

APPLICATION CERTIFICATION FCC Part 15C
On Behalf of
SHENZHEN SHENGLAI TECHNOLOGY CO., LIMITED

Bluetooth Earphones
Model No.: 40012BT

FCC ID: 2AL9B-40012BT

Prepared for : SHENZHEN SHENGLAI TECHNOLOGY CO., LIMITED
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Date of Report : March 24, 2018

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Test Report Certification

Applicant : SHENZHEN SHENGLAI TECHNOLOGY CO., LIMITED
Manufacturer : SHENZHEN SHENGLAI TECHNOLOGY CO., LIMITED
EUT Description : Bluetooth Earphones
Model No. : 40012BT
Brand Name : N/A

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247: 2018
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 : March 21-March 23, 2018
Date of Report : March 24, 2018

Test Engineer :

Star Yang

(Star Yang, Engineer)

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	:	40012BT
Bluetooth version	:	V 4.2
Frequency Range	:	2402MHz-2480MHz
Number of Channels	:	79
Antenna Gain(Max)	:	0dBi
Antenna type	:	PCB antenna
Adapter Input Voltage	:	DC 3.7V (Powered by Lithium battery) or DC 5V (Powered by USB port)
Modulation mode	:	GFSK, $\pi/4$ DQPSK, 8DPSK
Hardware version	:	V1.2
Software version	:	V027
Applicant	:	SHENZHEN SHENGLAI TECHNOLOGY CO., LIMITED
Address	:	ROOM 709, BLOCK B, XINTIAN CENTURY BUSINESS CENTRE, FUMING ROAD, FUTIAN DISTRICT, SHENZHEN, CHINA
Manufacturer	:	SHENZHEN SHENGLAI TECHNOLOGY CO., LIMITED
Address	:	ROOM 709, BLOCK B, XINTIAN CENTURY BUSINESS CENTRE, FUMING ROAD, FUTIAN DISTRICT, SHENZHEN, 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	ESPI3	101526/003	Jan. 06, 2018	1 Year
Spectrum Analyzer	Agilent	E7405A	MY45115511	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	Rohde&Schwarz	ESH3-Z5	100305	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	March 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

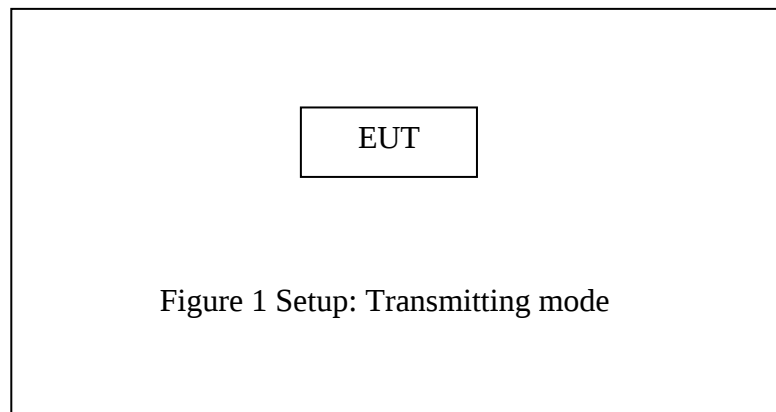
Middle Channel: 2441MHz

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.

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



(EUT: Bluetooth Earphones)

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

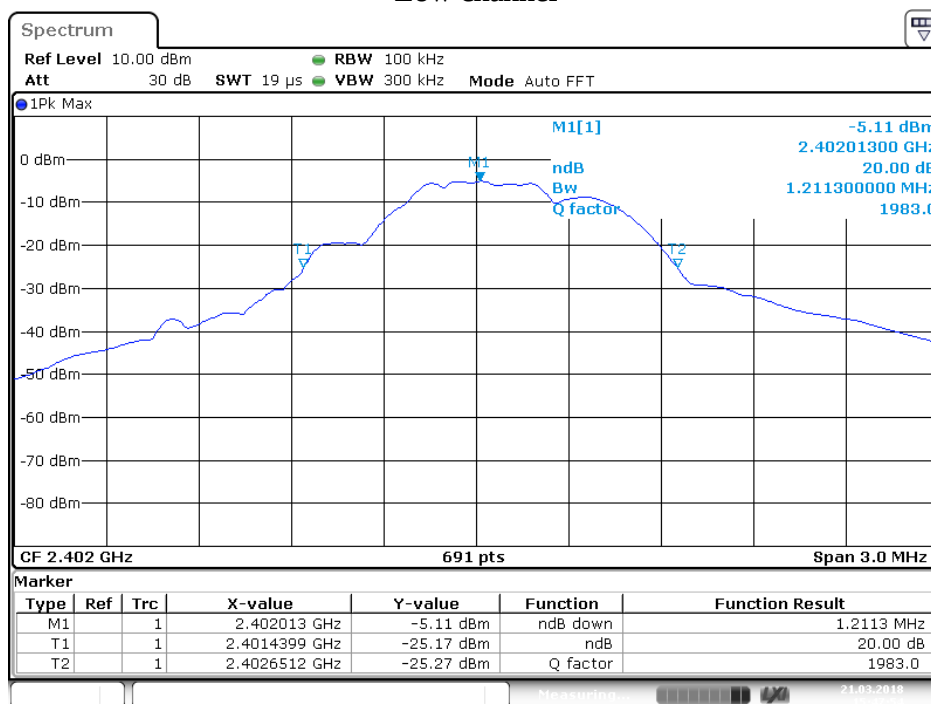
Test Engineer: Star

Channel	Frequency (MHz)	GFSK 20dB Bandwidth (MHz)	$\Pi/4$ -DQPSK 20dB Bandwidth (MHz)	8DPSK 20dB Bandwidth (MHz)	Result
Low	2402	1.211	1.350	1.368	Pass
Middle	2441	1.316	1.398	1.441	Pass
High	2480	1.329	1.411	1.433	Pass

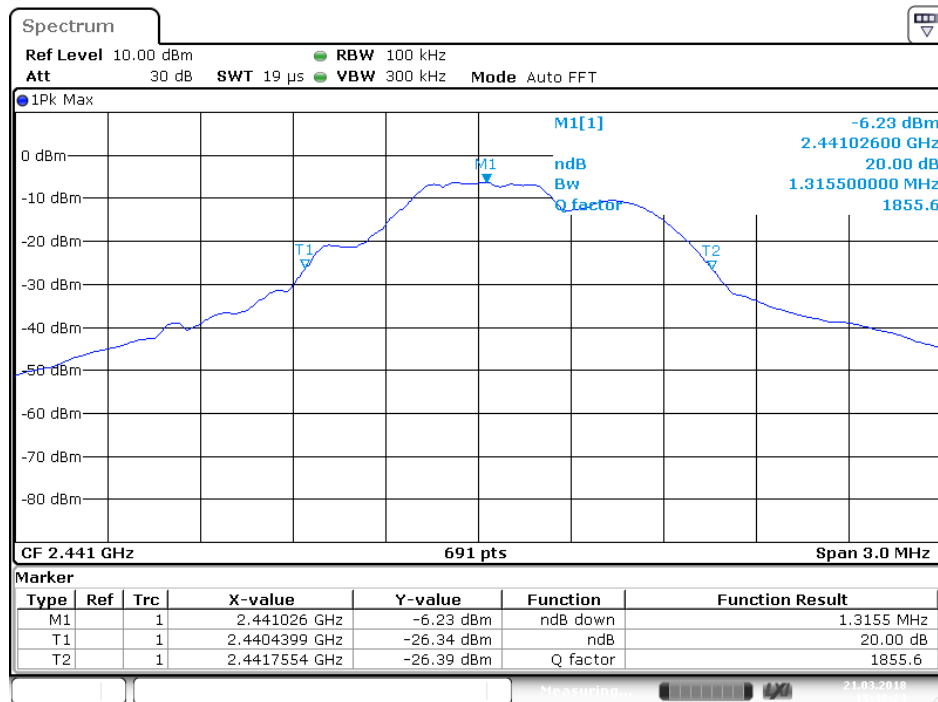
The spectrum analyzer plots are attached as below.

GFSK Mode

Low channel

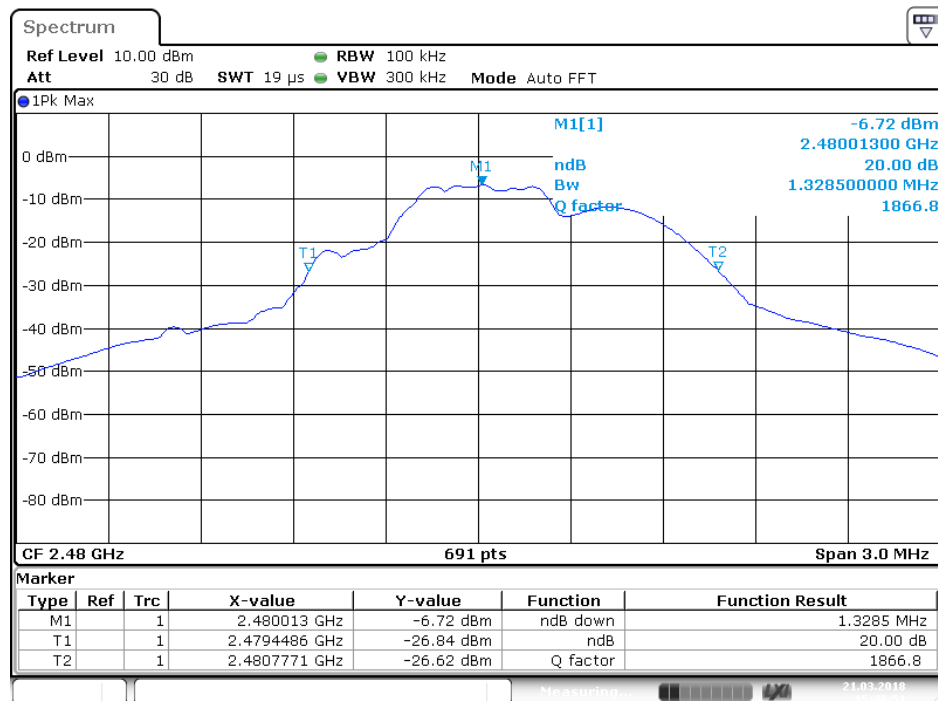


Middle channel



Date: 21.MAR.2018 15:48:25

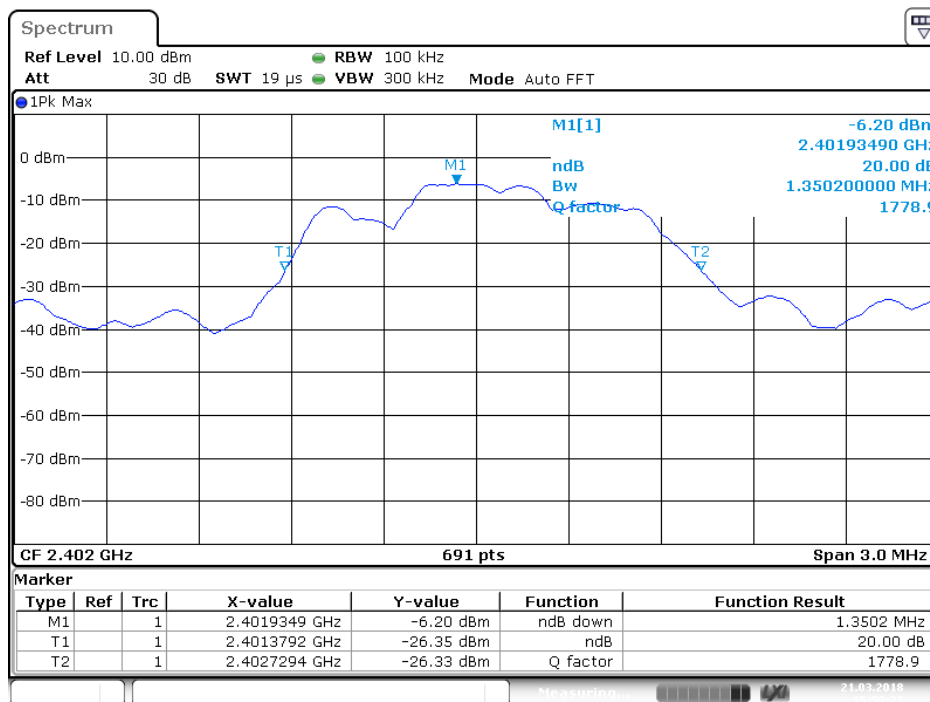
High channel



Date: 21.MAR.2018 15:48:51

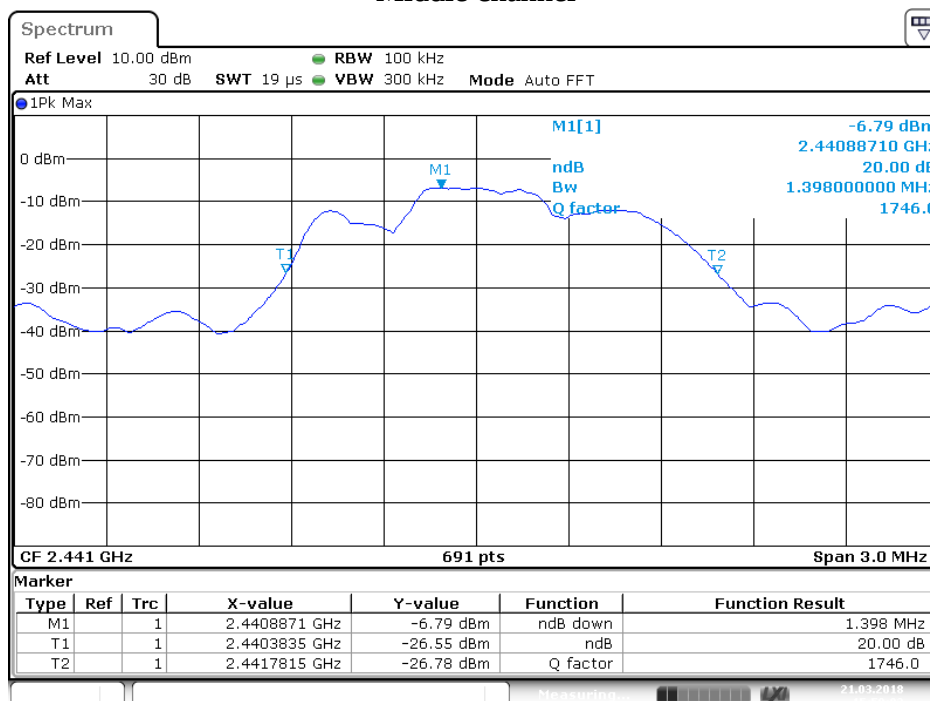
Π/4-DQPSK Mode

Low channel



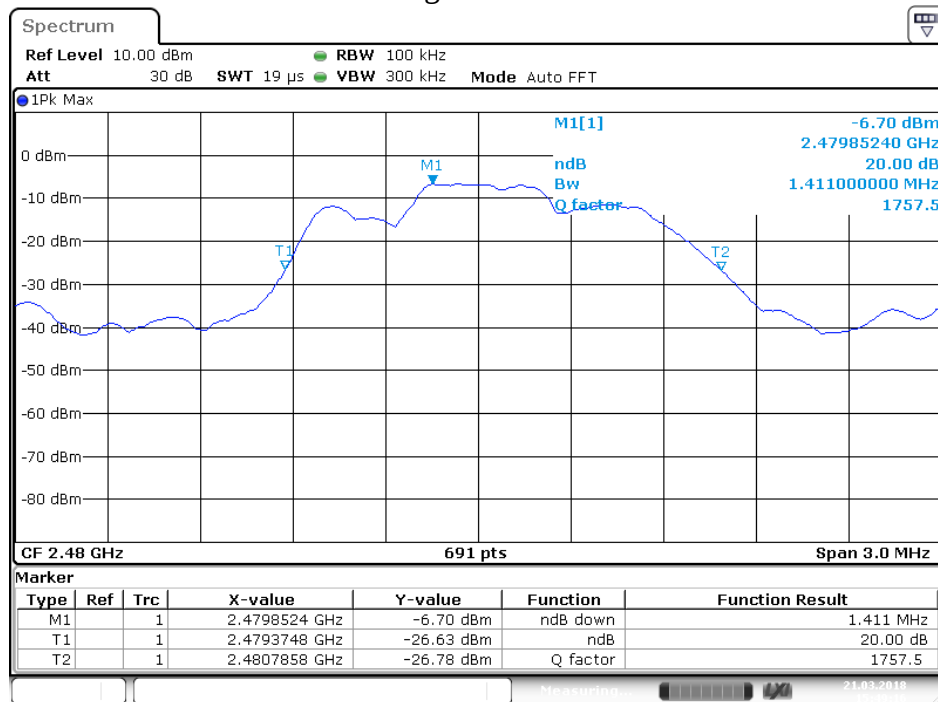
Date: 21.MAR.2018 15:50:27

Middle channel



Date: 21.MAR.2018 15:50:03

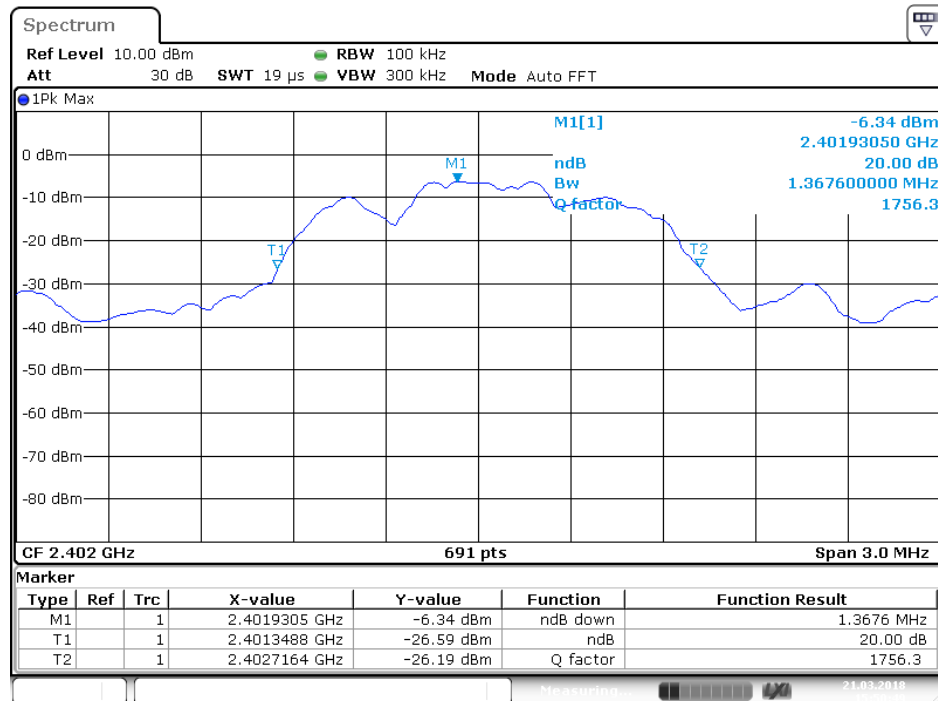
High channel



Date: 21.MAR.2018 15:49:16

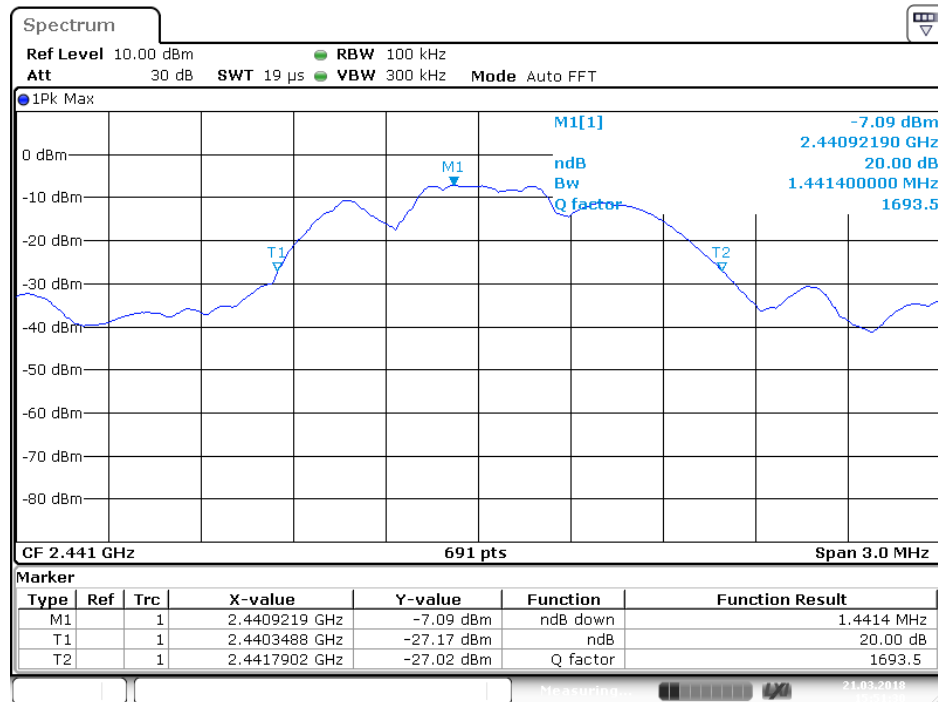
8DPSK Mode

Low channel



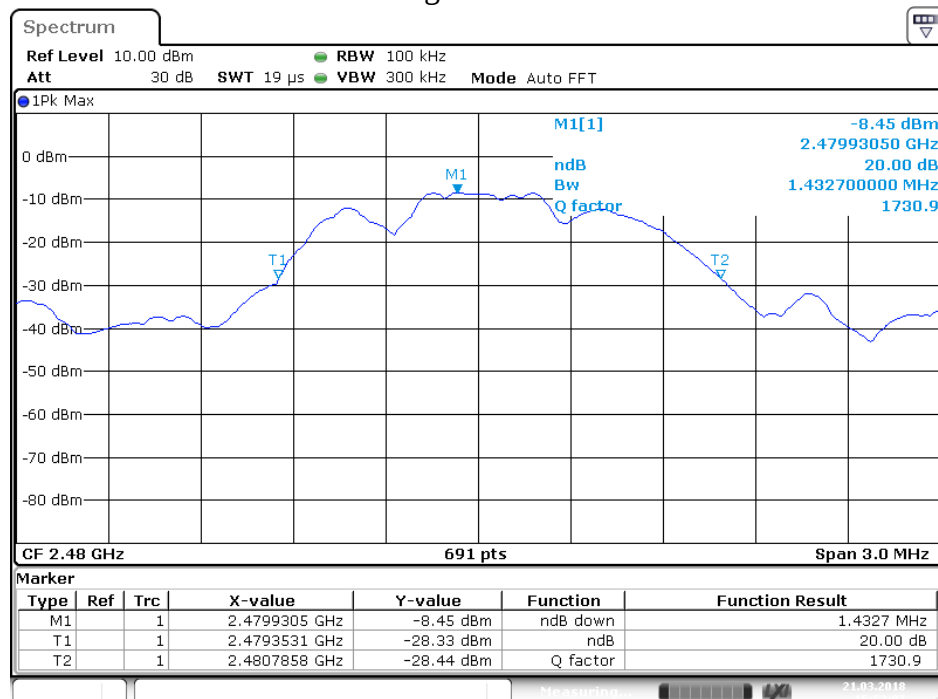
Date: 21.MAR.2018 15:50:49

Middle channel



Date: 21.MAR.2018 15:51:31

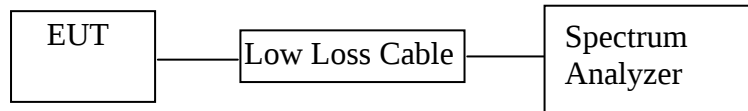
High channel



Date: 21.MAR.2018 15:52:07

6. CARRIER FREQUENCY SEPARATION TEST

6.1. Block Diagram of Test Setup



(EUT: Bluetooth Earphones)

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 pseudorandomly 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

Test Lab: Shielding room

Test Engineer: Star

GFSK

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.0029	25KHz or 2/3*20dB bandwidth	PASS
	2403			
Middle	2440	1.0029	25KHz or 2/3*20dB bandwidth	PASS
	2441			
High	2479	1.0029	25KHz or 2/3*20dB bandwidth	PASS
	2480			

Π/4-DQPSK

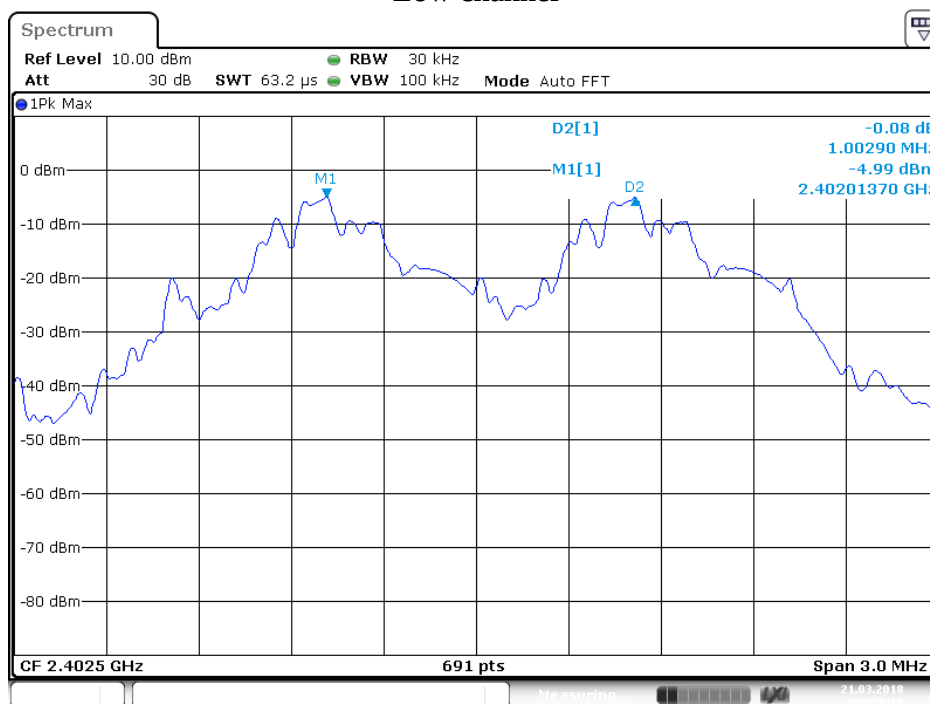
Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.0029	25KHz or 2/3*20dB bandwidth	PASS
	2403			
Middle	2440	1.0029	25KHz or 2/3*20dB bandwidth	PASS
	2441			
High	2479	1.0029	25KHz or 2/3*20dB bandwidth	PASS
	2480			

8DPSK

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.0029	25KHz or 2/3*20dB bandwidth	PASS
	2403			
Middle	2440	1.0029	25KHz or 2/3*20dB bandwidth	PASS
	2441			
High	2479	1.0029	25KHz or 2/3*20dB bandwidth	PASS
	2480			

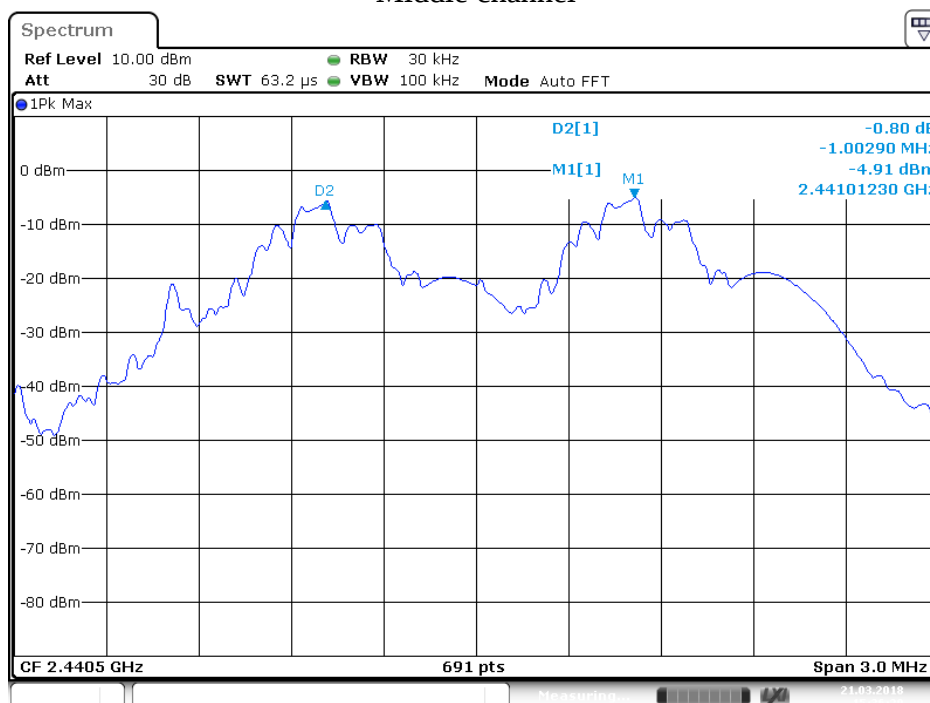
GFSK Mode

Low channel



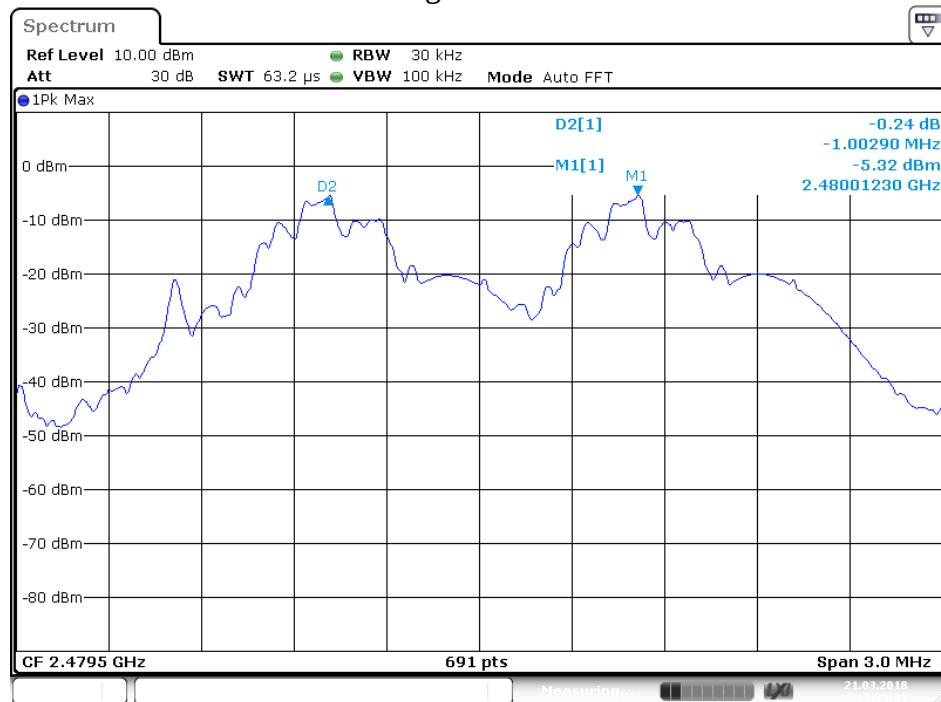
Date: 21.MAR.2018 15:37:10

Middle channel



Date: 21.MAR.2018 15:36:30

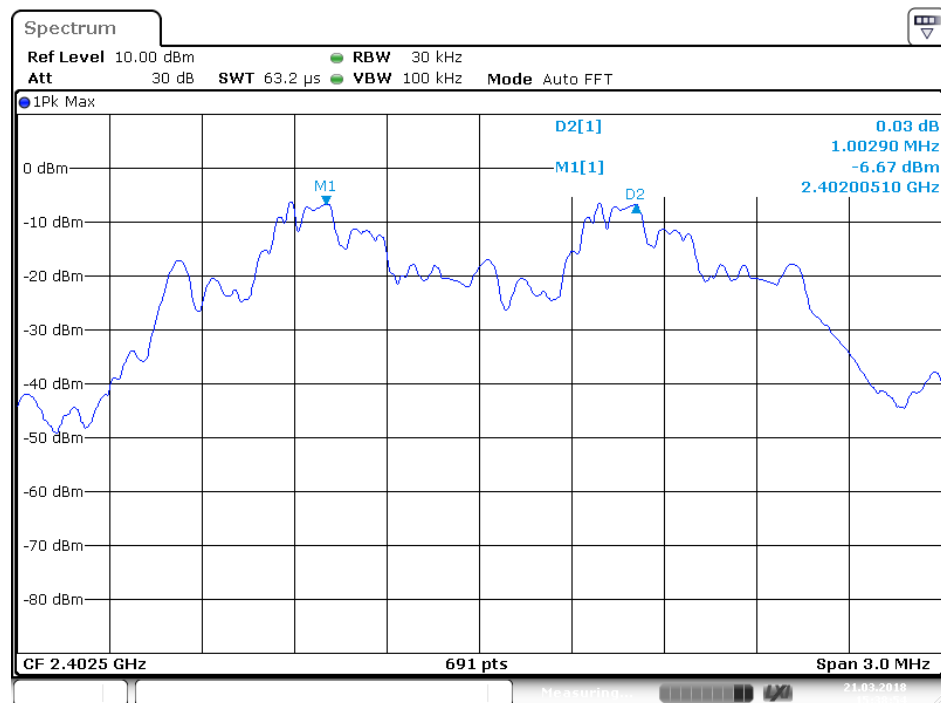
High channel



Date: 21.MAR.2018 15:35:32

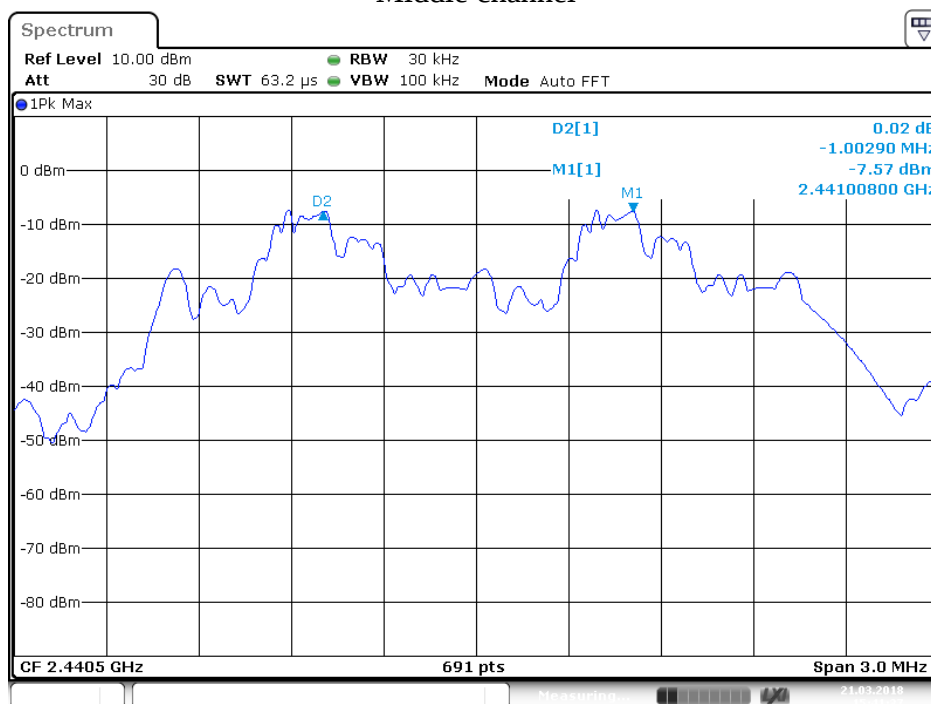
II/4-DQPSK Mode

Low channel



Date: 21.MAR.2018 15:38:55

Middle channel



Date: 21.MAR.2018 15:41:37

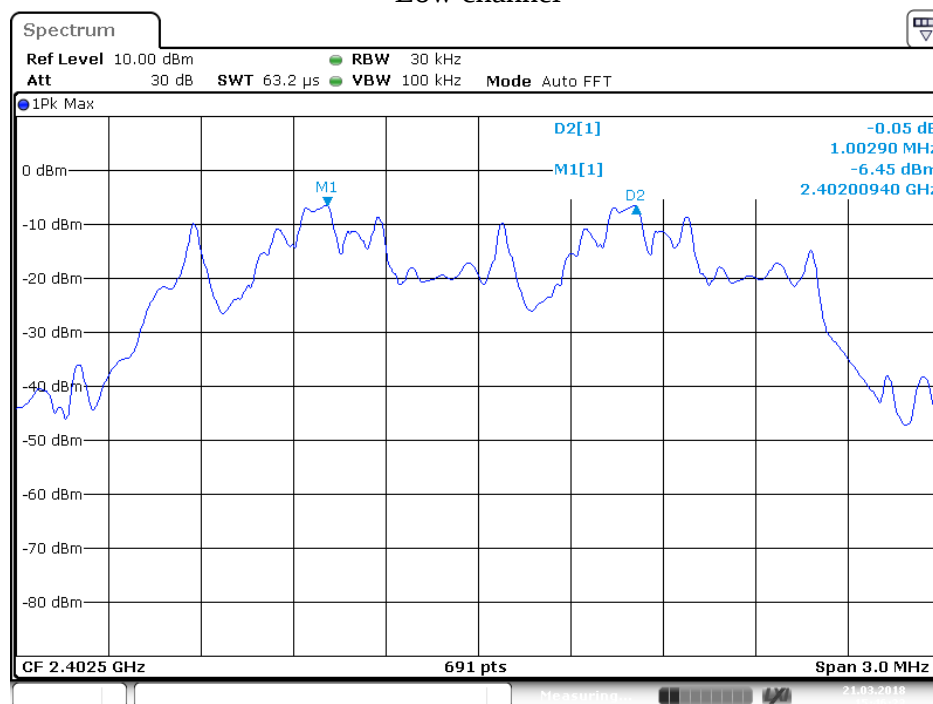
High channel



Date: 21.MAR.2018 15:43:05

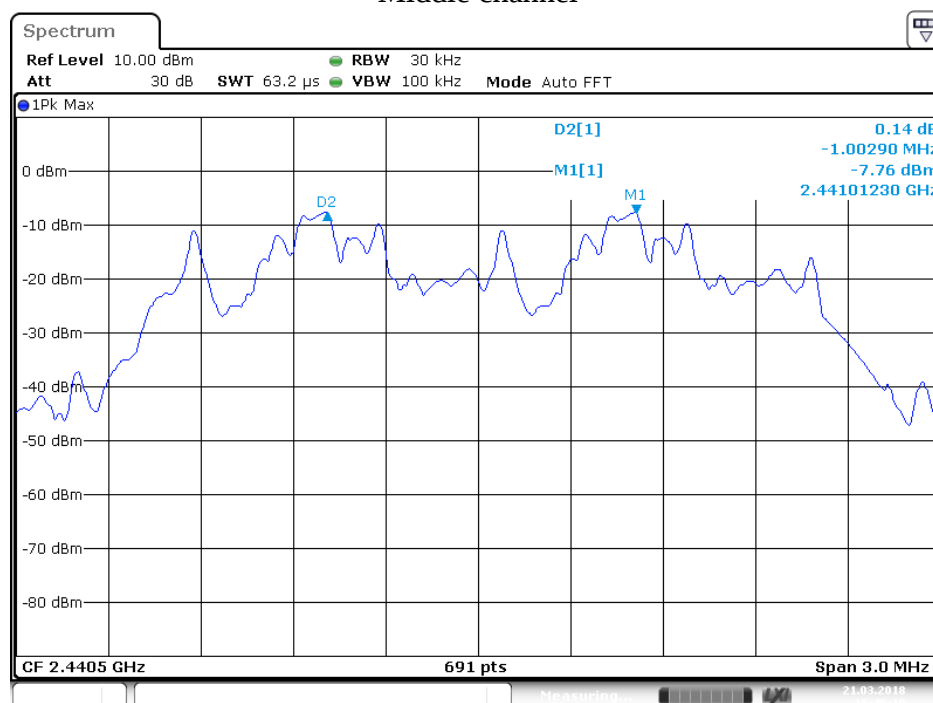
8DPSK Mode

Low channel



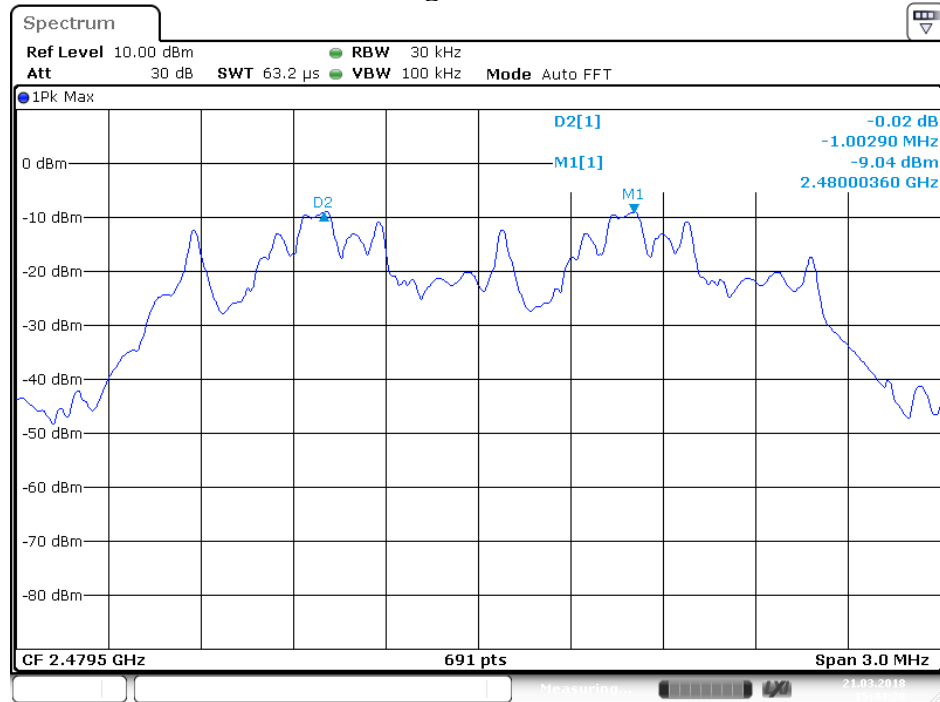
Date: 21.MAR.2018 15:46:23

Middle channel



Date: 21.MAR.2018 15:45:20

High channel



Date: 21.MAR.2018 15:44:20

7. NUMBER OF HOPPING FREQUENCY TEST

7.1. Block Diagram of Test Setup



(EUT: Bluetooth Earphones)

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.

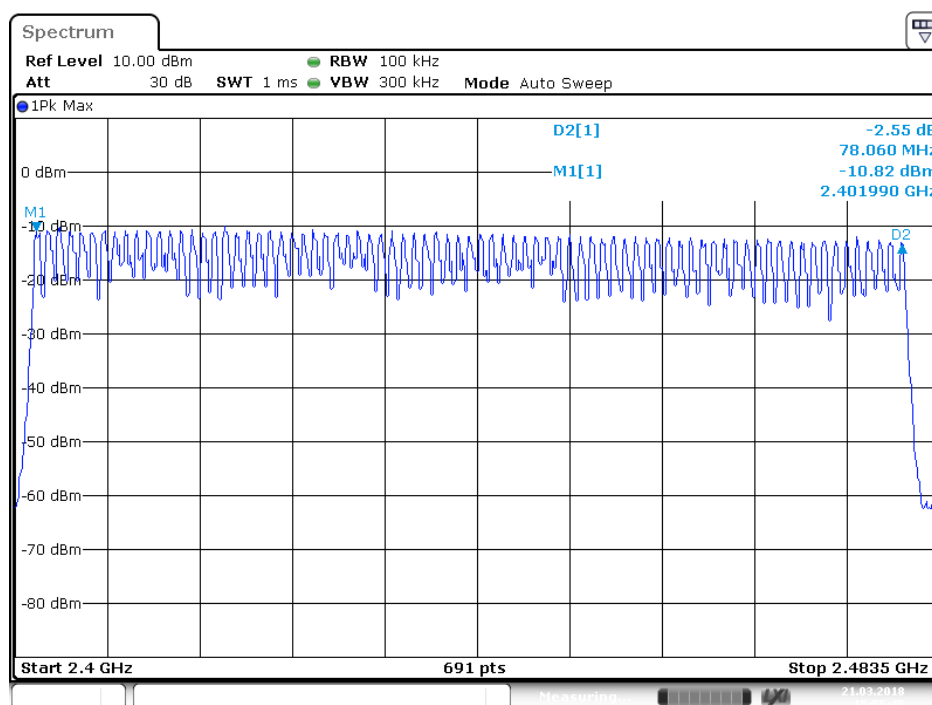
7.6.Test Result

Test Lab: Shielding room

Test Engineer: Star

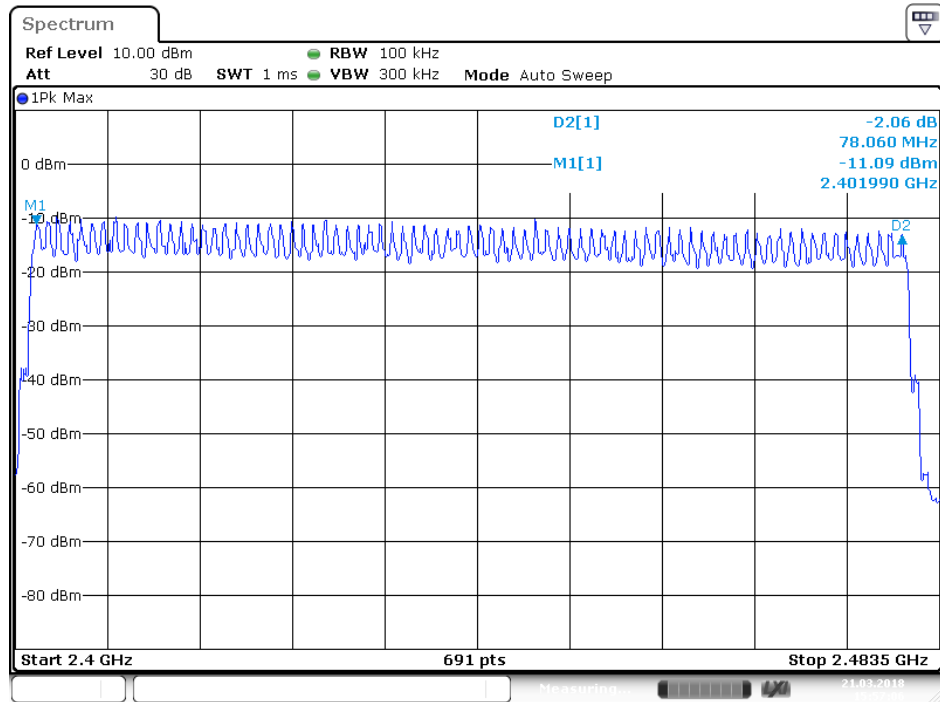
Total number of hopping channel	Measurement result(CH)	Limit(CH)
	79	≥ 15

Number of hopping channels(GFSK)



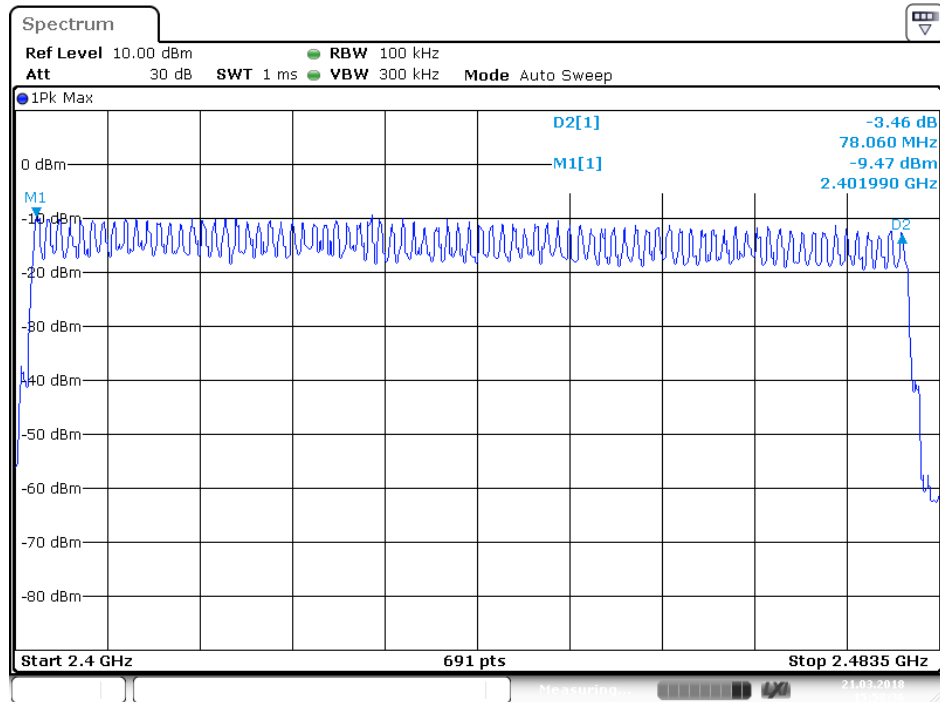
Date: 21.MAR.2018 15:55:45

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



Date: 21.MAR.2018 15:57:07

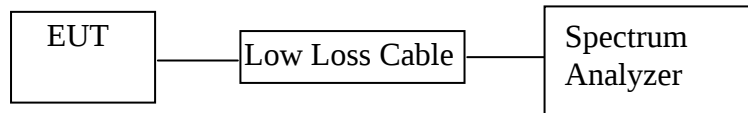
Number of hopping channels(8DPSK)



Date: 21.MAR.2018 15:58:36

8. DWELL TIME TEST

8.1. Block Diagram of Test Setup



(EUT: Bluetooth Earphones)

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	0.514	164.48	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	1.790	286.40	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	3.051	325.44	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 (Worst case)

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2441	0.522	167.04	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	1.783	285.28	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	3.065	326.93	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

8DPSK (Worst case)

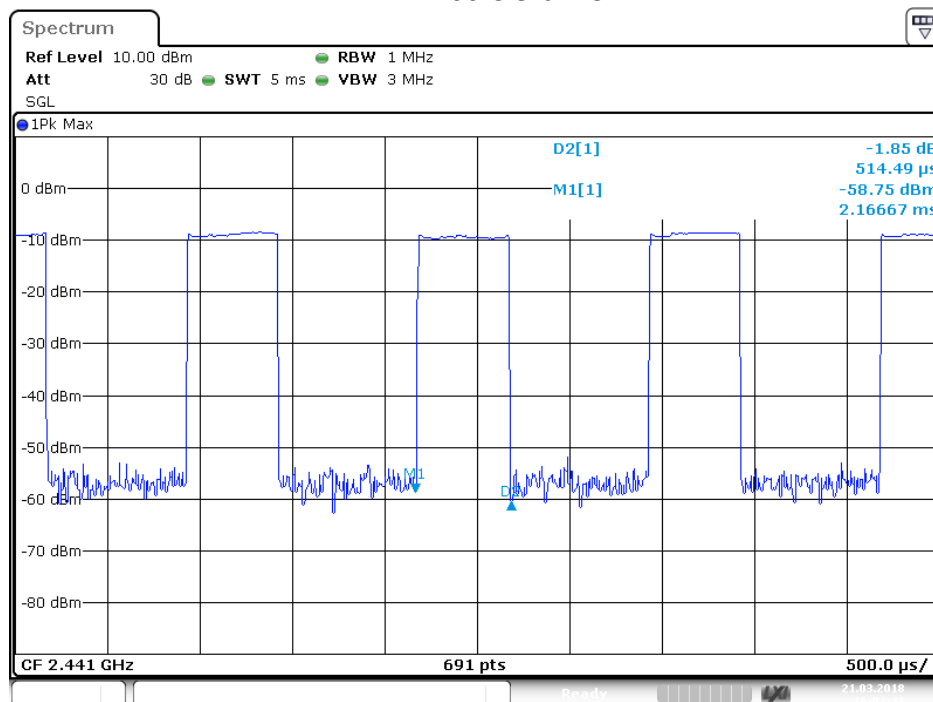
Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2441	0.522	167.04	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2 \times 79)) \times 31.6$				
DH3	2441	1.797	287.52	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4 \times 79)) \times 31.6$				
DH5	2441	3.036	323.84	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.

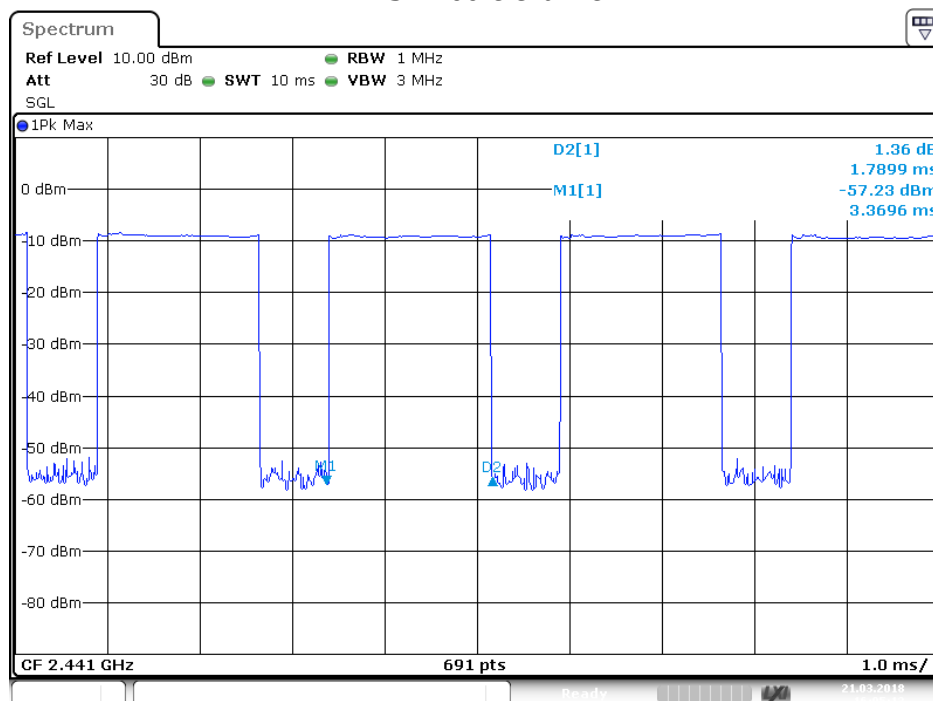
GFSK Mode

DH1 Middle channel



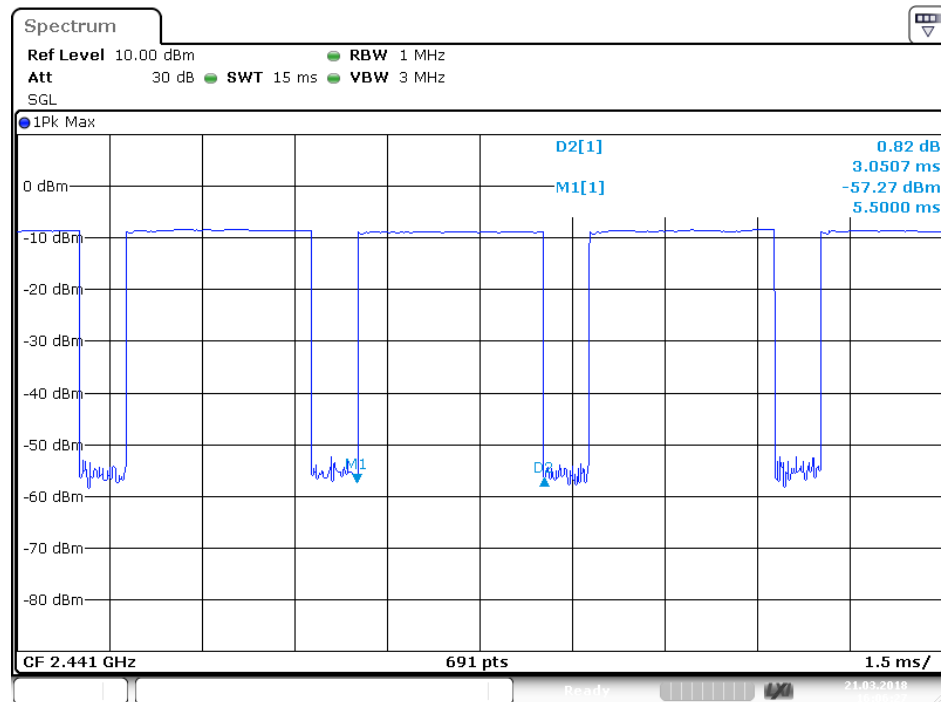
Date: 21.MAR.2018 16:03:42

DH3 Middle channel



Date: 21.MAR.2018 16:05:13

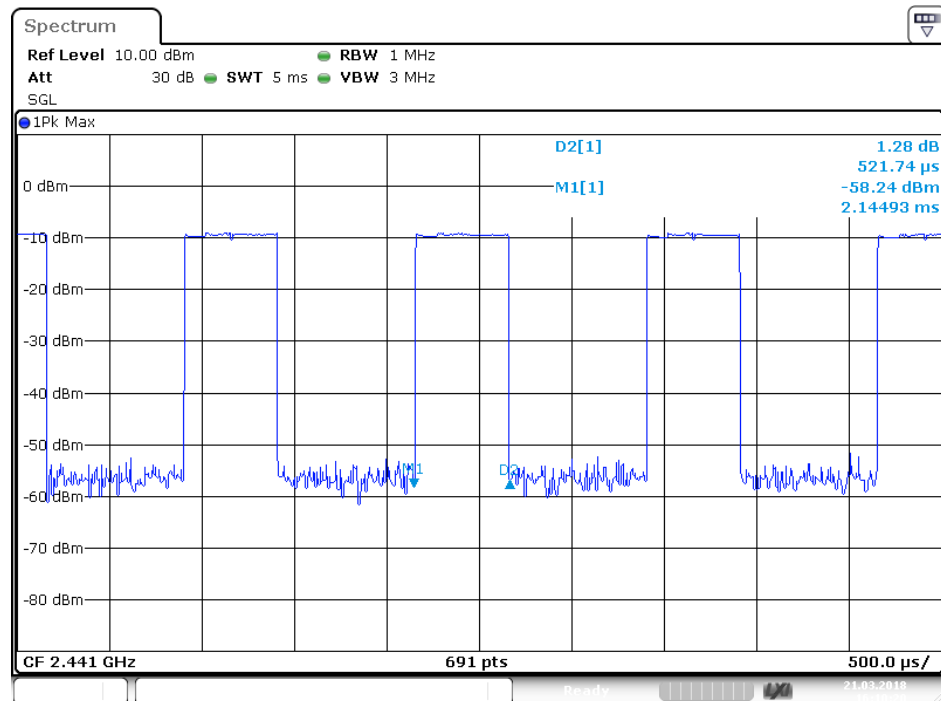
DH5 Middle channel



Date: 21.MAR.2018 16:06:28

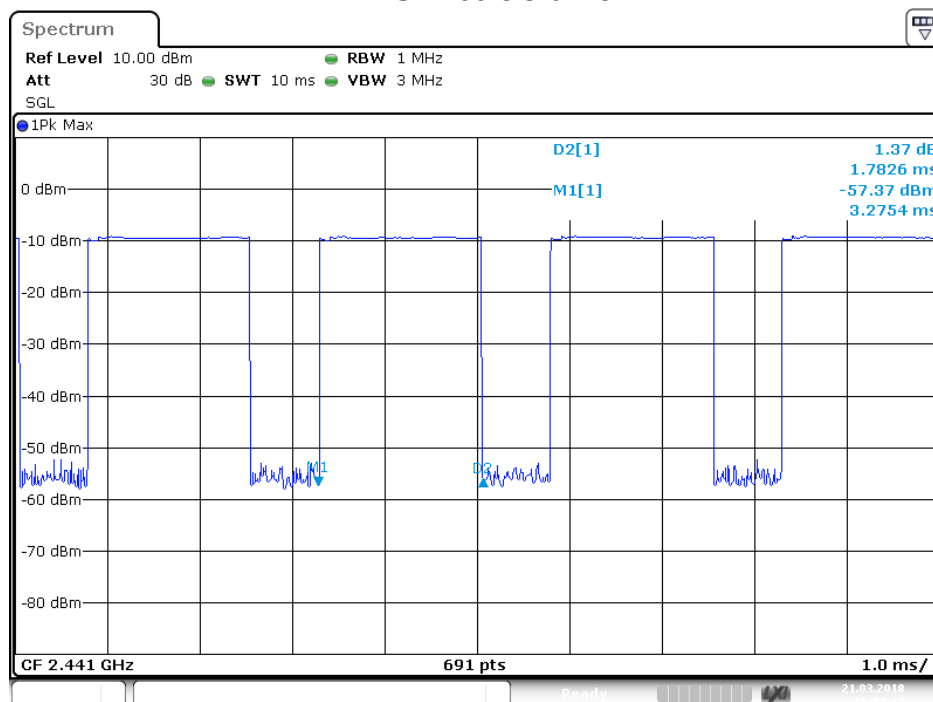
II/4-DQPSK

2DH1 Middle channel



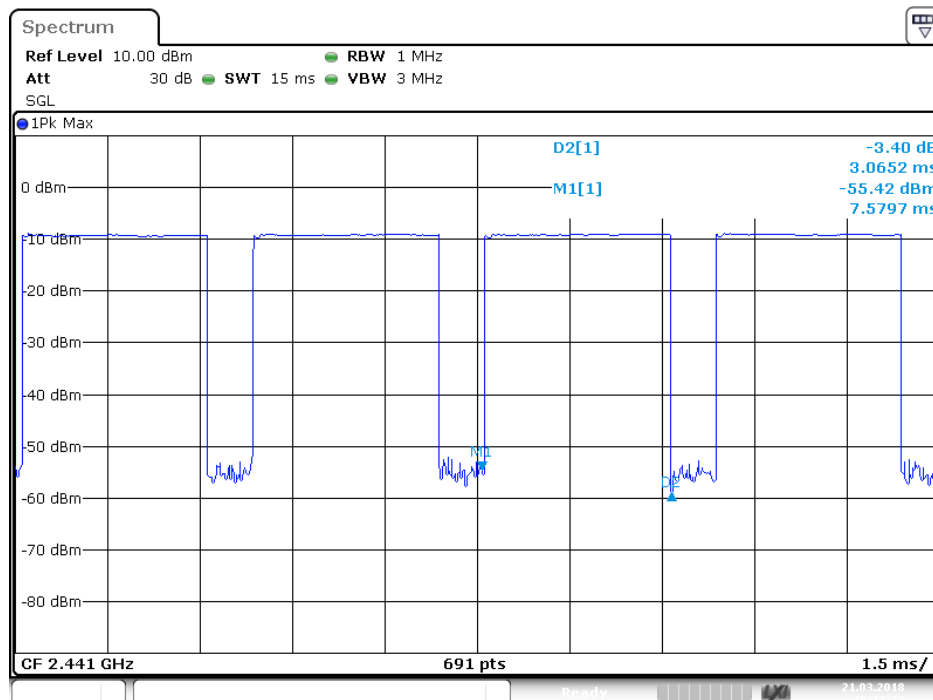
Date: 21.MAR.2018 16:10:20

2DH3 Middle channel



Date: 21.MAR.2018 16:09:34

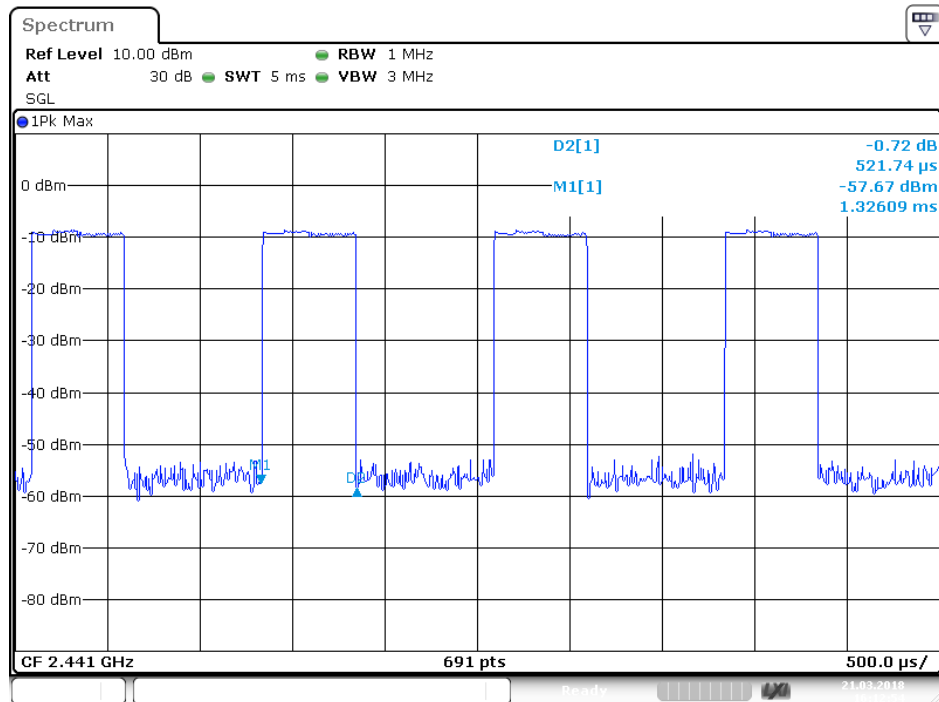
2DH5 Middle channel



Date: 21.MAR.2018 16:11:24

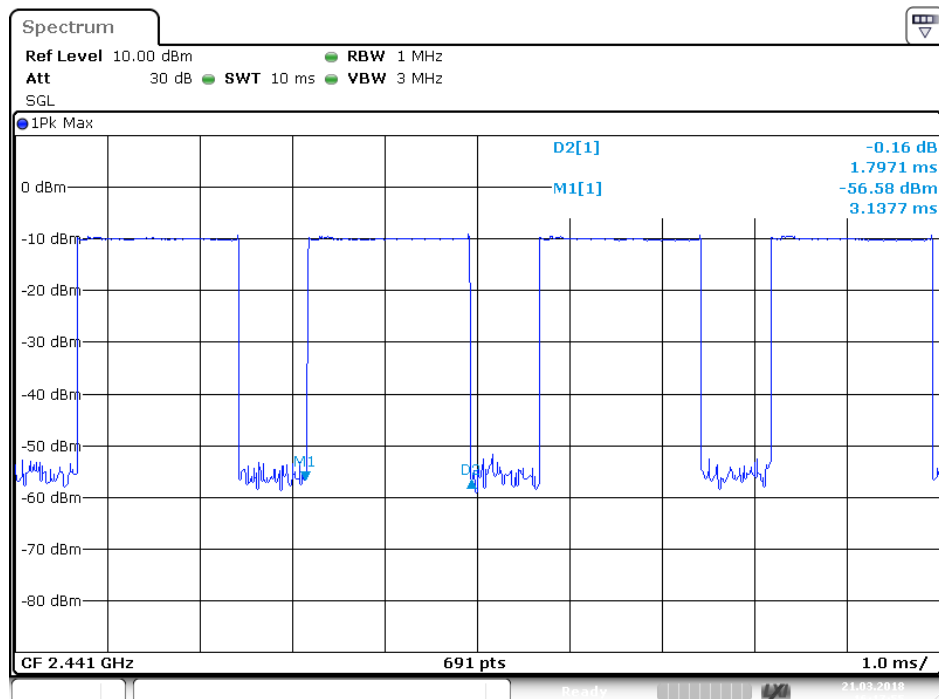
8DPSK

3DH1 Middle channel



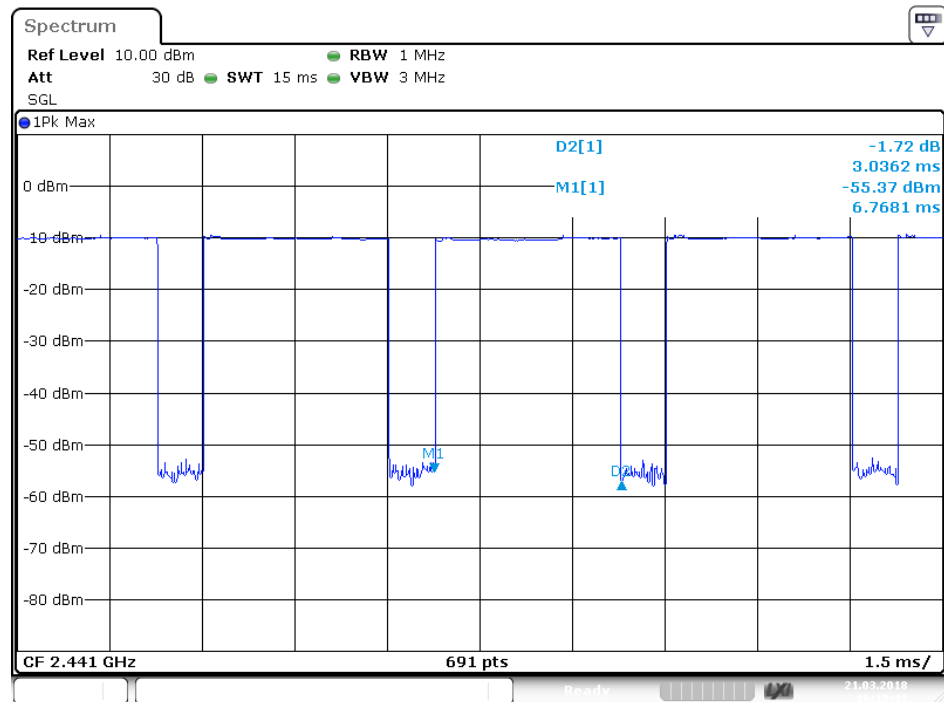
Date: 21.MAR.2018 16:12:54

3DH3 Middle channel



Date: 21.MAR.2018 16:17:55

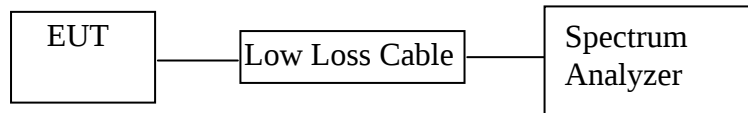
3DH5 Middle channel



Date: 21.MAR.2018 16:19:42

9. MAXIMUM PEAK OUTPUT POWER TEST

9.1. Block Diagram of Test Setup



(EUT: Bluetooth Earphones)

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	-4.66/0.0003	21 / 0.125
Middle	2441	-4.20/0.0004	21 / 0.125
High	2480	-4.21/0.0004	21 / 0.125

II/4-DQPSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	-5.38/0.0003	21 / 0.125
Middle	2441	-5.08/0.0003	21 / 0.125
High	2480	-4.83/0.0003	21 / 0.125

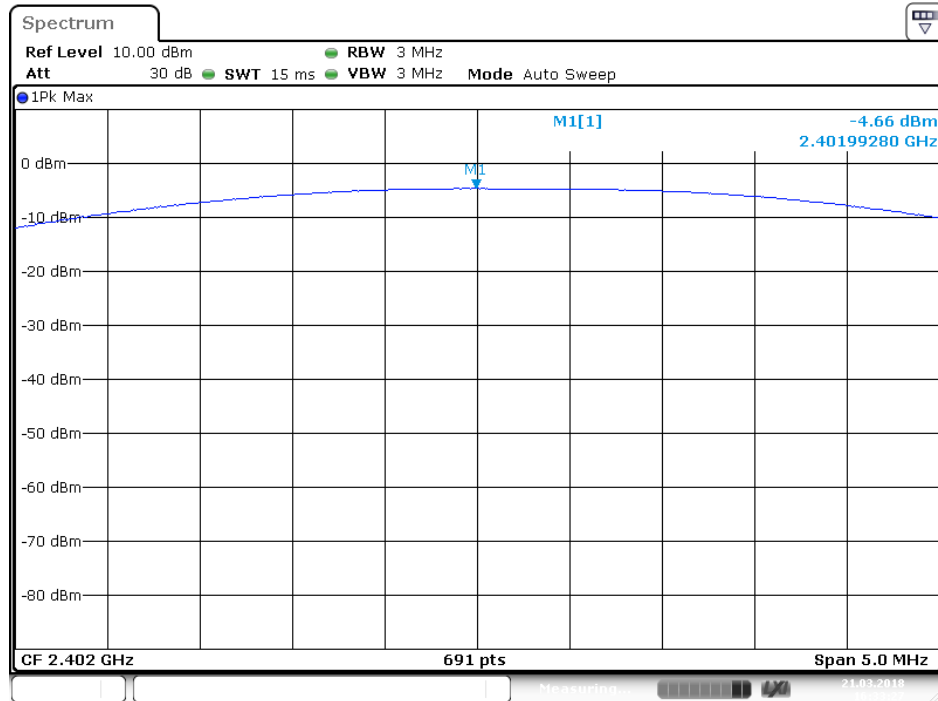
8DPSK

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	-4.74/0.0003	21 / 0.125
Middle	2441	-4.40/0.0004	21 / 0.125
High	2480	-4.38/0.0004	21 / 0.125

The spectrum analyzer plots are attached as below.

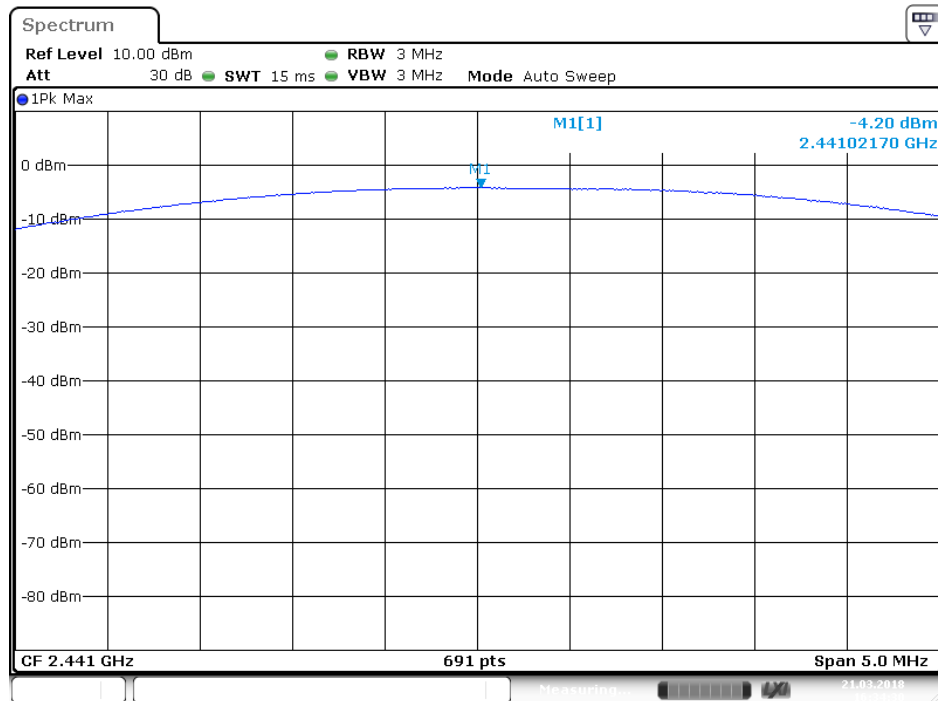
GFSK Mode

Low channel



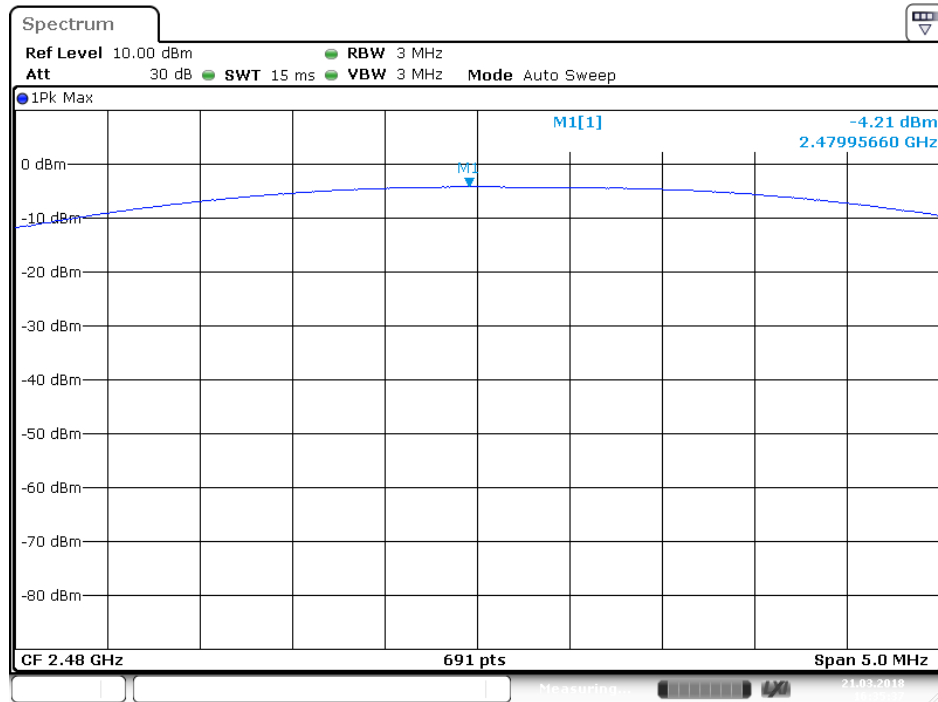
Date: 21.MAR.2018 16:33:28

Middle channel



Date: 21.MAR.2018 16:34:30

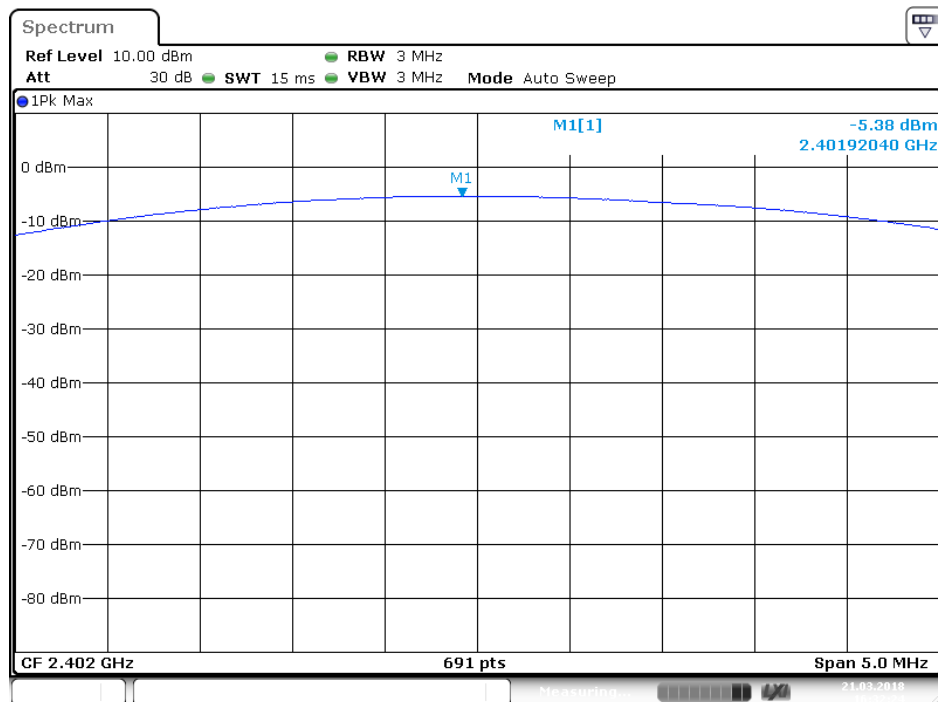
High channel



Date: 21.MAR.2018 16:35:37

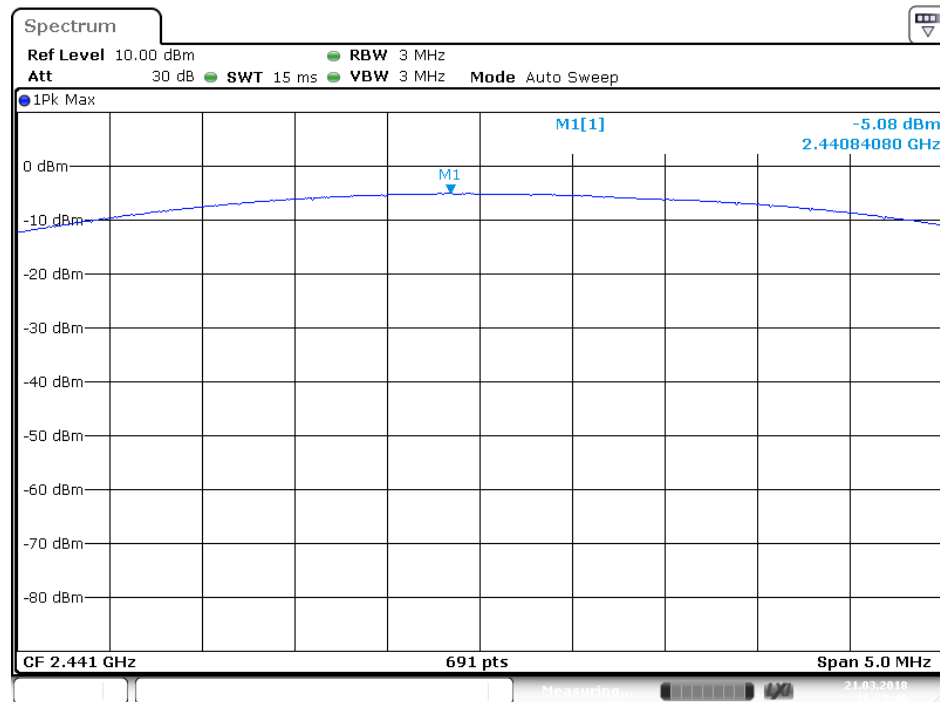
II/4-DQPSK Mode

Low channel



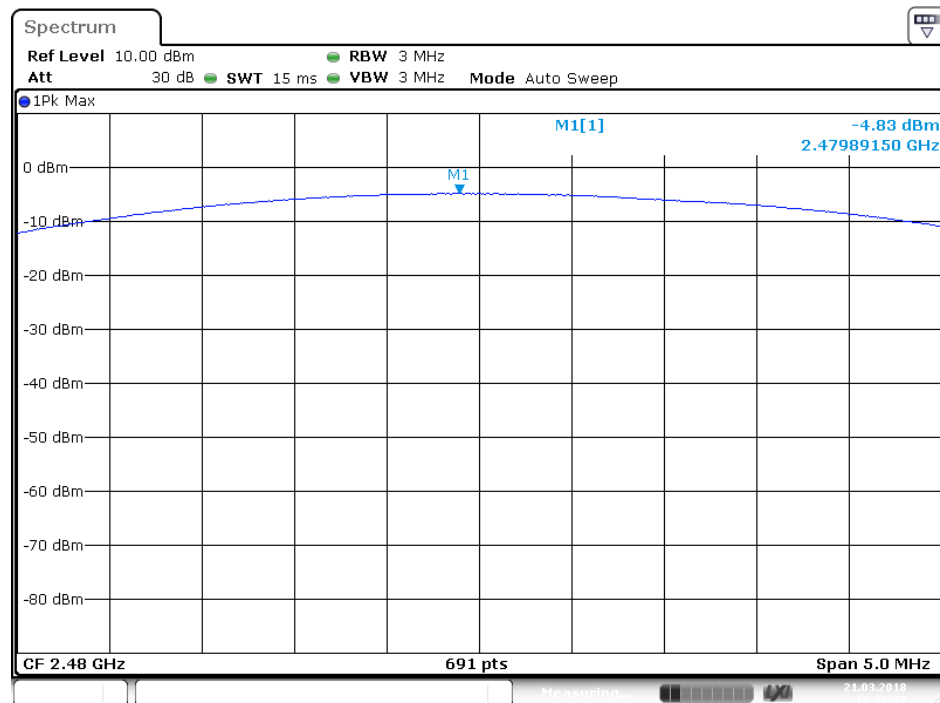
Date: 21.MAR.2018 16:32:24

Middle channel



Date: 21.MAR.2018 16:29:46

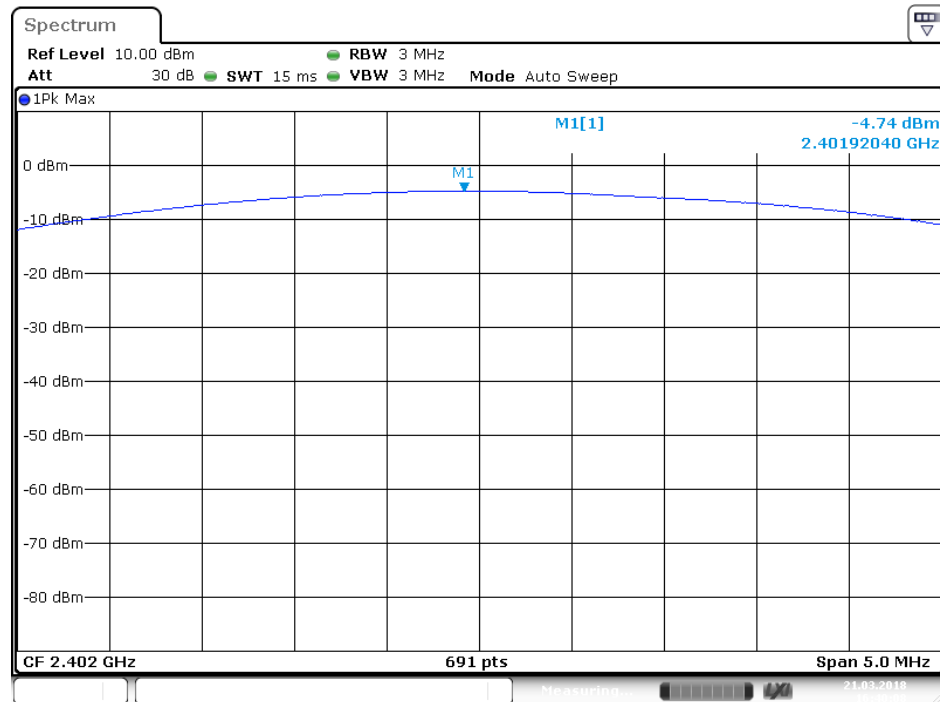
High channel



Date: 21.MAR.2018 16:30:48

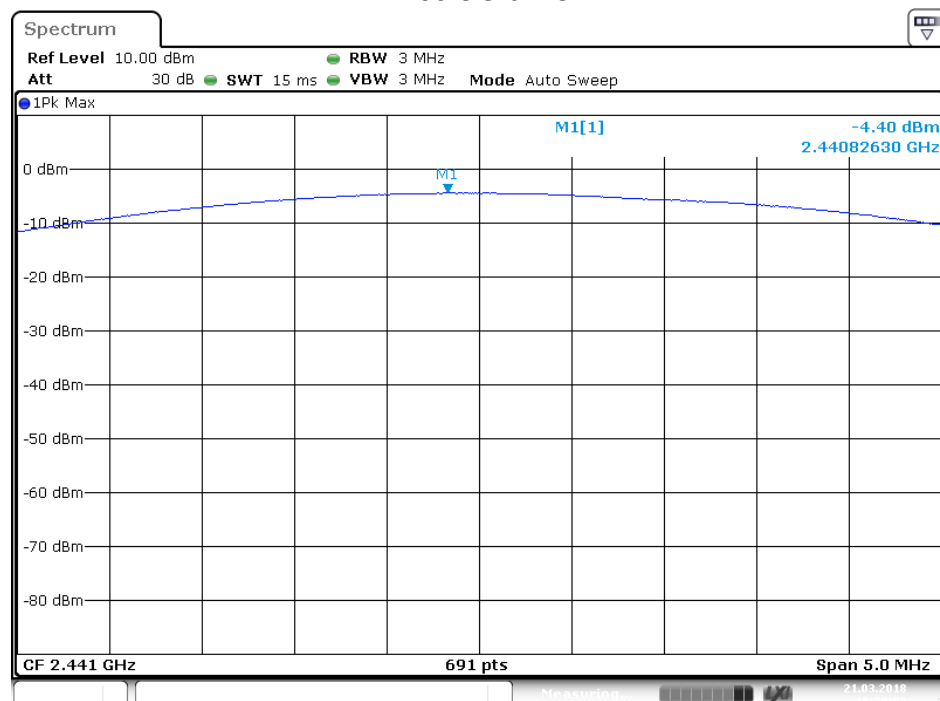
8DPSK Mode

Low channel



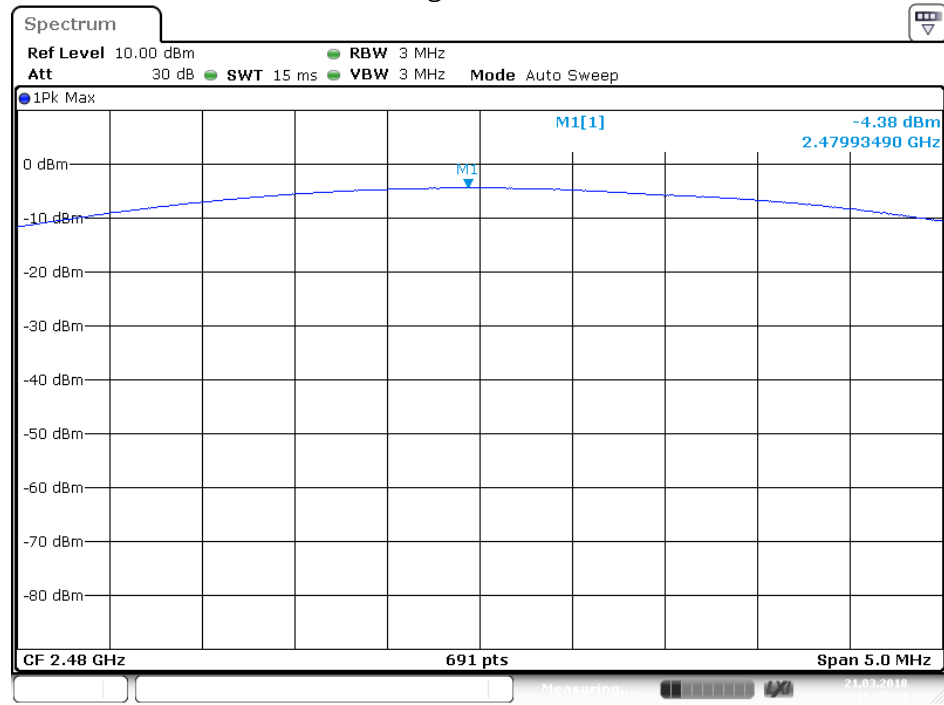
Date: 21.MAR.2018 16:40:08

Middle channel



Date: 21.MAR.2018 16:39:08

High channel

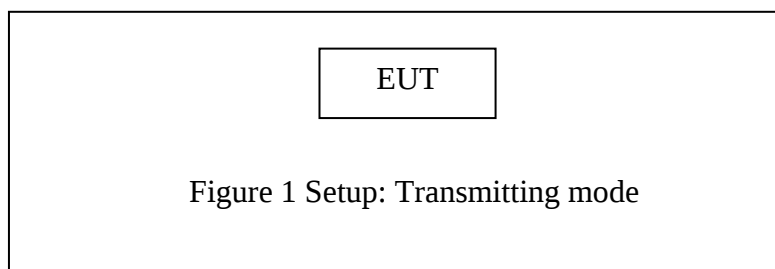


Date: 21.MAR.2018 16:37:34

10.RADIATED EMISSION TEST

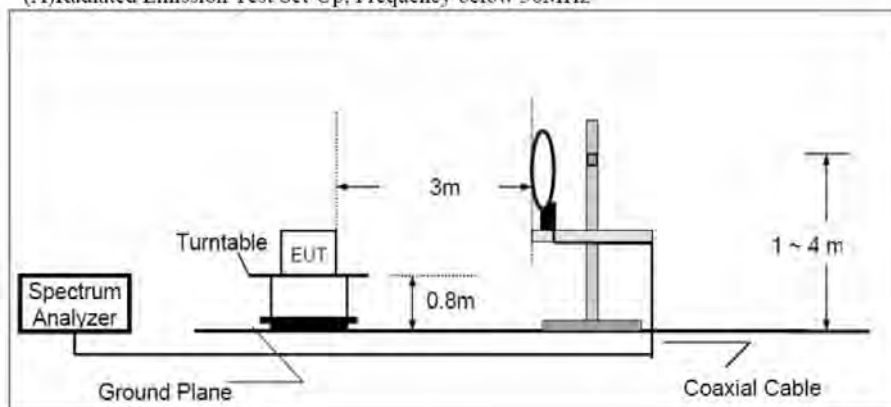
10.1.Block Diagram of Test Setup

10.1.1.Block diagram of connection between the EUT and peripherals

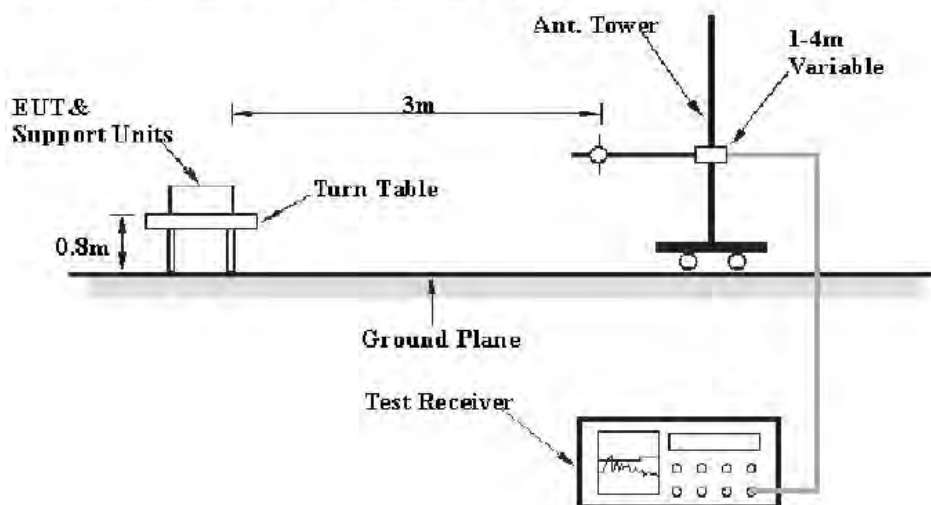


10.1.2.Semi-Anechoic Chamber Test Setup Diagram

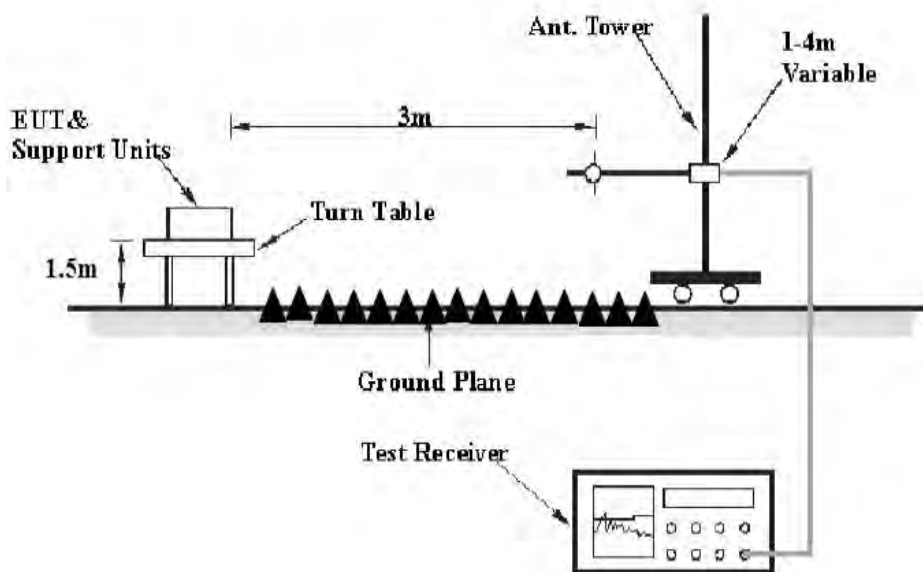
(A) Radiated Emission Test Set-Up, Frequency below 30MHz



(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 Section 15.209 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.

Test Lab: 3m Anechoic chamber

Test Engineer: Star

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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Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2018 #72

Standard: FCC Class C 3M Radiated

Test item: Radiation Test

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

EUT: Bluetooth Earphones

Mode: TX 2402MHz (GFSK)

Model: 40012BT

Manufacturer: SHENGLAI

Polarization: Horizontal

Power Source: DC 3.7V

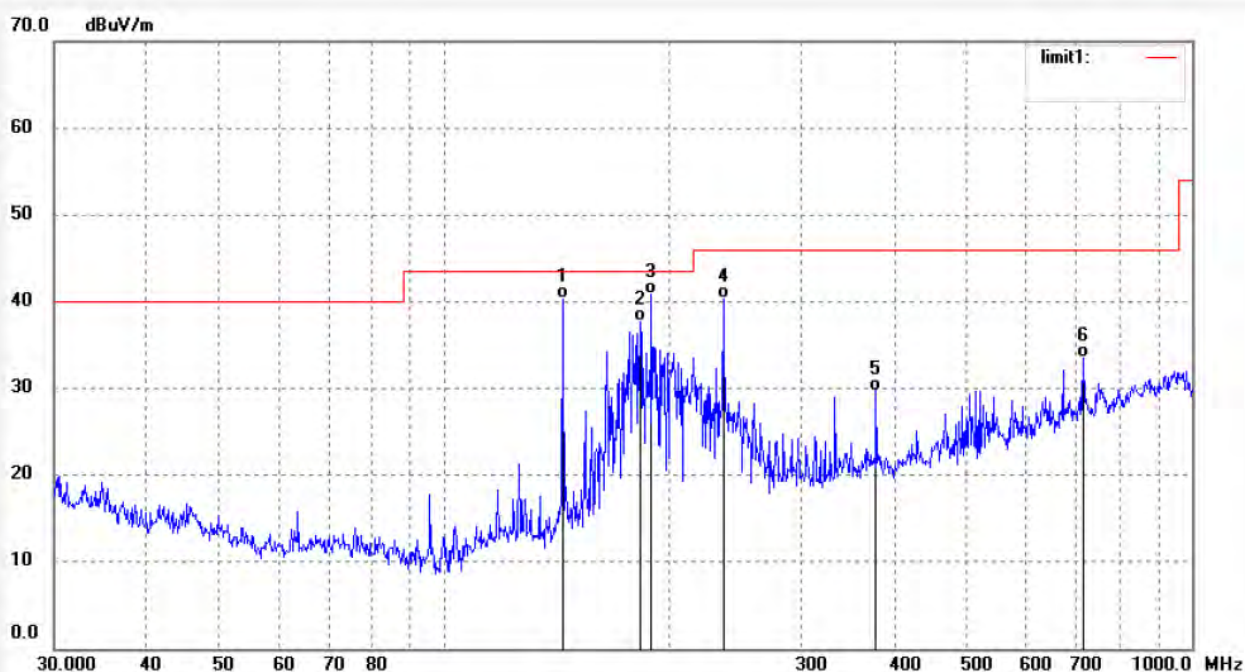
Date: 18/03/23/

Time: 11/14/19

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20180396



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	143.7760	62.55	-22.20	40.35	43.50	-3.15	QP			
2	182.5785	57.72	-20.09	37.63	43.50	-5.87	QP			
3	189.1076	60.43	-19.52	40.91	43.50	-2.59	QP			
4	235.9622	58.54	-18.28	40.26	46.00	-5.74	QP			
5	377.8481	43.91	-14.16	29.75	46.00	-16.25	QP			
6	716.2038	41.05	-7.58	33.47	46.00	-12.53	QP			



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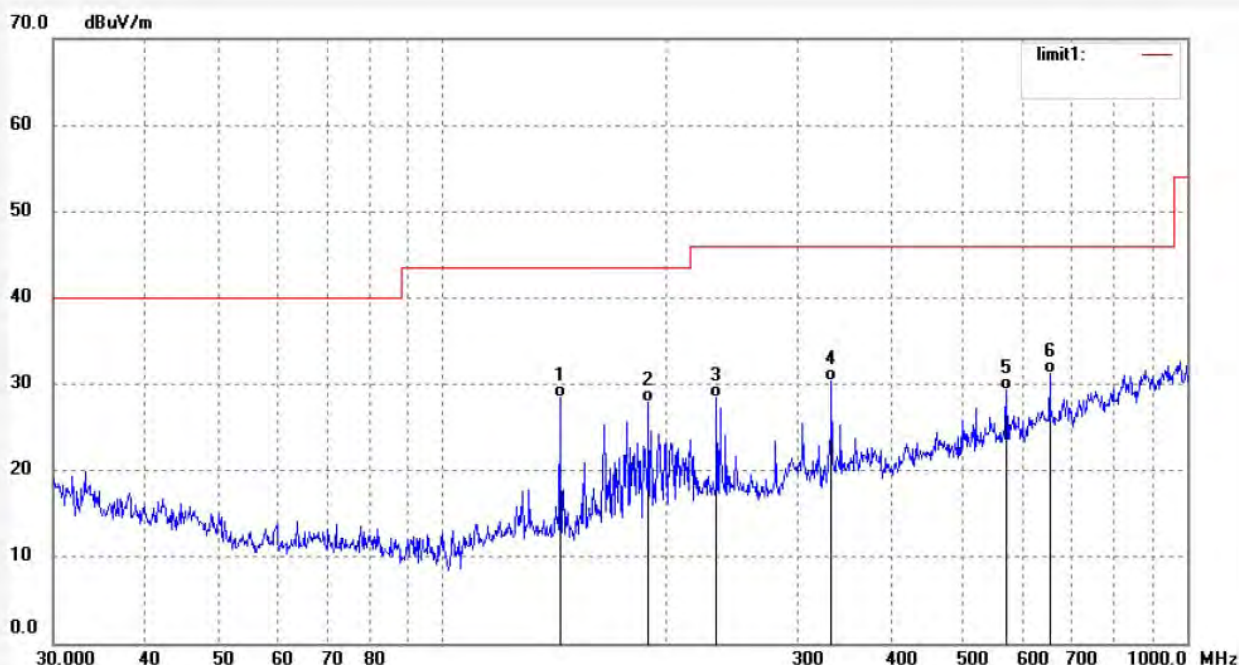
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2018 #71
Standard: FCC Class C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earphones
Mode: TX 2402MHz (GFSK)
Model: 40012BT
Manufacturer: SHENGLAI

Polarization: Vertical
Power Source: DC 3.7V
Date: 18/03/23/
Time: 11/13/09
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20180396





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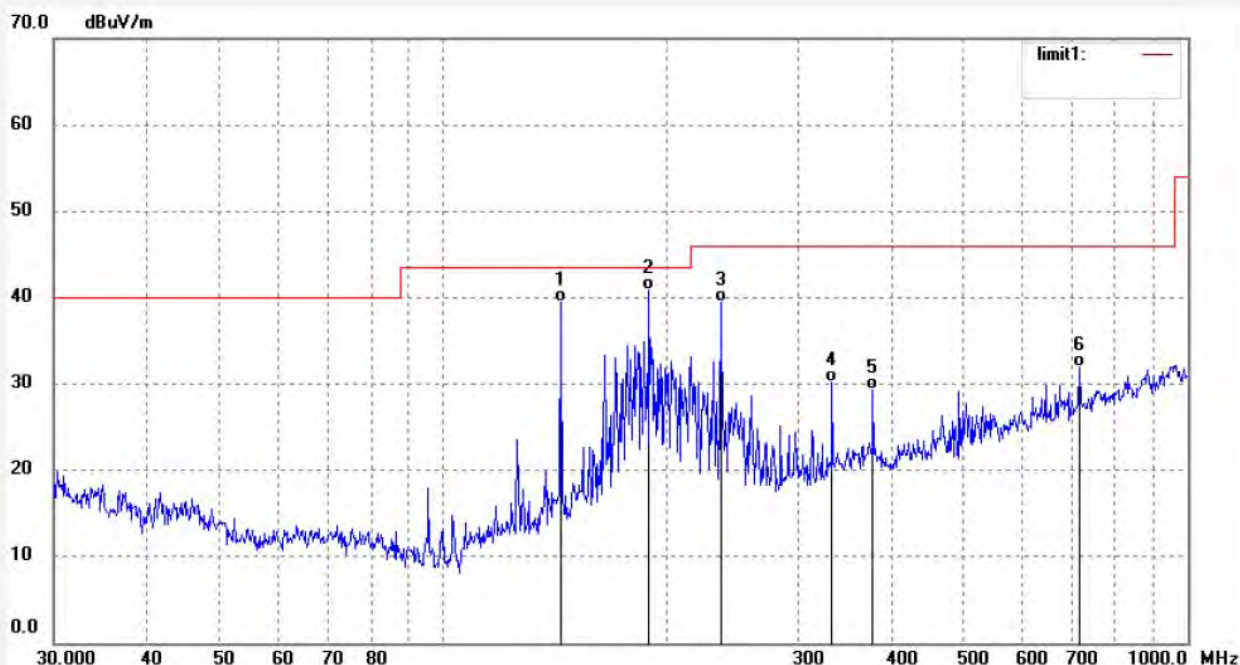
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2018 #73
Standard: FCC Class C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earphones
Mode: TX 2441MHz (GFSK)
Model: 40012BT
Manufacturer: SHENGLAI

Polarization: Horizontal
Power Source: DC 3.7V
Date: 18/03/23/
Time: 11/16/32
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20180396



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	143.7760	61.72	-22.20	39.52	43.50	-3.98	QP			
2	189.1075	60.35	-19.52	40.83	43.50	-2.67	QP			
3	235.9621	57.74	-18.28	39.46	46.00	-6.54	QP			
4	332.9534	45.40	-15.22	30.18	46.00	-15.82	QP			
5	377.8480	43.47	-14.16	29.31	46.00	-16.69	QP			
6	716.2038	39.47	-7.58	31.89	46.00	-14.11	QP			



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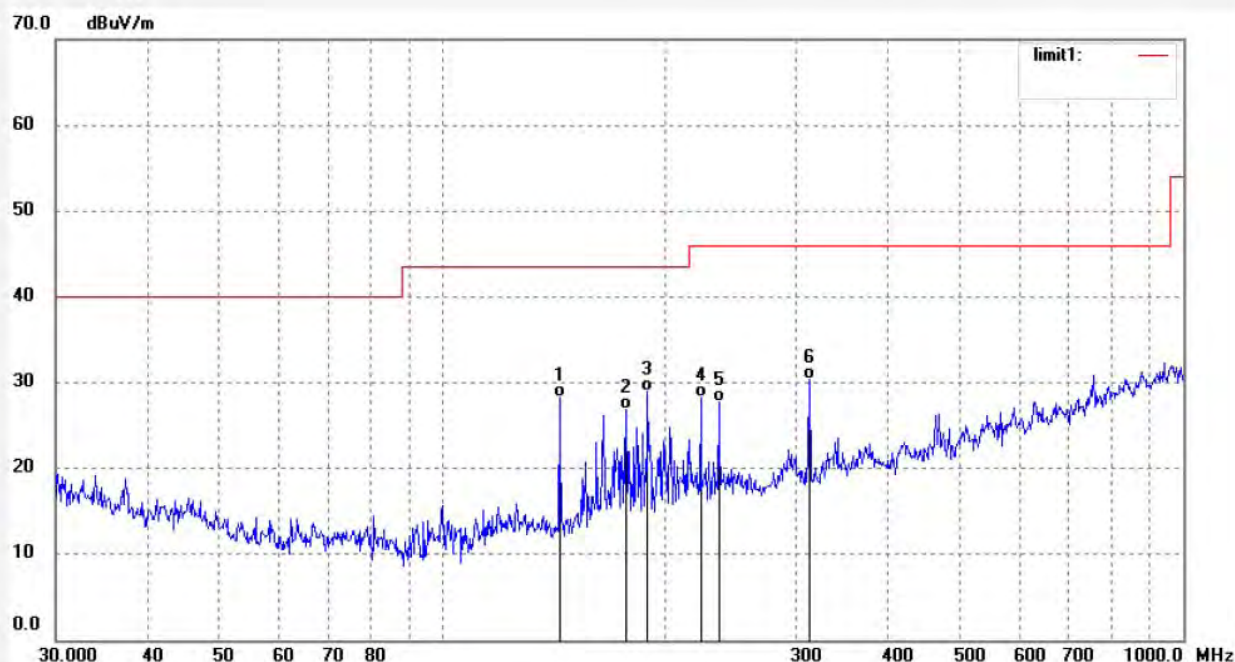
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2018 #74
Standard: FCC Class C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earphones
Mode: TX 2441MHz (GFSK)
Model: 40012BT
Manufacturer: SHENGLAI

Polarization: Vertical
Power Source: DC 3.7V
Date: 18/03/23/
Time: 11/17/32
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20180396



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	143.7760	50.52	-22.20	28.32	43.50	-15.18	QP			
2	176.8951	47.45	-20.62	26.83	43.50	-16.67	QP			
3	189.1074	48.40	-19.52	28.88	43.50	-14.62	QP			
4	223.0629	46.70	-18.37	28.33	46.00	-17.67	QP			
5	235.9620	46.08	-18.28	27.80	46.00	-18.20	QP			
6	312.5482	46.41	-15.99	30.42	46.00	-15.58	QP			



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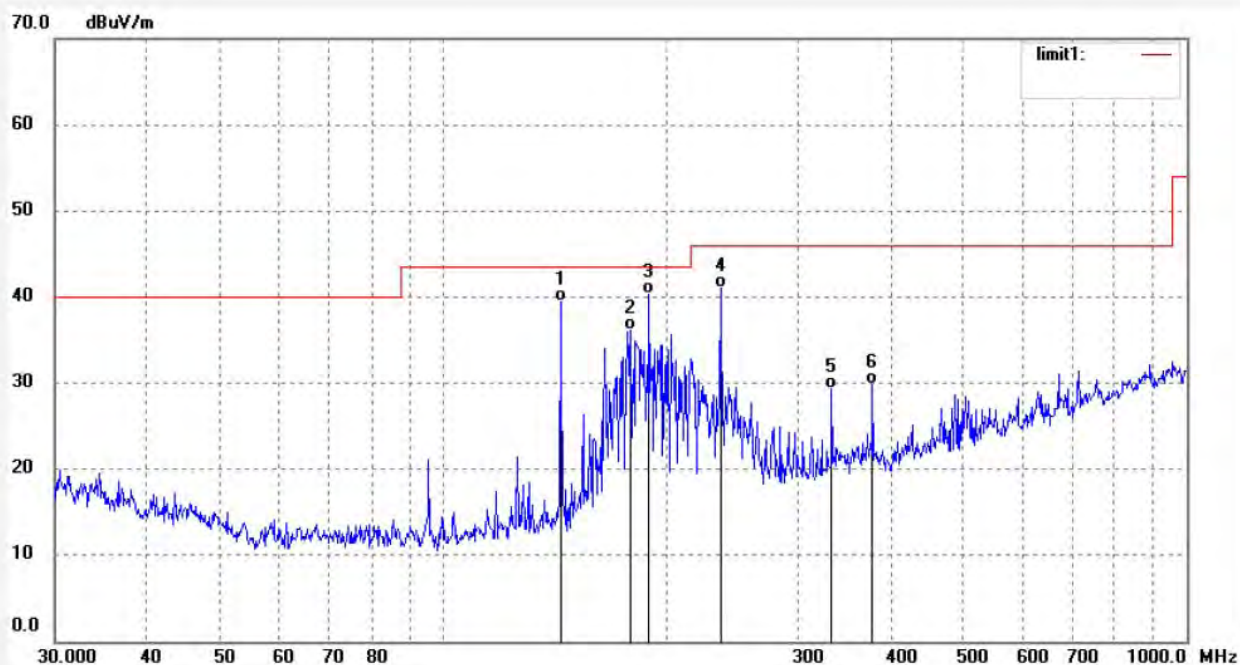
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2018 #76
Standard: FCC Class C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earphones
Mode: TX 2480MHz (GFSK)
Model: 40012BT
Manufacturer: SHENGLAI

Polarization: Horizontal
Power Source: DC 3.7V
Date: 18/03/23/
Time: 11/20/07
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20180396



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	143.7760	61.68	-22.20	39.48	43.50	-4.02	QP			
2	178.7697	56.64	-20.45	36.19	43.50	-7.31	QP			
3	189.1076	59.83	-19.52	40.31	43.50	-3.19	QP			
4	235.9622	59.32	-18.28	41.04	46.00	-4.96	QP			
5	332.9536	44.52	-15.22	29.30	46.00	-16.70	QP			
6	377.8481	44.05	-14.16	29.89	46.00	-16.11	QP			



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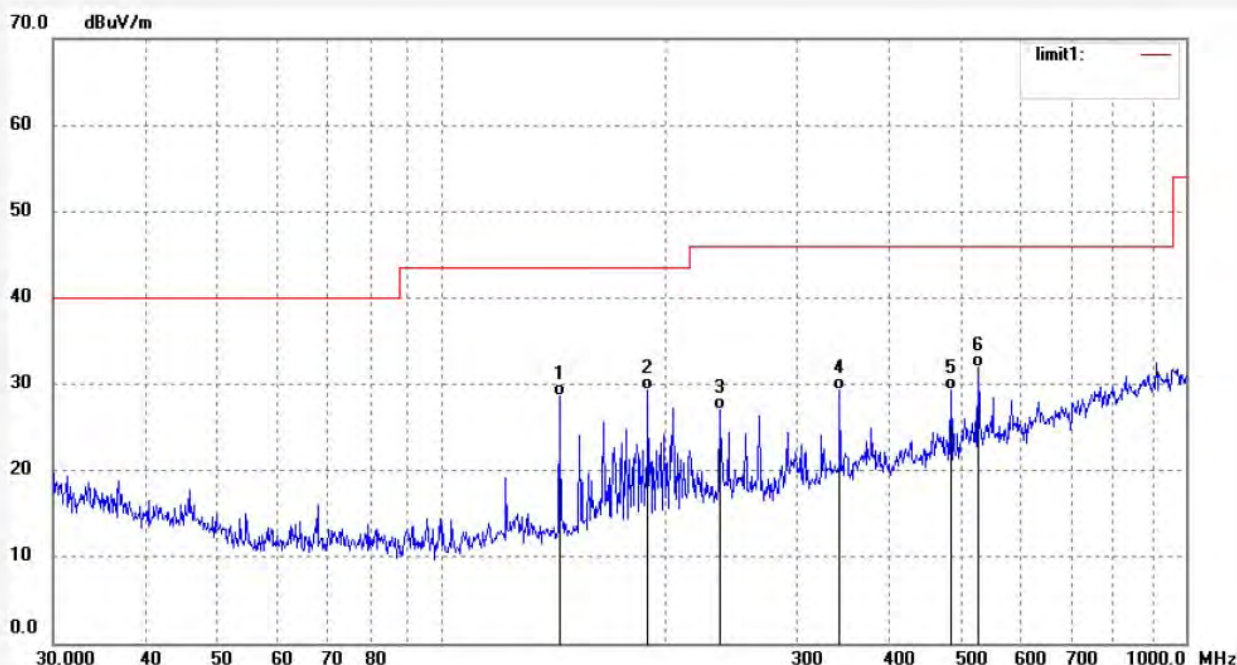
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR2018 #75
Standard: FCC Class C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earphones
Mode: TX 2480MHz (GFSK)
Model: 40012BT
Manufacturer: SHENGLAI

Polarization: Vertical
Power Source: DC 3.7V
Date: 18/03/23/
Time: 11/18/21
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20180396



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	143.7760	50.77	-22.20	28.57	43.50	-14.93	QP			
2	189.1075	48.75	-19.52	29.23	43.50	-14.27	QP			
3	235.9621	45.29	-18.28	27.01	46.00	-18.99	QP			
4	342.4452	44.24	-14.92	29.32	46.00	-16.68	QP			
5	483.2060	41.68	-12.43	29.25	46.00	-16.75	QP			
6	525.7201	43.58	-11.65	31.93	46.00	-14.07	QP			

Above 1GHz



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Job No.: STAR2018 #78

Standard: FCC PK

Test item: Radiation Test

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

EUT: Bluetooth Earphones

Mode: TX 2402MHz (GFSK)

Model: 40012BT

Manufacturer: SHENGLAI

Polarization: Horizontal

Power Source: DC 3.7V

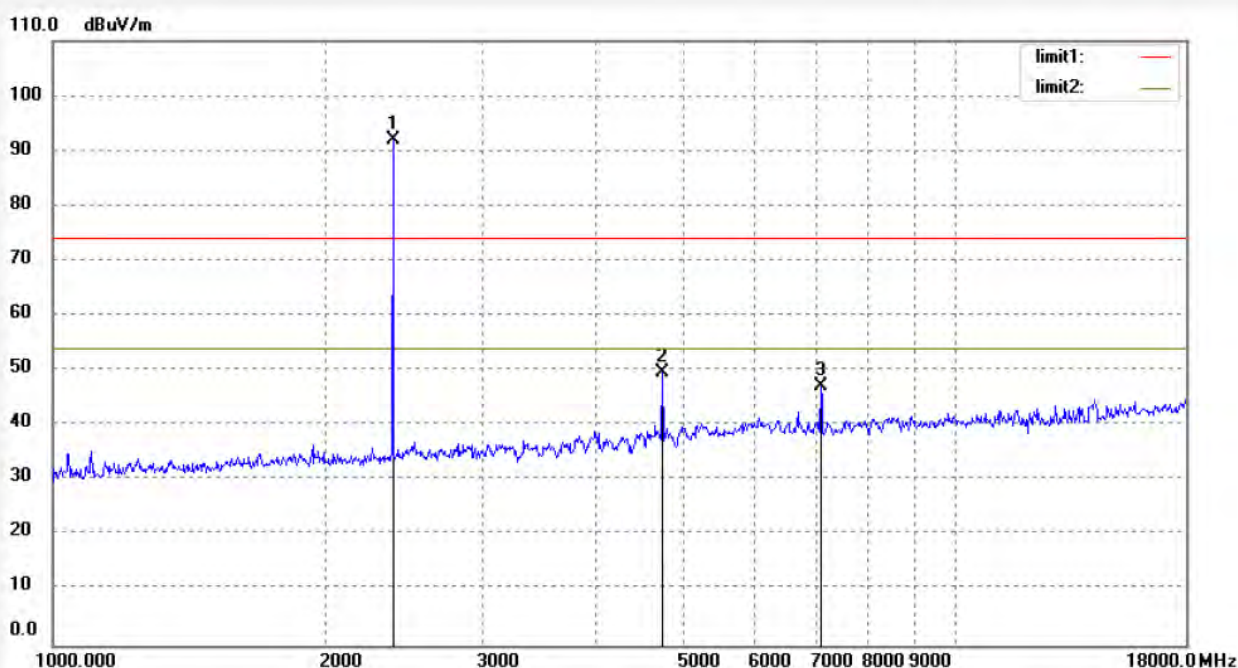
Date: 18/03/23/

Time: 11/28/02

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20180396



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	100.01	-8.03	91.98			peak			
2	4804.057	52.27	-2.53	49.74	74.00	-24.26	peak			
3	7206.054	45.25	1.92	47.17	74.00	-26.83	peak			



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Job No.: STAR2018 #77

Standard: FCC PK

Test item: Radiation Test

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

EUT: Bluetooth Earphones

Mode: TX 2402MHz (GFSK)

Model: 40012BT

Manufacturer: SHENGLAI

Polarization: Vertical

Power Source: DC 3.7V

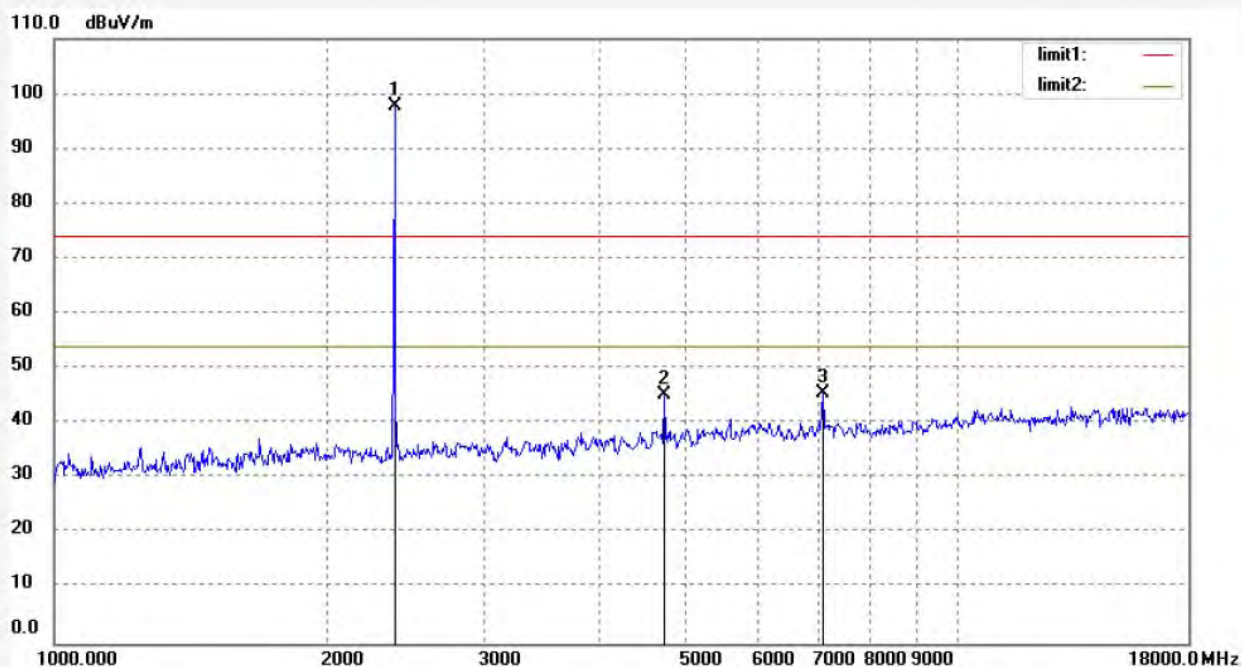
Date: 18/03/23/

Time: 11/24/47

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20180396



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	105.67	-8.03	97.64			peak			
2	4804.057	47.86	-2.53	45.33	74.00	-28.67	peak			
3	7206.054	43.51	1.92	45.43	74.00	-28.57	peak			



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Job No.: STAR2018 #79

Standard: FCC PK

Test item: Radiation Test

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

EUT: Bluetooth Earphones

Mode: TX 2441MHz (GFSK)

Model: 40012BT

Manufacturer: SHENGLAI

Polarization: Horizontal

Power Source: DC 3.7V

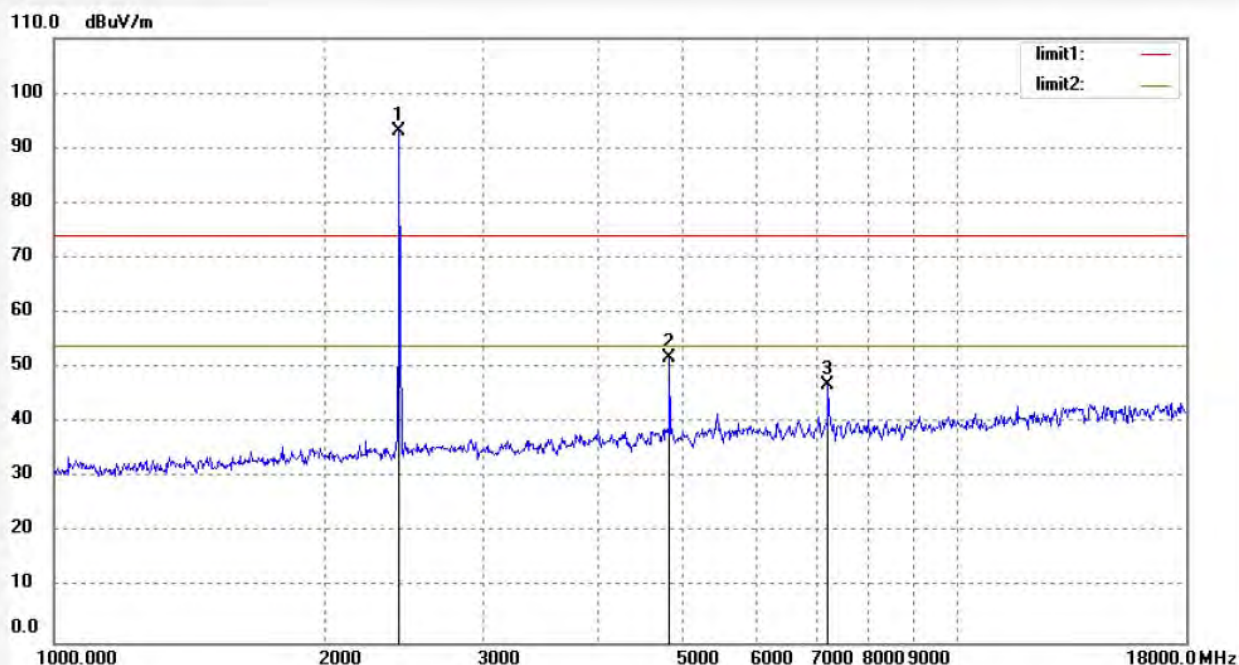
Date: 18/03/23/

Time: 11/29/55

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20180396



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	101.05	-7.93	93.12			peak			
2	4882.324	54.03	-2.25	51.78	74.00	-22.22	peak			
3	7323.096	44.87	2.11	46.98	74.00	-27.02	peak			



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Job No.: STAR2018 #80

Standard: FCC PK

Test item: Radiation Test

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

EUT: Bluetooth Earphones

Mode: TX 2441MHz (GFSK)

Model: 40012BT

Manufacturer: SHENGLAI

Polarization: Vertical

Power Source: DC 3.7V

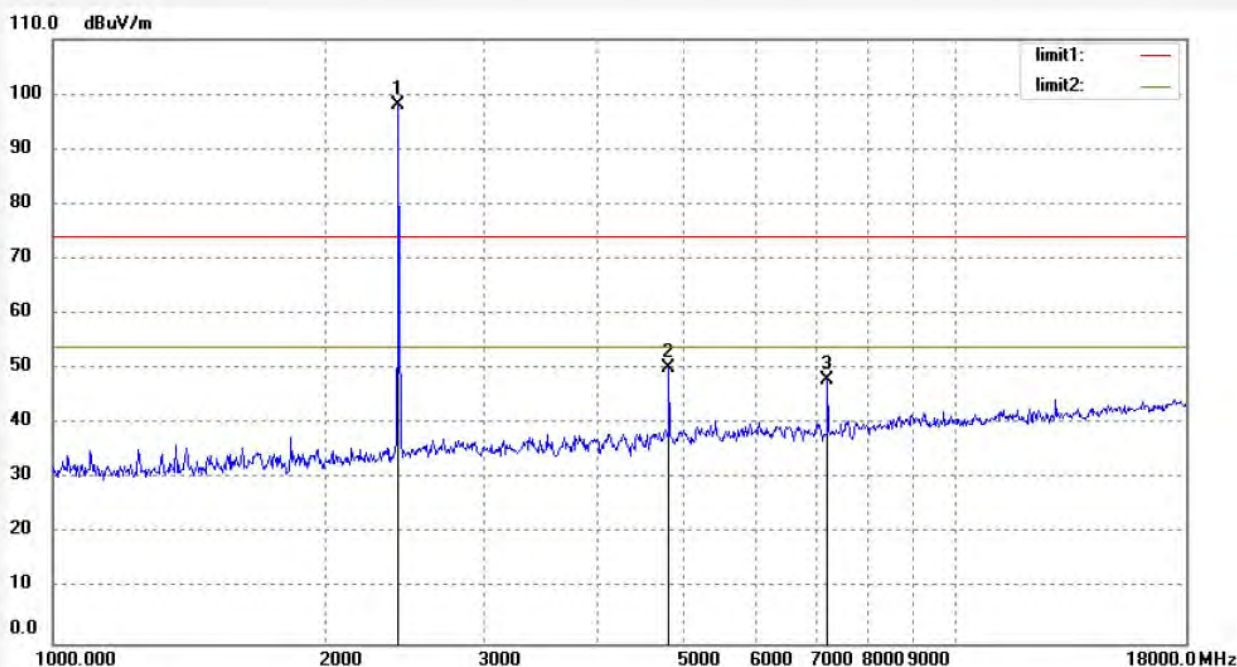
Date: 18/03/23/

Time: 11/31/45

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20180396



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	106.00	-7.93	98.07			peak			
2	4882.324	52.39	-2.25	50.14	74.00	-23.86	peak			
3	7323.096	45.84	2.11	47.95	74.00	-26.05	peak			



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Job No.: STAR2018 #82

Standard: FCC PK

Test item: Radiation Test

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

EUT: Bluetooth Earphones

Mode: TX 2480MHz (GFSK)

Model: 40012BT

Manufacturer: SHENGLAI

Polarization: Horizontal

Power Source: DC 3.7V

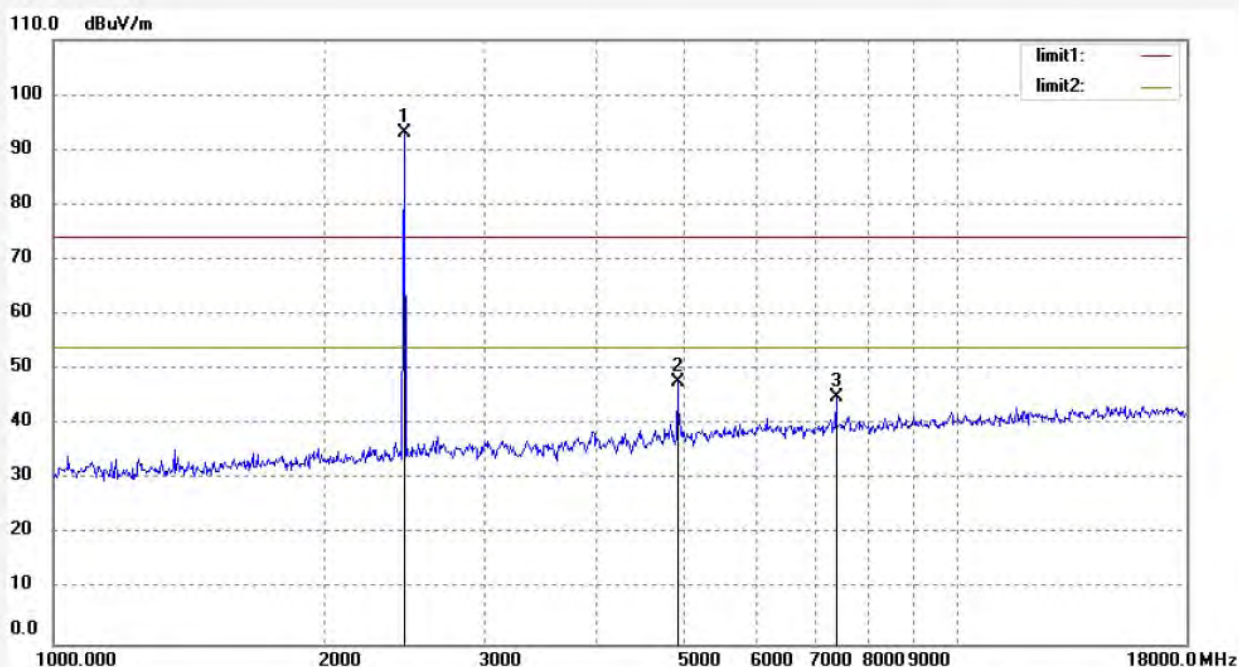
Date: 18/03/23/

Time: 11/35/24

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20180396



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	100.91	-7.84	93.07			peak			
2	4960.144	49.58	-1.92	47.66	74.00	-26.34	peak			
3	7440.246	42.71	2.33	45.04	74.00	-28.96	peak			



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Job No.: STAR2018 #81

Standard: FCC PK

Test item: Radiation Test

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

EUT: Bluetooth Earphones

Mode: TX 2480MHz (GFSK)

Model: 40012BT

Manufacturer: SHENGLAI

Polarization: Vertical

Power Source: DC 3.7V

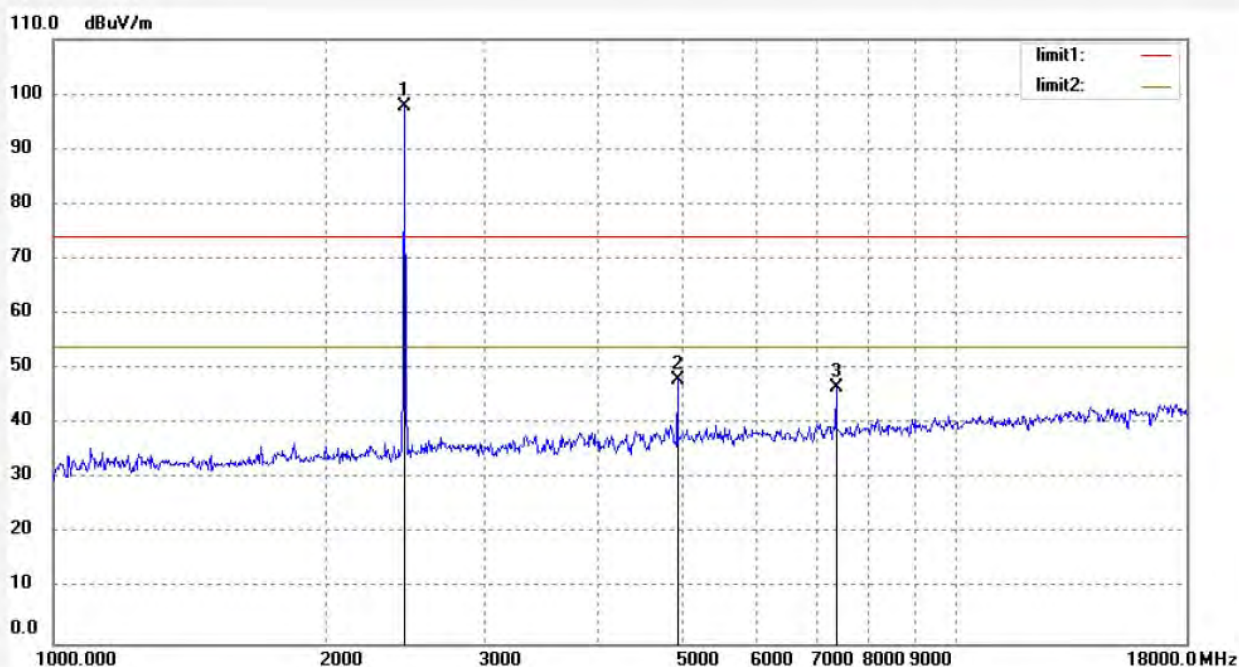
Date: 18/03/23/

Time: 11/33/21

Engineer Signature: star

Distance: 3m

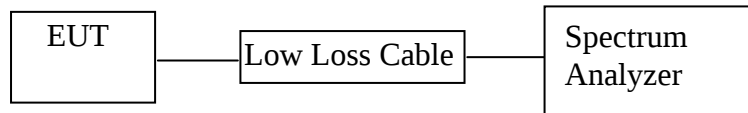
Note: Report No.:ATE20180396



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	105.61	-7.84	97.77			peak			
2	4960.044	49.78	-1.92	47.86	74.00	-26.14	peak			
3	7440.246	44.27	2.33	46.60	74.00	-27.40	peak			

11.BAND EDGE COMPLIANCE TEST

11.1.Block Diagram of Test Setup



(EUT: Bluetooth Earphones)

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

Test Lab: Shielding room

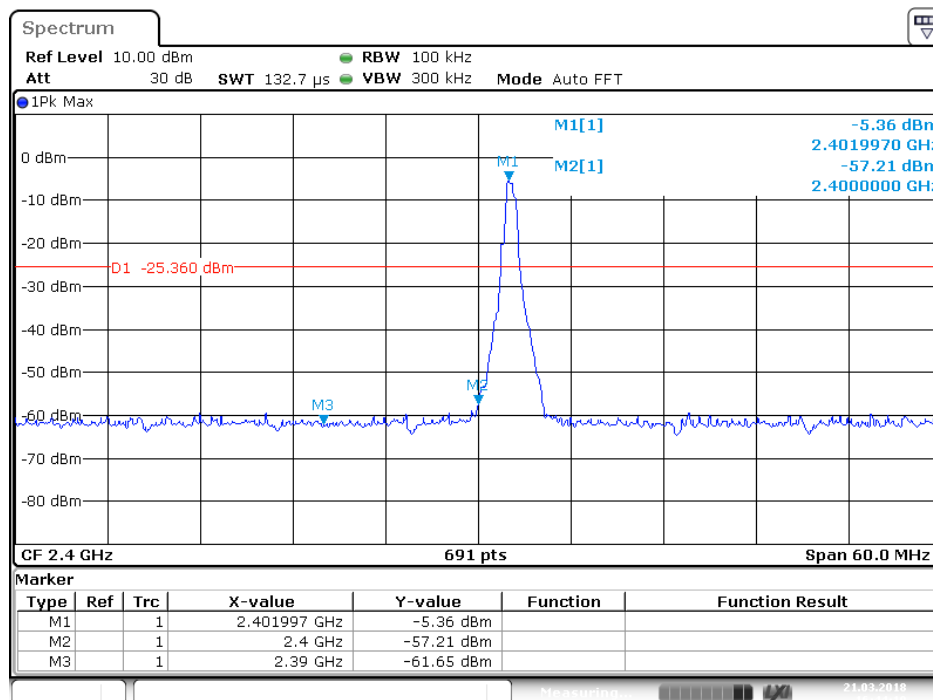
Test Engineer: Star

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

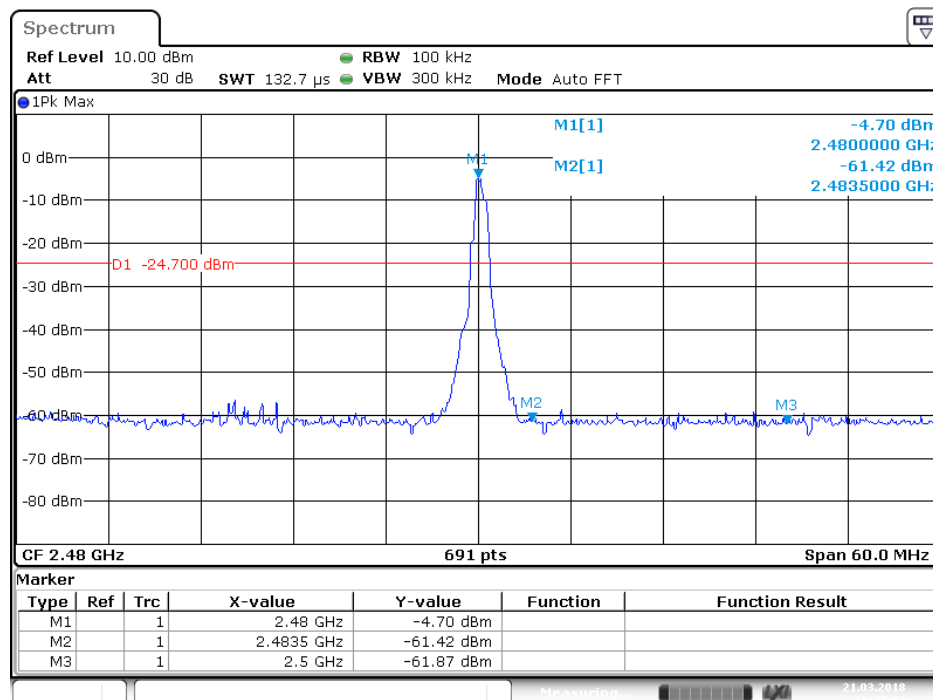
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
GFSK Mode		
2400.00	51.86	> 20dBc
2483.50	56.72	> 20dBc
Π/4-DQPSK Mode		
2400.00	50.03	> 20dBc
2483.50	55.36	> 20dBc
8DPSK Mode		
2400.00	47.79	> 20dBc
2483.50	54.85	> 20dBc

The spectrum analyzer plots are attached as below.

GFSK Mode

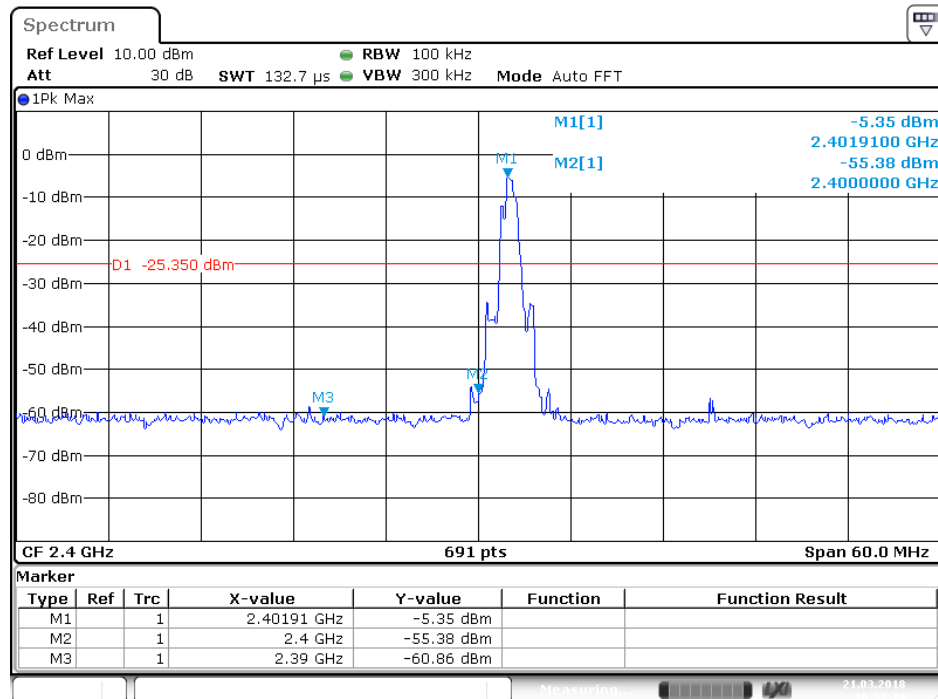


Date: 21.MAR.2018 16:44:19

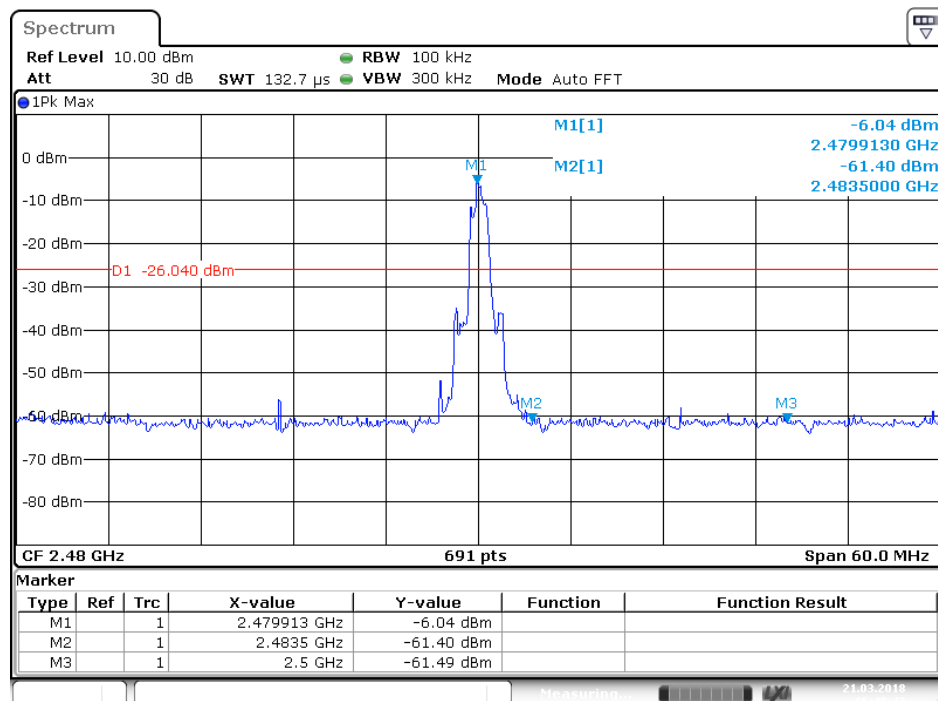


Date: 21.MAR.2018 16:47:00

Π/4-DQPSK Mode

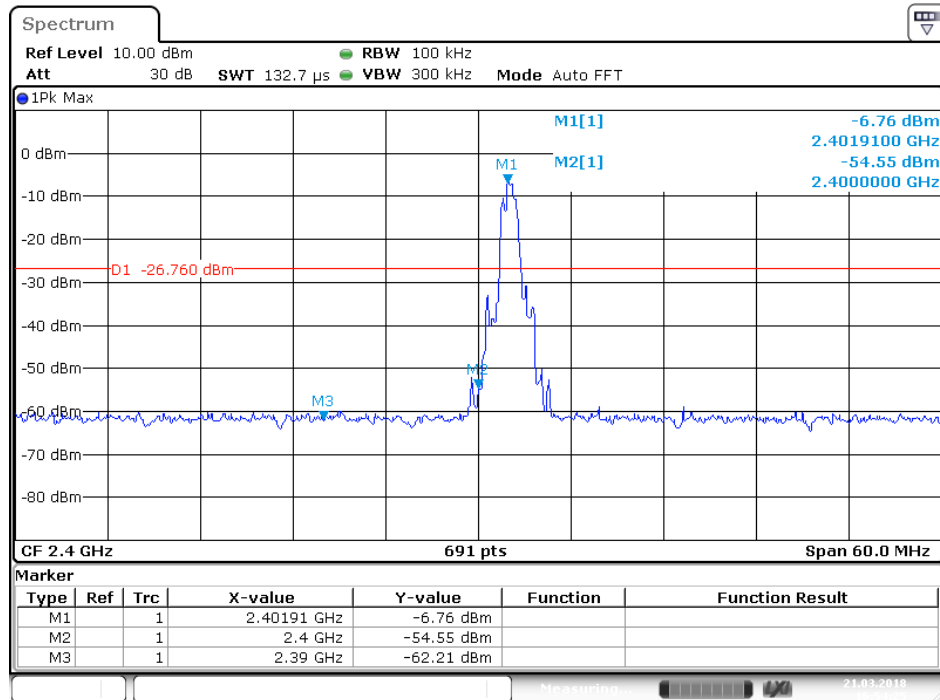


Date: 21.MAR.2018 16:52:14

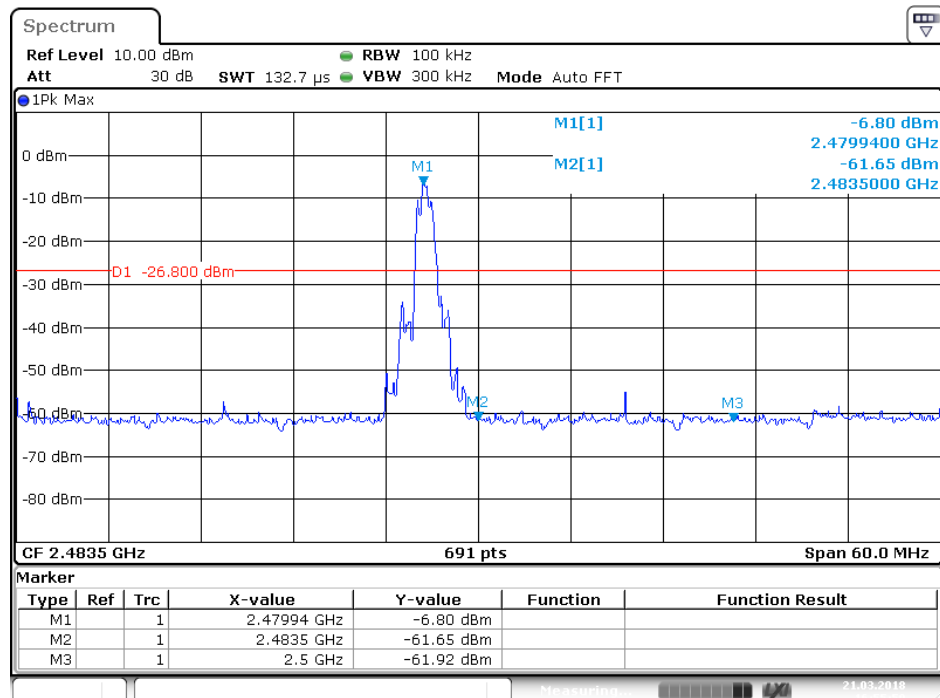


Date: 21.MAR.2018 16:48:43

8DPSK Mode



Date: 21.MAR.2018 16:54:25



Date: 21.MAR.2018 16:55:59

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



Non-hopping mode ACCURATE TECHNOLOGY CO., LTD.

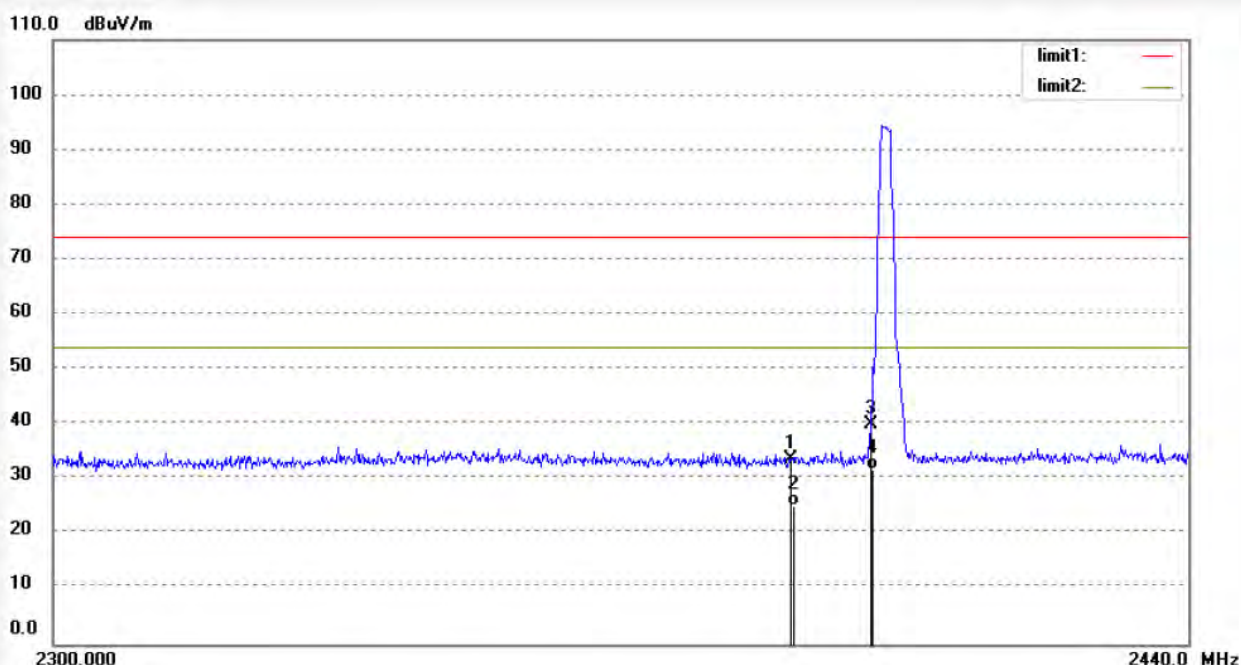
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
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Site: 1# Chamber
Tel:+86-0755-26503290
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Job No.: STAR2018 #86
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Bluetooth Earphones
Mode: TX 2402MHz (GFSK)
Model: 40012BT
Manufacturer: SHENGLAI

Polarization: Horizontal
Power Source: DC 3.7V
Date: 18/03/23/
Time: 11/43/45
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20180396



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	41.72	-8.00	33.72	74.00	-40.28	peak			
2	2390.000	33.25	-8.00	25.25	54.00	-28.75	AVG			
3	2400.000	47.96	-7.97	39.99	74.00	-34.01	peak			
4	2400.000	39.71	-7.97	31.74	54.00	-22.26	AVG			

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



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Job No.: STAR2018 #85

Standard: FCC PK

Test item: Radiation Test

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

EUT: Bluetooth Earphones

Mode: TX 2402MHz (GFSK)

Model: 40012BT

Manufacturer: SHENGLAI

Polarization: Vertical

Power Source: DC 3.7V

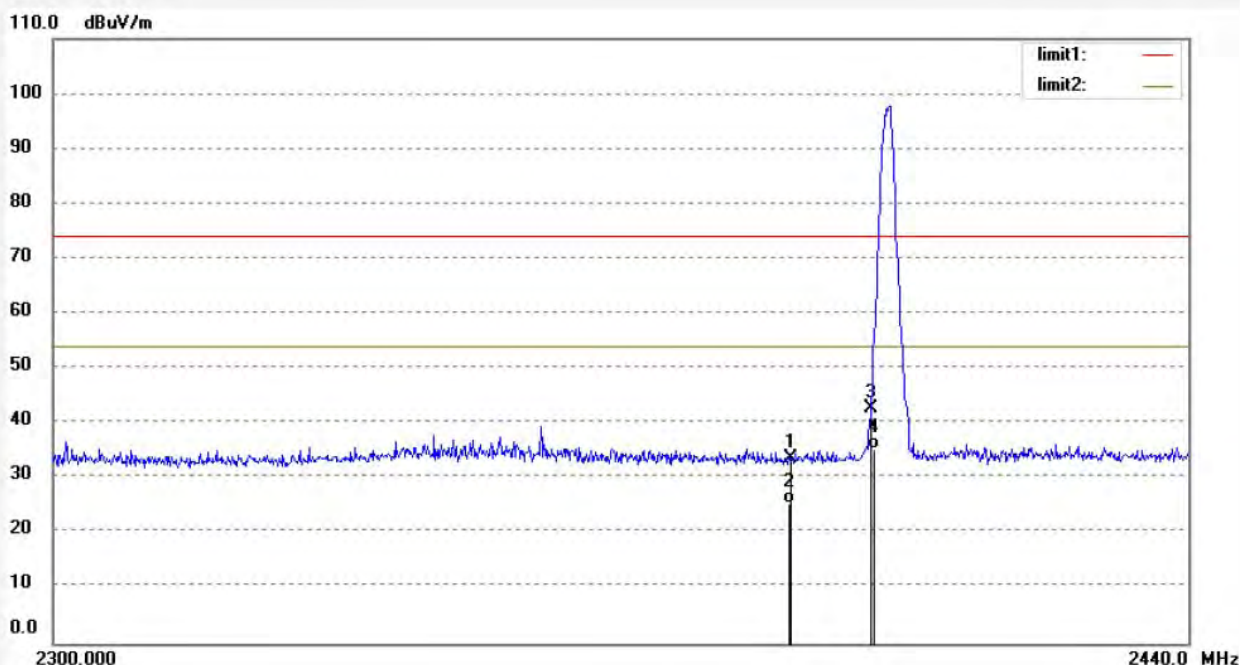
Date: 18/03/23/

Time: 11/42/32

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20180396



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	41.82	-8.00	33.82	74.00	-40.18	peak			
2	2390.000	33.54	-8.00	25.54	54.00	-28.46	AVG			
3	2400.000	50.87	-7.97	42.90	74.00	-31.10	peak			
4	2400.000	43.27	-7.97	35.30	54.00	-18.70	AVG			

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



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Job No.: STAR2018 #83

Standard: FCC PK

Test item: Radiation Test

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

EUT: Bluetooth Earphones

Mode: TX 2480MHz (GFSK)

Model: 40012BT

Manufacturer: SHENGLAI

Polarization: Horizontal

Power Source: DC 3.7V

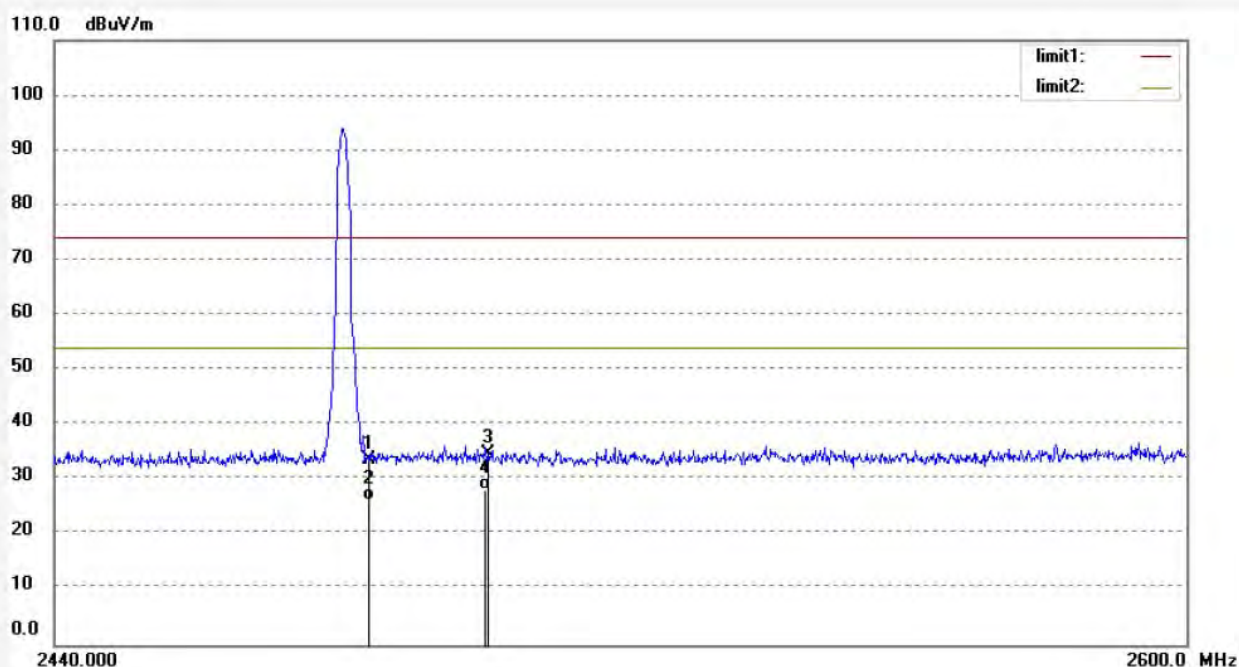
Date: 18/03/23/

Time: 11/39/54

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20180396



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	41.39	-7.76	33.63	74.00	-40.37	peak			
2	2483.500	34.02	-7.76	26.26	54.00	-27.74	AVG			
3	2500.000	42.37	-7.71	34.66	74.00	-39.34	peak			
4	2500.000	35.92	-7.71	28.21	54.00	-25.79	AVG			

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



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Job No.: STAR2018 #84

Standard: FCC PK

Test item: Radiation Test

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

EUT: Bluetooth Earphones

Mode: TX 2480MHz (GFSK)

Model: 40012BT

Manufacturer: SHENGLAI

Polarization: Vertical

Power Source: DC 3.7V

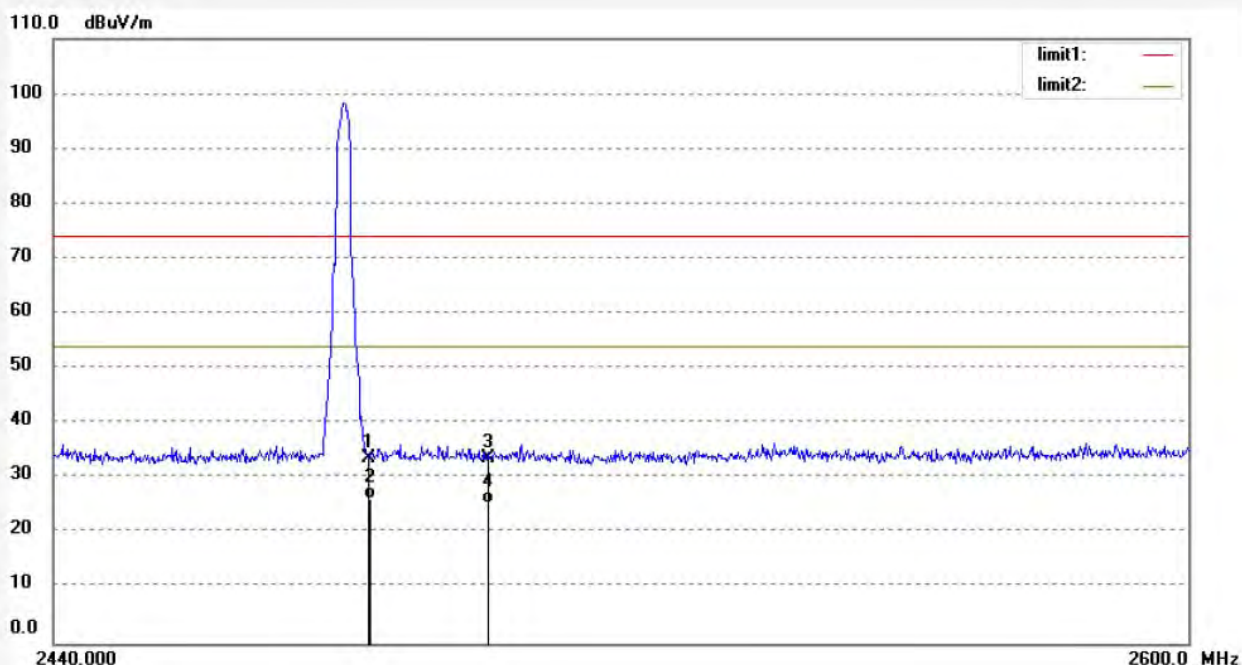
Date: 18/03/23/

Time: 11/41/01

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20180396



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	41.41	-7.76	33.65	74.00	-40.35	peak			
2	2483.500	33.90	-7.76	26.14	54.00	-27.86	AVG			
3	2500.000	41.31	-7.71	33.60	74.00	-40.40	peak			
4	2500.000	33.05	-7.71	25.34	54.00	-28.66	AVG			

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

Hopping mode



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Job No.: STAR2018 #88

Standard: FCC PK

Test item: Radiation Test

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

EUT: Bluetooth Earphones

Mode: Hopping (GFSK)

Model: 40012BT

Manufacturer: SHENGLAI

Polarization: Horizontal

Power Source: DC 3.7V

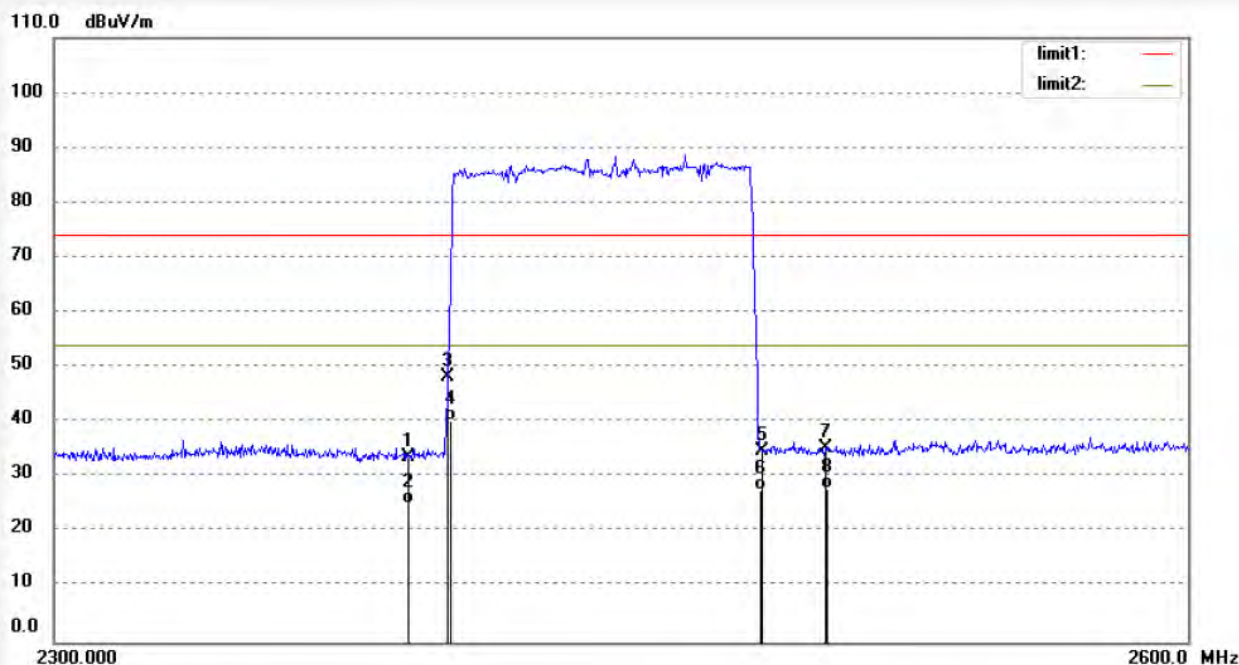
Date: 18/03/23/

Time: 13/47/15

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20180396



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	41.74	-8.00	33.74	74.00	-40.26	peak			
2	2390.000	33.28	-8.00	25.28	54.00	-28.72	AVG			
3	2400.000	56.18	-7.97	48.21	74.00	-25.79	peak			
4	2400.000	48.13	-7.97	40.16	54.00	-13.84	AVG			
5	2483.500	42.48	-7.76	34.72	74.00	-39.28	peak			
6	2483.500	35.48	-7.76	27.72	54.00	-26.28	AVG			
7	2500.000	43.12	-7.71	35.41	74.00	-38.59	peak			
8	2500.000	35.52	-7.71	27.81	54.00	-26.19	AVG			

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



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Job No.: STAR2018 #87

Standard: FCC PK

Test item: Radiation Test

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

EUT: Bluetooth Earphones

Mode: Hopping (GFSK)

Model: 40012BT

Manufacturer: SHENGLAI

Polarization: Vertical

Power Source: DC 3.7V

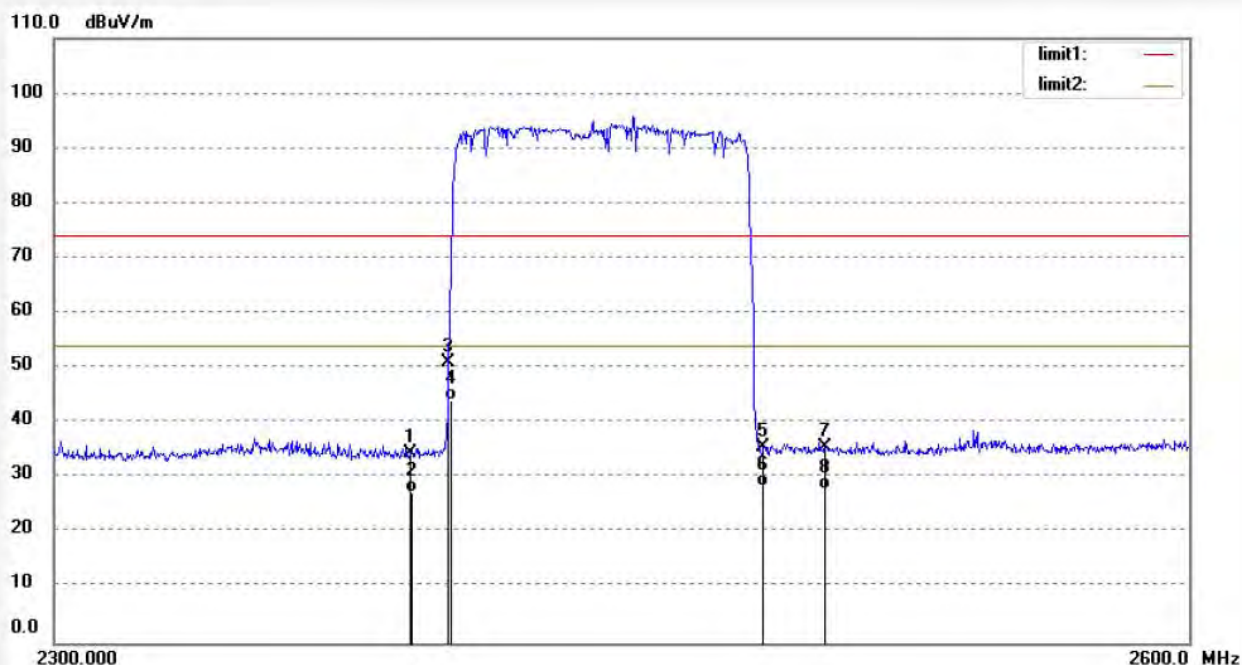
Date: 18/03/23/

Time: 13/42/47

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20180396



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	42.62	-8.00	34.62	74.00	-39.38	peak			
2	2390.000	35.36	-8.00	27.36	54.00	-26.64	AVG			
3	2400.000	59.01	-7.97	51.04	74.00	-22.96	peak			
4	2400.000	52.09	-7.97	44.12	54.00	-9.88	AVG			
5	2483.500	43.36	-7.76	35.60	74.00	-38.40	peak			
6	2483.500	36.14	-7.76	28.38	54.00	-25.62	AVG			
7	2500.000	43.27	-7.71	35.56	74.00	-38.44	peak			
8	2500.000	35.62	-7.71	27.91	54.00	-26.09	AVG			

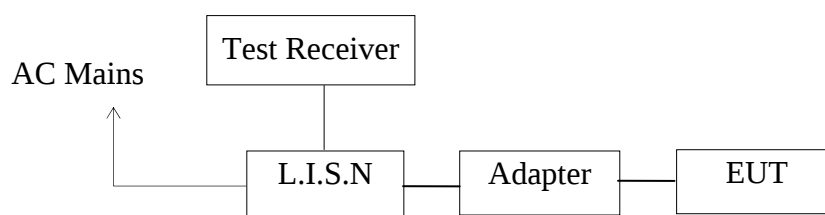
Note: Average measurement with peak detection at No.2&4&6&8

12.AC POWER LINE CONDUCTED EMISSION FOR FCC PART

15 SECTION 15.207(A)

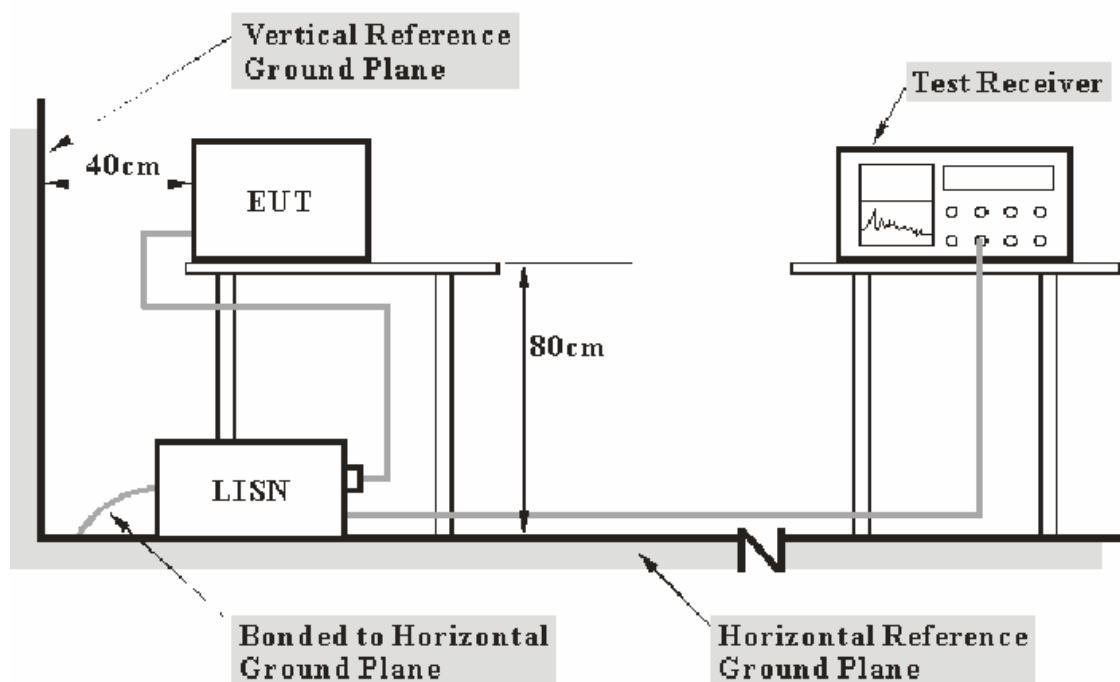
12.1.Block Diagram of Test Setup

12.1.1.Block diagram of connection between the EUT and simulators



(EUT: Bluetooth Earphones)

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	10.5	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.

Test Lab: Shielding room

Test Engineer: Star

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.

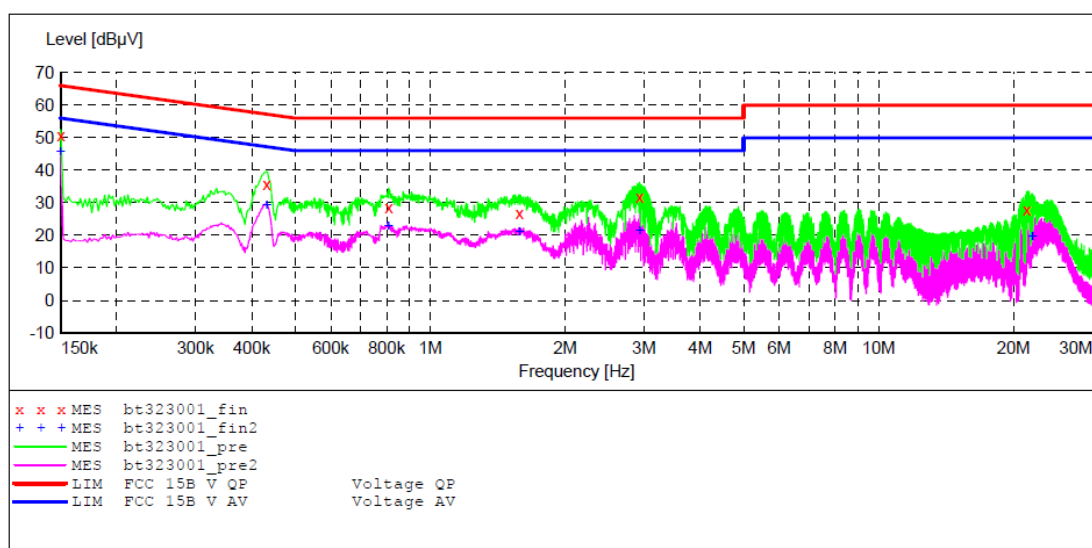
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15C

EUT: Bluetooth Earphones M/N:40012BT
 Manufacturer: SHENGLAI
 Operating Condition: BT Communication
 Test Site: 2#Shielding Room
 Operator: star
 Test Specification: N 240V/60Hz
 Comment: Report No.:ATE20180396
 Start of Test: 2018-3-23 / 16:17:17

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "bt323001_fin"

2018-3-23 16:19

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	50.60	10.8	66	15.4	QP	N	GND
0.432000	35.70	11.0	57	21.5	QP	N	GND
0.808000	28.50	11.1	56	27.5	QP	N	GND
1.580000	26.90	11.2	56	29.1	QP	N	GND
2.930000	31.90	11.3	56	24.1	QP	N	GND
21.420000	27.70	11.7	60	32.3	QP	N	GND

MEASUREMENT RESULT: "bt323001_fin2"

2018-3-23 16:19

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	45.60	10.8	56	10.4	AV	N	GND
0.432000	29.40	11.0	47	17.8	AV	N	GND
0.808000	22.80	11.1	46	23.2	AV	N	GND
1.580000	21.20	11.2	46	24.8	AV	N	GND
2.930000	21.30	11.3	46	24.7	AV	N	GND
22.025000	19.60	11.7	50	30.4	AV	N	GND

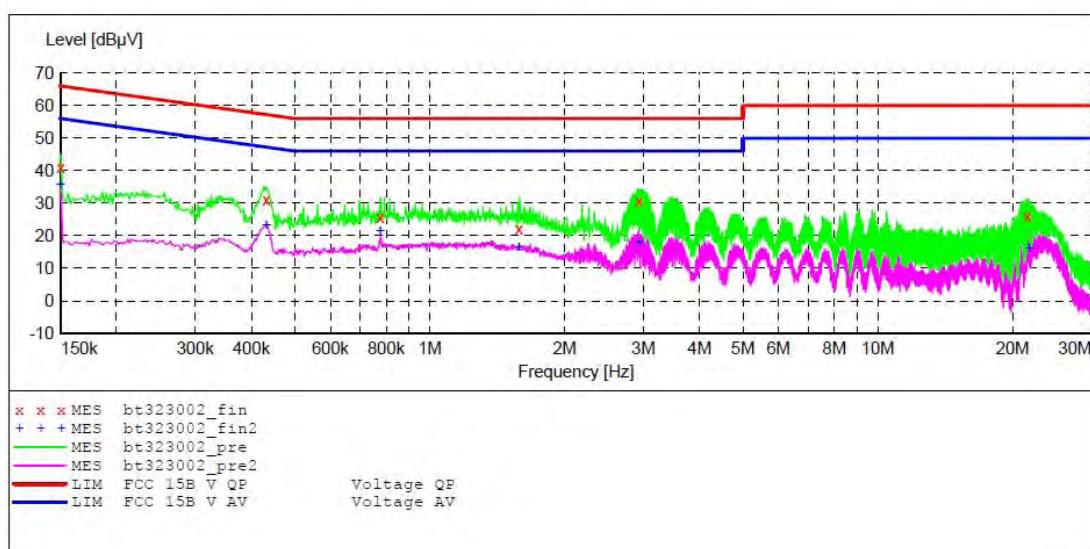
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15C

EUT: Bluetooth Earphones M/N:40012BT
 Manufacturer: SHENGLAI
 Operating Condition: BT Communication
 Test Site: 2#Shielding Room
 Operator: star
 Test Specification: L 240V/60Hz
 Comment: Report No.:ATE20180396
 Start of Test: 2018-3-23 / 16:20:15

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "bt323002_fin"

2018-3-23 16:22

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.150000	41.00	10.8	66	25.0	QP	L1	GND
0.432000	30.90	11.0	57	26.3	QP	L1	GND
0.776000	25.60	11.1	56	30.4	QP	L1	GND
1.582000	22.20	11.2	56	33.8	QP	L1	GND
2.930000	30.50	11.3	56	25.5	QP	L1	GND
21.575000	26.20	11.7	60	33.8	QP	L1	GND

MEASUREMENT RESULT: "bt323002_fin2"

2018-3-23 16:22

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.150000	35.70	10.8	56	20.3	AV	L1	GND
0.432000	23.30	11.0	47	23.9	AV	L1	GND
0.776000	21.50	11.1	46	24.5	AV	L1	GND
1.582000	16.50	11.2	46	29.5	AV	L1	GND
2.930000	17.90	11.3	46	28.1	AV	L1	GND
21.795000	16.10	11.7	50	33.9	AV	L1	GND

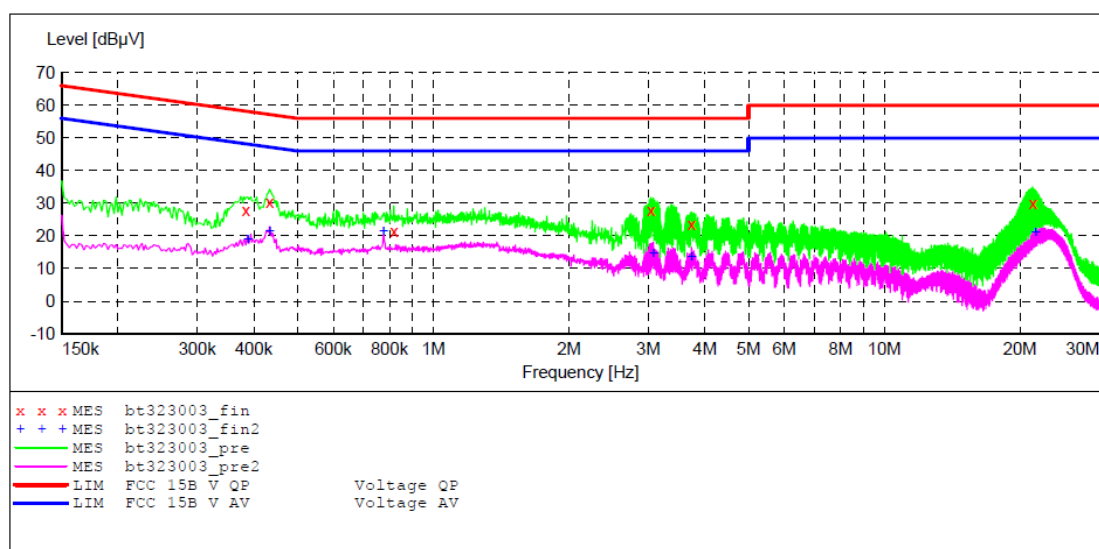
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15C

EUT: Bluetooth Earphones M/N:40012BT
 Manufacturer: SHENGLAI
 Operating Condition: BT Communication
 Test Site: 2#Shielding Room
 Operator: star
 Test Specification: N 120V/60Hz
 Comment: Report No.:ATE20180396
 Start of Test: 2018-3-23 / 16:22:52

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "bt323003_fin"

2018-3-23 16:24

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.384000	27.70	10.9	58	30.5	QP	N	GND
0.434000	30.40	11.0	57	26.8	QP	N	GND
0.818000	21.60	11.1	56	34.4	QP	N	GND
3.040000	27.70	11.3	56	28.3	QP	N	GND
3.735000	23.50	11.4	56	32.5	QP	N	GND
21.345000	30.00	11.7	60	30.0	QP	N	GND

MEASUREMENT RESULT: "bt323003_fin2"

2018-3-23 16:24

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.388000	18.80	11.0	48	29.3	AV	N	GND
0.434000	21.40	11.0	47	25.8	AV	N	GND
0.776000	21.50	11.1	46	24.5	AV	N	GND
3.075000	14.60	11.3	46	31.4	AV	N	GND
3.735000	13.60	11.4	46	32.4	AV	N	GND
21.655000	20.90	11.7	50	29.1	AV	N	GND

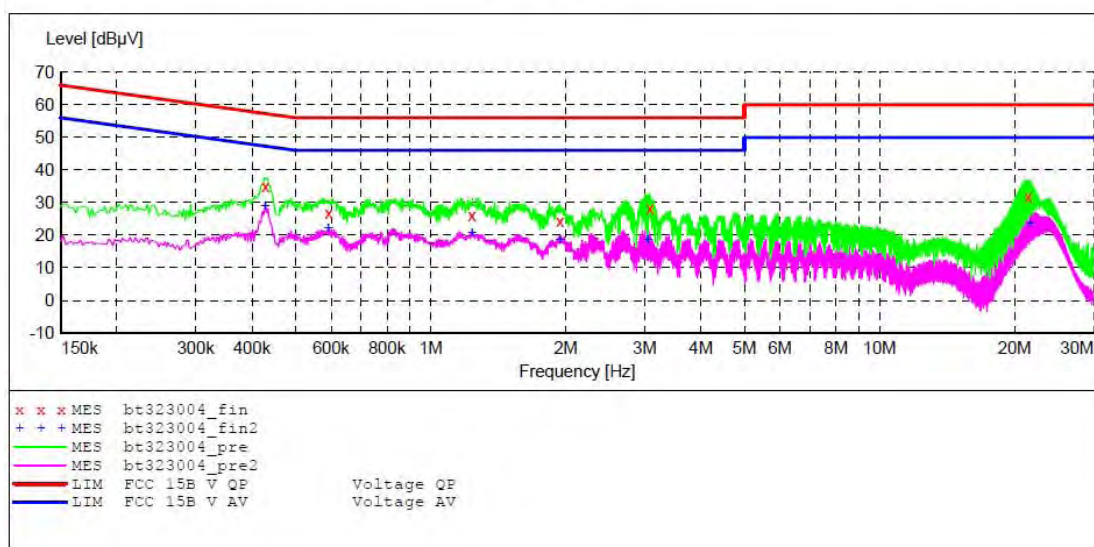
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15C

EUT: Bluetooth Earphones M/N:40012BT
 Manufacturer: SHENGLAI
 Operating Condition: BT Communication
 Test Site: 2#Shielding Room
 Operator: star
 Test Specification: L 120V/60Hz
 Comment: Report No.:ATE20180396
 Start of Test: 2018-3-23 / 16:25:18

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "bt323004_fin"

2018-3-23 16:27

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.428000	34.80	11.0	57	22.5	QP	L1	GND
0.592000	26.90	11.0	56	29.1	QP	L1	GND
1.236000	26.10	11.2	56	29.9	QP	L1	GND
1.942000	24.30	11.3	56	31.7	QP	L1	GND
3.080000	28.30	11.3	56	27.7	QP	L1	GND
21.455000	31.90	11.7	60	28.1	QP	L1	GND

MEASUREMENT RESULT: "bt323004_fin2"

2018-3-23 16:27

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.428000	29.00	11.0	47	18.3	AV	L1	GND
0.592000	22.10	11.0	46	23.9	AV	L1	GND
1.236000	20.70	11.2	46	25.3	AV	L1	GND
1.942000	18.70	11.3	46	27.3	AV	L1	GND
3.045000	18.60	11.3	46	27.4	AV	L1	GND
21.660000	23.40	11.7	50	26.6	AV	L1	GND

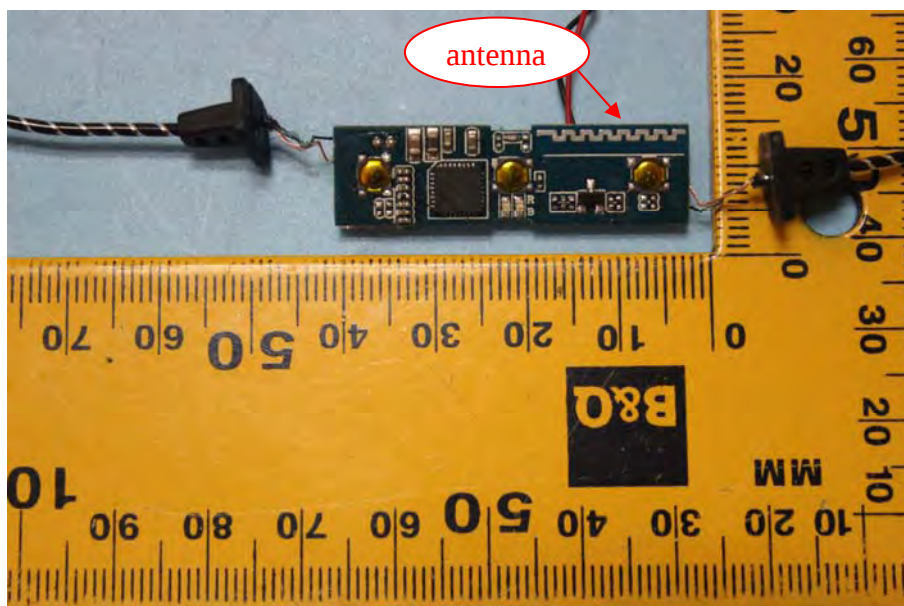
13.ANTENNA REQUIREMENT

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 0dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



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