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

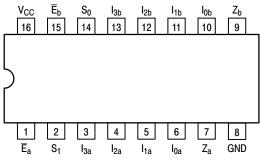


Figure 1. Pinout: 16–Lead Packages Conductors (Top View)

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				
Ēa	Side A Enable Input				
Ēb	Side B Enable Input				
Za	Side A Output				
Zb	Side B Output				

TRUTH TABLE

Select Inputs			Output				
S ₀	S ₁	Ē	I ₀	I ₁	l ₂	I ₃	Z
Х	Х	Н	Х	Х	Х	Х	L
L	L	L	L	Х	Х	Х	L
L	L	L	Н	Х	Х	Х	Н
Н	L	L	Х	L	Х	Х	L
Н	L	L	х	Н	х	х	н
L	Н	L	Х	Х	L	Х	L
L	Н	L	Х	Х	Н	Х	Н
Н	Н	L	Х	Х	Х	L	L
Н	Н	L	Х	Х	Х	Н	Н

H = HIGH Voltage Level

L = LOW Voltage Level

X = Immaterial



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		MARKING DIAGRAMS
16 Prestate	SOIC-16 D SUFFIX CASE 751B	16 XXX153G AWLYWW 1 UUUUUUUU 1
16- Ference	TSSOP-16 DT SUFFIX CASE 948F	
xxx	= AC or AC	
A WL or L	= Assembly = Wafer Lot	Location
Y	= Year	
	/ = Work Wee	
G or ■	= Pb–Free F	0
(Note: Microc	lot 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.

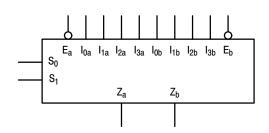


Figure 2. Logic Symbol

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 (S₀, S₁). 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.

$$Z_{a} = \overline{E}_{a} \bullet (I_{0a} \bullet \overline{S}_{1} \bullet \overline{S}_{0} + I_{1a} \bullet \overline{S}_{1} \bullet S_{0} + I_{2a} \bullet S_{1} \bullet \overline{S}_{0} + I_{3a} \bullet S_{1} \bullet S_{0})$$

$$Z_{b} = \overline{E}_{b} \bullet (I_{0b} \bullet \overline{S}_{1} \bullet \overline{S}_{0} + I_{1b} \bullet \overline{S}_{1} \bullet S_{0} + I_{2b} \bullet S_{1} \bullet \overline{S}_{0} + I_{3b} \bullet S_{1} \bullet S_{0})$$

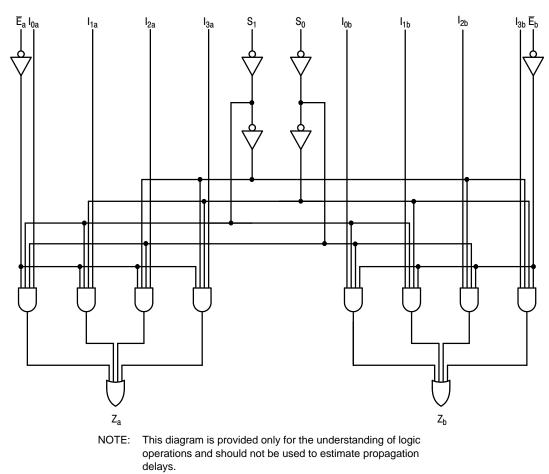


Figure 3. Logic Diagram

MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V _{CC}	DC Supply Voltage		-0.5 to +7.0	V
VI	DC Input Voltage		$-0.5 \leq V_{I} \leq V_{CC} + 0.5$	V
Vo	DC Output Voltage	(Note 1)	$-0.5 \leq V_O \leq V_{CC} + 0.5$	V
I _{IK}	DC Input Diode Current		±20	mA
I _{OK}	DC Output Diode Current		±50	mA
I _O	DC Output Sink/Source Current		±50	mA
I _{CC}	DC Supply Current per Output Pin		±50	mA
I _{GND}	DC Ground Current per Output Pin		±50	mA
T _{STG}	Storage Temperature Range		-65 to +150	°C
TL	Lead temperature, 1 mm from Case for 10 Seconds	ad temperature, 1 mm from Case for 10 Seconds 260		
TJ	Junction temperature under Bias		+ 150	°C
θ_{JA}	Thermal Resistance (Note 2)	SOIC TSSOP	69.1 103.8	°C/W
P _D	Power Dissipation in Still Air at 65°C (Note 3)	SOIC TSSOP	500 500	mW
MSL	Moisture Sensitivity		Level 1	
F _R	Flammability Rating Oxyger	n Index: 30% – 35%	UL 94 V-0 @ 0.125 in	
V _{ESD}	Mac	Body Model (Note 4) hine Model (Note 5) vice Model (Note 6)	> 2000 > 200 > 1000	V
I _{Latch-Up}	Latch–Up Performance Above V _{CC} and Below G	ND at 85°C (Note 7)	±100	mA

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. I_O 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	
		Ϋ́AC	2.0	5.0	6.0	
V _{CC}	Supply Voltage	Ϋ́ACT	4.5	5.0	5.5	V
V _{IN} , V _{OUT}	DC Input Voltage, Output Voltage (Ref. to GND)		0	-	V _{CC}	V
		V _{CC} @ 3.0 V	_	150	_	
T T/	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	V _{CC} @ 4.5 V	-	40	-	ns/V
		V _{CC} @ 5.5 V	-	25	_	1
	Input Rise and Fall Time (Note 2)	V _{CC} @ 4.5 V	_	10	_	
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.

1. V_{IN} from 30% to 70% V_{CC} ; see individual Data Sheets for devices that differ from the typical input rise and fall times. 2. 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	$V_{IN} = V_{IL} \text{ or } V_{IH}$ -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	I _{OUT} = 50 μA
		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

*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		74/	AC		
Symbol	Parameter		T, C	_A = +25° S _L = 50 p	C F	T _A = -40°C C _L = 5		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 \overline{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

			744	СТ	74ACT		
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	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	$V_{IN} = V_{IL} \text{ or } V_{IH}$ -24 mA V_{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	$V_{IN} = V_{IL} \text{ or } V_{IH}$ 24 mA V_{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	$V_{I} = V_{CC} - 2.1 V$
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
Icc	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		74A	CT		
Symbol	Parameter	V _{CC} * (V)				T _A = -40°C to +85°C C _L = 50 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}	Propagation Delay \overline{E}_n to Z_n	5.0	2.0	6.5	10.5	2.0	12.5	ns	3–6
t _{PHL}	Propagation Delay \overline{E}_n to Z_n	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.





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