The Testcenter facility ‘LoRa® Test Lab’ within IMST GmbH is recognized by the LoRa™ Alliance for testing in accordance to the LoRaWAN™ Specification V1.0.2

Report for Test of Conformance to LoRaWAN™ V1.0.2

for the Device

“ISL105 LoRaWAN Transmitter "

for the Customer

“Invisible Systems Limited”

Markus Ridder
Yavuz Turan

10. December 2018
Administrative Summary

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

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

Company and Contact Information:
Invisible Systems Limited
Mr. Steve Wright
9 Beetham Road, LA7 7QL, Milnthorpe
United Kingdom
Tested Device: ISL105 LoRaWAN Transmitter
Firmware version: 2.1.0
Hardware version: ISL105-1
End-device identifier: 70B3D55F2000000A
LoRa Device Class: A
LoRaWAN Specification version: V1.0.2
Certification requirements: LoRa End Device Certification EU Version 1.5
Frequency band(s) tested: 868 MHz
Test Equipment: Test Software Version: 1.1.11
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: December 10th, 2018

The Test Report, No. 6181674 has the following conclusion:

The device has PASSED the tests hereunder.

Responsibility:  
Yavuz Turan  
Test Engineer

Approved:  
Markus Ridder  
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>ISL105 LoRaWAN Transmitter</td>
</tr>
<tr>
<td>Kind of product</td>
<td>LoRaWAN Transmitter</td>
</tr>
<tr>
<td>Series (if any)</td>
<td>ISL105</td>
</tr>
<tr>
<td>Hardware Version</td>
<td>ISL105-1</td>
</tr>
<tr>
<td>Firmware Version</td>
<td>2.1.0</td>
</tr>
<tr>
<td>Type of DUT</td>
<td>Module / End Device</td>
</tr>
<tr>
<td>Geographical area of operation</td>
<td>Europe</td>
</tr>
<tr>
<td>Operating frequency</td>
<td>433 MHz</td>
</tr>
<tr>
<td>Operating frequency</td>
<td>868 MHz</td>
</tr>
<tr>
<td>Operating frequency</td>
<td>915 MHz</td>
</tr>
<tr>
<td>Adaptive Data Rate (ADR) supported?</td>
<td>Yes</td>
</tr>
<tr>
<td>Optional data rates supported?</td>
<td>DR6</td>
</tr>
<tr>
<td>Optional data rates supported?</td>
<td>DR7</td>
</tr>
<tr>
<td>Activation possibilities</td>
<td>Over the air</td>
</tr>
<tr>
<td>Activation possibilities</td>
<td>by personalization</td>
</tr>
<tr>
<td>Activation possibilities</td>
<td>both</td>
</tr>
<tr>
<td>Test According LoRaWAN™ Spec</td>
<td>V1.0.1</td>
</tr>
<tr>
<td>Test According LoRaWAN™ Spec</td>
<td>V1.0.2</td>
</tr>
<tr>
<td>Output Power</td>
<td>16dBm</td>
</tr>
<tr>
<td>Number / Type of Antenna(s)</td>
<td>1 / PCB, using Semtech Planar F-Antenna Reference Design, AN1200.20</td>
</tr>
<tr>
<td>Antenna Gain</td>
<td>Average -2.8 dBi from reference design</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 V1.5” Chapter 3.

1.3 DUT Setup

![Figure 1 DUT Setup](image-url)
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
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
Di Channel Request Mac Command: 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): Yes
Link ADR Request Block: Yes
Di Channel Request: Yes
Range 6dB: Yes

Remarks: None.

Result: The device passed the test without limitations.