

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.

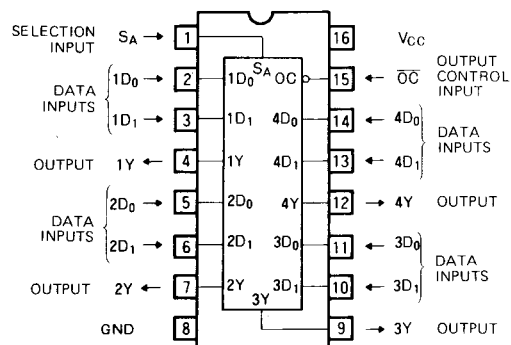
FUNCTIONAL DESCRIPTION

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)



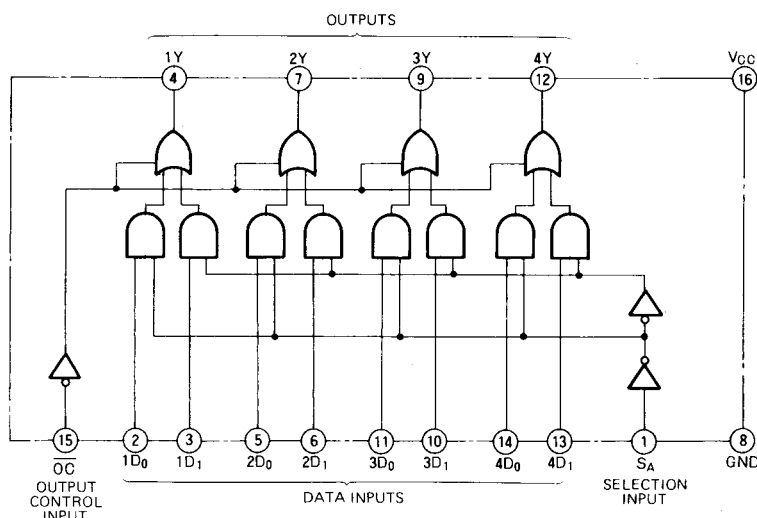
Outline 16P4

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 ($T_a = -20 \sim +75^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Limits	Unit
V_{CC}	Supply voltage		$-0.5 \sim +7$	V
V_I	Input voltage		$-0.5 \sim +15$	V
V_O	Output voltage	Off-state	$-0.5 \sim +5.5$	V
T_{opr}	Operating free-air ambient temperature range		$-20 \sim +75$	$^\circ\text{C}$
T_{stg}	Storage temperature range		$-65 \sim +150$	$^\circ\text{C}$

RECOMMENDED OPERATING CONDITIONS ($T_a = -20 \sim +75^\circ\text{C}$, 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	$V_{OH} \geq 2.4\text{V}$	0		-2.6	mA
I_{OL}	Low-level output current	$V_{OL} \leq 0.4\text{V}$	0		12	mA
		$V_{OL} \leq 0.5\text{V}$	0		24	mA

ELECTRICAL CHARACTERISTICS ($T_a = -20 \sim +75^\circ\text{C}$, 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		$V_{CC} = 4.75\text{V}$, $I_{IC} = -18\text{mA}$			-1.5	V
V_{OH}	High-level output voltage		$V_{CC} = 4.75\text{V}$, $V_I = 0.8\text{V}$ $V_I = 2\text{V}$, $I_{OH} = -2.6\text{mA}$	2.4	3.1		V
V_{OL}	Low-level output voltage		$V_{CC} = 4.75\text{V}$ $V_I = 0.8\text{V}$, $V_I = 2\text{V}$		0.25	0.4	V
			$I_{OL} = 12\text{mA}$ $I_{OL} = 24\text{mA}$		0.35	0.5	V
I_{OZH}	Off-state high-level output current		$V_{CC} = 5.25\text{V}$, $V_I = 2\text{V}$, $V_O = 2.4\text{V}$			20	μA
I_{OZL}	Off-state low-level output current		$V_{CC} = 5.25\text{V}$, $V_I = 2\text{V}$, $V_O = 0.4\text{V}$			-20	μA
I_{IH}	High-level input current	$D_0, D_1, \overline{OC}$	$V_{CC} = 5.25\text{V}$			20	μA
		S_A	$V_I = 2.7\text{V}$			40	μA
		$D_0, D_1, \overline{OC}$	$V_{CC} = 5.25\text{V}$			0.1	mA
		S_A	$V_I = 10\text{V}$			0.2	mA
I_{IL}	Low-level input current	$D_0, D_1, \overline{OC}$	$V_{CC} = 5.25\text{V}$			-0.4	mA
		S_A	$V_I = 0.4\text{V}$			-0.8	mA
I_{OS}	Short-circuit output current (Note 2)		$V_{CC} = 5.25\text{V}$, $V_O = 0\text{V}$	-30		-130	mA
I_{CCH}	Supply current, all outputs high		$V_{CC} = 5.25\text{V}$ (Note 3)		6.2	10	mA
I_{CCL}	Supply current, all outputs low		$V_{CC} = 5.25\text{V}$ (Note 4)		10	16	mA
I_{CCZ}	Supply current, all outputs off		$V_{CC} = 5.25\text{V}$ (Note 5)		12	19	mA

* : All typical values are at $V_{CC} = 5\text{V}$, $T_a = 25^\circ\text{C}$.

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 , D_1 at 0V and D_0 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.

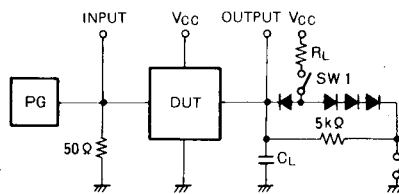
SWITCHING CHARACTERISTICS ($V_{CC} = 5\text{V}$, $T_a = 25^\circ\text{C}$, unless otherwise noted)

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	$C_L = 45\text{pF}$ (Note 6)		6	18	ns
t_{PHL}				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}				11	35	ns
t_{PZH}	Output enable time to high-level	$R_L = 667\Omega$, $C_L = 45\text{pF}$ (Note 6)		7	22	ns
t_{PZL}	Output enable time to low-level	$R_L = 667\Omega$, $C_L = 45\text{pF}$ (Note 6)		9	35	ns
t_{PLZ}	Output disable time from low-level	$R_L = 667\Omega$, $C_L = 5\text{ pF}$ (Note 6)		11	26	ns
t_{PHZ}	Output disable time from high-level	$R_L = 667\Omega$, $C_L = 5\text{ pF}$ (Note 6)		8	35	ns

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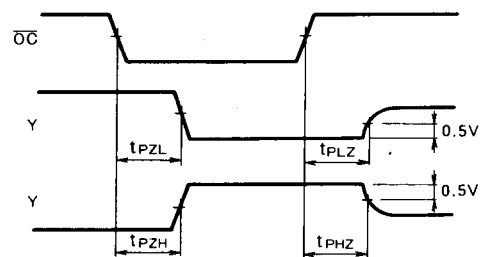
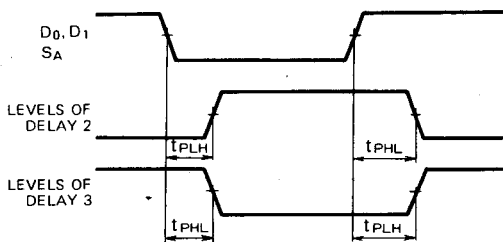
Note 6: Measurement circuit



Symbol	SW 1	SW 2
tPZH	Open	Closed
tPZL	Closed	Open
tPLZ	Closed	Closed
tPHZ	Closed	Closed

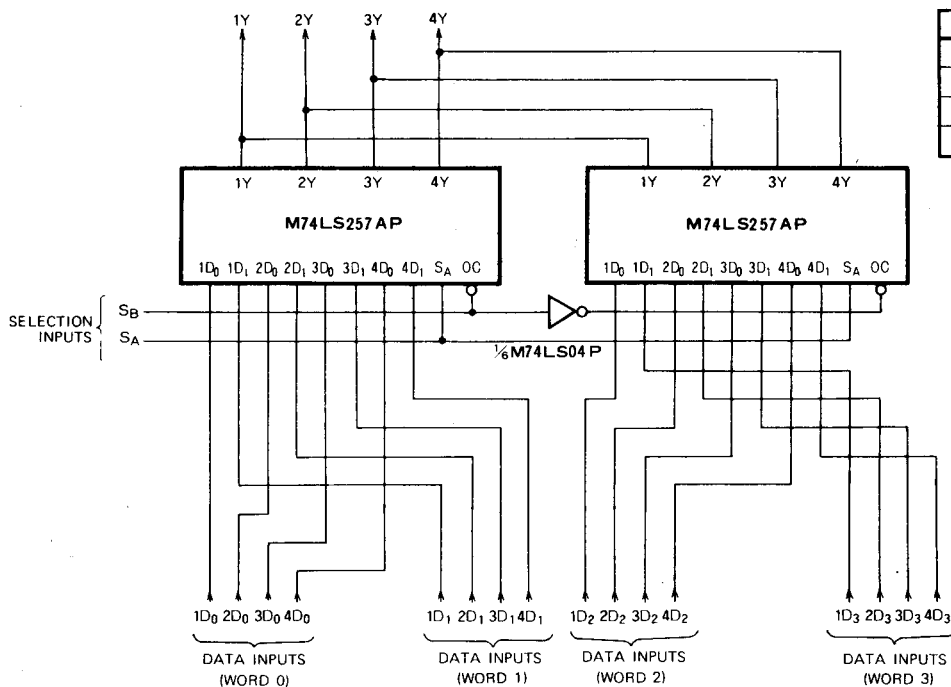
- (1) The pulse generator (PG) has the following characteristics:
PRR = 1MHz, $t_r = 6\text{ns}$, $t_f = 6\text{ns}$, $t_w = 500\text{ns}$,
 $V_p = 3V_{p-p}$, $Z_o = 50\Omega$.
(2) All diodes are switching diodes ($t_{rr} \leq 4\text{ns}$)
(3) C_L includes probe and jig capacitance.

TIMING DIAGRAM (Reference level = 1.3V)



APPLICATION EXAMPLE

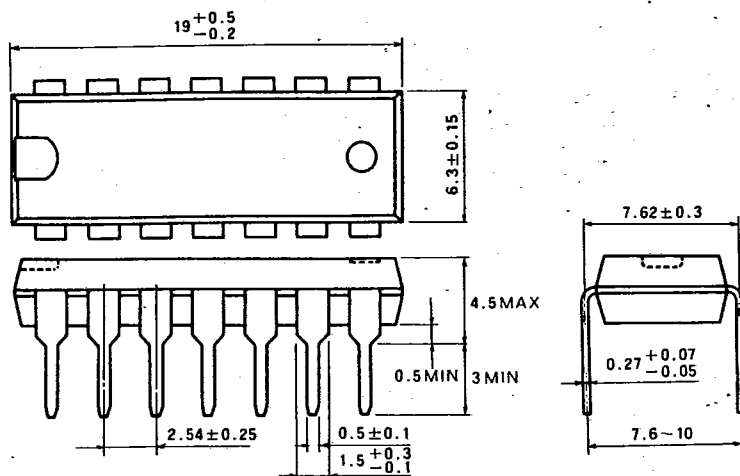
4-line to 1-line data selector (multiplexer)



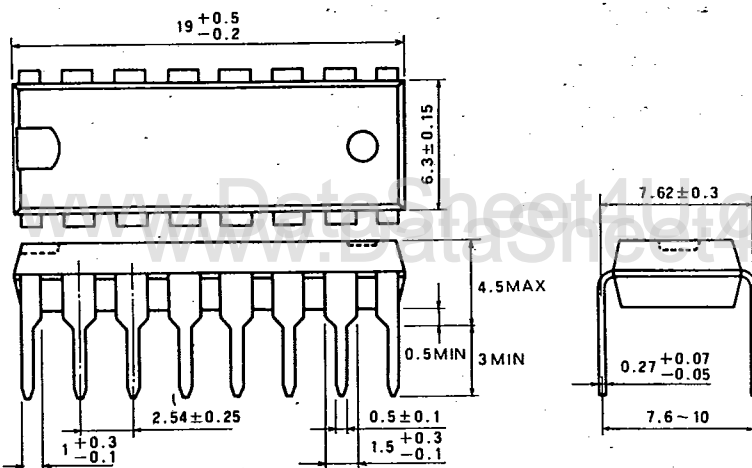
S _A	S _B	OUTPUT
L	L	WORD 0
L	H	WORD 1
H	L	WORD 2
H	H	WORD 3

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

