

FCC Test Report

Report No.: AGC00803180702FE01

APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : Penlic mini keyboard KB3
BRAND NAME : Penlic
MODEL NAME : KB3
CLIENT : Penlic AB
DATE OF ISSUE : Jul. 25, 2018
STANDARD(S) : FCC Part 15 Subpart B
REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jul. 25, 2018	Valid	Initial release

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1. VERIFICATION OF CONFORMITY

Applicant	Penclic AB
Address	Vendev. 90, Danderyd, 182 32, Sweden
Manufacturer	Shenzhen Hangshi Technology Co., Ltd
Address	Hangshi Technology Park, Democracy West Industry Area, Shajing Town, Bao'an District, Shenzhen, China.
Product Designation	Penclic mini keyboard KB3
Brand Name	Penclic
Test Model	KB3
Date of test	Jul. 23, 2018 to Jul. 24, 2018
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-IT/AC

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. For compliance with the requirements set forth in the FCC Rules and Regulations Part 15, the measurement procedure according to ANSI C63.4:2014. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements. The test results of this report relate only to the tested sample identified in this report.

Tested By Jonhen Wang
 Jonhen Wang(Wang Yonghuan) Jul. 24, 2018

Reviewed By Cool Cheng
 Cool Cheng(Cheng Mengguo) Jul. 25, 2018

Approved By Forrest Lei
 Forrest Lei(Lei Yonggang)
 Authorized Officer Jul. 25, 2018

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2. SYSTEM DESCRIPTION

EUT set up procedure:

1. Connect the EUT with PC.
2. Make sure the EUT c operates normally during the test.

Test Mode

TEST MODE DESCRIPTION		
NO.	TEST MODE DESCRIPTION	WORST
1	Data transmission	V

Note: V means EMI worst mode.

3. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

- Uncertainty of Conducted Emission, $U_c = \pm 3.2$ dB
- Uncertainty of Radiated Emission, $U_c = \pm 3.2$ dB

4. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.107	Conduction Emission	Compliant
§15.109	Radiated Emission	Compliant

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5. PRODUCT INFORMATION

Housing Type	Plastic and Metal
Voltage	DC 3.7V by battery

I/O Port Information (Applicable Not Applicable)

I/O Port of EUT			
I/O Port Type	Q'TY	Cable	Tested with
USB Port	1	0	1

6. SUPPORT EQUIPMENT

Device Type	Manufacturer	Model Name	Serial No.	Power Cable
PC	APPLE	A1534	N/A	0
PC	APPLE	A1465	N/A	0
PC Adapter	APPLE	E132068	N/A	2m unshielded
USB Cable	N/A	N/A	N/A	1m unshielded

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

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7. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location 1	1-2F., Bldg.2, No.1-4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District, Shenzhen, Guangdong, P.R.China
Location 2	B112-B113, Bldg.12, Baoan Bldg Materials Center, No.1 of Xixiang Inner Ring Road, Baoan District, Shenzhen 518012
Note: The test item conducted emission was tested in the laboratory of the location 1, the others were tested in the laboratory of the location 2.	

8. TEST EQUIPMENT LIST

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Test Receiver	ROHDE&SCHWARZ	ESCI	100694	July 2, 2018	July 1, 2019
LISN	R&S	ESH3-Z5	838979/009	Mar.01 2018	Feb. 28, 2019

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun.20, 2018	Jun.19, 2019
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec.08, 2017	Dec.07, 2018
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep.28, 2017	Sep.27, 2018
HORN ANTENNA	EM	EM-AH-10180	N/A	Mar.01, 2018	Feb.28, 2019

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9. FCCLINE CONDUCTED EMISSION TEST

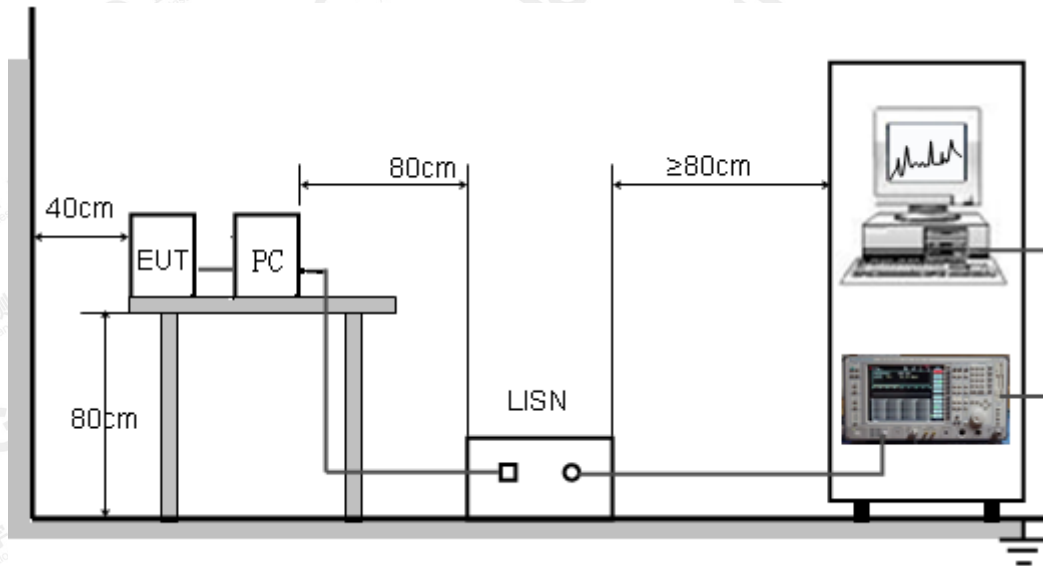
9.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	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.

9.2. BLOCK DIAGRAM OF TEST SETUP



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9.3. PROCEDURE OF LINE CONDUCTED EMISSION TEST

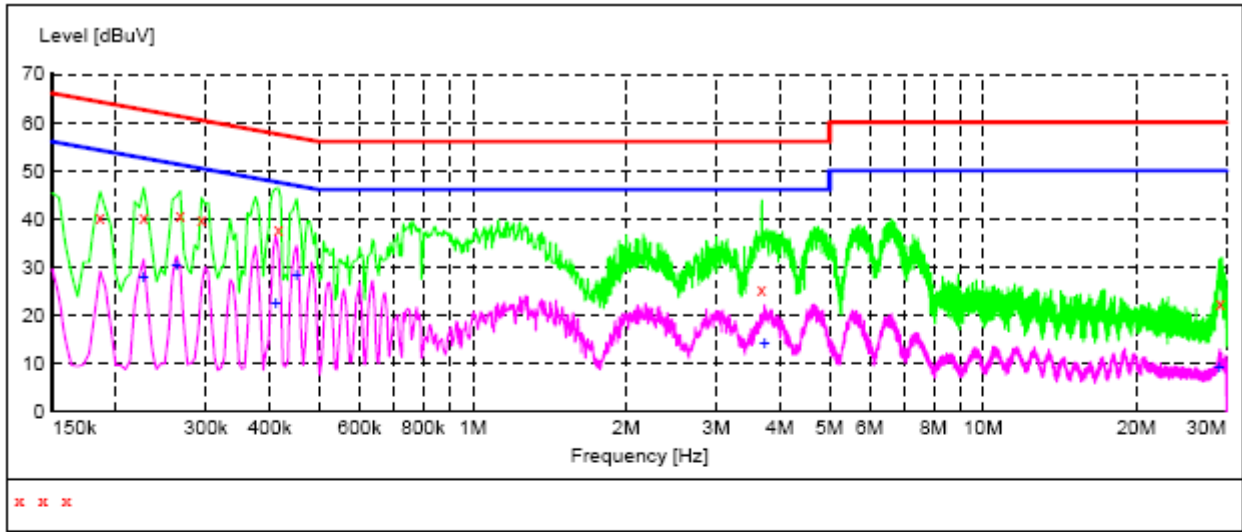
- (1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground 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 charging voltage by PC which 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.

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9.4. TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST-L



MEASUREMENT RESULT:

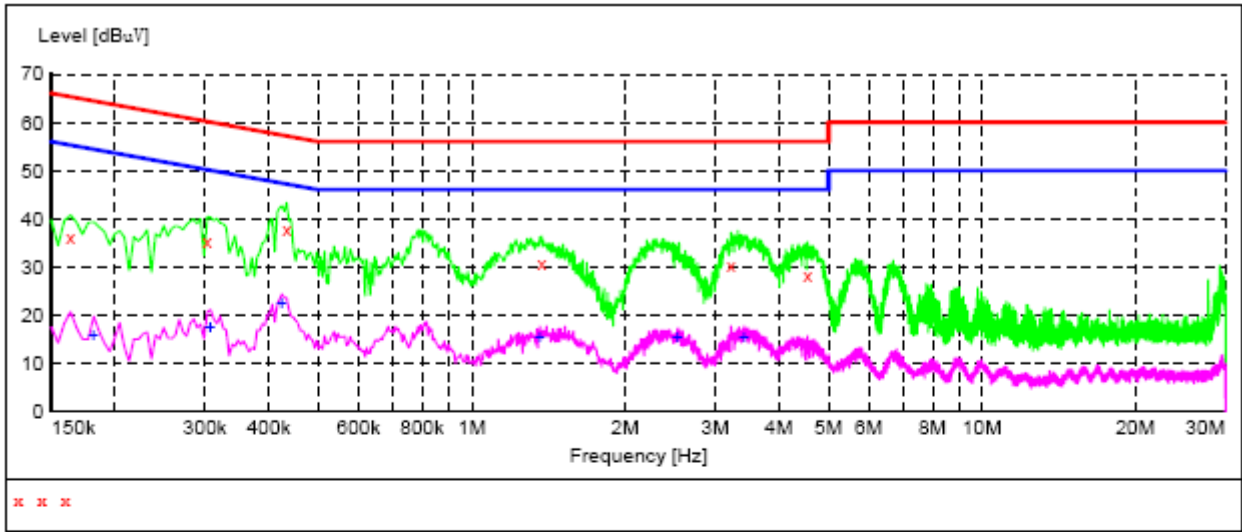
Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	AUX STATE
MHz	dBuV	dB	dBuV	dB				
0.186000	40.30	10.3	64	23.9	QP	L1	FLO	ON
0.226500	40.10	10.3	63	22.5	QP	L1	FLO	ON
0.267000	40.60	10.3	61	20.6	QP	L1	FLO	ON
0.294000	39.70	10.3	60	20.7	QP	L1	FLO	ON
0.415500	37.70	10.3	58	19.8	QP	L1	FLO	ON
3.682500	25.20	10.5	56	30.8	QP	L1	FLO	ON
29.143500	22.40	11.8	60	37.6	QP	L1	FLO	ON

MEASUREMENT RESULT:

Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	AUX STATE
MHz	dBuV	dB	dBuV	dB				
0.226500	27.70	10.3	53	24.9	AV	L1	FLO	ON
0.262500	30.10	10.3	51	21.3	AV	L1	FLO	ON
0.411000	22.50	10.3	48	25.1	AV	L1	FLO	ON
0.451500	28.30	10.3	47	18.5	AV	L1	FLO	ON
3.732000	14.10	10.5	46	31.9	AV	L1	FLO	ON
29.080500	9.30	11.8	50	40.7	AV	L1	FLO	ON

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LINE CONDUCTED EMISSION TEST-N



MEASUREMENT RESULT:

Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	AUX STATE
MHz	dBuV	dB	dBuV	dB				
0.163500	36.30	10.3	65	32.0	QP	N	FLO	ON
0.303000	35.40	10.3	60	24.8	QP	N	FLO	ON
0.433500	37.70	10.3	57	19.5	QP	N	FLO	ON
1.369500	30.70	10.4	56	25.3	QP	N	FLO	ON
3.223500	30.30	10.5	56	25.7	QP	N	FLO	ON
4.551000	28.30	10.5	56	27.7	QP	N	FLO	ON

MEASUREMENT RESULT:

Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	AUX STATE
MHz	dBuV	dB	dBuV	dB				
0.181500	15.70	10.3	54	38.7	AV	N	FLO	ON
0.307500	17.30	10.3	50	32.7	AV	N	FLO	ON
0.424500	22.60	10.3	47	24.8	AV	N	FLO	ON
1.360500	15.30	10.4	46	30.7	AV	N	FLO	ON
2.530500	15.40	10.5	46	30.6	AV	N	FLO	ON
3.417000	15.40	10.5	46	30.6	AV	N	FLO	ON

RESULT: PASS

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10. FCC RADIATED EMISSION TEST

10.1. LIMITS OF RADIATED EMISSION TEST

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
960~1000	3	54.0
Above 1000	3	Other:74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)

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

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

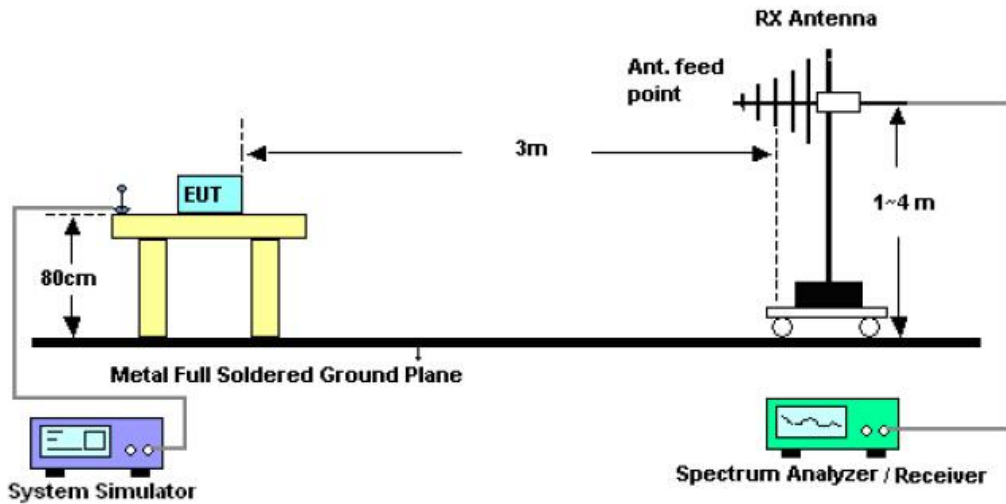
Spectrum Parameter	Setting
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~13GHz RBW 1MHz/ VBW 3MHz for Peak, RBW 1MHz/ VBW 10Hz for Average

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

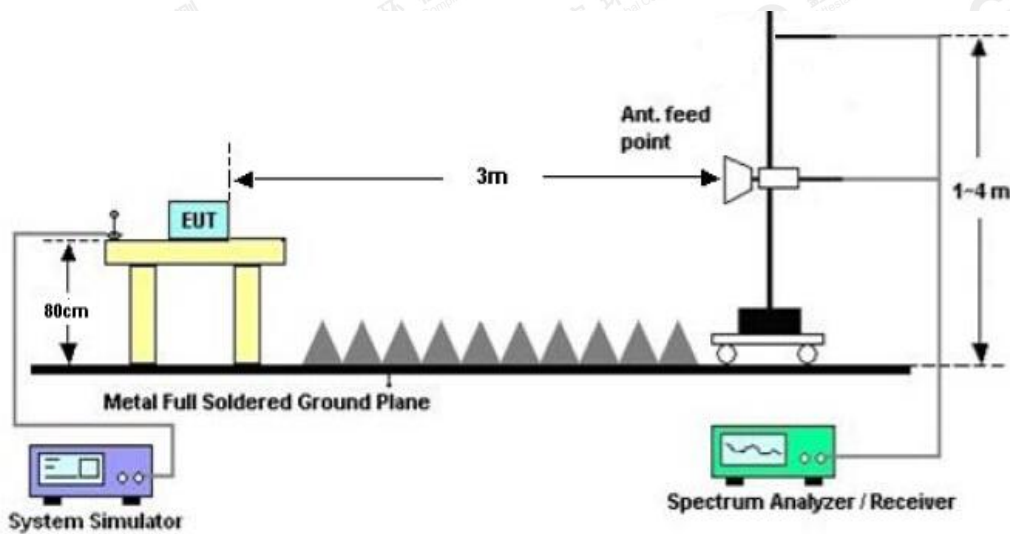
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10.2. BLOCK DIAGRAM OF TEST SETUP

RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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10.3. PROCEDURE OF RADIATED EMISSION TEST

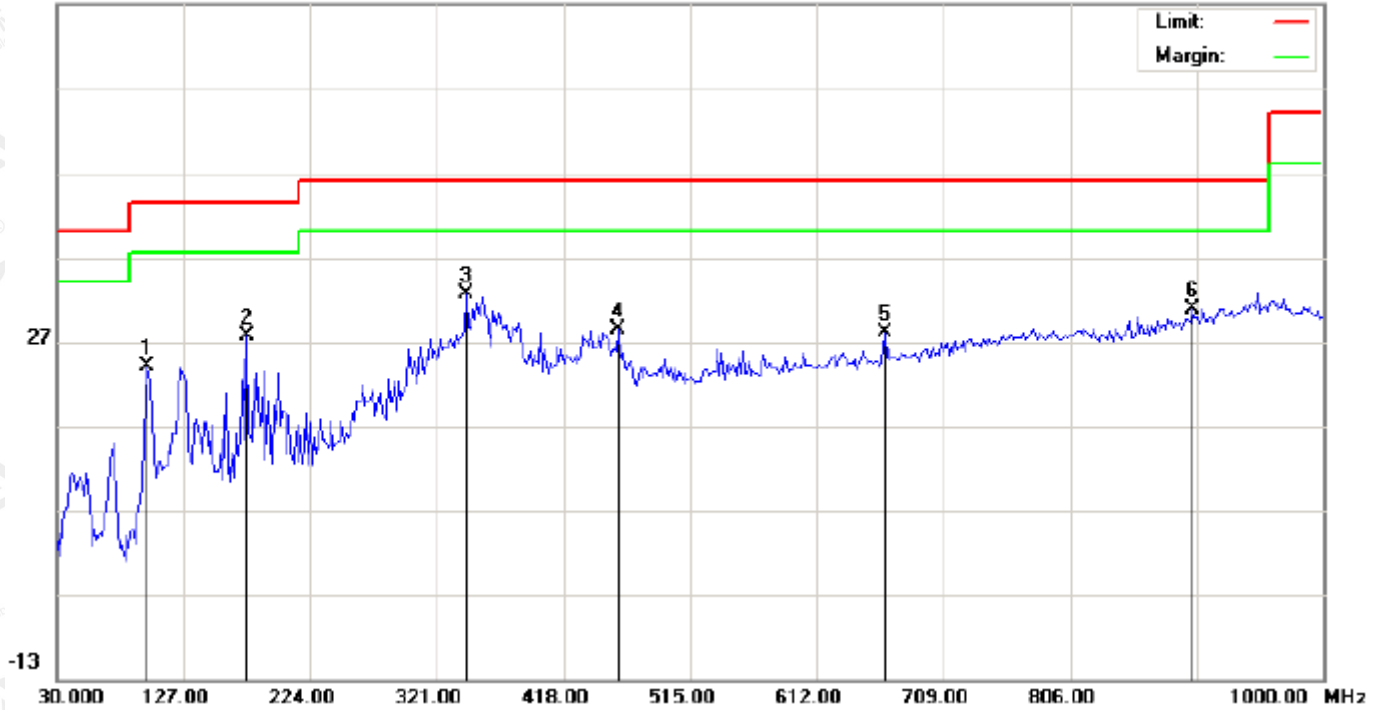
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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. 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.

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10.4. TEST RESULT OF RADIATED EMISSION TEST

Radiated Emission Test at 3m Distance-Horizontal

66.9 dBuV/m

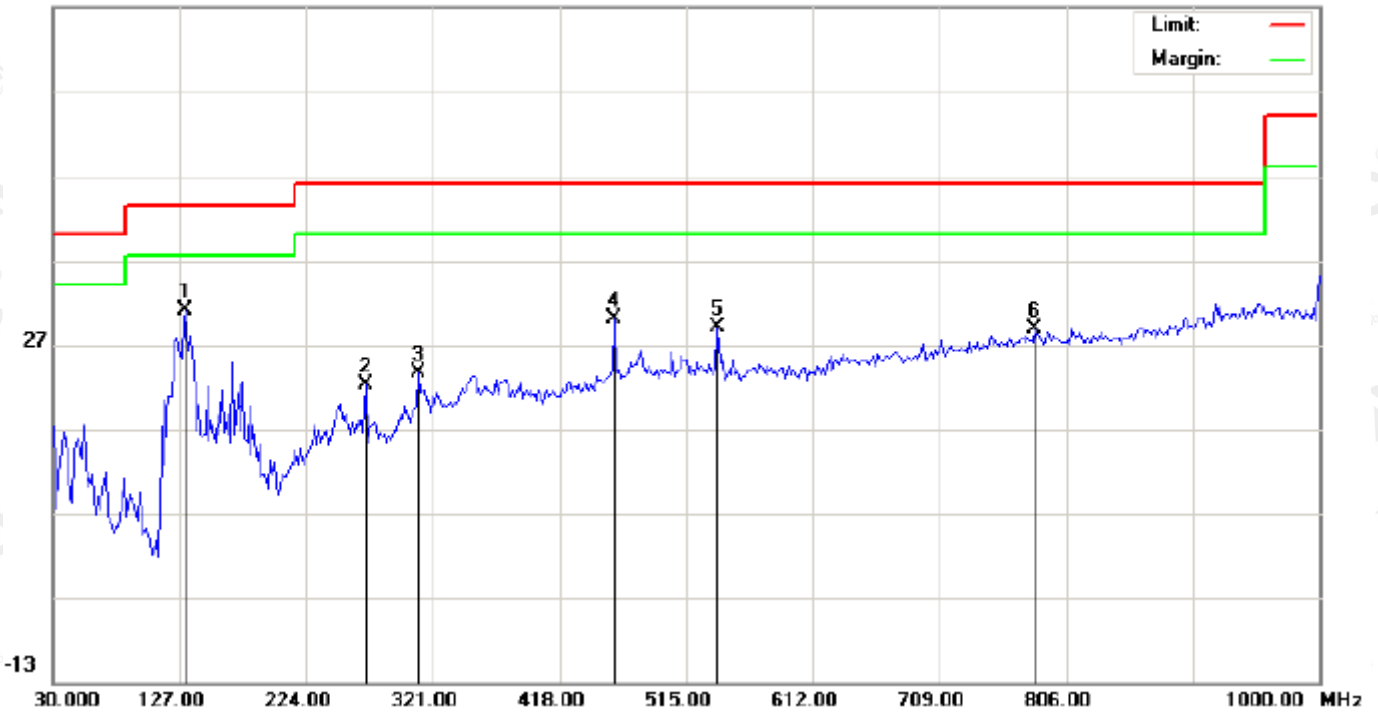


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		99.5167	13.96	10.00	23.96	43.50	-19.54	peak			
2		175.5000	16.78	10.90	27.68	43.50	-15.82	peak			
3	*	343.6333	14.35	18.32	32.67	46.00	-13.33	peak			
4		460.0333	7.77	20.70	28.47	46.00	-17.53	peak			
5		663.7333	3.68	24.23	27.91	46.00	-18.09	peak			
6		899.7667	2.25	28.60	30.85	46.00	-15.15	peak			

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Radiated Emission Test at 3m Distance-Vertical

66.9 dBuV/m



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna	Table	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		Height	Degree	
									cm	degree	
1	*	131.8500	19.23	11.80	31.03	43.50	-12.47	peak			
2		269.2667	7.71	14.48	22.19	46.00	-23.81	peak			
3		309.6833	7.57	16.05	23.62	46.00	-22.38	peak			
4		460.0333	9.35	20.70	30.05	46.00	-15.95	peak			
5		539.2500	6.79	22.19	28.98	46.00	-17.02	peak			
6		781.7500	1.68	27.07	28.75	46.00	-17.25	peak			

RESULT: PASS

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

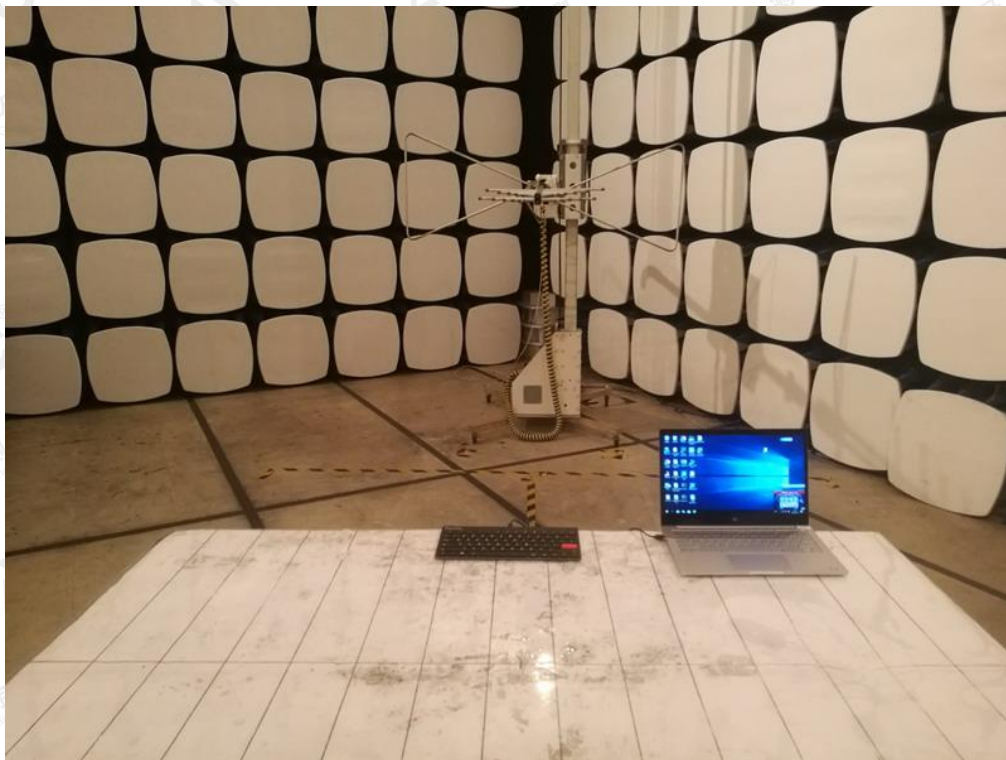
1~13GHz at least have 20dB margin. No recording in the test report.

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APPENDIX A: PHOTOGRAPHS OF TEST SETUP
FCC LINE CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP

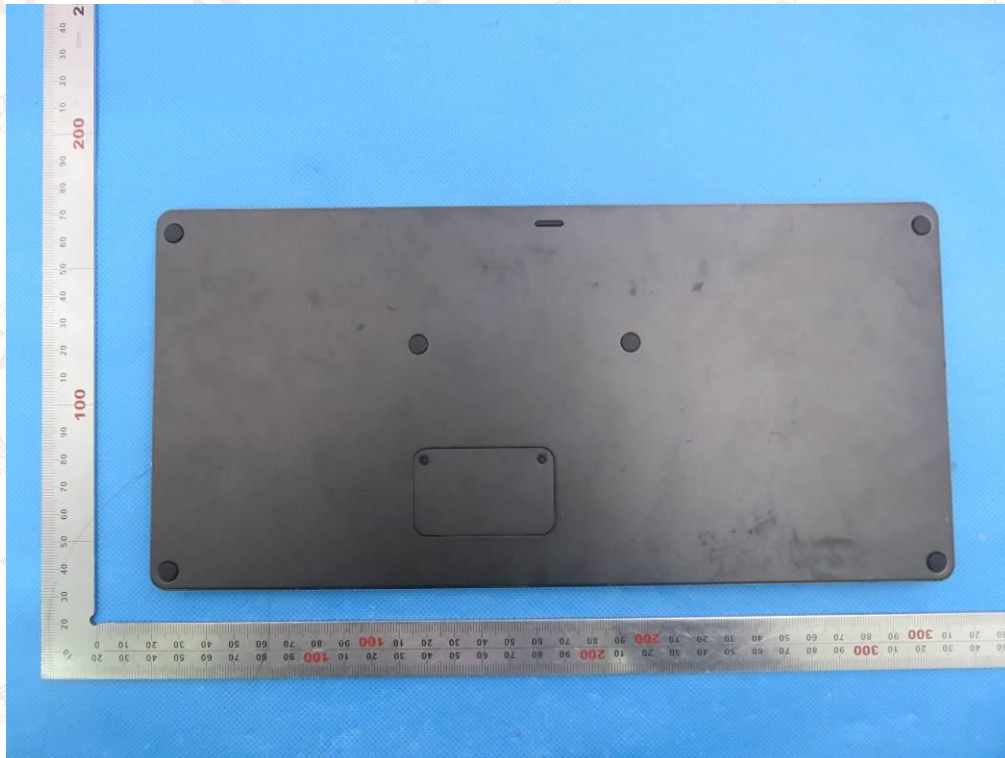


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APPENDIX B: PHOTOGRAPHS OF EUT
TOP VIEW OF EUT



BOTTOM VIEW OF EUT



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FRONT VIEW OF EUT



BACK VIEW OF EUT



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LEFT VIEW OF EUT



RIGHT VIEW OF EUT

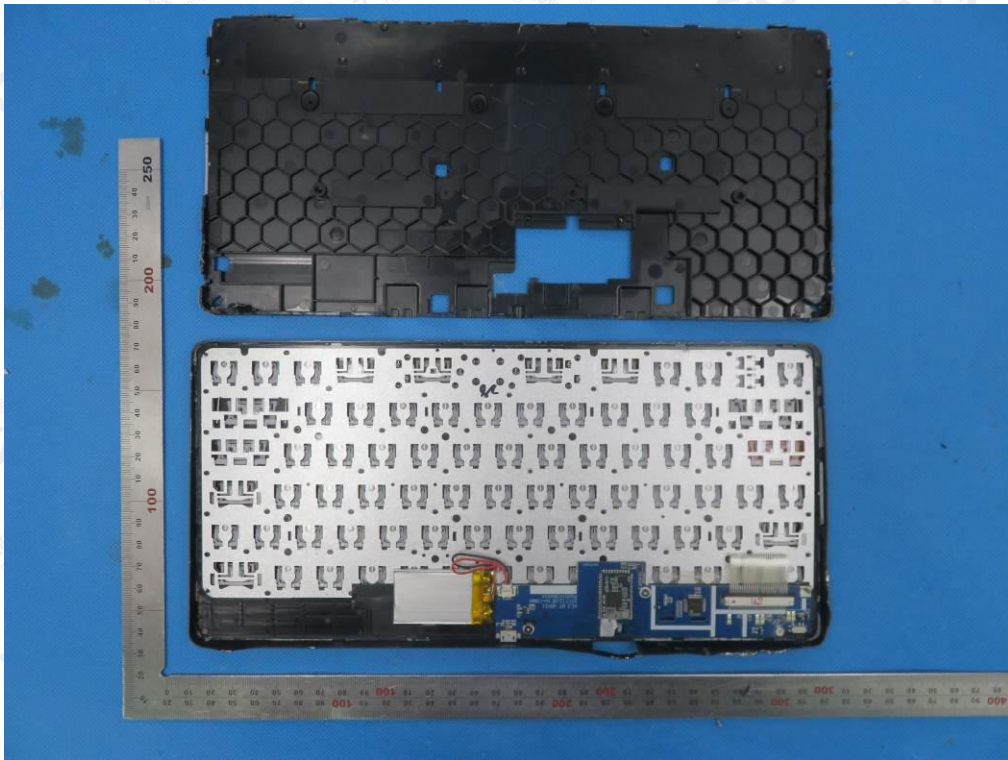


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VIEW OF EUT (Port)



OPEN VIEW OF EUT

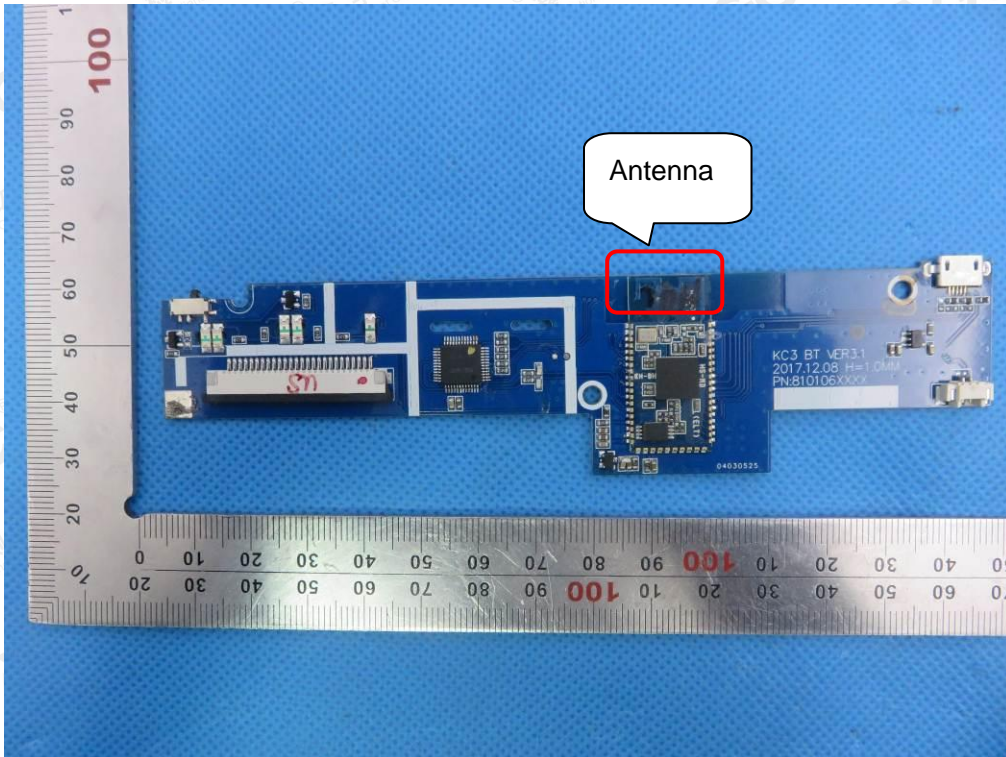


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VIEW OF BATTERY

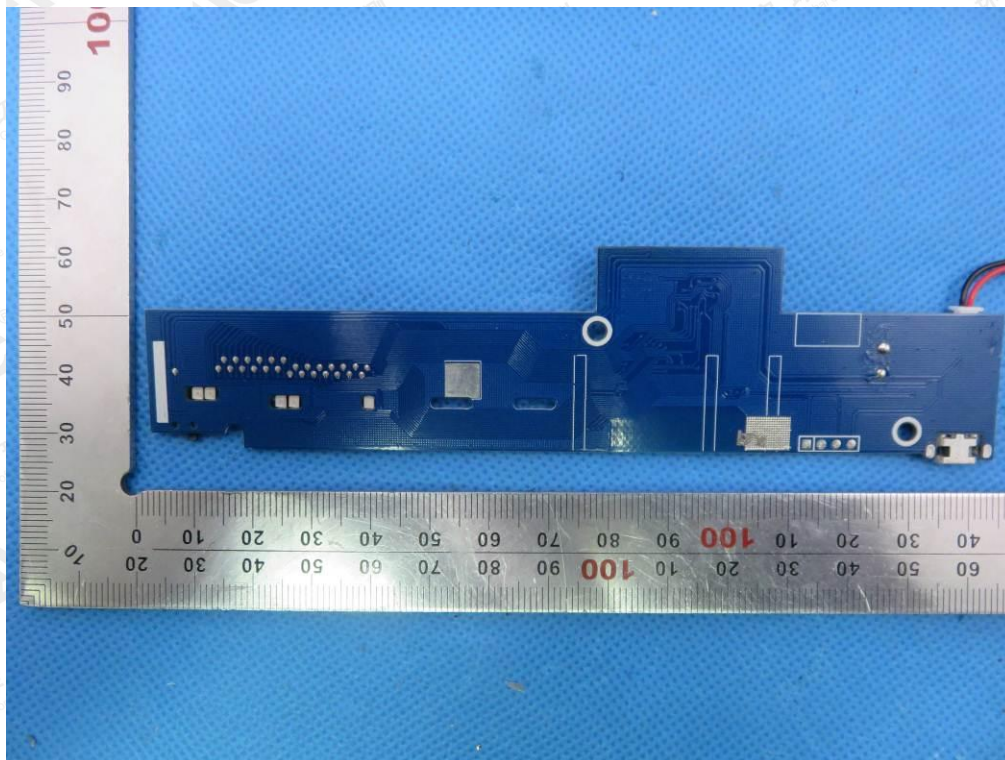


INTERNAL VIEW OF EUT-1



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INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3



----END OF REPORT----

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