

MITSUBISHI LSTTLs
M74LS253P

**DUAL 4-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER
WITH 3-STATE OUTPUT**

DESCRIPTION

The M74LS253P is a semiconductor integrated circuit containing two 4-line to 1-line data selector/multiplexer circuits and 3-state outputs.

FEATURES

- Selection inputs common to both circuits
- Output control inputs separate for each circuit
- 3-state outputs
- Wide operating temperature range ($T_a = -20 \sim +75^\circ\text{C}$)

APPLICATION

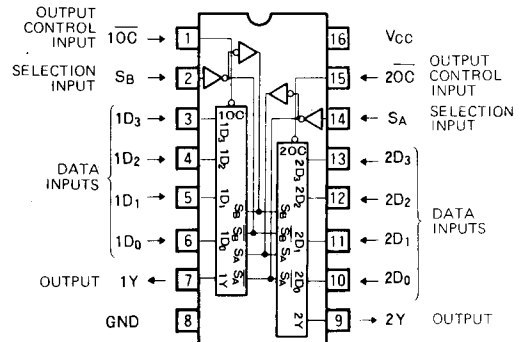
General purpose, for use in industrial and consumer equipment.

FUNCTIONAL DESCRIPTION

This IC has two data selector circuits which provide 1-line selection of 4 input signal using two multiplexer circuits which convert the 4-bit parallel data into serial data by time-sharing. When 4-line signals are applied to the data inputs D_0, D_1, D_2 and D_3 , and 1 data is specified from among the data input by selection inputs S_A and S_B , the input signal is output at Y. By applying 4-bit parallel data to data inputs D_0, D_1, D_2 and D_3 and by connecting the output of a synchronous divide-by-four counter to S_A and S_B , data D_0, D_1, D_2 and D_3 appear in the order of D_0, D_1, D_2 and D_3 , synchronized with the clock pulse. S_A and S_B are common to both circuits while output control inputs $\overline{1OC}$ and $\overline{2OC}$ are separate. When $\overline{1OC}$ and $\overline{2OC}$ are set high, $1Y$ and $2Y$ are put in the high-impedance state ("Z") irrespective of the status of the inputs.

M74LS253P has the same functions and pin connections as M74LS153P but the latter is provided with active pull-up resistor outputs.

PIN CONFIGURATION (TOP VIEW)



Outline 16P4

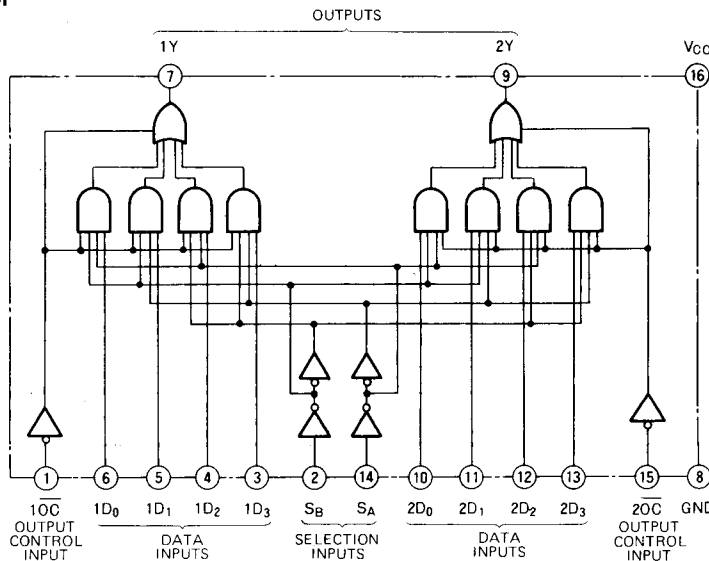
FUNCTION TABLE (Note 1)

S_B	S_A	D_0	D_1	D_2	D_3	$\overline{OC}$	Y
X	X	X	X	X	X	H	Z
L	L	L	X	X	X	L	L
L	L	H	X	X	X	L	H
L	H	X	L	X	X	L	L
L	H	X	H	X	X	L	H
H	L	X	X	L	X	L	L
H	L	X	X	H	X	L	H
H	H	X	X	X	L	L	L
H	H	X	X	X	H	L	H

Note 1 X : Irrelevant

Z : High-impedance state

BLOCK DIAGRAM



**DUAL 4-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		4	mA
		$V_{OL} \leq 0.5\text{V}$	0		8	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	$V_{CC} = 4.75\text{V}$ $V_I = 0.8\text{V}$, $V_I = 2\text{V}$				
		$I_{OL} = 4\text{mA}$ $I_{OL} = 8\text{mA}$		0.25 0.35	0.4 0.5	V
I_{OZH}	Off-state high-level output current	$V_{CC} = 5.25\text{V}$, $V_I = 2\text{V}$, $V_O = 2.7\text{V}$			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	$V_{CC} = 5.25\text{V}$, $V_I = 2.7\text{V}$			20	μA
		$V_{CC} = 5.25\text{V}$, $V_I = 10\text{V}$			0.1	mA
I_{IL}	Low-level input current	$V_{CC} = 5.25\text{V}$, $V_I = 0.4\text{V}$			-0.4	mA
I_{OS}	Short-circuit output current (Note 2)	$V_{CC} = 5.25\text{V}$, $V_O = 0\text{V}$	-30		-130	mA
I_{CCL}	Supply current, all outputs low	$V_{CC} = 5.25\text{V}$ (Note 3)		7	12	mA
I_{CCZ}	Supply current, all outputs off	$V_{CC} = 5.25\text{V}$ (Note 4)		8.5	14	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_{CCL} is measured with all inputs at 0V.

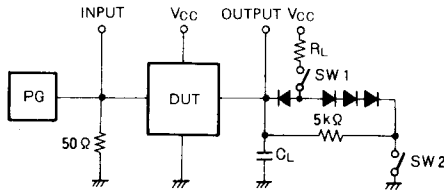
Note 4: I_{CCZ} is measured with 10°C and 20°C at 4.5V and all other inputs at 0V.

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 $D_0 \sim D_3$ to output Y	$C_L = 15\text{pF}$ (Note 5)		8	25	ns
t_{PHL}	High-to-low-level, high-to-low-level output propagation time, from inputs $D_0 \sim D_3$ to output Y			12	20	ns
t_{PLH}	Low-to-high-level, high-to-low-level output propagation time, from inputs S_A , S_B to output Y			12	45	ns
t_{PHL}	High-to-low-level, high-to-low-level output propagation time, from inputs S_A , S_B to output Y			12	32	ns
t_{PZH}	Output enable time to high-level	$R_L = 2\text{k}\Omega$, $C_L = 15\text{pF}$ (Note 5)		11	28	ns
t_{PZL}	Output enable time to low-level	$R_L = 2\text{k}\Omega$, $C_L = 15\text{pF}$ (Note 5)		12	23	ns
t_{PHZ}	Output disable time from high-level	$R_L = 2\text{k}\Omega$, $C_L = 5\text{pF}$ (Note 5)		15	41	ns
t_{PLZ}	Output disable time from low-level	$R_L = 2\text{k}\Omega$, $C_L = 5\text{pF}$ (Note 5)		9	27	ns

**DUAL 4-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER
WITH 3-STATE OUTPUT**

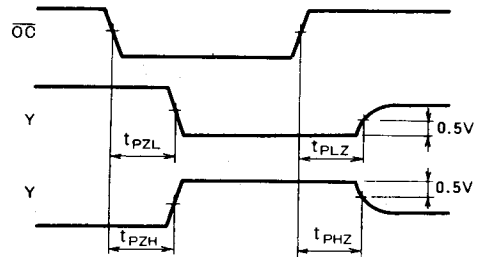
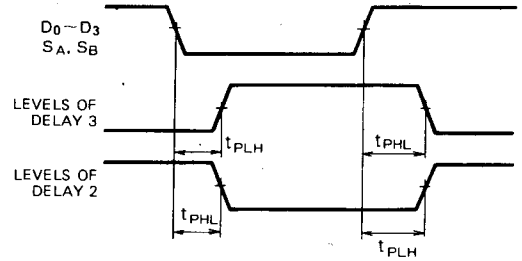
Note 5: Measurement circuit



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

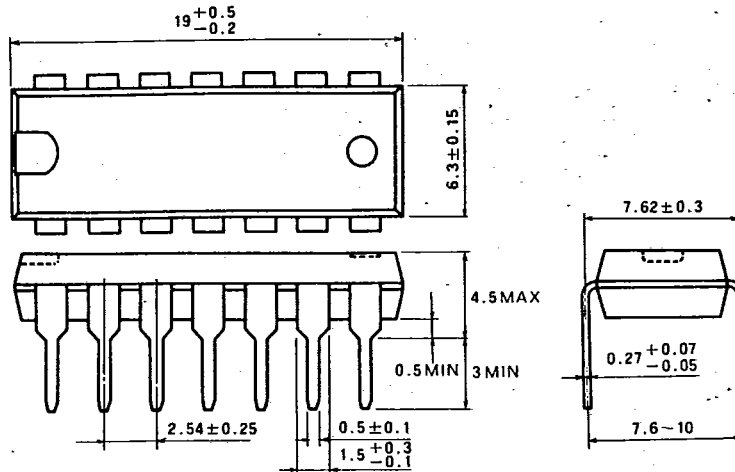
- (1) The pulse generator (PG) has the following characteristics:
PRR: 1MHz, $t_r=6ns$, $t_f=6ns$, $t_w=500ns$, $V_P = 3V_{P.P.}$, $Z_0 = 50\Omega$.
- (2) All diodes are switching diodes. ($t_{rr} \leq 4ns$)
- (3) C_L includes probe and jig capacitance.

TIMING DIAGRAM (Reference level = 1.3V)



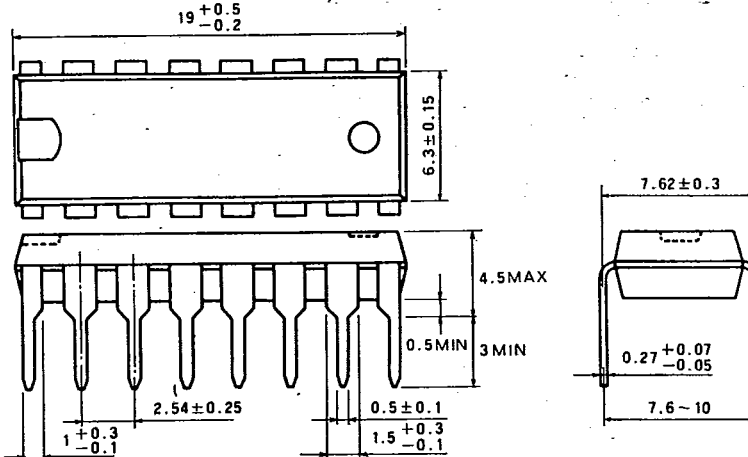
TYPE 14P4 14-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 16P4 16-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 20P4 20-PIN MOLDED PLASTIC DIL

Dimension in mm

