

## ETAS GETK-P4.0A

Measurement Interface for Microprocessors and Microcontroller using PCI Express



User Guide

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## Contents

1	Basic Safety Notices .....	6
1.1	Classification of Safety Messages .....	6
1.2	Safety Information .....	6
1.3	Intended Use .....	7
1.3.1	Application areas .....	7
1.3.2	Technical Condition .....	8
1.4	Assembly .....	8
1.4.1	Installation Location .....	8
1.4.2	Securing the Product .....	8
1.4.3	Ventilation .....	8
1.5	Operation .....	9
1.6	Electrical Connection .....	9
1.6.1	Electrical Safety and Power Supply .....	9
1.6.2	Connection to the power supply .....	10
1.6.3	De-energizing the product .....	10
1.7	Cables and Accessories .....	10
1.7.1	Cables .....	10
1.7.2	Accessories .....	10
1.7.3	Transport .....	10
1.7.4	Maintenance .....	11
1.7.5	Cleaning .....	11
1.7.6	Repairs .....	11
1.7.7	Shipment and Packaging .....	11
1.8	Identifications on the Product .....	11
1.9	Fulfilled Standards and Norms .....	12
1.10	Taking the Product Back and Recycling .....	12
1.11	Declaration of Conformity .....	13
1.11.1	CE Declaration of Conformity (European Union) .....	13
1.11.2	UKCA Declaration of Conformity (Great Britain) .....	13
1.11.3	KCC Marking .....	13
1.12	RoHS Conformity .....	13
1.12.1	European Union .....	13
1.12.2	China .....	13
1.13	Declarable Substances .....	13
1.14	Use of Open Source Software .....	14
2	Introduction .....	15
2.1	System Overview .....	15
2.1.1	Data Acquisition for Autonomous Driving ECUs .....	15
2.1.2	System Interfaces .....	15
2.1.3	Data Transfer .....	15
2.1.4	Setup Overview .....	15
2.1.5	Cascading .....	16
2.2	Product Features .....	17
3	Hardware Description .....	18
3.1	Architecture .....	18

3.2	Interfaces Overview .....	19
3.2.1	40/100GE Ethernet Interface to Recorder PC .....	20
3.2.2	PCIe1-4 Interface to ECU .....	20
3.2.3	CAS-IN Interface .....	20
3.2.4	CAS-OUT Interface .....	21
3.3	LED Display of the System .....	21
3.4	Power Supply .....	22
3.4.1	Voltage Supply .....	22
3.4.2	Reverse Polarity Protection .....	22
3.5	Temperature Control and Restart .....	22
3.6	Operation States .....	22
3.6.1	Standby State .....	22
3.6.2	Operation State .....	23
3.7	Control Signals Functional Description .....	23
3.7.1	Wakeup (GPIO_WAKE) .....	24
3.7.2	/Present.P (/GPIO_ECU_PRST_P) .....	24
3.7.3	Ready (GPIO_CASC_RDY) .....	24
3.8	Precision Time Protocol (PTP) .....	25
3.8.1	Precision Time Protocol IEEE 802.1AS .....	25
3.8.2	PCIe Clock and ECU Synchronization .....	25
3.9	Use Case Measurement .....	25
3.9.1	Measurement Technology Network (MT) .....	25
3.9.2	Measurement Data .....	25
3.10	Application Hints .....	27
3.11	Configuration .....	27
4	Installation .....	28
4.1	Ventilation .....	28
4.2	Inserting the Interface Cables .....	28
4.3	Adapter Kit 19" for GETK-P4 for Installation into a 19" Rack .....	29
5	Configuration .....	30
5.1	IP Address Configuration .....	30
5.1.1	Fixed IP Addresses .....	30
5.1.2	Configuring Customized IP Addresses .....	30
5.1.3	IP Addresses .....	30
5.1.4	Configuring network adapter of Host-PC .....	30
5.1.5	TCP/IP6 configuration .....	31
5.2	Firmware Update .....	31
5.2.1	Requirements for Installation .....	31
5.2.2	Verify the Python Version .....	31
5.2.3	Extract both packages into the same directory .....	32
5.2.4	Start the processmanager in parallel .....	32
5.2.5	Starting getkupdate .....	32
5.2.6	getkupdate command options .....	32
5.2.7	Check communication .....	33
5.2.8	Download the firmware .....	33
5.3	Set the alias-name .....	33
5.4	Web Interface .....	33

5.4.1	Web Subpages .....	34
6	Technical Data .....	35
6.1	System Requirements for the ECU .....	35
6.2	Environmental Conditions .....	36
6.3	Mechanical Data .....	36
6.4	Power Supply PWR .....	37
6.4.1	Power Supply .....	37
6.4.2	Power Supply PWR Interface Pinning .....	37
6.5	PCIe 1-5 Interfaces .....	37
6.5.1	Interface Characteristics PCIe 1-5 .....	37
6.5.2	Mini-SAS HD PCIe Pin Assignment .....	38
6.6	CAS-IN Interface .....	39
6.6.1	CAS-IN Interface Characteristics .....	39
6.6.2	CAS-IN Interface Pinning .....	40
6.7	CAS-OUT Interface .....	41
6.7.1	CAS-OUT Interface Characteristics .....	41
6.7.2	CAS-OUT Interface Pinning .....	41
6.8	10GE Interface .....	42
6.9	40/100GE Interface .....	42
6.10	1GE Interface .....	42
6.11	USB Interface .....	42
7	Cables and Accessories .....	43
7.1	Power Supply Cable .....	43
7.1.1	Power Supply Cable CBP510-2 .....	43
7.1.2	Power Supply Safety Cable CBP5105-2 .....	44
7.2	PCIe Cables CBBC100.1 and CBBO100.1 .....	44
7.2.1	General .....	44
7.2.2	Vendor Identification .....	44
7.2.3	Opposite Installation of PCIe1-4 connectors to PCIe5 connector .....	45
7.2.4	Cable bending and handling .....	45
7.2.5	PCIe Copper Cable CBBC100.1 (DAC) .....	46
7.2.6	PCIe Optical Cable CBBO100.1 (AOC) .....	47
7.3	Ethernet Cables .....	47
7.3.1	1GE: Standard Ethernet Cables .....	47
7.3.2	10GE: SFP+ Direct Attached Copper Cables .....	48
7.3.3	40/100GE: QSFP28 Direct Attached Copper Cables .....	48
7.4	Other cables .....	48
7.4.1	Chain Connection Cable CBAV423.1 .....	48
8	Ordering Information .....	50
8.1	GETK-P4.0A .....	50
8.2	Cable and Adapter .....	50
8.3	Adapter Kit 19" for GETK-P4 for installation into a 19" Rack .....	50
9	Contact Information .....	51
	Index .....	52


# 1 Basic Safety Notices


This chapter contains information about the following topics:


- Classification of Safety Messages ..... 6
- Safety Information ..... 6
- Intended Use ..... 7
- Assembly ..... 8
- Operation ..... 9
- Electrical Connection ..... 9
- Cables and Accessories ..... 10
- Identifications on the Product ..... 11
- Fulfilled Standards and Norms ..... 12
- Taking the Product Back and Recycling ..... 12
- Declaration of Conformity ..... 13
- RoHS Conformity ..... 13
- Declarable Substances ..... 13
- Use of Open Source Software ..... 14

## 1.1 Classification of Safety Messages

The safety messages used here warn of dangers that can lead to personal injury or damage to property:

 <b>DANGER</b>
indicates a hazardous situation with a high risk of death or serious injury if not avoided.

 <b>WARNING</b>
indicates a hazardous situation of medium risk, which could result in death or serious injury if not avoided.

 <b>CAUTION</b>
indicates a hazardous situation of low risk, which may result in minor or moderate injury if not avoided.

<b>NOTICE</b>
indicates a situation, which may result in damage to property if not avoided.

## 1.2 Safety Information

Refer to the following safety instructions and the technical documentation available to download from the ETAS website [www.etas.com](http://www.etas.com). Keep the information provided in a safe place.

Failure to comply with the safety instructions may lead to the risk of damage to life and limb or property. The ETAS Group and its representatives shall not be liable for any damage or injury caused by improper operation or use of the product.

Only use the product if you have read and understood the information concerning safe operation and have the required qualifications and training for this product. If you have questions about safe operation, contact ETAS:

- Technical Support: [www.etas.com/hotlines](http://www.etas.com/hotlines)
- ETAS contact partners by region: [www.etas.com/contact](http://www.etas.com/contact)

The product is only approved for the applications described in the technical documentation. When using and operating this product, all applicable regulations and laws must be observed.

ETAS products made available as beta versions or prototypes of firmware, hardware and/or software are to be used exclusively for testing and evaluation purposes. These products may not have sufficient technical documentation and not fulfill all requirements regarding quality and accuracy for market-released series products. The product performance may therefore differ from the product description. Only use the product under controlled testing and evaluation conditions. Do not use data and results from beta versions without prior and separate verification and validation and do not share them with third parties.

Before starting up the product, check whether there is a Known Issue Report (KIR) for that product version: [www.etas.com/kir](http://www.etas.com/kir) (password: KETASIR). Note the information given in the report.

Program codes or program control sequences that are created or changed via ETAS products, as well as all types of data obtained through the use of ETAS products, must be checked for their reliability and suitability prior to use or distribution. Only use these codes or sequences in public areas (e.g., in road traffic) if you have ensured that the application and product settings are safe through testing in self-contained and designated testing environments and circuits.

This ETAS product allows you to influence safety-relevant systems or data (e.g. in motor vehicles, vehicle components and test benches). In the event of a malfunction or a hazardous situation, it must be possible to put the system into a safe state (e.g., emergency stop or emergency operation).

### 1.3 Intended Use

The product was developed and approved for applications in the automotive sector. Only operate the product as per its specifications. If the product is used in any other way, product safety is no longer ensured.

The Gigabit Emulator Probe (GETK-P4.0A) is a measurement technology adapter for access to vehicle control units. The GETK-P4.0A is designed for recording and transfer internal data.

#### 1.3.1 Application areas

- The product is approved for use in the following areas:

- Interior
  - Passenger cell
  - Trunk
  - Laboratory
  - Test bench
- Do not operate the product in a wet or damp environment.
  - Do not operate the product in potentially explosive atmospheres.

### 1.3.2 Technical Condition

The product is designed in accordance with state-of-the-art technology. Only operate the product and its accessories if they are in perfect working order. Shut down a damaged product immediately. Do not open or alter the product. Only ETAS may make changes to the product.

## 1.4 Assembly

Only install, connect, disconnect, and cable ETAS products and components when they are de-energized.

### 1.4.1 Installation Location

Install the product into a rack or on a smooth, level and firm surface.

#### NOTICE

##### Damage to the electronics due to potential equalization

The cables' shield may be connected to the housing, the ground or the ground for the product's power supply. If there are different ground potentials in the test setup, equalizing currents can flow between the products via the cables' shield. Take account of different electric potentials in your test setup and take appropriate measures to prevent equalizing currents.

### 1.4.2 Securing the Product

The housing must not be damaged while securing the product.

Only secure the product to fastening elements intended for this.



#### WARNING

##### Risk of injury due to inadequate fastening

- Secure the product so that it does not move uncontrollably.
- Only use carrier systems and fastening materials that can accommodate the static and dynamic forces of the product and are suitable for the ambient conditions.

### 1.4.3 Ventilation

- Protect the product against direct solar radiation and other sources of heat.
- Ensure that there is sufficient air circulation for efficient heat exchange.
  - Keep a distance of at least 4 cm to the rear and at least 4 cm to the front.
  - Do not cover the ventilation slots.



- Do not operate the product in enclosed areas.

## 1.5 Operation

Only operate the product with the latest firmware. You can find information about updating the firmware in the user manual.

If the firmware update is not completed successfully, try it again. If a new firmware update is not possible and the product is not functional, send the product to ETAS.



### WARNING

Undefined vehicle behavior due to critical system error in the ECU software

Disconnections or faulty communication via the PCIe interface can lead to a critical system error in the ECU software.

Only use the product with ECU hardware and ECU software that are not prone to disconnections or faulty communication with the PCIe interface.

## 1.6 Electrical Connection

### 1.6.1 Electrical Safety and Power Supply

- Only connect the product to electric circuits with safety extra-low voltage in accordance with IEC 61140 (devices of class III) within the voltage limits for accessible parts as per IEC 61010-1.
- Comply with the connection and setting values (see chapter Technical Data).
- The power supply for the product must be safely disconnected from the mains power.
- Only use lab power supplies with dual protection for the supply network (with double/reinforced insulation (DI/RI)).
- The power supply must be suitable for use according to the ambient conditions for the product.
- It is possible to discharge the vehicle battery in regular operation and long standby operation.
- Central load-dump protection is required for operation.

## 1.6.2 Connection to the power supply



### WARNING

#### **Risk to life from electric shock**

If an unsuitable power supply is used, this may generate a hazardous electrical voltage.

- Use a power supply that is permitted for the product.
- Do not connect the product to power outlets.
- To prevent inadvertent connection to power outlets, use power cords with safety banana plugs in areas with power outlets.

- Only connect the product to the power supply via a suitable fuse protection.
- Ensure that the connections of the power supply are easily accessible.

## 1.6.3 De-energizing the product

1. Disconnect the product from the power supply in one of the following ways:
  - Switch off the laboratory power supply for the test setup.
  - Disconnect the test setup's connection to the vehicle battery.
  - Remove the power cord.
2. Remove all cables from the product.

## 1.7 Cables and Accessories

### 1.7.1 Cables

- Only use ETAS cables, cables recommended by ETAS or other cables certified for the application.
- Route the cables such that they are protected against abrasion, damage, deformation and kinking.
- Do not place any objects on the cables.
- Do not use any damaged cables.
- The connector and connection must not be dirty.
- The connector and connection must be compatible.
- Correctly align the connector with the connection.
- Do not connect the connector and connection by force.

### 1.7.2 Accessories

Use ETAS accessories, accessories recommended by ETAS or other accessories certified for the application. For detailed information about accessories, see the product's user manual.

### 1.7.3 Transport

- Only transport the product individually.
- Remove all connected cables before transportation.
- Do not transport the product by the connected cables.

#### 1.7.4 Maintenance

The product is maintenance-free.

#### 1.7.5 Cleaning

- Only clean the product when it is de-energized.
- Do not use compressed air to clean the fans.
- Do not use cleaning agents that could harm the product.
- Do not apply cleaning agents directly onto the product
- Use a dry or slightly dampened, soft, lint-free cloth.
- Make sure that no moisture enters the product.

#### 1.7.6 Repairs









If repairs are required, send the product to ETAS.

#### 1.7.7 Shipment and Packaging

You will find the hardware return form and the procedure at the ETAS-Website:  
[www.etas.com/en/support/hw\\_return\\_form.php](http://www.etas.com/en/support/hw_return_form.php).

### 1.8 Identifications on the Product

The following symbols are used for identification of the product:

Symbol	Description
	The User Guide must be read prior to the startup of the product!
	WEEE symbol, see chapter 1.10 on page 12
	CE conformity symbol, see chapter 1.11.1 on page 13
	UKCA conformity symbol (Great Britain), see chapter 1.11.2 on page 13
	KCC conformity symbol (Korea), see chapter 1.11.3 on page 13
	China RoHS symbol, see chapter 1.12.2 on page 13
	China RoHS symbol, see chapter 1.12.2 on page 13
	Symbol for electrostatic sensitive components
GETK-P4.0A	Product designation
F 00K XXX YY	Order number of the product
SN: yyxxxxx	Serial number (7-digit)

Symbol	Description
XXXX/YY	Product version
ZZZZ	Year of manufacture
ETAS GmbH...	Manufacturer's address

**NOTE**

For symbols and product information one or several adhesive labels can be used.

## 1.9 Fulfilled Standards and Norms

The module adheres to the following standards and norms:

Norm	Test
EN 61326-1 <sup>1)</sup>	Electrical equipment for measurement, control and laboratory use - EMC requirements
EN 61000-6-2	Immunity (industrial environments)
EN 61000-6-4	Emission standard (industrial environments)
IEC 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use

<sup>1)</sup> the product is not suitable to be used in DC supply networks.

When using the module outside of industrial environments avoid possible radio disturbances by additional shielding measures!

## 1.10 Taking the Product Back and Recycling

The European Union has passed a directive called Waste Electrical and Electronic Equipment, or WEEE for short, to ensure that systems are setup throughout the EU for the collection, treating and recycling of electronic waste.

This ensures that the devices are recycled in a resource-saving way representing no danger to health or the environment.



**Fig. 1-1** WEEE-Symbol

The WEEE symbol (see Fig. 1-1 on page 12) on the product or its packaging shows that the product must not be disposed of as residual garbage.

The user is obliged to collect the old devices separately and return them to the WEEE take-back system for recycling. The WEEE directive concerns all ETAS devices but not external cables or batteries.

For more information on the ETAS GmbH Recycling software, contact the ETAS sales and service locations.

## 1.11 Declaration of Conformity

### 1.11.1 CE Declaration of Conformity (European Union)

With the CE mark attached to the product or its packaging, ETAS confirms that the product corresponds to the applicable product-specific European Directives. The CE Declaration of Conformity for the product is available upon request.

### 1.11.2 UKCA Declaration of Conformity (Great Britain)

With the UKCA mark attached to the product or its packaging, ETAS confirms that the product corresponds to the product-specific, applicable standards and directives of Great Britain. The UKCA declaration of conformity for the product is available on request.

### 1.11.3 KCC Marking

With the KCC mark attached to the product and its packaging, ETAS confirms that the product has been registered in accordance with the product-specific KCC guidelines of the Republic of Korea.

## 1.12 RoHS Conformity

### 1.12.1 European Union

The EU Directive 2011/65/EU limits the use of certain dangerous materials for electrical and electronic devices (RoHS conformity).

This product does not contain any of the restricted substances specified in the EU Directive 2011/65/EU or exceeds the maximum concentrations stipulated therein. For individual electronic components used in our products, there are currently no equivalent alternative substances, which is why we make use of the exception 6a, 7a, 7C-I, and 6C (for accessory cables) in Annex III of this Directive.

ETAS confirms that the product corresponds to this directive which is applicable in the European Union.

### 1.12.2 China

ETAS confirms that the product meets the product-specific applicable guidelines of the China RoHS (Management Methods for Controlling Pollution Caused by Electronic Information Products Regulation) applicable in China with the China RoHS marking affixed to the product or its packaging.

## 1.13 Declarable Substances

### European Union

Some products from ETAS GmbH (e.g., modules, boards, cables) use components with substances that are subject to declaration in accordance with the REACH regulation (EU) no.1907/2006.

Detailed information is located in the ETAS download center in the customer information "REACH Declaration" ([www.etas.com/Reach](http://www.etas.com/Reach)). This information is continuously being updated.

#### 1.14 Use of Open Source Software

The product uses Open Source Software (OSS). This software is installed in the product at the time of delivery and does not have to be installed or updated by the user. Reference shall be made to the use of the software in order to fulfill OSS licensing terms. Additional information is available in the document "OSS Attributions List" at the ETAS website [www.etas.com](http://www.etas.com).

## 2 Introduction

This chapter contains information about following topics:

- System Overview..... 15
- Product Features..... 17

### 2.1 System Overview

#### 2.1.1 Data Acquisition for Autonomous Driving ECUs

The GETK-P4.0A (Gigabit Emulator Test Probe PCIe) is a Measurement Interface for Microprocessors and Microcontroller using PCI Express to access Electronic Control Units (ECUs). Its key functionality is the fast data acquisition from ADAS-ECUs and to storing the data on a High-Performance PC.

#### 2.1.2 System Interfaces

To process the ECU data, the GETK-P4.0A connects the ECU microprocessors via PCIe Gen4 interface. A GETK-P4.0A ECU Driver must be installed on the ECU as part of the middleware.

#### 2.1.3 Data Transfer

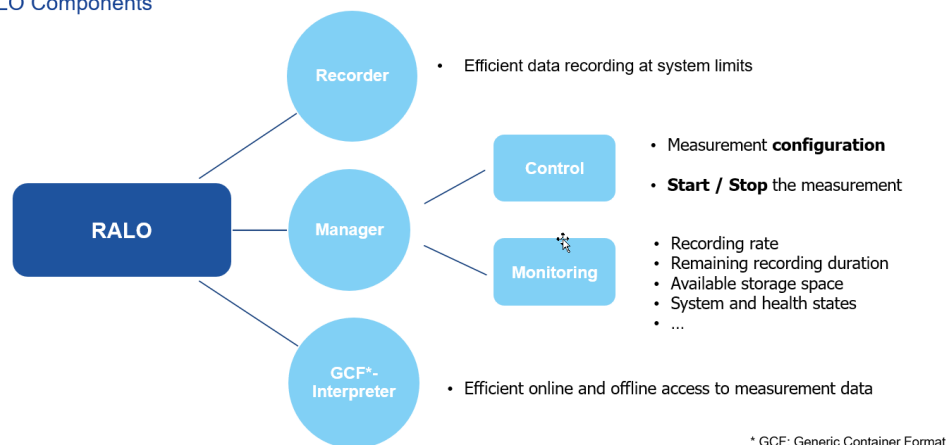
The measurement data from the ECU will be transferred via Ethernet to one or more Recorder PCs and/or to one or more Visualization PCs. Often the GETK-P4.0A is connected to an Ethernet switch. At this switch, several other network devices can be connected.

#### 2.1.4 Setup Overview

The ETAS software RALO is used to control the setup.

### RALO

RALO Components



**Fig. 2-1** GETK-P4.0A RALO overview

Beside the GETK-P4.0A and the ECU, one or more PCs installed in the Measurement (Ethernet) network of the vehicle are necessary for the recording, visualization and control, configuration or monitor functionalities.

- Configuration functionality  
Allows the user to configure and control one or more measurement sessions and to monitor them and all the ETAS measurement devices installed in the vehicle.
- Recorder functionality  
Used to transfer the data with high-speed from the ECU to the Recorder PC.
- Visualization functionality  
Used to analyze and visualize the data. This can be done online during a running measurement, or offline after the measurement.

The above functionality can be split onto different PCs.

### 2.1.5 Cascading

Multiple GETK-P4.0A devices or MDH devices can be added to the measurement setup as well as connected by the cascading interface.

MHD is a Measurement Interface for capturing Video raw signals.

The cascading interfaces delivers the ECU with basic status information generalized for the connected measurement devices.

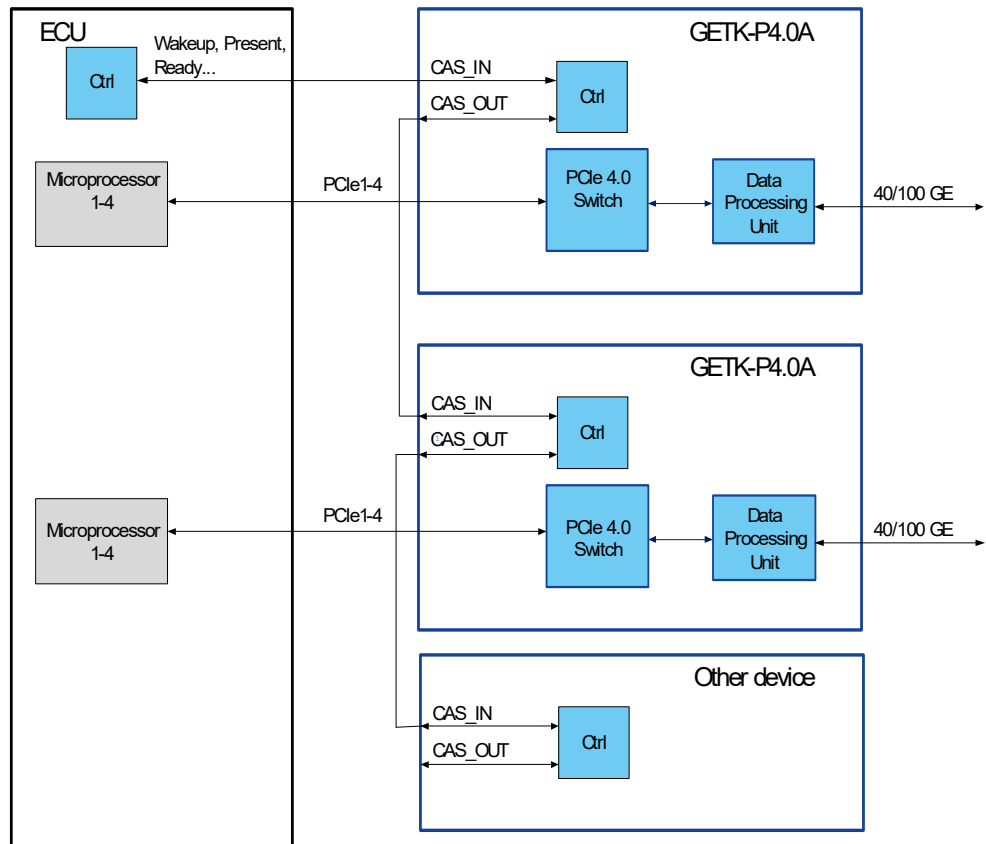
General signals:

- Wakeup
- Present
- Ready
- Replay mode

When using several GETK-P4.0A devices in the same network, make sure they have a unique IP -address. See as well "Configuring Customized IP Addresses" on page 30.



Compatible devices can be added as well and can be integrated into the control line at CAS-OUT.



**Fig. 2-2** Cascading of GETK-P4.0A and compatible devices

## 2.2

### Product Features

The GETK-P4.0A provides following features:

- 4 PCIe Gen4 Mini-SAS HD interfaces to the ECU
- Additional control signals for Wakeup and cascading
- 40/100GE high-speed Ethernet connection to the Recorder PC
- 10 GE Interface
- 1 GE Interface

For more technical data on the GETK-P4.0A refer to "Technical Data" on page 35.

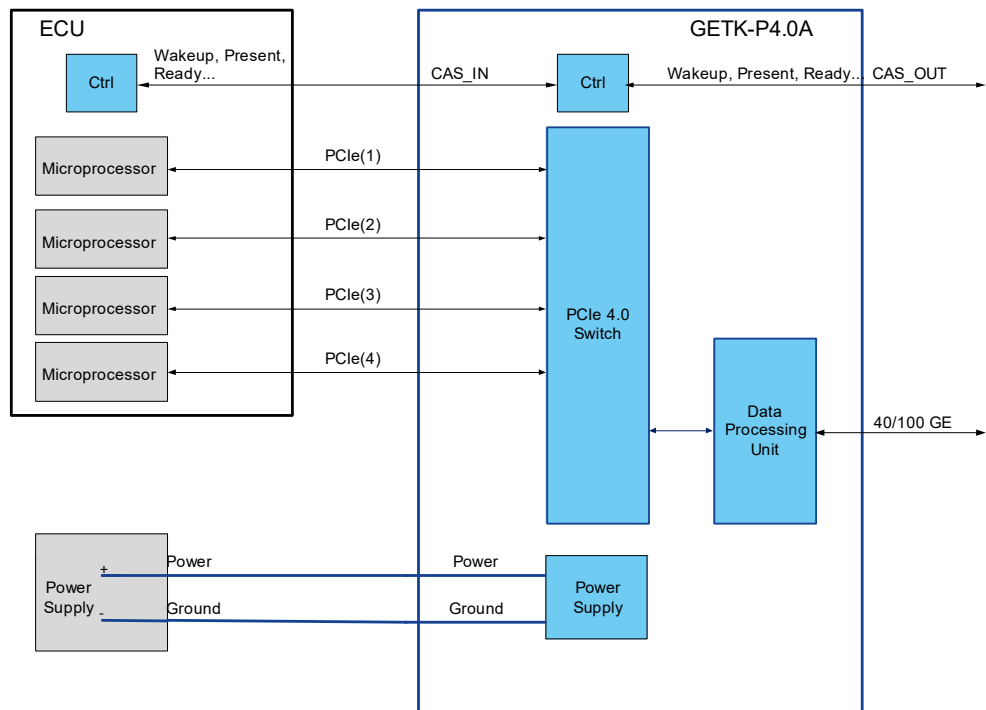
### 3 Hardware Description

This chapter contains information about following topics:

- Architecture ..... 18
- Interfaces Overview ..... 19
- LED Display of the System ..... 21
- Power Supply ..... 22
- Temperature Control and Restart ..... 22
- Operation States ..... 22
- Control Signals Functional Description ..... 23
- Precision Time Protocol (PTP) ..... 25
- Use Case Measurement ..... 25
- Application Hints ..... 27
- Configuration ..... 27

#### 3.1 Architecture

The key functionality of the GETK-P4.0A (Gigabit Emulator Test Probe PCIe) is the fast acquisition of measurement data from an ECU via PCIe and writing it to a local hard drive.



**Fig. 3-1** GETK-P4.0A Architecture

On the four GETK-P4.0A PCIe Mini-SAS HD interfaces, standard PCIe Gen4 Mini-SAS HD cables are used for the data transfer between ECU and GETK-P4.0A.

The ETAS cable CBAV423 (Cascading) cable is used for control signals and the connection to additional GETK-P4.0A.

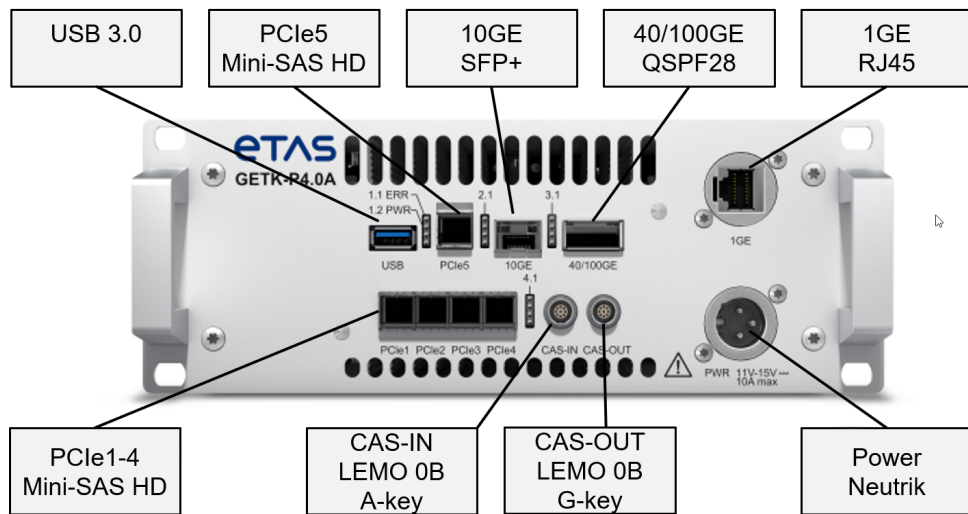
The GETK-P4.0A is supplied by the ETAS Power cable CBP510 or the Powercable CBP5105-2.

### 3.2 Interfaces Overview

The interfaces are listed below:



**Fig. 3-2** GETK-P4.0A Interfaces



**Fig. 3-3** GETK-P4.0A Interfaces

Label	Interface Connector type	Connection
USB	USB 3.0 (Host) connection	Reserved for ETAS internal use.
PCIe5	PCIe Gen4 Mini-SAS HD	Reserved for ETAS internal use.
10GE	10 Gigabit Ethernet SFP+	To laptop/PC e.g., for monitoring
40/100GE	QSFP28	To measurement network(switch) / Recorder PC

Label	Interface Connector type	Connection
1GE	RJ45	To laptop/PC for service operations e.g., FW Update..
PCle1	PCle Gen4 Mini-SAS HD	To PCle Interface of ECU
PCle2	PCle Gen4 Mini-SAS HD	To PCle Interface of ECU
PCle3	PCle Gen4 Mini-SAS HD	To PCle Interface of ECU
PCle4	PCle Gen4 Mini-SAS HD	To PCle Interface of ECU
CAS-IN	Control signals LEMO 0B 9pin (A-key)	First GETK-P4.0A to ECU Cascaded GETK-P4.0A to the previ- ous GETK-P4.0A
CAS-OUT	Control signals LEMO 0B 9pin (G-key)	To a cascaded GETK-P4.0A
PWR	Neutrik 3pin	To power supply

### 3.2.1 40/100GE Ethernet Interface to Recorder PC

The GETK-P4.0A is equipped with a 40/100 Gigabit Ethernet connector for connection to the measurement network (switch) / Recorder PC

### 3.2.2 PCle1-4 Interface to ECU



#### **WARNING**

Undefined vehicle behavior due to critical system faults in the ECU software  
Disconnections or faulty communication via the PCle interface can lead to a critical system error in the ECU software.  
Only use the product with ECU hardware and ECU software that are not prone to disconnections or faulty communication with the PCle interface

#### ***NOTICE***

Damage to the electronics due to potential equalization  
The cables' shield may be connected to the housing, the ground or the ground for the product's power supply. If there are different ground potentials in the test setup, equalizing currents can flow between the products via the cables' shield.  
Take account of different electric potentials in your test setup and take appropriate measures to prevent equalizing currents.

The four PCle interfaces are connected to the ECU.

Mini-SAS HD cables for PCle Gen4 can be used to connect the GETK-P4.0A with the ECU. All necessary signals between GETK-P4.0A and ECU interfaces are routed via the Mini-SAS HD adapter. The GETK-P4.0A connects the ECU via its microprocessor interfaces.

### 3.2.3 CAS-IN Interface

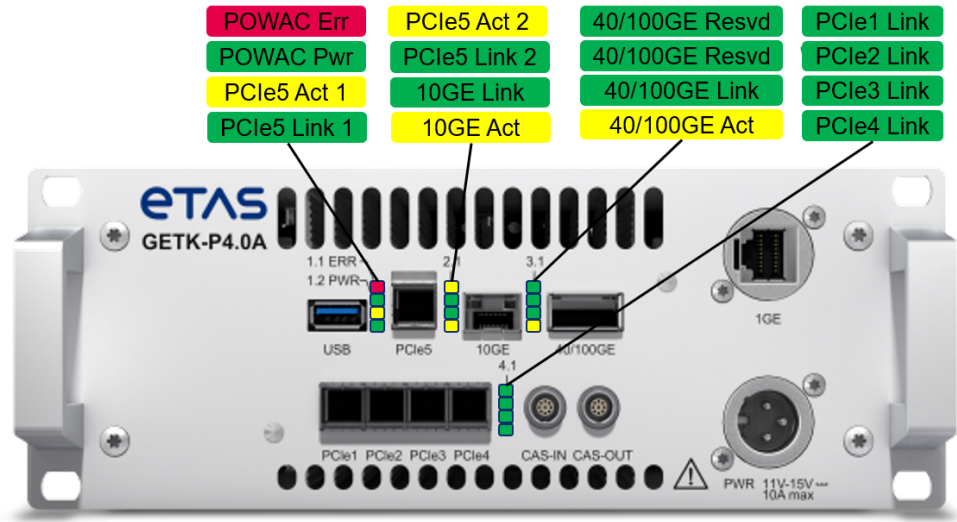
The CAS-IN interface contains control signals like Wakeup, Present, and Ready between the ECU and the GETK-P4.0A

### 3.2.4 CAS-OUT Interface

The CAS-OUT interface connects control signals like Wakeup, Present, and Ready to the next connected GETK-P4.0A.

### 3.3 LED Display of the System

Fig. 3-4 on page 21 shows the location of the LEDs on the front plate.



**Fig. 3-4** GETK-P4.0A Status LEDs

Description of the LED-states

LED	State	Description
PWR	Off	No voltage supplied to the device
	On	Voltage supplied to the device
ERR	Off	No error of the device
	On	Error state of the device. More information is available with the web interface
LinkX at PCIE1-4	Off	No link, no traffic
	Steady on	Link established, no traffic
	Flashing	Link established, data traffic

List of the Frontpanel LEDs

Refer to Fig. 3-4 on page 21.

LED-No.	Interface	State	Color
1.1	SystemError	ERR	Red
1.2	SystemPower	PWR	Green
1.3	PCIe5	Act1	Yellow
1.4	PCIe5	Link1	Green
2.1	PCIe5	Act2	Yellow
2.2	PCIe5	Link2	Green
2.3	10GE	Link	Green

LED-No.	Interface	State	Color
2.4	10GE	Act	Yellow
3.1	40/100GE	Reserved	Green
3.2	40/100GE	Reserved	Green
3.3	40/100GE	Link	Green
3.4	40/100GE	Act	Yellow
4.1	PCIe1	Link	Green
4.2	PCIe2	Link	Green
4.3	PCIe3	Link	Green
4.4	PCIe4	Link	Green

### 3.4 Power Supply

#### 3.4.1 Voltage Supply

The GETK-P4.0A requires supply voltage. The cable CBP510 or the cable CBP5105-2 connects the Power supply with the GETK-P4.0A. For technical details see "Power Supply PWR Interface Pinning" on page 37.

#### 3.4.2 Reverse Polarity Protection

To avoid short circuits in the supply voltage, the GETK-P4.0A is equipped with a reverse polarity protection circuit and an overcurrent protection.

### 3.5 Temperature Control and Restart

In case the GETK-P4.0A temperature control has detected a critical temperature, the temperature alarm is active and the GETK-P4.0A changes the operating state to the standby state.

After some time, the GETK-P4.0A wakes up and checks whether the temperature alarm is still valid. This check is repeated until the system has cooled down and the temperature alarm is no longer valid. The systems operation state switches back to the operation state.

### 3.6 Operation States

There are 2 operation states of the GETK-P4.0A:

- Standby
- Operation

After supplying power, the GETK-P4.0A goes into the Standby state.

#### 3.6.1 Standby State

The GETK-P4.0A is in power save (sleep) state.

The power consumption is low, see chapter "Power Supply" on page 37.

The GETK-P4.0A changes to the start-up state, if following is detected:

- Wakeup signal from the ECU or
- Ethernet activity at one of the Ethernet interfaces.

### 3.6.2 Operation State

The GETK-P4.0A is activated and in operation state. The PCIe links are established and the Ethernet Data Links are available.

Configuration, measurement, or firmware updates are possible.

Change to the Standby state, if following is detected:

- No Wakeup signal from the ECU and
- No Ethernet activity at any of the Ethernet interfaces.

The GETK-P4.0A can be activated via the Ethernet interfaces independently from the Wakeup signal. This enables to make measurements during start-up of the ECU, or configuration and firmware updates.

### 3.7 Control Signals Functional Description

The control signals are present at the interfaces CAS-IN and CAS-OUT.

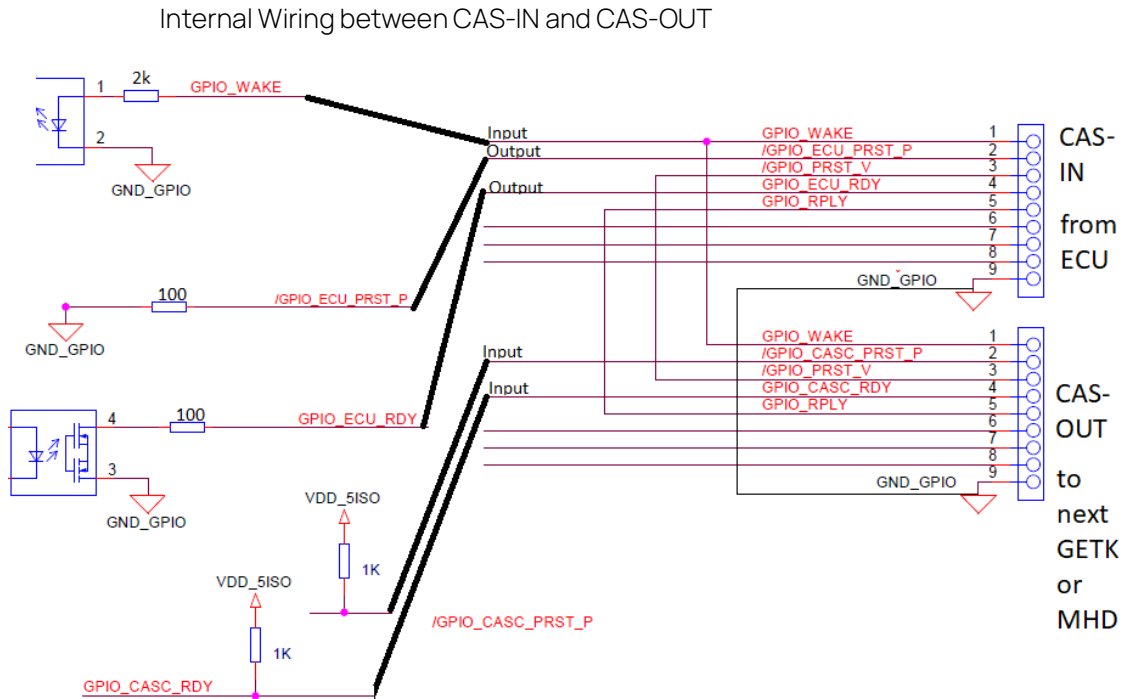
They contain control signals like Wakeup, Present, and Ready.

All signals are according to open drain standard. The control signals are optically isolated to prevent ground loops. Maximum voltage level: 15V DC.

The signals from the ECU must be connected at the CAS-IN.

When an additional GETK-P4.0A or a compatible device is added, the control signals are connected to the CAS-OUT to this device.

Signal	Direction	Functionality
Wakeup	From ECU to GETK-P4.0A	Wakeup GETK-P4.0A GETK-P4.0A changes from sleep (power save) state to operational state
/Present.V	From MHD to ECU	MHD is attached ECU may change configuration or behavior
/Present.P	From GETK-P4.0A to ECU	GETK-P4.0A is attached ECU may change configuration or behavior
Ready	From GETK-P4.0A to ECU	GETK-P4.0A indicates the ECU that it is ready for operation ECU may wait for GETK-P4.0A
Replay.V (Video Replay or (HIL mode)	From MHD to ECU	Video data is provided by MHD (replay), not by cameras ECU may change configuration or behavior
ECU GND	From ECU to MHD or GETK-P4.0A	Reference GND for CAS-IN/Out signals



**Fig. 3-5** Control signals internal function

### 3.7.1 Wakeup (GPIO\_WAKE)

The Wakeup signal from the ECU is an input signal for the GETK-P4.0A. After the GETK-P4.0A detects the high signal, the GETK-P4.0A changes to the Operation state.

This signal is looped through all cascaded GETK-P4.0A devices.

### 3.7.2 /Present.P (/GPIO\_ECU\_PRST\_P)

The /Present.P signal at the interface CAS-IN is connected over a pull-down resistor to ECU GND. With the connection to the ECU, the pull-up signal from the ECU is pulled down.

The /Present.P signal at CAS-OUT from a cascaded GETK-P4.0A is connected as an input.

### 3.7.3 Ready (GPIO\_CASC\_RDY)

A high Ready signal at CAS-IN signals to the ECU, that the GETK-P4.0A is ready and the measurement can be started.

If an additional GETK-P4.0A is connected at CAS-OUT, then the Ready signal is only active, if the connected GETK-P4.0A has as well an activated Ready signal.



## 3.8 Precision Time Protocol (PTP)

### 3.8.1 Precision Time Protocol IEEE 802.1AS

The Precision Time Protocol IEEE 802.1AS is used to synchronize multiple clocks within a network. The GETK-P4.0A uses the Precision Time Protocol to synchronize its internal clock against a PTP master clock within the local network. The master clock might be a dedicated device in the measurement network, the ECU, or other devices.

For more details about the Precision Time Protocol, please refer to the IEEE standard.

### 3.8.2 PCIe Clock and ECU Synchronization

The GETK-P4.0A supports all standard compliant clocking architectures. At all PCIe ports to the ECU, the following reference clocks are available:

- separate reference clocking with constant frequency clock (SRNS)
- separate reference clocking with independent spread spectrum clock (SRIS).

## 3.9 Use Case Measurement

### 3.9.1 Measurement Technology Network (MT)

The GETK-P4.0A transfers the ECU source data over PCIe Gen4 into the high-speed Ethernet Measurement Technology network (MT network). The MT network describes the entirety of all MT nodes.

Typically, the GETK-P4.0A is connected to an Ethernet switch and the other network components are connected there.

The data sink function in the Measurement Technology network is assumed by the RALO components "RALO Recorder" and "RALO Online GCF Receiver (OGRE)". The RALO Recorder runs on a High-Performance PC and serves as a data recorder. It provides functionality to receive data from several GETKs and to write that data to a local file system at data rates as high as supported by the storage device underlying the file system.

OGRE runs on a PC/laptop installed in the vehicle. It provides the functionality to receive data from several GETKs, to extract them and to provide them to the customer tool for online visualization.

The data flow between GETK-P4.0A and RALO Recorder PC and RALO OGRE is controlled by the RALO Manager. It provides interfaces enabling the user to configure, to operate and to monitor the RALO Recorder as well as multiple GETKs.

### 3.9.2 Measurement Data

#### Time Stamps in Measurement Data

A full measurement setup consists typically of many components, e.g.:

- Multiple ECUs

- Multiple GETK-P4.0A devices
- Multiple RALO data sinks (Recorder and/or OGRE)

Each of the ECUs may run in a different clock domain. Some of the ECUs are typically synchronized to each other; however there is often still more than one clock domain in use.

This setup leads to the situation that different time stamps in measurement data may be related to different clock domains.

The GETK-P4.0A devices are instead synchronized to each other (provided that a device acting as PTP Master is installed and running in the measurement network).

The measurement data is transferred via GETK-P4.0A and contains information about the relation between different clock domains. This allows getting a relation of measurement data coming from different clock domains.

### Acquiring Relation between different Clock Domains

The GETK-P4.0A is connected to the ECU via PCIe, also it is connected via Ethernet to the RALO systems. The GETK-P4.0A devices are time-synchronized via PTP to the other systems on the Ethernet-based measurement network. Also, the ECU provides its current time periodically via PCIe to the GETK-P4.0A. This allows the GETK-P4.0A to identify the relation between the ECU's clock domain and the measurement network's clock domain.

### Transferring Time Stamp Relations within the Measurement Data

The relation between different clock domains is transferred periodically to the recording system (RALO) as part of the measurement data that is flowing from the GETK-P4.0A to the RALO data sinks.

This allows RALO to convert the timestamps of the measurement data from the ECU clock domain to the measurement network time domain, ensuring that they are all synchronized to each other.

### Data Packet Format

For details, refer to the RALO Manager Doxy Gen User Guide. The measurement data are packed in an ETAS specific format and sent to the RALO Recorder PC via Ethernet.



#### NOTE

In an overload situation, when more data is requested than can be delivered, data packets are discarded. The number of discarded data packets is counted and made available via RALO monitoring.

### 3.10 Application Hints

#### Implementation of the ECU Program is not deterministic

The GETK-P4.0A can read large amounts of data from the ECU memory via the PCIe interface. This read access increases the load of the memory interface of the ECU, so that a deterministic execution of the ECU program could not be ensured.

#### Solution

Regarding the ECU architecture, make sure that the ECU's memory bandwidth is dimensioned sufficiently, so that the additional read access of the GETK-P4.0A does not significantly increase the memory bandwidth.


#### Restriction

If the ECU architecture cannot be dimensioned accordingly, it is recommended to limit the measurement data rate, so that the memory bandwidth is less.

### 3.11 Configuration

The configuration of the data flows and the measurement is controlled by a measurement configuration file. For details refer to the RALO User Guide.

## 4 Installation

 **WARNING**


Risk to life from electric shock

If an unsuitable power supply is used, this may generate a hazardous electrical voltage.

- Use a power supply that is permitted for the product.
- Do not connect the product to power outlets.
- To prevent inadvertent connection to power outlets, use power cords with safety banana plugs in areas with power outlets.

This chapter contains information about following topics:

- Ventilation ..... 28
- Inserting the Interface Cables ..... 28
- Adapter Kit 19" for GETK-P4 for Installation into a 19" Rack ..... 29

 **WARNING**

Risk of injury due to inadequate fastening

- Secure the product so that it does not move uncontrollably.
- Only use carrier systems and fastening materials that can accommodate the static and dynamic forces of the product and are suitable for the ambient conditions.

### 4.1 Ventilation

There are two fans installed at the rear side. The airflow is going from the front panel to the rear.

- Protect the product against direct solar radiation and other sources of heat.
- Ensure that there is sufficient air circulation for efficient heat exchange.
  - Keep a distance of at least 4 cm to the rear and at least 4 cm to the front.
  - Do not cover the ventilation slots.
  - Do not operate the product in enclosed areas.

### 4.2 Inserting the Interface Cables

**NOTICE**

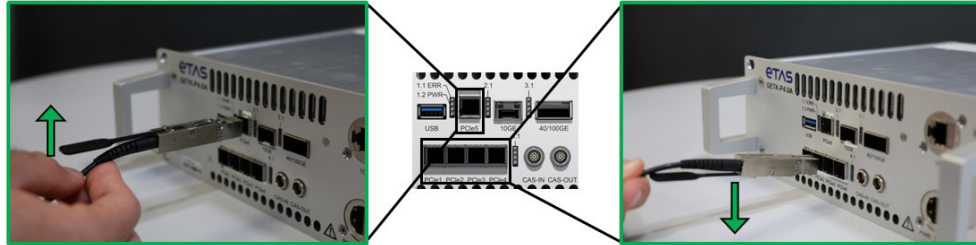
Damage to the electronics due to potential equalization

The cables' shield may be connected to the housing, the ground or the ground for the product's power supply. If there are different ground potentials in the test setup, equalizing currents can flow between the products via the cables' shield. Take account of different electric potentials in your test setup and take appropriate measures to prevent equalizing currents.

The connectors should be carefully and firmly inserted. Check, that the connectors remain locked.

If the PCIe1-5, the 40/100 GE, the 10 GE, and the Power connector are inserted in the correct orientation, they snap in and remain locked.

For the PCIe5 interface in the upper row the unlocking strap of the cable must point to the top..



**Fig. 4-1** Different Orientation of the PCIe cables



**NOTE**

The PCIe1-4 connectors are rotated 180° compared to the PCIe5 connector, see Fig. 4-1.

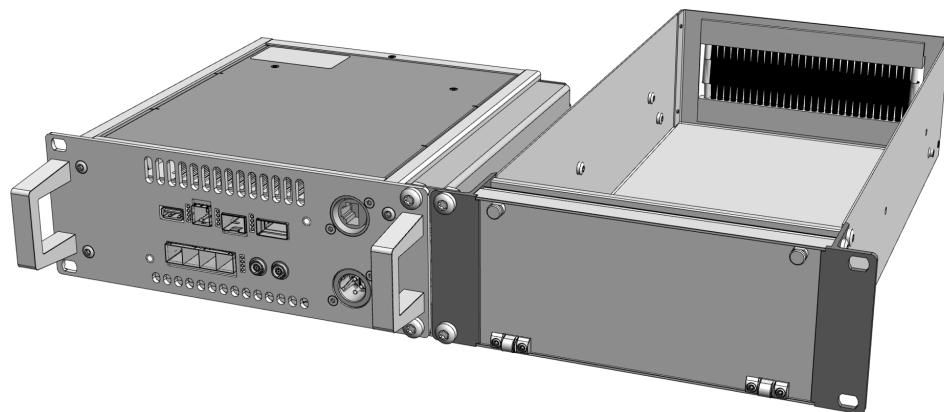
**4.3 Adapter Kit 19" for GETK-P4 for Installation into a 19" Rack**

The GETK-P4.0A can be assembled into a standard 19" rack with the Adapter Kit 19" for GETK-P4 (HOL\_RACK-KIT19.1-GETK-P4).

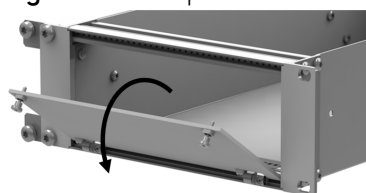
The Adapter Kit 19" for GETK-P4 comprises of:

- Storage container ½ 19"
- Mounting Adapter

The storage container can be mounted either on the left-hand side or on the right-hand side. The front plate can be opened without tools and can completely be removed. The rear has a brush strip for cable wiring.



**Fig. 4-2** Adapter Kit 19" for GETK-P4



**Fig. 4-3** Adapter Kit 19" for GETK-P4 Front Plate

## 5 Configuration

This chapter contains information about following topics:

- IP Address Configuration ..... 30
- Firmware Update ..... 31
- Set the alias-name ..... 33
- Web Interface ..... 33

### 5.1 IP Address Configuration

#### 5.1.1 Fixed IP Addresses

The GETK-P4.0A has fixed IP addresses for each ethernet port ending with x.13. This IP address cannot be changed and cannot be used with other devices in the same network. With this address, the web interface can be started and the configuration can be changed.

When several GETK-P4.0A devices are attached in the same network, disconnect all others for using this default IP address. This avoids data collisions.

#### 5.1.2 Configuring Customized IP Addresses

The customized IP address is configurable in the Web Interface. Start from the Fixed IP Address. If the customized IP address is unknown, use the fixed IP address for configuration.

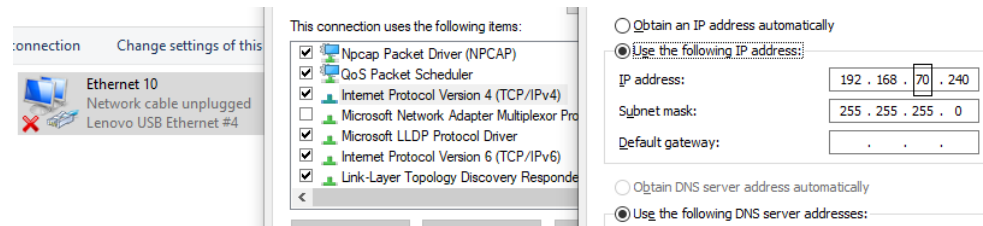
#### 5.1.3 IP Addresses

Ethernet port	Fixed IP address	Possible customized IP address except any fixed IP address
10GE	192.168.60.13	192.168.xx.xx
40/100GE	192.168.80.13	192.168.xx.xx
1GE	192.168.70.13	192.168.xx.xx
	192.168.40.13 192.168.50.13 for internal use only	

#### 5.1.4 Configuring network adapter of Host-PC

1. In Windows Search, type > **network**  
Windows 11:  
    Select **View network connections**  
Windows 10:  
    Select **Check network status**  
    Change adapter options
2. Double-click the used network card
3. Select **Internet Protocol Version TCP/(IPv4)**
4. Select **Properties**
5. Set **IP address** and **Subnet mask** see example

Example: For connection to the Fixed IP address at 1GE following settings can be used:



### 5.1.5 TCP/IP6 configuration

Please contact ETAS about details:

- ETAS contact partners by region: [www.etas.com/contact](http://www.etas.com/contact)

## 5.2 Firmware Update

The GETK-P4.0A includes several hardware and software components that can be updated. ETAS bundles updates for multiple components as "service packs". The installed firmware can be displayed in the web interface.

A service pack (\*.swu file) can be installed with the getkupdate tool.

The firmware update is done with Python scripts.

The same Python commands are used for Linux and Windows.

The following steps describe the procedure for **Windows 10**.

**Linux:** The same procedure can be adapted for Linux. Please contact ETAS for details:

- ETAS contact partners by region: [www.etas.com/contact](http://www.etas.com/contact)

### 5.2.1 Requirements for Installation

- Python V3.7.x
- Installed library aiohttp (procedure see below)
- Firmware getk-p4-servicepack<version>.swu
- Installation package had-mt-tools-<version>.zip
- Installation package had-mt-common-<version>.zip

The update can be done at any ethernet port, 1GE, 10GE, or 40/100GE.

Only the customized addresses can be used. The fixed IP addresses cannot be used, see "IP Addresses" on page 30.

### 5.2.2 Verify the Python Version

Start the Python terminal and type:

**python**

C:\WINDOWS\system32\cmd.exe - python

```
(getkupdateEnv) C:\Users\>python
Python 3.7.16 (default, Jan 17 2023, 16:06:28) [MSC v.1916 64 bit (AMD64)] :: Anaconda, Inc. on win32
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

In above screenshot, the compatible version 3.7.16 is displayed.

Some Python distributions allow changing to other versions.

If the version is OK, close this window.

### 5.2.3 Extract both packages into the same directory

1. Create a new local directory e.g. `C:\temp`. This directory will be used in the following description.
2. Extract the top contents of `<had-mt-common-<version>.zip` to the local directory.
  - › This will create `C:\temp\had-mt`
3. Extract the top contents of `<had-mt-tools-<version>.zip` to the same local directory.
4. Check, that the following 3 files are located in the same folder:
  - `C:\temp\had-mt\<version>\bin\processmanager.exe`
  - `C:\temp\had-mt\<version>\bin\getkupdate`
  - `C:\temp\had-mt\<version>\bin\aliasinfo.exe`

### 5.2.4 Start the processmanager in parallel

Double-click on

```
C:\temp\had-mt\<version>\bin\processmanager.exe
```

This program must run in parallel in the background, until the update is finished.

### 5.2.5 Starting getkupdate

1. Start a Python terminal
2. Change the directory with:
 

```
cd C:\temp\had-mt\<version>\bin\
```
3. Install the missing component `aiohttp`, if Python was installed new:
 

```
pip install aiohttp
```

### 5.2.6 getkupdate command options

1. Display of command options:
 

```
python getkupdate -h
```
2. Display of subcommand options:
 

```
python getkupdate discover -h
```

```
python getkupdate show -h
```

```
python getkupdate install-h
```



## 5.2.7 Check communication

1. `python getkupdate discover`

```
(getkupdateEnv) C:                                     \bin>python getkupdate discover
IP      ALIAS      NODE ID      PRODUCT NAME  SERVICE_PACK  ACTIVE PROFILE
192.168.60.42  getk-p4-42  0x60343106C9  GETK-P4      1.4.0-alpha+master.1205  etas-measurement.target
```

This will display the available IP address, in this example 192.168.60.42 together with the alias name `getk-p4-42`.

The fixed address 192.168.xx.13 will not be displayed and cannot be used. Only customized addresses can be used.

Use the found IP address in the following.

2. Display of the current firmware versions:  
`python getkupdate show -ip 192.168.xx.xx`

## 5.2.8 Download the firmware

1. Use the download command:  
  - > `python getkupdate install --ip 192.168.xx.xx --servicepack getk-p4-servicepack<version>.swu`
2. Accept with „Y“  
The current version will be displayed.
3. Continue with „Y“  
The update is performed.  
After the update, the GETK-P4.0A will reboot.
4. Kill the running `processmanager`

## 5.3 Set the alias-name

The alias-name is displayed at the top right of the web interface.

1. Start the Command Prompt and change to:  
`C:\temp\had-mt\<version>\bin`
2. Example, how to set the alias to: `getkp4-21`:  
`aliasinfo.exe --setdevicealias getkp4-21 --ipaddress 192.168.xx.xx`

## 5.4 Web Interface

Use a standard web browser to access the GETK-P4.0A web interface.

The web interface provides access to configuration, logfiles and generic information.

- Prefer the fixed IP addresses for the web browser, see "IP Addresses" on page 30.
- The setup of the network card must fit to the IP address.
- If you use the fixed IP address, make sure, only one GETK-P4.0A is connected in this network.

## Web Interface

The screenshot shows the ETAS web interface for a GETK-P4 device. The browser address bar shows the URL 192.168.70.13. The page title is 'GETK-P4 | getk-p4-42'. The interface features a navigation menu on the left and two main data tables.

Device Information		Software and Firmware Versions	
Hardware Revision	Rev. B12.2	powac	11.0
Serial Number	42	fe-ctrl	11.6
Manufacturing Date	2022-11-03	pcie-switch	1.6.0+default
Alias Name	getk-p4-42	ssbl	1.3.0+master.36
		env	11.0+default
		linux	23.5.22+master1205
		rcw	1.4.0+CN
		firmware-config	0.0.0

### 5.4.1 Web Subpages

- System Information
  - Hardware Revision, Serial Number, Manufacturing Date and Software and Firmware versions.
- Monitoring
  - Voltages, temperatures, CPU load and Memory usage.
- Network Devices
  - Display of the fixed IP addresses and configuration of the customized IP addresses  
See "IP Addresses" on page 30
  - Configuration of Jumbo Frames for each connection
  - 40/100GE-connection: Switch between both transfer rates
- PCIe configuration
  - Display of the PCIe1-PCIe4 information e.g. Physical Port, Datarate and Status.
- IEEE1588
  - Display of the IEEE1588 configuration, statistics and status
- Documentation
  - Access to the documentation
- Sources
  - Display and access to the directories and packages of the used GETK-P4.0A software
- OSS Licenses
  - Display of the open source licenses.
- Safety Advice
  - Display of the Safety Information
- Logfiles
  - Possible to save the Logfile to the PC.

## 6 Technical Data

This chapter contains information about following topics:

- System Requirements for the ECU ..... 35
- Environmental Conditions ..... 36
- Mechanical Data ..... 36
- Power Supply PWR ..... 37
- PCIe 1-5 Interfaces ..... 37
- CAS-IN Interface ..... 39
- CAS-OUT Interface ..... 41
- 10GE Interface ..... 42
- 40/100GE Interface ..... 42
- 1GE Interface ..... 42
- USB Interface ..... 42

### 6.1 System Requirements for the ECU

The GETK-P4.0A requires special functionalities at the ECU:

In order to measure ECU data with a GETK-P4.0A over PCIe, the following memory areas on the ECU must be reachable via DMA:

- Any memory used for measurement data, if additional copying of the data is not desired
- An additional 128MB for the GETK-P4.0A adapter itself

Additional requirements

- The memory with the measurement data must be contiguous (Posix type memory)
- Operating system QNX 7.1
- System Memory Management Unit (SMMU) from ECU must allow read access from the GETK-P4.0A.

Additional requirements to support PCIe:

- The ECU must use the pin assignment according to the PCIe Cabling Specification for the Mini-SAS HD interface. Please be aware that for the Mini-SAS HD form factor (SFF-8644), conflicting pin assignments for other specifications exist, e.g. SAS.
- In order to use active optical cables, the PWR and MGTPWR pins must be powered.
- Use cables which support an SFF-8636 Management Interface / EEPROM at both ends.

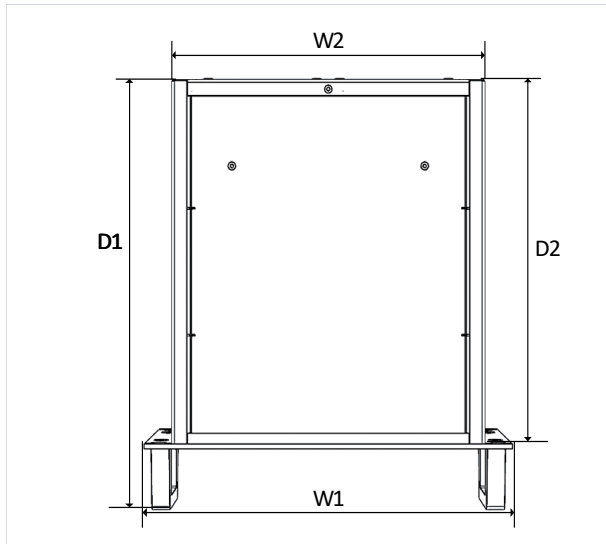
For details see chapter "Mini-SAS HD PCIe Pin Assignment" on page 38.

## 6.2 Environmental Conditions

Item	Characteristics
Operating temperature range	-20 °C to +50 °C -4 °F to +122 °F
Storage temperature range (without packaging)	-20 °C to +85 °C -4 °F to +185 °F
Max. relative humidity (non-condensing)	85% (operation) 95% (storage)
Max. altitude	5000 m / 16400 ft
Degree of contamination (IEC 60664-1, IEC 61010-1)	2
Protection rating (when closed)	IP20

## 6.3 Mechanical Data

The GETK-P4.0A requires half a 19" rack in width and 2U in height.



**Fig. 6-1** Dimensions

Dimensions	
H x W1 x D1	88 x 241 x 266 mm / 3.5 x 9.5 x 10.5 in
H x W2 x D2 without handles	88 x 205 x 224 mm / 3.5 x 8.1 x 8.8 in
Weight	4.20 kg / 9.26 lb

## 6.4 Power Supply PWR

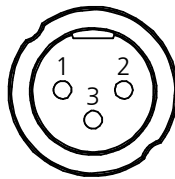
### 6.4.1 Power Supply

Power supply	11 V to 15 V DC ( $\pm 10\%$ ), provided by power supply
Power dissipation (typ.)	100 W
Standby current @ 12V (typ.)	120 mA *)
Max. current consumption	10 A
Load Dump Protection	Available
Galvanic isolation	Not available
Plug connection	At the GETK-P4.0A side: Plug-in connection
Reverse polarity protection	Available for Power Supply.
Overvoltage category (AC mains supply)	II

\*) Only copper cables are connected to the GETK-P4.0A. If optical cables are connected, then the standby current is correspondingly higher.

### 6.4.2 Power Supply PWR Interface Pinning

Neutrik: NC3MD-LX-M3



**Fig. 6-2** Powersupply interface

Pin	Signal	Function
1	-	Reserved
2	Power Supply+	Supply voltage, plus
3	Ground	Ground

## 6.5 PCIe 1-5 Interfaces

### 6.5.1 Interface Characteristics PCIe 1-5

Item	Characteristics
Connection	Connection 1-4: GETK-P4.0A <--> ECU Connection 5: Reserved for ETAS internal use
Number of interfaces	5
Standard	PCIe Gen4, Interfaces configurable as x8/x4/x2 lanes
Gross data rate	PCIe Gen4 16 GT/s

## 6.5.2 Mini-SAS HD PCIe Pin Assignment

The GETK-P4.0A uses a standard Mini-SAS HD PCIe interface. The table below shows the pin assignment according to the PCIe Cabling Specification.

### Additional requirements for the ECU:

- The ECU must use the pin assignment according to the PCIe Cabling Specification for the Mini-SAS HD interface. Please be aware that for the Mini-SAS HD form factor (SFF-8644), conflicting pin assignments for other specifications exist, e.g. SAS.
- In order to use active optical cables, the PWR and MGTPWR pins must be powered.

### Additional requirements for the PCIe cables:

- Use cables which support a SFF-8636 Management Interface / EEPROM at both ends.
- If a cable bridges the CMI Pins (SCL, SDA) between both sides, the ECU must not drive these pins - they are driven by the GETK-P4.0A. Disregarding this might result in an unreliable connection.
- Please refer to chapter "PCIe Cables CBBC100.1 and CBBO100.1" on page 44 for cables recommended by ETAS.

Pin	Signal	Direction	Remark
A1	CADDR	Out	I <sup>2</sup> C address select <sup>1)</sup>
A2	CINT#	In (10k pull-up to 3.3V)	Interrupt request input
A3	GND	---	
A4	PCIE_R0_P	In	
A5	PCIE_R0_N	In	
A6	GND	---	
A7	PCIE_R3_P	In	
A8	PCIE_R3_N	In	
A9	GND	---	
B1	PWR	Out	3.3V, 500 mA max
B2	CBLPRSNT#	In (10k pull-up to 3.3V)	Cable presence detect
B3	GND	---	
B4	PCIE_R1_P	In	
B5	PCIE_R1_N	In	
B6	GND	---	
B7	PCIE_R2_P	In	
B8	PCIE_R2_N	In	
B9	GND	---	
C1	SCL	Out	I <sup>2</sup> C management interface
C2	SDA	In/Out	I <sup>2</sup> C management interface
C3	GND	---	
C4	PCIE_T0_P	Out	

Pin	Signal	Direction	Remark
C5	PCIE_T0_N	Out	
C6	GND	---	
C7	PCIE_T3_P	Out	
C8	PCIE_T3_N	Out	
C9	GND	---	
D1	PWR	Out	3.3V, 500 mA max
D2	MGTPWR	Out	3.3V, 30 mA max
D3	GND	---	
D4	PCIE_T1_P	Out	
D5	PCIE_T1_N	Out	
D6	GND	---	
D7	PCIE_T2_P	Out	
D8	PCIE_T2_N	Out	
D9	GND	---	

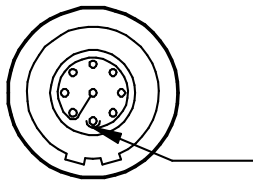
<sup>1)</sup>CADDR: ECU side requires a PullUp to HIGH (3.3V). GETK-P4.0A side is set to LOW.

## 6.6 CAS-IN Interface

### 6.6.1 CAS-IN Interface Characteristics

A female Lemo 0B 9 pins with "A" key is used. All signals have a maximum voltage level of 15V DC.

Pin 1 is marked with an arrow.



**Fig. 6-3** CAS-IN Interface Lemo size 0B 9 pins with A-key

Internal wiring between CAS-IN and CAS-OUT.

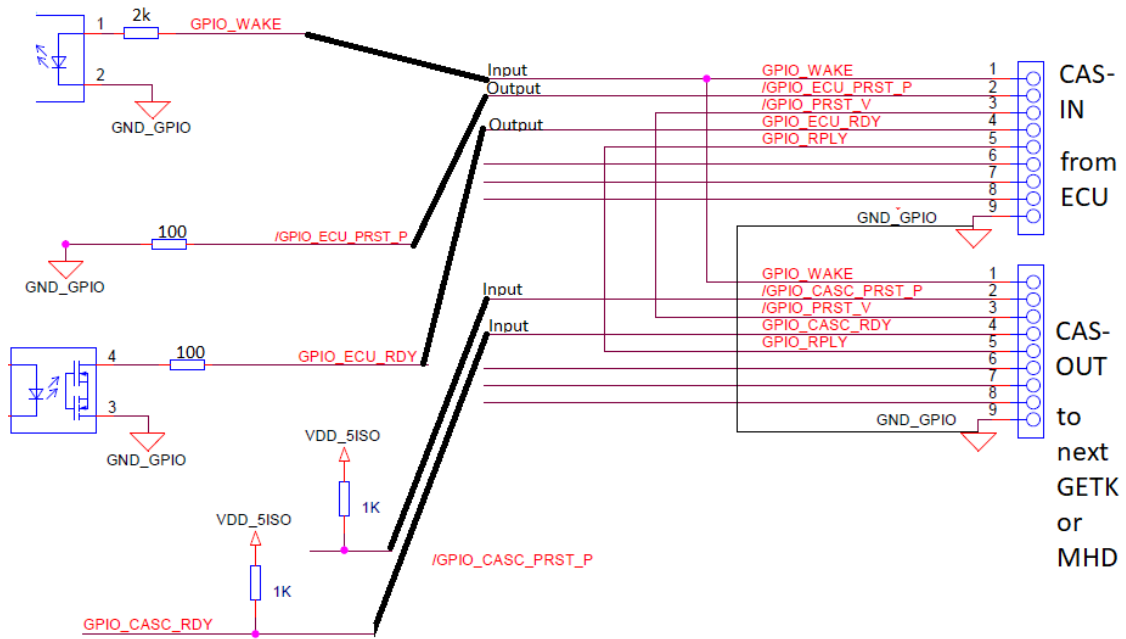


Fig. 6-4 CAS-IN/Out internal connection

### 6.6.2 CAS-IN Interface Pinning

Signals with the symbol "/" are low active.

Referenced labels from Fig. 6-4 on page 40 are in brackets "()".

Pin	Label	Function	Comment
1	Wakeup (GPIO_WAKE)	input	Wakeup from the ECU cascaded: Wakeup from the ECU looped through a previous GETK-P4.0A.
2	/Present.P (/GPIO_CASC_PRST_P)	output	GETK-P4.0A is connected
3	/Present.V (/GPIO_PRST_P)		looped through
4	Ready (GPIO_CASC_RDY)	output	GETK-P4.0A is ready
5	Replay.V (GPIO_RPLY)		looped through
6	Reserved		
7	Reserved		
8	Reserved		
9	Reference ECU GND (GND_GPIO)		ECU ground



Typical voltage levels

Used voltage [V]	Low voltage [V]	Current [mA]
12	<1.1	11
5	<0.45	4.5
3.3	<0.3	3
2.5	<0.28	2.3
1.8	<0.16	1.6

## 6.7 CAS-OUT Interface

### 6.7.1 CAS-OUT Interface Characteristics

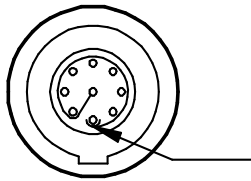
A female Lemo 0B 9 pins with "G" key is used.

All signals according to open drain standard and are galvanically isolated. The maximum voltage level is 15V DC.

This interface is used to connect to an additional GETK-P4.0A or a MHD for Wakeup, Ready and other signals.

Pin 1,3, 5, and 9 are connected to CAS-IN.

Pin 1 is marked with an arrow.



**Fig. 6-5** CAS-OUT Interface Lemo size 0B 9 pins with G-key

### 6.7.2 CAS-OUT Interface Pinning

Signals with the symbol "/" are low active.

Referenced labels from Fig. 6-4 on page 40 are in brackets "()".

Pin	Label	Function	Comment
1	Wakeup (GPIO_WAKE)		Wakeup to the next GETK-P4.0A looped through
2	/Present.P (/GPIO_CASC _PRST_P)	input	Present from the next GETK-P4.0A
3	/Present.V (/GPIO _PRST_P)		looped through
4	Ready (GPIO_CASC _RDY)	input	Ready from next GETK-P4.0A
5	Replay.V (GPIO_RPLY)		looped through
6	Reserved		

Pin	Label	Function	Comment
7	Reserved		
8	Reserved		
9	Reference ECU GND (GND_GPIO)		ECU GND

### 6.8 10GE Interface

This is an Ethernet SFP+ interface.

Connection to a laptop/PC e.g., for monitoring.

Electrical data and Pinning are according to the standard.

### 6.9 40/100GE Interface

This is a Ethernet QSFP28 interface.

Electrical data and Pinning are according to the standard.

### 6.10 1GE Interface

To Laptop/PC for service operations.

This is a standard Ethernet RJ45 interface.

Electrical data and Pinning are according to the standard.

### 6.11 USB Interface

Reserved for ETAS internal use.

## 7 Cables and Accessories

This chapter contains information about the following cables and accessories:

Requirements for failsafe Operation



### NOTE

We recommend using ETAS cables or any other cables certified by the standards for the application. Adhere to the maximum permissible cable lengths!



### NOTE

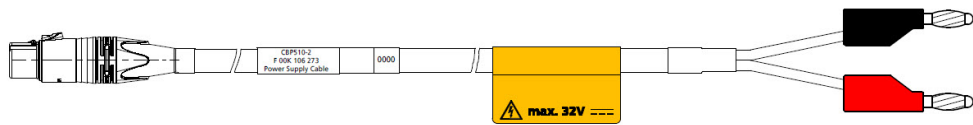
Application-specific cables are available from ETAS. Please contact your ETAS partner or e-mail [sales.de@etas.com](mailto:sales.de@etas.com).

- Power Supply Cable ..... 43
- PCIe Cables CBBC100.1 and CBBO100.1 ..... 44
- Ethernet Cables ..... 47
- Other cables ..... 48

### 7.1 Power Supply Cable

#### 7.1.1 Power Supply Cable CBP510-2

Cable with Banana interfaces.



Side A		Side B
--------	--	--------

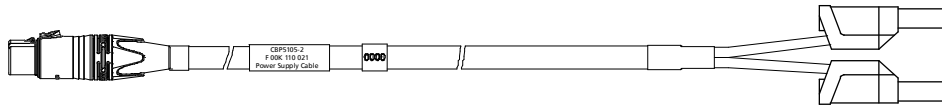
**Fig. 7-1** CBP510-2 Cable

Side A			Side B	
Pin	Signal		Plug	Signal
1	n.c.			
2	Power Supply+		Red	Power Supply+
3	Ground		Black	Ground

Order Name	Short Name	Length	Order Number
Power Supply Cable, Neutrik NC3FFX - Banana (3mc-2mc), 2 m	CBP510-2	2 m	F 00K 106 273

### 7.1.2 Power Supply Safety Cable CBP5105-2

Cable with safety Banana connectors.



Side A			Side B
--------	--	--	--------

**Fig. 7-2** CBP5105-2 Cable

Side A			Side B	
Pin	Signal		Plug	Signal
1	n.c.			
2	Power Supply+		Red	Power Supply+
3	Ground		Black	Ground

Order Name	Short Name	Length	Order Number
Power Supply Cable, Neutrik NC3FFX – Safety Banana (3mc-2mc), 2 m	CBP5105-2	2 m	F 00K 110 021

## 7.2 PCIe Cables CBBC100.1 and CBBO100.1

### 7.2.1 General

Please consider the prerequisites and notes as defined in chapters:

- “Additional requirements for the ECU:” on page 38 and
- “Mini-SAS HD PCIe Pin Assignment” on page 38.

Abbreviations:

- DAC: Direct Attached Copper Cable
- AOC: Active Optical Cable

ETAS recommendation:

- Use ETAS copper cables (DAC) CBBC100.1 from 0,5 m up to 3 m.
- Use ETAS active optical cables (AOC) CBBO100.1 from 5 m up to 10 m.

### 7.2.2 Vendor Identification

Please make sure, that your connected device is enabled to work with the ETAS vendor identification and is not limited to specific vendors only.

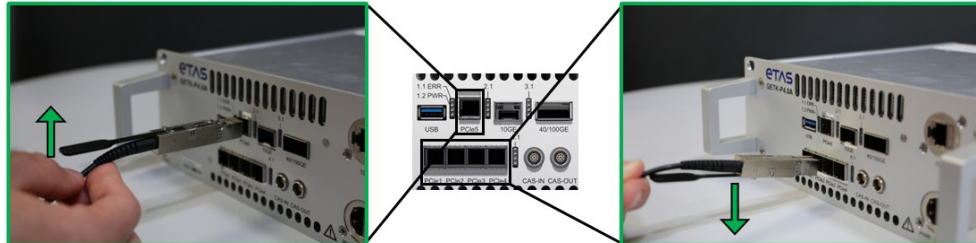
The GETK-P4.0A does not prevent connecting 3rd party cables. However, the proper functionality cannot be guaranteed.

### 7.2.3 Opposite Installation of PCIe1-4 connectors to PCIe5 connector

Please follow the example as shown in Fig. 7-3.

For the PCIe1-4 interfaces in the bottom row the unlocking strap of the cable must point to the bottom.

For the PCIe5 interface in the upper row the unlocking strap of the cable must point to the top.



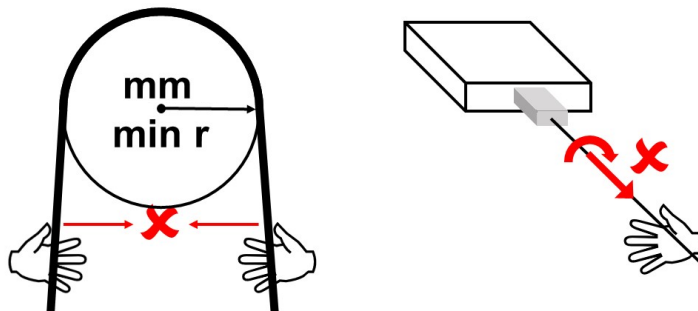
**Fig. 7-3** Orientation of the PCIe Cables.

i **NOTE**

The PCIe1-4 connectors are rotated 180° compared to the PCIe5 connector, see Fig. 7-3.

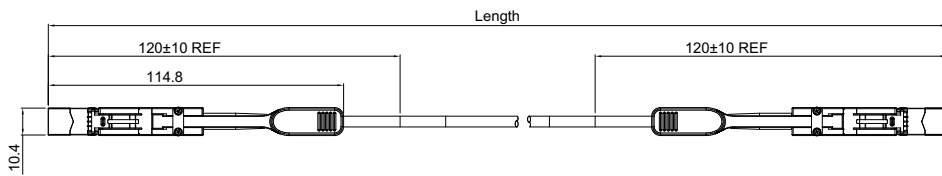
### 7.2.4 Cable bending and handling

- Do not bend the cable less than the minimum cable bending radius specified in the tables.
- Do not drag the cable while connected to the GETK-P4.0A.
- Do not rotate the cable while connected to the GETK-P4.0A.
- For removal, touch only the connectors!



**Fig. 7-4** Minimum cable bending radius and handling

### 7.2.5 PCIe Copper Cable CBBC100.1 (DAC)



**Fig. 7-5** PCIe Copper Cable CBBC100.1

Item	Characteristics
Specification	PCIe Gen4.0
Vendor Identification	yes
PCIe Case operating temperature	-20 °C to 70 °C
Storage temperature	-20 °C to 85 °C
Minimum cable bending radius	72 mm

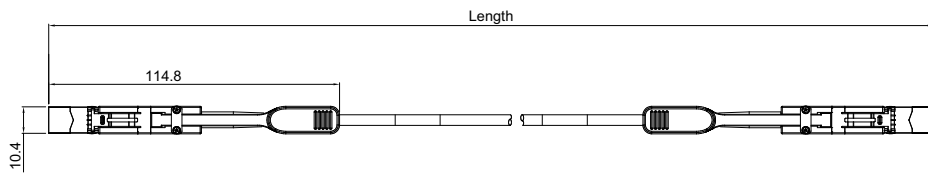
Order Name	Short Name	Length	Order Number
PCIe Gen4 x4 Copper Cable, Mini-SAS HD SFF-8644 – Mini-SAS HD SFF-8644, 0.5 m	CBBC100.1-0m5	0.5 m	F 00K 116 692
PCIe Gen4 x4 Copper Cable, Mini-SAS HD SFF-8644 – Mini-SAS HD SFF-8644, 1 m	CBBC100.1-1	1 m	F 00K 116 693
PCIe Gen4 x4 Copper Cable, Mini-SAS HD SFF-8644 – Mini-SAS HD SFF-8644, 3 m	CBBC100.1-3	3 m	F 00K 116 694

### 7.2.6 PCIe Optical Cable CBBO100.1 (AOC)

**i NOTE**

ETAS recommends using ETAS optical cables, they are tested with the GETK-P4.0A. The PCIe interface at the ECU shall allow/not prevent the use of the ETAS optical cable.

The GETK-P4.0A does not prevent connecting 3rd party optical cables. However, the proper functionality cannot be guaranteed.



**Fig. 7-6** PCIe Optical Cable CBBO100.1

Item	Characteristics
Specification	PCIe Gen4.0
Wire	OM3 fiber, armored metal pipe, black outer jacket
Vendor Identification	yes
PCIe Case operating temperature	-20 °C to 70 °C
Storage temperature	-20 °C to 85 °C
Minimum cable bending radius	30 mm

Order Name	Short Name	Length	Order Number
PCIe Gen4 x4 Active Optical Cable, Mini-SAS HD SFF-8644 – Mini-SAS HD SFF-8644, 5 m	CBBO100.1-5	5 m	F 00K 115 560
PCIe Gen4 x4 Active Optical Cable, Mini-SAS HD SFF-8644 – Mini-SAS HD SFF-8644, 10 m	CBBO100.1-10	10 m	F 00K 115 560

### 7.3 Ethernet Cables

**i NOTE**

10GE and 40/100GE Ethernet cables: Please contact for questions or assistance on this topic your ETAS technical support [www.etas.com/en/hotlines.php](http://www.etas.com/en/hotlines.php).

#### 7.3.1 1GE: Standard Ethernet Cables

Standard RJ45 Ethernet cables can be used.

### 7.3.2 10GE: SFP+ Direct Attached Copper Cables

ETAS recommends using the GETK-P4.0A with following electrical cables at the 10GE Ethernet interface:

- Mellanox MC3309130-003  
10GbE SFP+ DAC Twinax electrical cable

### 7.3.3 40/100GE: QSFP28 Direct Attached Copper Cables

ETAS recommends using the GETK-P4.0A with following electrical cables at the 40/100GE Ethernet interface:

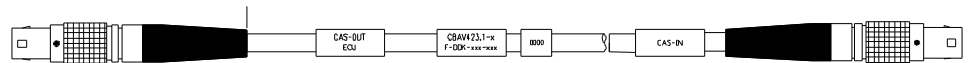
- DAC Cable 2 m, Mellanox MCP1600-C002E30N Rev. A2. Ethernet Cable, 100Gb/s, Connection Cable QSFP28 to QSFP28, AWG30

## 7.4 Other cables

### 7.4.1 Chain Connection Cable CBAV423.1

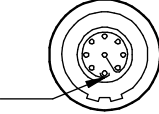
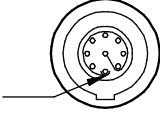
For the control signals to the ECU and for cascading, this cable is used.

Pin 1 is marked with an arrow.



**Fig. 7-7** Cable CBAV423.1

Specification of CASCADING plug on ECU: Lemo EPG.0B.309 (or compatible model).

CAS-IN A		CAS-OUT	
			
Pin	Signal	Pin	Signal
1	Wakeup	1	Wakeup
2	/Present.P	2	/Present.P
3	/Present.V	3	/Present.V
4	Ready	4	Ready
5	Replay.V	5	Replay.V
6	Reserved	6	Reserved
7	Reserved	7	Reserved
8	Reserved	8	Reserved
9	ECU GND	9	ECU GND



Order Name	Short Name	Length	Order Number
Chain Connection, Lemo 0B FGG – Lemo 0B FGA (9mc- 9mc), 0m5	CBAV423.1-0m5	0.5 m	F 00K 114 678
Chain Connection, Lemo 0B FGG – Lemo 0B FGA (9mc- 9mc), 3m	CBAV423.1-3	3 m	F 00K 114 679
Chain Connection, Lemo 0B FGG – Lemo 0B FGA (9mc- 9mc), 5m	CBAV423.1-5	5 m	F 00K 114 680
Chain Connection, Lemo 0B FGG – Lemo 0B FGA (9mc- 9mc), 10m	CBAV423.1-10	10 m	F 00K 114 681

## 8 Ordering Information

### 8.1 GETK-P4.0A

Order Name	Short Name	Order Number
GETK-P4.0A Measurement Interface for Microprocessors and Microcontroller using PCIe Express	GETK-P4.0A	F 00K 114 085
<b>Package Contents</b>		
<ul style="list-style-type: none"> <li>- 1x GETK-P4.0A</li> <li>- Safety advice</li> <li>- Power cable (F 00K 106 273, CBP510-2)</li> </ul>		

### 8.2 Cable and Adapter

See chapter "Cables and Accessories" on page 43 for information and order numbers of cables and adapters.

#### NOTE

We recommend using ETAS cables or any other cables certified by the standards for the application. Adhere to the maximum permissible cable lengths!

#### NOTE

Application-specific cables are available from ETAS. Please contact your ETAS partner or e-mail [sales.de@etas.com](mailto:sales.de@etas.com).  
Please contact ETAS in an early state, because those parts might not be always on stock.

### 8.3 Adapter Kit 19" for GETK-P4 for installation into a 19" Rack

The GETK-P4.0A can be assembled into a standard 19" rack with the Adapter Kit 19" for GETK-P4.

Details see chapter "Adapter Kit 19" for GETK-P4 for Installation into a 19" Rack" on page 29.

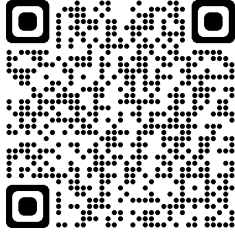
For ordering and detailed technical information for the ETAS Asset Adapter Kit 19" for GETK-P4 or further customization please contact your ETAS Partner or e-Mail [sales.de@etas.com](mailto:sales.de@etas.com).

## 9 Contact Information

### Technical Support

For details of your local sales office as well as your local technical support team and product hotlines, take a look at the ETAS website:

[www.etas.com/en/hotlines.php](http://www.etas.com/en/hotlines.php)



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## Index

### Symbols

..... 48

### A

Altitude, Operating ..... 36

Application Hints ..... 27

### C

#### Cable

    CBAV423.1 Chain Connection ..... 48

    CBBC100.1 Mini-SAS HD ..... 46

    CBBO100.1 Mini-SAS HD ..... 46

    CBP510-2 Power Supply Cable ... 43

    CBP5105-2 Power Supply Cable .. 44

    PCIe Mini-SAS HD ..... 44

    QSFP28 Direct Attached Copper Cables  
        48

CBBC100.1 Mini-SAS HD ..... 46

CBBO100.1 Mini-SAS HD ..... 46

Configuration ..... 27

Contamination Level ..... 36

Current, Standby ..... 37

Customer specific IP Address ..... 30

### D

#### Data

    Measurement ..... 25

Dissipation, Power Supply ..... 37

### E

Environmental Conditions ..... 36

### F

Features ..... 17

Firmware Update ..... 31

Fixed IP Address ..... 30

### G

Galvanic Isolation ..... 37

### I

Identifications on the Product ..... 11

#### Interface

    Overview ..... 19

    PCIe ..... 15, 37

#### IP Address

    Customer specific ..... 30

    Fixed ..... 30

Isolation, Galvanic ..... 37

### L

Level Contamination ..... 36

Load Dump Protection ..... 37

### M

#### Measurement

    Data ..... 25

    Technology Network ..... 25

MHD ..... 16

Monitoring, RALO ..... 26

### N

Norms ..... 12

### O

Operating Altitude ..... 36

#### Operation

    Mode ..... 23

    States ..... 22

Order Information ..... 50

#### Overview

    Interface ..... 19

### P

PCIe Interface ..... 15, 37

PCIe Mini-SAS HD Cables ..... 44

Power Supply ..... 22, 37

    Dissipation ..... 37

#### Power Supply Cable

    CBP510-2 ..... 43

    CBP5105-2 ..... 44

#### Product

    Taking Back ..... 12

#### Protection

    Load Dump ..... 37

    Reverse Polarity ..... 22

### Q

#### QSFP28

    Direct Attached Copper Cables .. 48

### R

#### RALO

    Manager Doxy Gen ..... 26

    Monitoring ..... 26

    Recorder ..... 26

REACH Regulation (EU) ..... 13

Recycling ..... 12

Relative Humidity ..... 36

Reverse Polarity Protection ..... 22

#### RoHS Conformity

    China ..... 13

    European Union ..... 13

### S

#### SFP+

    Direct Attached Copper Cables .. 48

Standards ..... 12

Standards and norms ..... 12

Standby ..... 22

Standby Current ..... 37

System Overview ..... 15

### T

TCP/IP6 ..... 31

Temperature Range ..... 36

Temperature Range, Operation ..... 36

Temperature Range, Storage ..... 36

**U**

UKCA conformity .....13

**W**

Waste Electrical and Electronic Equipment  
12

WEEE ..... 12

WEEE take-back system ..... 12