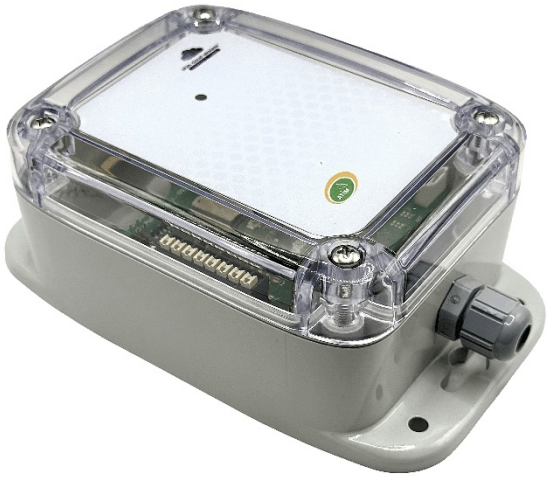
atim cloud wireless™
PRODUCT LINE

Atim Cloud Wireless®

LoRaWAN Relay

User Guide



Models concerned :

ACW/LW8-RPT-O

LoRaWAN™

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	Product references	Product Version (Visible on the product label)
LoRaWAN	ACW/LW8-RPT-O	A.0

Version history of this document

Version	Date	Description	Author	Affected Software Version /Revision
1.2	04/02/2026	Document Corrections	FR	V1.0.0 / A.0
1.1	02/10/2025	Initial document	JR	V1.0.0 / A.0

Disclaimer

The information contained in this document is subject to change without notice and does not represent a commitment on the part of ATIM.

Trademarks and copyrights

ATIM, ACW ATIM Cloud Wireless®, ARM Advanced Radio Modem® are registered trademarks of ATIM Sarl in France. Other trademarks mentioned in this document are the property of their respective owners.

Declaration of conformity

All ACW Atim Cloud Wireless® products comply with the regulatory requirements of Directives 2014/53/EU (RED) and 2011/65/EU (RoHS). When used as intended, the following standards have been applied :



1 Safety (Article 3.1a of Directive 1999/5/EC)

NF EN60950-1 Ed. 2006/A1:2010/A11:2009/A12:2011/A2:2013 (health)

EN62311:2008 (Power> 20mW) EN50385 EN50581

2 Electromagnetic compatibility (Article 3.1b of Directive 1999/5/EC)

EN 301489-3 v2.1.0, EN 301489-1 V2.1.1

3 Efficient use of the radio frequency spectrum (Article 3.2 of Directive 1999/5/EC)

ETSI EN300 220-2 v3.1.1

4 Cyber Security

The **EN18031** standard is composed of 3 points:

EN 18031-1 – Network-Connected Devices

EN 18031-2 – Wireless devices processing personal data

EN 18031-3 – Wireless devices involved in monetary transactions

All ACW Atim Cloud Wireless® products are not affected by points (b) and (c), as personal and transaction data are stored on the gateway and server side (LNS, IoT platform, and smartphone terminals, computers, etc.).

Regarding point (a), ATIM equipment operating in LoRaWAN, or proprietary LoRa are not concerned because they are not connected directly on the networks. Direct access is not possible from the LAN network or from the Internet.

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Environmental recommendations

a. Environment

Observe the storage and operating temperature ranges for the products. Failure to comply with these instructions could disrupt operation and even damage the equipment.

Follow the precautions and instructions below to ensure your safety and that of your environment and to prevent damage to your device.



General Hazard – If instructions are not followed, there is a risk of damage to equipment.

This product is powered by low voltage 10 to 30V direct current only – Be careful to check the polarity!



This symbol means that the product should not be disposed of with unsorted household waste. This product is subject to selective collection of electrical and electronic equipment, in accordance with the regulations in force. At the end of its life, it must be deposited at a collection point provided for this purpose (waste disposal centre, take-back point at a distributor, specialised sector, etc.), in order to allow: the recovery and recycling of materials, the limitation of the impact on the environment and human health. For more information on the collection and recycling channels available, check with your local authorities, your distributor or the manufacturer where you purchased the product.

a. Radio

Modems in the ACW range are radio communication modems that use ISM (Industrial Scientific Medical) bands, which can be used freely (free of charge and without authorization) for industrial, scientific, and medical applications.

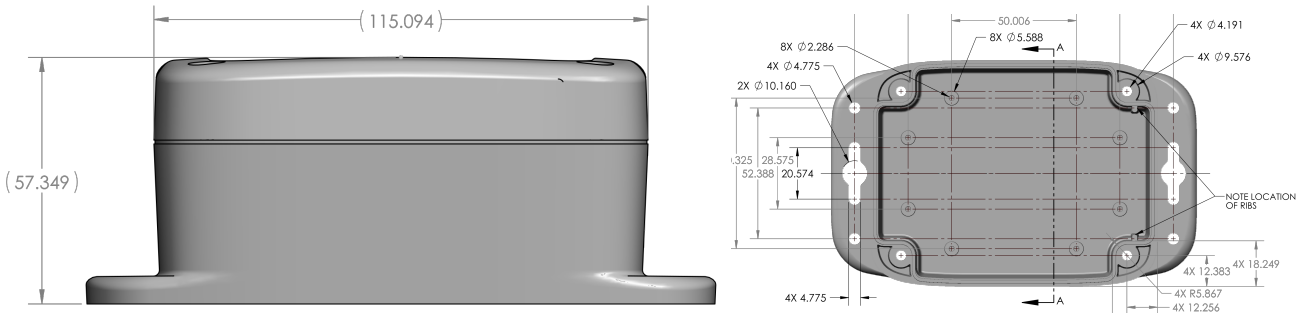
Technical characteristics

Dimensions	147 x 87 x 58 mm – see Dimensions Dimensions
Antenna	Built-in (1/4 wave)
Temperature	-20°C to +55°C (Operating)
	-40°C to +70°C (storage)
Fixation	By 4 screws or 2 hose clamps
Case	
Feeding	1 pack of 4 Lithium batteries (14.4Ah) External power supply or photovoltaic panel option
Weight	100 g
Frequency	863 – 870 MHz
Power	25 mW (14 dBm)
Stack	LoRaWAN : v1.0.4 LBM

Box

a. Dimensions

The dimensions below are given in millimetres.



b. Installation

The housing is secured by four screws that fit into the four mounting holes on the back of the case or with one or two hose clamps.

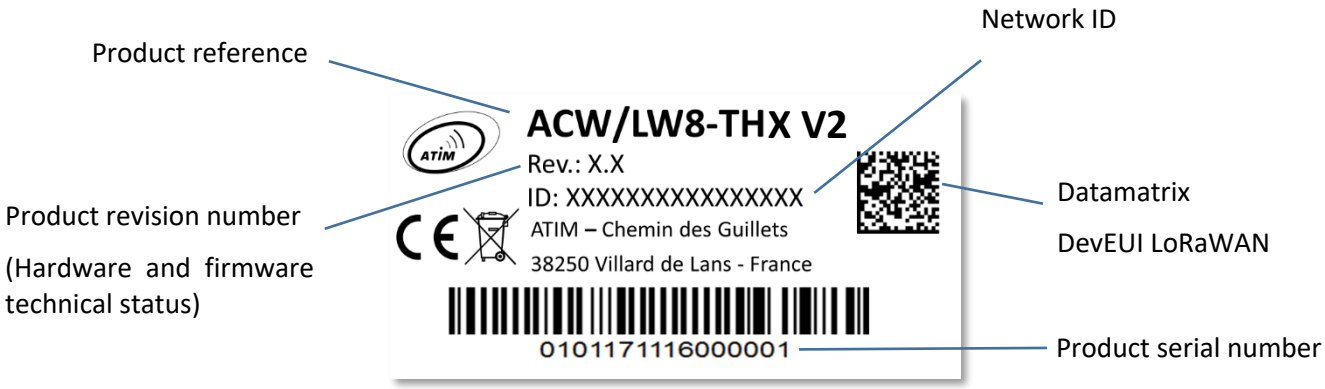
Box

For optimal results, it is recommended to install the enclosure without environmental obstructions and to place it at a height of approximately 1m50. For information, the antenna is integrated into the housing. It should be mounted on a vertical stand, or attached to a wall.

c. Identification

The product's LoRaWAN ID is visible on the outer label on the back of the product, on the inside on the electronic board, and in the status bar of the ACW configurator.

The communication keys are automatically given by the network (pairing by "Over The Air Activation", or OTAA).



Example of a product label

OPERATION

a. Operating mode

To check the status of the product, simply run a magnet briefly (<2 sec) against the QRCODE label, which causes the LED light to illuminate. The color of the LED indicates the mode of operation of the product as described :

○ **Storage Mode** : This mode optimizes the life of the batteries by preventing them from oxidizing. The product does not emit and waits patiently for it to be woken up.

Network pairing mode: This mode is active when the product leaves storage mode or when it starts after a power cut (battery change, harvester power) and allows pairing to a network.

Operation Mode : This is the default mode after the product startup phase. In this mode, the relay emits a life frame periodically (1 time per day by default, configurable by Downlink), and it performs its repeater function by relaying the UPLINK frames of the associated end-devices.

Internal Fault Mode: This mode allows the normal operation of the module to be interrupted when a critical event occurs. The nature of the event can be multiple:

Empty battery (Battery voltage< 2.2V)

Internal error of the radio module

System Error

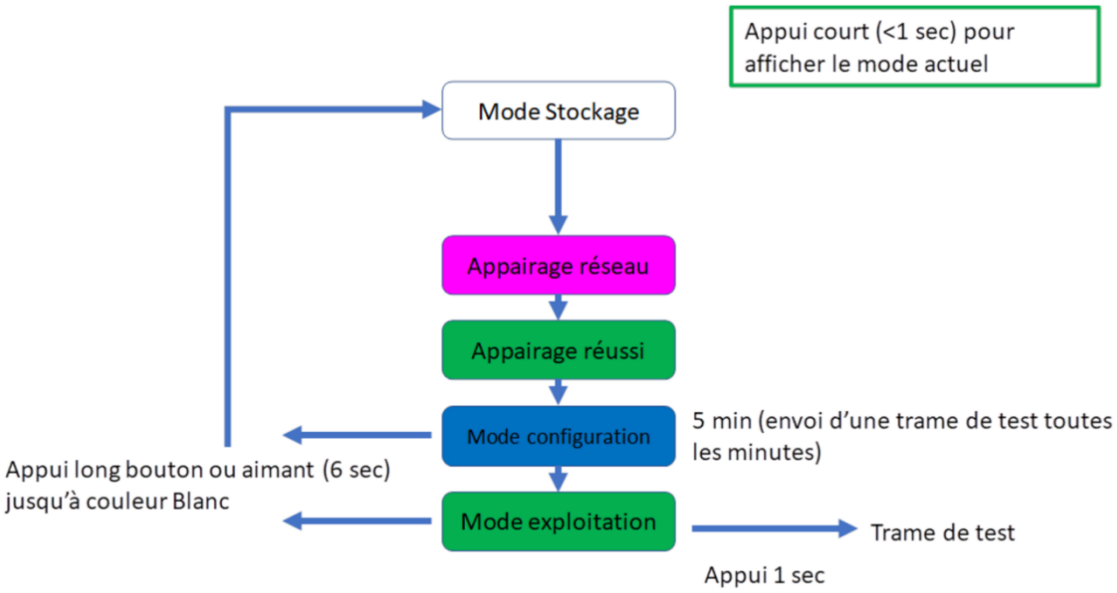
Entry into this "Internal Fault" mode is indicated by a RED flashing of the product LED.

If the error does not prevent the use of the radio module, the product will send a radio frame every 24 hours containing the error code(s) (see chapter Frame Format for error codes). In addition, the product will emit a light warning depending on the nature of the event.

Once in this mode, the module must be restarted (by disconnecting and then reconnecting the battery, by Downlink command or with the magnet) to return to normal operation.

b. Product commissioning

Battery-operated products are delivered in storage mode.



WARNING : The repeater does not have a configuration mode, everything is done by Downlink and MAC commands

Unless otherwise requested, ACW products are delivered with connected batteries and put into "storage" mode.

To place the product in its operating mode, hold a magnet against the QRCODE label for **6 seconds**. During these six seconds, the product's LED should flash **WHITE** until it enters the pairing phase.

The ACW then enters the network peering phase. During this phase, a **FUSCHIA** light flashes every 45 seconds, indicating that the search phase is in progress. This phase lasts a maximum of 5 minutes.

In case of successful connection, the product will emit a light signal indicating the quality of the network:

GREEN light signal : good network quality

YELLOW light signal : average network quality

ORANGE light signal : poor network quality

The module will then enter its operating mode and start to send the information back to the network depending on the configuration.

NOTE
In the LoRaWAN version, in the event of a connection failure (no Join Accept received by the product), the ACW will go into simple standby and make a next pairing attempt every day until it successfully joins the network.

c. Sending a test frame

When the product is in its operating mode **(and only in this mode),** it is possible to transmit a **life frame** (unlike end-devices which send a measurement frame).

To do this, simply hold the magnet close to the QRCODE label, which lights up the LED **GREEN** and wait for it to turn off before immediately removing the magnet. The successful sending of the test frame will be indicated by a **CYAN** light signal.

d. Switching to Storage Mode

During transport or storage of the ACW, it is best to place it in its storage mode to avoid unnecessary energy consumption.

From any operating mode (except fault mode), hold a magnet against the QRCODE on the case for **6 seconds**.

During these six seconds, the product's LED will flash in the color corresponding to the current operating mode, then the end of the sequence will be indicated by a **WHITE** fade, confirming that the product has been successfully put into standby mode. The magnet can then be removed.

e. Radio Module Activity

During Setup Only mode, each emission of a test frame is indicated by three short flashes of **GREEN** color from the LED.

By default, radio transmissions in Operation mode are not indicated by these LED flashes. However, it is possible to configure the product so that all radio emissions are indicated by these LED flashes.

f. Battery de-passivation

All new generation ACW products incorporate a battery depassivation feature, preventing battery oxidation during prolonged storage phases. This feature is automatically activated as soon as the product enters its storage mode. The product will then be woken up once a week to start the battery depassivation sequence.

HOW THE LORAWAN RELAY WORKS

a. Product configuration

The repeater complies with the "LoRaWAN® Relay Specification 43: TS011-1.0.0" specifications

Configuration is done only by MAC commands from the LNS (LoRa Network Server).

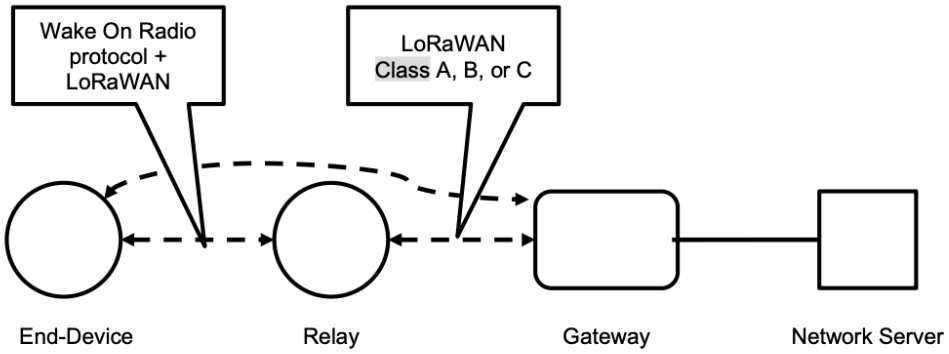
b. Sending downlink commands

The only Downlink command in effect in this repeater is the configuration of the periodicity of the life frame. The method is explained in document ATIM_ACW-DLConfig_UG_FR_v1.4, relating to version V1.2.0 of the ATIM Downlink Protocol.

c. What a LoRaWAN relay does

A LoRaWAN relay is a Class A/B/C LoRaWAN node that carries (encapsulates) uplink/downlink frames between an enddevice and the network when direct coverage by the gateways is insufficient. It adds a **short radio link** with the sensors (WakeOnRadio) and then relays their frames to the network with its own LoRaWAN session.

Currently only **Class A** is supported, contact ATIM if you want a specific version.



Schematic diagram of the LoRaWAN relay

STRENGTHS

- **Very simple installation**
- **Extended range** without deploying a new gateway.
- **Low power consumption** on the relay side thanks to periodic **scanning** of the WOR channel (default period 1s, adjustable).
- **Compatibility** with LoRaWAN versions from version 1.0.4 and **dedicated security** (WOR keys).
- **Downlinks** to the sensor via a new **RXR (**RX Relay) window. See Figure 2, p. 10.
- **Limitation of the number of repetitions,** configurable by type of message.

d. How the radio relay works

➔ The operating principle is explained in detail in the LoRa Alliance TS011-1.0.0 specification.

WOR : the sensor emits a **Wake On Radio frame** with a long preamble (up to ~1 s in the initial phase) to "wake up" the relay and announce the radio parameters of the following uplink (frequency, DR).

1. **WOR ACK**: The relay can acknowledge (WOR ACK) and provides useful information: **CadToRx** delay (2/4/6/8 symbols), **CADPeriodicity** (1 s to 20 ms), **XTALAccuracy** (10–40 ppm), **TOffset**, and Forward boundary status.

2. **LoRaWAN uplink**: The sensor transmits its LoRaWAN frame (classic). The relay **receives** it and **sends it back** to the NS on a **dedicated FPort** (LA_FPORT_RELAY).

3. **Downlink**: if the network responds, the relay sends the frame back to the sensor in the **RXR window** (opened after the uplink if no DL received in RX1/RX2).

Technical support

For any information or technical questions, we invite you to open a ticket on our dedicated support web page: https://www.atim.com/support-technique/

