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RF Exposure Evaluation Report

Report No. : CQASZ20210100003EX-03
Applicant: SHENZHEN AMEDIATECH TECHNOLOGY CO.,LTD
Address of Applicant: No.01, 2/F, A Plant, Block B, Minsheng Industrial Park, Longmei Road, Gaofeng community, Dalang office, Longhua District, Shenzhen, China

Equipment Under Test (EUT):

Product: Set Top Box
Model No.: X96Q PRO
Brand Name: N/A
FCC ID: 2AI6D-X96QPRO
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
KDB447498D01 General RF Exposure Guidance v06

Date of Receipt: Jan. 04, 2021
Date of Test: Jan. 04, 2021 – Jan. 31, 2021
Date of Issue: Jan. 31, 2021
Test Result : **PASS***

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

Tested By: Jun Li
(Jun Li)

Reviewed By: Ares Liu
(Ares Liu)

Approved By: Sheek, Luo
(Sheek Luo)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20210100003EX-03	Rev.01	Initial report	Jan. 31, 2021

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3 General Information

3.1 Client Information

Applicant:	SHENZHEN AMEDIATECH TECHNOLOGY CO.,LTD
Address of Applicant:	No.01, 2/F, A Plant, Block B, Minsheng Industrial Park, Longmei Road, Gaofeng community, Dalang office, Longhua District, Shenzhen, China
Manufacturer:	SHENZHEN AMEDIATECH TECHNOLOGY CO.,LTD
Address of Manufacturer:	No.01, 2/F, A Plant, Block B, Minsheng Industrial Park, Longmei Road, Gaofeng community, Dalang office, Longhua District, Shenzhen, China

3.2 General Description of EUT

Product Name:	Set Top Box
Model No.:	X96 mini+
Trade Mark:	N/A
Hardware Version:	V1.0
Software Version:	V1.0
Sample Type:	<input type="checkbox"/> Mobile <input type="checkbox"/> Portable <input checked="" type="checkbox"/> Fix Location
Power Supply:	100-240V 50/60Hz

3.3 General Description of 2.4G WIFI

Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(H40): 2422MHz~2452MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels IEEE 802.11n HT40: 7
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM IEEE for 802.11n(HT20): OFDM IEEE for 802.11n(HT40): OFDM
Antenna Type:	IPEX Antenna
Antenna Gain:	0dBi

3.4 General Description of 5G WIFI

Operation Frequency:	5180 ~ 5240 MHz, 5745 ~ 5825 MHz
Channel Numbers:	5180 ~ 5240 MHz:4 for 802.11n, 802.11ac, 2 for 802.11n40 , 802.11ac 40 5745 ~ 5825 MHz:5 for, 802.11n , 802.11ac, 2 for 802.11n40, 802.11ac40
Type of Modulation:	IEEE 802.11n/IEEE 802.11ac: OFDM
Antenna Type:	IPEX Antenna
Antenna Gain:	0dBi

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.

4.1.3 EUT RF Exposure Evaluation standalone operations

1) For 2.4G WIFI

Antenna Gain: 0dB

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

802.11b mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
Lowest(2412MHz)	Ant1	10.54	10.0±1.0	11.0	12.589
Middle(2437MHz)	Ant1	10.61	10.0±1.0	11.0	12.589
Highest(2462MHz)	Ant1	10.38	10.0±1.0	11.0	12.589
802.11g mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
Lowest(2412MHz)	Ant1	8.76	8±1.0	9.0	7.943
Middle(2437MHz)	Ant1	8.69	8±1.0	9.0	7.943
Highest(2462MHz)	Ant1	9.04	8±1.0	9.0	7.943
802.11n(HT20) SISO mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
Lowest(2412MHz)	Ant1	6.67	6±1.0	7.0	5.012
Middle(2437MHz)	Ant1	6.71	6±1.0	7.0	5.012
Highest(2462MHz)	Ant1	6.53	6±1.0	7.0	5.012
802.11n(HT40) SISO mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
Lowest(2422MHz)	Ant1	3.97	3±1.0	4.0	2.512
Middle(2437MHz)	Ant1	4.13	4±1.0	5.0	3.162
Highest(2452MHz)	Ant1	4.28	4±1.0	5.0	3.162

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
12.589	0	0.0025	1.0	PASS

Note: 1) Refer to report No. CQASZ20210100003EX-01 for EUT test Max Conducted average Output Power value.

2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (12.589 * 1.0) / (4 * 3.1416 * 20^2) = 0.0025$

2) For 5G WIFI

Antenna Gain: 0dB

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

802.11n(HT20) SISO mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
5180	Ant1	11.07	11±1.0	12.0	15.849
5200	Ant1	10.4	10±1.0	11.0	12.589
5240	Ant1	10.14	10±1.0	11.0	12.589
5745	Ant1	3.43	3±1.0	4.0	2.512
5785	Ant1	3.73	3±1.0	4.0	2.512
5825	Ant1	5.69	5±1.0	6.0	3.981
802.11n(HT40) SISO mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
5190	Ant1	10.56	10±1.0	11.0	12.589
5230	Ant1	10.40	10±1.0	11.0	12.589
5755	Ant1	4.51	4±1.0	5.0	3.162
5795	Ant1	3.94	3±1.0	4.0	2.512

802.11ac(VHT20) SISO mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
5180	Ant1	10.38	10±1.0	11.0	12.589
5200	Ant1	9.77	9±1.0	10.0	10.000
5240	Ant1	9.24	9±1.0	10.0	10.000
5745	Ant1	2.46	2±1.0	3.0	1.995
5785	Ant1	2.16	2±1.0	3.0	1.995
5825	Ant1	2.77	2±1.0	3.0	1.995
802.11ac(VHT40) SISO mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
5190	Ant1	10.25	10±1.0	11.0	12.589
5230	Ant1	9.33	9±1.0	10.0	10.000
5755	Ant1	2.70	2±1.0	3.0	1.995
5795	Ant1	2.06	2±1.0	3.0	1.995

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
15.849	0	0.0032	1.0	PASS

Note: 1) Refer to report No. CQASZ20210100003EX-02 for EUT test Max Conducted average Output Power value.

$$2) P_d = (P_{out} * G) / (4 * \pi * R^2) = (15.849 * 1.0) / (4 * 3.1416 * 20^2) = 0.0032$$

4.1.4 EUT RF Exposure Evaluation simultaneous transmission operations

According to 865664D02 2.2 d) 1):

The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE limits :

Simultaneous transmission mode	The sum of the ratios	Result
2.4G WIFI + 5G WIFI	$0.0025/1 + 0.0032/1$	$=0.0057 < 1$