

FCC Test Report

Report No.: AGC08218190701FE01

FCC ID : 2ASFYMR04DHAMBL0000
PRODUCT DESIGNATION : R.A.T. AIR
BRAND NAME : MAD CATZ
MODEL NAME : R.A.T. AIR
APPLICANT : MAD CATZ GLOBAL LIMITED
DATE OF ISSUE : Sep. 05, 2019
STANDARD(S) : FCC Part 18 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	/	Sep. 05, 2019	Valid	Initial release



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1. VERIFICATION OF CONFORMITY

Applicant	MAD CATZ GLOBAL LIMITED
Address	Office H on 22nd Floor, Kings Wing Plaza 2, No.1 on Kwan Street, Sha Tin, N.T., HK.Sha TinHong Kong
manufacturer	Dexin Electronic Co., LTD
Address	No.2, Jianye Second, ShiTan Pu Industrial, Tangxia Town, Dongguan Guangdong, China
Factory	Dexin Electronic Co., LTD
Address	No.2, Jianye Second, ShiTan Pu Industrial, Tangxia Town, Dongguan Guangdong, China
Product Designation	R.A.T. AIR
Brand Name	MAD CATZ
Test Model	R.A.T. AIR
Date of test	Aug. 16, 2019 to Sep. 04, 2019
Deviation	None
Condition of Test Sample	Normal
Test Result	Pass
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 18, the measurement procedure according to FCC/OET MP-5. 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



Draven Li
(Project Engineer)

Sep. 04, 2019

Reviewed By



Max Zhang
(Reviewer)

Sep. 05, 2019

Approved By



Forrest Lei
(Authorized Officer)

Sep. 05, 2019

2. SYSTEM DESCRIPTION

TEST MODE DESCRIPTION		
NO.	TEST MODE DESCRIPTION	WORST
1	Charging mode	V
Note: 1. V means EMI worst mode. 2. All the modes are tested, but only the worst case was recorded in this report.		

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, $U_c = \pm 3.2$ dB
- Uncertainty of Radiated Emission below 1GHz, $U_c = \pm 3.9$ dB
- Uncertainty of Radiated Emission above 1GHz, $U_c = \pm 4.8$ dB



4. PRODUCT INFORMATION

Housing Type	Plastic
Hardware Version	34
Software Version	1.0.2.10
Operation Frequency range	6.78MHz
Power Supply	DC 5V
Wireless Output Power	5W

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

I/O Port of EUT			
I/O Port Type	Number	Cable Description	Tested With
Micro-USB	1	--	1

Note:

1. All the above "--" means that EUT has no cable.
2. All the cables were provided by AGC Lab.

5. SUPPORT EQUIPMENT

Item	Equipment	Model No.	ID or Specification	Remark
1	R.A.T. AIR	R.A.T. AIR	2ASFYMR04DHAMBL0000	EUT
2	PC	XIAOMI	N/A	Support
3	PC adapter	XIAOMI ADC6501TM	DC20V/3A	Support

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

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	Jun.12, 2019	Jun.11, 2020
LISN	R&S	ESH2-Z5	100086	Jun.12, 2019	Jun.11, 2020

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun.12, 2019	Jun.11, 2020
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec.20, 2018	Dec.19, 2019
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.21, 2018	Sep.20, 2019
preamplifier	ChengYi	EMC184045SE	980508	Oct.31, 2018	Oct.30, 2019
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May17, 2019	May16, 2020
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun.12, 2019	Jun.11, 2020
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep.21, 2018	Sep.20, 2019



7. TEST ITEMS AND THE RESULTS

Test item	Test Requirement	Test Method	Class/Severity	Result
Radiated Emission	§18.305(b)	FCC/OET MP-5	Any type	Pass
Conducted Emission	§18.307(a)	FCC/OET MP-5	Any type	Pass



8. FCC LINE CONDUCTED EMISSION TEST

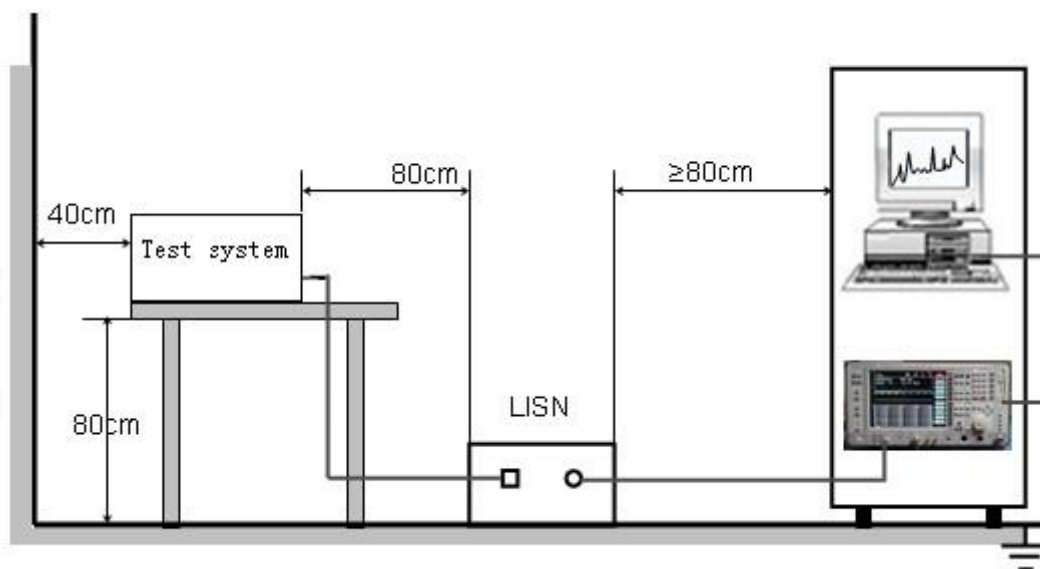
8.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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.

8.2. BLOCK DIAGRAM OF TEST SETUP



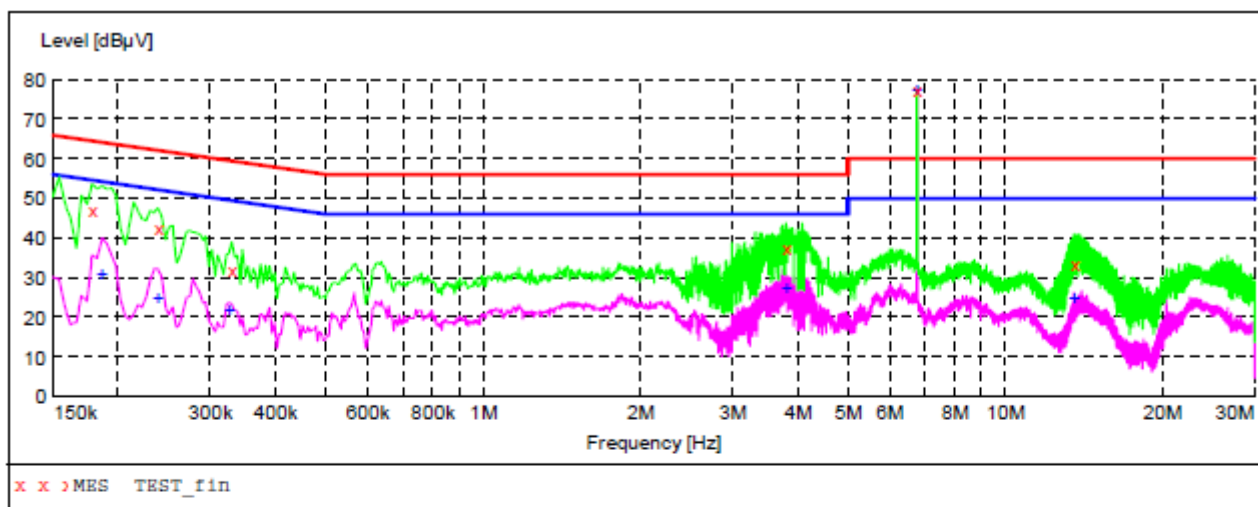
8.3. PROCEDURE OF LINE CONDUCTED EMISSION TEST

- (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 FCC/OET MP-5 (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 FCC/OET MP-5.
- (3) All I/O cables were positioned to simulate typical actual usage as per FCC/OET MP-5.
- (4) The EUT received 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.



8.4. TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST-L



MEASUREMENT RESULT: "TEST_fin"

8/26/2019 4:53PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.178000	47.00	10.9	65	17.6	QP	L1	FLO
0.238000	42.60	10.9	62	19.6	QP	L1	FLO
0.330000	32.00	10.7	60	27.5	QP	L1	FLO
3.790000	37.80	11.6	56	18.2	QP	L1	FLO
6.782000	77.30	11.7	60	-17.3	QP	L1	FLO
13.558000	33.70	12.1	60	26.3	QP	L1	FLO

MEASUREMENT RESULT: "TEST_fin2"

8/26/2019 4:53PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.186000	31.00	10.9	54	23.2	AV	L1	FLO
0.238000	25.10	10.9	52	27.1	AV	L1	FLO
0.326000	21.70	10.8	50	27.9	AV	L1	FLO
3.798000	27.50	11.6	46	18.5	AV	L1	FLO
6.782000	77.60	11.7	50	-27.6	AV	L1	FLO
13.558000	24.90	12.1	50	25.1	AV	L1	FLO

RESULT: PASS



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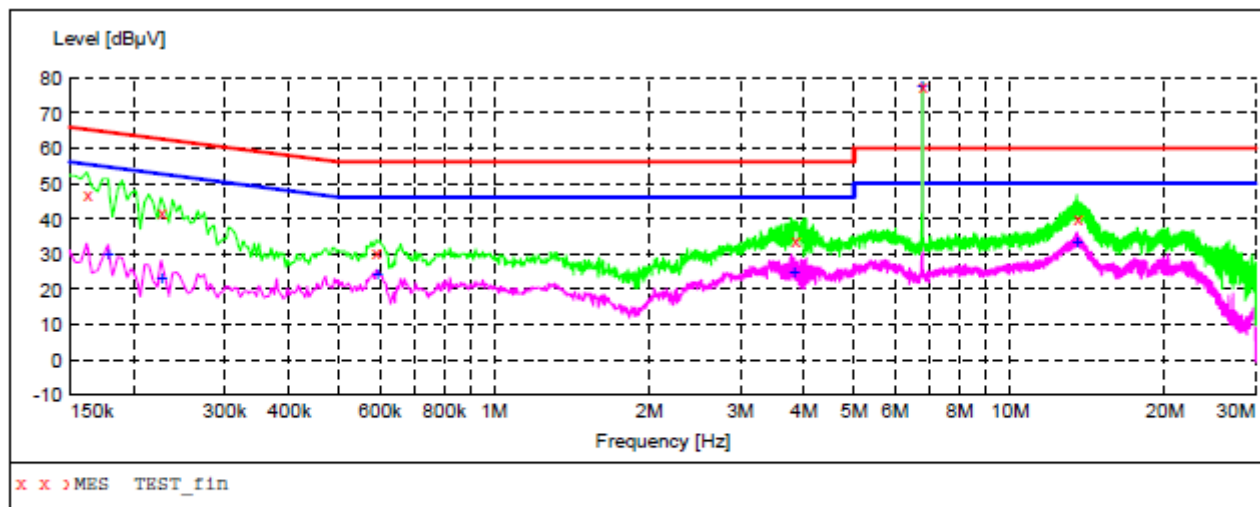
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LINE CONDUCTED EMISSION TEST-N



MEASUREMENT RESULT: "TEST_fin"

8/26/2019 4:57PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.162000	47.30	10.8	65	18.1	QP	N	FLO
0.226000	41.60	10.9	63	21.0	QP	N	FLO
0.590000	30.80	10.8	56	25.2	QP	N	FLO
3.830000	34.00	11.6	56	22.0	QP	N	FLO
6.782000	77.60	11.7	60	-17.6	QP	N	FLO
13.518000	40.30	12.1	60	19.7	QP	N	FLO

MEASUREMENT RESULT: "TEST_fin2"

8/26/2019 4:57PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.178000	29.90	10.9	55	24.7	AV	N	FLO
0.226000	23.40	10.9	53	29.2	AV	N	FLO
0.594000	24.10	10.8	46	21.9	AV	N	FLO
3.822000	24.80	11.6	46	21.2	AV	N	FLO
6.782000	77.80	11.7	50	-27.8	AV	N	FLO
13.506000	33.40	12.1	50	16.6	AV	N	FLO

RESULT: PASS

9. FCC RADIATED EMISSION TEST

9.1. LIMITS OF RADIATED EMISSION TEST

9KHz-30MHz

Equipment	Operating frequency	RF Power generated by equipment (watts)	Field strength limit (uV/m)	Distance (meters)
Any type unless otherwise specified (miscellaneous)	Any ISM frequency	Below 500	25	300
		500 or more	$25 \times \sqrt{\text{power}/500}$	1300
	Any non-ISM frequency	Below 500	15	300
		500 or more	$15 \times \sqrt{\text{power}/500}$	1300
Industrial heaters and RF stabilized arc welders	On or below 5,725 MHz Above 5,725 MHz	Any	10	1,600
		Any	(²)	(²)
Medical diathermy	Any ISM frequency Any non-ISM frequency	Any	25	300
		Any	15	300
Ultrasonic	Below 490 kHz	Below 500	$2,400/F(\text{kHz})$	300
		500 or more	$2,400/F(\text{kHz}) \times \sqrt{\text{power}/500}$	3300
	490 to 1,600 kHz Above 1,600 kHz	Any	$24,000/F(\text{kHz})$	30
		Any	15	30
Induction cooking ranges	Below 90 kHz On or above 90 kHz	Any	1,500	430
		Any	300	430

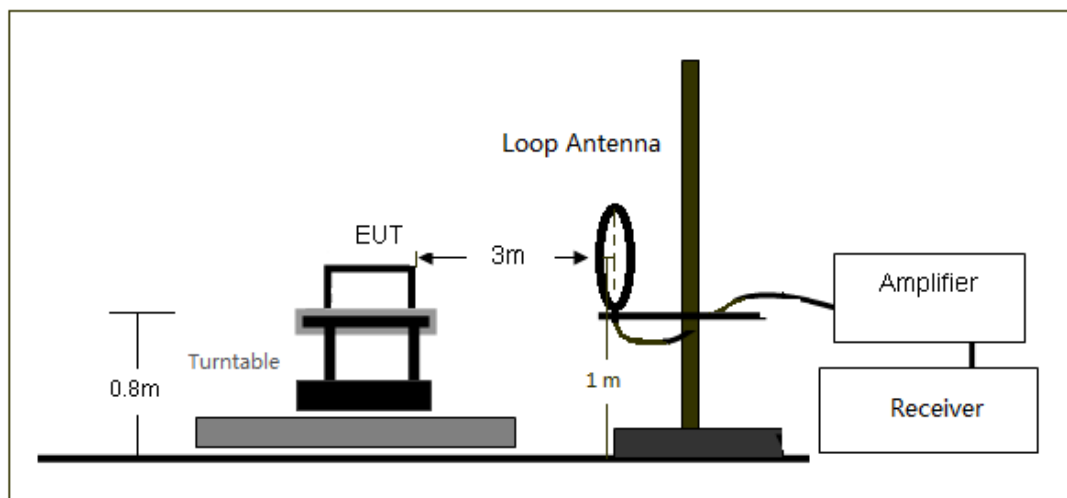
30MHz-1000MHz

Frequency (MHz)	Field strength limit at 30 meters (uV/m)
Non-consumer equipment:	
30-88	30
88-216	50
216-1000	70
Consumer equipment:	
30-88	10
88-216	15
216-1000	20

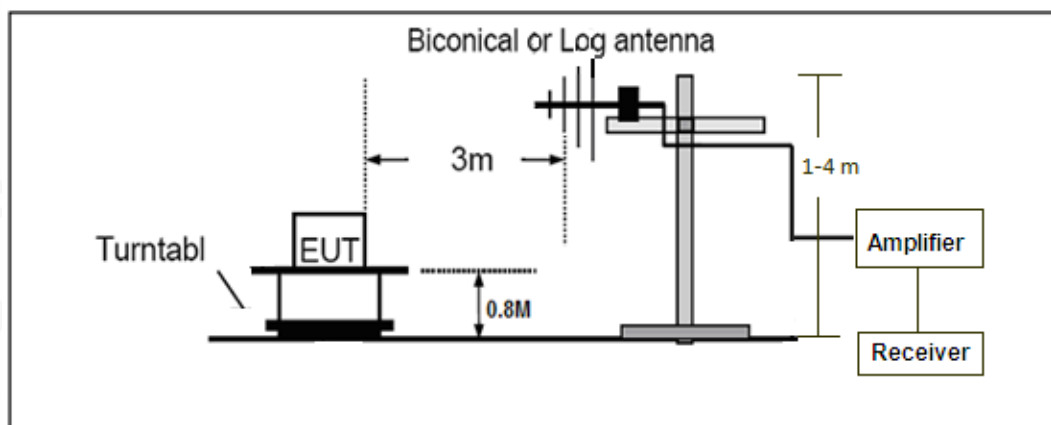
Note: The lower limit shall apply at the transition frequency.

9.2. BLOCK DIAGRAM OF TEST SETUP

RADIATED EMISSION TEST SETUP BELOW 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



9.3. PROCEDURE OF RADIATED EMISSION TEST

The following table is the setting of spectrum analyzer and receiver.

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

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

- (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 FCC/OET MP-5 (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 FCC/OET MP-5.
- (3) All I/O cables were positioned to simulate typical actual usage as per FCC/OET MP-5.
- (4) All support equipments received AC120V/60Hz power from socket under the turntable, if any.
- (5) The antenna was placed at 3 meter away from the EUT. 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.

9.4. TEST RESULT OF RADIATED EMISSION TEST

9KHz-30MHz

Frequency	Reading	Correction Factor	Result	Limit	Margin	Polar	Detector
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Front/side	
6.78	98.69	-11.29	87.40			Front	Peak
13.56	52.87	-12.03	40.84	67.96	-27.12	Front	Peak
6.78	83.95	-11.29	72.66			Side	Peak
13.56	43.35	-12.03	31.32	67.96	-36.64	Side	Peak

Note:

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

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

Margin=Level-Limit

Limit(dBuV/m)=20log25+20log(300/3)=67.96dBuV/m.

ISM equipment operating on a frequency specified in §18.301 is permitted unlimited radiated energy in the band specified for that frequency.



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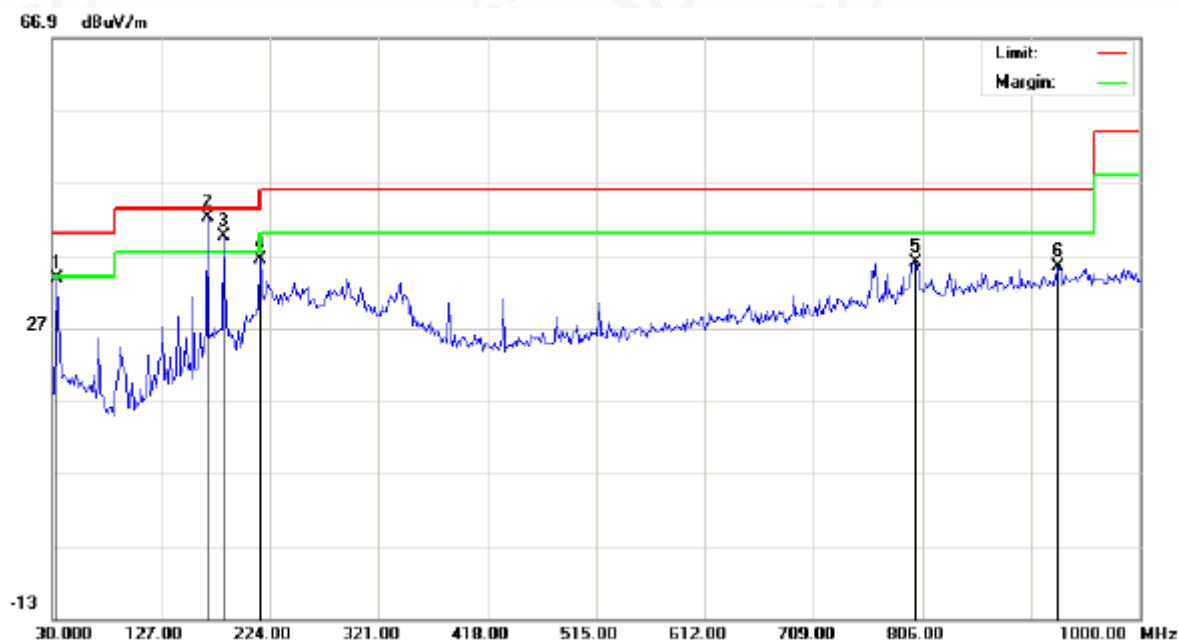
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30MHz-1GHz

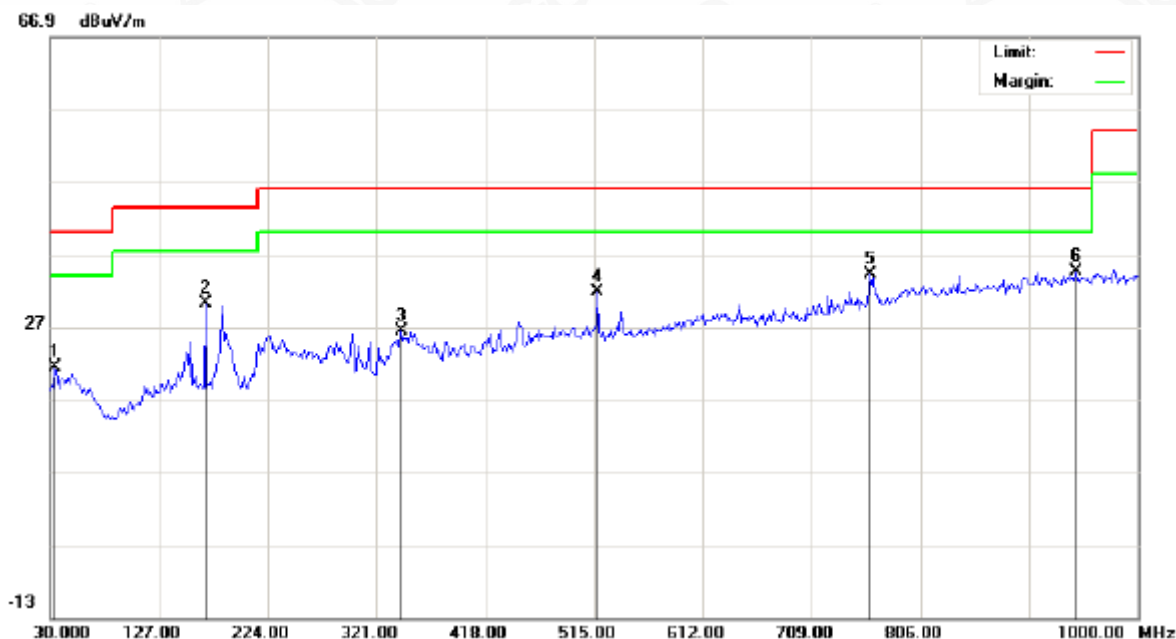
Radiated Emission below 1GHz Test at 3m Distance-Horizontal



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		34.8500	15.40	18.32	33.72	40.00	-6.28	peak			
2	*	169.4973	23.94	18.21	42.15	43.50	-1.35	QP			
3	!	183.5833	22.67	16.94	39.61	43.50	-3.89	peak			
4		215.9167	19.40	17.00	36.40	43.50	-7.10	peak			
5		799.5333	5.60	30.40	36.00	46.00	-10.00	peak			
6		927.2500	3.44	31.93	35.37	46.00	-10.63	peak			

RESULT: PASS

Radiated Emission below 1GHz 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		34.8500	3.14	18.32	21.46	40.00	-18.54	peak			
2		169.0333	11.87	18.26	30.13	43.50	-13.37	peak			
3		343.6333	5.37	21.00	26.37	46.00	-19.63	peak			
4		518.2333	6.53	25.35	31.88	46.00	-14.12	peak			
5		760.7333	4.72	29.52	34.24	46.00	-11.76	peak			
6	*	945.0333	2.50	32.09	34.59	46.00	-11.41	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

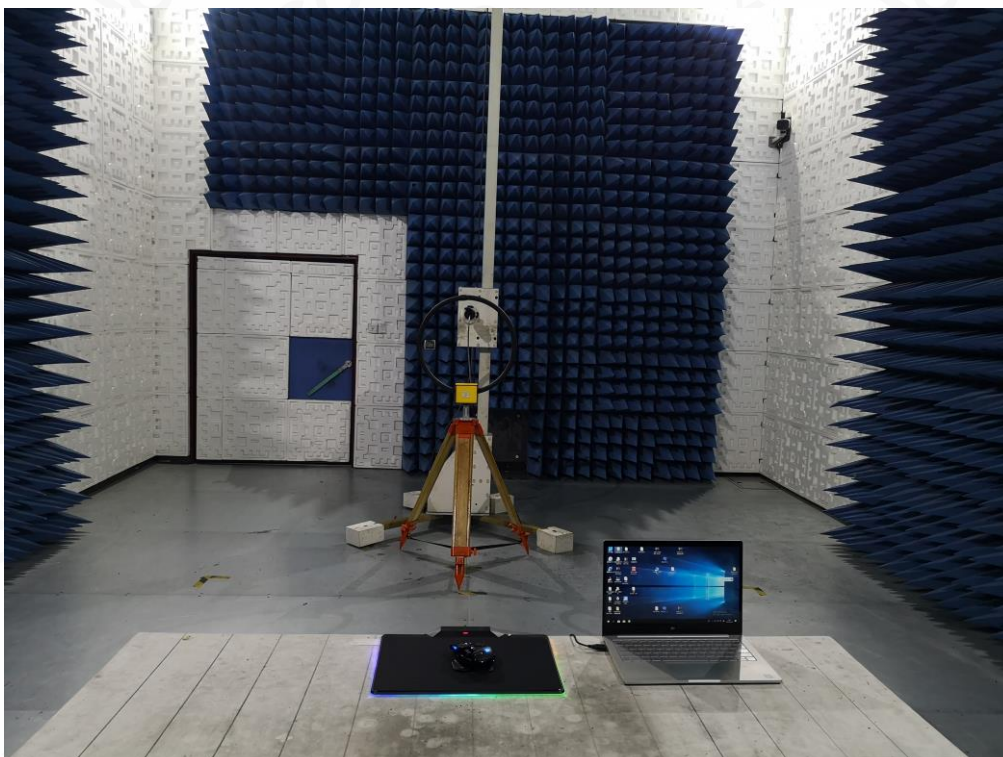
Over= Measurement -Limit

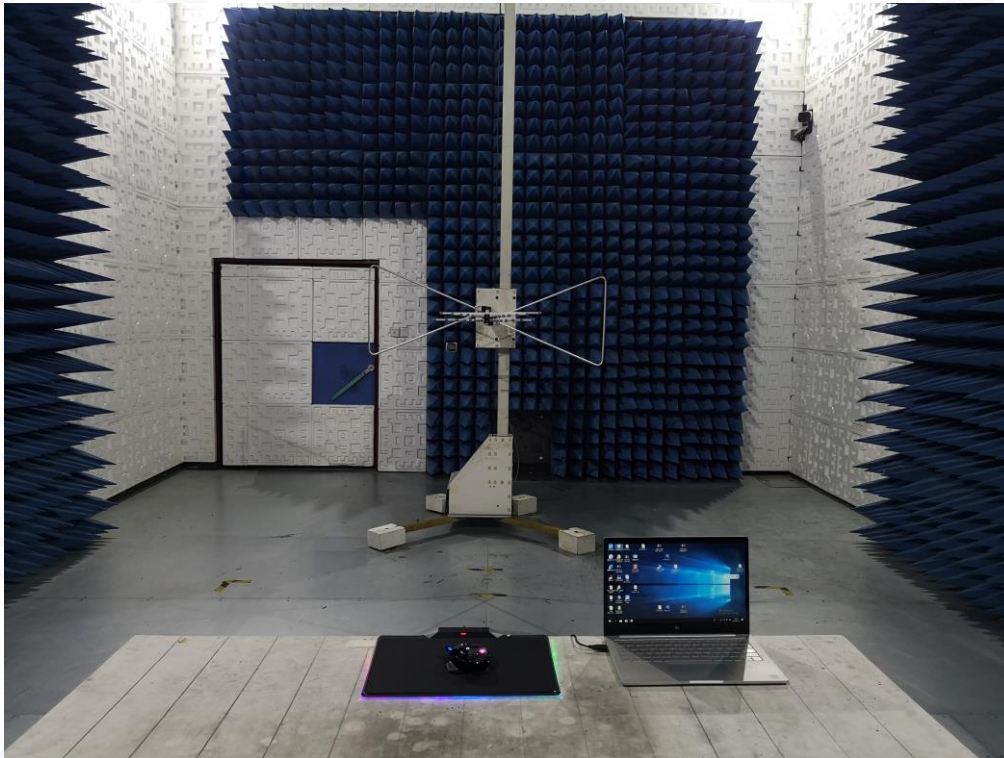
APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP





APPENDIX B: PHOTOGRAPHS OF EUT

ALL VIEW OF EUT



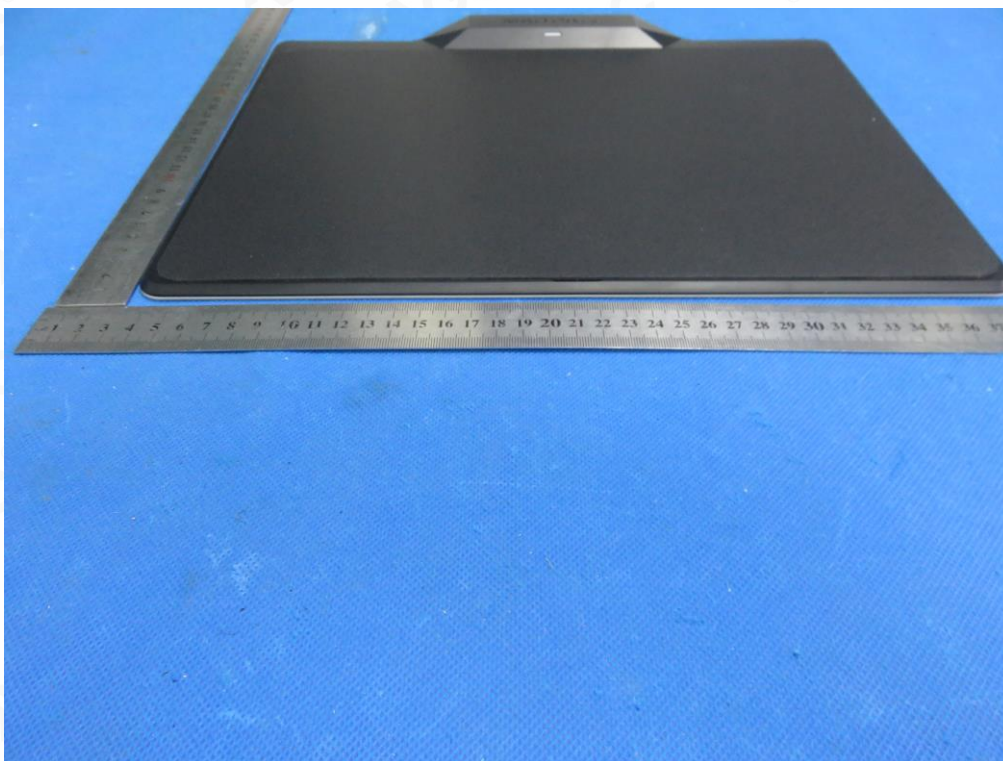
TOP VIEW OF EUT



BOTTOM VIEW OF EUT



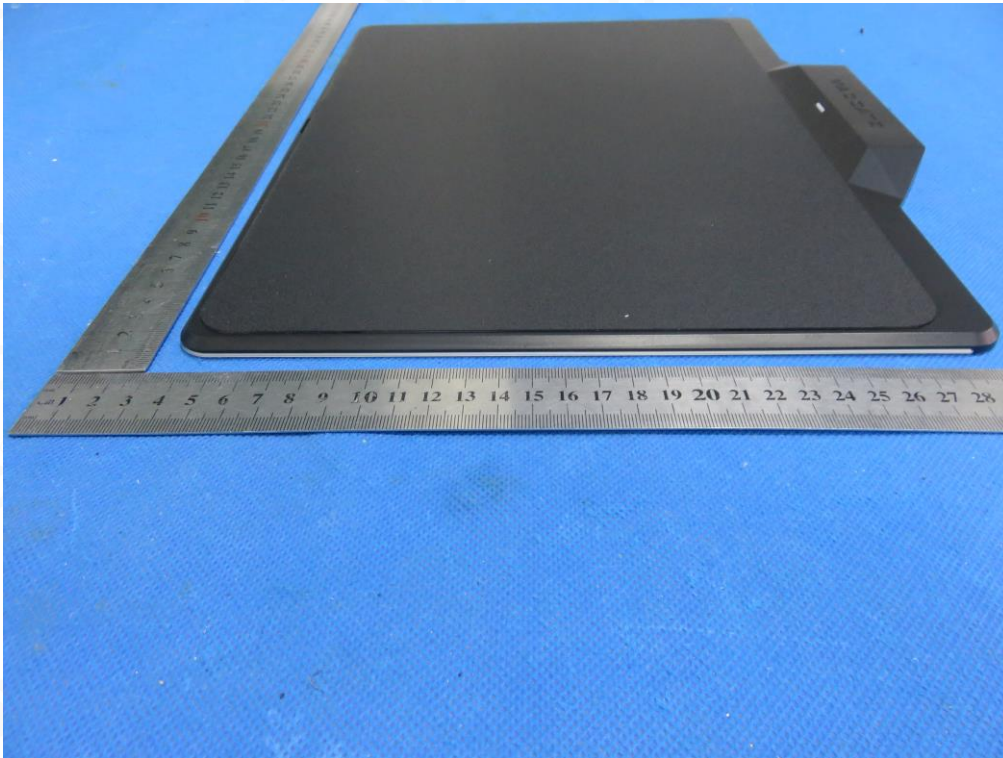
FRONT VIEW OF EUT



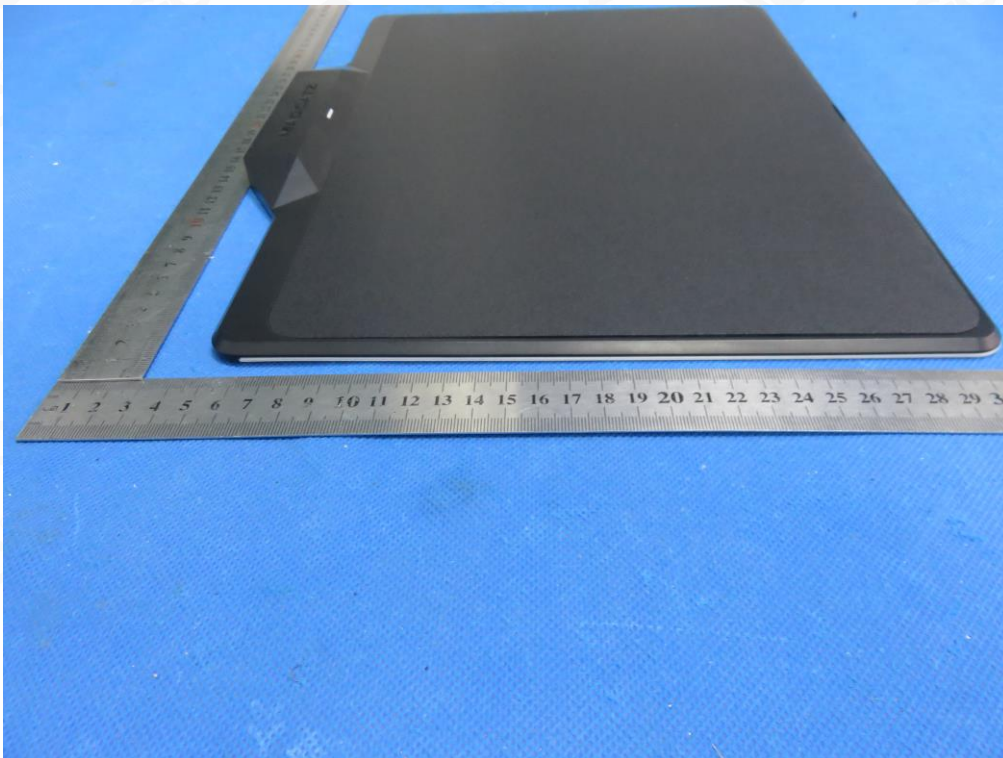
BACK VIEW OF EUT



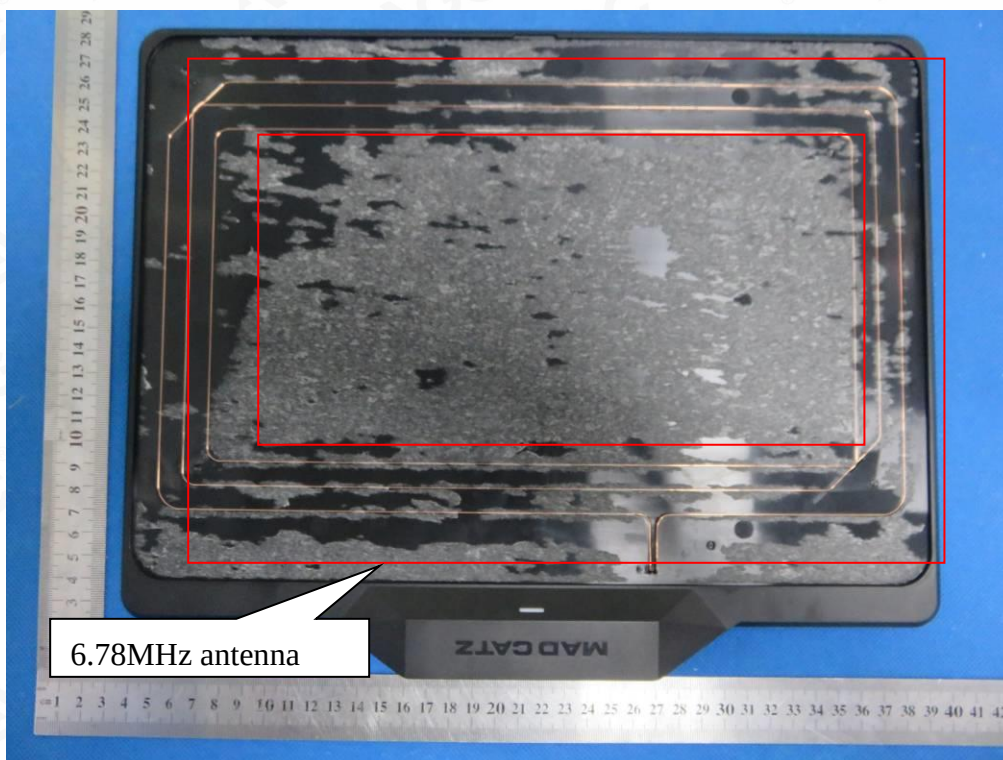
LEFT VIEW OF EUT



RIGHT VIEW OF EUT



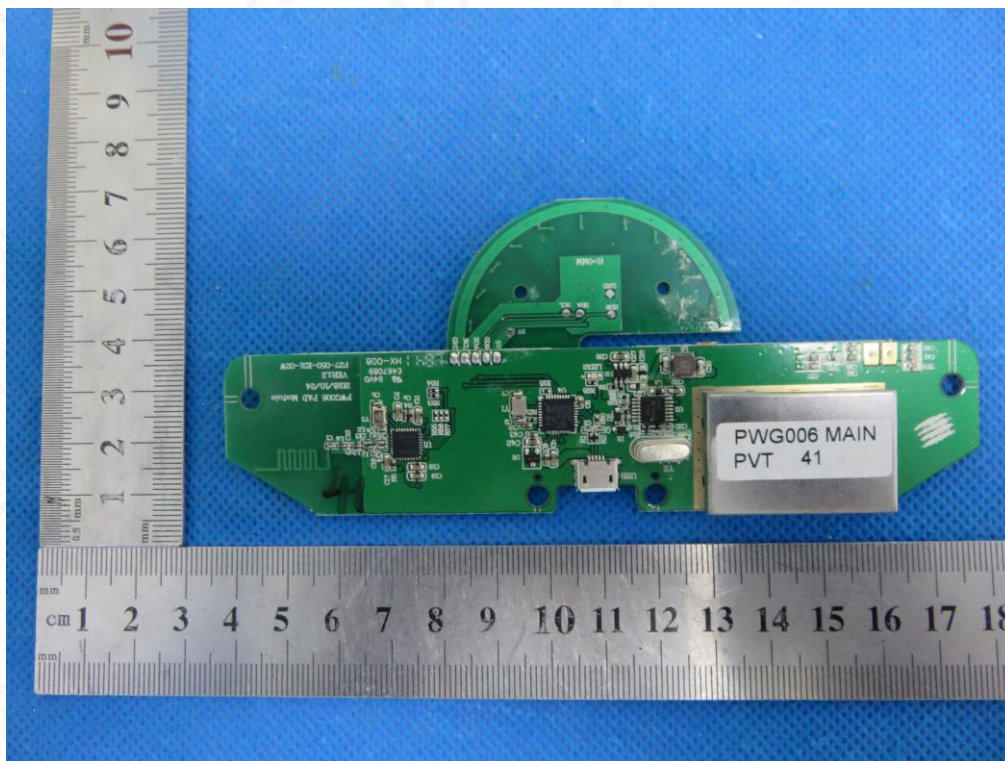
OPEN VIEW OF EUT-1



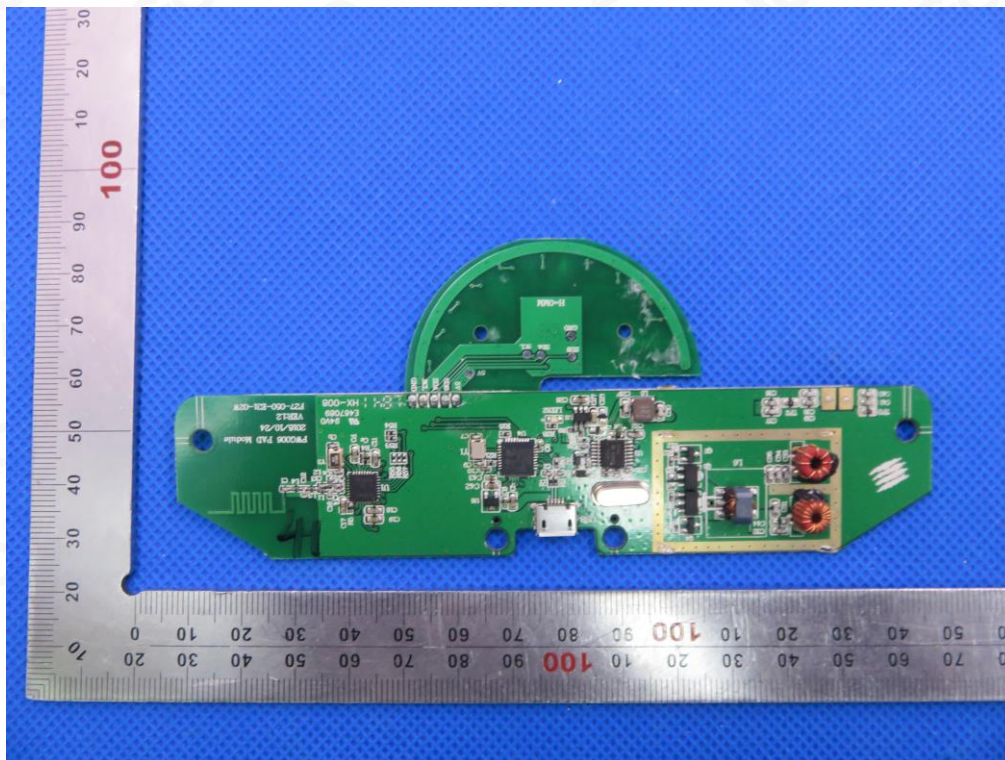
OPEN VIEW OF EUT-2



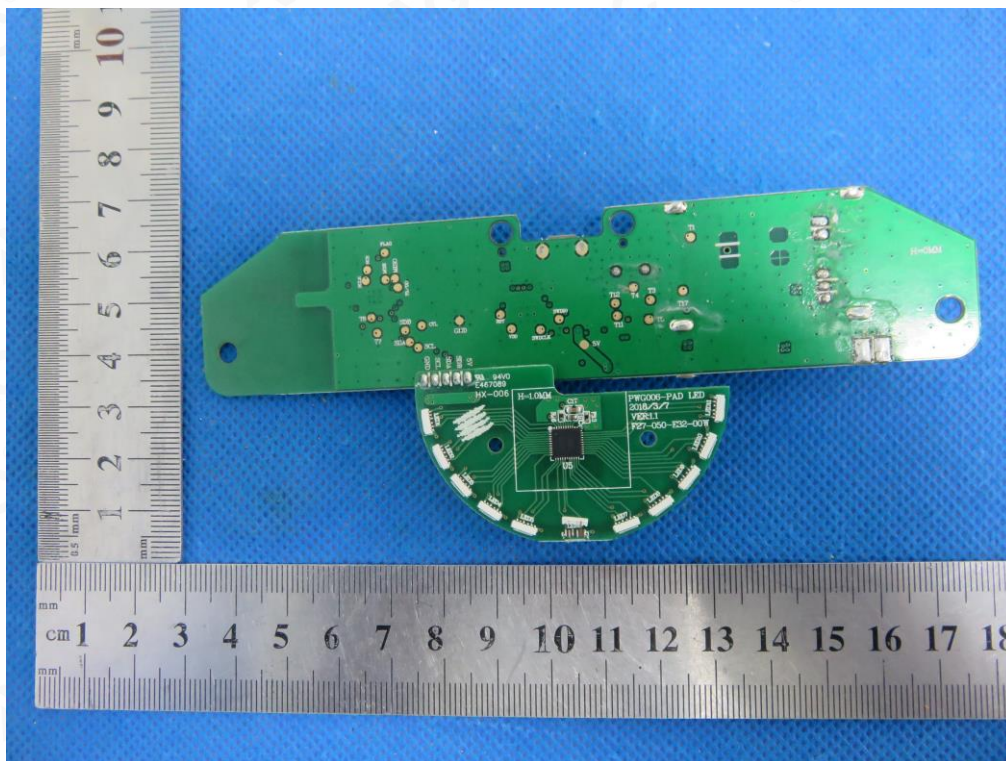
INTERNAL VIEW OF EUT-1



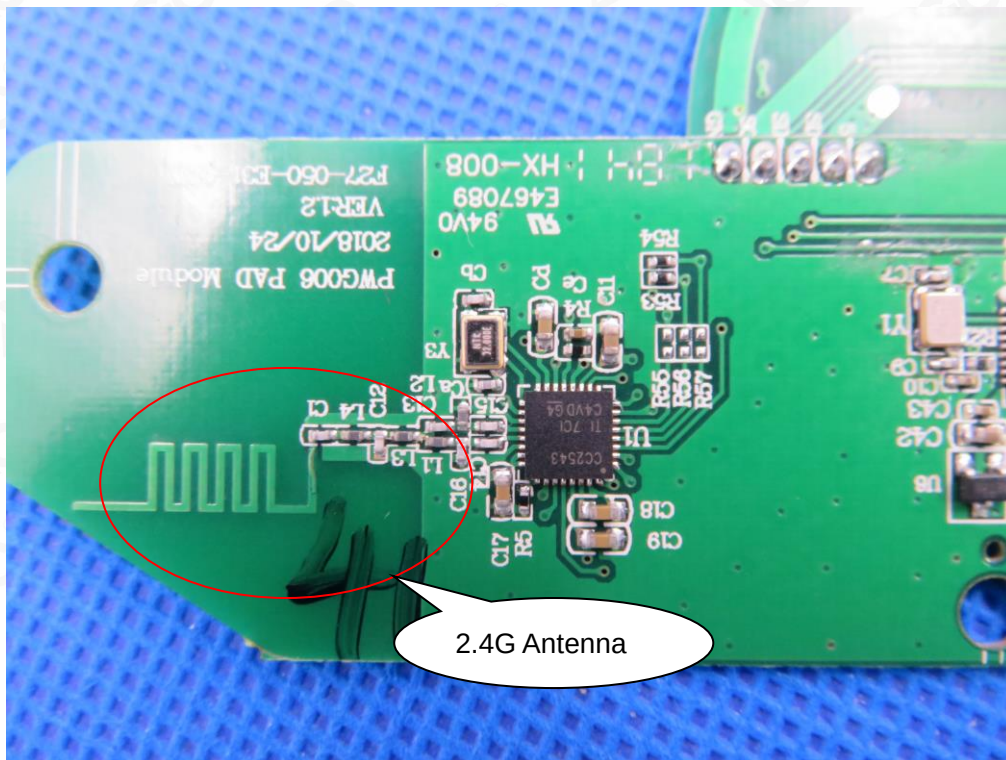
INTERNAL VIEW OF EUT-2



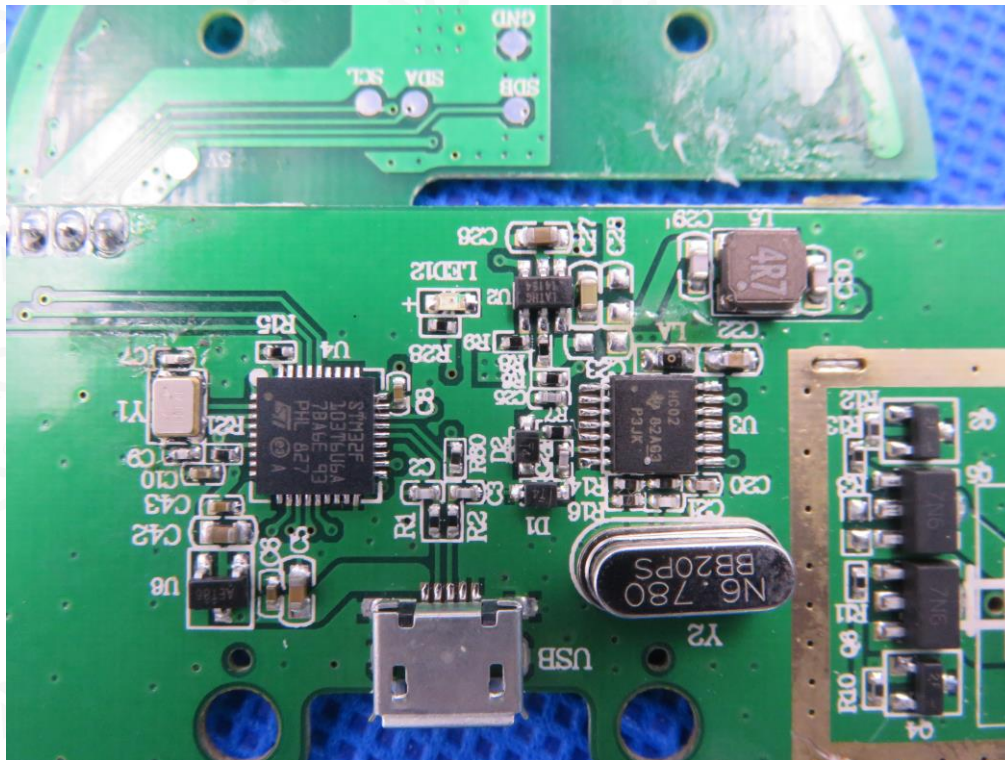
INTERNAL VIEW OF EUT-3



INTERNAL VIEW OF EUT-4



INTERNAL VIEW OF EUT-5



----END OF REPORT----



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