



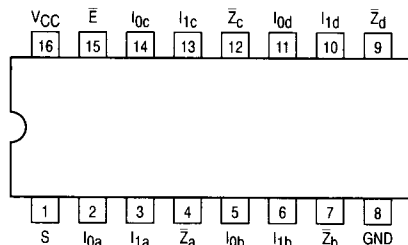
MOTOROLA

MC74AC158 MC74ACT158

Quad 2-Input Multiplexer

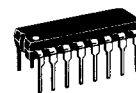
The MC74AC158/74ACT158 is a high-speed quad 2-input multiplexer. It selects four bits of data from two sources using the common Select and Enable inputs. The four buffered outputs present the selected data in the inverted form. The MC74AC158/74ACT158 can also be used as a function generator.

- Outputs Source/Sink 24 mA
- 'ACT158 Has TTL Compatible Inputs



PIN NAMES

I_{0a}-I_{0d} Source 0 Data Inputs
I_{1a}-I_{1d} Source 1 Data Inputs
E Enable Input
S Select Input
Z_a-Z_d Inverted Outputs



N SUFFIX
CASE 648-08
PLASTIC



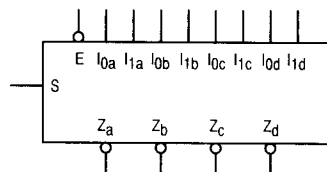
D SUFFIX
CASE 751B-05
PLASTIC

TRUTH TABLE

Inputs				Outputs
$\bar{E}$	S	I ₀	I ₁	Z
H	X	X	X	H
L	L	L	X	H
L	L	H	X	L
L	H	X	L	H
L	H	X	H	L

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

LOGIC SYMBOL



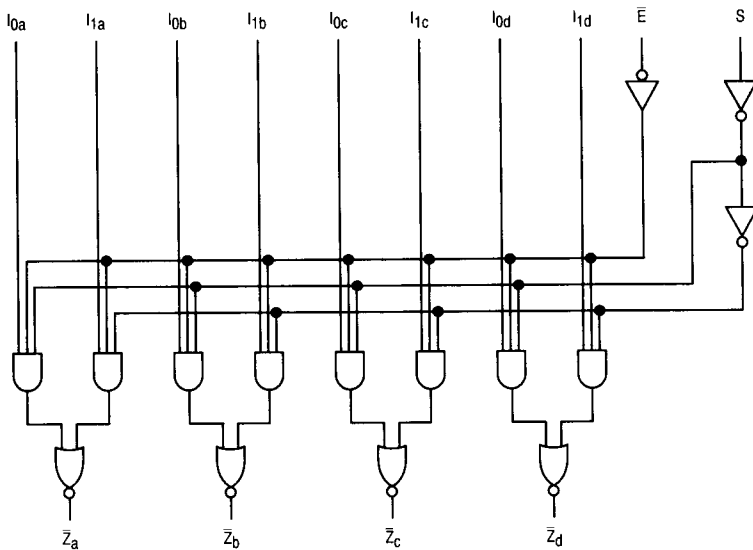
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FUNCTIONAL DESCRIPTION

The MC74AC158/74ACT158 quad 2-input multiplexer selects four bits of data from two sources under the control of a common Select input (S) and presents the data in inverted form at the four outputs. The Enable input ($\bar{E}$) is active-LOW. When $\bar{E}$ is HIGH, all of the outputs ($\bar{Z}$) are forced HIGH regardless of all other inputs. The MC74AC158/74ACT158 is the logic implementation of a 4-pole, 2-position switch where the position of the switch is determined by the logic levels supplied to the Select input.

A common use of the MC74AC158/74ACT158 is the moving of data from two groups of registers to four common output busses. The particular register from which the data comes is determined by the state of the Select input. A less obvious use is as a function generator. The MC74AC158/74ACT158 can generate four functions of two variables with one variable common. This is useful for implementing gating functions.

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.

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	± 20	mA
I_{out}	DC Output Sink/Source Current, per Pin	± 50	mA
I_{CC}	DC V_{CC} or GND Current per Output Pin	± 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.

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RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Max	Unit
V _{CC}	Supply Voltage	V _{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 V	150		ns/V
		V _{CC} @ 4.5 V	40		
		V _{CC} @ 5.5 V	25		
t _r , t _f	Input Rise and Fall Time (Note 2) *ACT Devices except Schmitt Inputs	V _{CC} @ 4.5 V	10		ns/V
		V _{CC} @ 5.5 V	8.0		
T _J	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

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

Symbol	Parameter	V _{CC} (V)	74AC		74AC		Unit	Conditions
			T _A = +25°C		T _A = −40°C to +85°C			
			Typ	Guaranteed Limits				
V _{IH}	Minimum High Level Input Voltage	3.0	1.5	2.1	2.1	V	V _{OUT} = 0.1 V or V _{CC} − 0.1 V	
		4.5	2.25	3.15	3.15			
		5.5	2.75	3.85	3.85			
V _{IL}	Maximum Low Level Input Voltage	3.0	1.5	0.9	0.9	V	V _{OUT} = 0.1 V or V _{CC} − 0.1 V	
		4.5	2.25	1.35	1.35			
		5.5	2.75	1.65	1.65			
V _{OH}	Minimum High Level Output Voltage	3.0	2.99	2.9	2.9	V	I _{OUT} = −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 _{IN} = V _{IL} or V _{IH} −12 mA I _{OH} −24 mA −24 mA	
		4.5		3.86	3.76			
		5.5		4.86	4.76			
V _{OL}	Maximum Low Level Output Voltage	3.0	0.002	0.1	0.1	V	I _{OUT} = 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 _{IN} = V _{IL} or V _{IH} 12 mA I _{OL} 24 mA 24 mA	
		4.5		0.36	0.44			
		5.5		0.36	0.44			
I _{IN}	Maximum Input Leakage Current	5.5		±0.1	±1.0	μA	V _I = V _{CC} , GND	
I _{OLD}	†Minimum Dynamic Output Current	5.5			75	mA	V _{OLD} = 1.65 V Max	
I _{OHD}		5.5			−75	mA	V _{OHD} = 3.85 V Min	
I _{CC}	Maximum Quiescent Supply Current	5.5		8.0	80	μA	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}.

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

Symbol	Parameter	VCC* (V)	74AC			74AC		Unit	Fig. No.
			TA = +25°C CL = 50 pF			TA = -40°C to +85°C CL = 50 pF			
			Min	Typ	Max	Min	Max		
tPLH	Propagation Delay S to Z _n	3.3 5.0	1.5 1.5		11.5 9.0	1.5 1.0	12.5 9.5	ns	3-6
tPHL	Propagation Delay S to Z _n	3.3 5.0	1.5 1.5		11.5 9.0	1.5 1.5	12.5 10.0	ns	3-6
tPLH	Propagation Delay E to Z _n	3.3 5.0	1.5 1.5		12.0 9.5	1.5 1.5	13.0 10.5	ns	3-6
tPHL	Propagation Delay E _n to Z _n	3.3 5.0	1.5 1.5		11.0 8.5	1.5 1.0	12.0 9.5	ns	3-6
tPLH	Propagation Delay I _n to Z _n	3.3 5.0	1.5 1.5		9.0 7.0	1.5 1.0	10.0 7.5	ns	3-5
tPHL	Propagation Delay I _n to Z _n	3.3 5.0	1.5 1.5		8.0 6.5	1.0 1.0	8.5 6.5	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

DC CHARACTERISTICS								
Symbol	Parameter	V _{CC} (V)	74ACT		74ACT		Unit	Conditions
			T _A = +25°C		T _A = -40°C to +85°C			
			Typ	Guaranteed Limits				
V _{IH}	Minimum High Level Input Voltage	4.5	1.5	2.0	2.0	V	V _{OUT} = 0.1 V or V _{CC} - 0.1 V	
		5.5	1.5	2.0	2.0			
V _{IL}	Maximum Low Level Input Voltage	4.5	1.5	0.8	0.8	V	V _{OUT} = 0.1 V or V _{CC} - 0.1 V	
		5.5	1.5	0.8	0.8			
V _{OH}	Minimum High Level Output Voltage	4.5	4.49	4.4	4.4	V	I _{OUT} = -50 μA	
		5.5	5.49	5.4	5.4			
		4.5		3.86	3.76	V	*V _{IN} = V _{IL} or V _{IH} -24 mA I _{OH} -24 mA	
		5.5		4.86	4.76			
V _{OL}	Maximum Low Level Output Voltage	4.5	0.001	0.1	0.1	V	I _{OUT} = 50 μA	
		5.5	0.001	0.1	0.1			
		4.5		0.36	0.44	V	*V _{IN} = V _{IL} or V _{IH} 24 mA I _{OL} 24 mA	
		5.5		0.36	0.44			
I _{IN}	Maximum Input Leakage Current	5.5		±0.1	±1.0	μA	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 Output Current	5.5			75	mA	V _{OLD} = 1.65 V Max	
I _{OHD}		5.5			-75	mA	V _{OHD} = 3.85 V Min	
I _{CC}	Maximum Quiescent Supply Current	5.5		8.0	80	μA	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.

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

Symbol	Parameter	V _{CC} * (V)	74ACT			74ACT		Unit	Fig. No.
			T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF			
			Min	Typ	Max	Min	Max		
t _{PLH}	Propagation Delay S to $\bar{Z}_n$	5.0	2.5	6.0	9.5	2.0	11.0	ns	3-6
t _{PHL}	Propagation Delay S to $\bar{Z}_n$	5.0	1.5	5.5	9.0	1.5	10.0	ns	3-6
t _{PLH}	Propagation Delay E _n to $\bar{Z}_n$	5.0	1.5	5.5	9.5	1.5	10.5	ns	3-6
t _{PHL}	Propagation Delay E _n to $\bar{Z}_n$	5.0	1.5	5.5	9.5	1.5	10.5	ns	3-6
t _{PLH}	Propagation Delay I _n to $\bar{Z}_n$	5.0	1.5	4.5	8.0	1.0	8.5	ns	3-6
t _{PHL}	Propagation Delay I _n to $\bar{Z}_n$	5.0	1.5	4.0	6.5	1.0	7.5	ns	3-6

* 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	45	pF	V _{CC} = 5.0 V