



RF EXPOSURE EVALUATION REPORT

FCC ID : I28-WYSBHVDXP
Equipment : WLAN/BTLE module
Brand Name : ZEBRA
Model Name : WYSBHVDXP
Applicant : Zebra Technologies Corporation
3 Overlook Point, Lincolnshire, IL 60069, United States
Manufacturer : Zebra Technologies Corporation
3 Overlook Point, Lincolnshire, IL 60069, United States
Standard : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC has been evaluated this product in accordance with 47 CFR Part2.1091 and it complies with applicable limit.

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC evaluation.

The results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. Laboratory, the test report shall not be reproduced except in full

Approved by: Cona Huang / Deputy Manager



SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



Table of Contents

1. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	4
2. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS	6
3. RF EXPOSURE LIMIT INTRODUCTION	6
4. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION	7
4.1. Standalone Power Density Calculation	7
4.2. Collocated Power Density Calculation.....	7



History of this test report

Report No.	Version	Description	Issued Date
FA0D2423-05	Rev. 01	Initial issue of report	Aug. 28, 2023



1. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	WLAN/BTLE module
Brand Name	ZEBRA
Model Name	WYSBHVDXP
FCC ID	I28-WYSBHVDXP
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.6GHz Band: 5470 MHz ~ 5725 MHz WLAN 5.8GHz Band: 5725 MHz ~ 5825 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz
Mode	WLAN: 802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
HW Version	Revision G
SW Version	17.68.01.p94
EUT Stage	Identical Prototype
Remark:	
1. Based on the original RF Exposure test report No.: FA0D2423, changed BT trace and added new BT/WiFi antenna for evaluation MPE calculation.	

WLAN Antenna Information									
1	Ant. Type	Dipole Antenna	connector	U.FL	2	Ant. Type	Chip Antenna	connector	U.FL
	Model No.	RD2458-5	Brand Name	Laird		Model No.	W3006	Brand Name	Pulse
	Peak Gain (dBi)					Peak Gain (dBi)			
	2400~2483.5MHz	3.0	5470~5725MHz	5.0		2400~2483.5MHz	3.2	5470~5725MHz	4.2
	5150~5250MHz	5.0	5725~5850MHz	5.0		5150~5250MHz	4.2	5725~5850MHz	4.2
5250~5350MHz	5.0	5925~7125MHz		5250~5350MHz	4.2	5925~7125MHz			
3	Ant. Type	Mylar Antenna	connector	U.FL	4	Ant. Type	Mylar Antenna	connector	U.FL
	Model No.	220370-09	Brand Name	Auden		Model No.	B91882-30	Brand Name	Auden
	Peak Gain (dBi)					Peak Gain (dBi)			
	2400~2483.5MHz	3.81	5470~5725MHz	3.19		2400~2483.5MHz	0.3	5470~5725MHz	4.4
	5150~5250MHz	2.18	5725~5850MHz	2.69		5150~5250MHz	3.4	5725~5850MHz	4.0
5250~5350MHz	2.71	5925~7125MHz		5250~5350MHz	3.3	5925~7125MHz			
5	Ant. Type	Monopole Antenna	connector	U.FL	6	Ant. Type	Monopole Antenna	connector	U.FL
	Model No.	B53023-30	Brand Name	Auden		Model No.	B53025-30	Brand Name	Auden
	Peak Gain (dBi)					Peak Gain (dBi)			
	2400~2483.5MHz	3.3	5470~5725MHz	2.1		2400~2483.5MHz	5.1	5470~5725MHz	3.1
	5150~5250MHz	1.0	5725~5850MHz	-1.6		5150~5250MHz	0.9	5725~5850MHz	2.7
5250~5350MHz	1.9	5925~7125MHz		5250~5350MHz	3.2	5925~7125MHz			



Bluetooth Antenna Information									
1	Brand Name	gigaAnt			2	Brand Name	TAIYO YUDEN		
	Ant. Type	Monopole Antenna	Peak Gain	2.7 dBi		Ant. Type	Monopole Antenna	Peak Gain	3 dBi
	connector	U.FL	Model No.	3030A5645-01		connector	U.FL	Model No.	AH 168M245001
3	Brand Name	Johanson Technology			4	Brand Name	Laird		
	Ant. Type	Monopole Antenna	Peak Gain	1 dBi		Ant. Type	Dipole Antenna	Peak Gain	3 dBi
	connector	U.FL	Model No.	2450AT07A0100		connector	U.FL	Model No.	RD2458-5
5	Brand Name	Auden			6	Brand Name	Auden		
	Ant. Type	Monopole Antenna	Peak Gain	3.81 dBi		Ant. Type	Monopole Antenna	Peak Gain	3.2 dBi
	connector	U.FL	Model No.	220370-09		connector	U.FL	Model No.	A73009-00
7	Brand Name	Auden			8	Brand Name			
	Ant. Type	Monopole Antenna	Peak Gain	5.5 dBi		Ant. Type		Peak Gain	
	connector	U.FL	Model No.	B53026-90		connector		Model No.	

Reviewed by: Jason Wang

Report Producer: Daisy Peng



2. Maximum RF average output power among production units

Band	Average Power (dBm)		
	Ant 1	Ant 2	Ant 1+2
2.4GHz WLAN	17	17	14
5.2GHz WLAN	15	14	13
5.3GHz WLAN	14	14	13
5.5GHz WLAN	14	14	13
5.8GHz WLAN	14	14	13

Band	Average Power (dBm)
Bluetooth	12

3. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

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 Exposures				
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
300-1500			f/300	6
1500-100,000			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
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna



4. Radio Frequency Radiation Exposure Evaluation

4.1. Standalone Power Density Calculation

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WLAN2.4GHz Band	5.1	17.0	22.1	0.16	162.18	0.032	1.000	0.032
WLAN5GHz Band	5.0	15.0	20.0	0.10	100.00	0.020	1.000	0.020
Bluetooth	5.5	12.0	17.5	0.06	56.23	0.011	1.000	0.011

4.2. Collocated Power Density Calculation

WLAN 2.4 GHz Power Density / Limit	WLAN 5GHz Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of WLAN+Bluetooth
0.032	0.020	0.011	0.063

Note:

- Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WLAN + Bluetooth.
- Considering the WLAN and Bluetooth transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 3 collocated transmitters is compliant

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.