



Radio Frequency Exposure Evaluation Report

FOR:
Ezlo Innovation LLC

Model Number:
ESWV1-US

Product Description:
Ezlo Smart Water Shut-Off Valve

FCC ID: 2AIYW-ESWV
IC: 26382-ESWV

Per:
CFR Part Part1 (1.1307 & 1.1310), Part 2 (2.1091),
FCC KDB 447498 D01 General RF Exposure Guidance v06
ISED RSS-102 Issue 5

Report number: EMC_EZLOI-007-21001_FCC_ISED_MPE_Rev2

DATE: 2023-05-31



CETECOM Inc.

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1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 & 1.1310), Part 2 (2.1091) and IC standard RSS-102 issue 5 under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant).

In addition, maximum antenna gain or minimum distance towards the human body is calculated respectively, where relevant.

The device meets the limits as stipulated by the above given FCC and IC rule parts based on available specifications for worst case conditions at 20cm distance to the body.

Company	Description	Model #
Ezlo Innovation LLC	Ezlo Smart Water Shut-Off Valve	ESWV1-US

Report reviewed by: TCB Evaluator

Arndt Stoecker

2023-05-31

Compliance

(Director of Regulatory Services)

Date	Section	Name	Signature
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Responsible for the Report:

Cheng Song

2023-05-31

Compliance

(EMC Engineer)

Date	Section	Name	Signature
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2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Director of Regulatory Services:	Arndt Stoecker
Responsible Project Leader:	Akanksha Baskaran

2.2 Identification of the Client / Manufacturer

Client's Name:	Ezlo Innovation LLC
Street Address:	200 Broadacres Drive
City/Zip Code	Bloomfield, NJ / 07003
Country	USA

Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment under Assessment

Model No:	ESWV1-US
HW Version :	HW: 1.23
SW Version :	FW: 0.8.1503
FCC ID:	2AIYW-ESWV
IC:	26382-ESWV
Product Marketing Name (PMN):	Smart Water Shut-Off Valve
Product Description:	Ezlo Smart Water Shut-Off Valve
Radio Information:	Wi-Fi: • Module: ESP32-D0WDQ6 • 802.11 b/g/n 20MHz • 2.4GHz : Ch1-13 Z-Wave: • Module Name: SiLabs • Module Number: EFR32ZG14
Antenna Information:	2.4GHz Wi-Fi Antenna: • Type: PCB Antenna • Location: Internal • Maximum Gain: 5.6 dBi • Frequency Band: 2.4 GHz ISM Z-Wave Antenna: • Type: PCB Antenna • Location: Internal • Frequency Band: 902-928 MHz ISM
Maximum Conducted Output Power:	Wi-Fi: 18.66 dBm
Power Supply/ Rated Operating Voltage Range:	External Power Adapter 100 - 240V , 50/60Hz. converter to 24Vdc for the Water Valve
Operating Temperature Range:	0°C to 65 °C
Sample Revision:	☐ Prototype Unit; ☐ Production Unit; ☒ Pre-Production

4 RF Exposure Limits and FCC and IC Basic Rules

For the specific described radio apparatus the following basic limits and rules apply for both, FCC and IC where not indicated differently.

4.1 Power Density Limits acc. to FCC 1.1310(e) / RSS-102 i5, cl. 4:

FCC

Frequency Range (MHz)	Power density (mW/cm ²)	Averaging time (minutes)
300 – 1500	$f \text{ (MHz)} / 1500$	30
1500 – 100000	1.0	30

IC

300 – 6000	$0.02619 \times f \text{ (MHz)}^{0.6834}$	6
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4.2 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.1091(c) / RSS-102, cl. 2.5 (rounded to 1 decimal point):

FCC

operating frequency < 1.5GHz: excluded if ERP < 1.5W / 31.8dBm (EIRP: 33.9 dBm);

operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm (EIRP: 36.9 dBm);

$$P_{th}(\text{mW}) = ERP_{20\text{ cm}}(\text{mW}) = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

IC

300MHz <= operating frequency < 6 GHz: excluded if EIRP < $0.0131 \times f \text{ (MHz)}^{0.6834} \text{ W}$

4.3 RF Exposure Estimation (MPE Estimation)

Having available the source based average output power and peak antenna gain or the ERP/EIRP of the specified device and for a known minimum distance of its radiating structures from the body of persons according to its use cases (at least 20cm) the power density at that distance can be estimated by the following formula for plane-wave equivalent conditions (far-field conditions), when ground reflection is neglected.

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

where: S = power density (mW/cm² or W/m²)

P = power input to the antenna (mW or W)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (cm or m)

5 Evaluations

5.1 Analysis of RF Exposure

FCC

WLAN

Operating frequency > 1.5GHz, ERP20cm Limit = 3060mW = 3.06W
 Actual ERP = 0.163W < 3.06W; Excluded.

Z-wave

Operating frequency < 1.5GHz, ERP20cm Limit = 2040 x 0.908 = 1852.32mW = 1.85W
 Actual ERP = 0.004W < 1.85W; Excluded.

ISED

WLAN

EIRP Limit = $0.0131 \times f \text{ (MHz)}^{0.6834} = 2.684W$
 Actual EIRP = 0.267W < 2.684W; Excluded.

Z-wave

EIRP Limit = $0.0131 \times f \text{ (MHz)}^{0.6834} = 1.377W$
 Actual EIRP = 0.007W < 1.377W; Excluded.

MPE

Radio	freq MHz	MaxPower W conducted	MaxPower convert to dBm	Ant Gain dbi	Ant Gain lin	EIRP W calculate d	Max Duty Cycle	IC W/m2	FCC W/m2	Actual W/m2	How much of IC limit is used up	How much of FCC limit is used up
WLAN	2412	0.073	18.660	5.6	3.63	0.267	100.00%	5.366	10.000	0.531	9.88%	5.30%
Z-wave	908.42	NA	NA	NA	NA	0.007	100.00%	2.753	6.056	0.014	0.47%	0.21%
Distance(m):										0.200		

5.2 Conclusion:

The worst-case simultaneous transmission is Z-wave simultaneous with WLAN, which is using 10.35% of IC limit and 5.51% of FCC limit. The equipment is passing RF exposure requirements for 20cm distance.

6 Revision History

Date	Report Name	Changes to report	Prepared by
2022-05-26	EMC_EZLOI-007-21001_FCC_ISSED_MPE	Initial Release	Cheng Song
2023-04-25	EMC_EZLOI-007-21001_FCC_ISSED_MPE_Rev1	Updated section 5.1 Analysis of RF Exposure	Cheng Song
2023-05-31	EMC_EZLOI-007-21001_FCC_ISSED_MPE_Rev2	Updated section 3	Cheng Song

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