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ACL Products	

74AC/ACT1153

Dual 4-input multiplexer

FEATURES

- Separate Output Enable inputs for each section
- Common Select inputs
- Output capability: ± 24 mA
- CMOS (AC) and TTL (ACT) voltage level inputs
- 50Ω incident wave switching
- Center-pin V_{CC} and ground configuration to minimize high-speed switching noise
- I_{CC} category: MSI

DESCRIPTION

The 74AC/ACT1153 high-performance CMOS devices combine very high speed and high output drive comparable to the most advanced TTL families.

The 74AC/ACT1153 device provides two identical 4-input multiplexers with non-inverting outputs which select two bits from four sources selected by common select inputs (S_0, S_1). When the individual Enable ($1E, 2E$) inputs of the 4-input multiplexers are High, the outputs are forced Low.

The 74AC/ACT1153 devices are the logic implementation of a 2-pole, 4-position

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS $T_{amb} = 25^\circ\text{C}; \text{GND} = 0\text{V};$ $V_{CC} = 5.0\text{V}$	TYPICAL		UNIT
			AC	ACT	
t_{PLH}/t_{PHL}	Propagation delay $1I_n, 2I_n$ to nY	$C_L = 50\text{pF}$	4.7	5.9	ns
C_{PD}	Power dissipation capacitance per multiplexer ¹	$f = 1\text{MHz}; C_L = 50\text{pF}$	30	34	pF
C_{IN}	Input capacitance	$V_I = 0\text{V}$ or V_{CC}	3.5	3.5	pF
I_{LATCH}	Latch-up current	Per JEDEC JC40.2 Standard 17	500	500	mA

Note:

1. C_{PD} is used to determine the dynamic power dissipation (P_D in μW):

$$P_D = C_{PD} \times V_{CC}^2 \times f_I + \sum (C_L \times V_{CC}^2 \times f_O) \text{ where:}$$

f_I = input frequency in MHz, C_L = output load capacitance in pF,

f_O = output frequency in MHz, V_{CC} = supply voltage in V,

$\sum (C_L \times V_{CC}^2 \times f_O)$ = sum of outputs

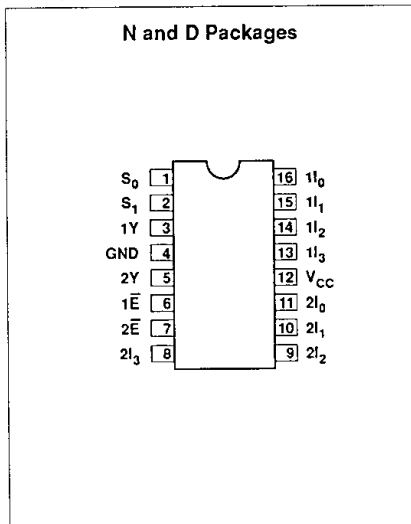
ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	ORDER CODE
16-pin plastic DIP (300mil-wide)	-40°C to +85°C	74AC1153N 74ACT1153N
16-pin plastic SO (150mil-wide)	-40°C to +85°C	74AC1153D 74ACT1153D

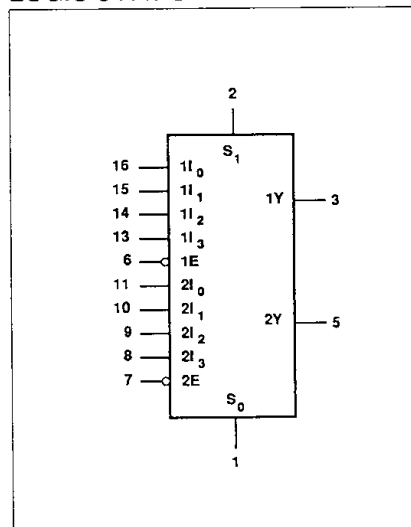
tion switch; the position of the switch being determined by the logic levels supplied to the two select inputs.

The '1153 is the non-inverting version of the '1152.

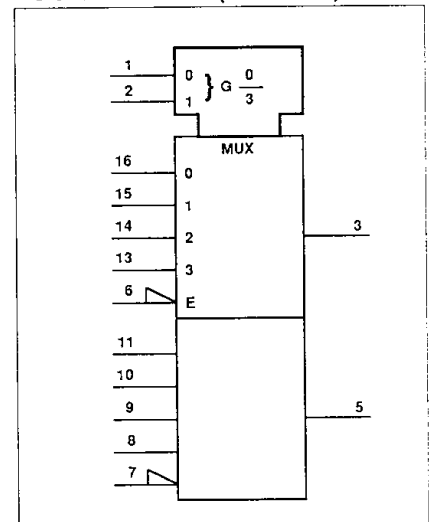
PIN CONFIGURATION



LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



Dual 4-input multiplexer

74AC/ACT11153

PIN DESCRIPTION

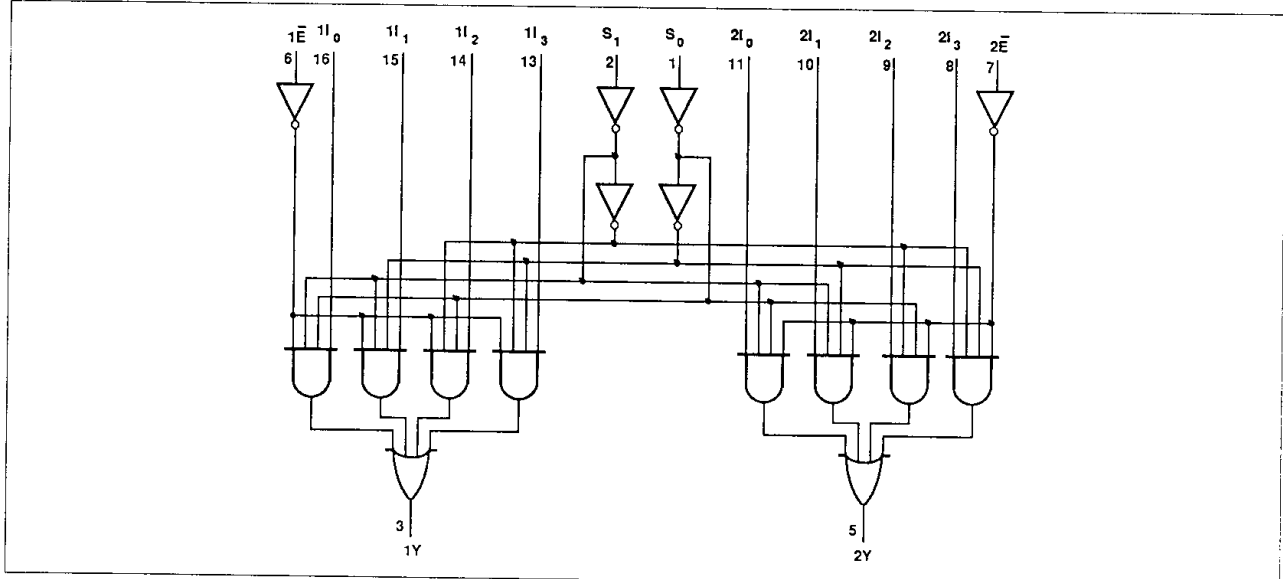
PIN NUMBER	SYMBOL	NAME AND FUNCTION
1, 2	S_0, S_1	Common select inputs
16, 15, 14, 13	$1I_0 - 1I_3$	Port A data inputs
11, 10, 9, 8	$2I_0 - 2I_3$	Port B data inputs
6	$1\bar{E}$	Port A enable input (active Low)
7	$2\bar{E}$	Port B enable input (active Low)
3, 5	$1Y, 2Y$	Data outputs
4	GND	Ground (0V)
12	V_{CC}	Positive supply voltage

FUNCTION TABLE

$n\bar{E}$	INPUTS						OUTPUT
	S_0	S_1	$1I_0$	$1I_1$	$1I_2$	$1I_3$	
H	X	X	X	X	X	X	L
L	L	L	L	X	X	X	L
L	L	L	H	X	X	X	H
L	H	L	X	L	X	X	L
L	H	L	X	H	X	X	H
L	L	H	X	X	L	X	L
L	L	H	X	X	H	X	H
L	H	H	X	X	X	L	L
L	H	H	X	X	X	H	H

H = High voltage level steady state
 L = Low voltage level steady state
 X = Don't care
 Z = High-impedance "OFF" state

LOGIC DIAGRAM



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RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	ACT11153			ACT11153			UNIT
		Min	Nom	Max	Min	Nom	Max	
V_{CC}	DC supply voltage	3.0 ¹	5.0	5.5	4.5	5.0	5.5	V
V_I	Input voltage	0		V_{CC}	0		V_{CC}	V
V_O	Output voltage	0		V_{CC}	0		V_{CC}	V
$\Delta V/\Delta t$	Input transition rise or fall rate	0		10	0		10	ns/V
T_{amb}	Operating free-air temperature range	-40		+85	-40		+85	°C

NOTE:

- No electrical or switching characteristics are specified at $V_{CC} < 3V$. Operation between 2V and 3V is not recommended, but within that range, a device output will maintain a previously established logic state.

ABSOLUTE MAXIMUM RATINGS¹

SYMBOL	PARAMETER	TEST CONDITIONS	RATING	UNIT
V_{CC}	DC supply voltage		-0.5 TO +7.0	V
I_{IK} or V_I	DC input diode current ²	$V_I < 0$	-20	mA
	DC input voltage	$V_I > V_{CC}$	20	
I_{OK} or V_O	DC output diode current ²	$V_O < 0$	-50	mA
		$V_O > V_{CC}$	50	
	DC output voltage		-0.5 to $V_{CC} + 0.5$	V
I_O	DC output source or sink current per output pin	$V_O = 0$ to V_{CC}	± 50	mA
I_{CC} or I_{GND}	DC V_{CC} current		± 100	mA
	DC ground current		± 100	
T_{STG}	Storage temperature		-65 to 150	°C
P_{TOT}	Power dissipation per package	Above 70°C; derate linearly by 8mW/K	500	mW
	Power dissipation per package Plastic surface mount (SO)	Above 70°C; derate linearly by 8mW/K	400	mW

NOTES:

- Stresses beyond those listed 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.
- The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

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DC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	V _{CC}	74AC11153				74ACT11153				UNIT	
				T _{amb} = +25°C		T _{amb} = -40°C to +85°C		T _{amb} = +25°C		T _{amb} = -40°C to +85°C			
				Min	Max	Min	Max	Min	Max	Min	Max		
V _{IH}	High-level input voltage		3.0	2.10		2.10						V	
			4.5	3.15		3.15		2.0		2.0			
			5.5	3.85		3.85		2.0		2.0			
V _{IL}	Low-level input voltage		3.0		0.90		0.90					V	
			4.5		1.35		1.35		0.8		0.8		
			5.5		1.65		1.65		0.8		0.8		
V _{OH}	High-level output voltage	V _I = V _{IL} or V _{IH}	I _{OH} = -50μA	3.0	2.9		2.9					V	
				4.5	4.4		4.4		4.4		4.4		
			5.5	5.4		5.4		5.4		5.4			
			I _{OH} = -4mA	3.0	2.58		2.48						
				4.5	3.94		3.8		3.94		3.8		
I _{OH} = -24mA	5.5	4.94		4.8		4.94		4.8					
I _{OH} = -75mA ¹	5.5			3.85				3.85					
V _{OL}	Low-level output voltage	V _I = V _{IL} or V _{IH}	I _{OL} = 50μA	3.0		0.1		0.1				V	
				4.5		0.1		0.1		0.1			0.1
			5.5		0.1		0.1		0.1		0.1		
			I _{OL} = 12mA	3.0		0.36		0.44					
				4.5		0.36		0.44		0.36			0.44
			I _{OL} = 24mA	5.5		0.36		0.44		0.36			0.44
I _{OL} = 75mA ¹	5.5				1.65				1.65				
I _I	Input leakage current	V _I = V _{CC} or GND	5.5		±0.1		±1.0		±0.1		±1.0	μA	
I _{CC}	Quiescent supply current	V _I = V _{CC} or GND, I _O = 0mA	5.5		8.0		80		8.0		80	μA	
ΔI _{CC}	Supply current, TTL inputs High ²	One input at 3.4V, other inputs at V _{CC} or GND	5.5						0.9		1.0	mA	

NOTES:

1. Not more than one output should be tested at a time, and the duration of the test should not exceed 10ms.
2. This is the increase in supply current for each input that is at one of the specified TTL voltage levels rather than 0V or V_{CC}.

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AC ELECTRICAL CHARACTERISTICS AT 3.3V ±0.3V

SYMBOL	PARAMETER	WAVEFORM	74AC1153					UNIT
			T _{amb} = +25°C			T _{amb} = -40°C to +85°C		
			Min	Typ	Max	Min	Max	
t _{PLH} t _{PHL}	Propagation delay nI _n to nY	1	2.3 2.6	6.9 7.1	8.4 8.7	2.3 2.6	9.5 9.9	ns
t _{PLH} t _{PHL}	Propagation delay S _n to nY	1	2.3 2.6	7.4 7.6	9.5 9.9	2.3 2.6	10.5 11.0	ns
t _{PLH} t _{PHL}	Propagation delay nE to nY	2	1.8 1.0	5.3 5.2	6.7 7.2	1.8 1.0	7.5 8.5	ns

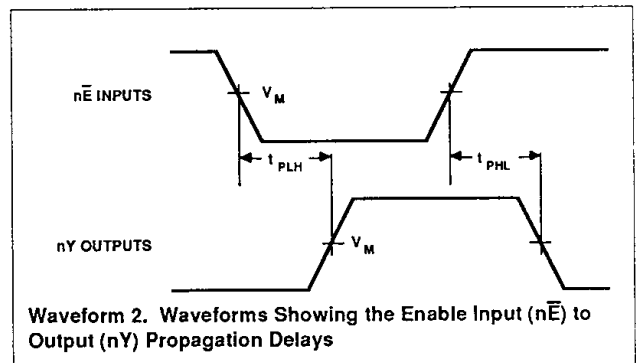
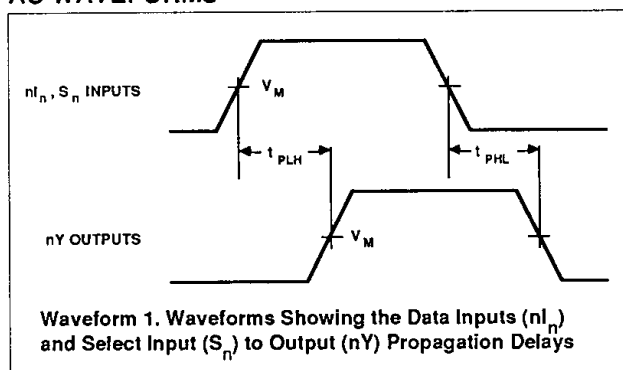
AC ELECTRICAL CHARACTERISTICS AT 5.0V ±0.5V

SYMBOL	PARAMETER	WAVEFORM	74AC1153					UNIT
			T _{amb} = +25°C			T _{amb} = -40°C to +85°C		
			Min	Typ	Max	Min	Max	
t _{PLH} t _{PHL}	Propagation delay nI _n to nY	1	1.9 2.5	4.5 5.0	6.1 6.9	1.9 2.5	6.9 7.8	ns
t _{PLH} t _{PHL}	Propagation delay S _n to nY	1	2.0 1.6	4.7 5.5	6.8 7.7	2.0 1.6	7.6 8.6	ns
t _{PLH} t _{PHL}	Propagation delay nE to nY	2	1.4 1.8	3.6 4.3	5.1 5.8	1.4 1.8	5.7 6.7	ns

AC ELECTRICAL CHARACTERISTICS AT 5.0V ±0.5V

SYMBOL	PARAMETER	WAVEFORM	74ACT1153					UNIT
			T _{amb} = +25°C			T _{amb} = -40°C to +85°C		
			Min	Typ	Max	Min	Max	
t _{PLH} t _{PHL}	Propagation delay nI _n to nY	1	2.8 3.0	5.4 6.4	7.5 8.8	2.8 3.0	8.3 9.8	ns
t _{PLH} t _{PHL}	Propagation delay S _n to nY	1	2.8 3.1	6.4 6.8	9.8 10.0	2.8 3.1	10.9 11.0	ns
t _{PLH} t _{PHL}	Propagation delay nE to nY	2	2.2 2.9	5.5 5.6	8.6 6.6	2.2 2.9	9.3 7.6	ns

AC WAVEFORMS



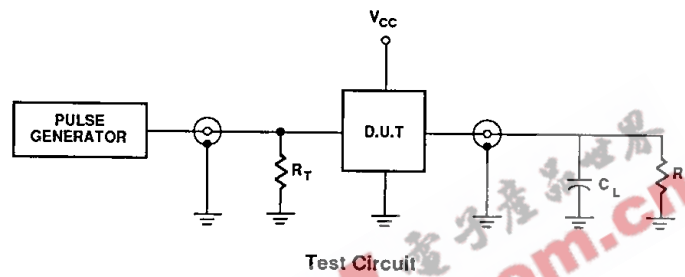
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WAVEFORM CONDITIONS

	INPUTS	OUTPUTS
AC	$V_{IN} = \text{GND to } V_{CC}$ $V_M = 50\% V_{CC}$	$V_{OUT} = V_{OL} \text{ to } V_{OH}$
ACT	$V_{IN} = \text{GND to } 3.0V$, $V_M = 1.5V$	$V_M = 50\% V_{CC}$

TEST CIRCUIT



DEFINITIONS

C_L = Load capacitance, 50pF; includes jig and probe capacitance

R_L = Load resistor, 500Ω

R_T = Termination resistance should be equal to Z_{OUT} of pulse generators

Input pulses: PRR ≤ 10MHz

$t_r = t_f = 3ns$