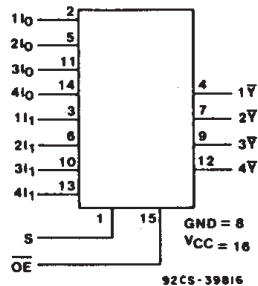


CD54/74HC258 CD54/74HCT258

File Number 1775

Data sheet acquired from Harris Semiconductor
SCHS276

High-Speed CMOS Logic



92CS-39816

FUNCTIONAL DIAGRAM

Quad 2-Input Multiplexer with 3-State Inverting Outputs

Type Features:

- Buffered inputs
- Typical CD54/74HC258 propagation delay = 7 ns
@ $V_{CC} = 5\text{ V}$, $C_L = 15\text{ pF}$, $T_A = 25^\circ\text{C}$

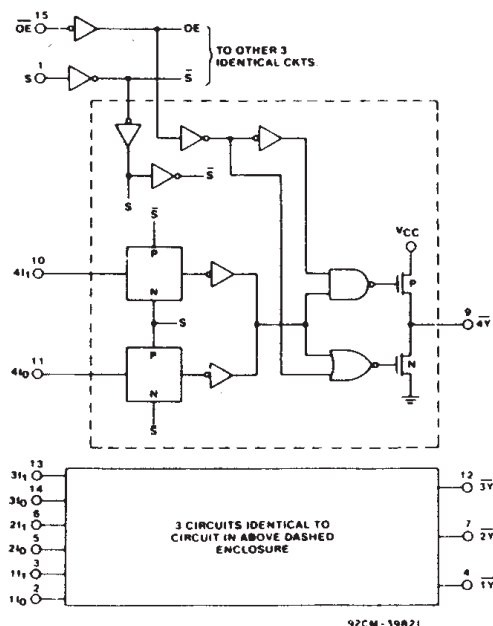
The RCA-CD54/74HC258 and CD54/74HCT258 are quad 2-input multiplexers which select four bits of data from two sources under the control of a common Select input (S). The Output Enable input ($\overline{OE}$) is active LOW. When $\overline{OE}$ is HIGH, all of the outputs (1Y-4Y) are in the high impedance state regardless of all other input conditions.

Moving data from two groups of registers to four common output busses is a common use of the 258. The state of the Select input determines the particular register from which the data comes. It can also be used as a function generator.

The CD54HC/HCT258 are supplied in 16-lead hermetic dual-in-line ceramic packages (F suffix). The CD74HC/HCT258 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).

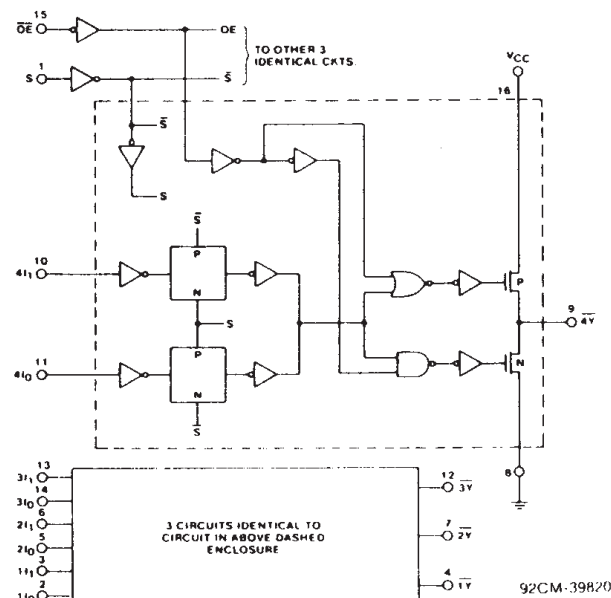
Family Features:

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



92CM-39821

CD54/74HC258 Logic Diagram



92CM-39820

CD54/74HCT258 Logic Diagram

CD54/74HC258

CD54/74HCT258

MAXIMUM RATINGS, Absolute-Maximum Values:

DC SUPPLY-VOLTAGE, (V_{CC}):	
(Voltages referenced to ground)	-0.5 to +7 V
DC INPUT DIODE CURRENT, I_{IK} (FOR $V_i < -0.5$ V OR $V_i > V_{CC} + 0.5$ V)	± 20 mA
DC OUTPUT DIODE CURRENT, I_{OK} (FOR $V_o < -0.5$ V OR $V_o > V_{CC} + 0.5$ V)	± 20 mA
DC DRAIN CURRENT, PER OUTPUT (I_o) (FOR -0.5 V $< V_o < V_{CC} + 0.5$ V)	± 35 mA
DC V_{CC} OR GROUND CURRENT (I_{CC})	± 70 mA
POWER DISSIPATION PER PACKAGE (P_D):	
For $T_A = -40$ to $+60^\circ\text{C}$ (PACKAGE TYPE E)	500 mW
For $T_A = +60$ to $+85^\circ\text{C}$ (PACKAGE TYPE E)	Derate Linearly at 8 mW/ $^\circ\text{C}$ to 300 mW
For $T_A = -55$ to $+100^\circ\text{C}$ (PACKAGE TYPE F, H)	500 mW
For $T_A = +100$ to $+125^\circ\text{C}$ (PACKAGE TYPE F, H)	Derate Linearly at 8 mW/ $^\circ\text{C}$ to 300 mW
For $T_A = -40$ to $+70^\circ\text{C}$ (PACKAGE TYPE M)	400 mW
For $T_A = +70$ to $+125^\circ\text{C}$ (PACKAGE TYPE M)	Derate Linearly at 6 mW/ $^\circ\text{C}$ to 70 mW
OPERATING-TEMPERATURE RANGE (T_A):	
PACKAGE TYPE F, H	-55 to $+125^\circ\text{C}$
PACKAGE TYPE E, M	-40 to $+85^\circ\text{C}$
STORAGE TEMPERATURE (T_{stg})	-65 to $+150^\circ\text{C}$
LEAD TEMPERATURE (DURING SOLDERING):	
At distance $1/16 \pm 1/32$ in. (1.59 ± 0.79 mm) from case for 10 s max.	$+265^\circ\text{C}$
Unit inserted into a PC Board (min. thickness $1/16$ in., 1.59 mm)	
with solder contacting lead tips only	$+300^\circ\text{C}$

RECOMMENDED OPERATING CONDITIONS:

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

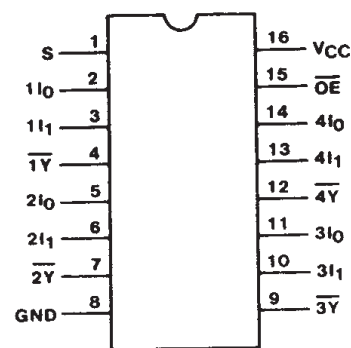
CHARACTERISTIC	LIMITS		UNITS
	MIN.	MAX.	
Supply-Voltage Range (For T_A = Full Package-Temperature Range) V_{CC} .*			V
CD54/74HC Types	2	6	
CD54/74HCT Types	4.5	5.5	
DC Input or Output Voltage V_i, V_o	0	V_{CC}	V
Operating Temperature T_A :			$^\circ\text{C}$
CD74 Types	-40	+85	
CD54 Types	-55	+125	
Input Rise and Fall Times t_r, t_f			ns
at 2 V	0	1000	
at 4.5 V	0	500	
at 6 V	0	400	

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

FUNCTION TABLE

Output Enable	Select Input	Data Inputs		Output
$\overline{OE}$	S	I_0	I_1	$\overline{Y}$
H	X	X	X	Z
L	L	L	X	H
L	L	H	X	L
L	H	X	L	H
L	H	X	H	L

H = High level voltage
 L = Low level voltage
 X = Don't care.
 Z = High impedance (off) state



92CS-39815

TERMINAL ASSIGNMENT

CD54/74HC258 CD54/74HCT258

STATIC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC		CD74HC258/CD54HC258										CD74HCT258/CD54HCT258										UNITS
		TEST CONDITIONS			74HC/54HC TYPES			74HC TYPE		54HC TYPE		TEST CONDITIONS		74HCT/54HCT TYPES			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	V_i V	V_{cc} V	Min	Typ	Max	Min	Max	Min	Max							
High-Level Input Voltage	V_{IH}		2	1.5	—	—	1.5	—	1.5	—	—	4.5	2	—	—	2	—	2	—	V		
			4.5	3.15	—	—	3.15	—	3.15	—	—	to	—	—	—	—	—	—	—			
			6	4.2	—	—	4.2	—	4.2	—	—	5.5	—	—	—	—	—	—	—			
Low-Level Input Voltage	V_{IL}		2	—	—	0.5	—	0.5	—	0.5	—	4.5	—	—	0.8	—	0.8	—	0.8	V		
			4.5	—	—	1.35	—	1.35	—	1.35	—	to	—	—	—	—	—	—	—			
			6	—	—	1.8	—	1.8	—	1.8	—	5.5	—	—	—	—	—	—	—			
High-Level Output Voltage	V_{OH}	V_{IL}	2	1.9	—	—	1.9	—	1.9	—	V_{IL}	4.5	4.4	—	—	4.4	—	4.4	—	V		
CMOS Loads	V_{IH}	or	4.5	4.4	—	—	4.4	—	4.4	—	or		—	—	—	—	—	—	—			
		V_{IH}	6	5.9	—	—	5.9	—	5.9	—	V_{IH}		—	—	—	—	—	—	—			
TTL Loads (Bus Driver)	V_{IL}	or	—	—	—	—	—	—	—	—	V_{IL}	4.5	3.98	—	—	3.84	—	3.7	—	V		
	V_{IH}	or	—	—	—	—	—	—	—	—	or		—	—	—	—	—	—	—			
		V_{IH}	—	—	—	—	—	—	—	—	V_{IH}		—	—	—	—	—	—	—			
Low-Level Output Voltage	V_{OL}	V_{IL}	2	—	—	0.1	—	0.1	—	0.1	V_{IL}	4.5	—	—	0.1	—	0.1	—	0.1	V		
CMOS Loads	V_{IH}	or	4.5	—	—	0.1	—	0.1	—	0.1	or		—	—	—	—	—	—	—			
		V_{IH}	6	—	—	0.1	—	0.1	—	0.1	V_{IH}		—	—	—	—	—	—	—			
TTL Loads (Bus Driver)	V_{IL}	or	—	—	—	—	—	—	—	—	V_{IL}	4.5	—	—	0.26	—	0.33	—	0.4	V		
	V_{IH}	or	—	—	—	—	—	—	—	—	or		—	—	—	—	—	—	—			
		V_{IH}	—	—	—	—	—	—	—	—	V_{IH}		—	—	—	—	—	—	—			
Input Leakage Current	I_i	V_{CC} or Gnd	6	—	—	±0.1	—	±1	—	±1	Any Voltage Between V_{CC} & Grid	5.5	—	—	±0.1	—	±1	—	±1	μA		
Quiescent Device Current	I_{CC}	V_{CC} or Gnd	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}^*										$V_{CC}=2.1$ to 5.5	4.5 to 5.5	— to —	100 to 360	— to —	450 to —	— to —	490 to —	μA			
3-State leakage current	I_{OZ}	V_{IL} or V_{IH}	$V_O = V_{CC}$ or Gnd	6	—	—	±0.5	—	±5	—	±10	V_{IL} or V_{IH}	5.5	—	—	±0.5	—	±5	—	±10	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*
Data	0.5
S	1.5
OE	1.5

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

CD54/74HC258

CD54/74HCT258

SWITCHING CHARACTERISTICS ($V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$, Input $t_r, t_f = 6\text{ ns}$)

CHARACTERISTIC	CL (pF)	TYPICAL		UNITS
		HC	HCT	
$nI_O, nI_I, \text{ to } \bar{Y}$ $t_{PHL} \ t_{PLH}$	15	7	11	ns
$\bar{OE} \text{ to } \bar{Y}$ $t_{PZL} \ t_{PZH}$	15	11	11	ns
	15	12	12	ns
S to $\bar{Y}$ $t_{PHL} \ t_{PLH}$	15	11	14	ns
Power Dissipation Capacitance* C_{PD}	—	49	49	pF

* C_{PD} is used to determine the dynamic power consumption, per multiplexer.

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

C_L = output load capacitance

V_{CC} = supply voltage

SWITCHING CHARACTERISTICS ($C_L = 50\text{ pF}$, Input $t_r, t_f = 6\text{ ns}$)

CHARACTERISTIC		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, nI _O , nI _I , to $\bar{Y}$ (Fig. 2)	t _{PLH}	2	—	95	—	—	—	120	—	—	—	145	—	—	ns
	t _{PHL}	4.5	—	19	—	27	—	24	—	34	—	29	—	41	
		6	—	15	—	—	—	20	—	—	—	25	—	—	
Propagation Delay S to $\bar{Y}$ (Fig. 3)	t _{PLH}	2	—	140	—	—	—	175	—	—	—	210	—	—	ns
	t _{PHL}	4.5	—	28	—	34	—	35	—	43	—	42	—	51	
		6	—	24	—	—	—	30	—	—	—	36	—	—	
Propagation Delay $\overline{OE}$ to Y (Fig. 4)	t _{PZL}	2	—	140	—	—	—	175	—	—	—	210	—	—	ns
	t _{PZH}	4.5	—	28	—	28	—	35	—	35	—	42	—	42	
		6	—	24	—	—	—	30	—	—	—	36	—	—	
Propagation Delay $\overline{OE}$ to Y (Fig. 4)	t _{PLZ}	2	—	150	—	—	—	190	—	—	—	225	—	—	ns
	t _{PHZ}	4.5	—	30	—	30	—	38	—	38	—	45	—	45	
		6	—	26	—	—	—	33	—	—	—	38	—	—	
Output Transition Time (Fig. 2)	t _{TLH}	2	—	60	—	—	—	75	—	—	—	90	—	—	ns
	t _{THL}	4.5	—	12	—	12	—	15	—	15	—	18	—	18	
		6	—	10	—	—	—	13	—	—	—	15	—	—	
Input Capacitance	C _I		—	10	—	10	—	10	—	10	—	10	—	10	pF
3-State Output Capacitance	C _O		—	20	—	20	—	20	—	20	—	20	—	20	pF

CD54/74HC258
CD54/74HCT258

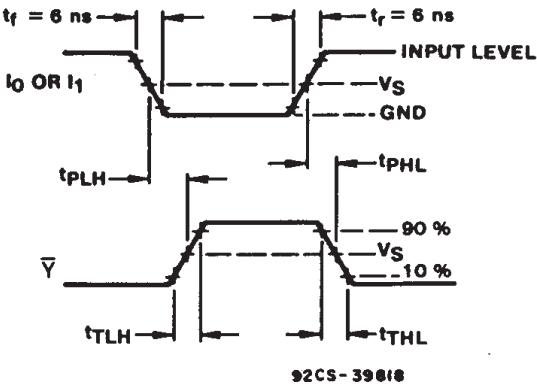


Fig. 2 - Select to output delays.

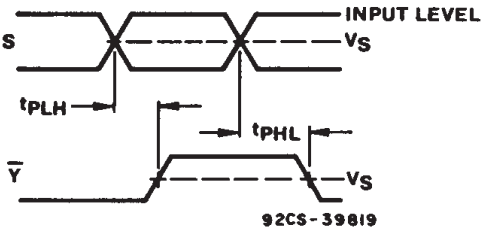


Fig. 3 - Select to output propagation delays.

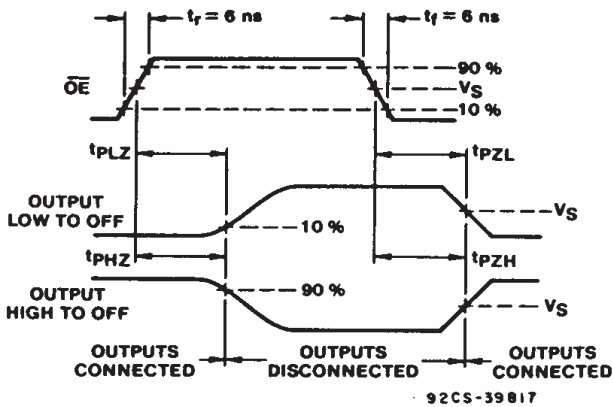


Fig. 4 - Output Enable to output propagation delays.

	54/74HC	54/74HCT
Input Level	V _{CC}	3V
Switching Voltage, V _S	50% V _{CC}	1.3 V

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