

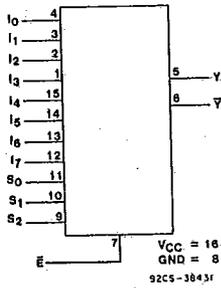
CD54/74HC151
CD54/74HCT151

HARRIS SEMICOND SECTOR

27E D ■ 4302271 0017591 7 ■ HAS

T-67-21-51

High-Speed CMOS Logic



8-Input Multiplexer

Type Features:

- Complementary data outputs
- Buffered inputs and outputs

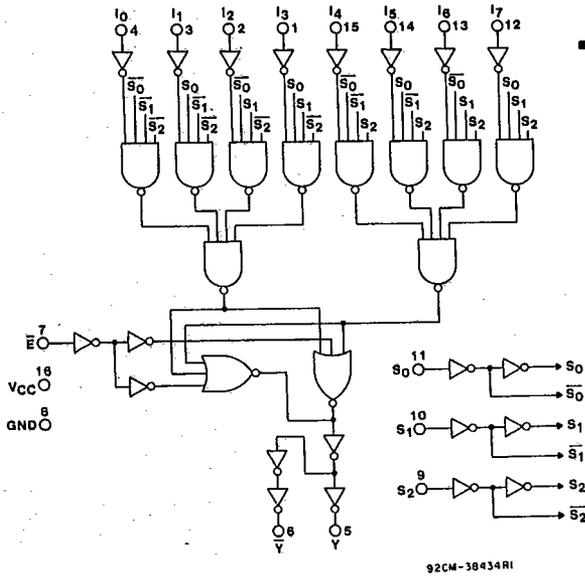
FUNCTIONAL DIAGRAM

The RCA CD54/74HC151 and CD54/74HCT151 are single 8-channel digital multiplexers having three binary control inputs, S₀, S₁ and S₂ and an active low enable (E) input. The three binary signals select 1 of 8 channels. Outputs are both inverting (\bar{Y}) and non-inverting (Y).

The CD54HC/HCT151 devices are supplied in 16-lead ceramic dual-in-line packages (F suffix). The CD74HC/HCT151 are supplied in 16-lead dual-in-line plastic packages (E suffix) and in 16-lead dual-in-line surface mount plastic packages (M suffix). Both types are also available in chip form (H suffix).

Family Features:

- Fanout (Over Temperature Range):
Standard Outputs - 10 LSTTL Loads
Bus Driver Outputs - 15 LSTTL Loads
- Wide Operating Temperature Range:
CD74HC/HCT: -40 to +85°C
- Balanced Propagation Delay and Transition Times
- Significant Power Reduction Compared to LSTTL Logic ICs
- Alternate Source is Philips/Signetics
- CD54HC/CD74HC Types:
2 to 6 V Operation
High Noise Immunity: N_{IL} = 30%, N_{IH} = 30% of V_{CC}
@ V_{CC} = 5 V
- CD54HCT/CD74HCT Types:
4.5 to 5.5 V Operation
Direct LSTTL Input Logic Compatibility
V_{IL} = 0.8 V Max., V_{IH} = 2 V Min.
CMOS Input Compatibility
I_I ≤ 1 μA @ V_{OL}, V_{OH}



CD54/74HC151
CD54/74HCT151

STATIC ELECTRICAL CHARACTERISTICS

| CHARACTERISTICS | CD74HC151/CD54HC151 | | | | | | | | | | CD74HCT151/CD54HCT151 | | | | | | | | | | UNITS |
|---|--|----------------------|----------------------|----------------|------|------|---------------|------|----------------|------|--|---|------------------|------------------|-----|---------------|------------|----------------|------------|-----|-------|
| | TEST CONDITIONS | | | 74HC/54HC TYPE | | | 74HC TYPE | | 54HC TYPE | | TEST CONDITIONS | | | 74HCT/54HCT TYPE | | | 74HCT TYPE | | 54HCT TYPE | | |
| | V _I V | I _O mA | V _{CC} V | +25°C | | | -40/ +85°C | | -55/ +125°C | | V _I V | V _{CC} V | +25°C | | | -40/ +85°C | | -55/ +125°C | | | |
| | | | | Min | Typ | Max | Min | Max | Min | Max | | | Min | Typ | Max | Min | Max | Min | Max | | |
| High-Level Input Voltage V _{IH} | | | 2 | 1.5 | — | — | 1.5 | — | 1.5 | — | — | 4.5 | | | | | | | | | V |
| | | | 4.5 | 3.15 | — | — | 3.15 | — | 3.15 | — | — | to | 2 | — | — | 2 | — | 2 | — | — | V |
| | | | 6 | 4.2 | — | — | 4.2 | — | 4.2 | — | — | 5.5 | | | | | | | | | V |
| Low-Level Input Voltage V _{IL} | | | 2 | — | — | 0.5 | — | 0.5 | — | 0.5 | — | 4.5 | | | | | | | | | V |
| | | | 4.5 | — | — | 1.35 | — | 1.35 | — | 1.35 | — | to | — | — | 0.8 | — | 0.8 | — | 0.8 | — | V |
| | | | 6 | — | — | 1.8 | — | 1.8 | — | 1.8 | — | 5.5 | | | | | | | | | V |
| High-Level Output Voltage V _{OH} | V _{IL} or V _{IH} | -0.02 | 2 | 1.9 | — | — | 1.9 | — | 1.9 | — | V _{IL} or V _{IH} | 4.5 | 4.4 | — | — | 4.4 | — | 4.4 | — | — | V |
| CMOS Loads | | | 4.5 | 4.4 | — | — | 4.4 | — | 4.4 | — | | 4.5 | 4.4 | — | — | 4.4 | — | 4.4 | — | — | V |
| | | | 6 | 5.9 | — | — | 5.9 | — | 5.9 | — | | | | | | | | | | | V |
| TTL Loads | V _{IL} or V _{IH} | | -4 | 4.5 | 3.98 | — | — | 3.84 | — | 3.7 | — | V _{IL} or V _{IH} | 4.5 | 3.98 | — | — | 3.84 | — | 3.7 | — | V |
| Low-Level Output Voltage V _{OL} | V _{IL} or V _{IH} | 0.02 | 2 | — | — | 0.1 | — | 0.1 | — | 0.1 | — | V _{IL} or V _{IH} | 4.5 | — | — | 0.1 | — | 0.1 | — | 0.1 | V |
| CMOS Loads | | | 4.5 | — | — | 0.1 | — | 0.1 | — | 0.1 | — | | | | | | | | | | V |
| | | | 6 | — | — | 0.1 | — | 0.1 | — | 0.1 | — | | | | | | | | | | V |
| TTL Loads | V _{IL} or V _{IH} | | 4 | 4.5 | — | — | 0.26 | — | 0.33 | — | 0.4 | V _{IL} or V _{IH} | 4.5 | — | — | 0.26 | — | 0.33 | — | 0.4 | V |
| Input Leakage Current I _I | V _{CC} or Gnd | | 6 | — | — | ±0.1 | — | ±1 | — | ±1 | — | Any Voltage Between V _{CC} and Gnd | 5.5 | — | — | ±0.1 | — | ±1 | — | ±1 | μA |
| Quiescent Device Current I _{CC} | V _{CC} or Gnd | 0 | 6 | — | — | 8 | — | 80 | — | 160 | | V _{CC} or Gnd | 5.5 | — | — | 8 | — | 80 | — | 160 | μA |
| Additional Quiescent Device Current per Input Pin: 1 Unit Load ΔI _{CC} * | | | | | | | | | | | | V _{CC} -2.1 | 4.5 to 5.5 | — | 100 | 360 | — | 450 | — | 490 | μA |

*For dual-supply systems theoretical worst case (V_I = 2.4 V, V_{CC} = 5.5 V) specification is 1.8 mA.

HCT INPUT LOADING TABLE

| INPUT | UNIT LOADS * |
|--------|--------------|
| Select | 1.5 |
| Data | 0.45 |
| Enable | 0.3 |

* Unit load is ΔI_{CC} limit specified in Static Characteristic Chart, e.g., 360 μA max. @ 25°C.

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CD54/74HC151
CD54/74HCT151

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RECOMMENDED OPERATING CONDITIONS:

For maximum reliability, nominal operating conditions should be selected so that operation is always within the following ranges:

| CHARACTERISTIC | LIMITS | | UNITS |
|---|--------|-----------------|-------|
| | MIN. | MAX. | |
| Supply-Voltage Range (For T _A = Full Package Temperature Range) V _{CC} .* | | | |
| CD54/74HC Types | 2 | 6 | V |
| CD54/74HCT Types | 4.5 | 5.5 | V |
| DC Input or Output Voltage V _I , V _O | 0 | V _{CC} | V |
| Operating Temperature T _A : | | | |
| CD74 Types | -40 | +85 | °C |
| CD54 Types | -55 | +125 | °C |
| Input Rise and Fall Times, t _r , t _f | | | |
| at 2 V | 0 | 1000 | ns |
| at 4.5 V | 0 | 500 | ns |
| at 6 V | 0 | 400 | ns |

*Unless otherwise specified, all voltages are referenced to Ground.

SWITCHING CHARACTERISTICS (V_{CC} = 5 V, T_A = 25°C, Input t_r, t_f = 6 ns)

| CHARACTERISTIC | C _L pF | SYMBOL | TYPICAL VALUES | | UNITS |
|--------------------------------|----------------------|--------------------------------------|----------------|----------|-------|
| | | | 54/74HC | 54/74HCT | |
| Propagation Delays | | t _{PLH} t _{PHL} | 14 | 16 | ns |
| Any data input to Y | 15 | t _{PLH}/t_{PHL}} | 15 | 15 | ns |
| Any select to Y | 15 | t _{PLH}/t_{PHL}} | 15 | 17 | ns |
| Any select to \bar{Y} | 15 | t _{PLH}/t_{PHL}} | 17 | 18 | ns |
| Enable to Y | 15 | t _{PLH}/t_{PHL}} | 11 | 12 | ns |
| Enable to \bar{Y} | 15 | t _{PLH}/t_{PHL}} | 12 | 15 | ns |
| Power Dissipation Capacitance* | — | C _{PD} | 59 | 58 | pF |

* C_{PD} is used to determine the dynamic power dissipation per device:

$P_D = V_{CC}^2 f_i (C_{PD} + C_L)$ where:

f_i = input frequency.

C_L = output load capacitance.

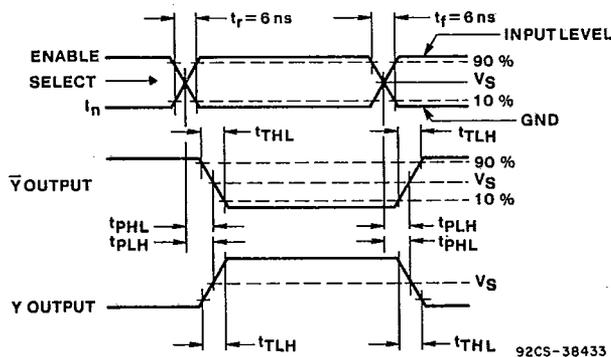
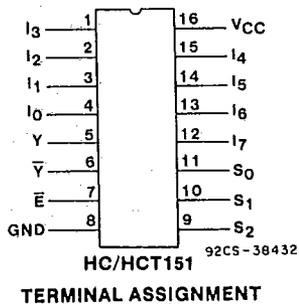
V_{CC} = supply voltage.

T-67-21-51

CD54/74HC151
CD54/74HCT151

SWITCHING CHARACTERISTICS ($C_L = 50$ pF, Input $t_r = 6$ ns)

| CHARACTERISTIC | SYMBOL | V_{CC} | 25° C | | | | -40° C to +85° C | | | | -55° C to +125° C | | | | UNITS |
|---|-----------|----------|-------|------|------|------|------------------|------|-------|------|-------------------|------|-------|------|-------|
| | | | HC | | HCT | | 74HC | | 74HCT | | 54HC | | 54HCT | | |
| | | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | |
| Propagation Delay, Any Data Input to Y | t_{PLH} | 2 | 170 | — | — | 215 | — | — | 255 | — | — | — | — | ns | |
| | t_{PHL} | 4.5 | 34 | 38 | — | 43 | 48 | — | 51 | 57 | — | — | — | | |
| Any Data Input to \bar{Y} | t_{PLH} | 2 | 185 | — | — | 230 | — | — | 280 | — | — | — | — | ns | |
| | t_{PHL} | 4.5 | 37 | 36 | — | 46 | 45 | — | 56 | 54 | — | — | — | | |
| Any Select to Y | t_{PLH} | 2 | 185 | — | — | 230 | — | — | 280 | — | — | — | — | ns | |
| | t_{PHL} | 4.5 | 37 | 41 | — | 46 | 51 | — | 56 | 62 | — | — | — | | |
| Any Select to \bar{Y} | t_{PLH} | 2 | 205 | — | — | 255 | — | — | 310 | — | — | — | — | ns | |
| | t_{PHL} | 4.5 | 41 | 43 | — | 51 | 54 | — | 62 | 65 | — | — | — | | |
| Enable to Y | t_{PLH} | 2 | 140 | — | — | 175 | — | — | 210 | — | — | — | — | ns | |
| | t_{PHL} | 4.5 | 28 | 29 | — | 35 | 36 | — | 42 | 44 | — | — | — | | |
| Enable to \bar{Y} | t_{PLH} | 2 | 145 | — | — | 180 | — | — | 220 | — | — | — | — | ns | |
| | t_{PHL} | 4.5 | 29 | 36 | — | 36 | 45 | — | 44 | 54 | — | — | — | | |
| Output Transition Time | t_{TLH} | 2 | 75 | — | — | 95 | — | — | 110 | — | — | — | — | ns | |
| | t_{THL} | 4.5 | 15 | 15 | — | 19 | 19 | — | 22 | 22 | — | — | — | | |
| | | 6 | 13 | — | — | 16 | — | — | 19 | — | — | — | — | | |
| Input Capacitance | C_i | — | — | 10 | — | 10 | — | 10 | — | 10 | — | 10 | — | pF | |



| | CD54/74HC | CD54/74HCT |
|--------------------------|--------------|------------|
| Input Level | V_{CC} | 3 V |
| Switching Voltage, V_s | 50% V_{CC} | 1.3 V |

Fig. 2 - Propagation delays to Y and \bar{Y} outputs.

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