RED-EMC Test Report

Client Name	:	Sariana LLC
Address	:	7365 Mission Gorge Road Suite G San Diego, CA 92120, U.S.A.
Product Name	:	Bluetooth Keypad
Date	:	Aug. 01, 2019

Shenzhen Anbotek Compliance Laboratory Limited

Contents

TEST REPORT

Applicant	:	Sariana LLC
Manufacturer	:	B&W ELECTRONICS DEVELOPMENT LTD
Product Name	:	Bluetooth Keypad
Model No.	:	ST-XLABK, ST-XLABKM, ST-XLABKS, ST-XLABKG, ST-XLABKK
Trade Mark	:	Satechi
Rating(s)	:	Input: DC 5V, 100mA(with DC 3.7V, 110 mAh Battery inside)
Test Standard(s)	:	**ETSI EN 301 489-1 V2.1.1 (2017-02)** **ETSI EN 301 489-17 V3.1.1 (2017-02)**

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN 301 489-1 and EN 301 489-17 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Receipt Jul. 16, 2019

Date of Test Jul. 16~24, 2019

Prepared By

Anbotek (SZ) Compliance Laboratory Limited * Approved *

(Engineer / Dolly Mo)

Reviewer

(Supervisor / Snowy Meng)

Approved & Authorized Signer

(Manager / Sally Zhang)

1. General Information

1.1. Client Information

Applicant	:	Sariana LLC
Address	:	7365 Mission Gorge Road Suite G San Diego, CA 92120, U.S.A.
Manufacturer	:	B&W ELECTRONICS DEVELOPMENT LTD
Address	:	3/F, Building B, Heshengjia Industrial Park, No.154 Huating Road, Dalang Street, Longhua District, Shenzhen, China
Factory	:	B&W ELECTRONICS DEVELOPMENT LTD
Address	:	3/F, Building B, Heshengjia Industrial Park, No.154 Huating Road, Dalang Street, Longhua District, Shenzhen, China

1.2. Description of Device (EUT)

Product Name	:	Bluetooth Keypad	
Model No.	:	ST-XLABK, ST-XLABKM, ST-XLABKS, ST-XLABKG, ST-XLABKK (Note: All samples are the same except the model name and the color, so we prepare "ST-XLABK" for test only.)	
Trade Mark	:	Satechi	
Test Power Supply	:	AC 110V, 50Hz for adapter/ AC 230V, 50Hz for adapter/ DC 3.7V Battery inside	
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)	
Product Description	:	Operation Frequency:	2402~2480MHz
		Transfer Rate:	1 Mbits/s
		Number of Channel:	79 Channels
		Modulation Type:	GFSK
		Antenna Type:	PCB Antenna
		Antenna Gain(Peak):	1.87 dBi
Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.			

1.3. Auxiliary Equipment Used During Test

Notebook	:	Product: AppleMacBook
		M/N: A1708 CMIIT ID:2016AJ5746 Input Rating: 20.3V/3A
		Adapter:
		Input: 100-240V, 50-60HZ, 1.5A Output: 20.3V/3A (USB PD) or 9V/3A(USB PD) or 5.2V/2.4A
Adapter	:	Manufacturer: ZTE M/N: STC-A2050I1000USBA-C S/N: 201202102100876 Input: 100-240V~ 50/60Hz, 0.3A Output: DC 5V, 1000mA

1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Charge Mode
Mode 2	BT Mode

For Conducted Emission	
Final Test Mode	Description
Mode 1	Charge Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	Charge Mode
Mode 2	BT Mode

Address: 1/F, Building D, Sogood Science and Technology Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.
Tel:(86)755-26066440 Fax:(86)755-26014772 Email:service@anbotek.com
Hotline 400-003-0500 www.anbotek.com

1.5. Test Equipment List

Conducted Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Nov. 26, 2018	1 Year
2.	L.I.S.N. Artificial Mains Network	Schwarzbeck	NSLK 8127	8126377	Nov. 26, 2018	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Nov. 05, 2018	1 Year
4.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Nov. 05, 2018	1 Year
5.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A

Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Nov. 05, 2018	1 Year
2.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 19, 2018	1 Year
3.	Pre-amplifier	SONOMA	310N	186860	Nov. 05, 2018	1 Year
4.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A
5.	Preamplifier	SKET Electronic	BK1G18G30D	KD17503	Nov. 05, 2018	1 Year
6.	Spectrum Analysis	Agilent	E4407B	US39390582	Nov. 05, 2018	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 19, 2018	1 Year

Electrostatic Discharge Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Simulators	3Ctest	ESD-30T	ES0131505	Nov. 26, 2018	1 Year

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R/S Immunity Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Signal Generator	Agilent	N5182A	MY48180656	Nov. 05, 2018	1 Year
2	Amplifier	Micotoop	MPA-80-1000-250	MPA1903096	N/A	N/A
3	Amplifier	Micotoop	MPA-1000-6000-100	MPA1903122	N/A	N/A
4	Log-Periodic Antenna	Schwarzbeck	VULP9118E	00992	Aug. 17, 2018	3 Year
5	Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 19, 2018	3 Year
6	Power Sensor	Agilent	E9301A	MY41498906	Nov. 05, 2018	1 Year
7	Power Sensor	Agilent	E9301A	MY41498088	Nov. 05, 2018	1 Year
8	Power Meter	Agilent	E4419B	GB40202909	Nov. 05, 2018	1 Year
9	Field Probe	ETS-Lindgren	HI-6006	00212747	Apr. 20, 2017	3 Year
10	software	EMtrace	EM 3	N/A	N/A	N/A

1.6. Description of Test Facility

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

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registed and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111, September 30, 2018.

ISED-Registration No.: 8058A

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A, March 07, 2019.

Test Location

Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102

1.7. Performance Criteria

1.7.1. For EMS Test:

√ A: Normal performance within the specification limits;

√ B: Temporary degradation or loss of function or performance which is self-recoverable;

√ C: Temporary degradation or loss of function or performance which requires operator intervention or system reset;

√ D: Degradation or loss of function which is not recoverable due to damage of equipment (components) or software, or loss of data

Note: The manufacturer's specification may define effects on the EUT which may be considered insignificant, and therefore acceptable.

This classification may be used as a guide in formulating performance criteria, by committees responsible for generic, product and product-family standards, or as a framework for the agreement on performance criteria between the manufacturer and the purchaser, for example where no suitable generic, product or product-family standard exists.

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2. Summary of Test Results

EMC Emission				
Test Items	**Standard**	**Basic Standard**	**Limit**	**Results**
Conducted Emission	ETSI EN 301 489-1 V2.1.1 Clause 8.3 & 8.4	EN 55032: 2015	Class A or B NOTE (2)	PASS
Radiated Emission	ETSI EN 301 489-1 V2.1.1 Clause 8.2	EN 55032: 2015	Class A or B NOTE (2)	PASS
Harmonic Current Emission	ETSI EN 301 489-1 V2.1.1 Clause 8.5	EN 61000-3-2: 2014	Class A	N/A
Voltage Fluctuations& Flicker	ETSI EN 301 489-1 V2.1.1 Clause 8.6	EN 61000-3-3: 2013	/	N/A
EMC Immunity				
Test Items	**Standard**	**Basic Standard**	**Performance Criteria**	**Results**
Electrostatic Discharge	ETSI EN 301 489-1 V2.1.1 Clause 9.3	EN 61000-4-2: 2009	B	PASS
RF Electromagnetic Field	ETSI EN 301 489-1 V2.1.1 Clause 9.2	EN 61000-4-3: 2006 +A1: 2008+A2: 2010	A	PASS
Fast transients, common mode	ETSI EN 301 489-1 V2.1.1 Clause 9.4	EN 61000-4-4: 2012	B	N/A
Surges	ETSI EN 301 489-1 V2.1.1 Clause 9.8	EN 61000-4-5: 2014+A1: 2017	B	N/A
Radio frequency, common mode	ETSI EN 301 489-1 V2.1.1 Clause 9.5	EN 61000-4-6: 2014	A	N/A
Volt. Interruptions Volt. Dips	ETSI EN 301 489-1 V2.1.1 Clause 9.7	EN 61000-4-11: 2004	B / C / C NOTE (3)	N/A

NOTE:

(1) ” N/A” denotes test is not applicable in this Test Report

(2) Alternatively, for equipment intended to be used exclusively in an industrial environment or a telecommunication centre, the class A limits may be used.

(3) Voltage dip: 100% reduction – Performance Criteria B

Voltage dip: 100% reduction – Performance Criteria B

Voltage dip: 70% reduction – Performance Criteria C

Voltage Interruption: 0% Interruption – Performance Criteria C

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3. Emission Test

3.1. Conducted Emission Test at Main Ports

3.1.1. Test Standard and Limit

Test Standard	ETSI EN 301 489-1 V2.1.1 Clause 8.3 & 8.4
Basic Standard	EN 55032: 2015

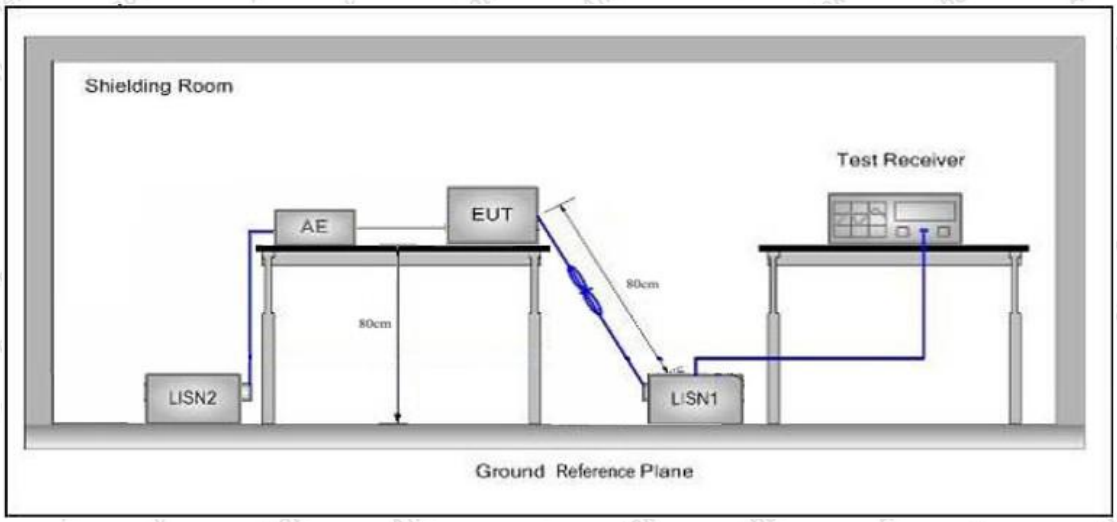
Limits for conducted emissions

Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
	5MHz~30MHz	60	50
Remark: *Decreasing linearly with logarithm of the frequency.			

Limits for conducted emissions of equipment
intended to be used in telecommunication centres and industrial environment

Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	79	66
	500kHz~30MHz	73	60

3.1.2. Test Setup



3.1.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ETSI EN 301 489-1 V2.1.1& EN 55032: 2015 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

For the actual test configuration, please refer to the related Item EUT Test Photos.

3.1.4. Test Data

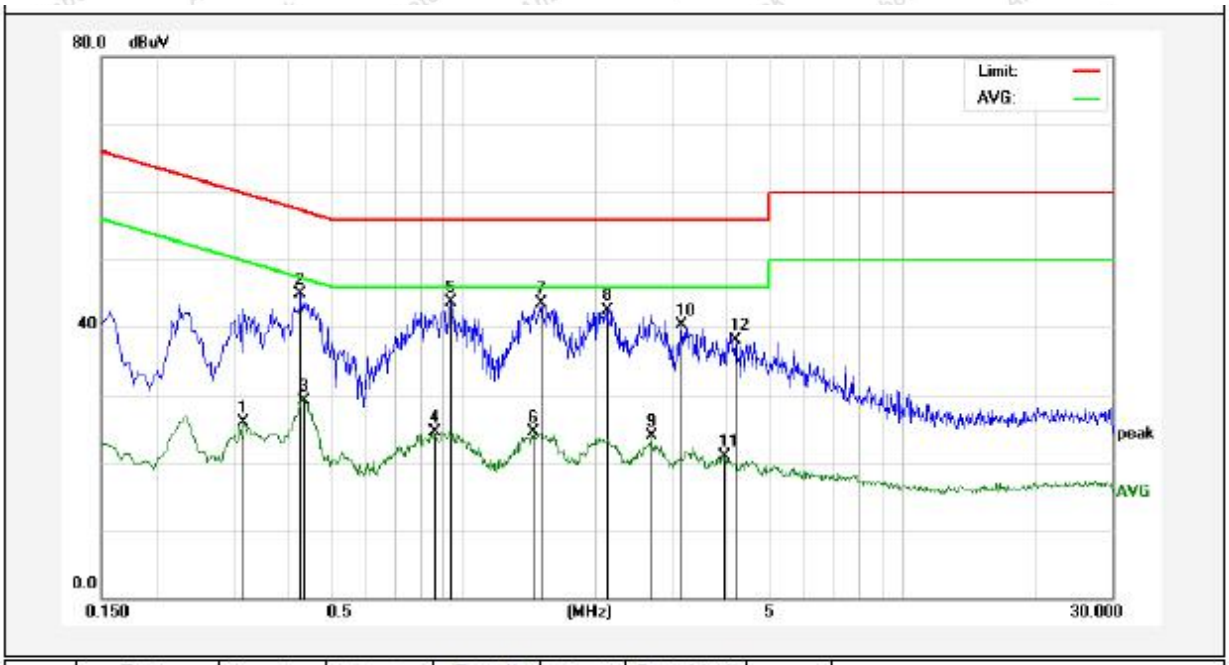
PASS

The EUT should be compliance to the limit of Class B

Only the worst case data was showed in the report, please to see the following pages

Conducted Emission Test Data

Test Site: 1# Shielded Room
Operating Condition: Mode 1
Test Specification: AC 230V, 50Hz for adapter
Comment: Live Line
Tem.: 22.5℃ Hum.: 54%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.3180	5.97	19.90	25.87	49.76	-23.89	AVG	
2	0.4260	24.88	19.95	44.83	57.33	-12.50	QP	
3	0.4340	9.12	19.95	29.07	47.18	-18.11	AVG	
4	0.8580	4.45	20.08	24.53	46.00	-21.47	AVG	
5	0.9420	23.67	20.10	43.77	56.00	-12.23	QP	
6	1.4420	4.42	20.13	24.55	46.00	-21.45	AVG	
7	1.5100	23.39	20.13	43.52	56.00	-12.48	QP	
8	2.1300	22.42	20.14	42.56	56.00	-13.44	QP	
9	2.6860	3.69	20.15	23.84	46.00	-22.16	AVG	
10	3.1420	20.09	20.16	40.25	56.00	-15.75	QP	
11	3.9580	0.72	20.18	20.90	46.00	-25.10	AVG	
12	4.1740	17.96	20.18	38.14	56.00	-17.86	QP	

Conducted Emission Test Data

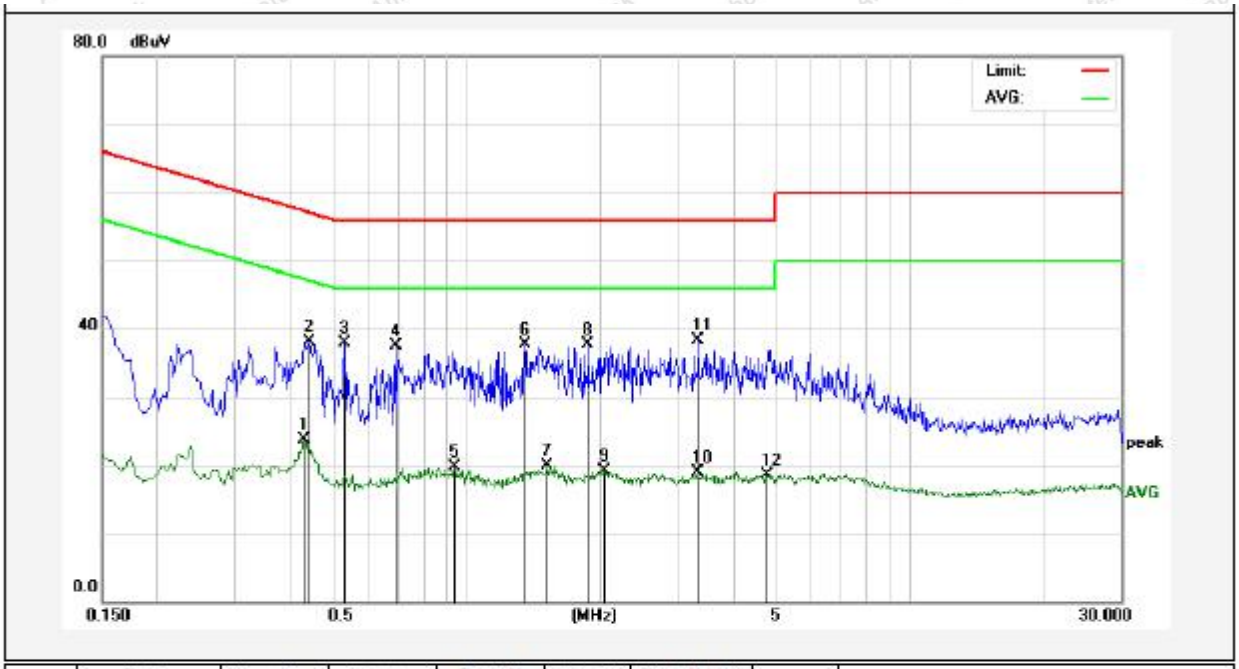
Test Site: 1# Shielded Room

Operating Condition: Mode 1

Test Specification: AC 230V, 50Hz for adapter

Comment: Neutral Line

Tem.: 22.5℃ Hum.: 54%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.4300	3.72	19.95	23.67	47.25	-23.58	AVG	
2	0.4420	18.21	19.95	38.16	57.02	-18.86	QP	
3	0.5299	17.93	19.99	37.92	56.00	-18.08	QP	
4	0.6900	17.55	20.04	37.59	56.00	-18.41	QP	
5	0.9420	-0.47	20.10	19.63	46.00	-26.37	AVG	
6	1.3580	17.65	20.13	37.78	56.00	-18.22	QP	
7	1.5220	-0.30	20.13	19.83	46.00	-26.17	AVG	
8	1.8820	17.48	20.14	37.62	56.00	-18.38	QP	
9	2.0420	-1.11	20.14	19.03	46.00	-26.97	AVG	
10	3.3220	-1.32	20.17	18.85	46.00	-27.15	AVG	
11	3.3300	18.16	20.17	38.33	56.00	-17.67	QP	
12	4.7300	-1.64	20.20	18.56	46.00	-27.44	AVG	

Conducted Emission Test Data

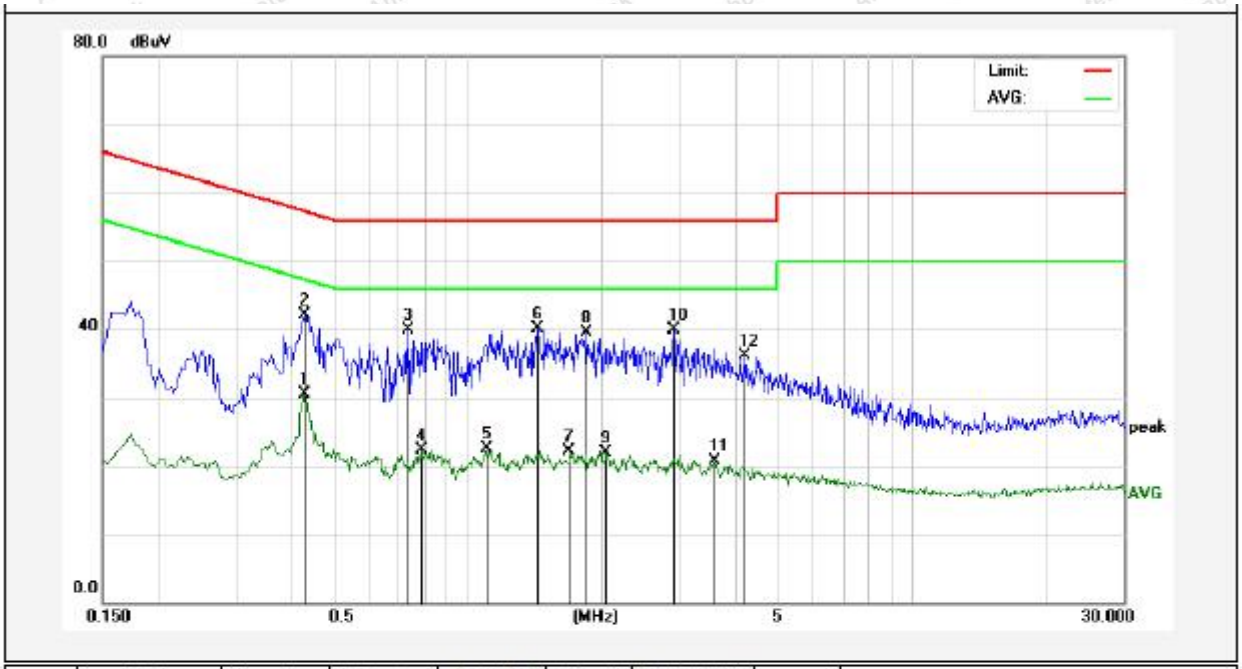
Test Site: 1# Shielded Room

Operating Condition: Mode 1

Test Specification: AC 110V, 50Hz for adapter

Comment: Live Line

Tem.: 22.5℃ Hum.: 54%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.4260	10.47	19.95	30.42	47.33	-16.91	AVG	
2	0.4300	22.06	19.95	42.01	57.25	-15.24	QP	
3	0.7340	19.76	20.05	39.81	56.00	-16.19	QP	
4	0.7900	2.32	20.06	22.38	46.00	-23.62	AVG	
5	1.1100	2.31	20.12	22.43	46.00	-23.57	AVG	
6	1.4340	20.04	20.13	40.17	56.00	-15.83	QP	
7	1.6980	2.04	20.13	22.17	46.00	-23.83	AVG	
8	1.8500	19.41	20.14	39.55	56.00	-16.45	QP	
9	2.0460	1.78	20.14	21.92	46.00	-24.08	AVG	
10	2.9020	19.69	20.16	39.85	56.00	-16.15	QP	
11	3.5940	0.63	20.17	20.80	46.00	-25.20	AVG	
12	4.2100	15.93	20.19	36.12	56.00	-19.88	peak	

Conducted Emission Test Data

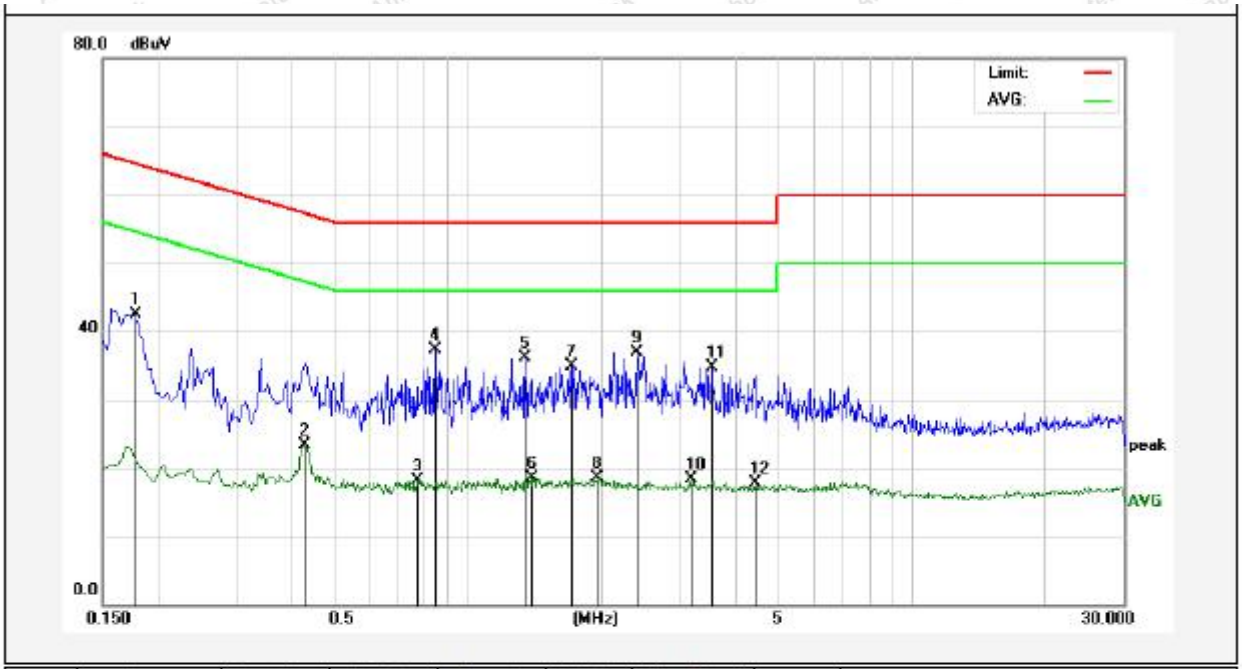
Test Site: 1# Shielded Room

Operating Condition: Mode 1

Test Specification: AC 110V, 50Hz for adapter

Comment: Neutral Line

Tem.: 22.5℃ Hum.: 54%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1780	22.62	19.90	42.52	64.57	-22.05	QP	
2	0.4260	3.39	19.95	23.34	47.33	-23.99	AVG	
3	0.7700	-1.94	20.06	18.12	46.00	-27.88	AVG	
4	0.8460	17.26	20.08	37.34	56.00	-18.66	QP	
5	1.3460	15.88	20.13	36.01	56.00	-19.99	QP	
6	1.3900	-1.60	20.13	18.53	46.00	-27.47	AVG	
7	1.7140	14.82	20.13	34.95	56.00	-21.05	QP	
8	1.9580	-1.62	20.14	18.52	46.00	-27.48	AVG	
9	2.4020	16.76	20.15	36.91	56.00	-19.09	QP	
10	3.1860	-1.89	20.16	18.27	46.00	-27.73	AVG	
11	3.5380	14.44	20.17	34.61	56.00	-21.39	QP	
12	4.4380	-2.45	20.19	17.74	46.00	-28.26	AVG	

3.2. Radiated Emission Test

3.2.1. Test Standard and Limit

Test Standard	ETSI EN 301 489-1 V2.1.1 Clause 8.2
Basic Standard	EN 55032: 2015

Radiated Emission Test Limit (Below 1000MHz)

Frequency (MHz)	Limit (dBμV/m)	
	Quasi-peak Level	
	Class B	Class A
30MHz~230MHz	40	50
230MHz~1000MHz	47	57
Remark: 1. The lower limit shall apply at the transition frequency. 2. The test distance is 3m.		

Radiated Emission Test Limit (Above 1000MHz)

Frequency (MHz)	Limit (dBμV/m)			
	Class B		Class A	
	Peak	Average	Peak	Average
1000 MHz -3000 MHz	70	50	76	56
3000 MHz -6000 MHz	74	54	80	60
Remark: 1. The lower limit applies at the transition frequency. 2. The test distance is 3m.				

Radiated Emission Test Limit for FM Receivers

Frequency (MHz)	Limit (dBμV/m)	
	Quasi-peak Level	
	Fundamental	Harmonics
30MHz~230MHz	60	52
230MHz~300MHz	60	52
300MHz~1000MHz	60	56
Remark: 1. The lower limit shall apply at the transition frequency. 2. The test distance is 3m.		

Frequency Range of Radiated Measurement

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 6 GHz, whichever is lower

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3.2.2. Test Setup

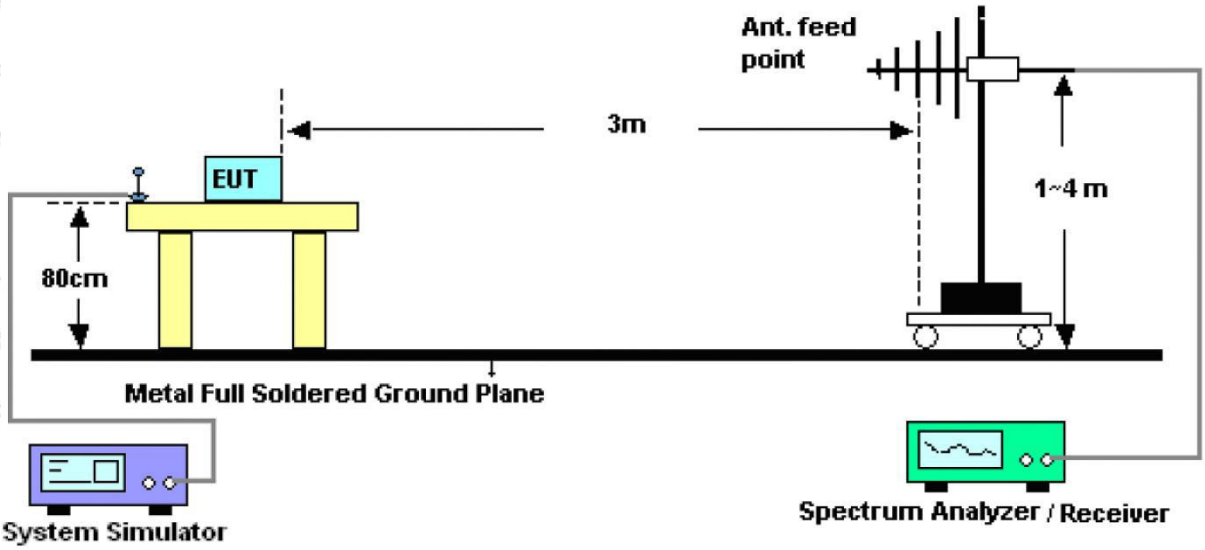


Figure 1. 30MHz to 1GHz

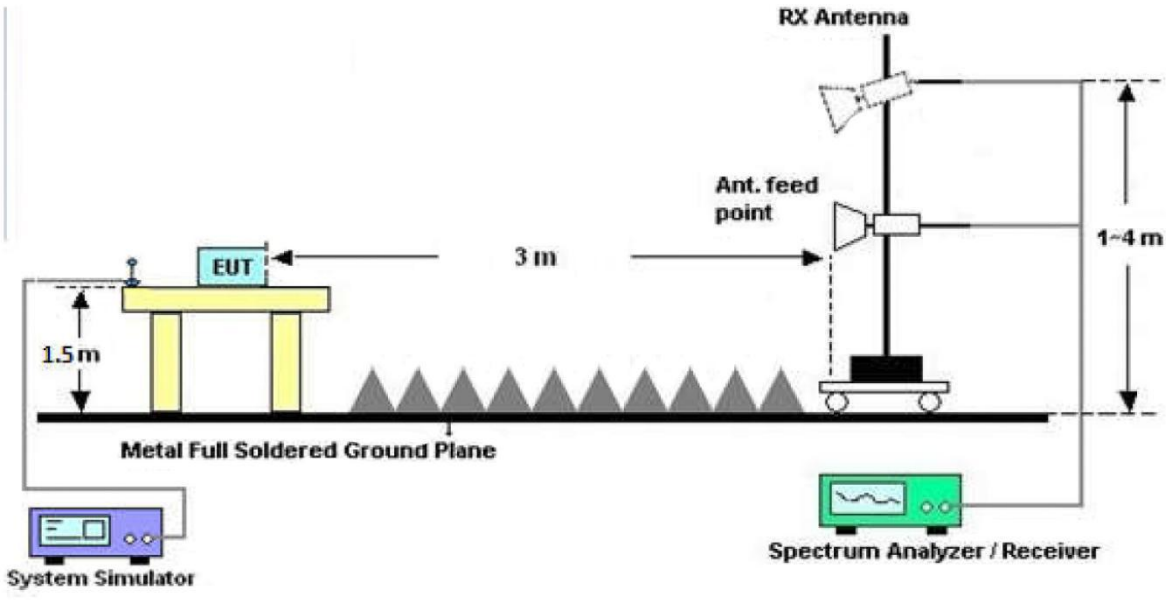


Figure 2. Above 1 GHz

3.2.3. Test Procedure

1) The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
2) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter test site. The table was rotated 360 degrees to determine the position of the highest radiation.
3) The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarization of the antenna are set to make the measurement.
4) The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
5) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.
The test receiver/spectrum was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
6) For the actual test configuration, please refer to the related Item –EUT Test Photos.

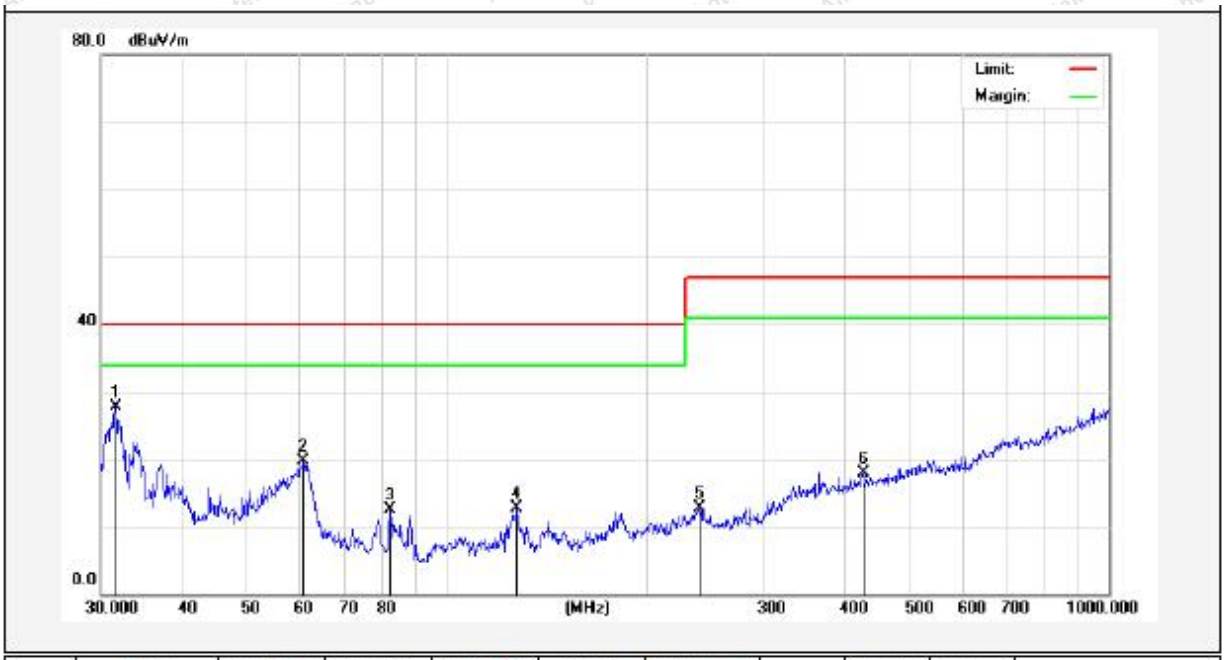
Note:
The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak/ Average detection at frequency above 1GHz.

3.2.4. Test Data

PASS
The EUT should be compliance to the limit of Class B
Only the worst case data was showed in the report, please to see the following pages

Test Results (30~1000MHz)

Test Mode:	Mode 1
Power Source:	AC 230V, 50Hz for adapter
Polarization:	Vertical
Temp.(℃)/Hum.(%RH):	24.9℃/51%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	31.6202	45.59	-17.93	27.66	40.00	-12.34	peak			
2	60.7044	37.36	-17.69	19.67	40.00	-20.33	peak			
3	82.0706	33.34	-20.90	12.44	40.00	-27.56	peak			
4	127.6645	31.30	-18.52	12.78	40.00	-27.22	peak			
5	240.8304	27.63	-14.95	12.68	47.00	-34.32	peak			
6	425.0280	30.47	-12.56	17.91	47.00	-29.09	peak			

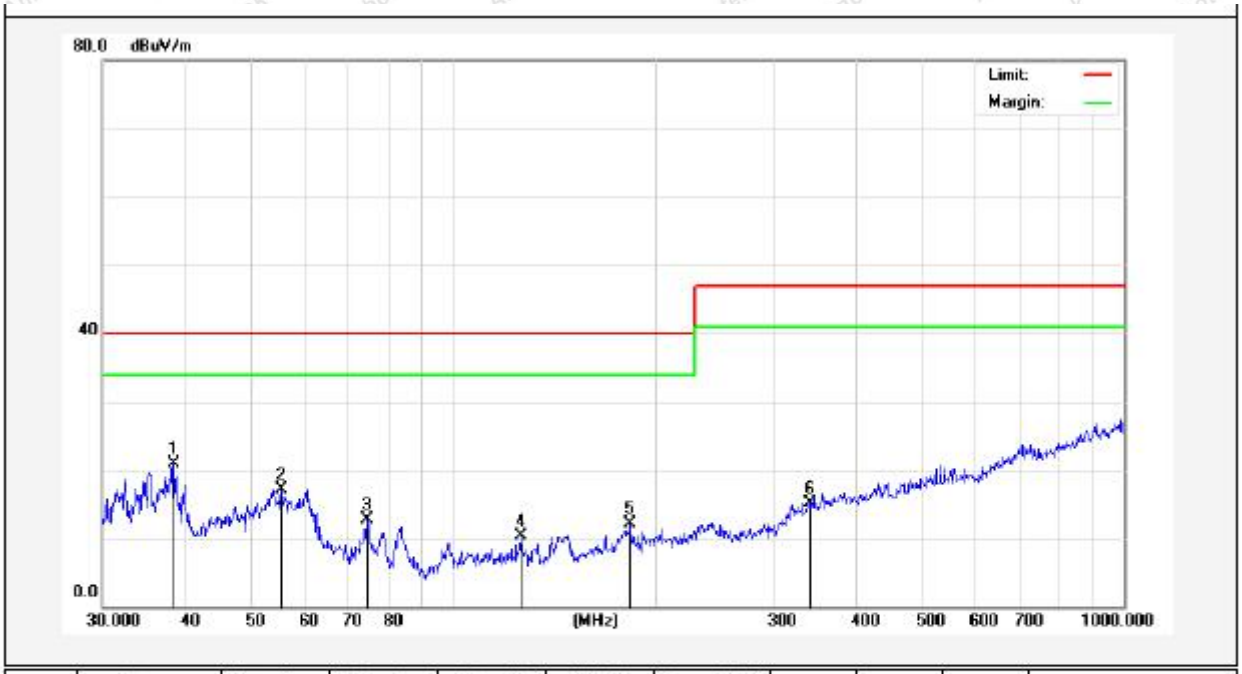
Test Results (30~1000MHz)

Test Mode:	Mode 1
Power Source:	AC 230V, 50Hz for adapter
Polarization:	Horizontal
Temp.(℃)/Hum.(%RH):	24.9℃/51%RH

No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	44.9006	30.76	-17.53	13.23	40.00	-26.77	peak			
2	59.4405	31.58	-18.37	13.21	40.00	-26.79	peak			
3	98.4866	31.13	-23.01	8.12	40.00	-31.88	peak			
4	131.2965	32.44	-23.72	8.72	40.00	-31.28	peak			
5	244.2321	32.05	-19.14	12.91	47.00	-34.09	peak			
6	440.1963	32.26	-13.54	18.72	47.00	-28.28	peak			

Test Results (30~1000MHz)

Test Mode:	Mode 1
Power Source:	AC 110V, 50Hz for adapter
Polarization:	Vertical
Temp.(℃)/Hum.(%RH):	24.9℃/51%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	38.3462	37.90	-17.00	20.90	40.00	-19.10	peak			
2	55.4147	34.26	-17.07	17.19	40.00	-22.81	peak			
3	74.3955	34.90	-22.24	12.66	40.00	-27.34	peak			
4	126.3286	28.56	-18.32	10.24	40.00	-29.76	peak			
5	183.8440	29.58	-17.39	12.19	40.00	-27.81	peak			
6	339.5888	29.46	-14.35	15.11	47.00	-31.89	peak			

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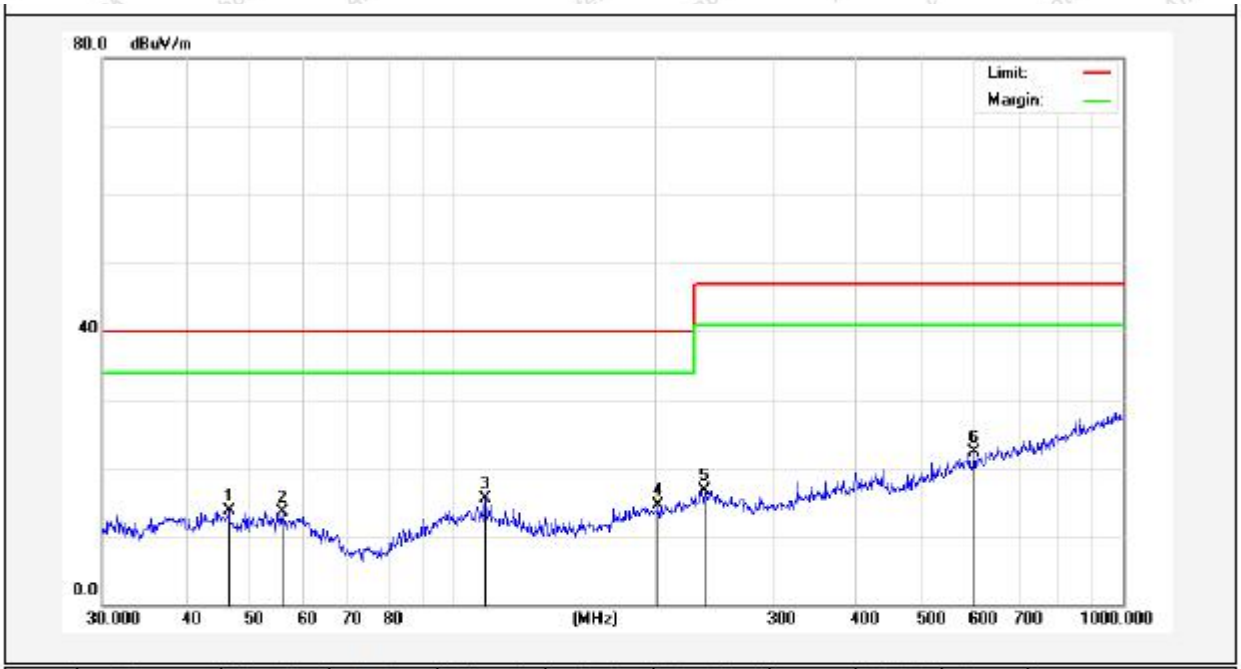
Test Results (30~1000MHz)

Test Mode:	Mode 1
Power Source:	AC 110V, 50Hz for adapter
Polarization:	Horizontal
Temp.(℃)/Hum.(%RH):	24.9℃/51%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	46.3402	31.23	-17.59	13.64	40.00	-26.36	peak			
2	55.6094	31.64	-18.08	13.56	40.00	-26.44	peak			
3	111.7380	38.42	-22.83	15.59	40.00	-24.41	peak			
4	202.8104	35.33	-20.77	14.56	40.00	-25.44	peak			
5	237.4760	35.94	-19.20	16.74	47.00	-30.26	peak			
6	599.3212	34.38	-12.11	22.27	47.00	-24.73	peak			

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Test Results (1GHz~6GHz)

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.	Detector
1315.18	48.20	-3.14	45.06	70.00	-24.94	H	PEAK
1872.95	51.32	-3.38	47.94	70.00	-22.06	H	PEAK
1963.97	49.13	-4.27	44.86	70.00	-25.14	H	PEAK
4002.67	54.41	-4.78	49.63	74.00	-24.37	H	PEAK
4454.65	45.81	-5.30	40.51	74.00	-33.49	H	PEAK
4959.21	53.50	-5.57	47.93	74.00	-26.07	H	PEAK
1315.18	39.98	-3.14	36.84	50.00	-13.16	H	AVG
1872.95	41.44	-3.38	38.06	50.00	-11.94	H	AVG
1963.97	38.83	-4.27	34.56	50.00	-15.44	H	AVG
4002.67	45.72	-4.78	40.94	54.00	-13.06	H	AVG
4454.65	41.00	-5.30	35.70	54.00	-18.30	H	AVG
4959.21	44.30	-5.57	38.73	54.00	-15.27	H	AVG
1675.47	46.34	-3.01	43.32	70.00	-26.68	V	PEAK
1913.84	55.76	-3.23	52.54	70.00	-17.46	V	PEAK
2154.87	46.77	-3.76	43.01	70.00	-26.99	V	PEAK
3852.12	45.35	-4.58	40.77	74.00	-33.23	V	PEAK
4464.60	46.79	-4.68	42.10	74.00	-31.90	V	PEAK
5030.58	50.97	-6.12	44.85	74.00	-29.15	V	PEAK
1675.47	40.18	-3.01	37.16	50.00	-12.84	V	AVG
1913.84	40.49	-3.23	37.27	50.00	-12.73	V	AVG
2154.87	42.30	-3.76	38.54	50.00	-11.46	V	AVG
3852.12	40.25	-4.58	35.67	54.00	-18.33	V	AVG
4464.60	37.80	-4.68	33.11	54.00	-20.89	V	AVG
5030.58	37.57	-6.12	31.45	54.00	-22.55	V	AVG

Remark:

1. Level =Receiver Read level + Antenna Factor

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4. Immunity Test

General Performance Criteria

◆ Performance criteria for continuous phenomena applied to transmitters and receivers (CT/CR)

During and after the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.

During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

◆ Performance criteria for transient phenomena applied to transmitters and receivers (TT/TR)

After the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer,when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.

During the EMC exposure to an electromagnetic phenomenon, a degradation of performance is,however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

◆ Performance criteria for equipment which does not provide a continuous communication link

For radio equipment which does not provide a continuous communication link, the performance criteria described in CT/CR and TT/TR are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests.

The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in CT/CR and TT/TR.

◆ Performance criteria for ancillary equipment tested on a stand alone basis

If ancillary equipment is intended to be tested on a stand alone basis, the performance criteria described in CT/CR and TT/TR are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests.

The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in CT/CR and TT/TR.

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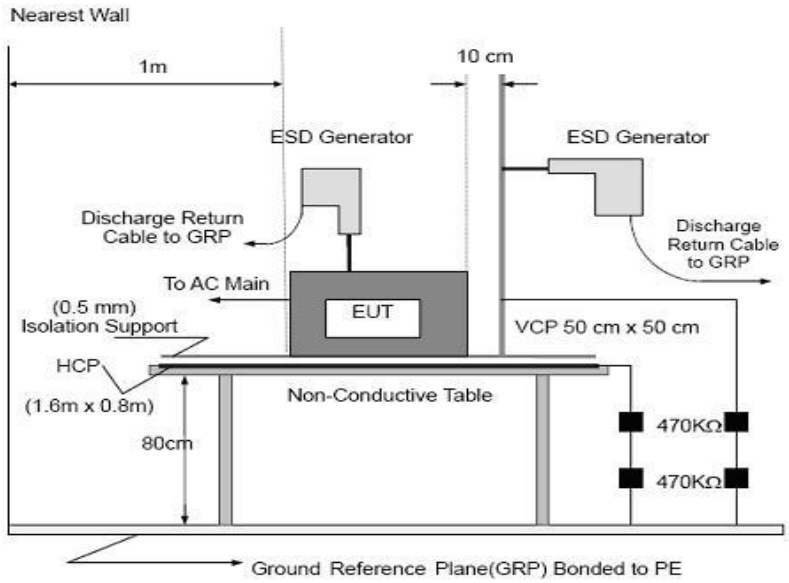
4.1. Electrostatic Discharge Test

4.1.1. Test Standard and Specification

Test Standard	ETSI EN 301 489-1 V2.1.1 Clause 9.3
Basic Standard	EN 61000-4-2: 2009
Discharge Impedance:	330 ohm / 150 pF
Performance Criterion:	CT/CR
Discharge Voltage:	Air Discharge: 2kV/4kV/8kV Contact Discharge: 2kV/4kV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point Contact Discharge: min. 200 times in total
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

4.1.2. Test Setup



Note:

TABLE-TOP EQUIPMENT:

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940kohm total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC /EN 61000-4-2, and its cables were

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placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT:
The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

4.1.3. Test Procedure

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

1) Contact discharge was applied to conductive surfaces and coupling planes of the EUT.

During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second.

Vertical Coupling Plane (VCP):

The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

2) Air discharges at insulation surfaces of the EUT.

It was at least ten single discharges with positive and negative at the same selected point.

3）When applying direct discharges to a portable or handheld battery-powered EUT with a display screen, it may not be possible to observe the screen for a given EUT orientation. If observation of the screen is necessary during this test, the EUT may be mounted vertically using non-metallic supports.

4）For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.4. Test Data

Temp.(℃)/Hum.(%RH): 21.8℃/57%RH

Power Source: AC 230V, 50Hz for adapter/ DC 3.7V battery inside

Test Mode: Mode 1, Mode 2

Item	Contact Discharge to conducted surfaces and to coupling planes		Air Discharge at insulating surfaces
	Direct Contact Discharge	Indirect Contact Discharge	
Test Voltage	Reaction of EUT / Result	Reaction of EUT / Result	Reaction of EUT / Result
+2kV	n.r.r. PASS	n.r.r. PASS	n.r.r. PASS
-2kV	n.r.r. PASS	n.r.r. PASS	n.r.r. PASS
+4kV	n.r.r. PASS	n.r.r. PASS	n.r.r. PASS
-4kV	n.r.r. PASS	n.r.r. PASS	n.r.r. PASS
+6kV	-	-	n.r.r. PASS
-6kV	-	-	n.r.r. PASS
+8kV	-	-	n.r.r. PASS
-8kV	-	-	n.r.r. PASS

Remarks: n.r.r. = no reaction recognized

Performance Criteria A observed and No any function degraded during the tests.

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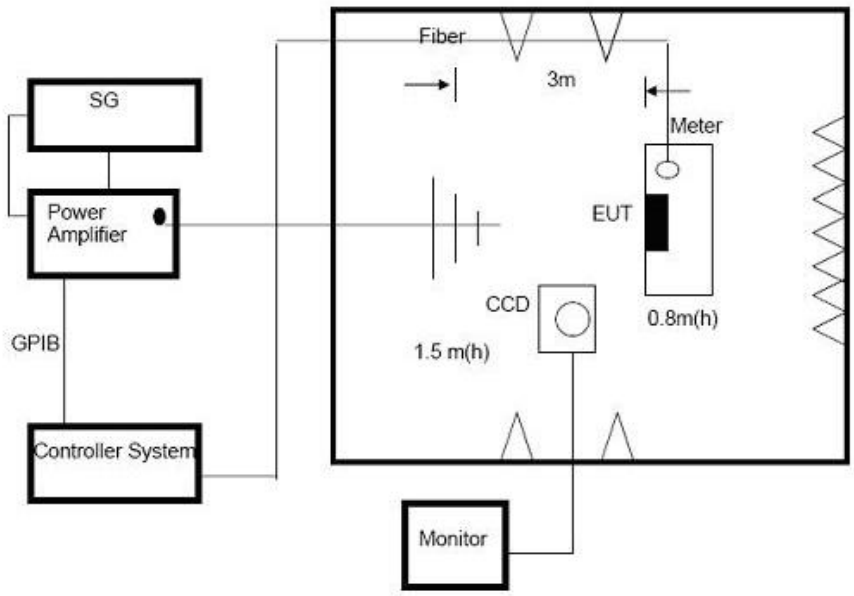
4.2. Radiated, RF Electromagnetic Fields Test

4.2.1. Test Standard and Specification

Test Standard	ETSI EN 301 489-1 V2.1.1 Clause 9.2
Basic Standard	EN 61000-4-3: 2006+A1: 2008+A2: 2010
Required Performance	A
Frequency Range	80MHz to 6GHz
Field Strength	3 V/m
Modulation	1kHz Sine Wave, 80%, AM Modulation
Frequency Step	1 % of preceding frequency value
Polarity of Antenna	Horizontal and Vertical
Test Distance	3 m
Antenna Height	1.5 m
Dwell Time	at least 0.5 seconds

4.2.2. Test Setup



4.2.3. Test Procedure

The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber. The testing distance from antenna to the EUT was 3 meters.

1) The field strength level was 3V/m

2) The frequency range is swept from 80 MHz to 6000 MHz with the signal 80%amplitude modulated with a 1kHz sine wave.

3) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond, but shall in no case be less than 0.5s.

4) The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

4.2.4. Test Data

Temp.(℃)/Hum.(%RH): 21.8℃/57%RH

Power Source: AC 230V, 50Hz for adapter/ DC 3.7V battery inside

Test Mode: Mode 1, Mode 2

Frequency Range (MHz)	Antenna Polarity	R.F. Field Strength	Azimuth	Result
80~6000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	☑ A ☐ B ☐ C ☐ D
			Rear	
			Left	
			Right	

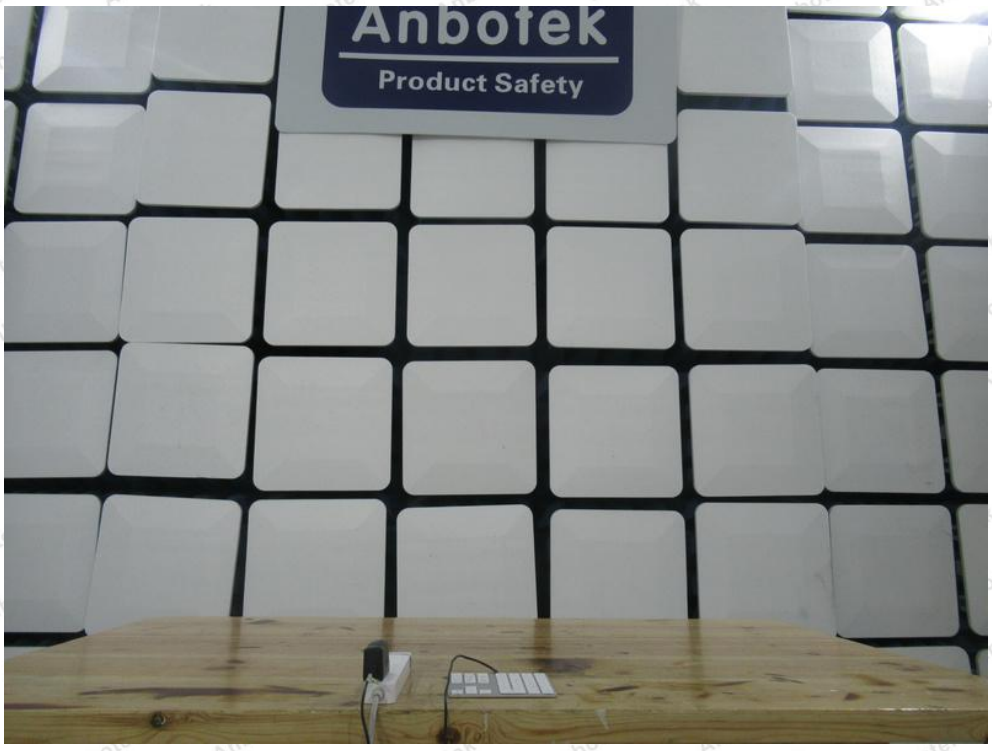
APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Conducted Emission Test

Photo of Radiation Emission Test

Photo of Electrostatic Discharge Test

Photo of RF Field Strength Susceptibility Test

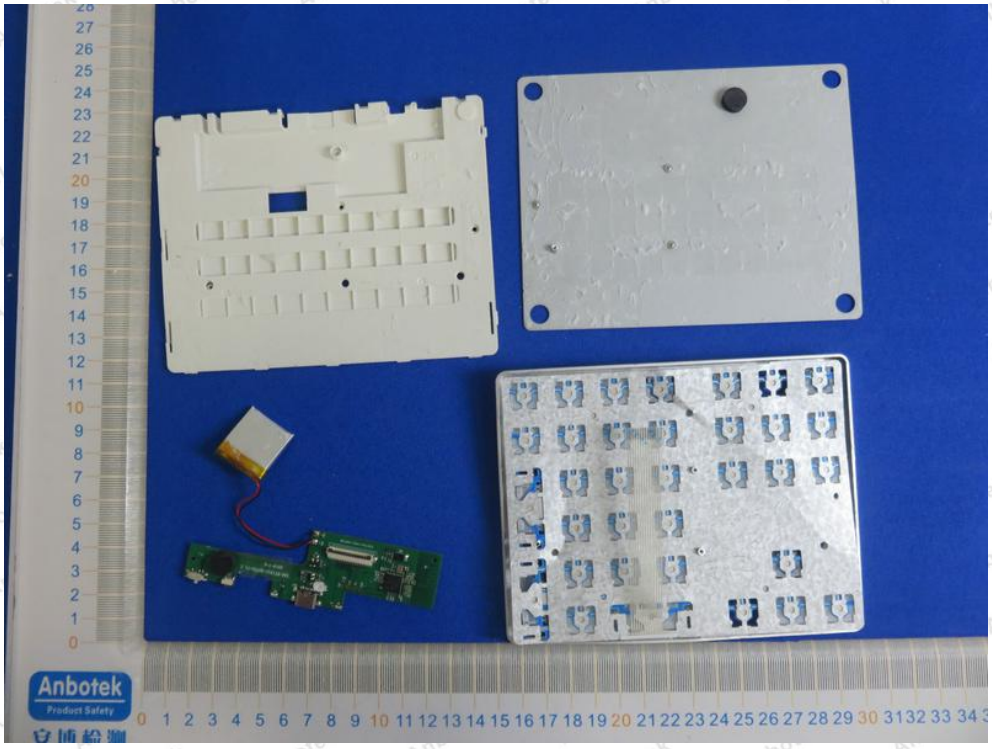


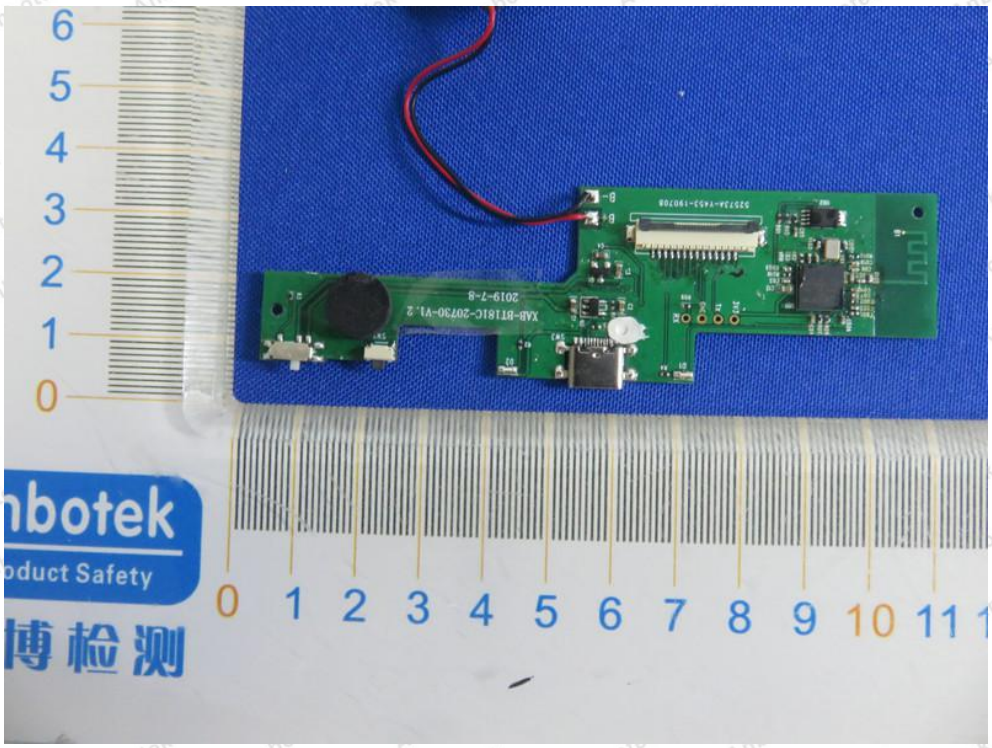
APPENDIX II -- EXTERNAL PHOTOGRAPH

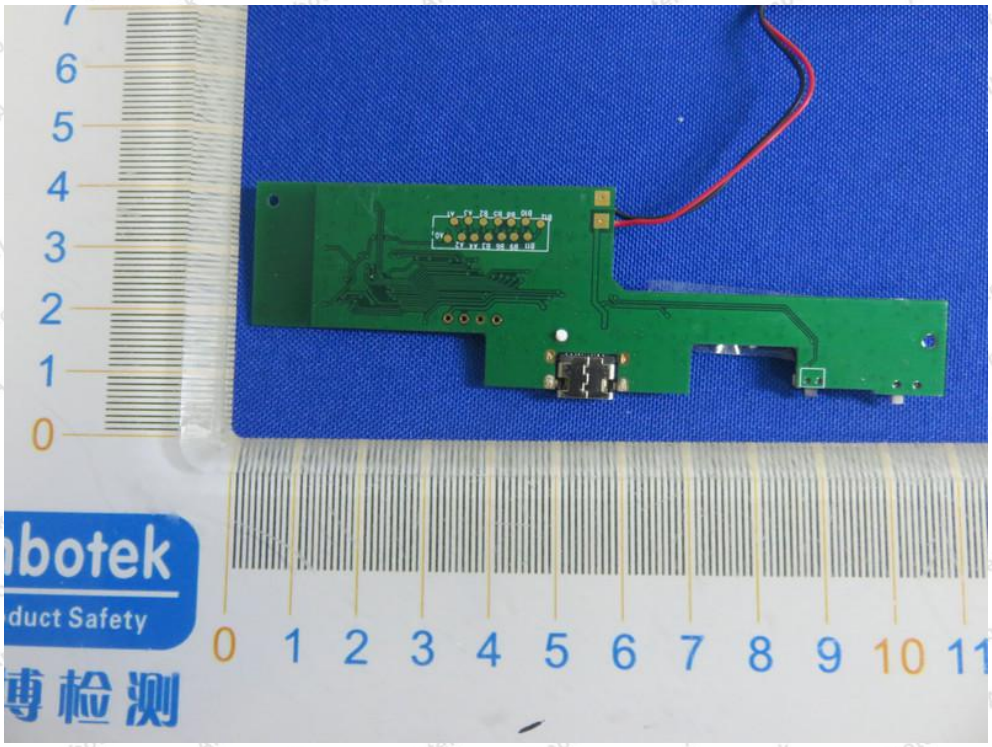

prtscn
home
page up
delete
end
page down
clear
enter
0 1 2 3 4 5 6 7 8 9 10 11 12 13

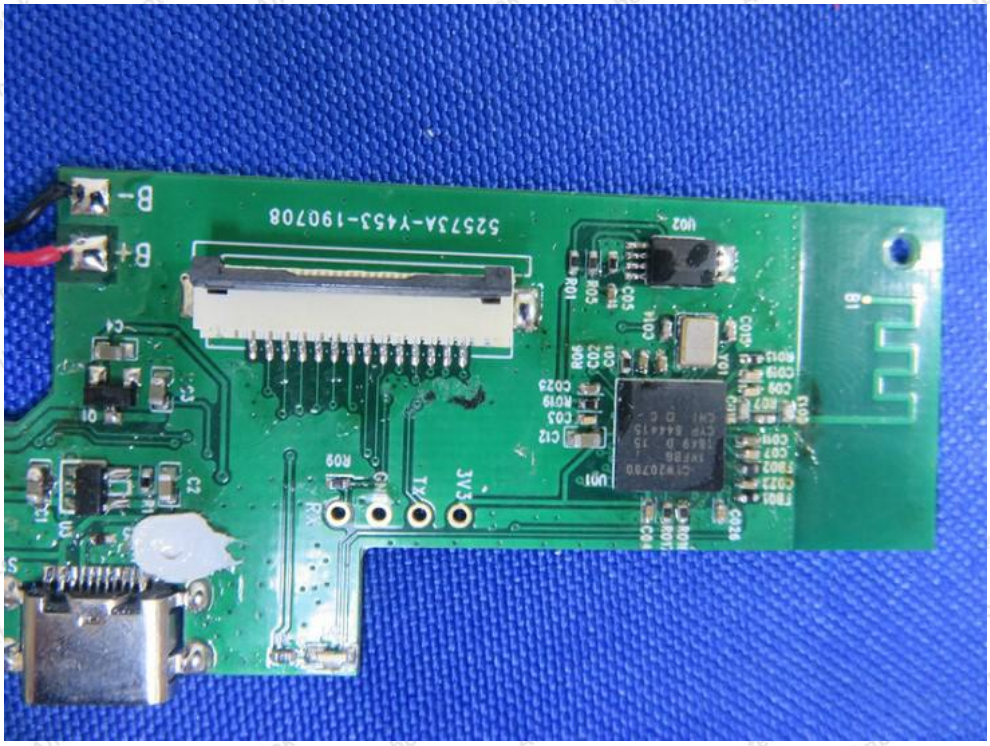

enter
del
0 1 2 3 4 5 6 7 8 9 10 11

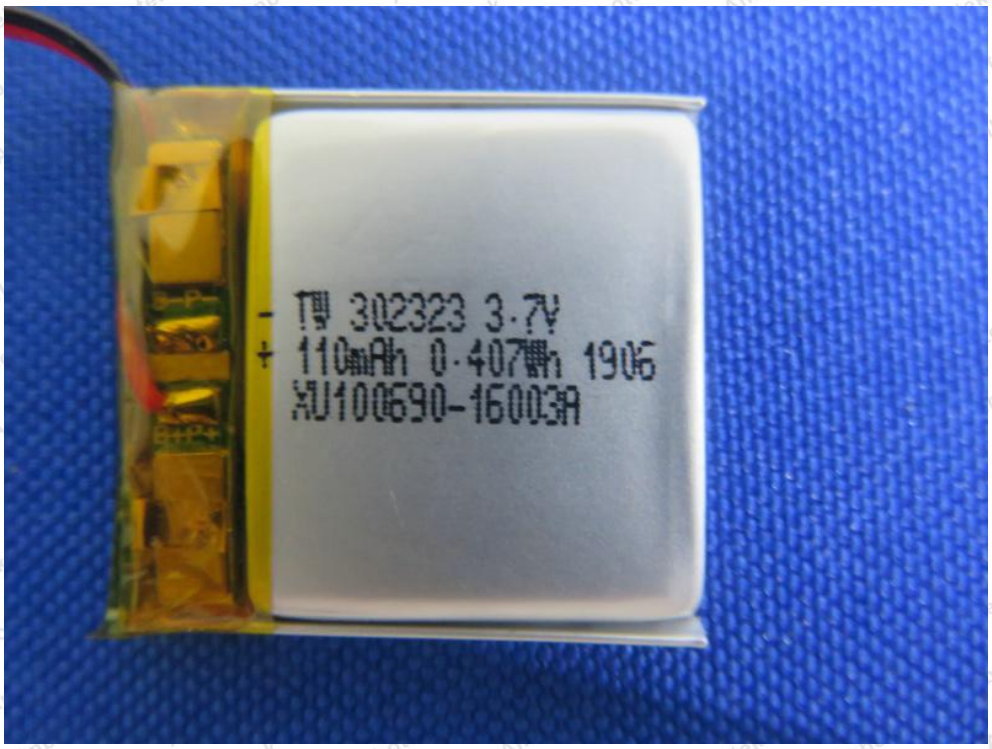
APPENDIX III -- INTERNAL PHOTOGRAPH











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