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

"ERH"

for the Customer

"**GWF AG**"

Jens Lerner
Yavuz Turan

1st February, 2024

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:
GWF AG
Lukas Kempf
Obergrundstrasse 119
6005 Luzern
Switzerland
Tested Device: ERH
Hardware version: 20.1119 V12
Firmware version: V1
End-device identifier: 70B3D53878000638
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 v3.11.0_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: February 1st, 2024

The Test Report, No. 6230704 has the following conclusion:

The device has PASSED the tests hereunder.

Responsibility: Yavuz Turan, Test Engineer
Approved: Jens Lerner, Quality Engineer

1 Description of the Device Under Test (DUT)

1.1 General

Item	Value
Product name	ERH
Product Vertical(s)	N/A
Series (if any)	N/A
Hardware Version	20.1119 V12
Firmware Version	V1
LoRaWAN® Device Class	A
Type of DUT	☐ Module ☒ End Device/Sensor ☐ others
Geographical area of operation	☐ Europe ☒ USA ☐ Australia
Operating frequency	☐ 433 MHz ☐ 868 MHz ☒ 915 MHz
Adaptive Data Rate (ADR) supported?	☒ Yes ☐ No
Optional data rates supported?	☐ DR6 ☐ DR7
Activation possibilities	☒ Over the air ☐ by personalization ☐ both
Test According LoRaWAN® Spec	☐ V1.0.1 ☐ V1.0.2 ☒ V1.0.4
Output Power	22 dBm
Number / Type of Antenna(s)	Monopol
Antenna Gain	N/A

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

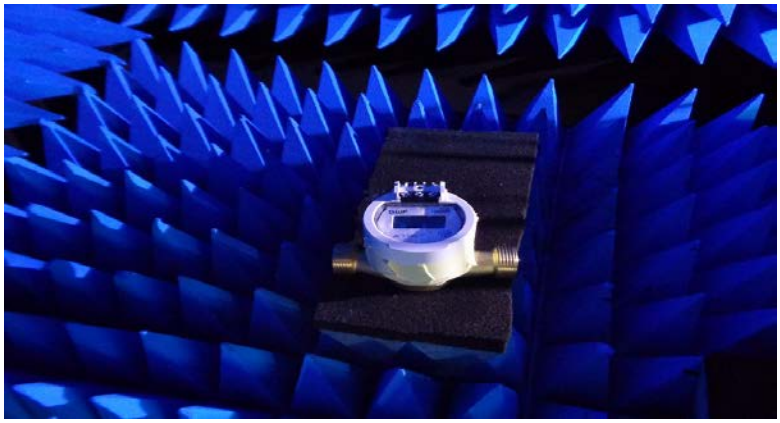

Figure 1 DUT Setup

Applied Methods of Measurement

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

Detailed Test Results:

Test Case ID	Description	Verdict	Date
TP_A_US915_ED_MAC_104_BV_000	Activation Pre-test	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_001_A	Over the Air Activation	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_002	Cryptography	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_003	Downlink Sequence Number	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_004	Confirmed Frames	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_005	DevStausReq MAC Command	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_006	NewChannelReq MAC Command for Fixed Channel plan devices only	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_007	DIChannelReq for Fixed Channel plan devices only	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_008	RXParameterSetupReq MAC Command	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_009	RXTimingSetupReq MAC Command	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_010	TXParamSetupReq MAC Command	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_011	LinkCheckReq MAC Command	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_012A	LinkADRReq MAC Command (Part 1)	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_012B	LinkADRReq MAC Command (Part 2)	PASS	2024-01-30
TP_A_US915_ED_MAC_104_BV_013	DutyCycleReq MAC Command	PASS	
TP_A_US915_ED_MAC_104_BV_014	DeviceTimeReq MAC Command	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_015A	RX1 Receive Window Test (Part 1)	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_015B	RX1 Receive Window Test (Part 2)	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_016	RX2 Receive Window Test	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_017	RX1 and RX2 simultaneous frames	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_018	RX Oversized Payload	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_019A	Maximum Allowed Payload (Part 1)	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_019B	Maximum Allowed Payload (Part 2)	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_020	MAC Command(s) in App-Payload and/or Frame Options	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_021	Multiple MAC Commands prioritization	PASS	2024-01-29
TP_A_US915_ED_MAC_104_BV_022	FPort 224 Deactivation	PASS	2024-01-30
TP_A_US915_ED_MAC_104_ RETRANSMISSION_BACKOFF	Retransmission back-off tests for power-up of device	PASS	2024-01-25

Supported Optional Features:

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

Remarks: None

Result: The device passed the test without limitations.