

FCC Test Report

Part 15 subpart C

Client Information:

Applicant : SHENZHEN GOLDSTONE HOROLOGY INDUSTRIAL CO., LTD
Applicant add.: 801, Block A, Xinlong Technoloy Park, 50 Xin'er Zhuangcun Road,
Shajing Street, Bao'an District, Shenzhen, China

EUT Information:

EUT Name : Heart Rate Monitor Quartz Watch
Model No. : GW002
Brand Name : N/A
FCC ID : 2AF66GW002

Prepared By:

Shenzhen ECT Testing Technology Co., Ltd.
Add. : Room 1106, Era Innovation Certer, Xixiang gushu second road,
Baoan district, Shenzhen city, China

Date of Receipt: Oct. 14, 2015
Date of Issue: Oct. 20, 2015

Date of Test: Oct. 15~20, 2015
Test Result: **Pass**

Test procedure used: ANSI C63.4-2009

This device described above has been tested by Shenzhen ECT Testing Technology Co., Ltd., 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.

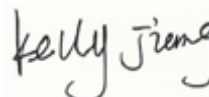
Reviewed by:



Jerome Luo



Approved by:



Back Huang

1 Contents

	Page
COVER PAGE	
1 CONTENTS	2
2 TEST SUMMARY	4
2.1 COMPLIANCE WITH FCC PART 15 SUBPART C	4
2.2 MEASUREMENT UNCERTAINTY	4
3 GENERAL INFORMATION	5
3.1 GENERAL DESCRIPTION OF EUT	5
3.2 DESCRIPTION OF TEST CONDITIONS	7
3.3 EUT PERIPHERAL LIST	8
3.4 TEST PERIPHERAL LIST	8
3.5 TEST LOCATION	8
4 EQUIPMENTS LIST FOR ALL TEST ITEMS	9
5 TEST RESULT	10
5.1 ANTENNA REQUIREMENT	10
5.1.1 Standard requirement	10
5.1.2 EUT Antenna	10
5.2 CONDUCTION EMISSIONS MEASUREMENT	11
5.2.1 Applied procedures / Limit	11
5.2.2 Test procedure	11
5.2.3 Test results	12
5.3 RADIATED EMISSIONS MEASUREMENT	14
5.3.1 Applied procedures / Limit	14
5.3.2 Test procedure	14
5.3.3 Test Result	15
5.3.4 TEST RESULTS (Restricted Bands Requirements)	20
5.4 BANDWIDTH TEST	26
5.4.1 Applied procedures / Limit	26
5.4.2 Test procedure	26
5.4.3 Deviation from standard	26
5.4.4 Test setup	26
5.4.5 Test results	27
5.5 MAXIMUM PEAK OUTPUT POWER	30
5.5.1 Applied procedures / Limit	30
5.5.2 Test procedure	30
5.5.3 Deviation from standard	30
5.5.4 Test setup	30
5.5.5 Test results	31

5.6	PEAK POWER DENSITY.....	
5.6.1	Applied procedures / Limit	34
5.6.2	Test procedure.....	34
5.6.3	Deviation from standard.....	34
5.6.4	Test results	35
5.7	BAND EDGE	38
5.7.1	Applied procedures / Limit	38
5.7.2	Test procedure.....	38
5.7.3	Deviation from standard.....	38
5.7.4	Test setup	38
5.7.5	Test results	39
5.8	CONDUCTED SPURIOUS EMISSIONS	40
5.8.1	Applied procedures / Limit	40
5.8.2	Test procedure.....	40
5.8.3	Deviation from standard.....	40
5.8.4	Test setup	40
5.8.5	Test results	41

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) and Section 15.203	PASS
6 dB Bandwidth	FCC Part 15 C:2013	section 15.247 (a)(2)	PASS
Maximum Peak Output Power	FCC Part 15 C:2013	section 15.247(b)(3)	PASS
Peak Power Spectral Density	FCC Part 15 C:2013	section 15.247(e)	PASS
Conducted Spurious Emission	FCC Part 15 C:2013	section 15.209 &15.247(d)	PASS
Radiated Spurious Emission	FCC Part 15 C:2013	section 15.209 &15.247(d)	PASS
Band Edges Measurement	FCC Part 15 C:2013	section 15.247 (d) &15.205	PASS
Conducted Emissions at Mains Terminals	FCC Part 15 C:2013	section 15.207	PASS

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	$\pm 1.38\text{dB}$
2	Radiated Emission Test	$\pm 3.57\text{dB}$

3 General Information

3.1 General Description of EUT

Manufacturer:	SHENZHEN GOLDSTONE HOROLOGY INDUSTRIAL CO., LTD
Manufacturer Address:	801, Block A,Xinlong Technoloy Park, 50 Xin'er Zhuangcun Road, Shajing Street, Bao'an District, Shenzhen, China
EUT Name:	Heart Rate Monitor Quartz Watch
Model No:	GW002
Operation frequency:	2402MHz to 2480MHz
Channel Number:	40
Modulation Technology:	GFSK
AntennaType:	Integral
Antenna Gain:	0 dBi
Brand Name:	N/A
Serial No:	GW003,GW004,GW005,GW006,GW007,GW008,GW009,GW010,GW011,GW012, GW013,GW014,GW015,GW016
Power Supply Range:	DC 5V from Host unit DC 3.7V from Battery
Power Supply:	DC 5V from Host unit DC 3.7V from Battery
Power Cord:	N/A
Effective Isotropic Radiated Power (max) :	-5.04 dBm

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. Pre-test the EUT in AC mode and B/O mode, find worse case in B/O mode.

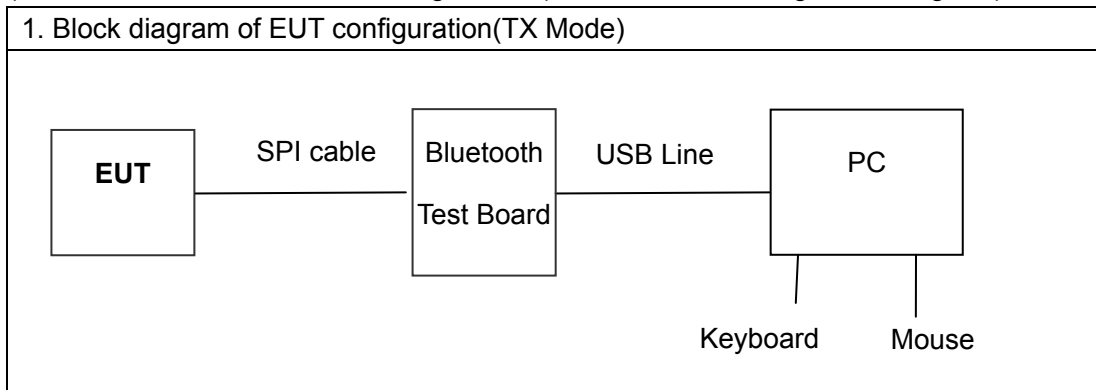
3. EUT channels and frequencies list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	27	2456
1	2404	28	2458
2	2406	29	2460
3	2408	30	2462
4	2410	31	2464
5	2412	32	2466
6	2414	33	2468
7	2416	34	2470
8	2418	35	2472
9	2420	36	2474
10	2422	37	2476
11	2424	38	2478
12	2426	39	2480
13	2428	40	/
14	2430	41	/
15	2432	42	/
16	2434	43	/
17	2436	44	/
18	2438	45	/
19	2440	46	/
20	2442	47	/
21	2444	48	/
22	2446	49	/
23	2448	50	/
24	2450	51	/
25	2452	52	/
26	2454	53	/

4. The USB cable only can connect to PC for charging. It can't transfer data.
5. According to the declaration of the applicant, the electrical circuit design, layout, components used and internal wiring were identical for above models, with only difference being the model no.. Therefore, only one model **GW002** was tested in this report.

3.2 Description of Test conditions

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



- (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 .

3.3 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

3.4 Test Peripheral List

No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	signal cable
1	Lap top	ASUS	N/A	X401A	X16-96072	N/A	N/A
2	Adapter (laptop)	ASUS	N/A	EXA0703 YH	N/A	1.8m/unshielded /detachable	N/A
3.	USB Cable	N/A	N/A	N/A	N/A	0.4m/unshielded /detachable	N/A

3.5 Test Location

All tests were performed at:

DONGGUAN UTL ELECTRONIC TECHNOLOGY CO., LTD.

1F,Hengzheng Bldg, North Road of Station, Nancheng District, DongGuan, GuangDong, China.

The FCC Registration No. of DONGGUAN UTL ELECTRONIC TECHNOLOGY CO., LTD. is 713614.

4 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	2015.10.16	2016.10.15
2	EMI Measuring Receiver	Schaffner	SCR3501	235	2015.10.16	2016.10.15
3	Low Noise Pre Amplifier	Tsj	MLA-10K01-B01-27	1205323	2015.09.08	2016.09.07
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2015.04.08	2016.04.07
5	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2015.07.05	2016.07.04
6	Broadband Horn Antenna	SCHWARZBECK	BBHA9120A	451	2015.07.05	2016.07.04
7	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2015.09.08	2016.09.07
8	EMI Test Receiver	R&S	ESCI	100124	2014.12.29	2015.12.28
9	LISN	Kyoritsu	KNW-242	8-837-4	2015.04.08	2016.04.07
10	LISN	Kyoritsu	KNW-407	8-1789-3	2015.04.08	2016.04.07
11	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2015.04.08	2016.04.07
12	Loop Antenna	ARA	PLA-1030/B	1029	2015.04.08	2016.04.07
13	Power Meter	R&S	NRVS	101336	2015.04.08	2016.04.07
14	EMI Test Receiver	Rohde & Schwarz	ESIB26	100394	2015.04.08	2016.04.07

5 Test Result

5.1 Antenna Requirement

5.1.1 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.

5.1.2 EUT Antenna

The antenna is integrated on the main PCB and no consideration of replacement. Antenna gain is max 0 dBi from 2.4GHz to 2.5GHz.

5.2 Conduction Emissions Measurement

5.2.1 Applied procedures / Limit

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	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.

5.2.2 Test procedure

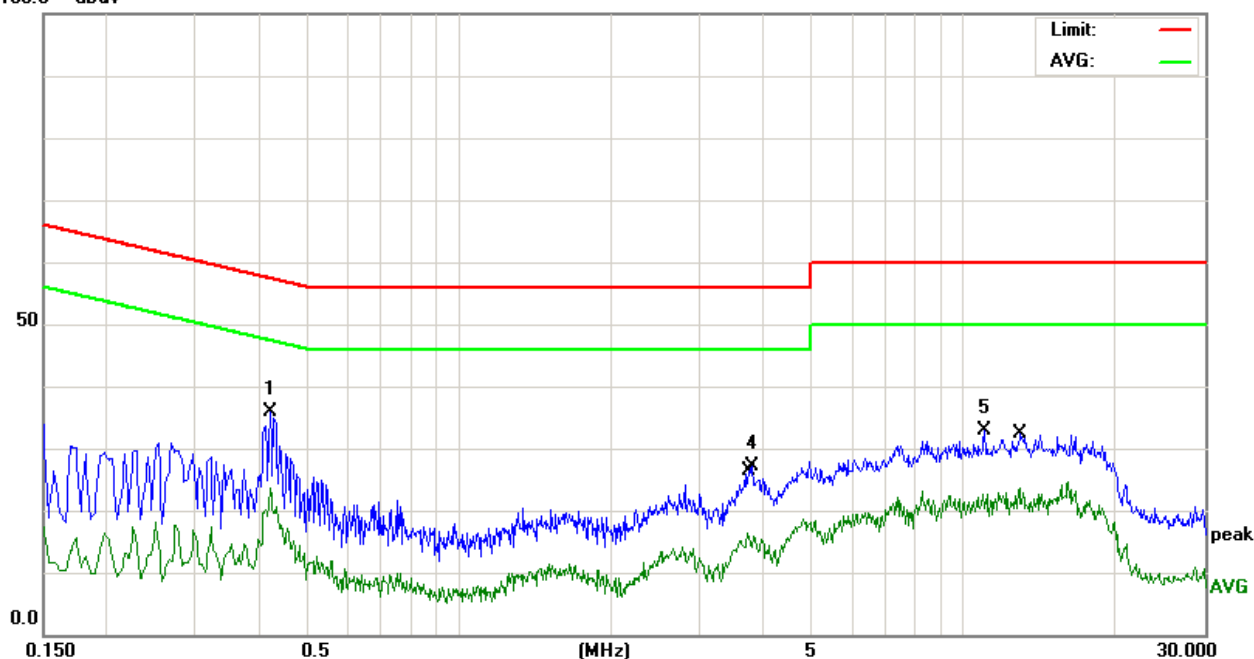
EUT was placed upon a wooden test table 0.8m above the horizontal metal reference plane and 0.4m from the vertical ground plane, and it was connected to an AMN. The closest distance between the boundary of the EUT and the surface of the AMN is 0.8m. All peripherals were connected to another AMN, and 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.

5.2.3 Test results

EUT:	Heart Rate Monitor Quartz Watch	Model Name. :	GW002
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Test Date :	2015-10-19
Test Mode:	TX	Phase :	Line
Test Voltage :	DC 5V from laptop, AC 120V/60Hz for laptop adapter		

Level(dBμV)

100.0 dBμV



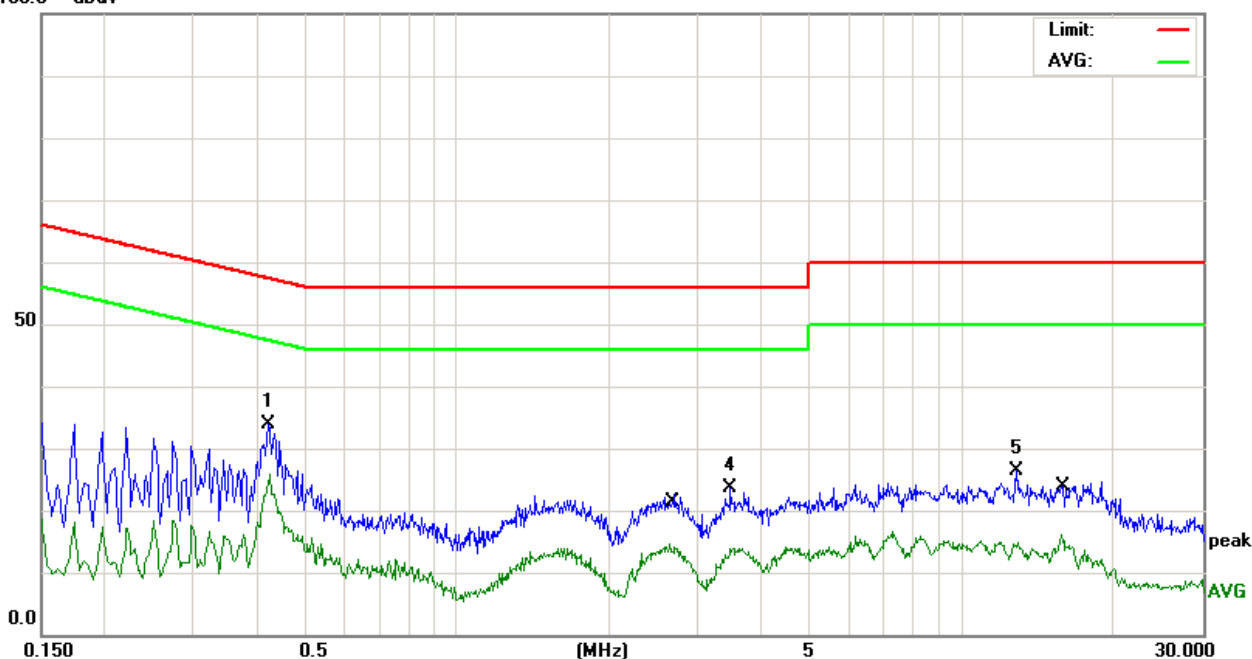
Measure data:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	Level	Factor	ment			Detector
			dBμV	dB	dBμV	dBμV	dB	
1	*	0.4220	25.80	10.11	35.91	57.41	-21.50	QP
2		0.4220	13.64	10.11	23.75	47.41	-23.66	AVG
3		3.7220	6.27	10.05	16.32	46.00	-29.68	AVG
4		3.8140	17.03	10.05	27.08	56.00	-28.92	QP
5		11.0020	31.47	1.30	32.77	60.00	-27.23	QP
6		12.8740	22.19	1.35	23.54	50.00	-26.46	AVG

EUT:	Heart Rate Monitor Quartz Watch	Model Name. :	GW002
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Test Date :	2015-10-19
Test Mode:	TX	Phase :	Neutral
Test Voltage :	DC 5V from laptop, AC 120V/60Hz for laptop adapter		

Level(dBμV)

100.0 dBμV



Measure result:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBμV	dB	dBμV	dBμV	dB	Detector
1		0.4220	23.79	10.11	33.90	57.41	-23.51	QP
2	*	0.4260	15.75	10.10	25.85	47.33	-21.48	AVG
3		2.6500	4.55	10.02	14.57	46.00	-31.43	AVG
4		3.4860	13.59	10.04	23.63	56.00	-32.37	QP
5		12.8258	24.99	1.35	26.34	60.00	-33.66	QP
6		15.7659	14.66	1.50	16.16	50.00	-33.84	AVG

5.3 Radiated Emissions Measurement

5.3.1 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)
	$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$	
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

5.3.2 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.

5.3.3 Test Result

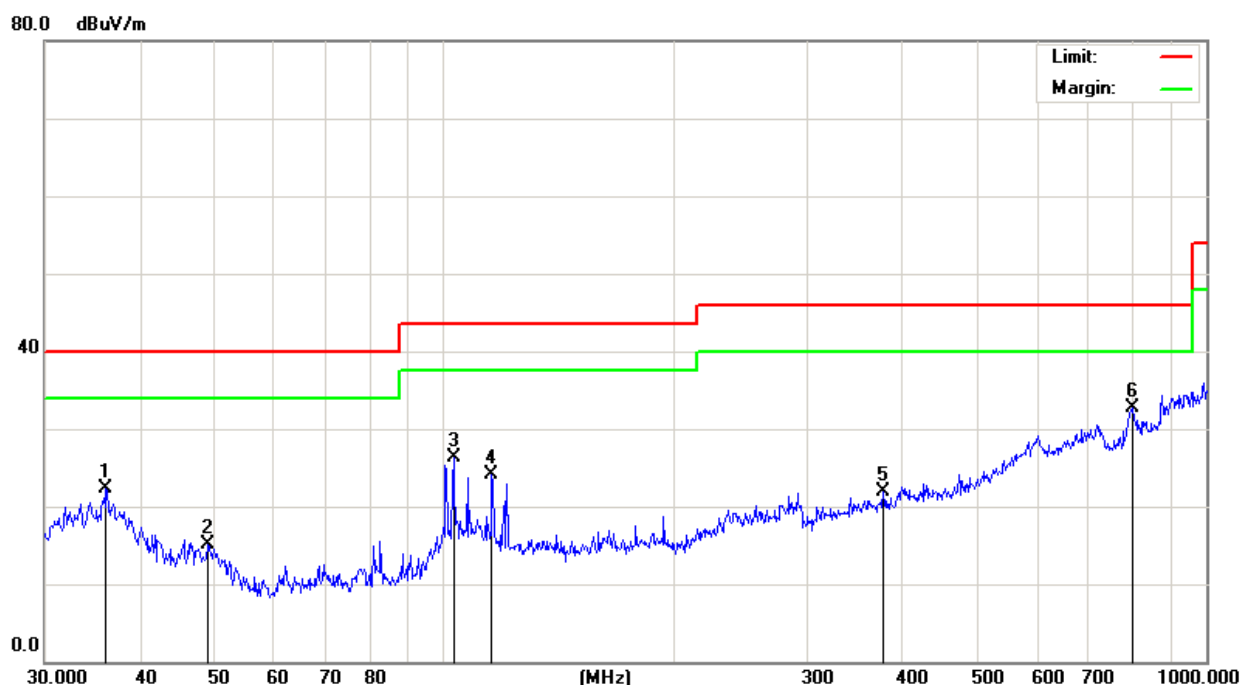
There is not detected blow 30MHz.

EUT:	Heart Rate Monitor Quartz Watch	Model Name :	GW002
Temperature:	25 °C	Test Data	2015-10-19
Pressure:	1010 hPa	Relative Humidity:	60%
Test Mode :	TX	Test Voltage :	DC 3.7V from battery
Measurement Distance	3 m	Frenqucy Range	30MHz to 1GHz
RBW/VBW	100KHz / 300KHz for spectrum, RBW=120KHz for receiver.		

(a) Antenna polarization: vertical

Peak scan

Level (dBμV/m)

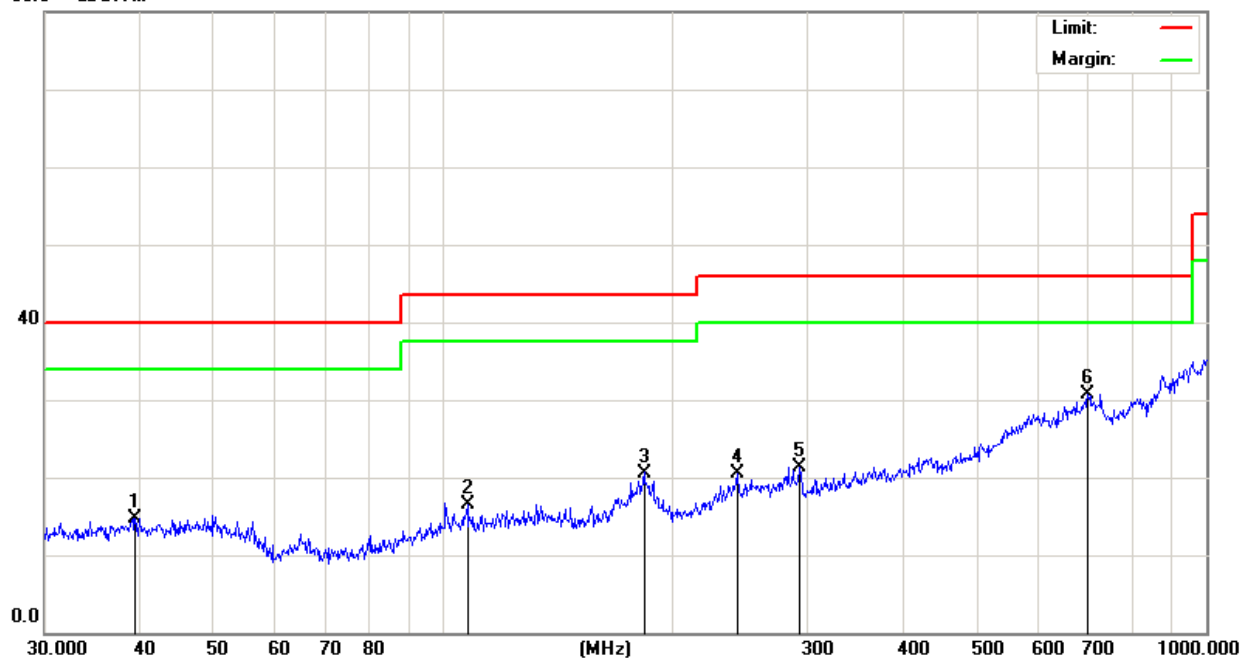


Quasi-peak measurement

No.	Mk.	Freq. MHz	Reading Level dBμV	Correct Factor dB	Measure- ment dBμV/m	Limit dBμV/m	Over dB	Detector
1		36.1272	38.94	-16.64	22.30	40.00	-17.70	OP
2		49.0144	33.48	-18.42	15.06	40.00	-24.94	OP
3		103.0799	39.91	-13.54	26.37	43.50	-17.13	OP
4		115.7256	38.22	-14.13	24.09	43.50	-19.41	OP
5		377.2590	29.63	-7.65	21.98	46.00	-24.02	OP
6	*	798.9796	29.56	3.24	32.80	46.00	-13.20	OP

(b) Antenna polarization: Horizontal

Peak scan

Level (dB μ V/m)80.0 dB μ V/m

Quasi-peak measurement

No.	Mk.	Freq. MHz	Reading Level dB μ V	Correct Factor dB	Measure- ment dB μ V/m	Limit dB μ V/m	Over dB	Detector
1		39.4371	29.13	-14.36	14.77	40.00	-25.23	OP
2		107.5101	31.72	-15.31	16.41	43.50	-27.09	OP
3		183.2005	30.99	-10.39	20.60	43.50	-22.90	OP
4		242.5253	31.87	-11.41	20.46	46.00	-25.54	OP
5		293.0842	31.19	-9.87	21.32	46.00	-24.68	OP
6	*	699.3046	30.51	0.14	30.65	46.00	-15.35	OP

Note: '*' means the worst case

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss-Pre-amplifier

EUT:	Heart Rate Monitor Quartz Watch	Model Name :	GW002
Temperature:	25 °C	Test Data	2015-10-19
Pressure:	1010 hPa	Relative Humidity:	60%
Test Mode :	1Mbps(the worst case)	Test Voltage :	DC 3.7V from battery
Measurement Distance	3 m	Frenqucy Range	1GHz to 25GHz
RBW/VBW	1MHz/1MHz for Peak, 1MHz/10Hz for Average.		

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Vertical Measurement:

Frequency (MHz)	Reading Level (dB μ V)	factor (dB)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Antenna polarization
4804.000	47.18	5.06	52.24	74.00	-21.76	peak
*4804.000	34.83	5.06	39.89	54.00	-14.11	AVG
7206.000	44.02	7.03	51.05	74.00	-22.95	peak
7206.000	32.37	7.03	39.40	54.00	-14.60	AVG

Horizontal Measurement:

Frequency (MHz)	Reading Level (dB μ V)	factor (dB)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Antenna polarization
4804.000	43.67	5.06	48.73	74.00	-25.27	peak
*4804.000	32.60	5.06	37.66	54.00	-16.34	AVG
7206.000	40.95	7.03	47.98	74.00	-26.02	peak
7206.000	30.49	7.03	37.52	54.00	-16.48	AVG

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-PreAmplifier

Low Channel 00: 2402 MHz

Data rate: 1Mbps

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Vertical Measurement:

Frequency (MHz)	Reading Level (dB μ V)	factor (dB)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Antenna polarization
4880.000	44.41	5.14	49.55	74.00	-24.45	peak
*4880.000	32.56	5.14	37.70	54.00	-16.30	AVG
7320.000	40.67	7.52	48.19	74.00	-25.81	peak
7320.000	29.49	7.52	37.01	54.00	-16.99	AVG

Horizontal Measurement:

Frequency (MHz)	Reading Level (dB μ V)	factor (dB)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Antenna polarization
4880.000	43.53	5.14	48.67	74.00	-25.33	peak
*4880.000	33.62	5.14	38.76	54.00	-15.24	AVG
7320.000	41.22	7.52	48.74	74.00	-25.26	peak
7320.000	30.04	7.52	37.56	54.00	-16.44	AVG

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-PreAmplifier

Middle Channel 19: 2440 MHz

Data rate: 1Mbps

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Vertical Measurement:

Frequency (MHz)	Reading Level (dB μ V)	factor (dB)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Antenna polarization
4960.000	43.66	5.22	48.88	74.00	-25.12	peak
*4960.000	34.12	5.22	39.34	54.00	-14.66	AVG
7440.000	40.14	8.06	48.20	74.00	-25.80	peak
7440.000	29.98	8.06	38.04	54.00	-15.96	AVG

Horizontal Measurement:

Frequency (MHz)	Reading Level (dB μ V)	factor (dB)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Antenna polarization
4960.000	42.74	5.22	47.96	74.00	-26.04	peak
4960.000	32.78	5.22	38.00	54.00	-16.00	AVG
7440.000	39.67	8.06	47.73	74.00	-26.27	peak
*7440.000	30.18	8.06	38.24	54.00	-15.76	AVG

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-PreAmplifier

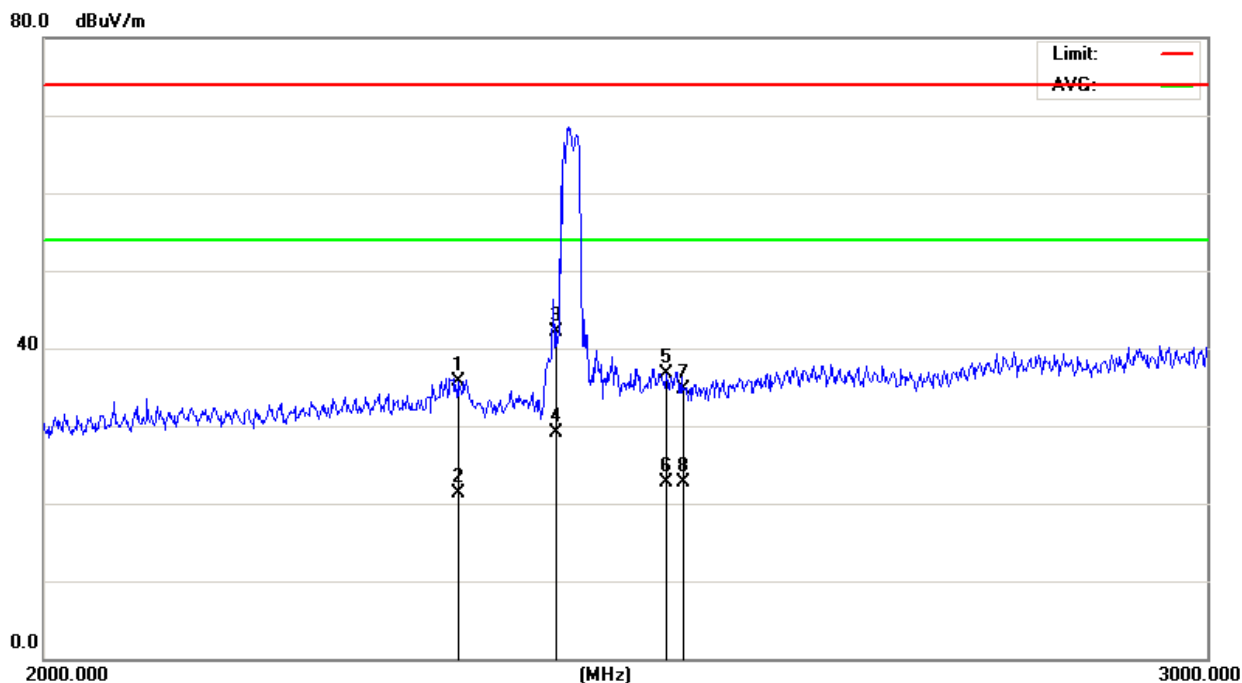
High Channel 39: 2480 MHz

Data rate: 1Mbps

5.3.4 TEST RESULTS (Restricted Bands Requirements)

1. Low Channel

Vertical:

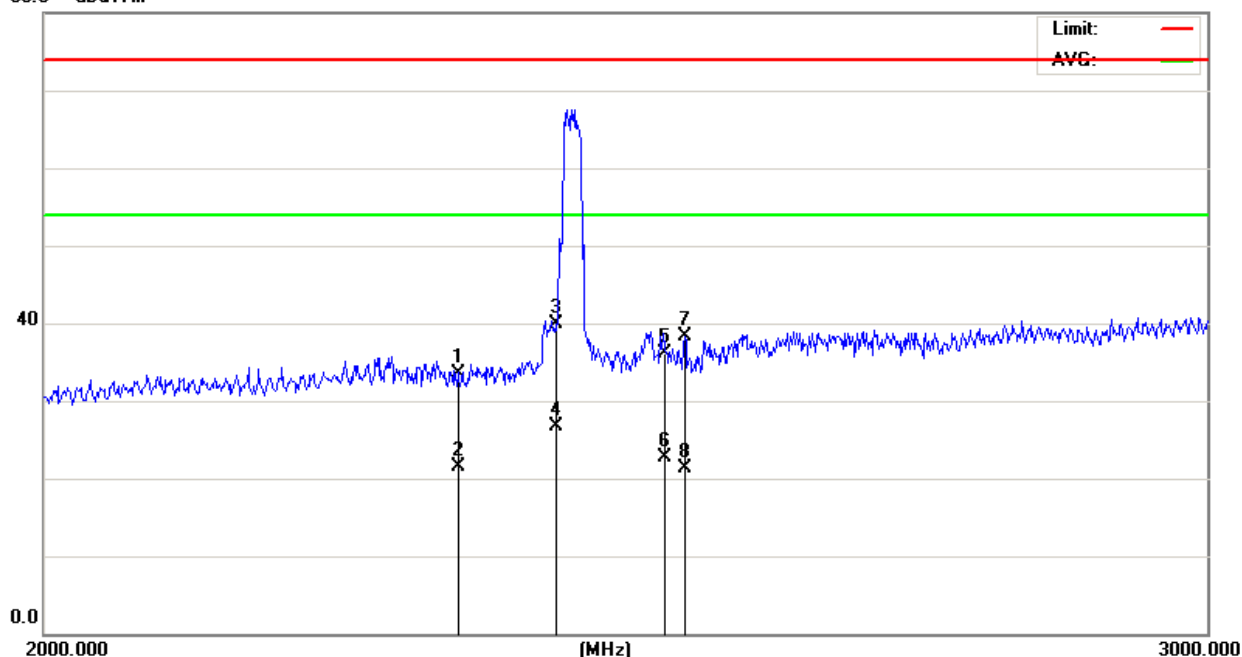


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	42.12	-6.42	35.70	74.00	-38.30	peak
2		2310.000	27.64	-6.42	21.22	54.00	-32.78	AVG
3		2390.000	47.89	-5.79	42.10	74.00	-31.90	peak
4	*	2390.000	34.98	-5.79	29.19	54.00	-24.81	AVG
5		2483.500	41.68	-4.98	36.70	74.00	-37.30	peak
6		2483.500	27.69	-4.98	22.71	54.00	-31.29	AVG
7		2500.000	39.53	-4.83	34.70	74.00	-39.30	peak
8		2500.000	27.55	-4.83	22.72	54.00	-31.28	AVG

1. Low Channel

Horizontal:

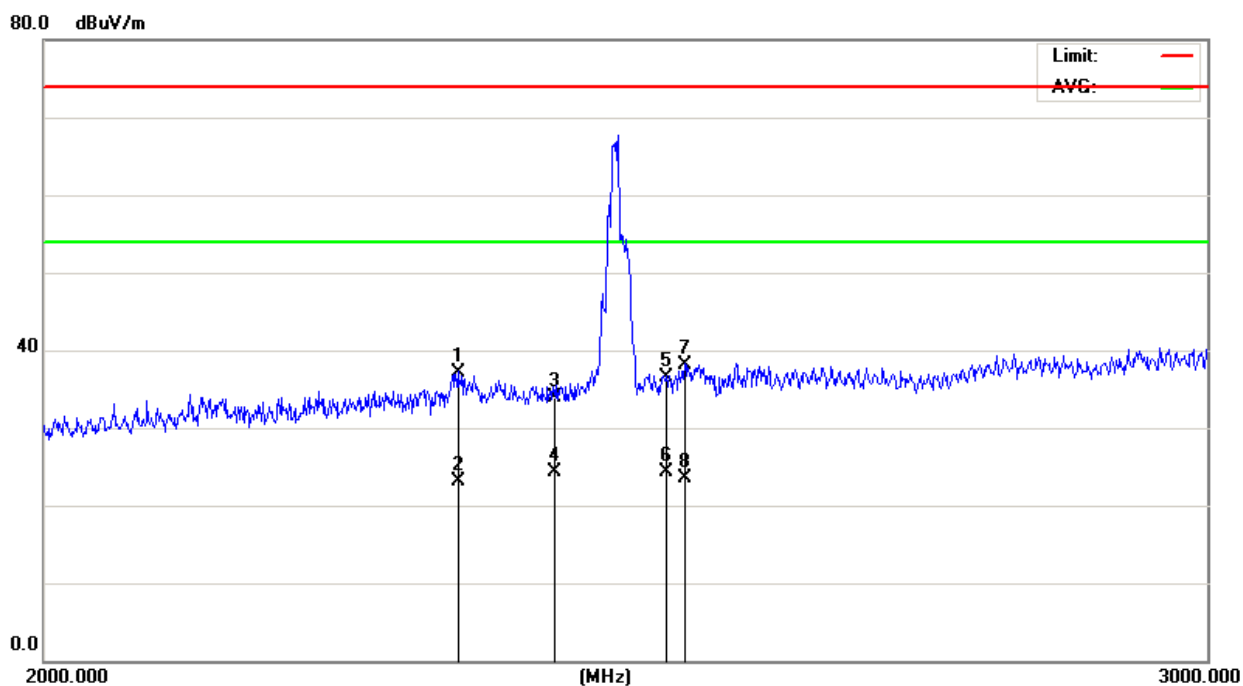
80.0 dBuV/m



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2310.000	40.02	-6.42	33.60	74.00	-40.40	peak
2		2310.000	28.02	-6.42	21.60	54.00	-32.40	AVG
3		2390.000	45.79	-5.79	40.00	74.00	-34.00	peak
4	*	2390.000	32.54	-5.79	26.75	54.00	-27.25	AVG
5		2483.500	41.18	-4.98	36.20	74.00	-37.80	peak
6		2483.500	27.67	-4.98	22.69	54.00	-31.31	AVG
7		2500.000	43.23	-4.83	38.40	74.00	-35.60	peak
8		2500.000	26.10	-4.83	21.27	54.00	-32.73	AVG

2. Middle Channel

Vertical:

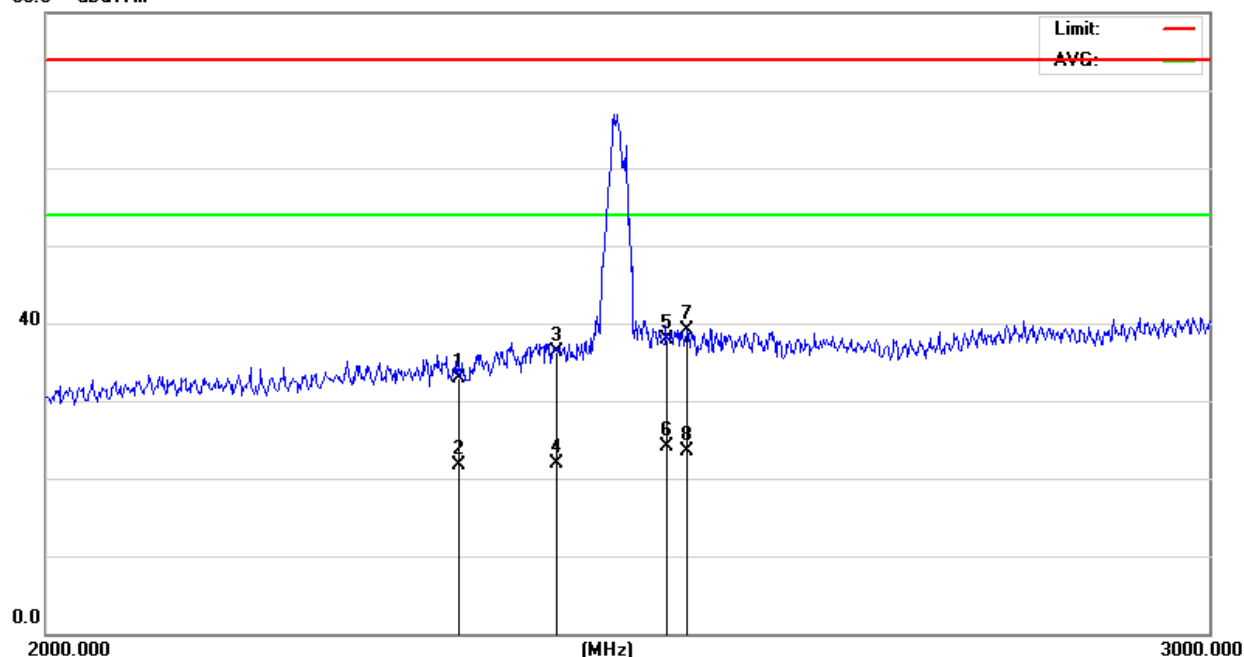


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2310.000	40.92	-6.42	34.50	74.00	-39.50	peak
2		2310.000	28.08	-6.42	21.66	54.00	-32.34	AVG
3		2390.000	42.59	-5.79	36.80	74.00	-37.20	peak
4		2390.000	28.22	-5.79	22.43	54.00	-31.57	AVG
5		2483.500	43.28	-4.98	38.30	74.00	-35.70	peak
6		2483.500	27.56	-4.98	22.58	54.00	-31.42	AVG
7		2500.000	39.63	-4.83	34.80	74.00	-39.20	peak
8	*	2500.000	28.42	-4.83	23.59	54.00	-30.41	AVG

2. Middle Channel

Horizontal:

80.0 dBuV/m

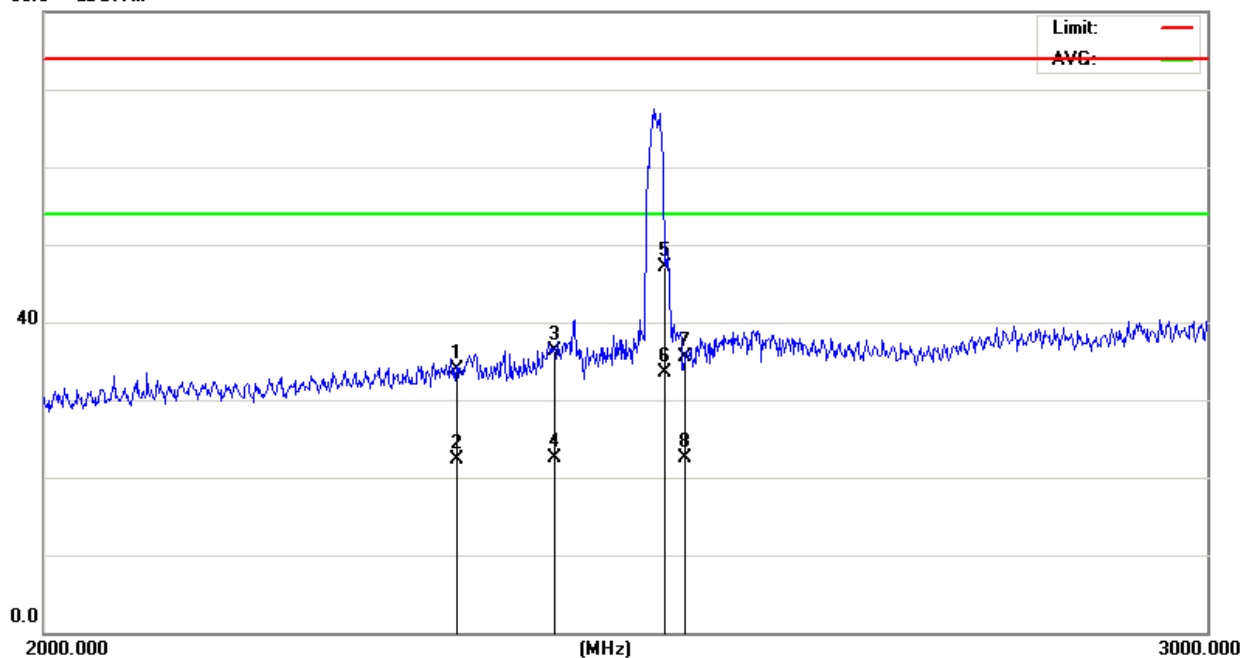


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2310.000	39.42	-6.42	33.00	74.00	-41.00	peak
2		2310.000	28.04	-6.42	21.62	54.00	-32.38	AVG
3		2390.000	42.19	-5.79	36.40	74.00	-37.60	peak
4		2390.000	27.66	-5.79	21.87	54.00	-32.13	AVG
5		2483.500	42.88	-4.98	37.90	74.00	-36.10	peak
6	*	2483.500	29.18	-4.98	24.20	54.00	-29.80	AVG
7		2500.000	43.93	-4.83	39.10	74.00	-34.90	peak
8		2500.000	28.43	-4.83	23.60	54.00	-30.40	AVG

3. High Channel

Vertical:

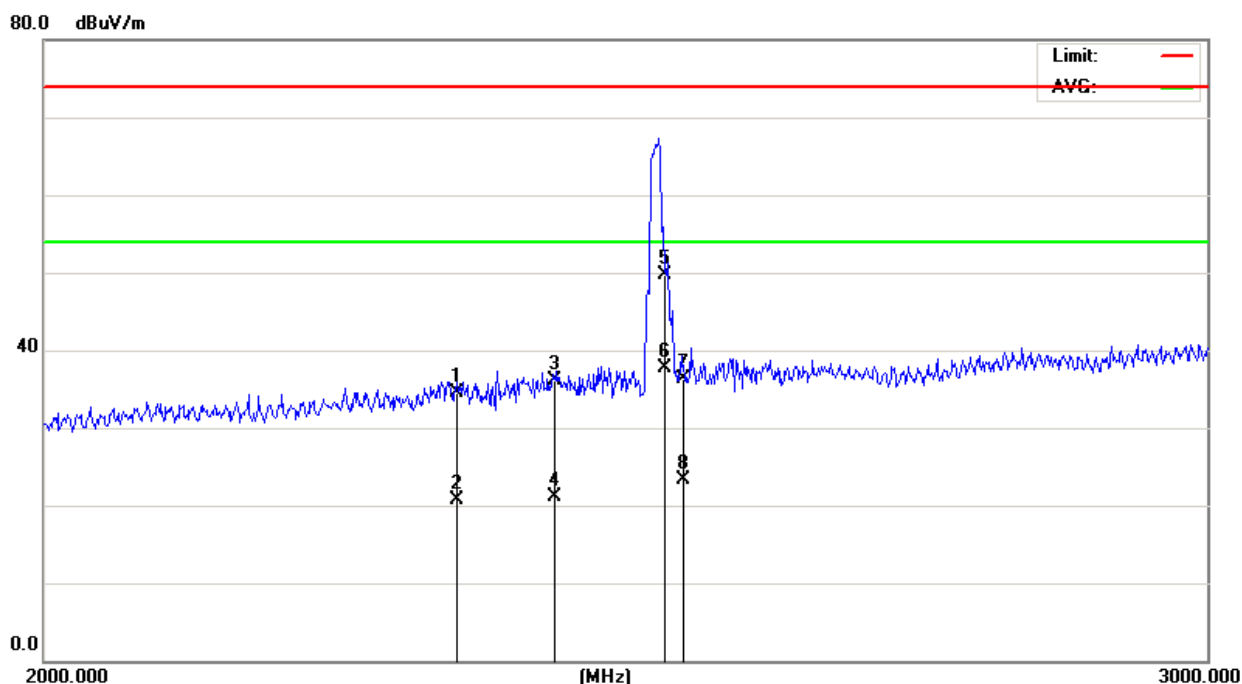
80.0 dBuV/m



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2310.000	40.32	-6.42	33.90	74.00	-40.10	peak
2		2310.000	28.68	-6.42	22.26	54.00	-31.74	AVG
3		2390.000	42.09	-5.79	36.30	74.00	-37.70	peak
4		2390.000	28.32	-5.79	22.53	54.00	-31.47	AVG
5		2483.500	52.08	-4.98	47.10	74.00	-26.90	peak
6	*	2483.500	38.57	-4.98	33.59	54.00	-20.41	AVG
7		2500.000	40.33	-4.83	35.50	74.00	-38.50	peak
8		2500.000	27.36	-4.83	22.53	54.00	-31.47	AVG

3. High Channel

Horizontal:



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2310.000	41.02	-6.42	34.60	74.00	-39.40	peak
2		2310.000	27.08	-6.42	20.66	54.00	-33.34	AVG
3		2390.000	41.99	-5.79	36.20	74.00	-37.80	peak
4		2390.000	26.94	-5.79	21.15	54.00	-32.85	AVG
5		2483.500	54.68	-4.98	49.70	74.00	-24.30	peak
6	*	2483.500	42.76	-4.98	37.78	54.00	-16.22	AVG
7		2500.000	41.13	-4.83	36.30	74.00	-37.70	peak
8		2500.000	28.11	-4.83	23.28	54.00	-30.72	AVG

Remark: No any other emission which falls in restricted bands can be detected and be reported.

Test result: The unit does meet the FCC requirements.

5.4 BANDWIDTH TEST

5.4.1 Applied procedures / Limit

15.247(a)(2) Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.4.2 Test procedure

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW= 100KHz, VBW \geq RBW, Sweep time = Auto.

5.4.3 Deviation from standard

No deviation.

5.4.4 Test setup



5.4.5 Test results

EUT:	Heart Rate Monitor Quartz Watch	Model Name :	GW002
Temperature:	26 °C	Relative Humidity:	53%
Pressure:	1010 hPa	Test Power :	DC 3.7V from battery
Test Mode :	TX 1Mbps		

Test result:

Channel No.	Frequency (MHz)	Mode	Data Rate	Measured 6dB bandwidth (kHz)	Limit	Result
0	2402	GFSK	1 Mbps	677.3	≥500KHz	Pass
19	2440		1 Mbps	680.3		Pass
39	2480		1 Mbps	680.3		Pass

Receiver **Spectrum** [X] [Menu]

Ref Level 12.00 dBm Offset 2.00 dB RBW 100 kHz
 Att 30 dB SWT 18.9 μ s VBW 300 kHz Mode Auto FFT Input 1 AC

1Pk Max

0 dBm
 -10 dBm
 -20 dBm
 -30 dBm
 -40 dBm
 -50 dBm
 -60 dBm
 -70 dBm
 -80 dBm

M1[1] -4.68 dBm
 2.40228170 GHz
 ndB
 6.00 dB
 T1
 T2
 Q factor
 677.300000000 kHz
 3546.7

CF 2.402 GHz 1001 pts Span 3.0 MHz

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4022817 GHz	-4.68 dBm	ndB down	677.3 kHz
T1		1	2.4017003 GHz	-10.67 dBm	ndB	6.00 dB
T2		1	2.4023776 GHz	-10.62 dBm	Q factor	3546.7

Measuring... [Progress Bar] [Error Icon]

06.06.2015 10:29:02

Date: 6.JUN.2015 10:29:02

Receiver **Spectrum** [X] [Menu]

Ref Level 12.00 dBm Offset 2.00 dB RBW 100 kHz
 Att 30 dB SWT 18.9 µs VBW 300 kHz Mode Auto FFT Input 1 AC

● 1Pk Max

CF 2.44 GHz 1001 pts Span 3.0 MHz

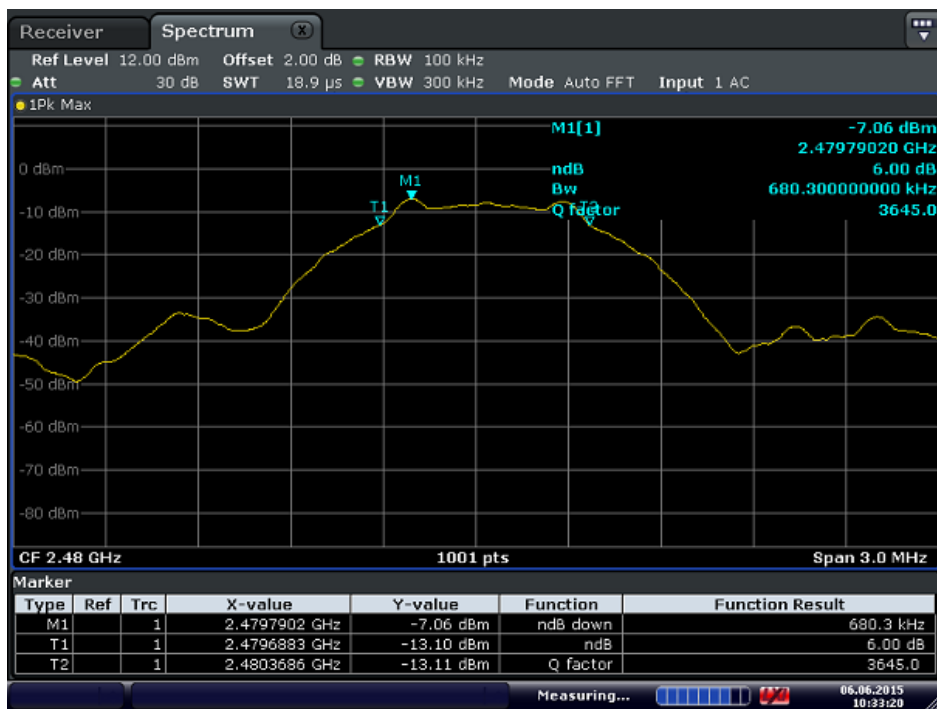
Markers:

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4402817 GHz	-5.62 dBm	ndB down	680.3 kHz
T1		1	2.4397033 GHz	-11.65 dBm	ndB	6.00 dB
T2		1	2.4403836 GHz	-11.63 dBm	Q factor	3587.0

Measuring... [Progress Bar] [Error Icon] 06.06.2015 10:20:32

Date: 6.JUN.2015 10:32:32

CH 39-1Mbps



Date: 6.JUN.2015 10:33:20

5.5 Maximum Peak Output Power

5.5.1 Applied procedures / Limit

15.247(b)(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

5.5.2 Test procedure

- (1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as RBW=3MHz, VBW \geq RBW, Sweep time=Auto, Detector Function=Peak.
- (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.

5.5.3 Deviation from standard

No deviation.

5.5.4 Test setup



5.5.5 Test results

EUT:	Heart Rate Monitor Quartz Watch	Model Name :	GW002
Temperature:	22 °C	Relative Humidity:	60%
Pressure:	1010 hPa	Test Voltage :	DC 3.7V from battery
Test Mode :	TX		

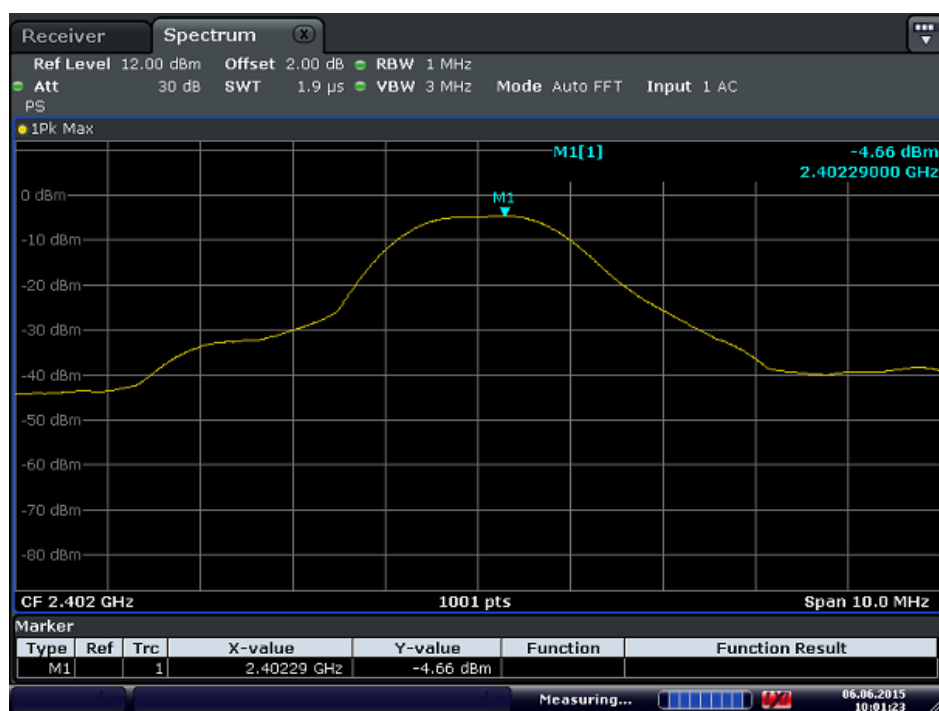
Test result:

Channel No.	Frequency (MHz)	Mode	Data Rate	Measured Channel Power (dBm)	Limit	Result
0	2402	GFSK	1Mbps	-4.66	1W(30dBm)	Pass
19	2440		1Mbps	-5.61		Pass
39	2480		1Mbps	-7.11		Pass

Remark: cable lose=2.0 dB

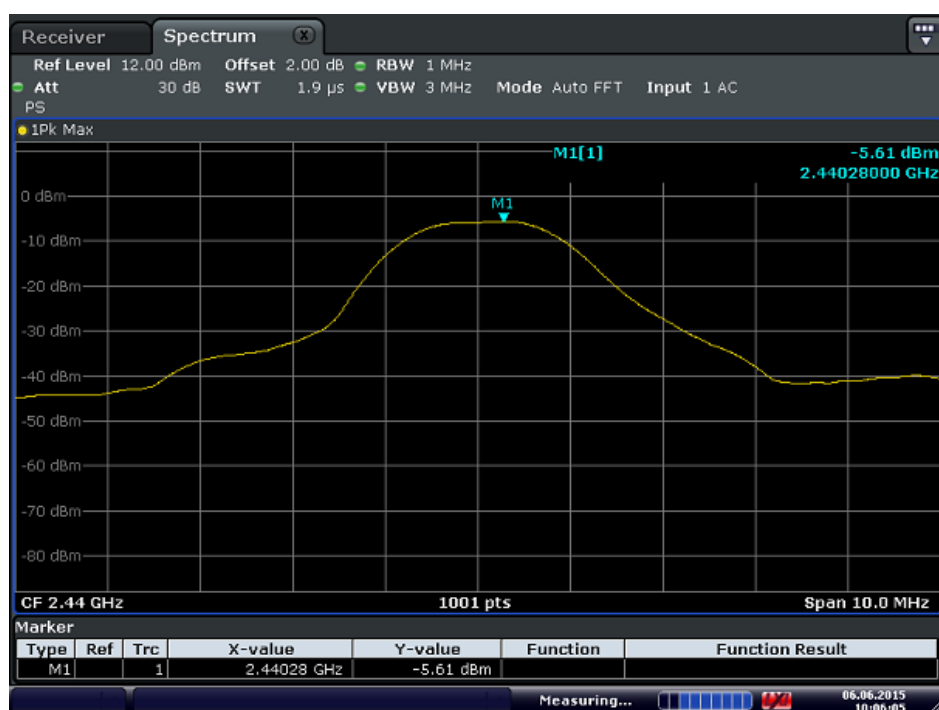
Test result: The unit does meet the FCC requirements.

CH 00-1Mbps



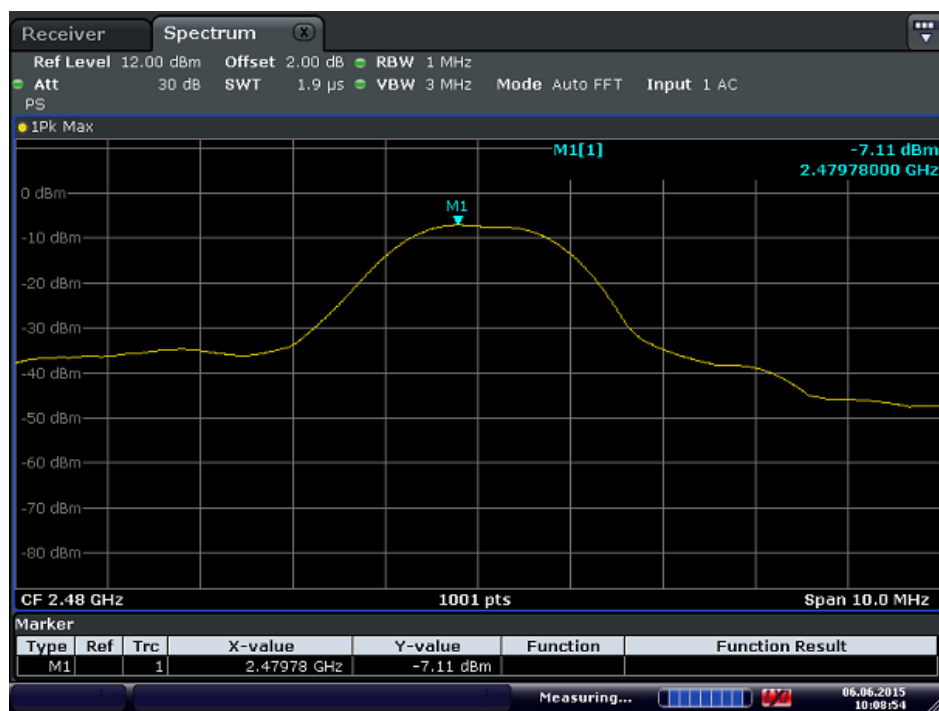
Date: 6.JUN.2015 10:01:23

CH 19-1Mbps



Date: 6.JUN.2015 10:06:05

CH 39-1Mbps



Date: 6.JUN.2015 10:08:53

5.6 Peak Power Density

5.6.1 Applied procedures / Limit

15.247(a) (e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

5.6.2 Test procedure

1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =1.5dB) from the antenna port to the spectrum analyzer or power meter.
2. Set the spectrum analyzer:
 - a) Set CENTER FREQUENCY = Frequency from Power Spectral Density Test Matrix (see 6.10.2)
 - b) Set SPAN = 20 MHz (For devices with a nominal 40 MHz BW, 50 MHz span will be needed)
 - c) Set REFERENCE LEVEL = 20 dBm
 - d) Set ATTENUATION = 0 dB (add internal attenuation, if necessary)
 - e) Set SWEEP TIME = Coupled
 - f) Set RBW = 3 kHz
 - g) Set VBW = 10 kHz
 - h) Set DETECTOR = Peak
 - i) Set MKR = Center Frequency
 - j) Set TRACE = CLEAR WRITE

Place the radio in continuous transmit mode. Set the TRACE to MAX HOLD, and after the trace stabilizes, the TRACE to VIEW. Set the marker on the peak of the signal and then adjust the center frequency of the spectrum analyzer to the marker frequency.

After viewing the EUT waveform on the spectrum analyzer, perform the following spectrum analyzer functions to capture the trace:

Set SPAN = 300 kHz

Set SWEEP TIME = 100 s

Set TRACE = MAX HOLD

Set MKR = PEAK SEARCH

3. Measure the Power Spectral Density of the test frequency with special test status.
4. Repeat until all the test status is investigated.

5.6.3 Deviation from standard

No deviation.

5.6.4 Test results

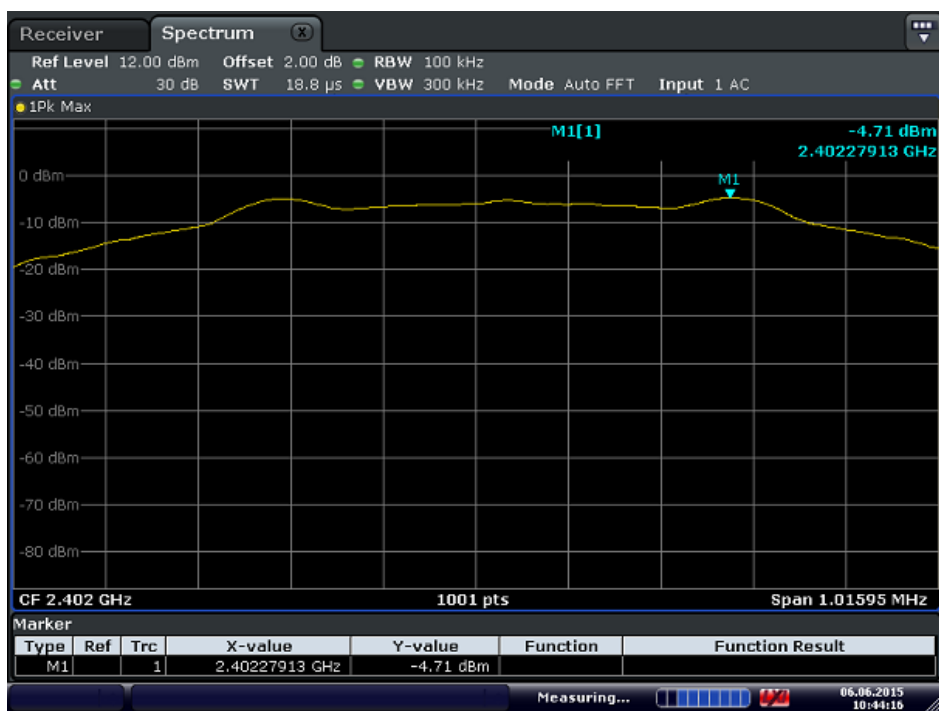
EUT:	Heart Rate Monitor Quartz Watch	Model Name :	GW002
Temperature:	22 °C	Relative Humidity:	53%
Pressure:	1010 hPa	Test Power :	DC 3.7V from battery
Test Mode :	TX 1Mbps		

Test result:

Channel No.	Frequency (MHz)	Mode	Data Rate	Measured Peak Power Spectral Density (dBm/3KHz)	Limit	Result
0	2402	GFSK	1 Mbps	-4.71	8dBm/3KHz	Pass
19	2440		1 Mbps	-5.55		Pass
39	2480		1 Mbps	-7.09		Pass

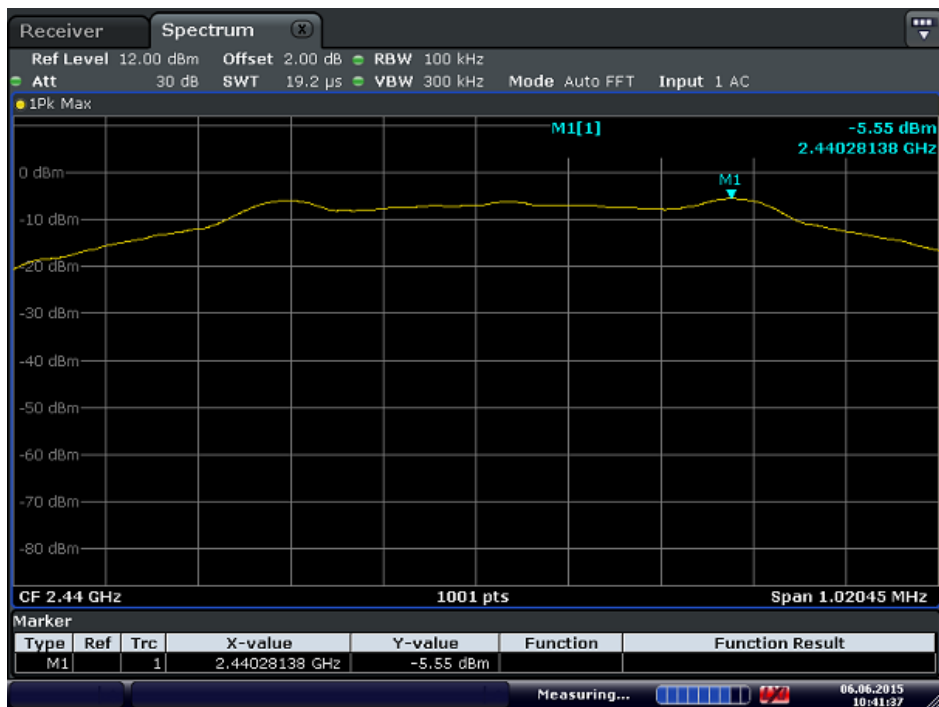
Test result: the unit does meet the FCC requirements.

CH 00-1Mbps



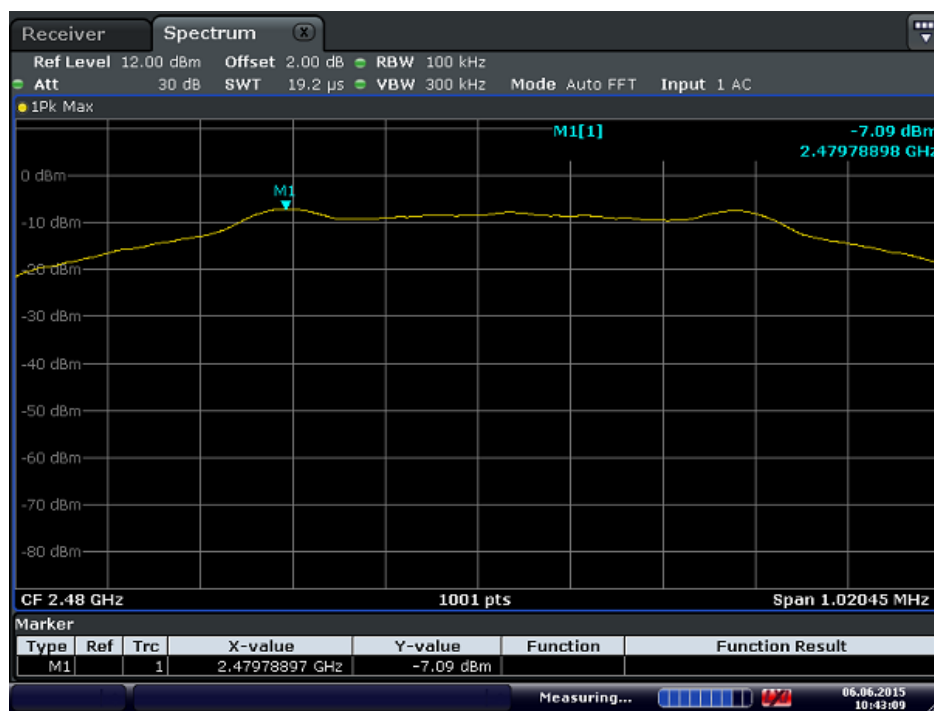
Date: 6.JUN.2015 10:44:16

CH 19-1Mbps



Date: 6.JUN.2015 10:41:37

CH 39-1Mbps



Date: 6.JUN.2015 10:43:09

Test result: The unit does meet the FCC requirements.

5.7 Band edge

5.7.1 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)).

5.7.2 Test procedure

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW=100kHz, VBW \geq RBW, Sweep time=Auto, Detector Function=Peak.

5.7.3 Deviation from standard

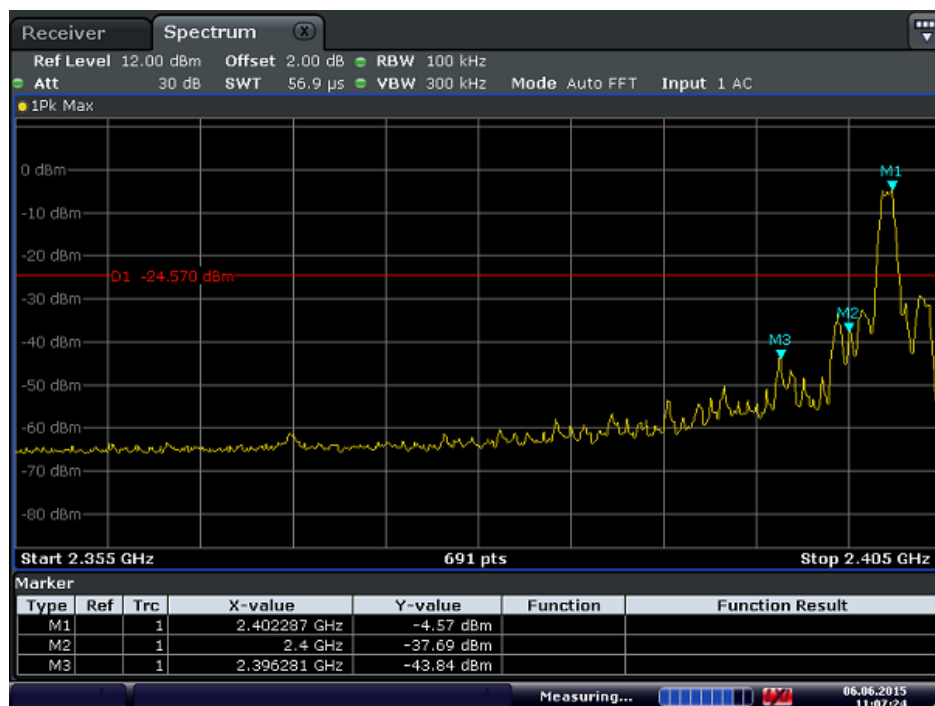
No deviation.

5.7.4 Test setup



5.7.5 Test results

CH00 (Lower) Data rate 1Mbps



Date: 6.JUN.2015 11:07:24

CH 39 (Upper) Data rate 1Mbps



Date: 6.JUN.2015 11:10:36

5.8 Conducted Spurious Emissions

5.8.1 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)).

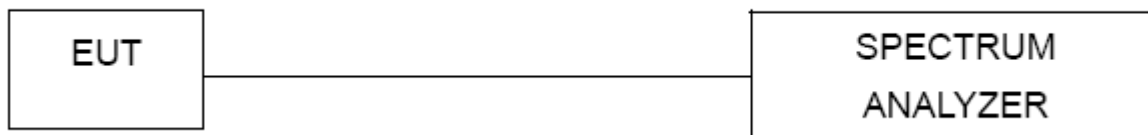
5.8.2 Test procedure

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW=100kHz, VBW \geq RBW, Sweep time=Auto, Detector Function=Peak.

5.8.3 Deviation from standard

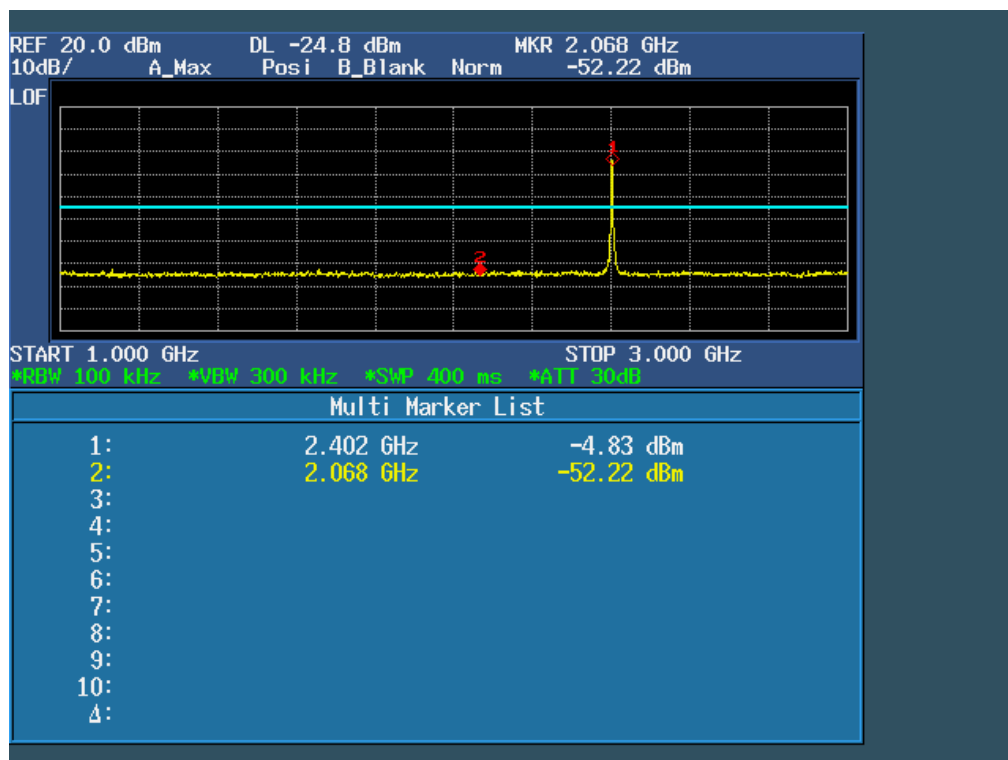
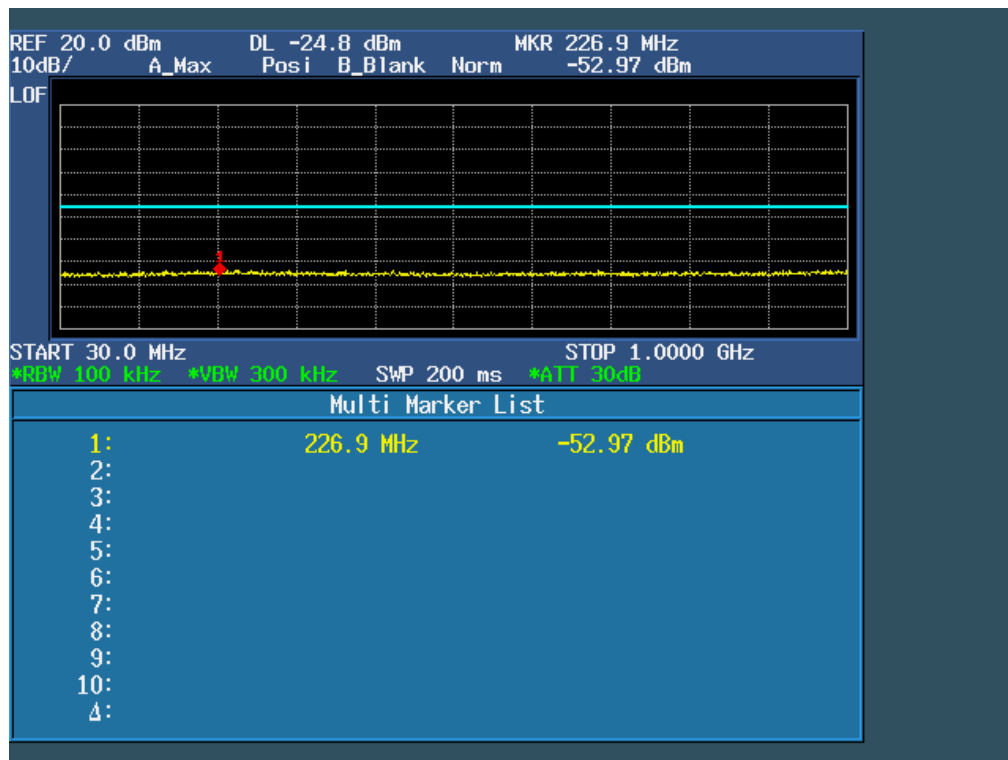
No deviation.

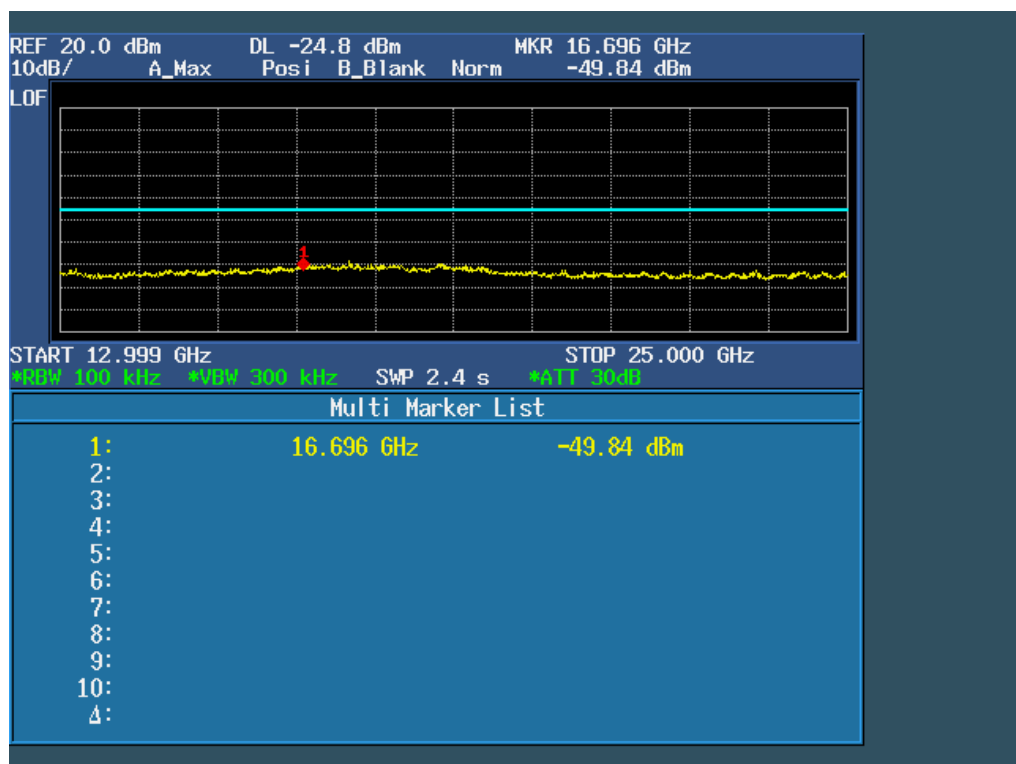
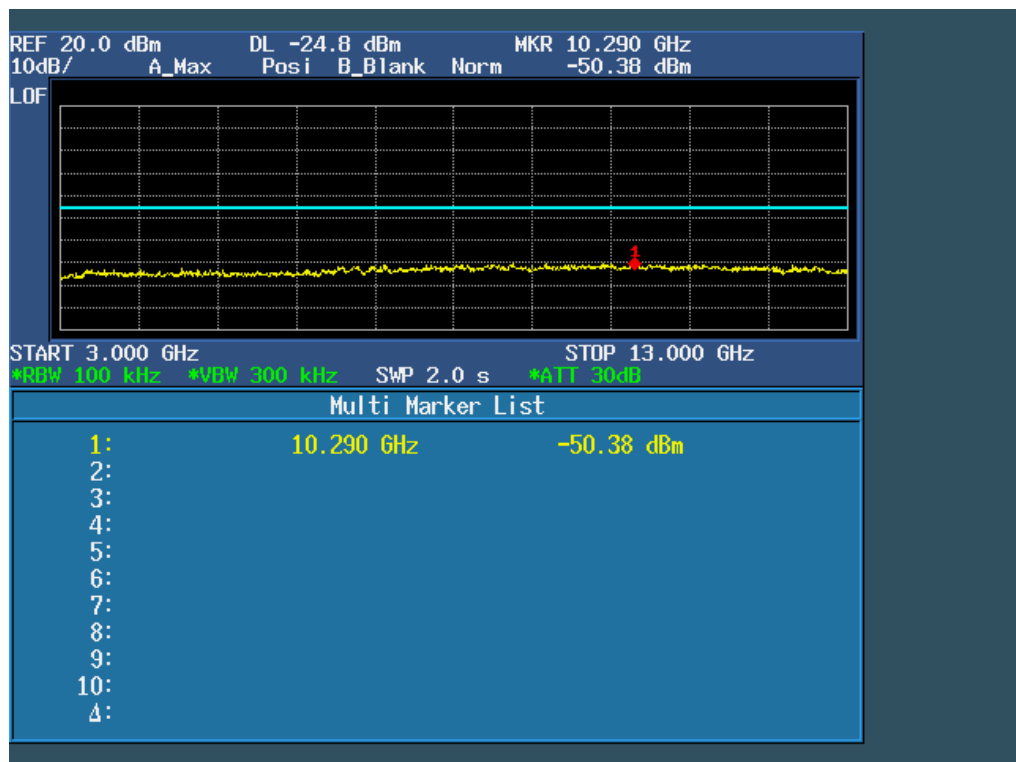
5.8.4 Test setup



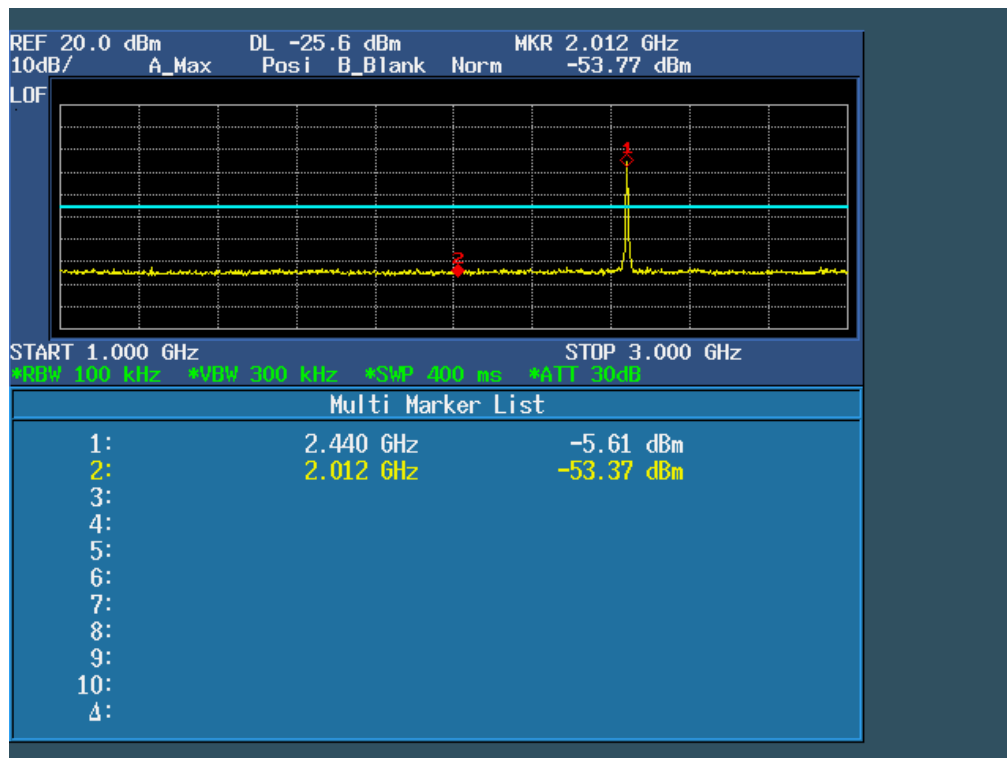
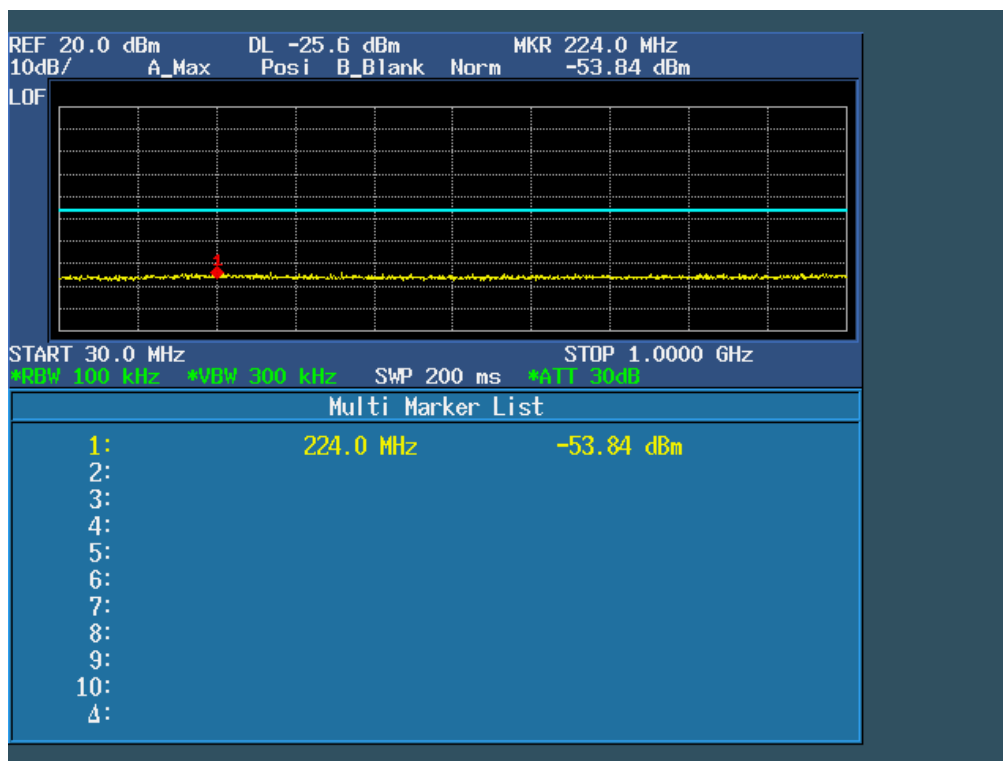
5.8.5 Test results

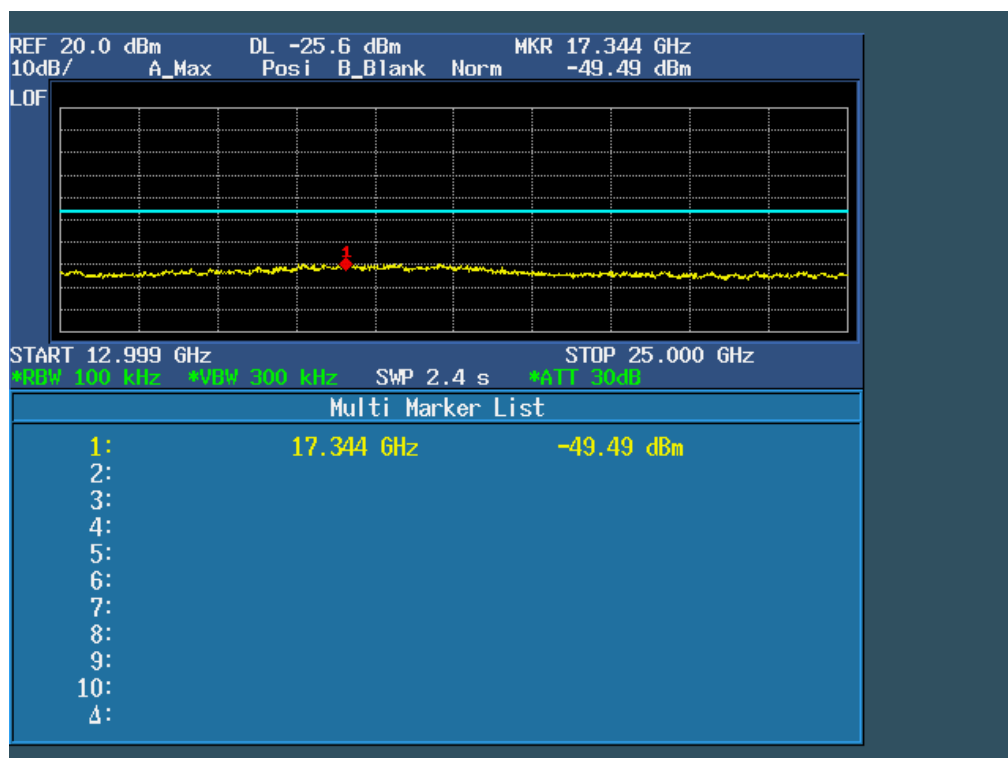
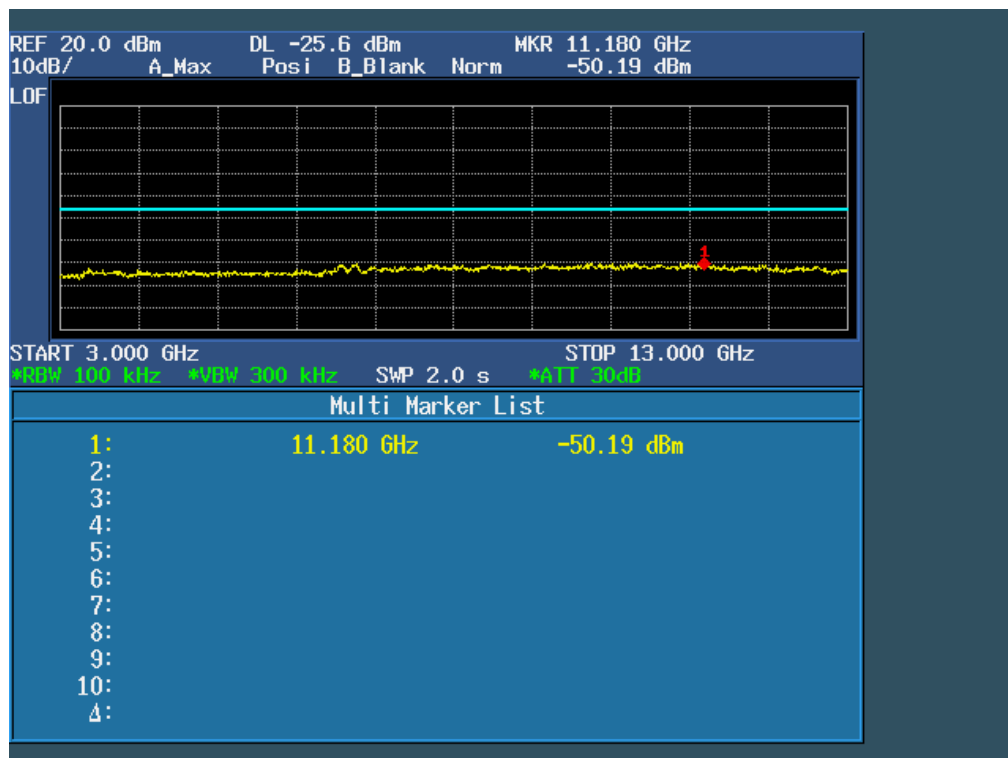
Lowest Channel: 30 MHz to 25 GHz





Middle Channel: 30 MHz to 25 GHz





Highest Channel: 30 MHz to 25 GHz

