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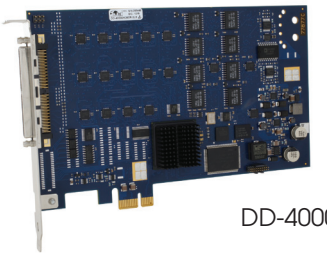
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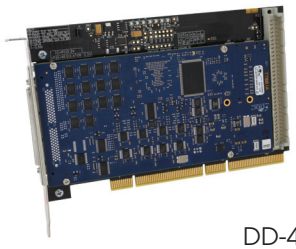
Find the *DDC DD-40100F060R-3L0* at our website: ***Click HERE***

PCIe/PMC/PCI/cPCI/PXI Cards
with up to 36 ARINC 429 Channels & ARINC 717

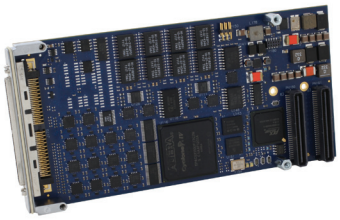
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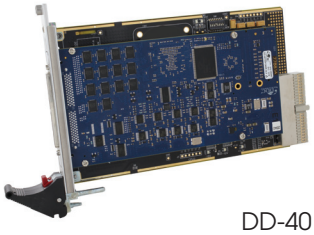
DD-40000K



DD-40100i



DD-40100F



DD-40100T

Preliminary Hardware Manual

The World's only cards offering up to 36 ARINC 429 Channels that can be individually programmed *for Transmit/Receive functionality with parametric test features, variable output voltage, and voltage monitoring on board. Providing an optimal solution for both commercial and military test applications, DDC's ARINC 429/717 series offers flexibility and efficiency by enabling users to configure I/O mix and use one board for all levels of testing and simulation.*

Applications

- Systems Integration Labs
- Simulators
- Production Test Stands
- Automated Test
- Commercial Aerospace
- New Product Development
- System Troubleshooting
- Portable Testers
- Flight Line Diagnostics
- Flight Testing
- Software Development
- Data Loading
- Data Monitoring
- Bus Debugging & Diagnostics



For more information: www.ddc-web.com/DD-40X00X

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DDC's Data Networking Solutions

MIL-STD-1553 | ARINC 429 | Fibre Channel | Ethernet

As the leading global supplier of data bus components, cards, and software solutions for the military, civil, and aerospace markets, DDC's data bus networking solutions encompass the full range of data interface protocols to support the real-time processing demands of field-critical data networking between systems and subsystems on military vehicles. These products, along with our traditional MIL-STD-1553 solutions, represent a wide and flexible array of performance and cost solutions, enabling DDC to support multi-generational programs.

Whether employed in increased bandwidth, high-speed serial communications, or traditional avionics and ground support applications, DDC's data solutions fulfill the expanse of military requirements including reliability, determinism, low CPU utilization, real-time performance, and ruggedness within harsh environments. Our use of in-house intellectual property ensures superior multi-generational support, independent of the life cycles of civil devices. Moreover, we maintain software compatibility between product generations to protect our customers' investments in software development, system testing, and end-product qualification.

MIL-STD-1553

DDC provides an assortment of quality MIL-STD-1553 rugged embedded and lab grade cards and components to meet your data conversion and data interface needs. Our 1553 data bus board solutions are integral elements of military, aerospace, and industrial applications. Our extensive line of military and space grade components provide MIL-STD-1553 interface solutions for microprocessors, PCI buses, and simple systems. Our 1553 data bus solutions are designed into a global array of aircraft, helicopter, unmanned vehicles, and missile programs.

ARINC 429

DDC also has a wide assortment of quality ARINC 429 embedded and lab grade cards and components, which will meet your data conversion and data interface needs. DDC's ARINC 429 components ensure the accurate and reliable transfer of flight-critical data. Our 429 interfaces support data bus development, validation, and the transfer of flight-critical data aboard civil aerospace platforms.

Fibre Channel

DDC has developed its line of high-speed Fibre Channel network access controllers and switches to support the real-time processing demands of field-critical data networking between sensors, computer nodes, data storage, displays, and weapons, for air, sea, and ground military vehicles. Fibre Channel's architecture is optimized to meet the performance,reliability, and demanding environmental requirements of embedded, real time, military applications, and designed to endure the multi-decade life cycle demands of military/aerospace programs.

Ethernet

DDC offers a convenient solution to convert MIL-STD-1553, ARINC 429, and Ethernet protocol in any direction, in real-time, without a host computer.

Extensions to MIL-STD-1553

DDC offers a wide variety of solutions based on extensions of MIL-STD-1553 for emerging aerospace applications. Turbo 1553 increases the data rate of 1553 from 1 Mbps to 5 Mbps while maintaining the architectural features of MIL-STD-1553. Hyper 1553 provides high speed communication (50 to 100+ Mbps) over MIL-STD-1553 buses while operating concurrently with legacy 1 Mbps 1553 (similar to ADSL for telephone networks).

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DDC supplies MIL-STD-1553 and ARINC 429 board level products in a variety of form factors including USB, PCI-Express, PCMCIA, ExpressCard, AMC, PMC, XMC, PCI-104, PC/104-Plus, PC/104, PCI, cPCI, VME, and ISAbus boards. Our laboratory simulation and in-flight products include multi-function and single-function for system integration and production test environments. Our extensive line of military and space grade components provide MIL-STD-1553 interface solutions for microprocessors and simple systems. Our software is supplied in the form of menus, libraries, and drivers. We also offer additional software to expand our data networking range of options.



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DD-40X00K/F/i/T ARINC 429/717 PCI-EXPRESS, PMC, PCI, AND cPCI/PXI CARDS HARDWARE MANUAL

MN-40X00XXX-001

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Revision	Date	Pages	Description
A	08/2012	All	Initial Release
B	01/2014	5, 25, 26, 29	Updated ARINC 717 speed settings. Updated Section 4.2.7 Avionics Discrete I/O. Added Table 13: Avioics I/O Configuration. Updated Table 6.

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1 PREFACE

This manual uses typographical conventions to assist the reader in understanding the content. This section will define the text formatting used in the rest of the manual.

1.1 Text Usage

- **BOLD**–indicates important information and table, figure, and chapter references.
- ***BOLD ITALIC***–designates DDC Part Numbers.
- `Courier New`–indicates code examples.
- <…> - indicates user-entered text or commands.

1.2 Standard Definitions

PCI Peripheral Component Interconnect

PMC PCI Mezzanine Card

1.3 Special Handling and Cautions

The ***BU-40x00K/F/i/T*** uses state-of-the-art components, and proper care should be used to ensure that the device will not be damaged by Electrical Static Discharge (ESD), physical shock, or improper power surges and that precautions are taken to avoid electrocution.



Warnings: Turn off power to the computer hardware and unplug from wall.

NEVER insert or remove card with power turned on.

Ensure that standard ESD precautions are followed. As a minimum, one hand should be grounded to the power supply in order to equalize the static potential.

Do not store disks in environments exposed to excessive heat, magnetic fields or radiation.

1.4 Trademarks

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1.5 What is included in this manual?

This manual contains a complete description of hardware installation and use.

1.6 Technical Support

In the event that problems arise beyond the scope of this manual, you can contact DDC by the following:

US Toll Free Technical Support:
1-800-DDC-5757, ext. 7771

Outside of the US Technical Support:
1-631-567-5600, ext. 7771

Fax:
1-631-567-5758 to the attention of DATA BUS Applications

DDC Website:
www.ddc-web.com/ContactUs/TechSupport.aspx

Please note that the latest revisions of Software and Documentation are available for download at DDC's Web Site, www.ddc-web.com.

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2 OVERVIEW

The **DD-40x00F/I/T/K** from Data Device Corporation is a line of ARINC 429 tester simulator boards. Its comprehensive set of ARINC test features and availability in a variety of form factors make it an ideal solution for use in common commercial avionic test systems.

The ***DD-40100F*** is an air cooled PMC card with a front panel connector, which gives the user access to the ARINC channels and Avionics Discrete I/Os. Communication to the PCI bus is accomplished via a Revision 2.2 “Compliant” 32-bit (33/66MHz) PCI interface that supports both 5.0V and 3.3V PCI signaling. The operating environment for this card is in the temperature range between 0 to +71°C.

The ***DD-40100I*** is an ARINC 429 Tester Simulator half-length PCI Card utilizing all of the powerful features of the DD-40100F in a PCI form factor. The operating environment for this card is in the temperature range between 0 to +55°C.

The ***DD-40100T*** is an ARINC 429 Tester Simulator 3U cPCI/PXI Card utilizing all of the powerful features of the ***DD-40100F*** in a cPCI/PXI form factor. The operating environment for this card is in the temperature range between 0 to +55°C.

The ***DD-40000K*** ARINC 429 Tester Simulator card is designed for use in standard desktops or servers that provide a standard height half-length PCI Express slot. The PCI Express specifications require interoperability of the X1 card in any link width PCIe slot (x1, x4, x8 or x16) and any current PCI Express generation (1.0a/1.1/2.0). All customer I/O is made available via the single 100-pin Honda connector on the standard I/O bracket. The operating environment for this card is in the temperature range between 0 to +71°C.

The ***DD-40x00F/I/T/K*** boards provide new levels of performance and flexibility for systems interfacing to an ARINC 429 data bus. There are up to 36 independently programmable ARINC 429 channels and up to16 Avionics Discrete IOs. Variable voltage setting of outputs and voltage level monitoring of inputs are available on the first eight channels. The card also offers full error injection and IRIG-B time input and output. The transmission speeds for the channels can be varied between 500-200,000 bps and is capable of supporting a number of ARINC 429 compatible standards.

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2.1 Features

ARINC 429/575
The *DD-40x00F/I/T/K* cards include up to 36 independently programmable ARINC 429/575 channels, with each channel independently configurable as a Transmitter or Receiver. The card's powerful and efficient ARINC engine supports full line transmission/reception on all channels.

DMA
The efficient DMA engine means Ultra Low CPU and PCI/PCIe Utilization of the host system.

Message Scheduling
Both Scheduled and Mailbox data transfer methods are supported. To support this, there is a message FIFO dedicated to each channel. Datawords in the FIFO can be modified while the hardware is transmitting.

Asynchronous message insertion is available in both low priority and high priority modes.

Message Filtering
Message filtering can be performed on each channel based on the Label/SDI.

Variable Transmission Speed
The transmission speed is user configurable between 500 to 200,000 bits per second.

Variable Voltage/Voltage Monitoring
The card offers voltage monitoring and variable voltage output capabilities on the first 8 ARINC 429 channels.

Full Error Injection
Full Error Injection can be configured for each message. The user will have the ability to vary the inter-message bit gap from 1 to 32K bits, vary the ARINC message length from 2 to 33 bits, and toggle the parity bit for every single transmitted message.

Loopback
Internal loopback is supported digitally via the FPGA. External loopback will require an external loopback connector.

Replay
Full message replay/playback is supported via software.

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ARINC 717/573
The *DD-40x00F/I/T/K* cards include 2 ARINC 717/573 channels. Each channel is software configurable as a Transmitter or Receiver. The powerful and efficient ARINC engine supports full line transmission/reception on all channels.

Additional features include configurable sub-frame sync patterns, configurable line speed (32, 64, 128, 256, 512, 1024, 2048, 4096, 8192 words-per-second (WPS)), and configurable output format (Harvard Bi-Phase or Bi-Polar Return-to-Zero (BPRZ)).

Note: *The following ARINC 717 compatible protocols are supported:*

- *ARINC 573/717*

Avionics Discrete I/Os
The *DD-40x00F/I/T/K* cards include up to 16 Avionics Discrete I/O's that are individually programmable as inputs or outputs. As outputs they act as Open-Drain type drivers. When used as inputs these channels are configured to sense Ground/Open discrete inputs with +35V input voltage tolerance.

Time / IRIG
The *DD-40x00F/I/T/K* has numerous capabilities for external time synchronization and data time stamping.

48-bit relative message time tagging is available for ARINC 429 messages with 100 ns resolution.

For time synchronization, the device can take an IRIG-B Digital/Analog Input.

The device can also generate an IRIG-B digital signal at a fixed 1 Pulse-per-Second (PPS) Output.

Note: *Please refer to Software Manual for timestamp configurations.*

2.2 System Requirements

For the ***DD-40000K***:

- Standard height PCI Express 1.0/1/2.0 compatible slot (x1, x4, x8 or x16).
- A supported operating system.

For the ***DD-40100F***:

- PCI-PMC connector supporting 3.3V or 5V PCI signaling (see “Use with 5V PCI Signaling”).
- PCI-PMC connector with +5V & ±12V supply voltage available.

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- A supported operating system.

For the ***DD-40100i***:

- PCI connector supporting 3.3V or 5V PCI signaling (See “Use with 5V PCI Signaling)
- PCI connector with +5V & ±12V supply voltage available.
- A supported operating system.

For the ***DD-40100T***:

- cPCI connector supporting 3.3V or 5V PCI signaling (See “Use with 5V PCI Signaling)
- cPCI connector with +5V & ±12V supply voltage available.
- A supported operating system.

2.3 Configuration Options

Table 1. I/O Channel Count and Type Options

Ordering Option #	ARINC 429 Rx/Tx	ARINC 717 Rx/Tx	Voltage Monitoring	Variable Voltage Output	Avionics Discrete I/O	IRIG-B Input & Output
060	6	0	0	0	0	YES
100	10	2	8	8	16	YES
180	18	2	8	8	16	YES
360	36	2	8	8	5	YES

2.4 Mechanical Design

The ***DD-40000K*** ARINC 429 Tester Simulator card is designed for use in standard desktops or servers that provide a standard height half-length PCI Express slot. The PCI Express specifications require interoperability of the X1 card in any link width PCIe slot (x1, x4, x8 or x16) and any current PCI Express generation (1.0a/1.1/2.0). All customer I/O is made available via the single 100-pin Honda connector on the standard I/O bracket. The operating environment for this card is in the temperature range between 0 to +71°C.

The ***DD-40100F*** is an air cooled PMC card with a front panel connector, which gives the user access to the ARINC channels and Avionics Discrete I/Os. Communication to the PCI bus is accomplished via a Revision 2.2 “Compliant” 32-bit (33/66MHz) PCI interface that supports both 5.0V and 3.3V PCI signaling. The operating environment for this card is in the temperature range between 0 to +71°C.

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The ***DD-40100I*** is an ARINC 429 Tester Simulator half-length PCI Card utilizing all of the powerful features of the DD-40100F in a PCI form factor. The operating environment for this card is in the temperature range between 0 to +55°C.

The ***DD-40100T*** is an ARINC 429 Tester Simulator 3U cPCI/PXI Card utilizing all of the powerful features of the ***DD-40100F*** in a cPCI/PXI form factor. The operating environment for this card is in the temperature range between 0 to +55°C.



Figure 1. DD-40000K PCI-Express Card

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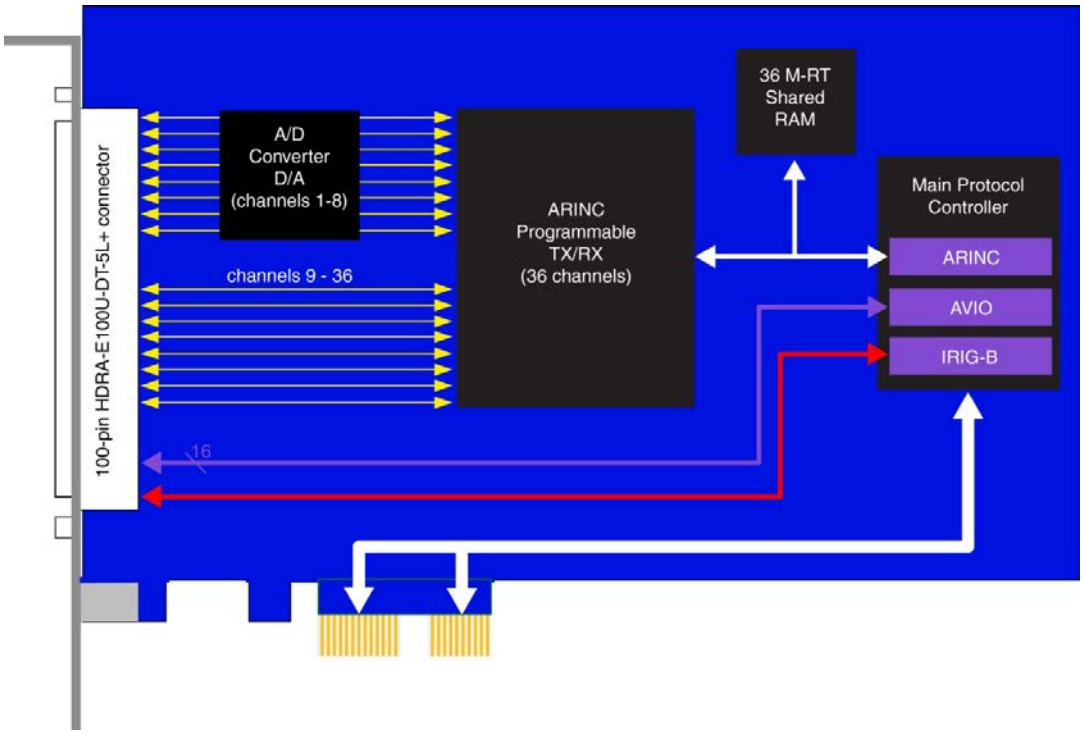


Figure 2. DD-40000K Architecture

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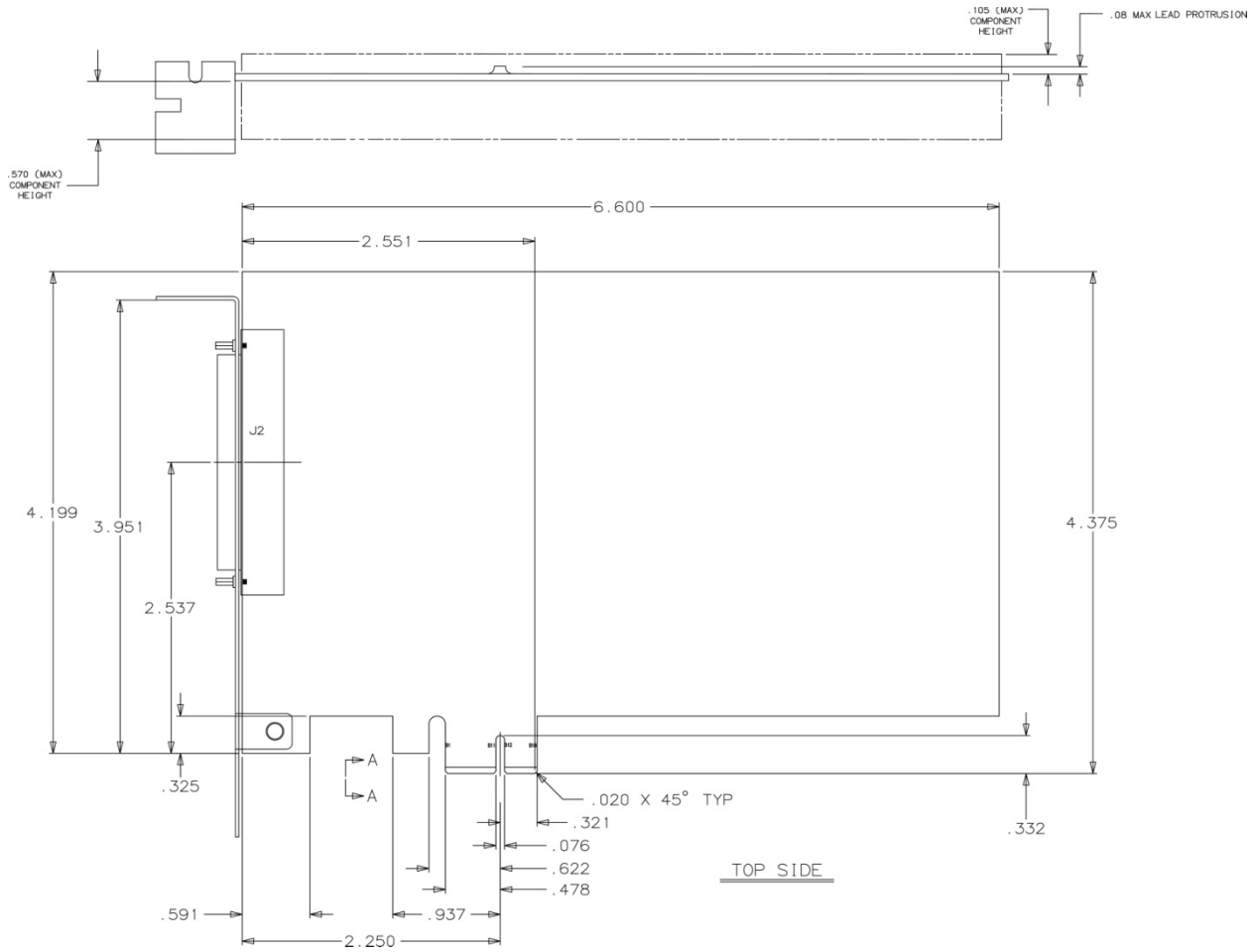


Figure 3. DD-40000K Mechanical Outline

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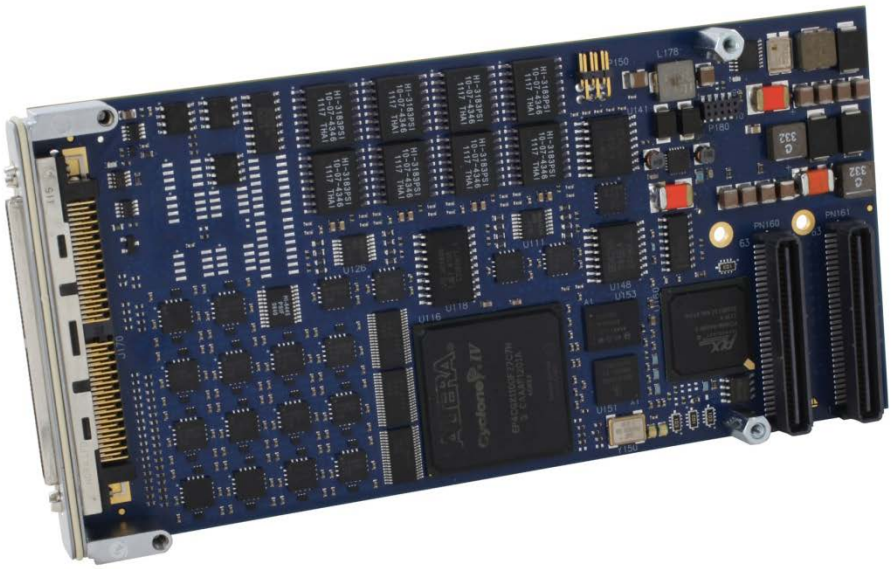


Figure 4. DD-40100F Front Panel PMC Card

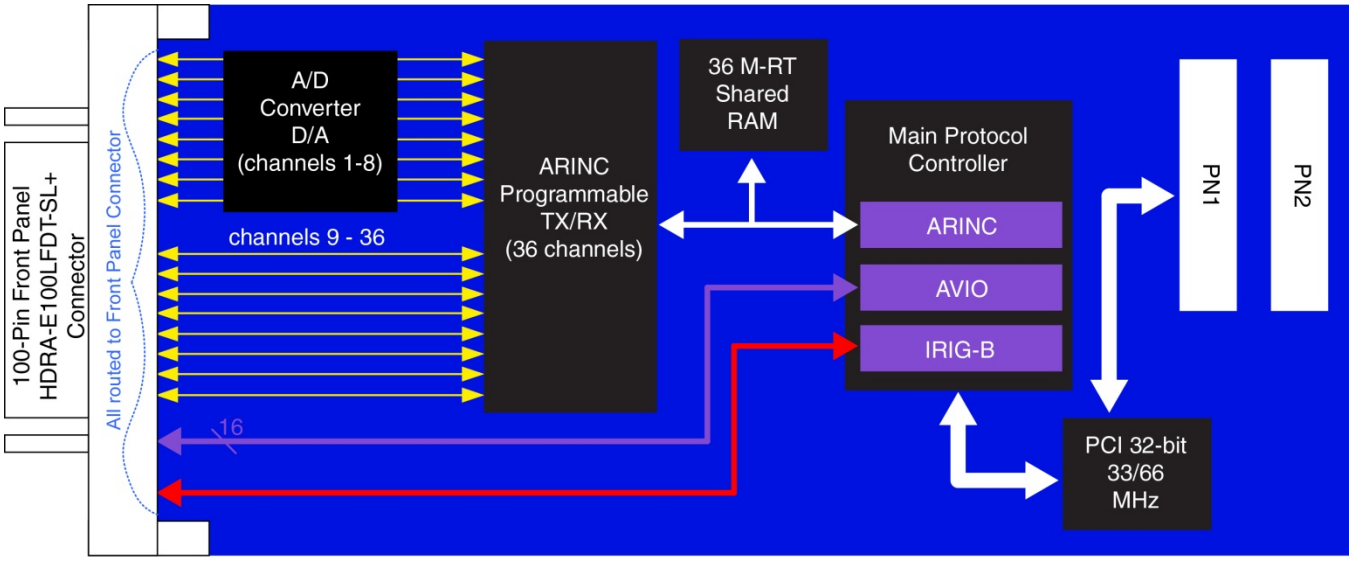


Figure 5. DD-40100F Architecture

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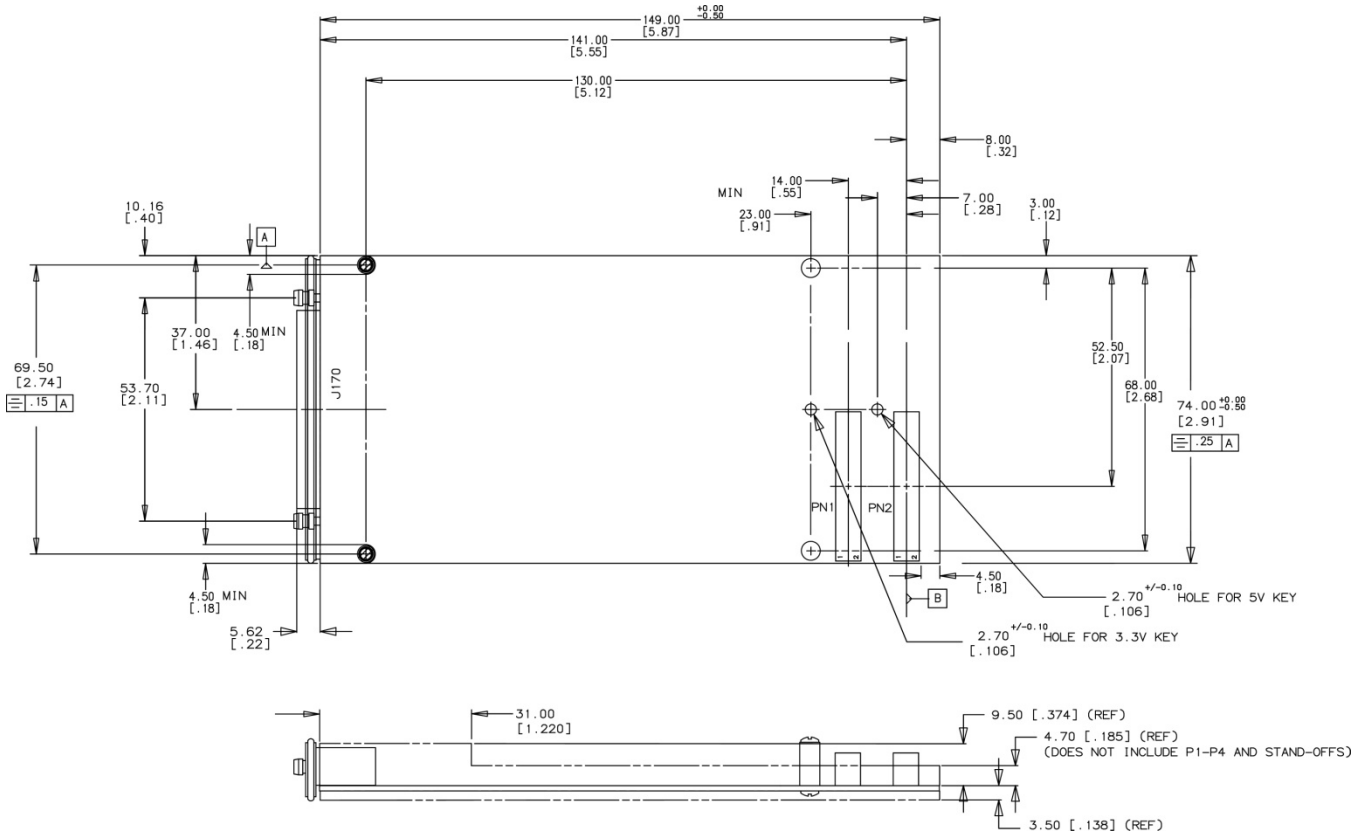


Figure 6. DD-40100F Mechanical Outline

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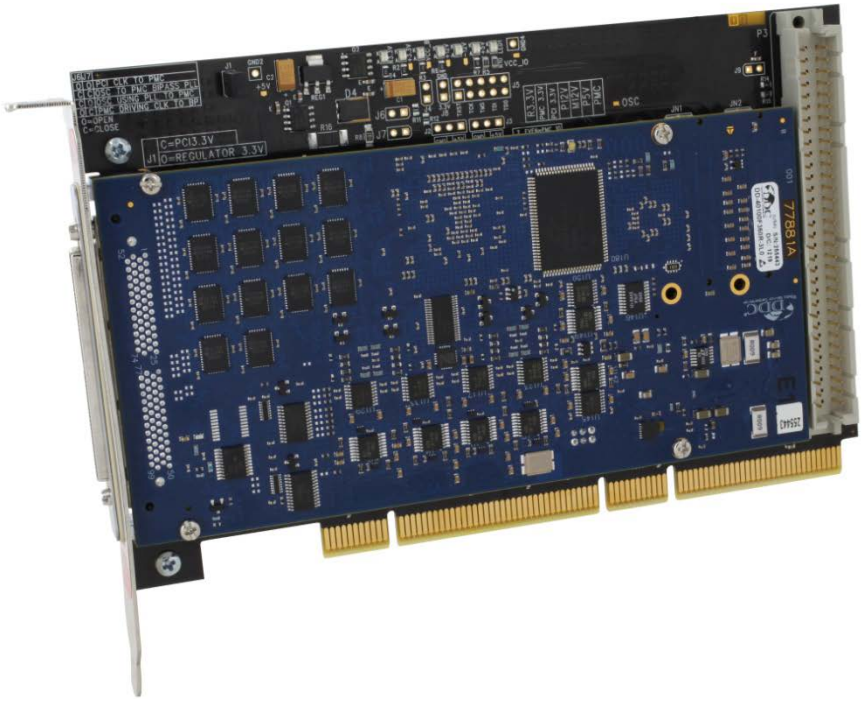


Figure 7. DD-40100i PCI Card

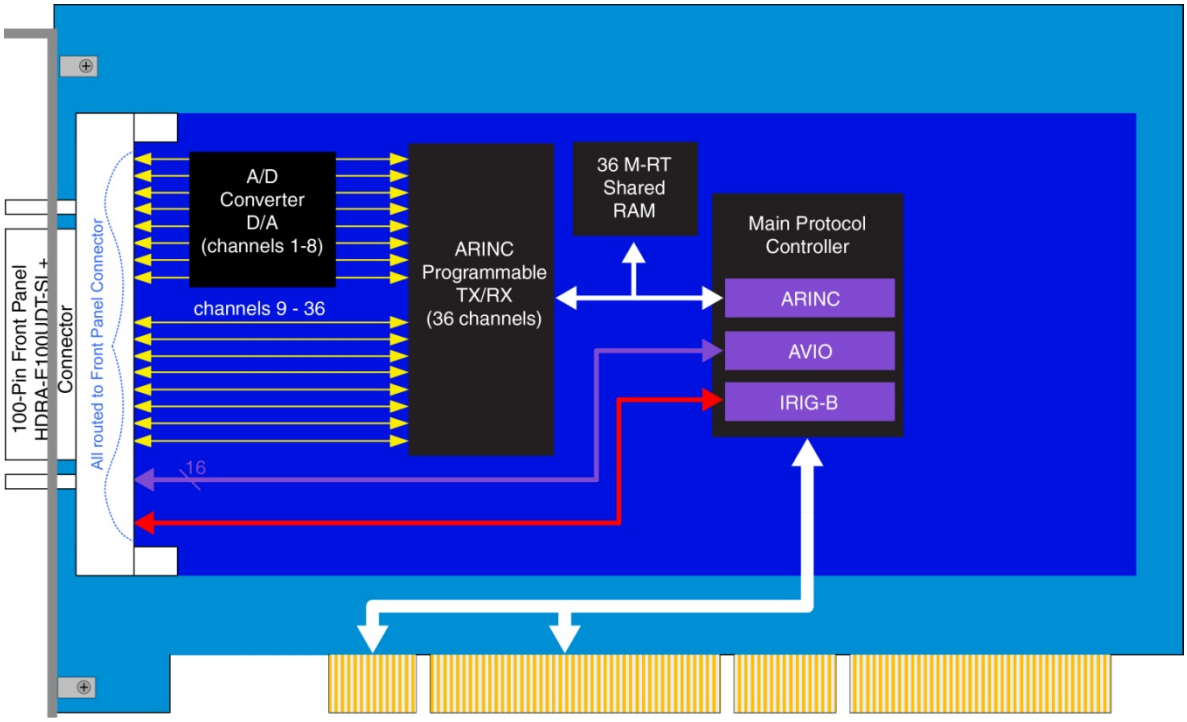


Figure 8. DD-40100i Architecture

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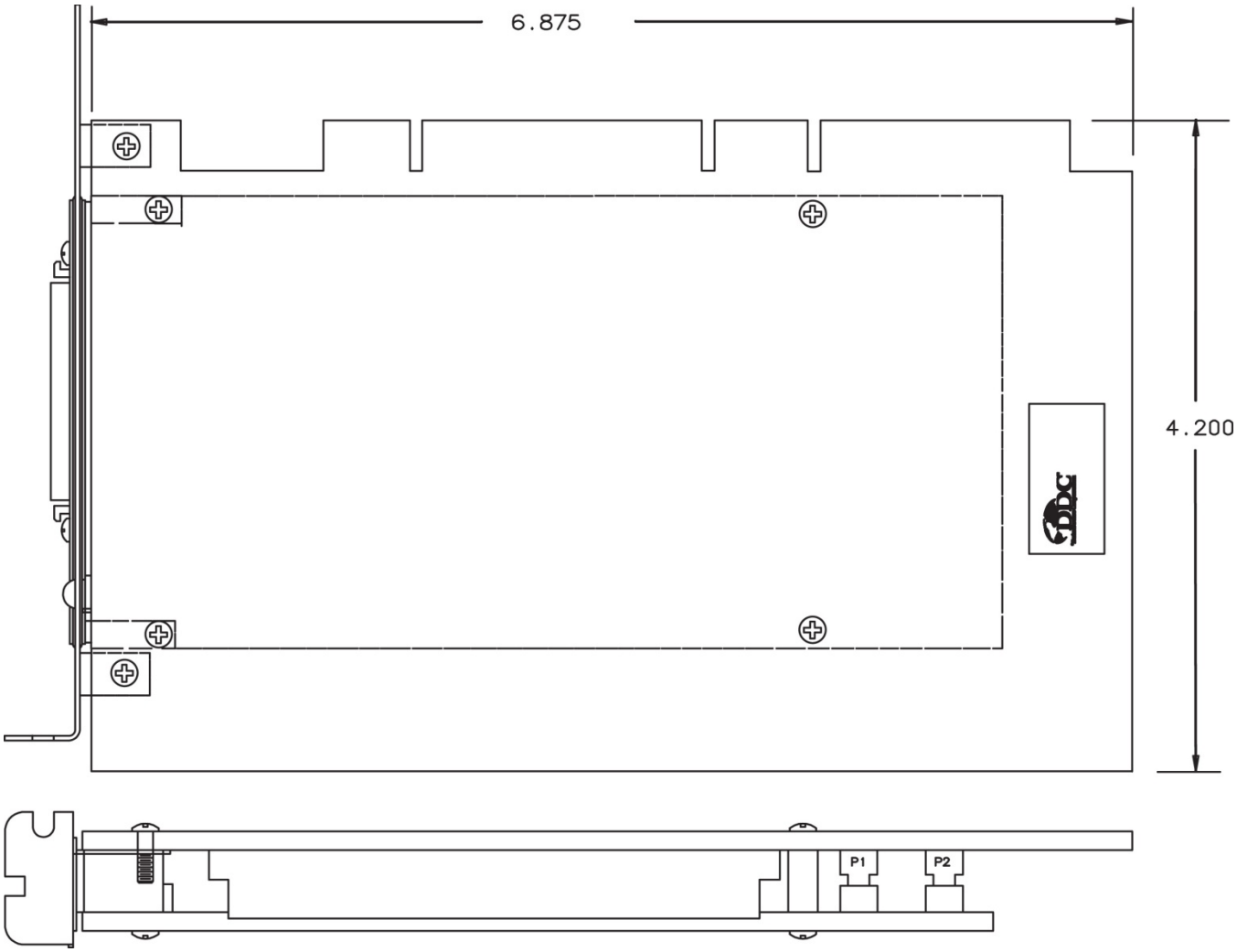


Figure 9. DD-40100i Mechanical Outline

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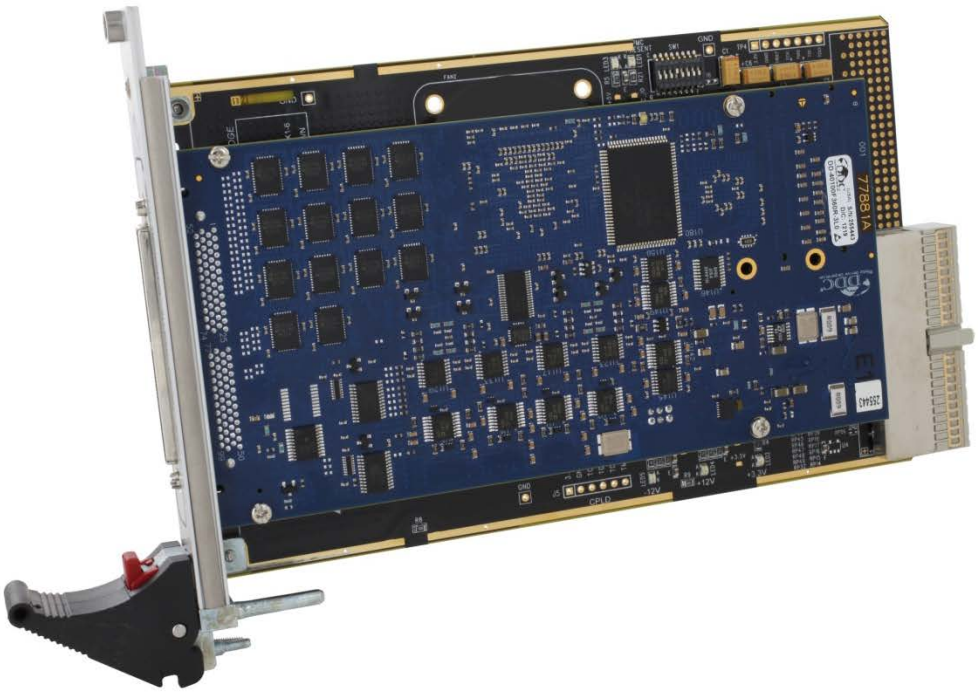


Figure 10. DD-40100T cPCI Card

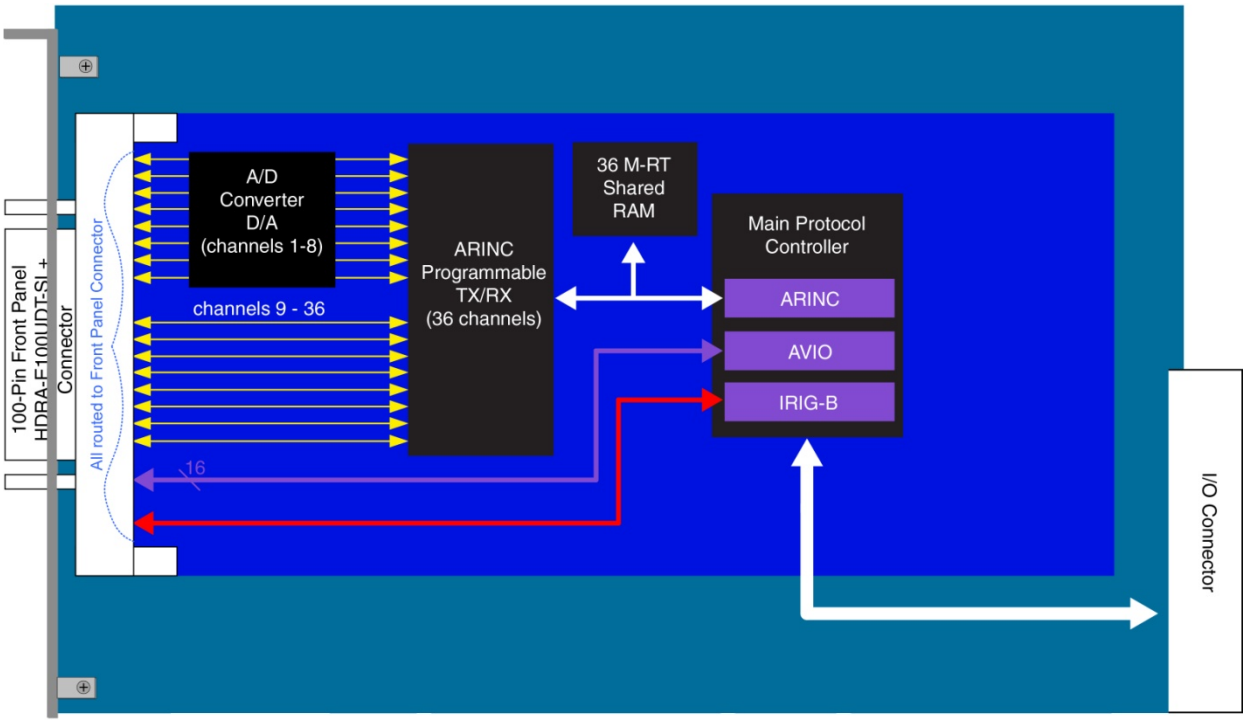


Figure 11. DD-40100Txx0 Architecture

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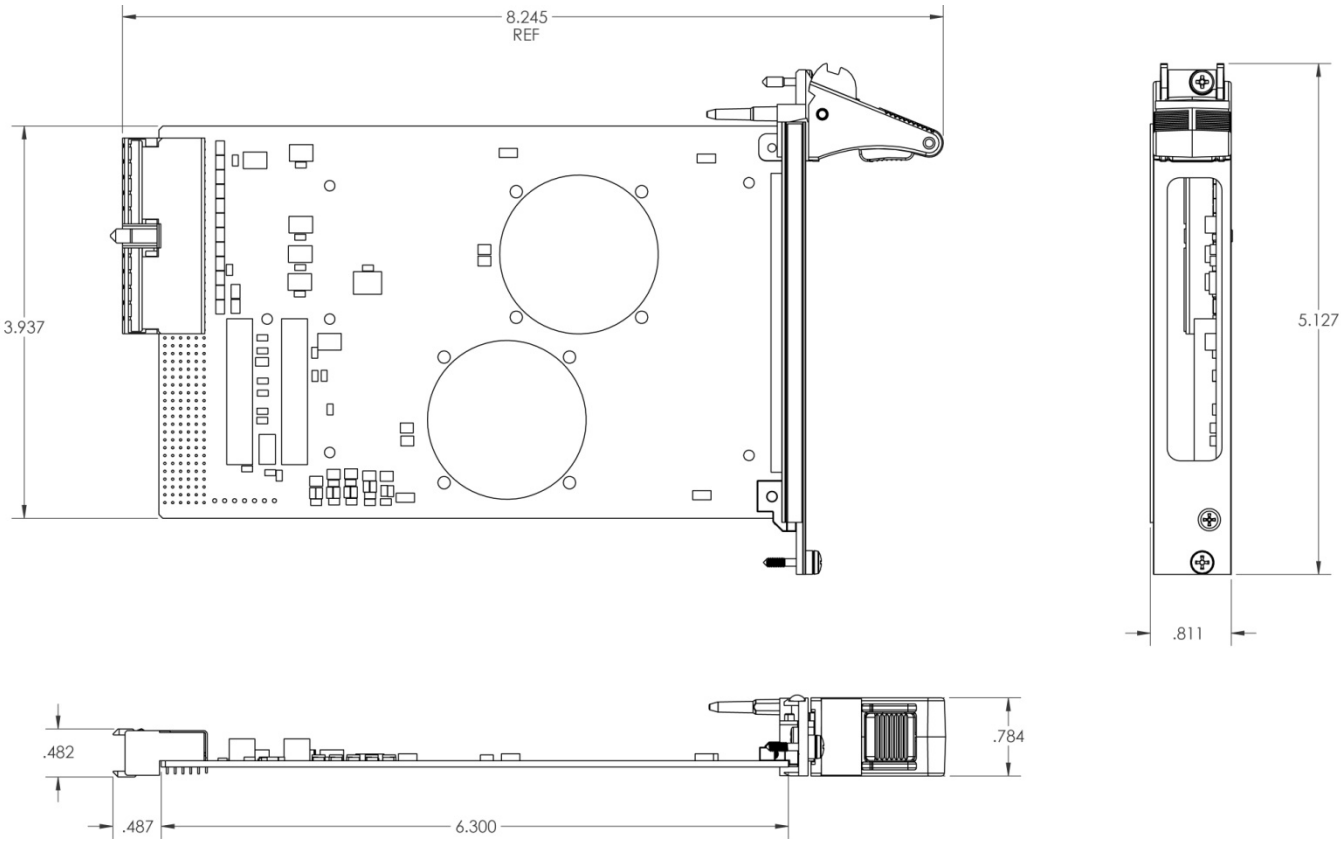


Figure 12. DD-40100Txx0 Mechanical Outline

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2.5 Specifications

Table 2. DD-40000K Specification Table				
PARAMETER	**MIN**	**TYP**	**MAX**	**UNITS**
ABSOLUTE MAXIMUM RATING				
Supply Voltage				
+3.3 V	0		5.5	V
+12 V	0		18	V
-12 V	0		-18	V
POWER SUPPLY REQUIREMENTS				
Voltages/Tolerances				
+3.3 V	3.00	3.3	3.59	V
+12 V	11	12.0	12.9	V
-12 V	-11	-12.0	-12.9	V
POWER CONSUMPTION (Note 3)				
Idle @ Room Temp				
+3.3 V		0.769		W
+12 V		0.423		W
100% Duty Cycle @ Room Temp				
+3.3 V		2.084		W
+12 V		0.600		W
Idle @ 0°C				
+3.3 V		0.825		W
+12 V		0.418		W
100% Duty Cycle @ 0°C				
+3.3 V		2.090		W
+12 V		0.579		W
Idle @ 71°C				
+3.3 V		0.734		W
+12 V		0.452		W
100% Duty Cycle @ 71°C				
+3.3 V		2.106		W
+12 V		0.603		W
ARINC 429 RECEIVER				
Differential Input Voltage (Note 1))				
• ONE	6.5	10.0	13.0	V
• ZERO	-13.0	-10.0	-6.5	V
• NULL	-2.5	0.0	2.5	V

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Table 2. DD-40000K Specification Table				
PARAMETER	**MIN**	**TYP**	**MAX**	**UNITS**
ARINC 429 TRANSMITTER				
Open Circuit Differential Output Voltage (Note 1)				
• ONE	9.0	10.0	11.0	V
• ZERO	-11.0	-10.0	-9.0	V
• NULL	-0.5	0.0	0.5	V
Variable Output speed				
• In increments of 100 bps	500		50,000	bps
• In increments of 1,000 bps	50,000		200,000	bps
Voltage Monitoring Sampling Rate (Note 2)		1		µs/sample
Variable Output Voltage (Note 1)				
• 8-bit software programmable (0-0xFF)	0		±10	V
THERMAL				
Card Operating Temperature	0		71	°C

Table 2 Notes:

1. Differential voltage measured from Line A to Line B.
2. Since the Voltage Monitor utilizes a serial A/D converter, resolution will be reduced when monitoring several receive channels simultaneously. For example, voltage monitoring for one channel will have a 1µs/sample resolution while monitoring on two channels will have a 2 µs/sample resolution.
3. A 36 channel variant was selected in this testing. All 36 ARINC 429 channels were used in the gathering of the Power Consumption values.

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Table 3. DD-40100F/i/T Specification Table				
PARAMETER	**MIN**	**TYP**	**MAX**	**UNITS**
ABSOLUTE MAXIMUM RATING				
Supply Voltage				
+5 V	0		6	V
+12 V	0		18	V
-12 V	0		-18	V
POWER SUPPLY REQUIREMENTS				
Voltages/Tolerances				
+5 V	4.75	5	5.25	V
+12 V	11.4	12	12.6	V
-12 V	-11.4	-12	-12.6	V
POWER CONSUMPTION (Note 3)				
Idle @ Room Temp				
+3.3 V		0.292		W
+12 V		0.085		W
100% Duty Cycle @ Room Temp				
+3.3 V		0.307		W
+12 V		0.084		W
Idle @ 0°C				
+3.3 V		0.302		W
+12 V		0.117		W
100% Duty Cycle @ 0°C				
+3.3 V		0.318		W
+12 V		0.080		W
Idle @ 71°C				
+3.3 V		0.307		W
+12 V		0.117		W
100% Duty Cycle @ 71°C				
+3.3 V		0.306		W
+12 V		0.080		W
ARINC 429 RECEIVER				
Differential Input Voltage (Note 1)				
• ONE	6.5	10.0	13.0	V
• ZERO	-13.0	-10.0	-6.5	V
• NULL	-2.5	0.0	2.5	V

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Table 3. DD-40100F/i/T Specification Table				
PARAMETER	**MIN**	**TYP**	**MAX**	**UNITS**
ARINC 429 TRANSMITTER				
Open Circuit Differential Output Voltage (Note 1)				
• ONE	9.0	10.0	11.0	V
• ZERO	-11.0	-10.0	-9.0	V
• NULL	-0.5	0.0	0.5	V
Variable Output speed				
• In increments of 100 bps	500		50,000	bps
• In increments of 1,000 bps	50,000		200,000	bps
Voltage Monitoring Sampling Rate (Note 2)		1		µs/sample
Variable Output Voltage (Note 1)				
• 8-bit software programmable (0-0xFF)	0		±10	V
THERMAL				
Card Operating Temperature				
• DD-40100F	0		71	°C
• DD-40100i	0		55	°C
• DD-40100T	0		55	°C

Table 3 Notes:

1. Differential voltage measured from Line A to Line B.
2. Since the Voltage Monitor utilizes a serial A/D converter, resolution will be reduced when monitoring several receive channels simultaneously. For example, voltage monitoring for one channel will have a 1 µs/sample resolution while monitoring on two channels will have a 2 µs/sample resolution.
3. A 36 channel variant was selected in this testing. All 36 ARINC 429 channels were used in the gathering of the Power Consumption values

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3 HARDWARE INSTALLATION

The ***DD-40100F/i/T*** card is a 32-bit, 33/66MHz PCI Local Bus Rev. 2.2 compliant interface target device that may be inserted into any compatible slot.

When installing the card, the following should be observed:

- **NEVER** insert or remove the card with the power turned on.
- **ALWAYS** take proper precautions to guard against static damage.
- Use a wrist strap if available, or ensure proper static grounding by touching the power supply cover **WITH POWER OFF**.
- Insert the card and then gently press into the PMC mating connector (for ***DD-40100F***). Secure with proper hardware.
- Make sure that adjacent cabling and wiring do not hinder the airflow around the card.

The card is a true Plug and Play device. Interrupts and memory selections will be performed by the operating system as the boot system progresses.

The ***DD-40000K*** card is a PCI Express Base Specification Rev. 1.1 compliant interface target device that may be inserted into any compatible slot.

When installing the card, the following should be observed:

- **NEVER** insert or remove the card with the power turned on.
- **ALWAYS** take proper precautions to guard against static damage.
- Use a wrist strap if available, or ensure proper static grounding by touching the power supply cover **WITH POWER OFF**.
- Insert the card and then gently press into the standard PCI Express slot
- Secure the rear I/O panel with the proper hardware
- Make sure that adjacent cabling and wiring do not hinder the airflow around the card.

The card is a true Plug and Play device. Interrupts and memory selections will be performed by the operating system as the boot system progresses.

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3.1 Hardware Configuration and Operation

The DD-40x00F/i/T/K card utilizes the PCI and the PCI-Express interface, and as such, does not require any jumpers or switches to set the Base address or interrupt values. The configuration for Plug-and-Play PCI and PCI-Express Bus is performed by the operating system.

During the initial power on boot process, the system performs an enumeration of the appropriate busses and allocates a resource configuration that satisfies the card's requirements. The system will save the configuration information in the card's PCI configuration space registers. These registers are configured at the factory to contain information that identifies the card type, vendor, required memory sizes, and interrupt resources.

When the driver loads, it will access the configuration registers to identify how the system has configured the card. After identifying each of the installed card, the device driver will enumerate each of the channels on the card and create a configuration structure that defines the allocated address and interrupt. This information is directly available to the ARINC 429 Multi-IO C Software Development Kit and is necessary for READ, WRITE and INTERRUPT operations. The end user need not know this information if using one of the supplied C API libraries to operate the card.

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4 DETAILED ARCHITECTURE

4.1 PCI/PCIe Interface

The card provides a target 32-bit PCI interface that operates at clock speeds of up to 66MHz for applications where higher bus speed is desired. If a 33MHz device were to be placed on a 66MHz bus, the bus speed would be forced to slow down to 33MHz. Although ARINC channels may not require the additional bandwidth of a 66MHz bus, the ***DD-40x00F/I/T/K*** device allows the base CPU PCI bus to run at 66MHz, making it possible for other high-speed devices on the bus to take advantage of the higher bandwidth.

When using the card with the supplied RTL ***Xtreme-429 Multi-IO C SDK*** and drivers there is no need to reference the PCI configuration registers.

The card supports 32-bit and 16-bit read and write operations only. All 8-bit accesses are illegal, but will not generate a target abort.

4.1.1 Use with 5V PCI Signaling

The PCI interface signals on the ***DD-40100F/I/T*** operate at 3.3V and are 5V tolerant however it is necessary to confirm that CMC bus input signals “BUSMODE3#” and “BUSMODE4#” supplied by the host module are connected to ground or always at a logic low (as typically implemented on single board computer applications). Once this is confirmed it is safe to remove the +5V-keying pin on the host card to install the board. The BUSMODE3#” and “BUSMODE4#” signals on the ***DD-40100F/I/T*** are not 5V tolerant.

The PCI interface signals on the ***DD-40100F/I/T*** operate at +3.3V and are +5V tolerant.

4.1.2 Interrupts

The card may issue interrupt requests over the PCI bus. PCI Interrupts are generated on the INTA# output signal to the PCI host. The interrupts from each of the channels are functionally OR’ed together to provide a single interrupt. The operations to be taken during the interrupt cycle will be determined by a combination of the device driver requirements and the service routine that is specified by the user application. The device driver will determine which channel on the card generated the interrupt by reading the interrupt status registers and queue. It then transfers this information to an interrupt structure and signals the appropriate application that a interrupt has occurred. The ***ARINC 429 Multi-IO C SDK*** library provides the necessary routines for generating user Interrupt Service Routines and hooking them into the device driver.

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4.1.3 DMA Design

The card's DMA engine is host initiated via the ***ARINC 429 Multi-IO C SDK***. The software(Host) will initiate the DMA transfer by writing to the PCI controller on the card. The card will then issue an interrupt once a DMA transfer has been completed. The SDK uses a round robin scheduling mechanism in order arbitrate the 429 channels over the one DMA transfer. A software DMA work queue may need to be implemented in order to adhere to this scheduling mechanism.

4.2 ARINC Controller Architecture

Each of the ARINC controllers is independently software programmable to operate either as a Transmitter or a Receiver. In addition each ARINC channel can be software configured to support either high or low speed ARINC 429 or ARINC 575 speed mode of operation.

4.2.1 Tx/Rx Variable Speed

The card gives the user the ability to vary the Tx/Rx speed, via software, from 500 to 200,000 bits per second. Speed increments are configurable in steps of 100 bits per second for speeds between 500 to 50,000 bits per second. For speeds between 50,000 to 200,000 bits per second, the speed increments are 1,000 bits per second.

4.2.2 ARINC Mode Receive

The card allows the user access to the following card features in a simple, easy to understand format:

- "Mailbox" type reception
- FIFO type reception
- Filtering of received data
- Variable voltage monitoring (on first 8 channels only)
- Time stamping of received data

Each receive channel has a receive hardware FIFO that is 32 bits wide by 8K words long. The FIFO size will go down to 4K words if message time stamping is enabled. The receivers can be independently designated to be high or low speed. In addition, the user can choose a custom speed between 500 to 200,000 bits per second.

The software API library supports two modes of reception: Mailbox and FIFO. Mailbox reception allows the user to retrieve the "latest" copy of data received on a particular label/SDI combination. This mode is used when the user is only interested in the most recently received data. FIFO reception allows the user to dequeue words

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in the same sequence as they were received on the channel. This mode is useful when the user wants to see the exact order and timing of events on the data bus. Data may be stored in the Mailbox only, FIFO only, or in both the Mailbox and Receive FIFO modes.

Data from each receive channel may by filtered prior to storing in the FIFO or Mailbox. A filter table, which is defined under program control, allows the user to specify which label/SDI combinations should be stored. Message filtering allows the user to only maintain data that is needed. This will reduce the data being stored on the hard disk and displayed on the screen. A separate filter table is maintained for each receiver channel.

4.2.3 Voltage Monitoring

The Voltage Monitoring feature is a useful and powerful tool to give the user a snapshot of the incoming signal for a particular ARINC message. The first 8 channels of the card are capable of supporting voltage monitoring over time as a receiver.

The receiving channels utilize a 10-bit Serial A/D converter that can be triggered via software to take samples at a rate of 1 μs/sample. This sampling resolution will decrease if the user wishes to monitor the incoming voltage of several channels at the same time. For example: one channel will sample at a rate of 1μs/sample while two channels will sample at 2μs/sample.

The 16-bit voltage data will be stored in a 4K byte data FIFO.

Figure 13 shows voltage data collected from one channel transmitting at low speed.

Figure 14 shows voltage data collected from one channel transmitting at high speed.

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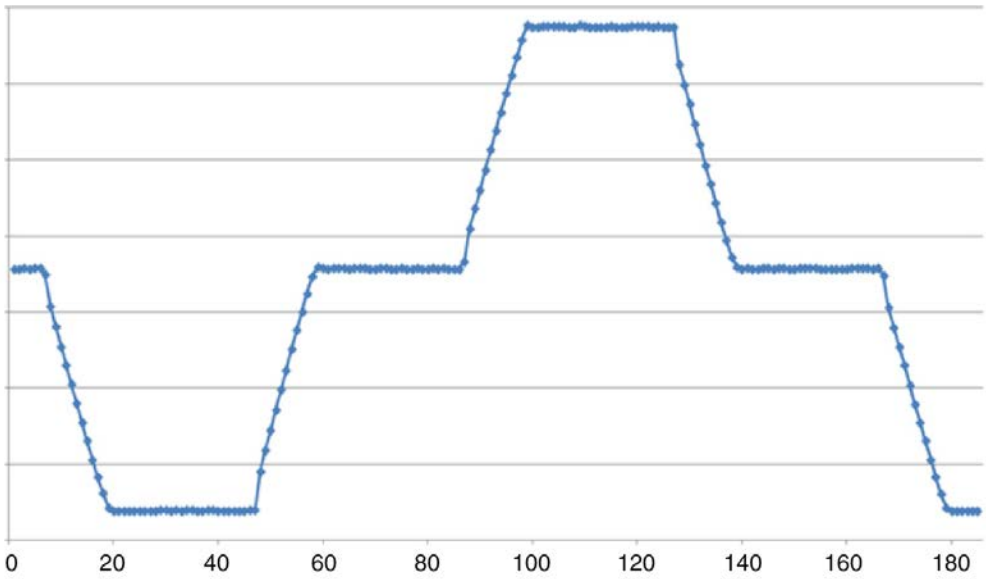


Figure 13. Differential Voltage Monitoring for one ARINC 429 Low Speed Receive Channel

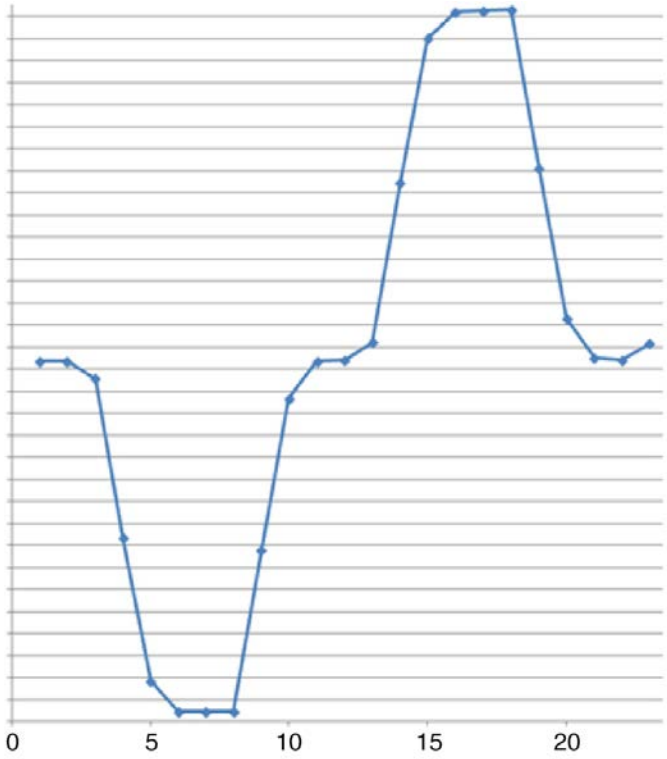


Figure 14. Differential Voltage Monitoring for one ARINC 429 High Speed Receive Channel

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4.2.4 ARINC Mode Transmit

The card allows the user access to the following card features in Transmit mode:

- FIFO Queued transmissions
- Major/Minor Frame Scheduling
- Variable Transmission speeds
- Inserting of Asynchronous Messages
- Full Error Injection on Each Message
- Variable Voltage Output

Each transmitter has a transmit hardware FIFO that is 32bits wide by 2K words long. The 2K message FIFO will be used to store a combination of frame interval data (time between frames), message data, and the message control word (used for error injection). For each channel, an additional 64 bits of data will be consumed for the Minor Frame number and the Frame Repeat count. Figure 15 and Figure 16 below depict the structures of the FIFO and the contents of the Control Word.

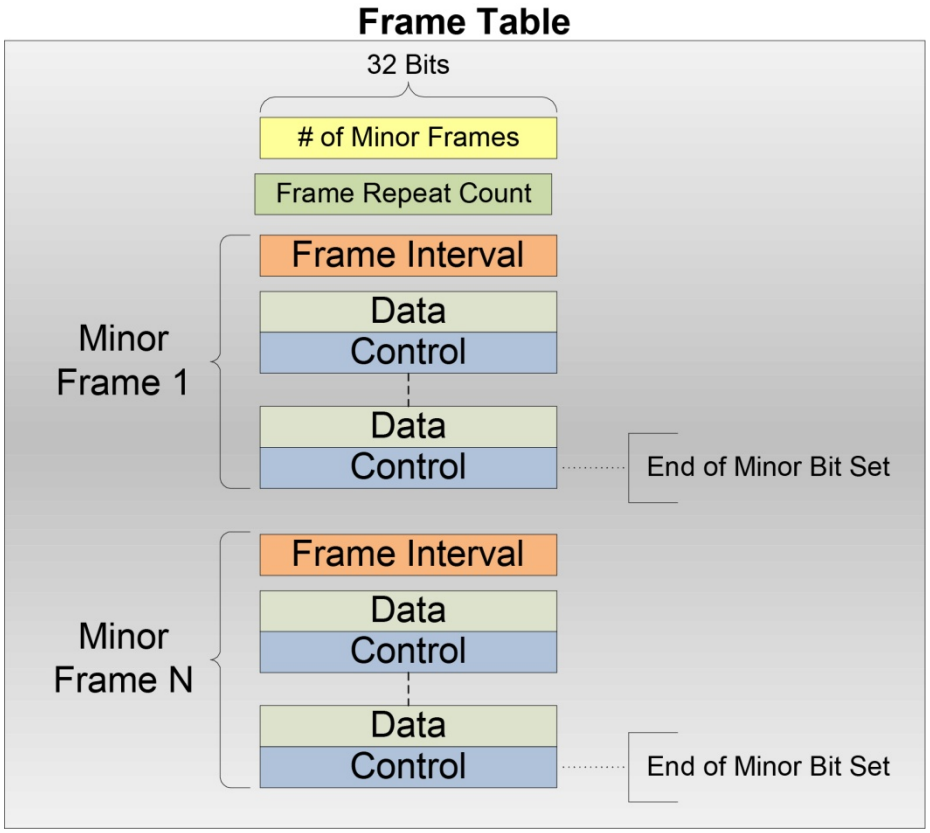


Figure 15. ARINC Message Frame Structure

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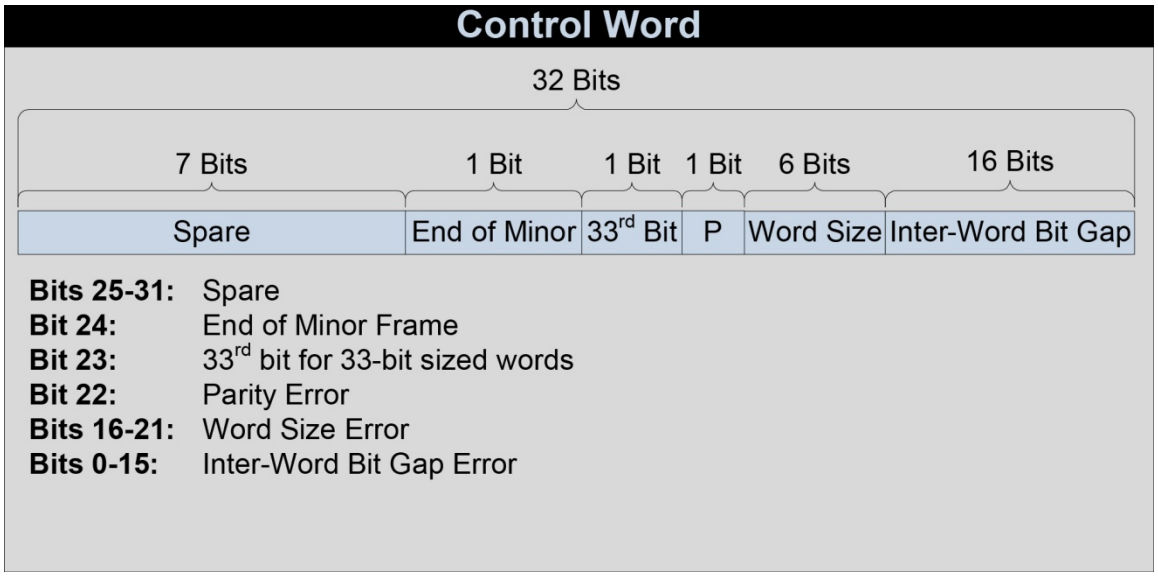


Figure 16. ARINC Data Control Word

Each transmit FIFO allows the host PC to reliably transfer blocks of data to the card for transmission. Use of this FIFO prevents the host PC from being bound by I/O processes, and allows for other activities to proceed when not transferring data to the card.

Data contained in the FIFO is transmitted on command from the host system. The speeds for the transmit channels may be configured as either high, low, or user-specified. The transmission speeds are independent of the receiver speed settings. The library supports two modes of transmission: Scheduled and FIFO. Scheduled transmission allows the user to configure the host to automatically transmit labels at regular intervals (e.g. every 20 msec). Data values can be changed or updated at run time, without stopping the scheduled transmission once it has been started.

FIFO transmission allows the user to transmit a series of words in sequence. FIFO and Scheduled transmissions can be intermixed on the same transmit channel.

When a transmitter is set up for both FIFO and scheduled transmissions, the scheduled data will take priority over the FIFO data. The FIFO data will get transmitted on the first available gap between scheduled data transmissions without altering the schedule.

The transmitter also gives the user the ability to insert asynchronous messages. Each asynchronous message can be inserted via low priority or high priority mode. Low priority messages will only transmit if there is enough free time between

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messages to do so. High priority messages will go out immediately after the current message completes. This can, in effect, disrupt the scheduled timing. The low priority or high priority messages are placed in separate low priority or high priority FIFOs, which are limited to 8 messages.

4.2.4.1 Error Injection

It is possible to configure full error injection on every ARINC 429 message. Error injection options are as follows: Inter Word Bit Gap error, Parity error, Word Size error, and Extra Bit (bit 33) error.

The Inter Word Bit Gap error allows the user to vary the inter word bit gap from 1 bit to 32,000 bits instead of the default 4 bits.

Setting the Parity error for a particular message will cause the parity bit to be flipped to the opposite of what was configured for the channel. If odd or even parity is not selected, then the parity bit is left alone.

The word size error will allow the user to vary the ARINC message from 2 to 32 bits.

The Extra bit error will add an extra bit to the ARINC message.

4.2.5 Variable Output Voltage

The ***DD-40x00F/I/T/K*** ARINC cards gives the user abitlity to vary the output voltage on the first eight transmit channels. The output voltage is software configurable with 8-bit granularity. A voltage between 0 to ±10 Volts can be configured by inputting a hexadecimal value between 0 to 0xFF. The voltage is measured differentially from Line A to Line B.

4.2.6 ARINC Interrupt Handling

The ***DD-40x00F/I/T/K*** ARINC Controllers are capable of generating interrupts to the host computer. Using the supplied ***ARINC 429 Multi I/O C SDK***, the host is capable of configuring the ARINC controllers to generate interrupts based on an event. Interrupts for each channel may be configured independently of each other.

Using the **SetIntCondition()** function within the SDK allows the user to define interrupts conditions per interface. The interrupt conditions are:

1. An ARINC Protocol word is received
2. A Fail warning is received

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3. An ARINC Function test command is received.
4. An ARINC solo command word is received.
5. An ARINC transmit start command is issued.
6. No data Received
7. End of transmission
8. Normal operation mode received
9. Data Pattern match
10. Word type match
11. Receiver buffer is full
12. Received FIFO rollover
13. Completion of Voltage Sampling

4.2.7 Avionics Discrete I/O

The ***DD-40x00F/I/T/K*** card includes up to sixteen Avionic Level Discrete I/O Channels that are individually programmable as inputs or outputs (cards with thirty-six 429 channels only support five Avionics Discretes and cards with six 429 channels don't support any). Avionics Discrete I/O channel 1 is the LSB and channel 16 is the MSB for any software accesses to these signals. As outputs they are Open-Drain type drivers. When used as inputs these channels are configured to sense Ground / Open discrete inputs with +35V input voltage tolerance.

Each Avionics I/O channel is capable of sinking up to 0.5 amps of current when used as an output. However, the P1 connector pins are individually only capable of sinking 0.25A, so both pins of each AIO pair must be connected if the load is greater than 0.25A. Similarly, sufficient ground pins must be connected to accommodate the maximum current that can be sunk by all of the channels combined.

If an Avionics Discrete is used with an external Avionics Input, an external 10K Ω resistor should be connected between the AIO signal and the system power to ensure full swing of the discrete signal, unless the other device has an internal pullup of no greater than 10K Ω.

The Avionics I/O channels can also be used as triggers to indicate ARINC 429 real-time events.

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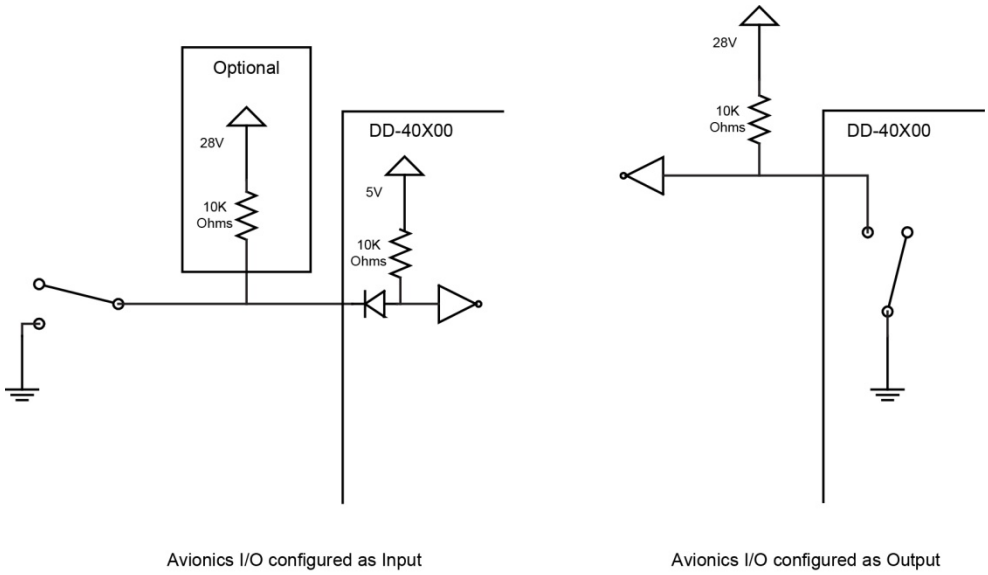


Figure 17. Avionics I/O Configuration

4.2.8 ARINC Time Tag

A 48-bit relative time tag is available if specified by the user via software. Received ARINC 429 messages can be time stamped with a resolution of 100ns and can be used in conjunction with an external IRIG-B source.

Time tagging of ARINC messages is enabled by calling the EnableTimeStamp() library routine of the ARINC 429 API Library.

4.2.9 IRIG Time code

IRIG-B, B123 time code standardization allows equipment to be synchronized to a known global reference time.

The ***DD-40x00F/T/I/K*** ARINC 429 card can accept a 64-bit IRIG-B (B123 format) input via digital signal or amplitude modulated (AM) coding on an audio sine wave carrier signal. Digital or demodulated analog data is read once per second.

DD-40x00F/T/I/K can also optionally generate a *digital* IRIG-B (B123 format) output signal at a fixed 1 Pulse-per-Second (PPS) Output.

The IRIG Time can be used by the ARINC 429 Engines to complement the on-board 100ns relative time clock.

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5 CARD PINOUTS

This section gives the pinouts for the card. The front-panel configuration (***DD-40100F***) allows protocol data to pass through a 100-pin Honda I/O connector.

In the case of the ***DD-40100I and DD-40100T***, the protocol data passes through the 100-pin connector in identical fashion to the ***DD-40100F***.

The ***DD-40000K*** card utilizes the same 100-pin Honda I/O connector with a different pinout than that of the ***DD-40100F/I/T***.

An optional breakout cable is available for purchase that brings out the card's pins to two D-style connectors. The breakout cables are routed in a way so that the pinouts at the two D-style connectors are identical for both the ***DD-40100F/I/T*** and the ***DD-40000K***.

The pinouts described here are for the high density connector that contains the ARINC 429, ARINC 717, Programmable Avionics Discrete I/O, and IRIG signals.

Table 4. Signal List

SIGNAL NAME	Dir	Description
CHxxA_429_RX_TX_IO	I/O	Fully Programmable ARINC 429 Rx/Tx Differential Signal (Positive)
CHxxB_429_RX_TX_IO	I/O	Fully Programmable ARINC 429 Rx/Tx Differential Signal (Negative)
CHxA_717_RX_TX_IO	I/O	Fully Programmable ARINC 717/573 Rx/Tx Differential Signal (Positive)
CHxB_717_RX_TX_IO	I/O	Fully Programmable ARINC 717/573 Rx/Tx Differential Signal (Negative)
AV_IO5_.5AMP	I/O	Avionics Discrete I/O 1 (+35V)
IRIG_ANA_IN	I	Modulated IRIG-B time code input supporting 64-bit time-tags. If using AM Modulated IRIG-B signal, then connect to this input and leave the IRIG_DIG signal unconnected.
IRIG_DIG_OUT	O	Digital IRIG-B time code output. This output complies with IRIG-200-04
IRIG_DIG_IN	I	Digital IRIG-B time code input supporting 64-bit time-tags. If using PWM IRIG-B signal, then connect to this input and leave the IRIG_MOD signal unconnected.
GND	P	Ground reference connection
NC	NC	Do Not Connect

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5.1 Connectors

5.1.1 I/O Connectors

The ***DD-40x00F/I/T/K*** models feature a 100-pin connector for I/O connection (model number HDRA-E100LFDT-SL+) that is Soldered on the board. Pin numbering designations for the connector are as shown in Figure 18.

A mating connector (HDRA-E100M1) and the shell are available with each ***DD-40x00F/I/T/K.***

In addition, optional breakout cables are available. Please see the section below for model number and assembly details.

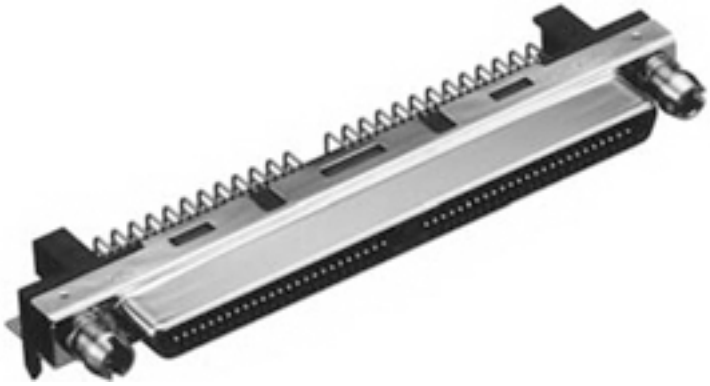


Figure 18. 100-Pin I/O Connector Photograph

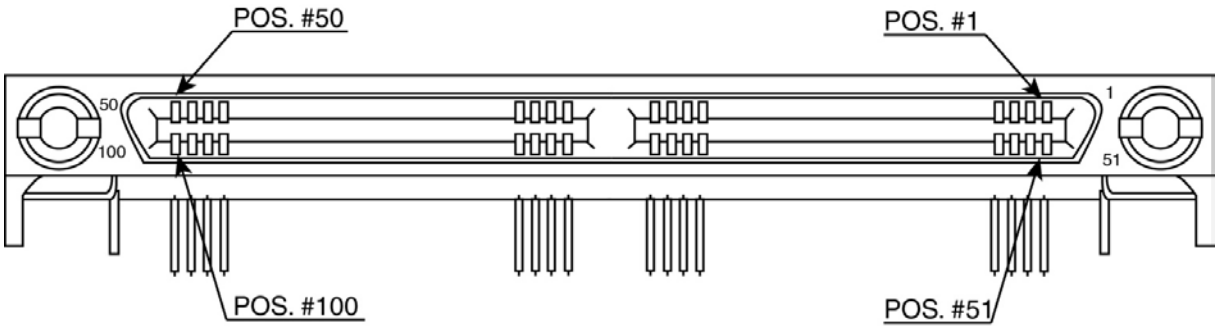


Figure 19. 100-Pin I/O Connector Pin Locations

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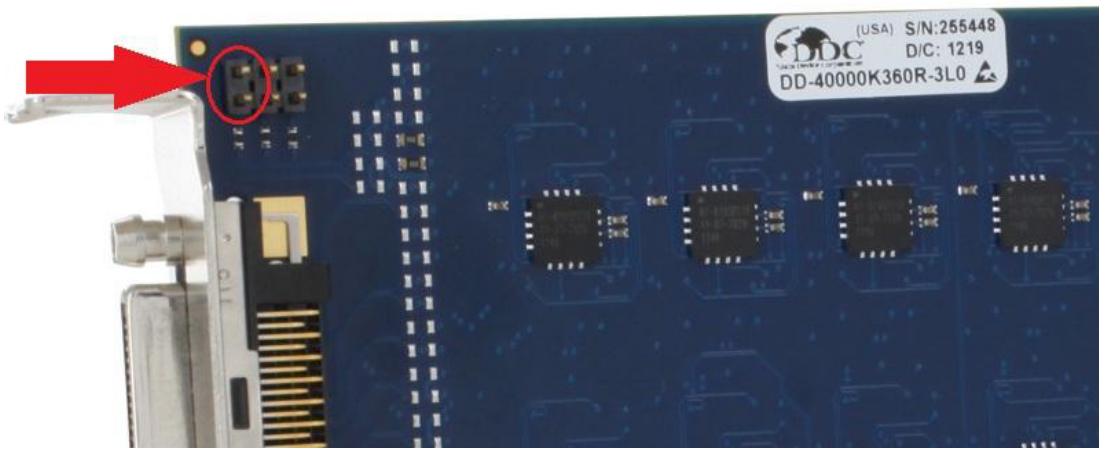


Figure 20. DD-40000K Jumpers

Jumper pins W1A, W1B, and W1C are located close to the front panel connector of the DD-40000K card. The pin closest to the mounting bracket is the W1C jumper pin.

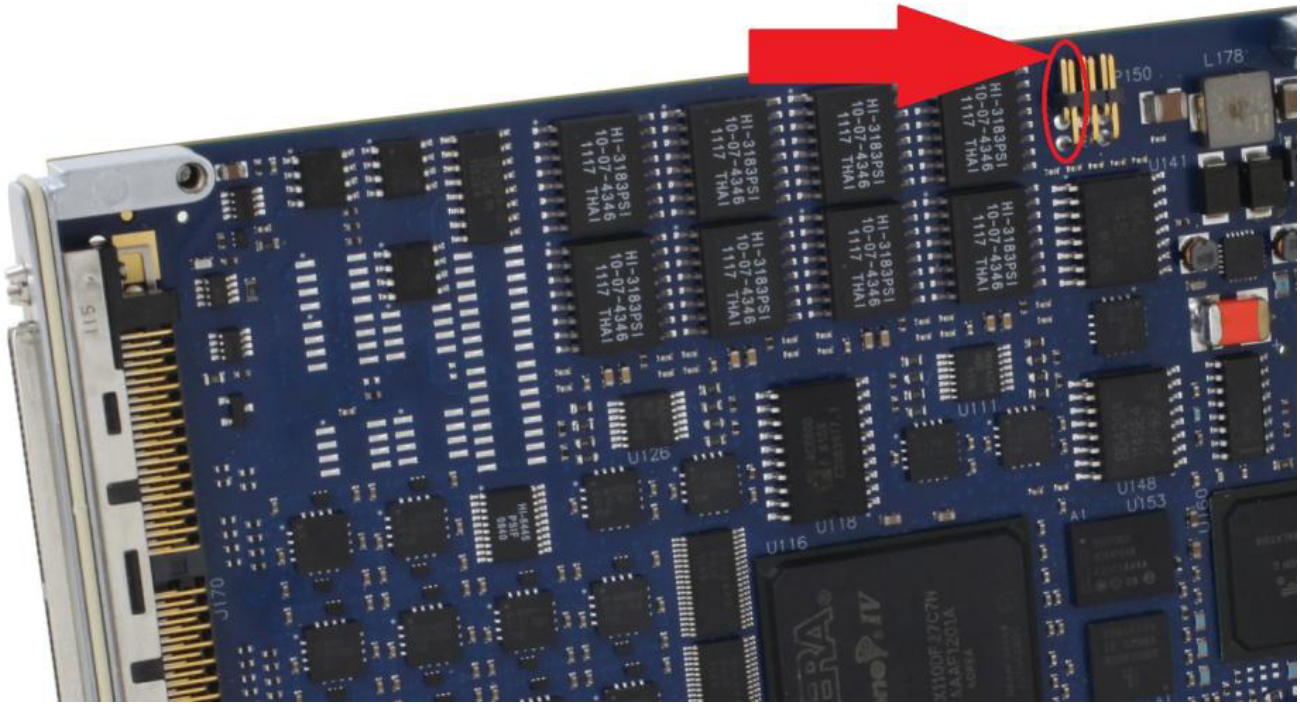


Figure 21. DD-40000F/i/T Jumpers

Jumper pins W1A, W1B, and W1C are located on the primary side of DD-40100F/I/T card. The pin closest to the front panel connector is the W1C jumper pin.

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Table 5. Jumper Pins	
Pin	**Function**
W1A	BOOT SEL. When a jumper is placed on this pin, the board will boot up into the backup flash. This is useful when the primary flash of the board is corrupted and the board needs to be restored to a known state by updating the primary firmware.
W1B	RESERVED
W1C	Flash Enable. When a jumper is placed on this pin, the user will be allowed to update the primary flash.

5.1.2 Interface Cables

Breakout cables are available to be purchased separately for the ***DD-40x00F/I/T/K***. The cables bring out the card's pins from the 100-pin Honda connector to two D-style connectors. Even though the pinouts are different at the 100-pin Honda connector of the card, the pinouts for the two D-style connectors are identical for both the ***DD-40100F/I/T*** and the ***DD-40000K***.

Table 6. Interface Cable Assemblies	
MODEL Number	**Cable Part Number**
DD-40100F/I/T	DDC-78149-2
DD-40000K	DDC-78149-1

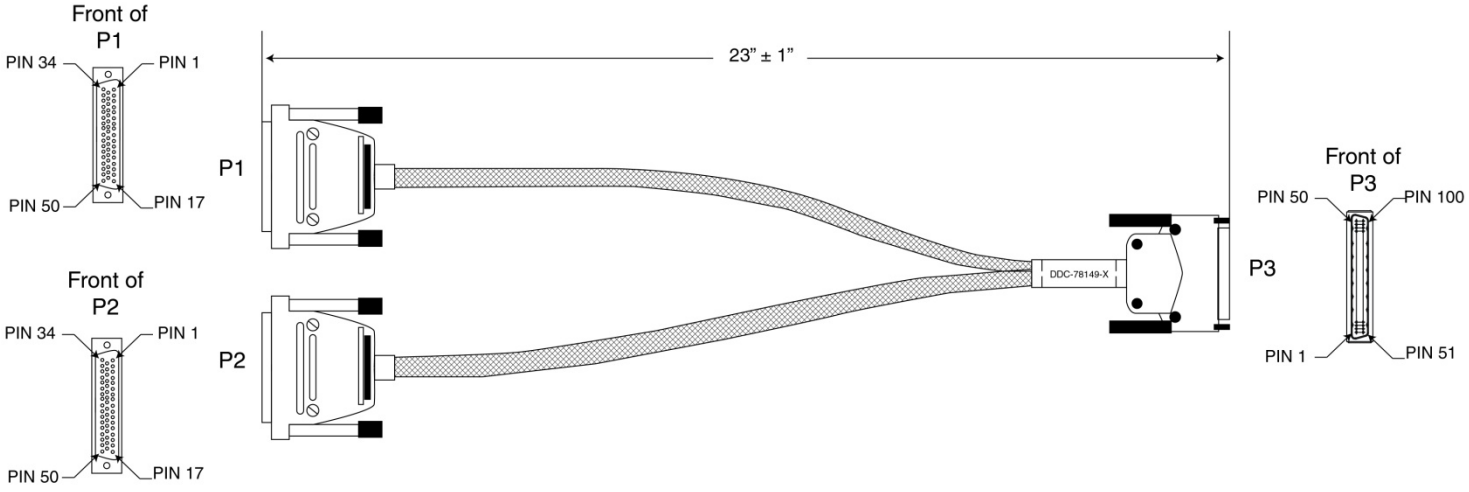


Figure 22. Mechanical Outline of Interface Cable Assembly DDC-78149-1/2

Table 7. Cable Connector (P1/P2/P3)		
Manufacturer	**Part Number**	**Description**
AMP	1658661-1	Male Connector P1/P2 housing
AMP	1658641-1	Male Pins P1/P2 Inserted Male Sockets

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WEICO	XFR-1/2	Polyester Sleeving
WEICO	KYNAR 2030	Solid Conductor
HONDA	HDRA-E100LPWC	Male Connector P3 housing
HONDA	HDRA-E100M1+	Male Pins P3 Inserted Male Sockets

The following tables list the two separate pinouts for the 100-pin Honda connectors for the: ***DD-40100F/I/T*** and the ***DD-40000K.***The **HDRA** column shows the pins of the 100 pin Honda type connector of the board. The **P1/P2** column shows the pins from the two 50 pin D-style connectors of the optional break-out cable. Tables 7 and 8 list the pinouts by the pin order of the **HDRA** Honda connector. Tables 9 and 10 list the pin outs by order of channel number.

Table 8. DD-40000K Honda Connector Pinout

HDRA	P1/P2	DD-40000K360-XXX	DD-40000K180-XXX	DD-40000K100-XXX	DD-40000K060-XXX
1	P1-48	IRIG_DIG_IN	IRIG_DIG_IN	IRIG_DIG_IN	IRIG_DIG_IN
2	P1-2	GND	GND	GND	GND
3	P1-1	AV_IO1_.5AMP	AV_IO1_.5AMP	AV_IO1_.5AMP	NC
4	P1-3	AV_IO1_.5AMP	AV_IO1_.5AMP	AV_IO1_.5AMP	NC
5	P1-46	CH2B_717_RX_TX_IO	CH2B_717_RX_TX_IO	CH2B_717_RX_TX_IO	NC
6	P1-47	CH2A_717_RX_TX_IO	CH2A_717_RX_TX_IO	CH2A_717_RX_TX_IO	NC
7	P2-15	CH19B_429_RX_TX_IO	GND	GND	NC
8	P1-4	GND	GND	GND	GND
9	P2-16	CH19A_429_RX_TX_IO	GND	GND	NC
10	P1-6	GND	GND	GND	GND
11	P2-17	CH20B_429_RX_TX_IO	GND	GND	NC
12	P1-8	GND	GND	GND	GND
13	P2-18	CH20A_429_RX_TX_IO	GND	GND	NC
14	P1-21	CH11B_429_RX_TX_IO	CH11B_429_RX_TX_IO	NC	NC
15	P2-46	CH34A_429_RX_TX_IO	AV_IO14_.5AMP	AV_IO14_.5AMP	NC
16	P1-22	CH11A_429_RX_TX_IO	CH11A_429_RX_TX_IO	NC	NC
17	P1-43	CH1A_717_RX_TX_IO	CH1A_717_RX_TX_IO	CH1A_717_RX_TX_IO	NC
18	P2-28	CH25A_429_RX_TX_IO	GND	GND	NC
19	P1-42	CH1B_717_RX_TX_IO	CH1B_717_RX_TX_IO	CH1B_717_RX_TX_IO	NC
20	P2-13	CH18B_429_RX_TX_IO	CH18B_429_RX_TX_IO	GND	NC
21	P2-14	CH18A_429_RX_TX_IO	CH18A_429_RX_TX_IO	GND	NC
22	P2-29	CH26B_429_RX_TX_IO	AV_IO6_.5AMP	AV_IO6_.5AMP	NC
23	P2-30	CH26A_429_RX_TX_IO	AV_IO6_.5AMP	AV_IO6_.5AMP	NC
24	P2-49	CH36B_429_RX_TX_IO	AV_IO16_.5AMP	AV_IO16_.5AMP	NC

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Table 8. DD-40000K Honda Connector Pinout					
HDRA	**P1/P2**	**DD-40000K360-XXX**	**DD-40000K180-XXX**	**DD-40000K100-XXX**	**DD-40000K060-XXX**
25	P1-30	CH2A_429_RX_TX_IO	CH2A_429_RX_TX_IO	CH2A_429_RX_TX_IO	CH2A_429_RX_TX_IO
26	P2-26	CH24A_429_RX_TX_IO	GND	GND	NC
27	P1-34	CH8B_429_RX_TX_IO	CH8B_429_RX_TX_IO	CH8B_429_RX_TX_IO	NC
28	P1-27	CH7B_429_RX_TX_IO	CH7B_429_RX_TX_IO	CH7B_429_RX_TX_IO	NC
29	P1-35	CH8A_429_RX_TX_IO	CH8A_429_RX_TX_IO	CH8A_429_RX_TX_IO	NC
30	P2-47	CH35B_429_RX_TX_IO	AV_IO15_.5AMP	AV_IO15_.5AMP	NC
31	P2-48	CH35A_429_RX_TX_IO	AV_IO15_.5AMP	AV_IO15_.5AMP	NC
32	P1-32	CH5A_429_RX_TX_IO	CH5A_429_RX_TX_IO	CH5A_429_RX_TX_IO	CH5A_429_RX_TX_IO
33	P2-41	CH32B_429_RX_TX_IO	AV_IO12_.5AMP	AV_IO12_.5AMP	NC
34	P2-42	CH32A_429_RX_TX_IO	AV_IO12_.5AMP	AV_IO12_.5AMP	NC
35	P1-25	CH4B_429_RX_TX_IO	CH4B_429_RX_TX_IO	CH4B_429_RX_TX_IO	CH4B_429_RX_TX_IO
36	P2-39	CH31B_429_RX_TX_IO	AV_IO11_.5AMP	AV_IO11_.5AMP	NC
37	P2-40	CH31A_429_RX_TX_IO	AV_IO11_.5AMP	AV_IO11_.5AMP	NC
38	P2-37	CH30B_429_RX_TX_IO	AV_IO10_.5AMP	AV_IO10_.5AMP	NC
39	P2-38	CH30A_429_RX_TX_IO	AV_IO10_.5AMP	AV_IO10_.5AMP	NC
40	P2-31	CH27B_429_RX_TX_IO	AV_IO7_.5AMP	AV_IO7_.5AMP	NC
41	P2-32	CH27A_429_RX_TX_IO	AV_IO7_.5AMP	AV_IO7_.5AMP	NC
42	P2-23	CH23B_429_RX_TX_IO	GND	GND	NC
43	P2-24	CH23A_429_RX_TX_IO	GND	GND	NC
44	P2-9	CH16B_429_RX_TX_IO	GND	GND	NC
45	P2-8	CH15A_429_RX_TX_IO	GND	GND	NC
46	P2-10	CH16A_429_RX_TX_IO	GND	GND	NC
47	P1-45	CH10A_429_RX_TX_IO	CH10A_429_RX_TX_IO	CH10A_429_RX_TX_IO	NC
48	P1-44	CH10B_429_RX_TX_IO	CH10B_429_RX_TX_IO	CH10B_429_RX_TX_IO	NC
49	P2-20	CH21A_429_RX_TX_IO	GND	GND	NC
50	P2-19	CH21B_429_RX_TX_IO	GND	GND	NC
51	P1-17	AV_IO5_.5AMP	AV_IO5_.5AMP	AV_IO5_.5AMP	NC
52	P1-49	IRIG_ANA_IN	IRIG_ANA_IN	IRIG_ANA_IN	IRIG_ANA_IN
53	P1-19	AV_IO5_.5AMP	AV_IO5_.5AMP	AV_IO5_.5AMP	NC
54	P1-20	GND	GND	GND	GND
55	P1-13	AV_IO4_.5AMP	AV_IO4_.5AMP	AV_IO4_.5AMP	NC
56	P1-9	AV_IO3_.5AMP	AV_IO3_.5AMP	AV_IO3_.5AMP	NC
57	P1-15	AV_IO4_.5AMP	AV_IO4_.5AMP	AV_IO4_.5AMP	NC
58	P1-11	AV_IO3_.5AMP	AV_IO3_.5AMP	AV_IO3_.5AMP	NC
59	P1-10	GND	GND	GND	GND

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Table 8. DD-40000K Honda Connector Pinout					
HDRA	**P1/P2**	**DD-40000K360-XXX**	**DD-40000K180-XXX**	**DD-40000K100-XXX**	**DD-40000K060-XXX**
60	P1-33	GND	GND	GND	GND
61	P1-12	GND	GND	GND	GND
62	P1-5	AV_IO2_.5AMP	AV_IO2_.5AMP	AV_IO2_.5AMP	NC
63	P1-50	IRIG_DIG_OUT	IRIG_DIG_OUT	IRIG_DIG_OUT	IRIG_DIG_OUT
64	P1-7	AV_IO2_.5AMP	AV_IO2_.5AMP	AV_IO2_.5AMP	NC
65	P2-45	CH34B_429_RX_TX_IO	AV_IO14_.5AMP	AV_IO14_.5AMP	NC
66	P2-27	CH25B_429_RX_TX_IO	GND	GND	NC
67	P1-14	GND	GND	GND	GND
68	P2-1	CH12B_429_RX_TX_IO	CH12B_429_RX_TX_IO	NC	NC
69	P1-16	GND	GND	GND	GND
70	P2-35	CH29B_429_RX_TX_IO	AV_IO9_.5AMP	AV_IO9_.5AMP	NC
71	P2-2	CH12A_429_RX_TX_IO	CH12A_429_RX_TX_IO	NC	NC
72	P2-36	CH29A_429_RX_TX_IO	AV_IO9_.5AMP	AV_IO9_.5AMP	NC
73	P1-36	CH3B_429_RX_TX_IO	CH3B_429_RX_TX_IO	CH3B_429_RX_TX_IO	CH3B_429_RX_TX_IO
74	P1-23	CH1B_429_RX_TX_IO	CH1B_429_RX_TX_IO	CH1B_429_RX_TX_IO	CH1B_429_RX_TX_IO
75	P2-50	CH36A_429_RX_TX_IO	AV_IO16_.5AMP	AV_IO16_.5AMP	NC
76	P2-25	CH24B_429_RX_TX_IO	GND	GND	NC
77	P1-28	CH7A_429_RX_TX_IO	CH7A_429_RX_TX_IO	CH7A_429_RX_TX_IO	NC
78	P1-18	GND	GND	GND	GND
79	P1-31	CH5B_429_RX_TX_IO	CH5B_429_RX_TX_IO	CH5B_429_RX_TX_IO	CH5B_429_RX_TX_IO
80	P2-3	CH13B_429_RX_TX_IO	CH13B_429_RX_TX_IO	NC	NC
81	P1-38	CH6B_429_RX_TX_IO	CH6B_429_RX_TX_IO	CH6B_429_RX_TX_IO	CH6B_429_RX_TX_IO
82	P1-39	CH6A_429_RX_TX_IO	CH6A_429_RX_TX_IO	CH6A_429_RX_TX_IO	CH6A_429_RX_TX_IO
83	P2-4	CH13A_429_RX_TX_IO	CH13A_429_RX_TX_IO	NC	NC
84	P1-26	CH4A_429_RX_TX_IO	CH4A_429_RX_TX_IO	CH4A_429_RX_TX_IO	CH4A_429_RX_TX_IO
85	P1-37	CH3A_429_RX_TX_IO	CH3A_429_RX_TX_IO	CH3A_429_RX_TX_IO	CH3A_429_RX_TX_IO
86	P1-29	CH2B_429_RX_TX_IO	CH2B_429_RX_TX_IO	CH2B_429_RX_TX_IO	CH2B_429_RX_TX_IO
87	P2-5	CH14B_429_RX_TX_IO	CH14B_429_RX_TX_IO	NC	NC
88	P1-24	CH1A_429_RX_TX_IO	CH1A_429_RX_TX_IO	CH1A_429_RX_TX_IO	CH1A_429_RX_TX_IO
89	P2-6	CH14A_429_RX_TX_IO	CH14A_429_RX_TX_IO	NC	NC
90	P1-40	CH9B_429_RX_TX_IO	CH9B_429_RX_TX_IO	CH9B_429_RX_TX_IO	NC
91	P2-22	CH22A_429_RX_TX_IO	GND	GND	NC
92	P1-41	CH9A_429_RX_TX_IO	CH9A_429_RX_TX_IO	CH9A_429_RX_TX_IO	NC
93	P2-21	CH22B_429_RX_TX_IO	GND	GND	NC
94	P2-7	CH15B_429_RX_TX_IO	GND	GND	NC

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Table 8. DD-40000K Honda Connector Pinout					
HDRA	**P1/P2**	**DD-40000K360-XXX**	**DD-40000K180-XXX**	**DD-40000K100-XXX**	**DD-40000K060-XXX**
95	P2-34	CH28A_429_RX_TX_IO	AV_IO8_.5AMP	AV_IO8_.5AMP	NC
96	P2-33	CH28B_429_RX_TX_IO	AV_IO8_.5AMP	AV_IO8_.5AMP	NC
97	P2-44	CH33A_429_RX_TX_IO	AV_IO13_.5AMP	AV_IO13_.5AMP	NC
98	P2-11	CH17B_429_RX_TX_IO	GND	GND	NC
99	P2-43	CH33B_429_RX_TX_IO	AV_IO13_.5AMP	AV_IO13_.5AMP	NC
100	P2-12	CH17A_429_RX_TX_IO	GND	GND	NC

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Table 9. DD-40100F/I/T Honda Connector Pinout					
HDRA	**P1/P2**	**DD-40100F360-XXX**	**DD-40100F180-XXX**	**DD-40100F100-XXX**	**DD-40100F060-XXX**
1	P2-30	CH26A_429_RX_TX_IO	AV_IO6_.5AMP	AV_IO6_.5AMP	NC
2	P2-34	CH28A_429_RX_TX_IO	AV_IO8_.5AMP	AV_IO8_.5AMP	NC
3	P2-29	CH26B_429_RX_TX_IO	AV_IO6_.5AMP	AV_IO6_.5AMP	NC
4	P2-33	CH28B_429_RX_TX_IO	AV_IO8_.5AMP	AV_IO8_.5AMP	NC
5	P2-38	CH30A_429_RX_TX_IO	AV_IO10_.5AMP	AV_IO10_.5AMP	NC
6	P2-42	CH32A_429_RX_TX_IO	AV_IO12_.5AMP	AV_IO12_.5AMP	NC
7	P2-37	CH30B_429_RX_TX_IO	AV_IO10_.5AMP	AV_IO10_.5AMP	NC
8	P2-41	CH32B_429_RX_TX_IO	AV_IO12_.5AMP	AV_IO12_.5AMP	NC
9	P2-18	CH20A_429_RX_TX_IO	GND	GND	NC
10	P2-14	CH18A_429_RX_TX_IO	CH18A_429_RX_TX_IO	GND	NC
11	P2-17	CH20B_429_RX_TX_IO	GND	GND	NC
12	P2-13	CH18B_429_RX_TX_IO	CH18B_429_RX_TX_IO	GND	NC
13	P1-22	CH11A_429_RX_TX_IO	CH11A_429_RX_TX_IO	NC	NC
14	P2-22	CH22A_429_RX_TX_IO	GND	GND	NC
15	P1-21	CH11B_429_RX_TX_IO	CH11B_429_RX_TX_IO	NC	NC
16	P2-21	CH22B_429_RX_TX_IO	GND	GND	NC
17	P2-26	CH24A_429_RX_TX_IO	GND	GND	NC
18	P2-9	CH16B_429_RX_TX_IO	GND	GND	NC
19	P2-25	CH24B_429_RX_TX_IO	GND	GND	NC
20	P2-10	CH16A_429_RX_TX_IO	GND	GND	NC
21	P2-2	CH12A_429_RX_TX_IO	CH12A_429_RX_TX_IO	NC	NC
22	P2-4	CH13A_429_RX_TX_IO	CH13A_429_RX_TX_IO	NC	NC
23	P2-1	CH12B_429_RX_TX_IO	CH12B_429_RX_TX_IO	NC	NC
24	P2-3	CH13B_429_RX_TX_IO	CH13B_429_RX_TX_IO	NC	NC
25	P1-2	GND	GND	GND	GND
26	P2-46	CH34A_429_RX_TX_IO	AV_IO14_.5AMP	AV_IO14_.5AMP	NC
27	P2-50	CH36A_429_RX_TX_IO	AV_IO16_.5AMP	AV_IO16_.5AMP	NC
28	P2-45	CH34B_429_RX_TX_IO	AV_IO14_.5AMP	AV_IO14_.5AMP	NC
29	P2-49	CH36B_429_RX_TX_IO	AV_IO16_.5AMP	AV_IO16_.5AMP	NC
30	P1-4	GND	GND	GND	GND
31	P1-42	CH1B_717_RX_TX_IO	CH1B_717_RX_TX_IO	CH1B_717_RX_TX_IO	NC
32	P1-46	CH2B_717_RX_TX_IO	CH2B_717_RX_TX_IO	CH2B_717_RX_TX_IO	NC
33	P1-43	CH1A_717_RX_TX_IO	CH1A_717_RX_TX_IO	CH1A_717_RX_TX_IO	NC
34	P1-47	CH2A_717_RX_TX_IO	CH2A_717_RX_TX_IO	CH2A_717_RX_TX_IO	NC

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Table 9. DD-40100F/I/T Honda Connector Pinout					
HDRA	**P1/P2**	**DD-40100F360-XXX**	**DD-40100F180-XXX**	**DD-40100F100-XXX**	**DD-40100F060-XXX**
35	P1-6	GND	GND	GND	GND
36	P1-35	CH8A_429_RX_TX_IO	CH8A_429_RX_TX_IO	CH8A_429_RX_TX_IO	NC
37	P1-34	CH8B_429_RX_TX_IO	CH8B_429_RX_TX_IO	CH8B_429_RX_TX_IO	NC
38	P1-8	GND	GND	GND	GND
39	P1-30	CH2A_429_RX_TX_IO	CH2A_429_RX_TX_IO	CH2A_429_RX_TX_IO	CH2A_429_RX_TX_IO
40	P1-37	CH3A_429_RX_TX_IO	CH3A_429_RX_TX_IO	CH3A_429_RX_TX_IO	CH3A_429_RX_TX_IO
41	P1-36	CH3B_429_RX_TX_IO	CH3B_429_RX_TX_IO	CH3B_429_RX_TX_IO	CH3B_429_RX_TX_IO
42	P1-10	GND	GND	GND	GND
43	P1-50	IRIG_DIG_OUT	IRIG_DIG_OUT	IRIG_DIG_OUT	IRIG_DIG_OUT
44	P1-48	IRIG_DIG_IN	IRIG_DIG_IN	IRIG_DIG_IN	IRIG_DIG_IN
45	P1-17	AV_IO5_.5AMP	AV_IO5_.5AMP	AV_IO5_.5AMP	NC
46	P1-19	AV_IO5_.5AMP	AV_IO5_.5AMP	AV_IO5_.5AMP	NC
47	P1-5	AV_IO2_.5AMP	AV_IO2_.5AMP	AV_IO2_.5AMP	NC
48	P1-7	AV_IO2_.5AMP	AV_IO2_.5AMP	AV_IO2_.5AMP	NC
49	P1-1	AV_IO1_.5AMP	AV_IO1_.5AMP	AV_IO1_.5AMP	NC
50	P1-3	AV_IO1_.5AMP	AV_IO1_.5AMP	AV_IO1_.5AMP	NC
51	P2-28	CH25A_429_RX_TX_IO	GND	GND	NC
52	P2-32	CH27A_429_RX_TX_IO	AV_IO7_.5AMP	AV_IO7_.5AMP	NC
53	P2-27	CH25B_429_RX_TX_IO	GND	GND	NC
54	P2-31	CH27B_429_RX_TX_IO	AV_IO7_.5AMP	AV_IO7_.5AMP	NC
55	P2-36	CH29A_429_RX_TX_IO	AV_IO9_.5AMP	AV_IO9_.5AMP	NC
56	P2-40	CH31A_429_RX_TX_IO	AV_IO11_.5AMP	AV_IO11_.5AMP	NC
57	P2-35	CH29B_429_RX_TX_IO	AV_IO9_.5AMP	AV_IO9_.5AMP	NC
58	P2-39	CH31B_429_RX_TX_IO	AV_IO11_.5AMP	AV_IO11_.5AMP	NC
59	P2-12	CH17A_429_RX_TX_IO	GND	GND	NC
60	P2-16	CH19A_429_RX_TX_IO	GND	GND	NC
61	P2-11	CH17B_429_RX_TX_IO	GND	GND	NC
62	P2-15	CH19B_429_RX_TX_IO	GND	GND	NC
63	P2-20	CH21A_429_RX_TX_IO	GND	GND	NC
64	P2-23	CH23A_429_RX_TX_IO	GND	GND	NC
65	P2-19	CH21B_429_RX_TX_IO	GND	GND	NC
66	P2-24	CH23B_429_RX_TX_IO	GND	GND	NC
67	P2-8	CH15A_429_RX_TX_IO	GND	GND	NC
68	P1-12	GND	GND	GND	GND
69	P2-7	CH15B_429_RX_TX_IO	GND	GND	NC

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Table 9. DD-40100F/I/T Honda Connector Pinout					
HDRA	**P1/P2**	**DD-40100F360-XXX**	**DD-40100F180-XXX**	**DD-40100F100-XXX**	**DD-40100F060-XXX**
70	P1-41	CH9A_429_RX_TX_IO	CH9A_429_RX_TX_IO	CH9A_429_RX_TX_IO	NC
71	P1-45	CH10A_429_RX_TX_IO	CH10A_429_RX_TX_IO	CH10A_429_RX_TX_IO	NC
72	P1-40	CH9B_429_RX_TX_IO	CH9B_429_RX_TX_IO	CH9B_429_RX_TX_IO	NC
73	P1-44	CH10B_429_RX_TX_IO	CH10B_429_RX_TX_IO	CH10B_429_RX_TX_IO	NC
74	P2-6	CH14A_429_RX_TX_IO	CH14A_429_RX_TX_IO	NC	NC
75	P2-5	CH14B_429_RX_TX_IO	CH14B_429_RX_TX_IO	NC	NC
76	P2-44	CH33A_429_RX_TX_IO	AV_IO13_.5AMP	AV_IO13_.5AMP	NC
77	P2-48	CH35A_429_RX_TX_IO	AV_IO15_.5AMP	AV_IO15_.5AMP	NC
78	P2-43	CH33B_429_RX_TX_IO	AV_IO13_.5AMP	AV_IO13_.5AMP	NC
79	P2-47	CH35B_429_RX_TX_IO	AV_IO15_.5AMP	AV_IO15_.5AMP	NC
80	P1-32	CH5A_429_RX_TX_IO	CH5A_429_RX_TX_IO	CH5A_429_RX_TX_IO	CH5A_429_RX_TX_IO
81	P1-14	GND	GND	GND	GND
82	P1-31	CH5B_429_RX_TX_IO	CH5B_429_RX_TX_IO	CH5B_429_RX_TX_IO	CH5B_429_RX_TX_IO
83	P1-16	GND	GND	GND	GND
84	P1-39	CH6A_429_RX_TX_IO	CH6A_429_RX_TX_IO	CH6A_429_RX_TX_IO	CH6A_429_RX_TX_IO
85	P1-38	CH6B_429_RX_TX_IO	CH6B_429_RX_TX_IO	CH6B_429_RX_TX_IO	CH6B_429_RX_TX_IO
86	P1-28	CH7A_429_RX_TX_IO	CH7A_429_RX_TX_IO	CH7A_429_RX_TX_IO	NC
87	P1-27	CH7B_429_RX_TX_IO	CH7B_429_RX_TX_IO	CH7B_429_RX_TX_IO	NC
88	P1-24	CH1A_429_RX_TX_IO	CH1A_429_RX_TX_IO	CH1A_429_RX_TX_IO	CH1A_429_RX_TX_IO
89	P1-23	CH1B_429_RX_TX_IO	CH1B_429_RX_TX_IO	CH1B_429_RX_TX_IO	CH1B_429_RX_TX_IO
90	P1-29	CH2B_429_RX_TX_IO	CH2B_429_RX_TX_IO	CH2B_429_RX_TX_IO	CH2B_429_RX_TX_IO
91	P1-18	GND	GND	GND	GND
92	P1-26	CH4A_429_RX_TX_IO	CH4A_429_RX_TX_IO	CH4A_429_RX_TX_IO	CH4A_429_RX_TX_IO
93	P1-25	CH4B_429_RX_TX_IO	CH4B_429_RX_TX_IO	CH4B_429_RX_TX_IO	CH4B_429_RX_TX_IO
94	P1-20	GND	GND	GND	GND
95	P1-33	GND	GND	GND	GND
96	P1-49	IRIG_ANA_IN	IRIG_ANA_IN	IRIG_ANA_IN	IRIG_ANA_IN
97	P1-9	AV_IO3_.5AMP	AV_IO3_.5AMP	AV_IO3_.5AMP	NC
98	P1-13	AV_IO4_.5AMP	AV_IO4_.5AMP	AV_IO4_.5AMP	NC
99	P1-11	AV_IO3_.5AMP	AV_IO3_.5AMP	AV_IO3_.5AMP	NC
100	P1-15	AV_IO4_.5AMP	AV_IO4_.5AMP	AV_IO4_.5AMP	NC

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Table 10. DD-40000K Pinout by Channel #										
HDRA	P1/P2	DD-40000K360/180	100	60		HDRA	P1/P2	DD-40000K360	180/100	60
88	P1-24	CH1A_429_RX_TX_IO				9	P2-16	CH19A_429_RX_TX_IO	GND	NC
74	P1-23	CH1B_429_RX_TX_IO				7	P2-15	CH19B_429_RX_TX_IO	GND	NC
25	P1-30	CH2A_429_RX_TX_IO				13	P2-18	CH20A_429_RX_TX_IO	GND	NC
86	P1-29	CH2B_429_RX_TX_IO				11	P2-17	CH20B_429_RX_TX_IO	GND	NC
85	P1-37	CH3A_429_RX_TX_IO				49	P2-20	CH21A_429_RX_TX_IO	GND	NC
73	P1-36	CH3B_429_RX_TX_IO				50	P2-19	CH21B_429_RX_TX_IO	GND	NC
84	P1-26	CH4A_429_RX_TX_IO				91	P2-22	CH22A_429_RX_TX_IO	GND	NC
35	P1-25	CH4B_429_RX_TX_IO				93	P2-21	CH22B_429_RX_TX_IO	GND	NC
32	P1-32	CH5A_429_RX_TX_IO				43	P2-24	CH23A_429_RX_TX_IO	GND	NC
79	P1-31	CH5B_429_RX_TX_IO				42	P2-23	CH23B_429_RX_TX_IO	GND	NC
82	P1-39	CH6A_429_RX_TX_IO				26	P2-26	CH24A_429_RX_TX_IO	GND	NC
81	P1-38	CH6B_429_RX_TX_IO				76	P2-25	CH24B_429_RX_TX_IO	GND	NC
77	P1-28	CH7A_429_RX_TX_IO		NC		18	P2-28	CH25A_429_RX_TX_IO	GND	NC
28	P1-27	CH7B_429_RX_TX_IO		NC		66	P2-27	CH25B_429_RX_TX_IO	GND	NC
29	P1-35	CH8A_429_RX_TX_IO		NC		23	P2-30	CH26A_429_RX_TX_IO	AV_IO6_.5AMP	NC
27	P1-34	CH8B_429_RX_TX_IO		NC		22	P2-29	CH26B_429_RX_TX_IO	AV_IO6_.5AMP	NC
92	P1-41	CH9A_429_RX_TX_IO		NC		41	P2-32	CH27A_429_RX_TX_IO	AV_IO7_.5AMP	NC
90	P1-40	CH9B_429_RX_TX_IO		NC		40	P2-31	CH27B_429_RX_TX_IO	AV_IO7_.5AMP	NC
47	P1-45	CH10A_429_RX_TX_IO		NC		95	P2-34	CH28A_429_RX_TX_IO	AV_IO8_.5AMP	NC
48	P1-44	CH10B_429_RX_TX_IO		NC		96	P2-33	CH28B_429_RX_TX_IO	AV_IO8_.5AMP	NC
16	P1-22	CH11A_429_RX_TX_IO	NC	NC		72	P2-36	CH29A_429_RX_TX_IO	AV_IO9_.5AMP	NC
14	P1-21	CH11B_429_RX_TX_IO	NC	NC		70	P2-35	CH29B_429_RX_TX_IO	AV_IO9_.5AMP	NC
71	P2-2	CH12A_429_RX_TX_IO	NC	NC		39	P2-38	CH30A_429_RX_TX_IO	AV_IO10_.5AMP	NC
68	P2-1	CH12B_429_RX_TX_IO	NC	NC		38	P2-37	CH30B_429_RX_TX_IO	AV_IO10_.5AMP	NC
83	P2-4	CH13A_429_RX_TX_IO	NC	NC		37	P2-40	CH31A_429_RX_TX_IO	AV_IO11_.5AMP	NC
80	P2-3	CH13B_429_RX_TX_IO	NC	NC		36	P2-39	CH31B_429_RX_TX_IO	AV_IO11_.5AMP	NC
89	P2-6	CH14A_429_RX_TX_IO	NC	NC		34	P2-42	CH32A_429_RX_TX_IO	AV_IO12_.5AMP	NC
87	P2-5	CH14B_429_RX_TX_IO	NC	NC		33	P2-41	CH32B_429_RX_TX_IO	AV_IO12_.5AMP	NC
45	P2-8	CH15A_429_RX_TX_IO	GND	NC		97	P2-44	CH33A_429_RX_TX_IO	AV_IO13_.5AMP	NC
94	P2-7	CH15B_429_RX_TX_IO	GND	NC		99	P2-43	CH33B_429_RX_TX_IO	AV_IO13_.5AMP	NC
46	P2-10	CH16A_429_RX_TX_IO	GND	NC		15	P2-46	CH34A_429_RX_TX_IO	AV_IO14_.5AMP	NC
44	P2-9	CH16B_429_RX_TX_IO	GND	NC		65	P2-45	CH34B_429_RX_TX_IO	AV_IO14_.5AMP	NC
100	P2-12	CH17A_429_RX_TX_IO	GND	NC		31	P2-48	CH35A_429_RX_TX_IO	AV_IO15_.5AMP	NC
98	P2-11	CH17B_429_RX_TX_IO	GND	NC		30	P2-47	CH35B_429_RX_TX_IO	AV_IO15_.5AMP	NC
21	P2-14	CH18A_429_RX_TX_IO	GND	NC		75	P2-50	CH36A_429_RX_TX_IO	AV_IO16_.5AMP	NC

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Table 10. DD-40000K Pinout by Channel #										
HDRA	P1/P2	DD-40000K360/180	100	60		HDRA	P1/P2	DD-40000K360	180/100	60
20	P2-13	CH18B_429_RX_TX_IO	GND	NC		24	P2-49	CH36B_429_RX_TX_IO	AV_IO16_.5AMP	NC
17	P1-43	CH1A_717_RX_TX_IO				1	P1-48	IRIG_DIG_IN		
19	P1-42	CH1B_717_RX_TX_IO				63	P1-50	IRIG_DIG_OUT		
6	P1-47	CH2A_717_RX_TX_IO				52	P1-49	IRIG_ANA_IN		
5	P1-46	CH2B_717_RX_TX_IO								
						2	P1-2	GND		
3	P1-1	AV_IO1_.5AMP		NC		8	P1-4	GND		
4	P1-3	AV_IO1_.5AMP		NC		10	P1-6	GND		
62	P1-5	AV_IO2_.5AMP		NC		12	P1-8	GND		
64	P1-7	AV_IO2_.5AMP		NC		59	P1-10	GND		
56	P1-9	AV_IO3_.5AMP		NC		61	P1-12	GND		
58	P1-11	AV_IO3_.5AMP		NC		67	P1-14	GND		
55	P1-13	AV_IO4_.5AMP		NC		69	P1-16	GND		
57	P1-15	AV_IO4_.5AMP		NC		78	P1-18	GND		
51	P1-17	AV_IO5_.5AMP		NC		54	P1-20	GND		
53	P1-19	AV_IO5_.5AMP		NC		60	P1-33	GND		

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Table 11. DD-40100F/I/T Pinout by Channel #										
HDRA	P1/P2	DD-40100F/I/T360/180	100	60		HDRA	P1/P2	DD-40100F/I/T360	180/100	60
88	P1-24	CH1A_429_RX_TX_IO				60	P2-16	CH19A_429_RX_TX_IO	GND	NC
89	P1-23	CH1B_429_RX_TX_IO				62	P2-15	CH19B_429_RX_TX_IO	GND	NC
39	P1-30	CH2A_429_RX_TX_IO				9	P2-18	CH20A_429_RX_TX_IO	GND	NC
90	P1-29	CH2B_429_RX_TX_IO				11	P2-17	CH20B_429_RX_TX_IO	GND	NC
40	P1-37	CH3A_429_RX_TX_IO				63	P2-20	CH21A_429_RX_TX_IO	GND	NC
41	P1-36	CH3B_429_RX_TX_IO				65	P2-19	CH21B_429_RX_TX_IO	GND	NC
92	P1-26	CH4A_429_RX_TX_IO				14	P2-22	CH22A_429_RX_TX_IO	GND	NC
93	P1-25	CH4B_429_RX_TX_IO				16	P2-21	CH22B_429_RX_TX_IO	GND	NC
80	P1-32	CH5A_429_RX_TX_IO				64	P2-24	CH23A_429_RX_TX_IO	GND	NC
82	P1-31	CH5B_429_RX_TX_IO				66	P2-23	CH23B_429_RX_TX_IO	GND	NC
84	P1-39	CH6A_429_RX_TX_IO				17	P2-26	CH24A_429_RX_TX_IO	GND	NC
85	P1-38	CH6B_429_RX_TX_IO				19	P2-25	CH24B_429_RX_TX_IO	GND	NC
86	P1-28	CH7A_429_RX_TX_IO		NC		51	P2-28	CH25A_429_RX_TX_IO	GND	NC
87	P1-27	CH7B_429_RX_TX_IO		NC		53	P2-27	CH25B_429_RX_TX_IO	GND	NC
36	P1-35	CH8A_429_RX_TX_IO		NC		1	P2-30	CH26A_429_RX_TX_IO	AV_IO6_.5AMP	NC
37	P1-34	CH8B_429_RX_TX_IO		NC		3	P2-29	CH26B_429_RX_TX_IO	AV_IO6_.5AMP	NC
70	P1-41	CH9A_429_RX_TX_IO		NC		52	P2-32	CH27A_429_RX_TX_IO	AV_IO7_.5AMP	NC
72	P1-40	CH9B_429_RX_TX_IO		NC		54	P2-31	CH27B_429_RX_TX_IO	AV_IO7_.5AMP	NC
71	P1-45	CH10A_429_RX_TX_IO		NC		2	P2-34	CH28A_429_RX_TX_IO	AV_IO8_.5AMP	NC
73	P1-44	CH10B_429_RX_TX_IO		NC		4	P2-33	CH28B_429_RX_TX_IO	AV_IO8_.5AMP	NC
13	P1-22	CH11A_429_RX_TX_IO	NC	NC		55	P2-36	CH29A_429_RX_TX_IO	AV_IO9_.5AMP	NC
15	P1-21	CH11B_429_RX_TX_IO	NC	NC		57	P2-35	CH29B_429_RX_TX_IO	AV_IO9_.5AMP	NC
21	P2-2	CH12A_429_RX_TX_IO	NC	NC		5	P2-38	CH30A_429_RX_TX_IO	AV_IO10_.5AMP	NC
23	P2-1	CH12B_429_RX_TX_IO	NC	NC		7	P2-37	CH30B_429_RX_TX_IO	AV_IO10_.5AMP	NC
22	P2-4	CH13A_429_RX_TX_IO	NC	NC		56	P2-40	CH31A_429_RX_TX_IO	AV_IO11_.5AMP	NC
24	P2-3	CH13B_429_RX_TX_IO	NC	NC		58	P2-39	CH31B_429_RX_TX_IO	AV_IO11_.5AMP	NC
74	P2-6	CH14A_429_RX_TX_IO	NC	NC		6	P2-42	CH32A_429_RX_TX_IO	AV_IO12_.5AMP	NC
75	P2-5	CH14B_429_RX_TX_IO	NC	NC		8	P2-41	CH32B_429_RX_TX_IO	AV_IO12_.5AMP	NC
67	P2-8	CH15A_429_RX_TX_IO	GND	NC		76	P2-44	CH33A_429_RX_TX_IO	AV_IO13_.5AMP	NC
69	P2-7	CH15B_429_RX_TX_IO	GND	NC		78	P2-43	CH33B_429_RX_TX_IO	AV_IO13_.5AMP	NC
20	P2-10	CH16A_429_RX_TX_IO	GND	NC		26	P2-46	CH34A_429_RX_TX_IO	AV_IO14_.5AMP	NC
18	P2-9	CH16B_429_RX_TX_IO	GND	NC		28	P2-45	CH34B_429_RX_TX_IO	AV_IO14_.5AMP	NC
59	P2-12	CH17A_429_RX_TX_IO	GND	NC		77	P2-48	CH35A_429_RX_TX_IO	AV_IO15_.5AMP	NC
61	P2-11	CH17B_429_RX_TX_IO	GND	NC		79	P2-47	CH35B_429_RX_TX_IO	AV_IO15_.5AMP	NC
10	P2-14	CH18A_429_RX_TX_IO	GND	NC		27	P2-50	CH36A_429_RX_TX_IO	AV_IO16_.5AMP	NC

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Table 11. DD-40100F/I/T Pinout by Channel #										
HDRA	P1/P2	DD-40100F/I/T360/180	100	60		HDRA	P1/P2	DD-40100F/I/T360	180/100	60
12	P2-13	CH18B_429_RX_TX_IO	GND	NC		29	P2-49	CH36B_429_RX_TX_IO	AV_IO16_.5AMP	NC
33	P1-43	CH1A_717_RX_TX_IO				44	P1-48	IRIG_DIG_IN		
31	P1-42	CH1B_717_RX_TX_IO				43	P1-50	IRIG_DIG_OUT		
34	P1-47	CH2A_717_RX_TX_IO				96	P1-49	IRIG_ANA_IN		
32	P1-46	CH2B_717_RX_TX_IO								
						25	P1-2	GND		
49	P1-1	AV_IO1_.5AMP		NC		30	P1-4	GND		
50	P1-3	AV_IO1_.5AMP		NC		35	P1-6	GND		
47	P1-5	AV_IO2_.5AMP		NC		38	P1-8	GND		
48	P1-7	AV_IO2_.5AMP		NC		42	P1-10	GND		
97	P1-9	AV_IO3_.5AMP		NC		68	P1-12	GND		
99	P1-11	AV_IO3_.5AMP		NC		81	P1-14	GND		
98	P1-13	AV_IO4_.5AMP		NC		83	P1-16	GND		
100	P1-15	AV_IO4_.5AMP		NC		91	P1-18	GND		
45	P1-17	AV_IO5_.5AMP		NC		94	P1-20	GND		
46	P1-19	AV_IO5_.5AMP		NC		95	P1-33	GND		

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6 SOFTWARE INSTALLATION

ARINC 429 Multi I/O C SDK software package is included with the ***DD-40x00F/I/T/K*** cards. The DDC software packages are developed to make for shorter design cycles by allowing all hardware functionality to be accessed by user level code.

The following Software packages are available from DDC to operate with this device:

- ***ARINC 429 Multi I/O C SDK*** API Library (***DD-42992Sx***)
- FLASH Utility
- Device Drivers (included in ARINC 429 API package)
- LabView and Labview Real-Time Support Package for MIL-STD-1553 and ARINC-429 (BU-69093)
- dataSims Avionics Data Bus Test and Analysis (BU-69414)

6.1 ARINC 429 Software Overview

The ***DD-42992*** SDK provides the framework for developing applications for DDC's ARINC 429 tester/simulator devices with minimal development time. This software library of functions is used to configure the card for receiving and transmitting data on the bus. The library allows users to develop software for the card without detailed knowledge of the card's architecture.

The software is written so that all low-level accesses to the device are performed through a set of driver modules. All Board Support Package specific functions and processor-specific issues are abstracted in a way to allow easy portability of the SDK to a variety of hardware and/or software.

Table 12. ARINC 429 Software

Part Number	Description	Requirements
DD-42992S0	Software Development Kit and Device Drivers for Windows.	Windows XP/Vista/7
DD-42992S1	Software Development Kit and Device Drivers for Linux	Linux Kernel version 3.x
DD-42992S2	Software Development Kit and Device Drivers for WindRiver VxWorks	WindRiver VxWorks versions 6.x

Note: *For detailed instructions for all ARINC 429 software installation, please refer to the* ***Software User's Manual For ARINC 429 Multi-IO Cards*** *(MN-42992SX-001), available on the DD-42992SX Product Page on the DDC website.*

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6.1.1 Windows XP/Vista/7 (DD-42992S0)

Software installation for the Windows installation is performed by InstallShield®. This install script will make all necessary registry modifications and create the required directory structures. A Windows XP/Vista/7 operating system specific driver is installed along with the high-level C library functions.

6.1.2 Linux (DD-42992S1)

The SDK for Linux includes a Linux specific loadable module driver and source code so that the user can compile it against a specific version of the Linux kernel. The driver was developed and tested with Linux kernel version 3.x.

Installation instructions are included in the ***DD-42992S1*** software package.

6.1.3 VxWorks (*DD-42992S2*)

The SDK for VxWorks is supplied as a single driver/library. Files can be linked to the VxWorks Kernel with a full rebuild of the kernel or it can be built as a downloadable module to be loaded and unloaded by the user.

First extract the ZIP file using an appropriate utility. The extraction of the ZIP file performs the installation of the software, which can then be used with the WindRiver Workbench IDE. The library will be placed in the /lib/modules directory. A script file is provided with the software to handle dynamic loading of the module.

6.1.4 Testing the Installation

Once the hardware and software is installed, the user can test the installation by running one of the sample programs that is shipped with the software. Follow the steps below to test the installation.

6.1.4.1 Testing the ARINC 429 Software Installation

The ***DD-42992S*** software package comes with a loopback test that can be run to make sure the device is set up and that it is communicating properly. The loopback test can be run digitally via the FPGA or externally via a loopback connector.

6.1.5 Troubleshooting the Installation

In most cases the installation will be successful, and the self-test will pass. There are, however, some situations that can cause problems during the installation. The most common are detailed below.

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An error is returned when an attempt is made to run the SELFTEST or any of the other sample programs. This fault is almost always related to an incorrectly assigned device number. Be sure that a device number was correctly assigned through the DDC Card Manager.

If an error is encountered while the device number appears to be correctly assigned, check the operating system resources to verify that the card has been given a valid memory region by the operating system. Errors have sometimes been observed in Windows XP operating systems. The BIOS setting for a PnP operating system is sometimes set to YES, which can cause a problem. This BIOS option was originally created by manufacturers to distinguish between Windows NT and Windows 9x based operating systems. Since Windows XP is an extension of the Windows NT kernel this BIOS option must be set for NO under these operating systems. The operating system, as well as all hardware on your system, will still maintain PnP compatibility; it will not be necessary to manually configure resources for PnP cards.

6.2 Updating the Flash Firmware

Detailed instructions regarding the Flash Firmware upgrade utility and its operation, ***Flash Utility***, can be found on the DDC website at www.ddc-web.com.

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7 ORDERING INFORMATION

DD-40000K XXX R-XL0 (PCI-Express Card)

Operating Temperature:
3L = 0°C to +71°C

I/O Option	# of 429 Ch	# of 717 Ch	Avionics Discrete I/O	IRIG-B In & Out	Voltage Monitoring	Variable Voltage Output
060	6	0	0	✓	0	0
100	10	2	16	✓	8	8
180	18	2	16	✓	8	8
360	36	2	5	✓	8	8

DD-40100X XXX R-XL0 (Front I/O PMC, PCI, & cPCI/PXI Cards)

Operating Temperature:
JL = 0°C to +55°C (PCI & cPCI/PXI Cards)
3L = 0°C to +71°C (Front I/O PMC Card)

I/O Option	# of 429 Ch	# of 717 Ch	Avionics Discrete I/O	IRIG-B In & Out	Voltage Monitoring	Variable Voltage Output
060	6	0	0	✓	0	0
100	10	2	16	✓	8	8
180	18	2	16	✓	8	8
360	36	2	5	✓	8	8

Card Type:
F = Front I/O PMC Card
i = PCI Card
T = cPCI/PXI Card

Included Accessories:

- 1 Mating Connector and Backshell

Optional Cables:

For the DD-40000K version:

- P/N DDC-78149-1

For the DD-40100F/i/T versions:

- P/N: DDC-78149-2

Included Software:

DD-42992SX- ARINC 429 Multi I/O Software Development Kit (SDK)

Operating System:
0 = Windows XP/Vista/7
1 = Linux
2 = VxWorks

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Optional Software:

BU-694X4DS-64VM- ***dataSIMS*** **(Avionics Data Bus Test and Analysis Software)**

BU-69093S0-XX0- **LabVIEW® and LabVIEW® Real-Time Support Package**

DD-42999S0-XX0- **Commercial Avionics Utilities Software Package**

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Product Families

Data Bus | Synchro/Resolver Digital Conversion| Power Controllers | Motor Controllers

DDC is a leader in the development, design, and manufacture of highly reliable and innovative military data bus solutions. DDC's Data Networking Solutions include MIL-STD-1553, ARINC 429, Ethernet and Fibre Channel. Each Interface is supported by a complete line of quality MIL-STD-1553 and ARINC 429 commercial, military, and COTS grade cards and components, as well as software that maintain compatibility between product generations. The Data Bus product line has been field proven for the military, commercial and aerospace markets.

DDC is also a global leader in Synchro/Resolver Solutions. We offer a broad line of Synchro/Resolver instrument-grade cards, including angle position indicators and simulators. Our Synchro/Resolver-to-Digital and Digital-to-Synchro/Resolver microelectronic components are the smallest, most accurate converters, and also serve as the building block for our card-level products. All of our Synchro/Resolver line is supported by software, designed to meet today's COTS/MOTS needs. The Synchro/Resolver line has been field proven for military and industrial applications, including radar, IR, and navigation systems, fire control, flight instrumentation/simulators, motor/motion feedback controls and drivers, and robotic systems.

As the world's largest supplier of Solid-State Power Controllers (SSPCs) and Remote Power Controllers (RPCs), DDC was the first to offer commercial and fully-qualified MIL-PRF-38534 and Class K Space-level screening for these products. DDC's complete line of SSPC and RPC boards and components support real-time digital status reporting and computer control, and are equipped with instant trip, and true I^2T wire protection. The SSPC and RPC product line has been field proven for military markets, and are used in the Bradley fighting vehicles and M1A2 tank.

DDC is the premier manufacturer of hybrid motor drives and controllers for brush, 3-phase brushless, and induction motors operating from 28 Vdc to 270 Vdc requiring up to 18 kilowatts of power. Applications range from aircraft actuators for primary and secondary flight controls, jet or rocket engine thrust vector control, missile flight controls, to pumps, fans, solar arrays and momentum wheel control for space and satellite systems.

Certifications

Data Device Corporation is ISO 9001: 2008 and AS 9100, Rev. C certified.

DDC has also been granted certification by the Defense Logistics Agency (DLA) for manufacturing Class D, G, H, and K hybrid products in accordance with MIL-PRF-38534, as well as ESA and NASA approved.

Industry documents used to support DDC's certifications and Quality system are: AS9001 OEM Certification, MIL-STD-883, ANSI/NCSL Z540-1, IPC-A-610, MIL-STD-202, JESD-22, and J-STD-020.



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ISO 9001:2008, AS9100C:2009-01
EN9100:2009, JIS Q9100:2009
FILE NO. 10001296 ASH09



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DDC is the world leader in the design and manufacture of high reliability data interface products, motion control, and solid-state power controllers for aerospace, defense, and industrial automation.

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