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: Approved:

Yavuz Turan   Markus Ridder

Test Engineer   Quality Engineer

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LoRa® Alliance

1 Description of the Device Under Test (DUT)

1.1 General

Item	Value
Product name	ISL105 LoRaWAN Transmitter
Kind of product	LoRaWAN Transmitter
Series (if any)	ISL105
Hardware Version	ISL105-1
Firmware Version	2.1.0
Type of DUT	☒ Module / End Device ☐ Gateway / Concentrator
Geographical area of operation	☒ Europe ☐ USA
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
Output Power	16dBm
Number / Type of Antenna(s)	1 / PCB, using Semtech Planar F-Antenna Reference Design, AN1200.20
Antenna Gain	Average -2.8 dBi from reference design

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

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.