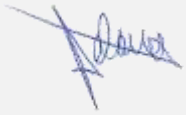
Test report No:

NIE: 420136900.002

Test Report
LoRa Alliance End Device Certification Requirements

Identification of item tested :	LPWAN Sensor
Trademark :	Yokogawa Electric Corporation
DUT :	420136900_XS770
Model or type reference :	XS770A
Final HW version :	S1.01
Final SW version :	N/A
Final FW version :	R1.01.01
Standard :	LoRaWAN specification V1.0.2 for AS 923MHz ISM Band
Manufacturer :	Yokogawa Electric Corporation
Test method requested :	LoRa Alliance End-Device Certification Requirements for AS923MHz ISM Band Devices ver1.1
Test Spec Errata(s) :	v1.1/2017-07-19
Test procedure(s) :	LoRaEndDeviceCertificationAS923v11
Summary :	IN COMPLIANCE
Approved by (name / position & signature) :	Miguel Delorme Manager 
Date of issue :	2018-02-09
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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.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA and the Accreditation Bodies.

Usage of samples

Samples undergoing test have been selected and supplied by: Yokogawa Electric Corporation

Sample M/01 is composed of the following elements:

CONTROL Nº	DESCRIPTION	MODEL	HW VERSION	SW VERSION	FW VERSION	SERIAL Nº	DATE OF RECEPTION
420136900/01	LPWAN Sensor	XS770A	S1.01	N/A	R1.01.01	LP2-18	2018-01-12

Test sample description

The test sample M/01 consists on 420136900/01 device programmed with FW version R1.01.01.

Yokogawa XS770A is an Industrial IoT wireless sensor which measures vibration and temperature to monitor machine or facility conditions for industrial applications. It can improve its management efficiency by visualizing its conditions. The sensor has environmental resistance features to support heavy-duty use.

Identification of the client

Yokogawa Electric Corporation

2-9-32 Nakacho, Musashino-shi, Tokyo

180-8750 Japan

Testing period

The performed test started on 2018-01-12 and finished on 2018-02-07.

The tests have been performed at DEKRA Certification Japan.

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:

Jose Enrique Serrano Comes

Testing verdicts

As detailed in Appendix A.

Means of testing identification

Following equipment was used to perform the testing:

ITEM	AS923 SETUP	
TEST SYSTEM	TACS4 LPWAN	
CONTROL NUMBER	DKJP-0002	
HARDWARE	Equipment	Serial Nº
	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 v4.8.0_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).

0 test cases have been executed with SCR errors
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	2018-02-07	Yes	**PASS**	
	App ID	N/a				
	Fw ver	R1.01.01				
	Hw ver	S1.01				
TP_A_AS923_ED_MAC_BV_001 **Test application functionality**	**Device ID**	M/01	2018-02-07	Yes	**PASS**	
	App ID	N/a				
	Fw ver	R1.01.01				
	Hw ver	S1.01				
TP_A_AS923_ED_MAC_BV_002 **Over the Air activation**	**Device ID**	M/01	2018-02-07	Yes	**PASS**	
	App ID	N/a				
	Fw ver	R1.01.01				
	Hw ver	S1.01				
TP_A_AS923_ED_MAC_BV_003 **Downlink error rate**	**Device ID**	M/01	2018-02-07	Yes	**PASS**	
	App ID	N/a				
	Fw ver	R1.01.01				
	Hw ver	S1.01				
TP_A_AS923_ED_MAC_BV_004 **AES encryption and message integrity**	**Device ID**	M/01	2018-02-07	Yes	**PASS**	
	App ID	N/a				
	Fw ver	R1.01.01				
	Hw ver	S1.01				
TP_A_AS923_ED_MAC_BV_005 **Downlink window timing**	**Device ID**	M/01	2018-02-07	Yes	**PASS**	
	App ID	N/a				
	Fw ver	R1.01.01				
	Hw ver	S1.01				

TP_A_AS923_ED_MAC_BV_006 **Frame sequence number**	**Device ID** **App ID** **Fw ver** **Hw ver**	M/01 N/a R1.01.01 S1.01	2018-02-07	Yes	**PASS**	
TP_A_AS923_ED_MAC_BV_007 **DevStatusReq MAC command**	**Device ID** **App ID** **Fw ver** **Hw ver**	M/01 N/a R1.01.01 S1.01	2018-02-07	Yes	**PASS**	
TP_A_AS923_ED_MAC_BV_008 **MAC Commands**	**Device ID** **App ID** **Fw ver** **Hw ver**	M/01 N/a R1.01.01 S1.01	2018-02-07	Yes	**PASS**	
TP_A_AS923_ED_MAC_BV_009 **NewChannelReq MAC command**	**Device ID** **App ID** **Fw ver** **Hw ver**	M/01 N/a R1.01.01 S1.01	2018-02-07	Yes	**PASS**	
TP_A_AS923_ED_MAC_BV_010 **DlChannelReq MAC command**	**Device ID** **App ID** **Fw ver** **Hw ver**	M/01 N/a R1.01.01 S1.01	2018-02-07	Yes	**PASS**	
TP_A_AS923_ED_MAC_BV_011 **Confirmed packets**	**Device ID** **App ID** **Fw ver** **Hw ver**	M/01 N/a R1.01.01 S1.01	2018-02-07	Yes	**PASS**	
TP_A_AS923_ED_MAC_BV_012 **RXParamSetupReq MAC command**	**Device ID** **App ID** **Fw ver** **Hw ver**	M/01 N/a R1.01.01 S1.01	2018-02-07	Yes	**PASS**	
TP_A_AS923_ED_MAC_BV_013 **RXTimingSetupReq MAC command**	**Device ID** **App ID** **Fw ver** **Hw ver**	M/01 N/a R1.01.01 S1.01	2018-02-07	Yes	**PASS**	
TP_A_AS923_ED_MAC_BV_014_A **LinkADRReq MAC command**	**Device ID** **App ID** **Fw ver** **Hw ver**	M/01 N/a R1.01.01 S1.01	2018-02-07	Yes	**PASS**	
TP_A_AS923_ED_MAC_BV_014_B **LinkADRReq MAC command**	**Device ID** **App ID** **Fw ver** **Hw ver**	M/01 N/a R1.01.01 S1.01	2018-02-07	Yes	**PASS**	
TP_A_AS923_ED_MAC_BV_015 **Packet Error Rate RX1**	**Device ID** **App ID** **Fw ver** **Hw ver**	M/01 N/a R1.01.01 S1.01	2018-02-07	Yes	**PASS**	
TP_A_AS923_ED_MAC_BV_016 **Packet Error Rate RX2**	**Device ID** **App ID** **Fw ver** **Hw ver**	M/01 N/a R1.01.01 S1.01	2018-02-07	Yes	**PASS**	
TP_A_AS923_ED_MAC_BV_017 **TXParamSetupReq MAC command**	**Device ID** **App ID** **Fw ver** **Hw ver**	M/01 N/a R1.01.01 S1.01	2018-02-07	Yes	**PASS**	

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	7 dBm
Maximum transmission power	11 dBm
Application key (AppKey)	'2B7E151628AED2A6ABF7158809CF4F3C'O
Application identifier (AppEUI)	'0202020202020202'O

Appendix D – General Parameters

NAME	VALUE
General Timer	90
AS923 RECEIVE_DELAY1 (s)	1.0
AS923 RECEIVE_DELAY2 (s)	2.0
AS923 JOIN_ACCEPT_DELAY1 (s)	5
AS923 JOIN_ACCEPT_DELAY2 (s)	6
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