

MC74LCX07

Low-Voltage CMOS Hex Buffer with Open Drain Outputs

With 5 V-Tolerant Inputs

The MC74LCX07 is a high performance hex buffer operating from a 2.3 to 3.6 V supply. High impedance TTL compatible inputs significantly reduce current loading to input drivers. These LCX devices have open drain outputs which provide the ability to set output levels, or do active-HIGH AND or active-LOW OR functions. A V_I specification of 5.5 V allows MC74LCX07 inputs to be safely driven from 5.0 V devices.

Features

- Designed for 2.3 to 3.6 V V_{CC} Operation
- 5.0 V Tolerant Inputs/Outputs
- LVTTTL Compatible
- LVC MOS Compatible
- 24 mA Output Sink Capability
- Near Zero Static Supply Current (10 μ A) Substantially Reduces System Power Requirements
- Latchup Performance Exceeds 500 mA
- Wired-OR, Wired-AND
- Output Level Can Be Set Externally Without Affecting Speed of Device
- ESD Performance: Human Body Model >1500 V; Machine Model >200 V
- These Devices are Pb-Free and are RoHS Compliant

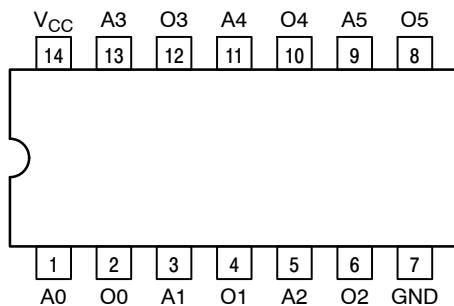


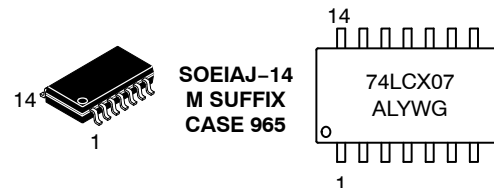
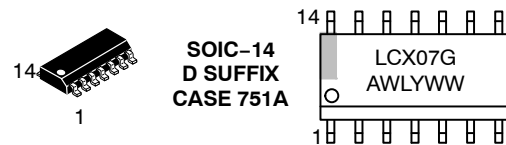
Figure 1. Pinout: 14-Lead (Top View)



ON Semiconductor®

<http://onsemi.com>

MARKING DIAGRAMS



- A = Assembly Location
 - L, WL = Wafer Lot
 - Y, YY = Year
 - W, WW = Work Week
 - G = Pb-Free Package
 - = 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 2 of this data sheet.

MC74LCX07

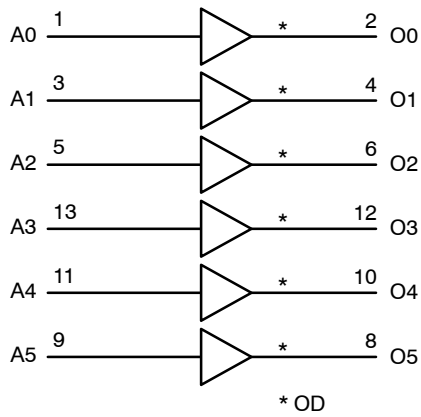


Figure 2. Logic Diagram

PIN NAMES

Pins	Function
An	Data Inputs
On	Outputs

TRUTH TABLE

An	On
L	L
H	Z

MAXIMUM RATINGS

Symbol	Parameter	Value	Condition	Unit
V_{CC}	DC Supply Voltage	-0.5 to +7.0		V
V_I	DC Input Voltage	$-0.5 \leq V_I \leq +7.0$		V
V_O	DC Output Voltage	$-0.5 \leq V_O \leq +7.0$	Output in HIGH or LOW State (Note 1)	V
I_{IK}	DC Input Diode Current	-50	$V_I < GND$	mA
I_{OK}	DC Output Diode Current	-50	$V_O < GND$	mA
		+50	$V_O > V_{CC}$	mA
I_O	DC Output/Sink Current	+50		mA
I_{CC}	DC Supply Current Per Supply Pin	± 100		mA
I_{GND}	DC Ground Current Per Ground Pin	± 100		mA
T_{STG}	Storage Temperature Range	-65 to +150		$^{\circ}C$

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.

1. I_O absolute maximum rating must be observed.

ORDERING INFORMATION

Device	Package	Shipping [†]
MC74LCX07DG	SOIC-14 (Pb-Free)	55 Units / Rail
MC74LCX07DR2G	SOIC-14 (Pb-Free)	2500 Tape & Reel
MC74LCX07DTG	TSSOP-14*	96 Units / Rail
MC74LCX07DTR2G	TSSOP-14*	2500 Tape & Reel
MC74LCX07MG	SOEIAJ-14 (Pb-Free)	50 Units / Rail
MC74LCX07MELG	SOEIAJ-14 (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.

*This package is inherently Pb-Free.

MC74LCX07

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Max	Unit
V_{CC}	Supply Voltage Operating Data Retention Only	2.0 1.5	2.3 to 3.3	5.5 5.5	V
V_I	Input Voltage	0		5.5	V
V_O	Output Voltage (HIGH or LOW State)	0		5.5	V
I_{OH}	HIGH Level Output Current $V_{CC}=3.0\text{ V}-3.6\text{ V}$ $V_{CC}=2.7\text{ V}-3.0\text{ V}$ $V_{CC}=2.3\text{ V}-2.7\text{ V}$			-24 -12 -8	mA
I_{OL}	LOW Level Output Current $V_{CC}=3.0\text{ V}-3.6\text{ V}$ $V_{CC}=2.7\text{ V}-3.0\text{ V}$ $V_{CC}=2.3\text{ V}-2.7\text{ V}$			+24 +12 +8	mA
T_A	Operating Free-Air Temperature	-40		+85	°C
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate, V_{IN} from 0.8 V to 2.0 V, $V_{CC} = 3.0\text{ V}$	0		10	ns/V

DC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic	Condition	$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		Unit
			Min	Max	
V_{IH}	HIGH Level Input Voltage (Note 2)	$2.3\text{ V} \leq V_{CC} \leq 2.7\text{ V}$	1.7		V
		$2.7\text{ V} \leq V_{CC} \leq 3.6\text{ V}$	2.0		
		$4.5\text{ V} \leq V_{CC} \leq 5.25\text{ V}$	3.125		
V_{IL}	LOW Level Input Voltage (Note 2)	$2.3\text{ V} \leq V_{CC} \leq 2.7\text{ V}$		0.7	V
		$2.7\text{ V} \leq V_{CC} \leq 3.6\text{ V}$		0.8	
		$4.5\text{ V} \leq V_{CC} \leq 5.25\text{ V}$		0.8	
V_{OL}	LOW Level Output Voltage	$2.3\text{ V} \leq V_{CC} \leq 3.6\text{ V}; I_{OL} = 100\ \mu\text{A}$		0.2	V
		$V_{CC} = 2.3\text{ V}; I_{OL} = 8\text{ mA}$		0.3	
		$V_{CC} = 2.7\text{ V}; I_{OL} = 12\text{ mA}$		0.4	
		$V_{CC} = 3.0\text{ V}; I_{OL} = 16\text{ mA}$		0.4	
		$V_{CC} = 3.0\text{ V}; I_{OL} = 24\text{ mA}$		0.55	
I_I	Maximum Input Leakage Current	$2.3\text{ V} \leq V_{CC} \leq 3.6\text{ V}, 0\text{ V} \leq V_I \leq 5.5\text{ V}$		± 5	μA
I_{OFF}	Power-Off Leakage Current	$V_{CC} = 0\text{V}, V_O$ or $V_I = 5.5\text{V}$		10	μA
I_{CC}	Maximum Quiescent Supply Current	$2.3\text{ V} \leq V_{CC} \leq 3.6\text{ V}, V_I = V_{CC}$ or GND $2.3\text{ V} \leq V_{CC} \leq 3.6\text{ V}, 3.6\text{ V} \leq V_I \leq 5.5\text{ V}$ $V_{CC} = 5.25\text{ V}, V_I = 3.125\text{ V}$		10 ± 10 60	μA μA mA
ΔI_{CC}	Increase in I_{CC} per Input	$2.3\text{ V} \leq V_{CC} \leq 3.6\text{ V}$		500	μA
		$4.5\text{ V} \leq V_{CC} \leq 5.5\text{ V}$		1.0	mA
		$V_{CC} = 5.25\text{ V}$, one input at 3.125 V, other inputs at V_{CC} or GND		10	mA

2. These values of V_I are used to test DC electrical characteristics only.

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Limits						Unit
		$T_A = -40^\circ\text{C to } +85^\circ\text{C}$						
		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		$V_{CC} = 2.7\text{ V}$		$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$		
		$C_L = 50\text{ pF}$		$C_L = 50\text{ pF}$		$C_L = 30\text{ pF}$		
		Min	Max	Min	Max	Min	Max	
t_{PLZ}	Propagation Delay	0.5	3.0	0.8	3.7	0.8	3.8	ns
t_{PZL}	Input to Output	0.5	3.0	0.8	3.7	0.8	3.8	ns

MC74LCX07

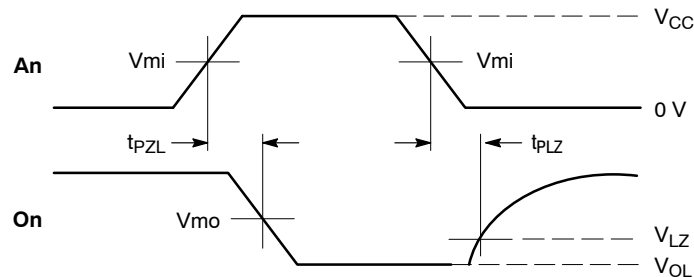
DYNAMIC SWITCHING CHARACTERISTICS

Symbol	Characteristic	Condition	T _A = +25°C			Unit
			Min	Typ	Max	
V _{OLP}	Dynamic LOW Peak Voltage (Note 3)	V _{CC} = 3.3 V, C _L = 50 pF, V _{IH} = 3.3 V, V _{IL} = 0 V V _{CC} = 2.5 V, C _L = 30 pF, V _{IH} = 2.5 V, V _{IL} = 0 V		0.9 0.7		V
V _{OLV}	Dynamic LOW Valley Voltage (Note 3)	V _{CC} = 3.3 V, C _L = 50 pF, V _{IH} = 3.3 V, V _{IL} = 0 V V _{CC} = 2.5 V, C _L = 30 pF, V _{IH} = 2.5 V, V _{IL} = 0 V		-0.8 -0.6		V

3. 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	Unit
C _{IN}	Input Capacitance	V _{CC} = 3.3 V, V _I = 0 V or V _{CC}	7	pF
C _{OUT}	Output Capacitance	V _{CC} = 3.3 V, V _I = 0 V or V _{CC}	8	pF
C _{PD}	Power Dissipation Capacitance	10 MHz, V _{CC} = 3.3 V, V _I = 0 V or V _{CC}	25	pF

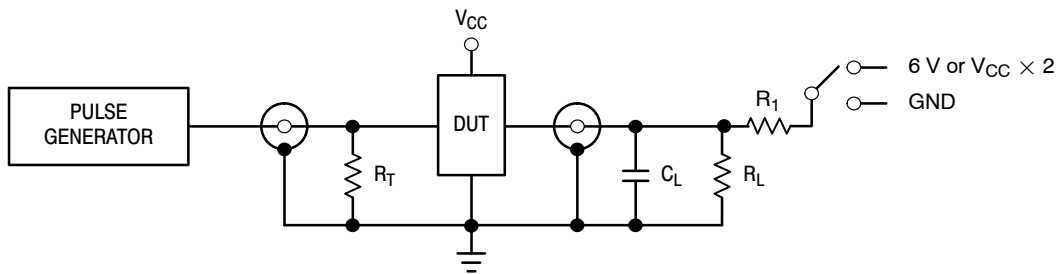


PROPAGATION DELAYS

$$t_R = t_F = 2.5 \text{ ns, } 10\% \text{ to } 90\%; f = 1\text{MHz}; t_W = 500 \text{ ns}$$

Symbol	V _{CC}		
	3.3 V ± 0.3 V	2.7 V	2.5 V ± 0.2 V
V _{mi}	1.5 V	1.5 V	V _{CC} /2
V _{mo}	1.5 V	1.5 V	V _{CC} /2
V _{LZ}	V _{OL} + 0.3 V	V _{OL} + 0.3 V	V _{OL} + 0.15 V

Figure 3. AC Waveforms



TEST	SWITCH
t _{PZL} , t _{PLZ}	6 V
Open Collector/Drain t _{PLH} and t _{PHL}	6 V
t _{PZH} , t _{PHZ}	GND

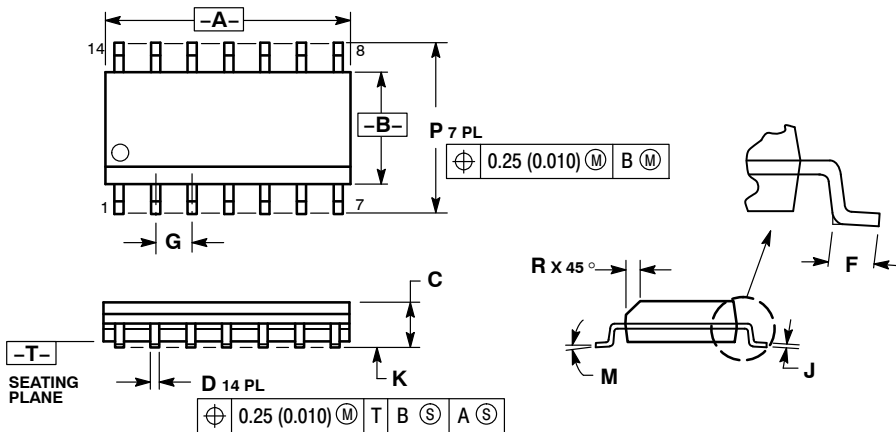
C_L = 50 pF at V_{CC} = 3.3 ± 0.3 V or equivalent (includes jig and probe capacitance)
 C_L = 30 pF at V_{CC} = 2.5 ± 0.2 V or equivalent (includes jig and probe capacitance)
 R_L = R₁ = 500 Ω or equivalent
 R_T = Z_{OUT} of pulse generator (typically 50 Ω)

Figure 4. Test Circuit

MC74LCX07

PACKAGE DIMENSIONS

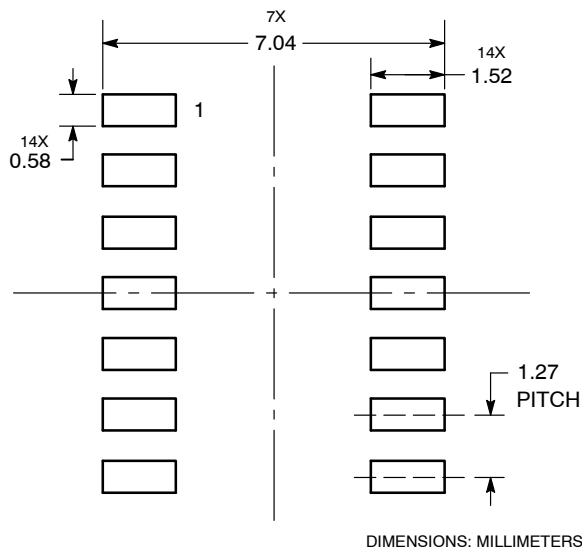
SOIC-14
CASE 751A-03
ISSUE J



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.
 3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
 4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
 5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.55	8.75	0.337	0.344
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.228	0.244
R	0.25	0.50	0.010	0.019

SOLDERING FOOTPRINT*



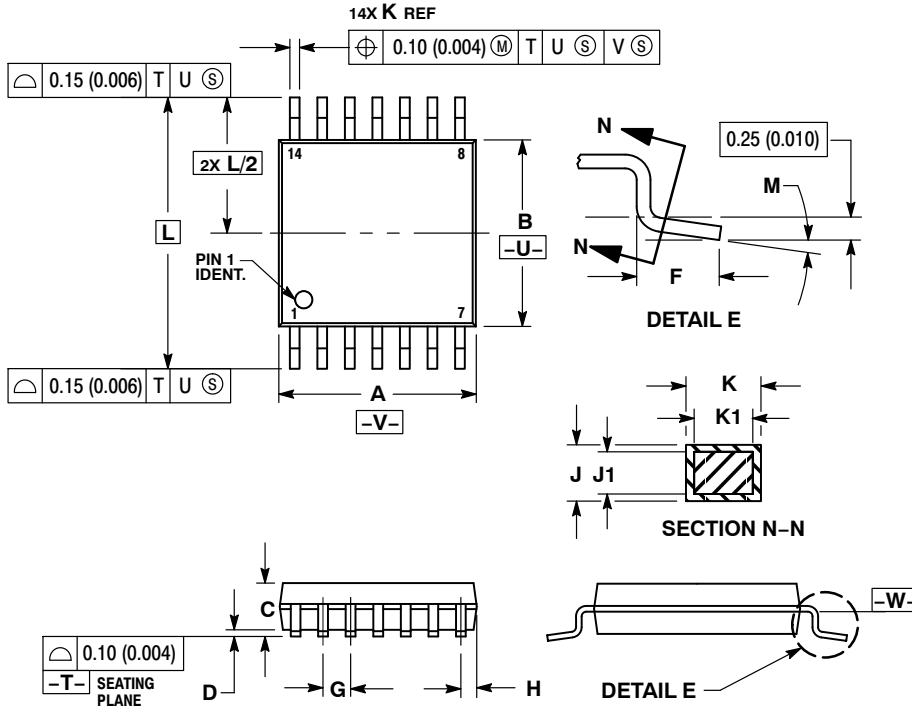
DIMENSIONS: MILLIMETERS

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

MC74LCX07

PACKAGE DIMENSIONS

TSSOP-14
CASE 948G-01
ISSUE B

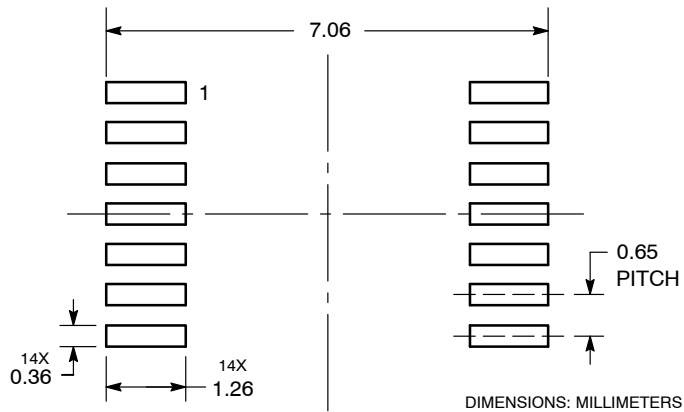


NOTES:

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	0.50	0.60	0.020	0.024
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*

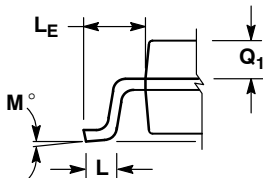
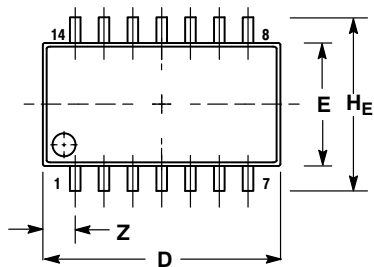


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

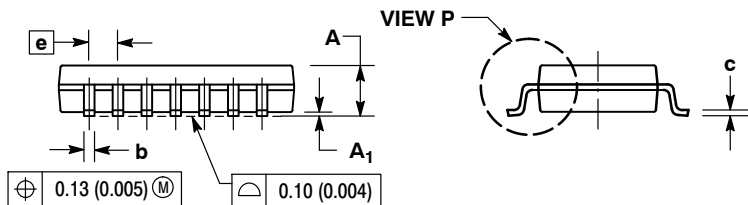
MC74LCX07

PACKAGE DIMENSIONS

SOEIAJ-14
CASE 965-01
ISSUE B



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	0.10	0.20	0.004	0.008
D	9.90	10.50	0.390	0.413
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 _F	1.10	1.50	0.043	0.059
M	0°	10°	0°	10°
Q ₁	0.70	0.90	0.028	0.035
Z	---	1.42	---	0.056

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC 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. "Typical" parameters which may be provided in SCILLC 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. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC 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 SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support: Phone: 421 33 790 2910
Japan Customer Focus Center Phone: 81-3-5773-3850

ON Semiconductor Website: www.onsemi.com
Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative

MC74LCX07/D