China

FCC/IC - TEST REPORT

Report Number	:	68.920.14.026.01	Date of Issue:	November 24, 2014

Model	:	BH2200
Product Type	:	Bluetooth Headphones
Applicant	:	ASDER ELECTRONICS CO., LTD
Address	:	3F-1 NO22, SEC.2, KEELUNG ROAD, TAIPEI, TAIWAN, R.O.C
Production Facility	:	DONGGUAN CHANG AN SHA TOU UNI WORLD TOY MANUFACTORY
Address	:	No.97, Jinghai W. Rd., Shatou S. Dist., Chang'an Town, Dongguan City, Guangdong Province, China

Test Result	:	■ **Positive** ☐ **Negative**
Total pages including Appendices	:	24

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2 Details about the Test Laboratory

Details about the Test Laboratory
Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
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Telephone: 86 755 8828 6998
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Test Site 2
Company name: Global United Technology Services Co., Ltd.
Floor, Block No.2, Laodong Industrial Zone,
Xixiang Road Baoan District,
Shenzhen, China 518102

Telephone: 86 755 2779 8480
Fax: 86 755 2779 8960

3 Description of the Equipment Under Test

Product:	Bluetooth Headphones
Model no.:	BH2200
FCC ID:	2ADG5-BH2200
Brand Name:	ASDER
Options and accessories:	Bluetooth 3_CSR 2.4.8
Rating Voltage:	DC 3.7V by Li-ion Battery
Rating Current:	Charging: 200mA; Playing: 70mA
RF Transmission Frequency:	2402-2480MHz
No. of Operated Channel:	40
Modulation:	GFSK(BLE)
Antenna Type:	PCB
Antenna Gain:	0dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Bluetooth Headphones operated at 2.4GHz

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China

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2013 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 3 December 2010	General Requirements and Information for the Certification of Radio Apparatus
RSS-210 Issue 8 December 2010	RSS-210 — Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

All the test methods were according to Public Notice DA 00-705 -Frequency Hopper Spread Spectrum Test Procedure released by FCC on March 30, 2000 and C63.10 (2013).

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5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C, RSS-Gen, RSS-210					
Test Condition			Pages	Test Site	Test Result
§15.207	RSS-GEN A7.2.4	Conducted emission AC power port	---	---	N/A
§15.247(b)(1)	RSS-210 A8.4	Conducted peak output power	10	Site 2	Pass
§15.247(a)(2)	RSS-210 A8.2(a)	6dB bandwidth	11	Site 2	Pass
§15.247(a)(1)	RSS-210 A8.1(a) & RSSGEN 4.6.2	20dB bandwidth and 99% Occupied Bandwidth	---	---	N/A
§15.247(a)(1)	RSS-210 A8.1(b)	Carrier frequency separation	---	---	N/A
§15.247(a)(1)(iii)	RSS-210 A8.1(d)	Number of hopping frequencies	---	---	N/A
§15.247(a)(1)(iii)	RSS-210 A8.1(c)	Dwell Time	---	---	N/A
§15.247(e)	RSS-210 A8.2(b)	Power spectral density*	13	Site 2	Pass
§15.247(d)	RSS-210 A8.5	Spurious RF conducted emissions	14	Site 2	Pass
§15.247(d)	RSS-210 A8.5	Band edge	18	Site 2	Pass
§15.247(d) & §15.209 &	RSS-210 2.5 & RSSGEN 7.2.5 & RSSGEN 6.1	Spurious radiated emissions for transmitter and receiver	20	Site 2	Pass
§15.203	RSSGEN 7.1.2	Antenna requirement	See note 2		Pass

Note 1: N/A=Not Applicable.
Note 2: The EUT uses a permanently ceramic antenna, which gain is 0dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2ADG5-BH2200 complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules and RSS-210.

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: October 31, 2014

Testing Start Date: October 31, 2014

Testing End Date: November 24, 2014

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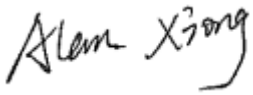
Reviewed by:

John Zhi
EMC Project Manager

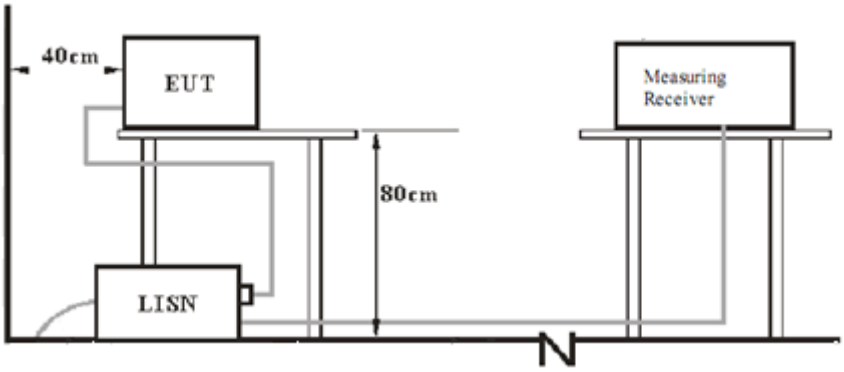
Prepared by:



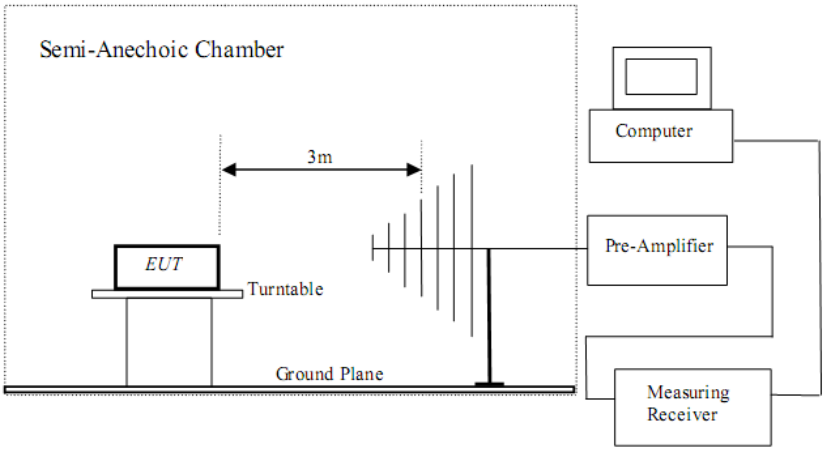
Alan Xiong
EMC Project Engineer

7 Test Setups

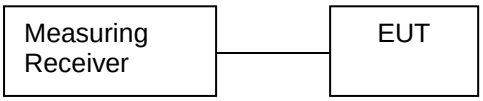
7.1 AC Power Line Conducted Emission test setups



7.2 Radiated test setups



7.3 Conducted RF test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
NoteBook	Lenovo	X200	---
Phone	HUAWEI	G610	---

Test software: CSR_Bluetooth 3, which used to control the EUT in continues transmitting mode

The system was configured to non-hopping mode.

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power

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9 Technical Requirement

9.1 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

According to §15.247 (b) (1) and RSS-210 A8.4, conducted peak output power limit as below:

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

Bluetooth Mode BLE modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	2.05	Pass
Middle channel 2440MHz	3.61	Pass
High channel 2480MHz	3.42	Pass

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9.2 6dB 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.

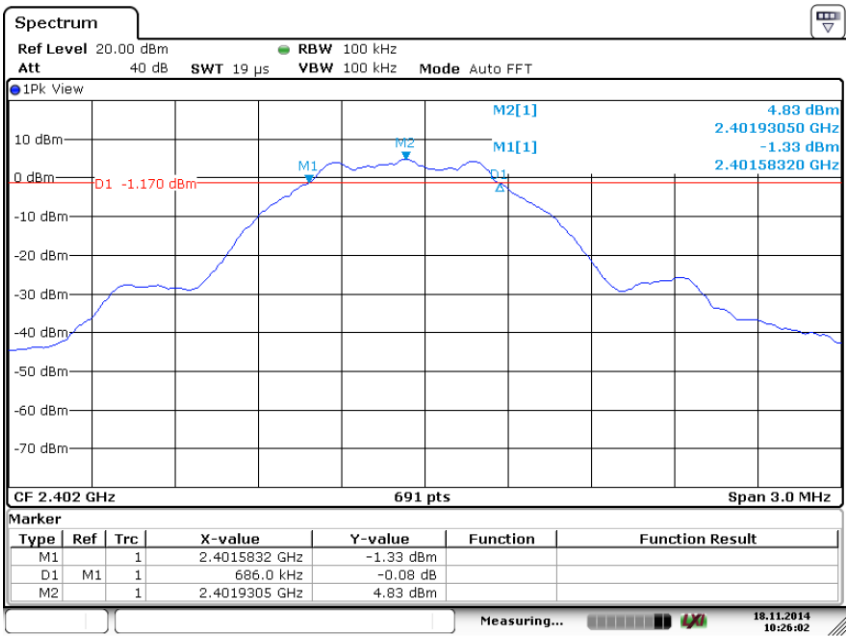
Limit

Limit [kHz]
≥500

Test result

Frequency MHz	6dB bandwidth kHz	Result
Low channel 2402MHz	686.0	Pass
Middle channel 2440MHz	681.6	Pass
High channel 2480MHz	672.9	Pass

2402MHz



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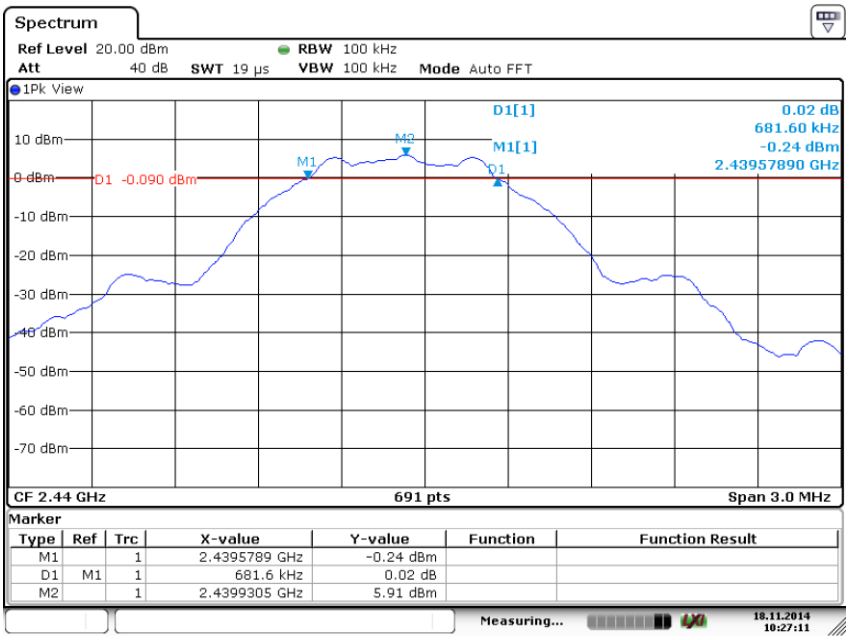
2440MHz



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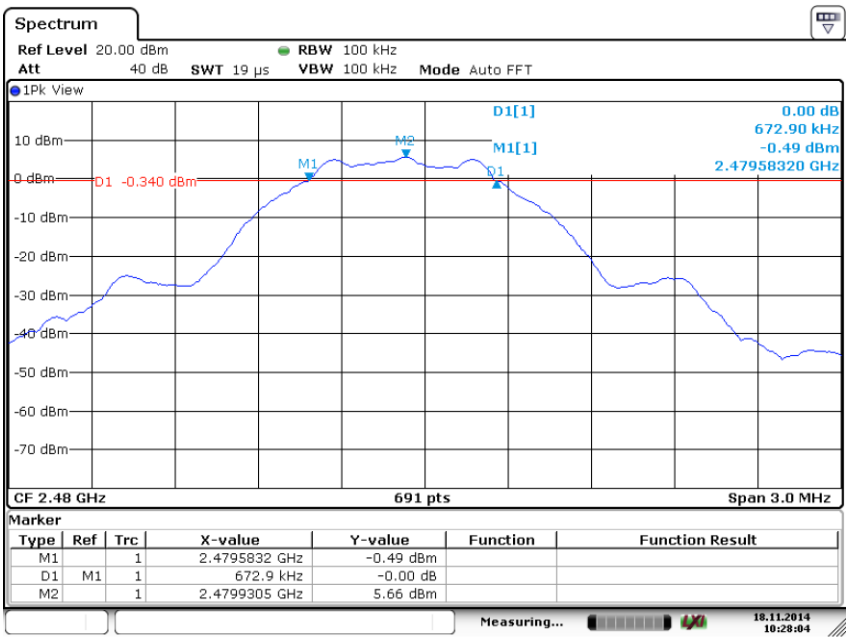
2480MHz



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9.29.3 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

Test result

Frequency MHz	Power spectral density dBm	Result
Low channel 2402MHz	-10.73	Pass
Middle channel 2440MHz	-9.69	Pass
High channel 2480MHz	-9.80	Pass

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9.39.4 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

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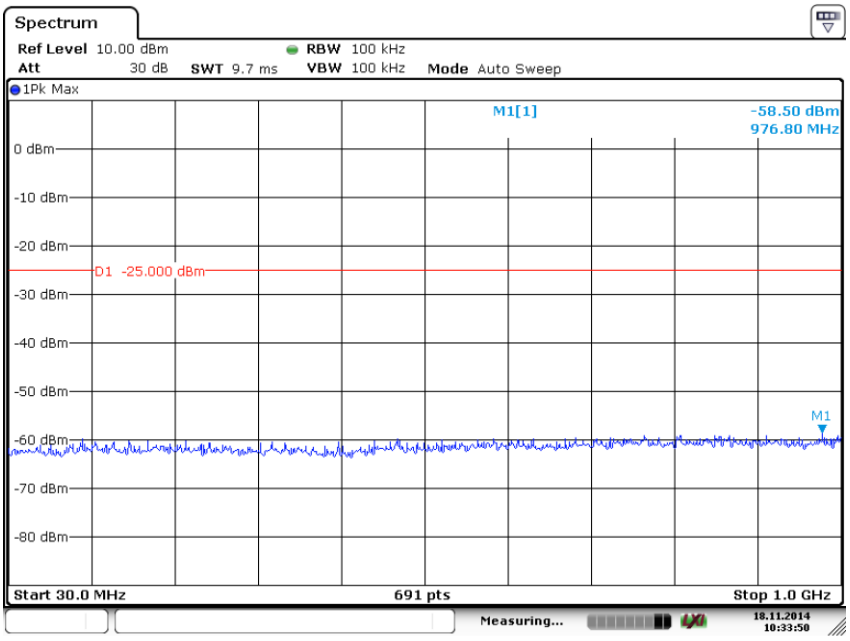
Spurious RF conducted emissions

2402MHz



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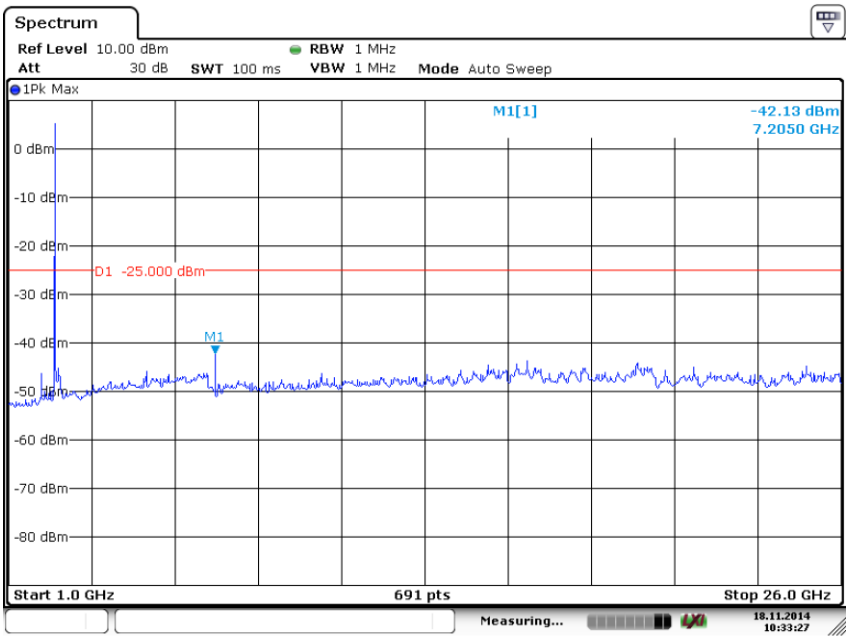

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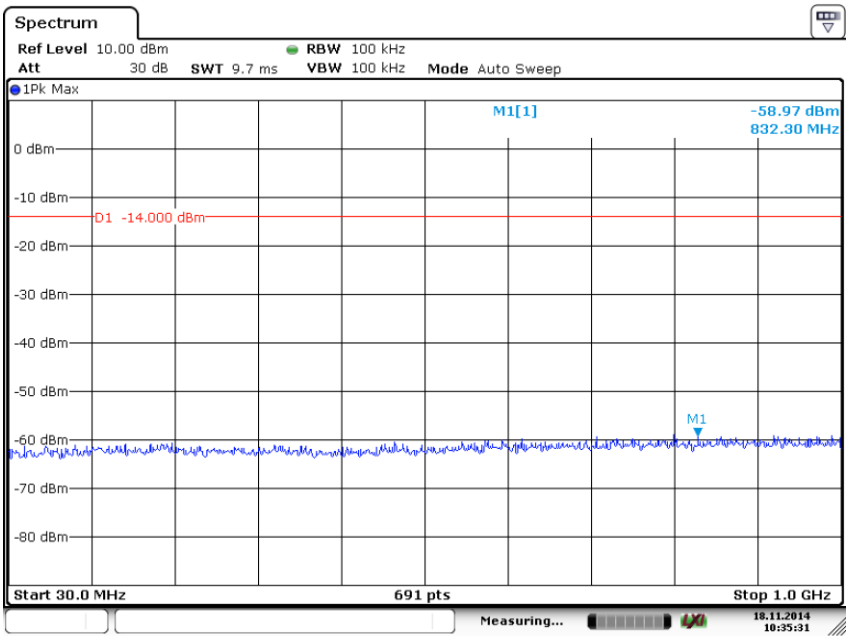
Spurious RF conducted emissions

2440MHz



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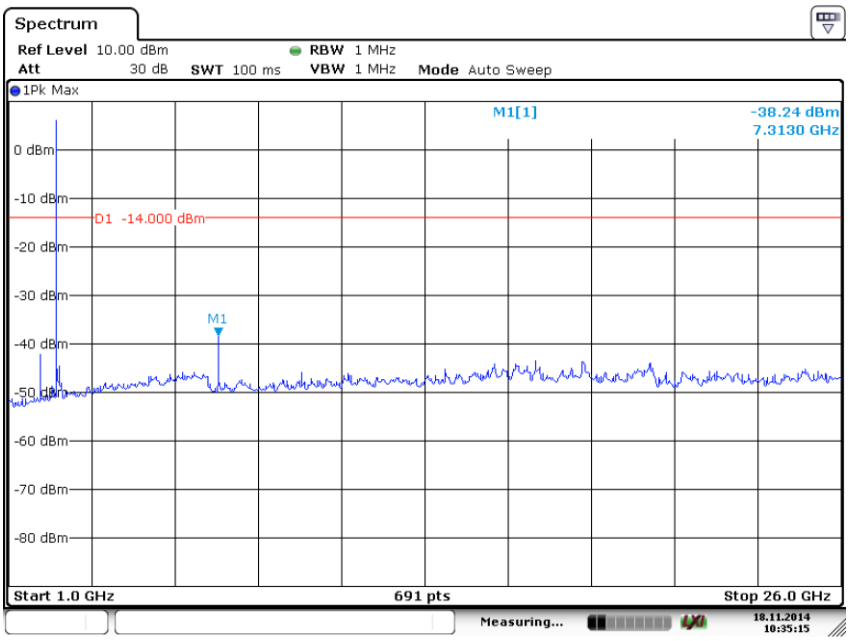

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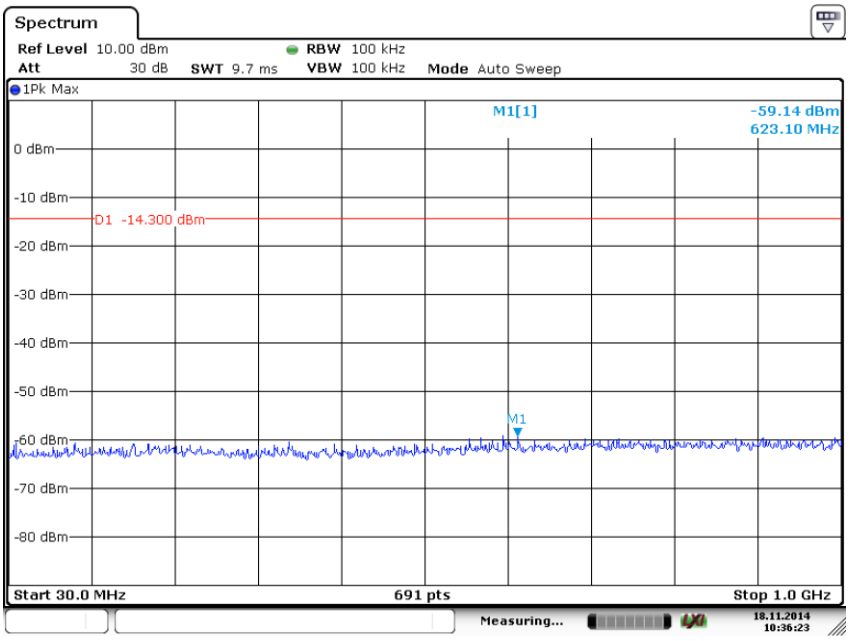
Spurious RF conducted emissions

2480MHz



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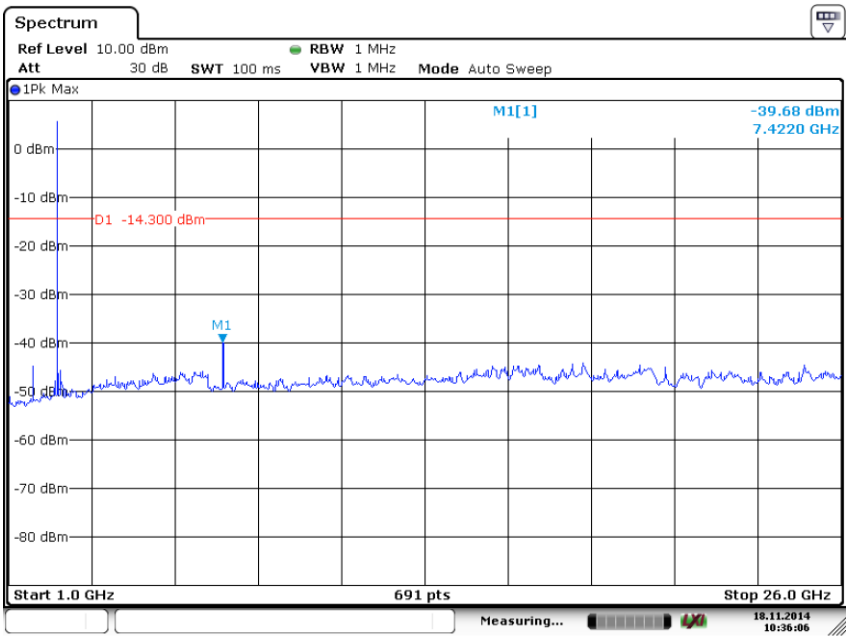

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9.49.5 Band edge testing

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≥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:

According to §15.247(d) and RSS-210 A8.5, in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) and RSS-Gen7.2.2, must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)) and RSS-Gen.

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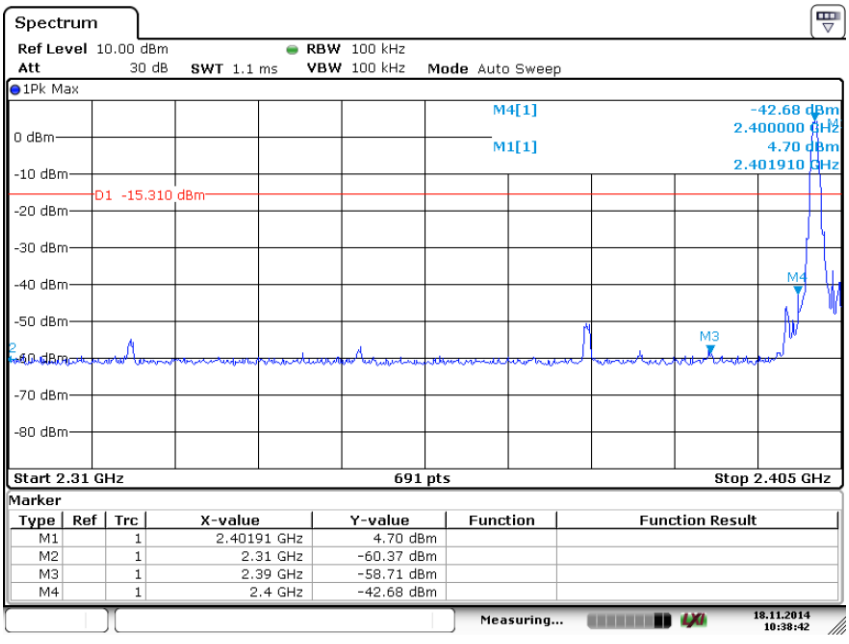
Band edge testing

BLE Modulation Test Result:



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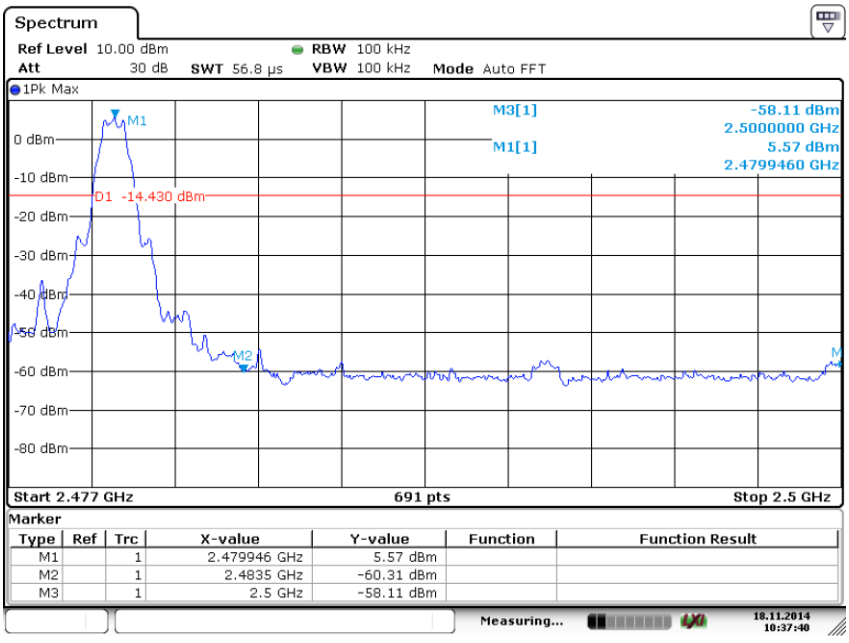

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9.59.6 Spurious radiated emissions for transmitter and receiver

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 ≥ 1GHz, 100 kHz for f < 1 GHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Follow the guidelines in ANSI C63.4-1992 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 20log(duty cycle/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit

According to part 15.247(d), 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 section15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dBµV/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

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Spurious radiated emissions for transmitter and receiver

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:

Bluetooth Mode GFSK (BLE) Modulation 2402MHz Test Result

Frequency	Emission Level	Limit	Polarization	Margin	Detector	Result
MHz	dBuV/m	dBuV/m		dBμV/m		
155.98	30.94	43.5	Horizontal	12.56	QP	Pass
444.01	34.28	46	Horizontal	11.72	QP	Pass
437.27	30.18	46	Vertical	15.82	QP	Pass
444.01	31.25	46	Vertical	14.75	QP	Pass
*4804	49.56	74	Horizontal	24.44	PK	Pass
*4804	46.71	74	Vertical	27.29	PK	Pass
*4804	47.38	54	Horizontal	6.62	Ave	Pass
*4804	45.64	54	Vertical	8.36	Ave	Pass
*7206	48.73	74	Horizontal	25.27	PK	Pass
*7206	47.88	74	Vertical	26.12	PK	Pass
*7206	45.29	54	Horizontal	8.71	Ave	Pass
*7206	46.15	54	Vertical	7.85	Ave	Pass

Bluetooth Mode GFSK (BLE) Modulation 2440MHz Test Result

Frequency	Emission Level	Limit	Polarization	Margin	Detector	Result
MHz	dBuV/m	dBuV/m		dBμV/m		
*4880	50.12	74	Horizontal	23.88	PK	Pass
*4880	47.25	74	Vertical	26.75	PK	Pass
*4880	48.32	54	Horizontal	5.68	Ave	Pass
*4880	44.29	54	Vertical	9.71	Ave	Pass
*7320	51.27	74	Horizontal	22.73	PK	Pass
*7320	50.33	74	Vertical	23.67	PK	Pass
*7320	47.39	54	Horizontal	6.61	Ave	Pass
*7320	45.96	54	Vertical	8.04	Ave	Pass

Bluetooth Mode GFSK (BLE) Modulation 2480MHz Test Result

Frequency	Emission Level	Limit	Polarization	Margin	Detector	Result
MHz	dBuV/m	dBuV/m		dBμV/m		
*4960	49.33	74	Horizontal	24.67	PK	Pass
*4960	47.48	74	Vertical	26.52	PK	Pass
*4960	46.31	54	Horizontal	7.69	Ave	Pass
*4960	45.08	54	Vertical	8.92	Ave	Pass
*7440	49.93	74	Horizontal	24.07	PK	Pass
*7440	50.15	74	Vertical	23.85	PK	Pass
*7440	45.39	54	Horizontal	8.61	Ave	Pass

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*7440	46.11	54	Vertical	7.89	Ave	Pass

Remark:

(1) QP Emission Level= Antenna Factor +Cable Loss + Reading
PK Emission Level= Antenna Factor +Cable Loss - Amp. factor + Reading
AV Emission Level= PK Emission Level+20log(dutycycle)

(2) 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.

(3) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

Receiving emission test result as below:

Frequency	Emission Level	Limit	Polarization	Margin	Detector	Result
MHz	dBuV/m	dBuV/m		dBµV/m		
331.99	34.55	46	Horizontal	11.45	QP	Pass
428.02	35.13	46	Horizontal	10.87	QP	Pass
428.12	31.24	46	Vertical	14.76	QP	Pass
444.03	32.57	46	Vertical	13.43	QP	Pass
1000-25000	--	--	Horizontal	74	PK	Pass
1000-25000	--	--	Vertical	74	PK	Pass

Remark:

(1) QP Emission Level= Antenna Factor +Cable Loss + Reading
PK Emission Level= Antenna Factor +Cable Loss - Amp. factor + Reading
AV Emission Level= PK Emission Level+20log (dutycycle)

(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 20db below the permissible limits or the field strength is too small to be measured.

(3) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section RSS-Gen.

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10 Test Equipment List

List of Test Instruments

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE	
C	Spectrum	Agilent	E4446A	US44300459	May.08, 15	☒
RE < 1 GHz	Test Receiver <1GHz	Rohde & Schwarz	ESVS10	834468/011	May.07, 15	☒
	Amplifier < 1 GHz	HP	8447D	2648A04738	May.07, 15	☒
	HF Cable	Hubersuhne	Sucoflex104	Room 2	May.08, 15	☒
	Bilog Antenna	Schaffner	CBL6111C	2598	Oct.25, 15	☒
RE > 1 GHz	Spectrum > 1GHz	Agilent	E4446A	US44300459	May.08, 15	☒
	Horn Antenna	EMCO	3115	9607-4877	Jun. 24, 15	☒
	Amp > 1 Ghz	HP	8449B	3008A08495	May.08, 15	☒
	HF Cable	Hubersuhne	Sucoflex104	Room1	May.08, 15	☒

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth
- Power spectral density*
- Spurious RF conducted emissions
- Band edge

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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 9kHz-30MHz	4.54dB
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 9kHz-150KHz	3.88dB
Uncertainty for Conducted Emission 150kHz-30MHz	3.50dB

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