

MITSUBISHI LSTTLs

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

APPLICATION

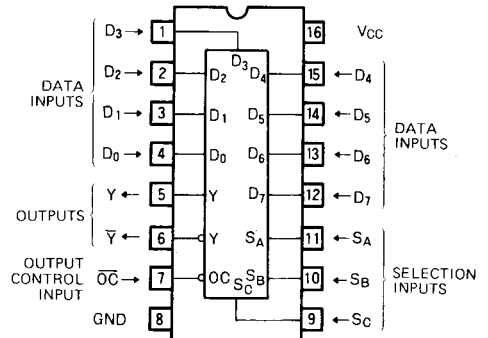
General purpose, for use in industrial and consumer equipment.

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 \bar{Y} . When output control input \overline{OC} is set high, Y and \bar{Y} are put in the high-impedance state and the outputs are completely isolated.

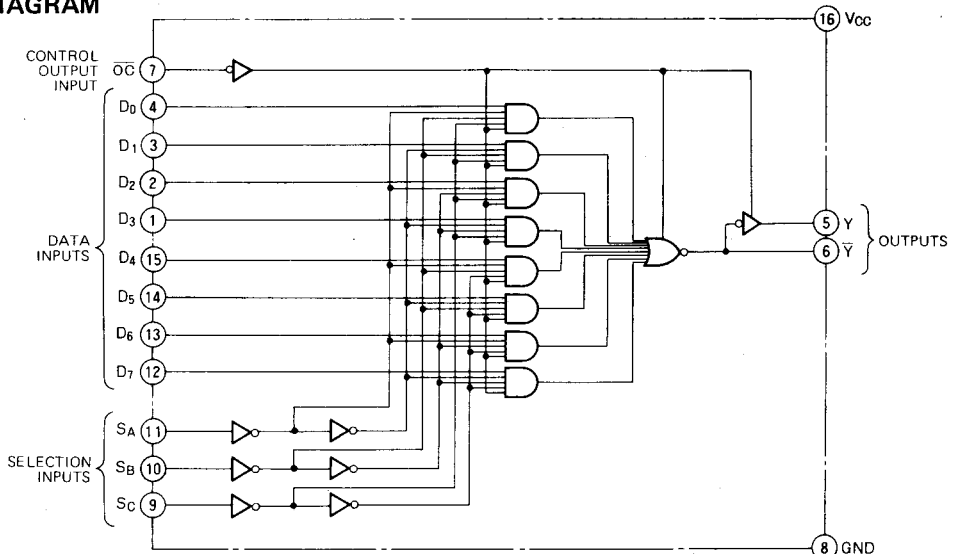
M74LS251P has the same functions and pin connections as M74LS151P but the latter is provided with active pull-up resistor outputs.

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 ~ +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 ~ +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		4	mA
		V _{OL} ≤ 0.5V	0		8	mA

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

ELECTRICAL CHARACTERISTICS (T_a = -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		0.25	0.4	V
		V _I = 0.8V, V _I = 2V		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.

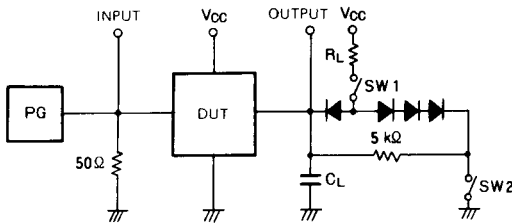
Note 3: I_{CC} is measured with \overline{OC} at 0V and all other inputs at 4.5VNote 4: I_{CCZ} is measured with all inputs at 4.5V.

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}	High-to-low-level, high-to-low-level output propagation time, from inputs S _A , S _B , S _C to output Y			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}	High-to-low-level, high-to-low-level output propagation time, from inputs S _A , S _B , S _C to output \overline{Y}			15	33	ns
t _{PLH}	Low-to-high-level, high-to-low-level output propagation time, from inputs D ₀ ~ D ₇ to output Y			15	28	ns
t _{PHL}	High-to-low-level, high-to-low-level output propagation time, from inputs D ₀ ~ D ₇ to output Y			14	28	ns
t _{PLH}	Low-to-high-level, high-to-low-level output propagation time, from inputs D ₀ ~ D ₇ to output \overline{Y}			7	15	ns
t _{PHL}	High-to-low-level, high-to-low-level output propagation time, from inputs D ₀ ~ D ₇ to output \overline{Y}			7	15	ns
t _{PZH}	High-level output enable time, from input \overline{OC} to output Y	R _L = 2kΩ, 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 = 2kΩ, 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 output disable time, from input \overline{OC} to output Y	R _L = 2kΩ, 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 = 2kΩ, 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

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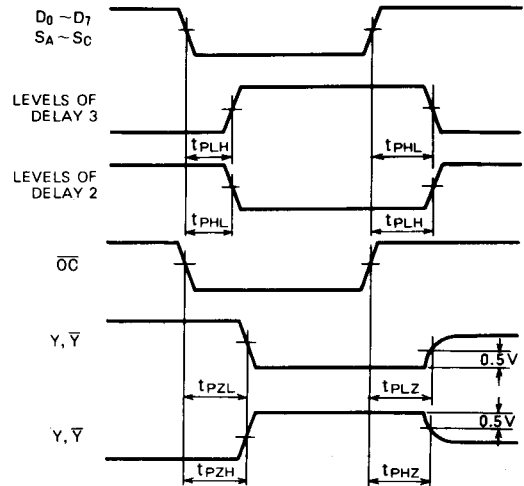
Note 5: Measurement circuit



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

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

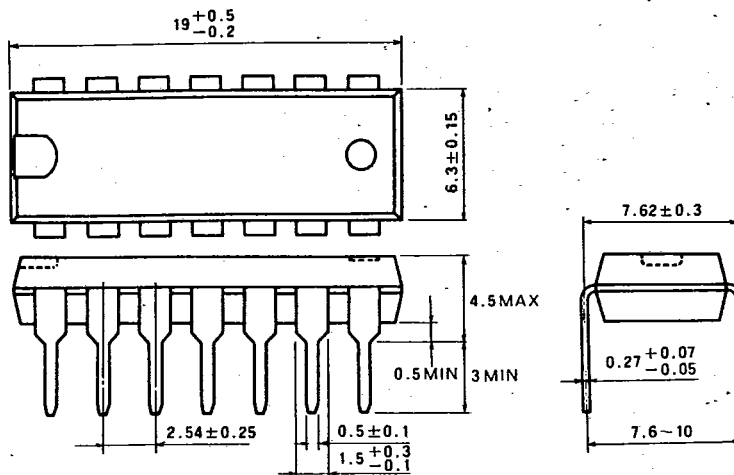
TIMING DIAGRAM (Reference level = 1.3V)



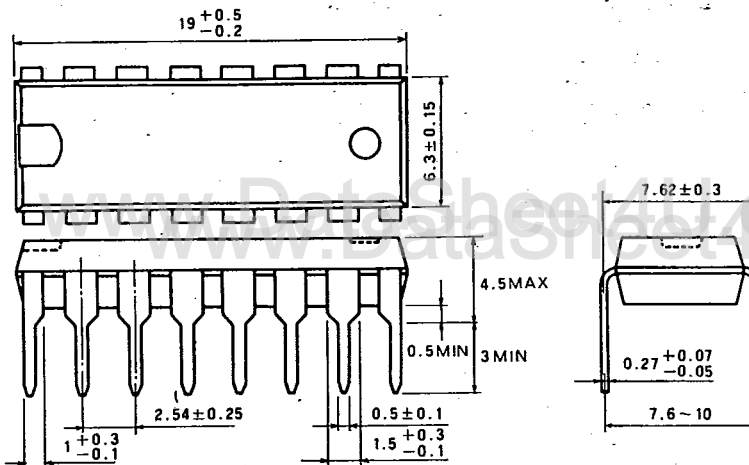
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TYPE 14P4 14-PIN MOLDED PLASTIC DIL

Dimension in mm

**TYPE 16P4 16-PIN MOLDED PLASTIC DIL**

Dimension in mm

**TYPE 20P4 20-PIN MOLDED PLASTIC DIL**

Dimension in mm

