

BMH05108 Datasheet**Product**

8-Electrode Body Composition Module BMH05108

Version:V1.1

Update date: 2023.10.07

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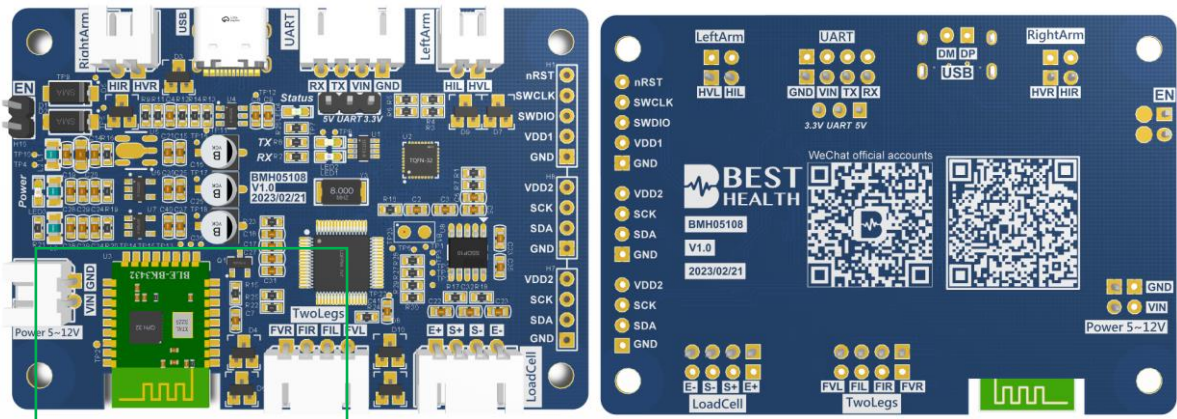
1. Version change record

Ver	Date	Description	Author
V1.0	2022/02/10	Initial version	Chen Weijian
V1.1	2023/10/07	Update module pictures, interface diagrams and interface descriptions	Chen Weijian

2. Overview

BMH05108 is a body composition analysis module launched by BEST HEALTH CORP. It has complete UART, USB, and BLE interfaces and can communicate with external MCUs, Android screens, or smartphones. Suitable for use in products such as eight-electrode/four-electrode AC body fat and body composition analyzers.

The module has the characteristics of high precision, easy development, convenient wiring and IAP upgrade program.



BLE does not upload by default

3. Principle

The body composition of the human body is analyzed using BIA bioelectrical impedance analysis.

It mainly uses the difference in "water and oil conductivity" to pass a small current through the body. The more tissues with high "water" content, the better the conductivity of the body, the lower the resistance, the lower the body fat. On the contrary, adipose tissue The electrical conductivity is relatively poor, the resistance is high, and the body fat rate is relatively high.

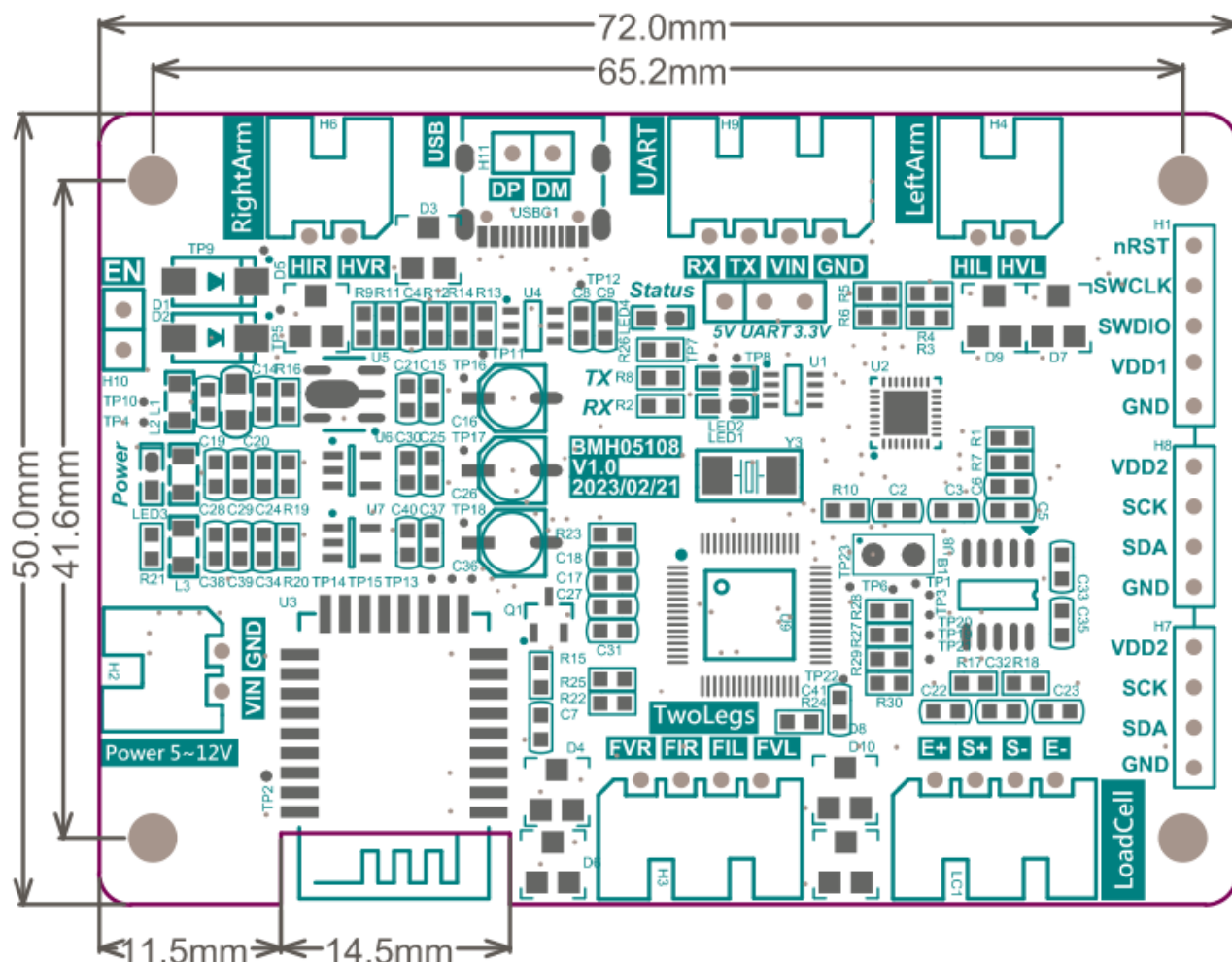
4. Features

- Simple development: directly read weight and impedance results
- Flexible and convenient, you can use your own algorithm. BEST HEALTH CORP. can also provide IOS, Android, and Web API interfaces to directly obtain about 58 items of body composition data.
- Dual-frequency eight-electrode solution and single-frequency four-electrode solution provide high body composition accuracy
- Size: 72mm*50mm
- Voltage range: 5V~12V
- Communication interface: UART, USB, BLE
- IAP upgrade program

5. Application



6. Interface diagram



7. Interface description

The functions of each interface are described in the following table

Interface	I/T	O/T	Description
GND	PWR	-	Power supply negative terminal
VIN	PWR	-	Power supply positive terminal
TXD	-	CMOS	UART TX serial data output
RXD	ST	-	UART RX serial data input
EN	-	-	Module enable pin: high level enable, can be enabled by shorting VIN through a jumper cap, or external level control, cannot be left floating.
USB	-	-	USB interface
DP	-	-	USB differential data bus conforms to Universal Serial Bus standard

DM	-	-	USB differential data bus conforms to Universal Serial Bus standard
UART	-	-	UART serial port communication level: 5V/3.3V or external level can be selected through jumper cap
5V	-	-	Serial communication level: 5V
3.3V	-	-	Serial communication level: 3.3V
E+	-	AN	Connect to the positive terminal of the full-bridge load cell power supply
S+	-	AN	Connect to the positive terminal of the full bridge load cell signal
S-	-	AN	Connect to the negative terminal of the full bridge load cell signal
E-	-	AN	Connect to the negative terminal of the full-bridge load cell power supply
HVR	AN	AN	Connect the right thumb part
HIR	AN	AN	Connect the right palm part
HIL	AN	AN	Connect the palm part of the left hand
HVL	AN	AN	Connect the left thumb part
FVR	AN	AN	Connect the right heel part
FIR	AN	AN	Connect the forefoot part of the right foot
FIL	AN	AN	Connect the forefoot part of the left foot
FVL	AN	AN	Connect the left heel part
VDD1	PWR	-	No connection required, test pin
VDD2	PWR	-	No connection required, test pin
OCDSC	ST	-	No connection required, test pin
OCDSDA	ST	CMOS	No connection required, test pin
nRST	-	-	No connection required, test pin
SWSC	-	-	No connection required, test pin
SWDIO	-	-	No connection required, test pin

Note :

I/T : input type

O/T : output type

PWR : Power supply

ST : Schmitt trigger input

CMOS : CMOS output

AN : Analog signal

8. Application circuit diagram

Connect the power supply; connect the full-bridge load cell; connect the electrodes of both feet and hands; connect UART or USB or BLE.

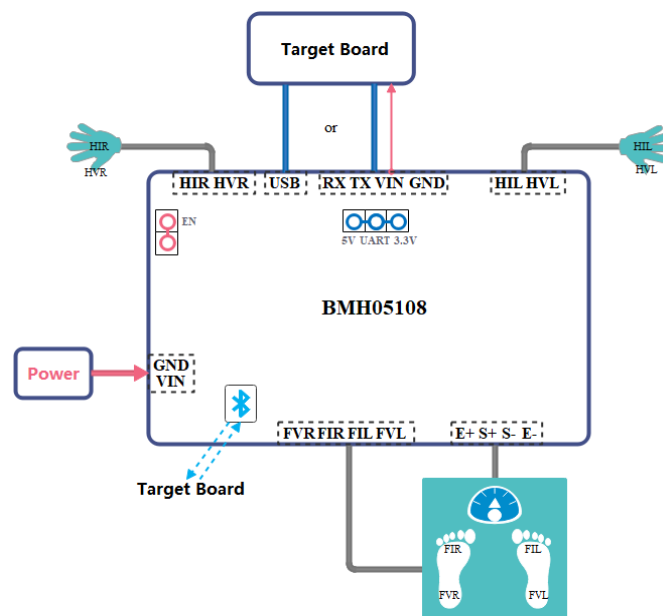
When the BMH05108 module does not need to be controlled to sleep, the EN short-circuit cap is connected (default); when the BMH05108 module needs to be controlled to sleep, the EN pin is connected to the external main control board. It operates at a high level and sleeps at a low level. The EN pin cannot be left floating.

The UART communication level is shorted to 5V or 3.3V through a shorting cap.

Note: Just choose one of the USB and UART communication methods. USB power supply can only be supplied to the BMH05108 module in one direction from the main control board. Optimize the wiring path of the wire harness, increase the distance between the power wire harness and the signal wire harness, and reduce the coupling of power interference to the BMH05108 module.

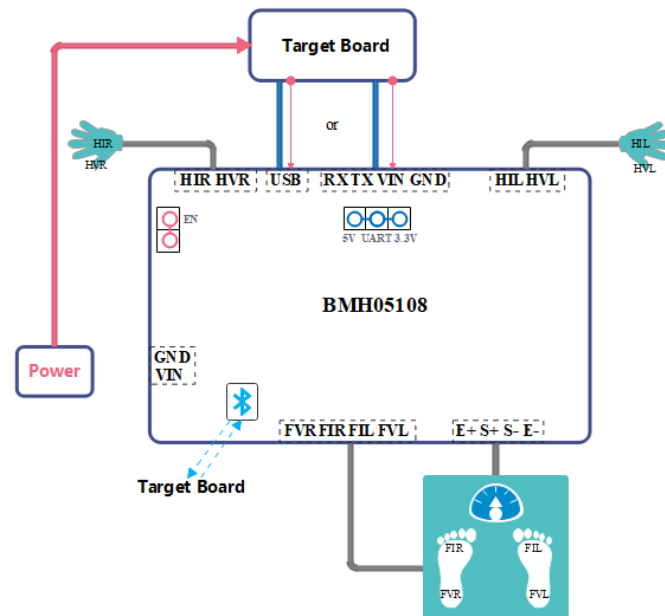
● Wiring method 1 :

Power supply → BMH05108 module → Main control board



- **Wiring method 2 :**

Power supply → Main control board → BMH05108 module 模块



9. Electrical specifications

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Input voltage	-	5	5	12	V
Working temperature	VIN = 5V	-10	25	60	°C
Storage ambient temperature	-	-25	-	85	°C
Working current	Sleep current	-	1	3	μA
	VIN = 5V	-	21	25	mA

10. Weight specification

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Measuring range	-	3	-	300	kg
measurement accuracy	3~20kg	-	10	-	g
	20~300kg	-	50	-	g

The measurement range and accuracy are determined by the sensor structure used by the customer. The theoretical accuracy of the module can reach 10,000 points. For example, if the sensor is 100kg, the theoretical maximum accuracy can reach 10g. The final accuracy depends on the sensor and structure.

11. Impedance specification

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Measuring range	-	10	-	2000	Ω
measurement accuracy	100~2000 Ω	-	1%	-	%
	50~100 Ω	-	± 1	-	Ω

人体生物阻抗四肢约为 200~700 Ω 之间，躯干约为 15~40 Ω 之间。

12. Body composition specifications

Can pass CFDA certification

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
measurement accuracy	DEXA comparison	-	0.98	-	Correlation

The body composition parameter list can provide Android, IOS, and web API algorithm interfaces to obtain more body composition results and related judgment standards.

● BEST HEALTH Body270 algorithm input

Parameter	Resolution	Attribute	standard	Parameter	Resolution	Attribute	standard
height	1cm	enter	-	age	1 year old	enter	-
weight	0.1kg	Measured value	√	gender	Men/women	enter	-
20kHz right hand impedance	0.1ohm	Measured value	-	100kHz right hand impedance	0.1ohm	Measured value	-
20kHz left hand impedance	0.1ohm	Measured value	-	100kHz left hand impedance	0.1ohm	Measured value	-
20kHz trunk impedance	0.1ohm	Measured value	-	100kHz trunk impedance	0.1ohm	Measured value	-
20kHz right foot impedance	0.1ohm	Measured value	-	100kHz right foot impedance	0.1ohm	Measured value	-
20kHz left foot impedance	0.1ohm	Measured value	-	100kHz left foot impedance	0.1ohm	Measured value	-

● BEST HEALTH Body270 algorithm output

Parameter	Resolution	Attribute	standard	Parameter	Resolution	Attribute	standard
Moisture content	0.1kg	Whole body composition	√	Right hand fat percentage	0.1kg	segmental body components	-
fat mass	0.1kg	Whole body composition	√	Left hand fat percentage	0.1kg	segmental body components	-
Protein quantity	0.1kg	Whole body composition	√	trunk fat percentage	0.1kg	segmental body components	-
Muscle mass	0.1kg	Whole body composition	√	Right foot fat percentage	0.1kg	segmental body components	-
Skeletal muscle mass	0.1kg	Whole body composition	√	Left foot fat percentage	0.1kg	segmental body components	-
Inorganic salt content	0.1kg	Whole body composition	√	Right hand fat mass	0.1kg	segmental body components	-
Bone mass	0.1kg	Whole body composition	√	left hand fat mass	0.1kg	segmental body components	-
lean body mass	0.1kg	Whole body composition	√	Trunk fat mass	0.1kg	segmental body components	-
Extracellular water volume	0.1kg	Whole body composition	√	Right foot fat mass	0.1kg	segmental body components	-
intracellular water volume	0.1kg	Whole body composition	√	Left foot fat mass	0.1kg	segmental body components	-
Body cell mass	0.1kg	Whole body composition	√	right hand muscle mass	0.1kg	segmental body components	-
Subcutaneous fat mass	0.1kg	Whole body composition	-	Left hand muscle mass	0.1kg	segmental body components	-
				trunk muscle mass	0.1kg	segmental body components	-
Muscle rate	0.1%	other	-	Right foot muscle mass	0.1kg	segmental body components	-
				Left foot muscle mass	0.1kg	segmental body components	-
body type	15	Evaluation suggestions	-				
Recommended calorie intake	1Kcal	Evaluation suggestions	-	body mass index	0.1	obesity analysis	√
body score	1 分	Evaluation suggestions	-	Fat percentage	0.1%	obesity analysis	√
physical age	1 year old	Evaluation suggestions	-	waist to hip ratio	0.1	obesity analysis	√
ideal weight	0.1kg	Evaluation suggestions	-	Visceral fat level	1	obesity analysis	√
weight control	0.1kg	Evaluation suggestions	-	Obesity	1%	obesity analysis	√
fat control	0.1kg	Evaluation suggestions	-	basal metabolism	1Kcal	obesity analysis	√
muscle control	0.1kg	Evaluation suggestions	-	Subcutaneous fat rate	0.1%	obesity analysis	√
Exercise consumption	1Kcal	Evaluation suggestions	-				

Parameter	Resolution	Attribute	standard	Parameter	Resolution	Attribute	standard
Moisture content	0.1kg	Whole body composition	√	Right hand fat percentage	0.1kg	segmental body components	-
fat mass	0.1kg	Whole body composition	√	Left hand fat percentage	0.1kg	segmental body components	-
Protein quantity	0.1kg	Whole body composition	√	trunk fat percentage	0.1kg	segmental body components	-
Muscle mass	0.1kg	Whole body composition	√	Right foot fat percentage	0.1kg	segmental body components	-
Skeletal muscle mass	0.1kg	Whole body composition	√	Left foot fat percentage	0.1kg	segmental body components	-
Inorganic salt content	0.1kg	Whole body composition	√	Right hand fat mass	0.1kg	segmental body components	-
Bone mass	0.1kg	Whole body composition	√	left hand fat mass	0.1kg	segmental body components	-
lean body mass	0.1kg	Whole body composition	√	Trunk fat mass	0.1kg	segmental body components	-
Extracellular water volume	0.1kg	Whole body composition	√	Right foot fat mass	0.1kg	segmental body components	-
intracellular water volume	0.1kg	Whole body composition	√	Left foot fat mass	0.1kg	segmental body components	-
Body cell mass	0.1kg	Whole body composition	√	right hand muscle mass	0.1kg	segmental body components	-
Subcutaneous fat mass	0.1kg	Whole body composition	-	Left hand muscle mass	0.1kg	segmental body components	-
				trunk muscle mass	0.1kg	segmental body components	-
Muscle rate	0.1%	other	-	Right foot muscle mass	0.1kg	segmental body components	-
				Left foot muscle mass	0.1kg	segmental body components	-
body type	15	Evaluation suggestions	-				
Recommended calorie intake	1Kcal	Evaluation suggestions	-	body mass index	0.1	obesity analysis	√
body score	1 分	Evaluation suggestions	-	Fat percentage	0.1%	obesity analysis	√
physical age	1 year old	Evaluation suggestions	-	waist to hip ratio	0.1	obesity analysis	√
ideal weight	0.1kg	Evaluation suggestions	-	Visceral fat level	1	obesity analysis	√
weight control	0.1kg	Evaluation suggestions	-	Obesity	1%	obesity analysis	√
fat control	0.1kg	Evaluation suggestions	-	basal metabolism	1Kcal	obesity analysis	√
muscle control	0.1kg	Evaluation suggestions	-	Subcutaneous fat rate	0.1%	obesity analysis	√
Exercise consumption	1Kcal	Evaluation suggestions	-				

● BEST HEALTH TwoLegs/TwoArms Algorithm input

Parameter	Resolution	Attribute	standard	Parameter	Resolution	Attribute	standard
height	1cm	enter	-	age	1 year old	enter	-
weight	0.1kg	Measured value	-	gender	men and women	enter	-
50kHz two-pin impedance / 50kHz hand impedance	1ohm	Measured value	-	user type	Athletes/general population	enter	-

● BEST HEALTH TwoLegs/TwoArms algorithm output

Parameter	Resolution	Attribute	standard	Parameter	Resolution	Attribute	standard
Moisture rate	0.1%	Whole body composition	√	body mass index	0.1	obesity analysis	√
fat mass	0.1kg	Whole body composition	-	Fat percentage	0.1%	obesity analysis	√
protein rate	0.1%	Whole body composition	√	Visceral fat level	1	obesity analysis	√
Muscle mass	0.1kg	Whole body composition	√	basal metabolism	1Kcal	obesity analysis	√
Skeletal muscle mass	0.1kg	Whole body composition	√	Subcutaneous fat rate	0.1%	obesity analysis	√
Bone mass	0.1kg	Whole body composition	√				
lean body mass	0.1kg	Whole body composition	-	body type	9 types	Evaluation suggestions	-
Subcutaneous fat mass	0.1kg	Whole body composition	-	body score	1 score	Evaluation suggestions	-
Muscle rate	0.1%	Whole body composition	-	physical age	1 year old	Evaluation suggestions	-
				ideal weight	0.1Kg	Evaluation suggestions	-
				Exercise consumption	1Kcal	Evaluation suggestions	-

● Exercise consumption assessment, through which a weight loss plan can be specified

Exercise consumption	Unit	Exercise consumption	Unit	Exercise consumption	Unit
tennis	Kcal	squash	Kcal	walk	Kcal
football	Kcal	Taekwondo	Kcal	jogging	Kcal
fencing	Kcal	Aerobics	Kcal	bike	Kcal
croquet	Kcal	pingpong	Kcal	swim	Kcal
badminton	Kcal	Bouncy Ball	Kcal	climb mountains	Kcal
basketball	Kcal	jump rope	Kcal	golf	Kcal

13. Tool information

Development tool requirements list	
1	BMH05108 Development FAQ
2	BHM05108 communication protocol
3	BMH05106_8_AP (quickly evaluate product solution performance without writing a program)
4	BH-ISP (IAP upgrade program)