

MC74LVX157

Quad 2-Channel Multiplexer

With 5 V-Tolerant Inputs

The MC74LVX157 is an advanced high speed CMOS quad 2-channel multiplexer. The inputs tolerate voltages up to 7.0 V, allowing the interface of 5.0 V systems to 3.0 V systems.

It consists of four 2-input digital multiplexers with common select (S) and enable (\bar{E}) inputs. When \bar{E} is held High, selection of data is inhibited and all the outputs go Low.

The select decoding determines whether the I0 n or I1 n inputs get routed to the corresponding Z n outputs.

Features

- High Speed: $t_{PD} = 5.1$ ns (Typ) at $V_{CC} = 3.3$ V
- Low Power Dissipation: $I_{CC} = 4$ μ A (Max) at $T_A = 25^\circ$ C
- Power Down Protection Provided on Inputs
- Balanced Propagation Delays
- Low Noise: $V_{OLP} = 0.5$ V (Max)
- Pin and Function Compatible with Other Standard Logic Families
- Latchup Performance Exceeds 300 mA
- ESD Performance:
 - Human Body Model > 2000 V;
 - Machine Model > 200 V
- These Devices are Pb-Free and are RoHS Compliant

PIN NAMES

Pins	Function
I0n	Source 0 Data Inputs
I1n	Source 1 Data Inputs
\bar{E}	Enable Input
S	Select Input
Zn	Outputs

TRUTH TABLE

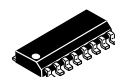
INPUTS				OUTPUT
\bar{E}	S	I0n	I1n	Zn
H	X	X	X	L
L	H	X	L	L
L	H	X	H	H
L	L	L	X	L
L	L	H	X	H

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



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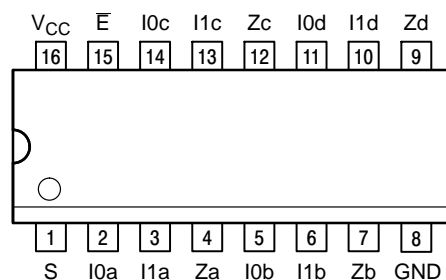


SOIC-16
D SUFFIX
CASE 751B



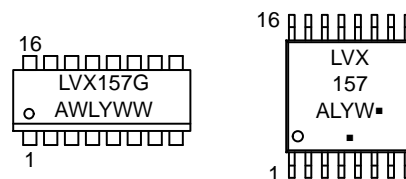
TSSOP-16
DT SUFFIX
CASE 948F

PIN ASSIGNMENT



16-Lead (Top View)

MARKING DIAGRAMS



SOIC-16

TSSOP-16

LVX157 = Specific Device Code
 A = Assembly Location
 WL, L = Wafer Lot
 Y = Year
 WW, W = Work Week
 G or ■ = 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 4 of this data sheet.

MC74LVX157

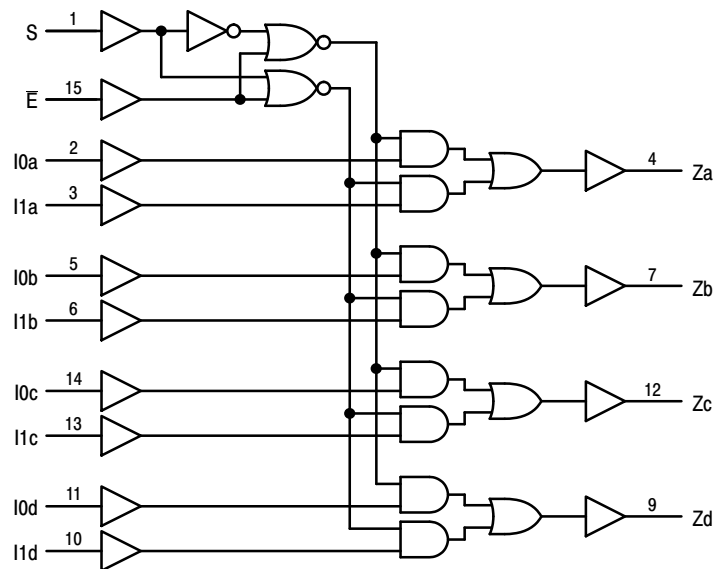


Figure 1. Logic Diagram

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage	-0.5 to +7.0	V
V_{in}	DC Input Voltage	-0.5 to +7.0	V
V_{out}	DC Output Voltage	-0.5 to $V_{CC} + 0.5$	V
I_{IK}	Input Diode Current	-20	mA
I_{OK}	Output Diode Current	± 20	mA
I_{out}	DC Output Current, per Pin	± 25	mA
I_{CC}	DC Supply Current, V_{CC} and GND Pins	± 50	mA
P_D	Power Dissipation	180	mW
T_{stg}	Storage Temperature	-65 to +150	$^{\circ}C$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage	2.0	3.6	V
V_{in}	DC Input Voltage	0	5.5	V
V_{out}	DC Output Voltage	0	V_{CC}	V
T_A	Operating Temperature, All Package Types	-40	+85	$^{\circ}C$
$\Delta t/\Delta V$	Input Rise and Fall Time	0	100	ns/V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

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DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	V _{CC} V	T _A = 25°C			T _A = -40 to 85°C		Unit
				Min	Typ	Max	Min	Max	
V _{IH}	High-Level Input Voltage		2.0	1.5	-	-	1.5	-	V
			3.0	2.0	-	-	2.0	-	
			3.6	2.4	-	-	2.4	-	
V _{IL}	Low-Level Input Voltage		2.0	-	-	0.5	-	0.5	V
			3.0	-	-	0.8	-	0.8	
			3.6	-	-	0.8	-	0.8	
V _{OH}	High-Level Output Voltage (V _{in} = V _{IH} or V _{IL})	I _{OH} = -50μA	2.0	1.9	2.0	-	1.9	-	V
		I _{OH} = -50μA	3.0	2.9	3.0	-	2.9	-	
		I _{OH} = -4mA	3.0	2.58	-	-	2.48	-	
V _{OL}	Low-Level Output Voltage (V _{in} = V _{IH} or V _{IL})	I _{OL} = 50μA	2.0	-	0.0	0.1	-	0.1	V
		I _{OL} = 50μA	3.0	-	0.0	0.1	-	0.1	
		I _{OL} = 4mA	3.0	-	-	0.36	-	0.44	
I _{in}	Input Leakage Current	V _{in} = 5.5V or GND	3.6	-	-	±0.1	-	±1.0	μA
I _{CC}	Quiescent Supply Current	V _{in} = V _{CC} or GND	3.6	-	-	4.0	-	40.0	μA

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

AC ELECTRICAL CHARACTERISTICS (Input t_r = t_f = 3.0ns)

Symbol	Parameter	Test Conditions	T _A = 25°C			T _A = -40 to 85°C		Unit
			Min	Typ	Max	Min	Max	
t _{PLH} , t _{PHL}	Propagation Delay, Input to Output	V _{CC} = 2.7V C _L = 15pF	-	6.6	12.5	1.0	15.5	ns
		V _{CC} = 2.7V C _L = 50pF	-	9.1	16.0	1.0	19.0	
t _{PLH} , t _{PHL}	Propagation Delay, S to Zn	V _{CC} = 3.3 ± 0.3V C _L = 15pF	-	5.1	7.9	1.0	9.5	ns
		V _{CC} = 3.3 ± 0.3V C _L = 50pF	-	7.6	11.4	1.0	13.0	
t _{PLH} , t _{PHL}	Propagation Delay, S to Zn	V _{CC} = 2.7V C _L = 15pF	-	8.9	16.9	1.0	20.5	ns
		V _{CC} = 2.7V C _L = 50pF	-	11.4	20.4	1.0	24.0	
t _{PLH} , t _{PHL}	Propagation Delay, E to Zn	V _{CC} = 3.3 ± 0.3V C _L = 15pF	-	7.0	11.0	1.0	13.0	ns
		V _{CC} = 3.3 ± 0.3V C _L = 50pF	-	9.5	14.5	1.0	16.5	
t _{PLH} , t _{PHL}	Propagation Delay, E to Zn	V _{CC} = 2.7V C _L = 15pF	-	9.1	17.6	1.0	20.5	ns
		V _{CC} = 2.7V C _L = 50pF	-	11.6	21.1	1.0	24.0	
t _{OSSL} , t _{OSLH}	Output-to-Output Skew (Note 1)	V _{CC} = 2.7V C _L = 50pF	-	-	1.5	-	1.5	ns
		V _{CC} = 3.3 ± 0.3V C _L = 50pF	-	-	1.5	-	1.5	

- 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_{OSSL}) or LOW-to-HIGH (t_{OSLH}); parameter guaranteed by design.

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	T _A = 25°C			T _A = -40 to 85°C		Unit
		Min	Typ	Max	Min	Max	
C _{in}	Input Capacitance	-	4	10	-	10	pF
C _{PD}	Power Dissipation Capacitance (Note 2)	-	20	-	-	-	pF

- 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}/4 (per bit). C_{PD} is used to determine the no-load dynamic power consumption; P_D = C_{PD} • V_{CC}² • f_{in} + I_{CC} • V_{CC}.

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NOISE CHARACTERISTICS (Input $t_r = t_f = 3.0\text{ns}$, $C_L = 50\text{pF}$, $V_{CC} = 3.3\text{V}$, Measured in SOIC Package)

Symbol	Characteristic	$T_A = 25^\circ\text{C}$		Unit
		Typ	Max	
V_{OLP}	Quiet Output Maximum Dynamic V_{OL}	0.3	0.5	V
V_{OLV}	Quiet Output Minimum Dynamic V_{OL}	-0.3	-0.5	V
V_{IHD}	Minimum High Level Dynamic Input Voltage	-	2.0	V
V_{ILD}	Maximum Low Level Dynamic Input Voltage	-	0.8	V

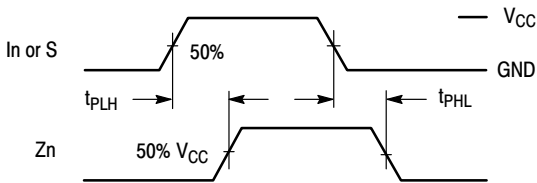


Figure 2.

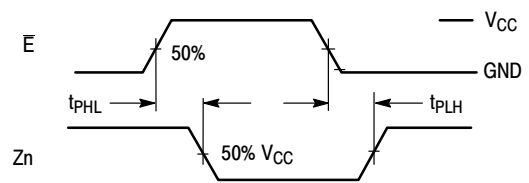
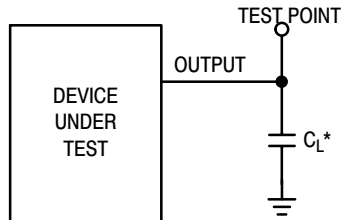


Figure 3.



*Includes all probe and jig capacitance

Figure 4. Propagation Delay Test Circuit

ORDERING INFORMATION

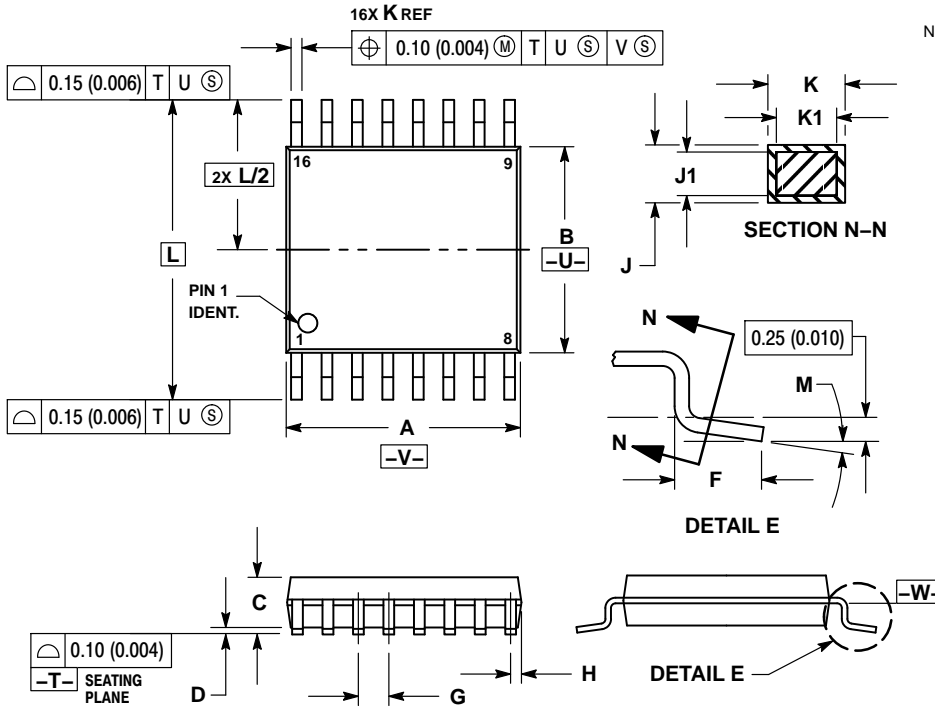
Device	Package	Shipping†
MC74LVX157DR2G	SOIC-16 (Pb-Free)	2500 Tape & Reel
MC74LVX157DTR2G	TSSOP-16 (Pb-Free)	2500 Tape & Reel

†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.

MC74LVX157

PACKAGE DIMENSIONS

TSSOP-16
CASE 948F
ISSUE B

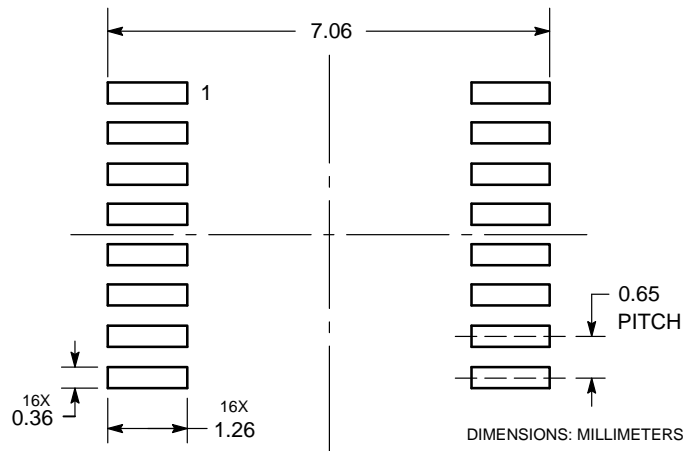


NOTES:

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	0.18	0.28	0.007	0.011
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*

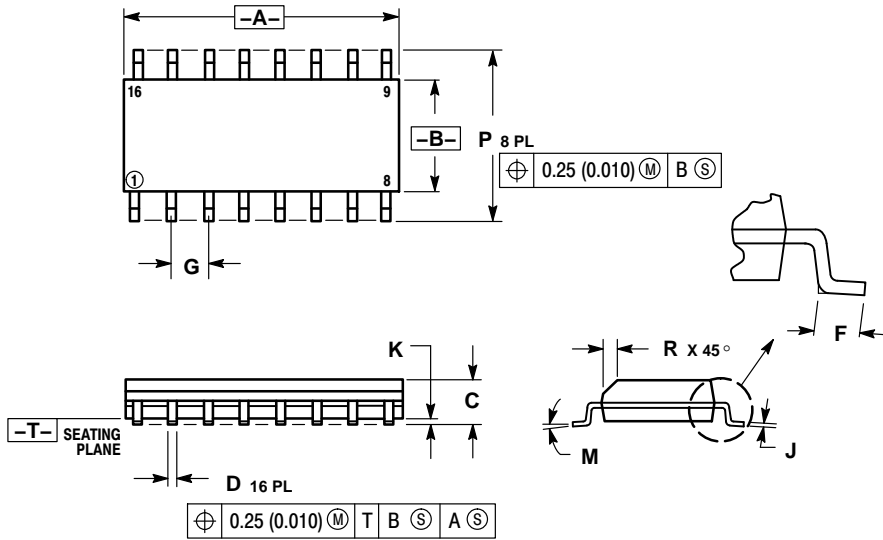


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

MC74LVX157

PACKAGE DIMENSIONS

SOIC-16
CASE 751B-05
ISSUE K

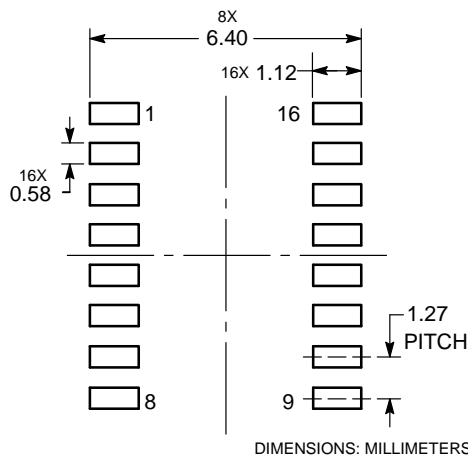


NOTES:


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	9.80	10.00	0.386	0.393
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	0.229	0.244
R	0.25	0.50	0.010	0.019

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.

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