

FCC - TEST REPORT

Report Number : 60.790.16.706.01R03 Date of Issue: March 4, 2016

Model : BT-101

Product Type : BT-101 Bluetooth in-ear headsets

Applicant : Fujikon Industrial Co., Ltd.

Address : 16/F Tower 1, Grand Central Plaza, 138 Shatin Rural
Committee Road, Shatin N.T. Hong Kong

Production Facility : Charter Media (Dongguan) Co., Ltd.

Address : Dabandi Industrial Zone, Daning District, Humen Town,
Dongguan City, Guangdong Province 523930, P. R. China

Test Result : ☒ **Positive** ☐ **Negative**

Total pages including
Appendices : 27

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Hong Kong Ltd.
3/F, West Wing, Lakeside 2,
10 Science Park West Avenue,
Science Park, Shatin, Hong Kong

Test Site 2

Company name: Hong Kong Productivity Council
LG1, HKPC Building,
78 Tat Chee Avenue,
Kowloon, Hong Kong

FCC Registration Number: 90656

3 Description of the Equipment Under Test

Product:	BT-101 Bluetooth in-ear headsets
Model no.:	BT-101
FCC ID	TTC-BT-101
Options and accessories:	Nil
Rating:	DC3.7V Supplied by Li-ion Rechargeable Battery DC5.0V Charged by the mini-USB port
RF Transmission Frequency:	2402MHz-2480MHz
No. of Operated Channel:	40
Modulation:	GFSK
Antenna Type:	Chip antenna
Antenna Gain:	1.6dBi
Description of the EUT:	The Equipment Under Test (EUT) is Bluetooth headset operated at 2.4GHz

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2015 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to FCC KDB 558074 D01 DTS Meas Guidance and ANSI C63.10-2013.

5 Summary of Test Results

Technical Requirements			
FCC Part 15 Subpart C			
Test Condition		Pages	Test Result
§15.207	Conducted emission AC power port	10	Pass
§15.247(b)(1)	Conducted peak output power	13	Pass
§15.247(e)	Power spectral density	15	Pass
§15.247(a)(2)	6dB bandwidth	16	Pass
§15.247(a)(1)	20dB bandwidth and 99% Occupied Bandwidth	--	N/A
§15.247(a)(1)	Carrier frequency separation	--	N/A
§15.247(a)(1)(iii)	Number of hopping frequencies	--	N/A
§15.247(a)(1)(iii)	Dwell Time	--	N/A
§15.247(d)	Spurious RF conducted emissions	10	Pass
§15.247(d)	Band edge	20	Pass
§15.247(d) & §15.209 & §15.203	Spurious radiated emissions for transmitter and receiver	22	Pass
§15.203	Antenna requirement	See note 1	Pass

Note 1: N/A=Not Applicable.

Note 2: The EUT uses a patch antenna, which gain is 1.6dBi. In accordance to §15.203, it is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: TTC-BT-101, complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C rules.

This report is for the BT 4.0 part.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

□ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

□ - **Does not** fulfill the general approval requirements.

Sample Received Date: February 15, 2016

Testing Start Date: February 16, 2016

Testing End Date: March 1, 2016

- TÜV SÜD HONG KONG LTD. -

Reviewed by:



Phoebe Hu
EMC Project Manager

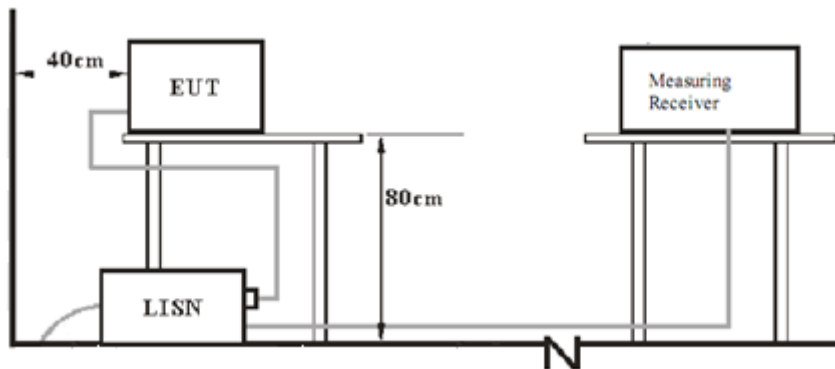
Prepared by:



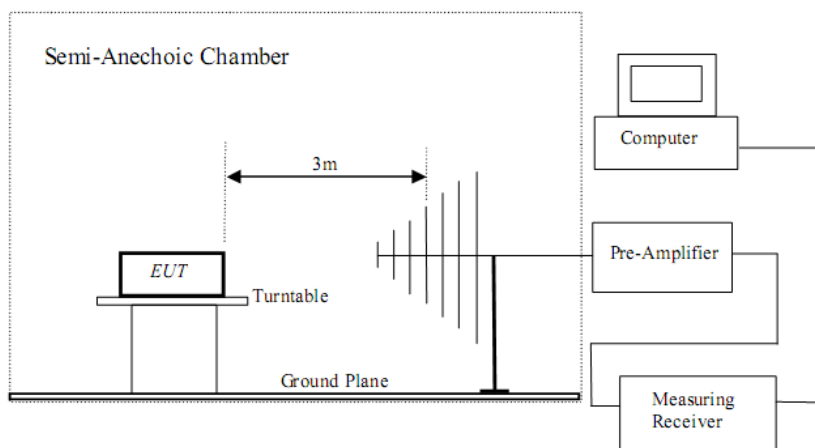
Felix Li
EMC Project Engineer

7 Test Setups

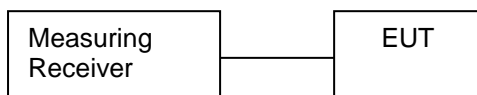
7.1 AC Power Line Conducted Emission test setups



7.2 Radiated test setups



7.3 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
PC	Lenovo	X220	---

Test software: Blue test 3.0, which used to control the EUT in, continues transmitting mode

9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

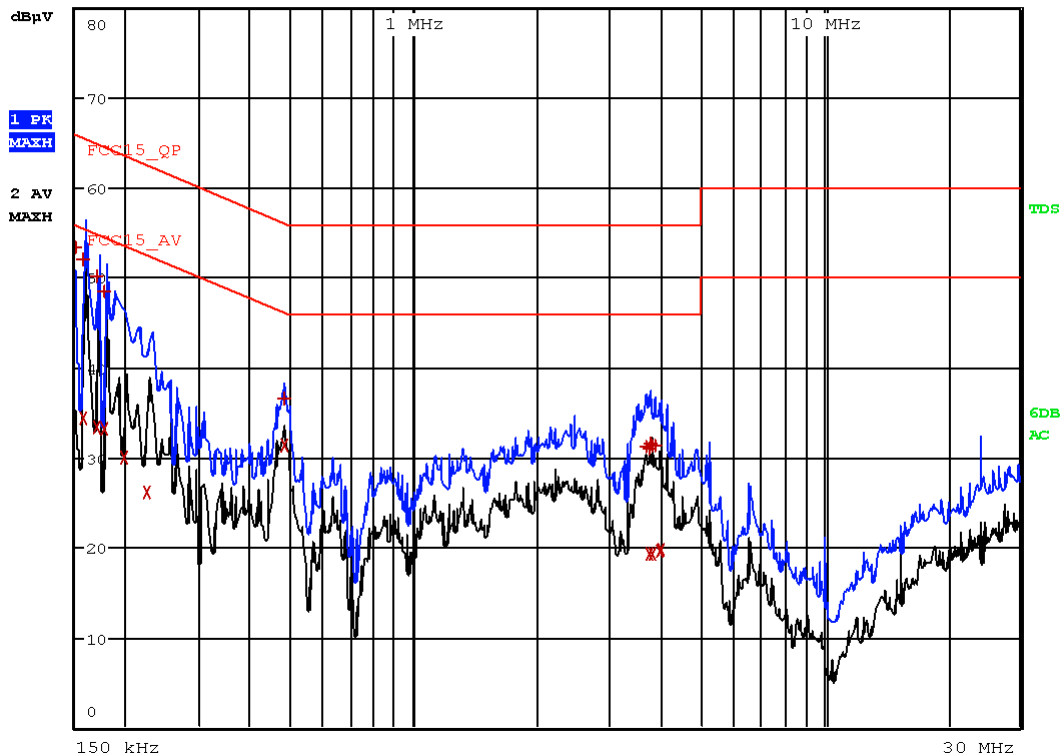
Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

Conducted Emission

Product Type : BT-101 Bluetooth in-ear headsets
 M/N : BT-101
 Operating Condition : Charging & BT
 Test Specification : Live
 Comment : AC 120V/60Hz

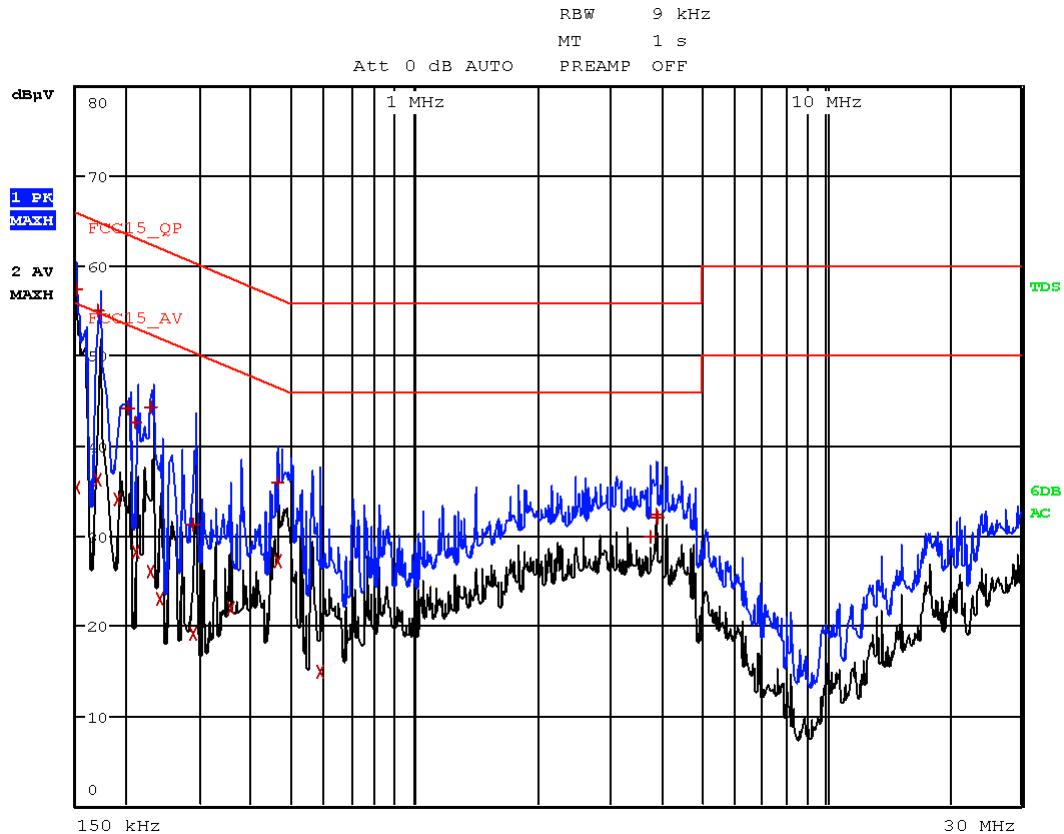
RBW 9 kHz
 MT 1 s
 Att 0 dB AUTO PREAMP OFF



Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
1	150.000000000 kHz	53.32	Quasi Peak	-12.68
1	158.000000000 kHz	51.96	Quasi Peak	-13.61
2	158.000000000 kHz	34.39	Average	-21.17
1	170.000000000 kHz	50.17	Quasi Peak	-14.79
2	170.000000000 kHz	33.44	Average	-21.52
1	178.000000000 kHz	48.49	Quasi Peak	-16.09
2	178.000000000 kHz	33.22	Average	-21.36
2	198.000000000 kHz	30.01	Average	-23.69
2	226.000000000 kHz	26.10	Average	-26.50
1	482.000000000 kHz	36.55	Quasi Peak	-19.76
2	482.000000000 kHz	31.33	Average	-14.98
1	3.666000000 MHz	31.21	Quasi Peak	-24.79
2	3.734000000 MHz	19.29	Average	-26.71
1	3.746000000 MHz	31.08	Quasi Peak	-24.92
1	3.770000000 MHz	31.44	Quasi Peak	-24.56
1	3.818000000 MHz	31.29	Quasi Peak	-24.71
2	3.818000000 MHz	19.27	Average	-26.73
1	3.878000000 MHz	31.32	Quasi Peak	-24.68
2	3.966000000 MHz	19.61	Average	-26.39
2	4.002000000 MHz	19.70	Average	-26.30

Conducted Emission

Product Type : BT-101 Bluetooth in-ear headsets
 M/N : BT-101
 Operating Condition : Charging & BT
 Test Specification : Neutral
 Comment : AC 120V/60Hz



Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
1	150.00000000 kHz	57.33	Quasi Peak	-8.67
2	150.00000000 kHz	35.43	Average	-20.57
1	170.00000000 kHz	55.08	Quasi Peak	-9.88
2	170.00000000 kHz	36.21	Average	-18.75
2	190.00000000 kHz	34.01	Average	-20.03
1	202.00000000 kHz	44.17	Quasi Peak	-19.36
1	210.00000000 kHz	42.57	Quasi Peak	-20.64
2	210.00000000 kHz	28.12	Average	-25.08
1	230.00000000 kHz	44.20	Quasi Peak	-18.25
2	230.00000000 kHz	25.97	Average	-26.48
2	242.00000000 kHz	22.93	Average	-29.09
1	290.00000000 kHz	31.25	Quasi Peak	-29.28
2	290.00000000 kHz	19.09	Average	-31.43
2	354.00000000 kHz	21.90	Average	-26.97
1	462.00000000 kHz	35.92	Quasi Peak	-20.74
2	462.00000000 kHz	27.08	Average	-19.57
2	586.00000000 kHz	14.90	Average	-31.10
1	3.742000000 MHz	29.82	Quasi Peak	-26.18
1	3.882000000 MHz	32.30	Quasi Peak	-23.70
1	3.918000000 MHz	32.05	Quasi Peak	-23.95

9.2 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
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. Add a correction factor to the display.
3. 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

Limits

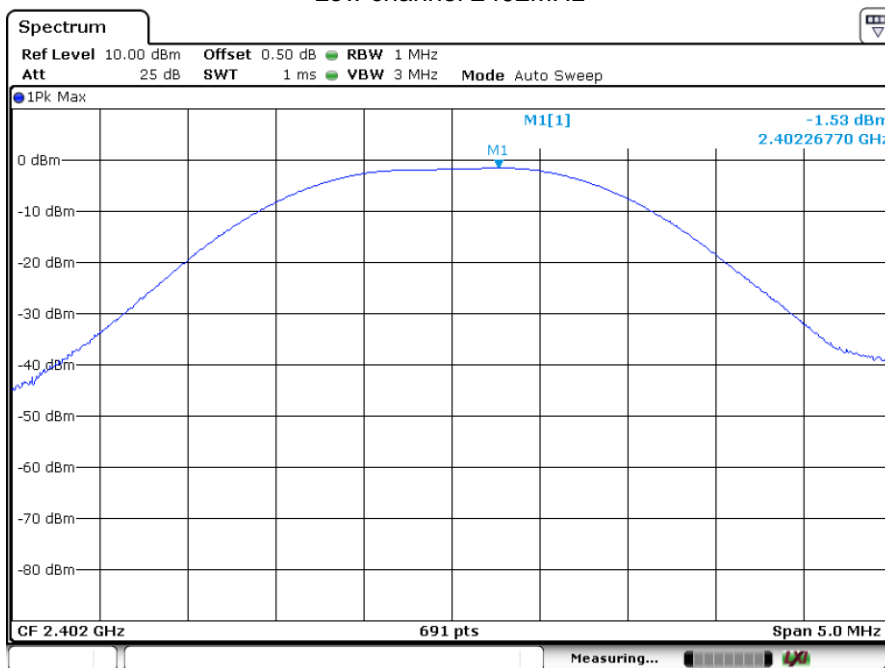
Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

Conducted peak output power

BT 4.0 Bluetooth Mode GFSK modulation Test Result

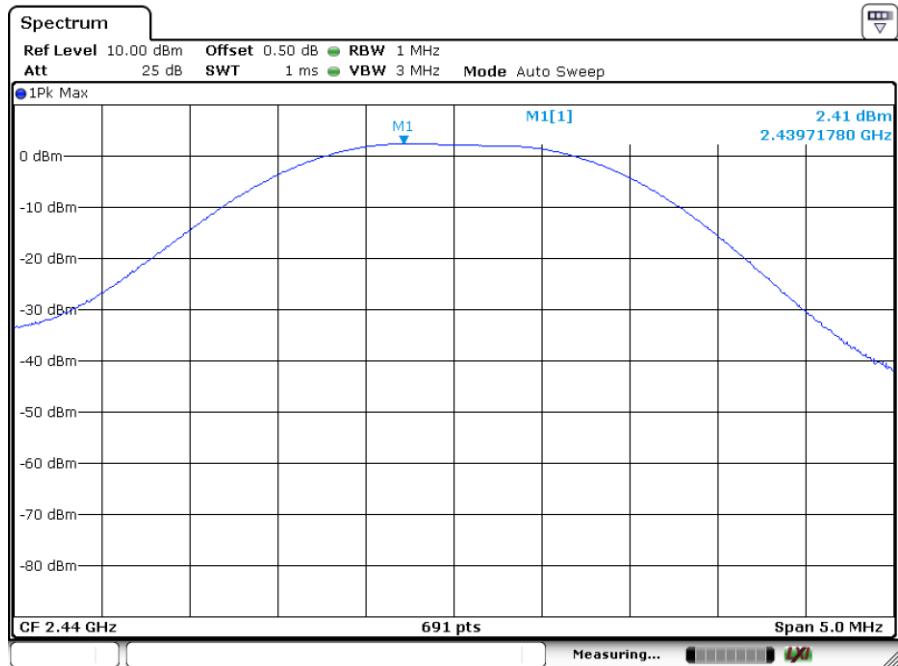
Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	-3.0	Pass
Middle channel 2440MHz	1.2	Pass
High channel 2480MHz	1.6	Pass

Low channel 2402MHz



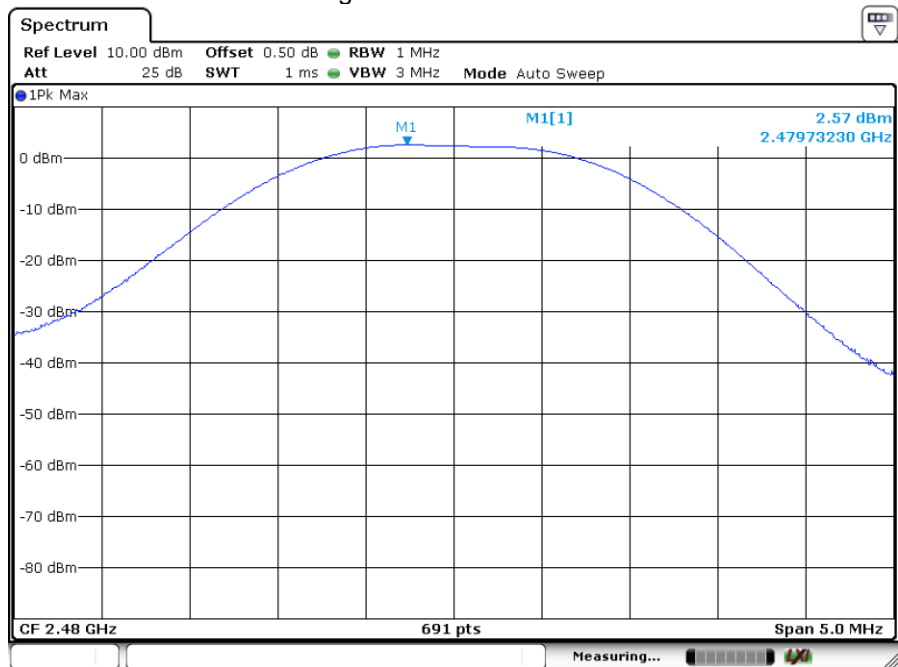
Date: 19.FEB.2016 14:09:24

Middle channel 2440MHz



Date: 19.FEB.2016 14:10:16

High channel 2480MHz



Date: 19.FEB.2016 14:10:57

9.3 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. Set analyzer center frequency to DTS channel center frequency.
RBW=3kHz, VBW \geq 3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold
2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
3. Repeat above procedures until other frequencies measured were completed

Limit

Limit [dBm]

≤ 8

BT 4.0 Bluetooth Mode GFSK modulation Test Result

Frequency MHz	Power spectral density	Limit dBm	Result
2402	-3.0	8	Pass
2440	1.2	8	Pass
2480	1.5	8	Pass

9.4 6 dB Bandwidth and 99% Occupied Bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=100K, VBW \geq 3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

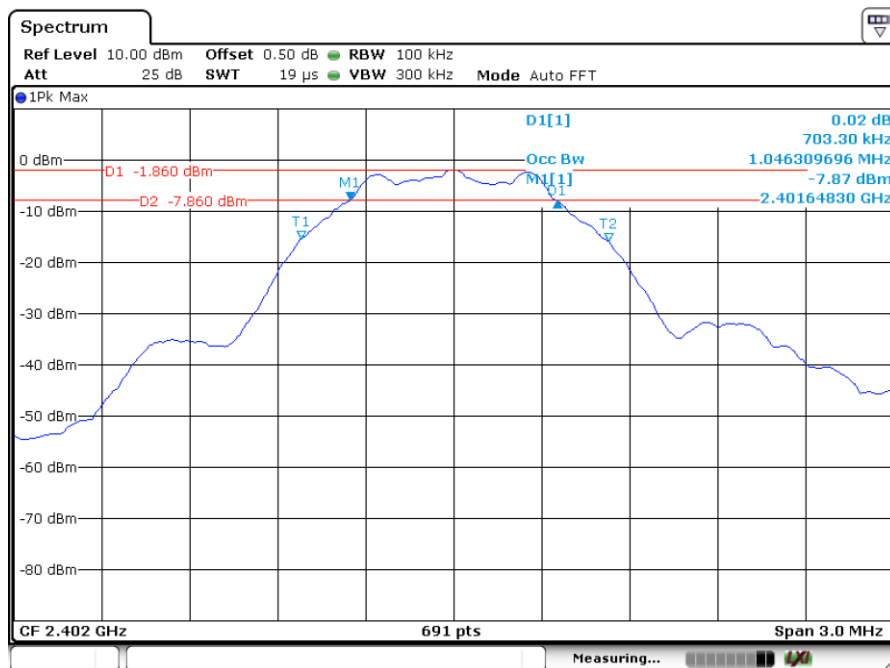
Limit [kHz]

≥ 500

BT 4.0 Bluetooth Mode GFSK modulation Test Result

Frequency MHz	6 dB Bandwidth kHz	Limit kHz	Result
2402	703.3	500	Pass
2440	707.7	500	Pass
2480	703.3	500	Pass

6 dB Bandwidth



Date: 19.FEB.2016 14:15:31

EMC_SZ_FR_21.00 FCC
Release 2014-03-20



9.5 Spurious RF conducted emissions

Test Method

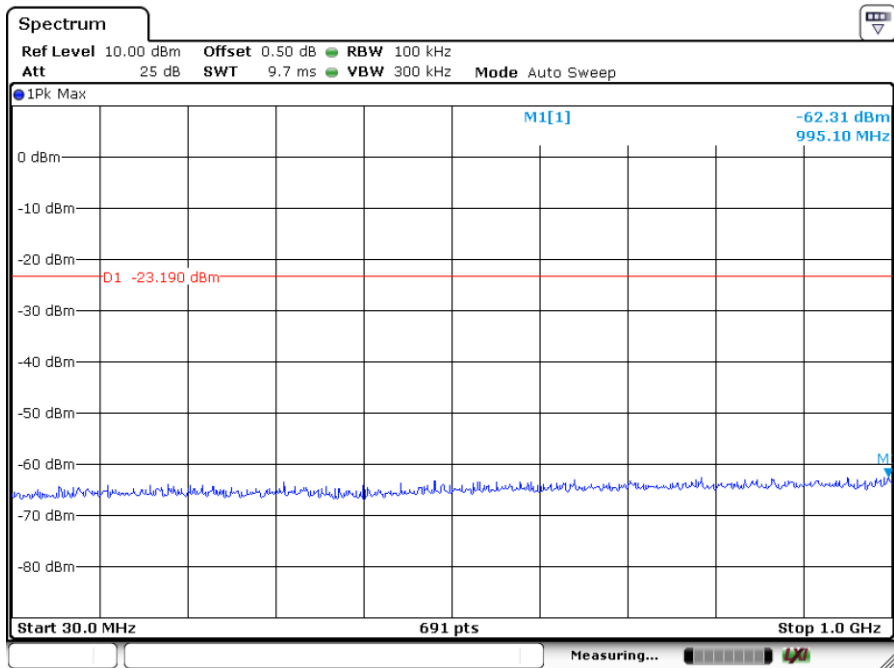
1. Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
3. The level displayed must comply with the limit specified in this Section. Submit these plots.
4. Repeat above procedures until all frequencies measured were complete.

Limit

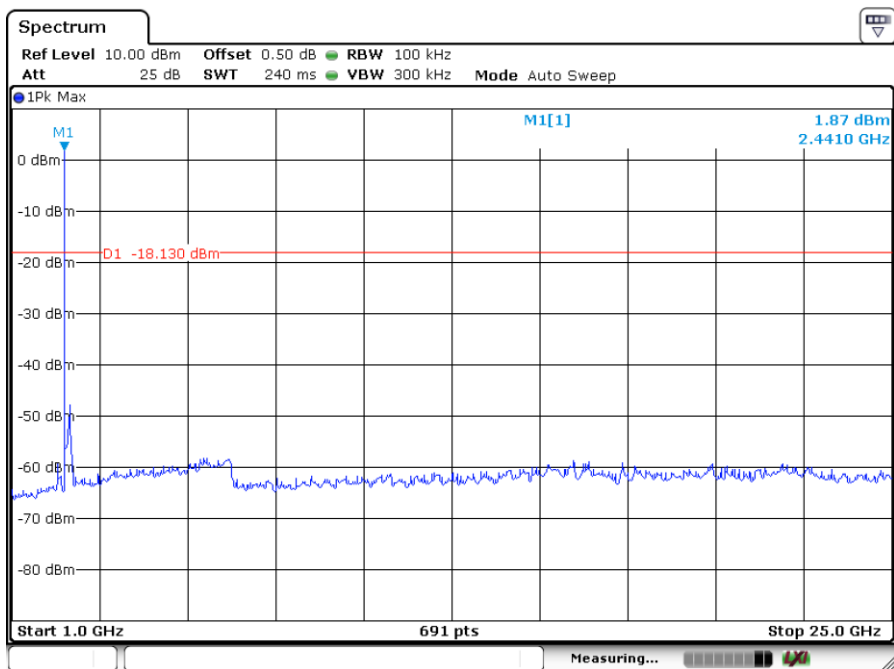
Frequency Range MHz	Limit (dBc)
30-25000	-20

Spurious RF conducted emissions

BT4.0 GFSK Modulation:
2402MHz

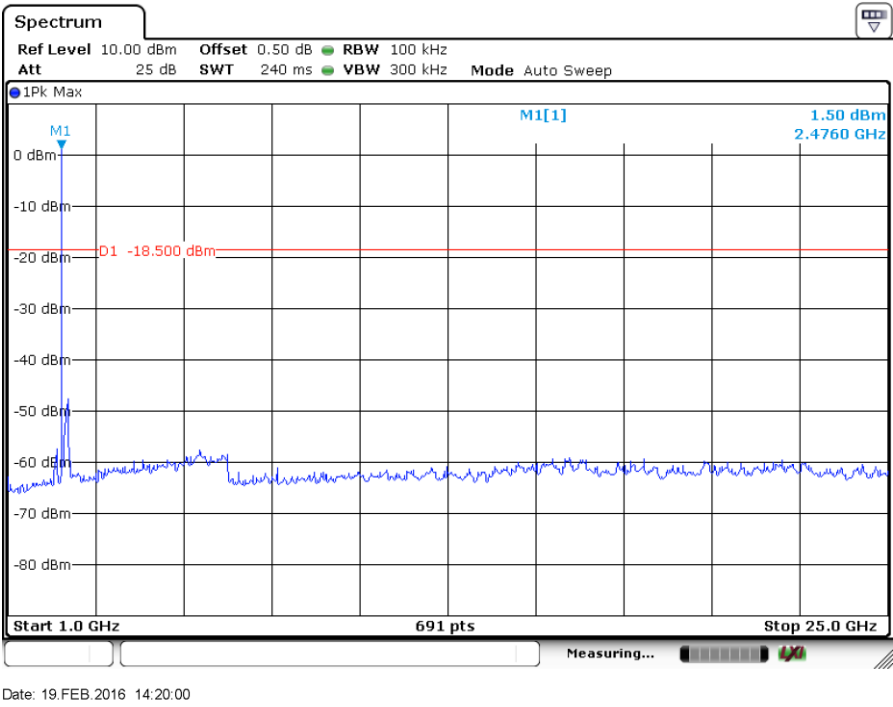
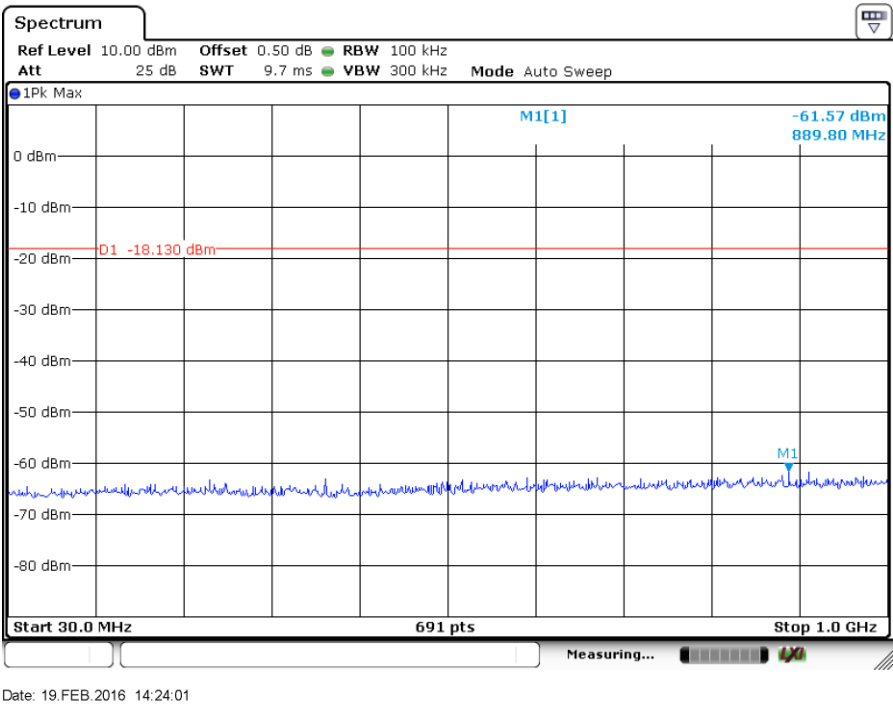


Date: 19.FEB.2016 14:25:41



Date: 19.FEB.2016 14:23:20

2440MHz



Spectrum

Ref Level 10.00 dBm Offset 0.50 dB RBW 100 kHz
 Att 25 dB SWT 9.7 ms VBW 300 kHz Mode Auto Sweep

1Pk Max

M1[1] -62.39 dBm
 847.70 MHz

D1 -18.500 dBm

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

Start 30.0 MHz 691 pts Stop 1.0 GHz

Measuring...

Spectrum

Ref Level 10.00 dBm Offset 0.50 dB RBW 100 kHz
 Att 25 dB SWT 240 ms VBW 300 kHz Mode Auto Sweep

● 1Pk Max

M1 M1[1] 1.50 dBm
 2.4760 GHz

D1 -18.500 dBm

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

Start 1.0 GHz 691 pts Stop 25.0 GHz

Measuring...

Date: 19.FEB.2016 14:20:00

9.6 Band edge testing

Test Method

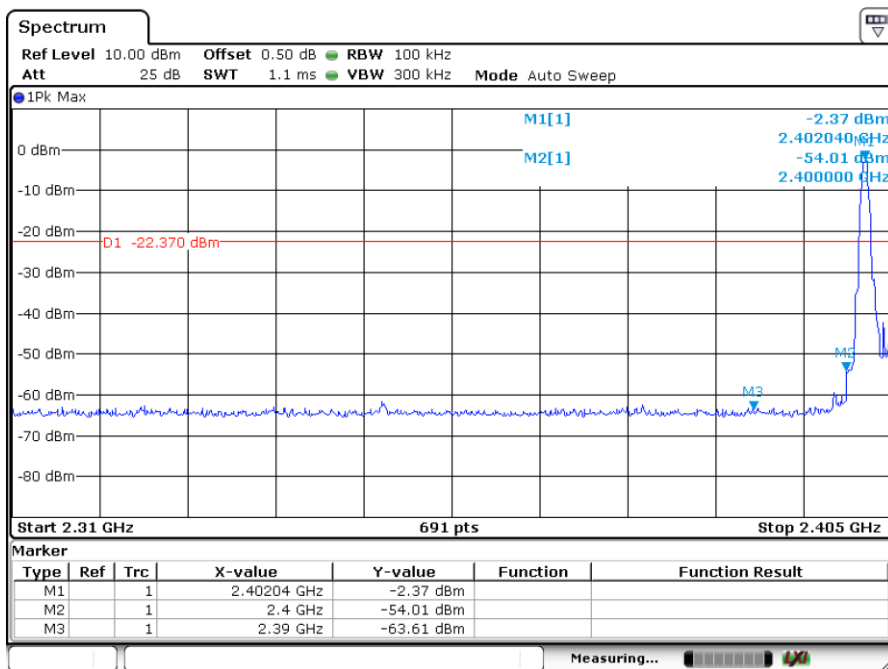
- 1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section. .
- 4 Repeat the test at the hopping off and hopping on mode, submit all the plots.

Limit:

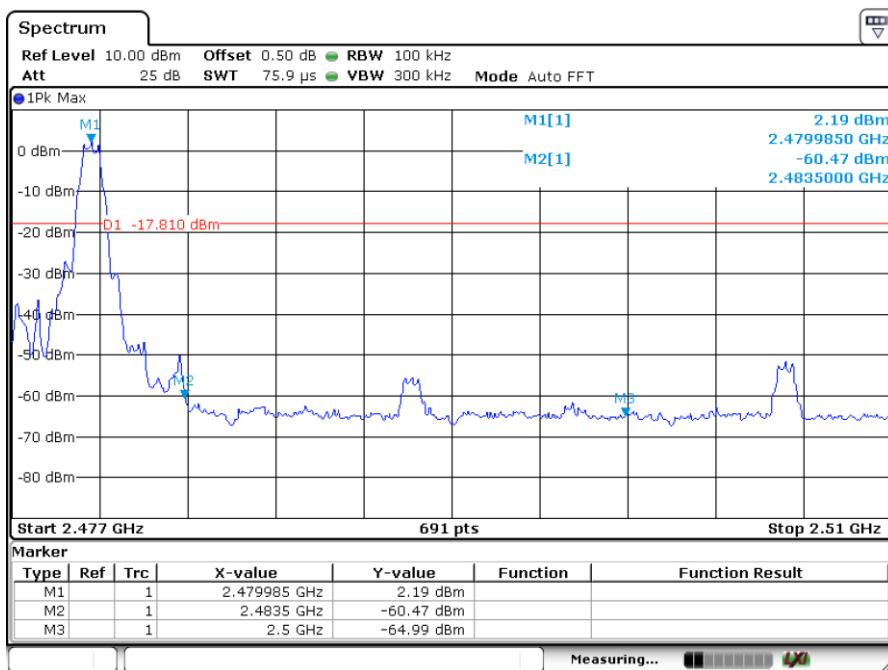
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

Band edge testing

BT4.0 GFSK Modulation Test Result



Date: 19.FEB.2016 14:27:28



Date: 19.FEB.2016 14:29:06

9.7 Spurious radiated emissions for transmitter

Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
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 C63.4-2009 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. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from $20\log(\text{duty cycle}/100\text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit

The radio emission outside the operating frequency band 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. Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dB μ V/m	Detector
30-88	100	40	QP
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

Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Transmitting spurious emission test result as below:

BT4.0 GFSK Modulation 2402MHz Test Result

Frequency band	Frequency MHz	Emission Level dBuV/m	Polarization	Limit dBuV/m	Detector	Margin dBuV/m	Result
30-1000MHz	--	--	H	43.5	QP	--	Pass
	--	--	H	46	QP	--	Pass
1000-25000MHz	4880	43.28	H	74	PK	30.72	Pass
	7454	39.67	H	74	PK	34.33	Pass
	4879.5	41.33	V	74	PK	32.67	Pass
	7408	38.13	V	74	PK	35.87	Pass

BT4.0 GFSK Modulation 2440MHz Test Result

Frequency band	Frequency MHz	Emission Level dBuV/m	Polarization	Limit dBuV/m	Detector	Margin dBuV/m	Result
30-1000MHz	--	--	H	43.5	QP	--	Pass
	--	--	H	46	QP	--	Pass
1000-25000MHz	4880	43.28	H	74	PK	30.72	Pass
	7454	39.67	H	74	PK	34.33	Pass
	4879.5	41.33	V	74	PK	32.67	Pass
	7408	38.13	V	74	PK	35.87	Pass

BT4.0 GFSK Modulation 2440MHz Test Result

Frequency band	Frequency MHz	Emission Level dBuV/m	Polarization	Limit dBuV/m	Detector	Margin dBuV/m	Result
30-1000MHz	--	--	H	43.5	QP	--	Pass
	--	--	H	46	QP	--	Pass
1000-25000MHz	4959.5	40.75	H	74	PK	33.25	Pass
	7479.5	38.63	H	74	PK	35.37	Pass
	4960.5	42.62	V	74	PK	31.38	Pass
	7470	38.71	V	74	PK	35.29	Pass

Remark:

- (1) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.
- (2) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

10 Test Equipment List

List of Test Instruments

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
CE	EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2016-7-24
	LISN	Rohde & Schwarz	ENV4200	100249	2016-7-24
	LISN	Rohde & Schwarz	ENV216	100326	2016-7-24
	ISN	Rohde & Schwarz	ENY81	100177	2016-7-24
	ISN	Rohde & Schwarz	ENY81-CA6	101664	2016-7-24
	High Voltage Probe	Rohde & Schwarz	TK9420(VT9 420)	9420-58	2016-7-24
	RF Current Probe	Rohde & Schwarz	EZ-17	100816	2016-7-24
	Test software	Rohde & Schwarz	EMC32	Version 9.15.0 0	N/A
C	Signal Generator	Rohde & Schwarz	SMB100A	108272	2016-7-24
	Signal Analyzer	Rohde & Schwarz	FSV40	101030	2016-7-24
	Vector Signal Generator	Rohde & Schwarz	SMU 200A	105324	2016-7-24
	RF Switch Module	Rohde & Schwarz	OSP120/OS P-B157	101226/10085 1	2016-7-24
RE	EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2016-7-24
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2016-8-14
	Horn Antenna	Rohde & Schwarz	HF907	102294	2016-7-24
	Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2016-7-24
	3m Semi-anechoic chamber	TDK	9X6X6	----	2019-5-29

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth
- 20dB bandwidth and 99% Occupied Bandwidth
- Carrier frequency separation
- Number of hopping frequencies
- Dwell Time
- Power spectral density*
- Spurious RF conducted emissions
- Band edge

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.83dB; Vertical: 4.91dB;
Uncertainty for Radiated Emission in 3m chamber 1000MHz-18000MHz	Horizontal: 4.89dB; Vertical: 4.88dB;
Uncertainty for Conducted Emission 150KHz-30MHz	U=3.5dB(k=2)