

MM54HCT157/MM74HCT157 Quad 2-Input Multiplexer MM54HCT158/MM74HCT158 Quad 2-Input Multiplexer (Inverted Output)

General Description

These high speed QUAD 2-to-1 line data selector/multiplexers utilize advanced silicon-gate CMOS technology. They possess the high noise immunity and low power consumption of standard CMOS integrated circuits, as well as the ability to drive 10 LS-TTL loads.

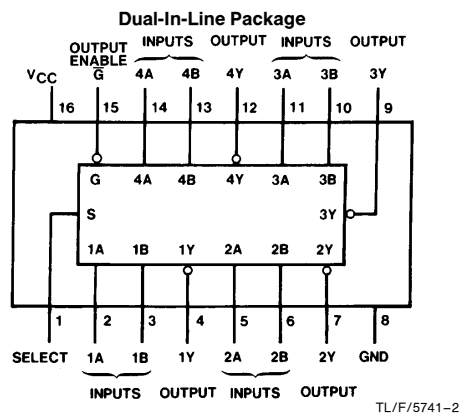
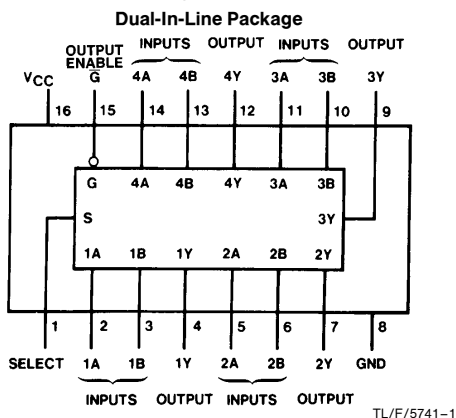
These devices each consist of four 2-input digital multiplexers with common select and OUTPUT ENABLE inputs. On the MM54HCT157/MM74HCT157, when the OUTPUT ENABLE input is at logical "0" the four outputs assume the values as selected from the inputs. When the OUTPUT ENABLE input is at a logical "1" the outputs assume logical "0". The MM54HCT158/MM74HCT158 operates in the same manner, except that its outputs are inverted. Select decoding is done internally resulting in a single select input only. If enabled, the select input determines whether the A or B inputs get routed to their corresponding Y outputs.

The 54HCT/74HCT logic family is functionally as well as pin-out compatible with the standard 54LS/74LS logic family. All inputs are protected from damage due to static discharge by internal diode clamps to V_{CC} and ground.

Features

- Typical propagation delay: 14 ns data to any output
- Power supply range: $5V \pm 10\%$
- Low power supply quiescent current: 80 μA maximum (74HCT Series)
- Low input current: 1 μA maximum
- Completely TTL compatible
- High output drive current: 60 mA minimum

Connection Diagrams



Order Number MM54HCT157/158 or MM74HCT157/158

Function Table

Inputs				Output Y	
Strobe	Select	A	B	HCT157	HCT158
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

H = High Level, L = Low Level, X = Irrelevant

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Absolute Maximum Ratings (Notes 1 & 2)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage (V_{CC})	−0.5 to +7.0V
DC Input Voltage (V_{IN})	−1.5 to $V_{CC} + 1.5V$
DC Output Voltage (V_{OUT})	−0.5 to $V_{CC} + 0.5V$
Clamp Diode Current (I_{IK}, I_{OK})	±20 mA
DC Output Current, per pin (I_{OUT})	±25 mA
DC V_{CC} or GND Current, per pin (I_{CC})	±50 mA
Storage Temperature Range (T_{STG})	−65°C to +150°C
Power Dissipation (P_D)	
(Note 3)	600 mW
S.O. Package only	500 mW
Lead Temperature (T_L)	
(Soldering, 10 seconds)	260°C

Operating Conditions

	Min	Max	Units
Supply Voltage (V_{CC})	4.5	5.5	V
DC Input or Output Voltage (V_{IN}, V_{OUT})	0	V_{CC}	V
Operating Temp. Range (T_A)			
MM74HCT	−40	+85	°C
MM54HCT	−55	+125	°C
Input Rise or Fall Times (t_r, t_f)		500	ns

DC Electrical Characteristics (Note 4)

Symbol	Parameter	Conditions	V _{CC}	T _A = 25°C		74HCT	54HCT	Units
				Type	Guaranteed Limits			
V _{IH}	Minimum High Level Input Voltage				2.0	2.0	2.0	V
V _{IL}	Maximum Low Level Input Voltage				0.8	0.8	0.8	V
V _{OH}	Minimum High Level Output Voltage	V _{IN} = V _{IH} or V _{IL} I _{OUT} ≤ 20 μA	4.5V		4.4	4.4	4.4	V
		V _{IN} = V _{IH} or V _{IL} I _{OUT} ≤ 6.0 mA	4.5V	4.2	3.98	3.84	3.7	V
		I _{OUT} ≤ 7.2 mA	5.5V	5.2	4.98	4.84	4.7	V
V _{OL}	Maximum Low Level Voltage	V _{IN} = V _{IH} or V _{IL} I _{OUT} = 20 μA		0	0.1	0.1	0.1	V
		I _{OUT} = 6.0 mA	4.5V	0.2	0.26	0.33	0.4	V
		I _{OUT} = 7.2 mA	5.5V	0.2	0.26	0.33	0.4	V
I _{IN}	Maximum Input Current	V _{IN} = V _{CC} or GND	6.0V		± 0.1	± 1.0	± 1.0	μA
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND I _{OUT} = 0 μA			8.0	80	160	μA
		V _{IN} = 2.4V or 0.5V (Note 4)			1.2	1.4	1.5	mA

Note 1: Absolute Maximum Ratings are those values beyond which damage to the device may occur.

Note 2: Unless otherwise specified all voltages are referenced to ground.

Note 3: Power Dissipation temperature derating — plastic “N” package: −12 mW/°C from 65°C to 85°C; ceramic “J” package: −12 mW/°C from 100°C to 125°C.

Note 4: For a power supply of 5V ±10% the worst case output voltages (V_{OH} , and V_{OL}) occur for HCT at 4.5V. Thus the 4.5V values should be used when designing with this supply. Worst case V_{IH} and V_{IL} occur at $V_{CC} = 5.5V$ and 4.5V respectively. (The V_{IH} value at 5.5V is 3.85V.) The worst case leakage current (I_{IN} , I_{CC} , and I_{OZ}) occur for CMOS at the higher voltage and so the 6.0V values should be used.

AC Electrical Characteristics $V_{CC}=5V$, $T_A=25^{\circ}C$, $C_L=15\text{ pF}$, $t_r=t_f=6\text{ ns}$

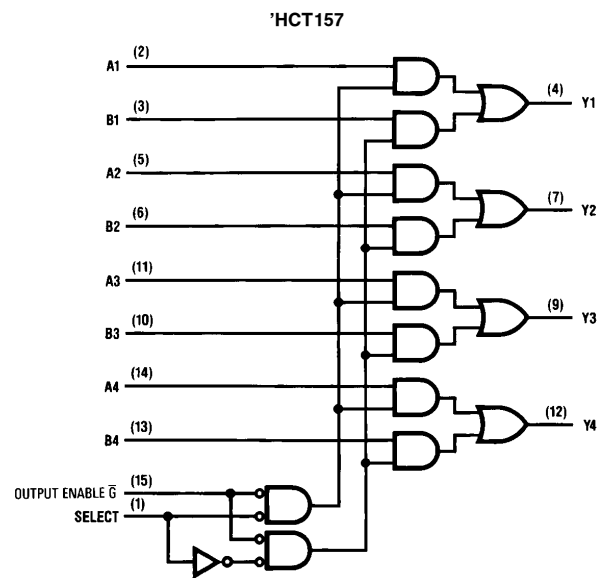
Symbol	Parameter	Conditions	Typ	Guaranteed Limit	Units
t_{PHL} , t_{PLH}	Maximum Propagation Delay, Data to Output		14	20	ns
t_{PHL} , t_{PLH}	Maximum Propagation Delay, Select to Output		14	20	ns
t_{PHL} , t_{PLH}	Maximum Propagation Delay, Strobe to Output		12	18	ns

AC Electrical Characteristics $V_{CC}=5V \pm 10\%$, $C_L=50\text{ pF}$, $t_r=t_f=6\text{ ns}$ (unless otherwise specified)

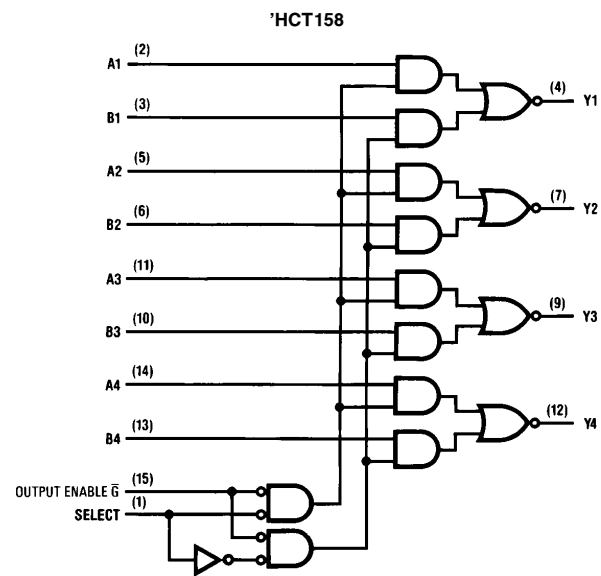
Symbol	Parameter	Conditions	T _A = 25°C		74HCT T _A = −40 to 85°C	54HCT T _A = −55 to 125°C	Units
			Typ	Guaranteed Limits			
t _{PHL} , t _{PLH}	Maximum Propagation Delay, Data to Output		13	22	28	33	ns
t _{PHL} , t _{PLH}	Maximum Propagation Delay, Select to Output		15	27	34	41	ns
t _{PHL} , t _{PLH}	Maximum Propagation Delay, OUTPUT ENABLE to Output		14	25	31	38	ns
t _{TLH} , t _{THL}	Maximum Output Rise and Fall Time		8	15	19	22	ns
C _{IN}	Maximum Input Capacitance		5	10	10	10	pF
C _{PD}	Power Dissipation Capacitance (Note 5)		48				pF

Note 5: C_{PD} determines the no load dynamic power consumption, $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$, and the no load dynamic current consumption, $I_S = C_{PD} V_{CC} f + I_{CC}$.

Logic Diagrams



TL/F/5741-3



TL/F/5741-4

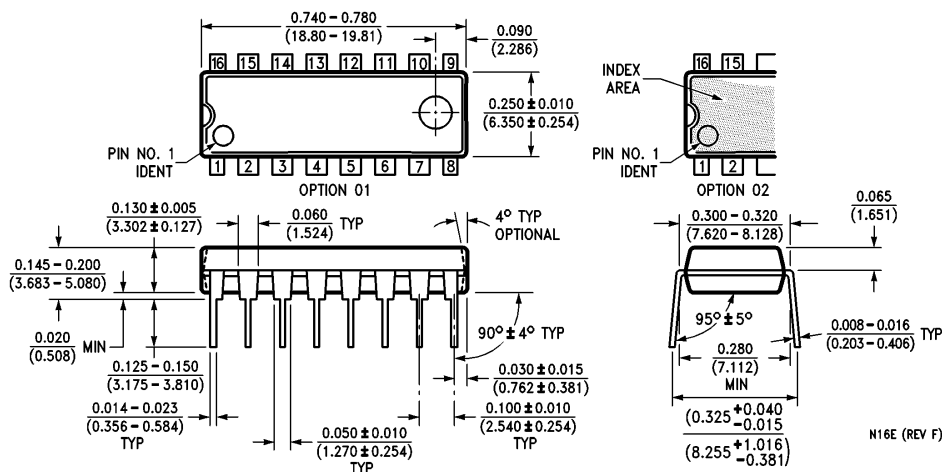
The drawing consists of three views of the J16A component:

- Top View:** Shows a rectangular component with a width of 0.785 [19.94] MAX and a height of 0.220-0.310 [5.59-7.87]. It has 16 pins on the left and 9 pins on the right. The corner radius is R 0.025 [0.64]. The bottom edge has a radius of R 0.005-0.020 TYP [0.13-0.51].
- Side View:** Shows the component's profile with a total height of 0.290-0.320 [7.37-8.13]. The top surface is 0.180 MAX [4.57] wide. The bottom surface has a width of 0.310-0.410 [7.87-10.41]. The side surface is 0.010 ± 0.002 [0.25 ± 0.05] wide. The bottom surface is 95° ± 5° TYP.
- End View:** Shows the component's end with a width of 0.125-0.200 [3.18-5.08] TYP. The top surface is 0.005 [0.13] wide. The bottom surface is 0.080 [2.03] MAX wide. The side surface is 0.010 ± 0.010 [2.54 ± 0.25] wide. The bottom surface is 90° ± 4° TYP.

J16A (REV L)

J16A (REV L)

Physical Dimensions inches (millimeters) (Continued)



Molded Dual-In-Line Package (N)
Order Number MM74HCT157N or MM74HCT158N
NS Package Number N16E

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