National Semiconductor

DS7834/DS8834 Quad TRI-STATE® Bus Transceivers

General Description

This family of TRI-STATE bus transceivers offers extreme versatility in bus organized data transmission systems. The data bus may be unterminated, or terminated DC or AC, at one or both ends. Drivers in the third (high impedance) state load the data bus with a negligible leakage current. The receiver input current is low, allowing at least 100 driver/receiver pairs to utilize a single bus. The bus loading is unchanged when V_{CC} = 0V. The receiver incorporates hysteresis to provide greater noise immunity. Both devices utilize a high current TRI-STATE output driver. The DS7834/DS8834 employs TTL outputs on the receiver.

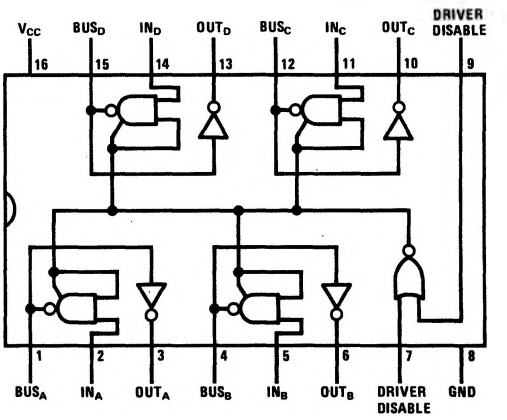
The DS7834/DS8834 are inverting quad transceivers with two common inverter driver disable controls.

Features

- Receiver hysteresis — 400 mV typ
- Receiver noise immunity — 1.4V typ
- Bus terminal current for normal V_{CC} or V_{CC} = 0V — 80 μA max
- Receivers
  - Sink — 16 mA at 0.4V max
  - Source — 2.0 mA (Mil) at 2.4V min; 5.2 mA (Com) at 2.4V min
- Drivers
  - Sink — 50 mA at 0.5V max; 32 mA at 0.4V max
  - Source — 10.4 mA (Com) at 2.4V min; 5.2 mA (Mil) at 2.4V min
- Drivers have TRI-STATE outputs
- Receivers have TRI-STATE outputs
- Capable of driving 100Ω DC-terminated Buses
- Compatible with Series 54/74

Connection Diagram

Dual-In-Line Package



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Top View

Order Number DS7834J, or DS8834N
See NS Package Number J16A or N16A

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	7.0V
Input Voltage	5.5V
Output Voltage	5.5V
Maximum Power Dissipation* at 25°C	
Cavity Package	1509 mW
Molded Package	1476 mW

*Derate cavity package 10.1 mW/°C above 25°C; derate molded package 11.8 mW/°C above 25°C.

Storage Temperature	−65°C to +150°C
Lead Temperature (Soldering, 4 seconds)	260°C

Operating Conditions

	Min	Max	Units
Supply Voltage (V_{CC})			
DS7834	4.5	5.5	V
DS8834	4.75	5.25	V
Temperature (T_A)			
DS7834	−55	+125	°C
DS8834	0	+70	°C

Electrical Characteristics (Notes 2 and 3)

Symbol	Parameter	Conditions			Min	Typ	Max	Units
DISABLE/DRIVER INPUT								
V_{IH}	High Level Input Voltage	V_{CC} = Min			2.0			V
V_{IL}	Low Level Input Voltage	V_{CC} = Min					0.8	V
I_{IH}	High Level Input Current	V_{CC} = Max	V_{IN} = 2.4V				40	μA
			V_{IN} = 5.5V				1.0	mA
I_{IL}	Low Level Input Current	V_{CC} = Max, V_{IN} = 0.4V				−1.0	−1.6	mA
I_{IND}	Driver Diasbled Input Low Current	Driver Disable Input = 2.0V, V_{IN} = 0.4V					−40	μA
V_{CL}	Input Clamp Diode	V_{CC} = 5.0V, I_{IN} = −12 mA, T_A = 25°C				−0.8	−1.5	V
RECEIVER INPUT/BUS OUTPUT								
V_{TH}	High Level Threshold Voltage	V_{CC} = Max		DS7834	1.4	1.75	2.1	V
				DS8834	1.5	1.75	2.0	V
V_{TL}	Low Level Threshold Voltage	V_{CC} = Min		DS7834	0.8	1.35	1.6	V
				DS8834	0.8	1.35	1.5	V
I_{BH}	Bus Current, Output Disabled or High	V_{BUS} = 4.0V	V_{CC} = Max, Disable Input = 2.0V			25	80	μA
			V_{CC} = 0V			5.0	80	μA
		V_{CC} = Max, V_{SUS} = 0.4V, Disable Input = 2.0V					−40	μA
V_{OH}	Logic "1" Output Voltage	V_{CC} = Min	I_{OUT} = −5.2 mA	DS7834	2.4	2.75		V
			I_{OUT} = −10.4 mA	DS7834	2.4	2.75		V
V_{OL}	Logic "0" Output Voltage	V_{CC} = Min	I_{OUT} = 50 mA			0.28	0.5	V
			I_{OUT} = 32 mA				0.4	V
I_{OS}	Output Short Circuit Current	V_{CC} = Max, (Note 4)			−40	−62	−120	mA
RECEIVER OUTPUT								
V_{OH}	Logic "1" Output Voltage	V_{CC} = Min	I_{OUT} = −2.0 mA	DS7834	2.4	3.0		V
			I_{OUT} = −5.2 mA	DS8834	2.4	2.9		V
V_{OL}	Logic "0" Output Voltage	V_{CC} = Min, I_{OUT} = 16 mA				0.22	0.4	V
I_{OS}	Output Short Circuit Current	V_{CC} = Max, (Note 4)		DS7834	−28	−40	−70	mA
				DS8834	−30		−70	mA
I_{CC}	Supply Current	V_{CC} = Max				75	95	mA

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

Note 2: Unless otherwise specified, min/max limits apply across the −55°C to +125°C temperature range for the DS7834 and across the 0°C to +70°C range for the DS8834. All typicals are given for V_{CC} = 5.0V and T_A = 25°C.

Note 3: All currents into device pins shown as positive, out of device pins as negative, all voltages referenced to ground unless otherwise noted. All values shown as max or min on absolute value basis.

Note 4: Only one output at a time should be shorted.

Switching Characteristics V_{CC} = 5.0V, T_A = 25°C

Symbol	Parameter	Conditions		Min	Typ	Max	Units
t_{pd0}	Propagation Delay to a Logic "0" from Input to Bus	*(Figure 1)*	DS7834/DS8834		10	20	ns
t_{pd1}	Propagation Delay to a Logic "1" from Input to Bus	*(Figure 1)*	DS7834/DS8834		11	30	ns
t_{pd0}	Propagation Delay to a Logic "0" from Bus to Output	*(Figure 2)*	DS7834/DS8834		16	35	ns
t_{pd1}	Propagation Delay to a Logic "1" from Bus to Output	*(Figure 2)*	DS7834/DS8834		18	30	ns
t_{PHZ}	Delay from Disable Input to High Impedance State (from Logic "1" Level)	C_L = 5.0 pF, *(Figures 1* and *2)* Driver Only			8	20	ns
t_{PLZ}	Delay from Disable Input to High Impedance State (from Logic "0" Level)	C_L = 5.0 pF, *(Figures 1* and *2)* Driver Only			20	35	ns
t_{PZH}	Delay from Disable Input to Logic "1" Level (from High Impedance State)	C_L = 50 pF, *(Figures 1* and *2)* Driver Only			24	40	ns
t_{PZL}	Delay from Disable Input to Logic "0" Level (from High Impedance State)	C_L = 50 pF, *(Figures 1* and *2)* Driver Only			19	35	ns

AC Test Circuit

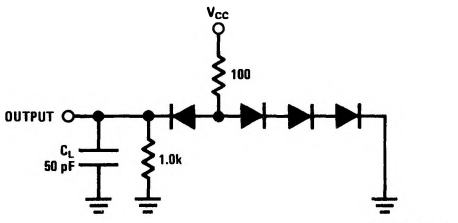

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FIGURE 1. Driver Output Load

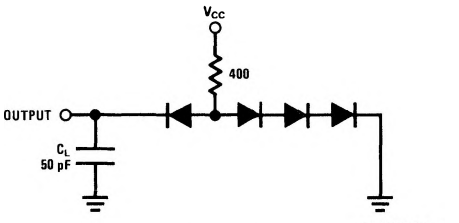

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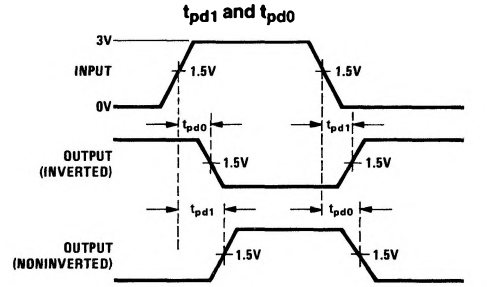
FIGURE 2. Receiver Output Load

Switching Time Waveforms



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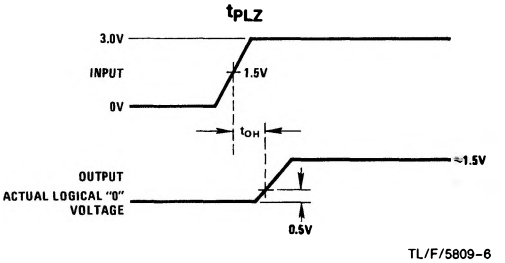

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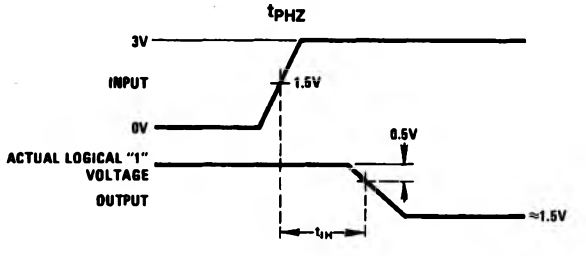
f = 1 MHz

$t_r = t_f \leq 10$ ns (10% to 90%)

Duty Cycle = 50%

Switching Time Waveforms (Continued)



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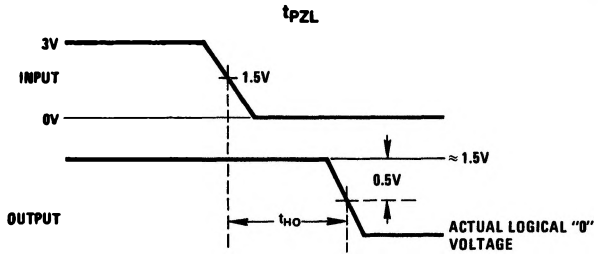

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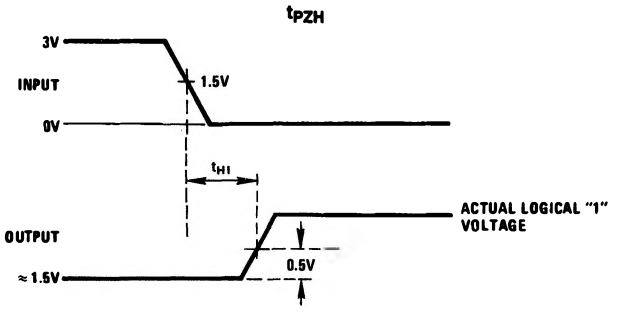

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Truth Table

Disable Input	Driver Input (IN_X)	Receiver Input/ Bus Output (BUS_X)	Receiver Output (OUT_X)	Mode of Operation
DS7834/DS8834				
1	X		$\overline{BUS}$	Receive Bus Signal
0	1	0	1	Drive Bus
0	0	1	0	Drive Bus

X = Don't care