M74LS251P

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

DESCRIPTION

The M74LS251P is a semiconductor integrated circuit containing an 8-line to 1-line data selector/multiplexer function and 3-state outputs.

FEATURES

- 3-state outputs
- Complementary output provided
- Wide operating temperature range (T_a=−20~+75°C)

APPLICATION

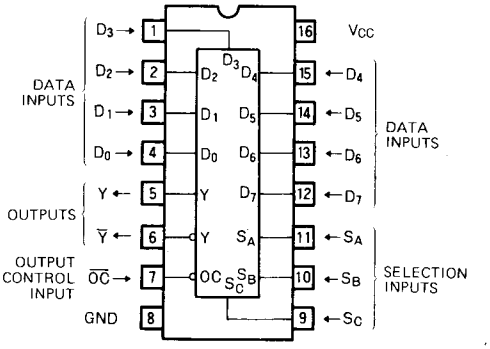
General purpose, for use in industrial and consumer equipment.

FUNCTIONAL DESCRIPTION

This IC has a data selector function which provides 1-line selection of 8 input signals and using a multiplexer function which converts the 8-bit parallel data into serial data by time-sharing. When 8-line signals are applied to the data inputs and 1 data is specified from among the 8 data from selection inputs S_A, S_B and S_C, the input signal is at output Y and the inverted signal from output $\overline{Y}$. When output control input $\overline{OC}$ is set high, Y and $\overline{Y}$ are put in the high-impedance state and the outputs are completely isolated.

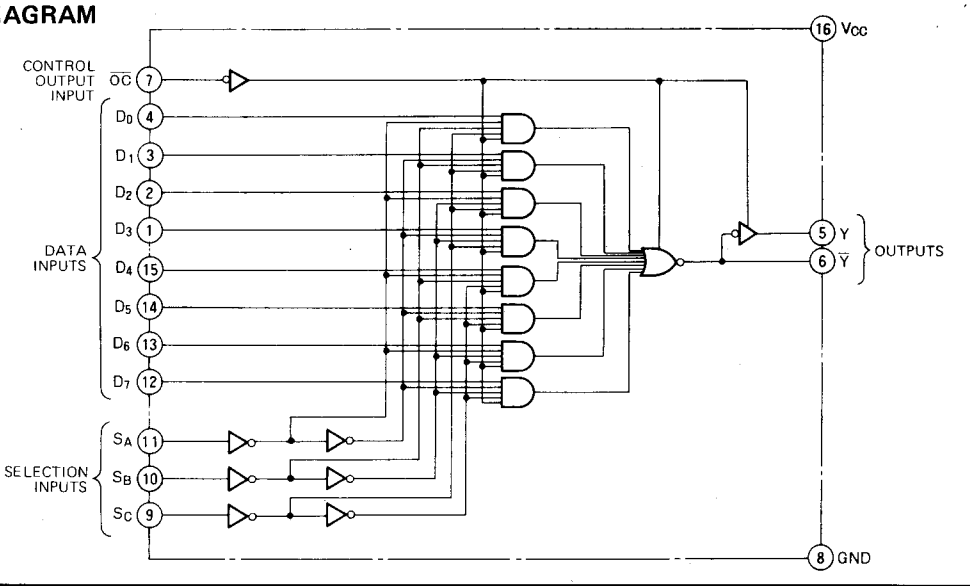
M74LS251P has the same functions and pin connections as M74LS151P but the latter is provided with active pull-up resistor outputs.

PIN CONFIGURATION (TOP VIEW)



Outline 16P4

BLOCK DIAGRAM



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

FUNCTION TABLE (Note 1)

S_C	S_B	S_A	$\overline{OC}$	D_0	D_1	D_2	D_3	D_4	D_5	D_6	D_7	Y	$\overline{Y}$
X	X	X	H	X	X	X	X	X	X	X	X	Z	Z
L	L	L	L	L	X	X	X	X	X	X	X	L	H
L	L	L	L	H	X	X	X	X	X	X	X	H	L
L	L	H	L	X	L	X	X	X	X	X	X	L	H
L	L	H	L	X	H	X	X	X	X	X	X	H	L
L	H	L	L	X	X	L	X	X	X	X	X	L	H
L	H	L	L	X	X	H	X	X	X	X	X	H	L
L	H	H	L	X	X	X	L	X	X	X	X	L	H
L	H	H	L	X	X	X	H	X	X	X	X	H	L
H	L	L	L	X	X	X	X	L	X	X	X	L	H
H	L	L	L	X	X	X	X	H	X	X	X	H	L
H	L	H	L	X	X	X	X	X	L	X	X	L	H
H	L	H	L	X	X	X	X	X	H	X	X	H	L
H	H	L	L	X	X	X	X	X	X	L	X	L	H
H	H	L	L	X	X	X	X	X	X	H	X	H	L
H	H	H	L	X	X	X	X	X	X	X	L	L	H
H	H	H	L	X	X	X	X	X	X	X	H	H	L

Note 1 X : Irrelevant
Z : High-impedance state

ABSOLUTE MAXIMUM RATINGS ($T_a = -20 \sim +75°C$, 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 ($T_a = -20 \sim +75°C$, 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	$V_{OH} \geqq 2.4V$	0		−2.6	mA
I_{OL}	Low-level output current	$V_{OL} \leqq 0.4V$	0		4	mA
		$V_{OL} \leqq 0.5V$	0		8	mA

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

ELECTRICAL CHARACTERISTICS ($T_a = -20 \sim +75°C$, 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	$V_{CC}=4.75V$ $I_{OL}=4mA$		0.25	0.4	V
		$V_I=0.8V$, $V_I=2V$ $I_{OL}=8mA$		0.35	0.5	V
I_{OZH}	Off-state high-level output current	$V_{CC}=5.25V$, $V_I=2V$, $V_O=2.7V$			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	$V_{CC}=5.25V$, $V_I=2.7V$			20	μA
		$V_{CC}=5.25V$, $V_I=10V$			0.1	mA
I_{IL}	Low-level input current	$V_{CC}=5.25V$, $V_I=0.4V$			−0.4	mA
I_{OS}	Short-circuit output current (Note 2)	$V_{CC}=5.25V$, $V_O=0V$	−30		−130	mA
I_{CC}	Supply current	$V_{CC}=5.25V$ (Note 3)		6.1	10	mA
I_{CCZ}	Supply current, all outputs off	$V_{CC}=5.25V$ (Note 4)		7.1	12	mA

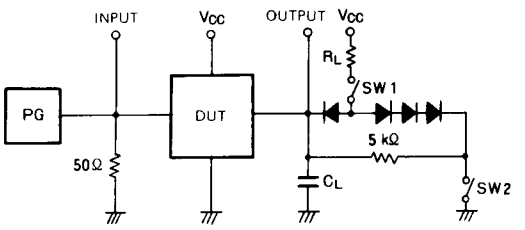
* : All typical values are at $V_{CC}=5V$, $T_a=25°C$.
Note 2: All measurements should be done quickly.
Note 3: I_{CC} is measured with $\overline{OC}$ at 0V and all other inputs at 4.5V
Note 4: I_{CCZ} is measured with all inputs at 4.5V.

SWITCHING CHARACTERISTICS ($V_{CC}=5V$, $T_a=25°C$, 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 S_A, S_B, S_C to output Y	$C_L=15pF$ (Note 5)		22	45	ns
t_{PHL}				18	45	ns
t_{PLH}	Low-to-high-level, high-to-low-level output propagation time, from inputs S_A, S_B, S_C to output $\overline{Y}$			10	33	ns
t_{PHL}				15	33	ns
t_{PLH}	Low-to-high-level, high-to-low-level output propagation time, from inputs $D_0 \sim D_7$ to output Y			15	28	ns
t_{PHL}				14	28	ns
t_{PLH}	Low-to-high-level, high-to-low-level output propagation time, from inputs $D_0 \sim D_7$ to output $\overline{Y}$			7	15	ns
t_{PHL}				7	15	ns
t_{PZH}	High-level output enable time, from input $\overline{OC}$ to output Y	$R_L=2k\Omega$, $C_L=15pF$ (Note 5)		11	45	ns
t_{PZL}	Low-level output enable time, from input $\overline{OC}$ to output Y			16	40	ns
t_{PZH}	High-level output enable time, from input $\overline{OC}$ to output $\overline{Y}$	$R_L=2k\Omega$, $C_L=15pF$ (Note 5)		11	27	ns
t_{PZL}	Low-level output enable time, from input $\overline{OC}$ to output $\overline{Y}$			13	40	ns
t_{PHZ}	High-level outpout disable time, from input $\overline{OC}$ to output Y	$R_L=2k\Omega$, $C_L=5pF$ (Note 5)		16	45	ns
t_{PLZ}	Low-level output disable time, from input $\overline{OC}$ to output Y			8	25	ns
t_{PHZ}	High-level output disable time, from input $\overline{OC}$ to output $\overline{Y}$	$R_L=2k\Omega$, $C_L=5pF$ (Note 5)		18	55	ns
t_{PLZ}	Low-level output disable time, from input $\overline{OC}$ to output $\overline{Y}$			9	25	ns

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

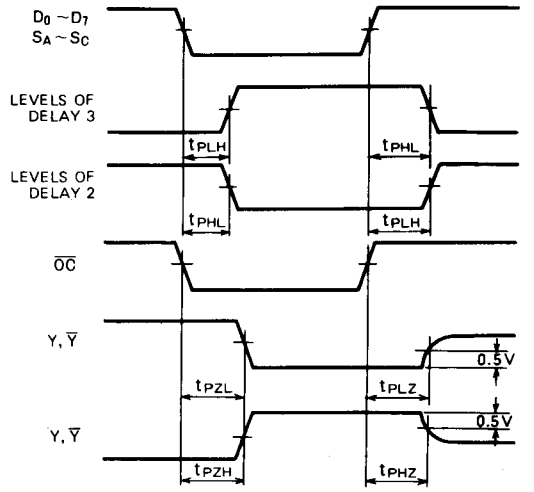
Note 5. Measurement circuit



(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=50Ω.
(2) All diodes are switching diodes. ($t_{rr} \leqq 4$ns)
(3) C_L includes probe and jig capacitance

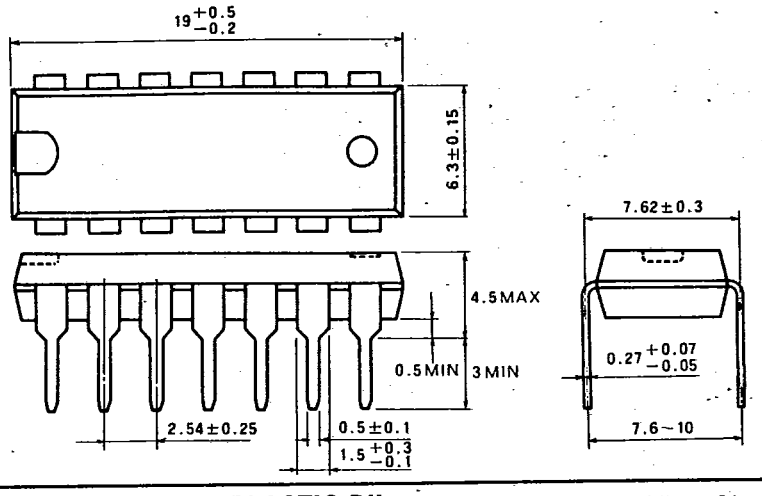
Symbol	SW 1	SW2
t_{PZH}	Open	Closed
t_{PZL}	Closed	Open
t_{PLZ}	Closed	Closed
t_{PHZ}	Closed	Closed

TIMING DIAGRAM (Reference level = 1.3V)



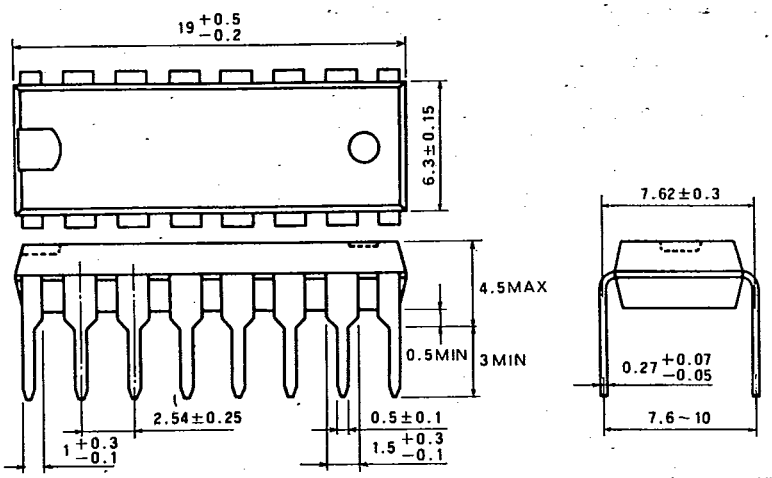
TYPE 14P4 14-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 16P4 16-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 20P4 20-PIN MOLDED PLASTIC DIL

Dimension in mm