

Test Report

Report No.: MTi211202001-01E2

Date of issue: Jan. 05, 2022

Applicant: China Etech Groups Ltd

Product name: Bluetooth transmitter

Model(s): 100079037, EQT6-210041

FCC ID: 2AS5O-100079037

Shenzhen Microtest Co., Ltd.
<http://www.mtitest.com>

Instructions

1. The report shall not be partially reproduced without the written consent of the laboratory;
2. The test results of this report are only responsible for the samples submitted;
3. This report is invalid without the seal and signature of the laboratory;
4. This report is invalid if transferred, altered or tampered with in any form without authorization;
5. Any objection to this report shall be submitted to the laboratory within 15 days from the date of receipt of the report.



Table of Contents

1	GENERAL DESCRIPTION	5
1.1	DESCRIPTIONS OF EUT	5
1.2	199 CHANNELS ARE PROVIDED TO FM	5
	CHANNEL LIST.....	5
1.3	FREQUENCY CHANNEL UNDER TEST	5
1.4	ANCILLARY EQUIPMENT LIST.....	5
1.5	DESCRIPTION OF SUPPORT UNITS	6
1.6	DESCRIPTION OF TEST MODE.....	7
2	SUMMARY OF TEST RESULTS	8
3	TEST FACILITIES AND ACCREDITATIONS	9
3.1	TEST LABORATORY.....	9
3.2	ENVIRONMENTAL CONDITIONS	9
3.3	MEASUREMENT UNCERTAINTY.....	9
3.4	TEST SOFTWARE	9
4	EQUIPMENT LIST	10
5	TEST RESULT	11
5.1	ANTENNA REQUIREMENT	11
5.1.1	Standard requirement.....	11
5.1.2	EUT antenna description.....	11
5.2	AC POWER LINE CONDUCTED EMISSION	12
5.2.1	Limit	12
5.2.2	Test method	12
5.2.3	Test Result.....	12
5.3	FIELD STRENGTH OF FUNDAMENTAL AND HARMONIC EMISSIONS	13
5.3.1	Limits.....	13
5.3.2	Test Method.....	13
5.3.3	Test Result.....	14
5.4	OPERATING FREQUENCY& OCCUPIED BANDWIDTH.....	15
5.4.1	Limits.....	15
5.4.2	Test method	15
5.4.3	Test result.....	15
5.5	RADIATED EMISSION	18
5.5.1	Limit	18
5.5.2	Test method	18
5.5.3	Test Result.....	18
	PHOTOGRAPHS OF THE TEST SETUP	21
	PHOTOGRAPHS OF THE EUT.....	22



TEST RESULT CERTIFICATION	
Applicant's name	China Etech Groups Ltd
Address.....	16/F, Block C, 2nd Phase of Central Avenue, Haihong Industrial Area, Xixiang Road, Baoan District, Shenzhen, China
Manufacturer's Name	Dongguan China Etech Groups Co., Ltd.
Address.....	Room401&501, Building 6, No.2 Hong Jin Road, Hongmei Town, Dongguan City, Guangdong Province, China.
Product description	
Product name.....	Bluetooth transmitter
Trademark	N/A
Model Name	100079037
Serial Model	EQT6-210041
Standards	FCC Part 15.239
Test procedure	ANSI C63.10-2013 DA 00-705
Date of Test	
Date (s) of performance of tests	2021-12-09 ~2021-12-27
Test Result	Pass
This device described above has been tested by Shenzhen Microtest 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.	

Testing Engineer

:

Cindy Qin

(Cindy Qin)

Technical Manager

:

Leon Chen

(Leon Chen)

Authorized Signatory

:

Tom Xue

(Tom Xue)

1 General description

1.1 Descriptions of EUT

Product name:	Bluetooth transmitter
Model name:	100079037
Series model:	EQT6-210041
Difference of series model:	All the models are the same circuit and module, except the model name.
Tx/Rx frequency range:	88.1 MHz to 107.9 MHz
Modulation type:	FM
Power source:	DC 12V from battery
Adapter information:	N/A
Antenna designation:	Internal antenna (Antenna Gain: 1.8dBi)
Hardware version:	V1.0
Software version:	V1.0

1.2 199 channels are provided to FM

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	88.1	100	98.0	198	107.8
2	88.2	101	98.1	199	107.9
k	$88.1+0.1(k-1)$	--	--		

1.3 Frequency Channel Under Test

Channel	Frequency
Low	88.1MHz
Middle	98.1MHz
High	107.9MHz

1.4 Ancillary equipment list

Equipment	Model	S/N	Manufacturer
Accumulator	6-QW-45(370)-L	/	Camel Group Co., Ltd.



1.5 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model/Type No.	Series No.	Note
/	/	/	/	/	
/	/	/	/	/	

Note:

- (1)The support equipment was authorized by Declaration of Confirmation.
- (2)For detachable type I/O cable should be specified the length in cm in 『Length』 column.

1.6 Description of Test mode

NO.	Test mode description
1	Sim TX BT Low channel GFSK +FM Low channel
2	Sim TX BT Middle channel GFSK +FM Low channel
3	Sim TX BT High channel GFSK +FM Low channel
4	Sim TX BT Low channel $\pi/4$ -DQPSK +FM Low channel
5	Sim TX BT Middle channel $\pi/4$ -DQPSK +FM Low channel
6	Sim TX BT High channel $\pi/4$ -DQPSK +FM Low channel
7	Sim TX BT Low channel 8DPSK +FM Low channel
8	Sim TX BT Middle channel 8DPSK +FM Low channel
9	Sim TX BT High channel 8DPSK +FM Low channel
10	Sim TX BT Low channel GFSK +FM Middle channel
11	Sim TX BT Middle channel GFSK +FM Middle channel
12	Sim TX BT High channel GFSK +FM Middle channel
13	Sim TX BT Low channel $\pi/4$ -DQPSK +FM Middle channel
14	Sim TX BT Middle channel $\pi/4$ -DQPSK +FM Middle channel
15	Sim TX BT High channel $\pi/4$ -DQPSK +FM Middle channel
16	Sim TX BT Low channel 8DPSK +FM Middle channel
17	Sim TX BT Middle channel 8DPSK +FM Middle channel
18	Sim TX BT High channel 8DPSK +FM Middle channel
19	Sim TX BT Low channel GFSK +FM High channel
20	Sim TX BT Middle channel GFSK +FM High channel
21	Sim TX BT High channel GFSK +FM High channel
22	Sim TX BT Low channel $\pi/4$ -DQPSK +FM High channel
23	Sim TX BT Middle channel $\pi/4$ -DQPSK +FM High channel
24	Sim TX BT High channel $\pi/4$ -DQPSK +FM High channel
25	Sim TX BT Low channel 8DPSK +FM High channel
26	Sim TX BT Middle channel 8DPSK +FM High channel
27	Sim TX BT High channel 8DPSK +FM High channel
Note: Only the result of the worst case was recorded in the report, if no other cases.	



2 Summary of Test Results

Test procedures according to the technical standards:

Item	FCC Part No.	Description of Test	Result	Remark
1	15.203	Antenna requirement	Pass	
2	15.207	AC power line conducted emission	Pass	
3	15.239 (b)	Field strength of fundamental and harmonic emissions	Pass	
4	15.209	Radiated emission	Pass	
5	15.239 (a)	Operating frequency	Pass	
6	15.239 (a)	Occupied Bandwidth	Pass	
The meaning of symbols: "N/A" – Not Applicable				

3 Test Facilities and Accreditations

3.1 Test laboratory

Test Laboratory	Shenzhen Microtest Co., Ltd
Location	No.102A & 302A, East Block, Hengfang Industrial Park, Xingye Road, Xixiang, Bao'an District, Shenzhen, Guangdong, China
FCC Registration No.:	FCC Registration No.: 448573

3.2 Environmental conditions

Temperature:	20°C~30°C
Humidity	30%~70%
Atmospheric pressure	98kPa~101kPa

3.3 Measurement uncertainty

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %

RF frequency	1×10^{-7}
RF power, conducted	$\pm 1.38\text{dB}$
Conducted emission(150kHz~30MHz)	$\pm 0.21\text{dB}$
Radiated emission(30MHz~1GHz)	$\pm 4.68\text{dB}$
Radiated emission (above 1GHz)	$\pm 4.89\text{dB}$
Temperature	$\pm 0.5^{\circ}\text{C}$
Humidity	$\pm 2 \%$

3.4 Test software

Software Name	Manufacturer	Model	Version
RF Test System	Farad	LZ-RF	Lz_Rf 3A3

4 Equipment list

No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
MTI-E043	EMI test receiver	R&S	ESC17	101166	2021/06/02	2022/06/01
MTI-E044	Broadband antenna	Schwarzbeck	VULB9163	9163-1338	2021/05/30	2023/05/29
MTI-E045	Horn antenna	Schwarzbeck	BBHA9120D	9120D-2278	2021/05/30	2023/05/29
MTi-E046	Active Loop Antenna	Schwarzbeck	FMZB 1519 B	00066	2021/05/30	2023/05/29
MTI-E047	Pre-amplifier	Hewlett-Packard	8447F	3113A06184	2021/06/02	2022/06/01
MTI-E048	Pre-amplifier	Agilent	8449B	3008A01120	2021/06/02	2022/06/01
MTi-E120	Broadband antenna	Schwarzbeck	VULB9163	9163-1419	2021/05/30	2023/05/29
MTi-E121	Pre-amplifier	Hewlett-Packard	8447D	2944A09365	2021/04/16	2022/04/15
MTi-E123	Pre-amplifier	Agilent	8449B	3008A04723	2021/05/06	2022/05/05
MTi-E122	MXA signal analyzer	Agilent	N9020A	MY54440859	2021/05/06	2022/05/05
MTi-E002	EMI Test Receiver	R&S	ESC13	101368	2021/06/02	2022/06/01
MTi-E023	Artificial power network	Schwarzbeck	NSLK8127	NSLK8127#841	2021/06/02	2022/06/01
MTi-E025	Artificial power network	Schwarzbeck	NSLK8127	8127183	2021/06/02	2022/06/01

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

5.1.2 EUT antenna description

The EUT antenna is PCB antenna (1.2dBi). It comply with the standard requirement. In case of replacement of broken antenna the same antenna type must be used.



5.2 AC power line conducted emission

5.2.1 Limit

Frequency (MHz)	Limit	
	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 from 0.15MHz to 0.5MHz.

5.2.2 Test method

1. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/50uH of coupling impedance for the measuring instrument.
2. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
3. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
4. LISN is at least 80 cm from nearest part of EUT chassis.
5. The resolution bandwidth of EMI test receiver is set at 9kHz.

5.2.3 Test Result

Note: The device is a DC power supply and does not apply to conducted emissions.



5.3 Field strength of fundamental and harmonic emissions

5.3.1 Limits

§15.239 (b): The field strength of any emissions within the permitted 200 kHz band shall not exceed 250 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

5.3.2 Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane for test frequency range below 1GHz, and 1.5m above ground plane for test frequency range above 1GHz.

2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.

3. Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1\text{GHz}$

RBW = 100 kHz for $f < 1\text{GHz}$

VBW $\geq$ RBW

Sweep = Auto

Detector function = Peak

Trace = max hold

4. Follow the guidelines in ANSI C63.4-2014 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

5. The peak level, once corrected, must comply with the limit specified in Section 15.209. Set the spectrum to

RBW = 1MHz

VBW = 10Hz

Detector = PK for AV value, while maintaining all of the other instrument settings



5.3.3 Test Result

Field Strength of Fundamental Emissions and Field strength of spurious emissions Value					
Operating Frequency (MHz)	Field Strength (dBuV/m)	Detector	Limit @3m (dBuV/m)	Margin (dB)	Antenna
88.1	41.83	Peak	67.96	26.13	Horizontal
	39.11	Average	47.96	8.58	Horizontal
	37.33	Peak	67.96	30.63	Vertical
	34.77	Average	47.96	13.19	Vertical
98	41.25	Peak	67.96	26.71	Horizontal
	38.93	Average	47.96	9.03	Horizontal
	36.69	Peak	67.96	31.27	Vertical
	32.06	Average	47.96	15.90	Vertical
107.9	39.41	Peak	67.96	28.55	Horizontal
	35.68	Average	47.96	12.28	Horizontal
	34.97	Peak	67.96	32.99	Vertical
	31.59	Average	47.96	16.37	Vertical

Field Strength of band edge Emissions and band edge Emissions Value					
Operating Frequency (MHz)	Field Strength (dBuV/m)	Detector	Limit @3m (dBuV/m)	Margin (dB)	Antenna
88	36.59	Peak	40.00	3.41	Horizontal
	32.74	Peak	40.00	7.26	Vertical
108	35.58	Peak	43.50	7.92	Horizontal
	31.98	Peak	43.50	11.52	Vertical

Note: If the PK measured values lower than average mode limit, the EUT shall be deemed to meet average limits and then no additional average mode measurement performed.



5.4 Operating frequency& Occupied Bandwidth

5.4.1 Limits

§15.239 (a): Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108 MHz.

5.4.2 Test method

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW $\geq 1\%$ of the 20 dB bandwidth

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

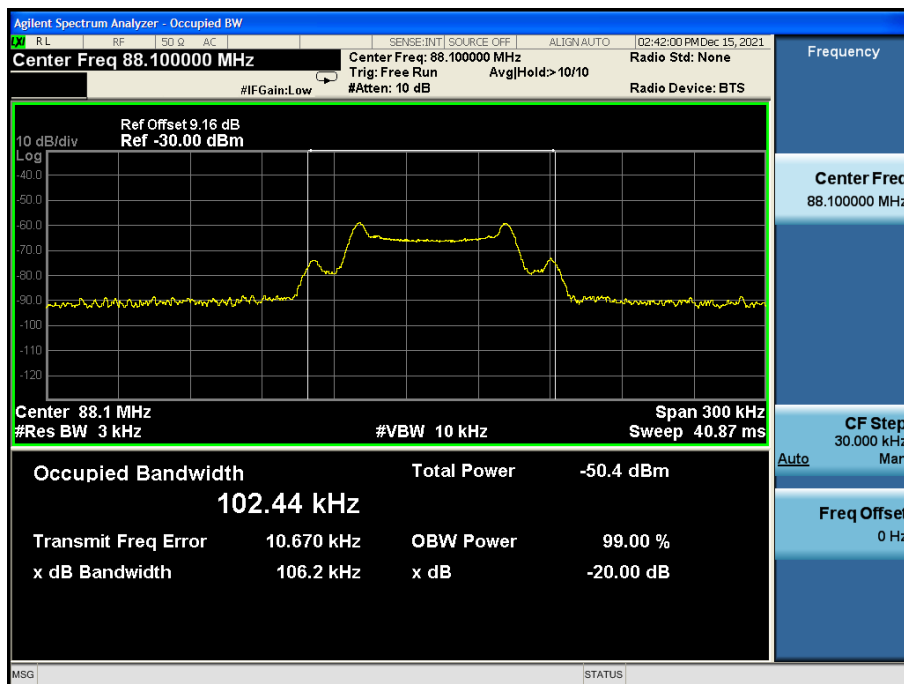
The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth and 99% occupied bandwidth of the emission.

5.4.3 Test result

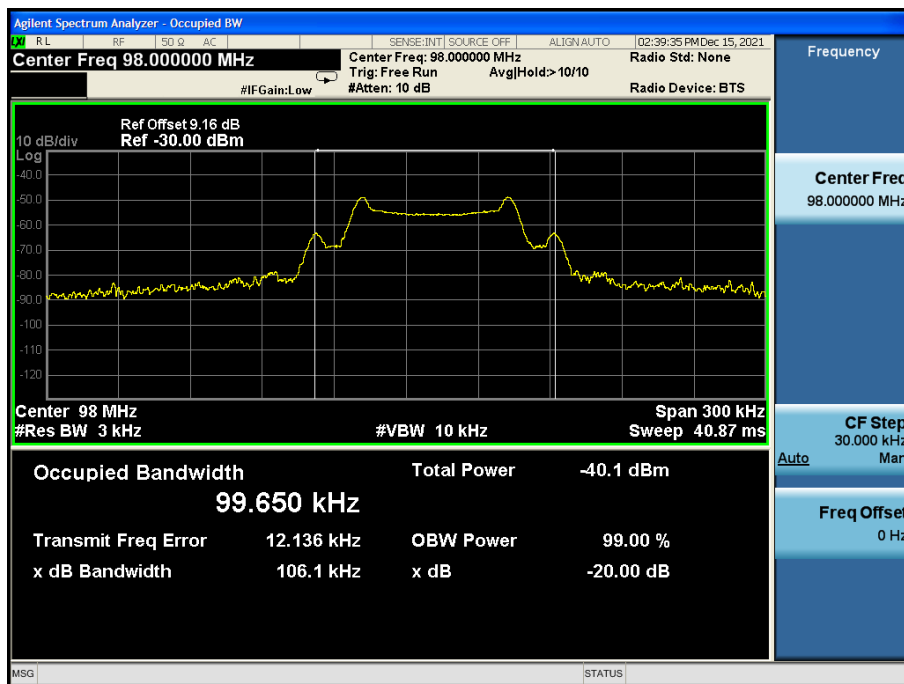
Frequency (MHz)	20dBm emission bandwidth (KHz)	Limit (KHz)
88.1	106.2	200
98.1	106.1	200
107.9	106.3	200



88.1 MHz

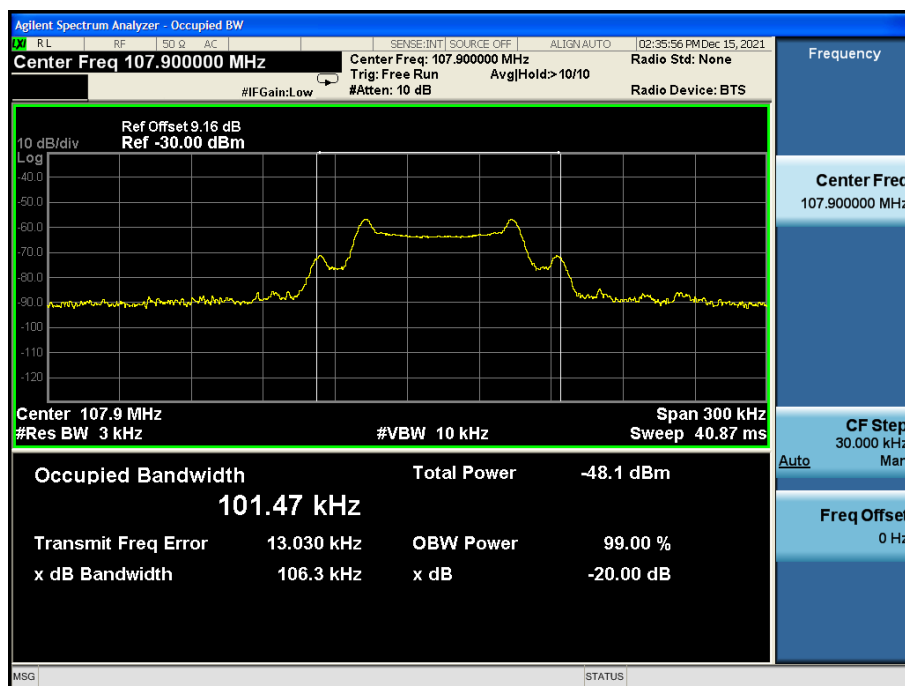


98.1 MHz





107.9 MHz



5.5 Radiated emission

5.5.1 Limit

Emissions radiated outside of the specified frequency bands, except for harmonic emissions, (b) shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in RSS-Gen, whichever is less stringent.

Frequency (MHz)	Field strength $\mu\text{V/m}$	Field strength $\text{dB}\mu\text{V/m}$	Detector	Measurement distance
30-88	100	40	QP	3m
88-216	150	43.5	QP	
216-960	200	46	QP	
960-1000	500	54	QP	
Above 1000	500	54	AV	
Above 1000	5000	74	PK	

5.5.2 Test method

1. The EUT is placed on a turntable, which is 0.8m above ground plane for test frequency range below 1GHz, and 1.5m above ground plane for test frequency range above 1GHz.

2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.

3. Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1\text{GHz}$

100 kHz for $f < 1\text{GHz}$, VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

4. Follow the guidelines in ANSI C63.4-2014 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

5. The peak level, once corrected, must comply with the limit specified in Section 15.209. Set the RBW = 1MHz, VBW = 10Hz, Detector = PK for AV value, while maintaining all of the other instrument settings.

5.5.3 Test Result

Remark:

If the PK measured values lower than average mode limit, the EUT shall be deemed to meet average limits and then no additional average mode measurement performed.

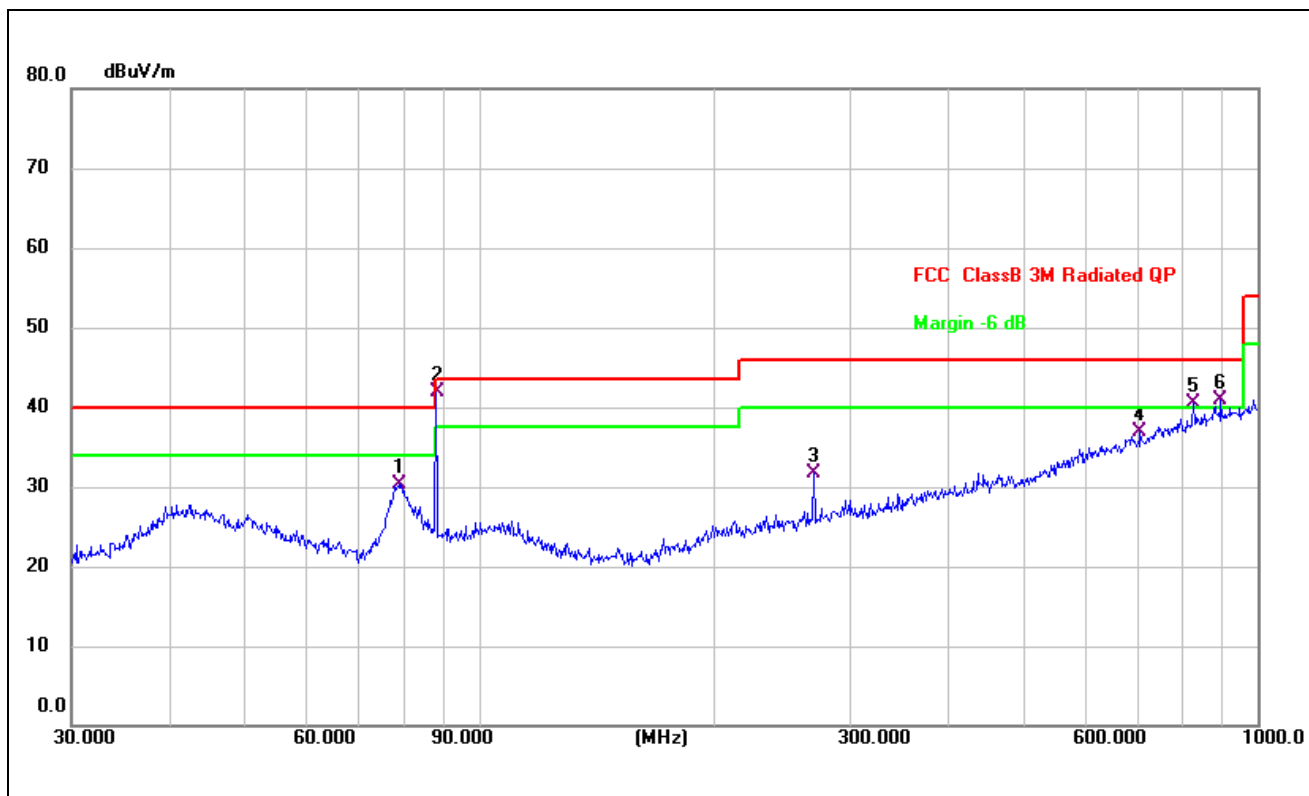


Radiated emission

Between 30MHz – 1GHz

Note: All the modulation modes have been tested, and the worst result was report as below:

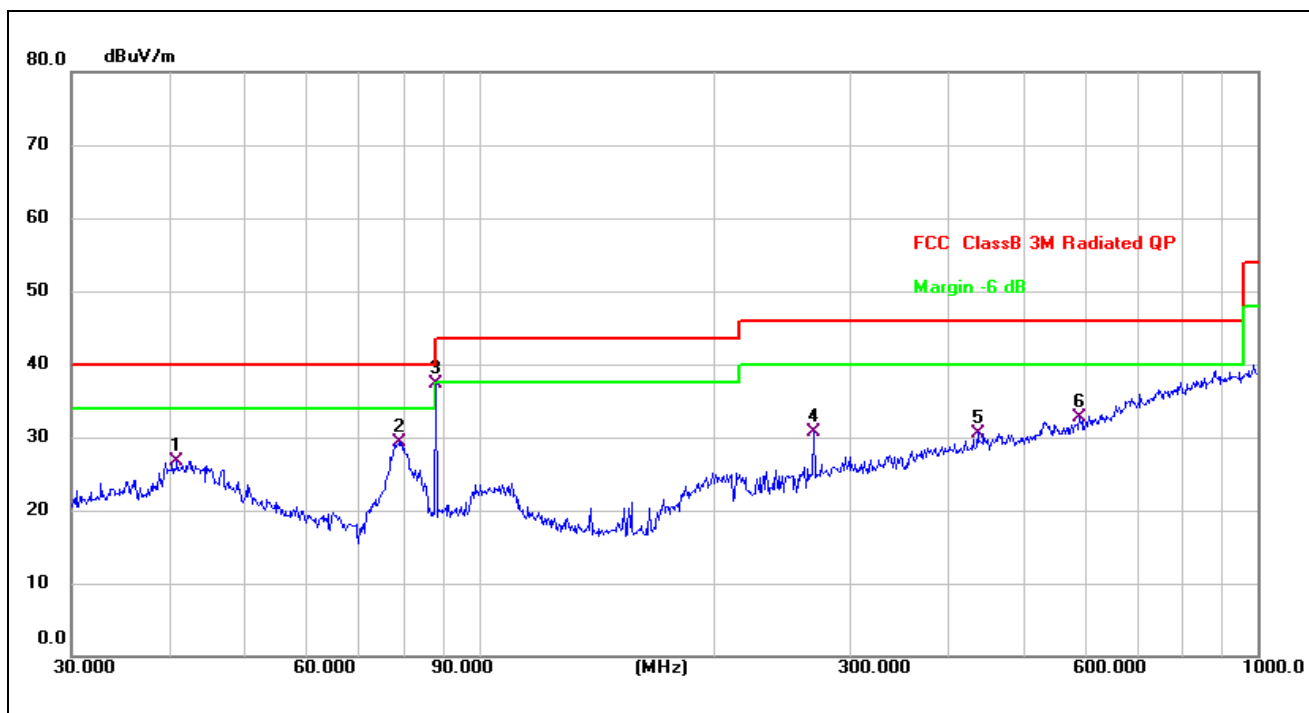
EUT:	Bluetooth transmitter	Model Name :	100079037
Relative Humidity:	52%	Phase:	H
Pressure:	1010 hPa	Test Voltage :	DC 12V from battery
Test Mode :	Mode 7		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		78.9651	41.17	-10.79	30.38	40.00	-9.62	QP
2	*	88.1000	51.21	-9.38	41.83	43.50	-1.67	QP
3		269.4282	35.71	-3.93	31.78	46.00	-14.22	QP
4		706.6997	32.42	4.46	36.88	46.00	-9.12	QP
5	!	827.4932	33.69	6.79	40.48	46.00	-5.52	QP
6	!	896.9963	33.28	7.53	40.81	46.00	-5.19	QP



EUT:	Bluetooth transmitter	Model Name :	100079037
Relative Humidity:	52%	Phase:	V
Pressure:	1010 hPa	Test Voltage :	DC 12V from battery
Test Mode :	Mode 7		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		40.9879	33.38	-6.69	26.69	40.00	-13.31	QP
2		78.9651	40.17	-10.79	29.38	40.00	-10.62	QP
3	*	88.1000	46.71	-9.38	37.33	43.50	-6.17	QP
4		269.4282	34.71	-3.93	30.78	46.00	-15.22	QP
5		437.1200	31.24	-0.64	30.60	46.00	-15.40	QP
6		590.9737	29.91	2.72	32.63	46.00	-13.37	QP

Note:

1. Emission Level = Meter Reading + Factor, Margin= Emission Level- Limit, Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. The three modulated high, medium and low channels have been tested. The report only shows the worst mode. The worst mode is Mode 7.
3. This 88.1 is the main frequency of FM



PHOTOGRAPHS OF THE TEST SETUP

Radiated emission





PHOTOGRAPHS OF THE EUT

See the APPENDIX 1- EUT PHOTO.

----END OF REPORT----