

RF Exposure Exemption Report

EnerSys SARL

Model: Zigbee Interface

In accordance with FCC CFR 47 Pt 1.1307

Prepared for: EnerSys SARL
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SIGNATURE

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Matthew Russell	Chief Engineer (RF)	Authorised Signatory	13 November 2023

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY

The wireless devices described within this report are compliant with the exemption criteria related to human exposure to electromagnetic fields laid out in FCC CFR Title 47 Part 1.1307.



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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	13 November 2023

Table 1

1.2 Introduction

Applicant	EnerSys SARL
Manufacturer	EnerSys SARL
Model Number(s)	Zigbee Interface
Part Number	6LA12230C
Hardware Version(s)	C
Software Version(s)	N3.6
Specification/Issue/Date	FCC 47 CFR Part 1.1307: 2021
Order Number	4501551273-FAL
Date	01 December-2022
Related Document(s)	<ul style="list-style-type: none">• KDB 447498 D04 v01• FCC 47 CFR Part 2.1091: 2021



1.3 Brief Summary of Results

The wireless devices described within this report are compliant with the exemption criteria related to human exposure to electromagnetic fields laid out in FCC CFR Title 47 Part 1.1307.

The calculations shown in this report were made in accordance with the procedures specified in the applied test specification(s).



1.4 Application Form

Specific Absorption Rate (SAR) Application Form

Technical Description: <i>(Please provide a brief description of the intended use of the equipment)</i>	Zigbee Rf Module Could be used as Uart or USB to Zigbee interface
Manufacturer:	EnerSys SARL Rue A. Fleming – Z.I. EST – CS40962 62033 Arras Cedex
Model:	Zigbee Interface
Part Number:	6LA12230

If more than one frequency band is supported, please confirm which combinations of bands are capable of simultaneous transmission.	Only one frequency band
--	-------------------------

Description of intended use.	Interface between PC (USB port) or charges (Uart) to batteries through Zigbee communication
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Product Dimensions?	34.10 * 13.20 * 4.20 mm (L x W x H)
Is the product body worn?	No (delete as applicable)
Is the product used against the ear?	No (delete as applicable)
Is the product used in front of the face? i.e., a push to talk radio?	No (delete as applicable)
Any accessories used with the product? i.e., a headset, belt clip etc.	No (delete as applicable). If yes, please describe below.
Is the product used in a backpack, pouch etc?	No (delete as applicable). If yes, please describe below.

Frequency Band 1: Please detail (one entry for each band). e.g. GSM 900 / WCDMA FDD I etc.

Bottom frequency:	2405	MHz
Middle frequency:	2445	MHz
Top frequency:	2480	MHz



Maximum declared RF output power	10	dBm
± Tolerance		dB

NOTE: Please add the section above for each additional frequency band of operation.

I hereby declare that the information supplied is correct and complete.

Name: Francois Beaucamp
Position held: Design Engineer
Date: November 09th 2023

F Beaucamp



1.5 Product Information

1.5.1 Technical Description

Bi-directional USB to Zigbee interface

1.5.2 Transmitter Description

The following radio access technologies and frequency bands are supported by the equipment under test.

Radio Access Technology	Frequency Band (MHz)	Minimum Frequency (MHz)	Output Power (dBm)	Duty Cycle (%)
802.15.4 Zigbee	2400 – 2483.5	2405	10	100

Table 2 – Transmitter Description- FCC

Note: Transmitter power includes upper bounds of uncertainty therefore maximum values are used.

1.5.3 Antenna Description

The following antennas are supported by the equipment under test.

Radio Access Technology	Antenna Model	Gain (dBi)	Antenna length (cm)	Minimum Separation Distance (cm)
802.15.4 Zigbee	Johanson 2450AT43B100	0	0.5	20

Table 3 – Antenna description

In the case of more than one type of antenna being supported by the equipment, the calculation is based on the maximum of the antenna gains. If other antennas can be used that have greater gains, the minimum separation distances will need to be recalculated.

Note: Antenna gain includes upper bounds of uncertainty therefore maximum values are used.

1.5.4 Equipment Configuration

Single transmitter



2 Assessment Details

2.1 Single RF Source options for determination of exemption.

Option	Reference	RF Exposure Test Exemptions for Single Source												
A (1-mW Test Exemption)	FCC 1.1307(b)(3)(i)(A)	The available maximum time averaged power is no more than 1 mW, regardless of separation distance.												
B (SAR-Based Exemption)	FCC 1.1307(b)(3)(i)(B)	<p>The available maximum timeaveraged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:</p> $P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$ <p>Where</p> $x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$ <p>and</p> $ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$ <p><i>d</i> = the separation distance (cm);</p>												
C (MPE-Based Exemption)	FCC 1.1307(b)(3)(i)(C)	<p>Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least λ/2π, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).</p> <p>TABLE 1 TO § 1.1307(b)(3)(i)(C)—SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION</p> <table><tr><th>RF Source frequency (MHz)</th><th>Threshold ERP (watts)</th></tr><tr><td>0.3–1.34</td><td>1,920 R².</td></tr><tr><td>1.34–30</td><td>3,450 R²/f².</td></tr><tr><td>30–300</td><td>3.83 R².</td></tr><tr><td>300–1,500</td><td>0.0128 R²f.</td></tr><tr><td>1,500–100,000</td><td>19.2R².</td></tr></table>	RF Source frequency (MHz)	Threshold ERP (watts)	0.3–1.34	1,920 R ² .	1.34–30	3,450 R ² /f ² .	30–300	3.83 R ² .	300–1,500	0.0128 R ² f.	1,500–100,000	19.2R ² .
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30–300	3.83 R ² .													
300–1,500	0.0128 R ² f.													
1,500–100,000	19.2R ² .													



2.2 Individual Antenna Port Exposure Results

2.2.1 Single Source Calculation of Exposure at Specified Separation Distance FCC 1.1307(b)(3)(i)(C) 'Option C' (MPE Based Exemption)

RAT	Frequency (MHz)	Conducted Power Output (mW)	Duty Cycle %	Time Average Conducted Power Output (mW)	Antenna Gain Ratio	Maximum Power (EIRP) mW	Maximum Power (ERP) mW	Minimum separation distance for MPE evaluation $\lambda/2$ π mm	Actual Distance (mm)	Threshold ERP (mW)	1.1307(b)(3)(i)(C) Exemption (Yes/No) (300 kHz to 100 GHz)
802.15.4 Zigbee	2405	10	100	10	1	10	6.1	19.9	200	768	Yes

Table 4 –Transmitter Result

The calculations show that the individual transmitters comply with FCC 1.1307(b)(3)(i)(C) MPE-based exception at a minimum distance of 20 cm.