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Kunden Referenz-Nr.: <i>Client Reference No.:</i>		Auftragsdatum: <i>Order date:</i>	12-01-2018		
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Prüfgegenstand: <i>Test item:</i>	CMWX1ZZABZ-093				
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	CMWX1ZZABZ-093				
Auftrags-Inhalt: <i>Order content:</i>	Test of Conformance to LoRaWAN™ Specification V1.0.2				
Prüfgrundlage: <i>Test specification:</i>	LoRa Alliance Asia AS 923MHz Region End Device Certification Requirements document V1.1				
Wareneingangsdatum: <i>Date of receipt:</i>	13-08-2018				
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000791266-001				
Prüfzeitraum: <i>Testing period:</i>	25-10-2018 - 26-10-2018				
Ort der Prüfung: <i>Place of testing:</i>	Taipei, Taiwan				
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland Taiwan Ltd.				
Prüfresultat: <i>Test results:</i>	PASS				
Geprüft von: <i>Tested by:</i>	Justin K.C. Yu Test Engineer	Kontrolliert von: <i>Reviewed by:</i>	Brenda S. H. Chen Project Manager		
29-10-2018		29-10-2018			
Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>
Sonstiges / <i>Other:</i> -					
<p>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark</i></p>					

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Revisions <i>Revisions</i>			
Revision Revision	Datum Date	Anmerkung Remark	Verfasser Author

Note: Latest revision report will replace all previous reports

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1 PRODUCT INFORMATION

The device under test (DUT) is a CMWX1ZZABZ-093 for LoRaWAN Certification testing

General information	
Product name:	CMWX1ZZABZ-093
Model:	CMWX1ZZABZ-093
Description:	LoRa Alliance LoRaWAN compliance testing
Manufacturer SKU	-
Hardware version:	MP
Firmware version:	1.1.03
Contact person:	Haitao Dong
Phone number:	+86-21-36355700-6138

LoRaWAN information	
Type of DUT	Module
LoRa Device Class	A
Geographical area of operation	Asia
Operating frequency	923 MHz
Adaptive Data Rate (ADR) supported?	Yes
Optional data rates supported?	DR6 (SF7BW250) and DR7 (FSK50)
Activation possibilities	Both Over the air and by personalization
Test According LoRaWAN™ Spec	V1.0.2
Output Power	16 dBm
Number / Type of Antenna(s)	1
Antenna Gain	-
Test sample information	production unit

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For OTA activation:	
Serial No of Device with OTAA	A000791266-001
End-device identifier (DevEUI)	3434 3731 7A36 710F
Application identifier (AppEUI)	0101 0101 0101 0101
Application key (AppKey)	2B7E 1516 28AE D2A6 ABF7 1588 09CF 4F3C
For activation by personalization:	
Serial No of Device with ABP	A000791266-001
End-device identifier (DevAddr)	1D9BDF2E
Application identifier (AppSKey)	2B7E 1516 28AE D2A6 ABF7 1588 09CF 4F3C
Application key (NwkSKey)	2B7E 1516 28AE D2A6 ABF7 1588 09CF 4F3C
Default RX2 Window Frequency	923.2MHz
Default RX2 Window Data Rate	DR2 (SF10, 125kHz)
RECEIVE_DELAY1	1 s
RECEIVE_DELAY2	2 s (must be RECEIVE_DELAY1 + 1s)
JOIN_ACCEPT_DELAY1	5 s
JOIN_ACCEPT_DELAY2	6 s
MAX_FCNT_GAP	16384
ADR_ACK_LIMIT	64
ADR_ACK_DELAY	32
ACK_TIMEOUT	2 +/- 1 s (random delay between 1 and 3 seconds)

Submitted Documents:

LoRa Certification Customer Questionnaire document.
LoRa Test Environment log files.

Remarks:

All test cases are tested with Over the Air Activation (OTAA) mode, else explicitly Activation by Personalization (ABP) to be tested.

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2 TEST EQUIPMENT

Prüfmittel <i>Test equipment</i>	Marke <i>Brand</i>	Version <i>Version</i>
Comprehensive Testing Environment (CTE)	4ffcom AG	CTE - TMF V45.1 CTE - SIG - LoRa V3.3
Semtech Development Kit IOT922STK1-8 (Semtech Gateway) for AS923 Band	Semtech	SX1301-based concentrator reference design >=GW_V_4.0.0-3
Semtech Development Kit IOT922STK1-8 (Semtech Packet Forwarder) for AS923 Band	Semtech	>= PF_V_2.2.1

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3 SUMMARY

Verdicts of functional requirements:	Verdict
Device Activation (Activation by Personalization)	PASS
Device Activation (Over the Air Activation)	PASS
Test Application Functionality	PASS
Over The Air Activation	PASS
Downlink Error Rate	PASS
Cryptography	PASS
Downlink Window Timing	PASS
Frame Sequence Number	PASS
Device Status Request MAC command	PASS
Mac Commands	PASS
New Channel Request MAC command	PASS
DIChannelReq MAC command	PASS
Confirmed packets	PASS
RX Parameter Setup Request MAC command	PASS
RX Timing Setup Request MAC command	PASS
Link ADR Request MAC command	PASS
Packet Error Rate RX1	PASS
Packet Error Rate RX2	PASS
TxParamSetupReq MAC command	PASS

Supported optional features:	YES / NO
Adaptive Data Rate (ADR)	YES

Overall Test Result: PASS

4 TEST CASE VERIDCTS AS PER TEST SPECIFICATIONS

Test results per test case (OTAA):

Test item	Description	Implementation	Result
AS923 2.1	Test mode activation	Mandatory	PASS
AS923 2.2	Test Application Functionality	Mandatory	PASS
AS923 2.3	Over The Air Activation	Mandatory	PASS
AS923 2.4	Downlink Error Rate	Mandatory	PASS
AS923 2.5.a	AES encryption	Mandatory	PASS
AS923 2.5.b	MIC	Mandatory	PASS
AS923 2.6	Downlink window timing	Mandatory	PASS
AS923 2.7.a	Uplink sequence number	Mandatory	PASS
AS923 2.7.b	Downlink sequence number	Mandatory	PASS
AS923 2.8	DevStatusReq MAC command	Mandatory	PASS
AS923 2.9	MAC Commands	Mandatory	PASS
AS923 2.10.a	Read-only default channels	Mandatory	PASS
AS923 2.10.b	Addition and removal of multiple channels	Mandatory	PASS
AS923 2.10.c & 10.d	Addition and removal of a single channel	Mandatory	PASS
AS923 2.11	DL Channel Request MAC command	Mandatory	PASS
AS923 2.12.a	Uplink confirmed packets	Mandatory	PASS
AS923 2.12.b	Uplink retransmission	Mandatory	PASS
AS923 2.12.c	Downlink confirmed packets	Mandatory	PASS
AS923 2.12.d	Downlink retransmission	Mandatory	PASS
AS923 2.13	RXParamSetupReq MAC command	Mandatory	PASS
AS923 2.14	RXTimingSetupReq MAC command	Mandatory	PASS
AS923 2.15.a	ADR bit	Mandatory	PASS
AS923 2.15.b	TXPower	Mandatory	PASS
AS923 2.15.c	Required DataRates	Mandatory	PASS
AS923 2.15.d	Optional DataRates	Mandatory	PASS
AS923 2.15.e	ChannelMask	Mandatory	PASS
AS923 2.15.f	Redundancy	Mandatory	PASS
AS923 2.15.g	ADRACKReq bit	Mandatory	PASS
AS923 2.15.h	LinkADRReq commands block	Mandatory	PASS
AS923 2.16	Packet Error Rate RX1	Mandatory	PASS
AS923 2.17	Packet Error Rate RX2	Mandatory	PASS
AS923 2.18.a	TxParamSetupReq MAC command - DwellTime	Mandatory	PASS
AS923 2.18.b	TxParamSetupReq MAC command - MaxEIRP	Mandatory	PASS

Test results per test case (ABP):

Test item	Description	Implementation	Result
AS923 2.1	Test mode activation	Mandatory	PASS
AS923 2.2	Test Application Functionality	Mandatory	PASS
AS923 2.4	Downlink Error Rate	Mandatory	PASS
AS923 2.5.a	AES encryption	Mandatory	PASS
AS923 2.5.b	MIC	Mandatory	PASS
AS923 2.6	Downlink window timing	Mandatory	PASS
AS923 2.7.a	Uplink sequence number	Mandatory	PASS
AS923 2.7.b	Downlink sequence number	Mandatory	PASS
AS923 2.8	DevStatusReq MAC command	Mandatory	PASS
AS923 2.9	MAC Commands	Mandatory	PASS
AS923 2.10.a	Read-only default channels	Mandatory	PASS
AS923 2.10.b	Addition and removal of multiple channels	Mandatory	PASS
AS923 2.10.c & 10.d	Addition and removal of a single channel	Mandatory	PASS
AS923 2.11	DL Channel Request MAC command	Mandatory	PASS
AS923 2.12.a	Uplink confirmed packets	Mandatory	PASS
AS923 2.12.b	Uplink retransmission	Mandatory	PASS
AS923 2.12.c	Downlink confirmed packets	Mandatory	PASS
AS923 2.12.d	Downlink retransmission	Mandatory	PASS
AS923 2.13	RXParamSetupReq MAC command	Mandatory	PASS
AS923 2.14	RXTimingSetupReq MAC command	Mandatory	PASS
AS923 2.15.a	ADR bit	Mandatory	PASS
AS923 2.15.b	TXPower	Mandatory	PASS
AS923 2.15.c	Required DataRates	Mandatory	PASS
AS923 2.15.d	Optional DataRates	Mandatory	PASS
AS923 2.15.e	ChannelMask	Mandatory	PASS
AS923 2.15.f	Redundancy	Mandatory	PASS
AS923 2.15.g	ADRACKReq bit	Mandatory	PASS
AS923 2.15.h	LinkADRRReq commands block	Mandatory	PASS
AS923 2.16	Packet Error Rate RX1	Mandatory	PASS
AS923 2.17	Packet Error Rate RX2	Mandatory	PASS
AS923 2.18.a	TxParamSetupReq MAC command - DwellTime	Mandatory	PASS
AS923 2.18.b	TxParamSetupReq MAC command - MaxEIRP	Mandatory	PASS

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5 TEST RESULTS

Detailed test results (OTAA):

Test item	Test Case Name	DataRate/ Timing	Limit	Results	Verdict
AS923 2.4	Packet Error Rate RX1	SF10BW125	5%	0.00%	PASS
AS923 2.4	Packet Error Rate RX2	SF10BW125	5%	5.00%	PASS
AS923 2.6	Downlink window timing	-20ms	-	-	PASS
		+20ms	-	-	PASS
AS923 2.16	Packet Error Rate RX1	SF12BW125	5%	0.00%	PASS
		SF11BW125	5%	0.00%	PASS
		SF10BW125	5%	0.00%	PASS
		SF9BW125	5%	0.00%	PASS
		SF8BW125	5%	0.00%	PASS
		SF7BW125	5%	1.67%	PASS
		SF7BW250	5%	0.00%	PASS
		FSK	5%	1.67%	PASS
AS923 2.17	Packet Error Rate RX2	SF12BW125	5%	0.00%	PASS
		SF11BW125	5%	0.00%	PASS
		SF9BW125	5%	1.67%	PASS
		SF8BW125	5%	0.00%	PASS
		SF7BW125	5%	3.33%	PASS
		SF7BW250	5%	0.00%	PASS
		FSK	5%	0.00%	PASS

6 PHOTO DOCUMENTATION

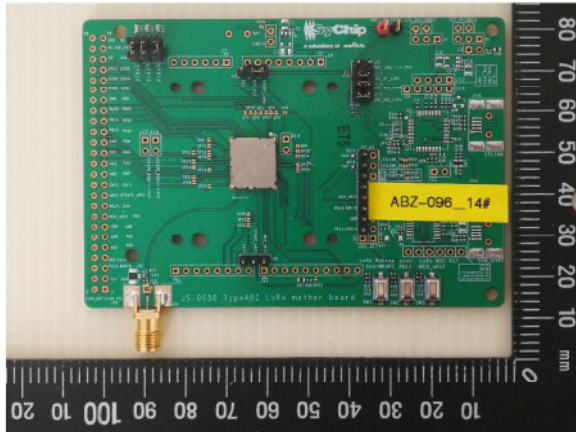


Photo 1: EUT front view

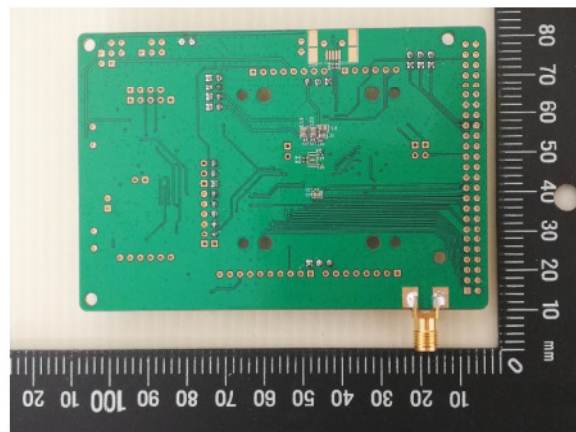


Photo 2: EUT rear view