

PRELIMINARY
November 1995

MM54HCT147/MM74HCT147 10-to-4 Line Priority Encoder

General Description

This priority encoder utilizes advanced silicon-gate CMOS technology. It has the high noise immunity and low power consumption typical of CMOS circuits, as well as the speeds and output drive similar to LS-TTL.

This priority encoder accepts 9 input request lines 1–9 and outputs 4 line BCD. The priority encoding ensures that only the highest order data line is encoded. The implied decimal zero condition requires no input condition as zero is encoded when all nine data lines are at a high logic level. All data inputs and outputs are active at low logic level.

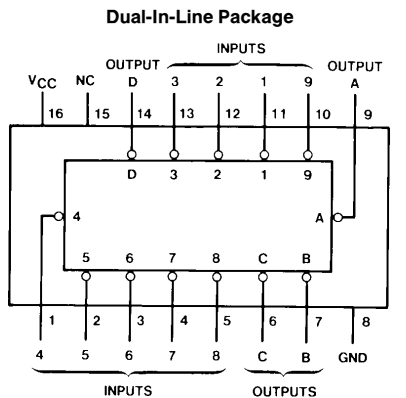
All inputs are protected from damage due to static discharge by internal diode clamps to V_{CC} and ground.

MM54HCT/MM74HCT devices are intended to interface between TTL and NMOS components and standard CMOS devices. These parts are also plug in replacements for LS-TTL devices and can be used to reduce power consumption in existing designs.

Features

- Low quiescent power consumption:
40 μ W maximum at 25°C
- High speed: 13 ns propagation delay (typical)
- Very low input current: 10^{-5} μ A typical

Connection and Logic Diagrams



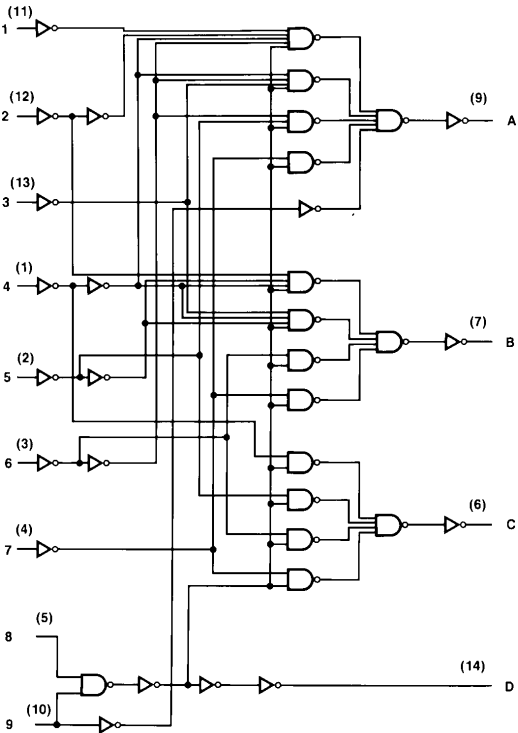
TL/F/9397-1

Order Number MM54HCT147 or MM74HCT147

Truth Table

Inputs									Outputs			
1	2	3	4	5	6	7	8	9	D	C	B	A
H	H	H	H	H	H	H	H	H	H	H	H	H
X	X	X	X	X	X	X	X	L	L	H	H	L
X	X	X	X	X	X	X	L	H	L	H	H	H
X	X	X	X	X	X	L	H	H	H	L	L	L
X	X	X	X	X	L	H	H	H	H	L	L	H
X	X	X	X	L	H	H	H	H	H	L	H	L
X	X	X	L	H	H	H	H	H	H	L	H	H
X	X	L	H	H	H	H	H	H	H	H	L	L
X	L	H	H	H	H	H	H	H	H	H	L	H
L	H	H	H	H	H	H	H	H	H	H	H	L

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



TL/F/9397-2

MM54HCT147/MM74HCT147 10-to-4 Line Priority Encoder

查询"MM54HCT147"供应商

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})	−0.5V to +7.0V
DC Input Voltage (V_{IN})	−1.5V to $V_{CC} + 1.5V$
DC Output Voltage (V_{OUT})	−0.5V to $V_{CC} + 0.5V$
Clamp Diode Current (I_{IK}, I_{OK})	±20 mA
DC Output Current, per pin (I_{OUT})	±35 mA
DC V_{CC} or GND Current, per pin (I_{CC})	±75 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})	2	6	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 $V_{CC} = 5V \pm 10\%$ (unless otherwise specified)

Symbol	Parameter	Conditions	T _A = 25°C		74HCT	54HCT	Units
				Typ	T _A = −40°C to +85°C	T _A = −55°C to +125°C	
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 I _{OUT} = 4.0 mA, V _{CC} = 4.5V I _{OUT} = 4.8 mA, V _{CC} = 5.5V	V _{CC} 4.2 5.7	V _{CC} − 0.1 3.98 4.98	V _{CC} − 0.1 3.84 4.84	V _{CC} − 0.1 3.7 4.7	V V V
V _{OL}	Maximum Low Level Output Voltage	V _{IN} = V _{IH} or V _{IL} I _{OUT} = 20 μA I _{OUT} = 4.0 mA, V _{CC} = 4.5V I _{OUT} = 4.8 mA, V _{CC} = 5.5V	0 0.2 0.2	0.1 0.26 0.26	0.1 0.33 0.33	0.1 0.4 0.4	V V V
I _{IN}	Maximum Input Current	V _{IN} = V _{CC} or GND, V _{IH} or V _{IL}		±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)		2.0	2.9	3.0	mA

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	T _A = 25°C		74HCT − 40°C to + 85°C	54HCT − 55°C to + 125°C	Units
		Typ	Guaranteed Limits			
t _{PD}	Maximum Propagation Delay		22	28	33	ns
t _r , t _f	Maximum Output Rise and Fall Time	7	11	14	17	ns
C _{PD}	Power Dissipation Capacitance (Note 5)	TBD				pF
C _{IN}	Maximum Input Capacitance	5	10	10	10	pF

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

Symbol	Parameter	T _A = 25°C		74HCT −40°C to +85°C	54HCT −55°C to +125°C	Units
		Typ	Guaranteed Limits			
t _{PD}	Maximum Propagation Delay	11				ns

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

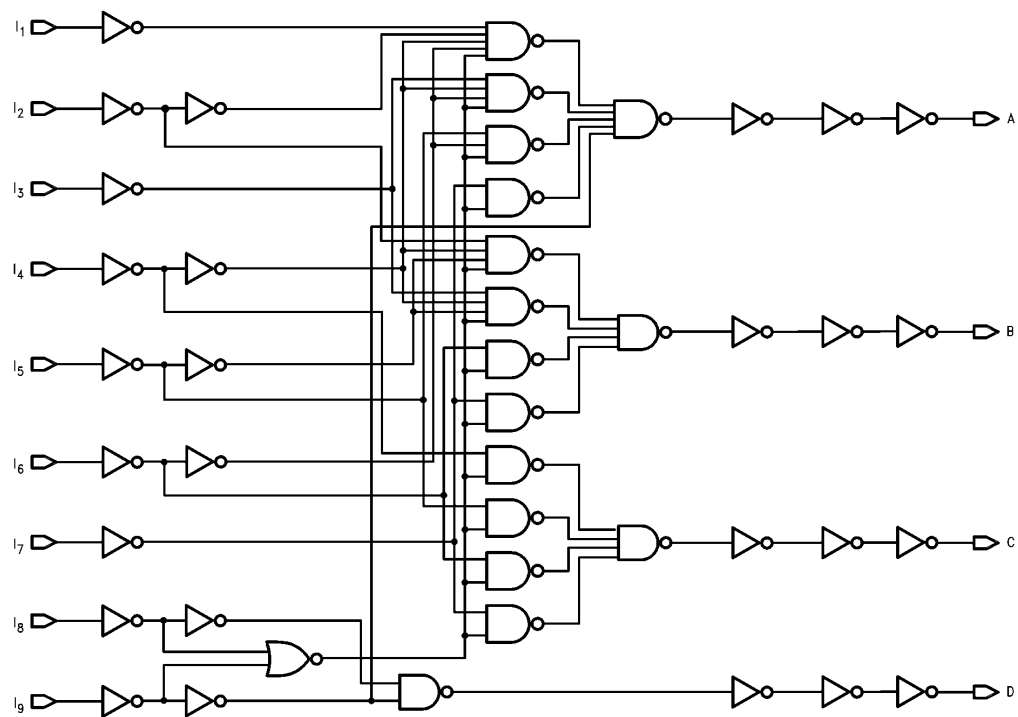
Note 2: Unless otherwise specified all voltages are referenced to ground.

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: Measured per input, other inputs held at V_{CC} or GND.

Note 5: C_{PD} determines the no load dynamic power consumption, and the no load dynamic current consumption.

Schematic Diagram



TL/F/9397-3

The drawing consists of three views: a top view, a side view, and an end view.

- Top View:** Shows a rectangular component with 16 pins on the left and 9 pins on the right. Dimensions include:
 - Overall width: 0.785 [19.94] MAX
 - Pin pitch (left): 0.025 [0.64]
 - Pin pitch (right): $0.005-0.020$ TYP [0.13-0.51]
 - Pin diameter: $0.220-0.310$ [5.59-7.87]
- Side View:** Shows the profile of the component with dimensions:
 - Top thickness: 0.037 ± 0.005 TYP [0.94 ± 0.13]
 - Pin height: 0.055 ± 0.005 TYP [1.40 ± 0.13]
 - Pin diameter: $0.020-0.060$ TYP [0.51-1.52]
 - Pin angle: $90^\circ \pm 4^\circ$ TYP
 - Pin diameter (bottom): 0.150 [3.81] MIN TYP
 - Pin diameter (bottom): 0.018 ± 0.003 TYP [0.46 ± 0.08]
- End View:** Shows the component with a glass sealant. Dimensions include:
 - Overall width: $0.290-0.320$ [7.37-8.13]
 - Pin diameter: 0.180 MAX [4.57]
 - Pin angle: $95^\circ \pm 5^\circ$ TYP
 - Pin diameter (bottom): 0.010 ± 0.002 TYP [0.25 ± 0.05]
 - Pin diameter (bottom): $0.310-0.410$ [7.87-10.41]

Other dimensions shown in the top view include: 0.005 [0.13] MIN TYP, 0.200 [5.08] MAX TYP, $0.125-0.200$ TYP [3.18-5.08], 0.080 [2.03] MAX, and 0.100 ± 0.010 TYP [2.54 ± 0.25].

J16A (REV L)

The figure shows three views of the N16E (REV F) package:

- Top View:** Shows the package footprint with dimensions:
 - Overall width: $0.740 - 0.780$ (18.80 - 19.81)
 - Pin 16 to Pin 9 distance: 0.090 (2.286)
 - Pin 9 to Pin 8 distance: 0.250 ± 0.010 (6.350 $\pm$ 0.254)
 - Pin 16 to Pin 1 distance: 0.130 ± 0.005 (3.302 $\pm$ 0.127)
 - Pin 1 to Pin 8 distance: 0.060 TYP (1.524)
 - Pin 16 to Pin 15 distance: $0.145 - 0.200$ (3.683 - 5.080)
 - Pin 15 to Pin 14 distance: 0.020 MIN (0.508)
 - Pin 14 to Pin 13 distance: $0.125 - 0.150$ (3.175 - 3.810)
 - Pin 13 to Pin 12 distance: $0.014 - 0.023$ (0.356 - 0.584) TYP
 - Pin 12 to Pin 11 distance: 0.050 ± 0.010 (1.270 $\pm$ 0.254) TYP
 - Pin 11 to Pin 10 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 10 to Pin 9 distance: 0.100 ± 0.010 (2.540 $\pm$ 0.254) TYP
 - Pin 9 to Pin 8 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 8 to Pin 7 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 7 to Pin 6 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 6 to Pin 5 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 5 to Pin 4 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 4 to Pin 3 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 3 to Pin 2 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 2 to Pin 1 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 1 to Pin 16 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 16 to Pin 15 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 15 to Pin 14 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 14 to Pin 13 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 13 to Pin 12 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 12 to Pin 11 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 11 to Pin 10 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 10 to Pin 9 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 9 to Pin 8 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 8 to Pin 7 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 7 to Pin 6 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 6 to Pin 5 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 5 to Pin 4 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 4 to Pin 3 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 3 to Pin 2 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 2 to Pin 1 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 1 to Pin 16 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
- Side View:** Shows the package height and pin dimensions:
 - Overall height: 0.065 (1.651)
 - Pin 16 to Pin 15 distance: $0.300 - 0.320$ (7.620 - 8.128)
 - Pin 15 to Pin 14 distance: $0.008 - 0.016$ TYP (0.203 - 0.406)
 - Pin 14 to Pin 13 distance: 0.280 (7.112) MIN
 - Pin 13 to Pin 12 distance: 0.325 ± 0.040 (8.255 $\pm$ 1.016) (0.015 - 0.381)
 - Pin 12 to Pin 11 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 11 to Pin 10 distance: 0.100 ± 0.010 (2.540 $\pm$ 0.254) TYP
 - Pin 10 to Pin 9 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 9 to Pin 8 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 8 to Pin 7 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 7 to Pin 6 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 6 to Pin 5 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 5 to Pin 4 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 4 to Pin 3 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 3 to Pin 2 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 2 to Pin 1 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 1 to Pin 16 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
- Front View:** Shows the package width and pin dimensions:
 - Overall width: $0.300 - 0.320$ (7.620 - 8.128)
 - Pin 16 to Pin 15 distance: $0.008 - 0.016$ TYP (0.203 - 0.406)
 - Pin 15 to Pin 14 distance: 0.280 (7.112) MIN
 - Pin 14 to Pin 13 distance: 0.325 ± 0.040 (8.255 $\pm$ 1.016) (0.015 - 0.381)
 - Pin 13 to Pin 12 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 12 to Pin 11 distance: 0.100 ± 0.010 (2.540 $\pm$ 0.254) TYP
 - Pin 11 to Pin 10 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 10 to Pin 9 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 9 to Pin 8 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 8 to Pin 7 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 7 to Pin 6 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 6 to Pin 5 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 5 to Pin 4 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 4 to Pin 3 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 3 to Pin 2 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 2 to Pin 1 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)
 - Pin 1 to Pin 16 distance: 0.030 ± 0.015 (0.762 $\pm$ 0.381)

Other features and dimensions include:

- Pin 16 to Pin 15 distance: 0.090 (2.286)
- Pin 15 to Pin 14 distance: 0.250 ± 0.010 (6.350 $\pm$ 0.254)
- Pin 14 to Pin 13 distance: 0.130 ± 0.005 (3.302 $\pm$ 0.127)
- Pin 13 to Pin 12 distance: 0.060 TYP (1.524)
- Pin 12 to Pin 11 distance: $0.014 - 0.023$ (0.356 - 0.584) TYP
- Pin 11 to Pin 10 distance: 0.05

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