TpC-PE1W123
TpC-PE1L123
TpC-PE1M123

Tapioca TpC-xE1x12x (Wireless to Ethernet, RS485) Datasheet

Tapioca monitors and modifies variables in a target system by wirelessly connecting to the target's system bus. Tapioca adapters support:

- Wire connection via RS485 and Ethernet.
- Wireless connection via NFC, Bluetooth Smart "Low Energy" (BLE), and Wi-Fi (IEE 802.11 b/g/n)
- LoRa and LTE-M/NBIOT LPWAN connections (extension board required).

3 November 2023
Version 1.4

Contents

1 Introduction

Connect existing electronic systems to mobile apps

The Tapioca line is designed to be added on a standard fieldbus or system bus that is already designed into the target system. These specific variants support physical connection on either RS485 or Ethernet and are only available in the IP67 case.

All Tapiocas offer the following range of standard RF channels:

- NFC
- Bluetooth Smart "Low Energy" (BLE)
- Wi-Fi (IEEE 802.11 b/g/n)

Tapioca extensions are available for the IP67 case to add long-range, low power RF channels:

- LoRa
- LTE-M, NBIOT

NFC and BLE channels allow direct, local connection between the Tapioca and a mobile app that can be automatically generated.

Wi-Fi can be configured for either local connection to mobile apps or connection to networks to send data or alarms to a cloud-based platform using the MQTT protocol.

Long-range, low power RF channels allow the sending of data or alarms to a cloud-based platform using the MQTT or the LoRaWAN protocol.

For connection to cloud platforms, messages and data can easily be formatted using Tapioca's embedded Virtual Machine.

Hierarchy between Tapioca and target electronic equipment

There are two ways for connecting Tapioca to a system bus (ex. Modbus RTU or TCP):

1. Tapioca acts as a server (slave), and the other devices (master) on the bus can access its variables.
2. Or, Tapioca acts as a client (master) and accesses specific addresses or address ranges in the memory space of the servers (slaves) that are available on the bus.

Depending on this choice, the variables shared between the Tapioca and the target will be located either in the target's memory or in the Tapioca's memory.

Table of Part Numbers

Part Number	Wireless protocol	Wire protocol	Prefix	Security	Casing	Power
TpC-PE1W123	NFC-BLE-Wi-Fi	Ethernet RS-485	12	Software	IP67 Compliant	5V-30V
TpC-PE1M123	NFC-BLE-Wi-Fi and LTE-M / NB-IOT	Ethernet RS-485	12	Software	IP67 Compliant	5V-30V
TpC-PE1L123	NFC-BLE-Wi-Fi and LoRa	Ethernet RS-485	12	Software	IP67 Compliant	5V-30V

About IoTize

IoTize is a French company based in Grenoble area:

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More information at: https://www.iotize.com/visit-iotize.html

2 Summary

The Tapioca is an adapter that replaces a traditional wire connection with a secure wireless link to mobile devices (iOS or Android) or to the cloud.

Radio channels

- Near Field Communication (NFC) Type5 tag (ISO/IEC 15693)
- Bluetooth Low Energy (BLE 4.2)
- Wi-Fi (IEEE 802.11 b/g/n)
- LoRa (LoRaWAN 1.0.3) *(optional with board)*
- LTE-M/NBIOT *(optional extension board)*

Wired communication channels

- The following ports are supported on this Tapioca Variant:
    - RS-485 with Modbus RTU.
    - Ethernet (802.3) with Modbus-TCP and socket connection to the lwM2M.
- For asynchronous serial communication (RS-485), either a transparent mode or Modbus RTU (Master and Slave) is supported.
- For Ethernet communication, either a lwM2M connection and Modbus TCP (Master and Slave) is supported.

Security features

- User management
- Configurable access profiles
- Configurable, encrypted passwords
- AES-128/256 module-level data encryption
- Configurable secure pairing with NFC

Casing versions

This Tapioca variant is available only in one version:

- Fixed IP67 Plastic case.

Electrical characteristics

- Input voltage: 5V to 30V
- Power consumption: from 15.2 to 100 mA at 12VDC
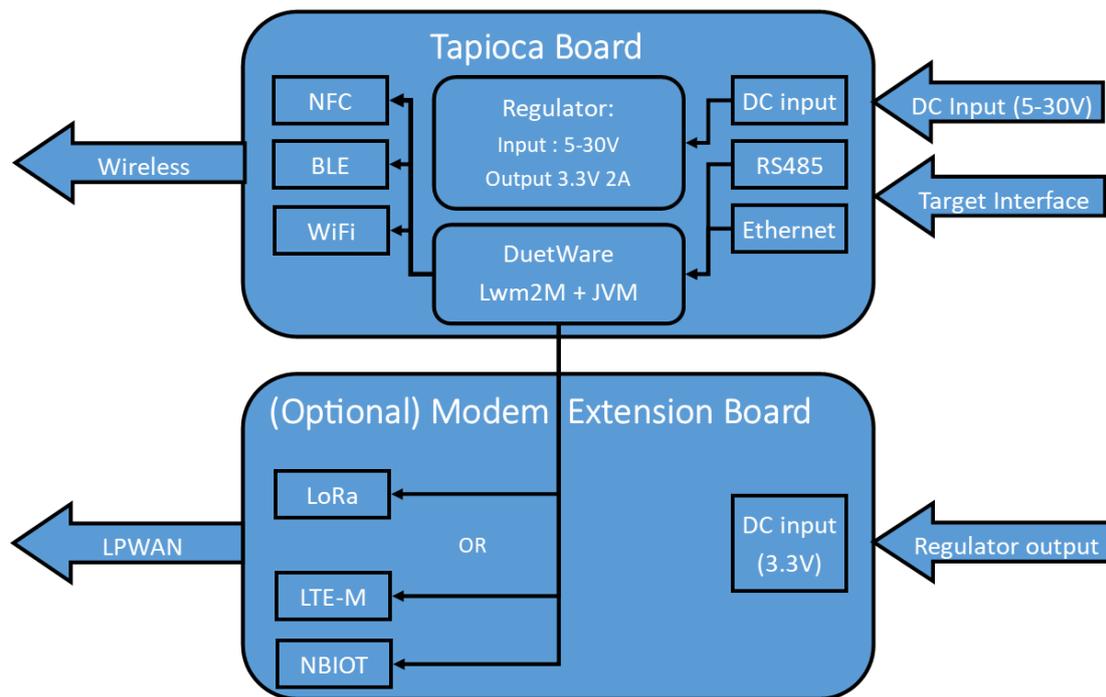- Standby mode: 4 ~ 5.8 mA at 12VDC

Temperature ranges

- Operating temperature: [-25°C, +50°C]
- Storage temperature: [-25°C, +70°C]

Acceptance

- RF certification: *(In testing)* CE (Europe), FCC (USA), IC (Canada).
- Green certification: REACH and RoHS compliant

3 Block diagram

The Tapioca is made up of a standard TapNLink module connected to a RS485 transceiver and a LAN transceiver. The firmware of the Tapioca gateways is the standard Duetware for TapNLink, TapNPass and Tapioca.

Two extension boards are available to add long-range, low-power wireless to any Tapioca (only available for Fixed IP67 Casing). The extension board is powered by 3.3V power supply from the Tapioca and is controlled by AT Commands. It is not possible to have LoRa and LTE-M/NBIOT in the same Tapioca, as they require different extension boards.

The communication mode is selected by configuring the module that is embedded in Tapioca.

3.1 Serial modes with RS485

Two modes are available for serial communication:

- **Transparent mode:** In this mode, Tapioca is used as a simple data transmission link (like a hardware cable). The protocol must be supported by the target application. The API provides basic functions such as "SendByte" and "GetByte".

- **Modbus RTU with access to variables:** In this mode, Tapioca can be either a Modbus server (slave) or Modbus client (master). In other words, variables can be considered either as being on the Tapioca (InTap variables) or on the target system. The API provides high level functions such as "ReadVariable" or "WriteVariable". A standard CSV file can be used to import the list of the available Modbus RTU registers.

3.2 Ethernet modes

Two modes are available for Ethernet communications:

- **Socket communication to the lwm2m:** By default, the Tapioca socket server is available on the Ethernet port. This socket server is the one that handles lwm2m requests (as for Wi-Fi). If needed, the Ethernet port can replace the Wi-Fi to access the lwm2m.

- **Modbus TCP with access to variables:** In this mode, the Tapioca can be considered either as a Modbus server or Modbus client. In other words, variables can be considered either as being on the Tapioca (InTap variables) or on the target system. The API provides high level functions such as "ReadVariable" or "WriteVariable". A standard CSV file can be used to import the list of the available Modbus RTU registers.

Note: For now, it is not possible to address multiple slaves in client mode using Modbus TCP.

4 Features

Tapioca offers no code integration of wireless radio interfaces that connect a target system to a local information appliance (smartphones, PDAs, tablets, PCs, etc.) or to a network gateway (WAN, LPWAN) and the cloud.

Tapioca can communicate directly with mobiles, tablets, and PCs via NFC, BLE or Wi-Fi. Users can use IoTize's app or their own custom apps to read/write target system data. In this case, the local information appliance can also serve as a network gateway to exchange data with the cloud using the MQTT protocol.

The Tapioca Wi-Fi or LPWAN channels (with optional LoRa, LTE-M/NBIOT extensions) can be configured to send data via MQTT to a cloud platform. The LPWAN extensions and the internal Virtual Machine allow the Tapioca to send alarms to the cloud at any time.

IoTize Tap Toolbox (Android or iOS) offers a generic interface app for communicating with the Tapioca-equipped target system. It eliminates the need to code apps in order to communicate with their target system and test connection parameters.

IoTize Tap Manager (Android of iOS) offers a generic interface for basic configuration of the Tapioca and creation of a customized human machine interface directly on the user's mobile. It eliminates the need to use a PC and server-based tools in order to create a customized user interface app.

IoTize Studio and Automatic App Generator, allow advanced configuration of Tapioca and creation of fully personalized, autonomous mobile apps.

4.1 Radio communication channels

4.1.1 Near Field Communication (NFC)

- Data transmission rate[1]:   2 kilobytes per second
- Range[2]:   up to 4 centimeters
- Supports use of NFC for dynamic wakeup and pairing of the BLE interface.

4.1.2 Bluetooth Low Energy (BLE)

- Max power: +9 dBm (conducted power)
- Data transmission rate: *In testing, to be completed.*
- Range[2]:   up to 30 meters

4.1.3 Wi-Fi (IEEE 802.11b/g/n)

- Max power: +20 dBm (conducted power)
- Data transmission rate: *In testing, to be completed.*
- Range[2]:   up to 90 meters

4.1.4 LoRa

- Max power: +22 dBm at 868/915MHz
- Data transmission rate[3]:   up to 21.9 kbits/s (SF7, bandwidth 500)
- Range[2]:   up 10 kilometers

4.1.5 LTE-M/NBIOT

- Max power: +23 dBm in each band
- Data transmission rate: *In testing, to be completed.*
- Range[2]:   *In testing, to be completed.*

Notes:

1. *Average speed while acquiring 1000 times 220 bytes from the target.*
2. *Measure line-of-site in an environment free of obstructions and rebound effects.*
3. *Data transmission rate from module specification.*

4.2 Wired communication channels

For Tapioca **TpC-xE1x123** the following wired communication channels are available.

4.2.1 RS485

- Baud rate: up to 250 kbps
- Input Hysteresis: 100mV
- ESD protection:
    - Human-Body Model: +/-15kV
    - Air-gap discharge (IEC 61000-4-2):   +/-15kV
    - Contact discharge (IEC 61000-4-2):   +/-8kV

4.2.2 Ethernet

- Baud rate: up to 10 Mbps
- ESD Protection: Class 3A
    - Contact Discharge: +/-8kV
    - Air-Gap Discharge: +/-15kV
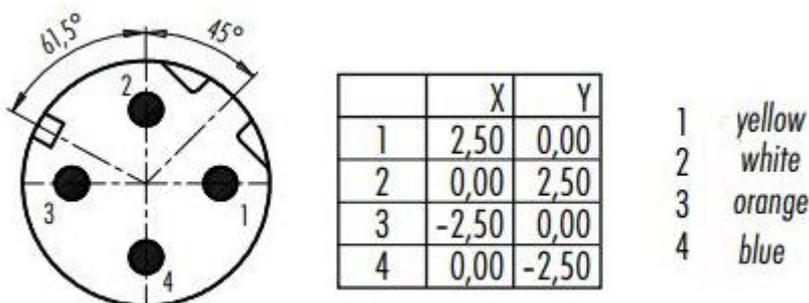
4.2.3 Communication cables

The communication cables are not included.

Important Note: *It is requested to only use shielded cables to connect the Tapioca to the target device.*

Following are the main characteristics for the cables:

Type: M12 Cable (IP67)
Ethernet: M12 D-Coded Male Cable 4 Contacts
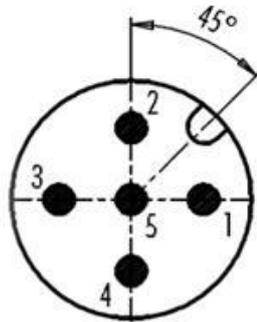RS485:   M12 A-Coded Male Cable 5 Contacts

4.2.3.1   Ethernet M12 cable pinout

Pin M12 D-Coded	Ethernet signal	Pin RJ45
1	TX+	1
2	RX+	3
3	TX-	2
4	RX-	6

4.2.3.2 RS485 M12 cable pinout

M12 A-Coded Male Connector 5 Pin Pinout

Pin M12 A-Coded	RS485 signal
1	FCT
2	V+
3	GND
4	A/RS485+
5	B/RS485-

Note: In standard configuration, the FCT pin is connected to a 4-20mA current loop.

4.3 Electrical characteristics

4.3.1 Power supply

- Maximum DC supply voltage: 30V
- Minimum DC supply voltage: 5V
- Standard DC supply voltage: 5V, 12V or 24V
- Tapioca DC internal voltage: 3.3V

Important Note: For safety reasons, the Tapioca must be powered by a circuit breaker.

4.3.2 Power consumption

The power consumption depends on the CPU Frequency, three different frequencies can be set: Normal, Fast and Slow. The default is the normal frequency, if needed the frequency can be lowered to minimize the power consumption of the Tapioca. Please note that the CPU Frequency must be carefully changed because it will affect the performance of the CPU.

Please note that the power consumption values below are average values and that brief power consumption peaks of several mA are expected during radio communications.

4.3.2.1 Power consumption with no Extension Board

Bellow the power consumption for the Tapioca **TpC-xE1W123** at normal CPU Frequency with a stable power source of 12VDC:

Normal CPU Frequency				
Operating Mode	NFC Only[1]	Wi-Fi Off[2]	Wi-Fi Hotspot[3]	Wi-Fi Station[3]
RS485				
Standby	4 mA	4 mA	4 mA	4 mA
Idle[4]	19 mA	20.5 mA	48 mA	23 mA
NFC Tx/Rx	19 mA	20.5 mA	48 mA	23 mA

BLE Tx/Rx	-	27 mA	48 mA	30 mA
Wi-Fi Tx/Rx	-	-	52 mA	35 mA
Ethernet				
Standby	5.8 mA	5.8 mA	5.8 mA	5.8 mA
Idle[4]	52.5 mA	54 mA	82.5 mA	57 mA
NFC Tx/Rx	51.5 mA	54 mA	82.5 mA	57 mA
BLE Tx/Rx	-	60 mA	83.5 mA	59 mA
Wi-Fi Tx/Rx	-	-	86 mA	68 mA

Bellow the power consumption for the Tapioca **TpC-xE1W123** at fast CPU Frequency with a stable power source of 12VDC:

Fast CPU Frequency				
Operating Mode	NFC Only[1]	Wi-Fi Off[2]	Wi-Fi Hotspot[3]	Wi-Fi Station[3]
RS485				
Standby	4 mA	4 mA	4 mA	4 mA
Idle[4]	25.5 mA	27 mA	55.5 mA	29 mA
NFC Tx/Rx	25 mA	27 mA	55.5 mA	29 mA
BLE Tx/Rx	-	32.5 mA	55.5 mA	31.5 mA
Wi-Fi Tx/Rx	-	-	59 mA	40 mA
Ethernet				
Standby	5.8 mA	5.8 mA	5.8 mA	5.8 mA
Idle[4]	59 mA	61.5 mA	97 mA	66 mA
NFC Tx/Rx	58 mA	61.5 mA	97 mA	66 mA
BLE Tx/Rx	-	70 mA	97 mA	70 mA
Wi-Fi Tx/Rx	-	-	100 mA	81 mA

Bellow the power consumption for the Tapioca **TpC-xE1W123** at slow CPU Frequency with a stable power source of 12VDC:

Slow CPU Frequency				
Operating Mode	NFC Only[1]	Wi-Fi Off[2]	Wi-Fi Hotspot[3]	Wi-Fi Station[3]
RS485				
Standby	4 mA	4 mA	4 mA	4 mA
Idle[4]	15.3 mA	17 mA	43.5 mA	20.5 mA
NFC Tx/Rx	15.2 mA	17 mA	43.5 mA	20.5 mA
BLE Tx/Rx	-	24 mA	44 mA	26 mA
Wi-Fi Tx/Rx	-	-	48 mA	30.5 mA
Ethernet				
Standby	5.8 mA	5.8 mA	5.8 mA	5.8 mA
Idle[4]	48.5 mA	50 mA	78 mA	53 mA
NFC Tx/Rx	48 mA	50 mA	78 mA	53 mA
BLE Tx/Rx	-	57 mA	78 mA	58 mA
Wi-Fi Tx/Rx	-	-	82 mA	68 mA

Notes:

1. *BLE and Wi-Fi disabled by configuration, only NFC available.*

2. *Wi-Fi disabled by conf, NFC and BLE available.*
3. *NFC and BLE are also activated.*
4. *BLE and Wi-Fi in advertising mode.*

4.3.2.2 Power consumption with LoRa Extension Board

In testing, to be completed.

4.3.2.3 Power consumption with LTE-M Extension Board

In testing, to be completed.

4.4 Radio specifications

4.4.1 Bluetooth Low Energy (BLE 4.2) and Wi-Fi (IEEE 802.11 b/g/n)

For details, see ESP32 specifications.

Parameter	Min	Typ	Max	Unit
Wi-Fi Center frequency range of operating channels	2412	-	2484	MHz
Wi-Fi Rx sensitivity[1]	-70	-93	-98	dBm
Wi-Fi Tx power[1]	+10	-	+20	dBm
BLE RX Sensitivity @30.8% PER	-94	-93	-92	dBm
BLE Tx power	-12	0	+9	dBm

Notes:

1. *Typical value, it depends on the type of modulation.*

4.4.2 LoRa (LoRaWAN 1.0.3)

For details, see LoRa-E5-HF specifications.

Parameter	Min	Typ	Max	Unit
Frequency range	868	-	915	MHz
LoRa Rx sensitivity at 868MHz	-	-135	-137	dBm
LoRa Tx max power at 868MHz @SF12, BW125kHz	-	+22	-	dBm

4.4.3 LTE-M/NBIOT

For details, see Monarch 2 GM02S specifications.

Parameter	Min	Typ	Max	Unit
Frequency bands	B1, B2, B3, B4, B5, B8, B12, B13, B14, B17, B18, B19, B20, B25, B26, B28, B66, B71, B85			
LTE-M/NBIOT Low Bands[1] Rx sensitivity	-	-105	-	dBm
LTE-M/NBIOT High Bands[2] Rx sensitivity	-	-106	-	dBm
LTE-M/NBIOT max power for each band	+22	+23	+24	dBm

Notes:

1. *Low Bands: B5, B8, B12, B13, B14, B17, B18, B19, B20, B26, B28, B71, B85.*
2. *High Bands: B1, B2, B3, B4, B25, B66.*

4.5 Security features

The communication chain is fully secured using classic techniques based on SCRAM (Salted Challenge Response Authentication Mechanism):

- Authentication: secured passwords or signed tokens
- Encryption: AES-128/256

4.6 Embedded user's memory

Configuration including access control data is stored into a 16KB of FLASH.

Java program and volatile data used for Java must be smaller than 64KB.

4.7 Low power modes

Such as all IoTize products, the Tapioca can be switched to low power mode. For now, only standby mode is available.

When in standby mode, wake-up of the Tapioca is possible by NFC or by a configurable periodic timer.

4.8 Temperature ranges

4.8.1 Operating temperature

The behavior and the radio characteristics have been tested to guarantee a correct operation in the range: **[-25°C, +50°C]**.

All the components used for this device are industrial grade components ([-40°C, +85°C] or better), moreover the main microcontroller has an operating temperature range of [-40°C, +105°C]. Theoretically the Tapioca can operate for temperatures higher than +50°C but we do not guarantee it for some reasons:

- The operating temperature is the temperature of the component, not the external environment.
- The fixed IP67 housing is hermetically sealed, and the housing temperature can be much higher than the environmental temperature.

Some connectors used in the Fixed IP67 Case are designed to operate in [-25°C, +85°C] temperature range.

It is advisable to use the Tapioca in a ventilated area and to not expose it to direct sunlight to minimize the heat in the case.

4.8.2 Storage temperature

The storage temperature range for the Tapioca is: **[-25°C, +70°C]**.

We do not guarantee a storage temperature higher than +70°C because of the sticker on the product.

5 Software environment

All IoTize hardware products are supported by a complete software ecosystem and web applications that simplify and speed their configuration, integration with cloud platforms, and/or creation of mobile apps.

Included in this ecosystem are:

- **Duetware** configurable device firmware pre-implementing all communication, security and data handling features
- **Tap Toolbox** mobile app provides utilities for setting communication parameters, testing the connection with target systems and reading/writing data to fieldbus registers.
- **Tap Manager** mobile app for device management, basic configuration, and user interface creation
- **IoTize Studio** PC software environment for advanced feature configuration
- **Automatic App Generator** for creation of mobile app projects and user interface apps for Android and iOS mobiles.

5.1 Device configuration

Tapioca embeds Duetware on the radio module. This can be initially configured using the Tap Manager app or using IoTize Studio PC software to configure and personalize advanced features.

Tap Manager allows device feature configuration and creation of a user interface app directly from a mobile phone.

IoTize Studio provides a complete interface for customizing the device configuration, writing code for the embedded Virtual Machine (edge data processing, cloud integration) and generating user interface apps with the Automatic App Generator. IoTize Studio provides:

- Drag-and-drop configuration of target data addresses from the target's register file
- Instant configuration transfer without extensive hardware installations
- Immediate configuration verification on the designer's PC and smartphone
- Mobile app and project generation for iOS and Android

5.2 Mobile device support

Tapioca includes radio implementations for NFC, Wi-Fi and BLE, which are compatible with a wide range of mobile devices running Android or iOS operating systems.

Mobile apps running on either iOS or Android can be automatically generated. Each variable can be associated with advanced graphical displays or controls (gauges, charts, bars, pies, …) and various APIs make it possible to enrich the mobile app with external components. The project source files can also be downloaded in order to modify the app at the source level. Traditional (and easy to modify) technology based on HTML, CSS and JS are used for the graphical interface displays and controls.
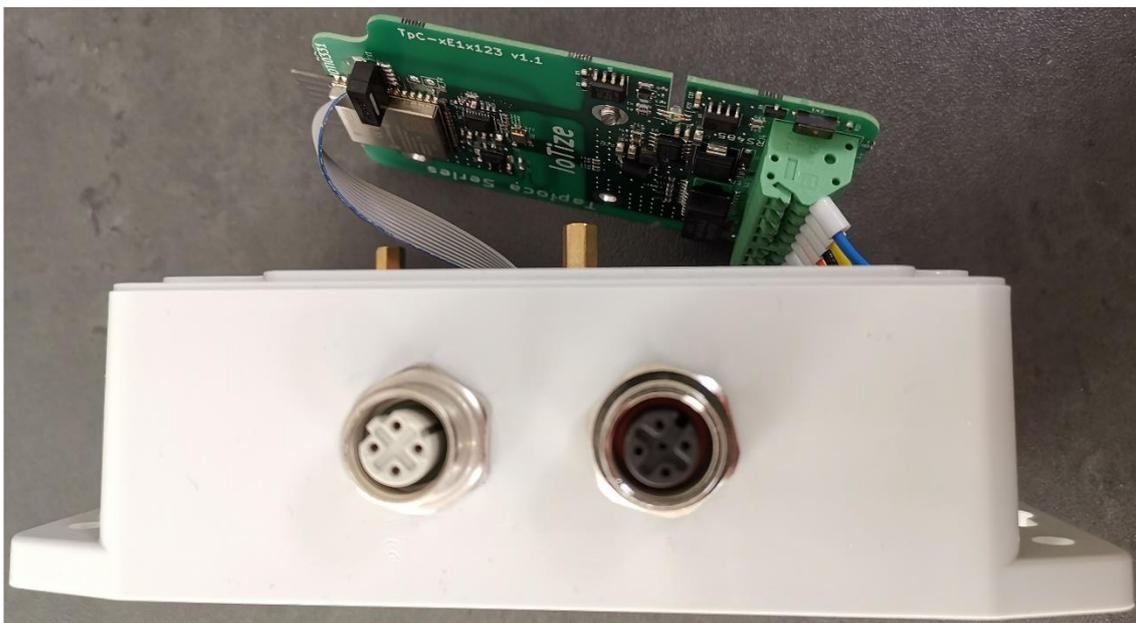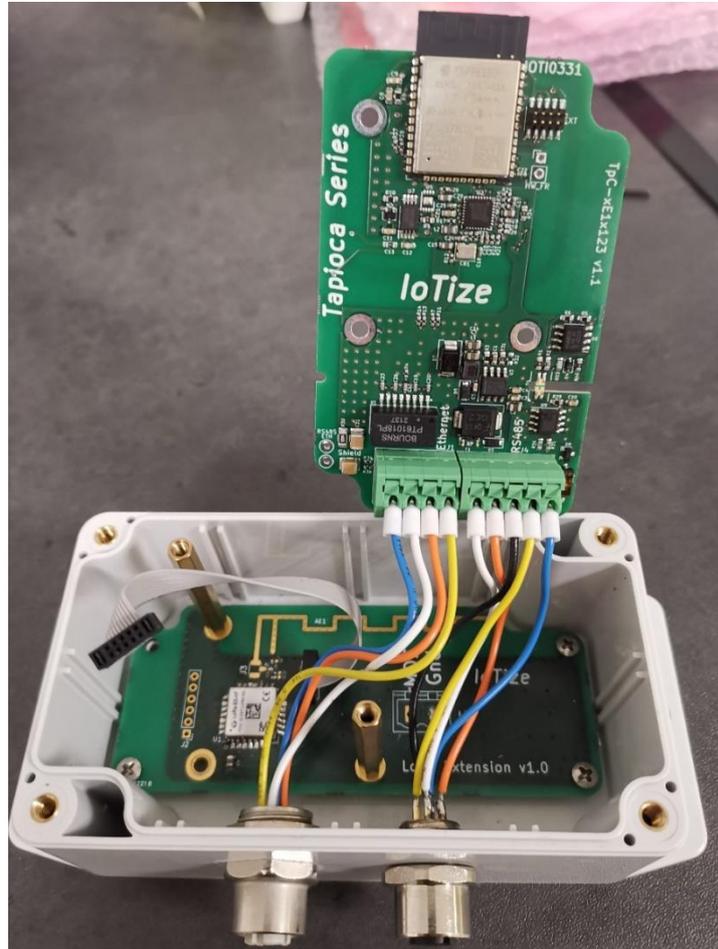
5.3 Cloud support

Tapioca includes an open source MQTT interface. Full information about IoTize cloud support for Tapioca is provided in the IoTize Documentation center.

6 Hardware Description

6.1 Overview

The Tapioca **TpC-xE1x123** is only available in Fixed IP67 Casing.

Below is an overview of this casing (with a LoRa extension board):

6.2 Connectors

Two connector types are available for the Fixed IP67 Case, M12 or Gland connectors.

Note: *M12 is the default connector type for Fixed IP67 Case.*

6.2.1 M12 connectors

Type:	M12 Connector (IP67)
Ethernet:	M12 D-Coded Female Connector 4 Contacts
RS485:	M12 A-Coded Female Connector 5 Contacts

The pinouts of both M12 connectors are available in the appendix.

Below is the placement of the M12 connectors:
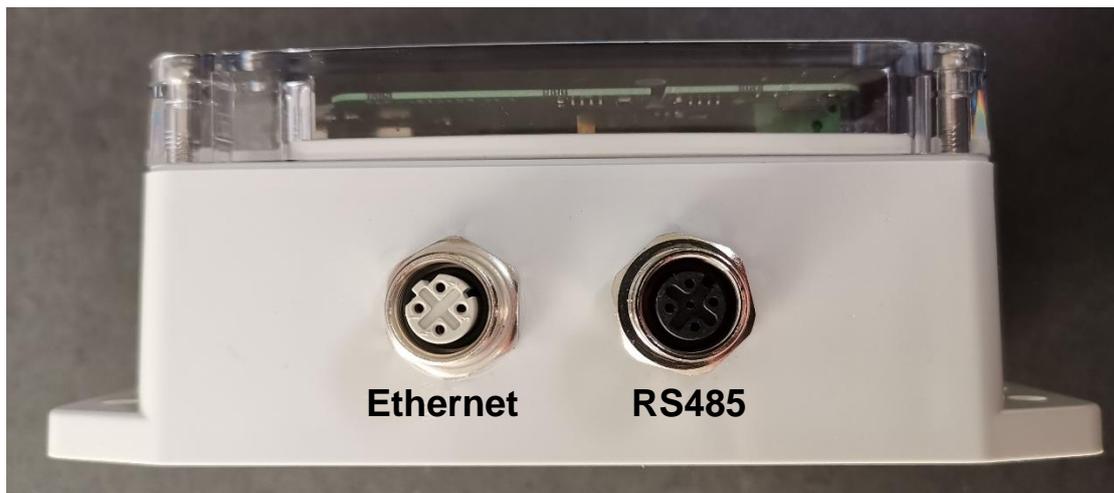
6.2.2 Gland connectors

Type:	Gland Connector (IP67)
Ethernet:	PG9 Gland Connector
RS485:	PG9 Gland Connector

Gland connector is a low-cost alternative to the M12 connector.

Below is the placement of the gland connectors:

6.3 Hardware factory reset

A Hardware Factory Reset jumper is available on Tapioca, by default this jumper is not solder and must be added if needed. The jumper is marked "HW_FR" on both sides of the PCB.

The instructions for resetting to factory settings are available on the technical documentation.

Note: *The hardware factory reset can be disabled by configuration.*

Below are zoomed-in photos of the "HW_FR" jumper on both sides of the Tapioca **TpC-xE1x123** board:
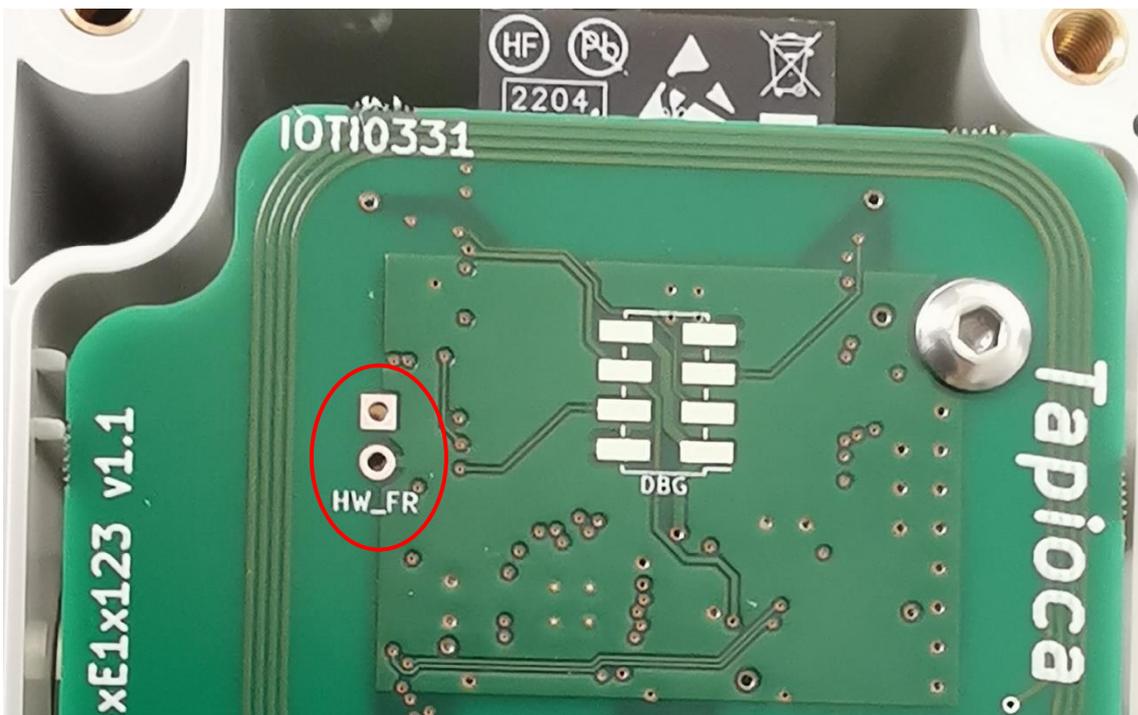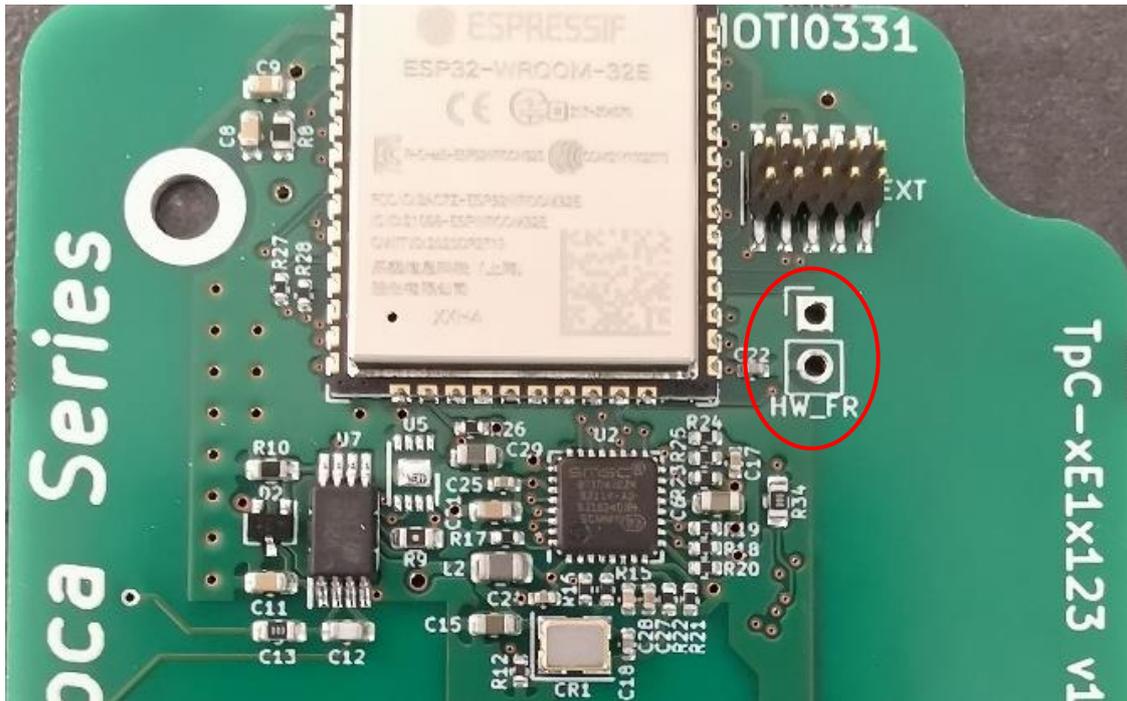
6.4 RS485 termination

As required by the EIA-485 standard the end devices of a RS485 bus must have a 120ohm resistor between differential signals. To respect this standard, every Tapioca device includes a 120ohm resistor and a hardware switch to connect it between the two signals.

The switch is not directly accessible from the top of the product, the two boards must be disassembled.

__Important Note:__ In a polluted environment such a factory it is recommended to enable the RS485 termination resistor. By default, the switch is off.

Below is a zoomed-in view of the Tapioca **TpC-PE1x123** board with the 120ohm resistor switch circled:
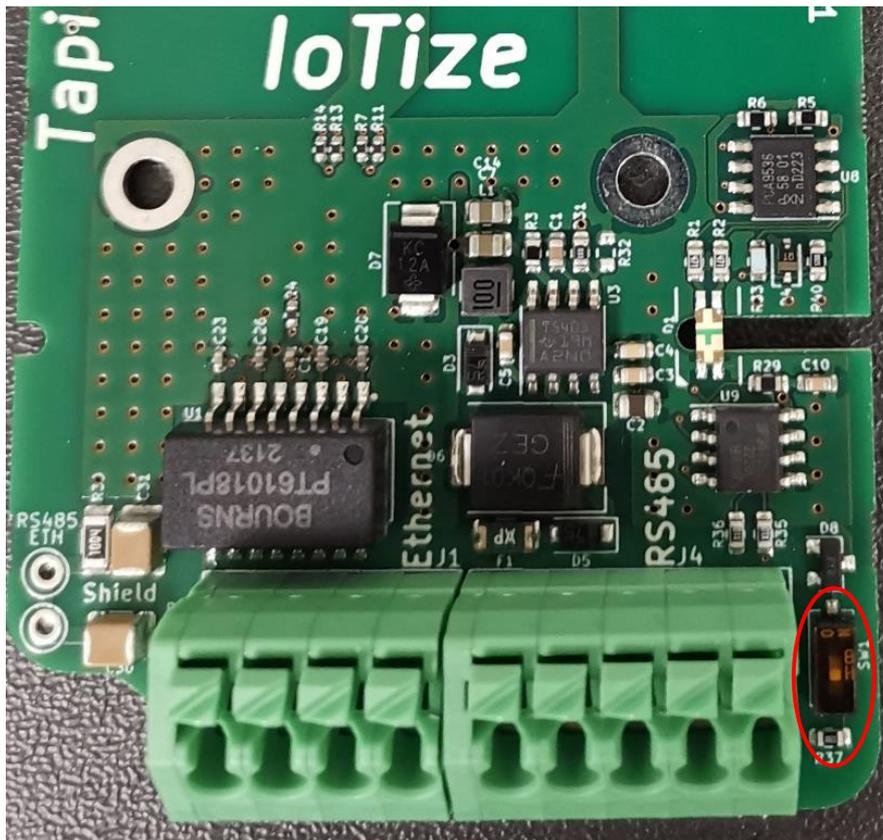
6.5 Configurable RGB LED

A RGB LED is available on Tapioca. This LED is not controlled by the firmware but fully configurable from the embedded Java Virtual Machine.

Some examples are available in IoTize Studio installation files. Moreover, when setting up a new project a template (adapted to the selected Tapioca) is used to generate the Java code of the project. This template contains all peripherals or pins configuration and the basic functions to control the LED on the desired Tapioca.

Note: On **TpC-xE1x123** *Family products, the LED is controlled by an I2C expander not a set of standard main microcontroller GPIO.*

Note: On early versions of Tapioca boards, the led is bicolor (red and green). Please read the readme file in IoTize Studio example directories to select the right java file.

Below is a picture highlighting the location of the led on the Tapioca **TpC-PE1x123**:
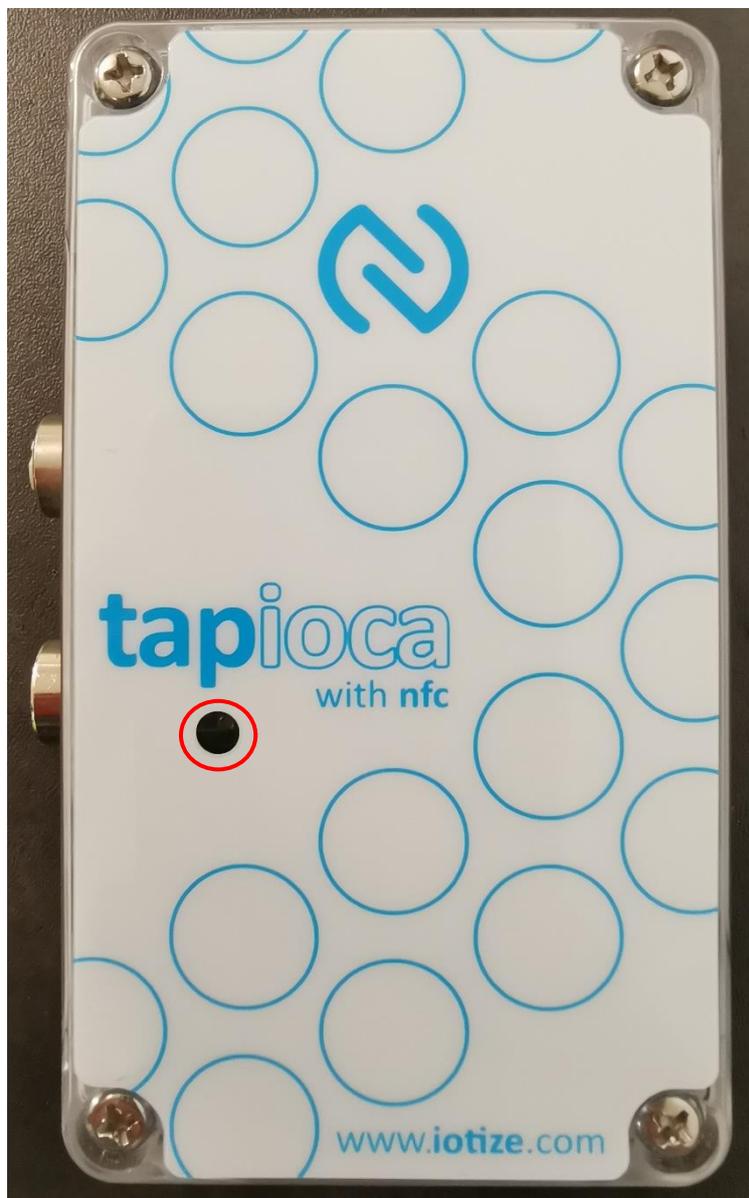
7 Mechanical characteristics

The Tapioca Ethernet & RS485 is only available in the Fixed IP67 casing.
This case is IP67 certified.

Dimensions (body):	L = 115 mm x W = 65 mm x H = 55 mm
Total length:	145 mm
Weight (without cables):	240g (+/- 5g)
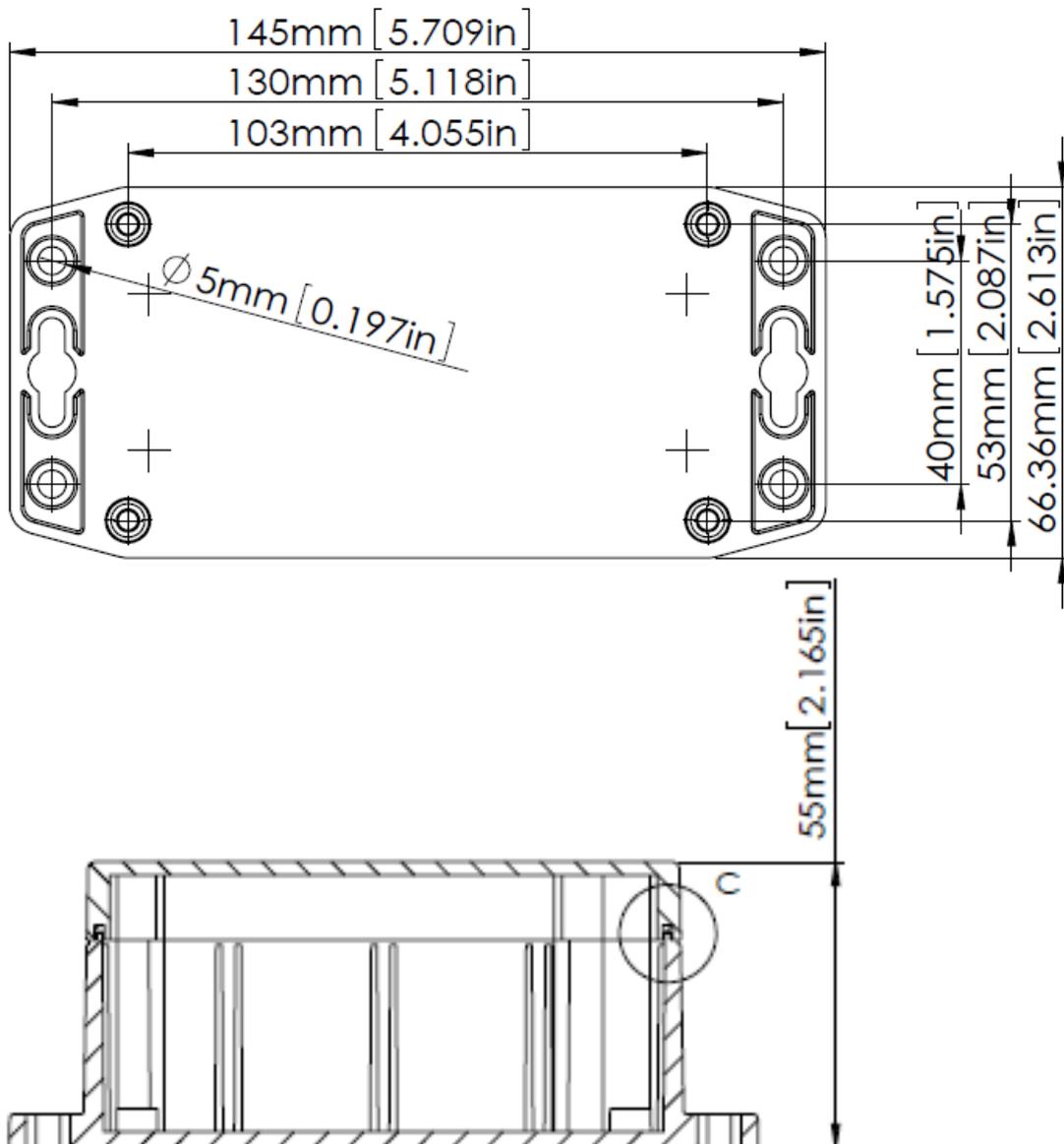
8 Regulatory compliance

8.1 CE certification (Europe)

The communication module used in Tapioca is tested for the following standards:

- EN 300 328 (V2.2.2)
- EN 301 489-1 (V2.2.3)
- EN 62368-1 (2014+A11/2017
- EN 62311 (2008)

Tapioca has been tested for the following standards:

- EN 62368-1 (2014+A11/2017)
- EN 62311 (2020)
- EN 55035 (2017+A11/2020) / EN 61000-6-2 (2005 & 2019)
- EN 55032 (2015+A11/2020)
- ETSI 301 489-1 (V2.2.3)
- ETSI 301 489-17 (V3.2.4)

8.2 RoHS and WEEE

Tapioca complies with:

- Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances (ROHS) in electrical and electronic equipment.
- Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE).

8.3 FCC (USA)

This product contains a transmitter module **FCCID: 2AC7Z-ESP32WROOM32E**.

To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must not be collocated or operating in conjunction with any other antenna or transmitter.

LoRa and LTE-M variants are in testing, to be completed.

8.4 IC (CANADA)

This product contains a transmitter module **IC: 21098-ESPWROOM32E**.

Ce produit contient un module transmetteur **IC: 21098-ESPWROOM32E**.

LoRa and LTE-M variants are in testing, to be completed.

9 Ordering information

Example part number: **TpC-PE1W123[1]**

Product Line	Use Mode	Physical Interface	Radio Interface[1]	Product Prefix	Security
TpC	**P**	**E1**	**W**	**12**	**3**

Product Lines: **TpC = Tapioca**

Use Mode: **P**   **= Fixed IP67 casing**

F[2]   = Fixed Standard DIN rail casing

N[3]   = Nomad (not available for Tapioca)

Physical interface: **E1**   **= Ethernet & RS485**

E0   = Ethernet

S4   = Serial RS485

S2   = Serial RS232

S0   = USB 2.0

C0   = CAN 2.0

Radio interface[3]:   *T[4]   = NFC Only*

R[5]   = BLE

W   = Wi-Fi, BLE

L   = LoRa, Wi-Fi, BLE

M   = LTE-M, NBIOT, Wi-Fi, BLE

Security: **3**   **= software-based security**

5[6]   = hardware-based security with embedded secure element

Notes:

1. *The features of the part number shown in the table are indicated in bold.*
2. *This case is not available for this version of Tapioca.*
3. *This case is not available for Tapioca.*
4. *All products include NFC by default for advanced functionalities such as secure wake-up and pairing.*
5. *These radio interfaces are not available for Tapioca.*
6. *Secure element management is not implemented on Tapioca.*

10 Appendices

10.1 EU Declaration of Conformity (DoC)

EU Declaration of Conformity (DoC)

We, the undersigned:	IoTize S.A.S. 960, Chemin de la Croix Verte 38330 Montbonnot St Martin France Email: contact@iotize.com Phone: +33 4 76 41 87 99
Designated product:	Tapioca Wireless Adapter RS485, Ethernet to NFC, BLE, WiFi

Model: TpC-xE1x12x
Frequency band 1:   2412-2484 MHz
Max Power: 19.68 dBm (802.11g)

Certify and declare: under our sole responsibility that the designated product is in conformity with the essential requirements and provisions of the following European Directives:

☒ Directive **2014/53/EU** of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of **radio equipment (RED)**.
The conformity of the designated product(s) with the provisions of this European Directive is given by the compliance with the following European Standard(s):

Article 3.1a concerning the requirements relative to health and safety protection of people and animals, and the protection of property with reference to 2014/35/EU directive.	- EN 62368-1 (2014+A11/2017) - EN 62311 (2020)
Article 3.1b concerning the requirements relative to protection with respect to Electromagnetic compatibility, with reference to 2014/30/EU directive.	- EN 55035 (2017+A11/2020) / EN 61000-6-2 (2005 & 2019) - EN 55032 (2015+A11/2020) - ETSI 301 489-1 (V2.2.3) - ETSI 301 489-17 (V3.2.4)
Article 3.2 concerning the requirements relative to proper use of the radio frequency spectrum.	- EN 300 328 (V2.2.2)

☒ Directive **2011/65/EU** of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances **(ROHS)** in electrical and electronic equipment.

☒ Directive **2012/19/EU** of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment **(WEEE)**.

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EU Declaration of Conformity (DoC)

Important Notice:	Red approval is only valid for products in delivery state, including standard hardware and software. The user is responsible for operating the radio equipment and the accessories as intended and in accordance with the provided instructions. It is the responsibility of the OEM manufacturer to demonstrate compliance with all applicable EU directives and standards. The IoTize declaration of conformity serves as a support input for the declaration of conformity for the final equipment.

The technical construction file is available from:

IoTize S.A.S

960 Chemin de la croix verte

38330 Montbonnot Saint Martin

Phone: +33 4 76 41 87 99

Issued on April 25th, 2023.

Name and position of person binding the manufacturer or his authorized representative:

Name: Francis Lamotte
Position: President
Email: francis.lamotte@iotize.com

Signature:

iOTize
960, chemin de la Croix Verte
38330 Montbonnot-St-Martin - FR
Tel : 0476 41 87 99
RCS : 825 335 896 - TVA : FR56825335896
SAS au capital de 858 020 €
contact@iotize.com

iOT
iotize.com

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10.2 Recycling

	This symbol of the crossed out wheeled bin indicates that the product (electrical and electronic equipment) should not be placed in municipal waste. Check local regulation for disposal of electronic products.

10.3   Ethernet M12 connector pinout

![iOTize logo]

M12_Connector_Ethernet_Pinout.odt

IP67 Tapioca – Ethernet M12 Connector Pinout
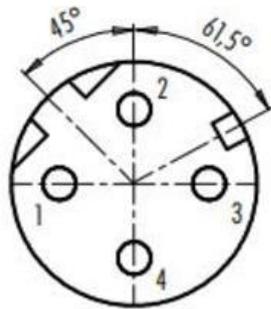
	X	Y
1	-2,50	0,00
2	0,00	2,50
3	2,50	0,00
4	0,00	-2,50

1 yellow
2 white
3 orange
4 blue

PIN	Wire Color	Signal
1	Yellow	TX+
2	White	RX+
3	Orange	TX-
4	Blue	RX-

Note: For Ethernet we use connector (Female) 21 03 371 2403 (HARTING).
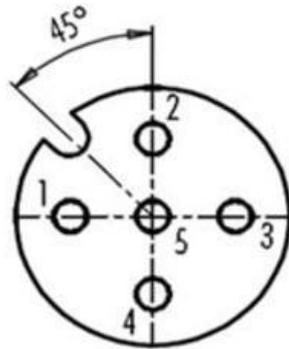
1

10.4 RS485 M12 connector pinout

![IOTize logo]

M12_Connector_RS485_StandardPinout.odt

IP67 Tapioca – Standard RS485 M12 Connector Pinout

M12 A-Coded Female Connector 5 Contacts Pinout

	X	Y
1	-2,50	0,00
2	0,00	2,50
3	2,50	0,00
4	0,00	-2,50
5	0,00	0,00

PIN	Wire Color	Signal
1	TBD	FCT
2	TBD	V+
3	TBD	GND
4	TBD	A/RS485+
5	TBD	B/RS485-

Note: The wires must not be yellow, white, orange or blue.

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11 History

Date	Version	Author	Modification
Nov. 2021	0.1	FL	First draft preliminary release version.
Jan. 2022	0.2	FL, JH	Text corrections.
Jan. 2022	0.3	SG	Update part numbers.
Mar. 2022	0.4	SG	Corrections and part number updates.
Oct. 2022	1.0	ES, SG	First release version for TpC-xE1x123 Family.
Nov. 2022	1.1	ES	Correction of the power consumption in standby mode.
Jan. 2023	1.2	ES	Update operating and storage temperatures. Update ordering information. Rename the file.
Mar. 2023	1.3	ES	Update input voltage.
Nov. 2023	1.4	ES	Fix Recycling appendices. Update Regulatory compliance. Add "About IoTize" section and fix "Power" in "Table of Part Numbers" in Introduction. Add important notes to RS485 termination and Power supply sections. Add EU Declaration of Conformity (DoC). Add Gland connectors section. Update Block diagram. Update Configurable RGB LED. Update RS485 ESD protection information.