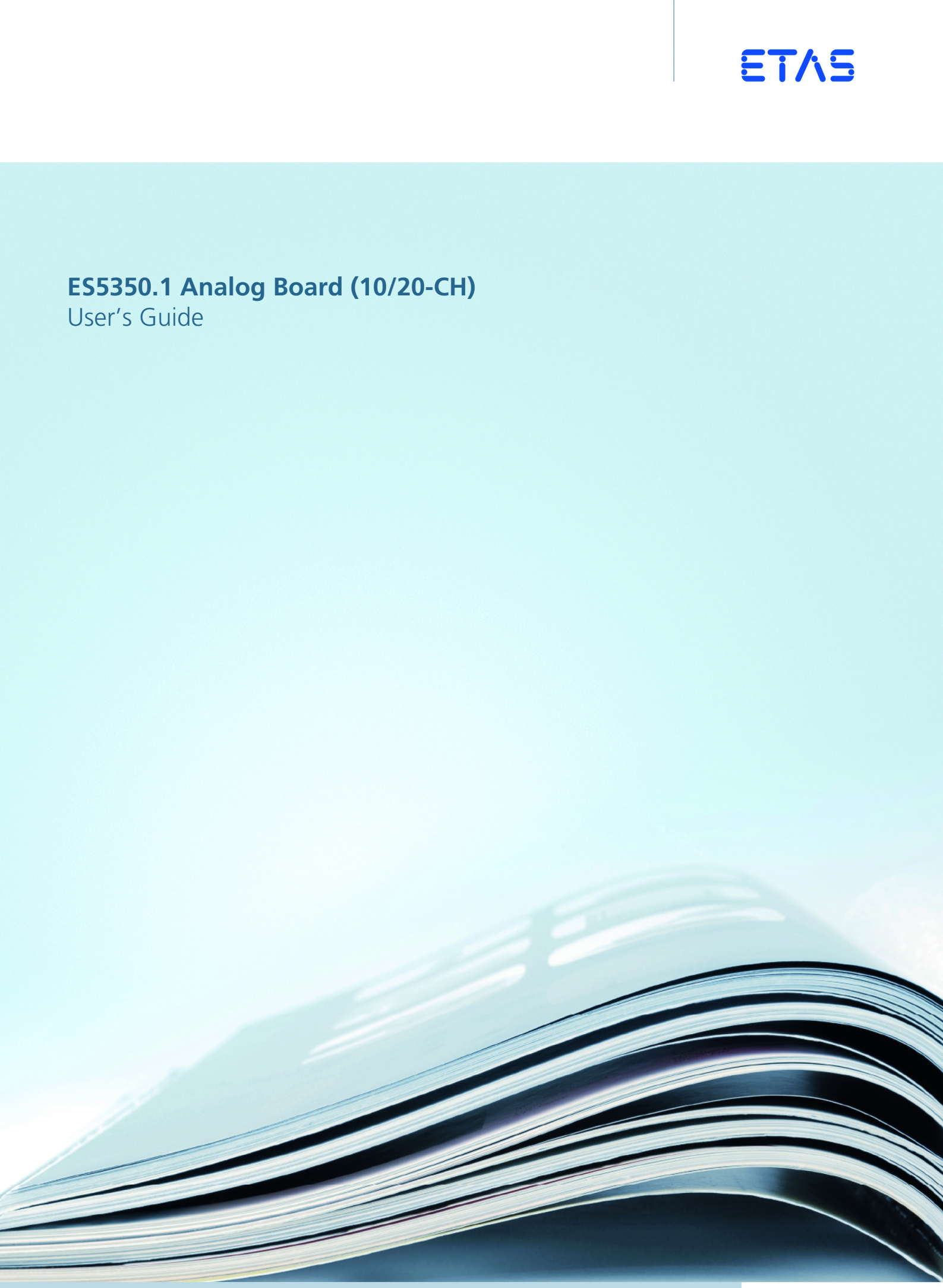
ES5350.1 Analog Board (10/20-CH)

User's Guide



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Contents

1 Introduction

This manual contains the description of the ES5350.1 plug-in card.

CAUTION!

Some components of the ES5350.1 plug-in card can be damaged or destroyed by electrostatic discharges. Leave the plug-in card in its transport packaging until it is installed.
Only remove, configure and install the product at a workplace that is protected against electrostatic discharges.

CAUTION!

If cards (e.g. for startup or calibration) are unlocked but not completely removed from the housing, they must be pulled out so far 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.

This chapter contains information about the following topics:

1.1 Properties

The ES5350.1 plug-in card serves as analog input and output card for the ES5300.1-A or ES5300.1-B Housing.

Due to the galvanic isolation of the 10 analog input channels and the five groups each with 4 output channels, the different signals can be acquired or generated without common ground reference point while achieving exact, interference-free measurement results.

Functions at a glance

- 10 analog, galvanically isolated input channels
- 20 analog output channels
  (5 groups each with 4 galvanically isolated outputs)
- 3 measurement ranges adjustable via software for every input channel:
  ±1 V, ±10 V and ±60 V
- Overvoltage protection for analog inputs and outputs: ±60 V
- Lab-capable temperature range from
  +5 °C to +40 °C (+40 °F to +104 °F)

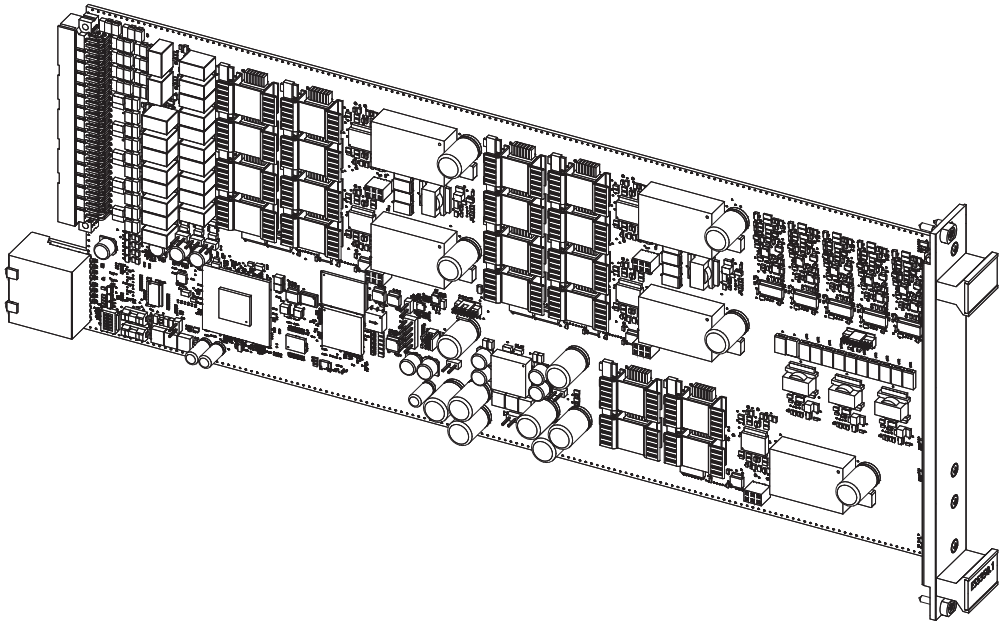


Fig. 1-1 View of an ES5350.1 plug-in card

The functional units of the ES5350.1 plug-in card are represented in the following block diagram:

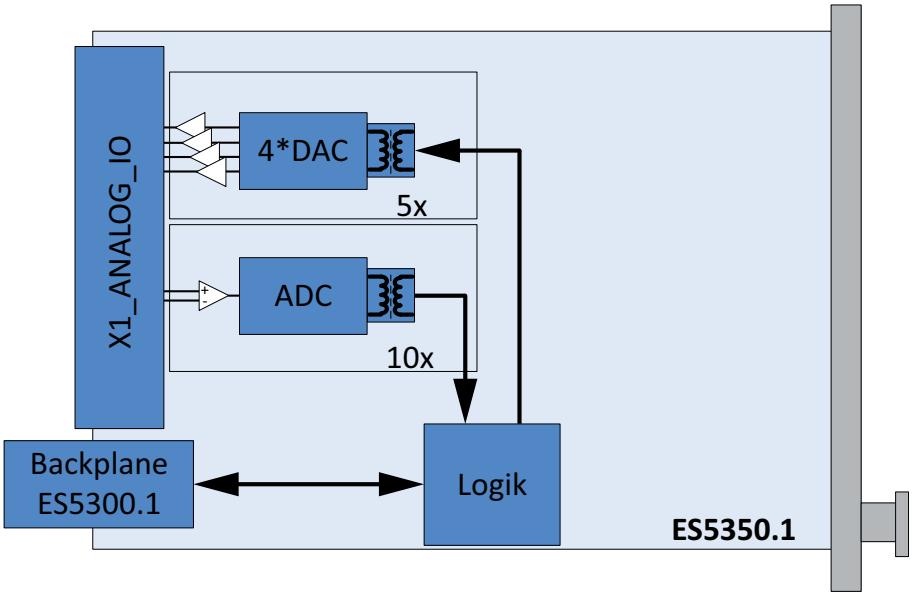


Fig. 1-2 Block diagram of ES5350.1 plug-in card

The connection of the channels is done via plug X1_ANALOG_IO (see "I/O interface X1_ANALOG_IO" on page 30). The communication with the ES5300.1-A Housing or the ES5300.1-B Housing is done via the ES5300 backplane connector CO200 (see "Backplane Connector CO200" on page 27).

There are fuses on the ES5350.1 plug-in card to protect the supply voltages of the ES5300.1-A or the ES5300.1-B backplane. For detailed information about the fuses, see the chapter "Fuses" on page 18.

1.2 Basic Safety Notices

Please observe the following safety notices to avoid health issues or damage to the device.

1.2.1 Identification of Safety Notices

The safety notices contained in this manual are identified with the danger symbol shown below:

The safety notices shown below are used for this purpose. They provide notes to extremely important information. Please read this information carefully.

CAUTION!

identifies a hazard with low risk that could result in minor or medium physical injuries or property damages if not avoided.

WARNING!

indicates a possible danger with moderate risk of death or (serious) injury, if not avoided.

DANGER!

indicates an immediate danger with a high risk of death or serious injury, if not avoided.

1.2.2 General Safety Information

Please observe the Product Safety Notices ("ETAS Safety Notice") and the following safety notices to avoid health issues or damage to the device.

Note

The User's Guide must be read prior to the startup of the product!

ETAS GmbH does not assume any liability for damages resulting from improper handling, unintended use or non-observance of the safety precautions.

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

The ES5350.1 is a plug-in card for the ES5300.1-A Housing and the ES5300.1-B Housing to generate and measure analog signals.

The ES5350.1 plug-in card consists of:

- PCI Express interface to the ES5300.1-A Housing or the ES5300.1-B Housing (see "Backplane Connector CO200" on page 27)
- Analog input and output interfaces to the ECU (see "I/O interface X1_ANALOG_IO" on page 30)

The ES5350.1 plug-in card may be installed and operated only in the ES5300.1-A Housing and the ES5300.1-B Housing and must not be operated as a stand-alone-unit.

The intended use of the ES5350.1 plug-in card in an ES5300.1-A Housing or in an ES5300.1-B Housing is as follows:

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

The ES5350.1 plug-in card is **not** intended for the following:

- Use within a vehicle on the road
- Use as part of a life support system
- Use as part of a medical application
- Use in applications where misuse can lead to injuries or damages
- Use in environments in which conditions prevail that fall outside the specified ranges: see "Ambient Conditions" on page 34.
- Use with signal conditioning that falls outside the specified ranges: see "Technical Data" on page 33 (voltages, currents and power consumption).

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, the 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!
Use only fuses that comply with the specification in Tab. 2-1 on page 19!
Never bridge defective fuses!
Failure to observe the fuse specification can lead to excess currents, short circuits and fires.

WARNING!

Unlike a fuse, the retry functionality is not a general safety feature. It is a software-supported convenience feature.
Always equip your connected test object with sufficient protection!

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 Card

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 card. Wait at least three minutes before removing the plug-in card.

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 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 ES5350.1 plug-in card can be damaged or destroyed by electrostatic discharges. Leave the plug-in card in its transport packaging until it is installed.
Only remove, configure and install the product at a workplace that is protected against electrostatic discharges.

CAUTION!

In order to prevent damage to the plug-in *card 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 Guides.*

CAUTION!

If cards (e.g. for startup or calibration) are unlocked but not completely removed from the housing, they must 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.

Connecting/Disconnecting Devices

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

- Do not apply any voltages to the connections of the ES5350.1 plug-in card that do not correspond to the specifications of the respective connection. The exact specification of the I/O hardware is located in the manuals of the corresponding boards.
- Do not connect or disconnect any devices while the ES5300.1-A Housing, the ES5300.1-B Housing or external devices are switched on. First, switch off the ES5300.1-A Housing or the ES5300.1-B Housing by shutting down the real-time PC and by activating the On/Off switch at the rear, then unplug the power plug.
- When plugging in connectors, ensure that they are inserted straight and no pins are bent.

Maintenance

The product 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 product labeling:

Symbol	Description
	The User's Guide must be read prior to the startup of the product
	Marking for CE conformity, see "CE Mark" on page 13
	Marking for China RoHS, see "RoHS Conformity" on page 13
	Marking for conformity with WEEE directive, see "Product Return and Recycling" on page 14
	Marking for KCC Conformity, see "KC Marking" on page 14

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

1.3.1 CE Mark

With the CE mark attached to the product or its packaging, ETAS confirms that the product corresponds to the product-specific, applicable European Directives. The CE Declaration of Conformity for the product is available upon request (see "ETAS Contact Addresses" on page 37).

1.3.2 RoHS Conformity

European Union

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

ETAS confirms that the product meets this directive applicable in the European Union.

China

With the China RoHS identification attached to the product or its packaging, ETAS confirms that the product meets the guidelines of the "China RoHS" (Management Methods for Controlling Pollution Caused by Electronic Information Products Regulation) applicable in the People's Republic of China.

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 issued the directive 2012/19/EU on waste electric and electronic equipment (Waste Electrical and Electronic Equipment - WEEE) in order to ensure the institution of systems for collection, handling, and disposal of all electronic scrap.

This ensures that the devices are recycled in a resource-friendly way that does not represent any risk to personal health and the environment.

Fig. 1-3 WEEE symbol

The WEEE symbol on the product or its packaging identifies that the product may not be disposed of together with the remaining trash.

The user is obligated to separate the waste equipment and to provide it to the WEEE return system for reuse.

The WEEE Directive applies to all ETAS devices, but not to external cables or batteries.

Additional information about the recycling program of ETAS GmbH is available from 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 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). This information is continuously being updated.

1.6 About this Manual

This manual consists of the following chapters:

- "Introduction" on page 5
  This chapter
- "Design, Installation and Fuses" on page 17
  This chapter contains information about the design and installation of ES5350.1 plug-in card, as well as information about the fuses.
- "Signals" on page 23
  This chapter features a description of the signals of the ES5350.1 plug-in card.
- "Connections and Connectors" on page 27
  This section provides a description of the different connections and connectors of the ES5350.1 plug-in card and its pin assignments.
- "Technical Data and Standards" on page 33
  This chapter contains the technical data of the ES5350.1 plug-in card. It also contains information about the norms and standards met as well as the ordering data.

1.6.1 Working with this Manual

Presentation of Information

All activities to be performed by the user are presented in a "Use Case" format. That is, the goal to be accomplished is briefly defined in the heading, and the respective steps required for reaching this goal are then presented in a list. The presentation looks as follows:

Target definition

Any advance information...

1. Step 1
   Any explanation for step 1...
2. Step 2
   Any explanation for step 2...

Any concluding comments...

Specific example:

Creating a new file

Before creating a new file, no other file may be open.

1. Select **File** → **New**.
   The "Create File" dialog box appears.
2. Enter the name for the file in the "File Name" field.
   The file name may not have more than 8 characters.
3. Click on **OK**.

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

Typographical Conventions

The following typographical conventions are used:

Select **File** → **Open**.	Menu commands are displayed in bold/ blue.
Click on **OK**.	Buttons are displayed in bold/blue.
Press <ENTER>.	Keyboard commands are presented in angled brackets starting with capital letter.
The "Open file" dialog window appears.	Names of program windows, dialog windows, fields and similar are set in quotation marks.
Select the `setup.exe` file.	Text in selection lists, program code, as well as path and file names are displayed using the `Courier` font.
A conversion between the logical and arithmetic data types is *not* possible.	Content-based highlights and newly introduced terms are placed in *italics*.

Important notes for the user are presented as follows:

Note

Important note for the user.

2 Design, Installation and Fuses

This chapter contains information about the design and installation of ES5350.1 plug-in card, as well as information about the fuses.

CAUTION!

Some components of the ES5350.1 plug-in card can be damaged or destroyed by electrostatic discharges. Leave the plug-in card in its transport packaging until it is installed.
Only remove, configure and install the product at a workplace that is protected against electrostatic discharges.

2.1 Scope of Supply

You can find the scope of supply in chapter "Ordering Data" on page 36.

2.2 Voltage Supply of ES5350.1 Plug-in Card

The ES5350.1 plug-in card is supplied via the backplane of the ES5300.1-A or ES5300.1-B housing. The electrical connection is done via backplane connector CO200.

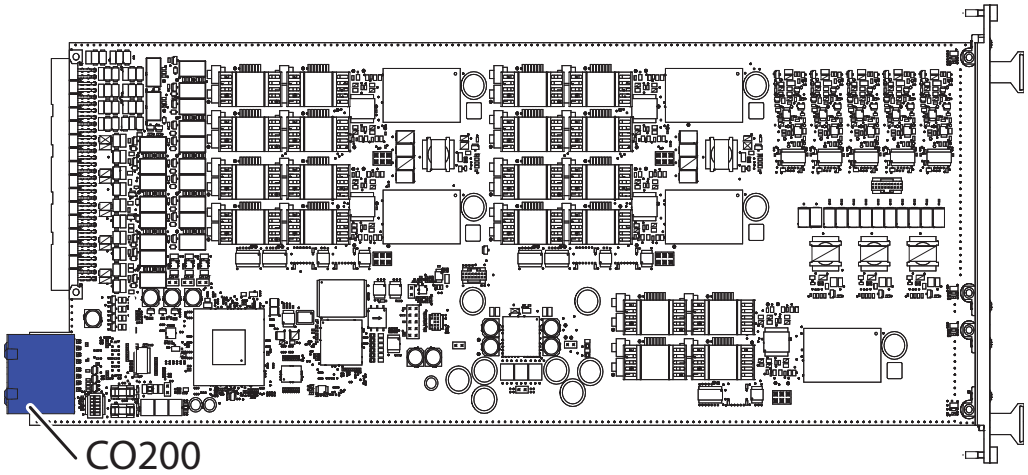


Fig. 2-1 Backplane connector CO200 to voltage supply

Note

Additional information about power consumption is located in the technical data in the chapter "Voltage Supply (Backplane Connector)" on page 34. Information about the pin assignment of the backplane connector CO200 is located in the chapter "Pin Assignment - Backplane Connector CO200" on page 28.

2.3 Fuses

The supply voltages of the backplane of the ES5300.1-A or the ES5300.1-B Housing are protected with fuses on the ES5350.1 plug-in card.

In case of a fuse defect, we recommend sending the board to ETAS for further testing. For this purpose, the device should be sent to ETAS (see "ETAS Contact Addresses" on page 37).

If a fuse trips multiple times, the device must be sent to ETAS.

WARNING!

Fire Hazard!
Use only fuses that comply with the specification in Tab. 2-1 on page 19!
Never bridge defective fuses!
Failure to observe the fuse specification can lead to excess currents, short circuits and fires.

CAUTION!

Replace fuses only while the ES5350.1 plug-in card *is removed.*

2.3.1 Position of Fuses

Fig. 2-2 shows the position of the fuses on the ES5350.1 plug-in card.

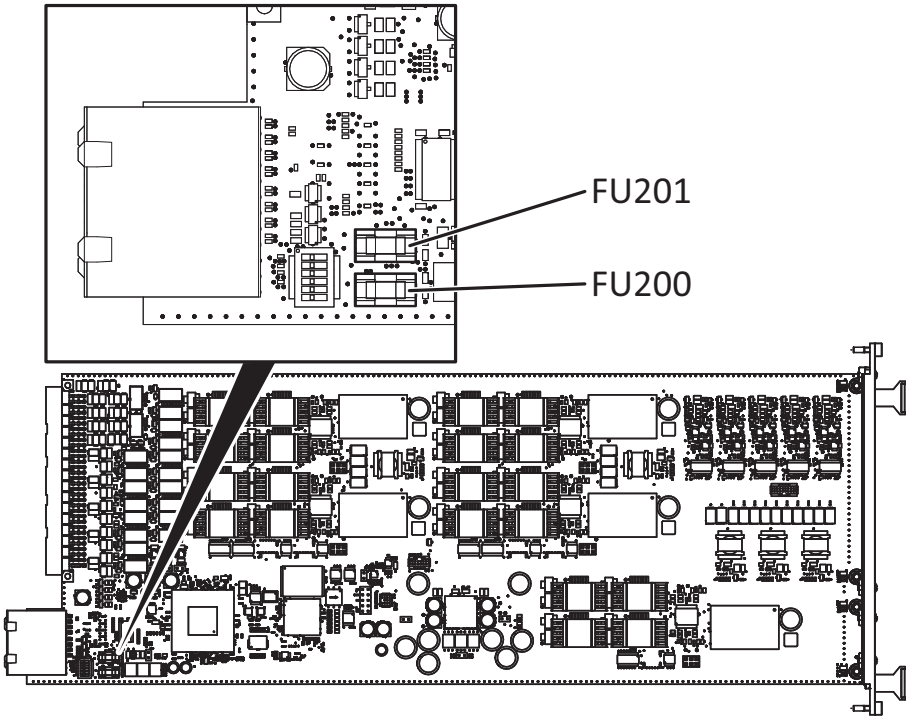


Fig. 2-2 Position of fuses on the ES5350.1 plug-in card

2.3.2 Specification of Fuses

The specification of the fuses is as follows:

Fuse	Type	Specification	Fuse protection of (voltage)
FU200	NANO2® Slo-Blo® Fuse 452/454 series	LF T 3 A	VCC12 (+12 V)
FU201	NANO2® Slo-Blo® Fuse 452/454 series	LF T 3 A	VCC3_3 (+3.3 V)

Tab. 2-1 Specification of fuses

2.3.3 Ordering Data of Fuses

The ordering data of the fuse are as follows:

Fuse	Type	Manufacturer	Order number
FU200 FU201	NANO2® Slo-Blo® Fuse 452/454 series	Littelfuse, Inc.	0452003

2.4 Installation in the ES5300.1-A and the ES5300.1-B Housing

A description for installing the ES5350.1 plug-in card in the ES5300.1-A Housing or the ES5300.1-B housing is located in the manual for the ES5300.1-A Housing or the ES5300.1-B housing.

The installation of the ES5350.1 plug-in card may be performed only by trained personnel in an ESD-safe area.

CAUTION!

Do not install the ES5350.1 plug-in card while the ES5300.1-A Housing, the ES5300.1-B housing or connected devices are switched on. First, switch off the ES5300.1-A housing or the ES5300.1-B housing by shutting down the real-time PC and by activating the On/Off switch at the rear, then unplug the power plug.

CAUTION!

Some components of the ES5350.1 plug-in card can be damaged or destroyed by electrostatic discharges. Leave the plug-in card in its transport packaging until it is installed.
Only remove, configure and install the product at a workplace that is protected against electrostatic discharges.

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 ES5300.1-B. For this reason, install front plates in all free slots!

Installation of the ES5350.1 in the ES5300.1-A Housing or ES5300.1-B Housing

1. Ensure that ESD-compliant conditions exist at your workplace.
2. Shut down the real-time PC and switch off the power supply of the ES5300.1-A or ES5300.1-B using the switch at the rear of the housing.
3. Wait a few minutes for the components (capacitors, etc.) to be discharged.
4. Insert the ES5350.1 plug-in card (handle at the front plate must point down!) into the upper and lower rail of the slot and push it in a little bit.

5. Carefully push in the ES5350.1 plug-in card until the backplane connector of the ES5350.1 plug-in card is completely inserted in the socket of the backplane.

Note

Watch for cables in the insertion area while pushing in the board – pull the lines to the front door area if necessary.

6. Secure the carrier card by fastening the front plate with screws.
7. Install front plates at all open slots before starting up the ES5350.1 plug-in card.

3 Signals

This chapter features a description of the signals of the ES5350.1 plug-in card.

3.1 Analog Inputs - I/O interface X1_ANALOG_IO

The plug connector "X1_ANALOG_IO" features 10 analog inputs ANA_IN_0... ANA_IN_9 that are differentially and galvanically isolated from each other. This allows the measurement of different signals, even without common reference point.

Every analog input channel has a mean filter with adjustable sample number (2, 4, 8, 16, 32, 64, 128) which is used for averaging. For this purpose, every input channel can be operated in regular analog or comparator mode.

3.1.1 Block Diagram of Analog Inputs

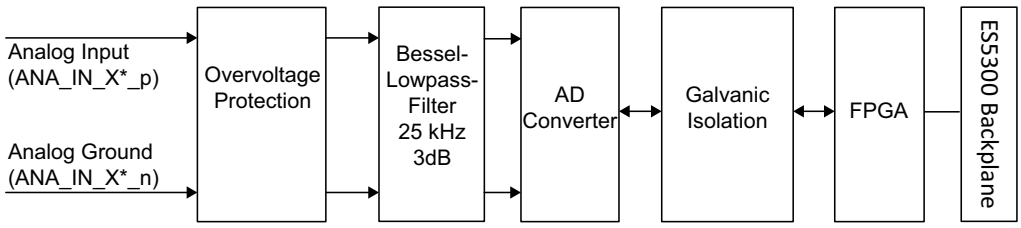


Fig. 3-1 Block diagram of analog inputs of the ES5350.1 plug-in card

* X represents the respective channel number (0...9)

For more detailed information about the analog inputs, see the Technical Data in the chapter "Analog Inputs (I/O interface X1_ANALOG_IO)" on page 33.

3.2 Analog Outputs - I/O interface X1_ANALOG_IO

20 analog outputs are available, which are divided into five groups with 4 outputs each.

In the process, you can configure the following functions using a software:

- PWM signal generation
- Switch/toggle mode
- Input-dependent output mode

3.2.1 Block Diagram of Analog Outputs

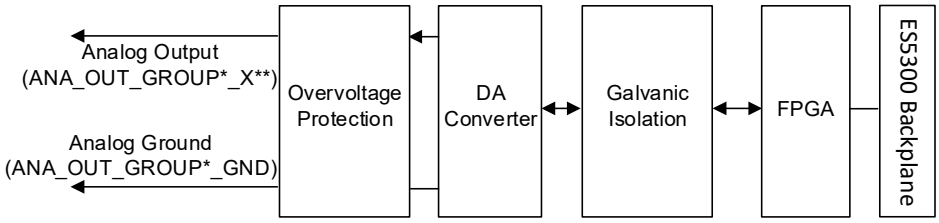


Fig. 3-2 Block diagram of analog outputs of the ES5350.1 plug-in card

*Group represents the five galvanically isolated groups (A...E)

**X represents the respective channel number (0...3)

For more detailed information about the analog outputs, see the Technical Data in the chapter "Analog Outputs (I/O interface X1_ANALOG_IO)" on page 34.

The Retry Functionality

The Retry functionality is activated when the maximum amount of the total current per output group is exceeded. All outputs of the group are temporarily switched off in case of an overload. The duration of the switch-off varies depending on the frequency of the overload case.

WARNING!

Unlike a fuse, the retry functionality is not a general safety feature. It is a software-supported convenience feature. Always equip your connected test object with sufficient protection!

4 Connections and Connectors

This section provides a description of the different connections and connectors of the ES5350.1 plug-in card and its pin assignments.

4.1 Backplane Connector CO200

The connection of the ES5350.1 plug-in card to the ES5300.1-A Housing or the ES5300.1-B Housing is done via the PCIe plug connector "CO200" (Fig. 4-1 on page 27), which is used for the voltage supply (see "Voltage Supply of ES5350.1 Plug-in Card" on page 17).

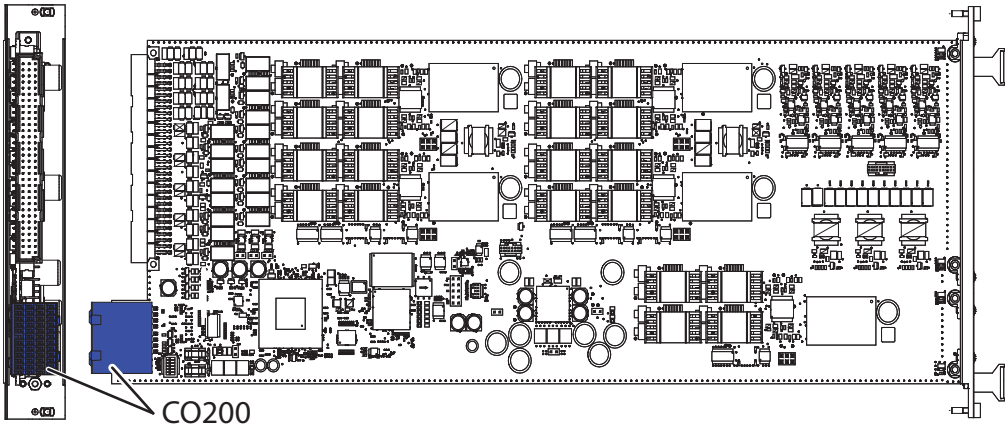


Fig. 4-1 Backplane connector CO200 of the ES5350.1 plug-in card

Type: ERMet® ZD, angled female multipoint connector, 4-pair (4-12)

Manufacturer: ERNI Production GmbH & Co. KG

Order number: 973099

Counterplug:

Type: ERMet® ZD, straight male multipoint connector, 4-pair (4-12)

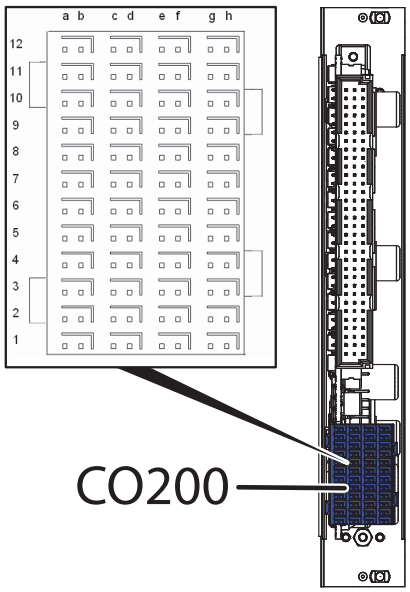
Manufacturer: ERNI Production GmbH & Co. KG

Order number: 973096

Note

It is absolutely necessary to observe the specifications for permissible voltages and currents in the "Technical Data" on page 33.

4.1.1 Pin Assignment - Backplane Connector CO200



The assignment of the pins is located in Tab. 4-1 on the next page (the maximum possible pin assignment for the ES5300.1-A Housing and ES5300.1-B Housing is listed):

Fig. 4-2 Pin assignment of the plug connector CO200 to the backplane

	h	g	f	e	d	c	e	a
12	GBLI_TX_n_0	GBLI_TX_p_0	GBLI_RX_n_0	GBLI_RX_p_0	M_LVDS_n_7	M_LVDS_p_7	BN_5	BN_4
12-shield	GND		GND		GND		GND	
11	GBLI_TX_n_1	GBLI_TX_p_1	GBLI_RX_n_1	GBLI_RX_p_1	M_LVDS_n_6	M_LVDS_p_6	SPI_CS_B_n	SPI_CS_A_n
11-shield	GND		GND		GND		GND	
10	GBLI_TX_n_2	GBLI_TX_p_2	GBLI_RX_n_2	GBLI_RX_p_2	M_LVDS_n_5	M_LVDS_p_5	SPI_MOSI	SPI_CLK
10-shield	GND		GND		GND		GND	
9	GBLI_TX_n_3	GBLI_TX_p_3	GBLI_RX_n_3	GBLI_RX_p_3	M_LVDS_n_4	M_LVDS_p_4	PCIE_WAKEn	SPI_MISO
9-shield	GND		GND		GND		GND	
8	GBLI_PRESENT_n	GEO_ADDR_4	PCIE_REFCLK_n	PCIE_REFCLK_p	M_LVDS_n_3	M_LVDS_p_3	n.c.	n.c.
8-shield	GND		GND		GND		GND	
7	PCIE_RX_n_0	PCIE_RX_p_0	PCIE_TX_n_0	PCIE_TX_p_0	M_LVDS_n_2	M_LVDS_p_2	n.c.	n.c.
7-shield	GND		GND		GND		GND	
6	Ass. internally	Ass. internally	Ass. internally	Ass. internally	M_LVDS_n_1	M_LVDS_p_1	PCIE_JTAG_TCK	PCIE_JTAG_TDI
6-shield	GND		GND		GND		GND	
5	Ass. internally	Ass. internally	Ass. internally	Ass. internally	M_LVDS_n_0	M_LVDS_p_0	PCIE_JTAG_TDO	PCIE_JTAG_TMS
5-shield	GND		GND		GND		GND	
4	Ass. internally	Ass. internally	Ass. internally	Ass. internally	GEO_ADDR_1	GEO_ADDR_0	BN_3	BN_2
4-shield	GND		GND		GND		GND	
3	VCC24	VCC24	GEO_ADDR_3	GEO_ADDR_2	PCIE_SMBDAT	PCIE_SMBCLK	BN_1	BN_0
3-shield	VCC3_3		VCC3_3		VCC3_3		VCC3_3	
2	VSS12	VSS12	VCC3_3	VCC5	PCIE_PERSTn	PCIE_PRSNT1n	PCIE_PRSNT2n_X1	PCIE_PRSNT2n_X4
2-shield	VCC12		VCC12		VCC12		VCC12	
1	VCC3_3	VCC3_3	VCC5	VCC5	VCC12	VCC12	VCC12	VCC12
1-shield	VCC12		VCC12		VCC12		VCC12	

Tab. 4-1 Table of pin assignment - backplane connector CO200

4.2 I/O interface X1_ANALOG_IO

The plug connector X1_ANALOG_IO is used for the connection of the generically usable analog inputs and outputs. The following figure shows the position of the plug connector on the ES5350.1 plug-in card.

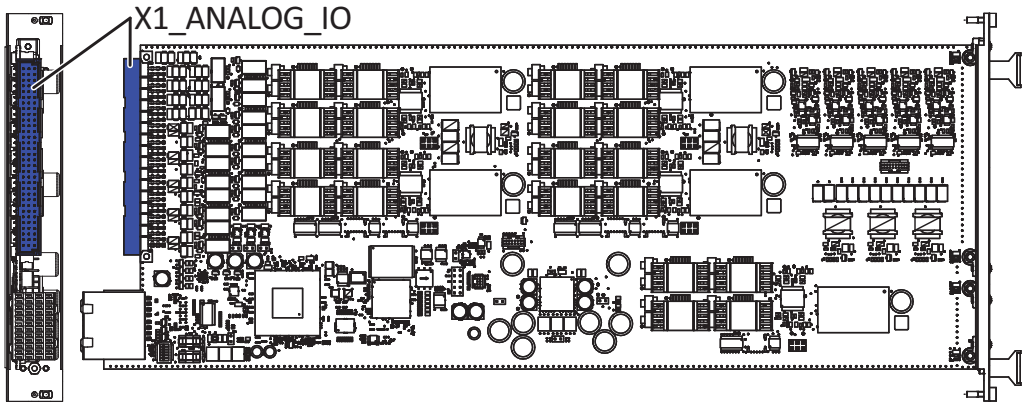


Fig. 4-3 I/O interface X1_ANALOG_IO of the ES5350.1 plug-in card

Type: DIN 41612, type C

Counterplug

Type: DIN 41612 plug connector, without crimp contacts

Manufacturer: e.g. HARTING Deutschland GmbH & Co.

Order number: 09030963214, crimp contacts: 09020008484

Note

It is absolutely necessary to observe the specifications for permissible voltages and currents in the "Technical Data" on page 33.

4.2.1 Pin Assignment - I/O Interface X1_ANALOG_IO

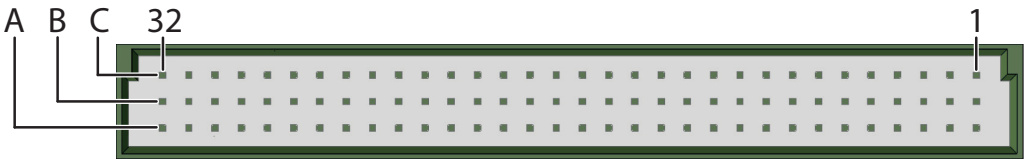


Fig. 4-4 Pin assignment of the plug connector X1_ANALOG_IO to the back-plane

The assignment of the pins is located in Tab. 4-2:

Shortname	Type	PIN (signal)	PIN (ref.)	Type	Shortname
ANA_IN_9_n	Negative input of the differential analog channel 9	A32	C32	Positive input of the differential analog channel 9	ANA_IN_9_p
ANA_IN_8_n	Negative input of the differential analog channel 8	A31	C31	Positive input of the differential analog channel 8	ANA_IN_8_p
ANA_IN_7_n	Negative input of the differential analog channel 7	A30	C30	Positive input of the differential analog channel 7	ANA_IN_7_p
ANA_IN_6_n	Negative input of the differential analog channel 6	A29	C29	Positive input of the differential analog channel 6	ANA_IN_6_p
ANA_IN_5_n	Negative input of the differential analog channel 5	A28	C28	Positive input of the differential analog channel 5	ANA_IN_5_p
ANA_IN_4_n	Negative input of the differential analog channel 4	A27	C27	Positive input of the differential analog channel 4	ANA_IN_4_p
ANA_IN_3_n	Negative input of the differential analog channel 3	A26	C26	Positive input of the differential analog channel 3	ANA_IN_3_p
ANA_IN_2_n	Negative input of the differential analog channel 2	A25	C25	Positive input of the differential analog channel 2	ANA_IN_2_p
ANA_IN_1_n	Negative input of the differential analog channel 1	A24	C24	Positive input of the differential analog channel 1	ANA_IN_1_p
ANA_IN_0_n	Negative input of the differential analog channel 0	A23	C23	Positive input of the differential analog channel 0	ANA_IN_0_p
ANA_OUT_E_3	analog output CH[3...0] of Group E	B20	A/C20	Ground pins of Group E	ANA_OUT_E_GND*
ANA_OUT_E_2		B19	A/C19		
ANA_OUT_E_1		B18	A/C18		
ANA_OUT_E_0		B17	A/C17		
ANA_OUT_D_3	analog output CH[3...0] of Group D	B16	A/C16	Ground pins of Group D	ANA_OUT_D_GND*
ANA_OUT_D_2		B15	A/C15		
ANA_OUT_D_1		B14	A/C14		
ANA_OUT_D_0		B13	A/C13		
ANA_OUT_C_3	analog output CH[3...0] of Group C	B12	A/C12	Ground pins of Group C	ANA_OUT_C_GND*
ANA_OUT_C_2		B11	A/C11		
ANA_OUT_C_1		B10	A/C10		
ANA_OUT_C_0		B9	A/C9		
ANA_OUT_B_3	analog output CH[3...0] of Group B	B8	A/C8	Ground pins of Group B	ANA_OUT_B_GND*
ANA_OUT_B_2		B7	A/C7		
ANA_OUT_B_1		B6	A/C6		
ANA_OUT_B_0		B5	A/C5		

Shortname	Type	PIN (signal)	PIN (ref.)	Type	Shortname
ANA_OUT_A_3	analog output CH[3...0] of Group A	B4	A/C4	Ground pins of Group A	ANA_OUT_A_GND*
ANA_OUT_A_2		B3	A/C3		
ANA_OUT_A_1		B2	A/C2		
ANA_OUT_A_0		B1	A/C1		
–	not connected	B32-B23 A/B/C 22 A/B/C 21	–	–	–

Tab. 4-2 Table of pin assignment - I/O interface X1_ANALOG_IO

* All eight ground pins of the respective group (A...E) are internally connected.

Note

Use at least one of the dedicated ground pins per output channel to obtain the best possible signal quality. For this purpose, observe the signal and ground pin mapping in Tab. 4-2 on page 32.

Note

The ES5350.1 does not have a separate input channel for an external reference voltage.
If the output voltage range of the analog output channels shall be configured as dependent on an external reference voltage, one of the analog input channels ANA_IN_0...ANA_IN_9 must be used for the external reference voltage.

5 Technical Data and Standards

This chapter contains the technical data of the ES5350.1 plug-in card. It also contains information about the norms and standards met as well as the ordering data.

5.1 Technical Data

5.1.1 *Analog Inputs (I/O interface X1_ANALOG_IO)*

Input quantity	**Data**
Max. input voltage	±60 V
Cut-off frequency	25 kHz at 3 dB
Frequency filter	Bessel low-pass filter (second order)
Accuracy	±1 mV at ±1 V ±5 mV at ±10 V ±30 mV at ±60 V
Resolution	16 bit
Sampling rate	100k samples/s
Overvoltage protection	up to ±60 V
Input impedance	>1 M?
Galvanic isolation	Yes

5.1.2 *Analog Outputs (I/O interface X1_ANALOG_IO)*

Output	Data
Voltage range	±20 V
Max. output current (per channel)	±30 mA
Max. amount of total current (per group)	80 mA
Accuracy	±20 mV
Resolution	16 bit
Galvanic isolation	Yes
Overvoltage protection	±60 V for max. 15 s
Max. rise and fall time for a jump from 0 V up to 10 V with a load of 10 k?‖33 pF	20 µs
Retry functionality for overload of group	Yes
Output switch-off with relay	Yes

WARNING!

Analog outputs may be cascaded only up to a voltage of 60 V towards Gnd_Case ES5300 potential.

Voltage Supply (Backplane Connector)

Max. permissible power consumption from backplane	25 W at 12 V 1.5 W at 3.3 V

Storage Conditions

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

Ambient 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 above sea level

Physical Dimensions

Height	4 U
Width	5 HP
Weight	0,5 kg

5.2 Norms and Standards met

The ES5350.1 plug-in card meets the following norms and standards:

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

The module is only intended for use in industrial settings in accordance with EN 61326-1. Avoid potential radio interference when using the module outside of the industrial settings with additional shielding measures!

WARNING!

This is class A equipment. This equipment can cause radio interference in residential areas. In this case, the operator may be required to institute reasonable measures.

Note

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

6 Ordering Data

The ordering data for the ES5350.1 plug-in card are as follows:

Order name	**Short name**	**Order number**
Analog board (10/20-CH)	ES5350.1	F-00K-110-272
Calibration Service for ES5350	K_ES5350	F-00K-110-270
Scope of Supply	**Quantity**	
Analog board (10/20-CH)	1	

7 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:

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

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