RF Exposure Report

Report No.:	SABDMW-WTW-P20121069
FCC ID:	M4Y-SP230
Test Model:	SP230-S5
Series Model:	SP230
Received Date:	Dec. 31, 2020
Test Date:	Feb. 04, 2021
Issued Date:	Feb. 19, 2021
Applicant:	Z-Com, Inc.
Address:	5F, No.8, HSIN ANN RD., HSINCHU SCIENCE PARK, HSINCHU, 30078 TAIWAN
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / Designation Number:	723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
SABDMW-WTW-P20121069	Original release.	Feb. 19, 2021

1 Certificate of Conformity

Product:	802.11 ac Wave 2 Access Point
Brand:	ZCOM
Test Model:	SP230-S5
Series Model:	SP230
Sample Status:	Mass product
Applicant:	Z-Com, Inc.
Test Date:	Feb. 04, 2021
Standards:	FCC Part 2 (Section 2.1091)
	IEEE C95.3 -2002
References Test Guidance:	KDB 447498 D01 General RF Exposure Guidance v06

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : *Vivian Huang* , **Date:** Feb. 19, 2021

Vivian Huang / Specialist

Approved by : , **Date:** Feb. 19, 2021

Clark Lin / Technical Manager

2 RF Exposure

2.1 Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (minutes)
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 ; *Plane-wave equivalent power density

2.2 MPE Calculation 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 center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 26 cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

Model: SP230-S5

Antenna NO.	Chain No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type	Cable Length (mm)
2G0	Chain 0 (J26)	BDTRON	1001A0018	5.5	2.4~2.4835GHz	PCB	i-pex(MHF)	230
2G1	Chain 1 (J24)	BDTRON	1001A0018	5.5	2.4~2.4835GHz	PCB	i-pex(MHF)	230
5G0	Chain 0 (J23)	BDTRON	98P1DUIPF000	9.52 10.39 10.39 10.14	5.15~5.25GHz 5.25~5.35GHz 5.47~5.725GHz 5.725~5.85GHz	PCB	i-pex(MHF) i-pex(MHF)	230
5G1	Chain 1 (J25)	BDTRON	98P1DUIPF000	8.6 9.87 9.87 10.43	5.15~5.25GHz 5.25~5.35GHz 5.47~5.725GHz 5.725~5.85GHz	PCB	i-pex(MHF)	230

Model: SP230

Antenna NO.	Chain No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type	Cable Length (mm)
2G0	Chain 0 (J26)	BDTRON	1001A0018	5.5	2.4~2.4835GHz	PCB	i-pex(MHF)	230
2G1	Chain 1 (J24)	BDTRON	1001A0018	5.5	2.4~2.4835GHz	PCB	i-pex(MHF)	230
5G0	Chain 0 (J23)	BDTRON	1001A0016	6.5	5.15~5.85GHz	PCB	i-pex(MHF)	230
5G1	Chain 1 (J25)	BDTRON	1001A0016	6.5	5.15~5.85GHz	PCB	i-pex(MHF)	230

*The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

2.5   Calculation Result

Operation Mode	Evaluation Frequency (MHz)	Max. Average Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm²)	Limit (mW/cm²)
WLAN (2.4GHz)	2412~2462	292.715	8.51	26	0.24451	1
WLAN (U-NII-1)	5180-5240	274.892	12.08	26	0.52240	1
WLAN (U-NII-3)	5745-5825	176.835	13.30	26	0.44550	1

Note:
1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. 2.4GHz: The directional gain = 5.5dBi + 10log(2) = 8.51dBi
3. 5GHz: U-NII-1 Band: The directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2]$ = 12.08 dBi
   U-NII-3 Band: The directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2]$ = 13.30 dBi

Conclusion:

The formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

WLAN 2.4GHz + WLAN 5GHz = 0.24451 / 1 + 0.52240 / 1 = 0.76691

Therefore the maximum calculations of above situations are less than the "1" limit.

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