

12 Leads ECG Module

Zug 12 Leads ECG module, referred herein after as MECG12/M102 module is used for adult, children and neonate non-invasive ECG diagnosis in ICUs and hospital care.

Comprehensive module features including diagnosis of multiple heart conditions.

12 Leads ECG Module

MECG12/M102



FEATURES

- 12-leads ECG monitoring
- With special function of ECG analysis, verified by MIT and CSE database
- Diagnosis of Arrhythmia, conduction block, myocardial infarction and chamber room hypertrophy
- Support ZUGMED protocol
- Support OEM, the best choice of 12 leads ECG

APPLICATION

- Patient ECG Monitor and Diagnosis

OVERVIEW

Zug 12 Leads ECG module, referred herein after as MEG12/M102 module is used for adult, children and neonate non-invasive ECG diagnosis in ICUs and hospital care.

ECG measurement method: the heart generate electrical stimulation, biological electricity and transmit

these signals to body surface before it shrinks mechanically. Different parts of the body will generate different electric potential changes and form potential differences on body surface. Through recording of the potential differences, they will form dynamic curves which constitute ECG signals.

PERFORMANCE

Range	0.15mv-5.5mv
Accuracy	2.36uV/LSB
Different filter mode	Low pass filter: 70Hz, 100Hz, 150Hz; High pass filter: 0.05Hz, 0.1Hz, 0.2Hz, 0.5Hz; EMG filter: 25Hz, 35Hz, 45Hz; AC filter: 50Hz, 60Hz, close
System common mode rejection ratio	≥100dB
Input impedance	≥5MΩ
System input noise	<30uV
Polarization voltage	±450mV

ALGORITHM INDEX

After the MIT and CSE database testing, ZUG ECG algorithm mainly tests the sensitivity and accuracy of QRS wave identification and the limit time of interval between identifications. For the heart beat recognition algorithm test, the module uses the MIT-BIH Arrhythmia Database of US MIT-BIH ECG database to test its detection rate. For the average template of the heart beat detection algorithm of the test, the module uses CSE (Standards for Electrocardiography Common) ECG database of European Union to test.

CSE database contains 125 cases of expert marking files. Each file contains 10 seconds of 500Hz ECG data. These 125 cases data are used to the detection test.

Acceptable range of CES test (table 1).

After testing, ECG algorithm of ZUG heart beat detection specificity is 99.8% and accuracy rate is 99.4%. The test results of ECG signature analysis are shown in table 2. The algorithm meets the measurement standards of MIT-BIH database and CSE database.

Time and time limit	Acceptable average deviation (ms)	Acceptable standard deviation (ms)
The time limit of P wave	±10	15
The time of PR	±10	10
The time limit of QRS	±10	10
The time of QT	±25	30

Time and time limit	The difference average	The difference standard deviation
The time limit of p wave	5.6	14.7
The time of PR	2.3	9.8
The time limit of QRS	3.9	8.5
The time of QT	12.7	16.3

DIAGNOSIS INDEX

The ZUG ECG algorithm can diagnose arrhythmia, conduction block, myocardial infarction, STT changes, ventricular hypertrophy, atrial enlargement, axis de-

viation, and other heart diseases. With Zug 12 Leads ECG module there are over 200 diagnostics possible, the table below lists the most common of them.

No. Disease

- 1 *Significant arrhythmia*
- 2 *Sinus arrhythmia Normal ECG*
- 3 *Marked sinus arrhythmia Borderline ECG, "11C",*
- 4 *Sinus rhythm Normal ECG*
- 5 *Sinus tachycardia abnormal rhythm ECG*
- 6 *Sinus Bradycardia abnormal ECG*
- 7 *Atrial rhythm abnormal rhythm ECG*
- 8 *Atrial fibrillation abnormal rhythm ECG*
- 9 *Atrial fibrillation with rapid ventricular response abnormal rhythm ECG*
- 10 *Atrial fibrillation with slow ventricular response abnormal rhythm ECG*
- 11 *Atrial fibrillation with ventricular differential conduction or ventricular contraction*
- 12 *Atrial fibrillation with rapid ventricular response with aberrant conduction, or ventricular premature complexes abnormal rhythm ECG*
- 13 *Atrial fibrillation with slow ventricular response with aberrant conduction, or ventricular premature complexes abnormal rhythm ECG*
- 14 *Rapid atrial rhythm abnormal rhythm ECG*
- 15 *Atrial rhythm abnormal rhythm ECG*
- 16 *Atrial flutter with aberrant conduction, or ventricular premature complex abnormal rhythm ECG*
- 17 *Cannot rule out atrial flutter abnormal rhythm ECG*
- 18 *Junctional rhythm abnormal rhythm ECG*
- 19 *Rapid junctional rhythm abnormal rhythm ECG*
- 20 *Undetermined rhythm (possible supraventricular rhythm) abnormal rhythm ECG*
- 21 *Undetermined rhythm (possible supraventricular tachycardia) abnormal rhythm ECG*
- 22 *Undetermined rhythm (possible supraventricular bradycardia) abnormal rhythm ECG*
- 23 *With occasional supraventricular premature complexes abnormal rhythm ECG*
- 24 *With frequent supraventricular premature complexes abnormal rhythm ECG*
- 25 *With frequent supraventricular premature complexes in a pattern of bigeminy abnormal rhythm ECG*

No. Disease

- 26 *With occasional ventricular premature complexes abnormal rhythm ECG*
- 27 *With occasional ventricular premature complexes (Unreliable analysis due to noise) abnormal rhythm ECG*
- 28 *With frequent ventricular premature complexes abnormal rhythm ECG*
- 29 *With frequent ventricular premature complexes (Unreliable analysis due to noise) abnormal rhythm ECG*
- 30 *With frequent ventricular premature complexes in a pattern of bigeminy abnormal rhythm ECG*
- 31 *With frequent ventricular premature complexes in a pattern of bigeminy (Unreliable analysis due to noise) abnormal rhythm ECG*
- 32 *With couplet ventricular premature complex abnormal rhythm ECG*
- 33 *With couplet ventricular premature complex (Unreliable analysis due to noise) abnormal rhythm ECG*
- 34 *Electronic atrial pacemaker Atypical ECG*
- 35 *Electronic ventricular pace maker Atypical ECG*
- 36 *Electronic atrial pacemaker (Unreliable analysis due to noise) Atypical ECG*
- 37 *Electronic ventricular pace maker (Unreliable analysis due to noise) Atypical ECG*
- 38 *Undetermined regular rhythm Atypical ECG*
- 39 *Undetermined rhythm Atypical ECG*
- 40 *Undetermined regular rhythm (tachycardia) Atypical ECG*
- 41 *Undetermined rhythm (tachycardia) Atypical ECG*
- 42 *Undetermined regular rhythm (bradycardia) Atypical ECG*
- 43 *Undetermined rhythm (bradycardia) Atypical ECG*
- 44 *Extreme bradycardia Atypical ECG*
- 45 *With occasional ectopic premature complexes abnormal rhythm ECG*
- 46 *With occasional ectopic premature complexes (Unreliable analysis due to noise) abnormal rhythm ECG*
- 47 *With frequency ectopic premature complexes abnormal rhythm ECG*
- 48 *With frequency ectopic premature complexes (Unreliable analysis due to noise) abnormal rhythm ECG*
- 49 *With frequent ectopic premature complex in a pattern of bigeminy abnormal rhythm ECG*
- 50 *Short PR interval Atypical ECG*

ELECTRICAL CHARACTERISTICS

Input Voltage	External power supply should provide +12V DC Voltage offset range should be between $\pm 10\%$ of voltage full range
Power Consumption	$\leq 3W$

ENVIRONMENT CHARACTERISTICS

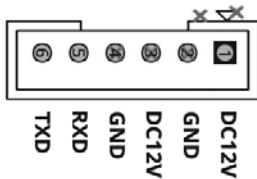
	Operating environment	Storage environment
Temperature	10°C to 40°C (50°F to 140°F)	-20°C to +70°C (4°F to 158°F)
Humidity	15%-90% non-condensing	15%-90% non-condensing
Altitude	-170 m to +1700 m	-170 m to +1700 m

DIMENSIONS: 130 MM × 70 MM × 13 MM

CONNECTORS

POWER AND COMMUNICATION

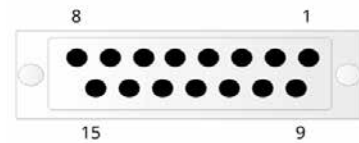
The connector shown below is used for the purpose of communication and power supply. The pin 1 is actually indicated by an arrow on the PCB.



Pin No	Signal	Description
1	+12V	Power Supply input 12V DC
2	GND	Ground
3	+12V	Power Supply input 12V DC
4	GND	Ground
5	RXD	UART Receiving data from host to the module
6	TXD	UART Sending data from module to host

12 LEADS INPUT

The connector shown below is used for the purpose of ECG signals transmission.



Pin No	Signal	Pin No	Signal
1	V2	8	NC
2	V3	9	RA
3	V4	10	LA
4	V5	11	LL
5	V6	12	V1
6	ECG SHIELD RL	13	NC
7	NC	14	RL
		15	NC

ORDERING

Our 12Ch ECG module part number is **MECG12/M102**.

For ordering our module, please contact directly our sales team by email at sales@zugmed.com or refer to our website www.zugmed.com for further information.

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