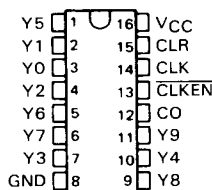


## D2684. DECEMBER 1982—REVISED JUNE 1989

- SN54HC4017 . . . J PACKAGE  
SN74HC4017 . . . N PACKAGE

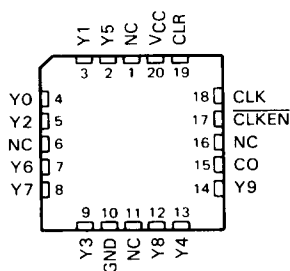
(TOP VIEW)



The SN54HC4017 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74HC4017 is characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

**SN54HC4017 . . . FK PACKAGE**

(TOP VIEW)



NC—No internal connection

<sup>†</sup>This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

Pin numbers shown are for J and N packages.

**PRODUCTION DATA** documents contain information 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.

**TEXAS**   
**INSTRUMENTS**  
POST OFFICE BOX 655012 • DALLAS, TEXAS 75265

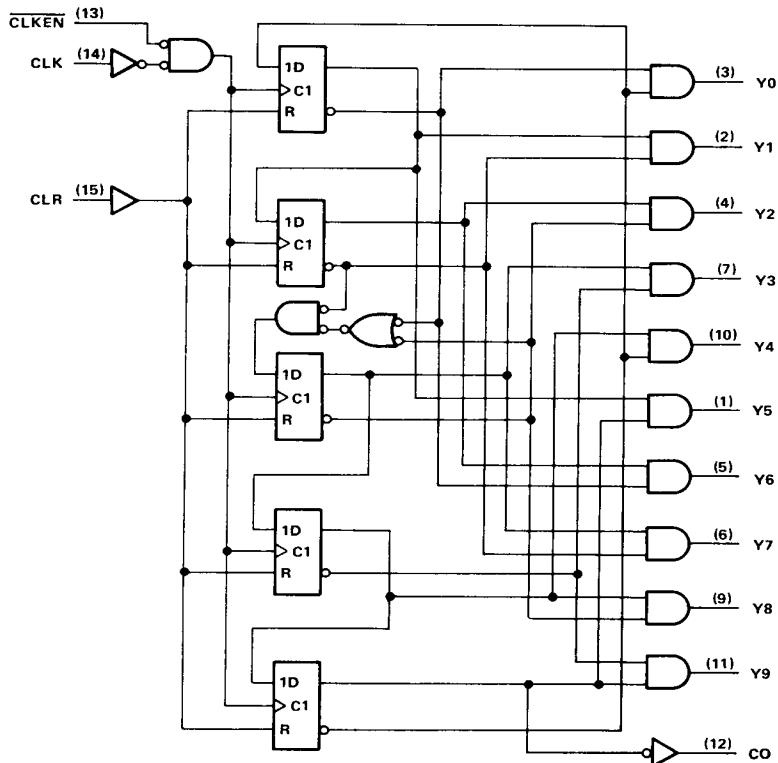
Copyright © 1989, Texas Instruments Incorporated

2-625

This Material Copyrighted By Its Respective Manufacturer

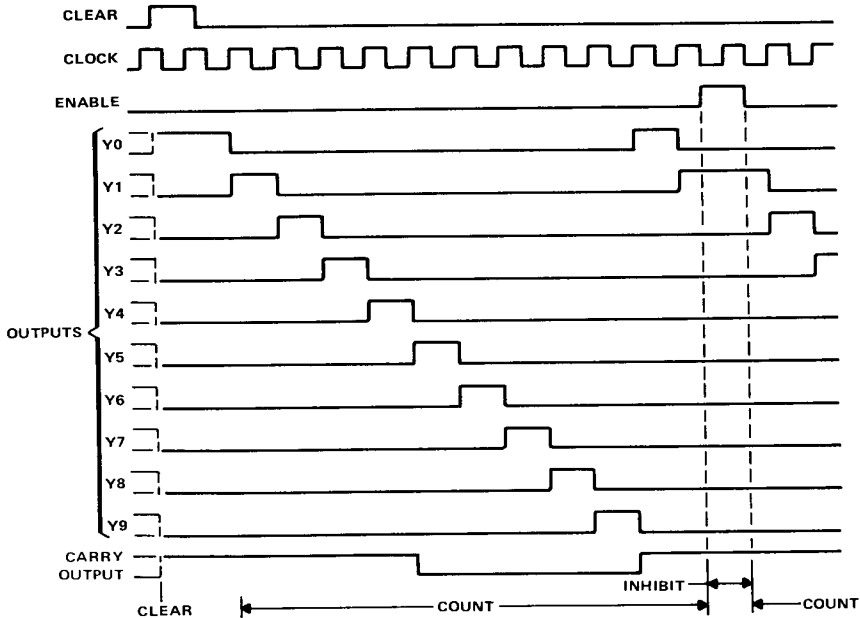
**SN54HC4017, SN74HC4017**  
**DECADE COUNTERS/DIVIDERS**

logic diagram (positive logic)



Pin numbers shown are for J and N packages.

typical clear, count, and inhibit sequences



2

HCMOS Devices

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: 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.

TEXAS  
INSTRUMENTS

POST OFFICE BOX 655012 • DALLAS, TEXAS 75265

2-627

# **SN54HC4017, SN74HC4017** **DECADE COUNTERS/DIVIDERS**

## **recommended operating conditions**

|                 |                                        |                                                                           | SN54HC4017         |                    |             | SN74HC4017         |                    |     | UNIT |
|-----------------|----------------------------------------|---------------------------------------------------------------------------|--------------------|--------------------|-------------|--------------------|--------------------|-----|------|
|                 |                                        |                                                                           | MIN                | NOM                | MAX         | MIN                | NOM                | MAX |      |
| V <sub>CC</sub> | Supply voltage                         |                                                                           | 2                  | 5                  | 6           | 2                  | 5                  | 6   | V    |
| V <sub>IH</sub> | High-level input voltage               | V <sub>CC</sub> = 2 V<br>V <sub>CC</sub> = 4.5 V<br>V <sub>CC</sub> = 6 V | 1.5<br>3.15<br>4.2 |                    |             | 1.5<br>3.15<br>4.2 |                    |     | V    |
| V <sub>IL</sub> | Low-level input voltage                | V <sub>CC</sub> = 2 V<br>V <sub>CC</sub> = 4.5 V<br>V <sub>CC</sub> = 6 V | 0<br>0<br>0        | 0.3<br>0.9<br>1.2  | 0<br>0<br>0 |                    | 0.3<br>0.9<br>1.2  | V   |      |
| V <sub>I</sub>  | Input voltage                          |                                                                           | 0                  | V <sub>CC</sub>    |             | 0                  | V <sub>CC</sub>    |     | V    |
| V <sub>O</sub>  | Output voltage                         |                                                                           | 0                  | V <sub>CC</sub>    |             | 0                  | V <sub>CC</sub>    |     | V    |
| t <sub>t</sub>  | Input transition (rise and fall) times | V <sub>CC</sub> = 2 V<br>V <sub>CC</sub> = 4.5 V<br>V <sub>CC</sub> = 6 V | 0<br>0<br>0        | 1000<br>500<br>400 | 0<br>0<br>0 |                    | 1000<br>500<br>400 | ns  |      |
| T <sub>A</sub>  | Operating free-air temperature         |                                                                           | -55 125            |                    | -40 85      |                    | °C                 |     |      |

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

| PARAMETER | TEST CONDITIONS                                                | $V_{CC}$ | $T_A = 25^\circ\text{C}$ |           |           | SN54HC4017 |            | SN74HC4017 |            | UNIT          |
|-----------|----------------------------------------------------------------|----------|--------------------------|-----------|-----------|------------|------------|------------|------------|---------------|
|           |                                                                |          | MIN                      | TYP       | MAX       | MIN        | MAX        | MIN        | MAX        |               |
| $V_{OH}$  | $V_I = V_{IH}$ or $V_{IL}$ , $I_{OH} = -20\text{ }\mu\text{A}$ | 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        |            |               |
|           | $V_I = V_{IH}$ or $V_{IL}$ , $I_{OH} = -4\text{ mA}$           | 4.5 V    | 3.98                     | 4.30      |           | 3.7        |            | 3.84       |            |               |
| $V_{OL}$  | $V_I = V_{IH}$ or $V_{IL}$ , $I_{OH} = -5.2\text{ mA}$         | 6 V      | 5.48                     | 5.80      |           | 5.2        |            | 5.34       |            | V             |
|           | $V_I = V_{IH}$ or $V_{IL}$ , $I_{OL} = 20\text{ }\mu\text{A}$  | 2 V      |                          | 0.002     | 0.1       |            | 0.1        |            | 0.1        |               |
|           |                                                                | 4.5 V    |                          | 0.001     | 0.1       |            | 0.1        |            | 0.1        |               |
|           |                                                                | 6 V      |                          | 0.001     | 0.1       |            | 0.1        |            | 0.1        |               |
|           | $V_I = V_{IH}$ or $V_{IL}$ , $I_{OL} = 4\text{ mA}$            | 4.5 V    |                          | 0.17      | 0.26      |            | 0.4        |            | 0.33       |               |
| $I_I$     | $V_I = V_{IH}$ or $V_{IL}$ , $I_{OL} = 5.2\text{ mA}$          | 6 V      |                          | 0.15      | 0.26      |            | 0.4        |            | 0.33       | nA            |
|           | $V_I = V_{CC}$ or 0                                            | 6 V      |                          | $\pm 0.1$ | $\pm 100$ |            | $\pm 1000$ |            | $\pm 1000$ |               |
| $I_{CC}$  | $V_I = V_{CC}$ or 0, $I_O = 0$                                 | 6 V      |                          |           | 8         |            | 160        |            | 80         | $\mu\text{A}$ |
| $C_i$     |                                                                | 2 to 6 V |                          | 3         | 10        |            | 10         |            | 10         | pF            |

# SN54HC4017, SN74HC4017 DECADE COUNTERS/DIVIDERS

2

HC MOS Devices

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

| PARAMETER          |                 |                                                                                                               | V <sub>CC</sub> | T <sub>A</sub> = 25°C |     | SN54HC4017 |     | SN74HC4017 |     | UNIT |
|--------------------|-----------------|---------------------------------------------------------------------------------------------------------------|-----------------|-----------------------|-----|------------|-----|------------|-----|------|
|                    |                 |                                                                                                               |                 | MIN                   | MAX | MIN        | MAX | MIN        | MAX |      |
| f <sub>clock</sub> | Clock frequency | CLK <sup>†</sup> or $\overline{\text{CLKEN}}^{\ddagger}$                                                      | 2 V             | 0                     | 6   | 0          | 4.2 | 0          | 5   | MHz  |
|                    |                 |                                                                                                               | 4.5 V           | 0                     | 31  | 0          | 20  | 0          | 25  |      |
|                    |                 |                                                                                                               | 6 V             | 0                     | 36  | 0          | 25  | 0          | 29  |      |
| t <sub>w</sub>     | Pulse duration  | CLK high or low <sup>†</sup> or $\overline{\text{CLKEN}}$ high or low <sup>‡</sup>                            | 2 V             | 80                    |     | 120        |     | 100        |     | ns   |
|                    |                 |                                                                                                               | 4.5 V           | 16                    |     | 25         |     | 20         |     |      |
|                    |                 |                                                                                                               | 6 V             | 14                    |     | 20         |     | 17         |     |      |
|                    |                 | CLR high                                                                                                      | 2 V             | 80                    |     | 120        |     | 100        |     |      |
|                    |                 |                                                                                                               | 4.5 V           | 16                    |     | 24         |     | 20         |     |      |
|                    |                 |                                                                                                               | 6 V             | 14                    |     | 20         |     | 17         |     |      |
| t <sub>su</sub>    | Setup time      | $\overline{\text{CLKEN}}$ low before CLK <sup>†</sup> or CLK high before $\overline{\text{CLKEN}}^{\ddagger}$ | 2 V             | 50                    |     | 75         |     | 63         |     | ns   |
|                    |                 |                                                                                                               | 4.5 V           | 10                    |     | 15         |     | 13         |     |      |
|                    |                 |                                                                                                               | 6 V             | 9                     |     | 13         |     | 11         |     |      |
|                    |                 | CLR inactive before CLK <sup>†</sup> or $\overline{\text{CLKEN}}^{\ddagger}$                                  | 2 V             | 50                    |     | 75         |     | 63         |     |      |
|                    |                 |                                                                                                               | 4.5 V           | 10                    |     | 15         |     | 13         |     |      |
|                    |                 |                                                                                                               | 6 V             | 9                     |     | 13         |     | 11         |     |      |
| t <sub>h</sub>     | Hold time       | $\overline{\text{CLKEN}}$ low after CLK <sup>†</sup> or CLK high after $\overline{\text{CLKEN}}^{\ddagger}$   | 2 V             | 5                     |     | 5          |     | 5          |     | ns   |
|                    |                 |                                                                                                               | 4.5 V           | 5                     |     | 5          |     | 5          |     |      |
|                    |                 |                                                                                                               | 6 V             | 5                     |     | 5          |     | 5          |     |      |

<sup>†</sup>These conditions apply if clocking is being performed via the CLK input.

<sup>‡</sup>These conditions apply if clocking is being performed via the  $\overline{\text{CLKEN}}$  input.

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 |     |     | SN54HC4017 |     | SN74HC4017 |     | UNIT |
|------------------|---------------------------|-------------|-----------------|-----------------------|-----|-----|------------|-----|------------|-----|------|
|                  |                           |             |                 | MIN                   | TYP | MAX | MIN        | MAX | MIN        | MAX |      |
| f <sub>max</sub> |                           |             | 2 V             | 6                     | 10  |     | 4.2        |     | 5          |     | MHz  |
|                  |                           |             | 4.5 V           | 31                    | 50  |     | 20         |     | 25         |     |      |
|                  |                           |             | 6 V             | 36                    | 55  |     | 25         |     | 29         |     |      |
| t <sub>pd</sub>  | CLK                       | Any Y or CO | 2 V             |                       | 90  | 230 |            | 343 |            | 290 | ns   |
|                  |                           |             | 4.5 V           |                       | 23  | 46  |            | 69  |            | 58  |      |
|                  |                           |             | 6 V             |                       | 20  | 39  |            | 58  |            | 49  |      |
| t <sub>pd</sub>  | $\overline{\text{CLKEN}}$ | Any Y or CO | 2 V             |                       | 125 | 250 |            | 373 |            | 315 | ns   |
|                  |                           |             | 4.5 V           |                       | 25  | 50  |            | 75  |            | 63  |      |
|                  |                           |             | 6 V             |                       | 21  | 43  |            | 63  |            | 54  |      |
| t <sub>pd</sub>  | CLR                       | Any Y       | 2 V             |                       | 90  | 230 |            | 343 |            | 290 | ns   |
|                  |                           |             | 4.5 V           |                       | 23  | 46  |            | 69  |            | 58  |      |
|                  |                           |             | 6 V             |                       | 20  | 39  |            | 58  |            | 49  |      |
| t <sub>PLH</sub> | CLR                       | CO          | 2 V             |                       | 90  | 230 |            | 343 |            | 290 | ns   |
|                  |                           |             | 4.5 V           |                       | 23  | 46  |            | 69  |            | 58  |      |
|                  |                           |             | 6 V             |                       | 20  | 39  |            | 58  |            | 49  |      |
| t <sub>t</sub>   |                           | Any output  | 2 V             |                       | 38  | 75  |            | 110 |            | 95  | ns   |
|                  |                           |             | 4.5 V           |                       | 8   | 15  |            | 22  |            | 18  |      |
|                  |                           |             | 6 V             |                       | 6   | 13  |            | 19  |            | 16  |      |

|                 |                               |                                |           |
|-----------------|-------------------------------|--------------------------------|-----------|
| C <sub>pd</sub> | Power dissipation capacitance | No load, T <sub>A</sub> = 25°C | 60 pF typ |
|-----------------|-------------------------------|--------------------------------|-----------|

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