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FEDERAL COMMUNICATIONS COMMISSION
Registration number: 282399

Report No.: SZEMO081005104RFF
Page: 1 of 20
FCC ID: WTEAXE001PS3AMRRE

TEST REPORT

Application No. : SZEMO081005104RF
Applicant: FREETRONCOM LTD
Manufacturer: Shenzhen Kaytom Plastic & Electronic Co. Ltd
FCC ID: WTEAXE001PS3AMRRE
Fundamental Carrier Frequency : 2.402GHz to 2.480GHz
Equipment Under Test (EUT):
Name: AXE Guitar 4 in 1
Model: AXE-001-PS3AMR-RECEIVER
Standards: FCC PART 15: 2008
Date of Receipt: 15 October 2008
Date of Test: 15 October to 05 November 2008
Date of Issue: 05 November 2008

Test Result :	PASS *
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* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Robinson Lo
Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Test Summary

Test	Test Requirement	Stanadard Paragraph	Result
Conduct Emission	FCC PART 15: 2008	Section 15.207	PASS
Flied Strength of Fundamental	FCC PART 15 : 2008	Section 15.249 (a)	PASS
Flied Strength of Harmornics or other Frequency	FCC PART 15 : 2008	Section 15.249 (a) Section 15.209	PASS
Occupied Bandwidth	FCC PART 15 : 2008	Section 15.249	PASS

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4 General Information

4.1 Client Information

Applicant Name: FREETRONCOM LTD
Applicant Address: Unit 5, 17/F, Vanta Industrial Centre, No 21 Tai Lin Pai Road, Kwai Chung, Hong Kong.
Manufacturer: Shenzhen Kaytom Plastic & Electronic Co. Ltd
Manufacturer Address: Blk4, City II Fuan Ind. City, Dayangtian Dev Area, Fuyong Town, Baoan, Shenzhen, China.

4.2 General Description of E.U.T.

Product Name: AXE Guitar 4 in 1
Model: AXE-001-PS3AMR-RECEIVER
Power Supply: Supply by PS3
Power Cord: N/A-

4.3 Description of Support Units

The EUT was tested as an independent unit: a 2.4GHz Wireless Guitar.

4.4 Standards Applicable for Testing

The customer requested FCC tests for a 2.4GHz Wireless Guitar.

The standard used was FCC PART 15, SUBPART C (2008) section 15.249.

4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory, No.198 Kezhu Road, Science Town Economic& Technology Development District Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

4.6 Other Information Requested by the Customer

None.

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4.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP – Lab Code: 200611-0**
SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0. Effective through December 31, 2006.
- **ACA**
SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.
- **VCCI**
The 3m Semi-anechoic chamber and Shielded Room (11.5m x 4m x 4m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-1599 and C-1706 respectively.
Date of Registration: June 01, 2005. Valid until February 22, 2008
- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**
Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.
- **CNAL – LAB Code: L0141**
SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAL/AC01: 2002 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:1999 General Requirements) for the Competence of Testing Laboratories.
- **FCC – Registration No.: 282399**
SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002. With the above and NVLAP's accreditation, SGS-CSTC is an authorised test laboratory for the DoC process.
- **Industry Canada (IC)**
The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 5169.

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5 Test Results

5.1 Test Instruments

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEL0017	16-06-2007	15-06-2009
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEL0023	12-12-2007	11-12-2008
3	EMI Test software	AUDIX	E3	SEL0050	N/A	N/A
4	Coaxial cable	SGS	N/A	SEL0028	18-06-2008	17-06-2009
5	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0014	12-08-2008	11-08-2009
6	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	18-06-2008	17-06-2009
7	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0005	12-08-2008	11-08-2009
8	Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEL0076	12-08-2008	11-08-2009
9	Pre-amplifier (1-18GHz)	Rohde & Schwarz	AFS42-00101 800-25-S-42	SEL0081	18-06-2008	17-06-2009
10	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33- 18002650-30- 8P-44	SEL0080	18-06-2008	17-06-2009
11	Band filter	Amindeon	82346	SEL0094	18-06-2008	17-06-2009
12	Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	15-06-2008	14-06-2009
13	Shielding Room	ZhongYu Electron	GB-88	SEL0042	N/A	N/A
14	LISN	ETS-LINDGREN	3816/2	SEL0021	18-06-2008	17-06-2009
15	ISN	Rohde & Schwarz	ENY 22 1109	EMC0114	18-06-2008	17-06-2009
16	ISN	Rohde & Schwarz	ENY 41 1110	EMC0115	18-06-2008	17-06-2009
17	EMI Test Receiver	Rohde & Schwarz	ESCI	SEL0022	18-06-2008	17-06-2009
18	Coaxial Cable	SGS	N/A	SEL0024	18-06-2008	17-06-2009

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5.2 E.U.T. Operation

Input voltage:	Supply by PS3
Operating Environment:	
Temperature:	24°C
Humidity:	50 % RH
Atmospheric Pressure:	1010 mbar
EUT Operation:	Test in transmitting mode:
	1. For channel 0: 2.402GHz.
	2. For channel 39: 2.441GHz.
	3. For channel 78: 2.480GHz.

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5.3 Test Procedure & Measurement Data

5.3.1 Radiated Emissions

5.3.1.1 Test in transmitting mode

Test Requirement: FCC Part15 .249,15.209,15.205
Test Method: ANSI:C63.4:2003
Measurement Distance: 3m (Semi-Anechoic Chamber)
Frequency range: 30 MHz – 25GHz
Test instrumentation resolution bandwidth
120 kHz (30 MHz - 1000 MHz), 1 MHz (1000 MHz – 25GHz)
Operation: Receive antenna scan height 1 - 4 m, polarization Vertical/
Horizontal

Requirements:

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m @ 3m)	Field Strength of Harmonics and Spurious Emissions (dBuV/m @ 3m)
902 to 928	94.0	54.0
2400 to 2483.5	94.0	54.0
5725 to 5875	94.0	54.0
24000 to 24250	108.0	68.0

The fundamental frequency of the EUT is 2.402GHz-2.480GHz

The limit for average field strength dBuV/m for the fundamental frequency = 94.0 dBuV/m.

No fundamental is allowed in the restricted bands.

The limit for average field strength dBuV/m for the harmonics and spurious frequencies = 54.0 dBuV/m. Spurious in the restricted bands must be less than 54.0 dBuV/m or 15.209.

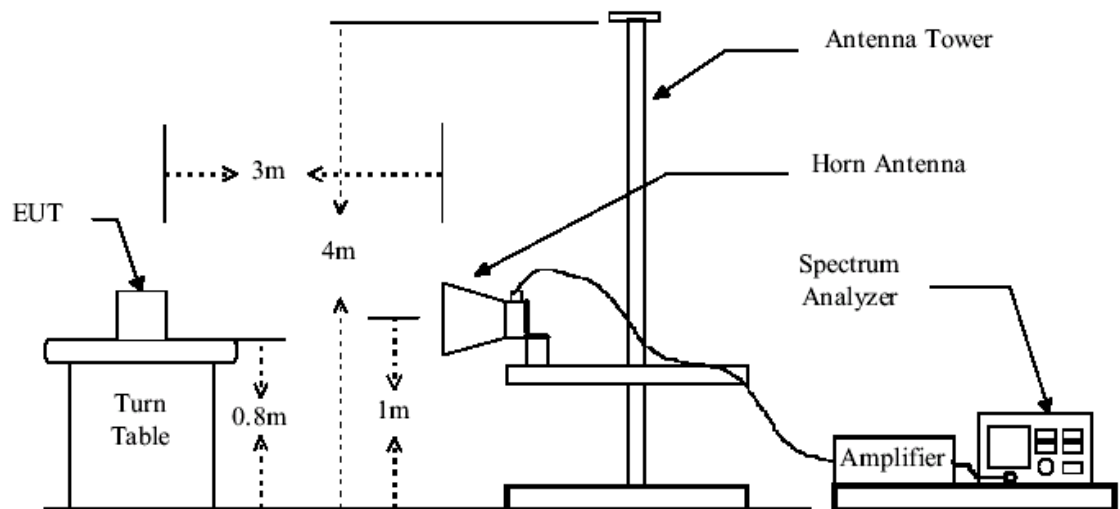
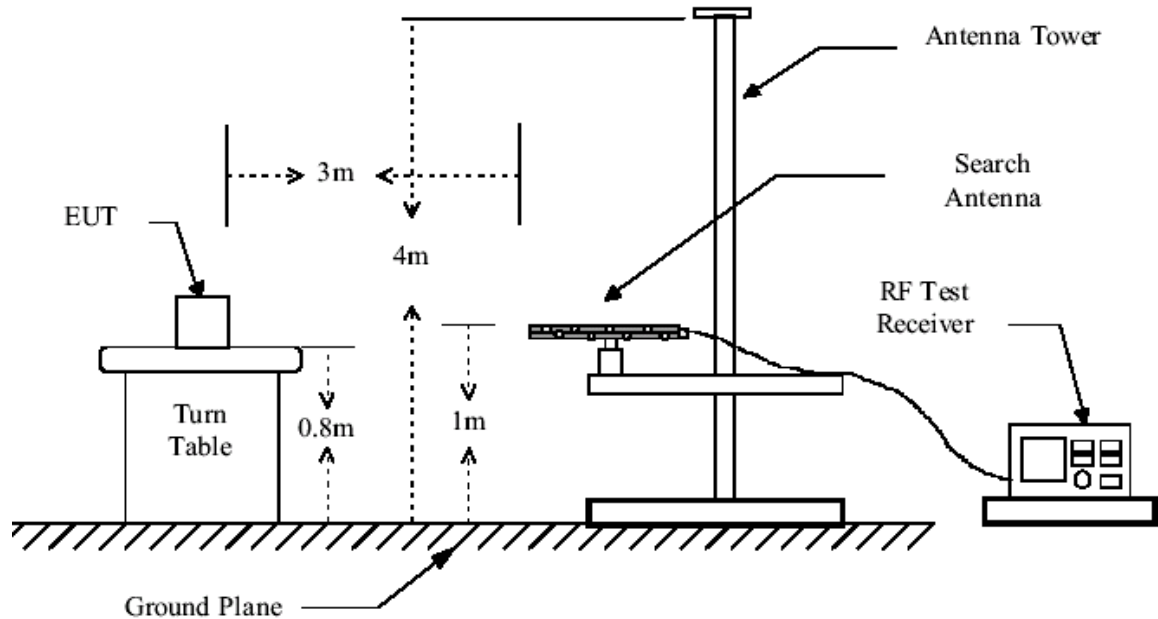
Test Procedure:

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
- 7 The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

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Test Configuration:



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The field strength is calculated by adding the Antenna Factor, Cable Factor & Peramplifier . The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Peramlifer Factor

The following test results were performed on the EUT:

1. The following test results were performed at 30MHz—1GHz

Vertical:

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)
55.220	0.80	7.56	28.08	55.87	36.15	40.00	-3.85
94.990	1.15	8.91	27.91	55.24	37.39	43.50	-6.11
144.460	1.31	8.53	27.49	50.80	33.15	43.50	-10.35
238.550	1.62	11.93	26.96	44.63	31.22	46.00	-14.78
330.700	2.00	14.95	26.95	47.24	37.24	46.00	-8.76
645.950	2.79	20.59	27.46	42.90	38.82	46.00	-7.18

Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)
97.900	1.18	9.02	27.89	52.13	34.44	43.50	-9.06
144.460	1.31	8.53	27.49	58.15	40.50	43.50	-3.00
172.590	1.36	9.61	27.31	49.03	32.69	43.50	-10.81
241.348	1.63	12.04	26.95	56.23	42.95	46.00	-3.05
322.940	1.98	14.76	26.90	51.72	41.56	46.00	-4.44
385.990	2.16	16.13	27.33	46.22	37.18	46.00	-8.82

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2. The following test results were performed at above 1GHz
For Channel 0:

Harmonics & Spurious Emissions

Peak Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamplifier factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2402	4.97	32.25	0	55.31	92.53	114	-21.47	Vertical
2394	4.97	32.24	37.65	61.33	60.89	74	-13.11	Vertical
2400	4.97	32.25	37.65	63.99	63.56	74	-10.44	Vertical
4804	6.61	34.04	38.18	44.32	46.79	74	-27.21	Vertical
7206	7.63	36.29	38.55	44.04	49.41	74	-24.59	Vertical
2402	4.97	32.25	0	52.13	89.35	114	-24.65	Horizontal
2394	4.97	32.24	37.65	59.01	58.57	74	-15.43	Horizontal
2400	4.97	32.25	37.65	63.95	63.52	74	-10.48	Horizontal
4804	6.63	34.03	38.22	44.46	46.90	74	-27.10	Horizontal
7206	7.62	36.25	38.54	44.48	49.81	74	-24.19	Horizontal

Average Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamplifier factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2402	4.97	32.25	0	45.31	82.53	94	-11.47	Vertical
2394	4.97	32.24	37.65	39.97	39.53	54	-14.47	Vertical
2400	4.97	32.25	37.65	44.69	44.26	54	-9.74	Vertical
4804	6.59	34.05	38.15	33.34	35.83	54	-18.17	Vertical
7206	7.63	36.29	38.55	32.05	37.42	54	-16.58	Vertical
2402	4.97	32.25	0	41.02	78.24	94	-15.76	Horizontal
2394	4.97	32.24	37.65	37.49	37.05	54	-16.95	Horizontal
2400	4.97	32.25	37.65	43.42	42.99	54	-11.01	Horizontal
4804	6.59	34.05	38.15	33.45	35.94	54	-18.06	Horizontal
7206	7.67	36.4	38.57	31.78	37.28	54	-16.72	Horizontal

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For Channel 39:

Harmonics & Spurious Emissions

Peak Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2441	5.03	32.27	0	56.66	93.96	114	-20.04	Vertical
2394	4.97	32.24	37.65	45.69	45.25	74	-28.75	Vertical
2496	5.1	32.3	37.64	45.08	44.84	74	-29.16	Vertical
4880	6.64	34.02	38.23	49.66	52.09	74	-21.91	Vertical
7320	7.62	36.25	38.54	44.43	49.76	74	-24.24	Vertical
2441	5.03	32.27	0	52.38	89.68	114	-24.32	Horizontal
2394	4.97	32.24	37.65	45.56	45.12	74	-28.88	Horizontal
2496	5.1	32.3	37.64	45.91	45.67	74	-28.33	Horizontal
4880	6.63	34.03	38.22	46.89	49.33	74	-24.67	Horizontal
7320	7.65	36.36	38.56	45.11	50.56	74	-23.44	Horizontal

Average Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2441	5.03	32.27	0	45.28	82.58	94	-11.42	Vertical
2394	4.97	32.24	37.65	33.24	32.80	54	-21.20	Vertical
2496	5.1	32.3	37.64	33.31	33.07	54	-20.93	Vertical
4880	6.63	34.03	38.22	36.49	38.93	54	-15.07	Vertical
7320	7.63	36.29	38.55	32.16	37.53	54	-16.47	Vertical
2441	5.03	32.27	0	42.35	79.65	94	-14.35	Horizontal
2411	4.99	32.25	37.65	33.45	33.04	54	-20.96	Horizontal
2496	5.1	32.3	37.64	33.57	33.33	54	-20.67	Horizontal
4880	6.63	34.03	38.22	33.5	35.94	54	-18.06	Horizontal
7320	7.62	36.25	38.54	32.38	37.71	54	-16.29	Horizontal

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For Channel 78:

Harmonics & Spurious Emissions

Peak Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2480	5.08	32.29	0	63.58	100.95	114	-13.05	Vertical
2483.5	5.08	32.29	37.64	61.43	61.16	74	-12.84	Vertical
2496	5.1	32.3	37.64	56.48	56.24	74	-17.76	Vertical
4960	6.68	34.01	38.32	43.78	46.15	74	-27.85	Vertical
7440	7.51	35.84	38.47	43.64	48.52	74	-25.48	Vertical
2480	5.08	32.29	0	60.23	97.60	114	-16.40	Horizontal
2483.5	5.08	32.29	37.64	60.11	59.84	74	-14.16	Horizontal
2496	5.1	32.3	37.64	54.15	53.91	74	-20.09	Horizontal
4960	6.68	34.01	38.3	44.41	46.8	74	-27.2	Horizontal
7440	7.52	35.91	38.47	43.32	48.28	74	-25.72	Horizontal

Average Measurement

Frequency (MHz)	Cable loss (dB)	Antenna factors (dB/m)	Preamp factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over limit	polarization
2480	5.08	32.29	0	50.14	87.51	94	-6.49	Vertical
2483.5	5.08	32.29	37.64	40.73	40.46	54	-13.54	Vertical
2496	5.1	32.3	37.64	36.73	36.49	54	-17.51	Vertical
4960	6.68	34.01	38.3	31.2	33.59	54	-20.41	Vertical
7440	7.52	35.91	38.47	30.85	35.81	54	-18.19	Vertical
2480	5.08	32.29	0	48.02	85.39	94	-8.61	Horizontal
2483.5	5.08	32.29	37.64	41.77	41.5	54	-12.5	Horizontal
2496	5.1	32.3	37.64	37.77	37.53	54	-16.47	Horizontal
4960	6.68	34.01	38.3	31.21	33.6	54	-20.4	Horizontal
7440	7.52	35.91	38.47	30.9	35.86	54	-18.14	Horizontal

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N/A: refer to remark 1).

Remark:

- 1). For this intentional radiator operates below 10 GHz, the spectrum shall be investigated to the tenth harmonic of the highest fundamental frequency. And above the fifth harmonic of this intentional radiator, the disturbance is very low. So the test result only displays to 4th harmonic.
- 2). According to 15.249 (e) As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

TEST RESULTS: The unit does meet the FCC requirements.

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5.3.2 Conducted Emissions

Test Requirement: FCC Part15.207
Test Method: ANSI C63.4:2003
Test Date: 20 September 2007
Frequency Range: 150KHz to 30MHz
Class / Severity: Class B
Detector: Peak for pre-scan (9kHz Resolution Bandwidth)
Test Procedure:
a. The EUT was placed 0.8 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
b. Connect EUT to the power port of a line impedance stabilization network(LISN)
c. All the support units are connected to the other LISN.
d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
e. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
f. Both sides of AC line were checked for maximum conducted interference.
g. The frequency range from 150kHz to 30MHz was searched.
h. Set the test-receiver system to Peak Detect Function and specified bandwidth with maximum Hold Mode
Operating Environment:
Temperature: 24.0 °C Humidity: 52% RH Atmospheric Pressure: 1010 Mbar
EUT Operation: Test the EUT in playing mode. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate.

5.3.2.1 Measurement Data

An initial pre-scan was performed on the live and neutral lines under communication with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with worst case peak emission were detected.

The following Quasi-Peak and Average measurements were performed on the EUT.:

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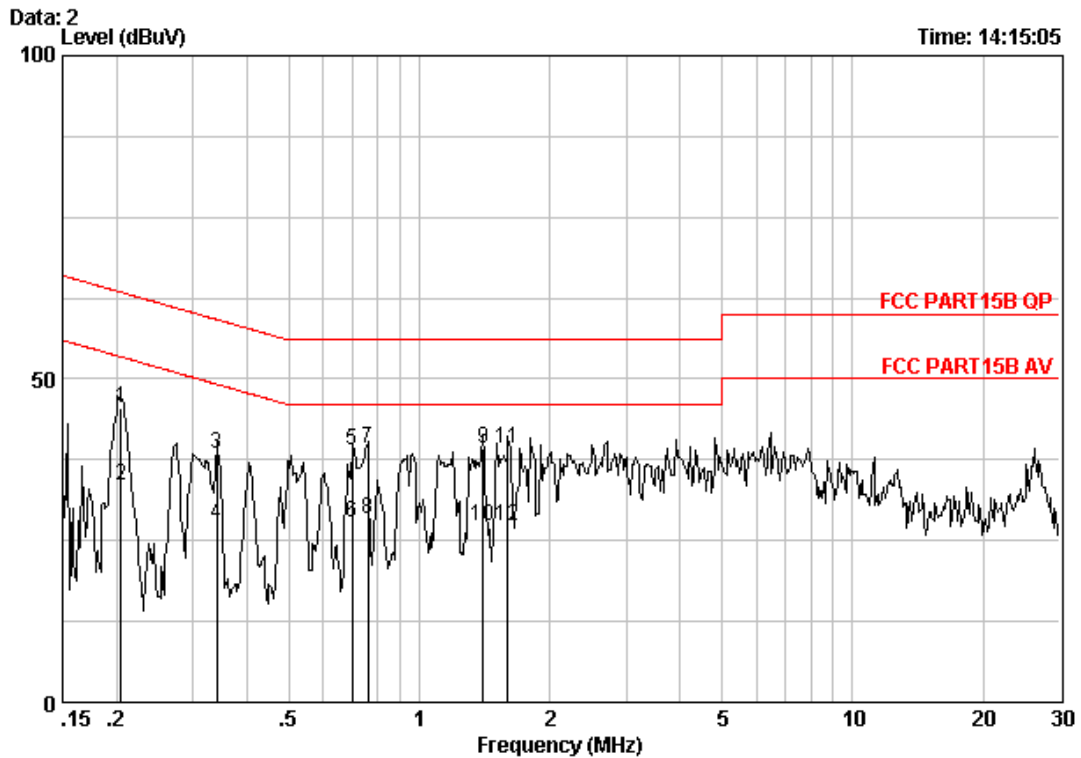


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Live line:



Site : Shielding Room
Condition : FCC PART15B QP CE LINE
EUT : AXE Guitar4 in 1
Job No. : S104RF
MODE : PLAYING

	Freq	Cable	LISN	Read	Limit	Over	
	MHz	Loss	Factor	Level	Line	Limit	Remark
		dB		dBuV	dBuV	dBuV	dB
1	0.20505	0.04	-0.04	45.54	45.54	63.40	-17.86 QP
2	0.20505	0.04	-0.04	33.54	33.54	53.40	-19.86 Average
3	0.34100	0.05	-0.04	38.54	38.55	59.18	-20.63 QP
4	0.34100	0.05	-0.04	27.54	27.55	49.18	-21.63 Average
5	0.70096	0.06	-0.05	38.90	38.91	56.00	-17.09 QP
6	0.70096	0.06	-0.05	27.90	27.91	46.00	-18.09 Average
7	0.75894	0.06	-0.05	39.30	39.32	56.00	-16.68 QP
8	0.75894	0.06	-0.05	28.30	28.32	46.00	-17.68 Average
9 @	1.403	0.10	-0.05	39.32	39.36	56.00	-16.64 QP
10	1.403	0.10	-0.05	27.32	27.36	46.00	-18.64 Average
11	1.602	0.11	-0.06	39.07	39.12	56.00	-16.88 QP
12	1.602	0.11	-0.06	27.07	27.12	46.00	-18.88 Average

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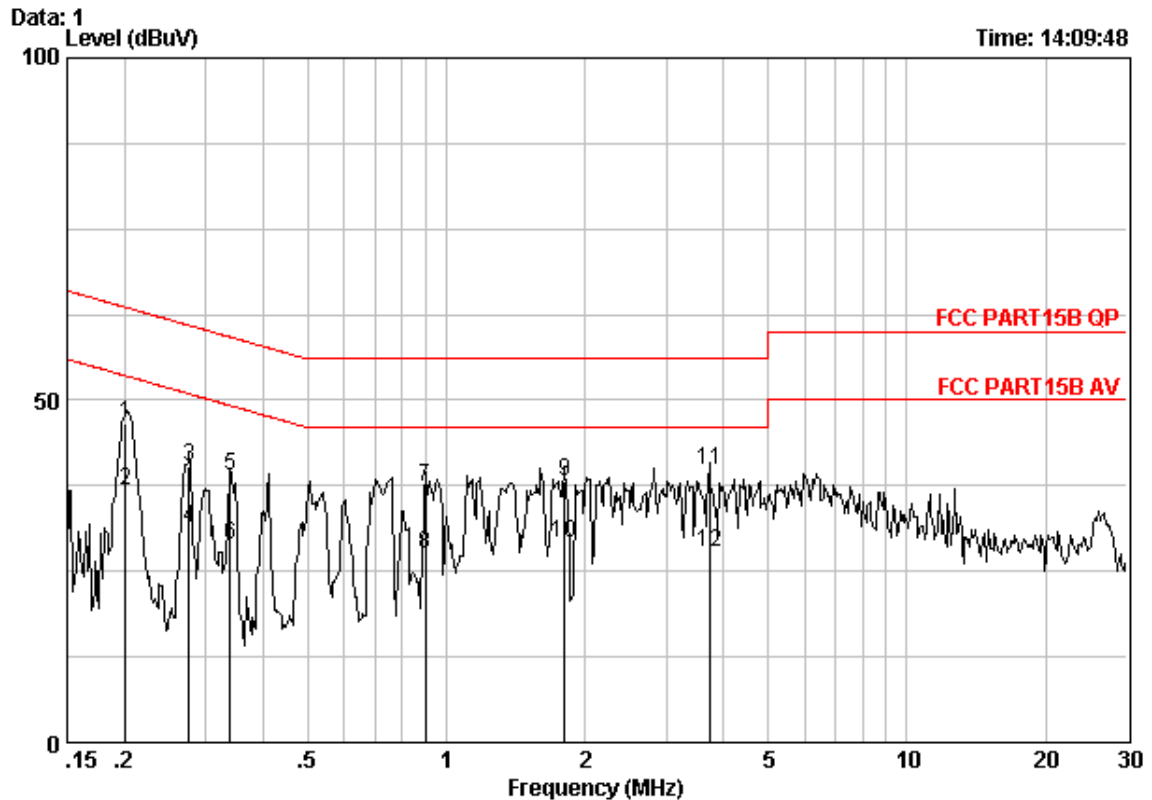


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Netural line:



Site : Shielding Room
Condition : FCC PART15B QP CE NEUTRAL
EUT : AXE Guitar4 in 1
Job No. : S104RF
MODE : PLAYING

	Freq	Cable	LISN	Read	Level	Limit	Over	
	MHz	Loss	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.20075	0.04	-0.04	46.70	46.69	63.58	-16.89	QP
2	0.20075	0.04	-0.04	36.70	36.69	53.58	-16.89	Average
3	0.27587	0.05	-0.04	40.45	40.46	60.94	-20.48	QP
4	0.27587	0.05	-0.04	31.45	31.46	50.94	-19.48	Average
5	0.33920	0.05	-0.04	38.84	38.85	59.22	-20.37	QP
6	0.33920	0.05	-0.04	28.84	28.85	49.22	-20.37	Average
7	0.89917	0.07	-0.04	37.42	37.45	56.00	-18.55	QP
8	0.89917	0.07	-0.04	27.42	27.45	46.00	-18.55	Average
9	1.810	0.11	-0.06	38.20	38.25	56.00	-17.75	QP
10	1.810	0.11	-0.06	29.20	29.25	46.00	-16.75	Average
11 @	3.720	0.15	-0.09	39.84	39.90	56.00	-16.10	QP
12	3.720	0.15	-0.09	27.84	27.90	46.00	-18.10	Average

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5.3.3 Occupied Bandwidth

Test Requirement: FCC Part 15.249

Test Method: ANSI:C63.4:2003

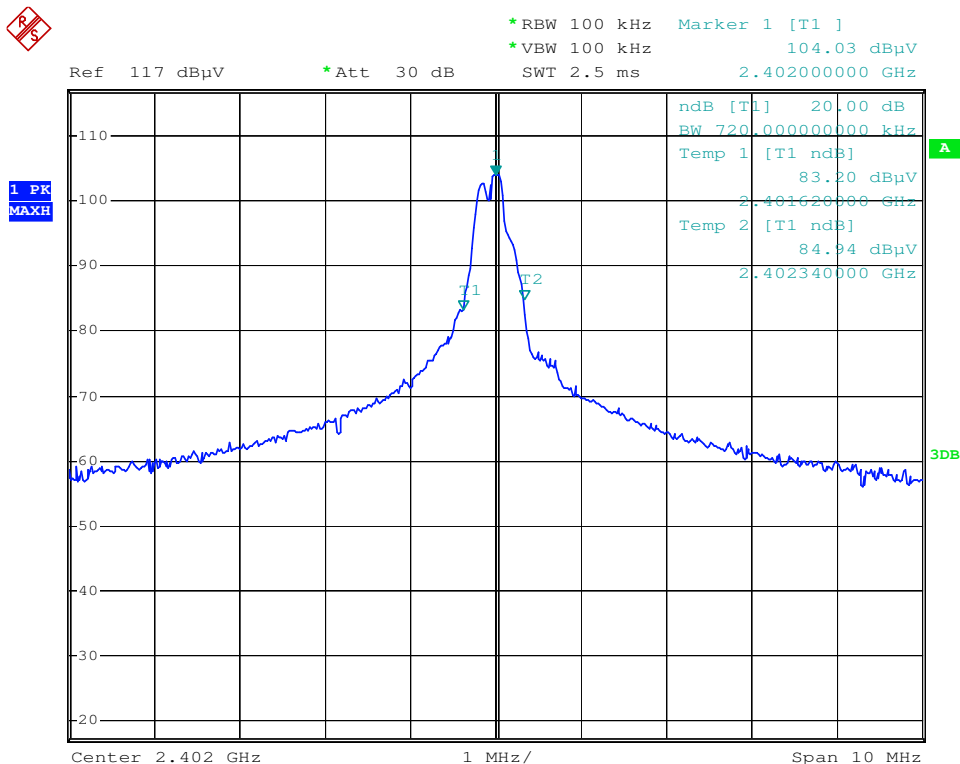
Operation within the band 2.402 – 2.480GHz

Requirements: 15.249 (d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Method of measurement: A small sample of the transmitter output was fed into the Spectrum Analyzer and the attached plot was taken. The vertical is set to 10dB per division.

The occupied bandwidth as below:

1. For Channel 0:



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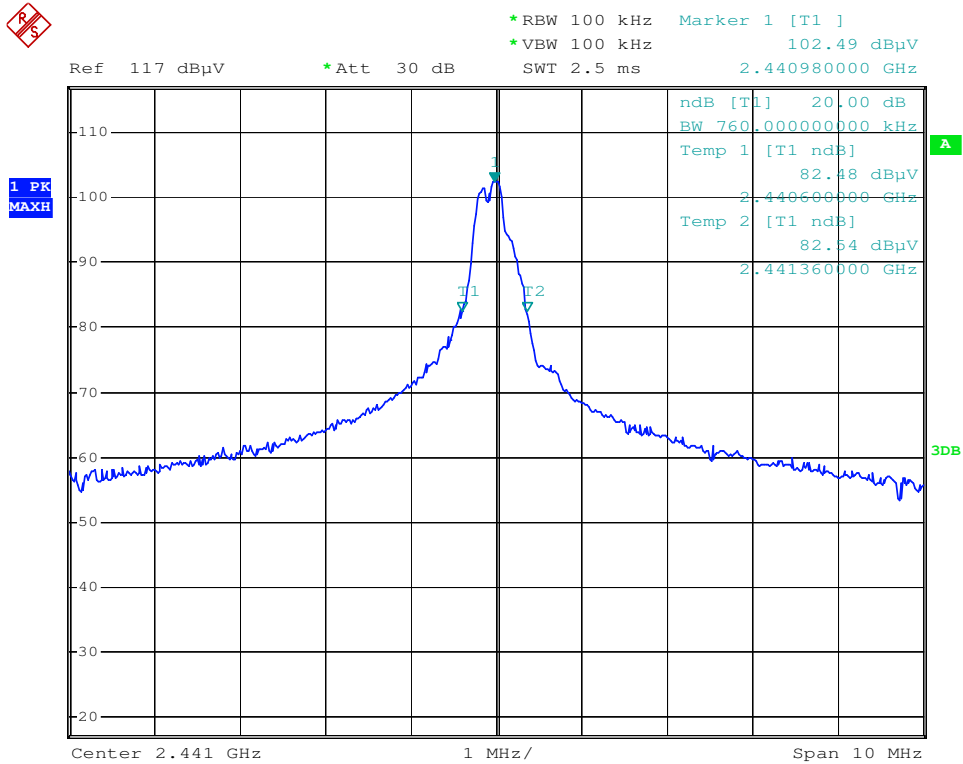


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2. For Channel 39:



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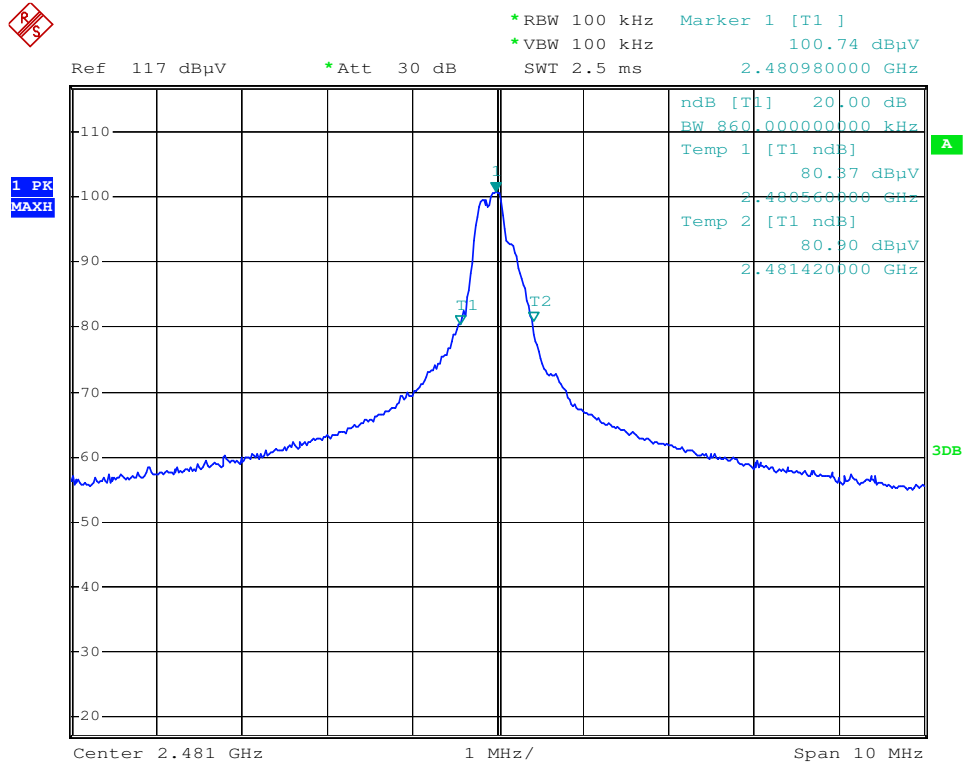


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3. For Channel 78:



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