Dekra Testing and Certification Co., Ltd.
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www.dekra.com

Test report No:

NIE: 1810185R-WLR001

Test Report
LoRa Alliance End Device Requirements

Identification of item tested .....:	R100H
Trademark.....:	Netvox
Model or type reference .....:	R100H
Final HW version .....:	0.1
Final SW version .....:	1.0_20180205
Final FW version.....:	4.4
Features.....:	LoRa Alliance End Device Certification Requirements for US and Canada 915MHz ISM Band Devices
Manufacturer .....:	Netvox Technology Co., Ltd. (Xiamen) No.2, Xin Feng 2 Road, Xiamen Torch Hi-Tech Industrial Development Zone, Xiamen City 36100, China
Test method requested.....:	LoRa Alliance Certification
Standard .....:	LoRa Alliance End Device Certification Requirements for US and Canada 915MHz ISM Band Devices Ver.1.3
Test procedure(s) .....:	TERD-WTS-TP-02 – LORA_TSSTP_PART_1_v1.0
Summary.....:	IN COMPLIANCE
Approved by (name / position & signature).....:	Michael Peng Project Manager
Date of issue.....:	2018-02-07
Report template No.....:	FLO001_01

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Usage of samples

Samples undergoing test have been selected and supplied by: Netvox Technology Co., Ltd.

Sample M/01 is composed of the following elements:

CONTROL Nº	DESCRIPTION	MODEL	HW VERSION	SW VERSION	FW VERSION	SERIAL Nº	DATE OF RECEPTION
1810185R-01	LoRa Module_For OTAA Testing	R100H	0.1	1.0_20180205	4.4	01180006	2018/01/19

Sample M/02 is composed of the following elements:

CONTROL Nº	DESCRIPTION	MODEL	HW VERSION	SW VERSION	FW VERSION	SERIAL Nº	DATE OF RECEPTION
1810185R-02	LoRa Module_For ABP Testing	R100H	0.1	1.0_20180205	4.4	01180010	2018/01/19

Test sample description

The test sample consists on 1810185R-01 and 1810185R-02 programmed with SW labeled as:

R100H_US915.hex

Netvox Wireless Module R100H is a module based on LoRa Technology compatible with LoRaWAN protocol. It provides long range, low power, and low cost wireless iot connectivity to remote sensors,industrial monitoring and control, home and building automation and so on. It can be connected to public or to private LoRaWAN networks through a variety of gateways from several vendors.

Identification of the client

Netvox Technology Co., Ltd.

NO. 21-1, SEC. 1, ZHONGHUA W. RD., SOUTH DIST, TAINAN CITY 702, Taiwan (R.O.C)

Testing period

The performed test started on 2018-02-05 and finished on 2018-02-06.

The tests have been performed at DEKRA Testing and Certification, Co., Ltd. (Taiwan)

Environmental conditions

The testing has been performed within the following limits:

TEMPERATURE	Min. = 15 ºC Max. = 35 ºC
RELATIVE HUMIDITY	Min. = 20 % Max. = 80 %

Remarks and comments

The tests have been performed by the technical personnel:

Gavin Yang

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Testing verdicts

As detailed in Appendix A.

Means of testing identification

Following equipment was used to perform the testing:

ITEM	US915 SETUP	
TEST SYSTEM	TACS4 LORA	
CONTROL NUMBER	QD070059	
HARDWARE	Equipment	Serial Nº
	TEKTELIC USA 64Ch GATEWAY	1737D0001
SOFTWARE	Equipment	
	TACS4 LORA GUI v1.10.0 TACS4 LORA Reporting Module v1.5.0 TACS4 LORA Technology Package v4.8.0_R1 TACS4 LORA ED Certification US & Canada v1.3	

Appendix A – Test result

Test campaign report

The abbreviations used in the header row of the test campaign report tables are:

Test Case ID:	Test case identifier, as it can be found on the referred standard.
Sample:	Sample details.
Description:	Test case description, as it can be found on the referred standard.
Date:	Date of the beginning of the execution.
Conformance:	YES/NO. If the test case has been executed in accordance to the standard.
Verdict:	Records the verdict assigned to each Test case run to completion. Following verdicts are possible: **PASS**: If the Test case passed. **FAIL**: If the Test case failed. **INCONC**: Inconclusive. The test case did not reach a PASS or FAIL verdict. **NA**: Not applicable. **NM**: Not measured.
Observations:	Provides a reference to additional information relevant to the test (when required).

0 test cases have been executed with SCR errors
21 test cases selected of 21 executed
21 test cases executed of 21 applicable

Test Case ID	Date	Conf	Verdict	Observations
TP_A_US915_ED_MAC_BV_000 Test mode activation	2018-02-05 2018-02-06	Yes	PASS	OTAA ABP
TP_A_US915_ED_MAC_BV_001 Over The Air activation	2018-02-05	Yes	PASS	OTAA
TP_A_US915_ED_MAC_BV_002 Test application functionality	2018-02-05 2018-02-06	Yes	PASS	OTAA ABP
TP_A_US915_ED_MAC_BV_003 AES encryption and message integrity	2018-02-05 2018-02-06	Yes	PASS	OTAA ABP
TP_A_US915_ED_MAC_BV_004 Downlink error rate	2018-02-05 2018-02-06	Yes	PASS	OTAA ABP
TP_A_US915_ED_MAC_BV_005 Downlink window timing	2018-02-05 2018-02-06	Yes	PASS	OTAA ABP
TP_A_US915_ED_MAC_BV_006_A Frame sequence number	2018-02-05 2018-02-06	Yes	PASS	OTAA ABP
TP_A_US915_ED_MAC_BV_006_B Downlink sequence number rollover	2018-02-05 2018-02-06	Yes	PASS	OTAA ABP
TP_A_US915_ED_MAC_BV_007 DevStatusReq MAC command	2018-02-05 2018-02-06	Yes	PASS	OTAA ABP
TP_A_US915_ED_MAC_BV_008_A MAC Commands	2018-02-05 2018-02-06	Yes	PASS	OTAA ABP

TP_A_US915_ED_MAC_BV_008_B MAC Commands in App-Payload & Fopts	2018-02-05 2018-02-06	Yes	**PASS**	OTAA ABP
TP_A_US915_ED_MAC_BV_009 NewChannelReq MAC command	2018-02-05 2018-02-06	Yes	**PASS**	OTAA ABP
TP_A_US915_ED_MAC_BV_010 Confirmed packets	2018-02-05 2018-02-06	Yes	**PASS**	OTAA ABP
TP_A_US915_ED_MAC_BV_011 RXParamSetupReq MAC command	2018-02-05 2018-02-06	Yes	**PASS**	OTAA ABP
TP_A_US915_ED_MAC_BV_012 RX1 Receive window test	2018-02-05 2018-02-06	Yes	**PASS**	OTAA ABP
TP_A_US915_ED_MAC_BV_013 RX2 Receive window test	2018-02-05 2018-02-06	Yes	**PASS**	OTAA ABP
TP_A_US915_ED_MAC_BV_014 RXTimingSetupReq MAC command	2018-02-05 2018-02-06	Yes	**PASS**	OTAA ABP
TP_A_US915_ED_MAC_BV_015_A LinkADRReq MAC command	2018-02-05 2018-02-06	Yes	**PASS**	OTAA ABP
TP_A_US915_ED_MAC_BV_015_B LinkADRReq MAC command	2018-02-05 2018-02-06	Yes	**PASS**	OTAA ABP
TP_A_US915_ED_MAC_BV_016 RX Oversized payload	2018-02-05 2018-02-06	Yes	**PASS**	OTAA ABP
TP_A_US915_ED_MAC_BV_017 Maximum allowed payload	2018-02-05 2018-02-06	Yes	**PASS**	OTAA ABP

Appendix B – ICS

OTAA

NAME	VALUE
DUT supports Trigger Join Request command in Test Mode	TRUE
DUT needs a reset after deactivating Test Mode	TRUE
DUT supports LinkADRReq block	TRUE
DUT implements LoRaWAN v1.0.2rB certification requirements	TRUE
DUT is a Class A Device (All End Devices)	TRUE
DUT works in USA 915MHz ISM Band	TRUE
DUT supports Over-The-Air Activation (OTAA) mechanism	TRUE
DUT supports Adaptive Data Rate (ADR) feature	TRUE

ABP

NAME	VALUE
DUT needs a reset after deactivating Test Mode	TRUE
DUT supports LinkADRReq block	TRUE
DUT implements LoRaWAN v1.0.2rB certification requirements	TRUE
DUT is a Class A Device (All End Devices)	TRUE
DUT works in USA 915MHz ISM Band	TRUE
DUT supports Adaptive Data Rate (ADR) feature	TRUE

Appendix C – IXIT

NAME	VALUE
Minimum transmission power	5
Maximum transmission power	20
Application session key (AppSKey)	'5A6967426565416C6C69616E63653039'O
Network session key (NwkSKey)	'5A6967426565416C6C69616E63653039'O
Application key (AppKey)	'5A6967426565416C6C69616E63653039'O
Application identifier (AppEUI)	'00137A1000000001'O
End-device Address (DevAddr)	'00000098'O

Appendix D – General Parameters

NAME	VALUE
Default Tx Antenna	0
EU868 RECEIVE_DELAY1 (s)	1.0
EU868 RECEIVE_DELAY2 (s)	2.0
EU868 JOIN_ACCEPT_DELAY1 (s)	5.0
EU868 JOIN_ACCEPT_DELAY2(s)	6.0
EU868 RX2 Receive window frequency	869.525
EU868 RX2 Receive window DR	SF12BW125
US915 RECEIVE_DELAY1 (s)	1.0
US915 RECEIVE_DELAY2 (s)	2.0
US915 JOIN_ACCEPT_DELAY1(s)	5.0
US915 JOIN_ACCEPT_DELAY2(s)	6.0
US915 RX2 Receive window frequency	923.3
EU868 RF Continuous Wave timer	3600
EU868 RF frequency	868.3
Gateway model	Tektelic
US915 RX2 Receive window DR	SF12BW500
General Timer	60
KR920 RECEIVE_DELAY1 (s)	1.0
KR920 RECEIVE_DELAY2 (s)	2.0
KR920 JOIN_ACCEPT_DELAY1(s)	5.0
KR920 JOIN_ACCEPT_DELAY2(s)	6.0
KR920 RX2 Receive window frequency	921.9
KR920 RX2 Receive window DR	SF12BW125
AS923 RECEIVE_DELAY1 (s)	1.0
AS923 RECEIVE_DELAY2 (s)	2.0
AS923 JOIN_ACCEPT_DELAY1 (s)	5.0
AS923 JOIN_ACCEPT_DELAY2 (s)	6.0
AS923 RX2 Receive window DR	SF10BW125
AS923 RX2 Receive window frequency	923.2
Gateway IP Address	192.168.32.3
Gateway socket port	1780
Default Tx Power (dBm)	14

Appendix E – Photographs

Sample for OTAA Testing

Sample for ABP Testing