



The Testcenter facility 'LoRa<sup>®</sup> Test Lab' within IMST GmbH is recognized by the LoRa<sup>™</sup> Alliance for testing in accordance to the LoRaWAN<sup>®</sup> Specification V1.0.2

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# Report for Test of Conformance to LoRaWAN<sup>®</sup> V1.0.2

for the Device

**“Arrow WAN 2”**

for the Customer

**“Maddalena S.p.A.”**

Jens Lerner

Yavuz Turan

22<sup>nd</sup> March, 2022

## Administrative Summary

Location: IMST GmbH, Test Centre, Kamp-Lintfort, Germany

Responsible Test Engineer: Yavuz Turan, Jens Lerner

Subject: Test of Conformance to LoRaWAN® Specification V1.0.2

Company and Contact Information:

Maddalena S.p.A.

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Tested Device: Arrow WAN 2

Hardware version: 1.0

Firmware version: 1.0

End-device identifier: 78D800B022910008

LoRa Device Class: A

LoRaWAN Specification version: V1.0.2

Certification requirements: LoRa End Device Certification EU Version 1.6

Frequency band(s) tested: 868 MHz

Test Equipment: LCTT v3.4.0\_R2

IMST LGW (iC880A + Raspberry Pi): Gateway software version 5.0.1

Packet forwarder software version 4.0.1


Test Result: PASS


Quality Engineer: Jens Lerner

Date: March 22<sup>nd</sup>, 2022

The Test Report, No. 6220120 has the following conclusion:

**The device has PASSED the tests hereunder.**

Responsibility:   
Yavuz Turan  
Test Engineer

Approved:   
Jens Lerner  
Quality Engineer

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# 1 Description of the Device Under Test (DUT)

## 1.1 General

Item	Value
Product name	Arrow WAN 2
Product Vertical(s)	Buildings, Utilities
Series (if any)	Arrow WAN
Hardware Version	1.0
Firmware Version	1.0
Type of DUT	<input type="checkbox"/> Module <input checked="" type="checkbox"/> End Device/Sensor <input type="checkbox"/> others
Geographical area of operation	<input checked="" type="checkbox"/> Europe <input type="checkbox"/> USA
Operating frequency	<input type="checkbox"/> 433 MHz <input checked="" type="checkbox"/> 868 MHz <input type="checkbox"/> 915 MHz
Adaptive Data Rate (ADR) supported?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Optional data rates supported?	<input checked="" type="checkbox"/> DR6 <input checked="" type="checkbox"/> DR7
Activation possibilities	<input type="checkbox"/> Over the air <input type="checkbox"/> by personalization <input checked="" type="checkbox"/> both
Test According LoRaWAN® Spec	<input type="checkbox"/> V1.0.1 <input checked="" type="checkbox"/> V1.0.2
Output Power	0-14dBm
Number / Type of Antenna(s)	1
Antenna Gain	1dB

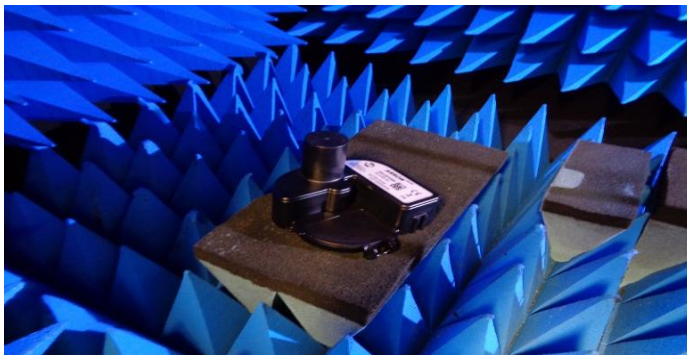
**Table 1 Device Information**

## 1.2 DUT Modes of Operation

During the tests the device operated in the following modes:

- Test mode according to document “LoRa Alliance End Device certification Requirements for EU863-870 MHz Version 1.6” Chapter 2.

## 1.3 DUT Setup



**Figure 1 DUT Setup**

Applied Methods of Measurement

## 1.4 Protocol Testing according to LoRaWAN® specification V1.0.2

### Detailed Test Results:

Device Activation (Activation By Personalization): **PASS**

Test Mode Activation (Over the Air Activation): **PASS**

Test Application Functionality: **PASS**

New Channel Request: **PASS**

Channel Plan Usage: **PASS**

Cryptography: **PASS**

Packet Error Rate RX2 SF12: **PASS**

Downlink Window Timing: **PASS**

Frame Sequence Number: **PASS**

Confirmed Packets: **PASS**

Device Status Request: **PASS**

Di Channel Request Mac Command: **PASS**

RX Parameter Setup Request: **PASS**

RX Timing Setup Request: **PASS**

TX Parameter Setup Request: **PASS**

Link Check Request: **PASS**

Link ADR Request: **PASS**

Uplink Datarate RX1 DR Offset Mapping: **PASS**

Packet Error Rate Rx1 MaxSize: **PASS**

Packet Error Rate Rx1 MaxSize: **PASS**

RX1 And RX2 Simultaneous Frames: **PASS**

RX Oversized Payload: **PASS**

Maximum Allowed Payload: **PASS**

Mac Commands: **PASS**

Device Deactivation: **PASS**

### Supported Optional Features:

Adaptive Data Rate (ADR):	Yes
DR6 (SF7BW250):	Yes
DR7 (FSK50):	Yes
Link ADR Request Block:	Yes
Di Channel Request:	Yes
Join Synch DevNonce:	No
Confirmed Re-transmissions	False

Remarks: None

**Result: The device passed the test without limitations.**