The Testcenter facility ‘LoRa® Test Lab’ within IMST GmbH is recognized by the LoRa™ Alliance for testing in accordance to the LoRaWAN™ Specification V1.0.1

Report for Test of Conformance to LoRaWAN™ V1.0.1

for the Device

“TM-901"

for the Customer

Kolff Computer Supplies BV

Markus Ridder
Yavuz Turan

22. Feb. 2017
Administrative Summary

Location: IMST GmbH, Test Centre, Kamp-Lintfort, Germany
Responsible Test Engineer: Yavuz Turan, Markus Ridder

Subject: Test of Conformance to LoRaWAN™ Specification V1.0.1

Company and Contact Information:
Kolff Computer Supplies BV, Mr. Jan Willem Versluis
Kuipershaven 22, 3311 AL Dordrecht, The Netherlands

Tested Device: TM-901
Firmware version: V0.950
Hardware version: N1C2
End-device identifier: 5403020102030405
LoRa Device Class: A
LoRaWAN Specification version: V1.0.1
Certification requirements: LoRa End Device Certification EU Version 1.2
Frequency band(s) tested: 868 MHz
Test Equipment: Test Software Version: 1.1.7
Semtech IOT SX1301 Starter Kit: Gateway software version 3.1.0
Packet forwarder software version 2.1.0

Test Result: PASS

Chief Test Engineer: Markus Ridder
Dept. Test Center

Date: Feb 22th, 2017

The Test Report, No. 6170083 has the following conclusion:

The device has PASSED the tests hereunder.

Responsibility: Approved:
Yavuz Turan Markus Ridder
Test Engineer Quality Engineer

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1 Description of the Device Under Test (DUT)

1.1 General

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product name</td>
<td>TM-901</td>
</tr>
<tr>
<td>Kind of product</td>
<td>Smart sensor</td>
</tr>
<tr>
<td>Series (if any)</td>
<td></td>
</tr>
<tr>
<td>Hardware Version</td>
<td>N1C2</td>
</tr>
<tr>
<td>Firmware Version</td>
<td>V0.950</td>
</tr>
<tr>
<td>Type of DUT</td>
<td>☑ Module / End Device ☐ Gateway / Concentrator</td>
</tr>
<tr>
<td>Geographical area of operation</td>
<td>☑ Europe ☐ USA</td>
</tr>
<tr>
<td>Operating frequency</td>
<td>☑ 433 MHz ☑ 868 MHz ☐ 915 MHz</td>
</tr>
<tr>
<td>Adaptive Data Rate (ADR) supported?</td>
<td>☑ Yes ☐ No</td>
</tr>
<tr>
<td>Optional data rates supported?</td>
<td>☑ DR6 ☐ DR7</td>
</tr>
<tr>
<td>Activation possibilities</td>
<td>☑ Over the air ☐ by personalization ☐ both</td>
</tr>
<tr>
<td>Test According LoRaWAN™ Spec</td>
<td>☑ V1.0 ☐ V1.0.1 (m/o June 2016 earliest)</td>
</tr>
<tr>
<td>Output Power</td>
<td>+20dBm</td>
</tr>
<tr>
<td>Number / Type of Antenna(s)</td>
<td>3x chip antenna</td>
</tr>
<tr>
<td>Antenna Gain</td>
<td>0dBm</td>
</tr>
</tbody>
</table>

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 End Device Certification EU V1_2” Chapter 3.

1.3 DUT Setup

Figure 1 DUT Setup
Applied Methods of Measurement

1.4 Protocol Testing according to LoRaWAN™ specification V1.0.1

Detailed Test Results:

Test Mode Activation (Activation by Personalization): PASS
Test Mode Activation (Over the Air Activation): PASS
Test Application Functionality: PASS
Packet Error Rate RX2 SF12: PASS
Cryptography: 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
RX Timing Setup Request: PASS
Link ADR Request: PASS
Packet Error Rate RX1 Window: PASS
Packet Error Rate RX2 Window: PASS

Supported Optional Features:

Adaptive Data Rate (ADR): Yes
DR6 (SF7BW250): Yes
DR7 (FSK50): No

Remarks: None.

Result: The device passed the test without limitations.