Relevant products

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Model</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCAN-MicroMod Analog 1</td>
<td>Including casing and PCAN-MicroMod</td>
<td>IPEH-002204</td>
</tr>
<tr>
<td>PCAN-MicroMod Configuration</td>
<td>Version 2.5 (Windows software)</td>
<td></td>
</tr>
</tbody>
</table>

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PEAK-System Technik GmbH
Otto-Roehm-Strasse 69
64293 Darmstadt
Germany

Phone: +49 (0)6151 8173-20
Fax: +49 (0)6151 8173-29

www.peak-system.com
info@peak-system.com

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1 Introduction

The motherboards for PCAN-MicroMod provide an application-oriented environment. Typical characteristics of this product group include a wide supply voltage range and the protective circuit for the inputs and outputs. CANopen® firmware is available for all PCAN-MicroMod motherboards.

The Analog 1 motherboard serves general analog requirements.

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

1.1 Properties at a Glance

- High-speed CAN connection (ISO 11898-2)
- Bit rates from 10 kbit/s up to 1 Mbit/s
- Compliant with CAN specifications 2.0A (11-bit ID) and 2.0B (29-bit ID)
- Completely configurable using the Windows program PCAN-MicroMod Configuration
- Operating voltage 11 to 26 V
- Aluminum casing with spring terminal connectors
- Optional DIN rail fixing available
- Extended operating temperature range from -40 to 85 °C (-40 to 185 °F)
8 analog inputs:
- Measuring range unipolar 0 to 5 V
- Resolution 10 bits, sample rate 1 kHz
- Measuring range extension optional
- Pull-down circuit
- Protection against under- and overvoltages
- Parallel connection of a digital input each for alternative use (e.g. push buttons)

4 analog outputs:
- Voltage range 0 to 10 V (based on 8-bit PWM)
- Output current 15 mA per channel
- Short-circuit protection

Status LEDs for power supply and digital output

1.2 Prerequisites for Operation

Power supply in the range of 11 to 26 V DC
(8 to 26 V without use of analog outputs)

For creating and transferring configurations:
- Computer with Windows 10, 8.1, or 7 (32/64-bit)
- CAN interface from the PCAN series
1.3 Scope of Supply

- PCAN-MicroMod
- PCAN-MicroMod motherboard in casing including mating connectors (Phoenix Contact FK-MCP 1,5/10-ST-3,81 1851122)
- PCAN-MicroMod Configuration for Windows
- Manual in PDF format
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.

**Attention!** Electrostatic discharge (ESD) can damage or destroy components on the motherboard or the PCAN-MicroMod. Take precautions to avoid ESD when handling the boards.

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
2.1 Modification on Nominal Supply Voltages > 12 V

If you want to supply the Analog 1 motherboard with a nominal voltage $+U_b > 12\,\text{V}$ (usually 24 V), then you must do the following modification:

1. Equip the unpopulated position D6 with a reference diode BZV55C12 (package SOD-80).
2. Replace the 0-Ohm resistor on position R35 with a resistor of 1.6 k$\text{\Omega}$ (package S1206).

![Figure 2: Positions D6 and R35](image)

**Note:** You do not need to consider voltage fluctuations that might occur. A modification isn't required in that case. Example: In the automotive sector up to 18 V may occur at a nominal voltage of 12 V.
2.2 Measuring Range Extension of the Inputs

You can extend the measuring range of each analog input to a higher maximum voltage than 5 Volts by using a voltage divider. On delivery of the motherboard the resistor positions R52 through R59 are not equipped. By inserting a resistor $R_x$ (package S0805) with a value calculated with the following formula the measuring range is extended to the desired maximum voltage $U_{MB}$.

$$R_x = \frac{2400 \Omega}{U_{MB} / 5V - 1} \quad (U_{MB} > 5V)$$

<table>
<thead>
<tr>
<th>Analog input</th>
<th>Insert $R_x$ on position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aln 0</td>
<td>R57</td>
</tr>
<tr>
<td>Aln 1</td>
<td>R53</td>
</tr>
<tr>
<td>Aln 2</td>
<td>R56</td>
</tr>
<tr>
<td>Aln 3</td>
<td>R55</td>
</tr>
<tr>
<td>Aln 4</td>
<td>R54</td>
</tr>
<tr>
<td>Aln 5</td>
<td>R58</td>
</tr>
<tr>
<td>Aln 6</td>
<td>R52</td>
</tr>
<tr>
<td>Aln 7</td>
<td>R59</td>
</tr>
</tbody>
</table>

Figure 3: Position of the resistors for the measuring range extension
3 Operation

3.1 Port Assignment

The motherboard has two connectors, J1/2 on the left and J3 on the right. The port assignment is as follows:

<table>
<thead>
<tr>
<th>Port name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>+U_b</td>
<td>Operating voltage 11 - 26 V DC, w/o AOut 8 - 26 V DC See also section 2.1 Modification on Nominal Supply Voltages &gt; 12 V on page 8.</td>
</tr>
<tr>
<td>GND</td>
<td>Digital ground</td>
</tr>
<tr>
<td>CAN_L</td>
<td>Differential CAN signal</td>
</tr>
<tr>
<td>CAN_H</td>
<td>Not connected</td>
</tr>
<tr>
<td>N/C</td>
<td></td>
</tr>
<tr>
<td>AOut 0</td>
<td>Analog output 0 - 10 V</td>
</tr>
<tr>
<td>AOut 1</td>
<td></td>
</tr>
<tr>
<td>AOut 2</td>
<td></td>
</tr>
<tr>
<td>AOut 3</td>
<td></td>
</tr>
<tr>
<td>AGND</td>
<td>Analog ground</td>
</tr>
</tbody>
</table>
### 3.2 Configuration Program

In order to create and transfer MicroMod configurations, the Windows program PCAN-MicroMod Configuration is used. This section covers basic points about installation and use of the program with the Analog 1 motherboard.

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 Prerequisites

- Windows 10, 8.1, or 7 (32/64-bit)
- 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 DVD. Start the corresponding installation routine by using the DVD navigation going to Tools > PCAN-MicroMod Configuration 2.5.x.

3.2.3 Creating a Configuration

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

![Board Type - Module No](image)

Figure 5: PCAN-MicroMod Configuration: selection of the Analog 1 motherboard

**Board Type**: PCAN-MicroMod Analog 1

**Module No**: 0

The module number of the MicroMod on the Analog 1 motherboard 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 section 3.4 Several MicroMods on the CAN Bus on page 14.
Bitrate 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.

3.2.4 Applicable MicroMod Services

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

<table>
<thead>
<tr>
<th>Function on motherboard</th>
<th>Port name</th>
<th>Access with MicroMod service(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog input</td>
<td>AIn 0 ... AIn 7</td>
<td><img src="image.png" alt="Analog Input" /></td>
</tr>
<tr>
<td>Digital input (parallel to the</td>
<td></td>
<td><img src="image.png" alt="Digital Function" /></td>
</tr>
<tr>
<td>channels AIn 0 ... AIn 7)</td>
<td></td>
<td><img src="image.png" alt="Rotary Encoder" /></td>
</tr>
<tr>
<td>Analog output (PWM with 4000 Hz)</td>
<td>AOOut 0 ... AOOut 3</td>
<td><img src="image.png" alt="PWM and Frequency Output" /></td>
</tr>
<tr>
<td>LED DOout 7</td>
<td>DOut 7</td>
<td><img src="image.png" alt="Digital Output" /></td>
</tr>
</tbody>
</table>
### 3.3 Status LEDs

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

<table>
<thead>
<tr>
<th>LED</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power (green)</td>
<td>Power is applied.</td>
</tr>
<tr>
<td>DOut 7 (red)</td>
<td>Is linked to the digital output DO 7 of the MicroMod and can be configured freely.</td>
</tr>
<tr>
<td>Activity (red)</td>
<td>Status of the PCAN-MicroMod:</td>
</tr>
<tr>
<td>blinking at 1 Hz</td>
<td>normal operation</td>
</tr>
<tr>
<td>blinking at 2 Hz</td>
<td>invalid or no configuration</td>
</tr>
<tr>
<td>blinking at 5 Hz</td>
<td>configuration mode</td>
</tr>
<tr>
<td>continuously on</td>
<td>internal MicroMod error</td>
</tr>
</tbody>
</table>

### 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.

During normal operation of the PCAN-MicroMod, the module number has no effect on the CAN communication.

For setting the solder jumpers 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 user manual for the PCAN-MicroMod.
Attention! Electrostatic discharge (ESD) can damage or destroy components on the motherboard or the PCAN-MicroMod. Take precautions to avoid ESD when handling the boards.

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 6: Positioning of the MicroMod
4 Technical Specifications

Connectors
Mating connector type Phoenix Contact FK-MCP 1,5/10-ST-3,81 1851122

Power supply
Operating voltage $+U_b$ 11 - 26 V DC (±5 %), 8 - 26 V w/o AOut
Current consumption max. 200 mA, typ. 35 mA at 12 V w/o load
Ripple (5 V) < 50 mV ($+U_b = 12$ V, 200 mA load)
Ripple (analog) < 20 mV
Reverse-polarity protection extant; can get ineffective by the wiring with other CAN nodes (danger of destruction of electronic components)

Analog inputs
Count 8
Measuring range 0 - 5 V, expandable with additional resistor (see 2.2 on page 9)
Resolution 10 bits
Sampling rate 1 kHz
Input impedance 100 k$\Omega$ (at measuring range 0 - 5 V), decreases with expansion of measuring range (e.g. 4.5 k$\Omega$ at measuring range 0 - 10 V)
Overvoltage protection extant
Low-pass $f_g = 66$ Hz
Special feature Digital inputs of PCAN-MicroMod parallel (digital assessment w/o threshold switch possible)

Analog outputs
Count 4
Type PWM based
Voltage range 0 - 10 V
Resolution full percentage steps (0 to 100 %)
Output current 15 mA
Short circuit protection extant
## CAN

<table>
<thead>
<tr>
<th>Transmission standard</th>
<th>High-speed CAN ISO 11898-2, typ. 500 kbit/s, setup with PCAN-MicroMod Configuration (Windows software)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Termination</td>
<td>none</td>
</tr>
<tr>
<td>CAN ID reserved for configuration transfer</td>
<td>0x7E7</td>
</tr>
<tr>
<td>Module number at delivery (for configuration transfer)</td>
<td>0</td>
</tr>
</tbody>
</table>

## Peculiarity Interference Immunity

<table>
<thead>
<tr>
<th>Tests</th>
<th>compliant to IEC 61000 and DIN EN 61326</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surge</td>
<td>±500 V (specification industrial sector: ±1 kV)¹</td>
</tr>
<tr>
<td>Line-conducted HF compatibility</td>
<td>10 V_{eff} (specification: 3 V_{eff})</td>
</tr>
</tbody>
</table>

## 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 |
| Ingress protection (IEC 60529) | IP20 |

## Measures

<table>
<thead>
<tr>
<th>Casing size (incl. connectors)</th>
<th>55 x 68 x 24 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>See also dimension drawing in Appendix B on page 19</td>
</tr>
<tr>
<td>Weight</td>
<td>108 g</td>
</tr>
</tbody>
</table>

## Conformity

<table>
<thead>
<tr>
<th>EMV</th>
<th>Directive 2014/30/EU</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DIN EN 61326-1:2013-07</td>
</tr>
<tr>
<td>RoHS 2</td>
<td>Directive 2011/65/EU</td>
</tr>
<tr>
<td></td>
<td>DIN EN 50581 VDE 0042-12:2013-02</td>
</tr>
</tbody>
</table>

¹ This specification could only be fulfilled with ±500 V due to the available space. Therefore the motherboard should be used with a local power supply.
Appendix A  CE Certificate

EU Declaration of Conformity

This declaration applies to the following product:
Product name: PCAN-MicroMod Analog 1
Item number(s): IPEH-002204
Manufacturer: PEAK-System Technik GmbH
Otto-Roehm-Strasse 69
64293 Darmstadt
Germany

We declare under our sole responsibility that the mentioned product is in conformity with the following directives and the affiliated harmonized standards:

EU Directive 2011/65/EU (RoHS 2)
DIN EN 50581 VDE 0042-12:2013-02
Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances;
German version EN 50581:2012

EU Directive 2014/30/EU (Electromagnetic Compatibility)
DIN EN 61326-1:2013-07
Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements (IEC 61326-1:2012);
German version EN 61326-1:2013

Darmstadt, 22 February 2019

Uwe Wilhelm, Managing Director
Appendix B Dimension Drawing

Figure 7: Top view and view of front side with connector. The figure does not show the actual size of the product.