MC74ACT640

Octal 3-State Inverting Transciever

The MC74ACT640 octal bus transceiver is designed for asynchronous two-way communication between data buses. The device transmits data from bus $\overline{A}$ to bus B when T/$\overline{R}$ = HIGH, or from bus $\overline{B}$ to bus A when T/$\overline{R}$ = LOW. The enable input can be used to disable the device so the buses are effectively isolated.

Features

- Bidirectional Data Path
- A and B Outputs Sink 24 mA/Source −24 mA
- TTL Compatible Inputs
- Pb−Free Packages are Available*

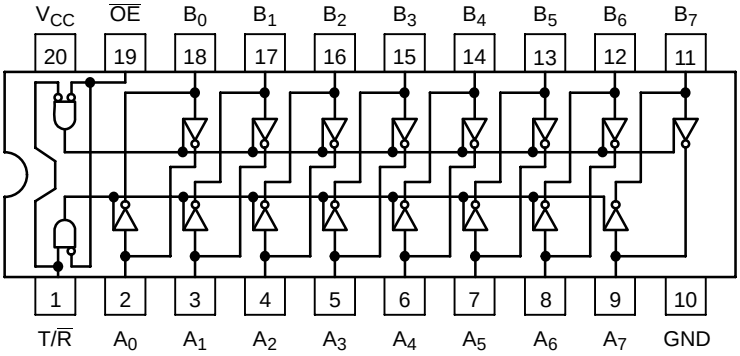

Figure 1. Pinout: 20−Lead Packages Conductors
(Top View)

PIN ASSIGNMENT

PIN	FUNCTION
A_0−A_7	Side A Inputs or 3-State Outputs
$\overline{OE}$	Output Enable Input
T/$\overline{R}$	Transmit/Receive Input
B_0−B_7	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	$\overline{A}$ to B	L
L	H	L	$\overline{A}$ to B	H
L	L	H	$\overline{B}$ to A	L
L	L	L	$\overline{B}$ to A	H

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

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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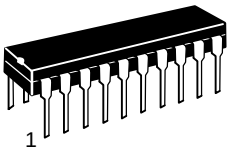
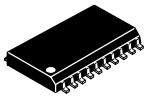
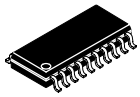


PDIP−20
N SUFFIX
CASE 738



SOIC−20W
DW SUFFIX
CASE 751D



SOEIAJ−20
M SUFFIX
CASE 967

ORDERING INFORMATION

Device	Package	Shipping†
MC74ACT640N	PDIP−20	18 Units/Rail
MC74ACT640NG	PDIP−20 (Pb−Free)	18 Units/Rail
MC74ACT640DW	SOIC−20	38 Units/Rail
MC74ACT640DWG	SOIC−20 (Pb−Free)	38 Units/Rail
MC74ACT640DWR2	SOIC−20	1000 / Tape & Reel
MC74ACT640DWR2G	SOIC−20 (Pb−Free)	1000 / Tape & Reel
MC74ACT640MEL	SOEIAJ−20	2000 / Tape & Reel
MC74ACT640MELG	SOEIAJ−20 (Pb−Free)	2000 / 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.

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 4 of this data sheet.

MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		−0.5 to +7.0	V
V_I	DC Input Voltage		$-0.5 \le V_I \le V_{CC} + 0.5$	V
V_O	DC Output Voltage	(Note 1)	$-0.5 \le V_O \le V_{CC} + 0.5$	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
T_L	Lead temperature, 1 mm from Case for 10 Seconds		260	°C
T_J	Junction temperature under Bias		+150	°C
θ_{JA}	Thermal resistance	PDIP SOIC	67 96	°C/W
P_D	Power Dissipation in Still Air at 85°C	PDIP SOIC	750 500	mW
MSL	Moisture Sensitivity		Level 1	
F_R	Flammability Rating	Oxygen Index: 30% − 35%	UL 94 V−0 @ 0.125 in	
V_{ESD}	ESD Withstand Voltage	Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4)	> 2000 > 200 > 1000	V
$I_{Latchup}$	Latchup Performance	Above V_{CC} and Below GND at 85°C (Note 5)	±100	mA

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. I_O absolute maximum rating must be observed.
2. Tested to EIA/JESD22−A114−A.
3. Tested to EIA/JESD22−A115−A.
4. Tested to JESD22−C101−A.
5. Tested to EIA/JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Typ	Max	Unit
V_{CC}	DC Input Voltage (Referenced to GND)		4.5		5.5	V
V_{in}, V_{out}	DC Input Voltage, Output Voltage (Referenced to GND)		0		V_{CC}	V
T_A	Operating Temperature, All Package Types		−40	25	+85	°C
t_r, t_f	Input Rise and Fall Time (Note 7)	V_{CC} = 4.5 V V_{CC} = 5.5 V	0 0	10 8.0	10 8.0	ns/V
T_J	Junction Temperature (PDIP)				140	°C
I_{OH}	Output Current − High				−24	mA
I_{OL}	Output Current − Low				24	mA

6. Unused Inputs may not be left open. All inputs must be tied to a high voltage level or low logic voltage level.
7. V_{in} from 0.8 V to 2.0 V; refer to individual Data Sheets for devices that differ from the typical input rise and fall times.

DC CHARACTERISTICS

Symbol	Parameter	V_{CC} (V)	T_A = +25°C		T_A = −40°C to +85°C	Unit	Conditions
			Typ	Guaranteed 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	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	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 V	I_{OUT} = −50 μA
		4.5 5.5		3.86 4.86	3.76 4.76	V V	*V_{IN} = V_{IL} or V_{IH} −24 mA I_{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 V	I_{OUT} = 50 μA
		4.5 5.5		0.36 0.36	0.44 0.44	V V	*V_{IN} = V_{IL} or V_{IH} −24 mA I_{OH} −24 mA
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_{OZ}	Maximum 3−State Current	5.5		±0.5	±5.0	μA	V_I (OE) = V_{IL}, V_{IH} V_I = V_{CC}, GND V_O = V_{CC}, GND
I_{OLD} I_{OHD}	†Minimum Dynamic Output Current	5.5 5.5			75 −75	mA mA	V_{OLD} = 1.65 V Max
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.

AC CHARACTERISTICS t_r = t_f = 3.0 ns (For Figures and Waveforms, See Figures 2 and 3.)

Symbol	Parameter	V_{CC}* (V)	T_A = +25°C C_L = 50 pF		T_A = −40°C to +85°C C_L = 50 pF		Unit
			Min	Max	Min	Max	
t_{PLH}	Propagation Delay An to Bn or Bn to An	5.0	1.5	8.0	1.0	8.5	ns
t_{PHL}	Propagation Delay An to Bn or Bn to An	5.0	1.5	8.0	1.0	9.0	ns
t_{PZH}	Output Enable Time $\overline{OE}$ to An or Bn	5.0	1.5	10.0	1.0	11.0	ns
t_{PZL}	Output Enable Time $\overline{OE}$ to An or Bn	5.0	1.5	10.0	1.0	11.0	ns
t_{PHZ}	Output Disable Time T/$\overline{R}$ or $\overline{OE}$ to An or Bn	5.0	1.5	10.0	1.0	11.0	ns
t_{PLZ}	Output Disable Time T/$\overline{R}$ or $\overline{OE}$ to An or Bn	5.0	1.5	10.0	1.0	11.0	ns

*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

SWITCHING WAVEFORMS

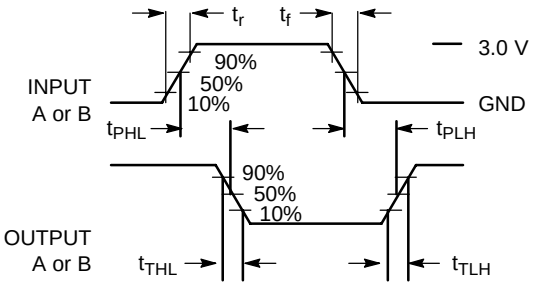


Figure 2.

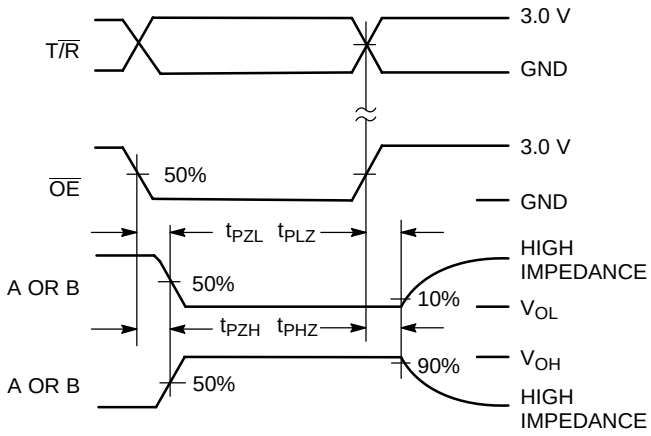
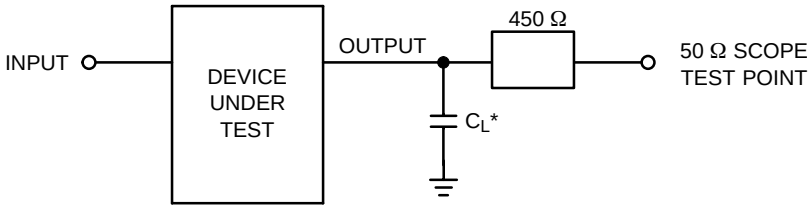


Figure 3.



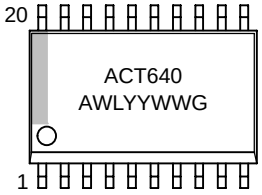
*Includes all probe and jig capacitance

Figure 4. Test Circuit

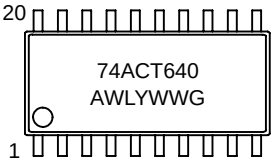
MARKING DIAGRAMS

PDIP−20

SOIC−20W



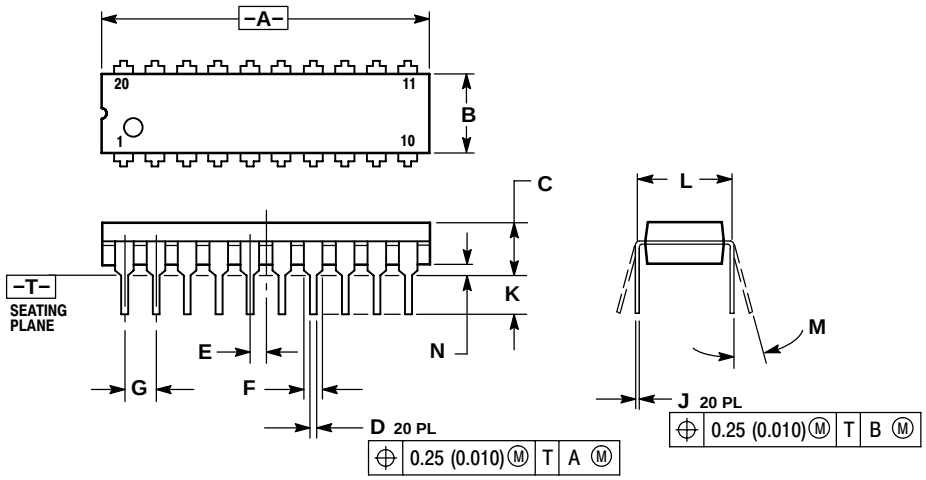
SOEIAJ−20



A = Assembly Location
WL = Wafer Lot
YY, Y = Year
WW = Work Week
G = Pb−Free Package

PACKAGE DIMENSIONS

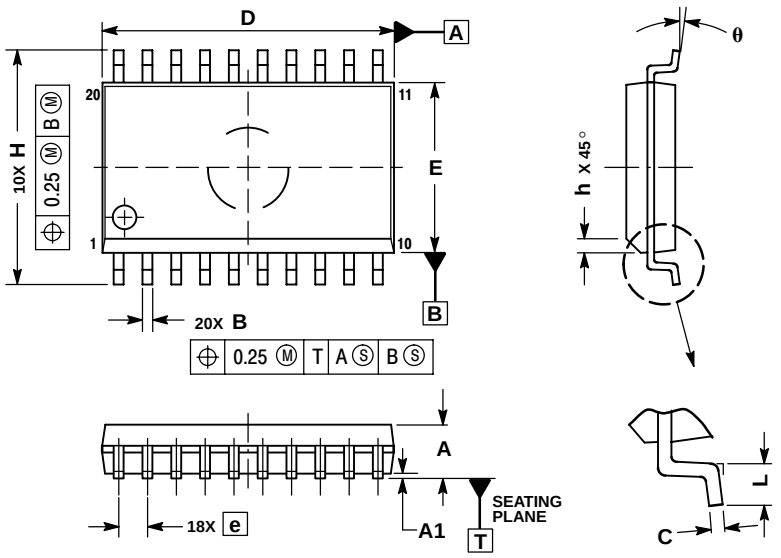
PDIP−20
N SUFFIX
PLASTIC DIP PACKAGE
CASE 738−03
ISSUE E



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.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	1.010	1.070	25.66	27.17
B	0.240	0.260	6.10	6.60
C	0.150	0.180	3.81	4.57
D	0.015	0.022	0.39	0.55
E	0.050 BSC		1.27 BSC	
F	0.050	0.070	1.27	1.77
G	0.100 BSC		2.54 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.140	2.80	3.55
L	0.300 BSC		7.62 BSC	
M	0 °	15 °	0 °	15 °
N	0.020	0.040	0.51	1.01

SOIC−20W
DW SUFFIX
CASE 751D−05
ISSUE G

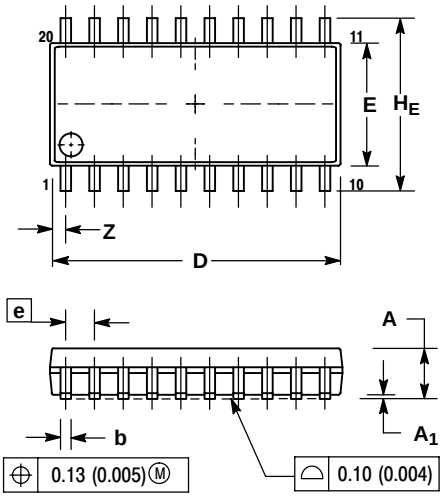


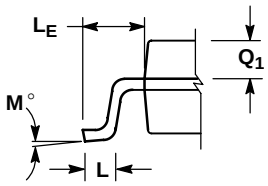
NOTES:
1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIMETERS	
DIM	MIN	MAX
A	2.35	2.65
A1	0.10	0.25
B	0.35	0.49
C	0.23	0.32
D	12.65	12.95
E	7.40	7.60
e	1.27 BSC	
H	10.05	10.55
h	0.25	0.75
L	0.50	0.90
θ	0 °	7 °

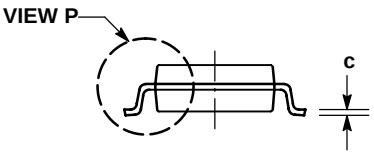
PACKAGE DIMENSIONS

SOEIAJ−20
M SUFFIX
CASE 967−01
ISSUE A





DETAIL P



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
5. THE LEAD WIDTH DIMENSION (b) DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE LEAD WIDTH DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSIONS AND ADJACENT LEAD TO BE 0.46 (0.018).

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	---	2.05	---	0.081
A_1	0.05	0.20	0.002	0.008
b	0.35	0.50	0.014	0.020
c	0.15	0.25	0.006	0.010
D	12.35	12.80	0.486	0.504
E	5.10	5.45	0.201	0.215
e	1.27 BSC		0.050 BSC	
H_E	7.40	8.20	0.291	0.323
L	0.50	0.85	0.020	0.033
L_E	1.10	1.50	0.043	0.059
M	0 °	10 °	0 °	10 °
Q_1	0.70	0.90	0.028	0.035
Z	---	0.81	---	0.032

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
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