



# **FCC TEST REPORT**

**Test report** 

On Behalf of

SOTEN TECHNOLOGY (HONGKONG) CO., LIMITED

For

**Rugged Tablet** 

Model No.: T101, S101, K101, S70V2, T60

FCC ID: 2AI62T101

Prepared for: SOTEN TECHNOLOGY (HONGKONG) CO., LIMITED

FLAT/RM A 20/F KIU FU COMMERCIAL BLDG 300 LOCKHART ROAD WAN CHAI HK

Prepared By: Shenzhen HUAK Testing Technology Co., Ltd.

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Shenzhen City, China

Date of Test: Nov. 13, 2018 ~ Jan. 14, 2019

Date of Report: Jan. 15, 2019

Report Number: HK1811161626E



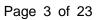
TEST RESULT CERTIFICATION

1.6	231 NESSET CENTILICATION
Applicant's name:	SOTEN TECHNOLOGY (HONGKONG) CO., LIMITED
Address:	FLAT/RM A 20/F KIU FU COMMERCIAL BLDG 300 LOCKHART ROAD WAN CHAI HK
Manufacture's Name:	Shenzhen SOTEN Technology Co., Ltd.
Address:	10th Floor,2nd Building,BaiWang Research and development building, No. 5308 Shahe west road,Xili,Nanshan district,ShenZhen, China
Factory's Name	Shenzhen SOTEN Technology Co., Ltd.
Address:	10th Floor,2nd Building,BaiWang Research and development building, No. 5308 Shahe west road,Xili,Nanshan district,ShenZhen, China
Product description	Rugged Tablet
Brand name	HUGEROCK
Mode name	T101, S101, K101, S70V2, T60
Test model name	T101
Difference description	All the same except for the model name.
Standards:	FCC Rules and Regulations Part 15B
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Date (s) of performance of tests	
Date of Issue	·
Test Result	·
Test Result	
Testing Engir	Gary Qian)  Gary Qian  Gary Qian
	(Gary Qian)
Technical Ma	inager: Edon Hu

Authorized Signatory:

(Jason Zhou)

(Eden Hu)





## **Revision History**

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jan. 15, 2019	Valid	Initial Release



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#### 1. SYSTEM DESCRIPTION

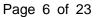
## **EUT** test procedure:

- 1. Connect EUT and peripheral devices (PC) through USB port.
- 2. Power on the EUT, use the software to transfer data between EUT and PC.
- 3. Make sure the EUT operates normally during the test.

#### **Test Mode**

TEST MODE DESCRIPTION					
NO.	TEST MODE DESCRIPTION	WORST			
1	USB (connection for data transferring)	V			
Note:	and EMI worst made				

- 1. V means EMI worst mode
- 2. USB cable is provided by AGC-Lab.

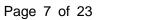




2. MEASUREMENT UNCERTAINTY

Test	Measurement Uncertainty	Notes
Transmitter power conducted	±0.57 dB	(1)
Transmitter power Radiated	±2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	±2.20 dB	(1)
Occupied Bandwidth	±0.01ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance0.15~30MHz	±3.20dB	(1)

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



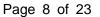


3. PRODUCT INFORMATION

Housing Type	Plastic and metal	
Hardware Version	T101-MainBoard-P3	
Software Version	T101-20181026-Q	
EUT Input Rating	DC3.7V by battery or DC 5.3V by TYPE-C	

I/O Port Information (⊠Applicable ☐Not Applicable)

I/O Port of EUT				
I/O Port Type Number Specific Tested With				
USB Port	1	0.8 Unshielded	1	





4. SUPPORT EQUIPMENT

Device Type	Manufacturer	Model Name	Serial No.	Data Cable	Power Cable
PC	Apple Inc.				0.8m Unshielded
Adapter	Apple Inc.				1.25m Unshielded

**Note:** All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.





## **5. TEST FACILITY**

Site	Shenzhen HUAK Testing Technology Co., Ltd.	
Location	1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China	
Designation Number	CN1229	
Test Firm Registration Number : 616276		

#### TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Conducted Emission Shielding Room Test Site (744)						
Equipment Manufacturer Model Serial Number Calibration Due						
Receiver	R&S	ESCI 7	HKE-010	Dec. 26, 2019		
LISN	R&S	ENV216	HKE-002	Dec. 26, 2019		
Conducted test software	Tonscend	TS+ Rev 2.5.0.0	HKE-081	N/A		

#### **TEST EQUIPMENT OF RADIATED EMISSION TEST**

Radiated Emission Test Site (966)				
Name of Equipment Manufacturer Model Serial				Calibration Due
Receiver	R&S	ESCI-7	HKE-010	Dec. 26, 2019
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 26, 2019
Preamplifier	EMCI	EMC051845SE	HKE-015	Dec. 26, 2019
Preamplifier	Agilent	83051A	HKE-016	Dec. 26, 2019
Loop antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 26, 2019
Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	Dec. 26, 2019
Horn antenna	Schwarzbeck	9120D	HKE-013	Dec. 26, 2019
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
Position controller	Taiwan MF	MF7802	HKE-011	Dec. 26, 2019
Radiated test software	Tonscend	TS+ Rev 2.5.0.0	HKE-082	N/A
RF cable (9KHz-1GHz)	Times	381806-001	N/A	N/A
RF cable	Times	1-40G	HKE-034	Dec. 26, 2019





**6. TEST ITEMS AND THE RESULTS** 

Test item	Test Requirement	Test Method	Class/Severity	Result
CONDUCTED EMISSION	FCC Part 15.107 Rules	ANSI C63.4:2014	Class B	Pass
RADIATED EMISSION	FCC Part 15.109 Rules	ANSI C63.4:2014	Class B	Pass



#### 7. FCCLINE CONDUCTED EMISSION TEST

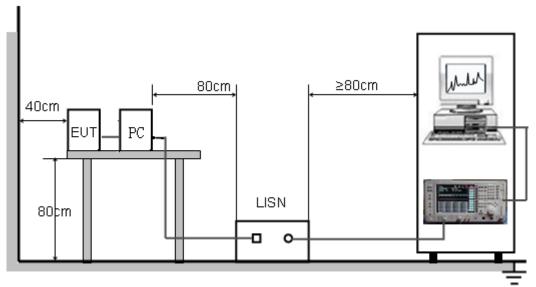
#### 7.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Fraguency	Maximum RF Line Voltage						
Frequency	Q.P.( dBuV)	Average( dBuV)					
150kHz-500kHz	66-56	56-46					
500kHz-5MHz	56	46					
5MHz-30MHz	60	50					

#### Note:

- 1. The lower limit shall apply at the transition frequency.
- 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz.

#### 7.2. BLOCK DIAGRAM OF TEST SETUP





#### 7.3. PROCEDURE OF LINE CONDUCTED EMISSION TEST

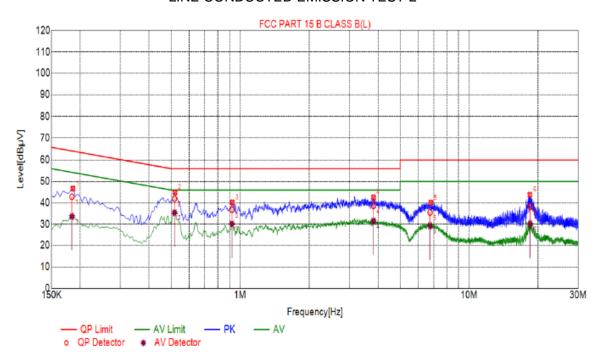
- (1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- (2) Support equipment, if needed, was placed as per ANSI C63.4.
- (3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- (4) The EUT received DC5V power from PC with receive AC120V/60Hz power from a LISN.
- (5) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- (6) Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- (7) During the above scans, the emissions were maximized by cable manipulation.
- (8) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions.
- (9) Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.

The test data of the worst case condition (mode 1) was reported on the Summary Data page.



#### 7.4. TEST RESULT OF LINE CONDUCTED EMISSION TEST

#### LINE CONDUCTED EMISSION TEST-L



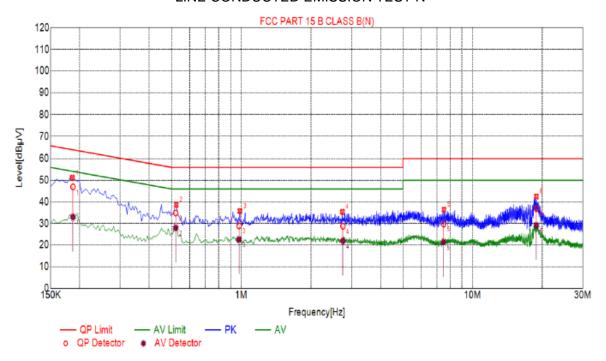
Susp	Suspected List											
NO.	Freq.	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Detector						
1	0.1860	46.68	10.05	64.21	17.53	PK						
2	0.5190	44.88	10.04	56.00	11.12	PK						
3	0.9240	40.19	10.06	56.00	15.81	PK						
4	3.8220	42.52	10.25	56.00	13.48	PK						
5	6.8055	40.09	10.21	60.00	19.91	PK						
6	18.4425	43.83	10.05	60.00	16.17	PK						

Final	Final Data List													
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dΒμV]	AV Margin [dB]						
1	0.1841	10.05	42.87	64.30	21.43	33.63	54.30	20.67						
2	0.5171	10.04	41.98	56.00	14.02	35.40	46.00	10.60						
3	0.9209	10.06	36.83	56.00	19.17	30.17	46.00	15.83						
4	3.8212	10.25	38.66	56.00	17.34	31.51	46.00	14.49						
5	6.7515	10.21	35.51	60.00	24.49	29.31	50.00	20.69						
6	18.5034	10.05	38.22	60.00	21.78	30.08	50.00	19.92						

4-



#### LINE CONDUCTED EMISSION TEST-N



Susp	Suspected List											
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Detector						
1	0.1860	51.21	10.05	64.21	13.00	PK						
2	0.5235	38.74	10.04	56.00	17.26	PK						
3	0.9870	35.82	10.08	56.00	20.18	PK						
4	2.7375	35.41	10.21	56.00	20.59	PK						
5	7.5255	36.43	10.17	60.00	23.57	PK						
6	18.8925	42.53	10.06	60.00	17.47	PK						

Final	Final Data List												
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]					
1	0.1872	10.04	46.94	64.16	17.22	33.03	54.16	21.13					
2	0.5206	10.04	34.86	56.00	21.14	27.99	46.00	18.01					
3	0.9784	10.06	28.95	56.00	27.05	22.64	46.00	23.36					
4	2.7520	10.21	28.73	56.00	27.27	21.93	46.00	24.07					
5	7.4928	10.18	29.76	60.00	30.24	21.43	50.00	28.57					
6	18.8898	10.06	36.98	60.00	23.02	29.13	50.00	20.87					

**RESULT: PASS** 



#### 8. FCC RADIATED EMISSION TEST

# 8.1. EXCEPT FOR CLASS A DIGITAL DEVICES, THE FIELD STRENGTH OF RADIATED EMISSIONS FROM UNINTENTIONAL RADIATORS AT A DISTANCE OF 3 METERS SHALL NOT EXCEED THE FOLLOWING VALUES:

Frequency (MHz)	Distance (m)	Maximum Field Strength Limit (dBuV/m/ Q.P.)
30~88	3	40.0
88~216	3	43.5
216~960	3	46.0
Above 960	3	54.0

Note: The lower limit shall apply at the transition frequency.

#### 8.1.1 The following table is the setting of spectrum analyzer and receiver:

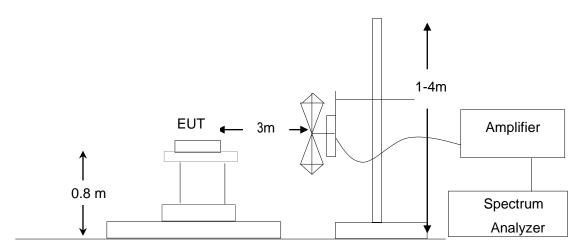
Spectrum Parameter	Setting				
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP				
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP				
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP				
Start ~Stop Frequency	1GHz~26.5GHz				
Start ~Stop i requerity	1MHz/1MHz for Peak, 1MHz/10Hz for Average				

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

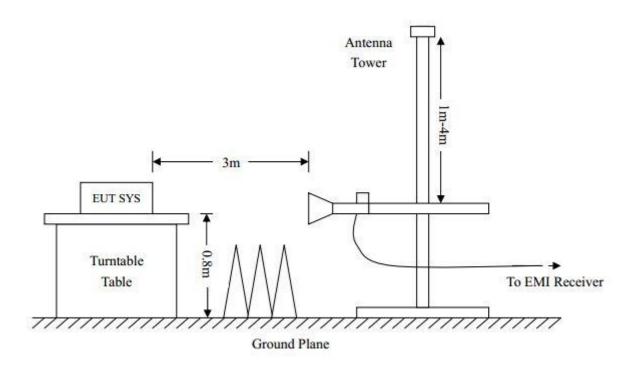


#### **8.2. BLOCK DIAGRAM OF TEST SETUP**

System Diagram of Connections between EUT and Simulators



RADIATED EMISSION TEST SETUP ABOVE 1000MHz





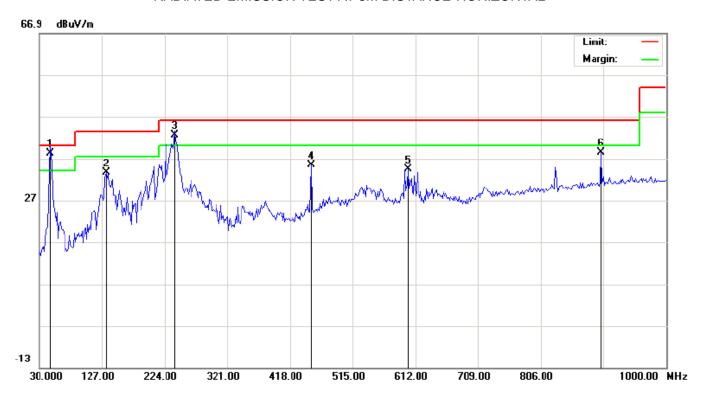
#### 8.3. PROCEDURE OF RADIATED EMISSION TEST

- 1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Then 1MHz RBW and 3MHz VBW for average reading in spectrum analyzer. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8.If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. If the emission level of the EUT in peak mode was 10 dB 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 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.
- 11. The test data of the worst case condition (mode 1) was reported on the Summary Data page.



#### 8.4. TEST RESULT OF RADIATED EMISSION TEST

#### RADIATED EMISSION TEST AT 3M DISTANCE-HORIZONTAL

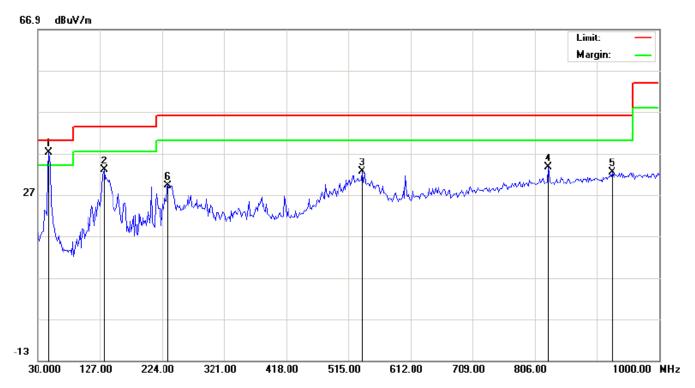


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	•	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	47.7832	23.73	14.41	38.14	40.00	-1.86	QP			
2		133.4667	19.80	13.81	33.61	43.50	-9.89	QP			
3	İ	240.1666	28.42	14.11	42.53	46.00	-3.47	QP			
4		450.3333	15.35	20.00	35.35	46.00	-10.65	QP			
5		600.6833	11.17	23.22	34.39	46.00	-11.61	QP			
6		899.7667	9.68	28.67	38.35	46.00	-7.65	QP			

**RESULT: PASS** 



#### RADIATED EMISSION TEST AT 3M DISTANCE-VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	47.7833	22.81	14.41	37.22	40.00	-2.78	QP			
2		133.4667	19.24	13.81	33.05	43.50	-10.45	QP			
3		536.0167	10.67	21.89	32.56	46.00	-13.44	QP			
4		827.0167	6.03	27.58	33.61	46.00	-12.39	QP			
5		927.2500	3.53	28.94	32.47	46.00	-13.53	QP			
6		233.7000	15.63	13.64	29.27	46.00	-16.73	QP			

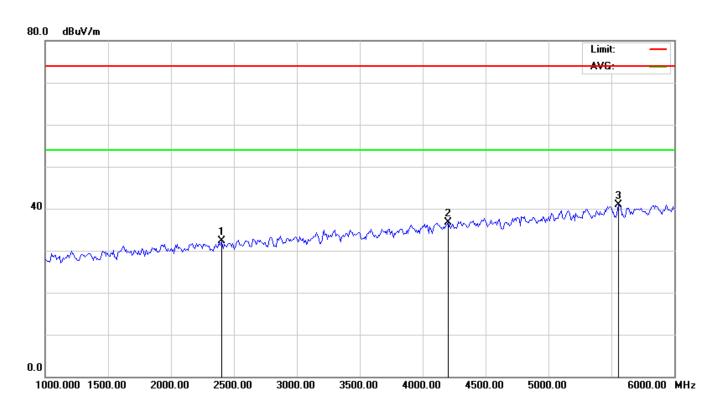
#### **RESULT: PASS**

Note: 1.Measurement = Reading + Factor, Over = Measurement – Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.



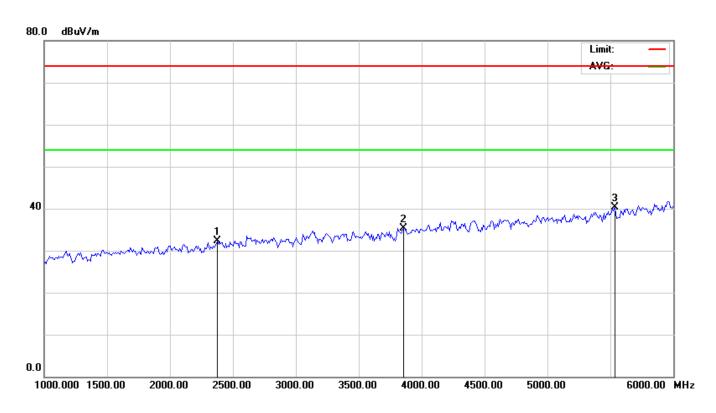
# RADIATED EMISSION ABOVE 1GHZ (1-10<sup>TH</sup> HARMONICS) –HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	•	MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB	<u> </u>	cm	degree	
1		2400.000	16.56	15.65	32.21	74.00	-41.79	peak			
2		4200.000	20.24	16.38	36.62	74.00	-37.38	peak			
3	*	5558.333	25.06	15.85	40.91	74.00	-33.09	peak			



## RADIATED EMISSION ABOVE 1GHZ (1-10<sup>TH</sup> HARMONICS) -VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	•	MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2375.000	16.59	15.65	32.24	74.00	-41.76	peak			
2		3858.333	18.31	16.94	35.25	74.00	-38.75	peak			
3	*	5533.333	24.37	15.85	40.22	74.00	-33.78	peak			

Note: 1. Emissions range from 6GHz to 12.5GHz have 20dB margin. No recording in the test report.

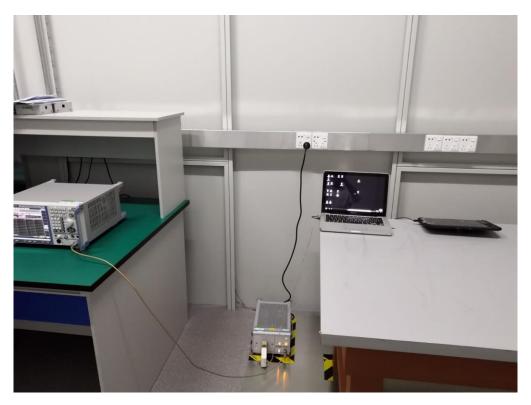
- 2. Factor=Antenna Factor + Cable loss Amplifier gain, Margin=Measurement-Limit.
- 3. The "Factor" value can be calculated automatically by software of measurement system.

Unit 1401 &1402, 14/F, Jin qi zhi gu mansion (No. 4 building of Chong wen Garden), Crossing of the Liu xian street and Tang ling road, Tao yuan street, Nan shan district, Shenzhen, P.R. China



## **APPENDIX A: PHOTOGRAPHS OF TEST SETUP**

FCC LINE CONDUCTED EMISSION TEST SETUP

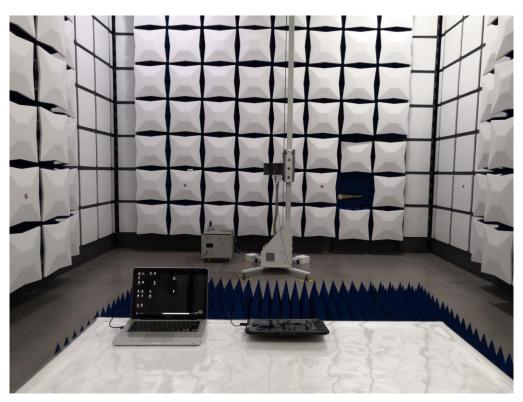


FCC RADIATED EMISSION TEST SETUP





# FCC RADIATED EMISSION TEST SETUP



----END OF REPORT----