Wireless Bio-Digital Multimeter

WiBi-DMM
a.k.a
„Multiparameter“

Author:

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General overview

Parameter	Value
Outline dimensions	approx. 30x40x10mm
User interface	Graphical LCD
Power supply	Battery 100-200mAh
Battery Cycle time	24h to 30 days (depends on measured parameters)

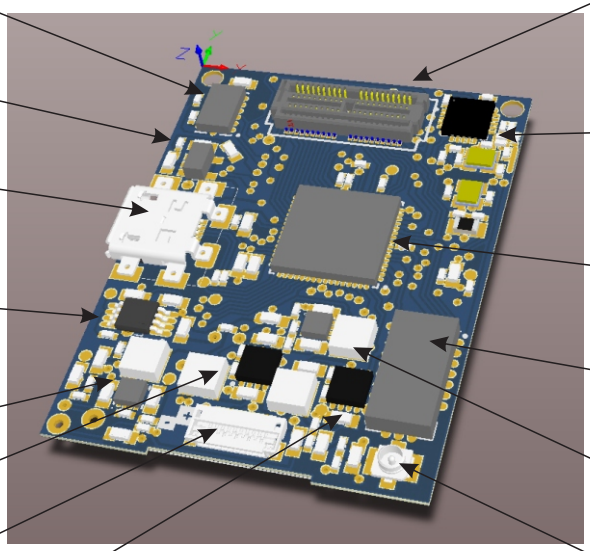
Measured parameters

Parameter	Value
Analytical	Low power analytical sensing channel designed for 2-electrode sensors based on a delta voltage.
Biochemical	Micro-power electrochemical sensing channel supporting multiple electrochemical amperometric sensors such as 3-lead toxic gas sensors and 2-lead galvanic cell sensors, both with programmable bias current.
Biooptical	Integrated LED transmitter and PIN diode receiver with programmable timing and gain.
Biopotential	Two channel simultaneous sampling biopotential inputs has Built-In Right Leg Drive Amplifier, Lead-Off off detection and self-test signal generator. Additionally it has integrated respiration impedance channel for measuring respiration rate.
IBP	Complete four channel IBP inputs provide independent power supply for each channel and programmable sampling for optimal power consumption.
Temperature	Internal temperature is measured with precision thermistor. External thermistor can be connected with separate calibration and diagnostic channel with selectable thermistor bias. Additionally, any IBP channel can be reconfigured to temperature measurements.
Acceleration	3D digital linear acceleration sensor
Compass	3D digital magnetic sensor

Connectivity

Interrface	Features
Sub-GHz ISM	Short-range Ultra Low Power RF, data rate 186kbit/s, operating frequency range from 863MHz to 928MHz.
2,4GHz Radio	Low power radio for operation in the world wide ISM frequency band at 2.400 - 2.4835GHz with data rates up to 2Mbps.
PC connectivity	Via USB (serial port profile or HID profile)
Battery charger	Integrated, only USB cable is required to charge, charging time for completely discharged battery approx. 15 minutes

Main board



6 DOF accelerometer +magnetic compass

Li-xx charger (from USB)

Micro USB

Precision 2,5V reference

2,2V DC/DC

2,7V DC/DC

Graphic LCD connector

5V DC/DC

40 pin expansion port

2.4GHz high speed wireless interface

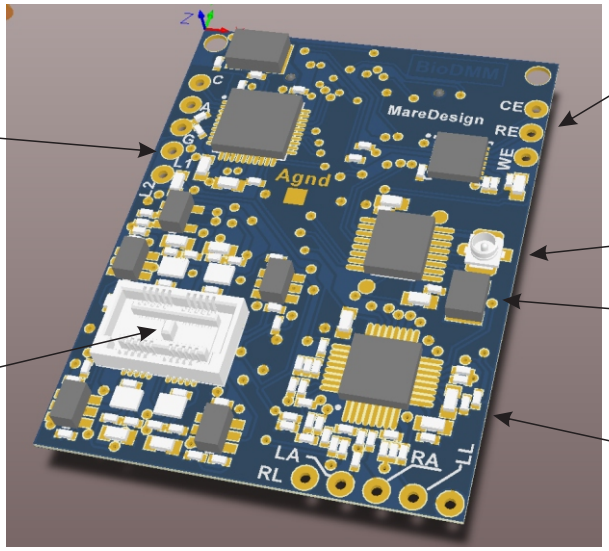
Low power ARM microcontroller

Sub-GHz ultra low power wireless interf.

1,9V DC/DC

RF connector for external antenna

Bio Digital Multimeter (BDMM) board



Bio-optical interface (e.g. SpO2)

4 channel IBP/temperature

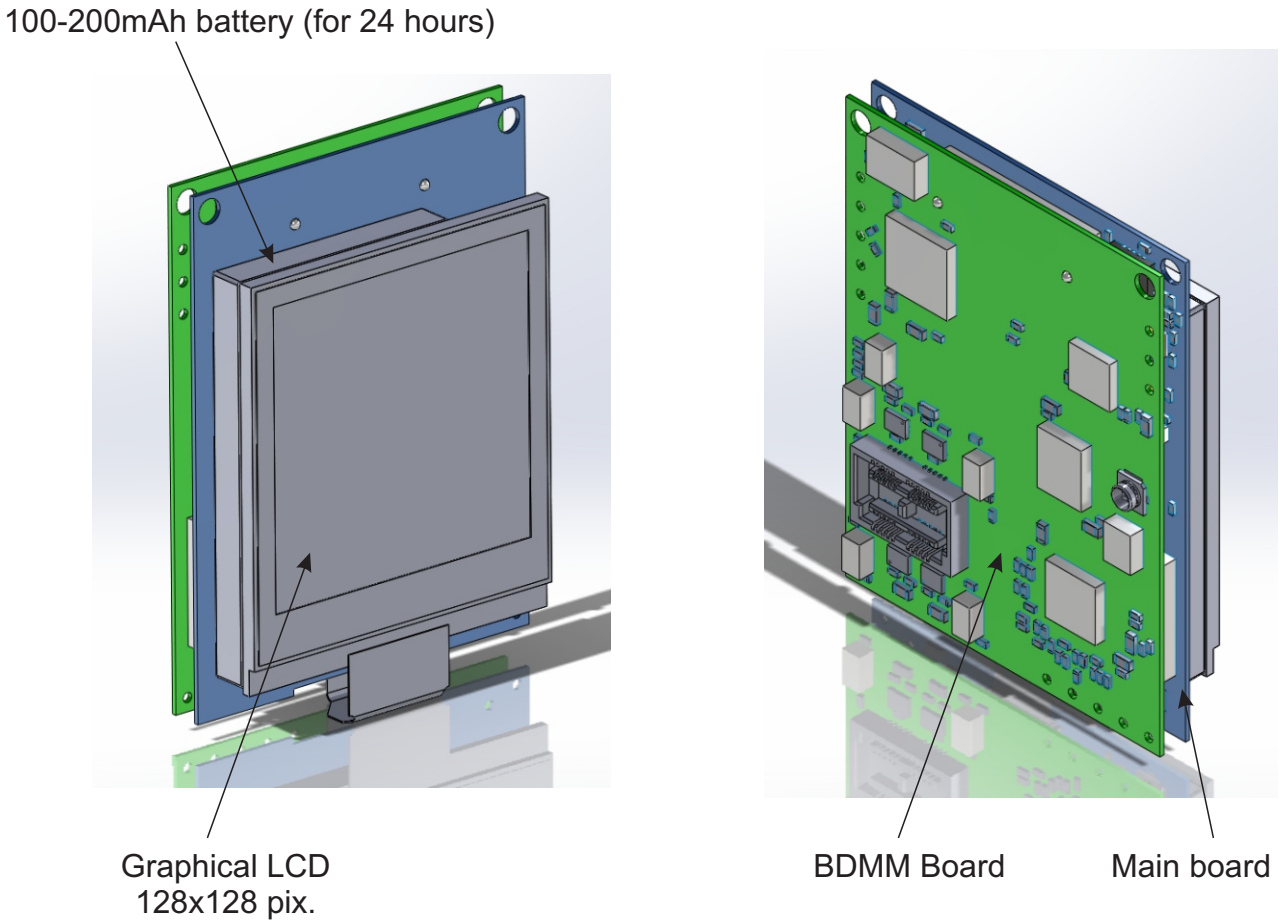
Biochemical sensing input (e.g. Blood glucose)

analytical sensing input (e.g. pH)

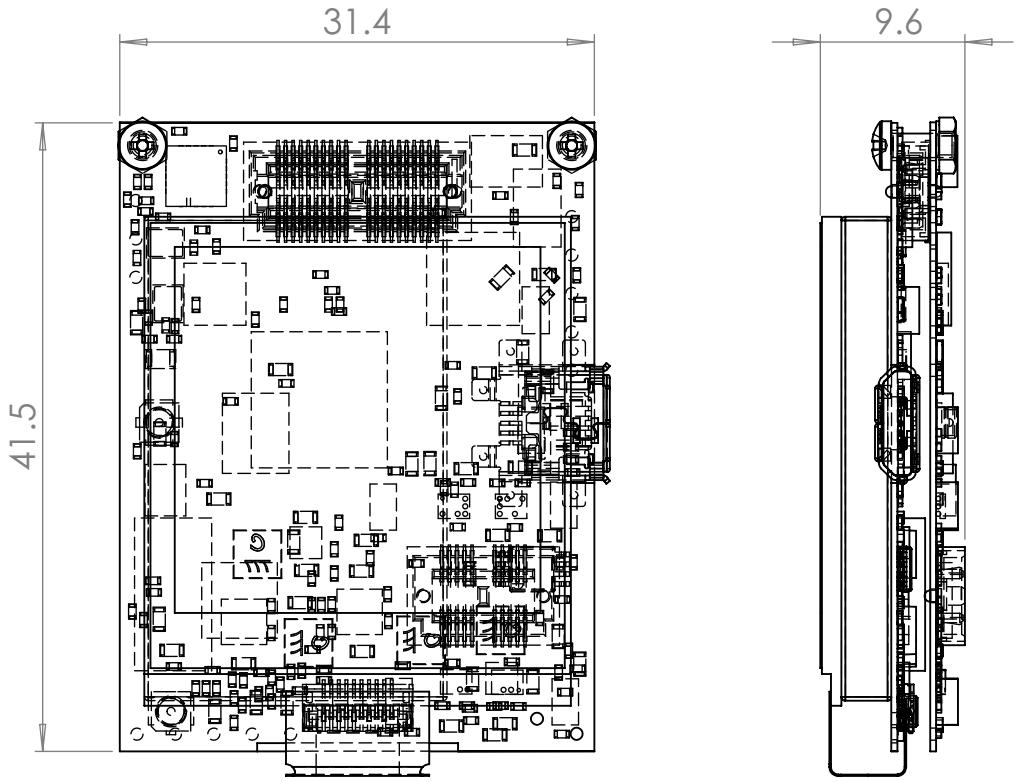
Temperature calibration module

Biopotential and bioimpedance (ECG/EEG/Resp.)

Complete system

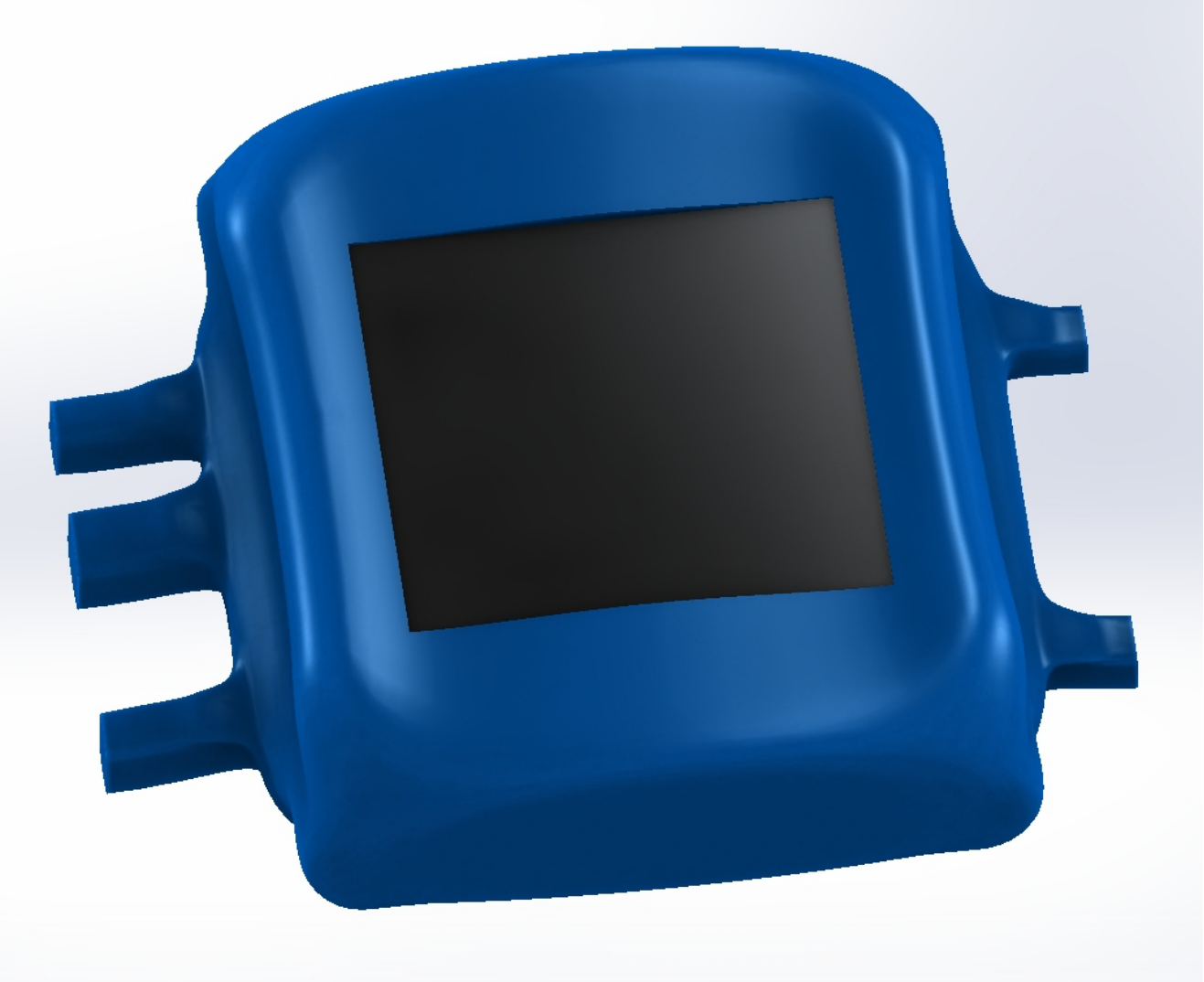


Half volume of matchbox*



* Standard matchbox is 50x35x15mm

One possible housing



Possible patient monitoring parameters (not all listed, just some typical)

Channel	Parameter
Analytical	pH, blood gases, humididty, CO2, CO, NO2
Biochemical	Respiration and other toxic gases concentration, blood glucose, CO2, NO2, SO2, NH3, Urea, Creatinine, L-Glutamate, Amygdalin, Penicilin, more than 900 different ReDox sensors can be used
Biooptical	SpO2, heart rate, respiration rate, blood glucose, oxygen, CO2, apnea
Biopotential	ECG, EMG, EEG, Heart rate, Respiration rate, nistagmus, sleep disorders, …
IBP	Blood pressure and/or temperature
Temperature	Body temperature and all derived parameters (e.g. perfusion, metabolism, etc.)
Acceleration	Patient fall detection, movements, tremor, baby shaking, tracking
Compass	indoor movement tracking, patient rotation, sleep disorders, etc…