PHOENIX TESTLAB

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FCC RF Exposure Evaluation

Report Number:

F231980E1

Equipment under Test (EUT):

Easy2_MOB

Applicant:

Weatherdock AG

ilac-MRA

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-17186-01-00

References

CFR 47 Rule part 1 Practice and Procedure

CFR 47Rule part 2 Frequency Allocations and Radio Treaty Matters; General Rules and Regulations

KDB 447498 D01 General RF Exposure Guidance v06

Assessed and written by:	Sebastian KREHS 26.04.2024	Signature
Reviewed and approved by:	Bernd STEINER 26.04.2024	Signature

This test report is only valid in its original form.

The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT NUMBER.

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1. Identification

1.1. Applicant

Name:	Weatherdock AG
Address:	Emmericher Strasse 17, D-90411 Nürnberg
Country:	Germany
Name for contact purposes:	Jürgen Zimmermann
eMail address:	jzimmermann@weatherdock.de

1.2. Manufacturer

Name:	Weatherdock AG
Address:	Emmericher Strasse 17, D-90411 Nürnberg
Country:	Germany
Name for contact purposes:	Jürgen Zimmermann
eMail address:	jzimmermann@weatherdock.de

1.3. Test Laboratory

The tests were carried out by:

PHOENIX TESTLAB GmbH
Königswinkel 10
32825 Blomberg
Germany

Accredited by *Deutsche Akkreditierungsstelle GmbH* in compliance with DIN EN ISO/IEC 17025 under Reg. No. D-PL-17186-01-06.

1.4. EUT (Equipment under Test)

Test object: *	MOB distress beacon
Model name: *	easy2-MOB
Article number: *	A22800
FCC ID: *	ZO5WDC-A228

	EUT number
	1
Serial number: *	Prototype
PCB identifier: *	Not available
Hardware version: *	Sample Unit May 2022 V2
Software version: *	V 2.0
Type Plate	Not available

* Declared by the applicant

1.5. Technical Data of Equipment

General			
Power supply EUT: *	Lithium Battery		
Supply voltage EUT: *	6 V DC	---	---
Temperature range: *	-20 °C to +55 °C		
Highest internal frequency: *	Not available		

* Declared by the applicant

AIS	
Operating frequency range: *	162.025 MHz / 169.975 MHz
Number of channels: *	2
Type of modulation: *	GMSK
Supply voltage: *	Not available
Antenna type / name: *	internal

* Declared by the applicant

DCS	
Operating frequency range: *	156.525 MHz
Number of channels: *	1
Type of modulation: *	FM
Supply voltage: *	Not available
Antenna type / name: *	internal

* Declared by the applicant

Bluetooth part	
Fulfils Bluetooth specification: *	BLE 4.0
Operating frequency range: *	2402 MHz – 2483 MHz
Number of channels: *	40
Type of modulation: *	GFSK
Supply voltage: *	Not available
Antenna type / name: *	internal

* Declared by the applicant

1.6. Additional Information

[1] AIS/DCS Radiated Emission for Easy2-MOB, Testreport: TUV-SUD:No. TR-713260183-00(Revision1)
[2] Bluetooth Testreport for uBlox ANNA B112, Testreport: Phoenix TestLab: F181323E1

2. Subject of Investigation

According to the CFR47 §2.1091 the device as declared by the applicant is a mobile device which is used at least at 20 cm separation distance between the device and the users.

3. MPE evaluation limits

3.1. Stand alone MPE evaluation limits

The human exposure to RF emissions from such devices could be evaluated based on the MPE limits adopted by the FCC for electric and magnetic field strength and / or power density. The limits for General Population / Uncontrolled Exposure are given in the following table from §1.1310(e)1:

Frequency Range [MHz]	Electric Field Strength (E) [V/m]	Magnetic Field Strength (H) [A/m]	Power Density (S) [mW/cm²]	Averaging Time $\|E\|^2$,$\|H\|^2$ or S [min]
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

Limits for General Population / Uncontrolled Exposure.

Note: f = frequency in MHz; * Plane – wave equivalent power density

3.2. Simultaneous transmission MPE requirements

Although this is not a module integration in the sense of product approval, the procedure for simultaneous transmission specified in KDB 447498 D01 General RF Exposure Guidance v06 in chapter 7.2 was taken into account:

According to the RF exposure KDB 447498 D01 General RF Exposure Guidance v06 in chapter 7.2:
For mobile exposure host platform devices to qualify for simultaneous transmission MPE test exclusion, all transmitters and antennas in the host must either be evaluated for MPE compliance, by measurement or computational modelling, or qualify for the standalone MPE test exclusion in 7.1.

When modular transmitters are used, the minimum test separation distance required for each simultaneously transmitting antenna installed in the host device must satisfy MPE compliance for both standalone and simultaneous transmission operations. When simultaneous transmission MPE test exclusion applies, transmitter modules may be incorporated in host devices according to Class I permissive change requirements to document the test exclusion conditions.

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0, according to calculated/estimated, numerically modelled, or measured field strengths or power density. The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to the MPE limit at the test frequency.

4. MPE evaluation

The power density is calculated as follows:

$$S = \frac{P \cdot G \cdot D}{4 \cdot \pi \cdot R^2}$$

Where:

P: conducted power

G: Antenna gain (linear)

D: Duty Cycle

R: minimum separation distance from antenna to the user

5. E.I.R.P Output Power

The radiated output power values listed below are based on the original test reports of the installed radio modules .[1][2]

5.1. AIS Emissions

The following information are based on [1] Test-Report TR-713260183-00 Revision 1 from TÜV SÜD Product Service

P: 1 W E.I.R.P.

G: NA

D: Duty cycle within 30 minutes of active operation:

AIS mode the EUT is transmitting 8 telegrams with a length of 0.026 s each per minute

8 telegrams * 0.026 s / 60 s = 0.00346

R: Distance in what the limit of S must be reached: 20 cm.

$$S = \frac{P \cdot G \cdot D}{4 \cdot \pi \cdot R^2} \Rightarrow \underline{S} = \frac{1000\,mW \;\cdot\; 0.00346}{4 \cdot \pi \cdot (20\,cm)^2} = \underline{0.0006883\,\frac{mW}{cm^2}}$$

5.2. DSC Emissions

The following information are based on [1] Test-Report TR-713260183-00 Revision 1 from TÜV SÜD Product Service

P: 2.5 W E.I.R.P.

G: NA

D: When the device is activated, it is sending every 5 minutes one DSC message of a length of 0.5s for 30 minutes. After that it is sending every 10 minutes, which means the duty-cycle is reduced by 50%. Duty cycle within 5 minutes of active operation: 0.5 s / 300 s = 0.00167

R: Distance in what the limit of S must be reached: 20 cm.

$$S = \frac{P \cdot G \cdot D}{4 \cdot \pi \cdot R^2} \Rightarrow \underline{S} = \frac{2500\,mW \;\cdot\; 0.00167}{4 \cdot \pi \cdot (20\,cm)^2} = \underline{0.0008306\,\frac{mW}{cm^2}}$$

5.3. BLE Emissions

The following information are based on [2] Test-Report F181323E2 from Phoenix Testlab GmbH

P: 1.9 mW

G: 0.5 dBi → 1.12

D: 100% duty cycle → 1

R: Distance in what the limit of S must be reached: 20 cm.

$$S = \frac{P \cdot G \cdot D}{4 \cdot \pi \cdot R^2} \Rightarrow \underline{S} = \frac{1.9\,mW\ 1.12 \cdot\ 1}{4 \cdot \pi \cdot (20\ cm)^2} = \underline{0.0004241\,\frac{mW}{cm^2}}$$

5.4. Simultaneous MPE results

Bluetooth low energy (BLE) is not considered for simultaneous transmission because it will be used only for programming purposes as declared by the applicant. Furthermore, it fulfils also in single Bluetooth Mode the limit of 1.0 mW/cm² as given in CFR 47 §1.1310(e)1.

For the simultaneous Transmission of AIS and DCS the following calculation show compliance to the limits given in CFR 47 §1.1310(e)1:

For the AIS Transmitter:

$$AIS_{ratio} = \frac{0.0006883\ \mathrm{mW/cm^2}}{0.2\ \mathrm{mW/cm^2}} = 0.003442$$

For the DSC Transmitter:

$$DSC_{ratio} = \frac{0.0008306\ \mathrm{mW/cm^2}}{0.2\ \mathrm{mW/cm^2}} = 0.004153$$

The Sum of the MPE ratios for the simultaneous transmission is:

Sum = 0.003442 + 0.004153

Sum = 0.007595 < 1.0

6. Conclusion

The Easy2-MOB complies in all operational modes to the limits given in CFR 47 §1.1310(e)1 in a distance of 20 cm

7. Report History

Report Number	Date	Comment
F231980E1	26.04.2024	Initial Test Report
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