FCC Test Report

Report No.: AGC04246150302FE01

FCC ID		NMCHBCR001
PRODUCT DESIGNATION	:	HBC Remote
BRAND NAME	:	UCLEAR DIGITAL
MODEL NAME	:	HBCR001
CLIENT	:	Bitwave Private Limited
DATE OF ISSUE	:	Jun.27,2015
STANDARD(S)	:	FCC Part 15 Rules
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	/	Jun.27,2015	Valid	Original Report

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1. VERIFICATION OF CONFORMITY

Applicant	Bitwave Private Limited
Address	11, Serangoon North Ave 5 , #05-03 Singapore 554809
Manufacturer	Bitwave Private Limited
Address	11, Serangoon North Ave 5 , #05-03 Singapore 554809
Product Designation	HBC Remote
Brand Name	UCLEAR DIGITAL
Test Model	HBCR001
Measurement Procedure	ANSI C63.4: 2009
Date of test	Jun.24,2015 to Jun.26,2015
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-IT/AC(2013-03-01)

The above equipment was tested by Compliance Certification Service(Shenzhen) Inc. for compliance with the requirements set forth in the FCC Rules and Regulations Part 15, the measurement procedure according to ANSI C63.4:2009. 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	Jerry Xiao	Jun.27,2015
Checked By	Forrest Lei	Jun.27,2015
Authorized By	Solger Zhang	Jun.27,2015

2. SYSTEM DESCRIPTION

TEST MODE DESCRIPTION		
NO.	**TEST MODE DESCRIPTION**	**WORST**
1	Normal Operation(USB)	V
Note: 1. V means EMI worst mode 2. Only worst mode data recorded in the test report		

3. MEASUREMENT UNCERTAINTY

Conducted measurement: +/- 2.75dB

Radiated measurement: +/- 3.2dB

4. PRODUCT INFORMATION

Housing Type	Plastic
EUT Input Rating	DC3.7V by Battery

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

I/O Port of EUT			
I/O Port Type	**Number**	**Cable Description**	**Tested With**
USB Port	1	1m, unshielded	1

5. SUPPORT EQUIPMENT

Device Type	Manufacturer	Model Name	Serial No.	Data Cable	Power Cable
PC	DELL	INSPIRON	--	--	--

6. TEST FACILITY

Site	Compliance Certification Service(Shenzhen) Inc.
Location	No.10-1 Mingkeda Logistics Park, No.18 Huanguan South RD. Guan lan Town,Baoan Distr

TEST EQUIPMENT OF LINE CONDUCTED EMISSION TEST

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	100694	04/01/2015	03/31/2016
LISN	R&S	ESH3-Z5	8389791009	07/16/2014	07/15/2015
Conduction Cable	Sat	CE1	C001	06/04/2015	06/03/2016

TEST EQUIPMENT OF RADIATED EMISSION

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
SPECTRUM ANALYZER	AGILENT	E4440A	US41421290	07/15/2014	07/16/2015
ANTENNA	A.H.	SAS-521-4	128	06/06/2015	06/05/2016
HORN ANTENNA	EM	EM-AH-10180	N/A	04/20/2015	04/19/2016
AMPLIFIER	EM	EM30180	0607030	02/26/2015	02/25/2016
POSITIONING CONTROLLER	MF	MF-7802	MF780208147	--	--
Radiation Cable 1	Sat	RE1	R003	06/04/2015	06/03/2016
Radiation Cable 2	Sat	RE2	R002	06/04/2015	06/03/2016

Note:” -- “means it’s not applicable.

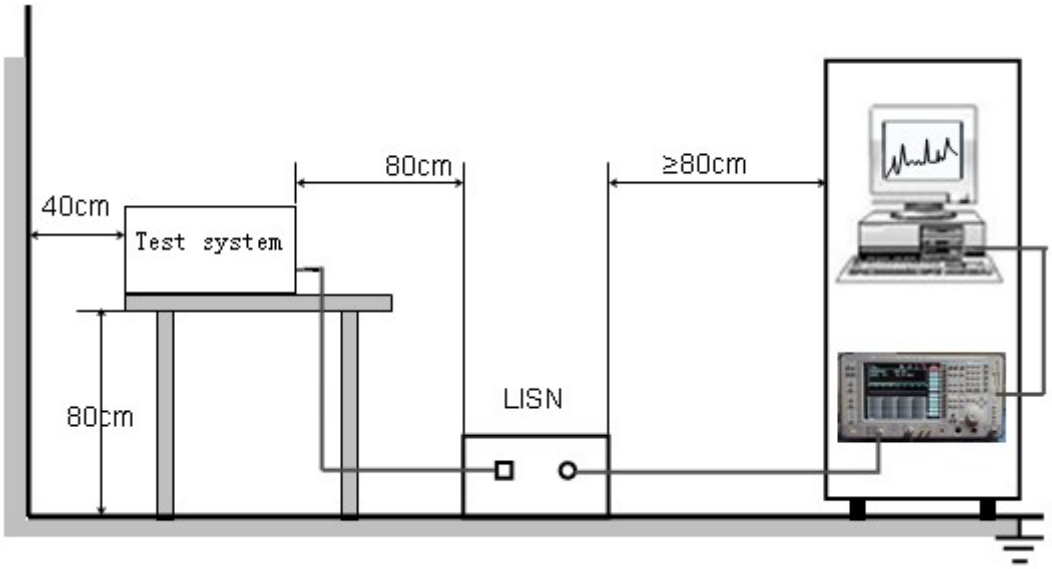
7. FCCLINE CONDUCTED EMISSION TEST

7.1. 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.

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 120V/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

Site: Conduction Phase: *L1* Temperature: 24.3
Limit: FCC Part 15 Rules Class B Conduction(QP) Power: Humidity: 53.1 %
EUT: HBC Remote
M/N: HBCR001
Mode: Normal Operation(USB)
Note:

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1900	42.36		27.97	10.20	52.56		38.17	64.03	54.03	-11.47	-15.86	P	
2	0.2340	37.10		24.07	10.25	47.35		34.32	62.30	52.30	-14.95	-17.98	P	
3	0.6020	30.12		21.76	10.31	40.43		32.07	56.00	46.00	-15.57	-13.93	P	
4	3.0660	30.10		17.96	10.54	40.64		28.50	56.00	46.00	-15.36	-17.50	P	
5	3.7780	34.48		21.40	10.47	44.95		31.87	56.00	46.00	-11.05	-14.13	P	
6	21.4660	31.82		18.66	10.13	41.95		28.79	60.00	50.00	-18.05	-21.21	P	

RESULT: PASS

LINE CONDUCTED EMISSION TEST-N

Site: Conduction Phase: *N* Temperature: 24.3
Limit: FCC Part 15 Rules Class B Conduction(QP) Power: Humidity: 53.1 %
EUT: HBC Remote
M/N: HBCR001
Mode: Normal Operation(USB)
Note:

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1860	42.03		28.61	10.20	52.23		38.81	64.21	54.21	-11.98	-15.40	P	
2	0.2100	40.80		22.11	10.23	51.03		32.34	63.20	53.20	-12.17	-20.86	P	
3	0.5980	30.16		21.02	10.31	40.47		31.33	56.00	46.00	-15.53	-14.67	P	
4	2.9300	28.84		16.21	10.53	39.37		26.74	56.00	46.00	-16.63	-19.26	P	
5	3.8620	34.17		20.18	10.45	44.62		30.63	56.00	46.00	-11.38	-15.37	P	
6	23.3540	29.85		18.20	10.11	39.96		28.31	60.00	50.00	-20.04	-21.69	P	

RESULT: PASS

8. FCC RADIATED EMISSION TEST

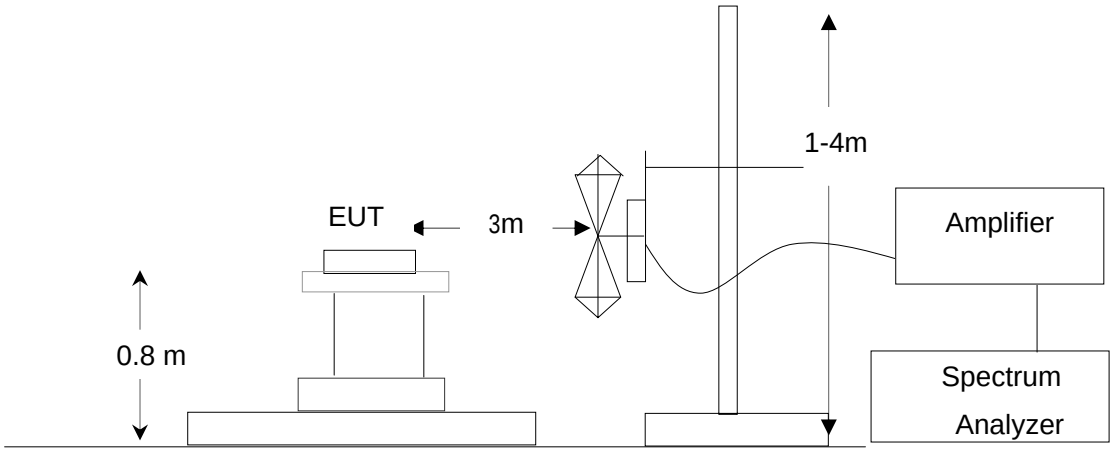
8.1. LIMITS OF RADIATED EMISSION TEST

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.

8.2. BLOCK DIAGRAM OF TEST SETUP

System Diagram of Connections between EUT and Simulators



8.3. 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 DC 5V power from PC with receive 120V/60Hz power from socket under the turntable through a LISN.

(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.

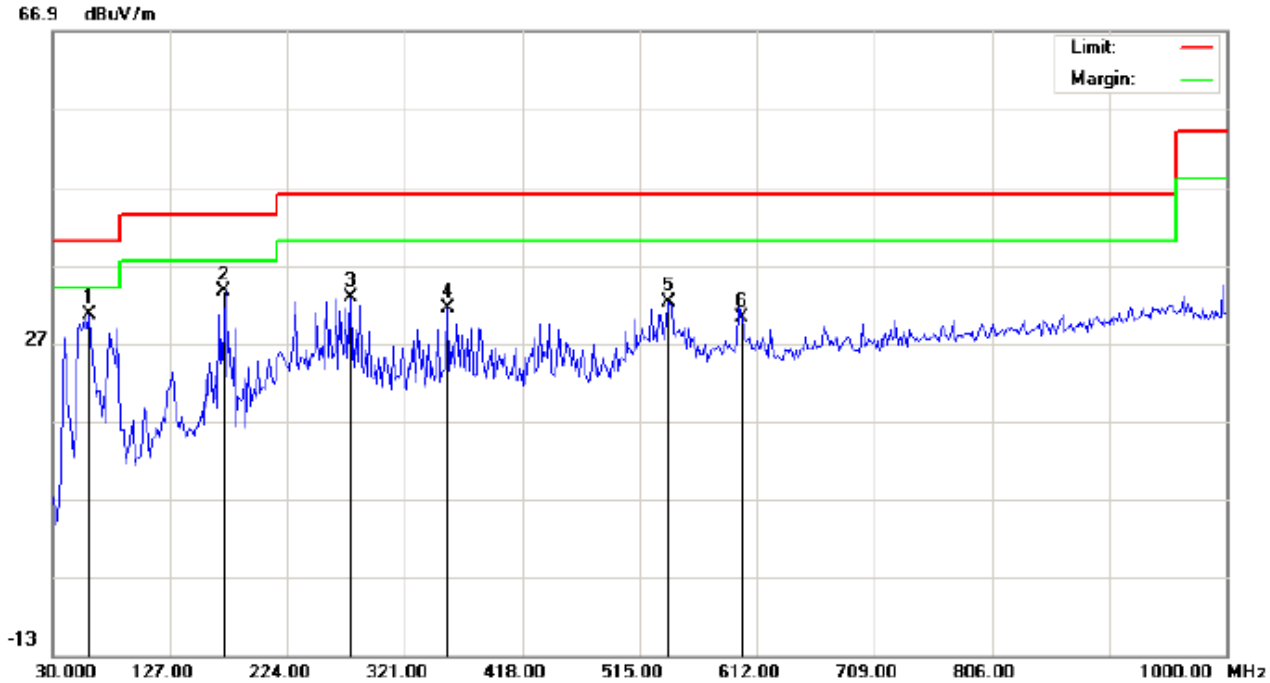
(7) The test mode(s) were scanned during the test:

(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.

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



Site: site #1
Limit: FCC Part 15 Rules Class B 3M Radiation
EUT: HBC Remote
M/N: HBCR001
Mode: Normal Operation(USB)
Note:

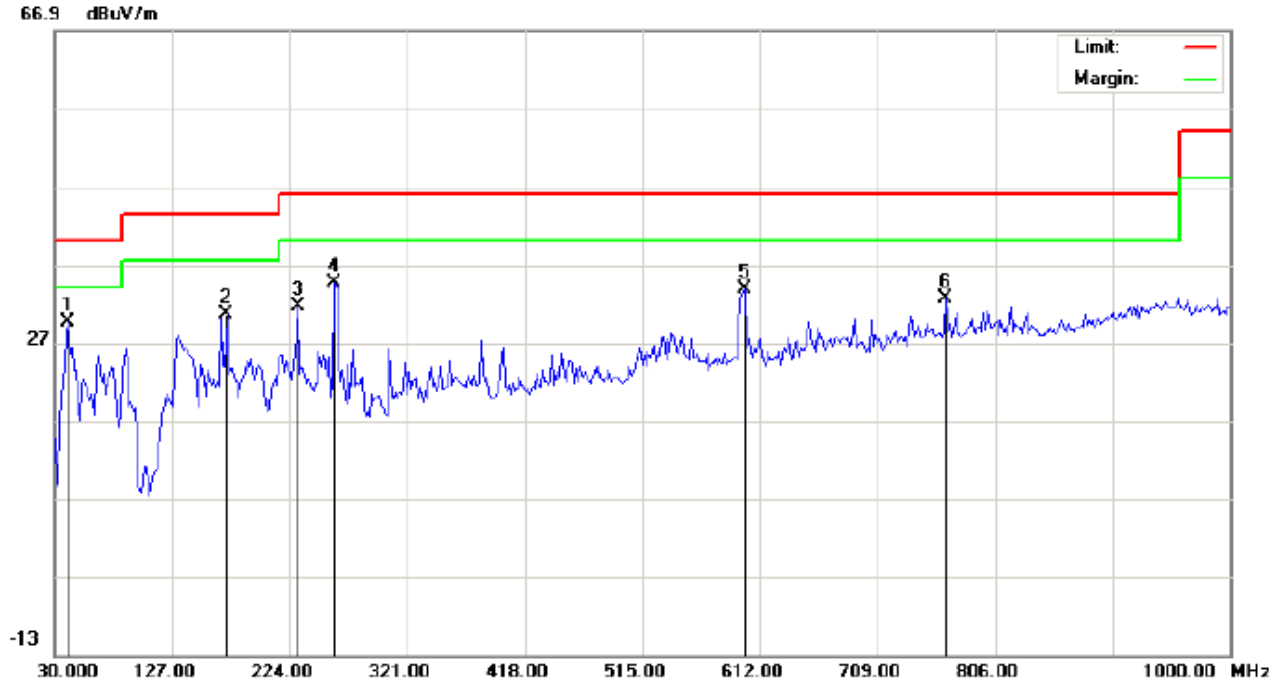
Polarization: *Horizontal*
Power:
Distance: 3m

Temperature: 22.8
Humidity: 54.1 %

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	*	60.7167	19.56	11.09	30.65	40.00	-9.35	peak			
2		172.2666	20.83	12.72	33.55	43.50	-9.95	peak			
3		275.7333	18.04	14.68	32.72	46.00	-13.28	peak			
4		356.5667	12.54	18.78	31.32	46.00	-14.68	peak			
5		539.2500	9.95	22.19	32.14	46.00	-13.86	peak			
6		599.0667	6.48	23.71	30.19	46.00	-15.81	peak			

RESULT: PASS

Radiated Emission Test at 3m Distance-Vertical



Site: site #1
Limit: FCC Part 15 Rules Class B 3M Radiation
EUT: HBC Remote
M/N: HBCR001
Mode: Normal Operation(USB)
Note:

Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 22.8
Humidity: 54.1 %

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	*	41.3167	20.73	8.81	29.54	40.00	-10.46	peak			
2		172.2666	15.96	14.56	30.52	43.50	-12.98	peak			
3		230.4667	19.60	11.99	31.59	46.00	-14.41	peak			
4		261.1832	20.30	14.24	34.54	46.00	-11.46	peak			
5		599.0667	11.02	22.73	33.75	46.00	-12.25	peak			
6		765.5833	5.72	26.85	32.57	46.00	-13.43	peak			

RESULT: PASS

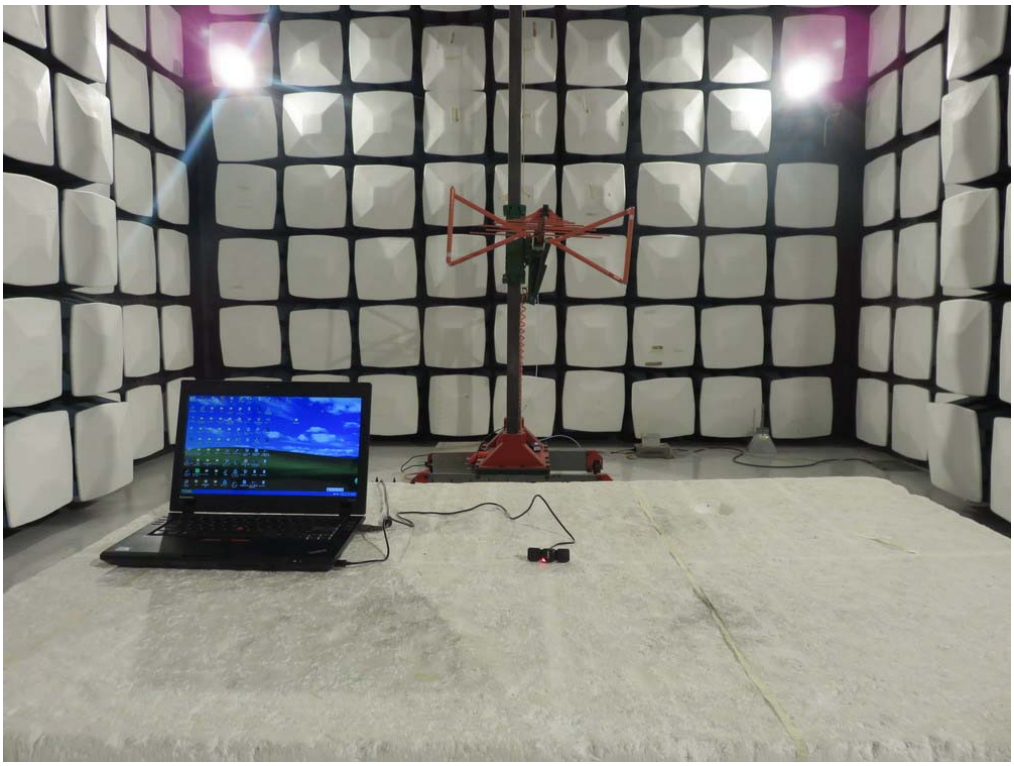
Note: All Other modes above 1GHz have more than 20db margin, no recording in the report

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

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC LINE CONDUCTED EMISSION TEST SETUP

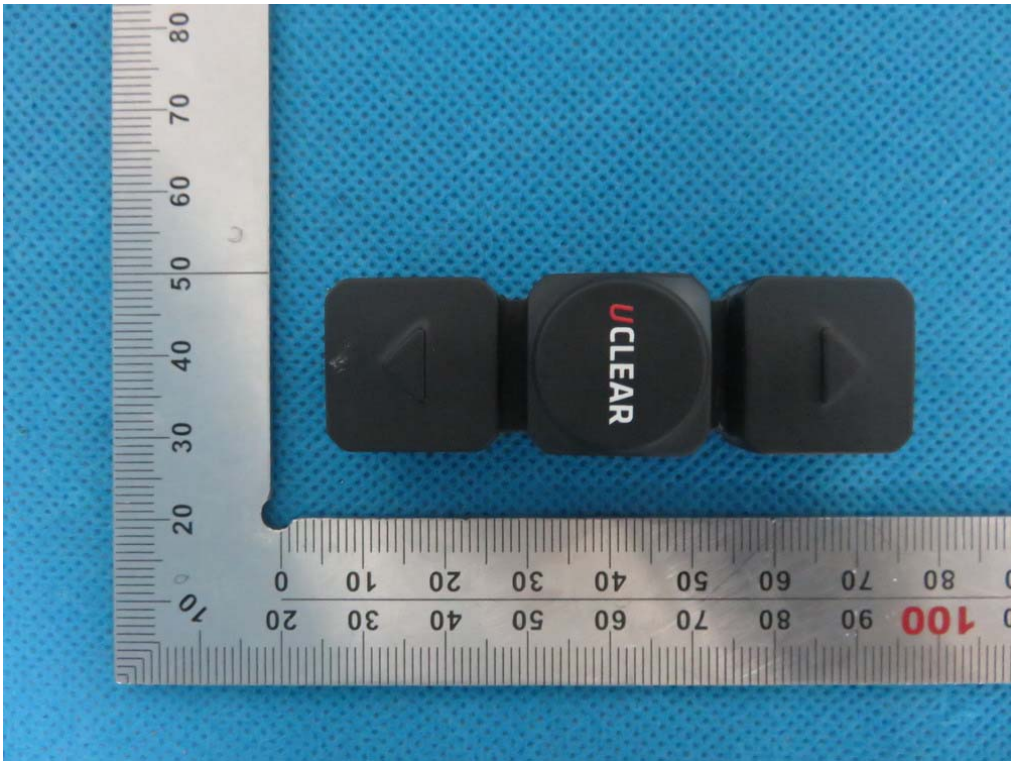
FCC RADIATED EMISSION TEST SETUP



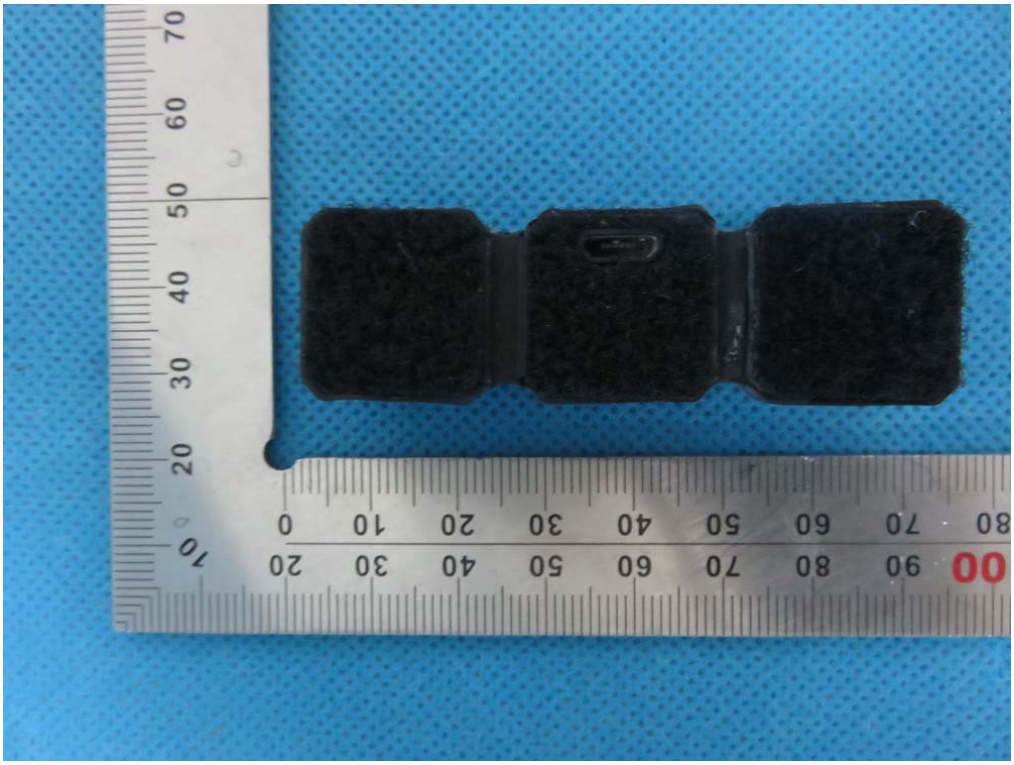
APPENDIX B: PHOTOGRAPHS OF EUT

TOTAL VIEW OF EUT

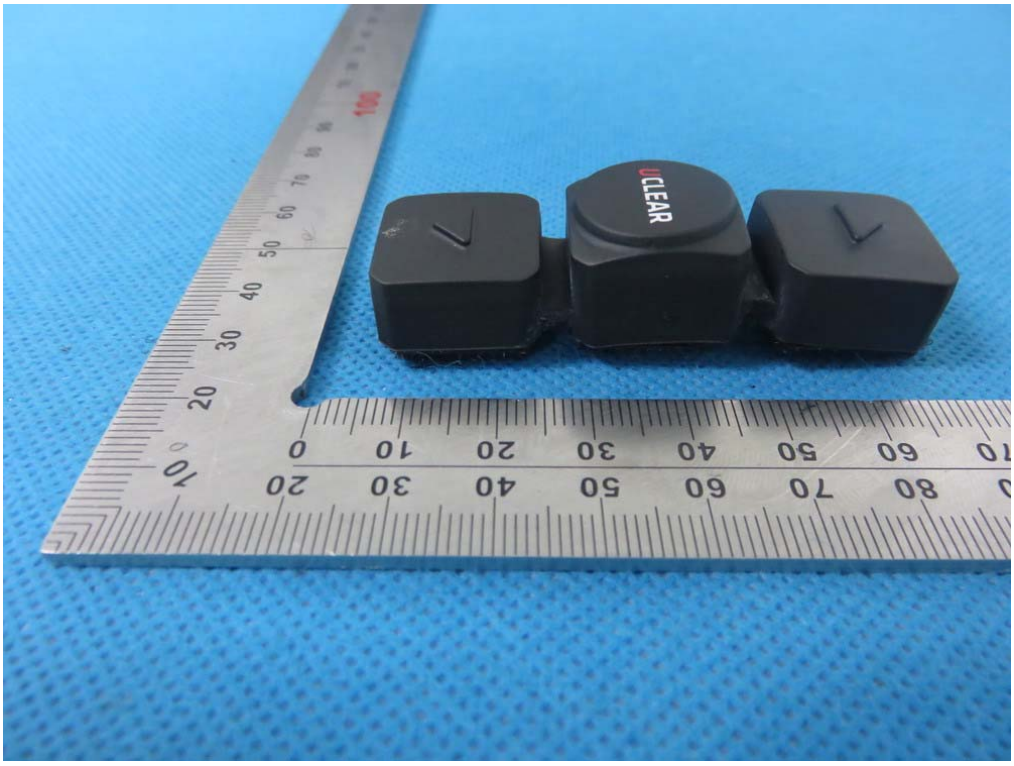
TOP VIEW OF EUT



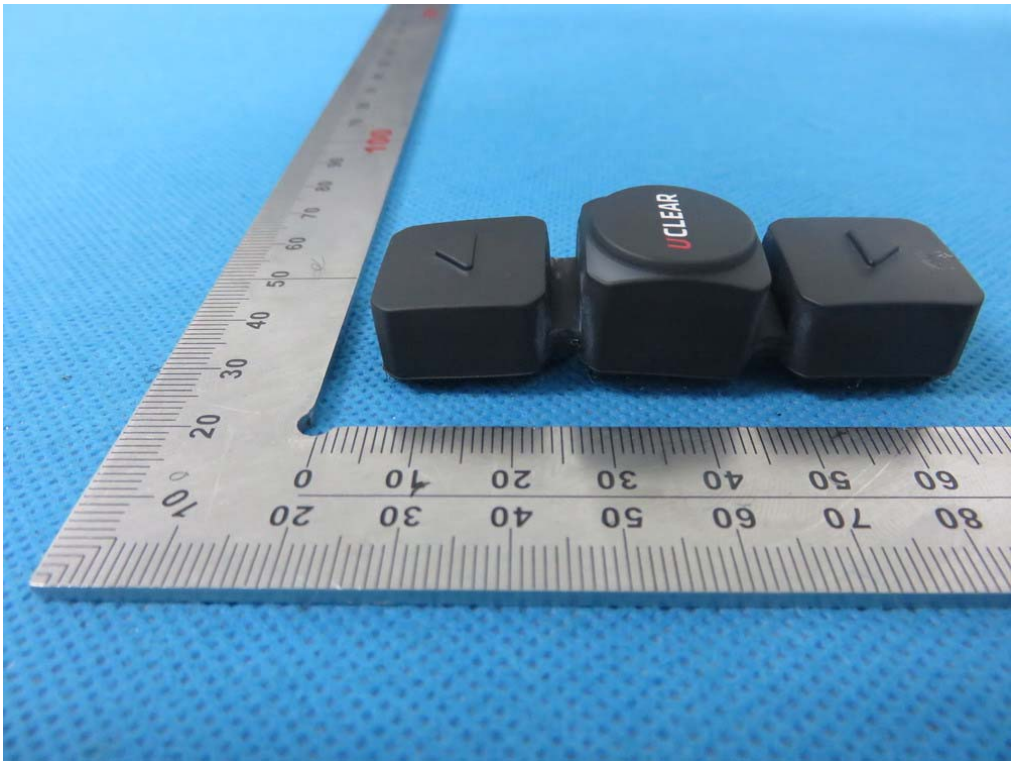
BOTTOM VIEW OF EUT



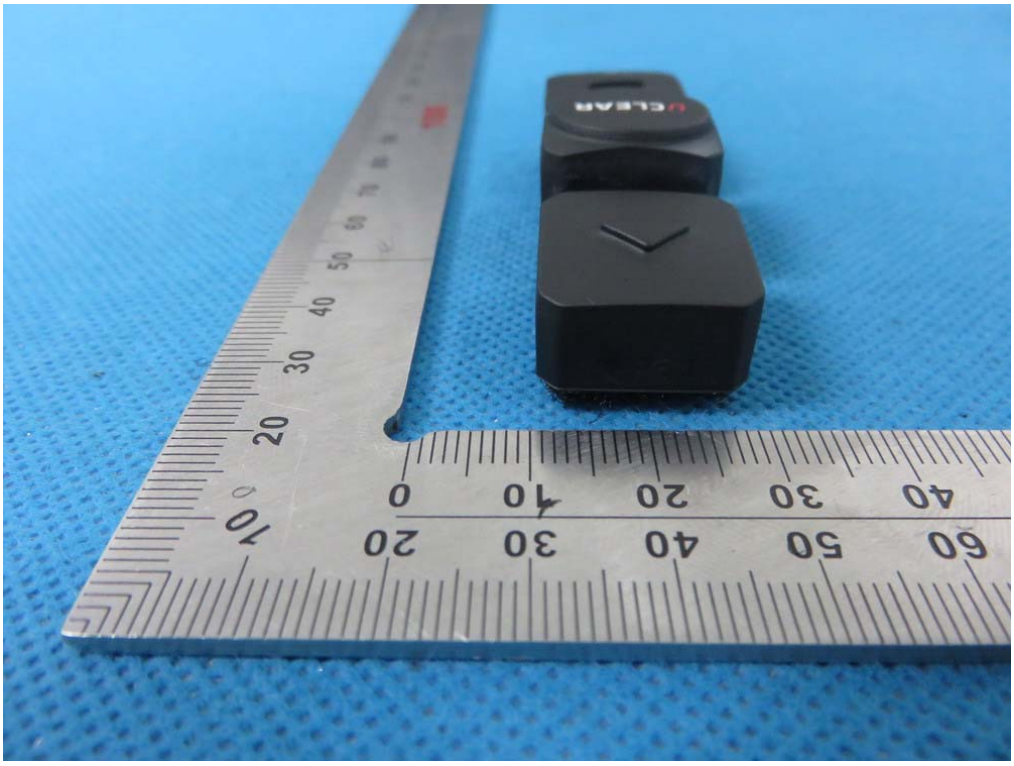
FRONT VIEW OF EUT



BACK VIEW OF EUT

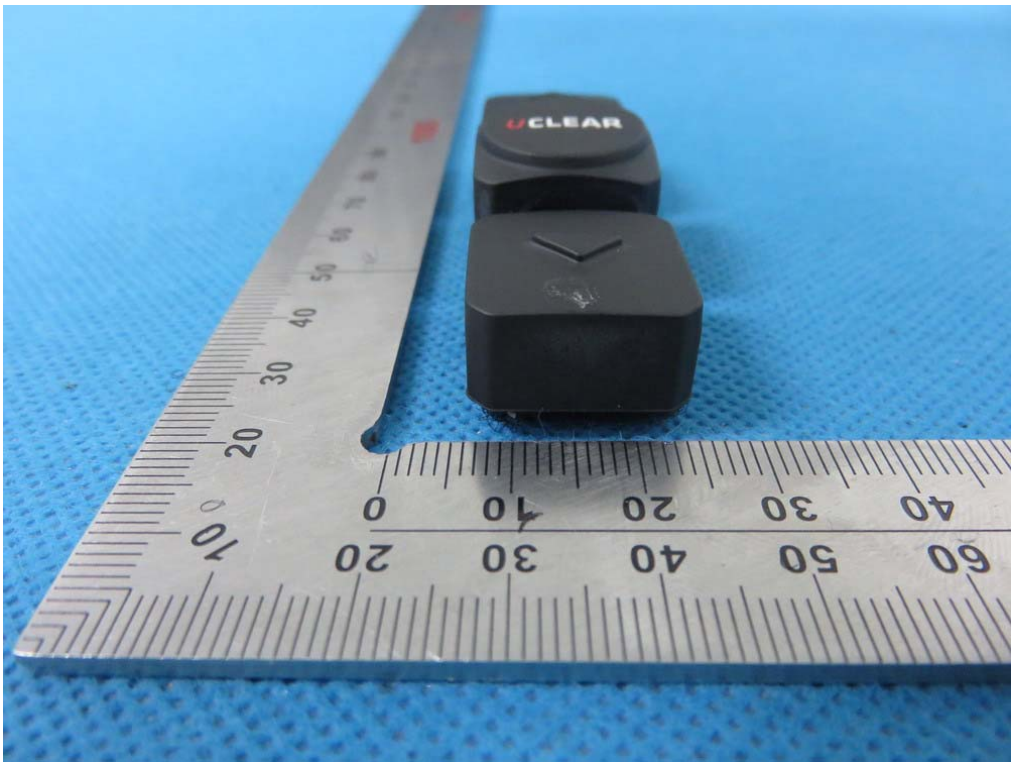


LEFT VIEW OF EUT

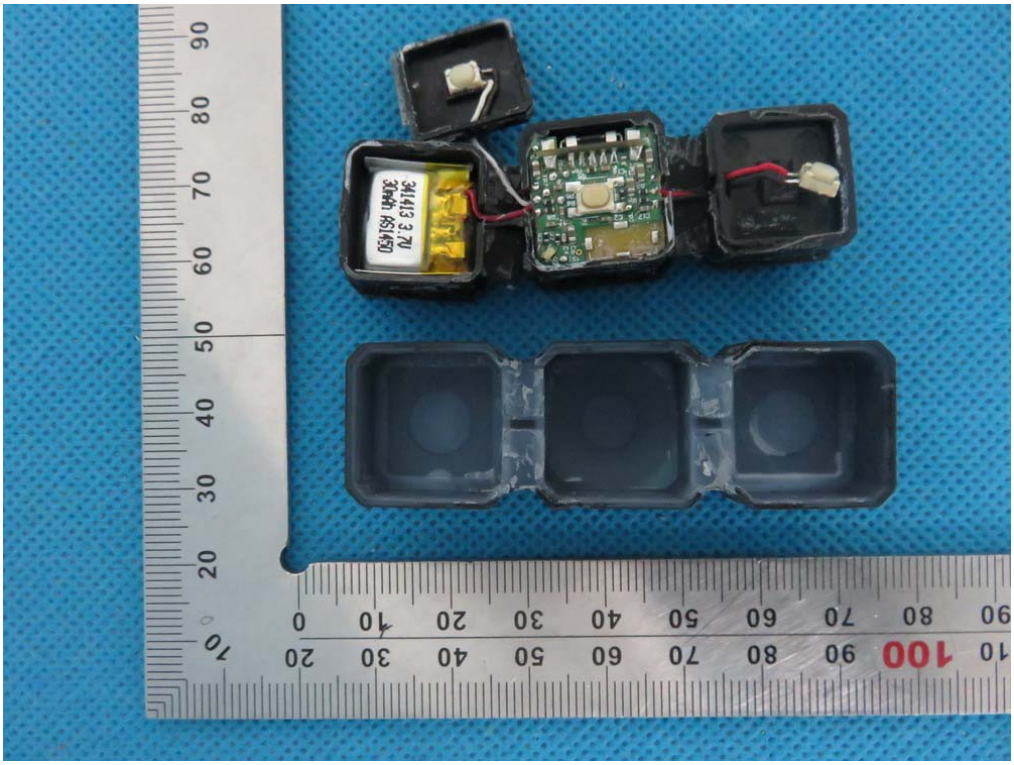


VIEW OF EUT-port

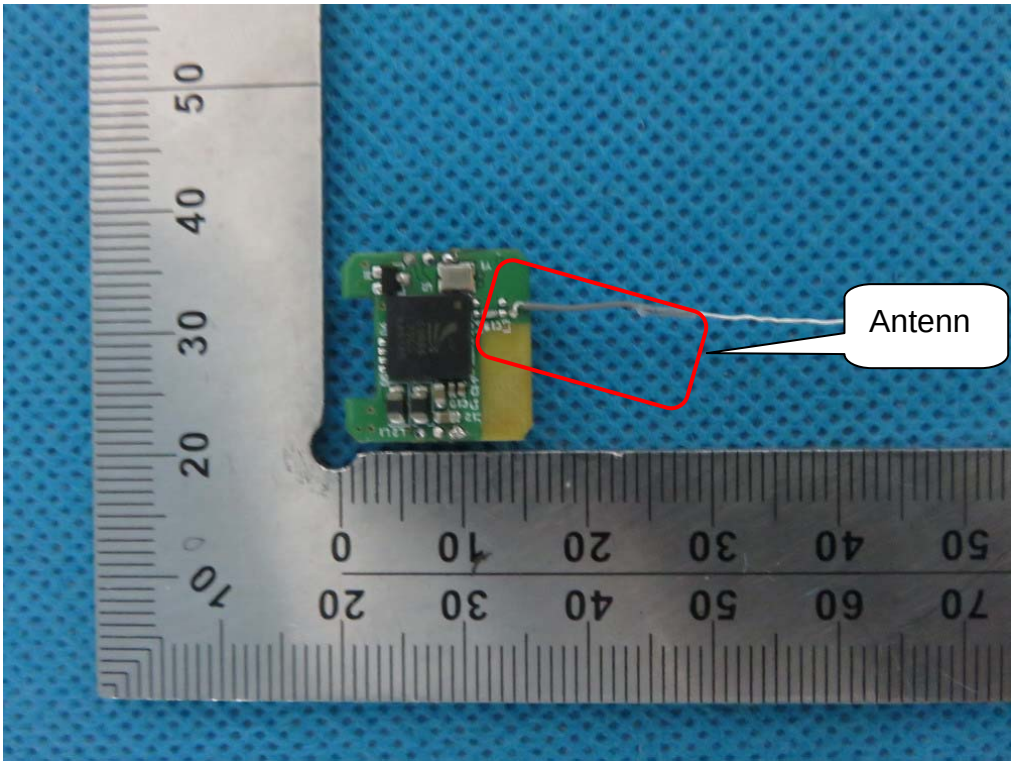
RIGHT VIEW OF EUT



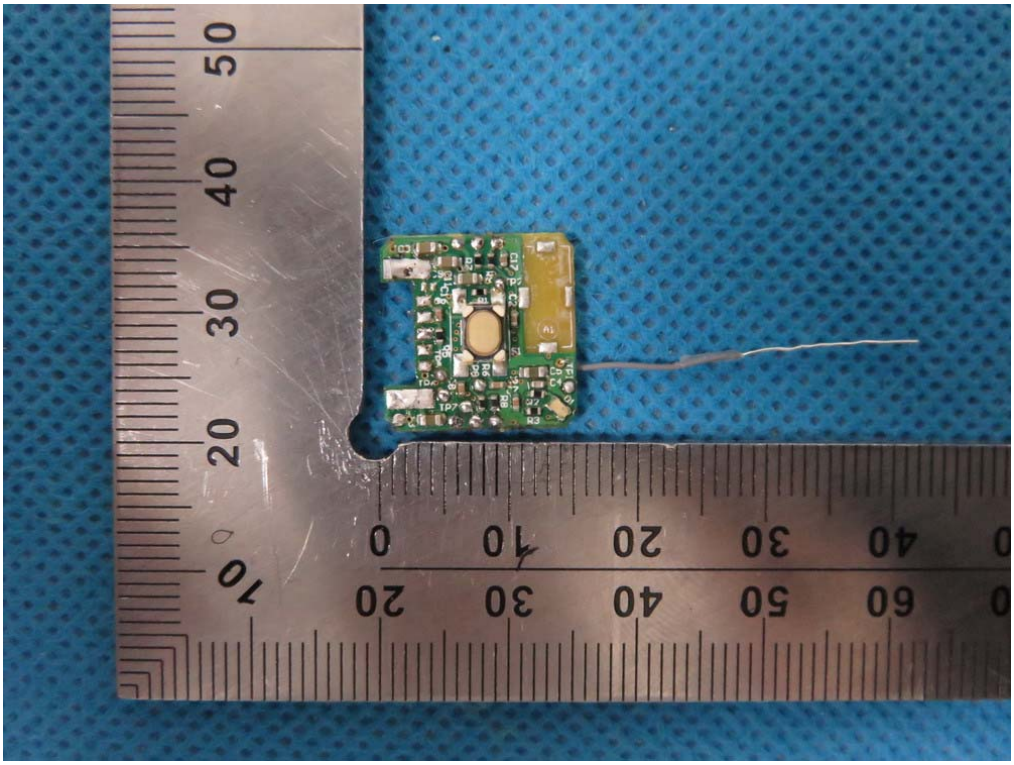
OPEN VIEW OF EUT



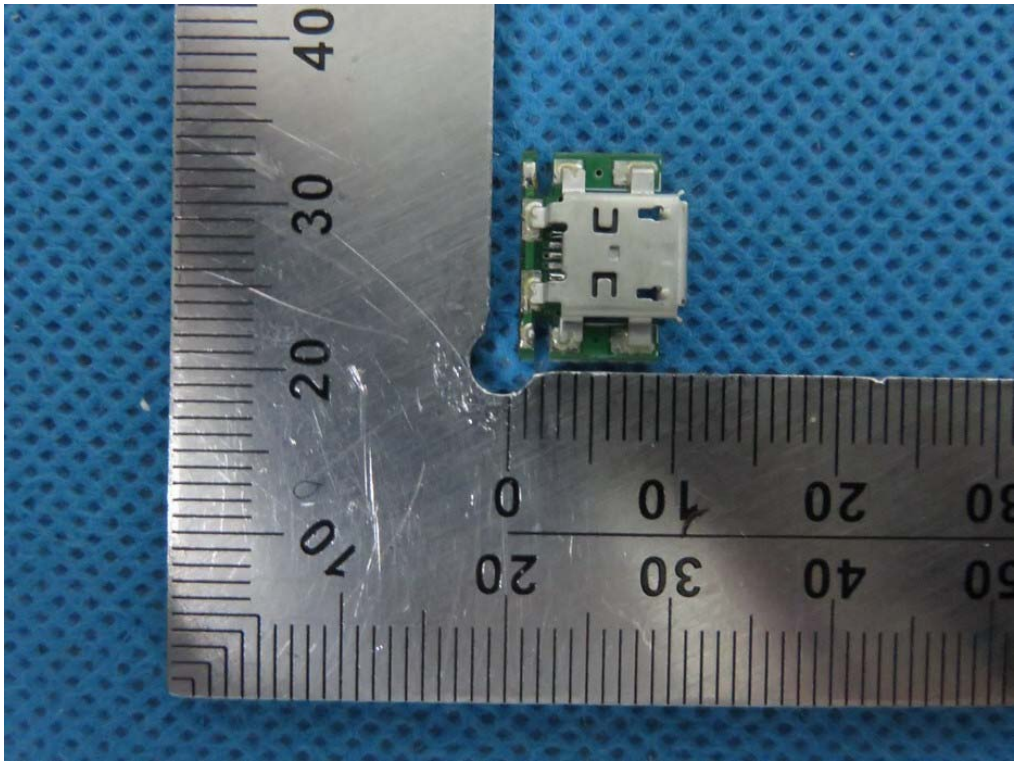
INTERNAL VIEW OF EUT-1



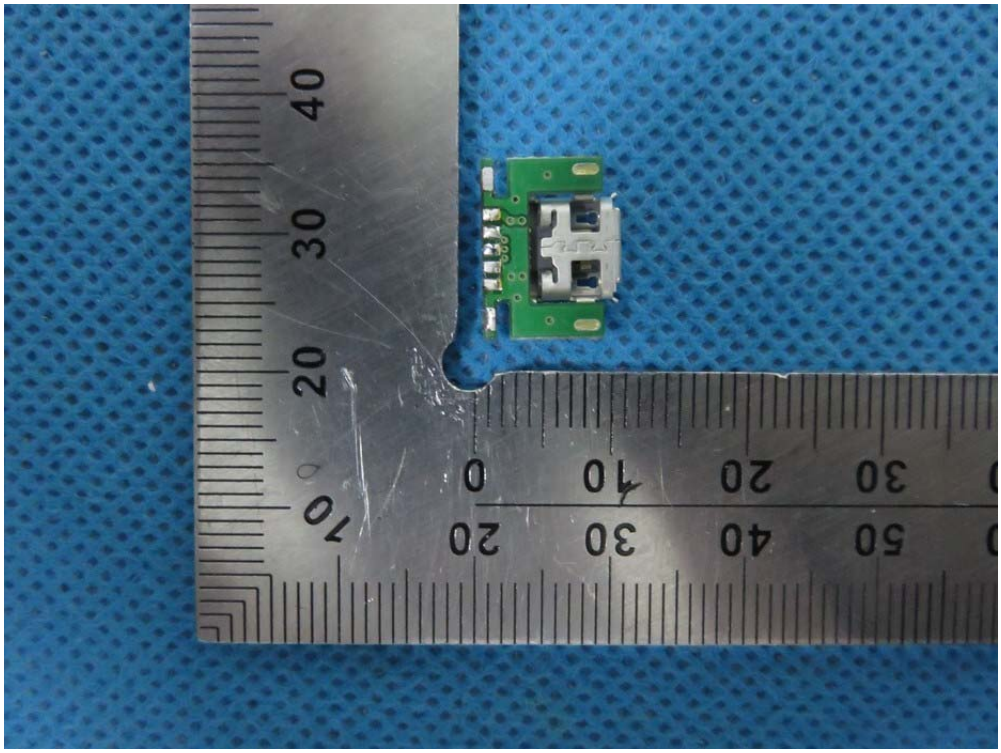
INTERNAL VIEW OF EUT-2



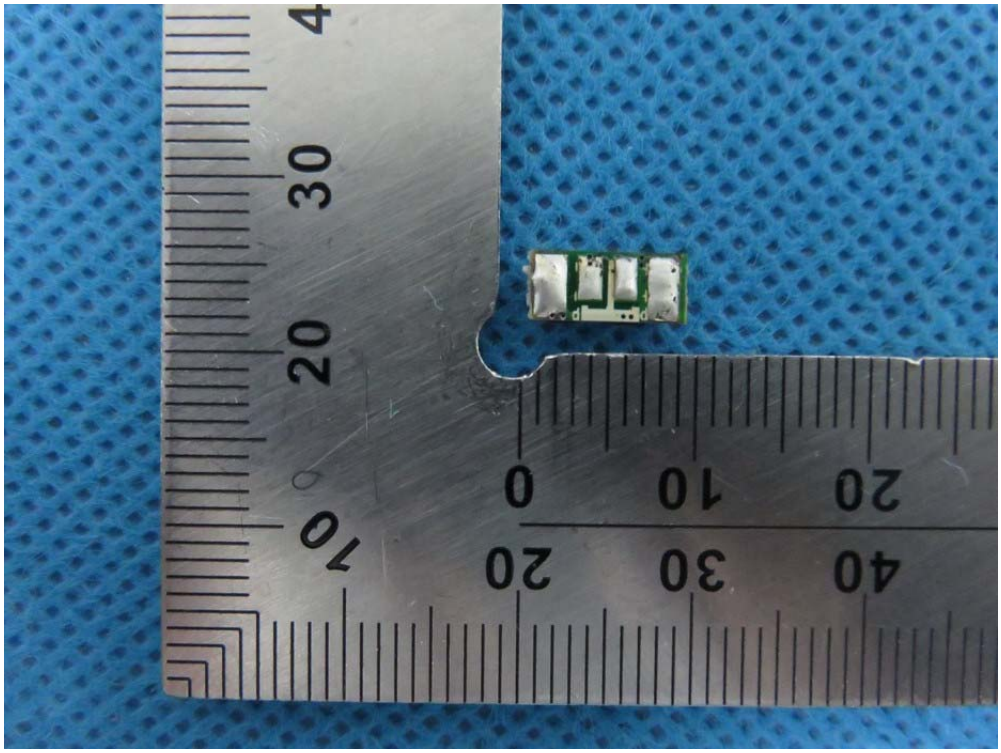
INTERNAL VIEW OF EUT-3



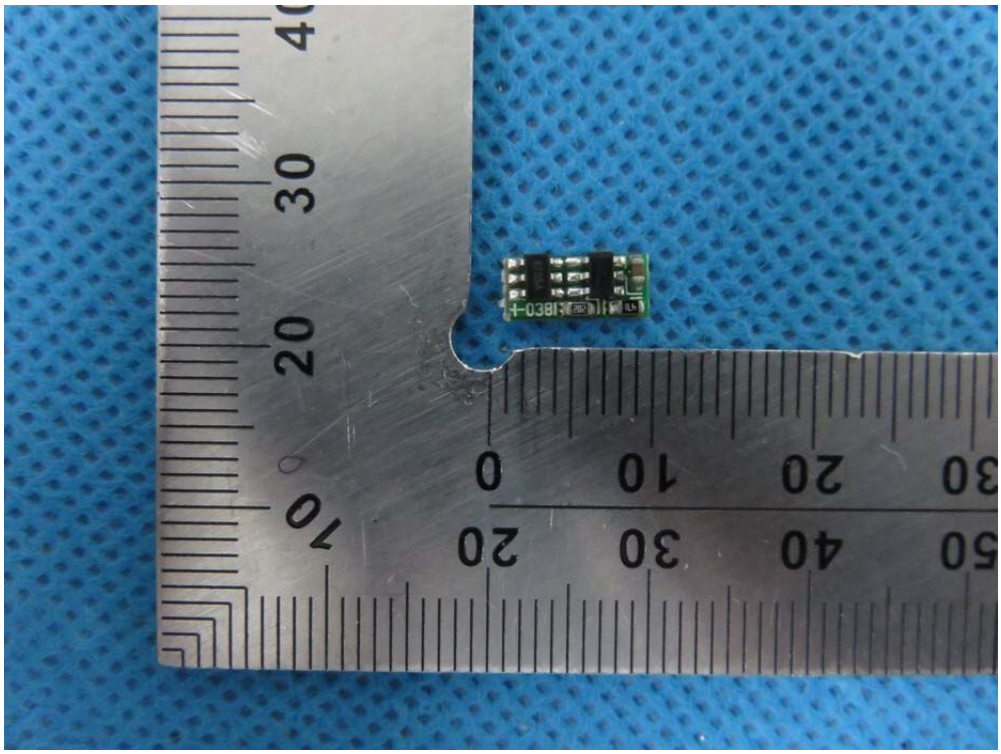
INTERNAL VIEW OF EUT-4



INTERNAL VIEW OF EUT-5



INTERNAL VIEW OF EUT-6



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