

# Hex 3-State Inverting Buffer with Common Enables and LSTTL Compatible Inputs

High-Performance Silicon-Gate CMOS

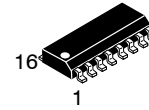
## MC74HCT366A

The MC74HCT366A is identical in pinout to the LS366. The device inputs are compatible with standard CMOS or LSTTL outputs.

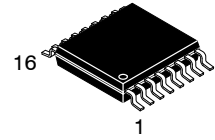
This device is a high-speed hex buffer with 3-state outputs and two common active-low Output Enables. When either of the enables is high, the buffer outputs are placed into high-impedance states. The HCT366A has inverting outputs.

### Features

- Output Drive Capability: 15 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 2.0 to 6.0 V
- Low Input Current: 1.0  $\mu$ A
- High Noise Immunity Characteristic of CMOS Devices
- In Compliance with the Requirements Defined by JEDEC Standard No. 7A
- Chip Complexity: 90 FETs or 22.5 Equivalent Gates
- -Q Suffix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These are Pb-Free Devices\*



SOIC-16  
D SUFFIX  
CASE 751B

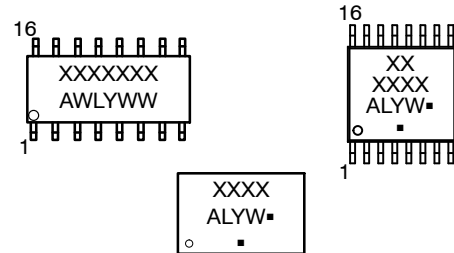


TSSOP-16  
DT SUFFIX  
CASE 948F



QFN16  
MN SUFFIX  
CASE 485AW

### MARKING DIAGRAMS



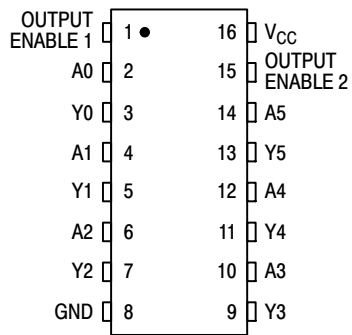
A = Assembly Location  
 WL, L = Wafer Lot  
 YY, Y = Year  
 WW, W = Work Week  
 G or ■ = Pb-Free Package  
 (Note: Microdot may be in either location)

### ORDERING INFORMATION

See detailed ordering and shipping information on page 7 of this data sheet.

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

# MC74HCT366A

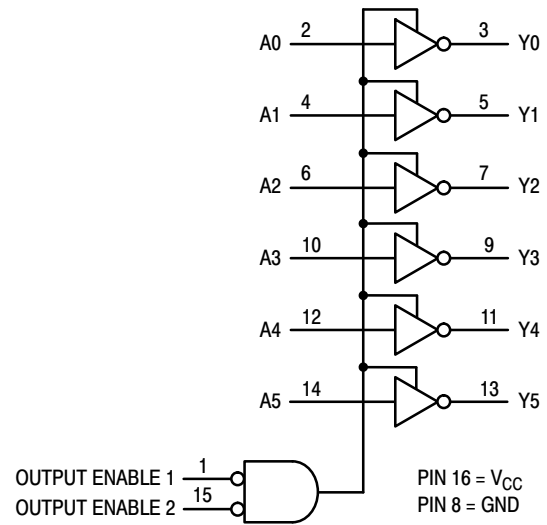


### Figure 1. Pin Assignment

## FUNCTION TABLE

Inputs			Output
Enable 1	Enable 2	A	Y
L	L	L	H
L	L	H	L
H	X	X	Z
X	H	X	Z

X = don't care  
Z = high impedance



**Figure 2. Logic Diagram**

# MC74HCT366A

## MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CC}$	DC Supply Voltage	−0.5 to +6.5	V
$V_{IN}$	DC Input Voltage	−0.5 to $V_{CC} + 0.5$	V
$V_{OUT}$	DC Output Voltage	−0.5 to $V_{CC} + 0.5$	V
$I_{IN}$	DC Input Current, per Pin	±20	mA
$I_{OUT}$	DC Output Current, per Pin	±25	mA
$I_{CC}$	DC Supply Current, $V_{CC}$ and GND Pins	±50	mA
$I_{IK}$	Input Clamp Current ( $V_{IN} < 0$ or $V_{IN} > V_{CC}$ )	±20	mA
$I_{OK}$	Output Clamp Current ( $V_{OUT} < 0$ or $V_{OUT} > V_{CC}$ )	±20	mA
$T_{STG}$	Storage Temperature	−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
$\theta_{JA}$	Thermal Resistance (Note 1)	SOIC-16 QFN16 TSSOP-16	126 118 159 °C/W
$P_D$	Power Dissipation in Still Air at 25°C	SOIC-16 QFN16 TSSOP-16	995 1062 787 mW
MSL	Moisture Sensitivity	Level 1	–
$F_R$	Flammability Rating	Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in
$V_{ESD}$	ESD Withstand Voltage (Note 2)	Human Body Model Charged Device Model	> 2000 N/A V

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. Measured with minimum pad spacing on an FR4 board, using 76 mm-by-114 mm, 2-ounce copper trace no air flow per JESD51-7.
2. HBM tested to EIA / JESD22-A114-A. CDM tested to JESD22-C101-A. JEDEC recommends that ESD qualification to EIA/JESD22-A115A (Machine Model) be discontinued.

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
$V_{CC}$	DC Supply Voltage	2.0	6.0	V
$V_{in}, V_{out}$	DC Input, Output Voltage (Note 3)	0	$V_{CC}$	V
$T_A$	Operating Free-Air Temperature	−55	+125	°C
$t_r, t_f$	Input Rise or Fall Time	$V_{CC} = 2.0\text{ V}$ $V_{CC} = 3.0\text{ V}$ $V_{CC} = 4.5\text{ V}$ $V_{CC} = 6.0\text{ V}$	0 0 0 0	1000 600 500 400 ns

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.

3. Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or  $V_{CC}$ ). Unused outputs must be left open.

# MC74HCT366A

## DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	V <sub>CC</sub> V	Guaranteed Limit			Unit
				-55 to 25°C	≤ 85°C	≤ 125°C	
V <sub>IH</sub>	Minimum High-Level Input Voltage	V <sub>out</sub> = V <sub>CC</sub> - 0.1 V  I <sub>out</sub>   ≤ 20 μA	4.5 to 5.5	2.0	2.0	2.0	V
V <sub>IL</sub>	Maximum Low-Level Input Voltage	V <sub>out</sub> = 0.1 V  I <sub>out</sub>   ≤ 20 μA	4.5 to 5.5	0.80	0.80	0.80	V
V <sub>OH</sub>	Minimum High-Level Output Voltage	V <sub>in</sub> = V <sub>IH</sub>  I <sub>out</sub>   ≤ 20 μA	2.0 4.5 6.0	1.9 4.4 5.9	1.9 4.4 5.9	1.9 4.4 5.9	V
		V <sub>in</sub> = V <sub>IH</sub>  I <sub>out</sub>   ≤ 3.6 mA  I <sub>out</sub>   ≤ 6.0 mA  I <sub>out</sub>   ≤ 7.8 mA	3.0 4.5 6.0	2.48 3.98 5.48	2.34 3.84 5.34	2.20 3.70 5.20	
V <sub>OL</sub>	Maximum Low-Level Output Voltage	V <sub>in</sub> = V <sub>IL</sub>  I <sub>out</sub>   ≤ 20 μA	2.0 4.5 6.0	0.1 0.1 0.1	0.1 0.1 0.1	0.1 0.1 0.1	V
		V <sub>in</sub> = V <sub>IL</sub>  I <sub>out</sub>   ≤ 3.6 mA  I <sub>out</sub>   ≤ 6.0 mA  I <sub>out</sub>   ≤ 7.8 mA	3.0 4.5 6.0	0.26 0.26 0.26	0.33 0.33 0.33	0.40 0.40 0.40	
I <sub>in</sub>	Maximum Input Leakage Current	V <sub>in</sub> = V <sub>CC</sub> or GND	6.0	±0.1	±1.0	±1.0	μA
I <sub>OZ</sub>	Maximum Three-State Leakage Current	Output in High-Impedance State V <sub>in</sub> = V <sub>IL</sub> or V <sub>IH</sub> V <sub>out</sub> = V <sub>CC</sub> or GND	6.0	±0.5	±5.0	±10	μA
I <sub>CC</sub>	Maximum Quiescent Supply Current (per Package)	V <sub>in</sub> = V <sub>CC</sub> or GND I <sub>out</sub> = 0 μA	6.0	4	40	160	μA

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

# MC74HCT366A

## AC ELECTRICAL CHARACTERISTICS

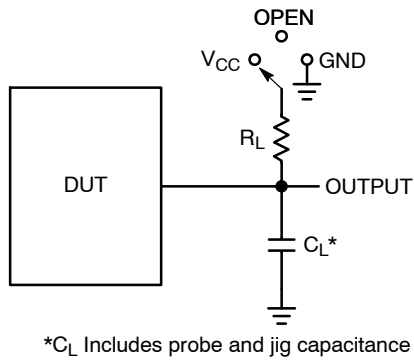
Symbol	Parameter	V <sub>CC</sub> V	Guaranteed Limit			Unit
			–55 to 25°C	≤ 85°C	≤ 125°C	
t <sub>PLH</sub> , t <sub>PHL</sub>	Maximum Propagation Delay, Input A to Output Y (Figures 3 and 4)	2.0 3.0 4.5 6.0	120 60 24 20	150 75 30 26	180 90 36 31	ns
t <sub>PLZ</sub> , t <sub>PHZ</sub>	Maximum Propagation Delay, Output Enable to Output Y (Figures 3 and 5)	2.0 3.0 4.5 6.0	220 110 44 37	275 140 55 47	330 170 66 56	ns
t <sub>PZL</sub> , t <sub>PZH</sub>	Maximum Propagation Delay, Output Enable to Output Y (Figures 3 and 5)	2.0 3.0 4.5 6.0	220 110 44 37	275 140 55 47	330 170 66 56	ns
t <sub>TLH</sub> , t <sub>THL</sub>	Maximum Output Transition Time, Any Output (Figures 3 and 4)	2.0 3.0 4.5 6.0	60 22 12 10	75 28 15 13	90 34 18 15	ns
C <sub>in</sub>	Maximum Input Capacitance	–	10	10	10	pF
C <sub>out</sub>	Maximum Three-State Output Capacitance (Output in High-Impedance State)	–	15	15	15	pF

C <sub>PD</sub>	Power Dissipation Capacitance (Per Buffer)*	Typical @ 25°C, V <sub>CC</sub> = 5.0 V	pF
		60	

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

\*Used to determine the no-load dynamic power consumption:  $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$ .

# MC74HCT366A



Test	Switch Position	C <sub>L</sub>	R <sub>L</sub>
t <sub>PLH</sub> / t <sub>PHL</sub>	Open	50 pF	1 kΩ
t <sub>PLZ</sub> / t <sub>PZL</sub>	V <sub>CC</sub>		
t <sub>PHZ</sub> / t <sub>PZH</sub>	GND		

Figure 3. Test Circuit

## SWITCHING WAVEFORMS

(V<sub>I</sub> = 0 to 3 V, V<sub>M</sub> = 1.3 V)

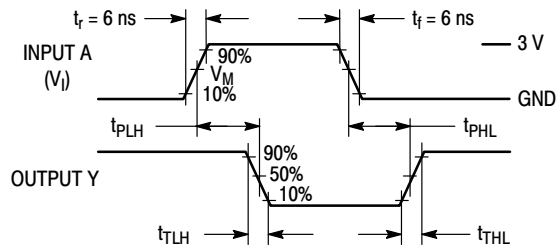


Figure 4.

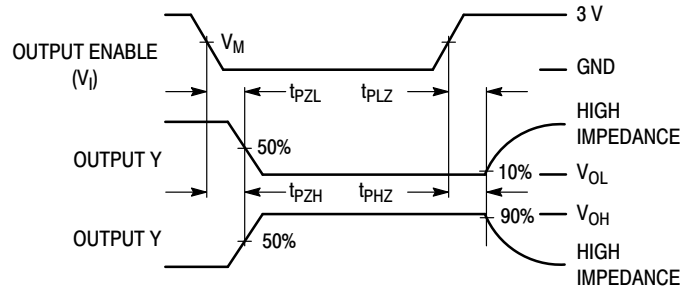


Figure 5.

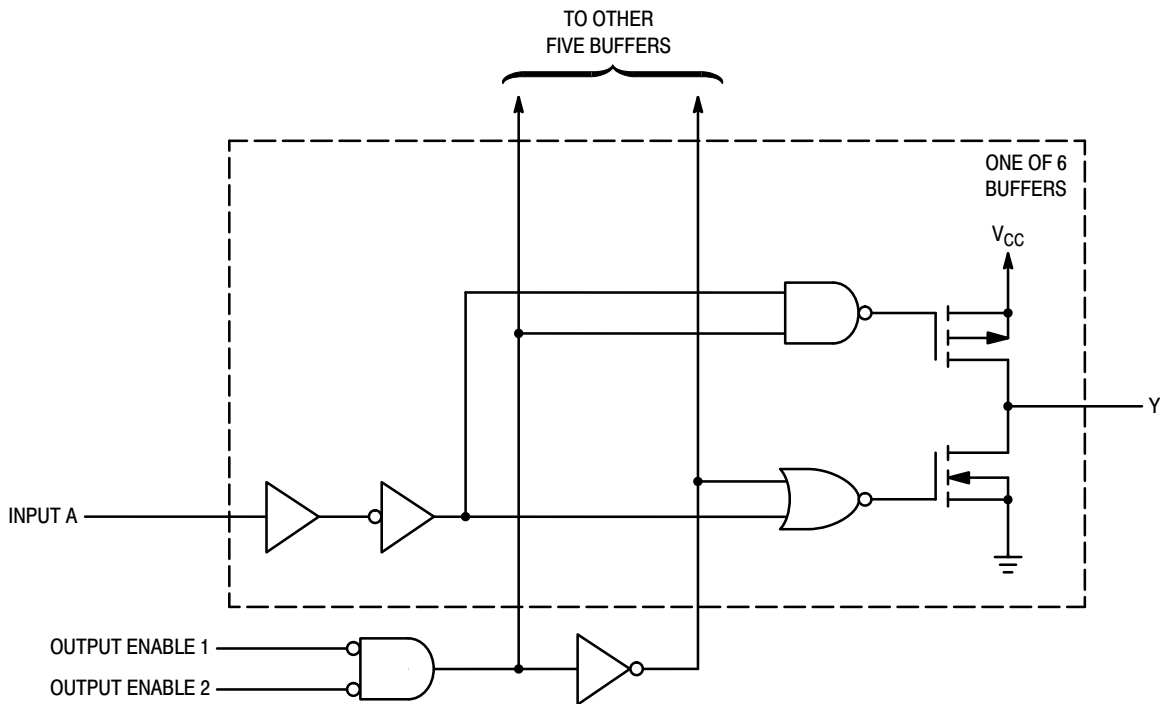


Figure 6. Logic Detail

## MC74HCT366A

### ORDERING INFORMATION

Device	Marking	Package	Shipping <sup>†</sup>
MC74HCT366ADR2G	HCT366AG	SOIC-16	2500 / Tape & Reel
MC74HCT366ADTR2G	HCT 366A	TSSOP-16	2500 / Tape & Reel
MC74HCT366ADTR2G-Q*	HCT 366A	TSSOP-16	2500 / Tape & Reel

<sup>†</sup>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.

\*-Q Suffix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.

# MC74HCT366A

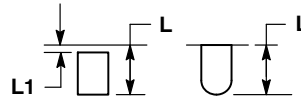
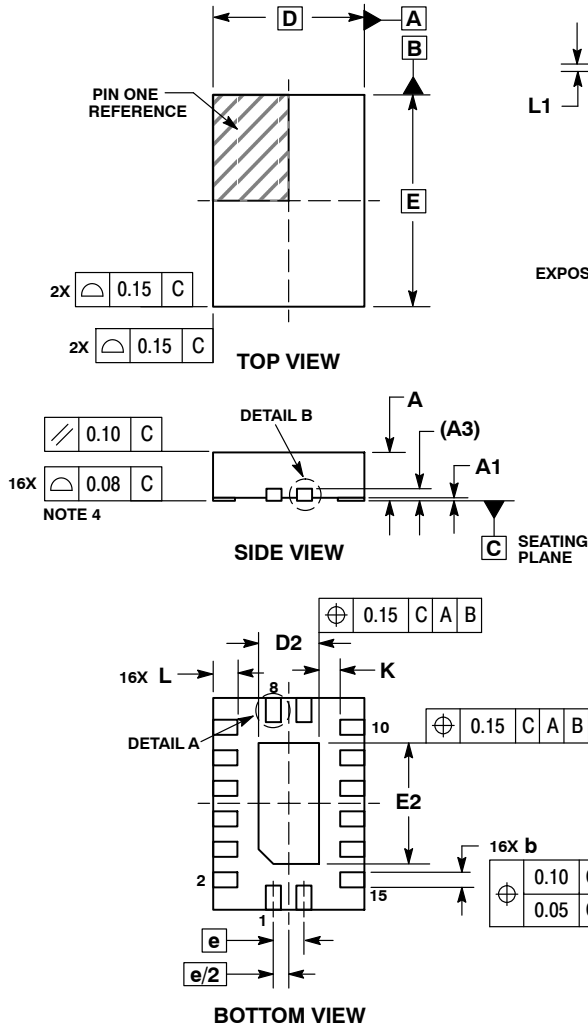
## PACKAGE DIMENSIONS



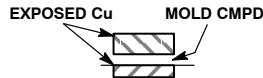
SCALE 2:1

QFN16, 2.5x3.5, 0.5P  
CASE 485AW  
ISSUE O

DATE 11 DEC 2008



**DETAIL A**  
ALTERNATE TERMINAL  
CONSTRUCTIONS



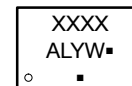
**DETAIL B**  
ALTERNATE  
CONSTRUCTIONS

### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSIONS b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 MM FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

MILLIMETERS		
DIM	MIN	MAX
A	0.80	1.00
A1	0.00	0.05
A3	0.20	REF
b	0.20	0.30
D	2.50	BSC
D2	0.85	1.15
E	3.50	BSC
E2	1.85	2.15
e	0.50	BSC
K	0.20	---
L	0.35	0.45
L1	---	0.15

### GENERIC MARKING DIAGRAM\*

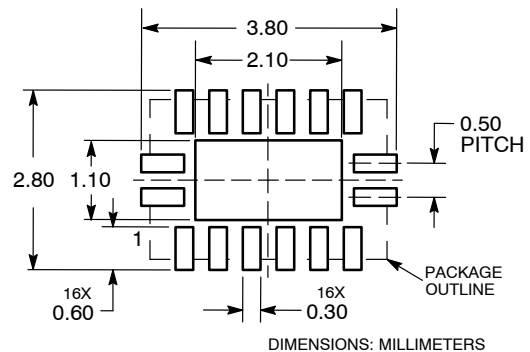


- XXXX = Specific Device Code  
A = Assembly Location  
L = Wafer Lot  
Y = Year  
W = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

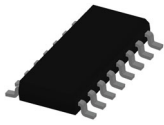
\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

### RECOMMENDED SOLDERING FOOTPRINT\*



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

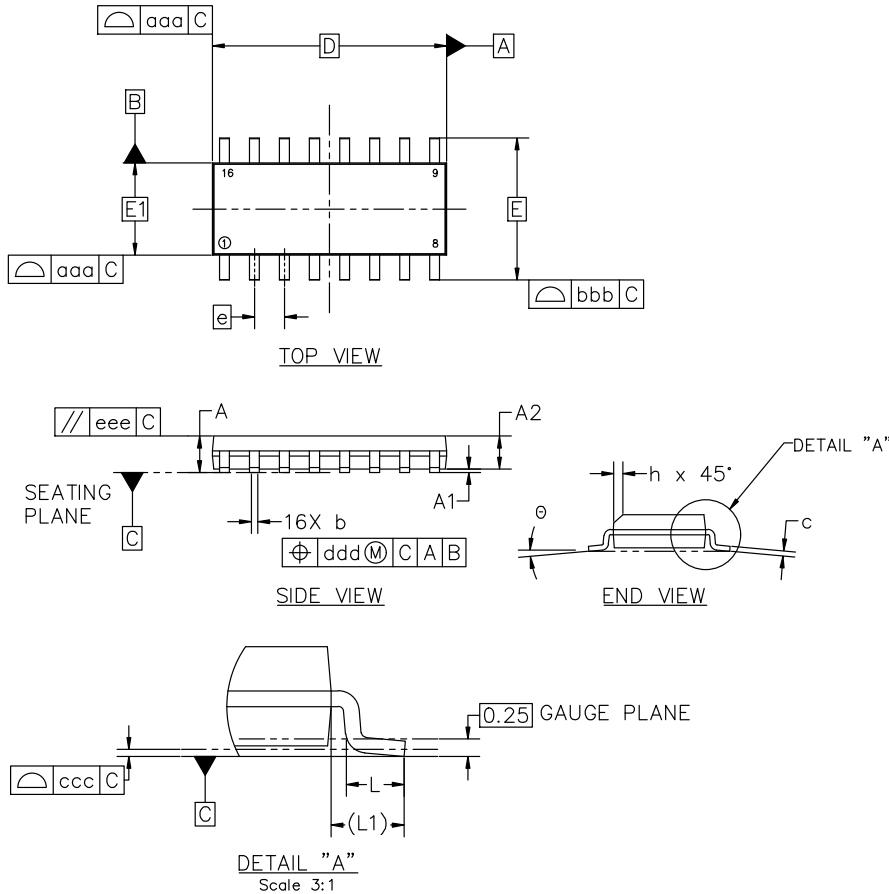



**SOIC-16 9.90x3.90x1.37 1.27P**  
**CASE 751B**  
**ISSUE M**

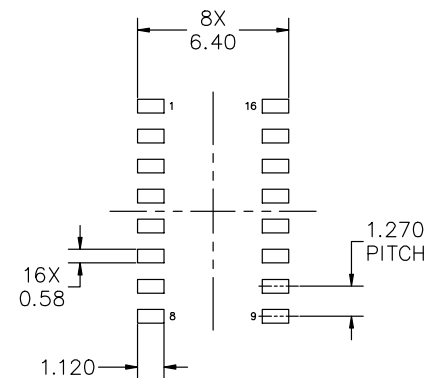
DATE 18 OCT 2024

## NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. DIMENSION IN MILLIMETERS. ANGLE IN DEGREES.
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15mm PER SIDE.
5. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127mm TOTAL IN EXCESS OF THE b DIMENSION AT MAXIMUM MATERIAL CONDITION.



MILLIMETERS			
DIM	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.18	0.25
A2	1.25	1.37	1.50
b	0.35	0.42	0.49
c	0.19	0.22	0.25
D	9.90 BSC		
E	6.00 BSC		
E1	3.90 BSC		
e	1.27 BSC		
h	0.25	---	0.50
L	0.40	0.83	1.25
L1	1.05 REF		
θ	0°	---	7°
TOLERANCE OF FORM AND POSITION			
aaa	0.10		
bbb	0.20		
ccc	0.10		
ddd	0.25		
eee	0.10		



\*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE onsemi SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERM/D

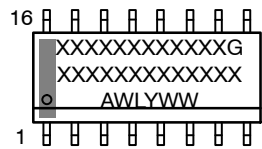
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<b>DESCRIPTION:</b>	<b>SOIC-16 9.90X3.90X1.37 1.27P</b>	<b>PAGE 1 OF 2</b>

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SOIC-16 9.90x3.90x1.37 1.27P  
CASE 751B  
ISSUE M

DATE 18 OCT 2024

GENERIC  
MARKING DIAGRAM\*

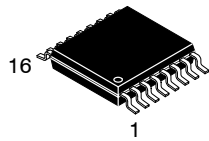


XXXXX = Specific Device Code  
A = Assembly Location  
WL = Wafer Lot  
Y = Year  
WW = Work Week  
G = Pb-Free Package

\*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.

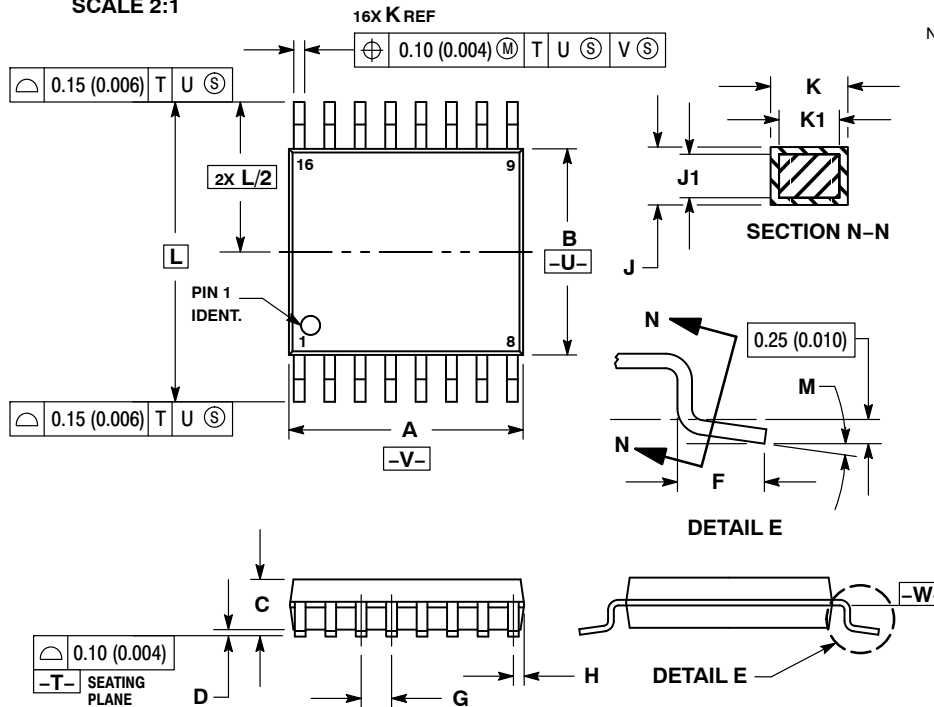
<b>STYLE 1:</b> PIN 1. COLLECTOR 2. BASE 3. EMITTER 4. NO CONNECTION 5. EMITTER 6. BASE 7. COLLECTOR 8. COLLECTOR 9. BASE 10. EMITTER 11. NO CONNECTION 12. EMITTER 13. BASE 14. COLLECTOR 15. EMITTER 16. COLLECTOR	<b>STYLE 2:</b> PIN 1. CATHODE 2. ANODE 3. NO CONNECTION 4. CATHODE 5. CATHODE 6. NO CONNECTION 7. ANODE 8. CATHODE 9. CATHODE 10. ANODE 11. NO CONNECTION 12. CATHODE 13. CATHODE 14. NO CONNECTION 15. ANODE 16. CATHODE	<b>STYLE 3:</b> PIN 1. COLLECTOR, DYE #1 2. BASE, #1 3. EMITTER, #1 4. COLLECTOR, #1 5. COLLECTOR, #2 6. BASE, #2 7. EMITTER, #2 8. COLLECTOR, #2 9. COLLECTOR, #3 10. BASE, #3 11. EMITTER, #3 12. COLLECTOR, #3 13. COLLECTOR, #4 14. BASE, #4 15. EMITTER, #4 16. COLLECTOR, #4	<b>STYLE 4:</b> PIN 1. COLLECTOR, DYE #1 2. COLLECTOR, #1 3. COLLECTOR, #2 4. COLLECTOR, #2 5. COLLECTOR, #3 6. COLLECTOR, #3 7. COLLECTOR, #4 8. COLLECTOR, #4 9. BASE, #4 10. EMITTER, #4 11. BASE, #3 12. EMITTER, #3 13. BASE, #2 14. EMITTER, #2 15. BASE, #1 16. EMITTER, #1
<b>STYLE 5:</b> PIN 1. DRAIN, DYE #1 2. DRAIN, #1 3. DRAIN, #2 4. DRAIN, #2 5. DRAIN, #3 6. DRAIN, #3 7. DRAIN, #4 8. DRAIN, #4 9. GATE, #4 10. SOURCE, #4 11. GATE, #3 12. SOURCE, #3 13. GATE, #2 14. SOURCE, #2 15. GATE, #1 16. SOURCE, #1	<b>STYLE 6:</b> PIN 1. CATHODE 2. CATHODE 3. CATHODE 4. CATHODE 5. CATHODE 6. CATHODE 7. CATHODE 8. CATHODE 9. ANODE 10. ANODE 11. ANODE 12. ANODE 13. ANODE 14. ANODE 15. ANODE 16. ANODE	<b>STYLE 7:</b> PIN 1. SOURCE N-CH 2. COMMON DRAIN (OUTPUT) 3. COMMON DRAIN (OUTPUT) 4. GATE P-CH 5. COMMON DRAIN (OUTPUT) 6. COMMON DRAIN (OUTPUT) 7. COMMON DRAIN (OUTPUT) 8. SOURCE P-CH 9. SOURCE P-CH 10. COMMON DRAIN (OUTPUT) 11. COMMON DRAIN (OUTPUT) 12. COMMON DRAIN (OUTPUT) 13. GATE N-CH 14. COMMON DRAIN (OUTPUT) 15. COMMON DRAIN (OUTPUT) 16. SOURCE N-CH	

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TSSOP-16 WB  
CASE 948F  
ISSUE B

DATE 19 OCT 2006

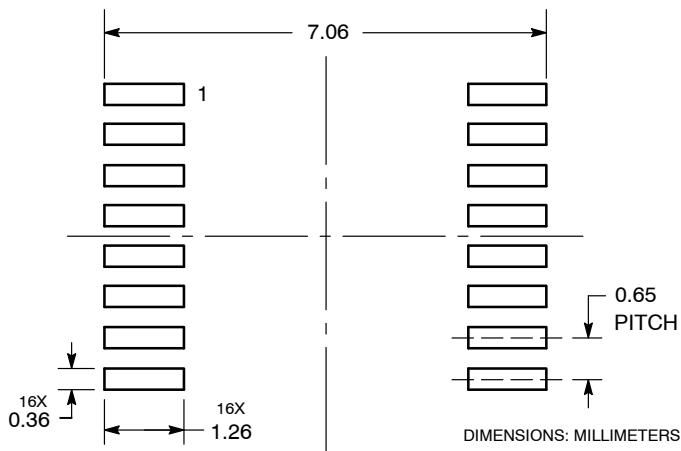


NOTES:

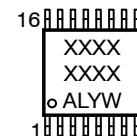
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD 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	4.90	5.10	0.193	0.200
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	0.18	0.28	0.007	0.011
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°

RECOMMENDED  
SOLDERING FOOTPRINT\*



GENERIC  
MARKING DIAGRAM\*



XXXX = Specific Device Code  
A = Assembly Location  
L = Wafer Lot  
Y = Year  
W = Work Week  
G or ■ = 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.

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

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