

PCAN-MicroMod FD Digital 1/2

User Manual



Relevant Products

| Product name | Model | Part number |
|--------------------------------|------------------------------------|--------------------|
| PCAN-MicroMod FD Digital 1 | | IPEH-003083 |
| PCAN-MicroMod FD Digital 2 | | IPEH-003084 |
| PCAN-MicroMod FD Configuration | Configuration software for Windows | |

Imprint

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1 Introduction

The PCAN-MicroMod FD plug-in board can be purchased together with ready-to-use motherboards that provide peripherals for specific requirements. For the connection of CAN, I/O, and power supply, spring terminal connectors are used.

The motherboards PCAN-MicroMod FD Digital 1 and 2 put the emphasis on digital inputs and outputs which are provided with appropriate protective circuitry. The digital outputs of the Digital 1 are equipped with low-side switches and those of the Digital 2 with high-side switches.

The PCAN-MicroMod FD is configured using the supplied Windows software. In addition to simple I/O mapping to CAN IDs, function blocks are also available for processing the data. The configuration created on the computer is transferred via the CAN bus to the PCAN-MicroMod FD which then runs as an independent CAN node. Multiple modules can be configured independently on a CAN bus.

1.1 Properties at a Glance

Motherboard in General

- Board with plugged-on PCAN-MicroMod FD
- Aluminum casing with spring terminal connectors
- Operating voltage 8 to 30 V
- Extended operating temperature range from -40 to 85 °C (-40 to +185 °F)

- High-speed CAN channel (ISO 11898-2)
 - Complies with CAN specifications 2.0 A/B and FD
 - CAN bit rates from 20 kbit/s up to 1 Mbit/s
 - CAN FD bit rates for the data field (max. 64 bytes) from 20 kbit/s up to 10 Mbit/s
 - CAN termination switchable
- 1 analog input for voltage monitoring up to 30 V, resolution 12 bits
- 2 frequency outputs
 - Low-side switch
 - Adjustable frequency range 0 to 20 kHz
- Completely configurable using the Windows program PCAN-MicroMod FD Configuration
- 4-bit rotary encoder switch for setting the module ID (for configuration transfer)

I/O Digital 1 and 2 Motherboards

- 8 digital inputs
 - Pull-up, Pull-down, or open (configurable)
- 8 digital outputs
 - Digital 1: Low-side switch
 - Digital 2: High-side switch
 - PWM mode: adjustable frequency range 0 to 20 kHz
- 3 analog inputs:
 - Resolution 12 bits
 - Measuring range from 0 to 10 V

1.2 Operation Requirements

- Voltage source 8 to 30 V DC (connection via 10-pole spring terminal strip)

For transfer of the configuration to the MicroMod FD via CAN:

- Operating system Windows 10, 8.1, 7 (32/64-bit)
- PC-CAN interface from PEAK-System
- CAN cabling between the CAN interface and the PCAN-MicroMod FD Digital 1/2 with proper termination (120 Ω on each end of the CAN bus)



Note: The transfer of the configuration is done with CAN 2.0 messages. For this reason, all PC-CAN interfaces from PEAK-System work in principle for this purpose. We recommend the use of CAN-FD-capable interfaces in order to activate the configuration mode of the PCAN-MicroMod FD Digital 1/2 also during CAN FD operation in a simple way.

1.3 Scope of Supply

- PCAN-MicroMod FD
- Motherboard in aluminum casing
- One mating connector each for both connections
- PCAN-MicroMod FD Configuration for Windows
- Manual in PDF format

2 Connectors

The motherboard has two connector sockets.

| Position on casing | Function | Type | Mating connector type |
|--------------------|--------------------|------------------------------------|------------------------------------|
| Left | Basic connectivity | 10-pole, single-row, 3.81 mm pitch | Phoenix Contact FMC 1,5/10-ST-3,81 |
| Right | I/O | 22-pole, double-row, 3.5 mm pitch | Phoenix Contact DFMC 1,5/11-ST-3,5 |

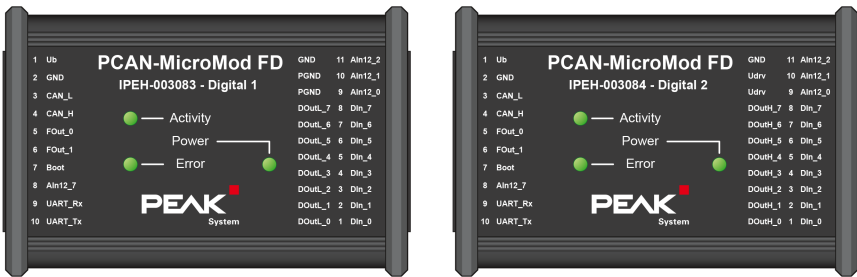


Figure 1: Top view PCAN-MicroMod FD Digital 1/2 with pin assignment

2.1 Basic Connectivity (left connector)



Figure 2: Connector left 10-pole

| Pin | Identifier | Function | Comment |
|-----|------------|----------------------------|---|
| 1 | Ub | Voltage supply 8 - 30 V DC | Power LED is on when supply is present. |
| 2 | GND | Common Ground | |

| Pin | Identifier | Function | Comment |
|-----|------------|---|--|
| 3 | CAN_L | High-speed CAN connection (ISO 11898-2) | Internal termination resistor 120 Ω can be activated. See 4.2 <i>Activate Internal CAN Bus Termination</i> on page 13 |
| 4 | CAN_H | | |
| 5 | Fout_0 | Frequency outputs (up to 10 kHz) | |
| 6 | Fout_1 | | |
| 7 | Boot | Start the CAN boot loader for a firmware update via CAN (High-active, connection to Ub during the start-up of the motherboard) | Activity LED quickly blinks orange when CAN bootloader is active |
| 8 | Aln12_7 | Analog input 7 (0 - 30 V, resolution 12 bits) | General tasks, e.g. voltage monitoring or threshold switch |
| 9 | UART_Rx | Serial RS-232 interface | Currently no use |
| 10 | UART_Tx | | |

For the startup of the PCAN-MicroMod FD Digital 1/2 it is sufficient to connect a voltage source to pins 1 und 2. The configuration of the PCAN-MicroMod FD Digital 1/2 is done viar the CAN bus being connected to pins 3 and 4. Read more in 5 *Configuration Software* on page 15.

2.2 I/O (right connector)



Figure 3: Right connector 2 x 11 terminals

| Function | A | Pin | B | Function |
|---------------------------------------|------|-----|---------|------------------------|
| Ground | GND | 11 | Aln12_2 | Analog inputs |
| Power ground (for digital outputs) | PGND | 10 | Aln12_1 | Resolution 12 bits |
| | PGND | 9 | Aln12_0 | Voltage range 0 - 10 V |

| Function | A | Pin | B | Function |
|---|--------------------|-----|-------|---|
| Digital outputs L: Low-side outputs (Digital 1) H: High-side outputs (Digital 2) Static state or PWM mode configurable | DOutL_7 DOutH_7 | 8 | DIn_7 | Digital inputs Pull-up/Pull-down/Open configurable |
| | DOutL_6 DOutH_6 | 7 | DIn_6 | |
| | DOutL_5 DOutH_5 | 6 | DIn_5 | |
| | DOutL_4 DOutH_4 | 5 | DIn_4 | |
| | DOutL_3 DOutH_3 | 4 | DIn_3 | |
| | DOutL_2 DOutH_2 | 3 | DIn_2 | |
| | DOutL_1 DOutH_1 | 2 | DIn_1 | |
| | DOutL_0 DOutH_0 | 1 | DIn_0 | |

3 Status LEDs

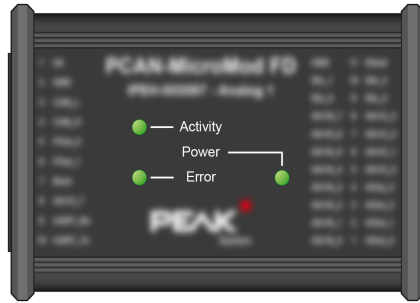


Figure 4: LEDs on the PCAN-MicroMod FD Digital 1/2

| LED | LED indication | Device status | Comment |
|----------|------------------------------|---|---|
| | Green blinking (1 Hz) | Normal operation | |
| | Green faster blinking (2 Hz) | No configuration with the set module ID | The PCAN-MicroMod FD is ready for receiving a configuration with 500 kbit/s. |
| Activity | Orange quick blinking (4 Hz) | CAN bootloader active | Ready for transfer of new firmware.* |
| | Red blinking | Configuration invalid | Specific parameters of the transmitted configuration are not supported, for example the bitrate |
| | Red on | No valid firmware* | |
| Power | Green on | Supply voltage present | |
| Error | No function | | |

* See also 6 *Firmware Update* on page 16.

4 Optional Hardware Settings

Two settings for special cases can be defined on the circuit board of the PCAN-MicroMod FD Digital 1/2:

- Several MicroMod-FD-based devices are to be configured on the same bus:
4.1 *Set Device ID* below
- The PCAN-MicroMod FD Digital 1/2 is to be used on one end of a CAN bus that is not fully terminated (for example, when two CAN nodes are connected directly):
4.2 *Activate Internal CAN Bus Termination* on page 13

4.1 Set Device ID

If you use several devices with PCAN-MicroMod FD on a single CAN bus and want to configure them there, a unique device ID must be assigned to each PCAN-MicroMod FD, so the configuration program can distinguish the modules. This is done by a rotary switch with 16 positions (0 to F, hexadecimal) on the board.

The device ID of a PCAN-MicroMod FD does not have an effect on the CAN communication.



Note: On a can bus, up to 16 PCAN-MicroMod FD can be configured. The operation of more than 16 modules is possible, as long as you do not want to configure them on that bus.

To open the casing and remove the circuit board:

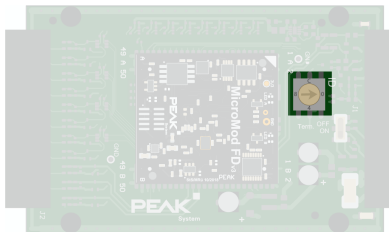


Attention! Electrostatic discharge (ESD) can damage or destroy components on the circuit board. Take precautions to avoid ESD when handling the circuit board.

1. Remove the mating connectors from the device.
2. On one connection side of the casing, remove the two screws to the right and left of the connector and remove the plate including the rubber sleeve.
3. Pull the board out of the side of the casing.
4. For later assembly, proceed in reverse order.

Do the following to set the device ID:

1. Set the rotary switch next to the 10-pole connector J1 to the desired device ID (0 to 15, with positions A to F corresponding to numbers 10 to 15).



Note: A changed device ID only takes effect after the PCAN-MicroMod FD Digital 1/2 has been restarted.

4.2 Activate Internal CAN Bus Termination

For correct termination of a High-speed CAN bus (ISO 11898-2), a 120-ohm resistor must be inserted at both bus ends between the CAN-High and CAN-Low lines. If the PCAN-MicroMod FD Digital 1/2 is to be connected to one end of the High-speed CAN bus, the internal termination can be activated to take the termination on this side of the CAN bus. This is done with a switch on the board. For this you have to remove it from the casing.



Tip: We recommend terminating the CAN cabling directly, for example with termination resistors. This allows CAN nodes to be flexibly connected to the bus.

To open the casing and remove the circuit board:

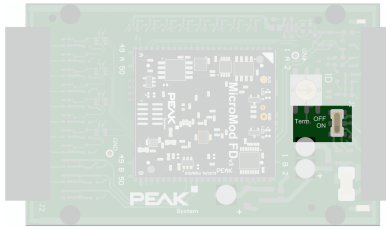


Attention! Electrostatic discharge (ESD) can damage or destroy components on the circuit board. Take precautions to avoid ESD when handling the circuit board.

1. Remove the mating connectors from the device.
2. On one connection side of the casing, remove the two screws to the right and left of the connector and remove the plate including the rubber sleeve.
3. Pull the board out of the side of the casing.
4. For later assembly, proceed in reverse order.

Do the following to activate the internal termination:

1. Set the slide switch next to the 10-pole connector J1 to the “ON” position.



5 Configuration Software

With the enclosed configuration software PCAN-MicroMod FD Configuration for Windows, you can create, edit, and then transmit configurations via CAN to one or more CAN nodes with PCAN-MicroMod FD (for example the PCAN-MicroMod FD Digital 1/2).

5.1 Prerequisites for the Configuration Transfer

- Windows 10, 8.1, 7 (32/64-bit)
- PC-CAN interface from PEAK-System, e.g. PCAN-USB FD
- CAN bus connection between the CAN node with PCAN-MicroMod FD and the PC-CAN interface

5.2 Installing the Configuration Program

The installation program for PCAN-MicroMod FD Configuration is located on the supplied storage medium.

Steps of the software installation:

1. Start the navigation program `Intro.exe` (on the storage medium).
2. Klick on *English > Tools*.
3. In the list, scroll to the entry *PCAN-MicroMod FD Configuration*. Klick on *Install* there.
4. Follow the instructions of the installation program.

You can find further information about the use of the program PCAN-MicroMod FD Configuration in the help which you can invoke in the program (for example with the F1 key).

6 Firmware Update

The PCAN-MicroMod FD Digital 1/2 can receive a firmware update via CAN. This is done with the Windows program PCAN-Flash, located on the supplied storage medium.

Go through the following sections for a firmware update.

6.1 System Requirements

- Operating system Windows 10, 8.1, 7 (32/64-bit)
- PC-CAN interface from PEAK-System
- CAN cabling between the PC-CAN interface and the PCAN-MicroMod FD Digital 1/2 with proper termination (120 Ω on each end of the CAN bus).

6.2 Preparing the Software

PCAN-Flash is used for the transfer of the firmware via CAN. It is located on the supplied storage medium in the following directory:

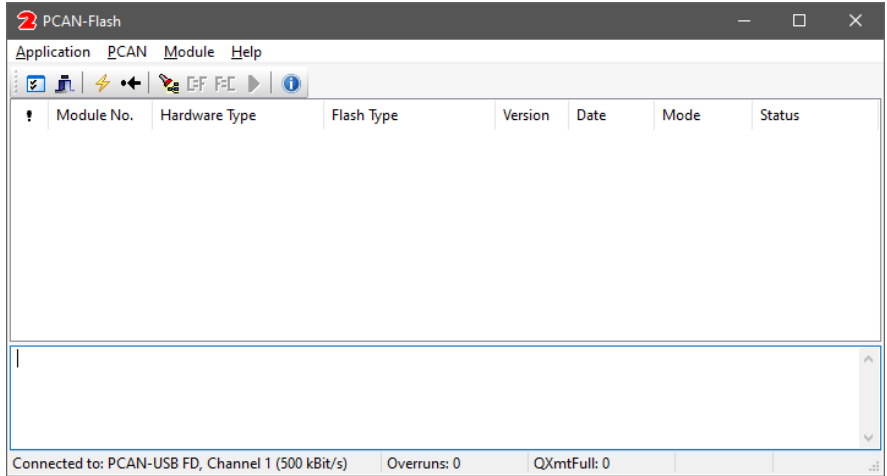
```
\Tools\PCAN-Flash
```


Copy the directory onto a storage medium of your computer.

6.3 Sending the Firmware

Do the following to update the firmware:

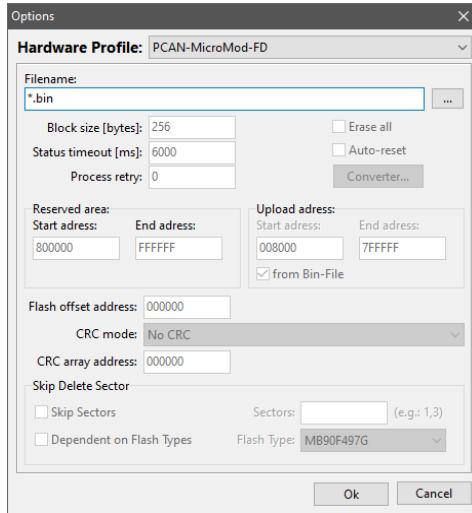
1. Start the program `PcanFlash.exe`.



2. Select *Application* > *Option* .

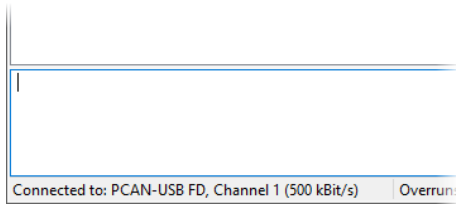
The corresponding dialog window appears.

3. From the *Hardware Profile* dropdown list, select the *PCAN-MicroMod FD* entry.

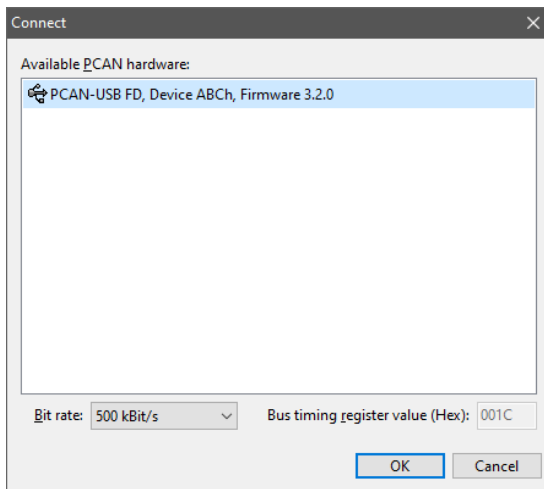



4. Click on dots button (...) next to the *File name* field in order to select the desired firmware file (*.bin) for the update.
5. Close the dialog box with *Ok*.

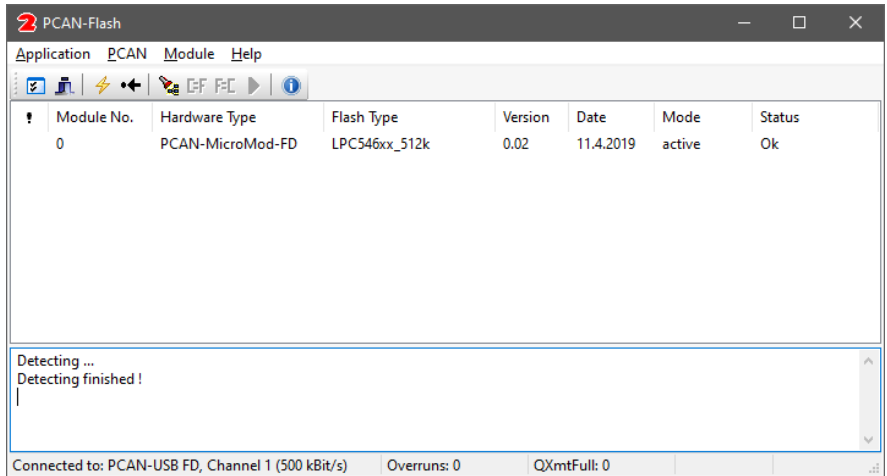
6. Make sure that the PCAN-Flash program is connected with 500 kbit/s to the available CAN interface at the computer.




If not, select *PCAN* > *Connect* ⚡ in order to change the selection in the according dialog box.




7. Select *Module > Detect*  in order to detect the PCAN-MicroMod FD being connected to the CAN bus. The main window shows a corresponding entry.



8. Select the entry for the PCAN-MicroMod FD.
9. Select *Module > Activate*  in order to activate the flash mode of the PCAN-MicroMod FD Digital 1/2.

The *Activity* blinks quickly orange and indicates that the flash mode for CAN is active.

10. Select *Module > Program*  in order to start the update process.

It was successful if in the status panel the last message to appear is "Flashing of module(s) finished!".

11. Restart the PCAN-MicroMod FD Digital 1/2 by briefly interrupting the power supply.

6.4 Activate Flash Mode by Hardware

If the PCAN-MicroMod FD Digital 1/2 cannot be set to flash mode by PCAN-Flash, this can be alternatively done by hardware:

1. Disconnect the left 10-pin mating connector for the basic supply.
2. Make a connection between pin 1 *Ub* and pin 7 *Boot* at the mating connector.
3. Reconnect the mating connector to the PCAN-MicroMod FD Digital 1/2 and thus also reconnect the power supply.

The *Activity* LED blinks quickly orange and indicates that the flash mode for CAN is active.

7 Technical Specifications

Digital inputs

| | |
|--------------------------------|---|
| Count | 8 |
| Connectors | DIn_0 ... DIn_7 |
| Input voltage maximum | +50 V |
| Input impedance | 69 kΩ (without Pull-up or Pull-down) |
| Input circuitry | Set per input by configuration: - Open - Pull-up: 4.7 kΩ to supply voltage - Pull-down: 4.7 kΩ to ground |
| Switching threshold Low → High | > 5.8 V typ. (4.5 V – 7.5 V) |
| Switching threshold High → Low | < 3.5 V typ. (2.2 V – 4.5 V) |
| Low-pass | $f_g = 3 \text{ kHz}$ |

Digital outputs

| | Digital 1 | Digital 2 |
|---|---|------------------------------|
| Count | 8 | 8 |
| Connectors | DOutL_0 ... DOutL_7 | DOutH_0 ... DOutH_7 |
| Type | Low-side switch | High-side switch |
| Driver chip | Infineon AUIPS2052G | STMicroelectronics VN800PS-E |
| Voltage maximum | 35 V on load | 36 V (input) |
| Output current nominal | 0.9 A | 0.7 A |
| Output current maximum (current limiting) | 1.2 A minimum 1.8 A typical 3.0 A maximum | 2.0 A |
| PWM mode | Frequency range 0 to 20 kHz PWM resolution determined by internal timer with 10 MHz (e.g. 0.1 % at 10 kHz) | |

Frequency outputs

| | |
|--|---|
| Count | 2 |
| Connectors | FOut_0 ... FOut_1 |
| Frequency maximum | 10 kHz |
| Type | Low-side switch |
| Driver chip | Infineon AUIPS2052G |
| Voltage maximum | 35 V on load |
| Output current nominal | 0.9 A |
| Output current maximum (current limiting) | 1.2 A minimum 1.8 A typical 3.0 A maximum |

CAN

| | | | |
|---|--|--------------------|----------------|
| Protocols | CAN FD ISO 11898-1:2015, CAN 2.0 A/B | | |
| Physical transmission | ISO 11989-2 (High-speed CAN) | | |
| Transceiver | Microchip MCP2558FD | | |
| CAN bitrates | 20 kbit/s – 1 Mbit/s | | |
| CAN FD bitrates | 20 kbit/s – 10 Mbit/s | | |
| Supported Clock frequencies | 20 MHz, 40 MHz, 80 MHz | | |
| Supported bit timing values | Prescaler (BRP) | Nominal 1 – 512 | Data 1 – 32 |
| | Time Segment 1 (TSEG1) | 1 – 256 | 1 – 32 |
| | Time Segment 2 (TSEG2) | 1 – 128 | 1 – 16 |
| | Synch. Jump Width (SJW) | 1 – 128 | 1 – 16 |
| Galvanic isolation | none | | |
| Termination | switchable on board (120 Ω between CAN-High and CAN-Low) | | |
| Voltage immunity | ±20 V | | |
| CAN ID reserved for confi- guration transfer | 7E7h | | |

CAN bootloader

| | |
|------------|--|
| Connection | Boot |
| Activation | High-active (switching threshold 1.7 V) during reset |

Serial RS-232 interface

| | |
|-------------------|------------------|
| Use | Currently no use |
| Connectors | UART_Rx, UART_Tx |
| Bit rates | max. 38,400 Baud |
| Signal level max. | ±15 V |

Power supply

| | |
|-------------------------|--|
| Operating voltage U_b | 8 – 30 V DC, 12 V nominal |
| Current consumption | max. 100 mA, typ. 45 mA at 12 V without load |

Measures

| | |
|-----------------|--|
| Casing measures | Without mating connectors: 87 x 58 x 28 mm |
| | With mating connectors: 121 x 58 x 28 mm |
| | See also Appendix B <i>Dimension Drawings</i> on page 27 |
| Weight | Without mating connectors: 115 g |
| | With mating connectors: 135 g |

Connectors

| | |
|--|---|
| Type | Spring terminal blocks |
| Mating connector for basic connectivity (left) | Phoenix Contact FMC 1,5/10-ST-3,81 (10-pole, single-row, 3.81 mm pitch) |
| Mating connector for I/O (right) | Phoenix Contact DFMC 1,5/11-ST-3,5 (22-pole, double-row, 3.5 mm pitch) |

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 |

Conformity

| | |
|--------|--|
| EMC | EU directive 2014/30/EU DIN EN 61326-1:2013-07 |
| RoHS 2 | Directive 2011/65/EU DIN EN 50581 VDE 0042-12:2013-02 |

Appendix A CE Certificate

EU Declaration of Conformity



This declaration applies to the following product:

Product name: PCAN-MicroMod FD Digital 1/2

Item number(s): IPEH-003083/84

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

CE 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, 12 December 2019

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

Uwe Wilhelm, Managing Director

Appendix B Dimension Drawings

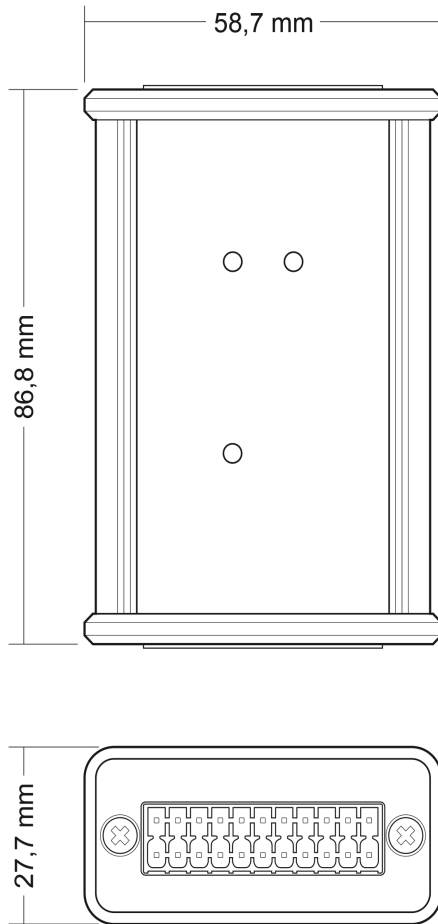


Figure 5: Dimension drawing with top view and side view.
The scale of the drawings differs from an 1-to-1 representation.