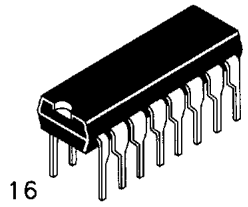
Available Q2, 1995

# DV74AC157, DV74ACT157
# DV74AC158, DV74ACT158

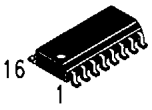
## Quad 2-Input Multiplexer

These devices are high speed, quad 2-input multiplexers with common select inputs and enable inputs for each section. It can select 4 bits of data from two sources. In addition to multiplexer operation, it can act as a function generator. The '157 has non-inverted outputs, the '158 has inverted outputs.

- **Advanced very high speed CMOS**
- **Outputs source/sink 24 mA**
- **Transmission line driving 50 ohms**
- **ACT has TTL compatible inputs**
- **Operation from 2 to 6 volts guaranteed**
- **DC & AC Parameters guaranteed over –40 to +85°C**

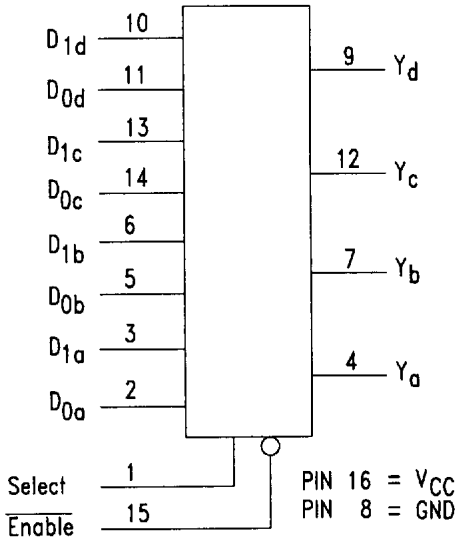



N Suffix
Plastic DIP
AVG-003 Case

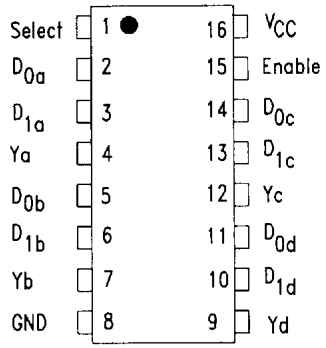



D Suffix
Plastic SOP
AVG-004 Case

### LOGIC DIAGRAM




### PIN ASSIGNMENT




### TRUTH TABLE

| Inputs | | | | '157 Output | '158 Output |
|---|---|---|---|---|---|
| $\overline{E}$ | S | Do | D1 | Y | Y |
| H | X | X | X | L | H |
| L | H | X | L | L | H |
| L | H | X | H | H | L |
| L | L | L | X | L | H |
| L | L | H | X | H | L |

H=HIGH Voltage Level
L=LOW Voltage Level
X=Don't Care

157,158

### ABSOLUTE MAXIMUM RATINGS

Maximum ratings are those values beyond which damage to the device may occur.

| Symbol | Parameter | AC157-158, ACT157-158 | Unit |
|---|---|---|---|
| $V_{CC}$ | DC Supply Voltage (Referenced to GND) | – 0.5 to +7.0 | V |
| $V_{IN}$ | DC Input Voltage (Referenced to GND) | – 0.5 to $V_{CC}$ +0.5 | V |
| $V_{OUT}$ | DC Output Voltage (Referenced to GND) | – 0.5 to $V_{CC}$ +0.5 | V |
| $I_{IN}$ | DC Input Current, per Pin | ± 20 | mA |
| $I_{OUT}$ | DC Output Sink/Source Current, per Pin | ± 50 | mA |
| $I_{CC}$ | DC $V_{CC}$ or GND Current per Output Pin | ± 50 | mA |
| $T_{STG}$ | Storage Temperature | – 65 to +150 | °C |

## GUARANTEED OPERATING CONDITIONS

| Symbol | Parameter | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CC}$ | Supply Voltage | 'AC | 2.0 | 5.0 | 6.0 | V |
| | | 'ACT | 4.5 | 5.0 | 5.5 | |
| $V_{IN}$, $V_{OUT}$ | DC Input Voltage, Output Voltage, (Ref. to GND) | | 0 | | $V_{CC}$ | V |
| $t_r$, $t_f$ | Input Rise and Fall Time (Note 1) **'AC** Devices | $V_{CC}$ @ 3.0 V | | | 150 | ns/V |
| | | $V_{CC}$ @ 4.5 V | | | 40 | ns/V |
| | | $V_{CC}$ @ 5.5 V | | | 25 | ns/V |
| $t_r$, $t_f$ | Input Rise and Fall Time (Note 2) **'ACT** Devices | $V_{CC}$ @ 4.5 V | | | 10 | ns/V |
| | | $V_{CC}$ @ 5.5 V | | | 8.0 | ns/V |
| $T_A$ | Operating Ambient Temperature Range | | –40 | | 85 | °C |
| $C_{PD}$ | Power Dissipation Capacitance | $V_{CC}$ = 5.0 V | | 50 | | pF |
| $C_{IN}$ | Input Capacitance $V_{CC}$ = 5.0 V | $V_{CC}$ = 5.0 V | | 4.5 | | pF |

1. $V_{IN}$ from 30% to 70% $V_{CC}$
2. $V_{IN}$ from 0.8 to 2.0 V

# AC — 157,158

## DC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Conditions | $V_{CC}$ (V) | AC157,158 | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | $T_A$ = +25°C | | $T_A$ = –40 to +85°C | |
| | | | | Typ | Guaranteed Limits | | |
| $V_{IH}$ | Minimum High Level Input Voltage | $V_{OUT}$ = 0.1V or $V_{CC}$ – 0.1 V | 3.0<br>4.5<br>5.5 | 1.5<br>2.25<br>2.75 | 2.1<br>3.15<br>3.85 | 2.1<br>3.15<br>3.85 | V |
| $V_{IL}$ | Maximum Low Level Input Voltage | $V_{OUT}$ = 0.1V or $V_{CC}$ – 0.1 V | 3.0<br>4.5<br>5.5 | 1.5<br>2.25<br>2.75 | 0.9<br>1.35<br>1.65 | 0.9<br>1.35<br>1.65 | V |
| $V_{OH}$ | Minimum High Level Output Voltage | $I_{OUT}$ = –50 µA | 3.0<br>4.5<br>5.5 | 2.99<br>4.49<br>5.49 | 2.9<br>4.4<br>5.4 | 2.9<br>4.4<br>5.4 | V |
| | | $V_{IN}$ = $V_{IL}$ or $V_{IH}$<br>$I_{OH}$ –12mA<br>$I_{OH}$ –24mA<br>$I_{OH}$ –24 mA | 3.0<br>4.5<br>5.5 | | 2.56<br>3.86<br>4.86 | 2.46<br>3.76<br>4.76 | V |
| $V_{OL}$ | MaximumLow Level Output Voltage | $I_{OUT}$ = 50 µA | 3.0<br>4.5<br>5.5 | 0.002<br>0.001<br>0.001 | 0.1<br>0.1<br>0.1 | 0.1<br>0.1<br>0.1 | V |
| | | $V_{IN}$ = $V_{IL}$ or $V_{IH}$<br>$I_{OH}$ 12mA<br>$I_{OH}$ 24mA<br>$I_{OH}$ 24 mA | 3.0<br>4.5<br>5.5 | | 0.36<br>0.36<br>0.36 | 0.44<br>0.44<br>0.44 | V |
| $I_{IN}$ | Maximum Input Leakage Current | VI=$V_{CC}$, GND | 5.5 | | ±0.1 | ±1.0 | µA |
| $I_{CC}$ | Maximum Quiescent Supply Current | $V_{IN}$ = $V_{CC}$ or GND | 5.5 | | 8.0 | 80 | µA |

## AC CHARACTERISTICS (*Voltage Range 3.3 V is 3.3 V ± 0.3 V; Voltage Range 5.0 V is 5.0 V ± 0.5 V)

| Symbol | Parameter ($C_L$ = 50 pF) | $V_{CC}$ (V) | AC157 | | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | $T_A$ = +25°C | | $T_A$ = – 40°C to +85°C | | |
| | | | Min | Max | Min | Max | |
| $t_{PLH}$ | Propagation Delay S to $\overline{Y}_n$ | 3.3 | 1.5 | 11.5 | 1.5 | 13.0 | ns |
| | | 5.0 | 1.5 | 9.0 | 1.5 | 10.0 | |
| $t_{PHL}$ | | 3.3 | 1.5 | 11.0 | 1.5 | 12 | |
| | | 5.0 | 1.5 | 8.5 | 1.0 | 9.5 | |
| $t_{PLH}$ | Propagation Delay $\overline{E}$ to $Y_n$ | 3.3 | 1.5 | 11.5 | 1.5 | 13 | ns |
| | | 5.0 | 1.5 | 9.0 | 1.5 | 10 | |
| $t_{PHL}$ | | 3.3 | 1.5 | 11 | 1.5 | 12 | ns |
| | | 5.0 | 1.5 | 9.0 | 1.0 | 9.5 | |
| $t_{PLH}$ | Propagation Delay $D_n$ to $Y_n$ | 3.3 | 1.5 | 8.5 | 1.0 | 9.0 | ns |
| | | 5.0 | 1.5 | 6.5 | 1.0 | 7.0 | |
| $t_{PHL}$ | | 3.3 | 1.5 | 8.0 | 1.0 | 9.0 | ns |
| | | 5.0 | 1.5 | 6.5 | 1.0 | 7.0 | |

| Symbol | Parameter ($C_L$ = 50 pF) | $V_{CC}$ ±10% (V) | AC158 | | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | $T_A$ = +25°C | | $T_A$ = – 40°C to +85°C | | |
| | | | Min | Max | Min | Max | |
| $t_{PLH}$ | Propagation Delay S to $Y_n$ | 3.3 | 1.5 | 11.5 | 1.5 | 12.5 | ns |
| | | 5.0 | 1.5 | 9.0 | 1.0 | 9.5 | |
| $t_{PHL}$ | | 3.3 | 1.5 | 11.5 | 1.5 | 12.5 | |
| | | 5.0 | 1.5 | 9.0 | 1.0 | 10.0 | |
| $t_{PLH}$ | Propagation Delay $\overline{E}$ to $Y_n$ | 3.3 | 1.5 | 12.0 | 1.5 | 13.0 | ns |
| | | 5.0 | 1.5 | 9.5 | 1.5 | 10.5 | |
| $t_{PHL}$ | | 3.3 | 1.5 | 11.0 | 1.5 | 12.0 | ns |
| | | 5.0 | 1.5 | 8.5 | 1.0 | 9.5 | |
| $t_{PLH}$ | Propagation Delay $D_n$ to $Y_n$ | 3.3 | 1.5 | 9.0 | 1.5 | 10.0 | ns |
| | | 5.0 | 1.5 | 7.0 | 1.5 | 7.5 | |
| $t_{PHL}$ | | 3.3 | 1.5 | 8.0 | 1.0 | 8.5 | ns |
| | | 5.0 | 1.5 | 6.5 | 1.0 | 6.5 | |

# ACT — 157, 158

## DC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Conditions | $V_{CC}$ (V) | ACT157, ACT158 | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | $T_A$ = +25°C | | $T_A$ = –40 to +85°C | |
| | | | | Typ | Guaranteed Limits | | |
| $V_{IH}$ | Minimum High Level Input Voltage | $V_{OUT}$ = 0.1V or $V_{CC}$ – 0.1 V | 4.5 | 1.5 | 2.0 | 2.0 | V |
| | | | 5.5 | 1.5 | 2.0 | 2.0 | |
| $V_{IL}$ | Maximum Low Level Input Voltage | $V_{OUT}$ = 0.1V or $V_{CC}$ – 0.1 V | 4.5 | 1.5 | 0.8 | 0.8 | V |
| | | | 5.5 | 1.5 | 0.8 | 0.8 | |
| $V_{OH}$ | Minimum High Level Output Voltage | $I_{OUT}$ = –50 µA | 4.5 | 4.49 | 4.4 | 4.4 | V |
| | | | 5.5 | 5.49 | 5.4 | 5.4 | |
| | | $V_{IN}$ = $V_{IL}$ or $V_{IH}$ $I_{OH}$ –24mA | 4.5 | | 3.86 | 3.76 | |
| | | –24 mA | 5.5 | | 4.86 | 4.76 | V |
| $V_{OL}$ | Maximum Low Level Output Voltage | $I_{OUT}$ = 50 µA | 4.5 | 0.001 | 0.1 | 0.1 | V |
| | | | 5.5 | 0.001 | 0.1 | 0.1 | |
| | | $V_{IN}$ = $V_{IL}$ or $V_{IH}$ $I_{OL}$ 24mA | 4.5 | | 0.36 | 0.44 | V |
| | | 24 mA | 5.5 | | 0.36 | 0.44 | |
| $I_{IN}$ | Maximum Input Leakage Current | $V_I$=$V_{CC}$, GND | 5.5 | | ±0.1 | ±1.0 | µA |
| $\Delta I_{CCT}$ | Additional Max $I_{CC}$/Input | $V_I$=$V_{CC}$ – 2.1 V | 5.5 | 0.6 | | 1.5 | mA |

157,158

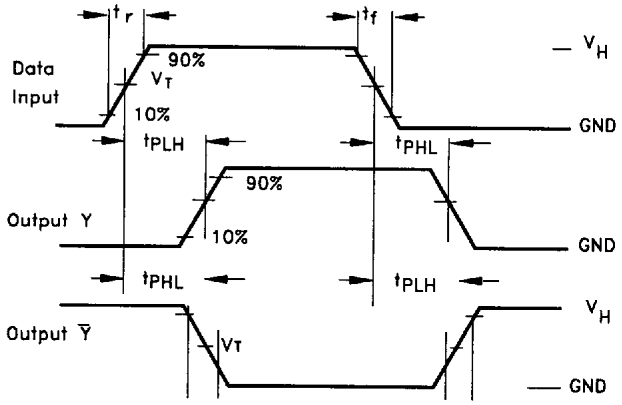
| Symbol | Parameter | Conditions | $V_{CC}$ (V) | ACT157, ACT158 | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | $T_A$ = +25°C | | $T_A$ = –40 to +85°C | |
| | | | | Typ | Guaranteed Limits | | |
| $I_{CC}$ | Maximum Quiescent Supply Current | $V_{IN}$ = $V_{CC}$ or GND | 5.5 | | 8.0 | 80 | µA |

## AC CHARACTERISTICS

| Symbol | Parameter ($C_L$ = 50 pF) | $V_{CC}$ ±10% (V) | ACT157 | | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | $T_A$ = +25°C | | $T_A$ = – 40°C to +85°C | | |
| | | | Min | Max | Min | Max | |
| $t_{PLH}$ | Propagation Delay, $S_n$ to $Y_n$ | 5.0 | 2.0 | 9.0 | 1.5 | 10 | ns |
| $t_{PHL}$ | | 5.0 | 2.0 | 9.5 | 2.0 | 10.5 | ns |
| $t_{PLH}$ | Propagation Delay, $\overline{E}_n$ to $Y_n$ | 5.0 | 1.5 | 10 | 1.5 | 11.5 | ns |
| $t_{PHL}$ | | 5.0 | 1.5 | 8.5 | 1.0 | 9.0 | ns |
| $t_{PLH}$ | Propagation Delay, $D_n$ to $Y_n$ | 5.0 | 1.5 | 7.0 | 1.0 | 8.5 | ns |
| $t_{PHL}$ | | 5.0 | 1.5 | 7.5 | 1.0 | 8.5 | ns |

| Symbol | Parameter ($C_L$ = 50 pF) | $V_{CC}$ (V) | ACT158 | | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | $T_A$ = +25°C | | $T_A$ = – 40°C to +85°C | | |
| | | | Min | Max | Min | Max | |
| $t_{PLH}$ | Propagation Delay, Select to Yn | 5.0 | 2.5 | 9.5 | 2.0 | 11.0 | ns |
| $t_{PHL}$ | | 5.0 | 1.5 | 9.0 | 1.5 | 10.0 | ns |
| $t_{PLH}$ | Propagation Delay, $\overline{E}_n$ to $Y_n$ | 5.0 | 1.5 | 9.5 | 1.5 | 10.5 | ns |
| $t_{PHL}$ | | 5.0 | 1.5 | 5.5 | 1.5 | 10.5 | ns |
| $t_{PLH}$ | Propagation Delay, $D_n$ to $Y_n$ | 5.0 | 1.5 | 4.5 | 1.0 | 8.5 | ns |
| $t_{PHL}$ | | 5.0 | 1.5 | 6.5 | 1.0 | 7.5 | ns |

## SWITCHING WAVEFORMS




Input and output threshold voltage:
$V_T$ = 50% Vcc for AC; 1.5V for ACT
$V_H$ = $V_{CC}$ for AC, 3V for ACT