

PCAN-MicroMod Mix 3

Motherboard for the PCAN-MicroMod

User Manual v2.0.1



PEAK
System

Products taken into account

Product Name	Model	Item Number
PCAN-MicroMod Mix 3	Including casing and PCAN-MicroMod	IPEH-002206

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1 Introduction

The motherboards by PEAK-System provide an application-specific environment for the I/O module PCAN-MicroMod (short: MicroMod). This includes input and output circuits, a casing, and connectors. This way you can use the MicroMod e.g. at instrument manufacture, plant construction, or in the automotive industry.

The motherboard Mix 3 provides all signals of the MicroMod at the ports.

 **Note:** This manual only refers to the motherboard as base for a MicroMod and to the standard firmware. For the MicroMod and the configuration program PCAN-MicroMod Configuration exists separate documentation.

1.1 Properties at a Glance

- └ 8 digital inputs:
 - Pull-up or pull-down circuit per input set with DIP switch
 - Schmitt trigger behavior, inverting
 - Low-pass behavior
 - High state at 5 to 18 V input voltage
- └ 4 frequency inputs:
 - 0 - 10 kHz
 - Pull-up or pull-down circuit per input set with DIP switch
 - Schmitt trigger behavior

- └ 8 analog inputs:
 - Measuring range unipolar, 0 to 4.1 V
 - Resolution 10 bits
 - Measuring range extension possible with voltage divider
 - Low-pass behavior
 - Protection against undervoltage and overvoltage
- └ 8 digital outputs:
 - High-side switch, 350 mA constant current, 500 mA short-circuit current
 - 4 outputs usable as low-side switches, 700 mA constant current, 1 A short-circuit current
 - Short circuit protection
- └ 4 frequency/PWM outputs:¹
 - Low-side switch, 350 mA constant current, 1 A short-circuit current
 - 2 outputs usable as high-side switches, 1.5 A constant current, 5 A short-circuit current
 - Short circuit protection
- └ 2 automotive plug-in connectors (Tyco)

¹ Usable as 4 PWM outputs 8-bit or 2 PWM outputs 16-bit or 2 frequency outputs

1.2 Prerequisites for Operation

- └ Power supply in the range of 8 to 26 V DC
- └ For creating and transferring configurations: computer with Windows 7/Vista/XP and a CAN interface from the PCAN series

1.3 Scope of Supply

- └ Module with following components: motherboard Mix 3, PCAN-MicroMod, casing
- └ 2 automotive plugs (Tyco, 12-pin and 32-pin)
- └ Crimp contacts for allocating the automotive plugs
- └ CD with software and documentation

2 Hardware Configuration

You can customize the motherboard by modifying the hardware. The following subsections contain descriptions about possible modifications.

Accessing the Motherboard

In order to carry out the modifications described in the following sections, unscrew the lid of the casing and pull off the MicroMod from the motherboard.

Remounting the MicroMod

When you remount the MicroMod, take notice of the white triangular marks on each the motherboard and the MicroMod (upper left corner). These marks must align.

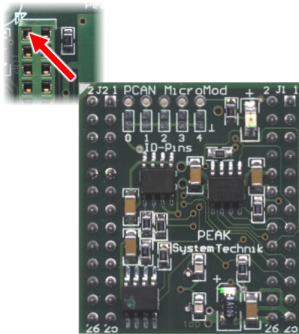


Figure 1: Positioning of the MicroMod

2.2 High-side/Low-side Switches at Digital Outputs

At delivery the digital outputs are configured as high-side switches and the frequency/PWM outputs as low-side switches. You can change the output behavior of four digital and two frequency/PWM outputs independently. This is done with jumpers which are marked with the mnemonics of the outputs.

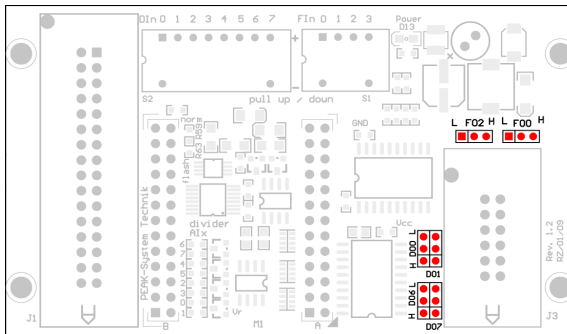



Figure 3: Positions of the jumpers for the behavior of the digital outputs

Outputs	Output behavior at jumper setting	
	H	L
Dout 0, Dout 1, Dout 6, Dout 7	High-side switch* 350 mA constant current 500 mA short-circuit current	Low-side switch 700 mA constant current 1 A short-circuit current
Fout 0, Fout 2	High-side switch 1.5 A constant current 5 A short-circuit current	Low-side switch* 350 mA constant current 1 A short-circuit current

* Default setting

The high-side switches require a **separate voltage supply** via pin 1 and/or pin 2 on connector J1 (see also 3.1 *Pin Assignment / Applicable MicroMod Services* on page 12). This voltage supply is also needed for the low-side operation of the digital outputs in order to avoid malfunctions (e.g. when using reactive loads).

 **Important note:** When you use a digital or a frequency/PWM output as **high-side switch**, the connected load must be linked to ground (**GND**). Otherwise, the overvoltage protection is not effective.

2.3 Range Extension for Analog Inputs

At delivery the analog inputs have a unipolar measuring range from 0 to 4.1 Volts. You can extend the measuring range of an analog input with a voltage divider by soldering in a resistor at the respectively marked position.

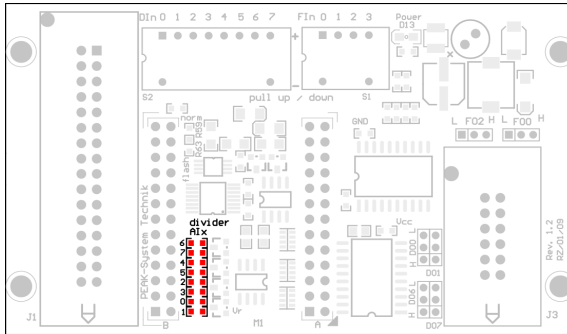


Figure 4: Resistor positions for the range extension

The resistor value R_x to be used results from the desired maximum voltage U_{\max} :

$$R_x = \frac{2400 \Omega}{\frac{U_{\max}}{4.1V} - 1} \quad (U_{\max} > 4.1V)$$

Example values:

U_{\max}	R_x (rounded)
5 V	11 k Ω
10 V	1.7 k Ω

Resistor position	Analog input
6	Ain 6
7	Ain 7
4	Ain 4
5	Ain 5
2	Ain 2
3	Ain 3
0	Ain 0
1	Ain 1

3 Operation

3.1 Pin Assignment / Applicable MicroMod Services








The motherboard has a 32-pin and a 12-pin connector. For each connector on the motherboard a mating connector is delivered which you can allocate as needed. For this use the delivered crimp contacts.



V _{Bat} (8-24V)	17	1	V _{HSout} (8-33V)			
Din 0	18	2	V _{HSout} (8-33V)			
Din 2	19	3	Din 1			
Din 4	20	4	Din 3			
Din 6	21	5	Din 5			
Fin 0	22	6	Din 7			
Fin 2	23	7	Fin 1			
GND	24	8	Fin 3			
V24-TxD	25	9	V24-RxD			
CAN-H	26	10	CAN-L			
Aout 0	27	11	Aout 1	Fout 3	12	6
AGND	28	12	GND	Fout 1	11	5
Ain 7	29	13	Ain 6	Dout 0	10	4
Ain 5	30	14	Ain 4	Dout 2	9	3
Ain 3	31	15	Ain 2	Dout 4	8	2
Ain 1	32	16	Ain 0	Dout 6	7	1


Figure 5: Pin assignment of the motherboard Mix 3

The following table shows the pin assignment and the assignment of the motherboard functions to the MicroMod services. The motherboard's inputs and outputs are controlled by the services of the MicroMod.

Pin J1	Port name	Function	Access with MicroMod service(s)
17	V _{Bat}	Voltage supply motherboard, 8 - 26 V DC	
1 2	V _{HSout}	Voltage supply high-side driver of the digital outputs (also needed for the low-side operation), 8 - 33 V DC	

Pin J1	Port name	Function	Access with MicroMod service(s)
18	Din 0	Digital input High state at 5 to 18 V input voltage Schmitt trigger behavior, inverting Low-pass behavior Pull-up/pull-down (4.7 k Ω) with DIP switches S2, default setting: open	 Digital Input  Digital Function  Rotary Encoder
3	Din 1		
19	Din 2		
4	Din 3		
20	Din 4		
5	Din 5		
21	Din 6		
6	Din 7		
22	Fin 0	Frequency input 0 - 10 kHz Schmitt trigger behavior Pull-up/pull-down (4.7 k Ω) with DIP switches S1, default setting: open	 Frequency Input
7	Fin 1		
23	Fin 2		
8	Fin 3		
24	GND	Digital ground	
25	V24-TxD	(Reserved)	
9	V24-RxD		
26	CAN-H	Differential CAN signal (High-speed CAN, ISO 11898-2)	
10	CAN-L		
27	Aout 0	(Reserved)	
11	Aout 1		
28	AGND	Analog ground	
12	GND	Digital ground	
29	Ain 7	Analog input Pull-down circuit Measuring range unipolar, 0 to 4.1 V Measuring range extension possible with voltage divider Low-pass behavior Protection against undervoltage and overvoltage	 Analog Input  Curve  Analog Hysteresis
13	Ain 6		
30	Ain 5		
14	Ain 4		
31	Ain 3		
15	Ain 2		
32	Ain 1		
16	Ain 0		

Pin J3	Port name	Function		Access with MicroMod service(s)
12	Fout 3	Frequency/PWM output Low-side switch 350 mA constant current 1 A short-circuit current		 PWM and Frequency Output
6	Fout 2		High-side switch by jumper 1.5 A constant current 5 A short-circuit current	
11	Fout 1			
5	Fout 0		(See Fout 2)	
10	Dout 0	Digital output High-side switch 350 mA constant current 500 mA short-circuit current	High-side switch by jumper 700 mA constant current 1 A short-circuit current	 Digital Output
4	Dout 1			
9	Dout 2			
3	Dout 3			
8	Dout 4			
2	Dout 5			
7	Dout 6			
1	Dout 7		(See Dout 0/1)	

 **Important note:** When you use a digital or a frequency/PWM output as **high-side switch**, the connected load must be linked to ground (**GND**). Otherwise, the overvoltage protection is not effective.

3.2 Configuration Program

In order to create and transfer MicroMod configurations the Windows software PCAN-MicroMod Configuration is used. This section covers basic points about installation and use of the program with the motherboard Mix 3.

You'll find detailed information about the use of PCAN-MicroMod Configuration in the related documentation which is invoked via the program (e.g. with **F1**).

3.2.1 System Requirements

- └ Windows 7/Vista/XP
- └ Computer with CAN interface of the PCAN series (for transferring a configuration to the PCAN-MicroMod via CAN)

3.2.2 Installing the Program

Under Windows install the program from the supplied CD. Start the corresponding installation routine by using the CD navigation going to **Tools > PCAN-MicroMod Configuration 2.x.x**.

3.2.3 Creating a Configuration

When you start creating a new configuration in PCAN-MicroMod Configuration, the dialog box Board Type appears in order to select the type of the used motherboard. The necessary settings are explained in the following.

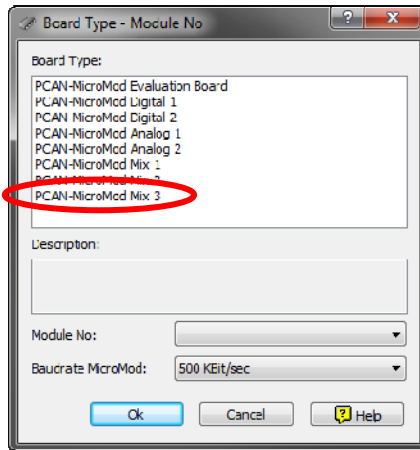


Figure 6: PCAN-MicroMod Configuration: selection of the motherboard Mix 3

Board Type: PCAN-MicroMod Mix 3

Module No: 0

The module number of the MicroMod on the motherboard Mix 3 is set to 0 at delivery and is relevant, if you want to configure more than one MicroMod on the same CAN bus. See also 3.4 *Several MicroMods on the CAN Bus* on page 17.

Baudrate MicroMod: 500 kbit/s

At delivery the MicroMod is set to a bit rate of 500 kbit/s. A change of this setting will take effect after sending the completed configuration to the MicroMod.



Note: For the first transfer of a configuration to the module it must be integrated in a CAN network with a bit rate of 500 kbit/s.

3.3 Status LEDs

The motherboard including MicroMod has two LEDs with the following status indications:


LED	Indication
Power (green)	Power is applied.
Activity (red)	Status of the MicroMod. During normal operation it blinks at a frequency of 1 Hz.

You'll find further information about other states of the status LED "Activity" in the user manual for the PCAN-MicroMod.

3.4 Several MicroMods on the CAN Bus

If you want to use several MicroMods on the same CAN bus and want to configure them, each one needs its own module number. That way the MicroMods are distinguishable for the program PCAN-MicroMod Configuration.

The module number is set on the MicroMod by solder jumpers and lies in the range of 0 to 31. At **delivery** each MicroMod has the **module number 0**.

 **Note:** During normal operation at the CAN bus the module number has not effect.

For setting the solder bridges on the MicroMod unscrew the top of the casing and remove the MicroMod from the motherboard. Please find further information about the assignment of module numbers in the separate manual for the PCAN-MicroMod.

Remounting the MicroMod

When you remount the MicroMod, take notice of the white triangular marks on each the motherboard and the MicroMod (upper left corner). These marks must align.

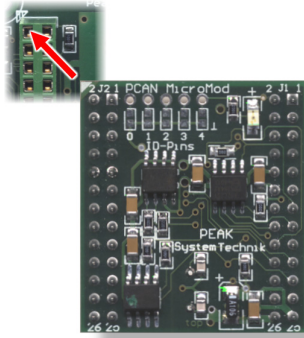


Figure 7: Positioning of the MicroMod

4 Technical specifications

Power supply	
Voltage supply V_{Bat} motherboard	Nominal + 12 V DC, 8 - 26 V possible
Voltage supply V_{HSout} high-side drivers	Nominal + 12 V DC, 8 - 33 V possible
Current consumption	60 mA at 12 V on V_{Bat} (all outputs passive)
Digital inputs	
Count	8
Input voltage Low	< 3.2 V
Input voltage High	> 4.0 V
Maximum input voltage	18 V
Circuit	open (130 k Ω , weak pull-down), pull-up (4.7 k Ω), pull-down (4.7 k Ω)
Further properties	Schmitt trigger behavior, inverting
Frequency inputs	
Count	4
Frequency range	0 - 10 kHz
Maximum voltage Low	3.2 V
Minimum voltage High	4.0 V
Maximum voltage	18 V
Circuit	open (130 k Ω , weak pull-down), pull-up (4.7 k Ω), pull-down (4.7 k Ω)
Further properties	Schmitt trigger behavior

Continued on the next page

Analog inputs

Count	8
Measuring range	0 - 4.1 V, unipolar, extensible through voltage divider with resistors
Resolution	10 bit
Input impedance	100 k Ω (at measuring range 4.1 V)
Source impedance	< 5 k Ω
Sample rate	1000 samples/s
Low-pass	$\tau = 2.5$ ms
Further properties	Pull-down circuit Protection against undervoltage and overvoltage

Digital outputs

Count	8	
Circuit	High-side switch 4 outputs alternatively configurable as low-side switch Short circuit protection	
	High-side:	Low-side:
Constant current	max. 350 mA	max. 700 mA
Short-circuit current	500 mA	1 A

Frequency/PWM outputs

Count	4, usable as - 4 PWM outputs 8-bit or - 2 PWM outputs 16-bit or - 2 frequency outputs	
Circuit	Low-side switch 2 outputs alternatively configurable as high-side switch Short circuit protection	
	Low-side:	High-side:
Constant current	max. 350 mA	max. 1.5 A
Short-circuit current	1 A	5 A
Maximum frequency	10 kHz	1.5 kHz

Continued on the next page

CAN	
Transmission standard	High-speed CAN ISO 11898-2 10 kbit/s - 1 Mbit/s, setup with PCAN-MicroMod Configuration (Windows software)
Termination	none
CAN ID reserved for configuration transfer	0x7E7
Module number at delivery (for configuration transfer)	0

Measures	
Size casing	100 x 60 x27 mm (3 15/16 x 2 3/8 x 1 1/16 inches) (W x D x H)
Weight	100 g (3.5 oz.) (without plug connectors)

Environment	
Operating temperature	-40 - +85 °C (-40 - +185 °F)
Temperature for storage and transport	-40 - +100 °C (-40 - +212 °F)
Relative humidity	15% - 90%, not condensing
EMC	Up to ser. no. 00199: EN 55024:2003-10 EN 55022:2007-04 From ser. no. 00200: EN 61326-1:2006-10 All: EC directive 2004/108/EG
Ingress protection (IEC 60529)	IP20

Appendix A CE Certificates

A.1 Up to serial number 00199

PCAN-MicroMod Motherboard Mix 3 IPEH-002206 – EC Declaration of Conformity
PEAK-System Technik GmbH



Notes on the CE Symbol

The following applies to the PCAN-MicroMod Motherboard Mix 3 products IPEH-002206

EC Directive

This product fulfills the requirements of EC directive 2004/108/EG on "Electromagnetic Compatibility" and is designed for the following fields of application as per the CE marking:

Electromagnetic Immunity

DIN EN 55024, Publication date: 2003-10
Information technology equipment, immunity characteristics – Limits and methods of measurement (IEC/CISPR 24:1997, modified + A1:2001 + A2:2003);
German version EN 55024:1998 + A1:2001 + A2:2003

Electromagnetic Emission

DIN EN 55022, Publication date: 2007-4
Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement (IEC/CISPR 22:2005, modified);
German version EN 55022:2006

Declarations of Conformity

In accordance with the above mentioned EU directives, the EC declarations of conformity and the associated documentation are held at the disposal of the competent authorities at the address below:

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A handwritten signature in black ink, appearing to read "Uwe W. M.", written in a cursive style.

Signed this 17th day of February 2009

A.2 From serial number 00200

PCAN-MicroMod Motherboard Mix 3 IPEH-002206 – EC Declaration of Conformity
PEAK-System Technik GmbH



Notes on the CE Symbol

The following applies to the PCAN-MicroMod Motherboard Mix 3 products IPEH-002206 (from Ser. no. 00200)

EC Directive

This product fulfills the requirements of EC directive 2004/108/EG on "Electromagnetic Compatibility" and is designed for the following fields of application as per the CE marking:

Electromagnetic Immunity/Emission

DIN EN 61326-1; publication date: 2006-10

Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements (IEC 61326-1:2005);

German version EN 61326-1:2006

Declarations of Conformity

In accordance with the above mentioned EU directives, the EC declarations of conformity and the associated documentation are held at the disposal of the competent authorities at the address below:

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info@peak-system.com

A handwritten signature in black ink, appearing to read "Uwe W. St.".

Signed this 26th day of August 2009

Appendix B Dimension Drawing

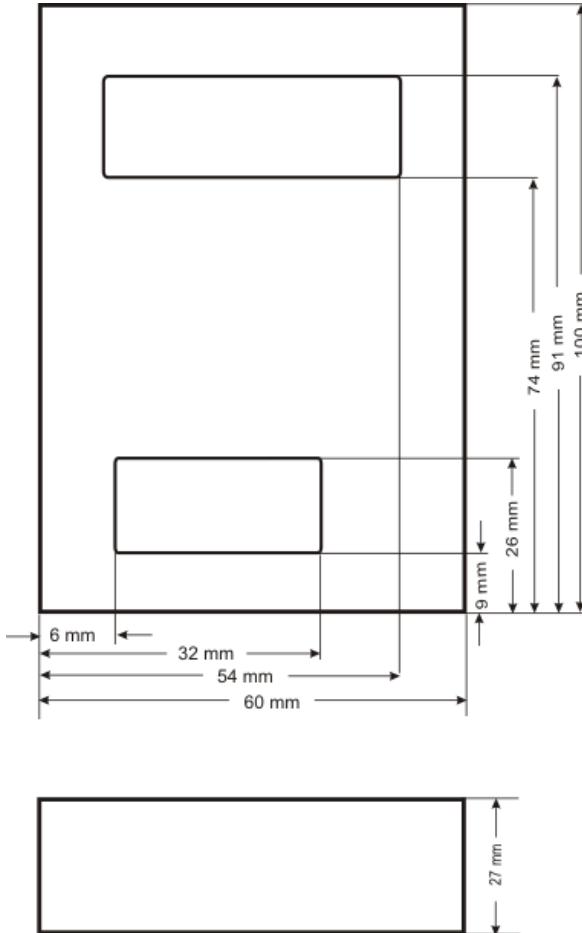


Figure 8: View Mix 3.

The figure does not show the actual size of the product.