

DS7833/DS8833/DS7835/DS8835 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. All devices utilize a high current TRI-STATE output driver. The DS7833/DS8833 and DS7835/DS8835 employ TRI-STATE outputs on the receiver also.

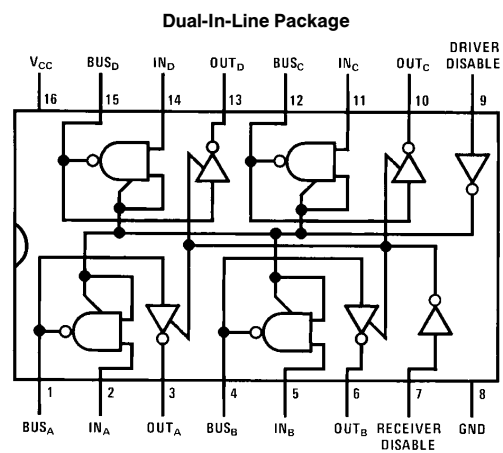
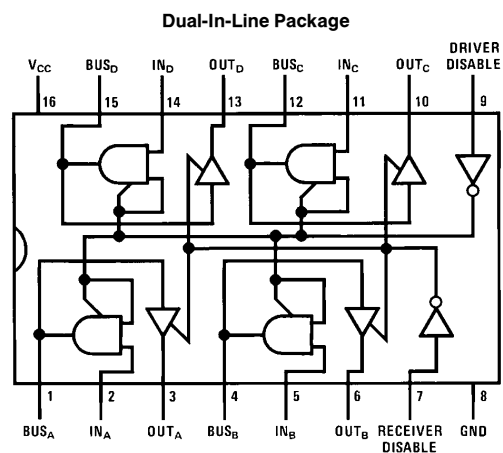
The DS7833/DS8833 are non-inverting quad transceivers with a common inverter driver disable control and common inverter receiver disable control.

The DS7835/DS8835 are inverting quad transceivers with a common inverter driver disable control and a common inverter receiver disable control.

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
- DS7833/DS8833, DS7835/DS8835 receivers have TRI-STATE outputs
- Capable of driving 100 Ω DC-terminated buses
- Compatible with Series 54/74

Connection Diagram



TRI-STATE® is a registered trademark of National Semiconductor Corp.

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
Storage Temperature	−65°C to +150°C
Maximum Power Dissipation* at 25°C	
Cavity Package	1509 mW
Molded Package	1476 mW
Lead Temperature (Soldering, 4 sec.)	260°C

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

Operating Conditions

	Min	Max	Units
Supply Voltage, V_{CC}			
DS7833/DS7835	4.5	5.5	V
DS8833/DS8835	4.75	5.25	V
Temperature (T_A)			
DS7833/DS7835	−55	+125	°C
DS8833/DS8835	0	+70	°C

Electrical Characteristics (Notes 2 and 3)

Symbol	Parameter	Conditions			Min	Typ	Max	Units
DISABLE/DRIVER INPUT								
V _{IH}	High Level Input Voltages	V _{CC} = Min			2.0			V
V _{IL}	Low Level Input Voltage	V _{CC} = Min	DS7833, DS8833, DS8835				0.8	V
			DS7835				0.7	
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
V _{CL}	Input Clamp Diode	V _{CC} = 5.0V, I _{IN} = −12 mA, T _A = 25°C				−0.8	−1.5	V
I _{IT}	Driver Low Level Disabled Input Current	Driver Disable Input = 2.0V, V _{IN} = 0.4V					−40	μA
RECEIVER INPUT/BUS OUTPUT								
V _{TH}	High Level Threshold Voltage			DS7833, DS7835	1.4	1.75	2.1	V
				DS8833, DS8835	1.5	1.75	2.0	V
V _{TL}	Low Level Threshold Voltage			DS7833, DS7835	0.8	1.35	1.6	V
				DS8833, DS8835	0.8	1.35	1.5	V
I _S	Bus Current, Output Disabled or High	V _{BUS} = 4.0V	V _{CC} = Max			25	80	μA
			V _{CC} = 0V			5.0	80	μA
		V _{CC} = Max, V _{BUS} = 0.4V			−2.0	−40	μA	
V _{OH}	Logic “1” Output Voltage	V _{CC} = Min	I _{OUT} = −5.2 mA	DS7833, DS7835	2.4	2.75		V
			I _{OUT} = −10.4 mA	DS8833, DS8835	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	DS7833, DS7835	2.4	3.0		V
			I _{OUT} = −5.2 mA	DS8833, DS8835	2.4	2.9		V
V _{OL}	Logic “0” Output Voltage	V _{CC} = Min, I _{OUT} = 16 mA				0.22	0.4	V
I _{OT}	Output Disabled Current	V _{CC} = Max, Disable Inputs = 2.0V	V _{OUT} = 2.4V				40	μA
			V _{OUT} = 0.4V				−40	μA

Electrical Characteristics (Notes 2 and 3) (Continued)

Symbol	Parameter	Conditions	Min	Typ	Max	Units	
RECEIVER OUTPUT (Continued)							
I _{OS}	Output Short Circuit Current	V _{CC} = Max, (Note 4)	DS7833, DS7835	28	−40	−70	mA
			DS8833, DS8835	−30		−70	mA
I _{CC}	Supply Current	V _{CC} = Max	DS7833, DS8833		84	116	mA
			DS7835, DS8835		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 $+125^{\circ}\text{C}$ temperature range for the DS7833, DS7835 and across the 0°C to $+70^{\circ}\text{C}$ range for the DS8833, DS8835. All typicals are given for $V_{CC} = 5.0\text{V}$ and $T_A = 25^{\circ}\text{C}$.

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 $V_{CC} = 5.0\text{V}$, $T_A = 25^{\circ}\text{C}$

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{pd0}	Propagation Delay to a Logic "0" from Input to Bus	(Figure 1) DS7833/DS8833		14	30	ns
		DS7835/DS8835		10	20	ns
t_{pd1}	Propagation Delay to a Logic "1" from Input to Bus	(Figure 1) DS7833/DS8833		14	30	ns
		DS7835/DS8835		11	30	ns
t_{pd0}	Propagation Delay to a Logic "0" from Bus to Input	(Figure 2) DS7833/DS8833		24	45	ns
		DS7835/DS8835		16	35	ns
t_{pd1}	Propagation Delay to a Logic "1" from Bus to Input	(Figure 2) DS7833/DS8833		12	30	ns
		DS7835/DS8835		18	30	ns
t_{PHZ}	Delay from Disable Input to High Impedance State (from Logic "1" Level)	$C_L = 5.0\text{ pF}$, (Figures 1 and 2) Driver		8.0	20	ns
		Receiver		6.0	15	ns
t_{PLZ}	Delay from Disable Input to High Impedance State (from Logic "0" Level)	$C_L = 5.0\text{ pF}$, (Figures 1 and 2) Driver		20	35	ns
		Receiver		13	25	ns
t_{PZH}	Delay from Disable Input to Logic "1" Level (from High Impedance State)	$C_L = 5.0\text{ pF}$, (Figures 1 and 2) Driver		24	40	ns
		Receiver		16	35	ns
t_{PZL}	Delay from Disable Input to Logic "0" Level (from High Impedance State)	$C_L = 5.0\text{ pF}$, (Figures 1 and 2) Driver		19	35	ns
		Receiver DS7833/DS8833		15	30	ns
		Receiver DS7835/DS8835		33	50	ns

AC Test Circuits

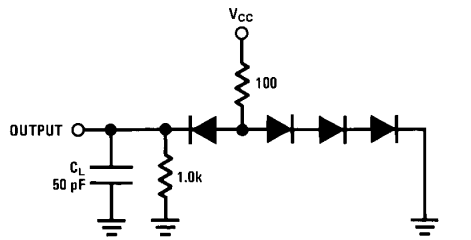


FIGURE 1. Driver Output Load

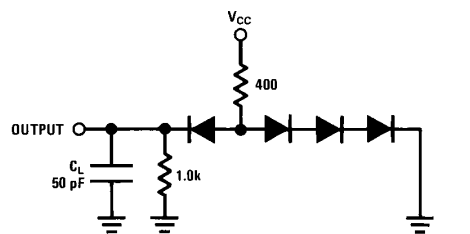
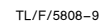
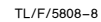
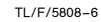
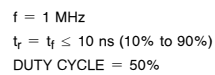


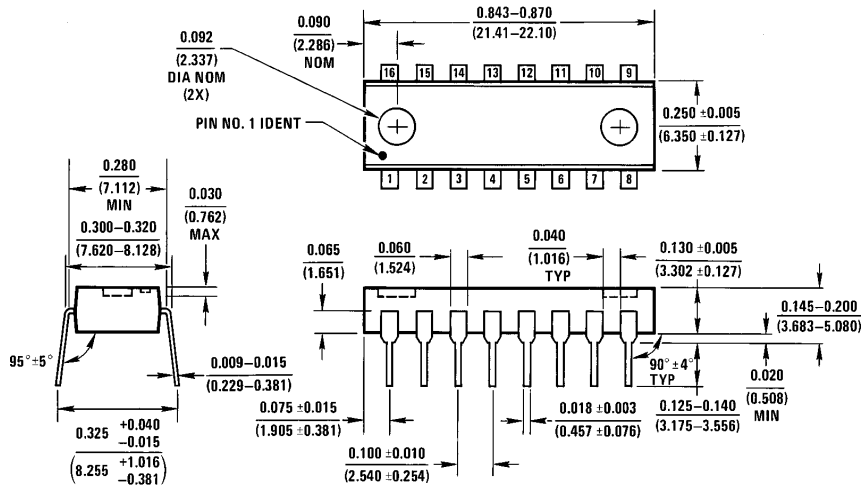
FIGURE 2. Receiver Output Load

<http://www.national.com>



J16A (REV L)

Physical Dimensions inches (millimeters) (Continued)



N16A (REV E)

Molded Dual-In-Line Package (N)
Order Number DS8833N or DS8835N
NS Package Number N16A

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



National Semiconductor Corporation
1111 West Bardin Road
Arlington, TX 76017
Tel: 1(800) 272-9959
Fax: 1(800) 737-7018

<http://www.national.com>

National Semiconductor Europe

Fax: +49 (0) 180-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 180-530 85 85
English Tel: +49 (0) 180-532 78 32
Français Tel: +49 (0) 180-532 93 58
Italiano Tel: +49 (0) 180-534 16 80

National Semiconductor Hong Kong Ltd.

19th Floor, Straight Block,
Ocean Centre, 5 Canton Rd.
Tsimshatsui, Kowloon
Hong Kong
Tel: (852) 2737-1600
Fax: (852) 2736-9960

National Semiconductor Japan Ltd.

Tel: 81-043-299-2308
Fax: 81-043-299-2408

National does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and National reserves the right at any time without notice to change said circuitry and specifications.