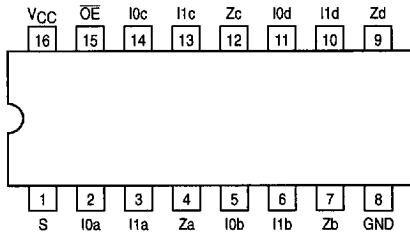*Product Preview*
Low-Voltage CMOS Quad 2-Input Multiplexer
With 5V-Tolerant Inputs and Outputs (3-State, Non-Inverting)

MC74LCX257

LCX

LOW–VOLTAGE CMOS QUAD 2–INPUT MULTIPLEXER

The MC74LCX257 is a high performance, quad 2–input multiplexer with 3–state outputs operating from a 2.7 to 3.6V supply. 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 5.5V allows MC74LCX257 inputs to be safely driven from 5V devices.

Four bits of data from two sources can be selected using the Select input. The four outputs present the selected data in the true (non–inverted) form. The outputs may be switched to a high impedance state by placing a logic HIGH on the Output Enable ($\overline{OE}$) input. Current drive capability is 24mA at the outputs.

- Designed for 2.7 to 3.6V V_{CC} Operation
- 5V Tolerant — Interface Capability With 5V TTL Logic
- Supports Live Insertion and Withdrawal
- I_{OFF} Specification Guarantees High Impedance When V_{CC} = 0V
- LVTTL Compatible
- LVCMOS Compatible
- 24mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current in All Three Logic States (10μA) Substantially Reduces System Power Requirements
- Latchup Performance Exceeds 500mA
- ESD Performance: Human Body Model >2000V; Machine Model >200V

D SUFFIX
PLASTIC SOIC
CASE 751B–05

M SUFFIX
PLASTIC SOIC EIAJ
CASE 966–01

SD SUFFIX
PLASTIC SSOP
CASE 940B–03

DT SUFFIX
PLASTIC TSSOP
CASE 948F–01

Pinout: 16–Lead Plastic Package
(Top View)

V_{CC}	$\overline{OE}$	I0c	I1c	Zc	I0d	I1d	Zd
16	15	14	13	12	11	10	9

1	2	3	4	5	6	7	8
S	I0a	I1a	Za	I0b	I1b	Zb	GND

PIN NAMES

Pins	Function
I0n	Source 0 Data Inputs
I1n	Source 1 Data Inputs
$\overline{OE}$	Output Enable Input
S	Select Input
Zn	Outputs

This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.

LOGIC DIAGRAM
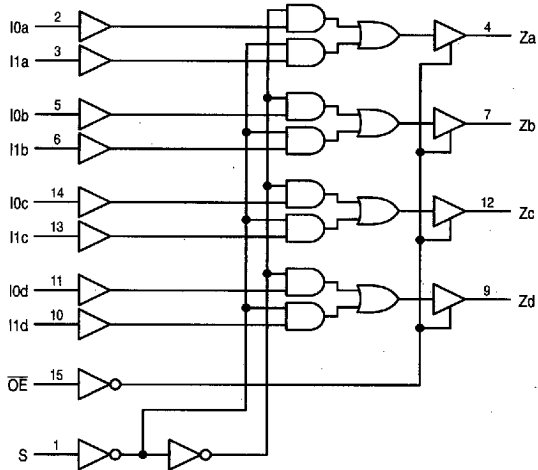
TRUTH TABLE

Inputs				Outputs
$\overline{OE}$	S	I0n	I1n	Zn
H	X	X	X	Z
L	H	X	L	L
L	H	X	H	H
L	L	L	X	L
L	L	H	X	H

H = High Voltage Level; L = Low Voltage Level; X = High or Low Voltage Level; Z = High Impedance State; For I_{CC} Reasons DO NOT FLOAT Inputs

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MC74LCX257

ABSOLUTE 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 ≤ V_I ≤ +7.0		V
V_O	DC Output Voltage	−0.5 ≤ V_O ≤ +7.0	Output in 3−State	V
		−0.5 ≤ V_O ≤ V_{CC} + 0.5	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 Source/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		°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.
1. Output in HIGH or LOW State. I_O absolute maximum rating must be observed.

RECOMMENDED OPERATING CONDITIONS

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

DC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic	Condition	T_A = −40°C to +85°C		Unit
			Min	Max	
V_{IH}	HIGH Level Input Voltage (Note 2.)	2.7V ≤ V_{CC} ≤ 3.6V	2.0		V
V_{IL}	LOW Level Input Voltage (Note 2.)	2.7V ≤ V_{CC} ≤ 3.6V		0.8	V
V_{OH}	HIGH Level Output Voltage	2.7V ≤ V_{CC} ≤ 3.6V; I_{OH} = −100µA	V_{CC} − 0.2		V
		V_{CC} = 2.7V; I_{OH} = −12mA	2.2		
		V_{CC} = 3.0V; I_{OH} = −18mA	2.4		
		V_{CC} = 3.0V; I_{OH} = −24mA	2.2		
V_{OL}	LOW Level Output Voltage	2.7V ≤ V_{CC} ≤ 3.6V; I_{OL} = 100µA		0.2	V
		V_{CC} = 2.7V; I_{OL} = 12mA		0.4	
		V_{CC} = 3.0V; I_{OL} = 16mA		0.4	
		V_{CC} = 3.0V; I_{OL} = 24mA		0.55	

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

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DC ELECTRICAL CHARACTERISTICS (continued)

Symbol	Characteristic	Condition	$T_A = -40°C$ to $+85°C$ Min	$T_A = -40°C$ to $+85°C$ Max	Unit
I_I	Input Leakage Current	$2.7V \leq V_{CC} \leq 3.6V; 0V \leq V_I \leq 5.5V$		±5.0	μA
I_{OZ}	3–State Output Current	$2.7 \leq V_{CC} \leq 3.6V; 0V \leq V_O \leq 5.5V;$ $V_I = V_{IH}$ or V_{IL}		±5.0	μA
I_{OFF}	Power–Off Leakage Current	$V_{CC} = 0V; V_I$ or $V_O = 5.5V$		10	μA
I_{CC}	Quiescent Supply Current	$2.7 \leq V_{CC} \leq 3.6V; V_I = GND$ or V_{CC}		10	μA
		$2.7 \leq V_{CC} \leq 3.6V; 3.6 \leq V_I$ or $V_O \leq 5.5V$		±10	μA
ΔI_{CC}	Increase in I_{CC} per Input	$2.7 \leq V_{CC} \leq 3.6V; V_{IH} = V_{CC} - 0.6V$		500	μA

AC CHARACTERISTICS ($t_R = t_F = 2.5ns$; $C_L = 50pF$; $R_L = 500\Omega$)

Symbol	Parameter	Waveform	Limits $T_A = -40°C$ to $+85°C$ $V_{CC} = 3.0V$ to $3.6V$ Min	Limits $V_{CC} = 3.0V$ to $3.6V$ Max	Limits $V_{CC} = 2.7V$ Max	Unit
t_{PLH} t_{PHL}	Propagation Delay In to Zn	1	1.5 1.5	6.0 6.0	6.5 6.5	ns
t_{PLH} t_{PHL}	Propagation Delay S to Zn	1,2	1.5 1.5	7.0 7.0	8.5 8.5	ns
t_{PZH} t_{PZL}	Output Enable Time to HIGH and LOW Level	3	1.5 1.5	7.0 7.0	8.5 8.5	ns
t_{PHZ} t_{PLZ}	Output Disable Time from HIGH and LOW Level	3	1.5 1.5	5.5 5.5	6.0 6.0	ns
t_{OSHL} t_{OSLH}	Output–to–Output Skew (Note 3.)			1.0 1.0		ns

3. 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_{OSHL}) or LOW–to–HIGH (t_{OSLH}); parameter guaranteed by design.

DYNAMIC SWITCHING CHARACTERISTICS

| Symbol	Characteristic	Condition	$T_A = +25°C$ Min	$T_A = +25°C$ Typ	$T_A = +25°C$ Max	Unit
V_{OLP}	Dynamic LOW Peak Voltage (Note 4.)	$V_{CC} = 3.3V, C_L = 50pF, V_{IH} = 3.3V, V_{IL} = 0V$		0.8		V
V_{OLV}	Dynamic LOW Valley Voltage (Note 4.)	$V_{CC} = 3.3V, C_L = 50pF, V_{IH} = 3.3V, V_{IL} = 0V$		0.8		V

4. 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.
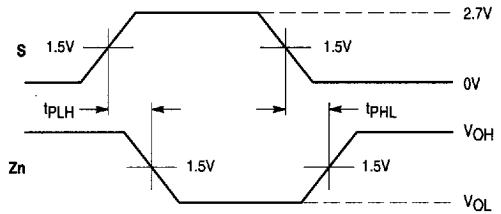
CAPACITIVE CHARACTERISTICS

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

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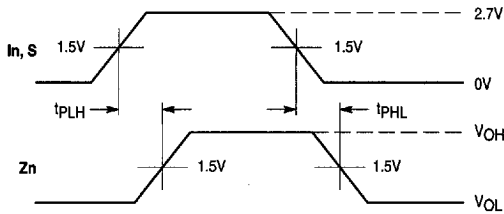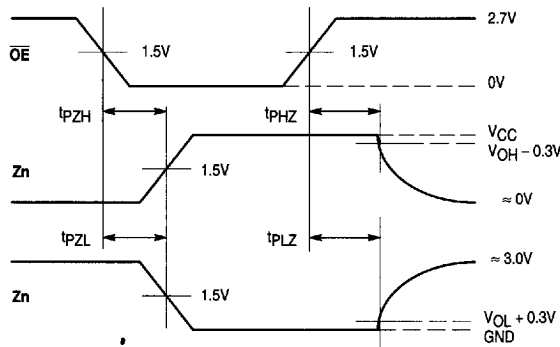
WAVEFORM 1 – NON–INVERTING PROPAGATION DELAYS
$t_R = t_F = 2.5ns$, 10% to 90%; f = 1MHz; $t_W = 500ns$
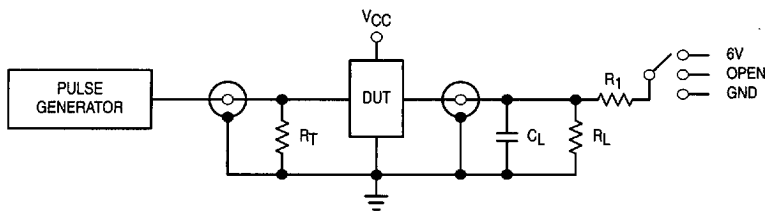
WAVEFORM 2 – INVERTING PROPAGATION DELAYS
$t_R = t_F = 2.5ns$, 10% to 90%; f = 1MHz; $t_W = 500ns$

WAVEFORM 3 – OUTPUT ENABLE AND DISABLE TIMES
$t_R = t_F = 2.5ns$, 10% to 90%; f = 1MHz; $t_W = 500ns$

Figure 1. AC Waveforms

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

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

Figure 2. Test Circuit

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