

# FCC PART 15C

## TEST REPORT

For

### Shenzhen Ronghua Electronic Co. Ltd.

Building 1, Quanxinyuan Industrial Park, Huafan Road, Dalang Sub-district, Longhua, Bao'an,  
Shenzhen, China

**FCC ID: QQ7EGUARDM6000**

<b>Report Type:</b> Original Report	<b>Product Type:</b> AM SYSTEMS
<b>Test Engineer:</b> <u>Billy Li</u>	<i>Billy Li</i>
<b>Report Number:</b> <u>RSZ151019006-00</u>	
<b>Report Date:</b> <u>2015-01-07</u>	
<b>Reviewed By:</b> <u>Candy Li</u> RF Engineer	<i>Candy Li</i>
<b>Prepared By:</b> Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 <a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a>	

**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *Shenzhen Ronghua Electronic Co. Ltd.*'s product, model number: *M 6000/6000G* (FCC ID: *QQ7EGUARDM6000*) or the "EUT" in this report was a *AM SYSTEMS*, which was measured approximately: 52 cm (L) x 14 cm (W) x 155 cm (H), rated with input voltage: DC 35V from Power supply.

*Note: This series products model: EG6000C, EG6000D, EG6000E, M 6080, M 6090, M 6088, M 6088S and M 6000/6000G are identical schematics, the difference among them is just the model name and the external structure of the shelf. Model M 6000/6000G was selected for fully testing, the detailed information can be referred to the attached declaration letter that stated and guaranteed by the applicant.*

*\* All measurement and test data in this report was gathered from production sample serial number: 1506825 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2015-10-19.*

### Objective

This report is prepared on behalf of *Shenzhen Ronghua Electronic Co. Ltd.* in accordance with Part 2-Subpart J, and Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207 and 15.209 rules.

### Related Submittal(s)/Grant(s)

No related submittal(s)

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with radiated emission is 5.91 dB for 30MHz-1GHz.

## **Test Facility**

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on October 31, 2013. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.10-2013.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

### Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

### EUT Exercise Software

No exercise software.

### Equipment Modifications

No modification was made to the EUT tested.

### Support Equipment List and Details

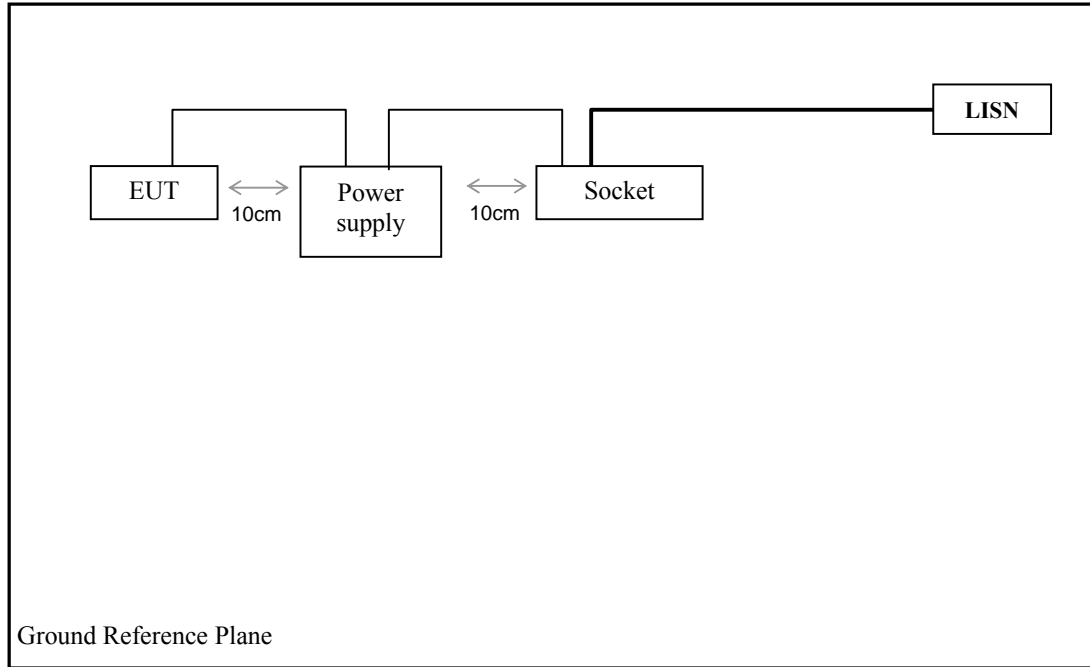
Manufacturer	Description	Model	Serial Number
/	/	/	/

### External I/O Cable

Cable Description	Length (m)	From/Port	To
Un-shielding Un-detachable AC Power Cable	0.5	Socket	Power supply
Un-shielding Un-detachable DC Power Cable	10.0	Power supply	EUT
Un-shielding Un-detachable AC Power Cable	1.2	LISN	Socket

### Block Diagram of Test Setup

For conducted emission:



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## **SUMMARY OF TEST RESULTS**

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<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emission	Compliance
15.205, §15.209	Field Strength And Radiated Emissions	Compliance

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## **FCC§15.203 - ANTENNA REQUIREMENT**

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### **Applicable Standard**

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

### **Antenna Connector Construction**

The EUT has an internal antenna arrangement, which was permanently attached and the antenna gain is 0dBi; fulfill the requirement of this section. Please refer to EUT photos.

**Result:** Compliant



**FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS**

**Applicable Standard**

FCC §15.207

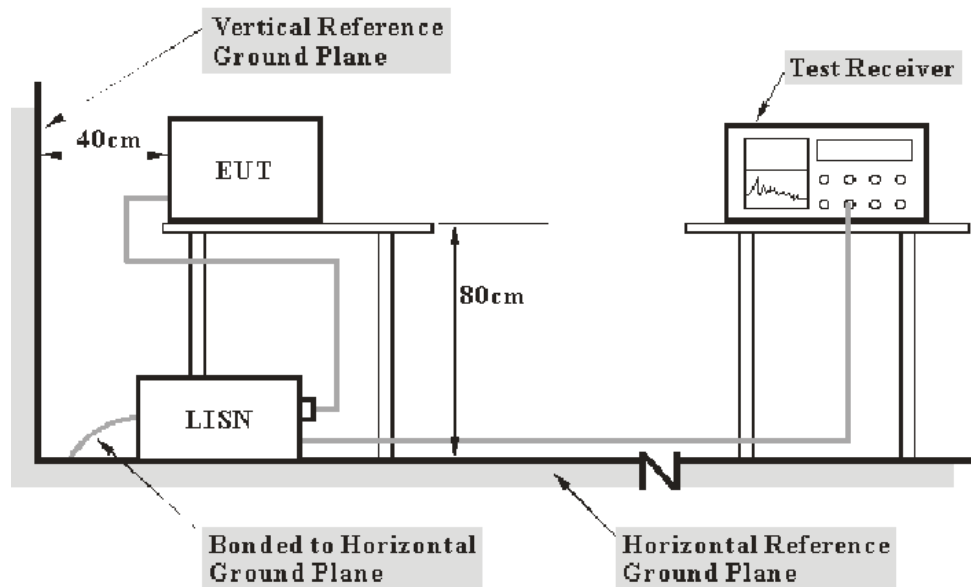
**Measurement Uncertainty**

Input quantities to be considered for conducted disturbance measurements may be receiver reading, attenuation of the connection between AMN/ISN and receiver, AMN/ISN voltage division factor, AMN/ISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report

Port	Measurement uncertainty
AC Mains	3.26 dB (k=2, 95% level of confidence)
CAT 3	3.70 dB (k=2, 95% level of confidence)
CAT 5	3.86 dB (k=2, 95% level of confidence)
CAT 6	4.64 dB (k=2, 95% level of confidence)

**EUT Setup**



- Note:**
1. Support units were connected to second LISN.
  2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

### EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

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

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

### Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2015-06-03	2016-06-03
Rohde & Schwarz	L.I.S.N.	ENV216	3560.6650.12-101613-Yb	2015-12-01	2016-12-01
Rohde & Schwarz	Transient Limitor	ESH3Z2	DE25985	2015-05-14	2016-05-14
Rohde & Schwarz	CE Test software	EMC 32	V8.53	NCR	NCR

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

### Test Results Summary

According to the recorded data in following table, the worst margin as below:

**0.2 dB at 19.548290 MHz in the Line conducted mode**

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(L_m)} \leq L_{lim} + U_{cispr}$$

In BACL,  $U_{(L_m)}$  is less than  $U_{cispr}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.

**Test Data**

**Environmental Conditions**

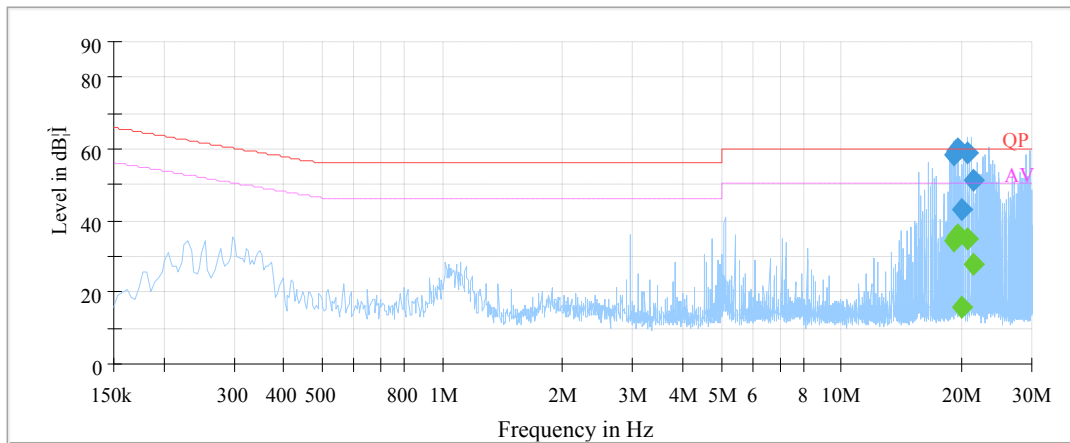
<b>Temperature:</b>	28.5 °C
<b>Relative Humidity:</b>	43 %
<b>ATM Pressure:</b>	101.0 kPa

The testing was performed by Billy Li on 2015-12-17.

Test Mode: Transmitting

**AC 120 V, 60 Hz, Line:**

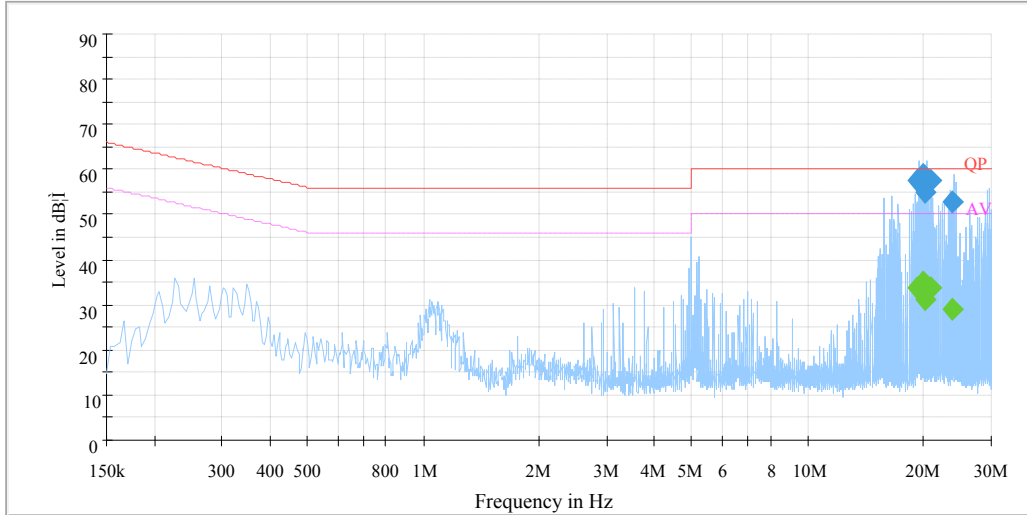
EMI Auto Test L



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/QP/Ave.)
19.198030	58.1	20.1	60.0	1.9	QP
19.198030	34.6	20.1	50.0	15.4	Ave.
19.317650	59.2	20.1	60.0	0.8	QP
19.317650	35.7	20.1	50.0	14.4	Ave.
19.548290	59.8	20.1	60.0	0.2	QP
19.548290	36.1	20.1	50.0	13.9	Ave.
19.967630	43.3	20.1	60.0	16.7	QP
19.967630	15.7	20.1	50.0	34.3	Ave.
20.593150	58.8	20.1	60.0	1.2	QP
20.593150	34.9	20.1	50.0	15.1	Ave.
21.290130	51.4	20.1	60.0	8.6	QP
21.290130	27.6	20.1	50.0	22.4	Ave.

**AC 120V, 60 Hz, Neutral:**

EMI Auto Test N



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/QP/Ave.)
19.316750	57.4	20.1	60.0	2.6	QP
19.316750	33.7	20.1	50.0	16.3	Ave.
19.896890	59.0	20.1	60.0	1.0	QP
19.896890	35.0	20.1	50.0	15.0	Ave.
20.188110	57.8	20.1	60.0	2.2	QP
20.188110	34.2	20.1	50.0	15.8	Ave.
20.275730	54.8	20.1	60.0	5.2	QP
20.275730	31.3	20.1	50.0	18.7	Ave.
20.824190	57.4	20.1	60.0	2.6	QP
20.824190	33.6	20.1	50.0	16.4	Ave.
23.780050	52.8	20.1	60.0	7.2	QP
23.780050	29.1	20.1	50.0	20.9	Ave.

**Note:**

- 1) Corrected Amplitude = Reading + Correction Factor
- 2) Correction Factor = LISN/ISN VDF (Voltage Division Factor) + Cable Loss + Pulse Limiter Attenuation  
The corrected factor has been input into the transducer of the test software.
- 3) Margin = Limit – Corrected Amplitude

**FCC§15.205 & §15.209 - FIELD STRENGTH AND RADIATED EMISSIONS**

**Applicable Standard**

FCC§15.205, §15.209

**Measurement Uncertainty**

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) will not be taken into consideration for the test data recorded in the report

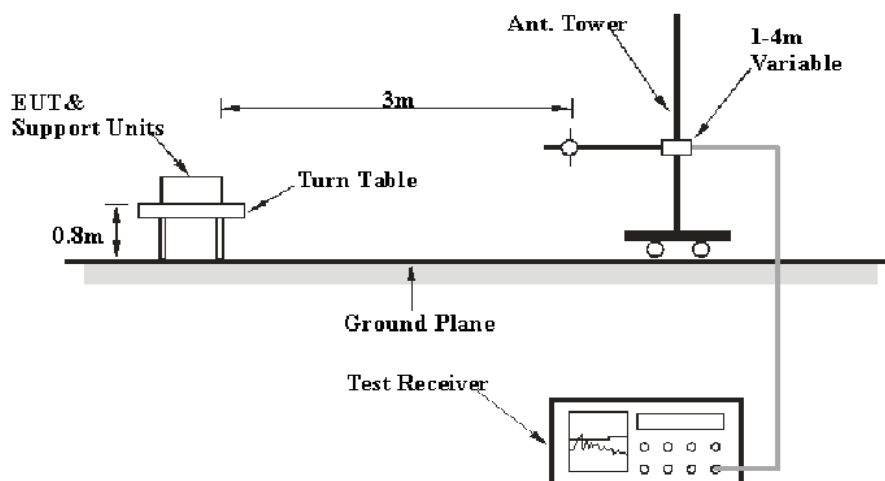
**Test Equipment Setup**

The spectrum analyzer or receiver is set as:

Frequency Range	RBW	Video B/W	IF B/W	Detector
9 kHz – 30 MHz	10 kHz	30 kHz	9 kHz	QP
30 MHz – 1000 MHz	100 kHz	300 kHz	120kHz	QP

Note: The frequency bands 9-90 kHz and 110-490 kHz, the testing are use an average detector.

**EUT Setup**



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209 and 15.205 limits.

## Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

## Corrected Amplitude & Margin Calculation

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

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447E	1937A01046	2015-05-06	2016-05-06
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2015-11-03	2016-11-03
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2014-12-07	2017-12-06
ETS	Passive Loop Antenna	6512	00029604	2014-12-24	2017-12-23
R&S	Auto test Software	EMC32	V9.10	NCR	NCR

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205 and 15.209, the worst margin reading as below:

**1.29 dB at 39.98 MHz in the Vertical polarization**

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(L_m)} \leq L_{lim} + U_{cispr}$$

In BACL.,  $U_{(L_m)}$  is less than  $+ U_{cispr}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.

**Test Data****Environmental Conditions**

<b>Temperature:</b>	28.3 °C
<b>Relative Humidity:</b>	43 %
<b>ATM Pressure:</b>	101.0 kPa

The testing was performed by Billy Li on 2015-12-17.

EUT operation mode: Transmitting

**1) Field Strength of Radiated Emissions, 9 kHz to 30 MHz:**

Indicated		Table Angle Degree	Antenna Height (m)	Detector PK/QP/Ave.	Correction Factor		Corrected Amplitude (dB $\mu$ V/m) @3m	FCC Part 15C	
Frequency (MHz)	Maximum Reading (dB $\mu$ V) @3m				Antenna Factor (dB/m)	Cable Loss (dB)		Limit (dB $\mu$ V/m) @3m	Margin (dB)
0.058	37.8	348	1.5	Ave.	71.7	0.2	109.3	112.3	3.0
0.116	26.8	156	1.5	Ave.	65.9	0.2	92.5	106.3	13.8
0.174	30.2	61	1.5	Ave.	60.8	0.2	90.8	106.3	15.5

**2) Spurious Emission, up to 1000 MHz:**

Frequency (MHz)	Corrected Amplitude (dB $\mu$ V/m)	Antenna height (m)	Polarity	Turntable position (Degree)	Correction Factor (dB)	Limit (dB $\mu$ V/m)	Margin (dB)
34.21	37.15	1.1	V	107	-3.4	40	2.85
37.66	38.50	1.0	V	115	-5.9	40	1.50
39.98	38.71	1.0	V	122	-7.3	40	1.29
46.56	35.58	1.1	V	60	-11.8	40	4.42
60.31	34.24	1.0	V	251	-13.8	40	5.76
86.73	31.78	1.1	V	127	-13.3	40	8.22

Test result: Pass.

## **PRODUCT SIMILARITY DECLARATION LETTER**

Shenzhen Ronghua Electronic Co. Ltd.  
Address: Building 1, Quanxinyuan Industrial Park, Huafan Road, Dalang Sub-district, Longhua, Bao'an ,  
Shenzhen , China  
Tel: 0755-2594-7093 Fax: 0755-8226-2665

December 26, 2015

### **Product Similarity Declaration**

To Whom It May Concern,

We, Shenzhen Ronghua Electronic Co. Ltd. hereby declare that we have a product named as AM SYSTEMS (Model number: M 6000/6000G) was tested by BACL, meanwhile, for our marketing purpose, we would like to list a series models (EG6000C; EG6000D EG6000E; M 6080;M 6090;M 6088;M 6088S) on reports and certificate, all the models are identical schematics, different as below:

- 1 Name is different
  - 2 The main test model and serial number are different from the external structure of the shelf.
- No other changes are made to them

We confirm that all information above is true, and we'll be responsible for all the consequences. Please contact me if you have any question.

Sincerely,

Signature *Jack Yang*

Jack Yang

Engineer

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