

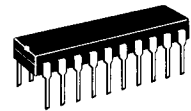
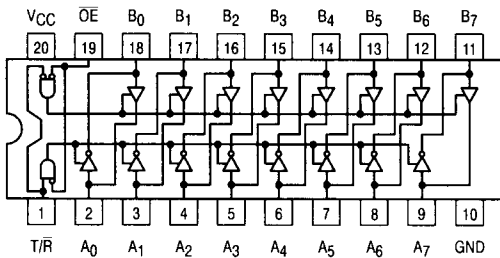


**MC74AC643
MC74ACT643**

**Octal Bidirectional Transceiver
with 3-State Outputs**

The MC74AC643/74ACT643 octal bus transceiver is designed for asynchronous two-way communication between data buses. The device transmits data from bus \bar{A} to bus B when T/\bar{R} = HIGH, or from bus B to bus A when T/\bar{R} = LOW. The enable input can be used to disable the device so the buses are effectively isolated.

- Bidirectional Data Path
- A and B Outputs Sink 24 mA/Source -24 mA
- 'ACT643 Has TTL Compatible Inputs



N SUFFIX
CASE 738-03
PLASTIC



DW SUFFIX
CASE 751D-04
PLASTIC

PIN NAMES

- A_0 - A_7 Side A Inputs or 3-State Outputs
- \overline{OE} Output Enable Input
- T/\bar{R} Transmit/Receive Input
- B_0 - B_7 Side B Inputs or 3-State Outputs

TRUTH TABLE

\overline{OE}	T/\bar{R}	Applied Inputs	Valid Direction I/P → O/P	Output
H	X	X	X	X
L	H	H	\bar{A} to B	L
L	H	L	\bar{A} to B	H
L	L	H	B to A	H
L	L	L	B to A	L

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

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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	°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 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.

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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 _{OZT}	Maximum 3-State Current	5.5		±0.6	±6.0		μA	V _I (OE) = V _{IL} , V _{IH} V _I = V _{CC} , GND V _O = 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	V _{CC} * (V)	74AC			74AC		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 A _n to B _n or B _n to A _n	3.3 5.0	1.5 1.5		8.5 6.5	1.0 1.0	9.5 7.5	ns	3-5
t _{PHL}	Propagation Delay A _n to B _n or B _n to A _n	3.3 5.0	1.5 1.5		8.5 6.5	1.0 1.0	9.5 7.5	ns	3-5
t _{PZH}	Output Enable Time	3.3 5.0	2.5 1.5		12.5 9.5	2.0 1.0	13.5 10.0	ns	3-7
t _{PZL}	Output Enable Time	3.3 5.0	2.5 1.5		12.5 9.5	2.0 1.0	13.5 10.0	ns	3-8
t _{PHZ}	Output Disable Time	3.3 5.0	2.0 1.5		12.0 9.0	1.0 1.0	12.5 10.0	ns	3-7
t _{PLZ}	Output Disable Time	3.3 5.0	2.0 1.5		12.0 9.5	1.5 1.0	13.5 10.5	ns	3-8

* 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 _{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 _{IIN} = 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 _{IIN} = 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 _{OZT}	Maximum 3-State Current	5.5		±0.6	±6.0	μA	V _I (OE) = V _{IL} , V _{IH} V _I = V _{CC} , GND V _O = 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 _{IIN} = 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 A _n to B _n or B _n to A _n	5.0	1.5		8.0	1.0	9.0	ns	3-5
t _{PHL}	Propagation Delay A _n to B _n or B _n to A _n	5.0	1.5		8.0	1.0	9.0	ns	3-5
t _{PZH}	Output Enable Time	5.0	1.5		10.5	1.0	11.5	ns	3-7
t _{PZL}	Output Enable Time	5.0	1.5		10.5	1.0	11.5	ns	3-8
t _{PHZ}	Output Disable Time	5.0	1.5		10.5	1.0	11.5	ns	3-7
t _{PLZ}	Output Disable Time	5.0	1.5		10.5	1.0	11.5	ns	3-8

* 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 _{I/O}	Input/Output Capacitance	15	pF	V _{CC} = 5.0 V
C _{PD}	Power Dissipation Capacitance	45	pF	V _{CC} = 5.0 V