

<b>Prüfbericht-Nr.:</b> 18021502_001 <i>Test Report No.:</i>		<b>Auftrags-Nr.:</b> 89213326 <i>Order No.:</i>		Seite 1 von 8 Page 1 of 8	
<b>Kunden Referenz-Nr.:</b> 4692320 <i>Client Reference No.:</i>		<b>Auftragsdatum</b> 12-01-2018 <i>Order date:</i>			
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<b>Prüfgegenstand:</b> <i>Test item:</i>		LPWAN Cyble			
<b>Bezeichnung / Typ-Nr.:</b> - <i>Identification / Type No.:</i>					
<b>Auftrags-Inhalt:</b> <i>Order content:</i>		Test of Conformance to LoRaWAN™ Specification V1.0.1			
<b>Prüfgrundlage:</b> <i>Test specification:</i>		LoRa End Device Certification EU Version 1.2			
<b>Wareneingangsdatum:</b> 12-01-2018 <i>Date of receipt:</i>					
<b>Prüfmuster-Nr.:</b> 001 <i>Test sample No.:</i>					
<b>Prüfzeitraum:</b> 23-03-2018 - 06-04-2018 <i>Testing period:</i>					
<b>Ort der Prüfung:</b> Leek, Netherlands <i>Place of testing:</i>					
<b>Prüflaboratorium:</b> TÜV Rheinland NL B.V. <i>Testing laboratory:</i>					
<b>Prüfergebnis:</b> PASS <i>Test results:</i>					
<b>Geprüft von</b> Sebastiaan van Staden <i>Tested by:</i>		<b>Kontrolliert von</b> Lourens Koopmans <i>Reviewed by:</i>			
06-04-2018		09-04-2018			
<b>Datum</b> <i>Date</i>	<b>Name / Stellung</b> <i>Name / Position</i>	<b>Unterschrift</b> <i>Signature</i>	<b>Datum</b> <i>Date</i>	<b>Name / Stellung</b> <i>Name / Position</i>	<b>Unterschrift</b> <i>Signature</i>
<b>Sontiges /</b> <i>Other:</i> -					
<p><b>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.</b>  <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 Revisions			
Revision Revision	Datum Date	Anmerkung Remark	Verfasser Author
0	09-04-2018	Original Report	SvS

Note: Latest revision report will replace all previous reports

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## 1 PRODUCT INFORMATION

The device under test (DUT) is a wireless LPWAN Cyble for LoRaWAN Certification testing

General information	
Product name:	LPWAN Cyble (smart meter module)
Model:	-
Description:	LoRa Alliance LoRaWAN compliance testing
Manufacturer SKU	-
Hardware version:	1.0
Software version:	1.0
Contact person:	Valentin Dupeyrot
Phone number:	+33 3 85 29 39 00

LoRaWAN information	
Type of DUT	End Device
LoRa Device Class	A
Geographical area of operation	Europe
Operating frequency	868 MHz
Adaptive Data Rate (ADR) supported?	Yes
Optional data rates supported?	No
Activation possibilities	Both Over the air and by personalization
Test According LoRaWAN™ Spec	V1.0.1
Output Power	Up to 25 mW
Number / Type of Antenna(s)	1
Antenna Gain	0 dB
Test sample information	production unit

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<b>For OTA activation:</b>	
Serial No of Device with OTAA	90DFFB815013C006
End-device identifier (DevEUI)	90DFFB815013C006
Application identifier (AppEUI)	90DFFB0000000001
Application key (AppKey)	EABB99CFEA1541BACF598FC318BC5994
<b>For activation by personalization:</b>	
Serial No of Device with ABP	17498006
End-device identifier (DevAddr)	17498006
Application identifier (AppSKey)	A54B55F5FFCE11E4AEE12F006B10AA92
Application key (NwkSKey)	5B0082E025B0127304EA497236994C56
Default RX2 Window Frequency	869.525MHz
Default RX2 Window Data Rate	DR0 (SF12, 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 Activation by Personalization (ABP)

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## 2 TEST EQUIPMENT

<b>Prüfmittel</b> <i>Test equipment</i>	<b>Marke</b> <i>Brand</i>	<b>Version</b> <i>Version</i>
Comprehensive Testing Environment (CTE)	4ffcom AG	CTE - TMF V45.1 CTE - SIG - LoRa V3.2
Semtech Development Kit (Semtech Gateway) for EU 863-870 Band	Semtech	SX1301-based concentrator reference design >=GW_V_3.1.0
Semtech Development Kit (Semtech Packet Forwarder) for EU 863-870 Band	Semtech	>= PF_V_2.2.0

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### 3 SUMMARY

Verdicts of functional requirements:	Verdict
Test Mode Activation (Activation by Personalization)	PASS
Test Mode Activation (Over the Air Activation)	PASS
Over The Air Activation	PASS
Test Application Functionality	PASS
Over The Air Activation	PASS
Cryptography	PASS
Downlink Error Rate	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

Supported optional features:	YES / No
Adaptive Data Rate (ADR)	YES
SF7BW250	No
FSK	No

**Overall Test Result: PASS**

#### 4 TEST CASE VERIDCTS AS PER TEST SPECIFICATIONS

##### Test results per test case (ABP):

Test item	Description	Implementation	Result
EU863-870 2.1	Device Activation	Mandatory	PASS
EU863-870 2.2	Test Application Functionality	Mandatory	PASS
EU863-870 2.3	Over The Air Activation	Mandatory	PASS
EU863-870 2.4	Packet Error Rate RX2 Default DR	Mandatory	PASS
EU863-870 2.5.a	AES encryption	Mandatory	PASS
EU863-870 2.5.b	MIC	Mandatory	PASS
EU863-870 2.6	Downlink window timing	Mandatory	PASS
EU863-870 2.7.a	Uplink sequence number	Mandatory	PASS
EU863-870 2.7.b	Downlink sequence number	Mandatory	PASS
EU863-870 2.8	DevStatusReq MAC command	Mandatory	PASS
EU863-870 2.9	MAC Commands	Mandatory	PASS
EU863-870 2.10.a	Read-only default channels	Mandatory	PASS
EU863-870 2.10.b	Addition and removal of multiple channels	Mandatory	PASS
EU863-870 2.10.c & 10.d	Addition and removal of a single channel	Mandatory	PASS
EU863-870 11.a	Uplink confirmed packets	Mandatory	PASS
EU863-870 11.b	Uplink retransmission	Mandatory	PASS
EU863-870 11.c	Downlink confirmed packets	Mandatory	PASS
EU863-870 11.d	Downlink retransmission	Mandatory	PASS
EU863-870 12	RXParamSetupReq MAC command	Mandatory	PASS
EU863-870 13	RXTimingSetupReq MAC command	Mandatory	PASS
EU863-870 14.a	ADR bit	Mandatory	PASS
EU863-870 14.b	TXPower	Mandatory	PASS
EU863-870 14.c	Required DataRates	Mandatory	PASS
EU863-870 14.d	Optional DataRates	Mandatory	N/A
EU863-870 14.e	ChannelMask	Mandatory	PASS
EU863-870 14.f	Redundancy	Mandatory	PASS
EU863-870 14.g	ADRACKReq bit	Mandatory	PASS
EU863-870 15	Packet Error Rate RX1	Mandatory	PASS
EU863-870 16	Packet Error Rate RX2	Mandatory	PASS



## 5 TEST RESULTS

### Detailed test results (ABP):

Test item	Test Case Name	DataRate/ Timing	Limit	Results	Verdict
EU863-870 2.4	Packet Error Rate RX1	SF10BW125	5 %	0.00 %	PASS
	Packet Error Rate RX2	SF10BW125	5 %	0.00 %	PASS
EU863-870 2.6	Downlink window timing	-20ms	-	-	PASS
		+20ms	-	-	PASS
EU863-870 15	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 %	0.00 %	PASS
EU863-870 16	Packet Error Rate RX2	SF11BW125	5 %	0.00 %	PASS
		SF10BW125	5 %	0.00 %	PASS
		SF9BW125	5 %	0.00 %	PASS
		SF8BW125	5 %	0.00 %	PASS
		SF7BW125	5 %	0.00 %	PASS

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## 6 PHOTO DOCUMENTATION



Photo 1: EUT front view



Photo 2: EUT rear view