DECEMBER 1983 – REVISED MARCH 1988

- **Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers and Flat Packages, and Plastic and Ceramic DIPs**
- **Dependable Texas Instruments Quality and Reliability**

## description

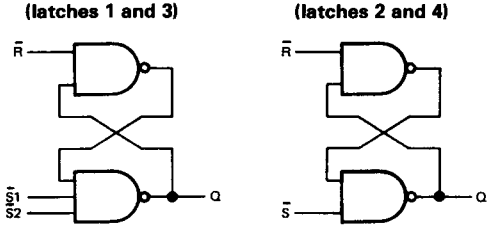
The '279 offers 4 basic S̄-R̄ flip-flop latches in one 16-pin, 300-mil package. Under conventional operation, the S̄-R̄ inputs are normally held high. When the S̄ input is pulsed low, the Q output will be set high. When R̄ is pulsed low, the Q output will be reset low. Normally, the S̄-R̄ inputs should not be taken low simultaneously. The Q output will be unpredictable in this condition.

**FUNCTION TABLE**
**(each latch)**

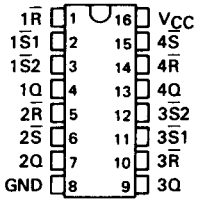
| INPUTS | | OUTPUT |
|---|---|---|
| S̄† | R̄ | Q |
| H | H | $Q_0$ |
| L | H | H |
| H | L | L |
| L | L | H‡ |

H = high level  L = low level
†For latches with double S inputs:
$Q_0$ = the level of Q before the indicated input conditions were established.
‡This configuration is nonstable: that is, it may not persist when the S̄ and R̄ inputs return to their inactive (high) level.
H = both S̄ inputs high
L = one or both S̄ inputs low

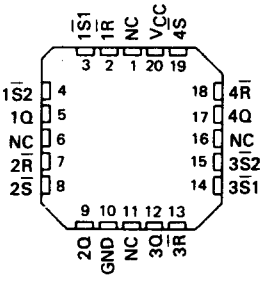
## logic diagram (positive logic)




SN54279, SN54LS279A . . . J OR W PACKAGE
SN74279 . . . N PACKAGE
SN74LS279A . . . D OR N PACKAGE
(TOP VIEW)

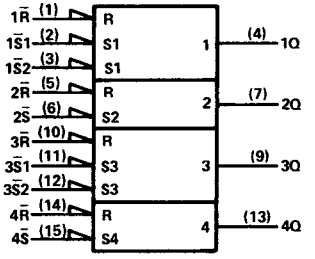



SN54LS279A . . . FK PACKAGE
(TOP VIEW)




NC – No internal connection

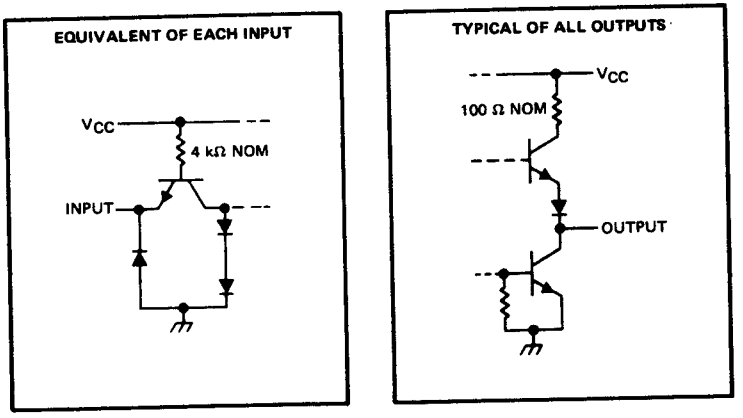
## logic symbol§



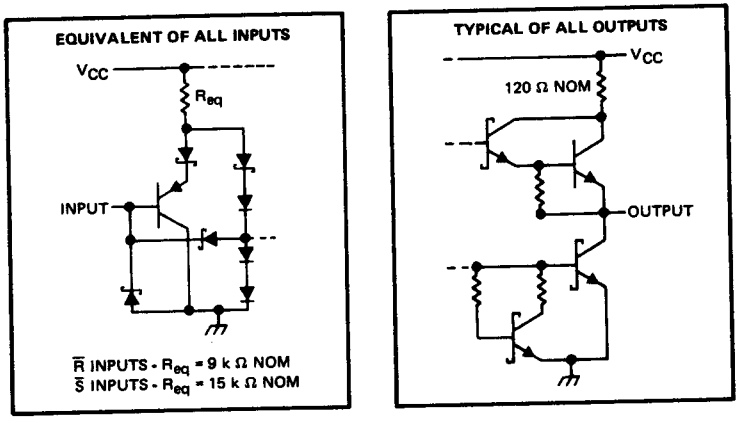

§This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.
Pin numbers shown are for D, J, N, and W packages.

## schematics of inputs and outputs

'279 CIRCUITS




'LS279A CIRCUITS




## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, $V_{CC}$ (see Note 1) . . . . . 7 V
Input voltage: '279 . . . . . 5.5 V
' LS279A . . . . . 7 V
Operating free-air temperature range: SN54' TYPES . . . . . −55°C to 125°C
SN74' TYPES . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

NOTE 1: Voltage values are with respect to network ground terminal.



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## recommended operating conditions

| | | SN54279 | | | SN74279 | | | UNIT |
|---|---|---|---|---|---|---|---|---|
| | | 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 | | | 0.8 | | | 0.8 | V |
| $I_{OH}$ | High-level output current | | | −0.8 | | | −0.8 | mA |
| $I_{OL}$ | Low-level output current | | | 16 | | | 16 | mA |
| $t_w$ | Pulse duration, low | 20 | | | 20 | | | ns |
| $T_A$ | Operating free-air temperature | −55 | | 125 | 0 | | 70 | °C |

## electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | TEST CONDITIONS† | | | SN54279 | | | SN74279 | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | MIN | TYP‡ | MAX | MIN | TYP‡ | MAX | |
| $V_{IK}$ | $V_{CC}$ = MIN, | $I_I$ = −12 mA | | | | −1.5 | | | −1.5 | V |
| $V_{OH}$ | $V_{CC}$ = MIN, | $V_{IL}$ = 0.8 V, | $I_{OH}$ = −0.8 mA | 2.4 | 3.4 | | 2.4 | 3.4 | | V |
| $V_{OL}$ | $V_{CC}$ = MIN, | $V_{IH}$ = 2 V, | $I_{OL}$ = 16 mA | | 0.2 | 0.4 | | 0.2 | 0.4 | V |
| $I_I$ | $V_{CC}$ = MAX, | $V_I$ = 5.5 V | | | | 1 | | | 1 | mA |
| $I_{IH}$ | $V_{CC}$ = MAX, | $V_I$ = 2.4 V | | | | 40 | | | 40 | μA |
| $I_{IL}$ | $V_{CC}$ = MAX, | $V_I$ = 0.4 V | | | | −1.6 | | | −1.6 | mA |
| $I_{OS}$§ | $V_{CC}$ = MAX | | | −18 | | −55 | −18 | | −57 | mA |
| $I_{CC}$ | $V_{CC}$ = MAX, | See Note 2 | | | 18 | 30 | | 18 | 30 | mA |

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at $V_{CC}$ = 5 V, $T_A$ = 25°C.
§ Not more than one output should be shorted at a time.
NOTE 2: $I_{CC}$ is measured with all R inputs grounded, all S inputs at 4.5 V, and all outputs open.

## switching characteristics, $V_{CC}$ = 5 V, $T_A$ = 25°C (see note 3)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| $t_{PLH}$ | $\overline{S}$ | Q | $R_L$ = 400 Ω, $C_L$ = 15 pF | | 12 | 22 | ns |
| $t_{PHL}$ | | | | | 9 | 15 | |
| $t_{PHL}$ | $\overline{R}$ | Q | | | 15 | 27 | ns |

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

## recommended operating conditions

| | | SN54LS279A | | | SN74LS279A | | | UNIT |
|---|---|---|---|---|---|---|---|---|
| | | 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 |
| $t_w$ | Pulse duration, low | 20 | | | 20 | | | ns |
| $T_A$ | Operating free-air temperature | −55 | | 125 | 0 | | 70 | °C |

## electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | TEST CONDITIONS† | | | SN54LS279A | | | SN74LS279A | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | MIN | TYP‡ | MAX | MIN | TYP‡ | MAX | |
| $V_{IK}$ | $V_{CC}$ = MIN, | $I_I$ = −18 mA | | | | −1.5 | | | −1.5 | V |
| $V_{OH}$ | $V_{CC}$ = MIN, | $V_{IL}$ = MAX, | $I_{OH}$ = −0.4 mA | 2.5 | 3.4 | | 2.7 | 3.4 | | V |
| $V_{OL}$ | $V_{CC}$ = MIN, | $V_{IH}$ = 2 V, | $I_{OL}$ = 4 mA | | 0.25 | 0.4 | | 0.25 | 0.4 | V |
| | $V_{CC}$ = MIN, | $V_{IH}$ = 2 V, | $I_{OL}$ = 8 mA | | | | | 0.25 | 0.5 | |
| $I_I$ | $V_{CC}$ = MAX, | $V_I$ = 7 V | | | | 0.1 | | | 0.1 | mA |
| $I_{IH}$ | $V_{CC}$ = MAX, | $V_I$ = 2.7 V | | | | 20 | | | 20 | μA |
| $I_{IL}$ | $V_{CC}$ = MAX, | $V_I$ = 0.4 V | | | | −0.2 | | | −0.2 | mA |
| $I_{OS}$§ | $V_{CC}$ = MAX | | | −20 | | −100 | −20 | | −100 | mA |
| $I_{CC}$ | $V_{CC}$ = MAX, | See note 2 | | | 3.8 | 7 | | 3.8 | 7 | mA |

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at $V_{CC}$ = 5 V, $T_A$ = 25°C.
§ Not more than one output should be shorted at a time, and the duration of the short-circuit should be less than one second.
NOTE 2: $I_{CC}$ is measured with all R inputs grounded, all S inputs at 4.5 V, and all outputs open.

## switching characteristics, $V_{CC}$ = 5 V, $T_A$ = 25°C (see note 3)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| $t_{PLH}$ | $\overline{S}$ | Q | $R_L$ = 2 kΩ, $C_L$ = 15 pF | | 12 | 22 | ns |
| $t_{PHL}$ | | | | | 13 | 21 | |
| $t_{PHL}$ | $\overline{R}$ | Q | | | 15 | 27 | ns |

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.





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