Anybus® CompactCom™ M30

# HARDWARE DESIGN GUIDE

HMSI-168-31 4.2 en-US ENGLISH

Connecting Devices™

# Important User Information

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# 1 Preface

## 1.1 About this Document

This document is intended to provide a good understanding of the mechanical and electrical properties of the Anybus CompactCom platform. It does not cover any of the network specific features offered by the Anybus CompactCom 30 products; this information is available in the appropriate Network Guide.

The reader of this document is expected to be familiar with hardware design and communication systems in general. For additional information, documentation, support etc., please visit the support website at www.anybus.com/support.

## 1.2 Related Documents

| Document | Author | Document ID |
|---|---|---|
| Anybus CompactCom 30 Software Design Guide | HMS | |
| Anybus CompactCom B30 Design Guide | HMS | |
| Anybus CompactCom Host Application Implementation Guide | HMS | HMSI-27-334 |
| Anybus CompactCom Network Guides (separate document for each supported fieldbus or network system) | HMS | |
| Low-Cost, Low-Power Level Shifting in Mixed-Voltage (5V, 3.3V) Systems (SCBA002A) | Texas Instruments | |
| LT1767 Data Sheet | Linear Technology | |
| EN 60950 | IEC | |
| EN 61000 | IEC | |
| EN 55011 | IEC | |

## 1.3 Document history

| Version | Date | Description |
|---|---|---|
| 1.00 - 3.10 | | See earlier versions |
| 4.0 | 2017-12-21 | Moved from FM to XML<br>Misc. updates |
| 4.1 | 2019-03-01 | Rebranded<br>Updated UL information |
| 4.2 | 2019-06-25 | Updated disclaimer<br>Updated footprint and host connector sections |

## 1.4 Document Conventions

Numbered lists indicate tasks that should be carried out in sequence:

1. First do this
2. Then do this

Bulleted lists are used for:

- Tasks that can be carried out in any order
- Itemized information

► An action

→ and a result

**User interaction elements** (buttons etc.) are indicated with bold text.

```
Program code and script examples
```

Cross-reference within this document: *Document Conventions, p. 4*

External link (URL): www.hms-networks.com

> **WARNING**
> Instruction that must be followed to avoid a risk of death or serious injury.

> **Caution**
> Instruction that must be followed to avoid a risk of personal injury.

> **!** Instruction that must be followed to avoid a risk of reduced functionality and/or damage to the equipment, or to avoid a network security risk.

> *Additional information which may facilitate installation and/or operation.*

## 1.5 Document Specific Conventions

- The terms "Anybus" or "module" refers to the Anybus CompactCom module.
- The terms "host" or "host application" refer to the device that hosts the Anybus.
- Hexadecimal values are written in the format NNNNh or 0xNNNN, where NNNN is the hexadecimal value.
- A byte always consists of 8 bits.
- All dimensions in this document have a tolerance of ±0.20mm unless otherwise stated.
- Outputs are TTL compliant unless otherwise stated.
- Signals which are "pulled to GND" are connected to GND via a resistor.
- Signals which are "pulled to 3V3" are connected to 3V3 via a resistor.
- Signals which are "tied to GND" are directly connect GND,
- Signals which are "tied to 3V3" are directly connected to 3V3.

## 1.6 Trademarks

- Anybus® is a registered trademark of HMS Industrial Networks.
- EtherNet/IP is a trademark of ODVA, Inc.
- DeviceNet is a trademark of ODVA, Inc.
- EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

All other trademarks are the property of their respective holders.

# 2 Introduction

## 2.1 General Description

All Anybus CompactCom module implementations share the same footprint and electrical interface, allowing the host application to support all major networking systems using the same hardware platform. In the same way all Anybus CompactCom B30 share footprint and electrical interface. This document describes the hardware details of the Anybus CompactCom M30 modules, both with and without housing. Please consult the Anybus CompactCom B30 Design Guide for specific information about the Anybus CompactCom B30 brick solution.

> **!** This a class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.
>
> This product contains ESD (Electrostatic Discharge) sensitive parts that may be damaged if ESD control procedures are not followed. Static control precautions are required when handling the product. Failure to observe this may cause damage to the product.

## 2.2 Features

- Integrated protocol stack handling (where applicable)
- Galvanically isolated network interface (where applicable)
- On-board network status indications according to each network standard (where applicable)
- On-board network connectors according to each network standard
- Compact size (52 x 50 mm, 2” x 1.97”)
- Firmware upgradable (FLASH technology)
- 3.3 V design
- Low power consumption
- Parallel & serial interface modes
- Precompliance tested for network conformance (where applicable). Not finalized. All Anybus CompactCom versions will be precertified for network conformance. While this is done to ensure that the final product *can* be certified, it does not necessarily mean that the final product does not require recertification. Contact HMS for further information.
- Precompliance tested for CE & UL.
- Version with M12 connector available for PROFINET (2-port), EtherNet/IP (2-port), ModbusTCP (2-port), PROFIBUS DP-V1, EtherCAT, and DeviceNet
- Support for functional safety communication (PROFINET 2-port)

## 2.3 Passive vs. Active

The Anybus CompactCom 30 product family features two types of communication modules:

| | |
|---|---|
| **Active CompactCom Modules** | An active module integrates the complete network functionality (i.e. the protocol stack and the physical interface) in the same package in order to provide network data exchange in an uniform manner. |
| **Passive CompactCom Modules** | A passive module uses a subset of the host interface signals, and generally operates on the physical level of a serial signal (i.e. RS-232, RS-485 etc.), or enables serial data exchange on another medium/protocol such as USB or Ethernet (serial server). |

Both types of modules can be supported in the host application by implementing the proper host interface signals. For more information, see *Module Compatibility, p. 23*.

## 2.4 M12 Connector

A number of the Anybus CompactCom M30 modules are available with M12 connectors instead of the usual network connector.

The M12 connector gives the opportunity to raise the IP rating of a product up to IP67. However, the standard Anybus CompactCom housing does not qualify for IP ratings above IP20. If a higher rating is needed, careful design of housings and/or module fronts is necessary. It is then recommended to use the Anybus CompactCom M30 without housing, and design a new housing/front that fulfills the requirements for IP67.

# 3 Host Interface

This chapter describes the low level properties of the Anybus CompactCom interface

## 3.1 Overview

The Anybus CompactCom has two different host communication interfaces, corresponding to different operating modes. The figure below illustrates the basic properties of these interfaces as well as various I/O and control signals, and how they relate to the host application.

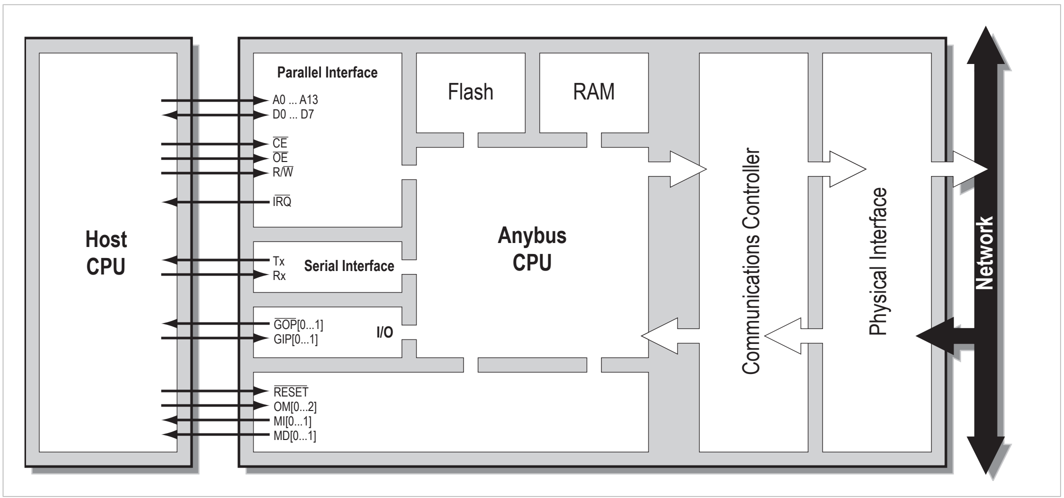



**Fig. 1**

Please note that only one communication interface at a time is available. Which one is decided at startup.

### 3.1.1 Parallel Interface

From an external point of view, the parallel interface is a common 8-bit parallel slave port interface, which can easily be incorporated into any microprocessor based system that has an external address/data bus. Generally, implementing this type of interface is comparable to implementing an 8-bit or 16-bit wide SRAM. Additionally, the parallel interface features an interrupt request line, allowing the host application to service the module only when actually needed.

### 3.1.2 Serial Interface (UART)

Compared to the serial interface, the parallel interface generally offers much higher performance. However, in some applications this solution may be impractical, e.g. when the host CPU doesn't have an external address/data bus etc. In such cases, the serial interface provides a simple way of interfacing the module via a common asynchronous serial interface.

## 3.2 Connector

The Anybus CompactCom uses a 50–pin CompactFlash™ style connector. The pinning is seen from the host application side of the CompactCom module

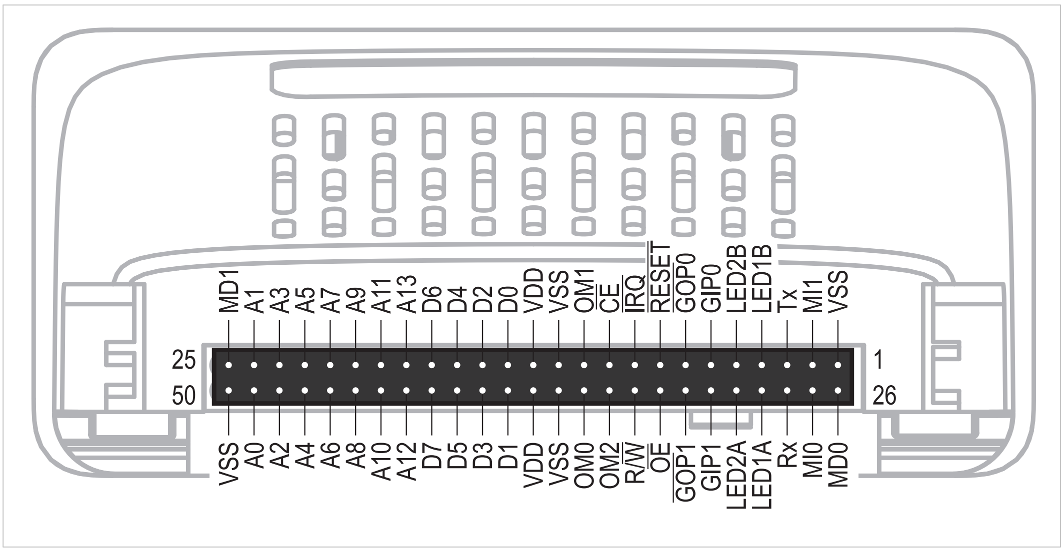



**Fig. 2**

See *.Host Interface Signals, p. 10* for information on how each pin is used in the different modes.

> **!** The host interface is not pin compatible with the CompactFlash™ standard. Also, prior to exchanging a module, power should be turned off or the MD (module detection signals should be used to shut down communication and power when the module is removed. Failure to observe this may cause damage to the host product and/or the Anybus CompactCom module.

| Pin type | Definition |
|---|---|
| I | Input, CMOS (3.3 V) |
| O | Output, CMOS (3.3 V) |
| BI | Bidirectional, Tristate |
| PWR | Power supply inputs |
| NC | Not connected |

*None of the host interface signals are 5 V tolerant.*

## 3.3 Host Interface Signals

Each signal presented in the tables below is described in detail later in this document.

Also note that the passive CompactCom modules use a limited number of the host interface signals.

For mechanical properties, dimensions, etc. see *Mechanical Specification, p. 30*.

For electrical characteristics, see *Electrical Characteristics, p. 42*.

### 3.3.1 Active Modules

| Position | Signal | Type | Function |
|---|---|---|---|
| 36, 11, 35 | OM[0...2] | I | Operating Mode |
| 27, 2 | MI[0...1] | O | Module Identification |
| 8 | $\overline{\text{RESET}}$ | I | Reset Input, active low |
| 26, 25 | MD[0...1] | O | Module Detection |
| 14, 39, 15, 40, 16, 41, 17, 42 | D[0...7] | BI | Parallel Interface<br>Please note that when the serial interface is used by the Anybus CompactCom 30 module, signals A12 and A13 can be used for functional safety communication (Anybus CompactCom 30 PROFINET 2-Port module only). For more information, see *Safety Serial Interface (PROFINET 2–port only), p. 14*. |
| 49, 24, 48, 23, 47, 22, 46, 21, 45, 20, 44, 19, 43, 18 | A[0...13] | I | |
| 10 | $\overline{\text{CE}}$ | I | |
| 33 | $\overline{\text{OE}}$ | I | |
| 34 | R/$\overline{\text{W}}$ | I | |
| 9 | $\overline{\text{IRQ}}$ | O | |
| 28 | Rx | I | Serial Interface |
| 3 | Tx | O | |
| 30 | LED2A | O | Network Status LED Outputs |
| 29 | LED1A | O | |
| 5 | LED2B | O | |
| 4 | LED1B | O | |
| 6, 31 | GIP[0...1] | I | General Purpose I/O |
| 7, 32 | $\overline{\text{GOP[0...1]}}$ | O | |
| 13, 38 | VDD | PWR | Power Supply |
| 1, 12, 37, 50 | VSS | PWR | Ground |

### 3.3.2 Passive Modules

| Position | Signal | Type | Function |
|---|---|---|---|
| 27, 2 | MI[0...1] | O | Module Identification |
| 8 | $\overline{RESET}$ | I | Reset Input, active low |
| 26, 25 | MD[0...1] | O | Module Detection |
| 14, 39, 15, 40, 16, 41, 17, 42 | D[0...7] | BI | Parallel Interface<br>The type of a passive module can be identified from host interface signals D0-D7 (on the parallel interface) if $\overline{CE}$ (10) and $\overline{OE}$ (33) are set to low and R/$\overline{W}$ (34) to high, see also "Network Identification" on page 21. |
| 10 | CE | I | |
| 34 | R/$\overline{W}$ | I | |
| 33 | $\overline{OE}$ | I | |
| 28 | Rx | I | Serial Interface |
| 3 | Tx | O | |
| 30 | LED2A | O | Network Status LED Outputs |
| 29 | LED1A | O | |
| 5 | LED2B | O | |
| 4 | LED1B | O | |
| 6 | GIP[0...1] | I | General Purpose I/O |
| 7 | $\overline{GOP[0...1]}$ | O | |
| 13, 38 | VDD | PWR | Power Supply |
| 1, 12, 37, 50 | VSS | PWR | Ground |
| 9, 11, 18, 19, 20, 21, 22, 23, 24, 31, 32, 35, 36, 43, 44, 45, 46, 47, 48, 49 | - | NC | (not used) |

# 3.4 Signal Descriptions

## 3.4.1 OM[0...2] (Operating Mode)

On active modules, these inputs select which interface that should be used to exchange data (parallel or serial) and, if the serial interface option is used, the operating baud rate. The state of these signals is sampled once during startup, i.e. any changes requires a reset in order to have effect.

*The state of these signals must be stable prior to releasing the RESET signal. Failure to observe this may result in faulty or unexpected behavior.*

| **Setting** | | | **Operating Mode** | |
|---|---|---|---|---|
| **OM2** | **OM1** | **OM0** | **Parallel interface State** | **Serial interface State** |
| LOW | LOW | LOW | Enabled | (disabled, se note below) |
| LOW | LOW | HIGH | (disabled, see note below) | Enabled, baud rate: 19.2 kbps |
| LOW | HIGH | LOW | | Enabled, baud rate: 57.6 kbps |
| LOW | HIGH | HIGH | | Enabled, baud rate: 115.2 kbps |
| HIGH | LOW | LOW | | Enabled, baud rate: 625 kbps |
| HIGH | LOW | HIGH | (reserved) | |
| HIGH | HIGH | LOW | | |
| HIGH | HIGH | HIGH | Service mode | |

LOW = $V_{IL}$

HIGH = $V_{IH}$

For more information regarding the parallel and serial interfaces, see *Parallel Interface Operation, p. 16* and *Serial Interface Operation, p. 21*.

These signals have no effect on passive modules; instead the communication settings are determined by other network specific factors. Furthermore, a subset of the parallel interface signals are used for network identification purposes, see *Additional Address Lines (A[11...13]), p. 23*.

## 3.4.2 MI[0...1] (Module Identification)

These signals indicate which type of module that is connected. It is recommended to check the state of these signals before accessing the module.

| **State** | | **Module Type** |
|---|---|---|
| **MI0** | **MI1** | |
| LOW | LOW | Anybus CompactCom (Active module) |
| HIGH | LOW | Anybus CompactCom (Passive module) |
| LOW | HIGH | (reserved) |
| HIGH | HIGH | |

LOW = $V_{OL}$

HIGH = $V_{OH}$

### 3.4.3 RESET (Reset Input)

The reset input is active low. It must be connected to a host application controllable output pin in order to handle the power up sequence, voltage deviations and to be able to support network reset requests.

The module does not feature any internal reset regulation. To establish a reliable interface, the host application is solely responsible for resetting the module when the supply voltage is outside the specified range. If this requirement is not fulfilled, a power brown-out (a drop in voltage) may cause unwanted side-effects such as data loss in nonvolatile memory etc.

There is no Schmitt trigger circuitry on this input, which means that the module requires a fast rise time of the reset signal, preferably equal to the slew rate of typical logical circuits. A simple RC circuit is for example not sufficient to guarantee stable operation, as the slew rate from logic 0 to logic 1 is too slow.

> **!** The rise time of the reset signal should be as fast as possible, and must not exceed 30 ns. The signal is not under any circumstances allowed to be left floating. Use a pull-down to prevent this.

The following requirements must be met by the reset regulator connected to the reset input signal.

**Power Up**

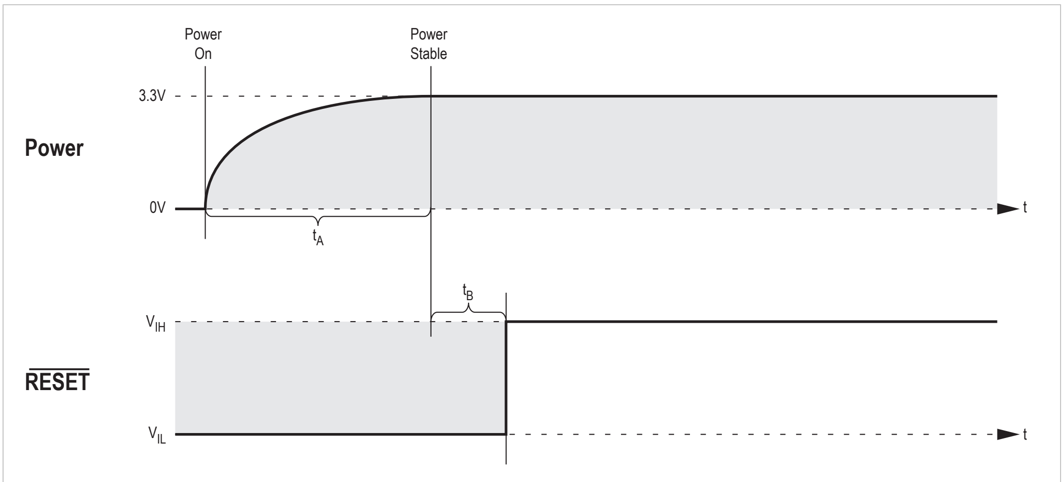



**Fig. 3**

Power up time limits are given in the table below:

| Symbol | Min. | Max. | Definition |
|---|---|---|---|
| $t_A$ | - | 50 ms | Power supply rise time (0.1 VCC to 0.9 VCC). |
| $t_B$ | 100ms | - | Safety margin. |

**Restart**

The reset pulse duration must be at least 100 µs in order for the Anybus CompactCom M30 to properly recognize a reset.

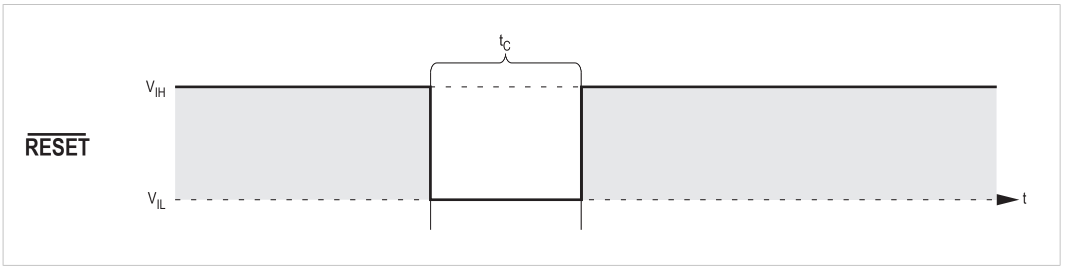



**Fig. 4**

| Symbol | Min. | Max. | Definition |
|---|---|---|---|
| $t_C$ | 100 µs | - | Reset pulse width. |

## 3.4.4 Parallel Interface

For a description of the parallel interface signals, see *Parallel Interface Operation, p. 16*.

## 3.4.5 Serial Interface

For a description of the serial interface signals, see *Serial Interface Operation, p. 21*.

## 3.4.6 Safety Serial Interface (PROFINET 2–port only)

If the parallel interface is used for the host application, the serial interface can be used for functional safety communication, using an add on safety module. If the host application uses the serial interface, an extra serial channel, only for functional safety communication, will be used:

| Position | Signal | Type | Function |
|---|---|---|---|
| 43 | ASM_Rx | I | Functional safety communication. If a Safety Module is connected, these signals must not be tied to VDD. |
| 18 | ASM_Tx | O | |

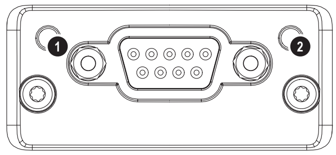
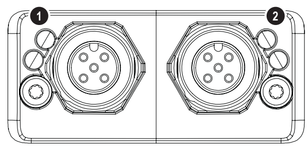
Functional safety communication is only available for Anybus CompactCom 30 PROFINET 2-port. For more information, see the Anybus CompactCom 30 PROFINET 2-port Network Guide.

### 3.4.7 Network Status LED Outputs

In some applications, the module may be mounted in a fashion that does not enable the user to see the on-board network indication LEDs. The LED[1A....2B] outputs are directly connected to the internal CPU and the on-board LEDs, and can be used to relay the network status indications to elsewhere on the host application.

Note that these outputs are unbuffered and thus not capable of driving LEDs directly. If unused, leave them unconnected.

The placement and the numbering of the LEDs in the picture are given as an example. Please refer to the network guides for each specific module.

| Led # | Corresponding Signals | Front View | |
|---|---|---|---|
| 1 | LED1A | Fieldbus connector   | M12 connectors   |
| | LED1B | | |
| 2 | LED2A | | |
| | LED2B | | |

See also *Network Status LED outputs (LED[1A...2B]), p. 24*.

### 3.4.8 General Purpose I/O

See *General Purpose I/O, p. 22*.

# 4 Parallel Interface Operation

## 4.1 General Information

Passive and active modules behave slightly differently concerning the parallel interface:

| | |
|---|---|
| **Active Modules** | On active modules, the parallel interface is based on an asynchronous dual port memory architecture, allowing the Anybus module to be interfaced directly as a memory mapped peripheral.<br>For increased efficiency, an optional interrupt request signal ($\overline{\text{IRQ}}$) allows the host application to service the Anybus module only when necessary. Polled operation is also possible, albeit at the cost of a slightly overhead.<br>On active modules, the parallel interface must be enabled using OM[0... 2].<br>See also *OM[0...2] (Operating Mode), p. 12* |
| **Passive Modules** | The passive modules use a subset of the parallel interface signals to provide means of network identification. Unlike active modules, it is not necessary to activate this functionality using OM[0... 2]. The serial interface remains enabled and is used as the main channel of communication.<br>See also *Network Identification, p. 20* |

See also *Module Compatibility, p. 23*.

> **!** The parallel interface does not support sequential or nonsequential burst access methods.

## 4.2 Parallel Interface Signals

The parallel interface uses the following signals:

| Signal | Description | Notes |
|---|---|---|
| A[0...10] | Mandatory address input signals.<br>Selects source/target location in shared memory. | Tie to VSS when unused |
| A[11...13] | Additional address input signals (optional)<br>(See *Additional Address Lines (A[11...13]), p. 23*) | Please note that if a Safety Module is connected, these signals must not be tied to VDD.<br>Tie to VDD when unused |
| D[0...7] | Bidirectional data bus. Target location is specified by A[0...13] | Tie to VSS when unused |
| CE | Bus chip enable; enables parallel access to the module when low. | A[0...13] must be stable while $\overline{\text{CE}}$ is active.<br>Tie to VDD when unused |
| R/W | Bus read/write; enables input on D[0...7] when low. | Tie to VDD when unused |
| OE | Bus output enable; enables output on D[0...7] when low. | Tie to VDD when unused |
| IRQ | Active low Interrupt Request signal. Asserted by the Anybus module, and de-asserted (i.e. acknowledged) by the host application by reading the Status Register (3FFFh). Please note that due to technical reasons, the module may acknowledge interrupts even if $\overline{\text{OE}}$ has not been asserted, if this address (3FFFh) is present on the bus while $\overline{\text{CE}}$ is active.<br>The use of this signal is optional though highly recommended. Even if the host application lacks interrupt capabilities, it is recommended to connect this signal to an input port to simplify software design.<br>This signal must be pulled to VDD on the host application side to prevent spurious interrupts during startup. | Leave unconnected if unused |

There are no internal pullup resistors on any of the signals above.

It is important to connect the serial interface signals correctly for proper functioning of the parallel interface. See *Serial Interface Signals, p. 21* for details.

## 4.3 Function Table (CE, R/W, OE, D[0...7])

| $\overline{\text{CE}}$ | R/$\overline{\text{W}}$ | $\overline{\text{OE}}$ | D[0...7] State | Comment |
|---|---|---|---|---|
| HIGH | X | X | High impedance | Module not selected. |
| LOW | LOW | X | Data Input (Write) | Data on D[0...7] is written to shared memory. |
| LOW | HIGH | LOW | Data Output (Read) | Data from shared memory is available on D[0...7] |
| LOW | HIGH | HIGH | High impedance | Module is selected, but D[0...7] is in a high impedance state. |

X = Don’t care

LOW = $V_{IL}$

HIGH = $V_{IH}$

## 4.4 Timing Diagrams

- Timing depends on capacitive load. The figures in this section are valid for loads up to 25 pF.
- $\overline{\text{CE}}$ must be high at least 3 ns between two accesses. This is applicable in both Read and Write Cycle.

### 4.4.1 Read Access Timing

R/$\overline{\text{W}}$ = HIGH

| Symbol | Parameter | Min. | Max. | Unit |
|---|---|---|---|---|
| tAV | Address Valid After Chip Enable | - | 7 | ns |
| tAA | Address Access Time | - | 30 | |
| tACE | Chip Enable Access Time | - | 30 | |
| tAR | Read Access Time | - | 15 | |
| tAH | Address Hold Time | 0 | - | |
| tLZ | Output Low-Z Time | 0 | - | |
| tHZ | Output High-Z Time | - | 15 | |

- tAR: Start of valid data depends on which timing becomes effective last; tAR, tACE or tAA
- tLZ: Timing depends on which signal is asserted last, $\overline{\text{OE}}$ or $\overline{\text{CE}}$
- tHZ Timing depends on which signal is de-asserted first, $\overline{\text{OE}}$ or $\overline{\text{CE}}$

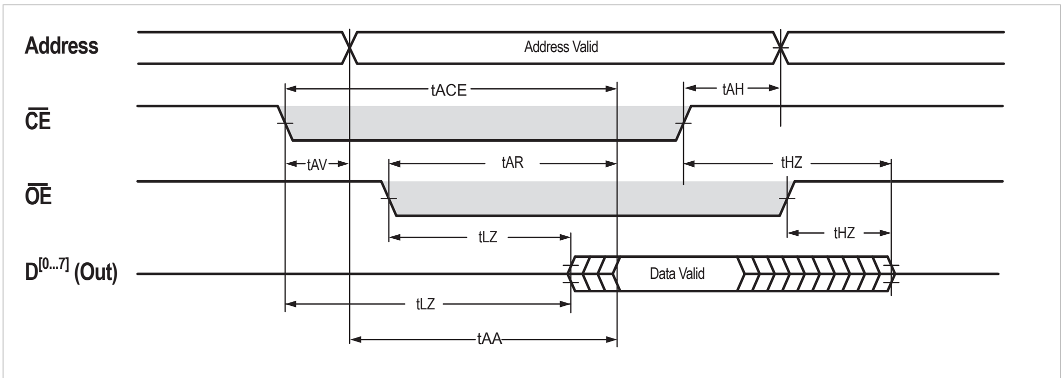



**Fig. 5**

## 4.4.2 Write Access Timing

| Symbol | Parameter | Min. | Max. | Unit |
|---|---|---|---|---|
| tWC | Write Cycle Time | 30 | - | ns |
| tSW | Chip Enable to End-of-Write | 25 | - | |
| tAW | Address Valid to End-of-Write | 25 | - | |
| tAS | Address Set-up Time | 0 | - | |
| tWP | Write Pulse Width | 25 | - | |
| tAH | Address Hold Time | 0 | | |
| tAV | Address Valid After Chip Enable | - | 7 | |
| tDW | Data Valid to End-of-Write | 15 | - | |
| tDH | Data Hold Time | 0 | - | |

- tAS: Timing depends on which enable signal ($\overline{CE}$ or R/$\overline{W}$) is asserted last
- tWP: A write occurs during the overlap (tSW or tWP) of $\overline{CE}$ = LOW and R/$\overline{W}$ = LOW

*Timing depends on capacitive load. The figures in this section are valid for loads up to 25 pF.*

**Write Cycle (R/W controlled timing)**

$\overline{OE}$ = Don't care

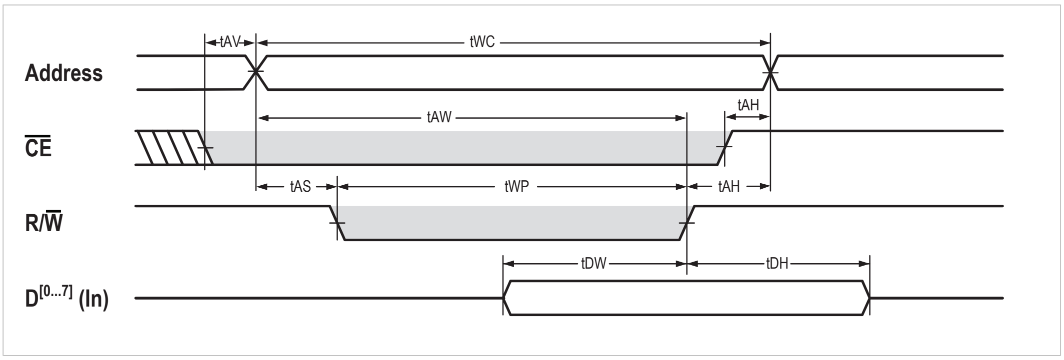



**Fig. 6**

**Write Cycle (CE controlled timing)**

$\overline{OE}$ = HIGH

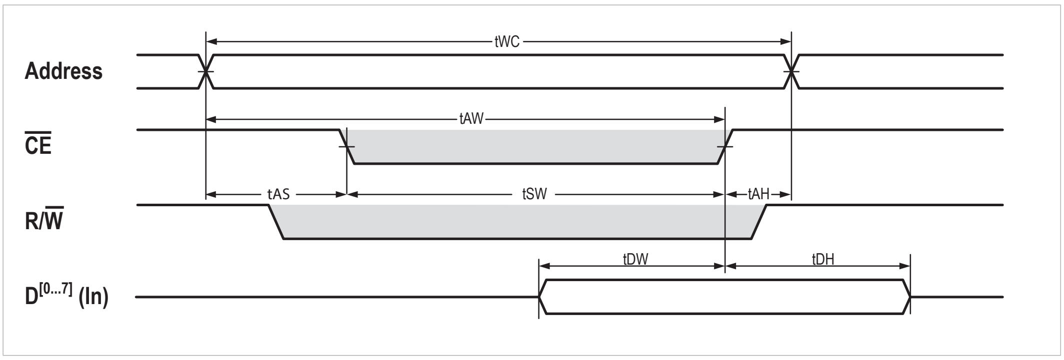



**Fig. 7**

## 4.5 Network Identification

As mentioned previously, the host application can detect the module type by examining the state of the MI[0...1] signals. On passive modules, the network type can then be established by reading a byte in the range 3800h... 38FFh. In case of active modules, the network type is retrieved by means of the host interface protocol (consult the Anybus CompactCom Software Design Guide for further information).

The type of a passive module can also be identified from host interface signals D0-D7 (on the parallel interface) if CE (10) and OE (33) are set to low and R/W (34) to high.

In case the host application for some reason cannot use the MI[0...1] signals, it is still possible to retrieve the module and network type as follows:

1. Release $\overline{\text{RESET}}$
2. Wait at least 1–5 s (if only using passive modules, skip this step)

   This time correlates to the start-up procedure (Initial Handshake) described in the Anybus CompactCom Software Design Guide.
3. Read a byte in the range 3800h... 38FFh

The result obtained while reading from the range 3800h... 38FFh shall be interpreted as follows:

| Value | Module Type & Network |
|---|---|
| 00h | Active module (network type identified by means of the host communication protocol) |
| 01h | Passive module, RS232 |
| 02h | Passive module, RS422 |
| 03h | Passive module, USB |
| 04h | (reserved for future use) |
| 05h | Passive module, Bluetooth |
| 06h | (reserved for future use) |
| 07h | (reserved for future use) |
| 08h... 09h | (reserved for future use) |
| 0Ah | Passive module, RS485 |
| (0Bh... FFh) | (reserved for future use) |

See also...


- *Passive vs. Active, p. 7*
- *General Information, p. 16*
- *Module Compatibility, p. 23*

- Anybus CompactCom 30 Software Design Guide

# 5 Serial Interface Operation

## 5.1 General Description

The serial interface is a common asynchronous serial interface, which can easily be interfaced directly to a micro controller or UART (For connection examples etc., see *Interfacing to 5V Logic, p. 27*).

The serial interface is handled differently depending on which type of module that is used (active or passive), see below.

| | |
|---|---|
| **Active Modules** | On active modules, the serial interface is activated using the (OM[0...2]) inputs, which are also used to select the operating baud rate (see *OM[0...2] (Operating Mode), p. 12*).<br>Other communication settings are fixed to the following values:<br>Data bits: 8<br>Parity: None<br>Stop bits: 1 |
| **Passive Modules** | On passive modules, the serial interface is always active (regardless of the state of the OM[0...2] inputs), and the communication settings are determined by other factors (network specific). |

## 5.2 Serial Interface Signals

The serial interface option uses only two signals:

| Signal | Description | Notes |
|---|---|---|
| Tx | TTL-compliant asynchronous serial transmit output.<br>This signal must be pulled to VDD on the host application side. | Leave this signal unconnected when unused. |
| Rx | Asynchronous serial receive. (This input is *not* 5V tolerant)<br>This signal must be pulled to VDD on the host application side. | Tie this signal to VDD when unused. |

It is important to connect the parallel interface signals correctly for proper functioning of the serial interface. See *Parallel Interface Signals, p. 17* for details.

## 5.3 Baud Rate Accuracy

As with most asynchronous communication devices, the actual baud rate used on the Anybus CompactCom may differ slightly from the ideal baud rate.

The baud rate error of the Anybus module is less than ±1.5%. For proper operation, it is recommended that the baud rate accuracy in the host application lies within ±1.5% from the ideal value.

# 6 General Purpose I/O

## 6.1 General

The functionality of these signals is module type dependent. These signals have no dedicated function, but it is still generally recommended to connect these signals to discreet inputs/outputs in the host application to be prepared for future functionality.

| Signal | Description | Notes |
|---|---|---|
| GIP0 | General Input Port 0 | Active high general purpose input ports. Preferably, connect these inputs to discreet outputs in the host application.<br>These signals should be pulled to VSS on the host application.<br>These ports can be used as outputs when extended LED functionality is enabled, see below.<br>Tie to VSS if unused. |
| GIP1 | General Input Port 1 | |
| GOP0 | General Output Port 0 | Active low general purpose output ports. Preferably, connect these outputs to interrupt capable inputs on the host application.<br>These signals should be pulled to VDD on the host application.<br>If unused, leave these signals unconnected. |
| GOP1 | General Output Port 1 | |

## 6.2 Functional Description

As mentioned previously, the function of these signals is different depending on module type. Please check the Implementation Details section in the network appendix for each module for more information.

### 6.2.1 Active Modules

At the time of writing, some active modules use these signals. For example, the General Purpose IO signals can, together with the LED[1A....2B] outputs, for some networks be used for extended LED functionality. However it is strongly recommended to implement the signals in the host application in order to be prepared for future functionality, whether or not they are used at the time being. Please consult the network appendices for more information.

### 6.2.2 Passive Modules

The following functionality has been defined for these signals when using passive modules:

| Signal | Function | Notes |
|---|---|---|
| GIP0 | DE | Data Enable; enables data transmission on half duplex networks such as RS-485. |
| GIP1 | (reserved) | Preferably, connect this input to a discreet output in the host application. |
| $\overline{\text{GOP0}}$ | CA | Communication Active; indicates if the connected network is ready for communication. |
| $\overline{\text{GOP1}}$ | (reserved) | Preferably, connect this output to a discreet input in the host application. |

# A Implementation Guidelines

## A.1 Module Compatibility

### A.1.1 General

As mentioned previously, the Anybus CompactCom M30 product family holds two major types of communication modules called “Passive” and “Active”. Both types can be supported in the host application by implementing the proper host interface signals, see table below.

### A.1.2 Compatibility Chart

<table>
<tr><th colspan="3">Host Interface Implementation</th><th colspan="2">Compatibility</th></tr>
<tr><th>General Purpose I/O</th><th>Serial Interface</th><th>Parallel Interface</th><th>Active Modules</th><th>Passive Modules</th></tr>
<tr><td rowspan="3">Yes</td><td>Yes</td><td>Yes</td><td rowspan="3">Yes</td><td rowspan="2">Yes</td></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td>No</td><td>Yes</td><td rowspan="4">No</td></tr>
<tr><td rowspan="3">No</td><td>Yes</td><td>Yes</td><td rowspan="3">(Yes)</td></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td>No</td><td>Yes</td></tr>
</table>

## A.2 Additional Address Lines (A[11...13])

At the time of writing, address lines 11-13 are unused. Future products may however utilize these extra address lines to accommodate a larger amount of high speed network I/O. To be able to take advantage of this future functionality, it is recommended to implement as many of the address lines as possible.

*Unused address lines must be tied to VDD in order to maintain software compatibility and keep the memory map intact, see table below. If a Safety Module is connected, A12 and A13 must not be tied to VDD, though.*

| Available Address Lines | Recommendation |
|---|---|
| 11 | Implement A[0...10]. Tie A[11...13] to VDD |
| 12 | Implement A[0...11]. Tie A[12...13] to VDD |
| 13 | Implement A[0...12]. Tie A[13] to VDD |
| 14 | Implement A[0...13] |

# A.3 Network Status LED outputs (LED[1A...2B])

## A.3.1 General

The LED[1A....2B] outputs can be used to relay the network status LEDs to elsewhere on the host application.

Note that it is the responsibility of the host application to ensure that each LED output is connected to a LED of the correct color (on active modules, it is possible to retrieve this information from the Anybus Object (01h); consult the general Anybus CompactCom Software Design Guide for more information).

An overview of the LED colors used are presented below. Most networks use the standard configuration, but there are a few exceptions.

<table>
<tr><th>Network</th><th>LED1A</th><th>LED1B</th><th>LED2A</th><th>LED2B</th></tr>
<tr><td>Standard configuration (Profibus DP-V1 and DP-V0, DeviceNet,CANopen, Ethernet Modbus-TCP, CC-Link etc.)</td><td>Green</td><td rowspan="2">Red</td><td rowspan="6">Green</td><td rowspan="2">Red</td></tr>
<tr><td>Modbus RTU</td><td>Yellow</td></tr>
<tr><td>RS232</td><td rowspan="4">-</td><td rowspan="4">-</td><td rowspan="4">-</td></tr>
<tr><td>RS422</td></tr>
<tr><td>RS485</td></tr>
<tr><td>USB</td></tr>
</table>

## A.3.2 Buffering

The outputs are unbuffered, and cannot drive LEDs directly. In this example, a LED is connected to one of the LED outputs of the Anybus module via an NPN transistor.

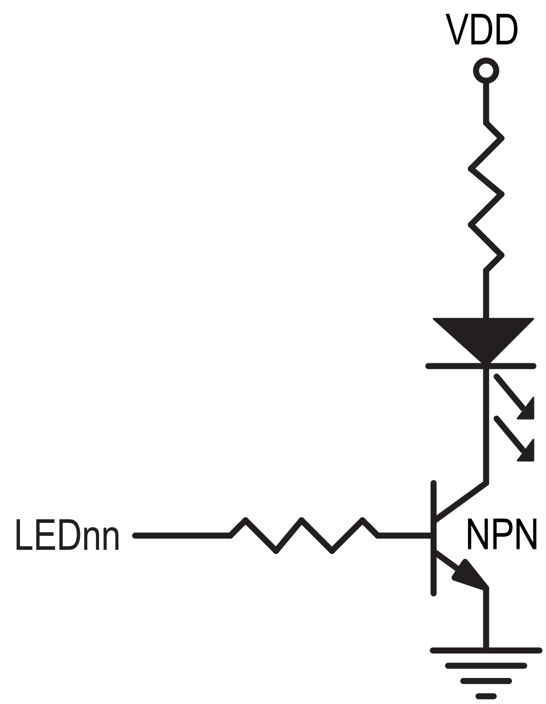



**Fig. 8**

*The LED[1A....2B] outputs can, together with the General Purpose IO signals, for some networks be used for extended LED functionality. Please consult the network appendices for more information.*

## A.4 Typical Implementation (3.3 V)

The example in the figure below shows a typical implementation with both parallel- and serial communications, allowing the host application to support passive modules as well as active modules in either serial or parallel mode.

Note that to increase readability, certain signals have intentionally been left out from this example.

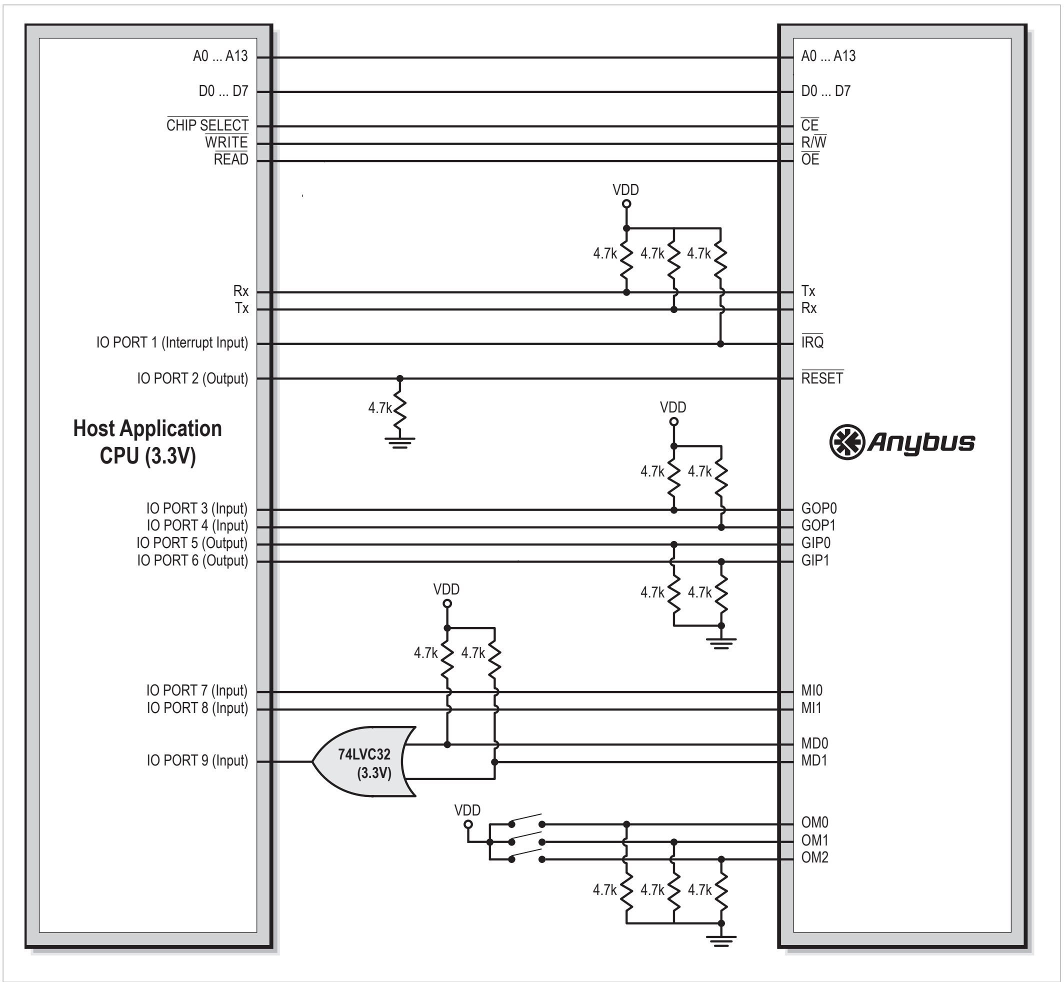



**Fig. 9**

*As with many common microcontrollers, the direction of the IO PORT pins on the CPU in this example is determined during power up; hence the pullup/pulldown resistors on the signals marked "IO PORT (OUTPUT) n".*

## A.5 Interfacing to 5V Logic

The Anybus CompactCom is not 5 V tolerant. This means that a level shifting circuit of some sort is required when interfacing the module in systems based on 5 V logic. To better understand the issues involved when designing mixed voltage systems, it is recommended to read “Low-Cost, Low-Power Level Shifting in Mixed-Voltage (5 V, 3.3 V)” Systems (Publication: SCBA002A) by Texas Instruments.

The example in the figure below uses four 74LVC245 bus transceivers powered with 3.3 V to buffer the signals towards the Anybus CompactCom M30. The CHIPSELECT and READ signals from the host application CPU are fed into a 74LVC32 logical OR gate (also powered by 3.3 V) of which the output is used to control the direction of the bus transceiver that buffers the data bus.

Note that to increase readability, certain signals have intentionally been left out from this example.

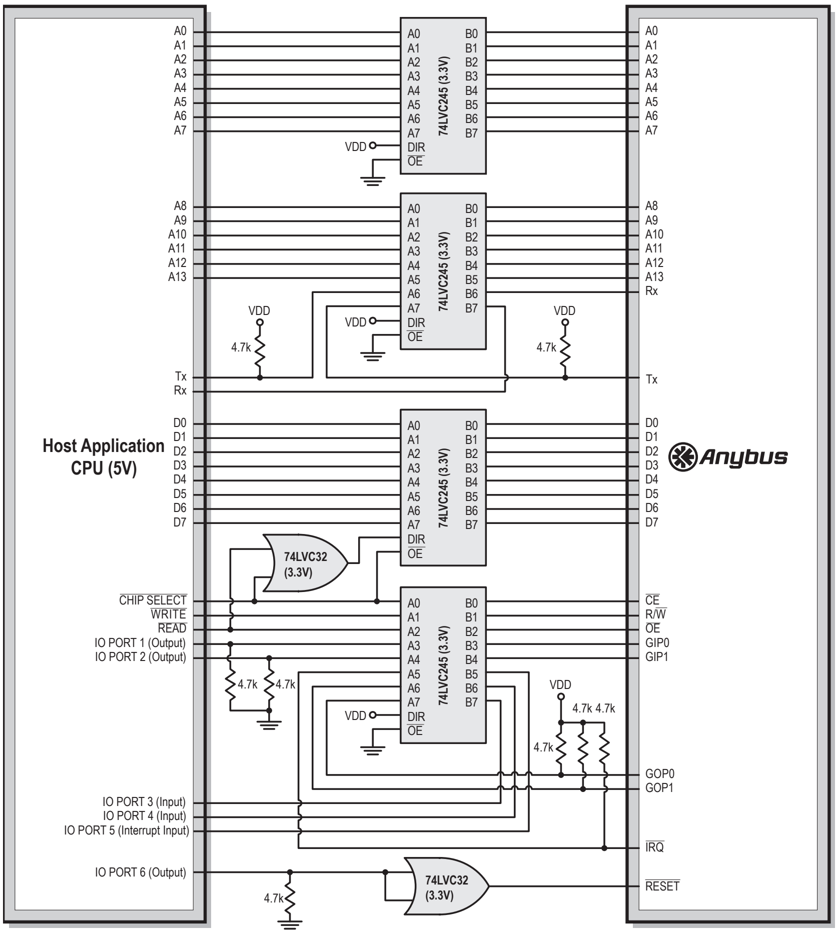



**Fig. 10**

*As with many common microcontrollers, the direction of the IO PORT pins on the CPU in this example is determined during power up; hence the pullup/pulldown resistors on the signals marked “IO PORT (OUTPUT) n”.*

# A.6 Power Supply Considerations

## A.6.1 General

The Anybus CompactCom platform in itself is designed to be extremely power efficient. The exact power requirements for a particular networking systems will however vary a lot depending on to the components used in the actual bus circuitry.

While some systems usually require less than 250 mA of supply current, some high performance networks, or networks which require the use of legacy ASIC technology, will consume up to 500 mA, or in rare cases even as much as 1000 mA.

As an aid when designing the power supply electronics, the networks have been divided into classes based on their power consumption as follows.

- Class A

  This class includes systems which consume less than 250 mA of supply current.

- Class B

  This class includes systems which consume up to 500 mA of supply current.

- Class C

  This class includes systems which consume up to 1000 mA of supply current.

  The following table lists the currently supported networking systems and their corresponding class.

<table>
<tr><th>Network</th><th>Class A</th><th>Class B</th><th>Class C</th></tr>
<tr><td>CANopen</td><td rowspan="14">Yes</td><td rowspan="21">Yes</td><td rowspan="22">Yes</td></tr>
<tr><td>DeviceNet</td></tr>
<tr><td>Modbus RTU</td></tr>
<tr><td>Profibus DP-V1</td></tr>
<tr><td>RS232 (Passive)</td></tr>
<tr><td>RS422/485 (Passive)</td></tr>
<tr><td>USB (Passive)</td></tr>
<tr><td>EtherNet/IP</td></tr>
<tr><td>Profibus DP-V0</td></tr>
<tr><td>CompoNet</td></tr>
<tr><td>Profinet</td></tr>
<tr><td>Modbus-TCP</td></tr>
<tr><td>BACnet MSTP</td></tr>
<tr><td>Bluetooth (Passive)</td></tr>
<tr><td>Sercos III</td><td rowspan="8">No</td></tr>
<tr><td>EtherCAT</td></tr>
<tr><td>Profinet 2-Port</td></tr>
<tr><td>Ethernet/IP 2-Port</td></tr>
<tr><td>CC-Link</td></tr>
<tr><td>BACnet/IP 2-Port</td></tr>
<tr><td>Modbus-TCP 2-Port</td></tr>
<tr><td>ControlNet</td><td>No</td></tr>
</table>

A power supply designed to fulfill Class A requirements (250 mA), will be able to support all networks belonging to class A, but none of the networks in Class B and C.

A power supply designed to fulfill Class C requirements, will be able to support all networks.

## A.7 Bypass Capacitance

The power supply inputs must have adequate bypass capacitance for high-frequency noise suppression. It is therefore recommended to add extra bulk capacitors near the power supply inputs:

| Reference | Value (Ceramic) |
|---|---|
| C1 | 22 µF / 6.3 V |
| C2 | 100 nF / 16 V |

An example is shown in the picture below.

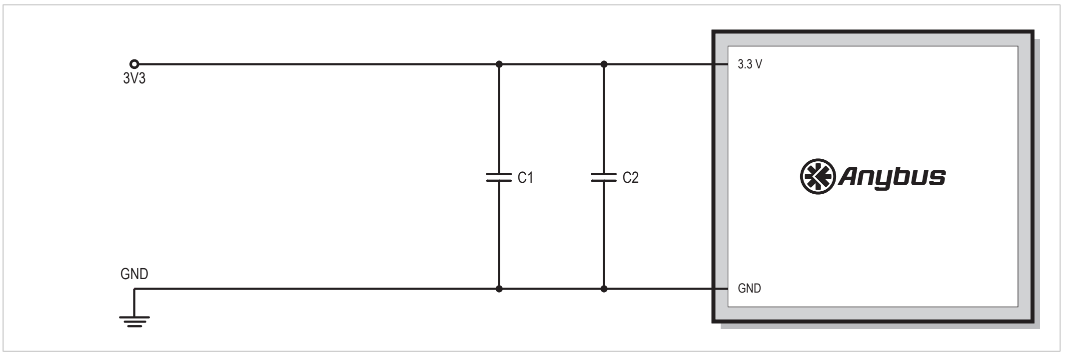



**Fig. 11**

## A.8 3.3 V Regulation

The following example uses the LT1767 from Linear Technology to provide a stable 3.3 V power source for the module. Note that all capacitors in this example are of ceramic type.

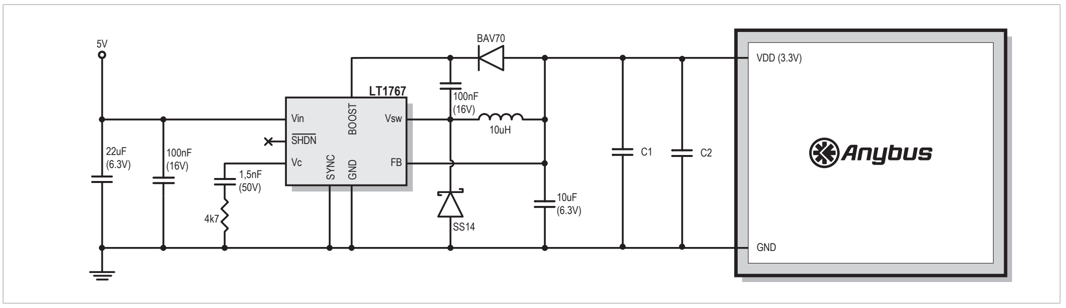



**Fig. 12**

*For detailed information regarding this example, consult the data sheet for the LT1767 (Linear Technology).*

# B Mechanical Specification

> **!**
>
> This a class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.
>
> This product contains ESD (Electrostatic Discharge) sensitive parts that may be damaged if ESD control procedures are not followed. Static control precautions are required when handling the product. Failure to observe this may cause damage to the product.

# B.1 Overview

*The dimensions below are given in millimeters and include a tolerance of ±0.20 mm.*

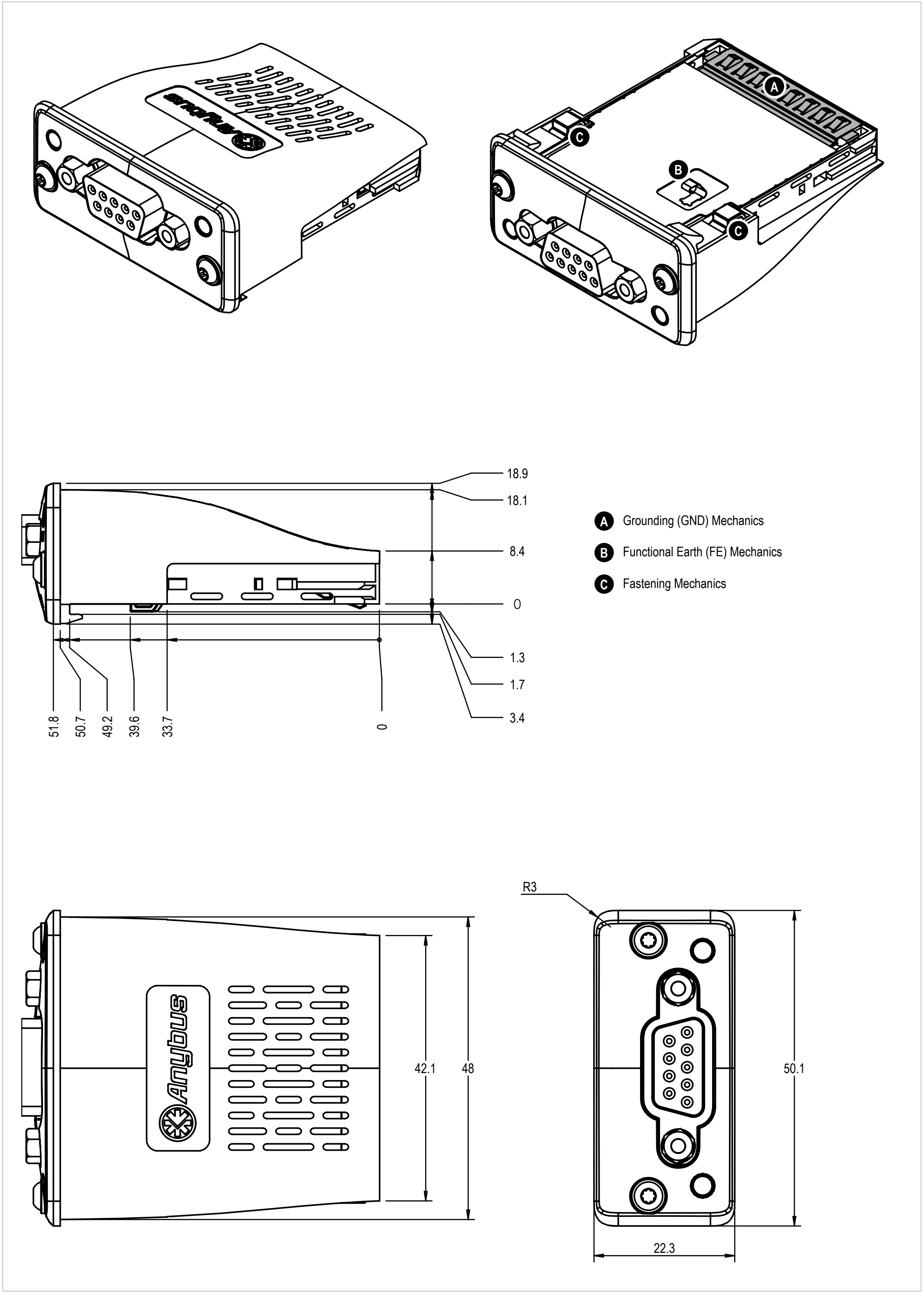



**Fig. 13**

## B.2 M12 Connector

The modules that are equipped with M12 connectors, either have two female connectors or one female and one male connector.

*The dimensions below are given in millimeters and include a tolerance of ±0.20 mm.*

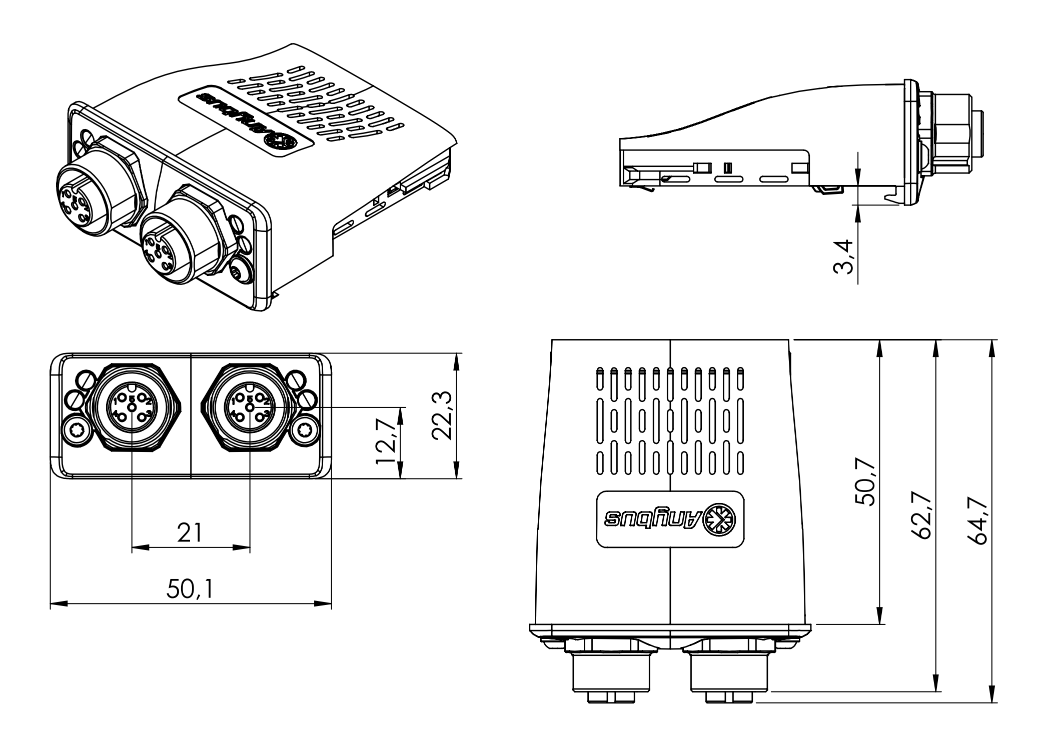



**Fig. 14**

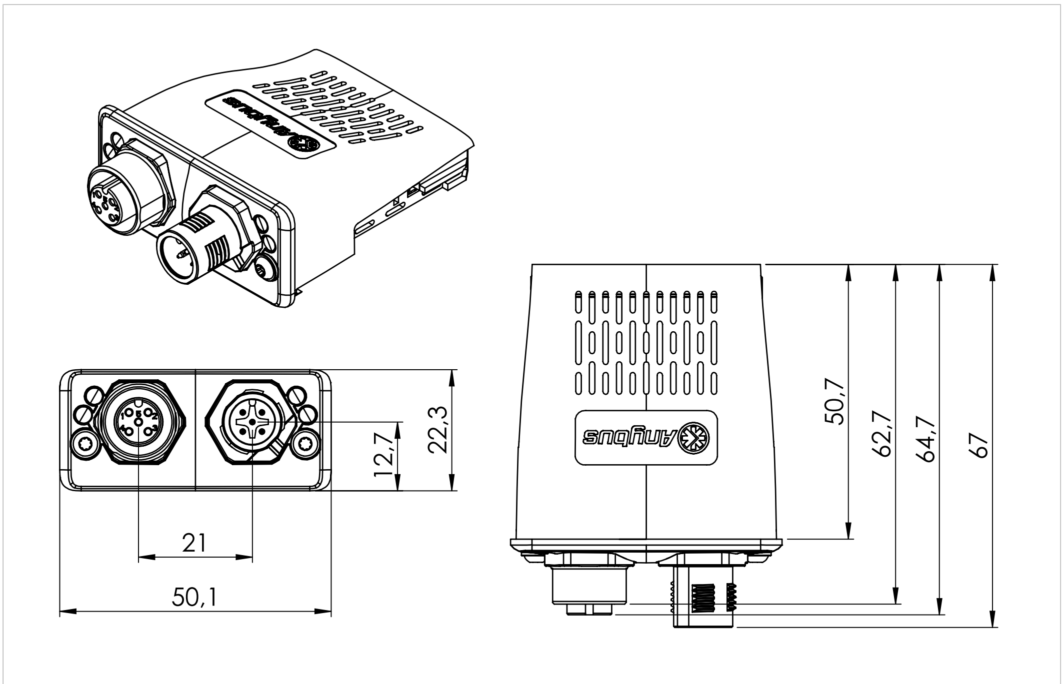



**Fig. 15**

## B.3 Footprint

*The dimensions below are given in millimeters and include a tolerance of ±0.10 mm.*

For a footprint for the Anybus CompactCom host connector, see *Anybus CompactCom Host Connector, p. 36*

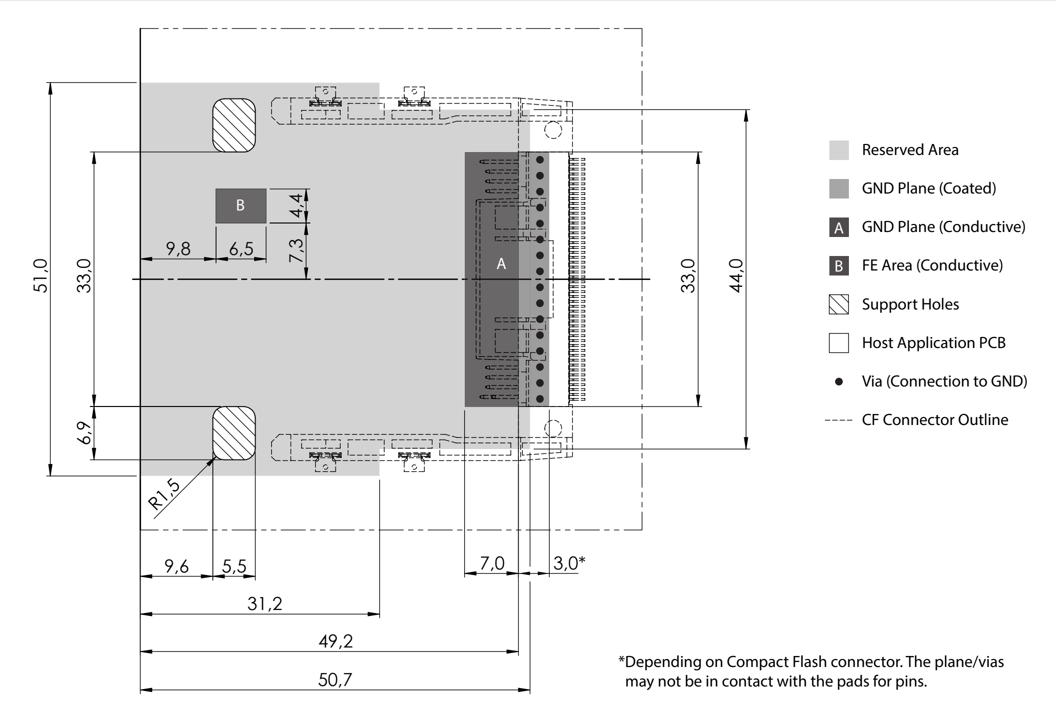



**Fig. 16**

| Area | Description |
|---|---|
| Reserved Area | To ensure isolation and mechanical compatibility, it is strongly advised that this area is kept completely free from components and signal lines.<br>Under no circumstances may components, via holes, or signal lines, be placed on the PCB-layer facing the Anybus module. Failure to comply with this requirement may induce EMC/EMI problems, mechanical compatibility issues, or even short circuit. |
| FE Area (Conductive) | To achieve proper EMC behavior and to provide support for different cable shielding standards, this area must be tin plated (preferably using Hot Air Levelling technology) and have a stable, low impedance connection to functional earth. |
| GND Plane (Coated) | The exact shape of this area depends on the properties of the CompactFlash connector. It is however important to follow these basic design rules:<br>• The plane must be continuous and have a stable, low impedance connection to GND (preferably through at least 16 vias as illustrated in the figure)<br>• The connection to GND should be placed beneath the CompactFlash connector as illustrated above (see figure)<br>• The plane must follow the signal path through the connector<br>• The conductive part must be tin plated, preferably using Hot Air Levelling technology |
| GND Plane (Conductive) | |
| Support Holes | These holes are used by the fastening mechanics to secure the module onto the host application. |

## B.4 Housing Preparations

*The dimensions below are given in millimeters and include a tolerance of ±0.20 mm.*

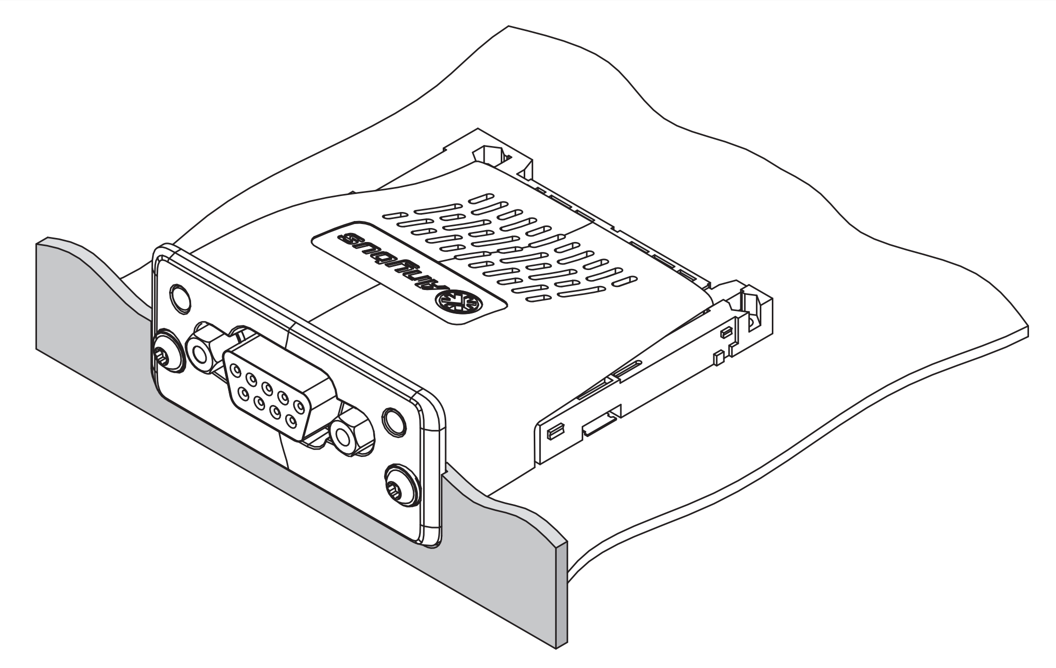



**Fig. 17**

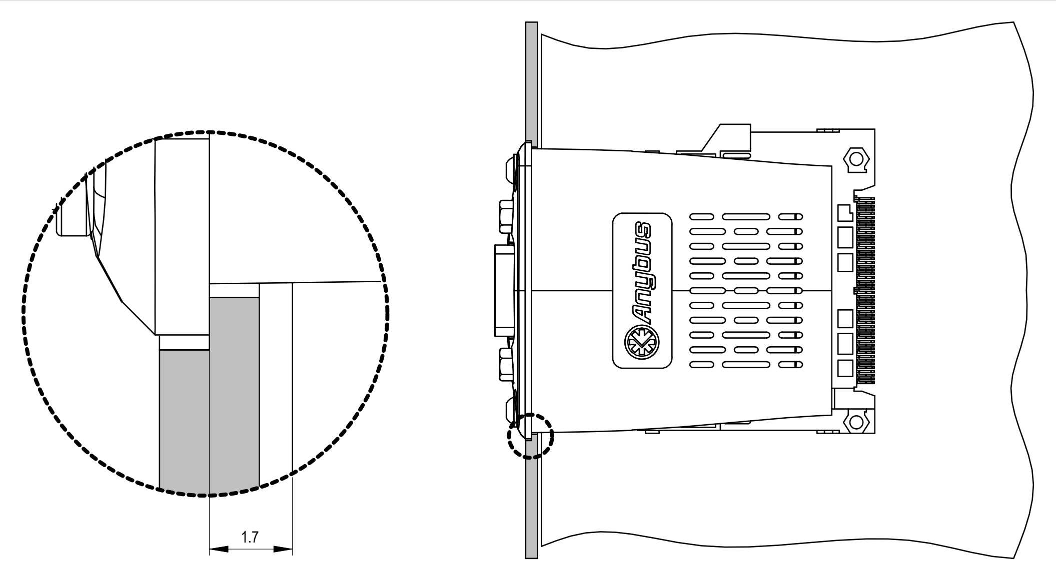



**Fig. 18**

### B.4.1 Front

*The dimensions below are given in millimeters and include a tolerance of ±0.10 mm.*

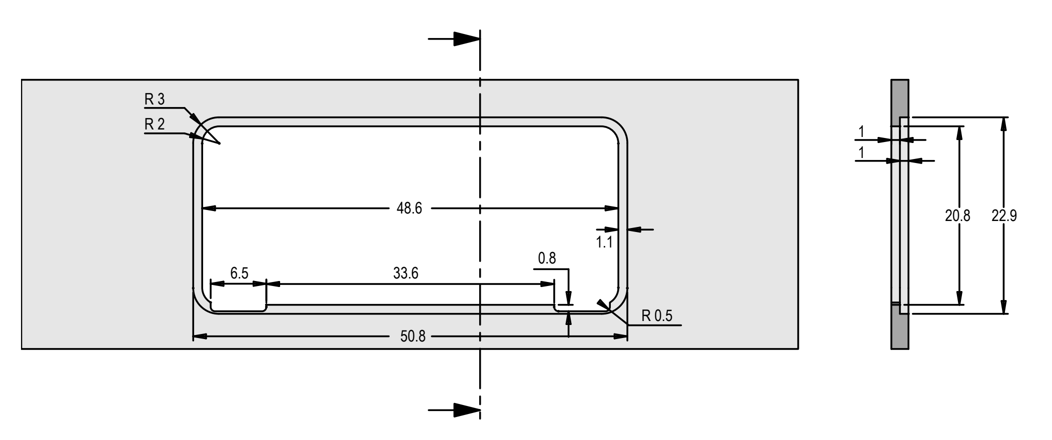



**Fig. 19**

## B.5 Slot Cover

HMS Industrial Networks can supply a “blind” slot-cover, which may be used to cover the Anybus CompactCom slot when not in use, allowing the Anybus CompactCom module to be supplied as an end-user option instead of being mounted during manufacturing.

*The dimensions below are given in millimeters and include a tolerance of ±0.10 mm.*

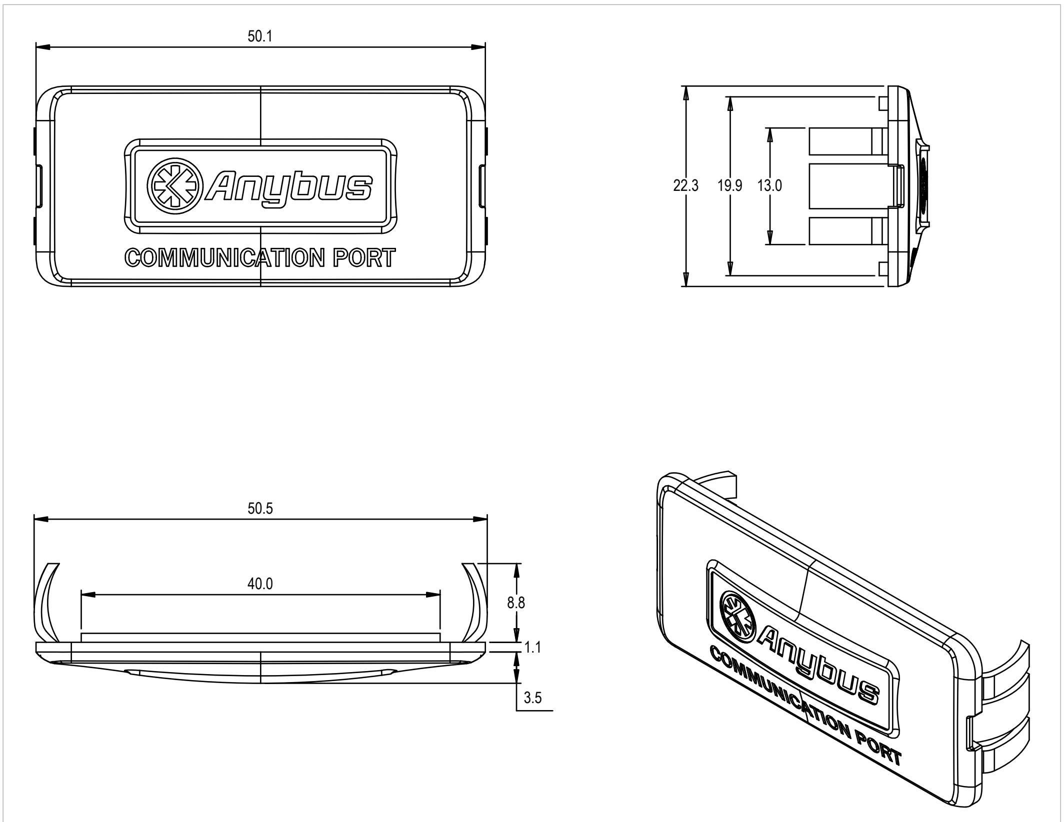



**Fig. 20**

## B.6 Anybus CompactCom Host Connector

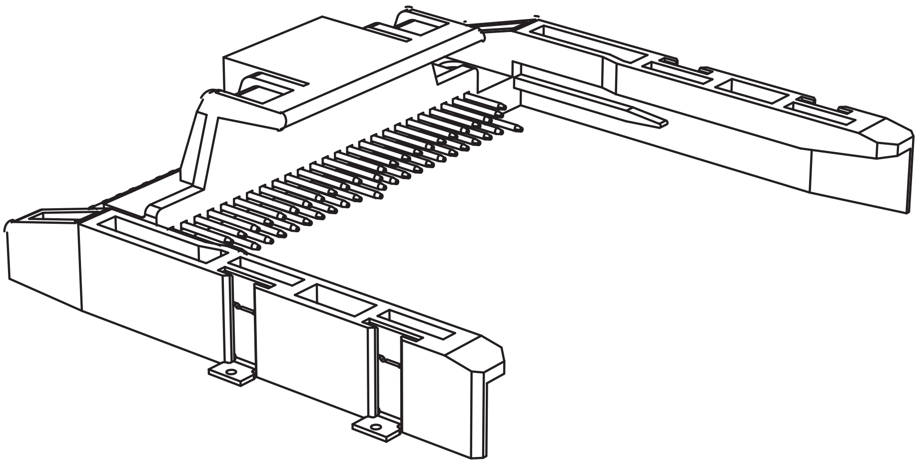


**Fig. 21**

The Anybus CompactCom is designed to use a compact flash connector as application connector. HMS Industrial Networks offers a host connector, that is designed to simplify the mounting and to meet the demands for a secure and stable connection of the Anybus CompactCom modules. For the dimensions of the connector and the information needed for the PCB layout, please visit the support pages for Anybus CompactCom at www.anybus.com/support, where you will find the latest available information for the connector.

Please note that it is recommended to mill oval holes in the PCB, to enable usage of other connectors.

> **!** Always verify that the dimensions of another connector is compatible with this design.

| Manufacturer | Part No. | Web |
|---|---|---|
| HMS Industrial Networks | SP1137 | For more information visit the support pages for Anybus CompactCom at www.anybus.com/support |

### B.6.1 Host Connector Considerations

When using other connectors, the following needs to be considered:

To prevent incorrect insertion and to ensure that the grounding mechanics work as intended, use connectors with guiding rails of sufficient length (preferably longer than 19 mm), or provide an equivalent mechanical solution.

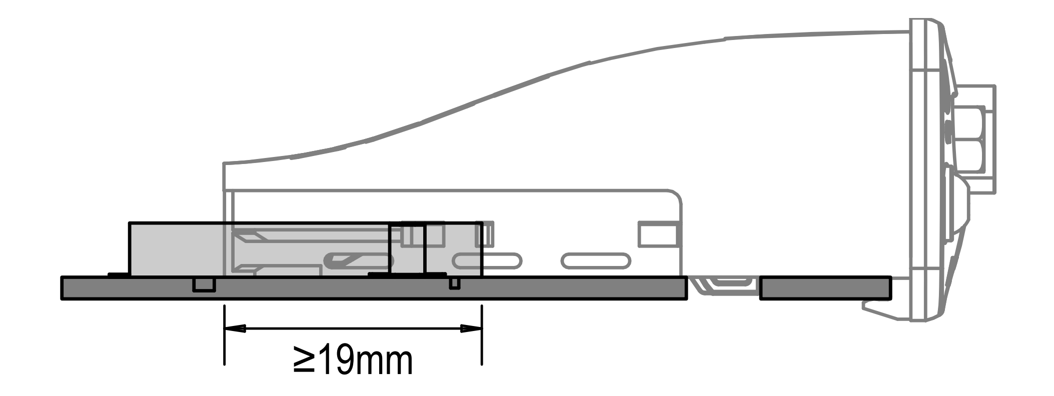



**Fig. 22**

To ensure stable connection to GND, use a connector that fits the distances from the PCB to the pins of the host connector, that are recommended in the picture. Tolerance (+0.35 mm, -0.05 mm).

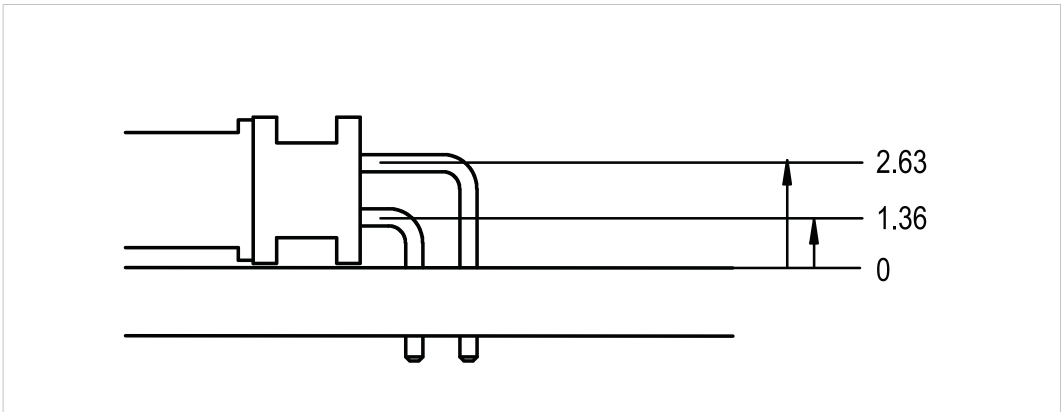



**Fig. 23**

It is recommended to use connectors which can be screwed into the host application board, to minimize mechanical strain on solder joints, etc.

The following connectors have been verified for use with the Anybus CompactCom:

| **Manufacturer** | **Part No.** | **Web** |
|---|---|---|
| Tyco | 1734451-1 | www.tycoelectronics.com |
| AllConnectors | 101D-TAAB-R | www.allconnectors.de |
| Suyin | 127531MB050XX04NA | www.suyin.com, www.suyin-europe.com, www.suyinusa.com |
| Harwin | M504-8815042 (obsolete)<br>M504-8825042 | www.harwin.com<br>***Note**: The dimensions of the holes for the fixing pins of this connector are 1.8 mm, i.e. slightly larger than the dimensions given in the figure above.* |

### B.6.2 Host Connector Pin Numbering

The surface mounted pins of the HMS compact flash connector are numbered from left to right (see figure below), corresponding to pin numbers 1, 26, 2, 27...... 25, 50 of the host interface connector.

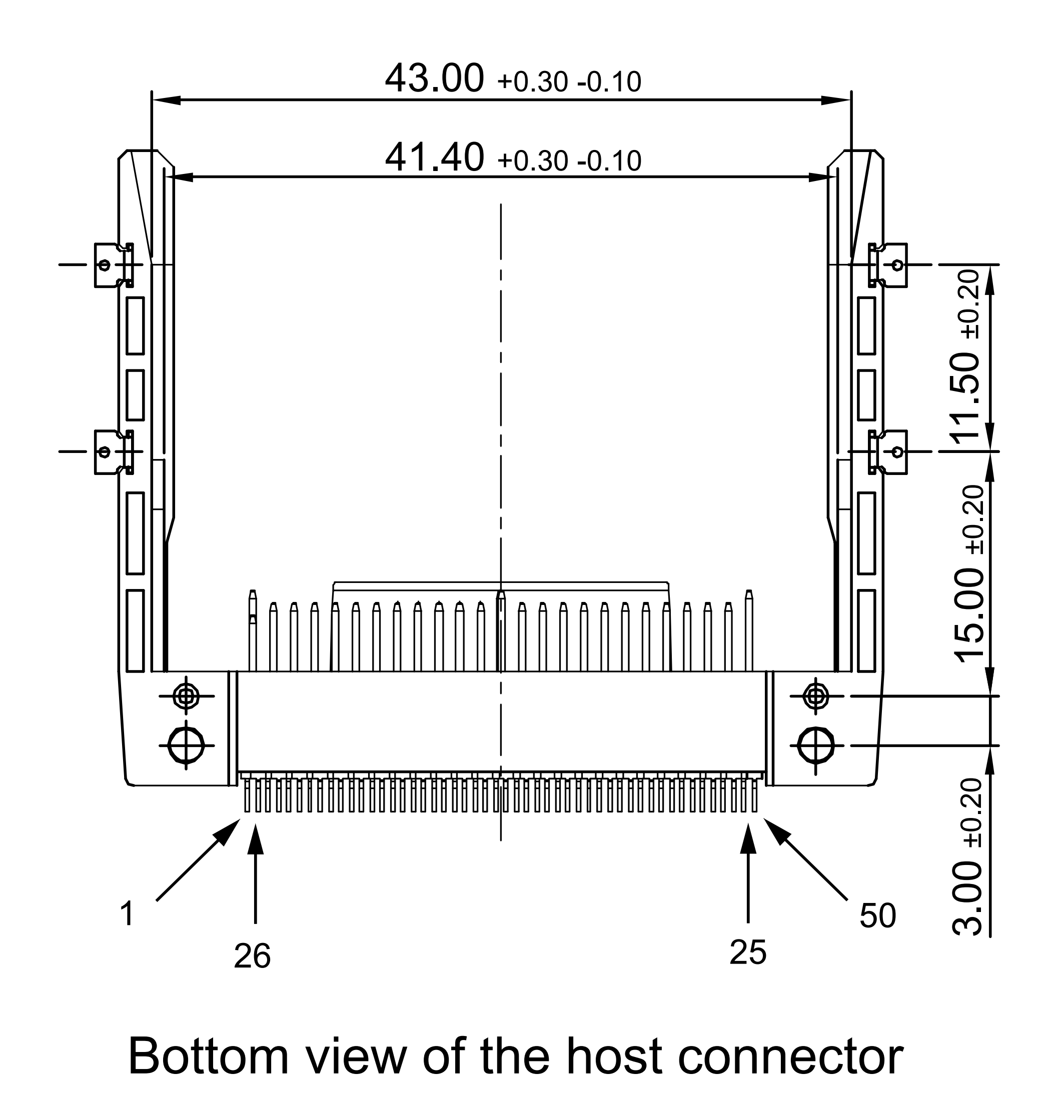



Fig. 24

# B.7 Fastening Mechanics

*To support the fastening mechanism, the host application PCB thickness must be 1.60 (±10%) mm.*

*Recommended screw tightening torque is 0.25 Nm.*

> **!** *When fastening the module into the end product, make sure that the Anybus module is properly aligned into the CompactFlash socket prior to applying any force. Rough handling and/or excessive force in combination with misalignment may cause mechanical damage to the Anybus CompactCom module and/or the end product.*

## B.7.1 Fastening

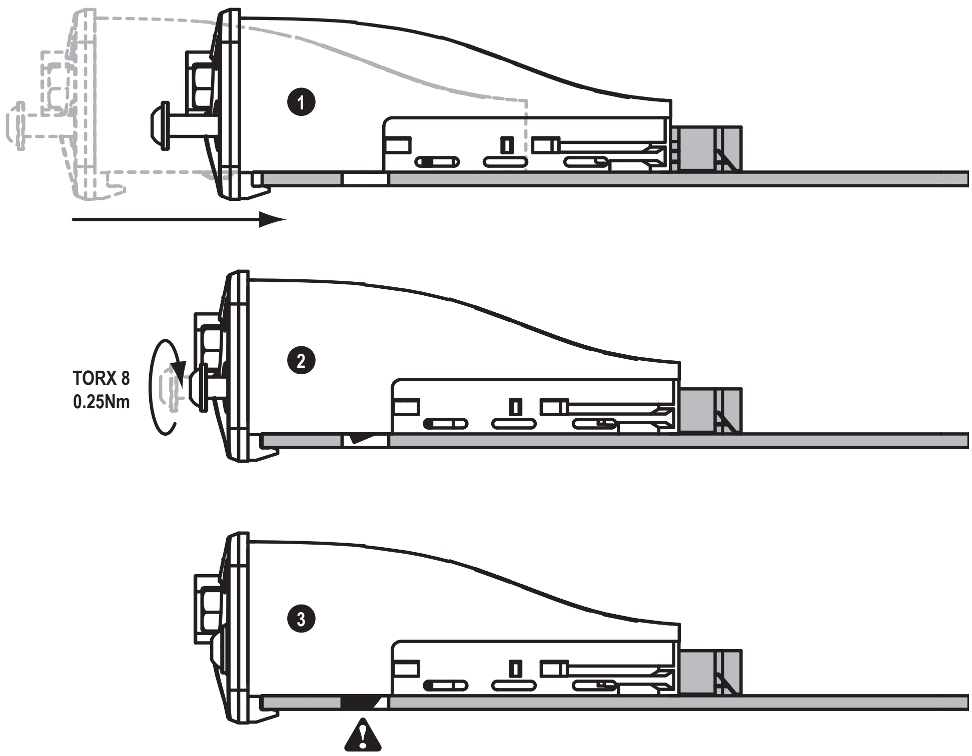



**Fig. 25**

## B.7.2 Removal

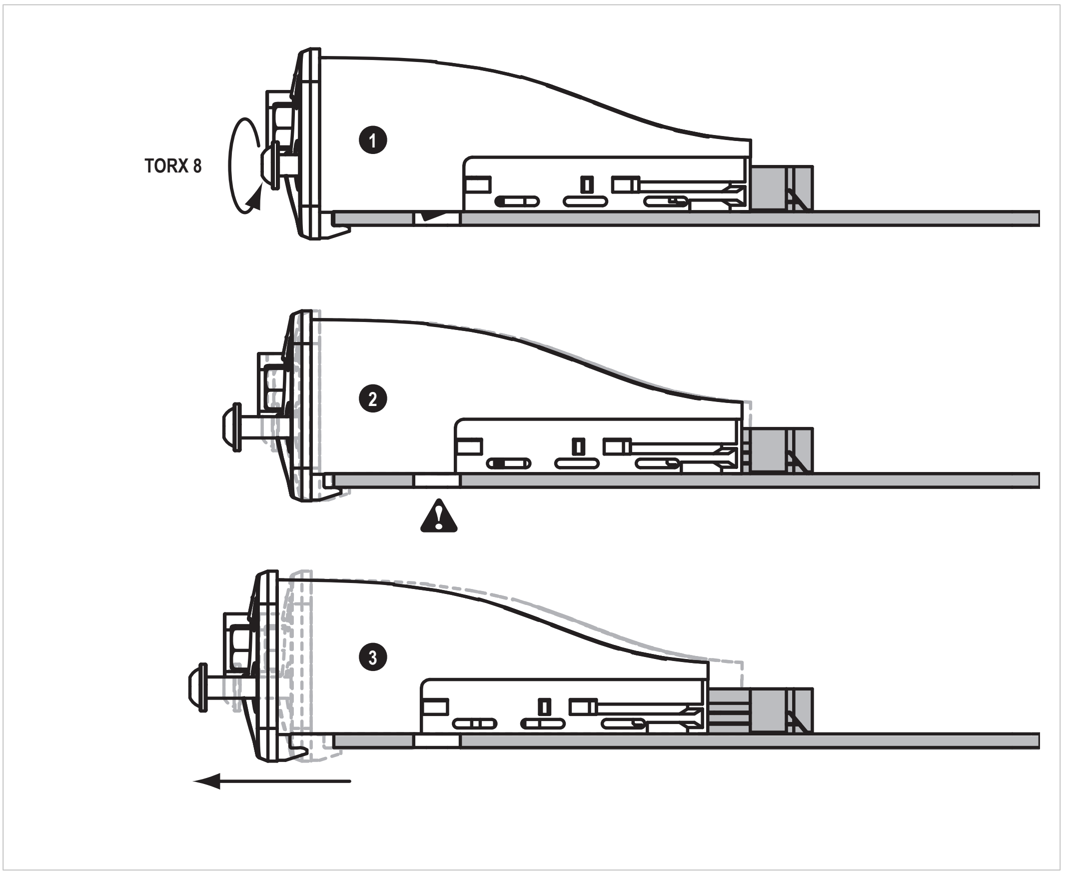



**Fig. 26**

# C Technical Specification

*The properties specified in this chapter applies to all Anybus CompactCom modules unless otherwise stated. Any deviations from what is stated in this chapter is specified separately in each network appendix.*

## C.1 Environmental

### C.1.1 Operating Temperature

| | |
|---|---|
| **Active mdules:** | -40 to 70°C (-40 to 158°F) |
| **Passive modules:** | -40 to 70°C (-40 to 158°F) |

(Tests performed according to IEC 60068-2-1 and IEC 60068-2-2)

### C.1.2 Storage Temperature

| | |
|---|---|
| **Active modules:** | -40 to 85°C (-40 to 185°F) |
| **Passive modules:** | -40 to 85°C (-40 to 185°F) |

(Tests performed according to IEC 60068-2-1 and IEC 60068-2-2)

### C.1.3 Humidity

| | |
|---|---|
| **Active modules:** | 5 to 95% non-condensing |
| **Passive modules:** | 5 to 95% non-condensing |

(Tests performed according to IEC 60068-2-30)

## C.2 Shock and Vibration

- Shock test, operating IEC 68-2-27 half-sine 30g, 11 ms, 3 positive and 3 negative shocks in each of three mutually perpendicular directions
- Shock test, operating IEC 68-2-27 half-sine 50g, 11 ms, 3 positive and 3 negative shocks in each of three mutually perpendicular directions
- Sinusoidal vibration, operating IEC 68-2-6 10-500 Hz, 0.35 mm, 5g, 1oct/min., 10 double-sweep in each of three mutually perpendicular directions.

# C.3 Electrical Characteristics

## C.3.1 Operating Conditions

| Symbol | Parameter | Pin Types | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{DD}$ | Supply Voltage (DC) | PWR | - | 3.15 | 3.30 | 3.45 | V |
| | Ripple (AC) | | | - | - | ± 100 | mV |
| $V_{SS}$ | Ground reference | | | 0.00 | 0.00 | 0.00 | V |
| $I_{IN}$ | Current consumption | | Class A | - | - | 250 | mA |
| | | | Class B | - | - | 500 | mA |
| | | | Class C | - | - | 1000 | mA |
| $V_{IH}$ | Input High Voltage | I, BI | - | 0.7 x $V_{DD}$ | - | $V_{DD}$ + 0.2 | V |
| $V_{IL}$ | Input Low Voltage | | | -0.2 | - | 0.2 x $V_{DD}$ | V |
| $I_{OH}$ | Current, Output High | O, BI | - | -40 | - | 40 | mA |
| $I_{OL}$ | Current, Output Low | | | | | | |
| $V_{OH}$ | Output High Voltage | | $I_{OH}$ = -4mA | 2.4 | - | - | V |
| $V_{OL}$ | Output Low Voltage | | $I_{OL}$ = 4mA | - | - | 0.4 | V |

I= Input, CMOS (3.3V)

O= Output, CMOS (3.3V)

BI= Bidirectional, Tristate

PWR= Power supply inputs

## C.3.2 Isolation (Host to Network)

Isolation distances for PCB between host, network, and FE (according to EN 60950-1; Pollution Degree 2; Material Group IIIb)

| Isolation Barrier | Working Voltage/Transient Voltage | | Distance | |
|---|---|---|---|---|
| | Creepage | Clearance | External | Internal |
| Host to FE | 250V/2500V | 250V/2500V | 2.5mm | 0.4mm |
| Host to Network | 250V/2500V | 250V/2500V | 2.5mm | 0.4mm |

## C.3.3 Functional Earth & Shielding

All Anybus CompactCom modules features a cable shield filter designed according to each network standard. To be able to support this, the host application *must* have a conductive area connected to functional earth as described in *Mechanical Specification, p. 30* (FE Connection Pad).

HMS cannot guarantee proper EMC behavior unless this requirement is fulfilled.

# C.4 Regulatory Compliance

## C.4.1 EMC Compliance (CE)

Since the Anybus CompactCom is considered a component for embedded applications, it cannot be CE-marked as an end product. However, the Anybus CompactCom family is pre-compliance tested in a typical installation providing that all modules conforms to the EMC directive in that installation.

Once the end product has successfully passed the EMC test using any of the Anybus CompactCom modules, the pre-compliance test concept allows any other interface of the same type in the Anybus CompactCom family to be embedded in that product without further EMC tests.

To be compliant to the EMC directive 2004/108/EC, the pre-compliance testing has been conducted according to the following standards:

| | |
|---|---|
| **Emission: EN61000-6-4** | EN55011 Radiated emission |
| | EN55011 Conducted emission |
| **Immunity: EN61000-6-2** | EN61000-4-2 Electrostatic discharge |
| | EN61000-4-3 Radiated immunity |
| | EN61000-4-4 Fast transients/burst |
| | EN61000-4-5 Surge immunity |
| | EN61000-4-6 Conducted immunity |

Since all Anybus CompactCom modules have been evaluated according to the EMC directive through the above standards, this serve as a base for our customers when certifying Anybus CompactCom based products.

## C.4.2 UL/c-UL Compliance

All members in the Anybus CompactCom M30 series are UL Recognized Components.

# D Anybus CompactCom 30 without Housing

> **!**
> This a class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.
>
> This product contains ESD (Electrostatic Discharge) sensitive parts that may be damaged if ESD control procedures are not followed. Static control precautions are required when handling the product. Failure to observe this may cause damage to the product.

## D.1 General Information

In some applications the standard Anybus CompactCom plug-in housing concept cannot be used. Instead an Anybus CompactCom 30 module without housing is mounted on the PCB, using a specially designed Anybus CompactCom Mounting Kit. This enables full Anybus CompactCom functionality for all applications without loss of network compatibility or environmental characteristics.

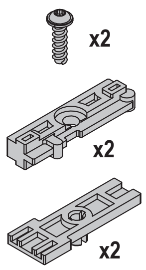



**Fig. 27**

The kit is easy to assemble, and is based on a few plastic parts which when assembled secures the Anybus module firmly onto the host application.

To support this concept in the host application, the PCB must be designed according to the footprint specification in this document.

To guarantee proper EMC behavior, it is also important that the application supports the FE (functional earth) and grounding mechanisms found on all Anybus CompactCom modules.

Anybus CompactCom modules without housing exist in three different versions:

- with the usual fieldbus or industrial network connector
- with M12 connectors
- as brick, with a pin connector directly to the carrier board instead of a fieldbus or network connector mounted on the Anybus CompactCom board, for more information see the Anybus CompactCom B30 Design Guide

If the module is equipped with M12 connectors, and front plate and housing are correctly designed, the resulting product can be rated up to class IP67.

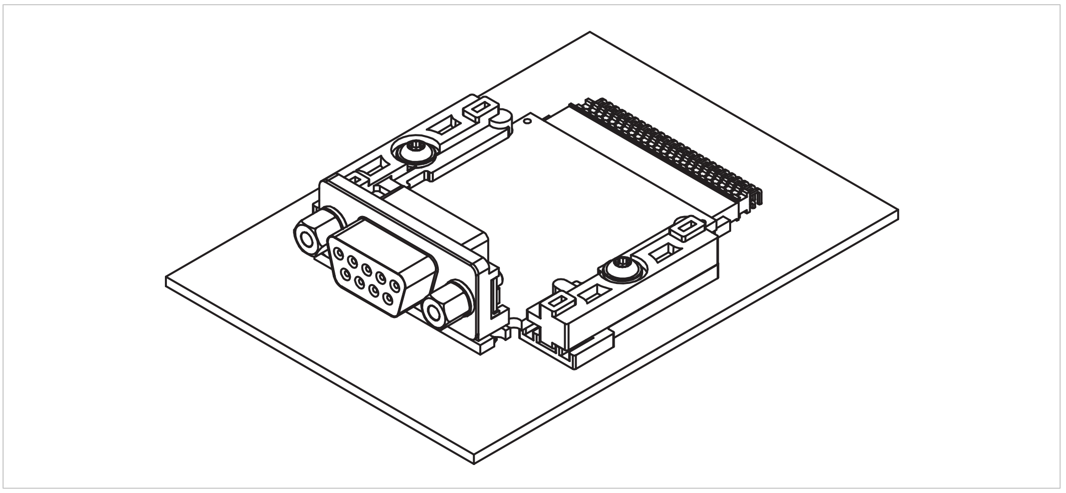


**Fig. 28**

All dimensions expressed in this document are stated in millimeters and have a tolerance of ±0.10mm unless stated otherwise.

## D.2 Ordering Information

| Part No. | Name | Contents |
|---|---|---|
| 019180 | ABCC Mounting Kit | 100 x Bottom Part<br>100 x Top Part<br>100 x Screw |

# D.3 Footprint

## D.3.1 Without Housing

Footprint for modules without housing.

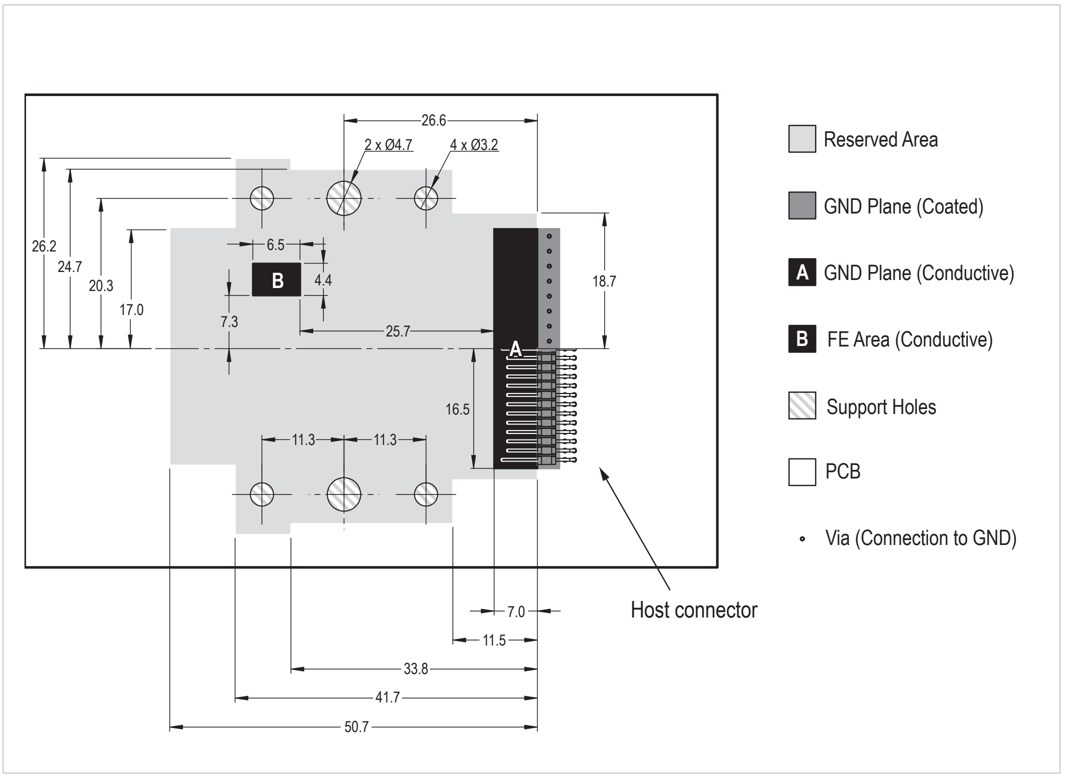



**Fig. 29**

| Area | Description |
|---|---|
| Reserved Area | To ensure isolation and mechanical compatibility, it is strongly advised that this area is kept completely free from components and signal lines.<br>Under no circumstances may components, vias, or signal lines, be placed on the PCB-layer facing the Anybus module. Failure to comply with this requirement may induce EMC/EMI problems, mechanical compatibility issues, or even short circuit. |
| FE Area (Conductive) | To achieve proper EMC behaviour and to provide support for different cable shielding standards, this area must be tin plated (preferably using Hot Air Levelling technology) and have a stable, low impedance connection to functional earth. |
| GND Plane (Coated)<br>GND Plane (Conductive) | The exact shape of this area depends on the properties of the CompactFlash connector. It is however important to follow these basic design rules:<br>• The plane must be continuous and have a stable, low impedance connection to GND (preferably through at least 16 vias as illustrated in the figure)<br>• The connection to GND should be placed beneath the CompactFlash connector as illustrated above (see figure)<br>• The plane must follow the signal path through the connector<br>• The conductive part must be tin plated, preferably using Hot Air Levelling technology |
| Support Holes | These holes are used by the mounting kit mechanics to secure the module onto the host application. |
| PCB | The host application PCB should be 1.6 mm thick to be able to support the fastening mechanics. |

## D.4 Host Connectors

The following connectors have been found to be compatible with the mounting kit.

| Manufacturer | Part No. | Comment | Web |
|---|---|---|---|
| Samtec | HPT-125-01-L-D-RA (recommended) | Through hole mounted | www.samtec.com |
| 3M | N7E50-D516PG-30 | Surface mounted | www.3m.com |

## D.5 Height Restrictions

All dimensions are in millimeters

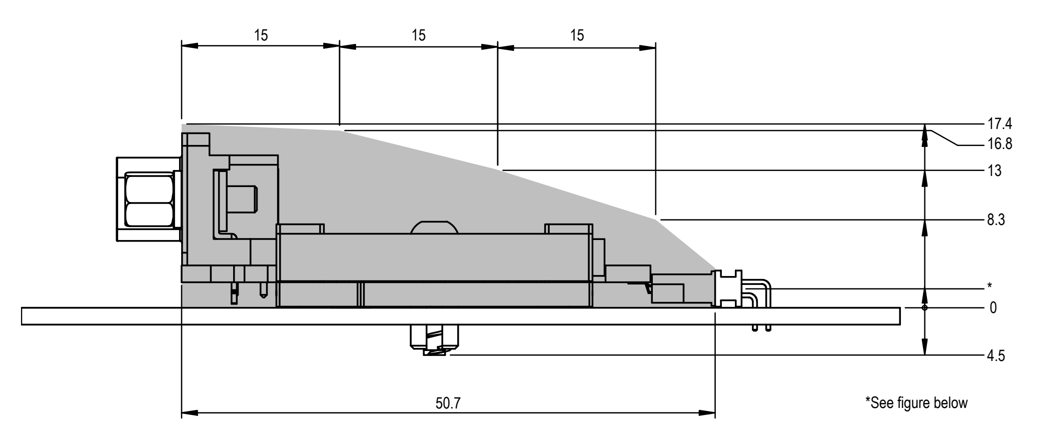



**Fig. 30**

The gray area in the figure above specifies the maximum height occupied by onboard components of the Anybus module. To ensure isolation, it is recommended to add an additional 2.5 mm on top of these dimensions.

*To ensure stable connection to GND, use a connector that conforms to the distances from the PCB to the pins of the host connector, that are recommended in the picture. Tolerance (+0.35 mm, -0.05 mm).*

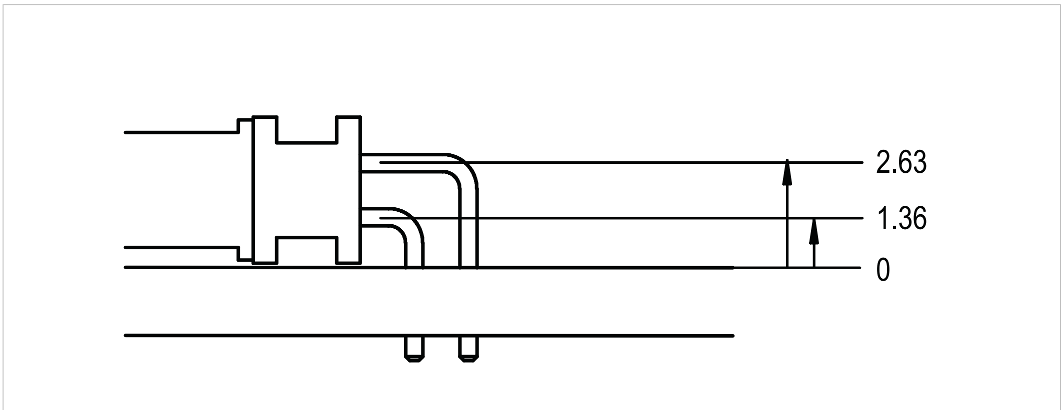



**Fig. 31**

## D.6 Assembly

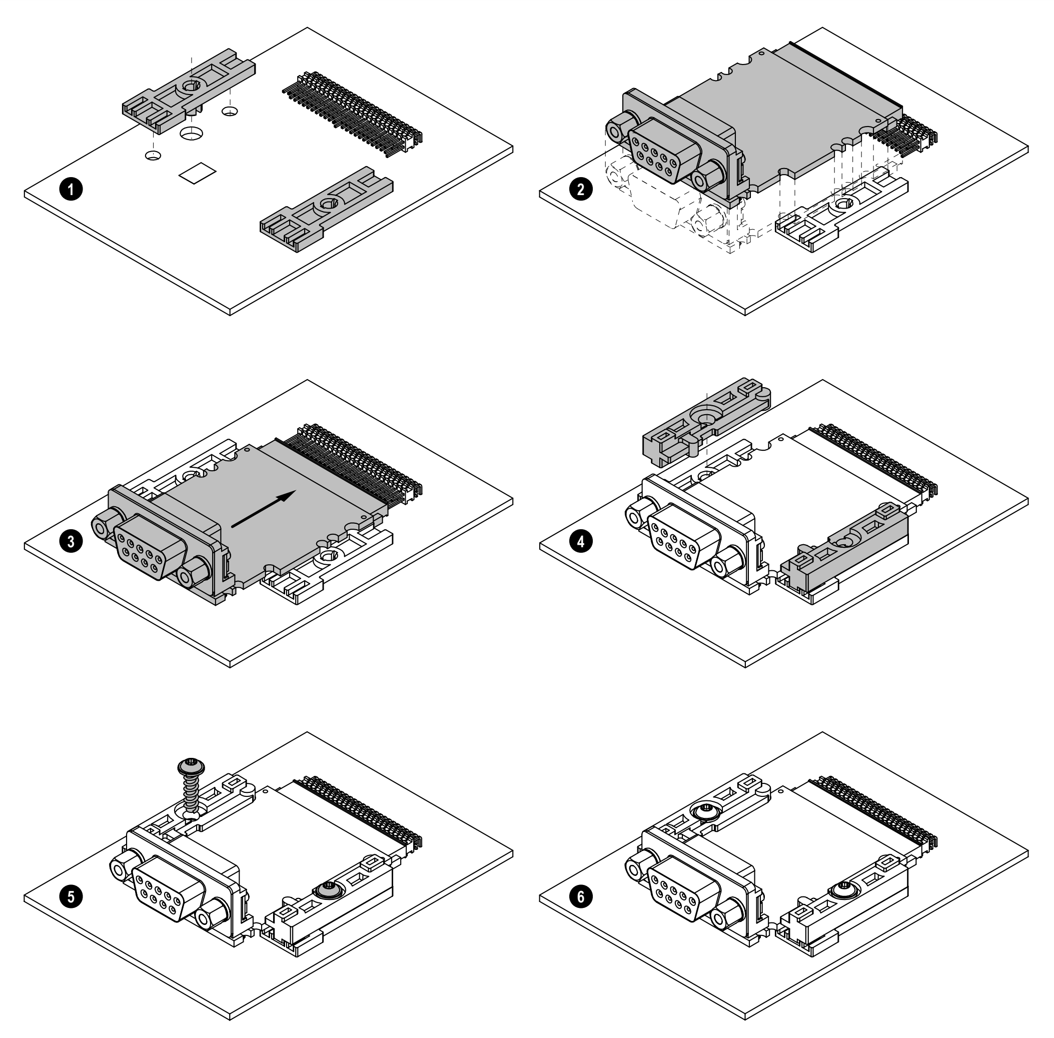


Fig. 32

## D.7 Dimensions

All dimensions are in millimeters.

### D.7.1 General

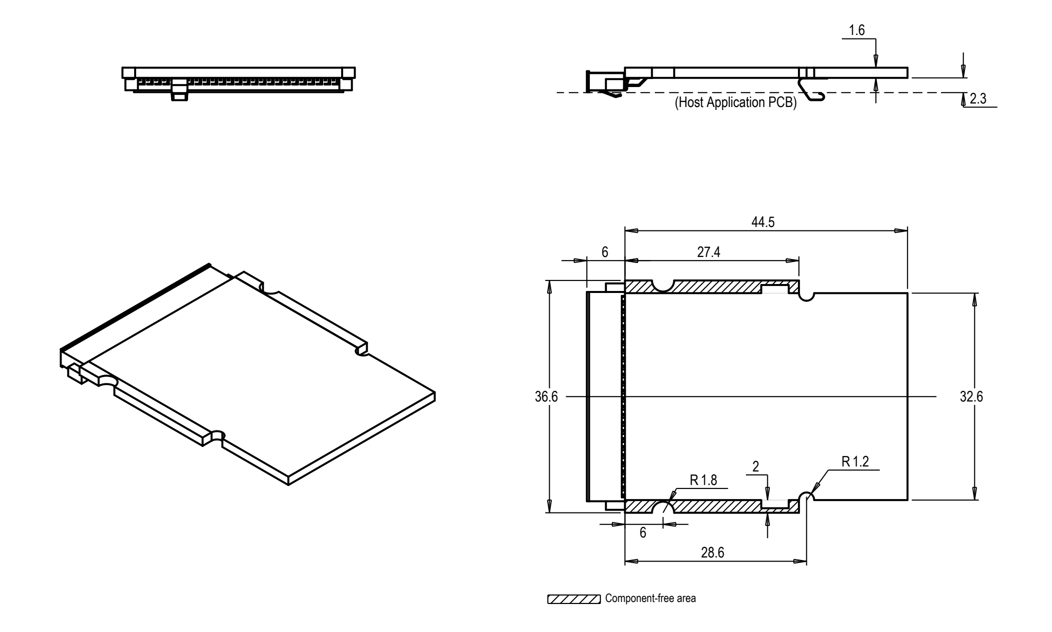



**Fig. 33**

### D.7.2 Standard LED Positions

Standard Anybus CompactCom:

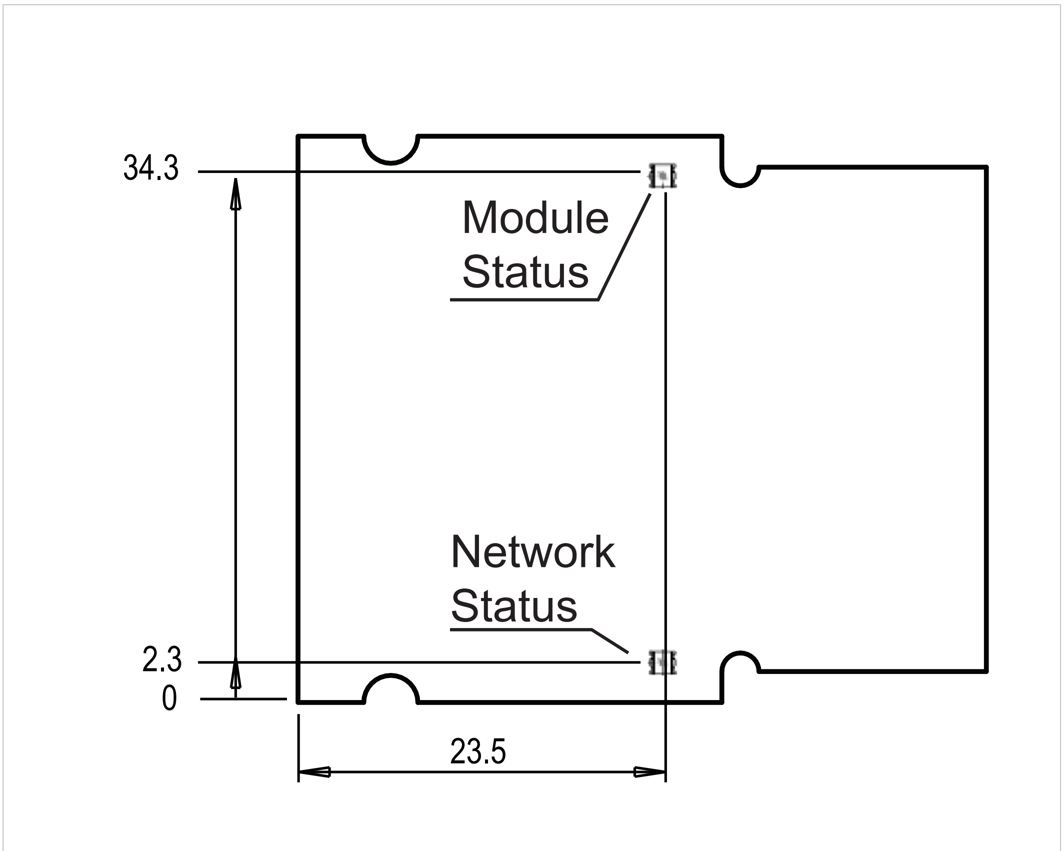



**Fig. 34**

Standard Anybus CompactCom, Ethernet versions:

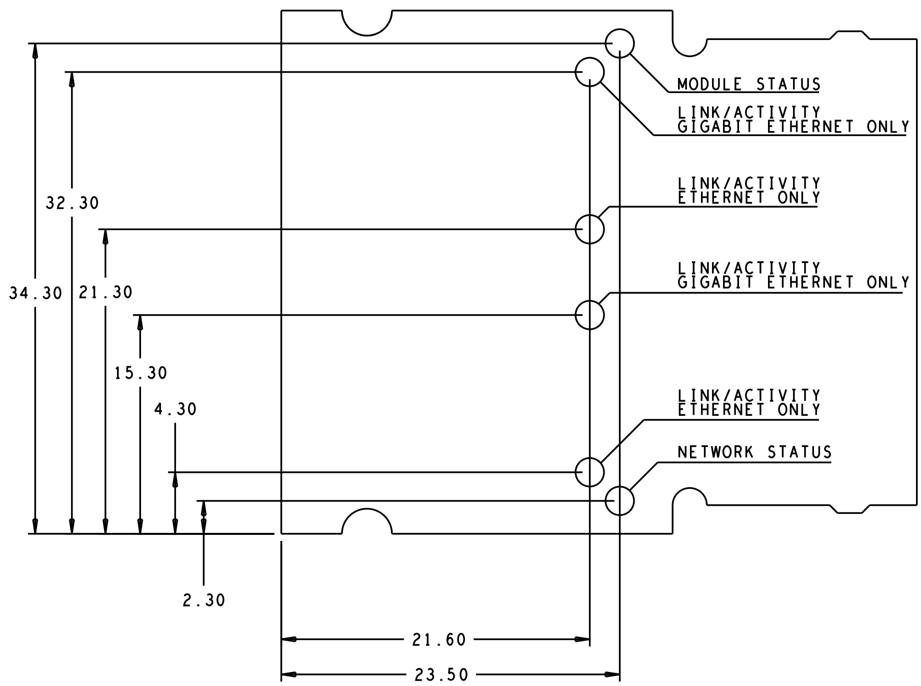



**Fig. 35**

Anybus CompactCom for M12 connectors:

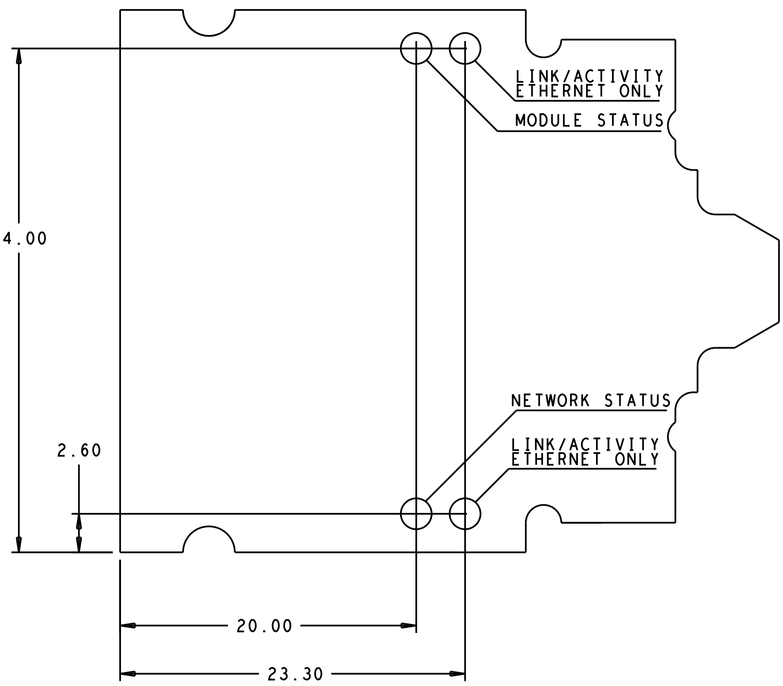



**Fig. 36**

### D.7.3 Mounting Kit Parts

Unless specified otherwise all dimensions are in millimeters, tolerance ± 0.1 mm.

**Bottom Part**

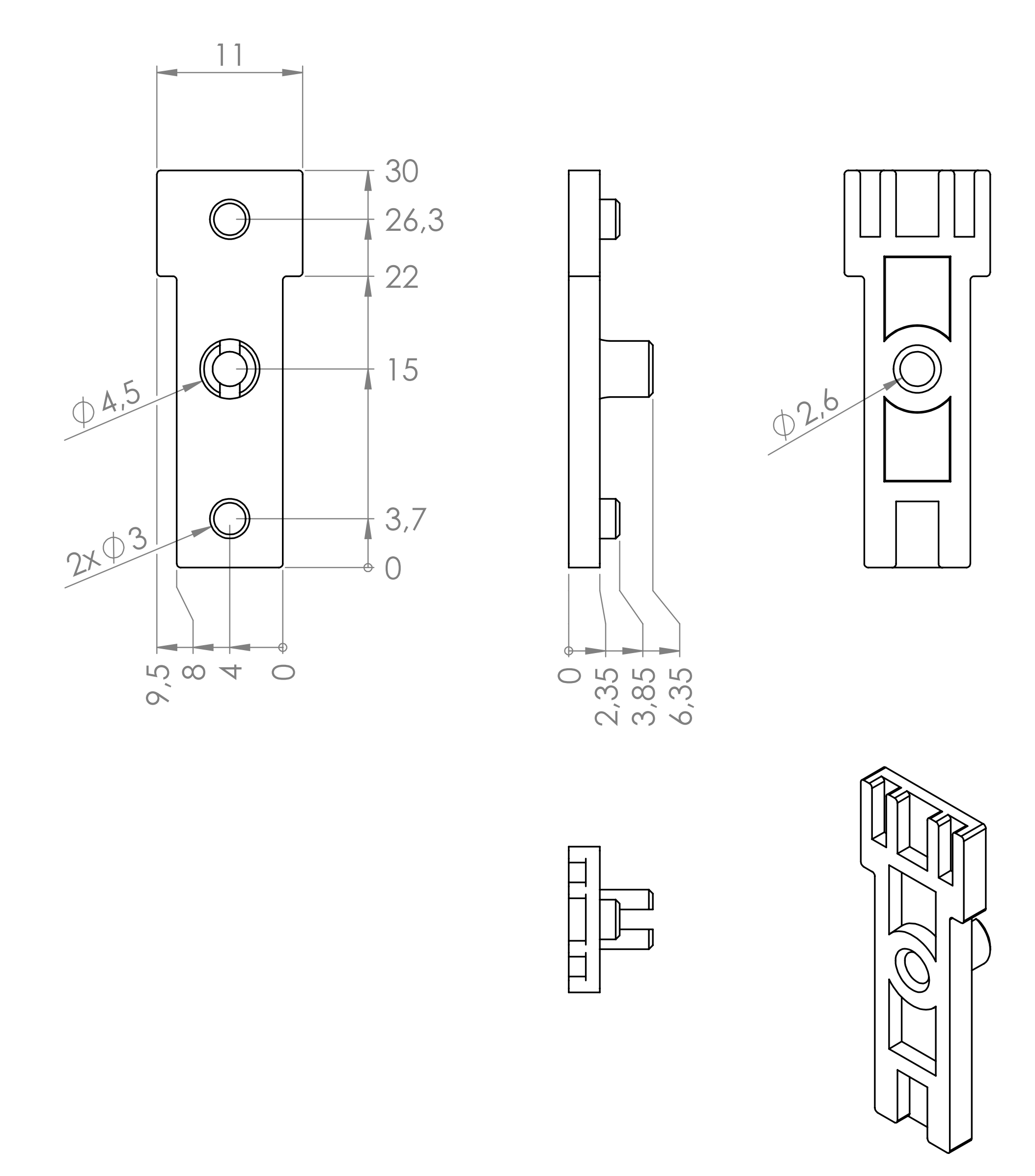



**Fig. 37**

**Top Part**

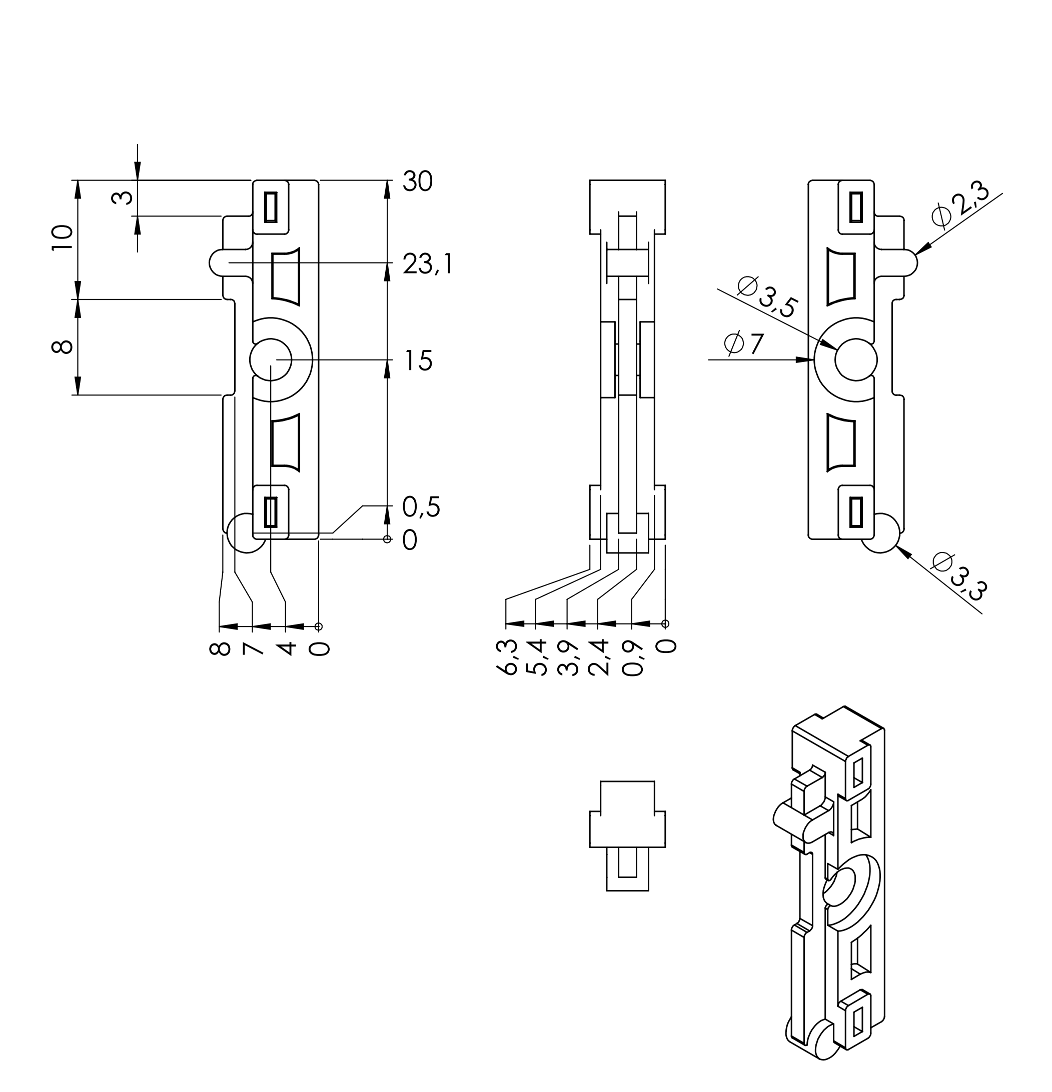



**Fig. 38**

**Fastening Screw**

Recommended screw tightening torque is 0.3 Nm.

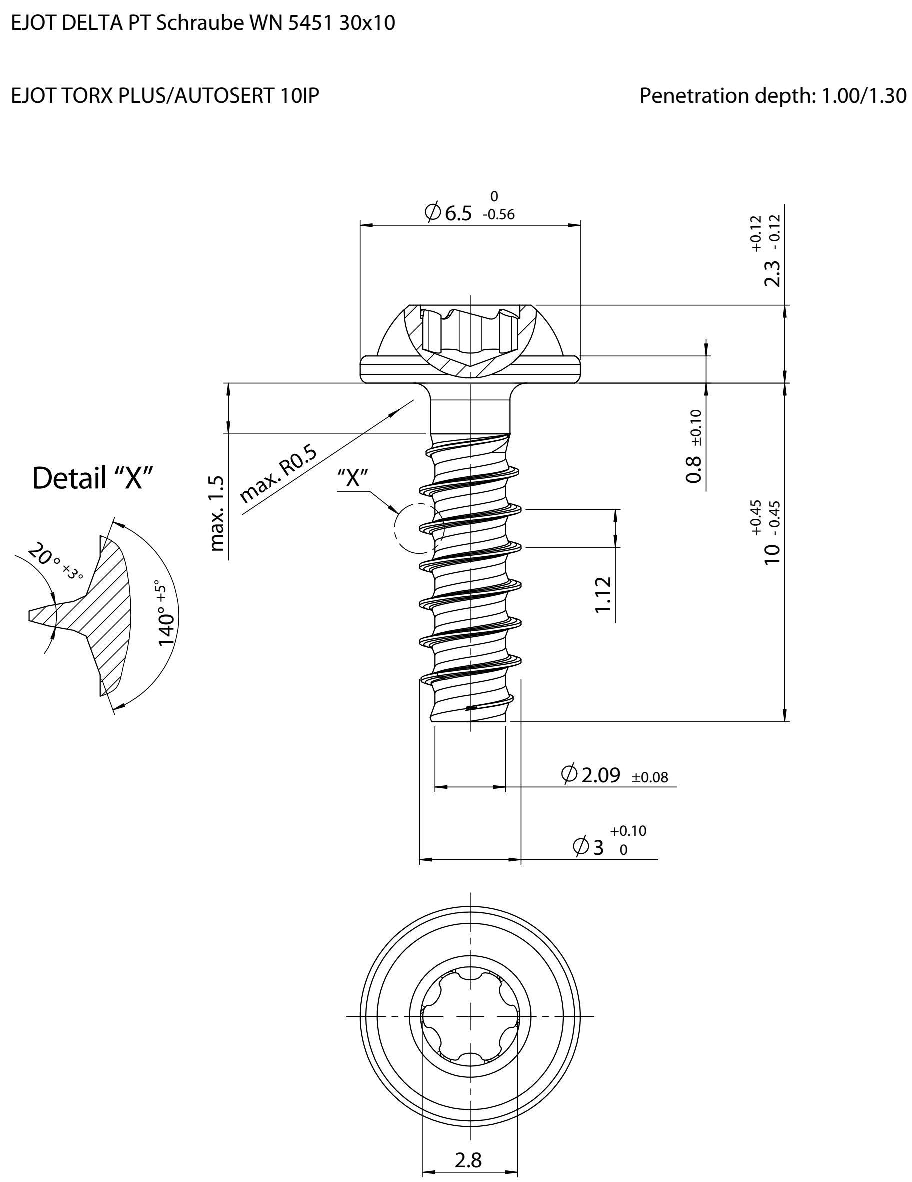



**Fig. 39**

### D.7.4 D-sub

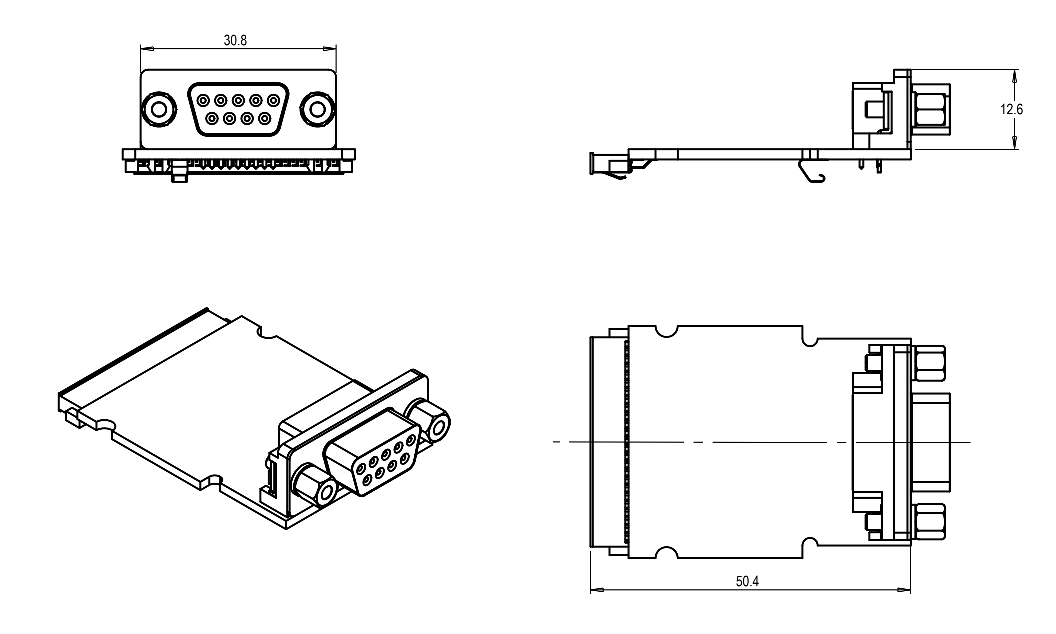



**Fig. 40**

### D.7.5 RJ45, 2–port

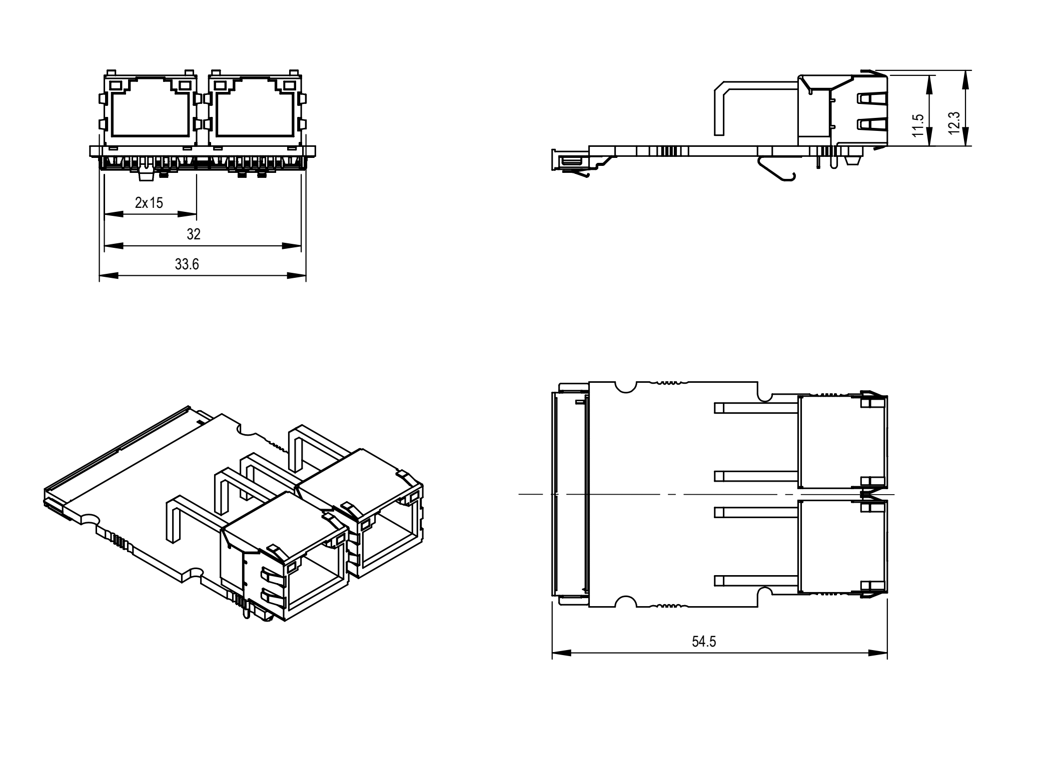



**Fig. 41**

## D.7.6 USB

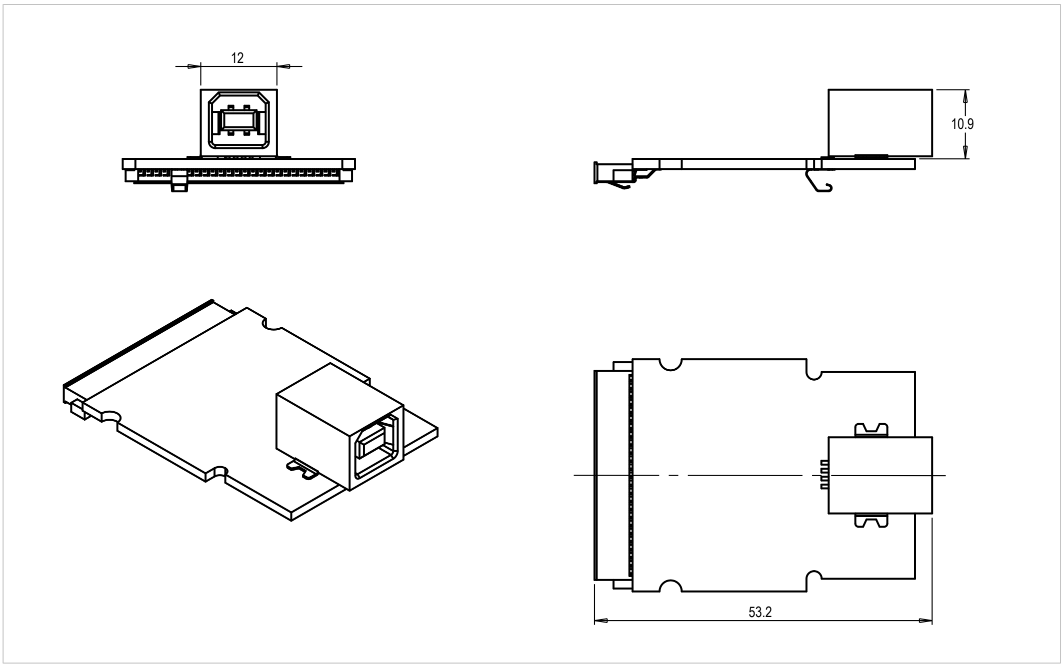



**Fig. 42**

## D.7.7 Pluggable Screw Terminal (5.08 mm)

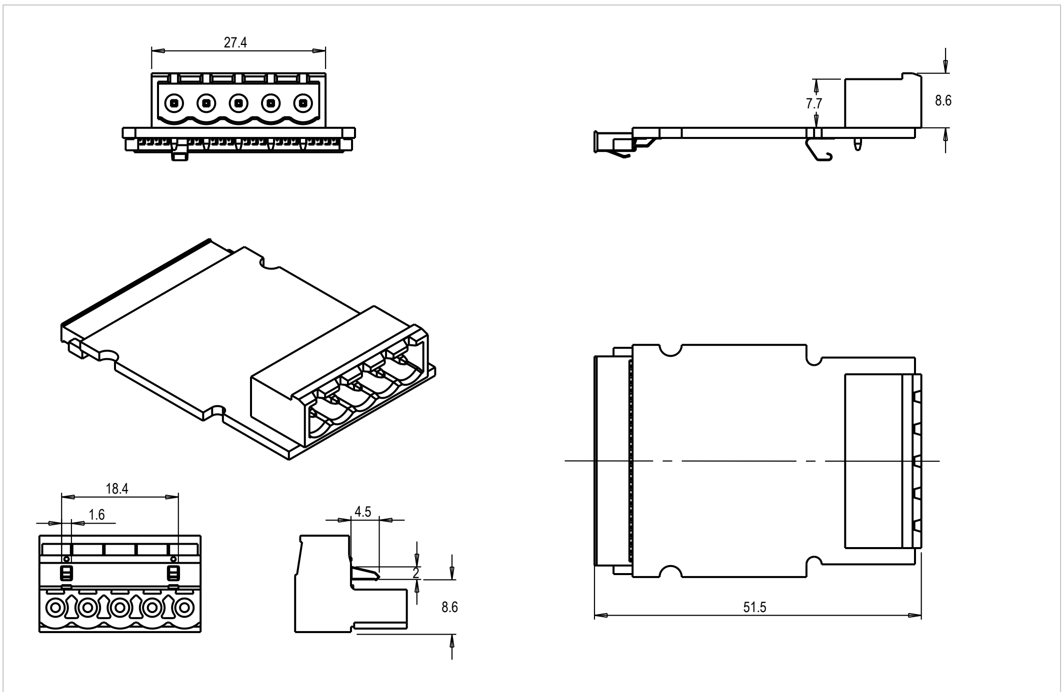



**Fig. 43**

## D.7.8 BNC, 2–Port

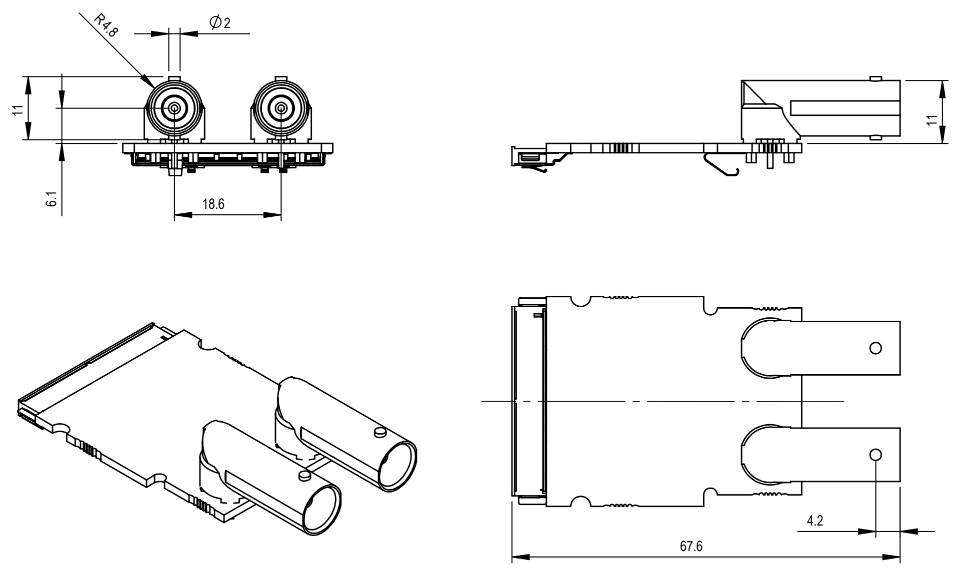



**Fig. 44**

# D.8 M12 Connectors

## D.8.1 Dimensions

**Female - Female**

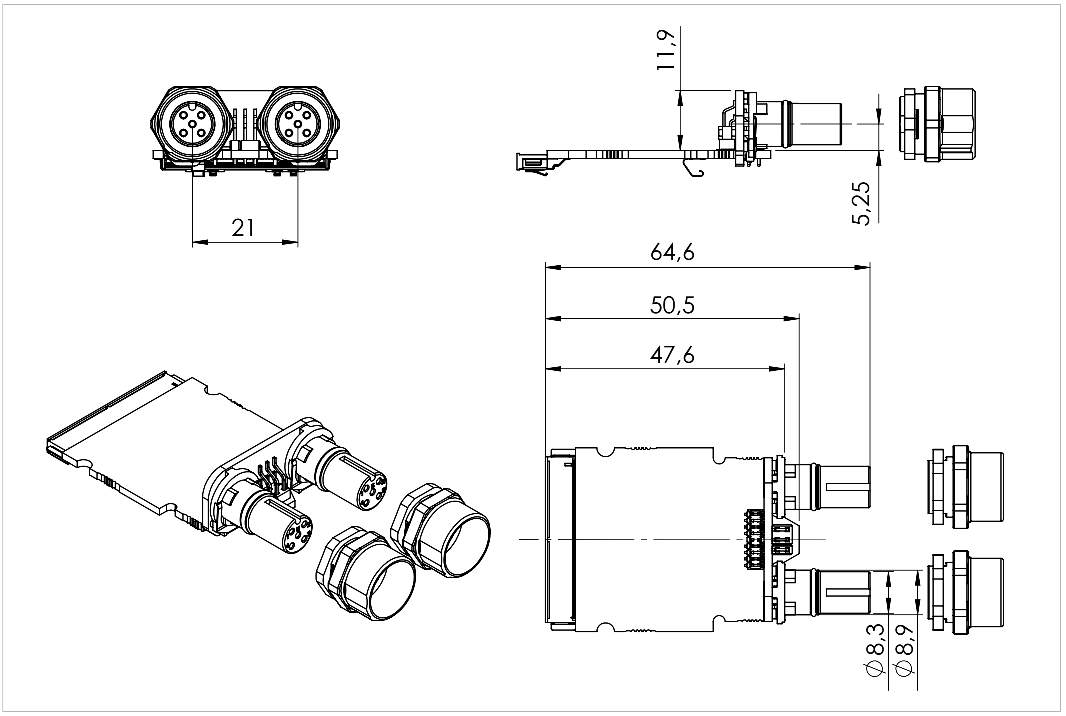



**Fig. 45**

**Female - Male**

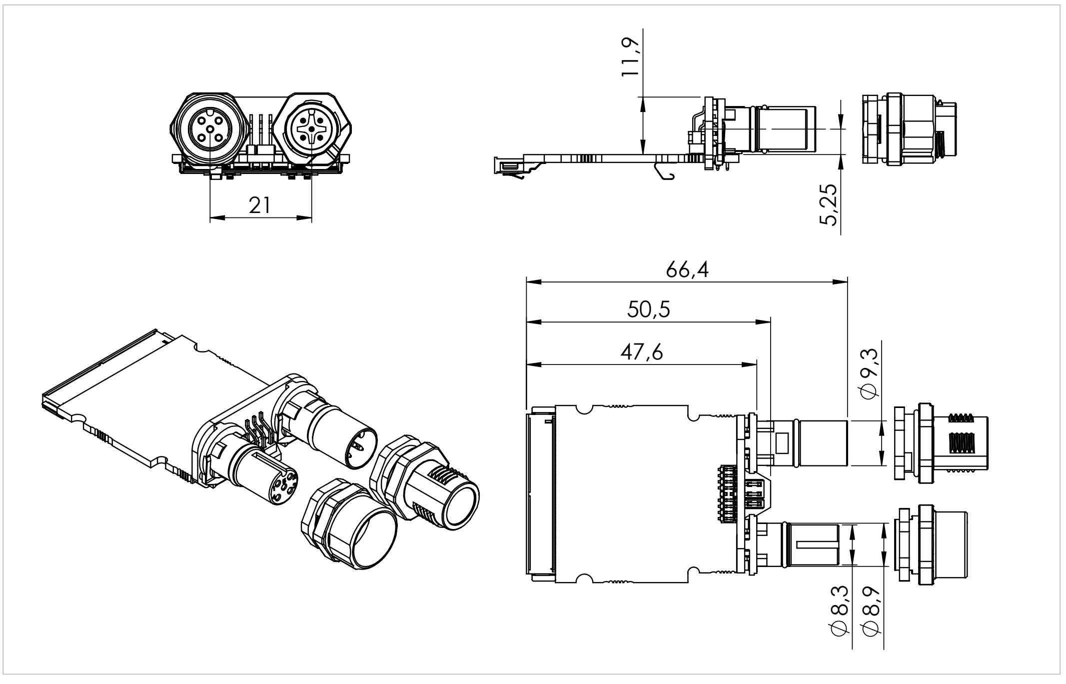



**Fig. 46**

### D.8.2 IP Rating

To ensure that the final design will fulfill the requirements for IP67 rating, the M12 connectors have to be firmly and tightly attached on both sides of the front plate. The dimensions for the front plate are given below.

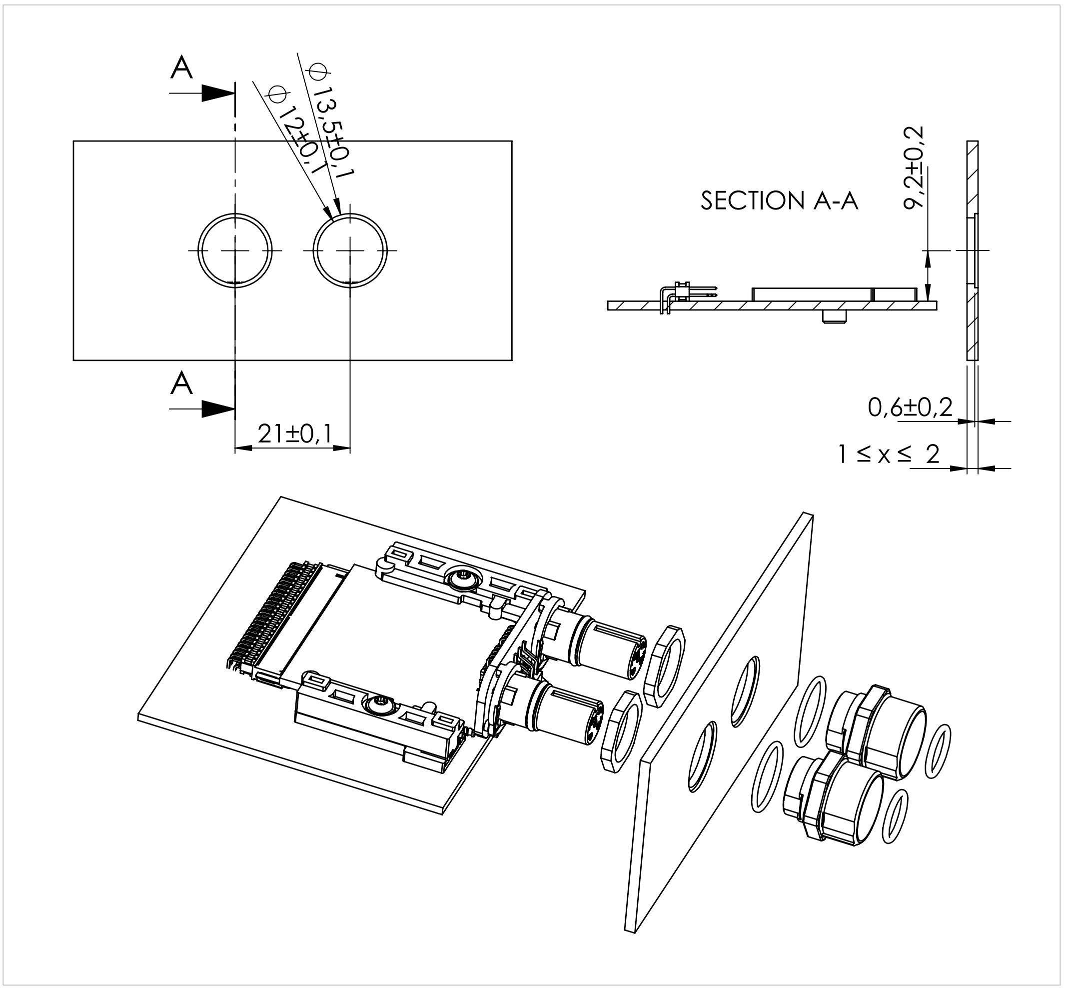



**Fig. 47**

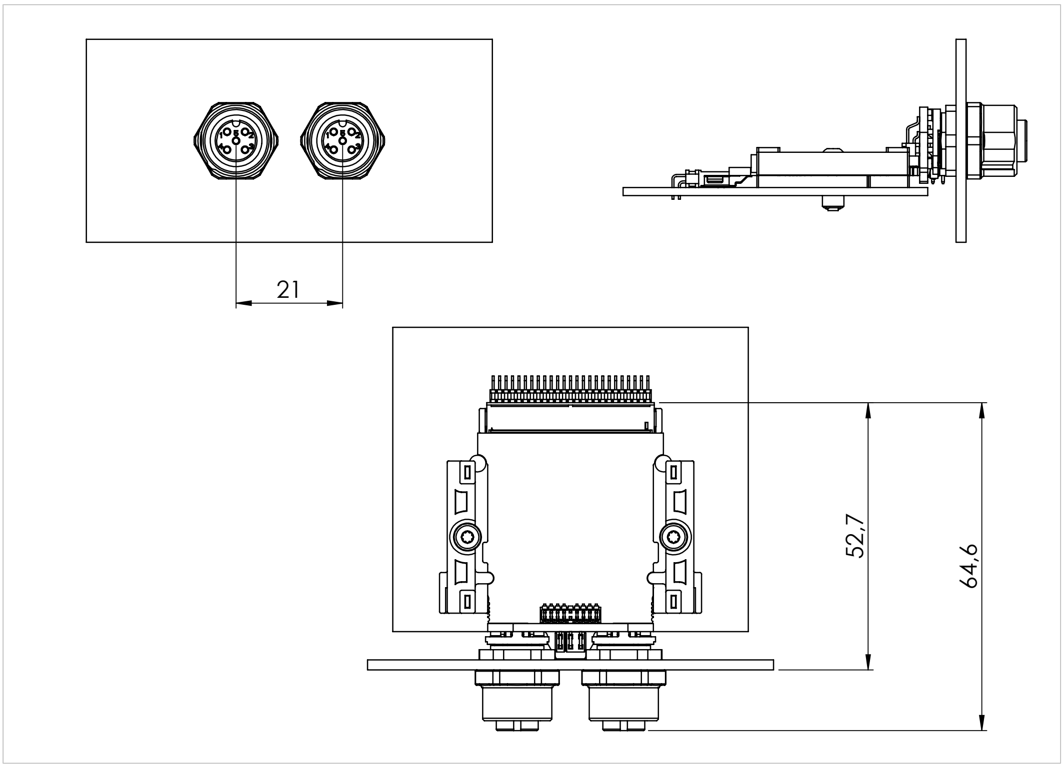



**Fig. 48**

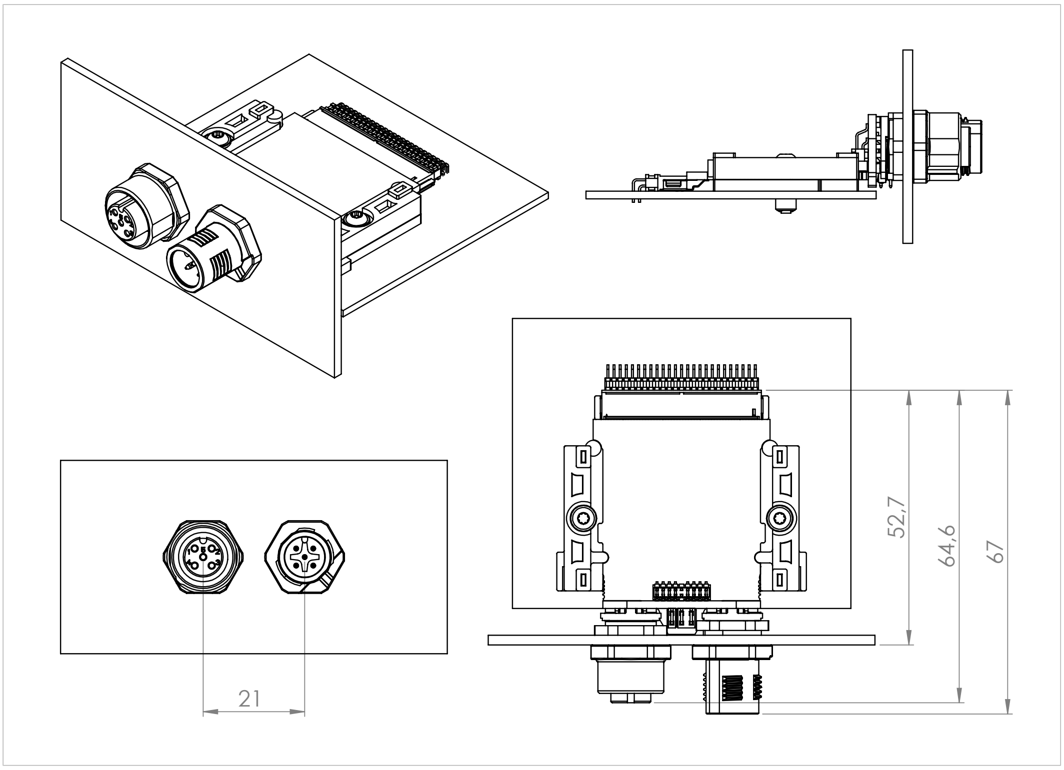



**Fig. 49**

### D.8.3 M12 Connector Assembly

The M12 connector parts are not joined on the Anybus CompactCom module at delivery. The connector has to be tightly mounted on both sides of the front plate if the design is to be rated in class IP67. The design, preparation and manufacturing of the front plate is not offered by HMS Industrial Networks, but has to be performed by the customer. For dimensions see *M12 Connectors, p. 57*.

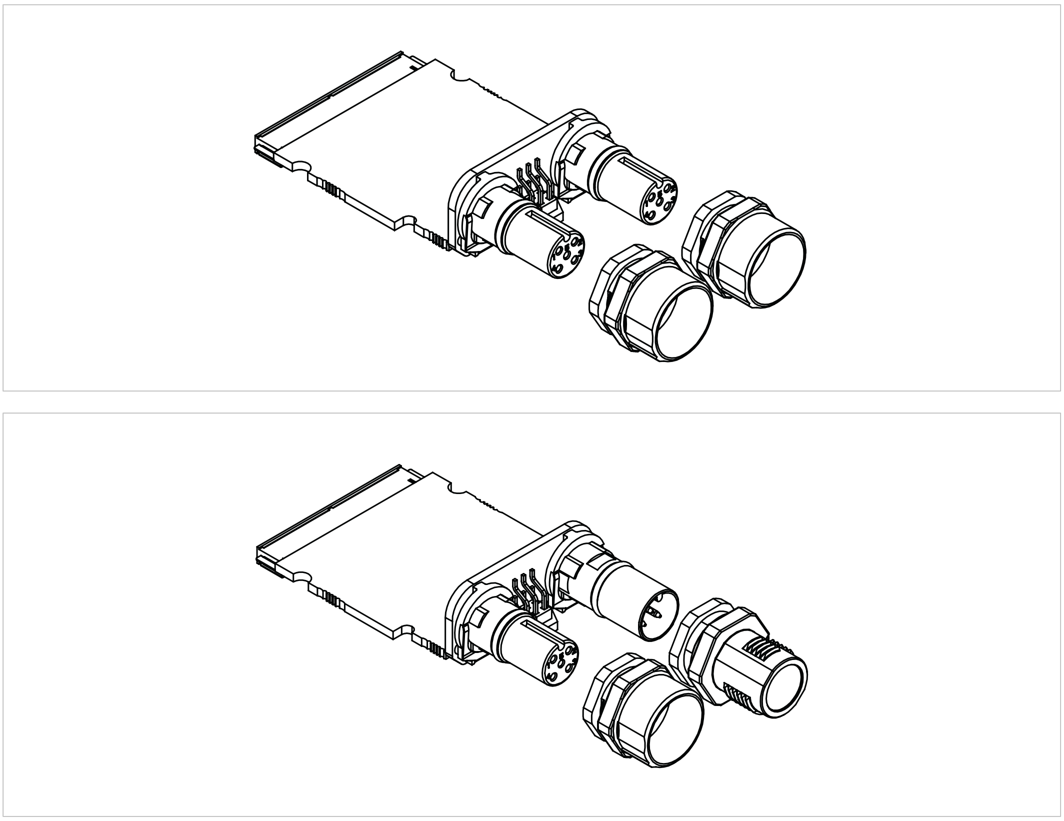


**Fig. 50**

There are three guides on both the inner and outer parts of the connectors for mechanical keying, ensuring correct rotation of the outher parts.

*Please make sure that the connectors are pushed all the way into these guides at assembly.*

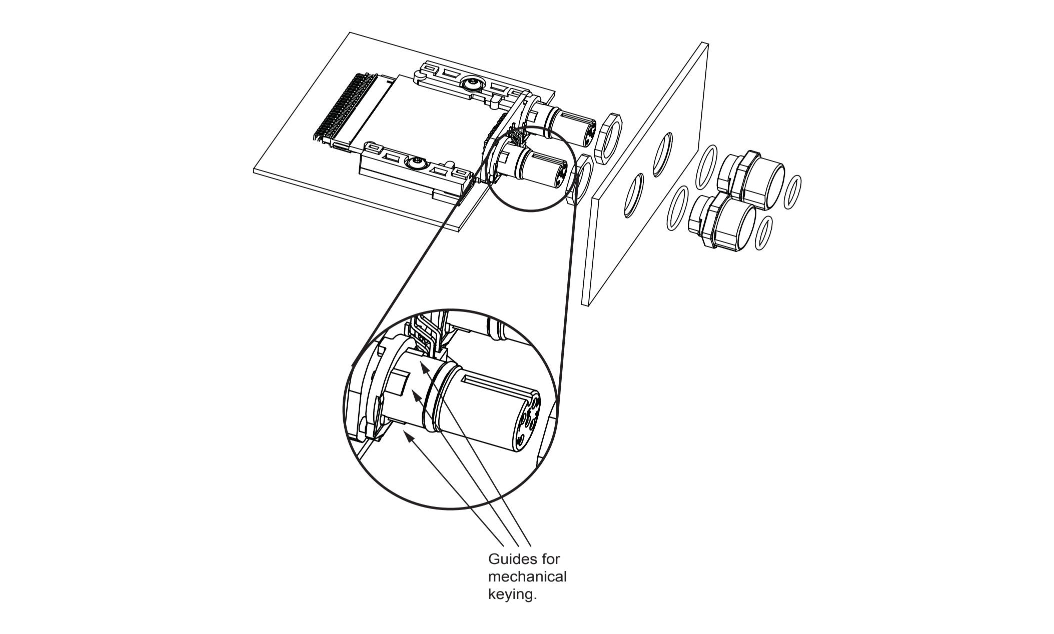



**Fig. 51**

There are also markings on the casings of the connectors to make it easier to mount the connectors at the correct mounting angle.

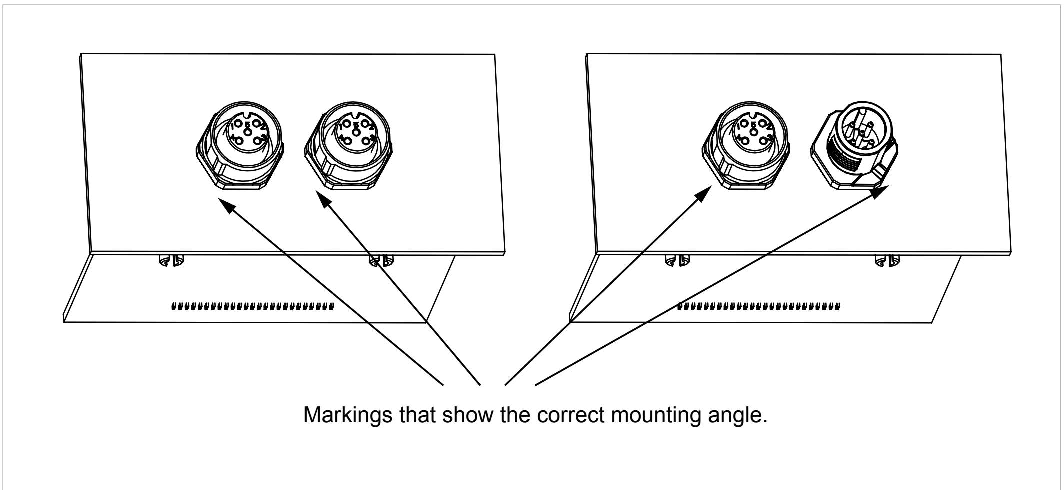



**Fig. 52**

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