Dual 4-input multiplexer

74ALS153

FEATURES

- Non–inverting outputs
- Common select outputs
- Separate enable for each section
- See 74ALS253 for 3–State version

DESCRIPTION

The 74ALS153 has two identical 4–input multiplexer with 3–State outputs which selects two bits of data from four sources by using common select inputs (S0, S1). The two 4–input multiplexer circuits have individual active–Low enables (Ēa, Ēb) which can be used to strobe the outputs independently. Outputs (Ya, Yb) are forced Low when the corresponding enable is high.

The 74ALS153 is the logic implementation of a 2–pole, 4–position switch where the position of the switch is determined by the logic levels supplied to the common select inputs.

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74ALS153	7.0ns	6.5mA

PIN CONFIGURATION

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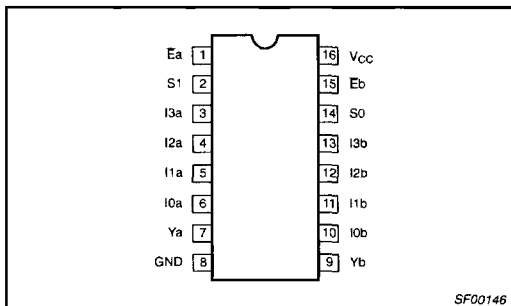
ORDERING INFORMATION

| DESCRIPTION	ORDER CODE	DRAWING NUMBER
	COMMERCIAL RANGE V_{CC} = 5V ±10%, T_{amb} = 0°C to +70°C	
16-pin plastic DIP	74ALS153N	SOT38-4
16-pin plastic SO	74ALS153D	SOT109-1
16-pin plastic SSOP Type II	74ALS153DB	SOT338-1

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

PINS	DESCRIPTION	74ALS (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
I0a – I3a	Port A data inputs	1.0/1.0	20µA/0.1mA
I0b – I3b	Port B data inputs	1.0/1.0	20µA/0.1mA
S0, S1	Common select inputs	1.0/1.0	20µA/0.1mA
Ēa	Port A enable input	1.0/1.0	20µA/0.1mA
Ēb	Port B enable input	1.0/1.0	20µA/0.1mA
Ya, Yb	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.
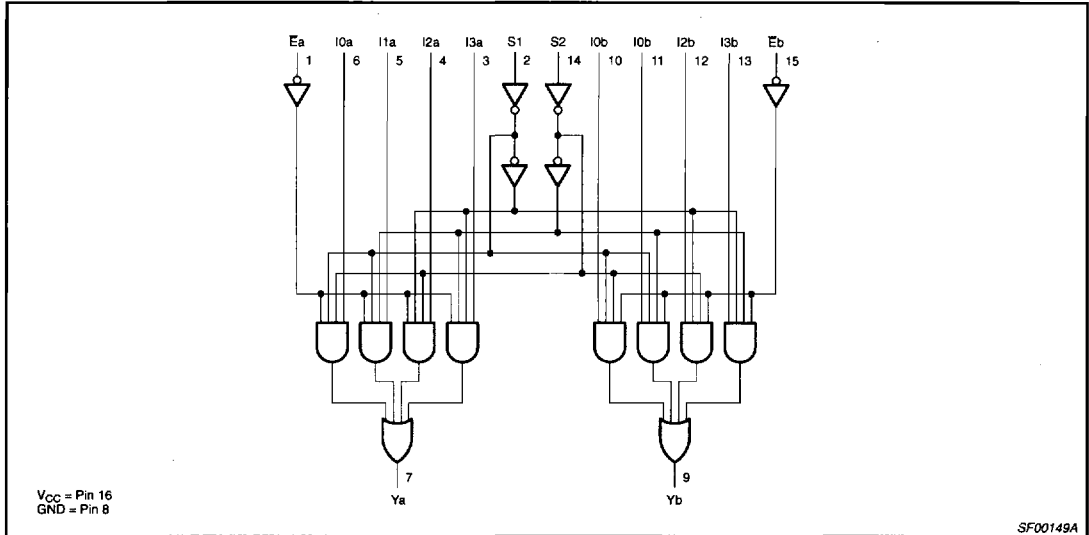
LOGIC SYMBOL

V_{CC} = Pin 16
GND = Pin 8

SF00147

IEC/IEEE SYMBOL

SF00148
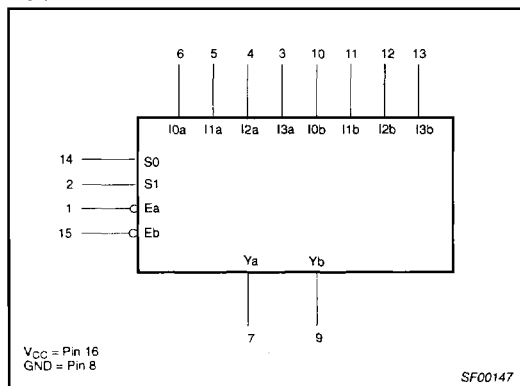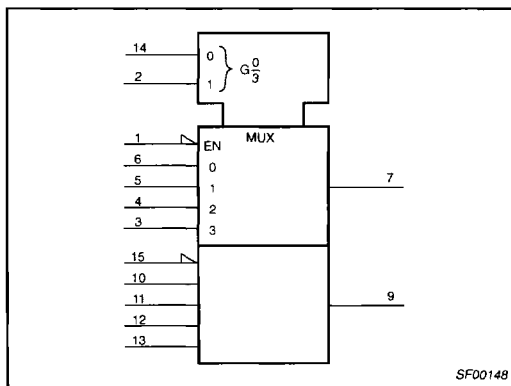
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LOGIC DIAGRAM

V_{CC} = Pin 16
GND = Pin 8

SF00149A

FUNCTION TABLE

INPUTS							OUTPUT
S0	S1	I0n	I1n	I2n	I3n	$\overline{En}$	Yn
L	L	L	X	X	X	L	L
L	L	H	X	X	X	L	H
H	L	X	L	X	X	L	L
H	L	X	H	X	X	L	H
L	H	X	X	L	X	L	L
L	H	X	X	H	X	L	H
H	H	X	X	X	L	L	L
H	H	X	X	X	H	L	H

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	$V_{CC} = ±10\%$, $V_{IL} = MAX$, $V_{IH} = MIN$	$I_{OH} = −0.4mA$	$V_{CC}−2$			V
			$I_{OH} = MAX$	2.4	3.2		V
V_{OL}	Low-level output voltage	$V_{CC} = MIN$, $V_{IL} = MAX$, $V_{IH} = MIN$	$I_{OL} = 12mA$		0.25	0.40	V
			$I_{OL} = 24mA$		0.35	0.50	V
V_{IK}	Input clamp voltage	$V_{CC} = MIN$, $I_I = I_{IK}$			−0.73	−1.5	V
I_I	Input current at minimum input voltage	$V_{CC} = MAX$, $V_I = 7.0V$				0.1	mA
I_{IH}	High-level input current	$V_{CC} = MAX$, $V_I = 2.7V$				20	µA
I_{IL}	Low-level input current	$V_{CC} = MAX$, $V_I = 0.4V$				−0.1	mA
I_O	Output current[3]	$V_{CC} = MAX$, $V_O = 2.25V$		−30		−112	mA
I_{CC}	Supply current (total)	$V_{CC} = MAX$			6.5	12	mA

NOTES:
1. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
2. All typical values are at $V_{CC} = 5V$, $T_{amb} = 25°C$.
3. 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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AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS $T_{amb} = 0°C$ to $+70°C$ $V_{CC} = +5.0V \pm 10\%$ $C_L = 50pF$, $R_L = 500\Omega$		UNIT
			MIN	MAX	
t_{PLH} t_{PHL}	Propagation delay In to Yn	Waveform 1	4.0 4.0	12.0 12.0	ns
t_{PLH} t_{PHL}	Propagation delay Sn to Yn	Waveform 2	5.0 7.0	15.0 16.0	ns
t_{PLH} t_{PHL}	Propagation delay En to Yn	Waveform 2	3.0 5.0	10.0 12.0	ns

AC WAVEFORMS

For all waveforms, $V_M = 1.3V$.
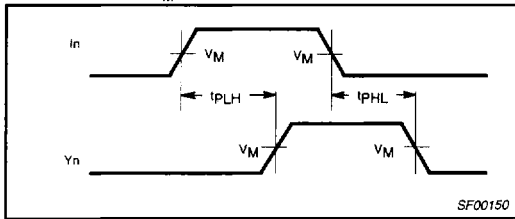
Waveform 1.   Propagation Delay for Data to Output
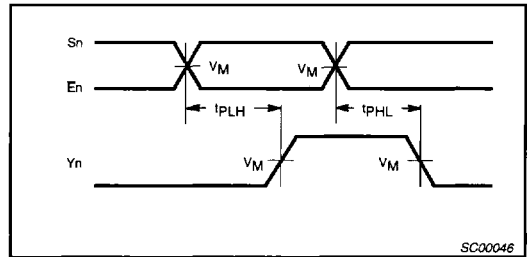
Waveform 2.   Propagation Delay for Select or Enable to Output

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