RT Box Digital Breakout Board

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RT Box Digital Breakout Board

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Introduction

The PLECS RT Box is a powerful real-time simulator based on a 1 GHz Xilinx Zynq system on a chip (SOC). With its 64 digital and 32 analog input and output signals (I/Os), the RT Box is well equipped for hardware-in-the-loop (HIL) testing as well as rapid control prototyping.

The front panel of the RT Box is comprised of four connectors for analog and digital I/Os. The I/Os need to be connected by the user to the device-under-test (DUT). If the RT Box is employed for HIL simulations, the DUT is the real control hardware and the RT Box emulates the plant. If the RT Box is used for rapid control prototyping, the DUT is the real plant controlled by the RT Box.

To simplify the connection to external hardware and to provide convenient access to the RT Box inputs and outputs, Plexim offers different sets of RT Box accessories.

The Digital Breakout Board facilitates a simple access to the digital input and output channels of the RT Box via terminal blocks and pin headers. This board is typically used in conjunction with the Analog Breakout Board, which allows access to the analog I/Os of the RT Box via BNC connectors.

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Breakout Board Description

The Digital Breakout Board provides a simple access to the 32 digital input and 32 output channels of the RT Box via terminal blocks, pin headers and peripheral modules. The board is also equipped with two CAN transceivers for future communication applications. Fig. 2.1 shows the top view of the digital breakout board.

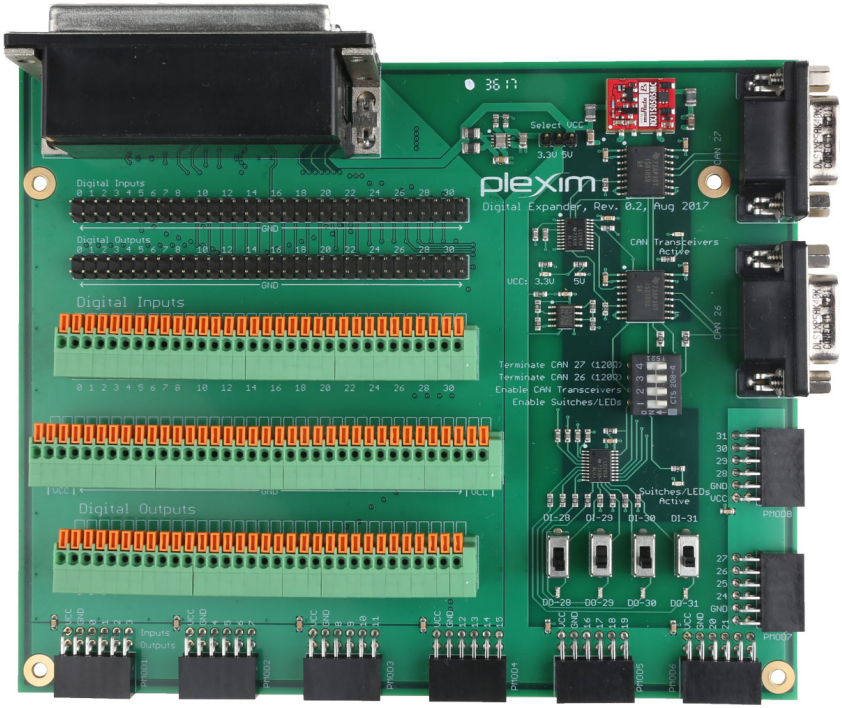

Figure 2.1: RT Box Digital Breakout Board

Onboard Voltage Supply

The board can supply either 5 V or 3.3 V at VCC. A jumper labeled **Select VCC** on the top section of the board can be used to obtain the desired voltage level. Two LEDs marked **3.3 V** or **5 V** indicate the selected power supply. VCC can be accessed at all the terminals labeled **VCC** on the center terminal block and the eight peripheral modules (PMODs).

Ground can be accessed at both digital input and digital output pin headers, at the central terminal block, and at the PMODs. The ground terminals are labeled **GND**.

Digital I/O

The 32 digital input and 32 digital output channels can be accessed through dedicated pin headers and terminal blocks labeled **Digital Inputs** and **Digital Outputs** respectively. Individual pins are marked **0...31** representing the digital channel number of the RT Box.

Digital inputs 28...31 can also be accessed via four sliding switches provided on the board labeled **DI28...DI31**. Digital outputs 28...31 are connected to four LEDs on the bottom right section of the board labeled **DO28...DO31**. These switches and LEDs can be enabled or disabled using a DIP switch labeled **Enable Switches/LEDs**.

Additionally, digital channels can be accessed at PMODs and for CAN communication as described in the sections below.

CAN Signals

Two electrically isolated CAN transceivers provide CAN communication signals that can be accessed through two 9-pin D-SUB connecters labeled **CAN 26** and **CAN 27** on the top right corner of the board. DIP switch labeled **Enable CAN Transceivers** enables or disables the CAN transceivers.

Tables 2.1 and 2.2 list the pin assignments of **CAN 26** and **CAN 27** respectively. The pin numbers of the 9-pin D-SUB connectors are labeled on the board.

RT Box Channel	CAN Transceiver		CAN 26
			1
DOUT 26	**TXD**	**CAN_L**	2
		GND	3
			4
			5
		GND	6
DI 26	**RXD**	**CAN_H**	7
			8
			9

Table 2.1: CAN 26 pin assignment

RT Box Channel	CAN Transceiver		CAN 27
			1
DOUT 27	**TXD**	**CAN_L**	2
		GND	3
			4
			5
		GND	6
DI 27	**RXD**	**CAN_H**	7
			8
			9

Table 2.2: CAN 27 pin assignment

Note CAN_L and CAN_H signals on pins 2 and 7 respectively on the 9-pin D-SUB connector can be terminated with a 120 Ω resistor using DIP switches labeled **Terminate CAN 26 (120 Ω)** and **Terminate CAN 27 (120 Ω)**.

Peripheral Modules

Eight PMODs labeled **PMOD1...PMOD8** provide access to 32 digital input and 32 output channels, as well as VCC and ground signals. In all the eight modules, the pins furthest to the left, labeled **VCC**, are VCC terminals. The pins labeled **GND** are ground terminals. The pins on the top row of the modules labeled **Inputs** correspond to digital inputs. Similarly, the pins on the bottom row of the modules labeled **Outputs** correspond to digital outputs. The individual digital channels that can be obtained from a particular PMOD module are labeled on the board above the terminals. PMOD1 supplies digital channels 0,1,2,3; PMOD2 supplies digital channels 4,5,6,7; PMOD3 supplies digital channels 8,9,10,11 and so on.

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