

Octal Buffer/Line Driver with 3-State Outputs

MC74AC240, MC74ACT240

The MC74AC240/74ACT240 is an octal buffer and line driver designed to be employed as a memory address driver, clock driver and bus oriented transmitter or receiver which provides improved PC board density.

Features

- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
- Outputs Source/Sink 24 mA
- 'ACT240 Has TTL Compatible Inputs
- These are Pb-Free Devices

TRUTH TABLE

Inputs		Outputs
\overline{OE}_1	D	(Pins 12, 14, 16, 18)
L	L	H
L	H	L
H	X	Z

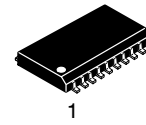
NOTE: H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
Z = High Impedance

TRUTH TABLE

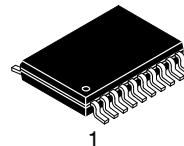
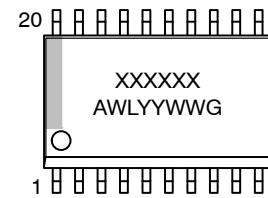
Inputs		Outputs
\overline{OE}_2	D	(Pins 3, 5, 7, 9)
L	L	H
L	H	L
H	X	Z

NOTE: H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
Z = High Impedance

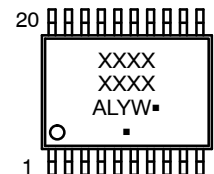
MARKING DIAGRAMS



1
SOIC-20W
DW SUFFIX
CASE 751D



1
TSSOP-20
DT SUFFIX
CASE 948E



XXXXXX = Specific Device Code
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)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

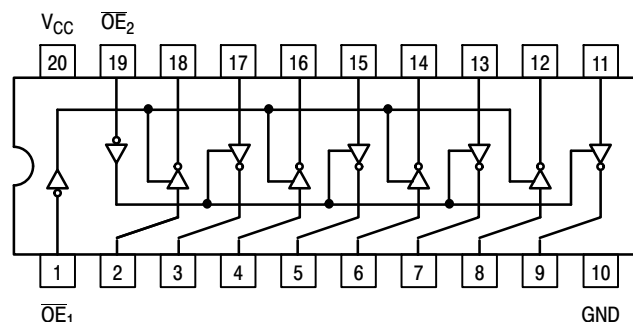


Figure 1. Pinout: 20-Lead Packages Conductors
(Top View)

MC74AC240, MC74ACT240

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CC}	DC Supply Voltage (Referenced to GND)	-0.5 to +6.5	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) (Note 1)	-0.5 to V _{CC} +0.5	V
I _{IK}	DC Input Diode Current	±20	mA
I _{OK}	DC Output Diode Current	±50	mA
I _{OUT}	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	±100	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	140	°C
θ _{JA}	Thermal Resistance (Note 2)	SOIC TSSOP 96 150	°C/W
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 3) Charged Device Model (Note 4) > 2000 > 1000	V
I _{Latchup}	Latchup Performance	Above V _{CC} and Below GND at 85°C (Note 5)	±100 mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. I_O absolute maximum rating must be observed.
2. The package thermal impedance is calculated in accordance with JESD 51-7.
3. Tested to EIA/JESD22-A114-A.
4. Tested to JESD22-C101-A.
5. Tested to EIA/JESD78.

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 6) '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 7) 'ACT Devices except Schmitt Inputs	V _{CC} @ 4.5 V	-	10	-	ns/V
		V _{CC} @ 5.5 V	-	8.0	-	
T _A	Operating Ambient Temperature Range	-40	25	85	°C	
I _{OH}	Output Current – High	-	-	-24	mA	
I _{OL}	Output Current – Low	-	-	24	mA	

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

6. V_{IN} from 30% to 70% V_{CC}; see individual Data Sheets for devices that differ from the typical input rise and fall times.
7. 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.

MC74AC240, MC74ACT240

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			
	I _{OH}	*V _{IN} = V _{IL} or V _{IH} -12 mA	3.0	-	2.56	2.46		V
			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			
	I _{OL}	*V _{IN} = V _{IL} or V _{IH} 12 mA	3.0	-	0.36	0.44		V
			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}.

MC74AC240, MC74ACT240

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	3.3 5.0	1.5 1.5	6.0 4.5	8.0 6.5	1.0 1.0	9.0 7.0	ns	3-5
t _{PHL}	Propagation Delay Data to Output	3.3 5.0	1.5 1.5	5.5 4.5	8.0 6.0	1.0 1.0	8.5 6.5	ns	3-5
t _{PZH}	Output Enable Time	3.3 5.0	1.5 1.5	6.0 5.0	10.5 7.0	1.0 1.0	11.0 8.0	ns	3-7
t _{PZL}	Output Enable Time	3.3 5.0	1.5 1.5	7.0 5.5	10.0 8.0	1.0 1.0	11.0 8.5	ns	3-8
t _{PHZ}	Output Disable Time	3.3 5.0	1.5 1.5	7.0 6.5	10.0 9.0	1.0 1.0	10.5 9.5	ns	3-7
t _{PLZ}	Output Disable Time	3.3 5.0	1.5 1.5	7.5 6.5	10.5 9.0	1.0 1.0	11.5 9.5	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} I _{OH} -24 mA -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 _{CC} T	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	5.0	1.5	6.0	8.5	1.5	9.5	ns	3-5
t _{PHL}	Propagation Delay Data to Output	5.0	1.5	5.5	7.5	1.5	8.5	ns	3-5
t _{pZH}	Output Enable Time	5.0	1.5	7.0	8.5	1.0	9.5	ns	3-7
t _{pZL}	Output Enable Time	5.0	2.0	7.0	9.5	1.5	10.5	ns	3-8
t _{PHZ}	Output Disable Time	5.0	2.0	8.0	9.5	2.0	10.5	ns	3-7
t _{PLZ}	Output Disable Time	5.0	2.5	6.5	10.0	2.0	10.5	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 _{PD}	Power Dissipation Capacitance	45	pF	V _{CC} = 5.0 V

MC74AC240, MC74ACT240

ORDERING INFORMATION

Device	Marking	Package	Shipping [†]
MC74AC240DWR2G	AC240	SOIC-20	1000 / Tape & Reel
MC74ACT240DWR2G	ACT240	SOIC-20	1000 / Tape & Reel
MC74AC240DTR2G	AC 240	TSSOP-20	2500 / 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.

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 1:1

SOIC-20 WB
CASE 751D-05
ISSUE H

DATE 22 APR 2015



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.

DIM	MILLIMETERS	
	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°

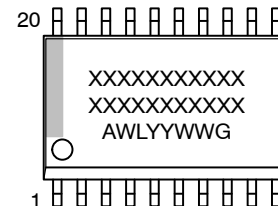
RECOMMENDED
SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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

GENERIC
MARKING DIAGRAM*



- XXXXXX = Specific Device Code
- A = Assembly Location
- WL = Wafer Lot
- YY = Year
- WW = Work Week
- G = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

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MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

ON Semiconductor®



TSSOP-20 WB
CASE 948E
ISSUE D

DATE 17 FEB 2016

SCALE 2:1



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-.

DIM	MILLIMETERS		INCHES	
	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



GENERIC MARKING DIAGRAM*



- A = Assembly Location
- L = Wafer Lot
- Y = Year
- W = Work Week
- = Pb-Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

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