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PB1651PWM1 Module

User's Guide

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1 Introduction

This User's Guide contains the description of the PB1651PWM1 Module.

It consists of the following chapters:

- "Introduction" on page 5
  - "Features and Applications" on page 5
  - "Block Diagram" on page 7
- "Hardware Features" on page 8
  - "Outputs" on page 8
  - "Inputs" on page 9
  - "Configuration" on page 10
  - "LEDs" on page 10
- "Pin Assignment" on page 12
- "Technical Data" on page 14

1.1 Features and Applications

The PB1651PWM1 Module is used to generate and measure PWM and digital signals. It can be used both with the ES1651 Carrier Board (VMEbus) and with the ES4350 Carrier Board (VXIbus).

The PB1651PWM1 Module has 24 input channels and 16 output channels which can all be configured as PWM or digital I/O channels.

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The following figure shows the front panel of the PB1651PWM1 Module.

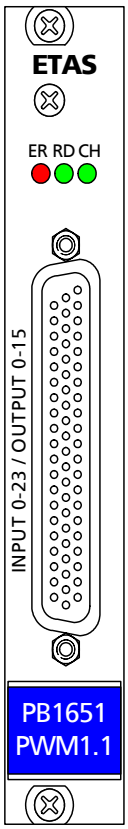


Fig. 1-1 Front Panel of the PB1651PWM1 Module

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1.2 Block Diagram

The following figure shows the block diagram of the PB1651PWM1 Module.

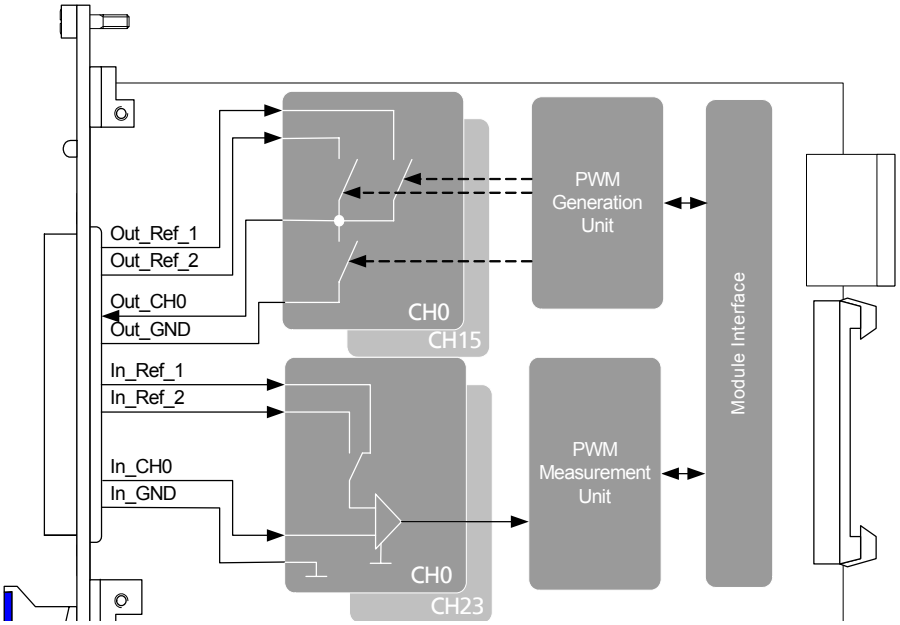


Fig. 1-2 Block Diagram of the PB1651PWM1 Module

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2 Hardware Features

This section contains a description of the inputs and outputs of the PB1651PWM1 Module.

2.1 Outputs

Each of the 16 outputs can be configured either as a TTL, UBatt or Open Collector output. Each channel has two "high-side" drivers and one "low-side" driver (see Fig. 2-1 on page 8).

The outputs have a resolution of 0.02% in the range 0 to 10 kHz and 0.2% in the range 0 to 100 kHz. The maximum output current per channel is 100 mA – the outputs are protected against overvoltage to +60 V.

The output voltage level is determined by two external supply voltages to be specified.

The following figure shows the block diagram of the outputs.

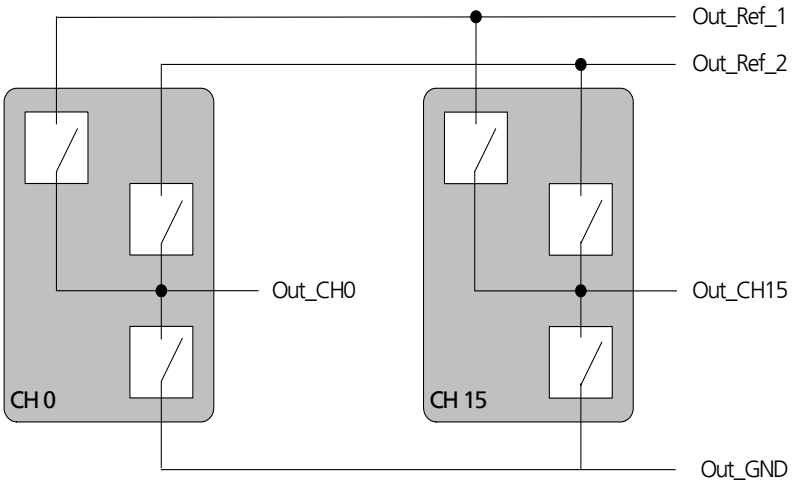


Fig. 2-1 Block Diagram of the Outputs

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2.2 Inputs

There are the following measuring modes for the 24 measuring inputs:

- Pulse width measuring
- Additive pulse width measuring
- Pulse and edge counting
- Frequency and cycle time measuring
- Duty cycle measuring
- Level measuring

These measuring procedures are described in the Real-Time Execution Connector V1.5 User's Guide.

The input voltages refer to two external reference voltages which are supplied via the front-facing connector. The threshold voltage for edge detection is In_Ref_1/2 * 0.5.

The inputs have overvoltage protection to +60 V.

The following figure shows the block diagram of the inputs.

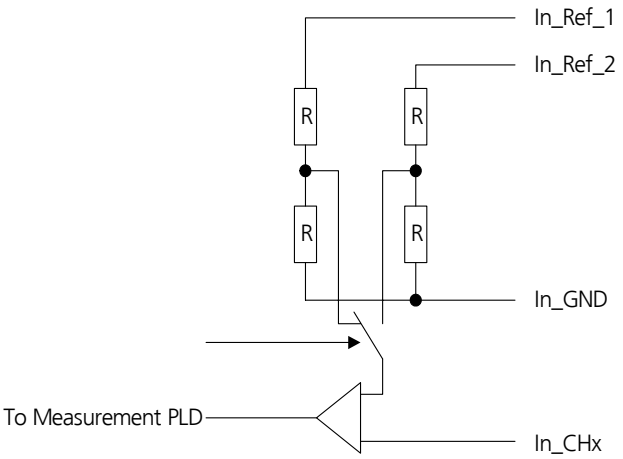


Fig. 2-2 Block Diagram of the Inputs

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2.3 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.

2.4 LEDs

There are 3 LEDs on the front panel of the PB1651PWM1 Module, the meaning of which is described below.



Fig. 2-3 LEDs on the Front Panel

The LEDs of the PB1651PWM1 Module have the following significance.

LED	Color	Meaning
ER	Red	Error
RD	Green	Ready
CH	Green	Can be configured using the software (see the section "Driving the "CH" LED" later in this chapter)

Tab. 2-1 Significance of the LEDs

Driving the "CH" LED

The driving source of the "CH" LED can be configured in the software – one of the 24 input channels or "RTIO" can be set as the control source.

If an input channel is set as the driving source, the LED lights up when the channel level is high and does not light up when the channel level is low. If "RTIO" is set as the driving source, the LED can be powered on/off by the simulation model.

The "LED Driving Source" parameter is described in the Real-Time Execution Connector V1.5 User's Guide.

Display of the Version Number of the I/O Modules

When the signal box is powered on, the I/O modules show the version number via the "RD" and "CH" LEDs. The version number consists of three parts (e.g.

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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.

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3 Pin Assignment

This section describes the pin assignment of the PB1651PWM1 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.

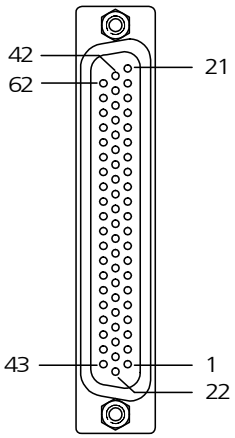


Fig. 3-1 Front-Facing Connector of the PB1651PWM1 Module (View from the Plug-In Side)

The following table contains the connector pin assignment.

Pin	Signal	Pin	Signal	Pin	Signal
1	Out_CH0	22	NC	43	In_CH0
2	Out_CH1	23	NC	44	In_CH1
3	Out_CH2	24	In_Ref_1	45	In_CH2
4	Out_CH3	25	In_Ref_1	46	In_CH3
5	Out_CH4	26	Out_Ref_1	47	In_CH4
6	Out_CH5	27	Out_Ref_1	48	In_CH5
7	Out_CH6	28	Out_Ref_2	49	In_CH6
8	Out_CH7	29	Out_Ref_2	50	In_CH7
9	Out_CH8	30	In_Ref_2	51	In_CH8
10	Out_CH9	31	In_Ref_2	52	In_CH9
11	Out_CH10	32	Out_GND	53	In_CH10
12	Out_CH11	33	Out_GND	54	In_CH11

Tab. 3-1 Pin Assignment of the PB1651PWM1 Module

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Pin	Signal	Pin	Signal	Pin	Signal
13	Out_CH12	34	In_GND	55	In_CH12
14	Out_CH13	35	In_GND	56	In_CH13
15	Out_CH14	36	NC	57	In_CH14
16	Out_CH15	37	NC	58	In_CH15
17	NC	38	NC	59	In_CH16
18	In_CH20	39	NC	60	In_CH17
19	In_CH21	40	NC	61	In_CH18
20	In_CH22	41	NC	62	In_CH19
21	In_CH23	42	NC		

Tab. 3-1 Pin Assignment of the PB1651PWM1 Module (cont'd.)

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4 Technical Data

This section contains the technical data of the PB1651PWM1 Module in tabular form.

Outputs

Number of channels	16
Output voltage V_{out} referring to Out_GND when switching output to external reference voltage	U_Out_Ref - 1 V ...U_Out_Ref
External supply voltages 1 + 2	0 V...+60 V
Output voltage V_{out} referring to Out_GND when switching output to Out_GND	Out_GND... Out_GND + 1 V
Output overvoltage protection	+60 V
Output current supplied by external references 1 + 2	0....100 mA
Resistance between GND and Out_GND	1 kΩ...∞
Frequency range	0...100 kHz
Accuracy at 0...10 kHz	0.02%
Accuracy at 0..0.100 kHz	0.2%
Frequency resolution	0.012 Hz
Duty cycle resolution	8 Bit at 100 kHz, 16 Bit at 500 Hz
Clock frequency for PWM generation	20 ns

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Inputs

Number of channels	24
Input voltage range	0 V...+36 V
Input reference voltage range	+5 V...+60 V
Input impedance	1 MΩ , 10 pF
Max. input frequency	100 kHz
Input overvoltage protection	±60 V
Hysteresis of input signals	1...1.5 V
Resistance between GND and In_GND	1 kΩ...∞
Counter width for PWM low/high time measurements	31-bit
Clock frequency for PWM generation	20 ns

Power Supply

Current consumption	0 A @ +2.5 V DC 70 mA @ +3.3 V DC 1.8 A @ +5 V DC 0 A @ +12 V DC 0 A @ -12 V DC

Environmental Conditions

Operating temperature	5 °C to 35 °C (5.00 °C to 35.00 °C)
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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16 Technical Data

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