

TEST REPORT ON **B METERS Hydrocal-M4 for EU 868MHz Band**

Test Report Reference: VDE_BMETERS_2301

Version: June 2023

Author: M. El-Fikri

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1 Administrative Data

1.1 Project Information

Project Name: VDE_BMETERS_2301
Responsible for Testing and Report: Mohamed El-Fikri
Date of Report: 2023-06-30
Testing Time Frame: 2023-06-26 - 2023-06-27

1.2 Applicant Information

Company Name: B METERS S.R.L.
Address: VIA FRIULI 3 33050 ITALY
Contact Person: MARIO PARONI
Phone: +39 0432 931415
Email: mario.paroni@bmetrics.com

1.3 Test Laboratory Information

The following list shows all Locations and Test Resources involved in the generation of test results:

7layers DE, Ratingen, Germany

Company Name	7layers GmbH
Address	Borsigstr. 11 40880 Ratingen NRW Germany
Contact	Michael Albert
Phone	+49 2102 749 201
Email	Michael.Albert@7layers.com

List of Test Resources

ID	Name	Responsible	Accreditation Info
1	LCTT LoRa Compliance Test Tool	Mohamed El-Fikri	

1.4 Signature of the Testing Responsible



(Responsible for Testing and Report)
Mohamed El-Fikri

1.5 Signature of the Accreditation Responsible(s)



(Responsible Accreditation Scope)
Mohamed El-Fikri

2 Test Object Data

2.1 Object Under Test (OUT) Description(s)

The following section lists all Objects Under Test (OUTs) involved during testing.

Object Under Test: HYDROCAL-M4

Description: The LoRaWAN based HYDROCAL-M4 is a compact thermal energy meter that measures the amount of energy used for heating or cooling the water.

Type / Model: M4

Manufacturer:

Company Name: B METERS S.R.L.

Address: VIA FRIULI 3 33050 ITALY

Contact Person: MARIO PARONI

Phone: +39 0432 931415

Email: mario.paroni@bmetrics.com

Address: VIA FRIULI 3 33050 ITALY

For further details see Annex.

2.2 Sample Description(s)

Sample Name: DE1413002aa01

Object Under Test:	HYDROCAL-M4
Description:	OTA Variant of the LoRaWAN based HYDROCAL-M4 thermal energy meter
Serial Number:	5062835
Hardware Version:	V01
Software Version:	V01.00.34
Firmware Version:	V01.00.03
Code:	aa01

Sample Name: DE1413002ab01

Object Under Test:	HYDROCAL-M4
Description:	ABP Variant of the LoRaWAN based HYDROCAL-M4 thermal energy meter
Serial Number:	5062844
Hardware Version:	V01
Software Version:	V01.00.34
Firmware Version:	V01.00.03
Code:	ab01

For further details see Annex.

3 Results

3.1 General

Documentation of tested devices: Available at the test laboratory.

Interpretation of the test results: The results of the inspection are described on the following pages, where ‘Conformity’ or ‘Passed’ means that the certification criteria were verified and that the tested device is conform to the applied standard.

In cases where ‘Declaration’ is stated, the required documents are available in the manufacturer’s product documentation.

In cases where ‘not applicable’ is stated, the test case requirements are not relevant to the specific equipment implementation.

- Notes:**
1. This report contains the abbreviated information content pertaining to services rendered. Supporting documentation not included herein is maintained and available at the test laboratory.
 2. All tests are performed under environmental conditions within the requirements of the specifications. Environmental condition records are available at the test laboratory.

3.2 Applicable Test Specification(s)

Test Specification:	LoRa End Device Certification EU v1.6
Date / Version:	March, 2020 / v1.6
Description:	LoRa Alliance End Device Certification Requirements for EU 863-870 MHz ISM Band devices, v1.6 (LoRaWAN™ core spec. 1.0.2 & LoRaWAN™ Regional Parameters Version 1.0.2rB)

3.3 Result Statistics

Test Specification	Total	Result Verdict			Pass
		Pass	Fail	Declaration	Ratio
LoRa End Device Certification EU v1.6	25	25	0	0	100.00 %

Note: Pass, Declaration, Fail and Inconclusive results are regarded for the Pass Ratio calculation. Pass and Declaration are summarized as Pass results. Fail and Inconclusive are summarized as Fail results. All are summarized as Total count (Pass + Declaration + Fail + Inconclusive). The Pass Ratio is calculated by the number of Pass results divided by the number of Total results. All other results like Error or Not Tested are not regarded for the calculation.

3.4 Result Summary

Test Case ID	Sample	Date	Verdict	Observations
TP_A_EU868_ED_MAC_BV_000 / "Device Activation (OTAA)"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_001_A / "Over the air activation"	DE1413002aa01	2023-06-27	PASS	
TP_A_EU868_ED_MAC_BV_001_B / "Activation By Personalization"	DE1413002ab01	2023-06-27	PASS	
TP_A_EU868_ED_MAC_BV_002 / "Test application functionality"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_003 / "AES encryption and message integrity"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_004 / "Downlink error rate"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_005 / "Downlink window timing"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_006 / "Frame sequence number"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_007 / "DevStatusReq MAC command"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_008 / "MAC commands"	DE1413002aa01	2023-06-27	PASS	
TP_A_EU868_ED_MAC_BV_009 / "NewChannelReq MAC command"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_010 / "DIChannelReq MAC command"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_011 / "Confirmed packets"	DE1413002aa01	2023-06-27	PASS	

Test Case ID	Sample	Date	Verdict	Observations
TP_A_EU868_ED_MAC_BV_012 / "RXParamSetupReq MAC command"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_013 / "RXTimingSetupReq MAC command"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_014_A / "LinkADRReq MAC command (Part 1)"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_014_B / "LinkADRReq MAC command (Part 2)"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_015_A / "RX1 Receive windows test (Part 1)"	DE1413002aa01	2023-06-27	PASS	
TP_A_EU868_ED_MAC_BV_015_B / "RX1 Receive windows test (Part 2)"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_016 / "RX2 Receive window test"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_017 / "RX1 and RX2 simultaneous frames"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_018 / "TXParamSetupReq MAC command"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_019 / "LinkCheckReq MAC command"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_020 / RX "Oversized payload"	DE1413002aa01	2023-06-26	PASS	
TP_A_EU868_ED_MAC_BV_021 / "Maximum Allowed payload"	DE1413002aa01	2023-06-26	PASS	

4 Test Equipment Details

4.1 List of Test Equipment

The information shown below is valid for the testing time frame of this test report.

Test Resource 1: LCTT LoRaWAN Compliance Test Tool

Description: for LoRaWAN Specification and LoRa Compliance Testspec

Test System LCTT LoRaWAN Compliance Test Environment of Test Resource LCTT LoRa Compliance Test Environment

Test System:	LCTT LoRaWAN Compliance Test Environment
Description:	Location: 7layers Conformance Lab
Manufacturer:	LoRa Alliance

Software Component and Version	Start Date	End Date
LCTT LoRa Compliance Test Tool User Interface v2.5		
LCTT Technology Package v3.9.0_R1	2023-01-26	

Single Devices of Test System 7layers LoRa Compliance Test Environment

Name	Serial Number	Manufacturer
7Layers LoRa Control PC	DSCM004667	Fujitsu
2 x (Semtech SX1301 LoRa 8-Channel Gateway) for EU863-870 MHz	IOTSX1301	Semtech

<i>Software Version</i>	<i>Start Date</i>	<i>End Date</i>
Lora Gateway SW (Driver HAL) v5.0.1; Packet forwarder v4.0.1	2021-01-01	

5 Annex

5.1 Object Under Test (OUT) Features

Supported Features for Object Under Test: HYDROCAL-M4

NAME	VALUE
DUT is a Class A Device (All End Devices)	TRUE
DUT is a Class B Device (Beacon Mode)	FALSE
DUT is a Class C Device (Continuously Listening)	FALSE
DUT works in EU 868MHz ISM Band	TRUE
DUT works in EU 443MHz ISM Band	FALSE
DUT works in USA 915MHz ISM Band	FALSE
DUT works in Asia 923MHz ISM Band	FALSE
DUT works in South Korea 920MHz ISM Band	FALSE
DUT supports Over-The-Air Activation (OTAA) mechanism	TRUE
DUT supports Activation By Personalization (ABP) mechanism	TRUE
DUT supports Adaptive Data Rate (ADR) feature	TRUE
DUT supports data rate DR6 (SF7BW250)	TRUE
DUT supports data rate DR7 (FSK50)	TRUE
DUT supports Trigger Join Request command in Test Mode	TRUE
DUT supports DIChannelReq MAC command	TRUE
DUT needs a reset after deactivating Test Mode	FALSE
DUT supports LinkADRReq block	TRUE
DUT implements LoRaWAN v1.0.2rB certification requirements	TRUE
DUT implements LoRaWAN v1.1 certification requirements	FALSE
DUT works in India 865-867 MHz ISM Band	FALSE
DUT supports the Lorawan-1.0.x-join-synch-issues-remedies-v1.0.0	FALSE
DUT implements Data Rate Decay	TRUE
DUT implements LoRaWAN v1.0.4 certification requirements	FALSE
DUT supports uplink re-transmissions for Confirmed frames	TRUE
DUT works in Rusia 864MHz ISM Band	FALSE
DUT works in Australia 915MHz ISM Band	FALSE
DUT permanently enabled Class C	FALSE
DUT works in Asia 923MHz ISM Band Group 1	FALSE
DUT works in Asia 923MHz ISM Band Group 2	FALSE
DUT works in Asia 923MHz ISM Band Group 3	FALSE
DUT works in Asia 923MHz ISM Band Group 4	FALSE
DUT supports SCHC	FALSE
DUT Output Power	2 dBm to 12 dBm

5.2 OTAA Sample DE1413002aa01 Extra Information Parameters

NAME	VALUE
Object Under Test	
Serial Number	5062835
Code	aa01
Minimum transmission power	2
Maximum transmission power	12
End-device identifier (DevEUI)	'E41E0A90000055B1'O
End-device Address assigned during activation (DevAddr)	'00000001'O
Maximum number of uplinks re-transmission	7
Frame counter size	32
RuleIDx for SCHC messages	NA
RuleIDy for SCHC messages	NA
RuleIDz for SCHC messages	101
Maximum number of ACK Request	NA
FPortUp of the DUT for SCHC messages	NA
FPortDown of the DUT for SCHC messages	NA
Inactivity timer for SCHC messages	NA
retransmission timer for SCHC messages	NA
Application session key (AppSKey)	NA
Network session key (NwkSKey)	NA
Application key (AppKey)	'1F7506431A2A39445C7463D134398BF3'O
Application identifier (AppEUI)	'E41E0A90000FFFFF'O
End-device Address (DevAddr)	NA

5.3 ABP Sample DE1413002ab01 Extra Information Parameters

NAME	VALUE
Object Under Test	
Serial Number	5062844
Code	aa02
Minimum transmission power	2
Maximum transmission power	12
End-device identifier (DevEUI)	NA
End-device Address assigned during activation (DevAddr)	NA
Maximum number of uplinks re-transmission	7
Frame counter size	32
RuleIDx for SCHC messages	NA
RuleIDy for SCHC messages	NA
RuleIDz for SCHC messages	NA
Maximum number of ACK Request	NA
FPortUp of the DUT for SCHC messages	NA
FPortDown of the DUT for SCHC messages	NA
Inactivity timer for SCHC messages	NA
retransmission timer for SCHC messages	NA
Application session key (AppSKey)	'3A696F397D9F9B4998880A7E19198737'O
Network session key (NwkSKey)	'E8B2A9B35E2F394247742CDCD361790B'O
Application key (AppKey)	NA
Application identifier (AppEUI)	NA
End-device Address (DevAddr)	'91E1DC90'O

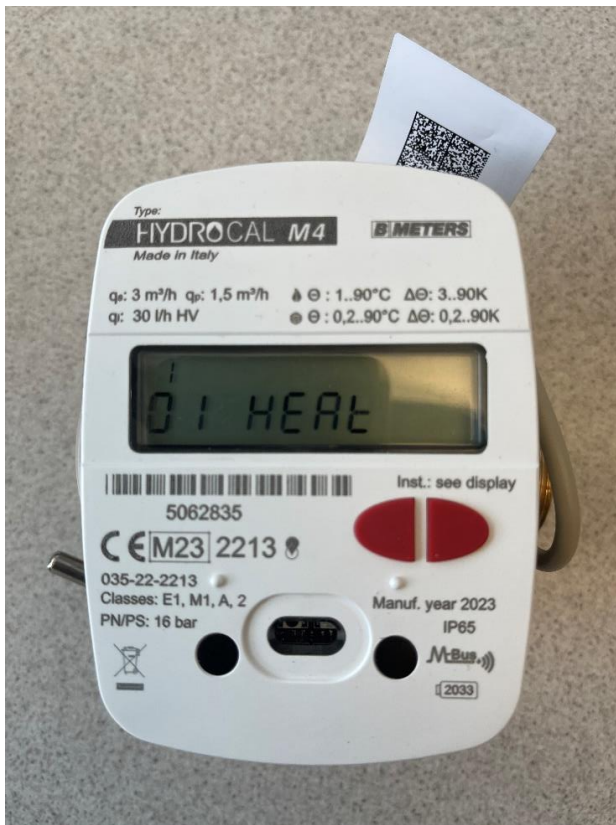
5.4 Additional Documentation for Samples

The following documents have been attached to Sample definitions as supporting documentation.

Object Under Test: HYDROCAL-M4

Sample Name: DE1413002aa01

Front view:



Rear view:



End of Test Report