



The Testcenter facility 'LoRa® Test Lab' within IMST GmbH is recognized by the LoRa® Alliance for testing in accordance to the LoRaWAN® Specification V1.0.4

Report for Test of Conformance to LoRaWAN® V1.0.4 Class A (US915)

for the Device

**“ AK-411 Remote Reading And Prepaid
Ultrasonic Water Meter”**

for the Customer

**“BAYLAN Ölçü Aletleri Sanayi ve
Ticaret Ltd. Şti.”**

Jens Lerner
Yavuz Turan

20th December, 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 V1.0.4 (Class A for US915)

Company and Contact Information:

BAYLAN Ölçü Aletleri Sanayi ve Ticaret Ltd. Şti.

Erman Baylan

10032. Sk. Atatürk Organize Sanayi Bölgesi No:16

35620 Çiğli / İzmir

Turkey

Tested Device: AK-411 Remote Reading And Prepaid Ultrasonic Water Meter

Hardware version: 200427LUKS0

Firmware version: V62/52

End-device identifier: 42594c0b19283746

LoRaWAN® Device Class: A

LoRaWAN Specification version: V1.0.4

Certification requirements: LoRaWAN 1.0.4 End Device Certification Requirements V1.6

Frequency band(s) tested: 915 MHz

Test Equipment: LCTT v3.8.0_R1

8x IMST LGW (iC980A + Raspberry Pi): Gateway software version 4.1.3

Packet forwarder software version 3.1.0


Test Result: PASS


Quality Engineer: Jens Lerner

Date: December 20th, 2022

The Test Report, No. 6220237 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	AK-411E Remote Reading And Prepaid Ultrasonic Water Meter
Product Vertical(s)	Industrial/Hazardous
Series (if any)	A
Hardware Version	200427LUKS0
Firmware Version	V62/52
LoRaWAN® Device Class	A
Type of DUT	<input type="checkbox"/> Module <input checked="" type="checkbox"/> End Device/Sensor <input type="checkbox"/> others
Geographical area of operation	<input type="checkbox"/> Europe <input checked="" type="checkbox"/> USA <input type="checkbox"/> Australia
Operating frequency	<input type="checkbox"/> 433 MHz <input type="checkbox"/> 868 MHz <input checked="" 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 type="checkbox"/> V1.0.2 <input checked="" type="checkbox"/> V1.0.4
Output Power	14 dBm
Number / Type of Antenna(s)	1 / Helical
Antenna Gain	1.5 dBi

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 All Regions Version 1.6” Chapter 2.

1.3 DUT Setup

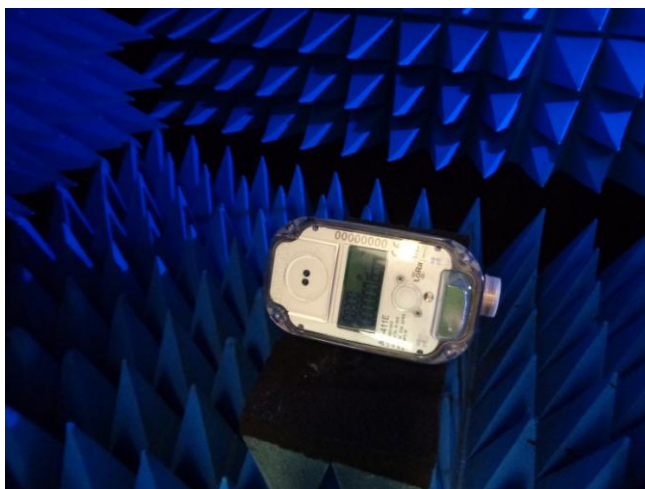


Figure 1 DUT Setup

Applied Methods of Measurement

1.4 Protocol Testing according to LoRaWAN® specification V1.0.4 (Class A device for US915)

Detailed Test Results:

Test Mode Activation: **PASS**
Over the Air Activation: **PASS**
Activation by Personalization: **PASS**
Cryptography: **PASS**
Downlink Sequence Number: **PASS**
Confirmed Frames: **PASS**
Device Status Request: **PASS**
New Channel Request Reject: **PASS**
Di Channel Request Reject: **PASS**
RX Parameter Setup Request: **PASS**
RX Timing Setup Request: **PASS**
TX Parameter Setup Request: **PASS**
Link Check Request: **PASS**
Link ADR Request: **PASS**
Duty Cycle Request: **PASS**
Device Time Request: **PASS**
RX1 Window Test: **PASS**
RX2 Window Test: **PASS**
RX1 and RX2 Simultaneous Frames: **PASS**
RX Oversized Payload: **PASS**
Maximum Allowed Payload: **PASS**
Mac Commands: **PASS**
Multiple MAC Commands Prioritization: **PASS**
Device Deactivation: **PASS**

Supported Optional Features:

Adaptive Data Rate (ADR):	Yes
Permanent Class C	No

Additional Tests By The Manufacturer:

Retransmission Back-Off for OTA devices only: **PASS**

Remarks: None

Result: The device passed the test without limitations.