Report for Test of Conformance to LoRaWAN® V1.0.2 (US915)

for the Device

"8911N"

for the Customer

"TE Connectivity Sensors"

Jens Lerner

Yavuz Turan

22th September, 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 (US915)

Company and Contact Information:
TE Connectivity Sensors
Marty Romain
4 rue Gaye Marie
31000 Toulouse
French
Tested Device: 8911N
Hardware version: B
Firmware version: 1.7.10
End-device identifier: BCAF9100000F1DBE
LoRaWAN® Device Class: A
LoRaWAN Specification version: V1.0.2
Certification requirements: End Device Certification Requirements for US and Canada
902-928 MHz ISM Band V1.5.1
Frequency band(s) tested: 915 MHz
Test Equipment: LCTT v3.7.0_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: September 22th, 2022

The Test Report, No. 6220408 has the following conclusion:

The device has PASSED the tests hereunder with known limitations.

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	8911N
Product Vertical(s)	Industry
Series (if any)	
Product Version	B
Hardware Version	1.7.10
Firmware Version	8911N
LoRaWAN® Device Class	Industry
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
Activation possibilities	☒ Over the air ☐ by personalization ☒ both
Test According LoRaWAN® Spec	☐ V1.0.1 ☒ V1.0.2 ☐ V1.0.4
Output Power	14 dBm
Number / Type of Antenna(s)	1 TE's own antenna
Antenna Gain	2.15dB

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 "End Device Certification Requirements for US and Canada 902-928 MHz ISM Band 1.5.1" Chapter 2.
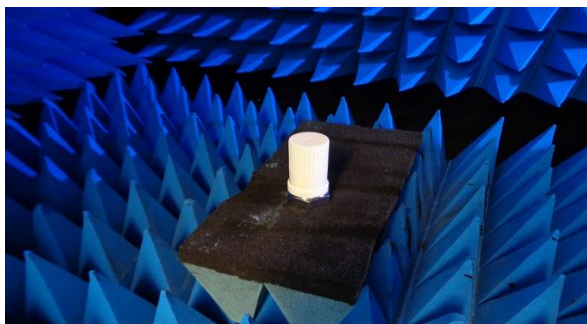
1.3 DUT Setup

Figure 1 DUT Setup

Applied Methods of Measurement

1.4 Protocol Testing according to LoRaWAN® specification V1.0.2 (US915)

Detailed Test Results:

Test Mode Activation: **PASS**

Over the Air Activation: **FAIL**

Test Application Functionality: **PASS**

AES Encryption and Message Integrity: **PASS**

Downlink Error Rate: **PASS**

Downlink Window Timing: **PASS**

Frame Sequence Number: **PASS**

Device Status Request**: PASS**

Mac Commands: **PASS**

New Channel Request**: PASS**

Confirmed Packets: **PASS**

RX Parameter Setup Request: **PASS**

RX1 Receive Window: **PASS**

RX2 Receive Window: **PASS**

RX Timing Setup Request**: PASS**

Link ADR Request: **FAIL**

RX Oversized Payload: **PASS**

Maximum Allowed Payload: **PASS**

Supported Optional Features:

Adaptive Data Rate (ADR):   Yes
Block of Link ADR Request: No

Remarks:

- Over the Air Activation (TP_A_US915_ED_MAC_BV_001)

  The test case fails due to a known issue in the LCTT

  More information: https://lcttbugs.lora-alliance.com/bugzilla/show_bug.cgi?id=559

- Link ADR Request: (TP_A_US915_ED_MAC_BV_015_A)

  Step 04 fails. The only goal of this step is to check the correct MAC reply of the DUT to a LinkADRReq including an RFU value for TXPower. The definition of this test case is based on the RegionalParametersv1.0.2 document, which defines for the US915 region some RFU values (from Id 11 to Id 15) as shown in the table below:

TXPower	Configuration (conducted power)
0	30 dBm – 2*TXpower
1	28 dBm
2	26 dBm
3 : 9	....
10	10 dBm
11:15	RFU

  As the DUT follows RegionalParametersv1.0.3, which defines no RFU values for US915, the LinkADRReq is accepted, which is recognizes as a fail by the LCTT. For more details, the table below shows the TxPower values defined by RegionalParametersv1.0.3:

TXPower	Configuration (conducted power)
0	30 dBm – 2*TXpower
1	28 dBm
2	26 dBm
3..15	....

  Table 13: US902-928 TX power table

Result: The device passed the test with limitations due to a bug by LCTT and due to inconsistencies between the RegionalParameters documents V1.0.2 and V1.0.3 (see above).

LoRa® Alliance