Quadruple 2-Line-To-1-Line Multiplexers With Three-State Outputs

DESCRIPTION

These data selectors/multiplexers select a 4-bit word from one of two sources and present it at the four outputs. The LS257 presents true data; the LS258 presents inverted data. With Output Control HIGH, the outputs are forced to a high impedance state.

FUNCTION TABLE

INPUTS				OUTPUT Y	
OUTPUT CONTROL	SELECT	A	B	LS257	LS258
H	X	X	X	Z	Z
L	L	L	X	L	H
L	L	H	X	H	L
L	H	X	L	L	H
L	H	X	H	H	L

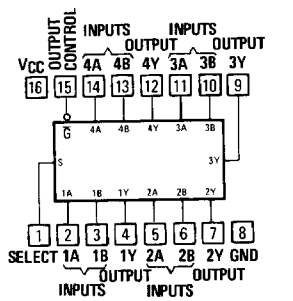
H = high level, L = low level, X = irrelevant, Z = high impedance (off)

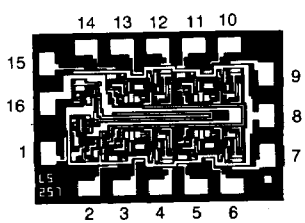
Low level at S selects A inputs.

High level at S selects B inputs.

PIN-OUT DIAGRAMS

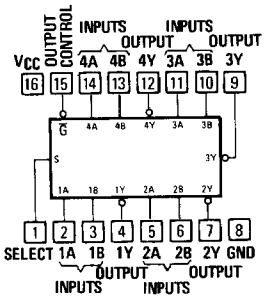
LS257

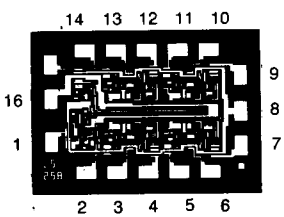




Die Size .047 x .066

LS258

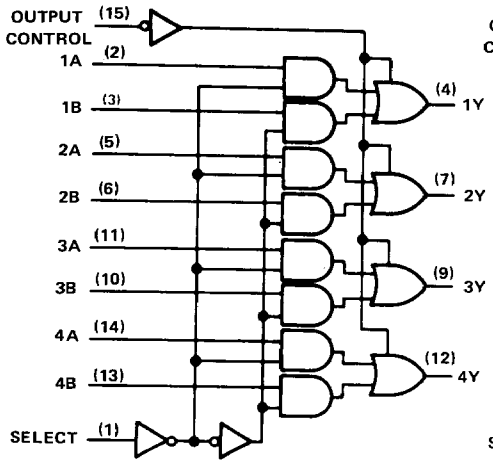




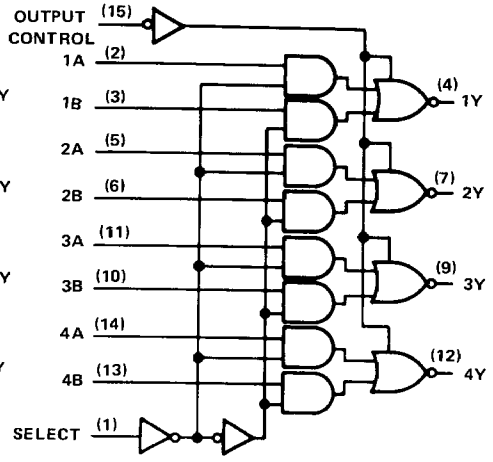
Die Size .047 x .066

LOGIC DIAGRAMS

LS257



LS258



Recommended Operating Conditions

	9LS/54LS			9LS/74LS			Unit
	Min	Nom	Max	Min	Nom	Max	
Supply voltage, V_{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}			-1			-2.6	mA
Low-level output current, I_{OL}			4			8	mA
Operating free-air temperature, T_A	-55		125	0		70	°C

Quadruple 2-Line-To-1-Line Multiplexers With Three-State Outputs

Electrical Characteristics Over Recommended Free-Air Temperature Range (Unless Otherwise Noted)

Parameter		Test Conditions*		9LS/54LS Min	9LS/54LS Typ**	9LS/54LS Max	9LS/74LS Min	9LS/74LS Typ**	9LS/74LS Max	Unit
V_{IH}				2			2			V
V_{IL}						0.7			0.8	V
V_I		V_{CC}=MIN, I_I=-18mA				-1.5			-1.5	V
V_{OH}		V_{CC}=MIN, V_{IH}=2V, V_{IL}=V_{IL} max, I_{OH}=MAX		2.4	3.4		2.4	3.1		V
V_{OL}		V_{CC}=MIN, V_{IH}=2V, V_{IL}=V_{IL} max	I_{OL}=4mA		0.25	0.4		0.25	0.4	V
			I_{OL}=8mA					0.35	0.5	
I_{OZH}		V_{CC}=MAX, V_{IH}=2V, V_O=2.4V				20			20	μA
I_{OZL}		V_{CC}=MAX, V_{IH}=2V, V_O=0.4V				-20			-20	μA
I_I	S input	V_{CC}=MAX, V_I=7V				0.2			0.2	mA
	Any other					0.1			0.1	
I_{IH}	S input	V_{CC}=MAX, V_I=2.7V				40			40	μA
	Any other					20			20	
I_{IL}	S input	V_{CC}=MAX, V_I=0.4V				-0.8			-0.8	mA
	Any other					-0.4			-0.4	
I_{OS}†		V_{CC}=MAX		-15		-100	-15		-100	mA
I_{CC}††	All outputs high	V_{CC}=MAX	LS257		5.9	10		5.9	10	mA
	All outputs low				9.2	16		9.2	16	
	All outputs off				10	17		10	17	
	All outputs high		LS258		4.1	7		4.1	7	
	All outputs low				6.2	11		6.2	11	
	All outputs off				7.0	12		7.0	12	

*For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.

**All typical values are at V_{CC} = 5V, T_A = 25°C.

†Not more than one output should be shorted at a time.

††I_{CC} is measured with all outputs open and all possible inputs grounded while achieving the stated output conditions.

Switching Characteristics, V_{CC} = 5V Over Recommended Free-Air Temperature Range

Parameter		From (input)	To (output)	−55°C			+25°C			+125°C			Unit
				Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Test Conditions: C_L = 15pF, R_L = 2kΩ (See Fig. C on page 2-174)													
t_{PLH}	LS257	Data	Any		8	15		6	12		8	15	ns
t_{PHL}					9	15		7	12		9	15	
t_{PLH}	LS258	Data	Any		10	17		8	14		10	17	ns
t_{PHL}					7	15		5	12		7	15	
t_{PLH}	LS257	Select	Any		14	21		12	18		14	21	ns
t_{PHL}					14	21		12	18		14	21	
t_{PLH}	LS258	Select	Any		14	21		12	18		14	21	ns
t_{PHL}					12	21		10	18		12	21	
t_{ZH}	LS257	Output Control	Any		12	21		10	18		12	21	ns
t_{ZL}					12	19		10	16		12	19	
t_{ZH}	LS258	Output Control	Any		12	21		10	18		12	21	ns
t_{ZL}					13	21		11	18		13	21	
Test Conditions: C_L = 15pF, R_L = 2kΩ (See Fig. A, page 2-174)													
t_{HZ}	LS257	Output Control	Any		12	18		10	15		12	18	ns
t_{LZ}					12	21		10	18		12	21	
t_{HZ}	LS258	Output Control	Any		11	18		9	15		11	18	ns
t_{LZ}					10	18		8	15		10	18	
Test Conditions: C_L = 50pF, R_L = 2kΩ (See Fig. A, page 2-174)													
t_{PLH}	LS257	Data	Any		12	19		10	17		12	19	ns
t_{PHL}					13	20		11	17		13	20	
t_{PLH}	LS258	Data	Any		14	22		12	19		14	22	ns
t_{PHL}					11	19		9	17		11	19	
t_{PLH}	LS257	Select	Any		18	25		16	23		18	25	ns
t_{PHL}					18	25		16	23		18	25	
t_{PLH}	LS258	Select	Any		18	25		16	23		18	25	ns
t_{PHL}					16	25		14	23		16	25	
t_{ZH}	LS257	Output Control	Any		16	25		14	23		16	25	ns
t_{ZL}					16	24		14	21		16	24	
t_{ZH}	LS258	Output Control	Any		16	25		14	23		16	25	ns
t_{ZL}					17	25		15	23		17	25	

Note: AC specification shown under −55°C and +125°C are for 9LS devices only.
All 50pF specifications are for 9LS only.