

FCC Part 1.1310, 2,1091 and ISED TEST REPORT

Report Number	031/25/04832/FCC	Rev. 00
Date of document	2025-01-30	
Total number of pages	Pag. 8	
OBJECT	Compliance to FCC Part 1.1310, 2,1091 and ISED RSS-102 Issue 6	
CUSTOMER	Stoerk-Tronic, Stoerk GmbH & Co. KG	
EQUIPMENT UNDER TEST	Wireless communication bridge with mesh functionality, where serial communication is transferred between Air Connect devices (2.4 GHz)	
MODEL	Air Connect Commander Air Connect Unit	
SUMMARY		
1	OBJECT OF THE TESTS	3
2	IDENTIFICATION	3
3	EQUIPMENT UNDER TEST (EUT)	3
4	REFERENCE STANDARDS	4
5	Test method & Test RESULT – MPE Requirements	5
Written by (Name + Signature)	ANDREA CUPIDO Lab Manager	
Verified by (Name + Signature)	MARCO NICOLE' Test engineer	
Approved and issued by (Name + Signature)	ALESSANDRO ZUCCATO Lab Director	

History sheet of test Report

Report Number	Rev.	Date	Description of modification
--	--	--	--
--	--	--	--
--	--	--	--
--	--	--	--

1 OBJECT OF THE TESTS

The objective of the tests is prepared, in accordance with FCC Part 1.1310, 2.1091 and ISSED RSS-102 Issue 6 , to evaluate RF exposure compliance of radiocommunication apparatus.

2 IDENTIFICATION

2.1 Laboratory

Name : Kiwa Creiven S.r.l.
 Street: Corso Spagna, 12
 City : 35127 Padova - ITALY
 Phone : +39.049.8704036
 Fax: +39.049.8707037
 E-mail : info.creiven@kiwa.com

FCC Designation

number: IT0016

ISED CAB Identifier: IT0007

2.2 Customer

Customer: Stoerk-Tronic, Stoerk GmbH & Co. KG
 Street: Untere Waldplaetze 6
 City: Stuttgart
 Phone: +(49) 711 68661 54
 Refer to : M. Wróblewski (technical Director)

3 EQUIPMENT UNDER TEST (EUT)

3.1 EUT identification (declared under responsibility of the customer)

EUT Description: Wireless communication bridge with mesh functionality, where serial communication is transferred between Air Connect devices (2.4 GHz)

Model: Air Connect Commander

Air Connect Unit

Code: 900229.001 - Air Connect Unit
 900229.002 - Air Connect Commander

Serial N°: 250117-00001

Software release: V1.0

Size: 80 x55 x 34 [mm] excluding flanges and antenna

Manufacturer: Stoerk-Tronic, Stoerk GmbH & Co. KG

Supply voltage: 12 Vdc

Rated Electrical Power: 0.6 W

Rated input current: 50 mA

FCC ID: 2BNLE-AIRCONNECT Contains FCC ID: 2AC7Z-ESPS3WROOM1U

Note: Air Connect Commander and Air Connect Unit have the same PCB and the same components (see pics for details)

3.1.1 EUT classifications

The manufacturer declared the following classification:

Object	Descriptions
Operating Frequency	Channel 1: 2412 MHz Channel 2: 2417 MHz Channel 3: 2422 MHz Channel 4: 2427 MHz Channel 5: 2432 MHz Channel 6: 2437 MHz Channel 7: 2442 MHz Channel 8: 2447 MHz Channel 9: 2452 MHz Channel 10: 2457 MHz
Equipment type	Based on WIFI running ESP_NOW protocol (by Espressif Systems)
Channel spacing	5 MHz
Number of Channels	10 (1-10)
Antenna Type	Monopole antenna 2.4-2.5 GHz
Antenna Peak Gain	1 dBi

Frequency Hopping Spread Spectrum	NO
Listen Before Talk	NO
Extreme Temperature Range	-40°C ÷ +85°C
Manufacturer declaration	04818LP
The type of modulation used by the equipment	☐ FHSS ☒ other forms of modulation (ESP-NOW uses OFDM modulation)
Adaptive / non-adaptive equipment	☒ non-adaptive Equipment ☐ adaptive Equipment without the possibility to switch to a non-adaptive mode ☐ adaptive Equipment which can also operate in a non-adaptive mode

3.1.2 EUT additional information

Object	Descriptions
Classification of installation and use	☐ Stand-alone ☒ Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment) ☐ Plug-in radio device (Equipment intended for a variety of host systems) ☐ Other
Means for connection to the supply:	☐ Supply cord fitted with a plug ☐ Supply cord without plug (for permanently connection to fixed wiring) ☒ Appliance inlet ☐ Appliance provided with a set of terminals allowing the connection of cables or fixed wiring
Date of receipt of test item	2025-01-20
Date(s) of performance of tests	See the data specified in test results details

3.2 EUT cables

The EUT has been configured by the manufacturer with the following input / output cables. EUT can works by either by connection cable or Ethernet cable.

Classification	Description	Cable		note
		Shielded	Specified max. length	
DC power port	Dc input cable with external power supply (not used during the tests)	☐	☒ none ☐ ≤ 1m ☐ ≤ 3m ☐ ≤ 10m ☐ ≤ 30m	type of power source: ☐ Internal Power Supply ☒ External Power Supply or AC/DC adapter ☐ Battery ☐ Other:
Telecommunication port	Ethernet cable contains power supply and serial communication (used during the test)	☒	☐ none ☐ ≤ 1m ☒ ≤ 3m ☐ ≤ 10m ☐ ≤ 30m	RJ45 connector Cable connected to Commander box (AE01)

3.3 EUT Auxiliary Equipments (AEs)

None

3.4 EUT Sampling and adopted criteria

Equipment used for testing was selected by the customer. Sampling criteria adopted by the customer is unknown to Kiwa Creiven laboratory.

3.5 EUT documents

The following documentations have been provide by the customer

Kiwa Creiven document reference	Descriptions
04818LP	Manufacturer declaration

4 REFERENCE STANDARDS

4.1 Reference standards

DOCUMENT	OBJECT
FCC CFR47	Rule Parts 1.1310, 2.1091
ISED	Rule RSS-102 Issue 6

5 TEST METHOD & TEST RESULT – MPE REQUIREMENTS

5.1 FCC MPE Requirements

The FCC MPE limits from CFR 47 Part 1.1310, 2.1091 are shown in the table below.

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 Exposure				
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
300-1,500			f/300	6
1,500-100,000			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
300-1,500			f/1500	30
1,500-100,000			1.0	30

5.2 ISED MPE Requirements

The ISED MPE limits from RSS-102 Issue 6 are shown in the table below.

Remark: If the operating frequency of the device is between two frequencies located in Table, linear interpolation is applied for the applicable separation distance.

RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ $f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ $f^{0.25}$	0.1540/ $f^{0.25}$	8.944/ $f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 $f^{0.3417}$	0.008335 f	0.02619 $f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ $f^{1.2}$
150000-300000	0.158 $f^{0.5}$	4.21 x 10 ⁻⁴ $f^{0.5}$	6.67 x 10 ⁻⁵ f	616000/ $f^{1.2}$
Note: f is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

5.3 Calculation

FCC

In order to perform the MPE assessment, the following equations have been used for the calculations; these equations are accurate in the far-field of an antenna and will over-predict power density in the near field, where they could be used for making a "worst-case" or conservative prediction:

$$\text{Power density: } S[mW/cm^2] = \frac{P_{E.I.R.P.}[mW]}{4\pi R[cm]^2}$$

Where:

S = power density

$P_{E.I.R.P.}$ = Equivalent isotropically radiated power

R = distance to the center of radiation of the antenna (evaluation distance)

ISED

In order to perform the MPE assessment, the following equations have been used for the calculations; these equations are accurate in the far-field of an antenna and will over-predict power density in the near field, where they could be used for making a "worst-case" or conservative prediction:

$$\text{Power density: } S[W/m^2] = \frac{P_{E.I.R.P.}[W]}{4\pi R[m]^2}$$

Where:

S = power density

$P_{E.I.R.P.}$ = Equivalent isotropically radiated power

R = distance to the center of radiation of the antenna (evaluation distance)

5.4 Test result

FCC RF Exposure

RF Mode	Frequency	Evaluation Distance	Antenna Gain	Duty Cycle	EIRP	EIRP	Power density	Limit for uncontrolled Exposure	Distance require to meet uncontrolled Exposure Limit	Result
	MHz	(cm)	(dBi)	(%)	(dBm)	(mW)	(mW/cm ²)	(mW/cm ²)	(cm)	
DTS device	2412-2457	20	1	100	23.763	238	0.0473	1	20	Pass

ISED RF Exposure

RF Mode	Frequency	Evaluation Distance	Antenna Gain	Duty Cycle	EIRP	EIRP	Power density	Limit for uncontrolled Exposure	Distance require to meet uncontrolled Exposure Limit	Result
	MHz	(cm)	(dBi)	(%)	(dBm)	(W)	(W/m ²)	(W/m ²)	(cm)	
DTS device	2412-2457	20	1	100	23.763	0.238	0.473	5,37	20	Pass

PASS= SAR evaluation is not required because the output power value is less than exemption limit.

Note:

*EIRP is the maximum eirp power of this EUT, and the data comes from the RF report for this EUT
(See Par. 3.6 of this test report)