|  |  |  | 157 <br> S157 <br> LTIPLEXER |  | CONNECTION DIAGRAM PINOUT A |
| :---: | :---: | :---: | :---: | :---: | :---: |
| DESCRIP <br> of data fr able inpu (non-inve different <br> ORDERIN | ION m two . The ed) for unction | The '157 is a high speed quad sources can be selected us our buffered outputs prese m. The ' 157 can also be used to two variables. <br> E: See Section 9 | ad 2 -input multiplexer. Fo ing the common Select and ent the selected data in th ed to generate any four of | bits <br> En- <br> true <br> 16 | LOGIC SYMBOL |
|  | PIN | COMMERCIAL GRADE | MILITARY GRADE |  |  |
| PKGS |  | $\begin{aligned} & \mathrm{V}_{\mathrm{Cc}}=+5.0 \mathrm{~V} \pm 5 \%, \\ & \mathrm{~T}_{\mathrm{A}}=0^{\circ} \mathrm{C} \text { to }+70^{\circ} \mathrm{C} \end{aligned}$ | $\begin{gathered} V_{C C}=+5.0 \mathrm{~V} \pm 10 \% \\ \mathrm{~T}_{\mathrm{A}}=-55^{\circ} \mathrm{C} \text { to }+125^{\circ} \mathrm{C} \end{gathered}$ | TYPE |  |
| Plastic DIP (P) | A | $\begin{aligned} & \text { 74157PC, 74S157PC } \\ & \text { 74LS157PC } \end{aligned}$ |  | 9B |  |
| Ceramic DIP (D) | A | $\begin{aligned} & \text { 74157DC, 74S157DC } \\ & \text { 74LS157DC } \end{aligned}$ | 54157DM, 54S157DM \|54LS157DM | 6B | $\begin{aligned} & V_{C C}=\operatorname{Pin} 16 \\ & \text { GND }=\operatorname{Pin} 8 \end{aligned}$ |
| Flatpak (F) | A | $\begin{aligned} & \text { 74157FC, 74S157FC } \\ & \text { 74LS157FC } \end{aligned}$ | 54157FM, 54S157FM 54LS157FM | 4L |  |

INPUT LOADING/FAN-OUT: See Section 3 for U.L. definitions

| PIN NAMES | DESCRIPTION | $54 / 74$ (U.L.) <br> HIGH/LOW | 54/74S (U.L.) <br> HIGH/LOW | $54 / 74$ LS (U.L.) <br> HIGH/LOW |
| :--- | :--- | :---: | :---: | :---: |
| $\mathrm{I}_{\mathrm{a}}-\mathrm{l}_{0 \mathrm{~d}}$ | Source 0 Data Inputs | $1.0 / 1.0$ | $1.25 / 1.25$ | $0.5 / 0.25$ |
| $\mathrm{I}_{1}-\mathrm{I}_{\mathrm{d}}$ | Source 1 Data Inputs | $1.0 / 1.0$ | $1.25 / 1.25$ | $0.5 / 0.25$ |
| E | Enable Input (Active LOW) | $1.0 / 1.0$ | 2.52 .5 | $1.0 / 0.5$ |
| S | Select Input | $1.0 / 1.0$ | $2.5 / 2.5$ | $1.0 / 0.5$ |
| $\mathrm{Z}_{\mathrm{a}}-\mathrm{Z}_{\mathrm{d}}$ | Outputs | $20 / 10$ | $25 / 12.5$ | $10 / 5.0$ |
|  |  |  |  | $(2.5)$ |

FUNCTIONAL DESCRIPTION - The '157 is a quad 2-input multiplexer. It selects four bits of data from two sources under the control of a common Select input ( S ). The Enable input ( $\bar{E}$ ) is active LOW. When $\overline{\mathrm{E}}$ is HIGH , all of the outputs $(Z)$ are forced LOW regardless of all other inputs. The' 157 is the logic implementation of a 4 -pole, 2-position switch where the position of the switch is determined by the logic levels supplied to the Select input. The logic equations for the outputs are shown below:

$$
\begin{array}{ll}
Z_{\mathrm{a}}=\bar{E} \bullet\left(l_{1 \mathrm{a}} \bullet S+l_{\mathrm{a}} \bullet \overline{\mathrm{~S}}\right) & Z_{\mathrm{b}}=\overline{\mathrm{E}} \bullet\left(l_{1 \mathrm{~b}} \bullet \mathrm{~S}+\mathrm{lob}_{0} \bullet \overline{\mathrm{~S}}\right) \\
Z_{\mathrm{c}}=\overline{\mathrm{E}} \bullet\left(l_{1 \mathrm{c}} \bullet \mathrm{~S}+\mathrm{l}_{\mathrm{c}} \bullet \overline{\mathrm{~S}}\right) & Z_{\mathrm{d}}=\overline{\mathrm{E}} \bullet\left(l_{1 \mathrm{~d}} \bullet \mathrm{~S}+\mathrm{l}_{\mathrm{od}} \bullet \overline{\mathrm{~S}}\right)
\end{array}
$$

A common use of the ' 157 is the moving of data from two groups of registers to four common output busses. The particular register from which the data comes is determined by the state of the Select input. A less obvious use is as a function generator. The '157 can generate any four of the 16 different functions of two variables with one variable common. This is useful for implementing highly irregular logic.

LOGIC DIAGRAMS
'157

'S157 •'LS157


## TRUTH TABLE

| INPUTS |  |  |  | OUTPUT |
| :---: | :---: | :---: | :---: | :---: |
| $\bar{E} \bar{E}$ | S $I_{0}$ | $I_{1}$ | Z |  |
| H | X | X | X | L |
| L | H | X | L | L |
| L | H | X | H | H |
| L | L | L | X | L |
| L | L | H | X | H |

H = HIGH Voltage Level
L = LOW Voltage Level
$X=$ Immaterial

DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

| SYMBOL | PARAMETER |  | 54/74 |  | 54/74S |  | 54/74LS |  | UNITS | CONDITIONS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min | Max | Min | Max | Min | Max |  |  |
| los | Output Short Circuit Current | XM | -20 | -55 | -40 | -100 | -20 | -100 | mA | V cc $=\mathrm{Max}$ |
|  |  | XC | -18 | -55 | -40 | -100 | -20 | -100 |  |  |
| Icc | Power Supply Current |  |  | 48 |  | 78 |  | 16 | mA | $\begin{aligned} & \mathrm{VCC}=\mathrm{Max} \\ & \text { All Inputs }=4.5 \mathrm{~V} \end{aligned}$ |

AC CHARACTERISTICS: $\mathrm{VCC}=+5.0 \mathrm{~V}, \mathrm{~T}_{\mathrm{A}}=+25^{\circ} \mathrm{C}$ (See Section 3 for waveforms and load configurations)

| SYMBOL | PARAMETER | 54/74 | 54/74S | 54/74LS | UNITS | CONDITIONS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | $\begin{aligned} & C_{L}=15 \mathrm{pF} \\ & \mathrm{R}_{\mathrm{L}}=400 \Omega \end{aligned}$ | $\begin{aligned} & C_{L}=15 \mathrm{pF} \\ & \mathrm{R}_{\mathrm{L}}=280 \Omega \end{aligned}$ | $C_{L}=15 \mathrm{pF}$ |  |  |
|  |  | Min Max | Min Max | Min Max |  |  |
| $\begin{aligned} & \text { tPLH } \\ & \text { tpHL } \end{aligned}$ | Propagation Delay $S$ to $Z_{n}$ | $\begin{aligned} & 23 \\ & 27 \end{aligned}$ | $\begin{aligned} & 15 \\ & 15 \end{aligned}$ | $\begin{aligned} & 26 \\ & 24 \end{aligned}$ | ns | Figs. 3-1, 3-20 |
| $\begin{aligned} & \text { tPLH } \\ & \text { tPHL } \\ & \hline \end{aligned}$ | Propagation Delay $\overline{\mathrm{E}}$ to $\mathrm{Z}_{\mathrm{n}}$ | $\begin{aligned} & 20 \\ & 21 \end{aligned}$ | $\begin{array}{r} 12.5 \\ 12 \end{array}$ | $\begin{aligned} & 20 \\ & 21 \end{aligned}$ | ns | Figs. 3-1, 3-4 |
| $\begin{aligned} & \text { tpLH } \\ & \text { tPHL } \end{aligned}$ | Propagation Delay In to $Z_{n}$ | $\begin{aligned} & 14 \\ & 14 \end{aligned}$ | $\begin{aligned} & 7.5 \\ & 6.5 \end{aligned}$ | $\begin{aligned} & 14 \\ & 14 \end{aligned}$ | ns | Figs. 3-1, 3-5 |

