

8-input multiplexer

74F151A

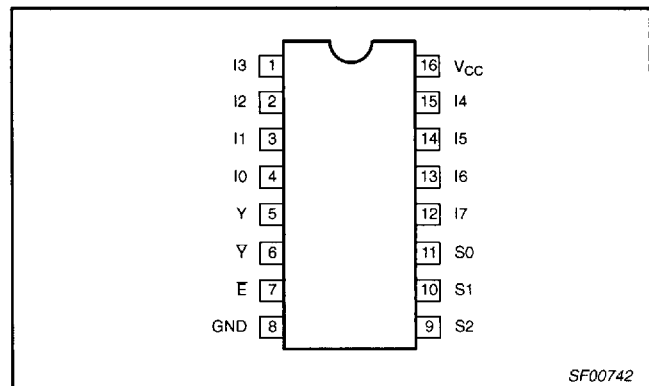
FEATURES

- High speed 8-to-1 multiplexing
- On chip decoding
- Multifunction capability
- Complementary outputs
- See 74F251A for 3-State version

DESCRIPTION

The 74F151A is a logic implementation of a single-pole, 8-position switch with the switch position controlled by the state of three Select (S0, S1, S2) inputs. True (Y) and complementary (\bar{Y}) outputs are both provided. The Enable input (E) is active Low. When E is High, the \bar{Y} output is High and the Y output is Low, regardless of all other inputs. In one package the 74F151A provides the ability to select from eight sources of data or control information. The device can provide any logic function of four variables and the negation with correct manipulation.

PIN CONFIGURATION



SF00742

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F151A	4.5ns	17mA

ORDERING INFORMATION

DESCRIPTION	ORDER CODE
	COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$, $T_{amb} = 0^{\circ}C$ to $+70^{\circ}C$
16-pin plastic DIP	N74F151AN
16-pin plastic SO	N74F151AD

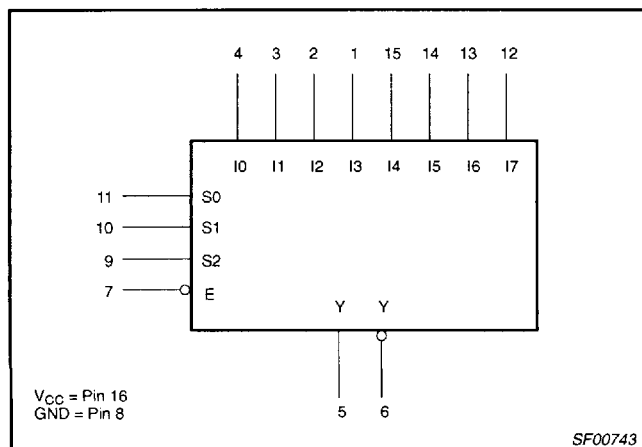
INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
I0–I7	Data inputs	1.0/1.0	20 μ A/0.6mA
S0–S2	Select inputs	1.0/1.0	20 μ A/0.6mA
E	Enable input (active High)	1.0/1.0	20 μ A/0.6mA
Y, \bar{Y}	Data outputs	150/33	3mA/20mA

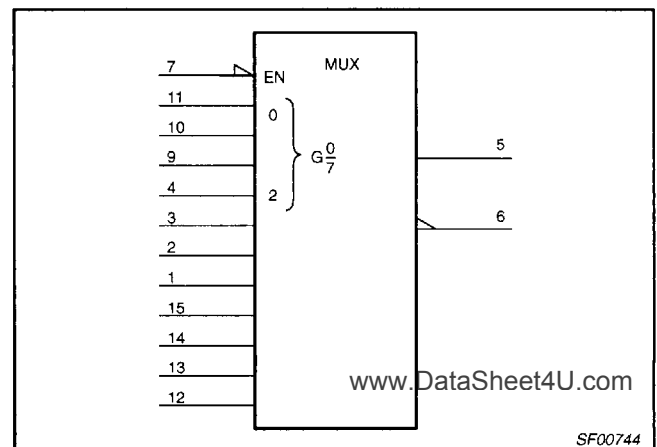
NOTE:

One (1.0) FAST unit load is defined as: 20 μ A in the High state and 0.6mA in the Low state.

LOGIC SYMBOL



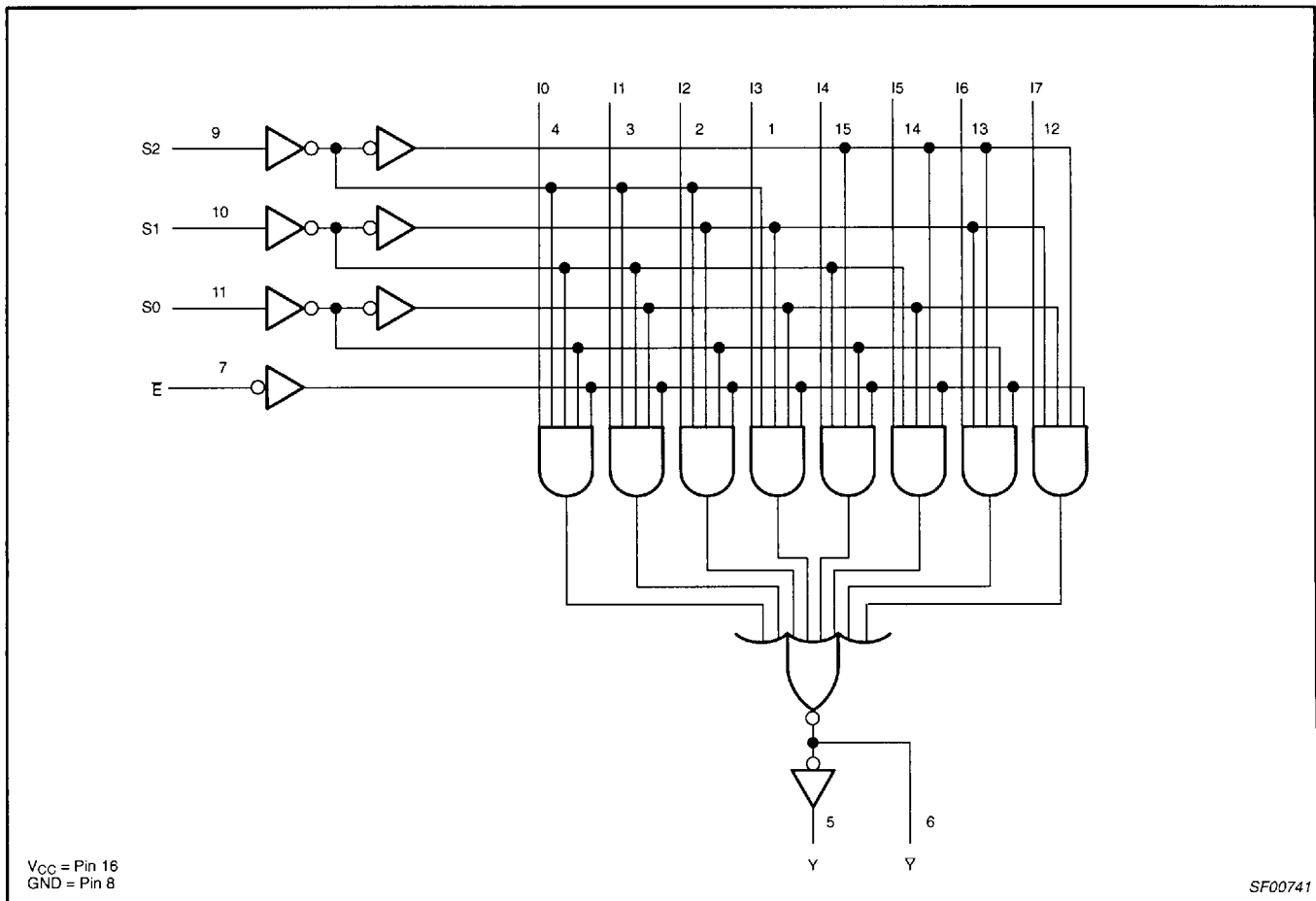
IEC/IEEE SYMBOL



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LOGIC DIAGRAM



FUNCTION TABLE

INPUTS				OUTPUTS	
S2	S1	S0	\bar{E}	Y	\bar{Y}
X	X	X	H	L	H
L	L	L	L	I0	$\bar{I}0$
L	L	H	L	I1	$\bar{I}1$
L	H	L	L	I2	$\bar{I}2$
L	H	H	L	I3	$\bar{I}3$
H	L	L	L	I4	$\bar{I}4$
H	L	H	L	I5	$\bar{I}5$
H	H	L	L	I6	$\bar{I}6$
H	H	H	L	I7	$\bar{I}7$

NOTES:

- 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	40	mA
T_{amb}	Operating free-air temperature range	0 to +70	°C
T_{stg}	Storage temperature	-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			-1	mA
I_{OL}	Low-level output current			20	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 ¹	TEST CONDITIONS ¹	LIMITS			UNIT	
			MIN	TYP ²	MAX		
V_{OH}	High-level output voltage	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX},$ $V_{IH} = \text{MIN}, I_{OH} = \text{MAX}$	$\pm 10\%V_{CC}$	2.5		V	
			$\pm 5\%V_{CC}$	2.7	3.4	V	
V_{OL}	Low-level output voltage	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX},$ $V_{IH} = \text{MIN}, I_{OL} = \text{MAX}$	$\pm 10\%V_{CC}$		0.30	0.50	V
			$\pm 5\%V_{CC}$		0.30	0.50	V
V_{IK}	Input clamp voltage	$V_{CC} = \text{MIN}, I_I = I_{IK}$		-0.73	-1.2	V	
I_I	Input current at maximum input voltage	$V_{CC} = \text{MAX}, V_I = 7.0V$			100	μA	
I_{IH}	High-level input current	$V_{CC} = \text{MAX}, V_I = 2.7V$			20	μA	
I_{IL}	Low-level input current	$V_{CC} = \text{MAX}, V_I = 0.5V$			-0.6	mA	
I_{OS}	Short-circuit output current ³	$V_{CC} = \text{MAX}$	-60		-150	mA	
I_{CC}	Supply current (total)	$V_{CC} = \text{MAX}$	I_{CCH}		18	25	mA
			I_{CCL}		17	25	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 $V_{CC} = 5V, T_{amb} = 25^\circ C$.
- Not more than one output should be shorted at a time. For testing I_{OS} , the use of high-speed test apparatus and/or sample-and-hold techniques are preferable in order to minimize internal heating and more accurately reflect operational values. Otherwise, prolonged shorting of a High output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter tests, I_{OS} tests should be performed last.

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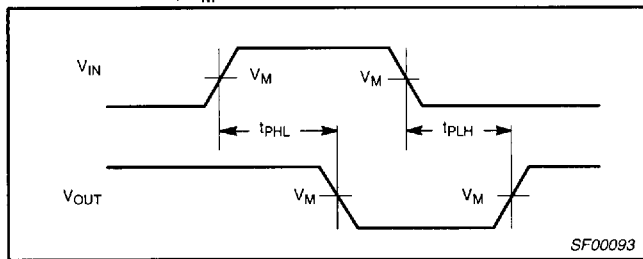
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AC ELECTRICAL CHARACTERISTICS

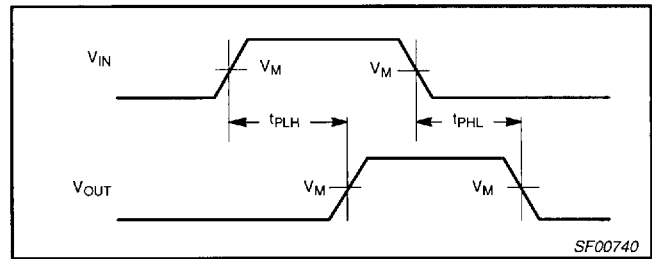
SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			$V_{CC} = +5.0V$ $T_{amb} = +25^{\circ}C$ $C_L = 50pF$ $R_L = 500\Omega$			$V_{CC} = +5.0V \pm 10\%$ $T_{amb} = 0^{\circ}C \text{ to } +70^{\circ}C$ $C_L = 50pF$ $R_L = 500\Omega$		
			MIN	TYP	MAX	MIN	MAX	
t_{PLH} t_{PHL}	Propagation delay In to Y	Waveform 1	2.5 2.5	4.5 4.5	7.0 7.0	2.5 2.5	7.5 7.5	ns
t_{PLH} t_{PHL}	Propagation delay In to \bar{Y}	Waveform 2	2.0 1.0	4.0 2.0	7.0 4.5	2.0 1.0	7.5 5.0	ns
t_{PLH} t_{PHL}	Propagation delay Sn to Y	Waveform 1, 2	4.5 4.0	6.5 6.0	10.0 8.5	4.0 3.5	11.0 9.5	ns
t_{PLH} t_{PHL}	Propagation delay Sn to \bar{Y}	Waveform 1, 2	3.5 2.5	5.5 4.5	8.5 7.0	3.0 2.0	9.5 7.5	ns
t_{PLH} t_{PHL}	Propagation delay E to Y	Waveform 1	4.0 3.0	6.5 5.0	9.0 7.0	3.5 3.0	9.5 7.5	ns
t_{PLH} t_{PHL}	Propagation delay E to \bar{Y}	Waveform 1	2.5 2.0	4.5 3.5	6.5 5.5	2.5 1.5	7.0 6.0	ns

AC WAVEFORMS

For all waveforms, $V_M = 1.5V$



Waveform 1. For Inverting Outputs



Waveform 2. For Non-Inverting Outputs

TEST CIRCUIT AND WAVEFORMS

Test Circuit for Totem-Pole Outputs

Input Pulse Definition

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.

family	INPUT PULSE REQUIREMENTS					
	amplitude	V_M	rep. rate	t_w	t_{TLH}	t_{THL}
74F	3.0V	1.5V	1MHz	500ns	2.5ns	2.5ns

SF00006