



FCC CFR47 PART 22H, 24E, 27 CERTIFICATION TEST REPORT FCC ID: 2AAU7-AF3

Product: Alloy Fusion v3 Trade Mark: Alloy SmartHome Model No.: af3.zw8us.4G Family Model: _{N/A} Issue Date: July 05, 2024

Prepared for

Tri plus grupa d.o.o.

Banjavciceva 11, 10000 Zagreb, Croatia

Prepared by

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TEST RESULT CERTIFICATION

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 name:	Alloy Fusion v3
Model and/or type reference:	af3.zw8us.4G
Trade Mark:	Alloy SmartHome
Family Model:	N/A
Test Sample Number	S240509052001
Date of Test:	July 04, 2024 ~ July 05, 2024
Standards	FCC CFR 47 Part 22H, Part 24E, Part 27
Test procedure	: ANSI C63.26:2015
	ANSI/TIA-603-E-2016

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Prepared By: Joe Yan Reviewed By: Aaron Cheng Approved By: Alex Li (Project Engineer) (Supervisor) (Manager)



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1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	Alloy Fusion v3		
Trade Mark	Alloy SmartHome		
Model Name	af3.zw8us.4G		
Family Model	N/A		
Model Difference	N/A		
	U.S. Bands:		
Frequency Bands:	WCDMA Band 2, 4, 5		
	⊠LTE FDD Band 2,4,5,12 ,13		
Frequency Range:	 WCDMA Band 2 Uplink: 1850MHz-1910MHz, Downlink: 1930MHz-1990MHz; WCDMA Band 4 Uplink: 1710MHz-1755MHz, Downlink: 2110MHz-2155MHz; WCDMA Band 5 Uplink: 824MHz-849MHz, Downlink: 869MHz-894MHz; LTE FDD Band 2 Uplink: 1850MHz-1910MHz, Downlink: 1930MHz-1990MHz; LTE FDD Band 4 Uplink: 1710MHz-1755MHz, Downlink: 2110MHz-2155MHz; LTE FDD Band 5 Uplink: 824MHz-849MHz, Downlink: 869MHz-894MHz; LTE FDD Band 5 Uplink: 699MHz-716MHz, Downlink: 869MHz-746MHz; LTE FDD Band 13 Uplink: 777MHz-787MHz, Downlink: 746MHz-756MHz; 		
Type of Modulation:	WCDMA:QPSK, LTE:QPSK, 16QAM		
Antenna:	PCB Antenna		
Adapter	N/A		
Battery	N/A		
Power supply	Input: AC 24V		
Hardware Version	SHO2_MAINPCB_4-BUTTON_V2_3		
Firmware version	smartrent_hub-v1.26.11		
Software version	N/A		



1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AAU7-AF3** filing to comply with the FCC Part 22H&24E&27

1.3 TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI/TIA-603-E-2016, FCC CFR 47 Part 2, Part 22, Part 24, Part 27, ANSI C63.26:2015.

1.4 TEST FACILITY

The test site used to collect the radiated data is located at:

ShenZhen NTEK Testing Technology Co., Ltd.

1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R.China.

The test site is constructed and calibrated to meet the FCC requirements in documents ANSI

C63.26:2015& ANSI C63.4: 2014.

FCC Registration No.:463705

IC Registration No.:9270A,

CNAS Registration No.:L5516



MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Measuring Uncertainty for a Level of Confidence of 95% (U = $2Uc(y)$)	2.5dB

1.5 SPECIAL ACCESSORIES

The battery and the charger, earphone supplied by the applicant were used as accessories and being tested with EUT intended for FCC grant together.

1.6 WORST-CASE CONFIGURATION AND MODE

The worst-case scenario for all measurements is based on the investigation results.

The device has LTE Bands of: Band 2/4/5/12/13, WCDMA Bands of: Band 2/4/5

The RB Size was selected to measure for peak or average ERP and EIRP, which was based on the conducted power verification baseline data.

For the fundamental investigation of radiated emissions, the EUT is investigated for vertical and horizontal antenna orientations and X Y and Z orientations of the EUT alone. After the investigations the worst case was determined to be at X orientation for all LTE bands.



2. SYSTEM TEST CONFIGURATION

2.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT EXERCISE

The Transmitter was operated in the maximum output power mode through Communication Tester. The TX frequency was fixed which was for the purpose of the measurements.

2.3 CONFIGURATION OF EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Note
1	Alloy Fusion v3	Af3.zw8us.4G	FCC ID: 2AAU7-AF3	EUT

Table 2-1 Equipment Used in EUT System

Note: All the accessories have been used during the test. the following "EUT" in setup diagram means EUT system.

2.4 TEST SETUP

For Radiated Test Cases





3.TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	MXA Signal Analyzer	Agilent	N9020A	MY49100060	2024.04.25	2025.04.24	1 year
2	Test Receiver	R&S	ESPI	101318	2024.03.12	2025.03.11	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2024.03.11	2025.03.10	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2023.05.06	2026.05.05	3 year
5	Broadband Horn Antenna	SCHWARZBE CK	BBHA 9120 D	2816	2023.01.12	2026.01.11	3 year
6	Broadband Horn Antenna	SCHWARZBE CK	BBHA 9120 D	2817	2023.01.12	2026.01.11	3 year
7	Amplifier	EM	EM-30180	060538	2024.04.26	2025.04.25	1 year
8	Loop Antenna	ARA	PLA-1030/B	1029	2024.03.12	2025.03.11	3 year
9	Power Meter	R&S	NRVS	100696	2024.04.26	2025.04.25	1 year
10	Power Sensor	R&S	URV5-Z4	0395.1619.0 5	2024.03.12	2025.03.11	1 year
11	Test Cable	N/A	R-01	N/A	2022.06.17	2025.06.16	3 year
12	Test Cable	N/A	R-02	N/A	2022.06.17	2025.06.16	3 year
13	Test Cable	N/A	R-03	N/A	2022.06.17	2025.06.16	3 year
14	Test Receiver	R&S	ESCI	101160	2024.03.12	2025.03.11	1 year
15	LISN	R&S	ENV216	101313	2024.03.12	2025.03.11	1 year
16	LISN	EMCO	3816/2	00042990	2024.03.12	2025.03.11	1 year
17	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2023.05.06	2026.05.05	3 year
18	Passive Voltage Probe	R&S	ESH2-Z3	100196	2024.03.12	2025.03.11	1 year
19	Test Cable	N/A	C01	N/A	2023.05.06	2026.05.05	3 year
20	Test Cable	N/A	C02	N/A	2023.05.06	2026.05.05	3 year
21	Test Cable	N/A	C03	N/A	2023.05.06	2026.05.05	3 year
22	Spectrum Analyzer	agilent	e4440a	us44300399	2024.03.12	2025.03.11	1 year
23	test receiver	R&S	ESCI	a0304218	2024.03.12	2025.03.11	1 year
24	Communication Tester	R&S	CMU200	A0304247	2023.05.06	2026.05.05	3 year



25	Thermal Chamber	Ten Billion	TTC-B3C	TBN-960502	2024.03.12	2025.03.11	1 year
26	DC Power Source	N/A	PS-6005D	2017040292 3	2023.05.06	2026.05.05	3 year
27	DC Power Source	N/A	PS-6005D	2017040292 3	2023.05.06	2026.05.05	3 year
28	MXG Vector Signal Generator	Agilent	N5183B	MY57280984	2023.11.03	2024.11.02	1 year
29	Communication Tester	R&S	CMW500	148500	2023.05.29	2024.05.28	1 year
30	Log-Periodic Antenna	SCHWARZBE CK	VULB 9162	584	2023.12.29	2024.12.28	1 year
31	Log-Periodic Antenna	SCHWARZBE CK	VULB 9162	586	2023.12.29	2024.12.28	1 year

Note: Each piece of equipment is scheduled for calibration once a year except the Test Cable& DC Power Source which is scheduled for calibration every 3 years.



4. SPURIOUS RADIATION EMISSION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27.53

§22.917 (e) and §24.238 and §90.691 (a): Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

§27.53 (g) For operations in the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB.

§27.53 (h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10(P) dB.

TEST PROCEDURE

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

The unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth in the 1 MHz band immediately outside and adjacent to the channel edge of the equipment. Beyond the 1 MHz band immediately outside the channel edge of the equipment, a resolution bandwidth of 1 MHz shall be employed. A narrower resolution bandwidth is allowed to be used provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz or 1% of the occupied bandwidth as applicable.



The power of any unwanted emissions measured from the channel edge of the equipment shall be attenuated below the transmitter power, P (dBW), as follows:

a. for base station and subscriber equipment, other than mobile subscriber equipment, the attenuation shall not be less than 43 + 10 Log10 (p), dB; and

b. for mobile subscriber equipment, the attenuation shall not be less than 43 + 10 Log10 (p), dB at the channel edges and 55 + 10 Log10 (p) at 5.5 MHz away and beyond the channel edges where p in (a) and (b) is the transmitter power measured in watts.

MODES TESTED

WCDMA Band 2/4/5 LTE Band 2/4/5/12/13

RESULTS

PASS

Test Results

EUT:	Alloy Fusion v3	Model Name :	af3.zw8us.4G		
Temperature:	24.3 ℃	Relative Humidity:	55%		
Pressure:	1010hPa	Test Voltage:	AC 24V		
Test Mode :	TE Band 4 1.4MHz BW QPSK +2.4GWiFi 11B				



	Test Results for Low Channel 1710.7MHz+WiFi 2412MHz						
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit(dBm)	Margin(dBm)	Polarity
197.8	-61.76	1.68	16.04	-47.4	-13	-34.4	Horizontal
454.4	-55.76	1.78	17.74	-39.8	-13	-26.8	Vertical
3421.4	-48.22	4.02	29.8	-22.44	-13	-9.44	Horizontal
3421.4	-58.69	4.02	29.8	-32.91	-13	-19.91	Vertical
4824.26	-48.89	5.21	35.59	-18.51	-13	-5.51	Horizontal
4824.26	-57.18	5.21	35.59	-26.8	-13	-13.8	Vertical
5132.1	-51.46	5.24	35.84	-20.86	-13	-7.86	Horizontal
5132.1	-59.58	5.24	35.84	-28.98	-13	-15.98	Vertical
7326.7	-48.85	6.48	36.27	-19.06	-13	-6.06	Horizontal
7326.7	-56.21	6.48	36.27	-26.42	-13	-13.42	Vertical
	Т	est Results fo	r Mid Channel 1	732.5MHz+WiFi	2437MHz		
207.5	-62.15	1.72	17.69	-46.18	-13	-33.18	Horizontal
345.7	-52.97	1.62	16.02	-38.57	-13	-25.57	Vertical
3465	-50.26	4.03	30	-24.29	-13	-11.29	Horizontal
3465	-59.21	4.03	30	-33.24	-13	-20.24	Vertical
4874.61	-53.01	5.21	35.66	-22.56	-13	-9.56	Horizontal
4874.61	-59.15	5.21	35.66	-28.7	-13	-15.7	Vertical
5197.5	-49.86	5.25	35.86	-19.25	-13	-6.25	Horizontal
5197.5	-60.02	5.25	35.86	-29.41	-13	-16.41	Vertical
7311.29	-51.20	7.1	36.5	-21.8	-13	-8.8	Horizontal
7311.29	-59.53	7.1	36.5	-30.13	-13	-17.13	Vertical
	Т	est Results for	High Channel	1754.3MHz+WiFi	2462MHz		
182.9	-62.44	1.8	16.69	-47.55	-13	-34.55	Horizontal
332.1	-50.09	1.75	16.66	-35.18	-13	-22.18	Vertical
3508.6	-59.72	4.05	30.01	-33.76	-13	-20.76	Horizontal
3508.6	-68.33	4.05	30.01	-42.37	-13	-29.37	Vertical
4924.56	-53.31	5.21	35.52	-23	-13	-10	Horizontal
4924.56	-69.48	5.21	35.52	-39.17	-13	-26.17	Vertical
5262.9	-56.12	5.26	35.86	-25.52	-13	-12.52	Horizontal
5262.9	-60.48	5.26	35.86	-29.88	-13	-16.88	Vertical
7386.37	-51.42	7.1	36.53	-21.99	-13	-8.99	Horizontal
7386.38	-58.16	7.1	36.53	-28.73	-13	-15.73	Vertical

Note: PMea(dBm)= Power(dBm)+ ARpl (dBm)

. Over Limit= : PMea(dBm)-Limit(dBm)

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All modes have been validated, only report the worst mode: LTE Band 4 1.4MHz BW QPSK +2.4GWiFi 11B.

----END OF REPORT----