

FCC REPORT

Applicant: Shanghai Huace Navigation Technology LTD.

Address of Applicant: Building C,599 GaojingRoad,Qingpu District

Equipment Under Test (EUT)

Product Name: GIS Receiver

Model No.: X360,X360A,X360B,X360C,X360D,X360E,X360F,X360G,X360H

Trade mark: CHC

FCC ID: SY4-A02008

Applicable standards: FCC CFR Title 47 Part 15 Subpart B

Date of sample receipt: 12 Jan., 2016

Date of Test: 13 Jan.,2016 to 06 Jan., 2017

Date of report issued: 06 Jan., 2017

Test Result: Pass *

*In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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2 Version

Version No.	Date	Description
00	06 Jan., 2017	Original

Tested by:

M. Liang

Date:

06 Jan., 2017

Test Engineer

Reviewed by:

Ryan. Lee

Date:

06 Jan., 2017

Project Engineer

3 Contents

Page

1	COVER PAGE.....	1
2	VERSION	2
3	CONTENTS	3
4	TEST SUMMARY.....	4
5	GENERAL INFORMATION.....	5
5.1	CLIENT INFORMATION	5
5.2	GENERAL DESCRIPTION OF E.U.T.	5
5.3	TEST MODE.....	5
5.4	MEASUREMENT UNCERTAINTY.....	5
5.5	DESCRIPTION OF SUPPORT UNITS	6
5.6	LABORATORY FACILITY	6
5.7	LABORATORY LOCATION	6
5.8	TEST INSTRUMENTS LIST.....	7
6	TEST RESULTS AND MEASUREMENT DATA.....	8
6.1	CONDUCTED EMISSION.....	8
6.2	RADIATED EMISSION	11
7	TEST SETUP PHOTO	17
8	EUT CONSTRUCTIONAL DETAILS	18

4 Test Summary

Test Item	Section in CFR 47	Result
Conducted Emission	Part15.107	Pass
Radiated Emission	Part15.109	Pass

Pass: The EUT complies with the essential requirements in the standard.

Remark: Test according to ANSI C63.4-2014

5 General Information

5.1 Client Information

Applicant:	Shanghai Huace Navigation Technology LTD.
Address of Applicant:	Building C,599 Gaojing Road,Qingpu District
Manufacturer	Shanghai Huace Navigation Technology LTD.
Address of Manufacturer:	Building C,599 Gaojing Road,Qingpu District

5.2 General Description of E.U.T.

Product Name:	GIS Receiver
Model No.:	X360, X360A, X360B, X360C, X360D, X360E, X360F, X360G, X360H
Power supply:	Rechargeable Li-ion Battery DC7.4V-4500mAh
Remark:	The No.:X360, X360A, X360B, X360C, X360D, X360E, X360F, X360G, X360H were identical inside, the electrical circuit design, layout, components used and internal wiring, with difference being model name,memory and camera.

5.3 Test Mode

Operating mode	Detail description
PC mode	Keep the EUT in Downloading mode(Worst case)
GPS mode	Keep the EUT in GPS receiver mode
Charging+RJ45 mode	Keep the EUT in Charging+RJ45 mode
The sample was placed 0.8m above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

5.4 Measurement Uncertainty

Items	Expanded Uncertainty (Confidence of 95%)
Conducted Emission (9kHz ~ 30MHz)	2.14 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	4.24 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	4.35 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	4.44 dB (k=2)
Radiated Emission (18GHz ~ 26.5GHz)	4.56 dB (k=2)

5.5 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC ID/DoC
DELL	PC	OPTIPLEX745	N/A	DoC
DELL	MONITOR	E178FPC	N/A	DoC
DELL	KEYBOARD	SK-8115	N/A	DoC
DELL	MOUSE	MOC5UO	N/A	DoC
HP	Printer	CB495A	05257893	DoC
MERCURY	Wireless router	MW150R	12922104015	DoC
SWtec	AC adapter	SW018S120150U1	N/A	VOC

5.6 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC - Registration No.: 817957**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 817957, February 27, 2012.

● **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

● **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

5.7 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No.B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282
Fax: +86-755-23116366

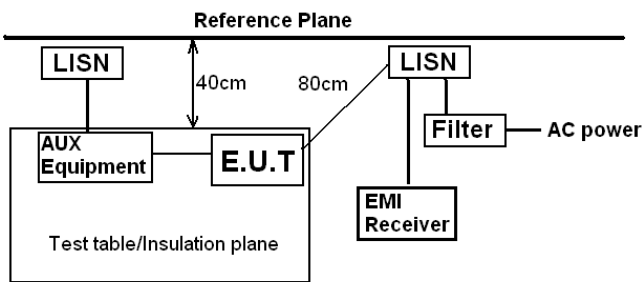
5.8 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
1	3m SAC	SAEMC	9(L)*6(W)* 6(H)	CCIS0001	08-23-2014	08-22-2017
2	BiConiLog Antenna	SCHWARZBECK	VULB9163	CCIS0005	03-25-2016	03-25-2017
3	Horn Antenna	SCHWARZBECK	BBHA9120D	CCIS0006	03-25-2016	03-25-2017
4	Pre-amplifier (10kHz-1.3GHz)	HP	8447D	CCIS0003	04-01-2016	03-31-2017
5	Pre-amplifier (1GHz-18GHz)	Compliance Direction Systems Inc.	PAP-1G18	CCIS0011	04-01-2016	03-31-2017
6	Spectrum analyzer 9k-30GHz	Rohde & Schwarz	FSP30	CCIS0023	03-28-2016	03-28-2017
7	EMI Test Receiver	Rohde & Schwarz	ESRP7	CCIS0167	03-28-2016	03-28-2017
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial Cable	N/A	N/A	CCIS0018	04-01-2016	03-31-2017
10	Coaxial Cable	N/A	N/A	CCIS0020	04-01-2016	03-31-2017

Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongShuo Electron	11.0(L)x4.0(W)x3.0(H)	CCIS0061	08-23-2014	08-22-2017
2	EMI Test Receiver	Rohde & Schwarz	ESCI	CCIS0002	03-24-2016	03-24-2017
3	LISN	CHASE	MN2050D	CCIS0074	03-26-2016	03-26-2017
4	Coaxial Cable	CCIS	N/A	CCIS0086	04-01-2016	03-31-2017
5	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

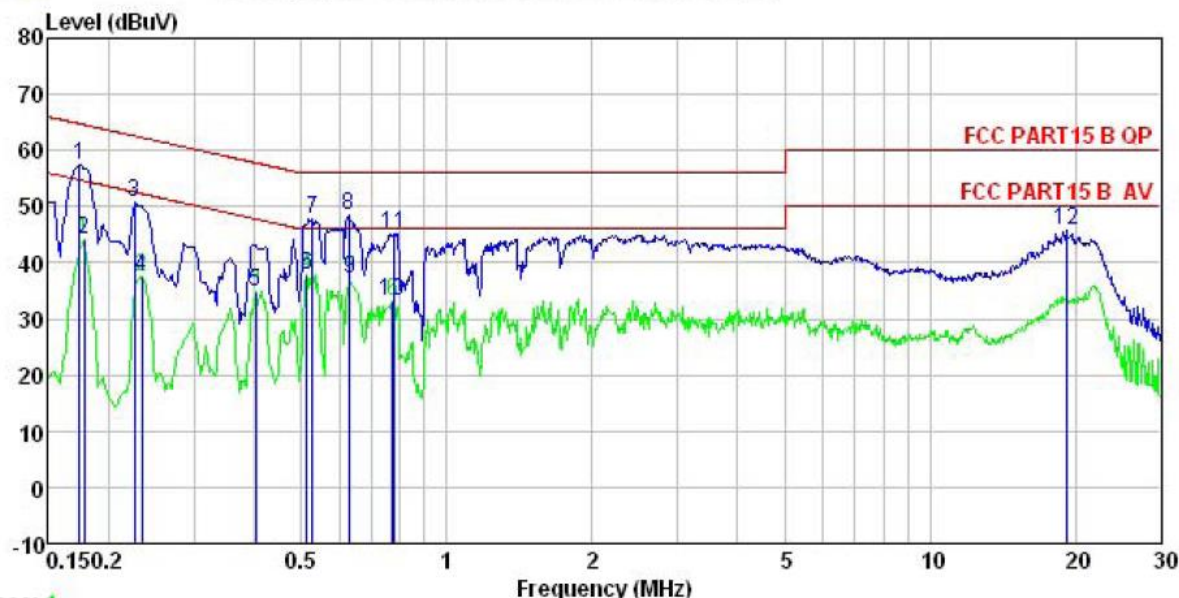
6 Test results and Measurement Data

6.1 Conducted Emission

Test Requirement:	FCC Part15 B Section 15.107					
Test Method:	ANSI C63.4:2014					
Test Frequency Range:	150kHz to 30MHz					
Class / Severity:	Class B					
Receiver setup:	RBW=9kHz, VBW=30kHz					
Limit:	Frequency range (MHz)	Limit (dBμV)				
		Quasi-peak		Average		
	0.15-0.5	66 to 56*		56 to 46*		
	0.5-5	56		46		
	0.5-30	60		50		
* Decreases with the logarithm of the frequency.						
Test setup:	Reference Plane  Remark E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m					
Test procedure	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network(L.I.S.N.). The provide a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014on conducted measurement.					
Test environment:	Temp.:	23°C	Humid.:	56%	Press.:	101kPa
Test Instruments:	Refer to section 5.7 for details					
Test mode:	Refer to section 5.3 for details					
Test results:	Pass					

Measurement data:

Line:



Trace: 1

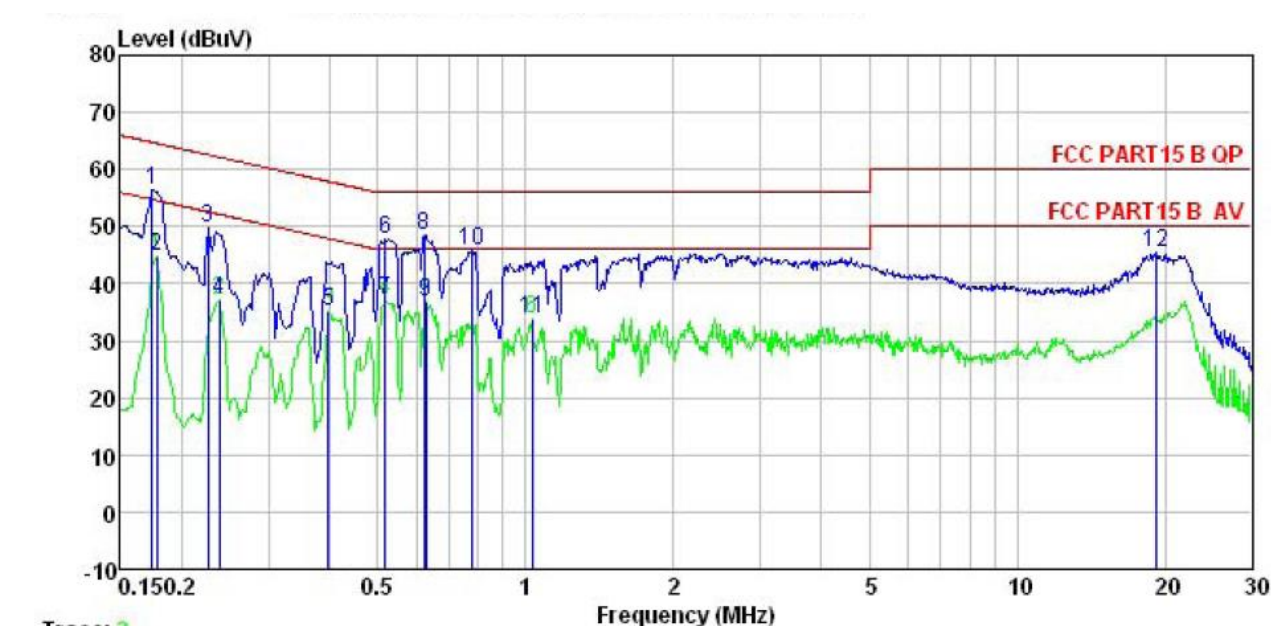
Site : CCIS Shielding Room
 Condition : FCC PART15 B QP LISN LINE
 EUT : GIS Receiver
 Model : X360
 Test Mode : PC mode
 Power Rating : AC 120 V/60 Hz
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa
 Test Engineer: MT
 Remark :

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.174	46.42	0.26	10.77	57.45	64.77	-7.32	QP
2	0.178	33.09	0.26	10.77	44.12	54.59	-10.47	Average
3	0.226	39.72	0.26	10.75	50.73	62.61	-11.88	QP
4	0.234	26.53	0.26	10.75	37.54	52.30	-14.76	Average
5	0.402	23.80	0.26	10.72	34.78	47.81	-13.03	Average
6	0.513	26.94	0.27	10.76	37.97	46.00	-8.03	Average
7	0.527	36.71	0.27	10.76	47.74	56.00	-8.26	QP
8	0.627	37.29	0.27	10.77	48.33	56.00	-7.67	QP
9	0.630	26.16	0.27	10.77	37.20	46.00	-8.80	Average
10	0.771	22.23	0.28	10.80	33.31	46.00	-12.69	Average
11	0.775	34.14	0.28	10.80	45.22	56.00	-10.78	QP
12	19.122	34.00	0.90	10.92	45.82	60.00	-14.18	QP

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss.

Neutral:



Trace: 3

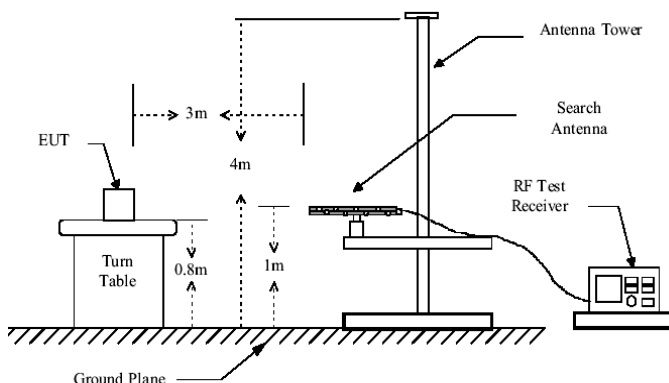
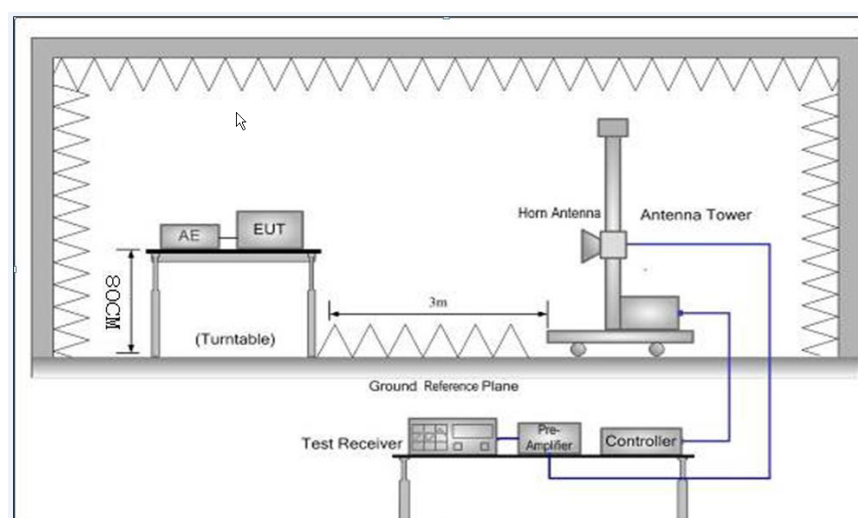
Site : CCIS Shielding Room
 Condition : FCC PART15 B QP LISN NEUTRAL
 EUT : GIS Receiver
 Model : X360
 Test Mode : PC mode
 Power Rating : AC 120 V/60 Hz
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa
 Test Engineer: MT
 Remark :

	Freq	Read	LISN	Cable	Level	Limit	Over	
	MHz	Level	Factor	Loss	dBuV	Line	Limit	Remark
		dBuV	dB	dB		dBuV	dB	
1	0.174	45.53	0.17	10.77	56.47	64.77	-8.30	QP
2	0.178	33.77	0.17	10.77	44.71	54.59	-9.88	Average
3	0.226	38.71	0.16	10.75	49.62	62.61	-12.99	QP
4	0.238	26.20	0.16	10.75	37.11	52.17	-15.06	Average
5	0.398	24.20	0.16	10.72	35.08	47.90	-12.82	Average
6	0.518	36.73	0.16	10.76	47.65	56.00	-8.35	QP
7	0.518	26.31	0.16	10.76	37.23	46.00	-8.77	Average
8	0.621	37.40	0.17	10.77	48.34	56.00	-7.66	QP
9	0.627	25.97	0.17	10.77	36.91	46.00	-9.09	Average
10	0.775	34.69	0.18	10.80	45.67	56.00	-10.33	QP
11	1.032	22.75	0.17	10.87	33.79	46.00	-12.21	Average
12	19.224	33.93	0.61	10.92	45.46	60.00	-14.54	QP

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss.

6.2 Radiated Emission

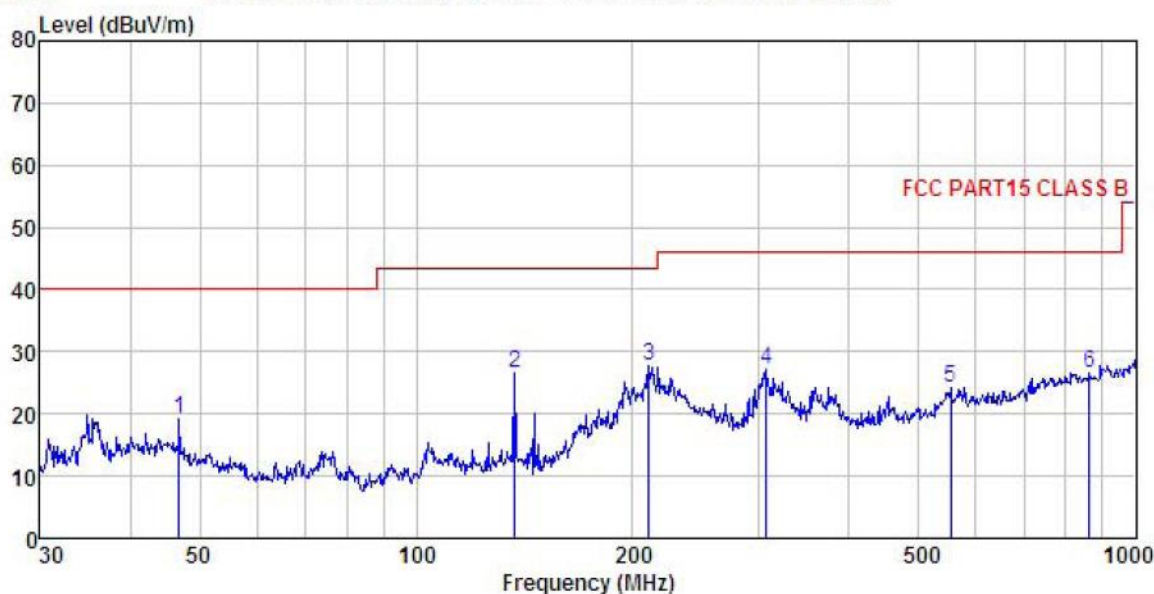
Test Requirement:	FCC Part15 B Section 15.109				
Test Method:	ANSI C63.4:2014				
Test Frequency Range:	30MHz to 26000MHz				
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
RMS		1MHz	3MHz	Average Value	
Limit:	Frequency		Limit (dBuV/m @3m)		Remark
	30MHz-88MHz		40.0		Quasi-peak Value
	88MHz-216MHz		43.5		Quasi-peak Value
	216MHz-960MHz		46.0		Quasi-peak Value
	960MHz-1GHz		54.0		Quasi-peak Value
	Above 1GHz		54.0		Average Value
74.0			Peak Value		
Test setup:	Below 1GHz				
					
Test setup:	Above 1GHz				
					

Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotating table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.					
Test environment:	Temp.:	25°C	Humid.:	55%	Press.:	101kPa
Test Instruments:	Refer to section 5.7 for details					
Test mode:	Refer to section 5.3 for details					
Test results:	Passed					
Remark:	All of the observed value above 6GHz were then noise floor, which were not recorded					

Measurement Data:

Below 1GHz

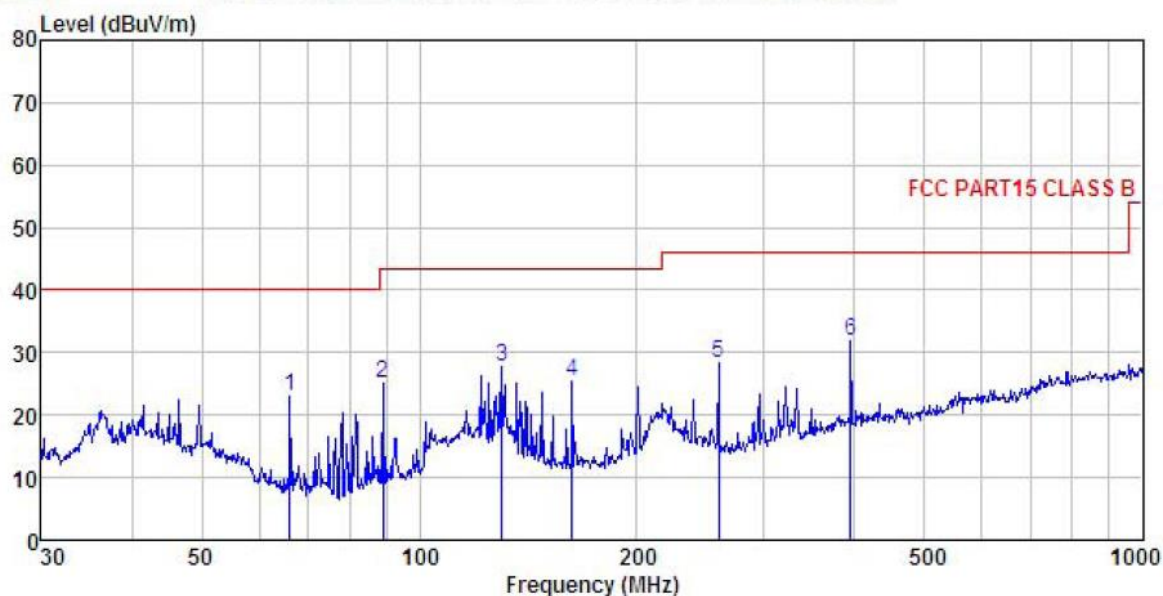
Horizontal:



Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VULB9163(30M3G) HORIZONTAL
 EUT : GIS Receiver
 Model : X360WXYZ
 Test mode : PC mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55% 101KPa
 Test Engineer: MT
 REMARK :

	Freq	ReadAntenna	Cable Preamp		Limit	Over		
	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	46.830	31.16	16.71	1.28	29.85	19.30	40.00	-20.70 QP
2	136.939	41.53	11.88	2.36	29.29	26.48	43.50	-17.02 QP
3	210.786	42.88	10.70	2.86	28.76	27.68	43.50	-15.82 QP
4	306.754	39.76	12.91	2.96	28.47	27.16	46.00	-18.84 QP
5	552.883	31.31	18.12	3.89	29.09	24.23	46.00	-21.77 QP
6	863.056	29.41	21.14	4.07	27.97	26.65	46.00	-19.35 QP

Vertical:

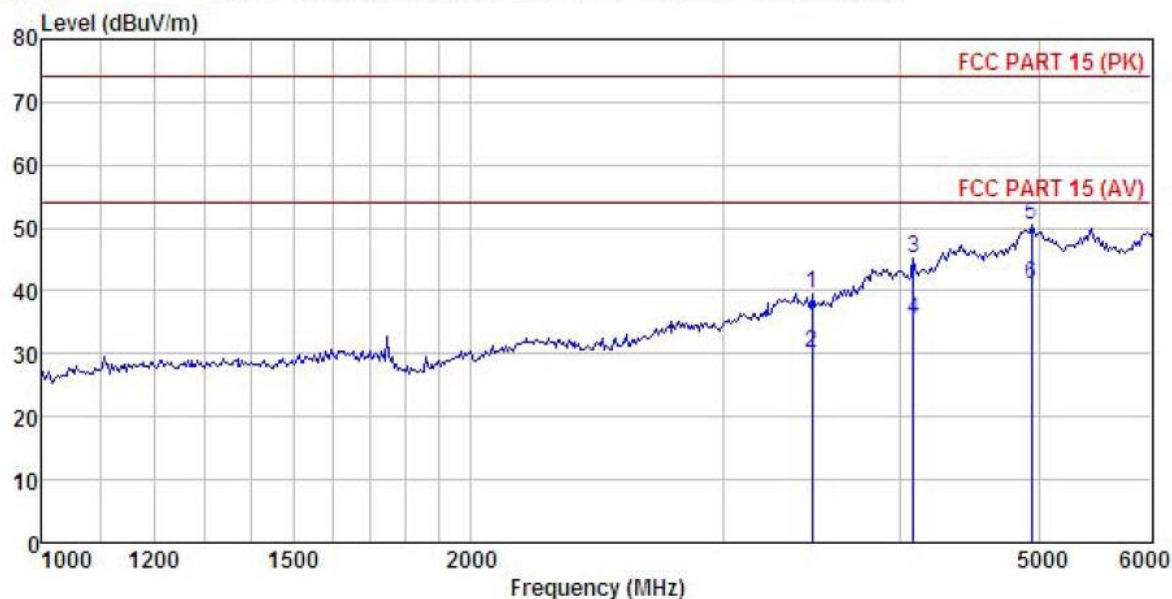


Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VULB9163(30M3G) VERTICAL
 EUT : GIS Receiver
 Model : X360WXYZ
 Test mode : PC mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55% 101KPa
 Test Engineer: MT
 REMARK :

	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamplifier Factor	Level	Limit	Over	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	66.266	43.30	8.00	1.41	29.75	22.96	40.00	-17.04	QP
2	88.964	44.60	8.04	2.00	29.58	25.06	43.50	-18.44	QP
3	129.923	42.45	12.30	2.28	29.33	27.70	43.50	-15.80	QP
4	162.611	42.04	9.87	2.61	29.11	25.41	43.50	-18.09	QP
5	259.234	42.19	11.72	2.83	28.52	28.22	46.00	-17.78	QP
6	394.855	41.79	15.78	3.08	28.76	31.89	46.00	-14.11	QP

Above 1GHz

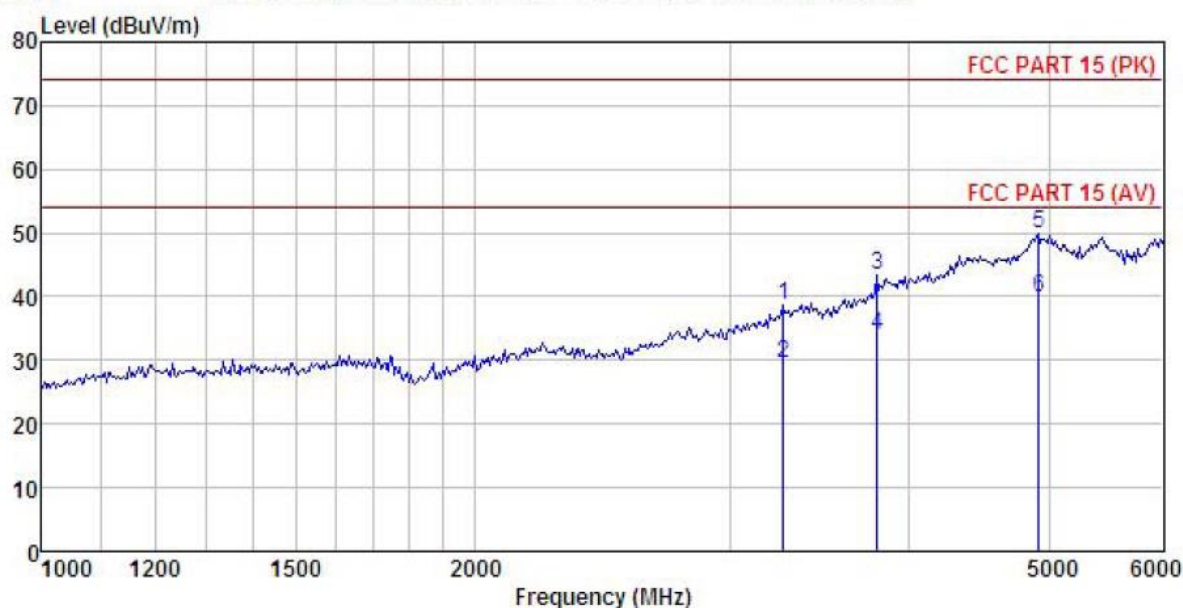
Horizontal:



Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
 Pro :
 EUT : GIS Receiver
 Model : X360WXYZ
 Test mode : PC mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark :

	Freq	ReadAntenna	Cable Preamp	Limit	Over				
	Level	Factor	Loss Factor	Level	Line	Limit	Remark		
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	3465.510	47.69	27.68	5.71	41.42	39.66	74.00	-34.34	Peak
2	3465.510	38.03	27.68	5.71	41.42	30.00	54.00	-24.00	Average
3	4086.182	47.92	32.68	6.23	41.81	45.02	74.00	-28.98	Peak
4	4086.182	38.26	32.68	6.23	41.81	35.36	54.00	-18.64	Average
5	4944.993	48.86	36.64	6.90	41.86	50.54	74.00	-23.46	Peak
6	4944.993	39.25	36.64	6.90	41.86	40.93	54.00	-13.07	Average

Vertical:



Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
 Pro :
 EUT : GIS Receiver
 Model : X360WXYZ
 Test mode : PC mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark :

	Freq	ReadAntenna	Cable	Preamp	Limit	Over	
		Level	Factor	Loss	Factor	Level	Line
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m
1	3270.858	47.59	26.85	5.50	41.39	38.55	74.00
2	3270.858	38.65	26.85	5.50	41.39	29.61	54.00
3	3801.333	48.48	30.58	6.08	41.79	43.35	74.00
4	3801.333	39.03	30.58	6.08	41.79	33.90	54.00
5	4916.490	48.44	36.51	6.88	41.85	49.98	74.00
6	4916.490	38.25	36.51	6.88	41.85	39.79	54.00