Advance Information

Low-Voltage CMOS Hex Buffer with Open Drain Outputs and 5V-Tolerant Inputs

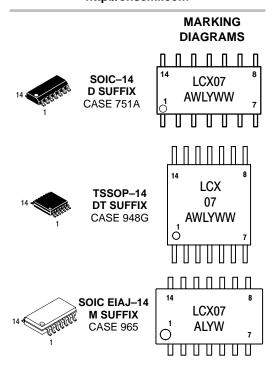
The MC74LCX07 is a high performance hex buffer with open drain outputs operating from a 2.3 to 5.5 V supply. High impedance TTL compatible inputs significantly reduce current loading to input drivers. Open drain outputs provide the ability to set output levels, or to do active–HIGH AND functions or active–LOW OR functions. A $V_{\rm I}$ specification of 5.5 V allows MC74LCX04 inputs to be safely driven from 5 V devices.

Current drive capability is 24mA at the outputs.

- Designed for 2.3 to 5.5 V V_{CC} Operation
- 5 V Tolerant Inputs Interface Capability With 5 V TTL Logic
- LVTTL Compatible
- LVCMOS Compatible
- 24mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current (10μA) Substantially Reduces System Power Requirements
- Latchup Performance Exceeds 500mA
- ESD Performance: Human Body Model >2000V; Machine Model >200V



http://onsemi.com



A =Assembly Location

WL or L = Wafer Lot Y = Year WW or W = Work Week

ORDERING INFORMATION

Device	Package	Shipping
MC74LCX07D	SOIC-14	55 Units/Rail
MC74LCX07DR2	SOIC-14	2500 Units/Reel
MC74LCX07DT	TSSOP-14	96 Units/Rail
MC74LCX07DTR2	TSSOP-14	2500 Units/Reel
MC74LCX07M	SOIC EIAJ-14	50 Units/Rail
MC74LCX07MEL	SOIC EIAJ-14	2000 Units/Reel

This document contains information on a new product. Specifications and information herein are subject to change without notice.

Pinout: 14-Lead (Top View)

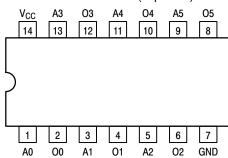
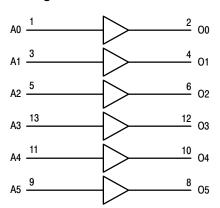


Figure 1. LOGIC DIAGRAM



PIN NAMES

Pins	Function
An	Data Inputs
On	Outputs

FUNCTION TABLE

An	On
L	L
H	Z

ABSOLUTE MAXIMUM RATINGS*

Symbol	Parameter	Value	Condition	Unit
V _{CC}	DC Supply Voltage	-0.5 to +7.0		V
VI	DC Input Voltage	$-0.5 \le V_1 \le +7.0$		V
Vo	DC Output Voltage	$-0.5 \le V_O \le V_{CC} + 0.5$	Note 1.	V
I _{IK}	DC Input Diode Current	-50	V _I < GND	mA
lok	DC Output Diode Current	-50	V _O < GND	mA
		+50	V _O > V _{CC}	mA
I _O	DC Output Source/Sink Current	±50		mA
Icc	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		°C

^{*} Absolute maximum continuous ratings are those values beyond which damage to the device may occur. Exposure to these conditions or conditions beyond those indicated may adversely affect device reliability. Functional operation under absolute—maximum—rated conditions is not implied.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Тур	Max	Unit
V _{CC}	Supply Voltage	Operating Data Retention Only	2.0 1.5	2.3 to 3.3	3.6 3.6	V
VI	Input Voltage		0		5.5	V
Vo	Output Voltage	(HIGH or LOW State)	0		V _{CC}	V
I _{ОН}	HIGH Level Output Current	V_{CC} = 3.0V-3.6V V_{CC} = 2.7V-3.0V V_{CC} = 2.3V-2.7V			-24 -12 -8	mA
l _{OL}	LOW Level Output Current	V _{CC} = 3.0V-3.6V V _{CC} = 2.7V-3.0V V _{CC} = 2.3V-2.7V			+24 +12 +8	mA
T _A	Operating Free–Air Temperature		-40		+85	°C
Δt/ΔV	Input Transition Rise or Fall Rate, V_{IN} from 0.8V to 2.0V, $V_{CC} = 3.0V$		0		10	ns/V

^{1.} Output in HIGH or LOW State. I_O absolute maximum rating must be observed.

DC ELECTRICAL CHARACTERISTICS

			T _A = -40°C to +85°C		
Symbol	Characteristic	Condition	Min	Max	Unit
V _{IH}	Minimum HIGH Level Input Voltage (Note 1.)	$\begin{array}{c} 2.3 \text{V} \leq \text{V}_{\text{CC}} < 2.7 \text{V} \\ 2.7 \text{V} \leq \text{V}_{\text{CC}} < 3.0 \text{V} \\ 3.0 \text{V} \leq \text{V}_{\text{CC}} < 3.6 \text{V} \\ 4.5 \text{V} \leq \text{V}_{\text{CC}} \leq 5.5 \text{V} \end{array}$	1.7 2.0 2.0 0.7 x V _{CC}		V
V _{IL}	Maximum LOW Level Input Voltage (Note 1.)	$\begin{array}{c} 2.3 \text{V} \leq \text{V}_{\text{CC}} < 2.7 \text{V} \\ 2.7 \text{V} \leq \text{V}_{\text{CC}} < 3.0 \text{V} \\ 3.0 \text{V} \leq \text{V}_{\text{CC}} < 3.6 \text{V} \\ 4.5 \text{V} \leq \text{V}_{\text{CC}} \leq 5.5 \text{V} \end{array}$		0.7 0.8 0.8 0.3 x V _{CC}	V
V _{OL}	Maximum LOW Level Output Voltage	$\begin{array}{c} 2.3 \text{V} \leq \text{V}_{\text{CC}} \leq 3.6 \text{V}, \text{I}_{\text{OL}} = 100 \mu \text{A} \\ \text{V}_{\text{CC}} = 2.3 \text{V}, \text{I}_{\text{OL}} = 8 \text{mA} \\ \text{V}_{\text{CC}} = 2.7 \text{V}, \text{I}_{\text{OL}} = 12 \text{mA} \\ \text{V}_{\text{CC}} = 3.0 \text{V}, \text{I}_{\text{OL}} = 16 \text{mA} \\ \text{V}_{\text{CC}} = 3.0 \text{V}, \text{I}_{\text{OL}} = 24 \text{mA} \\ \text{V}_{\text{CC}} = 4.5 \text{V}, \text{I}_{\text{OL}} = 32 \text{mA} \end{array}$		0.2 0.6 0.4 0.4 0.55 0.55	V
IĮ	Maximum Input Leakage Current	$2.3V \le V_{CC} \le 3.6V$, $0V \le V_I \le 5.5V$		±5.0	μΑ
l _{OFF}	Power–Off Leakage Current	V _{CC} = 0V, V _O or V _I = 5.5V		10.0	μΑ
Icc	Maximum Quiescent Supply Current	$\begin{array}{c} 2.3 \text{V} \leq \text{V}_{\text{CC}} \leq 3.6 \text{V}, \text{V}_{\text{ =}} \text{V}_{\text{CC}} \text{or GND} \\ 2.3 \text{V} \leq \text{V}_{\text{CC}} \leq 3.6 \text{V}, 3.6 \text{V} \leq \text{V}_{\text{ }} \leq 5.5 \text{V} \end{array}$		10 ±10.0	μА
Δl _{CC}	Increase in I _{CC} per Input	$2.3V \le V_{CC} \le 3.6V$ $4.5V \le V_{CC} \le 5.5V$		500 1	μA mA

^{1.} These values of V_I are used to test DC electrical characteristics only.

AC ELECTRICAL CHARACTERISTICS

Symbol	Symbol Parameter Limits						Unit			
			T _A = -40°C to +85°C					1		
		V _{CC} = 4.5V to 5.5V		V _{CC} = 3.0V to 3.6V V _{CC} = 2.7V		2.7V	V _{CC} = 3.0V to 3.6V		1	
		C _L =	50pF	C _L =	50pF	C _L =	50pF	C _L =	30pF	1
		Min	Max	Min	Max	Min	Max	Min	Max	
t _{PLZ}	Propagation Delay	0.5	3.0	0.8	3.7	1.0	4.4	0.8	3.8	ns
t _{PZL}	Input to Output	0.5	3.0	0.8	3.7	1.0	4.4	0.8	3.8	ns

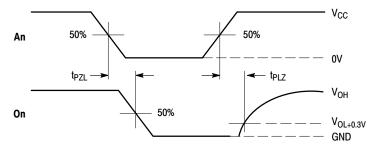
DYNAMIC SWITCHING CHARACTERISTICS

			T _A = +25°C			
Symbol	Characteristic	Condition	Min	Тур	Max	Unit
V _{OLP}	Dynamic LOW Peak Voltage (Note 1.)	$\begin{aligned} &V_{CC} = 3.3 \text{V, } C_L = 50 \text{pF, } V_{IH} = 3.3 \text{V, } V_{IL} = 0 \text{V} \\ &V_{CC} = 2.5 \text{V, } C_L = 30 \text{pF, } V_{IH} = 2.5 \text{V, } V_{IL} = 0 \text{V} \end{aligned}$		0.9 0.7		V
V _{OLV}	Dynamic LOW Valley Voltage (Note 1.)	$V_{CC} = 3.3 \text{V}, C_L = 50 \text{pF}, V_{IH} = 3.3 \text{V}, V_{IL} = 0 \text{V} $ $V_{CC} = 2.5 \text{V}, C_L = 30 \text{pF}, V_{IH} = 2.5 \text{V}, V_{IL} = 0 \text{V} $		-0.8 -0.6		V

^{1.} 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.

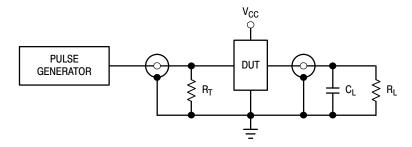
CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C _{IN}	Input Capacitance	$V_{CC} = 3.3V$, $V_I = 0V$ or V_{CC}	7	pF
C _{OUT}	Output Capacitance	V_{CC} = 3.3V, V_{I} = 0V or V_{CC}	8	pF
C _{PD}	Power Dissipation Capacitance	10MHz, $V_{CC} = 3.3V$, $V_I = 0V$ or V_{CC}	25	pF



 $\label{eq:propagation} \begin{array}{c} \textbf{PROPAGATION DELAYS} \\ t_R = t_F = 2.5 ns, \, 10\% \ to \ 90\%; \ f = 1 MHz; \, t_W = 500 ns \end{array}$

Figure 2. Figure 1. AC Waveforms

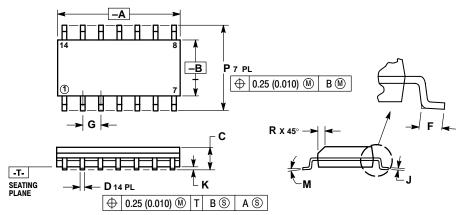


 $C_L=50 pF$ or equivalent (Includes jig and probe capacitance) $R_L=R_1=500\Omega$ or equivalent $R_T=Z_{OUT}$ of pulse generator (typically $50\Omega)$

Figure 2. Test Circuit

PACKAGE DIMENSIONS

SOIC-14 **D SUFFIX** CASE 751A-03 ISSUE F



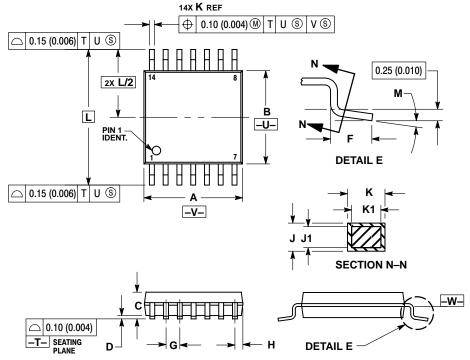
NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: MILLIMETER.
- DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
 MAXIMUM MOLD PROTRUSION 0.15 (0.006)
- PER SIDE.
- PEH SIDE.

 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.

	MILLIMETERS INCI			HES
DIM	MIN	MAX	MIN	MAX
Α	8.55	8.75	0.337	0.344
В	3.80	4.00	0.150	0.157
С	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	1.27 BSC		BSC
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
Р	5.80	6.20	0.228	0.244
R	0.25	0.50	0.010	0.019

TSSOP-14 **DT SUFFIX** CASE 948G-01 **ISSUE O**



NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI DIMENSION Y14.5M, 1982.
- CONTROLLING DIMENSION: MILLIMETER.
- B. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD
- PLASH, PROTRUSIONS ON GATE BURNS. MOLD FLASH OR GATE BURNS 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
- EXCEED 0.25 (0.010) PER SIDE.

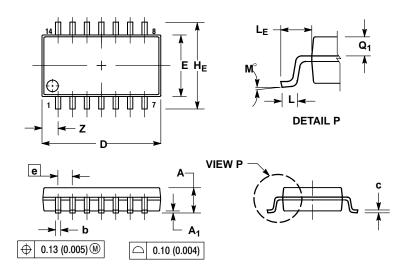
 5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.03) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL COLUMNOR. MATERIAL CONDITION. 5. TERMINAL NUMBERS ARE SHOWN FOR
- REFERENCE ONLY.
 7 DIMENSION A AND B ARE TO BE

DETERMINED AT DATUM PLANE -W								
DETE	MILLIN	IETERS	I PLANE	-W HES				
DIM	MIN	MAX	MIN	MAX				
Α	4.90	5.10	0.193	0.200				
В	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				
٦	6.40 BSC		0.252 BSC					
М	٥°	80	٥°	8 0				

PACKAGE DIMENSIONS

SOIC EIAJ-14 M SUFFIX

CASE 965-01 ISSUE O



- NOTES:

 1. DIMENSIONING AND TOLERANCING PER ANSI

 - OTES:

 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 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). TO BE 0.46 (0.018).

	MILLIMETERS		INC	HES
DIM	MIN	MAX	MIN	MAX
Α		2.05		0.081
A ₁	0.05	0.20	0.002	0.008
b	0.35	0.50	0.014	0.020
C	0.18	0.27	0.007	0.011
D	9.90	10.50	0.390	0.413
E	5.10	5.45	0.201	0.215
е	1.27 BSC		0.050	BSC
HE	7.40	8.20	0.291	0.323
L	0.50	0.85	0.020	0.033
LE	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

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