FCC TEST REPORT

FCC ID: SY4-B01011

On Behalf of

Shanghai Huace Navigation Technology LTD.

Handheld GNSS Data Collector

Model No.: LT50

Prepared for	:	Shanghai Huace Navigation Technology LTD.
Address	:	Building C, 599 Gaojing Road, Qingpu District, Shanghai, China

Prepared By	:	Shenzhen Alpha Product Testing Co., Ltd.
Address	:	Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

Report Number	:	T1880174 01
Date of Receipt	:	January 25, 2018
Date of Test	:	January 25, 2018-June 28, 2018
Date of Report	:	June 28, 2018
Version Number	:	REV0

Contents

TEST REPORT DECLARATION

Applicant	:	Shanghai Huace Navigation Technology LTD.
Address	:	Building C, 599 Gaojing Road, Qingpu District, Shanghai, China
Manufacturer	:	Shanghai Huace Navigation Technology LTD.
Address	:	Building C, 599 Gaojing Road, Qingpu District, Shanghai, China
EUT Description	:	Handheld GNSS Data Collector
	(A) Model No.	: LT50
	(B) Trademark	: CHCNAV

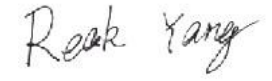
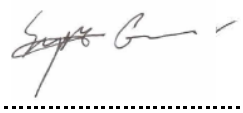
Measurement Standard Used:

FCC CFR Title 47 Part 15 Subpart B

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....:	Reak Yang Project Engineer	
Approved by (name + signature).....:	Simple Guan Project Manager	
Date of issue..... .....:	June 28, 2018	

Revision History

Revision	Issue Date	Revisions	Revised By
00	June 28, 2018	Initial released Issue	Simple Guan

1 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

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%.			

2 General Information

2.1 General Description of EUT

Product Name:	Handheld GNSS Data Collector
Model No.:	LT50
Power supply:	DC 3.8V by battery or DC 5V from adapter input AC 120V, 60Hz

2.2 Test mode

Test mode:	
Mode 1	Data Transmitting

2.3 Test Facility

Shenzhen Alpha Product Testing Co., Ltd

Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

June 21, 2018 File on Federal Communication Commission
Registration Number: 293961

July 25, 2017 Certificated by IC
Registration Number: 12135A

2.4 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC Approval
ACER	USB Keyboard	SK-9625	KBUSB1580500037E0 100	FCC DoC
ACER	USB Mouse	MS.11200.014	M-UAY-ACR2	FCC DoC
HP	Printer	HP1020	CNCJ410726	CE
ACER	Monitor	G205HV	SNID:10306738385	CE
ACER	Personal Computer	ASPIRE M1830	PTSF90C00305005CA C3000	DOC

2.5 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.

2.6 Abnormalities from Standard Conditions

None.

2.7 Other Information Requested by the Customer

None.

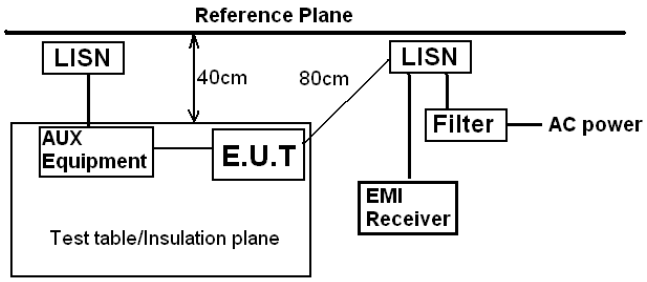
3 Test Instruments list

Test Equipment List

Equipment	Manufacture	Model No.	Serial No.	Last cal.	Cal Interval
3m Semi-Anechoic	ETS-LINDGREN	N/A	SEL0017	2017.09.22	1Year
Spectrum analyzer	Agilent	E4407B	MY46185649	2017.09.22	1Year
Receiver	R&S	ESCI	1166.5950K03-1011	2017.09.22	1Year
Receiver	R&S	ESCI	101202	2017.09.22	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	VULB9168-438	2016.09.30	2Year
Horn Antenna	EMCO	3115	640201028-06	2016.09.30	2Year
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2016.09.30	2Year
Cable	Resenberger	N/A	No.1	2017.09.22	1Year
Cable	SCHWARZBECK	N/A	No.2	2017.09.22	1Year
Cable	SCHWARZBECK	N/A	No.3	2017.09.22	1Year
Pre-amplifier	Schwarzbeck	BBV9743	9743-019	2017.09.22	1Year
Pre-amplifier	R&S	AFS33-18002650-30-8P-44	SEL0080	2017.09.22	1Year
Base station	Agilent	E5515C	GB44300243	2017.09.22	1 Year
Temperature controller	Terchy	MHQ	120	2017.09.22	1Year
Power divider	Anritsu	K240C	020346	2017.09.22	1 Year
Signal Generator	HP	83732B	VS3449051	2017.09.22	1 Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126466	2017.09.22	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	101043	2017.09.22	1 Year
20db Attenuator	ICPROBING	IATS1	82347	2017.09.22	1 Year
18-40 Horn Antenna	18-40G antenna	Sas-574	571	2018-3-15	2021-03-18

4 Test Results and Measurement Data

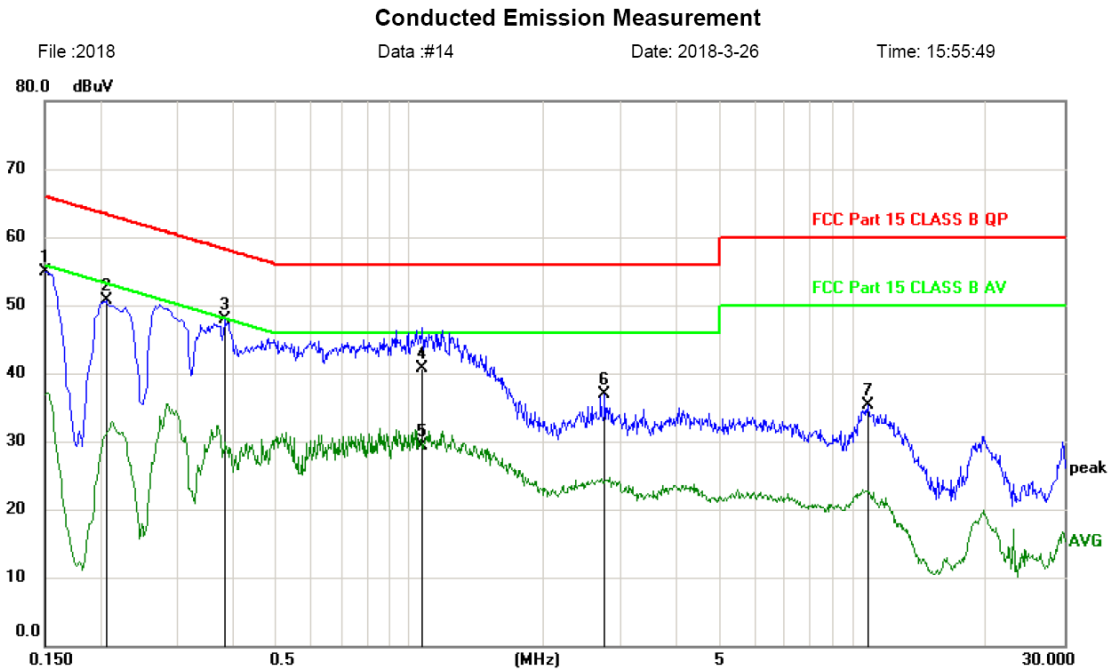
4.1 Conducted Emissions

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 B Section 15.107</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4:2014</td></tr>
<tr><td>Test Frequency Range:</td><td>150KHz to 30MHz</td></tr>
<tr><td>Class / Severity:</td><td>Class B</td></tr>
<tr><td>Receiver setup:</td><td>RBW=9KHz, VBW=30KHz, Sweep time=auto</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></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>5-30</td><td>60</td><td>50</td></tr>
</table>
* Decreases with the logarithm of the frequency.
</td></tr>
<tr><td>Test setup:</td><td>


Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m
</td></tr>
<tr><td>Test procedure:</td><td>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.</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 6 for details</td></tr>
<tr><td>Test mode:</td><td>Pre-scan all modes in section 5.2,.</td></tr>
<tr><td>Test results:</td><td>Pass</td></tr>
</table>

Measurement Data

Line:

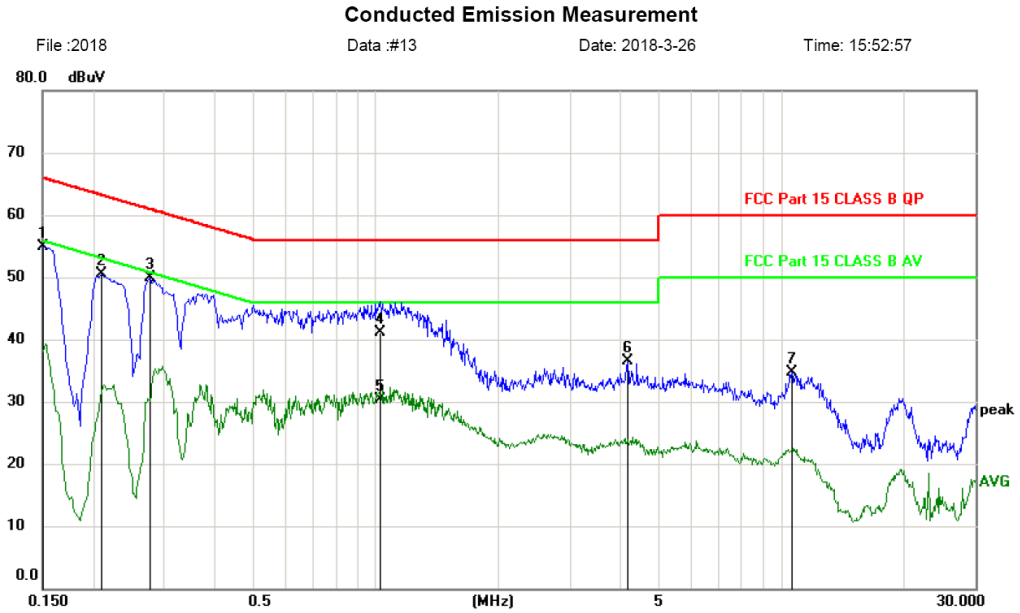


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	54.94	0.00	54.94	66.00	-11.06	peak	
2		0.2070	50.61	0.00	50.61	63.32	-12.71	peak	
3	*	0.3840	47.93	0.00	47.93	58.19	-10.26	peak	
4		1.0680	40.62	0.00	40.62	56.00	-15.38	QP	
5		1.0680	29.36	0.00	29.36	46.00	-16.64	AVG	
6		2.7630	36.96	0.00	36.96	56.00	-19.04	peak	
7		10.7940	35.22	0.00	35.22	60.00	-24.78	peak	

*:Maximum data x:Over limit !:over margin

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Neutral:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	54.93	0.00	54.93	66.00	-11.07	peak	
2		0.2100	50.51	0.00	50.51	63.21	-12.70	peak	
3	*	0.2760	49.87	0.00	49.87	60.94	-11.07	peak	
4		1.0260	41.05	0.00	41.05	56.00	-14.95	QP	
5		1.0260	30.21	0.00	30.21	46.00	-15.79	AVG	
6		4.1730	36.48	0.00	36.48	56.00	-19.52	peak	
7		10.6049	34.66	0.00	34.66	60.00	-25.34	peak	

*:Maximum data x:Over limit !:over margin

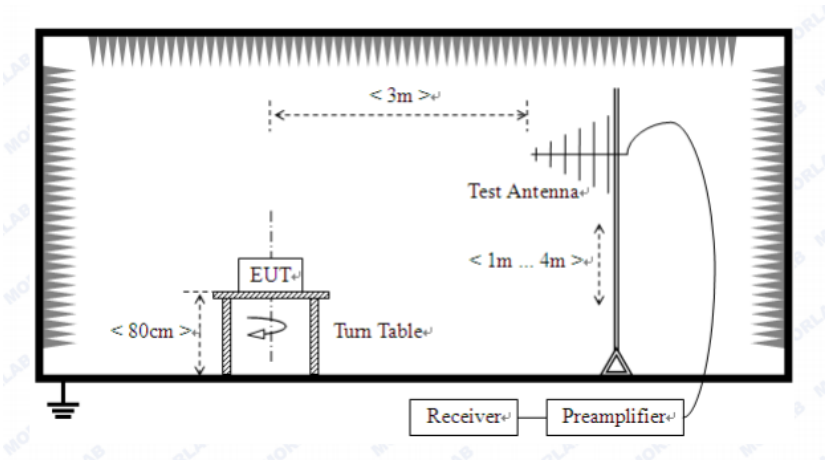
Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Notes:

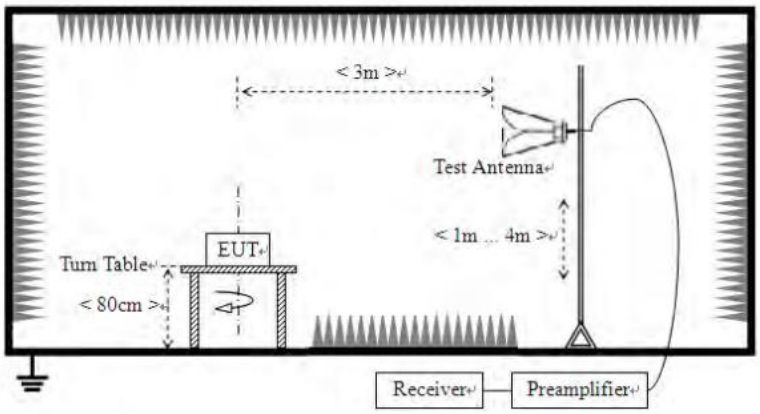
1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak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

4.2 Radiated Emission

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 B Section 15.109</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4:2014</td></tr>
<tr><td>Test Frequency Range:</td><td>30MHz to 25GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m (Semi-Anechoic Chamber)</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Remark</th></tr>
<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>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency</th><th>Limit (dBuV/m @3m)</th><th>Remark</th></tr>
<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>
</table>
</td></tr>
<tr><td>Test Procedure:</td><td>
1. 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.
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 rota 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.
</td></tr>
<tr><td>Test setup:</td><td>Below 1GHz</td></tr>
</table>



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:	Pre-scan all modes in section 5.2.					
Test results:	Pass					

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

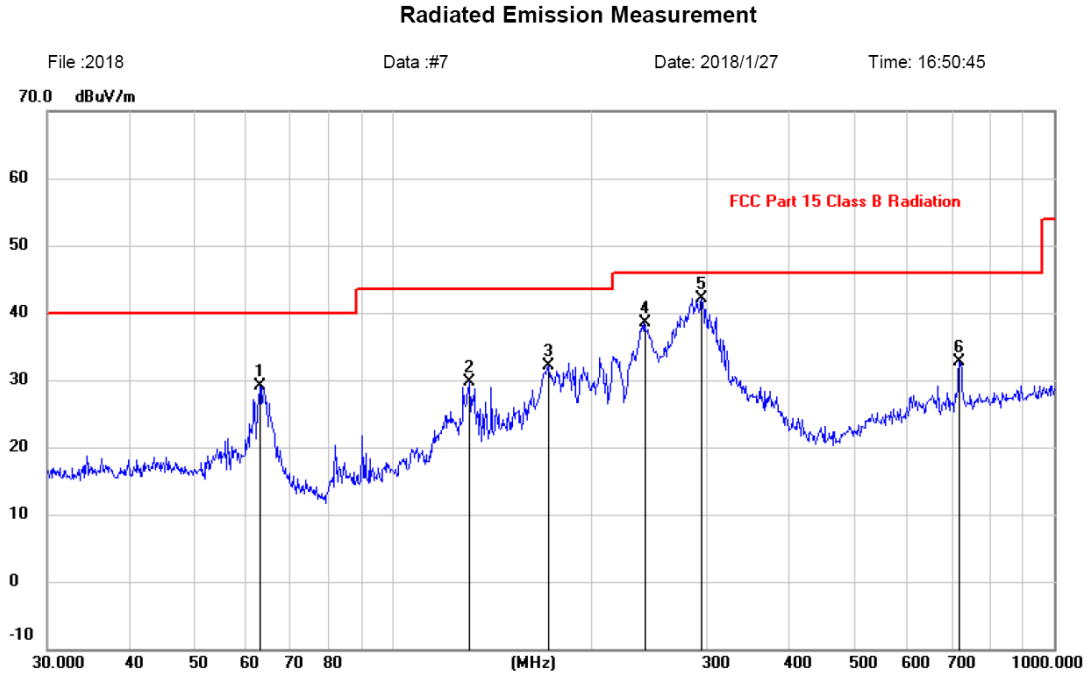
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

For above 1GHz test,1GHz to 25GHz all have been tested, only worse case 1GHz to 6GHz is reported, from 6GHz to 25GHz, no emission is found

Measurement Data

Below 1GHz

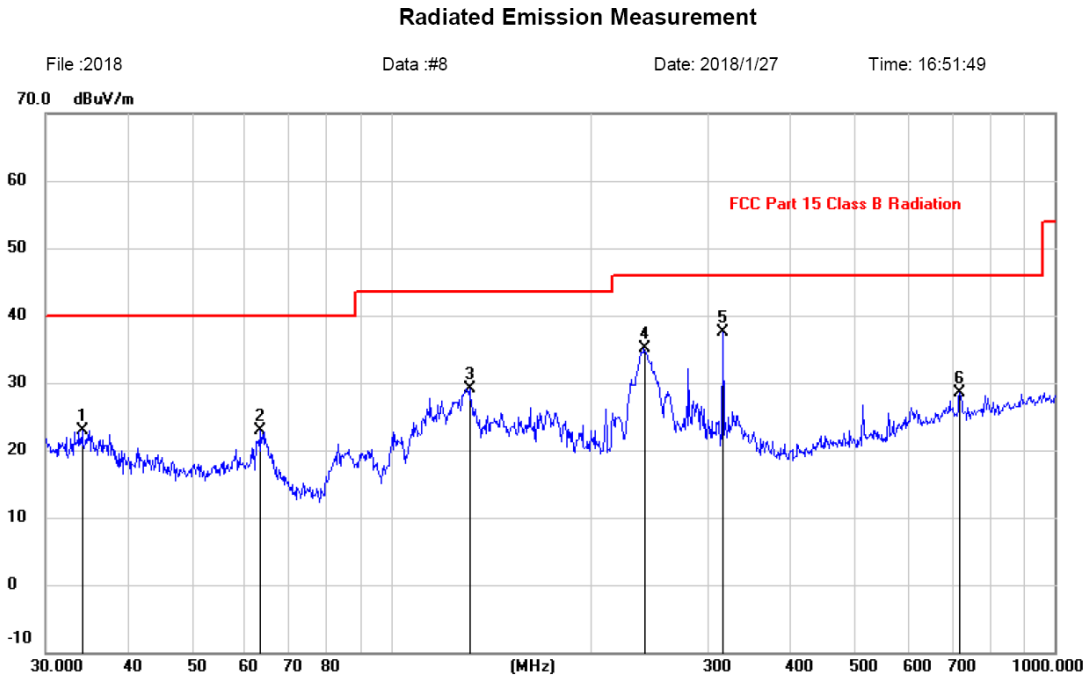
Horizontal:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		62.8708	16.90	12.24	29.14	40.00	-10.86	peak			
2		130.3789	16.54	13.26	29.80	43.50	-13.70	peak			
3		171.9946	18.66	13.45	32.11	43.50	-11.39	peak			
4		240.8304	26.56	11.99	38.55	46.00	-7.45	peak			
5	*	293.0842	28.84	13.24	42.08	46.00	-3.92	peak			
6		719.1995	11.64	21.08	32.72	46.00	-13.28	peak			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Vertical:

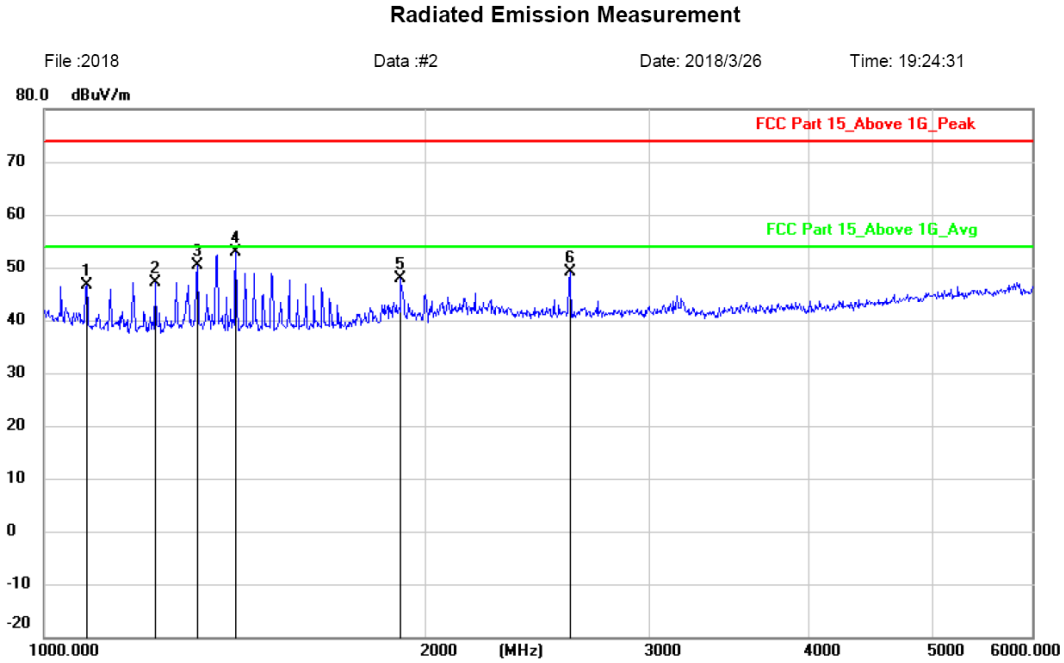


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		34.0365	9.44	13.45	22.89	40.00	-17.11	peak			
2		63.3132	10.68	12.20	22.88	40.00	-17.12	peak			
3		130.8369	15.92	13.28	29.20	43.50	-14.30	peak			
4		240.8304	23.16	11.99	35.15	46.00	-10.85	peak			
5	*	316.5890	23.68	13.79	37.47	46.00	-8.53	peak			
6		719.1995	7.50	21.08	28.58	46.00	-17.42	peak			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Above 1GHz

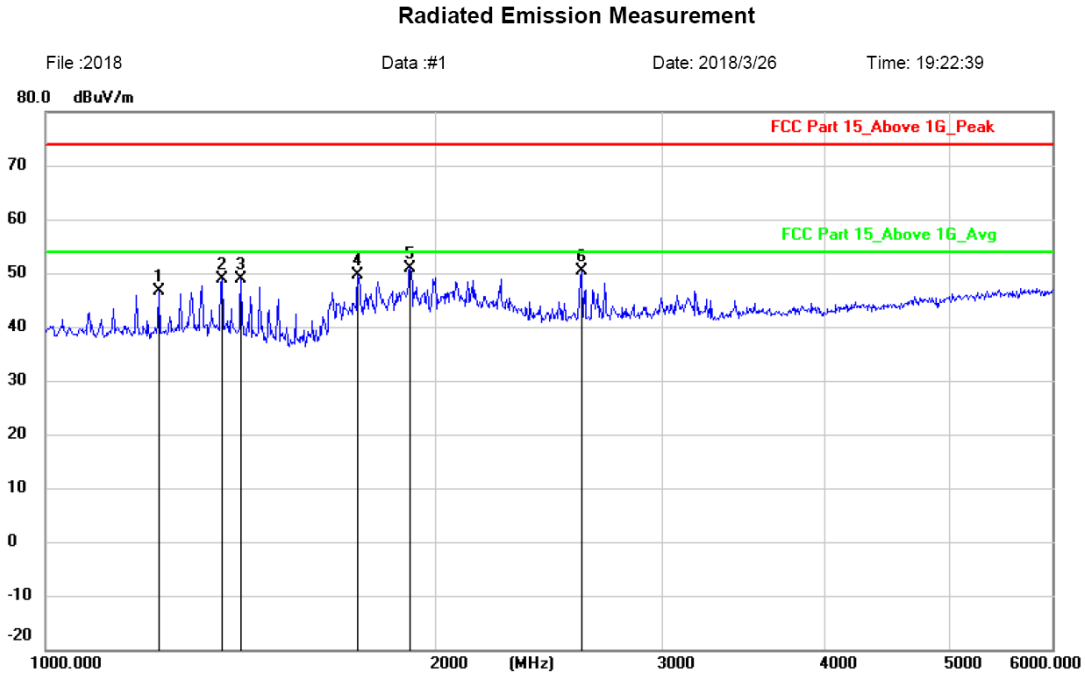
Horizontal:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		1080.091	55.10	-8.58	46.52	74.00	-27.48	peak			
2		1222.230	55.17	-8.05	47.12	74.00	-26.88	peak			
3		1320.120	57.68	-7.27	50.41	74.00	-23.59	peak			
4	*	1415.668	59.91	-7.00	52.91	74.00	-21.09	peak			
5		1909.469	53.92	-5.96	47.96	74.00	-26.04	peak			
6		2594.039	52.27	-3.15	49.12	74.00	-24.88	peak			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Vertical:

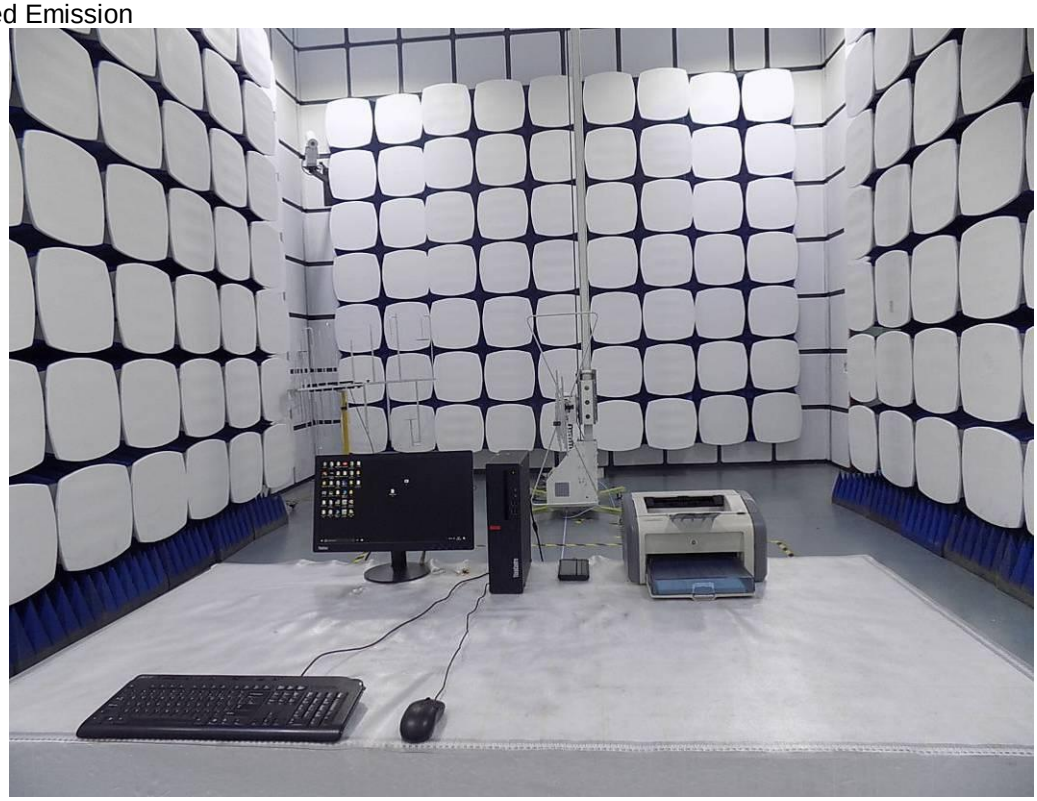


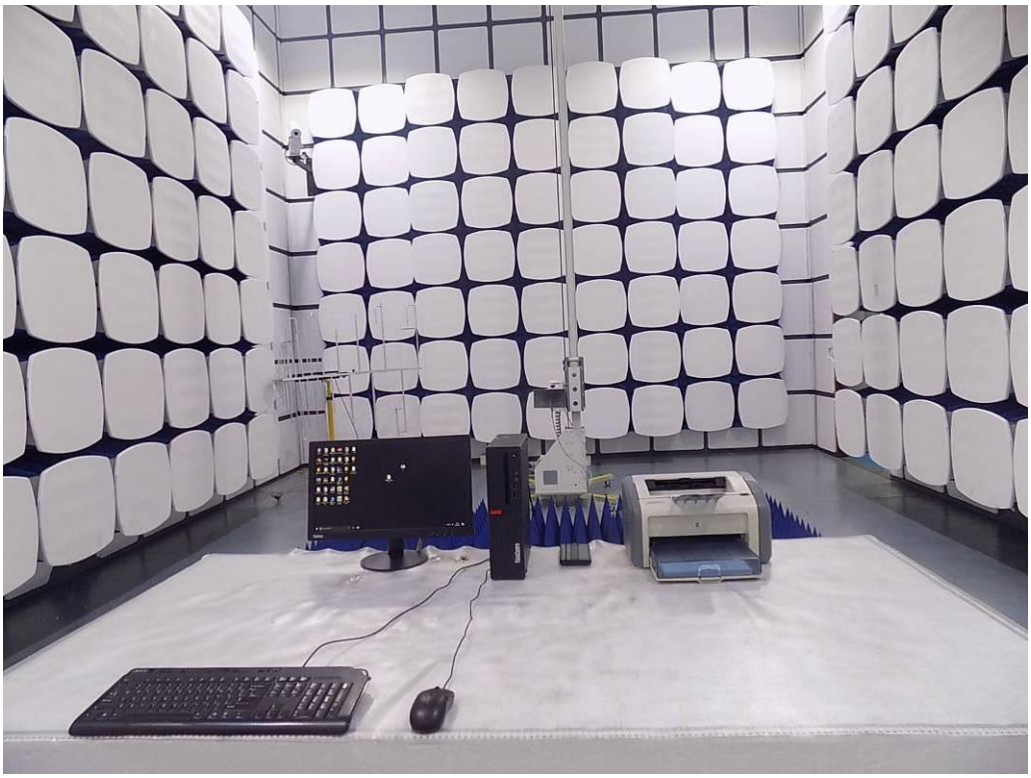
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		1222.230	54.79	-8.05	46.74	74.00	-27.26	peak			
2		1368.284	55.86	-7.10	48.76	74.00	-25.24	peak			
3		1415.668	55.91	-7.00	48.91	74.00	-25.09	peak			
4		1742.717	56.43	-6.68	49.75	74.00	-24.25	peak			
5	*	1912.893	56.92	-5.95	50.97	74.00	-23.03	peak			
6		2594.039	53.45	-3.15	50.30	74.00	-23.70	peak			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

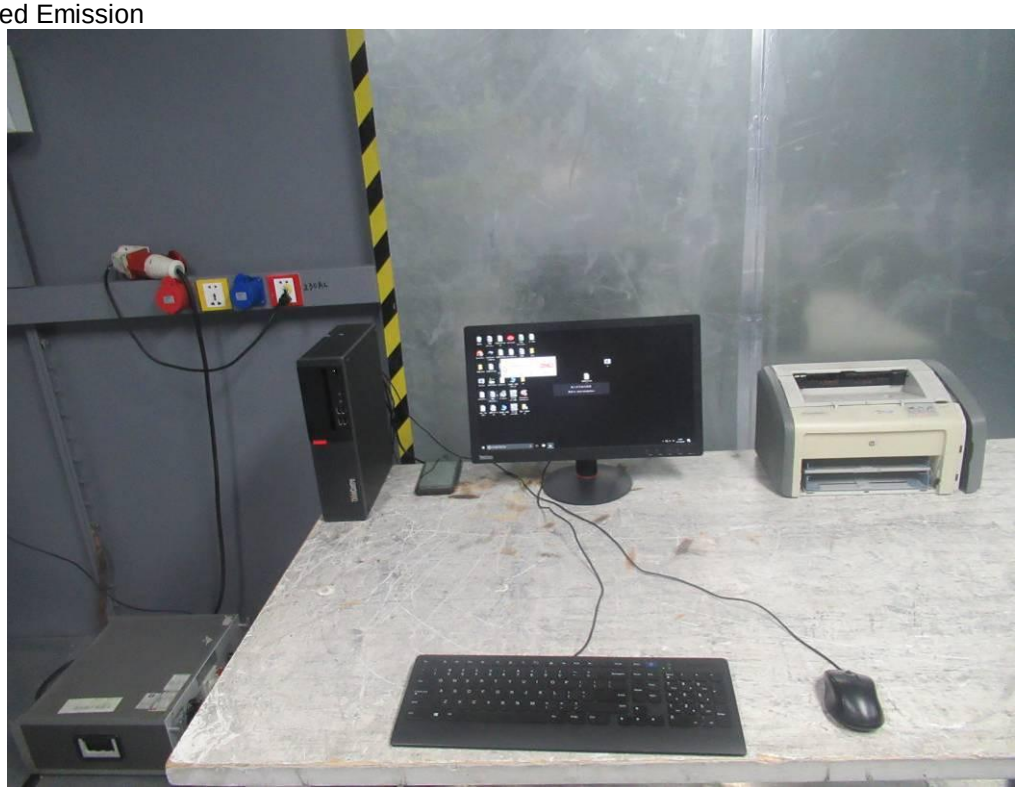
5 Test Setup Photo

Radiated Emission



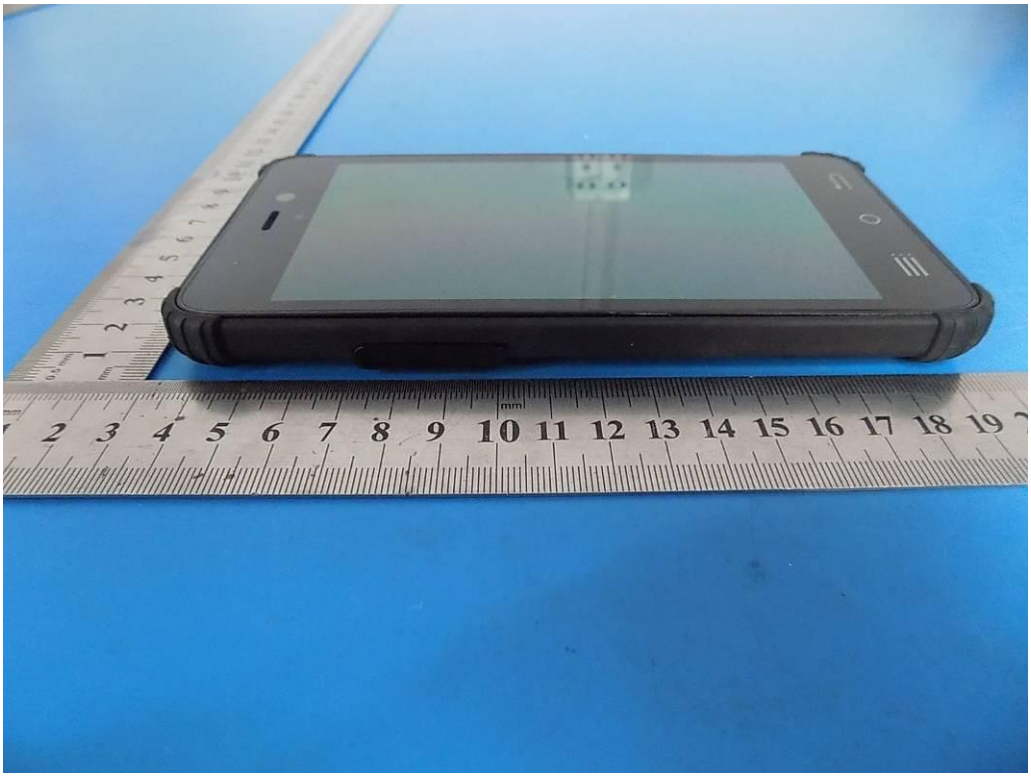


Conducted Emission



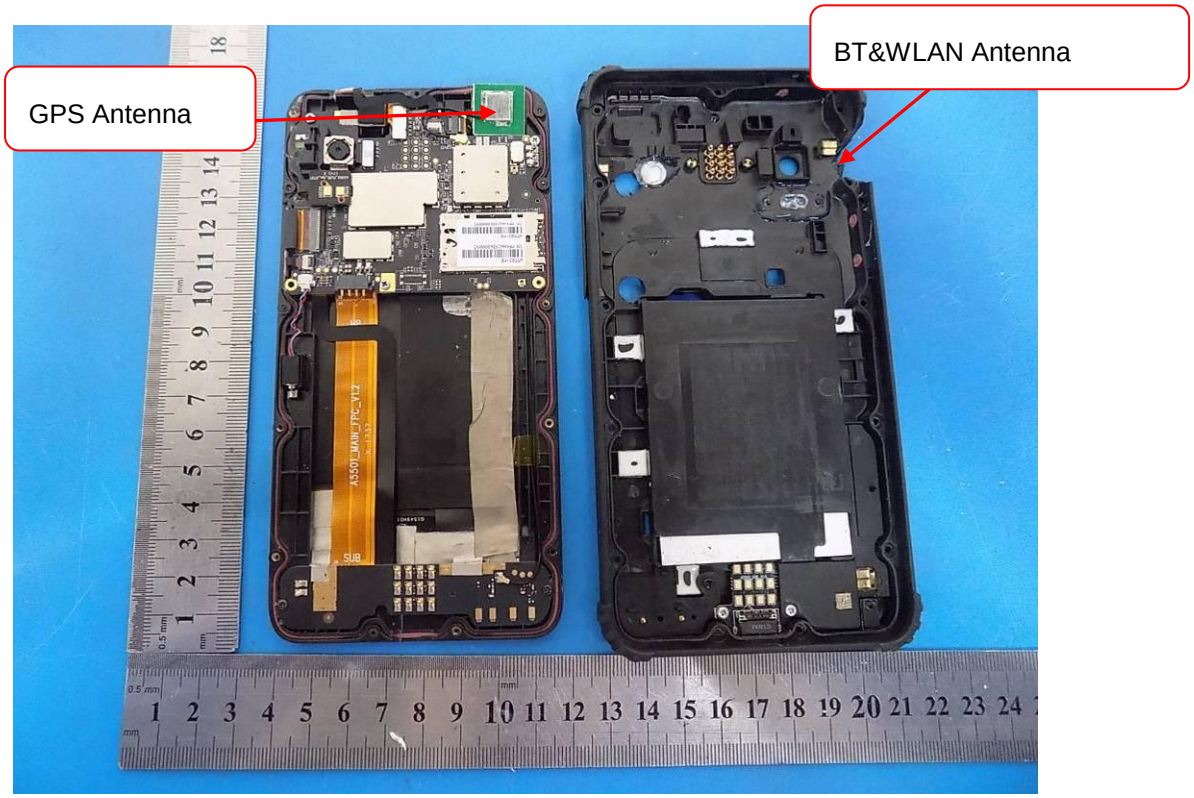
6 EUT Constructional Details

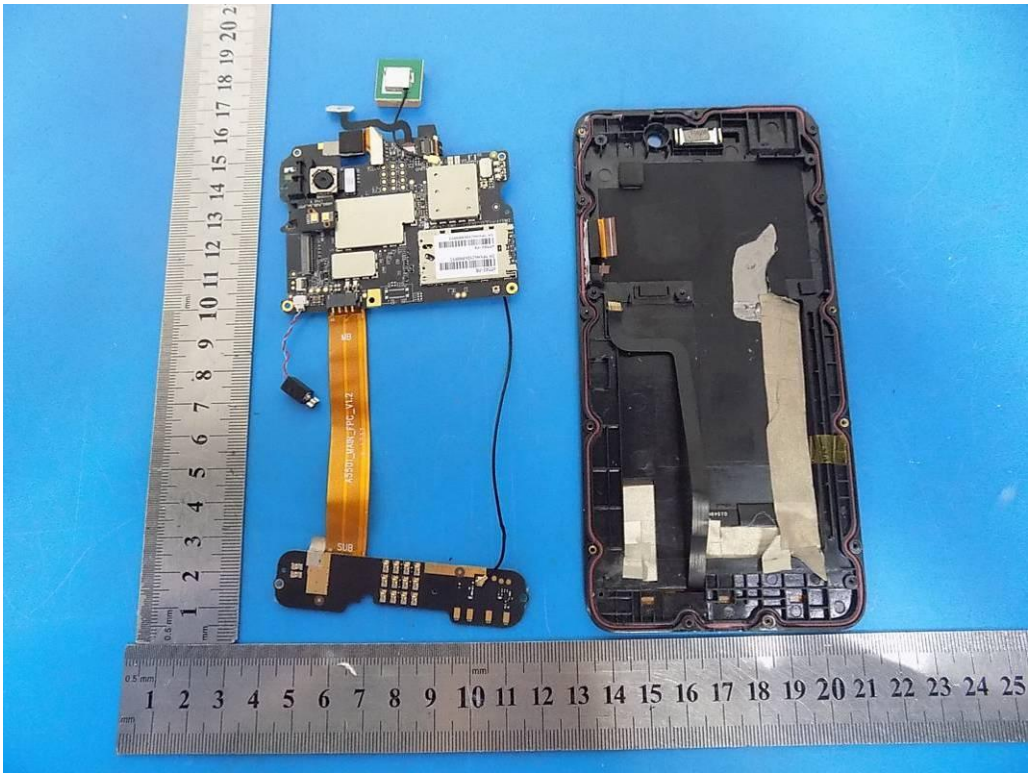
1.

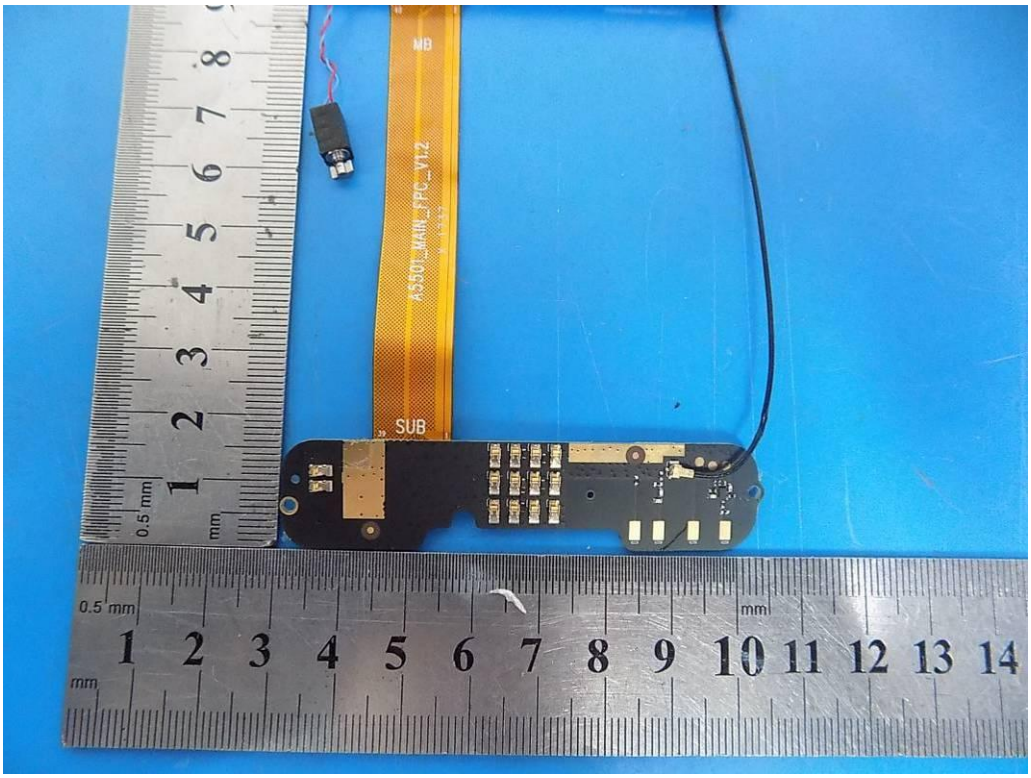



NFC Antenna


锂离子聚合物电池
Lithium-ion polymer battery


GPS Antenna
BT&WLAN Antenna

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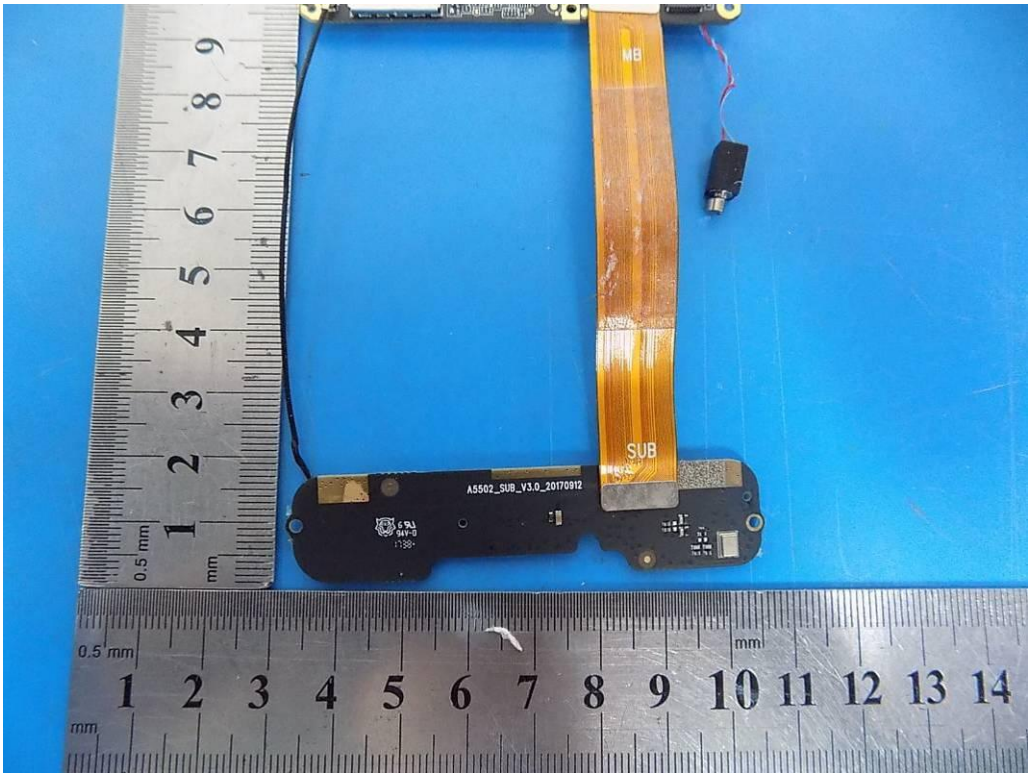
SUB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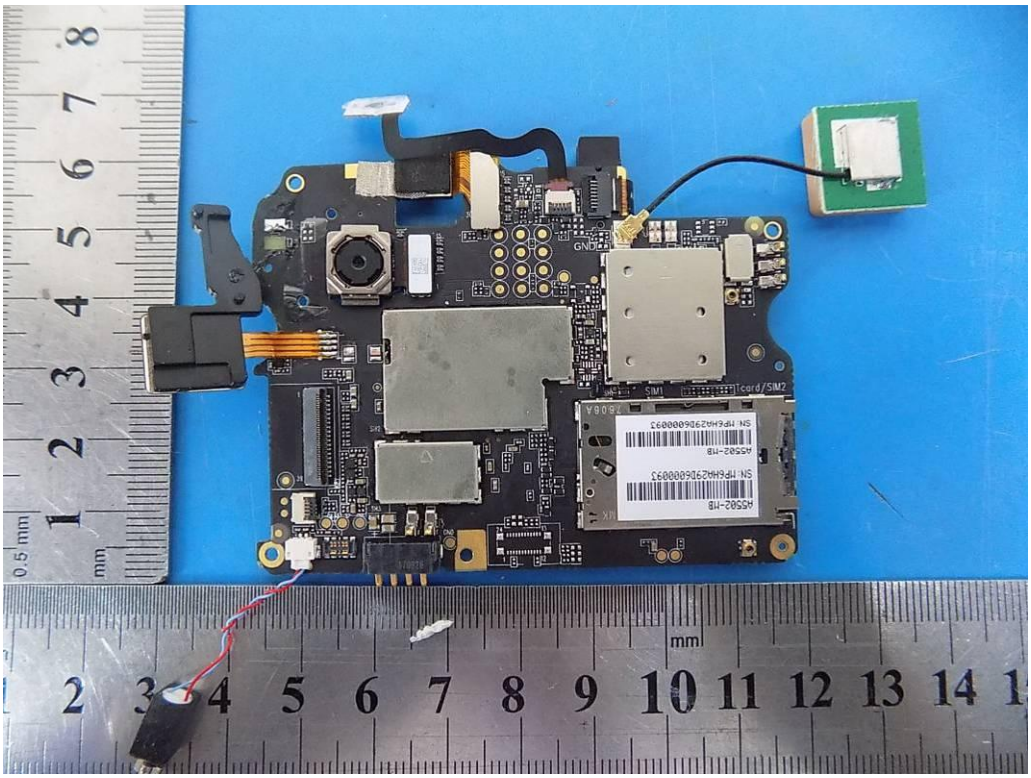
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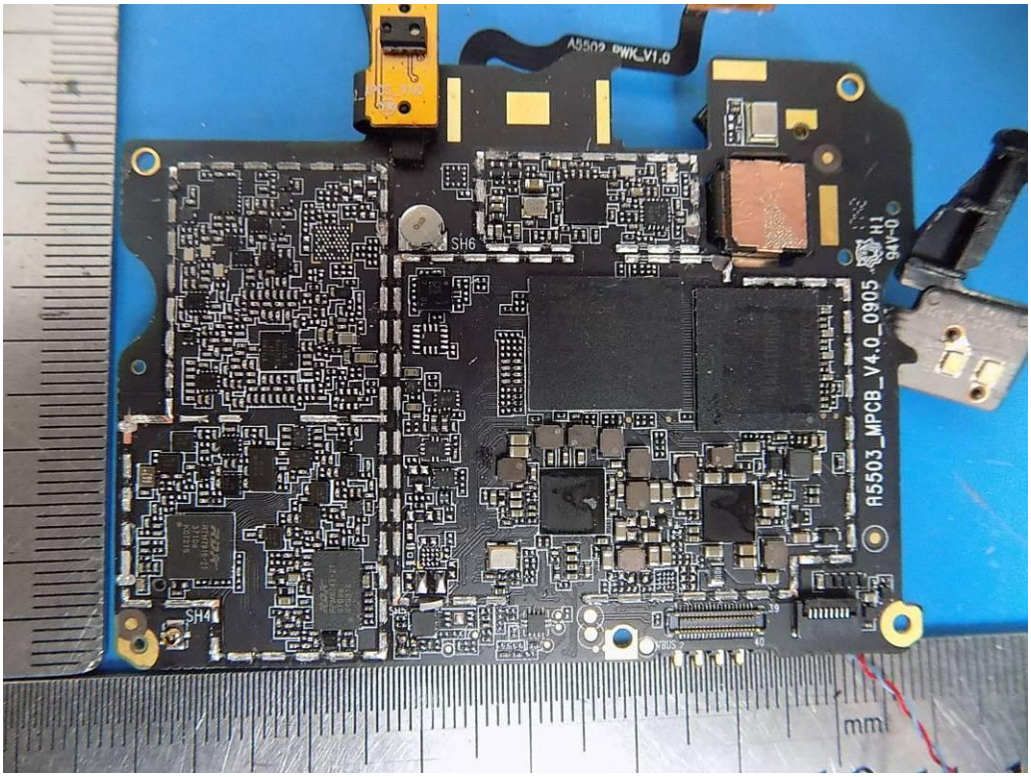
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SH4
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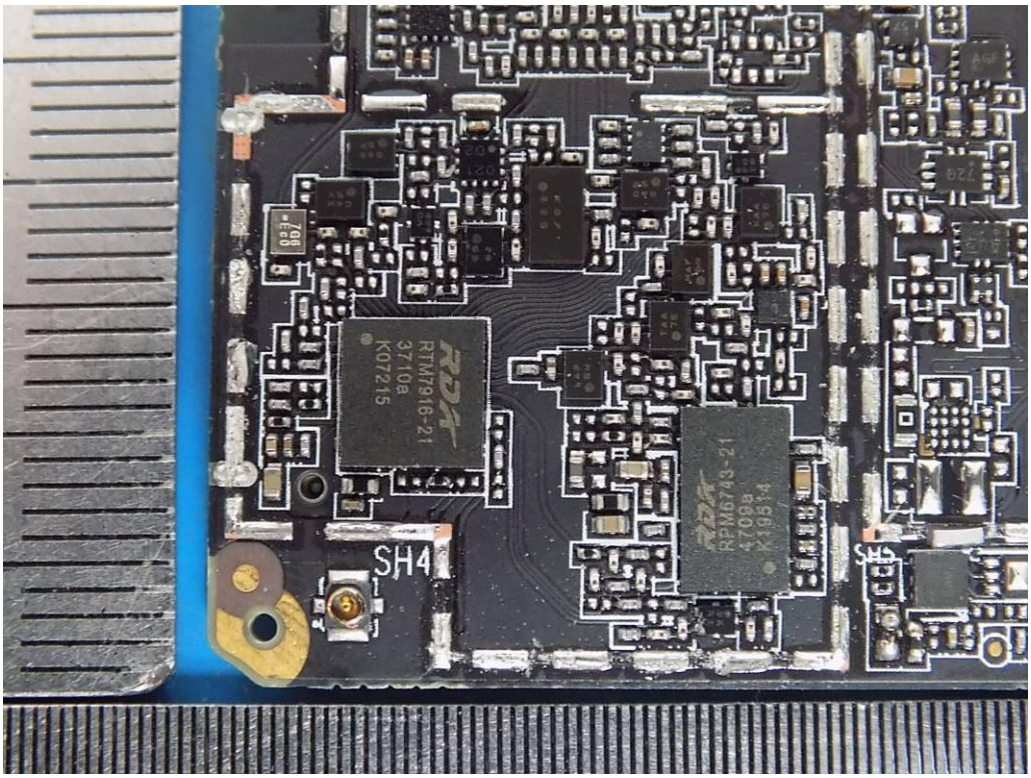
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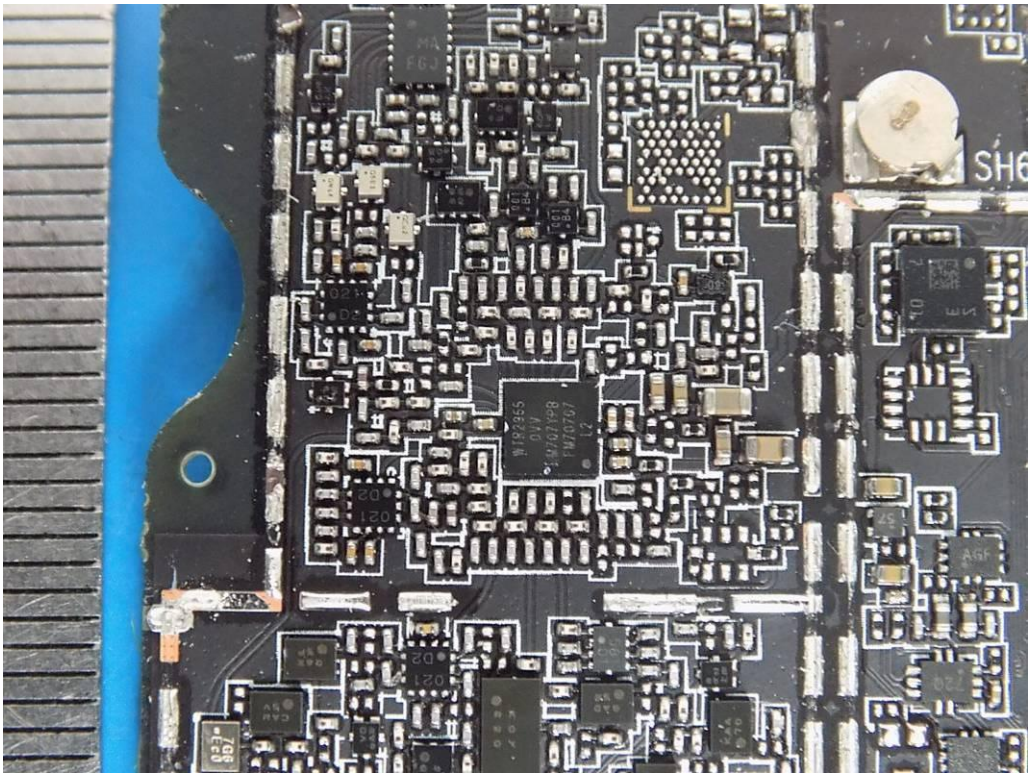

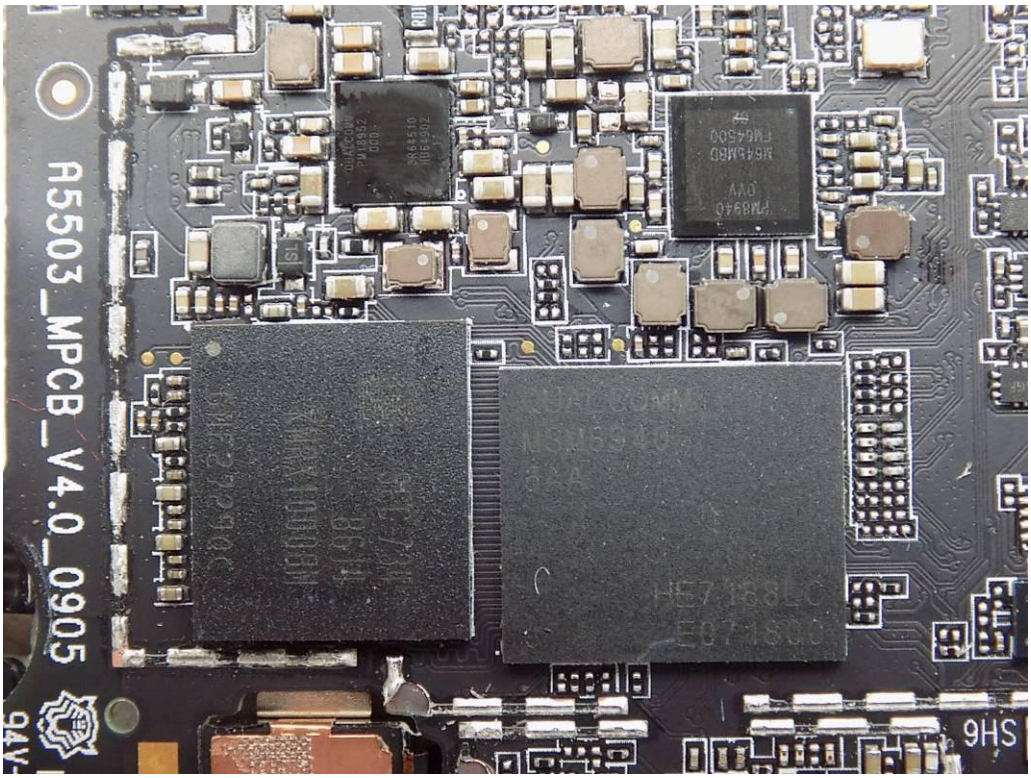
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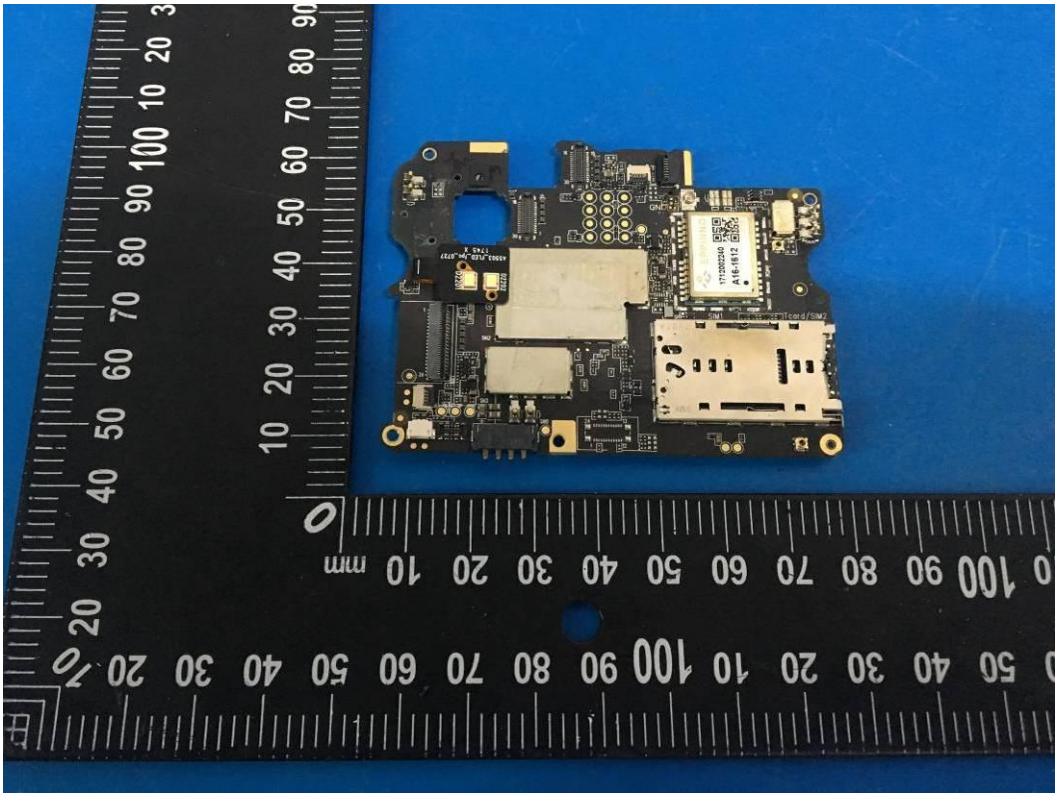

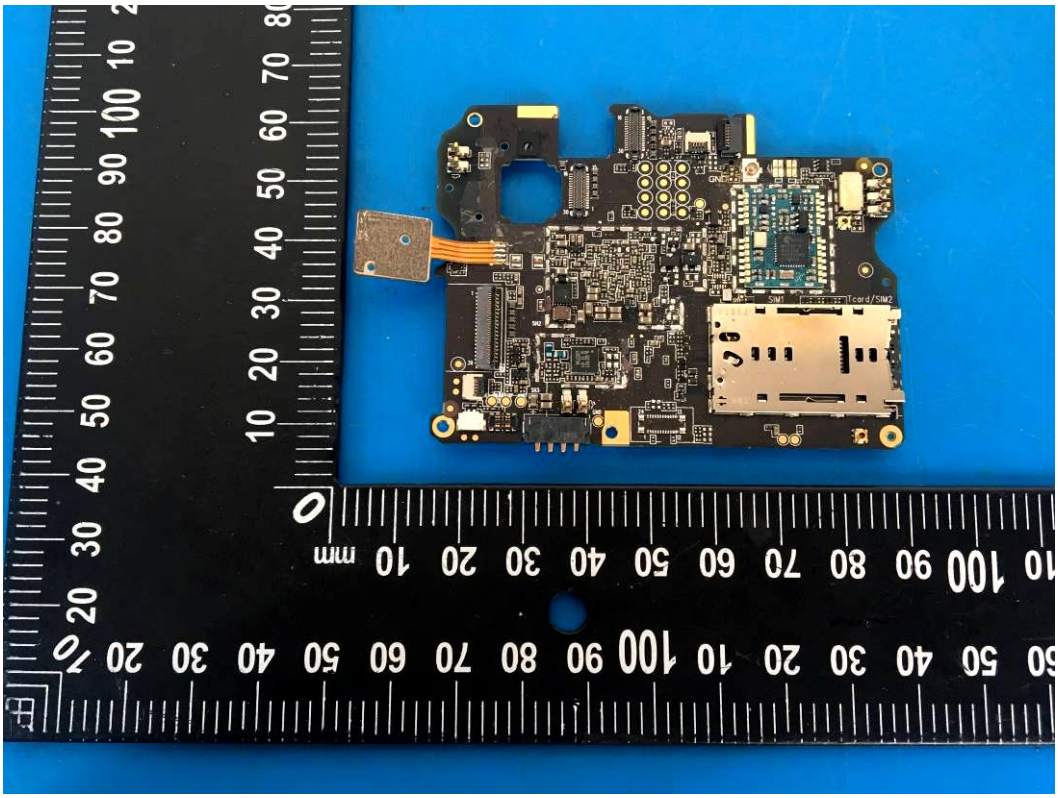

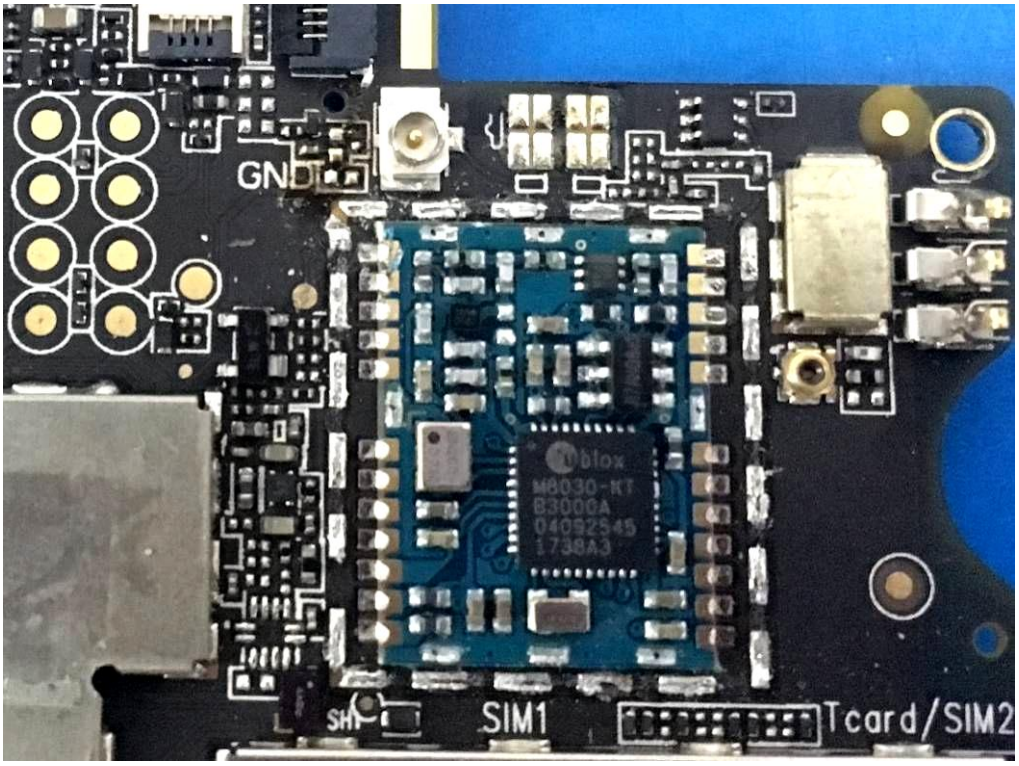
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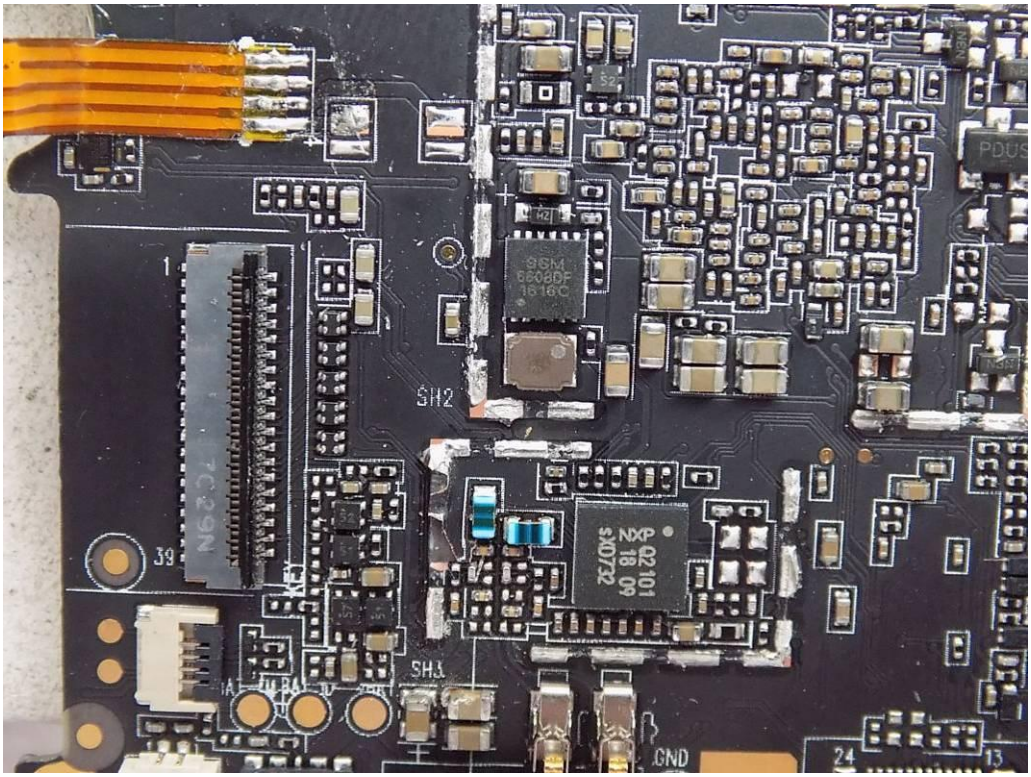
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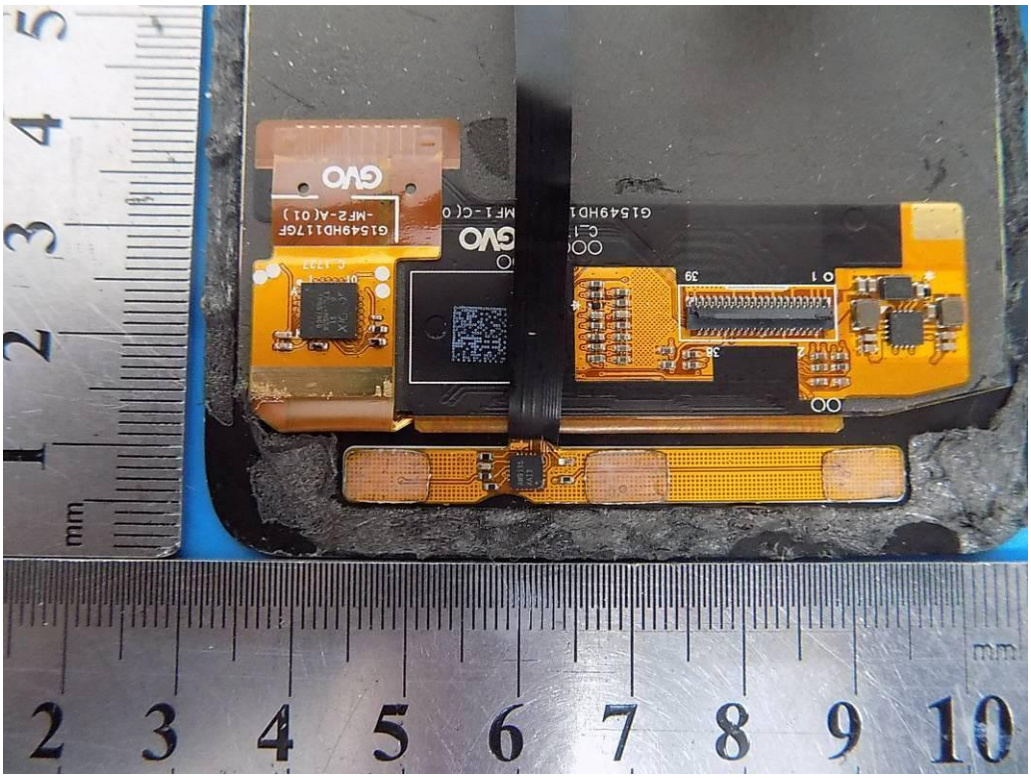

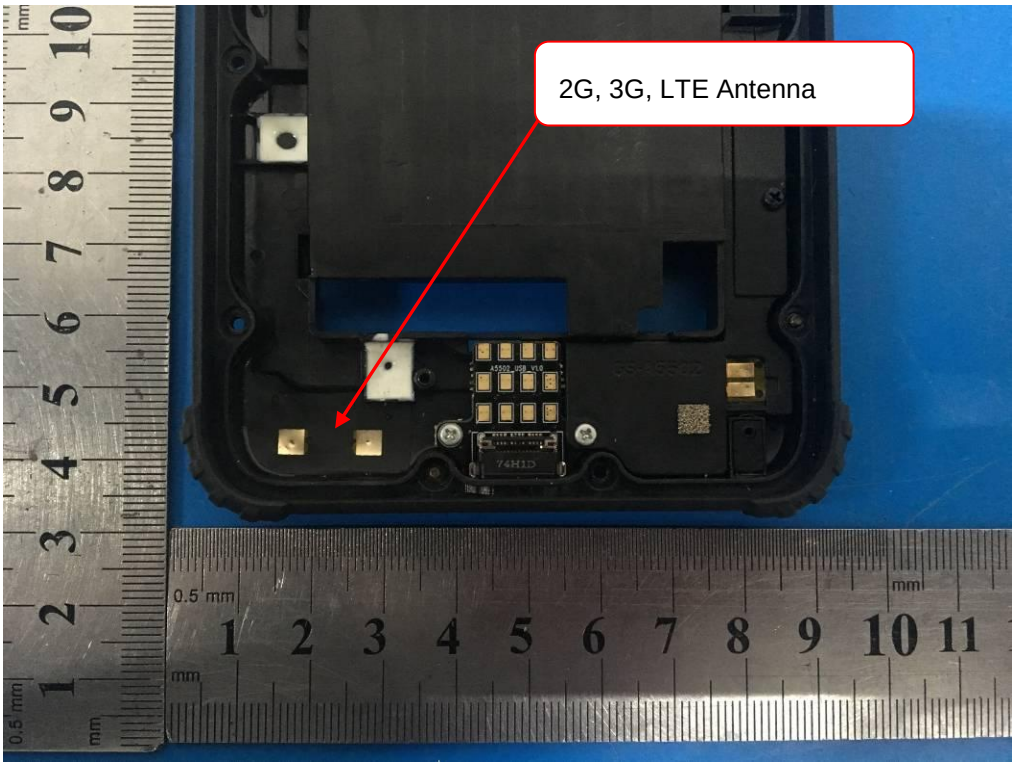

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