

Prüfbericht-Nr.: 17121804_001 <i>Test Report No.:</i>		Auftrags-Nr.: 89212868 <i>Order No.:</i>		Seite 1 von 8 Page 1 of 8	
Kunden Referenz-Nr.: 24097922 <i>Client Reference No.:</i>		Auftragsdatum 17-12-2017 : <i>Order date:</i>			
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Prüfgegenstand: Micro Tracker 2 <i>Test item:</i>					
Bezeichnung / Typ-Nr.: - <i>Identification / Type No.:</i>					
Auftrags-Inhalt: Test of Conformance to LoRaWAN™ Specification V1.0.2 <i>Order content:</i>					
Prüfgrundlage: LoRa End Device Certification EU Version 1.5 <i>Test specification:</i>					
Wareneingangsdatum: 03-01-2018 <i>Date of receipt:</i>					
Prüfmuster-Nr.: 001 <i>Test sample No.:</i>					
Prüfzeitraum: 09-01-2018 - 10-01-2018 <i>Testing period:</i>					
Ort der Prüfung: Leek, Netherlands <i>Place of testing:</i>					
Prüflaboratorium: TÜV Rheinland NL B.V. <i>Testing laboratory:</i>					
Prüfergebnis: PASS <i>Test results:</i>					
Geprüft von Sebastiaan van Staden <i>Tested by:</i> 		Kontrolliert von Lourens Koopmans <i>Reviewed by:</i> 		12-01-2018	
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>
Sontiges / <i>Other:</i> -					
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>					

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Revisions Revisions			
Revision Revision	Datum Date	Anmerkung Remark	Verfasser Author
0	12-01-2018	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 Abeeway Micro Tracker 2 for LoRaWAN Certification testing

General information	
Product name:	Abeeway Micro Tracker 2
Model:	-
Description:	LoRa Alliance LoRaWAN compliance testing
Manufacturer SKU	-
Hardware version:	V 3.1
Software version:	2018.01.10
Contact person:	Marc Bongartz
Phone number:	+33 4 92 96 11 21

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	V1.0.2
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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For OTA activation:	
Serial No of Device with OTAA	20635F00814C4B6D
End-device identifier (DevEUI)	20635F00814C4B6D
Application identifier (AppEUI)	20635F0000000001
Application key (AppKey)	2B7E151628AED2A6ABF7158809CF4F3C
For activation by personalization:	
Serial No of Device with ABP	014C4B6D
End-device identifier (DevAddr)	014C4B6D
Application identifier (AppSKey)	2B7E151628AED2A6ABF7158809CF4F3C
Application key (NwkSKey)	2B7E151628AED2A6ABF7158809CF4F3C
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)
All test cases are tested with Over the Air (OTA) Activation accept Packet Error Rate RX1 and RX2.

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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 V44.5 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	DL Channel Request MAC command	Mandatory	PASS
EU863-870 12.a	Uplink confirmed packets	Mandatory	PASS
EU863-870 12.b	Uplink retransmission	Mandatory	PASS
EU863-870 12.c	Downlink confirmed packets	Mandatory	PASS
EU863-870 12.d	Downlink retransmission	Mandatory	PASS
EU863-870 13	RXParamSetupReq MAC command	Mandatory	PASS
EU863-870 14	RXTimingSetupReq MAC command	Mandatory	PASS
EU863-870 15.a	ADR bit	Mandatory	PASS
EU863-870 15.b	TXPower	Mandatory	PASS
EU863-870 15.c	Required DataRates	Mandatory	PASS
EU863-870 15.d	Optional DataRates	Mandatory	N/A
EU863-870 15.e	ChannelMask	Mandatory	PASS
EU863-870 15.f	Redundancy	Mandatory	PASS
EU863-870 15.g	ADRACKReq bit	Mandatory	PASS
EU863-870 15.h	LinkADRRReq commands block	Mandatory	PASS
EU863-870 16	Packet Error Rate RX1	Mandatory	PASS
EU863-870 17	Packet Error Rate RX2	Mandatory	PASS

Test results per test case (OTAA):

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	DL Channel Request MAC command	Mandatory	PASS
EU863-870 12.a	Uplink confirmed packets	Mandatory	PASS
EU863-870 12.b	Uplink retransmission	Mandatory	PASS
EU863-870 12.c	Downlink confirmed packets	Mandatory	PASS
EU863-870 12.d	Downlink retransmission	Mandatory	PASS
EU863-870 13	RXParamSetupReq MAC command	Mandatory	PASS
EU863-870 14	RXTimingSetupReq MAC command	Mandatory	PASS
EU863-870 15.a	ADR bit	Mandatory	PASS
EU863-870 15.b	TXPower	Mandatory	PASS
EU863-870 15.c	Required DataRates	Mandatory	PASS
EU863-870 15.d	Optional DataRates	Mandatory	N/A
EU863-870 15.e	ChannelMask	Mandatory	PASS
EU863-870 15.f	Redundancy	Mandatory	PASS
EU863-870 15.g	ADRACKReq bit	Mandatory	PASS
EU863-870 15.h	LinkADRReq commands block	Mandatory	PASS
EU863-870 16	Packet Error Rate RX1	Mandatory	Not tested
EU863-870 17	Packet Error Rate RX2	Mandatory	Not tested

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 16	Packet Error Rate RX1	SF12BW125	5 %	0.00 %	PASS
		SF11BW125	5 %	0.00 %	PASS
		SF10BW125	5 %	1.66 %	PASS
		SF9BW125	5 %	0.00 %	PASS
		SF8BW125	5 %	0.00 %	PASS
		SF7BW125	5 %	0.00 %	PASS
EU863-870 17	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

6 PHOTO DOCUMENTATION



Photo 1: EUT front view



Photo 2: EUT rear view



Photo 3: PCB top view



Photo 4: PCB bottom view