# TC74HCT157AP/AF
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**TC74HCT157 Quad 2-Channel Multiplexer**
**TC74HCT158 Quad 2-Channel Multiplexer (Inverting)**

The TC74HCT157A and TC74HCT158A are high speed CMOS 2-CHANNEL MULTIPLEXERs fabricated with silicon gate $C^2MOS$ technology.

They achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

This device may be used as a level converter for interfacing TTL or NMOS to High Speed CMOS. The inputs are compatible with TTL, NMOS and CMOS output voltage levels.

The TC74HCT158A is an inverting multiplexer while the TC74HCT157A is a non-inverting.

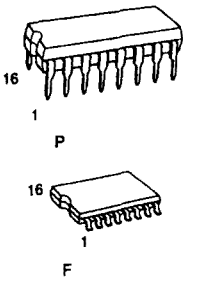
When $\overline{\text{STROBE}}$ is held high, selection of data is inhibited and all the outputs become low in the case of HC157A or high in the case of HC158A.

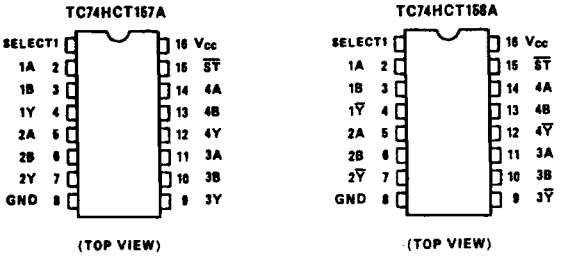
The SELECT decoding determines whether a A or B inputs get transferred to their corresponding Y ($\overline{Y}$) outputs.

All inputs are equipped with protection circuits against static discharge or transient excess voltage.

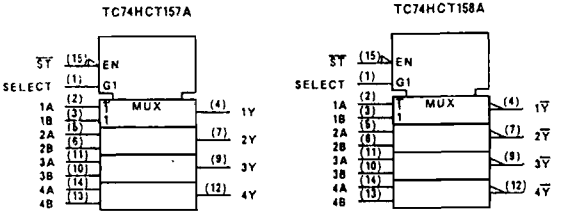
### Features

- High Speed: $t_{pd}$ = 21ns(Typ.) at $V_{CC}$ = 5V
- Low Power Dissipation: $I_{CC}$ = 1μA(Max.) at Ta = 25°C
- Compatible with TTL outputs: $V_{IH}$ = 2V(Min.)
  $V_{IL}$ = 0.8V(Max.)
- Wide Interfacing Ability: LSTTL, NMOS, CMOS
- Output Drive Capability: 10 LSTTL Loads
- Symmetrical Output Impedance: $|I_{OH}| = I_{OL}$ = 4mA(Min.)
- Balanced Propagation Delays: $t_{pLH} = t_{pHL}$
- Pin and Function Compatible with 74LS157/158




**Pin Assignment**




**IEC Logic Symbol**

**Truth Table**

| Inputs | | | | Outputs | |
|---|---|---|---|---|---|
| $\overline{ST}$ | SELECT | A | B | Y(157A) | $\overline{Y}$(158A) |
| H | X | X | X | L | H |
| L | L | L | X | L | H |
| L | L | H | X | H | L |
| L | H | X | L | L | H |
| L | H | X | H | H | L |

**X: Don't Care**

## Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Supply Voltage Range | $V_{CC}$ | -0.5 ~ 7 | V |
| DC Input Voltage | $V_{IN}$ | -0.5 ~ $V_{CC}$ + 0.5 | V |
| DC Output Voltage | $V_{OUT}$ | -0.5 ~ $V_{CC}$ + 0.5 | V |
| Input Diode Current | $I_{IK}$ | ±20 | mA |
| Output Diode Current | $I_{OK}$ | ±20 | mA |
| DC Output Current | $I_{OUT}$ | ±25 | mA |
| DC $V_{CC}$/Ground Current | $I_{CC}$ | ±50 | mA |
| Power Dissipation | $P_D$ | 500(DIP)*/180(SOIC) | mW |
| Storage Temperature | $T_{stg}$ | -65 ~ 150 | °C |
| Lead Temperature 10sec | $T_L$ | 300 | °C |

*500mW in the range of Ta = -40°C ~ 65°C. From Ta = 65°C to 85°C a derating factor of -10mW/°C shall be applied until 300mW.

## Recommended Operating Conditions

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Supply Voltage | $V_{CC}$ | 4.5 ~ 5.5 | V |
| Input Voltage | $V_{IN}$ | 0 ~ $V_{CC}$ | V |
| Output Voltage | $V_{OUT}$ | 0 ~ $V_{CC}$ | V |
| Operating Temperature | $T_{opr}$ | -40 ~ 85 | °C |
| Input Rise and Fall Time | $t_r$, $t_f$ | 0 ~ 500 | ns |

## DC Electrical Characteristics

| Parameter | Symbol | Test Condition | | $V_{CC}$ | Ta = 25°C Min. | Ta = 25°C Typ. | Ta = 25°C Max. | Ta = -40 ~ 85°C Min. | Ta = -40 ~ 85°C Max. | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| High-Level Input Voltage | $V_{IH}$ | – | | 4.5 ∫ 5.5 | 2.0 | – | – | 2.0 | – | V |
| Low-Level Input Voltage | $V_{IL}$ | – | | 4.5 ∫ 5.5 | – | – | 0.8 | – | 0.8 | V |
| High-Level Output Voltage | $V_{OH}$ | $V_{IN}$ = $V_{IH}$ or $V_{IL}$ | $I_{OH}$ = -20μA | 4.5 | 4.4 | 4.5 | – | 4.4 | – | V |
| | | | $I_{OH}$ = -4 mA | 4.5 | 4.18 | 4.31 | – | 4.13 | – | |
| Low-Level Output Voltage | $V_{OL}$ | $V_{IN}$ = $V_{IH}$ or $V_{IL}$ | $I_{OL}$ = 20μA | 4.5 | – | 0.0 | 0.1 | – | 0.1 | V |
| | | | $I_{OL}$ = 4 mA | 4.5 | – | 0.17 | 0.26 | – | 0.33 | |
| Input Leakage Current | $I_{IN}$ | $V_{IN}$ = $V_{CC}$ or GND | | 5.5 | – | – | ±0.1 | – | ±1.0 | μA |
| Quiescent Supply Current | $I_{CC}$ | $V_{IN}$ = $V_{CC}$ or GND | | 5.5 | – | – | 4.0 | – | 40.0 | μA |
| | $\Delta I_{CC}$ | Per Input: $V_{IN}$ = 0.5V or 2.4V Other Input: $V_{CC}$ or GND | | 5.5 | – | – | 2.0 | – | 2.9 | mA |

## AC Electrical Characteristics ($C_L$ = 15pF, $V_{CC}$ = 5V, Ta = 25°C)

| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Output Transition Time | $t_{TLH}$<br>$t_{THL}$ | – | – | 4 | 8 | ns |
| Propagation Delay Time (A, B-Y, $\overline{Y}$) | $t_{pLH}$<br>$t_{pHL}$ | – | – | 19 | 30 | |
| Propagation Delay Time ($\overline{STROBE}$-Y) | $t_{pLH}$<br>$t_{pHL}$ | – | – | 19 | 30 | |
| Propagation Delay Time *(SELECT-Y, $\overline{Y}$) | $t_{pLH}$<br>$t_{pHL}$ | – | – | 21 | 32 | |
| Propagation Delay Time **(SELECT-Y, $\overline{Y}$) | $t_{pLH}$<br>$t_{pHL}$ | – | – | 23 | 35 | |

## AC Electrical Characteristics ($C_L$ = 50pF, Input $t_r = t_f$ = 6ns)

| Parameter | Symbol | Test Condition | | Ta = 25°C | | | Ta = -40 ~ 85°C | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | $V_{CC}$ | Min. | Typ. | Max. | Min. | Max. | |
| Output Transition Time | $t_{TLH}$<br>$t_{THL}$ | – | 4.5<br>5.5 | –<br>– | 8<br>7 | 15<br>14 | –<br>– | 19<br>18 | ns |
| Propagation Delay Time (A, B-Y, $\overline{Y}$) | $t_{pLH}$<br>$t_{pHL}$ | – | 4.5<br>5.5 | –<br>– | 23<br>20 | 35<br>32 | –<br>– | 44<br>40 | |
| Propagation Delay Time ($\overline{STROBE}$-Y) | $t_{pLH}$<br>$t_{pHL}$ | – | 4.5<br>5.5 | –<br>– | 23<br>20 | 35<br>32 | –<br>– | 44<br>40 | |
| Propagation Delay Time *(SELECT-Y, $\overline{Y}$) | $t_{pLH}$<br>$t_{pHL}$ | – | 4.5<br>5.5 | –<br>– | 25<br>21 | 37<br>34 | –<br>– | 46<br>42 | |
| Propagation Delay Time *(SELECT-Y, $\overline{Y}$) | $t_{pLH}$<br>$t_{pHL}$ | – | 4.5<br>5.5 | –<br>– | 27<br>25 | 40<br>36 | –<br>– | 50<br>45 | |
| Input Capacitance | $C_{IN}$ | – | | – | 5 | 10 | – | 10 | pF |
| Power Dissipation Capacitance | $C_{PD}$(1) | TC74HCT157A | | – | 59 | – | – | - | |
| | | TC74HCT158A | | – | 56 | – | – | - | |

Note (1) $C_{PD}$ is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation:
$I_{CC(opr)} = C_{PD} \bullet V_{CC} \bullet f_{IN} + I_{CC}/4$(bit)

* TC74HCT157A only
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Notes