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Status	Product Specification
ACL Products	

74AC/ACT11251
8-input multiplexer (3-State)

FEATURES

- 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/ACT11251 high-performance CMOS devices combine very high speed and high output drive comparable to the most advanced TTL families.

The 74AC/ACT11251 provides an 8-to-1 multiplexer with three select lines and a common output enable. The state of the Select (S_n) inputs determines the particular input line from which the data comes. The Output Enable ($\overline{OE}$) input is active-Low. When $\overline{OE}$ is High, both the Y output and the $\overline{Y}$ output are in the High-impedance "OFF" state regardless of all other input conditions.

The device is the logic implementation of a single pole, 8 position switch where the position of the switch is determined by the logic levels supplied to the Select inputs.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS T_{amb} = 25°C; GND = 0V; V_{CC} = 5.0V		TYPICAL		UNIT
				AC	ACT	
$t_{PLH}/$ t_{PHL}	Propagation delay I_n to Y	C_L = 50pF		3.9	5.5	ns
C_{PD}	Power dissipation capacitance [1]	f = 1MHz;	Enabled	55	60	pF
		C_L = 50pF	Disabled	13	16	
C_{IN}	Input capacitance	V_I = 0V or V_{CC}		3.5	3.5	pF
C_{OUT}	Output capacitance	V_O = 0V or V_{CC}; Disabled		8.0	8.0	pF

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

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

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,

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

ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	ORDER CODE
16-pin plastic DIP (300mil-wide)	-40°C to +85°C	74AC11251N 74ACT11251N
16-pin plastic SO (150mil-wide)	-40°C to +85°C	74AC11251D 74ACT11251D

PIN CONFIGURATION

**N and D Packages**
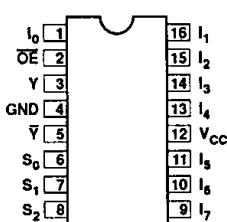
LOGIC SYMBOL
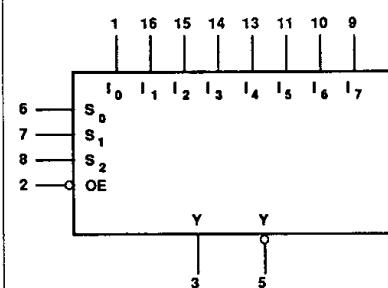
LOGIC SYMBOL (IEEE/IEC)
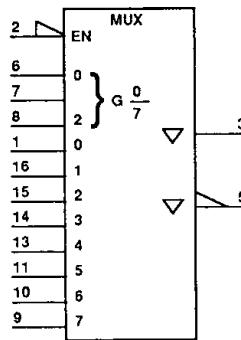
8-input multiplexer (3-State)

74AC/ACT11251

LOGIC DIAGRAM
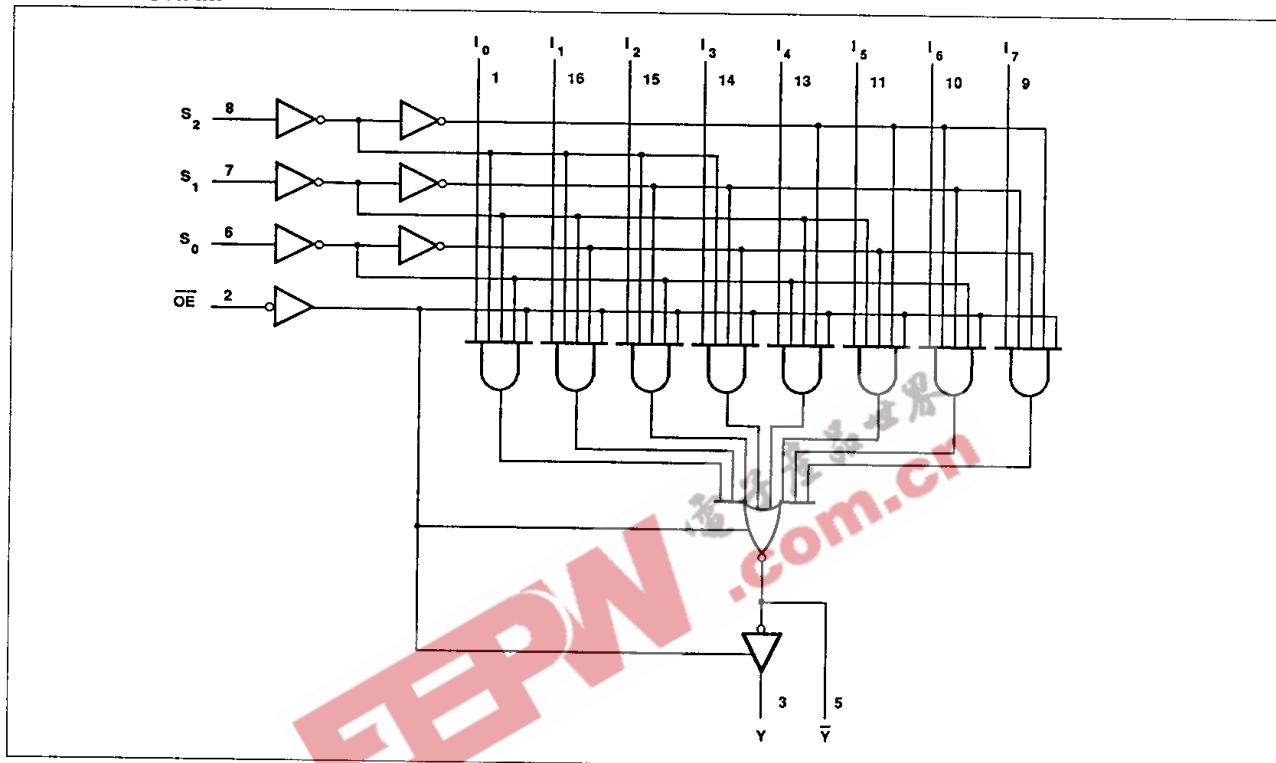
PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
6, 7, 8	S_n	Select inputs
2	$\overline{OE}$	Output enable input
1, 16, 15, 14 13, 11, 10, 9	$I_0 - I_7$	Data inputs
3, 5	Y, $\overline{Y}$	Data outputs
4	GND	Ground (0V)
12	V_{CC}	Positive supply voltage

FUNCTION TABLE

INPUTS				OUTPUTS	
S_2	S_1	S_0	$\overline{OE}$	Y	$\overline{Y}$
X	X	X	H	Z	Z
L	L	L	L	I_0	$\overline{I}_0$
L	L	H	L	I_1	$\overline{I}_1$
L	H	L	L	I_2	$\overline{I}_2$
L	H	H	L	I_3	$\overline{I}_3$
H	L	L	L	I_4	$\overline{I}_4$
H	L	H	L	I_5	$\overline{I}_5$
H	H	L	L	I_6	$\overline{I}_6$
H	H	H	L	I_7	$\overline{I}_7$

8-input multiplexer (3-State)

74AC/ACT11251

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	74AC11151			74ACT11151			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
$\Delta t/\Delta v$	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:
1. 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 RATINGS[1]

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
		$V_I > V_{CC}$	20	
	DC input voltage		-0.5 to V_{CC} +0.5	V
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:
1. 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.
2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

8-input multiplexer (3-State)

74AC/ACT11251

DC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS			V_{CC} V	74AC11251				74ACT11251				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						
			I_{OH} = -24mA		4.5	3.94		3.8		3.94		3.8		
					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					
			I_{OL} = 24mA		4.5		0.36		0.44		0.36		0.44	
					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_{OZ}	3-State output off–state current	$V_I = V_{IL}$ or V_{IH}, $V_0 = V_{CC}$ or GND			5.5		±0.5		5.0		±0.5		5.0	μA
I_{CC}	Quiescent supply current	$V_I = V_{CC}$ or GND, I_0 = 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}.

8-input multiplexer (3-State)

74AC/ACT11251

AC ELECTRICAL CHARACTERISTICS AT 3.3V ±0.3V

SYMBOL	PARAMETER	WAVEFORM	74AC11251					UNIT
			T_{amb} = +25°C			T_{amb} = -40°C to +85°C		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay I_n to Y	1	2.2 2.0	6.3 6.1	8.2 8.0	2.2 2.0	9.0 8.8	ns
t_{PLH} t_{PHL}	Propagation delay I_n to $\overline{Y}$	1	1.7 2.1	5.7 6.3	7.5 8.2	1.7 2.1	8.2 9.1	ns
t_{PLH} t_{PHL}	Propagation delay S_n to Y	1	2.6 2.8	8.1 8.3	10.8 10.8	2.6 2.8	12.1 11.9	ns
t_{PLH} t_{PHL}	Propagation delay S_n to $\overline{Y}$	1	2.6 2.5	7.9 8.0	10.2 10.8	2.6 2.5	11.3 12.1	ns
t_{PZH} t_{PZL}	Propagation delay $\overline{OE}$ to Y	2	1.3 1.6	4.1 4.9	5.7 6.6	1.3 1.6	6.1 7.2	ns
t_{PZH} t_{PZL}	Propagation delay $\overline{OE}$ to $\overline{Y}$	2	1.2 1.5	4.0 4.8	5.5 6.5	1.2 1.5	5.9 7.1	ns
t_{PHZ} t_{PLZ}	Propagation delay $\overline{OE}$ to Y	2	2.9 2.7	4.5 4.7	5.9 6.3	2.9 2.7	6.1 6.6	ns
t_{PHZ} t_{PLZ}	Propagation delay $\overline{OE}$ to $\overline{Y}$	2	2.9 2.8	4.5 4.7	5.9 6.3	2.9 2.8	6.2 6.6	ns

AC ELECTRICAL CHARACTERISTICS AT 5.0V ±0.5V

| SYMBOL	PARAMETER	WAVEFORM	74AC11251					UNIT
			T_{amb} = +25°C			T_{amb} = -40°C to +85°C		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay I_n to Y	1	1.8 1.7	4.0 3.8	5.9 5.7	1.8 1.7	6.5 6.3	ns
t_{PLH} t_{PHL}	Propagation delay I_n to $\overline{Y}$	1	1.4 1.7	3.5 4.1	5.4 5.9	1.4 1.7	5.8 6.6	ns
t_{PLH} t_{PHL}	Propagation delay S_n to Y	1	2.2 2.4	5.3 5.0	7.5 7.5	2.2 2.4	8.3 8.4	ns
t_{PLH} t_{PHL}	Propagation delay S_n to $\overline{Y}$	1	2.1 2.2	4.7 5.4	7.1 7.5	2.1 2.2	7.9 8.5	ns
t_{PZH} t_{PZL}	Propagation delay $\overline{OE}$ to Y	2	1.0 1.3	2.7 3.1	4.4 4.8	1.0 1.3	4.7 5.2	ns
t_{PZH} t_{PZL}	Propagation delay $\overline{OE}$ to $\overline{Y}$	2	1.0 1.2	2.6 3.0	4.3 4.7	1.0 1.2	4.6 5.1	ns
t_{PHZ} t_{PLZ}	Propagation delay $\overline{OE}$ to Y	2	2.8 2.6	4.2 4.2	5.6 5.7	2.8 2.6	5.9 6.0	ns
t_{PHZ} t_{PLZ}	Propagation delay $\overline{OE}$ to $\overline{Y}$	2	2.8 2.7	4.3 4.2	5.7 5.7	2.8 2.7	6.0 5.9	ns

8-input multiplexer (3-State)

74AC/ACT11251

AC ELECTRICAL CHARACTERISTICS AT 5.0V ±0.5V

SYMBOL	PARAMETER	WAVEFORM	74ACT11251					UNIT
			T_{amb} = +25°C			T_{amb} = -40°C to +85°C		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay I_n to Y	1	3.0 2.0	5.7 5.2	7.8 7.9	3.0 2.0	8.7 8.6	ns
t_{PLH} t_{PHL}	Propagation delay I_n to $\overline{Y}$	1	1.7 2.7	4.7 5.1	7.1 7.2	1.7 2.7	7.8 8.0	ns
t_{PLH} t_{PHL}	Propagation delay S_n to Y	1	3.2 2.7	6.8 6.7	10.2 9.5	3.2 2.7	11.4 10.5	ns
t_{PLH} t_{PHL}	Propagation delay S_n to $\overline{Y}$	1	2.5 2.8	6.3 6.3	8.8 9.7	2.5 2.8	9.8 10.8	ns
t_{PZH} t_{PZL}	Propagation delay $\overline{OE}$ to Y	2	1.3 1.3	3.7 4.0	6.2 6.0	1.3 1.3	6.8 6.8	ns
t_{PZH} t_{PZL}	Propagation delay $\overline{OE}$ to $\overline{Y}$	2	1.0 1.3	4.4 4.1	6.4 5.8	1.0 1.3	7.0 6.4	ns
t_{PHZ} t_{PLZ}	Propagation delay $\overline{OE}$ to Y	2	4.1 3.1	5.7 4.0	7.6 6.6	4.1 3.1	8.1 6.9	ns
t_{PHZ} t_{PLZ}	Propagation delay $\overline{OE}$ to $\overline{Y}$	2	4.1 3.2	5.7 4.1	7.7 6.6	4.1 3.2	8.2 6.9	ns

AC WAVEFORMS

Waveform 1. Waveforms Showing the Data Inputs (I_n) and Select Input (S_n) to Output (Y, $\overline{Y}$) Propagation Delays

Waveform 2. Waveforms Showing the Output Enable Input ($\overline{OE}$) to Output (Y, $\overline{Y}$) Propagation Delays
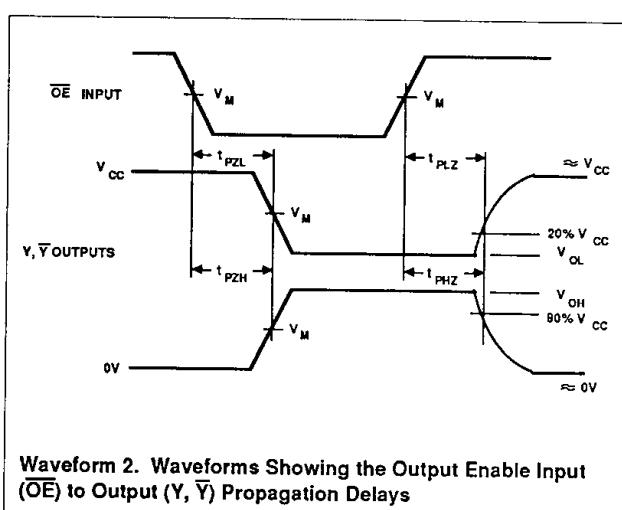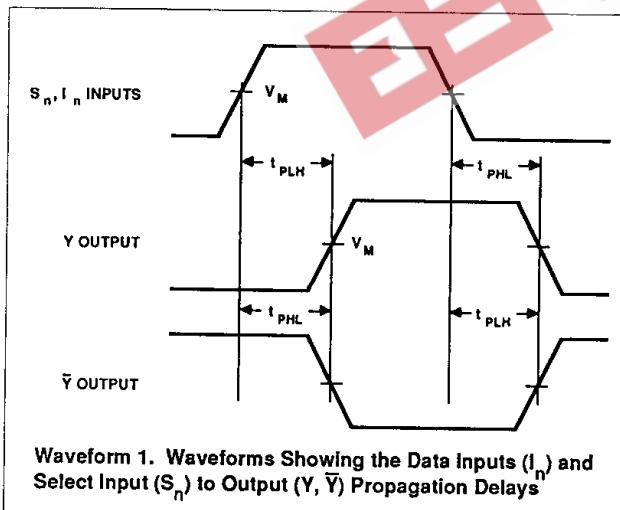
8-input multiplexer (3-State)   74AC/ACT11251

WAVEFORM CONDITIONS

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

TEST CIRCUIT

Test Circuit
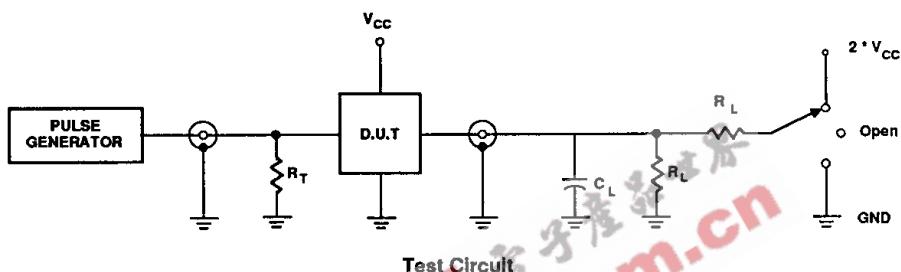
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	$2*V_{CC}$
t_{PHZ}/t_{PZH}	GND

SWITCH POSITION

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