Bt501

Bt502

ECL/TTL Octal Transceiver and Translator

Distinguishing Features

- 10KH or 100K ECL Compatibility
- Optional Single +5 V Operation
- Separate TTL and ECL Supply Pins
- Three-Statable TTL Pins
- TTL-Compatible Control Inputs
- 24-pin 0.3" DIP Package
- Typical Power Dissipation: 800 mW

Benefits

- Flexible Power Supply
- Reduced Component Count
- Simplified PCB Layout
- Reduced PCB Interconnect
- Low Bus Loading

Product Description

The Bt501 and Bt502 are octal ECL/TTL bidirectional transceivers and translators. The Bt501 is 10KH ECL compatible, and the Bt502 is 100K ECL compatible.

The direction and output-enable control inputs are TTL compatible to simplify interfacing to a standard MPU.

Both devices provide a bidirectional interface between TTL signals and ECL signals. The ECL input/output signals may be generated from normal ECL, single +5 V, or split ECL supplies.

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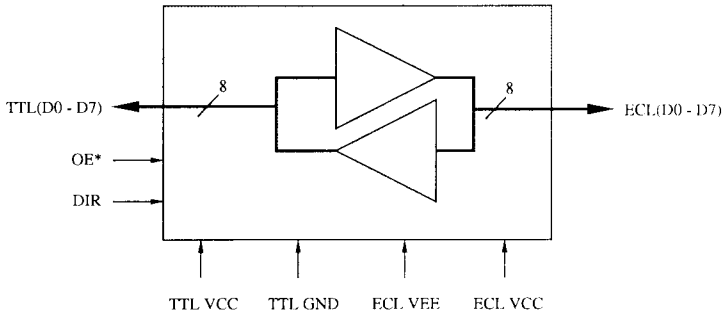
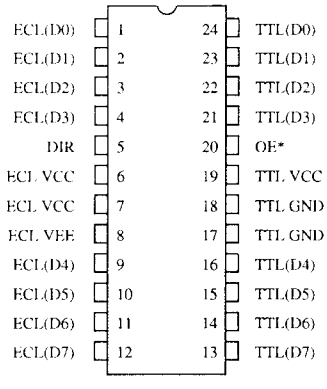
Functional Block Diagram





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L501001 Rev. H

Brooktree®

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Supply Pin	Nominal Voltages Applied		
	Single-Supply System	Dual-Supply System	Split ECL Supply
TTL VCC	+5.0 V	+5.0 V	+5.0 V
TTL GND	0 V	0 V	0 V
ECL VCC	+5.0 V	0 V	+ 2.0 V
ECL VEE	0 V	–5.2 V	–3.2 V

Bt501 Supply Operation.

Supply Pin	Nominal Voltages Applied		
	Single-Supply System	Dual-Supply System	Split ECL Supply
TTL VCC	+5.0 V	+5.0 V	+5.0 V
TTL GND	0 V	0 V	0 V
ECL VCC	+5.0 V	0 V	+ 2.0 V
ECL VEE	0 V	–4.5 V	–2.5 V

The TTL (D0–D7), DIR, and OE* pins are TTL compatible regardless of the ECL power supply parameters. Changing the ECL power supply parameters affects the threshold levels of only the ECL(D0–D7) pins.

Bt502 Supply Operation.

DIR	OE*	Function
0	0	TTL (D0–D7) --> ECL (D0–D7)
1	0	ECL (D0–D7) --> TTL (D0–D7)
x	1	TTL (D0–D7) three-stated, ECL (D0–D7) = 0

Control Truth Table.

Bt501—Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Units
TTL Device Ground	TTL GND	0	0	0	V
ECL Device Ground	ECL VCC	0	0	0	V
TTL Power Supply	TTL VCC	+4.75	+5.0	+5.25	V
ECL Power Supply	ECL VEE	–4.9	–5.2	–5.5	V
Ambient Operating Temperature	TA	0		+70	°C

Thermal equilibrium is established by applying power for at least 2 minutes while maintaining a transverse air flow of 400 linear feet per minute over the device mounted either in the test socket or on the printed circuit board.

Bt501—Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Units
ECL VEE (measured to ECL VCC)				–8.0	V
TTL VCC (measured to TTL GND)				+7.0	V
Voltage on Any ECL Pin		ECL VCC		ECL VEE	V
Voltage on Any TTL Pin		TTL GND –0.5		TTL VCC +0.5	V
ECL(D0–D7) Output Current				–50	mA
Ambient Operating Temperature	TA	–55		+125	°C
Storage Temperature	TS	–65		+150	°C
Junction Temperature	TJ			+175	°C
Soldering Temperature (5 seconds, 1/4" from pin)	TSOL			260	°C

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only, and functional operation of the device at these or any other conditions above those listed in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Bt501—ECL DC Characteristics

Parameter	Symbol	TA (°C)	Min	Typ	Max	Units
Input High Voltage (Note 1)	VIH	0 +25 +70	–1170 –1130 –1070		–840 –810 –735	mV mV mV
Input Low Voltage (Note 1)	VIL	0 +25 +70	–1950 –1950 –1950		–1480 –1480 –1450	mV mV mV
Output High Voltage (Note 1)	VOH	0 +25 +70	–1020 –980 –920		–840 –810 –735	mV mV mV
Output Low Voltage (Note 1)	VOL	0 +25 +70	–1950 –1950 –1950		–1630 –1630 –1600	mV mV mV
Input High Current (Vin = VIHmax)	IIH	FULL			10	µA
ECL VEE Supply Current	IEE	FULL			85	mA

Test conditions (unless otherwise specified): "Recommended Operating Conditions" with ECL (D0–D7) loading of 50 Ω to –2.0 V. Typical values are based on nominal temperature, i.e., room temperature, and nominal voltage, i.e., 5 V.

The specified limits shown can be met only after thermal equilibrium has been established. Thermal equilibrium is established by applying power for at least 2 minutes while maintaining a transverse air flow of 400 linear feet per minute over the device mounted either in the test socket or on the printed circuit board.

Note 1: Relative to ECL VCC.

Bt501—TTL DC Characteristics

Parameter	Symbol	Min	Typ	Max	Units
Input High Voltage (Note 1)	VIH	2.0		TTL VCC +0.5	V
Input Low Voltage (Note 1)	VIL	TTL GND –0.5		0.8	V
Input High Current (Vin = 2.4 V)	IIH			70	µA
Input Low Current (Vin = 0.4 V)	IIL			–0.7	mA
Output High Voltage (Note 1) (IOH = –2.0 mA)	VOH	2.5			V
Output Low Voltage (Note 1) (IOL = 16 mA)	VOL			0.5	V
Three-State Output Current	IOZ				
Vout = VOHmin				10	µA
Vout = VOLmax				–10	µA
TTL VCC Supply Current	ICC			95	mA
TTL(D0–D7) Short Circuit Output Current	IOS	–40		–150	mA

Test conditions (unless otherwise specified): "Recommended Operating Conditions" with ECL (D0–D7) loading of 50 Ω to –2.0 V. Typical values are based on nominal temperature, i.e., room temperature, and nominal voltage, i.e., 5 V.

Note 1: Relative to TTL GND.

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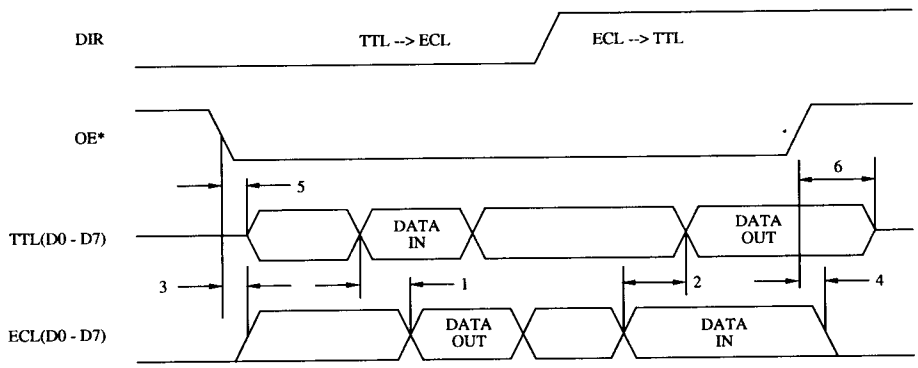
Bt501—AC Characteristics

Parameter	Symbol	Min	Typ	Max	Units
TTL --> ECL Propagation Delay	1	0.5		7	ns
ECL --> TTL Propagation Delay	2	2		11	ns
ECL (D0–D7) Enable Time	3	2		11	ns
ECL (D0–D7) Disable Time (Note 1)	4	3		11	ns
TTL (D0–D7) Enable Time	5	0.5		6.5	ns
TTL (D0–D7) Disable Time (Note 1)	6	0.5		6.5	ns

Test conditions (unless otherwise specified): "Recommended Operating Conditions" with ECL (D0–D7) loading of 50 Ω to –2.0 V. TTL input values are 0–3 V with input rise/fall times ≤ 4 ns, measured between the 10-percent and 90-percent points. ECL input values are –2.0 to –0.80 V with input rise/fall times ≤ 2 ns, measured between the 20-percent and 80-percent points. Timing reference points at 50 percent for inputs and outputs. Typical values are based on nominal temperature, i.e., room temperature, and nominal voltage, i.e., 5 V.

Note 1: Subject to capacitive loading.



Input/Output Timing.

Bt502—Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Units
TTL Device Ground	TTL GND	0	0	0	V
ECL Device Ground	ECL VCC	0	0	0	V
TTL Power Supply	TTL VCC	+4.75	+5.0	+5.25	V
ECL Power Supply	ECL VEE	–4.2	–4.5	–4.8	V
Ambient Operating Temperature	TA	0		+85	°C

Thermal equilibrium is established by applying power for at least 2 minutes while maintaining a transverse air flow of 400 linear feet per minute over the device mounted either in the test socket or on the printed circuit board.

Bt502—Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Units
ECL VEE (measured to ECL VCC)				–8.0	V
TTL VCC (measured to TTL GND)				+7.0	V
Voltage on Any ECL Pin		ECL VCC		ECL VEE	V
Voltage on Any TTL Pin		TTL GND –0.5		TTL VCC +0.5	V
ECL (D0–D7) Output Current				–50	mA
Ambient Operating Temperature	TA	–55		+125	°C
Storage Temperature	TS	–65		+150	°C
Junction Temperature	TJ			+175	°C
Soldering Temperature (5 seconds, 1/4" from pin)	TSOL			260	°C

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only, and functional operation of the device at these or any other conditions above those listed in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Bt502—ECL DC Characteristics

Parameter	Symbol	Min	Typ	Max	Units
Input High Voltage (Note 1) Input Low Voltage (Note 1)	VIH VIL	–1165 –1810		–880 –1475	mV mV
Output High Voltage (Note 1) Output Low Voltage (Note 1)	VOH VOL	–1025 –1810	–955 –1705	–880 –1620	mV mV
Input High Current (Vin = VIH max)	IIH			10	µA
ECL VEE Supply Current	IEE			85	mA

See notes below.

Bt502—TTL DC Characteristics

Parameter	Symbol	Min	Typ	Max	Units
Input High Voltage (Note 2)	VIH	2.0		TTL VCC +0.5	V
Input Low Voltage (Note 2)	VIL	TTL GND –0.5		0.8	V
Input High Current (Vin = 2.4 V)	IIH			70	µA
Input Low Current (Vin = 0.4 V)	IIL			–0.7	mA
Output High Voltage (Note 2) (IOH = –2.0 mA)	VOH	2.5			V
Output Low Voltage (Note 2) (IOL = 16 mA)	VOL			0.5	V
Three-State Output Current Vout = VOHmin Vout = VOLmax	IOZ			10 –10	µA µA
TTL VCC Supply Current	ICC			95	mA
TTL (D0–D7) Short Circuit Output Current	IOS	–40		–150	mA

Test conditions (unless otherwise specified): "Recommended Operating Conditions" with ECL (D0–D7) loading of 50 Ω to –2.0 V. Typical values are based on nominal temperature, i.e., room temperature, and nominal voltage, i.e., 5 V.

The specified limits shown can be met only after thermal equilibrium has been established. Thermal equilibrium is established by applying power for at least 2 minutes while maintaining a transverse air flow of 400 linear feet per minute over the device mounted either in the test socket or on the printed circuit board.

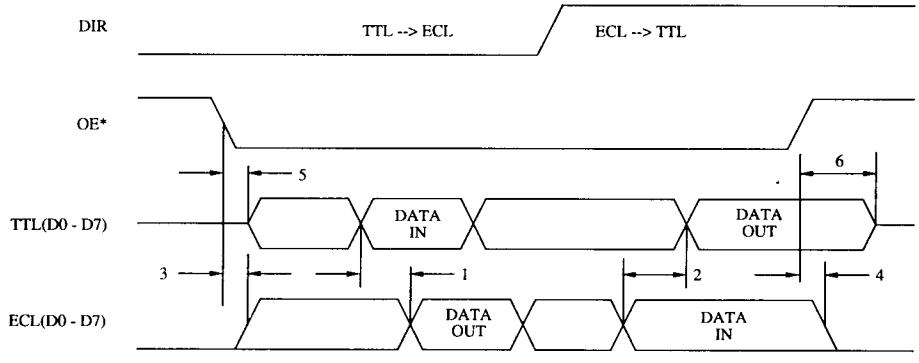
Note 1: Relative to ECL VCC
Note 2: Relative to TTL GND

Bt502—AC Characteristics

Parameter	Symbol	Min	Typ	Max	Units
TTL --> ECL Propagation Delay (Note 1) ECL --> TTL Propagation Delay (Note 1)	1 2	0.5 2		7 11	ns ns
ECL (D0–D7) Enable Time ECL (D0–D7) Disable Time (Note 1)	3 4	2 3		11 11	ns ns
TTL(D0–D7) Enable Time TTL(D0–D7) Disable Time (Note 1)	5 6	0.5 0.5		6.5 6.5	ns ns

Test conditions (unless otherwise specified): "Recommended Operating Conditions" with ECL(D0–D7) loading of 50 Ω to –2.0 V. TTL input values are 0–3 V with input rise/fall times ≤ 4 ns, measured between the 10-percent and 90-percent points. ECL input values are –0.80 to –2.0 V with input rise/fall times ≤ 2 ns, measured between the 20-percent and 80-percent points. Timing reference points at 50 percent for inputs and outputs. Typical values are based on nominal temperature, i.e., room temperature, and nominal voltage, i.e., 5 V.

Note 1: Subject to capacitive loading.



Input/Ouput Timing.

Ordering Information

Model Number	Compatibility	Package	Ambient Temperature Range
Bt501KC	10KH ECL	24-pin 0.3" CERDIP	0° to +70° C
Bt502KC	100K ECL	24-pin 0.3" CERDIP	0° to +85° C