


<b>Prüfbericht-Nr.:</b> 60160815-001 <i>Test Report No.:</i>		<b>Auftrags-Nr.:</b> 89213551 <i>Order No.:</i>		Seite 1 von 8 Page 1 of 8	
<b>Kunden Referenz-Nr.:</b> 46092320 <i>Client Reference No.:</i>		<b>Auftragsdatum:</b> 03-05-2018 <i>Order date:</i>			
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<b>Prüfgegenstand:</b> <i>Test item:</i>		BOSCH Asset Tracing Tag			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type No.:</i>		BOSCH Asset Tracing Tag / 0273600046			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>		LoRa Alliance End Device testing EU 868 MHz			
<b>Prüfgrundlage:</b> <i>Test specification:</i>		LoRa Alliance End Device Certification Requirements for EU 868 MHz ISM Band Devices Version 1.5			
<b>Wareneingangsdatum:</b> <i>Date of receipt:</i>					
<b>Prüfmuster-Nr.:</b> <i>Test sample No.:</i>					
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<b>Ort der Prüfung:</b> <i>Place of testing:</i>					
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>					
<b>Prüfergebnis:</b> <i>Test results:</i>					
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29-06-2018		29-06-2018			
<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 / Other:</b> -					
<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>					

**Prüfbericht-Nr.: 60160815-001**  
*Test Report No.: 60160815-001*

Seite 2 von 10  
Page 2 of 10

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

Note: Latest revision report will replace all previous reports

## Table of contents

1	Product Information.....	4
	Submitted Documents:.....	5
	Remarks:.....	5
2	Test Equipment.....	6
3	Summary.....	7
	Verdicts of functional requirements:.....	7
	Verdict .....	7
	Supported optional features:.....	7
	YES / No.....	7
4	Test Case verdicts as per Test Specifications .....	8
	Test results per test case (OTAA).....	8
5	Test Results .....	9
	Detailed test results (OTAA) .....	9
6	PHOTO DOCUMENTATION.....	10

Prüfbericht-Nr.: 60160815-001  
Test Report No.: 60160815-001

Seite 4 von 10  
Page 4 of 10

## 1 PRODUCT INFORMATION

The device under test (DUT) is a wireless Semtech LoRaMote for LoRaWAN 1.0.2 Certification testing.

General information	
Product name:	BOSCH Asset Tracing Tag
Model:	0273600046
Description:	LoRa Alliance LoRaWAN compliance testing
Manufacturer SKU	-
Hardware version:	HW-Stand-Gehäuse R1.0 HW-Stand-Leiterplatte R1(a)
Software version:	R1.0
Contact person:	Olaf Nill
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LoRaWAN information	
Type of DUT	End Device
LoRa Device Class	A
Geographical area of operation	Europe 868 MHz
Operating frequency	EU 863 - 870 MHz
Adaptive Data Rate (ADR) supported?	Yes
Optional data rates supported?	Yes, DR6 (SF7BW250), DR7 (FSK50)
Activation possibilities	Over the air
Test According LoRaWAN™ Spec	V1.0.2 (e/o 12/2016)
Output Power	+13 dbm
Number / Type of Antenna(s)	1 (onboard)
Antenna Gain	-10 dbi
Test sample information	production unit

Prüfbericht-Nr.: 60160815-001  
Test Report No.: 60160815-001

Seite 5 von 10  
Page 5 of 10

<b>For OTA activation:</b>	
Serial No of Device with OTAA	FC:D6:BD:00:0012:00:00:A0
End-device identifier (DevEUI)	FCD6BD00120000A0
Application identifier (AppEUI)	ABCDEE1037170998
Application key (AppKey)	BDFE F1E2D3C4B5A60511197419091998
Default RX2 Window Frequency	869.525 MHz
Default RX2 Window Data Rate	DR0 (SF12, 125 kHz)
RECEIVE_DELAY1	1 s
RECEIVE_DELAY2	2 s (must be RECEIVE_DELAY 1 + 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 Over the Air (OTA).

Prüfbericht-Nr.: 60160815-001  
Test Report No.: 60160815-001

Seite 6 von 10  
Page 6 of 10

## 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)	TÜV Rheinland Group	CTE - TMF V45.1 CTE - SIG - LoRa V3.3
Semtech Development Kit IOT868STKLM1 (Semtech Gateway) for EU 868 Band	Semtech	SX1301-based concentrator reference design >=GW_V_3.1.0
Semtech Development Kit IOT868STKLM1 (Semtech Packet Forwarder) for EU 868 Band	Semtech	>= PF_V_2.2.0

Prüfbericht-Nr.: 60160815-001  
Test Report No.: 60160815-001

Seite 7 von 10  
Page 7 of 10

### 3 SUMMARY

Verdicts of functional requirements:	Verdict
Device Activation	PASS
Test application functionality	PASS
Over The Air activation	PASS
Packet error rate RX2 default DR	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
DL Channel Request 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

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
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 2.11	DL Channel Request MAC command	Mandatory	PASS
EU863-870 2.12.a	Uplink confirmed packets	Mandatory	PASS
EU863-870 2.12.b	Uplink retransmission	Mandatory	PASS
EU863-870 2.12.c	Downlink confirmed packets	Mandatory	PASS
EU863-870 2.12.d	Downlink retransmission	Mandatory	PASS
EU863-870 2.13	RXParamSetupReq MAC command	Mandatory	PASS
EU863-870 2.14	RXTimingSetupReq MAC command	Mandatory	PASS
EU863-870 2.15.a	ADR bit	Mandatory	PASS
EU863-870 2.15.b	TXPower	Mandatory	PASS
EU863-870 2.15.c	Required DataRates	Mandatory	PASS
EU863-870 2.15.d	Optional DataRates	Mandatory	PASS
EU863-870 2.15.e	ChannelMask	Mandatory	PASS
EU863-870 2.15.f	Redundancy	Mandatory	PASS
EU863-870 2.15.g	ADRACKReq bit	Mandatory	PASS
EU863-870 2.15.h	LinkADRReq commands block	Mandatory	PASS
EU863-870 2.16	Packet Error Rate RX1	Mandatory	PASS
EU863-870 2.17	Packet Error Rate RX2	Mandatory	PASS



Prüfbericht-Nr.: 60160815-001  
Test Report No.: 60160815-001

Seite 9 von 10  
Page 9 of 10

## 5 TEST RESULTS

### Detailed test results (OTAA)

Test item	Test Case Name	DataRate/ Timing	Limit	Results	Verdict
EU863-870 2.4	Packet Error Rate RX2 Default DR	SF12BW125	5 %	0.00 %	PASS
EU863-870 2.6	Downlink window timing	-20ms	-	-	PASS
		+20ms	-	-	PASS
EU863-870 2.16	Packet Error Rate RX1	SF12BW125	5 %	0.00 %	PASS
		SF11BW125	5 %	1.67 %	PASS
		SF10BW125	5 %	0.00 %	PASS
		SF9BW125	5 %	1.67 %	PASS
		SF8BW125	5 %	5.00 %	PASS
		SF7BW125	5 %	3.33 %	PASS
		SF7BW250	5 %	3.33 %	PASS
		FSK	5 %	3.33 %	PASS
EU863-870 2.17	Packet Error Rate RX2	SF11BW125	5 %	3.33 %	PASS
		SF10BW125	5 %	0.00 %	PASS
		SF9BW125	5 %	3.33 %	PASS
		SF8BW125	5 %	3.33 %	PASS
		SF7BW125	5 %	0.00%	PASS
		SF7BW250	5 %	0.00 %	PASS
		FSK	5 %	1.67 %	PASS

Prüfbericht-Nr.: 60160815-001  
Test Report No.: 60160815-001

Seite 10 von 10  
Page 10 of 10

## 6 PHOTO DOCUMENTATION



Photo 1: EUT front view