

# Low-Voltage CMOS 16-Bit Buffer

With 5 V-Tolerant Inputs and Outputs (3-State, Non-Inverting)

## MC74LCX16244

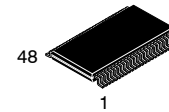
The MC74LCX16244 is a high performance, non-inverting 16-bit buffer operating from a 1.65 to 5.5 V supply. The device is nibble controlled. Each nibble has separate Output Enable inputs which can be tied together for full 16-bit operation. High impedance TTL compatible inputs significantly reduce current loading to input drivers while TTL compatible outputs offer improved switching noise performance. A  $V_I$  specification of 5.5 V allows MC74LCX16244 inputs to be safely driven from 5.0 V devices. The MC74LCX16244 is suitable for memory address driving and all TTL level bus oriented transceiver applications.

The 4.5 ns maximum propagation delays support high performance applications. Current drive capability is 24 mA at  $V_{CC} = 3.0$  V for the outputs. The Output Enable ( $\overline{OEn}$ ) inputs, when HIGH, disable the outputs by placing them in a HIGH Z condition.

The MC74LCX16244 contains sixteen non-inverting buffers with 3-state 5.0 V-tolerant outputs. The device is nibble controlled with each nibble functioning identically, but independently. The control pins may be tied together to obtain full 16-bit operation. The 3-state outputs are controlled by an Output Enable ( $\overline{OEn}$ ) input for each nibble. When  $\overline{OEn}$  is LOW, the outputs are on. When  $\overline{OEn}$  is HIGH, the outputs are in the high impedance state.

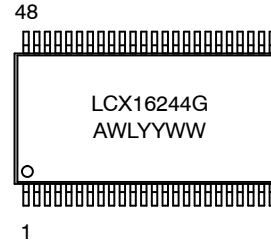
### Features

- Designed for 1.65 V to 5.5 V  $V_{CC}$  Operation
- 4.5 ns Maximum  $t_{pd}$  @  $V_{CC} = 3$  V
- 5.0 V Tolerant - Interface Capability With 5.0 V TTL Logic
- Supports Live Insertion and Withdrawal
- $I_{OFF}$  Specification Guarantees High Impedance When  $V_{CC} = 0$  V
- LVTTL Compatible
- LVCMOS Compatible
- 24 mA Balanced Output Sink and Source Capability at  $V_{CC} = 3$  V
- Near Zero Static Supply Current in All Three Logic States (20  $\mu$ A) Substantially Reduces System Power Requirements
- Latchup Performance Exceeds 100 mA
- ESD Performance:
  - ◆ Human Body Model >2000 V
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant



TSSOP-48  
DT SUFFIX  
CASE 1201

### MARKING DIAGRAM



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

### ORDERING INFORMATION

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

# MC74LCX16244

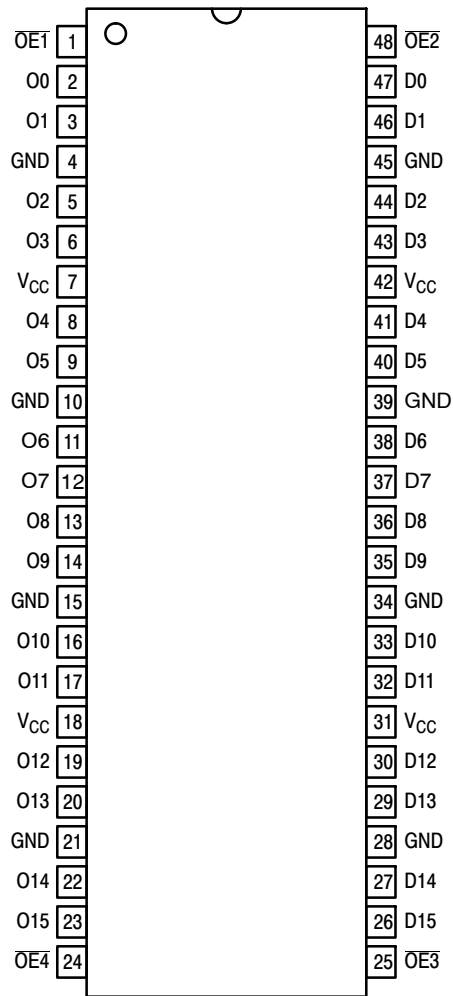


Figure 1. Pinout: 48-Lead (Top View)

Table 1. PIN NAMES

Pins	Function
OE <sub>n</sub>	Output Enable Inputs
D0-D15	Inputs
O0-O15	Outputs

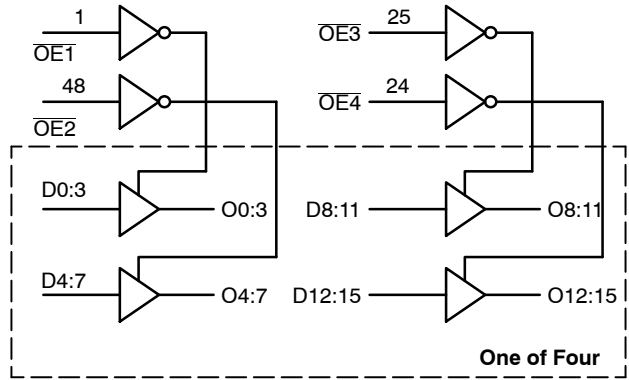


Figure 2. Logic Diagram

## TRUTH TABLE

OE1	D0:3	O0:3	OE2	D4:7	O4:7	OE3	D8:11	O8:11	OE4	D12:15	O12:15
L	L	L	L	L	L	L	L	L	L	L	L
L	H	H	L	H	H	L	H	H	L	H	H
H	X	Z	H	X	Z	H	X	Z	H	X	Z

H = High Voltage Level

L = Low Voltage Level

Z = High Impedance State

X = High or Low Voltage Level and Transitions Are Acceptable; for I<sub>CC</sub> reasons, DO NOT FLOAT Inputs.

# MC74LCX16244

## MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CC}$	DC Supply Voltage	-0.5 to +6.5	V
$V_{IN}$	DC Input Voltage (Note 1)	-0.5 to +6.5	V
$V_{OUT}$	DC Output Voltage (Note 1) Active-Mode (High or Low State) Tri-State Mode Power-Down Mode ( $V_{CC} = 0$ V)	-0.5 to $V_{CC} + 0.5$ -0.5 to +6.5 -0.5 to +6.5	V
$I_{IK}$	DC Input Diode Current $V_{IN} < GND$	-50	mA
$I_{OK}$	DC Output Diode Current $V_{OUT} < GND$	-50	mA
$I_O$	DC Output Source/Sink Current	$\pm 50$	mA
$I_{CC}$	DC Supply Current per Supply Pin	$\pm 100$	mA
$I_{GND}$	DC Supply Current per Ground Pin	$\pm 100$	mA
$T_{STG}$	Storage Temperature Range	-65 to +150	$^{\circ}C$
$T_L$	Lead Temperature, 1 mm from Case for 10 secs	260	$^{\circ}C$
$T_J$	Junction Temperature Under Bias	+150	$^{\circ}C$
$\theta_{JA}$	Thermal Resistance (Note 2)	71	$^{\circ}C/W$
$P_D$	Power Dissipation in Still Air	1765	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 3) 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.

- $I_O$  absolute maximum rating must be observed.
- 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.
- 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	Typ	Max	Unit
$V_{CC}$	Supply Voltage Operating Data Retention Only	1.65 1.5	3.3 3.3	5.5 5.5	V
$V_{IN}$	Digital Input Voltage (Note 4)	0		5.5	V
$V_{OUT}$	Output Voltage (Note 4) Active Mode (High or Low State) Tri-State Mode Power Down Mode ( $V_{CC} = 0$ V)	0 0 0		$V_{CC}$ 5.5 5.5	V
$T_A$	Operating Free-Air Temperature	-55		+125	$^{\circ}C$
$t_r, t_f$	Input Rise or Fall Rate $V_{CC} = 1.65$ V to 1.95 V $V_{CC} = 2.3$ V to 2.7 V $V_{IN}$ from 0.8 V to 2.0 V, $V_{CC} = 3.0$ V $V_{CC} = 4.5$ V to 5.5 V	0 0 0 0		20 20 10 5	ns/V

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.

- 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.

# MC74LCX16244

## DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	T <sub>A</sub> = -40 °C to +85 °C		T <sub>A</sub> = -55 °C to +125 °C		Unit
				Min	Max	Min	Max	
V <sub>IH</sub>	High-Level Input Voltage		1.65 to 1.95	0.65 x V <sub>CC</sub>		0.65 x V <sub>CC</sub>		V
			2.3 to 2.7	1.7		1.7		
			2.7 to 3.6	2.0		2.0		
			4.5 to 5.5	0.7 x V <sub>CC</sub>		0.7 x V <sub>CC</sub>		
V <sub>IL</sub>	Low-Level Input Voltage		1.65 to 1.95		0.35 x V <sub>CC</sub>		0.35 x V <sub>CC</sub>	V
			2.3 to 2.7		0.7		0.7	
			2.7 to 3.6		0.8		0.8	
			4.5 to 5.5		0.3 x V <sub>CC</sub>		0.3 x V <sub>CC</sub>	
V <sub>OH</sub>	High-Level Output Voltage	V <sub>I</sub> = V <sub>IH</sub> I <sub>OH</sub> = -100 μA I <sub>OH</sub> = -4 mA I <sub>OH</sub> = -8 mA I <sub>OH</sub> = -12 mA I <sub>OH</sub> = -16 mA I <sub>OH</sub> = -24 mA I <sub>OH</sub> = -32 mA	1.65 to 5.5	V <sub>CC</sub> - 0.1		V <sub>CC</sub> - 0.1		V
			1.65	1.2		1.2		
			2.3	1.8		1.8		
			2.7	2.2		2.2		
			3.0	2.4		2.4		
			3.0	2.2		2.2		
V <sub>OL</sub>	Low-Level Output Voltage	V <sub>I</sub> = V <sub>IL</sub> I <sub>OL</sub> = 100 μA I <sub>OL</sub> = 4 mA I <sub>OL</sub> = 8 mA I <sub>OL</sub> = 12 mA I <sub>OL</sub> = 16 mA I <sub>OL</sub> = 24 mA I <sub>OL</sub> = 32 mA	1.65 to 5.5		0.1		0.1	V
			1.65		0.45		0.45	
			2.3		0.6		0.6	
			2.7		0.4		0.4	
			3.0		0.4		0.4	
			3.0		0.55		0.55	
I <sub>I</sub>	Input Leakage Current	V <sub>I</sub> = 0 to 5.5 V	3.6		±5.0		±5.0	μA
I <sub>OZ</sub>	3-State Output Leakage Current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> , V <sub>O</sub> = 0 V to 5.5 V	3.6		±5.0		±5.0	μA
I <sub>OFF</sub>	Power Off Leakage Current	V <sub>I</sub> = 5.5 V or V <sub>O</sub> = 5.5 V	0		10		10	μA
I <sub>CC</sub>	Quiescent Supply Current	V <sub>I</sub> = 5.5 V or GND	3.6		10		10	μA
ΔI <sub>CC</sub>	Increase in I <sub>CC</sub> per Input	V <sub>IH</sub> = V <sub>CC</sub> - 0.6 V	2.3 to 3.6		500		500	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.

# MC74LCX16244

## AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Condition	V <sub>CC</sub> (V)	T <sub>A</sub> = -40 °C to +85 °C		T <sub>A</sub> = -55 °C to +125 °C		Unit
				Min	Max	Min	Max	
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay, D to O	See Figures 3 and 4	1.65 to 1.95		8.5		8.5	ns
			2.3 to 2.7		5.4		5.4	
			2.7		5.2		5.2	
			3.0 to 3.6		4.5		4.5	
			4.5 to 5.5		4.0		4.0	
t <sub>PZH</sub> , t <sub>PZL</sub>	Output Enable Time, OE to O	See Figures 3 and 4	1.65 to 1.95		10.5		10.5	ns
			2.3 to 2.7		7.2		7.2	
			2.7		6.3		6.3	
			3.0 to 3.6		5.5		5.5	
			4.5 to 5.5		5.5		5.5	
t <sub>PHZ</sub> , t <sub>PLZ</sub>	Output Disable Time, OE to O	See Figures 3 and 4	1.65 to 1.95		9.7		9.7	ns
			2.3 to 2.7		6.5		6.5	
			2.7		5.7		5.7	
			3.0 to 3.6		5.4		5.4	
			4.5 to 5.5		5.4		5.4	
t <sub>OSHL</sub> , t <sub>OSLH</sub>	Output to Output Skew, (Note 5)		1.65 to 1.95					ns
			2.3 to 2.7					
			2.7					
			3.0 to 3.6		1.0		1.0	
			4.5 to 5.5					

5. Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. The specification applies to any outputs switching in the same direction, either HIGH-to-LOW (t<sub>OSHL</sub>) or LOW-to-HIGH (t<sub>OSLH</sub>).

## DYNAMIC SWITCHING CHARACTERISTICS

Symbol	Characteristic	Condition	T <sub>A</sub> = +25 °C			Units
			Min	Typ	Max	
V <sub>OLP</sub>	Dynamic LOW Peak Voltage (Note 6)	V <sub>CC</sub> = 3.3 V, C <sub>L</sub> = 50 pF, V <sub>IH</sub> = 3.3 V, V <sub>IL</sub> = 0 V V <sub>CC</sub> = 2.5 V, C <sub>L</sub> = 30 pF, V <sub>IH</sub> = 2.5 V, V <sub>IL</sub> = 0 V		0.8 0.6		V
V <sub>OLV</sub>	Dynamic LOW Valley Voltage (Note 6)	V <sub>CC</sub> = 3.3 V, C <sub>L</sub> = 50 pF, V <sub>IH</sub> = 3.3 V, V <sub>IL</sub> = 0 V V <sub>CC</sub> = 2.5 V, C <sub>L</sub> = 30 pF, V <sub>IH</sub> = 2.5 V, V <sub>IL</sub> = 0 V		-0.8 -0.6		V

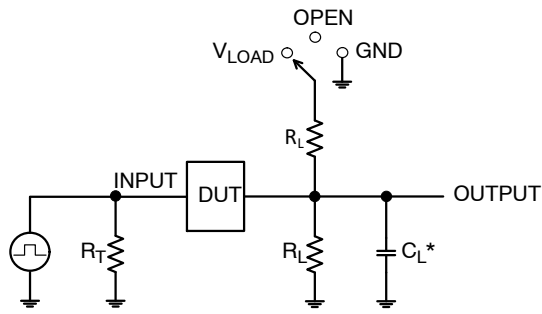
6. Number of outputs defined as "n". Measured with "n-1" outputs switching from HIGH-to-LOW or LOW-to-HIGH. The remaining output is measured in the LOW state.

## CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Units
C <sub>IN</sub>	Input Capacitance	V <sub>CC</sub> = 3.3 V, V <sub>I</sub> = 0 V or V <sub>CC</sub>	7	pF
C <sub>OUT</sub>	Output Capacitance	V <sub>CC</sub> = 3.3 V, V <sub>I</sub> = 0 V or V <sub>CC</sub>	8	pF
C <sub>PD</sub>	Power Dissipation Capacitance	10 MHz, V <sub>CC</sub> = 3.3 V, V <sub>I</sub> = 0 V or V <sub>CC</sub>	20	pF

7. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the dynamic operating current consumption without load. Average operating current can be obtained by the equation I<sub>CC(OPR)</sub> = C<sub>PD</sub> • V<sub>CC</sub> • f<sub>in</sub> + I<sub>CC</sub>. C<sub>PD</sub> is used to determine the no-load dynamic power consumption: P<sub>D</sub> = C<sub>PD</sub> • V<sub>CC</sub><sup>2</sup> • f<sub>in</sub> + I<sub>CC</sub> • V<sub>CC</sub>.

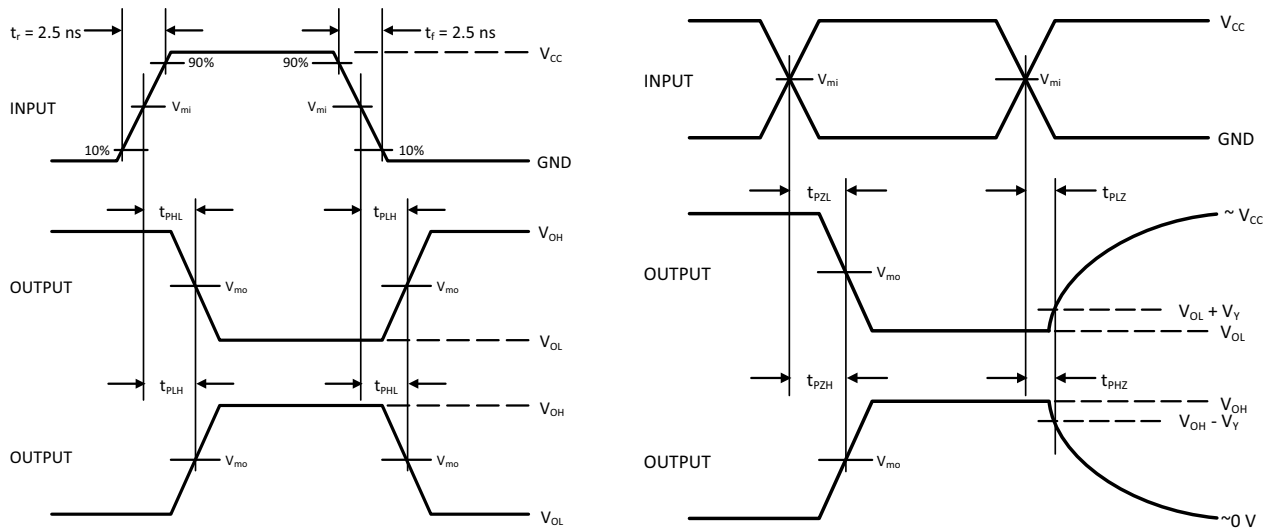
# MC74LCX16244



$C_L$  includes probe and jig capacitance  
 $R_T$  is  $Z_{OUT}$  of pulse generator (typically 50  $\Omega$ )  
 $f = 1$  MHz

Test	Switch Position
$t_{PLH} / t_{PHL}$	Open
$t_{PLZ} / t_{PZL}$	$V_{LOAD}$
$t_{PHZ} / t_{PZH}$	GND

Figure 3. Test Circuit



$V_{CC}, V$	$R_L, \Omega$	$C_L, pF$	$V_{LOAD}$	$V_{mi}, V$	$V_{mo}, V$	$V_Y, V$
1.65 to 1.95	500	30	$2 \times V_{CC}$	$V_{CC}/2$	$V_{CC}/2$	0.15
2.3 to 2.7	500	30	$2 \times V_{CC}$	$V_{CC}/2$	$V_{CC}/2$	0.15
2.7	500	50	6 V	1.5	1.5	0.3
3.0 to 3.6	500	50	6 V	1.5	1.5	0.3
4.5 to 5.5	500	50	$2 \times V_{CC}$	$V_{CC}/2$	$V_{CC}/2$	0.3

Figure 4. Switching Waveforms

## ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
MC74LCX16244DTR2G	TSSOP-48 (Pb-Free)	2,500 / Tape & Reel

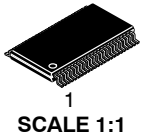
<sup>†</sup> For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

# MC74LCX16244

## REVISION HISTORY

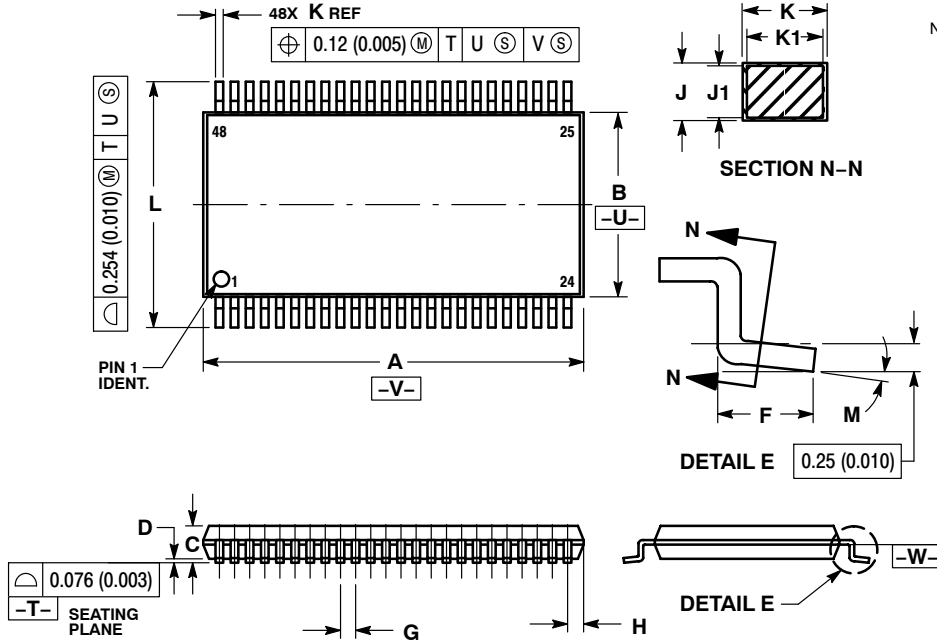
Revision	Description of Changes	Date
13	Edit five page 1 values, delete one bullet and edit another, replace all tables pages 3 and 4, replace figures 3 and 4	9/15/2025
14	Added electrical characteristics for TBD specifications and made editorial corrections throughout the document.	3/9/2026
15	Update Note 5 in the AC ELECTRICAL CHARACTERISTICS table for clarification.	3/25/2026

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.



TSSOP-48  
CASE 1201  
ISSUE B

DATE 06 JUL 2010

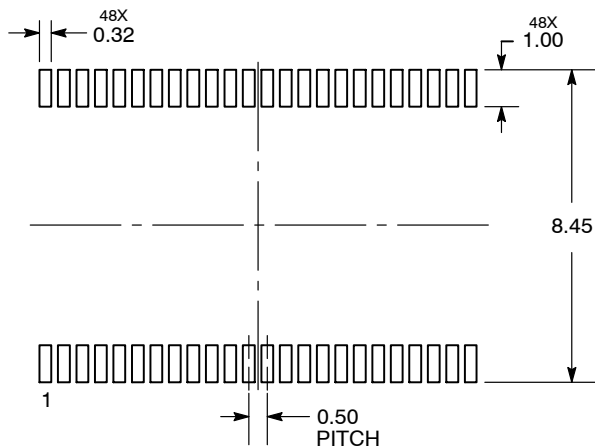


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. 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.
5. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
6. DIMENSIONS A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	12.40	12.60	0.488	0.496
B	6.00	6.20	0.236	0.244
C	---	1.10	---	0.043
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.50 BSC		0.0197 BSC	
H	0.37	---	0.015	---
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.17	0.27	0.007	0.011
K1	0.17	0.23	0.007	0.009
L	7.95	8.25	0.313	0.325
M	0°	8°	0°	8°

RECOMMENDED  
SOLDERING FOOTPRINT\*



DIMENSIONS: MILLIMETERS

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

GENERIC  
MARKING DIAGRAM\*



- XXXXX = 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.

DOCUMENT NUMBER:	98ASH70297A	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TSSOP-48	PAGE 1 OF 1

onsemi and ONSEMI are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at [www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)