FCC PART 15B

MEASUREMENT AND TEST REPORT

For

Shanghai Huace Navigation Technology LTD.

Building C,599 Gaojing Road,Qingpu District Shanghai

FCC ID: SY4-A01005

Report Type:	**Product Type:**
Original Report	GNSS Receiver

Test Engineer:	Poboo Li
Report Number:	RKS160808011-00G
Report Date:	2016-12-15
Reviewed By:	Jesse huang EMC Manager
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) Chenghu Road,Kunshan Development Zone No.248,Kunshan, Jiangsu, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Manufacturer	Shanghai Huace Navigation Technology LTD.
Model	M6 (FCC ID: SY4-A01005)
Product	GNSS Receiver
I/O	Charge port
Rate Voltage	DC 7.4V rechargeable battery,rated power :150W,rated current:2A
Operating Frequency	2480MHz
Dimension	1023 mm (L) × 702mm (W) × 446 mm (H)

Adapter Information:
Model: ABT030120
Input: AC 100-240V, 50/60 Hz
Output: DC 12V, 3A

Note: The product's series model number: M6X(X=0-9,A-Z). The difference between them was explained in the attached declaration letter.

**All measurement and test data in this report was gathered from production sample serial number: 20160801027 (Assigned by the BACL. The EUT supplied by the applicant was received on 2016-08-01)*

Objective

This report is prepared on behalf of Shanghai Huace Navigation Technology LTD. in accordance with Part 2-Subpart J, and Part 15-Subparts A and B of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine the compliance of EUT with FCC Part 15, Class B.

Related Submittal(s)/Grant(s)

FCC Part 22H/24E/27 PCB, FCC Part 15.247 DSS, Part 15.247 DTS & Part 90 TNB submissions with FCC ID: SY4-A01005.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2014, 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.

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

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the Chenghu Road, Kunshan Development Zone No.248, Kunshan, Jiangsu, China

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) 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 November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. 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

Test mode: Data Transmission.

EUT Exercise Software

Notebook throuth “winthrax”to read and write by USB cable for EUT.
Notebook launch command by RS232 for EUT.

Special Accessories

No special accessory was used.

Equipment Modifications

No modification was made to the EUT tested.

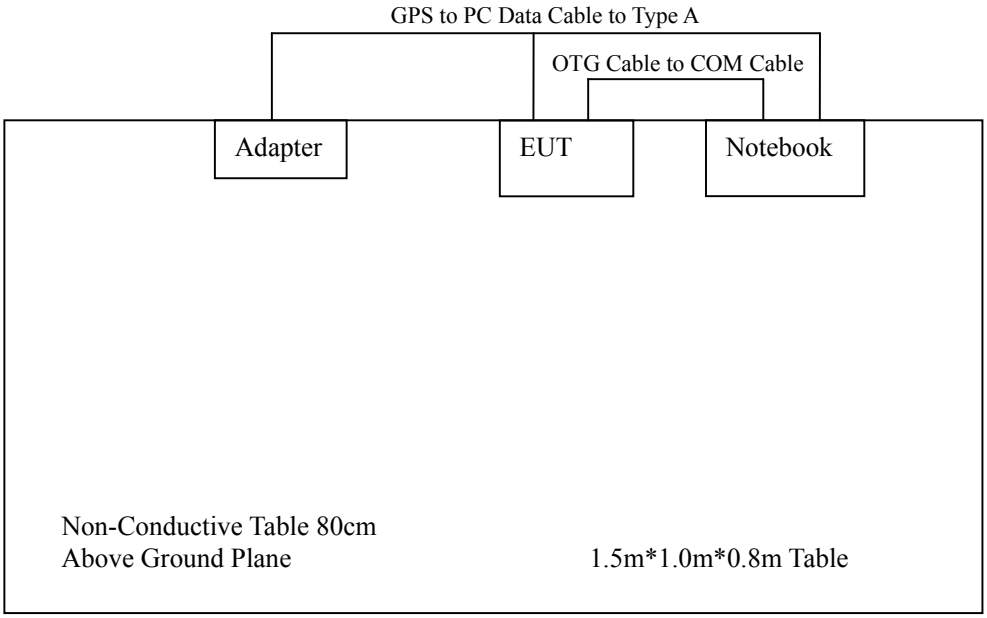
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	PC	GX620	D65874152

External I/O Cable

Cable Description	Shielding Type	Length (m)	From Port	To
/	/	/	/	/

Block Diagram of Radiated Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	Compliance
§15.109	Radiated Emissions	Compliance

FCC §15.107 – AC LINE CONDUCTED EMISSIONS

Applicable Standard

According to FCC§15.107

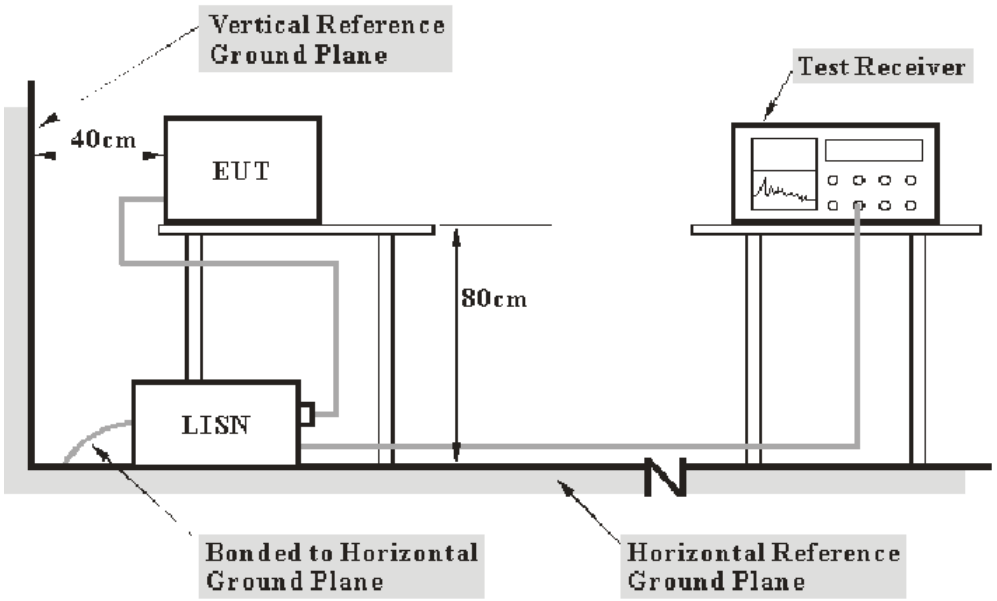
Measurement Uncertainty

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

Based on CISPR 16-4-2:2011-A1-2014, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Kunshan) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report.

Port	Expanded 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 measurement procedure of EUT setup is according with ANSI C63.4-2014. The related limit was specified in FCC Part 15.107 Class B.

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 EUT 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	834115/007	2015-11-12	2016-11-11
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2015-11-04	2016-11-03
Rohde & Schwarz	LISN	ESH3-Z5	892239/018	2016-06-23	2017-06-22
Rohde & Schwarz	Pulse limiter	ESH3-Z2	879940/0058	2016-06-19	2017-06-18
Rohde & Schwarz	CE Test software	EMC 32	V 09.10.0	--	--
MICRO-COAX	Coaxial Cable	Cable-6	006	2016-09-08	2017-09-07

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

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Correction Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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 7 dB below the limit. The equation for margin calculation is as follows:

Margin = Limit –Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.107 Class B, the worst margin reading as below:

9.50 dB at **0.420000 MHz** in the **Line** conducted mode

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

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

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

Test Data

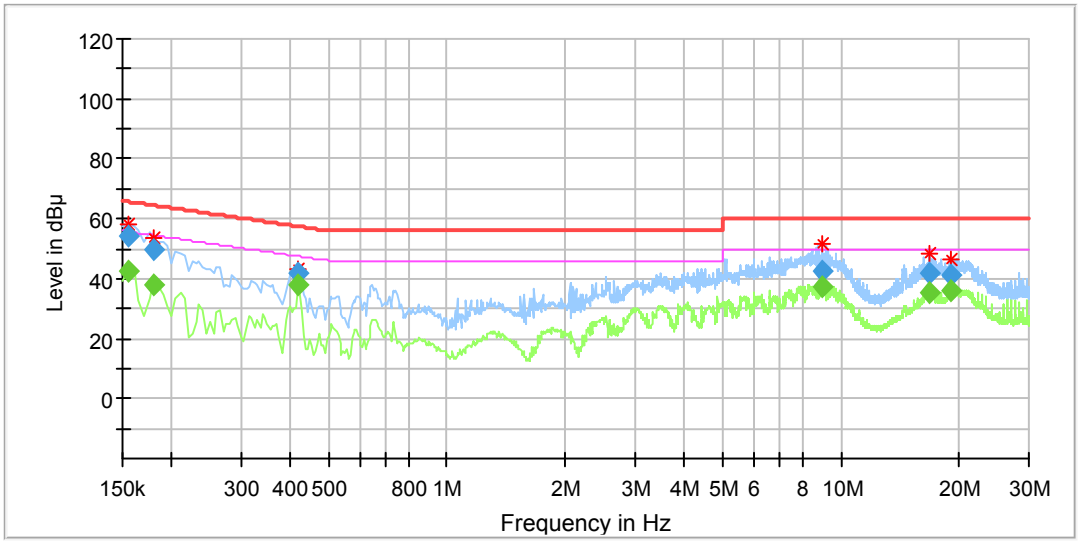
Environmental Conditions

Temperature:	25℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Poboo Li on 2016-10-17

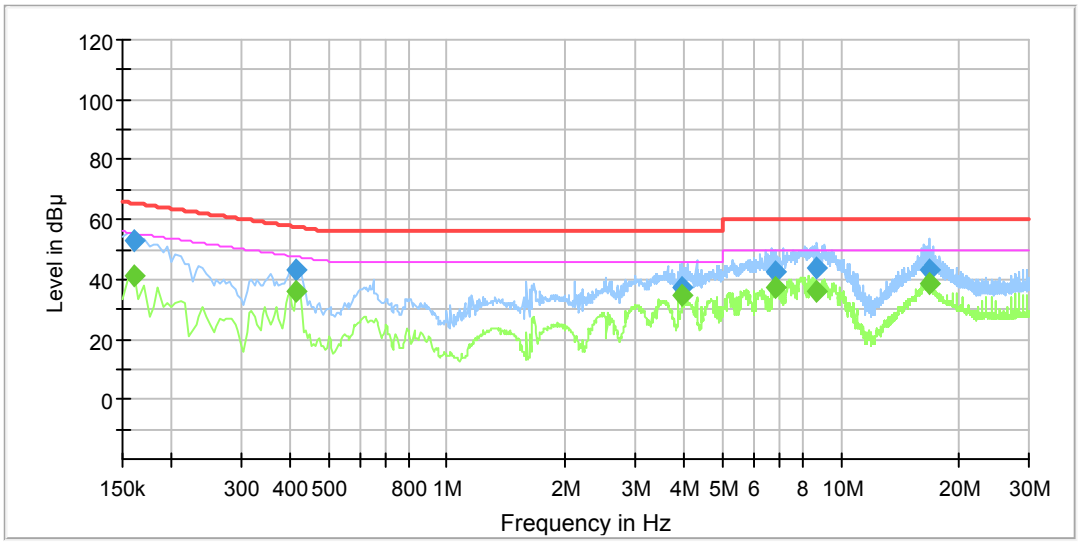
Test mode 1

Line



Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Limit (dB µ V)	Margin (dB)	Line	Corr. (dB)
0.155000	54.05	---	65.73	11.68	L1	10.3
0.155000	---	42.28	55.73	13.45	L1	10.3
0.180000	---	37.63	54.49	16.86	L1	10.3
0.180000	49.37	---	64.49	15.12	L1	10.3
0.420000	---	37.95	47.45	9.50	L1	10.3
0.420000	42.04	---	57.45	15.41	L1	10.3
8.980000	---	37.26	50.00	12.74	L1	10.5
8.980000	42.53	---	60.00	17.47	L1	10.5
16.820000	---	35.49	50.00	14.51	L1	10.5
16.820000	42.06	---	60.00	17.94	L1	10.5
19.125000	---	36.20	50.00	13.80	L1	10.5
19.125000	41.50	---	60.00	18.50	L1	10.5

Neutral



Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Limit (dB µ V)	Margin (dB)	Line	Corr. (dB)
0.160000	---	41.49	55.46	13.97	N	10.3
0.160000	52.65	---	65.46	12.81	N	10.3
0.415000	---	35.90	47.55	11.65	N	10.3
0.415000	43.03	---	57.55	14.52	N	10.3
3.950000	---	34.67	46.00	11.33	N	10.5
3.950000	37.44	---	56.00	18.56	N	10.5
6.840000	---	37.39	50.00	12.61	N	10.6
6.840000	42.47	---	60.00	17.53	N	10.6
8.710000	---	35.97	50.00	14.03	N	10.5
8.710000	43.66	---	60.00	16.34	N	10.5
16.720000	---	38.34	50.00	11.66	N	10.5
16.720000	43.15	---	60.00	16.85	N	10.5

FCC §15.109 - RADIATED EMISSIONS

Applicable Standard

FCC §15.109

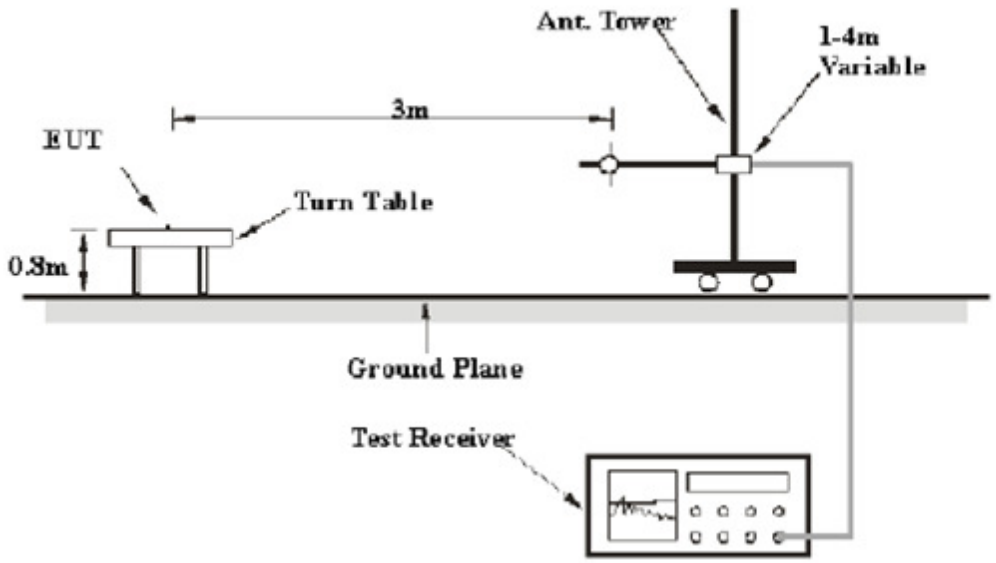
Measurement Uncertainty

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+A1-2014, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Kunshan) is shown in below table. And the uncertainty will not be taken into consideration for the test data recorded in the report

Frequency	Polarity	Measurement uncertainty
30 MHz~200 MHz	Horizontal	4.62 dB (k=2, 95% level of confidence)
	Vertical	4.54 dB (k=2, 95% level of confidence)
200 MHz~1 GHz	Horizontal	4.84 dB (k=2, 95% level of confidence)
	Vertical	5.91 dB (k=2, 95% level of confidence)
1 GHz~6 GHz	Horizontal/Vertical	4.68 dB (k=2, 95% level of confidence)
Above 6 GHz	Horizontal/Vertical	4.92 dB (k=2, 95% level of confidence)

EUT Setup



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2014. The specification used was the FCC Part 15.109 Class B limits.

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.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 13 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	1 Hz	/	Av

Test Procedure

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

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sonoma Instrunent	Amplifier	330	171377	2016-12-12	2017-12-11
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
ETS	Horn Antenna	3115	6229	2016-01-11	2019-01-10
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-24
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
Champrotek	Chamber	Chamber A	T-KSEMC049	-	-
R&S	Auto test Software	EMC32	V 09.10.0	-	-
Haojintech	Coaxial Cable	Cable-1	001	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-2	002	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-3	003	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-4	004	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-5	005	2016-12-12	2017-12-11

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

Correction Factor & Margin Calculation

The Correction Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

Correction Factor = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

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

Margin = Limit –Corrected Amplitude

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.109 Class B, with the worst margin reading of:

3.20 dB at **38.325000 MHz** in the **Vertical** polarization mode

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

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

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

Test Data

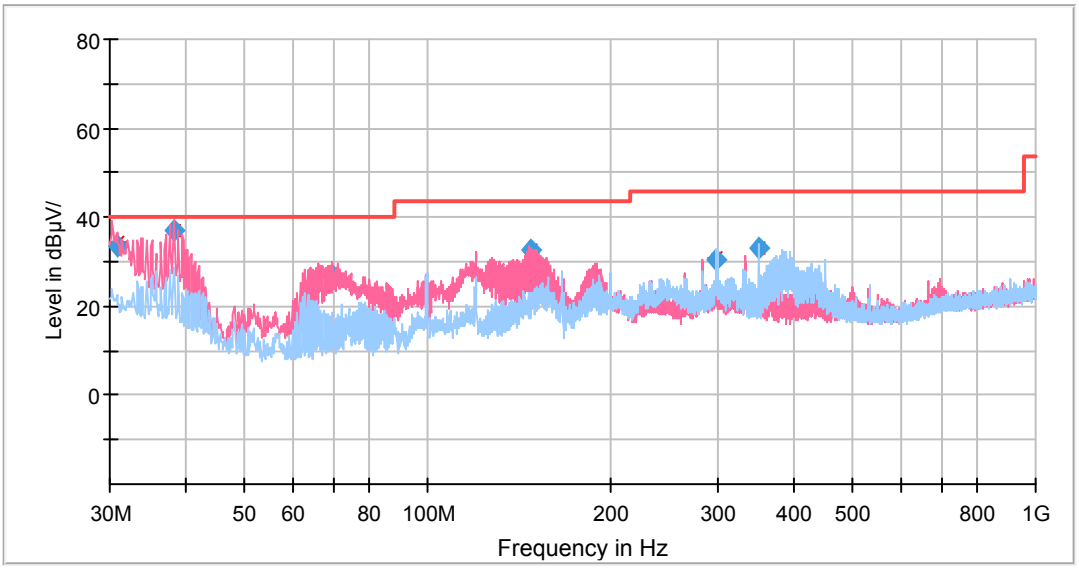
Environmental Conditions

Temperature:	25℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Poboo Li on 2016-12-14

Test mode: Data transmission

30MHz ~ 1GHz



Frequency (MHz)	QuasiPeak (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.920000	33.57	40.00	6.43	101.0	V	183.0	-5.8
38.325000	36.80	40.00	3.20	101.0	V	198.0	-9.5
69.810000	26.88	40.00	13.12	101.0	V	183.0	-17.1
147.726250	32.74	43.50	10.76	101.0	V	136.0	-12.2
298.771250	30.43	46.00	15.57	101.0	H	144.0	-10.4
349.978750	33.11	46.00	12.89	101.0	H	149.0	-9.4

Above 1 GHz:

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1365.420842	34.80	---	74.00	39.20	299.0	V	30.0	-8.5
1365.420842	---	21.02	54.00	32.98	299.0	V	30.0	-8.5
1719.108217	35.09	---	74.00	38.91	299.0	H	57.0	-6.4
1719.108217	---	22.03	54.00	31.97	299.0	H	57.0	-6.4
2446.543087	45.13	---	74.00	28.87	101.0	V	86.0	-3.3
2446.543087	---	22.75	54.00	31.25	101.0	V	86.0	-3.3
3913.236473	---	28.79	54.00	25.21	199.0	V	344.0	4.5
3913.236473	43.26	---	74.00	30.74	199.0	V	344.0	4.5
5561.793587	45.84	---	74.00	28.16	199.0	V	103.0	9.6
5561.793587	---	31.97	54.00	22.03	199.0	V	103.0	9.6
6650.791583	---	37.60	54.00	16.40	299.0	V	196.0	13.3
6650.791583	52.97	---	74.00	21.03	299.0	V	196.0	13.3

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