

TC74LCX257F, TC74LCX257FN, TC74LCX257FT

Low-Voltage Quad 2-Channel Multiplexer (3-state) with 5-V Tolerant Inputs and Outputs

The TC74LCX257F/FN/FT is a high-performance CMOS multiplexer. Designed for use in 3.3-V systems, it achieves high-speed operation while maintaining the CMOS low-power dissipation.

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

It is composed of four independent 2-channel multiplexers with common select and OE.

If OE is set low, the outputs are held in a high-impedance state. When SELECT is set low, "A" data inputs are enabled. Conversely, when SELECT is high, "B" data inputs are enabled.

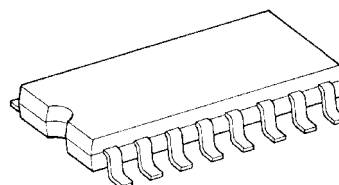
All inputs are equipped with protection circuits against static discharge.

Features

- Low-voltage operation: $V_{CC} = 2.0$ to 3.6 V
- High-speed operation: $t_{pd} = 6.0$ ns (max) ($V_{CC} = 3.0$ to 3.6 V)
- Output current: $|I_{OH}|/I_{OL} = 24$ mA (min) ($V_{CC} = 3.0$ V)
- Latch-up performance: ± 500 mA
- Available in JEDEC SOP, JEITA SOP and TSSOP
- Power-down protection provided on all inputs and outputs
- Pin and function compatible with the 74 series (74AC/VHC/HC/F/ALS/LS etc.) 257 type

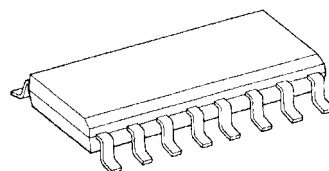
Note: xxxFN (JEDEC SOP) is not available in Japan.

TC74LCX257F



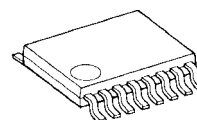
SOP16-P-300-1.27

TC74LCX257FN



SOL16-P-150-1.27

TC74LCX257FT



TSSOP16-P-0044-0.65

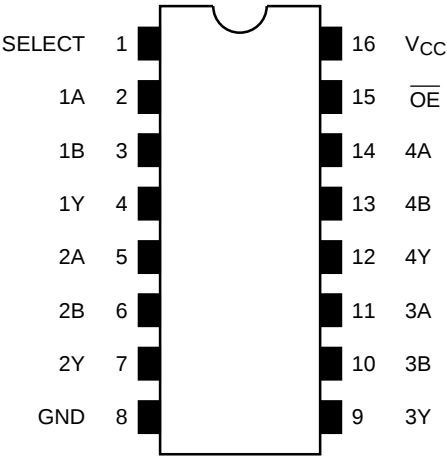
Weight

SOP16-P-300-1.27: 0.18 g (typ.)

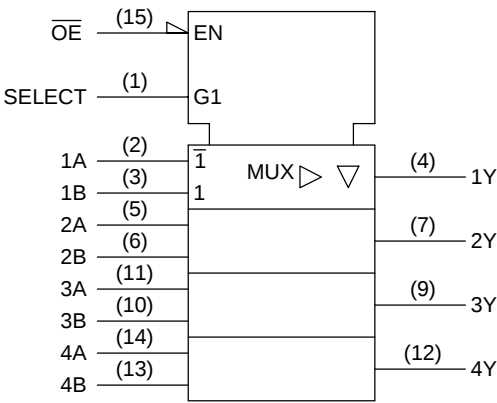
SOL16-P-150-1.27: 0.12 g (typ.)

TSSOP16-P-0044-0.65: 0.06 g (typ.)

Pin Assignment (top view)



IEC Logic Symbol



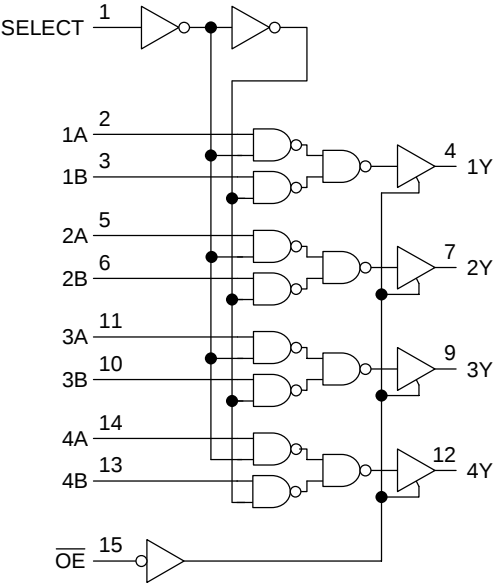
Truth Table

Inputs				Outputs
$\overline{\text{OE}}$	SELECT	A	B	Y
H	X	X	X	Z
L	L	L	X	L
L	L	H	X	H
L	H	X	L	L
L	H	X	H	H

X: Don't care

Z: High impedance

System Diagram



Maximum Ratings

Characteristics	Symbol	Rating	Unit
Power supply voltage	V_{CC}	-0.5 to 7.0	V
DC input voltage	V_{IN}	-0.5 to 7.0	V
DC output voltage	V_{OUT}	-0.5 to 7.0 (Note 1)	V
		-0.5 to $V_{CC} + 0.5$ (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 to 150	°C

Note 1: Output in OFF state

Note 2: High or low state. I_{OUT} absolute maximum rating must be observed.

Note 3: $V_{OUT} < GND$, $V_{OUT} > V_{CC}$

Recommended Operating Conditions

Characteristics	Symbol	Rating	Unit
Power supply voltage	V_{CC}	2.0 to 3.6	V
		1.5 to 3.6 (Note 4)	
Input voltage	V_{IN}	0 to 5.5	V
Output voltage	V_{OUT}	0 to 5.5 (Note 5)	V
		0 to V_{CC} (Note 6)	
Output current	I_{OH}/I_{OL}	± 24 (Note 7)	mA
		± 12 (Note 8)	
Operating temperature	T_{opr}	-40 to 85	°C
Input rise and fall time	dt/dv	0 to 10 (Note 9)	ns/V

Note 4: Data retention only

Note 5: Output in OFF state

Note 6: High or low state

Note 7: $V_{CC} = 3.0$ to 3.6 V

Note 8: $V_{CC} = 2.7$ to 3.0 V

Note 9: $V_{IN} = 0.8$ to 2.0 V, $V_{CC} = 3.0$ V

Electrical Characteristics
DC Characteristics (Ta = –40 to 85°C)

Characteristics		Symbol	Test Condition		V _{CC} (V)	Min	Max	Unit
Input voltage	H-level	V _{IH}	—		2.7 to 3.6	2.0	—	V
	L-level	V _{IL}	—		2.7 to 3.6	—	0.8	
Output voltage	H-level	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} = –100 μA	2.7 to 3.6	V _{CC} – 0.2	—	V
				I _{OH} = –12 mA	2.7	2.2	—	
				I _{OH} = –18 mA	3.0	2.4	—	
				I _{OH} = –24 mA	3.0	2.2	—	
	L-level	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 100 μA	2.7 to 3.6	—	0.2	
				I _{OL} = 12 mA	2.7	—	0.4	
				I _{OL} = 16 mA	3.0	—	0.4	
				I _{OL} = 24 mA	3.0	—	0.55	
Input leakage current		I _{IN}	V _{IN} = 0 to 5.5 V		2.7 to 3.6	—	±5.0	μA
3-state output OFF state current		I _{OZ}	V _{IN} = V _{IH} or V _{IL} V _{OUT} = 0 to 5.5 V		2.7 to 3.6	—	±5.0	μA
Power-off leakage current		I _{OFF}	V _{IN} /V _{OUT} = 5.5 V		0	—	10.0	μA
Quiescent supply current		I _{CC}	V _{IN} = V _{CC} or GND		2.7 to 3.6	—	10.0	μA
			V _{IN} /V _{OUT} = 3.6 to 5.5 V		2.7 to 3.6	—	±10.0	
Increase in I _{CC} per input		ΔI _{CC}	V _{IH} = V _{CC} – 0.6 V		2.7 to 3.6	—	500	

AC Characteristics (Ta = –40 to 85°C)

Characteristics		Symbol	Test Condition		V _{CC} (V)	Min	Max	Unit
Propagation delay time (A, B-Y)		t _{pLH}	Figure 1, Figure 2		2.7	—	6.5	ns
		t _{pHL}			3.3 ± 0.3	1.5	6.0	
Propagation delay time (SELECT-Y)		t _{pLH}	Figure 1, Figure 2		2.7	—	8.5	ns
		t _{pHL}			3.3 ± 0.3	1.5	7.0	
Output enable time		t _{pZL}	Figure 1, Figure 3		2.7	—	8.5	ns
		t _{pZH}			3.3 ± 0.3	1.5	7.0	
Output disable time		t _{pLZ}	Figure 1, Figure 3		2.7	—	6.0	ns
		t _{pHZ}			3.3 ± 0.3	1.5	5.5	
Output to output skew		t _{osLH}	(Note 10)		2.7	—	—	ns
		t _{osHL}			3.3 ± 0.3	—	1.0	

Note 10: Parameter guaranteed by design.

(t_{osLH} = |t_{pLHm} – t_{pLHn}|, t_{osHL} = |t_{pHLm} – t_{pHLn}|)

Dynamic Switching Characteristics
(Ta = 25°C, input: tr = tf = 2.5 ns, CL = 50 pF, RL = 500 Ω)

Characteristics	Symbol	Test Condition	VCC (V)	Typ.	Unit
Quiet output maximum dynamic VOL	VOLP	VIH = 3.3 V, VIL = 0 V	3.3	0.8	V
Quiet output minimum dynamic VOL	VOLV	VIH = 3.3 V, VIL = 0 V	3.3	0.8	V

Capacitive Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	VCC (V)	Typ.	Unit
Input capacitance	CIN	—	3.3	7	pF
Output capacitance	COUT	—	3.3	8	pF
Power dissipation capacitance	CPD	fIN = 10 MHz (Note 11)	3.3	25	pF

Note 11: CPD 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:
 $I_{CC (opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$

AC Test Circuit

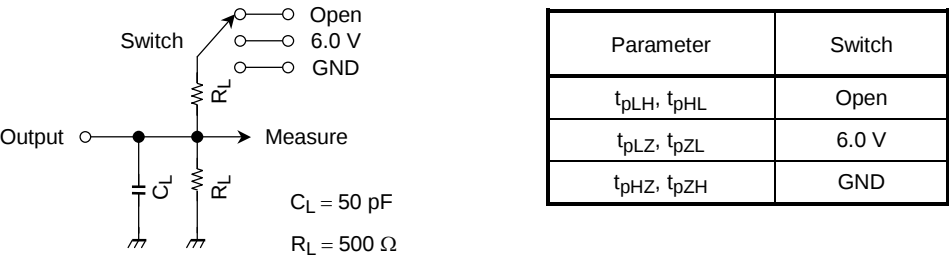


Figure 1

AC Waveform

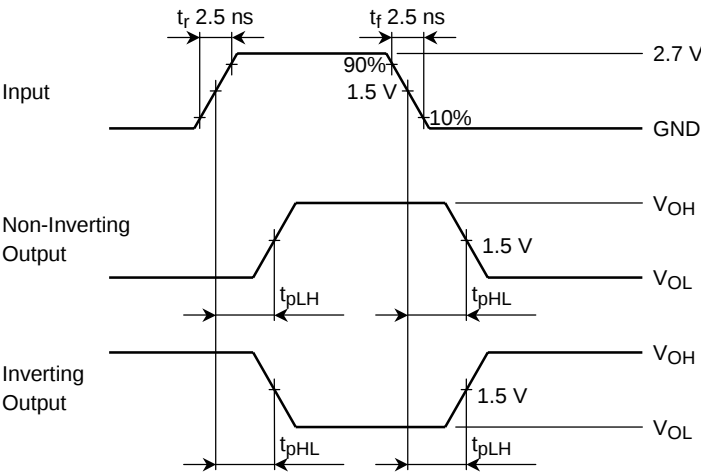


Figure 2 tPLH, tPHL

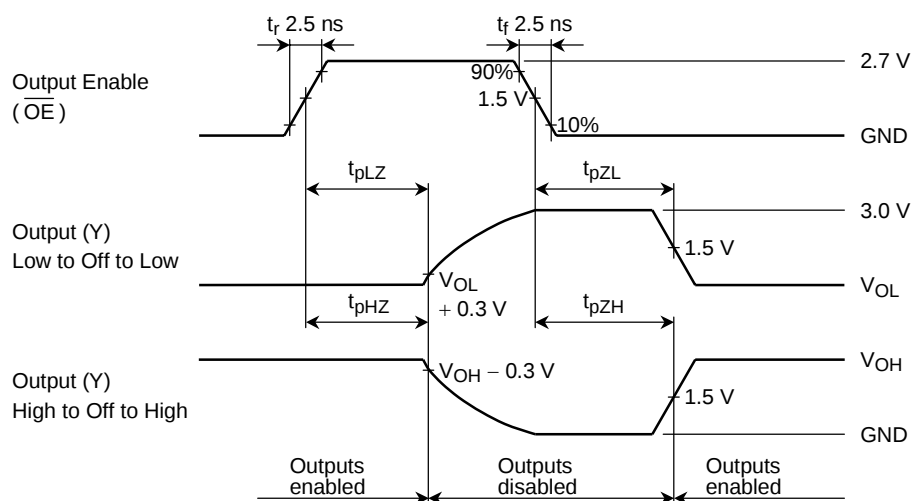
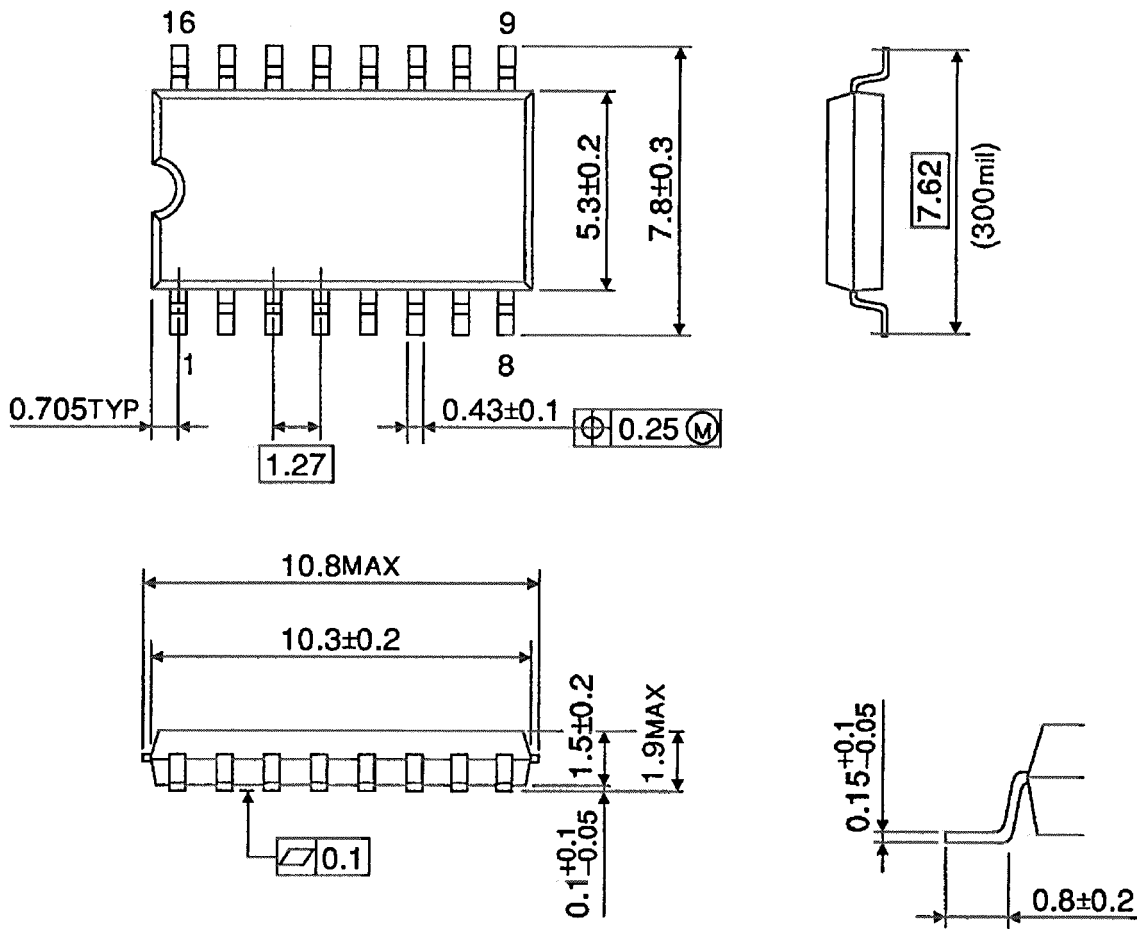


Figure 3 t_{pLZ} , t_{pHZ} , t_{pZL} , t_{pZH}

Package Dimensions

SOP16-P-300-1.27

Unit : mm



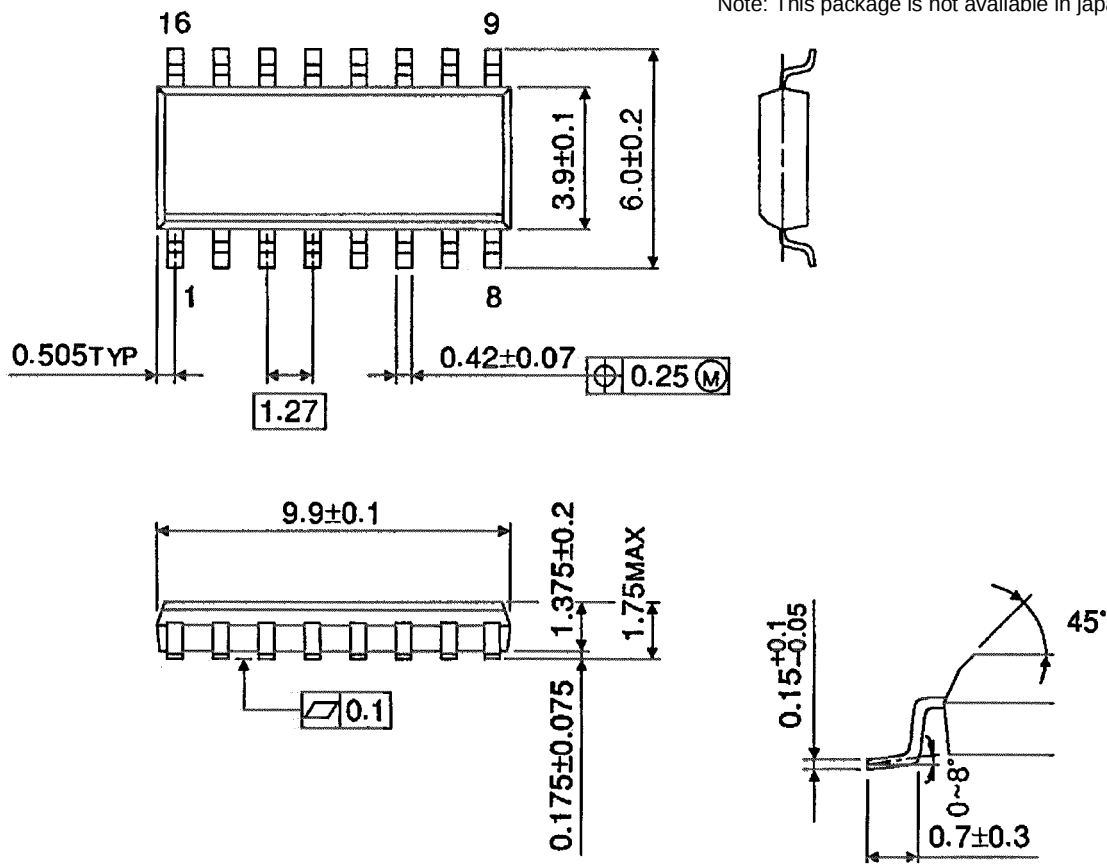
Weight: 0.18 g (typ.)

Package Dimensions

SOL16-P-150-1.27

Unit : mm

Note: This package is not available in Japan.

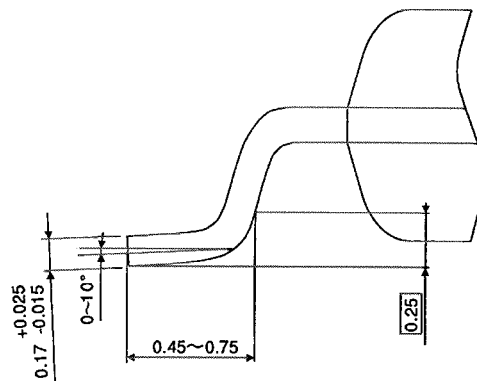
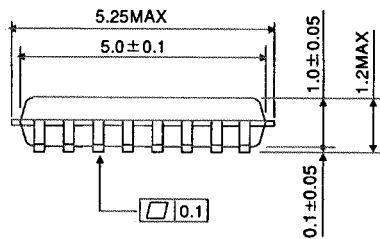
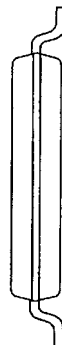
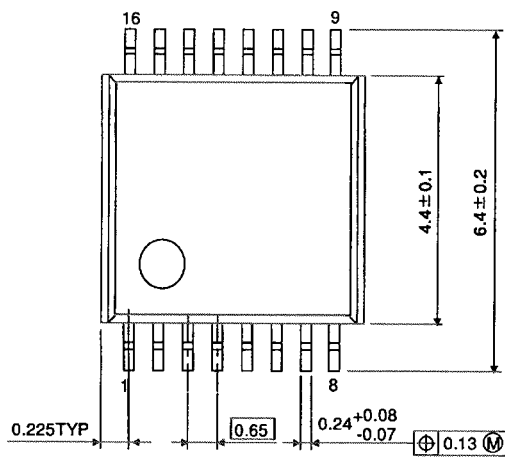


Weight: 0.12 g (typ.)

Package Dimensions

TSSOP16-P-0044-0.65

Unit : mm



Weight: 0.06 g (typ.)

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