Radio Test Report

Report No.: STS2408307H01

Issued for

Tri plus grupa d.o.o.

Banjavciceva 11, 10000 Zagreb, Croatia

Product Name:	Alloy Fusion v3
Brand Name:	Alloy SmartHome Hub
Model Name:	af3.zw8us.mw.4G
Series Model(s):	N/A
FCC ID:	2AAU7-AF3MW
Test Standards:	FCC 47CFR §2.1091

TEST REPORT

Applicant's Name	Tri plus grupa d.o.o.
Address	Banjavciceva 11, 10000 Zagreb, Croatia
Manufacturer's Name	Tri plus grupa d.o.o.
Address	Banjavciceva 11, 10000 Zagreb, Croatia

Product Description

Product Name	Alloy Fusion v3
Brand	Alloy SmartHome Hub
Model Number	af3.zw8us.mw.4G
Series Model(s)	N/A
Standards	FCC 47CFR §2.1091 447498 D01 Interim General RF Exposure Guidance v06

The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Shenzhen STS Test Services Co., Ltd.

Date of Test	
Date of receipt of test item	08 Aug. 2024
Date (s) of performance of tests	08 Aug. 2024 ~ 10 Sept. 2024
Date of Issue	10 Sept. 2024
Test Result	**Pass**

Testing Engineer : Aaron Bu

(Aaron Bu)

Technical Manager : Tony Liu

(Tony Liu)

Authorized Signatory : Bovey Yang

(Bovey Yang)

SHENZHEN STS TEST SERVICES CO.,LTD. TESTING APPROVAL

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Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	10 Sept. 2024	STS2408307H01	ALL	Initial Issue

1. GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF THE EUT

<table>
<tr><td>Product Name</td><td>Alloy Fusion v3</td></tr>
<tr><td>Brand</td><td>Alloy SmartHome Hub</td></tr>
<tr><td>Model Number</td><td>af3.zw8us.mw.4G</td></tr>
<tr><td>Series Model(s)</td><td>N/A</td></tr>
<tr><td>Model Difference</td><td>N/A</td></tr>
<tr><td>Product Description</td><td>The EUT is Alloy Fusion v3
<table><tr><td>Operation Frequency:</td><td>LTE Band 2:1850~1910MHz
LTE Band 4:1710~1755MHz
LTE Band 5:824~849MHz
LTE Band 12:699~716MHz
LTE Band 13:777~787MHz
LTE Band 25:1850~1915MHz
LTE Band 26 Part 90:814~824MHz
LTE Band 26 Part 22:824-849 MHz
2.4G WLAN
802.11b/g/n20(20MHz): 2412~2462 MHz
802.11n(40MHz):2422~2452MHz
5.2GWLAN
IEEE 802.11a/ n(HT20)/ac(VHT20): 5.180GHz-5.240GHz
IEEE 802.11n(HT40)/ac(VHT40): 5.190GHz-5.230GHz
IEEE 802.11ac(VHT80): 5.210GHz
5.3GWLAN
IEEE 802.11a/ n(HT20)/ac(VHT20): 5.260GHz-5.320GHz
IEEE 802.11 n(HT40)/ac(VHT40): 5.270GHz-5.310GHz
IEEE 802.11ac(VHT80): 5.290GHz
5.6GWLAN
IEEE 802.11a/ n(HT20)/ac(VHT20): 5.500GHz-5.700GHz
IEEE 802.11 n(HT40)/ac(VHT40): 5.510GHz-5.670GHz
IEEE 802.11ac(VHT80): 5.530GHz-5.610GHz
5.8GWLAN
IEEE 802.11a/ n(HT20)/ac(VHT20): 5.745GHz-5.825GHz
IEEE 802.11a/ n(HT40)/ac(VHT40): 5.755GHz-5.795GHz
IEEE 802.11ac(VHT80): 5.775GHz
BT: 2402 – 2480 MHz
Thread: 2409.75 -2475 MHz
Z-wave: 908.4 -916MHz
FDS: 57.0-61.56 GHz</td></tr></table></td></tr>
</table>

	Modulation Type:	LTE: QPSK/16QAM 2.4G WLAN: 802.11b(DSSS):CCK,DQPSK,DBPSK 802.11g(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM 5G WLAN: 802.11a(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11ac(OFDM):BPSK,QPSK,16-QAM,64-QAM,256-QAM Bluetooth: BT BR(1Mbps): GFSK BT EDR(2Mbps): π/4-DQPSK BT EDR(3Mbps): 8DPSK BLE: GFSK Thread: OQPSK Z-wave: OOK FDS:FMCW
	Antenna gain:	LTE:Band 2/4/25: 0.43 dBi Band 5/12/13/26: 0.75 dBi 2.4G WLAN: 2.45 dBi 5GWLAN:2.79dBi BT: 2.45dBi BLE: 2.45dBi Thread: 2.58dBi Z-wave: -0.99dBi FDS: 3dBi
	Antenna Designation:	LTE:PCB Antenna 2.4G /5GWLAN: Stamped metal Antenna BT/ BLE/ Thread/ Z-wave: Stamped metal Antenna FDS:Microstrip Antenna
Rating	Input: AC 24V 0.7A	
Battery	Model: CR2032 Rated Voltage: 3V Capacity: 220mAh	
Hardware version number	SHO2-R_V2_5	
Software version number	smartrent_hub-v1.28.1	

1.2 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD
Add. : 101, Building B, Zhuoke Science Park, No.190 Chongqing Road, ZhanChengShequ, Fuhai Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

A2LA Certificate No.: 4338.01

2. FCC 47CFR §2.1091 REQUIREMENT

2.1 TEST STANDARDS

The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The gain of the antennas used in the product is extracted from the Antenna data sheets provided and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.
Although the Friis Transmission formula is far field assumption, the calculated result of that is an over-prediction for near field power density. It is taken as worst case to specify the safety range.

2.2 LIMIT

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of the human exposure to radio-frequency (RF) radiation as specified in 1.1307 (b)

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)
Limits for Occupational / controlled Exposures			
300 - 1500	--	--	F/300
3.0-30	1842/f	4.89/f	*(900/f^2)
1500 – 100000	--	--	5.0
Limits for General population / Uncontrolled Exposure			
300 - 1500	--	--	F/1500
1.34-30	824/f	2.19/f	*(180f^2)
1500 – 100000	--	--	1.0

F= Frequency in MHz

Friss Formula

Friss Transmission Formula: $Pd = (Pout * G) / (4*pi*r^2)$

Where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

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

If we know the maximum gain of the antenna and the total output power to the antenna, through calculation, we will know MPE value at distance 20cm.

2.3 TEST RESULT

Turn up

Mode	Detector	Turn up Power
2.4G Wi-Fi	AV	12±1dBm
5G Wi-Fi	AV	12±1dBm
LTE	AV	24±1dBm
Z-wave	AV	-5±1dBm
Thread	AV	4±1dBm
BLE	AV	0±1dBm
BT	PK	-1±1dBm
FDS	PK	5±1dBm

Protocol	**Fre. (MHz)**	**Separation distance (cm)**	**Max Turn up power (dBm)**	**Max EIRP (dBm)**	**Max EIRP (mW)**	**Power Density (mW/cm²)**	**Limit (mW/cm²)**	**Ratio**	**Result**
2.4G Wi-Fi	2437	20	13	15.45	35.075	0.0070	1	0.0070	Pass
5G Wi-Fi	5825	20	13	15.79	37.931	0.0075	1	0.0075	Pass
BLE	2402	20	1	3.45	2.213	0.075	1	0.0004	Pass
Z-wave	908.4	20	-4	-4	0.398	0.0001	1	0.0001	Pass
Thread	2475	20	5	7.58	5.728	0.0011	1	0.0011	Pass
BT	2402	20	0	2.45	1.758	0.0003	1	0.0003	Pass
LTE	699	20	25	25.75	375.837	0.075	0.466	0.1605	Pass
FDS	60500	20	6	6	3.981	0.008	1	0.008	Pass

Multiple transmission:

2.4G Wi-Fi +5G Wi-Fi+ LTE +Z-wave+Thread+FDS

=0.0070+0.0075+0.1605+0.0001+0.0011+0.008=0.184 < 1

Note: 1. Antenna Gain

BT/BLE/2.4G WIFI =2.45 dBi, 5G WIFI=2.79 dBi, Thread=2.58 dBi, Z-wave= -0.99 dBi,FDS=3 dBi

2. The Maxinum power is less than the limit, complies with the exemption requirements.

3. Calculated formula: EIRP (dBm)=90.06 (dBuV/m)-95.2

4. ERP=EIRP-2.15

※※※※※END OF THE REPORT※※※※※