

FCC/IC - TEST REPORT

Report Number : 68.950.16.141.01 Date of Issue: July 26, 2016Model : MOTION ONEProduct Type : Bluetooth In-ear headphonesApplicant : GP Electronics (HK) LimitedAddress : 9/F, Building 12W, 12 Science Park West Avenue, Hong KongScience Park, Pak Shek Kok, New Territories, Hong KongProduction Facility : Charter Media (Dongguan) Co., Ltd.Address : Dabandi Industrial Zone, Daning District, Humen Town,Dongguan City, Guangdong Province 523930, P. R. ChinaTest Result : **Positive** **Negative**Total pages including
Appendices : 28

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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

IC Registration Number: 4780A

3 Description of the Equipment Under Test

Product:	Bluetooth In-ear headphones
Model no.:	MOTION ONE
FCC ID:	UXDF163902
IC:	21561-F163902
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:	1.5dBi
Description of the EUT:	The Equipment Under Test (EUT) is Bluetooth Headphones 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
RSS-247 Issue 1 2015	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSS) and Licence-Exempt Local Area Network (LE-LAN) Devices

All the test methods were according to KDB558074 D01 v03r05 DTS Measurement 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	RSS-GEN A7.2.4	Conducted emission AC power port	10	Pass
§15.247(b)(1)	RSS-247 Clause 5.4(2)	Conducted peak output power	13	Pass
§15.247(e)	RSS-247 Clause 5.2(2)	Power spectral density	14	Pass
§15.247(a)(2)	RSS-247 Clause 5.2(1)	6dB bandwidth	15	Pass
§15.247(a)(1)	RSS-247 Clause 5.1(1)	20dB bandwidth and 99% Occupied Bandwidth	--	N/A
§15.247(a)(1)	RSS-247 Clause 5.1(2)	Carrier frequency separation	--	N/A
§15.247(a)(1)(iii)	RSS-247 Clause 5.1(4)	Number of hopping frequencies	--	N/A
§15.247(a)(1)(iii)	RSS-247 Clause 5.1(4)	Dwell Time	--	N/A
§15.247(d)	RSS-247 Clause 5.5	Spurious RF conducted emissions	18	Pass
§15.247(d)	RSS-247 Clause 5.5	Band edge	22	Pass
§15.247(d) & §15.209 &	& RSSGEN 7.2.5	Spurious radiated emissions for transmitter	24	Pass
§15.203	RSSGEN 7.1.2	Antenna requirement	See note 1	Pass

Note 1: N/A=Not Applicable.

Note 2: The EUT uses a Chip 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: UXDF163902, IC: 21561-F163902B complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C, RSS 247 and RSS-Gen 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: May 9, 2016


Testing Start Date: May 9, 2016

Testing End Date: May 28, 2016

- TÜV SÜD HONG KONG LTD. -

Reviewed by:

Prepared by:



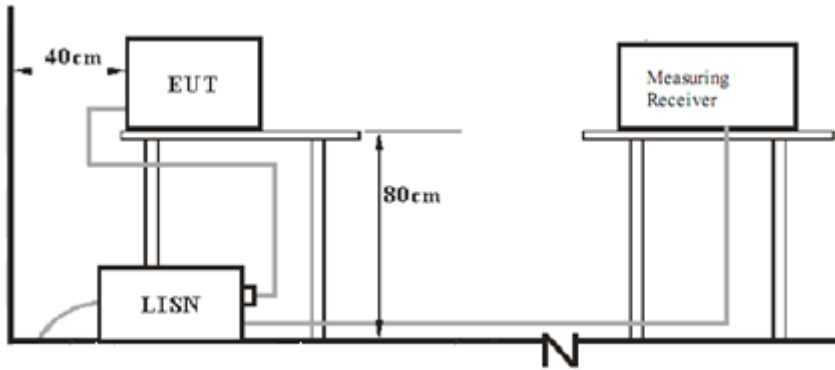
Phoebe Hu
EMC Project Manager



Felix Li
Senior EMC Project Engineer

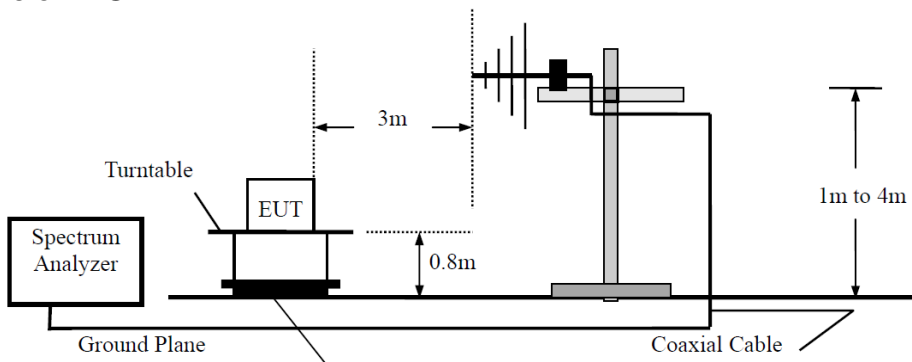
7 Test Setups

7.1 AC Power Line Conducted Emission test setups

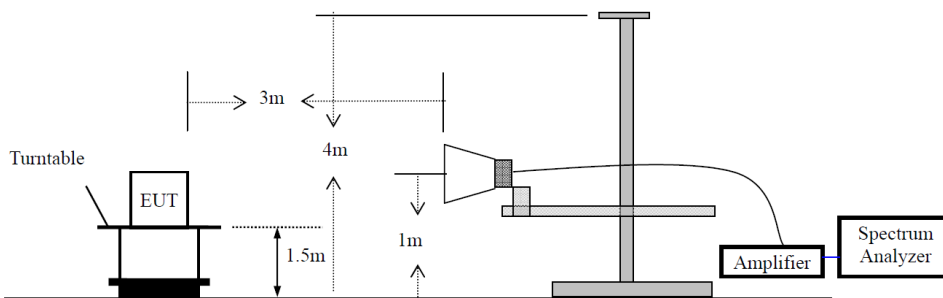


7.2 Radiated test setups

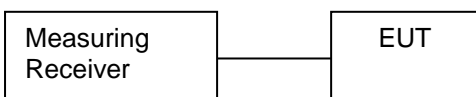
Below 1GHz



Above 1GHz



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

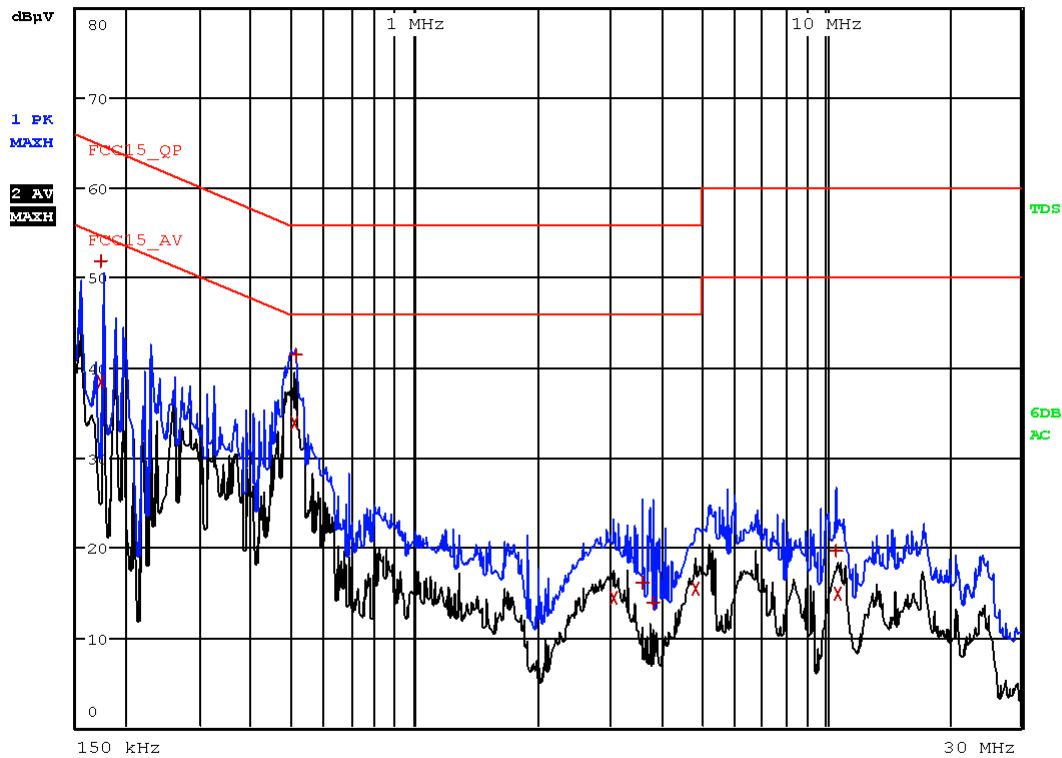
Decreasing linearly with logarithm of the frequency

Conducted Emission

Product Type : Bluetooth In-ear headphones
 M/N : MOTION ONE
 Operating Condition : Charging & BT
 Test Specification : Live
 Comment : AC 120V/60Hz



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



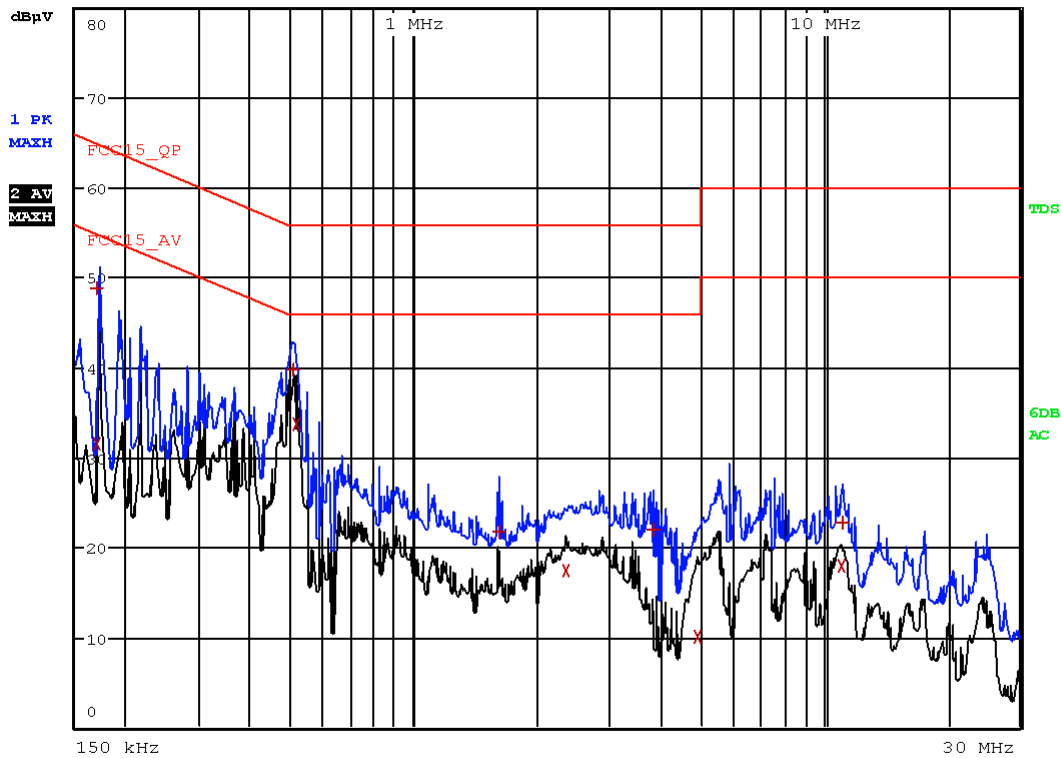
Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
1	154.00000000 kHz	51.45	Quasi Peak	-14.33
2	166.00000000 kHz	32.56	Average	-22.60
2	574.00000000 kHz	26.78	Average	-19.22
1	590.00000000 kHz	32.11	Quasi Peak	-23.89
2	2.886000000 MHz	18.76	Average	-27.24
1	3.462000000 MHz	24.07	Quasi Peak	-31.93
2	10.250000000 MHz	12.55	Average	-37.45
1	10.542000000 MHz	20.12	Quasi Peak	-39.88

Conducted Emission

Product Type : Bluetooth In-ear headphones
 M/N : MOTION ONE
 Operating Condition : Charging & BT
 Test Specification : Neutral
 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	170.00000000 kHz	48.88	Quasi Peak	-16.08
2	170.00000000 kHz	31.56	Average	-23.40
1	506.00000000 kHz	39.75	Quasi Peak	-16.25
2	514.00000000 kHz	33.75	Average	-12.25
1	1.61400000 MHz	21.73	Quasi Peak	-34.27
2	2.33800000 MHz	17.32	Average	-28.68
1	3.83400000 MHz	21.86	Quasi Peak	-34.14
2	4.91400000 MHz	9.98	Average	-36.02
2	11.05000000 MHz	17.88	Average	-32.12
1	11.07000000 MHz	22.74	Quasi Peak	-37.26

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

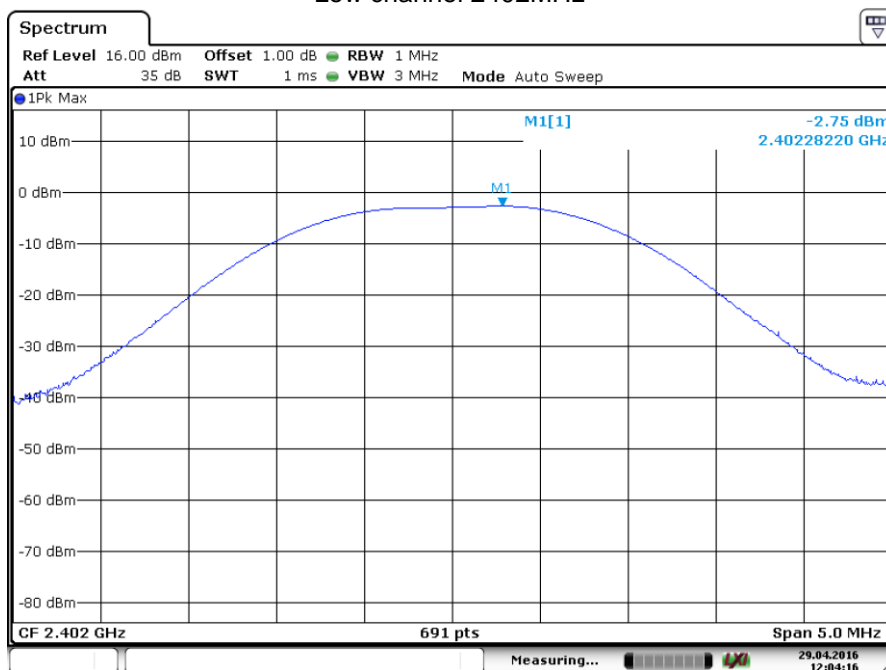
Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

Conducted peak output power

BT 4.0 Bluetooth Mode GFSK modulation Test Result

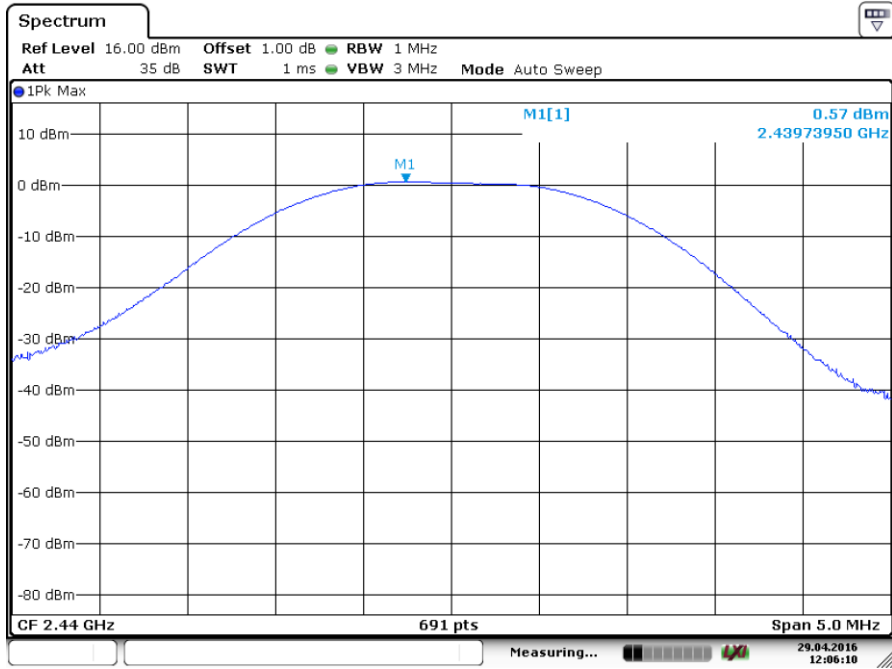
Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	-2.75	Pass
Middle channel 2440MHz	0.57	Pass
High channel 2480MHz	0.17	Pass

Low channel 2402MHz



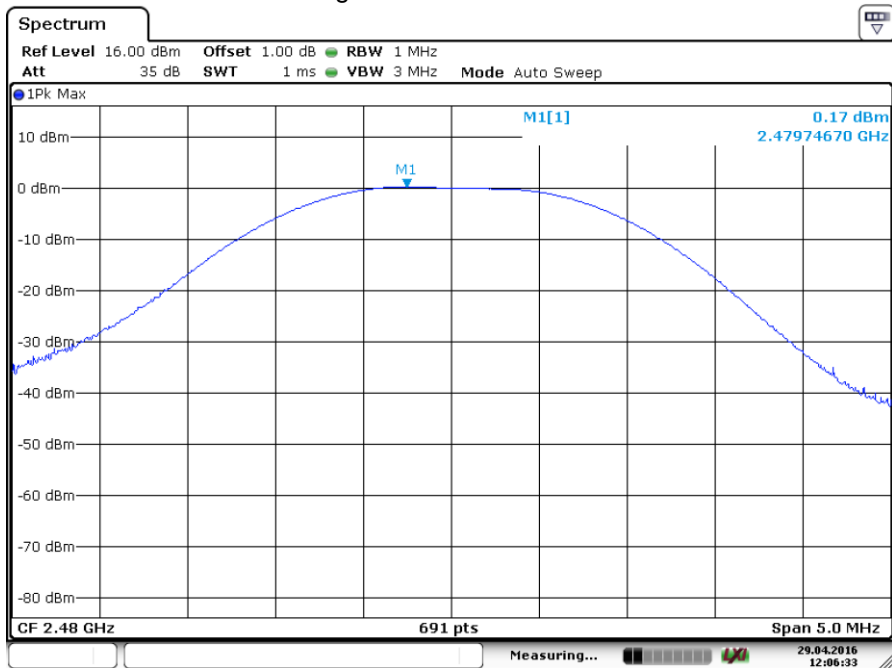
Date: 29.APR.2016 12:04:16

Middle channel 2440MHz



Date: 29.APR.2016 12:06:10

High channel 2480MHz



Date: 29.APR.2016 12:06:33



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≥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	-18.87	8	Pass
2440	-15.39	8	Pass
2480	-15.59	8	Pass

9.4 6 dB Bandwidth and 99% Occupied Bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=100K, VBW≥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

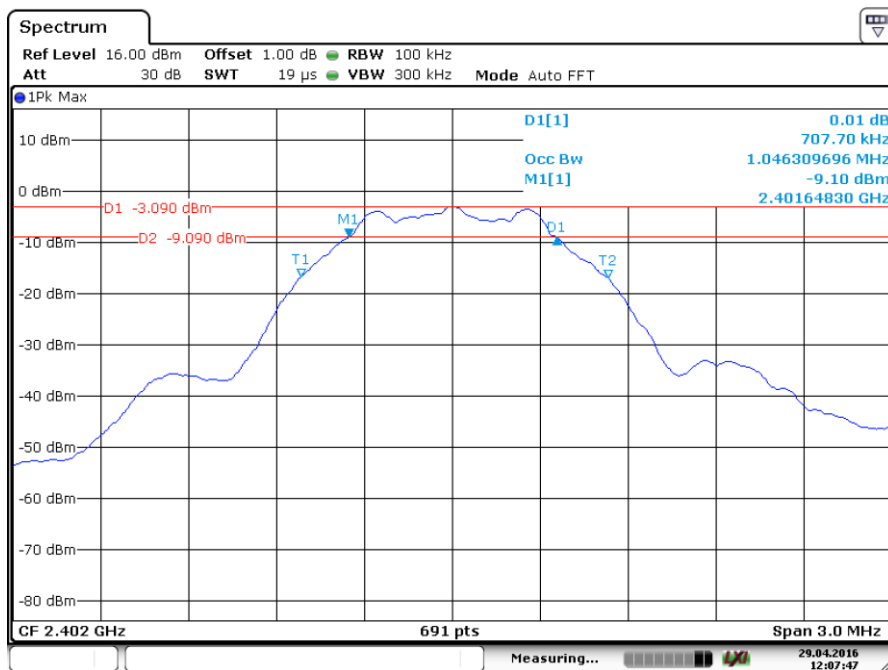
Limit [kHz]

≥500

BT 4.0 Bluetooth Mode GFSK modulation Test Result

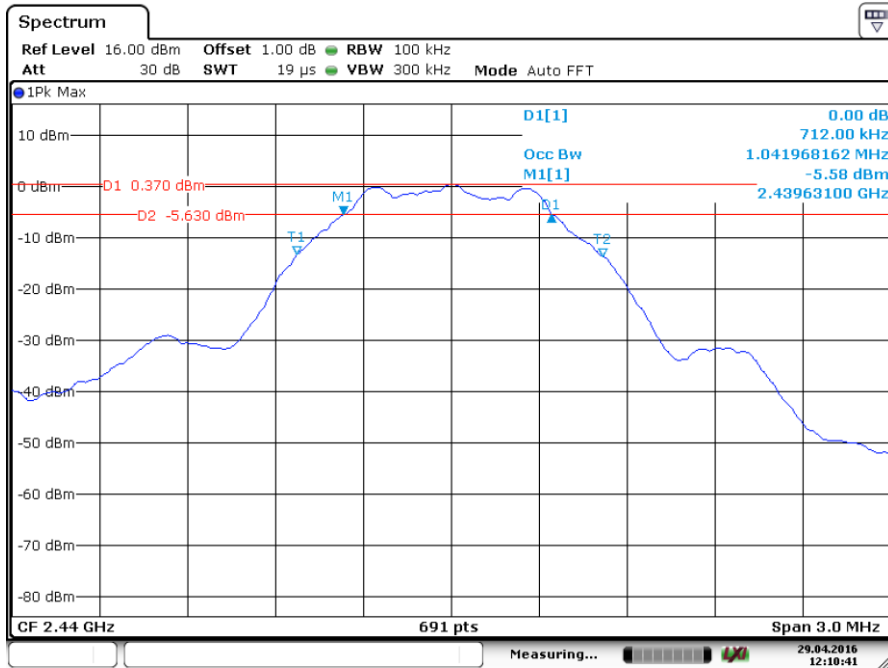
Frequency MHz	6 dB Bandwidth kHz	Limit kHz	Result
2402	707.7	500	Pass
2440	712.0	500	Pass
2480	707.7	500	Pass

6 dB Bandwidth

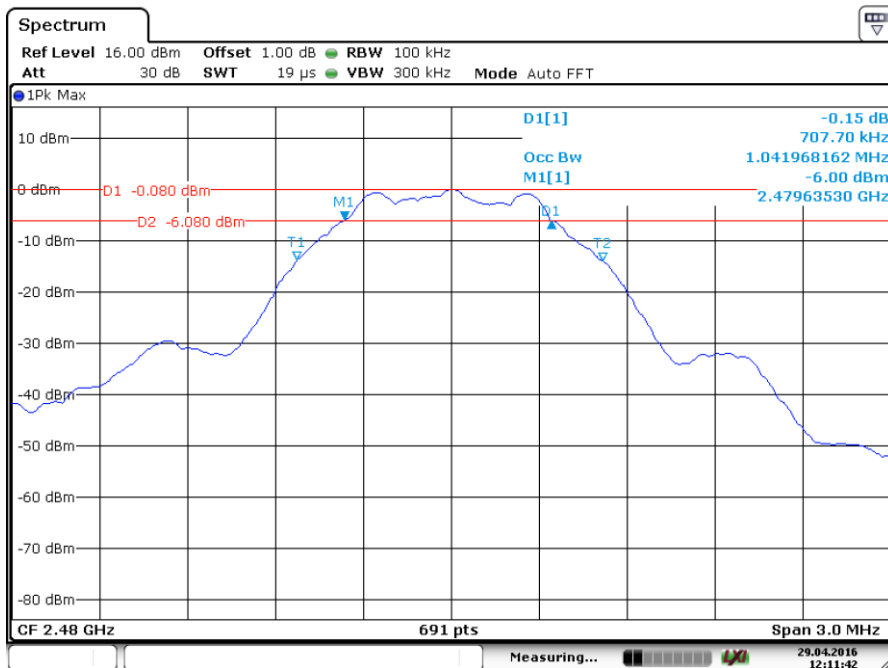


Date: 29.APR.2016 12:07:47

6 dB Bandwidth



Date: 29.APR.2016 12:10:41



Date: 29.APR.2016 12:11:42

9.5 Spurious RF conducted emissions

Test Method

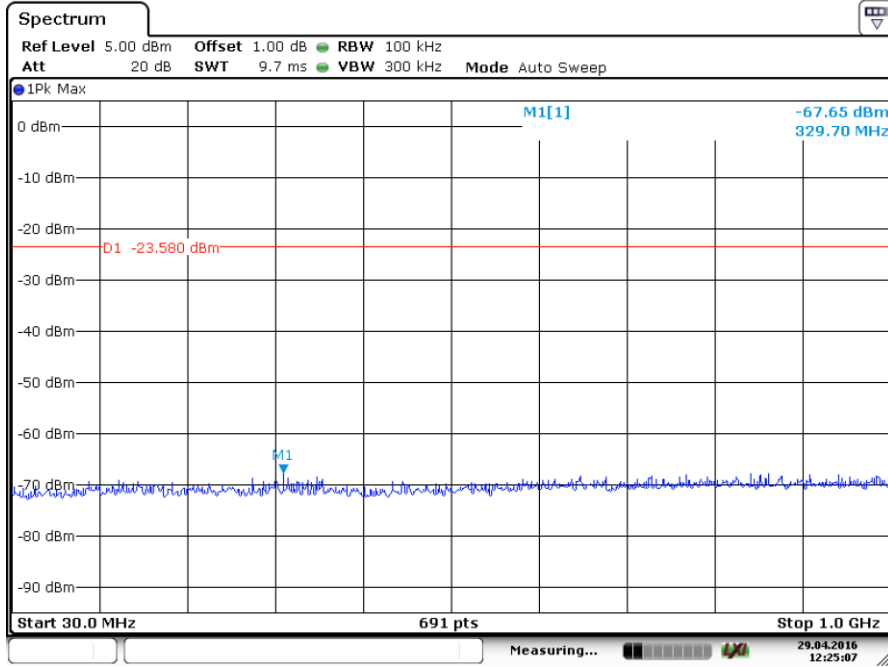
1. Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz, VBW \geq 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

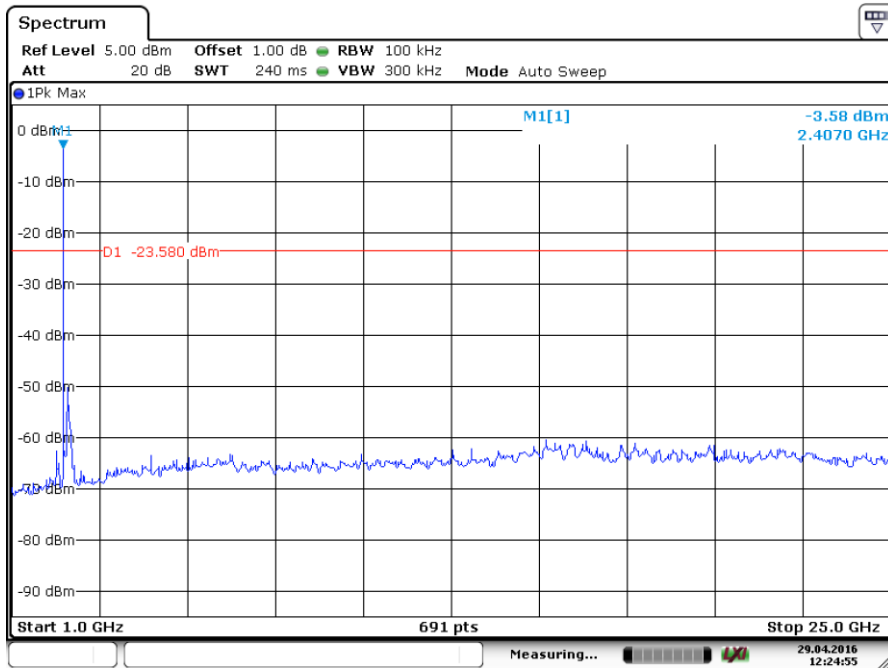
Frequency Range MHz	Limit (dBc)
30-25000	-20

Spurious RF conducted emissions

BT4.0 GFSK Modulation:
2402MHz

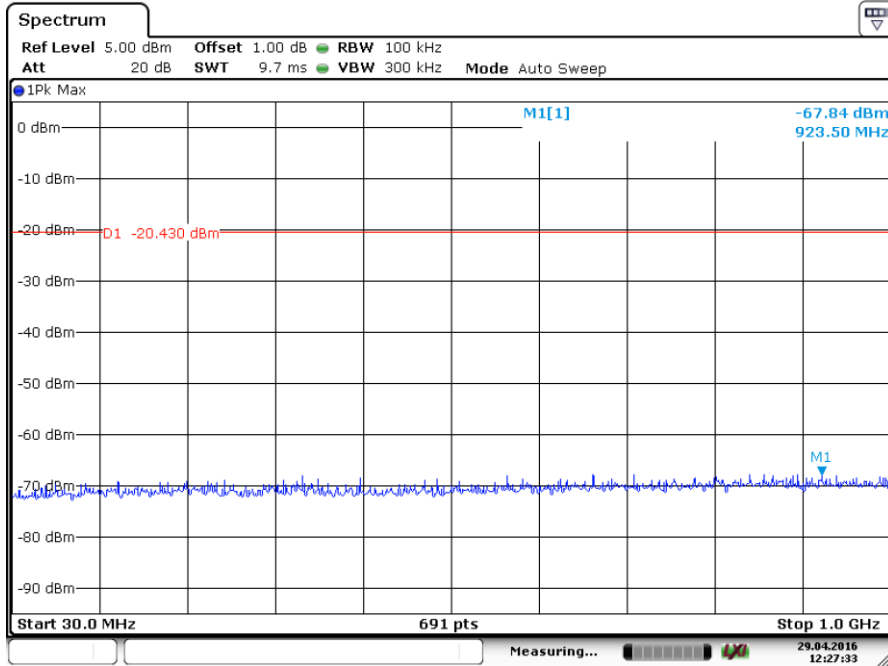


Date: 29.APR.2016 12:25:08

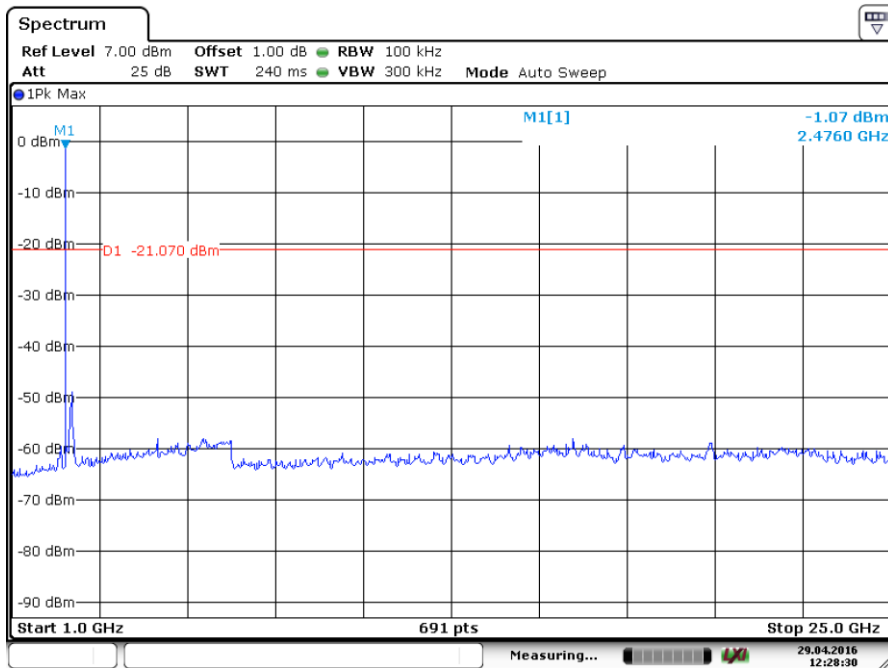


Date: 29.APR.2016 12:24:56

2440MHz

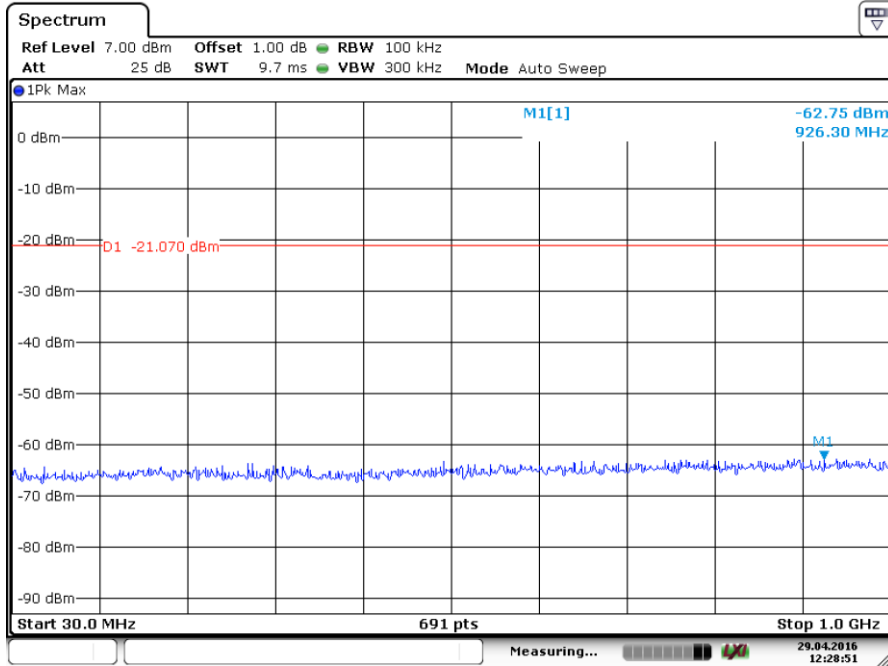


Date: 29.APR.2016 12:27:34

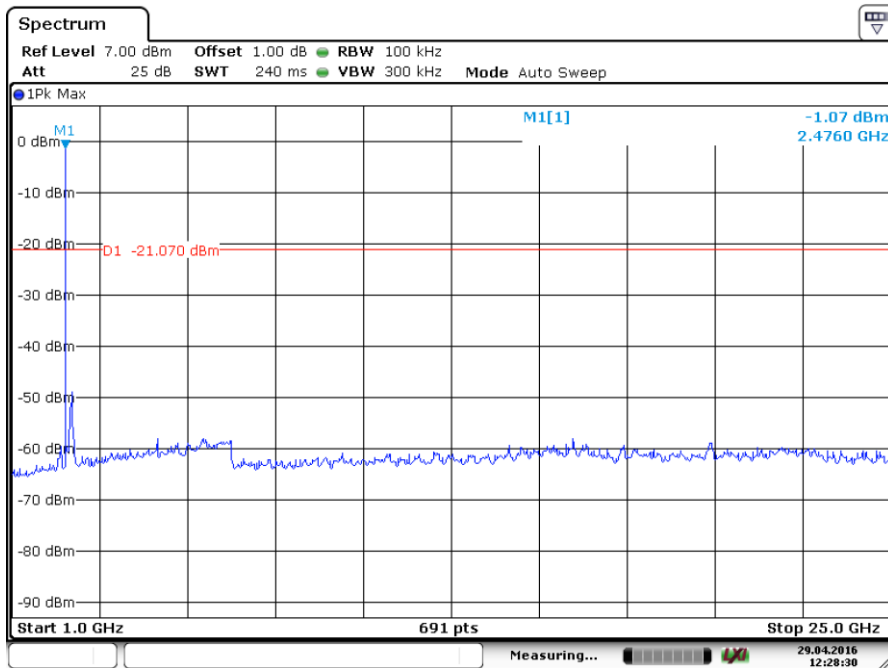


Date: 29.APR.2016 12:28:30

2480MHz



Date: 29.APR.2016 12:28:52



Date: 29.APR.2016 12:28:30

9.6 Band edge testing

Test Method

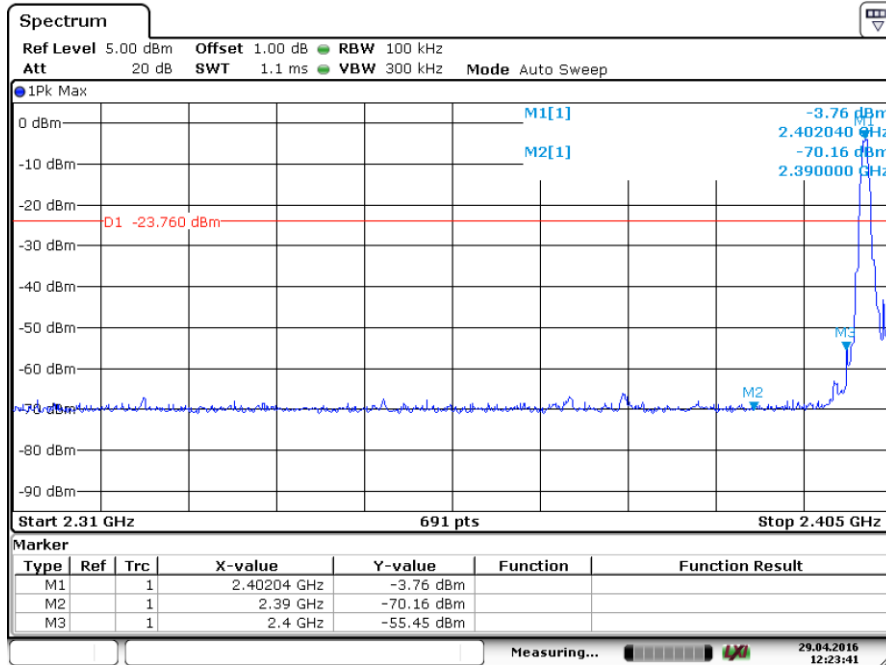
- 1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 2 Allow the trace to stabilize, use the peak and delta measurement to record 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:

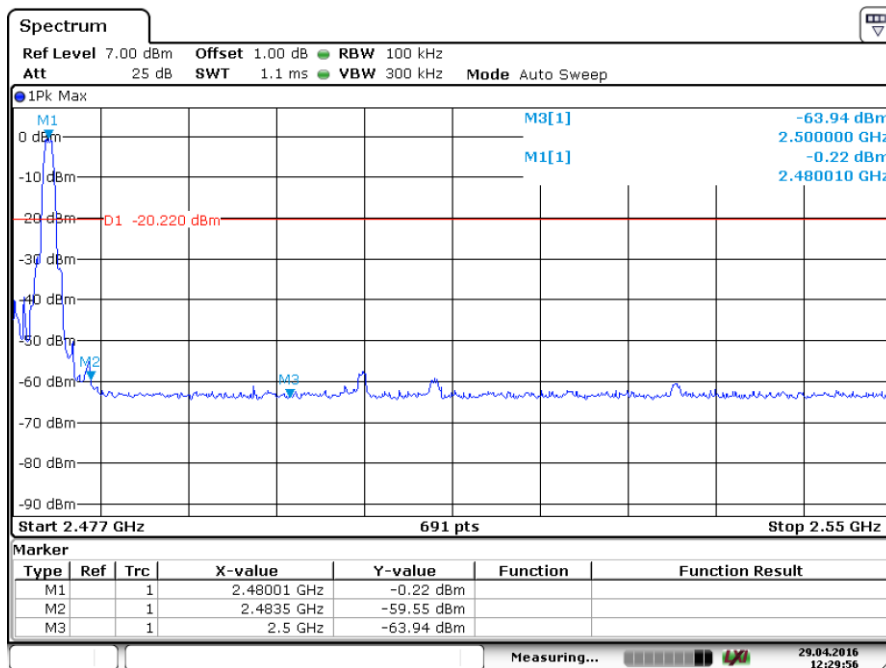
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either 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: 29.APR.2016 12:23:41



Date: 29.APR.2016 12:29:56

9.7 Spurious radiated emissions for transmitter

Test Method

- 1: The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
- 3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5: Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW \geq RBW for peak measurement and VBW = 10Hz for average measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Below 1GHz

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 for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Note:

- 1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.
- 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($20\log(1/\text{duty cycle})$).
- 4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.

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	Emission Level	Polarization	Limit	Detector	Margin	Result
	MHz	dBuV/m		dBuV/m		dBuV/m	
30-1000MHz	--	--	H	43.5	QP	--	Pass
	--	--	V	46	QP	--	Pass
1000-25000MHz	*4804	38.06	H	74	PK	35.94	Pass
	*7206	39.24	H	74	PK	34.76	Pass
	*4804	35.97	V	74	PK	38.03	Pass
	*7206	41.06	V	74	PK	32.94	Pass

BT4.0 GFSK Modulation 2440MHz Test Result

Frequency band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
	MHz	dBuV/m		dBuV/m		dBuV/m	
30-1000MHz	--	--	H	43.5	QP	--	Pass
	--	--	V	46	QP	--	Pass
1000-25000MHz	*4880	41.22	H	74	PK	32.78	Pass
	*7320	41.18	H	74	PK	32.82	Pass
	*4880	37.96	V	74	PK	36.04	Pass
	*7320	40.31	V	74	PK	33.69	Pass

BT4.0 GFSK Modulation 2480MHz Test Result

Frequency band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
	MHz	dBuV/m		dBuV/m		dBuV/m	
30-1000MHz	--	--	H	43.5	QP	--	Pass
	--	--	V	46	QP	--	Pass
1000-25000MHz	*4960	42.87	H	74	PK	31.13	Pass
	*7440	42.14	H	74	PK	31.86	Pass
	*4960	35.96	V	74	PK	38.04	Pass
	*7440	39.43	V	74	PK	34.57	Pass

Remark:

- (1) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.
- (2) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are the noise floor or attenuated more than 10dB below the permissible limits or the field strength is too small to be measured.

10 Test Equipment List

Site 2:

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Test Receiver	R & S	ESU26	100050	12-Feb-2017
Bi-conical Antenna	R & S	HK116	100242	07-Dec-2016
Log Periodic Antenna	R & S	HL223	841516/020	01-Sep-2017
Coaxial cable (50ohm)	Rosenberger	RTK081-05S- 05S-10m	LA2-001-10M / 001	01-Sep-2017
Microwave amplifier (0.5-26.5GHz, 25dB gain)	HP	83017A	3123A00437	10-Jun-2016
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	9829213	17-Jul-2016
Horn Antenna	EMCO	3115	9002-3351	28-Oct-2017
Active Loop Antenna	EMCO	6502	9107-2651	26-Aug-2017
RF Voltage Probe	Schwarzbeck	TK9416	None	10-Feb-2017
LISN	R&S	ESH3-Z5	849876/027	15-Jun-2016
Double Shield Cable	Radiall	RG142	Nil	14-Sep-2017
Pulse Limiter	R&S	ESH3-Z2	Nil	04-Jun-2016

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		
Items		Extended Uncertainty
Radiated Emissions	Level accuracy	±4.68 dB
	30 to 200 MHz	±5.73 dB
	200 to 1000 MHz 1000 to 25000 MHz	±5.57 dB
Conducted Emissions	Level accuracy 9 kHz to 30 MHz	±3.16 dB
Conducted RF Test		≤ 1 dB