Compact Avionics Interface Computer

Hardware Manual

Model: BU-67125W

ETHERNET
MIL-STD-1553
ARINC 429/717
CANbus
Motion Control
Power Control
Expansion I/O

intel inside

ACEXTREME®

DDC's Compact Avionics Interface Computer (C-AIC) offers a completely customizable, off-the-shelf solution, that can be optimized for specific application requirements. The C-AIC combines best-in-class performance from Intel's embedded computing architecture, with DDC's avionics data networking expertise and custom I/O capabilities, to deliver unmatched avionics connectivity computing in a small, deployable, rugged enclosure.

Applications

- Military Aerospace
  - Fixed Wing
  - Rotary
- UAVs
- Commercial Aerospace
  - Fixed Wing
  - Rotary
- Ground Vehicles

Need a Custom Solution? DDC can customize designs for all controllers, ranging from simple modifications of standard products to fully customized solutions for commercial, military, aerospace, and industrial applications.

For more information: www.ddc-web.com/BU-67125W

DDC's Data Networking Solutions

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

As the leading global supplier of data bus components, boards, modules, computers, and software solutions for the military and commercial 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 the platform. 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 bus solutions fulfill the expanse of military, civil aerospace, and space 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 commercial 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, the world leader in MIL-STD-1553 technology, provides the broadest selection of quality MIL-STD-1553 rugged embedded and lab grade computers, boards 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 almost every aircraft, helicopter, unmanned vehicle, missile programs, and space system that utilizes MIL-STD-1553.

ARINC 429

DDC has a wide assortment of quality ARINC 429 embedded and lab grade boards, LRUs, and components, to serve 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 commercial 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 convenient solutions to convert MIL-STD-1553, ARINC 429, and Ethernet protocol in any direction, in real-time, without a host computer, enabling seamless and cost saving multi-protocol connectivity for test and embedded applications.

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).

Form Factors, Software, & Drivers

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.

BU-67125W
COMPACT AVIONICS INTERFACE COMPUTER
HARDWARE MANUAL

MN-67125W-001

105 Wilbur Place
Bohemia, New York 11716-2426
Tel: (631) 567-5600, Fax: (631) 567-7358
World Wide Web - http://www.ddc-web.com

For Technical Support - 1-800-DDC-5757 ext. 7771
United Kingdom - Tel: +44-(0)1635-811140, Fax: +44-(0)1635-32264
France - Tel: +33-(0)1-41-16-3424, Fax: +33-(0)1-41-16-3425
Germany Tel: +49-(0)89-15 00 12-11, Fax: +49-(0)89-15 00 12-22
Japan - Tel: +81-(0)3-3814-7688, Fax: +81-(0)3-3814-7689
Asia - Tel: +65-6489-4801
India - Tel: +91 080 301 10 200

Revision	Date	Pages	Description
Rev A	6/2017	All	Initial Release

1 PREFACE 1
1.1 Text Usage 1
1.2 Standard Definitions 1
1.3 Special Handling and Cautions 1
1.4 Trademarks 1
1.5 What is included in this manual? 2
1.6 Technical Support 2

2 OVERVIEW 3
2.1 Features 4
2.2 Top-Level Block Diagram 6
2.3 System Requirements 8
2.4 Applications 8
2.5 Configuration Options 8

3 DESIGN & SPECIFICATIONS 9
3.1 Qualification testing 12
3.2 Power 12
3.3 Specifications 14
3.4 Cooling 15
3.5 Mounting 15

4 MODES AND OPERATION 16
4.1 Standalone Mode 16
4.2 Remote Access Mode 17
4.3 Protocol Conversion Mode 19

5 START UP 20

6 DETAILED ARCHITECTURE 21
6.1 C-AIC Main board 21
6.2 USB Interfaces 22
6.3 Ethernet Interfaces 22
6.4 DVI & Serial Interfaces 22
6.5 HD Audio 22
6.6 Storage 23
6.7 Front Panel LEDs 23
6.8 TX Inhibit & BC Disable 25

7 SOFTWARE 26
7.1 OS Restore USB Flash Drive 26

8 CONNECTORS AND PINOUTS 27
8.1 Introduction to the I/O Connectors 27

8.2 Signal Lists....28
8.3 Connector Pinouts....31
8.4 Mating Connectors....35

9 BREAKOUT CABLE ASSEMBLIES....37
9.1 Cable Assemblies Signal List....37
9.2 P1 - Power Cable Assembly....38
9.3 P2 - Avionics Cable Assembly....39
9.4 P3 - Computer Interfaces Cable Assembly....45

10 ORDERING INFORMATION....49

Figure 1. Compact Avionics Interface Computer Block Diagram 7
Figure 2. BU-67125Wx Compact Avionics Interface Computer 9
Figure 3. BU-67125Wx Base Model Mechanical Outline 10
Figure 4. BU-67125Wx Mechanical Outline with Mounting options 11
Figure 5. Example of C-AIC Used in Standalone Mode 16
Figure 6. Example of C-AIC Used in Remote Access Mode 18
Figure 7. Example of C-AIC Used in Protocol Conversion Mode 19
Figure 8. Front Panel LED Colors 24
Figure 9. BU-67125WX Front Panel Connectors 27
Figure 10. BU-67125WX Rear View 28
Figure 11. C-AIC J1 7-Pin Military Type Circular Connector 32
Figure 12. C-AIC J2 85-Pin Military Type Circular Connector 32
Figure 13. C-AIC J3 85-Pin Military Type Circular Connector 34
Figure 14. C-AIC J1 Mating Connector 35
Figure 15. C-AIC J2 Mating Connector 35
Figure 16. C-AIC J3 Mating Connector 36
Figure 17. P1 – Power Cable Assembly DDC-81249-1 39
Figure 18. P2 – Avionics Cable Assembly DDC-81253-1 40
Figure 19. P3 – Computer Interfaces Cable Assembly DDC-81251-1 45

Table 1. Qualification Specifications 12
Table 2. BU-67125Wx Specification Table 14
Table 3. Location of installed DDC cards 21
Table 4. Front Panel LED Description 23
Table 5. C-AIC Signal List 28
Table 6. J1 – Power Cable 32
Table 7. J2 - AIC Avionics Connector Pinout 33
Table 8. J3 - AIC Computer Connector Pinout 34
Table 9. Cable Assembly Part Numbers 37
Table 10. Signal Descriptions 37
Table 11. P1 Power Cable – DDC-81249-1 39
Table 12. P2 – J4 1553 Control Signals 41
Table 13. P2 - J1 ARINC 429/717 42
Table 14. P2 - J2 ARINC 429/717 43
Table 15. P2 – J3 GPIO / AVIO 43
Table 16. P3 – J1 GPIO 46
Table 17. P3 – J2 Serial I/O 46
Table 18. P3 – J3 Serial I/O 47
Table 19. P3 – J4 Serial I/O 47
Table 20. P3 – J5 Serial I/O 47

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.
- Courier New–indicates code examples.
- <…> - indicates user-entered text or commands.

1.2 Standard Definitions

PMC	PCI Mezzanine Card
Mini PCI-e	Small form factor Peripheral Component Interconnect Express
COMe	Computer On Module Express, computer module
SMBus	System Management Bus
GPIO	General Purpose Input / Output

1.3 Special Handling and Cautions

The BU-67125Wx 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.

It is recommended to power off the device safely by using the proper commands to shutdown the Operating System, then turning off power to the device.

1.4 Trademarks

All trademarks are the property of their respective owners.

1.5 What is included in this manual?

This manual contains a complete description of the Compact Avionic Interface Computer's functionality and usage.

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.

2 OVERVIEW

The BU-67125Wx is DDC's Compact Avionics Interface Computer (C-AIC). The BU-67125Wx is a fully enclosed rugged computer system based on the Computers on Modules, COMe type 10 processor module.

The product is targeted at various applications in the following markets: the military, aerospace and commercial avionics.

The C-AIC's generic Fedora 20 Linux OS allows for use with DDC cards as well as 3rd party cards. Contact Factory for more information about additional operating systems.

The BU-67125Wx operates is a conduction cooled box with a temperature range of -40°C to +71° C. Conduction cooling is done through the bottom of the enclosure.

The C-AIC is available with two 10/100/1000 Ethernet channels, three USB 2.0 ports, four RS-232/422 ports, one DVI port, and eight GPIO / AVIO. Further, there are many options for MIL-STD-1553 and ARINC 429 configurations and more.

The C-AIC also offers the ability to use an expansion module for more than the standard IO offered. The want for this expansion module will require a customer to contact the Factory. It will also require a slight re-design of the standard chassis to accommodate the physical dimensions of the expansion board as well as any extra IO connectors on the front plate.

The expansion module is wired with a PCI-e lane which will allow for features such as a Mini PCI-e slot or a SATA connector to be available for use.

See Ordering Information for more details. Contact the factory with custom requirements that is not seen on the ordering information tables.

The C-AIC offers a high degree of flexibility, and is therefore suitable for a wide range of applications. The C-AIC includes a Remote Access Mode, in addition to the Protocol Conversion Mode and Stand Alone Mode. For use in conjunction with Remote Access mode, DDC also offers multiple interactive GUI software programs.

Standalone mode allows a user to operate the C-AIC as a user programmable computer system. Software Development Kits (SDKs) are provided for MIL-STD-1553 and ARINC 429 to facilitate the development of applications requiring communication on these avionics I/Os. Onboard video and USB ports can also be utilized to further enhance Standalone mode. The user will not need to depend on a host PC.

In Protocol Conversion Mode, the C-AIC is configured to provide autonomous communication from any input channel(s) to any other channel(s). To minimize setup time and provide turnkey operation, the C-AIC includes a high-level protocol conversion API. Alternatively, users may develop their own conversion applications by means of DDC's AceXtreme MIL-STD-1553 and/or ARINC 429 APIs, along with Linux TCP/IP and UDP/IP socket interfaces for the C-AIC's Ethernet channel.

In Remote Access Mode, users are able to develop applications running on a remote computer communicating over Ethernet to the C-AIC's MIL-STD-1553 and/or ARINC 429 channels. In the remote access configuration, the user is able to write applications running on a remote host invoking the AceXtreme MIL-STD-1553 and/or ARINC 429 APIs. As an alternative to developing application software, in Remote Access Mode, the user is able to operate the C-AIC using any of DDC's GUI software programs. These include:

- **BusTrACEr**, a simple menu program for generating and monitoring MIL-STD-1553 messages. Further, BusTrACEr includes an option for the automatic generation of ANSI 'C' source code.
- ***dataSIMS*,** a software GUI tool for test and simulation applications. *dataSIMS* converts data to engineering units, allows the creation of graphical display formats, and may be used for either passive monitoring and/or simulation.
- **LabVIEW® and LabVIEW® Real-Time Support**. The BU-69093S0-XX0 software operates in conjunction with National Instruments' LabVIEW® or LabVIEW® Real-Time system design software to provide a simple interface and easy programming of the C-AIC's MIL-STD-1553 and/or ARINC 429 interfaces. Users can either create their own custom interfaces "from scratch" or may modify the samples that are provided.
- **Commercial Avionics Utilities Software Package.** The DD-42999S0-XX0 **Data Bus Analyzer and Data Loader GUI software** is for ARINC 429 data bus analysis and simulation. This GUI provides advanced filtering, message scheduling, and triggering. In addition, it includes a graphical ARINC 615 data loader, providing a software interface to load data to and from airborne computers.

2.1 Features

General

- Bridging Ethernet, MIL-STD-1553, and ARINC 429
- Computer
  - Intel® Atom™ E3845 Quad Core 1.91GHz Processor
  - 4GB DDR3L SDRAM
  - 120 GByte SSD (Contact factory for additional sizes)

  - 10/100/1000 Base-T Ethernet, USB 2.0, RS-232/422
  - Rugged Enclosure, Mountable Chassis
  - 2 Mini-PCIe Slots
  - Avionics & Discrete I/O
  - 2x Software configurable LED's
- Mini-PCIe Modules Support a Range of Avionics Interfaces
  - MIL-STD-1553
  - ARINC 429
  - ARINC 717
  - IRIG B
- Three Modes of Operation, Using DDC's Hardware and Software
  1. **Standalone Mode** Allows the C-AIC to Operate as a User Programmable Computer System
  2. **Remote Access Mode** Uses Ethernet as a Virtual Backplane Between Applications Running on a Host Computer and 1553/429 Interfaces Located Within the C-AIC, Eliminating the Need and Cost of Long Cabling to Onboard 1553/429 Connections from the Test Lab
  3. **Protocol Conversion Mode** Uses Bridging SDK, Which Allows Users to Easily Create Embedded Software on the C-AIC that will Autonomously Forward Data Between MIL-STD-1553, ARINC 429, and Ethernet Interfaces

Software

- Fedora 20 32-bit Linux Operating System and BSP
  - Ethernet Stacks, with UDP/IP and TCP/IP Sockets, Telnet, FTP, TFTP, SSH, and HCTP.
- DDC Protocol Conversion API, Providing Turnkey Conversion From Any Ethernet, 1553, or ARINC 429 Port to Any Other Port(s)
- DDC AceXtreme MIL-STD-1553 API, Including Sample Programs
- DDC ARINC 429 API, Including Sample Programs
- Configurable GPIO
- Configurable Watchdog timer
- Built-in Editor, Allowing Editing and Saving Files Over Telnet
- Built-in 'C' Compiler
- Can transfer internal files to a host computer, edit remotely, and transfer files back to the C-AIC before compiling.

2.2 Top-Level Block Diagram

Figure 1. is the top-level functional block diagram of the Compact Avionics Interface Computer (C-AIC). The C-AIC's CPU, an Intel E3845 Atom processor, mounted on a COM Express (COMe) Module, interfaces through a PCI Express Switch that routes PCI-e interfaces to the C-AIC's other major functional blocks for Mini PCI-e site connections, etc.

One 1x PCIe interface services the C-AIC's Mini PCI-e Site A. While a second PCIe link interfaces the other Mini PCI-e Site. PCI-e lanes are also used in bringing Serial and Ethernet signals to the front panel. A third PCI Express interface connects between the COMe module and the optional expansion connector which can be used for additional IO. Other interfaces from the COMe module include the SMBus for the onboard GPIOs. Two USB interfaces for the USB 2.0 ports. An onboard M.2 Solid State Disk has a link via SATA from the COMe module. Video is also available through the DVI-D connector on the break out cable.

The Expansion connector, in red, pictured in Figure 1. is an optional feature where additional or custom IO can be added to the device.

Depending on the type of IO selected the device weight and size may grow in order to accommodate the design.

Contact the DDC factory or your local sales representative for more information.

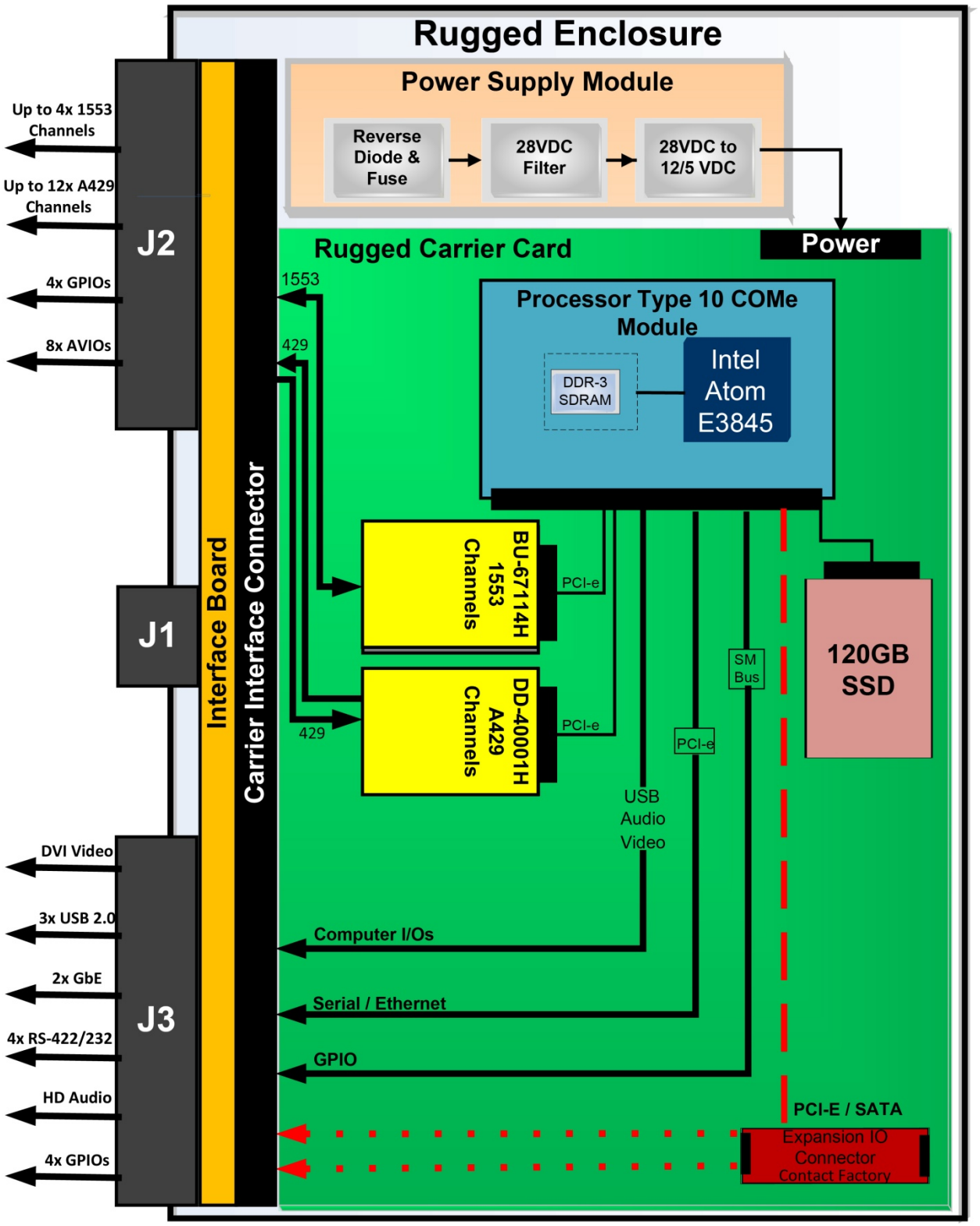


Figure 1. Compact Avionics Interface Computer Block Diagram

2.3 System Requirements

2.3.1 System Requirements for Protocol Conversion Mode

- Remote computer with Ethernet interface and Telnet.

2.3.2 System Requirements for Remote Access Mode

- Remote computer with Ethernet interface.
- Windows XP, Windows Vista 32/64-bit, Windows 7 32/64-bit, Windows 8 32/64-bit, Windows 10 32/64-bit, Linux, or VxWorks Operating System
    - Workbench software development environment for VxWorks platforms
- An appropriate compiler or development environment.
- Contact factory for additional operating systems

2.4 Applications

The BU-67125Wx rugged module is a valuable tool for embedded system teams involved with MIL-STD-1553, ARINC 429 interfaces, etc.. The Compact Avionics Interface Computer is the ideal solution for any application requiring an Ethernet-to-MIL-STD-1553 and/or ARINC 429 interface in an rugged environment.

The design of the ***Compact Avionics Interface Computer*** leverages the full capabilities of DDC's AceXtreme MIL-STD-1553 Architecture. Features include a highly autonomous BC with expanded instruction set, an RT or Multi-RT providing a wide variety of buffering options, a selective message monitor, IRIG-B time code input, and a 48-bit, 100 ns resolution Time Tag. Each AceXtreme channel contains up to 1 MB of RAM.

2.5 Configuration Options

- Base P/N: BU-67125W000R-C00
    - R = RoHS
- Mechanical/Environmental Options:
    - BU-67125W000R-C00 rugged box, RoHS only.

Note: Contact the Factory for more channel configurations that aren't listed in the Ordering Information.

3 DESIGN & SPECIFICATIONS

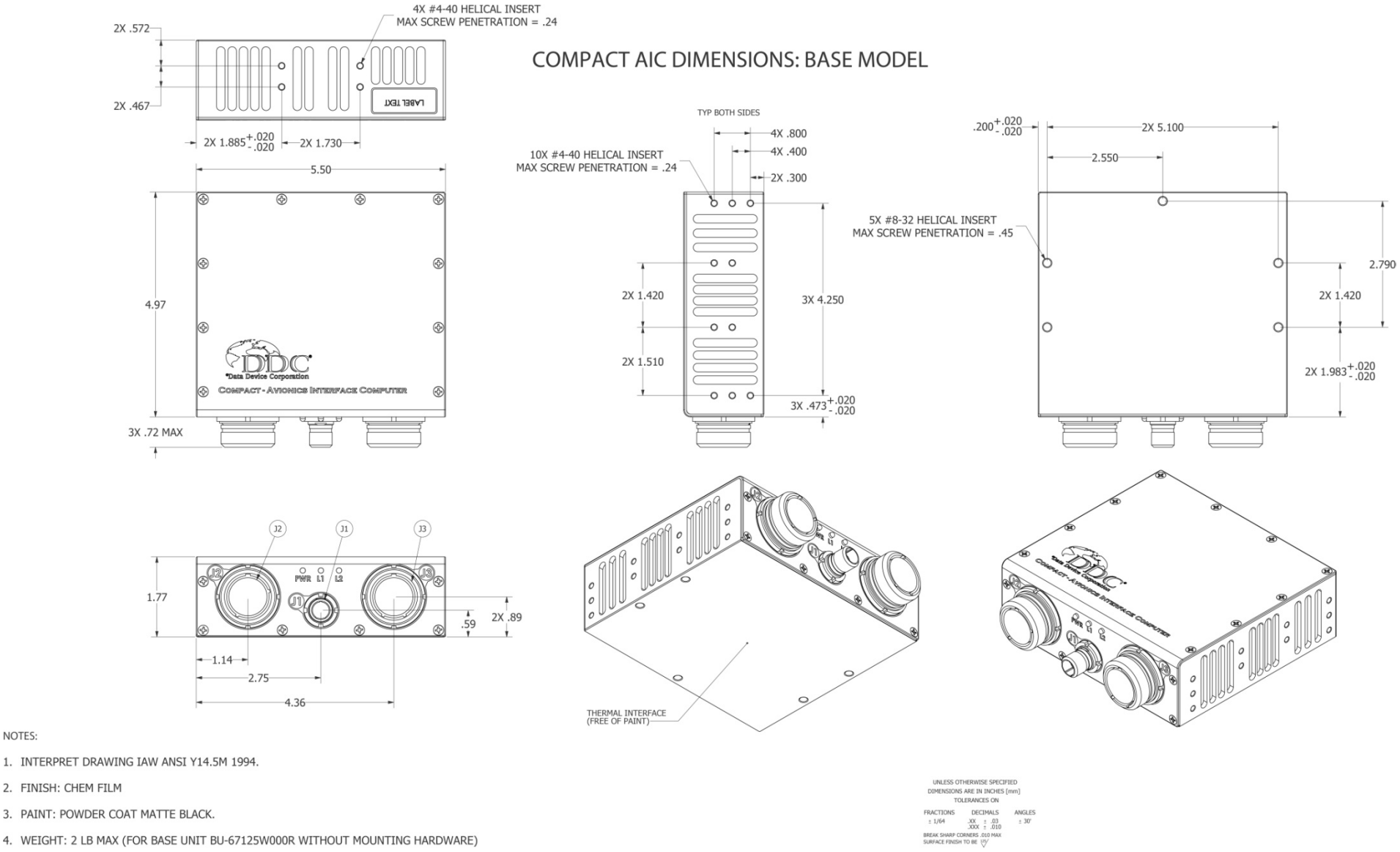
The BU-67125Wx ruggedized chassis (Figure 2) is intended for applications operating in a rugged embedded environment.

The C-AIC includes a mounting option as shown below. See more information about mounting in Section 3.5. Please contact factory if a more specific or custom mounting option is desired.

Front view

Rear view

Figure 2. BU-67125Wx Compact Avionics Interface Computer



NOTES:

1. INTERPRET DRAWING IAW ANSI Y14.5M 1994.
2. FINISH: CHEM FILM
3. PAINT: POWDER COAT MATTE BLACK.
4. WEIGHT: 2 LB MAX (FOR BASE UNIT BU-67125W000R WITHOUT MOUNTING HARDWARE)

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES [mm]
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS .XX ± .03 .XXX ± .010 ANGLES ± 30'
BREAK SHARP CORNERS .010 MAX
SURFACE FINISH TO BE

Figure 3. BU-67125Wx Base Model Mechanical Outline

MOUNTING HARDWARE DIMENSIONS: TYPE 1

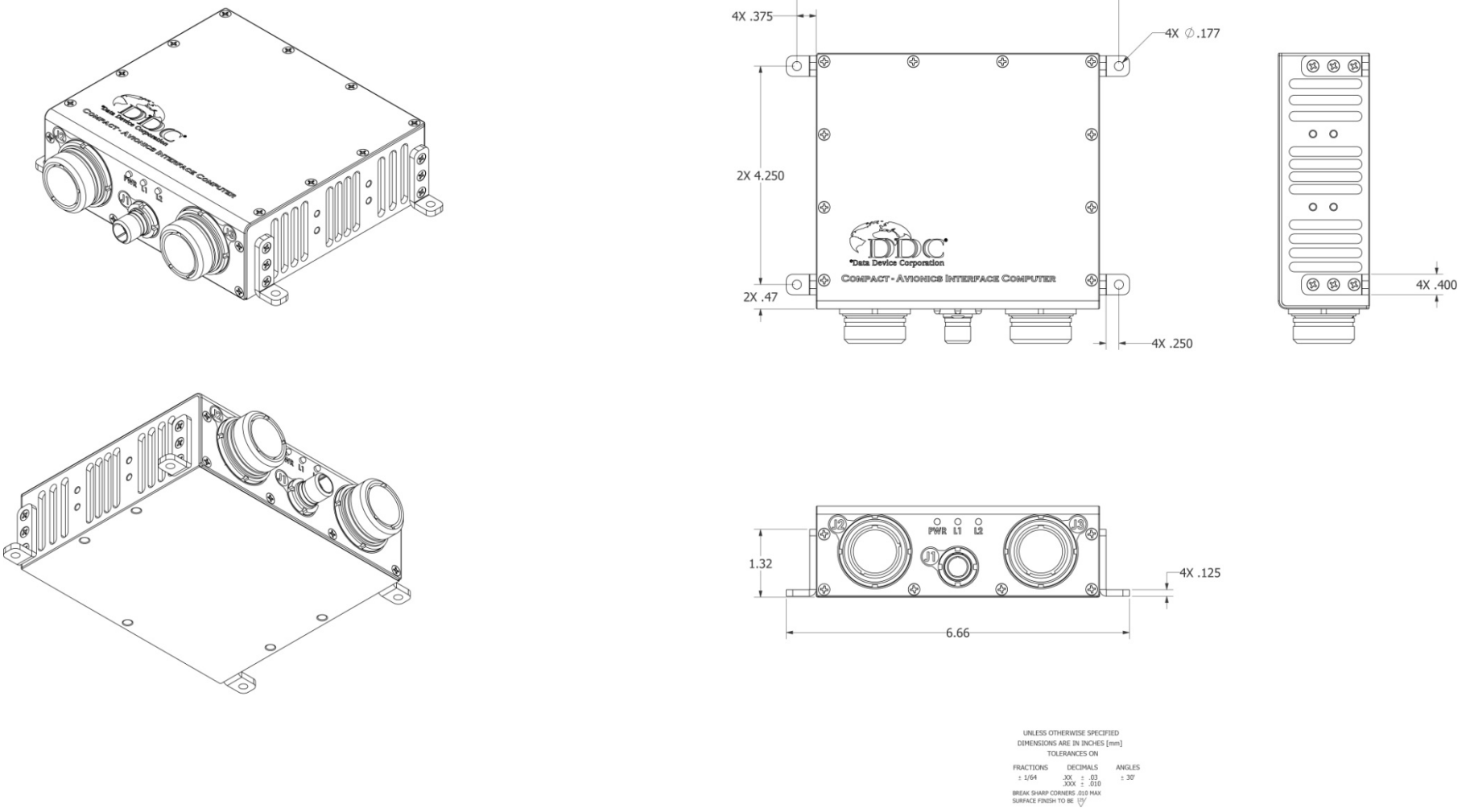


Figure 4. BU-67125Wx Mechanical Outline with Mounting options

3.1 Qualification testing

Table 1. Qualification Specifications		
Test	**Test Reference**	**Details**
Temperature and Altitude	RTCA DO-160G section 4, Category A1	Temperature range: -15° to 70° C Short Operating Temp: -40° to 70° C (2 Hours) Absolute Pressure: 57.18kPa
Temperature Variation	RTCA DO-160G section 5, Category C	
Humidity/Temperature Test	RTCA DO-160G section 6, Category A	95% non-condensing, post Humidity ATP to be performed within 1 hour of completion of test
Operational Shock (no crash safety)	RTCA DO-160G section 7, Condition A	
Vibration	RTCA DO-160G section 8, Category S	
Input Power	MIL-STD-1275E, MIL-STD-704F	
EMI	MIL-STD-461E,	CE102, CS101, CS114, CS115, CS116, RE102, and RS103 for land environments
EMI	RTCA DO-160G, Section 20-B, 21-B	

The BU-67125Wx is also CE compliant.

3.2 Power

The BU-67125WX Compact Avionics Interface Computer is powered by 28 VDC from an external power source. The C-AIC is in compliance with MIL-STD-1275E and MIL-STD-704F.

Additional power specifications can be seen below in Table 2.

See Section 9.2 for notes when using the P1, DDC-81249-1 cable assembly to power the C-AIC.

When using the DDC break out cable assembly, as mentioned in Section 9.2, DDC has tested the C-AIC with a lab grade bench power supply.

The tested power supply information is as follows:

Volteq HY3006D Regulated Linear DC power supply.

Adjustable outputs: 0-30V and 0-6A.

Coarse and fine controls for both current and voltage outputs.

3.3 Specifications

Table 2. BU-67125Wx Specification Table

PARAMETER	MIN	TYP	MAX	UNITS
ABSOLUTE MAXIMUM RATINGS				
DC Power Input	18	24-28	32	VDC
POWER SUPPLY REQUIREMENTS (NOTE 8)				
Direct DC Power Input				
• Input Voltage	-	24-28	-	V
GPIO SPECIFICATIONS				
V_{in}	-0.5		5.5	V
V_{IH}	2.0			
V_{IL}			.9	V
I_{OH}			10	mA
I_{OL}			-20	mA
AVIONICS I/O SPECIFICATIONS:				
V_{in}	-0.5		35	V
V_{IH}	3.5			
V_{IL}			0.8	V
I_{OH}			Note 1	
I_{OL}			- 500	mA
PHYSICAL CHARACTERISTICS				
Size				
• *BU-67125W000R-C00* *(does not include connector or mounting protrusions.)*	5.5 x 5.0 x 1.75 (139.7 x 127.0 x 44.4)			in. (mm)
Weight				
• *BU-67125W000R-C00* *(base model, no Mini PCI-e cards installed)*	<32.0 (<907.1)			oz. (g)

Note 1: Value determined by user pull-up resistor. Default recommendation, if used as input, is 10K to 28V.

3.4 Cooling

No external cooling is required. The box is optimized for thermal transfer through the bottom. Thermal conditions such as mounting surface heat dissipation and clearance from other heat sources should be considered in choosing a location and mounting the equipment.

3.5 Mounting

Mount the Compact Avionics Interface Computer (C-AIC) to a thermally and electrically conductive well-grounded surface at the selected location. Avoid mounting near heat ducts and other sources of high heat. Leave at least 3 inches for removal of connectors. Ensure that mounting hardware is accessible for removal.

Data Device Corporation supplies a default style of mounting hardware pre-installed on most variants of the C-AIC. In addition to this there are many additional mounting points as identified in the outline drawing. Make sure the correct size fasteners are used and that bolt penetration does not exceed maximum depths identified in the outline drawing.

All mounting points are free-running threads so it is advised that thread locking adhesive is used as necessary to meet vibration and shock requirements. For more information on mounting types, please contact Data Device Corporation's Technical Support (See Section 1.6).

4 MODES AND OPERATION

The C-AIC includes basic modes of operation, Protocol Conversion Mode, Remote Access Mode, and Stand Alone Mode.

4.1 Standalone Mode

Standalone mode allows the C-AIC to operate as a user programmable computer system. Software Development Kits (SDKs) are provided for MIL-STD-1553 and ARINC 429 to facilitate the development of applications requiring communication on these avionics I/Os. Onboard video, and USB ports can also be utilized to further enhance Standalone mode. The user will not need to depend on a host PC.

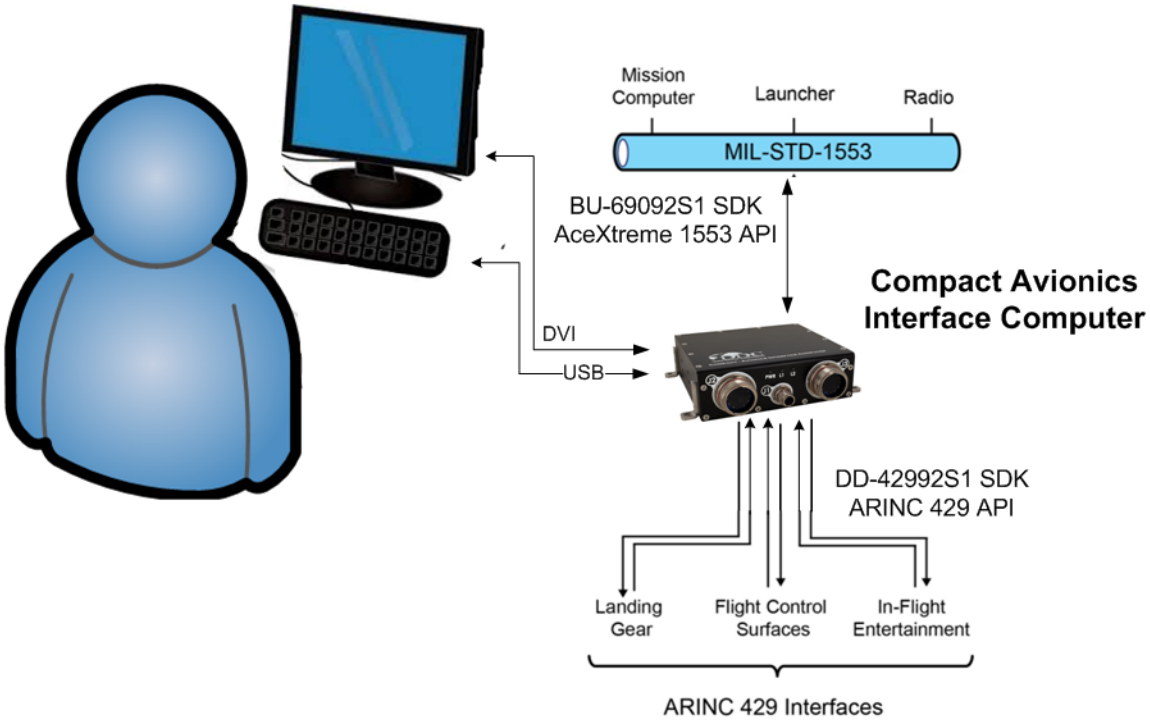


Figure 5. Example of C-AIC Used in Standalone Mode

4.2 Remote Access Mode

Remote Access Mode is a capability of the Compact Avionics Interface Computer.

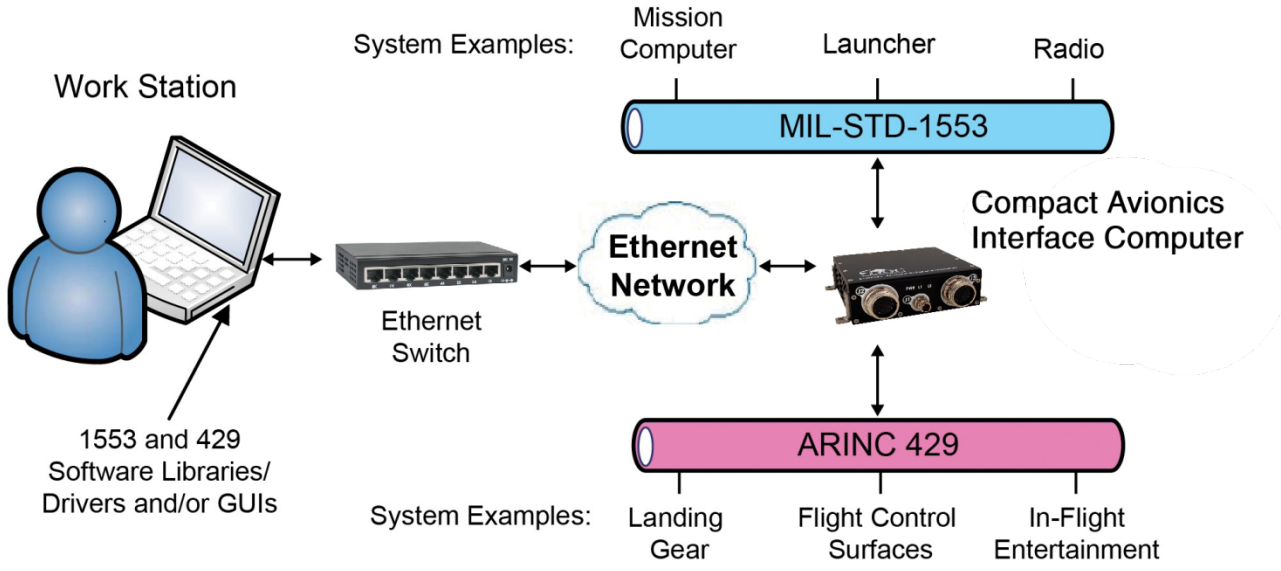


Figure 6. Example of C-AIC Used in Remote Access Mode

Figure 6 shows an example of the Compact Avionics Interface Computer operating in Remote Access Mode. In Remote Access Mode, users are able to develop applications running on a remote computer that communicates over Ethernet to the C-AIC's MIL-STD-1553 and/or ARINC 429 channels. In the remote access configuration, the user is able to write applications running on a remote host that invoke the AceXtreme MIL-STD-1553 and/or ARINC 429 APIs. For use in Remote Access Mode, DDC offers AceXtreme software drivers for Windows XP, Vista, 7,8, and 10; Linux kernel version 2.6.x and 3.x.x; and Wind River VxWorks versions 6.x.

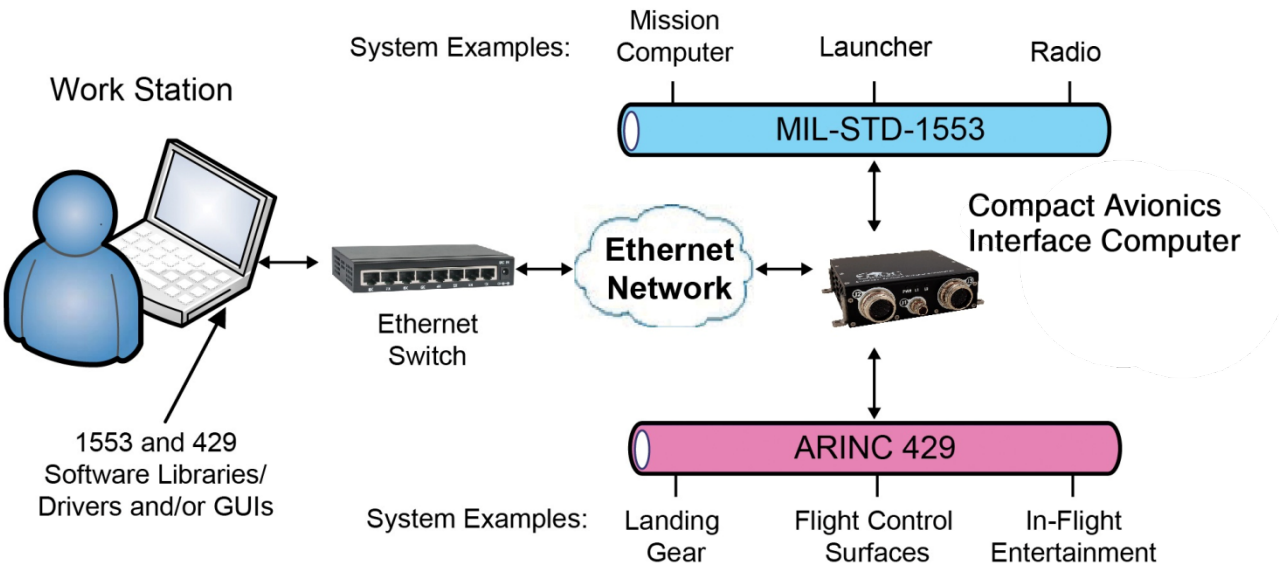


Figure 6. Example of C-AIC Used in Remote Access Mode

4.2.1 Optional Software Tools – BusTrACEr, *dataSIMS*, etc.

For the Remote Access Mode, as an alternative to developing application software, the user may operate the C-AIC using any of DDC's GUI software programs. These include:

- **BusTrACEr.** The BU-69066S0-XX0 BusTrACEr allows a user to generate and monitor MIL-STD-1553 messages. It allows rapid creation and setup of custom applications and includes an option for the automatic generation of ANSI 'C' source code.
- ***dataSIMS*.** The BU-694X4DS-64VM *dataSIMS* is a software GUI tool for accelerating software development for test and simulation applications. It includes capability to display data in a variety of graphical formats, and may be used for either passive monitoring, or both monitoring and simulation of real time systems with MIL-STD-1553 and/or ARINC 429 interfaces.
- **LabVIEW® and LabVIEW® Real-Time Support**. The BU-69093S0-XX0 software operates in conjunction with National Instruments' LabVIEW® or LabVIEW® Real-Time system design software to provide a simple interface and easy programming of the C-AIC's MIL-STD-1553 and/or ARINC 429 interfaces. Users can either create their own custom interfaces "from scratch" or may modify the samples that are provided.
- **Commercial Avionics Utilities Software Package.** The DD-42999S0-XX0 Data Bus Analyzer and Data Loader GUI software is for ARINC 429 data bus analysis and simulation. This GUI provides advanced filtering, message

scheduling and triggering. In addition, it includes a graphical ARINC 615 data loader, providing a software interface to load data to and from airborne computers.

4.3 Protocol Conversion Mode

Figure 7 shows an example of the Compact Avionics Interface Computer operating in its Protocol Conversion Mode. In its Protocol Conversion Mode, the C-AIC may be configured to provide autonomous communication conversion between any channel and any other channel(s). To minimize setup time and provide more “turnkey” operation, the C-AIC includes a high-level protocol conversion API. Alternatively, users may develop their own protocol conversion applications invoking DDC’s AceXtreme MIL-STD-1553 and/or ARINC 429 APIs, along with the Linux socket interfaces for the Ethernet channel.

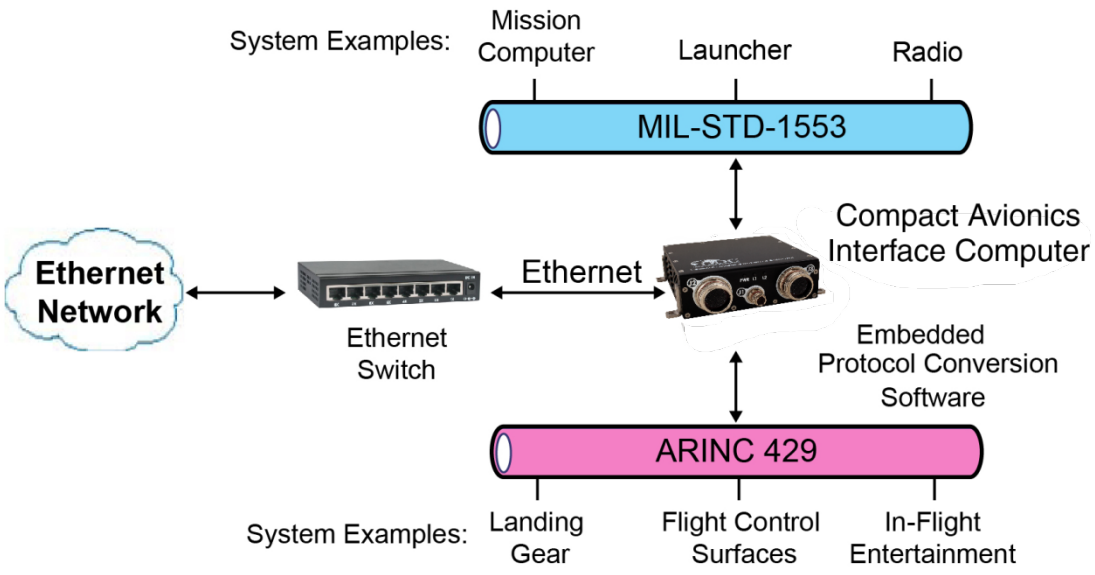


Figure 7. Example of C-AIC Used in Protocol Conversion Mode

5 START UP

See the BU-69094SX-003 Software manual.

6 DETAILED ARCHITECTURE

If using DDC cards for databus communication, additional details for the ARINC 429 and MIL-STD-1553 portions can be found in the hardware manuals for the cards installed in the C-AIC.

If a standard C-AIC variant is ordered, the BU-67114H200 and DD-40001H060 Mini PCI-e cards will be used for MIL-STD-1553 and ARINC 429 communication.

The DDC card's manuals can be found on the DDC website at www.ddc-web.com.

6.1 C-AIC Main board

The C-AIC main board is a DDC custom carrier card. This supports a COMe Type 10 processor module with four gigabytes of RAM. It utilizes an Intel Atom E3845 Quad core 1.91 GHz. Processor. As noted in previous sections, it also supports a M.2 solid state drive as well as two Mini PCI-e slots.

The table below describes where DDC installs the Mini PCI-e cards inside the enclosure.

See ordering options for what the variants contain.

Table 3. Location of installed DDC cards

C-AIC variants	Mini PCI-e Slots	
BU-67125W x x x	Slot A	Slot B
W000	-	-
W001	X	-
W002	-	X
W003	X	X
W004*	-*	-*
W005	X	X
W006	X	-
W007	X	X
W008	X	X

** The W004 variant contains an expansion board that does not allow the use of Mini PCI-e cards*

'-' = no card installed

'X' = card installed in Mini PCI-e slot

6.2 USB Interfaces

The C-AIC include two USB 2.0 ports. The C-AIC follows the USB standard for 2.0 ports. This means that they are backwards compatible to USB 1.1/1.0. The C-AIC will recognize most generic Keyboards and Mice. Transfer speeds follow the USB standard. USB 3.0 signals are available on the motherboard, but are not broken out to the Front Panel connectors due to the need of a high speed connector.

If USB 3.0 is needed, please contact the factory for details.

6.3 Ethernet Interfaces

The C-AIC includes one Ethernet interface. The Ethernet interface is capable of operating over 10 BASE-T, 100 BASE-T, or 1000 BASE-T physical layers, with auto-negotiation capability. The Linux stack running on the C-AIC's Atom processor supports TCP/IP and UDP/IP protocols.

6.4 DVI & Serial Interfaces

The C-AIC has DVI signals and RS-232/422 Serial port signals routed to the front panel. These signals are cabled out on the standard break out cable assemblies sold by DDC. The DVI connector follows the video standard. Both interfaces can be used to view command prompts of the C-AIC.

The Serial ports are labeled 0-3.

Ports 0 and 1 are part of an EXAR chip, and support BAUD rates up to 31.25 Mb/s.

Ports 2 and 3 are part of a legacy 16540 chip where up to 9600 b/s BAUD rate is supported.

6.5 HD Audio

The C-AIC implements an HD Audio codec.

This codec supports the following interfaces:

- 1x Stereo Line output
- 1x Headphone output
- 1x Stereo Line input
- 1x Stereo Microphone input

6.6 Storage

The C-AIC utilizes an M.2 form factor SATA Solid-State Drive.

The default size is 120GB. Contact factory for additional sizes.

There are no provisions designed into the C-AIC for storage sanitization.

Removing the hard drive would void the warranty.

It's possible for a customer to implement a software solution according to DoD 5220.22-M

6.7 Front Panel LEDs

The C-AIC has three LEDs on the front panel for power and status.

Two of the three front facing LEDs can be configured by the user via software.

Please see the software manual for details on how to configure the LEDS.

The LED's color and function are as follows:

Table 4. Front Panel LED Description

Front Panel LED	Color	Function
PWR	Green	Solid on when power is applied
L1	Amber/Yellow	Software configurable
L2	Red	Software configurable

Figure 8. Front Panel LED Colors

6.8 TX Inhibit & BC Disable

The Tx Inhibit and BC disable features are commonly used in the 1553 applications when a user needs to ensure that a transmitter or a Bus Controller does not, in any situation, turn on when it is not supposed to.

These features are available for users in Compact AIC variants that are populated with 1553 channels.

By default, the transmitters and bus controller are inhibited / disabled. A user will need to, via software, enable each feature to be able to send data by setting a specific GPIO to a 'LOW'.

It is recommended that a user drive a specific GPIO HIGH to inhibit a TX and/or disable a BC.

This is to ensure the feature is working at all times.

Here are the GPIO that are used to inhibit a TX or disable a BC:

GPIO	Function	Description	Default
240	DDC_GPIO__1553_SLOT_A_TX_INHIBIT	1553 TX Inhibit for Slot A	High
241	DDC_GPIO__1553_SLOT_A_BC_DISABLE	1553 BC Disable for Slot A	High
242	DDC_GPIO__1553_SLOT_B_TX_INHIBIT	1553 TX Inhibit for Slot B	High
243	DDC_GPIO__1553_SLOT_B_BC_DISABLE	1553 BC Disable for Slot B	High

See BU-69094SX Protocol Conversion SDK Software User's Manual for details about using the GPIO.

7 SOFTWARE

For information about C-AIC software, refer to the BU-69094SX Protocol Conversion SDK Software User's Manual and the AceXtreme SDK or DD-42992Sx SDK Software Manuals.

7.1 OS Restore USB Flash Drive

A bootable USB flash drive will be available for customers by contacting the DDC factory for support. The flash drive will serve the purpose of restoring the OS on the device in case of a corruption or failure occurs.

The USB drive will also be able to clone (backup) your OS and your files.

The part number for the restore package will be BU-69094R1.

For more details about the restore flash drive and procedure please see the BU-69094SX Protocol Conversion SDK Software User's Manual.

8 CONNECTORS AND PINOUTS

The BU-67125Wx is a ruggedized box. When using the BU-67125Wx, the following should be observed:

- **ENSURE** connectors are properly connected to device.

8.1 Introduction to the I/O Connectors

As seen in Figure 23, the C-AIC includes 3 front-panel I/O connectors, J1 through J3. Depending on how you configure your C-AIC, each connector may include a different set of signals for the cards installed in the device.

J1, a 7-pin Military Type circular connector, includes the signals to provide power the unit.

J2, an 85-pin Military Type circular connector, includes signals for the Avionics interfaces. Such as MIL-STD 1553, ARINC 429, etc.

J3, an 85-pin Military Type circular connector, includes signals for the Computer Interfaces. Such as DVI-D video, USB 2.0, RS-232/422, Audio, etc.

J2 and J3 are keyed ‘A’ and ‘B’, respectively, so that the user can’t mistake which

cables to use.

Figure 9. BU-67125WX Front Panel Connectors

On the rear of the C-AIC, as pictured in Figure 24, The device’s serial number and product label are located on the rear. Additional mounting holes are available as well.

Figure 10. BU-67125WX Rear View

8.1.1 Connectors

The connector and mating connector part numbers for the front panel of the C-AIC are as follows:

- J1 7-Pin Military Type Circular Connector: Amphenol 2M805-005-07M8-7PA
  - J1 Mating Connector: Amphenol 2M805-001-16M8-7SA
- J2 85-Pin Military Type Circular Connector: Amphenol 2M805-005-07M19-85SB
  - J2 Mating Connector: Amphenol 2M805-001-16M19-85PB
- J3 85-pin Military Type Circular Connector: Amphenol 2M805-005-07M19-85SA
  - J3 Mating Connector: Amphenol 2M805-001-16M19-85PA

8.2 Signal Lists

Below is Table 5 C-AIC Signal Lists, which mentions and describes the labels of the various signals that will be used to interface with the C-AIC.

8.2.1 C-AIC Signals List

Table 5. C-AIC Signal List

Signal	Signal Description
A_1553_TRIG_SS_CHx	Mini PCI-e Slot A, Trigger for Sub System Flag

Table 5. C-AIC Signal List	
Signal	**Signal Description**
B_1553_TRIG_SS_CHx	Mini PCI-e Slot B, Trigger for Sub System Flag
A_1553_DIG_GND	Mini PCI-e Slot A, Digital Ground pin
B_1553_DIG_GND	Mini PCI-e Slot B, Digital Ground pin
A_429_DIG_GND	Mini PCI-e Slot A, ARINC 429 digital ground signal
B_429_DIG_GND	Mini PCI-e Slot B, ARINC 429 digital ground signal
A_429_BOOT_SEL_L	Mini PCI-e Slot A, Boot from back up firmware (active low)
B_429_BOOT_SEL_L	Mini PCI-e Slot B, Boot from back up firmware (active low)
A_429_CHxA_717_429_RX_TX	Mini PCI-e Slot A, Positive leg of an ARINC 429/717 channel, Programmable TX/RX
A_429_CHxB_717_429_RX_TX	Mini PCI-e Slot A, Negative leg of an ARINC 429/717 channel, Programmable TX/RX
A_429_CHxA_429_RX_TX	Mini PCI-e Slot A, Positive leg of an ARINC 429 only channel, Programmable TX/RX
A_429_CHxB_429_RX_TX	Mini PCI-e Slot A, Negative leg of an ARINC 429 only channel, Programmable TX/RX
A_429_CHxA_429_RX	Mini PCI-e Slot A, Positive leg of an ARINC 429 only channel, RX only
A_429_CHxB_429_RX	Mini PCI-e Slot A, Negative leg of an ARINC 429 only channel, RX only
B_429_CHxA_717_429_RX_TX	Mini PCI-e Slot B, Positive leg of an ARINC 429/717 channel, Programmable TX/RX
B_429_CHxB_717_429_RX_TX	Mini PCI-e Slot B, Negative leg of an ARINC 429/717 channel, Programmable TX/RX
B_429_CHxA_429_RX_TX	Mini PCI-e Slot B, Positive leg of an ARINC 429 only channel, Programmable TX/RX
B_429_CHxB_429_RX_TX	Mini PCI-e Slot B, Negative leg of an ARINC 429 only channel, Programmable TX/RX
B_429_CHxA_429_RX	Mini PCI-e Slot B, Positive leg of an ARINC 429 only channel, RX only
B_429_CHxB_429_RX	Mini PCI-e Slot B, Negative leg of an ARINC 429 only channel, RX only
A_1553_xA+	Mini PCI-e Slot A, 1553 channel Bus A positive leg
A_1553_xA-	Mini PCI-e Slot A, 1553 channel Bus A negative leg
A_1553_xB+	Mini PCI-e Slot A, 1553 channel Bus B positive leg
A_1553_xB-	Mini PCI-e Slot A, 1553 channel Bus B negative leg
B_1553_xA+	Mini PCI-e Slot B, 1553 channel Bus A positive leg
B_1553_xA-	Mini PCI-e Slot B, 1553 channel Bus A negative leg
B_1553_xB+	Mini PCI-e Slot B, 1553 channel Bus B positive leg
B_1553_xB-	Mini PCI-e Slot B, 1553 channel Bus B negative leg
A_1553_Cable_Shield	Mini PCI-e Slot A, 1553 common cable shielding
B_1553_Cable_Shield	Mini PCI-e Slot B, 1553 common cable shielding
GPIO_x	General purpose I/O channel
GPIO_GND_x	General purpose I/O ground channel

Table 5. C-AIC Signal List	
Signal	**Signal Description**
AV_IO_x_.5AMP	Avionics I/O channel, supports up to 500mA
DGND	Digital Ground
AVIO_RTN_x	Avionics I/O return channel
RX422P_x / RX232_x	RS-422 Positive leg Receive Pin or RS-232 Receive pin
TX422P_x / TX232_x	RS-422 Positive leg Transmit Pin or RS-232 Transmit pin
TX422N_x / TX232RTS_x	RS-422 Negative leg Transmit pin or RS-232 Transmit RTS pin
RX422N_x / RX232CTS_x	RS-422 Negative leg Receive pin or RS-232 Receive CTS pin
RS232_x_GND	RS-232 Ground pin
A_429_DIG_IRIG_IN	Mini PCI-e Slot A, ARINC 429 card digital IRIG input
A_IRIG_DIG_GND	Mini PCI-e Slot A, IRIG digital ground
B_1553_DIG_IRIG_IN	Mini PCI-e Slot B, 1553 card digital IRIG input
B_IRIG_DIG_GND	Mini PCI-e Slot B, IRIG digital ground
GBE0_MDIx-	Ethernet Port 1, negative data signal
GBE0_MDIx+	Ethernet Port 1, positive data signal
GBE1_MDIx-	Ethernet Port 2, negative data signal
GBE1_MDIx+	Ethernet Port 2, positive data signal
LINE_OUT1_R	Line Out signal pin, right channel
LINE_OUT1_L	Line Out signal pin, left channel
MIC_L	Microphone, Left channel
MIC_R	Microphone, Right channel
LINE_IN_L	Line In signal pin, left channel
LINE_IN_R	Line In signal pin, right channel
AUDIO_GND	Audio ground signal
HEADPHONES_L	Headphones, Left channel
HEADPHONES_R	Headphones, Right channel
LID_BTN	Lid Open/Closed Button
RST_BTN	Reset Button
PWR_BTN	Power Button
Common_BTN_RTN	Button Return pin

Table 5. C-AIC Signal List	
Signal	**Signal Description**
USBx_D-	USB data pin, negative signal
USBx_D+	USB data pin, positive signal
VBUSx	USB bus voltage pin
USB_GNDx	USB bus ground pin
TMDS_DATAx-	DVI data signal, negative signal
TMDS_DATAx+	DVI data signal, positive signal
TMDS_DATAx_SHIELD	DVI data signal shield pin
TMDS_CLK+	DVI signal clock, positive signal
TMDS_CLK-	DVI signal clock, negative signal
TMDS_CLK_SHIELD	DVI signal clock shield pin
CLK_SCL	DVI SCL pin
DATA_SDA	DVI SDA pin
+5V_PWR	DVI 5V power pin
+5V_GND	DVI 5V ground pin
Hot_Plug_Detect	DVI Hot Plug detection pin

8.3 Connector Pinouts

Refer to Table 6 for names and descriptions of the various pins.

J1 will contain the signals for power to the device.

The Avionics interfaces will be routed out to J2. These interfaces include the following: MIL-STD-1553 and its control signals, ARINC 429 and its control signals, GPIO, Avionics IO, and IRIG-B signals.

The Computer Interfaces will be routed to J3. The interfaces are as follows: Ethernet, Audio, USB, DVI video, Serial IO, GPIO, and the power on / reset button signals.

8.3.1 C-AIC J1 Connector

NOTE *View from front face of pin inserts illustrated (Socket Mate reversed) in Figure 25.*

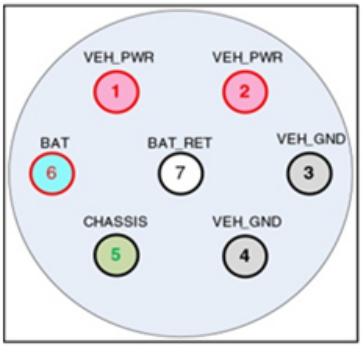


Figure 11. C-AIC J1 7-Pin Military Type Circular Connector

Table 6. J1 – Power Cable	
J1 Pin	**Connection**
1	VEH_PWR
2	VEH_PWR
3	VEH_GND
4	VEH_GND
5	CHASSIS
6	BAT
7	BAT_RET

8.3.2 C-AIC J2 Connector

NOTE *View from front face of socket illustrated (Plug Mate reversed) in Figure 26.*

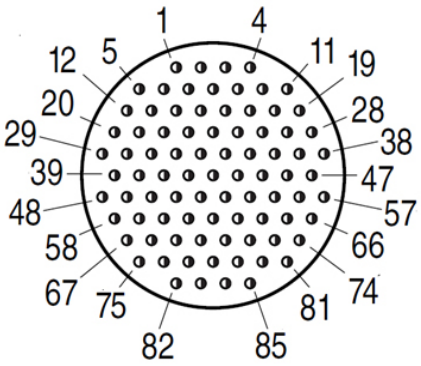


Figure 12. C-AIC J2 85-Pin Military Type Circular Connector

Table 7. J2 - AIC Avionics Connector Pinout							
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	B_1553_1B+	25	B_1553_TRIG_SS_CH1	49	DGND	73	A_429_CH6B_429_RX
2	B_1553_1B-	26	NC	50	GPIO_5	74	A_1553_2A+
3	B_1553_2A+	27	B_429_CH6A_429_RX	51	DGND	75	A_429_CH1B_717_429_RX_TX
4	B_1553_2A-	28	A_1553_1A+	52	GPIO_6	76	A_429_CH1A_717_429_RX_TX
5	B_1553_1A+	29	A_429_CH2B_717_429_RX_TX	53	DGND	77	A_429_CH5B_429_RX
6	B_1553_1A-	30	B_429_CH3A_429_RX_TX	54	GPIO_7	78	A_429_CH5A_429_RX
7	B_429_CH5A_429_RX	31	AVIO_RTN_5	55	DGND	79	NC
8	B_429_CH5B_429_RX	32	AV_IO_5_.5AMP	56	GPIO_4	80	A_1553_2B-
9	B_1553_Cable_Shield	33	AVIO_RTN_3	57	A_1553_1B-	81	A_1553_2A-
10	B_1553_2B+	34	AVIO_RTN_4	58	A_429_CH4A_429_RX_TX	82	A_429_CH3A_429_RX_TX
11	B_1553_2B-	35	AV_IO_4_.5AMP	59	AV_IO_7_.5AMP	83	A_429_CH3B_429_RX_TX
12	B_1553_TRIG_SS_CH2	36	AVIO_RTN_1	60	AVIO_RTN_8	84	A_429_DIG_GND
13	AVIO_RTN_6	37	AV_IO_2_.5AMP	61	AV_IO_3_.5AMP	85	A_1553_2B+
14	B_1553_DIG_IRIG_IN	38	A_1553_1A-	62	AV_IO_1_.5AMP		
15	B_IRIG_DIG_GND	39	AV_IO_8_.5AMP	63	A_1553_DIG_GND		
16	B_429_CH1B_717_429_RX_TX	40	NC	64	B_1553_DIG_GND		
17	B_429_CH1A_717_429_RX_TX	41	NC	65	A_1553_TRIG_SS_CH2		
18	AVIO_RTN_2	42	B_429_BOOT_SEL_L	66	NC		
19	B_429_CH6B_429_RX	43	A_1553_TRIG_SS_CH1	67	A_429_BOOT_SEL_L		
20	A_429_CH2A_717_429_RX_TX	44	B_429_CH4B_429_RX_TX	68	AVIO_RTN_7		
21	B_429_CH3B_429_RX_TX	45	B_429_CH4A_429_RX_TX	69	AV_IO_6_.5AMP		
22	B_429_DIG_GND	46	A_1553_Cable_Shield	70	A_429_DIG_IRIG_IN		
23	B_429_CH2B_717_429_RX_TX	47	A_1553_1B+	71	A_IRIG_DIG_GND		
24	B_429_CH2A_717_429_RX_TX	48	A_429_CH4B_429_RX_TX	72	A_429_CH6A_429_RX		

8.3.3 C-AIC J3 Connector

NOTE *View from front face of socket illustrated (Plug Mate reversed) in Figure 27.*

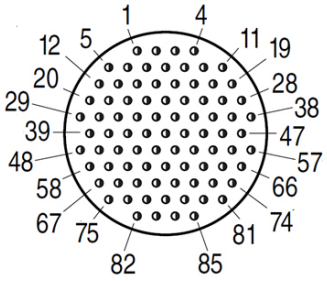


Figure 13. C-AIC J3 85-Pin Military Type Circular Connector

Table 8. J3 - AIC Computer Connector Pinout

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	GBE0_MDI0-	25	+5V_GND	49	RX422P_0 / RX232_0	73	Shell
2	GBE0_MDI1-	26	LID_BTN	50	RX422N_0 / RX232CTS_0	74	GBE1_MDI2+
3	GBE0_MDI2+	27	USB0_D-	51	TX422P_0 / TX232_0	75	USB_GND0
4	GBE0_MDI2-	28	USB2_D+	52	TX422N_0 / TX232RTS_0	76	Shell
5	TMDS_Data0-	29	TMDS_Data2-	53	RS232_0_GND	77	USB_GND3
6	TMDS_CLK-	30	TMDS_Data1+	54	RS232_3_GND	78	VBUS2
7	GBE0_MDI0+	31	TMDS_Data1_Shield	55	GPIO_GND_3	79	VBUS3
8	GBE0_MDI1+	32	GPIO_1	56	RX422P_3 / RX232_3	80	USB_GND2
9	GBE0_MDI3+	33	RS232_2_GND	57	GBE1_MDI1+	81	GBE1_MDI2-
10	GBE0_MDI3-	34	GPIO_2	58	LINE_OUT1_R	82	VBUS0
11	USB3_D+	35	GPIO_0	59	MIC_L	83	VBUS0
12	TMDS_Data0+	36	PWR_BTN	60	MIC_R	84	GBE1_MDI3-
13	TMDS_CLK+	37	USB2_D-	61	LINE_IN_L	85	GBE1_MDI3+
14	TMDS_CLK_Shield	38	GBE1_MDI0+	62	LINE_IN_R		
15	CLK_SCL	39	TMDS_Data2+	63	AUDIO_GND		
16	Data_SDA	40	TMDS_Data2_Shield	64	LINE_OUT1_L		
17	RST_BTN	41	GPIO_GND_0	65	HEADPHONES_L		
18	USB3_D-	42	TX422P_2 / TX232_2	66	GBE1_MDI1-		
19	USB0_D+	43	GPIO_GND_1	67	HEADPHONES_R		
20	TMDS_Data1-	44	RX422P_2 / RX232_2	68	RS232_1_GND		
21	TMDS_Data0_Shield	45	GPIO_GND_2	69	RX422N_1 / RX232CTS_1		

Table 8. J3 - AIC Computer Connector Pinout							
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
22	GPIO_3	46	TX422P_3 / TX232_3	70	RX422P_1 / RX232_1		
23	Hot_Plug_Detect	47	GBE1_MDI0-	71	TX422P_1 / TX232_1		
24	+5V_PWR	48	Common_BTN_RTN	72	TX422N_1 / TX232RTS_1		

8.4 Mating Connectors

This section provides details on which mating connectors the BU-67125WX will accept.

- J1 Mating Connector: Amphenol 2M805-001-16M8-7SA
- J2 Mating Connector: Amphenol 2M805-001-16M19-85PB
- J3 Mating Connector: Amphenol 2M805-001-16M19-85PA

8.4.1 Mating Connector to C-AIC J1

C-AIC connector J1 is a 7-Pin Military Type Circular Male plug. The mating connector to J1 is a 7-pin, Female, Military Type circular connector (Amphenol 2M805-001-16M8-7SA). The pinout for C-AIC J1 is shown in Table 6.

Figure 14. C-AIC J1 Mating Connector

8.4.2 Mating Connector for C-AIC J2

C-AIC J2 is a 85-Pin Military Type Circular Female socket. The mating connector is a 85-pin, Male, Military Type Circular connector (Amphenol 2M805-001-16M19-85PB). The pin out for C-AIC J2 is in Table 7.

Figure 15. C-AIC J2 Mating Connector

8.4.3 Mating Connector for C-AIC J3

C-AIC J3 is a 85-Pin Military Type circular Female Socket. The mating connector to J3 is an 85-pin, Male, Military Type connector (Amphenol 2M805-001-16M19-85PA). The pinout for C-AIC J3 is shown in Table 8.

Figure 16. C-AIC J3 Mating Connector

9 BREAKOUT CABLE ASSEMBLIES

DDC offers users the option of purchasing cable assemblies to interface with the C-AIC.

These cable assemblies breakout the various signals of the C-AIC to industry standard connectors for the Avionics and Computer signals.

The power and computer signals are broken out to COTS desktop/test connectors.

For example, the video signals breakout to a standard DVI-D connector and the USB signals beak out to Type-A receptacles.

See Signal List on Table 9. below.

The pinouts for the cable assemblies are listed in Tables 10 through 15.

Table 9. Cable Assembly Part Numbers

C-AIC Connector	C-AIC Interface Cable	Part Number to Order
J1	P1	DDC-81249-1
J2	P2	DDC-81253-1
J3	P3	DDC-81251-1

9.1 Cable Assemblies Signal List

The various signals of the cable assemblies are described in Table 10. below.

Table 10. Signal Descriptions

Signal	Description
A_1553_TRIG_SS_CHx	Mini PCI-e Slot A,Trigger for Sub System Flag
B_1553_TRIG_SS_CHx	Mini PCI-e Slot B,Trigger for Sub System Flag
A_1553_DIG_GND	Mini PCI-e Slot A, Digital Ground pin
B_1553_DIG_GND	Mini PCI-e Slot B, Digital Ground pin
A_429_DIG_GND	Mini PCI-e Slot A, ARINC 429 digital ground signal
B_429_DIG_GND	Mini PCI-e Slot B, ARINC 429 digital ground signal
A_429_BOOT_SEL_L	Mini PCI-e Slot A, Boot from back up firmware (active low)
B_429_BOOT_SEL_L	Mini PCI-e Slot B, Boot from back up firmware (active low)
A_429_CHxA_717_429_RX_TX	Mini PCI-e Slot A, Positive leg of an ARINC 429/717 channel, Programmable TX/RX
A_429_CHxB_717_429_RX_TX	Mini PCI-e Slot A, Negative leg of an ARINC 429/717 channel, Programmable TX/RX

Table 10. Signal Descriptions	
Signal	**Description**
A_429_CHxA_429_RX_TX	Mini PCI-e Slot A, Positive leg of an ARINC 429 only channel, Programmable TX/RX
A_429_CHxB_429_RX_TX	Mini PCI-e Slot A, Negative leg of an ARINC 429 only channel, Programmable TX/RX
A_429_CHxA_429_RX	Mini PCI-e Slot A, Positive leg of an ARINC 429 only channel, RX only
A_429_CHxB_429_RX	Mini PCI-e Slot A, Negative leg of an ARINC 429 only channel, RX only
B_429_CHxA_717_429_RX_TX	Mini PCI-e Slot B, Positive leg of an ARINC 429/717 channel, Programmable TX/RX
B_429_CHxB_717_429_RX_TX	Mini PCI-e Slot B, Negative leg of an ARINC 429/717 channel, Programmable TX/RX
B_429_CHxA_429_RX_TX	Mini PCI-e Slot B, Positive leg of an ARINC 429 only channel, Programmable TX/RX
B_429_CHxB_429_RX_TX	Mini PCI-e Slot B, Negative leg of an ARINC 429 only channel, Programmable TX/RX
B_429_CHxA_429_RX	Mini PCI-e Slot B, Positive leg of an ARINC 429 only channel, RX only
B_429_CHxB_429_RX	Mini PCI-e Slot B, Negative leg of an ARINC 429 only channel, RX only
GPIO_x	General purpose I/O channel
GPIO_GND_x	General purpose I/O ground channel
AV_IO_x_.5AMP	Avionics I/O channel, supports up to 500mA
DGND	Digital Ground
AVIO_RTN_x	Avionics I/O return channel
RX422P_x / RX232_x	RS-422 Positive leg Receive Pin or RS-232 Receive pin
TX422P_x / TX232_x	RS-422 Positive leg Transmit Pin or RS-232 Transmit pin
TX422N_x / TX232RTS_x	RS-422 Negative leg Transmit pin or RS-232 Transmit RTS pin
RX422N_x / RX232CTS_x	RS-422 Negative leg Receive pin or RS-232 Receive CTS pin
RS232_x_GND	RS-232 Ground pin

9.2 P1 - Power Cable Assembly

The power connector, P1, is terminated with banana jacks that can hook up to a standard 28 VDC lab power supply. See Section 3.2 for power details.

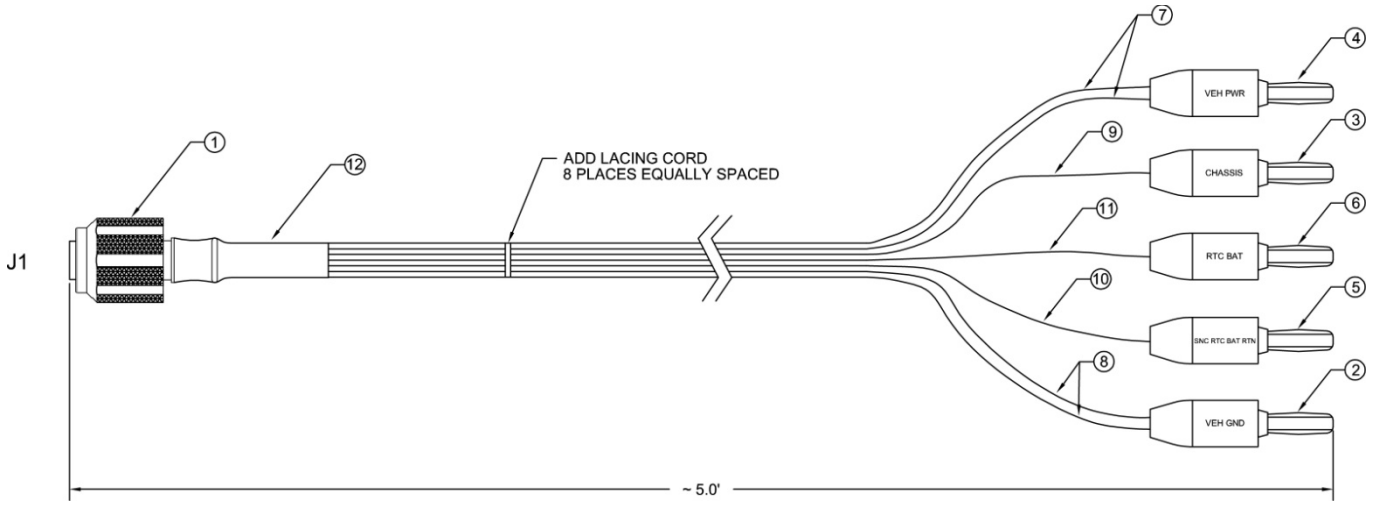


Figure 17. P1 – Power Cable Assembly DDC-81249-1

Table 11. P1 Power Cable – DDC-81249-1	
P1 Pin	**Connection**
1	VEH_PWR
2	VEH_PWR
3	VEH_GND
4	VEH_GND
5	CHASSIS
6	BAT
7	BAT_RET

Note* *Pins 6 & 7 are utilized for an external RTC power source.*

Warning

The standard C-AIC variants already have an internal RTC battery.

These pins should not be utilized and precautions should be taken to insulate and isolate the pins from the rest of the unit.

9.3 P2 - Avionics Cable Assembly

The P2 avionics cable assembly contains the MIL-STD-1553 and ARINC 429 signals as well as the Avionics I/O, GPIO, and controls signals for 1553 and 429.

This section describes what each I/O is broken out to in terms of termination.

Part number for P2 is DDC-81253-1

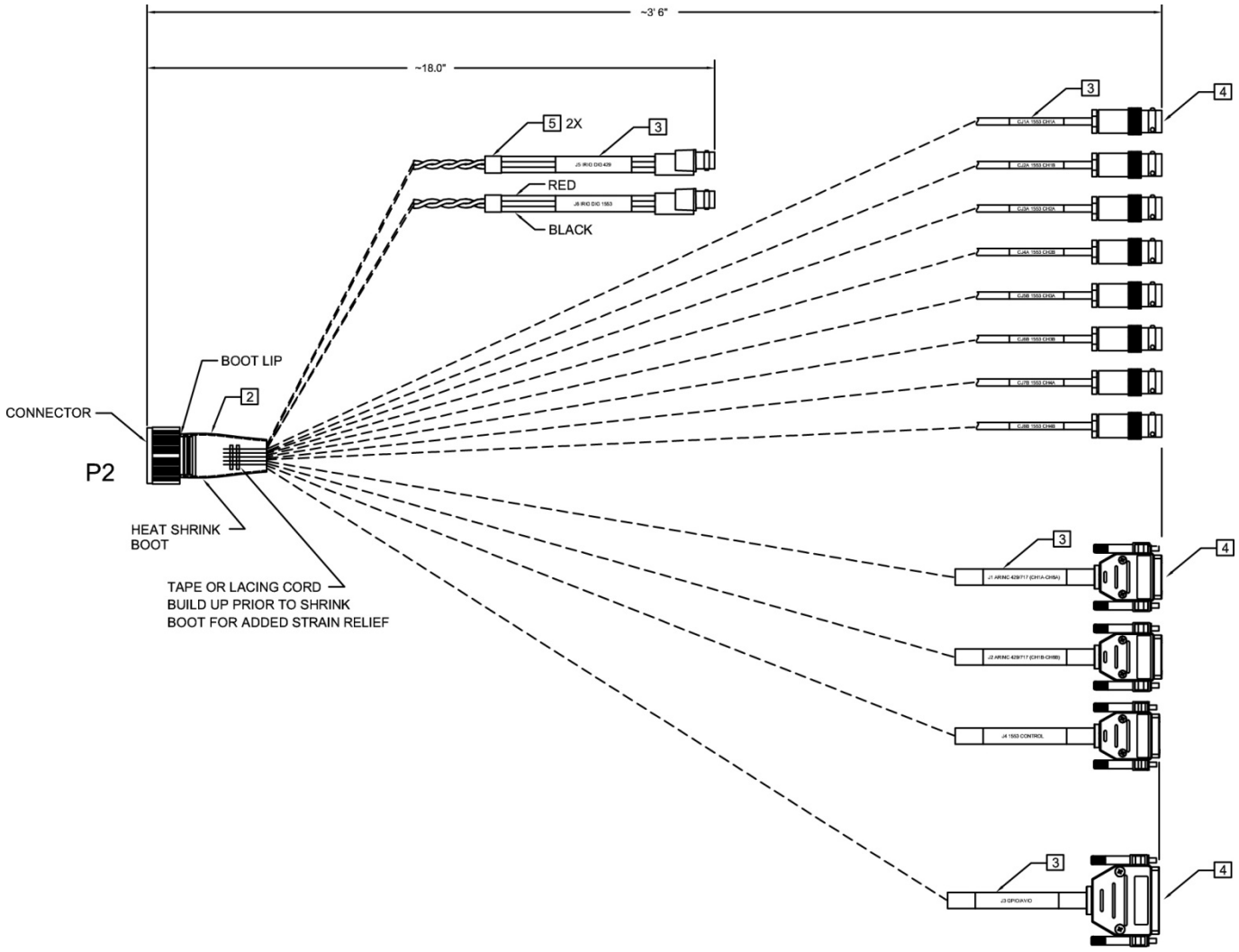


Figure 18. P2 – Avionics Cable Assembly DDC-81253-1

9.3.1 1553 Signals

The 1553 signal connections are terminated with trompeters.

The ‘A’ in CJxA refers to the mini PCI-e Slot the card is populated in. Slot A.

Trompeters labeled CJ1A, CJ2A are Channel 1 Bus A and B.

Trompeters labeled CJ3A, CJ4A are Channel 2 Bus A and B.

The ‘B’ in CJxB refers to the mini PCI-e Slot the card is populated in. Slot B.

NOTE: *If C-AIC model is selected with 2x 1553 BU-67114H cards:*

- *Trompeters labeled CJ5B, CJ6B are Channel 3 Bus A and B.*
- *Trompeters labeled CJ7B, CJ8B are Channel 4 Bus A and B.*

The 1553 mating connector required on the customer supplied stub cable is a Trompeter PL75 or equivalent connector. Two are required per dual-redundant 1553 channel.

9.3.2 1553 Control Signals

The 1553 control signals are used to trigger subsystem flags.

The signals are pinned out to a 15-pin D-SUB connector, P2-J4.

Table 12. P2 – J4 1553 Control Signals

J4 Pin	Signal
1	A_1553_TRIG_SS_CH1
2	A_1553_TRIG_SS_CH2
3	A_1553_DIG_GND
4	B_1553_TRIG_SS_CH1
5	B_1553_TRIG_SS_CH2
6	B_1553_DIG_GND
7	NC
8	NC
9	NC
10	NC
11	NC
12	NC
13	NC
14	NC
15	NC

P2-J4 connector: Norcomp 172-015-202R001

Mating connector for J4: Norcomp 172-015-102R001

9.3.3 ARINC 429 Signals

The ARINC 429 signals are broken out to 15-pin D-SUB connectors.

The C-AIC was designed to accept DDC's ***DD-40001H060*** Mini PCI-e card in either or both Mini PCI-e slots on board.

Depending on where the DD-40001H060 card is installed, P2 – J1, P2 – J2 will be used to connect the ARINC signals.

Table 13. P2 - J1 ARINC 429/717

J1 Pin	Signal
1	A_429_DIG_GND
2	NC
3	A_429_CH6A_429_RX
4	A_429_CH5A_429_RX
5	A_429_CH3A_429_RX_TX
6	A_429_CH2A_717_429_RX_TX
7	A_429_CH4A_429_RX_TX
8	A_429_CH1A_717_429_RX_TX
9	A_429_BOOT_SEL_L
10	A_429_CH6B_429_RX
11	A_429_CH5B_429_RX
12	A_429_CH3B_429_RX_TX
13	A_429_CH2B_717_429_RX_TX
14	A_429_CH4B_429_RX_TX
15	A_429_CH1B_717_429_RX_TX

Table 14. P2 - J2 ARINC 429/717	
J2 Pin	**Signal**
1	B_429_DIG_GND
2	NC
3	B_429_CH6A_429_RX
4	B_429_CH5A_429_RX
5	B_429_CH3A_429_RX_TX
6	B_429_CH2A_717_429_RX_TX
7	B_429_CH4A_429_RX_TX
8	B_429_CH1A_717_429_RX_TX
9	B_429_BOOT_SEL_L
10	B_429_CH6B_429_RX
11	B_429_CH5B_429_RX
12	B_429_CH3B_429_RX_TX
13	B_429_CH2B_717_429_RX_TX
14	B_429_CH4B_429_RX_TX
15	B_429_CH1B_717_429_RX_TX

P2-J1,P2-J2 connector: Norcomp 172-015-202R001

Mating connector for P2-J1, P2-J2: Norcomp 172-015-102R001

9.3.4 GPIO & Avionics I/O

General Purpose I/O and Avionics I/O are pinned out to a 25-pin D-SUB connector, P2-J3.

Table 15. P2 – J3 GPIO / AVIO	
J3 Pin	**Signal**
1	GPIO_4
2	GPIO_5
3	GPIO_6
4	GPIO_7
5	AV_IO_1_.5AMP
6	AV_IO_2_.5AMP
7	AV_IO_3_.5AMP

Table 15. P2 – J3 GPIO / AVIO	
J3 Pin	**Signal**
8	AV_IO_4_.5AMP
9	AV_IO_5_.5AMP
10	AV_IO_6_.5AMP
11	AV_IO_7_.5AMP
12	AV_IO_8_.5AMP
13	NC
14	DGND
15	DGND
16	DGND
17	DGND
18	AVIO_RTN_1
19	AVIO_RTN_2
20	AVIO_RTN_3
21	AVIO_RTN_4
22	AVIO_RTN_5
23	AVIO_RTN_6
24	AVIO_RTN_7
25	AVIO_RTN_8

P2-J3 connector: Norcomp 172-025-202R001

Mating connector for P2-J3: 172-025-102R001

9.3.5 IRIG-B Signals

The IRIG-B signals are terminated with BNC jacks.

Depending on where a DDC Mini PCI-e card is installed, will determine which IRIG-B jack is operational.

P2-J5, labeled IRIG DIG 429, is for the IRIG signals that are a part of the card in Mini PCI-e Slot A.

P2-J6, labeled IRIG DIG 1553, is for the IRIG signals that are a part of the card in Mini PCI-e Slot B.

For standard C-AIC configurations, please see Table 3., positions of Mini PCI-e cards.

9.4 P3 - Computer Interfaces Cable Assembly

The P3 computer interfaces cable assembly contains the Video, Audio, USB, GPIO, Ethernet, and Serial signals as well as the power and reset buttons.

This section describes what each I/O is broken out to in terms of termination.

Part number for P3 is DDC-81251-1

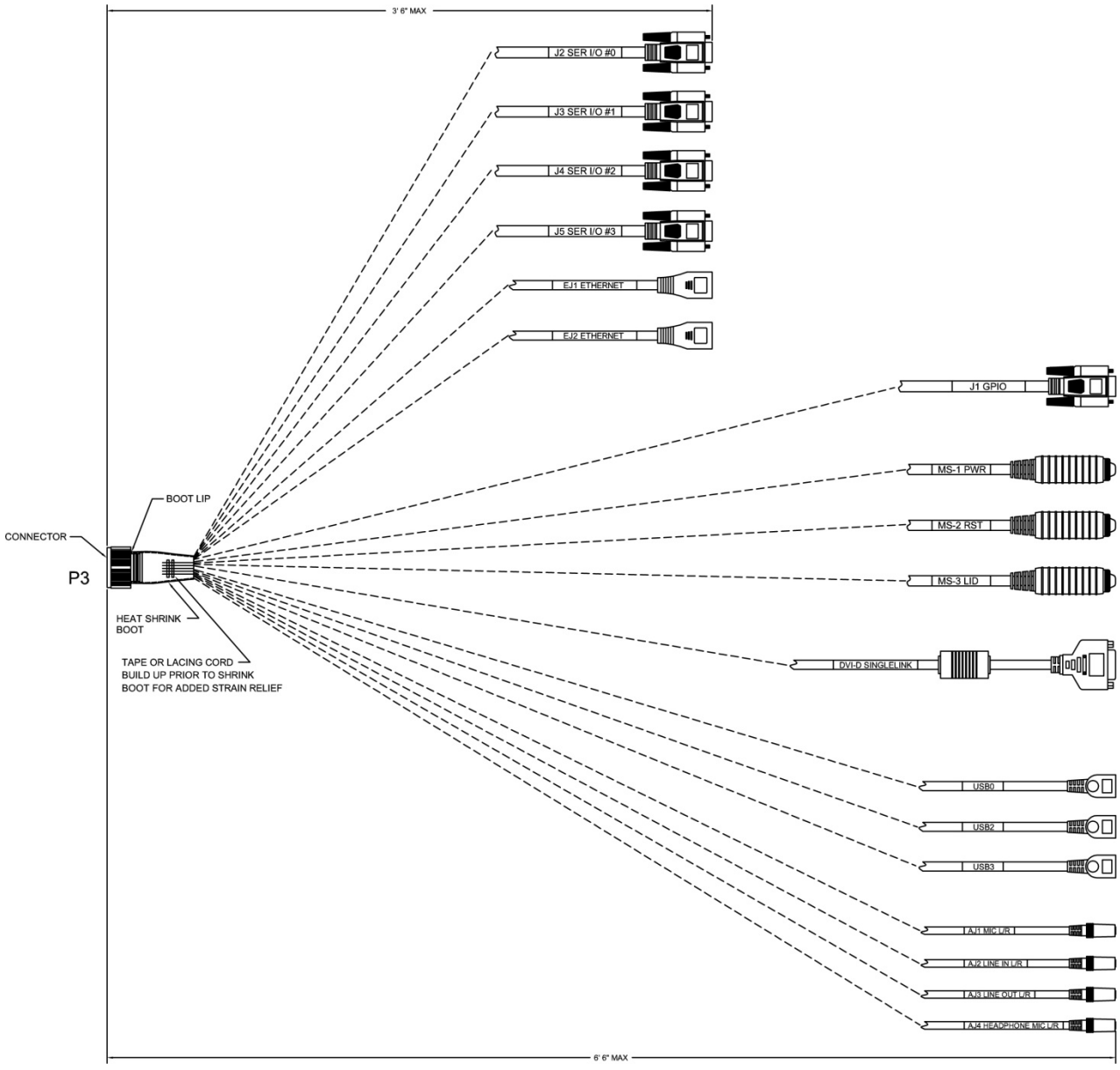


Figure 19. P3 – Computer Interfaces Cable Assembly DDC-81251-1

The GPIO signals are pinned out to a 9-pin D-SUB connector, P3-J1.

Table 16. P3 – J1 GPIO	
J1 Pin	**Signal**
1	GPIO_0
2	GPIO_1
3	GPIO_2
4	GPIO_3
5	NC
6	GPIO_GND_0
7	GPIO_GND_1
8	GPIO_GND_2
9	GPIO_GND_3

P3-J1 Connector: C2G 52035

Mating connector for P3-J1: Standard Male DB-9 connector

The Serial IO Signals are pinned out to 9-pin D-SUB connectors P3-J2,P3-J3, P3-J4, and P3-J5.

Table 17. P3 – J2 Serial I/O	
J1 Pin	**Signal**
1	NC
2	RX422P_0 / RX232_0
3	TX422P_0 / TX232_0
4	NC
5	RS232_0_GND
6	NC
7	TX422N_0 / TX232RTS_0
8	RX422N_0 / RX232CTS_0
9	NC

Table 18. P3 – J3 Serial I/O	
J1 Pin	**Signal**
1	NC
2	RX422P_1 / RX232_1
3	TX422P_1 / TX232_1
4	NC
5	RS232_1_GND
6	NC
7	TX422N_1 / TX232RTS_1
8	RX422N_1 / RX232CTS_1
9	NC

Table 19. P3 – J4 Serial I/O	
J1 Pin	**Signal**
1	NC
2	RX422P_2 / RX232_2
3	TX422P_2 / TX232_2
4	NC
5	RS232_2_GND
6	NC
7	NC
8	NC
9	NC

Table 20. P3 – J5 Serial I/O	
J1 Pin	**Signal**
1	NC
2	RX422P_3 / RX232_3
3	TX422P_3 / TX232_3
4	NC
5	RS232_3_GND
6	NC
7	NC
8	NC
9	NC

P3-J2, P3-J3, P3-J4, P3-J5 Connectors: C2G 52035

Mating connector for P3-J2 – P3-J5: Standard Male DB-9 connector

The Ethernet ports are terminated with female RJ-45 jacks.

The DVI port is terminated with a female DVI-D connector.

The USB ports are terminated with female TYPE A receptacles.

The Audio signals are terminated with 3.5mm female jacks.

There are 3 momentary switch buttons labeled as the following:

- MS-1
- MS-2
- MS-3

MS-1 is a power button. When pressed, this will execute a shutdown of the device a graceful manner.

This does not shut off power to the unit as the unit is externally powered by a 28 V source.

If MS-1 is held down it will execute a hard shutdown, where the device will not go through the normal shutdown sequences.

MS-2 is a reset button. When pressed, it will execute a hard reset. Meaning the device will not go through the normal shutdown sequences.

MS-2 is not recommended for resetting / rebooting the device.

MS-3 is to be ignored as its signal is a LID open signal. The COMe module brings out this pin for users.

DDC's button for the LID signal is inoperable. Will not do anything when pressed.

10 ORDERING INFORMATION

Model Number	System Description	Expansion Options	Operating Temperature	Size	Weight
BU-67125W000R-C00	Intel® Atom E3845 Quad Core, 1.91 GHz Processor, 4GB DDR3L SDRAM, 120 GByte SSD	2 Mini-PCIe Sites (Note 2)	-40°C to +71°C	5.5 in x 5.0 in x 1.75 in (139.7 mm x 127.0 mm x 44.4 mm) (Note 4)	<2lbs (<.91kg) (Note 3)

Notes: 1. Contact the Factory for more ordering options.
2. Expansion I/O board for custom I/O available. Contact Factory.
3. Weight spec is based on BU-67125W000R-C00 model.
4 Size spec does not include connector protrusions or mounting provisions.
5. Product Specifications for DDC's Mini PCI-e boards are available at www.ddc-web.com/databus

BU-67125W00X R-C00

C00 = Conduction Cooled (-40°C to +71°C)

R = RoHS Compliant

I/O Option	Number of Channels:								
	1553	429	717	RS-232/422	GPIO	AV I/O	IRIG-B Input	Ethernet	CAN
0	0	0	0	4	8	8	0	2	0
1	2	0	0	4	8	8	1	2	0
2	0	6	2	4	8	8	1	2	0
3	2	6	2	4	8	8	2	2	0
4	0	0	0	4	12	52	0	2	4
5	2	0	0	4	8	8	1	3	0
6	1	0	0	4	8	8	1	2	0
7	4	0	0	4	8	8	2	2	0
8	0	12	4	4	8	8	2	2	0

Cable Assemblies

P1 Power Cable Assembly: DDC-81249-1

P2 Avionics Interface Cable Assembly: DDC-81253-1

P3 Computer Interface Cable Assembly: DDC-81251-1

Data Device Corporation

Leadership Built on Over 50 Years of Innovation

Military | Civil Aerospace | Space | Industrial

Data Device Corporation (DDC) is a world leader in the design and manufacture of high-reliability Connectivity, Power and Control solutions (Data Networking; Power Distribution, Control and Conversion; Motor Control and Motion Feedback) for aerospace, defense, space, and industrial applications. With awards for quality, delivery and support, DDC has served these industries as a trusted resource for more than 50 years... providing proven solutions optimized for efficiency, reliability, and performance. Data Device Corporation brands include DDC, Beta Transformer Technology Corporation, National Hybrid Inc., North Hills Signal Processing Corporation, Pascall Electronics Ltd., and XCEL Power Systems Ltd. DDC is headquartered in Bohemia, NY and has manufacturing operations in New York, California, Mexico, and the United Kingdom.

Beta Transformer Technology Corporation, a subsidiary of DDC and leader in high reliability transformer, magnetic and cable assembly solutions for the aerospace, defense, and space industries, offers field proven transformer solutions for the most demanding industrial environments… extreme temperature, shock, vibration, dust, fluid, and radiation. Beta Transformer developed many of the world's smallest transformers and inductors, and is recognized for superior quality and performance. Beta Transformer headquarters along with their main design and manufacturing operations are located in Bohemia, NY. Beta has expanded production capabilities through their manufacturing operations at Beta Transformer Mexico, S. DE R L. DE C.V., located in Ensenada, Mexico, and North Hills Signal Processing Corporation in H. Matamoros Tamaulipas, Mexico, both subsidiaries of Beta Transformer Technology Corporation.

XCEL Power Systems and Pascall Electronics are divisions of DDC Electronics, Ltd., a subsidiary of Data Device Corporation. DDC Electronics, Ltd. specializes in the design and manufacture of power supply solutions for extreme environments. With over 30 years of experience in the defense, aerospace and industrial sectors, DDC Electronics is a trusted source for complete solutions in the design, development and manufacture of electronic power conversion products – from single converters to complex multi- function conversion systems. DDC Electronics products are the first choice for power with In-Flight Entertainment & Connectivity (IFEC) and defense systems. There are more than 170,000 Pascall power supply units installed on commercial aircraft. XCEL and Pascall power supply units are in service with Ground, Air and Naval forces across the world, powering state of the art electronic systems, and trusted by industry leaders to deliver reliable proven performance in some of the most challenging environments to be found anywhere. DDC Electronics, Ltd. headquarters, along with the XCEL Power Systems design operations and the Pascall Electronics factory are located in the UK.

DDC Microelectronics, a division of Data Device Corporation and formerly the space microelectronics division of Maxwell Technologies, is a leading developer and manufacturer of innovative, cost-effective, space-qualified microelectronics solutions for satellites and spacecraft. DDC Microelectronics has provided space-qualified radiation-tolerant and radiation-shielded products, including semiconductors and single-board computers, to the space industry for more than two decades. DDC radiation mitigated power modules, memory modules, and single board computers incorporate powerful commercial silicon for superior performance and high reliability in space applications. DDC Microelectronics specializes in understanding the radiation performance of commercial semiconductors, qualifying selected components for use in space, integrating them with proprietary radiation mitigation technologies, and manufacturing and screening these products in a DLA approved MIL-PRF-38534 facility, located in southern California.

Your Solution Provider for... Connectivity, Power, and Control

Connectivity

Data Bus Solutions
DDC is the market leader in high reliability data bus solutions for MIL-STD-1553/1760, ARINC 429, Fibre Channel, Ethernet, CANbus, Serial I/O and other protocols, and is one of the few companies able to provide a full range of computers, boards, hybrids and ASIC solutions for aerospace, defense and space applications.

Power

Power Supplies
DDC supplies highly customized power products to the aerospace, defense, maritime and satellite communications industries.

Solid-State Power Controllers
DDC's programmable solid-state power controllers provide simple and reliable power management for aerospace and defense systems.

Control

Motor Controllers and Drives
DDC is the world leader in high reliability torque, speed, and position controllers and drives engineered to operate in demanding environments.

Motion Feedback
DDC is the world leader in the design and manufacture of Synchro/Resolver-to-Digital and Digital-to-Synchro/Resolver converters.

Certifications

Data Device Corporation is ISO 9001:2008, AS 9100 Rev C, EN 9100, and JIS Q9100 certified. DDC has been granted certification by the Defense Logistics Agency, Land & Maritime (DLA) for manufacturing Class D, G, H, and K hybrid products in accordance with MIL-PRF-38534. Industry documents used to support DDC's certifications and Quality system are MIL-STD-883, ANSI/NCSL Z540-1, IPC-A-610, MIL-STD-202, JESD-22, and J-STD-020.

Beta Transformer Technology Corporation (BTTC) and its subsidiaries are ISO 9001:2008 and AS 9100 Rev C certified. BTTC has been granted certification as a qualified source of transformers by the Defense Logistics Agency, Land & Maritime (DLA) and is listed on the QPL for products MIL-PRF 21038/27-01 through -31 Product Levels C, M and T.

DDC Electronics, Ltd.'s XCEL Power Systems and Pascall Electronics manufacturing operations are ISO 9001:2008, AS 9100 Rev C, EN9100 and ISO 14001:2004 certified.

DDC®

Connectivity Power Control

Your Solution Provider for... Connectivity, Power, and Control

DDC Electronics Ltd. | Beta Transformer Technology Corporation | National Hybrid Incorporated | North Hills™ | Pascall | XCEL Power Systems

The first choice for more than 50 years—DDC
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.

Inside the U.S. : Call Toll-Free 1-800-DDC-5757

DDC ®Data Device Corporation

DATA DEVICE CORPORATION REGISTERED TO: ISO 9001:2008, AS9100C:2009-01 EN9100:2009, JIS Q9100:2009 FILE NO. 10001296 ASH09

Certified System Environment ISO 14001 SAI GLOBAL

Certified System SAI GLOBAL AS9100 Aerospace

Certified System SAI GLOBAL ISO 9001 Quality

DDC Headquarters and Main Factory
105 Wilbur Place, Bohemia, NY 11716-2426
Tel: (631) 567-5600
Toll-Free, Customer Service: 1-800-DDC-5757
www.ddc-web.com

DDC Microelectronics
13000 Gregg Street, Suite C, Poway, CA 92064
Tel: (631) 567-5600
Toll-Free, Customer Service: 1-800-DDC-5757

Beta Transformer Technology Corporation
40 Orville Drive, Bohemia, NY 11716-2426
Tel: (631) 244-7393
www.BTTC-Beta.com

Beta Transformer Mexico, S. DE R L. DE C.V.
Avedina 20 De Noviembre
959 Zona Centro, Ensenada, Baja Mexico
Tel: (631) 244-7393

North Hills Signal Processing Corporation
6851 Jericho Turnpike, Syosset, NY 11791
Tel: (631) 244-7393
www.nhsignal.com

North Hills Signal Processing Corporation
Avedina Jose Escandon y Helquera No. 21
Km. 8.5 Carretera Lauro Villar
H. Matamoros Tamaulipas, Mexico
Tel: (631) 244-7393

Outside the U.S. : Call 1-631-567-5600

DDC Electronics Ltd.

BSI UKAS 003

BSI UKAS 003

ADS 21ST CENTURY SUPPLY CHAINS SC 21 Bronze Award

DDC Electronics Ltd Headquarters and Pascall Electronics Ltd. Factory
Westbridge Business Park, Cothey Way
Ryde, Isle of Wight, PO33 1QT, UK
Tel: +44 (0) 1983 817300
www.pascall.co.uk

United Kingdom: DDC U.K., Ltd
James House, 27-35 London Road, Newbury,
Berkshire RG14 1JL, England
Tel: +44 1635 811140

XCEL Power Systems Ltd
Brunswick Road, Cobbs Wood Industrial Estate
Ashford, Kent, TN 23 1EH, UK
Tel: +44 (0) 1233 656800
www.xcelpower.com

bsi. AS/EN 9100 Series Aviation, Space and Defense | ISO 9001 Quality Management | ISO 14001 Environmental Management

DDC ®Data Device Corporation

DATA DEVICE CORPORATION REGISTERED TO: ISO 9001:2008, AS9100C:2009-01 EN9100:2009, JIS Q9100:2009 FILE NO. 10001296 ASH09

France: DDC Electronique
84-88 Bld de la Mission Marchand
92411 Courbevoie Cedex, France
Tel: +33-1-41-16-3424

Germany: DDC Elektronik GmbH
Triebstrasse 3, D-80993 München, Germany
Tel: +49 (0) 89-15 00 12-11

Japan: DDC Electronics K.K.
Suidobashi Sotobori-dori Bldg, 8F, 1-5,
Koraku 1-chome,
Bunkyo-ku, Tokyo 112-0004, Japan
Tel: 81-3-3814-7688
Web site: www.ddcjapan.co.jp

Asia: DDC - RO Registered in Singapore
Blk-327 Hougang Ave 5 #05-164
Singapore 530327
Tel: +65 6489 4801

India: DDC Electronics Private Limited
C-31, C/O Quest Offices Pvt. Ltd.
10th Floor, Raheja Towers
M.G Road, Bangalore 560001, India
Tel: +91 080 301 10 200