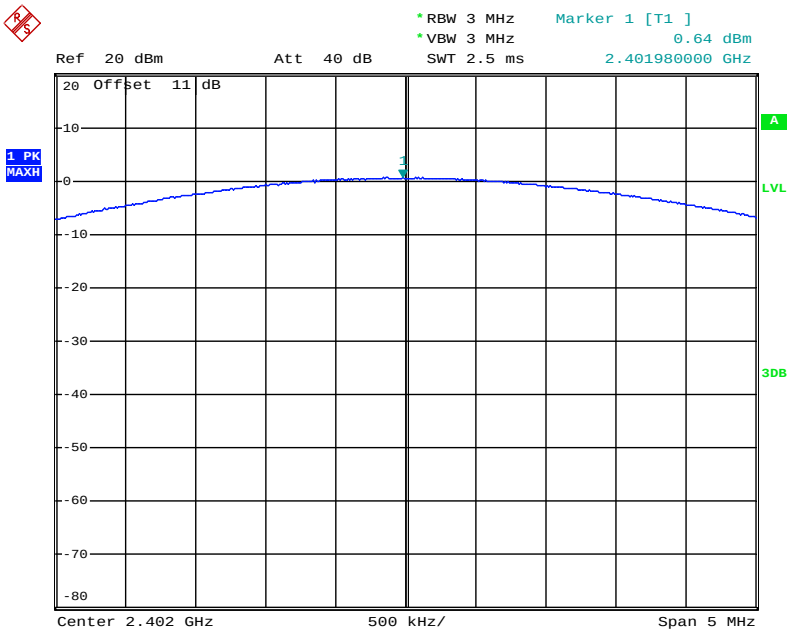


High channel

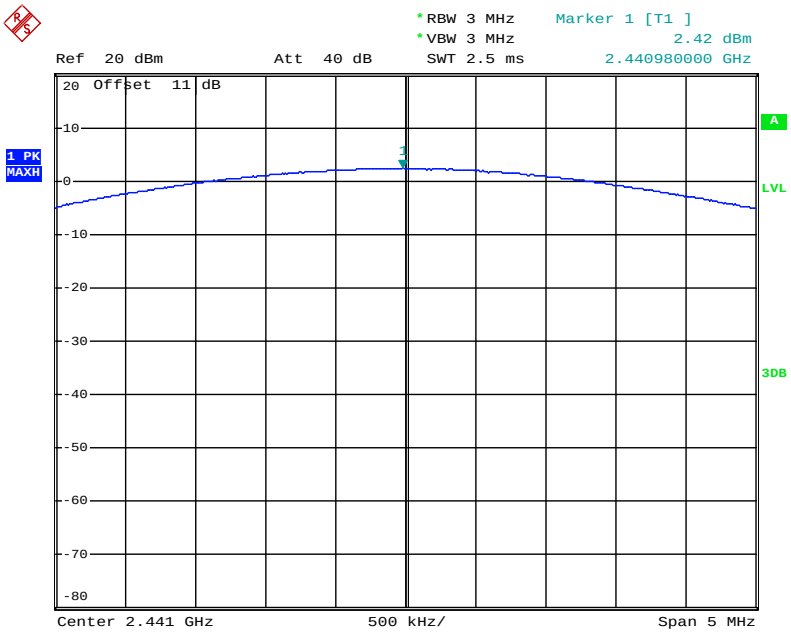


8DPSK Mode

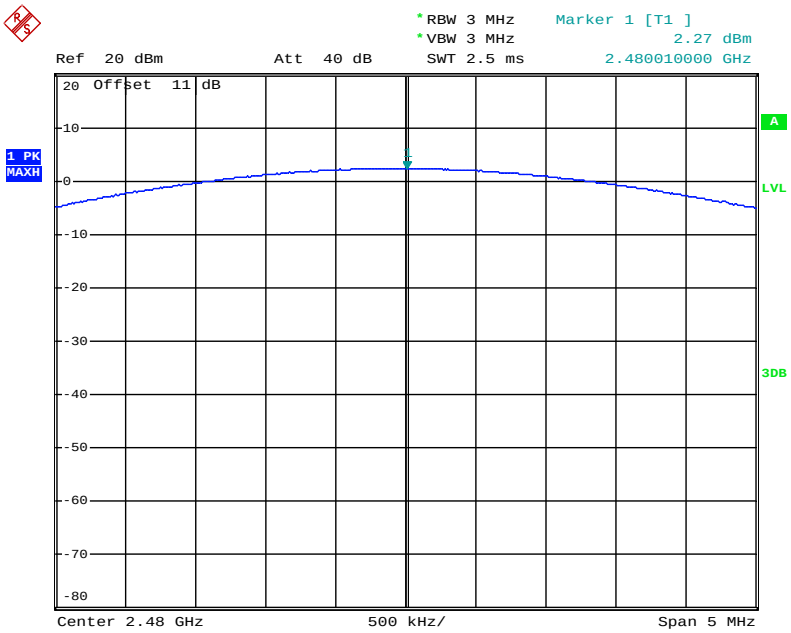
Low channel



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

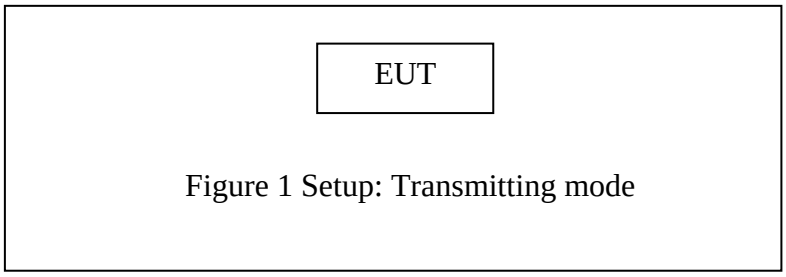
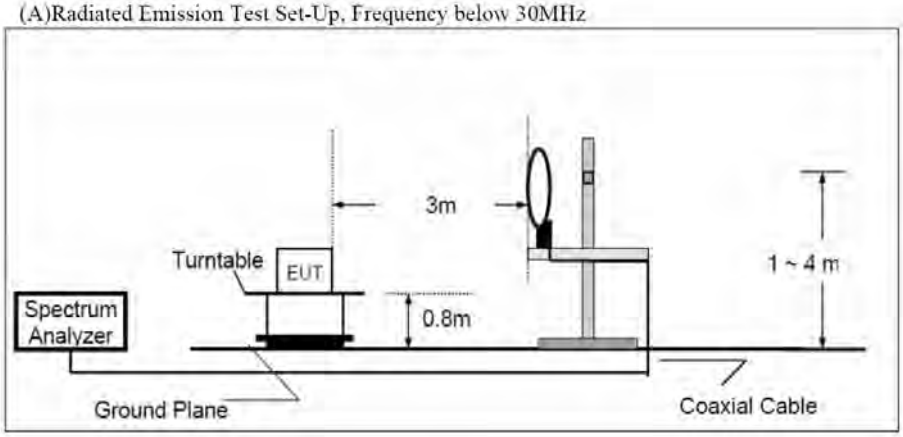


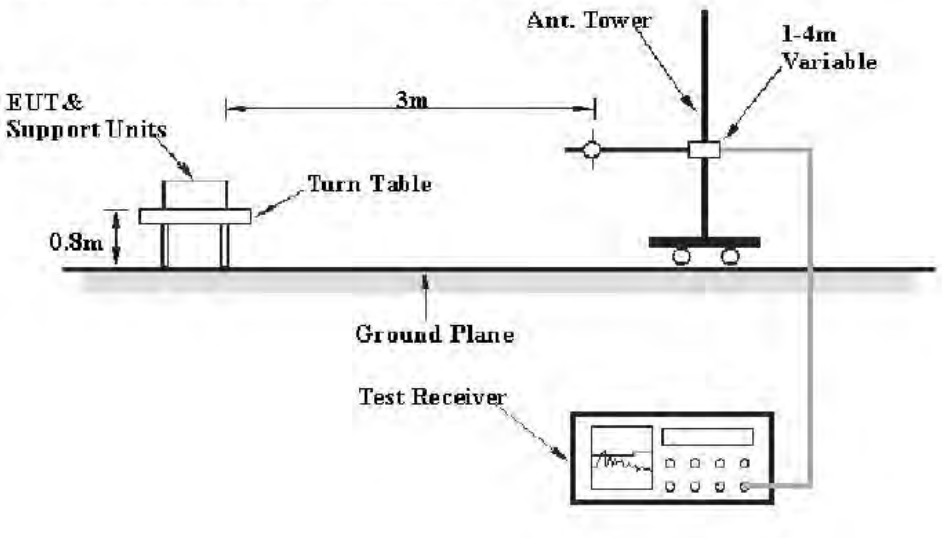
Figure 1 Setup: Transmitting mode

10.1.2. Semi-Anechoic Chamber Test Setup Diagram

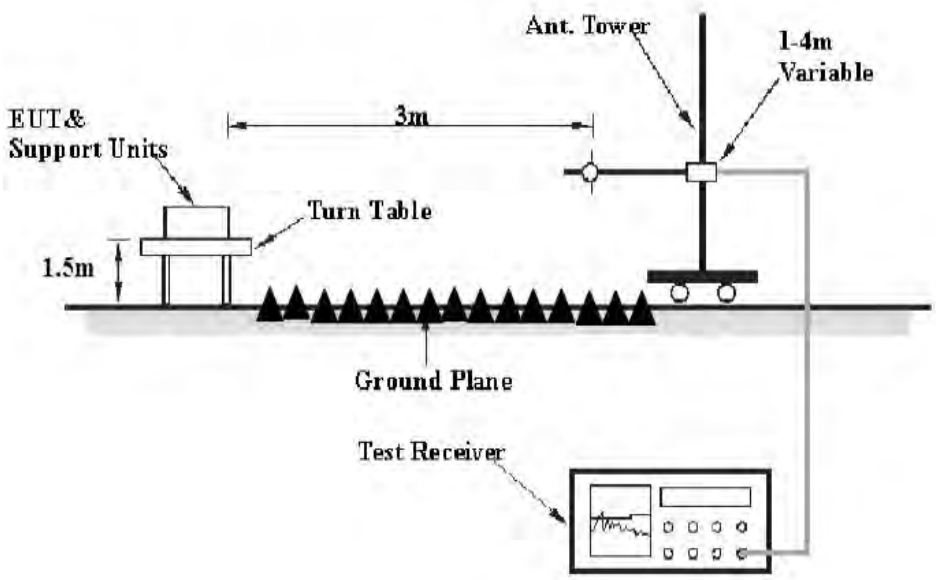
(A)Radiated Emission Test Set-Up, Frequency below 30MHz



(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			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510
[2]Above 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 (dBμv)	Factor (dB/m)	Result (dBμv/m)	Limit (dBμv/m)	Margin (dB)	Remark
X.XX	28.66	-15.19	13.47	40.0	-26.53	QP

Frequency(MHz) = Emission frequency in MHz
Reading(dBμv) = Uncorrected Analyzer/Receiver reading
Factor (dB/m) = Antenna factor + Cable Loss – Amplifier gain
Result(dBμv/m) = Reading(dBμv) + Factor(dB/m)
Limit (dBμv/m) = Limit stated in standard
Margin (dB) = Result(dBμv/m) - Limit (dBμv/m)
QP = Quasi-peak Reading

Calculation Formula:
Margin(dB) = Result (dBμV/m)–Limit(dBμV/m)
Result(dBμV/m)= Reading(dBμV)+ 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.
Test Lab: 3m Anechoic chamber
Test Engineer: Star

Note: 1.We tested GFSK mode, Π/4-DQPSK Mode & 8QPSK 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.

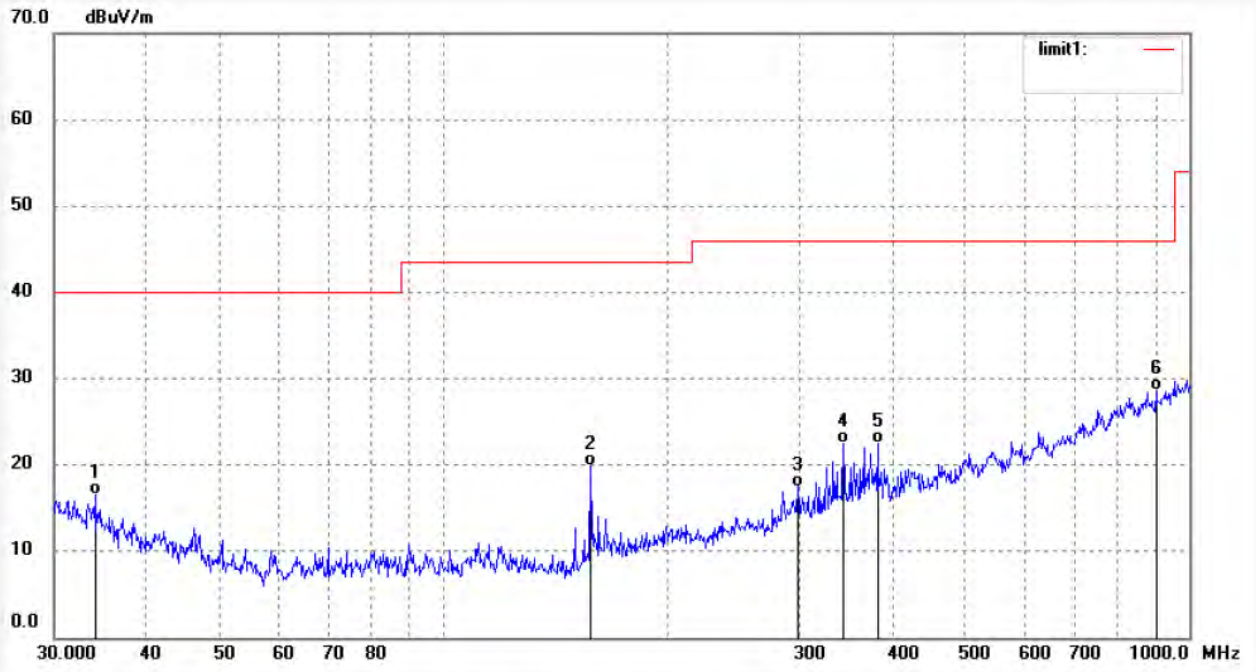
Below 1GHz

ACCURATE TECHNOLOGY CO., LTD.
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 #1266
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earbuds
Mode: TX 2402MHz (GFSK)
Model: BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2018/09/22
Time: 13:40:45
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181722



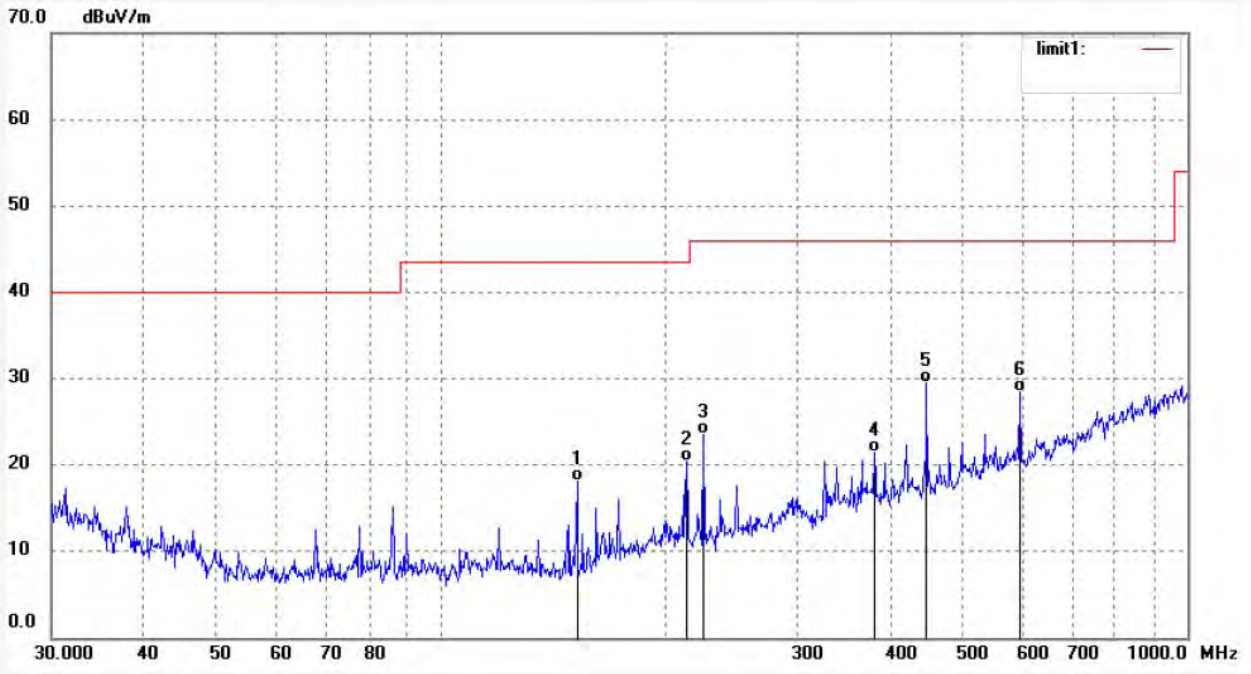
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	34.0451	37.74	-21.22	16.52	40.00	-23.48	QP	200	41	
2	157.5290	47.18	-27.34	19.84	43.50	-23.66	QP	200	214	
3	298.5932	38.78	-21.28	17.50	46.00	-28.50	QP	200	102	
4	343.6506	42.00	-19.58	22.42	46.00	-23.58	QP	200	203	
5	381.8520	41.10	-18.60	22.50	46.00	-23.50	QP	200	247	
6	903.1253	35.84	-7.14	28.70	46.00	-17.30	QP	200	324	

ACCURATE TECHNOLOGY CO., LTD.
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 #1267
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earbuds
Mode: TX 2402MHz (GFSK)
Model: BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited

Polarization: Vertical
Power Source: DC 3.7V
Date: 2018/09/22
Time: 13:41:30
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181722



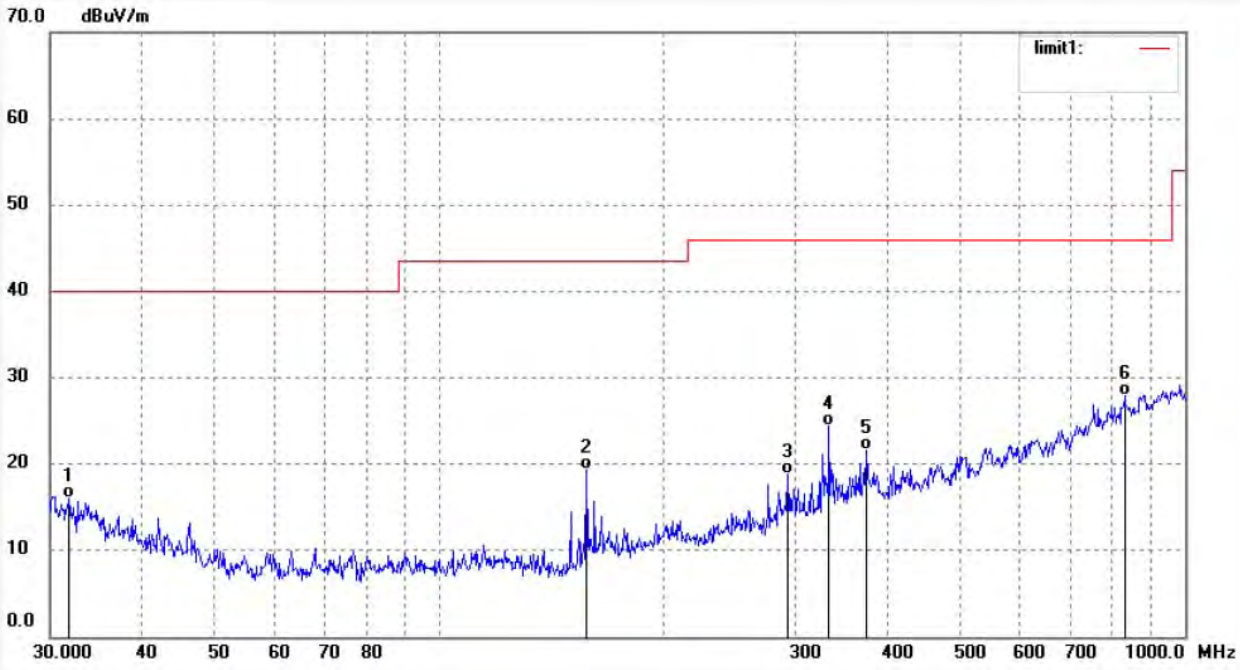
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	152.0902	45.94	-27.87	18.07	43.50	-25.43	QP	100	147	
2	213.1035	44.50	-24.08	20.42	43.50	-23.08	QP	100	241	
3	224.6361	47.51	-23.94	23.57	46.00	-22.43	QP	100	44	
4	380.5126	39.97	-18.61	21.36	46.00	-24.64	QP	100	292	
5	447.2619	46.75	-17.32	29.43	46.00	-16.57	QP	100	166	
6	596.6068	42.16	-13.76	28.40	46.00	-17.60	QP	100	207	

ACCURATE TECHNOLOGY CO., LTD.
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 #1269
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earbuds
Mode: TX 2441MHz (GFSK)
Model: BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2018/09/22
Time: 13:43:41
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181722



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	31.8465	36.72	-20.66	16.06	40.00	-23.94	QP	200	44	
2	157.5290	46.72	-27.34	19.38	43.50	-24.12	QP	200	111	
3	293.3933	40.28	-21.51	18.77	46.00	-27.23	QP	200	78	
4	332.9536	44.35	-19.99	24.36	46.00	-21.64	QP	200	232	
5	373.8861	40.38	-18.71	21.67	46.00	-24.33	QP	200	256	
6	830.0909	36.37	-8.39	27.98	46.00	-18.02	QP	200	324	

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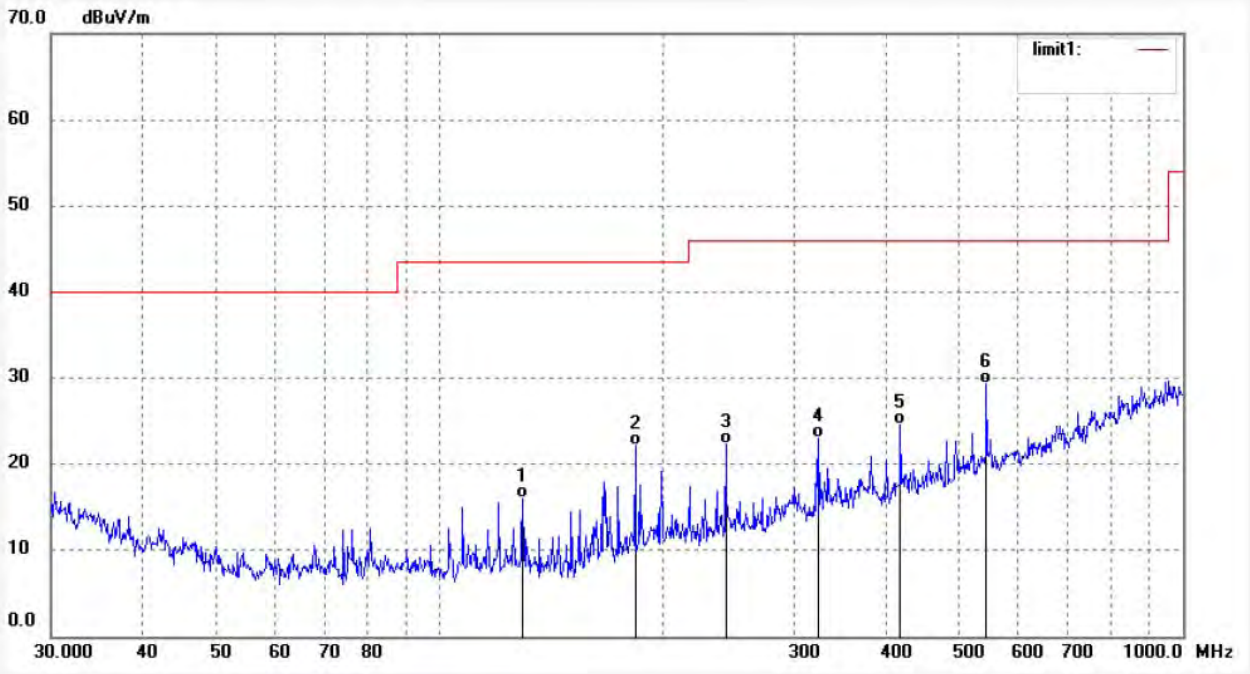
Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: STAR2018 #1268
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earbuds
Mode: TX 2441MHz (GFSK)
Model: BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited

Polarization: Vertical
Power Source: DC 3.7V
Date: 2018/09/22
Time: 13:42:31
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181722



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	129.3923	43.79	-27.70	16.09	43.50	-27.41	QP	100	242	
2	183.2211	47.87	-25.71	22.16	43.50	-21.34	QP	100	142	
3	242.6888	45.98	-23.70	22.28	46.00	-23.72	QP	100	189	
4	323.7250	43.52	-20.45	23.07	46.00	-22.93	QP	100	200	
5	416.9108	42.57	-18.04	24.53	46.00	-21.47	QP	100	214	
6	544.5202	44.36	-14.97	29.39	46.00	-16.61	QP	100	236	

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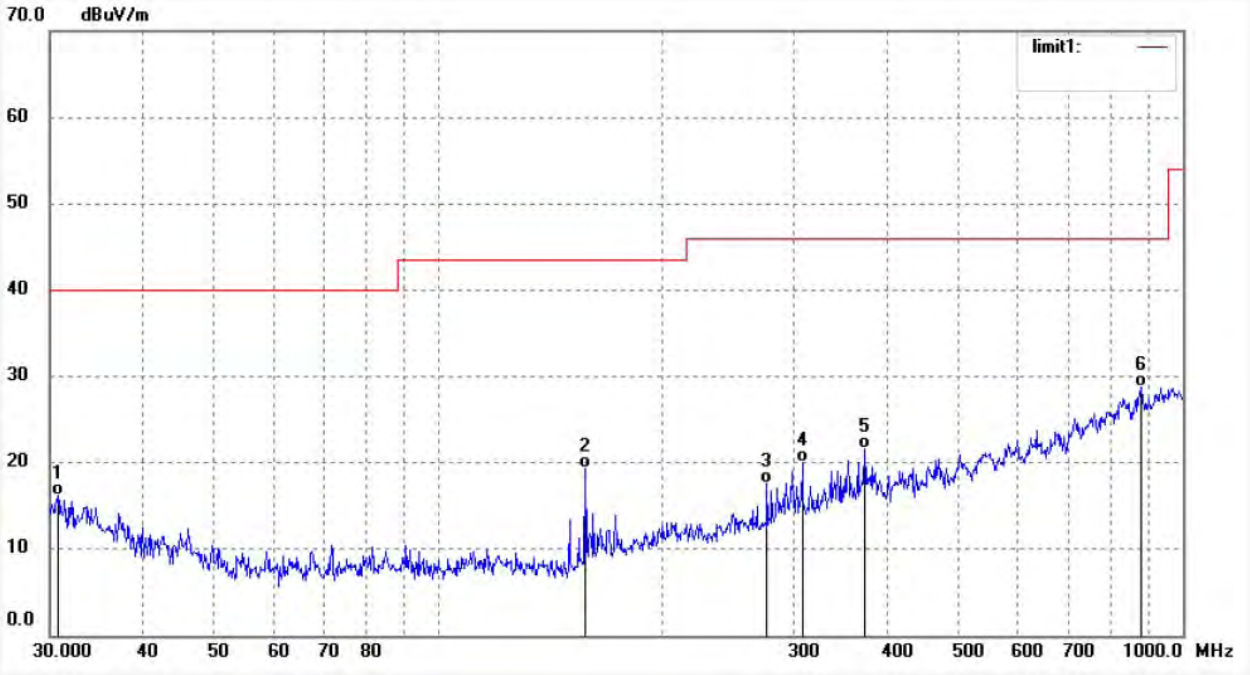
Job No.: STAR2018 #1270
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earbuds
Mode: TX 2480MHz (GFSK)
Model: BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2018/09/22
Time: 13:44:29
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181722



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	30.7470	36.51	-20.39	16.12	40.00	-23.88	QP	200	233	
2	157.5290	46.71	-27.34	19.37	43.50	-24.13	QP	200	24	
3	276.3818	39.86	-22.33	17.53	46.00	-28.47	QP	200	165	
4	308.1862	41.02	-21.00	20.02	46.00	-25.98	QP	200	128	
5	373.8861	40.35	-18.71	21.64	46.00	-24.36	QP	200	344	
6	881.1838	36.29	-7.50	28.79	46.00	-17.21	QP	200	253	

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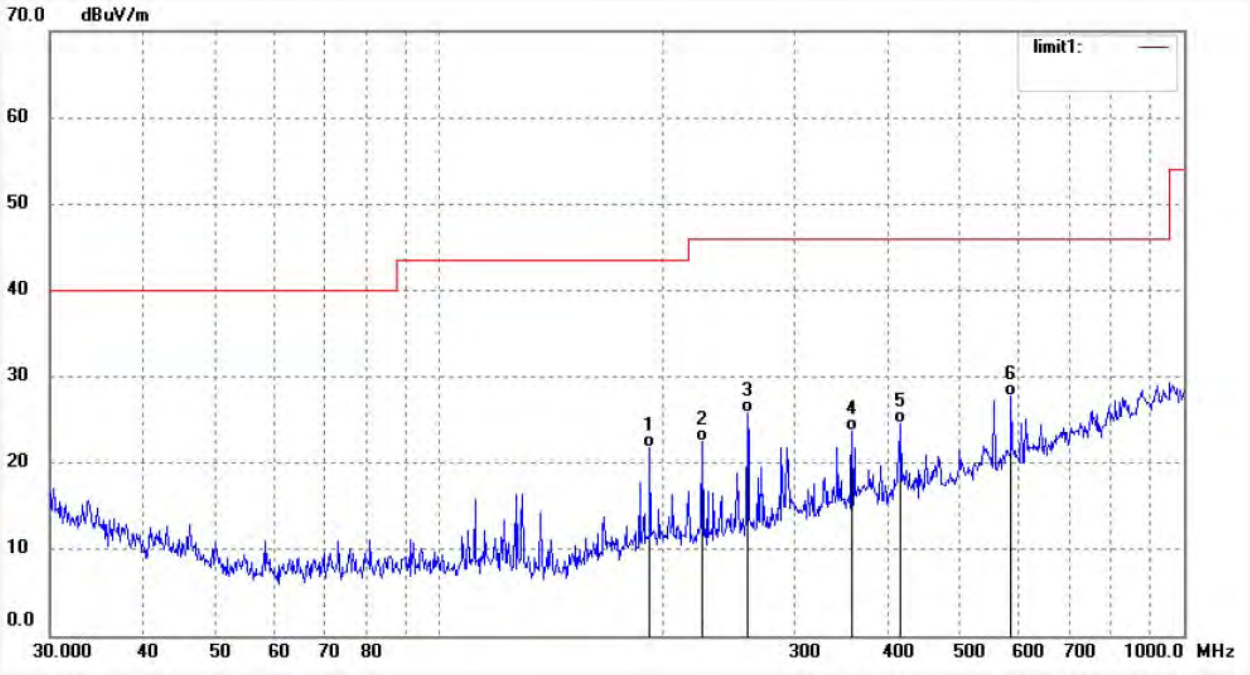
Job No.: STAR2018 #1271
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earbuds
Mode: TX 2480MHz (GFSK)
Model: BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited

Polarization: Vertical
Power Source: DC 3.7V
Date: 2018/09/22
Time: 13:45:40
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181722



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	191.7840	46.81	-24.95	21.86	43.50	-21.64	QP	100	222	
2	225.4267	46.34	-23.93	22.41	46.00	-23.59	QP	100	266	
3	259.4433	48.80	-23.07	25.73	46.00	-20.27	QP	100	21	
4	358.4497	42.68	-18.98	23.70	46.00	-22.30	QP	100	152	
5	416.9108	42.69	-18.04	24.65	46.00	-21.35	QP	100	156	
6	586.2172	41.75	-13.98	27.77	46.00	-18.23	QP	100	206	

Above 1GHz

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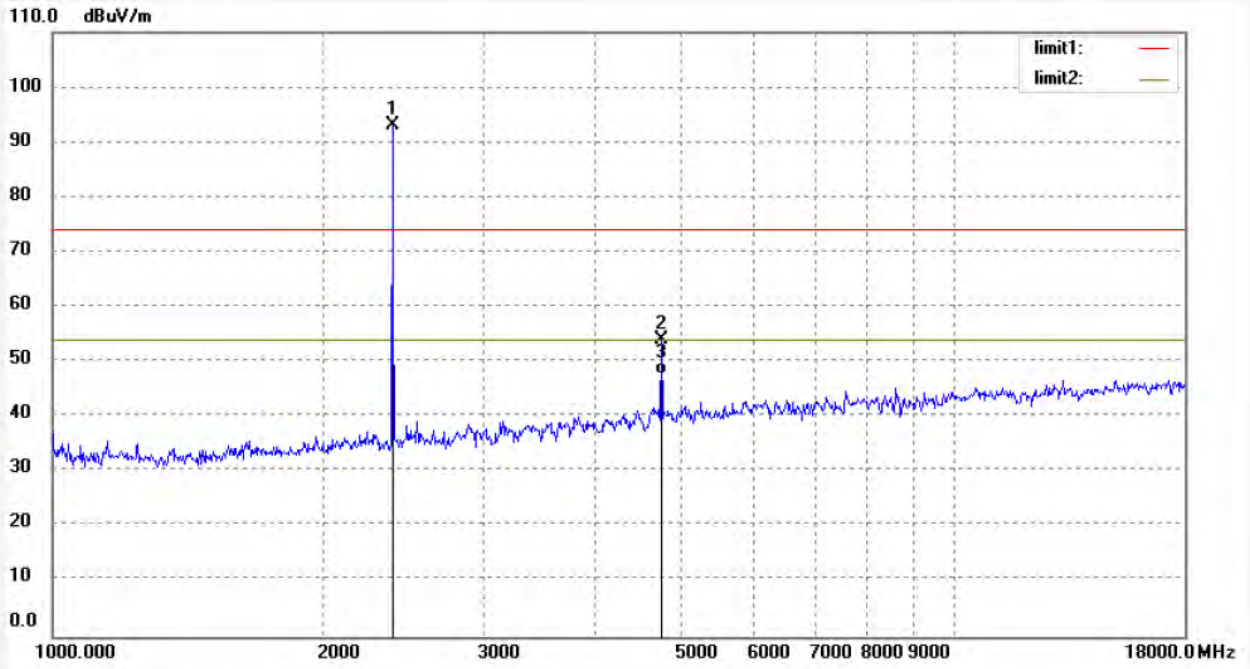
Job No.: STAR2018 #1273
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earbuds
Mode: TX 2402MHz (GFSK)
Model: BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2018/09/22
Time: 13:51:11
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181722



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	

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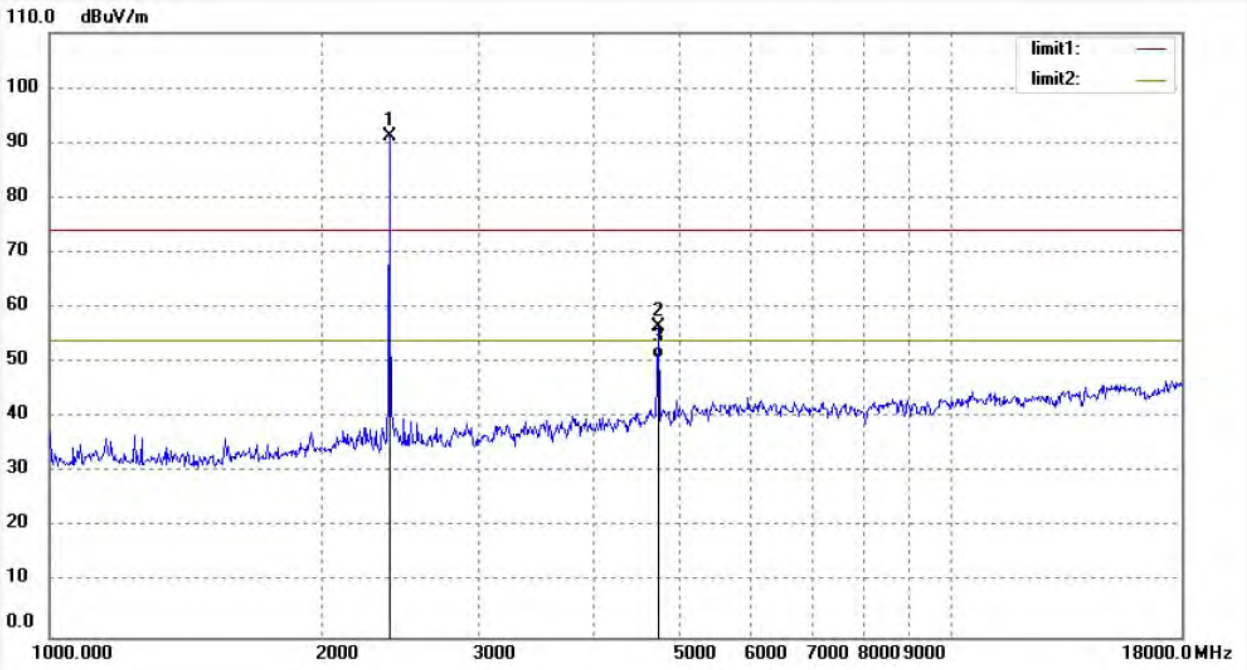
Job No.: STAR2018 #1272
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earbuds
Mode: TX 2402MHz (GFSK)
Model: BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited

Polarization: Vertical
Power Source: DC 3.7V
Date: 2018/09/22
Time: 13:49:42
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181722



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	

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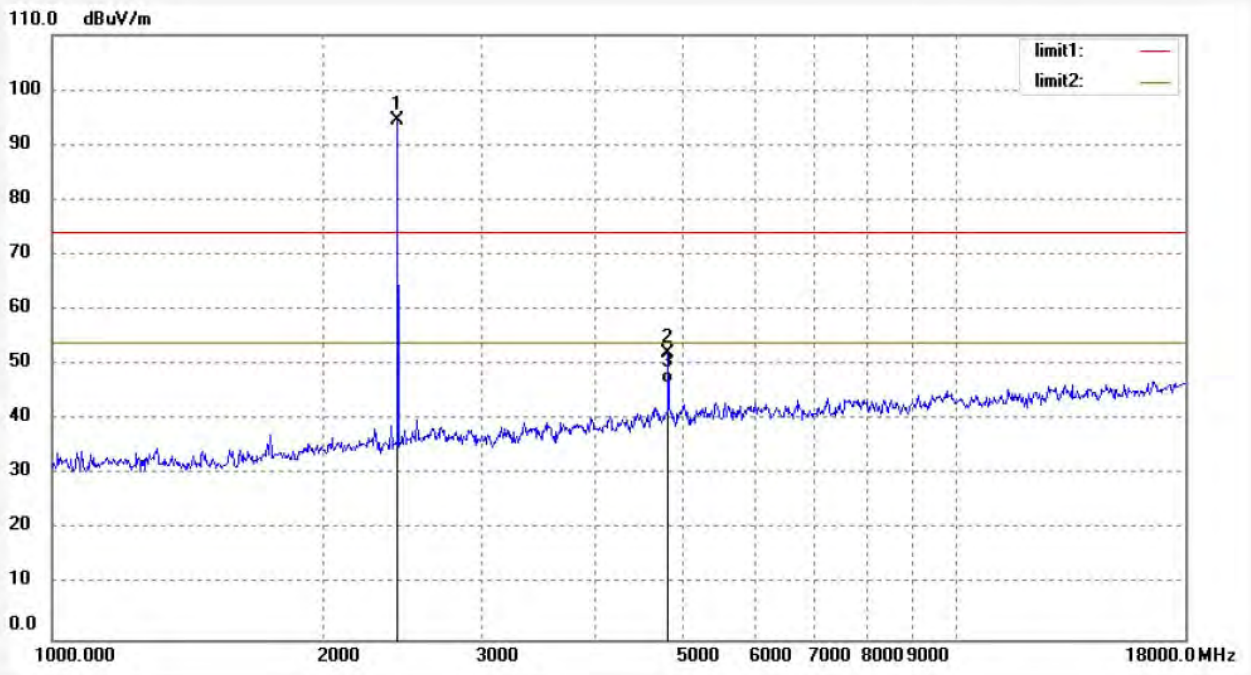
Job No.: STAR2018 #1274
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earbuds
Mode: TX 2441MHz (GFSK)
Model: BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2018/09/22
Time: 13:53:12
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181722



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	

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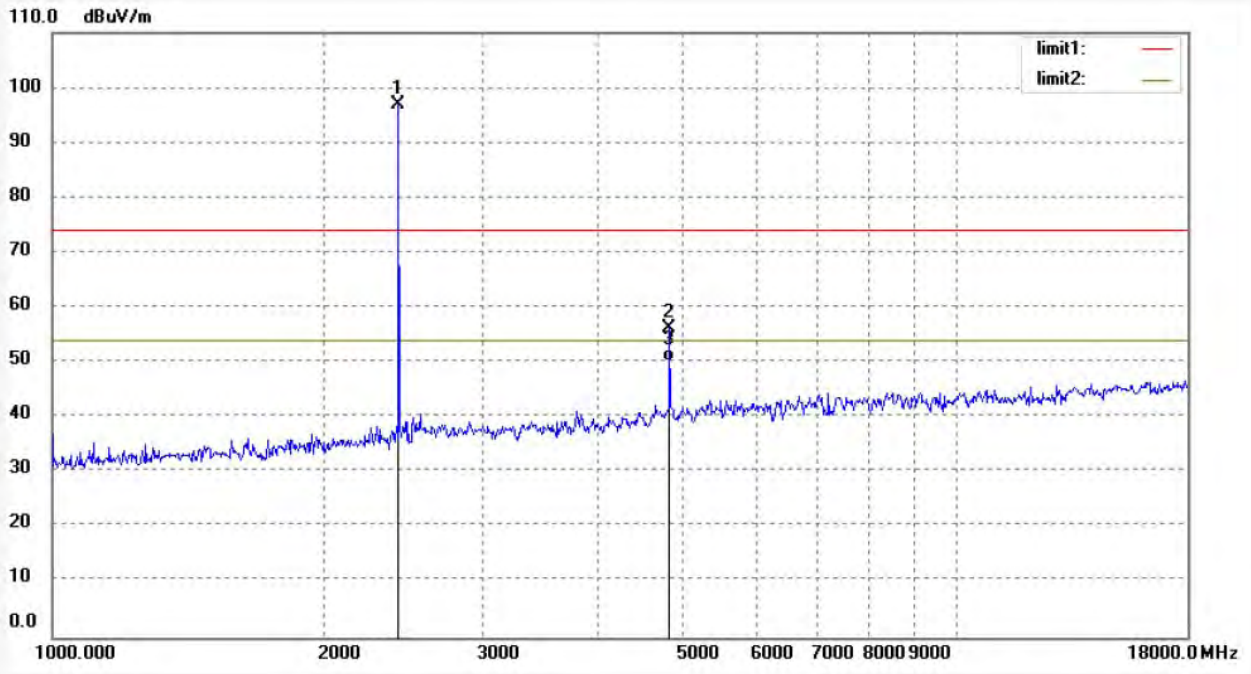
Job No.: STAR2018 #1275
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earbuds
Mode: TX 2441MHz (GFSK)
Model: BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited

Polarization: Vertical
Power Source: DC 3.7V
Date: 2018/09/22
Time: 13:54:49
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181722



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	

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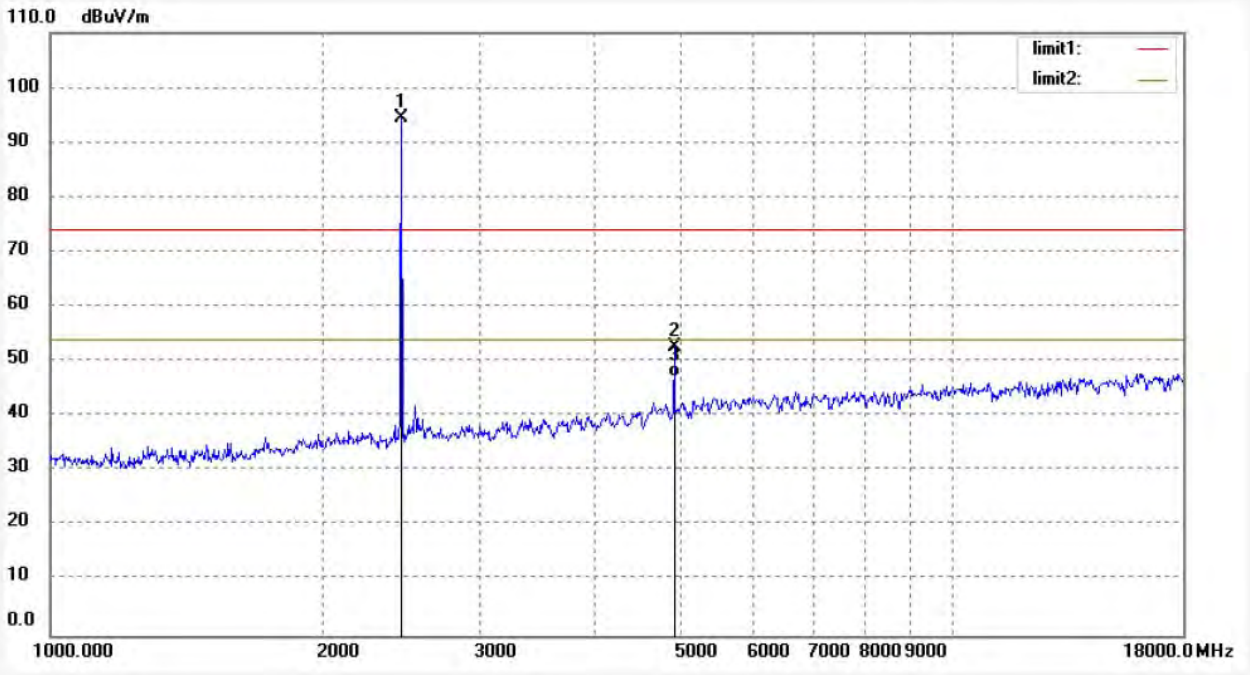
Job No.: STAR2018 #1277
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earbuds
Mode: TX 2480MHz (GFSK)
Model: BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2018/09/22
Time: 13:59:49
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181722



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	

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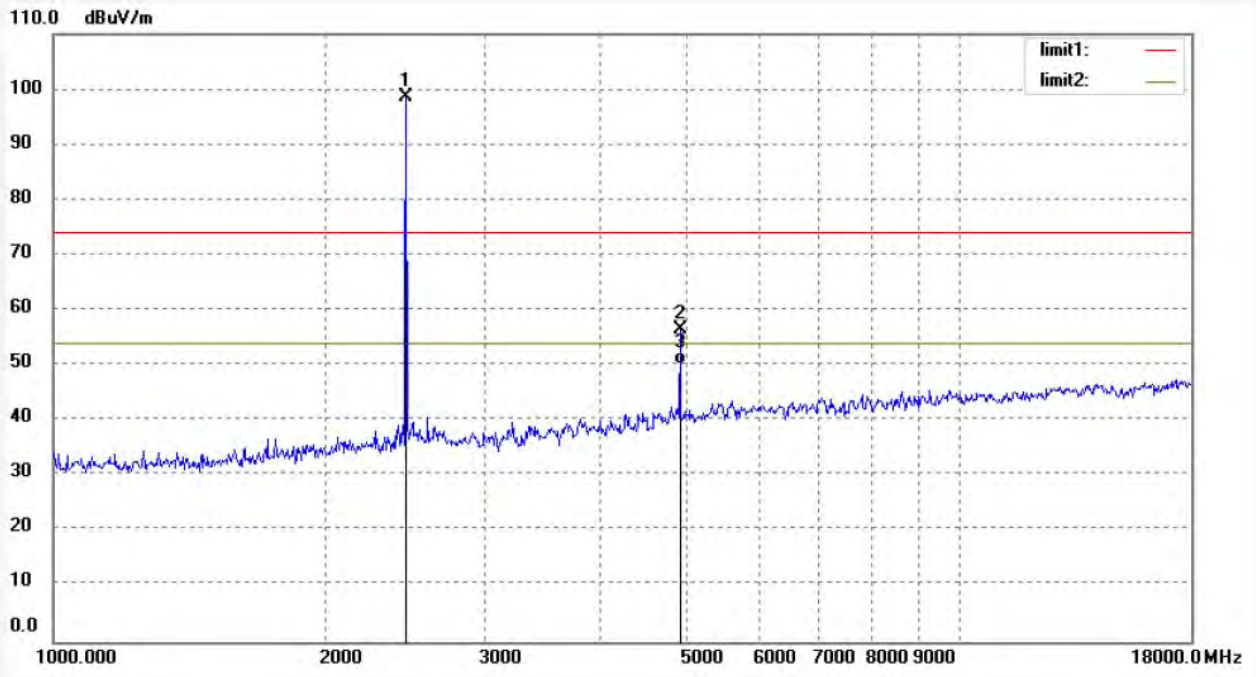
Job No.: STAR2018 #1276
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earbuds
Mode: TX 2480MHz (GFSK)
Model: BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited

Polarization: Vertical
Power Source: DC 3.7V
Date: 2018/09/22
Time: 13:56:34
Engineer Signature: star
Distance: 3m

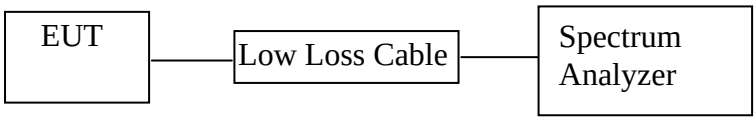
Note: Report No.:ATE20181722



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	

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 was measured and recorded.

11.6.Test Result

Test Lab: Shielding room
Test Engineer: Star

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

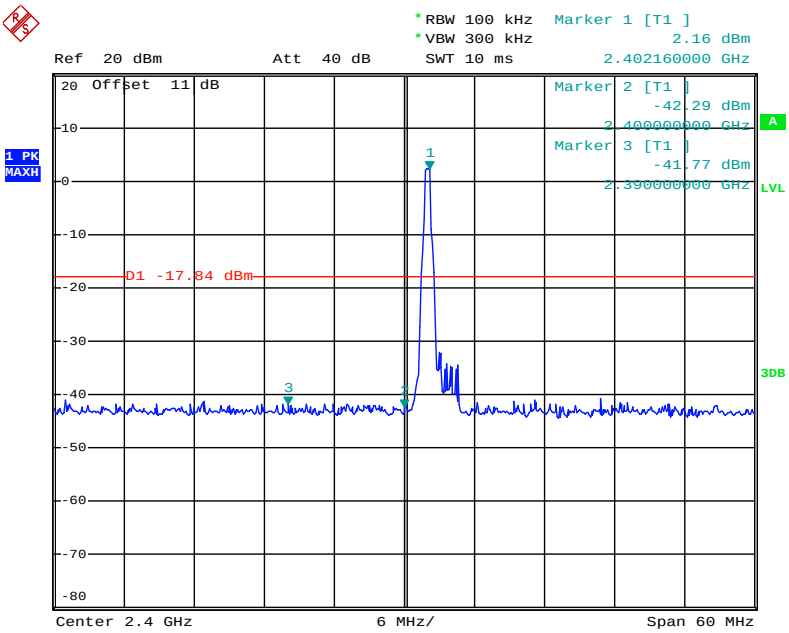
Conducted Band Edge Result

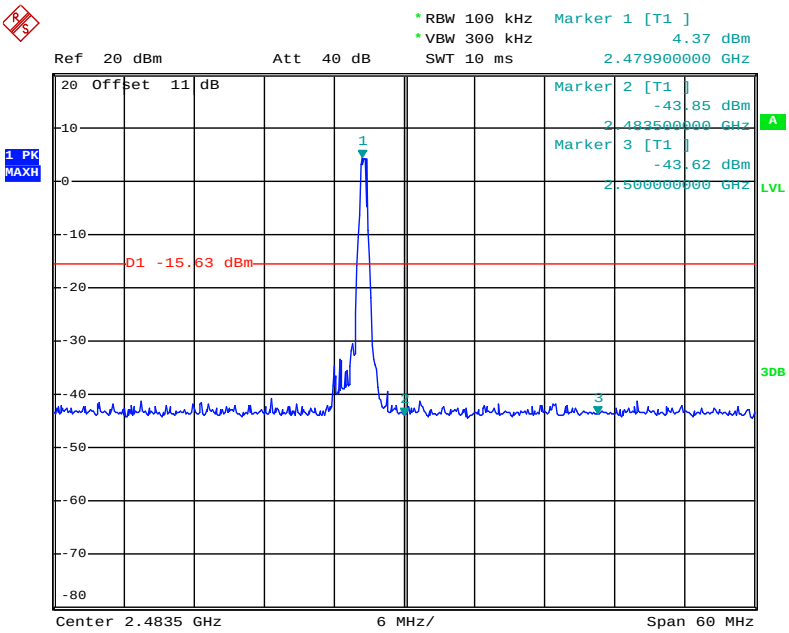
Non-hopping mode

Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)	Result
GFSK Mode			
2400.00	44.45	> 20dBc	Pass
2483.50	48.22	> 20dBc	Pass
Π/4-DQPSK Mode			
2400.00	42.00	> 20dBc	Pass
2483.50	45.59	> 20dBc	Pass
8DPSK Mode			
2400.00	42.78	> 20dBc	Pass
2483.50	45.75	> 20dBc	Pass

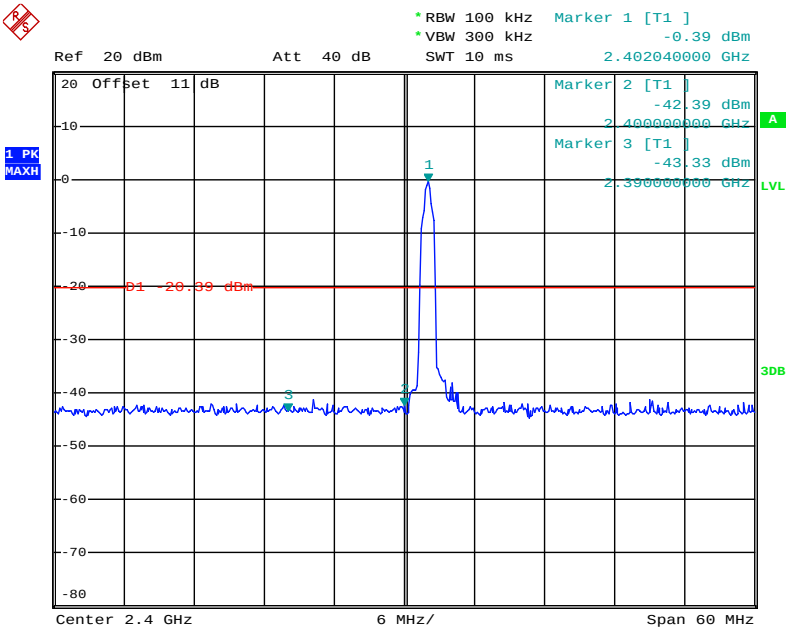
The spectrum analyzer plots are attached as below.

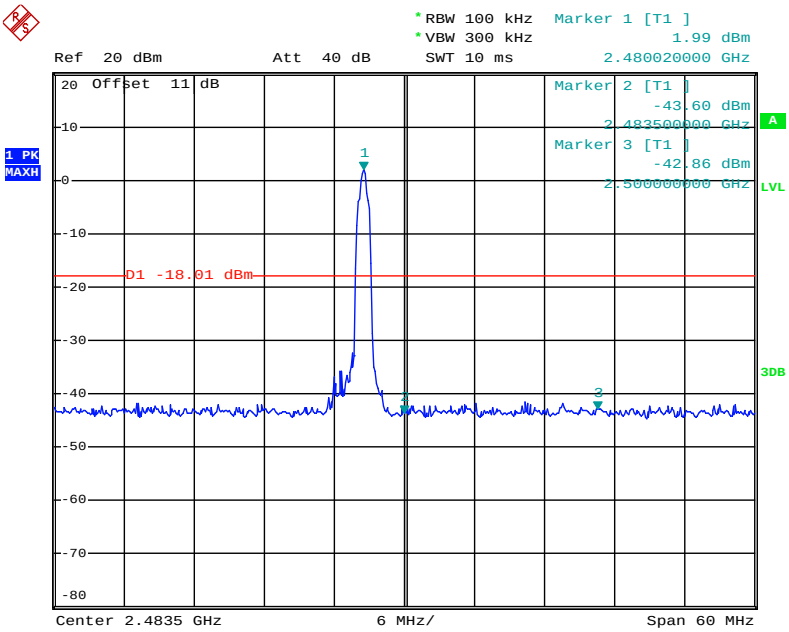
GFSK Mode


RBW 100 kHz
VBW 300 kHz
Ref 20 dBm
Att 40 dB
SWT 10 ms
Marker 1 [T1]
2.16 dBm
2.402160000 GHz
Marker 2 [T1]
-42.29 dBm
2.400000000 GHz
Marker 3 [T1]
-41.77 dBm
2.390000000 GHz
20 Offset 11 dB
D1 -17.84 dBm
1 PK MAXH
A
LVL
3DB
Center 2.4 GHz
6 MHz/
Span 60 MHz

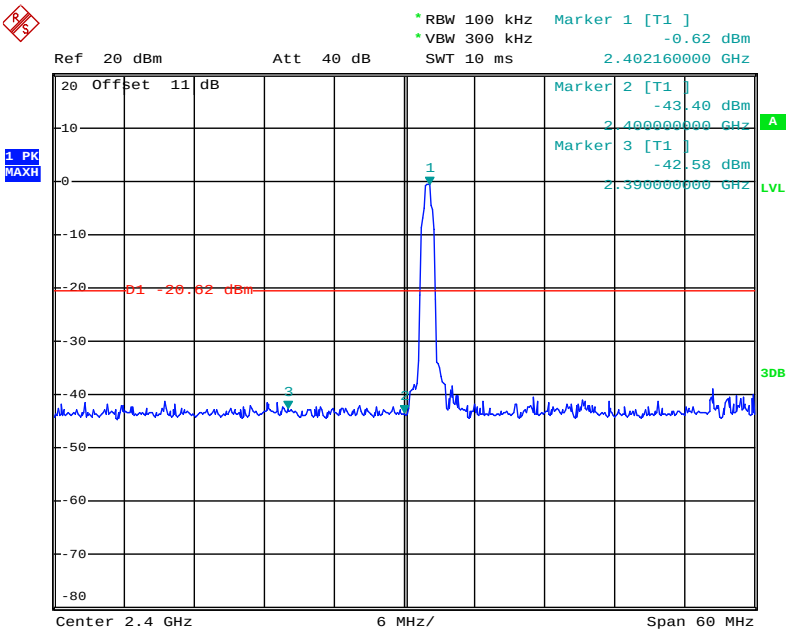

RBW 100 kHz
VBW 300 kHz
Ref 20 dBm
Att 40 dB
SWT 10 ms
Marker 1 [T1]
4.37 dBm
2.479900000 GHz
Marker 2 [T1]
-43.85 dBm
2.483500000 GHz
Marker 3 [T1]
-43.62 dBm
2.500000000 GHz
20 Offset 11 dB
D1 -15.63 dBm
1 PK MAXH
A
LVL
3DB
Center 2.4835 GHz
6 MHz/
Span 60 MHz

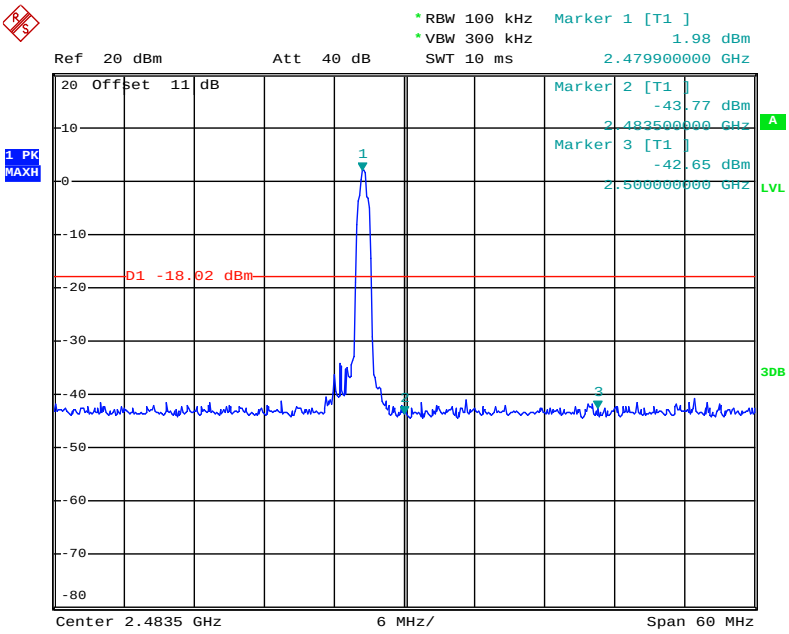
Π/4-DQPSK Mode





8DPSK Mode


RBW 100 kHz
VBW 300 kHz
Ref 20 dBm
Att 40 dB
SWT 10 ms
Marker 1 [T1]
-0.62 dBm
2.402160000 GHz
Marker 2 [T1]
-43.40 dBm
2.400000000 GHz
Marker 3 [T1]
-42.58 dBm
2.390000000 GHz
20 Offset 11 dB
D1 -20.02 dBm
1 PK MAXH
A
LVL
3DB
Center 2.4 GHz
6 MHz/
Span 60 MHz


RBW 100 kHz
VBW 300 kHz
Ref 20 dBm
Att 40 dB
SWT 10 ms
Marker 1 [T1]
1.98 dBm
2.479900000 GHz
Marker 2 [T1]
-43.77 dBm
2.483500000 GHz
Marker 3 [T1]
-42.65 dBm
2.500000000 GHz
20 Offset 11 dB
D1 -18.02 dBm
1 PK MAXH
A
LVL
3DB
Center 2.4835 GHz
6 MHz/
Span 60 MHz

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.

Test Lab: 3m Anechoic chamber
Test Engineer: Star

The spectrum analyzer plots are attached as below.

Non-hopping mode

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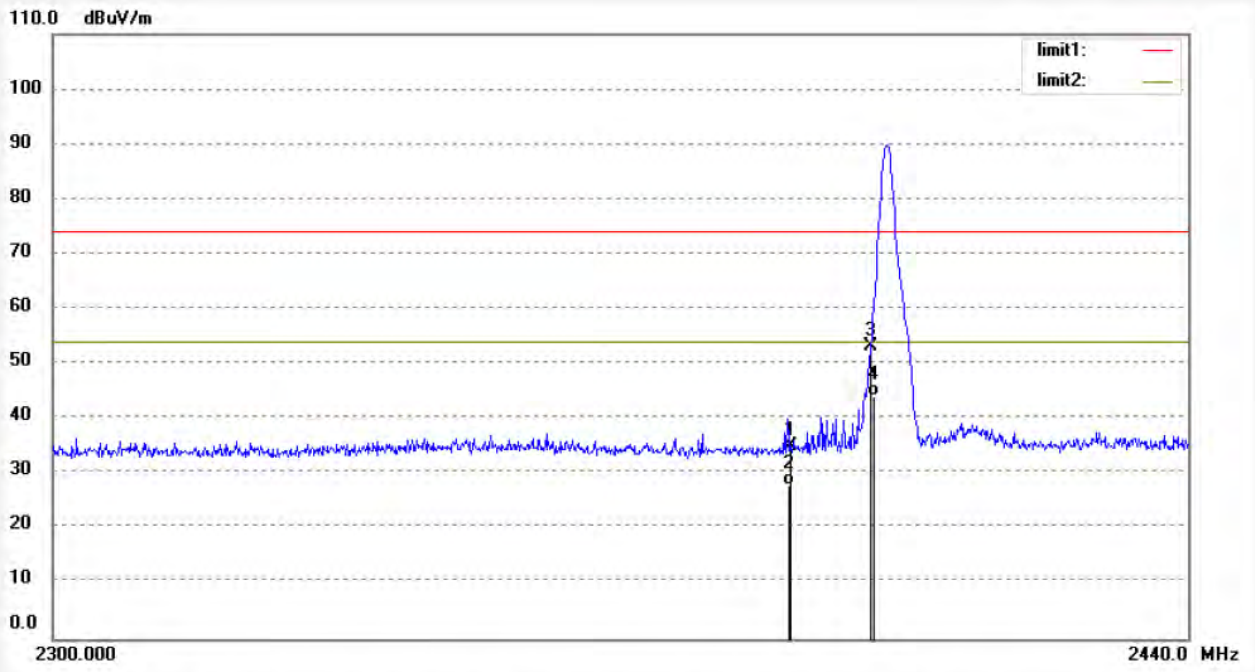
Job No.: STAR2018 #1278	Polarization: Horizontal
Standard: FCC PART 15C 3M Radiated	Power Source: DC 3.7V
Test item: Radiation Test	Date: 2018/09/22
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 14:04:20
EUT: Bluetooth Earbuds	Engineer Signature: star
Mode: TX 2402MHz (GFSK)	Distance: 3m
Model: BE1020	
Manufacturer: Shenzhen Kinlan Technology Company Limited	

Note: Report No.:ATE20181722



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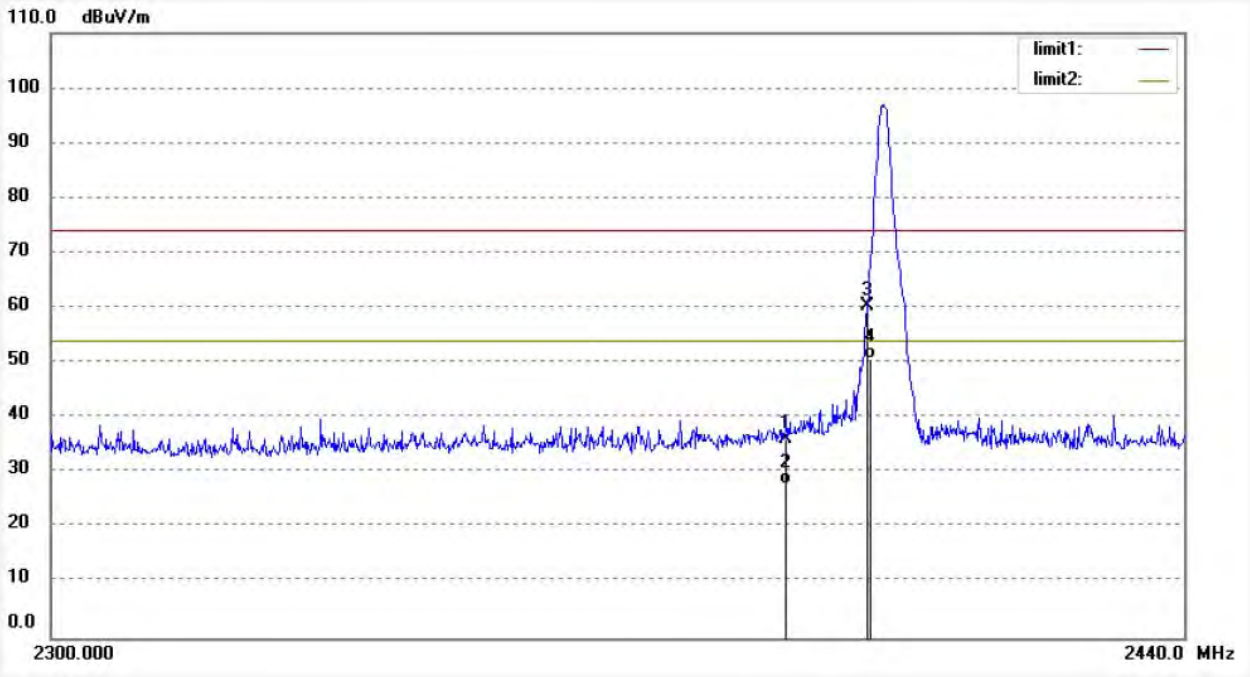
Fax:+86-0755-26503396

Job No.: STAR2018 #1279
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earbuds
Mode: TX 2402MHz (GFSK)
Model: BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited

Polarization: Vertical
Power Source: DC 3.7V
Date: 2018/09/22
Time: 14:05:46
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181722



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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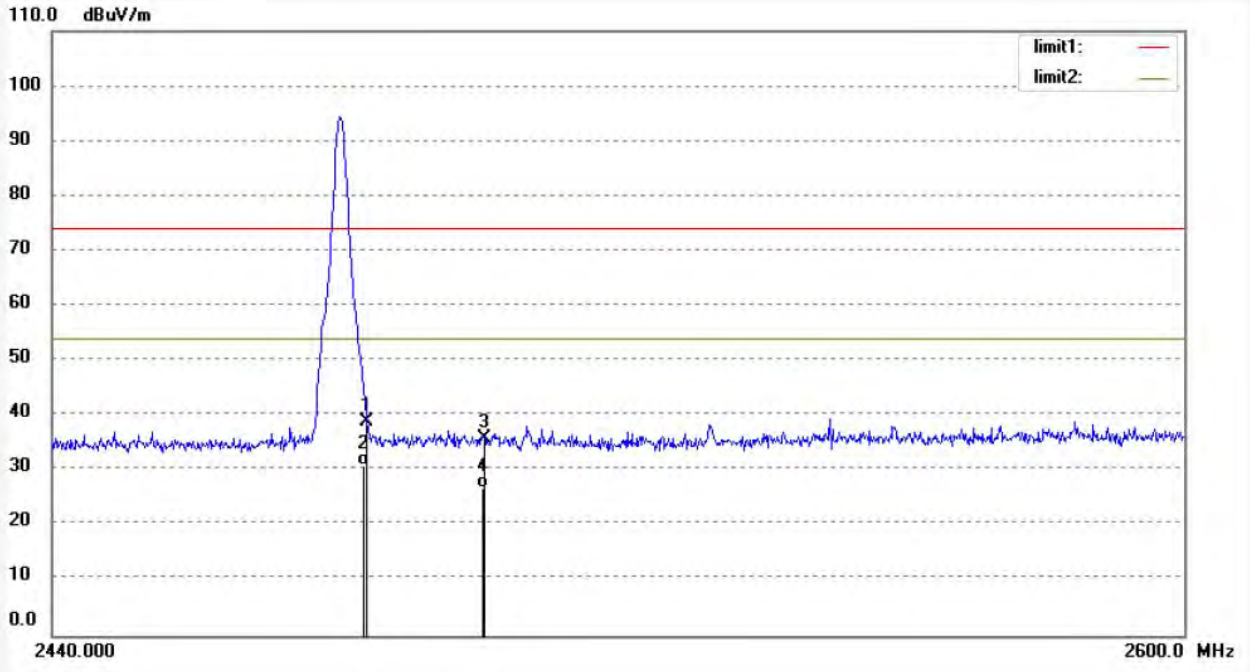
Job No.: STAR2018 #1281
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earbuds
Mode: TX 2480MHz (GFSK)
Model: BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited

Polarization: Horizontal
Power Source: DC 3.7V
Date: 2018/09/22
Time: 14:08:13
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181722



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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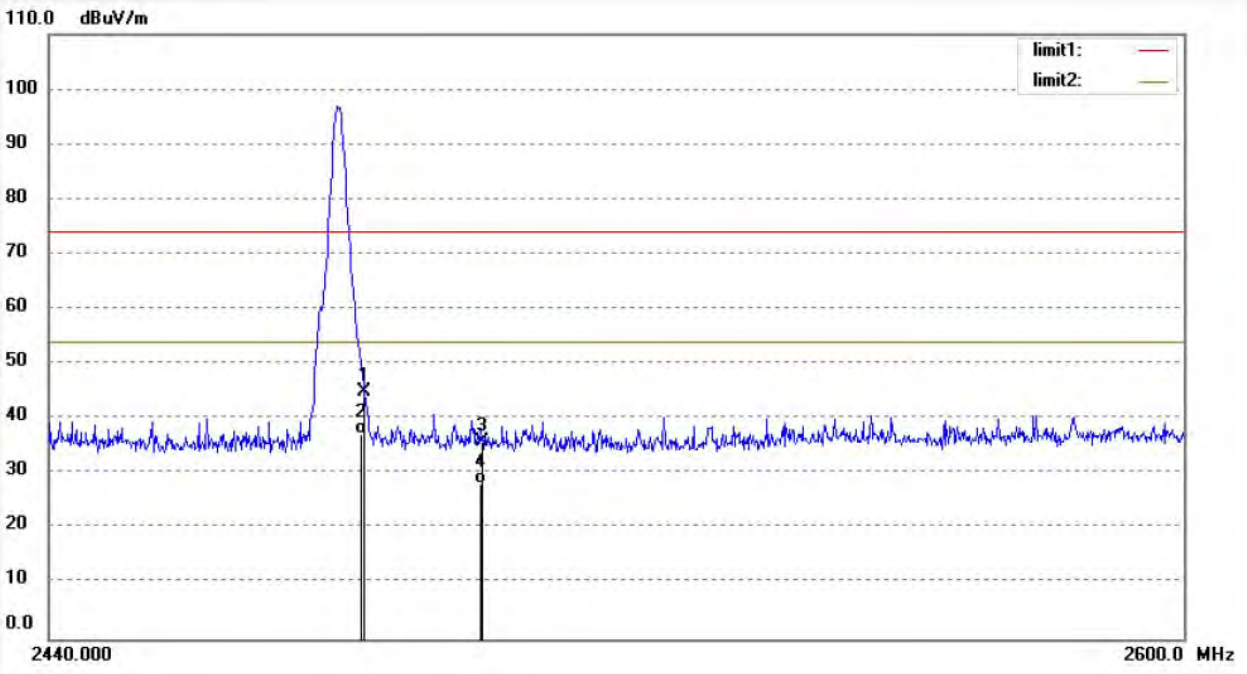
Fax:+86-0755-26503396

Job No.: STAR2018 #1280
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earbuds
Mode: TX 2480MHz (GFSK)
Model: BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited

Polarization: Vertical
Power Source: DC 3.7V
Date: 2018/09/22
Time: 14:07:11
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181722



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,
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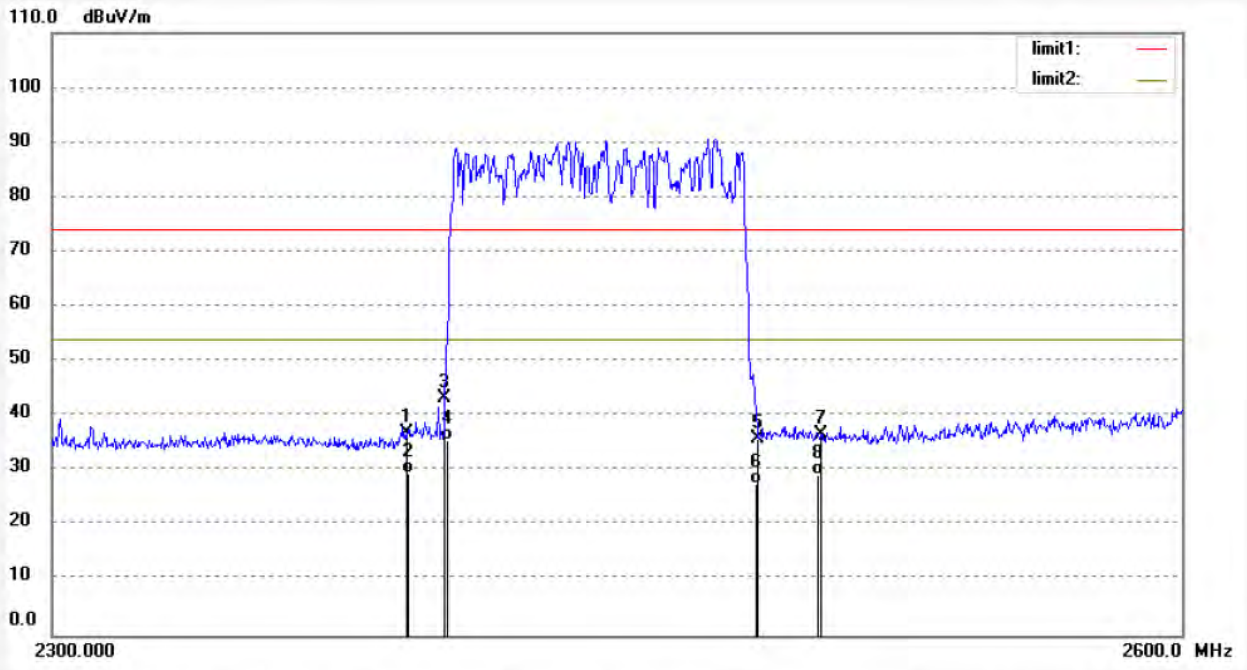
Job No.: STAR2018 #1295	Polarization: Horizontal
Standard: FCC PART 15C 3M Radiated	Power Source: DC 3.7V
Test item: Radiation Test	Date: 2018/09/22
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 14:55:29
EUT: Bluetooth Earbuds	Engineer Signature: star
Mode: Hopping (GFSK)	Distance: 3m
Model: BE1020	
Manufacturer: Shenzhen Kinlan Technology Company Limited	

Note: Report No.:ATE20181722



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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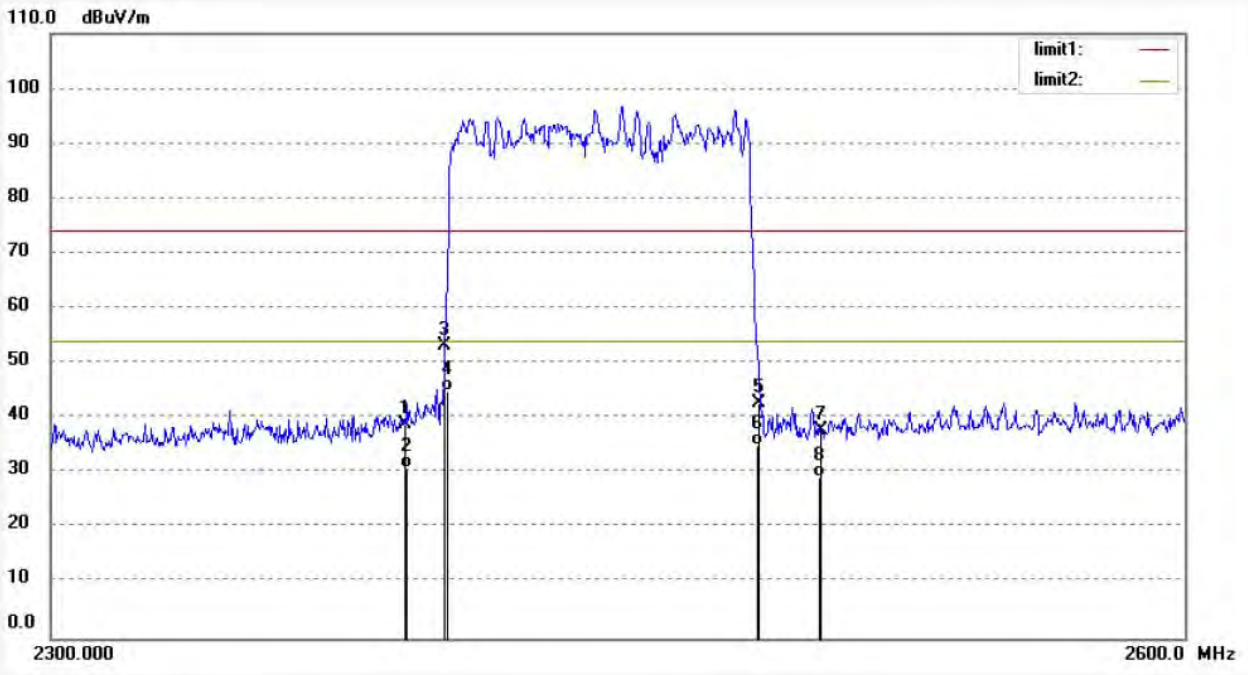
Fax:+86-0755-26503396

Job No.: STAR2018 #1296
Standard: FCC PART 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earbuds
Mode: Hopping (GFSK)
Model: BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited

Polarization: Vertical
Power Source: DC 3.7V
Date: 2018/09/22
Time: 15:01:52
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20181722



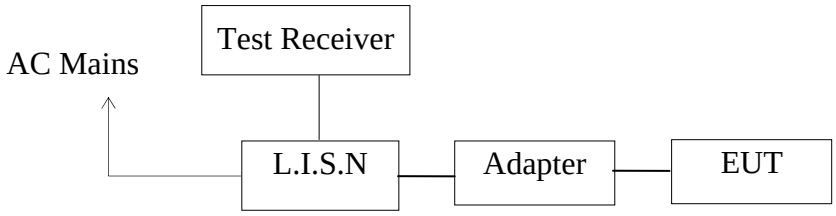
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	45.16	-6.32	38.84	74.00	-35.16	peak	150	135	
2	2390.000	37.25	-6.32	30.93	54.00	-23.07	AVG	150	245	
3	2400.000	59.44	-6.27	53.17	74.00	-20.83	peak	150	126	
4	2400.000	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

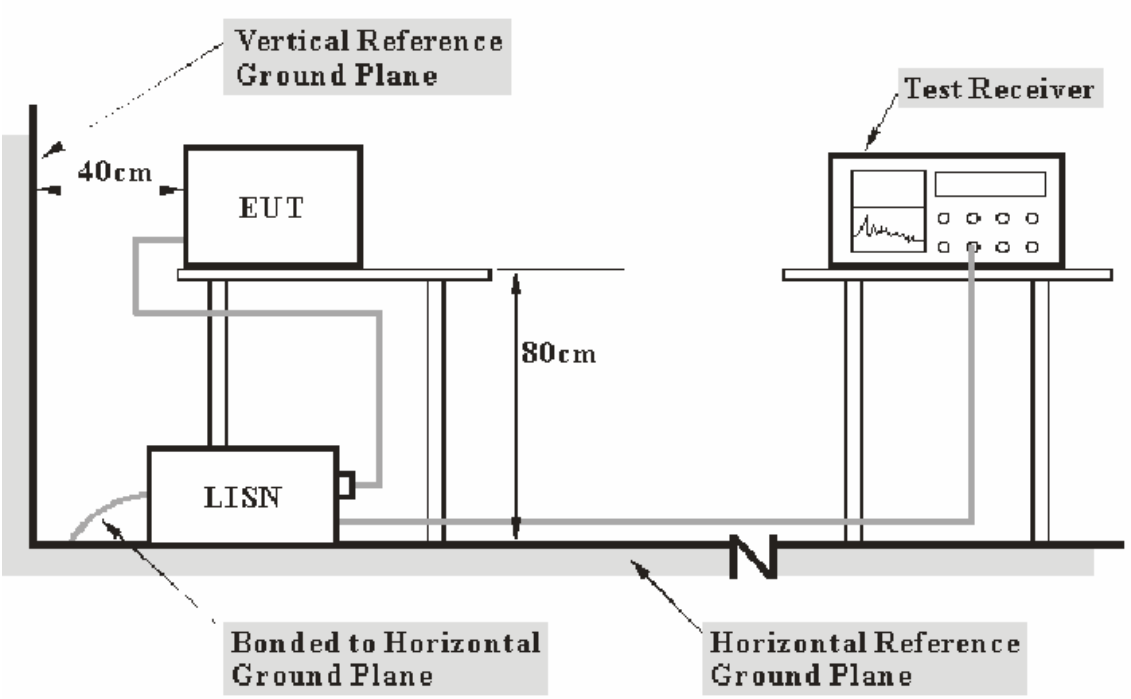
12. AC POWER LINE CONDUCTED EMISSION TEST

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(μV)	
	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 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	10.6	25.3	17.0	59.0	49.0	33.4	31.7	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

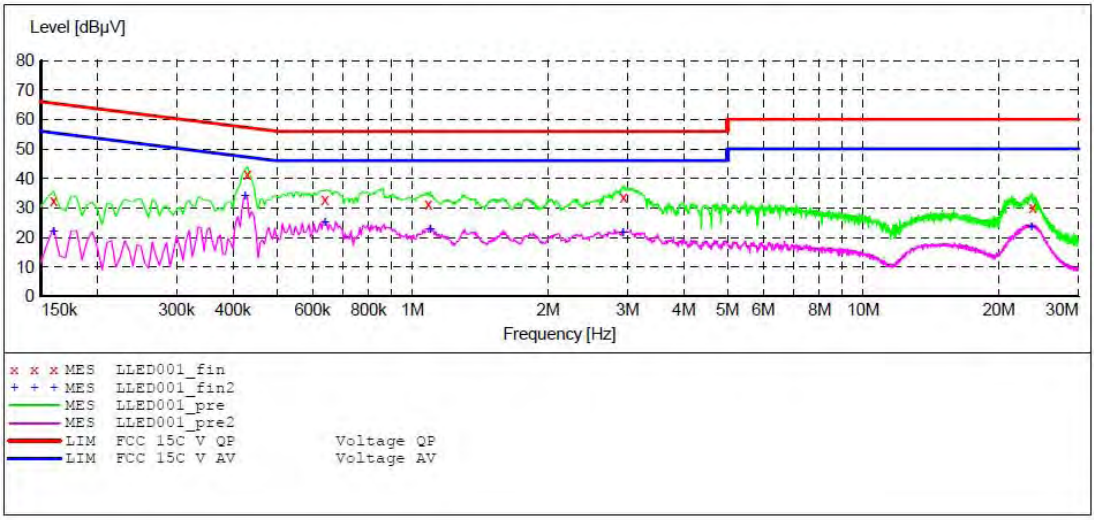
CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Bluetooth Earbuds M/N:BE1020
Manufacturer: Shenzhen Kinlan Technology Company Limited
Operating Condition: BT communication
Test Site: 1#Shielding Room
Operator: Star
Test Specification: L 120V/60Hz
Comment: Report No.:ATE20181722
Start of Test: 09/23/2018 / 3:14:29PM

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

Short Description: _SUB_STD_VTERM2 1.70

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



MEASUREMENT RESULT: "LLED001_fin"

09/23/2018 3:18PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.160000	32.30	10.5	66	33.2	QP	L1	GND
0.430000	41.50	10.7	57	15.8	QP	L1	GND
0.640000	33.00	10.8	56	23.0	QP	L1	GND
1.085000	31.20	10.9	56	24.8	QP	L1	GND
2.940000	33.50	11.1	56	22.5	QP	L1	GND
23.755000	30.00	11.5	60	30.0	QP	L1	GND

MEASUREMENT RESULT: "LLED001_fin2"

09/23/2018 3:18PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.160000	21.90	10.5	56	33.6	AV	L1	GND
0.425000	33.80	10.7	47	13.5	AV	L1	GND
0.640000	24.90	10.8	46	21.1	AV	L1	GND
1.095000	22.70	10.9	46	23.3	AV	L1	GND
2.930000	21.40	11.1	46	24.6	AV	L1	GND
23.635000	23.50	11.5	50	26.5	AV	L1	GND

ACCURATE TECHNOLOGY CO.,LTD

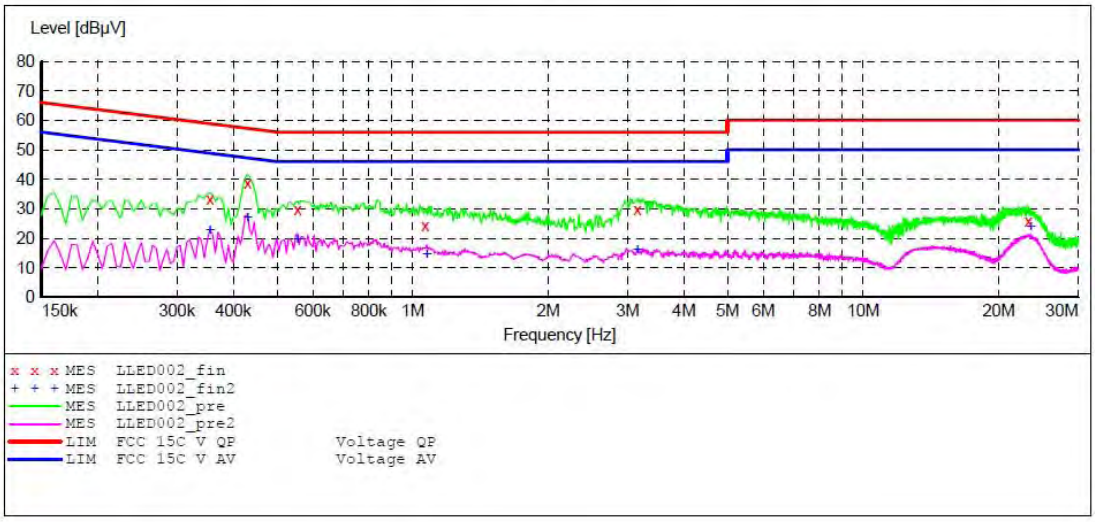
CONDUCTED EMISSION STANDARD FCC PART 15 C

```
EUT:                  Bluetooth Earbuds   M/N:BE1020
Manufacturer:         Shenzhen Kinlan Technology Company Limited
Operating Condition:  BT communication
Test Site:            1#Shielding Room
Operator:             Star
Test Specification:   N 120V/60Hz
Comment:              Report No.:ATE20181722
Start of Test:        09/23/2018 / 3:18:47PM
```

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

Short Description: _SUB_STD_VTERM2 1.70

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



MEASUREMENT RESULT: "LLED002_fin"

09/23/2018 3:23PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.355000	33.20	10.6	59	25.6	QP	N	GND
0.430000	38.70	10.7	57	18.6	QP	N	GND
0.555000	29.70	10.7	56	26.3	QP	N	GND
1.065000	24.40	10.9	56	31.6	QP	N	GND
3.150000	29.80	11.1	56	26.2	QP	N	GND
23.260000	25.80	11.5	60	34.2	QP	N	GND

MEASUREMENT RESULT: "LLED002_fin2"

09/23/2018 3:23PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.355000	22.60	10.6	49	26.2	AV	N	GND
0.430000	26.90	10.7	47	20.4	AV	N	GND
0.555000	19.60	10.7	46	26.4	AV	N	GND
1.075000	14.40	10.9	46	31.6	AV	N	GND
3.150000	16.10	11.1	46	29.9	AV	N	GND
23.560000	23.70	11.5	50	26.3	AV	N	GND

ACCURATE TECHNOLOGY CO.,LTD

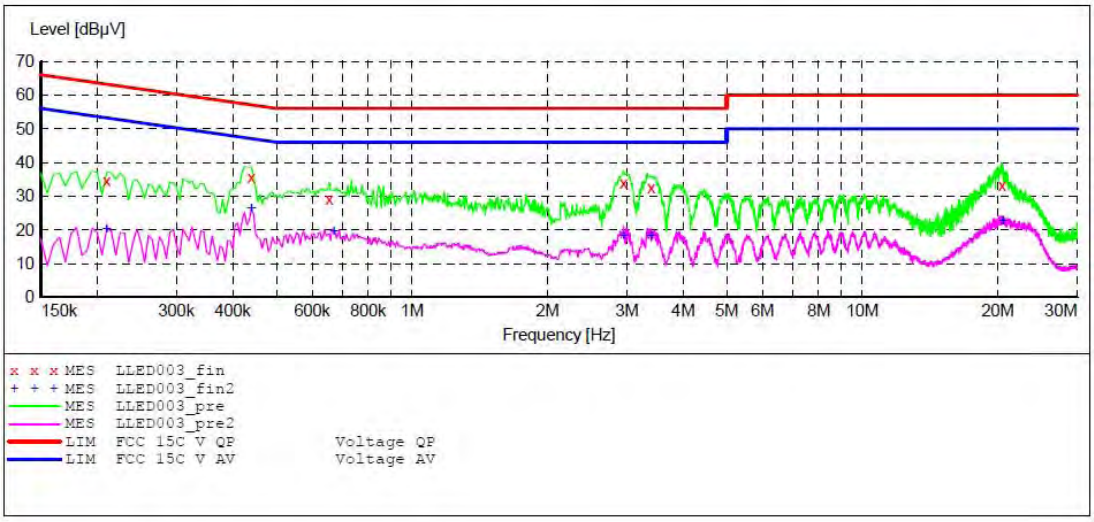
CONDUCTED EMISSION STANDARD FCC PART 15 C

```
EUT:                  Bluetooth Earbuds   M/N:BE1020
Manufacturer:         Shenzhen Kinlan Technology Company Limited
Operating Condition:  BT communication
Test Site:            1#Shielding Room
Operator:             Star
Test Specification:   N 240V/60Hz
Comment:              Report No.:ATE20181722
Start of Test:        09/23/2018 / 3:24:17PM
```

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

Short Description: _SUB_STD_VTERM2 1.70

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



MEASUREMENT RESULT: "LLED003_fin"

09/23/2018 3:27PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.210000	34.60	10.5	63	28.6	QP	N	GND
0.440000	35.60	10.7	57	21.5	QP	N	GND
0.655000	29.10	10.8	56	26.9	QP	N	GND
2.950000	33.70	11.1	56	22.3	QP	N	GND
3.400000	32.60	11.1	56	23.4	QP	N	GND
20.410000	33.10	11.4	60	26.9	QP	N	GND

MEASUREMENT RESULT: "LLED003_fin2"

09/23/2018 3:27PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.210000	20.20	10.5	53	33.0	AV	N	GND
0.440000	26.20	10.7	47	20.9	AV	N	GND
0.670000	19.50	10.8	46	26.5	AV	N	GND
2.950000	18.10	11.1	46	27.9	AV	N	GND
3.390000	18.30	11.1	46	27.7	AV	N	GND
20.530000	22.50	11.4	50	27.5	AV	N	GND

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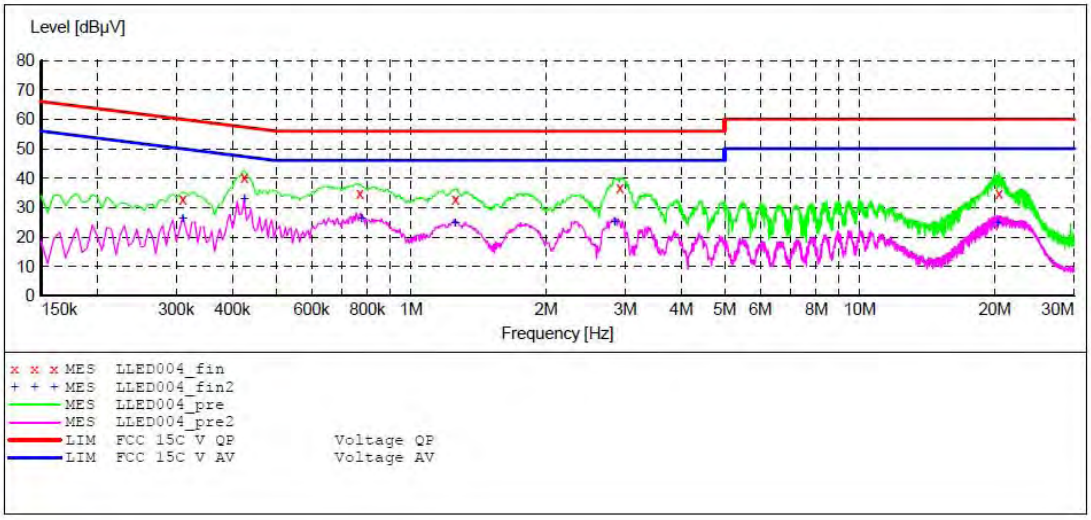
CONDUCTED EMISSION STANDARD FCC PART 15 C

```
EUT:                  Bluetooth Earbuds   M/N:BE1020
Manufacturer:         Shenzhen Kinlan Technology Company Limited
Operating Condition:  BT communication
Test Site:            1#Shielding Room
Operator:             Star
Test Specification:   L 240V/60Hz
Comment:              Report No.:ATE20181722
Start of Test:        09/23/2018 / 3:28:20PM
```

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

Short Description: _SUB_STD_VTERM2 1.70

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



MEASUREMENT RESULT: "LLED004_fin"

09/23/2018 3:32PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.310000	32.90	10.6	60	27.1	QP	L1	GND
0.425000	40.40	10.7	57	16.9	QP	L1	GND
0.770000	34.90	10.8	56	21.1	QP	L1	GND
1.255000	33.00	10.9	56	23.0	QP	L1	GND
2.920000	36.60	11.1	56	19.4	QP	L1	GND
20.410000	34.90	11.4	60	25.1	QP	L1	GND

MEASUREMENT RESULT: "LLED004_fin2"

09/23/2018 3:32PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.310000	26.10	10.6	50	23.9	AV	L1	GND
0.425000	32.80	10.7	47	14.5	AV	L1	GND
0.775000	26.20	10.8	46	19.8	AV	L1	GND
1.255000	24.70	10.9	46	21.3	AV	L1	GND
2.840000	25.00	11.0	46	21.0	AV	L1	GND
20.260000	24.60	11.4	50	25.4	AV	L1	GND

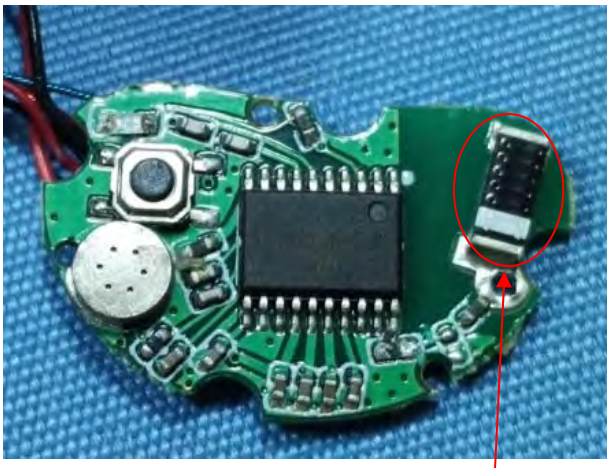
13. ANTENNA REQUIREMENT

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 2dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



******* End of Test Report *******