



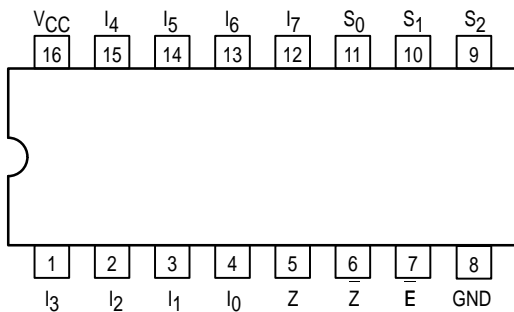
MC74AC151 MC74ACT151

1-OF-8
DECODER/DEMULTIPLEXER

1-of-8 Decoder/Demultiplexer

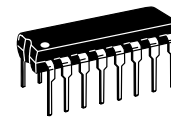
The MC74AC151/74ACT151 is a high-speed 8-input digital multiplexer. It provides, in one package, the ability to select one line of data from up to eight sources. The MC74AC151/74ACT151 can be used as a universal function generator to generate any logic function of four variables. Both true and complementary outputs are provided.

- Outputs Source/Sink 24 mA
- 'ACT151 Has TTL Compatible Inputs

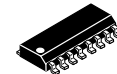


PIN NAMES

- I_0 – I_7 Data Inputs
- S_0 – S_2 Select Inputs
- E Enable Input
- Z Data Output
- Z Inverted Data Output



N SUFFIX
CASE 648-08
PLASTIC



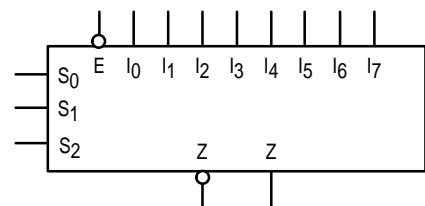
D SUFFIX
CASE 751B-05
PLASTIC

TRUTH TABLE

| Inputs | | | | Outputs | |
|-----------|-------|-------|-------|-----------|-------|
| \bar{E} | S_2 | S_1 | S_0 | \bar{Z} | Z |
| H | X | X | X | H | L |
| L | L | L | L | I_0 | I_0 |
| L | L | L | H | I_1 | I_1 |
| L | L | H | L | I_2 | I_2 |
| L | L | H | H | I_3 | I_3 |
| L | H | L | L | I_4 | I_4 |
| L | H | L | H | I_5 | I_5 |
| L | H | H | L | I_6 | I_6 |
| L | H | H | H | I_7 | I_7 |

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

LOGIC SYMBOL



MC74AC151 MC74ACT151

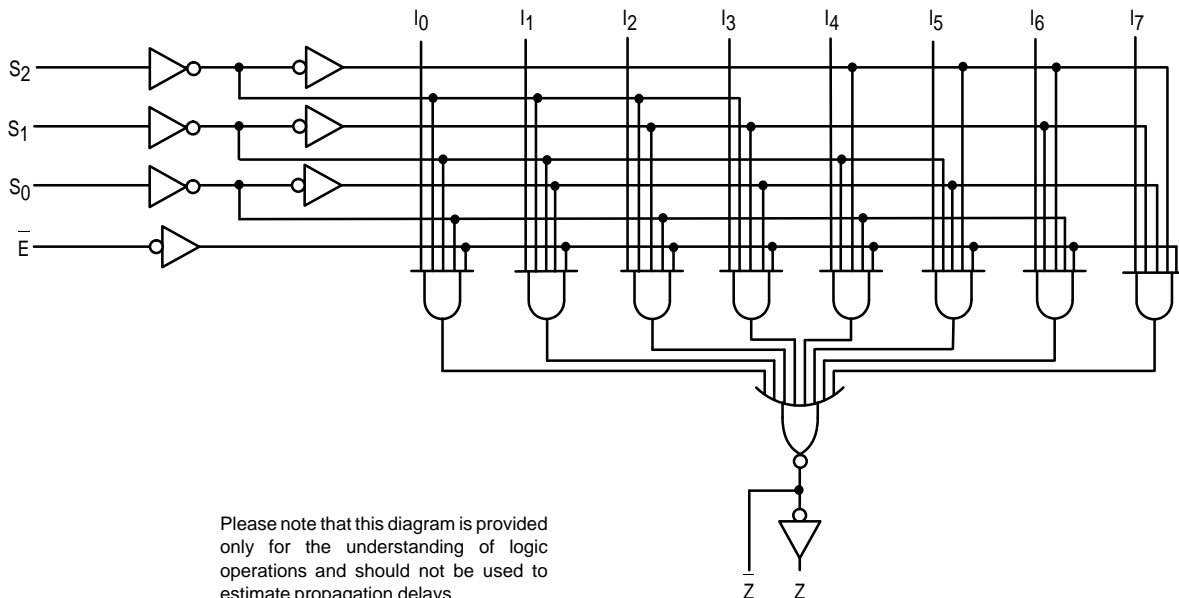
FUNCTIONAL DESCRIPTION

The MC74AC151/74ACT151 is a logic implementation of a single pole, 8-position switch with the switch position controlled by the state of three Select inputs, S_0 , S_1 , S_2 . Both true and complementary outputs are provided. The Enable input (E) is active LOW. When it is not activated, the complementary output is HIGH and the true output is LOW regardless of all other inputs. The logic function provided at the output is:

$$Z = \bar{E} \cdot (I_0 \cdot \bar{S}_0 \cdot \bar{S}_1 \cdot \bar{S}_2 + I_1 \cdot S_0 \cdot \bar{S}_1 \cdot \bar{S}_2 + I_2 \cdot S_0 \cdot S_1 \cdot \bar{S}_2 + I_3 \cdot S_0 \cdot S_1 \cdot S_2 + I_4 \cdot \bar{S}_0 \cdot S_1 \cdot \bar{S}_2 + I_5 \cdot S_0 \cdot S_1 \cdot \bar{S}_2 + I_6 \cdot S_0 \cdot S_1 \cdot S_2 + I_7 \cdot \bar{S}_0 \cdot S_1 \cdot S_2)$$

The MC74AC151/74ACT151 provides the ability, in one package, to select from eight sources of data or control information. By proper manipulation of the inputs, the MC74AC151/74ACT151 can provide any logic function of four variables and its complement.

LOGIC DIAGRAM



MAXIMUM RATINGS*

| Symbol | Parameter | Value | 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 | $^{\circ}C$ |

* Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

MC74AC151 MC74ACT151

RECOMMENDED 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 except Schmitt Inputs | V _{CC} @ 3.0 V | | 150 | | ns/V |
| | | V _{CC} @ 4.5 V | | 40 | | |
| | | V _{CC} @ 5.5 V | | 25 | | |
| t _r , t _f | Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs | V _{CC} @ 4.5 V | | 10 | | ns/V |
| | | V _{CC} @ 5.5 V | | 8.0 | | |
| T _J | Junction Temperature (PDIP) | | | 140 | °C | |
| T _A | Operating Ambient Temperature Range | -40 | 25 | 85 | °C | |
| I _{OH} | Output Current — High | | | -24 | mA | |
| I _{OL} | Output Current — Low | | | 24 | mA | |

1. V_{in} from 30% to 70% V_{CC}; see individual Data Sheets for devices that differ from the typical input rise and fall times.

2. V_{in} from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

DC CHARACTERISTICS

| Symbol | Parameter | V _{CC} (V) | 74AC | | 74AC | | Unit | Conditions |
|------------------|--------------------------------------|------------------------|------------------------|-------------------|------------------------------------|----|---|------------|
| | | | T _A = +25°C | | T _A = -40°C to +85°C | | | |
| | | | Typ | Guaranteed Limits | | | | |
| V _{IH} | Minimum High Level Input Voltage | 3.0 | 1.5 | 2.1 | 2.1 | V | V _{OUT} = 0.1 V or V _{CC} - 0.1 V | |
| | | 4.5 | 2.25 | 3.15 | 3.15 | | | |
| | | 5.5 | 2.75 | 3.85 | 3.85 | | | |
| V _{IL} | Maximum Low Level Input Voltage | 3.0 | 1.5 | 0.9 | 0.9 | V | V _{OUT} = 0.1 V or V _{CC} - 0.1 V | |
| | | 4.5 | 2.25 | 1.35 | 1.35 | | | |
| | | 5.5 | 2.75 | 1.65 | 1.65 | | | |
| V _{OH} | Minimum High Level Output Voltage | 3.0 | 2.99 | 2.9 | 2.9 | V | I _{OUT} = -50 μA | |
| | | 4.5 | 4.49 | 4.4 | 4.4 | | | |
| | | 5.5 | 5.49 | 5.4 | 5.4 | | | |
| | | 3.0 | | 2.56 | 2.46 | V | *V _{IN} = V _{IL} or V _{IH} -12 mA I _{OH} -24 mA -24 mA | |
| | | 4.5 | | 3.86 | 3.76 | | | |
| 5.5 | | 4.86 | 4.76 | | | | | |
| V _{OL} | Maximum Low Level Output Voltage | 3.0 | 0.002 | 0.1 | 0.1 | V | I _{OUT} = 50 μA | |
| | | 4.5 | 0.001 | 0.1 | 0.1 | | | |
| | | 5.5 | 0.001 | 0.1 | 0.1 | | | |
| | | 3.0 | | 0.36 | 0.44 | V | *V _{IN} = V _{IL} or V _{IH} 12 mA I _{OL} 24 mA 24 mA | |
| | | 4.5 | | 0.36 | 0.44 | | | |
| 5.5 | | 0.36 | 0.44 | | | | | |
| I _{IN} | Maximum Input Leakage Current | 5.5 | | ±0.1 | ±1.0 | μA | V _I = V _{CC} , GND | |
| I _{OLD} | †Minimum Dynamic Output Current | 5.5 | | | 75 | mA | V _{OLD} = 1.65 V Max | |
| I _{OHD} | | 5.5 | | | -75 | mA | V _{OHD} = 3.85 V Min | |
| I _{CC} | Maximum Quiescent Supply Current | 5.5 | | 8.0 | 80 | μA | V _{IN} = V _{CC} or GND | |

* All outputs loaded; thresholds on input associated with output under test.

† Maximum test duration 2.0 ms, one output loaded at a time.

Note: I_{IN} and I_{CC} @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V_{CC}.

MC74AC151 MC74ACT151

AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

| Symbol | Parameter | V _{CC} * (V) | 74AC | | | 74AC | | Unit | Fig. No. |
|------------------|---|--------------------------|--|-------------|--------------|--|--------------|------|----------|
| | | | T _A = +25°C C _L = 50 pF | | | T _A = -40°C to +85°C C _L = 50 pF | | | |
| | | | Min | Typ | Max | Min | Max | | |
| t _{PLH} | Propagation Delay S _n to Z or Z | 3.3 5.0 | 3.0 2.5 | 11.5 8.5 | 18.0 13.0 | 3.0 2.0 | 20.0 15.0 | ns | 3-6 |
| t _{PHL} | Propagation Delay S _n to Z or Z | 3.3 5.0 | 2.5 2.0 | 12 8.5 | 18.0 13.0 | 2.5 1.5 | 20.0 15.0 | ns | 3-6 |
| t _{PLH} | Propagation Delay E to Z or Z | 3.3 5.0 | 2.5 2.0 | 8.0 6.0 | 13.0 10.0 | 2.0 1.5 | 14.0 11.0 | ns | 3-6 |
| t _{PHL} | Propagation Delay E to Z or Z | 3.3 5.0 | 1.5 1.5 | 8.5 6.5 | 13.0 10.0 | 1.5 1.5 | 14.0 11.0 | ns | 3-6 |
| t _{PLH} | Propagation Delay I _n to Z or Z | 3.3 5.0 | 2.5 1.5 | 9.5 7.0 | 14.0 10.5 | 2.0 1.5 | 15.5 11.0 | ns | 3-5 |
| t _{PHL} | Propagation Delay I _n to Z or Z | 3.3 5.0 | 2.5 1.5 | 9.5 7.0 | 15.0 11.0 | 2.0 1.5 | 16.0 12.0 | ns | 3-5 |

* Voltage Range 3.3 V is 3.3 V ± 0.3 V
Voltage Range 5.0 V is 5.0 V ± 0.5 V

DC CHARACTERISTICS

| Symbol | Parameter | V _{CC} (V) | 74ACT | | 74ACT | | Unit | Conditions |
|--------------------|--|------------------------|------------------------|-------------------|---------------------------------|--|------|---|
| | | | T _A = +25°C | | T _A = -40°C to +85°C | | | |
| | | | Typ | Guaranteed Limits | | | | |
| V _{IH} | Minimum High Level Input Voltage | 4.5 | 1.5 | 2.0 | 2.0 | | V | V _{OUT} = 0.1 V or V _{CC} - 0.1 V |
| | | 5.5 | 1.5 | 2.0 | 2.0 | | | |
| V _{IL} | Maximum Low Level Input Voltage | 4.5 | 1.5 | 0.8 | 0.8 | | V | V _{OUT} = 0.1 V or V _{CC} - 0.1 V |
| | | 5.5 | 1.5 | 0.8 | 0.8 | | | |
| V _{OH} | Minimum High Level Output Voltage | 4.5 | 4.49 | 4.4 | 4.4 | | V | I _{OUT} = -50 μA |
| | | 5.5 | 5.49 | 5.4 | 5.4 | | | |
| | | 4.5 | | 3.86 | 3.76 | | V | *V _{IN} = V _{IL} or V _{IH} I _{OH} = -24 mA -24 mA |
| | | 5.5 | | 4.86 | 4.76 | | | |
| V _{OL} | Maximum Low Level Output Voltage | 4.5 | 0.001 | 0.1 | 0.1 | | V | I _{OUT} = 50 μA |
| | | 5.5 | 0.001 | 0.1 | 0.1 | | | |
| | | 4.5 | | 0.36 | 0.44 | | V | *V _{IN} = V _{IL} or V _{IH} I _{OL} = 24 mA 24 mA |
| | | 5.5 | | 0.36 | 0.44 | | | |
| I _{IN} | Maximum Input Leakage Current | 5.5 | | ±0.1 | ±1.0 | | μA | V _I = V _{CC} , GND |
| ΔI _{CC} T | Additional Max. I _{CC} /Input | 5.5 | 0.6 | | 1.5 | | mA | V _I = V _{CC} - 2.1 V |
| I _{OLD} | †Minimum Dynamic Output Current | 5.5 | | | 75 | | mA | V _{OLD} = 1.65 V Max |
| I _{OHD} | | 5.5 | | | -75 | | mA | V _{OHD} = 3.85 V Min |
| I _{CC} | Maximum Quiescent Supply Current | 5.5 | | 8.0 | 80 | | μA | V _{IN} = V _{CC} or GND |

* All outputs loaded; thresholds on input associated with output under test.

† Maximum test duration 2.0 ms, one output loaded at a time.

MC74AC151 MC74ACT151

AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

| Symbol | Parameter | V _{CC} * (V) | 74ACT | | | 74ACT | | Unit | Fig. No. |
|------------------|--|--------------------------|--|-----|------|--|------|------|----------|
| | | | T _A = +25°C C _L = 50 pF | | | T _A = -40°C to +85°C C _L = 50 pF | | | |
| | | | Min | Typ | Max | Min | Max | | |
| t _{PLH} | Propagation Delay S _n to Z | 5.0 | 3.5 | | 15.5 | 3.0 | 17.0 | ns | 3-6 |
| t _{PHL} | Propagation Delay S _n to Z | 5.0 | 3.5 | | 15.5 | 3.0 | 16.5 | ns | 3-6 |
| t _{PLH} | Propagation Delay S _n to Z | 5.0 | 3.5 | | 15 | 3.0 | 16.5 | ns | 3-6 |
| t _{PHL} | Propagation Delay S _n to Z | 5.0 | 4.0 | | 16.5 | 3.5 | 18.5 | ns | 3-6 |
| t _{PLH} | Propagation Delay E to Z | 5.0 | 2.5 | | 9.5 | 2.5 | 10.0 | ns | 3-6 |
| t _{PHL} | Propagation Delay E to Z | 5.0 | 2.5 | | 9.0 | 2.5 | 10.0 | ns | 3-6 |
| t _{PLH} | Propagation Delay E to Z | 5.0 | 2.5 | | 8.5 | 2.5 | 9.5 | ns | 3-6 |
| t _{PHL} | Propagation Delay E to Z | 5.0 | 3.0 | | 10.0 | 2.5 | 10.5 | ns | 3-6 |
| t _{PLH} | Propagation Delay I _n to Z | 5.0 | 3.5 | | 11.5 | 3.0 | 12.5 | ns | 3-6 |
| t _{PHL} | Propagation Delay I _n to Z | 5.0 | 3.5 | | 12.0 | 3.0 | 13.5 | ns | 3-6 |
| t _{PLH} | Propagation Delay I _n to Z | 5.0 | 3.5 | | 12.0 | 3.0 | 13.0 | ns | 3-6 |
| t _{PHL} | Propagation Delay I _n to Z | 5.0 | 4.0 | | 12.5 | 3.0 | 14.0 | ns | 3-6 |

* Voltage Range 5.0 V is 5.0 V ± 0.5 V

CAPACITANCE

| Symbol | Parameter | Value Typ | Unit | Test Conditions |
|-----------------|-------------------------------|--------------|------|-------------------------|
| C _{IN} | Input Capacitance | 4.5 | pF | V _{CC} = 5.0 V |
| C _{PD} | Power Dissipation Capacitance | 70 | pF | V _{CC} = 5.0 V |

MC74AC151 MC74ACT151

OUTLINE DIMENSIONS

N SUFFIX PLASTIC DIP PACKAGE CASE 648-08 ISSUE R

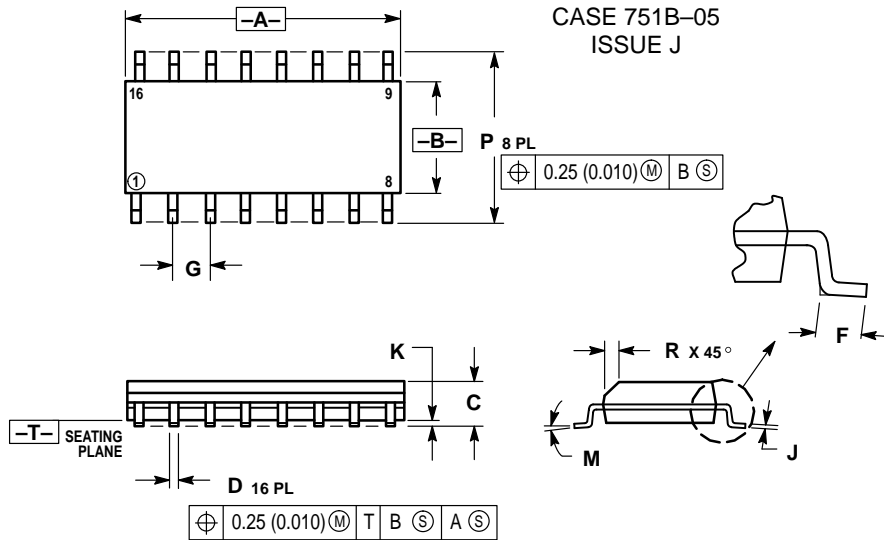


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.740 | 0.770 | 18.80 | 19.55 |
| B | 0.250 | 0.270 | 6.35 | 6.85 |
| C | 0.145 | 0.175 | 3.69 | 4.44 |
| D | 0.015 | 0.021 | 0.39 | 0.53 |
| F | 0.040 | 0.70 | 1.02 | 1.77 |
| G | 0.100 BSC | | 2.54 BSC | |
| H | 0.050 BSC | | 1.27 BSC | |
| J | 0.008 | 0.015 | 0.21 | 0.38 |
| K | 0.110 | 0.130 | 2.80 | 3.30 |
| L | 0.295 | 0.305 | 7.50 | 7.74 |
| M | 0° | 10° | 0° | 10° |
| S | 0.020 | 0.040 | 0.51 | 1.01 |


D SUFFIX PLASTIC SOIC PACKAGE CASE 751B-05 ISSUE J



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 9.80 | 10.00 | 0.386 | 0.393 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.054 | 0.068 |
| D | 0.35 | 0.49 | 0.014 | 0.019 |
| F | 0.40 | 1.25 | 0.016 | 0.049 |
| G | 1.27 BSC | | 0.050 BSC | |
| J | 0.19 | 0.25 | 0.008 | 0.009 |
| K | 0.10 | 0.25 | 0.004 | 0.009 |
| M | 0° | 7° | 0° | 7° |
| P | 5.80 | 6.20 | 0.229 | 0.244 |
| R | 0.25 | 0.50 | 0.010 | 0.019 |

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MC74AC151/D

