



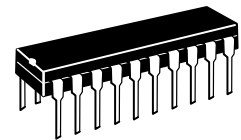
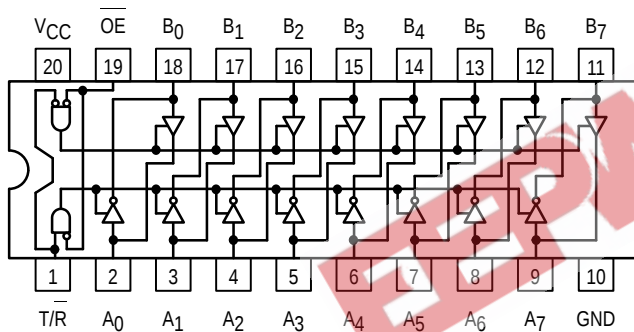
MOTOROLA

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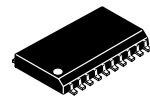
Octal Bidirectional Transceiver with 3-State Outputs

The MC74AC643/74ACT643 octal bus transceiver is designed for asynchronous two-way communication between data buses. The device transmits data from bus A to bus B when T/R = HIGH, or from bus B to bus A when T/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

A₀-A₇ Side A Inputs or 3-State Outputs
OE Output Enable Input
T/R Transmit/Receive Input
B₀-B₇ Side B Inputs or 3-State Outputs

TRUTH TABLE

OE	T/R	Applied Inputs	Valid Direction I/P→O/P	Output
H	X	X	X	X
L	H	H	A to B	L
L	H	L	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	V
		'ACT	4.5	5.0	
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	°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 _{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 _{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.

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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.

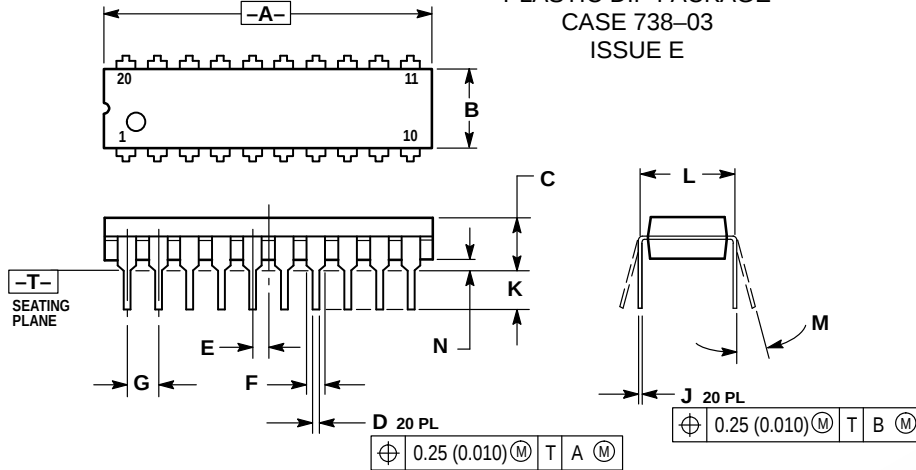
CAPACITANCE

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

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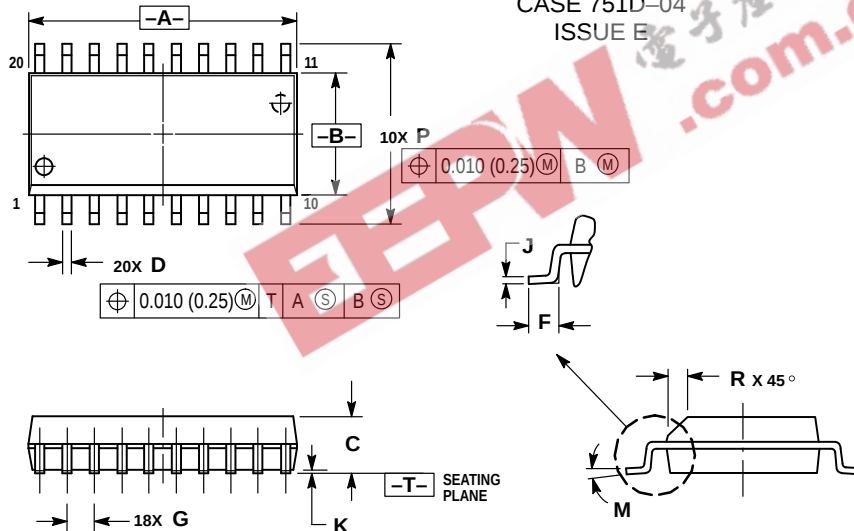
OUTLINE DIMENSIONS

N SUFFIX PLASTIC DIP PACKAGE CASE 738-03 ISSUE E



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

DW SUFFIX PLASTIC SOIC PACKAGE CASE 751D-04 ISSUE E



- 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 0.150 (0.006) PER SIDE.
 5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 (0.005) TOTAL IN EXCESS OF D DIMENSION AT MAXIMUM MATERIAL CONDITION.

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How to reach us:

USA/EUROPE: Motorola Literature Distribution;
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

MFAX: RMFAX0@email.sps.mot.com - TOUCHTONE (602) 244-6609
INTERNET: <http://Design-NET.com>

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki,
6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298



MC74AC643/D

