

APPLICATION CERTIFICATION FCC Part 15.247 & RSS-247

On Behalf of
AfterShokz LLC

Revvez Bone Conduction Sunglasses
Model No.: OS100

FCC ID: SHKASCEHB5
IC: 10978A-ASCEHB5

Prepared for : AfterShokz LLC
Address : 6057 Corporate Dr., East Syracuse, NY 13057

Prepared by : Shenzhen Accurate Technology Co., Ltd.
Address : 1/F., Building A, Changyuan New Material Port, Science &
Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

Tel: (0755) 26503290
Fax: (0755) 26503396

Report No. : ATE20190507
Date of Test : April 1-April 4, 2019
Date of Report : April 10, 2019

TABLE OF CONTENTS

Description	Page
 Test Report Certification	
1. GENERAL INFORMATION	5
1.1. Description of Device (EUT)	5
1.2. Accessory and Auxiliary Equipment	5
1.3. Description of Test Facility	6
1.4. Measurement Uncertainty	6
2. MEASURING DEVICE AND TEST EQUIPMENT.....	7
3. OPERATION OF EUT DURING TESTING.....	8
3.1. Operating Mode	8
3.2. Configuration and peripherals	8
4. TEST PROCEDURES AND RESULTS	9
5. 20DB BANDWIDTH TEST	10
5.1. Block Diagram of Test Setup	10
5.2. The Requirement For Section 15.247(a)(1).....	10
5.3. The Requirement For RSS-247 Section 5.1(a).....	10
5.4. EUT Configuration on Test	10
5.5. Operating Condition of EUT	10
5.6. Test Procedure	11
5.7. Test Result	11
6. 99% OCCUPIED BANDWIDTH TEST.....	15
6.1. Block Diagram of Test Setup	15
6.2. The Requirement for RSS-Gen Clause 6.7	15
6.3. EUT Configuration on Test	15
6.4. Operating Condition of EUT	15
6.5. Test Procedure	16
6.6. Test Result	16
7. CARRIER FREQUENCY SEPARATION TEST	20
7.1. Block Diagram of Test Setup	20
7.2. The Requirement For Section 15.247(a)(1).....	20
7.3. The Requirement For RSS-247 Section 5.1(b).....	20
7.4. EUT Configuration on Test	20
7.5. Operating Condition of EUT	20
7.6. Test Procedure	21
7.7. Test Result	21
8. NUMBER OF HOPPING FREQUENCY TEST	25
8.1. Block Diagram of Test Setup	25
8.2. The Requirement For Section 15.247(a)(1)(iii).....	25
8.3. The Requirement For RSS-247 Section 5.1(d).....	25
8.4. EUT Configuration on Test	25
8.5. Operating Condition of EUT	25
8.6. Test Procedure	25
8.7. Test Result	26
9. DWELL TIME TEST	27
9.1. Block Diagram of Test Setup	27
9.2. The Requirement For Section 15.247(a)(1)(iii).....	27

9.3.	The Requirement For RSS-247 Section 5.1(d).....	27
9.4.	EUT Configuration on Test	27
9.5.	Operating Condition of EUT	27
9.6.	Test Procedure	28
9.7.	Test Result	28
10.	MAXIMUM PEAK OUTPUT POWER TEST	39
10.1.	Block Diagram of Test Setup	39
10.2.	The Requirement For Section 15.247(b)(1)	39
10.3.	The Requirement For RSS-247 Section 5.4(b).....	39
10.4.	EUT Configuration on Test	39
10.5.	Operating Condition of EUT	39
10.6.	Test Procedure	40
10.7.	Test Result	40
11.	RADIATED EMISSION TEST	44
11.1.	Block Diagram of Test Setup	44
11.2.	The Requirement For Section 15.247(d)	45
11.3.	The Requirement for RSS-247 section 5.5.....	45
11.4.	Transmitter Emission Limit.....	46
11.5.	Restricted bands of operation	47
11.6.	EUT Configuration on Test	48
11.7.	Test Procedure	48
11.8.	Data Sample.....	49
11.9.	Test Result	49
12.	BAND EDGE COMPLIANCE TEST	77
12.1.	Block Diagram of Test Setup	77
12.2.	The Requirement For Section 15.247(d)	77
12.3.	The Requirement For RSS-247 Section 5.5	77
12.4.	EUT Configuration on Test	77
12.5.	Operating Condition of EUT	78
12.6.	Test Procedure	78
12.7.	Test Result	79
13.	AC POWER LINE CONDUCTED EMISSION TEST	89
13.1.	Block Diagram of Test Setup	89
13.2.	Power Line Conducted Emission Test Limits	90
13.3.	EUT Configuration on Test	90
13.4.	Operating Condition of EUT	90
13.5.	Test Procedure	90
13.6.	Data Sample.....	91
13.7.	Test Result	91
14.	CONDUCTED SPURIOUS EMISSION COMPLIANCE TEST.....	94
14.1.	Block Diagram of Test Setup	94
14.2.	The Requirement For Section 15.247(d)	94
14.3.	The Requirement for RSS-247 section 5.5.....	94
14.4.	EUT Configuration on Measurement	94
14.5.	Operating Condition of EUT	95
14.6.	Test Procedure	95
14.7.	Test Result	95
15.	ANTENNA REQUIREMENT	99
15.1.	The Requirement	99
15.2.	Antenna Construction.....	99

Test Report Certification

Applicant : AfterShokz LLC
 Address : 6057 Corporate Dr., East Syracuse, NY 13057
 Factory : SHENZHEN VOXTECH CO., LTD.
 Address : 1/F&4F - 6F, Building 14#, Shangcheng Industrial Zone, Shixin community, Shiyan Street, Baoan District, Shenzhen City, Guangdong Province, P.R. China
 Product : Revvez Bone Conduction Sunglasses
 Model No. : OS100

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247

ANSI C63.10: 2013

RSS-247 Issue 2 February 2017

RSS-Gen Issue 5 April 2018

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 and RSS-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 and IC 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 : April 1-April 4, 2019

Date of Report : April 10, 2019

Prepared by :



 (Sean Yang, Tester)

Approved & Authorized Signer :


 (Sean Liu, Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Model Number	: OS100
Bluetooth version	: V5.0 (single mode)
Frequency Range	: 2402-2480MHz
Number of Channels	: 79
Antenna Gain(Max)	: 4.97dBi
Antenna type	: Integral Antenna
Modulation mode	: GFSK, $\pi/4$ DQPSK, 8DPSK
HVIN	: OS100
Trade Mark	: N/A
Power supply	: INPUT: 5V $\overline{\text{---}}$ 140mA

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 (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	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 (Radiated Emission)	Compliance Direction	RSU-M2	38322	Jan. 05, 2019	One Year
Pre-Amplifier (Radiated Emission)	Agilent	8447D	294A10619	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	WHKX3.6/18 G-10SS	N/A	Jan. 05, 2019	One Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2 485-2375/2510 -60/11SS	N/A	Jan. 05, 2019	One Year
RF Coaxial Cable (Conducted Emission)	SUHNER	N-2m	No.2	Jan. 05, 2019	One Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-5m	NO.3	Jan. 05, 2019	One Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-5m	NO.4	Jan. 05, 2019	One Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-1m	NO.5	Jan. 05, 2019	One Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-1m	NO.6	Jan. 05, 2019	One Year
Conducted Emission Measurement Software: ES-K1 V1.71					
Radiated Emission Measurement Software: EZ_EMV V1.1.4.2					

3. OPERATION OF EUT DURING TESTING

3.1.Operating Mode

The mode is used: Transmitting mode

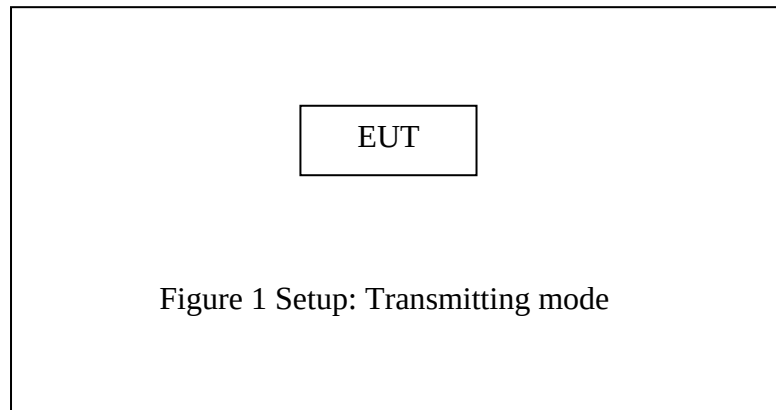
Low Channel: 2402MHz

Middle Channel: 2441MHz

High Channel: 2480MHz

Hopping

3.2.Configuration and peripherals



4. TEST PROCEDURES AND RESULTS

IC Rules	Description of Test	Result
FCC Section 15.247(a)(1) RSS-247 Section 5.1(a)	20dB Bandwidth Test	Compliant
RSS-Gen Section 6.7	99% Occupied Bandwidth Test	Compliant
FCC Section 15.247(a)(1) RSS-247 Section 5.1(b)	Carrier Frequency Separation Test	Compliant
FCC Section 15.247(a)(1)(iii) RSS-247 Section 5.1(d)	Number Of Hopping Frequency Test	Compliant
FCC Section 15.247(a)(1)(iii) RSS-247 Section 5.1(d)	Dwell Time Test	Compliant
FCC Section 15.247(b)(1) RSS-247 Section 5.4(b)	Maximum Peak Output Power Test	Compliant
FCC Section 15.247(d) FCC Section 15.209 RSS-247 Section 5.5 RSS-Gen Section 6.13 RSS-Gen Section 8.9	Radiated Emission Test	Compliant
FCC Section 15.247(d) RSS-247 Section 5.5 RSS-Gen 8.9 RSS-Gen Section 8.10	Band Edge Compliance Test	Compliant
FCC Section 15.207 RSS-Gen Section 8.8	AC Power Line Conducted Emissions Limits Test	Compliant
FCC Section 15.247(d) RSS-247 Section 5.5	Conducted Spurious Emission Test	Compliant
FCC Section 15.203 RSS-Gen Section 6.8	Antenna Requirement	Compliant

5. 20DB BANDWIDTH TEST

5.1. Block Diagram of Test Setup



5.2. The Requirement For 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. The Requirement For RSS-247 Section 5.1(a)

The bandwidth of a frequency hopping channel is the 20 dB emission bandwidth, measured with the hopping stopped. The system's radio frequency (RF) bandwidth is equal to the channel bandwidth multiplied by the number of channels in the hopset. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. 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.

5.4. EUT Configuration on Test

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.

5.5. Operating Condition of EUT

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

5.5.2. Turn on the power of all equipment.

5.5.3. 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.

5.6.Test Procedure

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

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

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

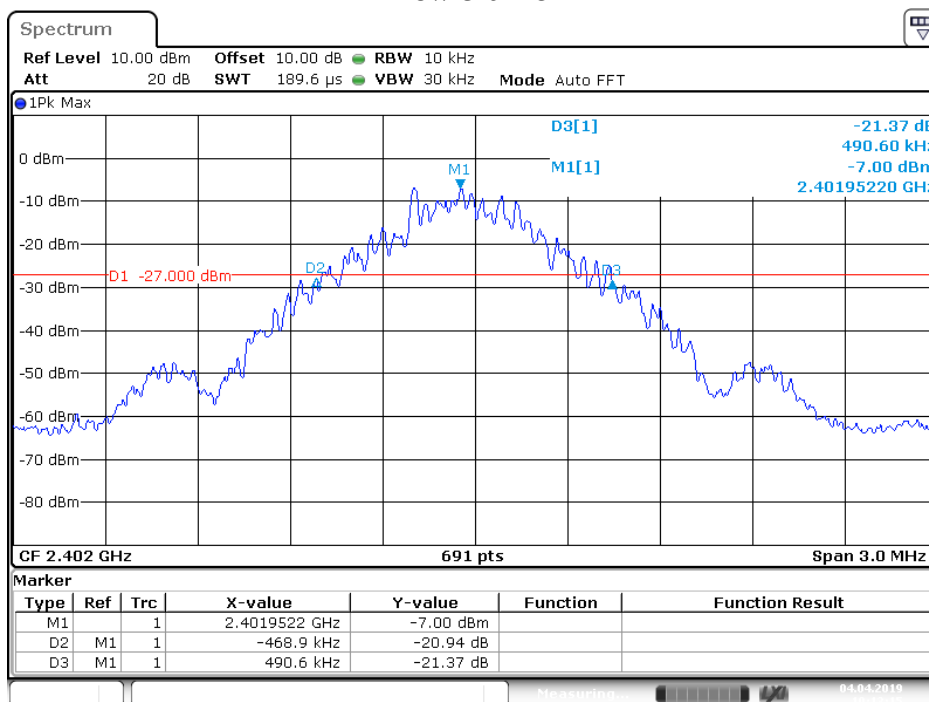
5.7.Test Result

Channel	Frequency (MHz)	GFSK 20dB Bandwidth (MHz)	8DPSK 20dB Bandwidth (MHz)	Result
Low	2402	0.960	1.298	Pass
Middle	2441	0.960	1.307	Pass
High	2480	0.964	1.324	Pass

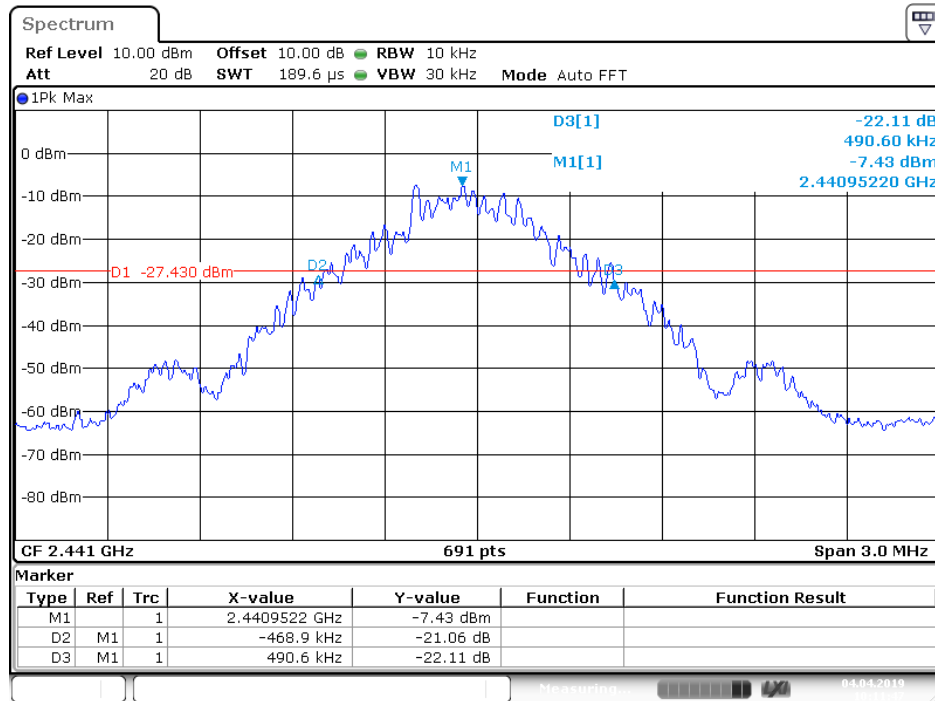
The spectrum analyzer plots are attached as below.

GFSK Mode

Low channel

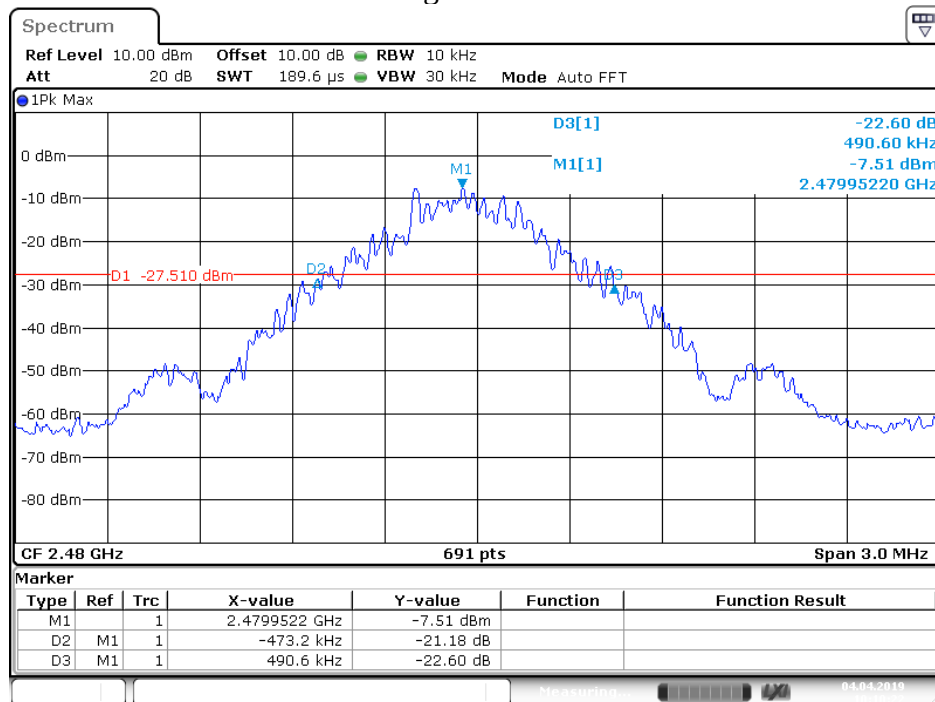


Middle channel



Date: 4.APR.2019 10:11:47

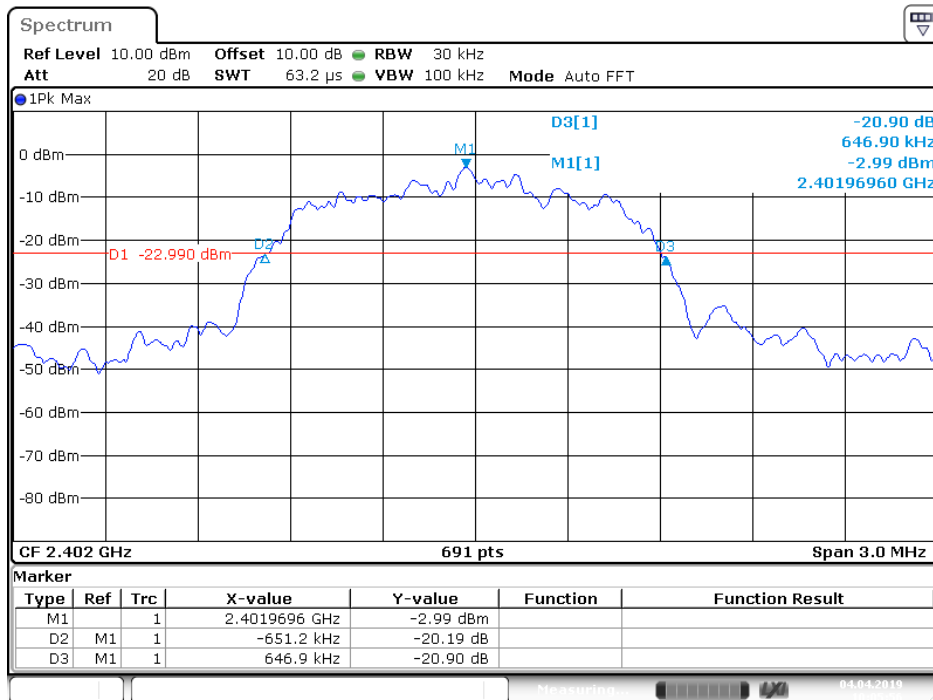
High channel



Date: 4.APR.2019 10:10:22

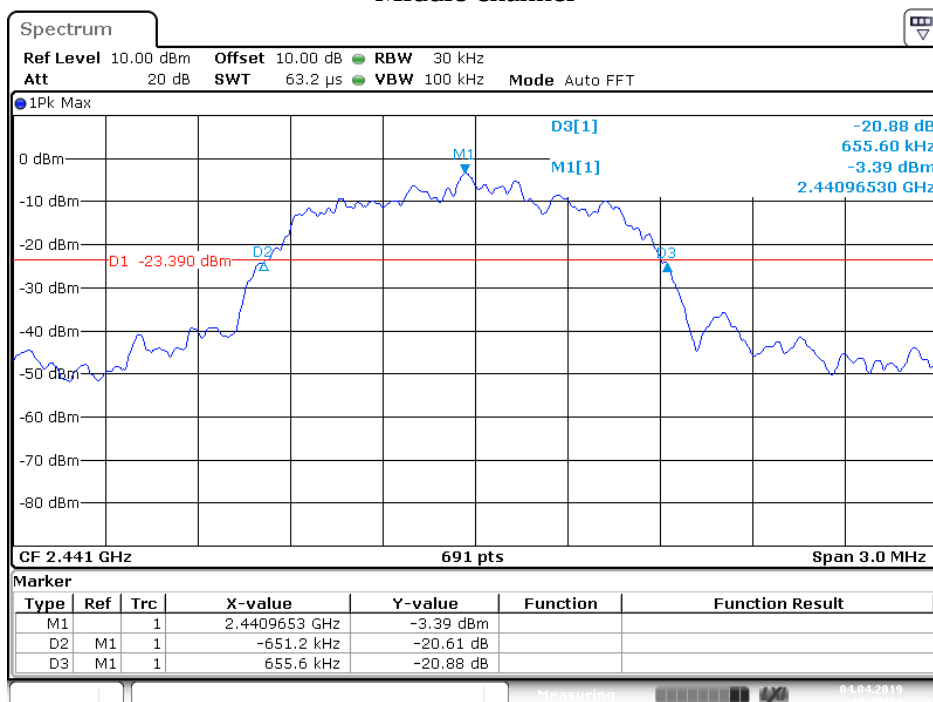
8DPSK Mode

Low channel



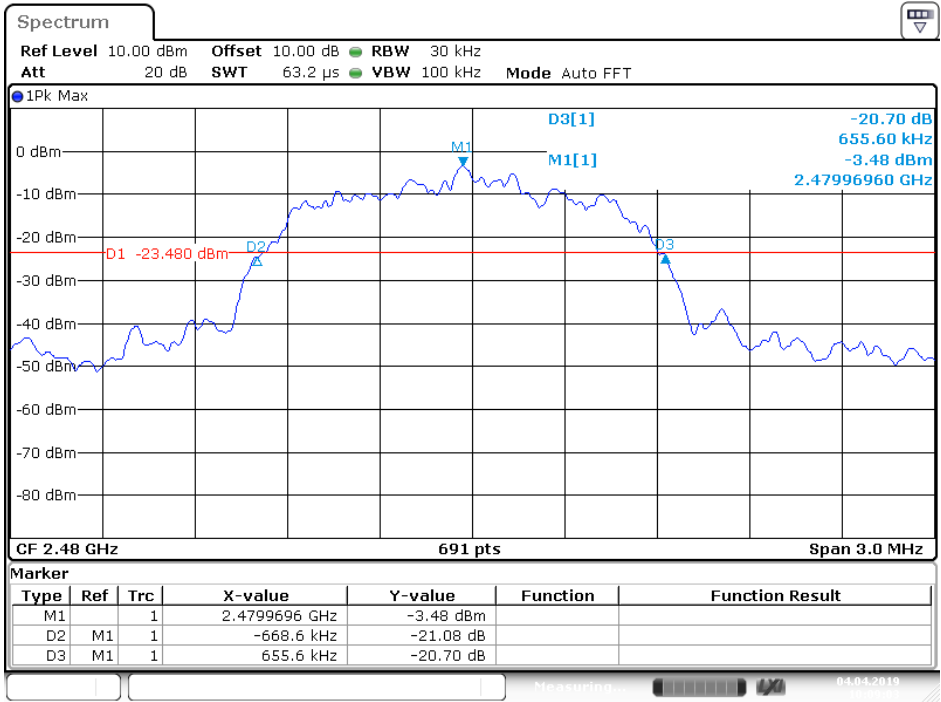
Date: 4.APR.2019 10:05:57

Middle channel



Date: 4.APR.2019 10:07:31

High channel



Date: 4.APR.2019 10:09:04

6. 99% OCCUPIED BANDWIDTH TEST

6.1. Block Diagram of Test Setup



6.2. The Requirement for RSS-Gen Clause 6.7

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

In some cases, the “x dB bandwidth” is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated x dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

6.3. EUT Configuration on Test

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.

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 modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, 2480MHz TX frequency to transmit.

6.5. Test Procedure

6.5.1. The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The transmitter output was connected to the spectrum analyzer through a low loss cable.

6.5.2. The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.

6.5.3. The detector of the spectrum analyzer shall be set to “Sample”. However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or “Max Hold”) may be necessary to determine the occupied / x dB bandwidth if the device is not transmitting continuously.

6.5.4. The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

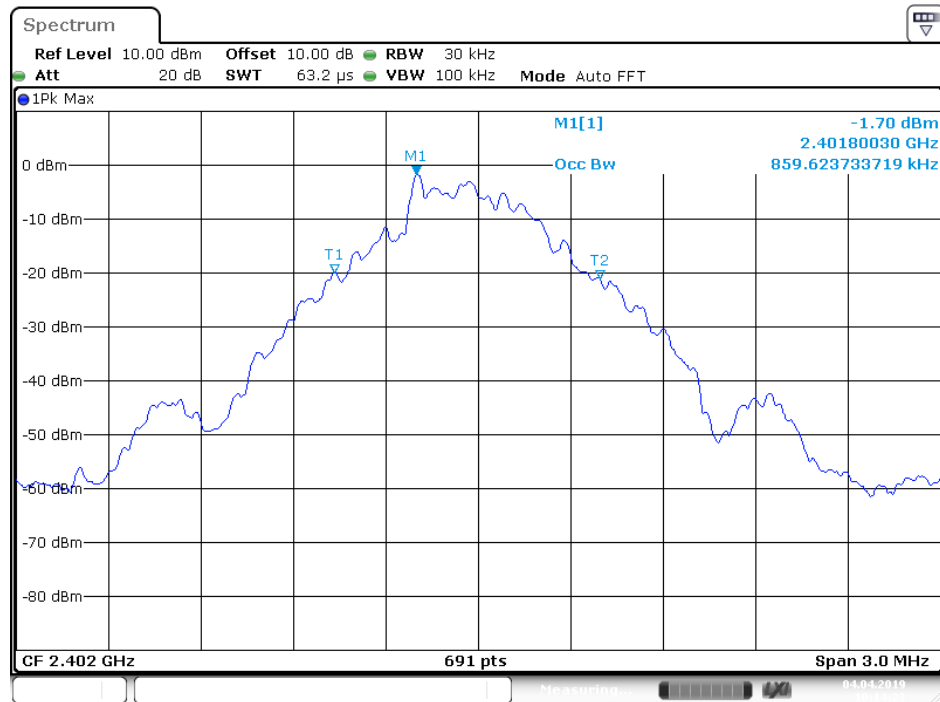
6.6. Test Result

Channel	Frequency (MHz)	GFSK 99% Bandwidth (MHz)	8DPSK 99% Bandwidth (MHz)	Result
Low	2402	0.860	1.172	Pass
Middle	2441	0.856	1.172	Pass
High	2480	0.851	1.168	Pass

The spectrum analyzer plots are attached as below.

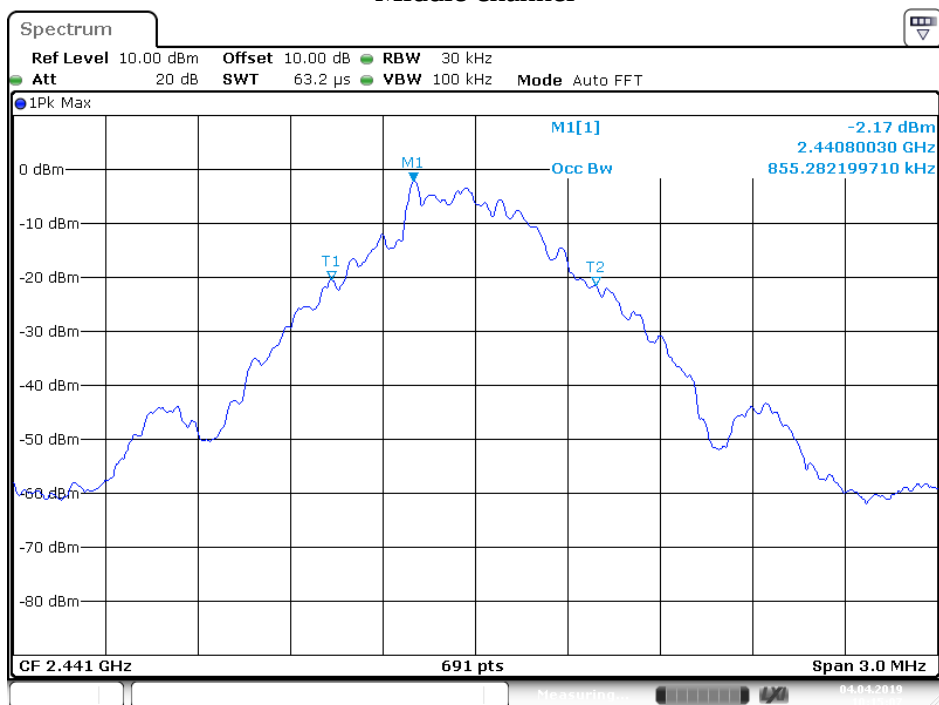
GFSK Mode

Low channel



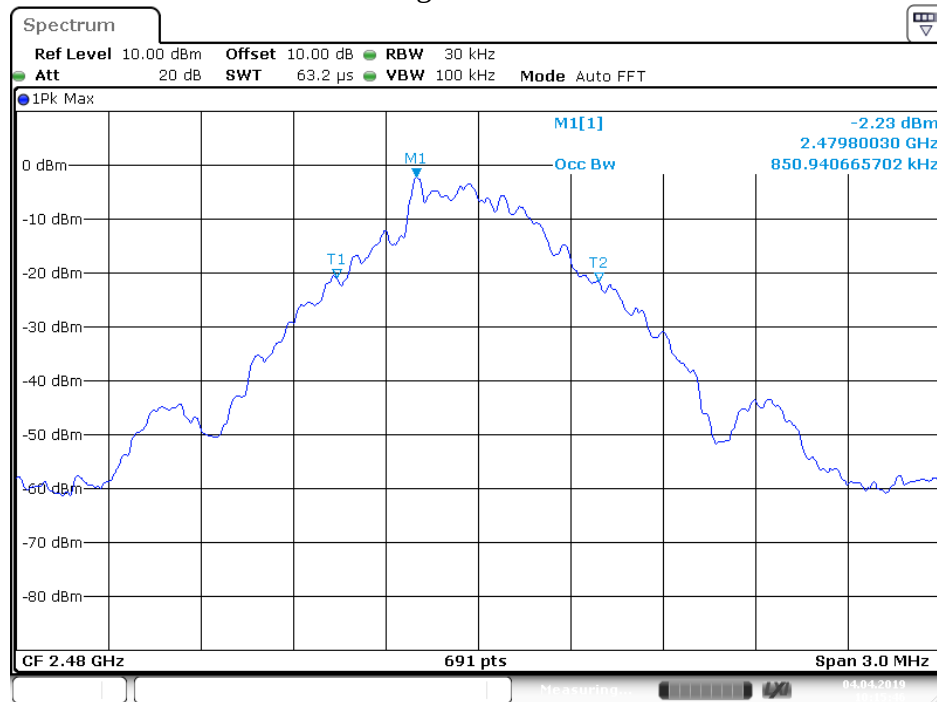
Date: 4.APR.2019 10:14:23

Middle channel



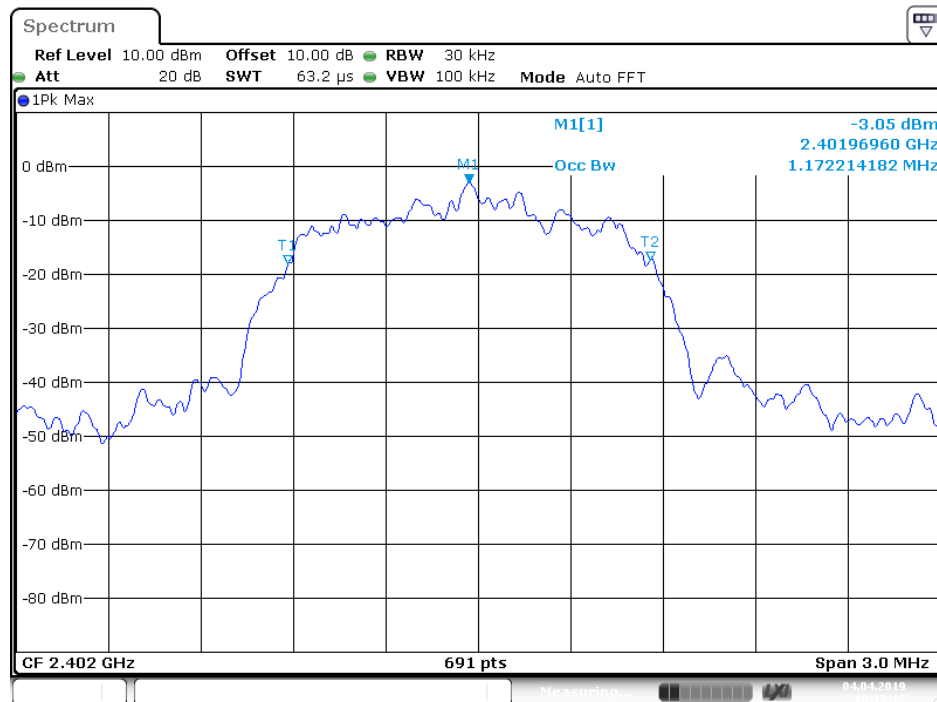
Date: 4.APR.2019 10:15:07

High channel

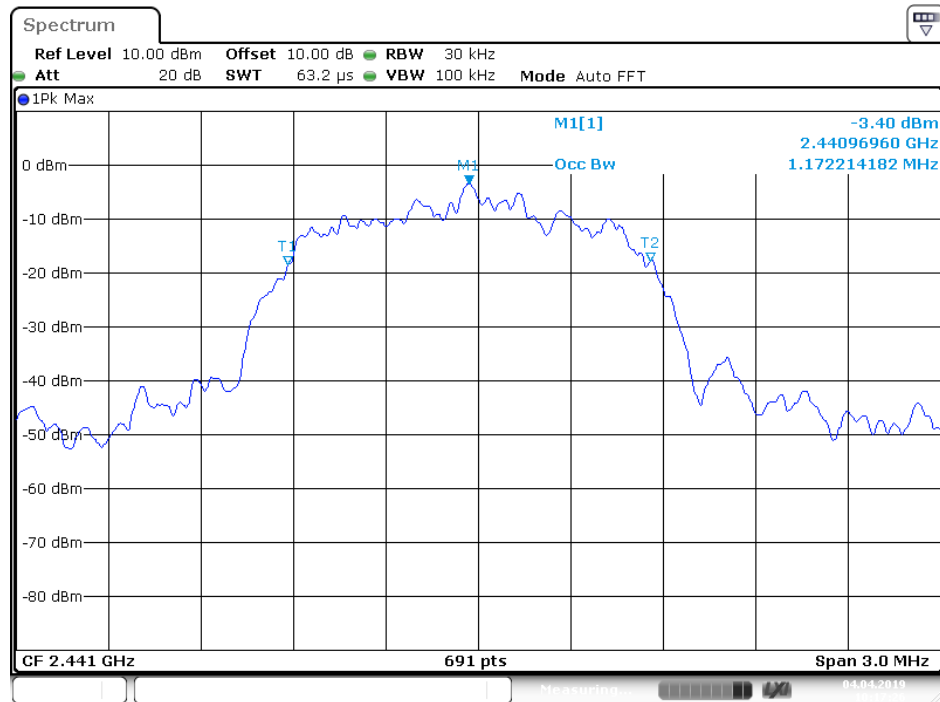


8DPSK Mode

Low channel

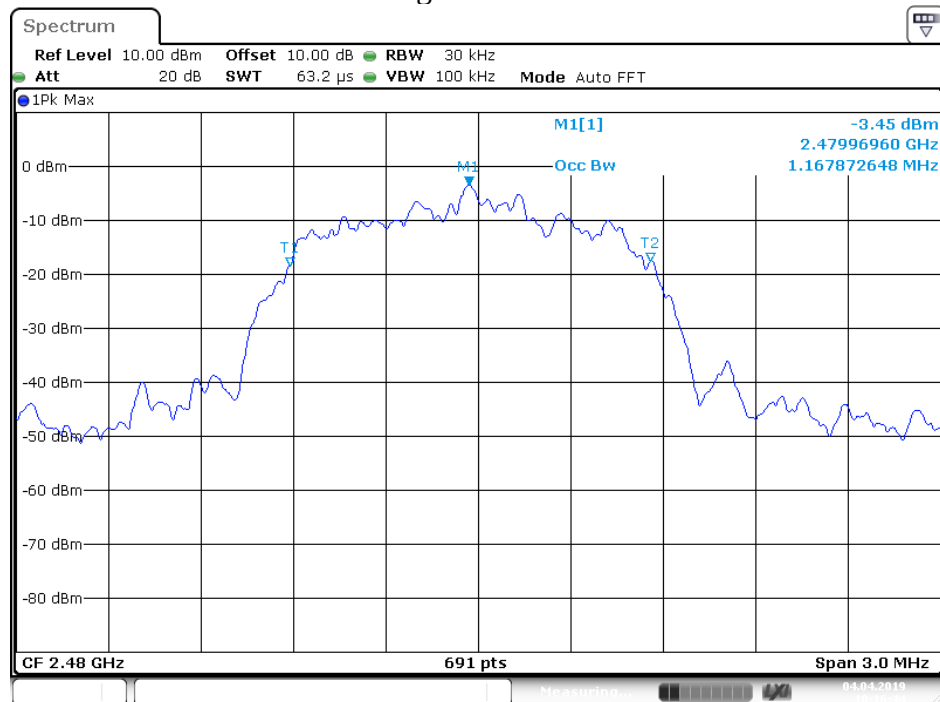


Middle channel



Date: 4.APR.2019 10:17:27

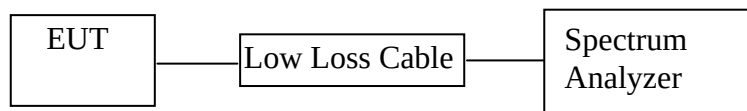
High channel



Date: 4.APR.2019 10:16:44

7. CARRIER FREQUENCY SEPARATION TEST

7.1. Block Diagram of Test Setup



7.2. The Requirement For 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.

7.3. The Requirement For RSS-247 Section 5.1(b)

FHSs 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, FHSs operating in the band 2400-2483.5 MHz 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 that the systems operate with an output power no greater than 0.125 W.

7.4. EUT Configuration on Test

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.

7.5. Operating Condition of EUT

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

7.5.2. Turn on the power of all equipment.

7.5.3. 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.

7.6.Test Procedure

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

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

7.6.3.Set the adjacent channel of the EUT maxhold another trace.

7.6.4.Measurement the channel separation

7.7.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			

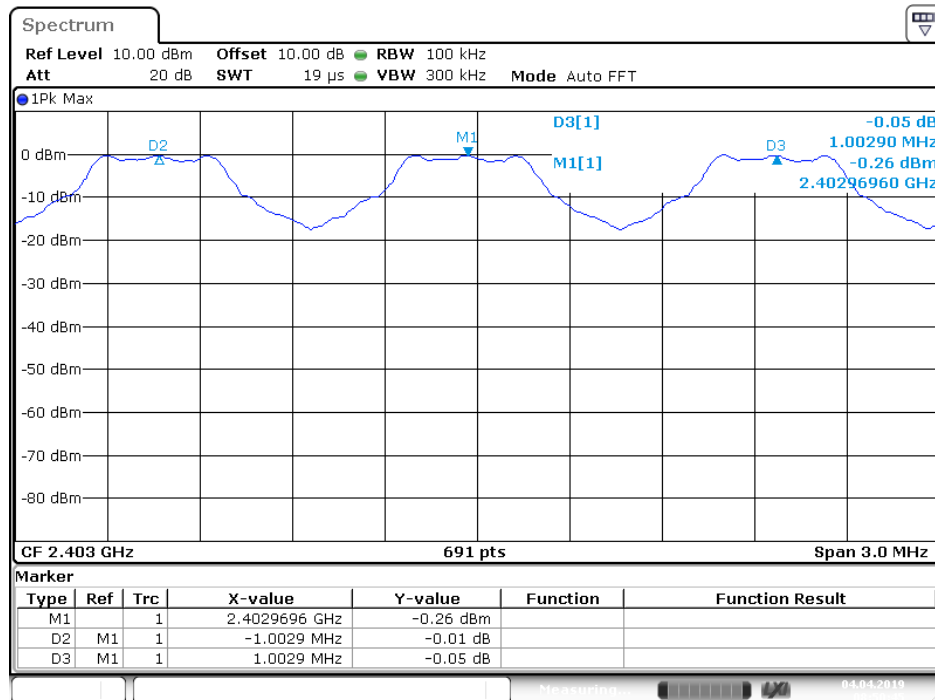
8DPSK Mode

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.

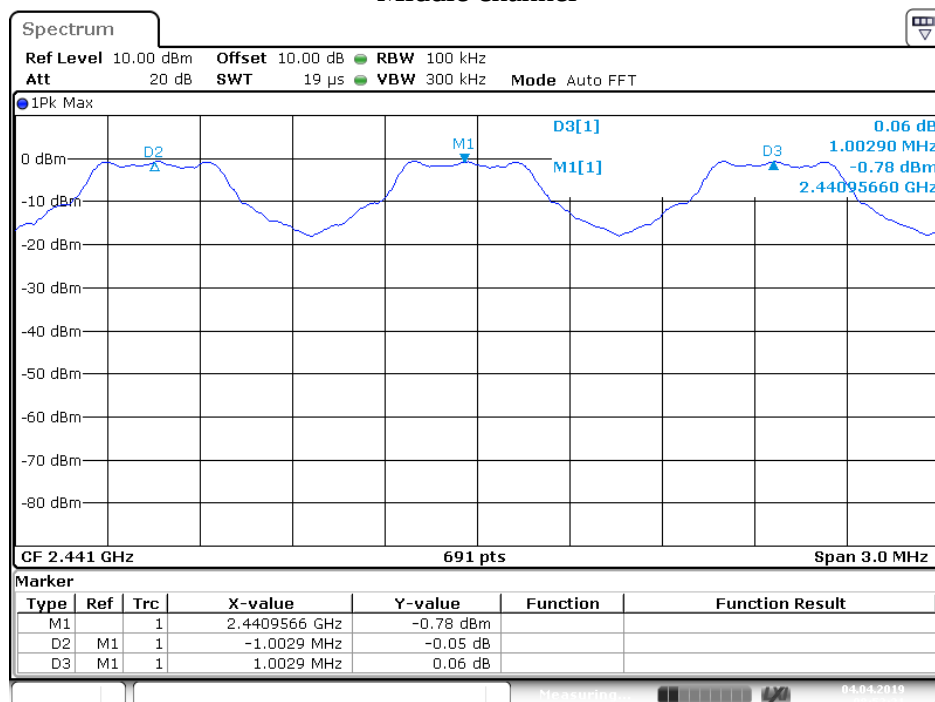
GFSK Mode

Low channel



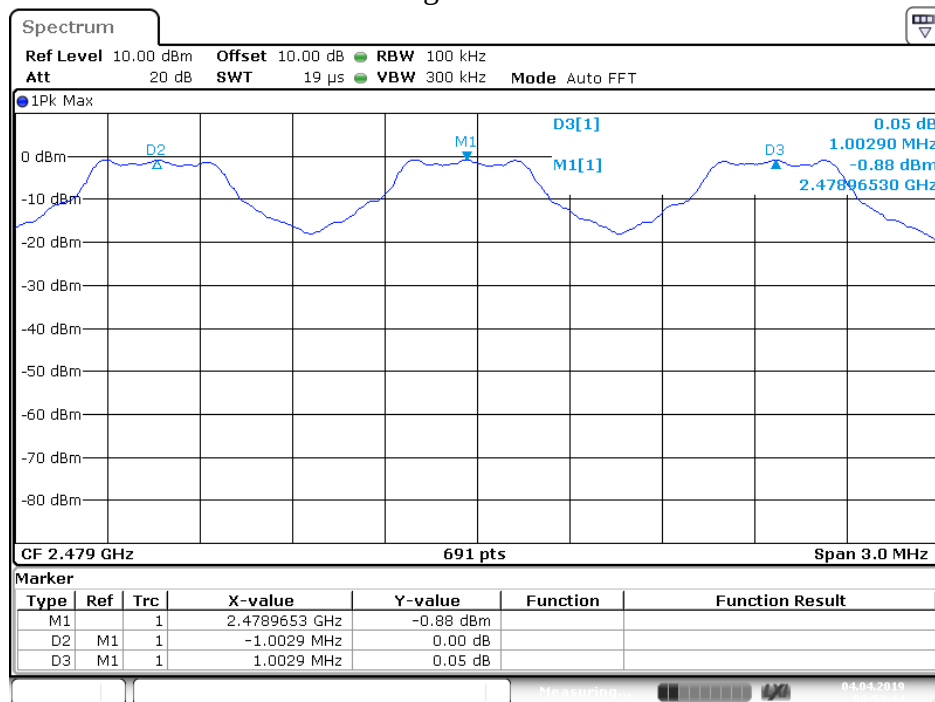
Date: 4.APR.2019 08:50:46

Middle channel



Date: 4.APR.2019 08:52:22

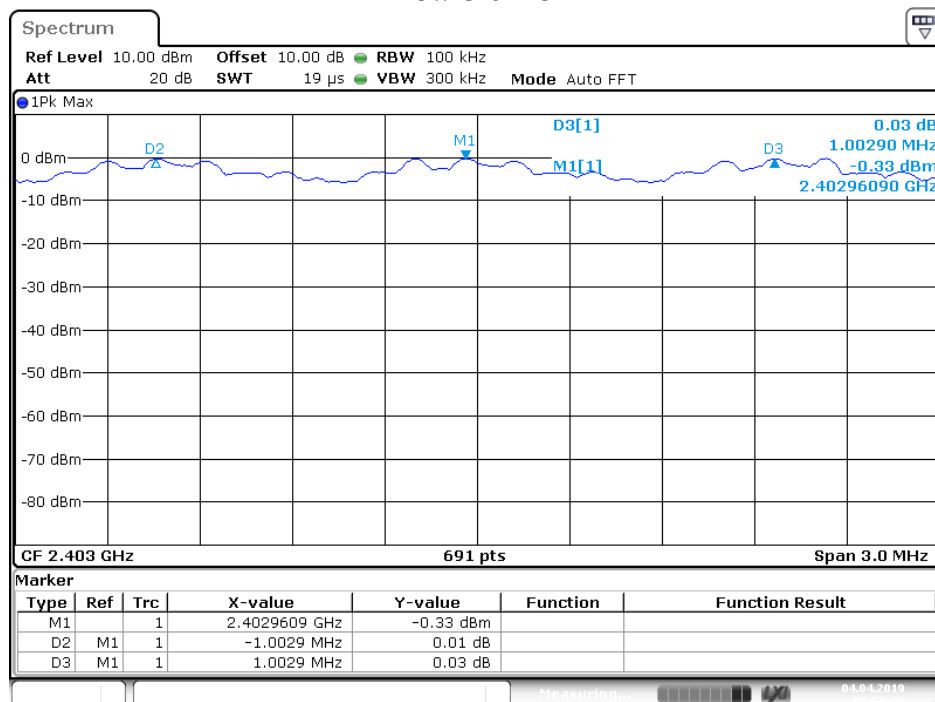
High channel



Date: 4.APR.2019 08:53:44

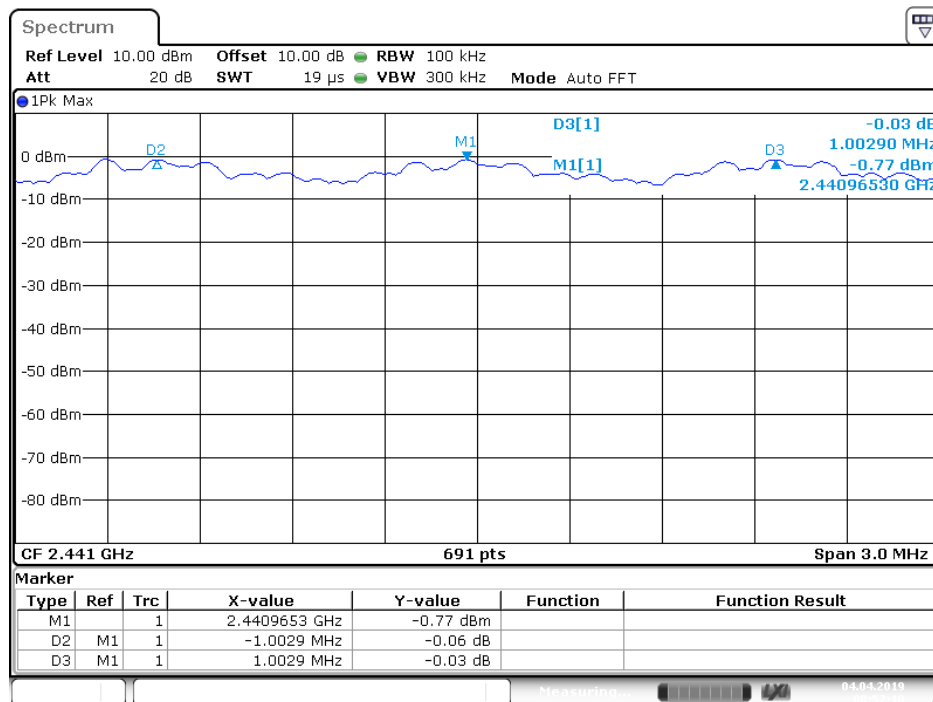
8DPSK Mode

Low channel



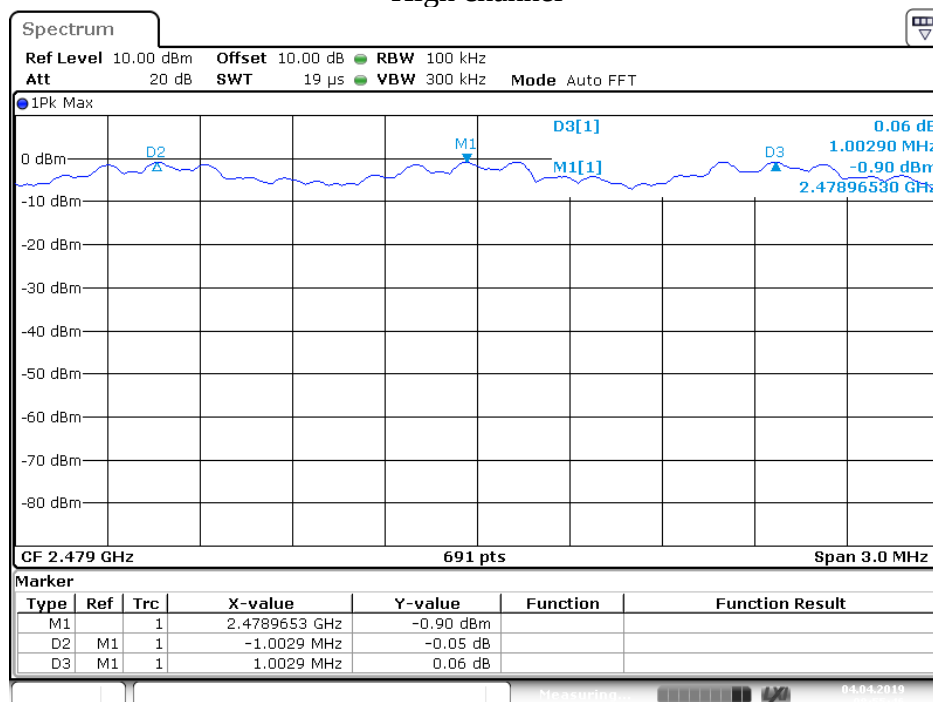
Date: 4.APR.2019 08:59:10

Middle channel



Date: 4.APR.2019 08:57:10

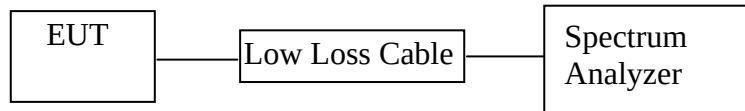
High channel



Date: 4.APR.2019 08:55:46

8. NUMBER OF HOPPING FREQUENCY TEST

8.1. Block Diagram of Test Setup



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

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

8.3. The Requirement For RSS-247 Section 5.1(d)

FHSs operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels.

8.4. EUT Configuration on Test

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.

8.5. Operating Condition of EUT

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

8.5.2. Turn on the power of all equipment.

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

8.6. Test Procedure

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

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

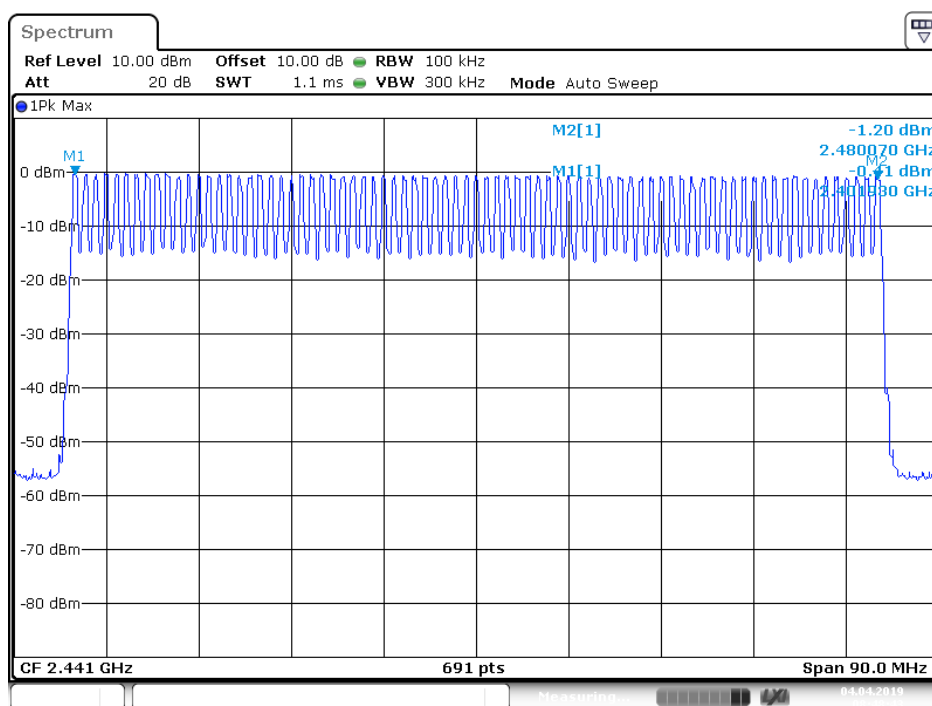
8.6.3. Max hold, view and count how many channel in the band.

8.7.Test Result

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

The spectrum analyzer plots are attached as below.

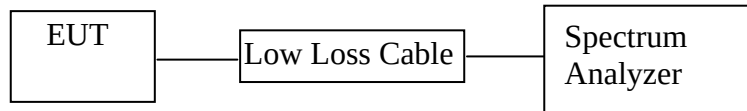
Number of hopping channels (GFSK Mode)



Date: 4.APR.2019 08:48:44

9. DWELL TIME TEST

9.1. Block Diagram of Test Setup



9.2. The Requirement For 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.

9.3. The Requirement For RSS-247 Section 5.1(d)

FHSs operating in the band 2400-2483.5 MHz shall use at least 15 hopping 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. Transmissions on particular hopping frequencies may be avoided or suppressed provided that at least 15 hopping channels are used.

9.4. EUT Configuration on Test

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.

9.5. Operating Condition of EUT

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

9.5.2. Turn on the power of all equipment.

9.5.3. 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.

9.6. Test Procedure

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

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

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

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

9.7. Test Result

Pass.

GFSK Mode

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.406	129.92	400
	2441	0.406	129.92	400
	2480	0.406	129.92	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2 \times 79)) \times 31.6$				
DH3	2402	1.681	268.96	400
	2441	1.681	268.96	400
	2480	1.667	266.72	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4 \times 79)) \times 31.6$				
DH5	2402	2.957	315.41	400
	2441	2.935	313.07	400
	2480	2.935	313.07	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

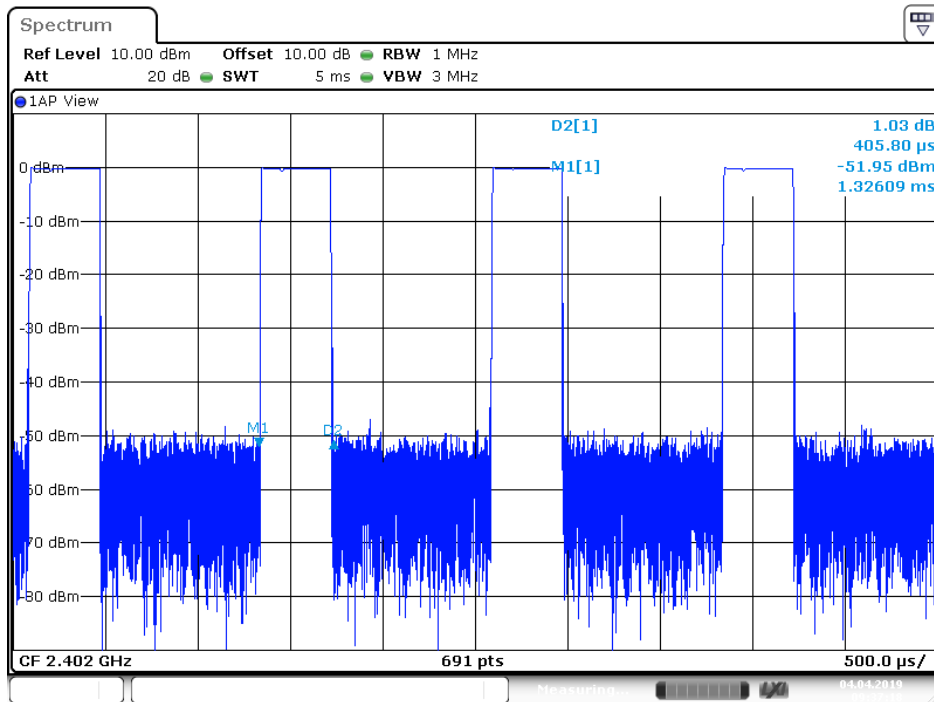
8DPSK Mode

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
3DH1	2402	0.413	132.16	400
	2441	0.420	134.40	400
	2480	0.413	132.16	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2 \times 79)) \times 31.6$				
3DH3	2402	1.696	271.36	400
	2441	1.681	268.96	400
	2480	1.681	268.96	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4 \times 79)) \times 31.6$				
3DH5	2402	2.935	313.07	400
	2441	2.957	315.41	400
	2480	2.957	315.41	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6 \times 79)) \times 31.6$				

The spectrum analyzer plots are attached as below.

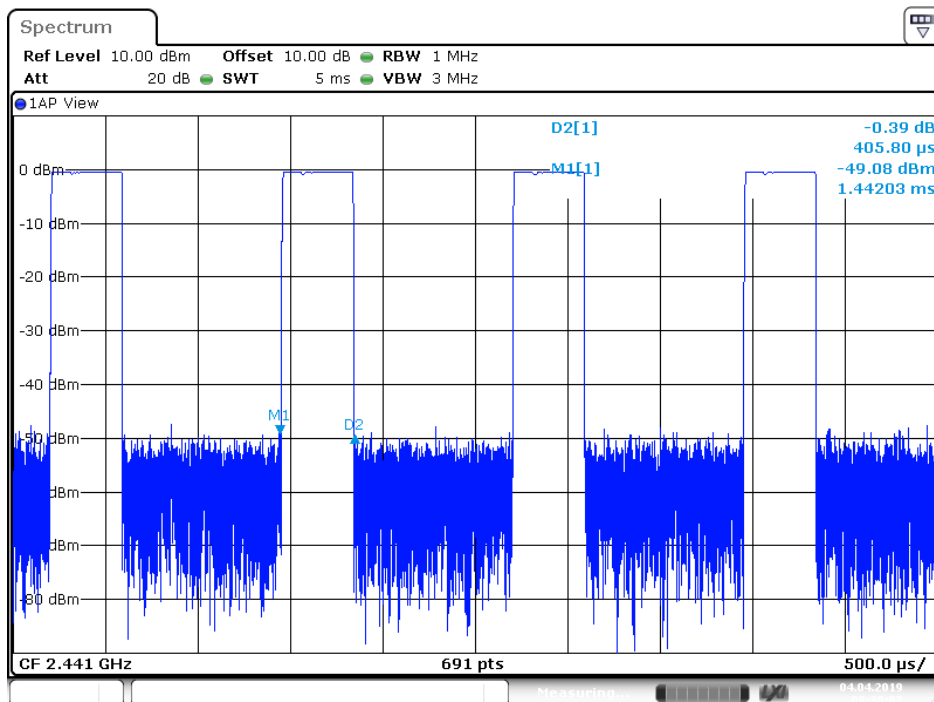
GFSK Mode

DH1 Low channel



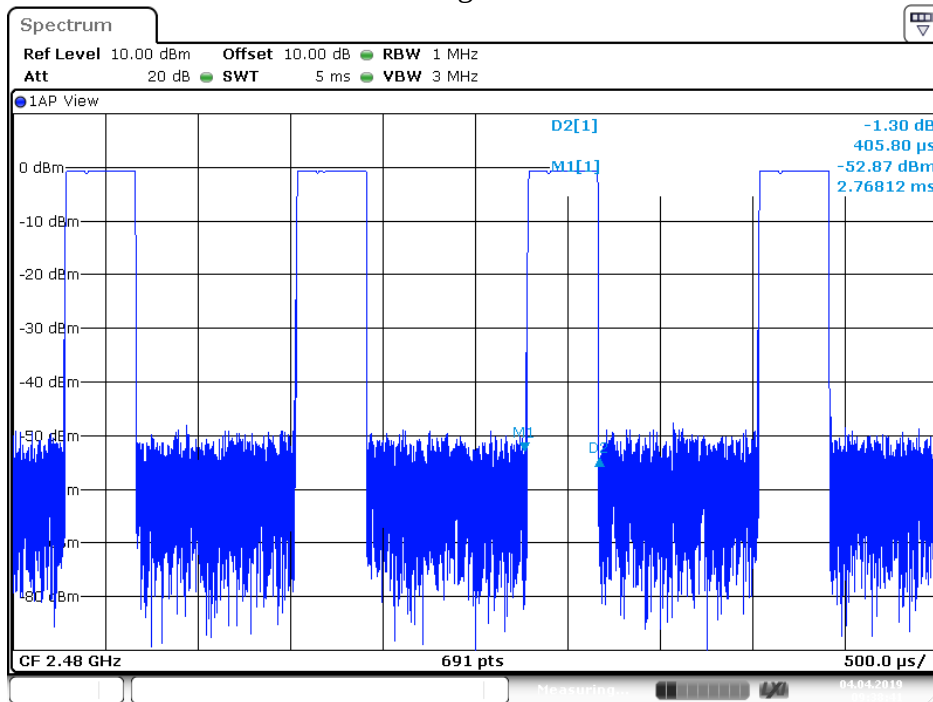
Date: 4.APR.2019 09:37:18

DH1 Middle channel



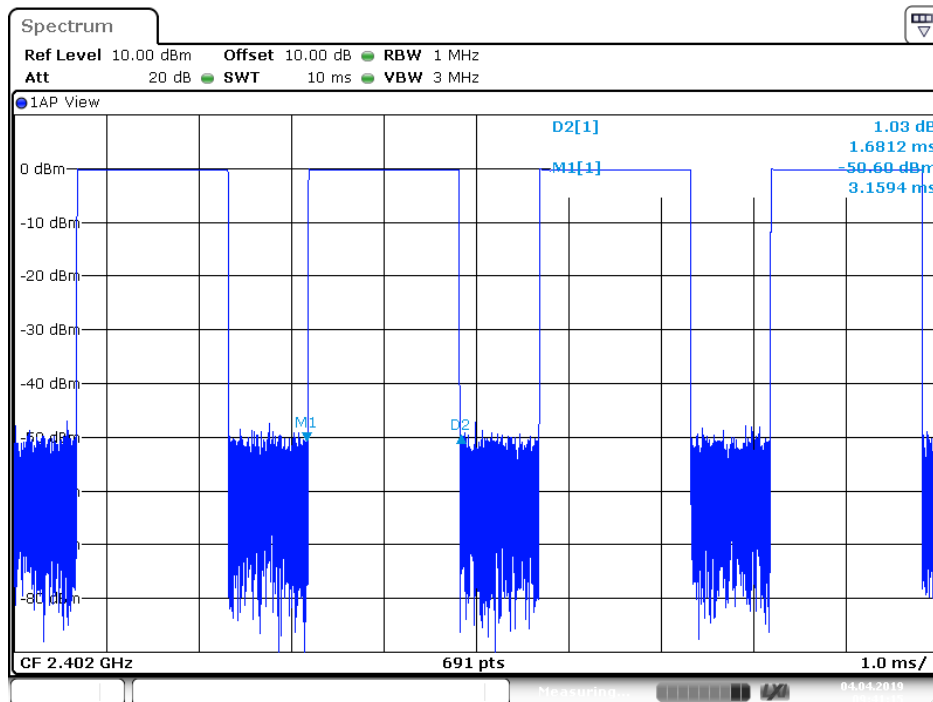
Date: 4.APR.2019 09:38:07

DH1 High channel



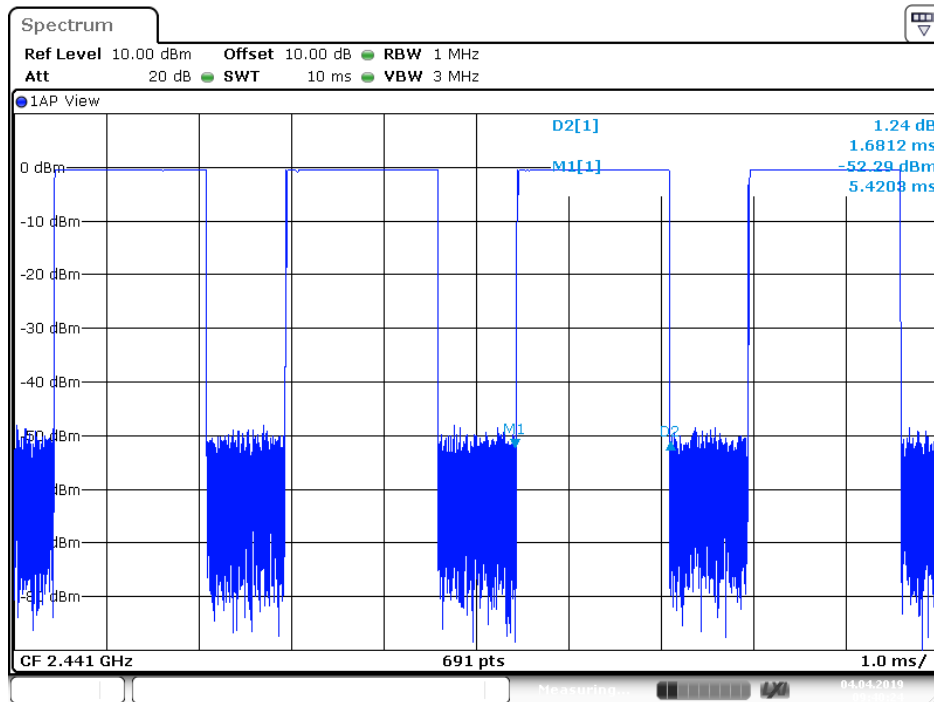
Date: 4.APR.2019 09:38:41

DH3 Low channel



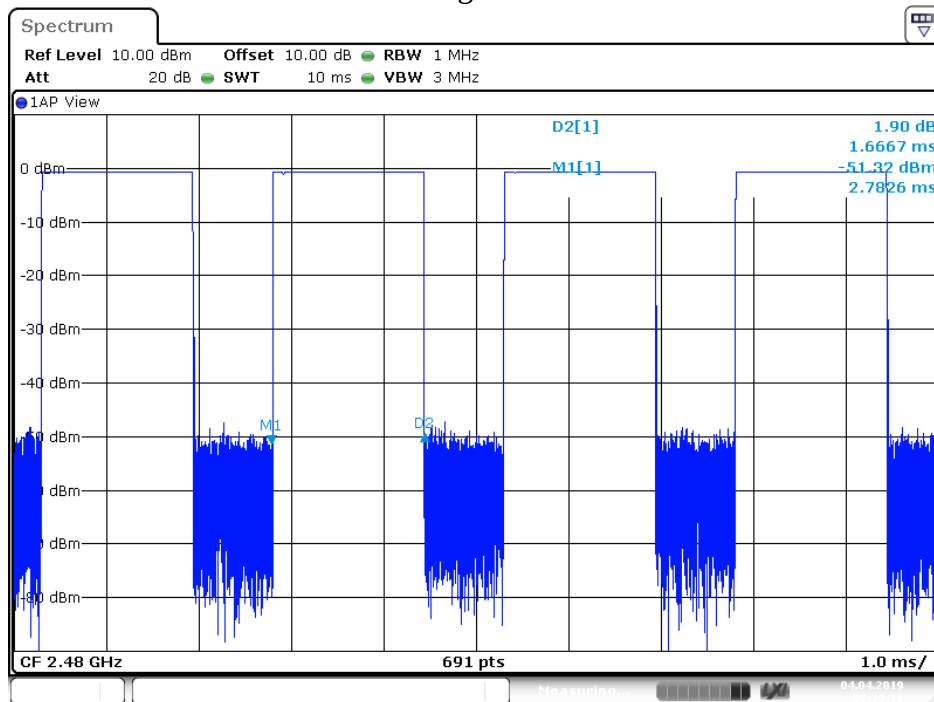
Date: 4.APR.2019 09:41:15

DH3 Middle channel



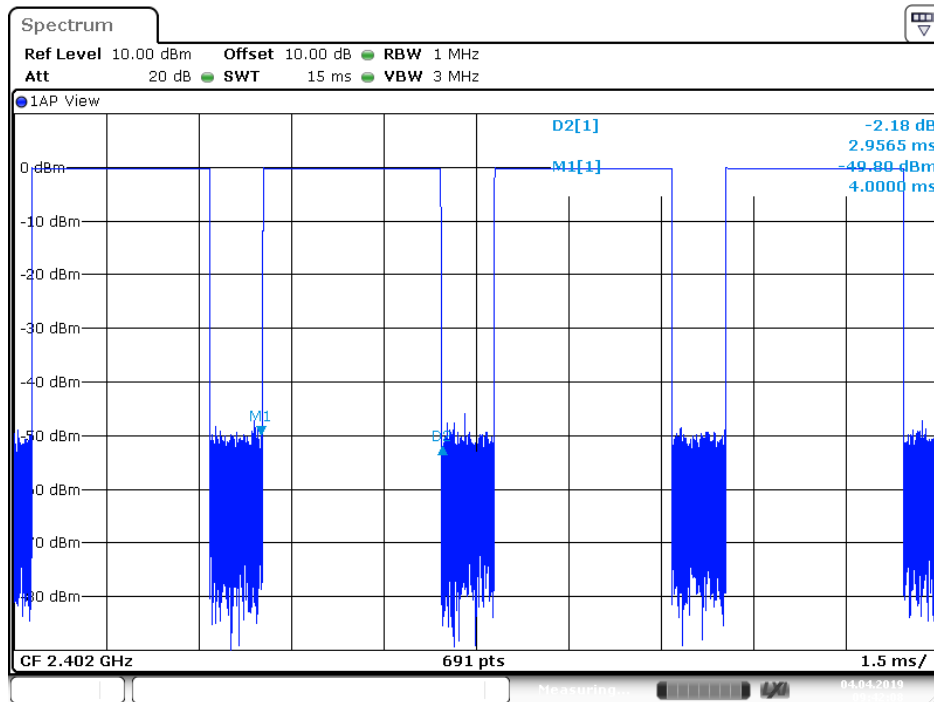
Date: 4.APR.2019 09:40:24

DH3 High channel



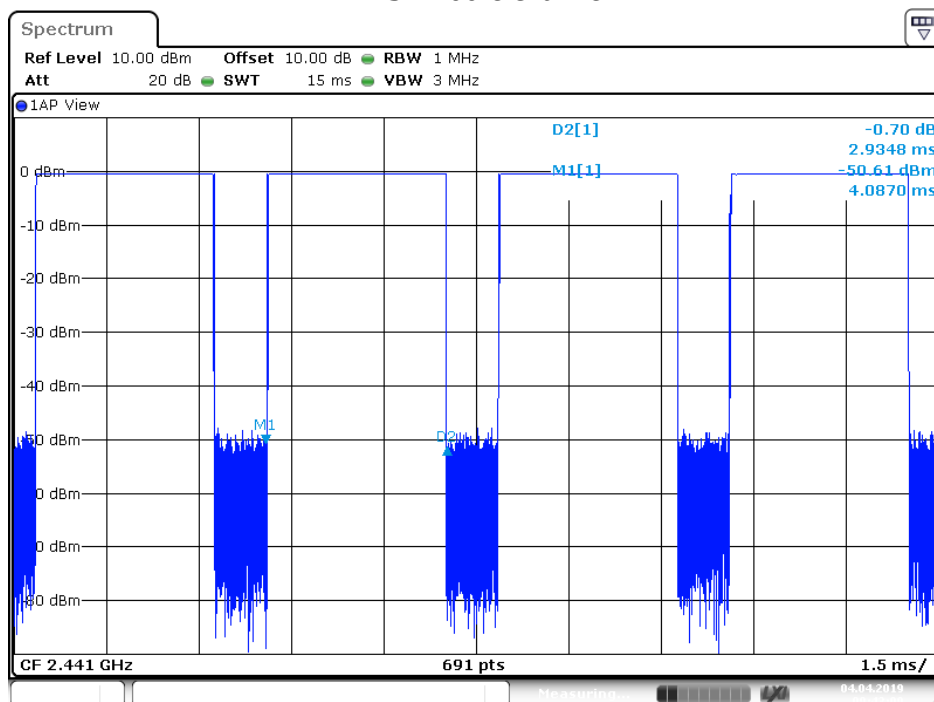
Date: 4.APR.2019 09:39:39

DH5 Low channel



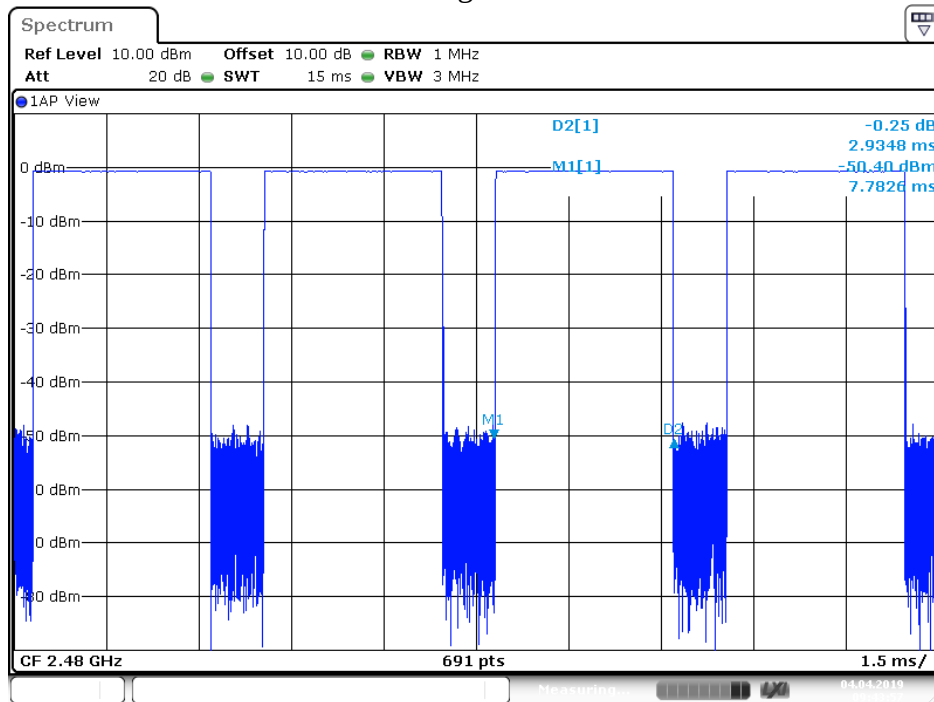
Date: 4.APR.2019 09:42:08

DH5 Middle channel



Date: 4.APR.2019 09:43:09

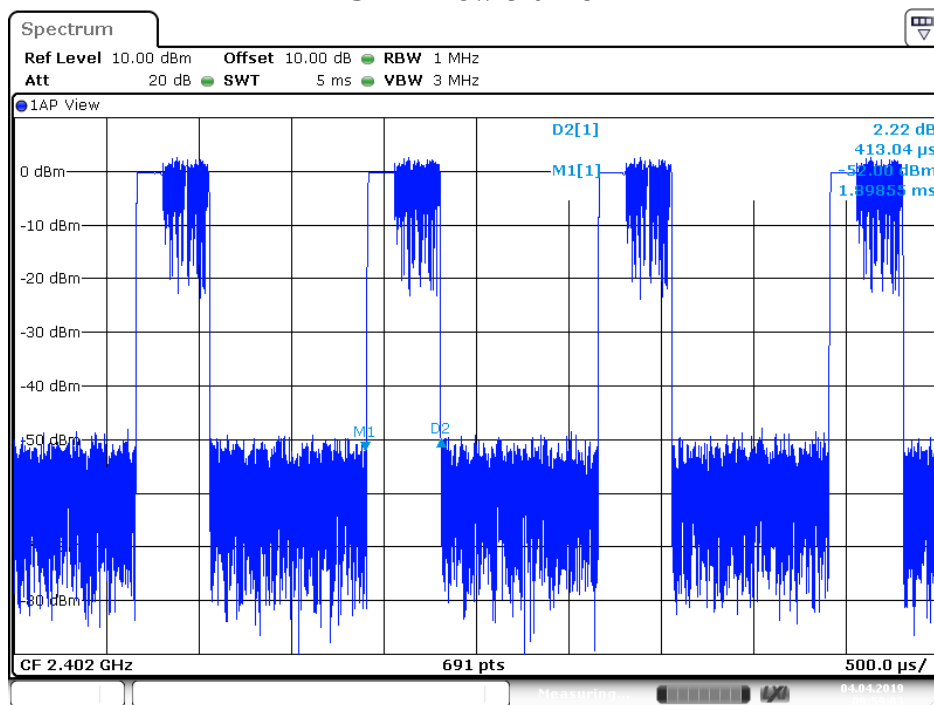
DH5 High channel



Date: 4.APR.2019 09:43:57

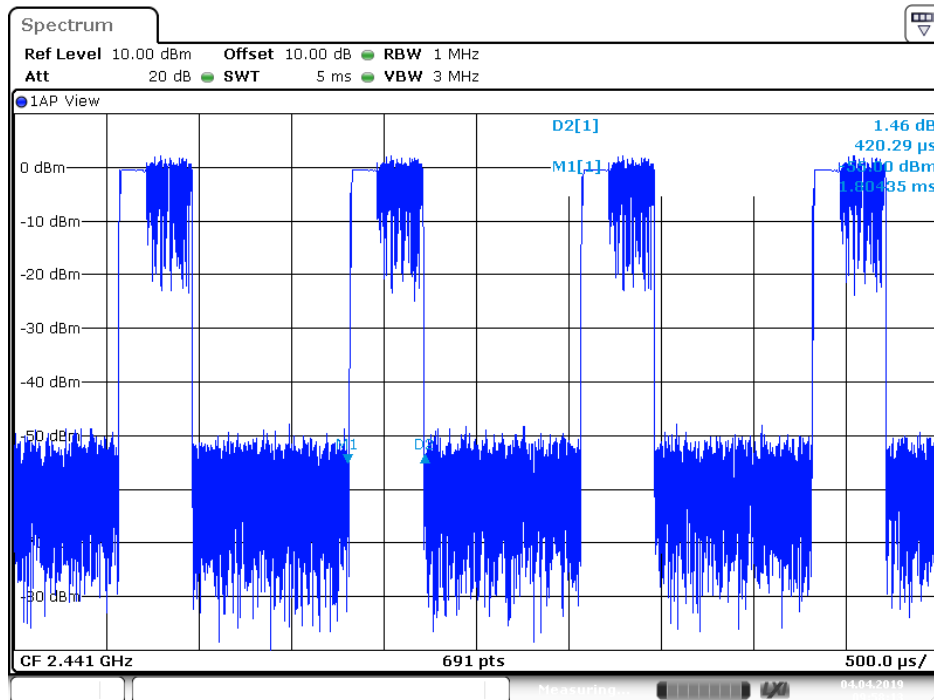
8DPSK Mode

3DH1 Low channel

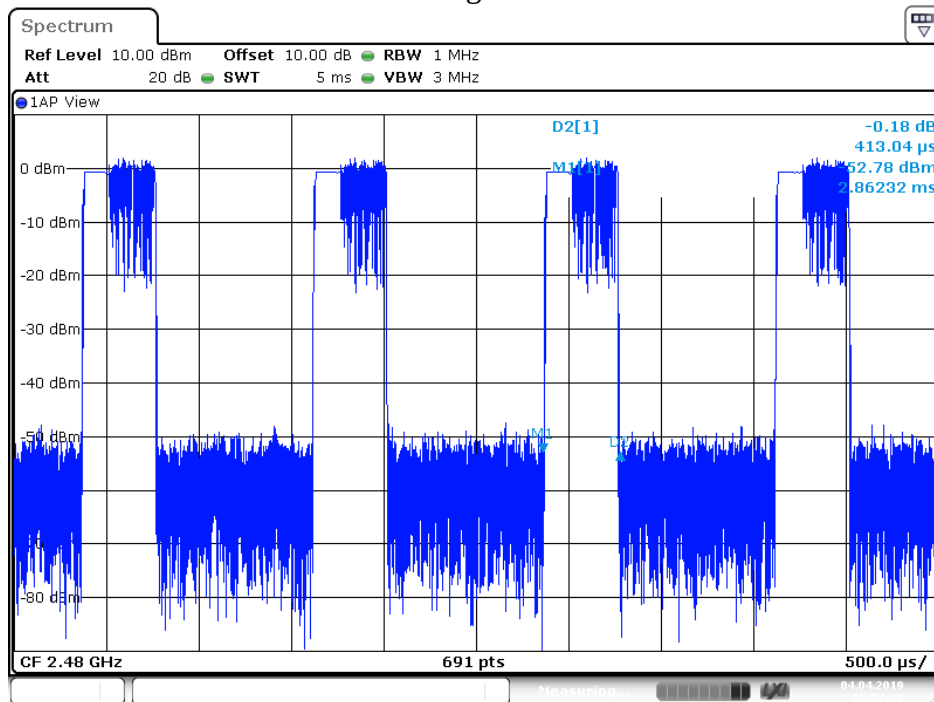


Date: 4.APR.2019 09:59:03

3DH1 Middle channel



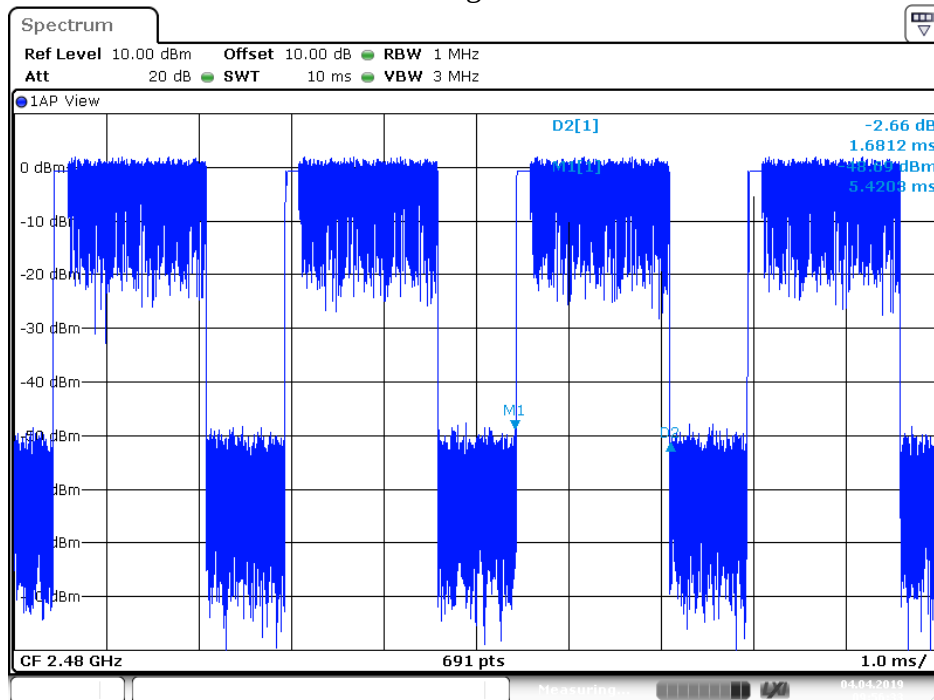
3DH1 High channel



Date: 4.APR.2019 09:54:31

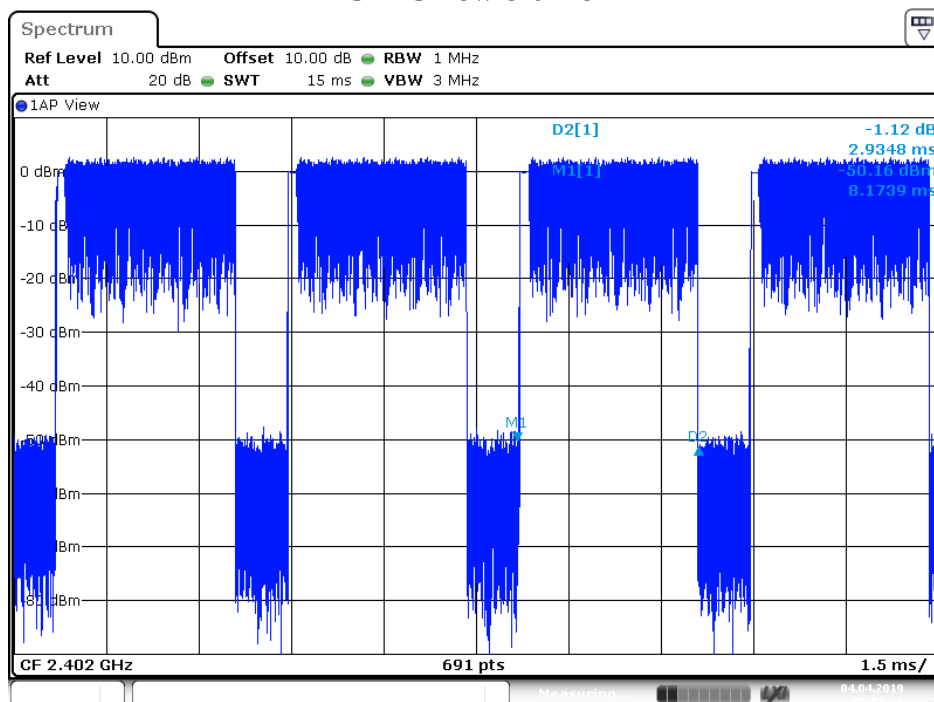
Date: 4.APR.2019 09:55:29

3DH3 High channel



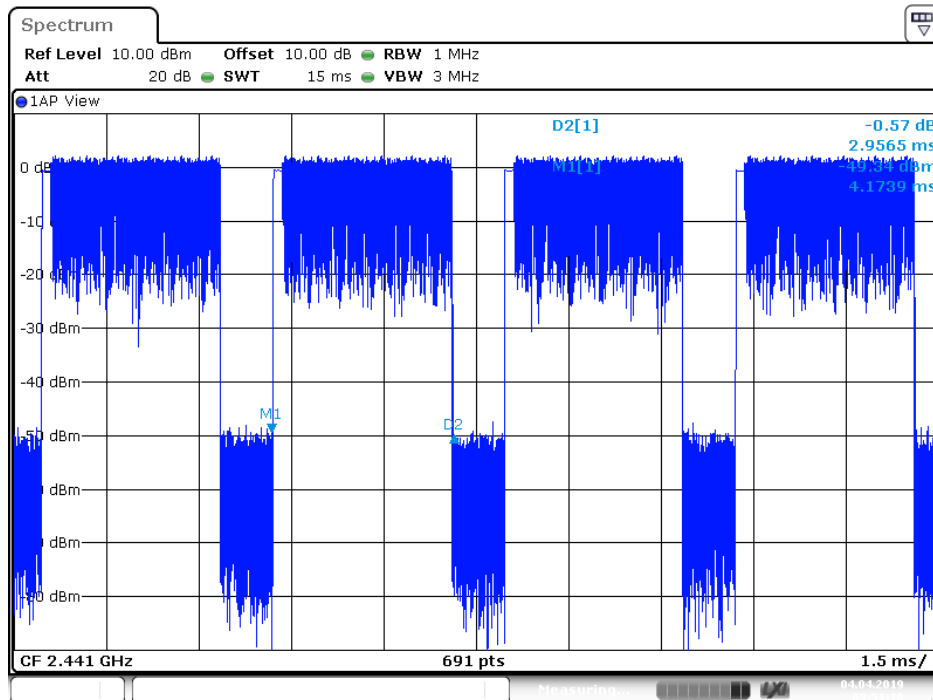
Date: 4.APR.2019 09:56:33

3DH5 Low channel



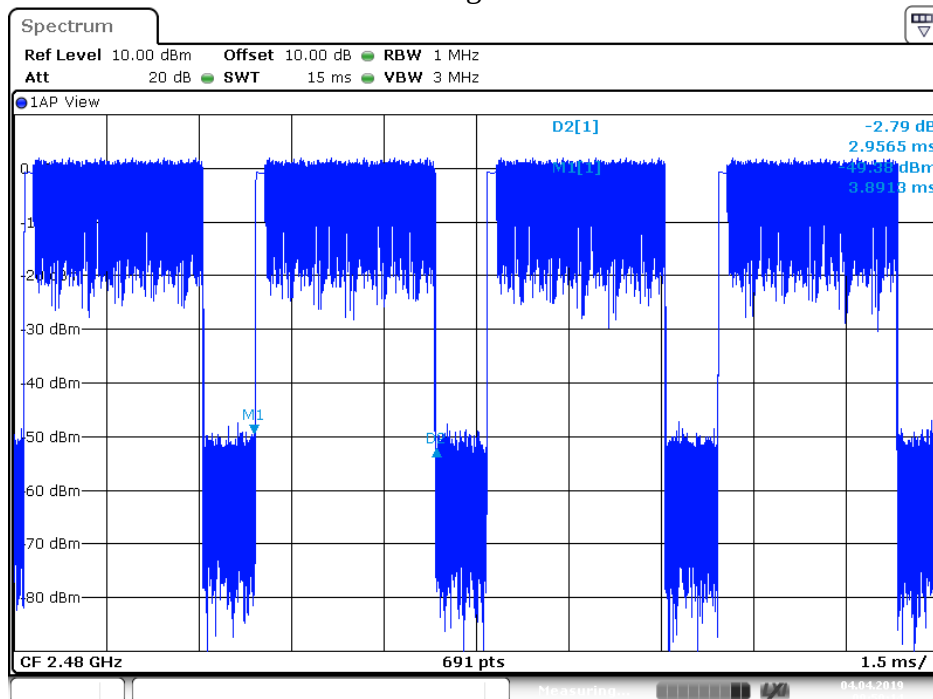
Date: 4.APR.2019 09:53:23

3DH5 Middle channel



Date: 4.APR.2019 09:51:10

3DH5 High channel



Date: 4.APR.2019 09:50:15

10. MAXIMUM PEAK OUTPUT POWER TEST

10.1. Block Diagram of Test Setup



10.2. The Requirement For 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.

10.3. The Requirement For RSS-247 Section 5.4(b)

For FHSs operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W if the hopset uses 75 or more hopping channels; the maximum peak conducted output power shall not exceed 0.125 W if the hopset uses less than 75 hopping channels. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

10.4. EUT Configuration on Test

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.

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 (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

10.6.Test Procedure

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

10.6.2.Set RBW of spectrum analyzer to 3MHz and VBW to 10MHz.

10.6.3.Measurement the maximum peak output power.

10.7.Test Result

GFSK Mode

Frequency (MHz)	Peak Output Power (dBm/W)	AV Output Power (dBm/W)	E.I.R.P (dBm/W)	Limits (dBm/W)	Result
2402	0.05/0.0010	-1.5/0.0007	3.47/0.0022	30 / 1	Pass
2441	-0.49/0.0009	-1.6/0.0007	3.37/0.0022	30 / 1	Pass
2480	-0.67/0.0009	-1.7/0.0007	3.27/0.0021	30 / 1	Pass

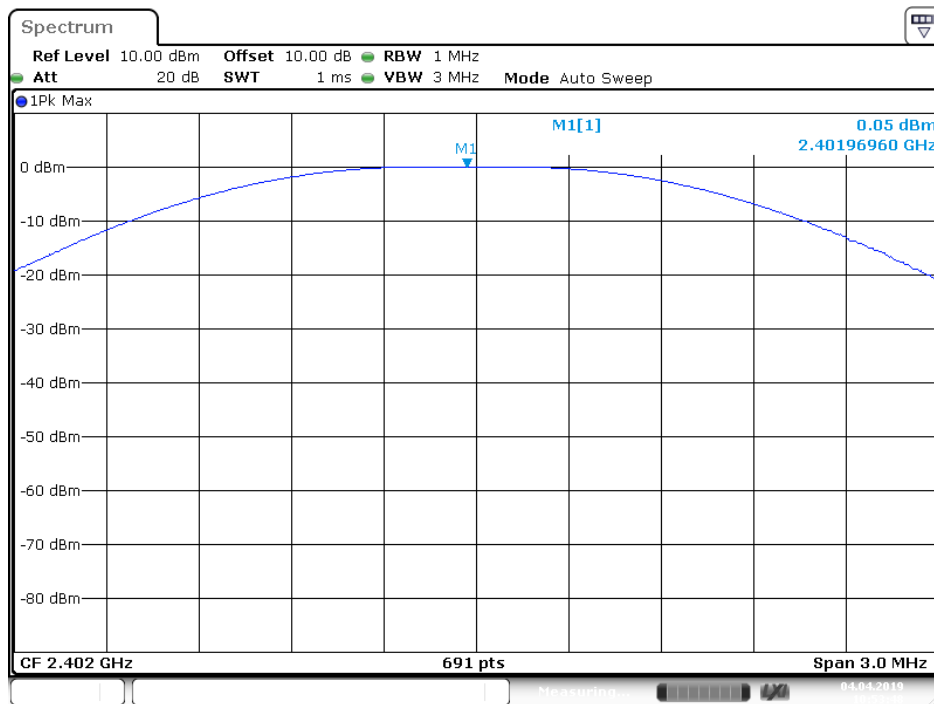
8DPSK Mode

Frequency (MHz)	Peak Output Power (dBm/W)	AV Output Power (dBm/W)	E.I.R.P (dBm/W)	Limits (dBm/W)	Result
2402	3.18/0.0021	-1.4/0.0007	3.57/0.0023	30 / 1	Pass
2441	2.68/0.0019	-1.6/0.0007	3.37/0.0022	30 / 1	Pass
2480	2.54/0.0018	-1.9/0.0006	3.07/0.0020	30 / 1	Pass

The spectrum analyzer plots are attached as below.

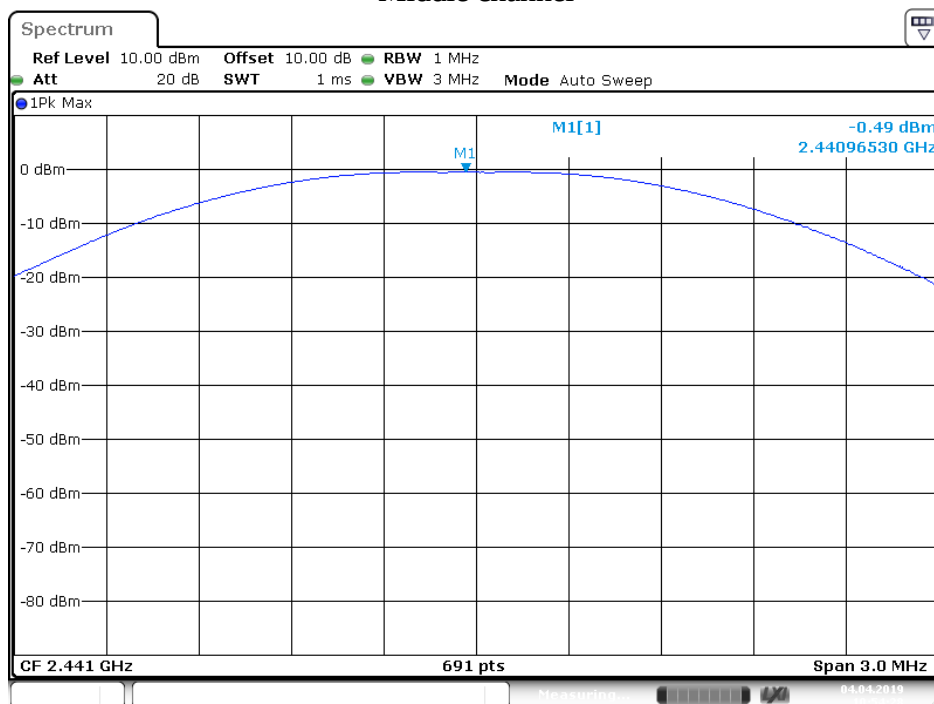
GFSK Mode

Low channel



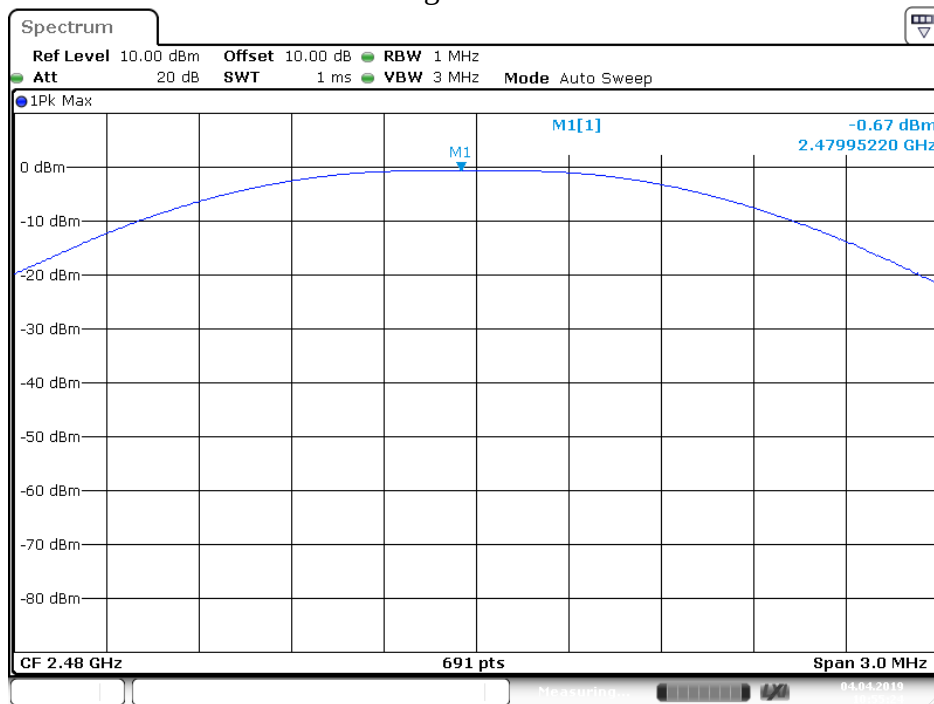
Date: 4.APR.2019 10:53:48

Middle channel



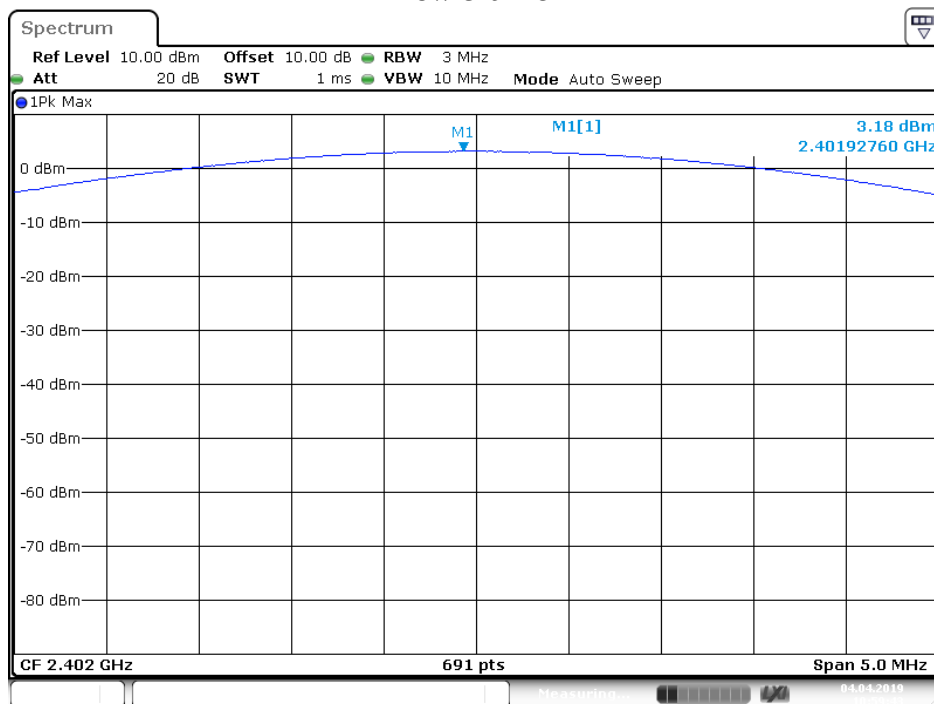
Date: 4.APR.2019 10:54:28

High channel

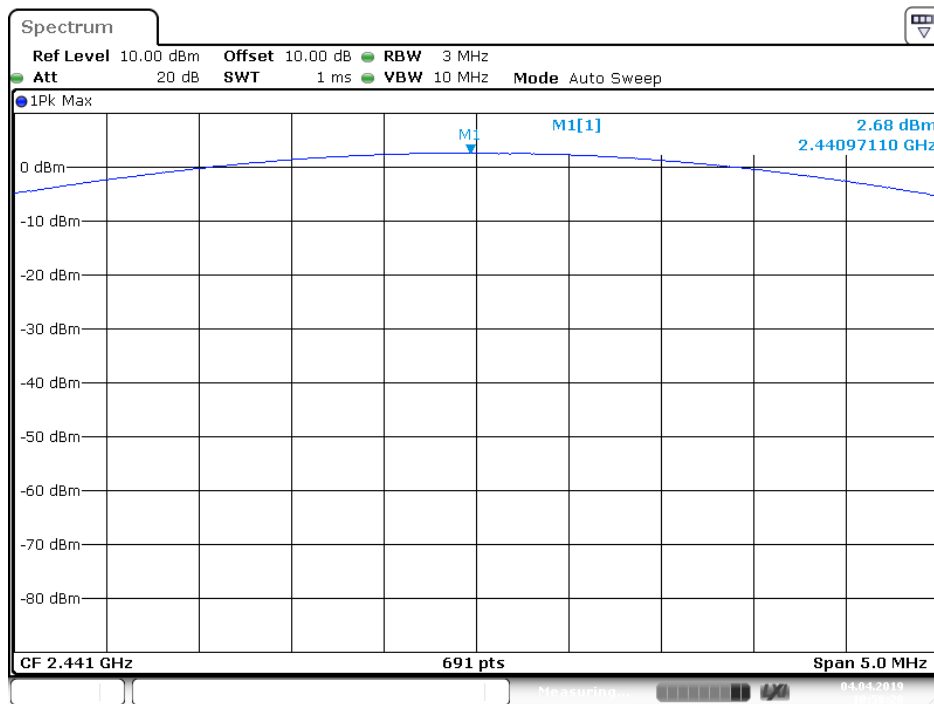


8DPSK Mode

Low channel

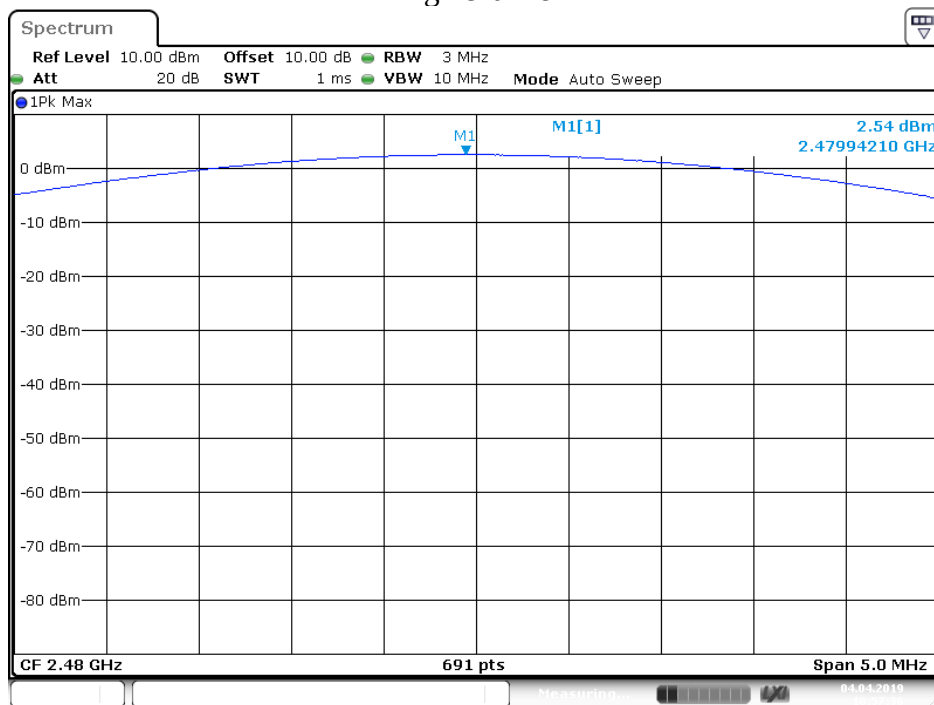


Middle channel



Date: 4.APR.2019 10:58:28

High channel

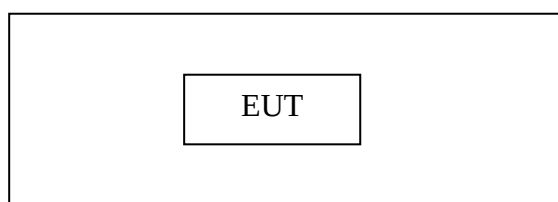


Date: 4.APR.2019 10:57:36

11.RADIATED EMISSION TEST

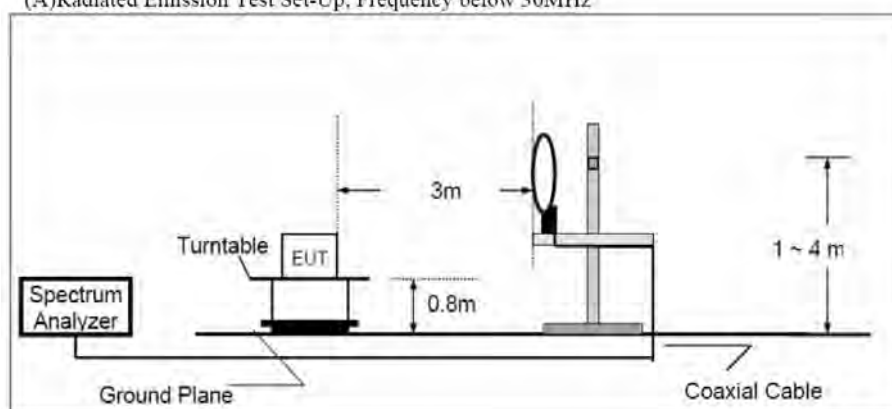
11.1.Block Diagram of Test Setup

11.1.1.Block diagram of connection between the EUT and peripherals

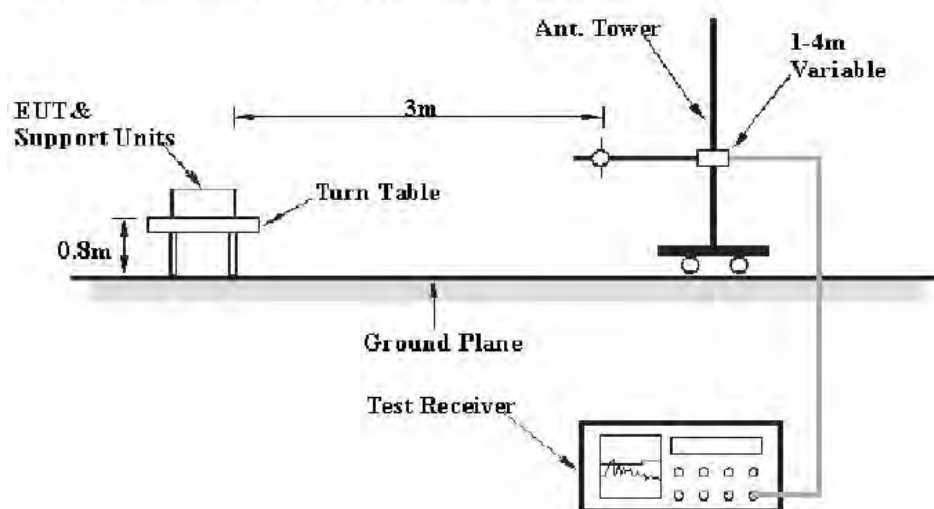


11.1.2.Semi-Anechoic Chamber Test Setup Diagram

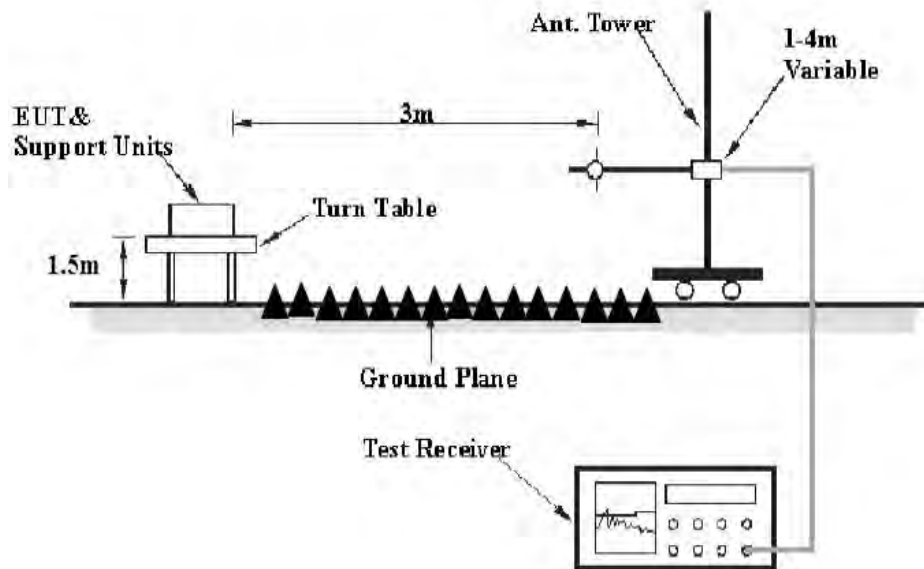
(A) Radiated Emission Test Set-Up, Frequency below 30MHz



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



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



11.2.The Requirement For 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.The Requirement for RSS-247 section 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

11.4. Transmitter Emission Limit

Except where otherwise indicated in the applicable RSS, 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 ($\mu\text{V/m}$ 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) ($\mu\text{A/m}$)	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.

11.5.Restricted bands of operation

Restricted frequency bands, identified in table 7, are designated primarily for safety-of-life services (distress calling and certain aeronautical activities), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following conditions related to the restricted frequency bands apply:

(a)The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands listed in table 7 except for apparatus compliant with RSS-287, *Emergency Position Indicating Radio Beacons (EPIRB)*, *Emergency Locator Transmitters (ELT)*, *Personal Locator Beacons (PLB)*, and *Maritime Survivor Locator Devices (MSLD)*.

(b) Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table 5 and table 6.

(c) Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table 5 and table 6.

Table 7 – Restricted frequency bands*

MHz	MHz	GHz
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 - 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 - 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 - 8500	
108 - 138	--	

* Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

11.6.EUT Configuration on Test

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.

11.7.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 worse case emissions are reported.

11.8.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	28.66	-15.19	13.47	40.0	-26.53	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.

11.9.Test Result

Pass.

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

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

The spectrum analyzer plots are attached as below.

9kHz-30MHz test data

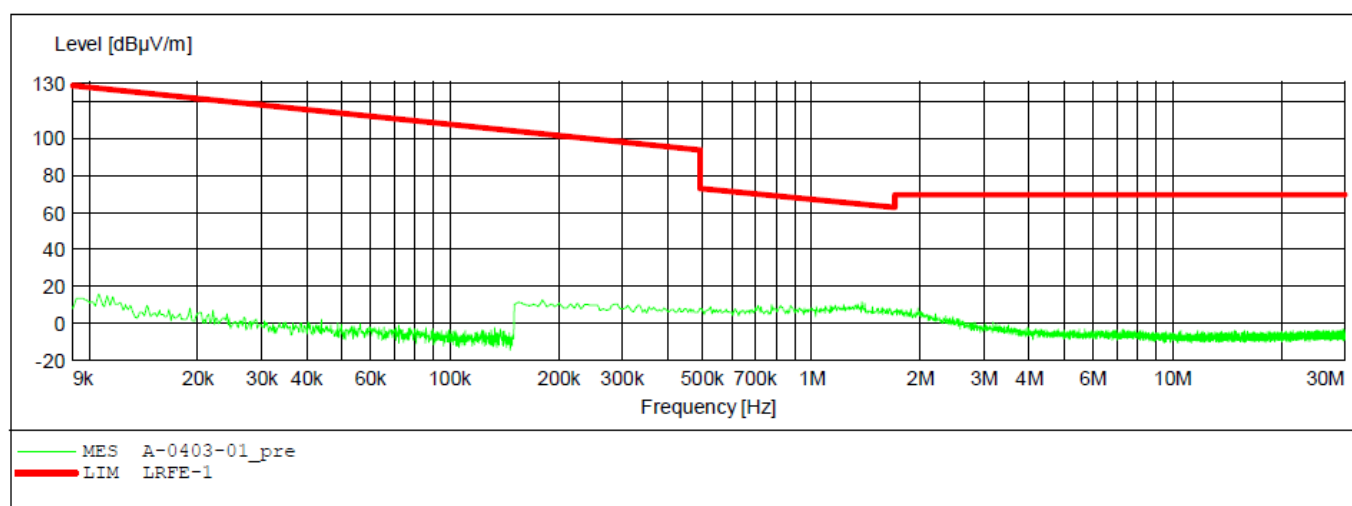
ACCURATE TECHNOLOGY CO.,LTD

FCC Part 15C 3m Radiated

EUT: Revvez Bone Conduction Sunglasses M/N:OS100
 Manufacturer: AfterShokz LLC
 Operating Condition: TX 2402MHz
 Test Site: 2# Chamber
 Operator: WADE
 Test Specification: DC 3.7V
 Comment: X
 Start of Test: 2019-4-3 /

SCAN TABLE: "LFRE Fin"

Short Description:			_SUB_STD_VTERM2 1.70			
Start	Stop	Step	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M



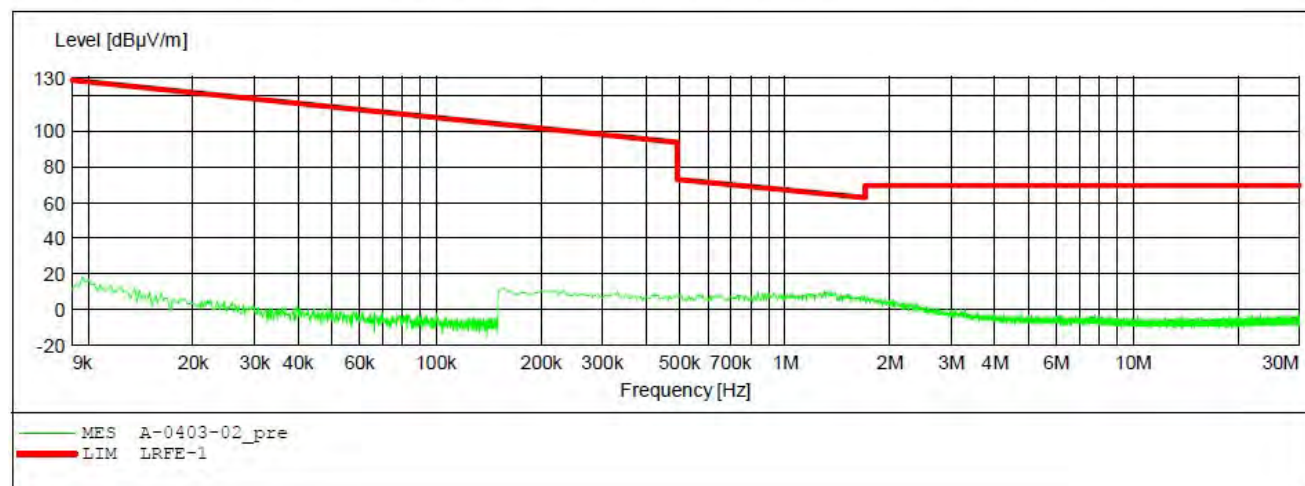
ACCURATE TECHNOLOGY CO., LTD

FCC Part 15C 3m Radiated

EUT: Revvez Bone Conduction Sunglasses M/N:OS100
 Manufacturer: AfterShokz LLC
 Operating Condition: TX 2402MHz
 Test Site: 2# Chamber
 Operator: WADE
 Test Specification: DC 3.7V
 Comment: Y
 Start of Test: 2019-4-3 /

SCAN TABLE: "LFRE Fin"

Short Description:			_SUB_STD_VTERM2 1.70		IF	Transducer
Start	Stop	Step	Detector	Meas. Time	Bandw.	
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



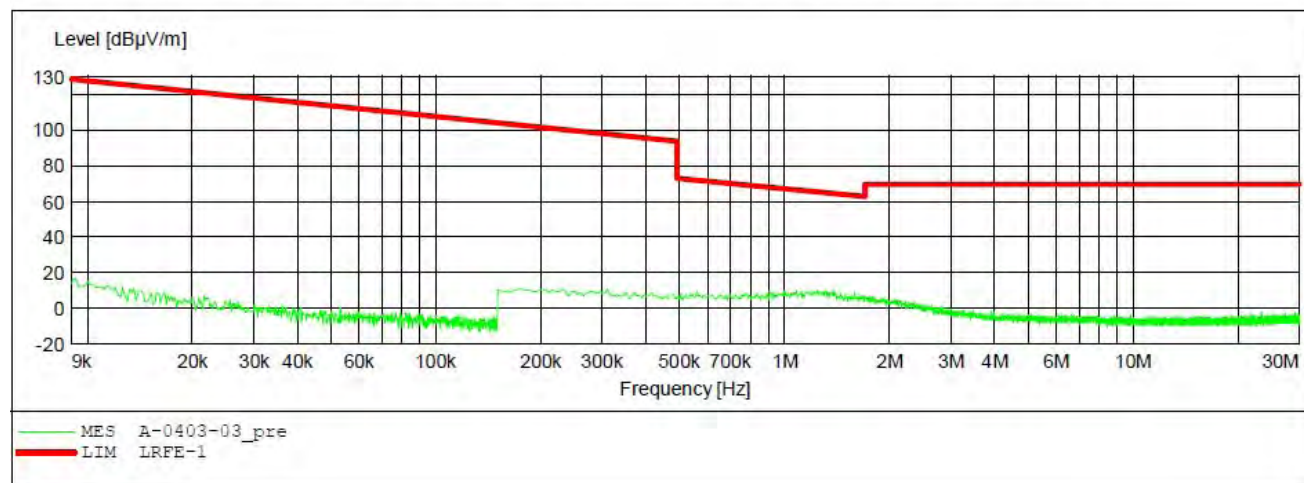
ACCURATE TECHNOLOGY CO., LTD

FCC Part 15C 3m Radiated

EUT: Revvez Bone Conduction Sunglasses M/N:OS100
 Manufacturer: AfterShokz LLC
 Operating Condition: TX 2402MHz
 Test Site: 2# Chamber
 Operator: WADE
 Test Specification: DC 3.7V
 Comment: Z
 Start of Test: 2019-4-3 /

SCAN TABLE: "LFRE Fin"

Short Description:			_SUB_STD_VTERM2 1.70				
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer	
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516M	
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M	



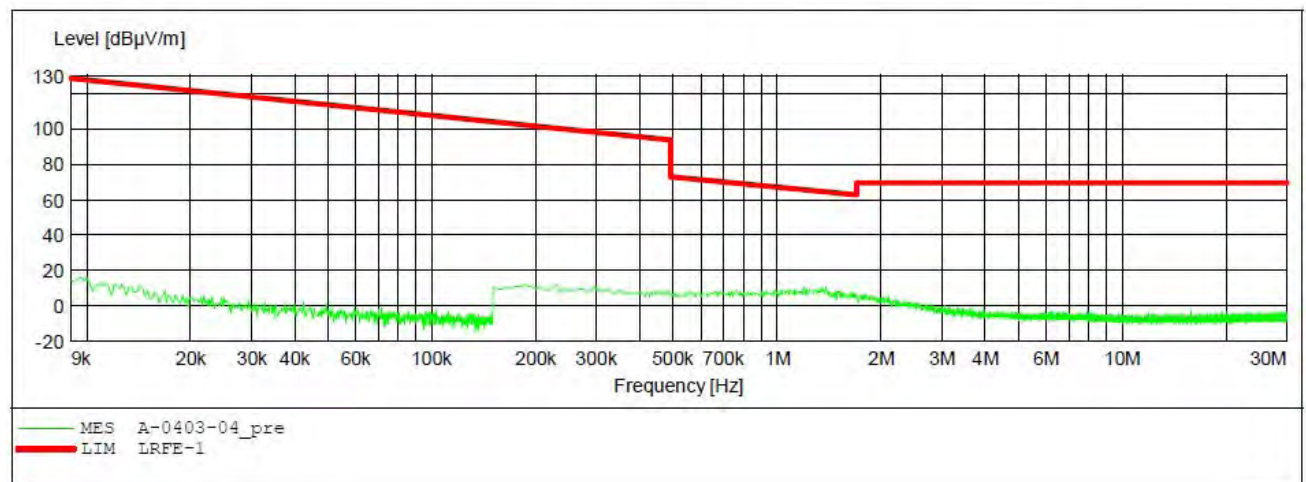
ACCURATE TECHNOLOGY CO.,LTD

FCC Part 15C 3m Radiated

EUT: Revvez Bone Conduction Sunglasses M/N:OS100
 Manufacturer: AfterShokz LLC
 Operating Condition: TX 2441MHz
 Test Site: 2# Chamber
 Operator: WADE
 Test Specification: DC 3.7V
 Comment: X
 Start of Test: 2019-4-3 /

SCAN TABLE: "LFRE Fin"

Short Description:			_SUB STD VTERM2 1.70			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M



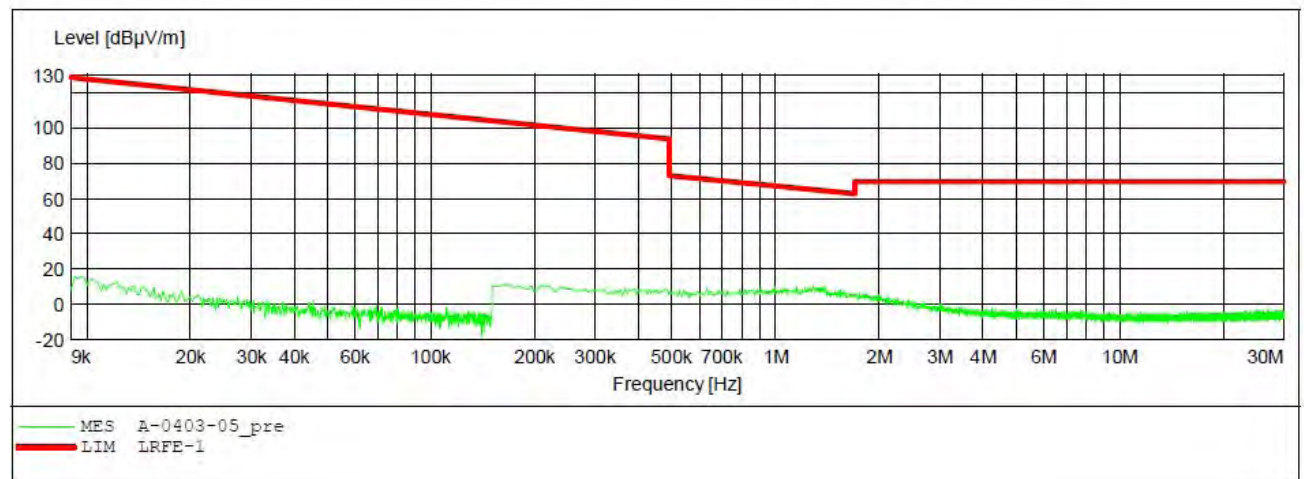
ACCURATE TECHNOLOGY CO., LTD

FCC Part 15C 3m Radiated

EUT: Revvez Bone Conduction Sunglasses M/N:OS100
 Manufacturer: AfterShokz LLC
 Operating Condition: TX 2441MHz
 Test Site: 2# Chamber
 Operator: WADE
 Test Specification: DC 3.7V
 Comment: Y
 Start of Test: 2019-4-3 /

SCAN TABLE: "LFRE Fin"

Start	Stop	Step	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



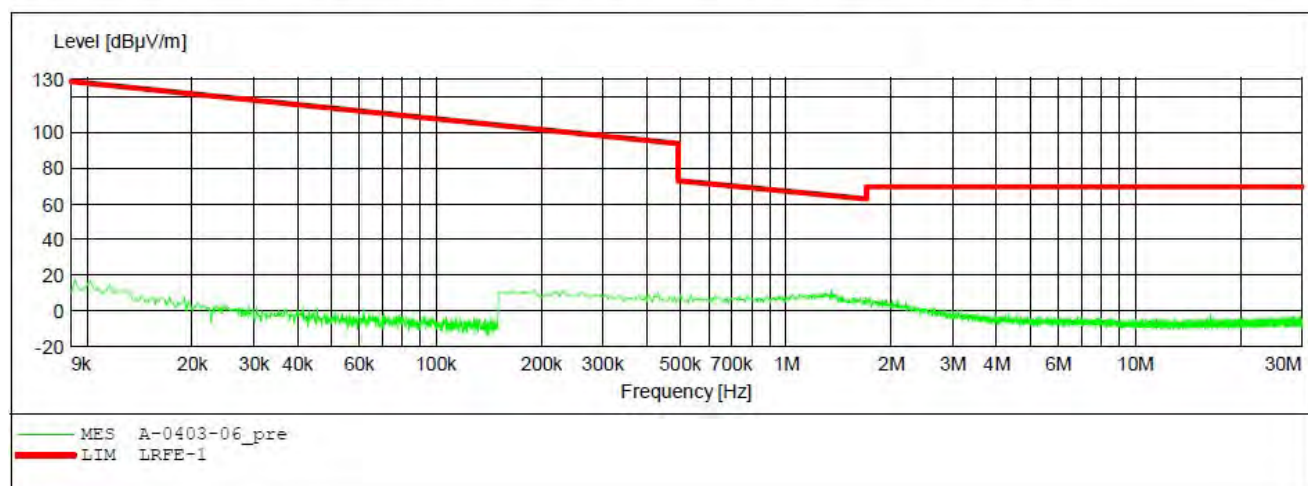
ACCURATE TECHNOLOGY CO., LTD

FCC Part 15C 3m Radiated

EUT: Revvez Bone Conduction Sunglasses M/N:OS100
 Manufacturer: AfterShokz LLC
 Operating Condition: TX 2441MHz
 Test Site: 2# Chamber
 Operator: WADE
 Test Specification: DC 3.7V
 Comment: Z
 Start of Test: 2019-4-3 /

SCAN TABLE: "LFRE Fin"

Short Description:			_SUB_STD_VTERM2 1.70				
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer	
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516M	
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M	



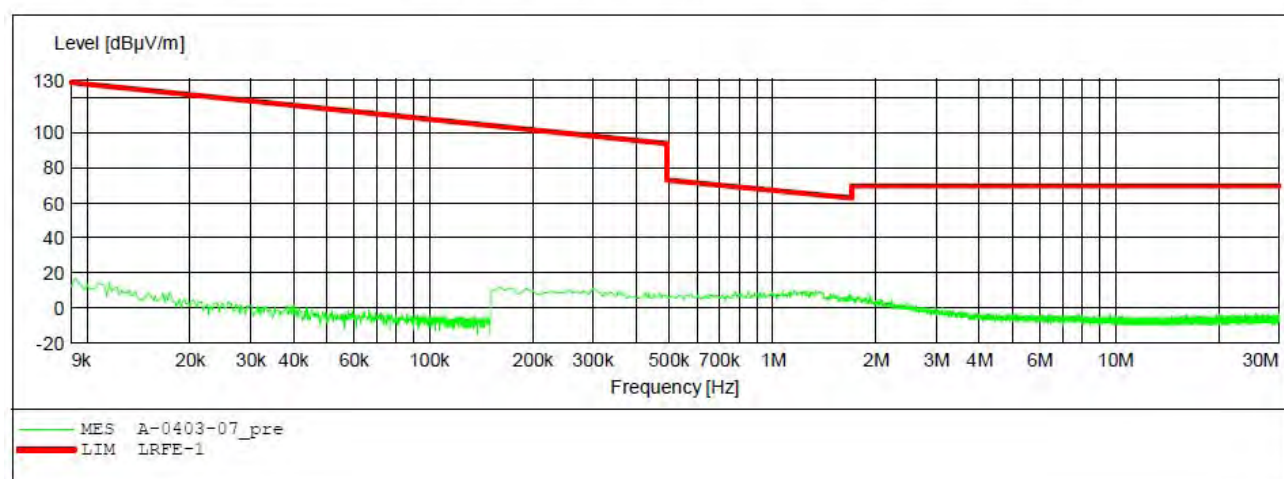
ACCURATE TECHNOLOGY CO., LTD

FCC Part 15C 3m Radiated

EUT: Revvez Bone Conduction Sunglasses M/N:OS100
 Manufacturer: AfterShokz LLC
 Operating Condition: TX 2480MHz
 Test Site: 2# Chamber
 Operator: WADE
 Test Specification: DC 3.7V
 Comment: X
 Start of Test: 2019-4-3 /

SCAN TABLE: "LFRE Fin"

Short Description:			_SUB_STD_VTERM2 1.70			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M



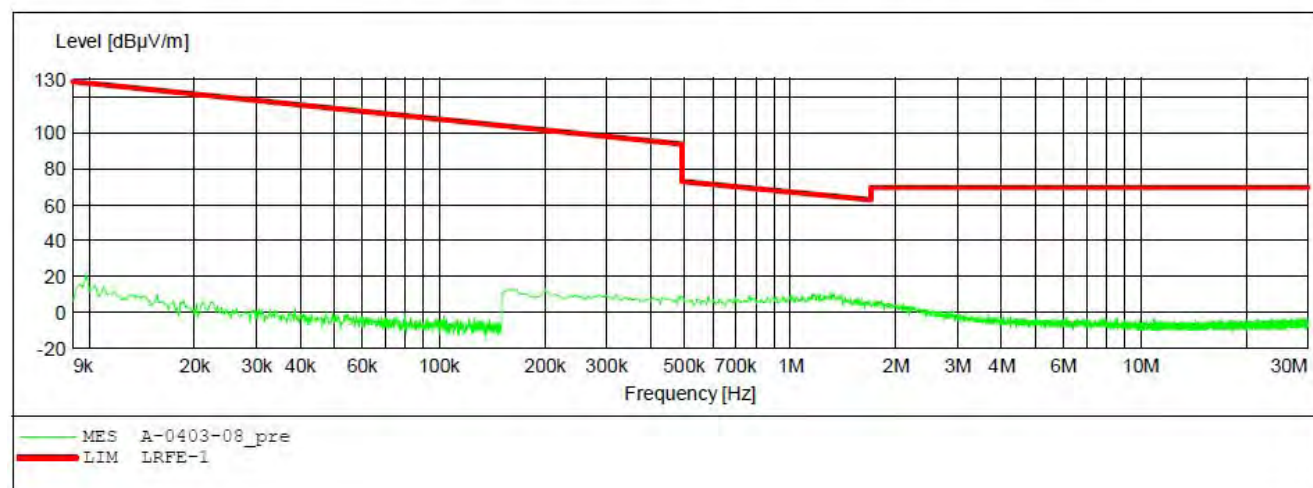
ACCURATE TECHNOLOGY CO., LTD

FCC Part 15C 3m Radiated

EUT: Revvez Bone Conduction Sunglasses M/N:OS100
 Manufacturer: AfterShokz LLC
 Operating Condition: TX 2480MHz
 Test Site: 2# Chamber
 Operator: WADE
 Test Specification: DC 3.7V
 Comment: Y
 Start of Test: 2019-4-3 /

SCAN TABLE: "LFRE Fin"

Short Description:			_SUB_STD_VTERM2 1.70			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M



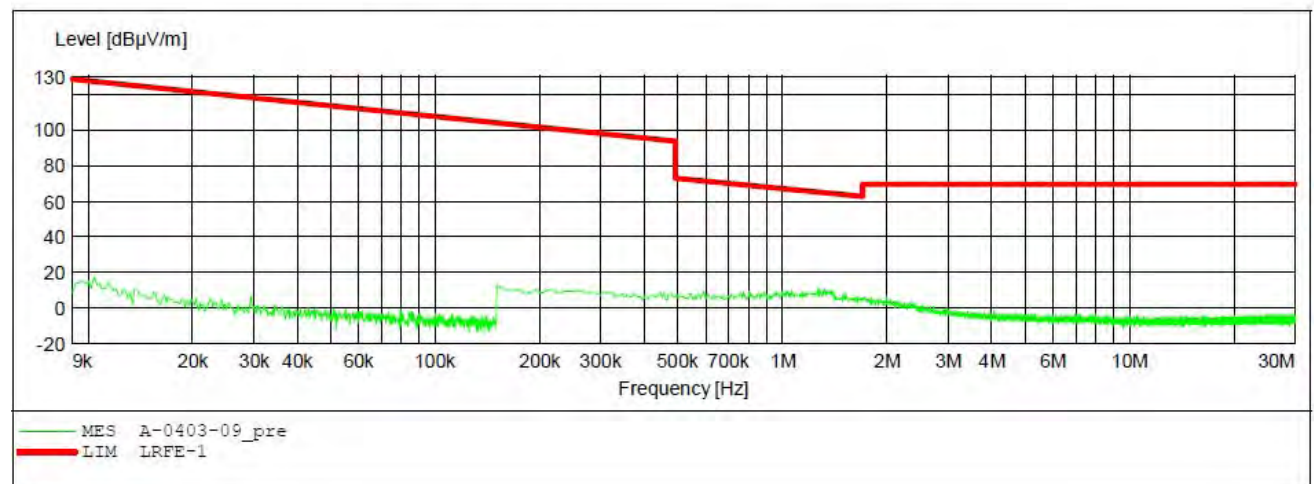
ACCURATE TECHNOLOGY CO., LTD

FCC Part 15C 3m Radiated

EUT: Revvez Bone Conduction Sunglasses M/N:OS100
 Manufacturer: AfterShokz LLC
 Operating Condition: TX 2480MHz
 Test Site: 2# Chamber
 Operator: WADE
 Test Specification: DC 3.7V
 Comment: Z
 Start of Test: 2019-4-3 /

SCAN TABLE: "LFRE Fin"

Short Description:			_SUB_STD_VTERM2 1.70			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	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 #807

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2402MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Horizontal

Power Source: DC 3.7V

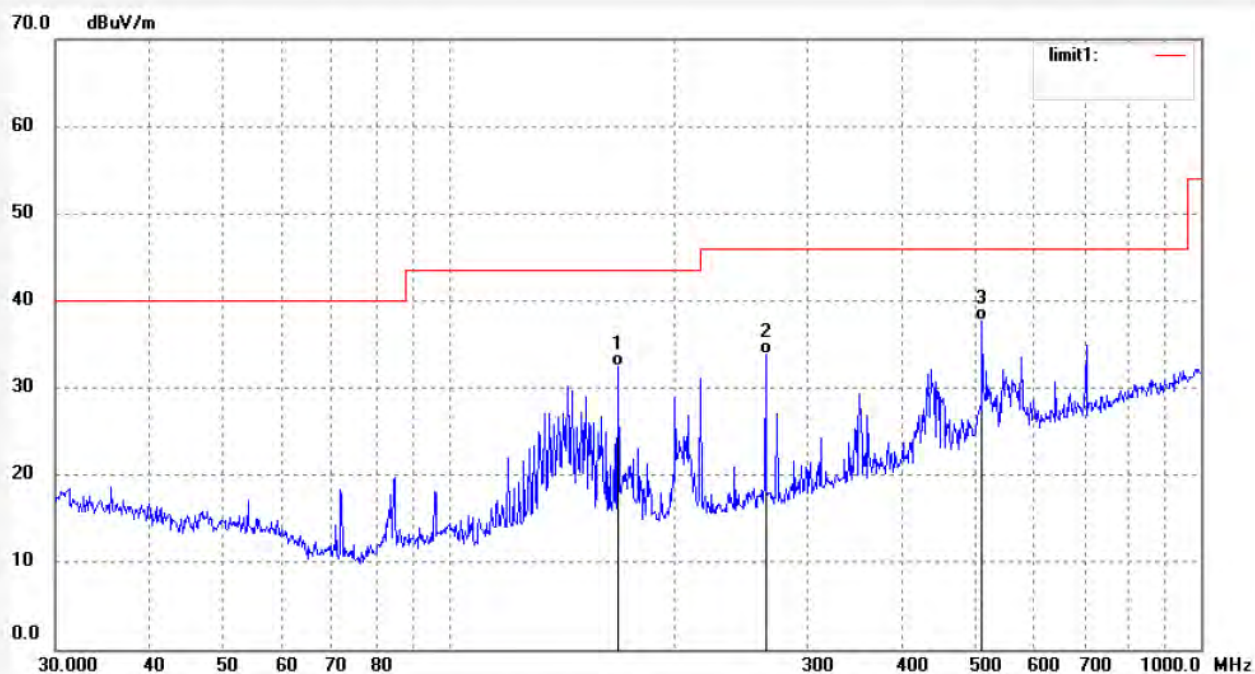
Date: 19/04/01/

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	167.8242	46.30	-13.88	32.42	43.50	-11.08	QP			
2	263.8190	44.07	-10.26	33.81	46.00	-12.19	QP			
3	511.8351	41.70	-4.03	37.67	46.00	-8.33	QP			



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 #808

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2402MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Vertical

Power Source: DC 3.7V

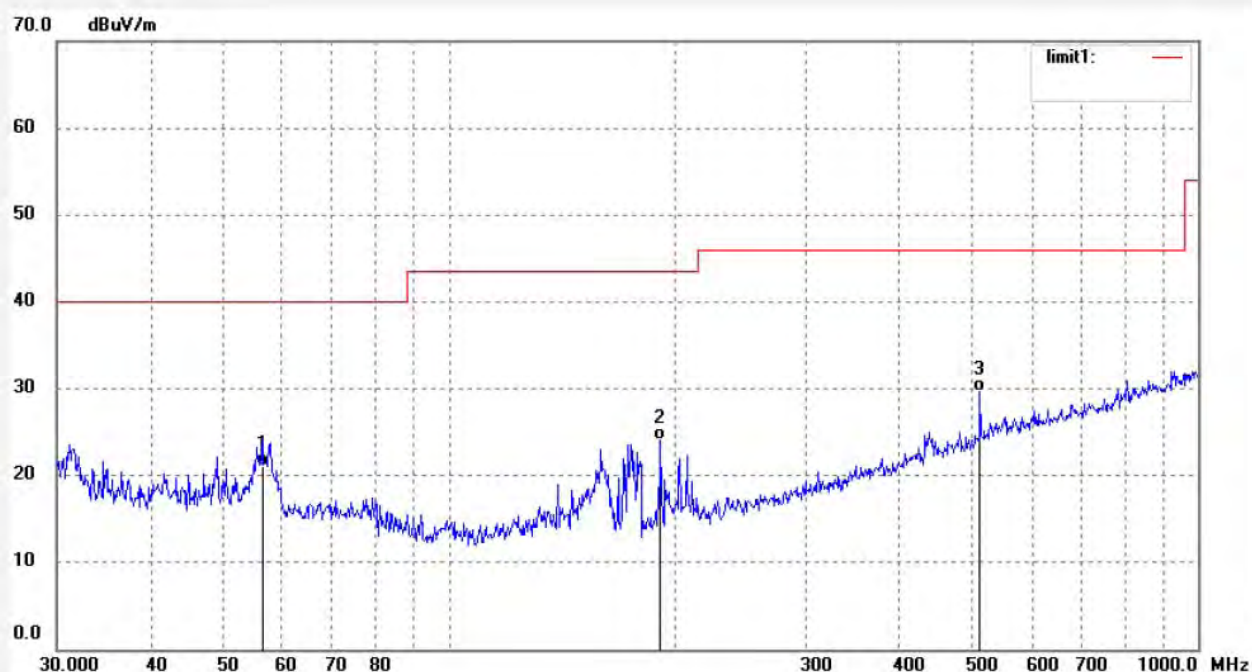
Date: 19/04/01/

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	56.3947	34.36	-13.21	21.15	40.00	-18.85	QP			
2	191.7450	36.51	-12.42	24.09	43.50	-19.41	QP			
3	511.8351	33.68	-4.03	29.65	46.00	-16.35	QP			



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 #810

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2441MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Horizontal

Power Source: DC 3.7V

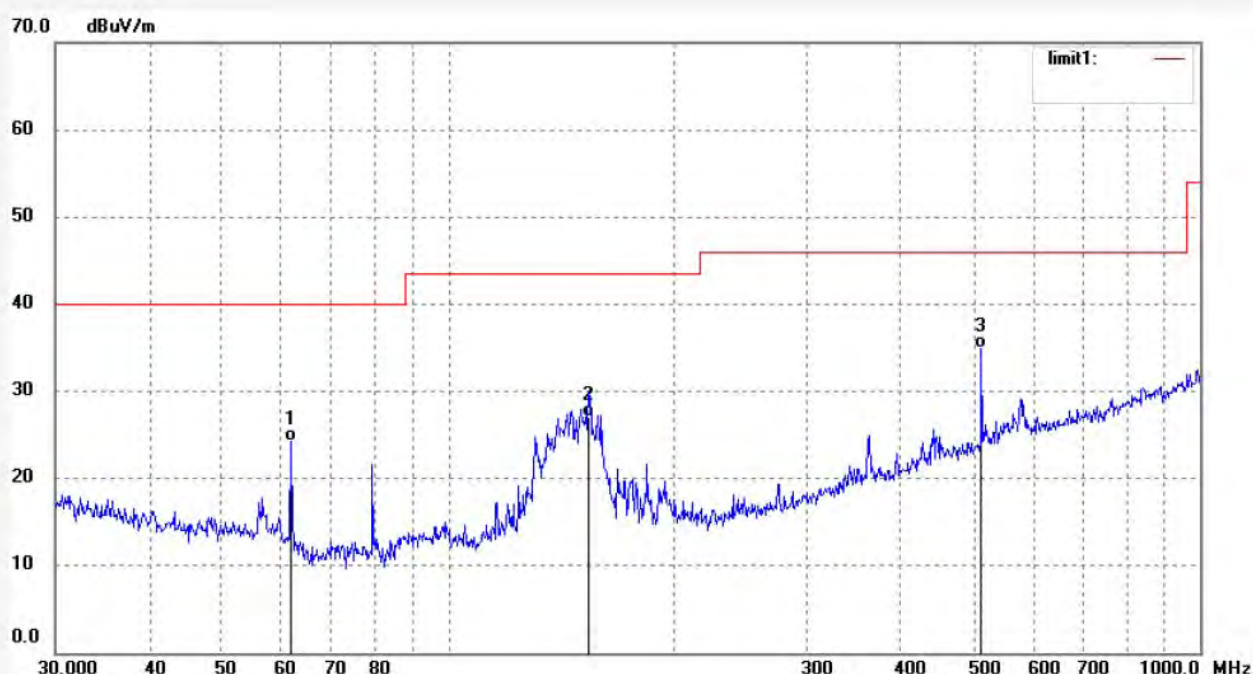
Date: 19/04/01/

Time:

Engineer Signature: WADE

Distance: 3m

Note:





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 #809

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2441MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Vertical

Power Source: DC 3.7V

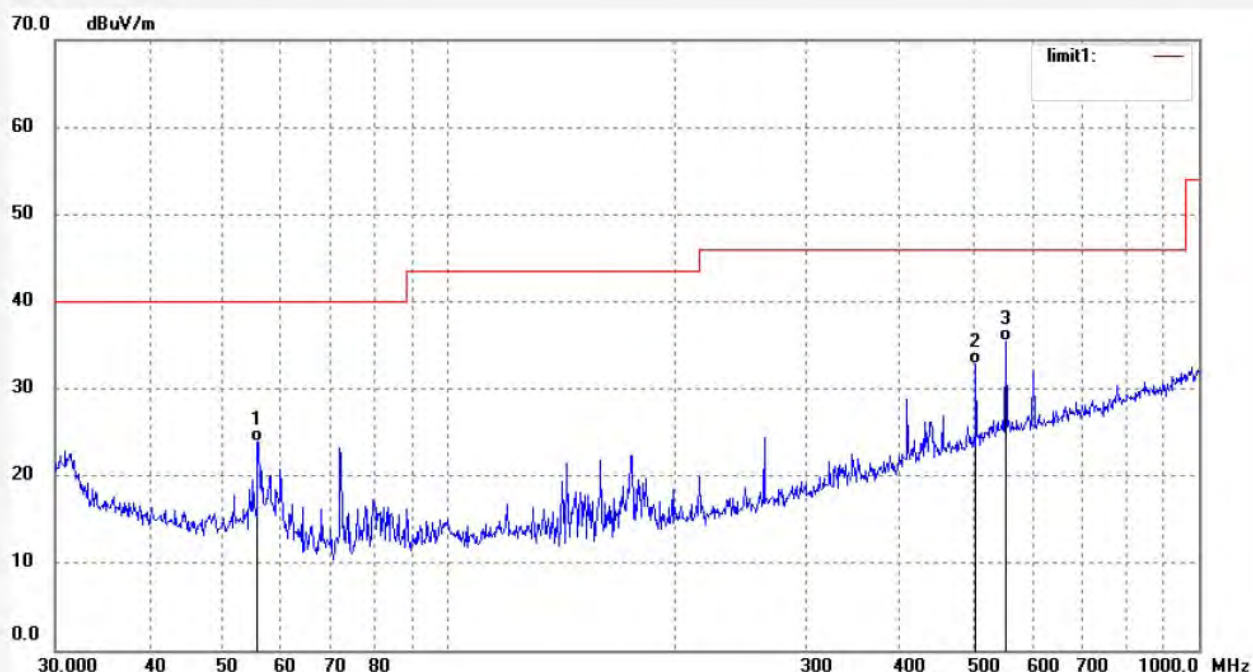
Date: 19/04/01/

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	55.8046	37.06	-13.10	23.96	40.00	-16.04	QP			
2	504.7062	37.01	-4.19	32.82	46.00	-13.18	QP			
3	552.8832	38.45	-3.00	35.45	46.00	-10.55	QP			



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 #811

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2480MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Horizontal

Power Source: DC 3.7V

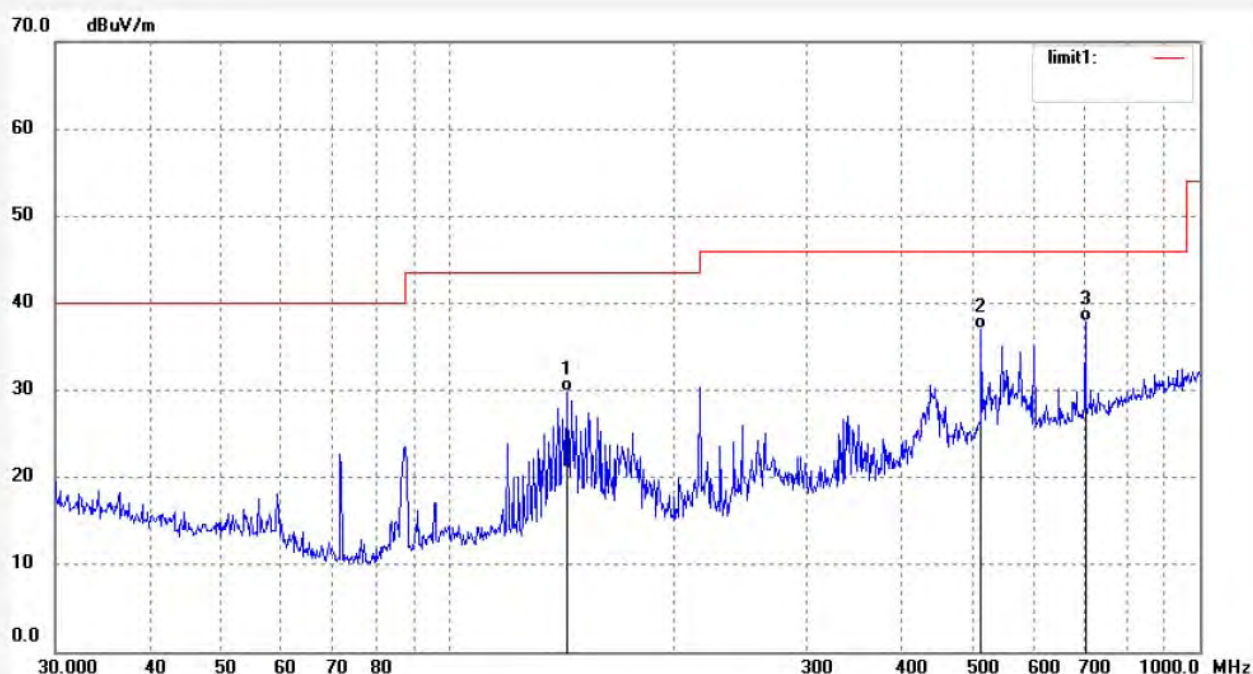
Date: 19/04/01/

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	143.8293	45.01	-15.11	29.90	43.50	-13.60	QP			
2	511.8351	41.09	-4.03	37.06	46.00	-8.94	QP			
3	704.2259	38.90	-0.96	37.94	46.00	-8.06	QP			



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 #812

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2480MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Vertical

Power Source: DC 3.7V

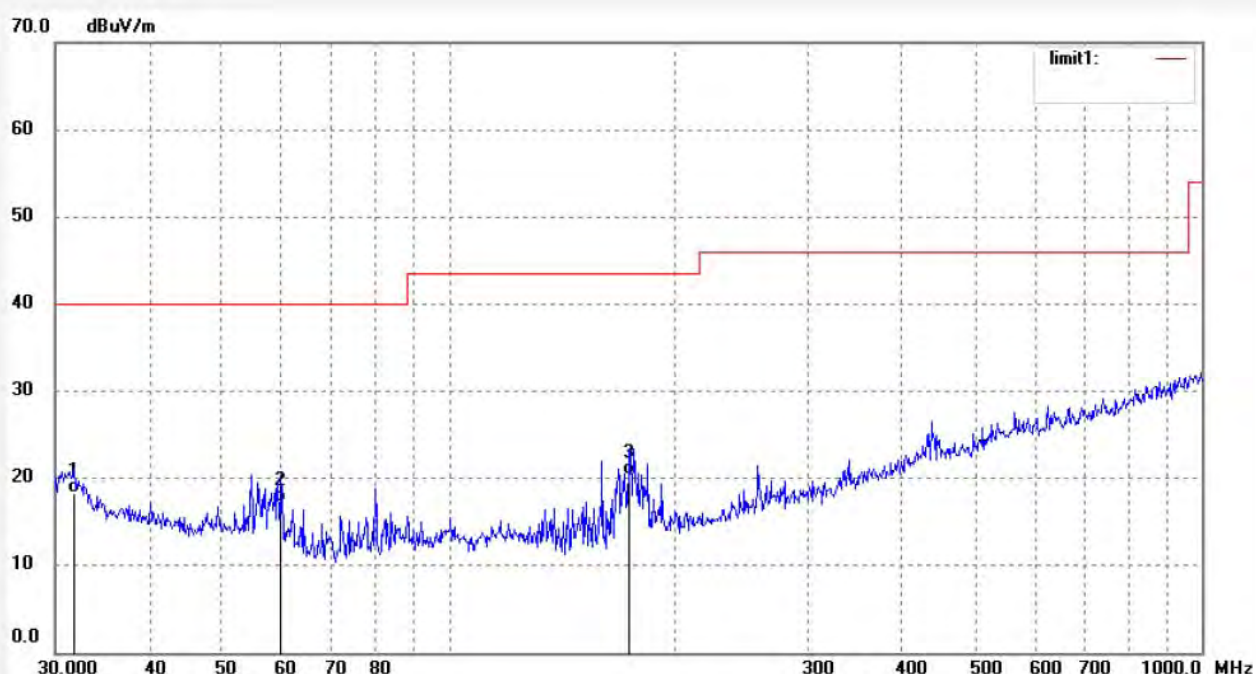
Date: 19/04/01/

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	31.8427	27.71	-9.47	18.24	40.00	-21.76	QP			
2	59.8588	31.09	-13.88	17.21	40.00	-22.79	QP			
3	173.8135	33.89	-13.50	20.39	43.50	-23.11	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 #775

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2402MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Horizontal

Power Source: DC 3.7V

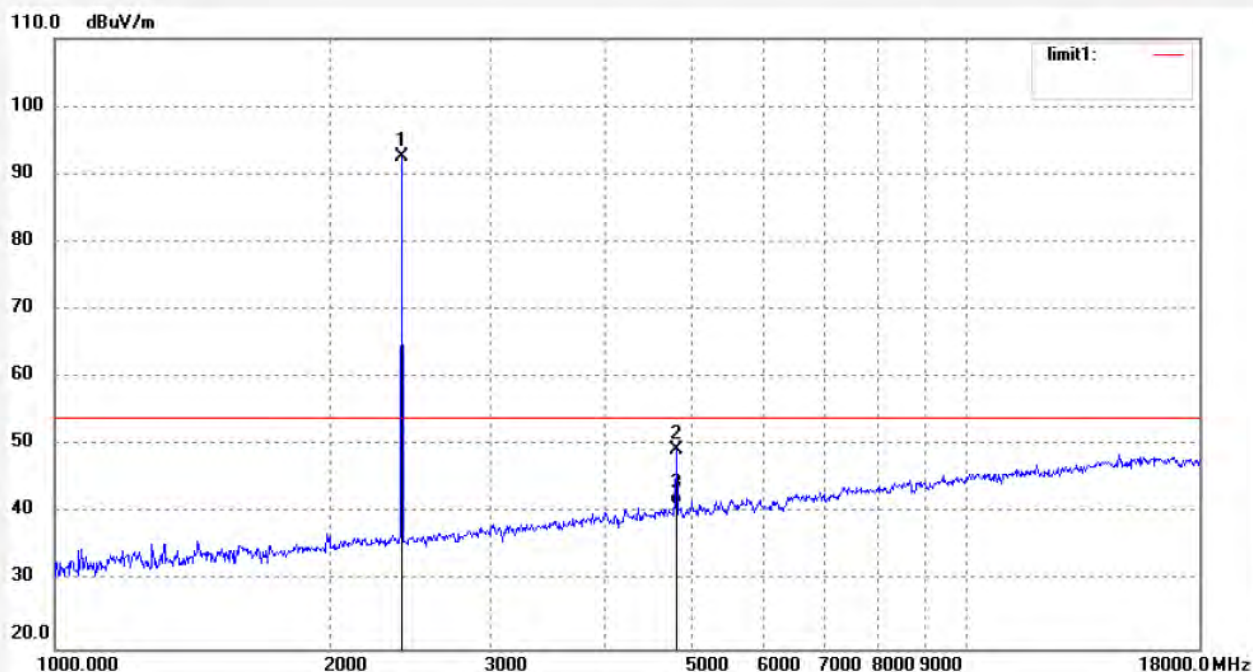
Date: 19/04/01/

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	91.61	0.89	92.50	/	/	peak			
2	4804.027	41.88	7.40	49.28	74.00	-24.72	peak			
3	4804.027	33.85	7.40	41.25	54.00	-12.75	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 #776

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2402MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Vertical

Power Source: DC 3.7V

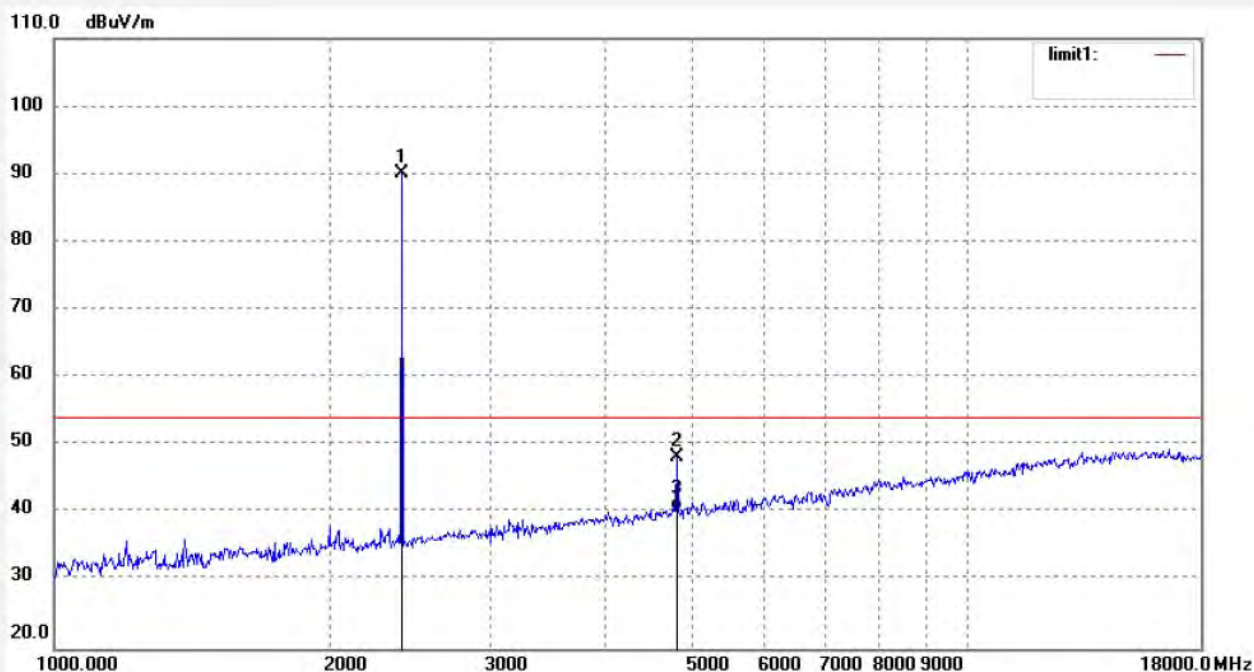
Date: 19/04/01/

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	89.20	0.89	90.09	/	/	peak			
2	4804.026	40.74	7.40	48.14	74.00	-25.86	peak			
3	4804.026	32.95	7.40	40.35	54.00	-13.65	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 #779

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2441MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Horizontal

Power Source: DC 3.7V

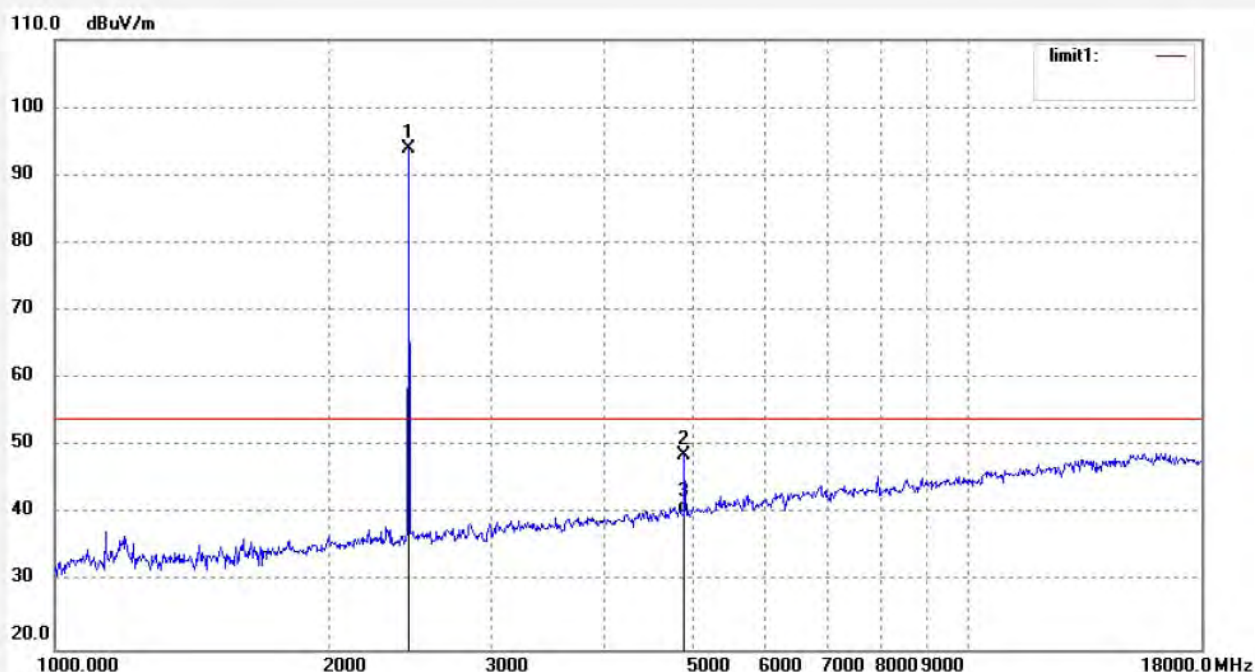
Date: 19/04/01/

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	92.87	1.06	93.93	/	/	peak			
2	4882.028	40.62	8.11	48.73	74.00	-25.27	peak			
3	4882.028	32.03	8.11	40.14	54.00	-13.86	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 #780

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2441MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Vertical

Power Source: DC 3.7V

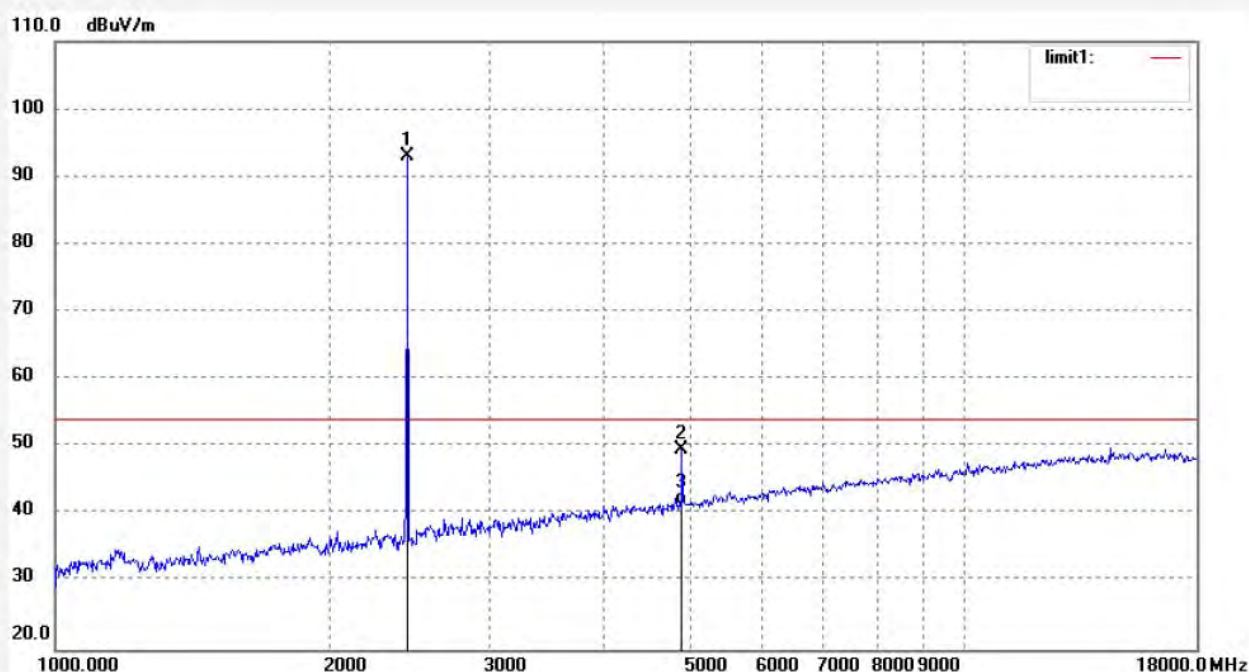
Date: 19/04/01/

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	91.96	1.06	93.02	/	/	peak			
2	4882.025	41.38	8.11	49.49	74.00	-24.51	peak			
3	4882.025	33.45	8.11	41.56	54.00	-12.44	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 #782

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2480MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Horizontal

Power Source: DC 3.7V

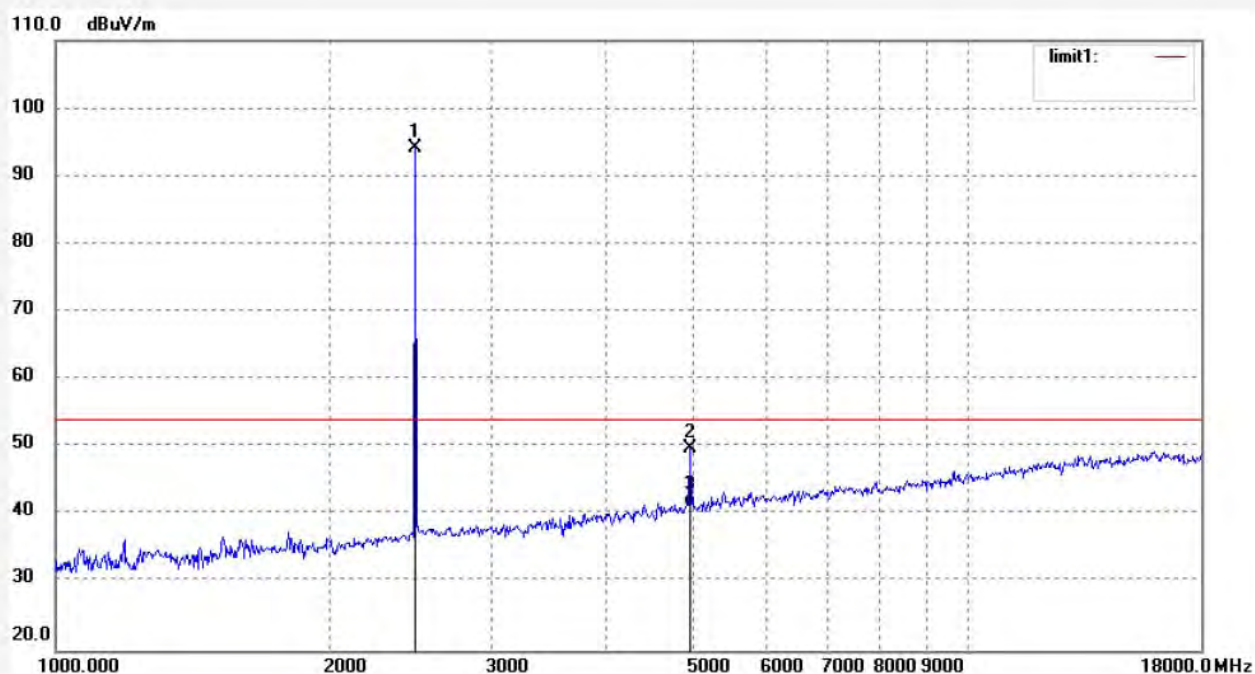
Date: 19/04/01/

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	93.08	1.10	94.18	/	/	peak			
2	4960.028	41.26	8.60	49.86	74.00	-24.14	peak			
3	4960.028	32.67	8.60	41.27	54.00	-12.73	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 #781

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2480MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Vertical

Power Source: DC 3.7V

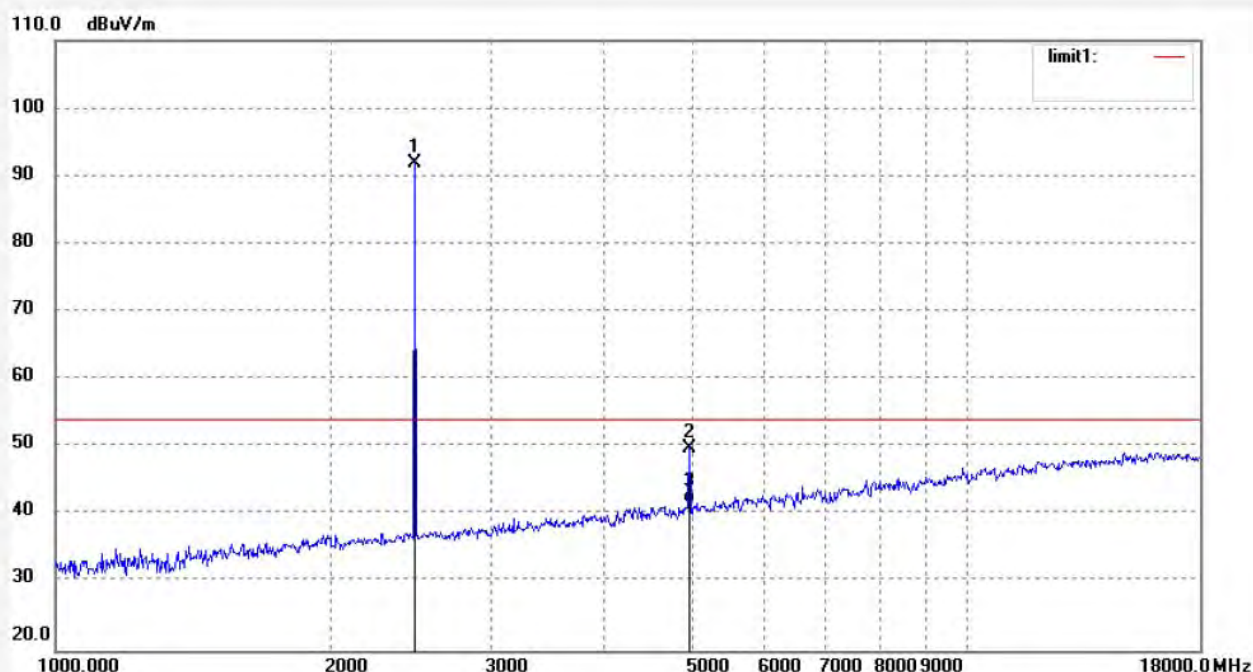
Date: 19/04/01/

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	90.76	1.10	91.86	/	/	peak			
2	4960.029	41.21	8.60	49.81	74.00	-24.19	peak			
3	4960.029	33.08	8.60	41.68	54.00	-12.32	AVG			

18GHz-26.5GHz test data



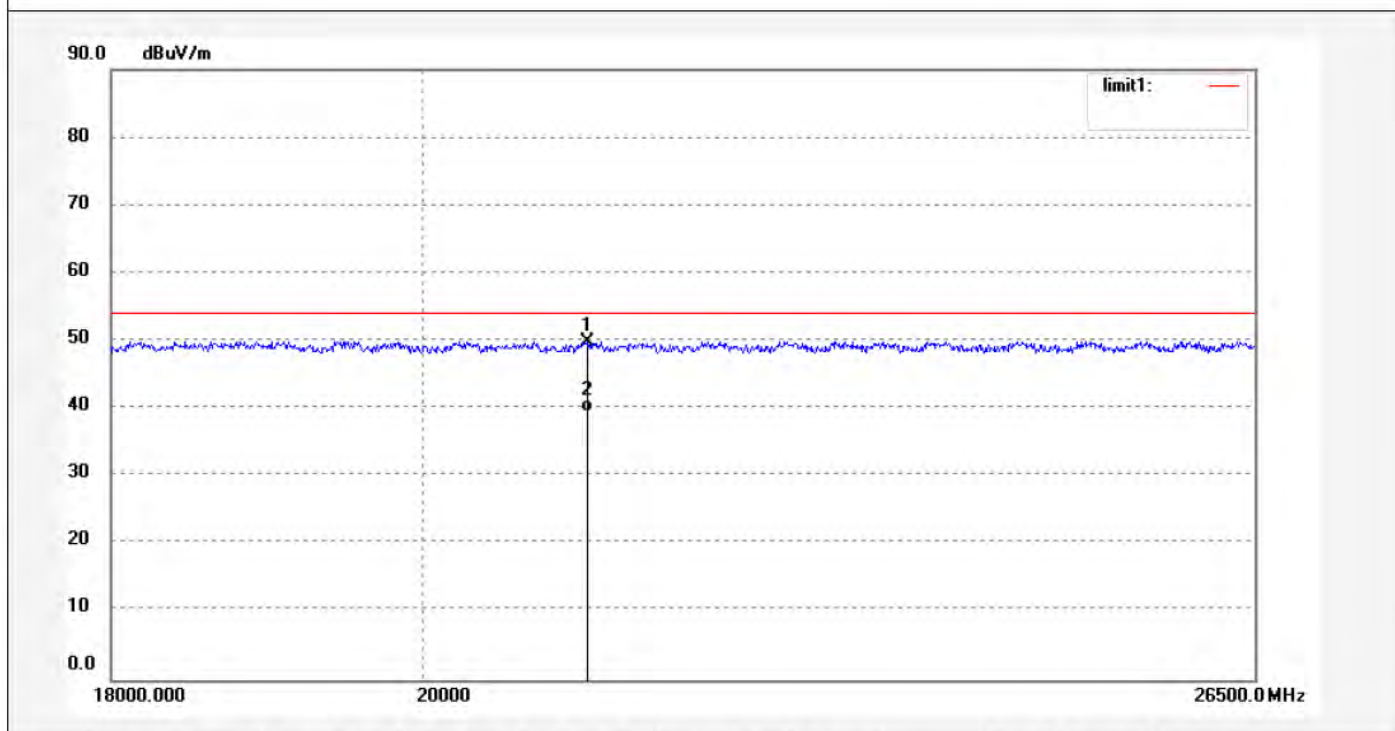
ACCURATE TECHNOLOGY CO., LTD.

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 #786	Polarization: Horizontal
Standard: FCC Part 15C 3M Radiated	Power Source: DC 3.7V
Test item: Radiation Test	Date: 19/04/01/
Temp.(C)/Hum.(%) 23 C / 48 %	Time:
EUT: Revvez Bone Conduction Sunglasses	Engineer Signature: WADE
Mode: TX 2402MHz	Distance: 3m
Model: OS100	
Manufacturer: AfterShokz LLC	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	21150.342	18.44	31.37	49.81	74.00	-24.19	peak			
2	21150.342	8.17	31.37	39.54	54.00	-14.46	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 #785

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2402MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Vertical

Power Source: DC 3.7V

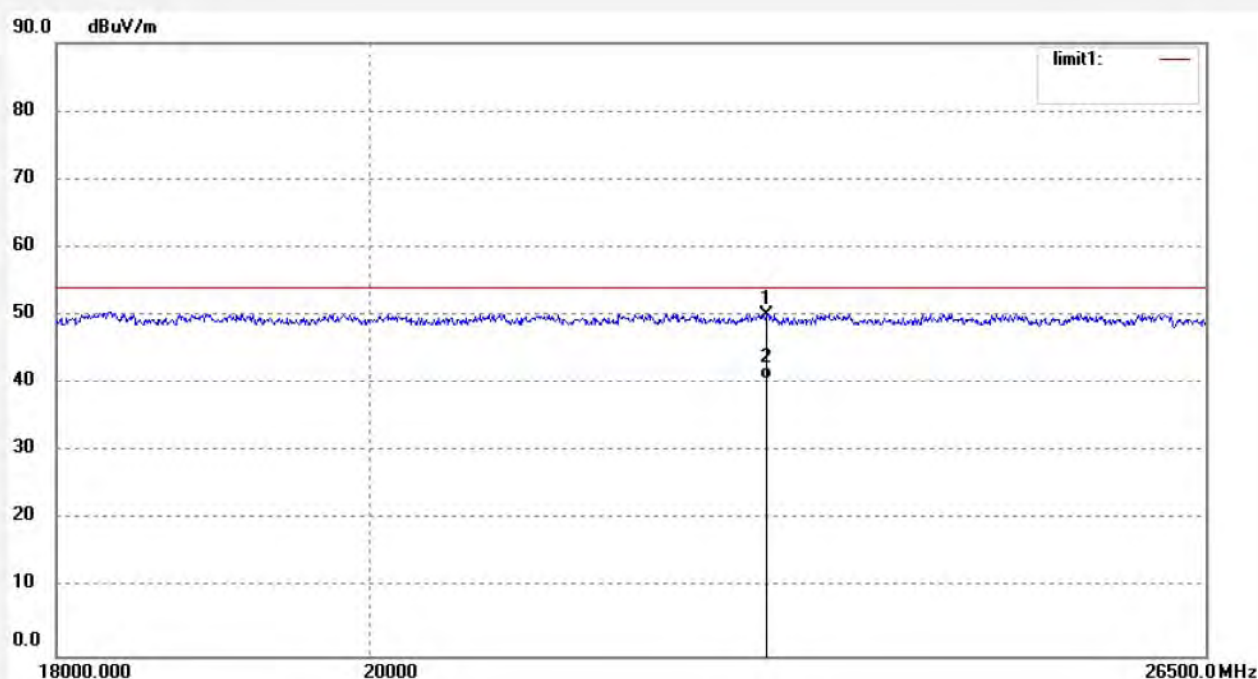
Date: 19/04/01/

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	22860.201	17.75	32.33	50.08	74.00	-23.92	peak			
2	22860.201	8.24	32.33	40.57	54.00	-13.43	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 #787

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2441MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Horizontal

Power Source: DC 3.7V

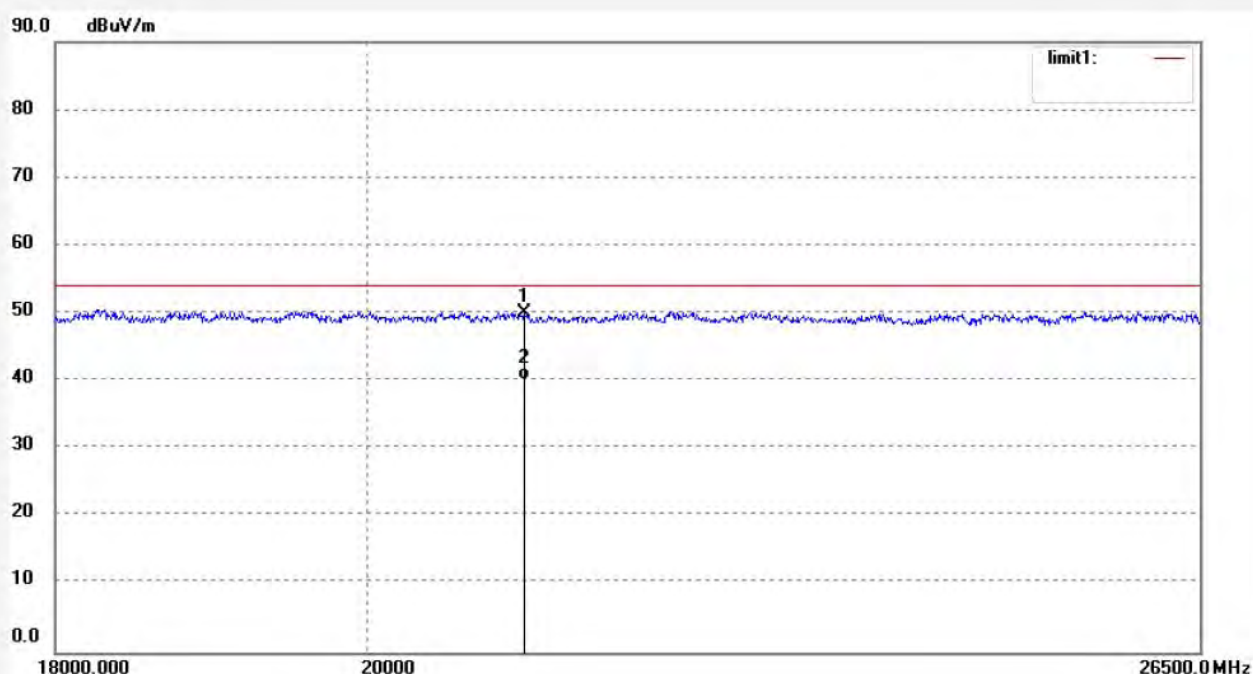
Date: 19/04/01/

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	21093.157	18.68	31.37	50.05	74.00	-23.95	peak			
2	21093.157	8.87	31.37	40.24	54.00	-13.76	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 #788

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2441MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Vertical

Power Source: DC 3.7V

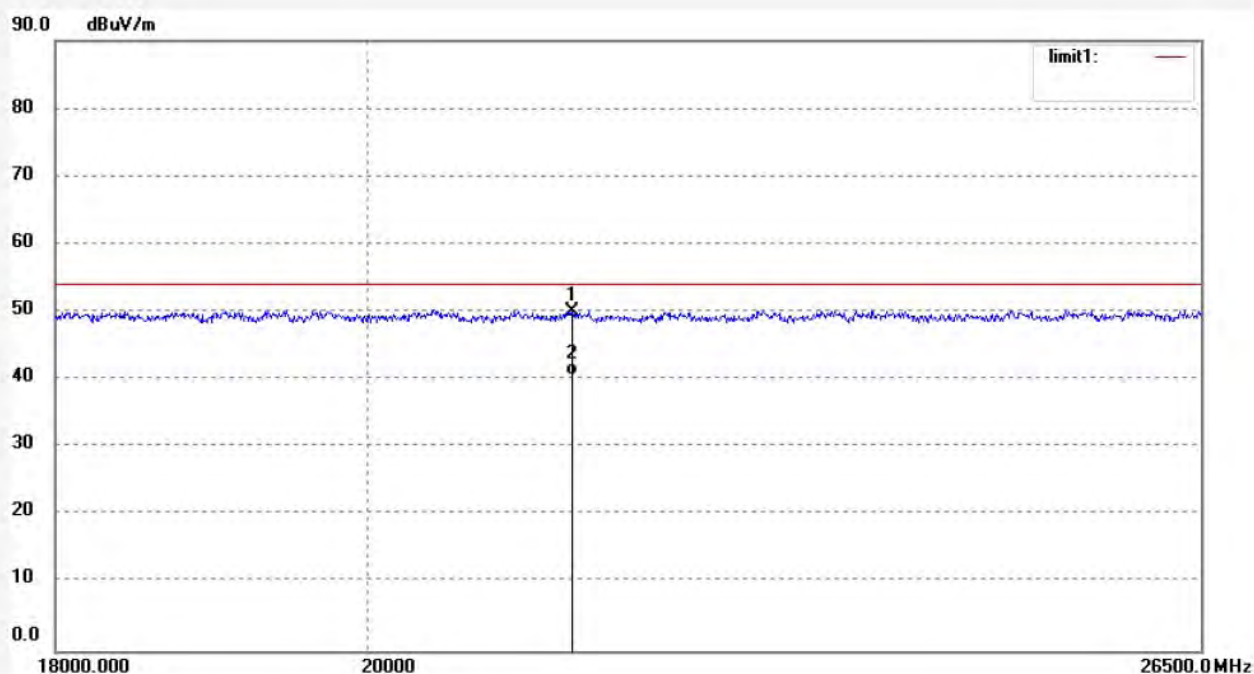
Date: 19/04/01/

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	21430.312	17.85	32.17	50.02	74.00	-23.98	peak			
2	21430.312	8.40	32.17	40.57	54.00	-13.43	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 #790

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2480MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Horizontal

Power Source: DC 3.7V

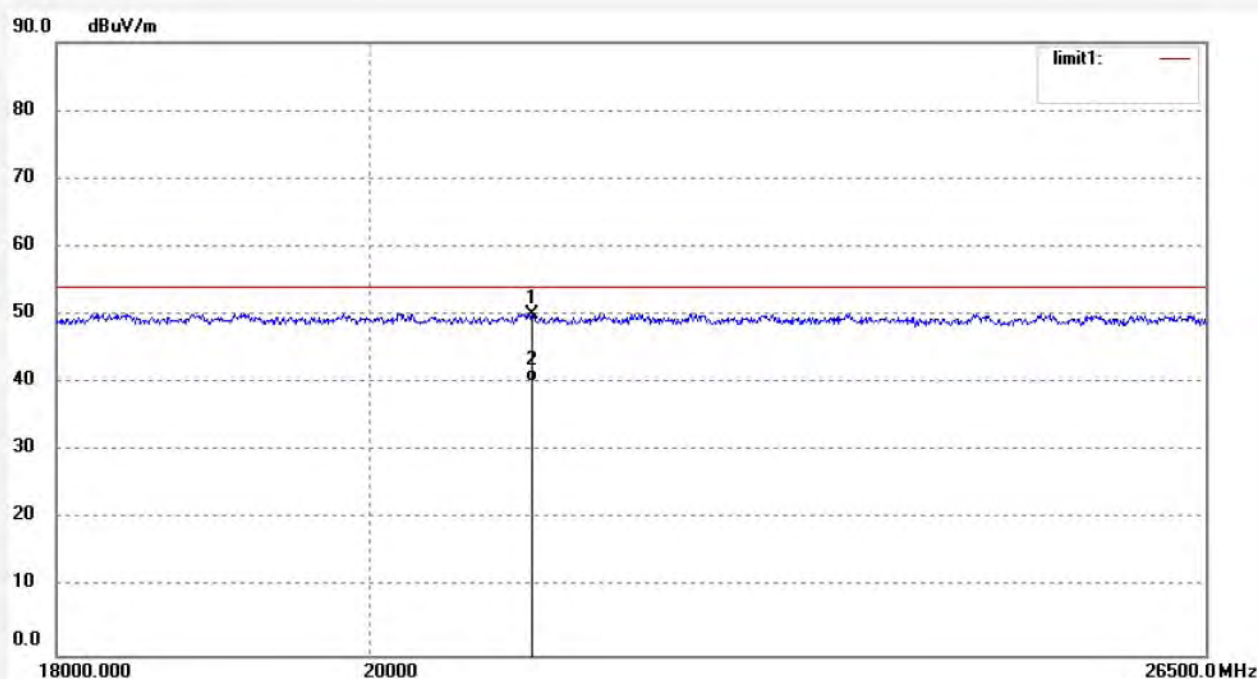
Date: 19/04/01/

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	21125.815	18.78	31.37	50.15	74.00	-23.85	peak			
2	21125.815	8.87	31.37	40.24	54.00	-13.76	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 #789

Standard: FCC Part 15C 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2480MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Vertical

Power Source: DC 3.7V

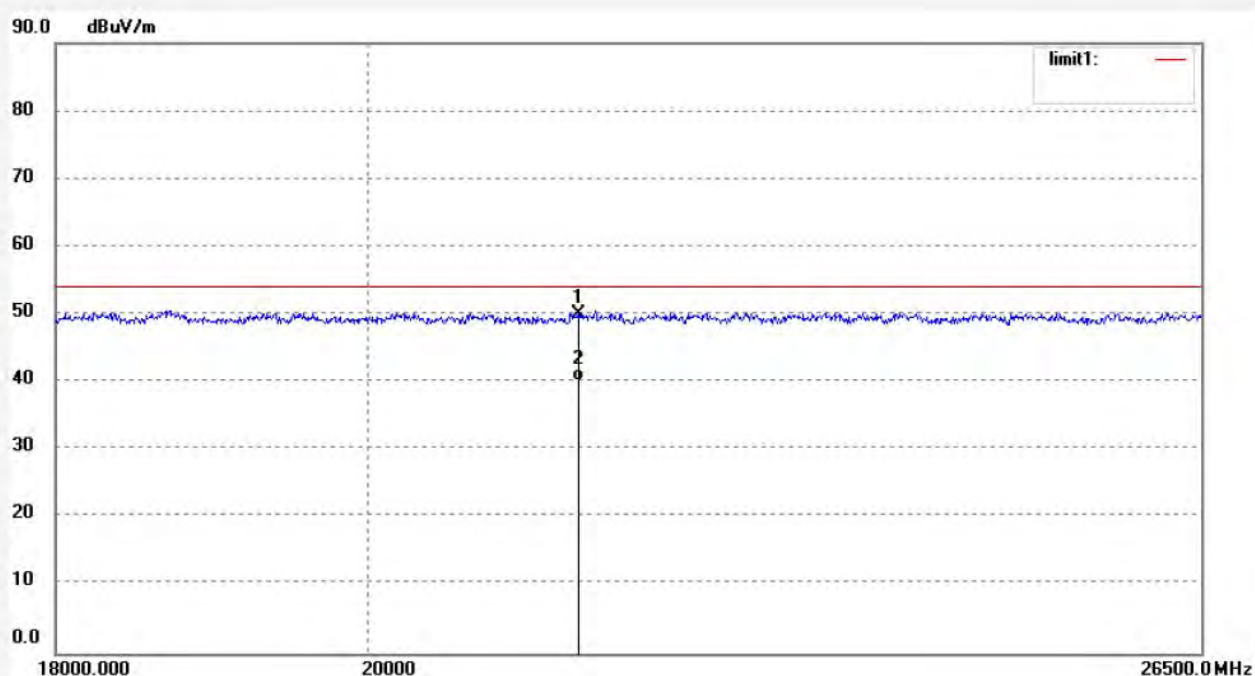
Date: 19/04/01/

Time:

Engineer Signature: WADE

Distance: 3m

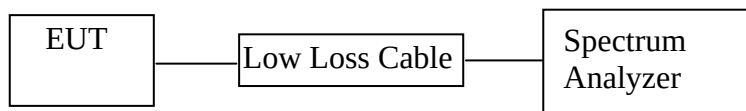
Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	21480.102	17.89	32.15	50.04	74.00	-23.96	peak			
2	21480.102	8.02	32.15	40.17	54.00	-13.83	AVG			

12.BAND EDGE COMPLIANCE TEST

12.1.Block Diagram of Test Setup



12.2.The Requirement For 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).

12.3.The Requirement For RSS-247 Section 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

12.4.EUT Configuration on Test

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.

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 TX (Hopping off, Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2480MHz TX frequency to transmit.

12.6.Test Procedure

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

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

12.6.3.The band edges was measured and recorded.

12.7.Test Result

Conducted Band Edge Result

Non-hopping mode

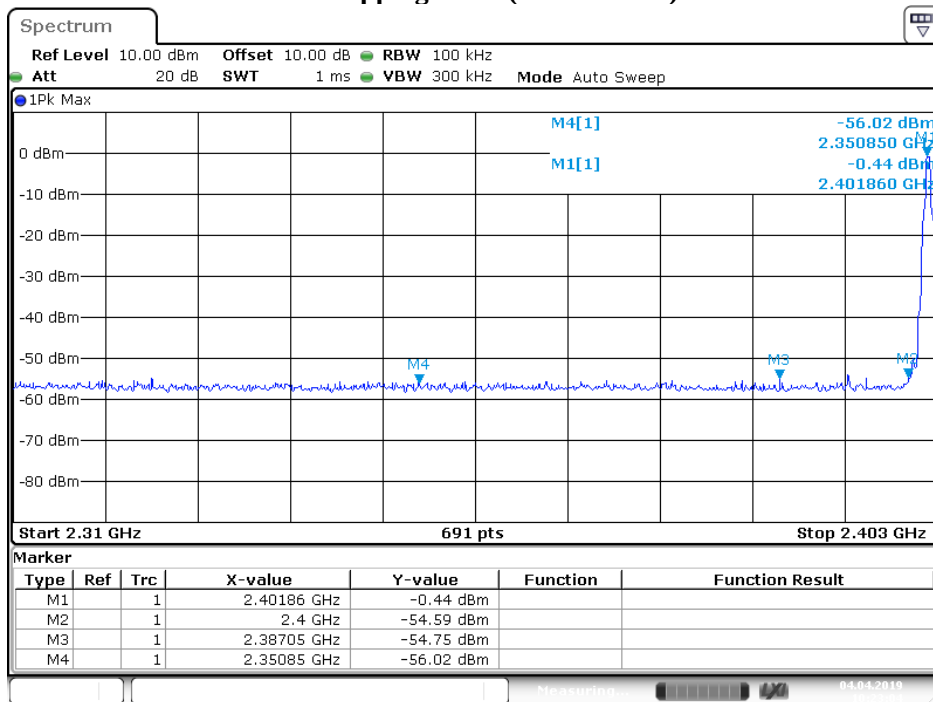
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)	Result
GFSK mode			
2400.00	54.15	> 20dBc	Pass
2487.98	53.31	> 20dBc	Pass
8DPSK mode			
2400.00	53.98	> 20dBc	Pass
2483.50	50.31	> 20dBc	Pass

Hopping mode

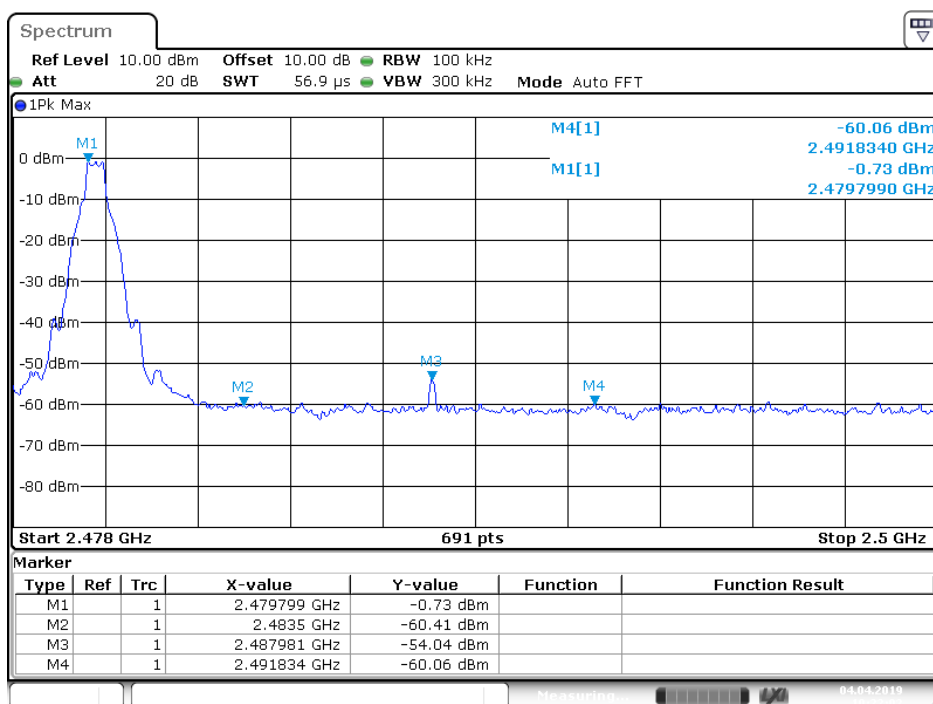
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)	Result
GFSK mode			
2360.80	53.96	> 20dBc	Pass
2486.94	57.84	> 20dBc	Pass
8DPSK mode			
2365.61	54.59	> 20dBc	Pass
2483.50	56.49	> 20dBc	Pass

The spectrum analyzer plots are attached as below.

Non-hopping mode (GFSK Mode)

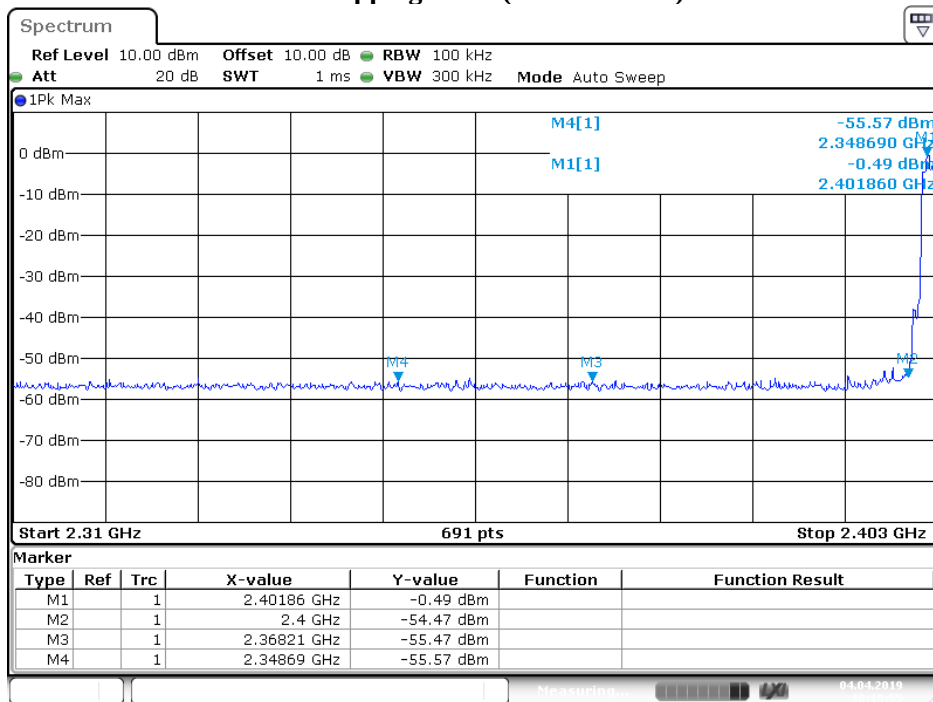


Date: 4.APR.2019 10:23:04

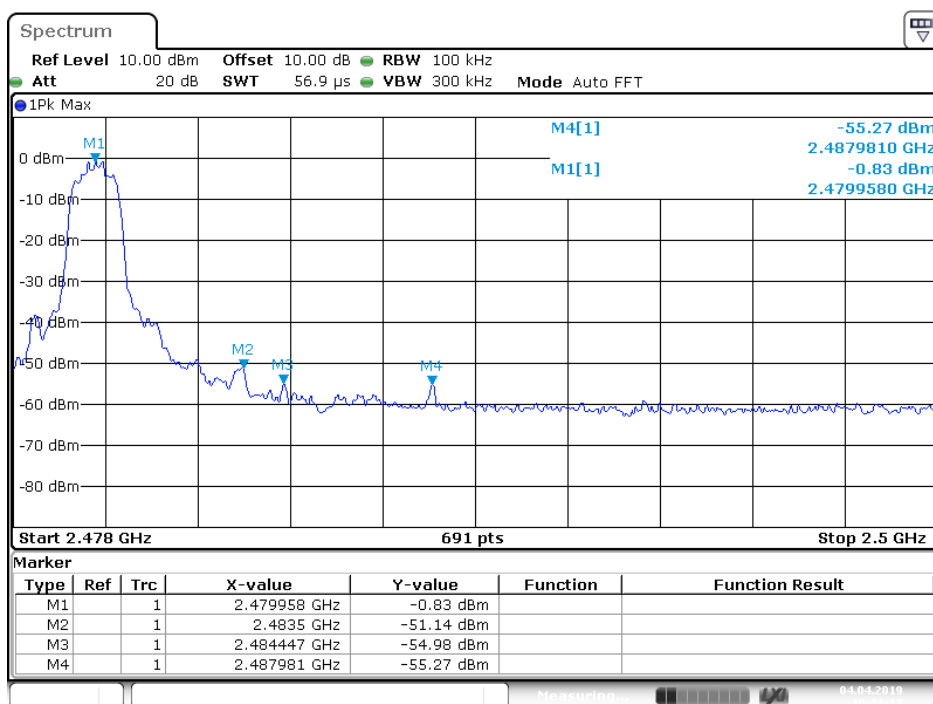


Date: 4.APR.2019 10:22:03

Non-hopping mode (8DPSK Mode)

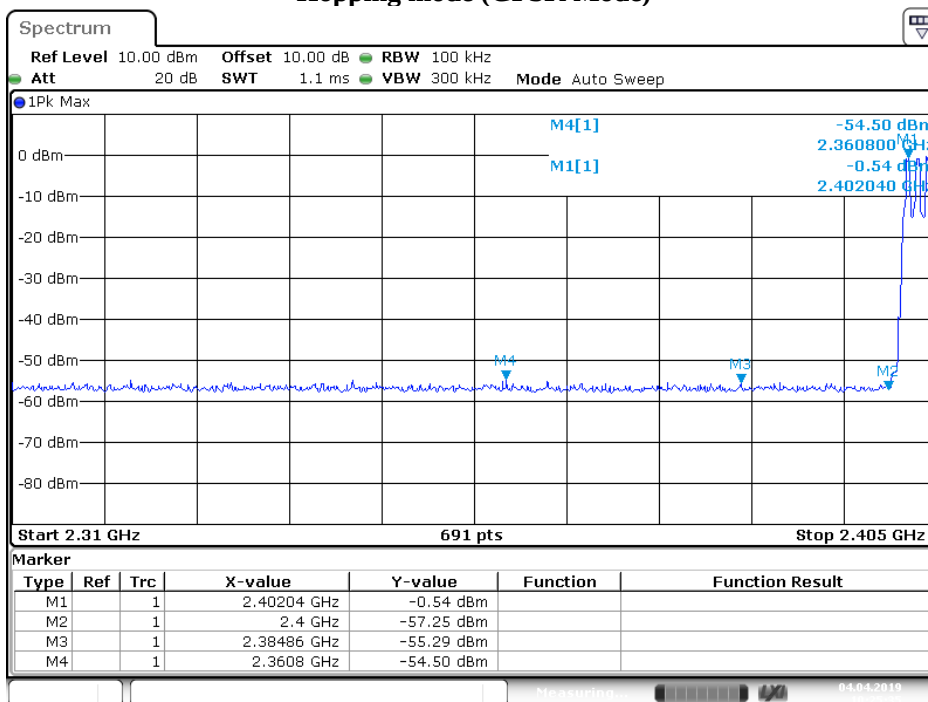


Date: 4.APR.2019 10:19:55

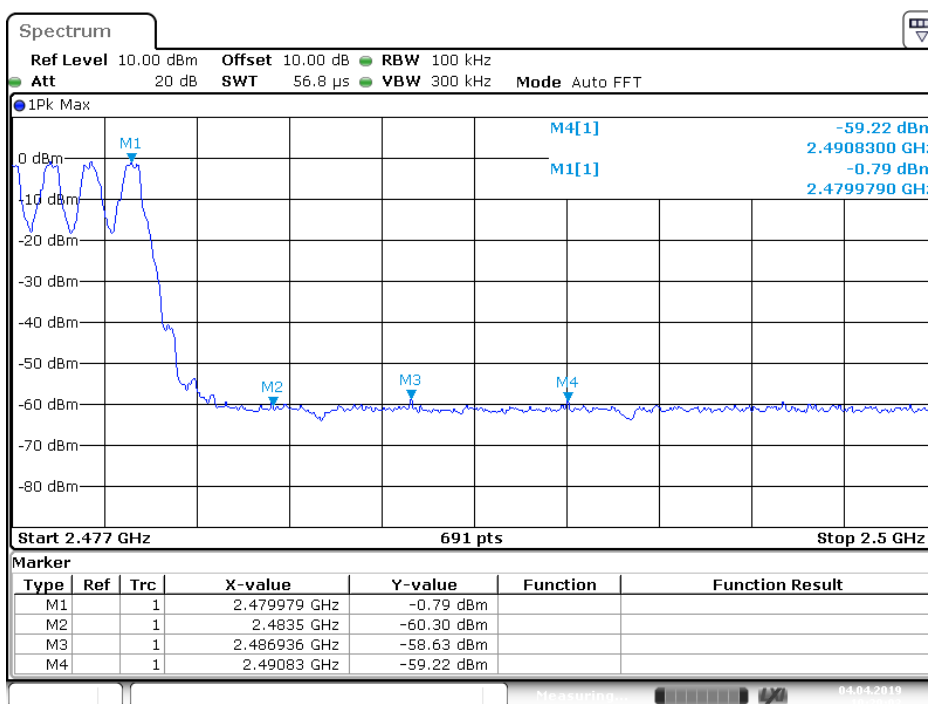


Date: 4.APR.2019 10:21:17

Hopping mode (GFSK Mode)

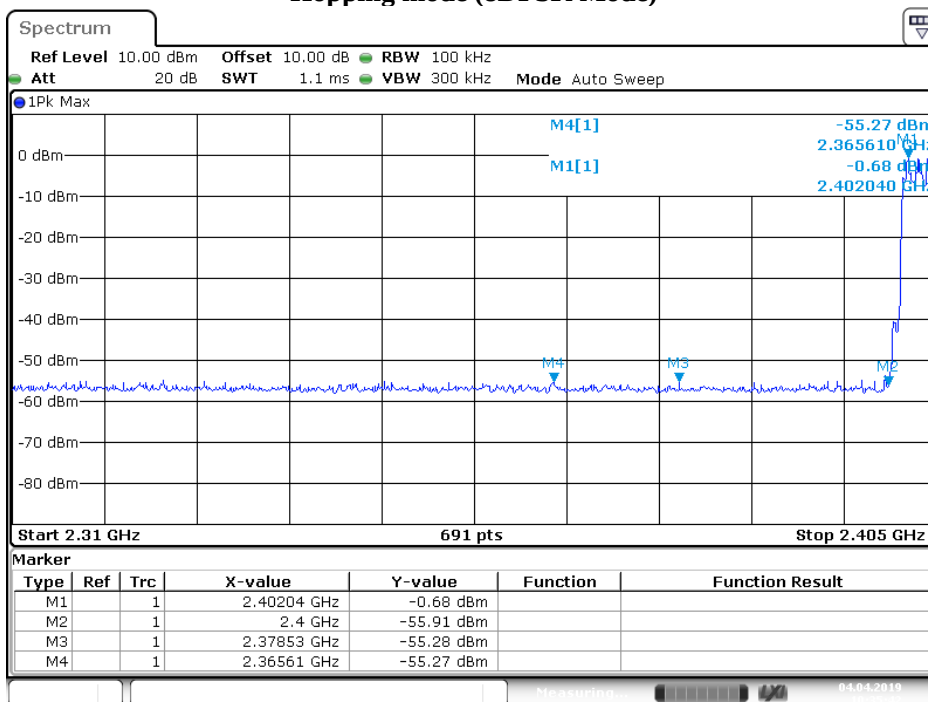


Date: 4.APR.2019 10:25:35

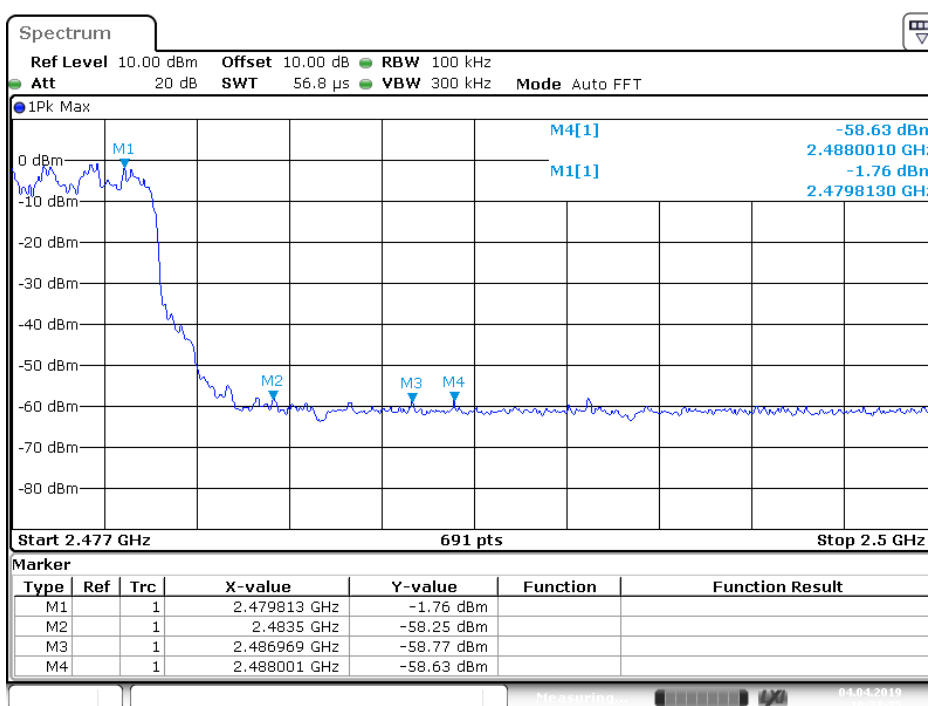


Date: 4.APR.2019 10:29:04

Hopping mode (8DPSK Mode)



Date: 4.APR.2019 10:35:43



Date: 4.APR.2019 10:31:26

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. 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 (8DPSK mode) emissions are reported.

The spectrum analyzer plots are attached as below.



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 #778

Standard: FCC (Band Edge)

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2402MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Horizontal

Power Source: DC 3.7V

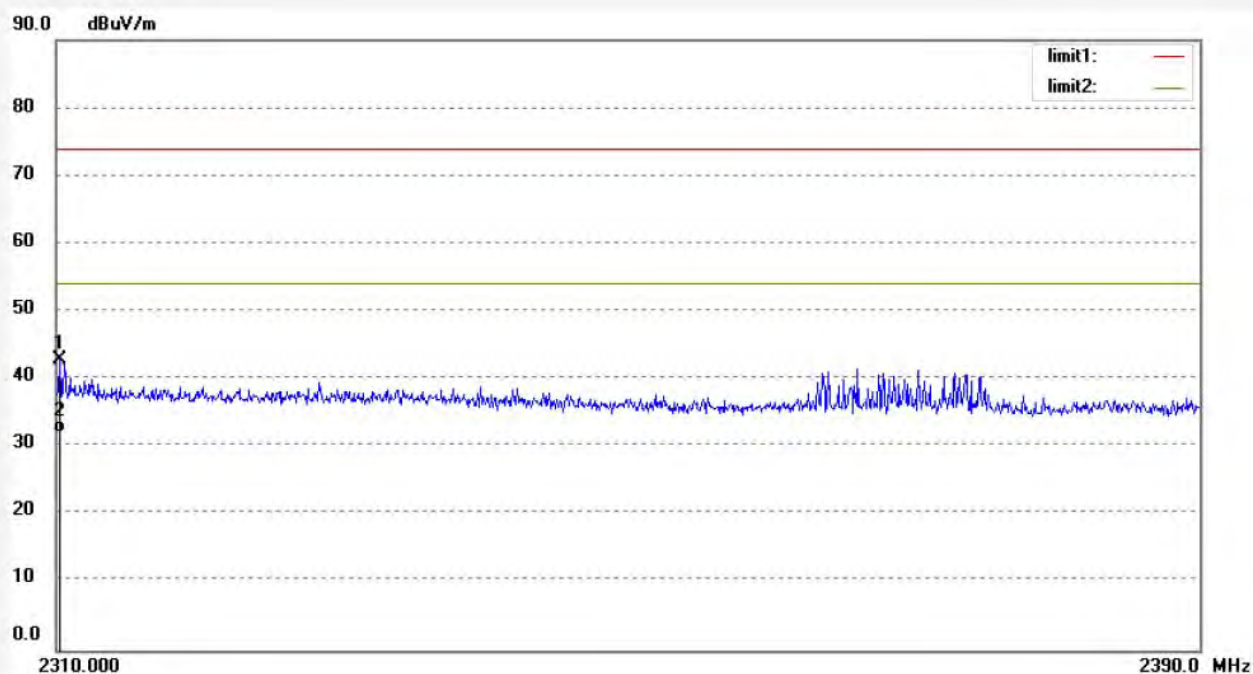
Date: 19/04/01/

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	2310.240	42.46	0.47	42.93	74.00	-31.07	peak			
2	2310.240	31.70	0.47	32.17	54.00	-21.83	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 #777

Standard: FCC (Band Edge)

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2402MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Vertical

Power Source: DC 3.7V

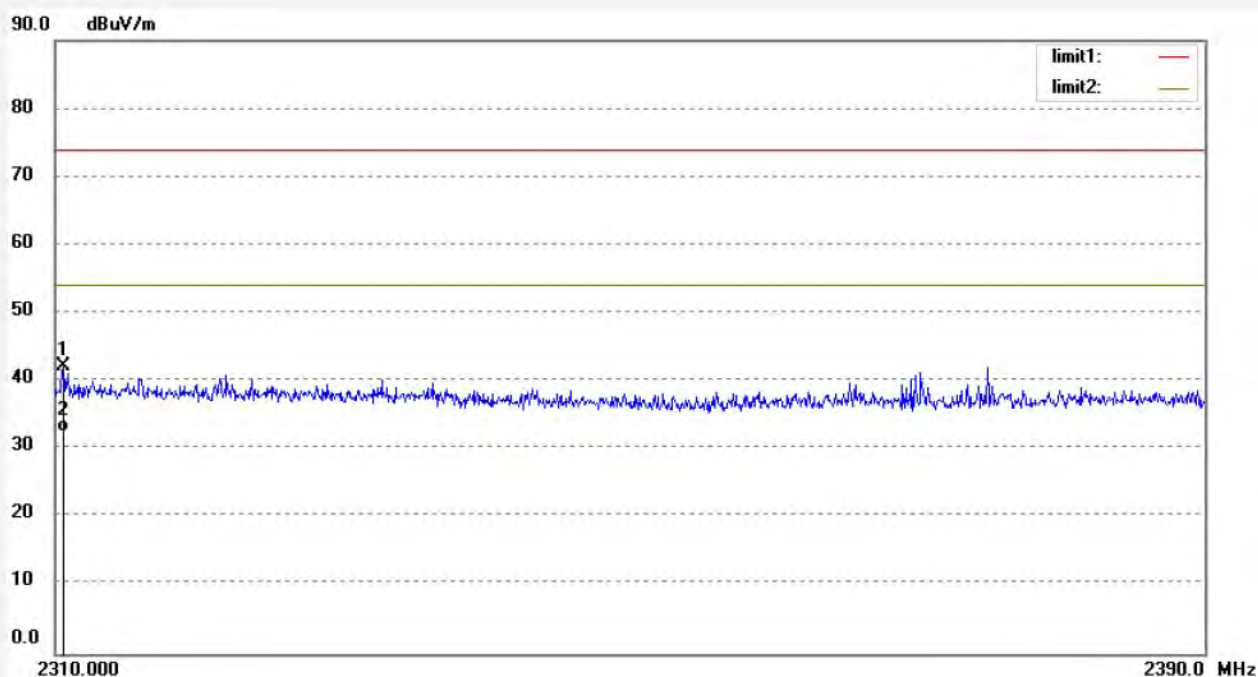
Date: 19/04/01/

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	2310.560	41.63	0.47	42.10	74.00	-31.90	peak			
2	2310.560	32.07	0.47	32.54	54.00	-21.46	AVG			



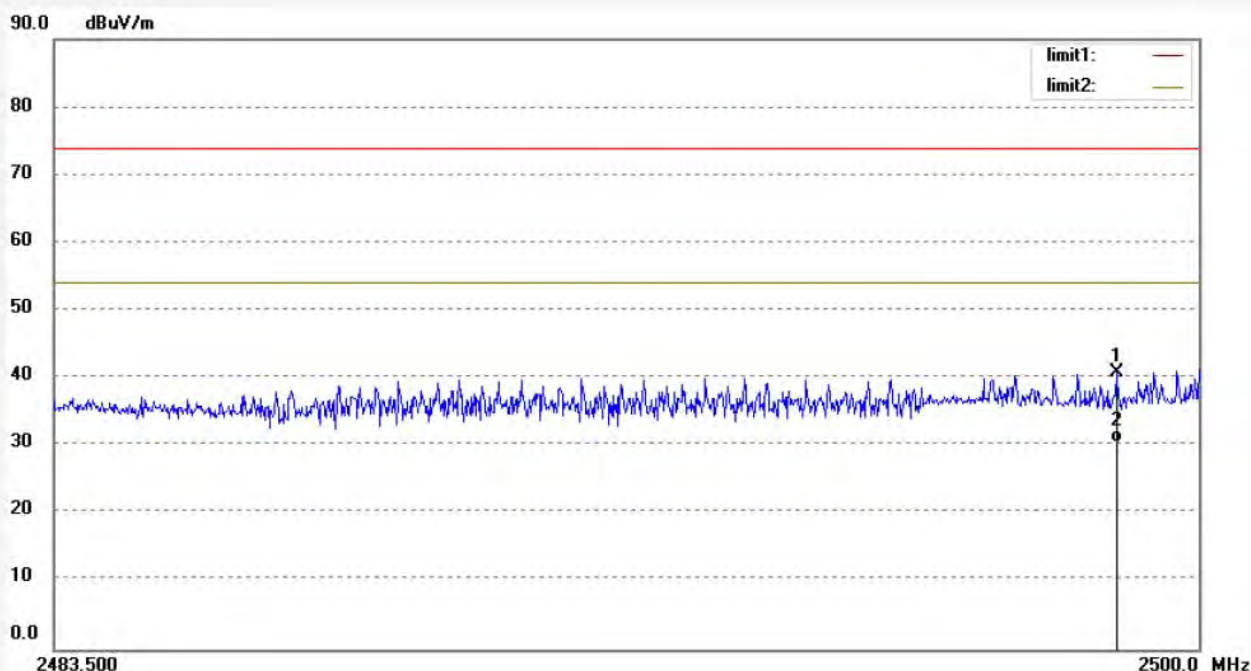
ACCURATE TECHNOLOGY CO., LTD.

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 #783	Polarization: Horizontal
Standard: FCC (Band Edge)	Power Source: DC 3.7V
Test item: Radiation Test	Date: 19/04/01/
Temp.(C)/Hum.(%) 23 C / 48 %	Time:
EUT: Revvez Bone Conduction Sunglasses	Engineer Signature: WADE
Mode: TX 2480MHz	Distance: 3m
Model: OS100	
Manufacturer: AfterShokz LLC	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2498.812	39.79	1.10	40.89	74.00	-33.11	peak			
2	2498.812	29.47	1.10	30.57	54.00	-23.43	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 #784

Standard: FCC (Band Edge)

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: Revvez Bone Conduction Sunglasses

Mode: TX 2480MHz

Model: OS100

Manufacturer: AfterShokz LLC

Polarization: Vertical

Power Source: DC 3.7V

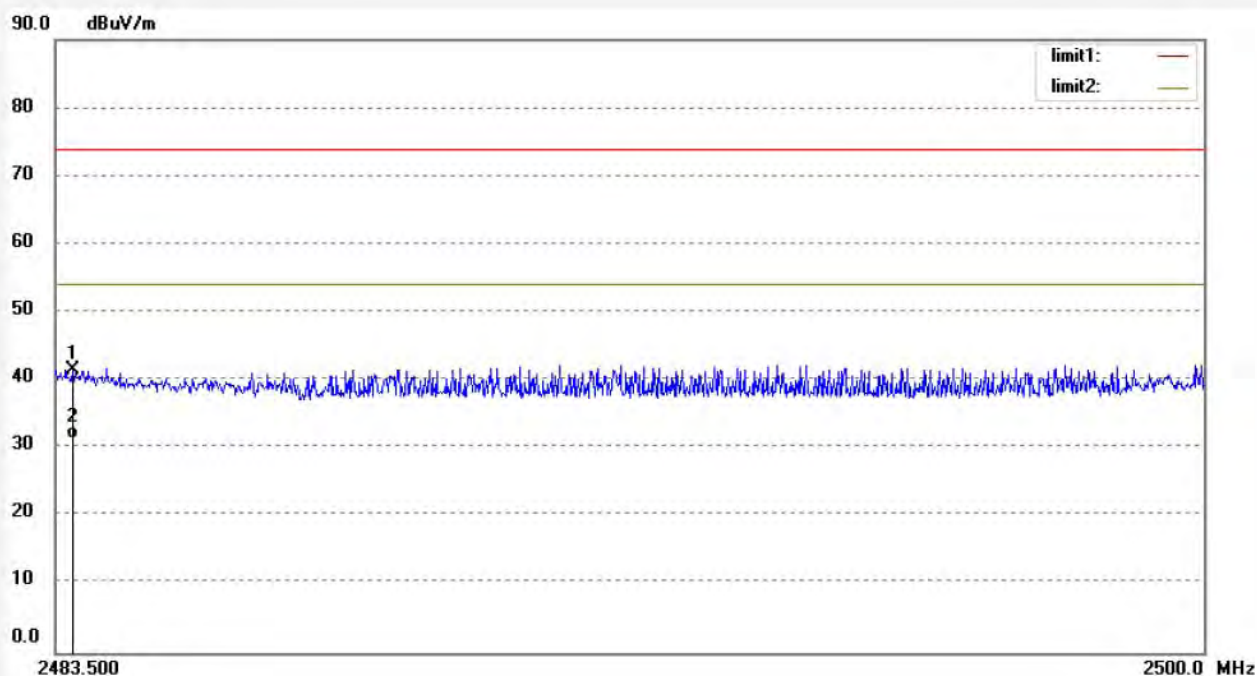
Date: 19/04/01/

Time:

Engineer Signature: WADE

Distance: 3m

Note:

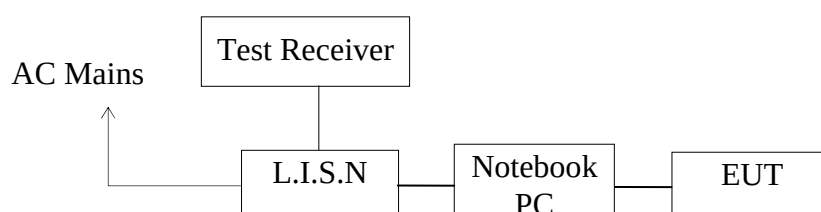


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.747	40.43	1.10	41.53	74.00	-32.47	peak			
2	2483.747	30.36	1.10	31.46	54.00	-22.54	AVG			

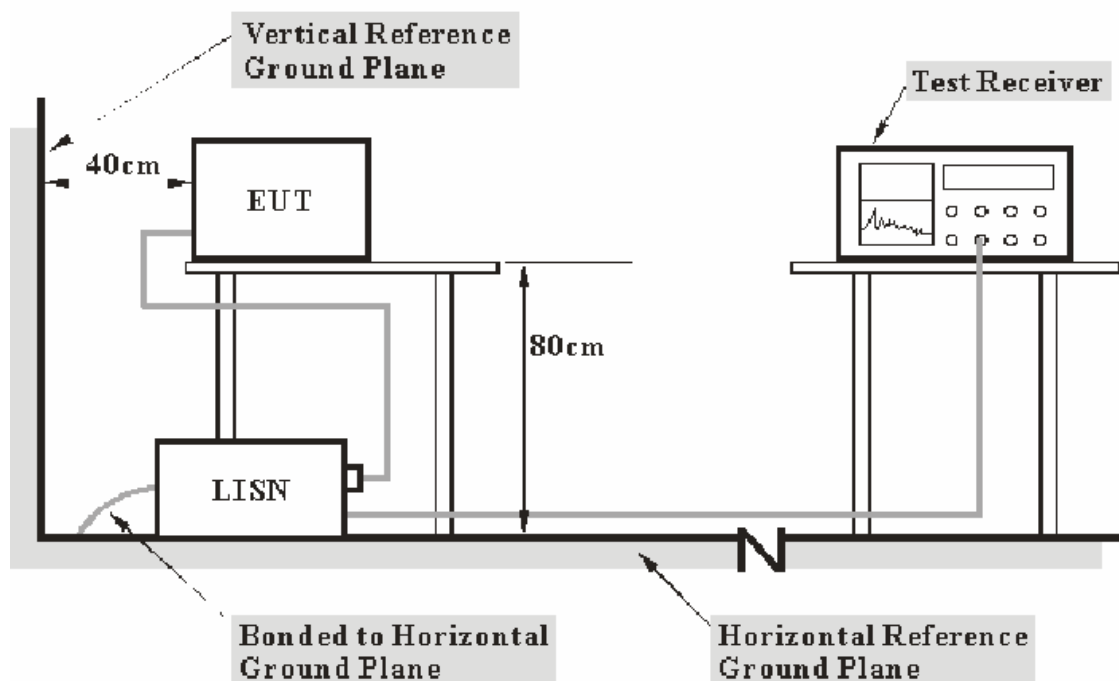
13.AC POWER LINE CONDUCTED EMISSION TEST

13.1.Block Diagram of Test Setup

13.1.1.Block diagram of connection between the EUT and simulators



13.1.2.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.

13.2.Power Line Conducted Emission Test Limits

Frequency (MHz)	Conducted 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.		

13.3.EUT Configuration on Test

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.

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 test mode and measure it.

13.5.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.

13.6.Data Sample

Frequency (MHz)	Transducer value (dB)	QuasiPeak Level (dBμV)	Average Level (dBμV)	QuasiPeak Limit (dBμV)	Average Limit (dBμV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XX	10.6	25.3	17.0	59.0	49.0	33.4	31.7	Pass

Frequency(MHz) = Emission frequency in MHz

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

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

Limit (dBμV) = Limit stated in standard

Margin = Limit (dBμV) - Level (dBμV)

Calculation Formula:

Margin = Limit (dBμV) - Level (dBμV)

13.7.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.

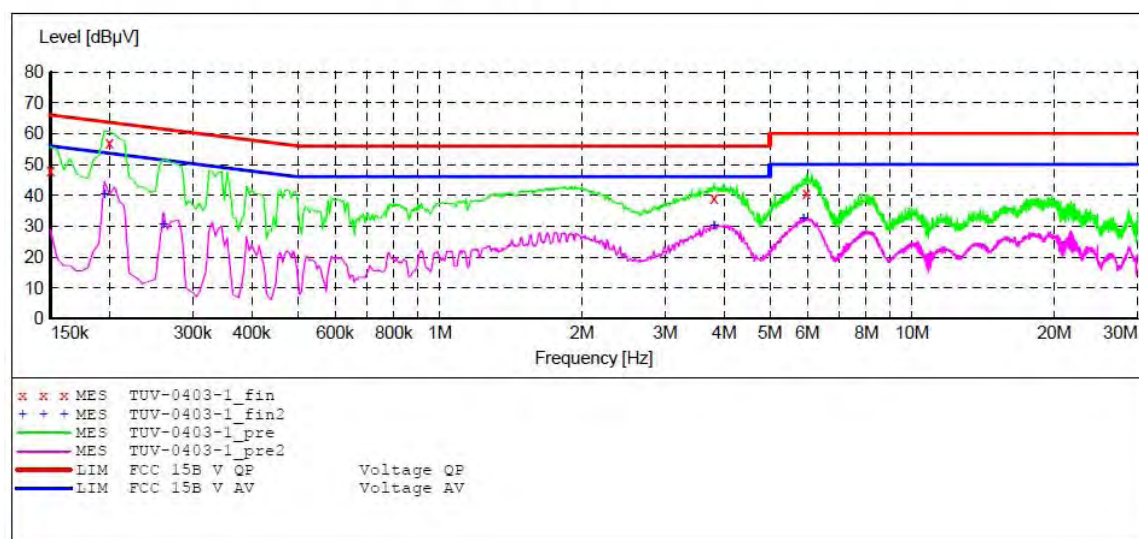
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Revvez Bone Conduction Sunglasses M/N:OS100
 Manufacturer: AfterShokz LLC
 Operating Condition: BT Communication
 Test Site: 1#Shielding Room
 Operator: WADE
 Test Specification: L 120V/60Hz
 Comment: Mains port
 Start of Test: 4/3/2019 /

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

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



MEASUREMENT RESULT: "TUV-0403-1_fin"

4/3/2019

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	48.00	10.5	66	18.0	QP	L1	GND
0.200000	56.90	10.5	64	6.7	QP	L1	GND
3.810000	38.90	11.1	56	17.1	QP	L1	GND
5.970000	40.60	11.2	60	19.4	QP	L1	GND

MEASUREMENT RESULT: "TUV-0403-1_fin2"

4/3/2019

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.195000	40.10	10.5	54	13.7	AV	L1	GND
0.260000	30.60	10.6	51	20.8	AV	L1	GND
3.810000	30.10	11.1	46	15.9	AV	L1	GND
5.890000	32.40	11.2	50	17.6	AV	L1	GND

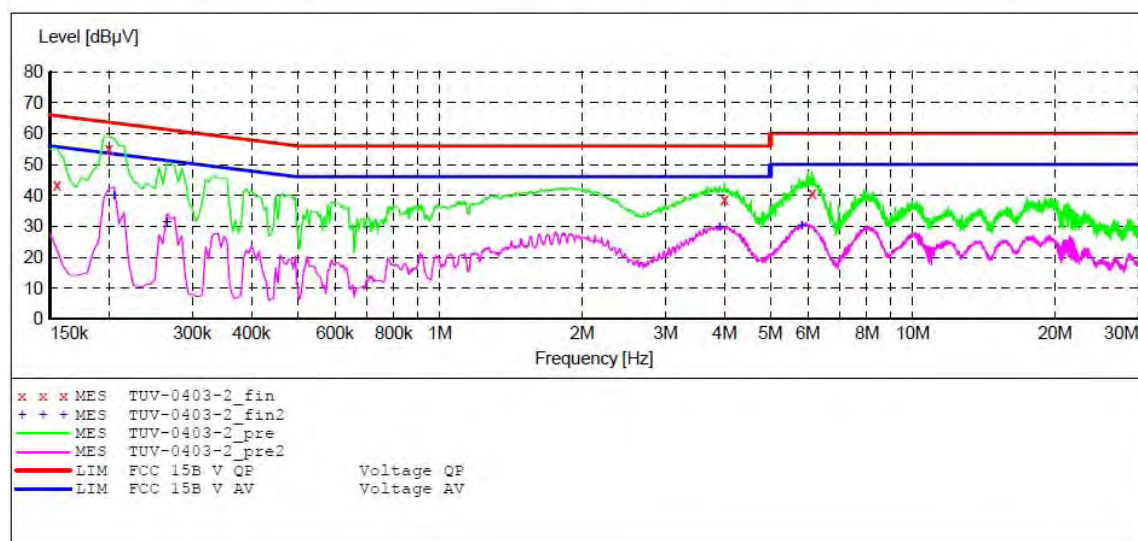
ACCURATE TECHNOLOGY CO.,LTD

CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Revvez Bone Conduction Sunglasses M/N:OS100
 Manufacturer: AfterShokz LLC
 Operating Condition: BT Communication
 Test Site: 1#Shielding Room
 Operator: WADE
 Test Specification: N 120V/60Hz
 Comment: Mains port
 Start of Test: 4/3/2019 /

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

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



MEASUREMENT RESULT: "TUV-0403-2_fin"

4/3/2019

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.155000	43.40	10.5	66	22.3	QP	N	GND
0.200000	55.20	10.5	64	8.4	QP	N	GND
4.000000	38.80	11.1	56	17.2	QP	N	GND
6.130000	40.80	11.2	60	19.2	QP	N	GND

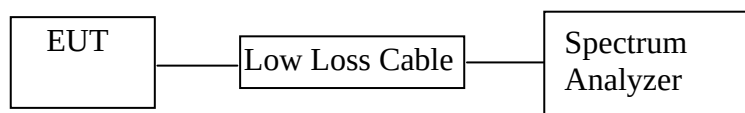
MEASUREMENT RESULT: "TUV-0403-2_fin2"

4/3/2019

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.205000	39.90	10.5	53	13.5	AV	N	GND
0.265000	31.20	10.6	51	20.1	AV	N	GND
3.910000	29.70	11.1	46	16.3	AV	N	GND
5.830000	30.20	11.2	50	19.8	AV	N	GND

14. CONDUCTED SPURIOUS EMISSION COMPLIANCE TEST

14.1. Block Diagram of Test Setup



14.2. The Requirement For 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).

14.3. The Requirement for RSS-247 section 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

14.4. 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.

14.5.Operating Condition of EUT

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

14.5.2.Turn on the power of all equipment.

14.5.3.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.

14.6.Test Procedure

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

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

14.6.3.The Conducted Spurious Emission was measured and recorded.

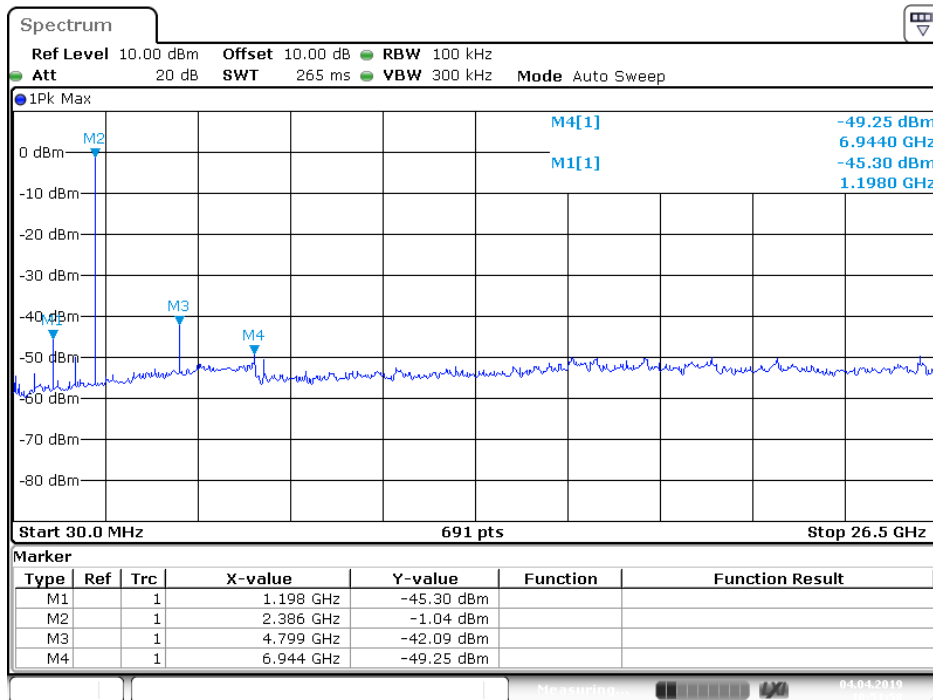
14.7.Test Result

Pass.

The spectrum analyzer plots are attached as below.

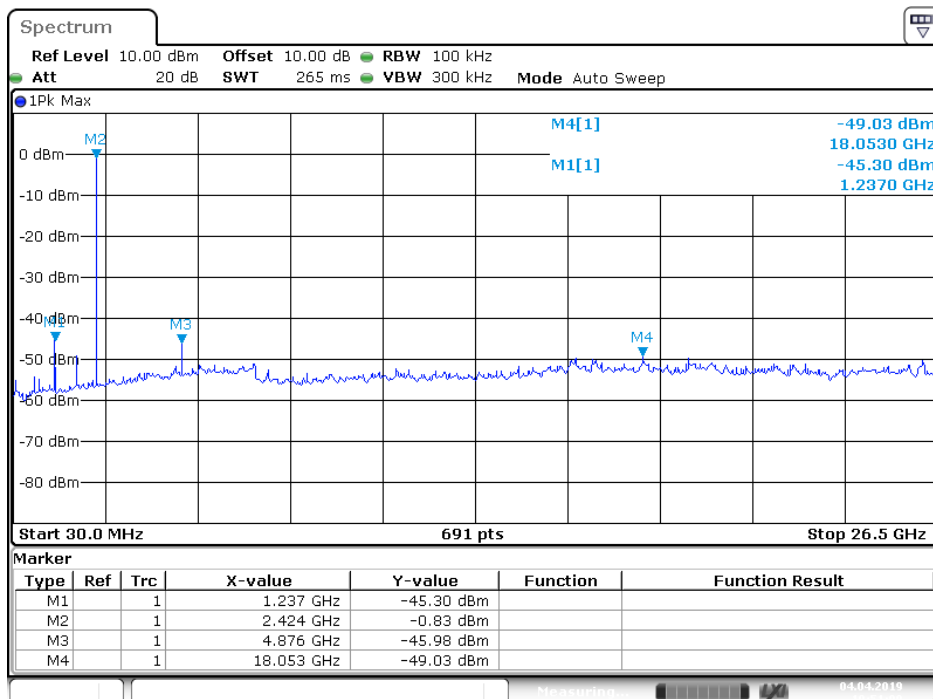
GFSK mode

Low Channel



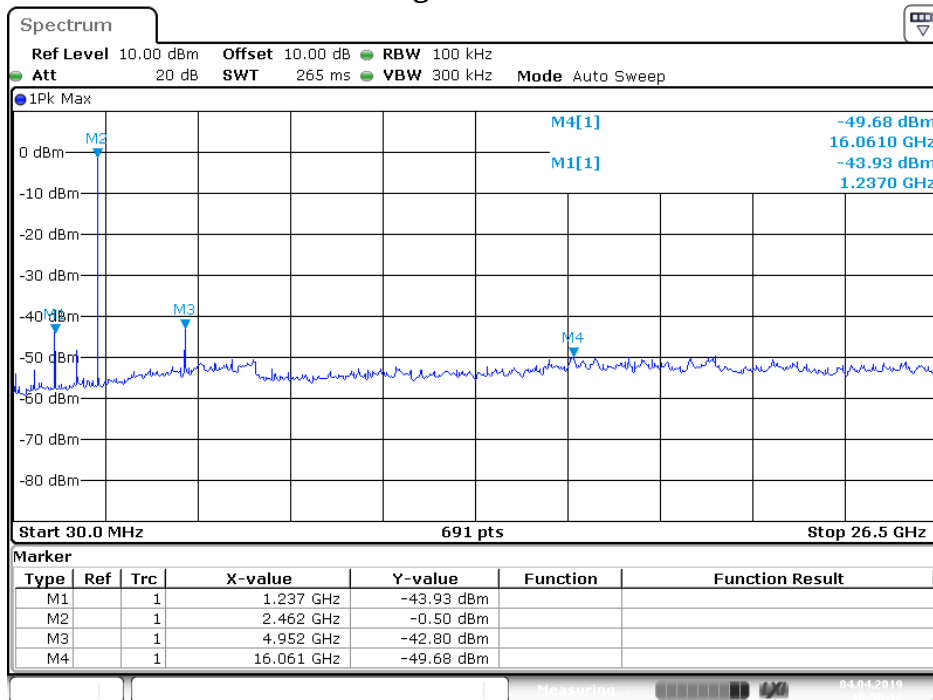
Date: 4.APR.2019 10:51:58

Middle Channel



Date: 4.APR.2019 10:51:09

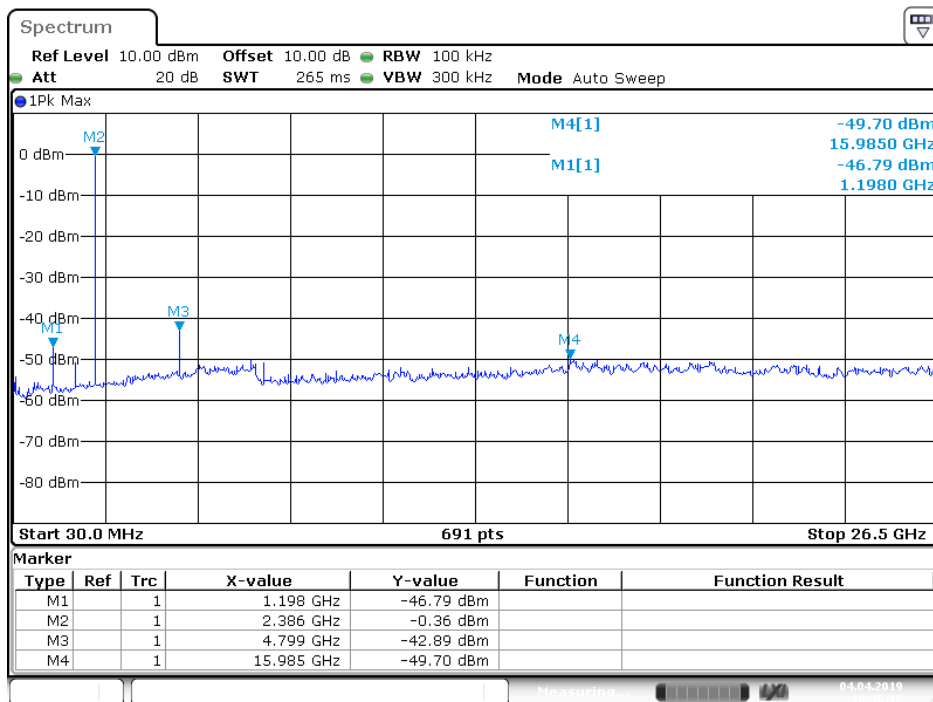
High Channel



Date: 4.APR.2019 10:50:12

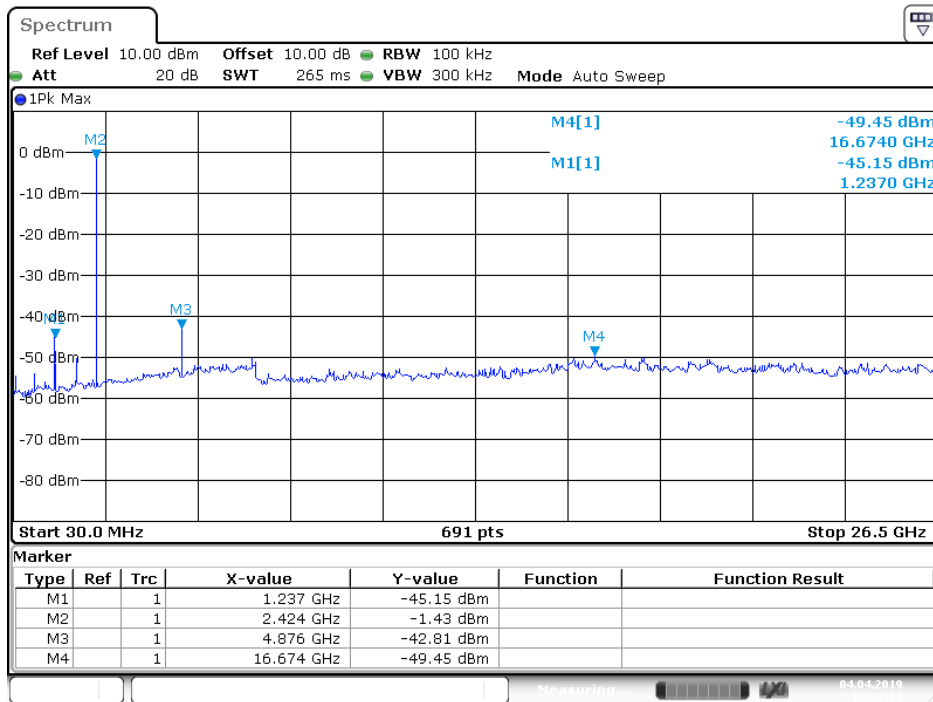
8DPSK mode

Low Channel



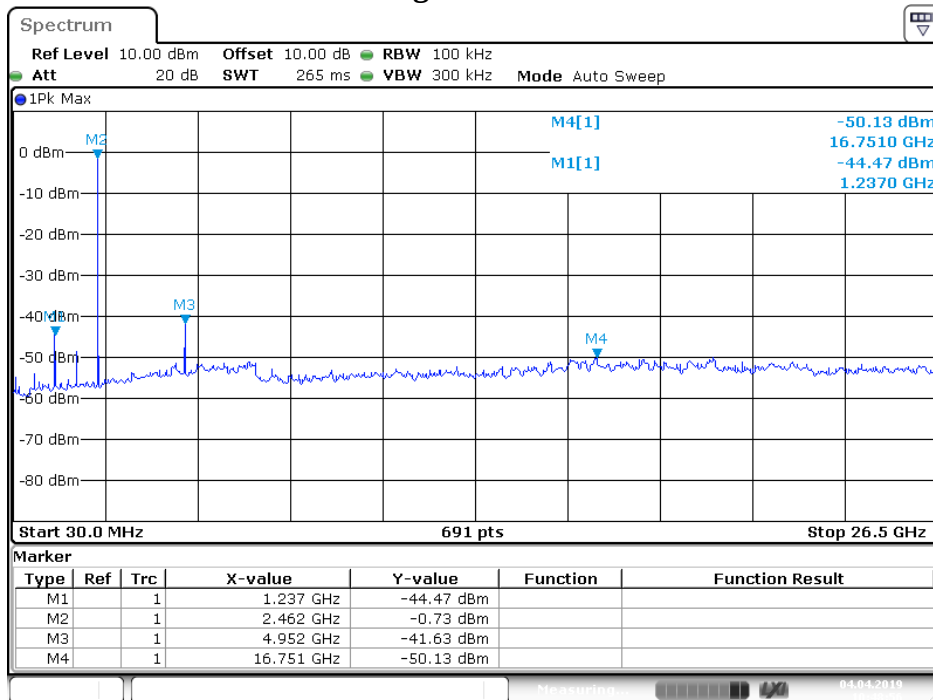
Date: 4.APR.2019 10:46:12

Middle Channel



Date: 4.APR.2019 10:47:53

High Channel



Date: 4.APR.2019 10:48:56

15.ANTENNA REQUIREMENT

15.1.The Requirement

According to Section Section 15.203 and RSS GEN 6.8, 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.

15.2.Antenna Construction

Device is equipped with permanent attached antenna, which isn't displaced by other antenna. The Max Antenna gain of EUT is 4.97dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203 and RSS GEN 6.8.

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