

FCC PART 15B
MEASUREMENT AND TEST REPORT
FOR

AsiaRF Co., Ltd.

1F., No.2, Lane45, Shuiyuan Street., Yonghe Dist, New Taipei City 234, Taiwan

FCC ID: TKZAWUHN2408

Report Concerns: Original Report	Equipment Type: Top Catcher CC Tactical
Model:	<u>AWUHN2408</u>
Report No.:	<u>STR12048085I-2</u>
Test Date:	<u>2012-04-17 to 2012-05-22</u>
Issue Date:	<u>2012-05-23</u>
Tested By:	<u>Seven Song / Engineer</u> <i>Seven Song</i>
Reviewed By:	<u>Lahm Peng / EMC Manager</u> <i>Lahm peng</i>
Approved & Authorized By:	<u>Jandy so / PSQ Manager</u> <i>Jandyso</i>
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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by SEM.Test Compliance Service Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: AsiaRF Co., Ltd.
Address of applicant: 1F., No.2, Lane45, Shuiyuan Street., Yonghe Dist, New Taipei City 234, Taiwan

Manufacturer: AsiaRF Co., Ltd.
Address of manufacturer: 1F., No.2, Lane45, Shuiyuan Street., Yonghe Dist, New Taipei City 234, Taiwan

General Description of E.U.T

Items	Description
EUT Description:	Top Catcher CC Tactical
Trade Name:	AsiaRF
Model No.:	AWUHN2408
Add Model:	CC Tactical
Rated Voltage:	USB DC 5V
Frequency range:	802.11b/g/n-HT20: 2412MHz~2462MHz 802.11n-HT40: 2422MHz~2452MHz
Number of channels:	802.11b/g/n-HT20: 11 802.11n-HT40: 7
Channel Separation:	5MHz
Antenna Gain:	Antenna 1: 15 dBi (Length 129 cm) Antenna 2: 8 dBi (Length 52 cm)
Type of Antenna:	Detachable Antenna
For more information refer to the circuit diagram form and the user's manual.	

Note: The test data is gathered from a production sample, provided by the manufacture. The others models listed in the report have different appearance only of AWUHN2408 without circuit and electronic construction changed, declared by the manufacturer.

1.2 Test Standards

The following report is prepared on behalf of the AsiaRF Co., Ltd. in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15.107, and 15.109 rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission/immunity, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible susceptibility against the tested phenomena. The test modes were adapted accordingly in reference to the Operating Instructions.

1.4 Test Facility

- **FCC – Registration No.: 994117**

SEM.Test Compliance 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 and the Registration is 994117.

- **Industry Canada (IC) Registration No.: 7673A**

The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

- **CNAS Registration No.: L4062**

Shenzhen SEM.Test Electronics Service Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 3/F, Jinbao Commerce Building, Xin'an Fanshen Road, Bao'an District, Shenzhen, P.R.C (518101)

1.5 EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the system components. The test software, provided by the customer, is started while the EUT is on to simulate the normal work. under the Windows XP terminal.

1.6 Accessories Equipment List and Details

Description	Manufacturer	Model	Serial Number
Notebook	SAMSUNG	NP-R20	124V93FP30082V

1.7 EUT Cable List and Details

Cable Description	Length (m)	Shielded/Unshielded	With Core/Without Core
USB Cable	4.0	Shielded	With Core

2. SUMMARY OF TEST RESULTS

Description of Test	Result
§15.107 (a) Conducted Emission	Compliant
§15.109 (a) Radiated Emission	Compliant

3. CONDUCTED EMISSION

3.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

3.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2012-03-28	2013-03-27
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2012-03-28	2013-03-27
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2012-03-28	2013-03-27

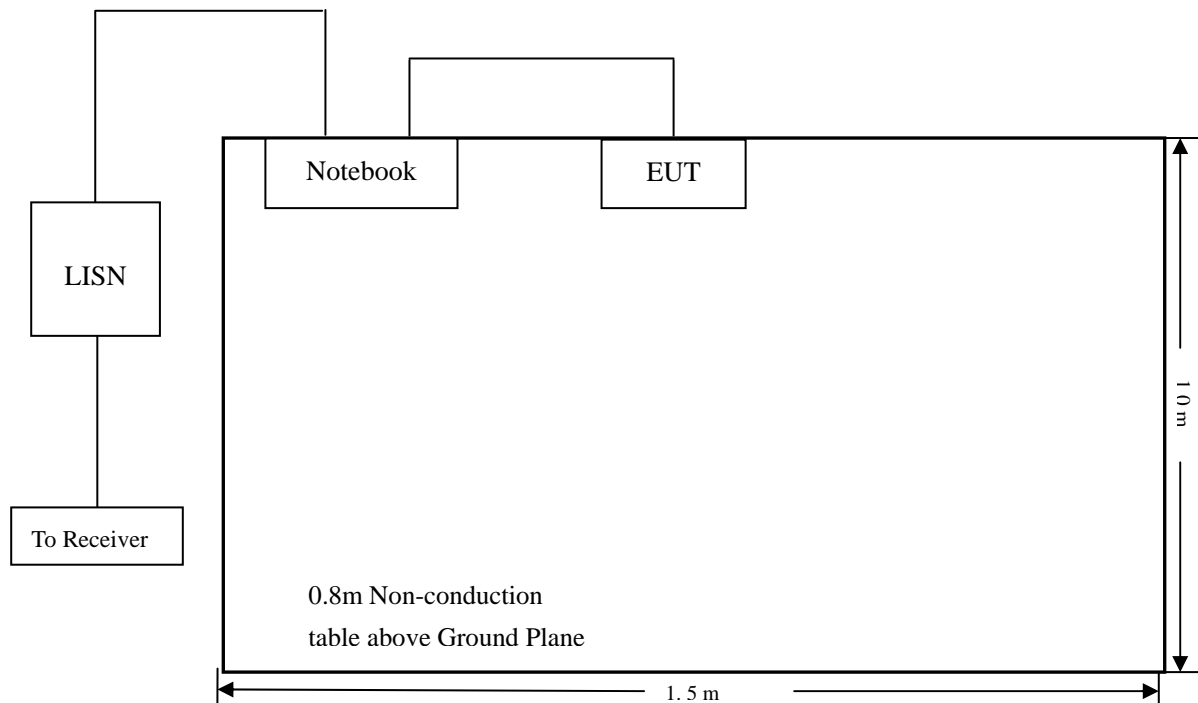
3.3 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.107 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

3.4 Basic Test Setup Block Diagram



3.5 Environmental Conditions

Temperature:	20° C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

3.6 Summary of Test Results/Plots

According to the data in section 3.7, the EUT complied with the FCC Part 15.107 Conducted margin for a Class B device, with the *worst* margin reading of:

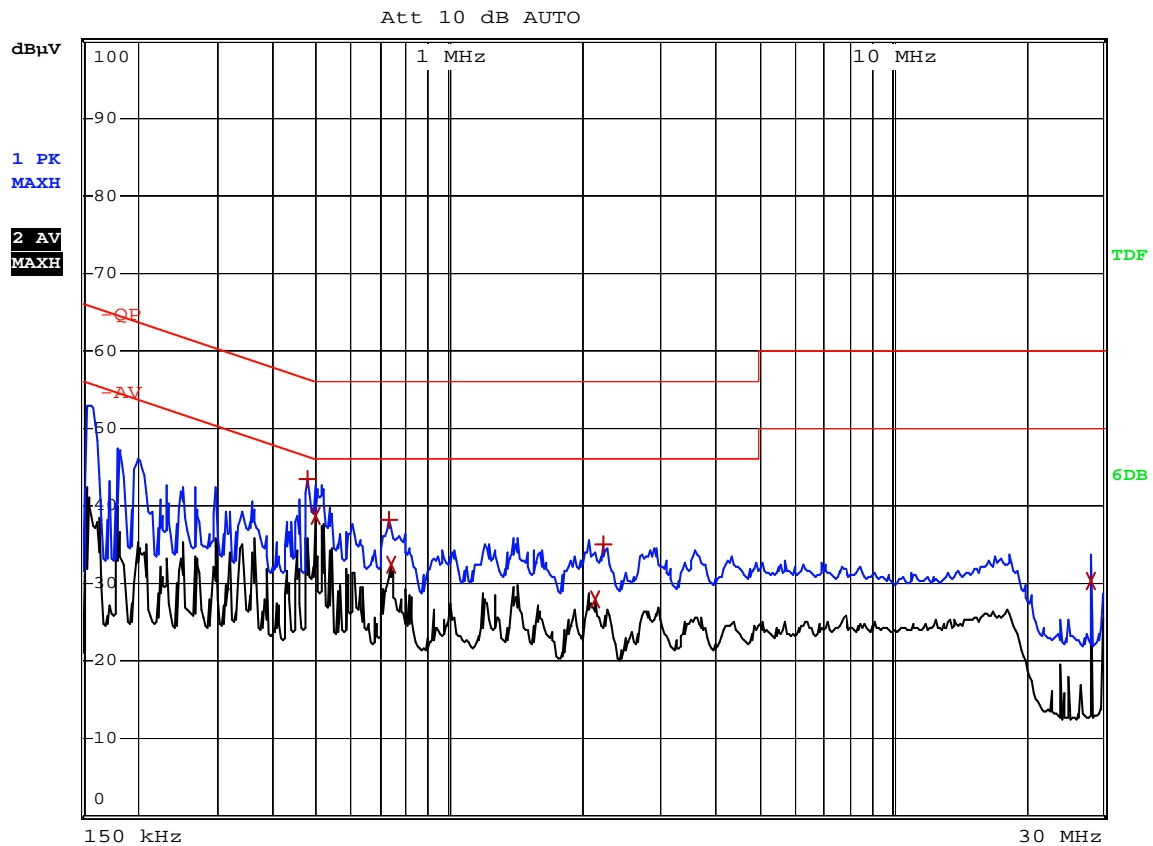
-7.38dBμV at 0.498 MHz in the Neutral mode, Average detector, 0.15-30MHz Operating with antenna 1

-3.22dBμV at 0.510 MHz in the Line mode, Average detector, 0.15-30MHz Operating with antenna 2

3.7 Conducted Emissions Test Data

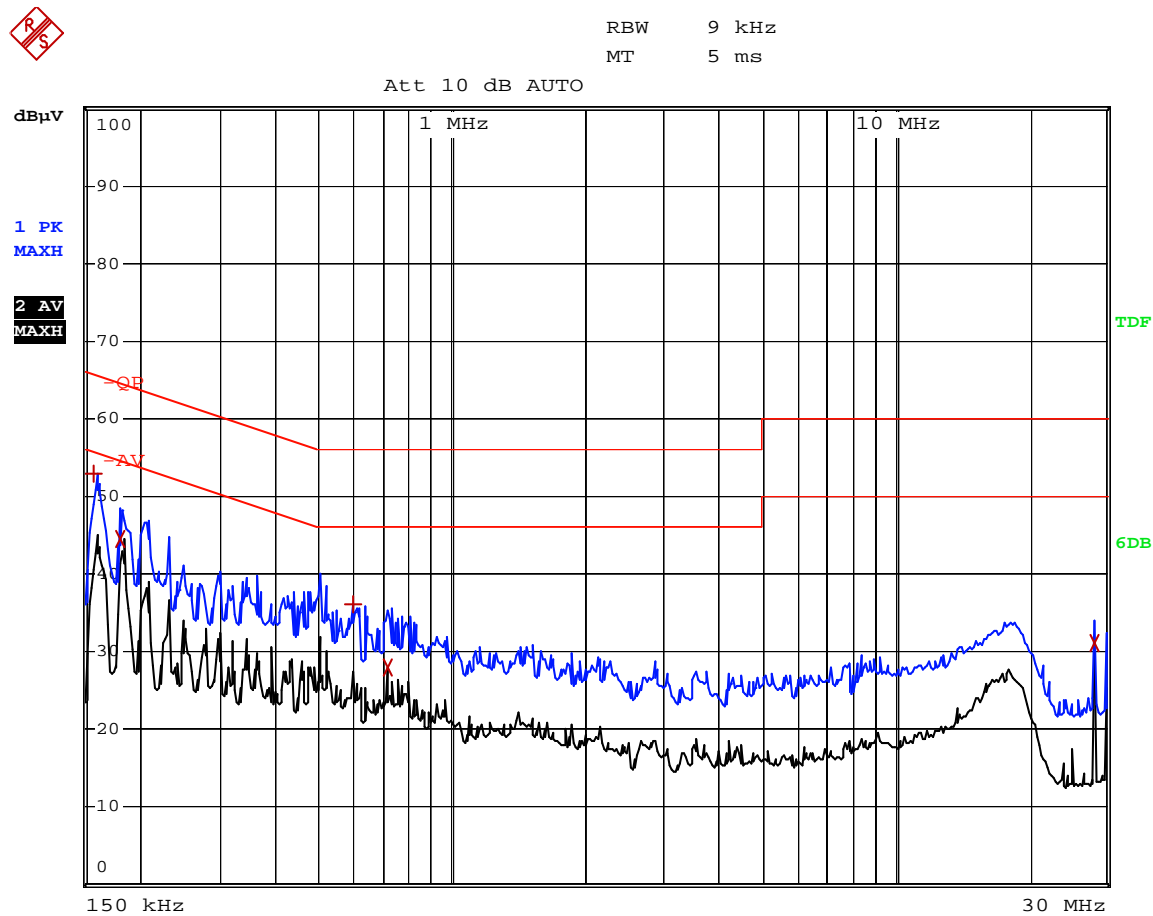
For antenna 1: 15dBi

LINE CONDUCTED EMISSIONS				FCC PART 15 CLASS B	
Frequency	Amplitude	Detector	Phase	Limit	Margin
MHz	dBμV	QP/Ave/Pk	Line/Neutral	dBμV	dB
0.498	38.65	Ave	Neutral	46.03	-7.38
0.182	44.38	Ave	Line	54.39	-10.01
0.158	52.80	Pk	Line	65.57	-12.77
0.478	43.53	Pk	Neutral	56.37	-12.84
0.742	32.29	Ave	Neutral	46.00	-13.71
0.730	38.22	Pk	Neutral	56.00	-17.78
0.714	28.03	Ave	Line	46.00	-17.97
2.150	27.85	Ave	Neutral	46.00	-18.15
28.003	31.00	Ave	Line	50.00	-19.00
28.03	30.27	Ave	Neutral	50.00	-19.73
0.594	36.04	Pk	Line	56.00	-19.96
2.242	34.97	Pk	Neutral	56.00	-21.03

Plot of Conducted Emissions Test Data*Conducted Disturbance**EUT: Top Catcher CC Tactical**M/N: AWUHN2408**Operating Condition: Operating with antenna 1**Test Specification: N**Comment: AC 120V/60Hz/USB 5V*RBW 9 kHz
MT 5 ms

Plot of Conducted Emissions Test Data

Conducted Disturbance
EUT: Top Catcher CC Tactical
M/N: AWUHN2408
Operating Condition: Operating with antenna 1
Test Specification: L
Comment: AC 120V/60Hz/USB 5V

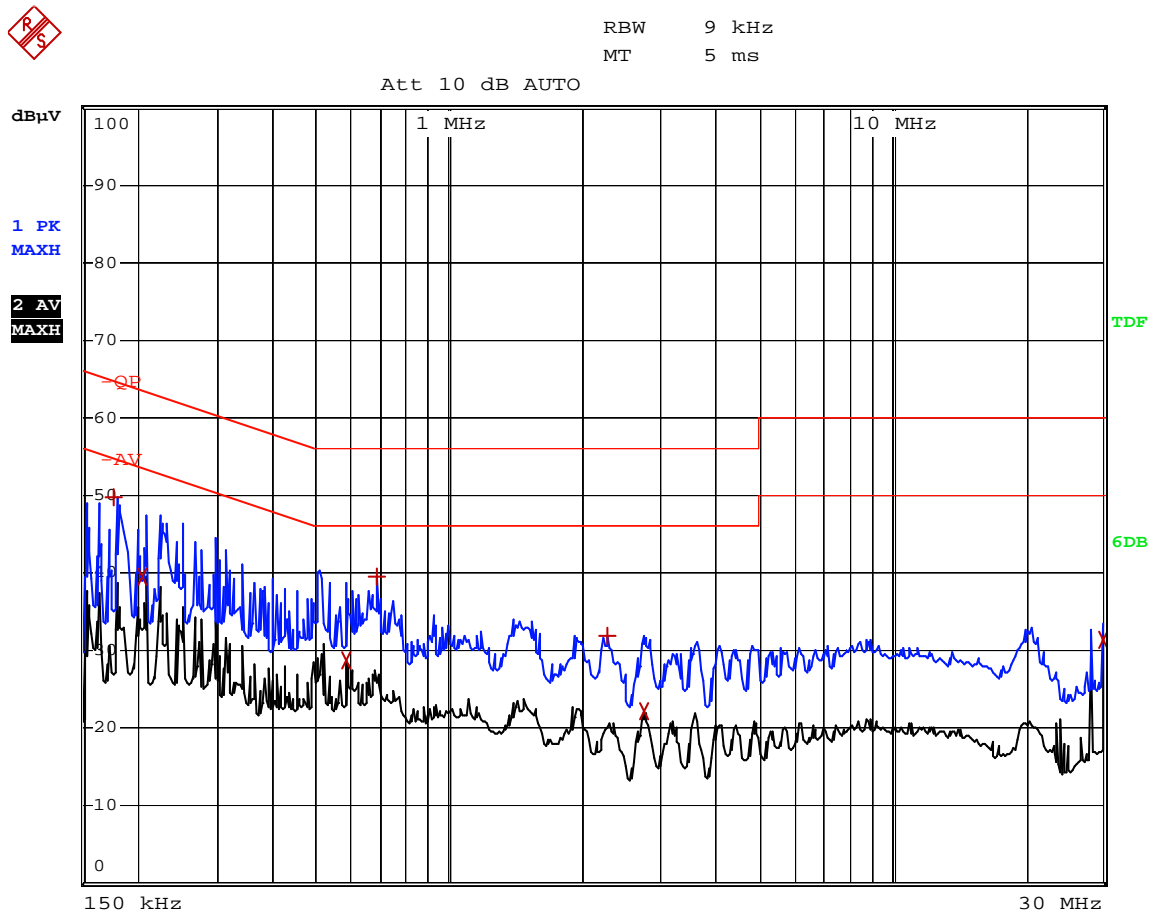


For antenna 2: 8dBi

LINE CONDUCTED EMISSIONS				FCC PART 15 CLASS B	
Frequency	Amplitude	Detector	Phase	Limit	Margin
MHz	dB μ V	QP/Ave/Pk	Line/Neutral	dB μ V	dB
0.510	42.78	Ave	Line	46.00	-3.22
0.606	37.50	Ave	Line	46.00	-8.50
0.510	46.68	Pk	Line	56.00	-9.32
2.718	33.17	Ave	Line	46.00	-12.83
0.598	42.12	Pk	Line	56.00	-13.88
0.206	39.38	Ave	Neutral	53.37	-13.99
0.178	49.67	Pk	Neutral	64.58	-14.91
0.686	39.52	Pk	Neutral	56.00	-16.48
2.754	39.07	Pk	Line	56.00	-16.93
0.582	28.81	Ave	Neutral	46.00	-17.19
30.000	31.45	Ave	Neutral	50.00	-18.55
8.226	29.30	Ave	Line	50.00	-20.70
2.774	22.15	Ave	Neutral	46.00	-23.85
2.286	31.97	Pk	Neutral	56.00	-24.03
19.994	35.85	Pk	Line	60.00	-24.15

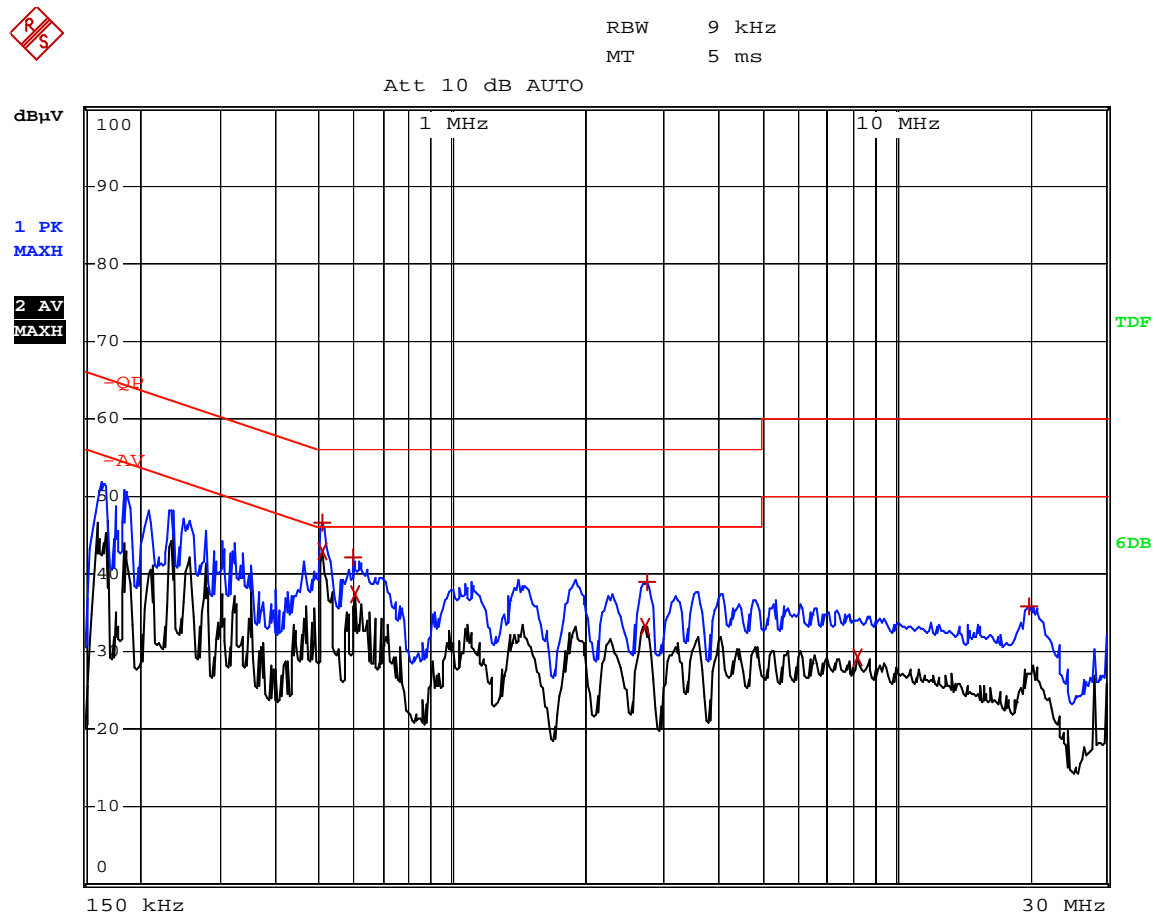
Plot of Conducted Emissions Test Data

Conducted Disturbance
EUT: Top Catcher CC Tactical
M/N: AWUHN2408
Operating Condition: Operating with antenna 2
Test Specification: N
Comment: AC 120V/60Hz/USB 5V



Plot of Conducted Emissions Test Data

Conducted Disturbance
EUT: Top Catcher CC Tactical
M/N: AWUHN2408
Operating Condition: Operating with antenna 2
Test Specification: L
Comment: AC 120V/60Hz/USB 5V



4. RADIATED EMISSION

4.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is ± 5.10 dB.

4.2 Test Equipment List and Details

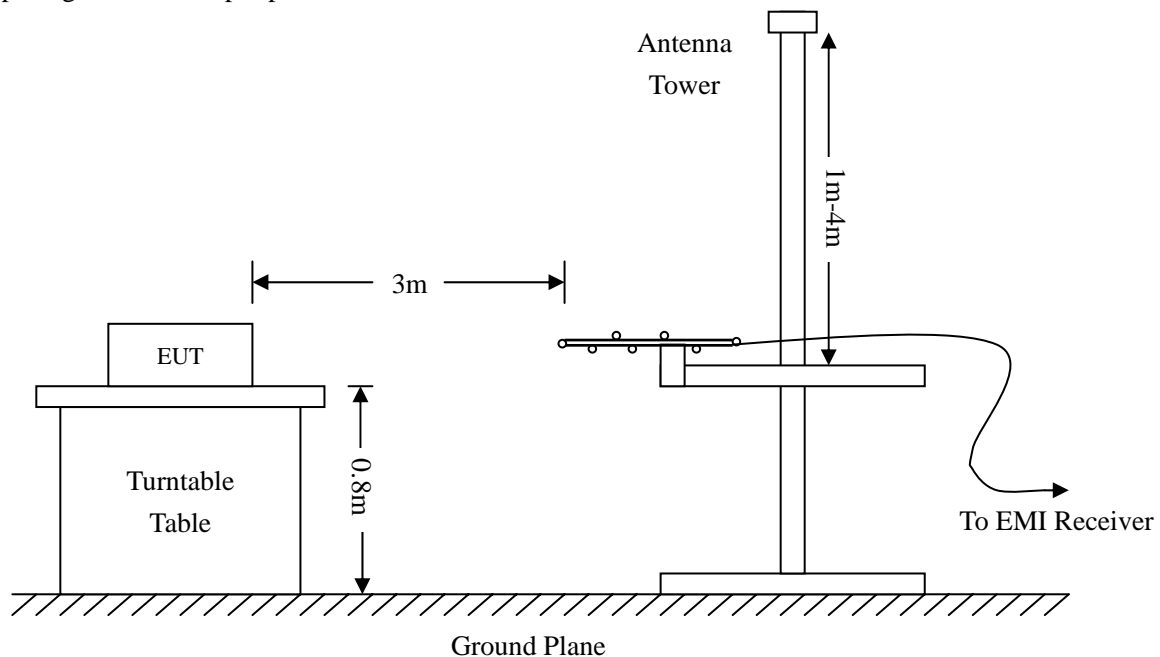
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2012-03-28	2013-03-27
EMI Test Receiver	R&S	ESVB	825471/005	2012-03-28	2013-03-27
Positioning Controller	C&C	CC-C-1F	N/A	2012-03-28	2013-03-27
RF Switch	EM	EMSW18	SW060023	2012-03-28	2013-03-27
Pre-amplifier	Agilent	8447F	3113A06717	2012-03-28	2013-03-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2012-03-28	2013-03-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2012-02-25	2013-02-24
Horn Antenna	ETS	3117	00086197	2012-02-25	2013-02-24

4.3 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.205 and FCC Part 15.109 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.



4.4 Test Receiver Setup

During the radiated emission test, the test receiver was set with the following configurations:

Start Frequency 30 MHz
 Stop Frequency..... 1000 MHz
 Sweep Speed Auto
 IF Bandwidth..... 100 kHz
 Quasi-Peak Adapter Bandwidth 120 kHz
 Quasi-Peak Adapter Mode Normal

4.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} - \text{Corr. Factor}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15B Limit}$$

4.6 Environmental Conditions

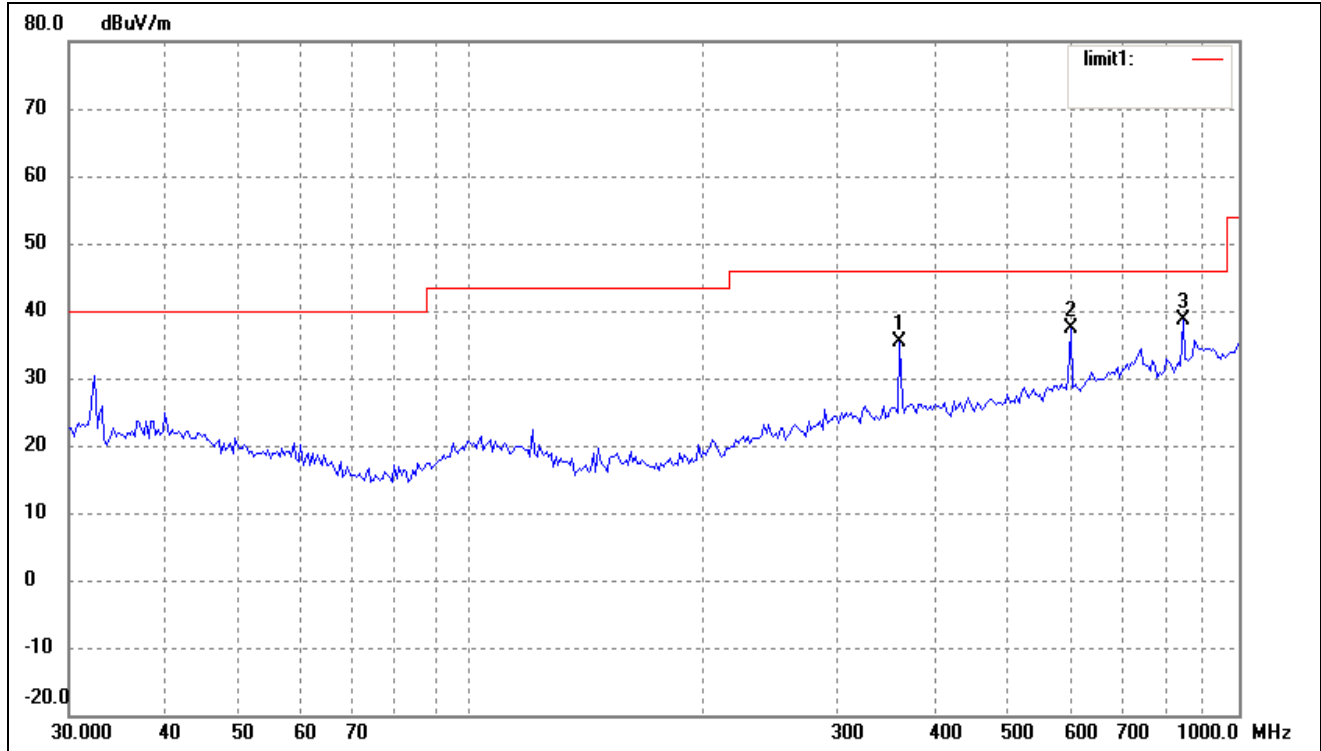
Temperature:	25 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

4.7 Summary of Test Results/Plots

According to the data, the EUT complied with the FCC Part 15B Class B standards, and had the worst margin of:

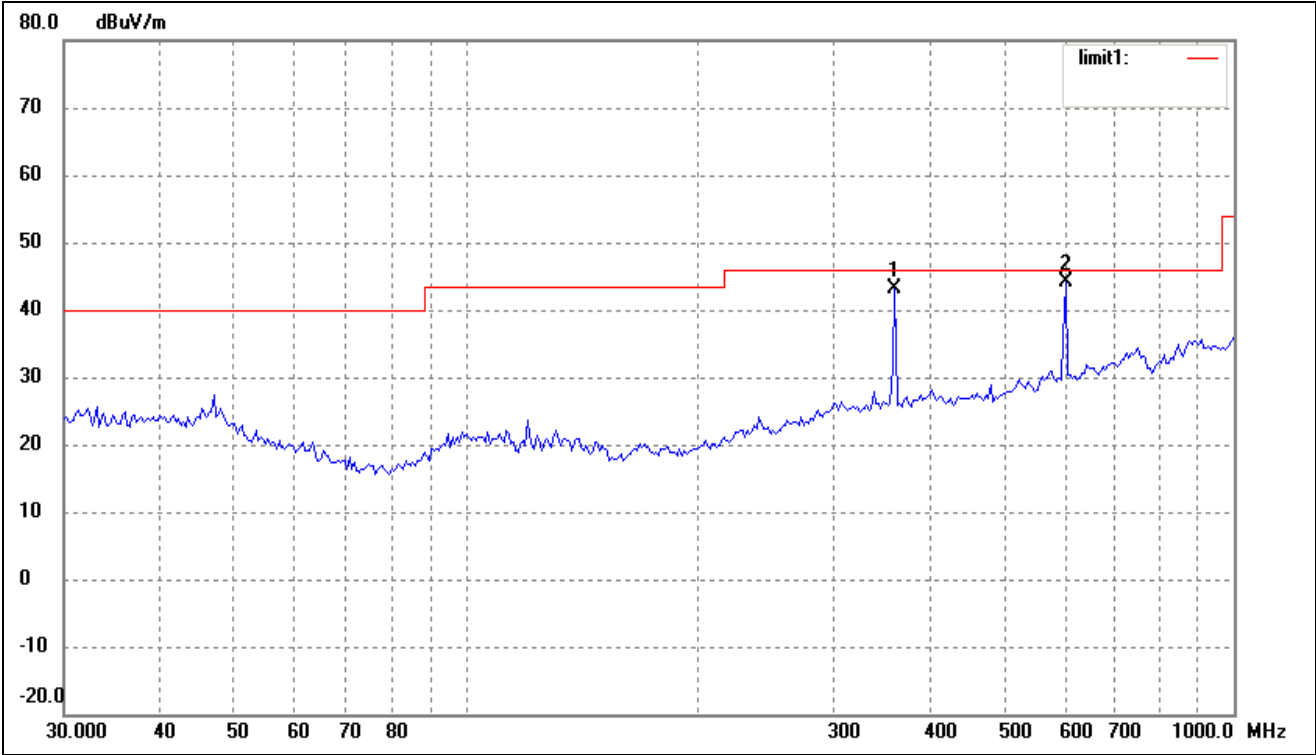
-1.79 dBμV at 603.5392 MHz in the Vertical polarization, 30 MHz to 1 GHz, 3Meters Operating with antenna 1

-2.11 dBμV at 603.5392 MHz in the Vertical polarization, 30 MHz to 1 GHz, 3Meters Operating with antenna 2

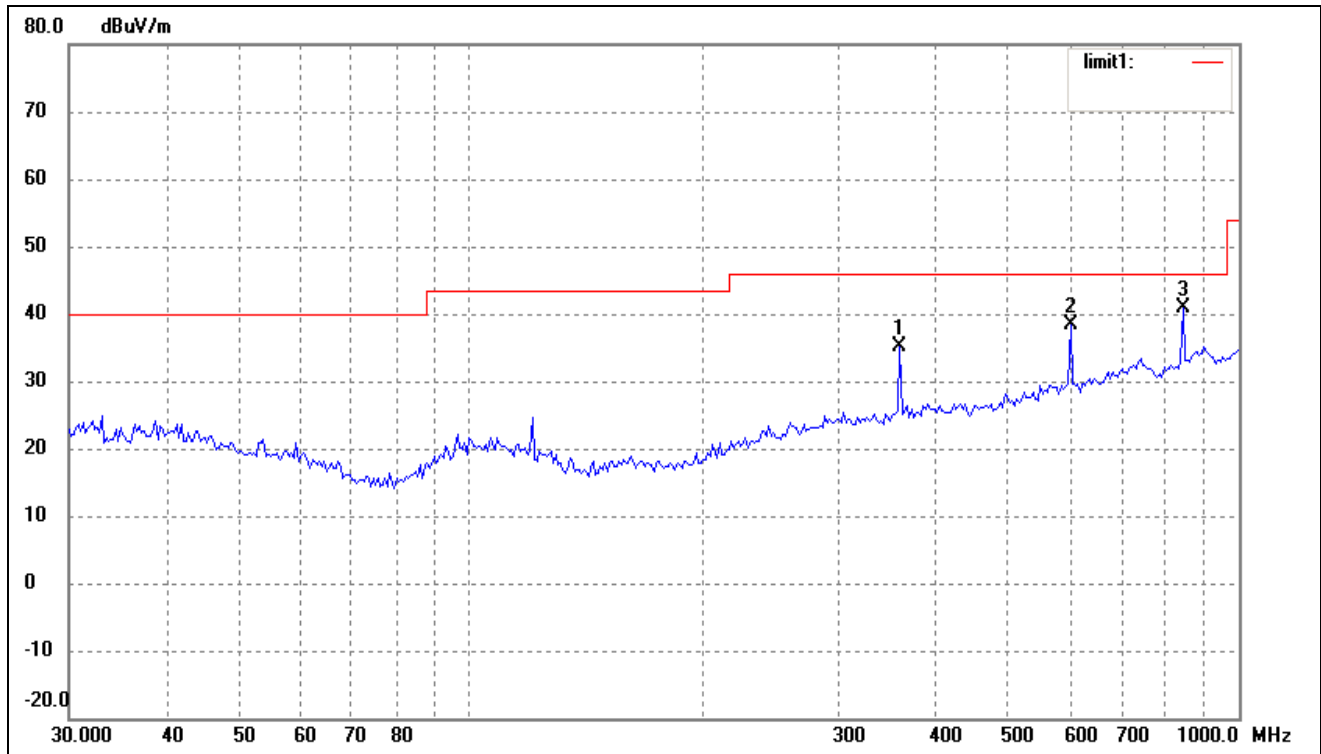
Plot of Radiation Emissions Test Data*Radiated Disturbance**EUT: Top Catcher CC Tactial**M/N: AWUHN2408**Operating Condition: Operating with antenna 1**Test Specification: Horizontal & Vertical**Comment: AC 120V/60Hz connect to PC, USB 5V***Horizontal**

No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	361.7139	24.59	10.69	35.28	46.00	-10.72	360	100	peak
2	603.5392	22.85	14.62	37.47	46.00	-8.53	360	100	peak
3	845.0878	21.22	17.45	38.67	46.00	-7.33	360	200	peak

Vertical

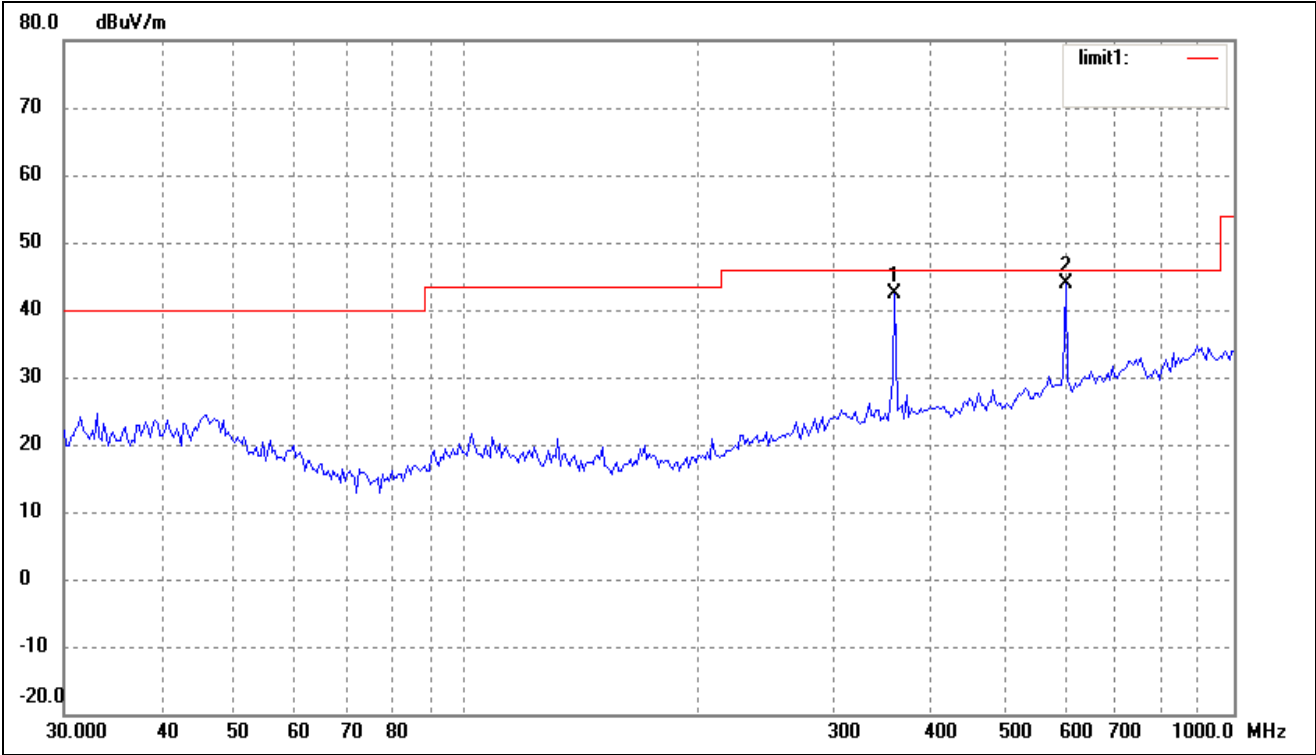


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	361.7139	32.42	10.69	43.11	46.00	-2.89	251	100	QP
2	603.5392	29.59	14.62	44.21	46.00	-1.79	116	100	QP

*Radiated Disturbance**EUT: Top Catcher CC Tactical**M/N: AWUHN2408**Operating Condition: Operating with antenna 2**Test Specification: Horizontal & Vertical**Comment: AC 120V/60Hz connect to PC, USB 5V**Horizontal*

No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	361.7139	24.40	10.69	35.09	46.00	-10.91	257	100	peak
2	603.5392	23.71	14.62	38.33	46.00	-7.67	118	100	peak
3	845.0878	23.53	17.45	40.98	46.00	-5.02	210	100	peak

Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	361.7139	31.65	10.69	42.34	46.00	-3.66	227	100	QP
2	603.5392	29.27	14.62	43.89	46.00	-2.11	179	100	QP

***** END OF REPORT *****