

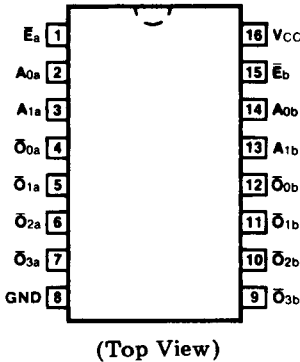
HD74AC139/HD74ACT139 • Dual 1-of-4 Decoder/ Demultiplexer

Description

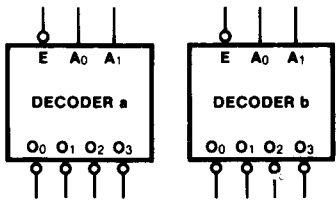
The HD74AC139/HD74ACT139 is a high-speed, dual 1-of-4 decoder, each accepting two inputs and providing four mutually-exclusive active-Low outputs. Each decoder has an active-Low Enable input which can be used as a data input for a 4-output demultiplexer. Each half of the HD74AC139/HD74ACT139 can be used as a function generator providing all four minterms of two variables.

- Multifunction Capability
- Two Completely Independent 1-of-4 Decoders
- Active Low Mutually Exclusive Outputs
- Outputs Source/Sink 24 mA
- HD74ACT139 has TTL-Compatible Inputs

Pin Assignment



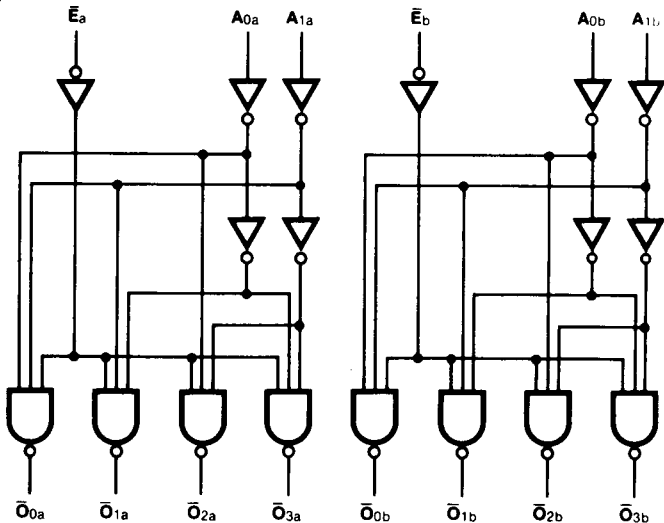
Logic Symbol



Pin Names

A ₀ , A ₁	Address Inputs
$\bar{E}$	Enable Inputs
$\bar{O}_0 \cdot \bar{O}_3$	Outputs

Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

HD74AC139/HD74ACT139

Functional Description

The HD74AC139/HD74ACT139 is a high-speed dual 1-of-4 decoder/demultiplexer. The device has two independent decoders, each of which accepts two binary weighted inputs (A_0 - A_1) and provides four mutually exclusive active-Low outputs ($\bar{O}_0$ - $\bar{O}_3$). Each decoder has an active-Low enable ($\bar{E}$). When $\bar{E}$ is High all outputs are forced High. The enable can be used as the data input for a 4-output demultiplexer application. Each half of the HD74AC139/HD74ACT139 generates all four minterms of two variables. These four minterms are useful in some applications, replacing multiple gate functions as shown in Figure a, and thereby reducing the number of packages required in a logic network.

Truth Table

Inputs			Outputs			
$\bar{E}$	A_0	A_1	$\bar{O}_0$	$\bar{O}_1$	$\bar{O}_2$	$\bar{O}_3$
H	X	X	H	H	H	H
L	L	L	L	H	H	H
L	H	L	H	L	H	H
L	L	H	H	H	L	H
L	H	H	H	H	H	L

H = High Voltage Level
L = Low Voltage Level
X = Immaterial

DC Characteristics (unless otherwise specified)

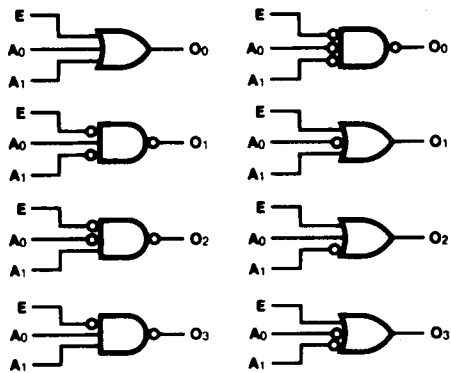
Symbol	Parameter	Max	Unit	Condition
I_{CC}	Maximum Quiescent Supply Current	80	μA	$V_{IN} = V_{CC}$ or Ground, $V_{CC} = 5.5V$, $T_a = \text{Worst Case}$
I_{CC}	Maximum Quiescent Supply Current	8.0	μA	$V_{IN} = V_{CC}$ or Ground, $V_{CC} = 5.5V$, $T_a = 25^\circ C$
I_{CCT}	Maximum Additional I_{CC} /Input(HD74ACT139)	1.5	mA	$V_{IN} = V_{CC} - 2.1V$ $V_{CC} = 5.5V$, $T_a = \text{Worst Case}$

AC Characteristics: HD74AC139

Symbol	Parameter	V_{CC}^* (V)	$T_a = +25^\circ C$ $C_L = 50pF$			$T_a = -40^\circ C$ to $+85^\circ C$ $C_L = 50pF$		Unit
			Min	Typ	Max	Min	Max	
t_{PLH}	Propagation Delay A_n to $\bar{O}_n$	3.3 5.0	1.0 1.0	8.0 6.5	11.5 8.5	1.0 1.0	13.0 9.5	ns
t_{PHL}	Propagation Delay A_n to $\bar{O}_n$	3.3 5.0	1.0 1.0	7.0 5.5	10.0 7.5	1.0 1.0	11.0 8.5	ns
t_{PLH}	Propagation Delay $\bar{E}_n$ to $\bar{O}_n$	3.3 5.0	1.0 1.0	9.5 7.0	12.0 8.5	1.0 1.0	13.0 10.0	ns
t_{PHL}	Propagation Delay $\bar{E}_n$ to $\bar{O}_n$	3.3 5.0	1.0 1.0	8.0 6.0	10.0 7.5	1.0 1.0	11.0 8.5	ns

* Voltage Range 3.3 is $3.3V \pm 0.3V$
Voltage Range 5.0 is $5.0V \pm 0.5V$

Figure a: Gate Functions (each half)



AC Characteristics: HD74ACT139

Symbol	Parameter	V _{CC} * (V)	T _a = +25°C C _L = 50pF			T _a = -40°C to +85°C C _L = 50pF		Unit
			Min	Typ	Max	Min	Max	
t _{PLH}	Propagation Delay A _n to $\bar{O}_n$	5.0	1.0	6.0	8.5	1.0	9.5	ns
t _{PHL}	Propagation Delay A _n to $\bar{O}_n$	5.0	1.0	6.0	9.5	1.0	10.5	ns
t _{PLH}	Propagation Delay $\bar{E}_n$ to $\bar{O}_n$	5.0	1.0	7.0	10.0	1.0	11.0	ns
t _{PHL}	Propagation Delay $\bar{E}_n$ to $\bar{O}_n$	5.0	1.0	7.0	9.5	1.0	10.5	ns

* Voltage Range 5.0 is 5.0V ± 0.5V

Capacitance

Symbol	Parameter	Typ	Unit	Condition
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = 5.5V
C _{PD}	Power Dissipation Capacitance	40.0	pF	V _{CC} = 5.0V

Package Information

In the HD74AC series of Advanced CMOS logic, either plastic DIP and small outline packages can be selected.

To order, please refer to the following package code.

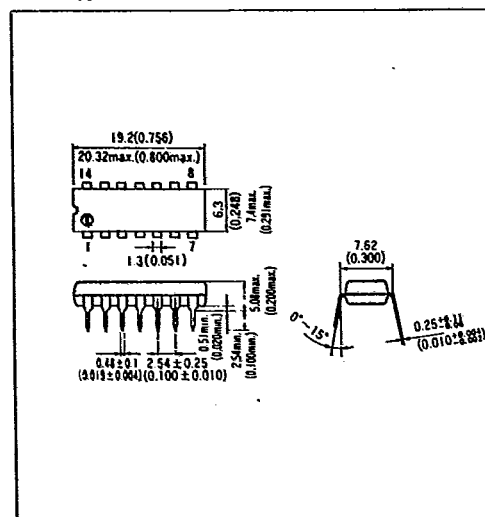
• Package code of Advanced CMOS Logic

HD74AC XXXX P

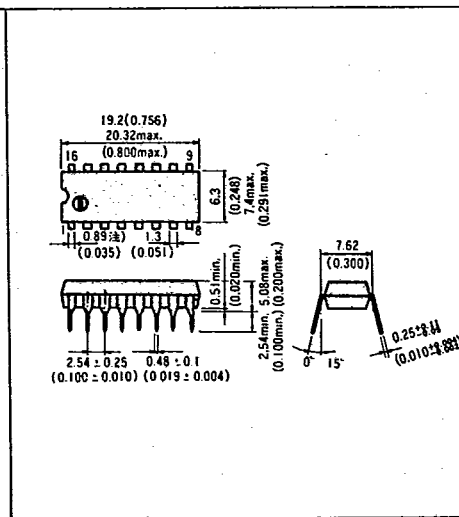
Package code
 P: Plastic DIP,
 FP: Small outline package
 Individual device code
 74AC: Commercial FACT
 74ACT: Commercial
 TTL-Compatible
 Advanced CMOS
 Initial cad of Hitachi
 digital IC

Plastic DIP Package [Unit: mm (inch)]

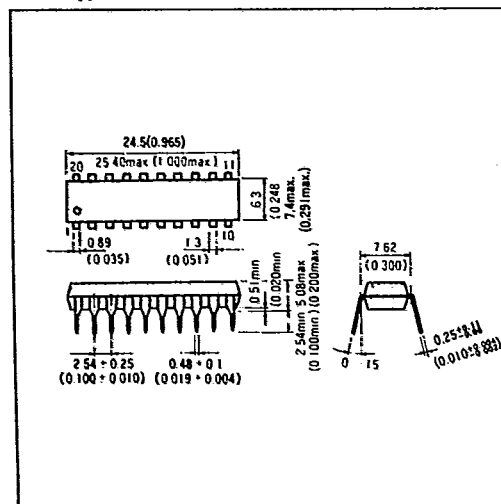
14 Pin type



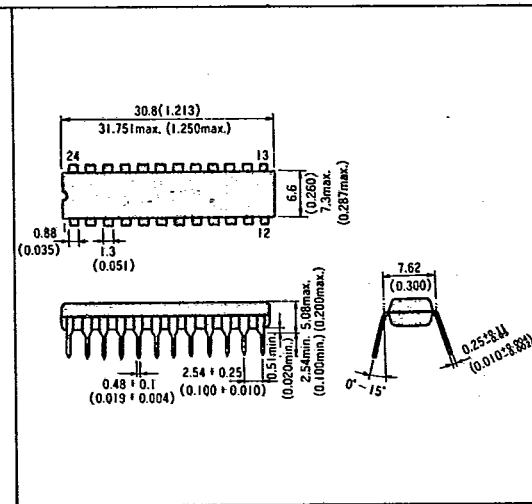
16 Pin type



20 Pin type



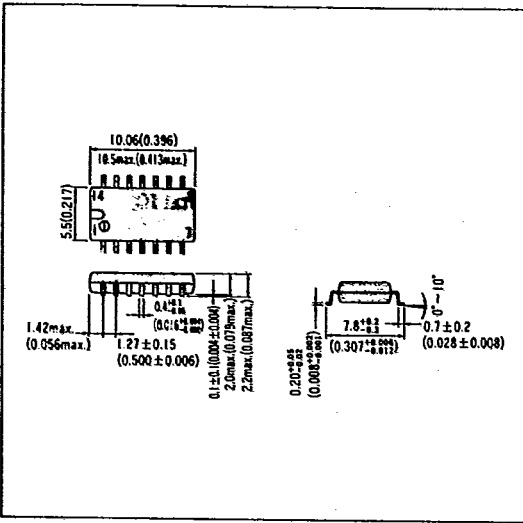
24 Pin type



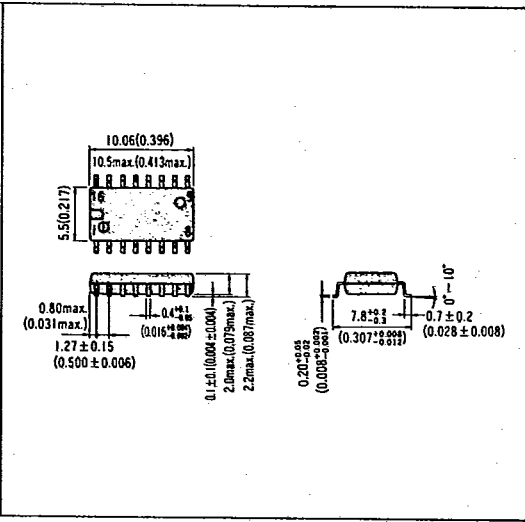
Package Information

Small Outline Package [Unit: mm (inch)]

14 Pin type



16 Pin type



20 Pin type

