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NTE8216
Integrated Circuit
4−Bit Parallel Bidirectional Bus Driver

Description:

The NTE8216 is a 4−bit bidirectional bus driver/receiver in a 16−Lead DIP type package. All inputs are low power TTL compatible. For driving MOS, the DO outputs provide high 3.65V V_{OH}, and for high current capacitance terminated bus structures, the DB outputs provide a high 50mA I_{OL} capability.

Features:

- Data Bus Buffer Driver for 8080 CPU
- Low Input Load Current
- High Output Drive Capability for Driving System Bus
- 3.65V Output High Voltage for Direct Interface to 8080 CPU
- 3−State Outputs
- Reduces System Package Count

Absolute Maximum Ratings: (Note 1)

All Output and Supply Voltages . . . . . −0.5V to +7V
All Input Voltages . . . . . −1.0V to +5.5V
Output Currents 125mA
Temperature Under Bias . . . . . 0° to +70°C
Stoage Temperature Range . . . . . −65° to +150°C

Note 1. 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 indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may effect device reliability.

DC Characteristics: (T_A = 0° to +70°C, V_{CC} = +5V ±5%, Note 2)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Load Current ($\overline{DIEN}$, $\overline{CS}$)	I_F 1	V_F = 0.45V	−	−0.15	−0.5	mA
Inpu Load Current (All Other Inputs)	I_F 2	V_F = 0.45V	−	−0.08	−0.25	mA
Input Leakage Current ($\overline{DIEN}$, $\overline{CS}$)	I_R 1	V_R = 5.25V	−	−	80	µA
Input leakage Current (DI Inputs)	I_R 2	V_R = 5.25V	−	−	40	µA
Input Forward Voltage Clamp	V_C	I_C = −5mA	−	−	−1	V
Input “Low” Voltage	V_{IL}		−	−	0.95	V
Input “High” Voltage	V_{IH}		2.0	−	−	V
Output Leakage Current (3−State) DO	$\|I_O\|$	V_O = 0.45V/5.25V_{CC}	−	−	20	µA
DB			−	−	100	µA
Power Supply Current	I_{CC}		−	95	130	mA
Output “Low” Voltage	V_{OL} 1	DO Outputs I_{OL} = 15mA, DB Outputs I_{OL} = 25mA	−	0.3	0.45	V
	V_{OL} 2	DB Outputs I_{OL} = 55mA	−	0.5	0.6	V
Output “High” Voltage	V_{OH} 1	DO Outputs I_{OH} = −1mA	3.65	4.0	−	V
	V_{OH} 2	DB Outputs I_{OH} = −10mA	2.4	3.0	−	V
Output Short Circuit Current	I_{OS}	DO Outputs $V_O \cong$ 0V	−15	−35	−65	mA
		DB Outputs V_{CC} = 5.0V	−30	−75	−120	mA

Note 2. Typical values are for T_A = +25°C, V_{CC} = 5V.

Capacitance: (B_{BIAS} = 2.5V, V_{CC} = +5V, T_A = +25°C, f = 1MHz, Note 2, Note 3)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Capacitance	C_{IN}		−	4	8	pF
Output Capacitance	C_{OUT} 1		−	6	10	pF
	C_{OUT} 2		−	13	18	pF

Note 2. Typical values are for T_A = +25°C, V_{CC} = 5V.

Note 3. This parameter is periodically sampled an not 100% tested.

AC Characteristics: (T_A = 0° to +70°C, V_{CC} = +5V ±5%, Note 2, Note 4)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input to Output Delay (DO Outputs)	T_{pD} 1	C_L = 30pF, R_1 = 300Ω, R_2 = 600Ω	−	15	25	ns
Input to Output Delay (DB Outputs)	T_{pD} 2	C_L = 300pF, R_1 = 90Ω, R_2 = 180Ω	−	19	30	ns
Output Enable Time	T_E	Note 5	−	42	65	ns
Outpu Disable Time	T_D	Note 6	−	16	35	ns

Note 2. Typical values are for T_A = +25°C, V_{CC} = 5V.

Note 4. Typical values are for T_A = +25°C, V_{CC} = 5V.

Note 5. DO Outputs, C_L = 30pF, R_1 = 300/10KΩ, R_2 = 180/1KΩ; DB Outputs, C_L = 300pF, R_1 = 90/10KΩ, R_2 = 180/1KΩ.

Note 6. DO Outputs, C_L = 5pF, R_1 = 300/10KΩ, R_2 = 600/1KΩ; DB Outputs, C_L = 5pF, R_1 = 90/10KΩ, R_2 = 180/1KΩ.

FUNCTIONAL DESCRIPTION:

Microprocessors like the 8080 are MOS devices and are generally capable of driving a single TTL load. The same is true for MOS memory devices. While this type of drive is sufficient in small systems with few components, quite often it is necessary to buffer the microprocessor and memories when adding components or expanding to a multi−board system.

The NTE8216 is a four bit bi−directional bus driver specifically designed to buffer microcomputer system components.

Bidirectional Driver:

Each buffered line of the four bit drive consists of two separate buffers that are tri−state in nature to achieve direct bus interface and bi−directional capability. On one side of the driver the output of one buffer and the input of another are tied together (DB), this side is used to interface to the system side components such as memories, I/O, etc., because its interface is direct TTL compatible and it has high drive (50mA). On the other side of the driver the inputs and outputs are separated to provide maximum flexibility. Of course, they can be tied together so that the driver can be used to buffer a true bi−directional bus such as the 8080 Data Bus. The DO outputs on this side of the driver have a special high voltage output drive capability (3.65V) so that direct interface to the 8080 and 8008 CPUs is achieved with an adequate amount of noise immunity (350mV worst case).

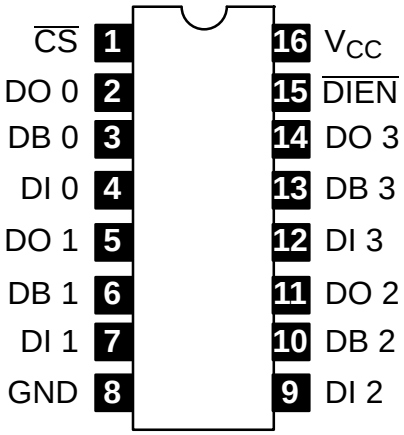
Control Gating $\overline{\text{DIEN}}$, $\overline{\text{CS}}$:

The $\overline{\text{CS}}$ input is actually a device select. When it is “high” the output drivers are all forced to their high−impedance state. When it is at “zero” the device is selected (enabled) and the direction of the data flow is determined by the $\overline{\text{DIEN}}$ input.

The $\overline{\text{DIEN}}$ input controls the direction of the data flow. This direction control is accomplished by forcing one of the pair of buffers into its high−impedance state and allowing the other to transmit its data. A simple two gate circuit is used for this function.

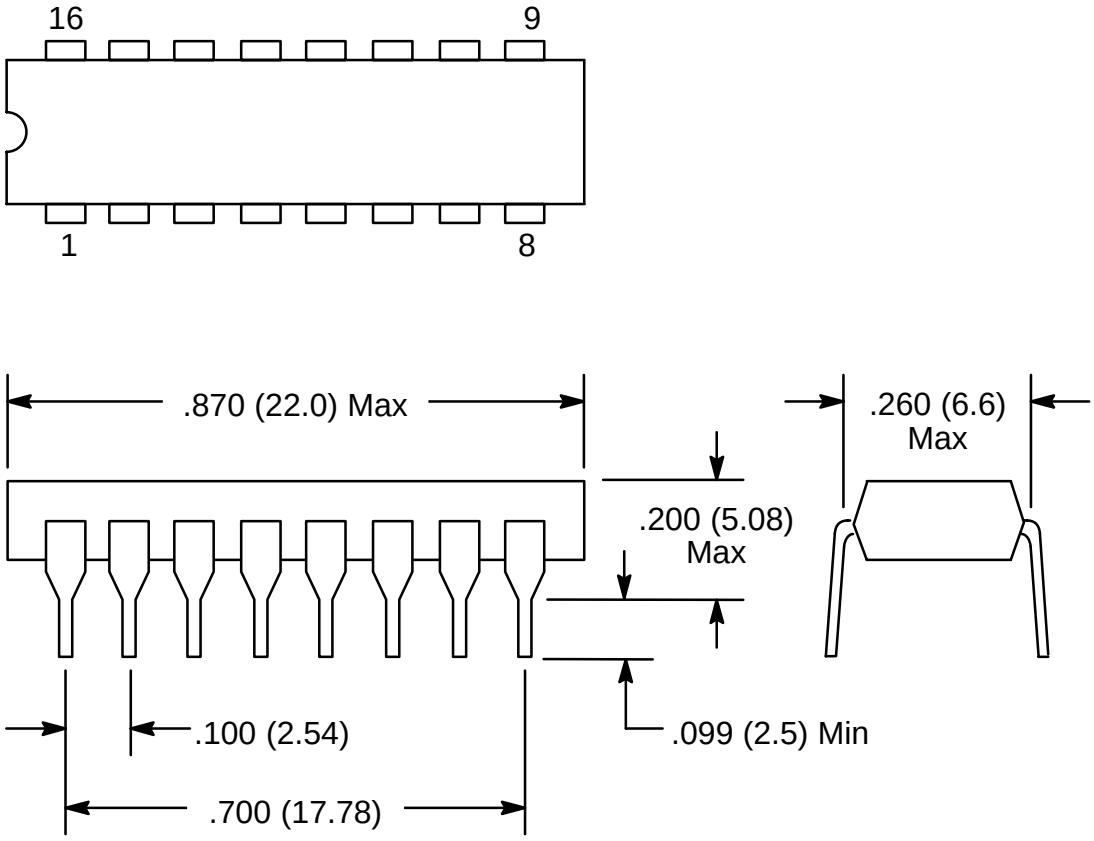
The NTE8216 is a device that will reduce component count in microcomputer systems and at the same time enhance noise immunity to assure reliable, high performance operation.

Pin Connection Diagram



Truth Table

$\overline{\text{DIEN}}$	$\overline{\text{CS}}$	
0	0	DI DB
1	0	DB DO
0	1	HIGH IMPEDANCE
1	1	HIGH IMPEDANCE


16
9
1
8
.870 (22.0) Max
.260 (6.6)
Max
.200 (5.08)
Max
.100 (2.54)
.099 (2.5) Min
.700 (17.78)