LoRa Alliance	Test report No: **NIE: 420155600.002**

Test Report
LoRa Alliance End Device Certification Requirements

Identification of item tested ....:	LoRa module
Trademark ....:	eWBM Co., Ltd.
DUT ....:	420155600_DLS76_01K41
Model or type reference ....:	DLS76_01K41
Final HW version...:	1.0
Final SW version ....:	1.1.14
Final FW version ....:	1.1.14
Standard...:	LoRaWAN specification V1.0.2 for AS 923MHz ISM Band
Manufacturer...:	Device Design Co., Ltd.
Test method requested ....:	LoRa Alliance End-Device Certification Requirements for AS923MHz ISM Band Devices ver1.1
Test procedure(s) ....:	LoRaEndDeviceCertificationAS923v11
Summary..:	IN COMPLIANCE
Approved by (name / position & signature).......:	Miguel Delorme Manager
Date of issue ....:	2018-07-03
Report template No ....:	FLO001_01

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Competences and guarantees

DEKRA 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, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

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Usage of samples

Samples undergoing test have been selected and supplied by: eWBM 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
420155600/01	LoRa module	DLS76_01K41	1.0	1.1.14	1.1.14	DLS76_01K41_02	2018-06-25

Sample M/02 is composed of the following elements:

CONTROL Nº	DESCRIPTION	MODEL	HW VERSION	SW VERSION	FW VERSION	SERIAL Nº	DATE OF RECEPTION
420155600/02	LoRa module	DLS76_01K41	1.0	1.1.14	1.1.14	DLS76_01K41_11	2018-06-25

Test sample description

The test sample M/01 consists on 420155600/01 device programmed with FW version 1.1.14 and set to ABP activation.

The test sample M/02 consists on 420155600/02 device programmed with FW version 1.1.14 and set to OTA activation.

This is a secure LoRa module powered by the MS500 from eWBM, who provides powerful security SoC products. eWBM delivers total solutions for LoRa communication in the device level, including hardware security accelerators for all of the industry's security needs.

Identification of the client

eWBM Co., Ltd.

14F,9 Teheran-ro 20-gil, Gangnam-gu, Seoul, Republic of Korea

06236 Republic of Korea

Testing period

The performed test started on 2018-06-25 and finished on 2018-06-26.

The tests have been performed at DEKRA Certification Japan.

Environmental conditions

The testing has been performed within the following limits:

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

Remarks and comments

The tests have been performed by the technical personnel:

Jose Enrique Serrano Comes

Miguel Delorme

Testing verdicts

As detailed in Appendix A.

Means of testing identification

Following equipment was used to perform the testing:

ITEM	KR920 SETUP	
TEST SYSTEM	TACS4 LPWAN	
CONTROL NUMBER	DKJP-0001	
HARDWARE	Equipment	Serial N°
	ST Nucleo-F746ZG LoRa GW	2163200506
SOFTWARE	Equipment	
	TACS4 LPWAN GUI v1.10.0 TACS4 LPWAN Reporting Module v1.5.0 TACS4 LPWAN Technology Package v5.3.0_R1 TACS4 LPWAN ED Certification AS 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).

19 test cases selected of 19 executed
19 test cases executed of 19 applicable

Test Case ID	Sample		Date	Conf	Verdict	Observations
TP_A_AS923_ED_MAC_BV_000 **Test mode activation**	Device ID	M/01	2018-06-26	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_001 **Test application functionality**	Device ID	M/01	2018-06-26	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_002 **Over the Air activation**	Device ID	M/02	2018-06-25	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_003 **Downlink error rate**	Device ID	M/02	2018-06-25	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_004 **AES encryption and message integrity**	Device ID	M/02	2018-06-25	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_005 **Downlink window timing**	Device ID	M/02	2018-06-26	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				

TP_A_AS923_ED_MAC_BV_006 **Frame sequence number**	**Device ID**	M/02	2018-06-26	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_007 **DevStatusReq MAC command**	**Device ID**	M/02	2018-06-26	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_008 **MAC Commands**	**Device ID**	M/02	2018-06-26	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_009 **NewChannelReq MAC command**	**Device ID**	M/01	2018-06-26	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_010 **DlChannelReq MAC command**	**Device ID**	M/02	2018-06-26	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_011 **Confirmed packets**	**Device ID**	M/02	2018-06-26	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_012 **RXParamSetupReq MAC command**	**Device ID**	M/02	2018-06-26	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_013 **RXTimingSetupReq MAC command**	**Device ID**	M/02	2018-06-25	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_014_A **LinkADRReq MAC command**	**Device ID**	M/01	2018-06-26	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_014_B **LinkADRReq MAC command**	**Device ID**	M/02	2018-06-26	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_015 **Packet Error Rate RX1**	**Device ID**	M/02	2018-06-25	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_016 **Packet Error Rate RX2**	**Device ID**	M/02	2018-06-25	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				
TP_A_AS923_ED_MAC_BV_017 **TXParamSetupReq MAC command**	**Device ID**	M/02	2018-06-26	Yes	**PASS**	
	App ID	N/A				
	Fw ver	1.1.14				
	Hw ver	1.0				

Appendix B – ICS

NAME	VALUE
DUT is a Class A Device (All End Devices)	TRUE
DUT works in Asia 923MHz ISM Band	TRUE
DUT supports Over-The-Air Activation (OTAA) mechanism	TRUE
DUT supports Adaptive Data Rate (ADR) feature	TRUE
DUT supports Trigger Join Request command in Test Mode	TRUE
DUT supports DlChannelReq MAC command	TRUE
DUT supports LinkADRReq block	TRUE
DUT implements LoRaWAN v1.0.2rB certification requirements	TRUE

Appendix C – IXIT

NAME	VALUE
Minimum transmission power	0
Maximum transmission power	14 dBm
End-device identifier (DevEUI)	'0000000000000001'O
Application session key (AppSKey)	'0000000000000000000000000000000B'O
Network session key (NwkSKey)	'0000000000000000000000000000000A'O
Application key (AppKey)	'00000000000000000000000000000005'O
Application identifier (AppEUI)	'0000000000000001'O
End-device Address (DevAddr)	'00000001'O

Appendix D – General Parameters

NAME	VALUE
General Timer	60
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	192.168.1.100
Gateway socket port	1780
Default Tx Power (dBm)	14
Default Tx Antenna	0