

FCC Report

Applicant: SHENZHEN FCAR TECHNOLOGY CO.,LTD

Address of Applicant: 8th floor, Chuangyi Building, No. 3025 Nanhai Ave., Nanshan, Shenzhen, Guangdong, China 518060

Equipment Under Test (EUT)

Product Name: AUTO DIAGNOSTIC SYSTEM

Model No.: F7S-W, F7S-D, F7S-G, F7S-E, F7S-R, F7S-M, F7S-P, F7S-N

Trade Mark: FCAR

FCC ID: 2AJDD-IDIAGSF7S

Applicable standards: FCC CFR Title 47 Part 15 Subpart B:2015

Date of sample receipt: August 24, 2016

Date of Test: August 25-September 02, 2016

Date of report issue: September 05, 2016

Test Result : PASS *

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

Authorized Signature:



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.

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2 Version

Version No.	Date	Description
00	September 05, 2016	Original

Prepared By:

Kang. Liu

Date:

September 05, 2016

Project Engineer

Check By:

Andy. Wu

Date:

September 05, 2016

Reviewer

3 Contents

	Page
1 COVER PAGE	1
2 VERSION	2
3 CONTENTS	3
4 TEST SUMMARY	4
4.1 MEASUREMENT UNCERTAINTY	4
5 GENERAL INFORMATION	5
5.1 CLIENT INFORMATION	5
5.2 GENERAL DESCRIPTION OF EUT	5
5.3 TEST MODE	5
5.4 TEST FACILITY	6
5.5 TEST LOCATION	6
5.6 DESCRIPTION OF SUPPORT UNITS	6
5.7 DEVIATION FROM STANDARDS	6
5.8 ABNORMALITIES FROM STANDARD CONDITIONS	6
5.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER	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	17
9 EUT CONSTRUCTIONAL DETAILS	18

4 Test Summary

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

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

Remark : Test according to ANSI C63.4:2014.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	± 4.34dB	(1)
Radiated Emission	30MHz ~ 1000MHz	± 4.24dB	(1)
Radiated Emission	1GHz ~ 26.5GHz	± 4.68dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	± 3.45dB	(1)

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

5 General Information

5.1 Client Information

Applicant:	SHENZHEN FCAR TECHNOLOGY CO.,LTD
Address of Applicant:	8th floor, Chuangyi Building, No. 3025 Nanhai Ave., Nanshan, Shenzhen, Guangdong, China 518060
Manufacturer/ Factory:	SHENZHEN FCAR TECHNOLOGY CO.,LTD
Address of Manufacturer/ Factory:	8th floor, Chuangyi Building, No. 3025 Nanhai Ave., Nanshan, Shenzhen, Guangdong, China 518060

5.2 General Description of EUT

Product Name:	AUTO DIAGNOSTIC SYSTEM
Model No.:	F7S-W, F7S-D, F7S-G, F7S-E, F7S-R, F7S-M, F7S-P, F7S-N
Test Model No.:	F7S-W
<i>Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The only difference is the software.</i>	
Power Supply:	SWITCHING POWER ADAPTER Model No.:GME36A-120300FDS Input: AC 100~240V, 50/60Hz, 1.2A Output: DC 12V, 3A Or DC 3.7V, 10000mAh, 37Wh

5.3 Test mode

Test mode:	
TF card playing mode	Keep the EUT in TF card playing status.
USB playing mode	Keep the EUT in USB playing status.
LAN mode	Keep the EUT in playing by LAN port.
HDMI mode	Keep the EUT in playing by HDMI port.
PC mode	Keep the EUT in exchanging data with PC.

5.4 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 22, 2016.

- **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, August 15, 2016.

5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

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

5.6 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC Approval
Apple	PC	A1278	C1MN99ERDTY3	FCC DoC
DELL	KEYBOARD	SK-8115	N/A	FCC DoC
DELL	MOUSE	N/A	N/A	FCC DoC

5.7 Deviation from Standards

Biconical, log.per. antenna and horn antenna were used instead of dipole antenna. Semi-anechoic Chamber was used as alternation of open air test sites, and all test suites were performed with radiated method in it.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.

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	June 29 2016	June 28 2017
4	BiConiLog Antenna	SCHWARZBECK	VULB9163	GTS214	June 29 2016	June 28 2017
5	Double -ridged waveguide horn	SCHWARZBECK	9120D	GTS208	June 29 2016	June 28 2017
6	RF Amplifier	HP	8347A	GTS204	June 29 2016	June 28 2017
7	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	June 29 2016	June 28 2017
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial cable	GTS	N/A	GTS210	June 29 2016	June 28 2017
10	Coaxial Cable	GTS	N/A	GTS211	June 29 2016	June 28 2017
11	Thermo meter	N/A	N/A	GTS256	June 29 2016	June 28 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	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	June 29 2016	June 28 2017
3	Pulse Limiter	R&S	ESH3-Z2	GTS224	June 29 2016	June 28 2017
4	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June 29 2016	June 28 2017
5	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June 29 2016	June 28 2017
6	Coaxial Cable	GTS	N/A	GTS227	June 29 2016	June 28 2017
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Thermo meter	KTJ	TA328	GTS233	June 29 2016	June 28 2017

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	ChangChun	DYM3	GTS257	June 29 2016	June 28 2017

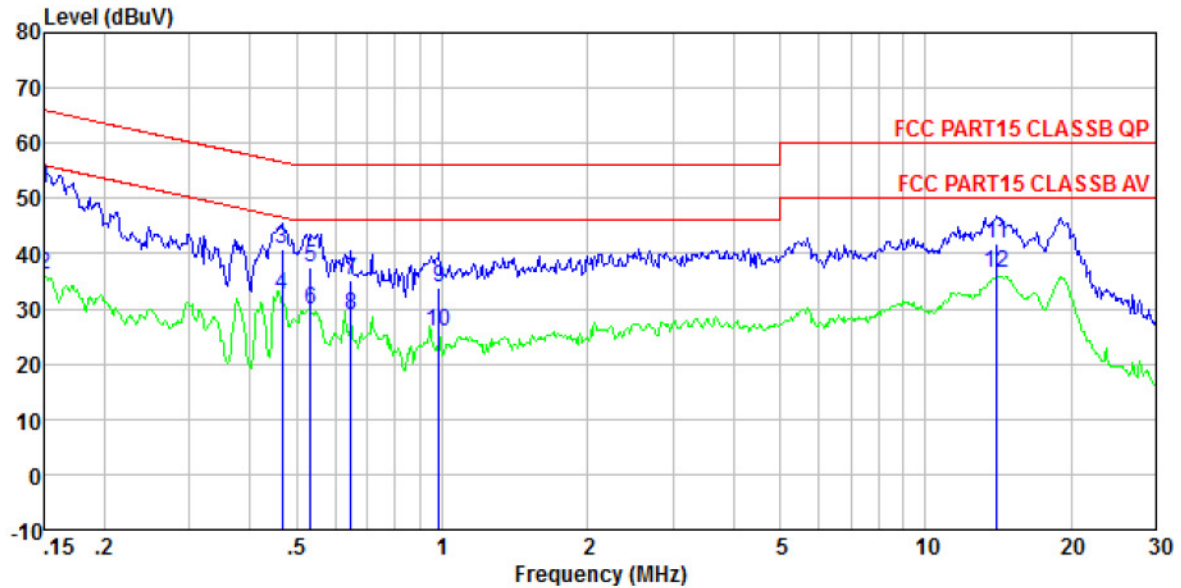
7 Test Results and Measurement Data

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, Sweep time=auto														
Limit:	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <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>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table> <p>* Decreases with the logarithm of the frequency.</p>	Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													
Test setup:	<p>Remark E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>														
Test procedure:	<ol style="list-style-type: none"> 1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides 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 refer 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 Instruments:	Refer to section 6 for details														
Test mode:	Refer to section 5.3 for details,only show the worst case.														
Test results:	Pass														

Measurement Data

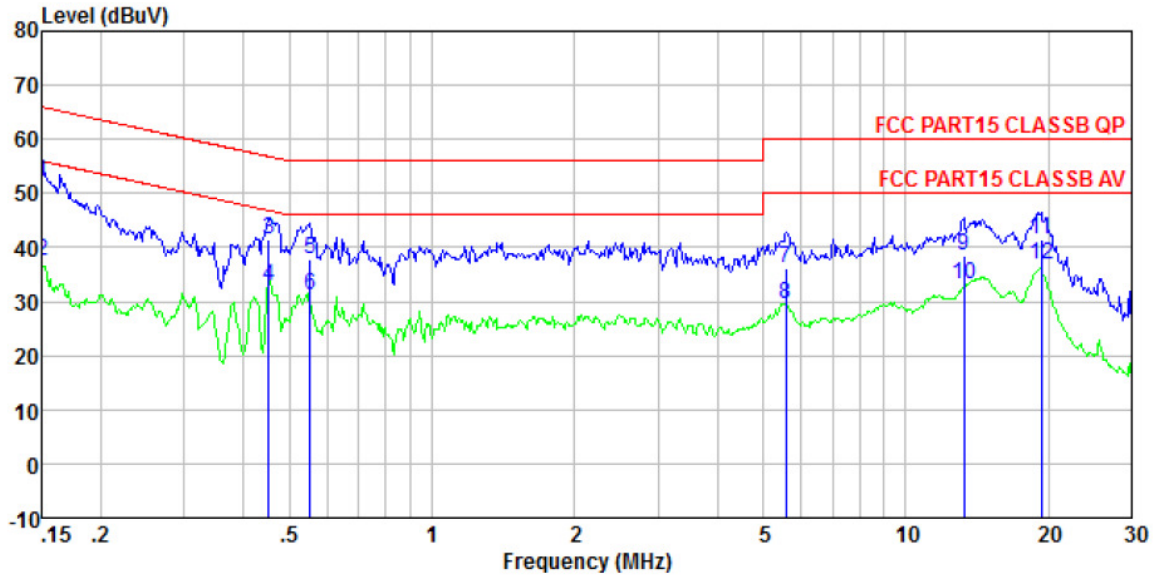
Line:



Site : Shielded room
 Condition : FCC PART15 CLASSB QP LISN-2013 LINE
 Job No. : 0197
 Test Mode : PC mode
 Test Engineer: Boy

	Read Freq	LISN Level	Cable Factor	Cable Loss	Limit Level	Over Line	Remark
	MHz	dBuV	dB	dB	dBuV	dB	
1	0.150	51.52	0.15	0.12	51.79	66.00	-14.21 QP
2	0.150	36.00	0.15	0.12	36.27	56.00	-19.73 Average
3	0.466	40.63	0.12	0.11	40.86	56.58	-15.72 QP
4	0.466	32.32	0.12	0.11	32.55	46.58	-14.03 Average
5	0.535	37.36	0.13	0.11	37.60	56.00	-18.40 QP
6	0.535	29.77	0.13	0.11	30.01	46.00	-15.99 Average
7	0.647	34.83	0.13	0.13	35.09	56.00	-20.91 QP
8	0.647	28.52	0.13	0.13	28.78	46.00	-17.22 Average
9	0.984	33.59	0.14	0.13	33.86	56.00	-22.14 QP
10	0.984	25.58	0.14	0.13	25.85	46.00	-20.15 Average
11	14.063	41.15	0.29	0.22	41.66	60.00	-18.34 QP
12	14.063	36.14	0.29	0.22	36.65	50.00	-13.35 Average

Neutral:



Site : Shielded room
 Condition : FCC PART15 CLASSB QP LISN-2013 NEUTRAL
 Job No. : 0197
 Test Mode : PC mode
 Test Engineer: Boy

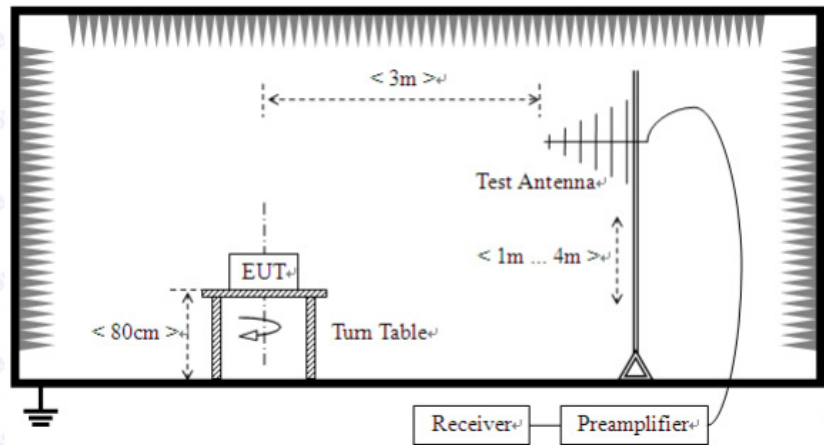
	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.150	51.99	0.07	0.12	52.18	66.00	-13.82	QP
2	0.150	37.46	0.07	0.12	37.65	56.00	-18.35	Average
3	0.452	41.29	0.06	0.11	41.46	56.85	-15.39	QP
4	0.452	32.82	0.06	0.11	32.99	46.85	-13.86	Average
5	0.552	37.78	0.07	0.11	37.96	56.00	-18.04	QP
6	0.552	30.90	0.07	0.11	31.08	46.00	-14.92	Average
7	5.594	35.86	0.16	0.15	36.17	60.00	-23.83	QP
8	5.594	29.11	0.16	0.15	29.42	50.00	-20.58	Average
9	13.267	37.95	0.32	0.21	38.48	60.00	-21.52	QP
10	13.267	32.72	0.32	0.21	33.25	50.00	-16.75	Average
11	19.326	40.67	0.49	0.22	41.38	60.00	-18.62	QP
12	19.326	35.99	0.49	0.22	36.70	50.00	-13.30	Average

Notes:

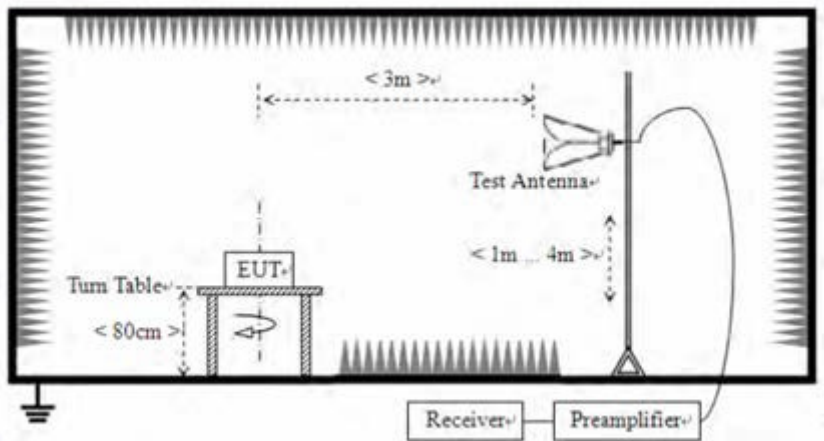
1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

7.2 Radiated Emission

Test Requirement:	FCC Part15 B Section 15.109																				
Test Method:	ANSI C63.4:2014																				
Test Frequency Range:	30MHz to 40GHz																				
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)																				
Receiver setup:	<table border="1"> <thead> <tr> <th>Frequency</th> <th>Detector</th> <th>RBW</th> <th>VBW</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>30MHz-1GHz</td> <td>Quasi-peak</td> <td>120kHz</td> <td>300kHz</td> <td>Quasi-peak Value</td> </tr> <tr> <td rowspan="2">Above 1GHz</td> <td>Peak</td> <td>1MHz</td> <td>3MHz</td> <td>Peak Value</td> </tr> <tr> <td>Peak</td> <td>1MHz</td> <td>10Hz</td> <td>Average Value</td> </tr> </tbody> </table>	Frequency	Detector	RBW	VBW	Remark	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value	Above 1GHz	Peak	1MHz	3MHz	Peak Value	Peak	1MHz	10Hz	Average Value	
Frequency	Detector	RBW	VBW	Remark																	
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value																	
Above 1GHz	Peak	1MHz	3MHz	Peak Value																	
	Peak	1MHz	10Hz	Average Value																	
Limit:	<table border="1"> <thead> <tr> <th>Frequency</th> <th>Limit (dBuV/m @3m)</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>30MHz-88MHz</td> <td>40.00</td> <td>Quasi-peak Value</td> </tr> <tr> <td>88MHz-216MHz</td> <td>43.50</td> <td>Quasi-peak Value</td> </tr> <tr> <td>216MHz-960MHz</td> <td>46.00</td> <td>Quasi-peak Value</td> </tr> <tr> <td>960MHz-1GHz</td> <td>54.00</td> <td>Quasi-peak Value</td> </tr> <tr> <td rowspan="2">Above 1GHz</td> <td>54.00</td> <td>Average Value</td> </tr> <tr> <td>74.00</td> <td>Peak Value</td> </tr> </tbody> </table>	Frequency	Limit (dBuV/m @3m)	Remark	30MHz-88MHz	40.00	Quasi-peak Value	88MHz-216MHz	43.50	Quasi-peak Value	216MHz-960MHz	46.00	Quasi-peak Value	960MHz-1GHz	54.00	Quasi-peak Value	Above 1GHz	54.00	Average Value	74.00	Peak Value
Frequency	Limit (dBuV/m @3m)	Remark																			
30MHz-88MHz	40.00	Quasi-peak Value																			
88MHz-216MHz	43.50	Quasi-peak Value																			
216MHz-960MHz	46.00	Quasi-peak Value																			
960MHz-1GHz	54.00	Quasi-peak Value																			
Above 1GHz	54.00	Average Value																			
	74.00	Peak Value																			
Test Procedure:	<ol style="list-style-type: none"> The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 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. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 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 setup:	Below 1GHz																				



Above 1GHz

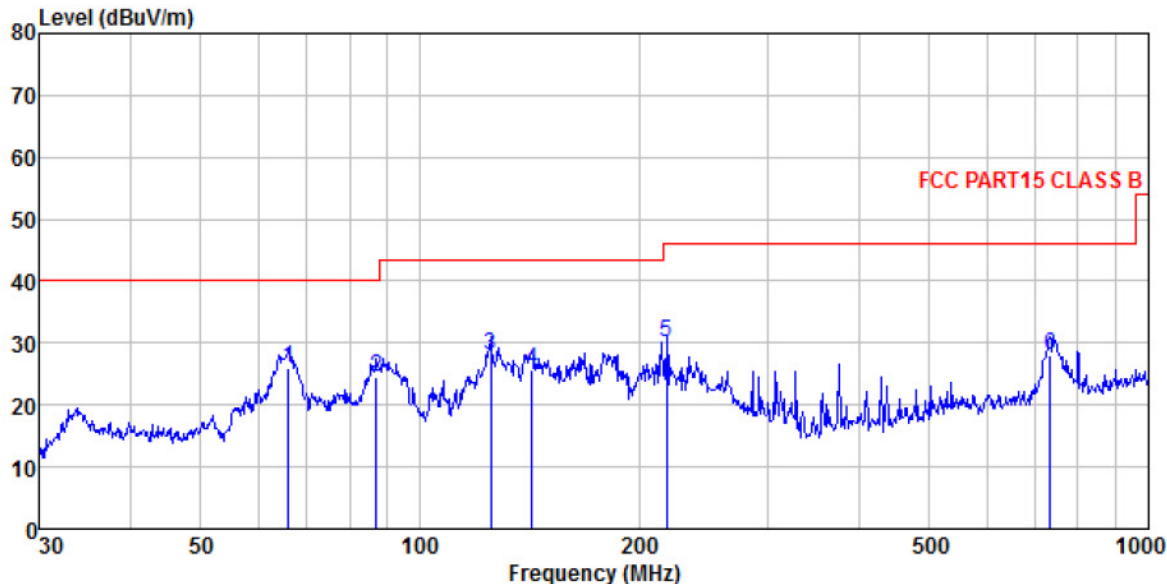


Test environment:	Temp.: 25 °C	Humid.: 52%	Press.: 1 012mbar
Measurement Record:	Uncertainty: ± 4.5dB		
Test Instruments:	Refer to section 6 for details		
Test mode:	Refer to section 5.3 for details, only show the worst case.		
Test results:	Pass		

Measurement Data

Below 1GHz

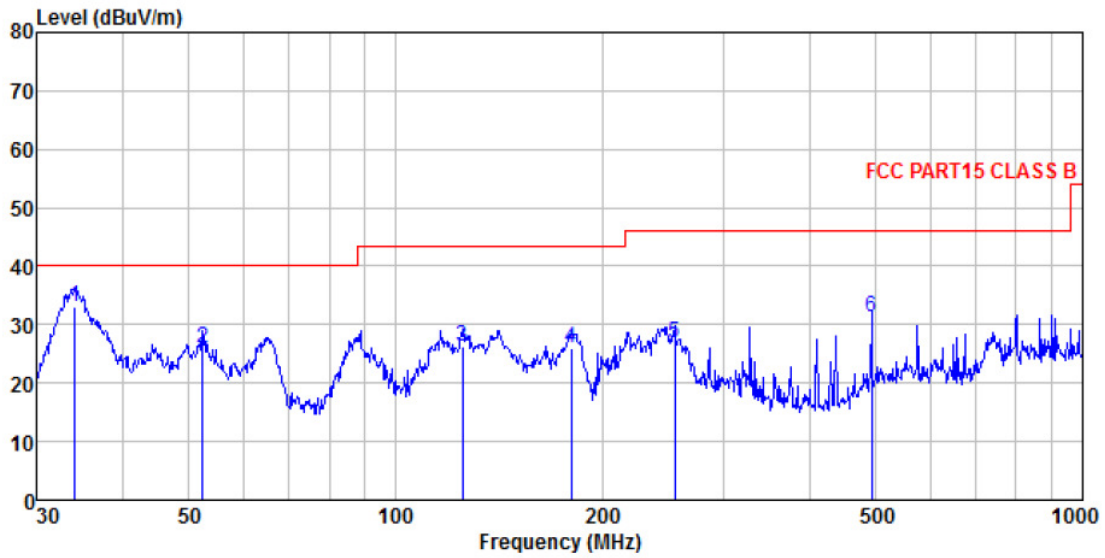
Horizontal:



Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m HORIZONTAL
 Job No. : 0197
 Test Mode : PC mode
 Test Engineer: Sky

	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	66.034	42.54	12.30	0.91	29.88	25.87	40.00	-14.13 QP
2	87.112	40.18	13.03	1.09	29.76	24.54	40.00	-15.46 QP
3	125.007	44.56	11.70	1.40	29.54	28.12	43.50	-15.38 QP
4	142.324	43.42	10.21	1.52	29.44	25.71	43.50	-17.79 QP
5	218.309	44.31	13.13	1.95	29.38	30.01	46.00	-15.99 QP
6	731.920	31.72	21.19	4.20	29.20	27.91	46.00	-18.09 QP

Vertical:

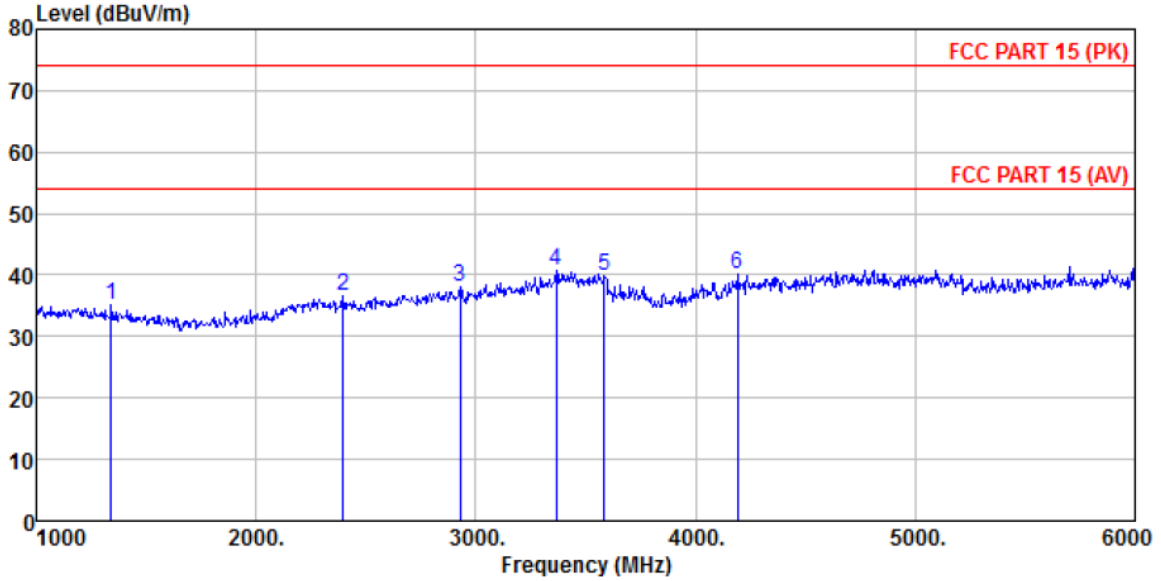


Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VERTICAL
 Job No. : 0197
 Test Mode : PC mode
 Test Engineer: Sky

	ReadAntenna	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	34.156	48.30	14.31	0.60	30.08	33.13	40.00	-6.87 QP
2	52.391	40.07	15.14	0.79	29.98	26.02	40.00	-13.98 QP
3	125.007	42.68	11.70	1.40	29.54	26.24	43.50	-17.26 QP
4	180.017	41.73	11.68	1.74	29.27	25.88	43.50	-17.62 QP
5	254.728	40.27	14.06	2.15	29.68	26.80	46.00	-19.20 QP
6	492.469	38.94	18.39	3.27	29.32	31.28	46.00	-14.72 QP

Above 1GHz

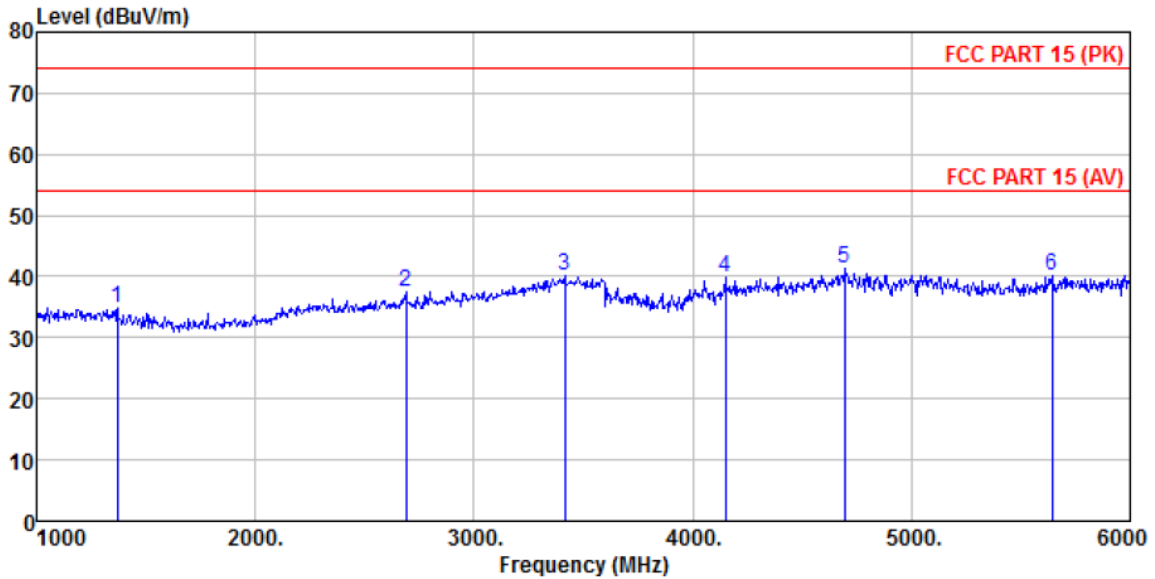
Horizontal:



Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m HORIZONTAL
 Job No. : 0197
 Test Mode : PC mode
 Test Engineer: Sky

	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	1340.000	38.26	25.69	4.57	33.33	35.19	74.00 -38.81 Peak
2	2395.000	37.66	27.59	5.39	34.01	36.63	74.00 -37.37 Peak
3	2930.000	37.18	28.44	5.87	33.39	38.10	74.00 -35.90 Peak
4	3365.000	38.31	28.51	6.70	32.91	40.61	74.00 -33.39 Peak
5	3585.000	36.35	29.12	7.13	32.66	39.94	74.00 -34.06 Peak
6	4190.000	33.74	30.18	8.05	31.96	40.01	74.00 -33.99 Peak

Vertical:



Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m VERTICAL
 Job No. : 0197
 Test Mode : PC mode
 Test Engineer: Sky

	ReadAntenna	Cable	Preamp	Limit	Over				
Freq	Level	Factor	Loss	Factor	Level	Line			
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m			
1	1370.000	37.88	25.66	4.59	33.39	34.74	74.00	-39.26	Peak
2	2690.000	37.25	28.12	5.66	33.68	37.35	74.00	-36.65	Peak
3	3415.000	37.44	28.87	6.80	32.85	40.06	74.00	-33.94	Peak
4	4150.000	33.67	30.06	8.01	32.01	39.73	74.00	-34.27	Peak
5	4695.000	33.19	31.65	8.51	32.03	41.32	74.00	-32.68	Peak
6	5645.000	30.52	32.36	9.72	32.35	40.25	74.00	-33.75	Peak

Note:

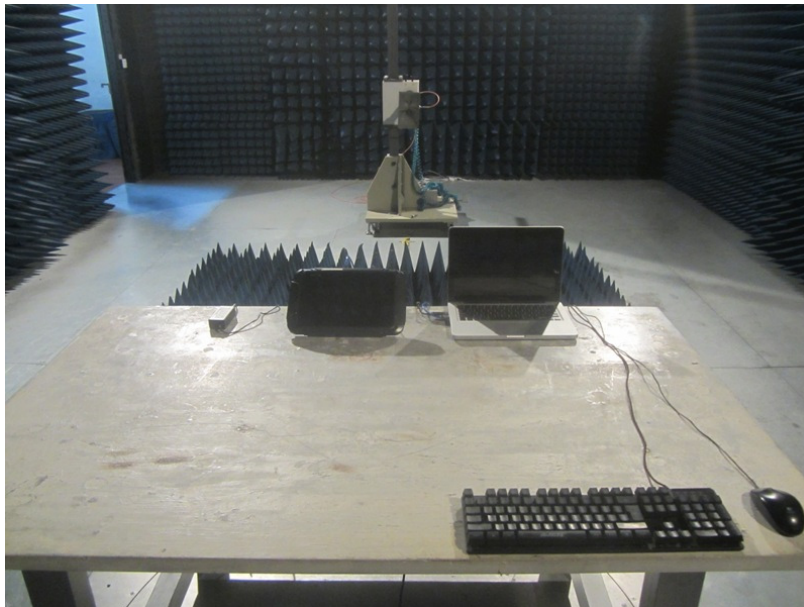
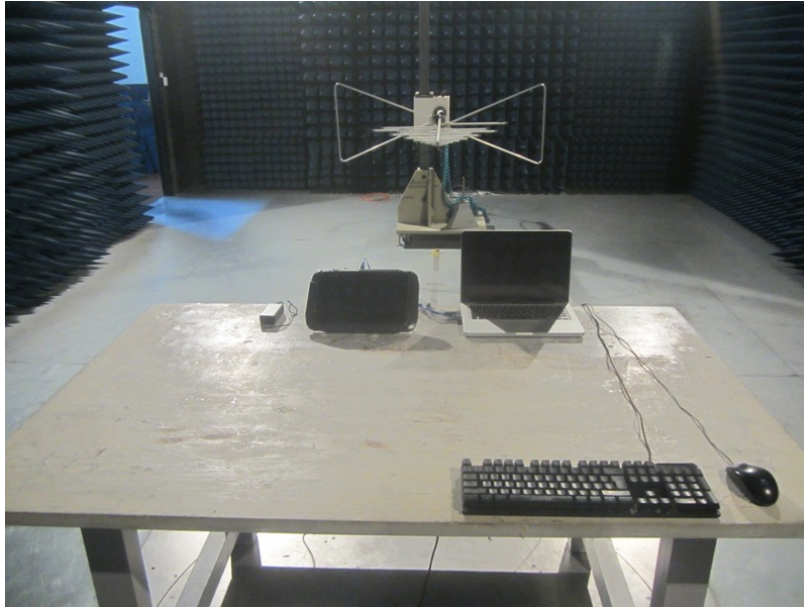
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$

Because the level of data above 1GHz is too low, so only show the data to 6GHz.

8 Test Setup Photo

Radiated Emission



Conducted Emission



9 EUT Constructional Details

Reference to the test report No. GTS201608000197E01

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