DUOLOCKER

PRODUCT DESCRIPTION

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INTRODUCTION

1. Purpose of the Document

The purpose of this document is to provide a general description of the **DuoLocker**. This document is intended for machinery manufacturers in general, where the **DuoLocker** can be applied, as well as technicians and developers.

The information contained in this document is for introductory purposes only. For updated, detailed, and in-depth information, it is always advisable to refer to **Duolabs** as the manufacturer of the **DuoLocker**.

All the technical documentation mentioned in this document is available upon signing an NDA.

This document is public and can be shared to explain the functionalities of the DuoLocker.

INTRODUCTION

2. Product Overview

The **DuoLocker** is an electronic device equipped with an **RFID interface**, designed to function as an external peripheral for credit management in devices such as coffee machines or electronic grinders. More generally, the **DuoLocker** can be used in any situation where credit needs to be stored and its usage authorized by decrementing it.

It is ideal for applications where the authenticity of consumables (e.g., coffee capsules or coffee packages) needs to be verified by loading a maximum number of credits that the main device can dispense in terms of doses or servings.

The **DuoLocker** is a standalone device that securely manages the remaining credit, relieving developers or integrators from the complexities of secure credit management and RFID tag reading.

The DuoLocker can be considered a standalone device, similar to an ATM for cash withdrawals. When the main device requests the dispensing of a variable credit, the DuoLocker verifies the availability of credit and authorizes the transaction, automatically deducting the corresponding amount from its internal credit balance. **The credit is reloaded using low-cost NFC recharge tags, which become unusable after being used.**

The DuoLocker is designed to operate on devices with or without a display. Additionally, it allows system operators/maintainers to manage credit using RFID tags called "Special Tags.“

These functionalities will be described in detail in the next section of this document.

INTRODUCTION

3. Protect your business with a cost-effective solution even for large volumes

DuoLocker represents an economical and secure solution to protect the consumables market against compatible product vendors.

Thanks to the low cost of the RFID Tags used by Duolabs, the economic impact of this solution allows you to optimize your profits with a negligible cost per unit.

You will quickly be able to adopt an effective, flexible, and secure deterrent against counterfeiting, applicable to all your products, even if your main device has limited computing power or lacks a display.

The management of credit and usage is entirely secure. DuoLocker operates as a "black box," autonomously managing credit processes such as recharging and decrementing. Your main device simply needs to request authorization from DuoLocker and specify the number of credits to deduct.

DuoLocker is specifically designed for the aftermarket, enabling consumption monitoring and preventing potential disputes with end users.

It is a modern, environmentally friendly solution capable of meeting all needs when it comes to consumables.

DuoLocker has already been tested for the Radio Equipment Directive 2014/53/EU (RED) for radio devices and is ready for certification in your final product.

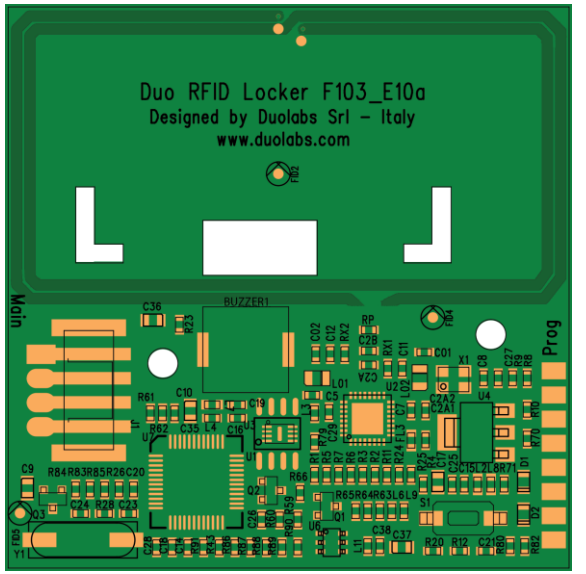
MAIN FEATURES

1. Rapid Integration on Existing Products

- The integration of DuoLocker into an existing product is quick and fully supported by Duolabs.
- Libraries for integration with a **coffee machine simulator software example** are provided in source code.
- DuoLocker only requires a 5-volt power supply from the main device and communicates via a UART (serial port).
- The main device does not need high computational performance.
- Communication with DuoLocker can be implemented even using 8-bit microcontrollers.

MAIN FEATURES

2. Compact Dimensions and High Performances



- Super compact dimensions of 59mm x 59mm, making it easy to integrate even into small and compact devices.
- Thickness ranging from 0.8mm to 1.6mm.
- Requires only 4 wires to connect to the main device.
- Low power consumption.
- Tag reading distance of up to 4 centimeters (the distance is the maximum achievable in an open field).
- Audible Buzzer to facilitate Tag recharging operations and the use of Special Tags.
- Status LED to indicate the operational status of the DuoLocker.

MAIN FEATURES

3. Autonomous Credit Management

- Credit is automatically and independently managed when a Recharge Tag is used.
- Recharge units stored as credit. the main device application can define how to interpret a single unit. For instance, a single Recharge Tag may add 100 units of credit to the DuoLocker it is programmed for.
- **Authorization of credit and revocation of the last authorized credit.**
- Control of the maximum rechargeable credit.
- Prevention of reusing an already used Tag.
- Storage of credit within the DuoLocker, not in the main device.
- Recording on the recharged Tag of the unique serial number of the DuoLocker where it was recharged.
- Logging on the DuoLocker of the last recharge Tags used.
- Locker ON or Locker OFF (*Free Play Mode*) option.

MAIN FEATURES

4. Special Tags

- DuoLocker can recognize Special Tags that allow credit and device management without requiring physical access to the DuoLocker itself!
- Special Tags are designed to check the internal state of the DuoLocker and directly import or export data from it. **This makes the DuoLocker particularly ideal for main devices without displays.**
- Special Tags include: **Import Tag**, **Export Tag, Reset Tag, Lock Tag, and Unlock Tag**.
  - The Import Tag allows you to set the number of credits, activate or deactivate the locker, reset the list of loaded tags, and perform other functions detailed in the technical manual.
  - The Export Tag enables the export of all data related to the Locker, such as the credit balance, the list of recently loaded tags, the recently used special tags, and other functions explained in detail in the technical manual.
  - The Lock Tag and Unlock Tag are used to enable or disable the DuoLocker. Further details are provided in the technical manual.
  - The Reset Tag is used to dissociate the main device from the DuoLocker. More details on the procedure for associating and dissociating the device can be found in the technical manual.

MAIN FEATURES

5. Security and Reliability

- Unique serial number for each DuoLocker, each Recharge Tag, and each Special Tag.
- Association procedure with the main device and encryption of communication between the DuoLocker and the main device.
- Use of certified encryption algorithms for secure communication.
- Authentication for every usage session and prevention of Man-In-The-Middle attacks.
- Use of secure devices for storing encrypted data.
- Unique encryption keys for each device.

MAIN FEATURES

6. Tag Security and Programming

- Tags are provided and programmed exclusively by Duolabs, using an asymmetric encryption algorithm with a Public Key and Private Key.
- All tags provided by Duolabs are verified and tested before being delivered to the customer.
- Tag Serialization. All Tags are serialized, and each Tag is programmed with a unique code delivered to the customer when purchasing the programmed Tags from Duolabs. This ensures market traceability.
- Usage Limits of Special Tags: All Special Tags have a usage limit in case of loss or theft.

MAIN FEATURES

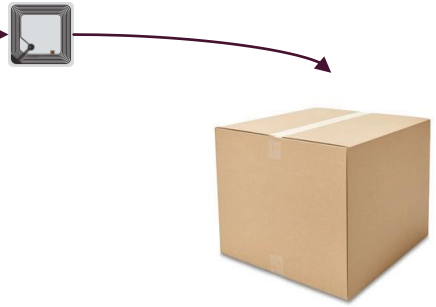
7. Tag Customization Based on the Client (Agency)

- Capability of recognizing and recharging only the Tags intended for a specific client, also referred to as an agency.
- Possibility to create a Recharge Tag-DuoLocker pair dedicated to a specific client.

- **EXAMPLE OF USE**

Duolabs Programming Facility

Customer Tag Application on the Box



End User Recharging Process

DUOLOCKER TECHNICAL SPECIFICATIONS

The technical specifications of the module can be summarized as follows:

General specs:

- Input power VCC at 5 Volts. Provided by the Coffee Machine using a 4 poles connector
- Power consumption typically < 200mA while in standby mode.
- UART settings: baudrate **115200** bps, data bits 8, parity **None,** stop bits **1.**
- Communication type synchronous.
- 1 Push button.
- 1 Status LED.

RFID specs:

- NFC operating frequency 13,56Mhz.
- Application RFID supported tags NFC Forum Type 2 Tag and ISO/IEC14443 Type A specifications (**NTag21x**).
- RFID supported Tags in Tag Hunting mode:
  - NFC Forum Type 1 ISO 14443A
  - NFC Forum Type 2 ISO 14443A
  - NFC Forum Type 3 ISO 14443A
  - NFC Forum Type 4 ISO 14443A, ISO 14443B
  - NFC Forum Type 5 ISO 15693

CONCLUSIONS

DuoLocker is an innovative, secure, and cost-effective system to protect your consumables business.

Take advantage of it now to safeguard your market and ensure the continuity of your business without letting anyone else benefit from your efforts!

Contact Duolabs now and request more information!

Duolabs Srl

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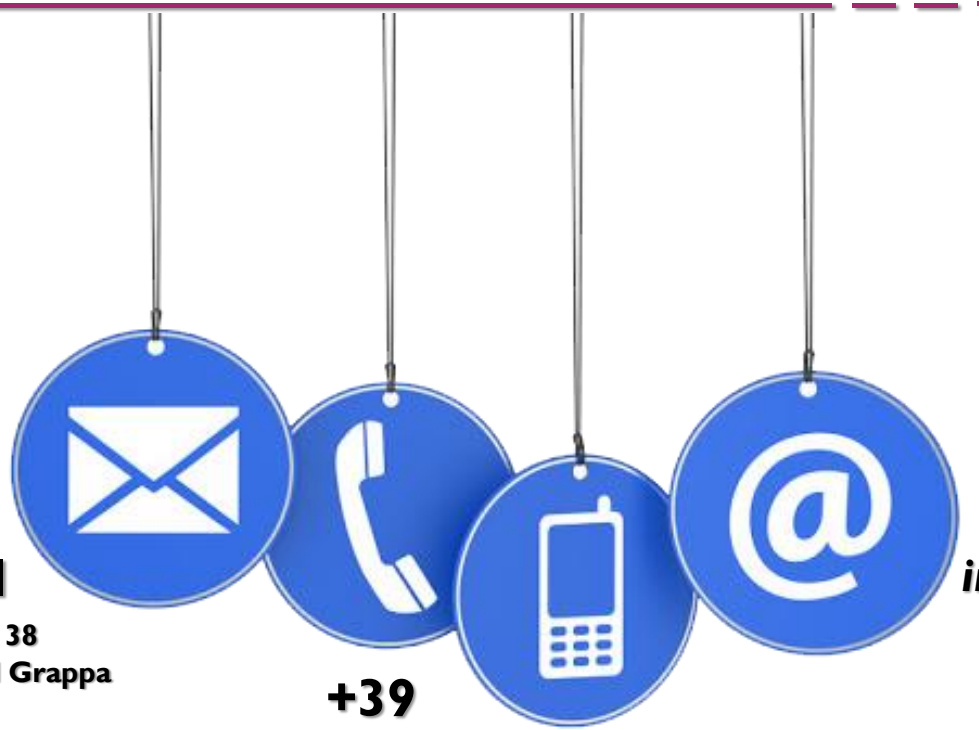
(C.E.O)

CONTACTS



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