APPLICATION CERTIFICATION FCC Part 15C
On Behalf of
UP Global Sourcing Ltd.

Industrial Wireless Earphones
Model No.: EE4020BT

FCC ID: 2AAR2EE4020BT

Prepared for	:	UP Global Sourcing Ltd.
Address	:	Manor Mill Victoria Street Chadderton Oldham OL9 0DD, UNITED KINGDOM
Prepared by	:	Shenzhen Accurate Technology Co., Ltd.
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Report No.	:	ATE20190489
Date of Test	:	March 16-April 2, 2019
Date of Report	:	April 10, 2019

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Test Report Certification

Applicant	:	UP Global Sourcing Ltd.
Address	:	Manor Mill Victoria Street Chadderton Oldham OL9 0DD, UNITED KINGDOM
Factory	:	CHANCO ELECTRONICS FACTORY
Address	:	NO.27, Sha Jin South Street, Changan Town, Dongguan City, Guangdong Province, China
Product	:	Industrial Wireless Earphones
Model No.	:	EE4020BT

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 :	March 16-April 2, 2019
Date of Report :	April 10, 2019

Prepared by : Stan Yang

(Stan Yang, Engineer)

Approved & Authorized Signer :

(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1.Description of Device (EUT)

Product	:	Industrial Wireless Earphones
Model Number	:	EE4020BT
Bluetooth version	:	V5.0 (Single Mode)
Frequency Range	:	2402-2480MHz
Channel Spacing	:	1MHz
Number of Channels	:	79
Antenna Gain(Max)	:	-0.58dBi
Antenna type	:	PIFA Antenna
Modulation mode	:	GFSK, π/4 DQPSK
Trade Mark	:	PRIMARK
Rating	:	Input: 5 V 0.5 A

1.2.Accessory and Auxiliary Equipment

Notebook PC: Manufacturer: Lenovo
M/N: ThinkPad X240
S/N: n.a

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	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 05, 2019	One Year
EMI Test Receiver	Rohde&Schwarz	ESR	101817	Jan. 05, 2019	One Year
Spectrum Analyzer	Rohde&Schwarz	FSV-40	101495	Jan. 05, 2019	One Year
Pre-Amplifier	Agilent	8447D	294A10619	Jan. 05, 2019	One Year
Pre-Amplifier	Compliance Direction	RSU-M2	38322	Jan. 05, 2019	One Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 05, 2019	One Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 05, 2019	One Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 05, 2019	One Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 05, 2019	One Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 05, 2019	One Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18G-10SS	N/A	Jan. 05, 2019	One Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2485-2375/2510-60/11SS	N/A	Jan. 05, 2019	One Year
Conducted Emission Measurement Software: ES-K1 V1.71					
Radiated Emission Measurement Software: EZ_EMC V1.1.4.2					

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

3.2.Configuration and peripherals

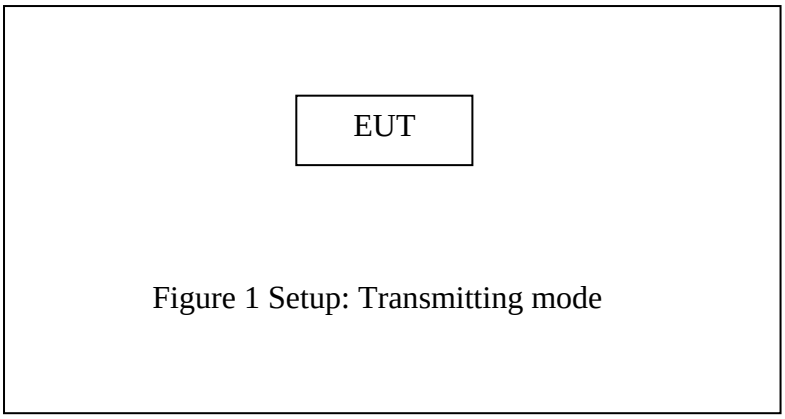


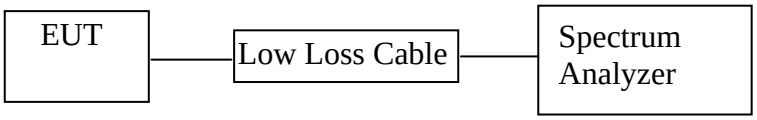
Figure 1 Setup: Transmitting mode

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 Emission Test	Compliant
Section 15.247(d)	Conducted Spurious Emission 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.The RBW should be 1%~5% of OBW.

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

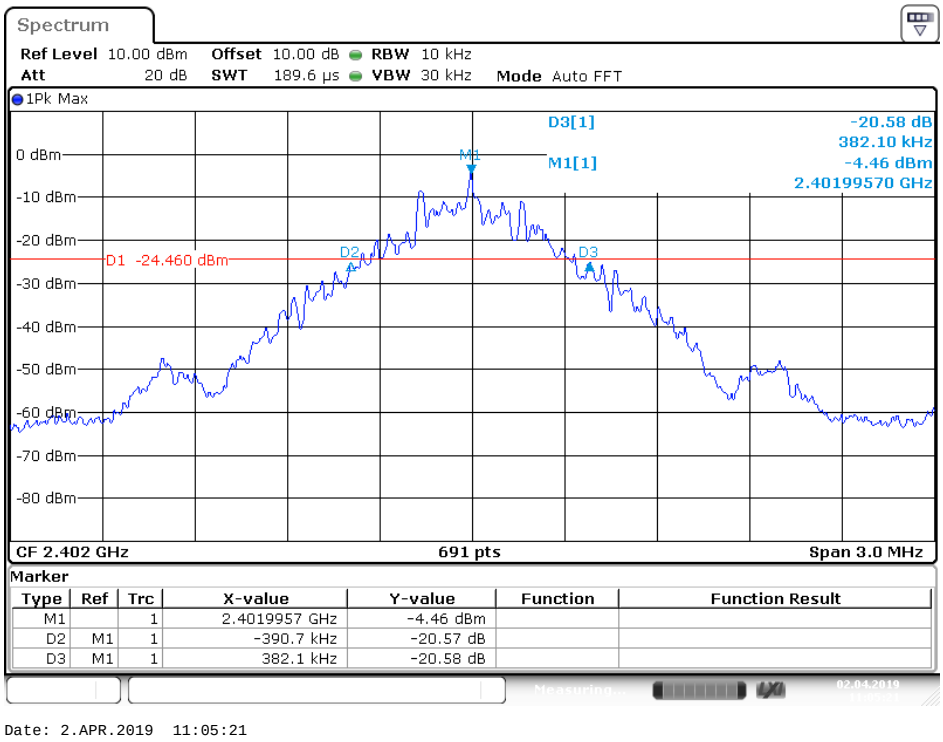
5.6.Test Result

Channel	Frequency (MHz)	GFSK mode 20dB Bandwidth (MHz)	π /4 DQPSK mode 20dB Bandwidth (MHz)	Result
Low	2402	0.773	1.246	Pass
Middle	2441	0.773	1.246	Pass
High	2480	0.773	1.224	Pass

The spectrum analyzer plots are attached as below.

GFSK Mode

Low channel



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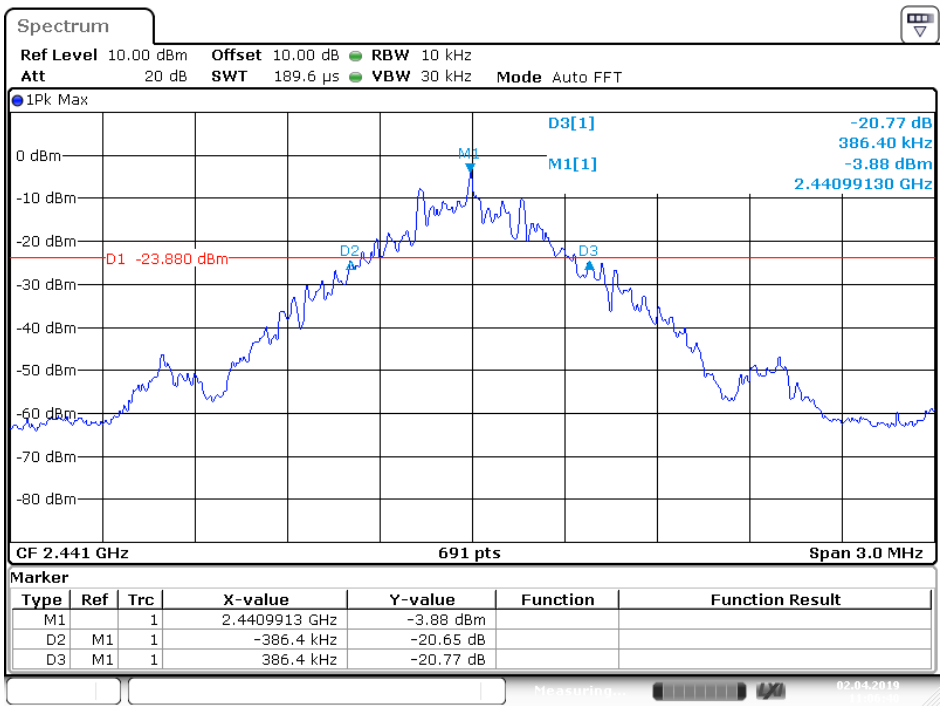
Middle channel



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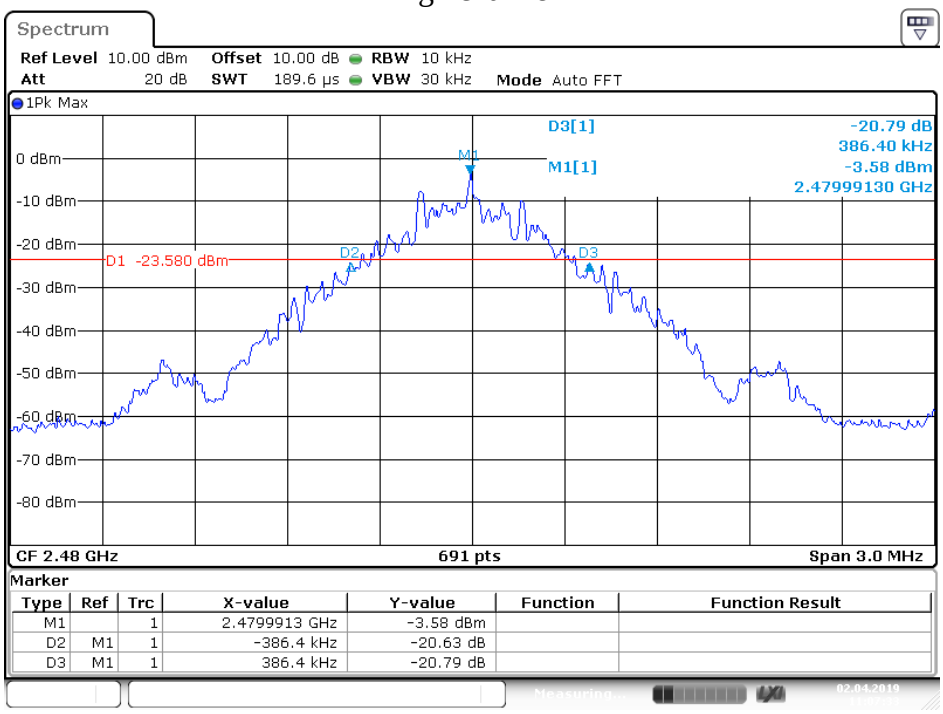
High channel



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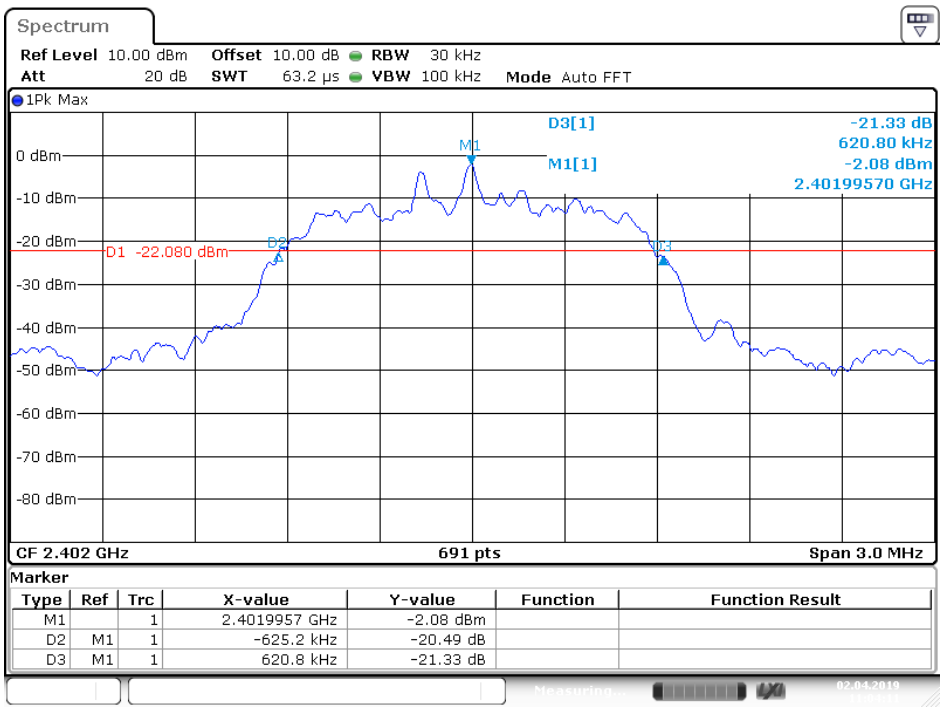
π /4 DQPSK Mode

Low channel



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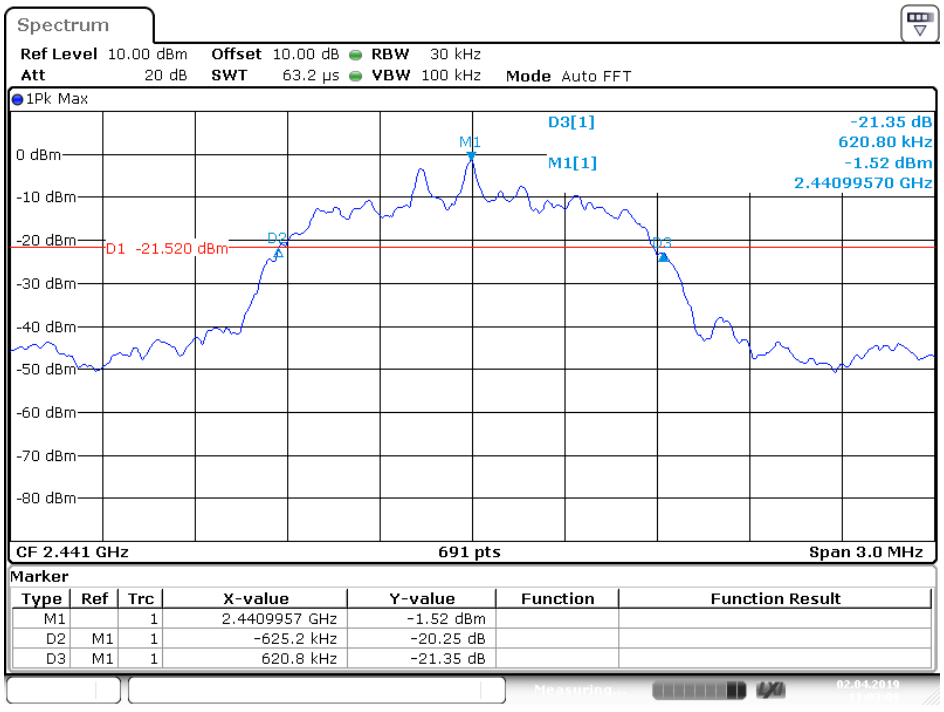
Middle channel



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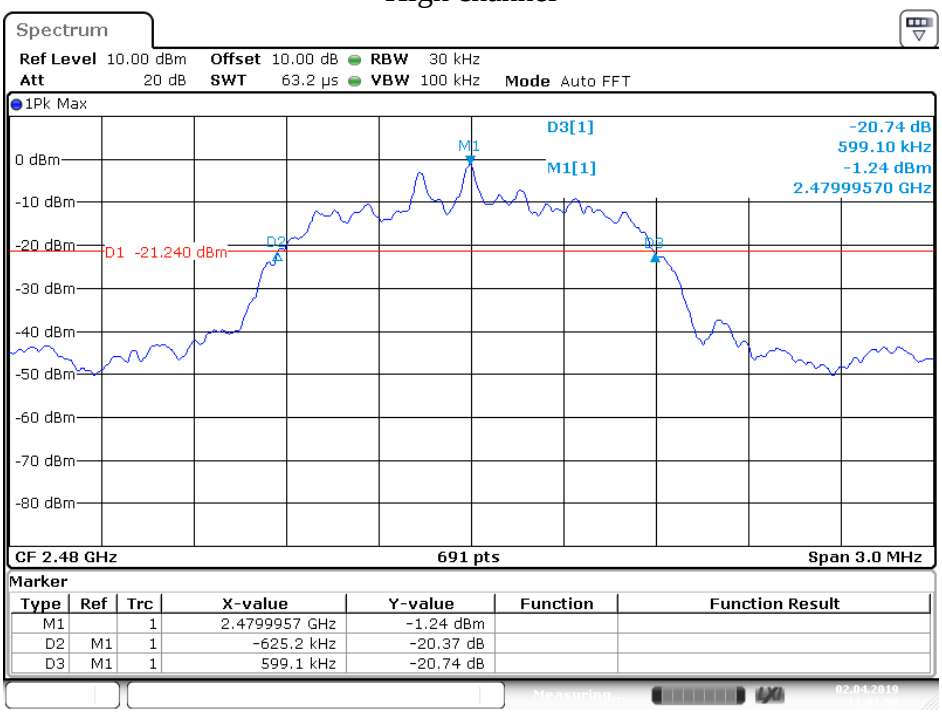
High channel



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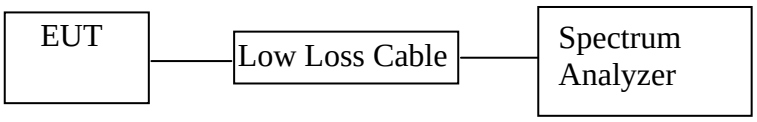
6. CARRIER FREQUENCY SEPARATION TEST

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 100 kHz and VBW to 300 kHz. Adjust Span to 3MHz.

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

6.5.4.Measurement the channel separation

6.6.Test Result

GFSK mode

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

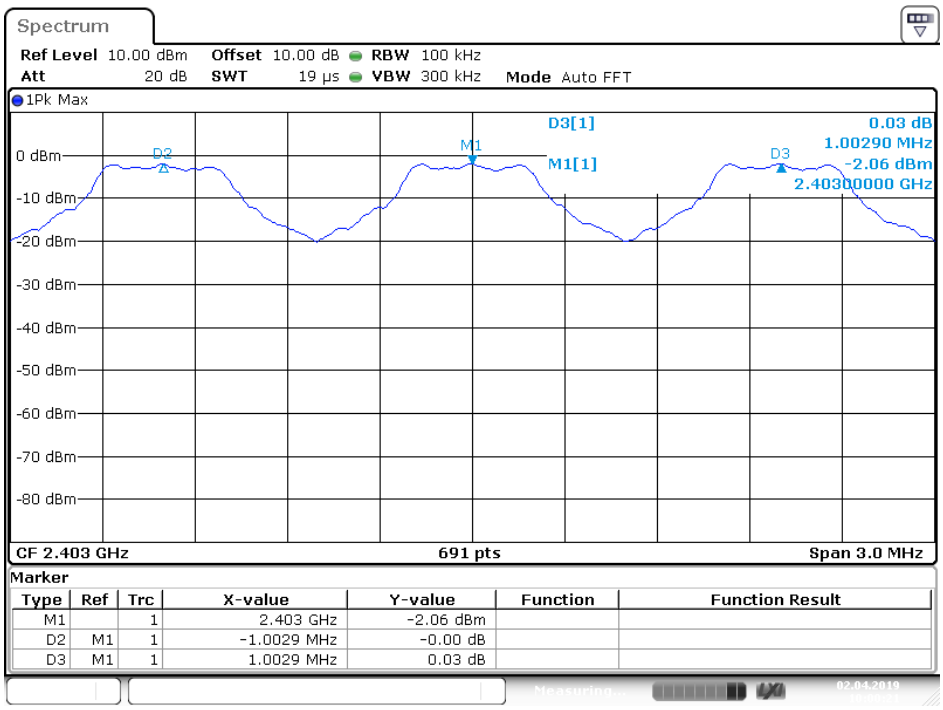
π /4 DQPSK Mode

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			

The spectrum analyzer plots are attached as below.

GFSK Mode

Low channel



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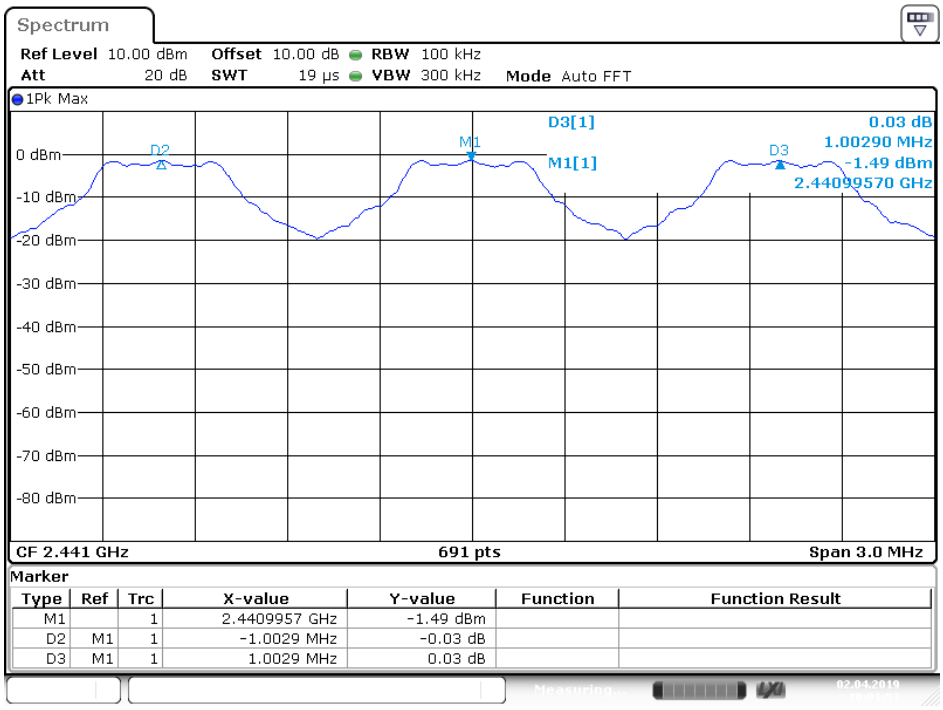
Middle channel



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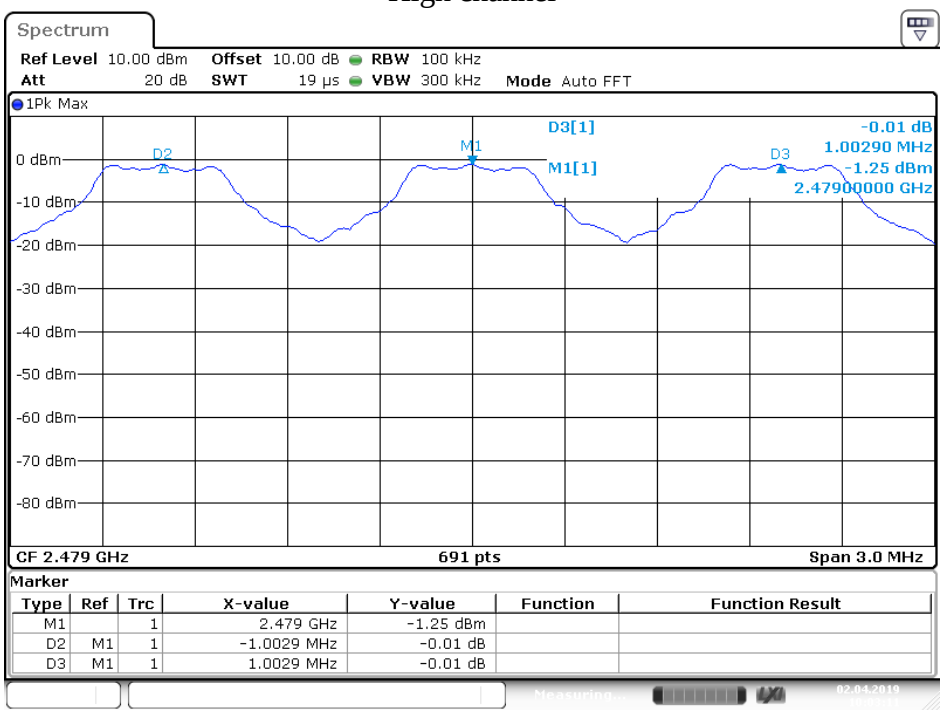
High channel



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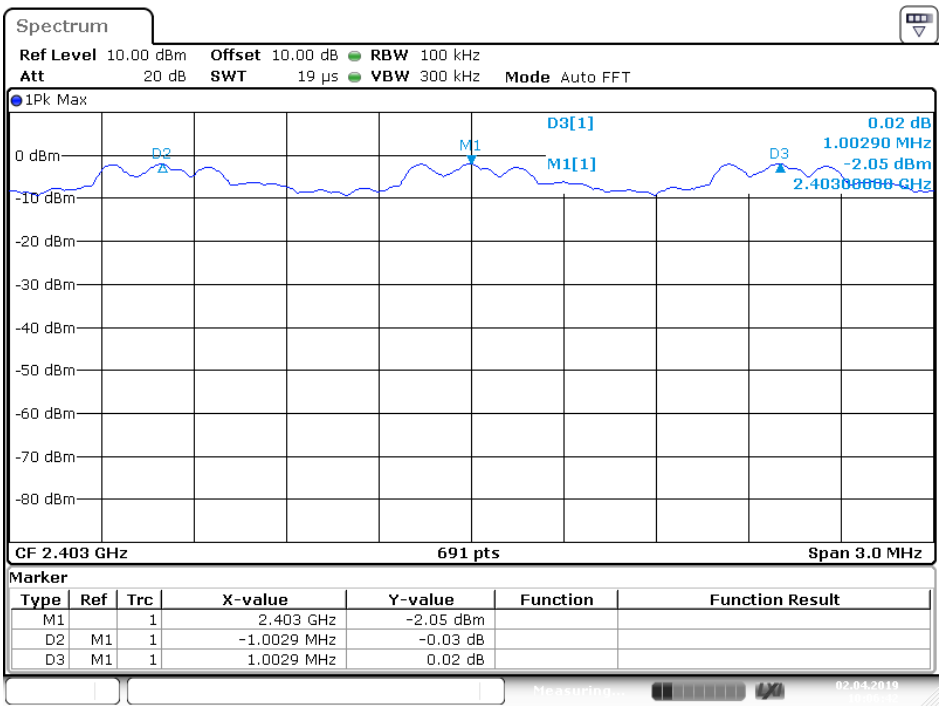
π /4 DQPSK Mode

Low channel



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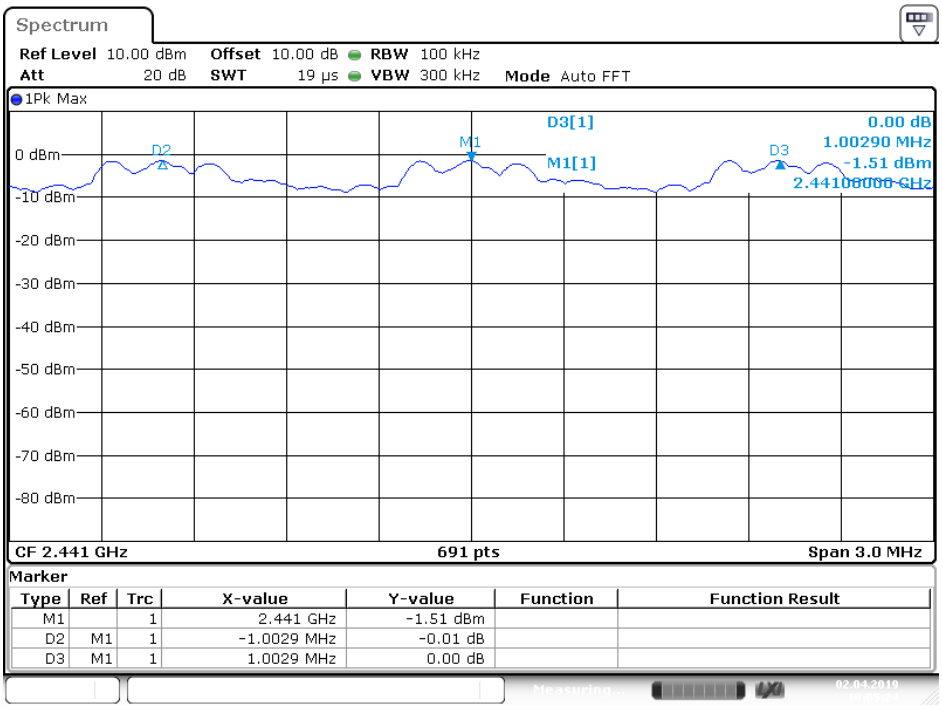
Middle channel



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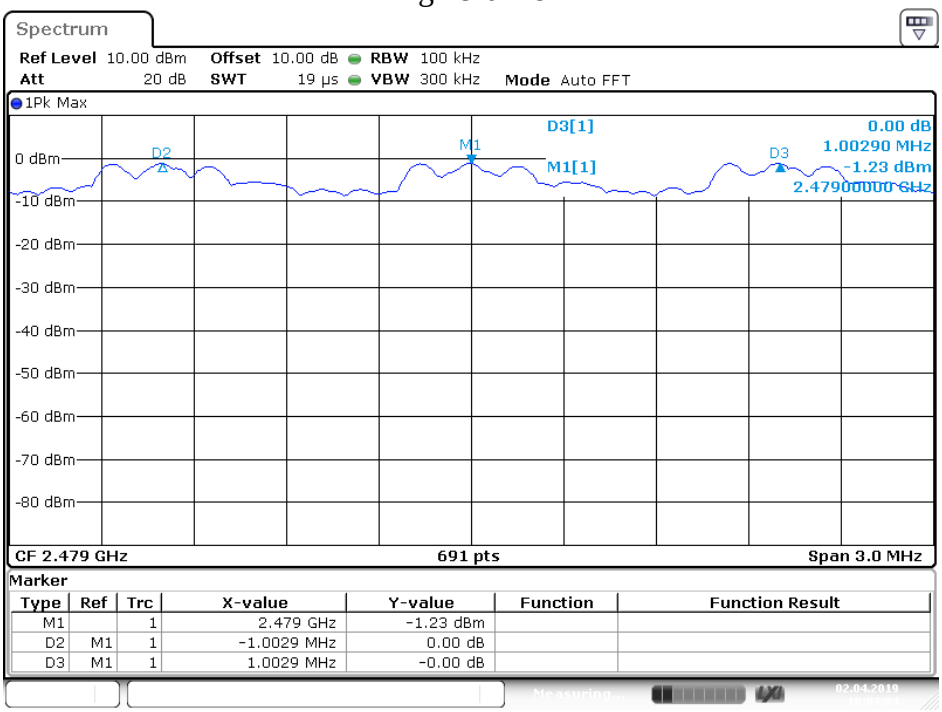
High channel



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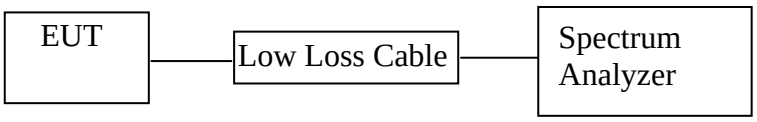
7. NUMBER OF HOPPING FREQUENCY TEST

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 Span=90MHz, RBW=100 kHz, VBW=300 kHz.

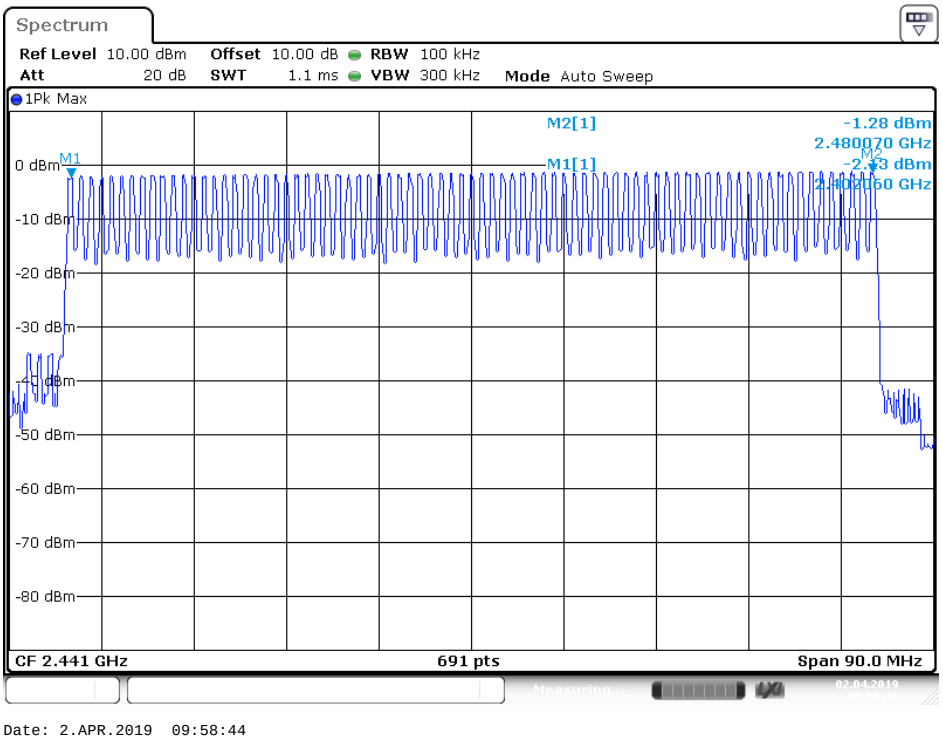
7.5.3.Max hold, view and count how many channel in the band.

7.6.Test Result

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

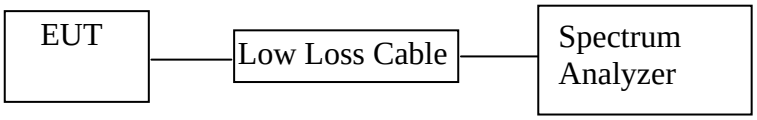
The spectrum analyzer plots are attached as below.

Number of hopping channels (GFSK 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

GFSK Mode

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.428	136.96	400
	2441	0.420	134.40	400
	2480	0.428	136.96	400
A period transmit time = 0.4 × 79 = 31.6 Dwell time = pulse time × (1600/(2*79))×31.6				
DH3	2402	1.696	271.36	400
	2441	1.710	273.60	400
	2480	1.696	271.36	400
A period transmit time = 0.4 × 79 = 31.6 Dwell time = pulse time × (1600/(4*79))×31.6				
DH5	2402	2.957	315.41	400
	2441	2.957	315.41	400
	2480	2.978	317.65	400
A period transmit time = 0.4 × 79 = 31.6 Dwell time = pulse time × (1600/(6*79))×31.6				

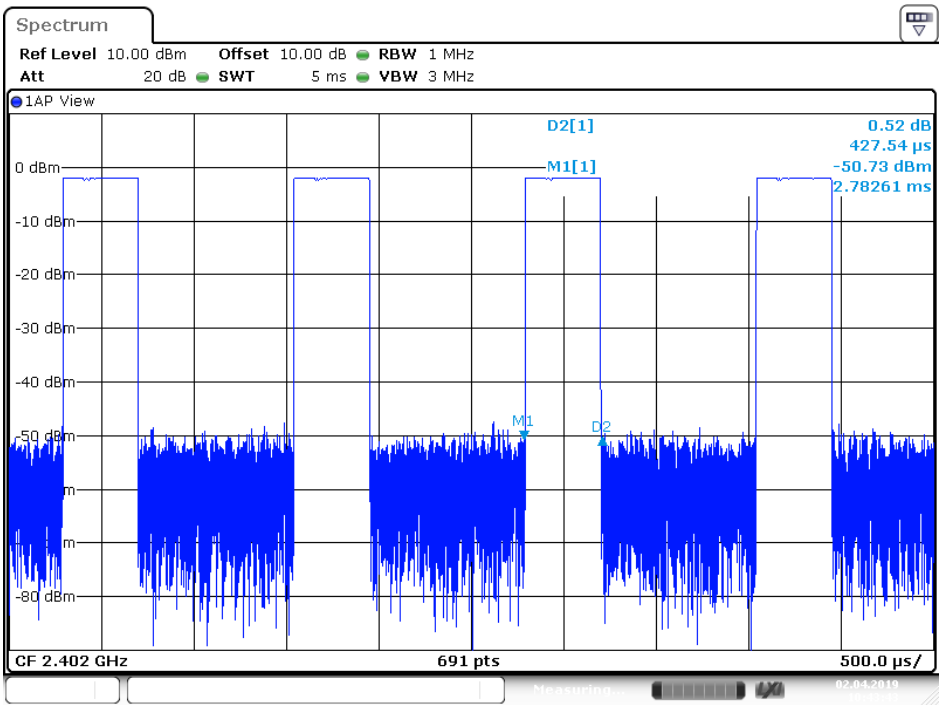
π /4 DQPSK Mode

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
2DH1	2402	0.435	139.20	400
	2441	0.435	139.20	400
	2480	0.435	139.20	400
A period transmit time = 0.4 × 79 = 31.6 Dwell time = pulse time × (1600/(2*79))×31.6				
2DH3	2402	1.710	273.60	400
	2441	1.710	273.60	400
	2480	1.710	273.60	400
A period transmit time = 0.4 × 79 = 31.6 Dwell time = pulse time × (1600/(4*79))×31.6				
2DH5	2402	2.957	315.41	400
	2441	2.957	315.41	400
	2480	2.957	315.41	400
A period transmit time = 0.4 × 79 = 31.6 Dwell time = pulse time × (1600/(6*79))×31.6				

The spectrum analyzer plots are attached as below.

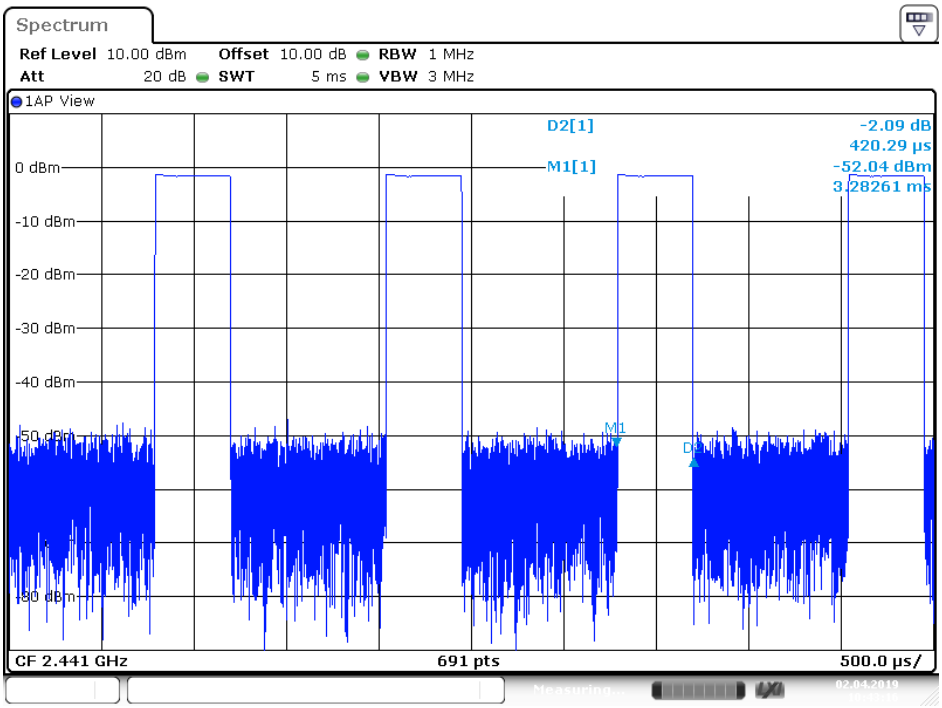
GFSK Mode

DH1 Low channel



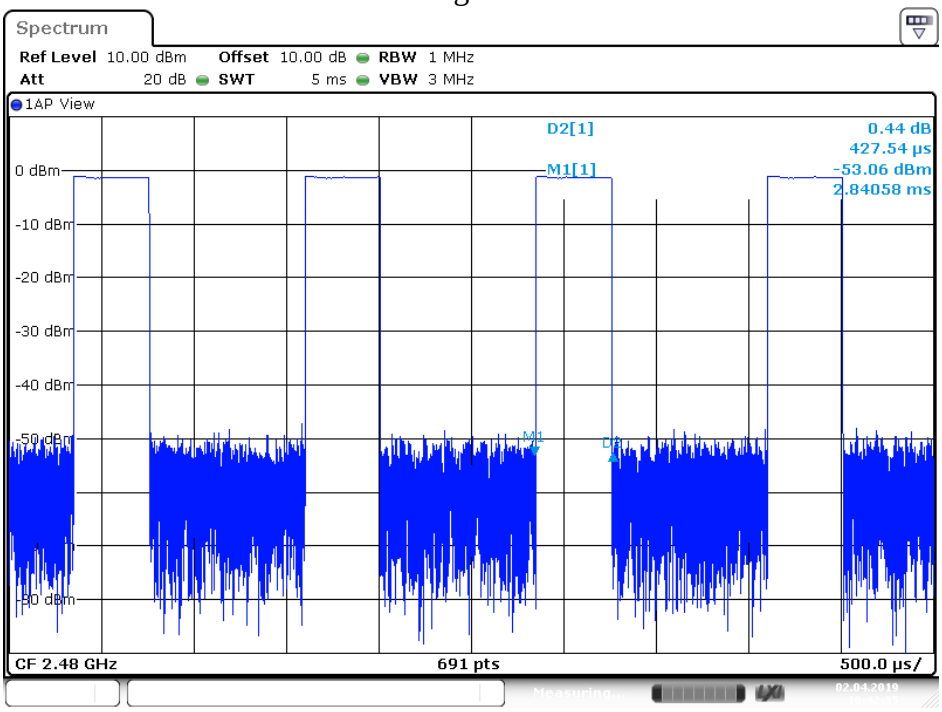
Date: 2.APR.2019 10:43:44

DH1 Middle channel



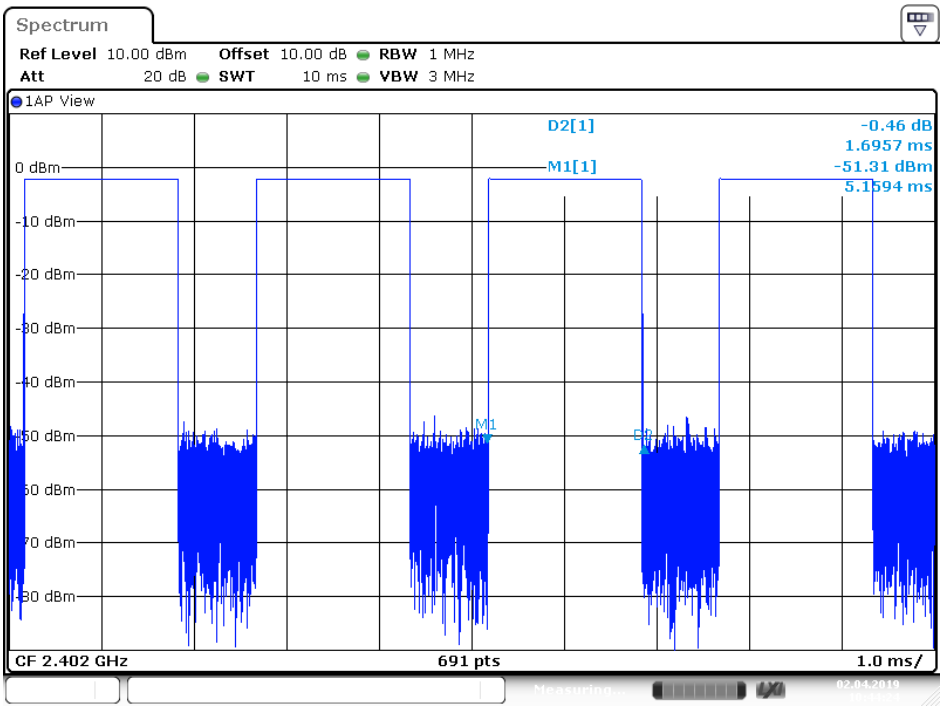
Date: 2.APR.2019 10:43:17

DH1 High channel



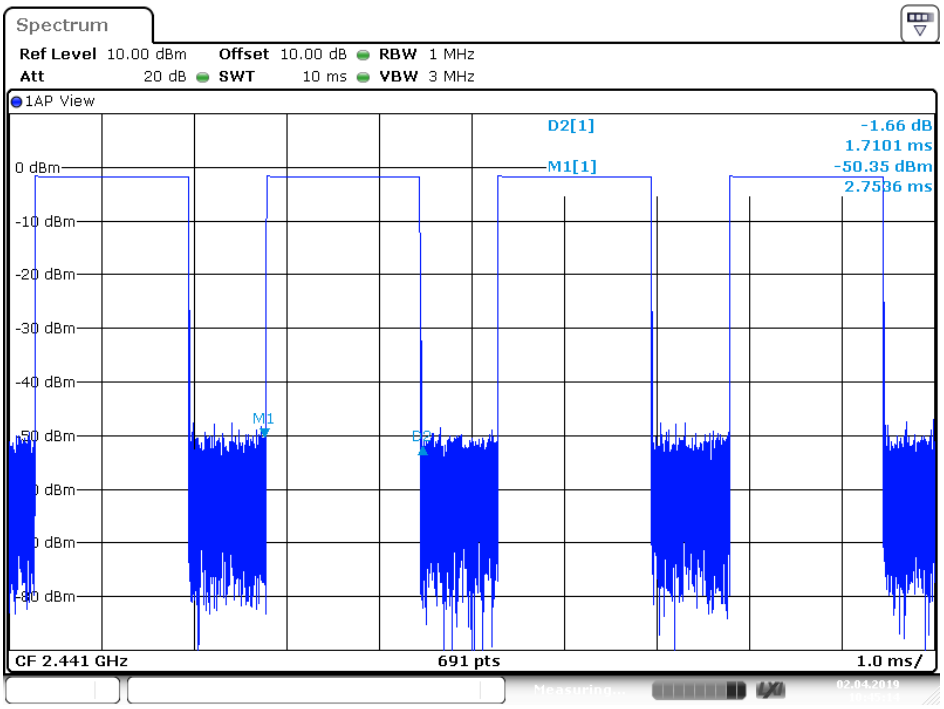
Date: 2.APR.2019 10:42:35

DH3 Low channel



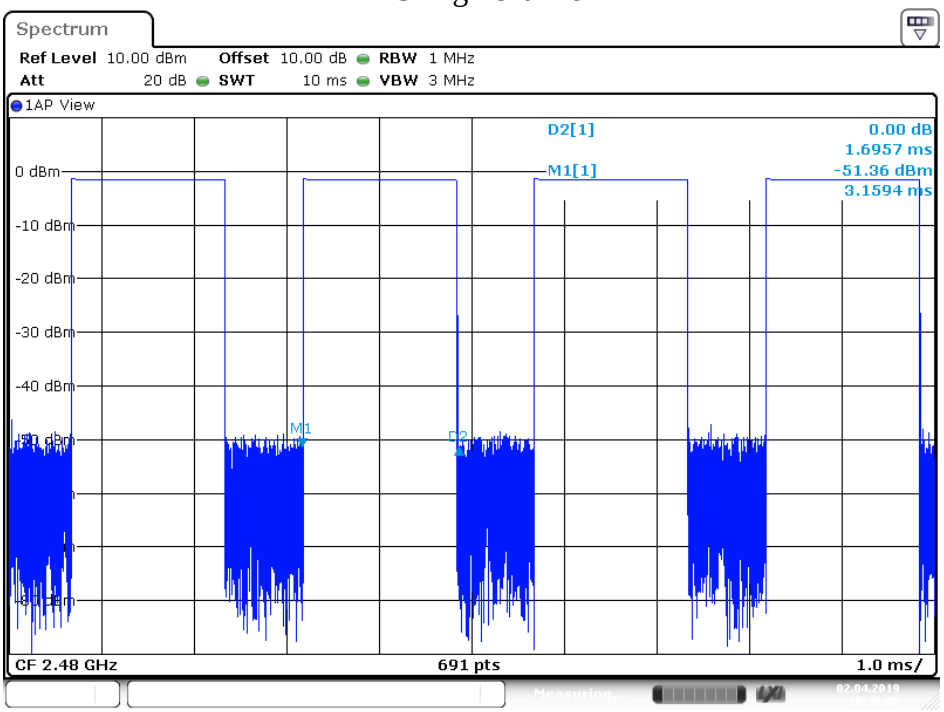
Date: 2.APR.2019 10:44:25

DH3 Middle channel



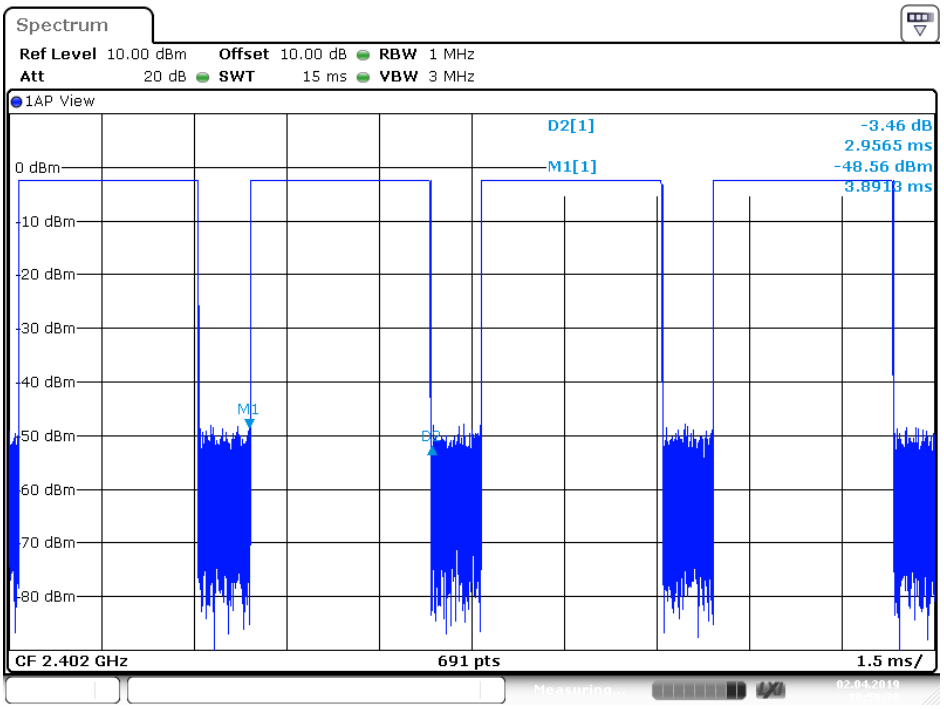
Date: 2.APR.2019 10:45:15

DH3 High channel



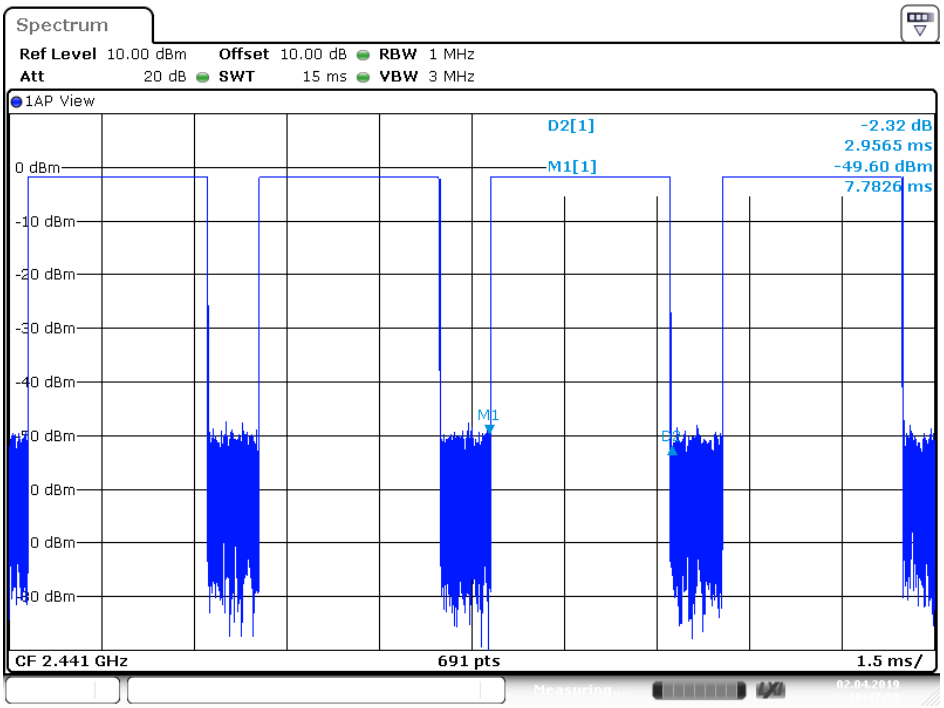
Date: 2.APR.2019 10:46:09

DH5 Low channel



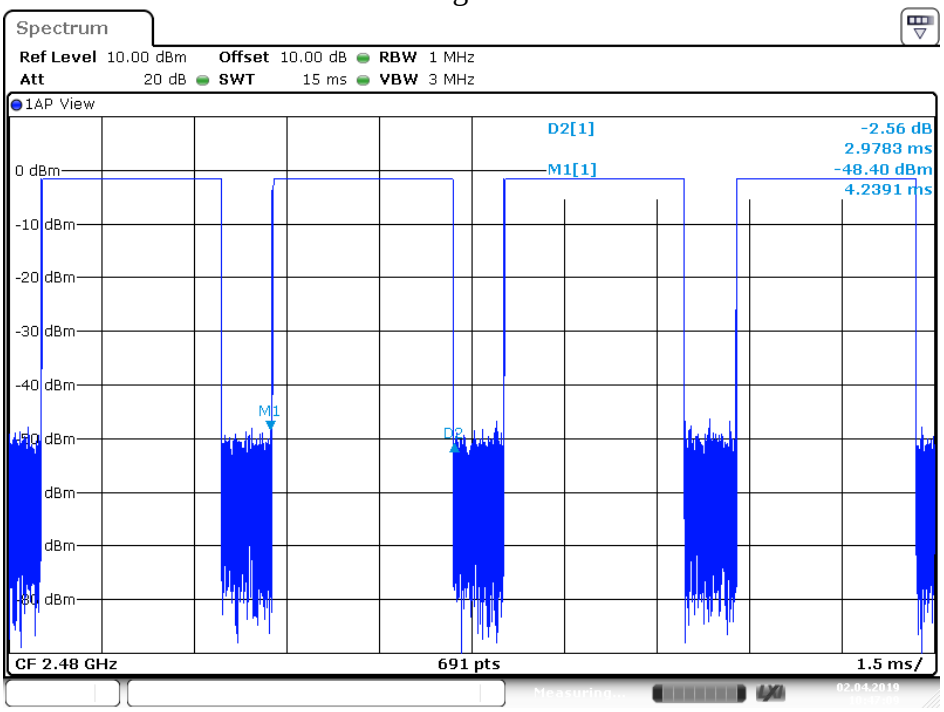
Date: 2.APR.2019 10:50:31

DH5 Middle channel



Date: 2.APR.2019 10:47:59

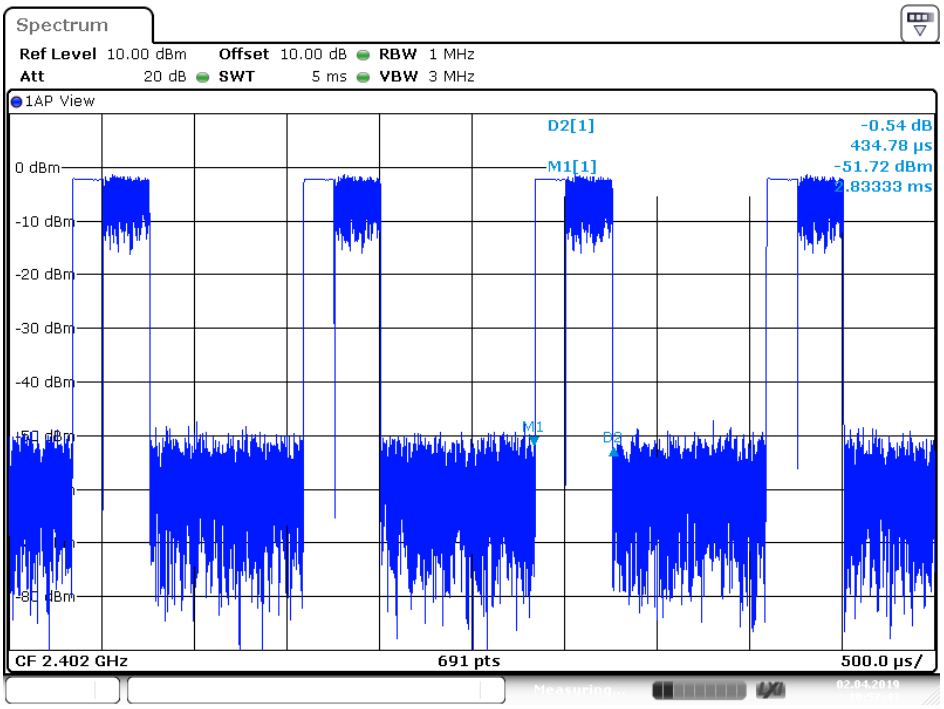
DH5 High channel



Date: 2.APR.2019 10:47:10

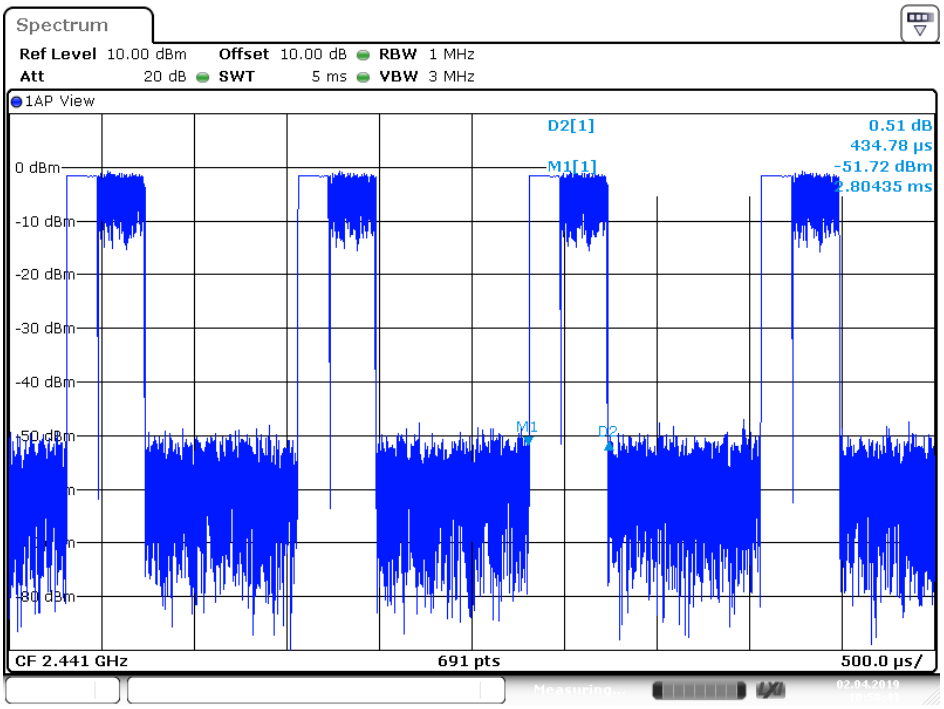
π /4 DQPSK Mode

2DH1 Low channel



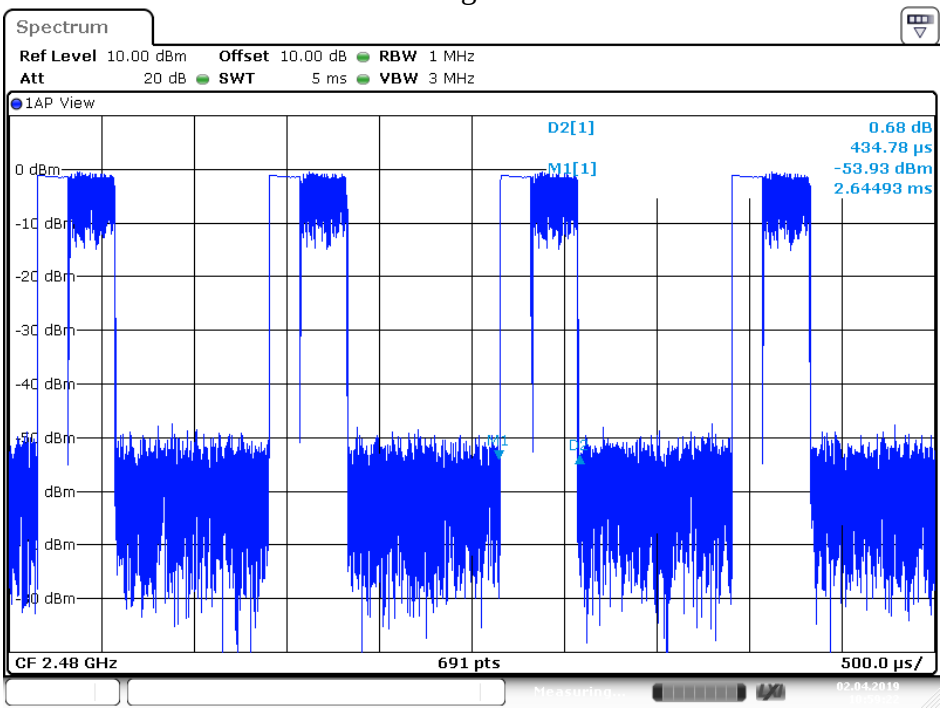
Date: 2.APR.2019 10:57:44

2DH1 Middle channel



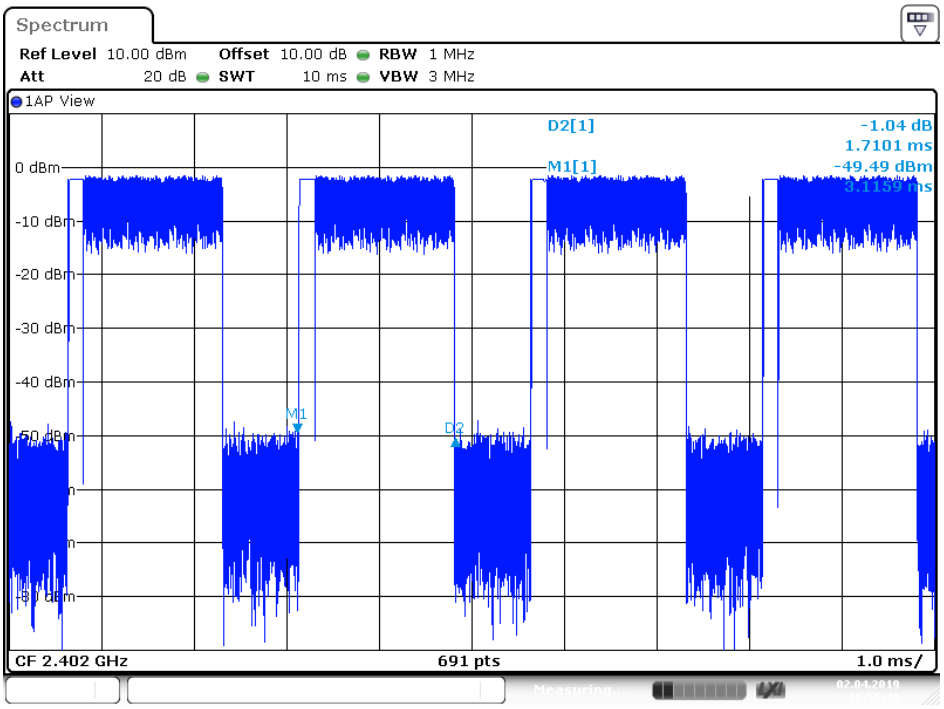
Date: 2.APR.2019 10:58:44

2DH1 High channel



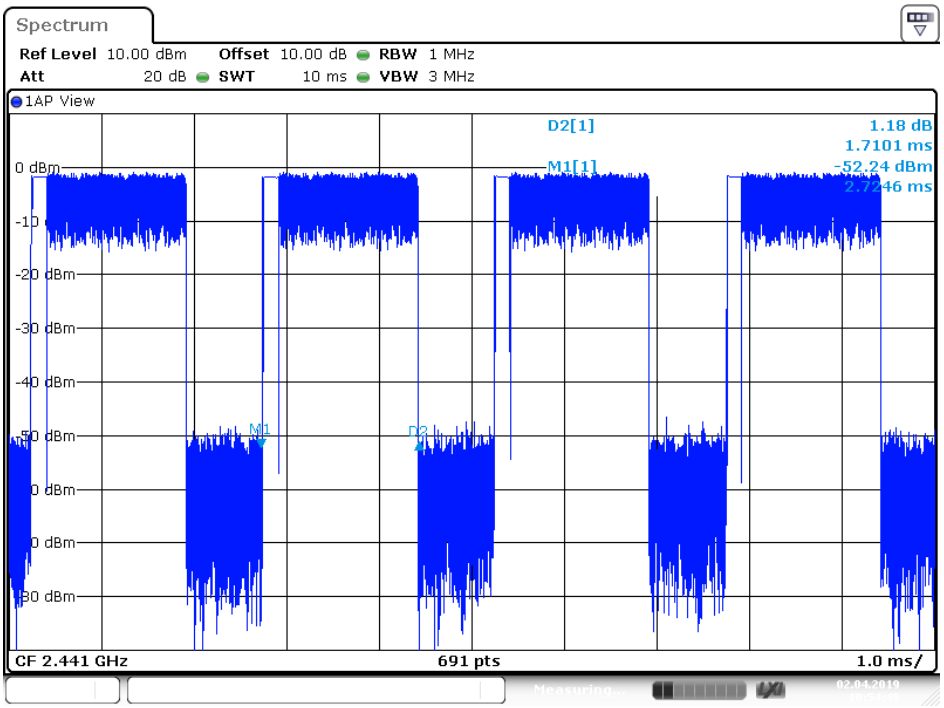
Date: 2.APR.2019 10:59:23

2DH3 Low channel



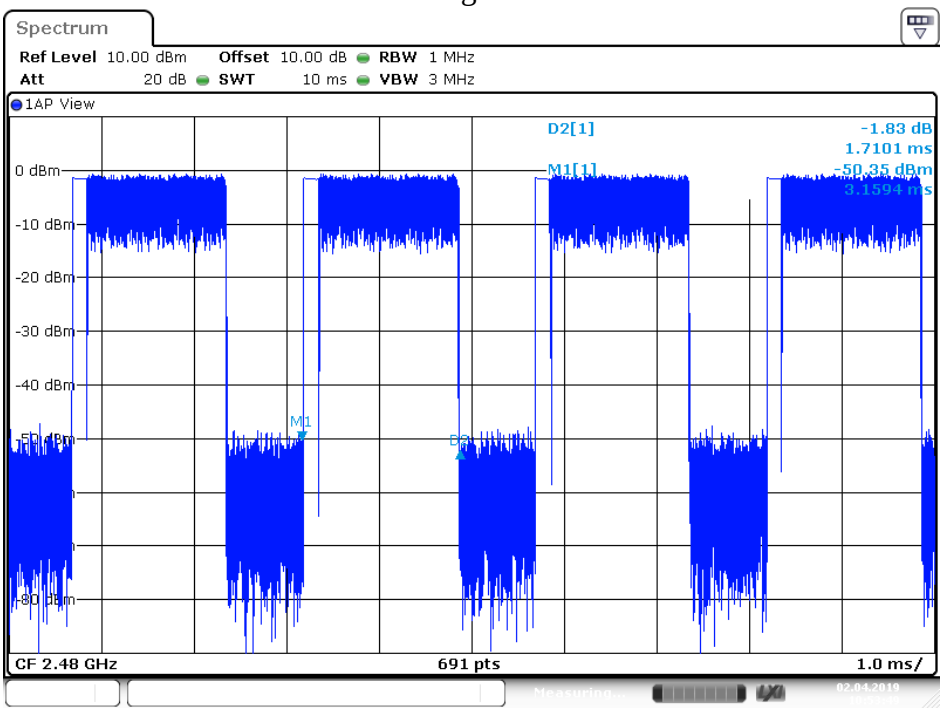
Date: 2.APR.2019 10:55:43

2DH3 Middle channel



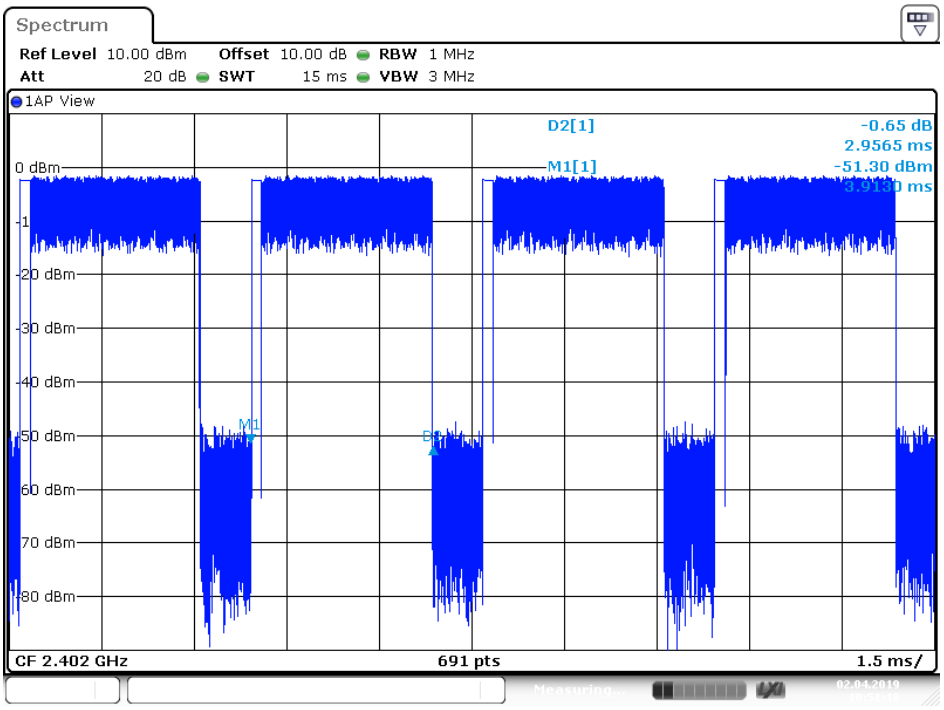
Date: 2.APR.2019 10:54:50

2DH3 High channel



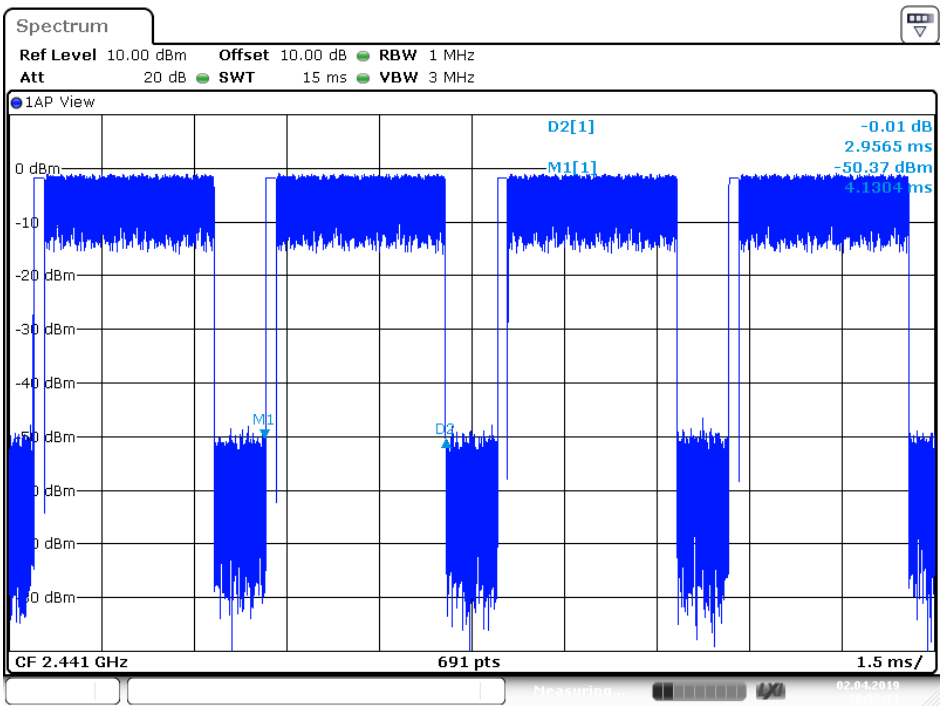
Date: 2.APR.2019 10:53:50

2DH5 Low channel



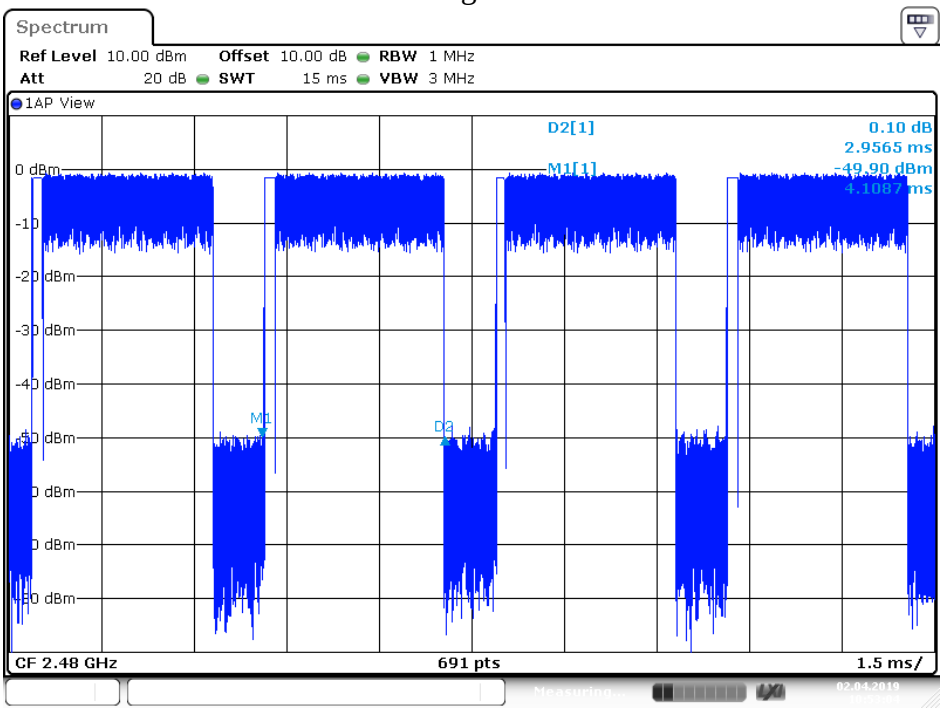
Date: 2.APR.2019 10:51:19

2DH5 Middle channel



Date: 2.APR.2019 10:52:12

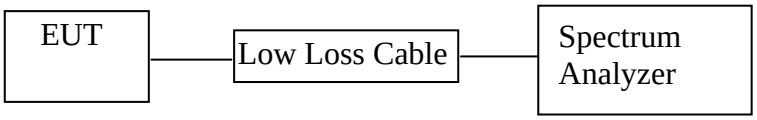
2DH5 High channel



Date: 2.APR.2019 10:53:04

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 10MHz

9.5.3.Measurement the maximum peak output power.

9.6.Test Result

GFSK Mode

Frequency (MHz)	Maximum peak conducted output power (dBm/W)	e.i.r.p. (dBm/W)	Limits dBm / W	Result
2402	-1.96//0.0006	-2.54/0.0006	30 / 1.000	Pass
2441	-1.40/0.0007	-1.98/0.0006	30 / 1.000	Pass
2480	-1.12//0.0008	-1.70/0.0007	30 / 1.000	Pass

π /4 DQPSK Mode

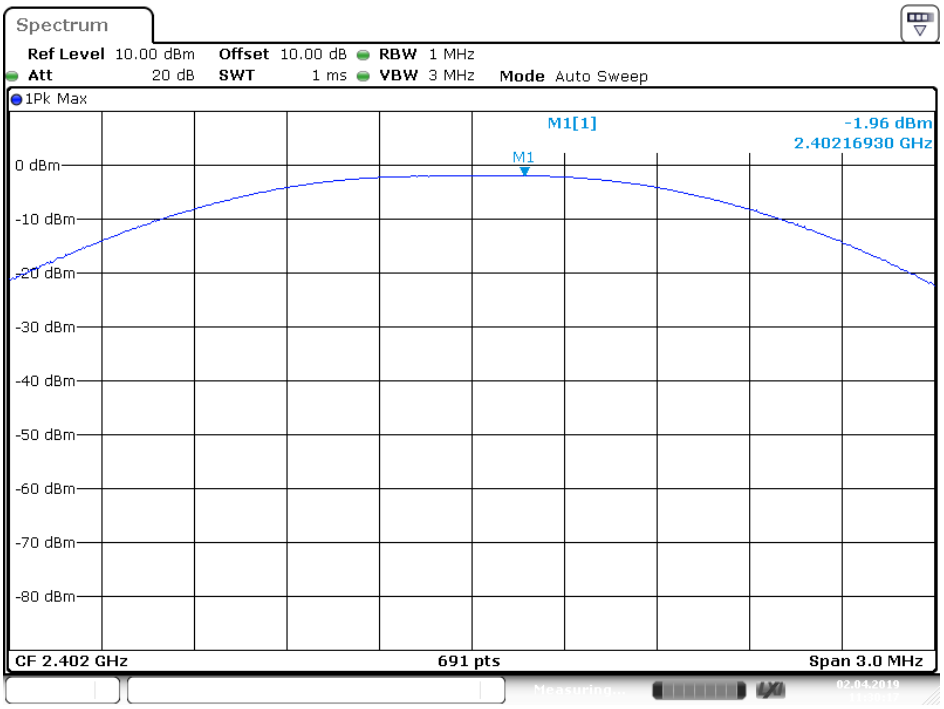
Frequency (MHz)	Maximum peak conducted output power (dBm/W)	e.i.r.p. (dBm/W)	Limits dBm / W	Result
2402	-0.62/0.0009	-1.20/0.0008	21 / 0.125	Pass
2441	-0.03/0.0010	-0.61/0.0009	21 / 0.125	Pass
2480	0.25/0.0011	-0.33/0.0009	21 / 0.125	Pass

Note: e.i.r.p= Maximum peak conducted output power+antenna gain(-0.58dBi)

The spectrum analyzer plots are attached as below.

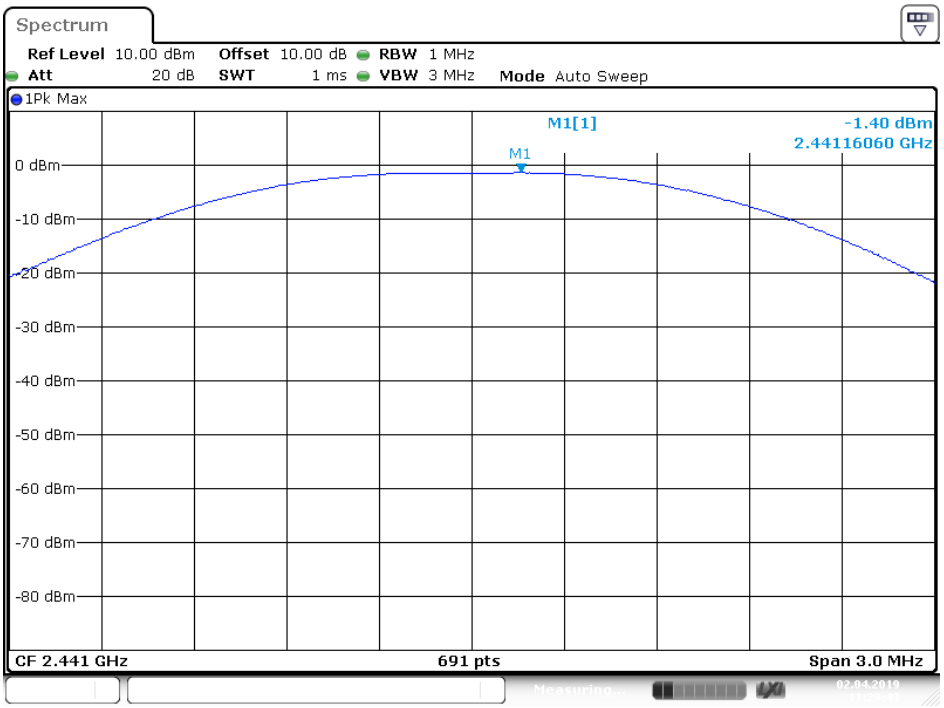
GFSK Mode

Low channel



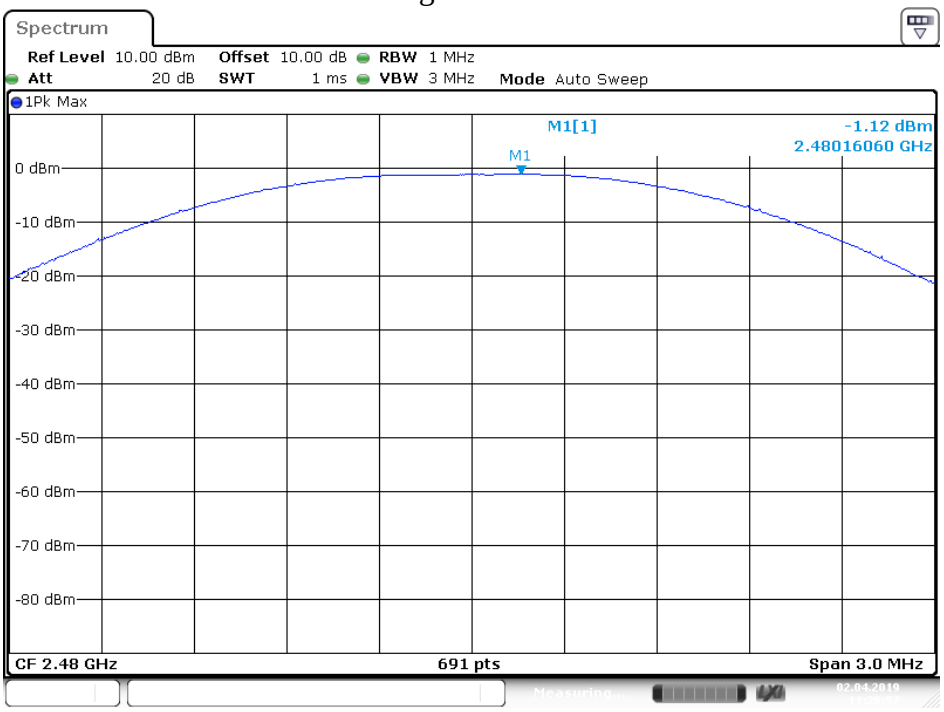
Date: 2.APR.2019 11:30:17

Middle channel



Date: 2.APR.2019 11:29:44

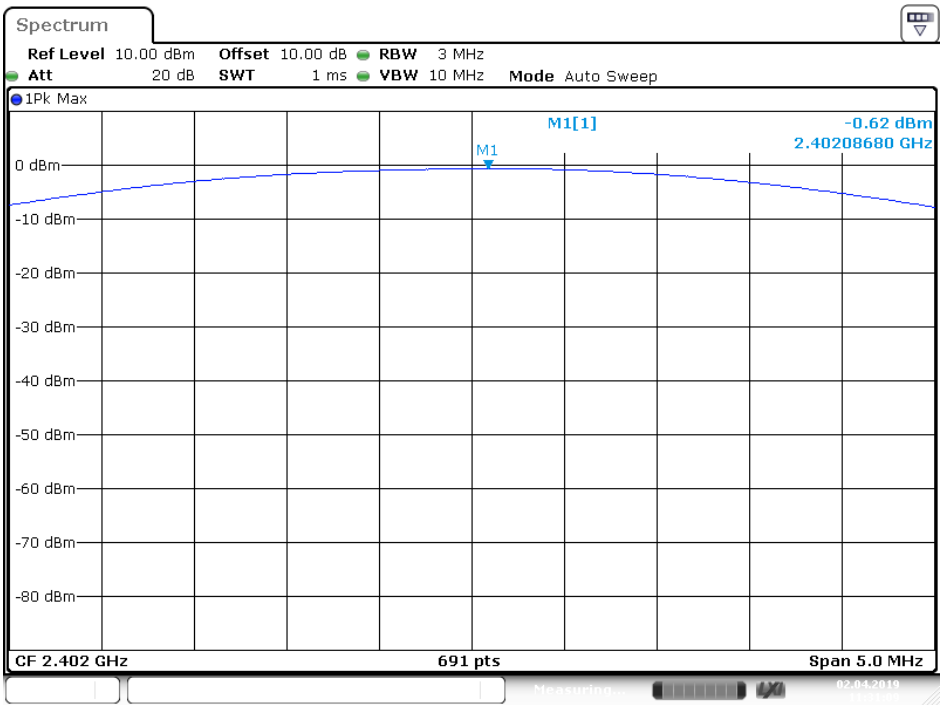
High channel



Date: 2.APR.2019 11:28:58

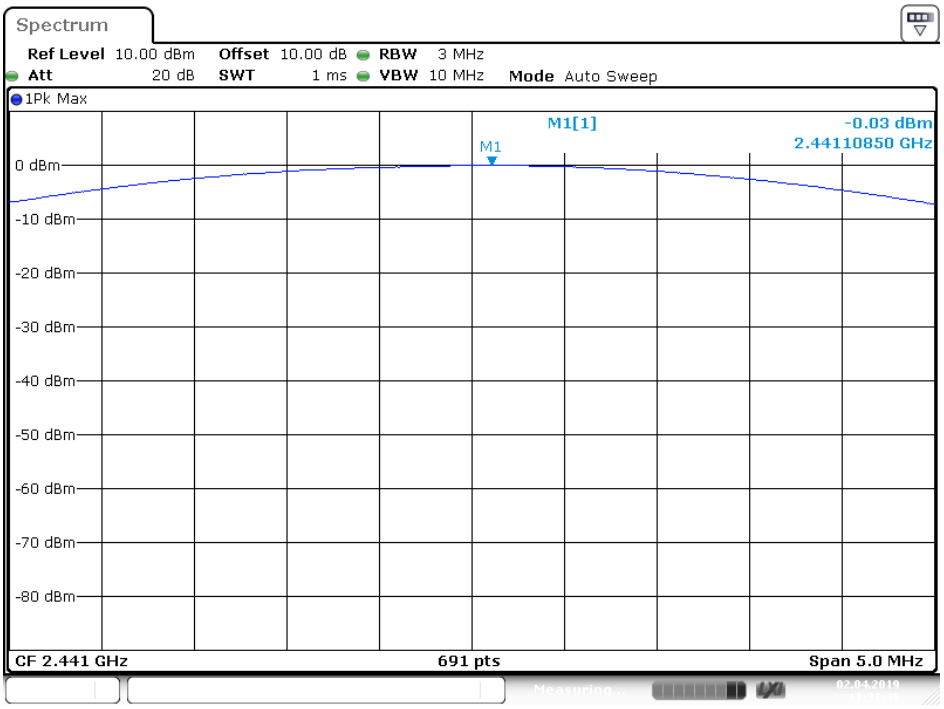
π /4 DQPSK Mode

Low channel



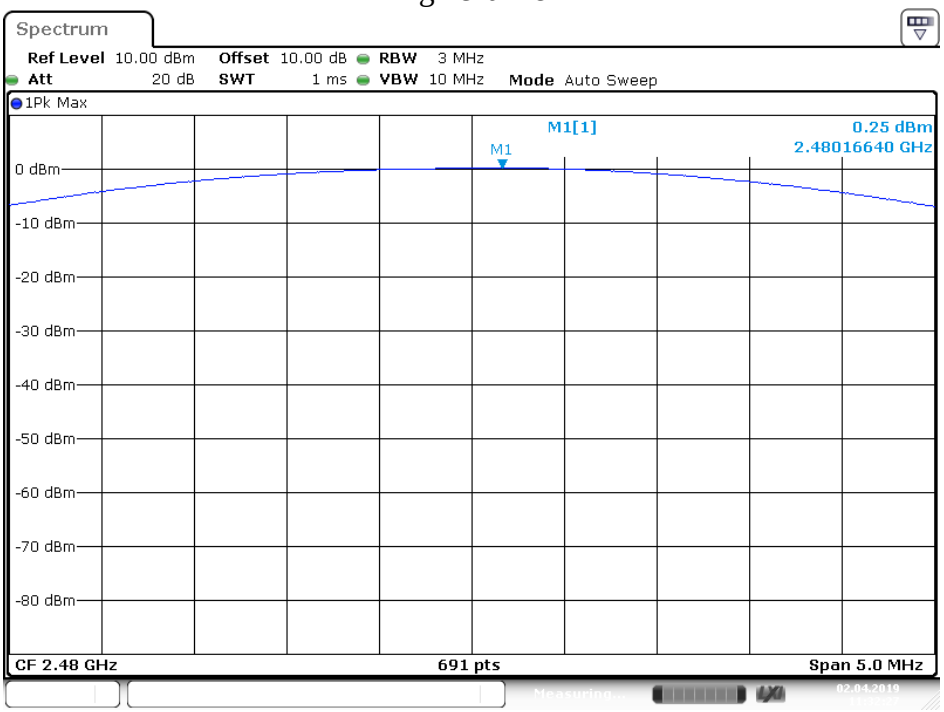
Date: 2.APR.2019 11:31:10

Middle channel



Date: 2.APR.2019 11:31:46

High channel



Date: 2.APR.2019 11:32:28

10.RADIATED EMISSION TEST

10.1.Block Diagram of Test Setup

10.1.1.Block diagram of connection between the EUT and peripherals

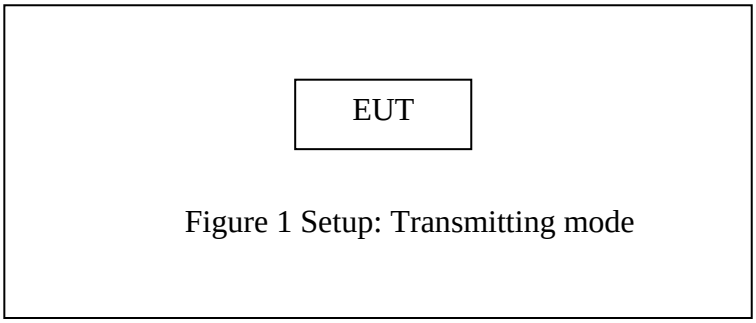
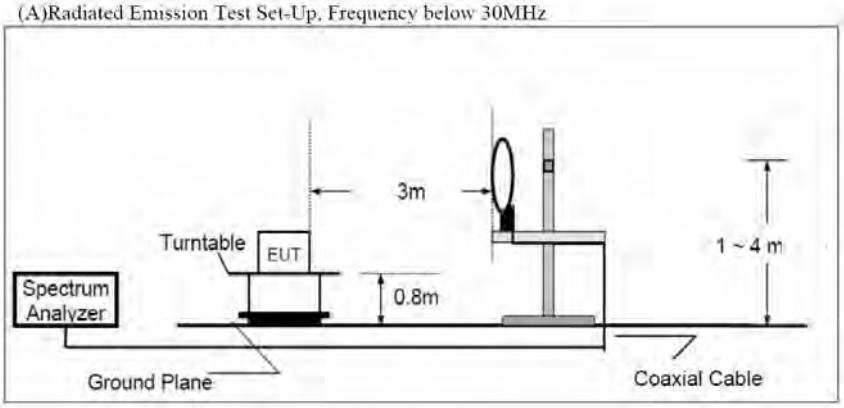


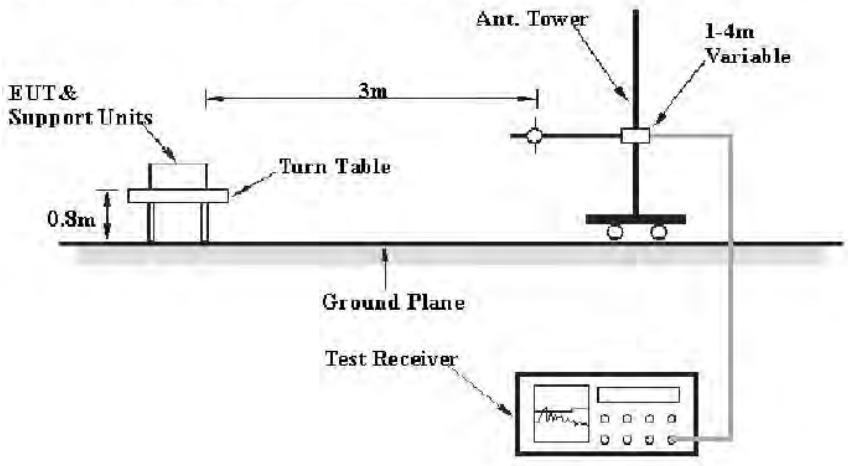
Figure 1 Setup: Transmitting mode

10.1.2.Semi-Anechoic Chamber Test Setup Diagram

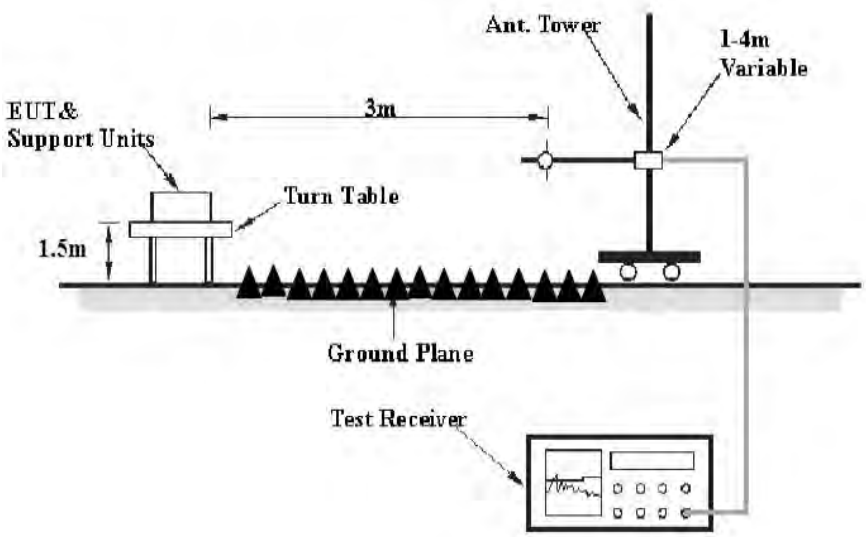
(A)Radiated Emission Test Set-Up, Frequency below 30MHz



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



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



10.2.The 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).

10.3.Transmitter Emission Limit

Radiated emissions shall comply with the field strength limits shown in table 5 and table 6. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.

Table 5 – General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field strength (μV/m at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) (μA/m)	Measurement distance (m)
9 - 490 kHz [1]	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

10.4.Restricted bands of operation

10.4.1.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.

10.5.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.

10.6.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	48.69	-13.35	35.34	46	-10.66	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.Test Result

Pass.

The frequency range from 9KHz to 26.5GHz is investigated.

Note: 1.We tested GFSK mode, ∏/4-DQPSK Mode, and recorded the worse case data (∏/4-DQPSK mode) for all test mode.

The spectrum analyzer plots are attached as below.

9kHz-30MHz test data

ACCURATE TECHNOLOGY CO.,LTD

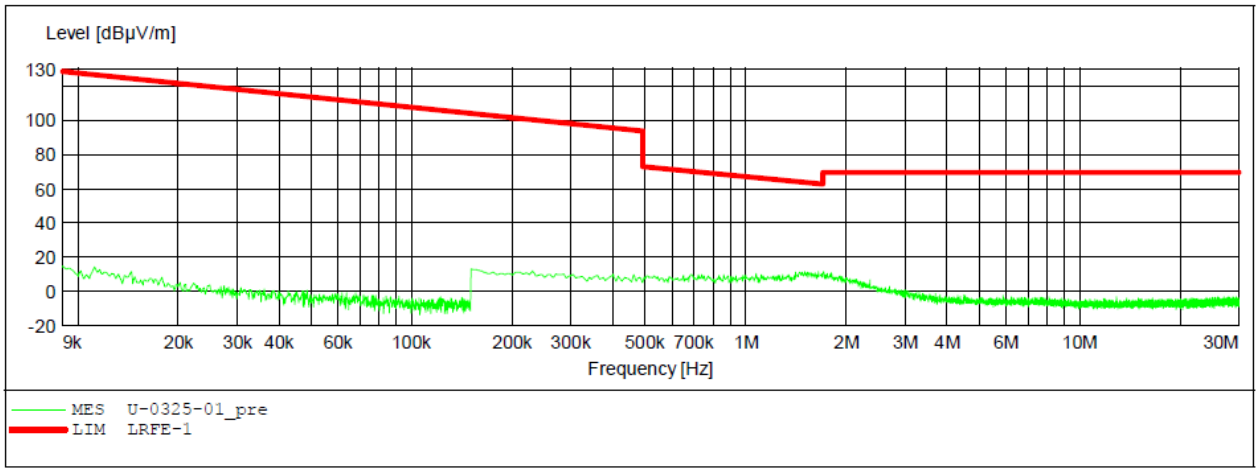
FCC Part 15C 3M Radiated

EUT: Industrial Wireless Earphones M/N:EE4020BT
Manufacturer: UP Global Sourcing UK Limited,
Operating Condition: TX 2402MHz
Test Site: 2# Chamber
Operator: WADE
Test Specification: DC 3.7V
Comment: X
Start of Test: 2019-03-25 /

SCAN TABLE: "LFRE 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	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M



ACCURATE TECHNOLOGY CO.,LTD

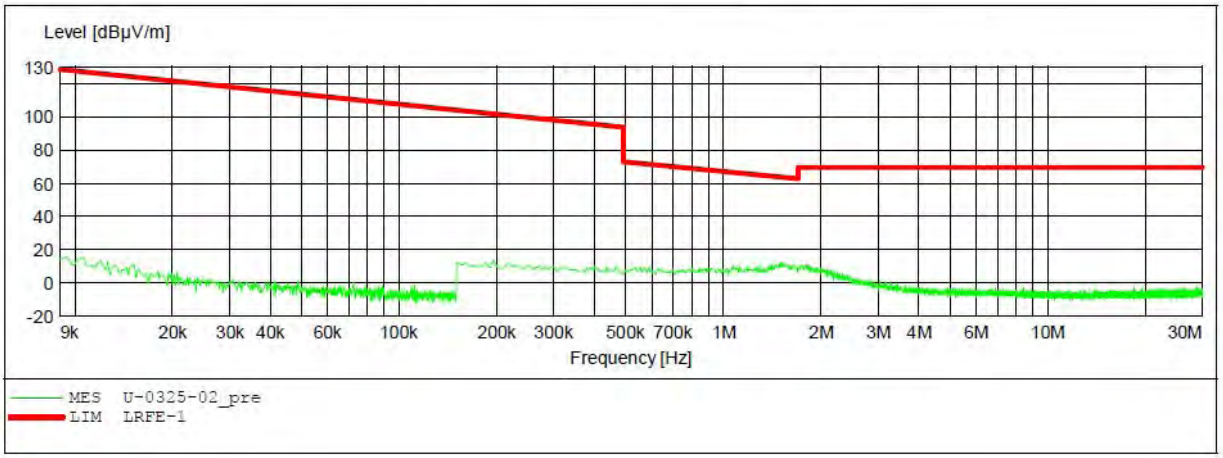
FCC Part 15C 3M Radiated

EUT: Industrial Wireless Earphones M/N:EE4020BT
Manufacturer: UP Global Sourcing UK Limited,
Operating Condition: TX 2402MHz
Test Site: 2# Chamber
Operator: WADE
Test Specification: DC 3.7V
Comment: Y
Start of Test: 2019-03-25 /

SCAN TABLE: "LFRE 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	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M



ACCURATE TECHNOLOGY CO.,LTD

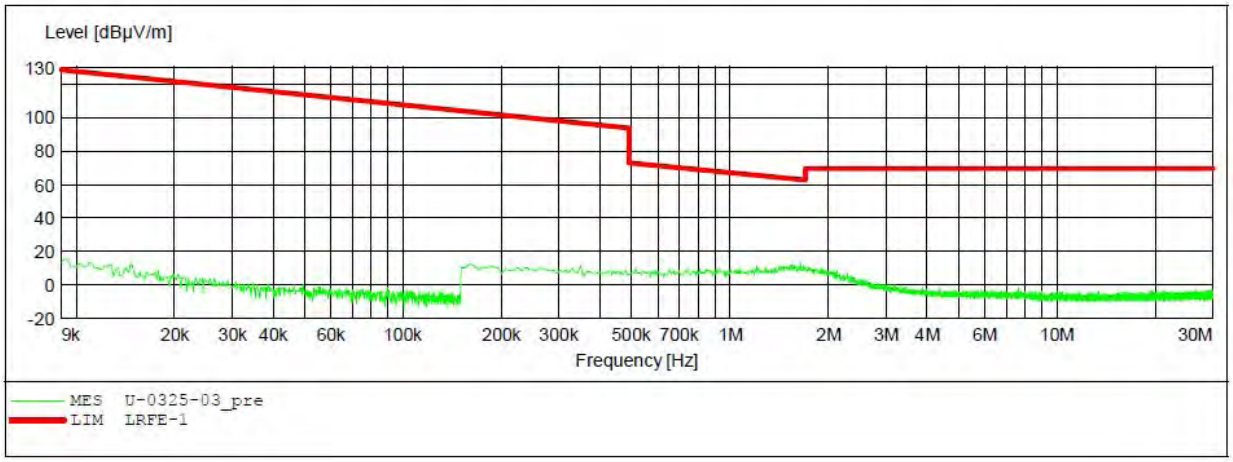
FCC Part 15C 3M Radiated

EUT: Industrial Wireless Earphones M/N:EE4020BT
Manufacturer: UP Global Sourcing UK Limited,
Operating Condition: TX 2402MHz
Test Site: 2# Chamber
Operator: WADE
Test Specification: DC 3.7V
Comment: Z
Start of Test: 2019-03-25 /

SCAN TABLE: "LFRE 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	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M



ACCURATE TECHNOLOGY CO.,LTD

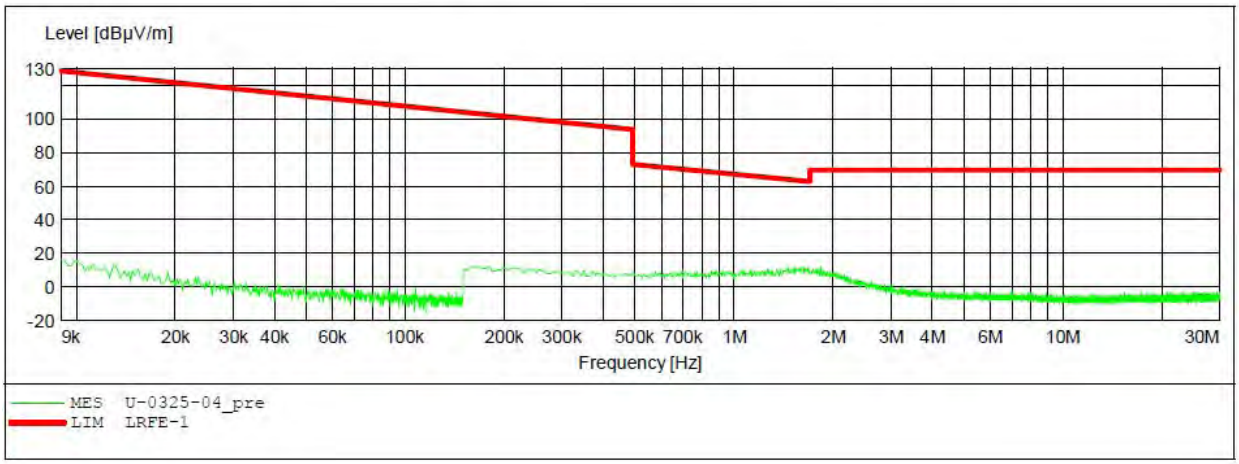
FCC Part 15C 3M Radiated

EUT:	Industrial Wireless Earphones M/N:EE4020BT
Manufacturer:	UP Global Sourcing UK Limited,
Operating Condition:	TX 2441MHz
Test Site:	2# Chamber
Operator:	WADE
Test Specification:	DC 3.7V
Comment:	X
Start of Test:	2019-03-25 /

SCAN TABLE: "LFRE 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	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M



ACCURATE TECHNOLOGY CO.,LTD

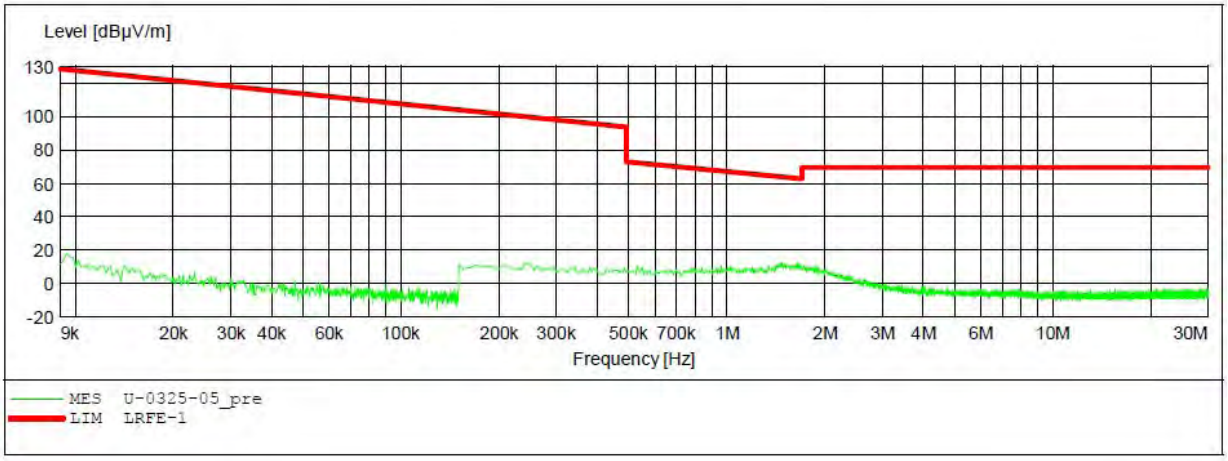
FCC Part 15C 3M Radiated

EUT: Industrial Wireless Earphones M/N:EE4020BT
Manufacturer: UP Global Sourcing UK Limited,
Operating Condition: TX 2441MHz
Test Site: 2# Chamber
Operator: WADE
Test Specification: DC 3.7V
Comment: Y
Start of Test: 2019-03-25 /

SCAN TABLE: "LFRE 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	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M



ACCURATE TECHNOLOGY CO.,LTD

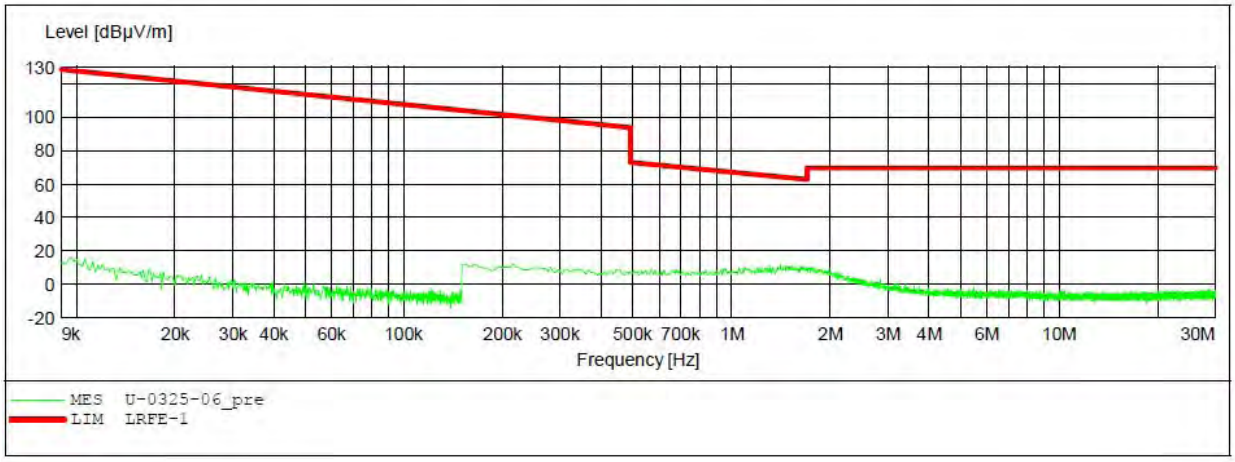
FCC Part 15C 3M Radiated

EUT: Industrial Wireless Earphones M/N:EE4020BT
Manufacturer: UP Global Sourcing UK Limited,
Operating Condition: TX 2441MHz
Test Site: 2# Chamber
Operator: WADE
Test Specification: DC 3.7V
Comment: Z
Start of Test: 2019-03-25 /

SCAN TABLE: "LFRE 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	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M



ACCURATE TECHNOLOGY CO.,LTD

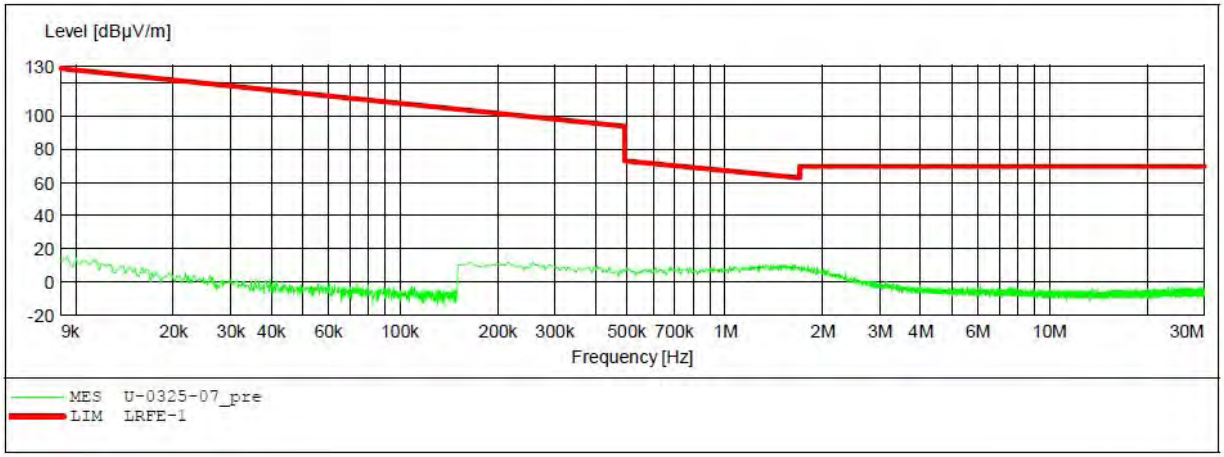
FCC Part 15C 3M Radiated

EUT: Industrial Wireless Earphones M/N:EE4020BT
Manufacturer: UP Global Sourcing UK Limited,
Operating Condition: TX 2480MHz
Test Site: 2# Chamber
Operator: WADE
Test Specification: DC 3.7V
Comment: X
Start of Test: 2019-03-25 /

SCAN TABLE: "LFRE 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	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M



ACCURATE TECHNOLOGY CO.,LTD

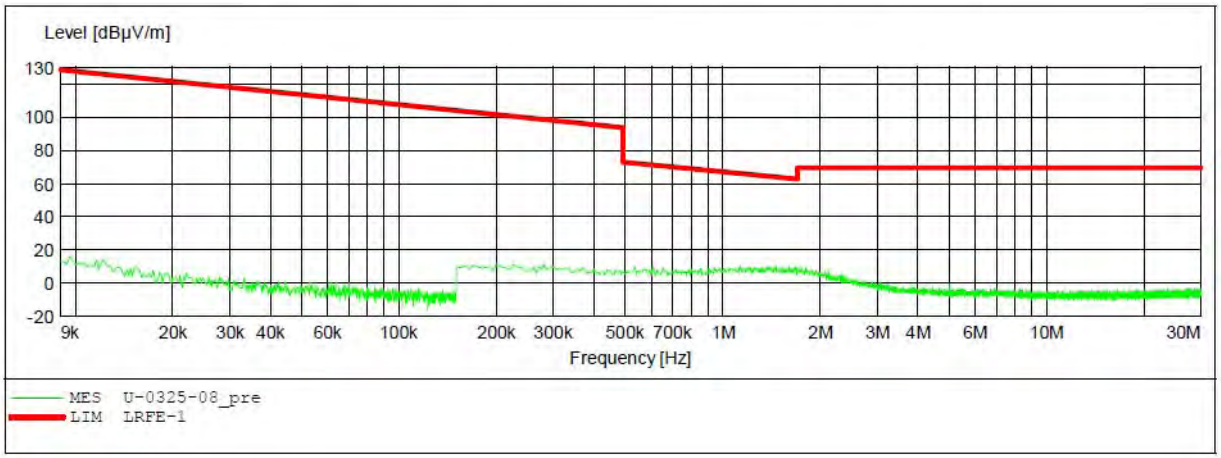
FCC Part 15C 3M Radiated

EUT: Industrial Wireless Earphones M/N:EE4020BT
Manufacturer: UP Global Sourcing UK Limited,
Operating Condition: TX 2480MHz
Test Site: 2# Chamber
Operator: WADE
Test Specification: DC 3.7V
Comment: Y
Start of Test: 2019-03-25 /

SCAN TABLE: "LFRE 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	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M



ACCURATE TECHNOLOGY CO.,LTD

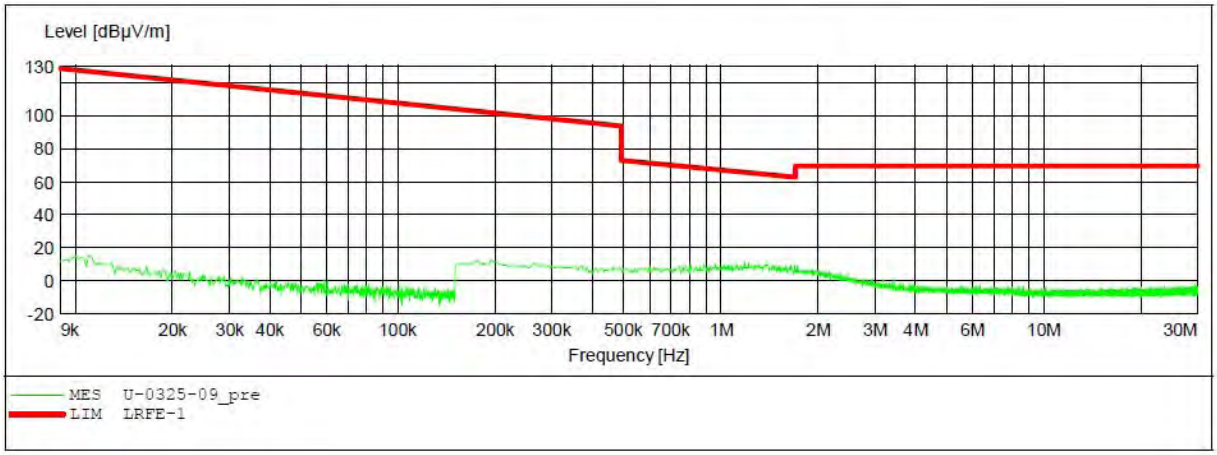
FCC Part 15C 3M Radiated

```
EUT:                  Industrial Wireless Earphones M/N:EE4020BT
Manufacturer:         UP Global Sourcing UK Limited,
Operating Condition:  TX 2480MHz
Test Site:            2# Chamber
Operator:             WADE
Test Specification:   DC 3.7V
Comment:              Z
Start of Test:        2019-03-25 /
```

SCAN TABLE: "LFRE 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	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M

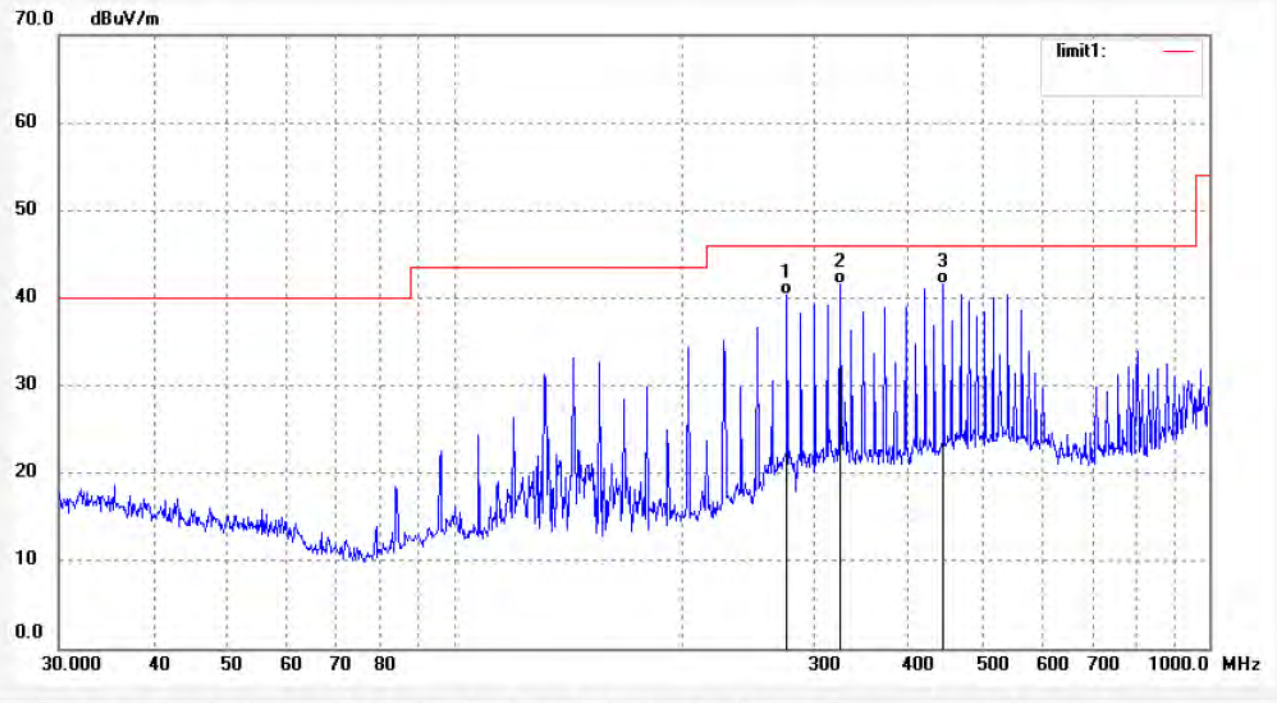


30MHz-1GHz Test data

ACCURATE TECHNOLOGY CO., LTD.
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China
Site: 2# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: LGW2019 #720	Polarization: Horizontal
Standard: FCC Part 15C 3M Radiated	Power Source: DC 3.7V
Test item: Radiation Test	Date: 19/03/21/
Temp.(C)/Hum.(%) 23 C / 48 %	Time:
EUT: Industrial Wireless Earphones	Engineer Signature: WADE
Mode: TX 2402MHz	Distance: 3m
Model: EE4020BT	
Manufacturer: UP Global Sourcing UK Limited,	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	276.1235	50.06	-9.70	40.36	46.00	-5.64	QP			
2	324.4560	49.82	-8.26	41.56	46.00	-4.44	QP			
3	444.8514	46.98	-5.43	41.55	46.00	-4.45	QP			

ACCURATE TECHNOLOGY CO., LTD.
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
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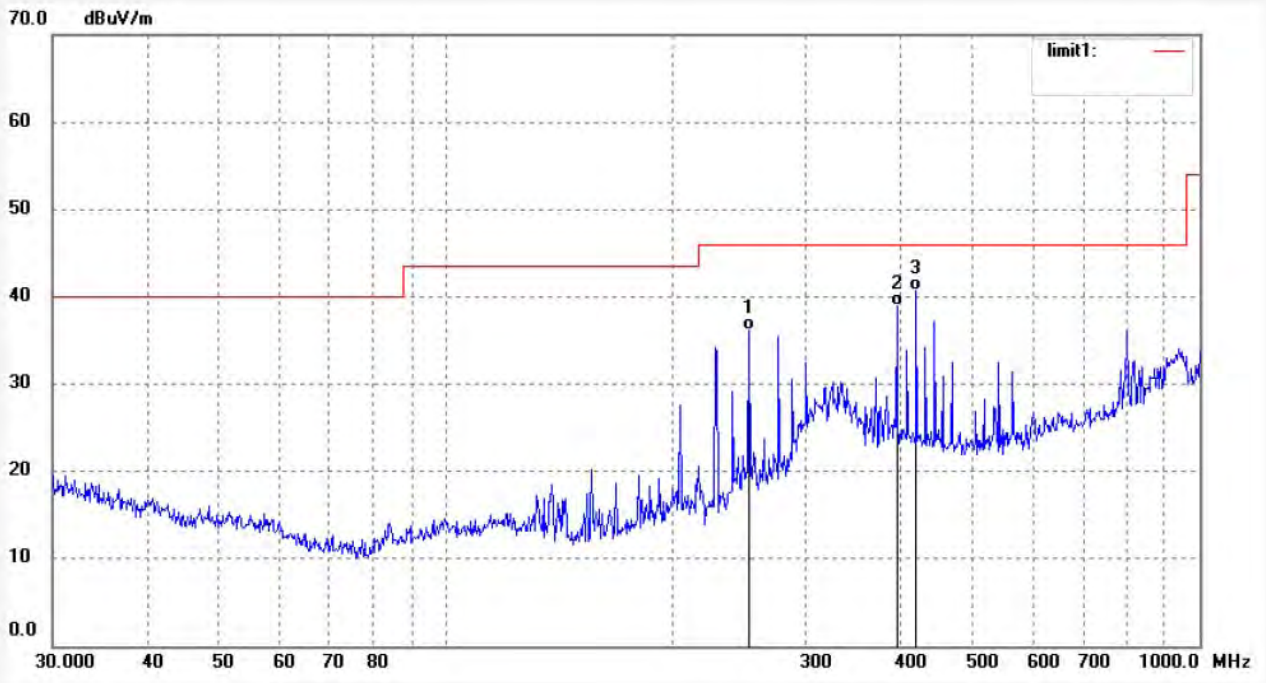
Site: 2# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: LGW2019 #721
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2402MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	252.0627	46.68	-10.54	36.14	46.00	-9.86	QP			
2	396.2414	45.55	-6.59	38.96	46.00	-7.04	QP			
3	420.5803	46.40	-5.75	40.65	46.00	-5.35	QP			

ACCURATE TECHNOLOGY CO., LTD.
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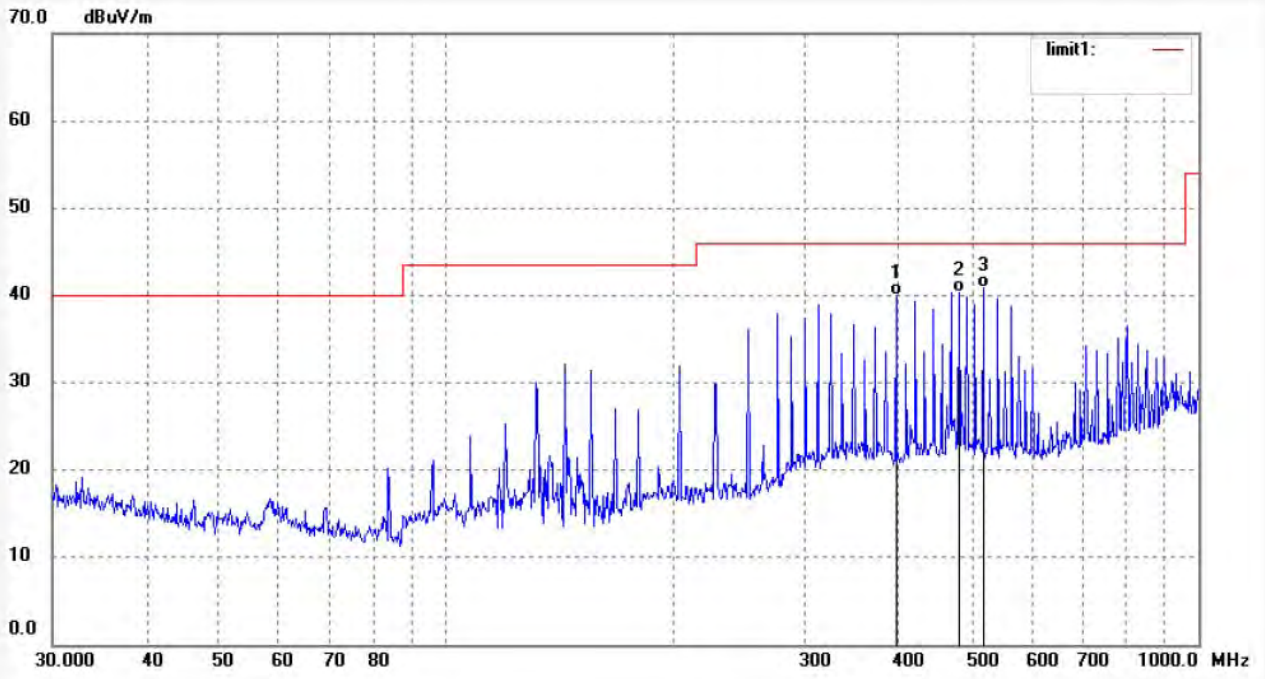
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: LGW2019 #723
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2441MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	396.2414	46.65	-6.59	40.06	46.00	-5.94	QP			
2	480.5276	45.30	-4.88	40.42	46.00	-5.58	QP			
3	517.2480	44.76	-3.91	40.85	46.00	-5.15	QP			

ACCURATE TECHNOLOGY CO., LTD.
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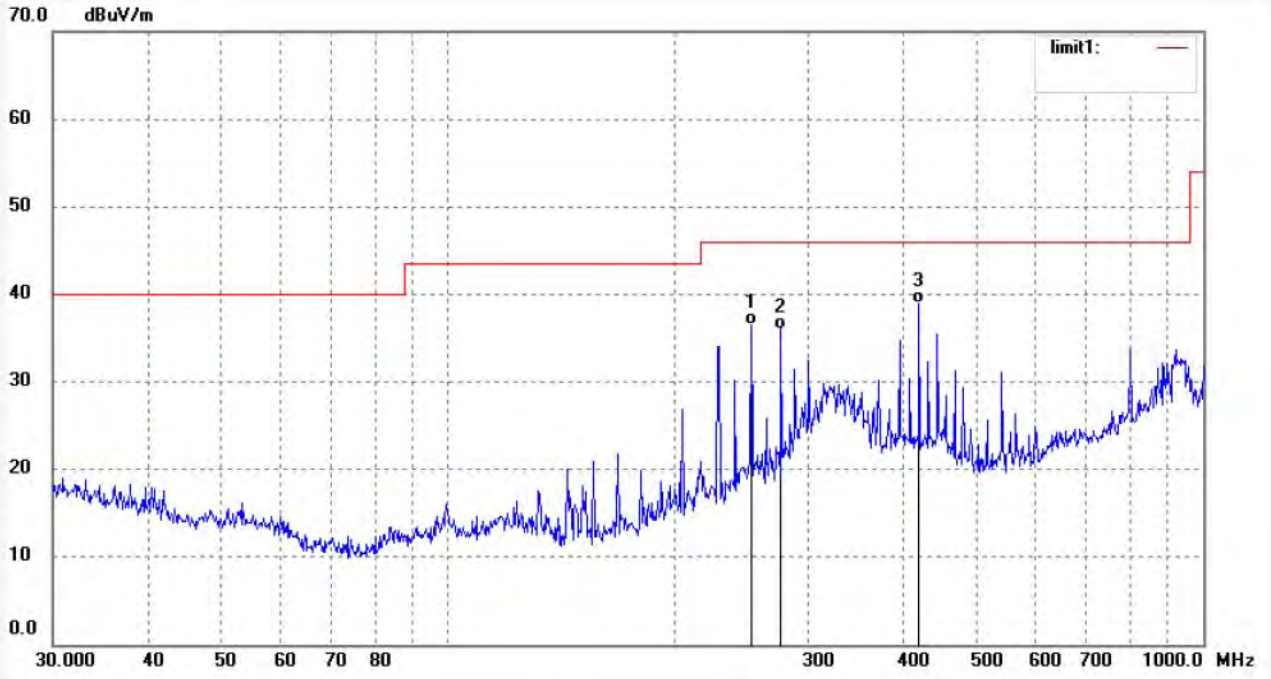
Fax:+86-0755-26503396

Job No.: LGW2019 #722
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2441MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	252.0627	47.10	-10.54	36.56	46.00	-9.44	QP			
2	276.1235	45.75	-9.70	36.05	46.00	-9.95	QP			
3	420.5803	44.77	-5.75	39.02	46.00	-6.98	QP			

ACCURATE TECHNOLOGY CO., LTD.
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
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Site: 2# Chamber
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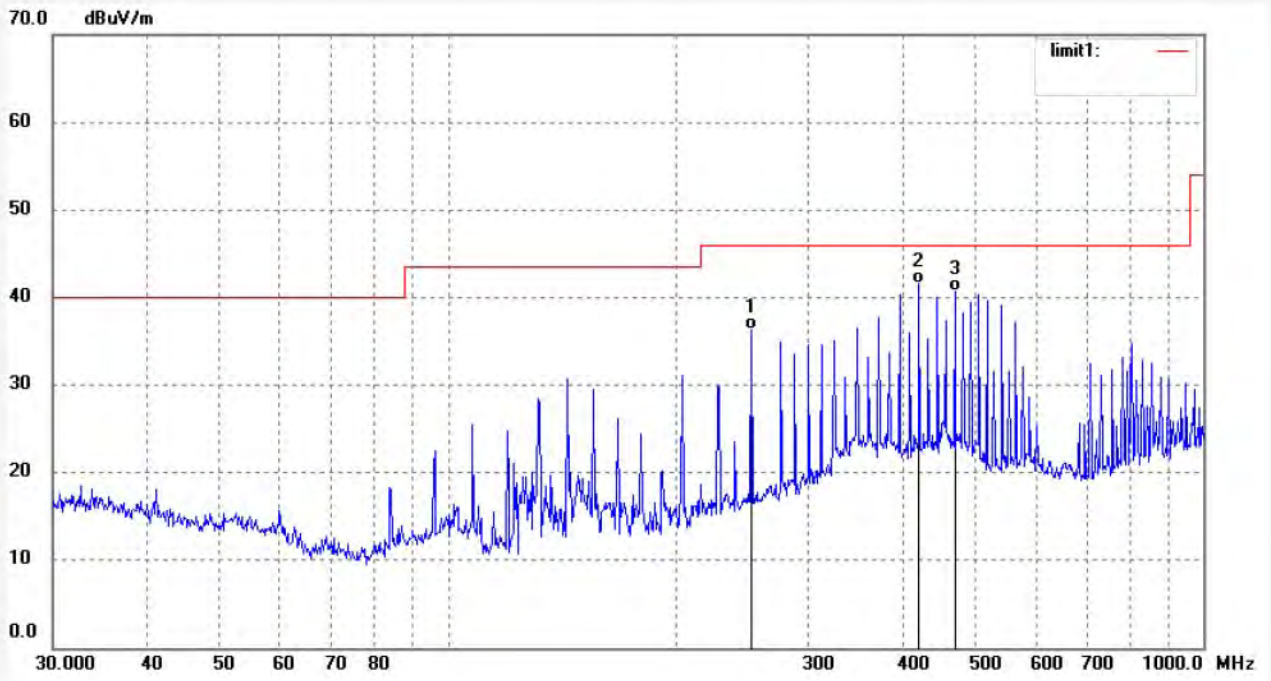
Fax:+86-0755-26503396

Job No.: LGW2019 #724
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2480MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	252.0627	46.89	-10.54	36.35	46.00	-9.65	QP			
2	420.5803	47.24	-5.75	41.49	46.00	-4.51	QP			
3	468.8761	45.76	-5.08	40.68	46.00	-5.32	QP			

ACCURATE TECHNOLOGY CO., LTD.
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
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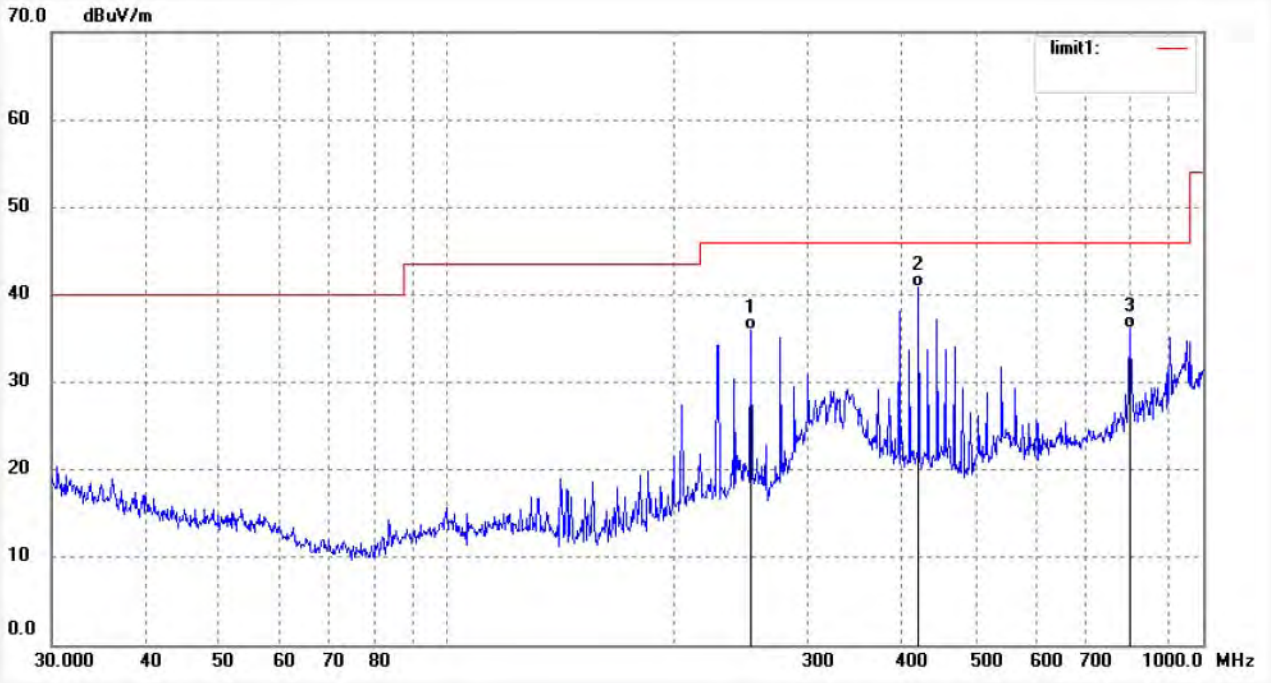
Site: 2# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: LGW2019 #725
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2480MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	252.0627	46.42	-10.54	35.88	46.00	-10.12	QP			
2	420.5803	46.54	-5.75	40.79	46.00	-5.21	QP			
3	798.9796	35.27	0.81	36.08	46.00	-9.92	QP			

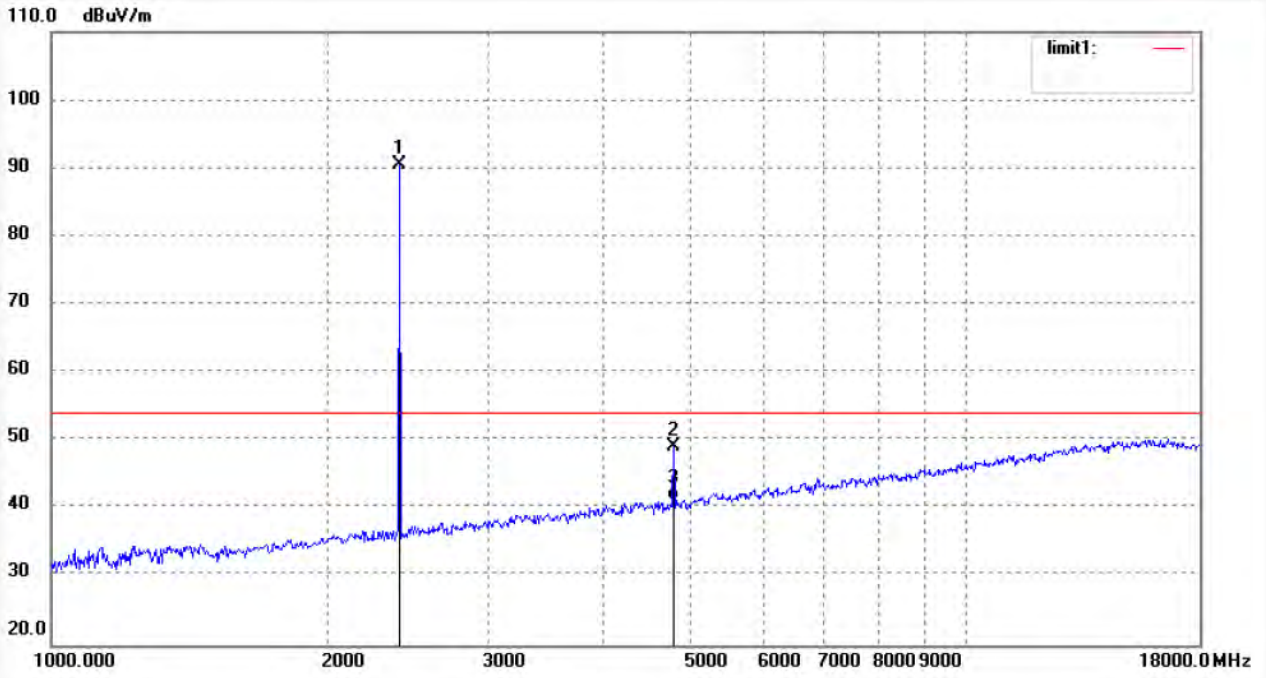
1GHz-18GHz test data

ACCURATE TECHNOLOGY CO., LTD.
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China
Site: 2# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: LGW2019 #688
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2402MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



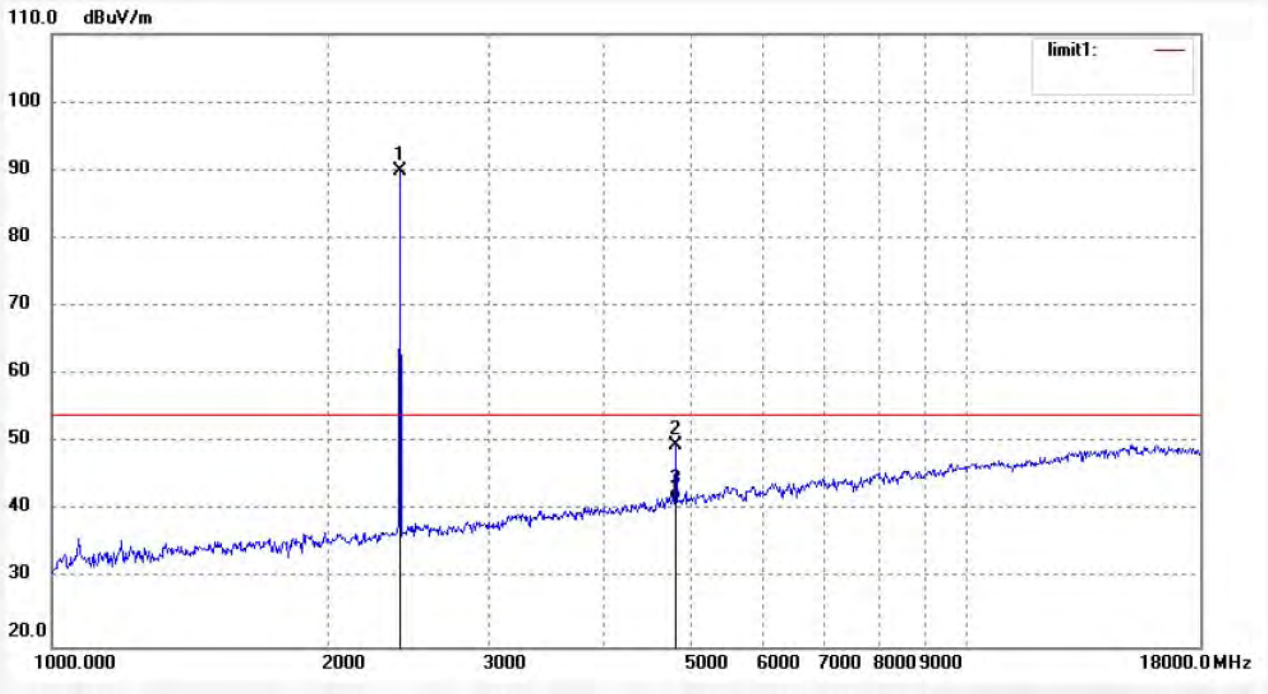
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.000	89.72	0.89	90.61	/	/	peak			
2	4804.026	41.80	7.40	49.20	74.00	-24.80	peak			
3	4804.026	33.96	7.40	41.36	54.00	-12.64	AVG			

ACCURATE TECHNOLOGY CO., LTD.
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China
Site: 2# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: LGW2019 #689
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2402MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



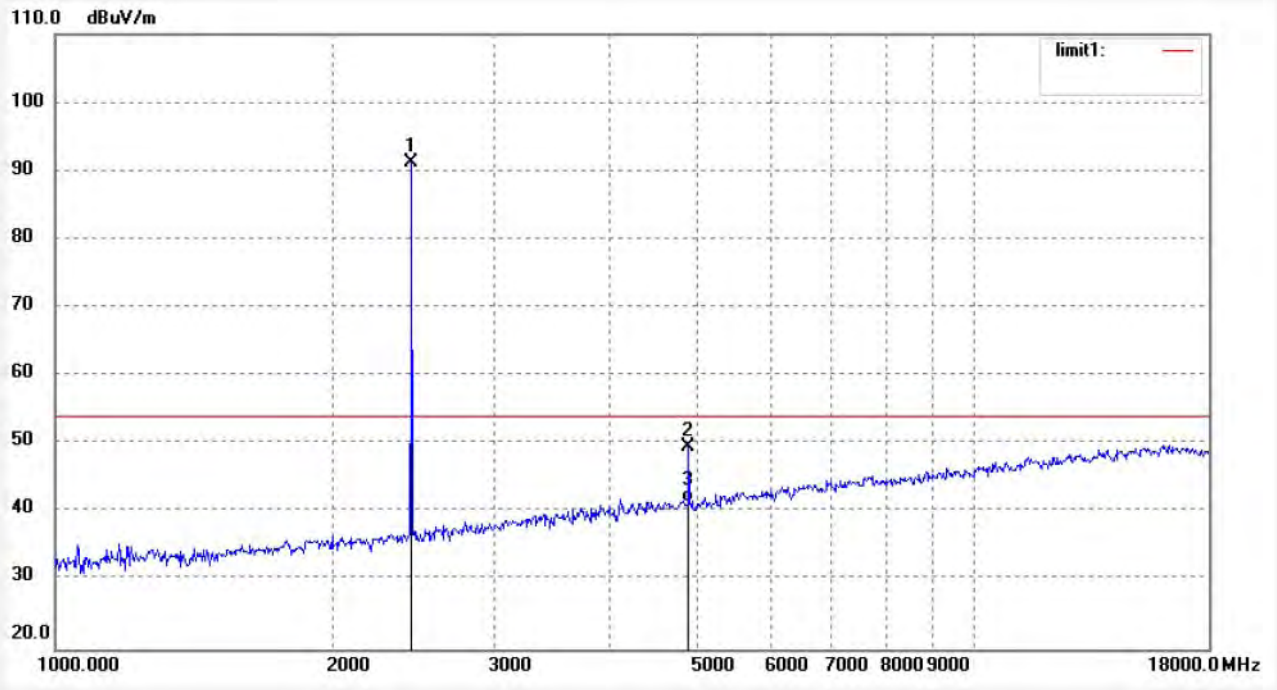
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.000	89.00	0.89	89.89	/	/	peak			
2	4804.027	42.25	7.40	49.65	74.00	-24.35	peak			
3	4804.027	34.17	7.40	41.57	54.00	-12.43	AVG			

ACCURATE TECHNOLOGY CO., LTD.
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China
Site: 2# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: LGW2019 #692
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2441MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



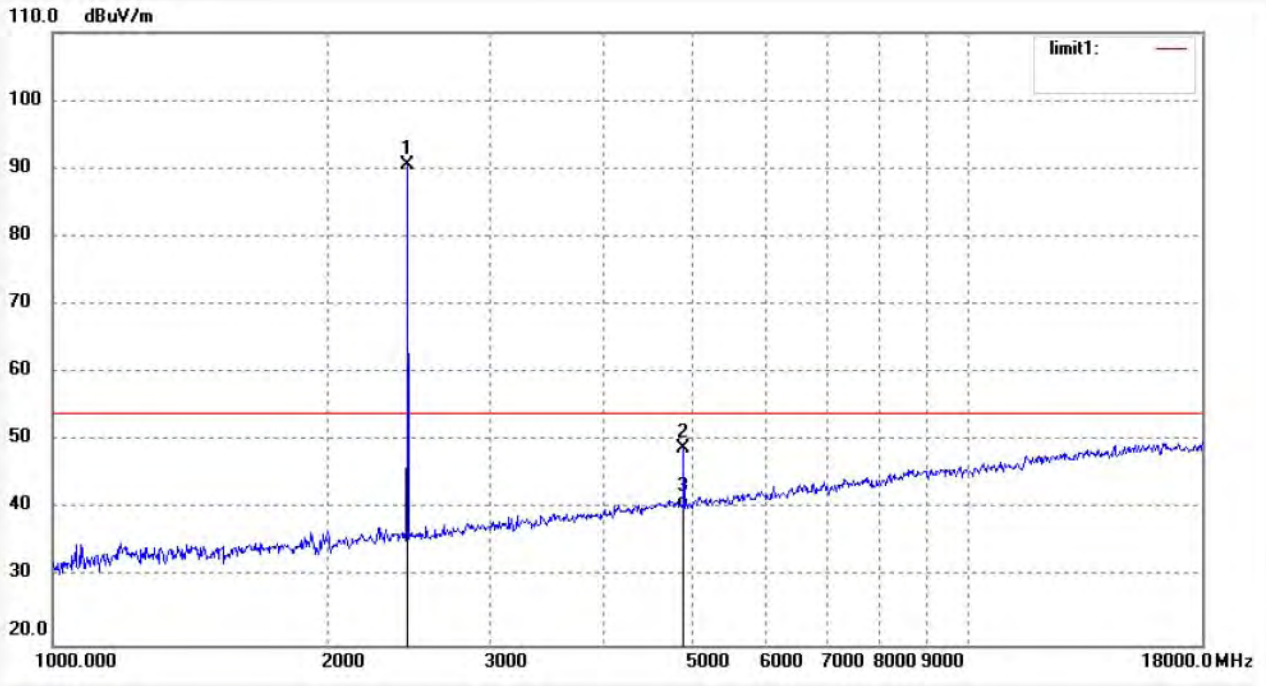
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2441.000	90.23	1.06	91.29	/	/	peak			
2	4882.025	41.39	8.11	49.50	74.00	-24.50	peak			
3	4882.025	33.40	8.11	41.51	54.00	-12.49	AVG			

ACCURATE TECHNOLOGY CO., LTD.
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China
Site: 2# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: LGW2019 #693
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2441MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



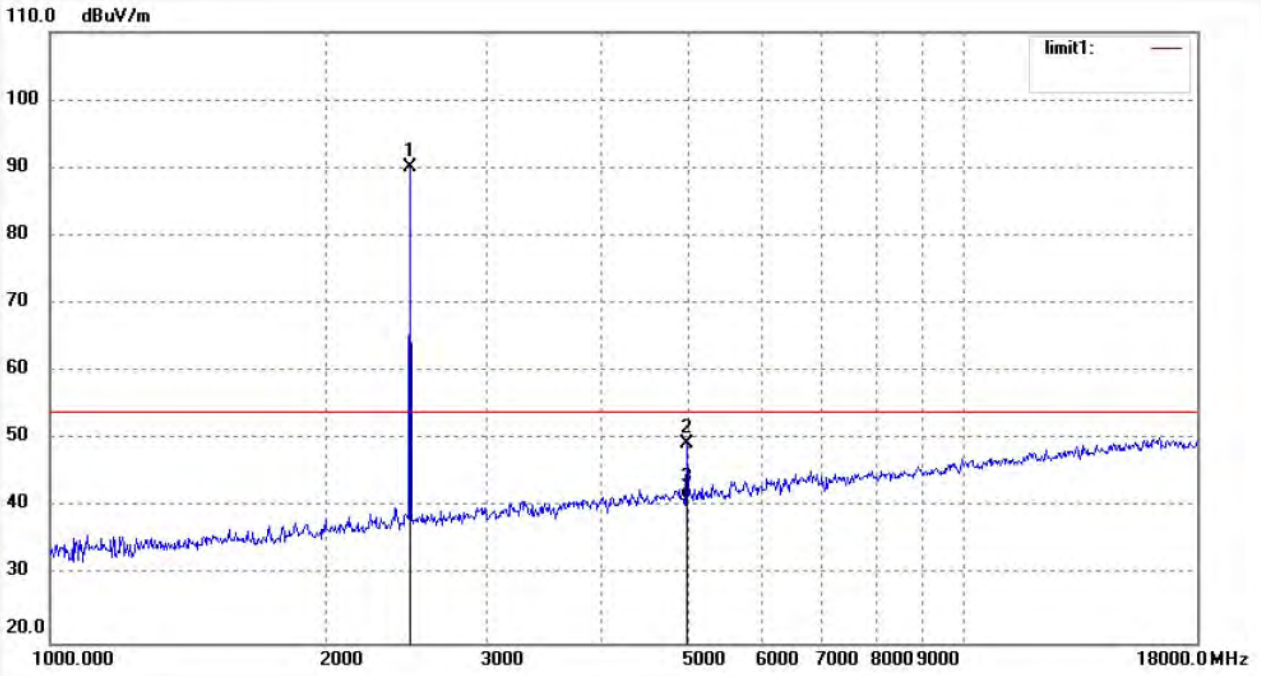
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2441.000	89.49	1.06	90.55	/	/	peak			
2	4882.028	40.70	8.11	48.81	74.00	-25.19	peak			
3	4882.028	32.12	8.11	40.23	54.00	-13.77	AVG			

ACCURATE TECHNOLOGY CO., LTD.
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China
Site: 2# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: LGW2019 #695
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2480MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



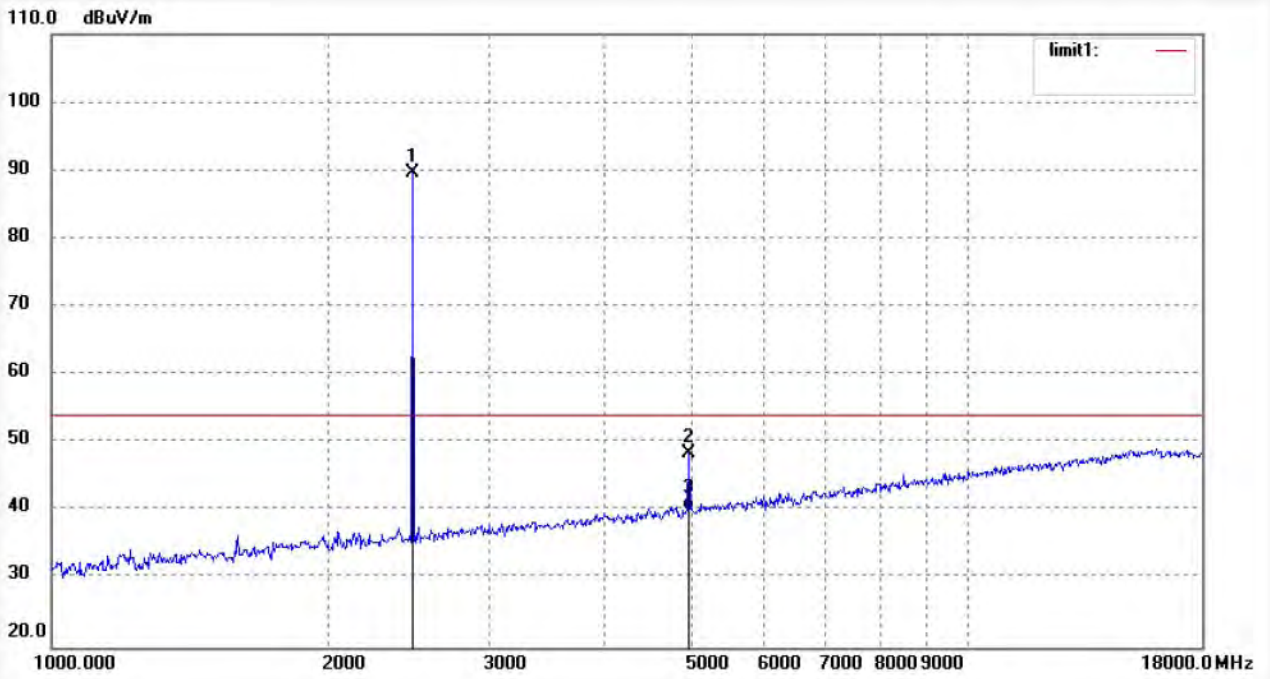
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.000	88.97	1.10	90.07	/	/	peak			
2	4960.030	40.72	8.60	49.32	74.00	-24.68	peak			
3	4960.030	32.76	8.60	41.36	54.00	-12.64	AVG			

ACCURATE TECHNOLOGY CO., LTD.
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China
Site: 2# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: LGW2019 #694
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2480MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.000	88.57	1.10	89.67	/	/	peak			
2	4960.029	39.97	8.60	48.57	74.00	-25.43	peak			
3	4960.029	31.64	8.60	40.24	54.00	-13.76	AVG			

18GHz-26.5GHz test data

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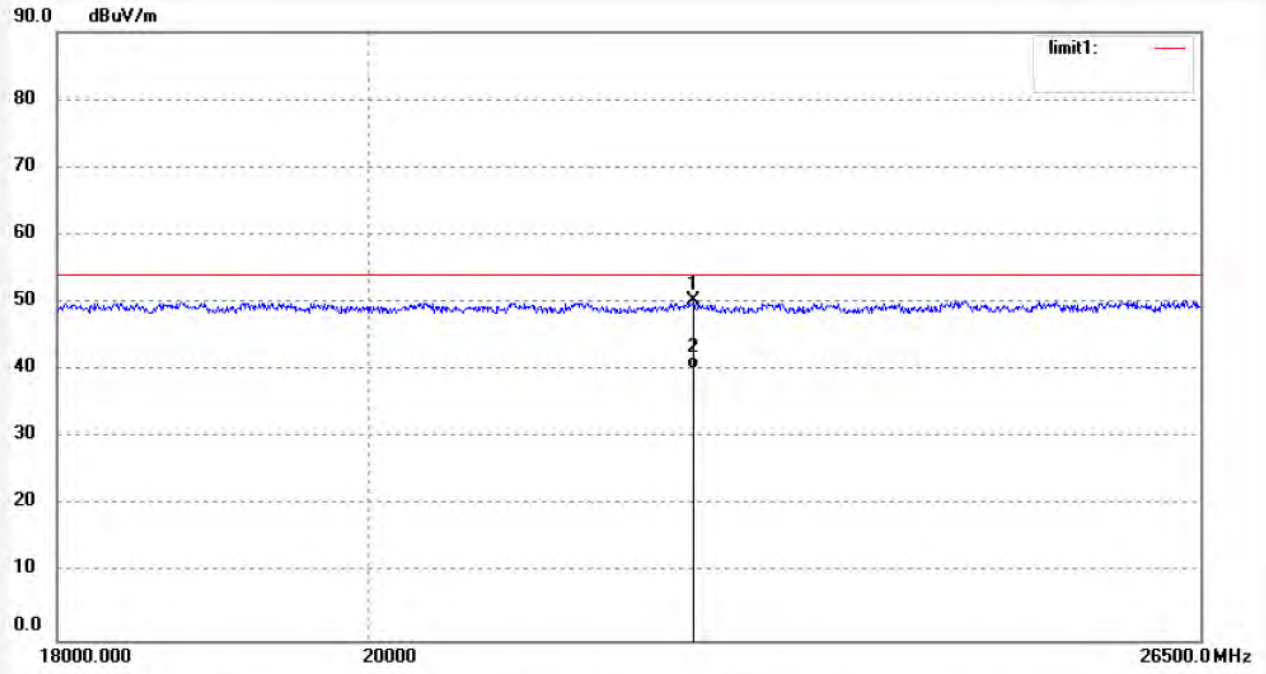
Job No.: LGW2019 #699	Polarization: Horizontal
Standard: FCC Part 15C 3M Radiated	Power Source: DC 3.7V
Test item: Radiation Test	Date: 19/03/21/
Temp.(C)/Hum.(%) 23 C / 48 %	Time:
EUT: Industrial Wireless Earphones	Engineer Signature: WADE
Mode: TX 2402MHz	Distance: 3m
Model: EE4020BT	
Manufacturer: UP Global Sourcing UK Limited,	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	22327.170	10.50	39.69	50.19	74.00	-23.81	peak			
2	22327.170	0.55	39.69	40.24	54.00	-13.76	AVG			

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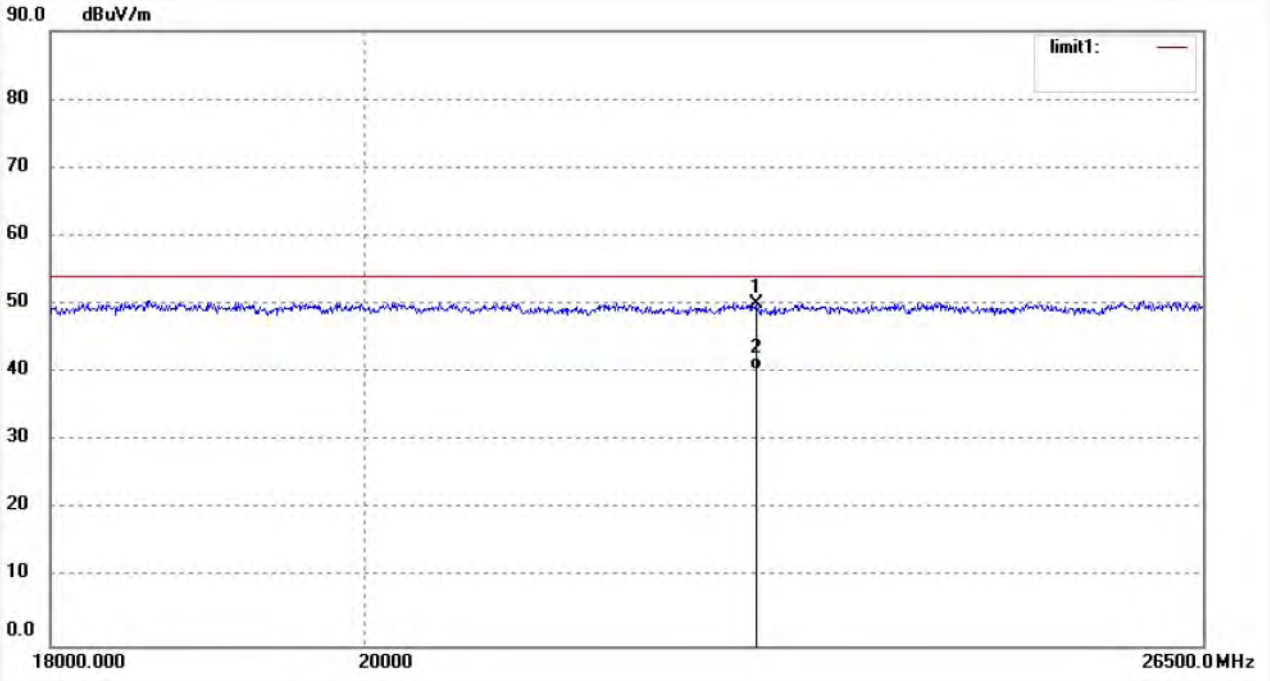
Job No.: LGW2019 #698
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2402MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	22816.035	10.36	39.66	50.02	74.00	-23.98	peak			
2	22816.035	0.70	39.66	40.36	54.00	-13.64	AVG			

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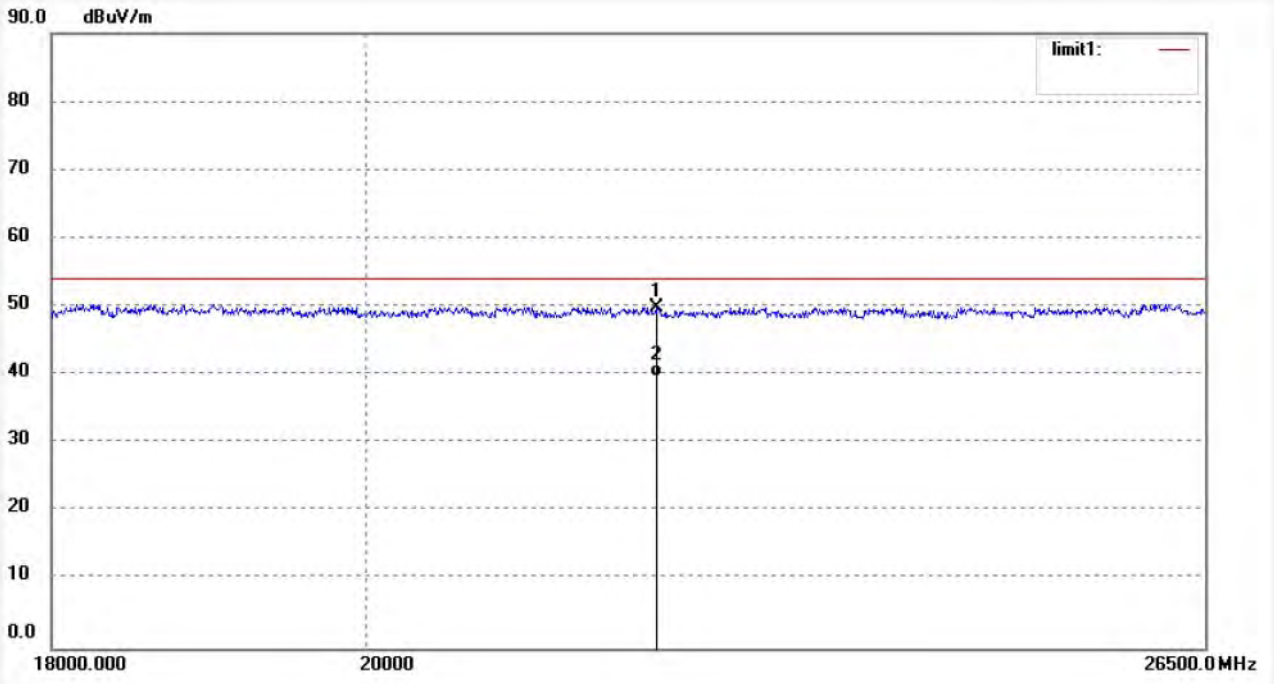
Job No.: LGW2019 #700
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2441MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	22044.007	10.40	39.44	49.84	74.00	-24.16	peak			
2	22044.007	0.21	39.44	39.65	54.00	-14.35	AVG			

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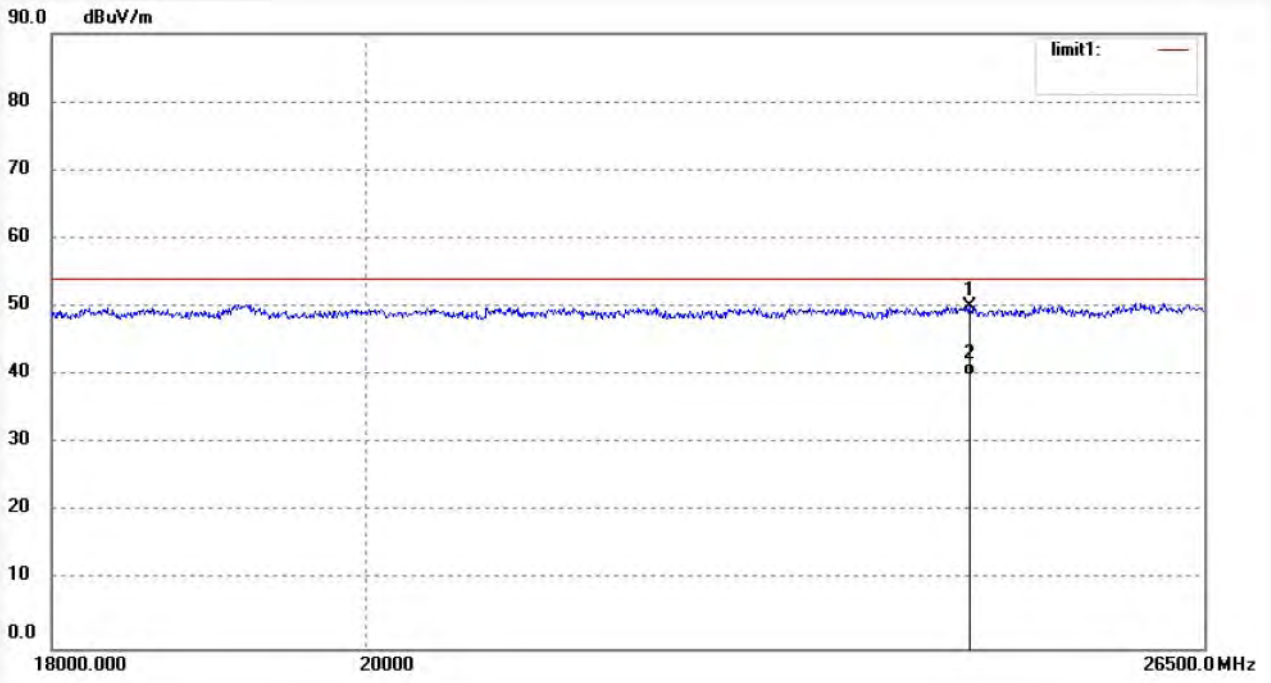
Job No.: LGW2019 #701
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2441MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	24489.465	9.84	40.18	50.02	74.00	-23.98	peak			
2	24489.465	-0.18	40.18	40.00	54.00	-14.00	AVG			

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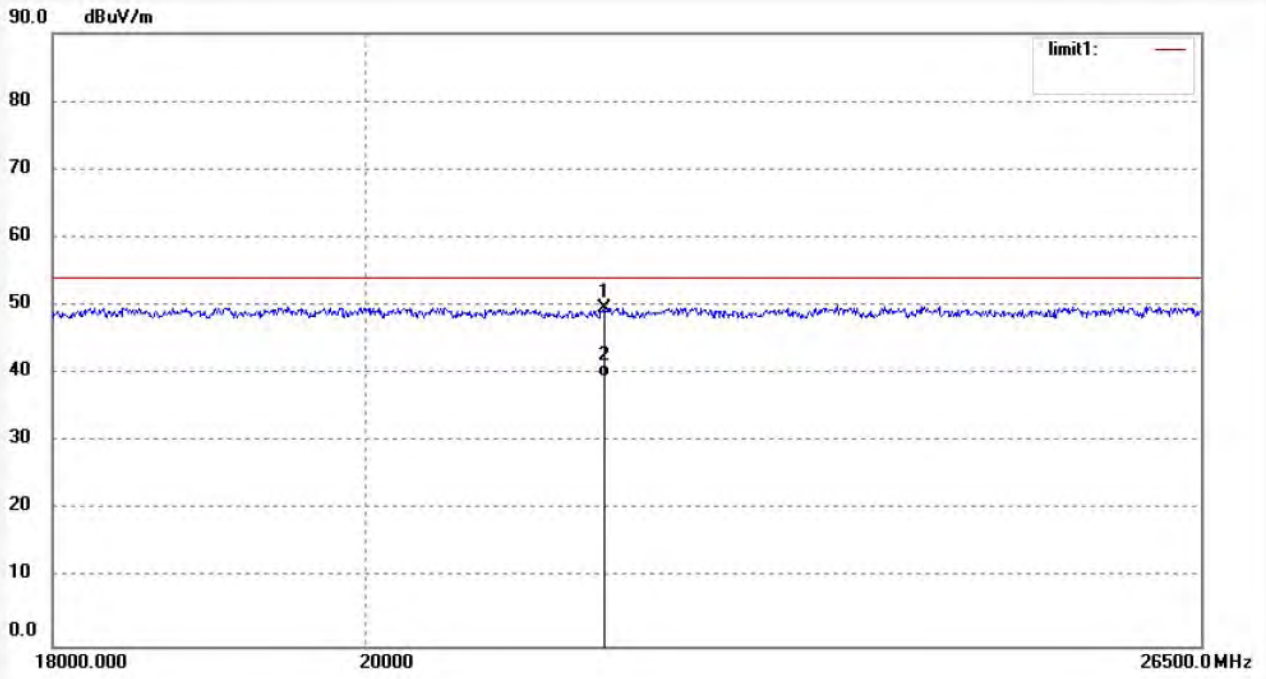
Job No.: LGW2019 #703
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2480MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	21672.036	10.87	38.82	49.69	74.00	-24.31	peak			
2	21672.036	0.75	38.82	39.57	54.00	-14.43	AVG			

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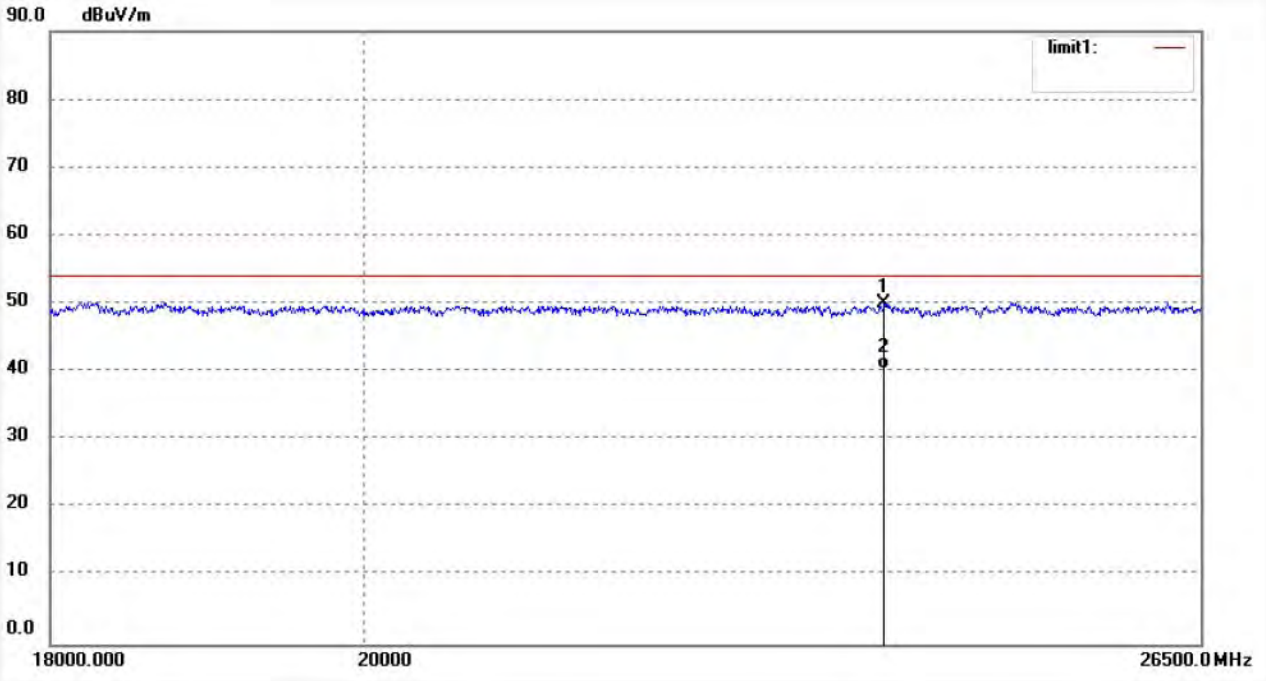
Job No.: LGW2019 #702
Standard: FCC Part 15C 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2480MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

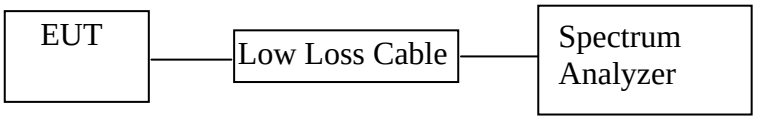
Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	23826.113	10.32	39.72	50.04	74.00	-23.96	peak			
2	23826.113	0.63	39.72	40.35	54.00	-13.65	AVG			

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

Non-hopping mode

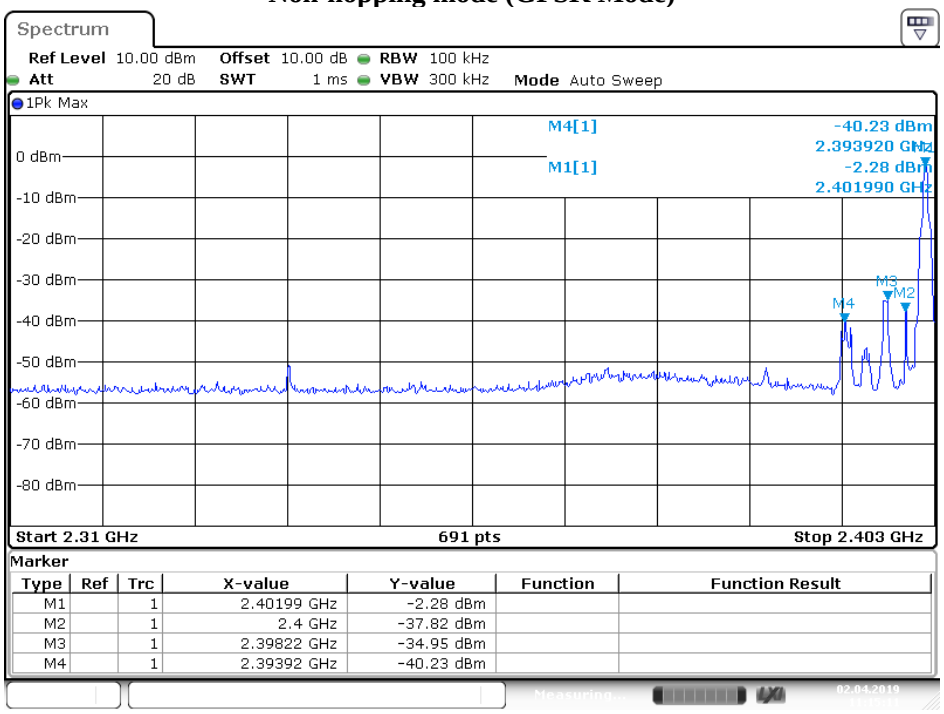
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)	Result
GFSK mode			
2398.22	32.67	> 20dBc	Pass
2483.50	40.08	> 20dBc	Pass
π /4 DQPSK mode			
2398.22	32.74	> 20dBc	Pass
2483.50	39.95	> 20dBc	Pass

Hopping mode

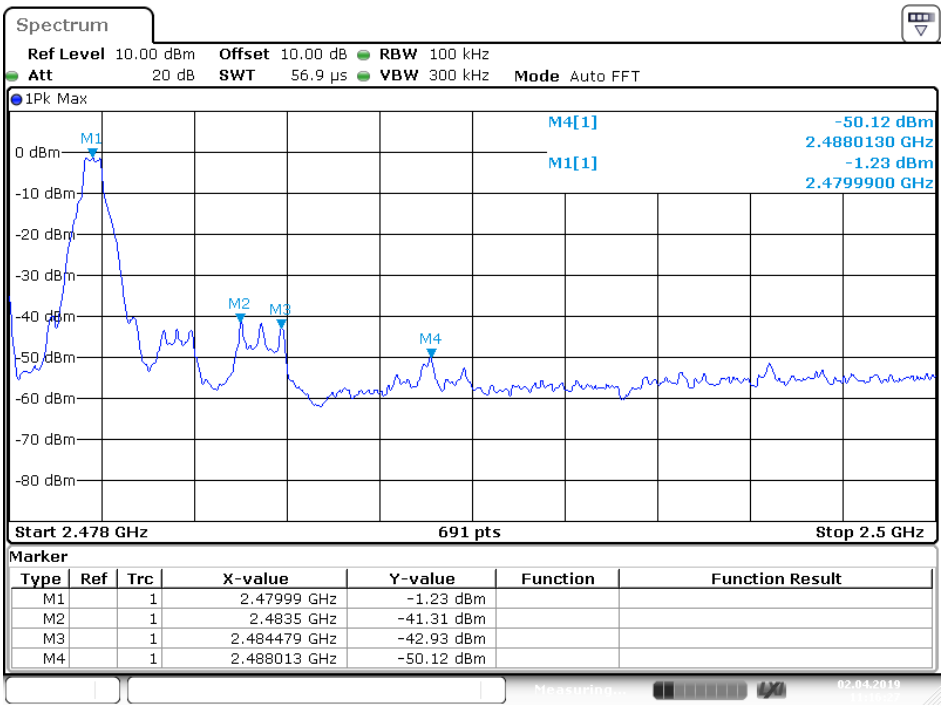
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)	Result
GFSK mode			
2398.05	33.12	> 20dBc	Pass
2483.50	40.43	> 20dBc	Pass
π /4 DQPSK mode			
2398.06	32.50	> 20dBc	Pass
2483.50	40.53	> 20dBc	Pass

The spectrum analyzer plots are attached as below.

Non-hopping mode (GFSK Mode)

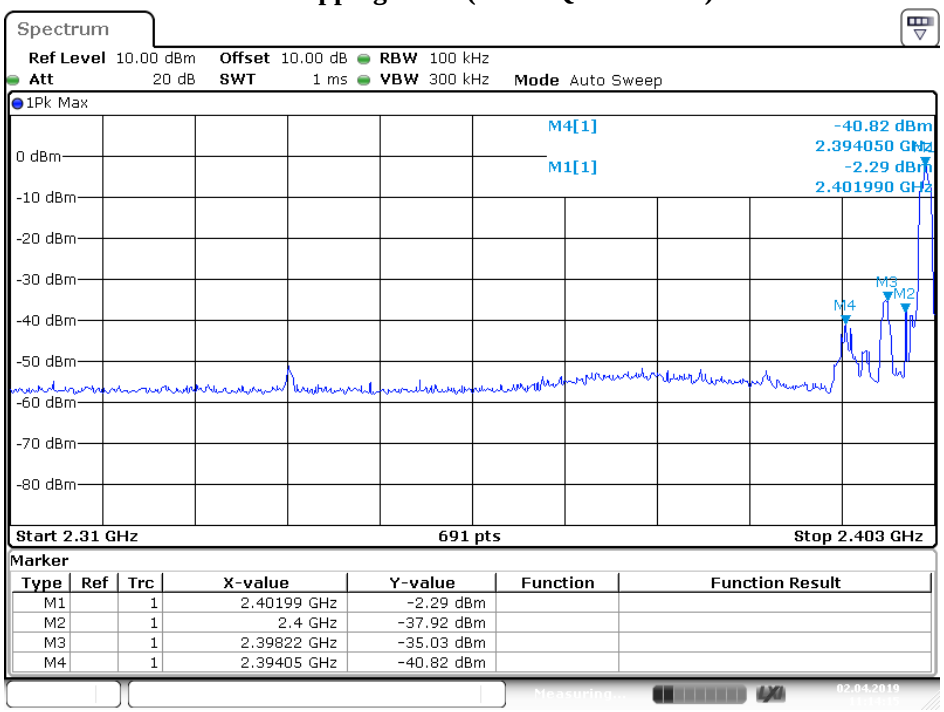


Date: 2.APR.2019 11:15:12

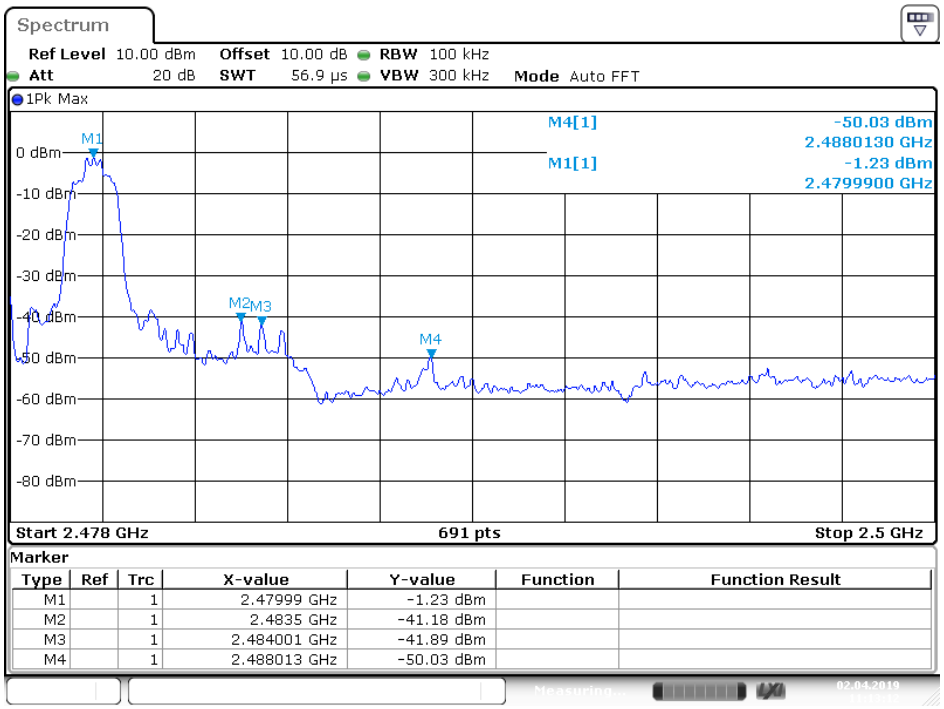


Date: 2.APR.2019 11:16:28

Non-hopping mode (π /4 DQPSK Mode)

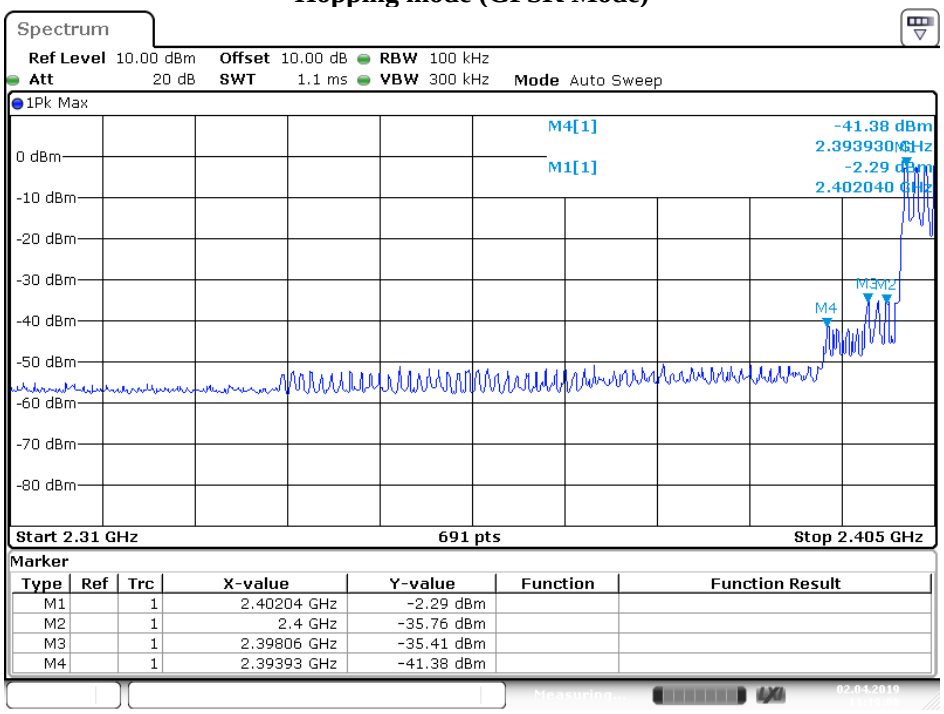


Date: 2.APR.2019 11:14:16

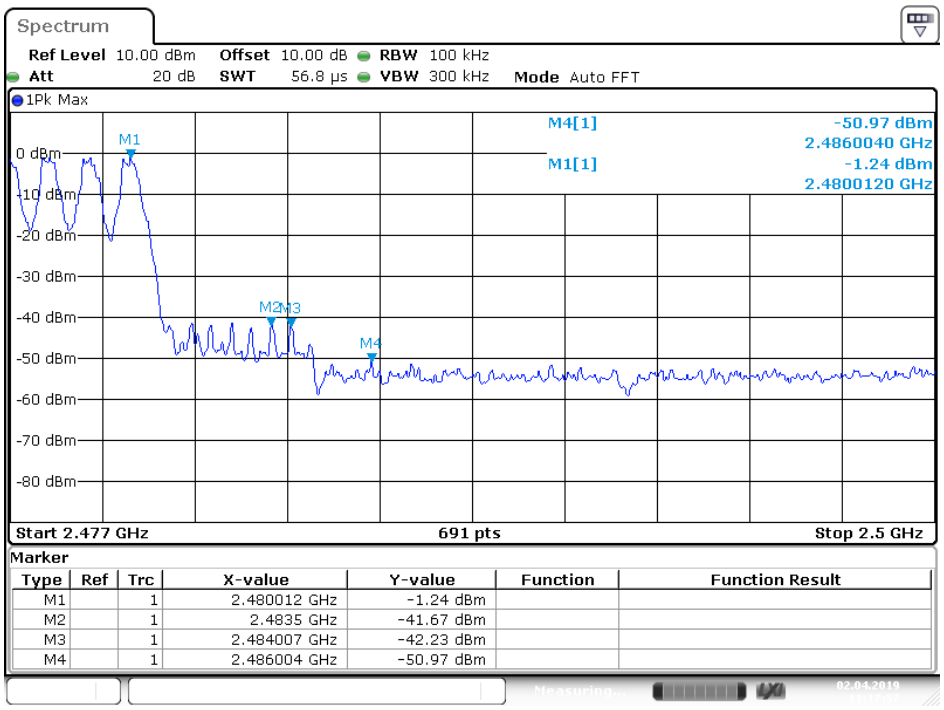


Date: 2.APR.2019 11:13:13

Hopping mode (GFSK Mode)

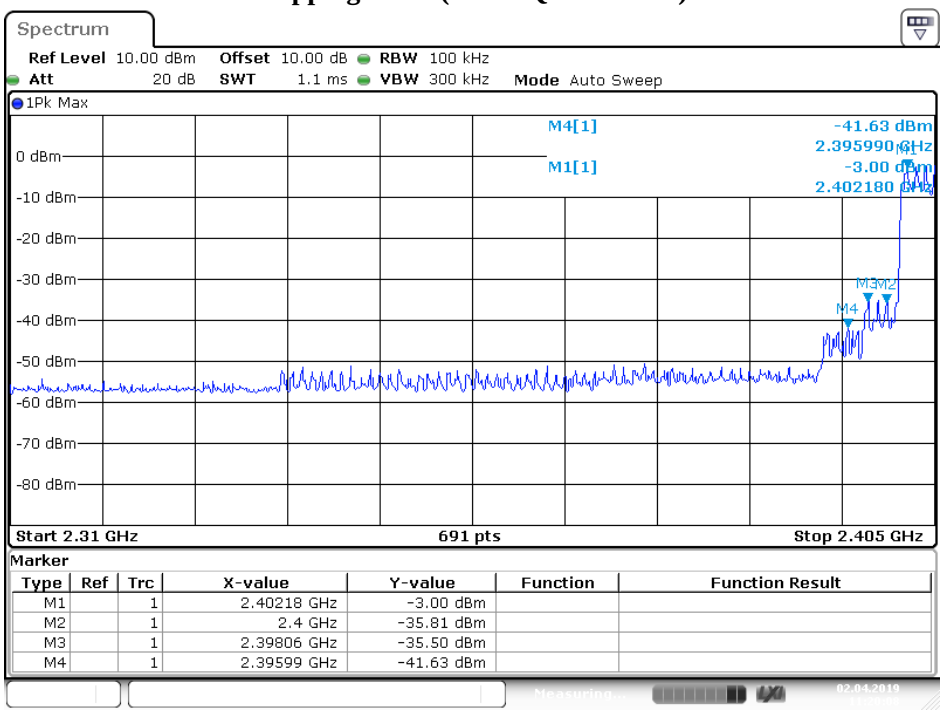


Date: 2.APR.2019 11:19:09

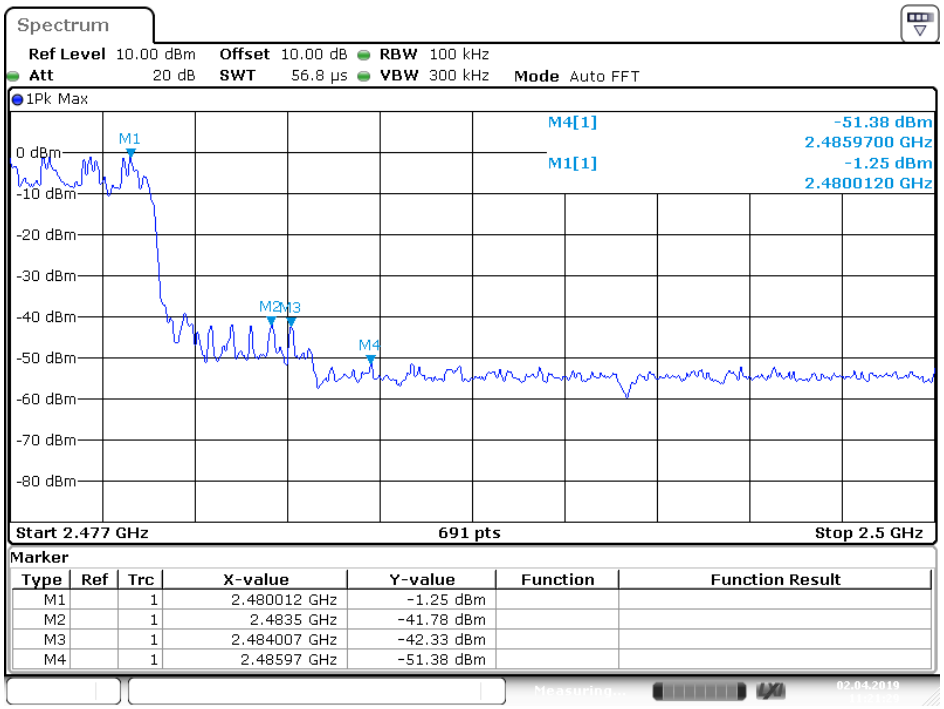


Date: 2.APR.2019 11:17:58

Hopping mode (π /4 DQPSK Mode)



Date: 2.APR.2019 11:20:09



Date: 2.APR.2019 11:21:30

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. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

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 worse case(GFSK) emissions are reported.

Non-hopping mode

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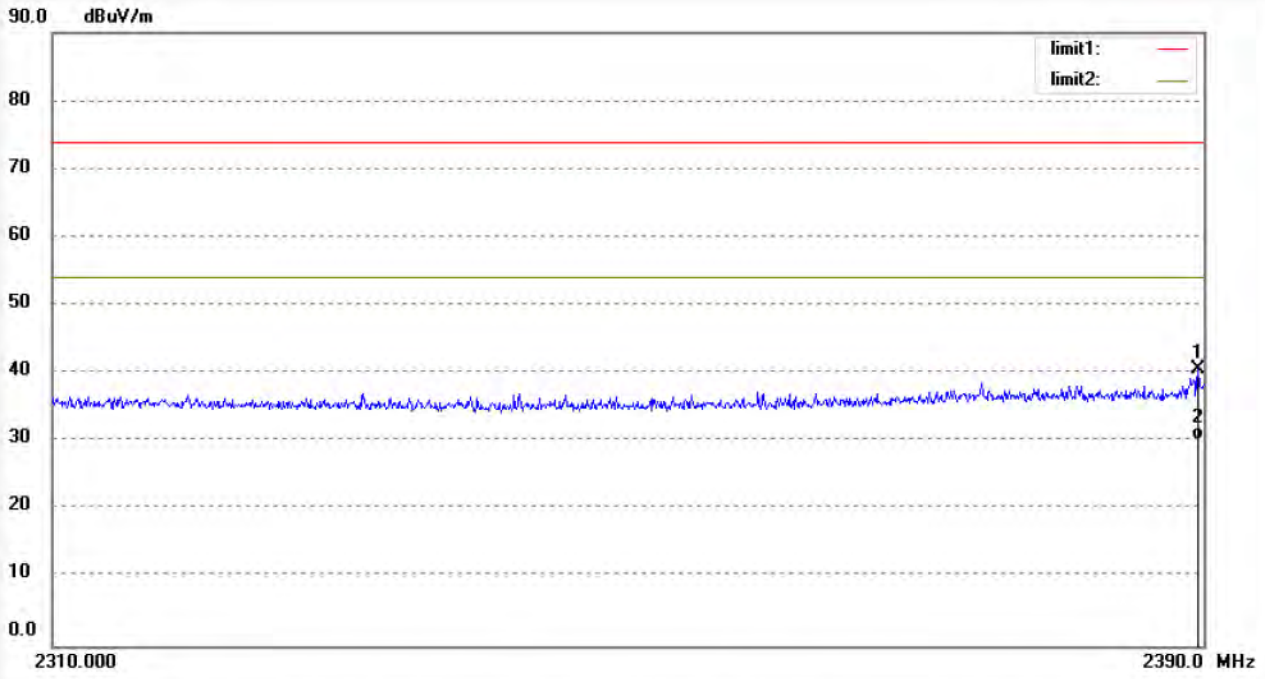
Job No.: LGW2019 #691
Standard: FCC (Band Edge)
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2402MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2389.600	39.90	0.79	40.69	74.00	-33.31	peak			
2	2389.600	29.48	0.79	30.27	54.00	-23.73	AVG			

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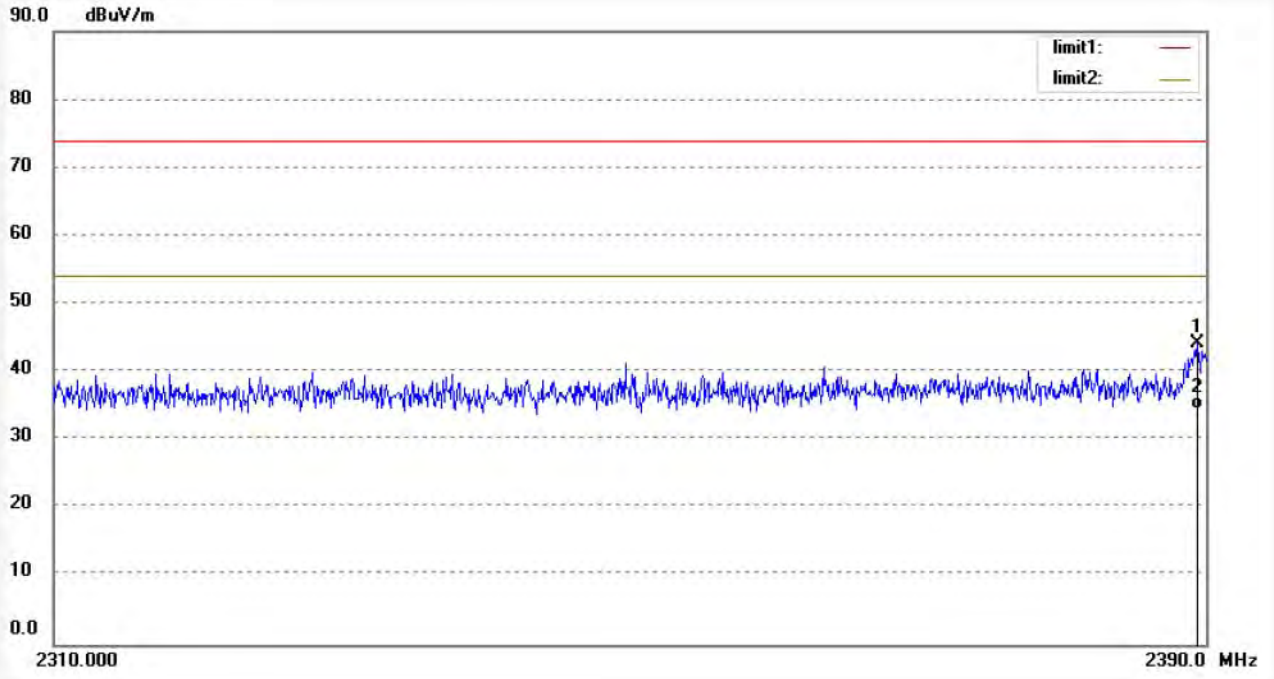
Job No.: LGW2019 #690
Standard: FCC (Band Edge)
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2402MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2389.360	43.48	0.79	44.27	74.00	-29.73	peak			
2	2389.360	33.86	0.79	34.65	54.00	-19.35	AVG			

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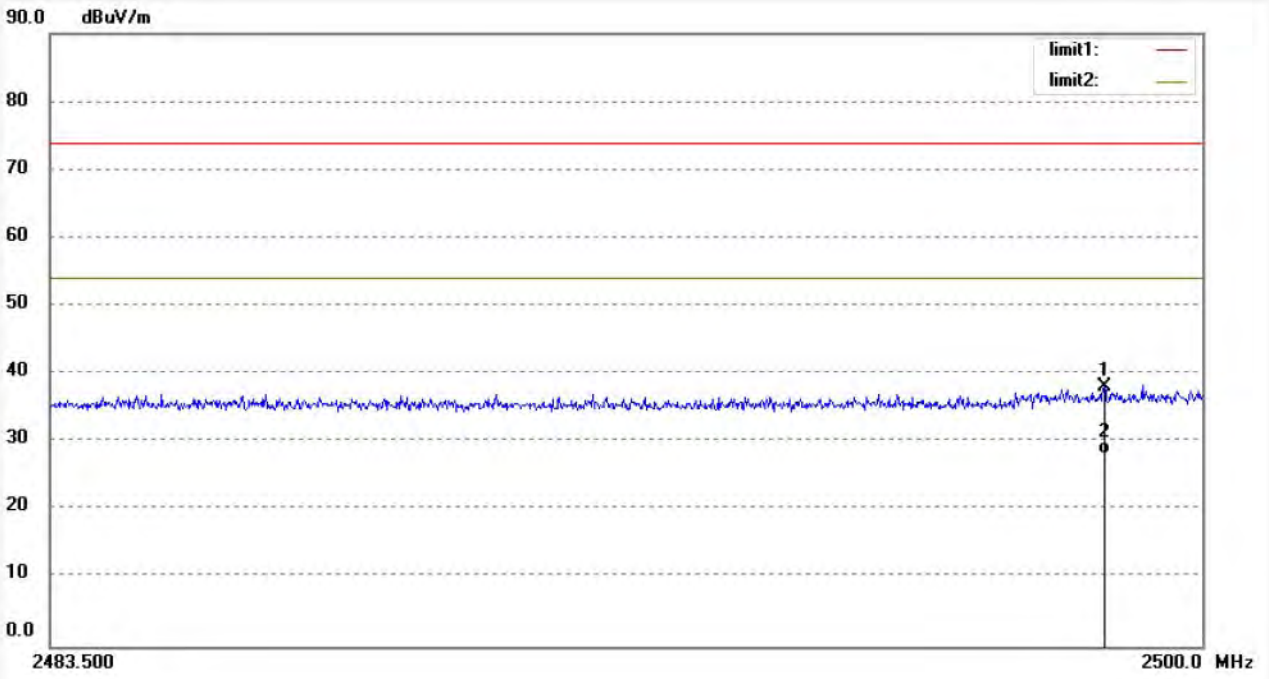
Job No.: LGW2019 #696
Standard: FCC (Band Edge)
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2480MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Horizontal
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2498.597	36.94	1.11	38.05	74.00	-35.95	peak			
2	2498.597	27.03	1.11	28.14	54.00	-25.86	AVG			

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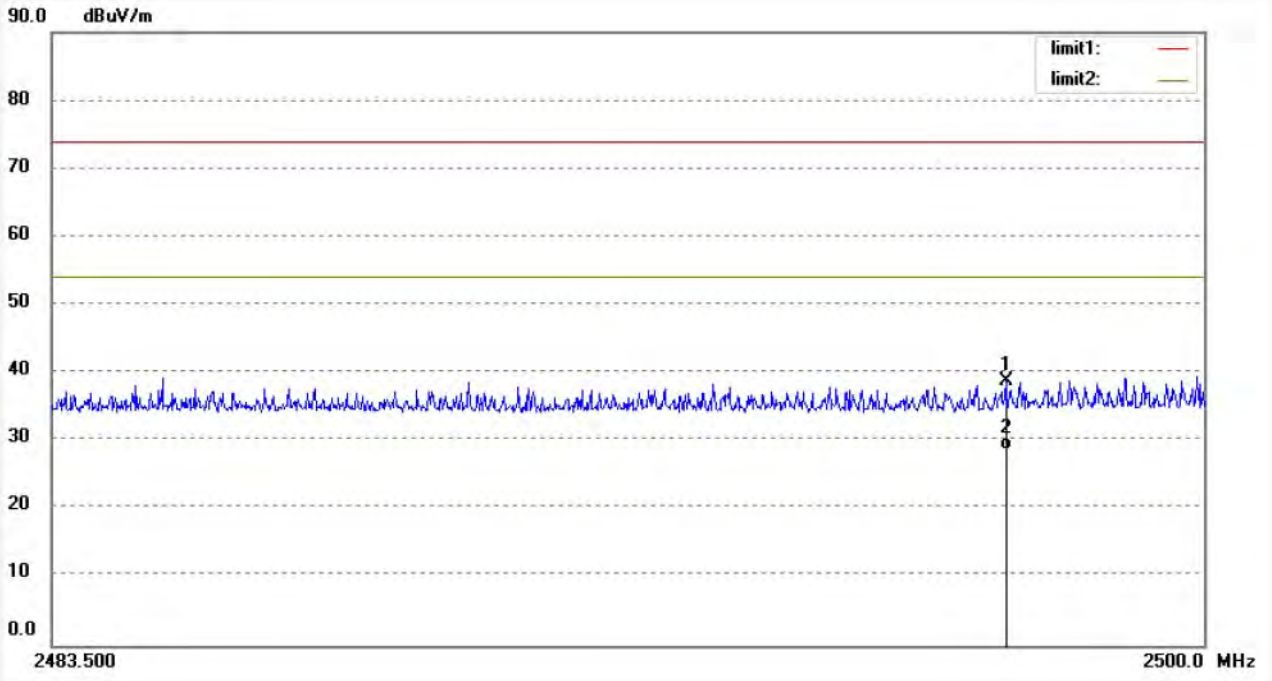
Job No.: LGW2019 #697
Standard: FCC (Band Edge)
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Industrial Wireless Earphones
Mode: TX 2480MHz
Model: EE4020BT
Manufacturer: UP Global Sourcing UK Limited,

Polarization: Vertical
Power Source: DC 3.7V
Date: 19/03/21/
Time:
Engineer Signature: WADE
Distance: 3m

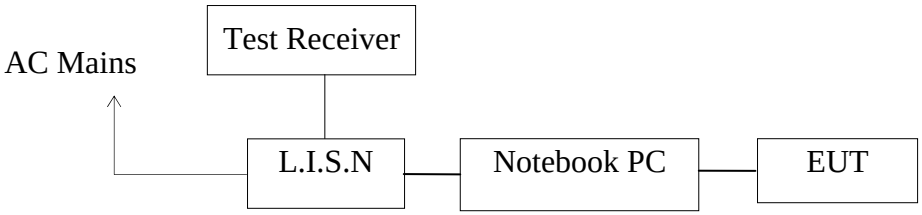
Note:



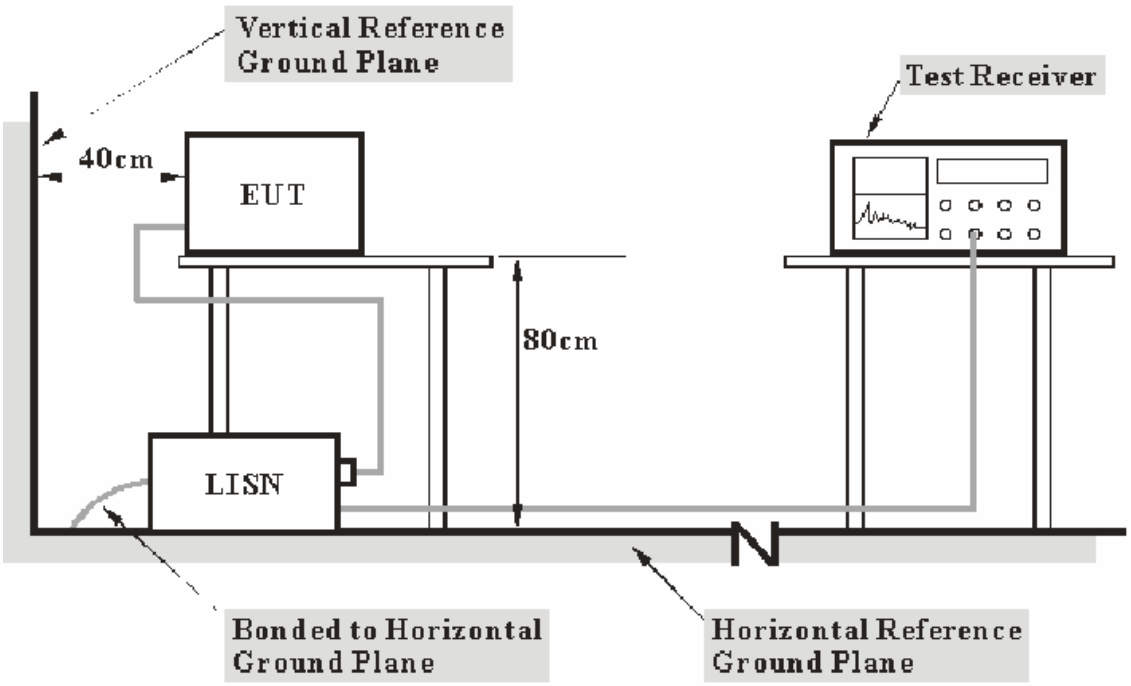
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2497.162	37.73	1.10	38.83	74.00	-35.17	peak			
2	2497.162	27.54	1.10	28.64	54.00	-25.36	AVG			

12.AC POWER LINE CONDUCTED EMISSION TEST

12.1.Block Diagram of Test Setup



12.2.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.

12.3.Test 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.		

12.4.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.

12.5.Operating Condition of EUT

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

12.5.2.Turn on the power of all equipment.

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

12.6.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 C63.4: 2014 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.

12.7.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

Calculation Formula:
Margin = Limit (dBμV) - Level (dBμV)

12.8.Test Result

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.

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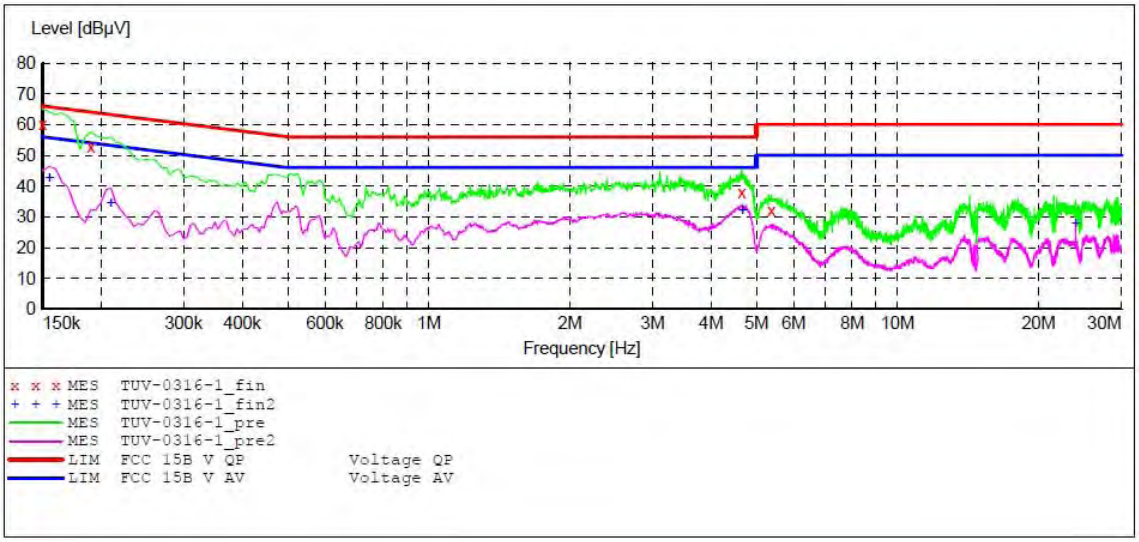
CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Industrial Wireless Earphones M/N:EE4020BT
Manufacturer: UP Global Sourcing UK Limited,
Operating Condition: BT Communication
Test Site: 1#Shielding Room
Operator: WADE
Test Specification: N 120V/60Hz
Comment: Mains Port
Start of Test: 3/16/2019 /

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: "TUV-0316-1_fin"

3/16/2019

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	60.30	10.5	66	5.7	QP	N	GND
0.190000	52.60	10.5	64	11.4	QP	N	GND
4.650000	38.00	11.1	56	18.0	QP	N	GND
5.380000	32.10	11.2	60	27.9	QP	N	GND

MEASUREMENT RESULT: "TUV-0316-1_fin2"

3/16/2019

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.155000	42.70	10.5	56	13.0	AV	N	GND
0.210000	34.50	10.5	53	18.7	AV	N	GND
4.670000	31.90	11.1	46	14.1	AV	N	GND
23.995000	27.60	11.5	50	22.4	AV	N	GND

ACCURATE TECHNOLOGY CO.,LTD

CONDUCTED EMISSION STANDARD FCC PART 15 C

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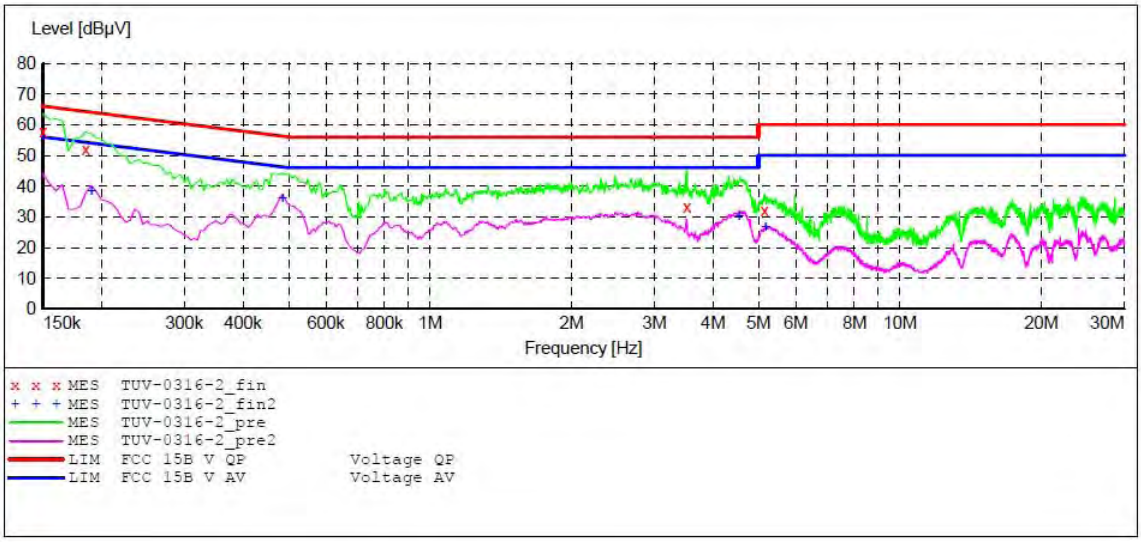
EUT:                 Industrial Wireless Earphones M/N:EE4020BT
Manufacturer:        UP Global Sourcing UK Limited,
Operating Condition: BT Communication
Test Site:           1#Shielding Room
Operator:            WADE
Test Specification:  L 120V/60Hz
Comment:             Mains Port
Start of Test:       3/16/2019 /
```

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: "TUV-0316-2_fin"

3/16/2019

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	57.60	10.5	66	8.4	QP	L1	GND
0.185000	52.10	10.5	64	12.2	QP	L1	GND
3.520000	33.20	11.1	56	22.8	QP	L1	GND
5.150000	32.20	11.2	60	27.8	QP	L1	GND

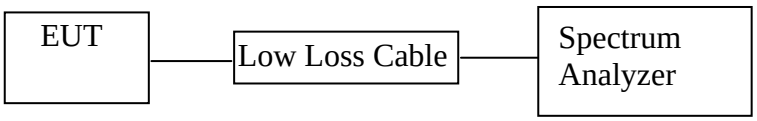
MEASUREMENT RESULT: "TUV-0316-2_fin2"

3/16/2019

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.190000	38.10	10.5	54	15.9	AV	L1	GND
0.485000	36.10	10.7	46	10.2	AV	L1	GND
4.550000	30.20	11.1	46	15.8	AV	L1	GND
5.170000	26.70	11.2	50	23.3	AV	L1	GND

13. CONDUCTED SPURIOUS EMISSION COMPLIANCE TEST

13.1. Block Diagram of Test Setup



13.2. 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).

13.3. EUT Configuration on Measurement

The equipment is 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.

13.4. Operating Condition of EUT

13.4.1. Setup the EUT and simulator as shown as Section 13.1.

13.4.2. Turn on the power of all equipment.

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

13.5.Test Procedure

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

13.5.2.Set RBW of spectrum analyzer to 100kHz and VBW to 300kHz

13.5.3.The Conducted Spurious Emission was measured and recorded.

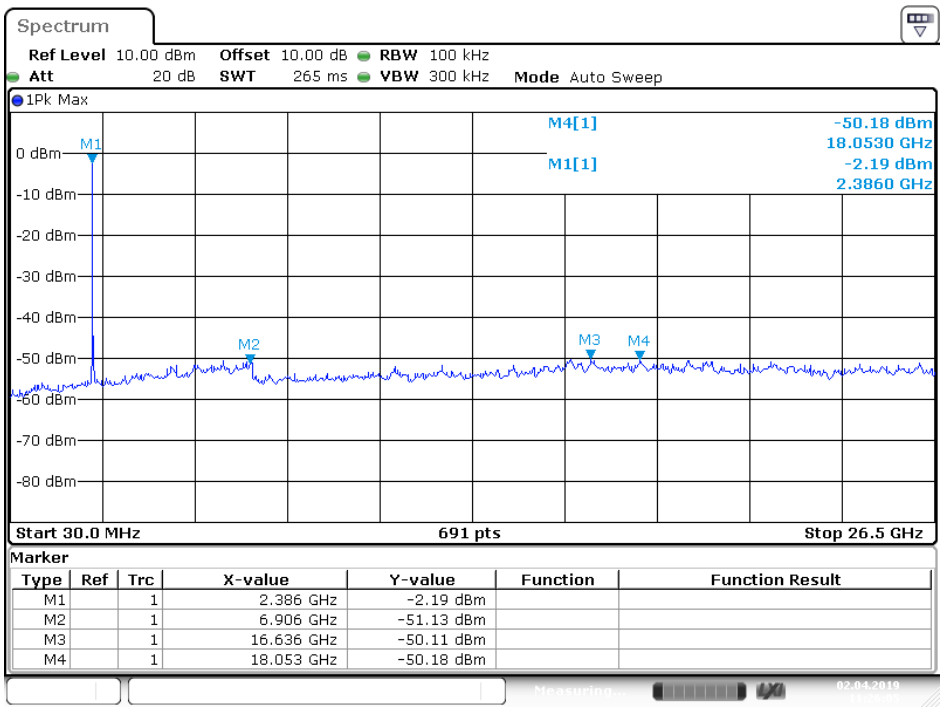
13.6.Test Result

Pass.

The spectrum analyzer plots are attached as below.

GFSK mode

Low Channel



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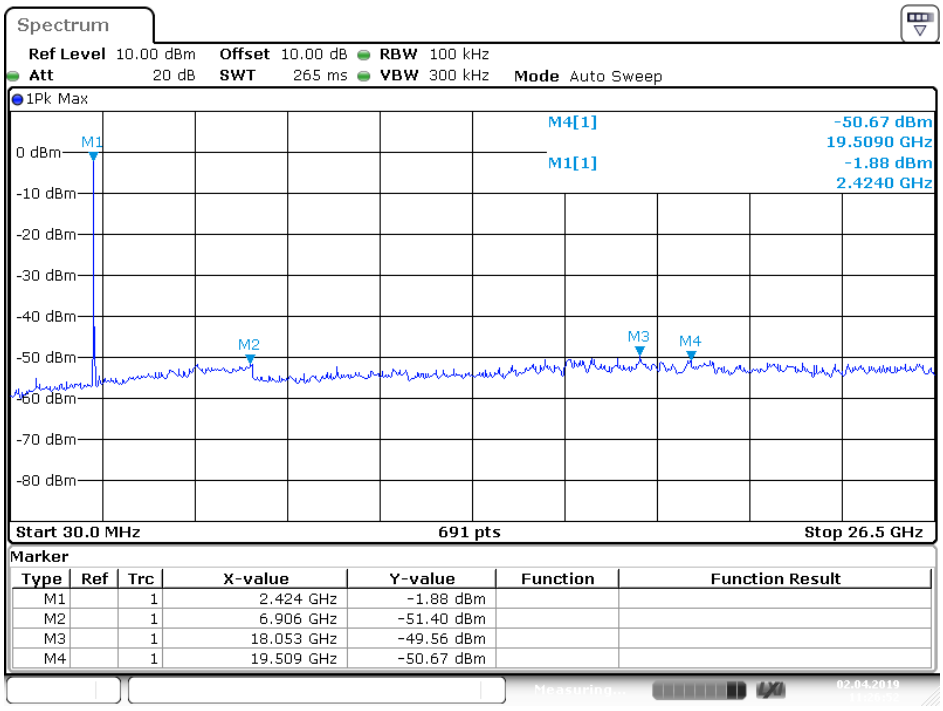
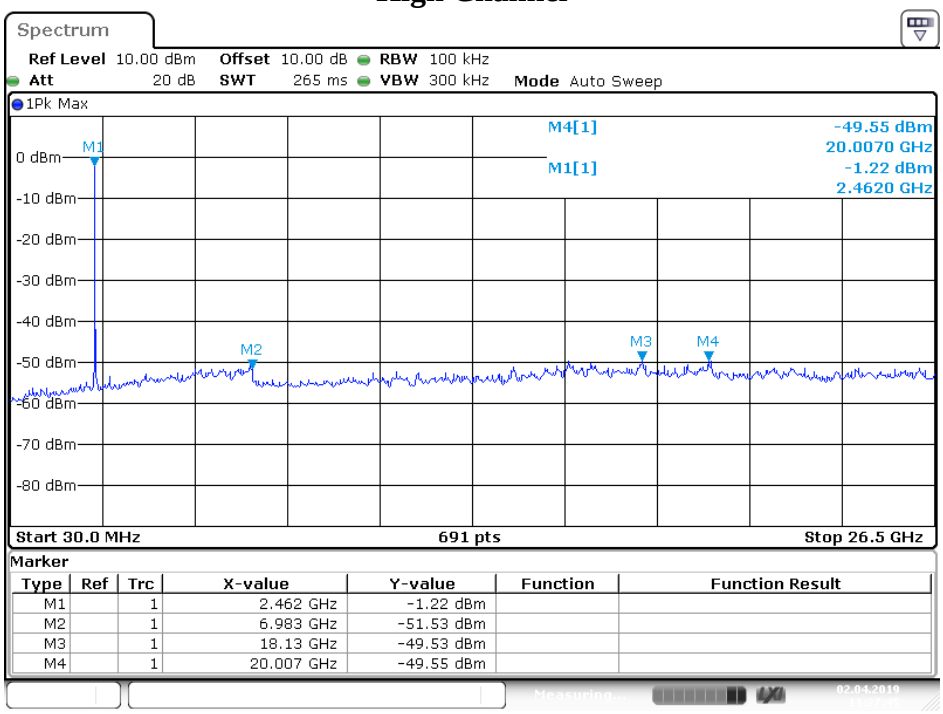
Middle Channel



Date: 2.APR.2019 11:26:52

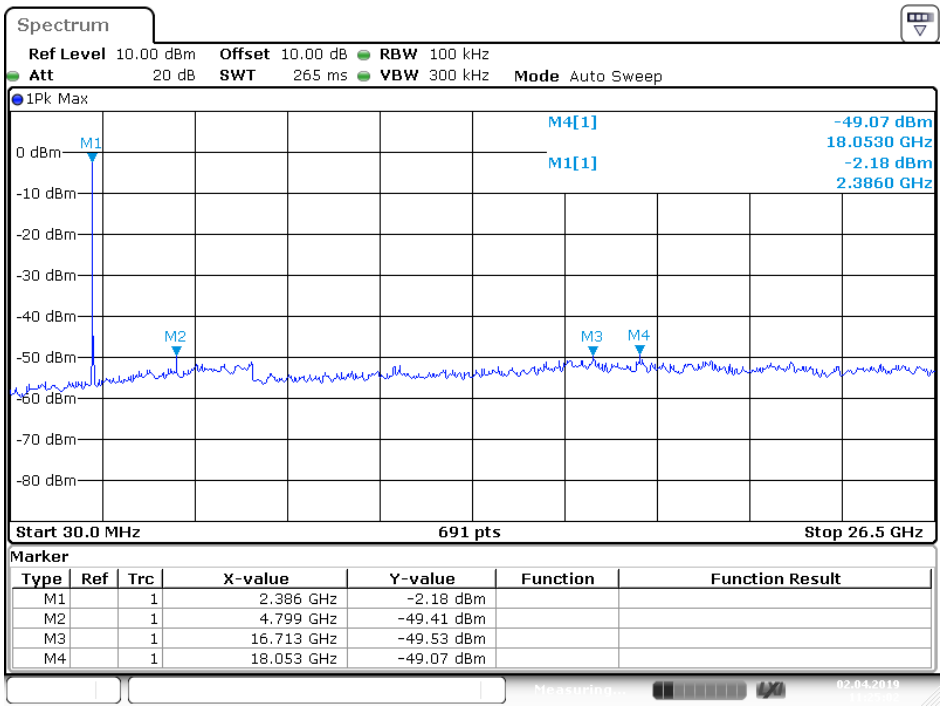
High Channel



Date: 2.APR.2019 11:27:45

π/4 DQPSK mode

Low Channel



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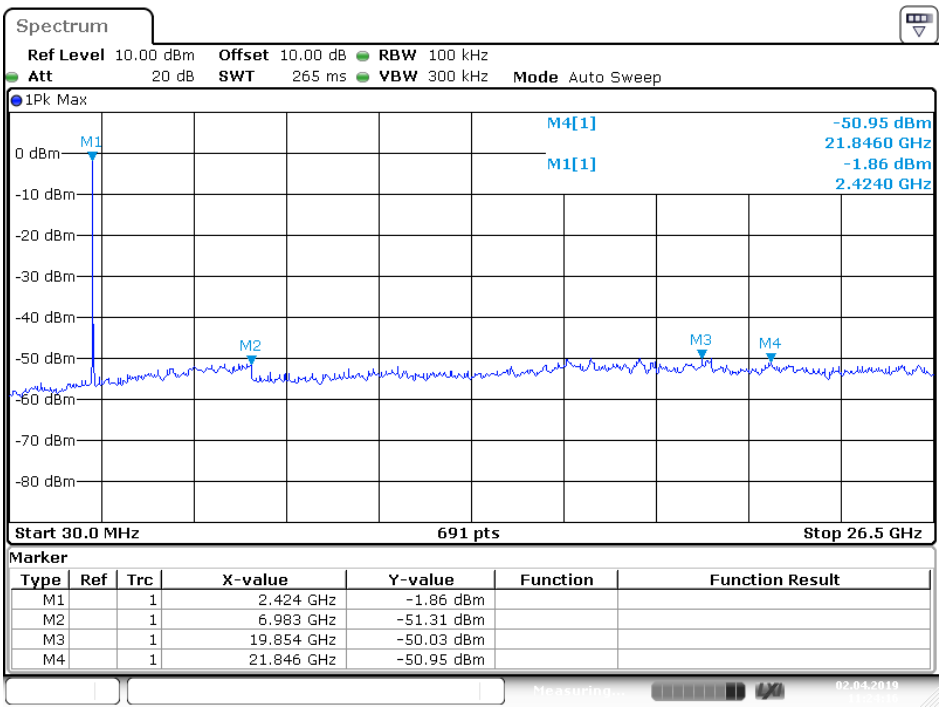
Middle Channel



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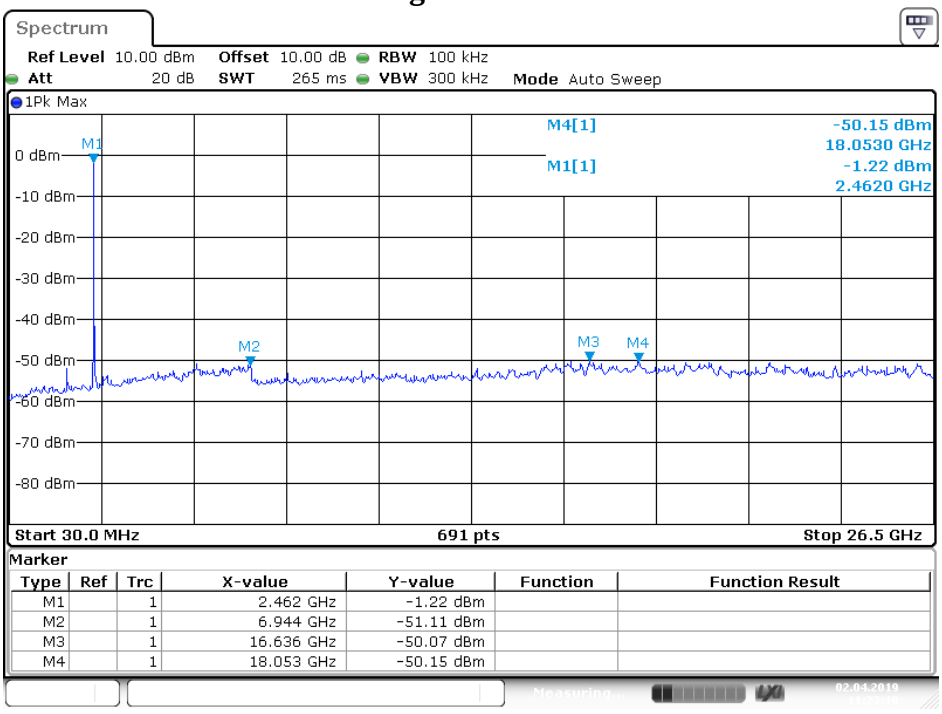
High Channel



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14. ANTENNA REQUIREMENT

14.1. 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.

14.2. Antenna Construction

Device is equipped with permanent attached antenna, which isn't displaced by other antenna. The Max Antenna gain of EUT is -0.58dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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