- **100K Compatible**
- **Inverting Outputs**
- **ECL and TTL Control Inputs**
- **Flow-Through Architecture Optimizes PCB Layout**
- **Center Pin $V_{CC}$, $V_{EE}$, and GND Configurations Minimize High-Speed Switching Noise**
- **Package Options Include "Small Outline" Packages and Standard Plastic 300-mil DIPs**

## description

This octal ECL-to-TTL translator is designed to provide a efficient translation between a 100K ECL signal environment and a TTL signal environment. This device is designed specifically to improve the performance and density of ECL-to-TTL CPU/bus-oriented functions such as memory-address drivers, clock drivers, and bus-oriented receivers and transmitters.

Two output pins, $\overline{OE}1$ and $\overline{OE}2$, are provided. These control inputs are ANDed together with $\overline{OE}1$ being ECL compatible and $\overline{OE}2$ being TTL compatible. This offers the choice of controlling the outputs of the device from either a TTL or ECL signal environment.

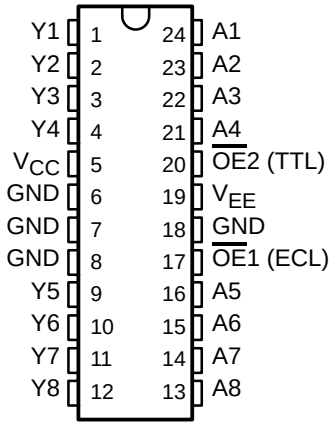
The SN100KT5540 is characterized for operation from 0°C to 85°C.

**FUNCTION TABLE**

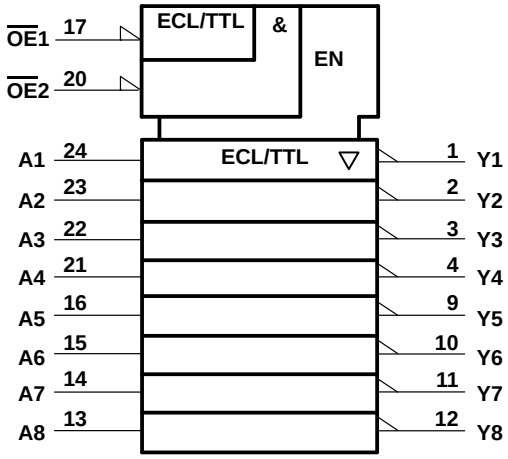
| OUTPUT ENABLE | | DATA INPUT | OUTPUT TTL |
|---|---|---|---|
| $\overline{OE}1$ | $\overline{OE}2$ | A | Y |
| X | H | X | Z |
| H | X | X | Z |
| L | L | L | H |
| L | L | H | L |

**R NT PACKAGE**

**(T0P VIEW)**

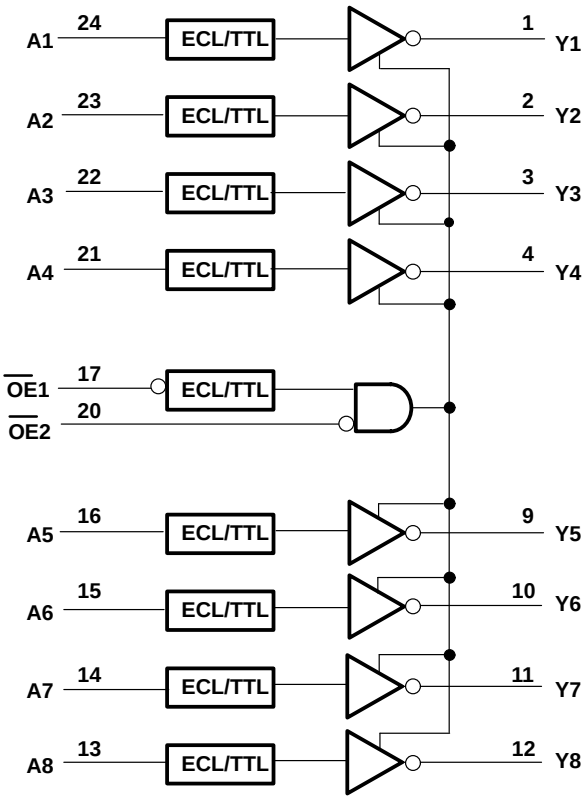



## logic symbol†




† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

## logic diagram (positive logic)




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

Supply voltage range, $V_{CC}$ . . . . . –0.5 V to 7 V
Supply voltage range, $V_{EE}$ . . . . . –8 V to 0 V
Input voltage range: TTL (see Note 1) . . . . . –1.2 V to 7 V
ECL . . . . . $V_{EE}$ to 0 V
Voltage applied to any output in the high state . . . . . –0.5 V to $V_{CC}$
Voltage applied to any output in the disabled or power-off state . . . . . –0.5 V to 5.5 V
Input current range (TTL) . . . . . –30 mA to 5 mA
Current into any output in the low state . . . . . 96 mA
Operating free-air temperature range . . . . . 0°C to 85°C
Storage temperature range . . . . . –65°C to 150°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.

NOTE 1: The TTL input voltage ratings may be exceeded provided the input current ratings are observed.

## recommended operating conditions

| | | MIN | NOM | MAX | UNIT |
|---|---|---|---|---|---|
| $V_{CC}$ | TTL supply voltage | 4.5 | 5 | 5.5 | V |
| $V_{EE}$ | ECL supply voltage | −4.2 | −4.5 | −4.8 | V |
| $V_{IH}$ | TTL high-level input voltage | 2 | | | V |
| $V_{IL}$ | TTL low-level input voltage | | | 0.8 | V |
| $V_{IH}$ | ECL high-level input voltage† | −1150 | | −840 | mV |
| $V_{IL}$ | ECL low-level input voltage† | −1810 | | −1490 | mV |
| $I_{IK}$ | TTL input clamp current | | | −18 | mA |
| $I_{OH}$ | High-level output current | | | −15 | mA |
| $I_{OL}$ | Low-level output current | | | 48 | mA |
| $T_A$ | Operating free-air temperature | 0 | | 85 | °C |

† The algebraic convention, in which the least positive (most negative) value is designated minimum, is used in this data sheet for logic levels only.

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

| PARAMETER | | TEST CONDITIONS | | | MIN | TYP‡ | MAX | UNIT |
|---|---|---|---|---|---|---|---|---|
| $V_{IK}$ | $\overline{OE}$2 only | $V_{CC}$ = 4.5 V, | $V_{EE}$ = −4.2 V, | $I_I$ = −18 mA | | | −1.2 | V |
| $V_{OH}$ | | $V_{CC}$ = 4.5 V, | $V_{EE}$ = −4.5 V ± 0.3 V, | $I_{OH}$ = −3 mA | 2.4 | 3.3 | | V |
| | | $V_{CC}$ = 4.5 V, | $V_{EE}$ = −4.5 V ± 0.3 V, | $I_{OH}$ = −15 mA | 2 | 3.1 | | |
| $V_{OL}$ | | $V_{CC}$ = 4.5 V, | $V_{EE}$ = −4.5 V ± 0.3 V, | $I_{OL}$ = 48 mA | | 0.38 | 0.55 | V |
| $I_I$ | $\overline{OE}$2 only | $V_{CC}$ = 5.5 V, | $V_{EE}$ = −4.8 V, | $V_I$ = 7 V | | | 0.1 | mA |
| $I_{IH}$ | $\overline{OE}$2 only | $V_{CC}$ = 5.5 V, | $V_{EE}$ = −4.8 V, | $V_I$ = 2.7 V | | | 20 | µA |
| $I_{IL}$ | $\overline{OE}$2 only | $V_{CC}$ = 5.5 V, | $V_{EE}$ = −4.8 V, | $V_I$ = 0.5 V | | | −0.5 | mA |
| $I_{IH}$ | Data inputs and $\overline{OE}$1 | $V_{CC}$ = 5.5 V, | $V_{EE}$ = −4.8 V, | $V_{IH}$ = −840 mV | | | 350 | µA |
| $I_{IL}$ | Data inputs and $\overline{OE}$1 | $V_{CC}$ = 5.5 V, | $V_{EE}$ = −4.8 V, | $V_{IL}$ = −1810 mV | 0.50 | | | µA |
| $I_{OZH}$ | | $V_{CC}$ = 5.5 V, | $V_{EE}$ = −4.8 V, | $V_O$ = 2.7 V | | | 50 | µA |
| $I_{OZL}$ | | $V_{CC}$ = 5.5 V, | $V_{EE}$ = −4.8 V, | $V_O$ = 0.5 V | | | −50 | µA |
| $I_{OS}$§ | | $V_{CC}$ = 5.5 V, | $V_{EE}$ = −4.8 V, | $V_O$ = 0 V | −100 | | −225 | mA |
| $I_{CCH}$ | | $V_{CC}$ = 5.5 V, | $V_{EE}$ = −4.8 V | | | 67 | 97 | mA |
| $I_{CCL}$ | | $V_{CC}$ = 5.5 V, | $V_{EE}$ = −4.8 V | | | 84 | 120 | mA |
| $I_{CCZ}$ | | $V_{CC}$ = 5.5 V, | $V_{EE}$ = −4.8 V | | | 81 | 116 | mA |
| $I_{EE}$ | | $V_{CC}$ = 5.5 V, | $V_{EE}$ = −4.8 V | | | −22 | −33 | mA |
| $C_i$ | | $V_{CC}$ = 5 V, | $V_{EE}$ = 4.5 V | | | 5 | | pF |
| $C_o$ | | $V_{CC}$ = 5 V, | $V_{EE}$ = 4.5 V | | | 7 | | pF |

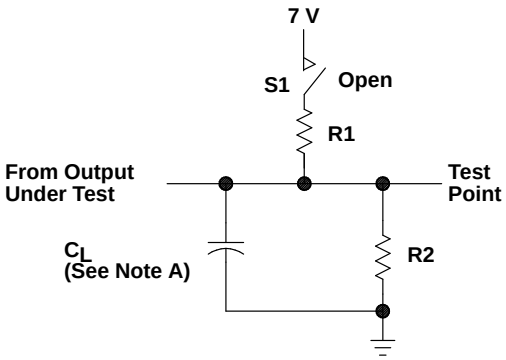
‡ All typical values are at $V_{CC}$ = 5 V, $V_{EE}$ = −4.5 V, $T_A$ = 25°C.
§ Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.

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

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $C_L$ = 50 pF, R1 = 500 Ω, R2 = 500 Ω | | | UNIT |
|---|---|---|---|---|---|---|
| | | | MIN | TYP† | MAX | |
| $t_{PLH}$ | A | Y | 1.6 | 3.9 | 6.4 | ns |
| $t_{PHL}$ | | | 1.6 | 4.2 | 6.4 | |
| $t_{PZH}$ | $\overline{OE}1$ | Y | 2.4 | 4.5 | 6.9 | ns |
| $t_{PZL}$ | | | 3.5 | 5.9 | 8.7 | |
| $t_{PHZ}$ | $\overline{OE}1$ | Y | 2.8 | 5.2 | 8.1 | ns |
| $t_{PLZ}$ | | | 2.2 | 4.6 | 8 | |
| $t_{PZH}$ | $\overline{OE}2$ | Y | 1.4 | 3.3 | 6.1 | ns |
| $t_{PZL}$ | | | 2.5 | 4.7 | 7.9 | |
| $t_{PHZ}$ | $\overline{OE}2$ | Y | 1.6 | 4.1 | 6.5 | ns |
| $t_{PLZ}$ | | | 0.7 | 3.3 | 6.4 | |

† All typical values are at $V_{CC}$ = 5 V, $V_{EE}$ = –4.5 V, $T_A$ = 25°C.

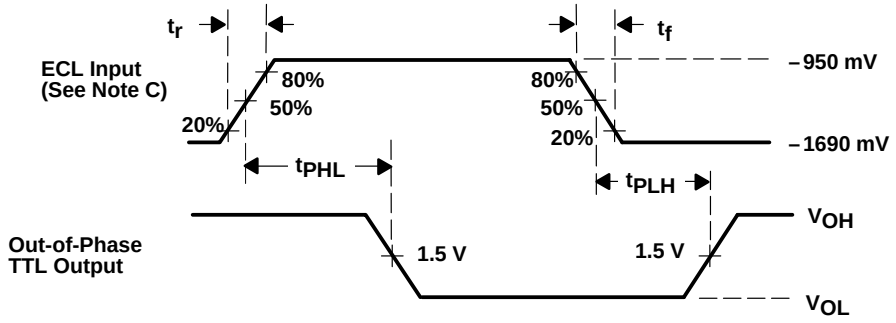
## PARAMETER MEASUREMENT INFORMATION



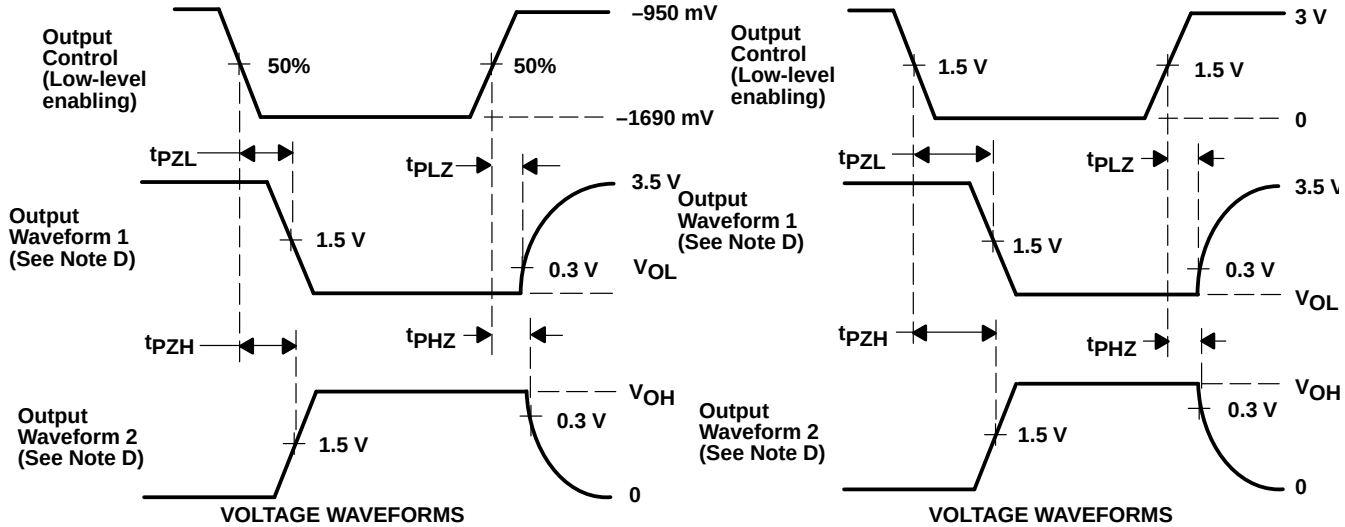

LOAD CIRCUIT

**SWITCH POSITION TABLE**

| TEST | S1 |
|---|---|
| $t_{PLH}$ | Open |
| $t_{PHL}$ | Open |
| $t_{PZH}$ | Open |
| $t_{PZL}$ | Closed |
| $t_{PHZ}$ | Open |
| $t_{PLZ}$ | Closed |




ECL INPUT PROPAGATION DELAY TIMES




VOLTAGE WAVEFORMS
ECL ENABLE AND DISABLE TIMES

VOLTAGE WAVEFORMS
TTL ENABLE AND DISABLE TIMES

NOTES: A. $C_L$ includes probe and jig capacitance.
B. For TTL inputs, input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, $Z_O$ = 50 Ω, $t_r$ ≤ 2.5 ns, $t_f$ ≤ 2.5 ns.
C. For ECL inputs, input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, $Z_O$ = 50 Ω, $t_r$ ≤ 0.7 ns, $t_f$ ≤ 0.7 ns.
D. 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.
E. The outputs are measured one at a time with one transition per measurement.

**FIGURE 1. LOAD CIRCUIT AND VOLTAGE WAVEFORMS**

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