

FCC Test Report

Report No.: AGC00803210701FE01

FCC ID : ZE9-SST-UCSW
PRODUCT DESIGNATION : Satechi Slim USB-C Wired Keyboard
BRAND NAME : SATECHI
MODEL NAME : ST-UCSW3M(Series model name please see page 4)
APPLICANT : SARIANA LLC
DATE OF ISSUE : Jul 08,2021
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. 08,2021	Valid	Initial release

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1 VERIFICATION OF CONFORMITY

Applicant	SARIANA LLC
Address	7365 Mission Gorge Road, Suite G, San Diego, CA 92120, USA
Manufacturer	SARIANA LLC
Address	7365 Mission Gorge Road, Suite G, San Diego, CA 92120, USA
Factory	SARIANA LLC
Address	7365 Mission Gorge Road, Suite G, San Diego, CA 92120, USA
Product Designation	Satechi Slim USB-C Wired Keyboard
Brand Name	SATECHI
Test Model	ST-UCSW3M
Series Model	ST-UCSW2M, ST-UCSW1M, ST-UCSW3S, ST-UCSW2S, ST-UCSW1S, ST-UCSW3B, ST-UCSW2B, ST-UCSW1B, ST-UCSW3R, ST-UCSW2R, ST-UCSW1R, ST-UCSW3G, ST-UCSW2G, ST-UCSW1G, ST-UCSW3K, ST-UCSW2K, ST-UCSW1K, ST-UCSW1X, ST-UCSW2X, ST-UCSW3X, ST-UCSW3M-FR, ST-UCSW3M-DE, ST-UCSW3M-ND, ST-UCSW3M-CH, ST-UCSW3M-UK, ST-UCSW3M-RU, ST-UCSW3M-JP, ST-UCSW3M-SC, ST-UCSW2M-FR, ST-UCSW2M-DE, ST-UCSW2M-ND, ST-UCSW2M-CH, ST-UCSW2M-UK, ST-UCSW2M-RU, ST-UCSW2M-JP, ST-UCSW2M-SC, ST-UCSW1M-FR, ST-UCSW1M-DE, ST-UCSW1M-ND, ST-UCSW1M-CH, ST-UCSW1M-UK, ST-UCSW1M-RU, ST-UCSW1M-JP, ST-UCSW1M-SC, ST-UCSWYX-XX ("Y" is Arabian number 1, 2 or 3 and X is English letter means color, XX means layout/country)
Difference description	All the same except for the size.
Date of test	Jul. 02, 2021 to Jul. 08,2021
Deviation	None any deviation from the test method.
Condition of Test Sample	Normal
Test Result	Pass

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.

Prepared By



Jack Gui
(Project Engineer)

Jul. 08,2021

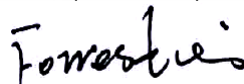
Reviewed By



Calvin Liu
(Reviewer)

Jul. 08,2021

Approved By



Forrest Lei
(Authorized Officer)

Jul. 08,2021

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2 SYSTEM DESCRIPTION

TEST MODE DESCRIPTION		
NO.	TEST MODE DESCRIPTION	WORST
1	Normal operation	V
Note: 1.V means EMI worst mode.		

Note: The product has three specifications of large, medium and small. The two specifications of large and medium are the same except that the keyboard layout is different. The large and small PCB layout are different, and they have been tested separately.

3 MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in measurement" (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, $U_c = \pm 3.1$ dB
- Uncertainty of Radiated Emission Below 1GHz, $U_c = \pm 4.0$ dB

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4 PRODUCT INFORMATION

Housing Type	Plastic and metal
EUT Input Rating	DC 5V by PC

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

I/O Port of EUT			
I/O Port Type	Number	Cable Description	Tested With
Type-C	1	2.65m Unshielded	1

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5 SUPPORT EQUIPMENT

Device Type	Manufacturer	Model Name	Serial No.	Data Cable	Power Cable
PC	HUAWEI	Boh-WAQ9R	--	--	--
PC	APPLE	MacBook Air	--	--	--
Adapter(PC)	APPLE	A1401	--	--	--

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6 TEST FACILITY

Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

7 TEST EQUIPMENT LIST

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Test Receiver	R&S	ESPI	101206	May 11, 2021	May 10, 2022
LISN	R&S	ESH2-Z5	100086	Jun. 09, 2021	Jun. 08, 2022
Test software	FARA	EZ-EMC (Ver.AGC-CON03A1)	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Test Receiver	R&S	ESCI	10096	Apr. 14, 2021	Apr. 13, 2022
Antenna	SCHWARZBECK	VULB9168	494	Jan. 08, 2021	Jan. 07, 2023
Test software	FARA	EZ-EMC (Ver.RA-03A)	N/A	N/A	N/A

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8 TEST SUMMARY LIST

Test item	Test Requirement	Test Method	Class/Severity	Result
Conducted Emission	FCC Part 15 Subpart B	ANSI C63.4	Class B	Pass
Radiated Emission	FCC Part 15 Subpart B	ANSI C63.4	Class B	Pass

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9 FCC LINE CONDUCTED EMISSION TEST

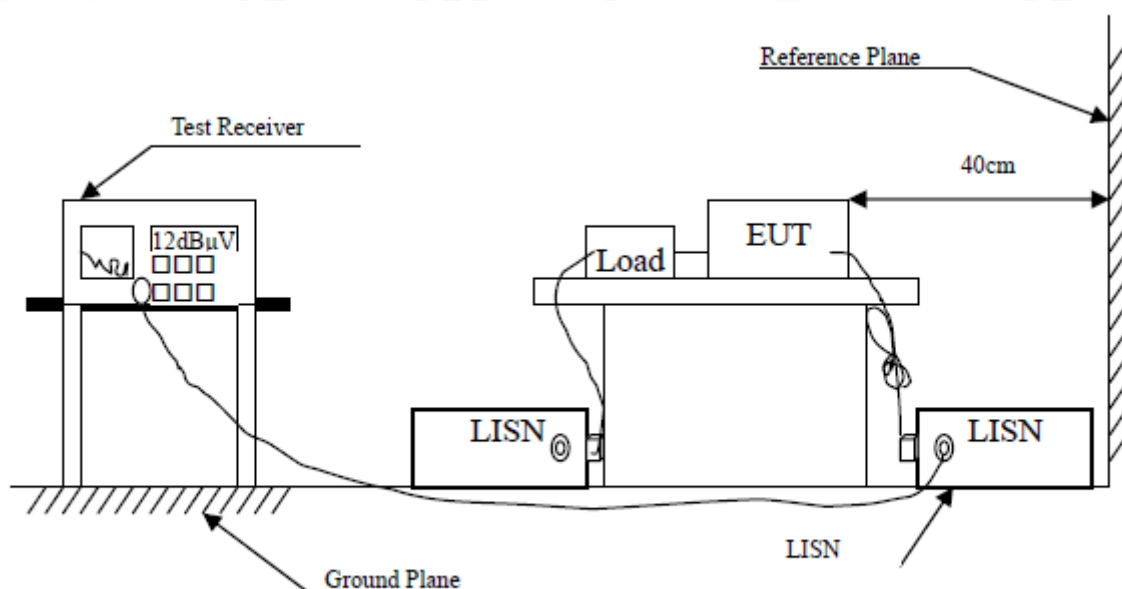
9.1 LIMITS OF LINE CONDUCTED EMISSION TEST

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 was received DC 5V power from PC which received AC 120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- (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.

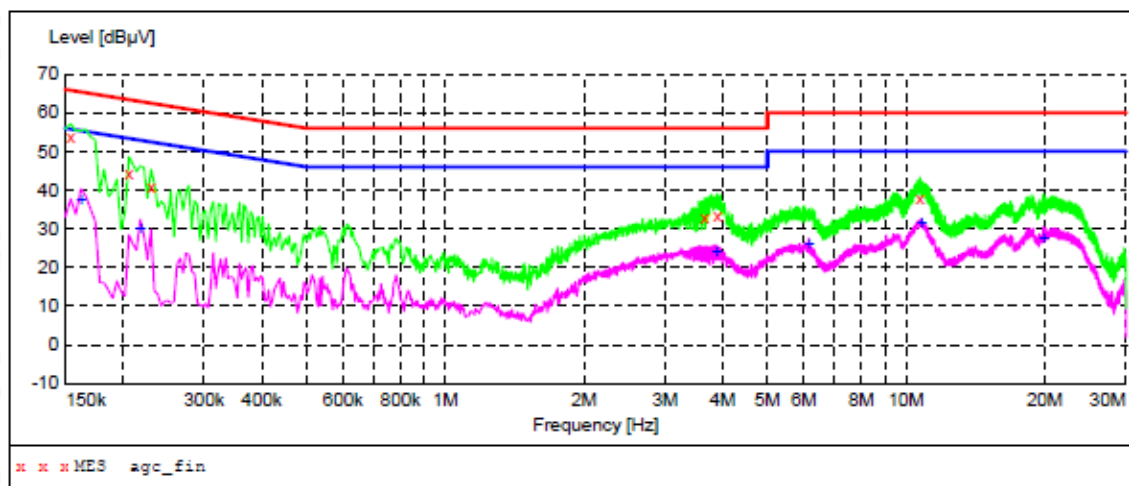
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9.4 TEST RESULT OF LINE CONDUCTED EMISSION TEST

ST-UCSW3M-big

LINE CONDUCTED EMISSION TEST-L

**MEASUREMENT RESULT: "agc_fin"**

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line
0.154000	54.00	7.4	66	11.8	QP	L1
0.206000	44.50	7.4	63	18.9	QP	L1
0.230000	40.70	7.4	62	21.7	QP	L1
3.658000	32.90	7.5	56	23.1	QP	L1
3.890000	33.60	7.5	56	22.4	QP	L1
10.726000	37.80	8.1	60	22.2	QP	L1

MEASUREMENT RESULT: "agc_fin2"

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line
0.162000	37.20	7.4	55	18.2	AV	L1
0.218000	29.90	7.4	53	23.0	AV	L1
3.874000	23.80	7.5	46	22.2	AV	L1
6.146000	26.00	7.7	50	24.0	AV	L1
10.798000	31.20	8.1	50	18.8	AV	L1
19.838000	27.60	9.8	50	22.4	AV	L1

RESULT: PASS

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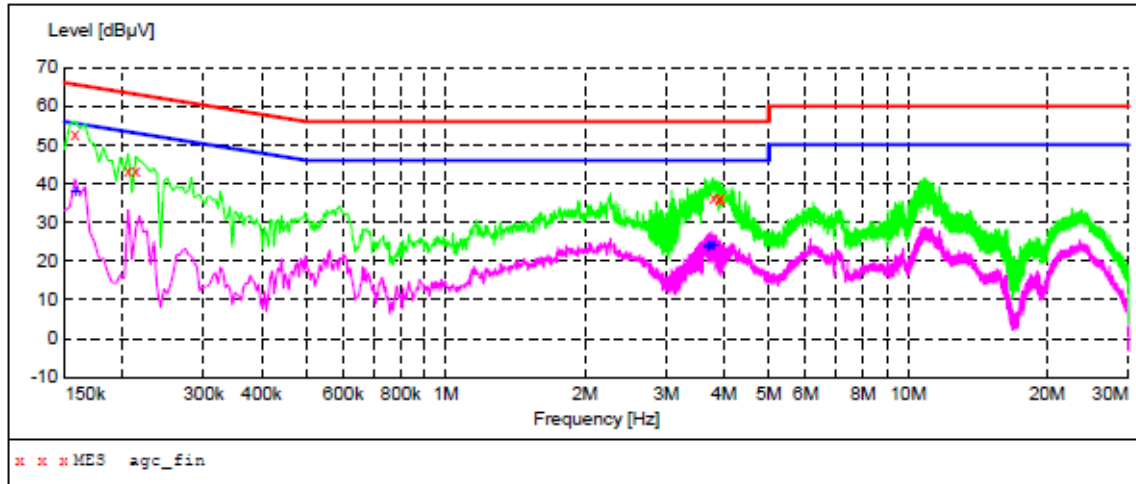
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LINE CONDUCTED EMISSION TEST-N



MEASUREMENT RESULT: "agc_fin"

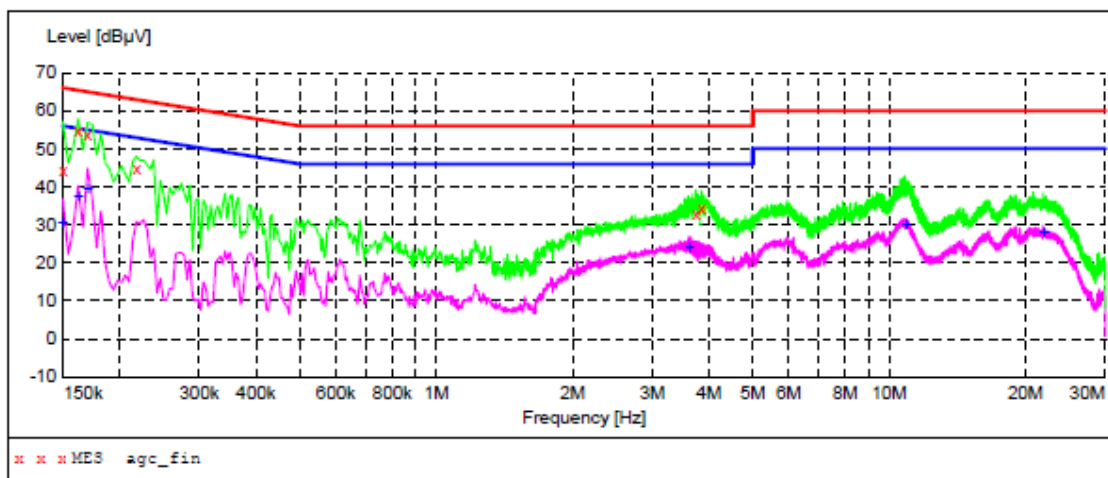
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.158000	52.60	7.4	66	13.0	QP	N
0.206000	43.50	7.4	63	19.9	QP	N
0.214000	43.20	7.4	63	19.8	QP	N
3.794000	36.50	7.5	56	19.5	QP	N
3.914000	36.10	7.5	56	19.9	QP	N
3.930000	36.20	7.5	56	19.8	QP	N

MEASUREMENT RESULT: "agc_fin2"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.158000	37.80	7.4	56	16.8	AV	N
3.686000	23.60	7.5	46	22.4	AV	N
3.698000	23.80	7.5	46	22.2	AV	N
3.710000	23.80	7.5	46	22.2	AV	N
3.758000	24.00	7.5	46	22.0	AV	N
3.794000	24.20	7.5	46	21.8	AV	N

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ST-UCSW3M-small
LINE CONDUCTED EMISSION TEST-L**MEASUREMENT RESULT: "agc_fin"**

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line
0.150000	44.50	7.4	66	21.5	QP	L1
0.162000	54.60	7.4	65	10.8	QP	L1
0.170000	54.00	7.4	65	11.0	QP	L1
0.218000	44.60	7.4	63	18.3	QP	L1
3.750000	32.90	7.5	56	23.1	QP	L1
3.858000	34.40	7.5	56	21.6	QP	L1

MEASUREMENT RESULT: "agc_fin2"

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line
0.150000	30.40	7.4	56	25.6	AV	L1
0.162000	37.50	7.4	55	17.9	AV	L1
0.170000	39.30	7.4	55	15.7	AV	L1
3.614000	24.20	7.5	46	21.8	AV	L1
10.914000	30.00	8.2	50	20.0	AV	L1
21.890000	27.90	9.9	50	22.1	AV	L1

RESULT: PASS

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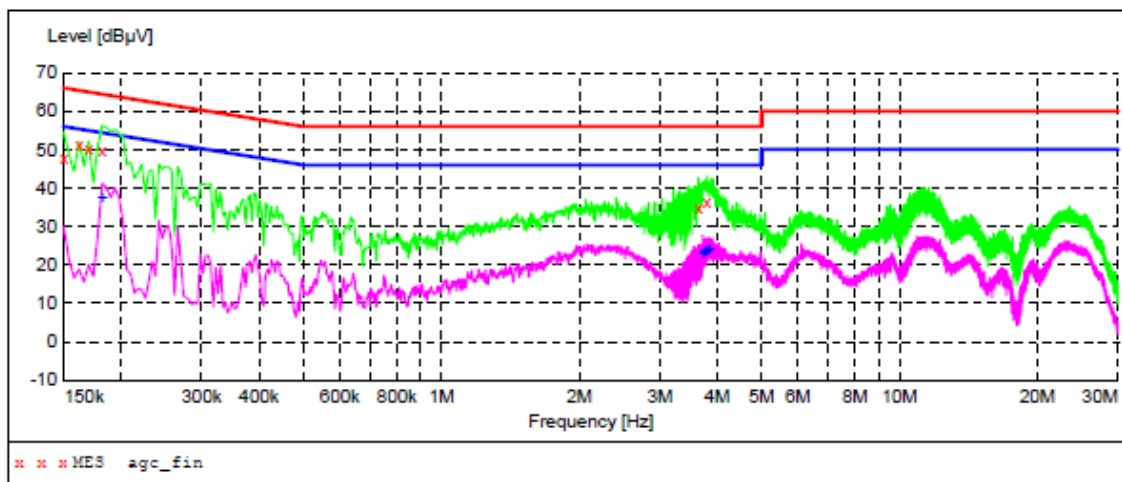
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LINE CONDUCTED EMISSION TEST-N

**MEASUREMENT RESULT: "agc_fin"**

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.150000	48.00	7.4	66	18.0	QP	N
0.162000	51.30	7.4	65	14.1	QP	N
0.170000	50.50	7.4	65	14.5	QP	N
0.182000	50.00	7.4	64	14.4	QP	N
3.638000	34.80	7.5	56	21.2	QP	N
3.798000	36.20	7.5	56	19.8	QP	N

MEASUREMENT RESULT: "agc_fin2"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.182000	37.20	7.4	54	17.2	AV	N
3.722000	23.20	7.5	46	22.8	AV	N
3.758000	23.70	7.5	46	22.3	AV	N
3.770000	23.70	7.5	46	22.3	AV	N
3.782000	23.60	7.5	46	22.4	AV	N
3.842000	23.90	7.5	46	22.1	AV	N

RESULT: PASS

Note:

Measurement Level(dBuV) = Receiver reading(dBuV)+Tansd(dB)

Transd(dB)=AMN Factor(dB)+Cable Loss(dB)+Attenuation(dB) for Attenuator

Margin= Limit-Level

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10 FCC RADIATED EMISSION TEST

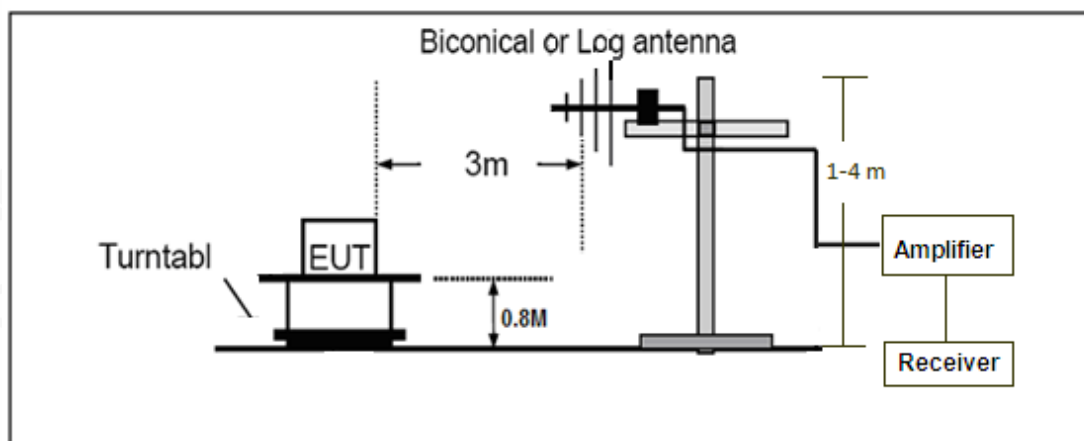
10.1 LIMITS OF RADIATED EMISSION TEST

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
Above 960	3	54.0

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

10.2 BLOCK DIAGRAM OF TEST SETUP

System Diagram of Connections between EUT and Simulators



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10.3 PROCEDURE OF RADIATED 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 turntable with a height of 0.8 meters is used which 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 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 which received AC120V/60Hz power from socket under the turntable.
- (5) The antenna was placed at 3 meter away from the EUT as stated in FCC Part 15. The antenna connected to the Analyzer via a cable and at times a pre-amplifier would be used.
- (6) The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- (7) The test mode(s) were scanned during the test:
- (8) Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and Q.P./Peak reading is presented.

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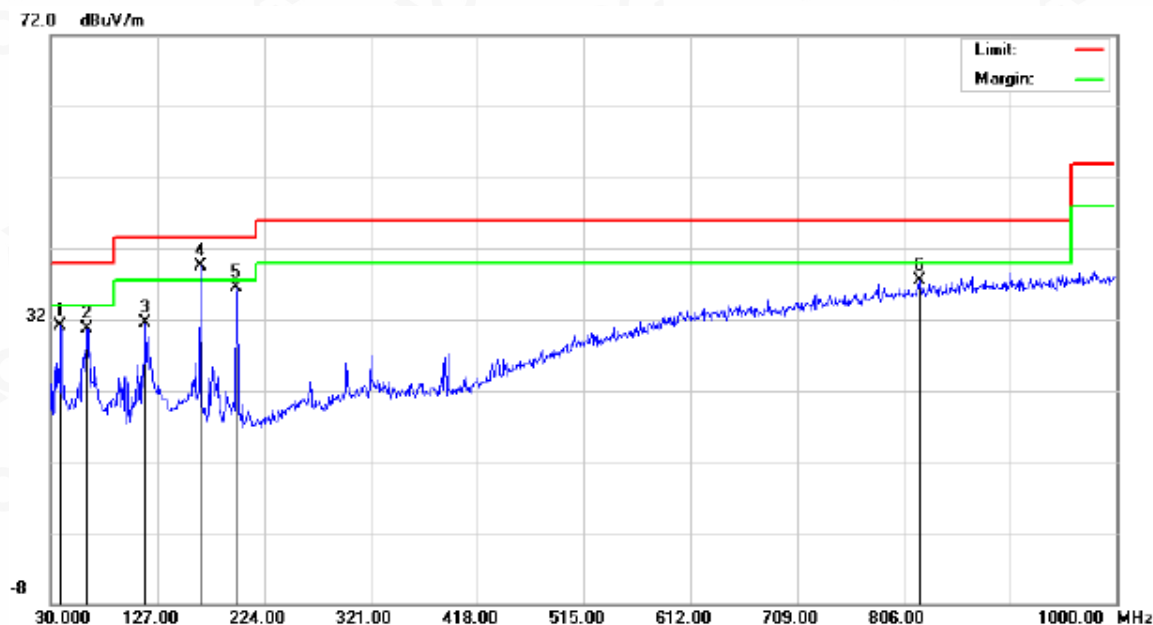
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10.4 TEST RESULT OF RADIATED EMISSION TEST

ST-UCSW3M-big

Radiated Emission Test at 3m Distance-Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		38.7300	16.79	14.39	31.18	40.00	-8.82	peak
2		62.9800	14.50	16.24	30.74	40.00	-9.26	peak
3		116.3300	14.78	16.69	31.47	43.50	-12.03	peak
4	*	165.8000	24.78	14.72	39.50	43.50	-4.00	peak
5		198.7800	23.60	12.94	36.54	43.50	-6.96	peak
6		820.5500	6.80	30.68	37.48	46.00	-8.52	peak

RESULT: PASS

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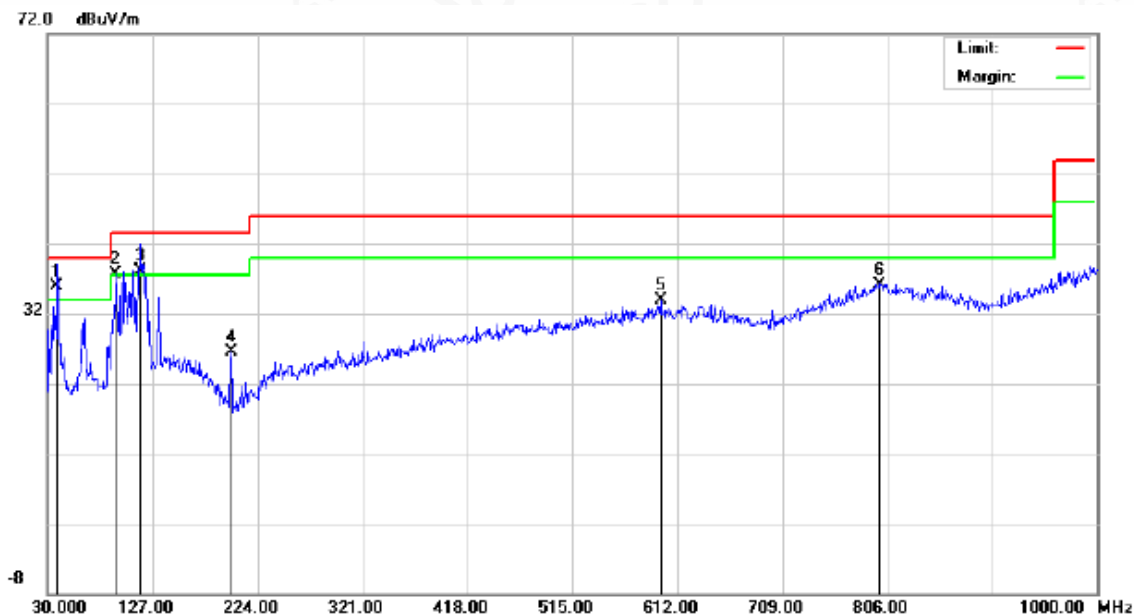
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Radiated Emission Test at 3m Distance-Vertical



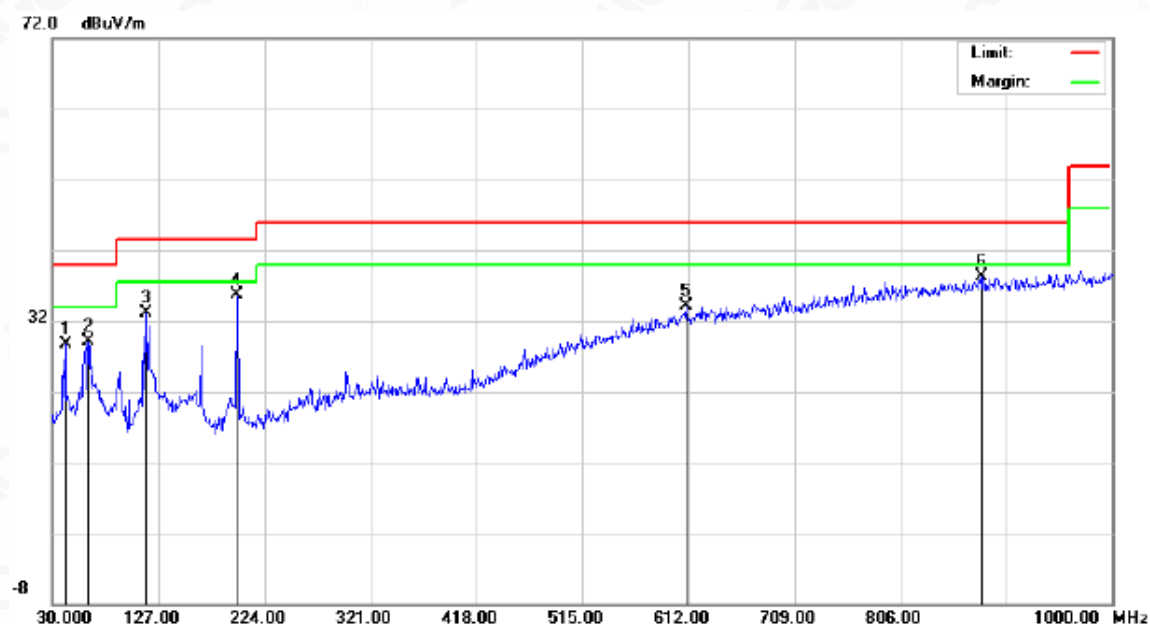
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	*	38.7300	21.58	14.39	35.97	40.00	-4.03	QP
2	!	93.0500	22.45	15.29	37.74	43.50	-5.76	peak
3	!	115.3600	20.49	17.52	38.01	43.50	-5.49	QP
4		199.7500	13.37	13.11	26.48	43.50	-17.02	peak
5		596.4800	7.10	26.88	33.98	46.00	-12.02	peak
6		799.2100	5.83	30.37	36.20	46.00	-9.80	peak

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Radiated Emission Test at 3m Distance-Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		41.6400	13.78	14.87	28.65	40.00	-11.35	peak
2		62.9800	12.91	16.24	29.15	40.00	-10.85	peak
3		116.3300	16.35	16.69	33.04	43.50	-10.46	peak
4	*	198.7800	22.83	12.94	35.77	43.50	-7.73	peak
5		610.0600	6.99	27.07	34.06	46.00	-11.94	peak
6		879.7200	6.77	31.44	38.21	46.00	-7.79	peak

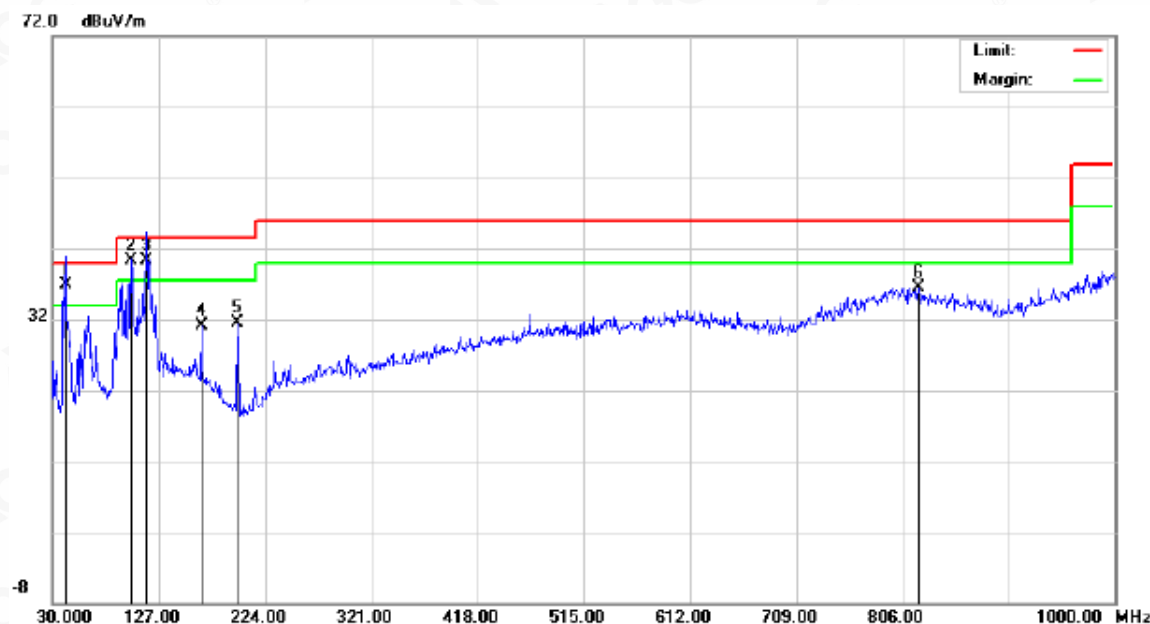
RESULT: PASS

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Radiated Emission Test at 3m Distance-Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	*	41.6400	22.12	14.87	36.99	40.00	-3.01	QP
2	!	101.7800	24.07	16.18	40.25	43.50	-3.25	QP
3	!	115.3600	22.84	17.52	40.36	43.50	-3.14	QP
4		165.8000	12.58	18.59	31.17	43.50	-12.33	peak
5		198.7800	18.18	13.31	31.49	43.50	-12.01	peak
6		820.5500	6.67	29.85	36.52	46.00	-9.48	peak

RESULT: PASS

Note:

Measurement(dBuV/m)=Reading(dBuV)+Factor(dB/m)

Factor(dB/m)=Antenna Factor(dB/m)+Cable loss(dB)+Attenuation(dB)for Attenuator

Over= Measurement - Limit

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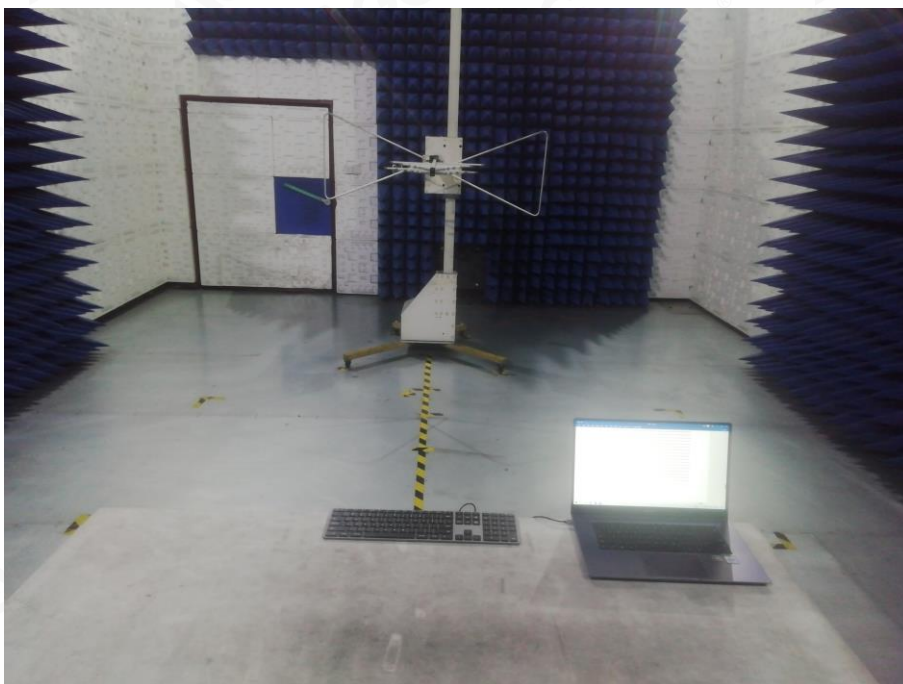
APPENDIX A: PHOTOGRAPHS OF TEST SETUP

ST-UCSW3M-big

FCC LINE CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP



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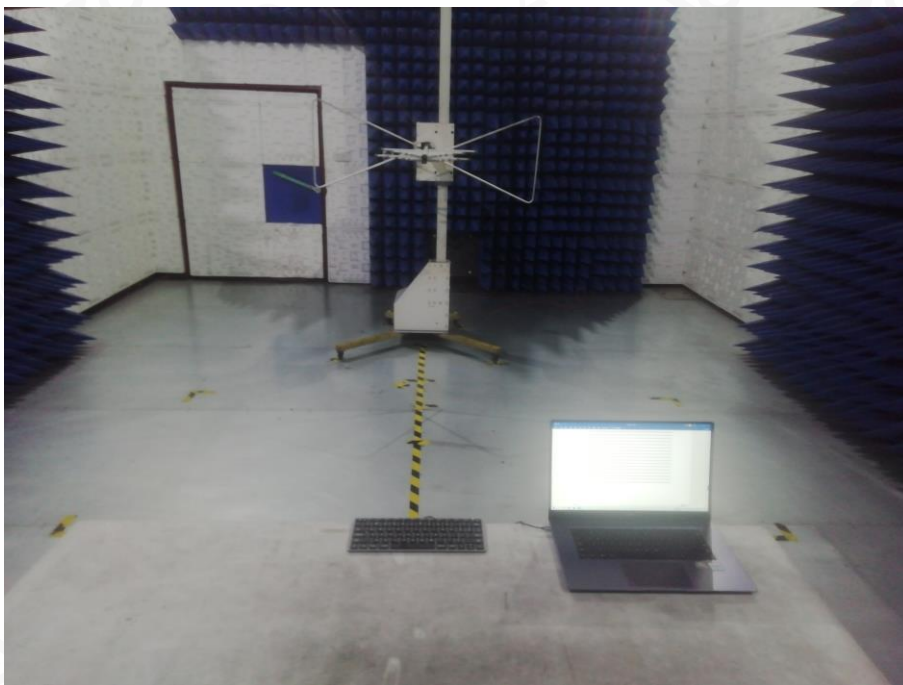


ST-UCSW3M-small

FCC LINE CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP



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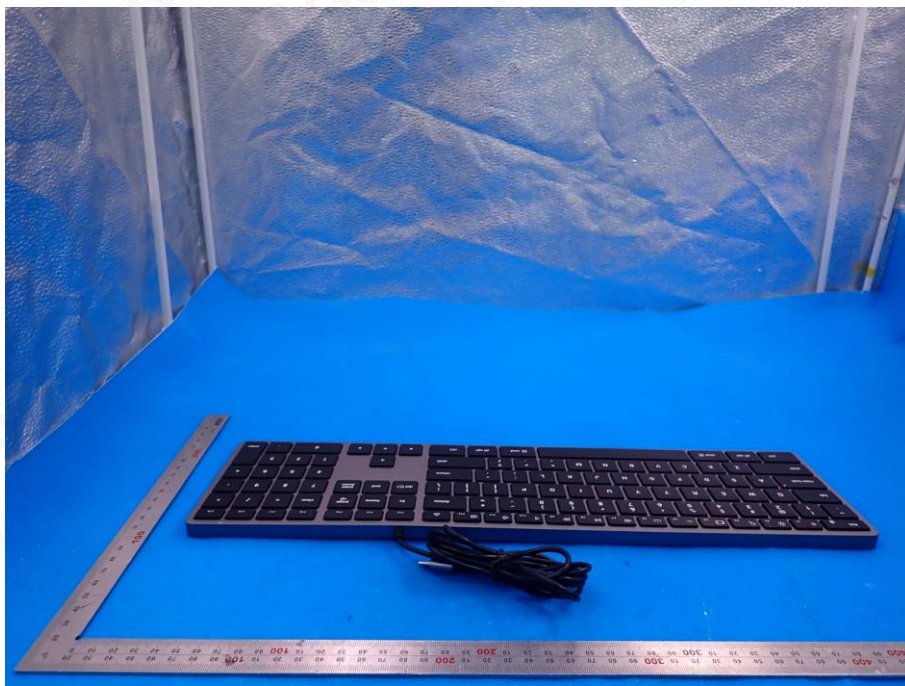
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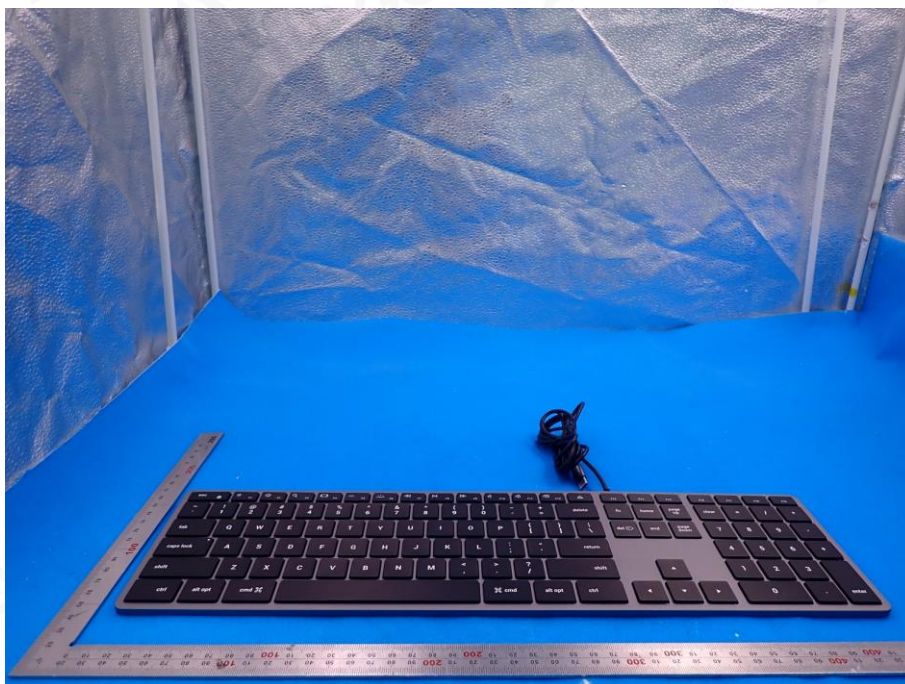
APPENDIX B: PHOTOGRAPHS OF EUT

ST-UCSW3M-big

TOP VIEW OF EUT



BOTTOM VIEW OF EUT



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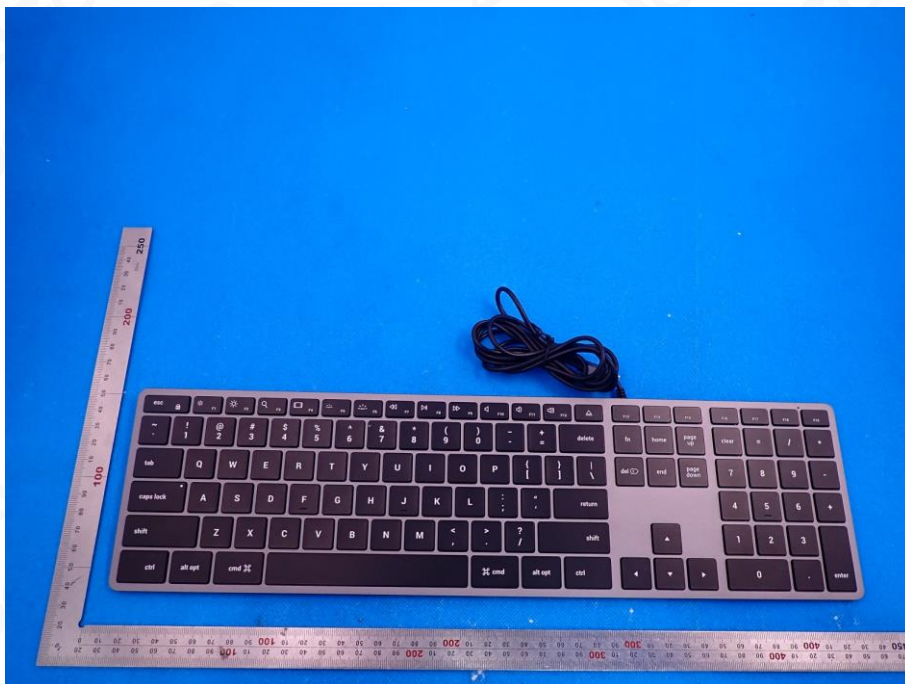
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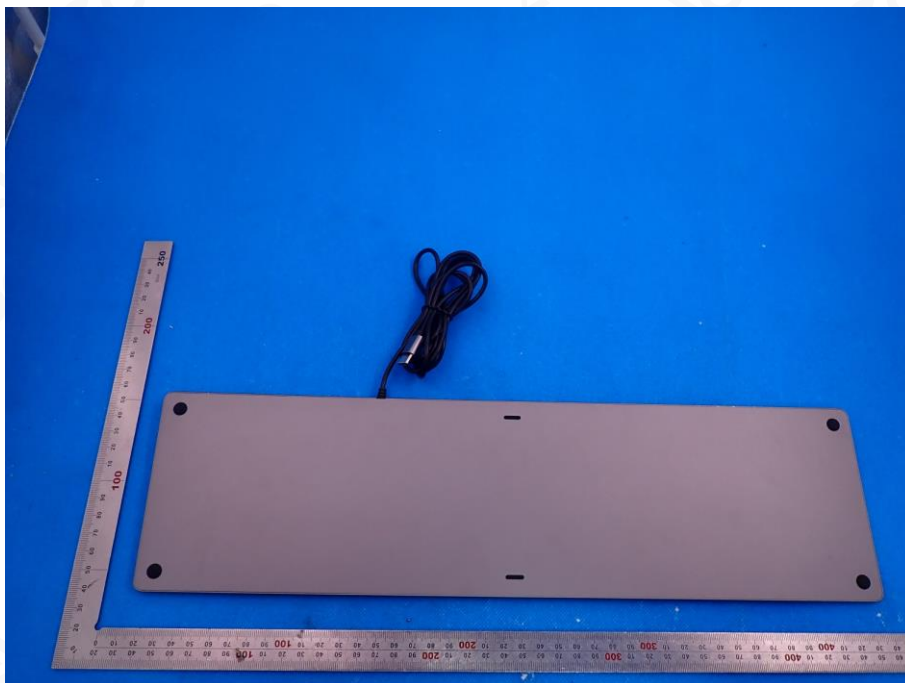
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FRONT VIEW OF EUT



BACK VIEW OF EUT



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LEFT VIEW OF EUT



RIGHT VIEW OF EUT



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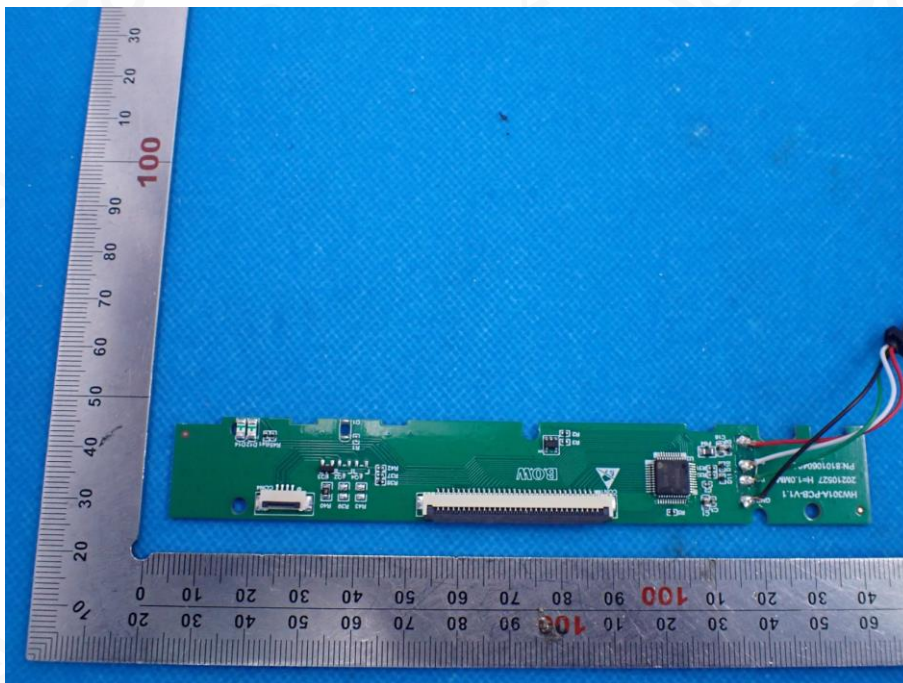
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OPEN VIEW OF EUT



INTERNAL VIEW OF EUT-1

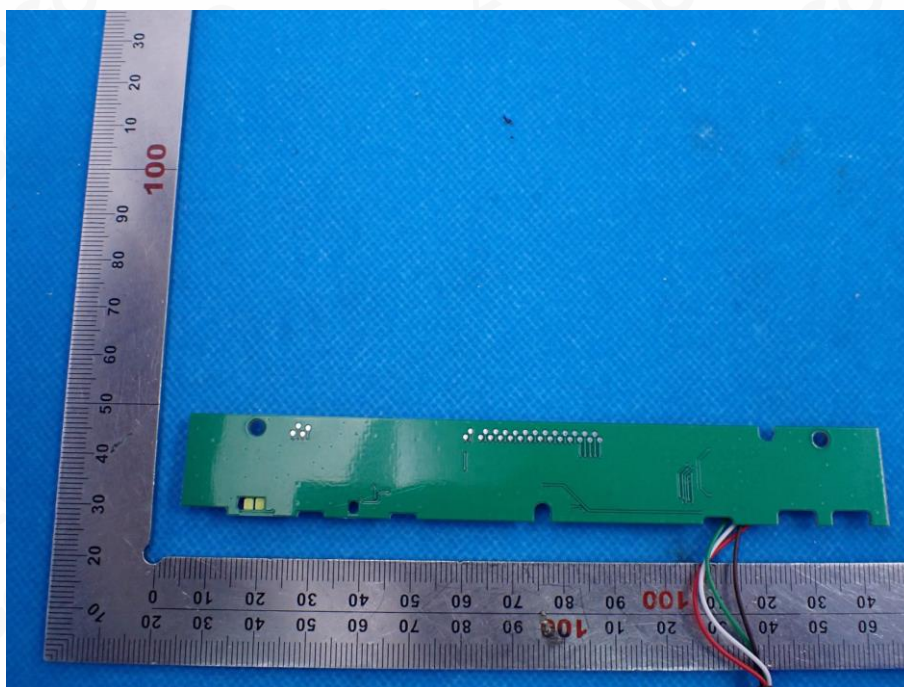


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INTERNAL VIEW OF EUT-2

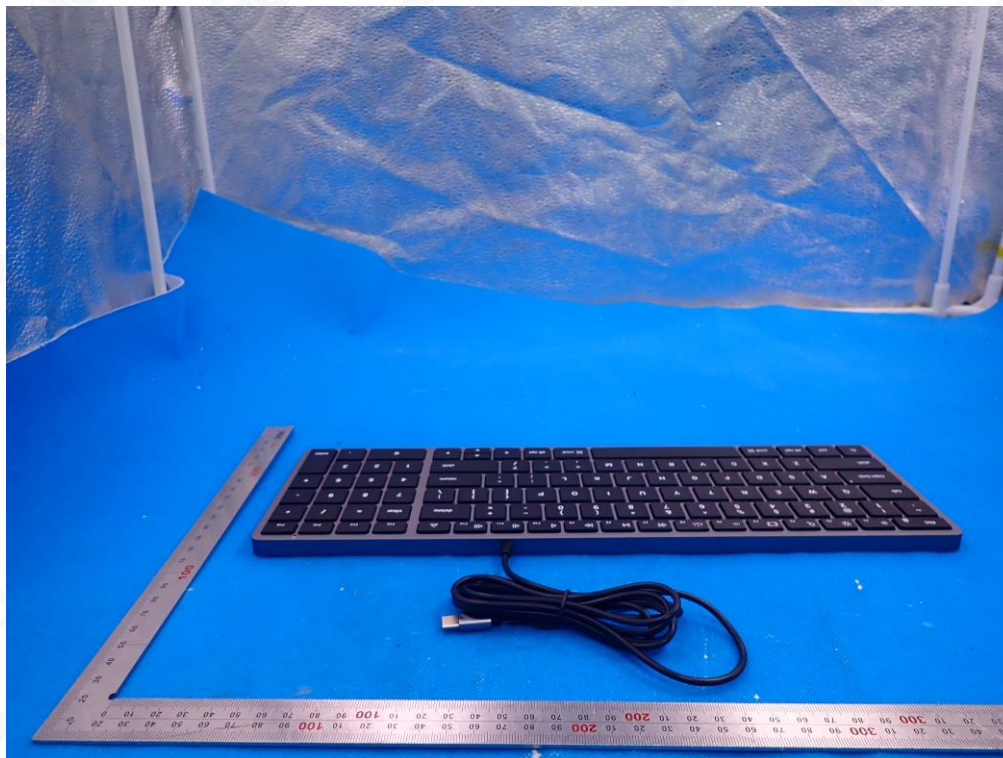


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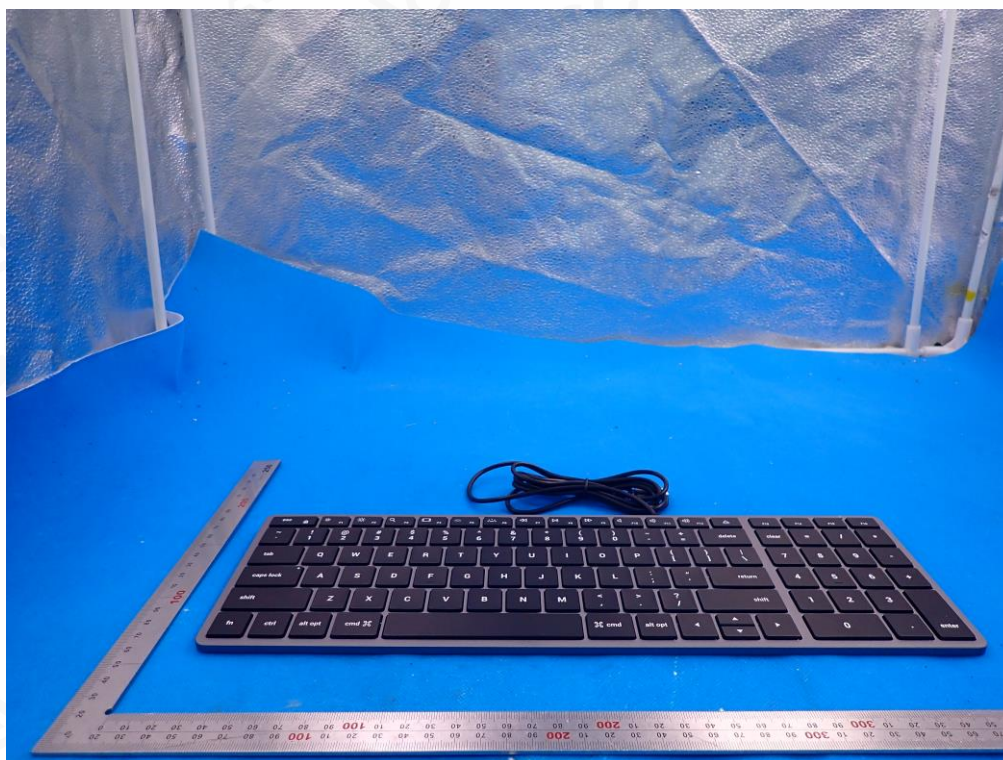
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ST-UCSW3M- medium
TOP VIEW OF EUT



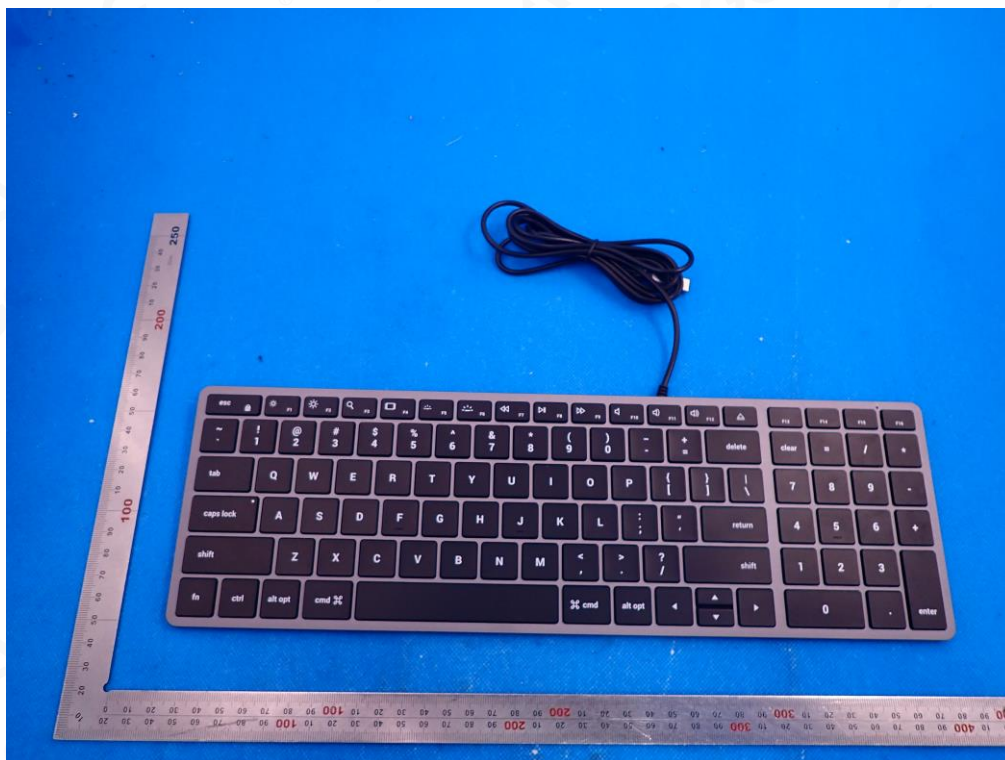
BOTTOM VIEW OF EUT



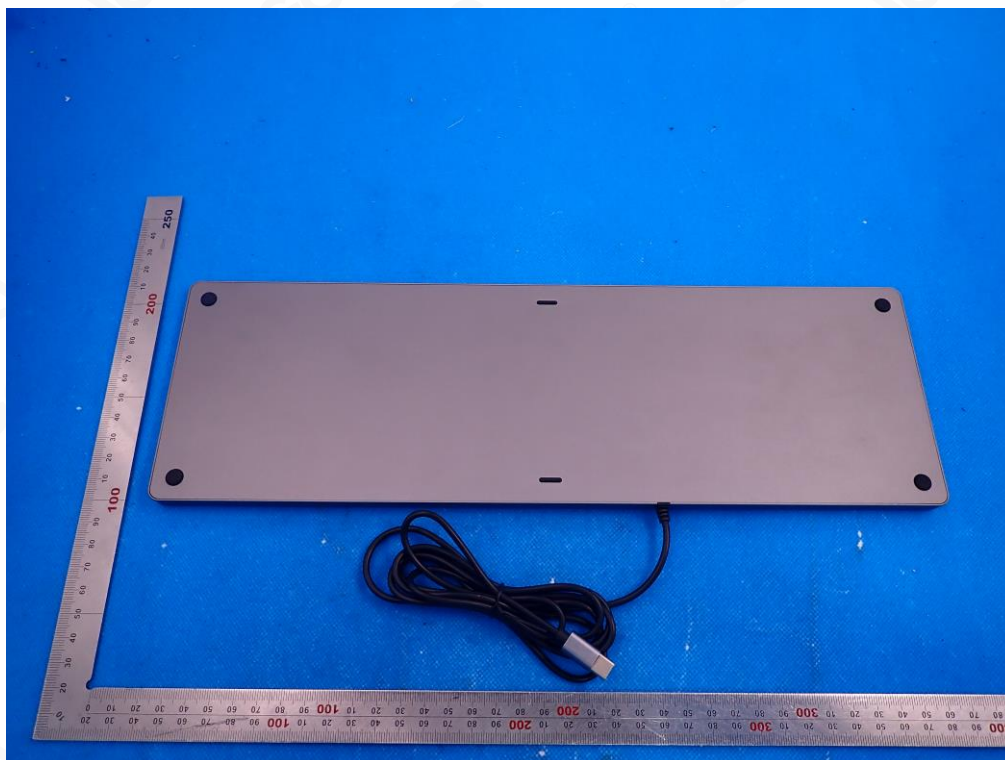
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FRONT VIEW OF EUT



BACK VIEW OF EUT



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LEFT VIEW OF EUT



RIGHT VIEW OF EUT

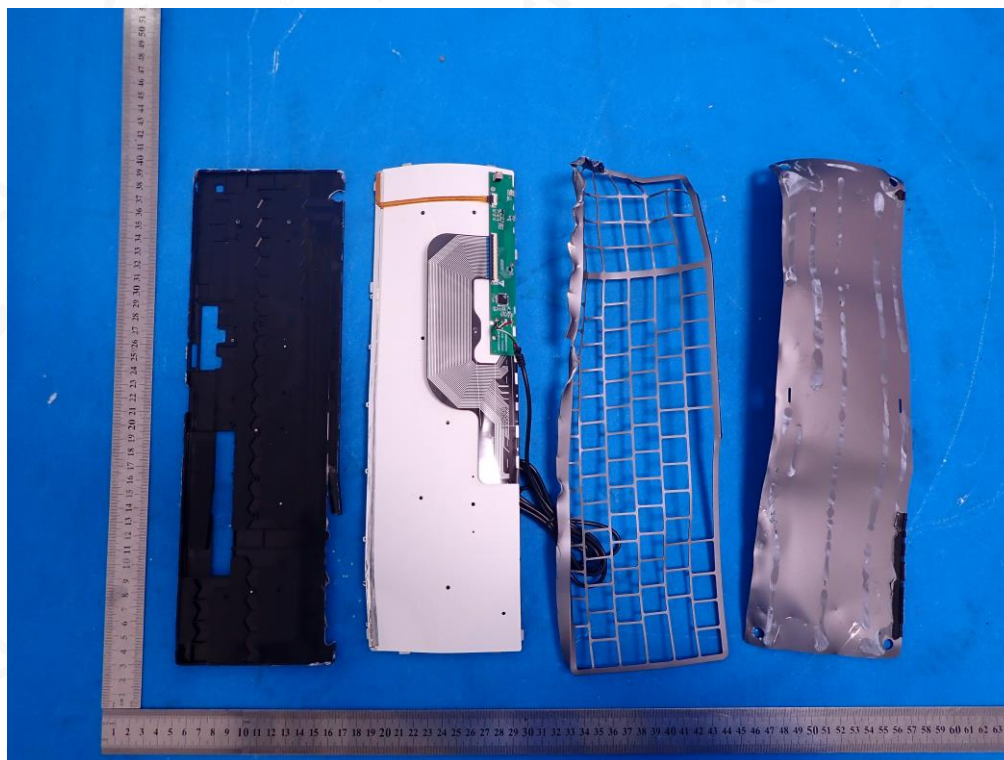


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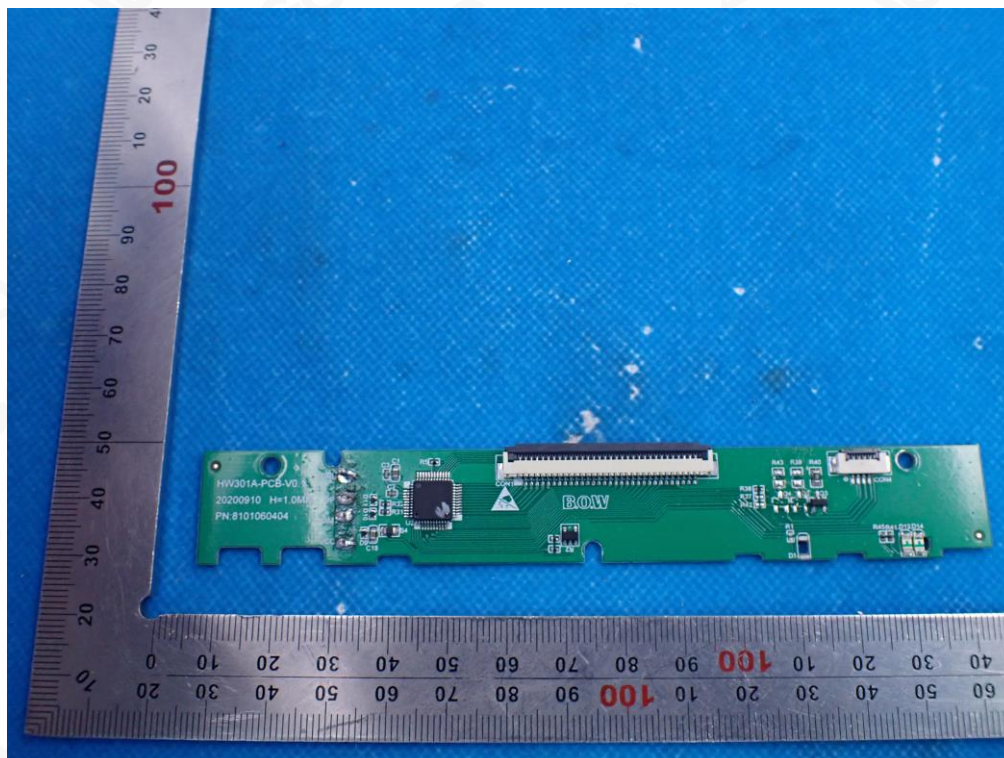
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OPEN VIEW OF EUT



INTERNAL VIEW OF EUT-1

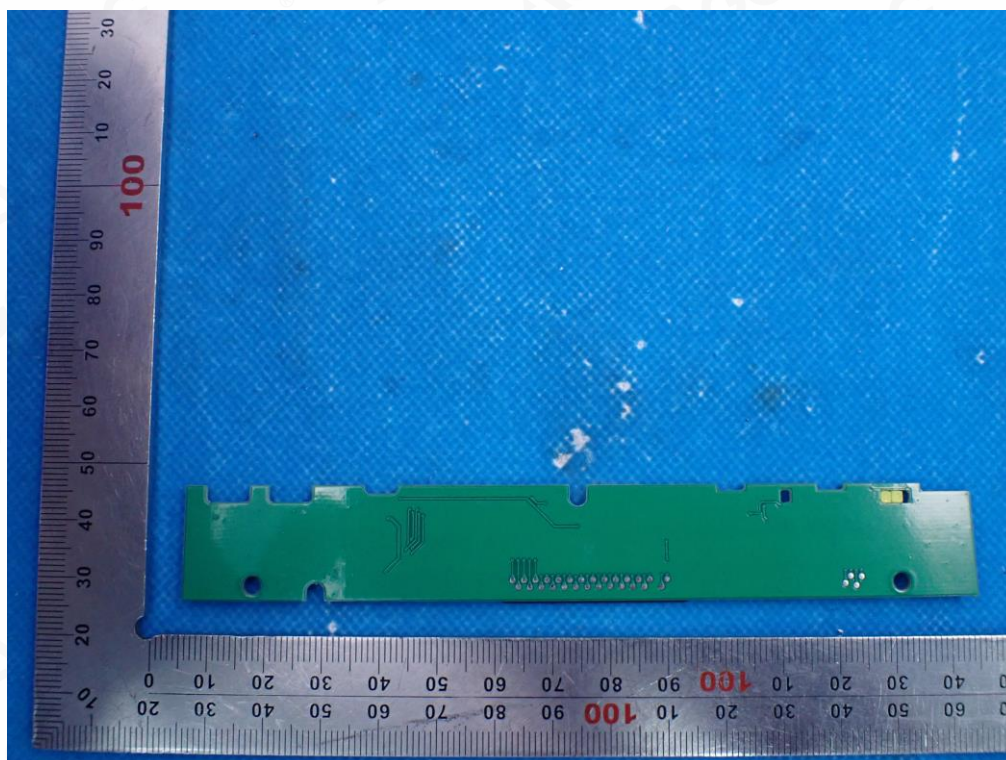


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INTERNAL VIEW OF EUT-2



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ST-UCSW3M-small
TOP VIEW OF EUT



BOTTOM VIEW OF EUT



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