

TEST REPORT

Applicant: Wuhan Geosun Navigation Technology Co., Ltd

Address of Applicant: 12/F, Jucheng Bldg., Wuhan Univ. Science and Technology Park, Univ. Rd., Wuhan City, Hubei Province, China

Equipment Under Test (EUT)

Product Name: Gnss data collector

Model No.: K2 series

FCC ID : 2AGY7-K2

Applicable standards: FCC CFR Title 47 Part 15 Subpart B:2014

Date of sample receipt: December 11, 2015

Date of Test: December 14-15, 2015

Date of report issued: December 16, 2015

Test Result : Pass *

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

Authorized Signature:

A circular blue stamp with the text "GTS GLOBAL TESTING" in the center and "UNITED TECHNOLOGY SERVICES CO." around the perimeter. A handwritten signature in black ink is written across the stamp.

Robinson Lo
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 GTS 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. Any mention of GTS or testing done by GTS in connection with, distribution or use of the product described in this report must be approved by GTS in writing.

This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

2 Version

Version No.	Date	Description
00	December 16, 2015	Original

Prepared by:

Edward. Pan

Project Engineer

Date:

December 16, 2015

Reviewed by:

Hank. Yan

Reviewer

Date:

December 16, 2015

3 Contents

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 EUT	5
5.3	TEST MODE	5
5.4	DESCRIPTION OF SUPPORT UNITS	5
5.5	DEVIATION FROM STANDARDS	5
5.6	ABNORMALITIES FROM STANDARD CONDITIONS.....	5
5.7	TEST FACILITY.....	6
5.8	TEST LOCATION.....	6
6	TEST INSTRUMENTS LIST	7
7	TEST RESULTS AND MEASUREMENT DATA.....	8
7.1	CONDUCTED EMISSIONS	8
7.2	RADIATED EMISSION	11
8	TEST SETUP PHOTO.....	16
9	EUT CONSTRUCTIONAL DETAILS	17

4 Test Summary

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

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

5 General Information

5.1 Client Information

Applicant:	Wuhan Geosun Navigation Technology Co., Ltd
Address of Applicant:	12/F, Jucheng Bldg., Wuhan Univ. Science and Technology Park, Univ. Rd., Wuhan City, Hubei Province, China
Manufacturer:	Wuhan Geosun Navigation Technology Co., Ltd
Address of Manufacturer:	12/F, Jucheng Bldg., Wuhan Univ. Science and Technology Park, Univ. Rd., Wuhan City, Hubei Province, China

5.2 General Description of EUT

Product Name:	Gnss data collector
Model No.:	K2 series
Power Supply:	Adapter Model No.: HSA052200B Input: AC 100-240V, 50/60Hz, 0.5A Output: DC 5.2V, 2.0A or DC 3.7V Li-ion Battery

5.3 Test mode

Test mode:	
PC mode	Keep the EUT in data exchange with PC mode.
Operation mode	Keep the EUT in the Operation status

5.4 Description of Support Units

None.

5.5 Deviation from Standards

None.

5.6 Abnormalities from Standard Conditions

None.

5.7 Test Facility

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

- **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen 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 files. Registration 600491, June 28, 2013.

- **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, June 26, 2013.

5.8 Test Location

Tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

6 Test Instruments list

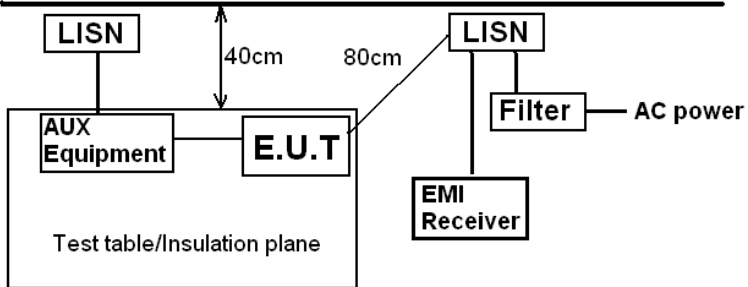
Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.0(L)*6.0(W)* 6.0(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	ESU EMI Test Receiver	R&S	ESU26	GTS203	July. 03 2015	July. 02 2016
4	BiConiLog Antenna	SCHWARZBECK	VULB9163	GTS214	July. 06 2015	July. 05 2016
5	RF Amplifier	HP	8347A	GTS204	July. 03 2015	July. 02 2016
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Coaxial cable	GTS	N/A	GTS210	Jul. 05 2015	Jul. 04 2016
8	Thermo meter	N/A	N/A	GTS256	July. 07 2015	July. 06 2016

Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May. 16 2014	May. 15 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	April. 29 2015	April. 29 2016
3	Pulse Limiter	R&S	ESH3-Z2	GTS224	July. 03 2015	July. 02 2016
4	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	July. 03 2015	July. 02 2016
5	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	July. 03 2015	July. 02 2016
6	Coaxial Cable	GTS	N/A	GTS227	Jul. 05 2015	Jul. 04 2016
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Thermo meter	KTJ	TA328	GTS233	July. 07 2015	July. 06 2016

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)
1	Barometer	ChangChun	DYM3	GTS257	July. 07 2015	July. 06 2016

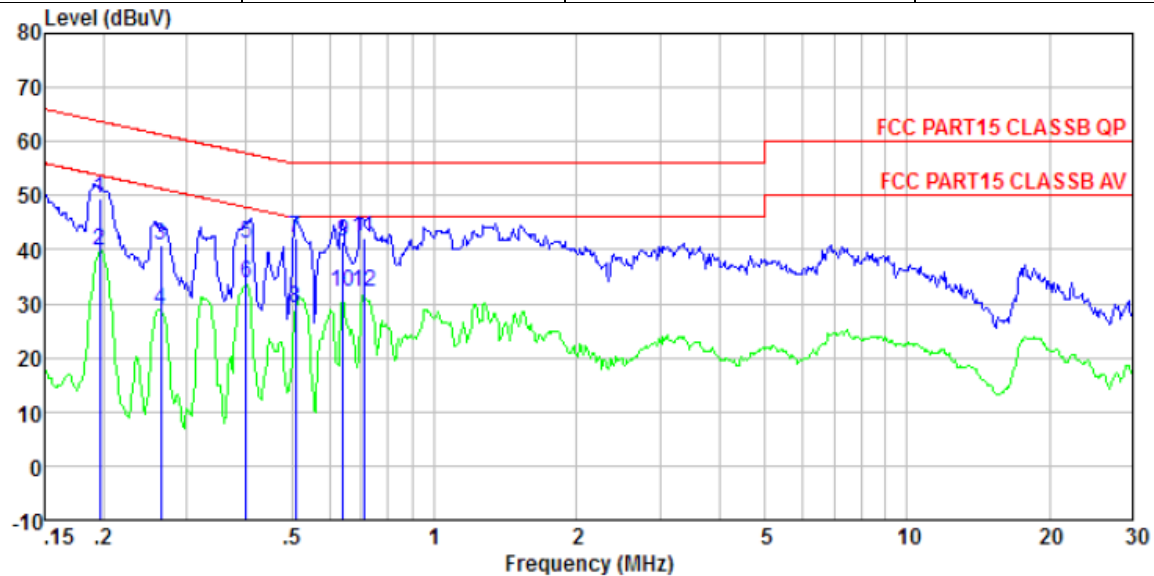
7 Test Results and Measurement Data

7.1 Conducted Emissions

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:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBμV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>0.5-30</td><td>60</td><td>50</td></tr></table>					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
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																	
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 C63.4:2014 on conducted measurement.																		
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1 012mbar													
Test Instruments:	Refer to section 6 for details																		
Test mode:	Refer to section 5.3 for details. Only the data of worst case is reported.																		
Test results:	Pass																		

Measurement Data

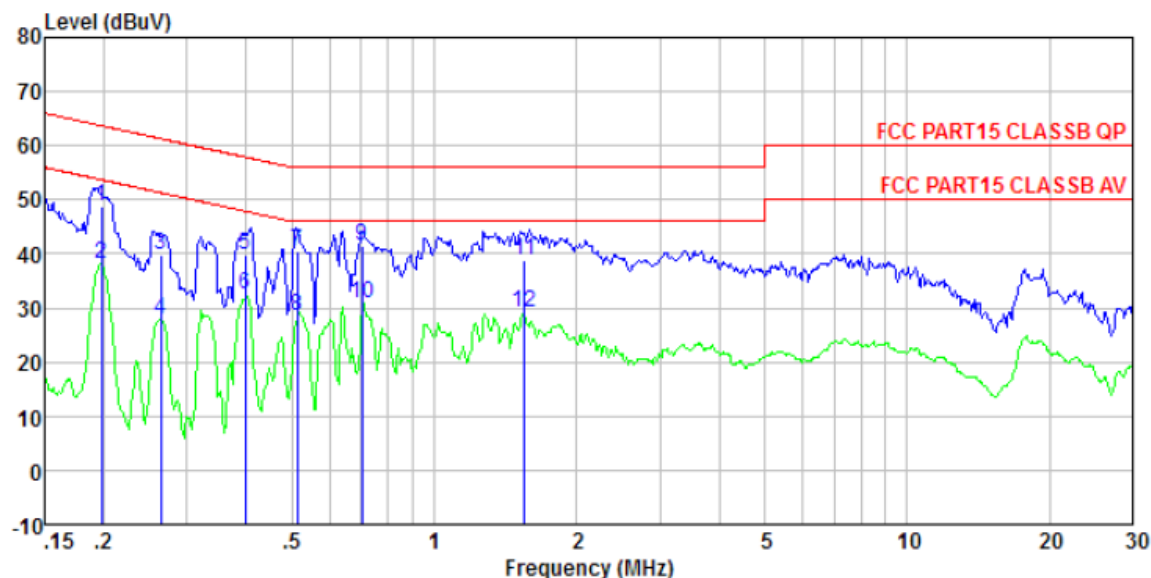
Test mode:	PC mode	Phase Polarity:	Line
------------	---------	-----------------	------



Site : Shielded room
 Condition : FCC PART15 CLASSB QP LISN-2013 LINE
 Job No. : 2088RF
 Test mode : PC mode
 Test Engineer: Arslan

	Freq	Read Level	Level	Limit	LISN	Cable	Over	
	MHz	dBuV	dBuV	Line	Factor	Loss	Limit	Remark
				dBuV	dB	dB	dB	
1	0.197	49.26	49.53	63.76	0.14	0.13	-14.23	QP
2	0.197	39.40	39.67	53.76	0.14	0.13	-14.09	Average
3	0.264	40.50	40.72	61.29	0.11	0.11	-20.57	QP
4	0.264	28.47	28.69	51.29	0.11	0.11	-22.60	Average
5	0.400	41.06	41.28	57.86	0.11	0.11	-16.58	QP
6	0.400	33.46	33.68	47.86	0.11	0.11	-14.18	Average
7	0.510	41.85	42.08	56.00	0.12	0.11	-13.92	QP
8	0.510	28.97	29.20	46.00	0.12	0.11	-16.80	Average
9	0.641	41.07	41.33	56.00	0.13	0.13	-14.67	QP
10	0.641	31.80	32.06	46.00	0.13	0.13	-13.94	Average
11	0.708	41.80	42.07	56.00	0.14	0.13	-13.93	QP
12	0.708	31.98	32.25	46.00	0.14	0.13	-13.75	Average

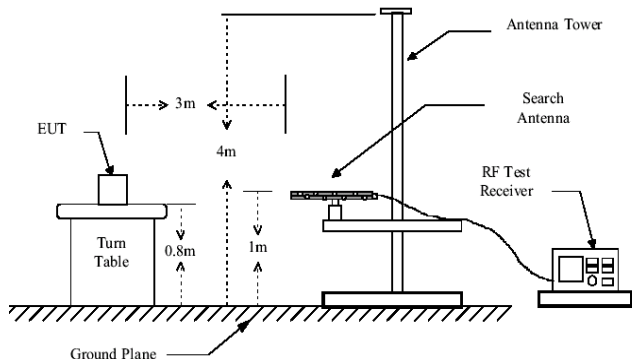
Test mode:	PC mode	Phase Polarity:	Neutral
------------	---------	-----------------	---------



Site : Shielded room
Condition : FCC PART15 CLASSB QP LISN-2013 NEUTRAL
Job No. : 2088RF
Test mode : PC mode
Test Engineer: Arslan

	Freq	Read Level	Level	Limit Line	LISN Factor	Cable Loss	Over Limit	Remark
	MHz	dBuV	dBuV	dBuV	dB	dB	dB	
1	0.198	48.67	48.87	63.71	0.07	0.13	-14.84	QP
2	0.198	37.87	38.07	53.71	0.07	0.13	-15.64	Average
3	0.264	39.80	39.97	61.29	0.06	0.11	-21.32	QP
4	0.264	27.58	27.75	51.29	0.06	0.11	-23.54	Average
5	0.398	39.74	39.91	57.90	0.06	0.11	-17.99	QP
6	0.398	32.29	32.46	47.90	0.06	0.11	-15.44	Average
7	0.513	40.39	40.56	56.00	0.06	0.11	-15.44	QP
8	0.513	28.47	28.64	46.00	0.06	0.11	-17.36	Average
9	0.705	41.30	41.50	56.00	0.07	0.13	-14.50	QP
10	0.705	30.74	30.94	46.00	0.07	0.13	-15.06	Average
11	1.552	38.61	38.84	56.00	0.09	0.14	-17.16	QP
12	1.552	29.03	29.26	46.00	0.09	0.14	-16.74	Average

7.2 Radiated Emission

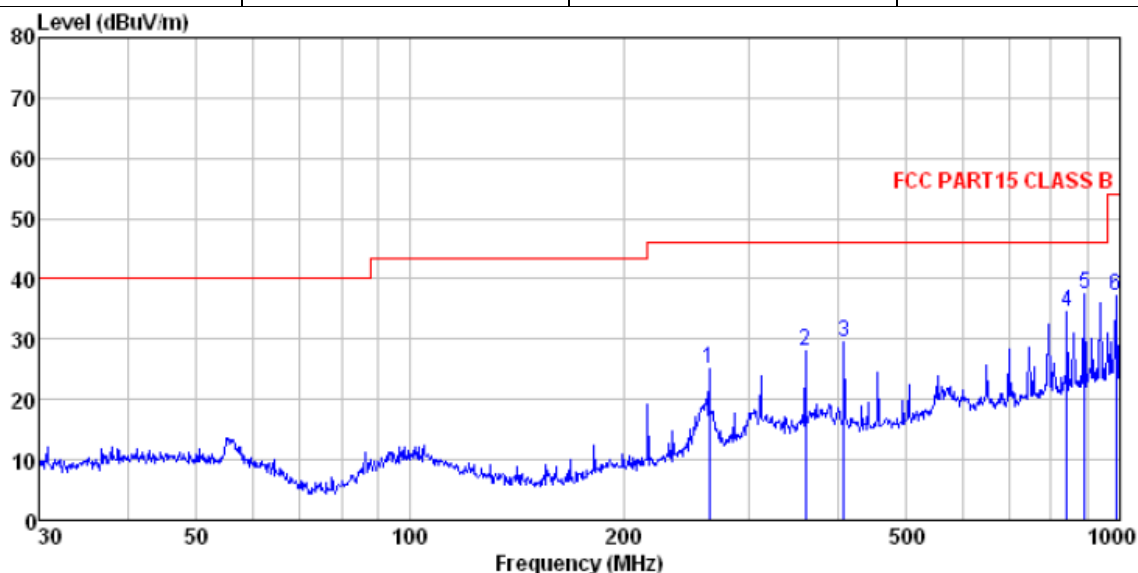
Test Requirement:	FCC Part15 B Section 15.109															
Test Method:	ANSI C63.4:2014															
Test Frequency Range:	30MHz to 1GHz															
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)															
Receiver setup:	<table><tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Value</th></tr><tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120kHz</td><td>300kHz</td><td>Quasi-peak</td></tr></table>	Frequency	Detector	RBW	VBW	Value	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak					
Frequency	Detector	RBW	VBW	Value												
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak												
Limit:	<table><tr><th>Frequency</th><th>Limit (dBμV/m @3m)</th><th>Value</th></tr><tr><td>30MHz-88MHz</td><td>40.00</td><td>Quasi-peak</td></tr><tr><td>88MHz-216MHz</td><td>43.50</td><td>Quasi-peak</td></tr><tr><td>216MHz-960MHz</td><td>46.00</td><td>Quasi-peak</td></tr><tr><td>960MHz-1GHz</td><td>54.00</td><td>Quasi-peak</td></tr></table>	Frequency	Limit (dBμV/m @3m)	Value	30MHz-88MHz	40.00	Quasi-peak	88MHz-216MHz	43.50	Quasi-peak	216MHz-960MHz	46.00	Quasi-peak	960MHz-1GHz	54.00	Quasi-peak
Frequency	Limit (dBμV/m @3m)	Value														
30MHz-88MHz	40.00	Quasi-peak														
88MHz-216MHz	43.50	Quasi-peak														
216MHz-960MHz	46.00	Quasi-peak														
960MHz-1GHz	54.00	Quasi-peak														
Test setup:																
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 rotatable 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.:	52%	Press.:	1 012mbar
Test Instruments:	Refer to section 6 for details					
Test mode:	Refer to section 5.3 for details. Only the data of worst case is reported.					
Test results:	Pass					

Measurement Data

Below 1GHz:

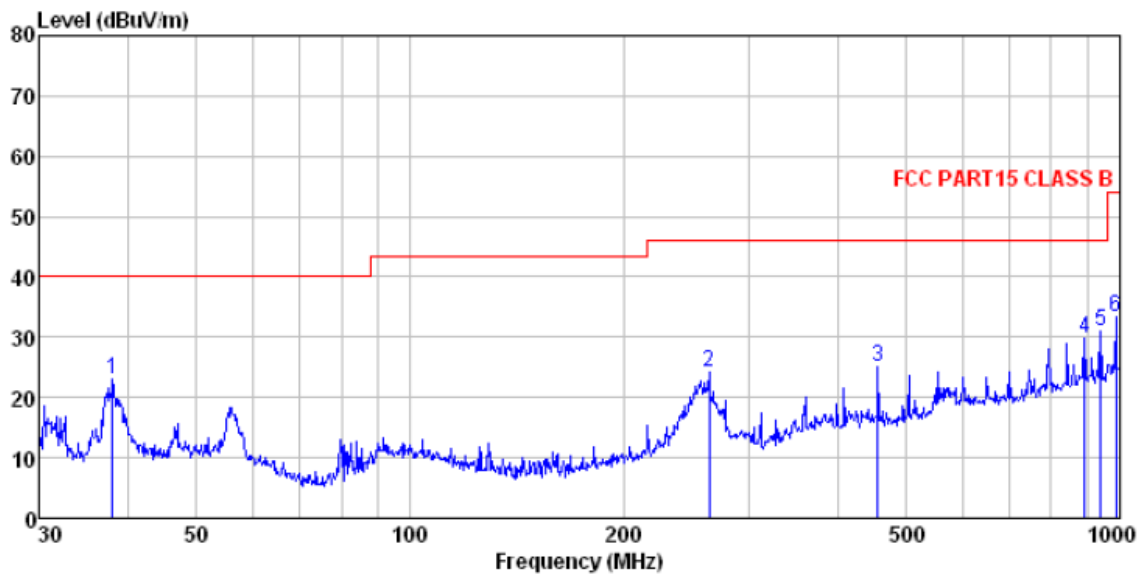
Test mode:	PC mode	Antenna Polarity:	Horizontal
------------	---------	-------------------	------------



Condition : FCC PART15 CLASS B VULB9163-2013M HORIZONTAL
 Job No. : 2088RF
 Test Mode : PC mode
 Test Engineer: He

	Read	Antenna	Cable	Preamp		Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	263.819	38.53	14.17	2.19	29.75	25.14	46.00	-20.86 QP
2	360.448	38.73	16.43	2.67	29.69	28.14	46.00	-17.86 QP
3	408.946	38.80	17.26	2.90	29.48	29.48	46.00	-16.52 QP
4	842.130	36.41	22.51	4.63	29.16	34.39	46.00	-11.61 QP
5	890.728	38.79	23.00	4.82	29.11	37.50	46.00	-8.50 QP
6	986.072	37.38	23.65	5.17	29.10	37.10	54.00	-16.90 QP

Test mode:	PC mode	Antenna Polarity:	Vertical
------------	---------	-------------------	----------

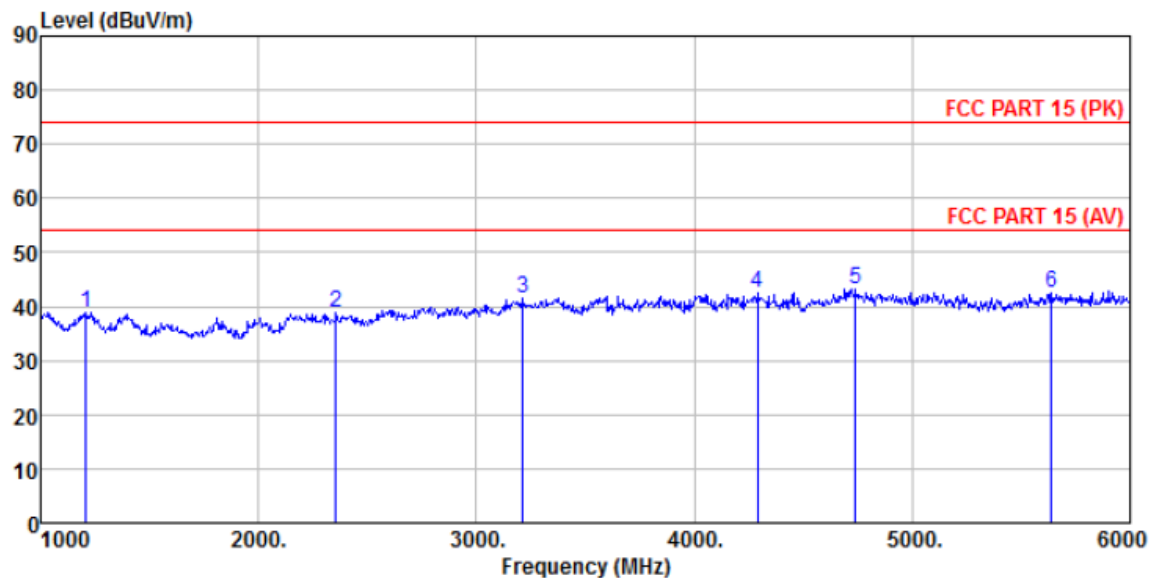


Condition : FCC PART15 CLASS B VULB9163-2013M VERTICAL
 Job No. : 2088RF
 Test Mode : PC mode
 Test Engineer: He

	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	38.078	37.25	15.11	0.64	30.05	22.95	40.00 -17.05 QP
2	263.819	37.52	14.17	2.19	29.75	24.13	46.00 -21.87 QP
3	455.906	33.81	17.58	3.11	29.38	25.12	46.00 -20.88 QP
4	890.728	31.13	23.00	4.82	29.11	29.84	46.00 -16.16 QP
5	938.833	31.81	23.34	4.99	29.10	31.04	46.00 -14.96 QP
6	986.072	33.67	23.65	5.17	29.10	33.39	54.00 -20.61 QP

Above 1GHz:

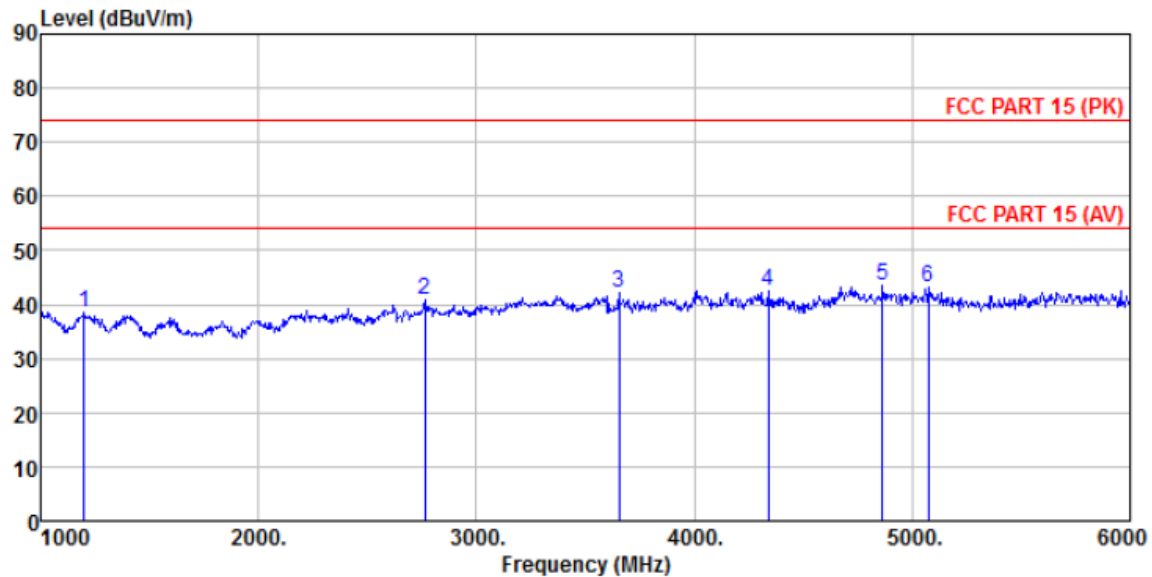
Test mode:	PC mode	Antenna Polarity:	Horizontal
------------	---------	-------------------	------------



Condition : FCC PART 15 (PK) BBHA9120D ANT(>1GHZ) HORIZONTAL
 Job No. : 2088RF
 Test Mode : PC mode
 Test Engineer: He

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	dBuV/m	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1210.000	42.08	25.39	4.47	33.10	38.84	74.00	-35.16	Peak
2	2355.000	40.02	27.69	5.34	34.05	39.00	74.00	-35.00	Peak
3	3215.000	39.47	28.68	6.39	33.08	41.46	74.00	-32.54	Peak
4	4290.000	35.51	30.65	8.15	31.84	42.47	74.00	-31.53	Peak
5	4740.000	35.04	31.70	8.54	32.06	43.22	74.00	-30.78	Peak
6	5640.000	32.67	32.36	9.70	32.35	42.38	74.00	-31.62	Peak

Test mode:	PC mode	Antenna Polarity:	Vertical
------------	---------	-------------------	----------

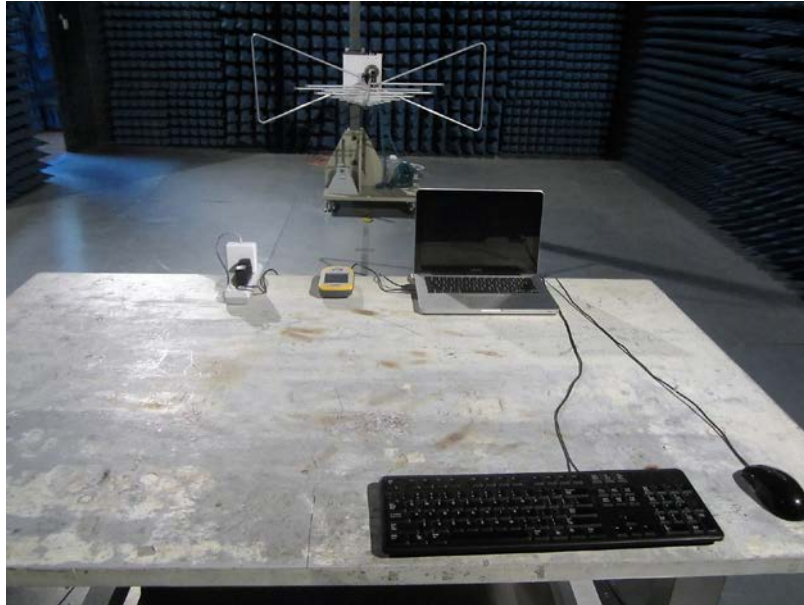


Condition : FCC PART 15 (PK) BBHA9120D ANT(>1GHZ) VERTICAL
 Job No. : 2088RF
 Test Mode : PC mode
 Test Engineer: He

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	dBuV/m	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1200.000	41.94	25.34	4.47	33.10	38.65	74.00	-35.35	Peak
2	2765.000	40.29	28.31	5.73	33.59	40.74	74.00	-33.26	Peak
3	3655.000	38.35	29.19	7.25	32.58	42.21	74.00	-31.79	Peak
4	4340.000	35.33	30.88	8.19	31.86	42.54	74.00	-31.46	Peak
5	4865.000	35.09	31.83	8.64	32.11	43.45	74.00	-30.55	Peak
6	5075.000	34.50	32.02	8.87	32.22	43.17	74.00	-30.83	Peak

8 Test Setup Photo

Radiated Emission



Conducted Emissions



9 EUT Constructional Details

Reference to the test report No. GTSE15110208801

-----End-----