

8-input multiplexer

74ALS151

FEATURES

- 8-to-1 multiplexing
- On chip decoding
- Multi-function capability
- Complementary outputs
- See 74ALS251 for 3-State version

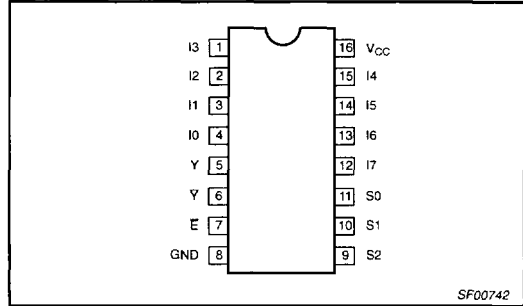
DESCRIPTION

The 74ALS151 is a logic implementation of a single 8-position switch with the switch position controlled by the state of three select (S0, S1, S2) inputs. True (Y) and complementary (Y-bar) outputs are both provided.

The enable (E) is active-Low. When E is High, Y output is Low and the Y-bar output is High regardless of all other inputs.

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74ALS151	8.0ns	8.0mA

PIN CONFIGURATION



SF00742

ORDERING INFORMATION

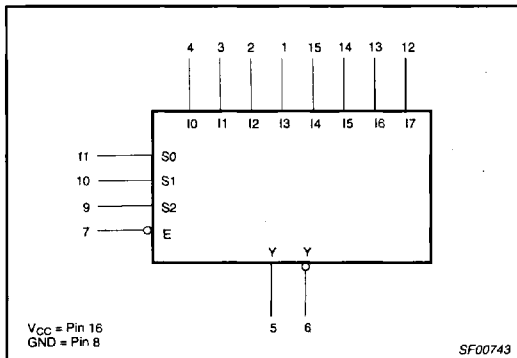
DESCRIPTION	ORDER CODE	DRAWING NUMBER
	COMMERCIAL RANGE V _{CC} = 5V ±10%, T _{amb} = 0°C to +70°C	
16-pin plastic DIP	74ALS151N	SOT38-4
16-pin plastic SO	74ALS151D	SOT109-1

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

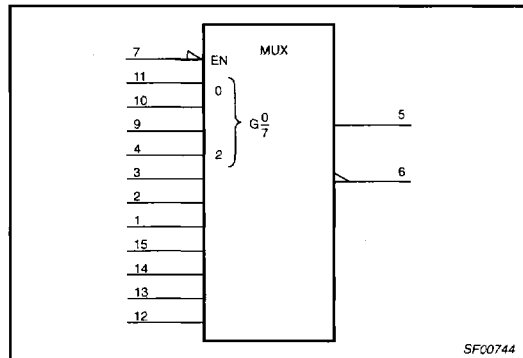
PINS	DESCRIPTION	74ALS (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
I0 – I7	Data inputs	1.0/1.0	20µA/0.1mA
S0 – S2	Select inputs	1.0/1.0	20µA/0.1mA
E	Enable input (active-Low)	1.0/1.0	20µA/0.1mA
Y, Y-bar	Data outputs	130/240	2.6mA/24mA

NOTE: One (1.0) ALS unit load is defined as: 20µA in the High state and 0.1mA in the Low state.

LOGIC SYMBOL



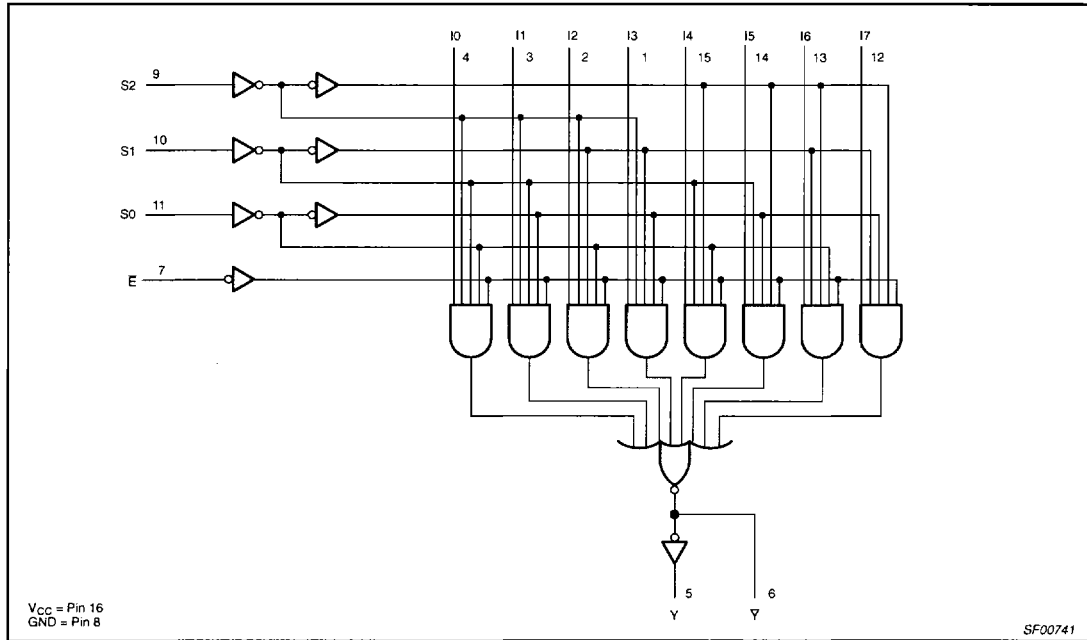
IEC/IEEE SYMBOL



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LOGIC DIAGRAM



FUNCTION TABLE

INPUTS				OUTPUTS	
S2	S1	S0	E	Y	Ȳ
X	X	X	H	L	H
L	L	L	L	I ₀	Ī ₀
L	L	H	L	I ₁	Ī ₁
L	H	L	L	I ₂	Ī ₂
L	H	H	L	I ₃	Ī ₃
H	L	L	L	I ₄	Ī ₄
H	L	H	L	I ₅	Ī ₅
H	H	L	L	I ₆	Ī ₆
H	H	H	L	I ₇	Ī ₇

H = High voltage level
L = Low voltage level
X = Don't care

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ABSOLUTE MAXIMUM RATINGS

(Operation beyond the limit set forth in this table may impair the useful life of the device. Unless otherwise noted these limits are over the operating free-air temperature range.)

SYMBOL	PARAMETER	RATING	UNIT
V_{CC}	Supply voltage	-0.5 to +7.0	V
V_{IN}	Input voltage	-0.5 to +7.0	V
I_{IN}	Input current	-30 to +5	mA
V_{OUT}	Voltage applied to output in High output state	-0.5 to V_{CC}	V
I_{OUT}	Current applied to output in Low output state	48	mA
T_{amb}	Operating free-air temperature range	0 to +70	°C
T_{stg}	Storage temperature range	-65 to +150	°C

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS			UNIT
		MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5.0	5.5	V
V_{IH}	High-level input voltage	2.0			V
V_{IL}	Low-level input voltage			0.8	V
I_{IK}	Input clamp current			-18	mA
I_{OH}	High-level output current			-2.6	mA
I_{OL}	Low-level output current			24	mA
T_{amb}	Operating free air temperature range	0		+70	°C

DC ELECTRICAL CHARACTERISTICS

(Over recommended operating free-air temperature range unless otherwise noted.)

SYMBOL	PARAMETER	TEST CONDITIONS ¹	LIMITS			UNIT
			MIN	TYP ²	MAX	
V_{OH}	High-level output voltage	$V_{CC} = \pm 10\%$, $V_{IL} = \text{MAX}$, $V_{IH} = \text{MIN}$	$I_{OH} = -0.4\text{mA}$	$V_{CC} - 2$		V
			$I_{OH} = \text{MAX}$	2.4	3.2	V
V_{OL}	Low-level output voltage	$V_{CC} = \text{MIN}$, $V_{IL} = \text{MAX}$, $V_{IH} = \text{MIN}$	$I_{OL} = 12\text{mA}$		0.25 0.40	V
			$I_{OL} = 24\text{mA}$		0.35 0.50	V
V_{IK}	Input clamp voltage	$V_{CC} = \text{MIN}$, $I_I = I_{IK}$		-0.73	-1.5	V
I_I	Input current at minimum input voltage	$V_{CC} = \text{MAX}$, $V_I = 7.0\text{V}$			0.1	mA
I_{IH}	High-level input current	$V_{CC} = \text{MAX}$, $V_I = 2.7\text{V}$			20	μA
I_{IL}	Low-level input current	$V_{CC} = \text{MAX}$, $V_I = 0.4\text{V}$			-0.1	mA
I_O	Output current ³	$V_{CC} = \text{MAX}$, $V_O = 2.25\text{V}$			-30 -112	mA
I_{CC}	Supply current (total)	$V_{CC} = \text{MAX}$		8.0	12	mA

NOTES:

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at $V_{CC} = 5\text{V}$, $T_{amb} = 25^\circ\text{C}$.
- The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .

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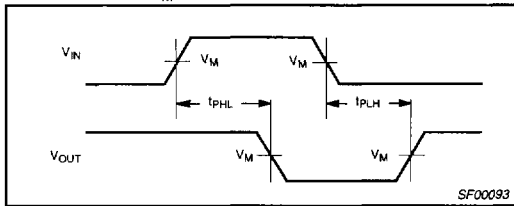
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AC ELECTRICAL CHARACTERISTICS

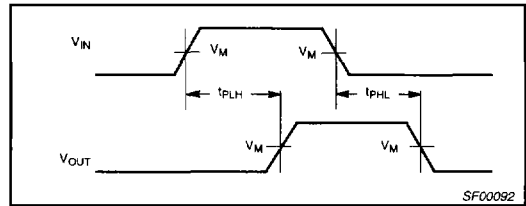
SYMBOL	PARAMETER	TEST CONDITION	LIMITS		UNIT
			$T_{amb} = 0^{\circ}\text{C to } +70^{\circ}\text{C}$ $V_{CC} = +5.0\text{V} \pm 10\%$ $C_L = 50\text{pF}, R_L = 500\Omega$		
			MIN	MAX	
t_{PLH} t_{PHL}	Propagation delay In to Y	Waveform 1	3.0 5.0	12.0 12.0	ns
t_{PLH} t_{PHL}	Propagation delay In to \bar{Y}	Waveform 2	3.0 5.0	15.0 15.0	ns
t_{PLH} t_{PHL}	Propagation delay S_n to Y	Waveform 1, 2	5.0 7.0	15.0 16.0	ns
t_{PLH} t_{PHL}	Propagation delay S_n to \bar{Y}	Waveform 1, 2	5.0 5.0	15.0 16.0	ns
t_{PLH} t_{PHL}	Propagation delay E to Y	Waveform 1	4.0 4.0	12.0 12.0	ns
t_{PLH} t_{PHL}	Propagation delay E to \bar{Y}	Waveform 1	4.0 5.0	12.0 14.0	ns

AC WAVEFORMS

For all waveforms, $V_M = 1.3\text{V}$.



Waveform 1. Propagation Delay for Inverting Output



Waveform 2. Propagation Delay for Non-inverting Output

TEST CIRCUIT AND WAVEFORMS

Test Circuit for Totem-pole Outputs

DEFINITIONS:
 R_L = Load resistor; see AC electrical characteristics for value.
 C_L = Load capacitance includes jig and probe capacitance; see AC electrical characteristics for value.
 R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.

Input Pulse Definition

Family	INPUT PULSE REQUIREMENTS					
	Amplitude	V_M	Rep.Rate	t_w	t_{TLH}	t_{THL}
74ALS	3.5V	1.3V	1MHz	500ns	2.0ns	2.0ns

SC00005