SPACE-PHY +5V or +3.3V Dual MIL-STD-1553 Transceiver/Transformer

Connectivity Power Control

Data Sheet

Models: BU-67402FX

SPACE-PHY is a completely integrated Rad Tolerant MIL-STD-1553 physical layer in a single package, including dual transceivers and transformers, and is designed to connect with IP incorporated in an FPGA or custom MIL-STD-1553 protocol ASIC.

Applications

- Launch Vehicles
- Military Satellites
- Research Satellites
- International Space Station
- Commercial Telecommunication Satellite

Need a Custom Solution?
DDC can customize designs for all boards, 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-67402F

DDC's Data Networking Solutions

MIL-STD-1553 | ARINC 429 | Fibre Channel | AFDX®/ARINC 664

As the leading global supplier of data bus components, cards, and software solutions for the military, commercial, 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 military vehicles, systems, and subsystems. These "products, along with our traditional MIL-STD-1553 solutions, represent a wide and flexible array of performance and cost requirements, enabling DDC to support multi-generational programs.

DDC has developed its line of high-speed Fibre Channel and Extended 1553 products to support the real-time processing of field-critical data networking between sensors, compute notes, data storage displays, and weapons for air, sea, and ground military vehicles.

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 mutli-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 provides an assortment of quality MIL-STD-1553 commercial, military, and COTS grade cards and components to meet your data conversion and data interface needs. DDC supplies MIL-STD-1553 board level products in a variety of form factors including AMC, USB, PCI, cPCI, PCI-104, PCI-Express PCMCIA, PMC, XMC, PC/104, PC/104-Plus, VME/VXI, and ISAbus cards. 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 network of aircraft, helicopter, and missle programs.

ARINC 429

DDC also has a wide assortment of quality ARINC-429 commercial, military, and COTS grade cards and components, which will meet your data conversion and data interface needs. DDC supplies ARINC-429 board level products in a variety of form factors including AMC, USB, PCI, PMC, PCI-104, PCI-Express, PC/104 Plus, and PCMCIA boards. 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.

AFDX®/ARINC 664

DDC provides powerful, field-proved AFDX®/ARINC 664 solutions for test, simulation, and system integration. These cards support both Airbus and Boeing AFDX protocol.

SPACE-PHY +5V OR +3.3V DUAL MIL-STD-1553 TRANSCEIVER/TRANSFORMER DEVICE

BU-67402 DATA SHEET

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Revision	Date	Pages	Description
Rev Pre A	6/2013	All	Preliminary Release
Rev A	8/2013	All	Initial Release
Rev B	8/2013	5	Update to figure 2
Rev C	2/2014	Cover, 4	Updated product photo
Rev D	3/2016	All	Added 3.3v option
Rev E	11/2016	14	Added metric values to figures 5 and 6. Corrected pin count on figure 5. Corrected pin width tolerance in figure 6.
Rev F	7/2017	18, 19	Updated Ordering information and corresponding notes
Rev G	4/2018	18, 19	Updated Ordering information and corresponding notes

1 PREFACE

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

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 Special Handling and Cautions

The BU-67402 is a state-of-the-art component, 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 precaution is 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.

1.3 Trademarks

All trademarks are the property of their respective owners.

1.4 What is included in this data sheet?

This data sheet contains a complete description of hardware installation and use.

1.5 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-67402 is a radiation-hardened MIL-STD-1553 dual transceiver with integrated isolation transformers that operates from a +5V or +3.3V power supply voltage. It operates with Harris type encoder/decoders and supports both transformer and direct-coupled operation.

The receiver section of the BU-67402 accepts Manchester II data from a MIL-STD-1553 Data Bus or stub and produces TTL level signals at its outputs: RX_DATA_OUT and $\overline{\text{RX\_DATA\_OUT}}$. These outputs represent positive and negative excursions of the input data signals beyond an internally fixed threshold level. An external STROBE input enables or disables the receiver's outputs.

The transmitter section accepts bipolar TTL signal data at its TX_DATA_IN and $\overline{\text{TX\_DATA\_IN}}$ inputs and produces Manchester II data at the TXOUT and $\overline{\text{TXOUT}}$ outputs.

An external input, TX_INHIBIT, takes priority over the transmitter inputs and disables the respective transmitter when asserted to logic "1". The small size, 5V power supply voltage, and integrated transformers simplify engineering design, making it an excellent choice for interfacing with any MIL-STD-1553 system.

2.1 Features

- Dual-Redundant, Side-by-Side, MIL-STD-1553 Transceiver/Transformer Combo
- Compact Ceramic Flatpack Package
  - 1 in. x 1 in. x 0.25 in. (25.4 mm x 25.44 mm x 6.35 mm)
- Radiation Specifications
  - Total Dose: 100krads (5V), 300krads (3.3V)
  - Latchup Immunity: 85.4 MeV-cm²/mg
  - Contact Factory for Radiation Reports and Test Conditions
- Dual Tap Secondaries
  - Secondaries' Center Taps Brought Out
- DSCC MIL-PRF-38534 Class H or K Qualified
- +3.3V or +5V Power Input

Applications Include:

- Launch Vehicles
- Military Satellites
- Research Satellites
- International Space Station
- Commercial Telecommunication Satellite

Figure 1. BU-67402 SPACE-PHY Transceiver/Transformer

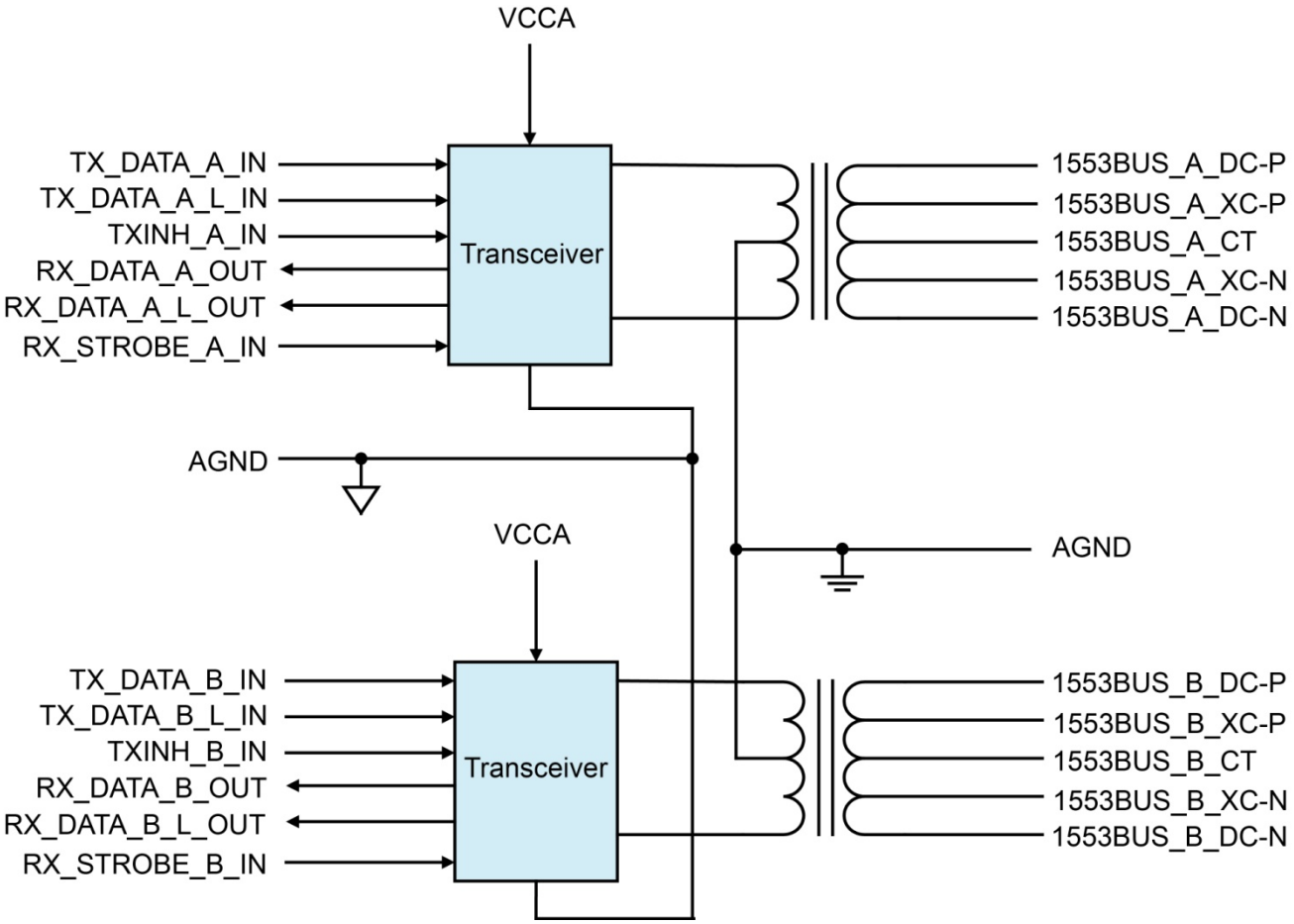


Figure 2. BU-67402 Block Diagram

Table 1. BU-67402 Specification Table

PARAMETER	MIN	TYP	MAX	UNITS
ABSOLUTE MAXIMUM RATINGS				
BU-67402x3				
Supply Voltage (VCCA, VCCB)	-0.3	5.0	7.0	Vdc
Receiver				
Input Voltage (Differential, Transformer-Coupled)			38	Vp-p
Input Voltage (Differential, Direct-Coupled)			53	Vp-p
Logic				
Voltage Input Range	-0.3		Vcc + 0.3	V
BU-67402x8				
Supply Voltage (VCCA, VCCB)	-0.3	3.3	4.5	Vdc
Receiver				
Input Voltage (Differential, Transformer-Coupled)			29	Vp-p
Input Voltage (Differential, Direct-Coupled)			37	Vp-p
Logic				
Voltage Input Range	-0.3		Vcc + 0.3	V

Table 1. BU-67402 Specification Table				
PARAMETER	**MIN**	**TYP**	**MAX**	**UNITS**
POWER SUPPLY REQUIREMENTS				
Voltages/Tolerances				
+5V	4.75	5.0	5.25	V
+3.3V	3.135	3.3	3.465	V
Current Drain (Notes 9, 10)				
BU-67402x3				
• Idle		80	100	mA
• 25% Transmitter Duty Cycle (1 Ch. Transmitting)		199	229	mA
• 50% Transmitter Duty Cycle (1 Ch. Transmitting)		286	348	mA
• 100% Transmitter Duty Cycle (1 Ch. Transmitting)		455	535	mA
BU-67402x8				
• Idle		18	28	mA
• 25% Transmitter Duty Cycle (1 Ch. Transmitting)		134	185	mA
• 50% Transmitter Duty Cycle (1 Ch. Transmitting)		270	342	mA
• 100% Transmitter Duty Cycle (1 Ch. Transmitting)		517	656	mA
POWER DISSIPATION				
BU-67402x3 (Vcc = +5V) (Note 9)				
• Idle		0.40	0.50	W
• 25% Transmitter Duty Cycle (1 Ch. Transmitting)		0.66	0.81	W
• 75% Transmitter Duty Cycle (1 Ch. Transmitting)		0.75	1.06	W
• 100% Transmitter Duty Cycle (1 Ch. Transmitting)		0.92	1.32	W
BU-67402x8 (Vcc = +3.3V) (Note 9)				
• Idle		0.059	0.100	W
• 25% Transmitter Duty Cycle (1 Ch. Transmitting)		0.158	0.275	W
• 75% Transmitter Duty Cycle (1 Ch. Transmitting)		0.257	0.450	W
• 100% Transmitter Duty Cycle (1 Ch. Transmitting)		0.455	0.800	W
RECEIVER				
Differential Input Impedance, Transformer-Coupled (Notes 1 – 6)	1.0			kΩ
Differential Input Impedance, Direct-Coupled (Notes 1 – 6)	2.0			kΩ
Threshold Voltage, Transformer-Coupled, Measured on Stub (Note 7)	0.200		0.860	Vp-p
Threshold Voltage, Direct-Coupled, Measured on Stub (Note 7)	0.280		1.200	Vp-p
Common-Mode Voltage (Note 8)	-10		10	Vpeak
TRANSMITTER				
Differential Output Voltage				
• Direct Coupled Across 35Ω, Measured on Bus	6	7	9	Vp-p
• Transformer Coupled Across 70Ω, Measured on Stub	18	20	27	Vp-p
Output Noise, Differential (Direct Coupled)			10	mVp-p, diff
Output Offset Voltage, Transformer Coupled Across 70Ω	-250		+250	mVp-p, diff
Rise/Fall Time	100	150	300	ns

Table 1. BU-67402 Specification Table				
PARAMETER	**MIN**	**TYP**	**MAX**	**UNITS**
LOGIC				
BU-67402x3				
• V_{IH}	2.0			V
• V_{IL}			0.8	V
• I_{IH} (RX_STROBE)	-10		10	µA
• I_{IL} (RX_STROBE)	-100		-20	µA
• I_{IH} (TX_DATA_IN, $\overline{\text{TX\_DATA\_IN}}$, TX_INHIBIT)	20		100	µA
• I_{IL} (TX_DATA_IN, $\overline{\text{TX\_DATA\_IN}}$, TX_INHIBIT)	-10		+10	µA
• V_{OH} (V_{CC} = 4.75V, I_{OH} = max)	2.4			V
• V_{OL} (V_{CC} = 4.75V, I_{OL} = min)			0.4	V
• I_{OL}	3.4			mA
• I_{OH}			-3.4	mA
BU-67402x8				
• V_{IH}	0.7*V_{CC}			V
• V_{IL}			0.3*V_{CC}	V
• I_{IH} (RX_STROBE)	-10		10	µA
• I_{IL} (RX_STROBE)	-100		-20	µA
• I_{IH} (TX_DATA_IN, $\overline{\text{TX\_DATA\_IN}}$, TX_INHIBIT)	20		100	µA
• I_{IL} (TX_DATA_IN, $\overline{\text{TX\_DATA\_IN}}$, TX_INHIBIT)	-10		+10	µA
• V_{OH} (V_{CC} = 3.135V, I_{OH} = max)	V_{CC}-0.3			V
• V_{OL} (V_{CC} = 3.135V, I_{OL} = min)			0.4	V
• I_{OL}	2.0			mA
• I_{OH}			-2.0	mA
THERMAL				
Thermal Resistance, Junction-to-Case (θ_{JC})				
• 3.3V		5.34	6.5	°C/W
• 5V		7.8	9.0	°C/W
Operating Case Temperature				
BU-67402XXXL-1XX	-55		+125	°C
Storage Temperature	-65		+150	°C
Lead Temperature (soldering, 10 sec.)			+300	°C
PHYSICAL CHARACTERISTICS				
Package Body Size				
36-Lead Flatpack		1.01 x 1.01 x 0.25		in.
		(25.654 x 25.654 x 6.35)		(mm)
Weight		0.353		oz.
		(10.0)		(g)

Table 1. BU-67402 Specification Table				
PARAMETER	**MIN**	**TYP**	**MAX**	**UNITS**

Table 1 Notes:

Notes 1 through 6 are applicable to the Receiver Differential Resistance and Differential Capacitance specifications:

1. Specifications include transmitter, receiver, and transformer.
2. Impedance parameters are specified directly between pins 1553BUS_A(B)_XC-P and 1553BUS_A(B)_XC-N or 1553BUS_A(B)_DC-P and 1553BUS_A(B)_DC-N.
3. It is assumed that all power and ground inputs to the package are connected for the impedance measurement. The 1553BUS_A(B)_CT transformer secondary connections are left unconnected for this measurement.
4. The specifications are applicable for both un-powered and powered conditions.
5. The specifications assume a 2-volt rms balanced differential, sinusoidal input. The applicable frequency range is 75 kHz to 1 MHz.
6. Minimum impedance is guaranteed over the operating range, but not tested.
7. The Threshold Level, as referred to in this specification, is meant to be the maximum peak-to-peak voltage (measured across the data bus or stub) that can be applied to the receiver's input without causing the output to change from the OFF state.
8. Assumes a common mode voltage within the frequency range of DC to 2 MHz, applied to the 1553BUS_A(B)_DC(XC) pins, and referenced to ANALOG GROUND.
9. Current drain and power dissipation specifications are preliminary and subject to change. Power dissipation of the transceiver is defined as the total power into the device minus the power dissipated in the load.
10. When transmitting, the peak supply current can be as high as 800mA.

3 MIL-STD-1553 MODES AND ARCHITECTURE

The BU-67402 is a radiation-hardened dual transmitter and receiver with integrated isolation transformers packaged in a 36-lead ceramic flatpack package. It is directly compatible with Harris type encoder/decoders and has internal (factory preset) threshold levels. The transceiver/transformer only requires a single power supply at either +3.3V or +5V and conforms to MIL-STD-1553A/B.

Figure 4 illustrates the connection between a BU-67402 transceiver/transformer and a MIL-STD-1553 data bus. It can be either direct coupled (short stub) or transformer coupled (long stub) to the 1553 data bus. The transformer secondary center tap connections are also brought out. These pins may be left unconnected, or may be connected to reduce common mode voltages for mitigating against ESD, lightning, and/or HIRF.

3.1 Transmit Operating Mode

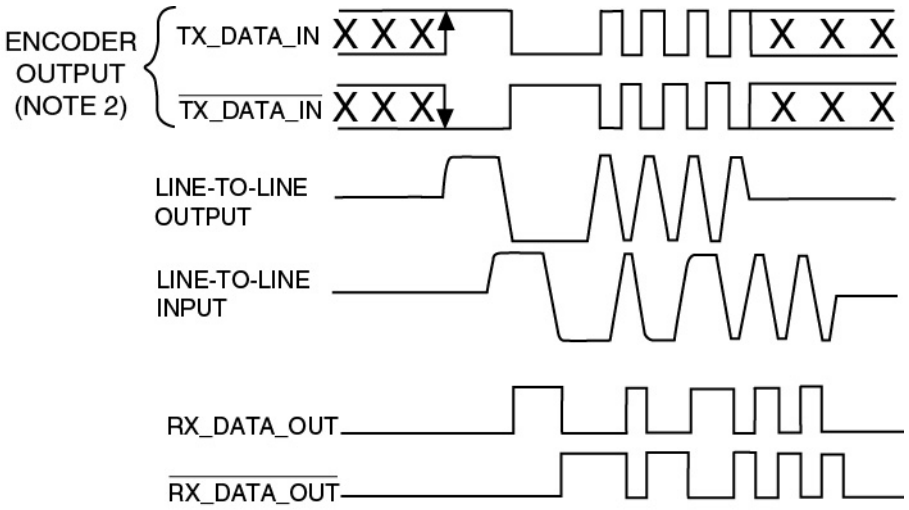
The transmitter section accepts encoded TTL data and converts it to bi-phase Manchester II form using a wave shaping network and driver circuits. The driver outputs TXOUT and $\overline{\text{TXOUT}}$ are transformer isolated from the Data Bus.

The transmitter output terminals can be put into a high impedance state by setting TX_INHIBIT high, or asserting TX_DATA_IN and $\overline{\text{TX\_DATA\_IN}}$ to the same logic level.

3.2 Receiver Operating Mode

The receiver section accepts data from a MIL-STD-1553 Data Bus when coupled to the Data Bus as shown in Figure 4. This data is converted to TTL levels and provided as RX_DATA_OUT and $\overline{\text{RX\_DATA\_OUT}}$.

When STROBE is high, data passes through the receiver to RX_DATA_OUT and $\overline{\text{RX\_DATA\_OUT}}$. Applying a low to STROBE disables the receiver output terminals. As illustrated in Figure 3, the receiver in the BU-67402 provides compatibility with Harris type decoders.



Notes:
(1) TX_DATA_IN and RX_DATA_OUT are TTL signals.
(2) TX_DATA_IN inputs must be at the same logic level when not transmitting.
(3) LINE-TO-LINE voltage is measured on the Data Bus.

Figure 3. Waveforms for Harris Type Encoder/Decoder

3.3 Waveforms

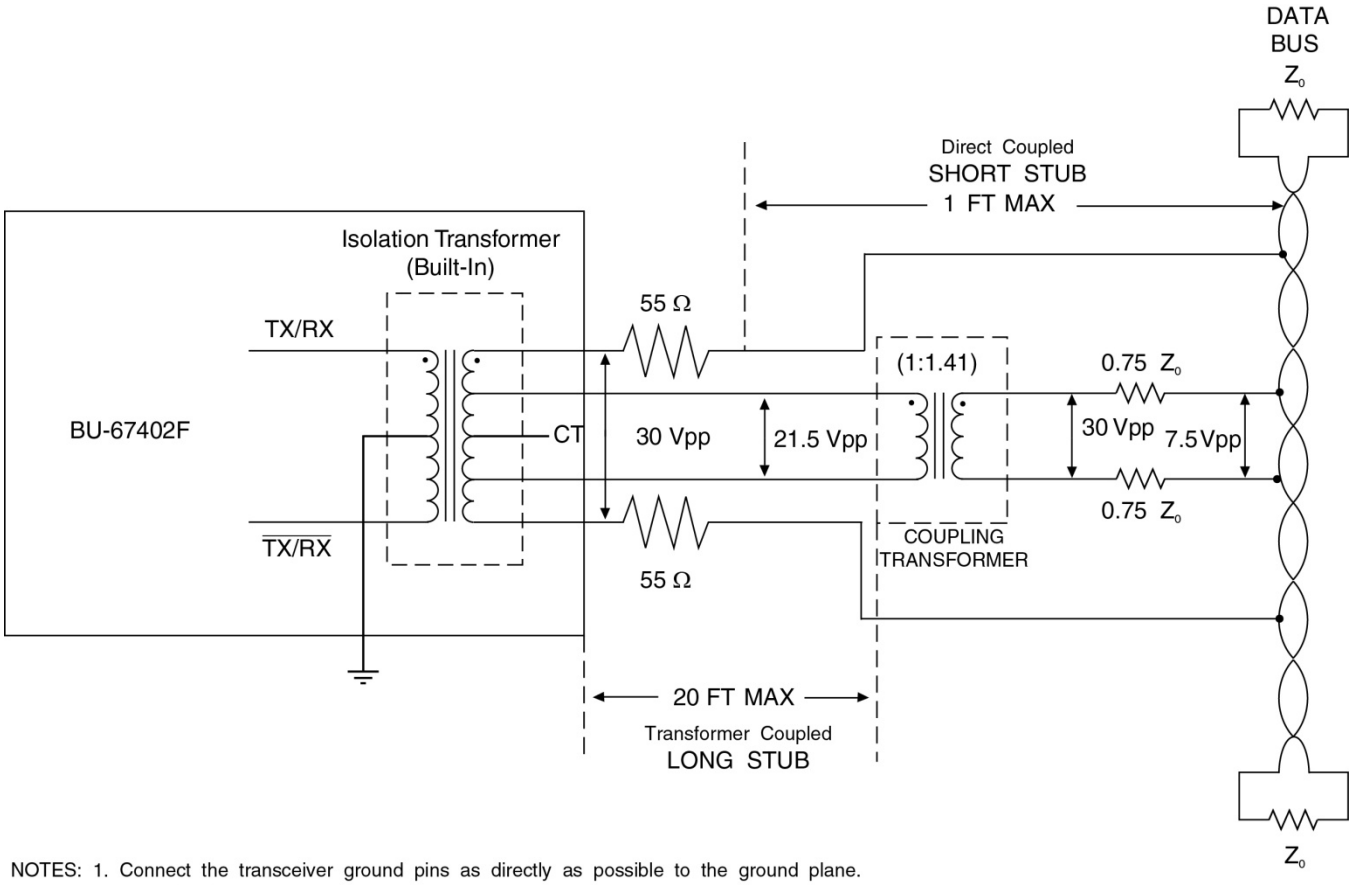
Figure 3 illustrates the BU-67402 with Harris type decoder interface. Note that the TX_DATA_IN and $\overline{\text{TX\_DATA\_IN}}$ inputs must be complementary waveforms with a 50% duty cycle.

3.4 1553 Bus Interface and Layout Considerations

Figure 4 illustrates the interface between the BU-67402 and a MIL-STD-1553 bus. Connections for both direct (short stub) and transformer (long stub) coupling, as well as the peak-to-peak voltage levels at various points (when transmitting), are indicated in the diagram.

It is recommended that a 10 µF low inductance capacitor (tantalum or ceramic) be placed as close as possible to the transceiver power inputs of the BU-67402 for each transceiver channel.

It is also recommended that a 0.01µF ceramic capacitor be mounted as close as possible and with the shortest leads to each transceiver power input of the BU-67402.



NOTES: 1. Connect the transceiver ground pins as directly as possible to the ground plane.
2. Zo = 70 to 85 Ohms.

Figure 4. BU-67402 Interface to a MIL-STD-1553 Bus

3.5 Radiation Tolerance

The BU-67402X3 (5V version) utilizes BiCMOS analog transceivers and has a total gamma dose immunity of $1x10^5$ Rad and an SEU threshold of 85.4 MeV-cm^2/mg.

The BU-67402x8 (3.3V version) utilizes a Silicon ON Insulator (SOI) CMOS technology and has a total gamma dose immunity of $3x10^5$ Rad and an SEE tolerance of 85 MeV-cm^2/mg.

Table 2. BU-67402 Radiation Specifications				
PARAMETER	**MIN**	**TYP**	**MAX**	**UNITS**
Total Dose BU-67402x3 (5V version) BU-67402x8 (3.3V version)	 1×10^5 3×10^5			Rad
Single Event Latchup Immunity	8.54×10^7			eV-cm^2/mg

Note: Radiation parameters specified in this data sheet are derived from initial qualification testing by DDC. These devices have not been evaluated for compliance to the RHA requirements stipulated in MIL-PRF-38534, Appendix G.

3.6 High-Rel Screening

DDC is committed to the design and manufacture of hybrids and transformers with enhanced processing and screening for spaceborne applications and other systems requiring the highest levels of reliability. These platforms include launch vehicles, satellites, and the International Space Station.

DDC has tailored its design methodologies to optimize the fabrication of space level hybrids. The intent of the design guidelines is to minimize the number of die and wirebonds, minimize the number of substrate layers, and maximize the space between components.

The BU-67402 is packaged in a 36-lead ceramic package. The use of ceramic eliminates the hermeticity problems associated with the glass beads used in Kovar (metal) packages. In addition, ceramic packages provide more rigid leads, better thermal properties, easier wirebonding, and lower weight.

The production of the space level hybrids can entail enhanced screening steps beyond DDC's standard flow. This includes Condition A visual inspection, SEM analysis, and element evaluation for all integrated circuit die. For the hybrids, available screening options include Particle Impact Noise Detection (PIND), 320-hour burn-in, 100% non-destructive wirebond pull, X-ray analysis, as well as Destructive Physical Analysis (DPA) testing, extended temperature cycling for QCI testing, and a moisture content limit of 5000 PPM. Table 3 summarizes the procurement screening, element evaluation, and hybrid screening used in the production of the BU-67402.

Table 3. High Reliability Screening Options	
ELEMENT EVALUATION	**METHOD**
Visual Inspection: Integrated Circuits Transistors and Diodes Passive Components	 MIL-STD-883, Method 2010 Condition A MIL-STD-750, Methods 2072 and 2073 MIL-STD-883, Method 2032 Class S
SEM Analysis for Integrated Circuits	MIL-STD-883, Method 2018
Element Evaluation: Visual. Electrical, Wire Bondability, 24-Hour Stabilization Bake, 10 Temperature Cycles, 3000 g's Constant Acceleration, 240-Hour Burn-in and 1000-Hour Life Test (Burn-In and Life Test are only required for active components.)	MIL-PRF-38534
ASSEMBLY AND TEST	**METHOD**
Particle Impact Noise Detection (PIND)	MIL-STD-883, Method 2020 Condition A
320-Hour Burn-In (available on this device)	MIL-STD-883, Method 1015
100% Non-Destructive Wirebond Pull (available on this device)	MIL-STD-883, Method 2023
Radiographic (x-ray) analysis	MIL-STD-883, Method 2012
QCI TESTING	**METHOD**
Extended Temperature Cycling: 20 Cycles including Radiographic (X-Ray) Testing	MIL-STD-883, Method 1010 Condition C and MIL-STD-883, Method 2012
Moisture Content Limit of 5000 PPM	MIL-STD-883, Method 1018

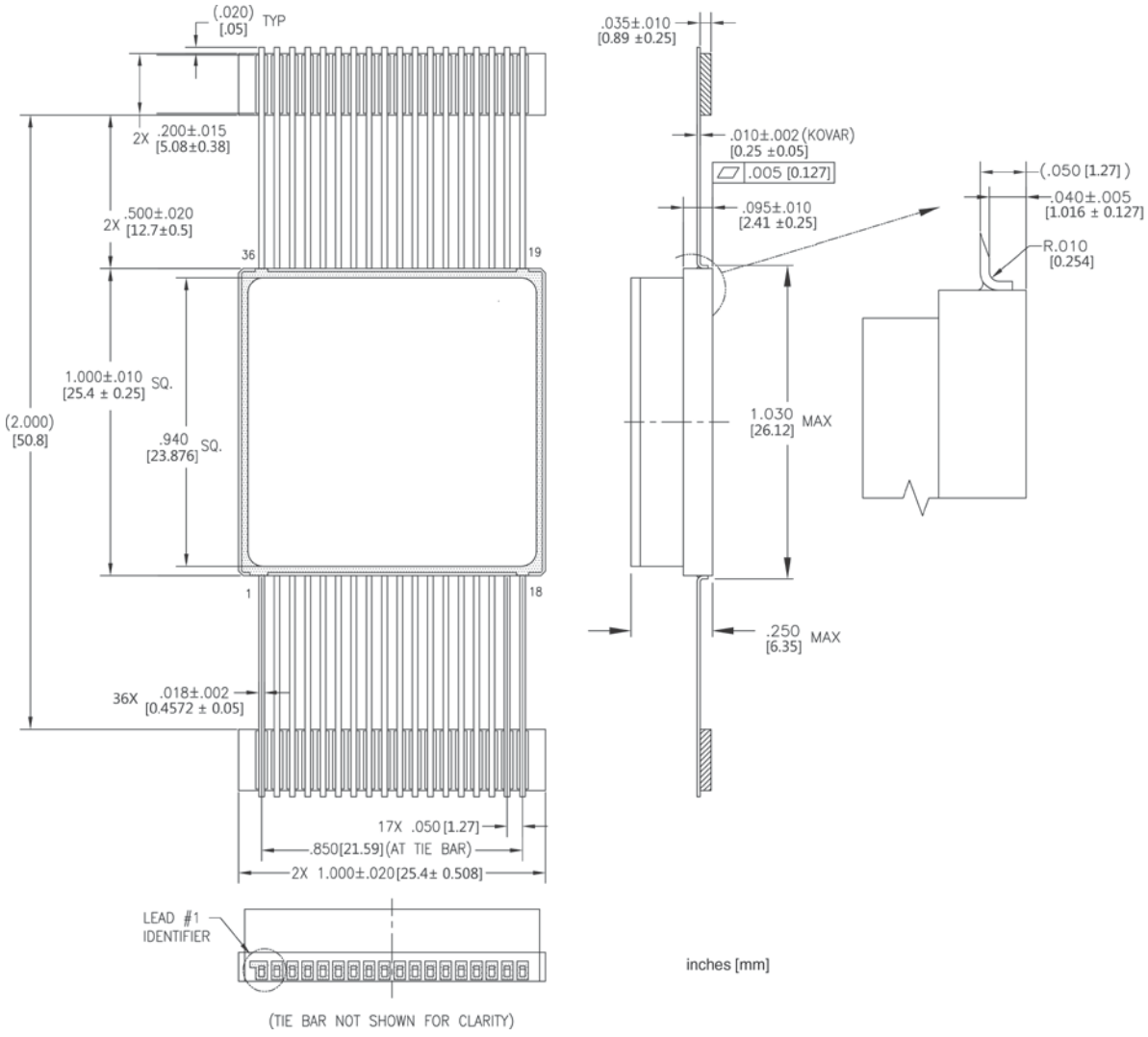


Figure 5. BU-67402 Mechanical Outline – SPACE-PHY 36-pin Flat Package

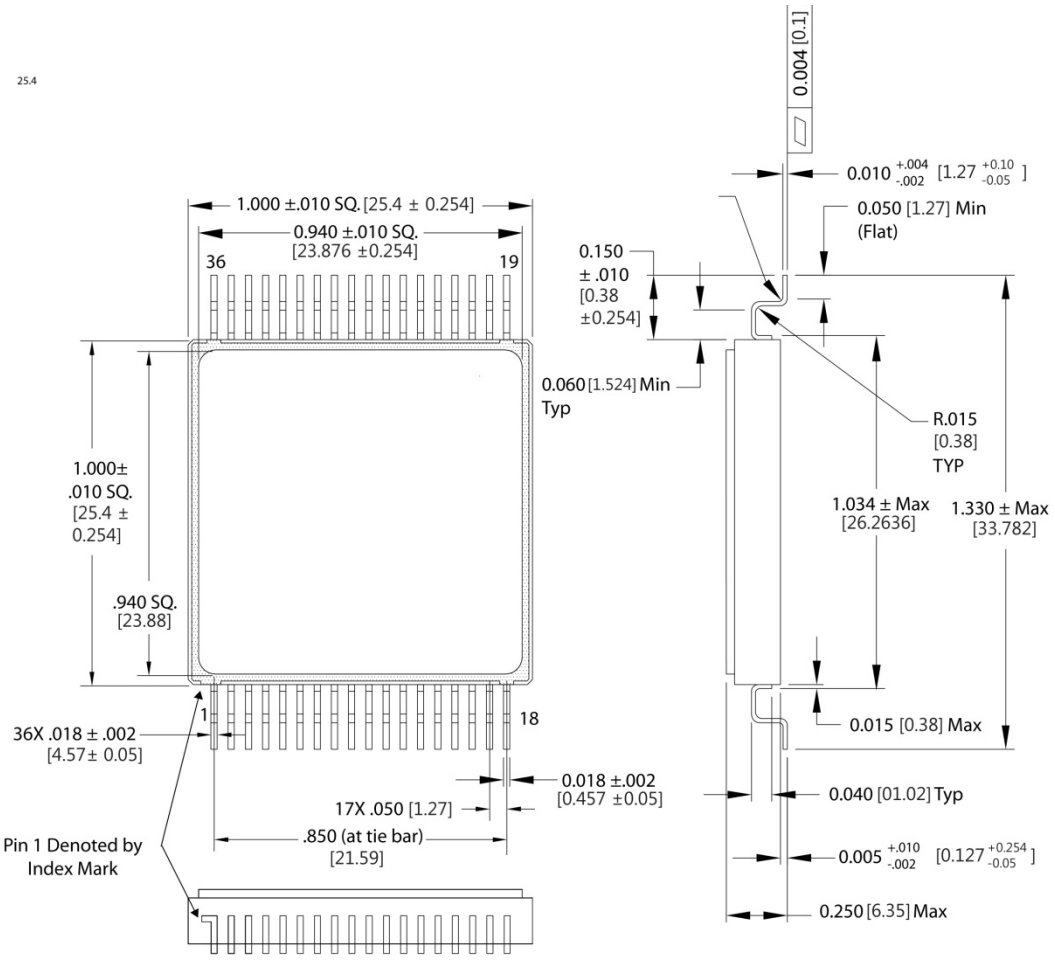


Figure 6. BU-67402 Mechanical Outline – SPACE-PHY 36-pin Gull Wing Package

Table 4. BU-67402 Pad Signal Descriptions					
Pin #	**Name**	**I/O**	**Termination**	**Description**	**Connection**
1	VCCA	PWR	-	+3.3V or +5V power input for Channel A Transceiver	Power
2	GND	GND	-	Digital ground for Channel A and B transceivers	GND
3	RX_STROBE_A	IN	Internal Pull-up	Receive enable for channel A. Drive high to enable channel A receiver. Driving low will force RX_DATA_OUT_A and RX_DATA_OUT_A_L to '0' regardless of input waveform on bus pins.	Functional or Tie HIGH
4	RX_DATA_OUT_A	OUT	-	Complimentary digital receive outputs for channel A. Both signals will be low when the 1553 bus is idle.	Functional
5	RX_DATA_OUT_A_L	OUT	-		Functional

Table 4. BU-67402 Pad Signal Descriptions					
Pin #	**Name**	**I/O**	**Termination**	**Description**	**Connection**
6	TXINH_A	IN	Internal Pull-down	Transmit inhibit for channel A. Drive high to prevent transmission.	Functional
7	TX_DATA_IN_A	IN	Internal Pull-down	Complimentary digital transmit inputs for channel A. Drive both signals low to idle bus when not transmitting.	Functional
8	TX_DATA_IN_A_L	IN	Internal Pull-down		Functional
9	RESERVED	-	Cover Metal Connection	Possible future direct connection to cover metal	GND or Chassis
10	RESERVED	-	-	Do not connect	None
11	RX_STROBE_B	IN	Internal Pull-up	Receive enable for channel B. Drive high to enable channel A receiver. Driving low will force RX_DATA_OUT_A and RX_DATA_OUT_A_L to '0' regardless of input waveform on bus pins.	Functional or Tie HIGH
12	RX_DATA_OUT_B	OUT	-	Complimentary digital receive outputs for channel B. Both signals will be low when the 1553 bus is idle.	Functional
13	RX_DATA_OUT_B_L	OUT	-		Functional
14	TXINH_B	IN	Internal Pull-down	Transmit inhibit for channel B. Drive high to prevent transmission.	Functional
15	TX_DATA_IN_B	IN	Internal Pull-down	Complimentary digital transmit inputs for channel B. Drive both signals low to idle bus when not transmitting.	Functional
16	TX_DATA_IN_B_L	IN	Internal Pull-down		Functional
17	GND	PWR	-	Digital ground for Channel A and B transceivers	GND
18	VCCB	PWR	-	+3.3V or +5V power input for Channel B Transceiver	Power
19	VCCB	PWR	-	+3.3 V or +5V power input for Channel B Transceiver	Power
20	1553BUS_B_DC-N	I/O	Transformer Secondary	Negative direct-coupled stub connection for channel B	1553 Bus
21	1553BUS_B_XC-N	I/O	Transformer Secondary	Negative transformer-coupled stub connection for channel B	1553 Stub
22	1553BUS_B_CT	I/O	Transformer Secondary	Secondary center tap for channel B	Not Recommended
23	1553BUS_B_XC-P	I/O	Transformer Secondary	Positive transformer-coupled stub connection for channel B	1553 Stub
24	1553BUS_B_DC-P	I/O	Transformer Secondary	Positive direct-coupled stub connection for channel B	1553 Bus
25	RESERVED	-	-	Do not connect	None
26	RESERVED	-	-	Do not connect	None
27	AGND	PWR	Transformer Primary	Analog Ground. Primary center tap for both channels. Requires high-current path to ground.	GND
28	AGND	PWR	Transformer Primary		GND
29	RESERVED	-	-	Do not connect	None

Table 4. BU-67402 Pad Signal Descriptions					
Pin #	**Name**	**I/O**	**Termination**	**Description**	**Connection**
30	RESERVED	-	-	Do not connect	None
31	1553BUS_A_DC-N	I/O	Transformer Secondary	Negative direct-coupled stub connection for channel A	1553 Bus
32	1553BUS_A_XC-N	I/O	Transformer Secondary	Negative transformer-coupled stub connection for channel A	1553 Stub
33	1553BUS_A_CT	I/O	Transformer Secondary	Secondary center tap for channel A	Not Recommended
34	1553BUS_A_XC-P	I/O	Transformer Secondary	Positive transformer-coupled stub connection for channel A	1553 Stub
35	1553BUS_A_DC-P	I/O	Transformer Secondary	Positive direct-coupled stub connection for channel A	1553 Bus
36	VCCA	PWR	-	+3.3V or +5V power input for Channel A Transceiver	Power

4 ORDERING INFORMATION

BU-67402F 80H L-X X X X (note 5)

Supplemental Process Requirements:
- S = Pre-Cap Source Inspection
- L = 100% Pull Test
- Q = 100% Pull test and Pre-Cap Source Inspection
- K = One Lot Data Code
- W = One Lot Data Code and Pre-Cap Source Inspection
- Y = One Lot Date Code and 100% Pull Test
- Z = One Lot Date Code, Pre-Cap Source Inspection and 100% Pull Test
- Blank = None of the Above

Other Options:
- 0 = No X-Ray
- 1 = X-Ray

Process Requirements:
- 0 = Standard DDC Processing, no Burn-In
- 1 = MIL-PRF-38534 Compliant (note 1)
- 3 = MIL-PRF-38534 Compliant with PIND Testing (note 1)
- 4 = MIL-PRF-38534 Compliant with Solder Dip (notes 1, 2)
- 5 = MIL-PRF-38534 Compliant with PIND Testing and Solder Dip (notes 1, 2)
- 9 = Standard DDC Processing with Solder Dip, no Burn-In

Temperature Grade/Data Requirements:
- 1 = -55°C to +125°C
- 3 = 0 to 70°C
- 4 = -55°C to +125°C with Variables Test Data

MIL-PRF-38534 Compliance:
- H = Class H
- K = Class K (note 3)

Power Supply Voltage:
- 3 = +5V
- 8 = +3.3V

Package:
- F = Flat Pack
- G = Gull Leads (note 4)

Notes:
1. Standard processing on this device includes 320 hours of burn-in.
2. These products contain tin-lead solder finish as applicable to solder dip requirements.
3. MIL-PRF-38534 Class K requires PIND testing, X-Ray and 100% Pull Test (-X31X or –X51X with L, Q, Y or Z as the last digit)
4. Gull wing package requires solder dip (-X4XX, –X5XX, or –X9XX)

Standard DDC Processing for Hybrid and Monolithic Hermetic Products

Test	MIL-STD-883	
	Method(s)	Condition(s)
Inspection	2009, 2010, 2017, and 2032	—
Seal	1014	A and C
Temperature Cycle	1010	C
Constant Acceleration	2001	3000g
Burn-In	1015 (note 1), 1030 (note 2)	Table 1

Notes:
1. For Process Requirements “B*” (refer to ordering information), devices may be non-compliant with MIL-STD-883, Test Method 1015, Paragraph 3.2. Contact factory for details.
2. When applicable.

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