

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC74LCX07F, TC74LCX07FN, TC74LCX07FT**LOW VOLTAGE HEX BUFFER****WITH 5 V TOLERANT INPUTS AND OUTPUTS (OPEN DRAIN)**

The TC74LCX07 is a high performance CMOS BUFFER. Designed for use in 3.3 Volt systems, it achieves high speed operation while maintaining the CMOS low power dissipation.

The TC74LCX07 has high performance MOS N-channel transistor. (Open-Drain outputs)

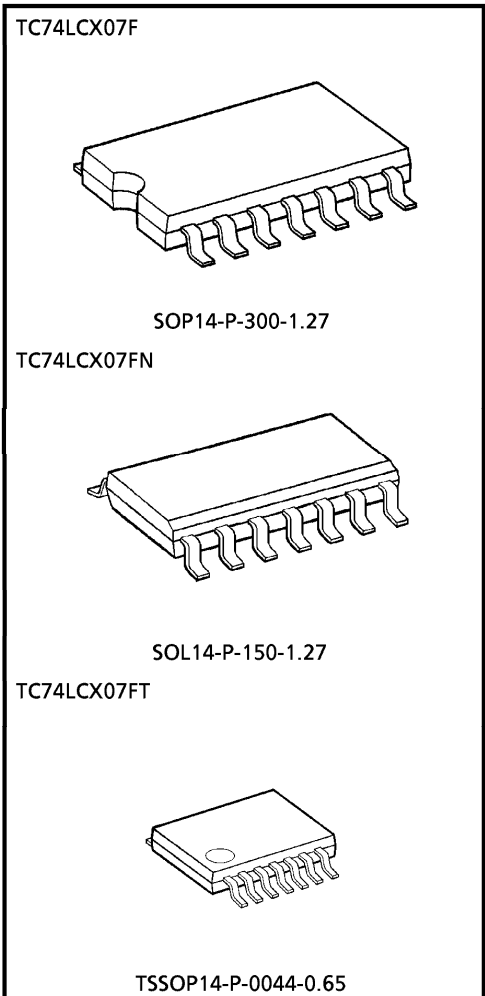
The device is designed for low-voltage (3.3 V) V_{CC} applications, but it could be used to interface to 5V supply environment for inputs.

All inputs are equipped with protection circuits against static discharge.

FEATURES

- Low voltage operation : $V_{CC} = 2.0\sim 3.6\text{ V}$
- High speed operation : $t_{pZ} = 3.7\text{ ns (max)}$
($V_{CC} = 3.0\sim 3.6\text{ V}$)
- Output current : $I_{OL} = 24\text{ mA (min)}$
($V_{CC} = 3.0\text{ V}$)
- Latch-up performance : -500 mA
- Available in JEDEC SOP, EIAJ SOP and TSSOP
- Open-Drain Outputs
- Power down protection is provided on all inputs and outputs.
- Pin and function compatible with the 74 series (74AC/VHC/HC/F/ALS/LS etc.) 07 type.

(Note) : The JEDEC SOP (FN) is not available in Japan.

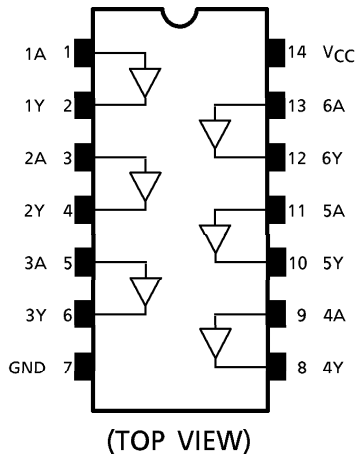
**Weight**

SOP14-P-300-1.27	: 0.18 g (Typ.)
SOL14-P-150-1.27	: 0.12 g (Typ.)
TSSOP14-P-0044-0.65	: 0.06 g (Typ.)

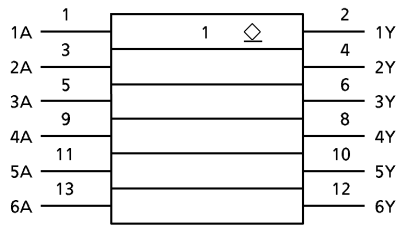
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PIN ASSIGNMENT



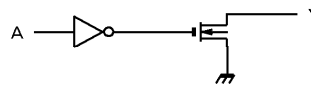
IEC LOGIC SYMBOL



TRUTH TABLE

INPUTS	OUTPUTS
A	Y
L	L
H	Z

SYSTEM DIAGRAM (per gate)



MAXIMUM RATINGS

PARAMETER	SYMBOL	RATING	UNIT
Power Supply Voltage	V_{CC}	-0.5~7.0	V
DC Input Voltage	V_{IN}	-0.5~7.0	V
DC Output Voltage	V_{OUT}	-0.5~7.0 (Note 1)	V
		-0.5~ $V_{CC} + 0.5$ (Note 2)	
Input Diode Current	I_{IK}	-50	mA
Output Diode Current	I_{OK}	-50 (Note 3)	mA
DC Output Current	I_{OUT}	50	mA
Power Dissipation	P_D	180	mW
DC V_{CC} /Ground Current	I_{CC}/I_{GND}	± 100	mA
Storage Temperature	T_{stg}	-65~150	$^{\circ}C$

(Note 1) : Output in Off-State

(Note 2) : Low State. I_{OUT} absolute maximum rating must be observed.

(Note 3) : $V_{OUT} < GND$

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	2.0~3.6	V
		1.5~3.6 (Note 4)	
Input Voltage	V_{IN}	0~5.5	V
Output Voltage	V_{OUT}	0~5.5 (Note 5)	V
		0~ V_{CC} (Note 6)	
Output Current	I_{OH}/I_{OL}	24 (Note 7)	mA
		12 (Note 8)	
Operating Temperature	T_{opr}	-40~85	°C
Input Rise And Fall Time	dt/dv	0~10 (Note 9)	ns/V

(Note 4) : Data Retention Only

(Note 5) : Output in Off-State

(Note 6) : Low State

(Note 7) : $V_{CC} = 3.0\sim 3.6\text{ V}$ (Note 8) : $V_{CC} = 2.7\sim 3.0\text{ V}$ (Note 9) : $V_{IN} = 0.8\sim 2.0\text{ V}$, $V_{CC} = 3.0\text{ V}$

ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS ($T_a = -40\sim 85^\circ\text{C}$)

PARAMETER	SYMBOL	TEST CONDITION	V_{CC} (V)	MIN	MAX	UNIT		
Input Voltage	"H" Level	V_{IH}	2.7~3.6	2.0	—	V		
	"L" Level	V_{IL}	2.7~3.6	—	0.8			
Output Voltage	"L" Level	V_{OL}	$V_{IN} = V_{IL}$	$I_{OL} = 100\ \mu\text{A}$	2.7~3.6	—	0.2	V
				$I_{OL} = 12\ \text{mA}$	2.7	—	0.4	
				$I_{OL} = 16\ \text{mA}$	3.0	—	0.4	
				$I_{OL} = 24\ \text{mA}$	3.0	—	0.55	
Input Leakage Current	I_{IN}	$V_{IN} = 0\sim 5.5\text{ V}$	2.7~3.6	—	± 5.0	μA		
Output Off-State Current	I_{OZ}	$V_{IN} = V_{IH}$, $V_{OUT} = 0\sim 5.5\text{ V}$	2.7~3.6	—	± 5.0	μA		
Power Off Leakage Current	I_{OFF}	$V_{IN}/V_{OUT} = 5.5\text{ V}$	0	—	10.0	μA		
Quiescent Supply Current	I_{CC}	$V_{IN} = V_{CC}$ or GND	2.7~3.6	—	10.0	μA		
		$V_{IN}/V_{OUT} = 3.6\sim 5.5\text{ V}$	2.7~3.6	—	± 10.0			
Increase in I_{CC} Per Input	ΔI_{CC}	$V_{IH} = V_{CC} - 0.6\text{ V}$	2.7~3.6	—	500	μA		

AC CHARACTERISTICS (Ta = -40~85°C)

PARAMETER	SYMBOL	TEST CONDITION	V _{CC} (V)	MIN	MAX	UNIT
Output Enable Time	t _{pZL}	(Fig.1, 2)	2.7	1.0	4.4	ns
			3.3 ± 0.3	0.8	3.7	
Output Disable Time	t _{pLZ}	(Fig.1, 2)	2.7	1.0	4.4	ns
			3.3 ± 0.3	0.8	3.7	
Output To Output Skew	t _{osZL}	(Note 10)	2.7	—	—	ns
			3.3 ± 0.3	—	1.0	

(Note 10) : Parameter guaranteed by design.
 (t_{osZL} = |t_{pZLm} - t_{pZLn}|)

DYNAMIC SWITCHING CHARACTERISTICS (Ta = 25°C, Input t_r = t_f = 2.5 ns, C_L = 50 pF, R_L = 500 Ω)

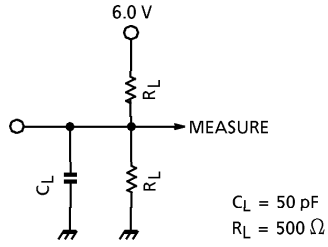
PARAMETER	SYMBOL	TEST CONDITION	V _{CC} (V)	TYP.	UNIT
Quiet Output Maximum Dynamic V _{OL}	V _{OLP}	V _{IH} = 3.3 V, V _{IL} = 0 V	3.3	0.8	V
Quiet Output Minimum Dynamic V _{OL}	V _{OLV}	V _{IH} = 3.3 V, V _{IL} = 0 V	3.3	0.8	V

CAPACITIVE CHARACTERISTICS (Ta = 25°C)

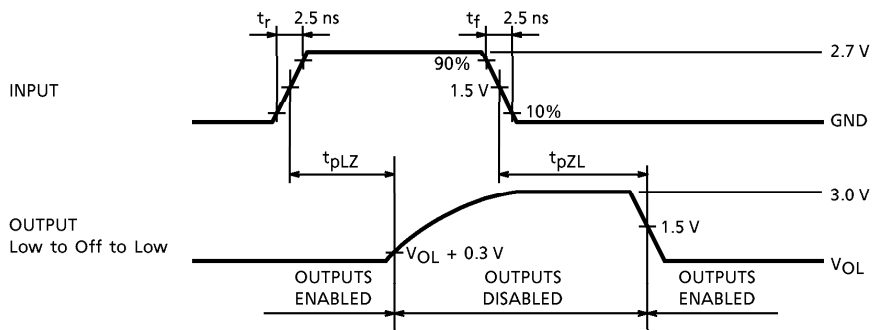
PARAMETER	SYMBOL	TEST CONDITION	V _{CC} (V)	TYP.	UNIT
Input Capacitance	C _{IN}	—	3.3	7	pF
Output Capacitance	C _{OUT}		3.3	8	pF
Power Dissipation Capacitance	C _{PD}	f _{IN} = 10 MHz (Note 11)	3.3	5	pF

(Note 11) : C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.
 Average operating current can be obtained by the equation :
 I_{CC}(opr.) = C_{PD}·V_{CC}·f_{IN} + I_{CC}/6 (Per gate)

TEST CIRCUIT
Fig.1

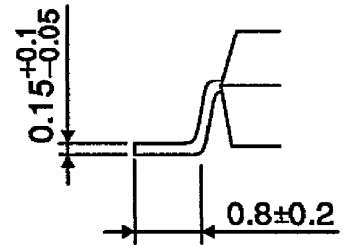
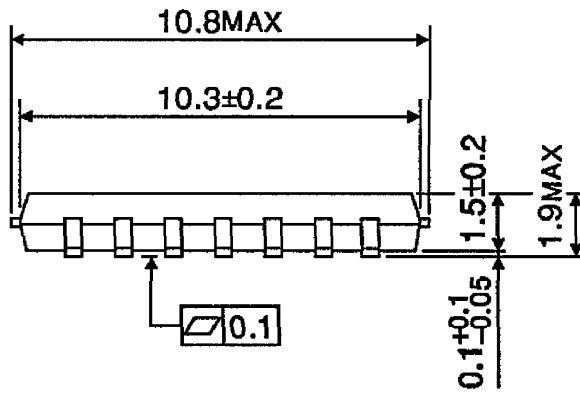
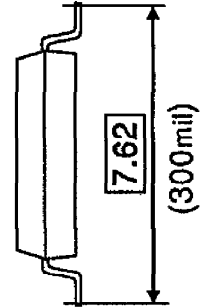
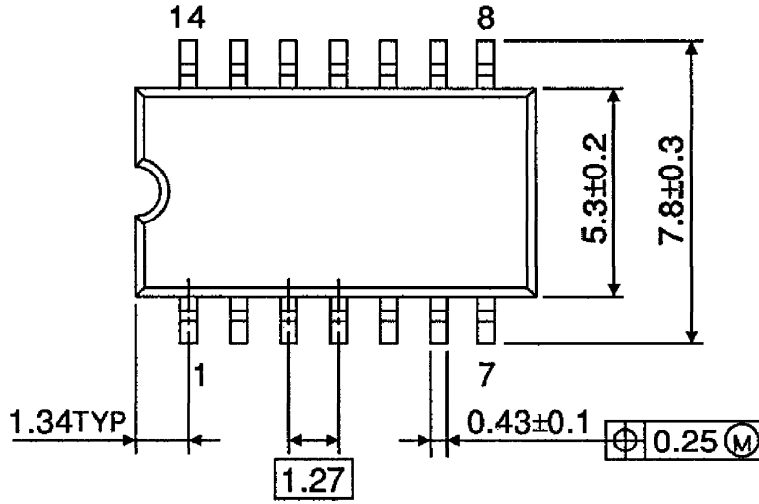


AC WAVEFORM
Fig.2 t_{pLZ} , t_{pZL}



PACKAGE DIMENSIONS
SOP14-P-300-1.27

Unit : mm

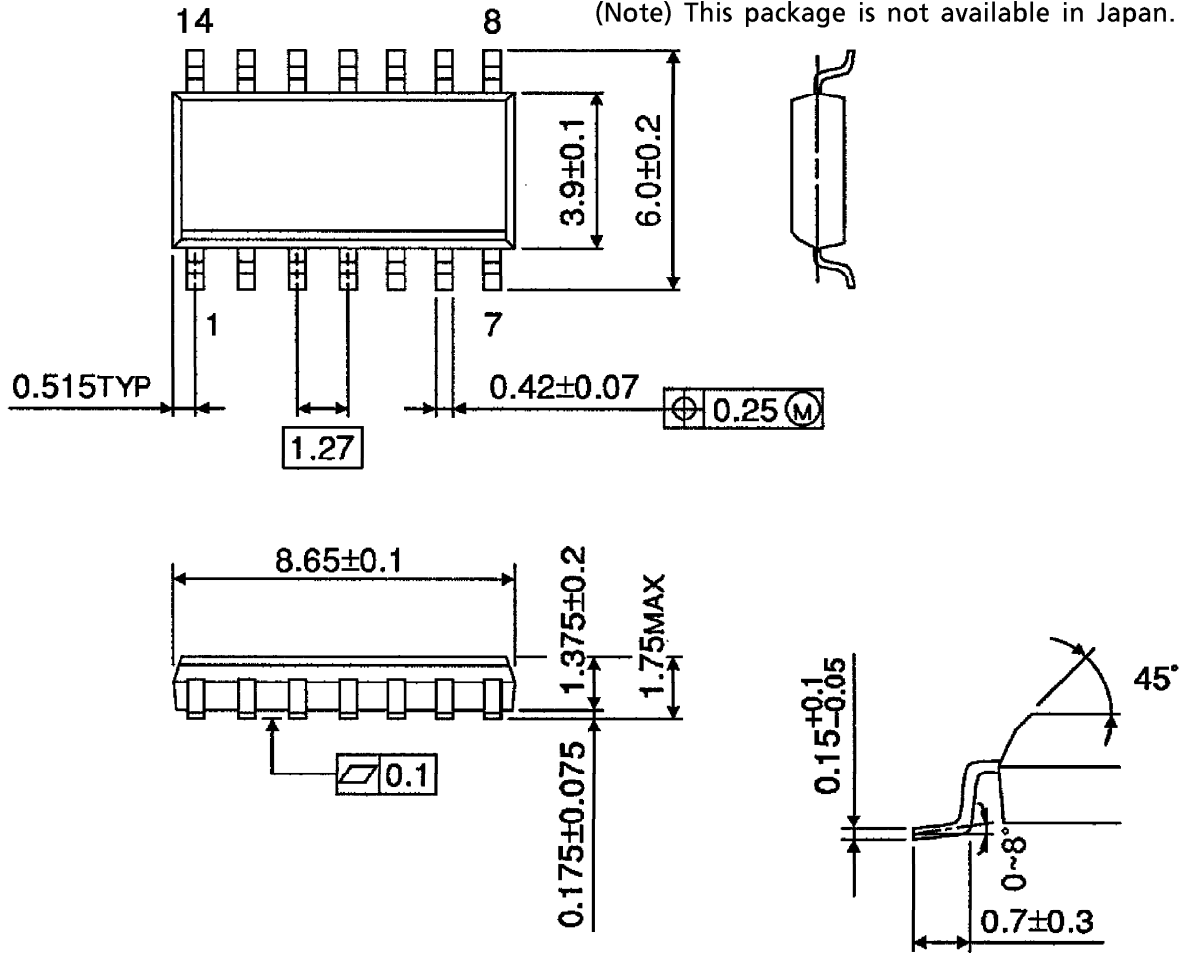


Weight : 0.18 g (Typ.)

PACKAGE DIMENSIONS
SOL14-P-150-1.27

Unit : mm

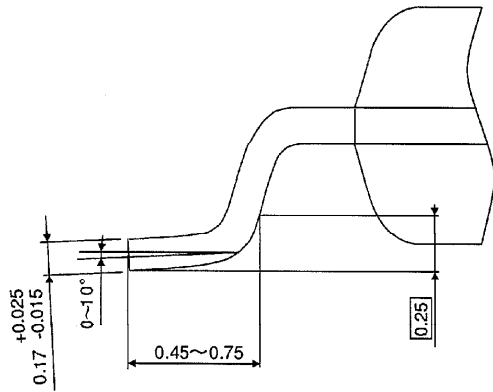
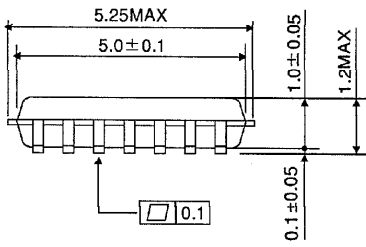
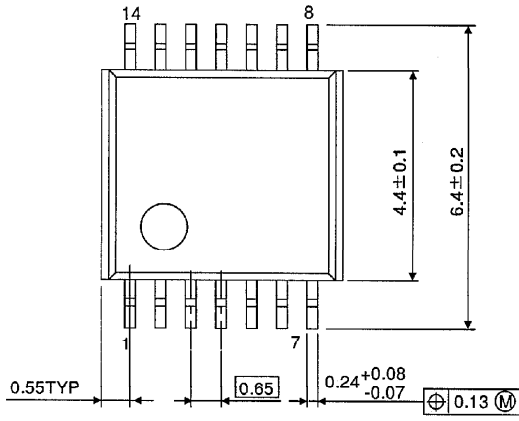
(Note) This package is not available in Japan.



Weight : 0.12 g (Typ.)

PACKAGE DIMENSIONS
TSSOP14-P-0044-0.65

Unit : mm



Weight : 0.06 g (Typ.)