

FCC PART 15B

MEASUREMENT AND TEST REPORT

For

Shanghai Huace Navigation Technology LTD.

Building C,599 Gaojing Road,Qingpu District Shanghai

FCC ID: SY4-A02010

Report Type: Original Report	Product Type: GNSS Receiver
Test Engineer: Phil Zhu	<i>Phil Zhu</i>
Report Number: RKS161114001-00A	
Report Date: 2016-11-15	
	Jesse huang
Reviewed By: EMC Manager	<i>Jesse Huang</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

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Manufacturer	Shanghai Huace Navigation Technology LTD.
Model	P3E
Product	GNSS Receiver
Rate Voltage	DC 9-36V, rated power :4.2W
Operating temperature	-25 °C to +65 °C (-13°F to 149°F)
Storage temperature	-40 °C to +80°C (-40°F to 176°F)
Operating Frequency	1575.42MHz
Dimension	215 mm (L) × 140mm (W) × 68 mm (H)

Note: The product's series model number: P3;P3X(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: 20160918003 (Assigned by BACL, Kunshan). The EUT was received on 2016-09-18.*

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)

N/A.

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 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.

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 1: GPS mode & Link LAN 100Mbps

EUT Exercise Software

No exercise software was used.

Special Accessories

No special accessory was used.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

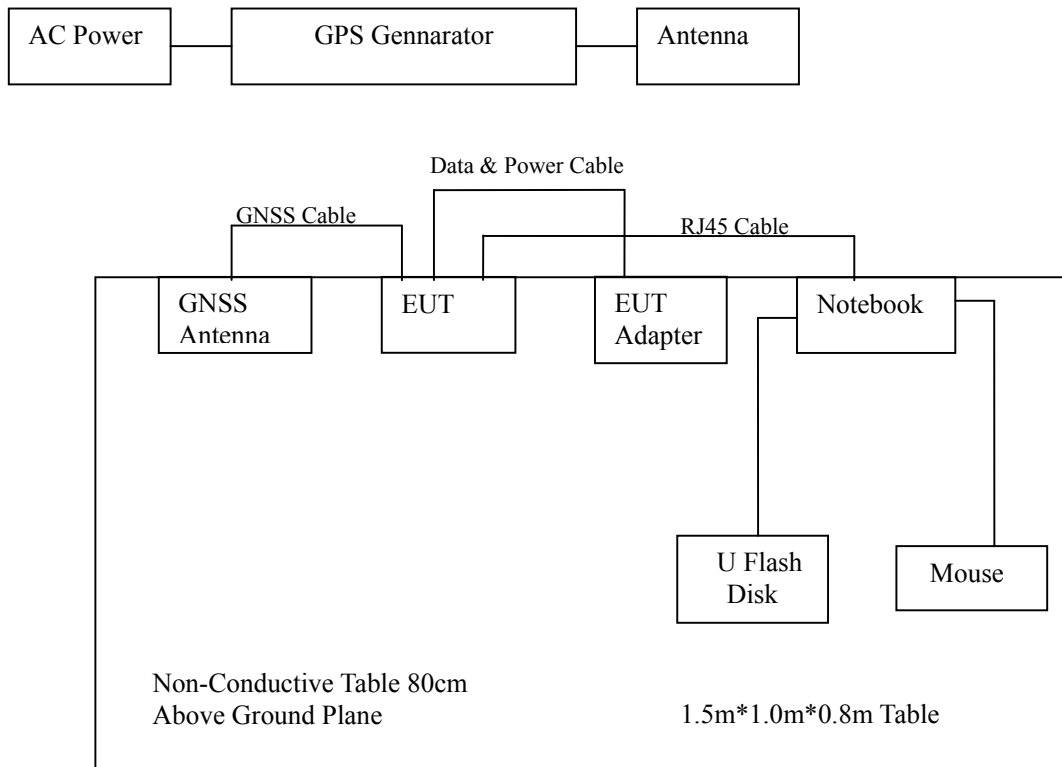
Manufacturer	Description	Model	Serial Number
DELL	PC	GX620	D65874152
MEGURO	GPS Signal Generator	MSG-2050	N/A
SHNT	GNSS Antenna	A220GR	14040306
U Flash Disk	Cement Resistance	5ohm/1500W	NA
NA	Mouse	F8108	NA

External I/O Cable

Cable Description	Length (m)	From/Port	To
RJ45	1.8	EUT	NB
USB Extension Wire	1.0	NB	U Flash
USB Cable	1.0	NB	Mouse

Block Diagram of Radiated Test Setup

Test mode 1



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

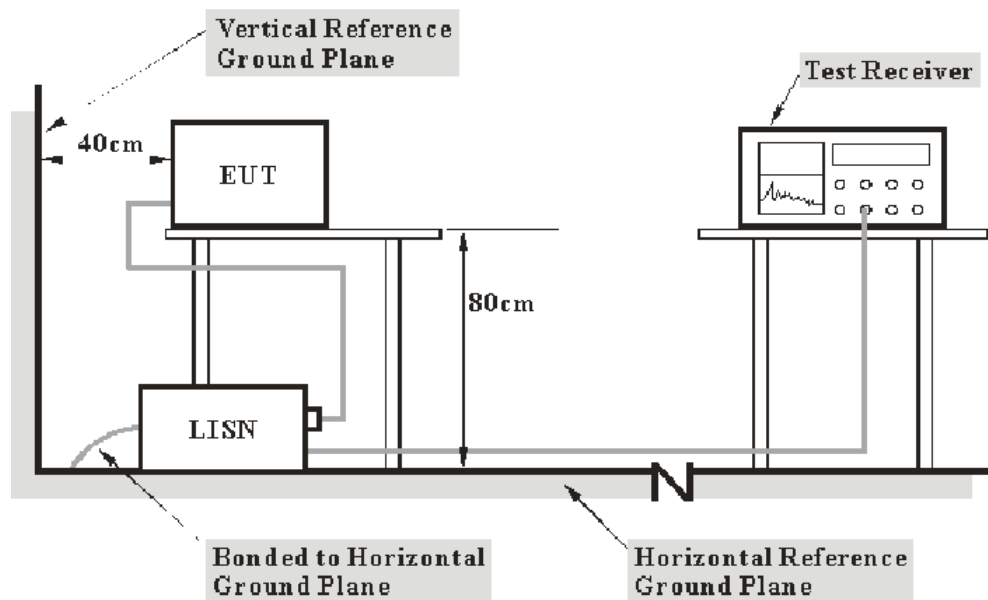
Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements 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.

The EUT was connected to an AC 120V/60 Hz power source.

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	934115/007	2015-11-11	2016-11-10
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2015-11-12	2016-11-11
Rohde & Schwarz	LISN	ESH3-Z5	892239/018	2016-06-23	2017-06-22
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2016-09-16	2017-09-15
Rohde & Schwarz	CE Test software	EMC 32	V 09.10.0	--	--
MICRO-COAX	Coaxial line	UFB-293B-1-0 480-50X50	97F0173	2016-10-01	2017-10-01

* **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:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

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 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:

0.74 dB at 0.595000 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

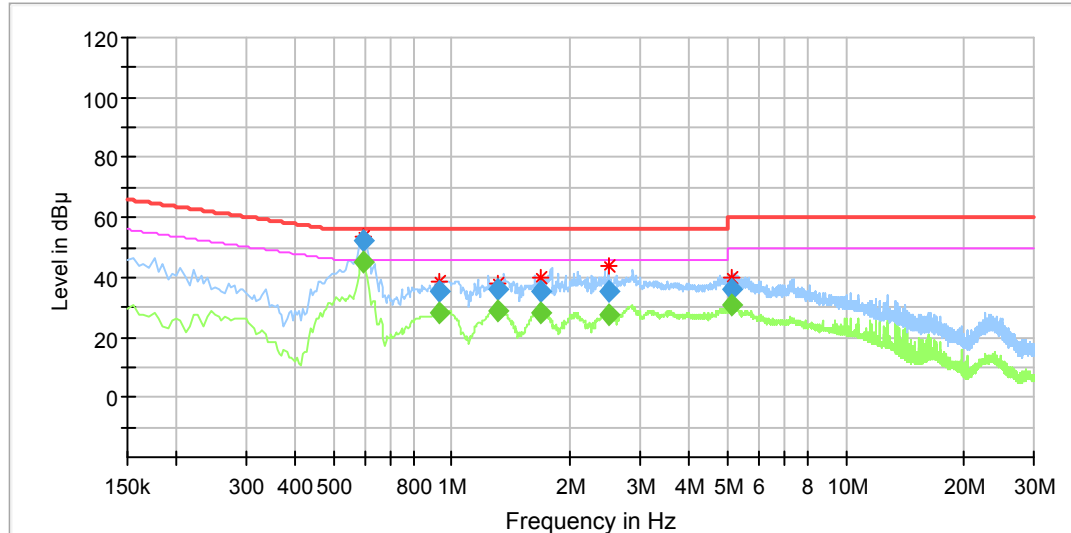
Environmental Conditions

Temperature:	25 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

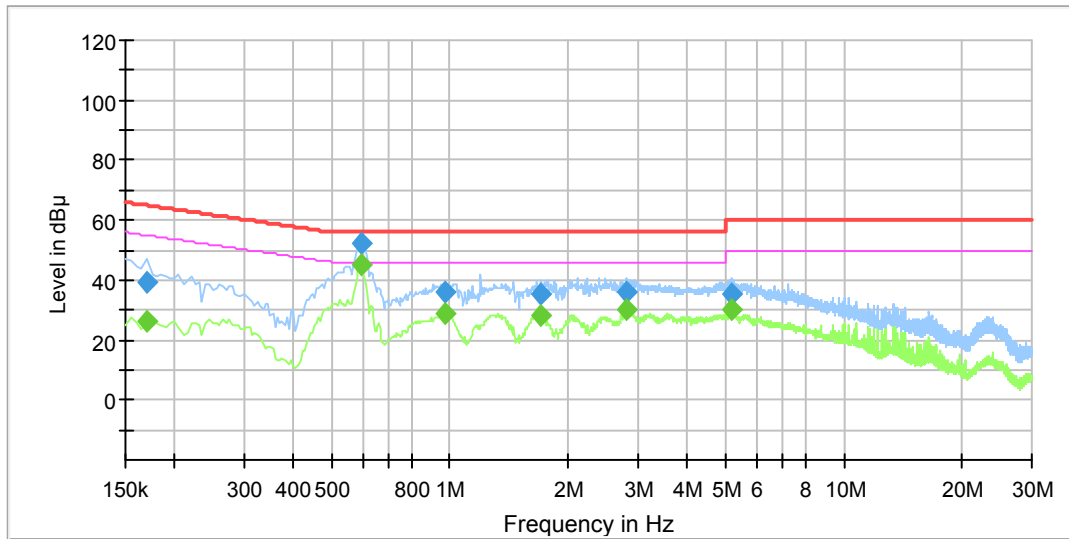
The testing was performed by Phil Zhu on 2016-10-21.

Test Model1

Line



Frequency (MHz)	Corrected Amplitude		Limit (dB μ V)	Margin (dB)	Line	Corr. (dB)
	QuasiPeak (dB μ V)	Average (dB μ V)				
0.595000	---	45.26	46.00	0.74	L1	10.3
0.595000	52.25	---	56.00	3.75	L1	10.3
0.925000	---	28.35	46.00	17.65	L1	10.3
0.925000	35.61	---	56.00	20.39	L1	10.3
1.310000	---	29.02	46.00	16.98	L1	10.3
1.310000	35.82	---	56.00	20.18	L1	10.3
1.675000	---	28.40	46.00	17.60	L1	10.4
1.675000	35.30	---	56.00	20.70	L1	10.4
2.490000	---	27.67	46.00	18.33	L1	10.4
2.490000	35.65	---	56.00	20.35	L1	10.4
5.120000	---	30.50	50.00	19.50	L1	10.5
5.120000	36.08	---	60.00	23.92	L1	10.5

Neutral

Frequency (MHz)	Corrected Amplitude		Limit (dB μ V)	Margin (dB)	Line	Corr. (dB)
	QuasiPeak (dB μ V)	Average (dB μ V)				
0.170000	39.24	---	64.96	25.72	N	10.3
0.170000	---	26.42	54.96	28.54	N	10.3
0.595000	52.01	---	56.00	3.99	N	10.3
0.595000	---	45.00	46.00	1.00	N	10.3
0.970000	36.18	---	56.00	19.82	N	10.3
0.970000	---	29.04	46.00	16.96	N	10.3
1.705000	35.62	---	56.00	20.38	N	10.4
1.705000	---	28.44	46.00	17.56	N	10.4
2.810000	36.32	---	56.00	19.68	N	10.5
2.810000	---	30.20	46.00	15.80	N	10.5
5.180000	---	29.82	50.00	20.18	N	10.6
5.180000	35.67	---	60.00	24.33	N	10.6

Note:

- 1) Corrected Amplitude = Reading + Correction Factor
- 2) Margin = Limit – Corrected Amplitude

FCC §15.109 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §15.109

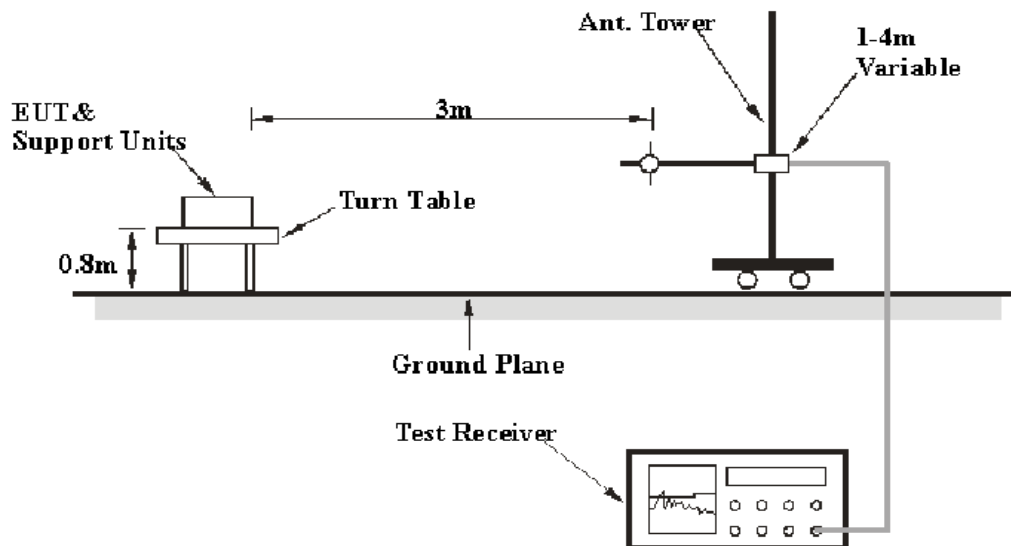
Measurement Uncertainty

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 expanded 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.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 9 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
1GHz-9GHz	1MHz	3MHz	-	PK
1GHz-9GHz	1MHz	10Hz	-	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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sonoma Instrument	Amplifier	330	171377	2016-09-16	2017-09-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2015-11-12	2016-11-11
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2017-01-08
ETS	Horn Antenna	3115	6229	2016-01-11	2017-01-10
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Mini	Pre-amplifier	ZVA-183-S+	857001418	2016-09-16	2017-09-15
champrotek	Chamber	Chamber A	V 09.10.0	-	-
R&S	Auto test Software	EMC32	V 09.10.0	-	-
MICRO-COAX	Coaxial line	UFB-293B-1-04 80-50X50	97F0173	2016-10-01	2017-10-01

* **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 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:

10.33 dB at 248.913600 MHz in the **Horizontal** polarization mode

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

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

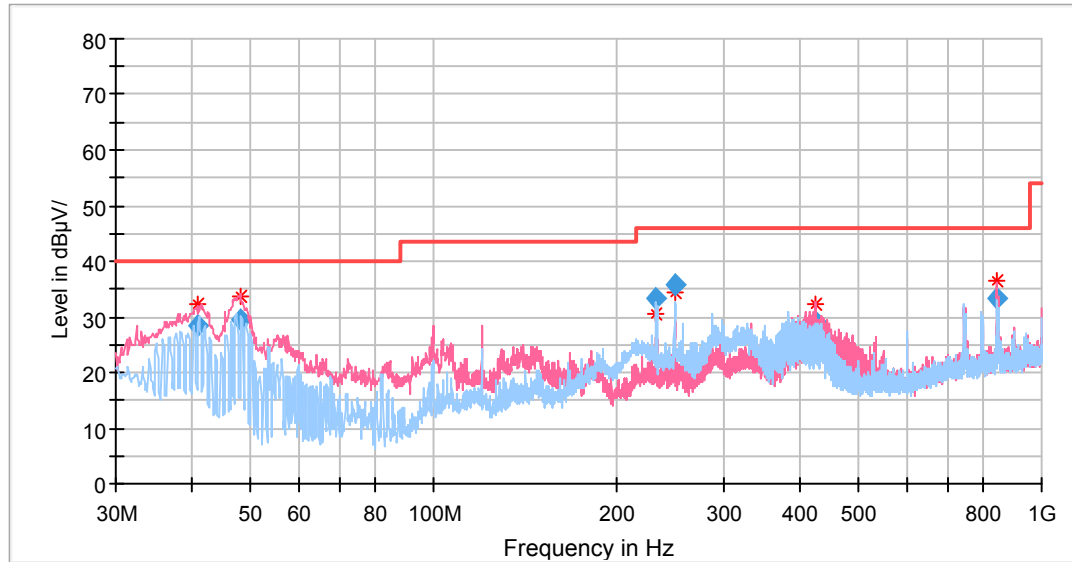
In BACL, $U_{(Lm)}$ is less than U_{cispr} , if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

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

The testing was performed by Phil Zhu on 2016-10-27.

*Test Model1***30MHz ~ 1GHz**

Frequency (MHz)	Corrected Amplitude (dB µ V/m)	Detector	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
40.933000	28.50	QuasiPeak	40.00	11.50	101.0	V	245.0	-10.8
47.995150	29.52	QuasiPeak	40.00	10.48	101.0	V	78.0	-15.2
232.322150	33.21	QuasiPeak	46.00	12.79	101.0	H	95.0	-12.2
248.913600	35.67	QuasiPeak	46.00	10.33	101.0	H	128.0	-12.0
423.868000	29.05	QuasiPeak	46.00	16.95	101.0	V	154.0	-7.8
846.144550	33.28	QuasiPeak	46.00	12.72	101.0	V	112.0	-1.3

Above 1GHz

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)
1000.090180	---	30.12	53.90	23.78	149.0	H	130.0	-11.3
1000.090180	37.80	---	73.90	36.10	149.0	H	130.0	-11.3
1809.609219	40.46	---	73.90	33.44	149.0	V	100.0	-5.9
1809.609219	---	22.16	53.90	31.74	149.0	V	100.0	-5.9
2713.597195	40.20	---	73.90	33.70	149.0	V	218.0	-1.7
2713.597195	---	24.32	53.90	29.58	149.0	V	218.0	-1.7
3060.811623	---	25.36	53.90	28.54	149.0	V	120.0	0.3
3060.811623	39.80	---	73.90	34.10	149.0	V	120.0	0.3
5448.006012	44.53	---	73.90	29.37	149.0	V	244.0	9.3
5448.006012	---	30.55	53.90	23.35	149.0	V	244.0	9.3
6648.406813	49.80	---	73.90	24.10	149.0	H	300.0	13.3
6648.406813	---	36.07	53.90	17.83	149.0	H	300.0	13.3

PRODUCT SIMILARITY DECLARATION LETTER

Company: Shanghai Huace Navigation Technology LTD.
Add: Building C,599 Gaojing Road,Qingpu District.Shanghai.China
Tel: 021-51508100-1241
Fax: 021-64851208

DECLARATION

Dear Sir or Madam:

We, Shanghai Huace Navigation Technology LTD. hereby declare that product series of P3E,P3and P3X (X=0~9,A~Z), They are based on the same of hardware and software. The differences of them are as follows:

1. The model name

Please contact me if there is need for any additional clarification or information.

Best Regards,



Signature:

Name/Title: Zhangdan / Test engineer

E-mail: dan_zhang@huace.cn

Date: 2016-11-10

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