

APPLICATION CERTIFICATION FCC Part 15C
On Behalf of
Hobbico Inc

REVELL FIRESHOT
Model No.: 3991

FCC ID: IYFTX3991

Prepared for : Hobbico Inc
Address : 2904 Research Road Champaign, IL USA 61821
Prepared by : ACCURATE TECHNOLOGY CO. LTD
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Report Number : ATE20141613
Date of Test : Aug 15-27, 2014
Date of Report : Aug 27, 2014

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Test Report Certification

Applicant : Hobbico Inc
Manufacturer : AF Enterprises, Huatong Metals & Plastics Products Co., Ltd.
EUT Description : REVELL FIRESHOT
(A) MODEL NO.: 3991
(B) POWER SUPPLY: 6V DC (“AA” batteries 4×)

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.249
ANSI C63.4: 2009

The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.249 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test : Aug 15-27, 2014

Prepared by : Tim Zhang
(Tim.zhang, Engineer)

Approved & Authorized Signer : Sean Liu
(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	REVELL FIRESHOT
Model Number	:	3991
Power Supply	:	6V DC (“AA ” batteries 4×)
Operate Frequency	:	2402.0-2480.0MHz
Channel Spacing	:	1MHz
Number of Channels	:	79
Max antenna gain	:	1.0dBi
Modulation Type	:	GFSK
Applicant	:	Hobbico Inc
Address	:	2904 Research Road Champaign, IL USA 61821
Manufacturer	:	AF Enterprises, Huatong Metals & Plastics Products Co., Ltd.
Address	:	Yongfeng Industrial District, Henglan Town, Zhongshan, Guangdong, P.R. China
Date of sample received	:	Aug 15, 2014
Date of Test	:	Aug 15-27, 2014

1.2. Description of Test Facility

EMC Lab	:	Accredited by TUV Rheinland Shenzhen
		Listed by FCC
		The Registration Number is 752051
		Listed by Industry Canada
		The Registration Number is 5077A-2
		Accredited by China National Accreditation Committee for Laboratories
		The Certificate Registration Number is L3193
Name of Firm	:	ACCURATE TECHNOLOGY CO. LTD
Site Location	:	F1, Bldg. A, Changyuan New Material Port, Keyuan Rd. Science & Industry Park, Nanshan, Shenzhen, Guangdong P.R. China

1.3.Measurement Uncertainty

Conducted Emission Expanded Uncertainty = 2.23dB, k=2

Radiated emission expanded uncertainty
(9kHz-30MHz) = 3.08dB, k=2

Radiated emission expanded uncertainty
(30MHz-1000MHz) = 4.42dB, k=2

Radiated emission expanded uncertainty
(Above 1GHz) = 4.06dB, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 12, 2014	Jan. 11, 2015
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 12, 2014	Jan. 11, 2015
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 12, 2014	Jan. 11, 2015
Pre-Amplifier	Rohde&Schwarz	CBLU1183540-01	3791	Jan. 12, 2014	Jan. 11, 2015
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Feb. 06, 2014	Feb. 05, 2015
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Feb. 06, 2014	Feb. 05, 2015
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Feb. 06, 2014	Feb. 05, 2015
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Feb. 06, 2014	Feb. 05, 2015
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 12, 2014	Jan. 11, 2015
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 12, 2014	Jan. 11, 2015
Highpass Filter	Wainwright Instruments	WHKX3.6/18G-10SS	N/A	Jan. 12, 2014	Jan. 11, 2015
Band Reject Filter	Wainwright Instruments	WRCG2400/2485-2375/2510-60/11SS	N/A	Jan. 12, 2014	Jan. 11, 2015

3. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission	N/A
Section 15.249(a)	Fundamental and Harmonics Radiated Emission	Compliant
Section 15.249(d)	Spurious Radiated Emission	Compliant
Section 15.249(d)	Band Edge	Compliant
Section 15.203	Antenna Requirement	Compliant

Remark: "N/A" means "Not applicable".

4. FUNDAMENTAL AND HARMONICS RADIATED EMISSION FOR SECTION 15.249

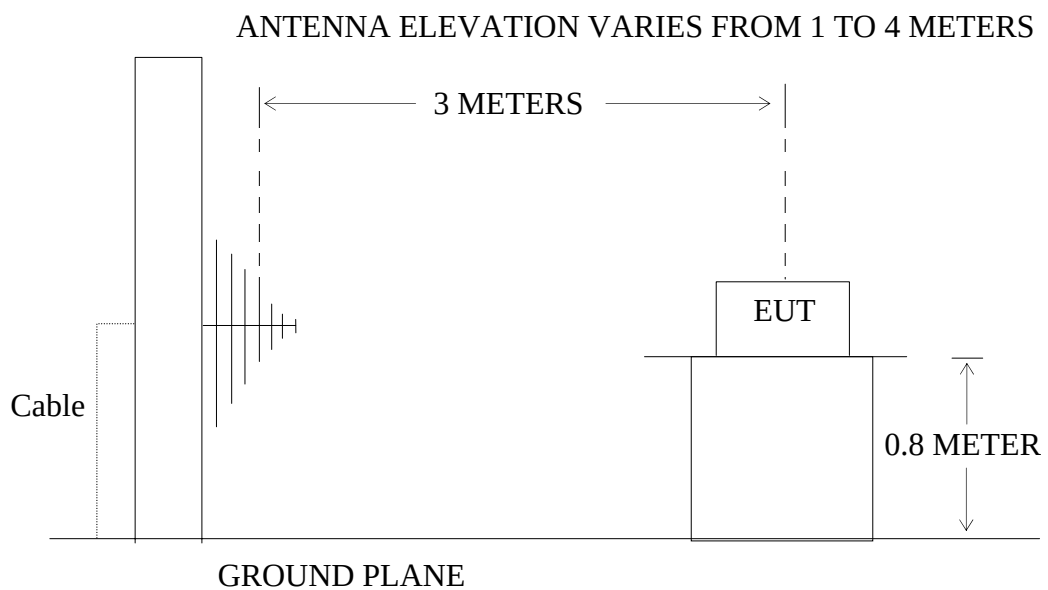
4.1. Block Diagram of Test Setup

4.1.1. Block diagram of connection between the EUT and simulators



(EUT: REVELL FIRESHOT)

4.1.2. Semi-Anechoic Chamber Test Setup Diagram



4.2. The Emission Limit

4.2.1. For intentional radiators, According to section 15.249(a), Operation within the frequency band of 2.4 to 2.4835GHz, The fundamental field strength shall not exceed 94 dB μ V/m and the harmonics shall not exceed 54 dB μ V/m.

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of harmonics (microvolts/meter)
902-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

4.2.2. According to section 15.249(e), as shown in section 15.35(b), 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.

4.3. Configuration of EUT on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

4.4. Operating Condition of EUT

4.4.1. Setup the EUT and simulator as shown as Section 4.1.

4.4.2. Turn on the power of all equipment.

4.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402.000-2480.000MHz. We are select 2402.000MHz, 2441.000MHz, 2480.000MHz TX frequency to transmit.

4.5. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2009 on radiated emission measurement. The EUT was tested in 3 orthogonal planes.

The bandwidth of test receiver is set at 120kHz in 30-1000MHz. and set at 1MHz in above 1000MHz.

The frequency range from 30MHz to 25000MHz is checked.

4.6.The Field Strength of Radiation Emission Measurement Results

PASS.

Date of Test:	Aug 20, 2014	Temperature:	25°C
EUT:	REVELL FIRESHOT	Humidity:	50%
Model No.:	3991	Power Supply:	DC 6V
Test Mode:	TX 2402.0MHz	Test Engineer:	Alen

Fundamental Radiated Emissions

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
2402.000	86.65	89.45	-6.76	79.89	82.69	94.00	114.00	-14.11	-31.31	Vertical
2402.000	86.39	89.29	-6.76	79.63	82.53	94.00	114.00	-14.37	-31.46	Horizontal

Harmonics Radiated Emissions

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
---	---	---	---	---	---	---	---	---	---	Vertical
---	---	---	---	---	---	---	---	---	---	Horizontal

Note:

- Emissions attenuated more than 20 dB below the permissible value are not reported.
- The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$

$$\text{Where Corrected Factor} = \text{Antenna Factor} + \text{Cable Loss} + \text{High Pass Filter Loss} - \text{Amplifier Gain}$$
- The spectral diagrams in appendix I display the measurement of peak values.

Date of Test:	Aug 20, 2014	Temperature:	25°C
EUT:	REVELL FIRESHOT	Humidity:	50%
Model No.:	3991	Power Supply:	DC 6V
Test Mode:	TX 2441.0MHz	Test Engineer:	Alen

Fundamental Radiated Emissions

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
2441.000	86.75	89.53	-6.67	80.08	82.86	94.00	114.00	-13.92	-31.14	Vertical
2441.000	84.99	87.95	-6.67	78.32	81.28	94.00	114.00	-15.18	-32.72	Horizontal

Harmonics Radiated Emissions

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
---	---	---	---	---	---	---	---	---	---	Vertical
---	---	---	---	---	---	---	---	---	---	Horizontal

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$

$$\text{Where Corrected Factor} = \text{Antenna Factor} + \text{Cable Loss} + \text{High Pass Filter Loss} - \text{Amplifier Gain}$$

3. The spectral diagrams in appendix I display the measurement of peak values.

Date of Test:	Aug 20, 2014	Temperature:	25°C
EUT:	REVELL FIRESHOT	Humidity:	50%
Model No.:	3991	Power Supply:	DC 6V
Test Mode:	TX 2480.0MHz	Test Engineer:	Alen

Fundamental Radiated Emissions

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
2480.000	87.53	90.20	-6.56	80.97	83.64	94.00	114.00	-13.03	-30.36	Vertical
2480.000	90.01	92.69	-6.56	83.45	86.13	94.00	114.00	-10.55	-27.87	Horizontal

Harmonics Radiated Emissions

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
---	---	---	---	---	---	---	---	---	---	Vertical
---	---	---	---	---	---	---	---	---	---	Horizontal

Note:

- Emissions attenuated more than 20 dB below the permissible value are not reported.
- The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:
Result = Reading + Corrected Factor
Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain
- The spectral diagrams in appendix I display the measurement of peak values.

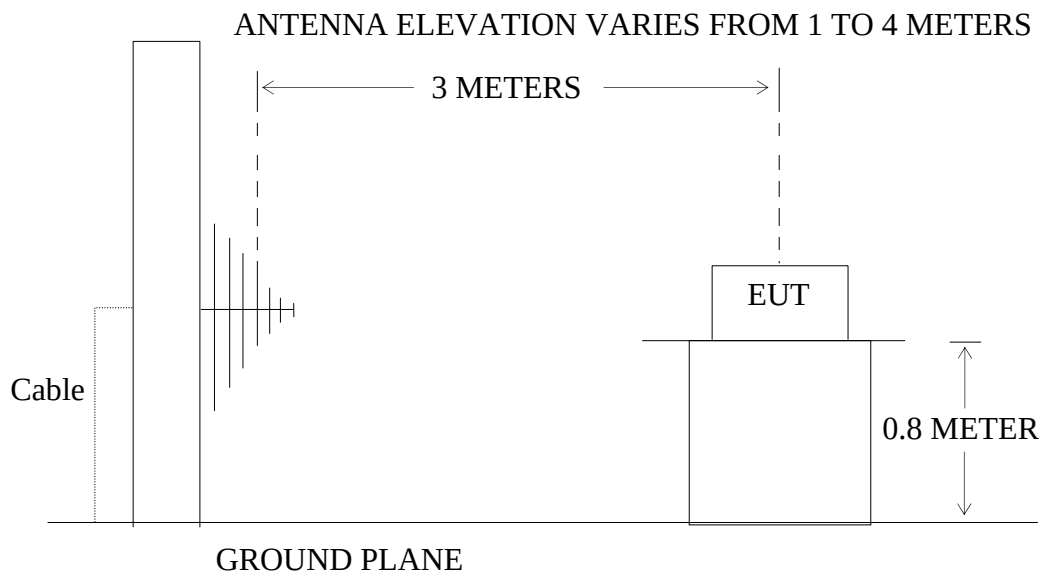
5. SPURIOUS RADIATED EMISSION FOR SECTION 15.249

5.1. Block Diagram of Test Setup

5.1.1. Block diagram of connection between the EUT and simulators



5.1.2. Semi-Anechoic Chamber Test Setup Diagram



5.2.The Emission Limit For Section 15.249(d)

5.2.1.Emission radiated outside of the specified frequency bands, except for harmonics, shall be comply with the general radiated emission limits in Section 15.209.

Radiation Emission Measurement Limits According to Section 15.209

Frequency (MHz)	Limit		
	Field Strength (microvolts/meter)	Measurement Distance (meters)	
0.009 – 0.490	2400/F(kHz)	300	The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.
0.490 – 1.705	24000/F(kHz)	30	
1.705 – 30.0	30	30	
30 - 88	100	3	
88 - 216	150	3	
216 - 960	200	3	
Above 960	500	3	

5.3.EUT Configuration on Measurement

The following equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.4. Operating Condition of EUT

5.4.1.Setup the EUT and simulator as shown as Section 5.1.

5.4.2.Turn on the power of all equipment.

5.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402.000-2480.000MHz. We are select 2402.000MHz, 2441.000MHz, 2480.000MHz TX frequency to transmit.

5.5. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2009 on radiated emission measurement. The EUT was tested in 3 orthogonal planes.

The frequency range from 9kHz to 25GHz is checked.

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

Frequency band(MHz)	Detector	RBW(KHz)	VBW(KHz)
30-1000	QP	120	300
Above 1000	Peak	1000	3000
	Average	1000	0.01

5.6.The Emission Measurement Result

PASS.



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Job No.: CARRY2014 #356

Standard: FCC 15.249 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: REVELL FIRESHOT

Mode: TX(2402MHz)

Model: 3991

Manufacturer: AF Enterprises, Huatong Metals & Plastics Products Co., Ltd.

Polarization: Horizontal

Power Source: DC 6V

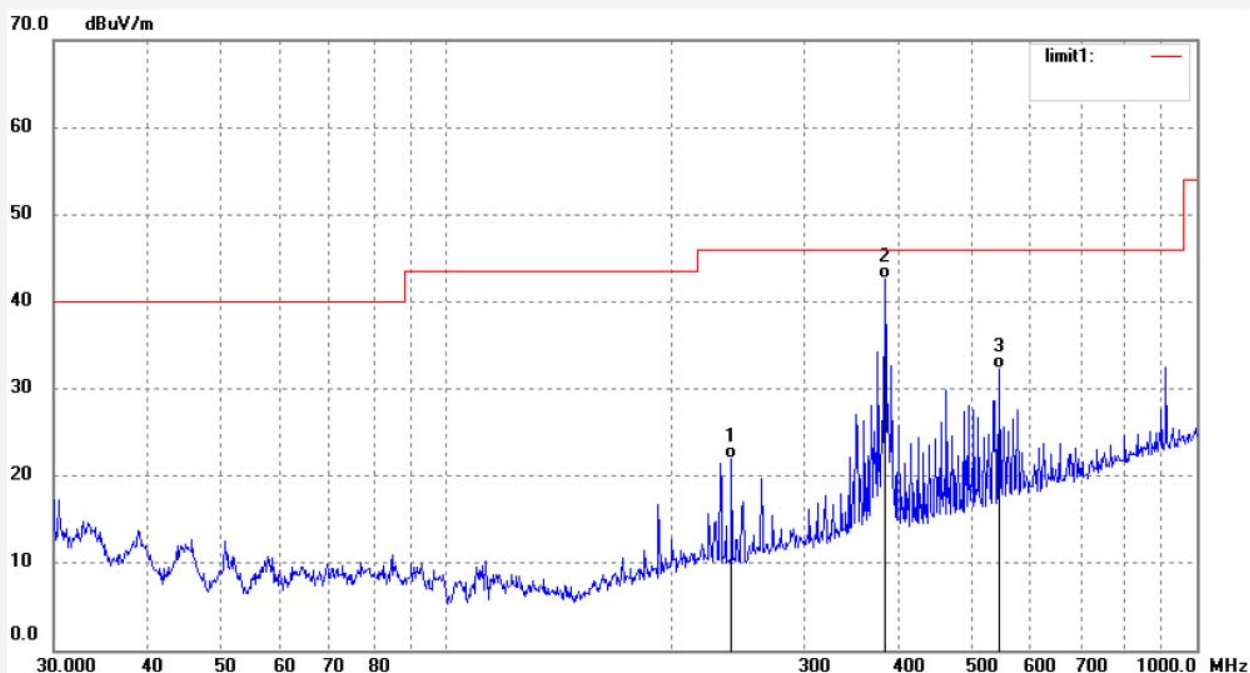
Date: 2014/08/20

Time: 17:29:23

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	239.9874	41.72	-19.80	21.92	46.00	-24.08	QP			
2	383.9318	58.36	-15.76	42.60	46.00	-3.40	QP			
3	545.1826	45.33	-12.96	32.37	46.00	-13.63	QP			

Job No.: CARRY2014 #357

Standard: FCC 15.249 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: REVELL FIRESHOT

Mode: TX(2402MHz)

Model: 3991

Polarization: Vertical

Power Source: DC 6V

Date: 2014/08/20

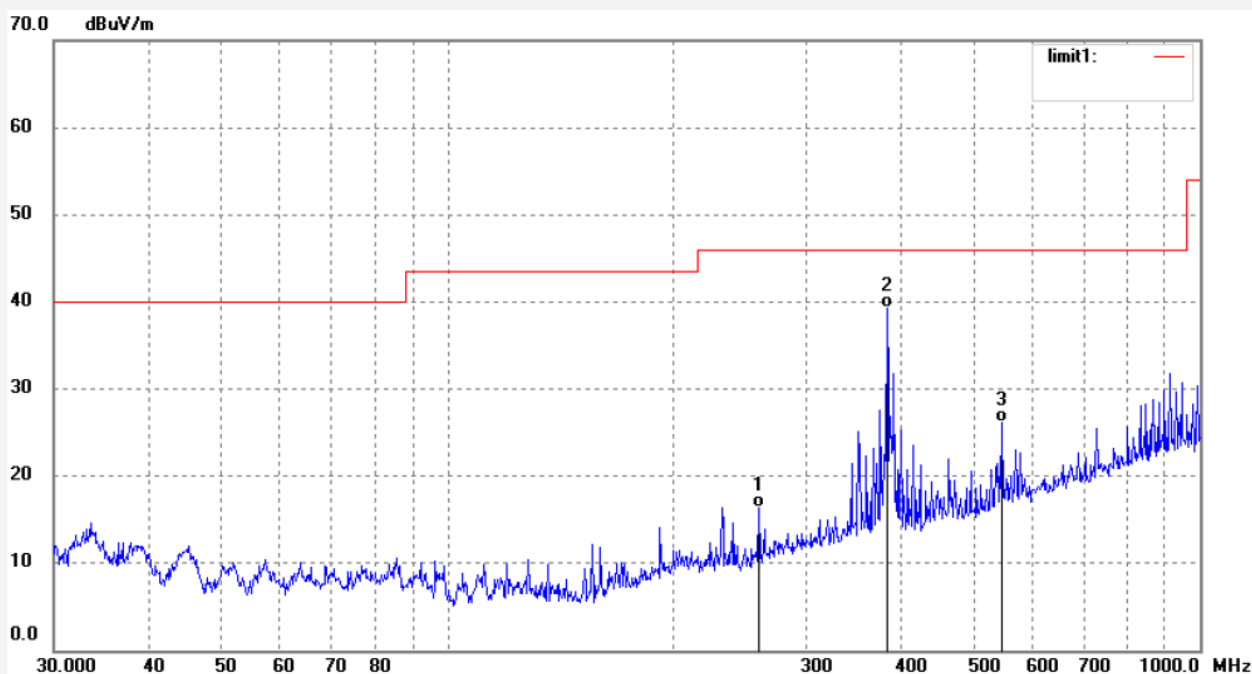
Time: 17:30:20

Engineer Signature:

Distance: 3m

Manufacturer: AF Enterprises, Huatong Metals & Plastics Products Co., Ltd.

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	259.2338	35.57	-19.18	16.39	46.00	-29.61	QP			
2	383.9318	55.06	-15.76	39.30	46.00	-6.70	QP			
3	545.1826	39.15	-12.96	26.19	46.00	-19.81	QP			



ACCURATE TECHNOLOGY CO., LTD.

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Job No.: alen #609

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 26 C / 55 %

EUT: REVELL FIRESHOT

Mode: TX 2402MHz

Model: 3991

Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd

Polarization: Horizontal

Power Source: DC 6V

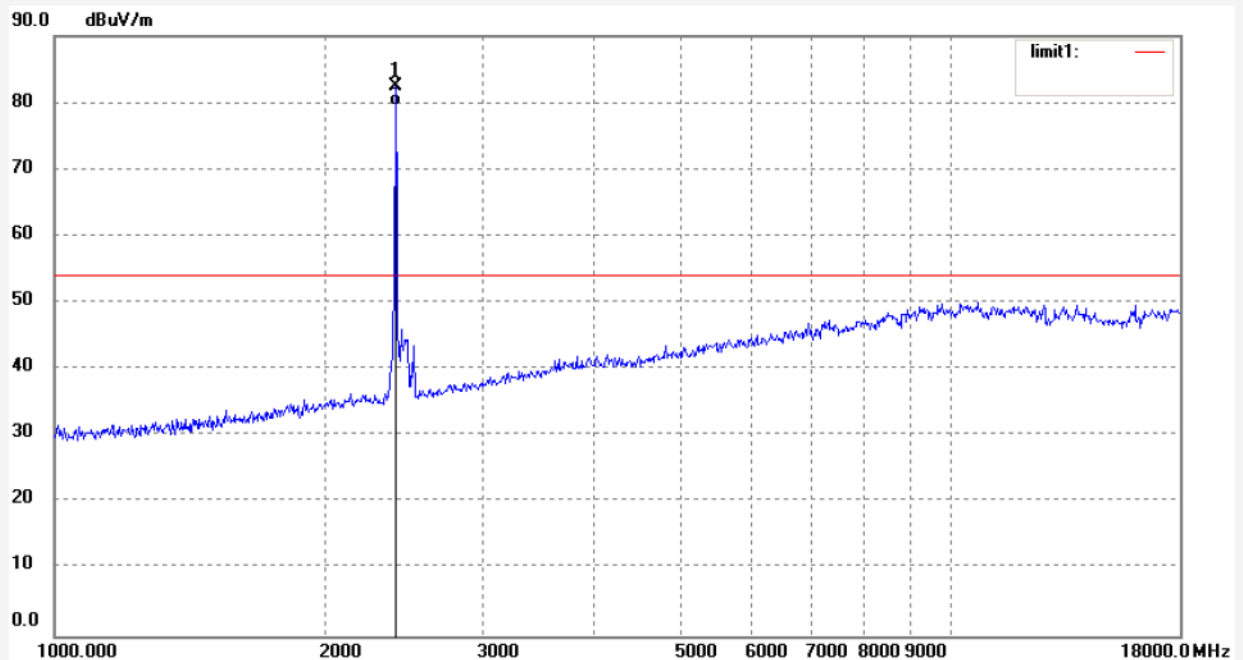
Date: 2014/08/20

Time: 9/30/21

Engineer Signature:

Distance: 3m

Note: Report No:ATE20141613

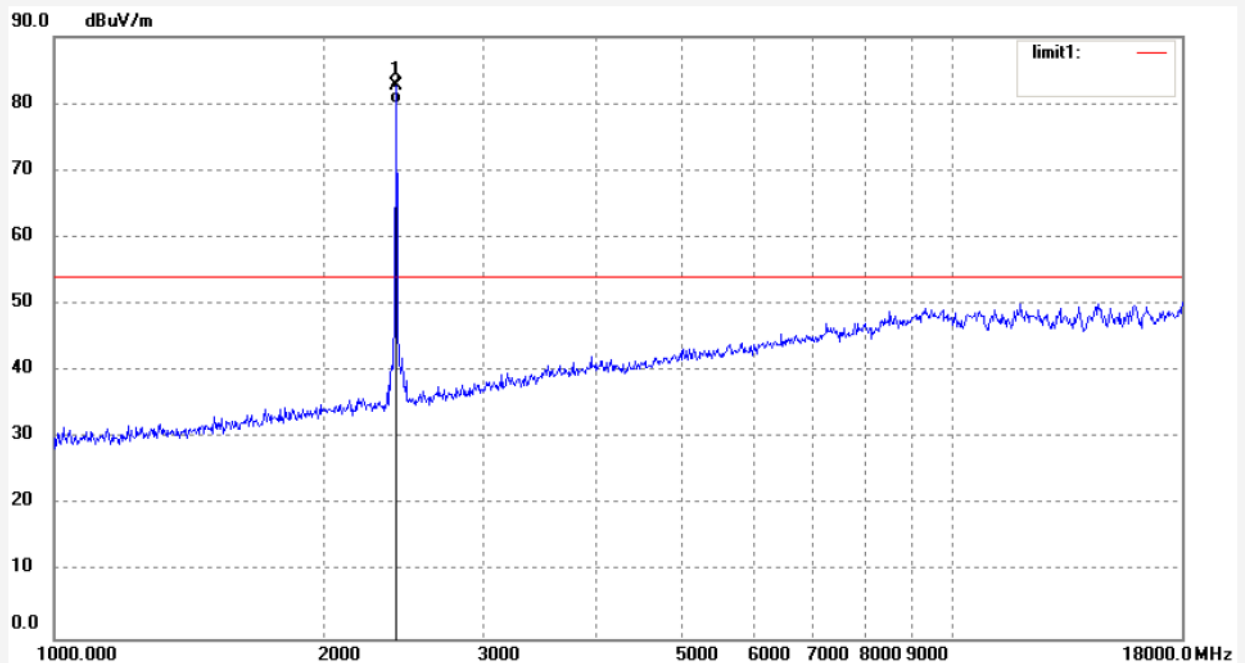


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.000	89.29	-6.76	82.53	114.00	-31.46	peak			
2	2402.000	86.39	-6.76	79.63	94.00	-14.37	AVG			

Job No.: alen #610
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 26 C / 55 %
EUT: REVELL FIRESHOT
Mode: TX 2402MHz
Model: 3991
Manufacturer: (AF Enterprises, Huatong Metals & Plastics Co., Ltd

Polarization: Vertical
Power Source: DC 6V
Date: 2014/08/20
Time: 9/31/40
Engineer Signature:
Distance: 3m

Note: Report No:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.000	89.45	-6.76	82.69	114.00	-31.31	peak			
2	2402.000	86.65	-6.76	79.89	94.00	-14.11	AVG			



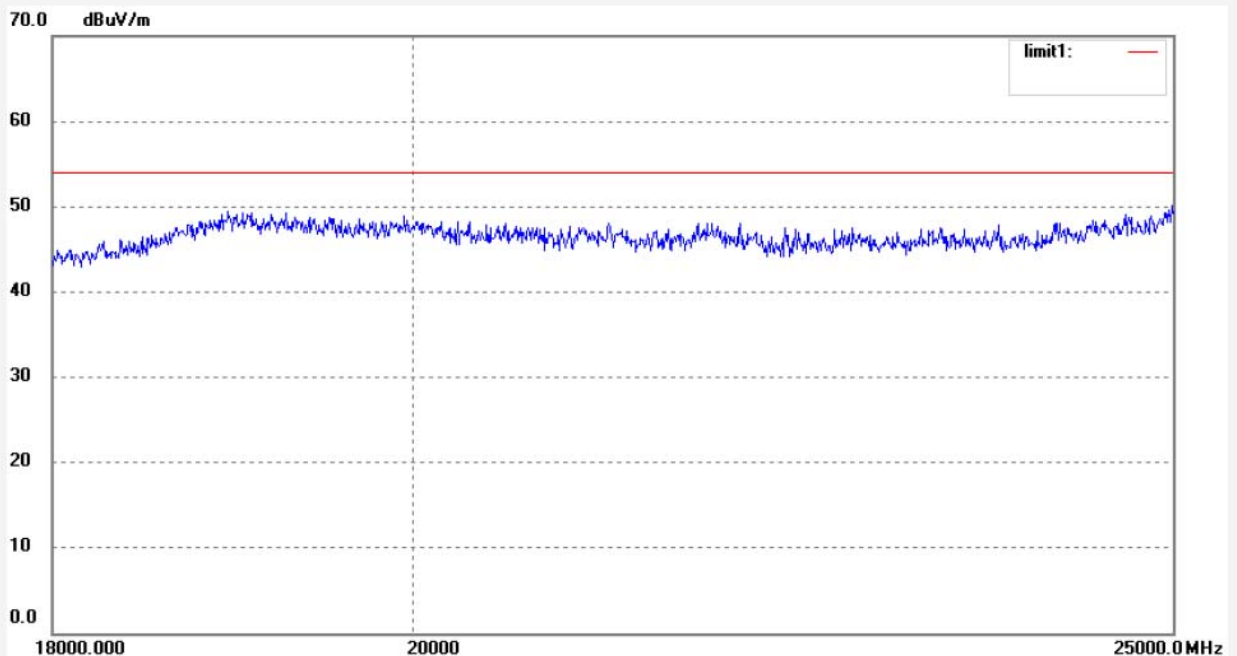
ACCURATE TECHNOLOGY CO., LTD.

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Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber
Tel:+86-0755-26503290
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Job No.: ALEN #674	Polarization: Horizontal
Standard: FCC 15C	Power Source: DC 6V
Test item: Radiation Test	Date: 2014/08/20
Temp.(C)/Hum.(%) 25 C / 50 %	Time: 11:23:55
EUT: REVELL FIRESHOT	Engineer Signature:
Mode: TX 2402MHz	Distance: 3m
Model: 3991	
Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd	

Note: Report No:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
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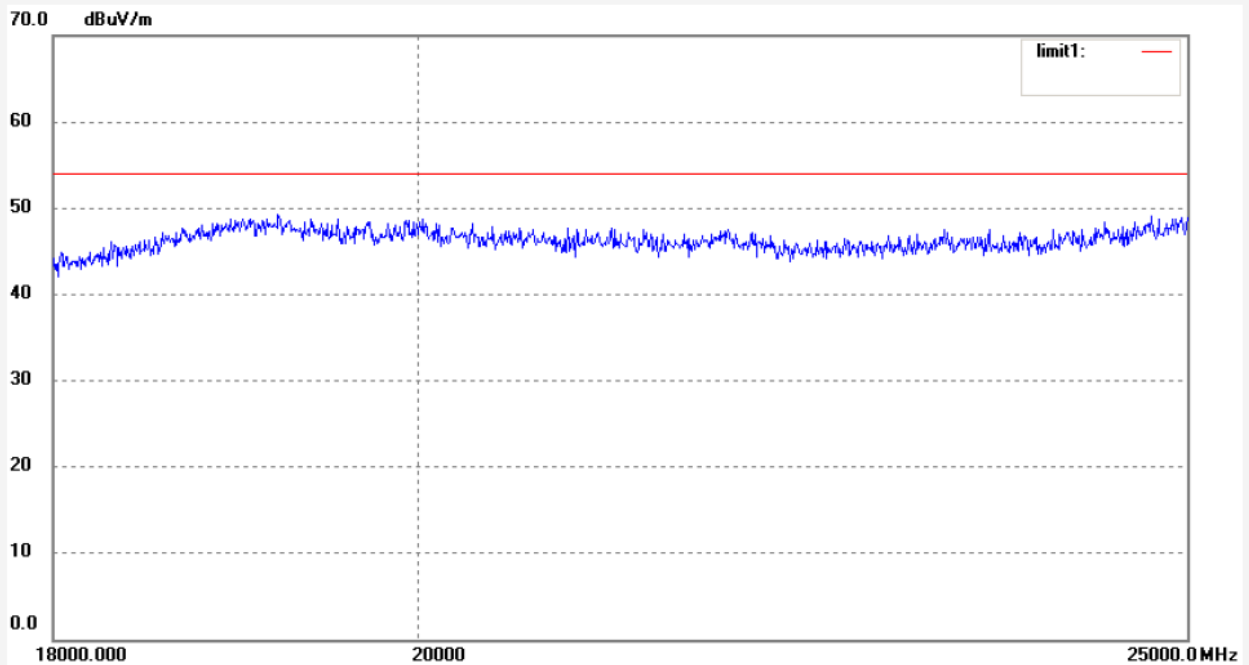
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: ALEN#675
Standard: FCC 15C
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 50 %
EUT: REVELL FIRESHOT
Mode: TX 2402MHz
Model: 3991
Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd

Polarization: Vertical
Power Source: DC 6V
Date: 2014/08/20
Time: 11:27:11
Engineer Signature:
Distance: 3m

Note: Report No:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
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Job No.: CARRY2014 #359

Standard: FCC 15.249 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: REVELL FIRESHOT

Mode: TX(2441MHz)

Model: 3991

Polarization: Horizontal

Power Source: DC 6V

Date: 2014/08/20

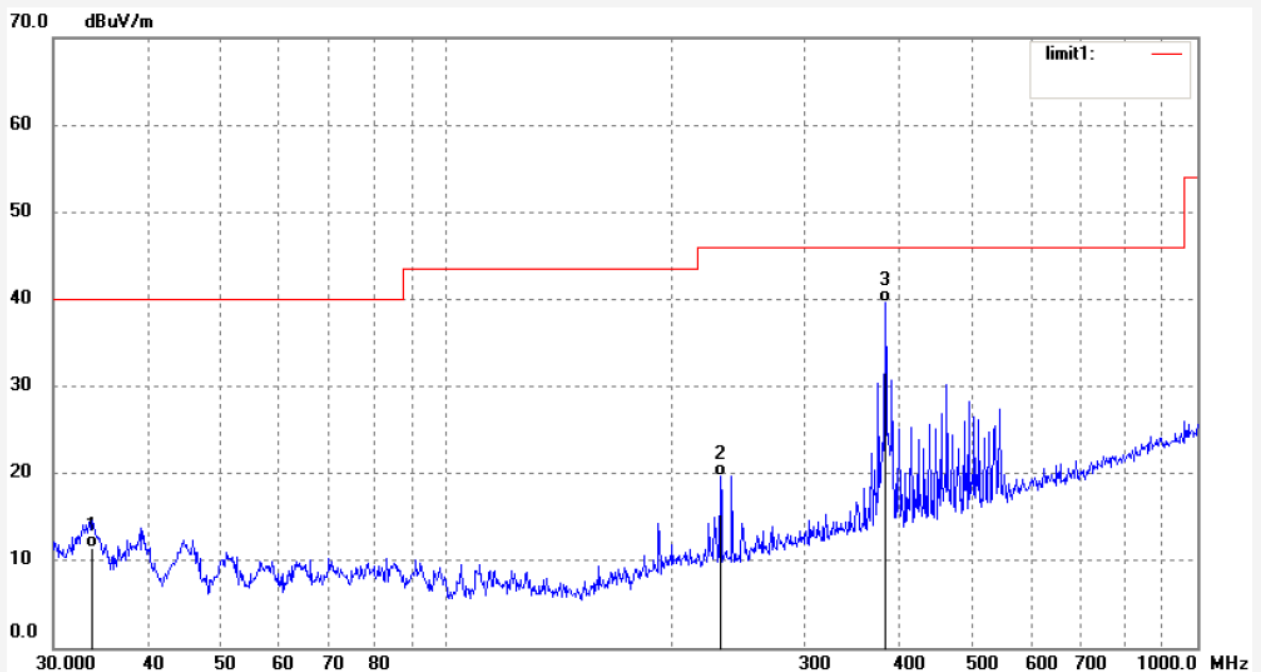
Time: 17:35:21

Engineer Signature:

Distance: 3m

Manufacturer: AF Enterprises, Huatong Metals & Plastics Products Co., Ltd.

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	33.7986	28.87	-17.34	11.53	40.00	-28.47	QP			
2	231.7179	39.57	-19.85	19.72	46.00	-26.28	QP			
3	383.9318	55.47	-15.76	39.71	46.00	-6.29	QP			

Job No.: CARRY2014 #358

Standard: FCC 15.249 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: REVELL FIRESHOT

Mode: TX(2441MHz)

Model: 3991

Manufacturer: AF Enterprises, Huatong Metals & Plastics Products Co., Ltd.

Polarization: Vertical

Power Source: DC 6V

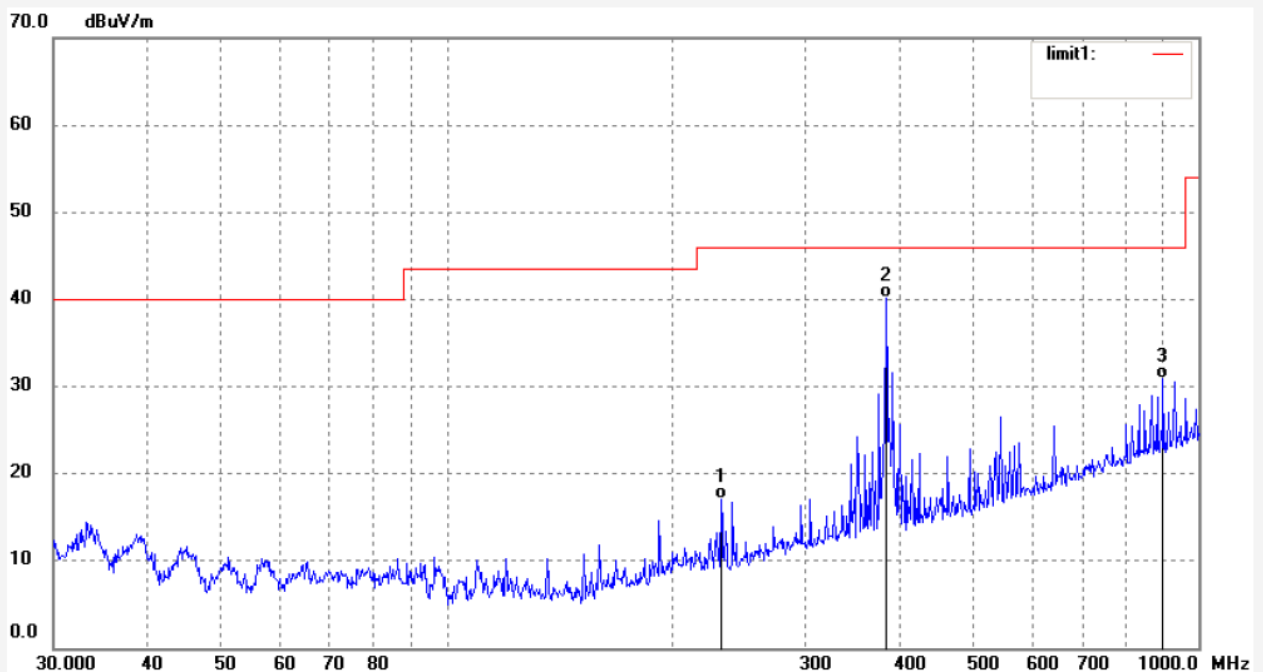
Date: 2014/08/20

Time: 17:32:29

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	231.7178	36.93	-19.86	17.07	46.00	-28.93	QP			
2	383.9318	55.85	-15.76	40.09	46.00	-5.91	QP			
3	896.9964	37.04	-6.15	30.89	46.00	-15.11	QP			



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Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: alen #619

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 26 C / 55 %

EUT: REVELL FIRESHOT

Mode: TX(2441MHz)

Model: 3991

Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd

Polarization: Horizontal

Power Source: DC 6V

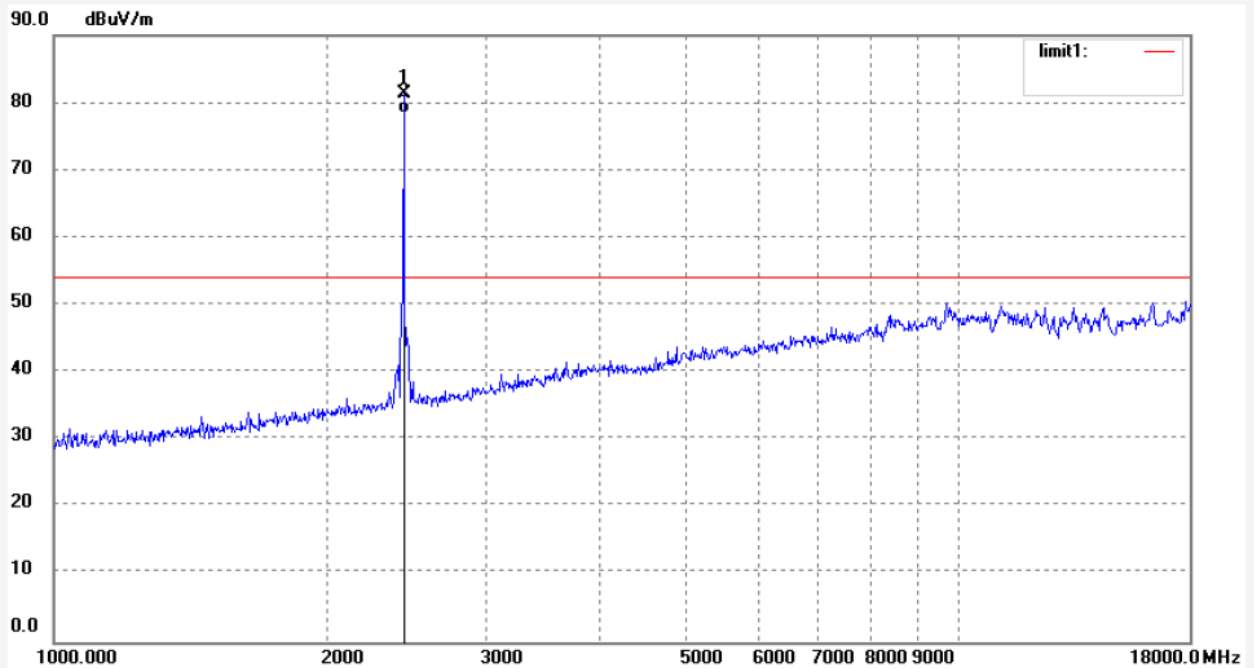
Date: 2014/08/20

Time: 10/10/08

Engineer Signature:

Distance: 3m

Note: Report No:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2438.000	87.95	-6.67	81.28	114.00	-32.72	peak			
2	2438.000	84.99	-6.67	78.32	94.00	-15.18	AVG			



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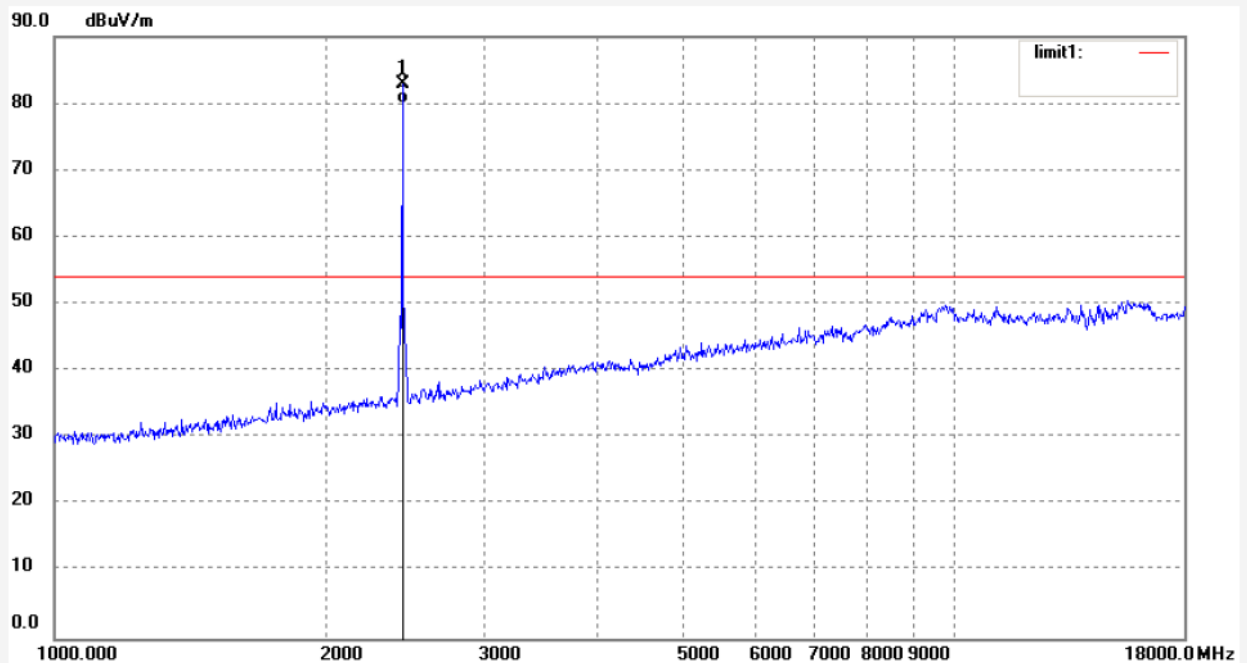
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: alen #620
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 26 C / 55 %
EUT: REVELL FIRESHOT
Mode: TX(2441MHz)
Model: 3991
Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd

Polarization: Vertical
Power Source: DC 6V
Date: 2014/08/20
Time: 10/12/00
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2438.000	89.53	-6.67	82.86	114.00	-31.14	peak			
2	2438.000	86.75	-6.67	80.08	94.00	-13.92	AVG			



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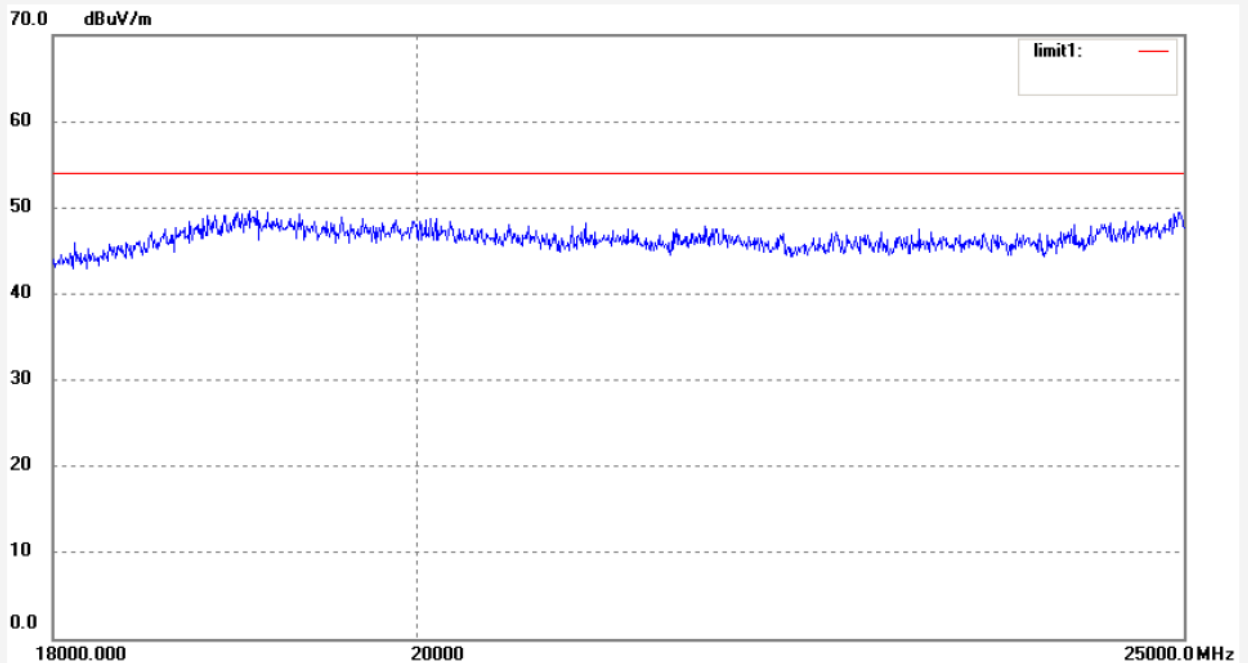
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: ALEN #673
Standard: FCC 15C
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 50 %
EUT: REVELL FIRESHOT
Mode: TX(2441MHz)
Model: 3991
Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd

Polarization: Horizontal
Power Source: DC 6V
Date: 2014/08/20
Time: 11:18:36
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	----------------	---------------------	----------------	--------------------	-------------------	----------------	----------	----------------	------------------	--------



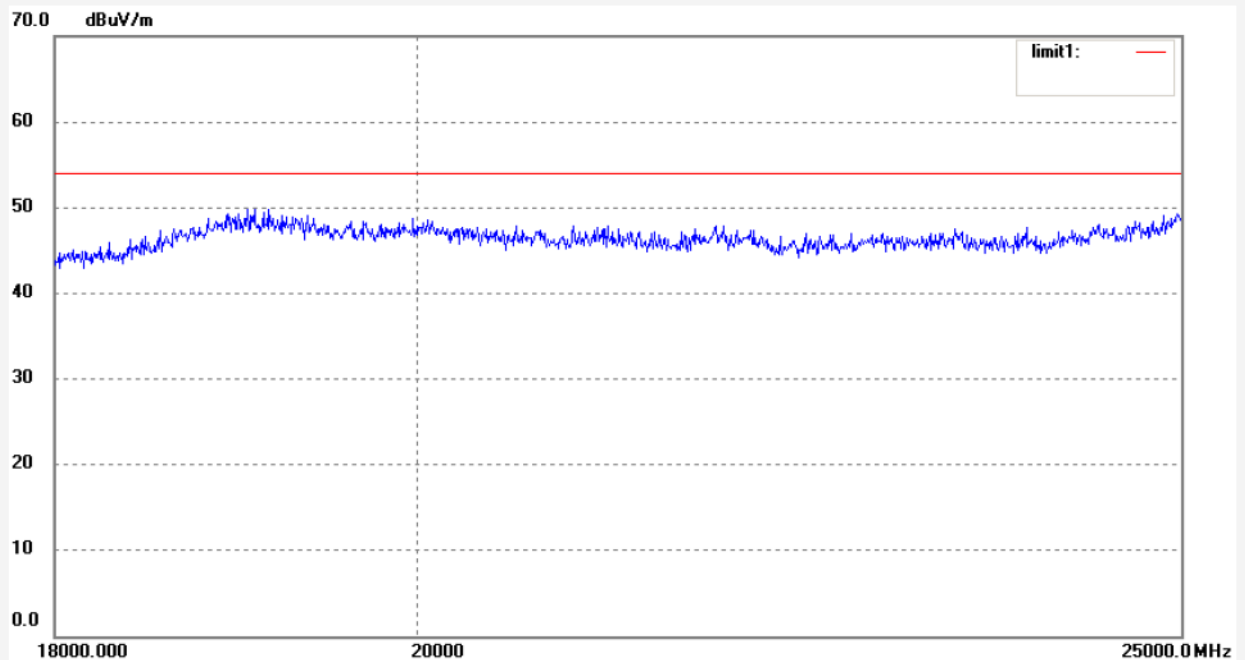
ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: ALEN #672	Polarization: Vertical
Standard: FCC 15C	Power Source: DC 6V
Test item: Radiation Test	Date: 2014/08/20
Temp.(C)/Hum.(%) 25 C / 50 %	Time: 11:14:45
EUT: REVELL FIRESHOT	Engineer Signature:
Mode: TX(2441MHz)	Distance: 3m
Model: 3991	
Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd	

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
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Job No.: CARRY2014 #360

Standard: FCC 15.249 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: REVELL FIRESHOT

Mode: TX(2480MHz)

Model: 3991

Polarization: Horizontal

Power Source: DC 6V

Date: 2014/08/20

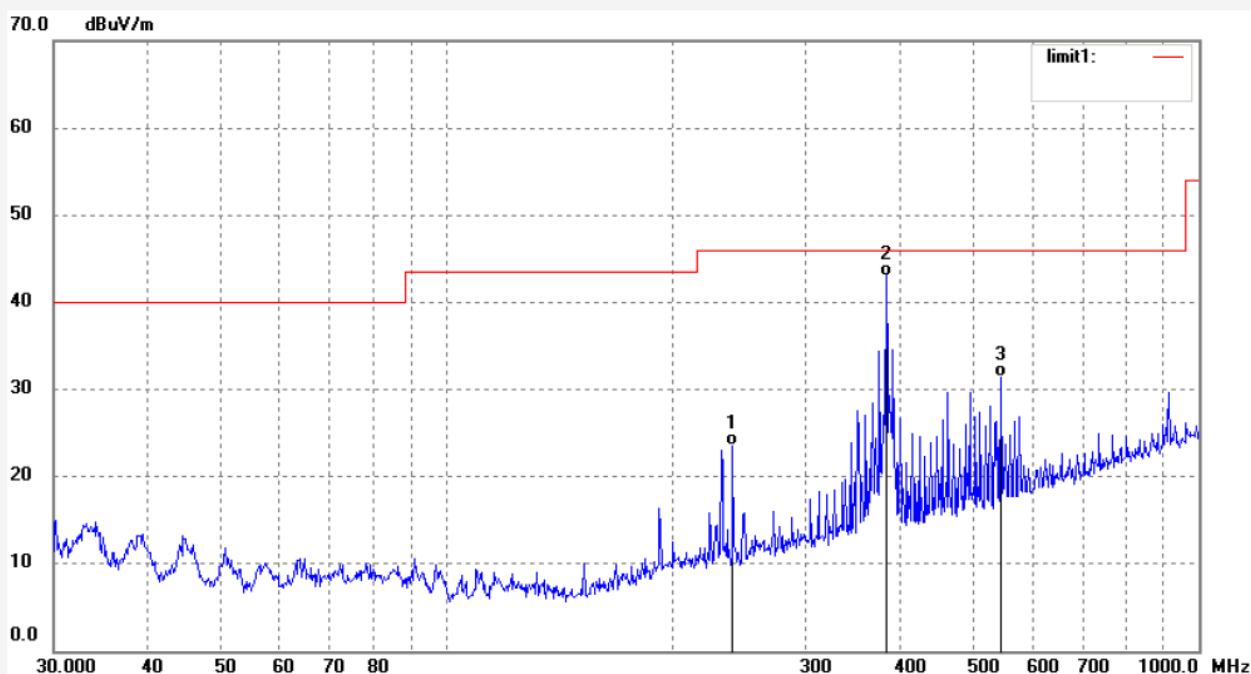
Time: 17:39:41

Engineer Signature:

Distance: 3m

Manufacturer: AF Enterprises, Huatong Metals & Plastics Products Co., Ltd.

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	239.9874	43.33	-19.80	23.53	46.00	-22.47	QP			
2	383.9318	58.75	-15.76	42.99	46.00	-3.01	QP			
3	545.1826	44.45	-12.96	31.49	46.00	-14.51	QP			

Job No.: CARRY2014 #361

Standard: FCC 15.249 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: REVELL FIRESHOT

Mode: TX(2480MHz)

Model: 3991

Polarization: Vertical

Power Source: DC 6V

Date: 2014/08/20

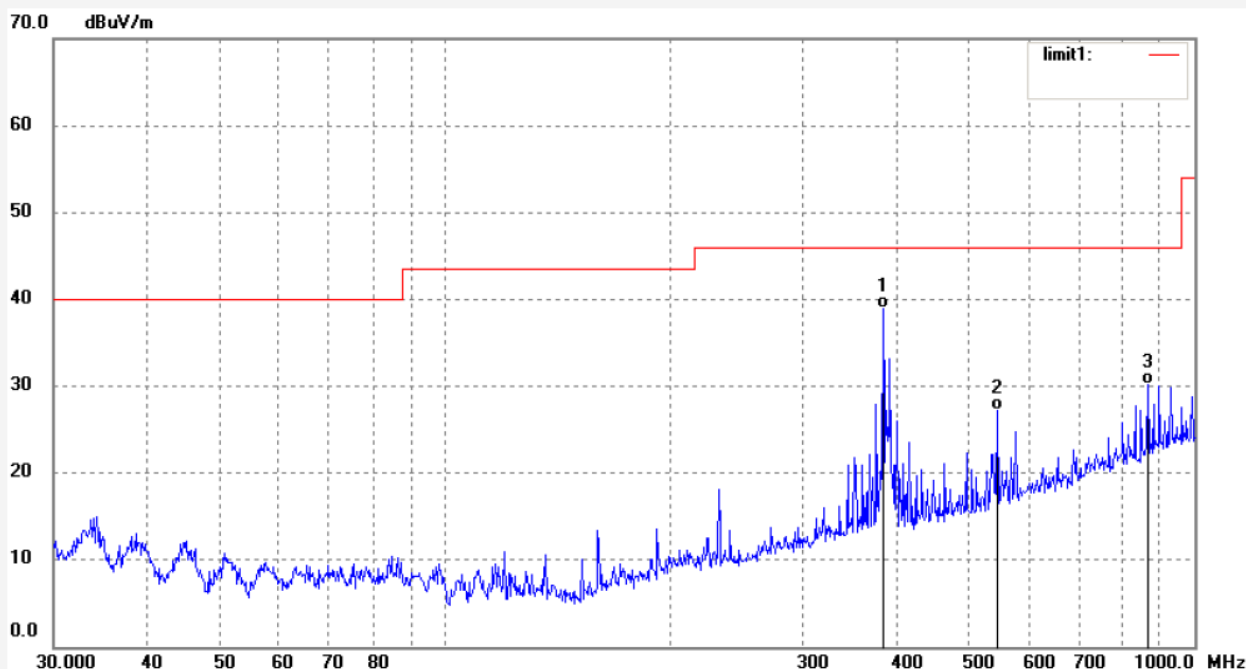
Time: 17:42:02

Engineer Signature:

Distance: 3m

Manufacturer: AF Enterprises, Huatong Metals & Plastics Products Co., Ltd.

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	383.9318	54.65	-15.76	38.89	46.00	-7.11	QP			
2	545.1826	40.12	-12.96	27.16	46.00	-18.84	QP			
3	866.0879	36.82	-6.69	30.13	46.00	-15.87	QP			



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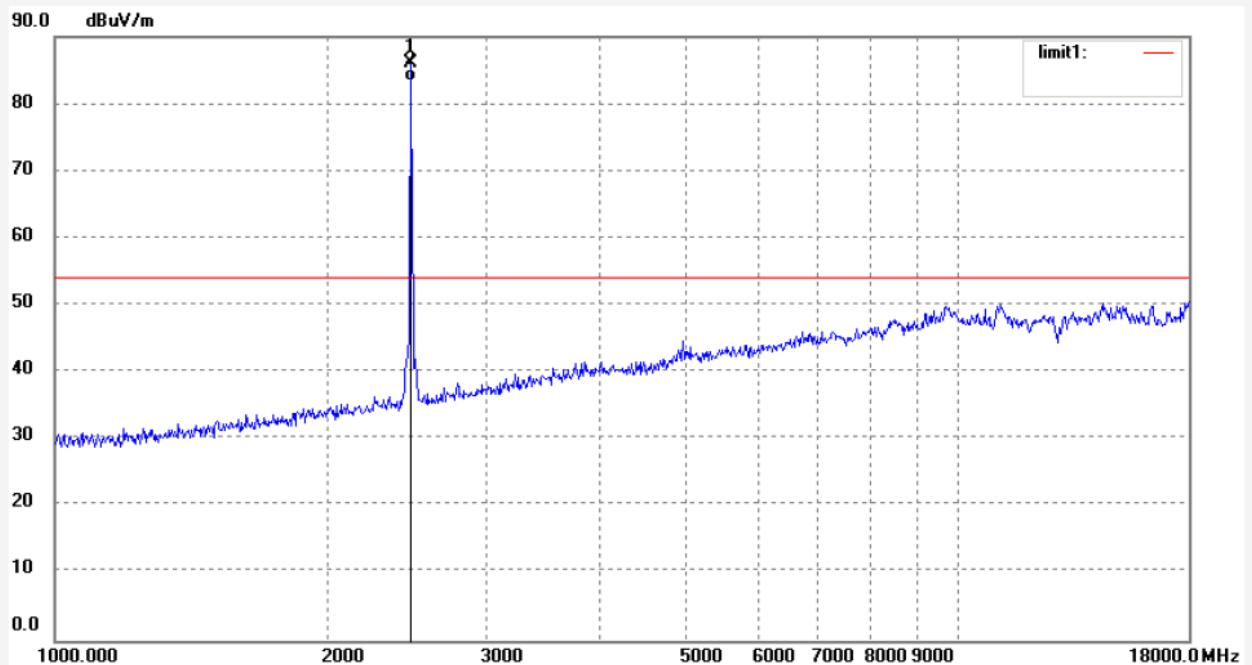
Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: alen #615
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 26 C / 55 %
EUT: REVELL FIRESHOT
Mode: TX 2480MHz
Model: 3991

Polarization: Horizontal
Power Source: DC 6V
Date: 2014/08/20
Time: 9/52/14
Engineer Signature:
Distance: 3m

Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.000	92.69	-6.56	86.13	114.00	-27.87	peak			
2	2480.000	90.01	-6.56	83.45	94.00	-10.55	AVG			



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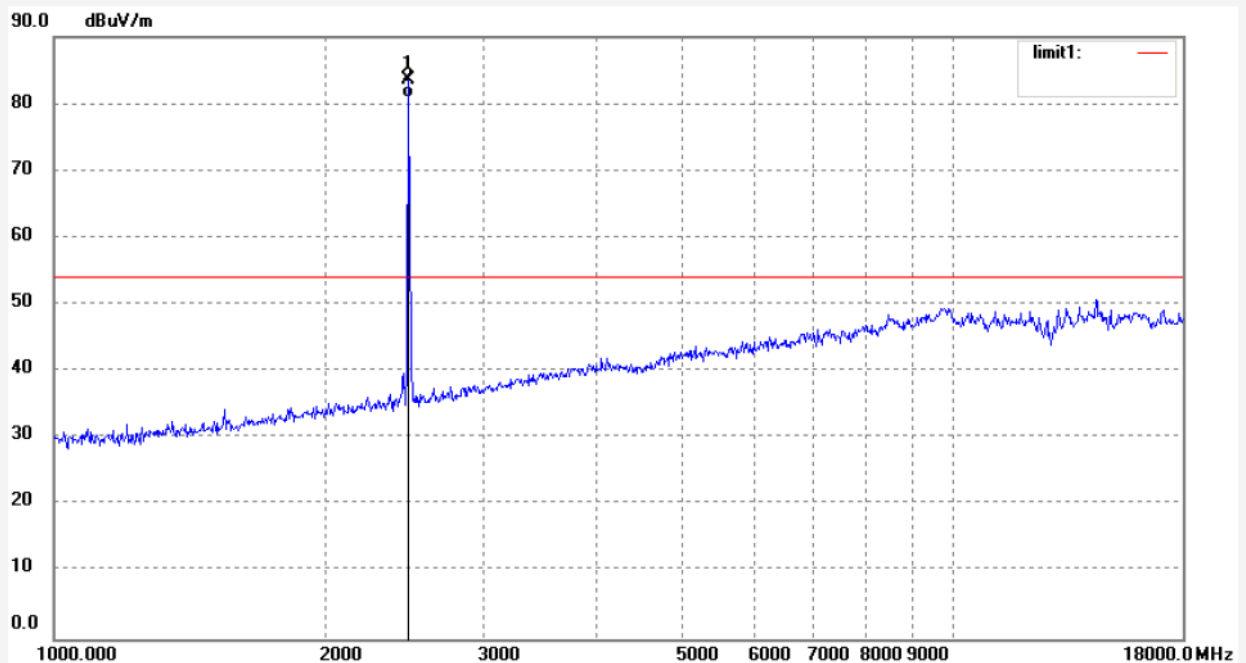
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: alen #616
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 26 C / 55 %
EUT: REVELL FIRESHOT
Mode: TX 2480MHz
Model: 3991
Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd

Polarization: Vertical
Power Source: DC 6V
Date: 2014/08/20
Time: 9/53/43
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.000	90.20	-6.56	83.64	114.00	-30.36	peak			
2	2480.000	87.53	-6.56	80.97	94.00	-13.03	AVG			



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Site: 966 chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: ALEN #670

Standard: FCC 15C

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 50 %

EUT: REVELL FIRESHOT

Mode: TX 2480MHz

Model: 3991

Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd

Polarization: Horizontal

Power Source: DC 6V

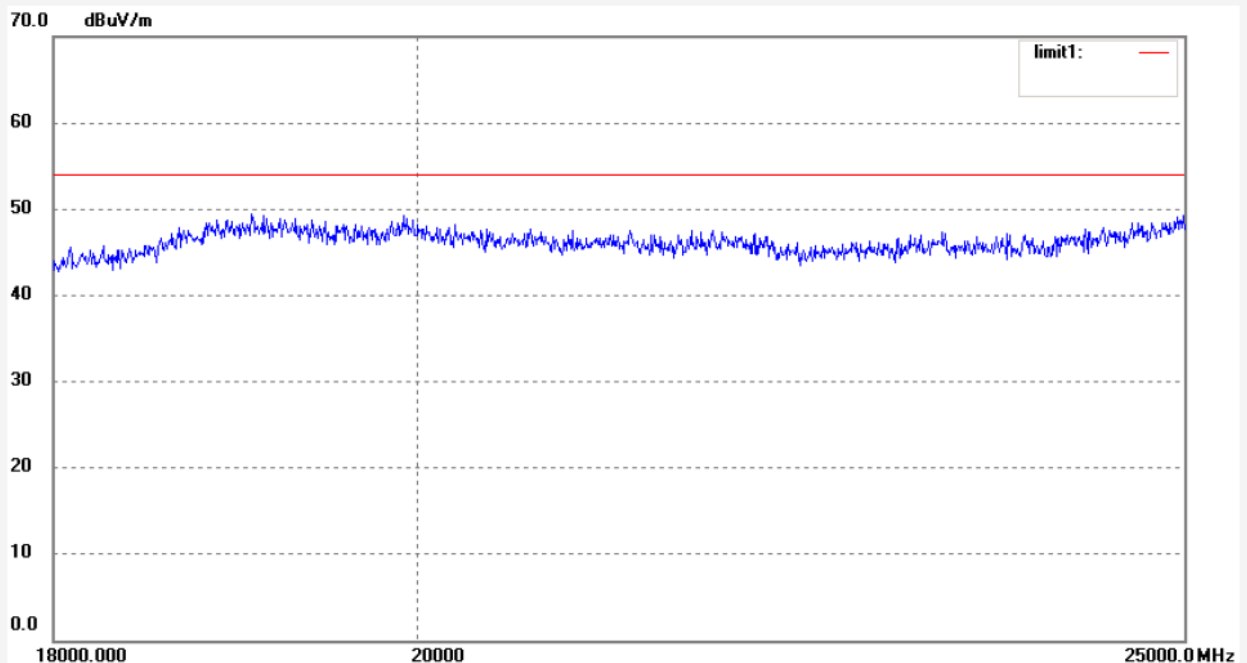
Date: 2014/08/20

Time: 11:07:15

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
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Job No.: ALEN #671

Standard: FCC 15C

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 50 %

EUT: REVELL FIRESHOT

Mode: TX 2480MHz

Model: 3991

Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd

Polarization: Vertical

Power Source: DC 6V

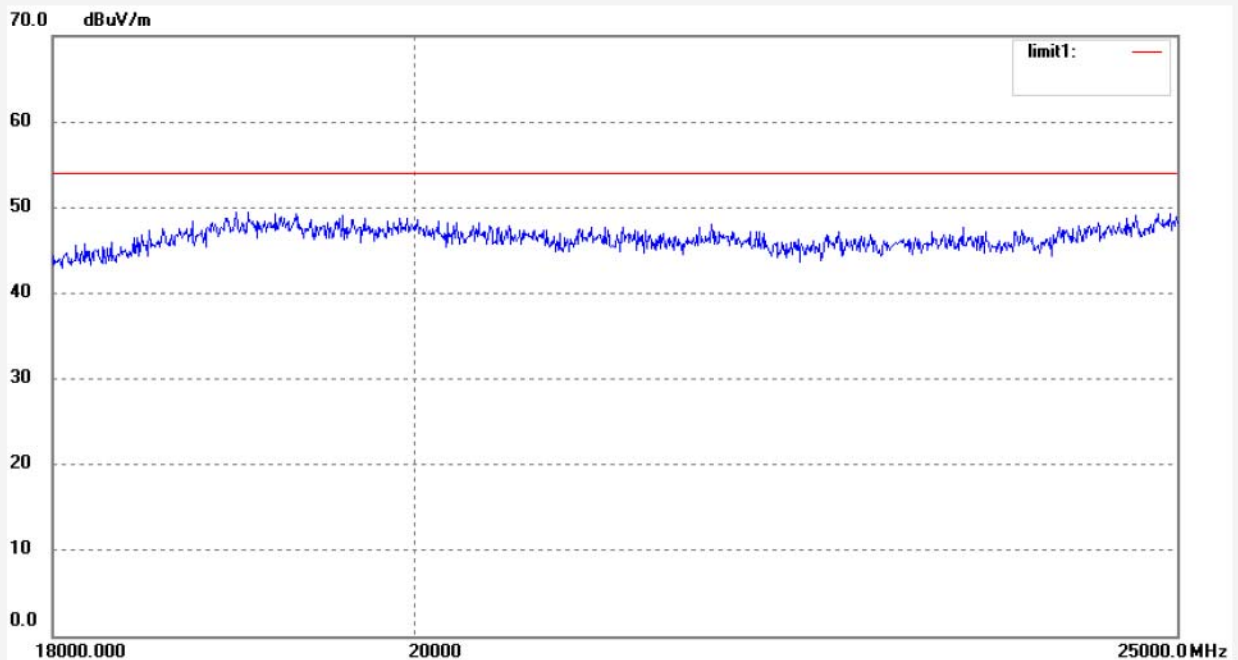
Date: 2014/08/20

Time: 11:09:22

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	----------------	---------------------	----------------	--------------------	-------------------	----------------	----------	----------------	------------------	--------

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$

$$\text{Where Corrected Factor} = \text{Antenna Factor} + \text{Cable Loss} + \text{High Pass Filter Loss} - \text{Amplifier Gain}$$

3. The spectral diagrams in appendix I display the measurement of peak values.

6. BAND EDGES

6.1.The Requirement

6.1.1.Band Edge from 2400MHz to 2483.5MHz. Emission 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.

6.2.EUT Configuration on Measurement

The following equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.3. Operating Condition of EUT

6.3.1.Setup the EUT and simulator as shown as Section 4.1.

6.3.2.Turn on the power of all equipment.

6.3.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402.000-2480.000MHz MHz. We are select 2402.000MHz, 2480.000MHz TX frequency to transmit.

6.4.Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.
2. The turntable was 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 emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

6.5.The Measurement Result

Pass.



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Site: 2# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: alen #306

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: REVELL FIRESHOT

Mode: TX 2402MHz(Non-hopping)

Model: 3991

Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd

Polarization: Horizontal

Power Source: DC 6V

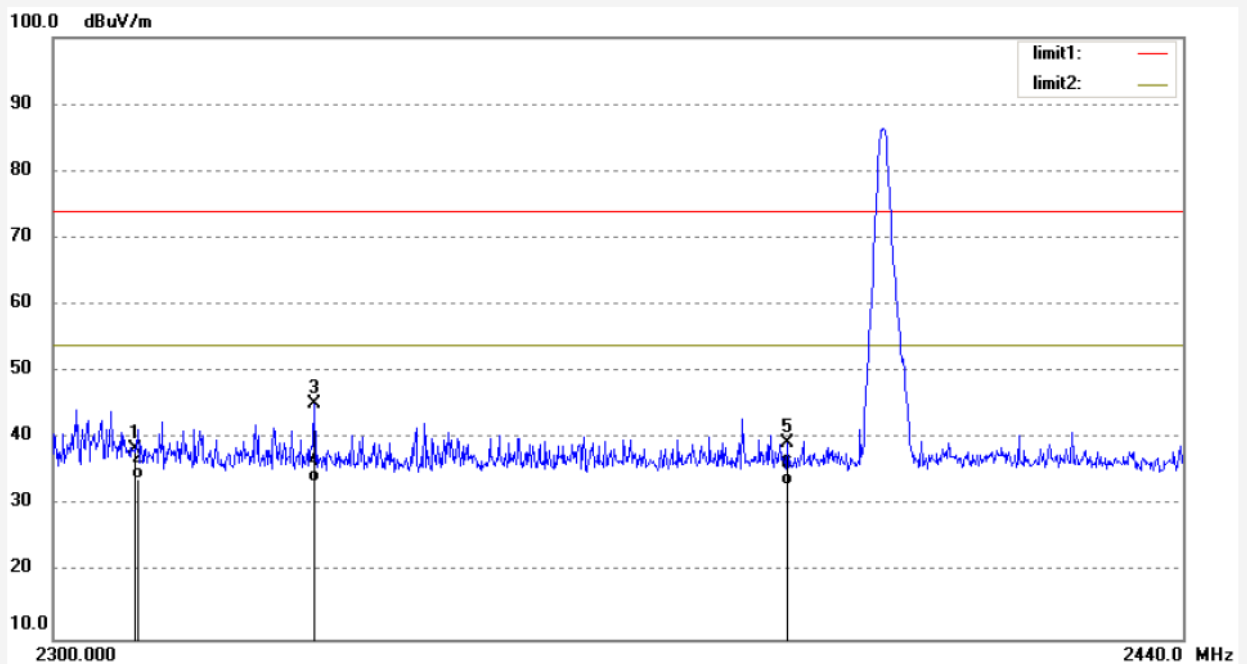
Date: 2014/08/20

Time: 12:51:19

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	46.33	-7.81	38.52	74.00	-35.48	peak			
2	2310.000	41.72	-7.81	33.91	54.00	-20.09	AVG			
3	2331.673	53.10	-7.81	45.29	74.00	-28.71	peak			
4	2331.673	41.32	-7.81	33.51	54.00	-20.49	AVG			
5	2390.000	46.89	-7.53	39.36	74.00	-34.64	peak			
6	2390.000	40.69	-7.53	33.16	54.00	-20.84	AVG			

Job No.: alen #306

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: REVELL FIRESHOT

Mode: TX 2402MHz(Non-hopping)

Model: 3991

Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd

Polarization: Vertical

Power Source: DC 6V

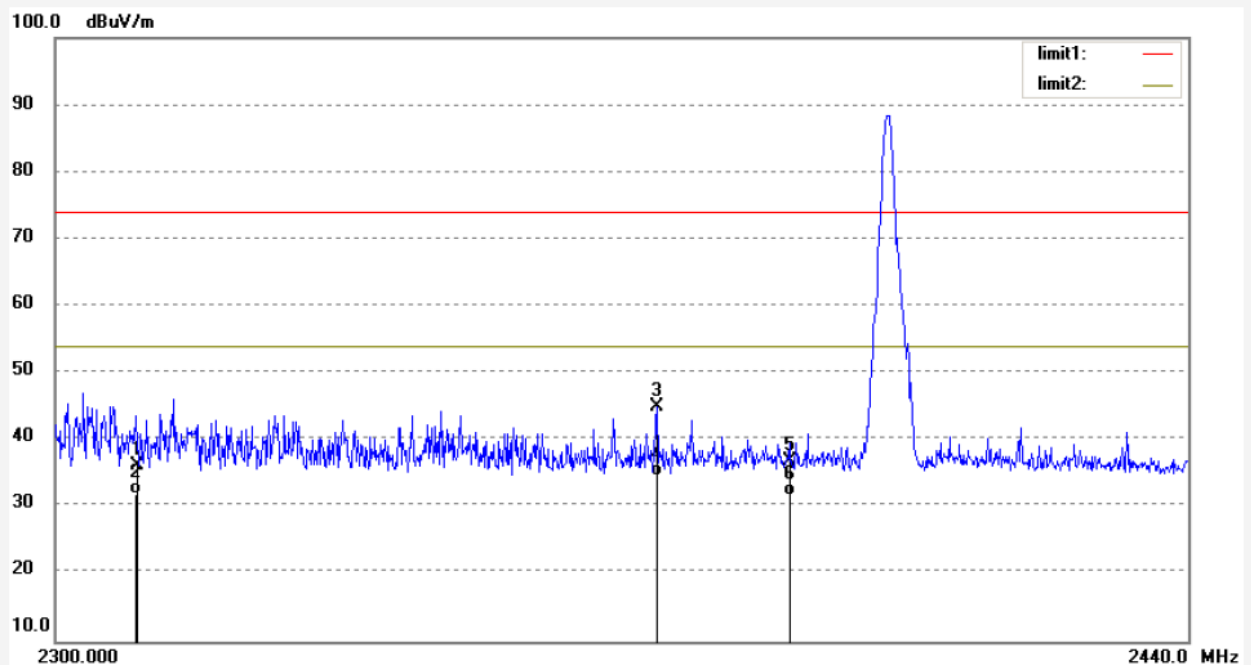
Date: 2014/08/20

Time: 12:55:27

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	44.00	-7.81	36.19	74.00	-37.81	peak			
2	2310.000	39.68	-7.81	31.87	54.00	-22.13	AVG			
3	2373.318	52.73	-7.64	45.09	74.00	-28.91	peak			
4	2373.318	42.20	-7.64	34.56	54.00	-19.44	AVG			
5	2390.000	44.34	-7.53	36.81	74.00	-37.19	peak			
6	2390.000	39.17	-7.53	31.64	54.00	-22.36	AVG			



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Site: 2# Chamber

Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: alen #306

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: REVELL FIRESHOT

Mode: TX 2480MHz (Non-hopping)

Model: 3991

Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd

Polarization: Horizontal

Power Source: DC 6V

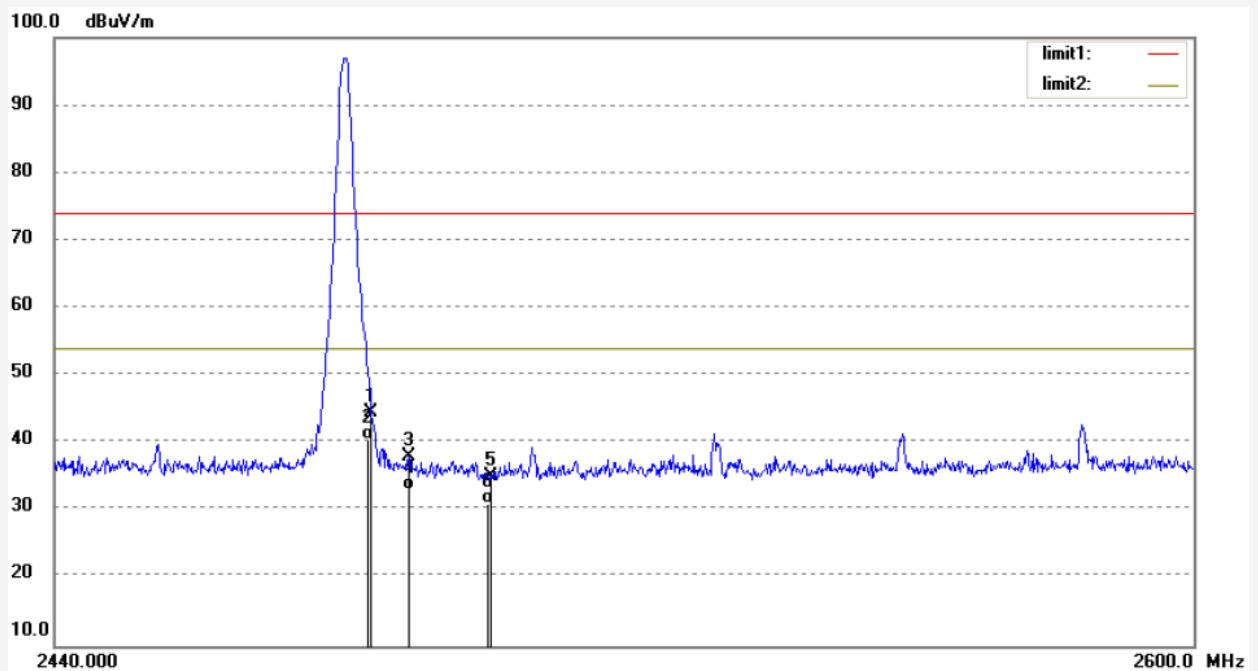
Date: 2014/08/20

Time: 13:04:09

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	52.00	-7.37	44.63	74.00	-29.37	peak			
2	2483.500	47.85	-7.37	40.48	54.00	-13.52	AVG			
3	2488.774	45.30	-7.39	37.91	74.00	-36.09	peak			
4	2488.774	40.34	-7.39	32.95	54.00	-21.05	AVG			
5	2500.000	42.38	-7.40	34.98	74.00	-39.02	peak			
6	2500.000	38.36	-7.40	30.96	54.00	-23.04	AVG			



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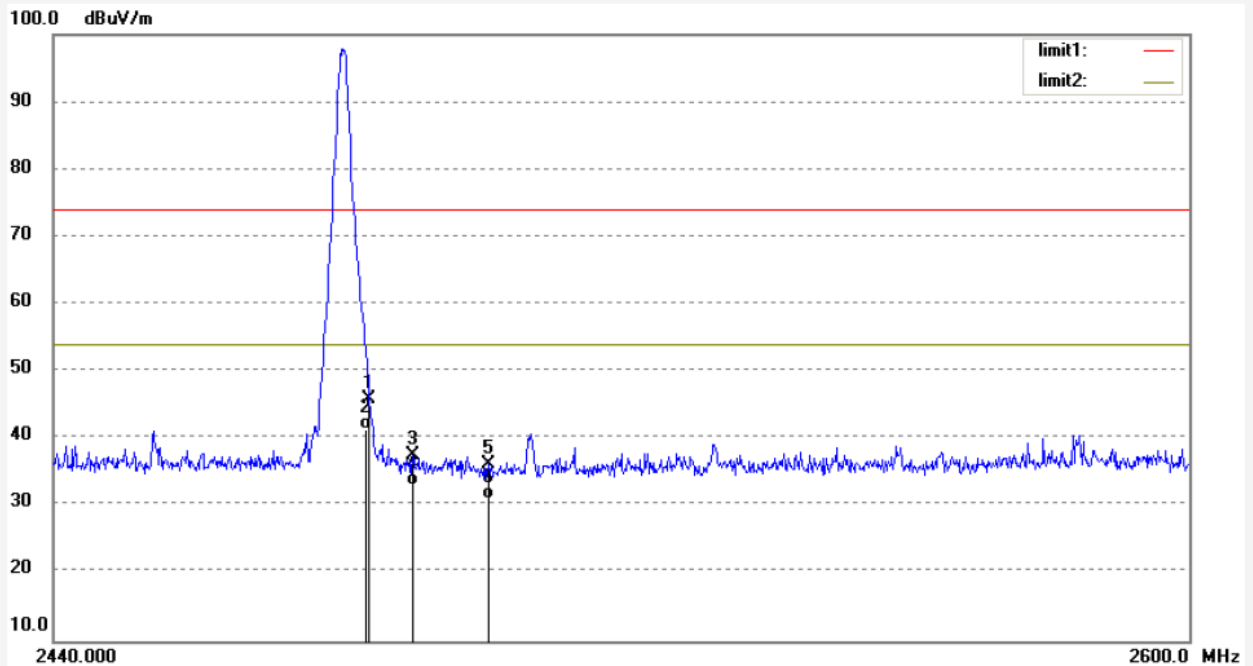
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 2# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: alen#306
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: REVELL FIRESHOT
Mode: TX 2480MHz(Non-hopping)
Model: 3991
Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd

Polarization: Vertical
Power Source: DC 6V
Date: 2014/08/20
Time: 12:59:52
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	53.31	-7.37	45.94	74.00	-28.06	peak			
2	2483.500	48.69	-7.37	41.32	54.00	-12.68	AVG			
3	2489.566	45.00	-7.39	37.61	74.00	-36.39	peak			
4	2489.566	40.55	-7.39	33.16	54.00	-20.84	AVG			
5	2500.000	43.64	-7.40	36.24	74.00	-37.76	peak			
6	2500.000	38.33	-7.40	30.93	54.00	-23.07	AVG			

Job No.: STAR #3027

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: REVELL FIRESHOT

Mode: HOPPING

Model: 3991

Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd

Polarization: Horizontal

Power Source: DC 6V

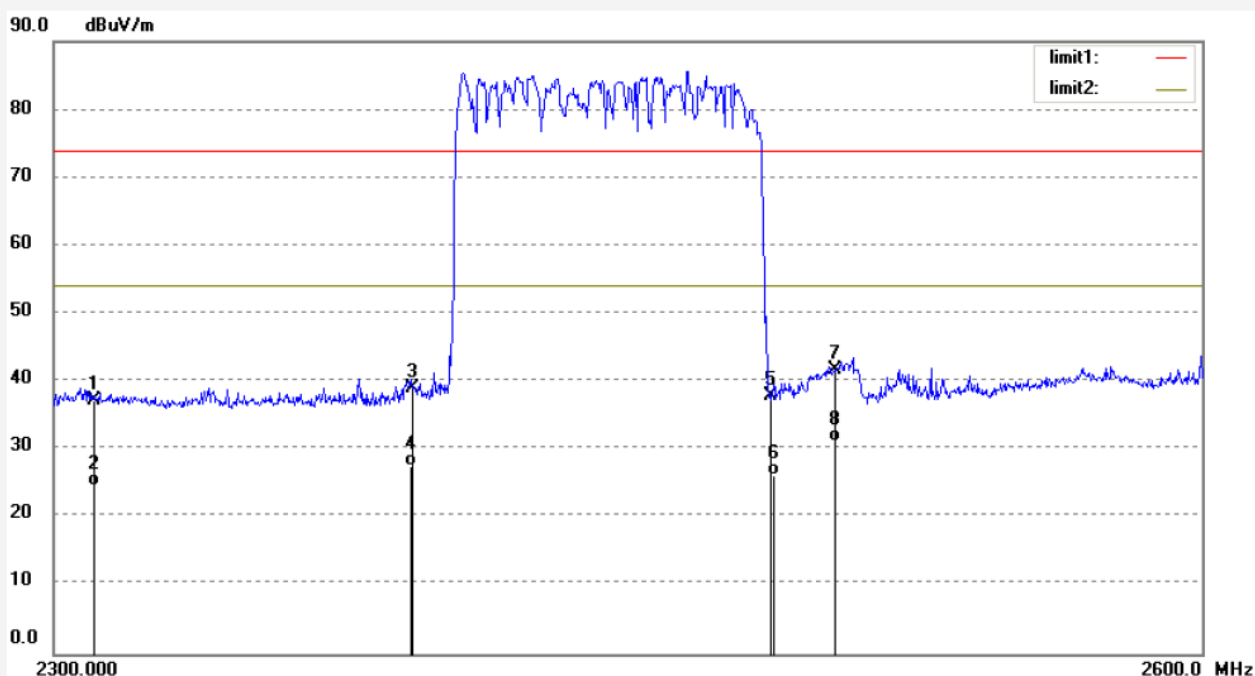
Date: 2014/08/20

Time: 11/22/51

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	44.18	-6.99	37.19	74.00	-36.81	peak			
2	2310.000	31.58	-6.99	24.59	54.00	-29.41	AVG			
3	2390.000	45.89	-6.78	39.11	74.00	-34.89	peak			
4	2390.000	34.25	-6.78	27.47	54.00	-26.53	AVG			
5	2483.500	44.36	-6.54	37.82	74.00	-36.18	peak			
6	2483.500	32.69	-6.54	26.15	54.00	-27.85	AVG			
7	2500.000	48.29	-6.50	41.79	74.00	-32.21	peak			
8	2500.000	37.66	-6.50	31.16	54.00	-22.84	AVG			

Job No.: STAR #3028

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: REVELL FIRESHOT

Mode: HOPPING

Model: 3991

Manufacturer: AF Enterprises, Huatong Metals & Plastics Co., Ltd

Polarization: Vertical

Power Source: DC 6V

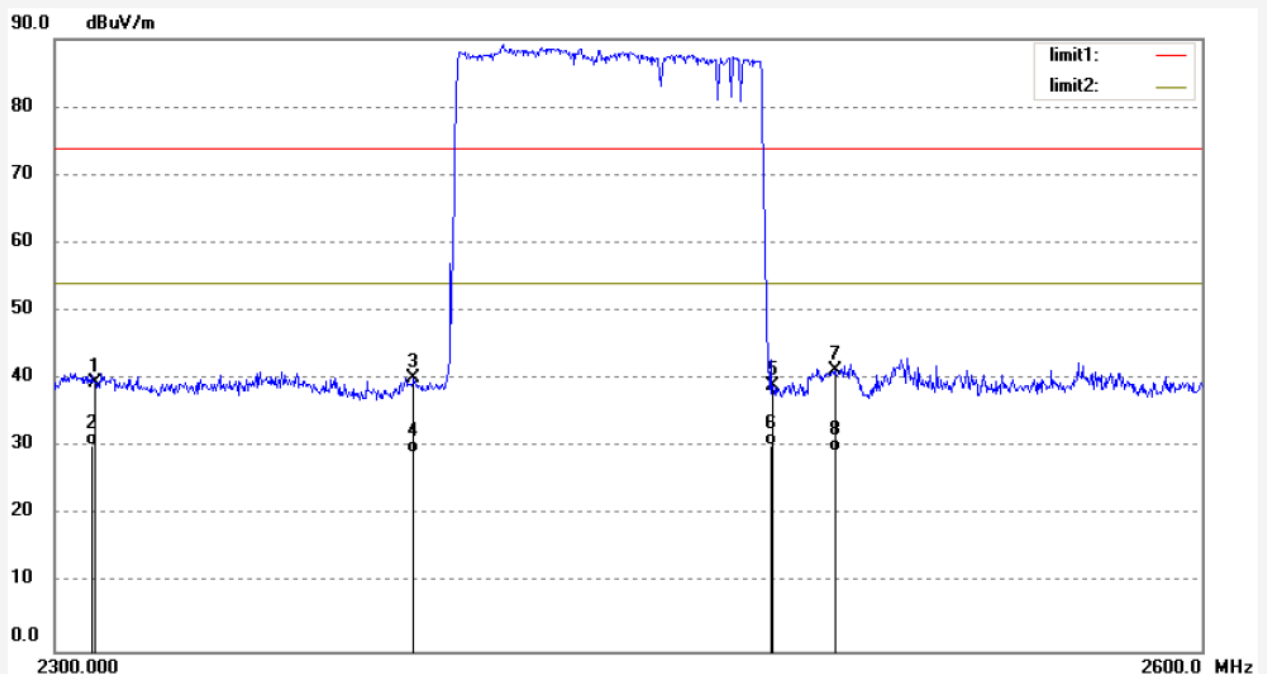
Date: 2014/08/20

Time: 11/25/42

Engineer Signature:

Distance: 3m

Note: Report NO.:ATE20141613



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2310.000	46.43	-6.99	39.44	74.00	-34.56	peak			
2	2310.000	37.25	-6.99	30.26	54.00	-23.74	AVG			
3	2390.000	46.86	-6.78	40.08	74.00	-33.92	peak			
4	2390.000	35.86	-6.78	29.08	54.00	-24.92	AVG			
5	2483.500	45.50	-6.54	38.96	74.00	-35.04	peak			
6	2483.500	36.87	-6.54	30.33	54.00	-23.67	AVG			
7	2500.000	47.78	-6.50	41.28	74.00	-32.72	peak			
8	2500.000	35.88	-6.50	29.38	54.00	-24.62	AVG			

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain

3. The spectral diagrams in appendix I display the measurement of peak values.

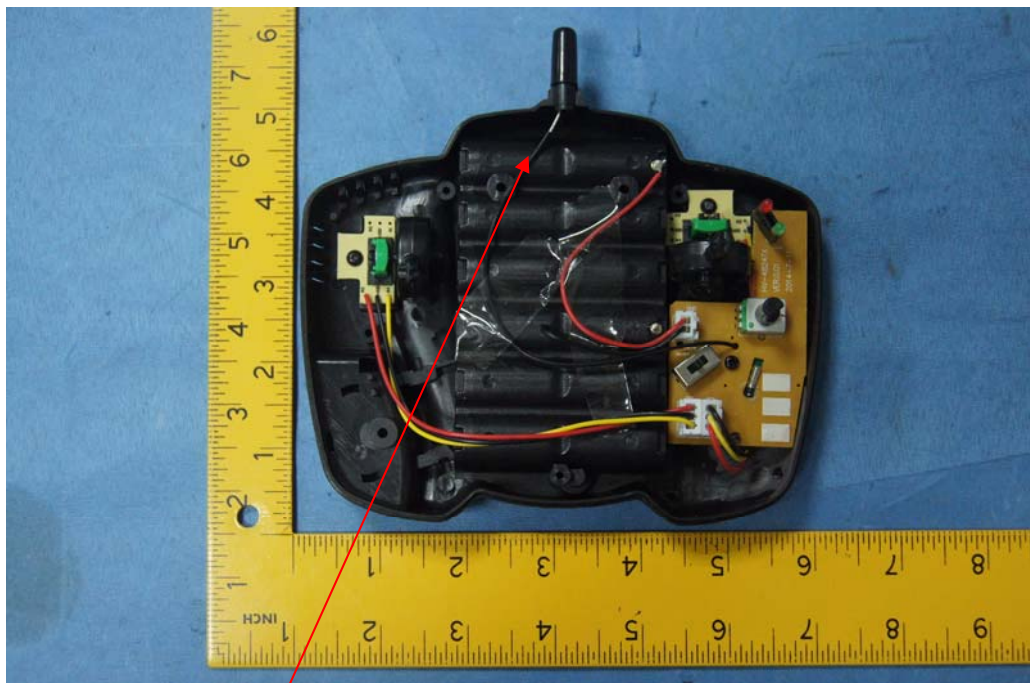
7. ANTENNA REQUIREMENT

7.1.The Requirement

7.1.1. According to Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

7.2.Antenna Construction

The antenna is Integral antenna, no consideration of replacement.



Antenna