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## DD-42924i5-300 ARINC 429 PCI Interface Card



### DESCRIPTION

The DD-42924i5-300 is a PCI card designed specifically to interface with an ARINC 429 data bus. This card contains two transmit channels, four receive channels, five discrete inputs, and five discrete outputs. The DD-42924i5-300 can be used as a data source for simulating data on an ARINC 429 Data Bus or as a data receiver for analyzing data from an ARINC 429 data bus.

LRU developers find that these cards provide easy access for simulating and/or testing new systems prior to use with actual flight systems. Avionics maintenance and validation teams can perform end-item testing in the laboratory and by using portable PC's can continue testing in an aircraft.

The DD-42924i5-300 has an on-board processor, which off-loads much of the low-level data processing from the host PC. The host PC easily transfers data to and from the card through the 256 Kilobytes of Dual-Port RAM.

This card can also run DDC's DD-42999S0 application software. This optional software suite includes an ARINC 429 Data Bus Analyzer, ARINC 615 Data Loader, and an ARINC 739 MCDU Simulator.

### FEATURES

- PCI Rev 2.2 - Plug and Play Compatible
- Two Tx Channels and Four Rx Channels
- High, Low, and Variable Speed Data Rates
- FIFO and Scheduled Transmission Methods
- Receive Data Filtering
- Programmable Time Stamping Resolution
- On-Board Processor Operating at 20 Mhz
- 256 Kilobytes Dual-Port RAM for Real-Time Data
- 256 Kilobytes Program RAM
- Five Discrete Inputs and Five Discrete Outputs
- Programmable Event Interrupts to PC
- 0° to 70 ° Operation
- Supports Windows 95/98/NT/2000, LabVIEW, LabWindows/CVI, and Linux
- Optional Application Software is Available

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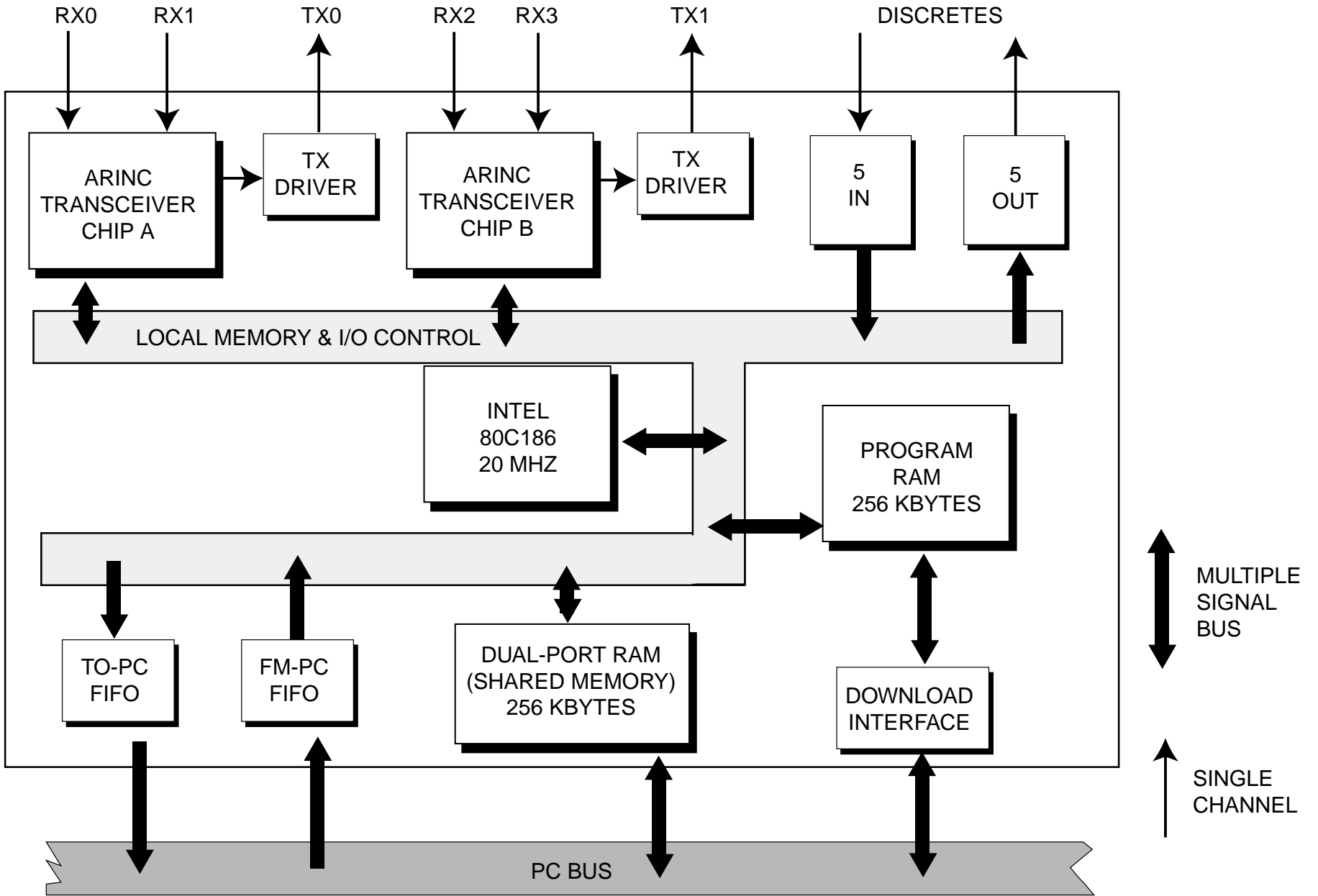


FIGURE 1. DD-4292415 BLOCK DIAGRAM

**TABLE 1. DD-42924i5-300 GENERAL SPECIFICATIONS**

<b>PHYSICAL CHARACTERISTICS</b>	Standard Half-Size PCI Card: 4.2 X 6.875 in. 106.7 x 174.6 mm.
<b>ENVIRONMENTAL</b>	
Operating Temperature	0° to 70°C at no more than 95% relative humidity, non-condensing.
Storage Temperature	-30° to 70°C at no more than 99% relative humidity, non-condensing.
<b>ELECTRICAL</b>	
Connectors	37-pin I/O connector is located on edge connector.
Nominal Data Rate	8/10/12.5/14/100 Kbps
Expected Bus Impedance	75 Ohms ±10% with termination at both ends.
Time Tag Resolution	Programmable (1-20ms)
Discrete Outputs	Sink 100 mA
Discrete Inputs	true condition : 3.5V to 40V false condition : 0V to 1.35V

## TECHNICAL OVERVIEW

The DD-42924i5-300 card is user-programmable with an on-board processor and 256 Kilobytes of program RAM. The card also contains 256 Kilobytes of Dual-Port RAM that can be accessed by both the PC and the card. This Dual-Port RAM is used to reliably transfer ARINC 429 data to and from the card.

Each of the transmit and receive channels can be operated at either high or low speed. In addition to the ARINC 429 transmitters and receivers, the card also has five input and five output discretes which provide the capability to control external devices or monitor events.

## APPLICABLE DOCUMENTS

PCI Local Bus Standard Specification Revision 2.2.

ARINC 429 Mark 33 Digital Information Transfer Systems (DITS).

## ARINC 429 TRANSMISSION

The DD-42924i5-300 card has firmware installed that allows the programmer access to the following card features in a simple, easy to understand format:

### TRANSMITTING

- FIFO Queued transmission
- Scheduled ARINC data transmission

If scheduled data is to be transmitted, the user must select scheduled mode through the OpenChannel API library routine.

The Transmit\_Scheduled API library routine allows the host to define a schedule that will continuously be transmitted by the

card. The user can assign a rate associated with each ARINC 32-bit data word. The data will get transmitted at the interval that the user has specified.

If the user wishes to distinguish by SDI then the Transmit\_Extended\_Scheduled API library routine should be used.

This card is capable of transmitting data in both FIFO and scheduled modes. When both modes are being used the scheduled data will take priority over the FIFO data. The FIFO data will get transmitted in the gaps between scheduled data transmissions without altering the schedule.

## ARINC 429 RECEPTION

The DD-42924i5-300 card has firmware installed that allows the programmer access to the following card features in a simple, easy to understand format:

- "Mailbox" type reception
- FIFO type reception
- Filtering of received data
- Time stamping of received data

The card is capable of receiving data in two modes: FIFO and mailbox.

When FIFO mode is selected through the OpenChannel API library routine, a First-In-First-Out queue is created in Dual-Port RAM, from which the host can read the received ARINC 429 data and time stamps in the exact order in which the words were received. The time stamp has a programmable resolution of 1 - 20 ms.

When mailbox mode is selected through the OpenChannel API library routine, a Dual-Port RAM "mailbox" is created from which

the host can read the most current data for a particular ARINC data word. Using this mode of reception, only the last received value for any label is stored by the DLL and can be requested by the user at any time by using the Receive\_Mailbox API library routine. This mode of reception is extremely useful when the user is only concerned with the latest received data. Both FIFO and mailbox modes can be used simultaneously.

## DIAGNOSTICS

In addition to running diagnostics on start up using the Initialize function, there are routines in the API library that will run diagnostics at any time and will determine the level of details of a failure. The RunDiagnostic API library routine runs a particular diagnostic test and returns a pass/fail status. If an error occurred, specific return codes provide details pertaining to which test failed. For the ROM\_FIFO test and MEMORY test, a data structure is updated with an address. Expected data and actual data offer further details as to specifics associated with each test.

A loopback connector is provided to verify channel operation. Diagnostic software also verifies memory and interrupts. There are 18 demo programs included to verify card operation and demonstrate some of the card's capabilities.

## TIME STAMPING

The card has time stamping capability. Each received data word will be time stamped if the user specifies to do so in the OpenChannel API library routine. The time stamping resolution is user programmable with a resolution of 1 to 20 ms. Users can program the resolution of the time stamping parameter in 1 ms steps.

## DATA MEMORY

The DD-42924i5-300 card contains 256 Kilobytes of Dual-Port RAM memory used for data exchange between the host computer and the card. This memory allows for excellent reliability of data transfer between the card and the host computer.

The card also contains 256 Kilobytes of program RAM used by the on-board processor to aid in data processing. This way the host computer is free to perform other tasks.

## INTERRUPT GENERATION

The DD-42924i5-300 card is capable of generating interrupts to the host computer. The DLL and driver can generate interrupts in one of two ways:

- A frequency-driven approach, where the PC is interrupted every "X" milliseconds.

- A reception-driven approach, where the PC is interrupted every time an ARINC data word is received by one of a particular set of receivers, e.g., if the set of receivers is R0 & R2, a word received by either R0 or R2 will cause an interrupt to be sent to the PC.

The programmer can choose which mode to set up a card for; choosing the frequency to interrupt the PC in the frequency-driven case, or the particular set of receivers in the reception-driven case. You must properly enable and disable the cards in order to ensure proper system operation.

## DISCRETE I/O

There are two basic commands for handling the card's discrete inputs and outputs. The WriteDiscrete API library routine is used for setting the value of all discrete outputs on the card, and the ReadDiscrete API library routine is used for reading the value of the discrete inputs.

The DD-42924i5-300 card contains 5 CMOS compatible discrete inputs (open/ground) and 5 discrete outputs.

Each discrete input accepts any level between 3.5 volts and 40 volts as a "true" condition, and 0 volts to 1.35 volts as a "false" condition.

Each discrete output uses a Darlington output driver that can sink up to 100 mA of current. The discrete outputs can be used for a variety of things, including triggering events, indicating status, and general-purpose use.

## CARD PINOUTS

Figure 2 shows the pinouts of the DD-42924i5-300 card. The card has all signals routed to a front panel 37-pin connector. This allows the user to easily interface to the ARINC channels and discretets.

## LOOPBACK CONNECTOR

The DD-42924i5-300 card comes with a loopback connector that is described in Figure 3.

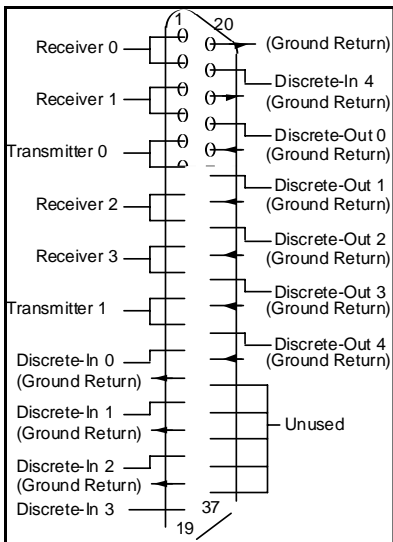
## INCLUDED SOFTWARE

The DD-42976S0 software includes Windows 95/98/NT/2000 drivers, and a complete API (Application Programmer Interface) software library. This software package also includes support for LabVIEW and LabWindows/CVI.

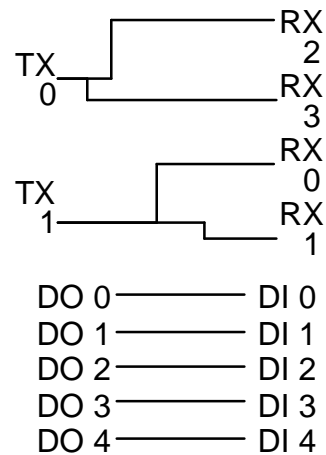
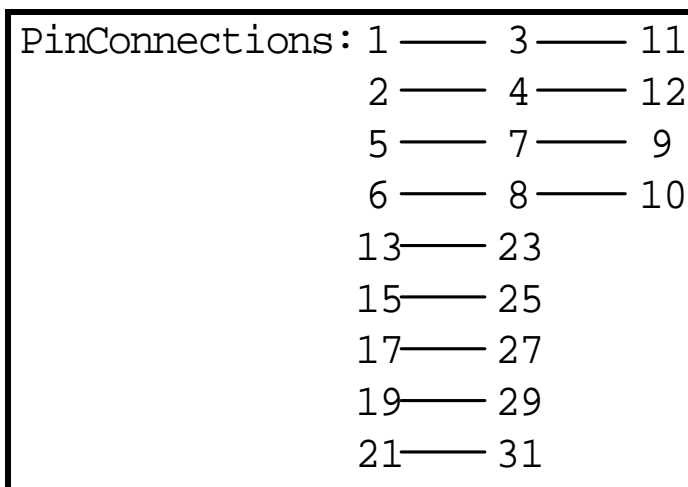
This software is a runtime library that provides the user with a hardware abstraction layer for the card. This software layer includes routines that dramatically reduce software development time by providing a high-level interface to the card. The library allows the user to program the card without detailed knowledge

of the card's architecture. There are eighteen demo programs included with the library to demonstrate the cards capabilities.

The DD-42976S1 software includes drivers and a complete API software library, and demo programs for Linux.



**FIGURE 2 - DD-42924I5-300 CARD PINOUTS**



**FIGURE 3 - LOOPBACK CONNECTOR**

## OPTIONAL APPLICATION SOFTWARE

### DD42999S0 COMMERCIAL AVIONICS UTILITIES SOFTWARE SUITE

Includes:       ARINC 429 Data Bus Analyzer  
                  ARINC 615 Data Loader  
                  ARINC 739 MCDU Simulator

## CUSTOMER SUPPORT

Data Device Corporation is committed to providing unsurpassed customer support. All hardware has a two-year limited warranty. All library and driver updates are available free of charge for the life of the product. This does **not** include application software.

### Ordering Information:

DD-42924i5-300

#### ARINC 429 Short PCI Card

2 Transmitters, 4 Receivers  
5 Discrete Inputs, 5 Discrete Outputs

### Included Software:

DD-42976S0

#### API library and drivers for Windows 95/98/NT/2000

DD-42976S1

#### API library and drivers for Linux

All of the above software is available free of charge on our website at [www.ddc-web.com](http://www.ddc-web.com)

### Optional Application Software Ordering Information:

DD-42999S0

#### Commercial Avionics Utilities Software Suite

(includes ARINC 429 Data Bus Analyzer,  
ARINC 615 Data Loader,  
ARINC 739 MCDU Simulator)

**NOTES:**

The information in this data sheet is believed to be accurate; however, no responsibility is assumed by Data Device Corporation for its use, and no license or rights are granted by implication or otherwise in connection therewith.  
Specifications are subject to change without notice.



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