

## **SN54HC377, SN54HC378, SN54HC379 SN74HC377, SN74HC378, SN74HC379**

### *Octal, Hex, and Quad D-Type Flip-Flops with Clock Enable*

These circuits are positive-edge-triggered D-type flip-flops with an enable input. The 'HC377, 'HC378, and 'HC379 devices are similar to 'HC273, 'HC174, and 'HC175 respectively, but feature a latched clock enable ( $\overline{G}$ ) instead of a common clear.

Information at the D inputs meeting the setup time requirements is transferred to the Q outputs on the positive-going edge of the clock pulse if  $\overline{G}$  is low. Clock triggering occurs at a particular voltage level and is not directly related to the transition time of the positive-going pulse. When the clock input is at either the high or low level, the D input signal has no effect at the output. The circuits are designed to prevent false clocking by transitions at the  $\overline{G}$  input.

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#### **Rochester Electronics Manufactured Components**

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceeds the OCM data sheet.

#### **Quality Overview**

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-38535
  - Class Q Military
  - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
  - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

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*The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.*

# SN54HC377, SN54HC378, SN54HC379 SN74HC377, SN74HC378, SN74HC379 OCTAL, HEX, AND QUAD D-TYPE FLIP-FLOPS WITH CLOCK ENABLE

SCLS202 – D2684, DECEMBER 1982 – REVISED JUNE 1989

- 'HC377 and 'HC378 Contain Eight and Six Flip-Flops, Respectively, with Single-Rail Outputs
- 'HC379 Contains Four Flip-Flops with Double-Rail Outputs
- Clock Enable Latched to Avoid False Clocking
- Applications Include:
  - Buffer/Storage Registers
  - Shift Registers
  - Pattern Generators
- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

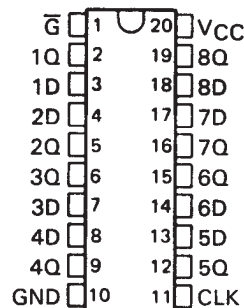
## description

These circuits are positive-edge-triggered D-type flip-flops with an enable input. The 'HC377, 'HC378, and 'HC379 devices are similar to 'HC273, 'HC174, and 'HC175 respectively, but feature a latched clock enable ( $\overline{G}$ ) instead of a common clear.

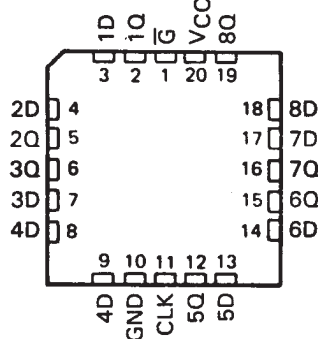
Information at the D inputs meeting the setup time requirements is transferred to the Q outputs on the positive-going edge of the clock pulse if  $\overline{G}$  is low. Clock triggering occurs at a particular voltage level and is not directly related to the transition time of the positive-going pulse. When the clock input is at either the high or low level, the D input signal has no effect at the output. The circuits are designed to prevent false clocking by transitions at the  $\overline{G}$  input.

The SN54HC377, SN54HC378, and SN54HC379 are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74HC377, SN74HC378, and SN74HC379 are characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

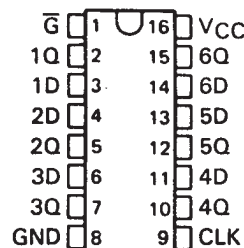
SN54HC377 . . . J PACKAGE  
SN74HC377 . . . DW OR N PACKAGE  
(TOP VIEW)



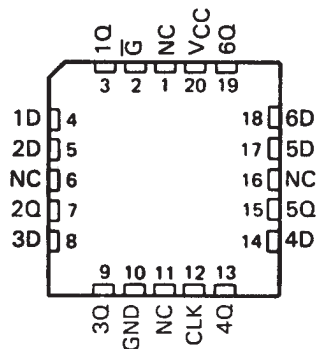
SN54HC377 . . . FK PACKAGE  
(TOP VIEW)



SN54HC378 . . . J PACKAGE  
SN74HC378 . . . D OR N PACKAGE  
(TOP VIEW)



SN54HC378 . . . FK PACKAGE  
(TOP VIEW)



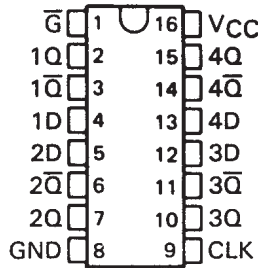
NC—No internal connection

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

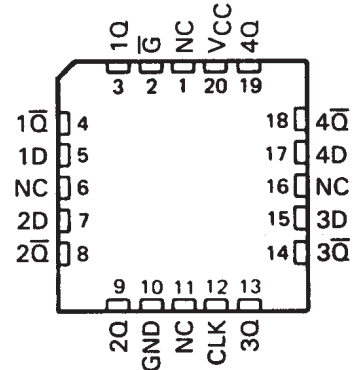
# SN54HC377, SN54HC378, SN54HC379 SN74HC377, SN74HC378, SN74HC379 OCTAL, HEX, AND QUAD D-TYPE FLIP-FLOPS WITH CLOCK ENABLE

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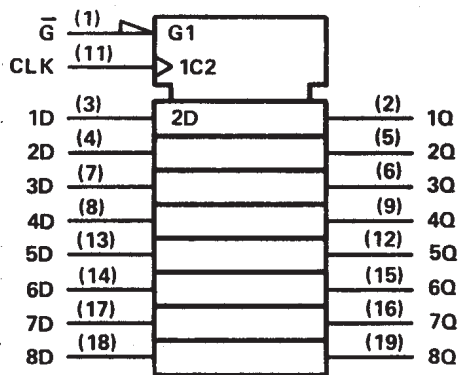
SN54HC379 . . . J PACKAGE  
SN74HC379 . . . D, J, OR N PACKAGE  
(TOP VIEW)



SN54HC379 . . . FK PACKAGE  
(TOP VIEW)



## HC377 logic symbol†



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

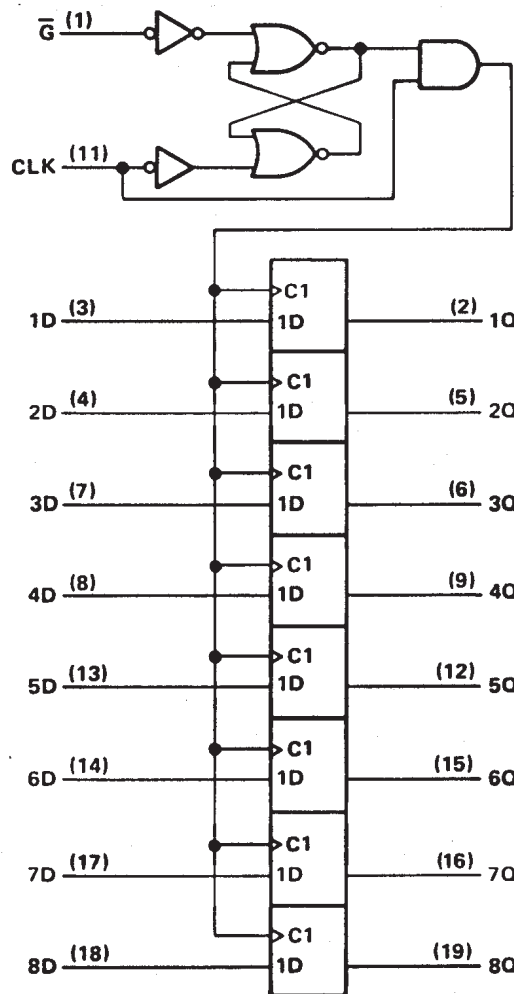
FUNCTION TABLE  
(EACH FLIP-FLOP)

| INPUTS    |       |      | OUTPUT |
|-----------|-------|------|--------|
| $\bar{G}$ | CLOCK | DATA | Q      |
| H         | X     | X    | $Q_0$  |
| L         | ↑     | H    | H      |
| L         | ↑     | L    | L      |
| X         | L     | X    | $Q_0$  |

H = high level, L = low level, X = irrelevant

NC—No internal connection

## HC377 logic diagram (positive logic)

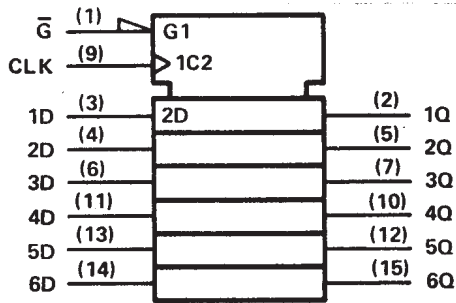


Pin numbers shown are for DW, J, and N packages.

SN54HC377, SN54HC378, SN54HC379  
SN74HC377, SN74HC378, SN74HC379  
OCTAL, HEX, AND QUAD D-TYPE FLIP-FLOPS WITH CLOCK ENABLE

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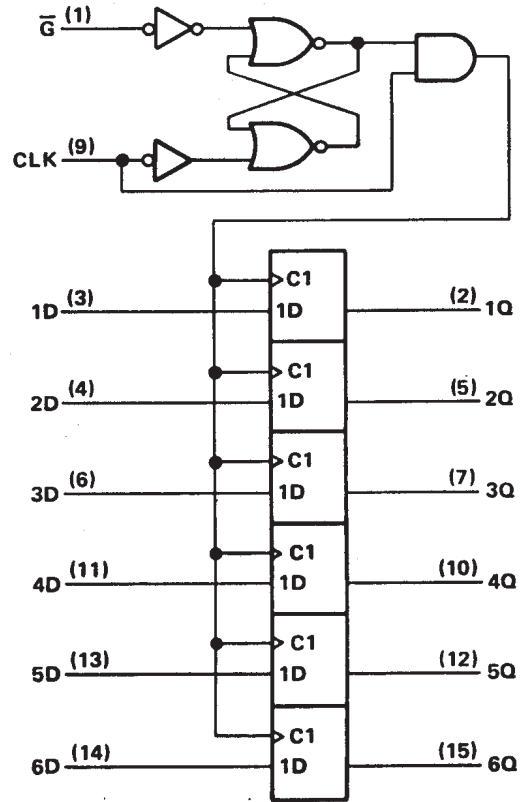
**'HC378 logic symbol†**



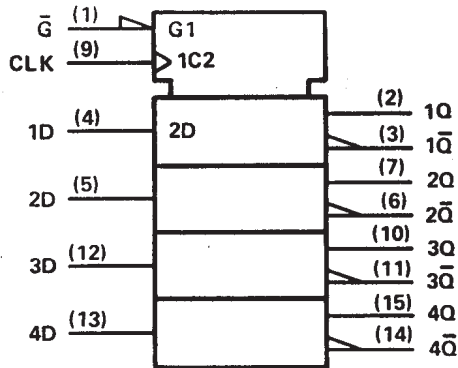
**FUNCTION TABLE  
(EACH FLIP-FLOP)**

| INPUTS    |       |      | OUTPUT |
|-----------|-------|------|--------|
| $\bar{G}$ | CLOCK | DATA | Q      |
| H         | X     | X    | $Q_0$  |
| L         | ↑     | H    | H      |
| L         | ↑     | L    | L      |
| X         | L     | X    | $Q_0$  |

**'HC378 logic diagram (positive logic)**



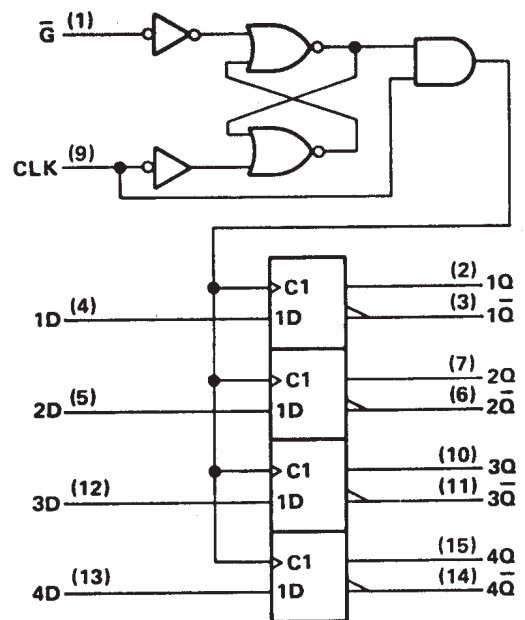
**'HC379 logic symbol†**



**FUNCTION TABLE  
(EACH FLIP-FLOP)**

| INPUTS    |       |      | OUTPUTS |             |
|-----------|-------|------|---------|-------------|
| $\bar{G}$ | CLOCK | DATA | Q       | $\bar{Q}$   |
| H         | X     | X    | $Q_0$   | $\bar{Q}_0$ |
| L         | ↑     | H    | H       | L           |
| L         | ↑     | L    | L       | H           |
| X         | L     | X    | $Q_0$   | $\bar{Q}_0$ |

**'HC379 logic diagram (positive logic)**



†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

Pin numbers are for D, J, and N packages.

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**absolute maximum ratings over operating free-air temperature range†**

|   |                |
|---|----------------|
| Supply voltage, $V_{CC}$ .....  | -0.5 V to 7 V  |
| Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ ) .....             | $\pm 20$ mA    |
| Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) .....            | $\pm 20$ mA    |
| Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) .....                | $\pm 25$ mA    |
| Continuous current through $V_{CC}$ or GND pins .....                           | $\pm 50$ mA    |
| Lead temperature 1,6 mm (1/16 in) from case for 60 s: FK or J package .....     | 300°C          |
| Lead temperature 1,6 mm (1/16 in) from case for 10 s: D, DW, or N package ..... | 260°C          |
| Storage temperature range .....   | -65°C to 150°C |

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

**recommended operating conditions**

|          |  | SN54HC377<br>SN54HC378<br>SN54HC379 |     |          | SN74HC377<br>SN74HC378<br>SN74HC379 |     |          | UNIT |
|----------|--|-------------------------------------|-----|----------|-------------------------------------|-----|----------|------|
|          |  | MIN                                 | NOM | MAX      | MIN                                 | NOM | MAX      |      |
| $V_{CC}$ | Supply voltage                         | 2                                   | 5   | 6        | 2                                   | 5   | 6        | V    |
| $V_{IH}$ | High-level input voltage               | $V_{CC} = 2$ V<br>1.5               |     |          | $V_{CC} = 2$ V<br>1.5               |     |          | V    |
|          |  | $V_{CC} = 4.5$ V<br>3.15            |     |          | $V_{CC} = 4.5$ V<br>3.15            |     |          |      |
|          |  | $V_{CC} = 6$ V<br>4.2               |     |          | $V_{CC} = 6$ V<br>4.2               |     |          |      |
| $V_{IL}$ | Low-level input voltage                | $V_{CC} = 2$ V<br>0                 |     | 0.3      | $V_{CC} = 2$ V<br>0                 |     | 0.3      | V    |
|          |  | $V_{CC} = 4.5$ V<br>0               |     | 0.9      | $V_{CC} = 4.5$ V<br>0               |     | 0.9      |      |
|          |  | $V_{CC} = 6$ V<br>0                 |     | 1.2      | $V_{CC} = 6$ V<br>0                 |     | 1.2      |      |
| $V_I$    | Input voltage                          | 0                                   |     | $V_{CC}$ | 0                                   |     | $V_{CC}$ | V    |
| $V_O$    | Output voltage                         | 0                                   |     | $V_{CC}$ | 0                                   |     | $V_{CC}$ | V    |
| $t_t$    | Input transition (rise and fall) times | $V_{CC} = 2$ V<br>0                 |     | 1000     | $V_{CC} = 2$ V<br>0                 |     | 1000     | ns   |
|          |  | $V_{CC} = 4.5$ V<br>0               |     | 500      | $V_{CC} = 4.5$ V<br>0               |     | 500      |      |
|          |  | $V_{CC} = 6$ V<br>0                 |     | 400      | $V_{CC} = 6$ V<br>0                 |     | 400      |      |
| $T_A$    | Operating free-air temperature         | -55                                 |     | 125      | -40                                 |     | 85       | °C   |

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

| PARAMETER | TEST CONDITIONS   | $V_{CC}$  | $T_A = 25^\circ\text{C}$ |       |            | SN54HC377<br>SN54HC378<br>SN54HC379 | SN74HC377<br>SN74HC378<br>SN74HC379 | UNIT             |
|-----------|---|---|--------------------------|-------|------------|-------------------------------------|-------------------------------------|------------------|
|           |   |   | MIN                      | TYP   | MAX        | MIN                                 | MAX                                 |                  |
| $V_{OH}$  | $V_I = V_{IH}$ or $V_{IL}$ , $I_{OH} = -20 \mu\text{A}$ | 2 V   | 1.9                      | 1.998 |            | 1.9                                 | 1.9                                 | V                |
|           |   | 4.5 V   | 4.4                      | 4.499 |            | 4.4                                 | 4.4                                 |                  |
|           |   | 6 V   | 5.9                      | 5.999 |            | 5.9                                 | 5.9                                 |                  |
| $V_{OL}$  | $V_I = V_{IH}$ or $V_{IL}$ , $I_{OH} = -4 \text{ mA}$   | 4.5 V   | 3.98                     | 4.30  |            | 3.7                                 | 3.84                                | V                |
|           |   | 6 V   | 5.48                     | 5.80  |            | 5.2                                 | 5.34                                |                  |
|           |   | $V_I = V_{IH}$ or $V_{IL}$ , $I_{OH} = -5.2 \text{ mA}$ | 6 V                      |       |            |                                     |                                     |                  |
| $V_{OL}$  | $V_I = V_{IH}$ or $V_{IL}$ , $I_{OL} = 20 \mu\text{A}$  | 2 V   |                          | 0.002 | 0.1        |                                     | 0.1                                 | V                |
|           |   | 4.5 V   |                          | 0.001 | 0.1        |                                     | 0.1                                 |                  |
|           |   | 6 V   |                          | 0.001 | 0.1        |                                     | 0.1                                 |                  |
| $V_{OL}$  | $V_I = V_{IH}$ or $V_{IL}$ , $I_{OL} = 4 \text{ mA}$    | 4.5 V   |                          | 0.17  | 0.26       |                                     | 0.4                                 | V                |
|           |   | 6 V   |                          | 0.15  | 0.26       |                                     | 0.4                                 |                  |
|           |   | $V_I = V_{IH}$ or $V_{IL}$ , $I_{OL} = 5.2 \text{ mA}$  | 6 V                      |       |            |                                     |                                     |                  |
| $I_I$     | $V_I = V_{CC}$ or 0                                     | 6 V   | $\pm 0.1$ $\pm 100$      |       | $\pm 1000$ |                                     | $\pm 1000$                          | nA               |
| $I_{CC}$  | $V_I = V_{CC}$ or 0, $I_O = 0$                          | 6 V   |                          |       | 8          |                                     | 160                                 | 80 $\mu\text{A}$ |
| $C_i$     |   | 2 to 6 V  | 3 10                     |       | 10         |                                     | 10                                  | pF               |



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timing requirements over recommended operating free-air temperature range (unless otherwise noted)

|                 |                                 | V <sub>CC</sub>             | T <sub>A</sub> = 25°C |                 |                     | SN54HC377<br>SN54HC378<br>SN54HC379 |                 | SN74HC377<br>SN74HC378<br>SN74HC379 |               | UNIT |
|-----------------|---------------------------------|-----------------------------|-----------------------|-----------------|---------------------|-------------------------------------|-----------------|-------------------------------------|---------------|------|
|                 |                                 |                             | MIN                   | MAX             | MIN                 | MAX                                 | MIN             | MAX                                 |               |      |
|                 |                                 |                             | f <sub>clock</sub>    | Clock frequency | 2 V<br>4.5 V<br>6 V | 0<br>0<br>0                         | 5<br>25<br>29   | 0<br>0<br>0                         | 3<br>16<br>19 |      |
| t <sub>w</sub>  | Pulse duration, CLK high or low | 2 V<br>4.5 V<br>6 V         | 100<br>20<br>17       |                 | 150<br>30<br>25     |                                     | 125<br>25<br>21 |                                     | ns            |      |
| t <sub>su</sub> | Set up time before CLK↑         | D                           | 2 V                   | 100             |                     | 150                                 |                 | 125                                 |               | ns   |
|                 |                                 |                             | 4.5 V                 | 20              |                     | 30                                  |                 | 25                                  |               |      |
|                 |                                 |                             | 6 V                   | 17              |                     | 25                                  |                 | 21                                  |               |      |
|                 | Ḡ high or low                  | 2 V                         | 100                   |                 | 150                 |                                     | 125             |                                     | ns            |      |
|                 |                                 | 4.5 V                       | 20                    |                 | 30                  |                                     | 25              |                                     |               |      |
|                 |                                 | 6 V                         | 17                    |                 | 25                  |                                     | 21              |                                     |               |      |
| t <sub>h</sub>  | Hold time after CLK↑            | Ḡ inactive or active, data | 2 V                   | 5               |                     | 5                                   |                 | 5                                   |               | ns   |
|                 |                                 |                             | 4.5 V                 | 5               |                     | 5                                   |                 | 5                                   |               |      |
|                 |                                 |                             | 6 V                   | 5               |                     | 5                                   |                 | 5                                   |               |      |

switching characteristics over recommended operating free-air temperature range (unless otherwise noted), C<sub>L</sub> = 50 pF (see Note 1)

| PARAMETER        | FROM (INPUT) | TO (OUTPUT) | V <sub>CC</sub> | T <sub>A</sub> = 25°C |     |     | SN54HC377<br>SN54HC378<br>SN54HC379 |     | SN74HC377<br>SN74HC378<br>SN74HC379 |     | UNIT |
|------------------|--------------|-------------|-----------------|-----------------------|-----|-----|-------------------------------------|-----|-------------------------------------|-----|------|
|                  |              |             |                 | MIN                   | TYP | MAX | MIN                                 | MAX | MIN                                 | MAX |      |
| f <sub>max</sub> |              |             | 2 V             | 5                     | 11  |     | 3                                   |     | 4                                   |     | MHz  |
|                  |              |             | 4.5 V           | 25                    | 54  |     | 16                                  |     | 20                                  |     |      |
|                  |              |             | 6 V             | 29                    | 64  |     | 19                                  |     | 23                                  |     |      |
| t <sub>pd</sub>  | CLK          | Any         | 2 V             |                       | 56  | 160 |                                     | 240 |                                     | 200 | ns   |
|                  |              |             | 4.5 V           |                       | 15  | 32  |                                     | 48  |                                     | 40  |      |
|                  |              |             | 6 V             |                       | 12  | 27  |                                     | 41  |                                     | 34  |      |
| t <sub>t</sub>   |              | Any         | 2 V             |                       | 38  | 75  |                                     | 110 |                                     | 95  | ns   |
|                  |              |             | 4.5 V           |                       | 8   | 15  |                                     | 22  |                                     | 19  |      |
|                  |              |             | 6 V             |                       | 6   | 13  |                                     | 19  |                                     | 16  |      |

|                 |                               |                                |           |
|-----------------|-------------------------------|--------------------------------|-----------|
| C <sub>pd</sub> | Power dissipation capacitance | No load, T <sub>A</sub> = 25°C | 30 pF typ |
|-----------------|-------------------------------|--------------------------------|-----------|

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



**PACKAGING INFORMATION**

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup>    | Lead/<br>Ball Finish | MSL Peak Temp <sup>(3)</sup> | Samples<br>(Requires Login) |
|------------------|-----------------------|--------------|-----------------|------|-------------|----------------------------|----------------------|------------------------------|-----------------------------|
| 5962-87807012A   | ACTIVE                | LCCC         | FK              | 20   | 1           | TBD                        | Call TI              | Call TI                      |                             |
| 5962-8780701RA   | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                        | Call TI              | Call TI                      |                             |
| SN54HC377J       | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                        | A42                  | N / A for Pkg Type           |                             |
| SN74HC377DW      | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74HC377DWE4    | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74HC377DWG4    | ACTIVE                | SOIC         | DW              | 20   | 25          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74HC377DWR     | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74HC377DWRE4   | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74HC377DWRG4   | ACTIVE                | SOIC         | DW              | 20   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74HC377N       | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)             | CU NIPDAU            | N / A for Pkg Type           |                             |
| SN74HC377NE4     | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)             | CU NIPDAU            | N / A for Pkg Type           |                             |
| SN74HC377NSR     | ACTIVE                | SO           | NS              | 20   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74HC377NSRE4   | ACTIVE                | SO           | NS              | 20   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74HC377NSRG4   | ACTIVE                | SO           | NS              | 20   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74HC378D       | OBSOLETE              | SOIC         | D               | 16   |             | TBD                        | Call TI              | Call TI                      |                             |
| SN74HC378N       | OBSOLETE              | PDIP         | N               | 16   |             | TBD                        | Call TI              | Call TI                      |                             |
| SN74HC378N3      | OBSOLETE              | PDIP         | N               | 16   |             | TBD                        | Call TI              | Call TI                      |                             |
| SN74HC379N       | OBSOLETE              | PDIP         | N               | 16   |             | TBD                        | Call TI              | Call TI                      |                             |
| SNJ54HC377FK     | ACTIVE                | LCCC         | FK              | 20   | 1           | TBD                        | POST-PLATE           | N / A for Pkg Type           |                             |
| SNJ54HC377J      | ACTIVE                | CDIP         | J               | 20   | 1           | TBD                        | A42                  | N / A for Pkg Type           |                             |

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

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**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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**OTHER QUALIFIED VERSIONS OF SN54HC377, SN74HC377 :**

● Catalog: [SN74HC377](#)

● Military: [SN54HC377](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications



**TAPE AND REEL INFORMATION**

**REEL DIMENSIONS**



**TAPE DIMENSIONS**



|    |   |
|----|---|
| A0 | Dimension designed to accommodate the component width     |
| B0 | Dimension designed to accommodate the component length    |
| K0 | Dimension designed to accommodate the component thickness |
| W  | Overall width of the carrier tape                         |
| P1 | Pitch between successive cavity centers                   |

**TAPE AND REEL INFORMATION**

\*All dimensions are nominal

| Device       | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74HC377DWR | SOIC         | DW              | 20   | 2000 | 330.0              | 24.4               | 10.8    | 13.0    | 2.7     | 12.0    | 24.0   | Q1            |
| SN74HC377NSR | SO           | NS              | 20   | 2000 | 330.0              | 24.4               | 8.2     | 13.0    | 2.5     | 12.0    | 24.0   | Q1            |

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

| Device       | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74HC377DWR | SOIC         | DW              | 20   | 2000 | 367.0       | 367.0      | 45.0        |
| SN74HC377NSR | SO           | NS              | 20   | 2000 | 367.0       | 367.0      | 45.0        |

J (R-GDIP-T\*\*)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



| DIM \ PINS ** | 14                     | 16                     | 18                     | 20                     |
|---------------|------------------------|------------------------|------------------------|------------------------|
| A             | 0.300<br>(7,62)<br>BSC | 0.300<br>(7,62)<br>BSC | 0.300<br>(7,62)<br>BSC | 0.300<br>(7,62)<br>BSC |
| B MAX         | 0.785<br>(19,94)       | .840<br>(21,34)        | 0.960<br>(24,38)       | 1.060<br>(26,92)       |
| B MIN         | —                      | —                      | —                      | —                      |
| C MAX         | 0.300<br>(7,62)        | 0.300<br>(7,62)        | 0.310<br>(7,87)        | 0.300<br>(7,62)        |
| C MIN         | 0.245<br>(6,22)        | 0.245<br>(6,22)        | 0.220<br>(5,59)        | 0.245<br>(6,22)        |



4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package is hermetically sealed with a ceramic lid using glass frit.
  - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
  - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

FK (S-CQCC-N\*\*)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



| NO. OF TERMINALS ** | A                |                  | B                |                  |
|---------------------|------------------|------------------|------------------|------------------|
|                     | MIN              | MAX              | MIN              | MAX              |
| 20                  | 0.342<br>(8,69)  | 0.358<br>(9,09)  | 0.307<br>(7,80)  | 0.358<br>(9,09)  |
| 28                  | 0.442<br>(11,23) | 0.458<br>(11,63) | 0.406<br>(10,31) | 0.458<br>(11,63) |
| 44                  | 0.640<br>(16,26) | 0.660<br>(16,76) | 0.495<br>(12,58) | 0.560<br>(14,22) |
| 52                  | 0.740<br>(18,78) | 0.761<br>(19,32) | 0.495<br>(12,58) | 0.560<br>(14,22) |
| 68                  | 0.938<br>(23,83) | 0.962<br>(24,43) | 0.850<br>(21,6)  | 0.858<br>(21,8)  |
| 84                  | 1.141<br>(28,99) | 1.165<br>(29,59) | 1.047<br>(26,6)  | 1.063<br>(27,0)  |



4040140/D 01/11

- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. This package can be hermetically sealed with a metal lid.
  - D. Falls within JEDEC MS-004

N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



4040049/E 12/2002

- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - $\triangle C$  Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - $\triangle D$  The 20 pin end lead shoulder width is a vendor option, either half or full width.

DW (R-PDSO-G20)

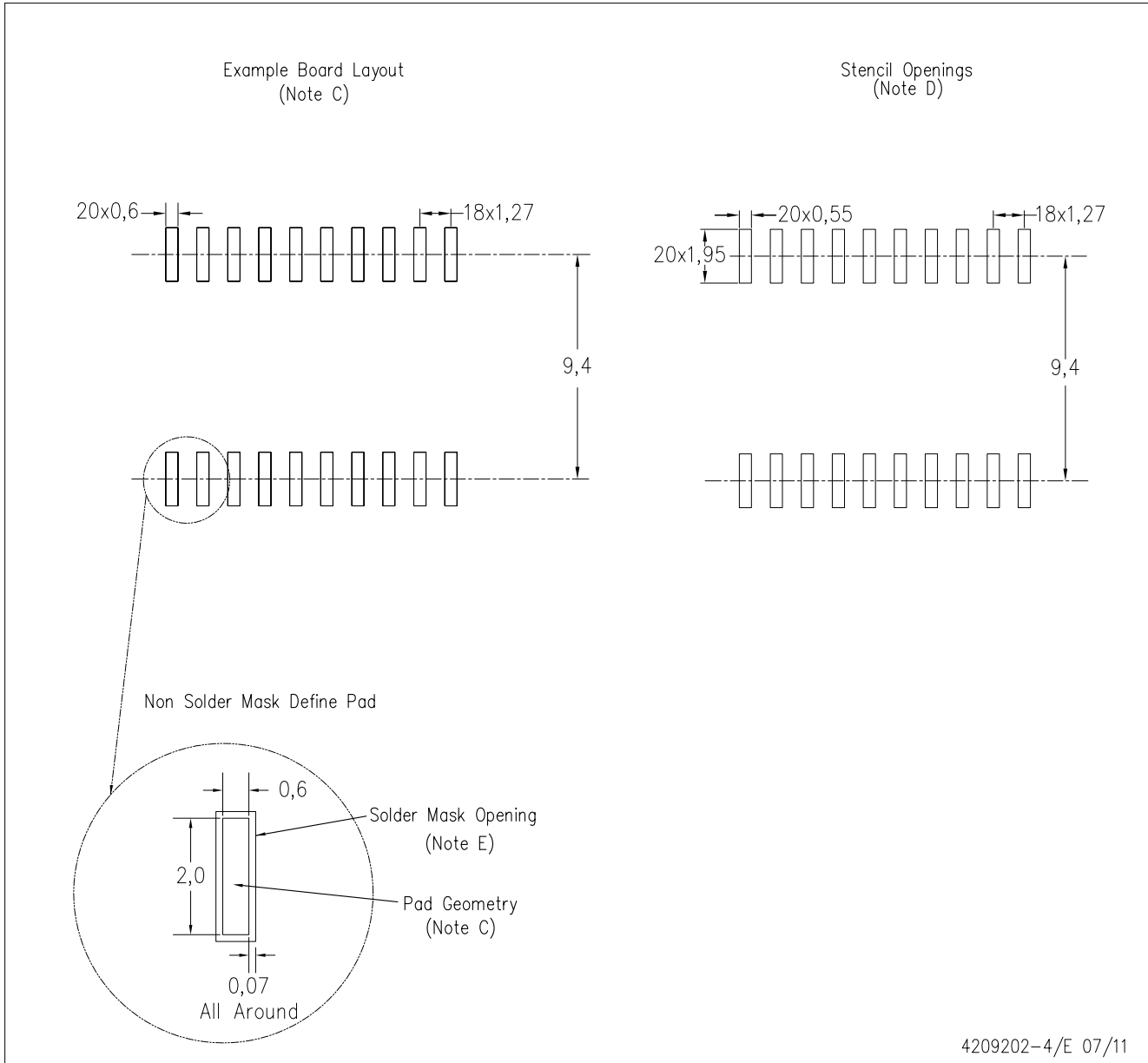
PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
  - D. Falls within JEDEC MS-013 variation AC.

DW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Refer to IPC7351 for alternate board design.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AC.



## MECHANICAL DATA

**NS (R-PDSO-G\*\*)**

**PLASTIC SMALL-OUTLINE PACKAGE**

**14-PINS SHOWN**



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

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|                               |  |
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