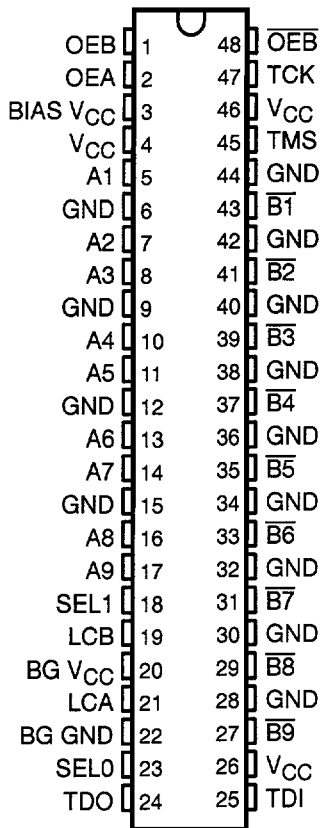


# SN54FB2031, SN74FB2031 9-BIT TTL/BTL ADDRESS/DATA TRANSCEIVERS

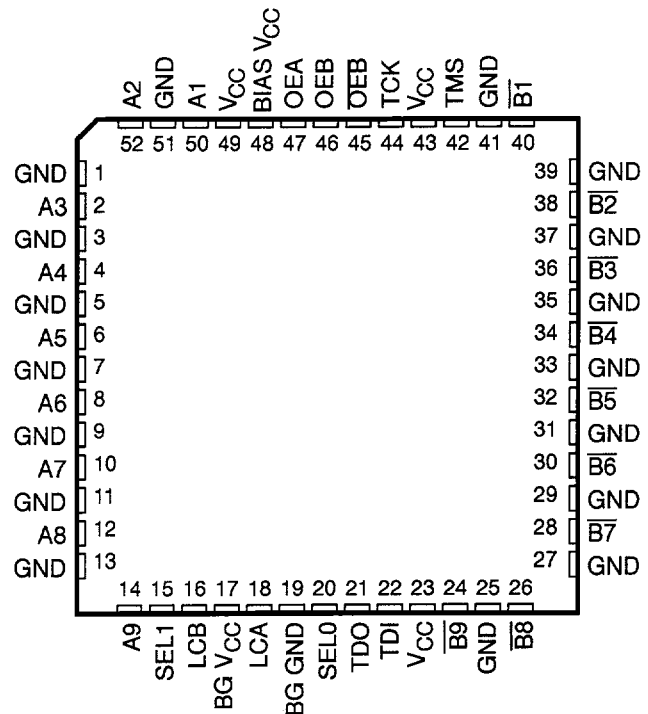
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- Compatible With IEEE 1194.1-1991 (BTL) and IEEE 896.2-1991 (Futurebus+) Standards
- TTL A Port, Backplane Transceiver Logic  $\overline{B}$  Port
- Open-Collector  $\overline{B}$ -Port Outputs Sink 100 mA
- Minimum  $\overline{B}$ -Port Edge Rate = 2 ns
- Isolated Logic-Ground and Bus-Ground Pins Reduce Noise
- BIAS  $V_{CC}$  Pin Minimizes Signal Distortion During Live Insertion/Withdrawal
- Available in Plastic Quad Flatpack (RC) and Ceramic Flatpack (WD) Packages
- $\overline{B}$ -Port Biasing Network Preconditions the Connector and PC Trace to the Backplane Transceiver Logic High-Level Voltage
- TTL-Input Structures Incorporate Active Clamping Networks to Aid in Line Termination

SN54FB2031 . . . WD PACKAGE  
(TOP VIEW)



SN74FB2031 . . . RC PACKAGE  
(TOP VIEW)



PRODUCT PREVIEW

## description

The 'FB2031 is a 9-bit transceiver designed to translate signals between TTL and backplane transceiver logic (BTL) environments. It is specifically designed to be compatible with IEEE 1194.1-1991 (BTL) and IEEE 896.2-1991 (Futurebus+) standards.

The  $\overline{B}$  port operates at BTL-signal levels. The open-collector  $\overline{B}$  ports are specified to sink 100 mA and have minimum output edge rates of 2 ns. Two output enables, OEB and  $\overline{OEB}$ , are provided for the  $\overline{B}$  outputs. When OEB is low,  $\overline{OEB}$  is high, or  $V_{CC}$  is typically less than 2.5 V, the  $\overline{B}$  port is turned off.

The A port operates at TTL-signal levels. The A outputs reflect the inverse of the data at the  $\overline{B}$  port when the A-port output enable, OEA, is high. When OEA is low or when  $V_{CC}$  is typically less than 2.5 V, the A outputs are in the high-impedance state.

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## description (continued)

Pins are allocated for the four-wire IEEE 1149.1 (JTAG) test bus, which will be implemented in a future version of the 'FB2031. Currently TMS and TCK are not connected and TDI is shorted to TDO.

BIAS  $V_{CC}$  establishes a voltage between 1.62 V and 2.1 V on the BTL outputs when  $V_{CC}$  is not connected.

BG  $V_{CC}$  and BG GND are the supply inputs for the bias generator.

The SN54FB2031 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74FB2031 is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

TRANSCEIVER FUNCTION TABLE

INPUTS			FUNCTION
OEA	OEB	OEB	
L	H	L	$\bar{A}$ data to B bus
H	L	X	$\bar{B}$ data to A bus
H	X	H	$\bar{B}$ data to A bus
H	H	L	$\bar{A}$ data to B bus, $\bar{B}$ data to A bus
L	L	X	Isolation
L	X	H	

STORAGE MODE TABLE

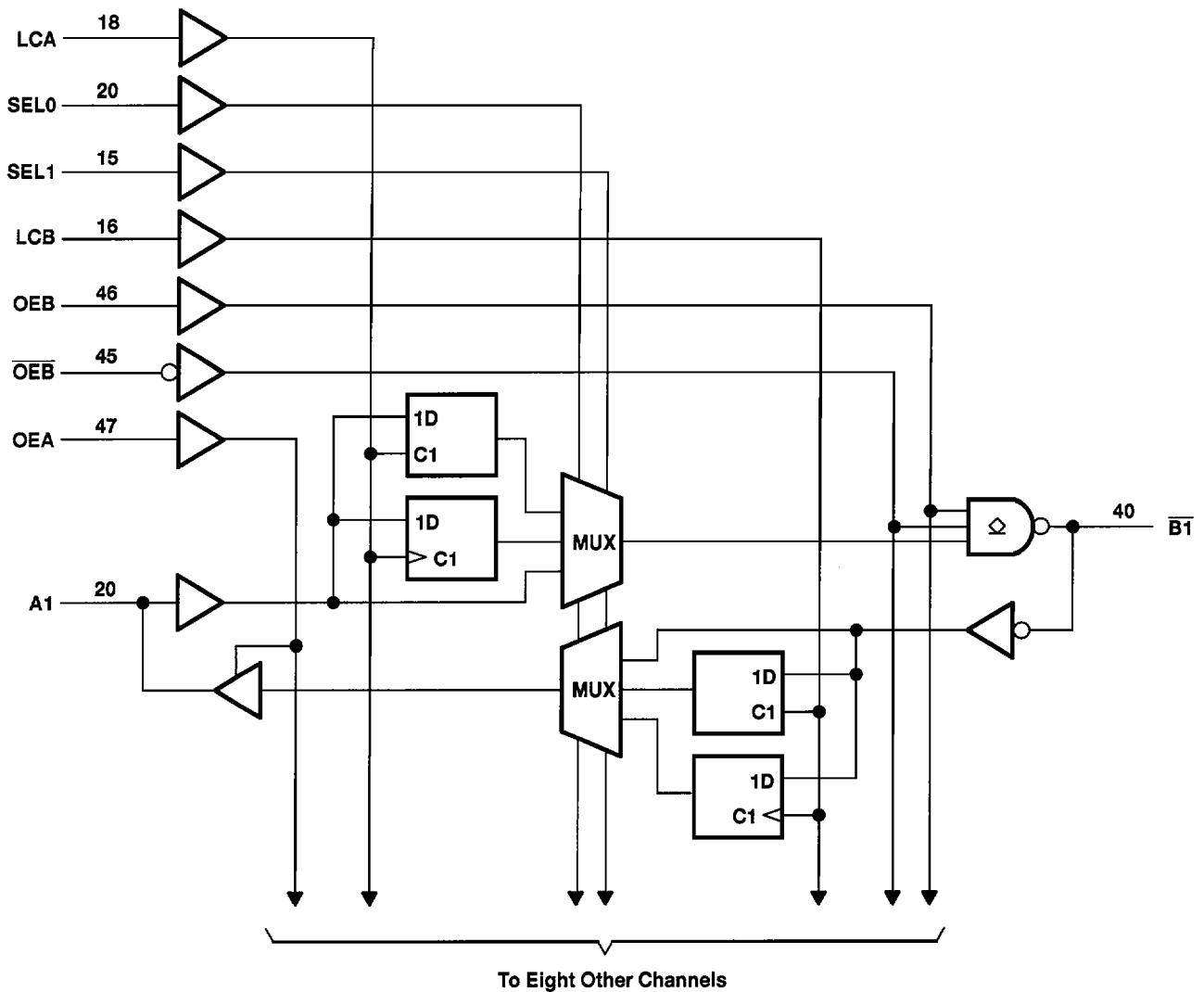
LCA, LCB	RESULT
0	Transparent
1	Latches latched
↑	Flip-flops triggered

SELECT FUNCTION TABLE

SEL1	SEL0	MUX A→B	MUX B→A
0	0	Latch	Latch
0	1	Thru	Thru
1	0	Flip-flop	Flip-flop
1	1	Flip-flop	Latch

PRODUCT PREVIEW

functional block diagram



PRODUCT PREVIEW

Pin numbers shown are for the RC package.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, $V_{CC}$ , BG $V_{CC}$ , Bias $V_{CC}$ .....	-0.5 V to 7 V
Input voltage range, $V_I$ (except $\overline{B}$ port) .....	-1.2 V to 7 V
$V_I$ ( $\overline{B}$ port) .....	-1.2 V to 3.5 V
Input current range (except $\overline{B}$ port) .....	-40 mA to 5 mA
Voltage range applied to any $\overline{B}$ output in the disabled or power-off state .....	-0.5 V to 5.5 V
Voltage range applied to any output in the high state .....	-0.5 V to $V_{CC}$
Current applied to any single output in the low state: A port .....	48 mA
$\overline{B}$ port .....	200 mA
Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air): RC package .....	1.4 W
Storage temperature range .....	$-65^\circ\text{C}$ to $150^\circ\text{C}$

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

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## recommended operating conditions (see Note 1)

		SN54FB2031			SN74FB2031			UNIT		
		MIN	NOM	MAX	MIN	NOM	MAX			
$V_{CC}$ , BIAS $V_{CC}$ , BG $V_{CC}$	Supply voltage	4.5	5	5.5	4.5	5	5.5	V		
$V_{IH}$	High-level input voltage	$\bar{B}$ port		1.62	2.3	$\bar{B}$ port		1.62	2.3	V
		Except $\bar{B}$ port		2		2				
$V_{IL}$	Low-level input voltage	$\bar{B}$ port		0.75	1.47	$\bar{B}$ port		0.75	1.47	V
		Except $\bar{B}$ port		0.8		0.8				
$I_{IK}$	Input clamp current				-18		-18		mA	
$I_{OH}$	High-level output current	A port		-3		-3		mA		
$I_{OL}$	Low-level output current	A port		24		24		mA		
		$\bar{B}$ port		100		100				
$T_A$	Operating free-air temperature	-55		125		0		70	°C	

NOTE 1: Unused or floating pins (input or I/O) must be held high or low.

## electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS		SN54FB2031		SN74FB2031		UNIT
				MIN	TYP†	MAX	MIN	
$V_{IK}$	$\bar{B}$ port	$V_{CC} = 4.5$ V,	$I_I = -18$ mA	-1.2		-1.2		V
	Except $\bar{B}$ port	$V_{CC} = 4.5$ V,	$I_I = -40$ mA	-0.5		-0.5		
$V_{OH}$	A port	$V_{CC} = 4.5$ V	$I_{OH} = -1$ mA					V
			$I_{OH} = -3$ mA	2.5	3.3	2.5	3.3	
$V_{OL}$	A port	$V_{CC} = 4.5$ V	$I_{OL} = 20$ mA					V
			$I_{OL} = 24$ mA	0.35	0.5	0.35	0.5	
	$\bar{B}$ port	$V_{CC} = 4.5$ V	$I_{OL} = 80$ mA	0.75	1.1	0.75	1.1	
			$I_{OL} = 100$ mA					
$I_I$	Except $\bar{B}$ port	$V_{CC} = 5.5$ V,	$V_I = 5.5$ V	50		50		$\mu$ A
$I_{IH}^\ddagger$	Except $\bar{B}$ port	$V_{CC} = 5.5$ V,	$V_I = 2.7$ V	50		50		$\mu$ A
$I_{IL}^\ddagger$	Except $\bar{B}$ port	$V_{CC} = 5.5$ V,	$V_I = 0.5$ V	-50		-50		$\mu$ A
	$\bar{B}$ port	$V_{CC} = 5.5$ V,	$V_I = 0.75$ V	-100		-100		
$I_{OH}$	$\bar{B}$ port	$V_{CC} = 0$ to 5.5 V,	$V_O = 2.1$ V	100		100		$\mu$ A
$I_{OS}^\S$	A port	$V_{CC} = 5.5$ V,	$V_O = 0$	-30	-150	-30	-150	mA
$I_{CC}$	A port to $\bar{B}$ port	$V_{CC} = 5.5$ V,	$I_O = 0$	25		25		mA
	$\bar{B}$ port to A port			60		60		
	Outputs disabled							
$C_i$		$V_I = V_{CC}$ or GND		5		5		pF
$C_o$	A port	$V_O = V_{CC}$ or GND						pF
$C_{io}$	$\bar{B}$ port per P1194.0	$V_{CC} = 0$ to 4.5 V		6		6		pF
		$V_{CC} = 4.5$ V to 5.5 V		5		5		

† All typical values are at  $V_{CC} = 5$  V,  $T_A = 25^\circ\text{C}$ .

‡ For I/O ports, the parameters  $I_{IH}$  and  $I_{IL}$  include the off-state output current.

§ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.



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**switching characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 5 V, T <sub>A</sub> = 25°C			SN54FB2031		SN74FB2031		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A (thru mode)	$\bar{B}$	5							ns
t <sub>PHL</sub>			5							
t <sub>PLH</sub>	A (transparent)	$\bar{B}$	6							ns
t <sub>PHL</sub>			6							
t <sub>PLH</sub>	LCA	$\bar{B}$	7							ns
t <sub>PHL</sub>			7							
t <sub>PLH</sub>	LCB	A	9							ns
t <sub>PHL</sub>			9							
t <sub>PLH</sub>	SEL1 or SEL0	A	5.5							ns
t <sub>PHL</sub>			5.5							
t <sub>PLH</sub>	SEL1 or SEL0	$\bar{B}$	7							ns
t <sub>PHL</sub>			7							
t <sub>PLH</sub>	$\bar{B}$ (thru mode)	A	6							ns
t <sub>PHL</sub>			6							
t <sub>PLH</sub>	$\bar{B}$ (transparent)	A	7							ns
t <sub>PHL</sub>			7							
t <sub>PLH</sub>	OEB or $\bar{OEB}$	$\bar{B}$	5.5							ns
t <sub>PHL</sub>			5.5							
t <sub>PZH</sub>	OEA	A	4							ns
t <sub>PZL</sub>			4							
t <sub>PHZ</sub>	OEA	A	5							ns
t <sub>PLZ</sub>			5							
t <sub>sk(p)</sub>	Skew for any single channel	A to $\bar{B}$ or $\bar{B}$ to A	0.5							ns
t <sub>sk(o)</sub>	Skew between drivers in the same package	A to $\bar{B}$ or $\bar{B}$ to A	1							ns
t <sub>t</sub>	Transition time, $\bar{B}$ outputs (1.3 V to 1.8 V)		2			1	3	1	3	ns
t <sub>PR</sub>	$\bar{B}$ -port input pulse rejection					1		1		ns

PRODUCT PREVIEW

### live-insertion characteristics over recommended operating free-air temperature range

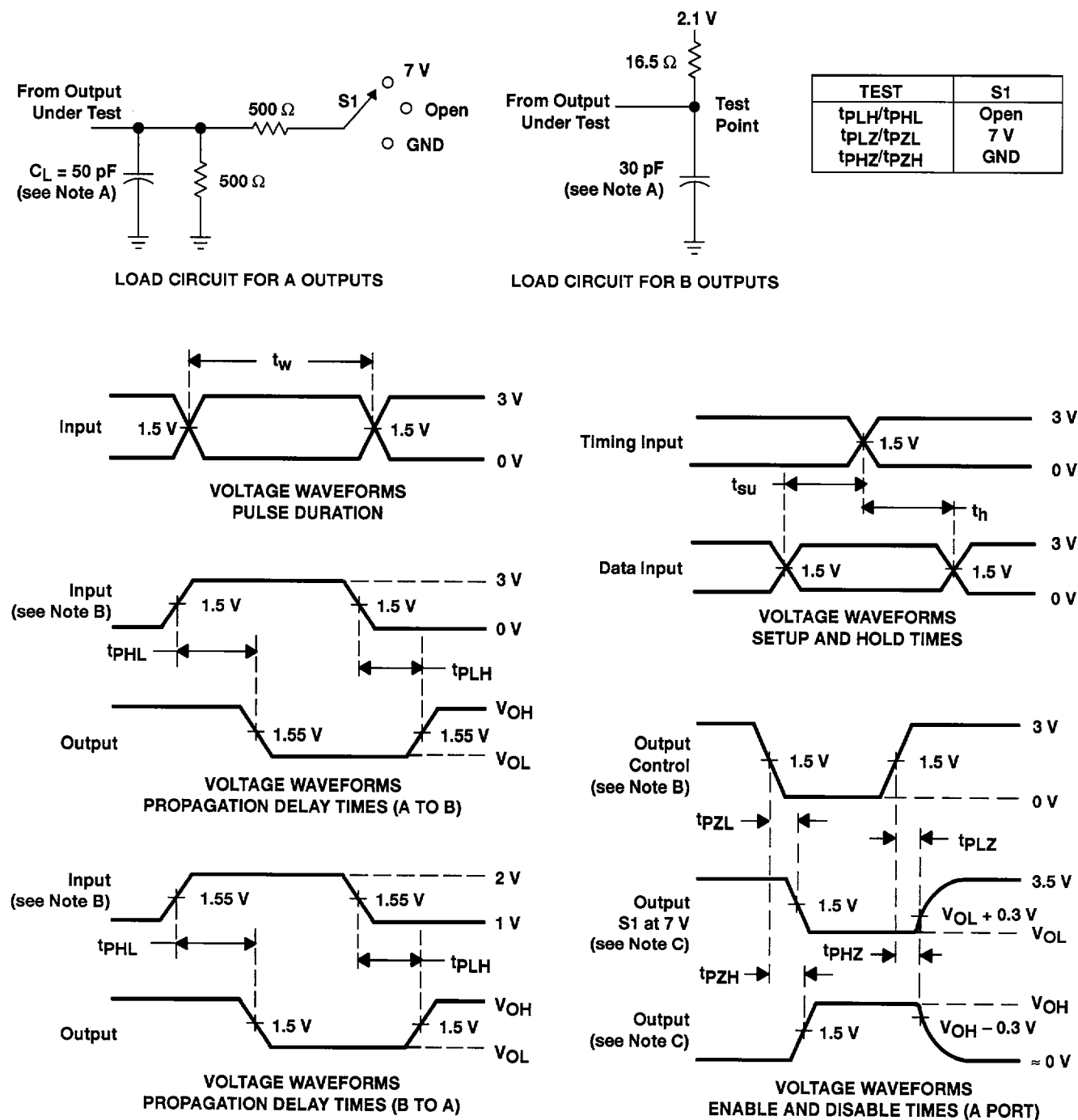
PARAMETER	TEST CONDITIONS			SN54FB2031		SN74FB2031		UNIT	
				MIN	MAX	MIN	MAX		
I <sub>CC</sub> (BIAS V <sub>CC</sub> )	V <sub>CC</sub> = 0 to 4.5 V		V <sub>B</sub> = 0 to 2 V,	BIAS V <sub>CC</sub> = 4.5 V to 5.5 V		450		μA	
	V <sub>CC</sub> = 4.5 V to 5.5 V					10			
V <sub>O</sub>	$\bar{B}$ port	V <sub>CC</sub> = 0,	V <sub>I</sub> (BIAS V <sub>CC</sub> ) = 4.5 V to 5.5 V		1.62	2.1	1.62	2.1	V
I <sub>O</sub>	$\bar{B}$ port	V <sub>CC</sub> = 0,		V <sub>B</sub> = 1 V,	BIAS V <sub>CC</sub> = 4.5 V to 5.5 V		-1		μA
		V <sub>CC</sub> = 0 to 5.5 V,		OEB = 0 to 0.8 V		100		100	
		V <sub>CC</sub> = 0 to 2.2 V,		OEB = 0 to 5 V		100		100	



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## PARAMETER MEASUREMENT INFORMATION



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. All input pulses are supplied by generators having the following characteristics: TTL Inputs - PRR  $\leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5 \text{ ns}$ ,  $t_f \leq 2.5 \text{ ns}$ . BTL Inputs - PRR  $\leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5 \text{ ns}$ ,  $t_f \leq 2.5 \text{ ns}$ .  
 C. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.  
 D. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms