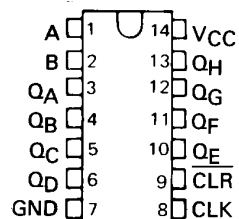


# SN54164, SN54LS164, SN74164, SN74LS164 8-BIT PARALLEL-OUT SERIAL SHIFT REGISTERS

MARCH 1974 — REVISED MARCH 1988

- Gated Serial Inputs
- Fully Buffered Clock and Serial Inputs
- Asynchronous Clear

SN54164, SN54LS164 . . . J OR W PACKAGE  
SN74164 . . . N PACKAGE  
SN74LS164 . . . D OR N PACKAGE  
(TOP VIEW)



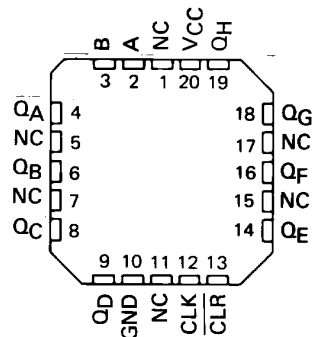
| TYPE   | TYPICAL<br>MAXIMUM<br>CLOCK FREQUENCY | TYPICAL<br>POWER DISSIPATION |
|--------|---------------------------------------|------------------------------|
| '164   | 36 MHz                                | 21 mW per bit                |
| 'LS164 | 36 MHz                                | 10 mW per bit                |

## description

These 8-bit shift registers feature gated serial inputs and an asynchronous clear. The gated serial inputs (A and B) permit complete control over incoming data as a low at either input inhibits entry of the new data and resets the first flip-flop to the low level at the next clock pulse. A high-level input enables the other input which will then determine the state of the first flip-flop. Data at the serial inputs may be changed while the clock is high or low, but only information meeting the setup-time requirements will be entered. Clocking occurs on the low-to-high-level transition of the clock input. All inputs are diode-clamped to minimize transmission-line effects.

The SN54164 and SN54LS164 are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74164 and SN74LS164 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN54LS164 . . . FK PACKAGE  
(TOP VIEW)



NC — No internal connection

FUNCTION TABLE

| INPUTS |       |   |   | OUTPUTS |             |     |
|--------|-------|---|---|---------|-------------|-----|
| CLEAR  | CLOCK | A | B | QA      | QB . . . QH |     |
| L      | X     | X | X | L       | L           | L   |
| H      | L     | X | X | QA0     | QB0         | QH0 |
| H      | ↑     | H | H | H       | QAn         | QGn |
| H      | ↑     | L | X | L       | QAn         | QGn |
| H      | ↑     | X | L | L       | QAn         | QGn |

H = high level (steady state), L = low level (steady state)

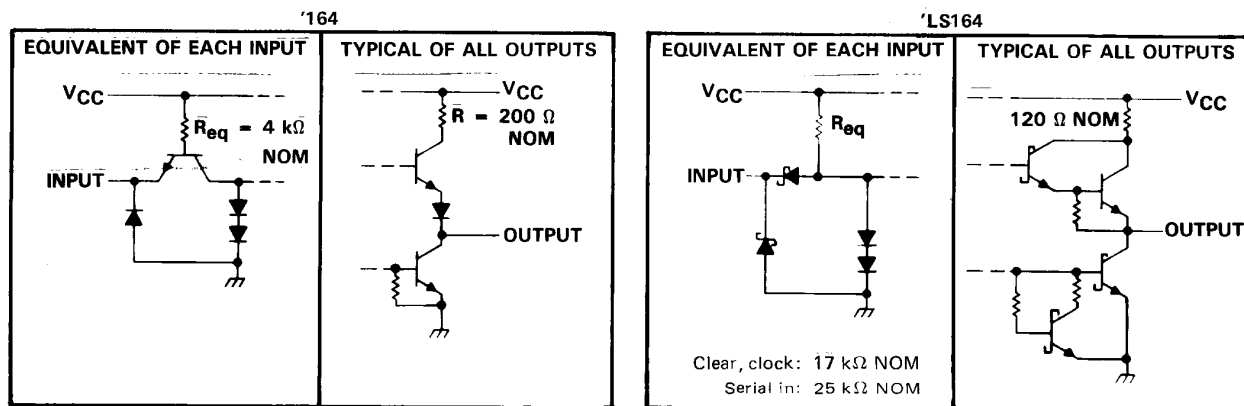
X = irrelevant (any input, including transitions)

↑ = transition from low to high level.

QA0, QB0, QH0 = the level of QA, QB, or QH, respectively, before the indicated steady-state input conditions were established.

QAn, QGn = the level of QA or QG before the most-recent ↑ transition of the clock; indicates a one-bit shift.

## schematics of inputs and outputs

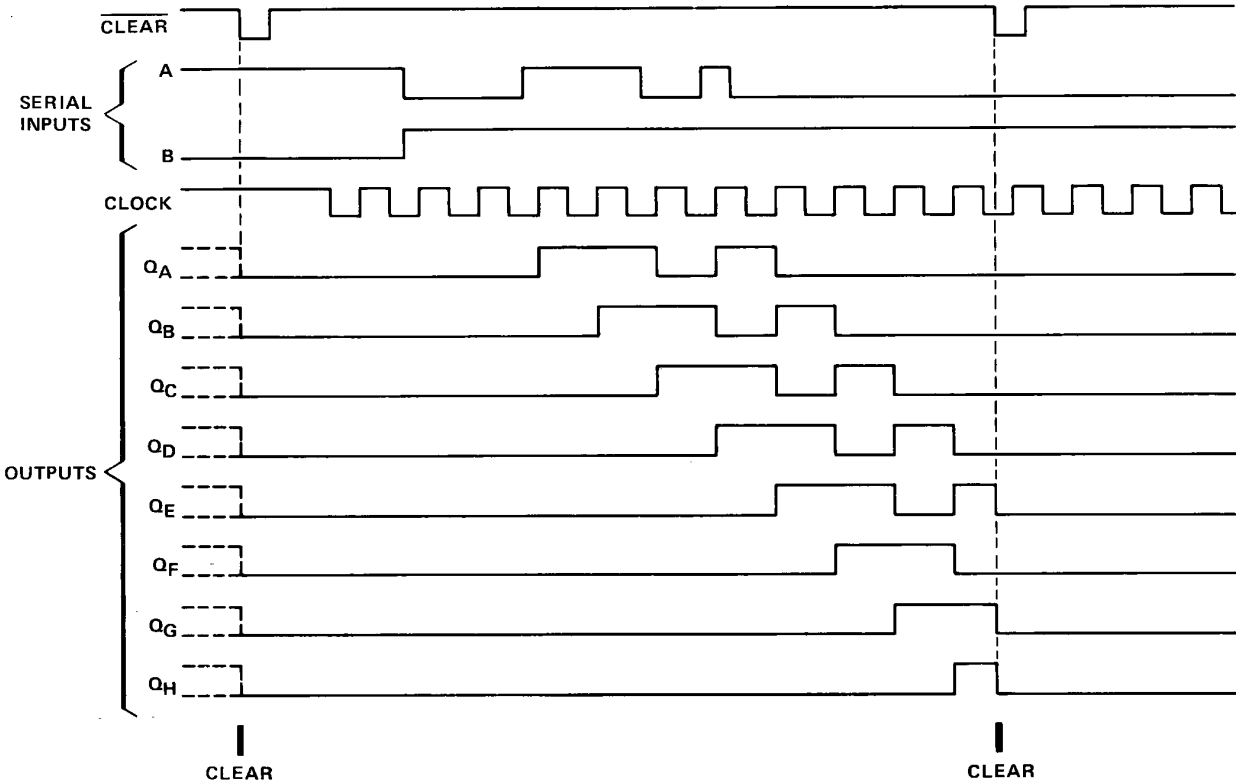


2

TTL Devices

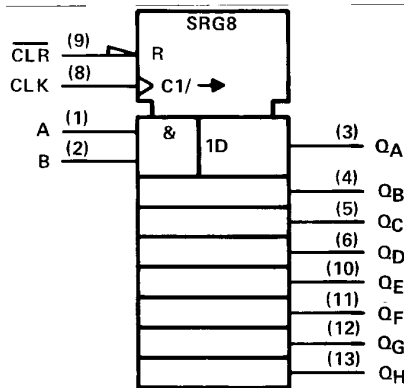
# SN54164, SN54LS164, SN74164, SN74LS164 8-BIT PARALLEL-OUT SERIAL SHIFT REGISTERS

typical clear, shift, and clear sequences



2  
TTL Devices

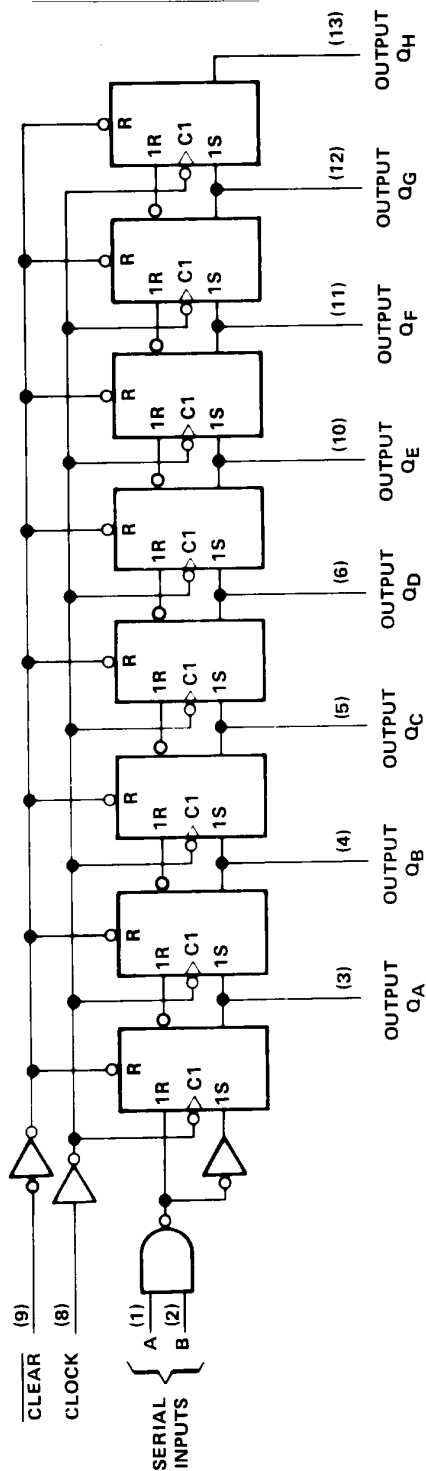
logic symbol†



†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.

# SN54164, SN54LS164, SN74164, SN74LS164 8-BIT PARALLEL-OUT SERIAL SHIFT REGISTER

logic diagram (positive logic)



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

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TTL Devices

# SN54164, SN74164

## 8-BIT PARALLEL-OUT SERIAL SHIFT REGISTERS

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

|   |                |
|---|----------------|
| Supply voltage, $V_{CC}$ (see Note 1)         | 7 V            |
| Input voltage                                 | 5.5 V          |
| Operating free-air temperature range: SN54164 | -55°C to 125°C |
| SN74164                                       | 0°C to 70°C    |
| Storage temperature range                     | -65°C to 150°C |

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

### recommended operating conditions

|   | SN54164 |     |      | SN74164 |     |      | UNIT    |
|---|---------|-----|------|---------|-----|------|---------|
|   | MIN     | NOM | MAX  | MIN     | NOM | MAX  |         |
| Supply voltage, $V_{CC}$                                  | 4.5     | 5   | 5.5  | 4.75    | 5   | 5.25 | V       |
| High-level output current, $I_{OH}$                       |         |     | -400 |         |     | -400 | $\mu$ A |
| Low-level output current, $I_{OL}$                        |         |     | 8    |         |     | 8    | mA      |
| Clock frequency, $f_{clock}$                              | 0       |     | 25   | 0       |     | 25   | MHz     |
| Width of clock or clear input pulse, $t_w$                | 20      |     |      | 20      |     |      | ns      |
| Data setup time, $t_{SU}$ (see Figure 1)                  | 15      |     |      | 15      |     |      | ns      |
| Data setup time, $t_{SU}$ (Clear Inactive) (see Figure 1) | 20      |     |      | 20      |     |      | ns      |
| Data hold time, $t_H$ (see Figure 1)                      | 5       |     |      | 5       |     |      | ns      |
| Operating free-air temperature, $T_A$                     | -55     |     | 125  | 0       |     | 70   | °C      |

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

| PARAMETER                                    | TEST CONDITIONS†   | SN54164 |      |       | SN74164 |      |       | UNIT    |
|--|--|---------|------|-------|---------|------|-------|---------|
|  |  | MIN     | TYP‡ | MAX   | MIN     | TYP‡ | MAX   |         |
| $V_{IH}$ High-level input voltage            |  | 2       |      |       | 2       |      |       | V       |
| $V_{IL}$ Low-level input voltage             |  |         |      | 0.8   |         |      | 0.8   | V       |
| $V_{IK}$ Input clamp voltage                 | $V_{CC} = \text{MIN}, I_I = -12 \text{ mA}$  |         |      | -1.5  |         |      | -1.5  | V       |
| $V_{OH}$ High-level output voltage           | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OH} = -400 \mu\text{A}$ | 2.4     | 3.2  |       | 2.4     | 3.2  |       | V       |
| $V_{OL}$ Low-level output voltage            | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OL} = 8 \text{ mA}$     |         | 0.2  | 0.4   |         | 0.2  | 0.4   | V       |
| $I_I$ Input current at maximum input voltage | $V_{CC} = \text{MAX}, V_I = 5.5 \text{ V}$   |         |      | 1     |         |      | 1     | mA      |
| $I_{IH}$ High-level input current            | $V_{CC} = \text{MAX}, V_I = 2.4 \text{ V}$   |         |      | 40    |         |      | 40    | $\mu$ A |
| $I_{IL}$ Low-level input current             | $V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$   |         |      | -1.6  |         |      | -1.6  | mA      |
| $I_{OS}$ Short-circuit output current§       | $V_{CC} = \text{MAX}$  | -10     |      | -27.5 | -9      |      | -27.5 | mA      |
| $I_{CC}$ Supply current                      | $V_{CC} = \text{MAX}, V_I(\text{clock}) = 0.4 \text{ V}$                                       |         |      | 30    |         |      | 30    | mA      |
|  | See Note 2 $V_I(\text{clock}) = 2.4 \text{ V}$   |         |      | 37    |         |      | 54    |         |

† For conditions shown at MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at  $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$ .

§ Not more than two outputs should be shorted at a time.

NOTE 2:  $I_{CC}$  is measured with outputs open, serial inputs grounded, and a momentary ground, then 4.5 V, applied to clear.

### switching characteristics, $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$

| PARAMETER   | TEST CONDITIONS       | MIN | TYP | MAX | UNIT |
|---|-----------------------|-----|-----|-----|------|
| $f_{max}$ Maximum clock frequency   | $C_L = 15 \text{ pF}$ | 25  | 36  |     | MHz  |
| $t_{PHL}$ Propagation delay time, high-to-low-level<br>Q outputs from clear input     | $C_L = 15 \text{ pF}$ |     | 24  | 36  | ns   |
|   | $C_L = 50 \text{ pF}$ |     | 28  | 42  |      |
| $t_{PLH}$ Propagation delay time, low-to-high-level<br>Q outputs from clock input     | $C_L = 15 \text{ pF}$ | 8   | 17  | 27  | ns   |
|   | $C_L = 50 \text{ pF}$ | 10  | 20  | 30  |      |
| $t_{PHL}$ Propagation delay time, high-to-low-level<br>Q outputs from the clock input | $C_L = 15 \text{ pF}$ | 10  | 21  | 32  | ns   |
|   | $C_L = 50 \text{ pF}$ | 10  | 25  | 37  |      |

## SN54LS164, SN74LS164 8-BIT PARALLEL-OUT SERIAL SHIFT REGISTERS

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

|   |                |
|---|----------------|
| Supply voltage, $V_{CC}$ (see Note 1) .....           | 7 V            |
| Input voltage .....                                   | 7 V            |
| Operating free-air temperature range: SN54LS164 ..... | -55°C to 125°C |
| SN74LS164 .....                                       | 0°C to 70°C    |
| Storage temperature range .....                       | -65°C to 150°C |

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

### recommended operating conditions

|             |  | SN54LS164 |     |      | SN74LS164 |     |      | 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   |
| $f_{clock}$ | Clock frequency                          | 0         |     | 25   | 0         |     | 25   | MHz  |
| $t_w$       | Width of clock or clear input pulse      | 20        |     |      | 20        |     |      | ns   |
| $t_{su}$    | Data setup time (See Figure 1)           | 15        |     |      | 15        |     |      | ns   |
| $t_{su}$    | Clear inactive setup time (See Figure 1) | 20        |     |      | 20        |     |      | ns   |
| $t_h$       | Data hold time (See Figure 1)            | 5         |     |      | 5         |     |      | 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†   | SN54LS164               |      |      | SN74LS164 |                         |      | UNIT |     |
|-----------|--|-------------------------|------|------|-----------|-------------------------|------|------|-----|
|           |  | MIN                     | TYP‡ | MAX  | MIN       | TYP‡                    | MAX  |      |     |
| $V_{IK}$  | $V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$  |                         |      | -1.5 |           |                         | -1.5 | V    |     |
| $V_{OH}$  | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = \text{MAX}, I_{OH} = -0.4 \text{ mA}$ | 2.5                     | 3.5  |      | 2.7       | 3.5                     |      | V    |     |
| $V_{OL}$  | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = \text{MAX}$                           | $I_{OL} = 4 \text{ mA}$ |      | 0.25 | 0.4       | $I_{OL} = 4 \text{ mA}$ |      | 0.25 | 0.4 |
|           |  | $I_{OL} = 8 \text{ mA}$ |      |      |           | $I_{OL} = 8 \text{ mA}$ |      | 0.35 | 0.5 |
| $I_I$     | $V_{CC} = \text{MAX}, V_I = 7 \text{ V}$   |                         |      | 0.1  |           |                         | 0.1  | mA   |     |
| $I_{IH}$  | $V_{CC} = \text{MAX}, V_I = 2.7 \text{ V}$   |                         |      | 20   |           |                         | 20   | μA   |     |
| $I_{IL}$  | $V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$   |                         |      | -0.4 |           |                         | -0.4 | mA   |     |
| $I_{OS}$  | $V_{CC} = \text{MAX}$  | -20                     |      | -100 | -20       |                         | -100 | mA   |     |
| $I_{CC}$  | $V_{CC} = \text{MAX},$ See Note 3  |                         | 16   | 27   |           | 16                      | 27   | mA   |     |

†For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡All typical values are at  $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$ .

§Not more than one output should be shorted at a time, and duration of the short-circuit should not exceed one second.

NOTE 3:  $I_{CC}$  is measured with outputs open, serial inputs grounded, the clock input at 2.4 V, and a momentary ground, then 4.5 V applied to clear.

### switching characteristics, $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$

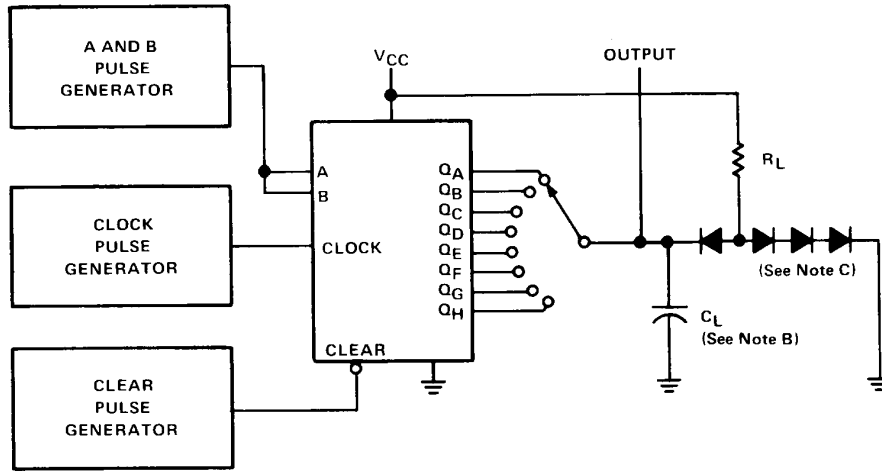
| PARAMETER  | TEST CONDITIONS                                 | MIN | TYP | MAX | UNIT |
|--|---|-----|-----|-----|------|
| $f_{max}$ Maximum clock frequency  |   | 25  | 36  |     | MHz  |
| $t_{PHL}$ Propagation delay time, high-to-low-level Q outputs from clear input | $R_L = 2 \text{ k}\Omega, C_L = 15 \text{ pF},$ |     | 24  | 36  | ns   |
| $t_{PLH}$ Propagation delay time, low-to-high-level Q outputs from clock input | See Figure 1                                    |     | 17  | 27  | ns   |
| $t_{PHL}$ Propagation delay time, high-to-low-level Q outputs from clock input |   |     | 21  | 32  | ns   |

2

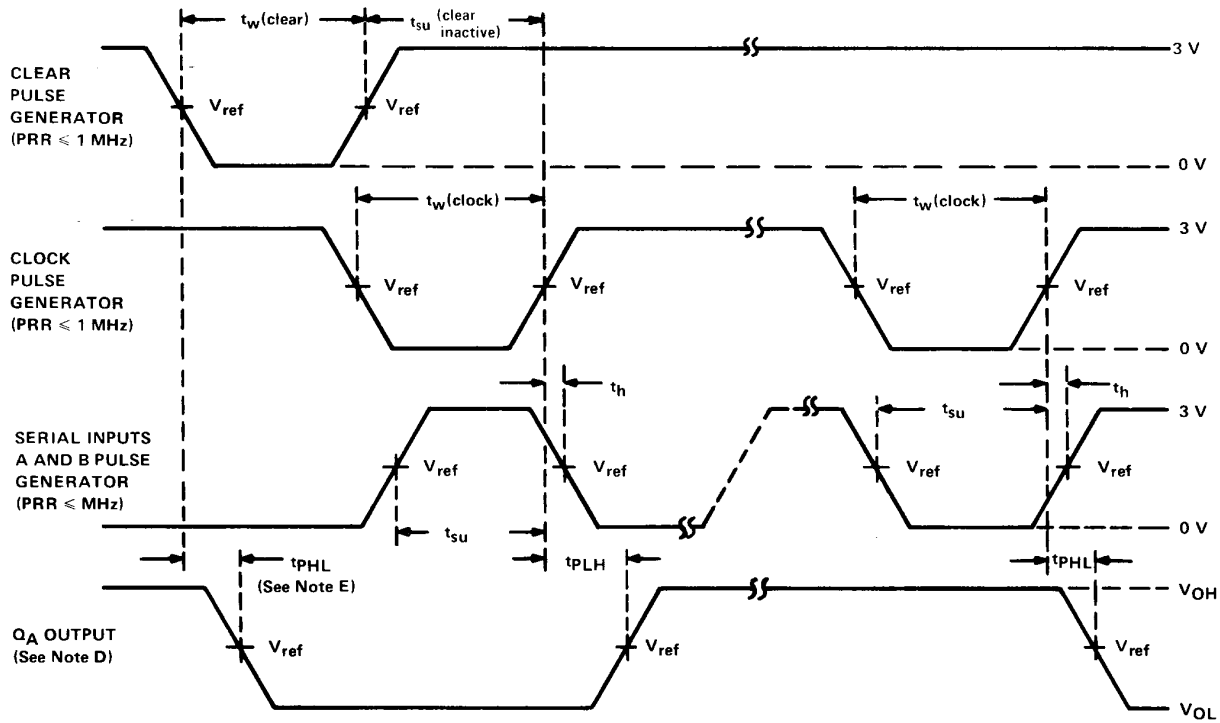
TTL Devices

**SN54164, SN54LS164, SN74164, SN74LS164**  
**8-BIT PARALLEL-OUT SERIAL SHIFT REGISTERS**

**PARAMETER MEASUREMENT INFORMATION**



**TEST CIRCUIT**



**VOLTAGE WAVEFORMS**

- NOTES: A. The pulse generators have the following characteristics: duty cyclé  $\leq 50\%$ ,  $Z_{out} \approx 50 \Omega$ ; for '164,  $t_r \leq 10$  ns,  $t_f \leq 10$  ns; and for 'LS164,  $t_r \leq 15$  ns,  $t_f \leq 6$  ns.  
 B.  $C_L$  includes probe and jig capacitance.  
 C. All diodes are 1N3064 or equivalent.  
 D.  $Q_A$  output is illustrated. Relationship of serial input A and B data to other Q outputs is illustrated in the typical shift sequence.  
 E. Outputs are set to the high level prior to the measurement of  $t_{PHL}$  from the clear input.  
 F. For '164,  $V_{ref} = 1.5$  V; for 'LS164,  $V_{ref} = 1.3$  V.

**FIGURE 1—SWITCHING TIMES**

**2**

**TTL Devices**

**PACKAGING INFORMATION**

| Orderable part number            | Status<br>(1) | Material type<br>(2) | Package   Pins | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6)  |
|----------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|----------------------|
| <a href="#">JM38510/30605B2A</a> | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605B2A |
| JM38510/30605B2A.A               | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605B2A |
| JM38510/30605B2A.A               | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605B2A |
| <a href="#">JM38510/30605BCA</a> | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605BCA |
| <a href="#">JM38510/30605BCA</a> | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605BCA |
| JM38510/30605BCA.A               | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605BCA |
| JM38510/30605BCA.A               | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605BCA |
| <a href="#">JM38510/30605BDA</a> | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605BDA |
| <a href="#">JM38510/30605BDA</a> | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605BDA |
| JM38510/30605BDA.A               | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605BDA |
| JM38510/30605BDA.A               | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605BDA |
| <a href="#">JM38510/30605SCA</a> | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605SCA |
| <a href="#">JM38510/30605SCA</a> | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605SCA |
| JM38510/30605SCA.A               | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605SCA |
| JM38510/30605SCA.A               | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605SCA |
| <a href="#">JM38510/30605SDA</a> | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605SDA |

| Orderable part number            | Status<br>(1) | Material type<br>(2) | Package   Pins | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6)  |
|----------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|----------------------|
| <a href="#">JM38510/30605SDA</a> | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605SDA |
| JM38510/30605SDA.A               | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605SDA |
| JM38510/30605SDA.A               | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605SDA |
| <a href="#">M38510/30605B2A</a>  | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605B2A |
| <a href="#">M38510/30605B2A</a>  | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605B2A |
| <a href="#">M38510/30605BCA</a>  | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605BCA |
| <a href="#">M38510/30605BCA</a>  | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605BCA |
| <a href="#">M38510/30605BDA</a>  | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605BDA |
| <a href="#">M38510/30605BDA</a>  | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605BDA |
| <a href="#">M38510/30605SCA</a>  | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605SCA |
| <a href="#">M38510/30605SCA</a>  | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605SCA |
| <a href="#">M38510/30605SDA</a>  | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605SDA |
| <a href="#">M38510/30605SDA</a>  | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>30605SDA |
| <a href="#">SN54LS164J</a>       | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SN54LS164J           |
| <a href="#">SN54LS164J</a>       | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SN54LS164J           |
| SN54LS164J.A                     | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SN54LS164J           |
| SN54LS164J.A                     | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SN54LS164J           |
| <a href="#">SN74LS164D</a>       | Obsolete      | Production           | SOIC (D)   14  | -                     | -           | Call TI                              | Call TI                           | 0 to 70      | LS164                |
| <a href="#">SN74LS164D</a>       | Obsolete      | Production           | SOIC (D)   14  | -                     | -           | Call TI                              | Call TI                           | 0 to 70      | LS164                |
| <a href="#">SN74LS164DR</a>      | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS164                |
| <a href="#">SN74LS164DR</a>      | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS164                |

| Orderable part number        | Status<br>(1) | Material type<br>(2) | Package   Pins | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6) |
|------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| SN74LS164DR.A                | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS164               |
| SN74LS164DR.A                | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS164               |
| <a href="#">SN74LS164N</a>   | Active        | Production           | PDIP (N)   14  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74LS164N          |
| <a href="#">SN74LS164N</a>   | Active        | Production           | PDIP (N)   14  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74LS164N          |
| SN74LS164N.A                 | Active        | Production           | PDIP (N)   14  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74LS164N          |
| SN74LS164N.A                 | Active        | Production           | PDIP (N)   14  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74LS164N          |
| SN74LS164NE4                 | Active        | Production           | PDIP (N)   14  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74LS164N          |
| SN74LS164NE4                 | Active        | Production           | PDIP (N)   14  | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74LS164N          |
| <a href="#">SN74LS164NSR</a> | Active        | Production           | SOP (NS)   14  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74LS164             |
| <a href="#">SN74LS164NSR</a> | Active        | Production           | SOP (NS)   14  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74LS164             |
| SN74LS164NSR.A               | Active        | Production           | SOP (NS)   14  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74LS164             |
| SN74LS164NSR.A               | Active        | Production           | SOP (NS)   14  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74LS164             |
| SN74LS164NSRE4               | Active        | Production           | SOP (NS)   14  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74LS164             |
| SN74LS164NSRE4               | Active        | Production           | SOP (NS)   14  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74LS164             |
| <a href="#">SNJ54LS164FK</a> | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SNJ54LS<br>164FK    |
| <a href="#">SNJ54LS164FK</a> | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SNJ54LS<br>164FK    |
| SNJ54LS164FK.A               | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SNJ54LS<br>164FK    |
| SNJ54LS164FK.A               | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SNJ54LS<br>164FK    |
| <a href="#">SNJ54LS164J</a>  | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SNJ54LS164J         |
| <a href="#">SNJ54LS164J</a>  | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SNJ54LS164J         |
| SNJ54LS164J.A                | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SNJ54LS164J         |
| SNJ54LS164J.A                | Active        | Production           | CDIP (J)   14  | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SNJ54LS164J         |
| <a href="#">SNJ54LS164W</a>  | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SNJ54LS164W         |
| <a href="#">SNJ54LS164W</a>  | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SNJ54LS164W         |
| SNJ54LS164W.A                | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SNJ54LS164W         |
| SNJ54LS164W.A                | Active        | Production           | CFP (W)   14   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SNJ54LS164W         |

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

- (2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.
- (3) **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.
- (4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.
- (5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.
- (6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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**OTHER QUALIFIED VERSIONS OF SN54LS164, SN54LS164-SP, SN74LS164 :**

- Catalog : [SN74LS164](#), [SN54LS164](#)
- Military : [SN54LS164](#)
- Space : [SN54LS164-SP](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product

- Military - QML certified for Military and Defense Applications
- Space - Radiation tolerant, ceramic packaging and qualified for use in Space-based application

**TAPE AND REEL INFORMATION**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**


\*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 |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74LS164DR  | SOIC         | D               | 14   | 2500 | 330.0              | 16.4               | 6.5     | 9.0     | 2.1     | 8.0     | 16.0   | Q1            |
| SN74LS164NSR | SOP          | NS              | 14   | 2000 | 330.0              | 16.4               | 8.1     | 10.4    | 2.5     | 12.0    | 16.0   | Q1            |

**TAPE AND REEL BOX DIMENSIONS**

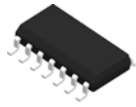

\*All dimensions are nominal

| Device       | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74LS164DR  | SOIC         | D               | 14   | 2500 | 353.0       | 353.0      | 32.0        |
| SN74LS164NSR | SOP          | NS              | 14   | 2000 | 353.0       | 353.0      | 32.0        |

**TUBE**


\*All dimensions are nominal

| Device             | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|--------------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| JM38510/30605B2A   | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| JM38510/30605B2A.A | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| JM38510/30605BDA   | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |
| JM38510/30605BDA.A | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |
| JM38510/30605SDA   | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |
| JM38510/30605SDA.A | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |
| M38510/30605B2A    | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| M38510/30605BDA    | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |
| M38510/30605SDA    | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |
| SN74LS164N         | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |
| SN74LS164N.A       | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |
| SN74LS164NE4       | N            | PDIP         | 14   | 25  | 506    | 13.97  | 11230  | 4.32   |
| SNJ54LS164FK       | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| SNJ54LS164FK.A     | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| SNJ54LS164W        | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |
| SNJ54LS164W.A      | W            | CFP          | 14   | 25  | 506.98 | 26.16  | 6220   | NA     |



# D0014A

# PACKAGE OUTLINE

## SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



4220718/A 09/2016

### NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm, per side.
5. Reference JEDEC registration MS-012, variation AB.

# EXAMPLE BOARD LAYOUT

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE  
SCALE:8X



SOLDER MASK DETAILS

4220718/A 09/2016

NOTES: (continued)

- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:8X

4220718/A 09/2016

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

# 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.

W (R-GDFP-F14)

CERAMIC DUAL FLATPACK



- 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 ceramic lid using glass frit.
  - D. Index point is provided on cap for terminal identification only.
  - E. Falls within MIL STD 1835 GDFP1-F14

## GENERIC PACKAGE VIEW

**FK 20**

**LCCC - 2.03 mm max height**

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

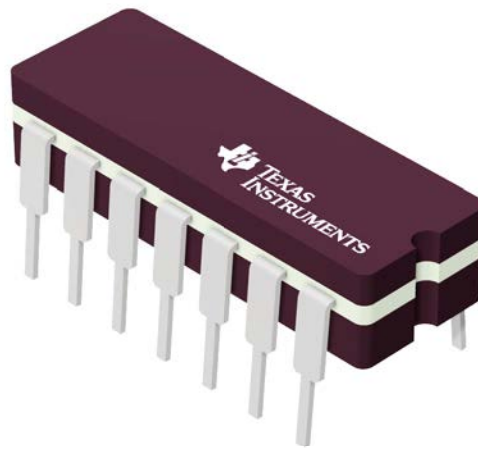
This image is a representation of the package family, actual package may vary.  
Refer to the product data sheet for package details.



4229370VA\

J 14

**GENERIC PACKAGE VIEW**  
**CDIP - 5.08 mm max height**  
CERAMIC DUAL IN LINE PACKAGE



Images above are just a representation of the package family, actual package may vary.  
Refer to the product data sheet for package details.

4040083-5/G

J0014A



# PACKAGE OUTLINE

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



NOTES:

1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermetically sealed with a ceramic lid using glass frit.
4. Index point is provided on cap for terminal identification only and on press ceramic glass frit seal only.
5. Falls within MIL-STD-1835 and GDIP1-T14.

# EXAMPLE BOARD LAYOUT

J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



LAND PATTERN EXAMPLE  
NON-SOLDER MASK DEFINED  
SCALE: 5X



4214771/A 05/2017

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

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



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

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