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PB4350DAC1 - D/A Module

User's Guide

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1 PB4350DAC1 D/A Module

This chapter contains the description of the PB4350DAC1 D/A Module. It consists of the following sections:

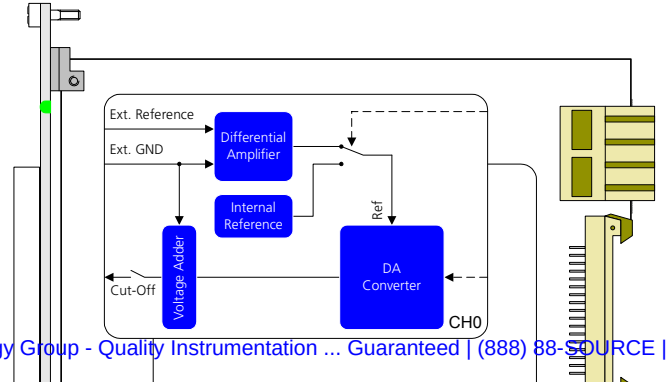
- Features and Applications (section 1.1 on page 5)
- Block Diagram (section 1.2 on page 5)
- Hardware Features (section 1.3 on page 6)
- Configuration (section 1.4 on page 7)
- LEDs (section 1.5 on page 7)
- Pin Assignment (section 1.6 on page 8)
- Technical Data (section 1.7 on page 10)

1.1 Features and Applications

The PB4350DAC1 D/A Module makes analog output signals with high resolution and precision available for high-end LabCars. It can be used on both VXIbus carrier boards (ES4350.1 Carrier Board) and on VMEbus carrier boards (ES1651.1 Carrier Board).

1.2 Block Diagram

The following figure shows the block diagram of the PB4350DAC1 D/A Module.



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1.3 Hardware Features

The PB4350DAC1 D/A Module has a total of ten D/A converter units which are independent of each other. The following figure shows a schematic of such a unit.

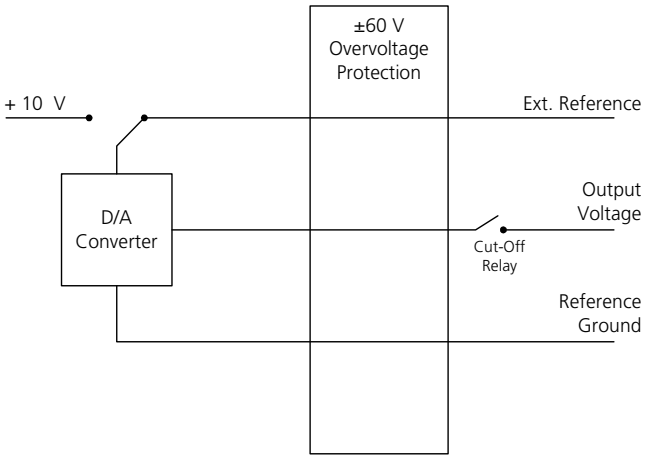


Fig. 1-2 D/A Converter Unit of the PB4350DAC1 D/A Module

The sections below contain more details.

1.3.1 Output Voltage

The D/A converters have a resolution of 14 bits with a nominal output voltage range of 0 V to 10 V – this corresponds to a resolution of 610 µV/bit.

The outputs of the D/A converter are routed via an output overvoltage protection which protects the module against externally applied voltages of up to ±60 V as well as against shorts against ground.

The output signal can also be opened via a mechanical relay. This makes it possible to test an ECU for its reaction to a short.

Note

To ensure the switch commands are implemented, the relays for interrupting the output signals should be switched every 50 ms at most!

1.3.2 Reference Voltage

The user can toggle between an internal reference voltage of 10 V and an external reference specified by the user for each of the 10 D/A converter outputs of the PB4350DAC1 D/A Module. The external reference can be any-

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where in the range -10 V to +10 V. ECUs typically provide a reference voltage of 5 V for analog sensors. In "Ext. reference" operating mode, the resolution can thus be doubled in the voltage range 0 ... 5 V to 305 µV.

1.3.3 Floating Ground

For every analog signal output of the PB4350DAC1 D/A Module there is a pin on the connector for the relevant ground (Ext. GND). This makes it possible to raise or lower an output signal by a constant "offset" by specifying a specific voltage as floating ground.

Note

The external floating ground can be anywhere in the range -10 V to +10 V. The voltage difference between the external reference and an external floating ground can be in the range from 0 V to 10 V – this is ensured by overvoltage protection.

Note

If the external ground is not used, connect this pin to AGND!

1.4 Configuration

Signal output is configured and controlled by the Real-Time Execution Connector and LABCAR-OPERATOR. A hardware configuration of the module is not necessary.

1.5 LEDs

The front panel of the ES4350.1 Carrier Board has space for the I/O connector and for 3 LEDs which every I/O module has.

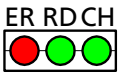


Fig. 1-3 LEDs

The LEDs of the PB4350DAC1 D/A Module have the following significance.

LED	Color	Meaning
ER	Red	Error
RD	Green	Ready
CH	Green	Flashes when displaying versioning information (see below)

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Display of the Version Number of the I/O Modules

When the ES4300 Chassis is powered on, the I/O modules show the version number via the "RD" and "CH" LEDs. It consists of three parts (e.g. 2.1.3). First of all, the "RD" LED flashes twice ("CH" LED off). Then the "RD" LED flashes once ("CH" LED lights up). Then the "RD" LED flashes three times ("CH" LED off).

After the version number of the relevant I/O module has been displayed, the two LEDs, "RD" and "CH", go out and take on the relevant function of the I/O module used.

1.6 Pin Assignment

This section describes the pin assignment of the PB4350DAC1 D/A Module.

The connector for the signal outputs is a DSUB62HD connector (female). The shielding is at front panel and housing potential and thus at protective earth.

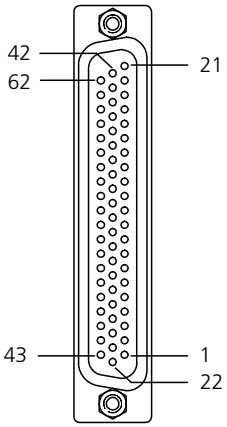


Fig. 1-4 Front-Facing Connector of the PB4350DAC1 D/A Module (View from the Connecting Side)

The following table contains the connector pin assignment.

Pin	Signal	Pin	Signal	Pin	Signal
1	Out_CH0	22	Ext. GND_CH0	43	ExtRef_CH0
2	Out_CH1	23	Ext. GND_CH1	44	ExtRef_CH1
3	Out_CH2	24	Ext. GND_CH2	45	ExtRef_CH2
4	Out_CH3	25	Ext. GND_CH3	46	ExtRef_CH3

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Pin	Signal	Pin	Signal	Pin	Signal
5	Out_CH4	26	Ext. GND_CH4	47	ExtRef_CH4
6	Out_CH5	27	Ext. GND_CH5	48	ExtRef_CH5
7	Out_CH6	28	Ext. GND_CH6	49	ExtRef_CH6
8	Out_CH7	29	Ext. GND_CH7	50	ExtRef_CH7
9	Out_CH8	30	Ext. GND_CH8	51	ExtRef_CH8
10	Out_CH9	31	Ext. GND_CH9	52	ExtRef_CH9
11	AGND	32	AGND	53	AGND
12	AGND	33	AGND	54	AGND
13	AGND	34	AGND	55	AGND
14	AGND	35	AGND	56	AGND
15	AGND	36	AGND	57	AGND
16	AGND	37	AGND	58	AGND
17	AGND	38	AGND	59	AGND
18	AGND	39	AGND	60	AGND
19	AGND	40	AGND	61	AGND
20	AGND	41	AGND	62	AGND
21	AGND	42	AGND		

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1.7 Technical Data

This section contains the technical data of the PB4350DAC1 D/A Module in tabular form.

Configuration	10 output channels
Output voltage V_{out}	0 V...10 V
Output overvoltage protection	±60 V
External reference voltage	-10 V...+10 V
External GND	-10 V...+10 V
External reference to external GND	0 V...+10 V
Analog out with ext. ref./ ratiometric	0...1 p.u.
Output current (max.)	20 mA
Analog output voltage resolution (internal reference)	610 µV (14 bit)
Accuracy of analog outputs voltage V_{out} in D/A converter mode with internal reference	±10 mV
Accuracy of analog outputs voltage V_{out} in D/A converter mode with external calibrated reference	±10 mV
Noise on DA outputs (10 kHz...100 MHz)	80 mVpp
Rising time 0 V to 10 V (load of 1 kΩ in parallel with 22 pF)	50 µs
Falling time 10 V to 0 V (load of 1 kΩ in parallel with 22 pF)	50 µs
Cut-off relays	For every channel

Note

The outputs are calibrated with a load of 1 kΩ in parallel with 22 pF.

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Note

Power Supply

Current consumption	100 mA @ +5 V DC 500 mA @ +12 V DC 500 mA @ -12 V DC 100 mA @ +3.3 V DC 100 mA @ +2.5 V DC

Environmental Conditions

Operating temperature	0 °C to 70 °C (32 °F to 158 °F)
Relative humidity	0 to 95% (non-condensing)

Physical Dimensions

Printed circuit board (L x W)	145 mm x 100 mm
Front panel	Height: 3 U Width: 4 HP

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