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RF Exposure Evaluation Report

Report No. : CQASZ20190500398E-03

Applicant: UNIONMAN TECHNOLOGY CO., LTD.

Address of Applicant: No.5 Huitai Road, Huinan High-Tech Industrial Park, Huizhou City, Guangdong, China.

Manufacturer: UNIONMAN TECHNOLOGY CO., LTD.

Address of Manufacturer: No.5 Huitai Road, Huinan High-Tech Industrial Park, Huizhou City, Guangdong, China.

Equipment Under Test (EUT):

Product: Set-top box

Model No.: UNT400X

Brand Name: N/A

FCC ID: 2ATGV-UNT400X

Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
KDB447498D01 General RF Exposure Guidance v06

Date of Test: 2019-05-22 to 2019-06-02

Date of Issue: 2019-06-03

Test Result : **PASS***

Tested By:

Daisy Qin

(Daisy Qin)

Reviewed By:

Aaron Ma

(Aaron Ma)

Approved By:

Jack Ai

(Jack Ai)



* In the configuration tested, the EUT complied with the standards specified above.

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

2 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20190500398E-03	Rev.01	Initial report	2019-06-03

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4 RF Exposure Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.2 EUT RF Exposure Evaluation

Calculated Result and Limit (For 2.4G WIFI)

Mode	Frequency (MHz)	output power (dBm)	output power (mW)	Target power (dBm)	Antenna gain		Power Density (S) (mW/cm ²)	Limited of Power Density (S) (mW/cm ²)	Test Result
					(dBi)	(Linear)			
IEEE 802.11b (ANT 1)	2412	15.81	38.11	15±1	2	1.59	0.01255	1	Compiles
	2437	15.42	34.83	15±1	2	1.59	0.01255	1	Compiles
	2462	15.50	35.48	15±1	2	1.59	0.01255	1	Compiles
IEEE 802.11g (ANT 1)	2412	11.90	15.49	11±1	2	1.59	0.00500	1	Compiles
	2437	10.36	10.86	11±1	2	1.59	0.00500	1	Compiles
	2462	10.30	10.72	11±1	2	1.59	0.00500	1	Compiles
IEEE 802.11b (ANT 2)	2412	13.72	23.55	13±1	2	1.59	0.00792	1	Compiles
	2437	13.85	24.27	13±1	2	1.59	0.00792	1	Compiles
	2462	13.16	20.70	13±1	2	1.59	0.00792	1	Compiles
IEEE 802.11g (ANT 2)	2412	8.81	7.60	9±1	2	1.59	0.00315	1	Compiles
	2437	9.12	8.17	9±1	2	1.59	0.00315	1	Compiles
	2462	8.46	7.01	9±1	2	1.59	0.00315	1	Compiles
IEEE 802.11n HT20 (ANT 1)	2412	11.11	12.91	11±1	2	1.59	0.00500	1	Compiles
	2437	10.85	12.16	11±1	2	1.59	0.00500	1	Compiles
	2462	10.38	10.91	11±1	2	1.59	0.00500	1	Compiles
IEEE 802.11n HT20 (ANT 2)	2412	8.63	7.30	9±1	2	1.59	0.00315	1	Compiles
	2437	8.83	7.64	9±1	2	1.59	0.00315	1	Compiles
	2462	8.76	7.52	9±1	2	1.59	0.00315	1	Compiles
IEEE 802.11n HT40 (ANT 1)	2422	8.88	7.73	8±1	2	1.59	0.00251	1	Compiles
	2437	7.73	5.93	8±1	2	1.59	0.00251	1	Compiles
	2452	7.78	6.00	8±1	2	1.59	0.00251	1	Compiles
IEEE 802.11n HT40 (ANT 2)	2422	6.71	4.69	7±1	2	1.59	0.00199	1	Compiles
	2437	6.43	4.40	7±1	2	1.59	0.00199	1	Compiles
	2452	6.60	4.57	7±1	2	1.59	0.00199	1	Compiles

Mode	Frequency (MHz)	Power Density (S) (mW /cm ²)			Limited of Power Density (S) (mW /cm ²)	Test Result
		ANT 1	ANT 2	Sum		
IEEE 802.11n HT20 (ANT 1+2)	2412	0.00500	0.00315	0.00815	1	Compiles
	2437	0.00500	0.00315	0.00815	1	Compiles
	2462	0.00500	0.00315	0.00815	1	Compiles
IEEE 802.11n HT40 (ANT 1+2)	2422	0.00251	0.00199	0.00450	1	Compiles
	2437	0.00251	0.00199	0.00450	1	Compiles
	2452	0.00251	0.00199	0.00450	1	Compiles

Calculated Result and Limit (For 5G WIFI)

Antenna 1: 2dBi

Antenna 2: 3dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.59/1.99 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

The worst case is IEEE 802.11N20 ANT1+ANT2

Mode	Frequency (MHz)	output power (dBm)	output power (mW)	Target power (dBm)	Antenna gain		Power Density (S) (mW /cm2)	Limited of Power Density (S) (mW /cm2)	Test Result
					(dBi)	(Linear)			
IEEE 802.11N20 (ANT 1)+	5745	17.27	53.33	17± 1.5	ANT1+ANT2	3.58	0.03799	1	Compiles
IEEE 802.11N20 (ANT 2)	5785	17.18	52.24	17± 1.5	ANT1+ANT2	3.58	0.03721	1	Compiles