

FCC PART 15B

MEASUREMENT AND TEST REPORT

For

Shanghai HowayGIS Co., Ltd

RM230, Fawkes Building, No.1985, Road Chunshen, Shanghai, China

FCC ID: 2AAZDT1XN2017

Report Type: Original Report	Product Type: Industrial Data Controller/Collector
Test Engineer: Phil Zhu	<i>Phil. Zhu</i>
Report Number: RKS170119001-00D	
Report Date: 2017-02-28 Kamp Chen	
Reviewed By: EMC Leader	<i>Kamp.chen</i>
Prepared By: Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn	

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. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY	3
TEST FACILITY	4
SYSTEM TEST CONFIGURATION.....	5
JUSTIFICATION	5
EUT EXERCISE SOFTWARE	5
SPECIAL ACCESSORIES.....	5
EQUIPMENT MODIFICATIONS	5
SUPPORT EQUIPMENT LIST AND DETAILS	5
EXTERNAL I/O CABLE.....	5
BLOCK DIAGRAM OF RADIATED TEST SETUP.....	6
SUMMARY OF TEST RESULTS.....	7
FCC §15.107 –CONDUCTED EMISSIONS	8
APPLICABLE STANDARD	8
MEASUREMENT UNCERTAINTY	8
EUT SETUP	8
EMI TEST RECEIVER SETUP.....	9
TEST PROCEDURE	9
TEST EQUIPMENT LIST AND DETAILS.....	9
CORRECTED FACTOR & MARGIN CALCULATION	9
TEST DATA	10
FCC §15.109 - RADIATED EMISSIONS	12
APPLICABLE STANDARD	12
MEASUREMENT UNCERTAINTY.....	12
EUT SETUP	12
EMI TEST RECEIVER SETUP.....	13
TEST PROCEDURE	13
TEST EQUIPMENT LIST AND DETAILS.....	14
CORRECTED AMPLITUDE & MARGIN CALCULATION	14
TEST DATA	15

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Shanghai HowayGIS Co., Ltd
Manufacturer	Shanghai HowayGIS Co., Ltd
Model	T17
Product	Industrial Data Controller/Collector
Rate Voltage	rated voltage: DC 5.0V From battery, rated power :1.11W, rated current :2A
Operating Frequency	2472MHz
Dimension	200 mm (L) × 96mm (W) × 32 mm (H)

Adapter Information:

Model: PSAC10R-050

Input: AC 100-240V, 50/60 Hz, 0.3A,23-32VA

Output: DC 5.0V, 2.0A

Note: The product's series model number: T17M,T17N,HC1. The difference between them was explained in the attached declaration letter.

Objective

This report is prepared on behalf of Shanghai HowayGIS Co., 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 15.247 DSS, Part 15.247 DTS and Part 22H24E PCB submissions with FCC ID: 2AAZDT1XN2017.

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 A used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, 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 C63.4-2009.

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

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

Test Mode: USB Transmission

EUT Exercise Software

NB exeutive “MyHWin”present “H” pattern on the monitor.

NB exeutive “winthrax.exe” through the Flash to R/W.

EUT exeutive software “ActiveSync” to do R/W with U Flash Disk.

EUT to run GNSS Viewerto check GPS

Open camera to live view.

Special Accessories

No special accessory was used.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

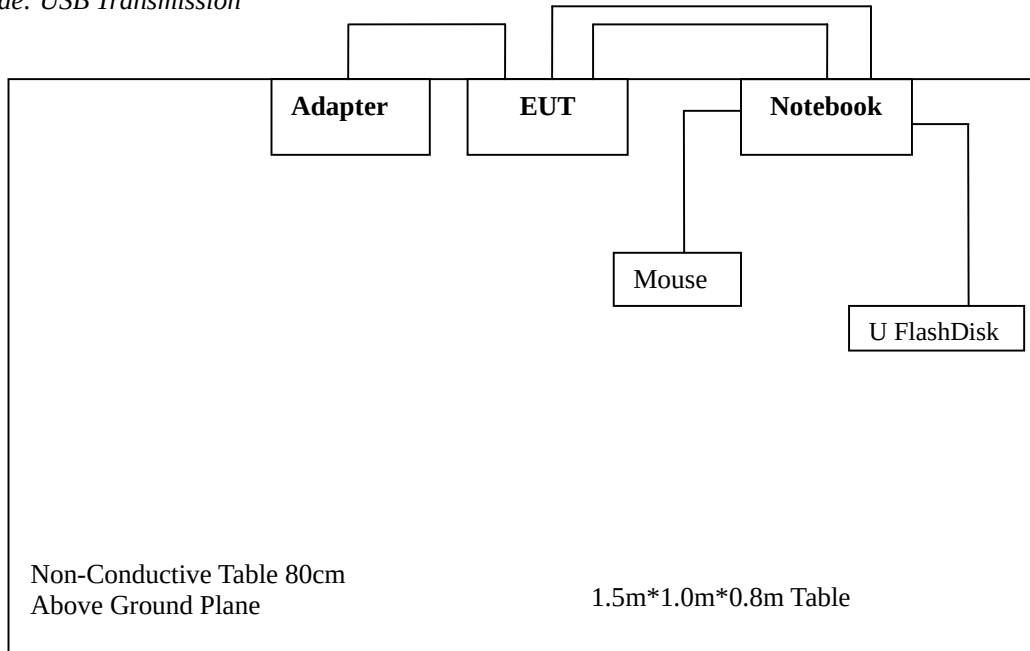
Manufacturer	Description	Model	Serial Number
HP	Notebook	HP 82062-17	56000
HYUNDAI	Mouse	CJC-MS255	/
DISK	U Flash Disk	T180	0A1266865200521

External I/O Cable

Cable Description	Length (m)	From/Port	To
USB to Com Cable	1.0	Notebook	Com Cable

Block Diagram of Radiated Test Setup

Test Mode: USB Transmission



SUMMARY OF TEST RESULTS

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

FCC §15.107 –CONDUCTED EMISSIONS

Applicable Standard

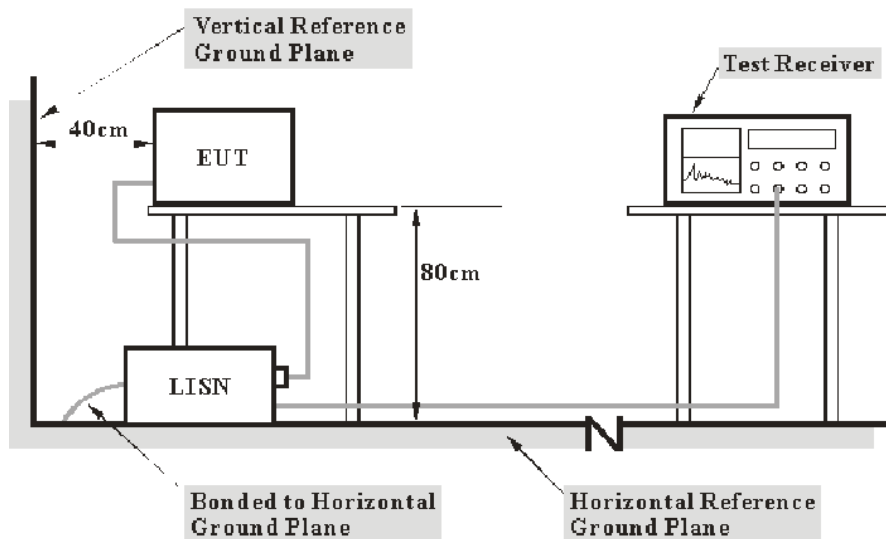
According to FCC§15.107

Measurement Uncertainty

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

Item		Measurement Uncertainty	U_{cispr}
AMN	150kHz~30MHz	3.26 dB	3.4 dB

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	2016-11-25	2017-11-24
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2016-10-10	2017-10-09
ROHDE&SCHWARZ	LISN	ENV216	3560655016	2016-11-25	2017-11-24
Rohde & Schwarz	CE Test software	EMC 32	100357	--	--
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:

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

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 7 dB below the limit. The equation for margin calculation is as follows:

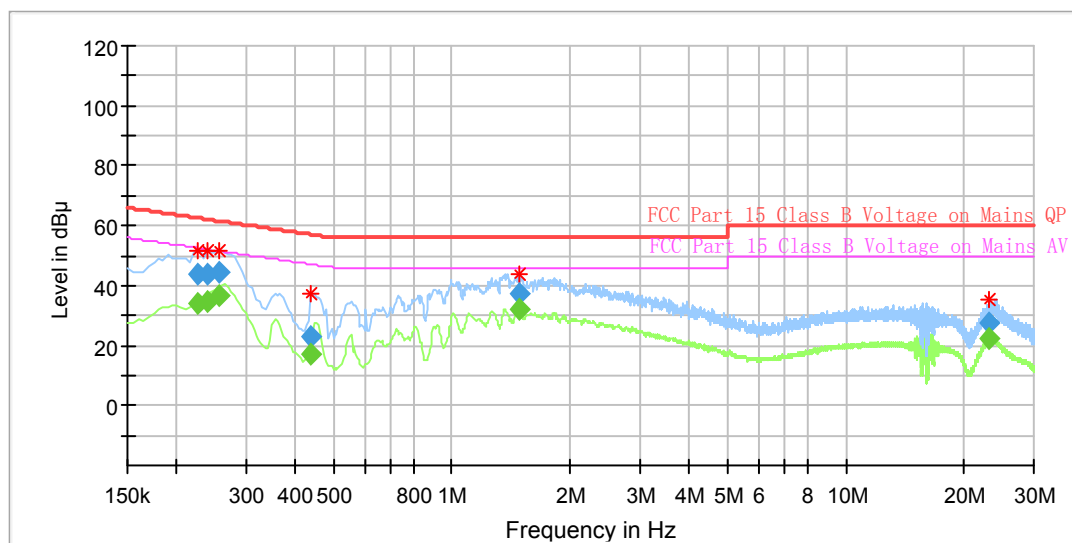
$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Data**Environmental Conditions**

Temperature:	22°C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

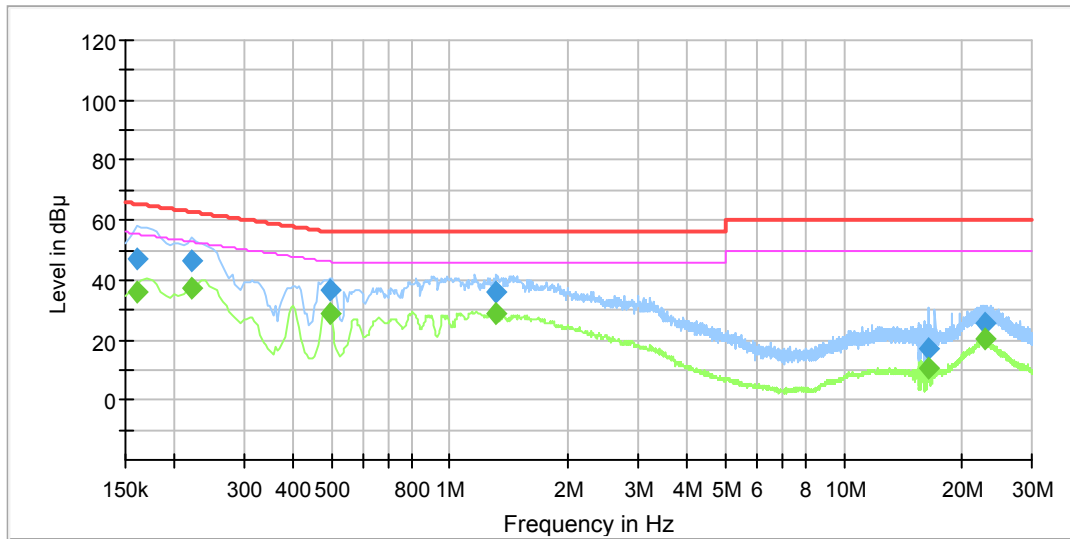
The testing was performed by Phil Zhu on 2017-01-17.

Test Mode: USB Transmission

Line

Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Corr. (dB)
0.225000	---	33.86	52.63	18.77	L1	9.9
0.225000	43.61	---	62.63	19.02	L1	9.9
0.240000	---	34.69	52.10	17.41	L1	9.9
0.240000	43.95	---	62.10	18.15	L1	9.9
0.255000	---	36.93	51.59	14.66	L1	9.9
0.255000	44.64	---	61.59	16.95	L1	9.9
0.440000	---	17.11	47.06	29.95	L1	9.9
0.440000	23.11	---	57.06	33.95	L1	9.9
1.485000	---	31.83	46.00	14.17	L1	9.8
1.485000	37.06	---	56.00	18.94	L1	9.8
23.185000	---	22.28	50.00	27.72	L1	10.4
23.185000	27.80	---	60.00	32.20	L1	10.4

Neutral



Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Corr. (dB)
0.160000	---	35.68	55.46	19.78	N	10.0
0.160000	47.10	---	65.46	18.36	N	10.0
0.220000	---	37.32	52.82	15.50	N	10.0
0.220000	46.39	---	62.82	16.43	N	10.0
0.495000	---	28.89	46.08	17.19	N	9.9
0.495000	36.82	---	56.08	19.26	N	9.9
1.310000	---	28.77	46.00	17.23	N	9.8
1.310000	35.98	---	56.00	20.02	N	9.8
16.335000	---	10.66	50.00	39.34	N	9.9
16.335000	17.05	---	60.00	42.95	N	9.9
22.895000	---	20.19	50.00	29.81	N	10.1
22.895000	25.83	---	60.00	34.17	N	10.1

FCC §15.109 - RADIATED EMISSIONS

Applicable Standard

FCC §15.109

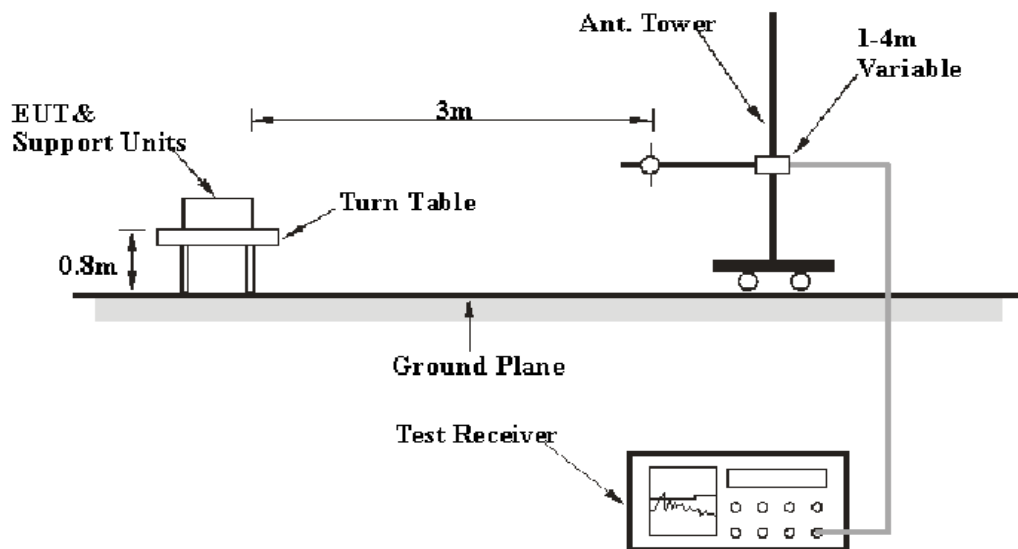
Measurement Uncertainty

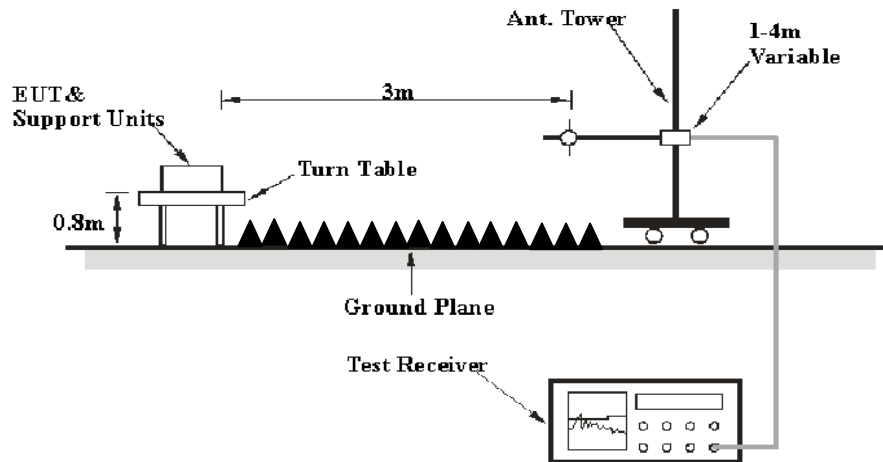
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency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

Item		Measurement Uncertainty	U_{cispr}
Radiated emission	30MHz~1GHz	5.91dB	6.3 dB
	1GHz~6GHz	4.68dB	5.2 dB
	6 GHz ~18 GHz	4.92dB	5.5 dB

EUT Setup

Below 1GHz:



Above 1GHz:

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.

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
30MHz – 1000 MHz	120 kHz	300 kHz	120kHz	QP
Above 1 GHz	1MHz	3 MHz	/	Peak
	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, Peak and average detection mode above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sonoma Instrument	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
Champrotek	Chamber	Chamber A	T-KSEMC049	-	-
R&S	Auto test Software	EMC32	100361	-	-
ETS	Horn Antenna	3115	6229	2016-01-11	2019-01-10
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-25
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
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).

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 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

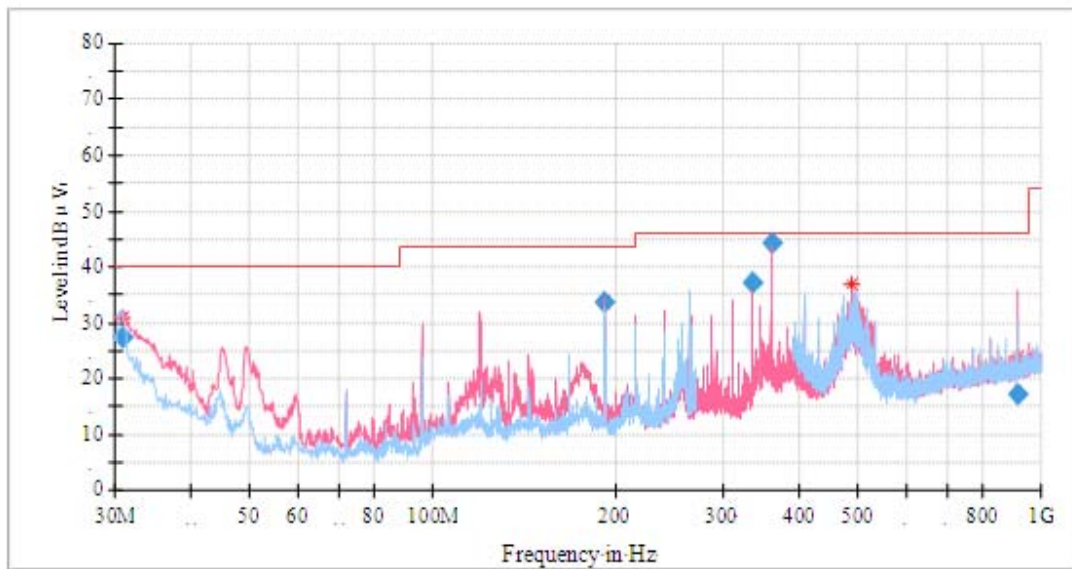
$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Data**Environmental Conditions**

Temperature:	27 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Phil Zhu on 2017-01-13.

Test Mode: USB Transmission

1)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	27.53	40.00	12.47	101.0	V	122.0	-5.5
192.019400	33.53	43.50	9.97	101.0	V	9.0	-12.3
336.018800	37.04	46.00	8.96	101.0	H	169.0	-9.7
360.002000	45.09	46.00	0.91	101.0	H	169.0	-9.1
488.289750	30.26	46.00	15.74	101.0	V	136.0	-5.8
914.385800	17.02	46.00	28.98	199.0	V	114.0	-0.6

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)
1393.396793	37.56	---	74.00	36.44	101.0	V	166.0	-9.8
1393.396793	---	22.63	54.00	31.37	101.0	V	166.0	-9.8
1657.605210	---	23.29	54.00	30.71	199.0	V	0.0	-8.2
1657.605210	36.77	---	74.00	37.23	199.0	V	0.0	-8.2
2821.993988	41.49	---	74.00	32.51	199.0	V	39.0	-3.3
2821.993988	---	27.01	54.00	26.99	199.0	V	39.0	-3.3
3941.613227	45.04	---	74.00	28.96	199.0	V	353.0	1.1
3941.613227	---	31.28	54.00	22.72	199.0	V	353.0	1.1
4957.885772	---	32.78	54.00	21.22	199.0	V	140.0	2.5
4957.885772	46.95	---	74.00	27.05	199.0	V	140.0	2.5
6957.505010	49.97	---	74.00	24.03	101.0	V	136.0	7.2
6957.505010	---	36.42	54.00	17.58	101.0	V	136.0	7.2

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