AT4 wireless, S.A.U.
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Test report No:

NIE: 201701.003

Test Report
LoRa Alliance End Device Certification Requirements

Identification of item tested ..... :	51425_Testing_US915_ABP + 51425_Testing_US915_OTAA
DUT ..... :	MultiConnect mDot
Model or type reference ..... :	MTMDK-ST-MDOT (MTDOT-915)
Final HW version ..... :	Rev B
Final SW version ..... :	2.0.14
Final FW version ..... :	2.0.14 (mdot-firmware-2.0.14-12-JOIN-SEND-ABP.bin) (mdot-firmware-2.0.14-12-JOIN-SEND-OTA.bin)
Features ..... :	LoRa Alliance End Device Certification Requirements for US and Canada 915MHz ISM Band Devices
Manufacturer ..... :	Multitech Systems Inc.
Test method requested ..... :	Lora Alliance Certification
Standard ..... :	LoRa Alliance End Device Certification Requirements for US and Canada 915MHz ISM Band Devices ver1.1/2017-01-13
Test procedure(s) ..... :	PELO001_01 TERD WTS TP 02 LORA_TSSTP_PART_2_v2.0
Summary ..... :	IN COMPLIANCE
Approved by (name / position & signature) ..... :	José Aurelio Rodrigo Simón Wireless Test Solution Manager
Date of issue ..... :	2017-01-19
Report template No ..... :	FLO001_01

Competences and guarantees

AT4 wireless is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance program for its measurement equipment.

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Usage of samples

Samples undergoing test have been selected and supplied by: Multitech Systems Inc.

Sample M/01 is composed of the following elements:

CONTROL Nº	DESCRIPTION	MODEL	HW VERSION	SW VERSION	FW VERSION	SERIAL Nº	DATE OF RECEPTION
51425/1	Product package						2016-09-07
51425/2	Anthena						2016-09-07
51425/3.1	LoRa module	MTDOT-915	Rev B	2.0.14	mdot-firmware-2.0.14-12-JOIN-SEND-OTA.bin	18489487	2016-10-06
51425/4.1	LoRa module	MTDOT-915	Rev B	2.0.14	mdot-firmware-2.0.14-12-JOIN-SEND-ABP.bin	18489486	2016-10-06

Test sample description

The test sample consists on 51425/3.1 which is the hardware 51425/3 programmed with FW labeled as:

“mdot-firmware-2.0.14-12-JOIN-SEND-OTA.bin”

The test sample consists on 51425/4.1 which is the hardware 51425/4 programmed with FW labeled as:

“mdot-firmware-2.0.14-12-JOIN-SEND-ABP.bin”

Identification of the client

Multitech Systems Inc.

Jason Reiss

jreiss@multitech.com

763.717.5508

Testing period

The performed test started on 2016-11-17 and finished on 2017-01-19.

The tests have been performed at AT4 wireless S.A.U. (Spain).

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:

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Testing verdicts

As detailed in Appendix A.

Means of testing identification

Following equipment was used to perform the testing:

ITEM	EU868 SETUP		US915 SETUP	
TEST SYSTEM	TACS4 LORA			
CONTROL NUMBER	5866			
HARDWARE	Equipment	Equipment	Equipment	Equipment
	Semtech GW IOT SX1301 Starter Kit	Semtech GW IOT SX1301 Starter Kit	Semtech GW IOT SX1301 Starter Kit	Semtech GW IOT SX1301 Starter Kit
SOFTWARE	Equipment		Equipment	
	TACS4 LORA GUI v1.6.0 TACS4 LORA Reporting Module v1.4.0 TACS4 LORA Technology Package v2.4.0_R1 TACS4 LORA ED Certification EU v1.2		TACS4 LORA GUI v1.6.0 TACS4 LORA Reporting Module v1.4.0 TACS4 LORA Technology Package v2.4.0_R1 TACS4 LORA ED Certification US+Canada v1.1	

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
31 test cases selected of 31 executed
31 test cases executed of 31 applicable

Test Case ID	Date	Conf	Verdict	Observations
TP_A_US915_ED_MAC_BV_000 Test mode activation	2016-11-25 2016-11-17	Yes Yes	**PASS** **PASS**	ABP OTAA
TP_A_US915_ED_MAC_BV_001 Over The Air activation	2016-11-25	Yes	**PASS**	OTAA
TP_A_US915_ED_MAC_BV_002 Test application functionality	2016-11-25 2016-11-21	Yes Yes	**PASS** **PASS**	ABP OTAA
TP_A_US915_ED_MAC_BV_003 AES encryption and message integrity	2016-11-28 2016-11-18	Yes Yes	**PASS** **PASS**	ABP OTAA
TP_A_US915_ED_MAC_BV_004 Downlink error rate	2016-11-29 2016-11-18	Yes Yes	**PASS** **PASS**	ABP OTAA
TP_A_US915_ED_MAC_BV_005 Downlink window timing	2016-11-29 2016-11-18	Yes Yes	**PASS** **PASS**	ABP OTAA

TP_A_US915_ED_MAC_BV_006 Frame sequence number	2016-11-29 2016-11-18	Yes Yes	**PASS** **PASS**	ABP OTAA
TP_A_US915_ED_MAC_BV_007 DevStatusReq MAC command	2016-11-29 2016-11-18	Yes Yes	**PASS** **PASS**	ABP OTAA
TP_A_US915_ED_MAC_BV_008 MAC Commands	2016-11-29 2016-11-18	Yes Yes	**PASS** **PASS**	ABP OTAA
TP_A_US915_ED_MAC_BV_009 NewChannelReq MAC command	2016-11-29 2016-11-18	Yes Yes	**PASS** **PASS**	ABP OTAA
TP_A_US915_ED_MAC_BV_010 Confirmed packets	2016-11-29 2016-11-18	Yes Yes	**PASS** **PASS**	ABP OTAA
TP_A_US915_ED_MAC_BV_011 RXParamSetupReq MAC command	2016-11-29 2016-11-18	Yes Yes	**PASS** **PASS**	ABP OTAA
TP_A_US915_ED_MAC_BV_012 RX1 Receive window test	2016-11-25 2016-11-18	Yes Yes	**PASS** **PASS**	ABP OTAA
TP_A_US915_ED_MAC_BV_013 RX2 Receive window test	2016-11-28 2016-11-18	Yes Yes	**PASS** **PASS**	ABP OTAA
TP_A_US915_ED_MAC_BV_014 RXTimingSetupReq MAC command	2016-11-29 2016-11-18	Yes Yes	**PASS** **PASS**	ABP OTAA
TP_A_US915_ED_MAC_BV_015_A LinkADRReq MAC command	2017-01-19 2017-01-19	Yes Yes	**PASS** **PASS**	ABP OTAA
TP_A_US915_ED_MAC_BV_015_B LinkADRReq MAC command	2017-01-19 2017-01-19	Yes Yes	**PASS** **PASS**	ABP OTAA

Appendix B – ICS

ABP

NAME	VALUE
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

OTAA

NAME	VALUE
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

Appendix C – IXIT

ABP

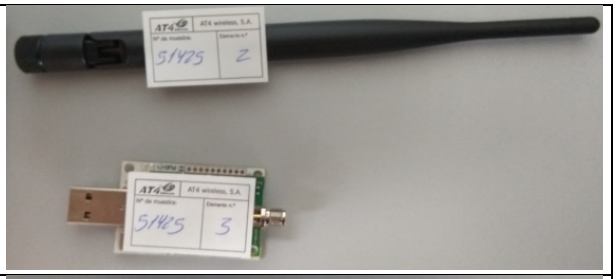
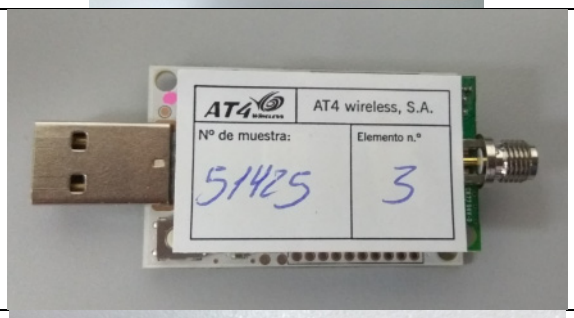
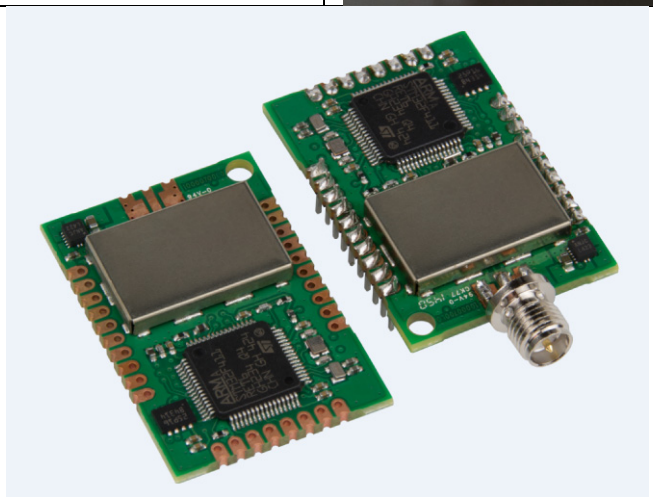
NAME	VALUE
Application session key (AppSKey)	'2B7E151628AED2A6ABF7158809CF4F3C'O
Network session key (NwkSKey)	'2B7E151628AED2A6ABF7158809CF4F3C'O
Application key (AppKey)	'1F33A170A5F1FDA0AB697AAE2B95916B'O
Application identifier (AppEUI)	'6C4EEF66F47986A6'O
End-device Address (DevAddr)	'01000000'O

OTAA

NAME	VALUE
Application session key (AppSKey)	'00000000000000000000000000000000'O
Network session key (NwkSKey)	'00000000000000000000000000000000'O
Application key (AppKey)	'9944565ef83c84a0053d483e7c601f89'O
Application identifier (AppEUI)	'18357a98f9a59d9a'O
End-device Address (DevAddr)	'00000000'O

Appendix D – General Parameters

NAME	VALUE
US915 RX2 Receive window DR	SF12BW500
General Timer	120
Gateway IP Address	192.168.110.44
Socket port communication between Test Tool and Gateway	1780
Default Tx Power (dBm)	14
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

Appendix E – Photographs

Sample M/01