National Semiconductor

DM71L22/DM81L22, DM71L23/DM81L23 Quad 2-Input Data Selectors/Multiplexers

General Description

These devices contain four, two-input multiplexers with common input select logic and common output disable circuitry. The DM71L22/81L22 provides conventional totem-pole output TTL construction, whereas DM71L23/81L23 provides TRI-STATE® outputs. When the enable/strobe input is at a low logic level, the outputs of all devices are conventional TTL. However, when the enable/strobe input is raised to a high logic level, the outputs of the DM71L22/81L22 go to the low logic state, and the outputs of the DM71L23/81L23 go to the high-impedance third state. These devices provide the designer with TRI-STATE and/or low power pin/pin replacements for the popular 9322 and 54/74157 multiplexers.

Features

- Pin equivalents popular 9322 and 54/74157 multiplexers
- Both conventional TTL and TRI-STATE outputs available
- Typical propagation delay 40 ns
- Typical power dissipation
    L22 15 mW
    L23 20 mW

Absolute Maximum Ratings (Note 1)

Supply Voltage	8V
Input Voltage	5.5V
Storage Temperature Range	−65°C to 150°C

Note 1: The "Absolute Maximum Ratings" are those values beyond which the safety of the device can not be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.
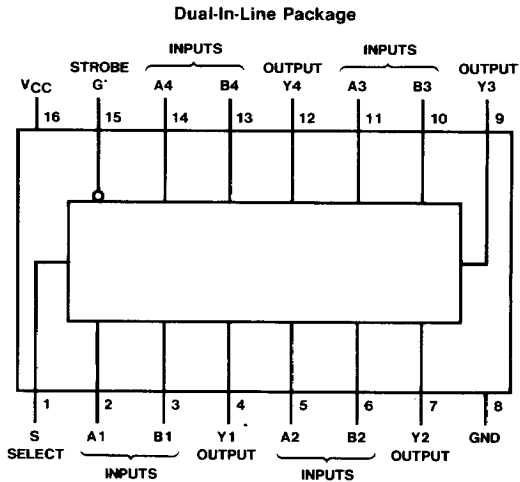
Function Tables

L22

Strobe	Select	Inputs A	Inputs B	Output Y
L	L	L	X	L
L	L	H	X	H
L	H	X	L	L
L	H	X	H	H
H	X	X	X	L

L23

Enable	Select	Inputs A	Inputs B	Output Y
L	L	L	X	L
L	L	H	X	H
L	H	X	L	L
L	H	X	H	H
H	X	X	X	Hi-Z

L = Low Logic Level
H = High Logic Level
X = Either Low or High Logic Level
Hi-Z = High Impedance (Off) State

Connection Diagram

Dual-In-Line Package

*Enable for 'L23

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71L22 (J)   81L22 (N)
71L23 (J)   81L23 (N)

Recommended Operating Conditions

Sym	Parameter	DM71L22			DM81L22			Units
		Min	Nom	Max	Min	Nom	Max	
V_{CC}	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High Level Input Voltage	2			2			V
V_{IL}	Low Level Input Voltage			0.7			0.7	V
I_{OH}	High Level Output Current			−0.2			−0.2	mA
I_{OL}	Low Level Output Current			2			3.6	mA
T_A	Free Air Operating Temperature	−55		125	0		70	°C

'L22 Electrical Characteristics

over recommended operating free air temperature (unless otherwise noted)

Sym	Parameter	Conditions		Min	Typ (Note 1)	Max	Units
V_{OH}	High Level Output Voltage	$V_{CC} = $ Min, $I_{OH} = $ Max $V_{IL} = $ Max, $V_{IH} = $ Min		2.4	2.8		V
V_{OL}	Low Level Output Voltage	$V_{CC} = $ Min $I_{OL} = $ Max $V_{IL} = $ Max $V_{IH} = $ Min	DM71		0.15	0.3	V
			DM81		0.2	0.4	
I_i	Input Current @ Max Input Voltage	$V_{CC} = $ Max, $V_I = 5.5V$				0.1	mA
I_{IH}	High Level Input Current	$V_{CC} \doteq $ Max, $V_I = 2.4V$				10	μA
I_{IL}	Low Level Input Current	$V_{CC} = $ Max, $V_I = 0.3V$				−0.18	mA
I_{OS}	Short Circuit Output Current	$V_{CC} = $ Max (Note 2)	DM71	−3		−15	mA
			DM81	−3		−15	
I_{CC}	Supply Current	$V_{CC} = $ Max (Note 3)			3	4	mA

Note 1: All typicals are at $V_{CC} = 5V$, $T_A = 25°C$.
Note 2: Not more than one output should be shorted at a time.
Note 3: I_{CC} is measured with all inputs grounded, and all outputs open.

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'L22 Switching Characteristics at $V_{CC} = 5V$ and $T_A = 25°C$
(See Section 1 for Test Waveforms and Output Load)

Parameter	Conditions	$R_L = 4\ k\Omega$ $C_L = 50\ pF$			Units
		Min	Typ	Max	
t_{PLH} Propagation Delay Time Low to High Level Output	Data to Output	20	40	80	ns
t_{PHL} Propagation Delay Time High to Low Level Output	Data to Output	20	40	80	ns
t_{PLH} Propagation Delay Time Low to High Level Output	Strobe to Output	30	60	120	ns
t_{PHL} Propagation Delay Time High to Low Level Output	Strobe to Output	30	60	120	ns
t_{PLH} Propagation Delay Time Low to High Level Output	Select to Output	35	70	140	ns
t_{PHL} Propagation Delay Time High to Low Level Output	Select to Output	25	50	100	ns

Recommended Operating Conditions

Sym	Parameter	DM71L23			DM81L23			Units
		Min	Nom	Max	Min	Nom	Max	
V_{CC}	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High Level Input Voltage	2			2			V
V_{IL}	Low Level Input Voltage			0.7			0.7	V
I_{OH}	High Level Output Current			−0.2			−0.2	mA
I_{OL}	Low Level Output Current			2			3.6	mA
T_A	Free Air Operating Temperature	−55		125	0		70	°C

'L23 Electrical Characteristics
over recommended operating free air temperature (unless otherwise noted)

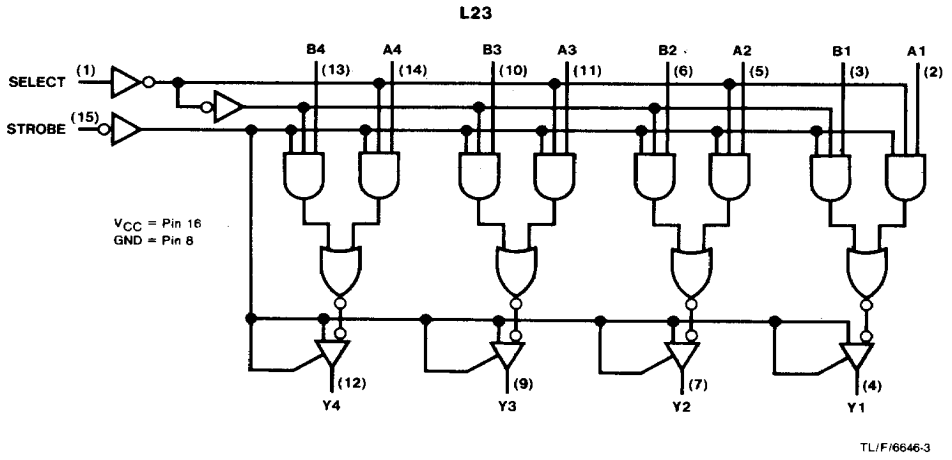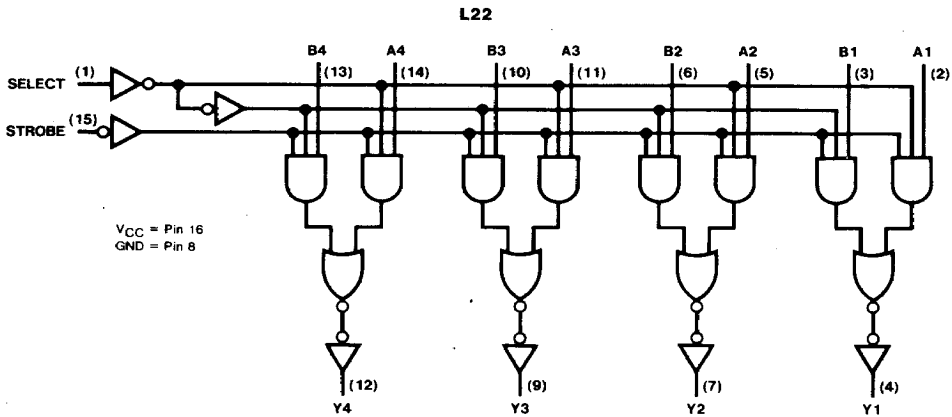| Sym	Parameter	Conditions		Min	Typ (Note 1)	Max	Units
V_{OH}	High Level Output Voltage	V_{CC} = Min, I_{OH} = Max V_{IL} = Max, V_{IH} = Min		2.4	2.8		V
V_{OL}	Low Level Output Voltage	V_{CC} = Min I_{OL} = Max V_{IL} = Max V_{IH} = Min	DM71		0.15	0.3	V
			DM81		0.2	0.4	
I_I	Input Current @ Max Input Voltage	V_{CC} = Max, V_I = 5.5V				0.1	mA
I_{IH}	High Level Input Current	V_{CC} = Max, V_I = 2.4V				10	μA
I_{IL}	Low Level Input Current	V_{CC} = Max, V_I = 0.3V				− 0.18	mA
I_{OZH}	Off-State Output Current with High Level Output Voltage Applied	V_{CC} = Max, V_O = 2.4V V_{IH} = Min, V_{IL} = Max				20	μA
I_{OZL}	Off-State Output Current with Low Level Output Voltage Applied	V_{CC} = Max, V_O = 0.3V V_{IH} = Min, V_{IL} = Max				− 40	μA
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 2)	DM71	− 3		− 15	mA
			DM81	− 3		− 15	
I_{CC}	Supply Current	V_{CC} = Max (Note 3)			4	5.3	mA

Note 1: All typicals are at V_{CC} = 5V, T_A = 25°C.

Note 2: Not more than one output should be shorted at a time.

Note 3: I_{CC} is measured with all inputs grounded, and all outputs open.

'L23 Switching Characteristics at $V_{CC} = 5V$ and $T_A = 25°C$

(See Section 1 for Test Waveforms and Output Load)

Parameter	From (Input) To (Output)	$R_L = 4\ k\Omega$						Units
		$C_L = 5\ pF$			$C_L = 50\ pF$			
		Min	Typ	Max	Min	Typ	Max	
t_{PLH} Propagation Delay Time Low to High Level Output	Data to Output				20	40	80	ns
t_{PHL} Propagation Delay Time High to Low Level Output	Data to Output				20	40	80	ns
t_{PLH} Propagation Delay Time Low to High Level Output	Select to Output				35	70	140	ns
t_{PHL} Propagation Delay Time High to Low Level Output	Select to Output				25	50	100	ns
t_{PZH} Output Enable Time to High Level Output	Output Control to Q				15	30	60	ns
t_{PZL} Output Enable Time to Low Level Output	Output Control to Q				20	35	70	ns
t_{PHZ} Output Disable Time from High Level Output	Output Control to Q	15	30	60				ns
t_{PLZ} Output Disable Time from Low Level Output	Output Control to Q	35	75	100				ns

Logic Diagrams

L22

SELECT (1)
STROBE (15)

B4 (13) A4 (14) B3 (10) A3 (11) B2 (6) A2 (5) B1 (3) A1 (2)

V_{CC} = Pin 16
GND = Pin 8

(12) Y4   (9) Y3   (7) Y2   (4) Y1

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L23

SELECT (1)
STROBE (15)

B4 (13) A4 (14) B3 (10) A3 (11) B2 (6) A2 (5) B1 (3) A1 (2)

V_{CC} = Pin 16
GND = Pin 8

(12) Y4   (9) Y3   (7) Y2   (4) Y1

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