◥ *National Semiconductor*

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DM54LS273/DM74LS273
8-Bit Register with Clear

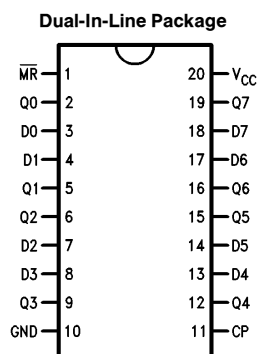## General Description

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 DM54LS273E, DM54LS273J, DM54LS273W, 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	
DM54LS	$-55°C$ 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	DM54LS273			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	DM54	2.5			V
			DM74	2.7	3.4		
V_{OL}	Low Level Output Voltage	$V_{CC} = $ Min, $I_{OL} = $ Max, $V_{IH} = $ Min	DM54			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, $V_I = 7V$ $V_I = 10V$ (DM54)				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)	DM54	-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.

Switching Characteristics $V_{CC} = +5.0V$, $T_A = +25°C$

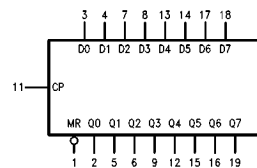| Symbol	Parameter	$C_L = 15$ pF				Units
		DM54LS		DM74LS		
				$R_L = 2$ kΩ		
		Min	Max	Min	Max	
f_{max}	Maximum Clock Frequency	30		30		MHz
t_{PLH} t_{PHL}	Propagation Delay CP to Q_n		24 24		24 24	ns
t_{PLH}	Propagation Delay $\overline{MR}$ to Q_n		27		27	ns

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

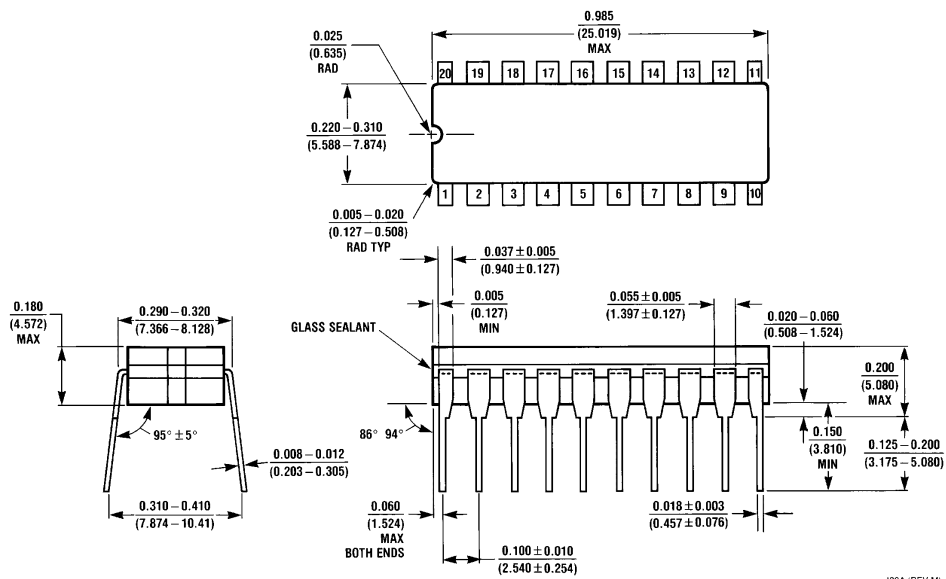V_{CC} = Pin 20
GND = Pin 10

TL/F/9825–2

Logic Diagram
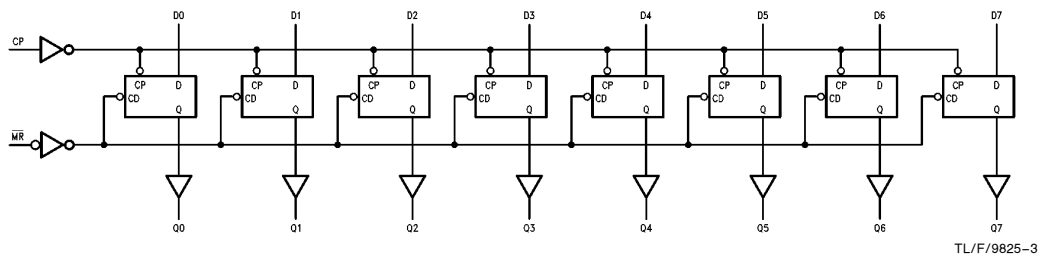
TL/F/9825–3

Physical Dimensions inches (millimeters)

Top View

0.350 ± 0.008
(8.890 ± 0.203)

Side View

0.063 − 0.075
(1.600 − 1.905)

DETAIL A

0.200 ± 0.005
(5.080 ± 0.127)
TYP

45° × 0.015 ± 0.010
(0.381 ± 0.254)

0.015
(0.381)
MIN TYP

0.007 − 0.011
(0.178 − 0.279)
R TYP

0.077 − 0.093
(1.959 − 2.362)

PIN #1
INDEX

0.022 − 0.028
(0.559 − 0.711)
TYP

0.045 − 0.055
(1.143 − 1.397)
TYP

0.067 − 0.083
(1.702 − 2.108)
TYP

0.045 − 0.055
(1.143 − 1.397)
TYP

45° × 0.040 ± 0.010
(1.016 ± 0.254)
3 PLCS

Bottom View

Detail A

0.003
(0.076)
MIN TYP

0.015
(0.381)
MAX TYP

0.022
(0.559)
MAX TYP

0.006
(0.152)
MIN TYP

E20A (REV D)

Ceramic Leadless Chip Carrier Package (E)
Order Number DM54LS273E
NS Package Number E20A

0.985
(25.019)
MAX

0.025
(0.635)
RAD

20 19 18 17 16 15 14 13 12 11

0.220 − 0.310
(5.588 − 7.874)

1 2 3 4 5 6 7 8 9 10

0.005 − 0.020
(0.127 − 0.508)
RAD TYP

0.180
(4.572)
MAX

0.290 − 0.320
(7.366 − 8.128)

GLASS SEALANT

0.037 ± 0.005
(0.940 ± 0.127)

0.005
(0.127)
MIN

0.055 ± 0.005
(1.397 ± 0.127)

0.020 − 0.060
(0.508 − 1.524)

0.200
(5.080)
MAX

0.150
(3.810)
MIN

0.125 − 0.200
(3.175 − 5.080)

95° ± 5°

86° 94°

0.008 − 0.012
(0.203 − 0.305)

0.310 − 0.410
(7.874 − 10.41)

0.060
(1.524)
MAX
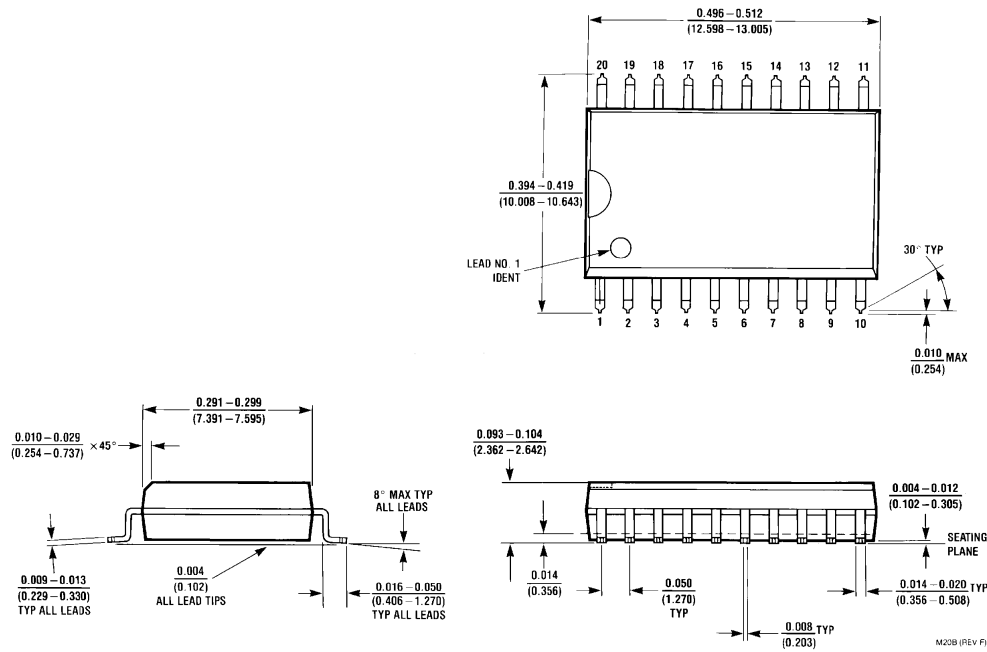BOTH ENDS

0.100 ± 0.010
(2.540 ± 0.254)

0.018 ± 0.003
(0.457 ± 0.076)

J20A (REV M)
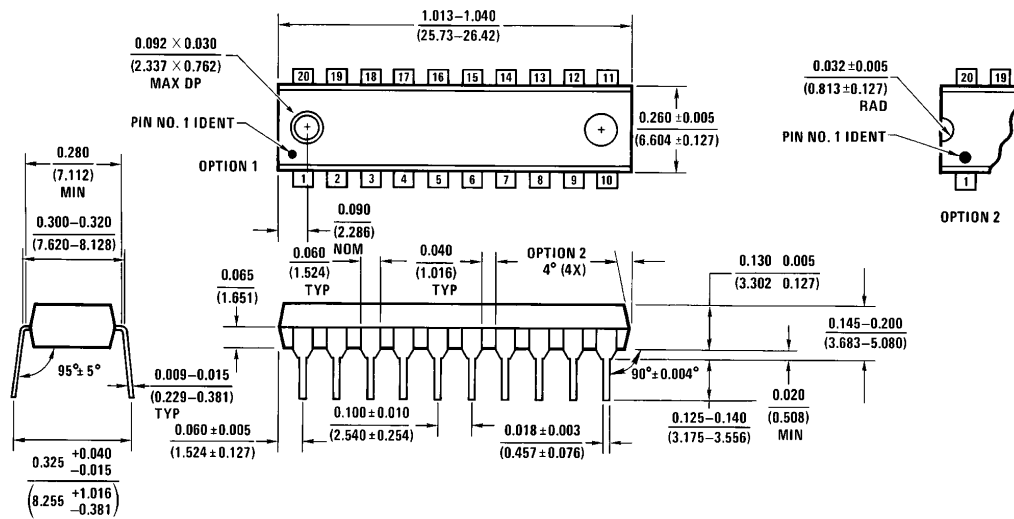
20-Lead Ceramic Dual-In-Line Package (J)
Order Number DM54LS273J
NS Package Number J20A
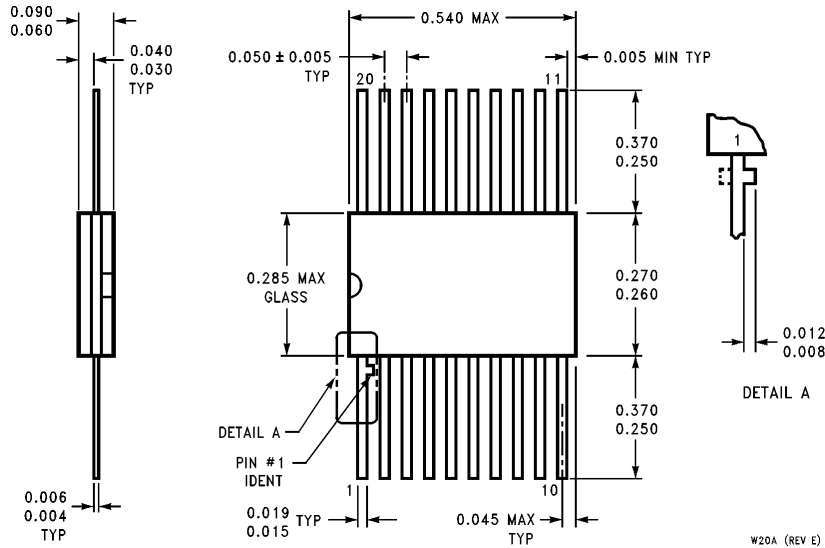
Physical Dimensions inches (millimeters) (Continued)

$$\frac{0.496 - 0.512}{(12.598 - 13.005)}$$

20 19 18 17 16 15 14 13 12 11

$$\frac{0.394 - 0.419}{(10.008 - 10.643)}$$

LEAD NO. 1 IDENT

30° TYP

1 2 3 4 5 6 7 8 9 10

$$\frac{0.010}{(0.254)} \text{MAX}$$

$$\frac{0.291 - 0.299}{(7.391 - 7.595)}$$

$$\frac{0.010 - 0.029}{(0.254 - 0.737)} \times 45°$$

$$\frac{0.093 - 0.104}{(2.362 - 2.642)}$$

8° MAX TYP ALL LEADS

$$\frac{0.004 - 0.012}{(0.102 - 0.305)}$$

SEATING PLANE

$$\frac{0.009 - 0.013}{(0.229 - 0.330)}$$ TYP ALL LEADS

$$\frac{0.004}{(0.102)}$$ ALL LEAD TIPS

$$\frac{0.016 - 0.050}{(0.406 - 1.270)}$$ TYP ALL LEADS

$$\frac{0.014}{(0.356)}$$

$$\frac{0.050}{(1.270)}$$ TYP

$$\frac{0.008}{(0.203)}$$ TYP

$$\frac{0.014 - 0.020}{(0.356 - 0.508)}$$ TYP

M20B (REV F)

20-Lead Wide Small Outline Molded Package (M)
Order Number DM74LS273M
NS Package Number M20B

$$\frac{1.013 - 1.040}{(25.73 - 26.42)}$$

$$\frac{0.092 \times 0.030}{(2.337 \times 0.762)}$$ MAX DP

20 19 18 17 16 15 14 13 12 11

PIN NO. 1 IDENT

OPTION 1

$$\frac{0.032 \pm 0.005}{(0.813 \pm 0.127)}$$ RAD

20 19

PIN NO. 1 IDENT

1

OPTION 2

$$0.260 \pm 0.005$$
$$(6.604 \pm 0.127)$$

1 2 3 4 5 6 7 8 9 10

$$\frac{0.280}{(7.112)}$$ MIN

$$\frac{0.300 - 0.320}{(7.620 - 8.128)}$$

$$\frac{0.090}{(2.286)}$$

$$\frac{0.060}{(1.524)}$$ NOM

$$\frac{0.040}{(1.016)}$$ TYP

OPTION 2 4° (4X)

$$\frac{0.130}{(3.302)} \quad \frac{0.005}{0.127)}$$

$$\frac{0.145 - 0.200}{(3.683 - 5.080)}$$

$$\frac{0.065}{(1.651)}$$ TYP

95° ± 5°

$$\frac{0.009 - 0.015}{(0.229 - 0.381)}$$ TYP

$$\frac{0.060 \pm 0.005}{(1.524 \pm 0.127)}$$

$$\frac{0.100 \pm 0.010}{(2.540 \pm 0.254)}$$

$$\frac{0.018 \pm 0.003}{(0.457 \pm 0.076)}$$

90° ± 0.004°

$$\frac{0.125 - 0.140}{(3.175 - 3.556)}$$

$$\frac{0.020}{(0.508)}$$ MIN

$$0.325 \begin{array}{c} +0.040 \\ -0.015 \end{array}$$
$$\left(8.255 \begin{array}{c} +1.016 \\ -0.381 \end{array} \right)$$

N20A (REV G)

20-Lead Molded Dual-In-Line Package (N)
Order Number DM74LS273N
NS Package Number N20A

Physical Dimensions inches (millimeters) (Continued)

0.090
0.060

0.040
0.030
TYP

0.540 MAX

0.050 ± 0.005
TYP

0.005 MIN TYP

20   11

0.370
0.250

0.285 MAX
GLASS

0.270
0.260

0.012
0.008

DETAIL A

0.370
0.250

DETAIL A

PIN #1
IDENT

1   10

0.006
0.004
TYP

0.019
0.015
TYP

0.045 MAX
TYP

W20A (REV E)

20-Lead Ceramic Flat Package (W)
Order Number DM54LS273W
NS Package Number W20A

LIFE SUPPORT POLICY

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

National Semiconductor was acquired by Texas Instruments.

This file is the datasheet for the following electronic components:

DM54LS273E - http://www.ti.com/product/dm54ls273e?HQS=TI-null-null-dscatalog-df-pf-null-wwe

74273 - http://www.ti.com/product/74273?HQS=TI-null-null-dscatalog-df-pf-null-wwe

74LS273 - http://www.ti.com/product/74ls273?HQS=TI-null-null-dscatalog-df-pf-null-wwe

DM54LS273J - http://www.ti.com/product/dm54ls273j?HQS=TI-null-null-dscatalog-df-pf-null-wwe

DM54LS273W - http://www.ti.com/product/dm54ls273w?HQS=TI-null-null-dscatalog-df-pf-null-wwe