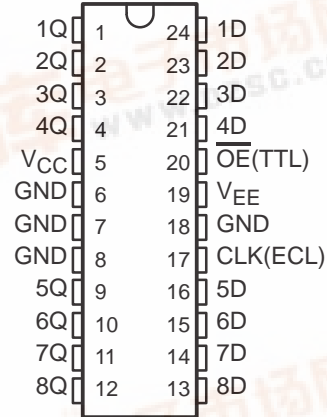


# SN10KHT5574 OCTAL ECL-TO-TTL TRANSLATOR WITH D-TYPE EDGE-TRIGGERED FLIP-FLOPS AND 3-STATE OUTPUTS

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- **10KH Compatible**
- **ECL Clock 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 DIPs**

DW OR NT PACKAGE  
(TOP VIEW)



## description

This octal ECL-to-TTL translator is designed to provide efficient translation between a 10KH 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.

The eight flip-flops of the SN10KHT5574 are edge-triggered D-type flip-flops. On the positive transition of the clock, the Q outputs are set to the logic levels that were set up at the D inputs.

A buffered output-enable input ( $\overline{OE}$ ) can be used to place the eight outputs in either a normal logic state (high or low logic levels) or a high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance third state and increased drive provide the capability to drive bus lines without need for interface or pullup components.

The output-enable input  $\overline{OE}$  does not affect the internal operations of the flip-flops. Old data can be retained or new data can be entered while the outputs are off.

The SN10KHT5574 is characterized for operation from 0°C to 75°C.

FUNCTION TABLE

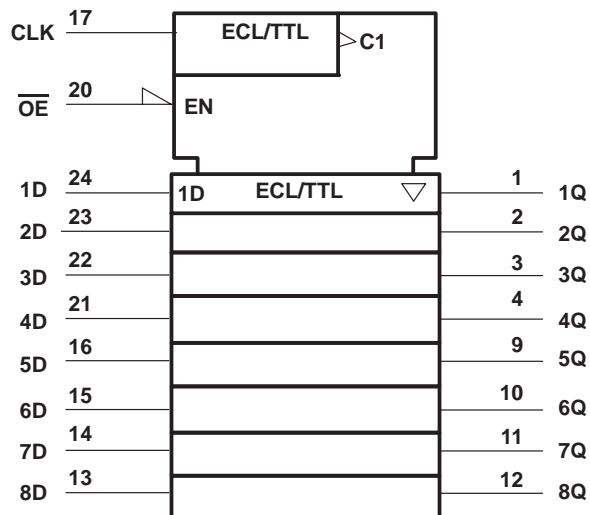
INPUTS			OUTPUT (TTL) Q
$\overline{OE}$	CLK	D	
L	↑	L	L
L	↑	H	H
L	L	X	$Q_0$
H	X	X	Z

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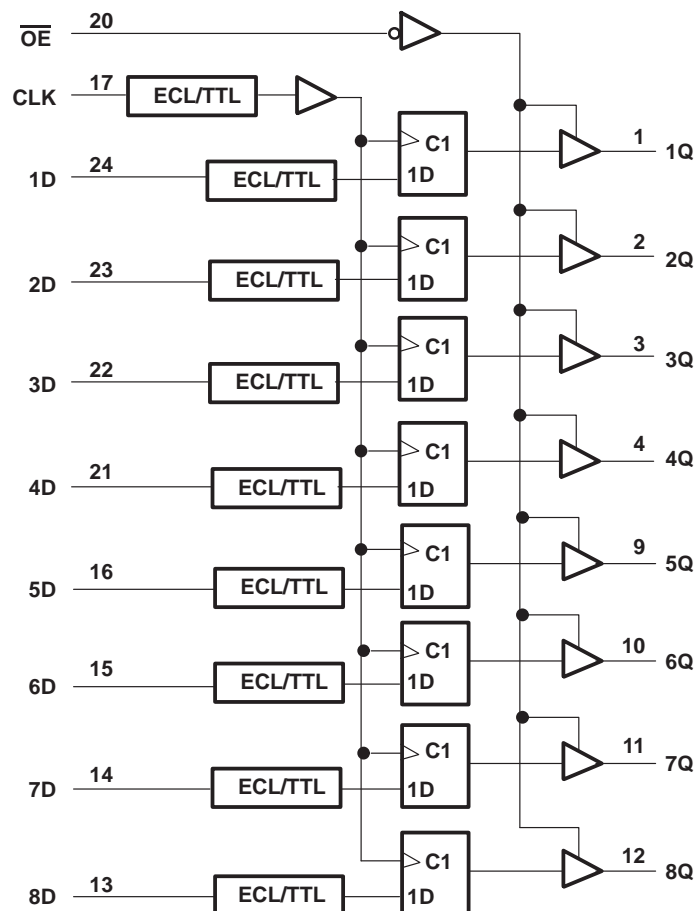
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logic symbol†



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

logic diagram (positive logic)



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**absolute maximum ratings over operating temperature range (unless otherwise noted)<sup>†</sup>**

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 disabled or power-off state	–0.5 V to 5.5 V
Voltage applied to any output in the high state	–0.5 V to $V_{CC}$
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 75°C
Storage temperature range	–65°C to 150°C

<sup>†</sup> 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	–4.94	–5.2	–5.46	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 <sup>‡</sup>	$T_A = 0^\circ\text{C}$	–1170	–840	mV
		$T_A = 25^\circ\text{C}$	–1130	–810	
		$T_A = 75^\circ\text{C}$	–1070	–735	
$V_{IL}$	ECL low-level input voltage <sup>‡</sup>	$T_A = 0^\circ\text{C}$	–1950	–1480	mV
		$T_A = 25^\circ\text{C}$	–1950	–1480	
		$T_A = 75^\circ\text{C}$	–1950	–1450	
$I_{IK}$	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 range	0		75	°C

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

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

PARAMETER		TEST CONDITIONS			MIN	TYP†	MAX	UNIT
$V_{IK}$	OE only	$V_{CC} = 4.5\text{ V}$ , $V_{EE} = -4.94\text{ V}$ , $I_I = -18\text{ mA}$					-1.2	V
$V_{OH}$		$V_{CC} = 4.5\text{ V}$ , $V_{EE} = -5.2\text{ V} \pm 5\%$ , $I_{OH} = -3\text{ mA}$			2.4	3.3		V
		$V_{CC} = 4.5\text{ V}$ , $V_{EE} = -5.2\text{ V} \pm 5\%$ , $I_{OH} = -15\text{ mA}$			2	3.1		
$V_{OL}$		$V_{CC} = 4.5\text{ V}$ , $V_{EE} = -5.2\text{ V} \pm 5\%$ , $I_{OL} = 48\text{ mA}$			0.38	0.55		V
$I_I$	OE only	$V_{CC} = 5.5\text{ V}$ , $V_{EE} = -5.46\text{ V}$ , $V_I = 7\text{ V}$					0.1	mA
$I_{IH}$	OE only	$V_{CC} = 5.5\text{ V}$ , $V_{EE} = -5.46\text{ V}$ , $V_I = 2.7\text{ V}$					20	$\mu\text{A}$
$I_{IL}$	OE only	$V_{CC} = 5.5\text{ V}$ , $V_{EE} = -5.46\text{ V}$ , $V_I = 0.5\text{ V}$					-0.5	mA
$I_{IH}$	Data inputs and CLK	$V_{CC} = 5.5\text{ V}$ , $V_{EE} = -5.46\text{ V}$ , $V_I = -840\text{ mV}$	$T_A = 0^\circ\text{C}$				350	$\mu\text{A}$
		$V_{CC} = 5.5\text{ V}$ , $V_{EE} = -5.46\text{ V}$ , $V_I = -810\text{ mV}$	$T_A = 25^\circ\text{C}$				350	
		$V_{CC} = 5.5\text{ V}$ , $V_{EE} = -5.46\text{ V}$ , $V_I = -735\text{ mV}$	$T_A = 75^\circ\text{C}$				350	
$I_{IL}$	Data inputs and CLK	$V_{CC} = 5.5\text{ V}$ , $V_{EE} = -5.46\text{ V}$ , $V_I = -1950\text{ mV}$	$T_A = 0^\circ\text{C}$		0.5			$\mu\text{A}$
			$T_A = 25^\circ\text{C}$		0.5			
			$T_A = 75^\circ\text{C}$		0.5			
$I_{OZH}$		$V_{CC} = 5.5\text{ V}$ , $V_{EE} = -5.46\text{ V}$ , $V_O = 2.7\text{ V}$					50	$\mu\text{A}$
$I_{OZL}$		$V_{CC} = 5.5\text{ V}$ , $V_{EE} = -5.46\text{ V}$ , $V_O = 0.5\text{ V}$					-50	$\mu\text{A}$
$I_{OS}^\ddagger$		$V_{CC} = 5.5\text{ V}$ , $V_{EE} = -5.46\text{ V}$ , $V_O = 0\text{ V}$			-100		-225	mA
$I_{CCH}$		$V_{CC} = 5.5\text{ V}$ , $V_{EE} = -5.46\text{ V}$				66	95	mA
$I_{CCL}$		$V_{CC} = 5.5\text{ V}$ , $V_{EE} = -5.46\text{ V}$				76	110	mA
$I_{CCZ}$		$V_{CC} = 5.5\text{ V}$ , $V_{EE} = -5.46\text{ V}$				74	106	mA
$I_{EE}$		$V_{CC} = 5.5\text{ V}$ , $V_{EE} = -5.46\text{ V}$				-43	-61	mA
$C_i$		$V_{CC} = 5.5\text{ V}$ , $V_{EE} = -5.2\text{ V}$ , $f = 10\text{ MHz}$				5		pF
$C_o$		$V_{CC} = 5.5\text{ V}$ , $V_{EE} = -5.2\text{ V}$ , $f = 10\text{ MHz}$				7		pF

† All typical values are at  $V_{CC} = 5\text{ V}$ ,  $V_{EE} = -5.2\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

‡ Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.

### timing requirements

			$V_{CC} = 4.5\text{ V to } 5.5\text{ V}$ , $V_{EE} = -4.94\text{ V to } -5.46\text{ V}$ , $T_A = \text{MIN to MAX}^\S$		UNIT
			MIN	MAX	
$t_w$	Pulse duration	CLK high	4		ns
		CLK low	4		
$t_{su}$	Setup time before CLK $\uparrow$	Data high	1		ns
		Data low	1		
$t_h$	Hold time after CLK $\uparrow$	Data high	1		ns
		Data low	1		

§ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$C_L = 50 \text{ pF}$ , $R1 = 500 \Omega$ , $R2 = 500 \Omega$			UNIT
			MIN	TYP†	MAX	
$f_{\text{max}}$			200	300		MHz
$t_{\text{PLH}}$	CLK	Q	2.3	4.1	7	ns
$t_{\text{PHL}}$			2.9	4.6	7.4	
$t_{\text{PZH}}$	$\overline{\text{OE}}$	Q	1.9	3.6	6.3	ns
$t_{\text{PZL}}$			2.7	4.8	7.7	
$t_{\text{PHZ}}$	$\overline{\text{OE}}$	Q	2.1	3.9	6.1	ns
$t_{\text{PLZ}}$			0.5	3.4	6.3	

† All typical values are at  $V_{\text{CC}} = 5 \text{ V}$ ,  $V_{\text{EE}} = -5.2 \text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

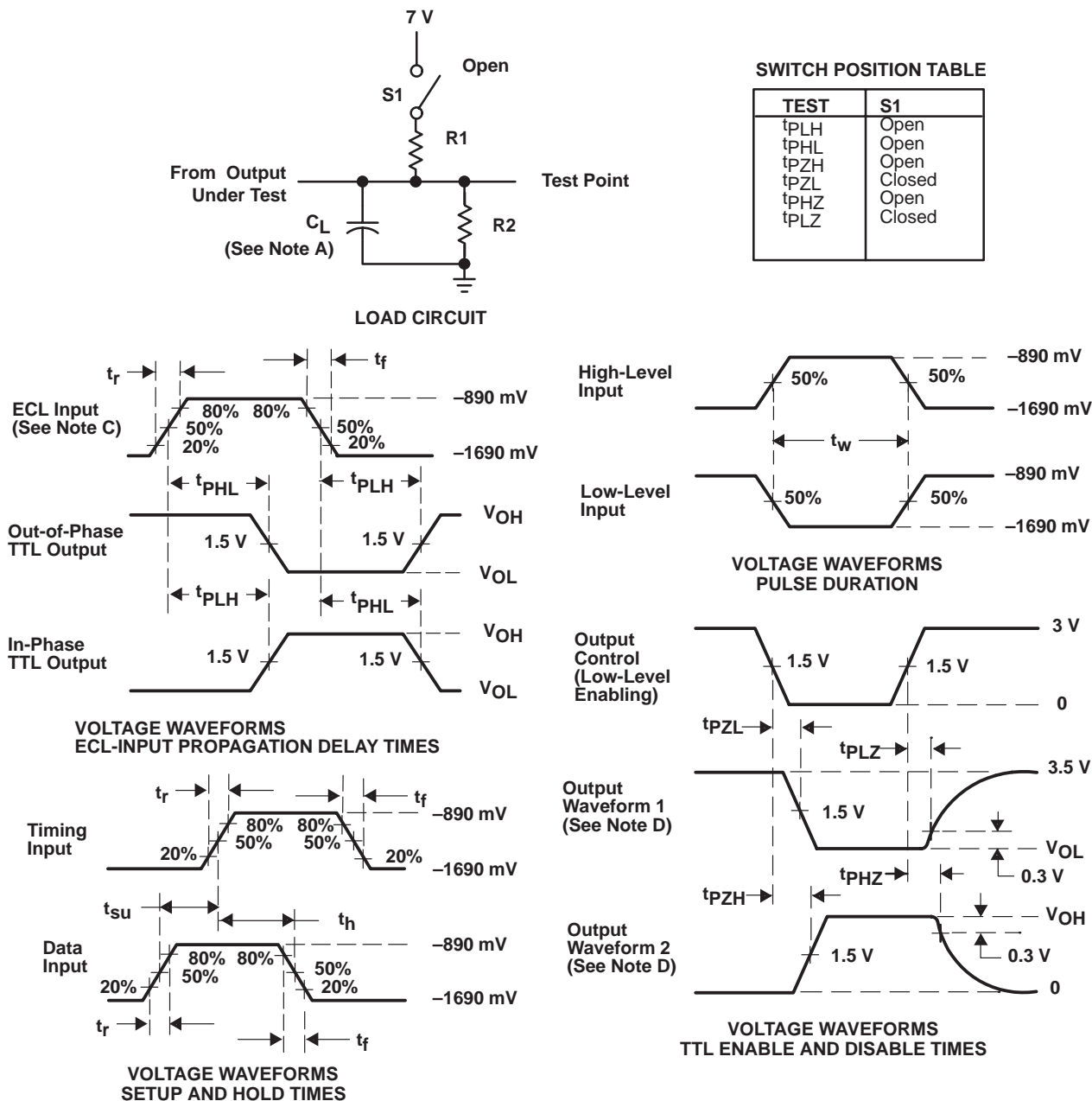
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### EDGE-TRIGGERED FLIP-FLOPS AND 3-STATE OUTPUTS

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#### PARAMETER MEASUREMENT INFORMATION



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. For TTL inputs, input pulses are supplied by generators having the following characteristics:  $PRR \leq 10$  MHz,  $Z_0 = 50 \Omega$ ,  $t_r \leq 2.5$  ns,  $t_f \leq 2.5$  ns.  
 C. For ECL inputs, input pulses are supplied by generators having the following characteristics:  $PRR \leq 10$  MHz,  $Z_0 = 50 \Omega$ ,  $t_r \leq 1.5$  ns,  $t_f \leq 1.5$  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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