

MC74AC540, MC74ACT540, MC74AC541, MC74ACT541

Octal Buffer/Line Driver with 3-State Outputs

The MC74AC540/74ACT540 and MC74AC541/74ACT541 are octal buffer/line drivers designed to be employed as memory and address drivers, clock drivers and bus oriented transmitter/receivers. The MC74AC541/74ACT541 is a noninverting option of the MC74AC540/74ACT540.

These devices are similar in function to the MC74AC240/74ACT240 and MC74AC244/74ACT244 while providing flow-through architecture (inputs on opposite side from outputs). This pinout arrangement makes these devices especially useful as output ports for microprocessors, allowing ease of layout and greater PC board density.

Features

- 3-State Outputs
- Inputs and Outputs Opposite Side of Package, Allowing Easier Interface to Microprocessors
- Outputs Source/Sink 24 mA
- MC74AC540/74ACT540 Provides Inverted Outputs
- MC74AC541/74ACT541 Provides Noninverted Outputs
- 'ACT540 and 'ACT541 Have TTL Compatible Inputs
- Pb-Free Packages are Available

TRUTH TABLE

Inputs			Outputs	
$\overline{OE}_1$	$\overline{OE}_2$	D	'540	'541
L	L	H	L	H
H	X	X	Z	Z
X	H	X	Z	Z
L	L	L	H	L

H = HIGH Voltage Level

L = LOW Voltage Level

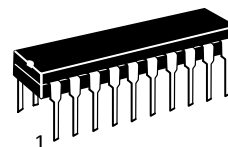
X = Immaterial

Z = High Impedance

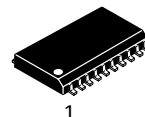


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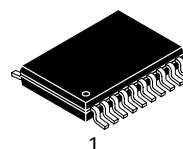
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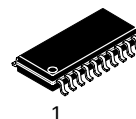
PDIP-20
N SUFFIX
CASE 738



SOIC-20W
DW SUFFIX
CASE 751D



TSSOP-20
DT SUFFIX
CASE 948E



SOEIAJ-20
M SUFFIX
CASE 967

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 7 of this data sheet.

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 9 of this data sheet.

MC74AC540, MC74ACT540, MC74AC541, MC74ACT541

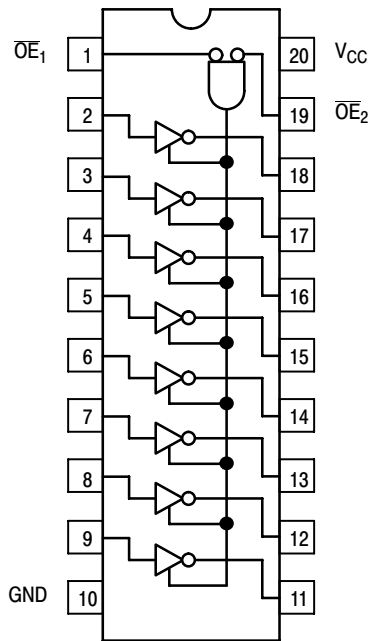


Figure 1. MC74AC540/74ACT540

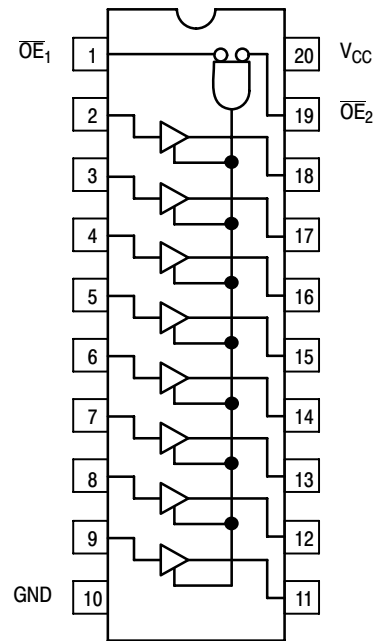


Figure 2. MC74AC541/74ACT541

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	$^{\circ}\text{C}$

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.

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	$^{\circ}\text{C}$
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

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 _{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}	†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 AND8277/D at www.onsemi.com)

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 Data to Output ('AC540)	3.3 5.0	1.5 1.5	5.5 4.0	7.5 6.0	1.0 1.0	8.0 6.5	ns	3-5
t _{PHL}	Propagation Delay Data to Output ('AC540)	3.3 5.0	1.5 1.5	5.0 4.0	7.0 5.5	1.0 1.0	7.5 6.0	ns	3-5
t _{PZH}	Output Enable Time (‘AC540)	3.3 5.0	3.0 2.0	8.5 6.5	11 8.5	2.5 2.0	12 9.5	ns	3-7
t _{PZL}	Output Enable Time (‘AC540)	3.3 5.0	2.5 2.0	7.5 6.0	10 7.5	2.0 1.5	11 8.5	ns	3-8
t _{PHZ}	Output Disable Time (‘AC540)	3.3 5.0	2.5 1.5	8.5 7.5	13 10.5	1.5 1.0	14 11	ns	3-7
t _{PLZ}	Output Disable Time (‘AC540)	3.3 5.0	2.0 1.5	7.0 6.0	10 8.0	2.0 1.5	11 9.0	ns	3-8
t _{PLH}	Propagation Delay Data to Output ('AC541)	3.3 5.0	2.0 1.5	5.5 4.0	8.0 6.0	1.5 1.0	9.0 6.5	ns	3-5
t _{PHL}	Propagation Delay Data to Output ('AC541)	3.3 5.0	2.0 1.5	5.5 4.0	8.0 6.0	1.5 1.0	8.5 6.5	ns	3-5
t _{PZH}	Output Enable Time (‘AC541)	3.3 5.0	3.0 2.0	8.0 6.0	11.5 8.5	3.0 1.5	12.5 9.5	ns	3-7
t _{PZL}	Output Enable Time (‘AC541)	3.3 5.0	2.5 1.5	7.0 5.5	10 7.5	2.5 1.0	11.5 8.5	ns	3-8
t _{PHZ}	Output Disable Time (‘AC541)	3.3 5.0	3.5 2.0	9.0 7.0	12.5 9.5	2.5 1.0	14 10.5	ns	3-7
t _{PLZ}	Output Disable Time (‘AC541)	3.3 5.0	2.5 2.0	6.5 5.5	9.5 7.5	2.0 1.0	10.5 8.5	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.

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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} 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	
		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 _{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}	†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 AND8277/D at www.onsemi.com)

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 Data to Output ('ACT540)	5.0	1.0	–	7.0	1.0	7.5	ns	3–5
t _{PHL}	Propagation Delay Data to Output ('ACT540)	5.0	1.0	–	8.0	1.0	8.5	ns	3–5
t _{PZH}	Output Enable Time (‘ACT540)	5.0	1.0	–	10.5	1.0	11.5	ns	3–7
t _{PZL}	Output Enable Time (‘ACT540)	5.0	1.0	–	9.5	1.0	10.5	ns	3–8
t _{PHZ}	Output Disable Time (‘ACT540)	5.0	1.0	–	12.0	1.0	12.5	ns	3–7
t _{PLZ}	Output Disable Time (‘ACT540)	5.0	1.5	–	9.0	1.0	10	ns	3–8
t _{PLH}	Propagation Delay Data to Output ('ACT541)	5.0	1.5	–	7.5	1.0	8.0	ns	3–5
t _{PHL}	Propagation Delay Data to Output ('ACT541)	5.0	1.5	–	7.5	1.0	8.0	ns	3–5
t _{PZH}	Output Enable Time (‘ACT541)	5.0	2.0	–	10.0	1.0	11.0	ns	3–7
t _{PZL}	Output Enable Time (‘ACT541)	5.0	1.5	–	9.5	1.0	10.5	ns	3–8
t _{PHZ}	Output Disable Time (‘ACT541)	5.0	2.0	–	11.0	1.0	12.0	ns	3–7
t _{PLZ}	Output Disable Time (‘ACT541)	5.0	2.0	–	9.0	1.0	10	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 _{PD}	Power Dissipation Capacitance	30	pF	V _{CC} = 5.0 V

MC74AC540, MC74ACT540, MC74AC541, MC74ACT541

ORDERING INFORMATION

Device	Package	Shipping [†]
MC74AC540N	PDIP-20	18 Units / Rail
MC74AC540NG	PDIP-20 (Pb-Free)	
MC74ACT540N	PDIP-20	
MC74ACT540NG	PDIP-20 (Pb-Free)	
MC74AC540DW	SOIC-20	38 Units / Rail
MC74AC540DWG	SOIC-20 (Pb-Free)	
MC74AC540DWR2	SOIC-20	1000 / Tape & Reel
MC74AC540DWR2G	SOIC-20 (Pb-Free)	
MC74ACT540DW	SOIC-20	38 Units / Rail
MC74ACT540DWG	SOIC-20 (Pb-Free)	
MC74ACT540DWR2	SOIC-20	1000 / Tape & Reel
MC74ACT540DWR2G	SOIC-20 (Pb-Free)	
MC74ACT540DTR2	TSSOP-20*	2500 / Tape & Reel
MC74ACT540DTR2G	TSSOP-20*	
MC74ACT540MEL	SOEIAJ-20	2000 / Tape & Reel
MC74ACT540MELG	SOEIAJ-20 (Pb-Free)	
MC74AC541N	PDIP-20	18 Units / Rail
MC74AC541NG	PDIP-20 (Pb-Free)	
MC74ACT541N	PDIP-20	
MC74ACT541NG	PDIP-20 (Pb-Free)	
MC74AC541DW	SOIC-20	38 Units / Rail
MC74AC541DWG	SOIC-20 (Pb-Free)	
MC74AC541DWR2	SOIC-20	1000 / Tape & Reel
MC74AC541DWR2G	SOIC-20 (Pb-Free)	
MC74ACT541DW	SOIC-20	38 Units / Rail
MC74ACT541DWG	SOIC-20 (Pb-Free)	
MC74ACT541DWR2	SOIC-20	1000 / Tape & Reel
MC74ACT541DWR2G	SOIC-20 (Pb-Free)	

[†]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.

*These packages are inherently Pb-Free.

MC74AC540, MC74ACT540, MC74AC541, MC74ACT541

ORDERING INFORMATION (continued)

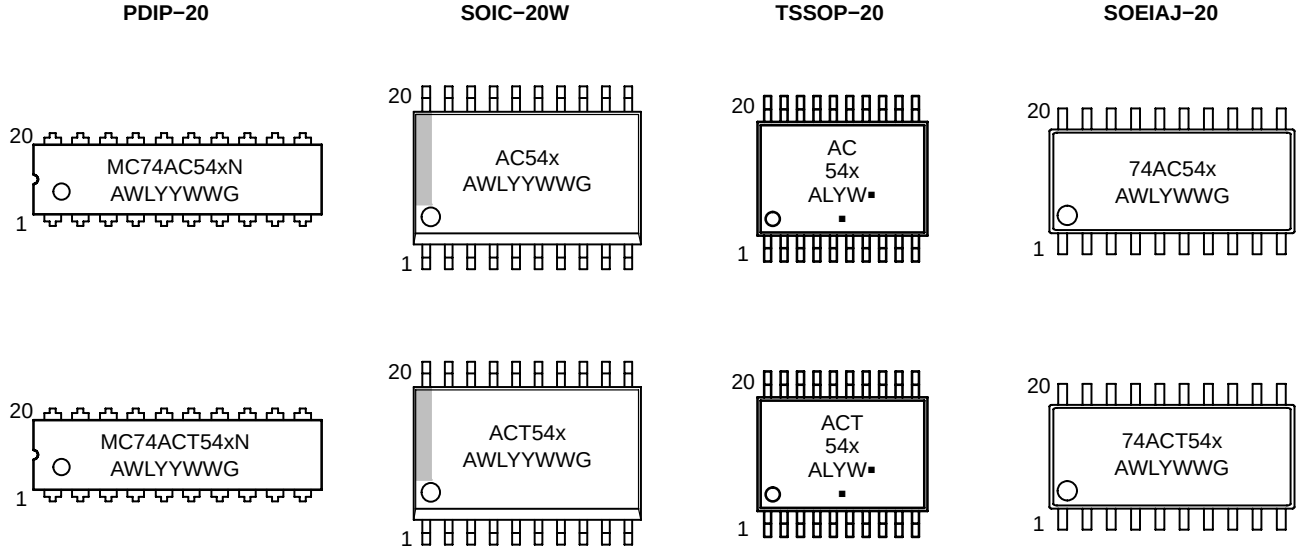
Device	Package	Shipping [†]
MC74AC541DTR2	TSSOP-20*	2500 / Tape & Reel
MC74AC541DTR2G	TSSOP-20*	
MC74ACT541DT	TSSOP-20*	75 Units / Rail
MC74ACT541DTG	TSSOP-20*	
MC74ACT541DTR2	TSSOP-20*	2500 / Tape & Reel
MC74ACT541DTR2G	TSSOP-20*	
MC74AC541M	SOEIAJ-20	40 Units / Rail
MC74AC541MG	SOEIAJ-20 (Pb-Free)	
MC74AC541MEL	SOEIAJ-20	2000 / Tape & Reel
MC74AC541MELG	SOEIAJ-20 (Pb-Free)	
MC74ACT541M	SOEIAJ-20	40 Units / Rail
MC74ACT541MG	SOEIAJ-20 (Pb-Free)	
MC74ACT541MEL	SOEIAJ-20	2000 / Tape & Reel
MC74ACT541MELG	SOEIAJ-20 (Pb-Free)	

[†]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.

*These packages are inherently Pb-Free.

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MARKING DIAGRAMS

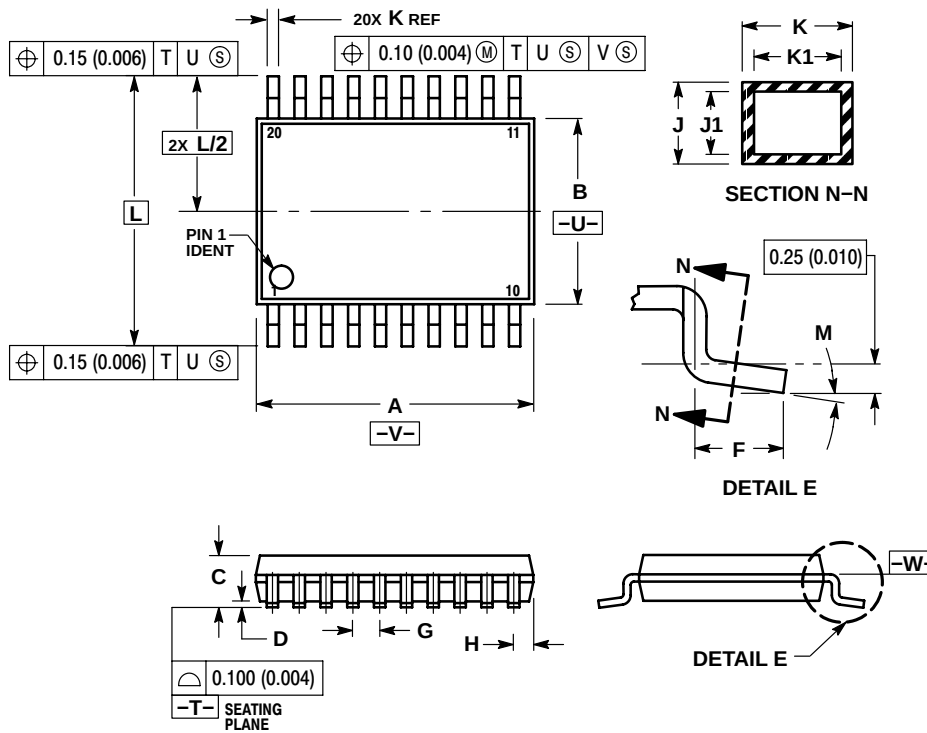


x = 0 or 1
 A = Assembly Location
 WL, L = Wafer Lot
 YY, Y = Year
 WW, W = Work Week
 G or ■ = Pb-Free Package
 (Note: Microdot may be in either location)

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PACKAGE DIMENSIONS

TSSOP-20
DT SUFFIX
CASE 948E-02
ISSUE C

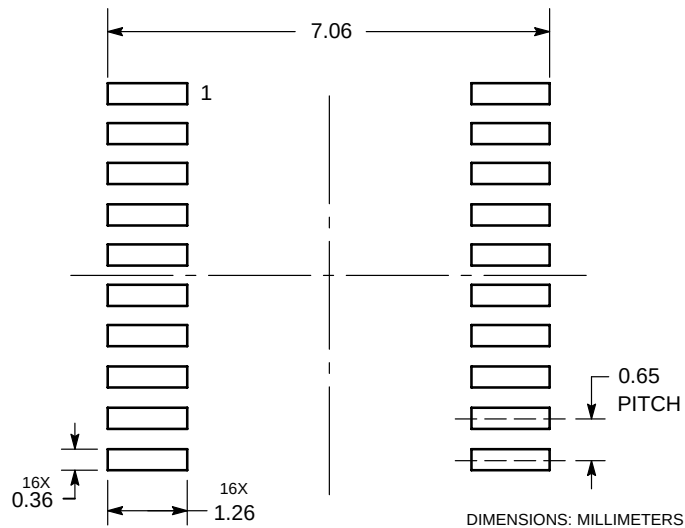


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	6.40	6.60	0.252	0.260
B	4.30	4.50	0.169	0.177
C	---	1.20	---	0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
H	0.27	0.37	0.011	0.015
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
M	0°	8°	0°	8°

SOLDERING FOOTPRINT*

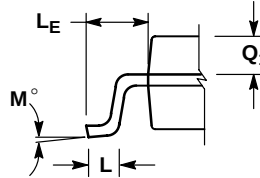
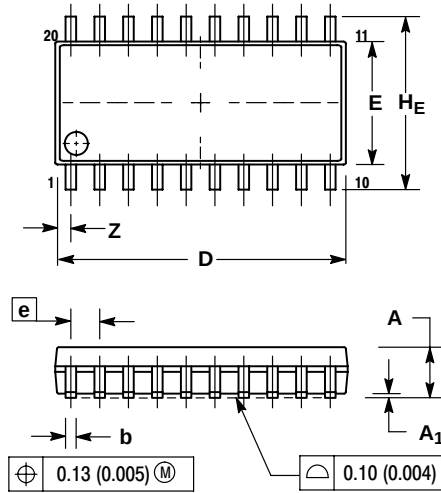


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

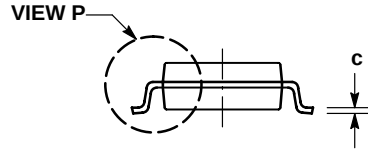
MC74AC540, MC74ACT540, MC74AC541, MC74ACT541

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).

DIM	MILLIMETERS		INCHES	
	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

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