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1 Introduction

1.1 Product Overview

The DM7820HR/DM8820HR/DM9820HR is designed to provide high speed digital I/O for PC/104-Plus, PCI-104, PCI/104-Express, and PCIe/104 Systems. It interfaces with the PCI or PCI Express bus and uses large FIFOs and DMA transfers to allow for efficient data management. Several peripherals, including Pulse Width Modulators, Incremental Encoders, and Programmable Clocks are also provided.

1.2 Board Features

- Digital I/O
  - 48 Diode protected I/O lines
  - 24 mA source and sink current
  - Compatible with DMR and DOP expansion boards
- Deep FIFOs with DMA
  - Two 2M-Word FIFOs
  - Each FIFO is attached to a separate DMA channel
  - 25 MHz bursted throughput
  - 12.5 MHZ continuous throughput
  - FIFO can be looped
- Pulse Width Modulators
  - Eight PWM outputs
  - Single-ended or Differential Outputs
  - 16-bit resolution
  - Separate period and width clocks provide full resolution at low duty cycles
  - Optional Interrupt generations
- Incremental Encoders
  - Four Incremental Encoder channels
  - Single-ended or Pseudo-differential Inputs
  - Variable frequency input filtering
  - Max input speed of 40ns per transition
  - 16-bit resolution
  - Two channels can be combined for 32-bit resolution
  - Connect to FIFO for position sampling
- Advanced Interrupts
  - Two Advanced Interrupt Modules
  - Interrupt on Match, Change, or Strobe
  - All 48 bits are captured when the interrupt is generated
  - Any combination of the 48 bits can be monitored
- Programmable Clocks
  - Four programmable clocks
  - Maximum frequency of 25 MHz
  - Can be started and stopped by an interrupt or another clock
  - Continuous or One-Shot Operation
  - Can be cascaded
- 82C54 Timer/Counters
  - Six Timer/Counter Channels
  - Fully programmable
  - Input clock and gate driven from internal or external source
  - 10 MHz maximum input

1.3 Ordering Information

The DMx820HR is available with the following options:

Table 1: Ordering Options

Part Number	Description
DM35820HR	PCIe/104 High-Speed Digital I/O DAQ Module
DM9820HR	PCI/104-Express High-Speed Digital I/O DAQ Module
DM8820HR	PCI-104 High-Speed Digital I/O DAQ Module
DM7820HR	PC/104-Plus High-Speed Digital I/O DAQ Module
IDAN-DM35820HR-62D	PCIe/104 High-Speed Digital I/O DAQ Module in IDAN enclosure
IDAN-DM9820HR-62D	PCI/104-Express High-Speed Digital I/O DAQ Module in IDAN enclosure
IDAN-DM8820HR-68S	PCI-104 High-Speed Digital I/O DAQ Module in IDAN enclosure
IDAN-DM7820HR-68S	PC/104-Plus High-Speed Digital I/O DAQ Module in IDAN enclosure

The Intelligent Data Acquisition Node (IDAN™) building block can be used in just about any combination with other IDAN building blocks to create a simple but rugged 104™ stack. This module can also be incorporated in a custom-built RTD HiDAN™ or HiDANplus High Reliability Intelligent Data Acquisition Node. Contact RTD sales for more information on our high reliability systems.

1.4 Contact Information

1.4.1 Sales Support

For sales inquiries, you can contact RTD Embedded Technologies sales via the following methods:

Phone: 1-814-234-8087 Monday through Friday, 8:00am to 5:00pm (EST).
E-Mail: sales@rtd.com

1.4.2 Technical Support

If you are having problems with you system, please try the steps in the Troubleshooting section of this manual on page76.

For help with this product, or any other product made by RTD, you can contact RTD Embedded Technologies technical support via the following methods:

Phone: 1-814-234-8087 Monday through Friday, 8:00am to 5:00pm (EST).
E-Mail: techsupport@rtd.com

2 Specifications

2.1 Operating Conditions

Table 2: Operating Conditions

Symbol	Parameter	Test Condition	Min	Max	Unit
V_{cc5}	5V Supply Voltage		4.75	5.25	V
T_a	Operating Temperature		-40	+85	C
T_s	Storage Temperature		-55	+125	C
RH	Relative Humidity	Non-Condensing	0	90%	%
MTBF	Mean Time Before Failure	Telcordia Issue 2 30°C, Ground benign, controlled		3,292,579	Hours

2.2 Electrical Characteristics

Table 3: Electrical Characteristics

Symbol	Parameter	Test Condition	Min	Max	Unit
P	Power Consumption	V_{cc5} = 5.0V		1.5	W
I_{cc5}	5V Input Supply Current	Active		300	mA
PCI Bus					
V_{IH}	Input High Voltage		1.65	5.5	V
V_{IL}	Input Low Voltage		0	0.8	V
I_{IL}	PCI Input Leakage	0<V_I<VIO	-10	10	uA
I_{OZ}	PCI Hi-Z Leakage	0<V_I<VIO		10	uA
V_{OH}	Output High Voltage		2.97		V
V_{OL}	Output Low Voltage			0.33	V
PCIe Bus					
	Differential Output Voltage		0.8	1.2	V
	DC Differential TX Impedance		95.2	116.9	Ω
	Differential Input Voltage		0.175	3.3	V
	DC Differential RX Impedance		92.7	115.8	Ω
	Electrical Idle Detect Threshold		61	173	mV
Digital I/O					
V_{IH}	Input High Voltage		2.0	5.5	V
V_{IL}	Input Low Voltage		-0.5	0.8	V
V_{OH}	Output High Voltage	I_{OH} = -24mA	2.4		V
V_{OL}	Output Low Voltage	I_{OL} = 24mA		0.4	V

Notes

1. DIO Vin DC overshoot must be limited to either 5.5V or 10mA and DC undershoot must be limited to either -0.5V or 10mA.
2. DIO pins may be driven to - 2.0V or + 7.0V provided these voltages last no longer than 11ns with a forcing current no greater than 100mA.
3. Inputs are terminated with 33Ω resistors and protection diodes.
4. DIO inputs should not be tied to voltages when the board is not powered.

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