

RF EXPOSURE EVALUATION REPORT

Product Name: TVB Anywhere
 Trade Mark: TVB Anywhere
 Model No. / HVIN: A15
 Add. Model No. / HVIN: A151
 Report Number: 200629016RFC-3
 Test Standards: FCC 47 CFR Part 1 Subpart I
 RSS-102 Issue 5
 FCC ID: 2AWYC-A15
 IC: 21882-A15
 Test Result: PASS
 Date of Issue: September 17, 2020

Prepared for:

TVB Anywhere Limited
 TVB City, 77 Chun Choi Street, Tseung Kwan O Industrial Estate,
 Tseung Kwan O, Kowloon, Hong Kong

Prepared by:

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Date: September 17, 2020

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Version

Version No.	Date	Description
V1.0	September 17, 2020	Original

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UTTR-RF-RSS102-V1.0

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	TVB Anywhere Limited
Address of Applicant:	TVB City, 77 Chun Choi Street, Tseung Kwan O Industrial Estate, Tseung Kwan O, Kowloon, Hong Kong
Manufacturer:	TVB Anywhere Limited
Address of Manufacturer:	TVB City, 77 Chun Choi Street, Tseung Kwan O Industrial Estate, Tseung Kwan O, Kowloon, Hong Kong

1.2 EUT INFORMATION

Product Name:	TVB Anywhere		
Model No. / HVIN:	A15		
Add. Model No. / HVIN:	A151		
Trade Mark:	TVB Anywhere		
DUT Stage:	Production Unit		
EUT Supports Function:	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n/ac
		5 250 MHz to 5 350 MHz	IEEE 802.11a/n/ac
		5 470 MHz to 5 725 MHz	IEEE 802.11a/n/ac
5 725 MHz to 5 850 MHz		IEEE 802.11a/n/ac	
Software Version:	V1.0		
Hardware Version:	V2.0		
Sample Received Date:	July 6, 2020		
Sample Tested Date:	July 16, 2020 to August 20, 2020		
Note: The additional model A151 is identical with the test model A15 except the different color.			

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

For 2.4 GHz ISM Band of Wi-Fi		
Frequency Band:	2400 MHz to 2483.5 MHz	
Frequency Range:	2412 MHz to 2462 MHz	
Support Standards:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20, IEEE 802.11n-HT40	
Type of Modulation:	IEEE 802.11b: DSSS(CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT20: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT40: OFDM(64-QAM, 16-QAM, QPSK, BPSK)	
Data Rate:	IEEE 802.11b: Up to 11 Mbps IEEE 802.11g: Up to 54 Mbps IEEE 802.11n-HT20: Up to MCS15 IEEE 802.11n-HT40: Up to MCS15	
Number of Channels:	IEEE 802.11b: 11 IEEE 802.11g: 11 IEEE 802.11n-HT20: 11 IEEE 802.11n-HT40: 7	
Channel Separation:	5 MHz	
Antenna Type:	Chain 0	PIFA Antenna
	Chain 1	PIFA Antenna
Antenna Gain:	Chain 0	2 dBi
	Chain 1	2 dBi
Directional gain:	5.01 dBi	

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Maximum Peak Power:	IEEE 802.11b: 20.98 dBm IEEE 802.11g: 22.66 dBm IEEE 802.11n-HT20: 20.59 dBm IEEE 802.11n-HT40: 18.59 dBm
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For 5 GHz U-NII Bands of Wi-Fi					
Frequency Bands:	5150 MHz to 5250 MHz (U-NII-1) 5250 MHz to 5350 MHz (U-NII-2A) 5470 MHz to 5725 MHz (U-NII-2C) 5 725 MHz to 5 850 MHz (U-NII-3)				
Frequency Ranges:	5180 MHz to 5240 MHz 5260 MHz to 5320 MHz 5500 MHz to 5700 MHz 5745 MHz to 5 825 MHz				
Support Standards:	IEEE 802.11a/n/ac				
TPC Function:	Not Support				
DFS Operational mode:	Slave without radar Interference detection function				
Type of Modulation:	IEEE 802.11a: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM(256QAM, 64QAM, 16QAM, QPSK, BPSK)				
Channel Spacing:	IEEE 802.11a/n-HT20/ac-VHT20: 20 MHz IEEE 802.11n-HT40/ac-VHT40: 40 MHz IEEE 802.11ac-VHT80: 80 MHz				
Data Rate:	IEEE 802.11a: Up to 54 Mbps IEEE 802.11n-HT20: Up to MCS15 IEEE 802.11n-HT40: Up to MCS15 IEEE 802.11ac-VHT20: Up to MCS8 IEEE 802.11ac-VHT40: Up to MCS9 IEEE 802.11ac-VHT80: Up to MCS9				
Number of Channels:	5150 MHz to 5250 MHz: 4 for IEEE 802.11a/n-HT20/ac-VHT20 2 for IEEE 802.11n-HT40/ac-VHT40 1 for IEEE 802.11acVHT80 5250 MHz to 5350 MHz: 4 for IEEE 802.11a/n-HT20/ac-VHT20 2 for IEEE 802.11n-HT40/ac-VHT40 1 for IEEE 802.11acVHT80 5470 MHz to 5725 MHz: 11 for IEEE 802.11a/n-HT20/ac-VHT20 5 for IEEE 802.11n-HT40/ac-VHT40 2 for IEEE 802.11ac-VHT80 5725 MHz to 5850 MHz: 5 for IEEE 802.11a/n-HT20/ac-VHT20 2 for IEEE 802.11n-HT40/ac-VHT40 1 for IEEE 802.11ac-VHT80				
Antenna Type:	<table border="1"> <tr> <td>Chain 0</td> <td>PIFA Antenna</td> </tr> <tr> <td>Chain 1</td> <td>PIFA Antenna</td> </tr> </table>	Chain 0	PIFA Antenna	Chain 1	PIFA Antenna
Chain 0	PIFA Antenna				
Chain 1	PIFA Antenna				
Antenna Gain:	<table border="1"> <tr> <td rowspan="2">Chain 0</td> <td>5150 MHz to 5250 MHz: 2.0 dBi</td> </tr> <tr> <td>5250 MHz to 5350 MHz: 2.0 dBi</td> </tr> </table>	Chain 0	5150 MHz to 5250 MHz: 2.0 dBi	5250 MHz to 5350 MHz: 2.0 dBi	
Chain 0	5150 MHz to 5250 MHz: 2.0 dBi				
	5250 MHz to 5350 MHz: 2.0 dBi				

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		5470 MHz to 5725 MHz: 2.0 dBi			
		5725 MHz to 5850 MHz: 2.0 dBi			
	Chain 1	5150 MHz to 5250 MHz: 2.0 dBi			
		5250 MHz to 5350 MHz: 2.0 dBi			
		5470 MHz to 5725 MHz: 2.0 dBi			
		5725 MHz to 5850 MHz: 2.0 dBi			
Maximum EIRP (dBm):	SISO_Chain 0	U-NII-1			
	IEEE 802.11a:	15.88			
	SISO_Chain 1	U-NII-1			
	IEEE 802.11a:	19.06			
	MIMO_Chain 0+1	U-NII-1			
	IEEE 802.11n-HT20:	16.29			
	IEEE 802.11n-HT40:	12.82			
	IEEE 802.11ac-VHT20:	16.41			
	IEEE 802.11ac-VHT40:	12.79			
	IEEE 802.11ac-VHT80:	11.53			
Maximum conducted output power (dBm):	SISO_Chain 0	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
	IEEE 802.11a:	13.88	16.19	13.39	16.83
	SISO_Chain 1	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
	IEEE 802.11a:	17.06	16.39	13.03	16.32
	MIMO_Chain 0+1	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
	IEEE 802.11n-HT20:	15.21	14.80	13.78	15.58
	IEEE 802.11n-HT40:	11.76	11.84	10.38	15.63
	IEEE 802.11ac-VHT20:	15.30	14.79	13.74	15.54
	IEEE 802.11ac-VHT40:	11.73	11.80	10.36	15.72
	IEEE 802.11ac-VHT80:	10.48	10.92	9.54	15.83

1.4 OTHER INFORMATION

Test channels for 2.4 GHz ISM Band of Wi-Fi				
Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
IEEE 802.11b	2412 MHz to 2462 MHz	Channel 1	Channel 6	Channel 11
		2412 MHz	2437 MHz	2462 MHz
IEEE 802.11g	2412 MHz to 2462 MHz	Channel 1	Channel 6	Channel 11
		2412 MHz	2437 MHz	2462 MHz
IEEE 802.11n-HT20	2412 MHz to 2462 MHz	Channel 1	Channel 6	Channel 11
		2412 MHz	2437 MHz	2462 MHz
IEEE 802.11n-HT40	2422 MHz to 2452 MHz	Channel 3	Channel 6	Channel 9
		2422 MHz	2437 MHz	2452 MHz

Test channels for 5 GHz U-NII Bands of Wi-Fi				
Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
IEEE 802.11a IEEE 802.11n-HT20 IEEE 802.11ac-VHT20	5150 MHz to 5250 MHz	Channel 36	Channel 44	Channel 48
		5180 MHz	5220 MHz	5240 MHz
	5250 MHz to 5350 MHz	Channel 52	Channel 60	Channel 64
		5260 MHz	5300 MHz	5320 MHz
	5470 MHz to 5725 MHz	Channel 100	Channel 116	Channel 140
		5500 MHz	5580 MHz	5700 MHz
	5725 MHz to 5850 MHz	Channel 149	Channel 157	Channel 165
		5745 MHz	5785 MHz	5825 MHz
IEEE 802.11n-HT40 IEEE 802.11ac-VHT40	5150 MHz to 5250 MHz	Channel 38	--	Channel 46
		5190 MHz	--	5230 MHz
	5250 MHz to 5350 MHz	Channel 54	--	Channel 62
		5270 MHz	--	5310 MHz
	5470 MHz to 5725 MHz	Channel 102	Channel 110	Channel 134
		5510 MHz	5550 MHz	5670 MHz
	5725 MHz to 5850 MHz	Channel 151	--	Channel 159
		5755 MHz	--	5795 MHz
IEEE 802.11ac-VHT80	5150 MHz to 5250 MHz	--	Channel 42	--
		--	5210 MHz	--
	5250 MHz to 5350 MHz	--	Channel 58	--
		--	5290 MHz	--
	5470 MHz to 5725 MHz	Channel 106	--	--
		5530 MHz	--	--
5725 MHz to 5850 MHz	--	Channel 155	--	
	--	5775 MHz	--	

1.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product, according to the specifications of the manufacturers. It must comply with the requirements of the following standards:

FCC 47 CFR Part 1 Subpart I
RSS-102 Issue 5

All test items have been performed and recorded as per the above standards

1.6 DEVIATION FROM STANDARDS

None.

1.7 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

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2. EQUIPMENT LIST

Please refer to the RF test report.



3. MPE EVALUATION

3.1 REFERENCE DOCUMENTS FOR EVALUATION

No.	Identity	Document Title
1	FCC 47 CFR Part 1 Subpart I	PROCEDURES IMPLEMENTING THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969
2	RSS-102 Issue 5	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
3	KDB 447498 D01 General RF Exposure Guidance v06	RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES

3.2 MPE COMPLIANCE REQUIREMENT

3.2.1 Limits

3.2.1.1 FCC 47 CFR Part 1 Subpart I

According to §1.1307(b)(1), system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	5	6

Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	1	30

Note: f = frequency in MHz: * = Plane-wave equivalent power density.

3.2.1.2 RSS-102 Issue 5

According to RSS-102 Issue 5, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

According to RSS-102 Issue 5, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz⁶ and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

3.2.2 Test Procedure

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

3.3 MPE CALCULATION METHOD

FCC 47 CFR Part 1 Subpart I

$$S = PG/4\pi R^2 = EIRP/4\pi R^2$$

S = power density (in appropriate units, e.g., mw/cm²)

P = power input to the antenna (in appropriate units, e.g., mw)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

3.4 MPE CALCULATION RESULTS

Note: For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

3.4.1 For WLAN

For Wi-Fi function, operating at 2412MHz to 2462 MHz for IEEE802.11b/g/n and
 operating at 5150 MHz to 5250 MHz for IEEE802.11a/n/ac and
 operating at 5250 MHz to 5350 MHz for IEEE802.11a/n/ac and
 operating at 5470 MHz to 5725 MHz for IEEE802.11a/n/ac and
 operating at 5725 MHz to 5850 MHz for IEEE802.11a/n/ac.

3.4.1.1 Antenna Type:

Chain 0: PIFA Antenna

Chain 1: PIFA Antenna

3.4.1.2 Antenna Gain:

- Chain 0:** 2412MHz to 2462 MHz: 2.0 dBi
- 5150 MHz to 5250 MHz: 2.0 dBi
- 5250 MHz to 5350 MHz: 2.0 dBi
- 5470 MHz to 5725 MHz: 2.0 dBi
- 5725 MHz to 5850 MHz: 2.0 dBi

Chain 1: Same as chain 0

For MIMO mode (2Tx/2Rx), there are two transmission antennas. Both Chain 0 and Chain 1 used at the same time and antenna ports have uniform output powers. The Chain 0 and Chain 1 antenna ports can be used alone. The transmit signals are correlated with each other.

$$\text{The directional gain} = G_{\text{ANT}} + 10 \log(N_{\text{ANT}}) \text{ dBi} = 2.0 + 10 \log(2) = 5.01 \text{ dBi}$$

For SISO mode (1Tx/1Rx), there are two transmission antennas. Both Chain 0 and Chain 1 used at the same time and antenna ports have uniform output powers. The Chain 0 and Chain 1 antenna ports cannot be used alone

$$\text{The antenna gain} = \text{Chain 0 or Chain 1} = 2.0 \text{ dBi}$$

3.4.1.3 Results for FCC 47 CFR Part 1 Subpart I

For SISO (1TX/1RX) Mode

Operating Mode	Freq.	Maximum conducted peak output power	Max. positive tolerance according manufacturer	Antenna Gain	Calculated maximum EIRP	Declared maximum EIRP	Distance	MPE Limit	MPE Value	
	(MHz)	(dBm)		(dBi)	(dBm)	(mW)	(cm)	(mW/cm ²)		
SISO	IEEE 802.11b	2412-2462	20.98	1	2.0	23.98	250.0345	20	1	0.0497
	IEEE 802.11g	2412-2462	22.66	2	2.0	26.66	463.4469	20	1	0.0922
	IEEE 802.11a	5180-5240	17.06	2.5	2.0	21.56	143.2188	20	1	0.0285
		5260-5320	16.39	1	2.0	19.39	86.8960	20	1	0.0173
		5500-5700	13.39	1.5	2.0	16.89	48.8652	20	1	0.0097
		5745-5825	16.83	1	2.0	19.83	96.1612	20	1	0.0191

For MIMO (2TX/2RX) Mode

Operating Mode	Freq.	Maximum conducted peak output power	Max. positive Tolerance according manufacturer	Direction al Gain	Calculated maximum EIRP	Declared maximum EIRP	Distance	MPE Limit	MPE Value	
	(MHz)	(dBm)		(dBi)	(dBm)	(mW)	(cm)	(mW/cm ²)		
MIMO (2TX/2RX)	IEEE 802.11n-HT20	2412-2462	20.59	1	5.01	26.60	457.0882	20	1	0.0909
	IEEE 802.11n-HT40	2422-2452	18.59	1	5.01	24.60	288.4032	20	1	0.0574
	IEEE 802.11n/ac-HT20	5180-5240	15.30	1	5.01	21.31	135.2073	20	1	0.0269
		5260-5320	14.80	1	5.01	20.81	120.5036	20	1	0.0240
		5500-5700	13.78	1	5.01	19.79	95.2796	20	1	0.0190
		5745-5825	15.58	1	5.01	21.59	144.2115	20	1	0.0287
	IEEE 802.11 n/ac-VHT40	5190-5230	11.76	1	5.01	17.77	59.8412	20	1	0.0119
		5270-5310	11.84	1	5.01	17.85	60.9537	20	1	0.0121
		5510-5670	10.38	1	5.01	16.39	43.5512	20	1	0.0087
	IEEE 802.11ac-VHT80	5755-5795	15.72	1	5.01	21.73	148.9361	20	1	0.0296
		5210	10.48	1	5.01	16.49	44.5656	20	1	0.0089
		5290	10.92	1	5.01	16.93	49.3174	20	1	0.0098
		5530	9.54	1	5.01	15.55	35.8922	20	1	0.0071
		5775	15.83	1	5.01	21.84	152.7566	20	1	0.0304

3.4.1.4 Results for RSS-102 Issue 5

For SISO (1TX/1RX) Mode

Operating Mode	Freq.	Maximum conducted peak output power	Max. positive tolerance according manufacturer	Antenna Gain	Calculated maximum EIRP	Declared maximum EIRP	Limit	
	(MHz)	(dBm)		(dBi)	(dBm)	(W)	(W)	
SISO	IEEE 802.11b	2412-2462	20.98	1	2.0	23.98	0.2500	2.6840
	IEEE 802.11g	2412-2462	22.66	2	2.0	26.66	0.4634	2.6840
	IEEE 802.11a	5180-5240	17.06	2.5	2.0	21.56	0.1432	4.5253
		5260-5320	16.39	1	2.0	19.39	0.0869	4.5253
		5500-5700	13.39	1.5	2.0	16.89	0.0489	4.5253
		5745-5825	16.83	1	2.0	19.83	0.0962	4.8570

For MIMO (2TX/2RX) Mode

Operating Mode	Freq.	Maximum conducted peak output power	Max. positive Tolerance according manufacturer	Directional Gain	Calculated maximum EIRP	Declared maximum EIRP	Limit	
	(MHz)	(dBm)		(dBi)	(dBm)	(W)	(W)	
MIMO (2TX/2RX)	IEEE 802.11n-HT20	2412-2462	20.59	1	5.01	26.60	0.4571	2.6840
	IEEE 802.11n-HT40	2422-2452	18.59	1	5.01	24.60	0.2884	2.6840
	IEEE 802.11n/ac-HT20	5180-5240	15.30	1	5.01	21.31	0.1352	4.5253
		5260-5320	14.80	1	5.01	20.81	0.1205	4.5253
		5500-5700	13.78	1	5.01	19.79	0.0953	4.5253
		5745-5825	15.58	1	5.01	21.59	0.1442	4.8570
	IEEE 802.11n/ac-VHT40	5190-5230	11.76	1	5.01	17.77	0.0598	4.5312
		5270-5310	11.84	1	5.01	17.85	0.0610	4.5312
		5510-5670	10.38	1	5.01	16.39	0.0436	4.5312
	IEEE 802.11ac-VHT80	5755-5795	15.72	1	5.01	21.73	0.1489	4.8628
		5210	10.48	1	5.01	16.49	0.0446	4.5432
		5290	10.92	1	5.01	16.93	0.0493	4.5432
		5530	9.54	1	5.01	15.55	0.0359	4.5432
		5775	15.83	1	5.01	21.84	0.1528	4.8743

APPENDIX 1 PHOTOS OF TEST SETUP

N/A

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal Photos.

*** End of Report ***

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 UnionTrust, this report can't be reproduced except in full.
