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Dual 4-Input Multiplexer

The MC74AC153/74ACT153 is a high-speed dual 4-input multiplexer with common select inputs and individual enable inputs for each section. It can select two lines of data from four sources. The two buffered outputs present data in the true (non-inverted) form. In addition to multiplexer operation, the MC74AC153/74ACT153 can act as a function generator and generate any two functions of three variables.

- Outputs Source/Sink 24 mA
- 'ACT153 Has TTL Compatible Inputs
- These are Pb-Free Devices

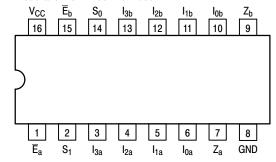


Figure 1. Pinout: 16-Lead Packages Conductors (Top View)

PIN ASSIGNMENT

PIN	FUNCTION
$I_{0a}-I_{3a}$	Side A Data Inputs
I _{0b} -I _{3b}	Side B Data Inputs
S ₀ , S ₁	Common Select Inputs
Ea	Side A Enable Input
E _b	Side B Enable Input
Za	Side A Output
Z _b	Side B Output

TRUTH TABLE

Sel Inp				Output			
S ₀	S ₁	Ē	I ₀	l ₁	l ₂	l ₃	Z
Χ	Χ	Н	Χ	Χ	Χ	Χ	L
L	L	L	L	Χ	Χ	Χ	L
L	L	L	Н	Χ	Χ	Χ	Н
Н	L	L	Х	L	Χ	Χ	L
Н	L	L	Х	Н	Х	Х	Н
L	Н	L	Χ	Χ	L	Χ	L
L	Н	L	Χ	Χ	Н	Χ	Н
Н	Н	L	Χ	Χ	Χ	L	L
Н	Н	L	Χ	Χ	Χ	Н	Н

H = HIGH Voltage Level

L = LOW Voltage Level

X = Immaterial



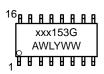
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MARKING DIAGRAMS



SOIC-16 **D SUFFIX CASE 751B**





XXX

TSSOP-16 **DT SUFFIX CASE 948F**



= AC or ACT

= Assembly Location

WL or L = Wafer Lot = Year WW or W = Work Week = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

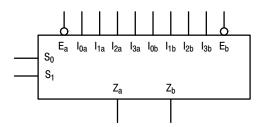
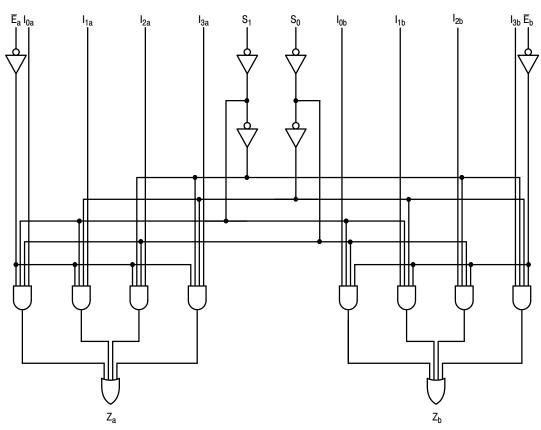


Figure 2. Logic Symbol

FUNCTIONAL DESCRIPTION

The MC74AC153/74ACT153 is a dual 4-input multiplexer. It can select two bits of data from up to four sources under the control of the common Select inputs (S_0 , S_1). The two 4-input multiplexer circuits have individual active–LOW Enables (\overline{E}_a , \overline{E}_b) which can be used to strobe the outputs independently. When the Enables (\overline{E}_a , \overline{E}_b) are HIGH, the corresponding outputs (Z_a , Z_b) are forced LOW. The MC74AC153/74ACT153 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 two Select inputs. The logic equations for the outputs are shown below.

$$\begin{split} Z_a &= \overline{E}_a \bullet (I_{0a} \bullet \overline{S}_1 \bullet \overline{S}_0 + I_{1a} \bullet \overline{S}_1 \bullet S_0 + I_{2a} \bullet S_1 \bullet \overline{S}_0 + I_{3a} \bullet S_1 \bullet S_0) \\ Z_b &= \overline{E}_b \bullet (I_{0b} \bullet \overline{S}_1 \bullet \overline{S}_0 + I_{1b} \bullet \overline{S}_1 \bullet S_0 + I_{2b} \bullet S_1 \bullet \overline{S}_0 + I_{3b} \bullet S_1 \bullet S_0) \end{split}$$



NOTE: This diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Figure 3. Logic Diagram

MAXIMUM RATINGS

		Value				
DC Supply Voltage		-0.5 to +7.0	V			
DC Input Voltage		$-0.5 \le V_I \le V_{CC} + 0.5$	V			
DC Output Voltage	(Note 1)	$-0.5 \le V_{O} \le V_{CC} + 0.5$	V			
DC Input Diode Current		±20	mA			
DC Output Diode Current		±50	mA			
DC Output Sink/Source Current		±50	mA			
DC Supply Current per Output Pin	±50	mA				
DC Ground Current per Output Pin	±50					
Storage Temperature Range	-65 to +150	°C				
Lead temperature, 1 mm from Case for 10 Seconds		260	°C			
Junction temperature under Bias		+ 150	°C			
Thermal Resistance (Note 2)	SOIC TSSOP	69.1 103.8	°C/W			
Power Dissipation in Still Air at 65°C (Note 3)	SOIC TSSOP	500 500	mW			
Moisture Sensitivity		Level 1				
Flammability Rating Oxygen I	ndex: 30% – 35%	UL 94 V-0 @ 0.125 in				
Machi	ne Model (Note 5)	> 2000 > 200 > 1000	V			
Latch-Up Performance Above V _{CC} and Below GNI	O at 85°C (Note 7)	±100	mA			
	DC Input Voltage DC Output Voltage DC Input Diode Current DC Output Diode Current DC Output Sink/Source Current DC Supply Current per Output Pin DC Ground Current per Output Pin Storage Temperature Range Lead temperature, 1 mm from Case for 10 Seconds Junction temperature under Bias Thermal Resistance (Note 2) Power Dissipation in Still Air at 65°C (Note 3) Moisture Sensitivity Flammability Rating Oxygen I ESD Withstand Voltage Human Bo Machi Charged Devi	DC Input Voltage DC Output Voltage (Note 1) DC Input Diode Current DC Output Diode Current DC Output Sink/Source Current DC Supply Current per Output Pin DC Ground Current per Output Pin Storage Temperature Range Lead temperature, 1 mm from Case for 10 Seconds Junction temperature under Bias Thermal Resistance (Note 2) SOIC TSSOP Power Dissipation in Still Air at 65°C (Note 3) SOIC TSSOP Moisture Sensitivity Flammability Rating Oxygen Index: 30% – 35% ESD Withstand Voltage Human Body Model (Note 4) Machine Model (Note 5) Charged Device Model (Note 7) Latch-Up Performance Above V _{CC} and Below GND at 85°C (Note 7)	DC Input Voltage $-0.5 \leq V_{I} \leq V_{CC} + 0.5$ DC Output Voltage $(Note \ 1) \qquad -0.5 \leq V_{O} \leq V_{CC} + 0.5$ DC Input Diode Current ± 20 DC Output Diode Current ± 50 DC Output Sink/Source Current ± 50 DC Output Sink/Source Current ± 50 DC Supply Current per Output Pin ± 50 DC Ground Current per Output Pin ± 50 Storage Temperature Range $-65 \text{ to } + 150$ Lead temperature, 1 mm from Case for 10 Seconds 260 Junction temperature under Bias $+ 150$ Thermal Resistance (Note 2)			

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

- 1. Io absolute maximum rating must be observed.
- 2. The package thermal impedance is calculated in accordance with JESD51-7.
- 3. 500 mW at 65°C; derate to 300 mW by 10 mW/ from 65°C to 85°C.
- 4. Tested to EIA/JESD22-A114-A.
- 5. Tested to EIA/JESD22-A115-A.
- 6. Tested to JESD22-C101-A.
- 7. Tested to EIA/JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Тур	Max	Unit			
	0 1 1/4	'AC	2.0	5.0	6.0	.,			
V _{CC}	Supply Voltage	'ACT	4.5	5.0	5.0 5.5 V				
V _{IN} , V _{OUT}	DC Input Voltage, Output Voltage (Ref. to GND)	0	-	Vcc	V				
		V _{CC} @ 3.0 V	-	150	_				
t _r , t _f	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	V _{CC} @ 4.5 V	-	40	_	ns/V			
	No Devided except estimit inputs	V _{CC} @ 5.5 V	-	25	_				
	Input Rise and Fall Time (Note 2)	V _{CC} @ 4.5 V	-	10	_	0/			
t _r , t _f	'ACT Devices except Schmitt Inputs	V _{CC} @ 5.5 V	-	8.0	_	ns/V			
TJ	Junction Temperature (PDIP)		_	-	140	°C			
T _A	Operating Ambient Temperature Range	-40	25	85	°C				
I _{OH}	Output Current – High	-	-	-24	mA				
I _{OL}	Output Current – Low	_	-	24	mA				

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

V_{IN} from 30% to 70% V_{CC}; see individual Data Sheets for devices that differ from the typical input rise and fall times.
 V_{IN} from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

DC CHARACTERISTICS

			74.	AC	74AC		
Symbol	Parameter	V _{CC} (V)	T _A = -	+25°C	T _A = -40°C to +85°C	Unit	Conditions
			Тур	Gua	aranteed Limits		
V _{IH}	Minimum High Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	2.1 3.15 3.85	2.1 3.15 3.85	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V
V _{IL}	Maximum Low Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	0.9 1.35 1.65	0.9 1.35 1.65	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V
V _{OH}	Minimum High Level Output Voltage	3.0 4.5 5.5	2.99 4.49 5.49	2.9 4.4 5.4	2.9 4.4 5.4	V	I _{OUT} = -50 μA
		3.0 4.5 5.5	- - -	2.56 3.86 4.86	2.46 3.76 4.76	V	* V _{IN} = V _{IL} or V _{IH} -12 mA I_{OH} -24 mA -24 mA
V _{OL}	Maximum Low Level Output Voltage	3.0 4.5 5.5	0.002 0.001 0.001	0.1 0.1 0.1	0.1 0.1 0.1	V	Ι _{ΟUT} = 50 μΑ
		3.0 4.5 5.5	- - -	0.36 0.36 0.36	0.44 0.44 0.44	V	$^*V_{IN} = V_{IL} \text{ or } V_{IH}$ 12 mA I_{OL} 24 mA 24 mA
I _{IN}	Maximum Input Leakage Current	5.5	-	±0.1	±1.0	μΑ	V _I = V _{CC} , GND
I _{OLD}	†Minimum Dynamic	5.5	-	-	75	mA	V _{OLD} = 1.65 V Max
I _{OHD}	Output Current	5.5	-	-	-75	mA	V _{OHD} = 3.85 V Min
I _{CC}	Maximum Quiescent Supply Current	5.5	-	8.0	80	μΑ	V _{IN} = V _{CC} or GND

 $^{^\}star\text{All}$ outputs loaded; thresholds on input associated with output under test. †Maximum test duration 2.0 ms, one output loaded at a time.

NOTE: I_{IN} and I_{CC} @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V_{CC} .

AC CHARACTERISTICS

			74AC T _A = +25°C C _L = 50 pF			74	AC		
Symbol	Parameter	V _{CC} * (V)				$T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$ $C_L = 50 \text{ pF}$		Unit	Fig. No.
			Min	Тур	Max	Min	Max		
t _{PLH}	Propagation Delay S _n to Z _n	3.3 5.0	2.5 2.0	9.5 6.5	15.0 11.0	2.5 2.0	17.5 12.5	ns	3–6
t _{PHL}	Propagation Delay S _n to Z _n	3.3 5.0	3.0 2.5	8.5 6.5	14.5 11.0	2.5 2.0	16.5 12.0	ns	3–6
t _{PLH}	Propagation Delay E _n to Z _n	3.3 5.0	2.5 1.5	8.0 5.5	13.5 9.5	2.0 1.5	16.0 11.0	ns	3–6
t _{PHL}	Propagation Delay \overline{E}_n to Z_n	3.3 5.0	2.5 2.0	7.0 5.0	11.0 8.0	2.0 1.5	12.5 9.0	ns	3–6
t _{PLH}	Propagation Delay I _n to Z _n	3.3 5.0	2.5 1.5	7.5 5.5	12.5 9.0	2.0 1.5	14.5 10.5	ns	3–5
t _{PHL}	Propagation Delay I_n to Z_n	3.3 5.0	1.5 1.5	7.0 5.0	11.5 8.5	1.5 1.5	13.0 10.0	ns	3–5

^{*}Voltage Range 3.3 V is 3.3 V ± 0.3 V. *Voltage Range 5.0 V is 5.0 V ± 0.5 V.

DC CHARACTERISTICS

			74 <i>P</i>	СТ	74ACT			
Symbol	Parameter	V _{CC} (V)	T _A =	+25°C	T _A = -40°C to +85°C	Unit	Conditions	
			Тур	Gua	ranteed Limits			
V _{IH}	Minimum High Level Input Voltage	4.5 5.5	1.5 1.5	2.0 2.0	2.0 2.0	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V	
V _{IL}	Maximum Low Level Input Voltage	4.5 5.5	1.5 1.5	0.8 0.8	0.8 0.8	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V	
V _{OH}	Minimum High Level Output Voltage	4.5 5.5	4.49 5.49	4.4 5.4	4.4 5.4	V	I _{OUT} = -50 μA	
		4.5 5.5	_ _	3.86 4.86	3.76 4.76	V	* V _{IN} = V _{IL} or V _{IH} -24 mA $_{OH}$ -24 mA	
V _{OL}	Maximum Low Level Output Voltage	4.5 5.5	0.001 0.001	0.1 0.1	0.1 0.1	V	I _{OUT} = 50 μA	
		4.5 5.5	_ _	0.36 0.36	0.44 0.44	V	* V _{IN} = V _{IL} or V _{IH} 24 mA $_{OL}$ 24 mA	
I _{IN}	Maximum Input Leakage Current	5.5	-	±0.1	±1.0	μΑ	V _I = V _{CC} , GND	
ΔI_{CCT}	Additional Max. I _{CC} /Input	5.5	0.6	-	1.5	mA	$V_{I} = V_{CC} - 2.1 \text{ V}$	
I _{OLD}	†Minimum Dynamic	5.5	-	_	75	mA	V _{OLD} = 1.65 V Max	
I _{OHD}	Output Current	5.5	-	_	- 75	mA	V _{OHD} = 3.85 V Min	
I _{CC}	Maximum Quiescent Supply Current	5.5	-	8.0	80	μΑ	V _{IN} = V _{CC} or GND	

^{*}All outputs loaded; thresholds on input associated with output under test. †Maximum test duration 2.0 ms, one output loaded at a time.

AC CHARACTERISTICS

			74ACT T _A = +25°C C _L = 50 pF			74A	CT		
Symbol	Parameter	V _{CC} * (V)				$T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$ $C_L = 50 \text{ pF}$		Unit	Fig. No.
			Min	Тур	Max	Min	Max		
t _{PLH}	Propagation Delay S _n to Z _n	5.0	3.0	7.0	11.5	2.0	13.5	ns	3–6
t _{PHL}	Propagation Delay S _n to Z _n	5.0	3.0	7.0	11.5	2.5	13.5	ns	3–6
t _{PLH}		5.0	2.0	6.5	10.5	2.0	12.5	ns	3–6
t _{PHL}		5.0	3.0	6.0	9.5	2.5	11.0	ns	3–6
t _{PLH}	Propagation Delay I_n to Z_n	5.0	2.5	5.5	9.5	2.0	11.0	ns	3–5
t _{PHL}	Propagation Delay I_n to Z_n	5.0	2.0	5.5	9.5	2.0	11.0	ns	3–5

^{*}Voltage Range 5.0 V is 5.0 V ± 0.5 V.

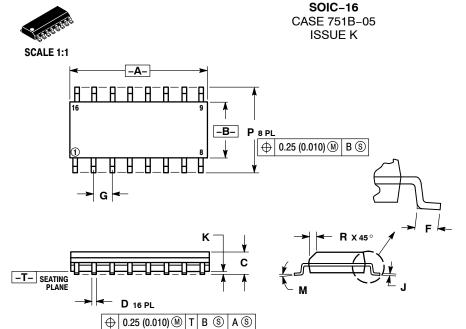
CAPACITANCE

Symbol	Parameter	Value Typ	Unit	Test Conditions	
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = 5.0 V	
C _{PD}	Power Dissipation Capacitance	65	pF	V _{CC} = 5.0 V	

ORDERING INFORMATION

Device Order Number	Package	Shipping [†]
MC74AC153DG	SOIC-16 (Pb-Free)	48 Units / Rail
MC74AC153DR2G	SOIC-16 (Pb-Free)	2500 Tape & Reel
MC74AC153DTR2G	TSSOP-16 (Pb-Free)	2500 Tape & Reel
MC74ACT153DG	SOIC-16 (Pb-Free)	48 Units / Rail
MC74ACT153DR2G	SOIC-16 (Pb-Free)	2500 Tape & Reel
MC74ACT153DTR2G	TSSOP-16 (Pb-Free)	2500 Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.



DATE 29 DEC 2006

- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI
- THE NOTION AND TOLETANOING FER ANSI'Y 14.5M, 1982.
 CONTROLLING DIMENSION: MILLIMETER.
 DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
- PHOI HUSION.

 MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.

 DIMENSION D DOES NOT INCLUDE DAMBAR
 PROTRUSION. ALLOWABLE DAMBAR PROTRUSION

 SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D

 DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIN	IETERS	INCHES				
DIM	MIN	MAX	MIN	MAX			
Α	9.80	10.00	0.386	0.393			
В	3.80	4.00	0.150	0.157			
С	1.35	1.75	0.054	0.068			
D	0.35	0.49	0.014	0.019			
F	0.40	1.25	0.016	0.049			
G	1.27	BSC	0.050 BSC				
J	0.19	0.25	0.008	0.009			
K	0.10	0.25	0.004	0.009			
M	0°	7°	0°	7°			
Р	5.80	6.20	0.229	0.244			
R	0.25	0.50	0.010	0.019			

STYLE 1:		STYLE 2:		STYLE 3:		STYLE 4:			
	COLLECTOR		CATHODE	PIN 1.	COLLECTOR, DYE #1	PIN 1.	COLLECTOR, DY		
2.	BASE		ANODE	2.	BASE, #1	2.	COLLECTOR, #1		
3.	EMITTER	3.	NO CONNECTION	3.	EMITTER, #1	3.	COLLECTOR, #2		
4.	NO CONNECTION	4.	CATHODE	4.	COLLECTOR, #1	4.	COLLECTOR, #2		
5.	EMITTER	5.	CATHODE	5.	COLLECTOR, #2	5.	COLLECTOR, #3		
6.	BASE	6.	NO CONNECTION	6.	BASE, #2	6.	COLLECTOR, #3		
7.	COLLECTOR	7.	ANODE	7.	EMITTER, #2	7.	COLLECTOR, #4		
8.	COLLECTOR	8.	CATHODE	8.	COLLECTOR, #2	8.	COLLECTOR, #4		
9.	BASE		CATHODE	9.	COLLECTOR, #3	9.	BASE, #4		
10.	EMITTER		ANODE	10.	BASE, #3	10.	EMITTER, #4		
11.	NO CONNECTION		NO CONNECTION	11.	EMITTER, #3	11.	BASE, #3		
12.	EMITTER		CATHODE	12.	COLLECTOR, #3	12.	EMITTER, #3		
13.	BASE		CATHODE	13.	COLLECTOR, #4	13.	BASE, #2	SOI DEE	RING FOOTPRINT
14.	COLLECTOR		NO CONNECTION	14.	BASE, #4	14.	EMITTER, #2	SOLDER	IIIIG FOOTFRINT
15.	EMITTER			15.	EMITTER, #4	15.	BASE, #1		8X
16.	COLLECTOR	16.	CATHODE	16.	COLLECTOR, #4	16.	EMITTER, #1	—	— 6.40 — >
									0.10
STYLE 5:		STYLE 6:		STYLE 7:					16X 1.12 ✓ ➤
PIN 1.	DRAIN, DYE #1		CATHODE	PIN 1.	SOURCE N-CH				
2.	DRAIN, #1		CATHODE	2.	COMMON DRAIN (OUTPUT	7)		. \Box 1	16
3.	DRAIN, #2	3.	CATHODE	3.	COMMON DRAIN (OUTPUT			, — ·	
4.	DRAIN, #2	4.	CATHODE	4.	GATE P-CH	,			
5.	DRAIN, #3	5.	CATHODE	5.	COMMON DRAIN (OUTPUT	7)		16X 🛣	
6.	DRAIN, #3		CATHODE	6.	COMMON DRAIN (OUTPUT			.58 J	' <u> </u>
7.	DRAIN, #4		CATHODE	7.	COMMON DRAIN (OUTPUT		U		1
8.	DRAIN. #4	8.	CATHODE	8.	SOURCE P-CH	,			
9.	GATE, #4	9.	ANODE	9.	SOURCE P-CH				
10.	SOURCE, #4	10.	ANODE	10.	COMMON DRAIN (OUTPUT	7)			
11.	GATE, #3	11.	ANODE	11.	COMMON DRAIN (OUTPUT				
12.	SOURCE, #3	12.	ANODE	12.	COMMON DRAIN (OUTPUT				
13.	GATE, #2	13.	ANODE	13.	GATE N-CH	,			
14.	SOURCE, #2	14.	ANODE	14.	COMMON DRAIN (OUTPUT	7)			— ↓ PITCH
15.	GATE, #1	15.	ANODE	15.	COMMON DRAIN (OUTPUT				<u> </u>
16.	SOURCE, #1		ANODE	16.	SOURCE N-CH	,			
	/""		-					□ ₈	9 +
								۰	,
									DIMENSIONS: MILLIMETERS

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