

# MC74AC352, MC74ACT352



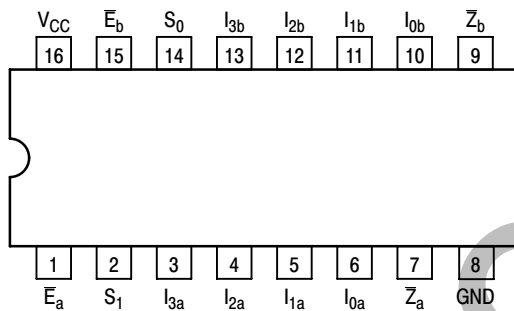
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## Dual 4-Input Multiplexer

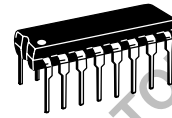
The MC74AC352/74ACT352 is a very high-speed dual 4-input multiplexer with common Select inputs and individual Enable inputs for each section. It can select two bits of data from four sources. The two buffered outputs present data in the inverted (complementary) form. The MC74AC352/74ACT352 is the functional equivalent of the MC74AC153/74ACT153 except with inverted outputs.

- Inverted Version of the MC74AC153/74ACT153
- Separate Enables for Each Multiplexer
- Outputs Source/Sink 24 mA
- 'ACT352 Has TTL Compatible Inputs



### PIN NAMES

- $I_{0a}-I_{3a}$  Side A Data Inputs
- $I_{0b}-I_{3b}$  Side B Data Inputs
- $S_0, S_1$  Common Select Inputs
- $E_a$  Side A Enable Input
- $E_b$  Side B Enable Input
- $Z_a, Z_b$  Multiplexer Outputs



N SUFFIX  
CASE 648-08  
PLASTIC

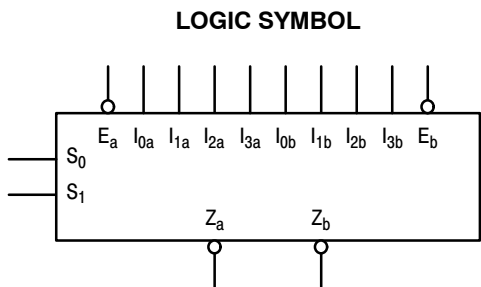


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CASE 751B-05  
PLASTIC

### TRUTH TABLE

Select Inputs		E	Inputs (a or b)				Z
$S_0$	$S_1$		$I_0$	$I_1$	$I_2$	$I_3$	
X	X	H	X	X	X	X	H
L	L	L	L	X	X	X	H
L	L	L	H	X	X	X	L
H	L	L	X	L	X	X	H
H	L	L	X	H	X	X	L
L	H	L	X	X	L	X	H
L	H	L	X	X	H	X	L
H	H	L	X	X	X	L	H
H	H	L	X	X	X	H	L

H = HIGH Voltage Level  
L = LOW Voltage Level  
X = Immaterial



### LOGIC SYMBOL

**FUNCTIONAL DESCRIPTION**

The MC74AC352/74ACT352 is a dual 4-input multiplexer. It selects 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 ( $\bar{E}_a, \bar{E}_b$ ) which can be used to strobe the outputs independently. When the Enables ( $E_a, E_b$ ) are HIGH, the corresponding outputs ( $Z_a, Z_b$ ) are forced HIGH.

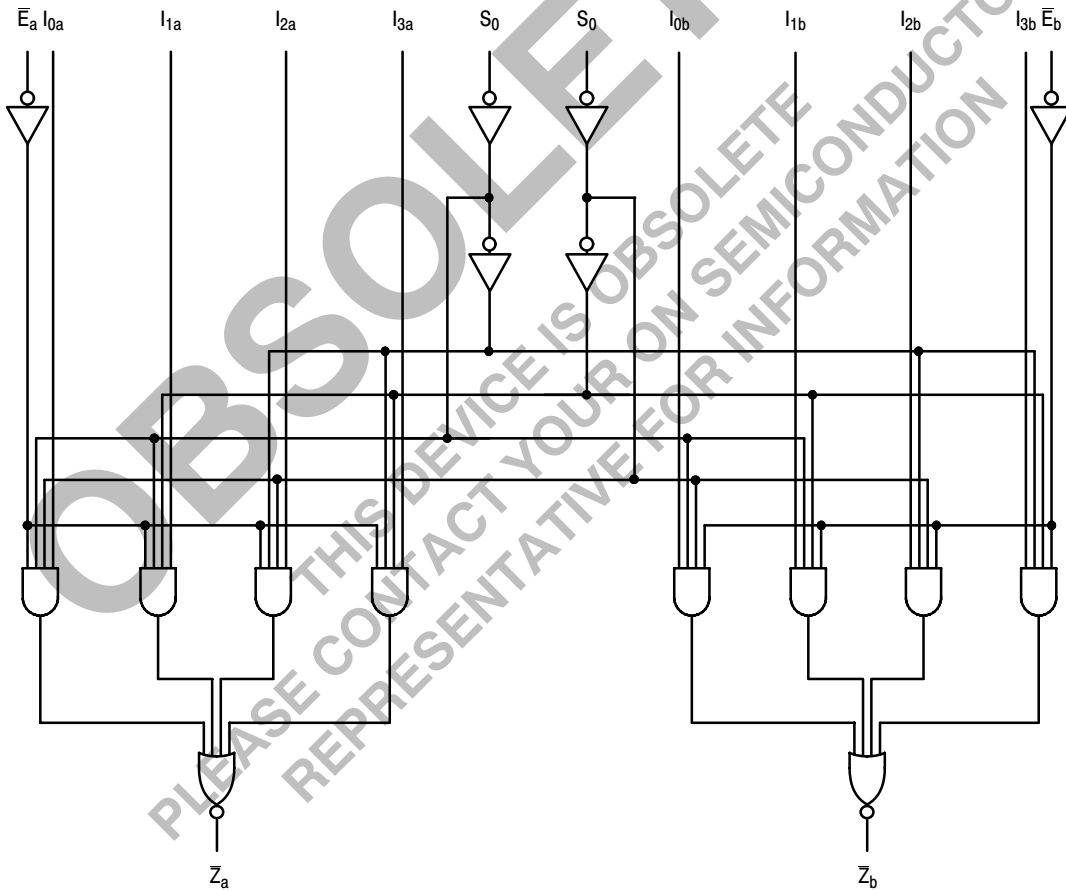
The logic equations for the outputs are shown below:

$$Z_a = \bar{E}_a \cdot (I_{0a} \cdot \bar{S}_1 \cdot \bar{S}_0 + I_{1a} \cdot \bar{S}_1 \cdot S_0 + I_{2a} \cdot S_1 \cdot \bar{S}_0 + I_{3a} \cdot S_1 \cdot S_0)$$

$$\bar{Z}_b = \bar{E}_b \cdot (I_{0b} \cdot \bar{S}_1 \cdot \bar{S}_0 + I_{1b} \cdot \bar{S}_1 \cdot S_0 + I_{2b} \cdot S_1 \cdot \bar{S}_0 + I_{3b} \cdot S_1 \cdot S_0)$$

The MC74AC352/74ACT352 can be used to move data from a group of registers to a common output bus. The particular register from which the data came would be determined by the state of the Select inputs. A less obvious application is as a function generator. The MC74AC352/74ACT352 can generate two functions of three variables. This is useful for implementing highly irregular random logic.

**LOGIC DIAGRAM**



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

# MC74AC352, MC74ACT352

## MAXIMUM RATINGS\*

Symbol	Parameter	Value	Unit
$V_{CC}$	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
$V_{in}$	DC Input Voltage (Referenced to GND)	-0.5 to $V_{CC} + 0.5$	V
$V_{out}$	DC Output Voltage (Referenced to GND)	-0.5 to $V_{CC} + 0.5$	V
$I_{in}$	DC Input Current, per Pin	$\pm 20$	mA
$I_{out}$	DC Output Sink/Source Current, per Pin	$\pm 50$	mA
$I_{CC}$	DC $V_{CC}$ or GND Current per Output Pin	$\pm 50$	mA
$T_{stg}$	Storage Temperature	-65 to +150	$^{\circ}\text{C}$

\* Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Max	Unit	
$V_{CC}$	Supply Voltage	'AC	2.0	5.0	6.0	V
		'ACT	4.5	5.0	5.5	
$V_{in}, V_{out}$	DC Input Voltage, Output Voltage (Ref. to GND)	0		$V_{CC}$	V	
$t_r, t_f$	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	$V_{CC} @ 3.0\text{ V}$		150		ns/V
		$V_{CC} @ 4.5\text{ V}$		40		
		$V_{CC} @ 5.5\text{ V}$		25		
$t_r, t_f$	Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs	$V_{CC} @ 4.5\text{ V}$		10		ns/V
		$V_{CC} @ 5.5\text{ V}$		8.0		
$T_J$	Junction Temperature (PDIP)			140	$^{\circ}\text{C}$	
$T_A$	Operating Ambient Temperature Range	-40	25	85	$^{\circ}\text{C}$	
$I_{OH}$	Output Current — High			-24	mA	
$I_{OL}$	Output Current — Low			24	mA	

- $V_{in}$  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.

# MC74AC352, MC74ACT352

## DC CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub> (V)	74AC		74AC		Unit	Conditions
			T <sub>A</sub> = +25°C		T <sub>A</sub> = -40°C to +85°C			
			Typ	Guaranteed Limits				
V <sub>IH</sub>	Minimum High Level Input Voltage	3.0	1.5	2.1	2.1		V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V
		4.5	2.25	3.15	3.15			
		5.5	2.75	3.85	3.85			
V <sub>IL</sub>	Maximum Low Level Input Voltage	3.0	1.5	0.9	0.9		V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V
		4.5	2.25	1.35	1.35			
		5.5	2.75	1.65	1.65			
V <sub>OH</sub>	Minimum High Level Output Voltage	3.0	2.99	2.9	2.9		V	I <sub>OUT</sub> = -50 μA
		4.5	4.49	4.4	4.4			
		5.5	5.49	5.4	5.4			
		3.0		2.56	2.46		V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> -12 mA I <sub>OH</sub> -24 mA -24 mA
		4.5		3.86	3.76			
		5.5		4.86	4.76			
V <sub>OL</sub>	Maximum Low Level Output Voltage	3.0	0.002	0.1	0.1		V	I <sub>OUT</sub> = 50 μA
		4.5	0.001	0.1	0.1			
		5.5	0.001	0.1	0.1			
		3.0		0.36	0.44		V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> 12 mA I <sub>OL</sub> 24 mA 24 mA
		4.5		0.36	0.44			
		5.5		0.36	0.44			
I <sub>IN</sub>	Maximum Input Leakage Current	5.5		±0.1	±1.0		μA	V <sub>I</sub> = V <sub>CC</sub> , GND
I <sub>OLD</sub>	†Minimum Dynamic Output Current	5.5			75		mA	V <sub>OLD</sub> = 1.65 V Max
I <sub>OHD</sub>		5.5			-75		mA	V <sub>OHD</sub> = 3.85 V Min
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5		8.0	80		μA	V <sub>IN</sub> = V <sub>CC</sub> 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<sub>IN</sub> and I<sub>CC</sub> @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V<sub>CC</sub>.

# MC74AC352, MC74ACT352

## AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

Symbol	Parameter	V <sub>CC</sub> * (V)	74AC			74AC		Unit	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
			Min	Typ	Max	Min	Max		
t <sub>PLH</sub>	Propagation Delay S <sub>n</sub> to $\bar{Z}_n$	3.3 5.0	2.0 2.0	8.5 6.5	15.0 11.0	1.0 1.0	17.5 12.5	ns	3-6
t <sub>PHL</sub>	Propagation Delay S <sub>n</sub> to $\bar{Z}_n$	3.3 5.0	2.0 2.0	8.0 6.0	14.5 11.0	1.0 1.0	16.5 12.0	ns	3-6
t <sub>PLH</sub>	Propagation Delay $\bar{E}_n$ to $\bar{Z}_n$	3.3 5.0	2.0 2.0	6.0 4.5	13.5 9.5	1.0 1.0	16.0 11.0	ns	3-6
t <sub>PHL</sub>	Propagation Delay E <sub>n</sub> to $\bar{Z}_n$	3.3 5.0	2.0 2.0	5.5 4.0	11.0 8.0	1.0 1.0	12.5 9.0	ns	3-6
t <sub>PLH</sub>	Propagation Delay I <sub>n</sub> to $\bar{Z}_n$	3.3 5.0	2.0 2.0	7.0 5.0	12.5 9.0	1.0 1.0	14.5 10.5	ns	3-5
t <sub>PHL</sub>	Propagation Delay I <sub>n</sub> to $\bar{Z}_n$	3.3 5.0	2.0 2.0	7.0 5.0	11.5 8.5	1.0 1.0	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

Symbol	Parameter	V <sub>CC</sub> (V)	74ACT		74ACT		Unit	Conditions
			T <sub>A</sub> = +25°C		T <sub>A</sub> = -40°C to +85°C			
			Typ	Guaranteed Limits	Typ	Guaranteed Limits		
V <sub>IH</sub>	Minimum High Level Input Voltage	4.5	1.5	2.0	2.0	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	
		5.5	1.5	2.0	2.0			
V <sub>IL</sub>	Maximum Low Level Input Voltage	4.5	1.5	0.8	0.8	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	
		5.5	1.5	0.8	0.8			
V <sub>OH</sub>	Minimum High Level Output Voltage	4.5	4.49	4.4	4.4	V	I <sub>OUT</sub> = -50 μA	
		5.5	5.49	5.4	5.4			
		4.5		3.86	3.76	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OH</sub> = -24 mA	
		5.5		4.86	4.76			
V <sub>OL</sub>	Maximum Low Level Output Voltage	4.5	0.001	0.1	0.1	V	I <sub>OUT</sub> = 50 μA	
		5.5	0.001	0.1	0.1			
		4.5		0.36	0.44	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OL</sub> = 24 mA	
		5.5		0.36	0.44			
I <sub>IN</sub>	Maximum Input Leakage Current	5.5		±0.1	±1.0	μA	V <sub>I</sub> = V <sub>CC</sub> , GND	
ΔI <sub>CCT</sub>	Additional Max. I <sub>CC</sub> /Input	5.5	0.6		1.5	mA	V <sub>I</sub> = V <sub>CC</sub> - 2.1 V	
I <sub>OLD</sub>	†Minimum Dynamic Output Current	5.5			75	mA	V <sub>OLD</sub> = 1.65 V Max	
I <sub>OHD</sub>		5.5			-75	mA	V <sub>OHD</sub> = 3.85 V Min	
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5		8.0	80	μA	V <sub>IN</sub> = V <sub>CC</sub> 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.

# MC74AC352, MC74ACT352

## AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

Symbol	Parameter	V <sub>CC</sub> * (V)	74ACT			74ACT		Unit	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
			Min	Typ	Max	Min	Max		
t <sub>PLH</sub>	Propagation Delay S <sub>n</sub> to $\bar{Z}_n$	5.0	3.0	6.0	10.5	1.0	11.5	ns	3-6
t <sub>PHL</sub>	Propagation Delay S <sub>n</sub> to $\bar{Z}_n$	5.0	3.0	6.0	10.0	1.0	11.5	ns	3-6
t <sub>PLH</sub>	Propagation Delay $\bar{E}_n$ to $\bar{Z}_n$	5.0	2.0	4.5	8.0	1.0	8.5	ns	3-6
t <sub>PHL</sub>	Propagation Delay $\bar{E}_n$ to $\bar{Z}_n$	5.0	2.0	4.5	8.0	1.0	8.5	ns	3-6
t <sub>PLH</sub>	Propagation Delay I <sub>n</sub> to $\bar{Z}_n$	5.0	2.0	5.5	10.0	1.0	11.0	ns	3-5
t <sub>PHL</sub>	Propagation Delay I <sub>n</sub> to $\bar{Z}_n$	5.0	2.0	6.5	8.5	1.0	9.0	ns	3-5

\* Voltage Range 5.0 V is 5.0 V ±0.5 V.

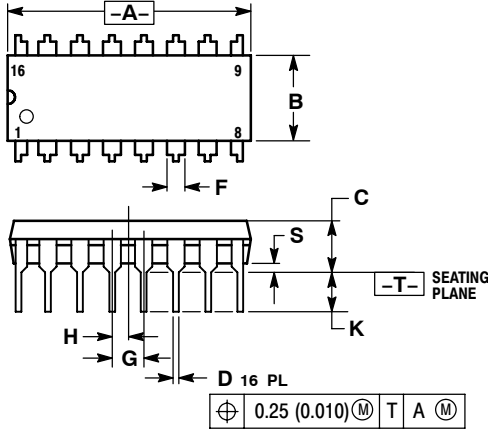
## CAPACITANCE

Symbol	Parameter	Value Typ	Unit	Test Conditions
C <sub>IN</sub>	Input Capacitance	4.5	pF	V <sub>CC</sub> = 5.0 V
C <sub>PD</sub>	Power Dissipation Capacitance	50	pF	V <sub>CC</sub> = 5.0 V

# MC74AC352, MC74ACT352

## OUTLINE DIMENSIONS

### N SUFFIX PLASTIC DIP PACKAGE CASE 648-08 ISSUE R

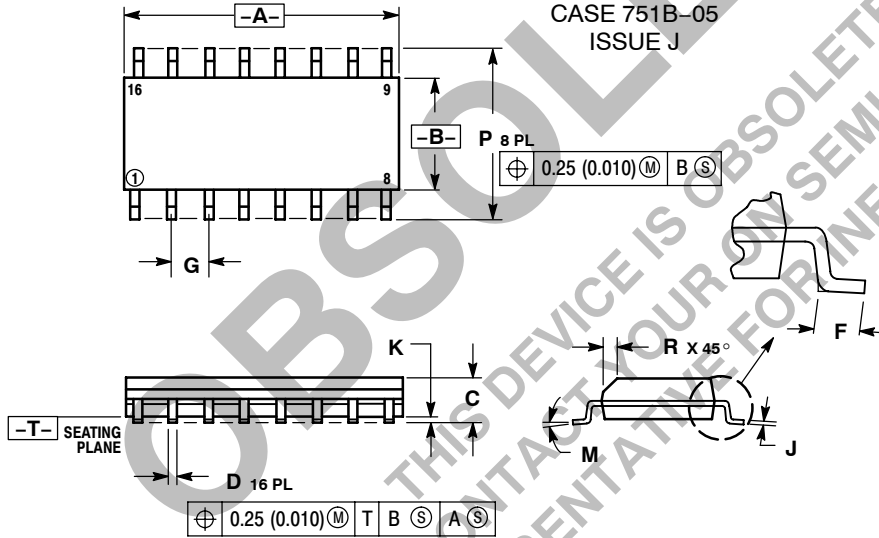


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.740	0.770	18.80	19.55
B	0.250	0.270	6.35	6.85
C	0.145	0.175	3.69	4.44
D	0.015	0.021	0.39	0.53
F	0.040	0.70	1.02	1.77
G	0.100 BSC		2.54 BSC	
H	0.050 BSC		1.27 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.130	2.80	3.30
L	0.295	0.305	7.50	7.74
M	0°	10°	0°	10°
S	0.020	0.040	0.51	1.01

### D SUFFIX PLASTIC SOIC PACKAGE CASE 751B-05 ISSUE J



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. 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.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	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°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

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