

TEST REPORT For FCC

Test Report No. : TK-FR11001
Date of Issue : 01/27/2011
FCC ID : P5A-AA-SR1PWUB
Description of Product : 2.4GHz USB dongle
Model No. : AA-SR1PWUB
Applicant : Areson Technology Corp.
Manufacturer : Axonic International Corp.
Standards : FCC Part 15.249
Test Date : 01/13/2011 – 01/25/2011
Test Results : PASS FAIL

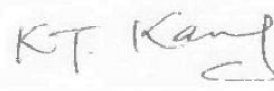
The test results relate only to the items tested.

Tested by:



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Date: 01/27/2011

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Date: 01/27/2011

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1.0 General product description

Equipment model name : AA-SR1PWUB
Serial number : Prototype
EUT condition : Pre-production, not damaged
Antenna type & gain : PCB antenna / Gain -0.31dBi
Frequency Range : 2403 ~ 2478 MHz
Number of channels : 20
Type of Modulation : GFSK
Power Source : DC 5V

1.1 Test frequency

	Low channel	Middle channel	High channel
Frequency (MHz)	2403	2453	2478

1.2 Test mode

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

1.3 Model differences

Not applicable

1.4 Device modifications

The following modifications were necessary for compliance: Not applicable manufacturer

1.5 Peripheral devices

Device	Manufacturer	Model No.	Serial No.
Notebook	Samsung electronics	NT-R410Y	Z9YJ93CS300631H

1.6 Calibration details of equipment used for measurement




Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.7 Test facility

The measurement facility is located at 477-6, Hager-ri, Yoju-up, Yoju-gun Kyunggi-do, 469-803, Korea. Tel: +82-31-883-5092/Fax: +82-31-883-5169.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.8 Laboratory accreditations and listings

Country	Agency	Scope of accreditation	Logo
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	 343818
KOREA	KCC	EMI (10 meter Open Area Test Site and two conducted sites) Radio (3 & 10 meter Open Area Test Sites and one conducted site)	 KR100
Canada	IC	3 & 10 meter Open Area Test Sites and one conducted site	 4769B-1

2.0 Summary of tests

Section in FCC Part 15	Parameter	Status
15.209(a) 15.249(a) 15.249(d) 15.205	Fundamental, spurious emission and band edge radiated emission	C
15.207	AC conducted emission	C
Note 1: C=Complies NC=Not complies NT=Not tested NA=Not applicable		
Note 2: The data in this test report are traceable to the national or international standards.		
Note 3: The sample was tested according to the following specification: FCC Part 15.249, ANSI C63.4-2003		

2.1 Technical characteristic test

2.1.1 Fundamental, spurious emission and band edge radiated emission

Test location

Testing was performed at a test distance of 3 meter Open Area Test Site

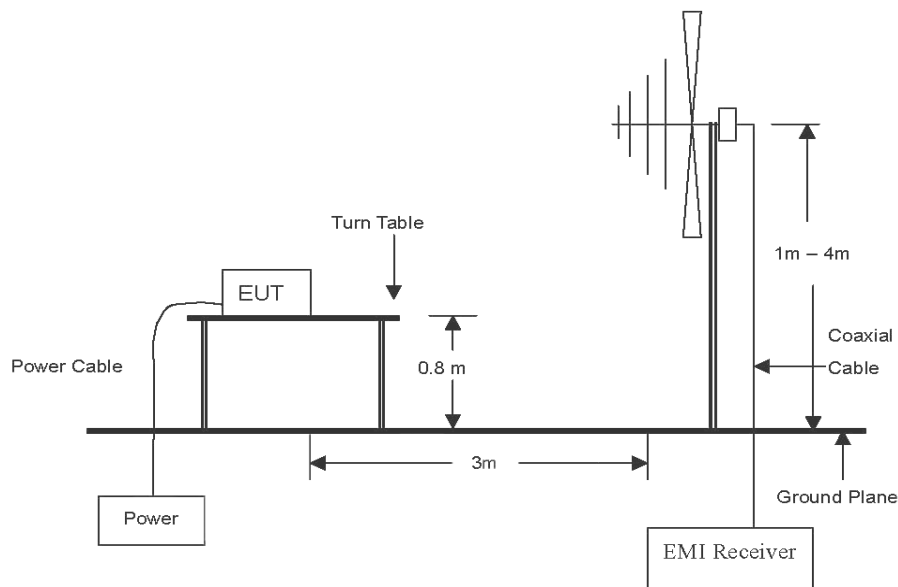
Test procedures

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity. The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

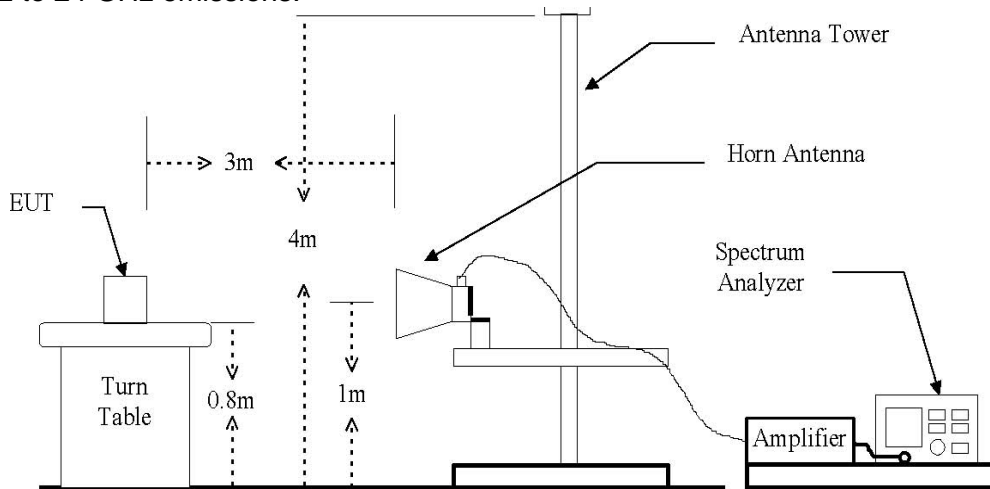
The spectrum analyzer is set to:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 120 kHz for Peak detection (PK) or Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1 GHz.

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 24 GHz emissions.



Limit

In the section 15.249(a) :

Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (mV/ m)	Field strength of harmonics (uV/ m)
902 ~ 928 MHz	50	500
2 400 ~ 2 483.5 MHz	50	500
5 725 ~ 5 875 MHz	50	500
24.0 ~ 24.25 GHz	250	2500

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Fundamental frequency (MHz)	Field strength (uV/ m)m	Measurement distance (m)
30 ~ 88	100*	3
88 ~ 216	150*	3
216 ~ 960	200*	3
Above 960	500	3

※ **Remark**

Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 - 72 MHz, 76 - 88 MHz, 174 - 216 MHz or 470 - 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

In the above emission table, the tighter limit applies at the band edges.

Fundamental frequency (MHz)	Field strength (μV/m at 3 meter)	Field strength (dBuV/m at 3 meter)
30 ~ 88	100	40
88 ~ 216	150	43.5
216 ~ 960	200	46
Above 960	500	54

Test results (Below 1000 MHz)

The frequency spectrum from 30 MHz to 1000 MHz was investigated. Emission levels are not reported much lower than the limits by over 20 dB.

Radiated emissions		Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dBuV/m)	Limit (dBuV/ m)	Margin (dB)
175.20	10.9	V	15.35	2.50	28.75	43.50	14.75
182.50	12.6	H	15.90	2.60	31.10	43.50	12.40
204.69	11.2	H	16.41	2.63	30.24	43.50	13.26
204.91	10.4	H	16.40	2.63	29.43	43.50	14.07
205.48	13.0	H	16.37	2.63	32.00	43.50	11.50
205.80	13.1	H	16.36	2.63	32.09	43.50	10.60
272.82	5.8	H	17.76	2.99	26.55	46.00	19.45
274.14	5.2	V	17.87	3.00	26.07	46.00	19.93
275.46	5.2	H	17.99	3.00	26.19	46.00	19.81
344.50	5.8	H	17.81	3.46	27.07	46.00	18.93
344.50	5.2	V	17.81	3.46	26.47	46.00	19.53
408.35	5.3	H	17.84	3.84	26.98	46.00	19.02

※ Remark

1. All spurious emission at channels are almost the same below 1 GHz, so that middle channel was chosen at representative in final test.
2. Actual = Reading + Ant. factor + Amp + CL (Cable loss)
3. Detector mode: Quasi peak
4. To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.

Test results (Above 1000 MHz)

A. Low channel (2403 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dBuV/m)	Limit (dBuV/ m)	Margin (dB)
2403	85.69	P	H	28.14	-34.48	79.35	114.00	34.65
2403	35.63	A	H	28.14	-34.48	29.29	94.00	64.71
2403	83.11	P	V	28.14	-34.48	76.77	114.00	37.23
2403	35.35	A	V	28.14	-34.48	29.01	94.00	64.99
2390*	45.76	P	H	28.11	-34.47	39.40	74.00	34.60
2390*	46.21	P	V	28.11	-34.47	39.85	74.00	34.15
4806	30.44	P	H	33.43	-31.91	31.96	74.00	42.04
4806	28.47	P	V	33.43	-31.91	29.99	74.00	44.01

B. Middle channel (2453 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dBuV/m)	Limit (dBuV/ m)	Margin (dB)
2453	85.76	P	H	28.23	-34.54	79.45	114.00	34.55
2453	36.14	A	H	28.23	-34.54	29.83	94.00	64.17
2453	84.63	P	V	28.23	-34.54	78.32	114.00	35.68
2453	35.25	A	V	28.23	-34.54	28.94	94.00	65.06
4906	30.99	P	H	33.67	-31.75	32.91	74.00	41.09
4906	29.56	P	V	33.67	-31.75	31.48	74.00	42.52

C. High channel (2478 MHz)

Radiated emissions			Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dBUV)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL(dB)	Actual (dBUV/m)	Limit (dBUV/ m)	Margin (dB)
2478	85.38	P	H	28.27	-34.57	79.08	114.00	34.92
2478	35.51	A	H	28.27	-34.57	29.21	94.00	64.79
2478	83.60	P	V	28.27	-34.57	77.30	114.00	36.70
2478	36.11	A	V	28.27	-34.57	29.81	94.00	64.19
2483.5*	49.71	P	H	28.28	-34.58	43.41	74.00	30.59
2483.5*	47.35	P	V	28.28	-34.58	41.05	74.00	32.95
4956	30.91	P	H	33.79	-31.67	33.03	74.00	40.97
4956	29.35	P	V	33.79	-31.67	31.47	74.00	42.53

※ Remark

1. "*" means the restricted band.
2. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using peak/average detector mode.
4. Average test would be performed if the peak result were greater than the average limit.
5. Actual = Reading + Ant. factor + Amp + CL (Cable loss)
6. To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.

2.1.2 AC conducted emissions

Test location

Shielded Room

Frequency range of measurement

150 kHz to 30 MHz

Instrument settings

IF Band Width: 9 kHz

Test procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m. Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit

According to §15.207(a) for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50uH/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted limit (dBuV/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

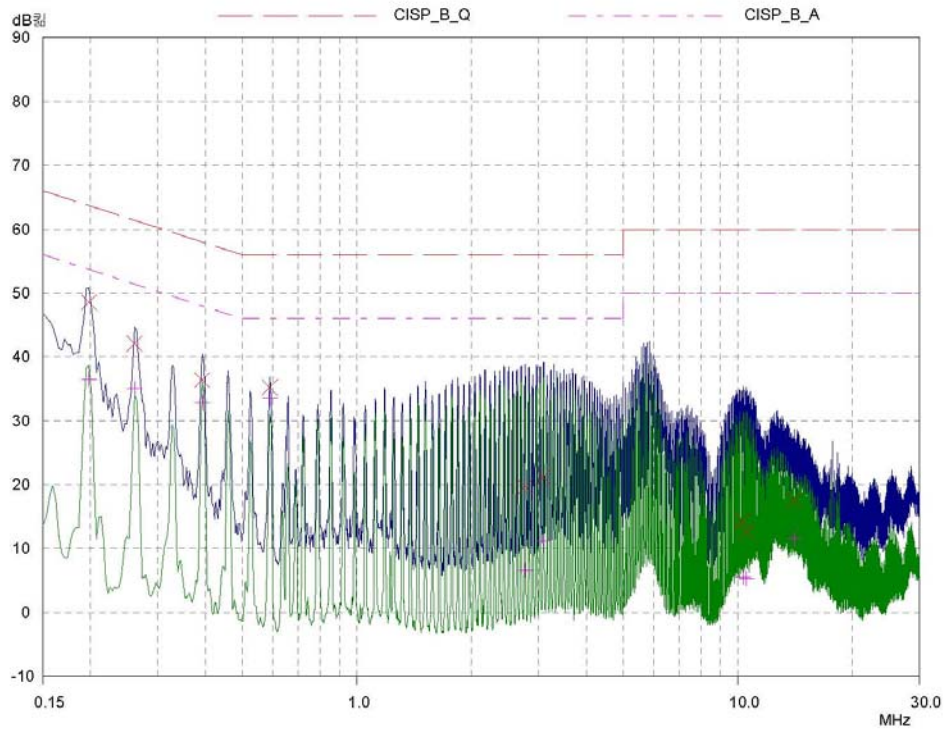
※ Remark

Decreases with the logarithm of the frequency.

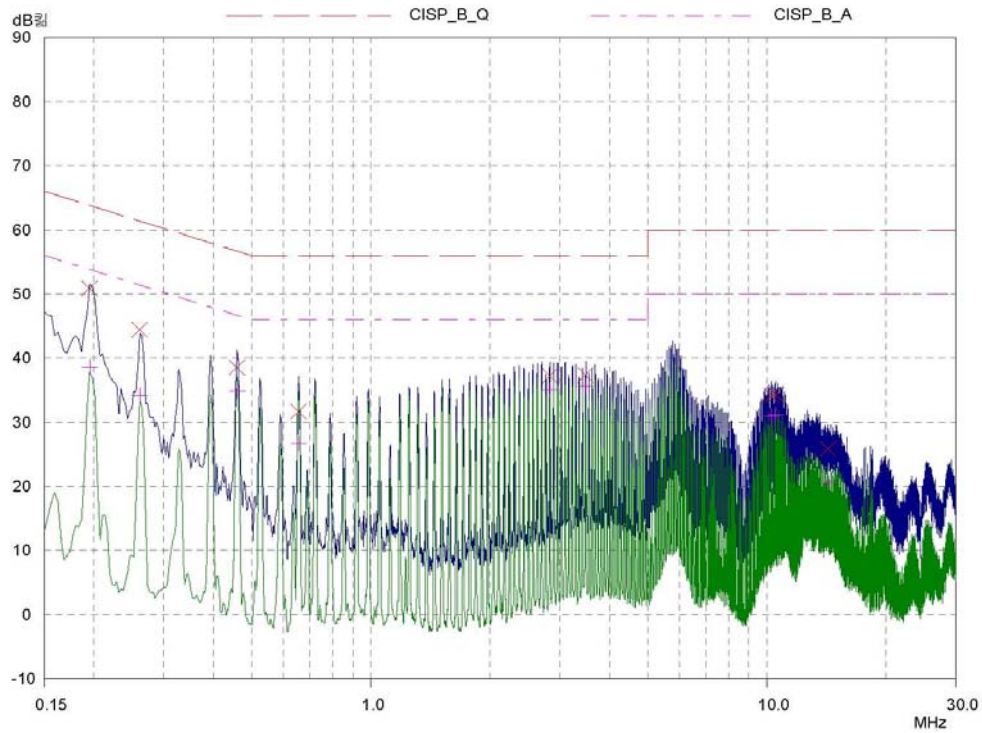
Test results

Frequency (MHz)	Correction		Phase Hot/ Neutral	Quasi peak			Average		
	LISN	Cable Loss		Reading	Result	Limit	Reading	Result	Limit
0.195	0.053	0.100	H	50.860	51.013	64	38.630	38.783	54
0.198	0.091	0.100	N	48.540	48.731	64	36.510	36.701	54
0.261	0.056	0.100	H	44.380	44.536	61	34.220	34.376	51
0.261	0.078	0.100	N	42.130	42.308	61	35.050	35.228	51
0.393	0.061	0.100	N	36.390	36.551	58	32.890	33.051	48
0.459	0.050	0.100	H	38.530	38.680	57	34.840	34.990	47
0.591	0.050	0.100	N	35.190	35.340	56	33.450	33.600	46
0.657	0.050	0.100	H	31.660	31.810	56	26.650	26.800	46
2.763	0.078	0.113	N	19.680	19.870	56	6.610	6.800	46
2.829	0.077	0.109	H	37.200	37.386	56	35.040	35.226	46
3.090	0.083	0.100	N	21.250	21.433	56	11.140	11.323	46
3.486	0.087	0.100	H	37.360	37.547	56	35.590	35.777	46
10.263	0.337	0.100	H	34.140	34.577	60	30.940	31.377	50
10.326	0.357	0.100	N	14.240	14.697	60	5.500	5.957	50
10.524	0.335	0.100	H	34.270	34.705	60	31.210	31.645	50
10.524	0.355	0.100	N	12.570	13.025	60	5.310	5.765	50
14.079	0.496	0.200	N	17.580	18.276	60	11.550	12.246	50
14.277	0.491	0.200	H	25.860	26.551	60	20.640	21.331	50

[Hot]



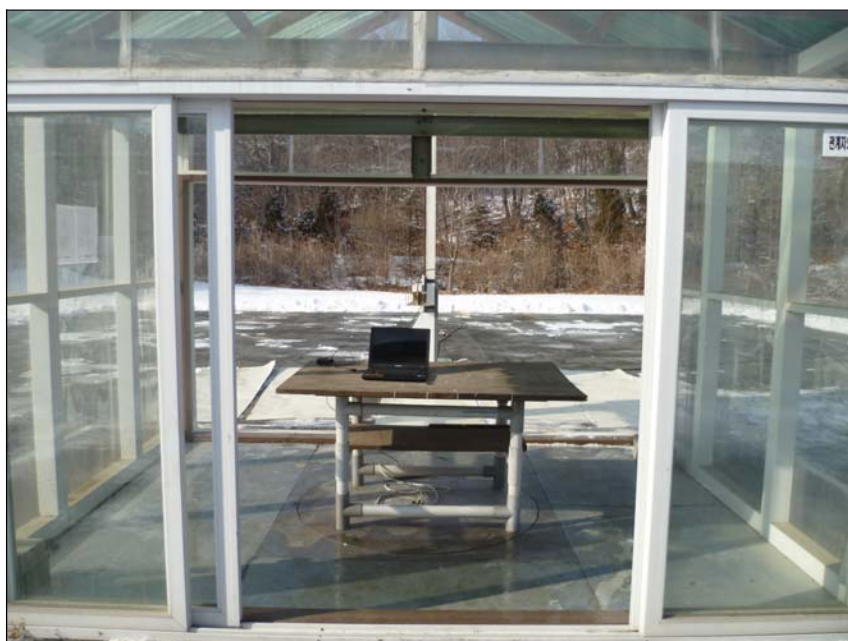
[Neutral]



Appendix A – Test equipment used For test

Equipment	Manufacturer	Model	Calibration due.
Spectrum Analyzer	R&S	FSV30	2012-01-07
Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	2011-03-27
Horn Antenna	A.H. System	SAS-571	2011-03-16
High Pass Filter	Wainwright Instrument	WHJS3000-10TT	2012-01-07
Preamplifier	HP	8447F	2011-05-06
Preamplifier	HP	8449B	2011-07-27
EMI Test Receiver	R&S	ESHS10	2011-06-01
EMI Test Receiver	R&S	ESVS10	2011-03-05
LISN	R&S	ENV216	2011-02-24

Test setup photos and configuration
Radiated electric field emissions



AC conducted emission

