

BU-63152 MIL-STD-1553 DATA BUS DUAL TRANSCEIVER

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FEATURES

- Only Requires +5V Power Supply
- Small Size - 64 Pin QFP
- Low Power
- Dual Transceiver
- HARRIS I/O Compatibility
- Conforms fully to MIL-STD-1553A, 1553B, AND 1760



DESCRIPTION

The BU-63152 transceiver is a complete dual transmitter and receiver pair conforming fully to MIL-STD-1553A, 1553B, and 1760. Features include: +5V power supply voltage, Harris interface type, completely independent dual redundant operation, and small size (64-pin QFP).

The receiver section of the BU-63152 series accepts phase-modulated bipolar data from a MIL-STD-1553 Data Bus and produces TTL level signals at its outputs: RX DATA OUT and RX DATA OUT. These outputs represent positive and negative variations 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 TX DATA IN inputs and produces phase-modulated bipolar data at the TX DATA OUT and TX DATA OUT outputs. When used with the recommended transformers, the transmitter typically produces 21Vp-p for transformer coupled outputs and 7.2Vp-p at the bus. An external input, INHIBIT, takes priority over the transmitter inputs and disables the transmitter when activated with a logic "1."

The small size, +5V power supply voltage, and compliance with MIL-STD-1553A, 1553B, and 1760 simplify engineering design, making it an excellent choice for interfacing with any MIL-STD-1553 system.

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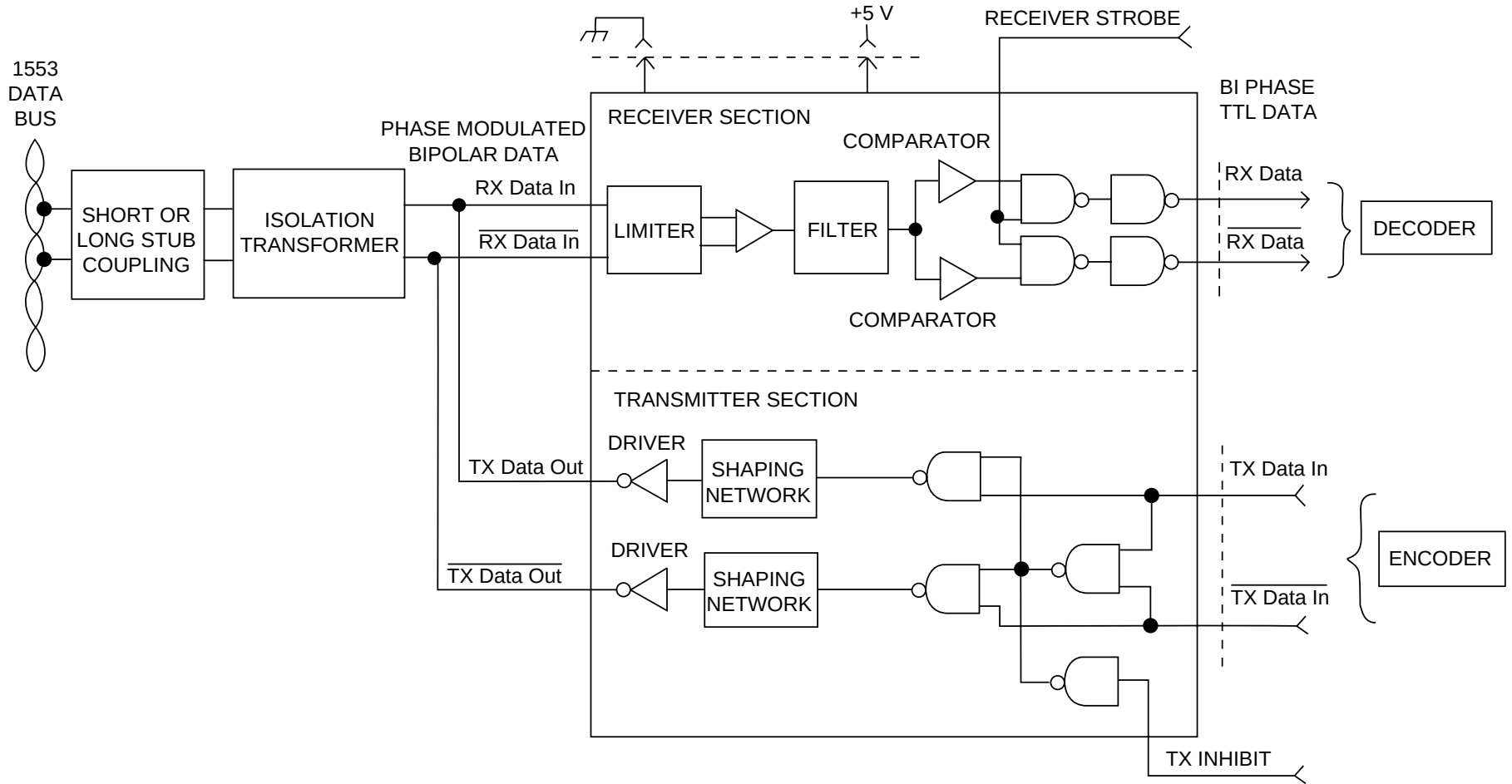


FIGURE 1. BU-63152 BLOCK DIAGRAM

TABLE 1. BU-63152 SPECIFICATIONS				
PARAMETER	MIN	TYP	MAX	UNITS
ABSOLUTE MAXIMUM RATING				
Supply Voltage • +5 V (Vcc)	-0.3	5.0	7.0	V
Receiver • Input Voltage (to transformer)			20	Vp-p
Logic • Voltage Input Range	-0.3		Vcc+0.3	V
RECEIVER				
Differential Input Resistance (Notes 1-6)	2.5			kohm
Differential Input Capacitance (Notes 1-6)			5	pF
Threshold Level (Note 7)	0.20		0.860	Vp-p
Common Mode Voltage (Note 8)			10	Vpeak
TRANSMITTER				
Differential Output Voltage • Direct Coupled Across 35 Ω , Measured on Bus	6	7.4	9	Vp-p
Transformer Coupled Across • 70 Ω , Measured on Stub (Note 9)	20	22	27	Vp-p
Output Noise, Differential (Direct Coupled)			10	mVp-p, diff
Dynamic Output Offset Voltage, Transformer Coupled Across 70 Ω	-250	0	+250	mVp-p, diff
Rise/Fall Time	100	150	300	ns
LOGIC				
V _{IH}	2.0		Vcc	V
V _{IL}	0		0.8	V
I _{IH} (TXIN, TXIN, TXINHIBIT)	20		100	μ A
I _{IH} (STROBE)			0	μ A
I _{IL} (TXIN, TXIN, TXINHIBIT)	0			μ A
I _{IL} (STROBE)	-100		-20	μ A
V _{OH} (Vcc=4.75V, I _{OH} =max)	4.0		0	V
V _{OL} (Vcc=4.75V, I _{OL} =min)			0.4	V
I _{OL}	4.0		0	mA
I _{OH}			-2.4	mA
POWER SUPPLY REQUIREMENTS				
Voltages/Tolerances • +5V	4.75	5.0	5.5	V
Current Drain (Both Channels) • Idle			100	mA
• 25% Transmitter Duty Cycle (One Channel Transmitting)			216	mA
• 50% Transmitter Duty Cycle (One Channel Transmitting)			332	mA
• 100% Transmitter Duty Cycle (One Channel Transmitting)			565	mA
POWER DISSIPATION, Vcc=5.0V				
One Channel (Note 10) • Idle			.25	W
• 25% Transmitter Duty Cycle			.5	W
• 50% Transmitter Duty Cycle			.7	W
• 100% Transmitter Duty Cycle			1.2	W

TABLE 1. BU-63152 SPECIFICATIONS (CONT.)				
PARAMETER	MIN	TYP	MAX	UNITS
THERMAL				
• Operating Ambient Temperature	-55		85	°C
• Thermal Resistance, Junction- to-Ambient (Either Channel) (Note 11)		40	45	°C/W
• Operating Junction Temperature	-55		150	°C
• Storage Temperature	-65		150	°C
• Lead Temperature (soldering, 10 sec.)			+300	°C
PHYSICAL CHARACTERISTICS				
Package	64-Pin QFP			
Size	14.00 x 14.00 x 2.00 (0.551 x 0.551 x 0.079)			mm (in)
Weight	0.5 (14)			oz (g)

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

- Specifications include both transmitter and receiver (assumed tied together externally).
- Impedance parameters are specified directly between pins TX/RX A(B) and TX/RX A(B) of the hybrid.
- It is assumed that all power and ground inputs to the hybrid are connected.
- The specifications are applicable for both unpowered and powered conditions.
- The specifications assume a 2 volt rms balanced, differential, sinusoidal input. The applicable frequency range is 75 kHz to 1 MHz.
- Minimum resistance and maximum capacitance parameters are guaranteed over the operating range, but are not tested.
- The Threshold Level, as referred to in this specification, is meant to be the maximum peak-to-peak voltage (measured on the stub) that can be applied to the receiver's input without causing the output to change from the OFF state.
- Assumes a common mode voltage within the frequency range of dc to 2 MHz, applied to pins of the isolation transformer on the stub side (either direct or transformer coupled), and referenced to transceiver ground. Transformer must be a DDC recommended transformer or other transformer that provides an equivalent minimum CMRR.
- MIL-STD-1760 requires minimum output voltage of 20 Vp-p on the stub connection.
- Power dissipation specifications assume a transformer coupled configuration, with external dissipation (while transmitting) of 0.14 watts for the active isolation transformer, 0.08 watts for the active coupling transformer, 0.45 watts for each of the two bus isolation resistors, and 0.15 watts for each of the two bus termination resistors.
- Thermal resistance, Junction-to-Ambient (Either Channel) applies when the device is soldered to a 4 in x 4 in x 0.060 in (FR4 or equivalent) PC board with a "1-oz" (1.4 mil thickness) ground-plane layer on the back of the board, positioned horizontally in still air.

GENERAL

The BU-63152 is a dual redundant transmitter and receiver packaged in a 64-pin QFP. It is directly compatible to Harris 15530 encoder/decoder and has internal (factory preset) threshold levels. Requiring only a +5V power supply, the BU-63152 is designed for use in any MIL-STD-1553 application.

FIGURE 1 shows a BU-63152 transceiver connected to a MIL-STD 1553 Data Bus. Once transformer isolated, coupling to a MIL-STD-1553 Data Bus can be either short stub (direct) or long (transformer). The recommended transformer for long and short stub coupling is Beta P/N B-3226 (through hole) or B-3227 (surface mount). There are other transformer configurations available from Beta. Reference FIGURE 3 and TABLE 2.

TRANSMIT OPERATING MODE

The transmitter section accepts encoded TTL data and converts it to phase-modulated differential format by means of a wave-shaping network and driver circuitry. These driver outputs are coupled to a MIL-STD-1553 Data Bus via a transformer which is driven from the TX DATA OUT and TX DATA OUT terminals. These output terminals can be put into a high impedance state when transmitting by bringing the respective TX_INHIBIT input to logic "1", or by placing both inputs at the same logic level. TABLE 3, Transmit Operating Mode, lists the functions for the output data and input data in reference to the state of INHIBIT.

The transceivers are able to operate in a "wraparound" mode. This allows output data to be monitored by the receiver section and returned to the decoder where it can be checked for errors.

RECEIVER OPERATING MODE

The receiver section accepts data from a MIL-STD-1553 Data Bus when properly coupled in either of the two possible configurations (long or short stub). This data is converted to bi-phase TTL and made available for decoding at the RX DATA and RX DATA terminals. Applying a logic "1" to the STROBE input allows data to pass through to the receiver output. Applying a logic "0" to the STROBE input turns the receiver output OFF.

The BU-63152 receiver outputs are both at a logic "0" when they are either strobed off, or no signal is being received. This is directly compatible with a "Harris" type of encoder/decoder. Compatibility to a "Smiths" type of encoder/decoder may be accomplished by swapping the RX DATA OUT and RX DATA OUT outputs and then inverting them (see FIGURE 4).

BU-63152 WAVEFORMS

FIGURE 2 illustrates the waveforms for the BU-63152. Note that DATA and DATA inputs must be complementary waveforms of 50% average duty cycle while transmitting.

PULSE TRANSFORMERS

Interfacing the BU-63152 to a MIL-STD-1553 bus requires pulse transformers. Beta Transformer Technology Corporation (BTTC), a subsidiary of DDC, manufactures transformers in a variety of mechanical configurations with the required turn ratios of 1:2.5 direct coupled and/or 1:1.79 transformer coupled. TABLE 2 provides a listing of many of these. For further information, contact BTTC at 631-244-7393 or at www.bttc-beta.com.

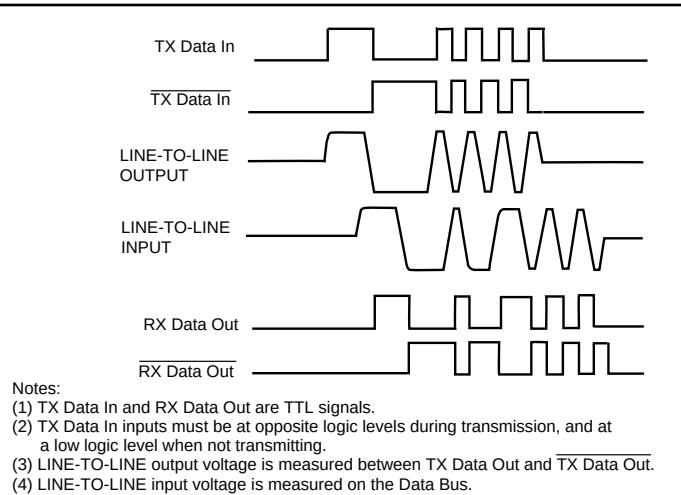


FIGURE 2. TYPICAL OPERATING WAVEFORMS

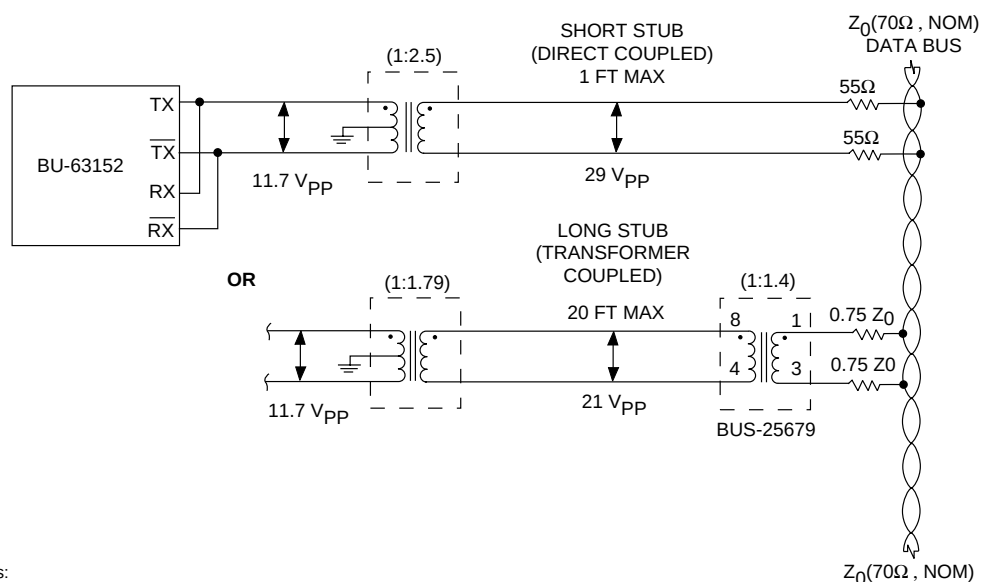


FIGURE 3. BUS COUPLING CONFIGURATIONS

TABLE 2. RECOMMENDED BETA TRANSFORMERS FOR USE WITH BU-63152

TRANSFORMER CONFIGURATION	BTTC PART NO.
Single epoxy transformer, through-hole, 0.625 X 0.625, 0.250" max height	B-3226
Single epoxy transformer, through-hole, 0.625 X 0.625, 0.220" max height.	B-3818
Single epoxy transformer, flat pack, 0.625" X 0.625", 0.275" max height	B-3231
Single epoxy transformer, surface mount, 0.625" X 0.625", 0.275" max height	B-3227
Single epoxy transformer, surface mount, hi-temp solder, 0.625" X 0.625", 0.220" max height.	B-3819
Single epoxy transformer, surface mount, 0.625" X 0.625", 0.160" max height	B-3257
Single epoxy transformer, surface mount, 0.625" X 0.625", 0.220" max height	B-3072
Single epoxy transformer, through-hole, 0.625" X 0.625", 0.220" max height	B-3067
Single epoxy transformer, through-hole, 0.625" X 0.625", 0.275" max height	B-3225
Single epoxy transformer, through-hole, 0.500" X 0.350", 0.250" max height	B-3229
Dual epoxy transformer, side by side, through-hole, 0.930" X 0.630", 0.155" max height	B-3300
Dual epoxy transformer, side by side, flat pack, 0.930" X 0.630", 0.155" max height	B-3261
Dual epoxy transformer, side by side, surface mount, 0.930" X 0.630", 0.155" max height	B-3310
Dual epoxy transformer, flat pack, 0.625" X 0.625", 0.220" max height	B-3820
Single metal transformer, hermetically sealed, flat pack, 0.630" X 0.630", 0.175" max height	HLP-6014
Single metal transformer, hermetically sealed, surface mount, 0.630" X 0.630", 0.175" max height	HLP-6015
Single epoxy transformer, flat pack, 0.625" X 0.625", 0.150" max height	LPB-5014
Single epoxy transformer, surface mount, 0.625" X 0.625", 0.150" max height	LPB-5015
Dual epoxy transformer, twin stacked, 0.625" X 0.625", 0.280" max height	TST-9007
Dual epoxy transformer, twin stacked, surface mount, 0.625" X 0.625", 0.280" max height	TST-9017
Dual epoxy transformer, twin stacked, flat pack, 0.625" X 0.625", 0.280" max height	TST-9027
Dual epoxy transformer, twin stacked, pc mount, 0.625" X 0.625", 0.280" max height	TST-9107
Dual epoxy transformer, twin stacked, surface mount, 0.625" X 0.625", 0.320" max height	TST-9117
Dual epoxy transformer, twin stacked, flat pack, 0.625" X 0.625", 0.320" max height	TST-9127

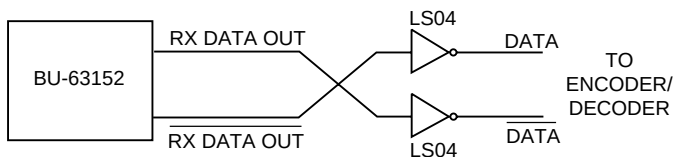
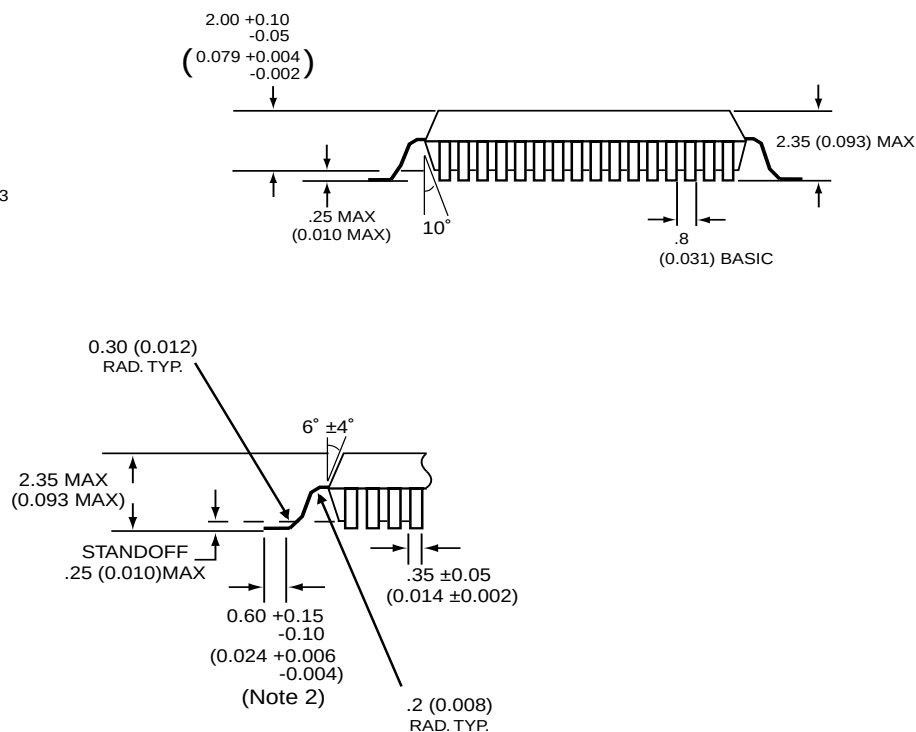
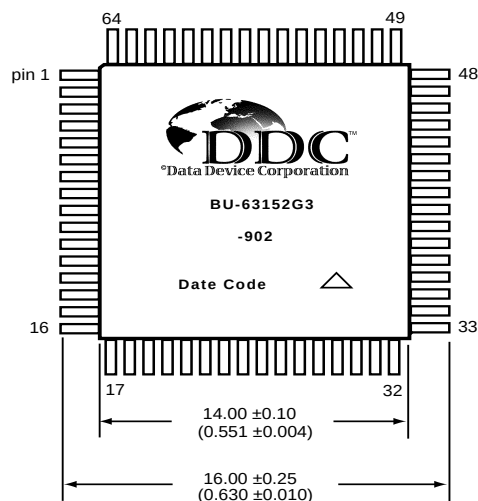


FIGURE 4. SMITHS ENCODER/DECODER COMPATIBILITY

TABLE 3. TRANSMIT OPERATING MODE			
TX Data In	$\overline{\text{TX Data In}}$	TX INHIBIT	DRIVER OUTPUT ⁽²⁾
X	X	H	OFF ⁽³⁾
0	0	X	OFF
0	1	L	ON ⁽⁴⁾
1	0	L	ON ⁽⁴⁾
1	1	X	OFF

Notes:

- (1) X = Don't Care
- (2) DRIVER OUT = TX Data Out and $\overline{\text{TX Data Out}}$.
- (3) DRIVER OUTPUT terminals are in the high impedance mode during OFF time, independent of INHIBIT status.
- (4) TX Data In and $\overline{\text{TX Data In}}$ must be switching (as shown in FIGURE 2) and must not be set in a "static" I/O or O/I condition.



Notes:

- (1) Dimensions shown are in millimeters (inches)
- (2) Foot length is measured at gage plane, 6.4 (0.25) above seating plane.

FIGURE 5. BU-63152 OUTLINE DRAWING

TABLE 4. BU-63152 PIN FUNCTIONS

PIN	FUNCTION	CHANNEL
1	GND	A
2	TX Data Out	A
3	TX Data Out	A
4	+5V	A
5	+5V	A
6	TX Data Out	A
7	TX Data Out	A
8	GND	B
9	Factory Test Input *	B
10	Factory Test Input *	B
11	GND	B
12	+5V	B
13	+5V	B
14	RX Data Out	B
15	Strobe	B
16	RX Data Out	B
17	Factory Test Input *	B
18	GND	B
19	+5V	B
20	+5V	B
21	+5V	B
22	GND	B
23	GND	B
24	GND	B
25	RX Data In	B
26	RX Data In	B
27	Factory Test Output *	B
28	+5V	B
29	+5V	B
30	TX Inhibit	B
31	TX Data In	B
32	TX Data In	B

TABLE 4. BU-63152 PIN FUNCTIONS (CONT.)

PIN	FUNCTION	CHANNEL
33	GND	B
34	TX Data Out	B
35	TX Data Out	B
36	+5V	B
37	+5V	B
38	TX Data Out	B
39	TX Data Out	B
40	GND	A
41	Factory Test Input *	A
42	Factory Test Input *	A
43	GND	A
44	+5V	A
45	+5V	A
46	RX Data Out	A
47	Strobe	A
48	RX Data Out	A
49	Factory Test Input *	A
50	GND	A
51	+5V	A
52	+5V	A
53	+5V	A
54	GND	A
55	GND	A
56	GND	A
57	RX Data In	A
58	RX Data In	A
59	Factory Test Output *	A
60	+5V	A
61	+5V	A
62	TX Inhibit	A
63	TX Data In	A
64	TX Data In	A

* Do not connect ; factory test points.

ORDERING INFORMATION

BU-63152G3-902

Test Criteria:

2 = MIL-STD-1760 Amplitude Compliant

Process Requirements:

0 = Standard DDC Processing, no Burn-In

Temperature Grade/Data Requirements:

9 = -55 to +85°C, Ambient

Rise/Fall Times Option:

3 = Rise/Fall times = 100 to 300 ns

Package Type:

G = Quad Gull Lead Package

Base Product Type:

BU-63152 = Dual +5V Plastic QFP Transceiver

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



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