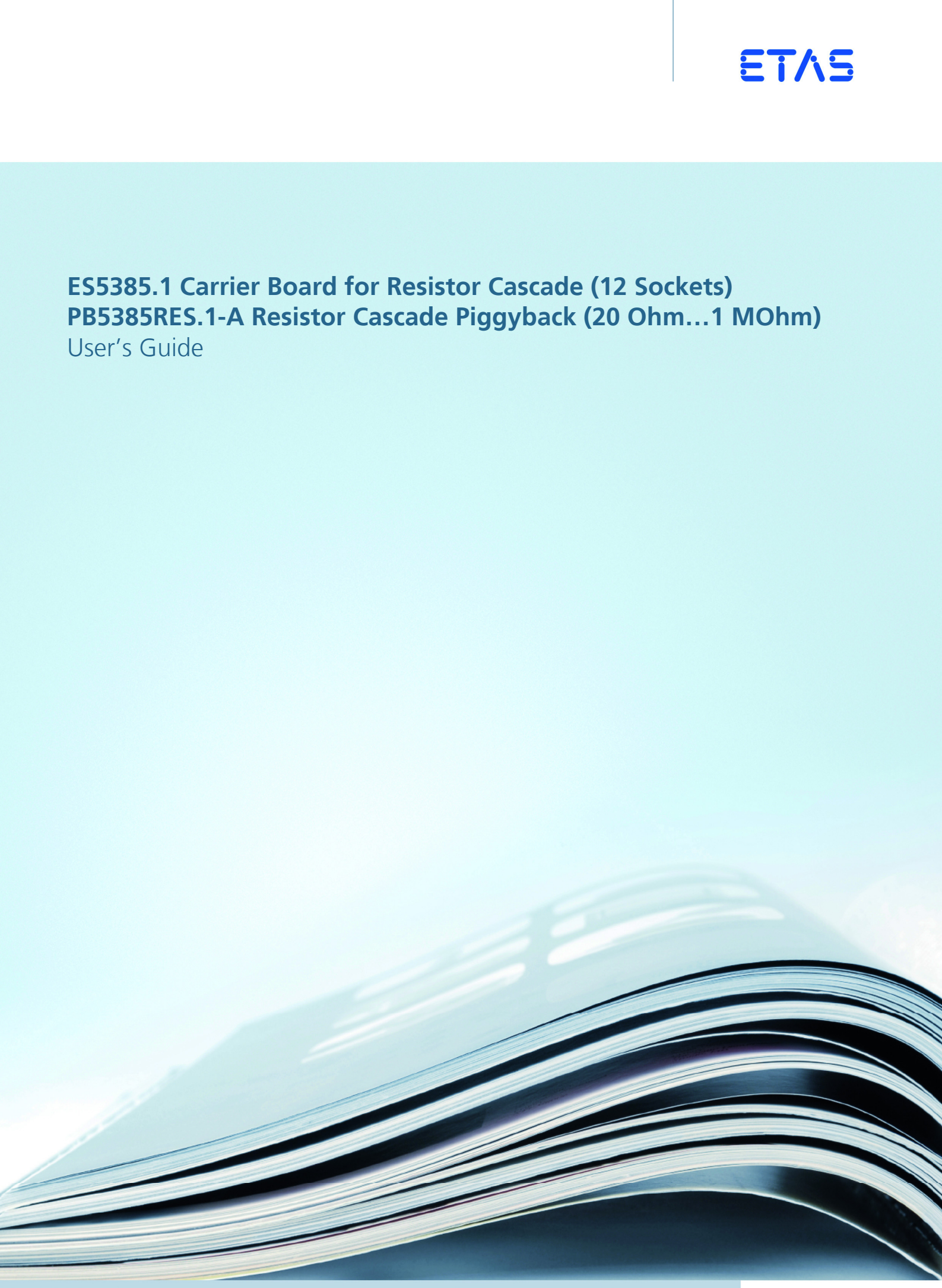
ES5385.1 Carrier Board for Resistor Cascade (12 Sockets)
PB5385RES.1-A Resistor Cascade Piggyback (20 Ohm…1 MOhm)

User's Guide



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Contents

1 Introduction

This User's Guide describes the ES5385.1 Carrier Board for Resistor Cascade. Cables and modules are not part of the delivery scope. PB5385RES.1-A Resistor Cascade Piggybacks must be ordered separately.

CAUTION!

Some components of the ES5385.1 Carrier Board for Resistor Cascade can be damaged or destroyed by electrostatic discharges. Leave the board in its transport packaging until it is installed.
Only remove, configure and install the ES5385.1 Carrier Board for Resistor Cascade and the PB5385RES.1-A Resistor Cascade Piggyback at a workplace that is protected against electrostatic discharges.

This chapter contains information on the following topics:

1.1 Features

The ES5385.1 Carrier Board for Resistor Cascade is used to accommodate up to twelve PB5385RES.1-A Resistor Cascade Piggybacks.

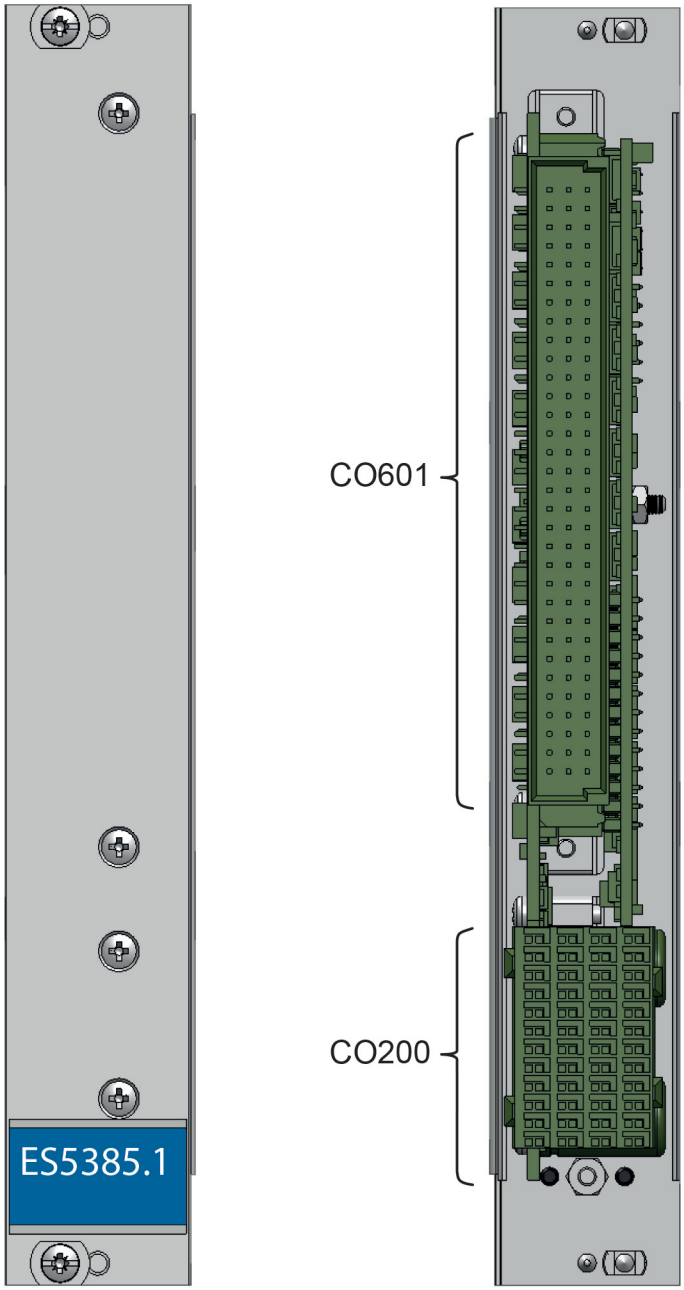


Fig. 1-1 Front Panel and Connection Side of the ES5385.1 Carrier Board for Resistor Cascade

The ES5385.1 Carrier Board for Resistor Cascade comes without a PB5385RES.1-A Resistor Cascade Piggyback. The ES5385.1 is delivered as shown in Figure 1-2.

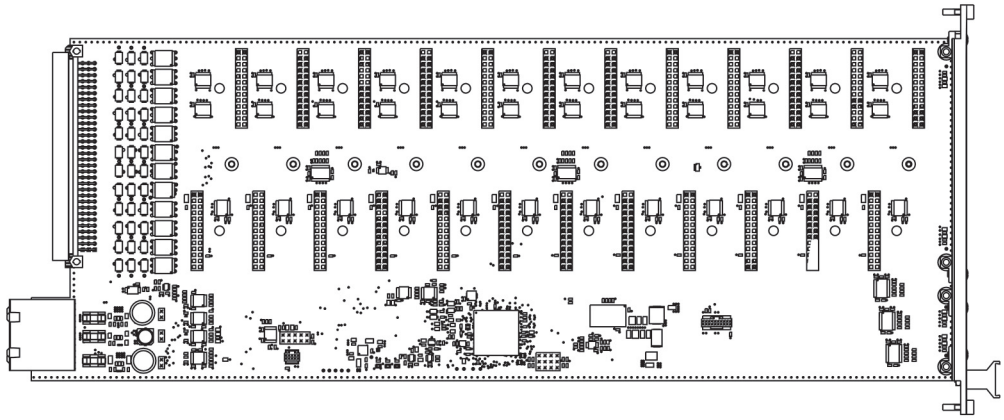


Fig. 1-2 View of the ES5385.1 Carrier Board for Resistor Cascade (Unassembled) from the Side

Figure 1-3 shows the PB5385RES.1-A Resistor Cascade Piggyback.

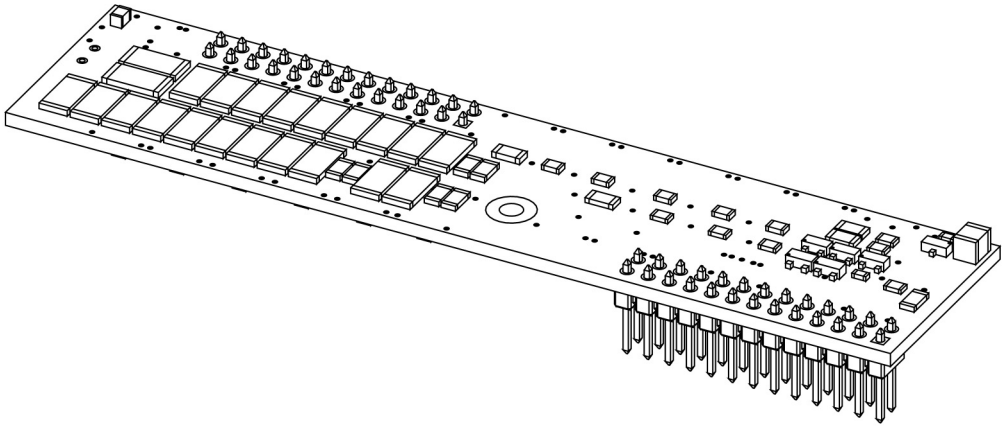


Fig. 1-3 View of a PB5385RES.1-A Resistor Cascade Piggyback

Figure 1-4 shows the ES5385.1 Carrier Board for Resistor Cascade holding twelve PB5385RES.1-A Resistor Cascade Piggybacks.

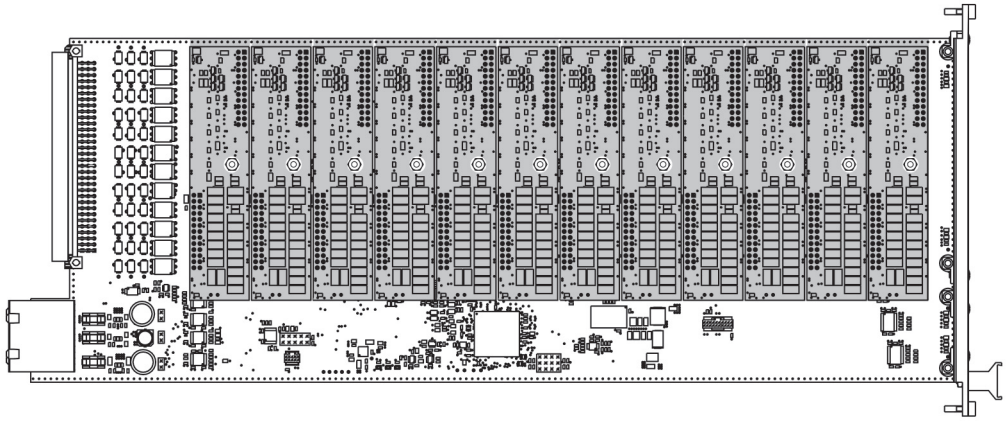


Fig. 1-4 Side View of the ES5385.1 Carrier Board for Resistor Cascade with Twelve Assembled PB5385RES.1-A Resistor Cascade Piggybacks

CAUTION!

The ES5385.1 Carrier Board for Resistor Cascade is only designed for the ETAS PB5385RES.1-A Resistor Cascade Piggyback. Installing boards that are not supported may result in damage to the ES5385.1, the ES5300.1-A or the ES5300.1-B and/or to the non-supported board.

The function units of the ES5385.1 Carrier Board for Resistor Cascade are shown in the following block diagram:

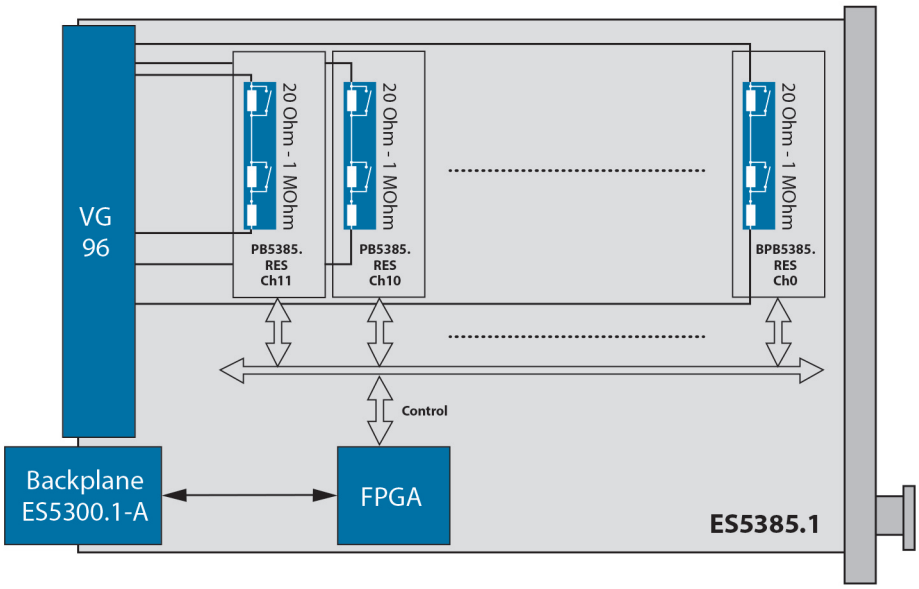


Fig. 1-5 Block Diagram of the ES5385.1 Carrier Board for Resistor Cascade with PB5385RES.1-A Resistor Cascade Piggyback

All resistor channels are galvanically isolated both from each other and from the housing potential of the ES5300.1-A Housing or ES5300.1-B Housing. Each individual PB5385RES.1-A Resistor Cascade Piggyback can be configured using software in real time in steps of 1 Ω in a range of 20 Ω to 1 .MΩ The resistor cascade channels are connected using the CO601 connector. Communication with the ES5300.1-A Housing or ES5300.1-B Housing takes place via the CO200 connector.

The ES5385.1 Carrier Board for Resistor Cascade features fuses to protect against the voltages of the ES5300.1-A and/or ES5300.1-B backplane (see "Fuses" on page 20).

1.2 Basic Safety Instructions

Please adhere to the safety instructions in this manual to avoid injury to yourself and others as well as damage to the device.

1.2.1 Labeling of Safety Instructions

The safety instructions contained in this manual are shown with the standard danger symbol shown below.

The following safety instructions are used. They provide extremely important information. Please read this information carefully.

CAUTION!

indicates a low-risk danger which could result in minor or less serious injury or damage if not avoided.

WARNING!

indicates a possible medium-risk danger which could lead to serious or even fatal injuries if not avoided.

DANGER!

indicates a high-risk, immediate danger which could lead to serious or even fatal injuries if not avoided.

1.2.2 General Safety Information

Please read the following safety instructions to avoid injury to yourself and others as well as damage to the device.

Note

Please read this User's Guide carefully before using the product!

ETAS GmbH cannot be made liable for damage which is caused by incorrect use and handling and not adhering to the safety instructions.

1.2.3 Requirements for Users and Duties for Operators

The product may be assembled, operated and maintained only if you have the necessary qualifications and experience for this product. Improper use or use by a user without sufficient qualification can put life at risk or cause damage to health or property.

The system integrator is responsible for the safety of systems that use the product!

General Safety at work

Follow the existing regulations for work safety and accident prevention. All applicable regulations and laws regarding operation must be strictly adhered to when using this product.

1.2.4 Intended Use

Application Area of the Product

The ES5385.1 Carrier Board for Resistor Cascade is a plug-in board for the ES5300.1-A Housing and the ES5300.1-B Housing. The ES5385.1 can accommodate up to twelve PB5385RES.1-A Resistor Cascade Piggybacks.

The ES5385.1 Carrier Board for Resistor Cascade consists of:

- 12 slots for accommodating resistor modules
- Up to 12 identical resistor modules
- SPI interface to the ES5300.1-A Housing or ES5300.1-B Housing
- Output interface to the ECU
- Piggyback power supply

The ES5385.1 Carrier Board for Resistor Cascade may only be installed and operated in the ES5300.1-A Housing or ES5300.1-B Housing and must not be operated as a stand-alone unit.

The use of the ES5385.1 in an ES5300.1-A Housing or ES5300.1-B Housing is as follows:

- In industrial lab facilities or at industrial workplaces
- As a hardware interface for ECUs in a hardware-in-the-loop test system
- In conjunction with ETAS Software that supports the ES5300.1-A Housing and ES5300.1-B Housing
- As an interface in conjunction with software programs that operate the standardized, documented and open APIs of ETAS software products

The ES5385.1 Carrier Board for Resistor Cascade is **not** intended to be used as follows:

- Within a vehicle on the road
- As part of a life support system
- As part of a medical application
- In applications where misuse can lead to injuries or damages
- In environments in which conditions prevail that fall outside the specified ranges (see "Environmental Conditions" on page 34)
- With signal conditioning that falls outside the specified ranges (see Voltages, Currents, Power Consumption, Characteristics in the chapter "Technical Data and Standards" on page 33)

Requirements for Operation

The following requirements are necessary for safe operation:

- Use the product only according to the specifications in the corresponding User's Guide. If the product is used in any other way, product safety is no longer ensured.
- Do not use the product in a wet or damp environment.
- Do not use the product in potentially explosive atmospheres.

Requirements for the Technical State of the Product

The product is designed in accordance with state-of-the-art technology and recognized safety rules. The product must only be operated in a technically flawless state, in accordance with its intended purpose and in a safety-conscious and hazard-aware manner under consideration of the documentation regarding the product. If the product is not used in accordance with its intended purpose, its product safety may be impaired.

Electrical safety and Power Supply

Observe the regulations applicable at the operating location concerning electrical safety as well as the laws and regulations concerning work safety.

WARNING!

Fire Hazard!
Only use fuses that comply with the specification in the User's Guide for the product. Never bridge defective fuses!
Failure to observe the fuse specification can lead to excess currents, short circuits and fires.

Power Supply

The product is powered by the ES5300.1-A Housing or the ES5300.1-B Housing via the PCIe backplane connector.

The electrical connection is made via the backplane connector CO200.

Insulation Requirements for lab power supplies to circuits connected to the HiL-System:

- The power supply to live circuitry must be safely isolated from the supply voltage. For example, use a car battery or a suitable lab power supply.
- Only use lab power supplies with dual protection for the supply network (with double/reinforced insulation (DI/RI)). Lab power supplies that comply with IEC/EN 60950 or IEC/EN 61010 meet this requirement.
- The lab power supply must be approved for use at a height of 2000 m and in ambient temperatures of up to 40 °C.

De-energizing the Plug-in Board

Switch off the ES5300.1-A Housing or the ES5300.1-B Housing and external power supplies and unplug the power plug and other connectors attached to the plug-in board. Wait at least three minutes before removing the plug-in board.

Approved Cables

The signal lines must not exceed a maximum length of 3 m.

WARNING!

Fire hazard!
Use only approved cables for creating cable assemblies (e.g. for connecting the ECU and external loads). The cables used must, in particular, be suitable for the currents, voltages and temperatures which occur and must be flame-retardant in accordance with one of the following standards
IEC60332-1-2, IEC60332-2-2, UL2556/UL1581VW-1!

Requirements for the Installation Location

WARNING!

This is class A equipment. This equipment can cause radio interference in residential areas. Should that be the case, the operator may be requested to institute reasonable measures.

Requirements for Ventilation

CAUTION!

The air circulation inside the ES5300.1-A Housing or the ES5300.1-B Housing can be ensured only if all free slots are covered with front plates. Otherwise, it may lead to overtemperatures and trip the overtemperature protection of the ES5300.1-A or the ES5300.1-B.
For this reason, install front plates in all free slots!

Transport and Installation

To avoid damages to the hardware from electrostatic discharge, please observe the following precautionary measures:

CAUTION!

Some components of the ES5385.1 Carrier Board for Resistor Cascade can be damaged or destroyed by electrostatic discharges. Leave the board in its transport packaging until it is installed.
Only remove, configure and install the ES5385.1 Carrier Board for Resistor Cascade and the PB5385RES.1-A Resistor Cascade Piggyback at a workplace that is protected against electrostatic discharges.

CAUTION!

In order to prevent damage to the plug-in board and the LABCAR-Housing and thereby also avoid damage to property or health, observe the installation instructions and information contained in the relevant User's Guide.

CAUTION!

If cards (e.g. for startup or calibration) are unlocked but not completely removed from the housing, they have to be pulled out far enough that the distance between the respective card and the backplane of the housing is at least 1 cm! Otherwise, contacts may be established between the cards and lead to their destruction.

CAUTION!

The ES5385.1 Carrier Board for Resistor Cascade is only designed for the ETAS PB5385RES.1-A Resistor Cascade Piggyback. Installing boards that are not supported may result in damage to the ES5385.1, the ES5300.1-A or the ES5300.1-B and/or to the non-supported board.

Connecting / Disconnecting Devices

To avoid injuries and hardware damages, please observe the following precautionary measures:

- Do not apply any voltages to the ports of the ES5385.1 Carrier Board for Resistor Cascade that do not correspond to the specifications of the relevant port.
- Do not connect or disconnect any devices while the ES5300.1-A Housing, ES5300.1-B Housing or connected devices are switched on. First switch off the ES5300.1-A Housing and the ES5300.1-B Housing by shutting down the real-time PC and by activating the On/Off switch at the rear of the device, then unplug all power plugs.
- When plugging in connectors, ensure that they are inserted straight and no pins are bent.

Maintenance

The device does not require maintenance.

Repairs

If an ETAS hardware product needs to be repaired, return the product to ETAS.

Cleaning

The product is not expected to require cleaning.

1.3 Identifications on the Product

The following symbols are used for identifying the product:

Symbol	Description
	Before using the product, carefully read the User's Guide!
	Identification for CE conformity, see "CE Marking" on page 15
	Identification for China RoHS, see "RoHS Conformity" on page 15
	Identification for WEEE directive, see "Product Return and Recycling" on page 16
	Marking for KCC Conformity, see "KC Marking" on page 16

Please read the information in the chapter "Technical Data and Standards" on page 33.

1.3.1 CE Marking

ETAS confirms that the product meets the product-specific applicable European Directives with the CE marking affixed to the product or its packaging. The CE Declaration of Conformity for the product is available upon request.

1.3.2 RoHS Conformity

European Union

The EU Directive 2002/95/EU limits the use of certain dangerous materials for electrical and electronic devices (RoHS conformity).

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

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.

1.3.3 KC Marking

With the KC 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.

1.4 Product Return and Recycling

The European Union (EU) has passed a directive called Waste Electrical and Electronic Equipment, or WEEE for short, to ensure that systems are set up throughout the EU for the collection, treatment 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. 1-6 WEEE-Symbol

The WEEE symbol 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 Program, contact the ETAS sales and service locations (see "ETAS Contact Addresses" on page 37).

1.5 Declarable Substances

European Union

Some products from ETAS GmbH (e.g. modules, boards, cables) use components with materials 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). This information is continuously being updated.

1.6 About this Manual

This manual consists of the following chapters:

- "Introduction" on page 5
  This chapter
- "Features and Functions" on page 19
  This chapter describes the features and functions of the components of the ES5385.1 Carrier Board for Resistor Cascade.
- "Pin Assignment and Connections" on page 27
  This section describes the various connectors of the ES5385.1 Carrier Board for Resistor Cascade.
- "Technical Data and Standards" on page 33
  This chapter contains the technical data on the ES5385.1 Carrier Board for Resistor Cascade.

1.6.1 Using this Manual

Representation of Information

All activities to be carried out by the user are shown in what we call a "Use-Case" format, i.e. the target to be achieved is defined briefly in the title and the individual steps necessary to achieve this target are then listed. The information is displayed as follows:

Target definition

Any introductory information...

1. Step 1
   Possibly an explanation of step 1...
2. Step 2
   Possibly an explanation of step 2...

Any concluding remarks...

Concrete example:

To create a new file

If you want to create a new file, no other file may be open.

1. Select **File** → **New**.
   The "Create file" dialog box appears.
2. Enter a name for the file in the "File name" field.
   The file name must not exceed 8 characters.
3. Click **OK**.

The new file is created and saved under the name specified. You can now work with the file.

Typographic Conventions

The following typographic conventions are used:

Select **File** → **Open**.	Menu commands are shown in boldface/ blue.
Click **OK**.	Buttons are shown in boldface/blue.
Press <ENTER>.	Keyboard commands are shown in angled brackets in block capitals.
The "Open File" dialog box appears.	Names of program windows, dialog boxes, fields etc. are shown in quotation marks.
Select the file `setup.exe`.	Text in drop-down lists, program code, as well as path and file names are shown in the `Courier` font.
A conversion between the file types logical and arithmetic is *not* possible.	Content markings and newly introduced terms are shown in *italics*.

Important notes for the user are shown as follows:

Note

Important note for the user.

2 Features and Functions

This chapter describes the features and functions of the components of the ES5385.1 Carrier Board for Resistor Cascade.

2.1 Scope of Supply

You can find the scope of supply in chapter "Ordering Information" on page 35.

Cables and modules are not part of the delivery scope. PB5385RES.1-A Resistor Cascade Piggybacks must be ordered separately.

2.2 Power Supply

Power is supplied to the ES5385.1 Carrier Board for Resistor Cascade and the PB5385RES.1-A Resistor Cascade Piggyback via the backplane of the ES5300.1-A or ES5300.1-B. The CO200 connector is responsible for the electrical connection.

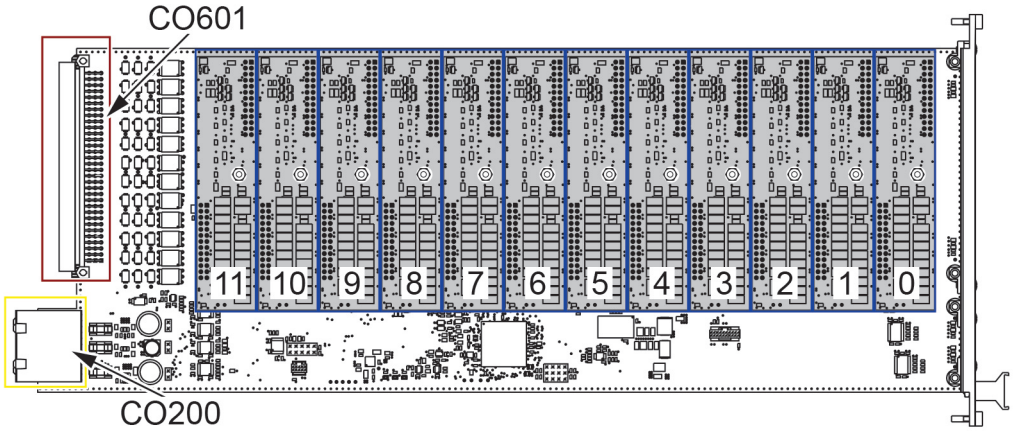


Fig. 2-1 Side View of the ES5385.1 Carrier Board for Resistor Cascade; Slots 0 - 11

2.3 Fuses

The backplane voltages of the ES5300.1-A Housing or ES5300.1-B Housing are protected by fuses on the ES5385.1 Carrier Board for Resistor Cascade (see page 9).
If a fuse is faulty, we recommend you send the board to ETAS for a thorough check using one of the addresses listed in the chapter "ETAS Contact Addresses" on page 37.

If a fuse is tripped several times, the device must be sent to ETAS.

WARNING!

Fire Hazard!
Only use fuses that comply with the specification in the User's Guide for the product. Never bridge defective fuses!
Failure to observe the fuse specification can lead to excess currents, short circuits and fires.

CAUTION!

Fuses can only be exchanged when the ES5385.1 Carrier Board for Resistor Cascade has been removed!

There are three fuses on the ES5385.1 Carrier Board for Resistor Cascade to protect the voltages from the ES5300.1-A or ES5300.1-B backplane.

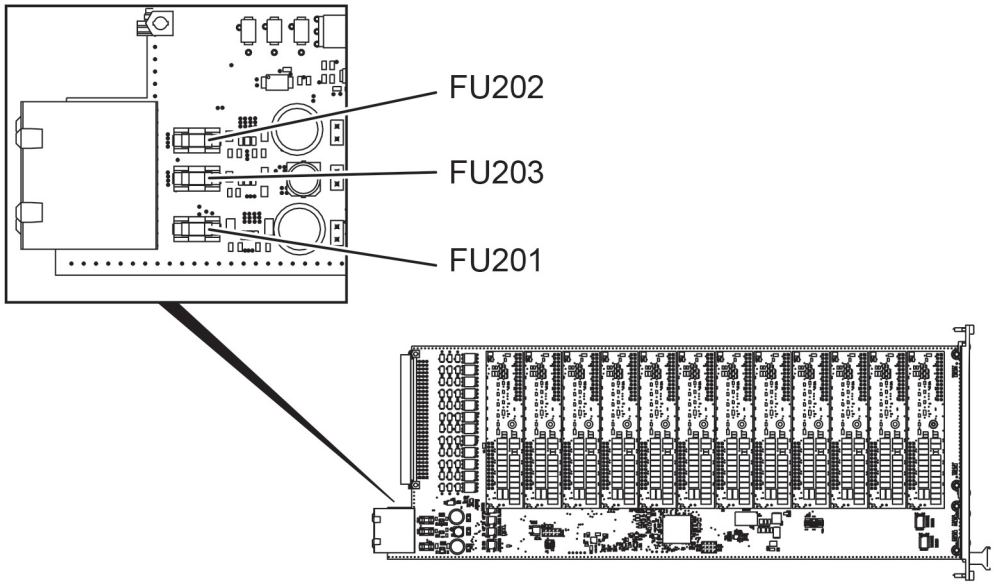


Fig. 2-2 Position of the Fuses on the ES5385.1 Carrier Board for Resistor Cascade

2.3.1 Fuse Specification:

The specification of the fuses is as follows:

Fuse	Type	Specification	Protection of (voltage)
FU202	NANO2® Slo-Blo® Fuse 452/454 Series	T 1 A	VCC5 (+5 V)
FU203	NANO2® Slo-Blo® Fuse 452/454 Series	T 2 A	VCC3_3 (+3,3 V)
FU201	NANO2® Slo-Blo® Fuse 452/454 Series	T 3 A	VCC12 (+12 V)

Tab. 2-1 Fuse Specification

2.4 Assembly

2.4.1 Getting Ready to Assemble the ES5385.1 Carrier Board for Resistor Cascade in the ES5300.1-A Housing or ES5300.1-B Housing

Before starting, ensure you have ESD-compliant conditions at your workplace.

CAUTION!

Some components of the ES5385.1 Carrier Board for Resistor Cascade can be damaged or destroyed by electrostatic discharges. Leave the board in its transport packaging until it is installed.
Only remove, configure and install the ES5385.1 Carrier Board for Resistor Cascade and the PB5385RES.1-A Resistor Cascade Piggyback at a workplace that is protected against electrostatic discharges.

CAUTION!

Never install a board when the ES5300.1-A Housing or ES5300.1-B Housing is powered on!

1. Shut down the real-time PC and disconnect the power supply to the ES5300.1-A or ES5300.1-B by switching it off on the back of the device.
2. Wait a few minutes until the components (capacitors etc.) have discharged.

2.4.2 Assembling the PB5385RES.1-A Resistor Cascade Piggyback on the ES5385.1 Carrier Board for Resistor Cascade

Assembling a PB5385RES.1-A Resistor Cascade Piggyback on the ES5385.1 Carrier Board for Resistor Cascade is described below as an assembly example. Assemble any additional PB5385RES.1-A Resistor Cascade Piggybacks in exactly the same way.

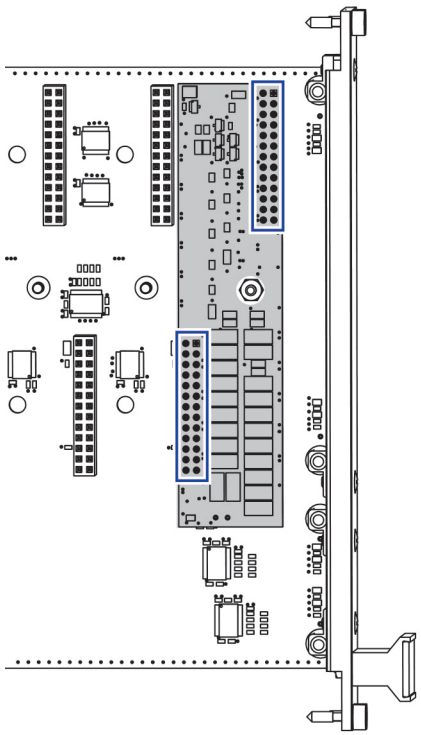


Fig. 2-3 Front View of an Assembled PB5385RES.1-A Resistor Cascade Piggyback

Please observe the following rules when assembling the PB5385RES.1-A Resistor Cascade Piggyback on the ES5385.1 Carrier Board for Resistor Cascade:

1. Align the Resistor Cascade Module to the relevant guide pin (orange-dashed rectangles in Fig. 2-4) of every slot of the ES5385.1 Carrier Board for Resistor Cascade.
2. **The alignment also has to correspond to the electrical interface (contact strip)!**
3. The Resistor Cascade Module can be mounted with slight pressure. This is only possible if the connector is correctly aligned (blue rectangle in Fig. 2-3). This prevents incorrect installation.

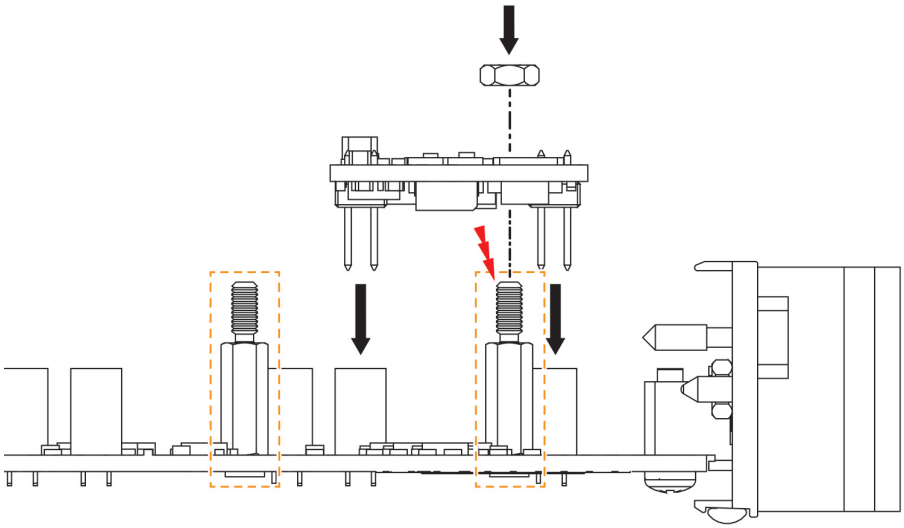


Fig. 2-4 Side View of the Assembly of a PB5385RES.1-A Resistor Cascade Piggyback

Attach the Resistor Cascade Module with the hexagon nut M2.5 provided and washer. The washer must be between the Resistor Cascade Module and hexagon nut. Gently tighten the hexagon nut.

CAUTION!

Ensure you have ESD-compliant environmental conditions to avoid damage to the electronic components.

CAUTION!

Ensure that the mechanical stress on all components is as low as possible. Only tighten the nuts gently (approx. 0.3 Nm). Make sure that the guide bolt does not touch electronic components and does not cause any mechanical stress when assembling the PB5385RES.1-A (indicated by a red flash in Fig. 2-4).

CAUTION!

Ensure the boards are aligned correctly so that no connector pins can be bent. Place the ES5385.1 Carrier Board for Resistor Cascade flat on an ESD-compliant, clean surface.

2.4.3 Inserting the ES5385.1 Carrier Board for Resistor Cascade into the slot

CAUTION!

When correctly assembled, the ES5385.1 Carrier Board for Resistor Cascade occupies just one slot of the ES5300.1-A Housing or ES5300.1-B Housing.
If adjacent boards or front panels of adjacent slots collide with the ES5385.1, you have not assembled the combination of PB5385RES.1-A and ES5385.1 correctly.
Please follow the instructions in "Assembling the PB5385RES.1-A Resistor Cascade Piggyback on the ES5385.1 Carrier Board for Resistor Cascade" on page 23.

1. Position the ES5385.1 (handle on the front panel must be pointing down!) into the top and bottom rail of the slot and push it in slightly.
2. Carefully slide in the carrier board until the backplane connector of the ES5385.1 is completely plugged in to the backplane socket.

Note

When sliding in the board, please make sure there are no cables in the way – if necessary, pull the cords into the front door area.

3. Secure the carrier board by tightly screwing on the slot bracket.

CAUTION!

The circulation of air within the ES5300.1-A Housing or the ES5300.1-B Housing can only be ensured if all free slots are covered with front panels. If not, overtemperature can be the result, activating the overtemperature protection of the ES5300.1-A or ES5300.1-B.
For this reason, make sure you cover all free slots with front panels!

3 Pin Assignment and Connections

This section describes the various connectors of the ES5385.1 Carrier Board for Resistor Cascade.

3.1 Backplane Connector (CO200)

Type: ERNI ERMet ZD Right Angle Female Connector 4 Pair (4-12) (Part Number 973099)

Mating connector (in ES5300): ERNI ERMet ZD Vertical Male Connector 4 Pair (4-12) (Part Number 973096)

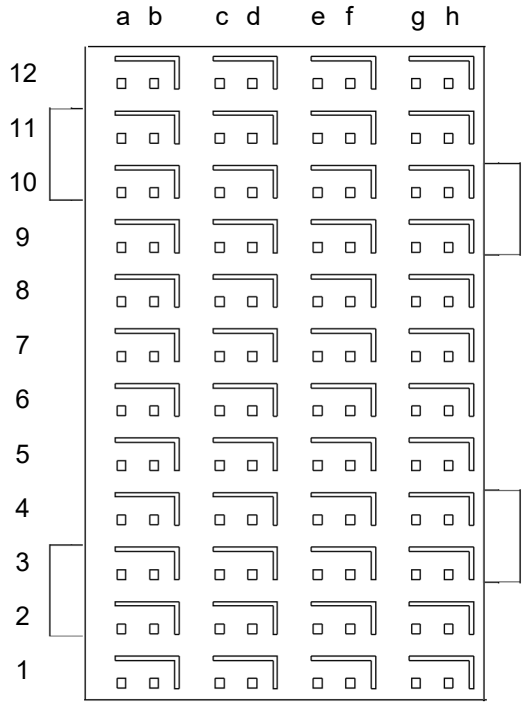


Fig. 3-1 Connectors to the Backplane (Plug-In Side)

The pin assignment is as follows:

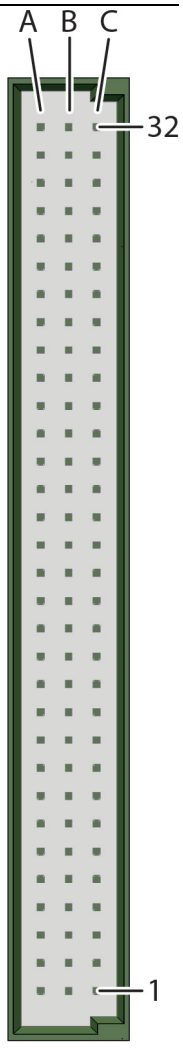
	a	b	c	d	e	f	g	h
12	BN_4	BN_5	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
12-Shield	GND		GND		GND		GND	
11	SPI_CS_A_n	SPI_CS_B_n	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
11-Shield	GND		GND		GND		GND	
10	SPI_CLK	SPI_MOSI	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
10-Shield	GND		GND		GND		GND	
9	SPI_MISO	PCIE_WAKEn	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
9-Shield	GND		GND		GND		GND	
8	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
8-Shield	GND		GND		GND		GND	
7	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
7-Shield	GND		GND		GND		GND	
6	PCIE_JTAG_TDI	PCIE_JTAG_TCK	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
6-Shield	GND		GND		GND		GND	
5	PCIE_JTAG_TMS	PCIE_JTAG_TDO	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
5-Shield	GND		GND		GND		GND	
4	BN_2	BN_3	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
4-Shield	GND		GND		GND		GND	
3	BN_0	BN_1	PCIE_SMBCLK	PCIE_SMBDAT	n.c.	n.c.	VCC24	VCC24
3-Shield	VCC3_3		VCC3_3		VCC3_3		VCC3_3	
2	n.c.	n.c.	n.c.	PCIE_PERSTn	VCC5	VCC3_3	VSS12	VSS12
2-Shield	VCC12		VCC12		VCC12		VCC12	
1	VCC12	VCC12	VCC12	VCC12	VCC5	VCC5	VCC3_3	VCC3_3
1-Shield	VCC12		VCC12		VCC12		VCC12	

3.2 VG 96 (CO601) I/O Interface

Note

For details of the permissible voltages and currents, please refer to the specifications in "Voltages, Currents, Power Consumption, Characteristics" on page 33.

Pin (A)	Signal	Pin (B)	Signal	Pin (C)	Signal
24 - 32	n. c.	24 - 32	n. c.	24 - 32	n. c.
23	Channel 11	23	Reference 11	23	Channel 11
22	n. c.	22	n. c.	22	n. c.
21	Channel 10	21	Reference 10	21	Channel 10
20	n. c.	20	n. c.	20	n. c.
19	Channel 9	19	Reference 9	19	Channel 9
18	n. c.	18	n. c.	18	n. c.
17	Channel 8	17	Reference 8	17	Channel 8
16	n. c.	16	n. c.	16	n. c.
15	Channel 7	15	Reference 7	15	Channel 7
14	n. c.	14	n. c.	14	n. c.
13	Channel 6	13	Reference 6	13	Channel 6
12	n. c.	12	n. c.	12	n. c.
11	Channel 5	11	Reference 5	11	Channel 5
10	n. c.	10	n. c.	10	n. c.
9	Channel 4	9	Reference 4	9	Channel 4
8	n. c.	8	n. c.	8	n. c.
7	Channel 3	7	Reference 3	7	Channel 3
6	n. c.	6	n. c.	6	n. c.
5	Channel 2	5	Reference 2	5	Channel 2
4	n. c.	4	n. c.	4	n. c.
3	Channel 1	3	Reference 1	3	Channel 1
2	n. c.	2	n. c.	2	n. c.
1	Channel 0	1	Reference 0	1	Channel 0



Tab. 3-1 Pin Assignment of the Resistor Channels on CO601

The resistor cascade is between Pin A and Pin C. The reference signals can be used to refer the relevant channel to an electric reference potential of the signal source (e.g. ECU potential).

Type: DIN 41612, Type C

Mating Connector: DIN41612 connector without crimp contacts (Part Number Harting 09030963214); crimp contacts (Part Number Harting 09020008484)

WARNING!

Fire hazard!
Use only approved cables for creating cable assemblies (e.g. for connecting the ECU and external loads). The cables used must, in particular, be suitable for the currents, voltages and temperatures which occur and must be flameretardant in accordance with one of the following standards
IEC60332-1-2, IEC60332-2-2, UL2556/UL1581VW-1!

Possible Connections for the "Reference x" Pin for Different Applications:

Res +	Channel x Pin A
Ref	Reference x Pin B
Res -	Channel x Pin C

Tab. 3-2 Allocation of the Signal Names in Fig. 3-2, Fig. 3-3 and Fig. 3-4 to the Pin Assignment in Tab. 3-1 on page 29

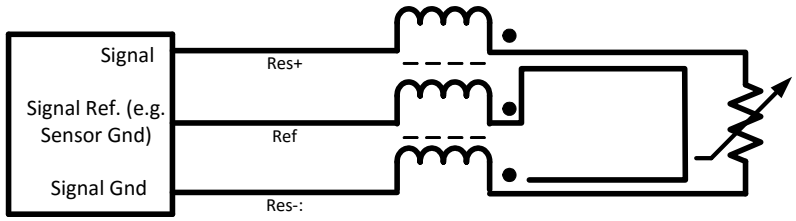


Fig. 3-2 Case 1: Sensor GND und Signal GND have different potential. Both GND potentials must be connected here.

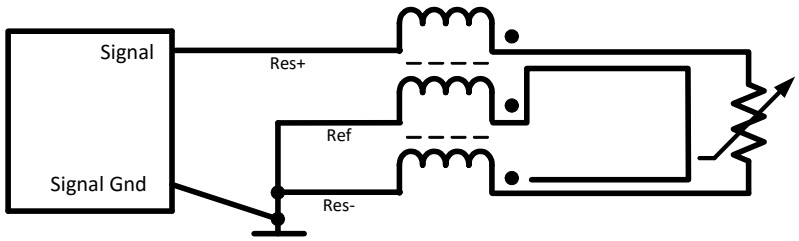


Fig. 3-3 Case 2: Sensor GND and Signal GND have a common reference potential: Connect pins "Ref" and "Res-" with each other.

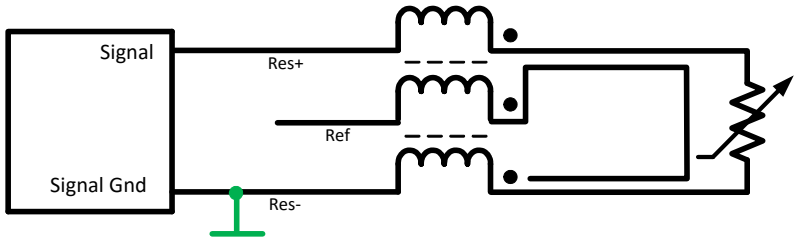


Fig. 3-4 Case 3: There is no sensor GND, only a signal GND (e.g. load simulation). The "Ref" pin is not connected.

Note

The function of the reference pin only applies when attention is paid to noise immunity when defining the ground/cabling concept. (This means, for example, signal flow with low impedance, defined reference potentials, low contact resistance, shielded configuration, no crosstalk).

4 Technical Data and Standards

4.1 Technical Data

This chapter contains the technical data on the ES5385.1 Carrier Board for Resistor Cascade.

Voltages, Currents, Power Consumption, Characteristics

Maximum voltage at inputs and outputs (CO601); PIN A to PIN C; PIN A or PIN C to Reference PIN B		±60 V for max. 15 seconds
Normal operation; voltage at inputs and outputs (CO601); PIN A to PIN C; PIN A or PIN C to Reference PIN B		±12 V
Maximum current per individual contact of the input/output connector (CO601); separate overcurrent detection per resistor channel		±100 mA
Maximum total current over the input/output connector (CO601)		±1.2 A
Resistance range of a PB5385RES.1-A		20 Ω – 1 MΩ
Resistance increment		1 Ω
Precision		1.5 Ω + 0.5%∗RTIO_set_value
Minimum permissible resistance change rate		5 ms (200 Hz)
Minimum switching delay time		Resistance value stable in 1 ms
Maximum permissible power consumption for backplane voltages		
	12 V	16 W
	5 V	1 W
	3.3 V	1 W

Storage Conditions

Temperature	-20 °C to 85 °C (-4 °F to 185 °F)
Relative humidity	0 to 95% (non-condensing)

Environmental Conditions

Environment	Use only inside enclosed and dry rooms
Max. contamination level	2
Temperature during operation	5 °C to 40 °C (41 °F to 104 °F)
Relative humidity	0 to 95% (non-condensing)
Operating Altitude	-200 m to 2000 m / 6500 ft above sea level

Physical Dimensions

Height	4 U
Width	5 HP
Weight	0,5 kg

4.2 Fulfilled Standards and Norms

The ES5385.1 Carrier Board for Resistor Cascade complies with the following standards and norms:

Standard	**Testing**
IEC 61326-1	Electrical equipment for measurement, control and laboratory use – EMC requirements (industrial environment)
IEC 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements

The board is only designed for use in industrial environments compliant with IEC 61326-1. Avoid any possible radio interference when using the module outside industrial environments by applying additional shielding measures!

WARNING!

This is class A equipment. This equipment can cause radio interference in residential areas. Should that be the case, the operator may be requested to institute reasonable measures.

Note

The signal lines must not exceed a maximum length of 3 m!

5 Ordering Information

Order Name	Short Name	Order Number
ES5385.1 Carrier Board for Resistor Cascade (12 Sockets)	ES5385.1	F-00K-109-675
K_ES5385.1 Calibration Service for ES5385.1	K_ES5385.1	F-00K-109-678
PB5385RES.1-A Resistor Cascade Piggyback (20 Ohm…1 MOhm)	PB5385RES.1-A	F-00K-109-676
Scope of Supply	**Number**	
ES5385.1 Carrier Board for Resistor Cascade	1	

6 ETAS Contact Addresses

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ETAS Subsidiaries and 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:

ETAS subsidiaries	WWW:	www.etas.com/en/contact.php
ETAS technical support	WWW:	www.etas.com/en/hotlines.php

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