

## Quad buffer (3-State)

54F126

## FEATURES

- High impedance NPN base inputs for reduced loading (20 $\mu$ A in High and Low states)

## FUNCTION TABLE

| INPUTS |   | OUTPUT |
|--------|---|--------|
| C      | A | Y      |
| H      | L | L      |
| H      | H | H      |
| L      | X | (Z)    |

H = High voltage level

L = Low voltage level

X = Don't care

Z = High Impedance

## ORDERING INFORMATION

| DESCRIPTION              | ORDER CODE | PACKAGE DESIGNATOR* |
|--------------------------|------------|---------------------|
| 14-Pin Ceramic DIP       | 54F126/BCA | GDIP1-T14           |
| 14-Pin Ceramic Flat Pack | 54F126/BDA | GDFP1-F14           |
| 20-Pin Ceramic LLCC      | 54F126/B2A | GDFP2-F20           |

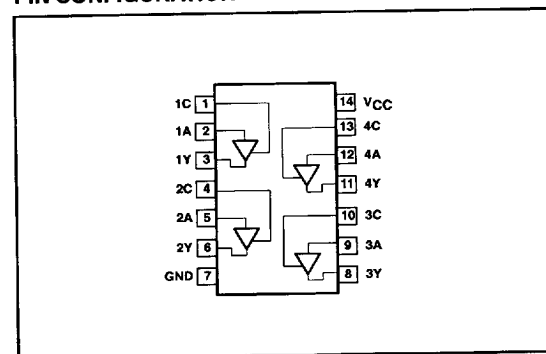
\* MIL-STD 1835 or Appendix A of 1995 Military Data Handbook

## INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

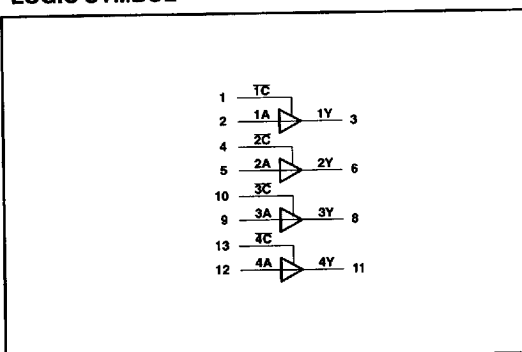
| PINS    | DESCRIPTION                 | 54F(U.L.) HIGH/LOW | LOAD VALUE HIGH/LOW   |
|---------|-----------------------------|--------------------|-----------------------|
| 1A - 4A | Data inputs                 | 1.0/0.033          | 20 $\mu$ A/20 $\mu$ A |
| 1C - 4C | 3-State output enable input | 1.0/0.033          | 20 $\mu$ A/20 $\mu$ A |
| 1Y - 4Y | Data outputs                | 600/80             | 12mA/48mA             |

NOTE: One (1.0) FAST Unit Load is defined as: 20 $\mu$ A in the High state and 0.6mA in the Low state.

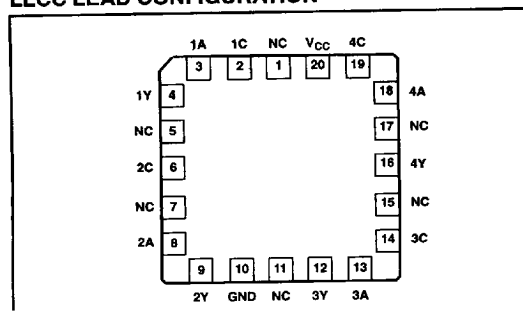
## PIN CONFIGURATION



## LOGIC SYMBOL



## LLCC LEAD CONFIGURATION



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**ABSOLUTE MAXIMUM RATINGS**

(Operation beyond the limits set forth in this table may impair the useful life of the device. Unless otherwise noted these limits are over the operating free-air temperature range.)

| SYMBOL    | PARAMETER                                            | RATING           | UNIT |
|-----------|------------------------------------------------------|------------------|------|
| $V_{CC}$  | Supply voltage                                       | 7.0              | V    |
| $V_I$     | Input voltage range                                  | -0.5 to +7.0     | V    |
| $I_I$     | Input current range                                  | -30 to +5        | mA   |
| $V_O$     | Voltage applied to output in High output state range | -0.5 to $V_{CC}$ | V    |
| $I_O$     | Current applied to output in Low output state        | 96               | mA   |
| $T_{STG}$ | Storage temperature range                            | -65 to +150      | °C   |

**RECOMMENDED OPERATING CONDITIONS**

| SYMBOL   | PARAMETER                            | LIMITS |     |      | UNIT |
|----------|--------------------------------------|--------|-----|------|------|
|          |                                      | Min    | Nom | Max  |      |
| $V_{CC}$ | Supply voltage                       | 4.5    | 5.0 | 5.5  | V    |
| $V_{IH}$ | High-level input voltage             | 2.0    |     |      | V    |
| $V_{IL}$ | Low-level input voltage              |        |     | 0.8  | V    |
| $I_{IK}$ | Input clamp current                  |        |     | -18  | mA   |
| $I_{OH}$ | High-level output current            |        |     | -12  | mA   |
| $I_{OL}$ | Low-level output current             |        |     | 64   | mA   |
| $T_A$    | Operating free-air temperature range | -55    |     | +125 | °C   |

**DC ELECTRICAL CHARACTERISTICS**

(Over recommended operating free-air temperature range unless otherwise noted.)

| SYMBOL    | PARAMETER                                            | TEST CONDITIONS <sup>1</sup>                                         |                                                    | LIMITS |                  |      | UNIT |
|-----------|------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------|--------|------------------|------|------|
|           |                                                      |                                                                      |                                                    | Min    | Typ <sup>2</sup> | Max  |      |
| $V_{OH}$  | High-level output voltage                            | $V_{CC} = \text{Min}, V_{IL} = \text{Max},$<br>$V_{IH} = \text{Min}$ | $I_{OH} = -3\text{mA}$                             | 2.4    |                  |      | V    |
|           |                                                      |                                                                      | $I_{OH} = \text{Max}$                              | 2.0    |                  |      | V    |
| $V_{OL}$  | Low-level output voltage                             | $V_{CC} = \text{Min}, V_{IL} = \text{Max}, V_{IH} = \text{Min}$      | $I_{OL} = 64\text{mA}$                             |        | .42              | .55  | V    |
| $V_{IK}$  | Input clamp voltage                                  | $V_{CC} = \text{Min}, I_I = I_{IK}$                                  |                                                    |        | -0.73            | -1.2 | V    |
| $I_{IH2}$ | Input current at maximum input voltage               | $V_{CC} = 0.0\text{V}, V_I = 7.0\text{V}$                            |                                                    |        |                  | 100  | μA   |
| $I_{IH1}$ | High-level input current                             | $V_{CC} = \text{Max}, V_I = 2.7\text{V}$                             |                                                    |        |                  | 20   | μA   |
| $I_{IL}$  | Low-level input current                              | $V_{CC} = \text{Max}, V_I = 0.5\text{V}$                             |                                                    |        |                  | -20  | μA   |
| $I_{OZH}$ | Off-state output current, High-level voltage applied | $V_{CC} = \text{Max}, V_{IH} = \text{Min}, V_O = 2.7\text{V}$        |                                                    |        | 2                | 50   | μA   |
| $I_{OZL}$ | Off-state output current, Low-level voltage applied  | $V_{CC} = \text{Max}, V_{IH} = \text{Min}, V_O = 0.5\text{V}$        |                                                    |        | -2               | -50  | μA   |
| $I_{OS}$  | Short-circuit output current <sup>3</sup>            | $V_{CC} = \text{Max}$                                                |                                                    | -100   | -150             | -225 | mA   |
| $I_{CC}$  | Supply Current <sup>4</sup> (total)                  | $I_{CCH}$                                                            | $V_{CC} = \text{Max}$<br>$C_N = D_N = 4.5\text{V}$ |        | 20               | 32   | mA   |
|           |                                                      | $I_{CCL}$                                                            | $C_N = 4.5\text{V}, D_N = \text{GND}$              |        | 32               | 48   | mA   |
|           |                                                      | $I_{CCZ}$                                                            | $C_N = \text{GND}, D_N = 4.5\text{V}$              |        | 26               | 40   | mA   |

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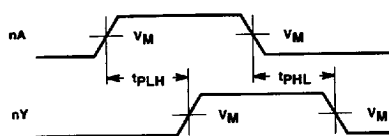
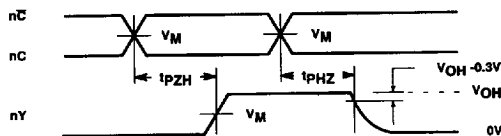
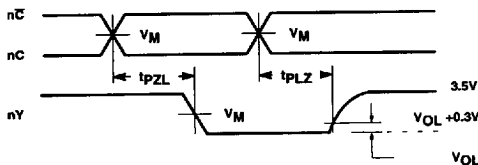
## AC ELECTRICAL CHARACTERISTICS

| SYMBOL                 | PARAMETER                                      | TEST CONDITIONS          | LIMITS                                                                                            |            |            |                                                                                                                                     |            |    | UNIT |
|------------------------|------------------------------------------------|--------------------------|---------------------------------------------------------------------------------------------------|------------|------------|-------------------------------------------------------------------------------------------------------------------------------------|------------|----|------|
|                        |                                                |                          | $T_A = +25^{\circ}\text{C}$ , $V_{CC} = +5.0\text{V}$<br>$C_L = 50\text{pF}$<br>$R_L = 500\Omega$ |            |            | $T_A = -55^{\circ}\text{C to } +125^{\circ}\text{C}$<br>$V_{CC} = +5.0\text{V} \pm 10\%$<br>$C_L = 50\text{pF}$ , $R_L = 500\Omega$ |            |    |      |
|                        |                                                |                          | Min                                                                                               | Type       | Max        | Min                                                                                                                                 | Max        |    |      |
|                        |                                                |                          |                                                                                                   |            |            |                                                                                                                                     |            |    |      |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation delay<br>nA to nY                  | Waveform 1               | 1.0<br>2.0                                                                                        | 3.5<br>4.0 | 6.5<br>8.0 | 1.0<br>2.0                                                                                                                          | 7.0<br>8.5 | ns |      |
| $t_{pZH}$<br>$t_{pZL}$ | Output enable time<br>to High and Low level    | Waveform 2<br>Waveform 3 | 2.0<br>3.0                                                                                        | 5.0<br>6.0 | 7.5<br>8.5 | 2.5<br>3.5                                                                                                                          | 8.5<br>9.0 | ns |      |
| $t_{PHZ}$<br>$t_{PLZ}$ | Output disable time<br>From High and Low level | Waveform 2<br>Waveform 3 | 1.0<br>2.5                                                                                        | 3.0<br>5.5 | 6.5<br>8.0 | 1.0<br>3.0                                                                                                                          | 7.5<br>8.5 | ns |      |

## NOTES:

- For conditions shown as Min or Max, use the appropriate value specified under recommended operating conditions for the applicable type and function table for operating mode.
- 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 the duration of the short circuit should not exceed one second.
- $I_{CC}$  is measured with outputs open.

## AC WAVEFORMS

Waveform 1. Propagation Delay  
For Input to OutputWaveform 2. 3-State Output Enable Time to High  
Level and Output Disable Time from High LevelWaveform 3. 3-State Output Enable Time to Low  
Level and Output Disable Time from Low LevelNOTE: For all waveforms,  $V_M = 1.5\text{V}$ 

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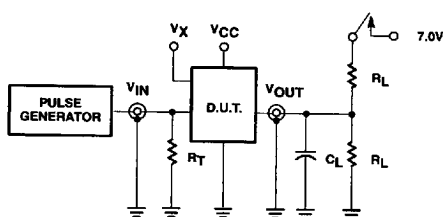
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## TEST CIRCUIT AND WAVEFORM



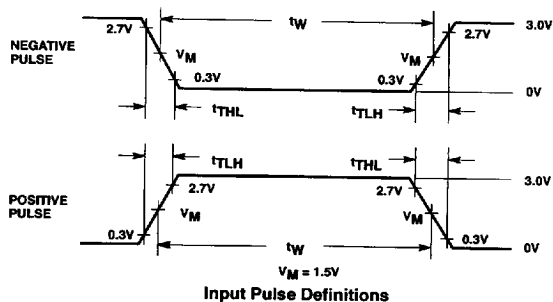
Test Circuit for 3-State Outputs and Open Collector Outputs

### SWITCH POSITION

| TEST                     | SWITCH |
|--------------------------|--------|
| $t_{PLZ}$ ,<br>$t_{PZL}$ | closed |
| All other                | open   |

### DEFINITIONS:

- $R_L$  = Load Resistor; see AC Characteristics for value.
- $C_L$  = Load capacitance includes jig and probe capacitance; see AC Characteristics for value.
- $R_T$  = Termination resistance should be equal to  $Z_{OUT}$  of pulse generators.
- $V_X$  = Unlocked pins must be held at:  $\leq 0.8V$ ;  $\geq 2.7V$  or open per Function Table.



| INPUT PULSE CHARACTERISTICS |           |             |              |              |
|-----------------------------|-----------|-------------|--------------|--------------|
| Family                      | Rep. Rate | Pulse Width | $t_{TLH}$    | $t_{THL}$    |
| 54F                         | 1MHz      | 500ns       | $\leq 2.5ns$ | $\leq 2.5ns$ |

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