LS273

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National Semiconductor

54LS273/DM74LS273
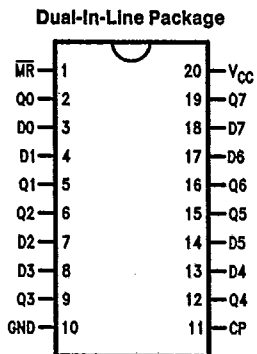## 8-Bit Register with Clear

General Description

The 'LS273 is a high speed 8-bit register, consisting of eight D-type flip-flops with a common Clock and an asynchronous active LOW Master Reset. This device is supplied in a 20-pin package featuring 0.3 inch row spacing.

Features

- Edge-triggered
- 8-bit high speed register
- Parallel in and out
- Common clock and master reset

Connection Diagram

Dual-In-Line Package

$\overline{MR}$	1	20	V_{CC}
Q0	2	19	Q7
D0	3	18	D7
D1	4	17	D6
Q1	5	16	Q6
Q2	6	15	Q5
D2	7	14	D5
D3	8	13	D4
Q3	9	12	Q4
GND	10	11	CP

TL/F/9825–1

Order Number 54LS273DMQB, 54LS273FMQB, 54LS273LMQB, DM74LS273M or DM74LS273N
See NS Package Number E20A, J20A, M20B, N20A or W20A

Pin Names	Description
CP	Clock Pulse Input (Active Rising Edge)
D0–D7	Data Inputs
$\overline{MR}$	Asynchronous Master Reset Input (Active LOW)
Q0–Q7	Flip-Flop Outputs

Absolute Maximum Ratings (Note)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	7V
Input Voltage	7V
Operating Free Air Temperature Range	
54LS	−55°C to +125°C
DM74LS	0°C to +70°C
Storage Temperature Range	−65°C to +150°C

Note: The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot 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.

Recommended Operating Conditions

Symbol	Parameter	54LS273			DM74LS273			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			0.8	V
I_{OH}	High Level Output Current			−0.4			−0.4	mA
I_{OL}	Low Level Output Current			4			8	mA
T_A	Free Air Operating Temperature	−55		125	0		70	°C
$t_s(H)$ $t_s(L)$	Setup Time HIGH or LOW D_n to CP	15 15			15 15			ns
$t_h(H)$ $t_h(L)$	Hold Time HIGH or LOW D_n to CP	5 5			5 5			ns
$t_w(H)$ $t_w(L)$	CP Pulse Width HIGH or LOW	20 20			20 20			ns
$t_w(L)$	$\overline{MR}$ Pulse Width LOW	20			20			ns
t_{rec}	Recovery Time $\overline{MR}$ to CP	15			15			ns

Electrical Characteristics

Over recommended operating free air temperature range (unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ (Note 1)	Max	Units
V_I	Input Clamp Voltage	V_{CC} = Min, I_I = −18 mA				−1.5	V
V_{OH}	High Level Output Voltage	V_{CC} = Min, I_{OH} = Max, V_{IL} = Max	54LS	2.5			V
			DM74	2.7	3.4		
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max, V_{IH} = Min	54LS			0.4	V
			DM74		0.35	0.5	
		I_{OL} = 4 mA, V_{CC} = Min	DM74		0.25	0.4	
I_I	Input Current @ Max Input Voltage	V_{CC} = Max, V_I = 10V				0.1	mA
I_{IH}	High Level Input Current	V_{CC} = Max, V_I = 2.7V				20	μA
I_{IL}	Low Level Input Current	V_{CC} = Max, V_I = 0.4V				−0.4	mA
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 2)	54LS	−20		−100	mA
			DM74	−20		−100	
I_{CC}	Supply Current	V_{CC} = Max				27	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, and the duration should not exceed one second.

LS273

Switching Characteristics

T-46-09-05

V_{CC} = +5.0V, T_A = +25°C (See Section 1 for waveforms and load configurations)

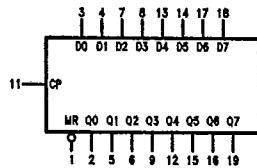| Symbol	Parameter	C_L = 15 pF				Units
		54LS		DM74LS		
				R_L = 2 kΩ		
		Min	Max	Min	Max	
f_{max}	Maximum Clock Frequency	30		30		MHz
t_{PLH} t_{PHL}	Propagation Delay CP to Q_n		32 32		24 24	ns
t_{PLH}	Propagation Delay $\overline{MR}$ to Q_n		32		27	ns

Functional Description

The 'LS273 is an 8-bit parallel register with a common Clock and common Master Reset. When the $\overline{MR}$ input is LOW, the Q outputs are LOW, independent of the other inputs. Information meeting the setup and hold time requirements of the D inputs is transferred to the Q outputs on the LOW-to-HIGH transition of the clock input.

Truth Table

Inputs			Outputs
MR	CP	D_n	Q_n
L	X	X	L
H	⌐	H	H
H	⌐	L	L

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

Logic Symbol

TL/F/9825-2

V_{CC} = Pin 20
GND = Pin 10

Logic Diagram

TL/F/9825-3