

FCC REPORT

Applicant: SHENZHEN TUGAO INTELLIGENT CO., LTD.

Address of Applicant: 8th Floor, Bldg A, Jingang Science&Technology Park, Fuyong, Bao'an District, Shenzhen, Guangdong, China.

Equipment Under Test (EUT)

Product Name: Smart phone

Model No.: Symbol S4

FCC ID: 2AOKUSYMBOLS4

Applicable standards: FCC CFR Title 47 Part 15 Subpart B

Date of sample receipt: 24 May, 2018

Date of Test: 24 May, to 25 Jun., 2018

Date of report issued: 26 Jun., 2018

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.

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2 Version

Version No.	Date	Description
00	26 Jun., 2018	Original

Tested by:

Mike.Ou

Date:

26 Jun., 2018

Test Engineer

Reviewed by:

Wimer Zhang

Date:

26 Jun., 2018

Project Engineer

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4 Test Summary

Test Item	Section in CFR 47	Result
Conducted Emission	Part 15.107	Pass
Radiated Emission	Part 15.109	Pass
<p><i>Remark:</i> <i>Pass: The EUT complies with the essential requirements in the standard.</i> <i>N/A: The EUT not applicable of the test item.</i></p>		

5 General Information

5.1 Client Information

Applicant:	SHENZHEN TUGAO INTELLIGENT CO., LTD.
Address of Applicant:	8th Floor, Bldg A, Jingang Science&Technology Park, Fuyong, Bao'an District, Shenzhen, Guangdong, China.
Manufacturer / Factory:	SHENZHEN TUGAO INTELLIGENT CO., LTD.
Address:	8th Floor, Bldg A, Jingang Science&Technology Park, Fuyong, Bao'an District, Shenzhen, Guangdong, China.

5.2 General Description of E.U.T.

Product Name:	Smart phone
Model No.:	Symbol S4
Power supply:	Rechargeable Li-ion Battery DC3.8V-3750mAh
AC adapter :	Model: 853-5010 Input: AC100-240V, 50/60Hz, 0.15A Output: DC 5.0V, 1.5A

5.3 Test Mode

Operating mode	Detail description
PC mode	Keep the EUT in Downloading mode(Worst case)
Charging+Recording mode	Keep the EUT in Charging+Recording mode
Charging+Playing mode	Keep the EUT in Charging+Playing mode
FM mode	Keep the EUT in FM receiver mode
GPS mode	Keep the EUT in GPS receiver 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

Parameters	Expanded Uncertainty
Conducted Emission (9kHz ~ 30MHz)	±2.22 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	±2.76 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	±4.28 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	±5.72 dB (k=2)
Radiated Emission (18GHz ~ 40GHz)	±2.88 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
LENOVO	Laptop	SL510	2847A65	DoC

5.6 Related Submittal(s) / Grant (s)

This is an original grant, no related submittals and grants.

5.7 Laboratory Facility

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

- **FCC - Registration No.: 727551**
Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The Registration No. is 727551.
- **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.
- **A2LA - Registration No.: 4346.01**
This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopepdf/4346-01.pdf>

5.8 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
 Email: info@ccis-cb.com, Website: http://www.ccis-cb.com

5.9 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	07-22-2017	07-21-2020
2	BiConiLog Antenna	SCHWARZBECK	VULB9163	CCIS0005	03-16-2018	03-15-2019
3	Horn Antenna	SCHWARZBECK	BBHA9120D	CCIS0006	03-16-2018	03-15-2019
4	Pre-amplifier (10kHz-1.3GHz)	HP	8447D	CCIS0003	03-07-2018	03-06-2019
5	Pre-amplifier (1GHz-18GHz)	Compliance Direction Systems Inc.	PAP-1G18	CCIS0011	03-07-2018	03-06-2019
6	Spectrum analyzer 9k-30GHz	Rohde & Schwarz	FSP30	CCIS0023	03-07-2018	03-06-2019
7	EMI Test Receiver	Rohde & Schwarz	ESRP7	CCIS0167	03-07-2018	03-06-2019
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial Cable	N/A	N/A	CCIS0018	03-07-2018	03-06-2019
10	Coaxial Cable	N/A	N/A	CCIS0020	03-07-2018	03-06-2019

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	07-22-2017	07-21-2020
2	EMI Test Receiver	Rohde & Schwarz	ESCI	CCIS0002	03-07-2018	03-06-2019
3	LISN	CHASE	MN2050D	CCIS0074	03-19-2018	03-18-2019
4	LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2017	07-20-2018
5	Coaxial Cable	CCIS	N/A	CCIS0086	03-07-2018	03-06-2019
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

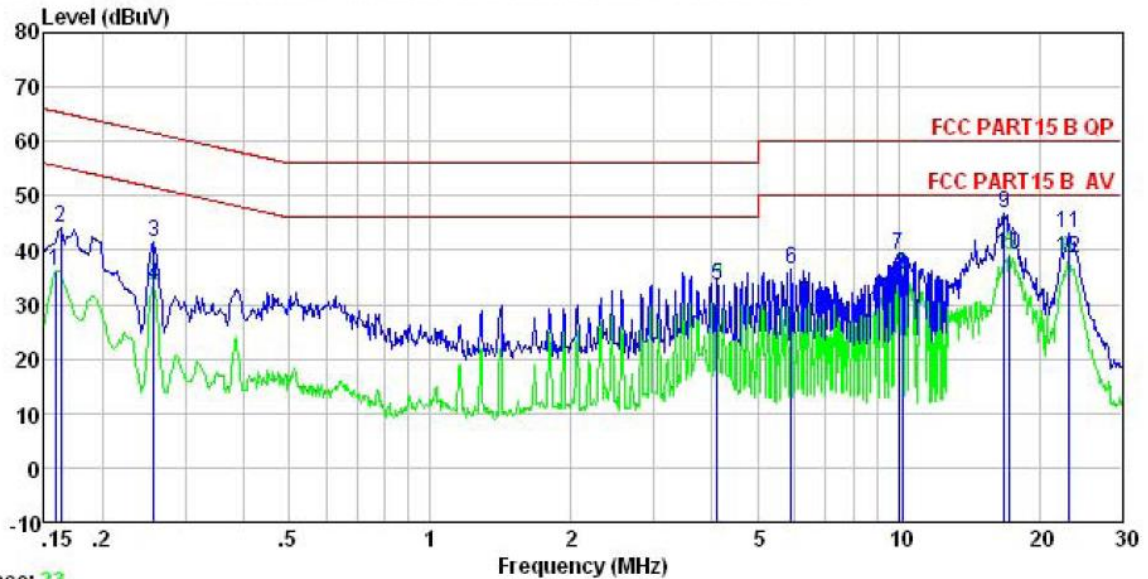
6 Test results and Measurement Data

6.1 Conducted Emission

Test Requirement:	FCC Part 15 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 (dB μ V)	
		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:	<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.). 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.:	23 °C	Humid.: 56% Press.: 101kPa
Test Instruments:	Refer to section 5.9 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Pass		

Measurement data:

Test Phase: Line



Trace: 23

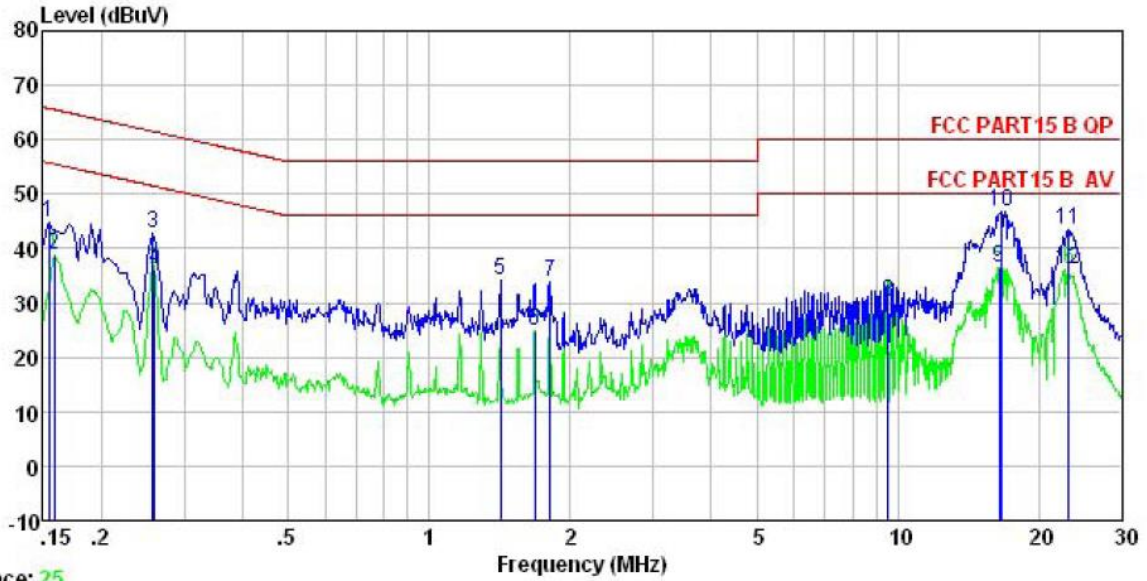
Site : CCIS Shielding Room
 Condition : FCC PART15 B QP LISN LINE
 EUT : Smart phone
 Model : Symbol S4
 Test Mode : PC Mode
 Power Rating : AC 120V/60Hz
 Environment : Temp: 23.2 °C Humi:56% Atmos:101KPa
 Test Engineer: Alex
 Remark :

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.158	25.17	0.27	10.78	36.22	55.56	-19.34	Average
2	0.162	33.17	0.27	10.77	44.21	65.34	-21.13	QP
3	0.258	30.56	0.27	10.75	41.58	61.51	-19.93	QP
4	0.258	22.44	0.27	10.75	33.46	51.51	-18.05	Average
5	4.092	22.37	0.28	10.89	33.54	46.00	-12.46	Average
6	5.898	25.42	0.31	10.82	36.55	60.00	-23.45	QP
7	10.019	27.94	0.31	10.94	39.19	60.00	-20.81	QP
8	10.179	24.13	0.31	10.94	35.38	50.00	-14.62	Average
9	16.839	35.70	0.33	10.91	46.94	60.00	-13.06	QP
10	17.291	27.79	0.33	10.91	39.03	50.00	-10.97	Average
11	23.018	31.81	0.45	10.89	43.15	60.00	-16.85	QP
12	23.018	27.18	0.45	10.89	38.52	50.00	-11.48	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.

Test Phase: Neutral



Trace: 25

Site : CCIS Shielding Room
 Condition : FCC PART15 B QP LISN NEUTRAL
 EUT : Smart phone
 Model : Symbol S4
 Test Mode : PC Mode
 Power Rating : AC 120V/60Hz
 Environment : Temp: 23.2 °C Humi:56% Atmos:101KPa
 Test Engineer: Alex
 Remark :

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.154	33.84	0.25	10.78	44.87	65.78	-20.91	QP
2	0.158	27.76	0.25	10.78	38.79	55.56	-16.77	Average
3	0.258	31.68	0.26	10.75	42.69	61.51	-18.82	QP
4	0.259	25.18	0.26	10.75	36.19	51.47	-15.28	Average
5	1.418	22.86	0.26	10.92	34.04	56.00	-21.96	QP
6	1.680	13.63	0.27	10.94	24.84	46.00	-21.16	Average
7	1.810	22.51	0.28	10.95	33.74	56.00	-22.26	QP
8	9.552	19.14	0.25	10.92	30.31	50.00	-19.69	Average
9	16.486	25.33	0.25	10.91	36.49	50.00	-13.51	Average
10	16.573	35.73	0.25	10.91	46.89	60.00	-13.11	QP
11	23.018	32.14	0.40	10.89	43.43	60.00	-16.57	QP
12	23.140	24.88	0.42	10.89	36.19	50.00	-13.81	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.

6.2 Radiated Emission

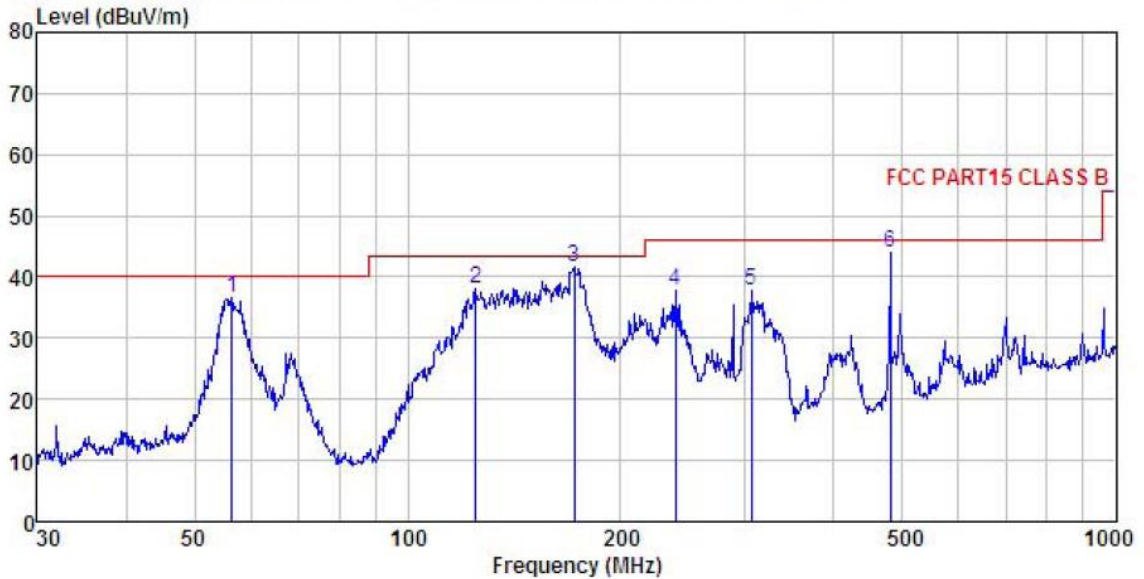
Test Requirement:	FCC Part 15 B Section 15.109				
Test Method:	ANSI C63.4:2014				
Test Frequency Range:	30MHz to 6000MHz				
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak RMS	1MHz 1MHz	3MHz 3MHz	Peak Value 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				

<p>Test Procedure:</p>	<ol style="list-style-type: none"> 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. 						
<p>Test environment:</p>	<table border="1"> <tr> <td>Temp.:</td> <td>25 °C</td> <td>Humid.:</td> <td>55%</td> <td>Press.:</td> <td>1 01kPa</td> </tr> </table>	Temp.:	25 °C	Humid.:	55%	Press.:	1 01kPa
Temp.:	25 °C	Humid.:	55%	Press.:	1 01kPa		
<p>Test Instruments:</p>	<p>Refer to section 5.9 for details</p>						
<p>Test mode:</p>	<p>Refer to section 5.3 for details</p>						
<p>Test results:</p>	<p>Passed</p>						
<p>Remark:</p>	<p>All of the observed value above 6GHz were the noise floor , which were no recorded</p>						

Measurement Data:

Below 1GHz

Test Polarization: Horizontal



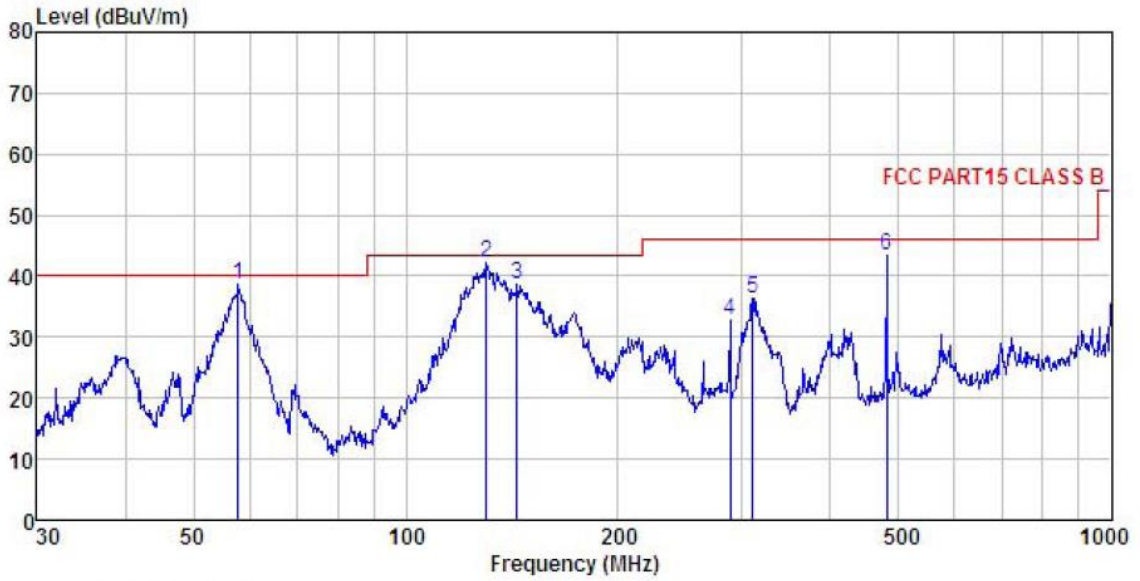
Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VULB9163(30M2G) HORIZONTAL
 EUT : Smart phone
 Model : Symbol S4
 Test mode : PC mode
 Power Rating : AC 120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: Alex
 Remark : TF TO PC

	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	56.395	51.93	12.98	1.36	29.79	36.48	40.00	-3.52 QP
2	125.007	55.86	9.43	2.22	29.36	38.15	43.50	-5.35 QP
3	171.995	58.60	9.48	2.67	29.03	41.72	43.50	-1.78 QP
4	239.147	50.56	12.94	2.82	28.60	37.72	46.00	-8.28 QP
5	305.680	49.52	13.72	2.96	28.46	37.74	46.00	-8.26 QP
6	480.528	52.52	16.97	3.46	28.92	44.03	46.00	-1.97 QP

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test Polarization: Vertical



Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VULB9163(30M2G) VERTICAL
 EUT : Smart phone
 Model : Symbol S4
 Test mode : PC mode
 Power Rating : AC 120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: Alex
 Remark : TF TO PC

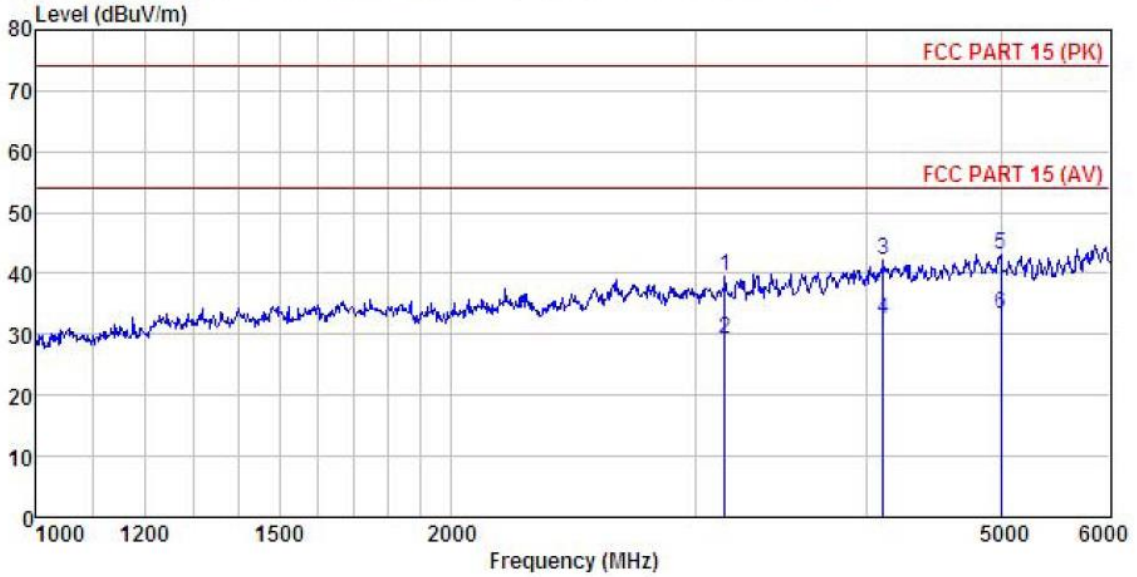
	Read	Antenna	Cable	Preamp	Limit	Over		
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	57.796	54.31	12.75	1.37	29.78	38.65	40.00	-1.35 QP
2	129.923	60.68	8.71	2.28	29.33	42.34	43.50	-1.16 QP
3	143.830	57.07	8.30	2.44	29.25	38.56	43.50	-4.94 QP
4	287.990	44.77	13.53	2.91	28.47	32.74	46.00	-13.26 QP
5	309.998	48.01	13.81	2.97	28.47	36.32	46.00	-9.68 QP
6	480.528	51.93	16.97	3.46	28.92	43.44	46.00	-2.56 QP

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Above 1GHz

Test Polarization: Horizontal



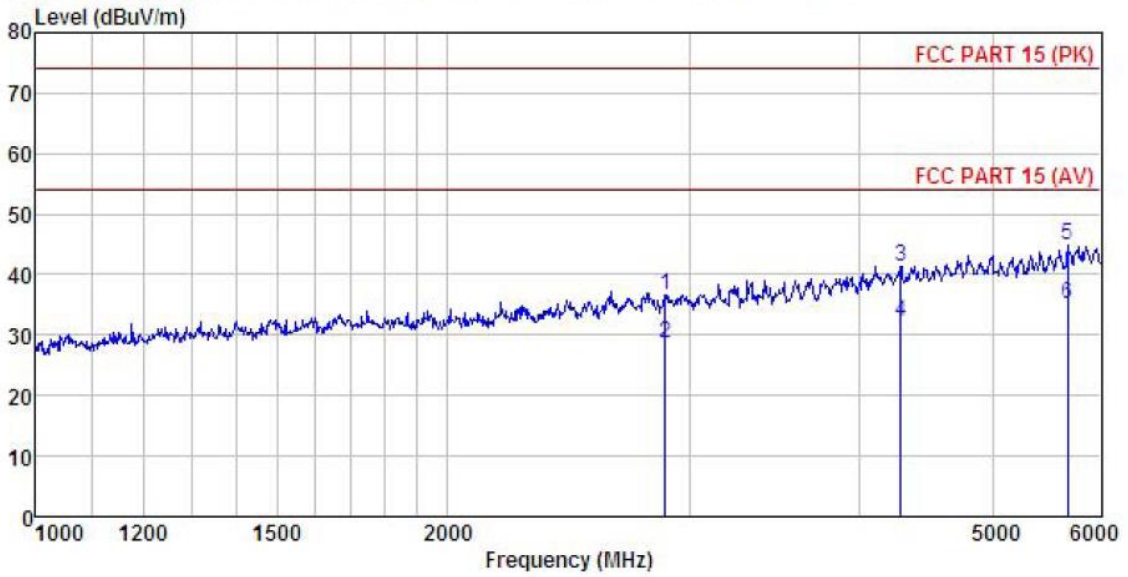
Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL
 EUT : Smart Phone
 Model : Symbol S4
 Test mode : PC Mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: Alex
 REMARK :

	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	3153.515	46.75	28.70	5.40	41.43	39.42	74.00 -34.58 Peak
2	3153.515	36.60	28.70	5.40	41.43	29.27	74.00 -44.73 Average
3	4111.131	47.47	30.41	6.27	41.81	42.34	74.00 -31.66 Peak
4	4111.131	37.50	30.41	6.27	41.81	32.37	74.00 -41.63 Average
5	4997.811	46.21	31.90	6.94	41.88	43.17	74.00 -30.83 Peak
6	4997.811	36.29	31.90	6.94	41.88	33.25	74.00 -40.75 Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamp Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test Polarization: Vertical



Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL
 EUT : Smart Phone
 Model : Symbol S4
 Test mode : PC Mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: Alex
 REMARK :

	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	2883.284	44.66	28.38	5.22	41.60	36.66	74.00 -37.34 Peak
2	2883.284	36.53	28.38	5.22	41.60	28.53	54.00 -25.47 Average
3	4284.092	46.02	30.72	6.52	41.87	41.39	74.00 -32.61 Peak
4	4284.092	36.76	30.72	6.52	41.87	32.13	54.00 -21.87 Average
5	5675.819	46.56	32.73	7.55	41.89	44.95	74.00 -29.05 Peak
6	5675.819	36.62	32.73	7.55	41.89	35.01	54.00 -18.99 Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.