FCC Test Report

Part 15 subpart C

Client Information:

Applicant : Ascion, LLC

Applicant add.: 341 Central Avenue Silver Creek, NY 14136

EUT Information:

EUT Name : Reverie 4.1 Bluetooth Speaker

Model No. : AM-BT-S01

Brand Name :

FCC ID : VFK-AM-BT-S01

Prepared By:

Asia Institute Technology (Dongguan) Limited

Add. : No. 22, JinQianLing Street 3, JiTiGang Village HuangJiang Town, DongGuan, GuangDong, China.

Date of Receipt: May. 20, 2014 Date of Test: Jun. 11~17, 2014

Date of Issue: Jun. 20, 2014 Test Result: **Pass**

Test procedure used: ANSI C63.4-2009

This device described above has been tested by Asia Institute Technology (Dongguan) Limited, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

*This test report must not be used by the client to claim product endorsement by any agency of the U.S. government.

Reviewed by: Seal.Chen

Approved by: Jackie.Deng

1 Contents

2 Test Summary

2.1 Compliance with FCC Part 15 subpart C

Test	Test Requirement	Standard Paragraph	Result
Antenna Requirement	FCC Part 15 C:2013	Section 15.247(c)	**PASS**
Conduction Emissions	FCC Part 15 C:2013	Section 15.207(a)	**PASS**
Radiated Emissions	FCC Part 15 C:2013	Section 15.247(d)	**PASS**
Carrier Frequencies Separated	FCC Part 15 C:2013	Section 15.247(a)(1)	**PASS**
Hopping Channel Number	FCC Part 15 C:2013	Section 15.247(a)(1) (iii)	**PASS**
Dwell Time	FCC Part 15 C:2013	Section 15.247(a)(1) (iii)	**PASS**
Maximum Peak Output Power	FCC Part 15 C:2013	Section 15.247(b)	**PASS**
Band edge	FCC Part 15 C:2013	Section 15.247(d)	**PASS**
Conducted Spurious Emissions	FCC Part 15 C:2013	Section 15.247(d)	**PASS**
Note: Reference to the FCC Public Notice DA 00-705			

2.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, The following measurements uncertainty Levels have estimated based on ANSI C63.4:2009, the maximum value of the uncertainty as below

No.	Item	Uncertainty
1	Conducted Emission Test	1.20dB
2	Radiated Emission Test	3.30dB

3 Test Facility

The test facility is recognized, certified or accredited by the following organizations:

.CNAS- Registration No: L6177

Dongguan Yaxu (AiT) technology Limited is accredited to ISO/IEC 17025:2005 general Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the competence of testing and calibration laboratories) on Apr. 18, 2013

.FCC- Registration No: 248337

The 3m Semi-Anechoic Chamber, 3m/10m Open Area Test Site and Shielding Room of Asia Institute Technology (Dongguan) Limited have been registered by Federal Communications Commission (FCC) on Dec.19, 2012.

.Industry Canada(IC)-Registration No: IC6819A-1 & IC6819A-2

The 3m Semi-Anechoic Chamber and 3m/10m Open Area Test Site of Asia Institute Technology (Dongguan) Limited have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing on Jun. 12, 2013.

.VCCI- Registration No: 2705

The 3m/10m Open Area Test Site, Shielding Room and 3m Chamber of Asia Institute Technology (Dongguan) Limited have been registered by Voluntary Control Council for Interference on Nov. 21, 2012. The Telecommunication Ports Conducted Disturbance Measurement of Asia Institute Technology (Dongguan) Limited have been registered by Voluntary Control Council for Interference on Sep. 06, 2011.

.TUV NORD

Asia Institute Technology (Dongguan) Limited has been assessed on Jun. 13, 2013 that it can carry out EMC tests by order and under supervision of TUV NORD.

.ITS- Registration No: TMPSHA031

Asia Institute Technology (Dongguan) Limited has been assessed and included in Intertek Shanghai TMP Program regarding Laboratory facilities and test equipment on Jul.22, 2012.

3.1 Deviation from standard

None

3.2 Abnormalities from standard conditions

None

4 General Information

4.1 General Description of EUT

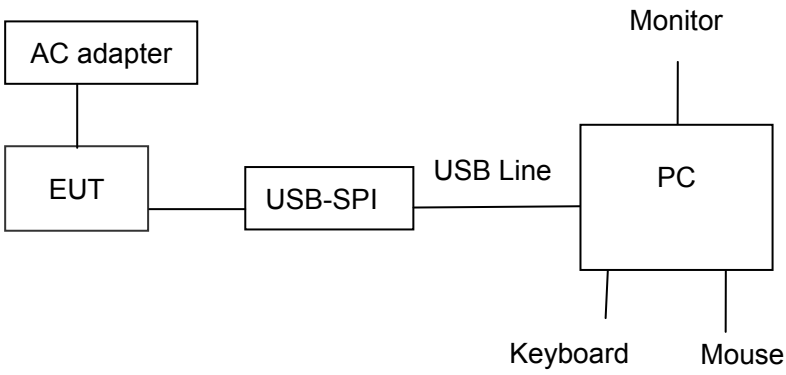
Manufacturer:	GIGATEK ELECTRONICS (DongGuan) CO.,LTD	
Manufacturer Address:	IN Yang Industrial, Zhangyang District, Zhangmutou Town, Dongguan City, Guandong, China 523636	
EUT Name:	Reverie 4.1 Bluetooth Speaker	
Model No:	AM-BT-S01	
Operation frequency:	2402 MHz to 2480 MHz	
NUMBER OF CHANNEL:	Bluetooth EDR	79
Modulation Technology:	Bluetooth EDR	GFSK, Π/4-DQPSK, 8DPSK(1/2/3Mbps)
Antenna Type:	dipole	
Antenna Gain:	max 2.11dBi	
Brand Name:	Reverie Sleep well tonight. Live better tomorrow.™	
Serial No:	N/A	
Power Supply Range:	Input: 100-240Vac，50/60Hz，1.5A Output：DC 16V 3.2A	
Power Supply:	DC 16.0V from Adapter,AC 120V/60Hz for Adapter	
Power Cord:	N/A	
Output power（max）:	Bluetooth EDR	1Mbps：6.60dBm
		3Mbps：5.05dBm
Note:		
1.	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.	

Description of Channel:					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

4.2 Description of Test conditions

(1) EUT was tested in normal configuration (Please See following Block diagram)

1. Block diagram of EUT configuration(TX Mode)



(2) E.U.T. test conditions:

15.31(e): For intentional radiators, measurements of the variation of the input power or the adiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

(3) Test frequencies:

According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and. If required reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

(4) Frequency range of radiated measurements:

According to the 15.33, the test range will be up to the tenth harmonic of the highest fundamental frequency.

4.3 EUT Peripheral List

No.	Equipment	Manufacturer	Model No.	Serial No.	Power cord	signal cable
1	N/A	N/A	N/A	N/A	N/A	N/A

4.4 Test Peripheral List

No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	signal cable
1	Personal computer	H P	CE 、FCC	DX2310	CNG8250MZ3	1.8m/unshielded /detachable	N/A
2	Keyboard	DELL	CE	SK-8115	CN-ONM432-71616-81M-OLKB	N/A	1.5m/unshielded /undetachable
3	Mouse	Microsoft	CE	X800898	30603	N/A	1.5m/unshielded /undetachable
4	Monitor	DELL	CE	T980KAC DK21SN	TWS20006045	1.8m/unshielded /detachable	1.8m/shielded /detachable
5	USB-SPI	CSR	N/A	N/A	N/A	N/A	0.8m/shielded /detachable

5 Equipments List for All Test Items

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Spectrum Analyzer	ADVANTEST	R3182	150900201	2013.06.27	2014.06.26
2	EMI Measuring Receiver	R&S	ESR	101160	2014.04.22	2015.04.21
3	Low Noise Pre Amplifier	Tsj	MLA-10K01-B01-27	1205323	2013.06.27	2014.06.26
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2013.12.02	2014.12.01
5	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2013.12.03	2014.12.02
6	Broadband Horn Antenna	SCHWARZBECK	BBHA9120D	452	2013.12.03	2014.12.02
7	SHF-EHF Horn	SCHWARZBECK	BBHA9170	BBHA9170367	2013.12.08	2013.12.07
8	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2013.09.26	2014.09.25
9	EMI Test Receiver	R&S	ESCI	100124	2013.06.27	2014.06.26
10	LISN	Kyoritsu	KNW-242	8-837-4	2013.06.27	2014.06.26
11	LISN	Kyoritsu	KNW-407	8-1789-3	2013.06.27	2014.06.26
12	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2013.09.26	2014.09.25
13	Loop Antenna	ARA	PLA-1030/B	1029	2014.03.19	2015.03.18
14	Power Meter	R&S	NRVS	101336	2013.06.27	2014.06.26
15	Power Sensor	R&S	URV5-Z7	100077	2013.06.27	2014.06.26

6 Test Result

6.1 Antenna Requirement

6.1.1 Standard requirement

15.203 requirement: For intentional device, according to 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.

15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

6.1.2 EUT Antenna

The antenna is fixed in the EUT by glue and no consideration of replacement. Antenna gain is max 2.11dbi from 2.4GHz to 2.5GHz.

6.2 RECEIVER INPUT BANDWIDTH

The input bandwidth of the receiver is 1.0 MHz. In every connection one Bluetooth device is Themaster and the other one is slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection (e.g. single of multisport (packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings. Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

6.3 HOPPING SEQUENCY IN DATA MODE

Example of a 79 hopping sequence in data mode:
40,21,44,23,42,53,46,55,48,33,52,35,50,65,54,67
56,37,60,39,58,69,62,71,64,25,68,27,66,57,70,59
72,29,76,31,74,61,78,63,01,41,05,43,03,73,07,75
09,45,13,47,11,77,15,00,64,49,66,53,68,02,70,06
01,51,03,55,05,04

6.4 EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR

The generation of the hopping sequence in connection mode depends essentially on two input values:

1 LAP/UAP of the master of the connection

2 Internal master clock

The LAP(lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP(upper address part) are the 24MSB's of the 48BD_ADDRESS

The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and Is never turned off. For synchronization with other units only offset are used. It has no relation to the time

Of the day. Its resolution is at least half the RX/TX slot length of 312.5us.The clock has a cycle of aboutOne day(23h30).In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire.

LAP(24 bits),4LSB's(4bits)(Input 1) and the 27MSB's of the clock(Input 2) are used. With this input values different mathematical procedures(permutations, additions, XOR-operations)are performed to generate te Sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following behavior:

The first connection between the two devices is established, a hopping sequence was generated. For Transmitting the wanted data the complete hopping sequence was not used. The connection ended. The second connection will be established. A new hopping sequence is generated. Due to the fact the

Bluetooth clock has a different value, because the period between the two transmission is longer(and itCannot be shorter)than the minimum resolution of the clock(312.5us).The hopping sequence will always Differ from the first one.

6.5 Conduction Emissions Measurement

6.5.1 Applied procedures / Limit

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

Note: Decreases with the logarithm of the frequency.

6.5.2 Test procedure

EUT was placed upon a wooden test table 0.8m above the horizontal metal reference plane and 0.4m from the vertical ground plane, and it was connected to an AMN. The closest distance between the boundary of the EUT and the surface of the AMN is 0.8m. All peripherals were connected to another AMN, and placed at a distance of 10cm from each other. A spectrum and receiver was connected to the RF output port of the AMN. Both average and quasi-peak value were detected.

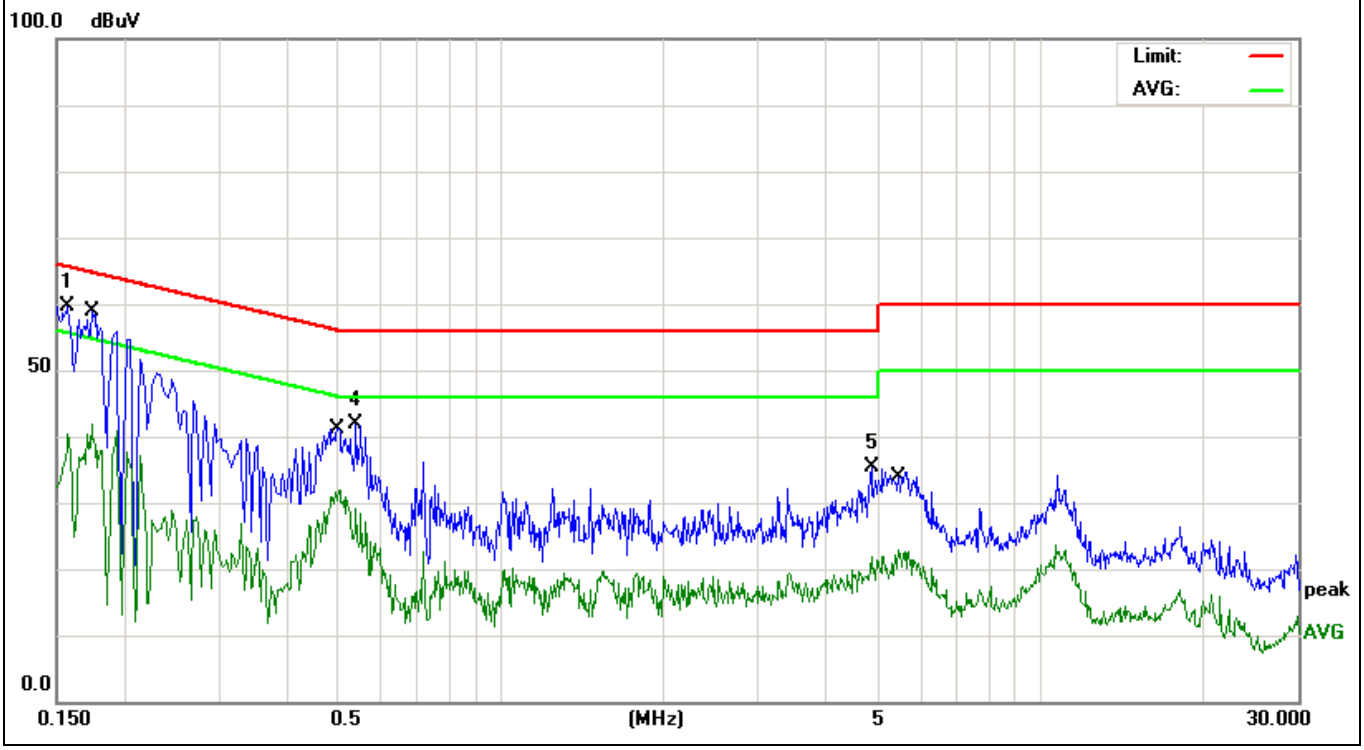
6.5.3 Test results

EUT:	Reverie 4.1 Bluetooth Speaker	Model Name. :	AM-BT-S01
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date :	2014-06-11
Test Mode:	TX	Phase :	Line
Test Voltage :	DC 16.0V from Adapter,AC 120V/60Hz for Adapter		

Frequency (MHz)	Meter Reading (dBμV)	Factor(dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Detector
*0.1580	47.82	11.75	59.57	65.56	-5.99	Quasi-Peak
0.1739	30.39	11.48	41.87	54.77	-12.90	Average
0.5380	31.98	10.00	41.98	56.00	-14.02	Quasi-Peak
0.5020	21.83	10.01	31.84	46.00	-14.16	Average
4.8539	25.16	10.10	35.26	56.00	-20.74	Quasi-Peak
5.4698	12.78	10.12	22.90	50.00	-27.10	Average

Remark:

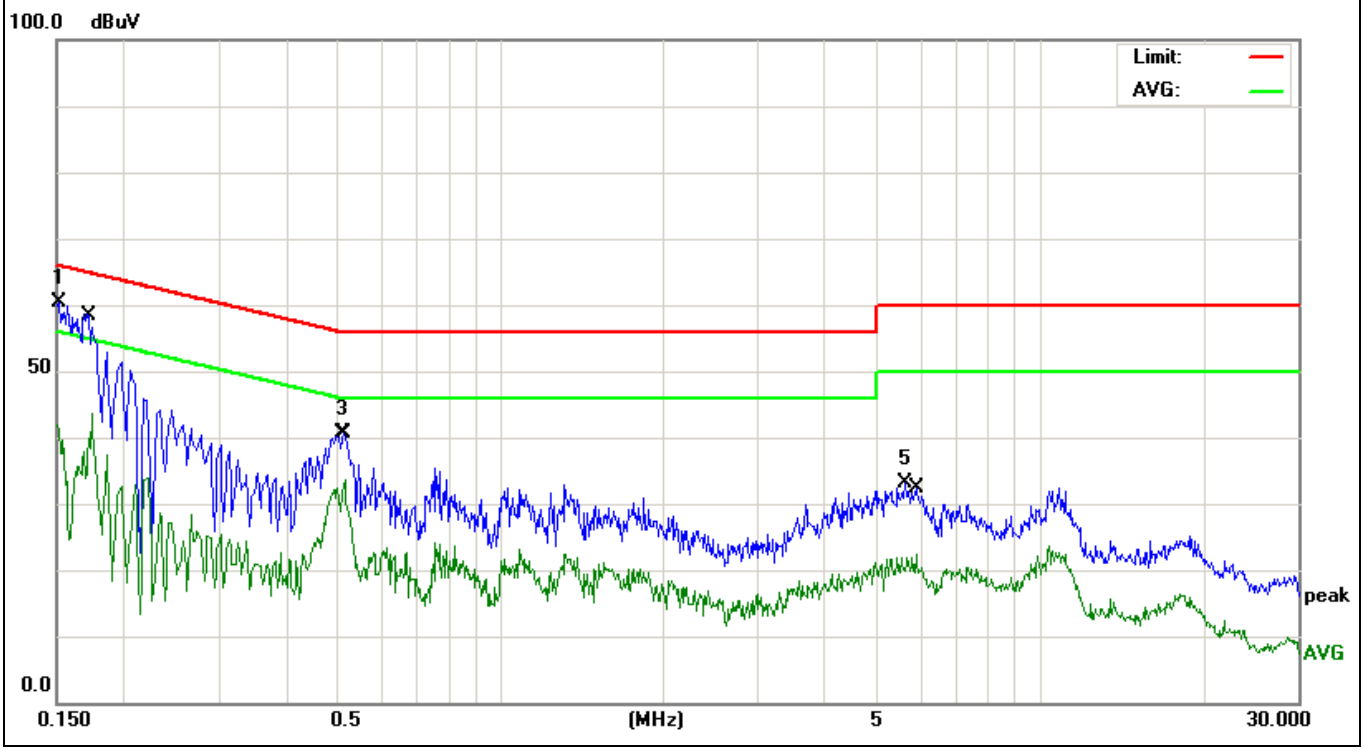
1. Factor = Insertion Loss + Cable Loss.
2. '*' means the worst case.



EUT：	Reverie 4.1 Bluetooth Speaker	Model Name. ：	AM-BT-S01
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Test Date :	2014-06-11
Test Mode：	TX	Phase :	Neutral
Test Voltage ：	DC 16.0V from Adapter,AC 120V/60Hz for Adapter		

Frequency (MHz)	Meter Reading (dBμV)	Factor(dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Detector
*0.1516	48.56	11.90	60.46	65.91	-5.45	Quasi-Peak
0.1737	32.13	11.49	43.62	54.78	-11.16	Average
0.5100	30.58	10.01	40.59	56.00	-15.41	Quasi-Peak
0.5140	23.52	10.01	33.53	46.00	-12.47	Average
5.6177	23.00	10.12	33.12	60.00	-26.88	Quasi-Peak
5.8859	12.24	10.12	22.36	50.00	-27.64	Average

Remark:
1. Factor = Insertion Loss + Cable Loss.
2. '*' means the worst case.



6.6 Radiated Emissions Measurement

6.6.1 Applied procedures / Limit

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) (see Section 15.205(c)).

Frequency of Emission (MHz)	Field Strength		Measurement Distance (meters)
	μV/m	dBμV/m	
0.009-0.49	2400/F(kHz)		300
0.49-1.705	24000/F(kHz)		30
1.705-30	30		30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

6.6.2 Test procedure

EUT was placed upon a wooden test table which was placed on the turn table 0.8m above the horizontal metal ground plane, and operating in the mode as mentioned above. A receiving antenna was placed 3m away from the EUT. During testing, turn around the turn table and move the antenna from 1m to 4m to find the maximum field-strength reading. All peripherals were placed at a distance of 10cm between each other. Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

6.6.3 Test Result

Radiated Emissions Test Data Below 30MHz

EUT：	Reverie 4.1 Bluetooth Speaker	Model Name ：	AM-BT-S01
Temperature：	25 ℃	Test Data	2014-06-12
Pressure：	1005 hPa	Relative Humidity：	60%
Test Mode ：	TX	Test Voltage ：	DC 16.0 V from Adapter AC 120V/60Hz for Adapter
Measurement Distance	3 m	Frenqucy Range	9KHz to 30MHz
RBW/VBW	9KHz~150KHz/RB 200Hz for QP, 150KHz~30MHz/RB 9KHz for QP		

No emission found between lowest internal used/generated frequencies to 30MHz.

Radiated Emissions Test Data Below 1GHz

EUT：	Reverie 4.1 Bluetooth Speaker	Model Name ：	AM-BT-S01
Temperature：	25 ℃	Test Data	2014-06-12
Pressure：	1010 hPa	Relative Humidity：	60%
Test Mode ：	TX	Test Voltage ：	DC 16.0 V from Adapter AC 120V/60Hz for Adapter
Measurement Distance	3 m	Frenqucy Range	30MHz to 1GHz
RBW/VBW	100KHz / 300KHz for spectrum, RBW=120KHz for receiver.		

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
***31.8427**	**33.76**	**-14.66**	**19.10**	**40.00**	**-20.90**	**QUASIPEAK**
64.2074	29.36	-17.84	11.52	40.00	-28.48	QUASIPEAK
85.8983	32.94	-17.14	15.80	40.00	-24.20	QUASIPEAK
199.9856	31.60	-15.40	16.20	43.50	-27.30	QUASIPEAK
283.9791	23.68	-10.18	13.50	46.00	-32.50	QUASIPEAK
404.6664	26.07	-6.97	19.10	46.00	-26.90	QUASIPEAK

(b) Antenna polarization: vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
32.4059	47.08	-16.88	30.20	40.00	-9.80	QUASIPEAK
49.7068	43.87	-19.07	24.80	40.00	-15.20	QUASIPEAK
***75.4462**	**51.87**	**-20.47**	**31.40**	**40.00**	**-8.60**	**QUASIPEAK**
92.1388	34.50	-17.37	17.13	43.50	-26.37	QUASIPEAK
136.9390	26.61	-16.71	9.90	43.50	-33.60	QUASIPEAK
568.6127	22.20	-3.43	18.77	46.00	-27.23	QUASIPEAK

Note: '*' means the worst case
Measurement Level = Reading Level + Factor
Factor=Ant Factor + Cable Loss

Radiated Emissions Test Data Above 1GHz

EUT：	Reverie 4.1 Bluetooth Speaker	Model Name ：	AM-BT-S01
Temperature：	25 ℃	Test Data	2014-06-12
Pressure：	1010 hPa	Relative Humidity：	60%
Test Mode ：	1Mbps	Test Voltage ：	DC 16.0 V from Adapter AC 120V/60Hz for Adapter
Measurement Distance	3 m	Frenqucy Range	1GHz to 25GHz
RBW/VBW	1MHz/1MHz for Peak, 1MHz/10Hz for Average.		

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
2400.000	45.38	-5.70	39.68	74.00	-34.32	PEAK
2400.000	33.18	-5.70	27.48	54.00	-26.52	AVERAGE
4804.000	57.03	5.06	62.09	74.00	-11.91	PEAK
***4804.000**	**42.11**	**5.06**	**47.17**	**54.00**	**-6.83**	**AVERAGE**
7206.000	42.14	7.03	49.17	74.00	-24.83	PEAK
7206.000	27.17	7.03	34.20	54.00	-19.80	AVERAGE

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
2400.000	48.31	-5.70	42.61	74.00	-31.39	PEAK
2400.000	33.09	-5.70	27.39	54.00	-26.61	AVERAGE
4804.000	56.31	5.06	61.37	74.00	-12.63	PEAK
***4804.000**	**42.74**	**5.06**	**47.80**	**54.00**	**-6.20**	**AVERAGE**
7206.000	39.39	7.03	46.42	74.00	-27.58	PEAK
7206.000	25.53	7.03	32.56	54.00	-21.44	AVERAGE

Note: '*' means the worst case

8~25GHz at least have 20dB margin. No recording in the test report.

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss

Low Channel 00: 2402 MHz

Data rate: 1Mbps

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
4882.000	58.79	5.14	63.93	74.00	-10.07	PEAK
***4882.000**	**41.45**	**5.14**	**46.59**	**54.00**	**-7.41**	**AVERAGE**
7323.000	40.22	7.54	47.76	74.00	-26.24	PEAK
7323.000	26.66	7.54	34.20	54.00	-19.80	AVERAGE

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
4882.000	53.86	5.14	59.00	74.00	-15.00	PEAK
***4882.000**	**39.64**	**5.14**	**44.78**	**54.00**	**-9.22**	**AVERAGE**
7323.000	38.06	7.54	45.60	74.00	-28.40	PEAK
7323.000	22.12	7.54	29.66	54.00	-24.34	AVERAGE

Note: '*' means the worst case

8~25GHz at least have 20dB margin. No recording in the test report.

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss

Middle Channel 39: 2441 MHz

Data rate: 1Mbps

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
2483.500	47.35	-4.98	42.37	74.00	-31.63	PEAK
2483.500	33.28	-4.98	28.30	54.00	-25.70	AVERAGE
4960.000	52.94	5.22	58.16	74.00	-15.84	PEAK
*4960.000	36.15	5.22	41.37	54.00	-12.63	**AVERAGE**
7440.000	38.23	8.06	46.29	74.00	-27.71	PEAK
7440.000	25.25	8.06	33.31	54.00	-20.69	AVERAGE

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
2483.500	46.29	-4.98	41.31	74.00	-32.69	PEAK
2483.500	32.98	-4.98	28.00	54.00	-26.00	AVERAGE
4960.000	50.07	5.22	55.29	74.00	-18.71	PEAK
***4960.000**	**35.35**	**5.22**	**40.57**	**54.00**	**-13.43**	**AVERAGE**
7440.000	38.32	8.06	46.38	74.00	-27.62	PEAK
7440.000	23.69	8.06	31.75	54.00	-22.25	AVERAGE

Note: '*' means the worst case

8~25GHz at least have 20dB margin. No recording in the test report.

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss

High Channel 78: 2480 MHz

Data rate: 1Mbps

EUT：	Reverie 4.1 Bluetooth Speaker	Model Name ：	AM-BT-S01
Temperature：	25 ℃	Test Data	2014-06-12
Pressure：	1010 hPa	Relative Humidity：	60%
Test Mode ：	3Mbps	Test Voltage ：	DC 16.0 V from Adapter AC 120V/60Hz for Adapter
Measurement Distance	3 m	Frenqucy Range	1GHz to 25GHz
RBW/VBW	1MHz/1MHz for Peak, 1MHz/10Hz for Average.		

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
2400.000	49.54	-5.70	43.84	74.00	-30.16	PEAK
2400.000	35.18	-5.70	29.48	54.00	-24.52	AVERAGE
4804.000	59.13	5.06	64.19	74.00	-9.81	PEAK
***4804.000**	**40.61**	**5.06**	**45.67**	**54.00**	**-8.33**	**AVERAGE**
7206.000	45.03	7.03	52.06	74.00	-21.94	PEAK
7206.000	33.01	7.03	40.04	54.00	-13.96	AVERAGE

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
2400.000	48.34	-5.70	42.64	74.00	-31.36	PEAK
2400.000	34.25	-5.70	28.55	54.00	-25.45	AVERAGE
4804.000	56.31	5.06	61.37	74.00	-12.63	PEAK
***4804.000**	**42.70**	**5.06**	**47.76**	**54.00**	**-6.24**	**AVERAGE**
7206.000	40.35	7.03	47.38	74.00	-26.62	PEAK
7206.000	26.38	7.03	33.41	54.00	-20.59	AVERAGE

Note: '*' means the worst case

8~25GHz at least have 20dB margin. No recording in the test report.

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss

Low Channel 00: 2402 MHz

Data rate: 3Mbps

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
4882.000	59.16	5.14	64.30	74.00	-9.70	PEAK
***4882.000**	**40.00**	**5.14**	**45.14**	**54.00**	**-8.86**	**AVERAGE**
7320.000	28.94	7.52	36.46	54.00	-17.54	PEAK
7323.000	40.17	7.54	47.71	74.00	-26.29	AVERAGE

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
4882.000	55.37	5.14	60.51	74.00	-13.49	PEAK
***4882.000**	**39.63**	**5.14**	**44.77**	**54.00**	**-9.23**	**AVERAGE**
7323.000	40.20	7.54	47.74	74.00	-26.26	PEAK
7323.000	25.29	7.54	32.83	54.00	-21.17	AVERAGE

Note: '*' means the worst case

8~25GHz at least have 20dB margin. No recording in the test report.

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss

Middle Channel 39: 2441 MHz

Data rate: 3Mbps

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
2483.500	45.35	-4.98	40.37	74.00	-33.63	PEAK
2483.500	31.44	-4.98	26.46	54.00	-27.54	AVERAGE
4960.000	52.37	5.22	57.59	74.00	-16.41	PEAK
***4960.000**	**35.64**	**5.22**	**40.86**	**54.00**	**-13.14**	**AVERAGE**
7440.000	36.23	8.06	44.29	74.00	-29.71	PEAK
7440.000	21.34	8.06	29.40	54.00	-24.60	AVERAGE

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
2483.500	47.33	-4.98	42.35	74.00	-31.65	PEAK
2483.500	34.03	-4.98	29.05	54.00	-24.95	AVERAGE
4960.000	50.15	5.22	55.37	74.00	-18.63	PEAK
***4960.000**	**37.09**	**5.22**	**42.31**	**54.00**	**-11.69**	**AVERAGE**
7440.000	36.18	8.06	44.24	74.00	-29.76	PEAK
7440.000	23.33	8.06	31.39	54.00	-22.61	AVERAGE

Note: '*' means the worst case

8~25GHz at least have 20dB margin. No recording in the test report.

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss

High Channel 78: 2480 MHz

Data rate: 3Mbps

6.6.4 TEST RESULTS (Restricted Bands Requirements)

EUT：	Reverie 4.1 Bluetooth Speaker	Model Name ：	AM-BT-S01
Temperature：	25 ℃	Test Data	2014-06-12
Pressure：	1010 hPa	Relative Humidity：	60%
Test Mode ：	TX 1Mbps\ 3Mbps	Test Voltage ：	DC 16.0 V from Adapter AC 120V/60Hz for Adapter
Note：	1. The transmitter was setup to transmit at the lowest channel. Then the field strength was measured at 2310-2390 MHz. 2. The transmitter was setup to transmit at the highest channel. Then the field strength was measured at 2483.5-2500 MHz.		

Test Mode	Ant.Pol. H/V	Freq. (MHz)	Reading		Ant/CF CF(dB)	Act		Limit	
			Peak (dBuv)	AV (dBuv)		Peak (dBuv/m)	AV (dBuv/m)	Peak (dBuv/m)	AV (dBuv/m)
Data rate 1Mbps	V	2390.00	48.69	33.21	-5.79	42.90	27.42	74.00	54.00
	H	2390.00	45.44	33.02	-5.79	39.65	27.23	74.00	54.00
	V	2483.50	46.29	32.98	-4.98	41.31	28.00	74.00	54.00
	H	2483.50	47.35	33.28	-4.98	42.37	28.30	74.00	54.00
Data rate 3Mbps	V	2390.00	48.04	34.13	-5.79	42.25	28.34	74.00	54.00
	H	2390.00	49.56	35.78	-5.79	13.78	29.99	74.00	54.00
	V	2483.50	47.33	34.03	-4.98	42.35	29.05	74.00	54.00
	H	2483.50	45.35	31.44	-4.98	40.37	26.46	74.00	54.00

Remark：

(1) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode.

(2) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

(3) Corr.Factor = Antenna Factor + Cable Loss – Pre-amplifier.

6.7 BANDWIDTH TEST

6.7.1 Applied procedures / Limit

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dBbandwidth of hopping channel shell be a minimum limit for the hopping channel separation.

6.7.2 Test procedure

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW, Sweep = auto, Detector function = peak Trace = max hold

6.7.3 Deviation from standard

No deviation.

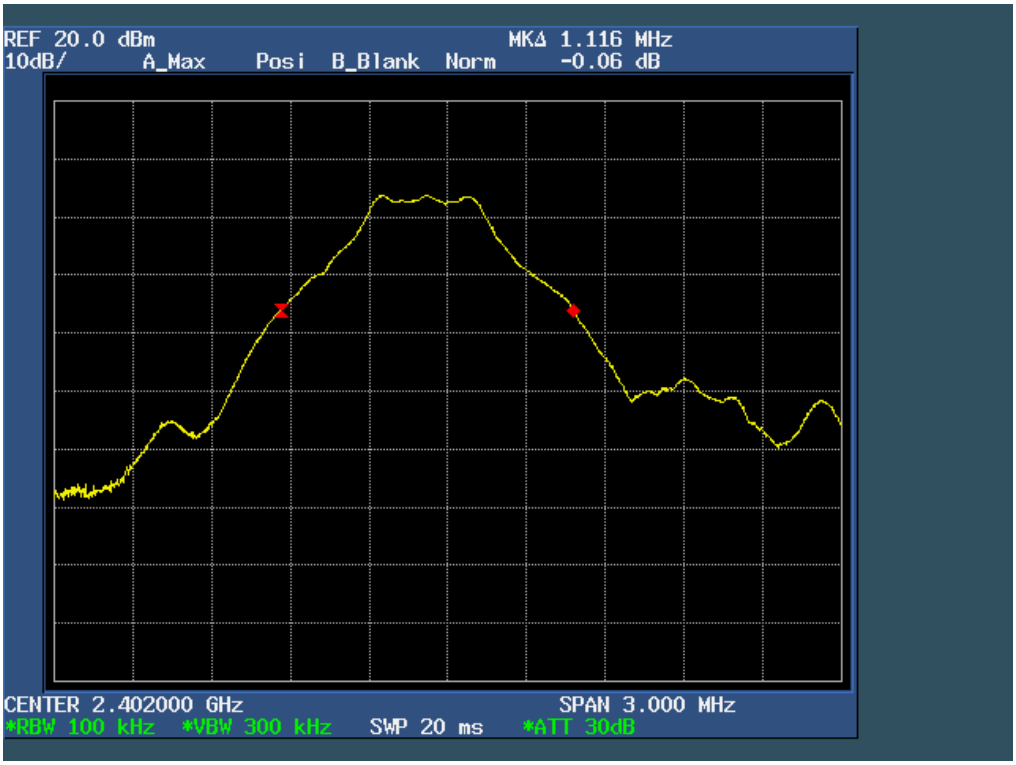
6.7.4 Test setup

6.7.5 Test results

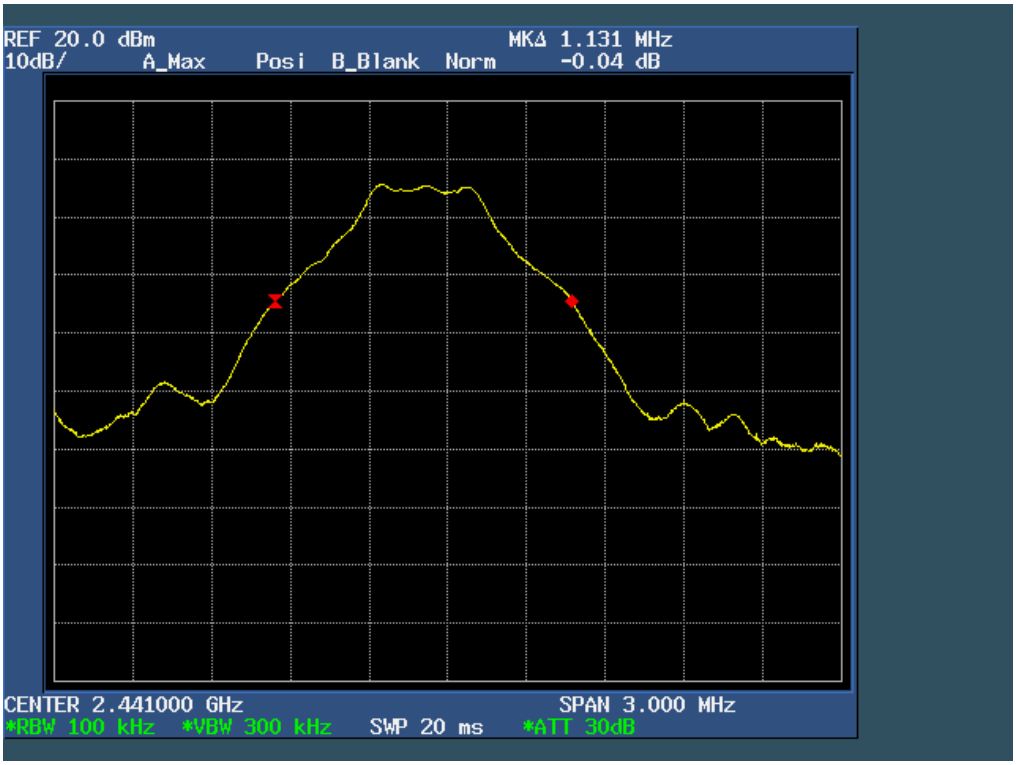
EUT：	Reverie 4.1 Bluetooth Speaker	Model Name ：	AM-BT-S01
Temperature：	26 ℃	Relative Humidity：	53%
Pressure：	1010 hPa	Test Power ：	DC 16.0 V from Adapter AC 120V/60Hz for Adapter
Test Mode ：	TX 1Mbps\ 3Mbps		

Channel		Channel frenqucy (MHz)	20dB bandwidth (KHz)	Limit (KHz)	Conclusion
1Mbps	Low	2402	1116	N/A	Pass
	Middle	2441	1131	N/A	Pass
	High	2480	1128	N/A	Pass
3Mbps	Low	2402	1374	N/A	Pass
	Middle	2441	1377	N/A	Pass
	High	2480	1377	N/A	Pass

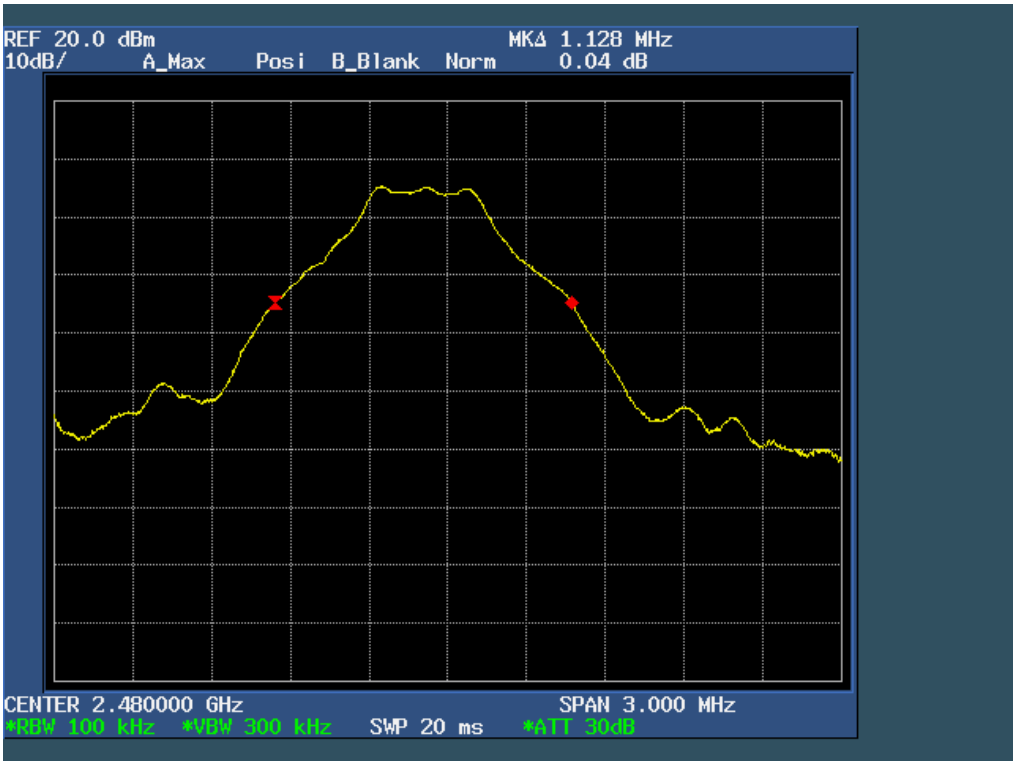
CH00-1Mbps



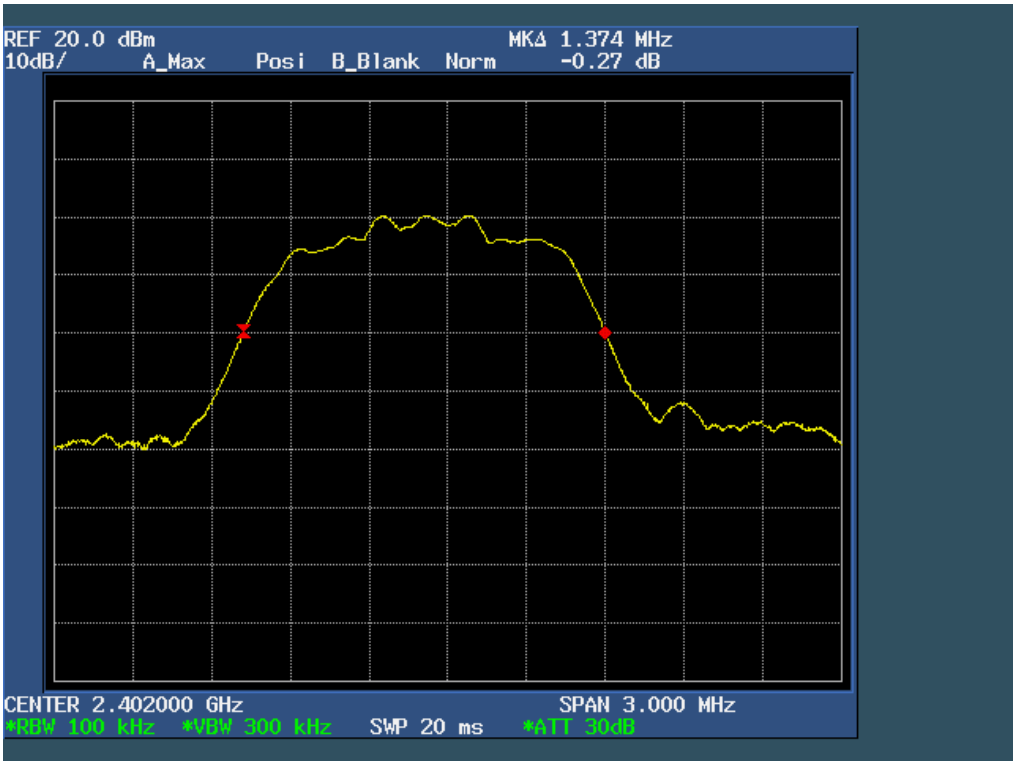
CH 39-1Mbps



CH 78-1Mbps



CH 00-3Mbps



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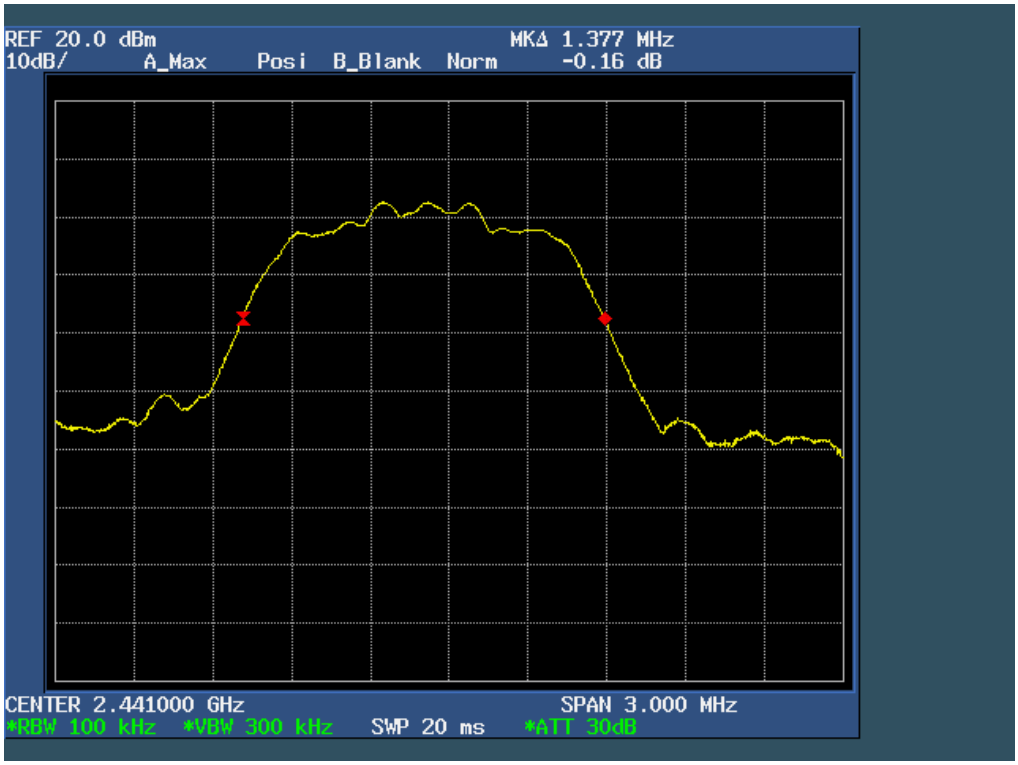

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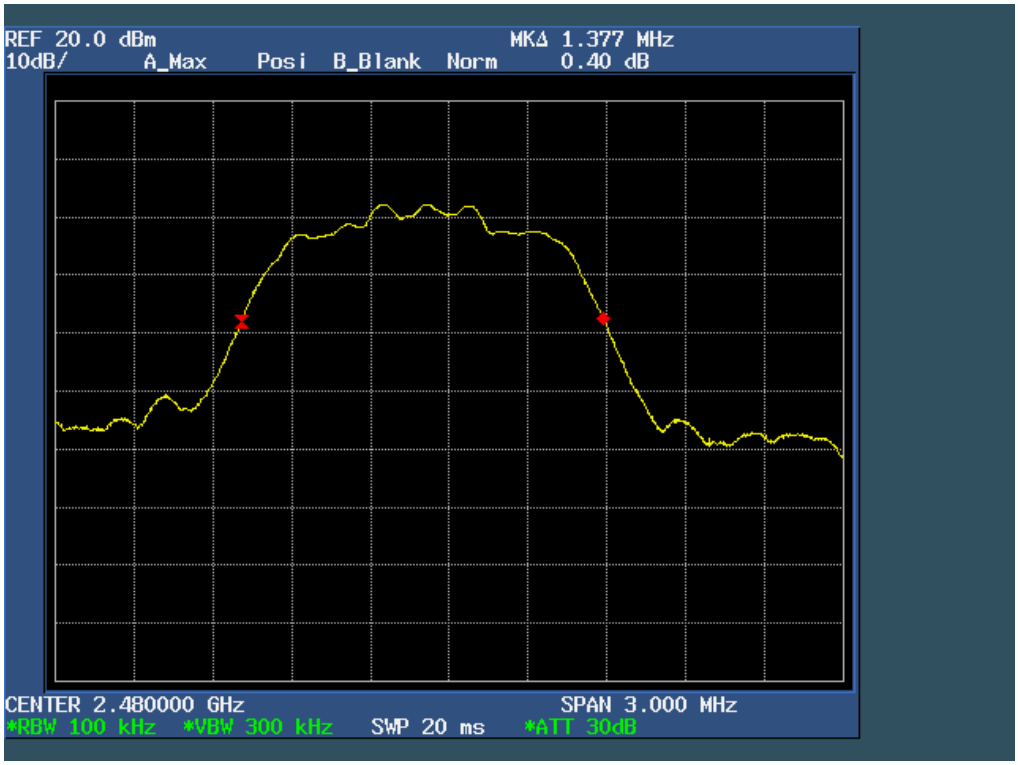


6.8 Carrier Frequencies Separated

6.8.1 Applied procedures / Limit

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.

6.8.2 Test procedure

(1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as Span = wide enough to capture the peaks of two adjacent channels, Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span, Video (or Average) Bandwidth (VBW) ≥ RBW Sweep = auto, Detector function = peak, Trace = max hold

(2) The EUT should be transmitting at its maximum data rate. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

(3) The above procedure shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range with modulated mode. also shall be performed at different modes of operation.

6.8.3 Deviation from standard

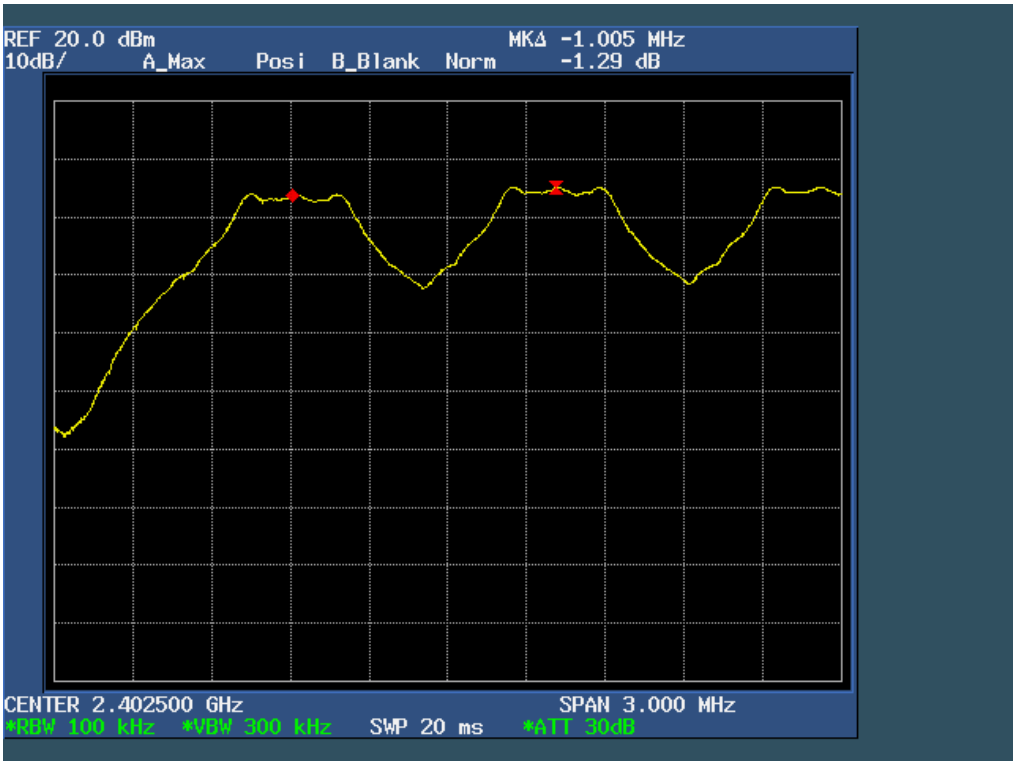
No deviation.

6.8.4 Test results

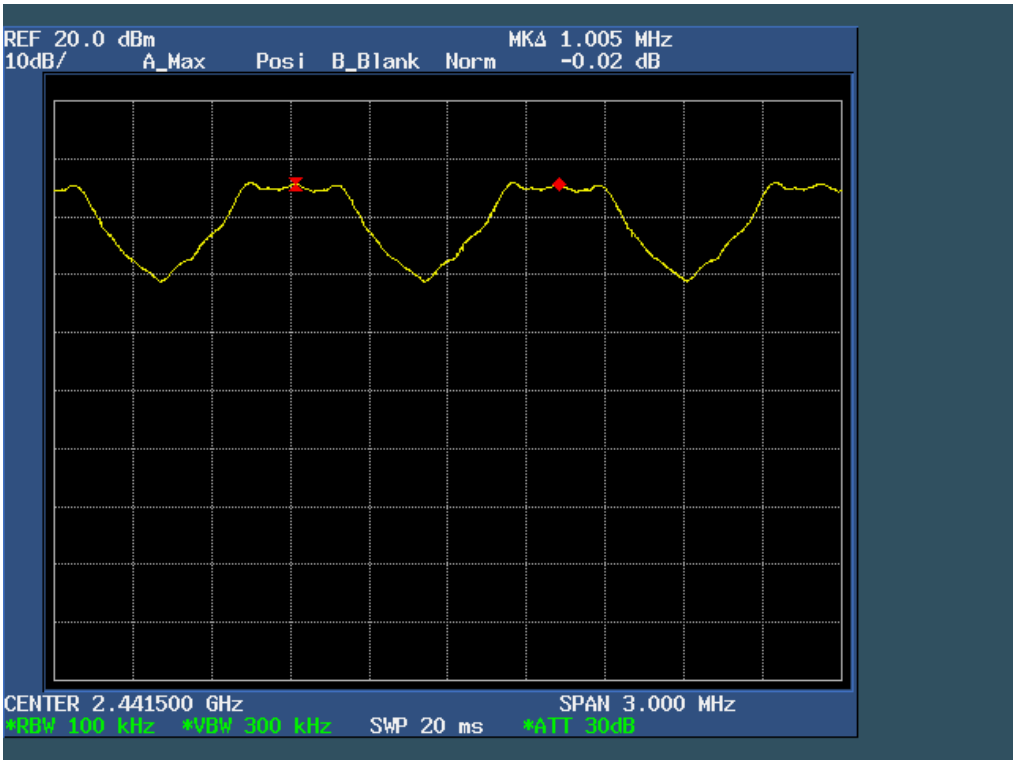
EUT：	Reverie 4.1 Bluetooth Speaker	Model Name ：	AM-BT-S01
Temperature：	26 ℃	Relative Humidity：	53%
Pressure：	1010 hPa	Test Power ：	DC 16.0 V from Adapter AC 120V/60Hz for Adapter
Test Mode ：	TX 1Mbps\ 3Mbps		

Channel		Channel frenqucy (MHz)	Channel Separation (MHz)	Conclusion
1Mbps	Low	2402	1.005	Pass
	Middle	2441	1.005	Pass
	Highest	2480	1.002	Pass
3Mbps	Low	2402	1.002	Pass
	Middle	2441	1.002	Pass
	Highest	2480	1.005	Pass

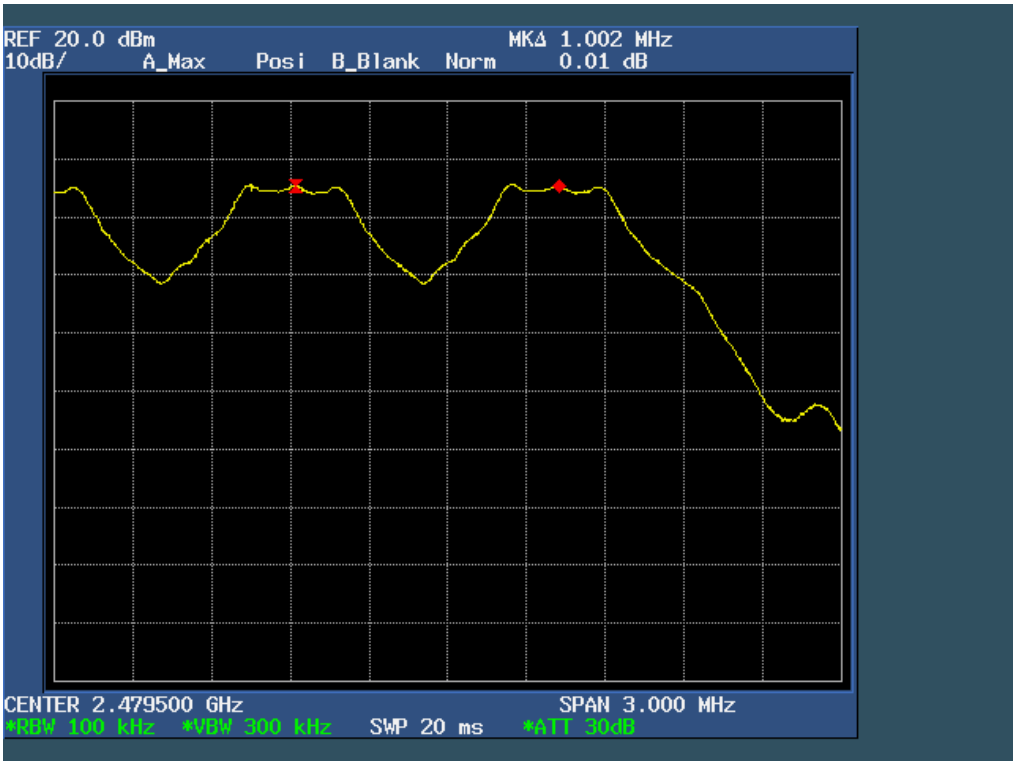
CH 00-1Mbps



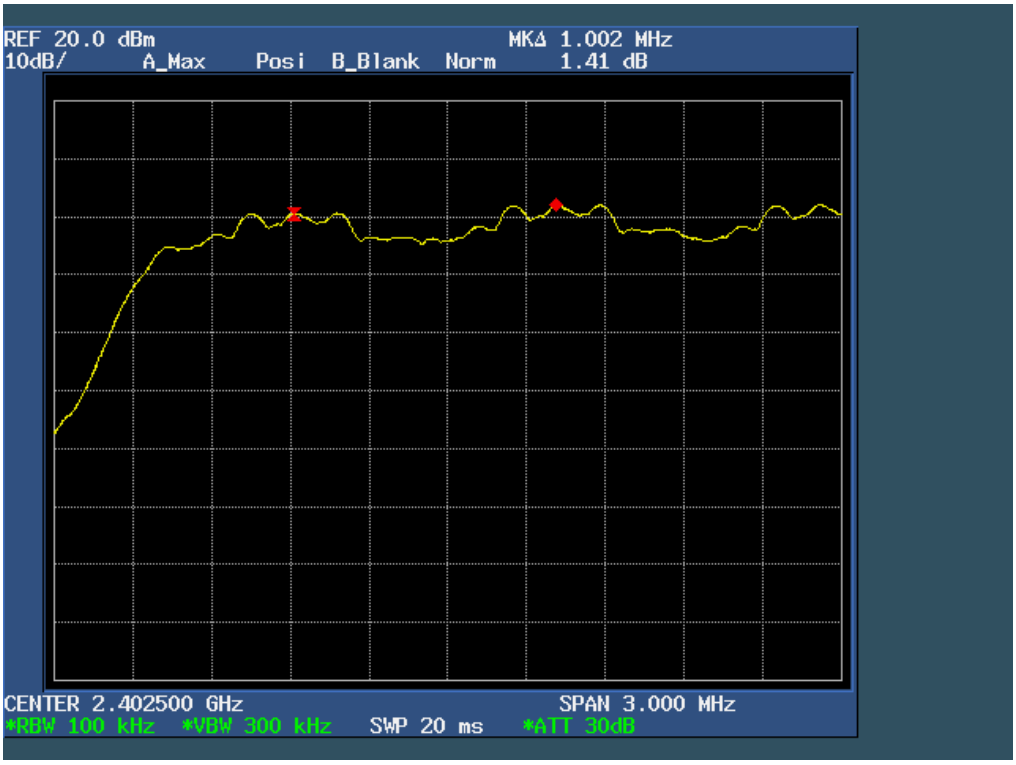
CH 39-1Mbps



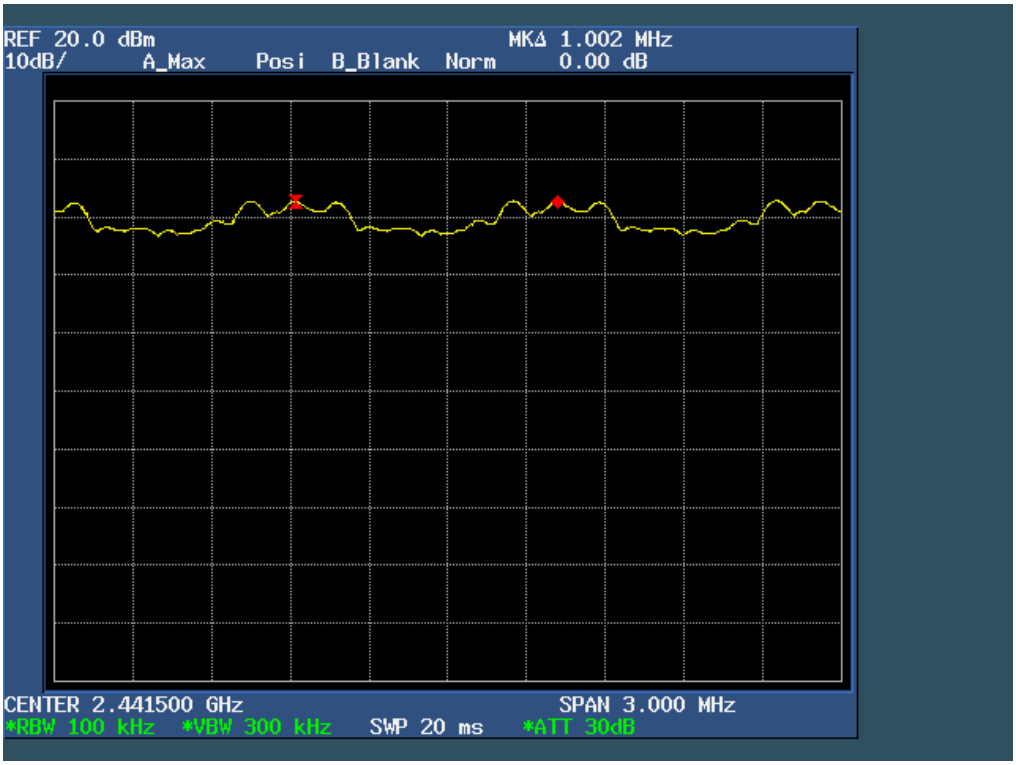
CH 78-1Mbps



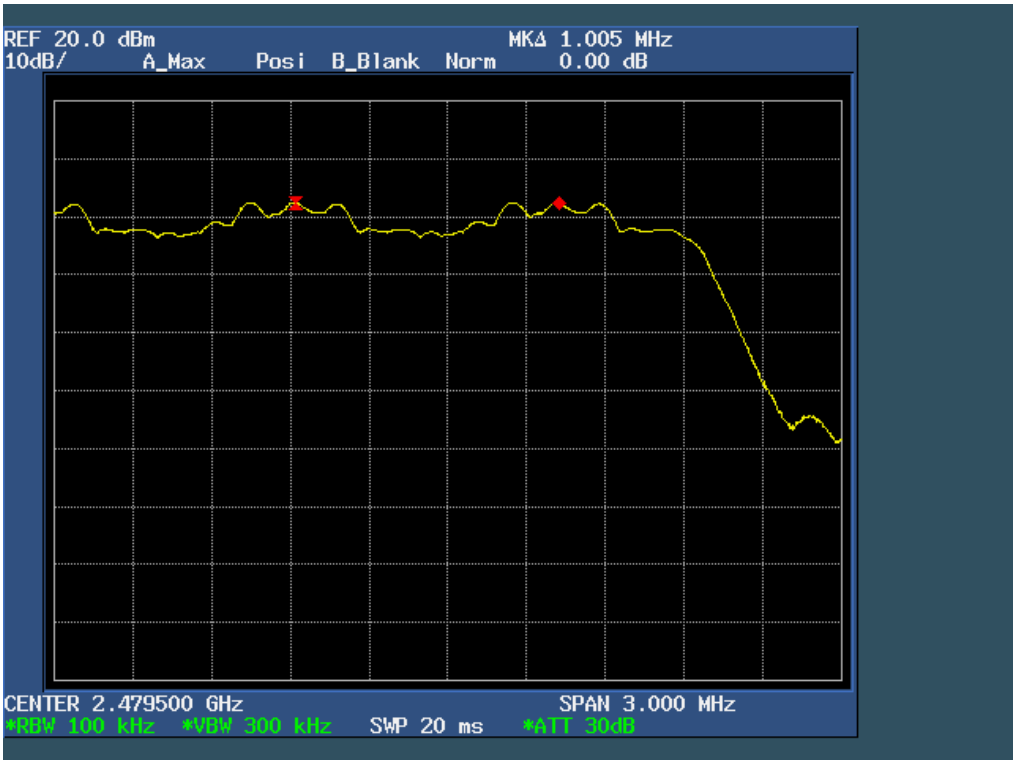
CH 00-3Mbps



CH 39-3Mbps



CH 78-3Mbps



6.9 Hopping Channel Number

6.9.1 Applied procedures / Limit

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.

6.9.2 Test procedure

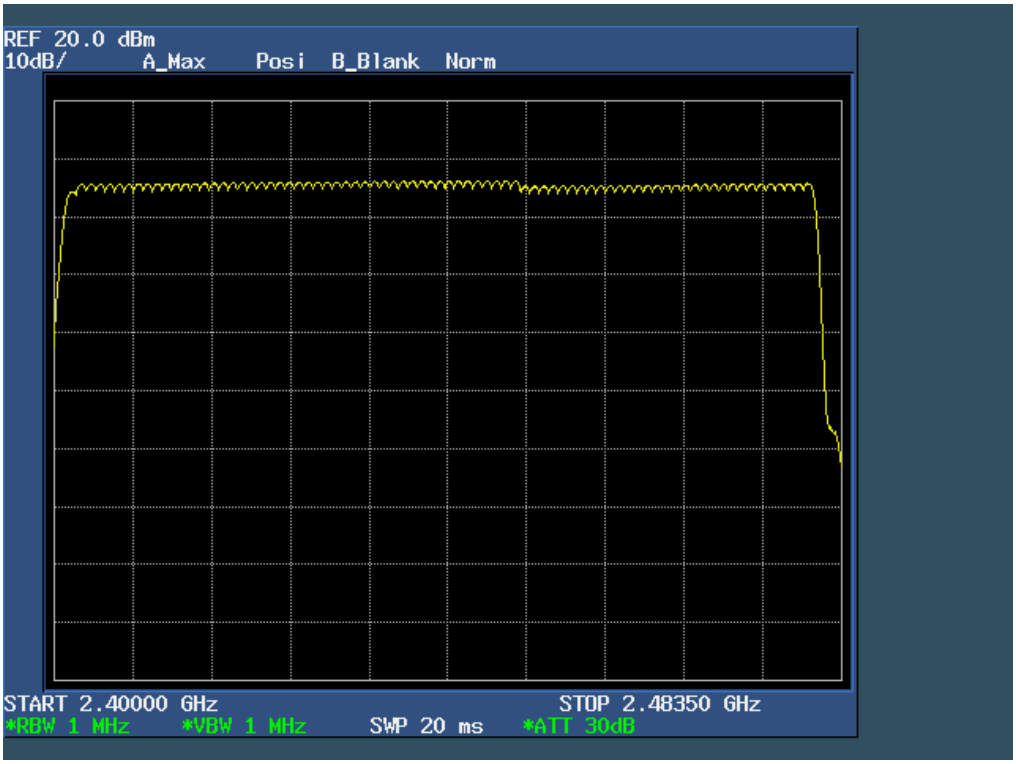
(1) Connected the antenna port to the Spectrum Analyzer , set the Spectrum Analyzer as Span = the frequency band of operation, RBW ≥ 1% of the span, VBW ≥ RBW Sweep = auto Detector function = peak, Trace = max hold

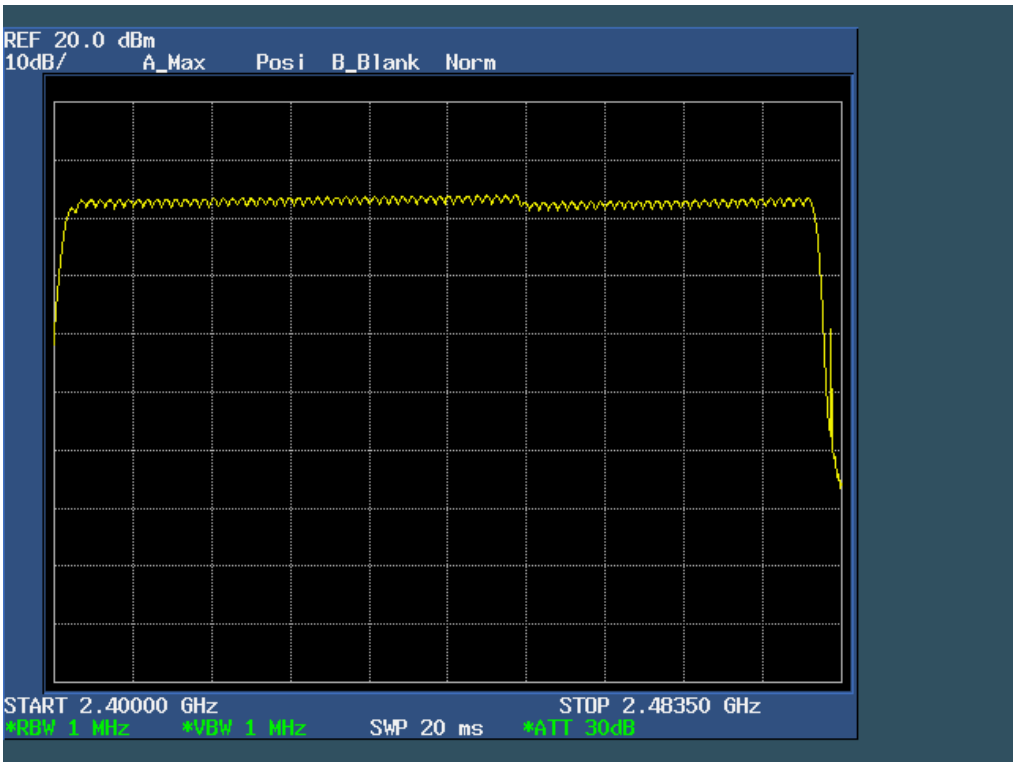
(2) The EUT should be have its hopping function enabled. Maxhold and record hopping channels It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies.

6.9.3 Test result

Hopping Channel Number result		
Operating Mode: 1Mbps\ 3Mbps Mode	Test date:2014-06-16	
Result	Limit	Conclusion
79	15	Pass

EUT：	Reverie 4.1 Bluetooth Speaker	Model Name ：	AM-BT-S01
Temperature：	26 ℃	Relative Humidity：	53%
Pressure：	1010 hPa	Test Power ：	DC 16.0 V from Adapter AC 120V/60Hz for Adapter
Test Mode ：	TX 1Mbps\ 3Mbps		





6.10 Dwell time

6.10.1 Applied procedures / Limit

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.

6.10.2 Test procedure

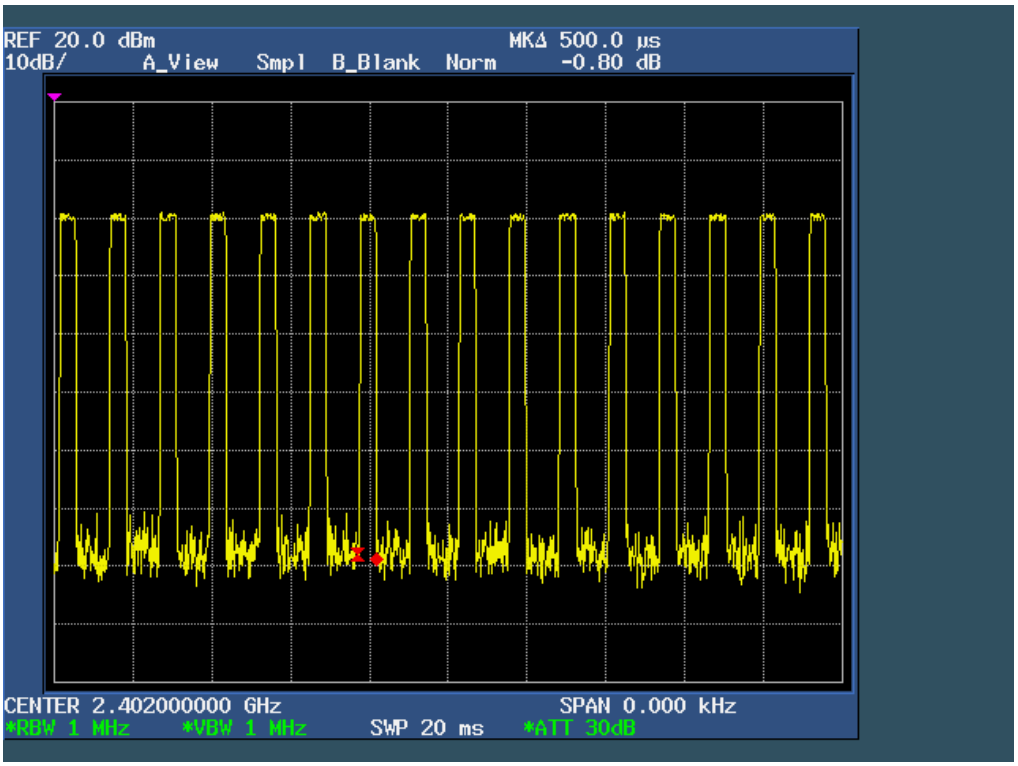
(1) Place the EUT on the table in the chamber or connect the antenna port of the EUT to spectrum analyzer and set it in transmitting mode.
(2) Set RBW of spectrum analyzer to 1MHz, VBW ≥ RBW
(3) Use a video trigger with the trigger level set to enable triggering only on full pulses.
(4) Sweep Time is more than once pulse time.
(5) Set the center frequency on any frequency would be measure and set the frequency span to zero span.
(6) Measure the maximum time duration of one single pulse.
(7) Set the EUT for DH5, DH3 and DH1 packet transmitting.
(8) Measure the maximum time duration of one single pulse.
(9) A Period Time = 79*0.4=31.6 S
DH1 Time Slot: Reading * (1600/2)*31.6/79
DH3 Time Slot: Reading * (1600/4)*31.6/79
DH5 Time Slot: Reading * (1600/6)*31.6/79

6.10.3 Test result

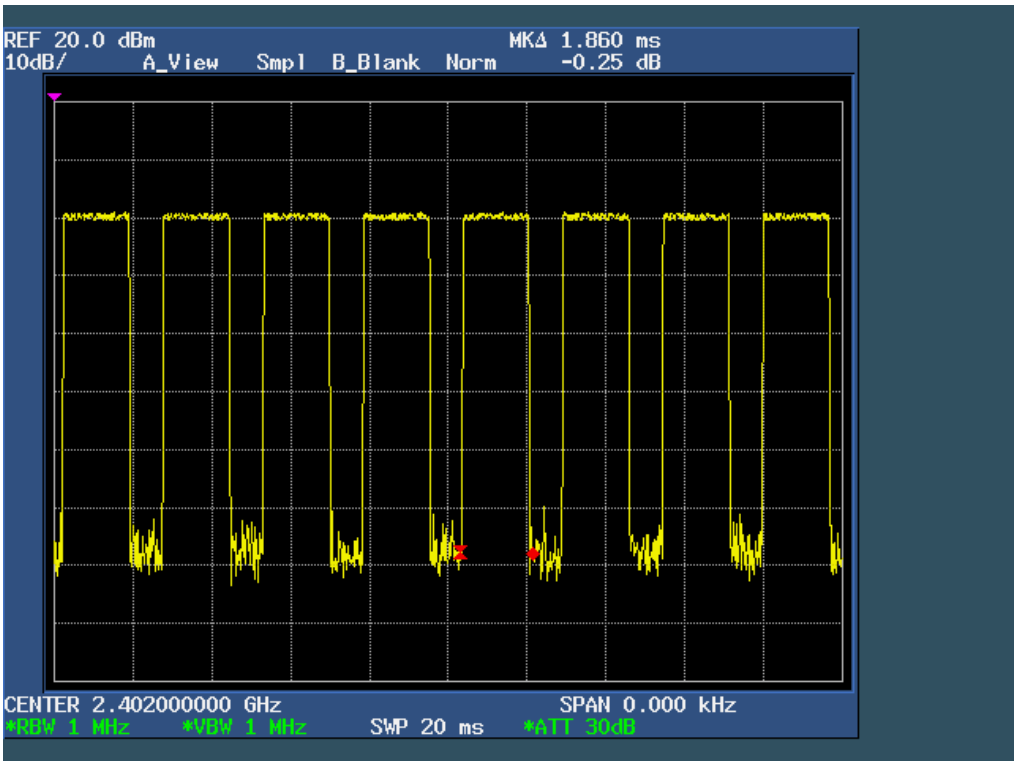
EUT：	Reverie 4.1 Bluetooth Speaker	Model Name ：	AM-BT-S01
Temperature：	26 ℃	Relative Humidity：	53%
Pressure：	1010 hPa	Test Power ：	DC 16.0 V from Adapter AC 120V/60Hz for Adapter
Test Mode ：	CH00-DH1/DH3/DH5 (1Mbps Mode)		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limits (s)
DH1	2402 MHz	0.500	0.1600	0.4000
DH3	2402 MHz	1.860	0.2976	0.4000
DH5	2402 MHz	3.100	0.3307	0.4000

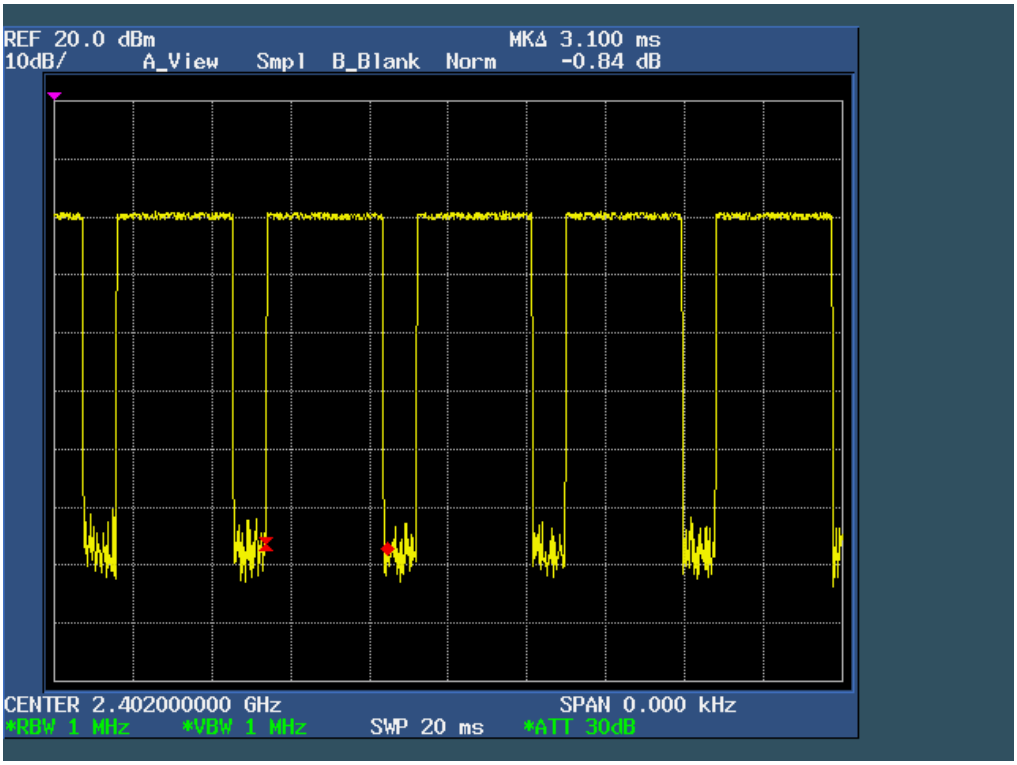
CH00-DH1



CH00-DH3



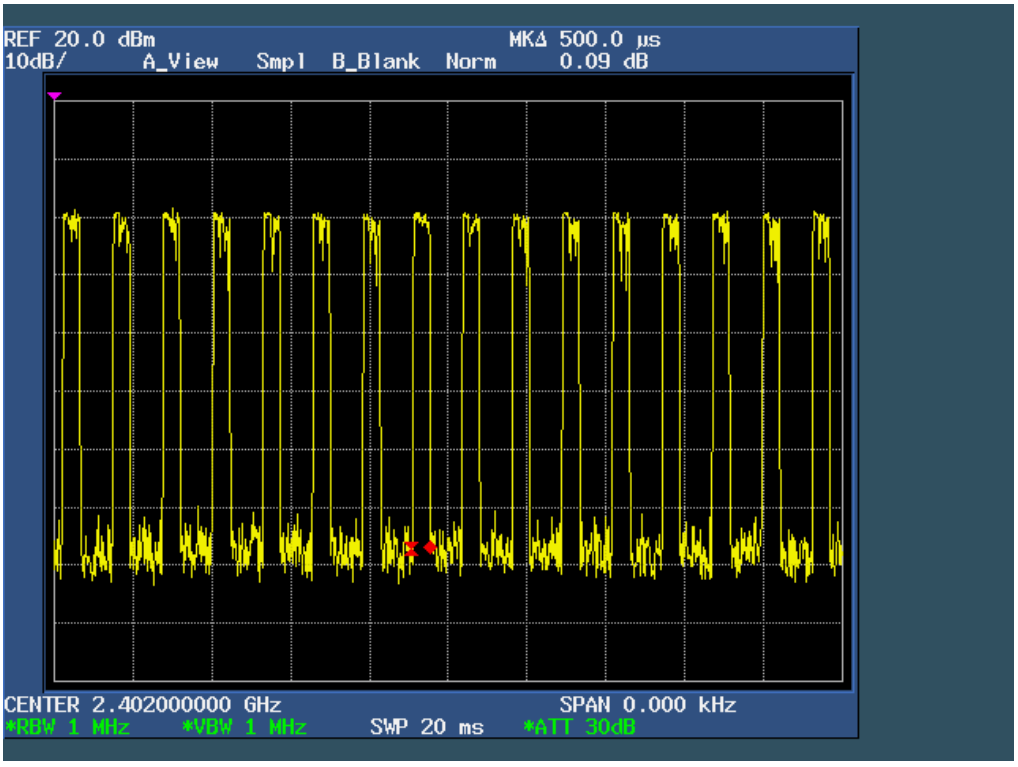
CH00-DH5



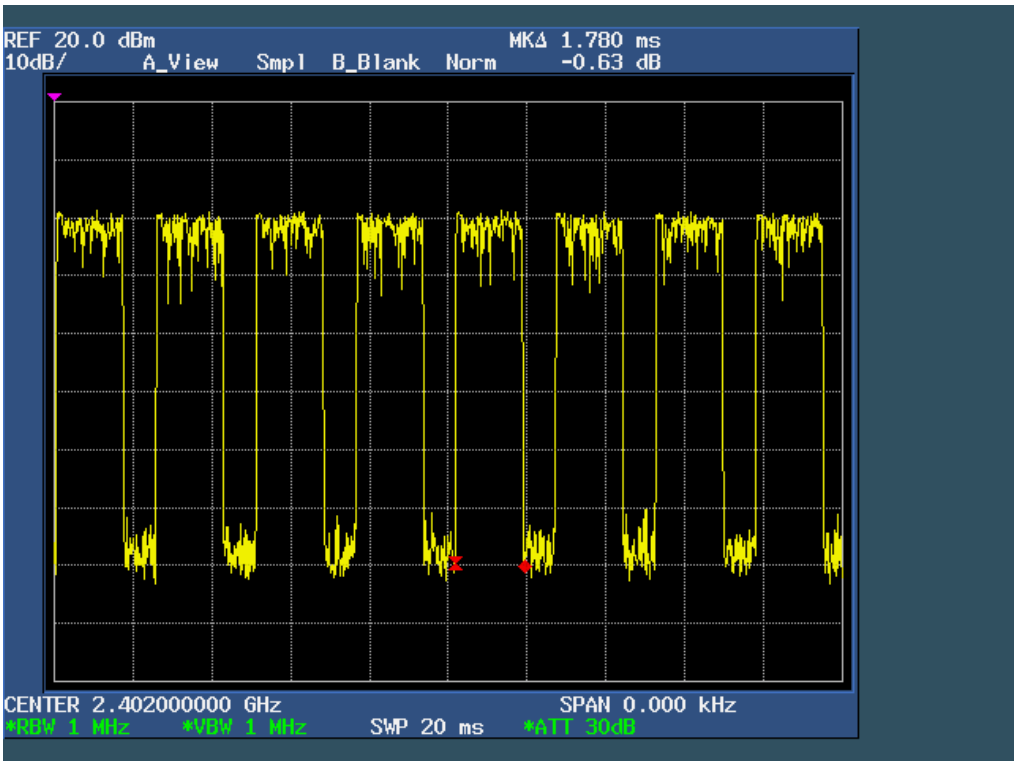
EUT：	Reverie 4.1 Bluetooth Speaker	Model Name ：	AM-BT-S01
Temperature：	26 ℃	Relative Humidity：	53%
Pressure：	1010 hPa	Test Power ：	DC 16.0 V from Adapter AC 120V/60Hz for Adapter
Test Mode ：	CH00-DH1/DH3/DH5 (3Mbps Mode)		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limits (s)
DH1	2402 MHz	0.500	0.1600	0.4000
DH3	2402 MHz	1.780	0.2848	0.4000
DH5	2402 MHz	3.100	0.3307	0.4000

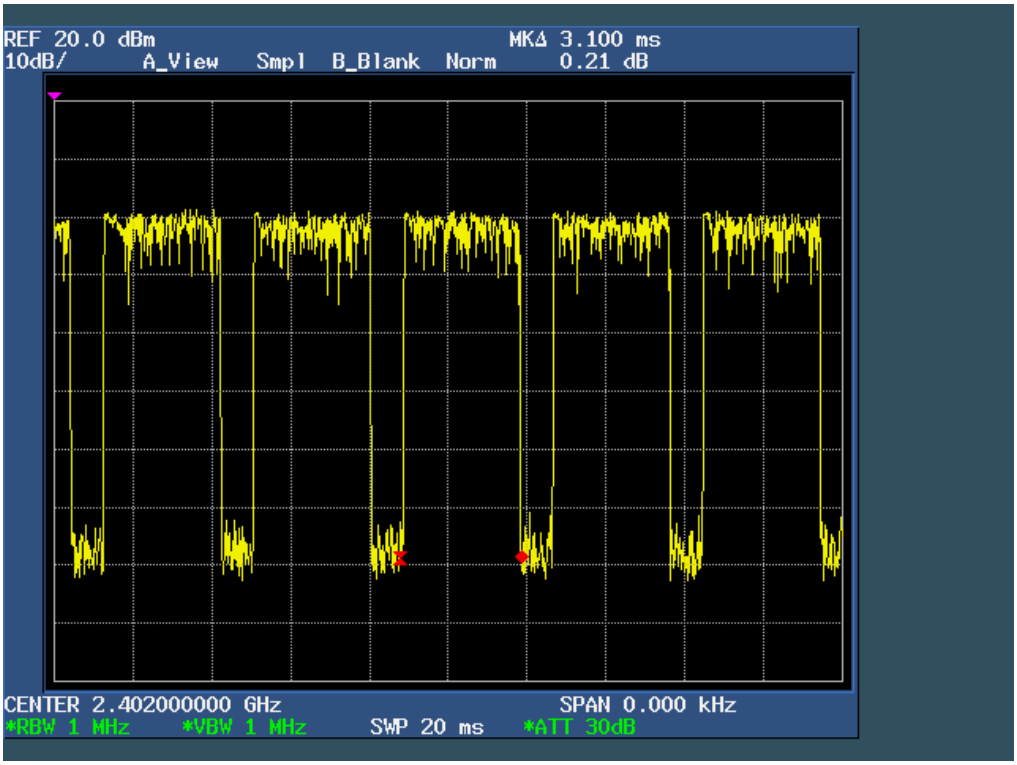
CH00-DH1



CH00-DH3



CH00-DH5



6.11 Maximum Peak Output Power

6.11.1 Applied procedures / Limit

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: 1watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

6.11.2 Test procedure

(1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as
Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
RBW > the 20 dB bandwidth of the emission being measured, VBW ≥ RBW, Sweep = auto
Detector function = peak, Trace = max hold

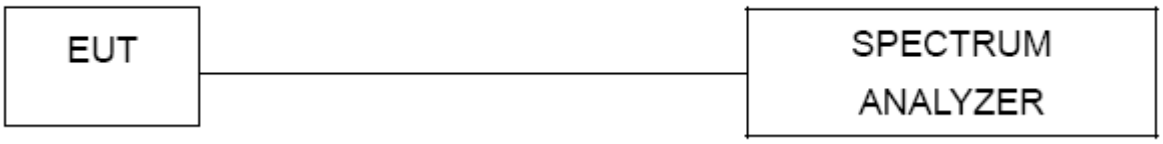
(2) The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

(3) The above procedure shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range with modulated mode. Also shall be performed at different modes of operation.

6.11.3 Deviation from standard

No deviation.

6.11.4Test setup

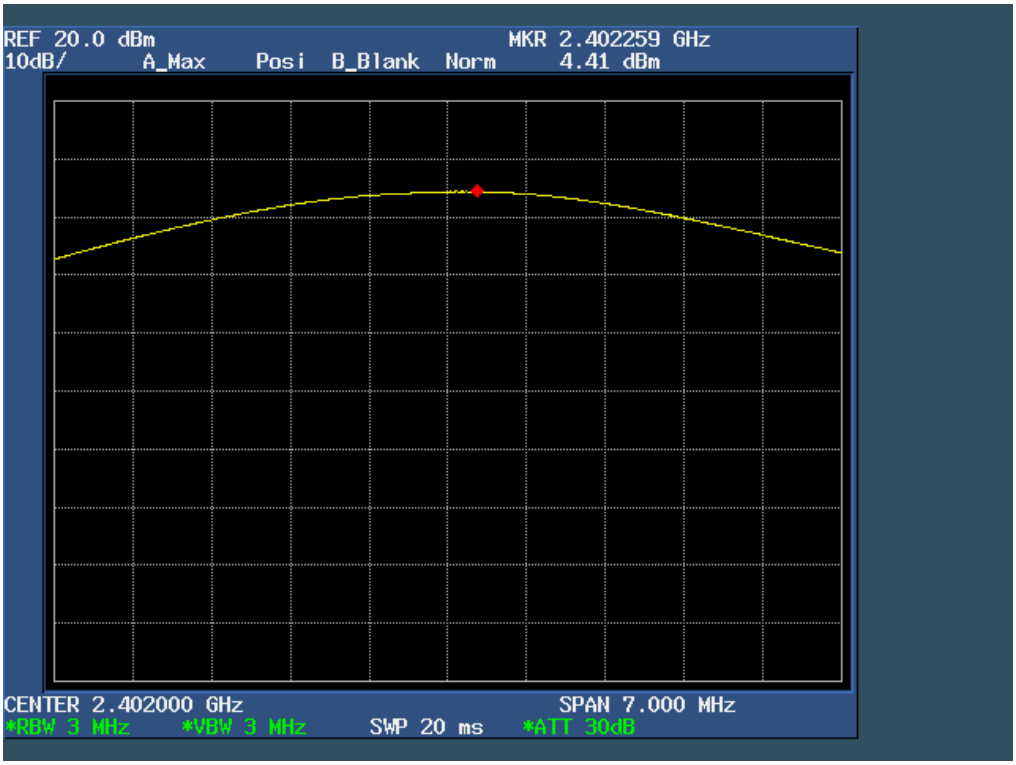


6.11.5 Test results

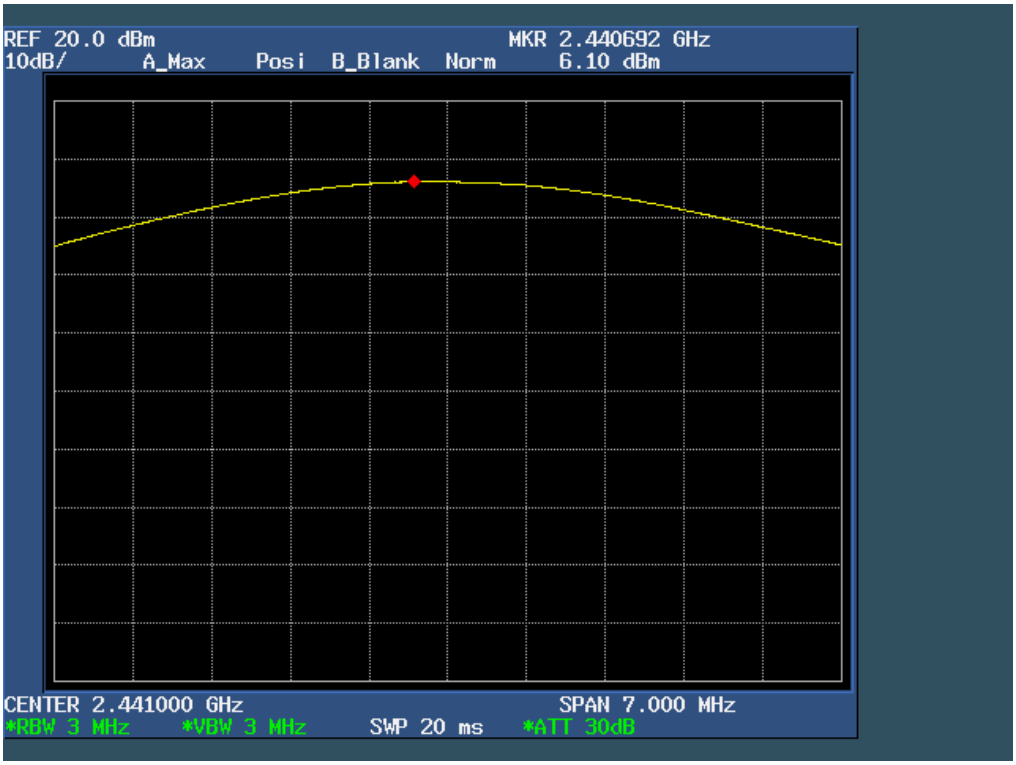
EUT：	Reverie 4.1 Bluetooth Speaker	Model Name ：	AM-BT-S01
Temperature：	26 ℃	Relative Humidity：	60%
Pressure：	1010 hPa	Test Voltage ：	DC 16.0 V from Adapter AC 120V/60Hz for Adapter
Test Mode ：	TX		
Note: All the data rates have be tested and the worst-case as the table below.			

Test Mode	Frequency	Reading Power (dBm)	Cable Loss (dB)	Peak Output Power (dBm)	Limit (dBm)	Result
Data rate 1Mbps	2402 MHz	4.41	0.5	4.91	30	Pass
	2441 MHz	6.10	0.5	6.60	30	Pass
	2480 MHz	5.76	0.5	6.26	30	Pass
Data rate 3Mbps	2402 MHz	2.70	0.5	3.20	30	Pass
	2441 MHz	4.55	0.5	5.05	30	Pass
	2480 MHz	4.25	0.5	4.75	30	Pass

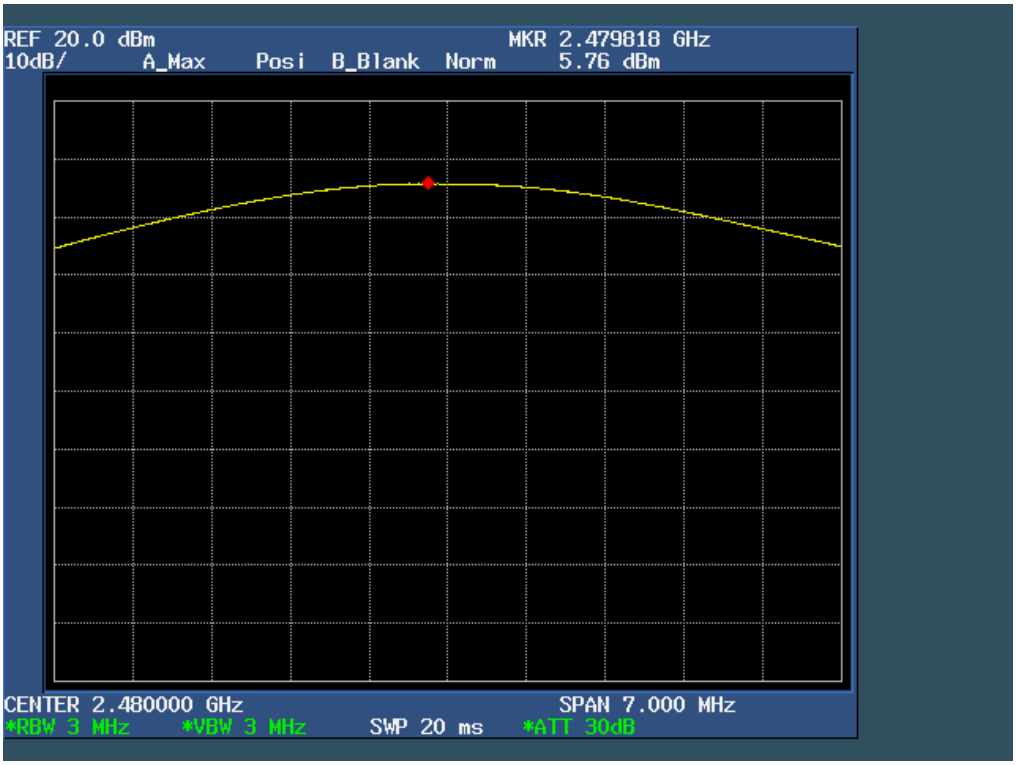
CH 00-1Mbps



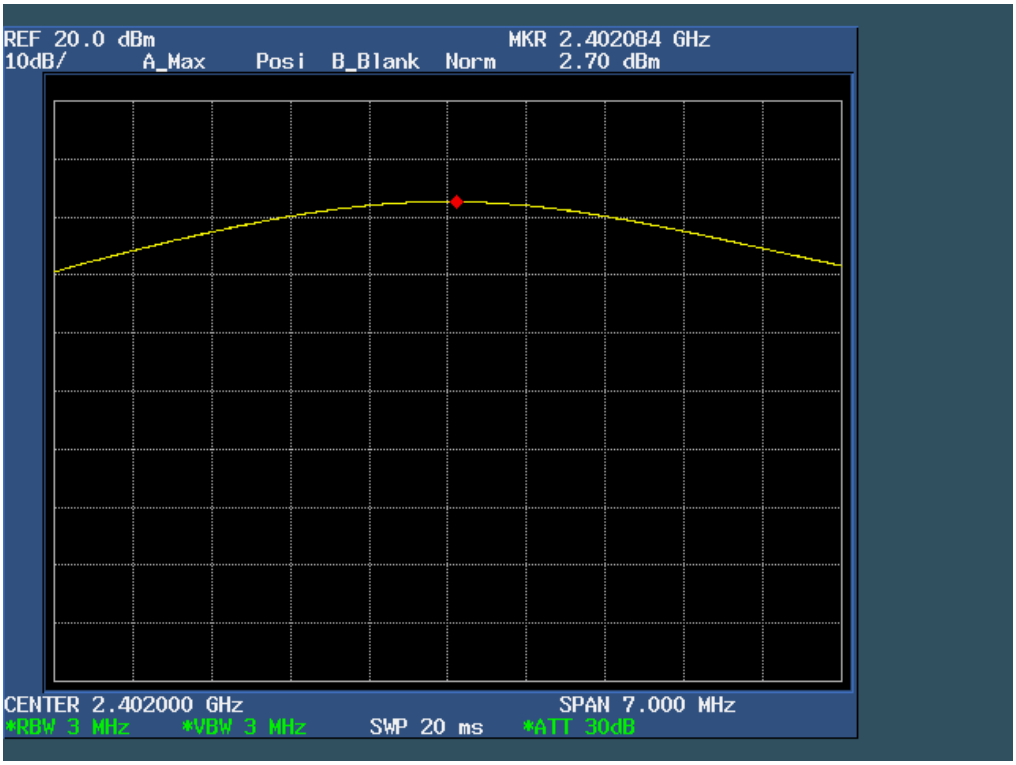
CH 39-1Mbps



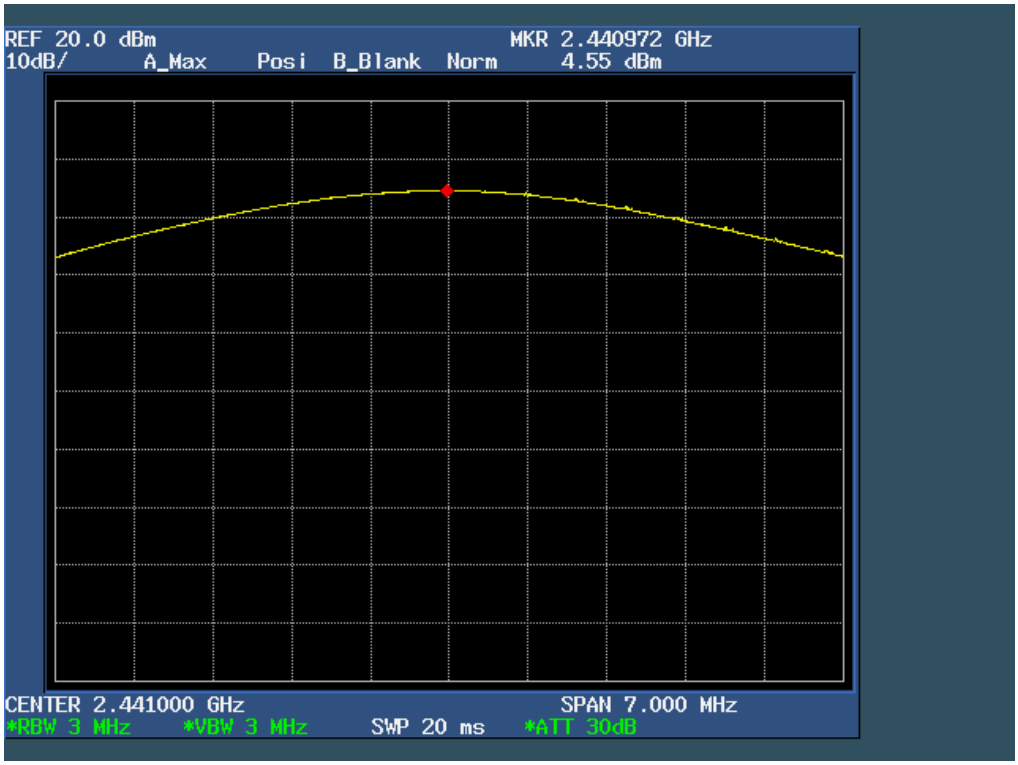
CH 78-1Mbps



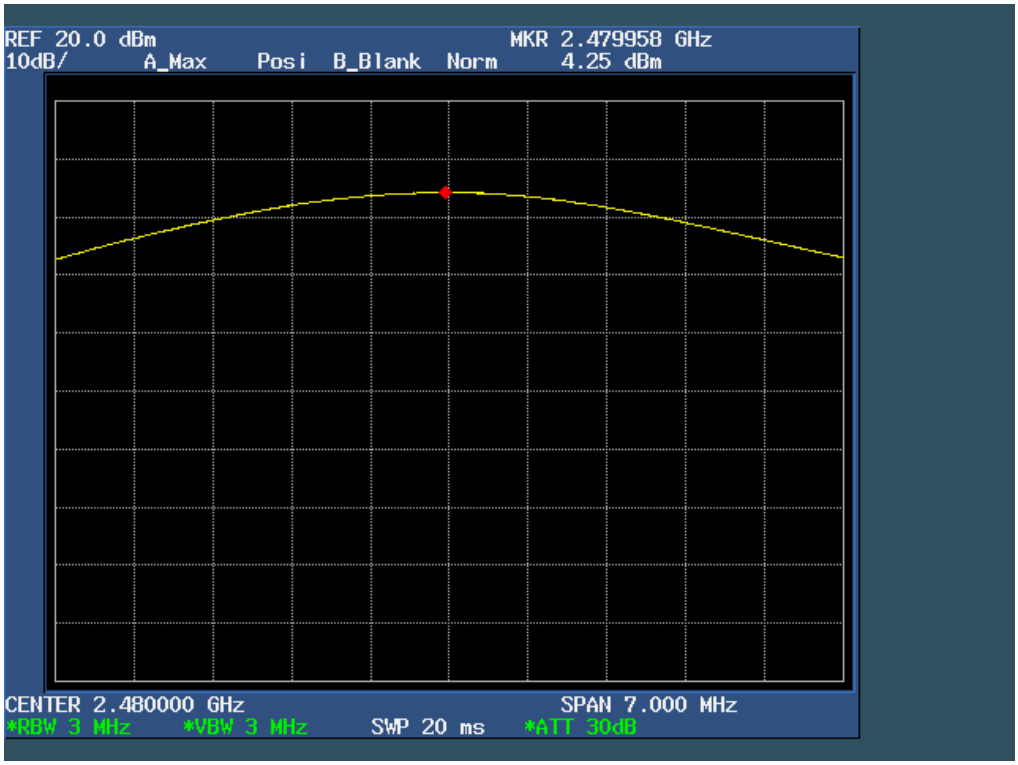
CH 00-3Mbps



CH 39-3Mbps



CH 78-3Mbps



6.12 Band edge

6.12.1 Applied procedures / Limit

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) (see Section 15.205(c)).

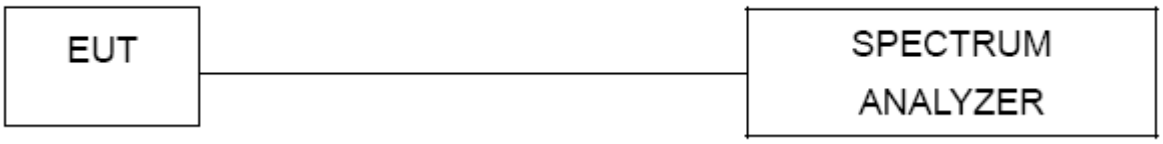
6.12.2 Test procedure

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation, RBW ≥ 1% of the span, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold

6.12.3 Deviation from standard

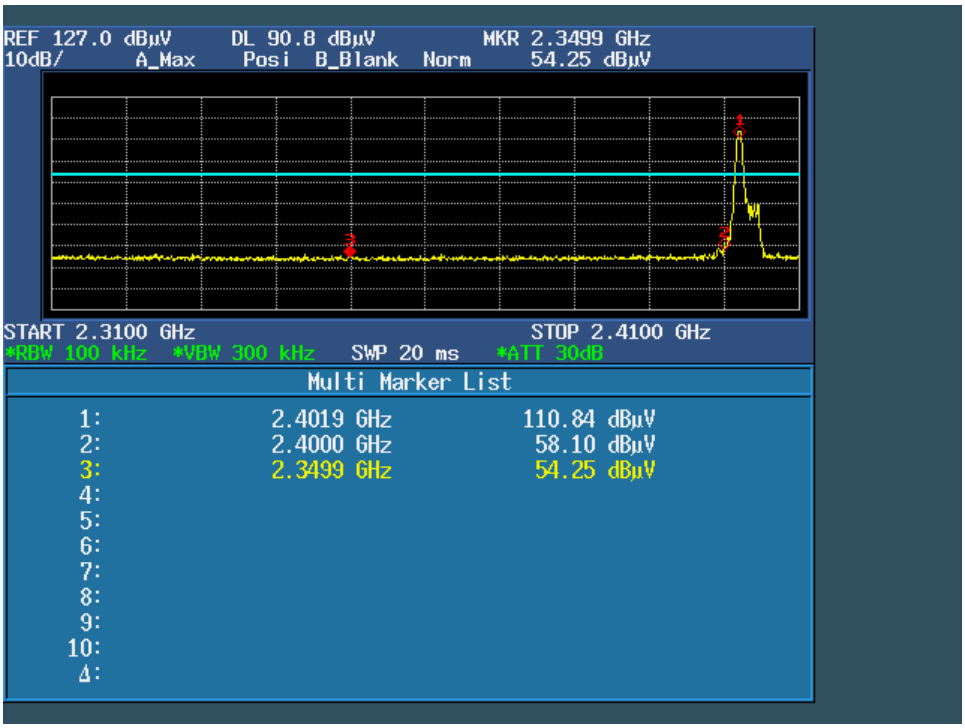
No deviation.

6.12.4 Test setup



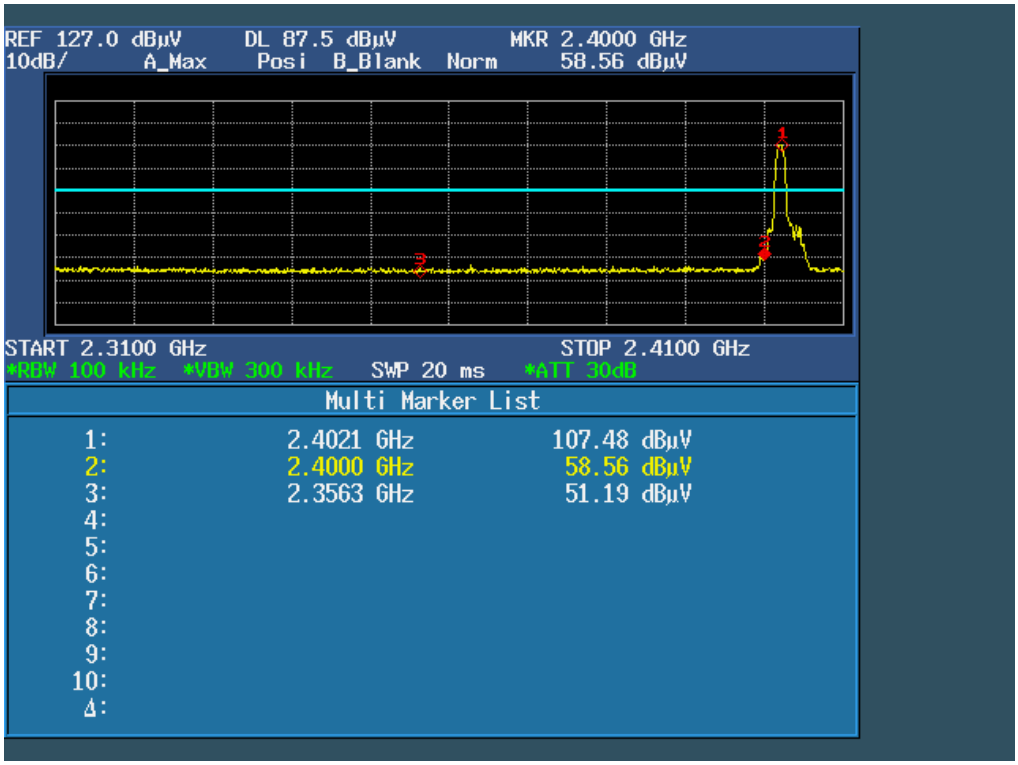
6.12.5Test results

CH00 (Lower) Data rate 1Mbps

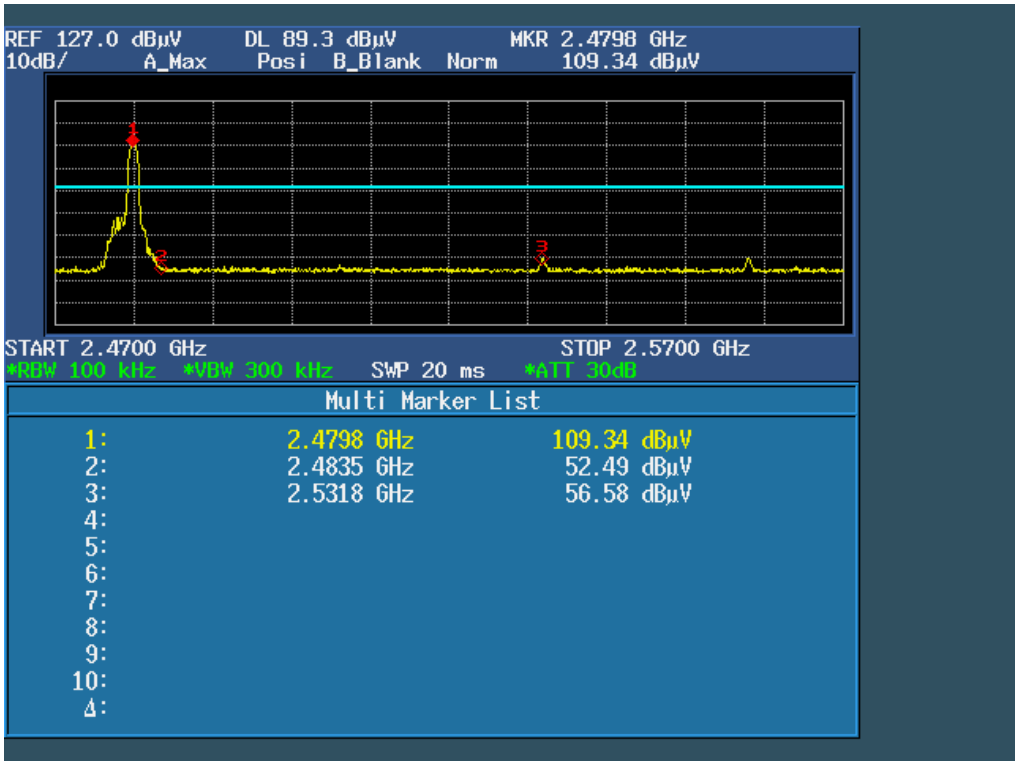


CH 78 (Upper) Data rate 1Mbps

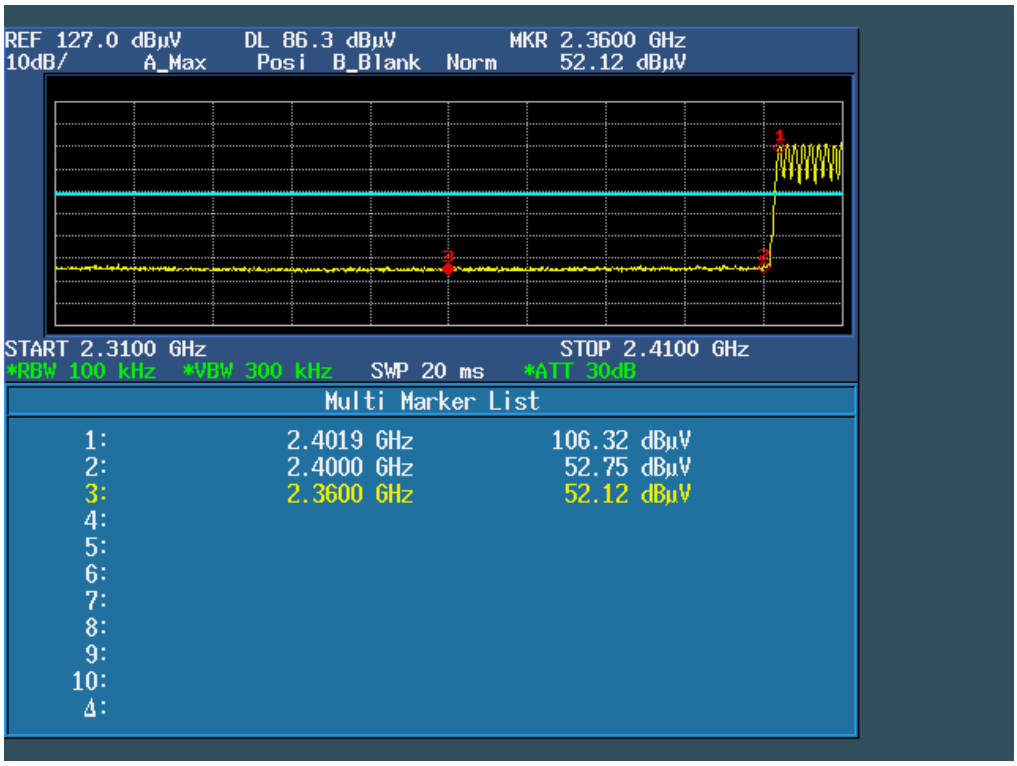
CH00 (Lower) Data rate 3Mbps



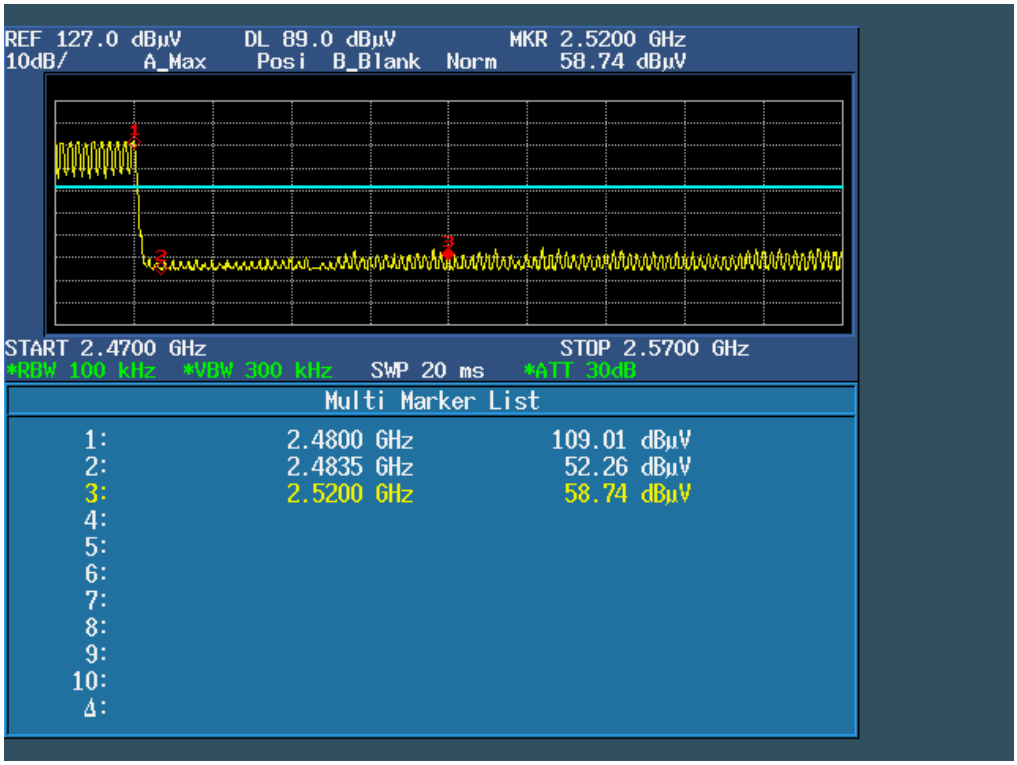
CH 78 (Upper) Data rate 3Mbps



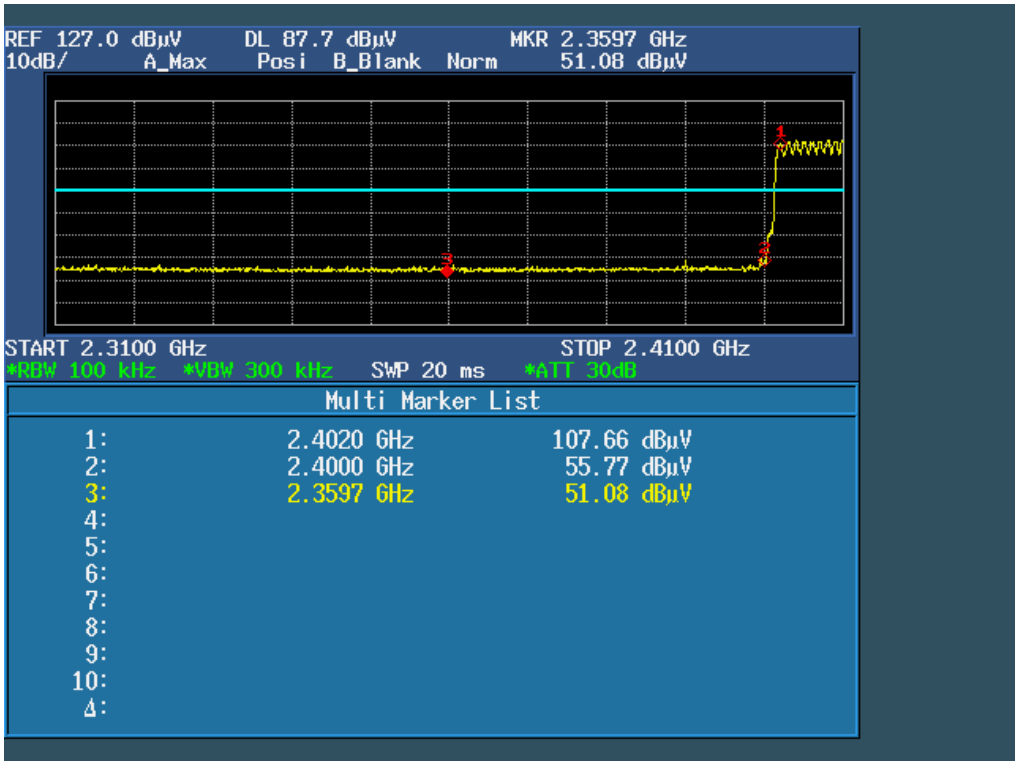
CH00 (Lower) Data rate 1Mbps



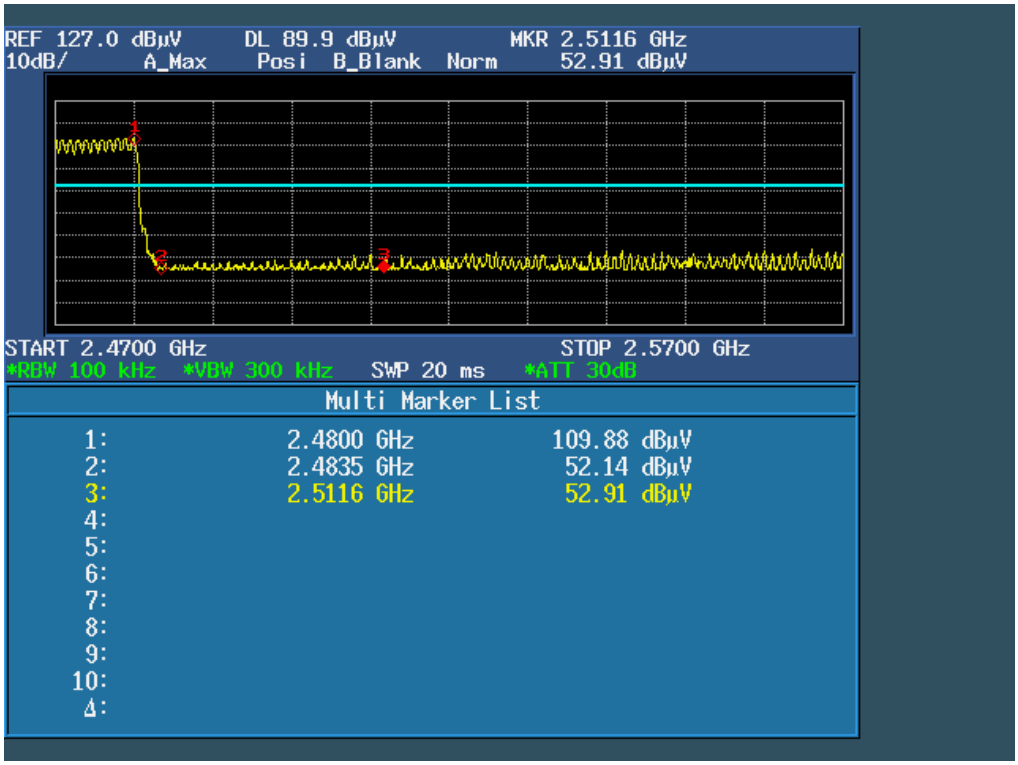
CH 78 (Upper) Data rate 1Mbps



CH00 (Lower) Data rate 3Mbps



CH 78 (Upper) Data rate 3Mbps



6.13 Conducted Spurious Emissions

6.13.1 Applied procedures / Limit

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) (see Section 15.205(c)).

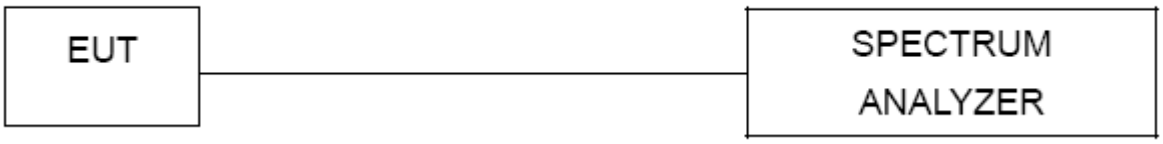
6.13.2 Test procedure

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10^{th} harmonic. Typically, several plots are required to cover this entire span. RBW = 100 kHz VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold

6.13.3 Deviation from standard

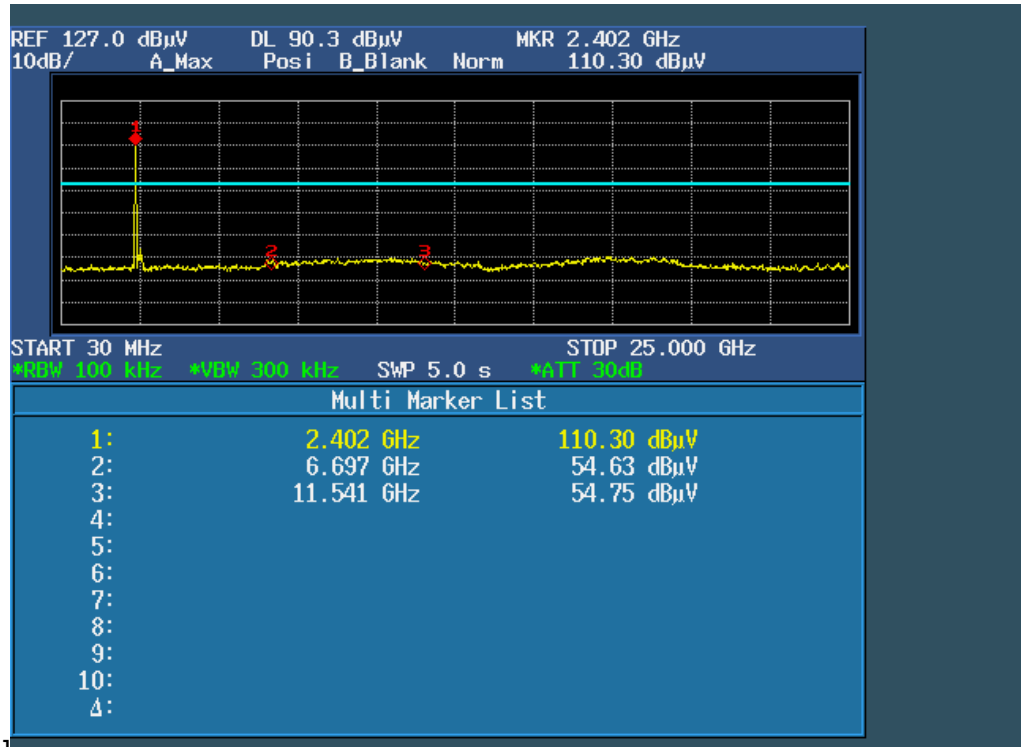
No deviation.

6.13.4 Test setup

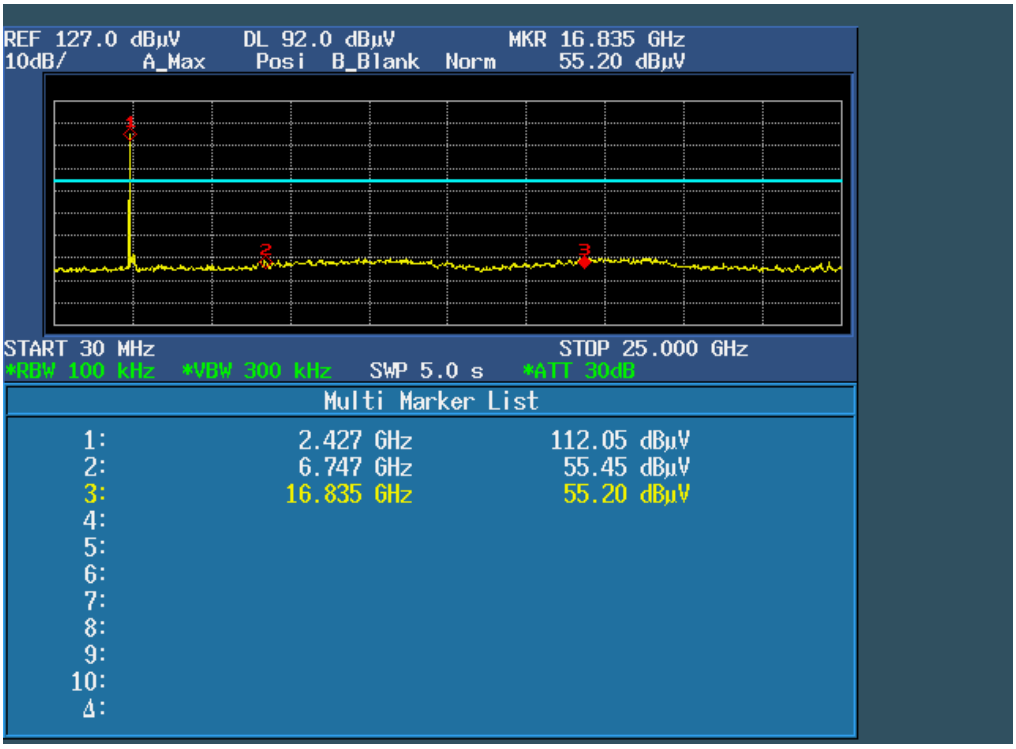


6.13.5 Test results

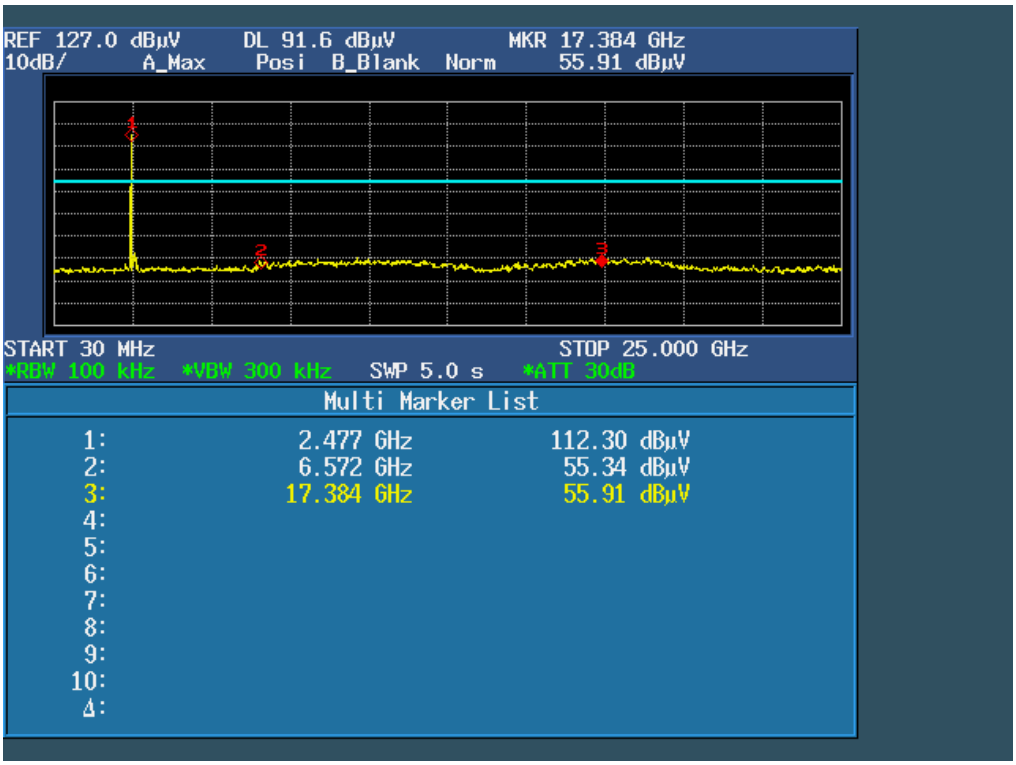
CH00 Data rate 1Mbps



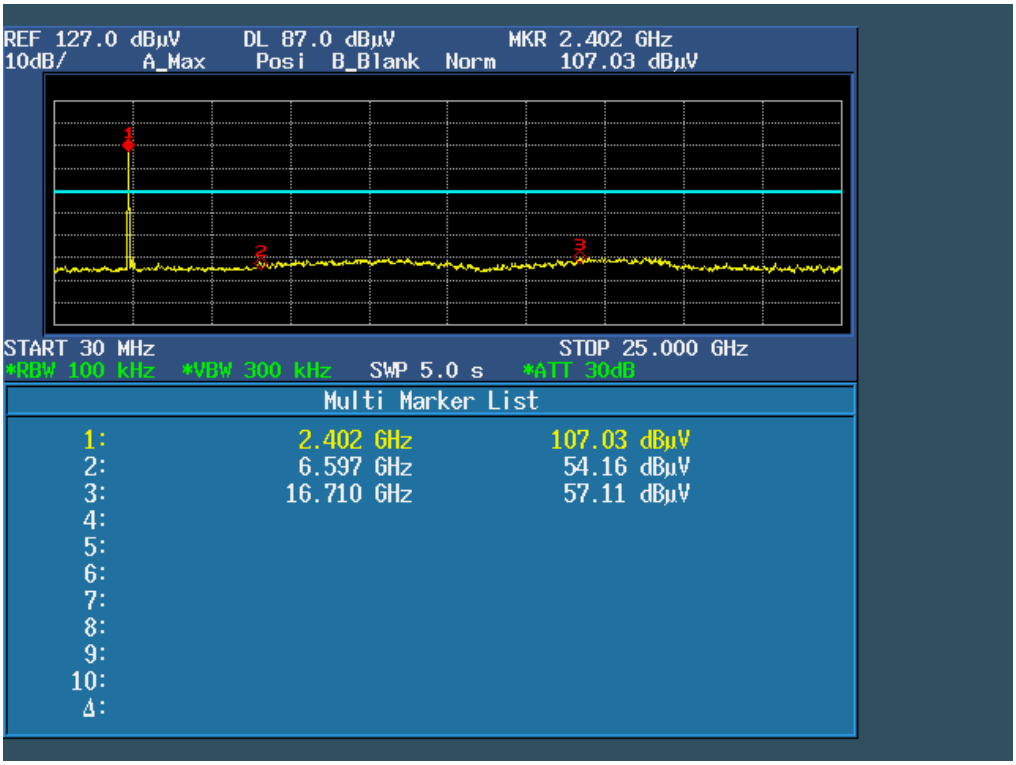
CH39 Data rate 1Mbps



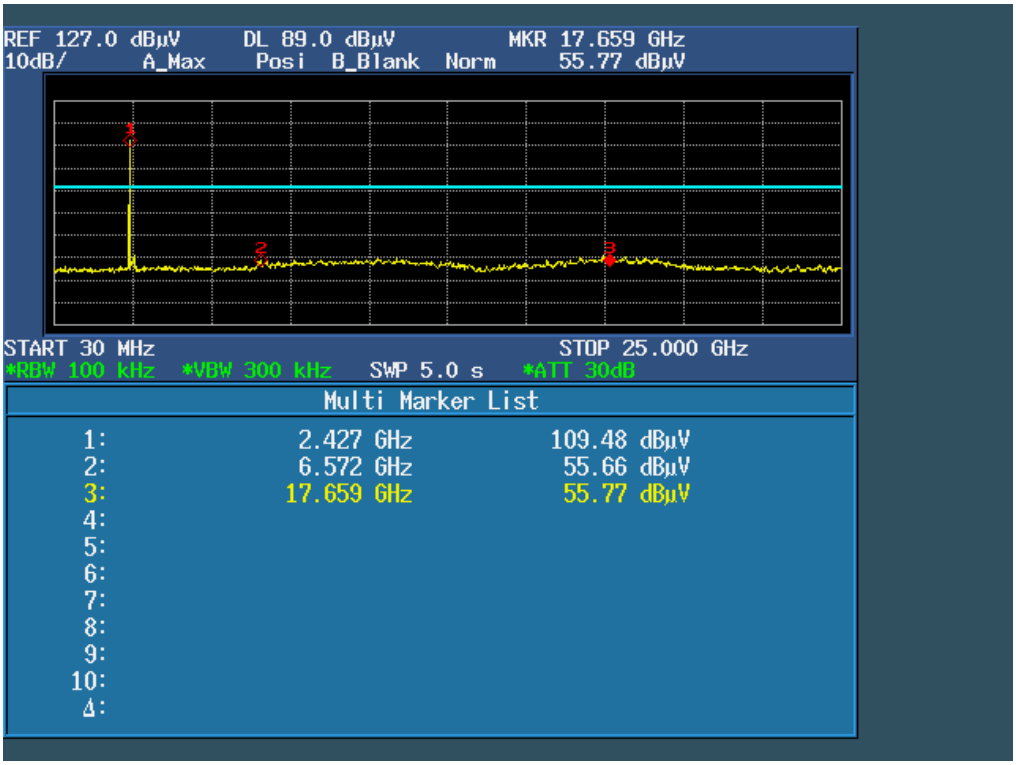
CH78 Data rate 1Mbps



CH00 Data rate 3Mbps



CH39 Data rate 3Mbps



CH78 Data rate 3Mbps