

MITSUBISHI LSTTLs M74LS257AP

QUADRUPLÉ 2-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER WITH 3-STATE OUTPUT

DESCRIPTION

The M74LS257AP is a semiconductor integrated circuit containing four 2-line to 1-line data selector/multiplexer circuits and 3-state outputs.

FEATURES

- Output control input common to all four circuits
- 3-state outputs
- Wide operating temperature range ($T_a = -20 \sim +75^\circ\text{C}$)

APPLICATION

General purpose, for use in industrial and consumer equipment.

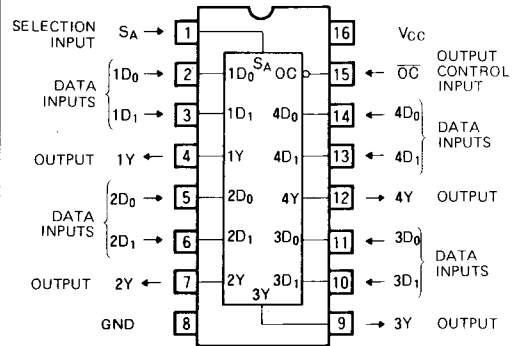
FUNCTIONAL DESCRIPTION

This IC has four data selector circuits which provide 1-line selection of 2 input signals using four multiplexer circuits which convert the 2-bit parallel data into serial data by time-sharing. When 2-line signals are applied to the data inputs D_0 and D_1 , and 1 data is specified from among the data input from selection input S_A , the input signal is output at Y .

S_A and output control \overline{OC} are common to all four circuits. When \overline{OC} is set high, 1Y, 2Y, 3Y and 4Y are put in the high-impedance state irrespective of the status of the other inputs.

M74LS257AP has the same functions and pin connections as M74LS157P but the latter is provided with active pull-up resistor outputs.

PIN CONFIGURATION (TOP VIEW)



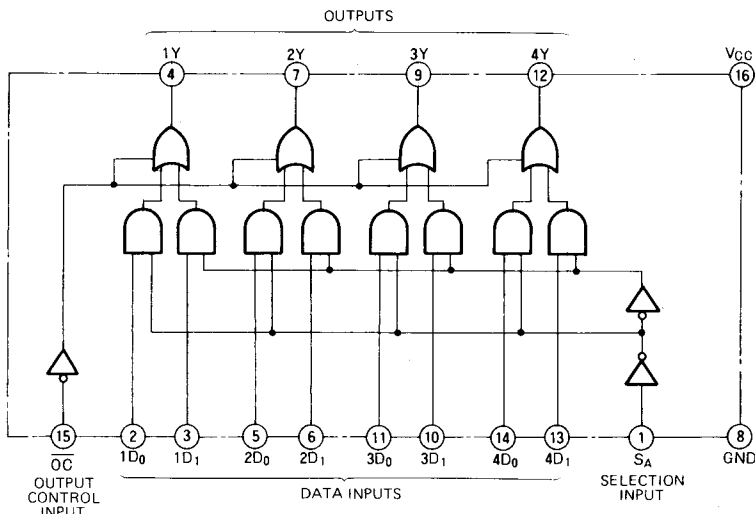
Outline 16P4

FUNCTION TABLE (Note 1)

\overline{OC}	S_A	D_0	D_1	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

Note 1 X : Irrelevant
Z : High-impedance state

BLOCK DIAGRAM



QUADRUPLE 2-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER
WITH 3-STATE OUTPUT

ABSOLUTE MAXIMUM RATINGS (Ta = -20 ~ +75°C, unless otherwise noted)

Symbol	Parameter	Conditions	Limits	Unit
V _{CC}	Supply voltage		-0.5 ~ +7	V
V _I	Input voltage		-0.5 ~ +15	V
V _O	Output voltage	Off-state	-0.5 ~ +5.5	V
T _{opr}	Operating free-air ambient temperature range		-20 ~ +75	°C
T _{stg}	Storage temperature range		-65 ~ +150	°C

RECOMMENDED OPERATING CONDITIONS (Ta = -20 ~ +75°C, unless otherwise noted)

Symbol	Parameter		Limits			Unit
			Min	Typ	Max	
V _{CC}	Supply voltage		4.75	5	5.25	V
I _{OH}	High-level output current	V _{OH} ≥ 2.4V	0		-2.6	mA
I _{OL}	Low-level output current	V _{OL} ≤ 0.4V	0		12	mA
		V _{OL} ≤ 0.5V	0		24	mA

ELECTRICAL CHARACTERISTICS (Ta = -20 ~ +75°C, unless otherwise noted)

Symbol	Parameter		Test conditions	Limits			Unit
				Min	Typ *	Max	
V _{IH}	High-level input voltage			2			V
V _{IL}	Low-level input voltage					0.8	V
V _{IC}	Input clamp voltage		V _{CC} = 4.75V, I _{IC} = -18mA			-1.5	V
V _{OH}	High-level output voltage		V _{CC} = 4.75V, V _I = 0.8V V _I = 2V, I _{OH} = -2.6mA	2.4	3.1		V
V _{OL}	Low-level output voltage		V _{CC} = 4.75V V _I = 0.8V, V _I = 2V	I _{OL} = 12mA	0.25	0.4	V
				I _{OL} = 24mA	0.35	0.5	V
I _{OZH}	Off-state high-level output current		V _{CC} = 5.25V, V _I = 2V, V _O = 2.4V			20	μA
I _{OZL}	Off-state low-level output current		V _{CC} = 5.25V, V _I = 2V, V _O = 0.4V			-20	μA
I _{IH}	High-level input current	D ₀ , D ₁ , \overline{OC}	V _{CC} = 5.25V			20	μA
		S _A	V _I = 2.7V			40	
		D ₀ , D ₁ , \overline{OC}	V _{CC} = 5.25V			0.1	mA
		S _A	V _I = 10V			0.2	
I _{IL}	Low-level input current	D ₀ , D ₁ , \overline{OC}	V _{CC} = 5.25V			-0.4	mA
		S _A	V _I = 0.4V			-0.8	
I _{OS}	Short-circuit output current (Note 2)		V _{CC} = 5.25V, V _O = 0V	-30		-130	mA
I _{CCH}	Supply current, all outputs high		V _{CC} = 5.25V (Note 3)		6.2	10	mA
I _{CCL}	Supply current, all outputs low		V _{CC} = 5.25V (Note 4)		10	16	mA
I _{CCZ}	Supply current, all outputs off		V _{CC} = 5.25V (Note 5)		12	19	mA

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

Note 2: All measurements should be done quickly and not more than one output should be shorted at a time.

Note 3: I_{CCH} is measured with \overline{OC} , S_A, D₁ at 0V and D₀ at 4.5V

Note 4: I_{CCL} is measured with all inputs at 0V.

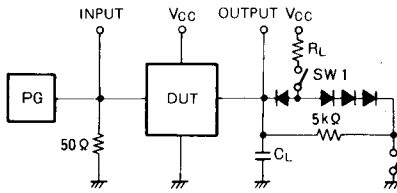
Note 5: I_{CCZ} is measured with \overline{OC} at 4.5V and all other inputs at 0V.

SWITCHING CHARACTERISTICS (V_{CC} = 5V, Ta = 25°C, unless otherwise noted)

Symbol	Parameter		Test conditions	Limits			Unit
				Min	Typ	Max	
t _{PLH}	Low-to-high-level, high-to-low-level output propagation time, from inputs D ₀ , D ₁ to output Y		C _L = 45pF (Note 6)		6	18	ns
t _{PHL}	Low-to-high-level, high-to-low-level output propagation time, from input S _A to output Y				8	18	ns
t _{PLH}	Low-to-high-level, high-to-low-level output propagation time, from input S _A to output Y				11	28	ns
t _{PHL}	Low-to-high-level, high-to-low-level output propagation time, from input S _A to output Y				11	35	ns
t _{PZH}	Output enable time to high-level		R _L = 667Ω, C _L = 45pF (Note 6)		7	22	ns
t _{PZL}	Output enable time to low-level		R _L = 667Ω, C _L = 45pF (Note 6)		9	35	ns
t _{PLZ}	Output disable time from low-level		R _L = 667Ω, C _L = 5 pF (Note 6)		11	26	ns
t _{PHZ}	Output disable time from high-level		R _L = 667Ω, C _L = 5 pF (Note 6)		8	35	ns

QUADRUPLE 2-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER
WITH 3-STATE OUTPUT

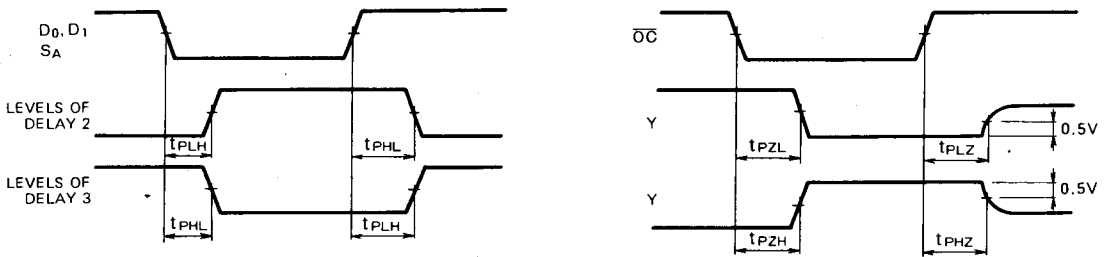
Note 6: Measurement circuit



Symbol	SW 1	SW 2
t_{PZH}	Open	Closed
t_{PZL}	Closed	Open
t_{PLZ}	Closed	Closed
t_{PHZ}	Closed	Closed

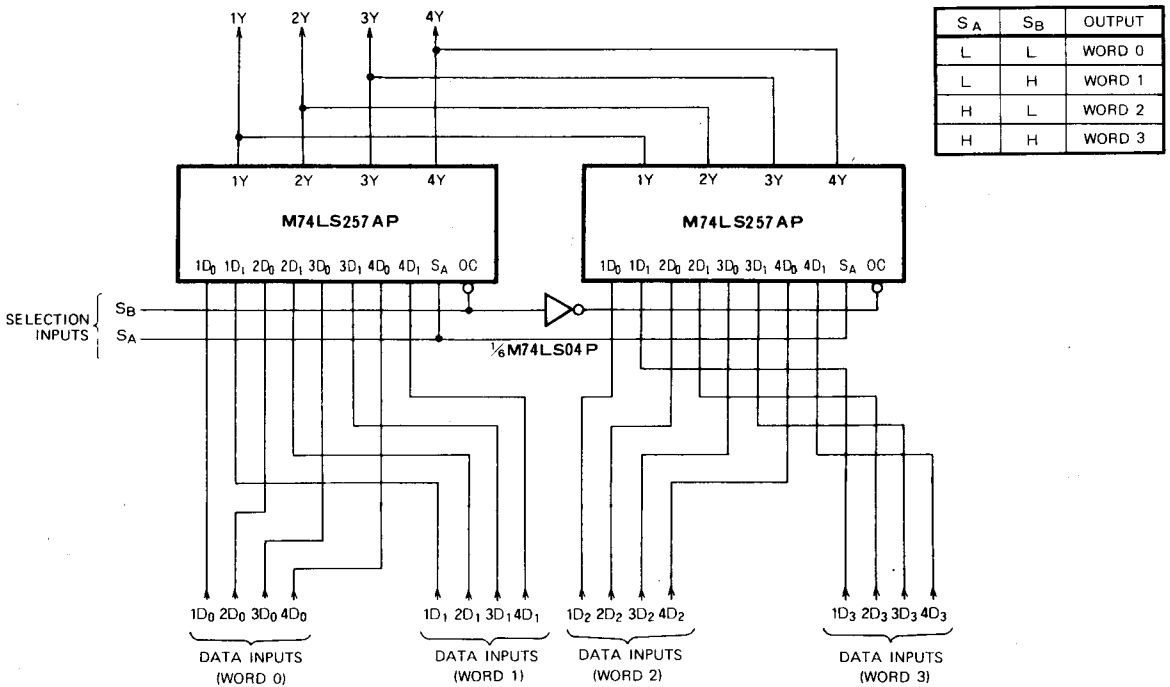
- (1) The pulse generator (PG) has the following characteristics:
PRR = 1MHz, $t_r = 6ns$, $t_f = 6ns$, $t_w = 500ns$,
 $V_p = 3V_{p-p}$, $Z_o = 50\Omega$.
- (2) All diodes are switching diodes ($t_{rr} \leq 4ns$)
- (3) C_L includes probe and jig capacitance.

TIMING DIAGRAM (Reference level = 1.3V)



APPLICATION EXAMPLE

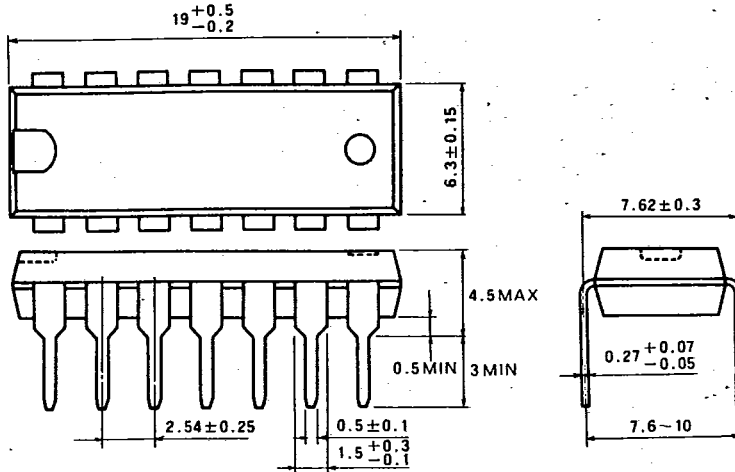
4-line to 1-line data selector (multiplexer)



T-90-20

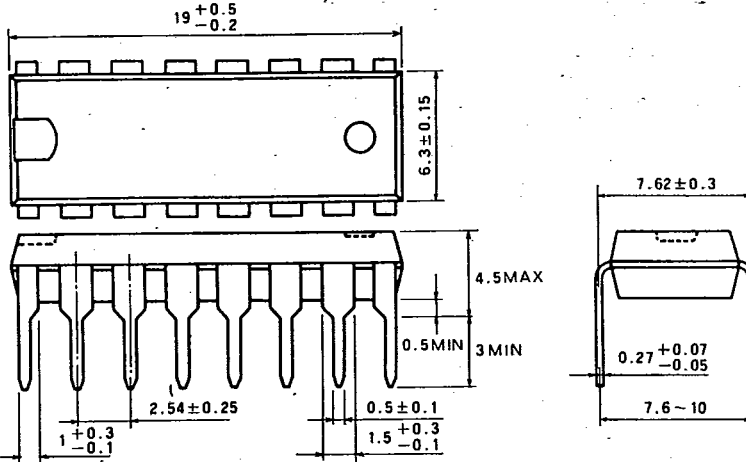
TYPE 14P4 14-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 16P4 16-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 20P4 20-PIN MOLDED PLASTIC DIL

Dimension in mm

