

Philips Components

|               |                       |
|---------------|-----------------------|
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10188  
Hex Buffer

Hex Buffer with Enable (Non-Inverting)

FEATURES

- Typical propagation delay: 2.0ns
- Typical supply current ( $-I_{EE}$ ): 33mA

DESCRIPTION

The 10188 includes six buffers offering individual inputs and outputs and a common Enable input, driving all outputs Low. Each input is connected to  $V_{EE}$  via a pull-down resistor resulting in high input impedance and eliminating the need for connecting unused inputs Low.

Due to open emitter outputs the 10188 features OR capability with high fan-out for driving 50 $\Omega$  lines.

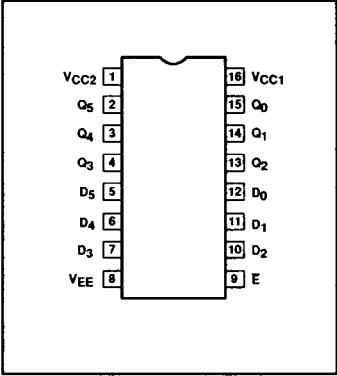
ORDERING INFORMATION

| DESCRIPTION        | ORDER CODE |
|--------------------|------------|
| 16-Pin Plastic DIP | 10188N     |
| 16-Pin Ceramic DIP | 10188F     |
| 16-Pin SO          | 10188D     |

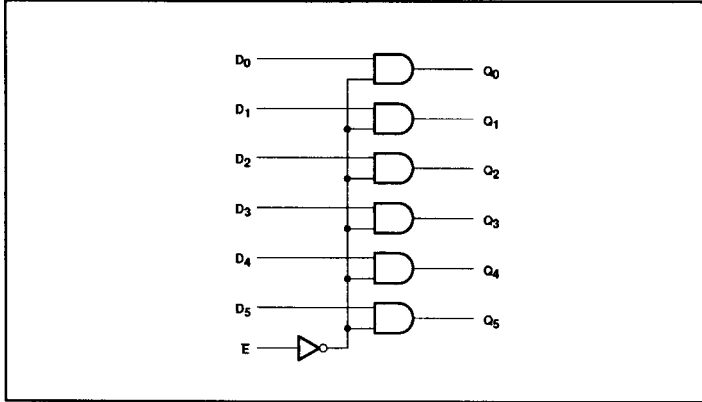
PIN DESCRIPTION

| PINS        | DESCRIPTION         |
|-------------|---------------------|
| $D_0 - D_5$ | Data Inputs         |
| E           | Common Enable Input |
| $Q_0 - Q_5$ | Data Outputs        |

PIN CONFIGURATION



LOGIC DIAGRAM



## Hex Buffer

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## FUNCTION TABLE

| INPUTS |                | OUTPUT         |
|--------|----------------|----------------|
| E      | D <sub>n</sub> | Q <sub>n</sub> |
| L      | L              | L              |
| L      | H              | H              |
| H      | X              | L              |

H = High Voltage Level

L = Low Voltage Level

X = Don't Care

## ABSOLUTE MAXIMUM RATINGS

| SYMBOL          | PARAMETER                                                                           |                 | LIMITS               | UNIT |
|-----------------|-------------------------------------------------------------------------------------|-----------------|----------------------|------|
| V <sub>EE</sub> | Supply voltage                                                                      |                 | -8.0                 | V    |
| V <sub>IN</sub> | Input voltage (V <sub>IN</sub> should never be more negative than V <sub>EE</sub> ) |                 | 0 to V <sub>EE</sub> | V    |
| I <sub>O</sub>  | Output source current (continuous)                                                  |                 | -50                  | mA   |
| T <sub>S</sub>  | Storage temperature range                                                           |                 | -55 to +150          | °C   |
| T <sub>J</sub>  | Maximum junction temperature                                                        | Ceramic Package | +165                 | °C   |
|                 |                                                                                     | Plastic Package | +150                 | °C   |

## NOTE:

Operation beyond the limits set forth in this table may impair the useful life of the device. Unless otherwise noted, these limits are specified over the operating ambient temperature range.

## DC OPERATING CONDITIONS

| SYMBOL                              | PARAMETER                           | TEST CONDITIONS        | LIMITS |      |       | UNIT |
|-------------------------------------|-------------------------------------|------------------------|--------|------|-------|------|
|                                     |                                     |                        | MIN.   | NOM. | MAX.  |      |
| V <sub>CC1</sub> , V <sub>CC2</sub> | Circuit ground                      |                        | 0      | 0    | 0     | V    |
| V <sub>EE</sub>                     | Supply voltage (negative)           |                        |        | -5.2 |       | V    |
| V <sub>IH</sub>                     | High level input voltage            | T <sub>A</sub> = -30°C |        |      | -890  | mV   |
|                                     |                                     | T <sub>A</sub> = +25°C |        |      | -810  | mV   |
|                                     |                                     | T <sub>A</sub> = +85°C |        |      | -700  | mV   |
| V <sub>IHT</sub>                    | High level input threshold voltage  | T <sub>A</sub> = -30°C | -1205  |      |       | mV   |
|                                     |                                     | T <sub>A</sub> = +25°C | -1105  |      |       | mV   |
|                                     |                                     | T <sub>A</sub> = +85°C | -1035  |      |       | mV   |
| V <sub>ILT</sub>                    | Low level input threshold voltage   | T <sub>A</sub> = -30°C |        |      | -1500 | mV   |
|                                     |                                     | T <sub>A</sub> = +25°C |        |      | -1475 | mV   |
|                                     |                                     | T <sub>A</sub> = +85°C |        |      | -1440 | mV   |
| V <sub>L</sub>                      | Low level input voltage             | T <sub>A</sub> = -30°C | -1890  |      |       | mV   |
|                                     |                                     | T <sub>A</sub> = +25°C | -1850  |      |       | mV   |
|                                     |                                     | T <sub>A</sub> = +85°C | -1825  |      |       | mV   |
| T <sub>A</sub>                      | Operating ambient temperature range |                        | -30    | +25  | +85   | °C   |

## NOTE:

When operating at other than the specified V<sub>EE</sub> voltage (-5.2V), the DC and AC Electrical Characteristics will vary slightly from specified values.

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**DC ELECTRICAL CHARACTERISTICS**  $V_{CC1} = V_{CC2} = \text{ground}$ ,  $V_{EE} = -5.2V \pm 0.010V$ ,  $T_A = -30^\circ\text{C}$  to  $+85^\circ\text{C}$  output loading  $50\Omega$  to  $-2.0V \pm 0.010V$  unless otherwise specified<sup>1,3</sup>

| SYMBOL                                | PARAMETER                              |                        | TEST CONDITIONS <sup>2</sup>                 |                                              | LIMITS |       |      | UNIT |
|---------------------------------------|----------------------------------------|------------------------|----------------------------------------------|----------------------------------------------|--------|-------|------|------|
|                                       |                                        |                        |                                              |                                              | MIN.   | TYP.  | MAX. |      |
| V <sub>OH</sub>                       | High level output voltage              | T <sub>A</sub> = -30°C | Apply V <sub>ILMIN</sub> to E input          | -1060                                        |        | -890  | mV   |      |
|                                       |                                        | T <sub>A</sub> = +25°C | with V <sub>IHMAX</sub> applied to           | -960                                         |        | -810  | mV   |      |
|                                       |                                        | T <sub>A</sub> = +85°C | all other inputs.                            | -890                                         |        | -700  | mV   |      |
| V <sub>OHT</sub>                      | High level output threshold voltage    | T <sub>A</sub> = -30°C | Apply V <sub>ILT</sub> to E input            | -1080                                        |        |       | mV   |      |
|                                       |                                        | T <sub>A</sub> = +25°C | with V <sub>IHMAX</sub> applied to           | -980                                         |        |       | mV   |      |
|                                       |                                        | T <sub>A</sub> = +85°C | all other inputs.                            | -910                                         |        |       | mV   |      |
| V <sub>OLT</sub>                      | Low level output threshold voltage     | T <sub>A</sub> = -30°C | Apply V <sub>IHT</sub> to E input            |                                              |        | -1655 | mV   |      |
|                                       |                                        | T <sub>A</sub> = +25°C | with V <sub>IHMAX</sub> applied to           |                                              |        | -1630 | mV   |      |
|                                       |                                        | T <sub>A</sub> = +85°C | all other inputs.                            |                                              |        | -1595 | mV   |      |
| V <sub>OL</sub>                       | Low level output voltage               | T <sub>A</sub> = -30°C | Apply V <sub>ILMIN</sub> to all inputs.      | -1890                                        |        | -1675 | mV   |      |
|                                       |                                        | T <sub>A</sub> = +25°C |                                              | -1850                                        |        | -1650 | mV   |      |
|                                       |                                        | T <sub>A</sub> = +85°C |                                              | -1825                                        |        | -1615 | mV   |      |
| I <sub>IH</sub>                       | High level input current               | Other inputs           | T <sub>A</sub> = -30°C                       | Apply V <sub>IHMAX</sub> to each input under |        |       | 425  | μA   |
|                                       |                                        |                        | T <sub>A</sub> = +25°C                       | test, one at a time, with V <sub>ILMIN</sub> |        |       | 265  | μA   |
|                                       |                                        |                        | T <sub>A</sub> = +85°C                       | applied to all other inputs.                 |        |       | 265  | μA   |
|                                       |                                        | E input                | T <sub>A</sub> = -30°C                       | Apply V <sub>IHMAX</sub> to E input          |        |       | 460  | μA   |
|                                       |                                        |                        | T <sub>A</sub> = +25°C                       | with V <sub>ILMIN</sub> applied to           |        |       | 290  | μA   |
|                                       |                                        |                        | T <sub>A</sub> = +85°C                       | all other inputs.                            |        |       | 290  | μA   |
| I <sub>IL</sub>                       | Low level input current                | T <sub>A</sub> = -30°C | Apply V <sub>ILMIN</sub> to each input under | 0.5                                          |        |       | μA   |      |
|                                       |                                        | T <sub>A</sub> = +25°C | test, one at a time, with V <sub>IHMAX</sub> | 0.5                                          |        |       | μA   |      |
|                                       |                                        | T <sub>A</sub> = +85°C | applied to all other inputs.                 | 0.3                                          |        |       | μA   |      |
| -I <sub>EE</sub>                      | V <sub>EE</sub> supply current         | T <sub>A</sub> = -30°C |                                              |                                              |        | 46    | mA   |      |
|                                       |                                        | T <sub>A</sub> = +25°C |                                              |                                              | 33     | 42    | mA   |      |
|                                       |                                        | T <sub>A</sub> = +85°C |                                              |                                              |        | 46    | mA   |      |
| $\frac{\Delta V_{OH}}{\Delta V_{EE}}$ | High level output voltage compensation | T <sub>A</sub> = +25°C |                                              |                                              |        | 0.016 |      | V/V  |
| $\frac{\Delta V_{OL}}{\Delta V_{EE}}$ | Low level output voltage compensation  |                        |                                              |                                              |        | 0.250 |      | V/V  |
| $\frac{\Delta V_{BB}}{\Delta V_{EE}}$ | Reference bias voltage compensation    |                        |                                              |                                              |        | 0.148 |      | V/V  |

## NOTES:

- The specified limits represent the worst case values for the parameter. Since these worst case values normally occur at the supply voltage and temperature extremes, additional noise immunity can be achieved by decreasing the allowable operating condition ranges.
- Conditions for testing shown in the tables are not necessarily worst case. For worst case testing guidelines, refer to DC Testing, Chapter 1, Section 3.
- The specified limits shown in the DC Electrical Characteristics table can be met only after thermal equilibrium has been established. Thermal equilibrium is established by applying power for at least 2 minutes, while maintaining transverse airflow of 2.5 meters/sec (500 linear feet/min) over the device, mounted either in a test socket or on a printed circuit board. Test voltage values are given in the DC Operating Conditions table.

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AC ELECTRICAL CHARACTERISTICS  $V_{CC1} = V_{CC2} = \text{ground}, V_{EE} = -5.2V \pm 0.010V$

| SYMBOL                               | PARAMETER                                             | TEST<br>CONDITIONS | LIMITS                 |              |                        |              |              |                        |              | UNIT     |
|--------------------------------------|-------------------------------------------------------|--------------------|------------------------|--------------|------------------------|--------------|--------------|------------------------|--------------|----------|
|                                      |                                                       |                    | T <sub>A</sub> = -30°C |              | T <sub>A</sub> = +25°C |              |              | T <sub>A</sub> = +85°C |              |          |
|                                      |                                                       |                    | Min                    | Max          | Min                    | Typ          | Max          | Min                    | Max          |          |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation delay<br>D <sub>n</sub> to Q <sub>n</sub> | Waveform 1         | 1.00<br>1.00           | 3.30<br>3.30 | 1.00<br>1.00           | 2.00<br>2.00 | 2.90<br>2.90 | 1.00<br>1.00           | 3.30<br>3.30 | ns       |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation delay<br>E to Q <sub>n</sub>              |                    | 1.10<br>1.10           | 3.90<br>3.90 | 1.10<br>1.10           | 2.50<br>2.50 | 3.50<br>3.50 | 1.10<br>1.10           | 3.90<br>3.90 | ns       |
| t <sub>TLH</sub><br>t <sub>THL</sub> | Transition time<br>20% to 80%, 80% to 20%             |                    | 1.10<br>1.10           | 3.70<br>3.70 | 1.10<br>1.10           | 2.00<br>2.00 | 3.30<br>3.30 | 1.10<br>1.10           | 3.70<br>3.70 | ns<br>ns |

NOTE:

For AC test setup information, see AC Testing, Chapter 2, Section 3.

AC WAVEFORMS

