

# TC74HC154AP

## 4 - TO - 16 LINE DECODER

The TC74HC154A is a high speed CMOS 4 to 16 LINE DECODER/DEMULTIPLEXER fabricated with silicon gate C<sup>2</sup>MOS technology.

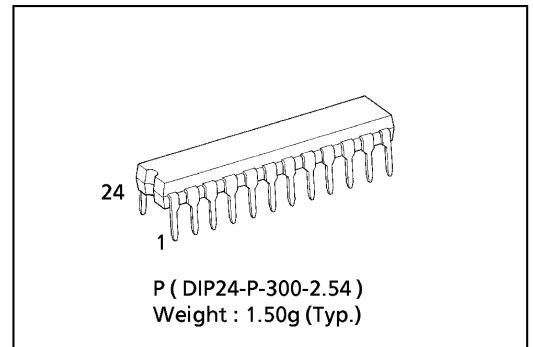
It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

A binary code applied to the four inputs A thru D is decoded within the device. Depending on the binary code, causes one of sixteen outputs to go low, when both the strobe inputs,  $\bar{G}1$  and  $\bar{G}2$ , are held low. When either strobe input is held high, the decoding function is inhibited to keep all outputs high. The strobe function makes it easy to expand the decoding lines through cascading, and simplifies the design of address decoding circuits in a memory control system.

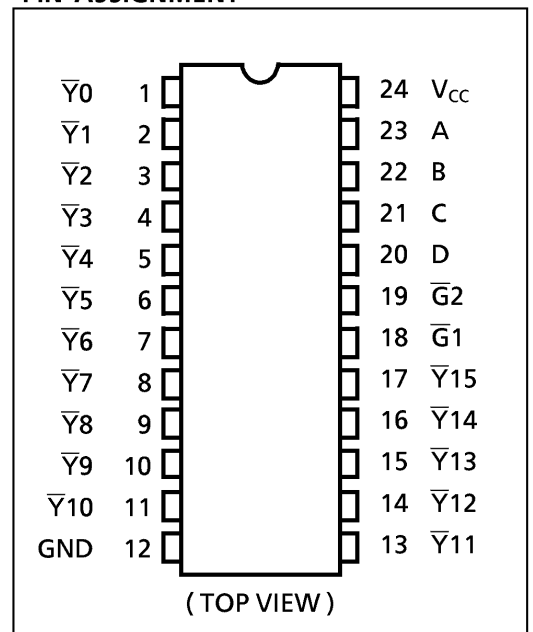
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

### FEATURES:

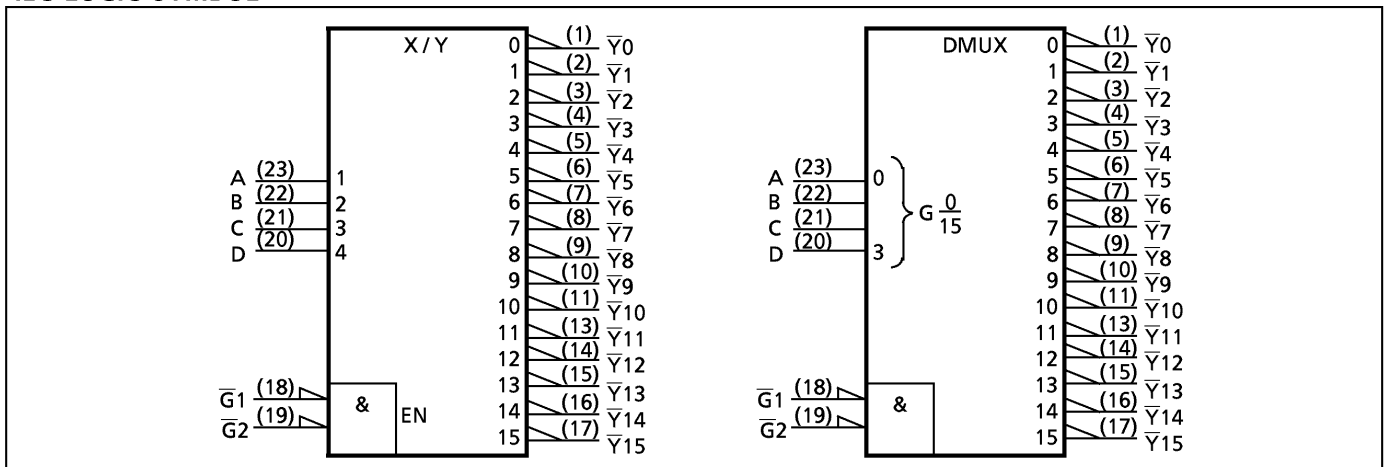
- High Speed..... $t_{pd} = 15ns$ (typ.) at  $V_{CC} = 5V$
- Low Power Dissipation..... $I_{CC} = 4\mu A$ (Max.) at  $T_a = 25^\circ C$
- High Noise Immunity..... $V_{NIH} = V_{NIL} = 28\% V_{CC}$  (Min.)
- Output Drive Capability..... 10 LSTTL Loads
- Symmetrical Output Impedance...  $|I_{OH}| = I_{OL} = 4mA$ (Min.)
- Balanced Propagation Delays.....  $t_{pLH} \approx t_{pHL}$
- Wide Operating Voltage Range....  $V_{CC}$  (opr.) =  $2V \sim 6V$
- Pin and Function Compatible with 74LS154



### PIN ASSIGNMENT



### IEC LOGIC SYMBOL

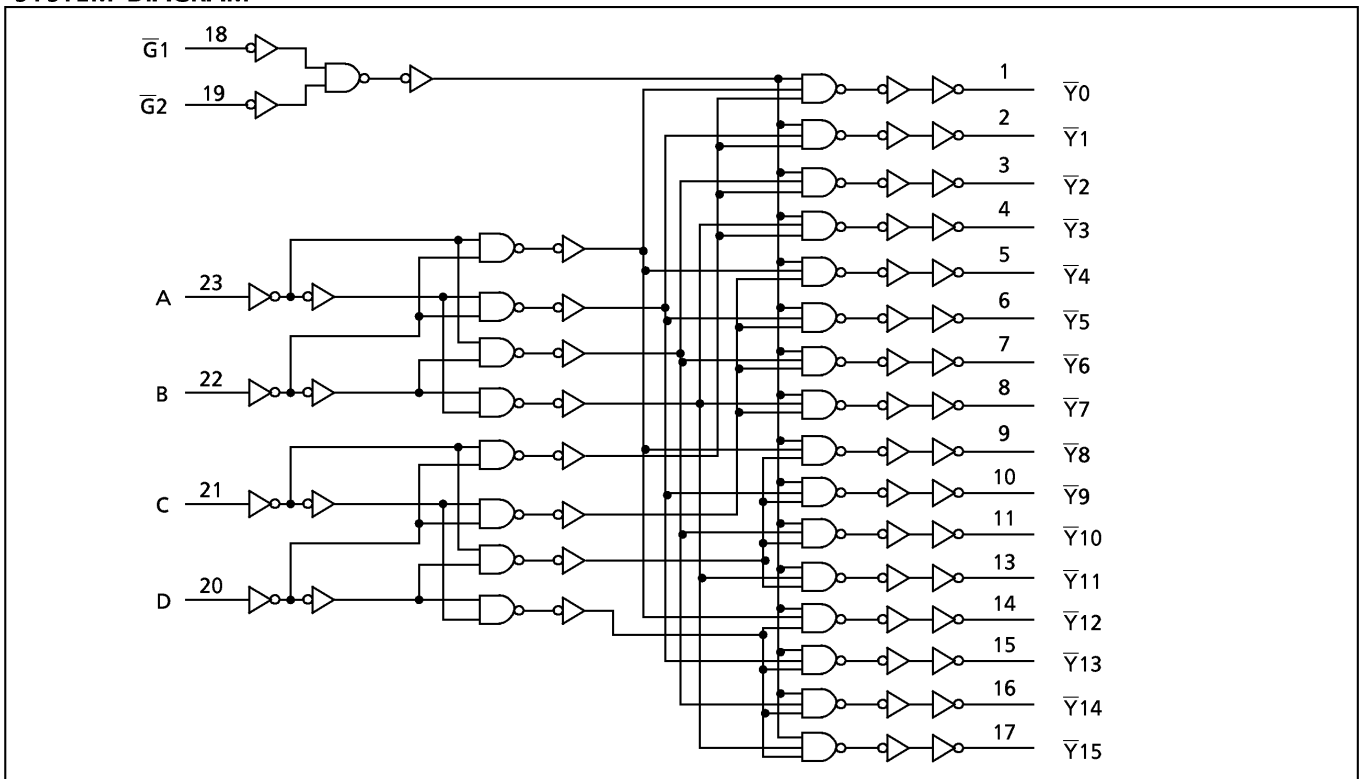


TRUTH TABLE

INPUT						SELECTED OUTPUT(L)
$\bar{G}1$	$\bar{G}2$	D	C	B	A	
L	L	L	L	L	L	$\bar{Y}0$
L	L	L	L	L	H	$\bar{Y}1$
L	L	L	L	H	L	$\bar{Y}2$
L	L	L	L	H	H	$\bar{Y}3$
L	L	L	H	L	L	$\bar{Y}4$
L	L	L	H	L	H	$\bar{Y}5$
L	L	L	H	H	L	$\bar{Y}6$
L	L	L	H	H	H	$\bar{Y}7$
L	L	H	L	L	L	$\bar{Y}8$
L	L	H	L	L	H	$\bar{Y}9$
L	L	H	L	H	L	$\bar{Y}10$
L	L	H	L	H	H	$\bar{Y}11$
L	L	H	H	L	L	$\bar{Y}12$
L	L	H	H	L	H	$\bar{Y}13$
L	L	H	H	H	L	$\bar{Y}14$
L	L	H	H	H	H	$\bar{Y}15$
X	H	X	X	X	X	NONE
H	X	X	X	X	X	NONE

X : Don't care

SYSTEM DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	$V_{CC}$	-0.5~7	V
DC Input Voltage	$V_{IN}$	-0.5~ $V_{CC} + 0.5$	V
DC Output Voltage	$V_{OUT}$	-0.5~ $V_{CC} + 0.5$	V
Input Diode Current	$I_{IK}$	±20	mA
Output Diode Current	$I_{OK}$	±20	mA
DC Output Current	$I_{OUT}$	±25	mA
DC $V_{CC}$ / Ground Current	$I_{CC}$	±50	mA
Power Dissipation	$P_D$	500*	mW
Storage Temperature	$T_{stg}$	-65~150	°C

\*500mW in the range of  $T_a = -40^{\circ}\text{C} \sim 65^{\circ}\text{C}$ . From  $T_a = 65^{\circ}\text{C}$  to  $85^{\circ}\text{C}$  a derating factor of  $-10\text{mW}/^{\circ}\text{C}$  shall be applied until 300mW.

## RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	$V_{CC}$	2~6	V
Input Voltage	$V_{IN}$	0~ $V_{CC}$	V
Output Voltage	$V_{OUT}$	0~ $V_{CC}$	V
Operating Temperature	$T_{opr}$	-40~85	°C
Input Rise and Fall Time	$t_r, t_f$	0~1000 ( $V_{CC} = 2.0\text{V}$ ) 0~500 ( $V_{CC} = 4.5\text{V}$ ) 0~400 ( $V_{CC} = 6.0\text{V}$ )	ns

## DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	$V_{CC}$ (V)	$T_a = 25^{\circ}\text{C}$			$T_a = -40 \sim 85^{\circ}\text{C}$		UNIT	
				MIN.	TYP.	MAX.	MIN.	MAX.		
High - Level Input Voltage	$V_{IH}$		2.0	1.50	—	—	1.50	—	V	
			4.5	3.15	—	—	3.15	—		
			6.0	4.20	—	—	4.20	—		
Low - Level Input Voltage	$V_{IL}$		2.0	—	—	0.50	—	0.50	V	
			4.5	—	—	1.35	—	1.35		
			6.0	—	—	1.80	—	1.80		
High - Level Output Voltage	$V_{OH}$	$V_{IN} = V_{IH}$ or $V_{IL}$	$I_{OH} = -20\mu\text{A}$	2.0	1.9	2.0	—	1.9	—	V
				4.5	4.4	4.5	—	4.4	—	
			$I_{OH} = -4\text{ mA}$ $I_{OH} = -5.2\text{ mA}$	4.5	4.18	4.31	—	4.13	—	
				6.0	5.68	5.80	—	5.63	—	
Low - Level Output Voltage	$V_{OL}$	$V_{IN} = V_{IH}$ or $V_{IL}$	$I_{OL} = 20\mu\text{A}$	2.0	—	0.0	0.1	—	0.1	V
				4.5	—	0.0	0.1	—	0.1	
			$I_{OL} = 4\text{ mA}$ $I_{OL} = 5.2\text{ mA}$	4.5	—	0.17	0.26	—	0.33	
				6.0	—	0.18	0.26	—	0.33	
Input Leakage Current	$I_{IN}$	$V_{IN} = V_{CC}$ or GND	6.0	—	—	±0.1	—	±1.0	$\mu\text{A}$	
Quiescent Supply Current	$I_{CC}$	$V_{IN} = V_{CC}$ or GND	6.0	—	—	4.0	—	40.0		

AC ELECTRICAL CHARACTERISTICS (  $C_L = 15\text{pF}$ ,  $V_{CC} = 5\text{V}$ ,  $T_a = 25^\circ\text{C}$ , Input  $t_r = t_f = 6\text{ns}$  )

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Transition Time	$t_{TLH}$ $t_{THL}$		—	4	8	ns
Propagation Delay Time (A, B, C, D- $\bar{Y}$ )	$t_{PLH}$ $t_{PHL}$		—	15	30	
Propagation Delay Time ( $\bar{G}1$ , $\bar{G}2$ - $\bar{Y}$ )	$t_{PLH}$ $t_{PHL}$		—	14	28	

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

PARAMETER	SYMBOL	TEST CONDITION	$T_a = 25^\circ\text{C}$			$T_a = -40\sim 85^\circ\text{C}$		UNIT	
			$V_{CC}$ (V)	MIN.	TYP.	MAX.	MIN.		MAX.
Output Transition Time	$t_{TLH}$ $t_{THL}$		2.0	—	30	75	—	95	ns
			4.5	—	8	15	—	19	
			6.0	—	7	13	—	16	
Propagation Delay Time (A, B, C, D- $\bar{Y}$ )	$t_{PLH}$ $t_{PHL}$		2.0	—	65	175	—	220	
			4.5	—	19	35	—	44	
			6.0	—	16	30	—	37	
Propagation Delay Time ( $\bar{G}1$ , $\bar{G}2$ - $\bar{Y}$ )	$t_{PLH}$ $t_{PHL}$		2.0	—	55	160	—	200	
			4.5	—	17	32	—	40	
			6.0	—	15	27	—	34	
Input Capacitance	$C_{IN}$		—	5	10	—	10	pF	
Power Dissipation Capacitance	$C_{PD}$ (1)		—	57	—	—	—		

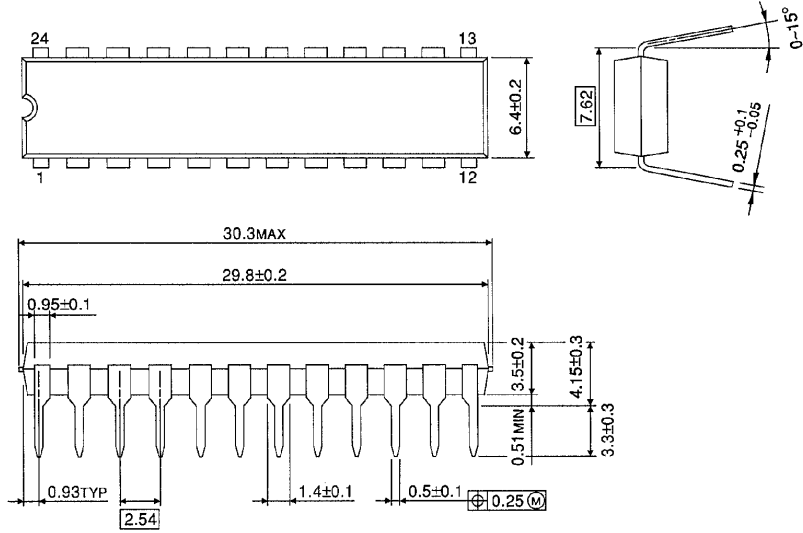
Note (1)  $C_{PD}$  is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation :

$$I_{CC}(\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

DIP 24PIN PACKAGE DIMENSIONS ( DIP24-P-300-2.54 )

Unit in mm



Weight : 1.50g (Typ.)

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