TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC74HC154AP

4 – TO – 16 LINE DECODER

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

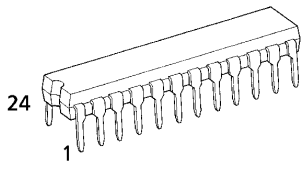
It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

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, $\overline{G}1$ and $\overline{G}2$, 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.

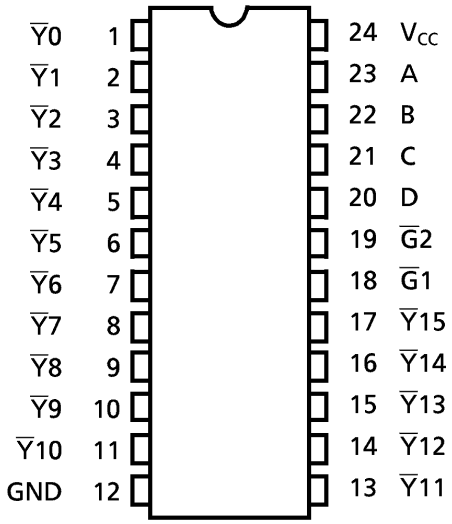
FEATURES :

- High Speed ····· t_{pd} = 15ns(typ.) at V_{CC} = 5V
- Low Power Dissipation ····· I_{CC} = 4μA(Max.) at Ta = 25°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 ····· $t_{pLH} \simeq t_{pHL}$
- Wide Operating Voltage Range ···· V_{CC} (opr.) = 2V ~ 6V
- Pin and Function Compatible with 74LS154



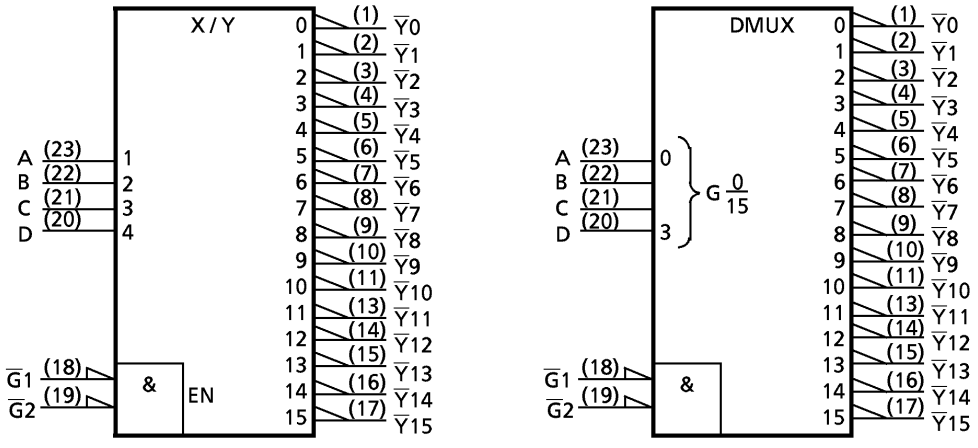
P (DIP24-P-300-2.54)
Weight : 1.50g (Typ.)

PIN ASSIGNMENT



(TOP VIEW)

IEC LOGIC SYMBOL

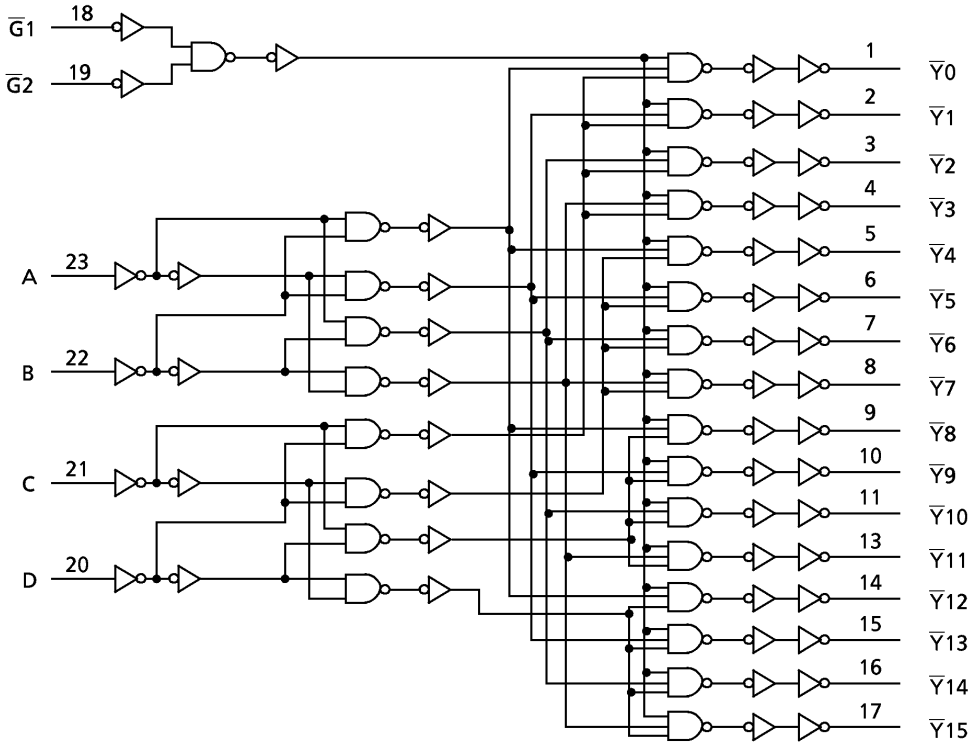


TRUTH TABLE

INPUT						SELECTED OUTPUT(L)
$\overline{G}1$	$\overline{G}2$	D	C	B	A	
L	L	L	L	L	L	$\overline{Y}0$
L	L	L	L	L	H	$\overline{Y}1$
L	L	L	L	H	L	$\overline{Y}2$
L	L	L	L	H	H	$\overline{Y}3$
L	L	L	H	L	L	$\overline{Y}4$
L	L	L	H	L	H	$\overline{Y}5$
L	L	L	H	H	L	$\overline{Y}6$
L	L	L	H	H	H	$\overline{Y}7$
L	L	H	L	L	L	$\overline{Y}8$
L	L	H	L	L	H	$\overline{Y}9$
L	L	H	L	H	L	$\overline{Y}10$
L	L	H	L	H	H	$\overline{Y}11$
L	L	H	H	L	L	$\overline{Y}12$
L	L	H	H	L	H	$\overline{Y}13$
L	L	H	H	H	L	$\overline{Y}14$
L	L	H	H	H	H	$\overline{Y}15$
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 Ta = −40°C~65°C. From Ta = 65°C to 85 °C a derating factor of −10mW/°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} = 2.0V) 0~ 500 (V_{CC} = 4.5V) 0~ 400 (V_{CC} = 6.0V)	ns

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION		V_{CC} (V)	Ta = 25°C MIN.	Ta = 25°C TYP.	Ta = 25°C MAX.	Ta = −40~85°C MIN.	Ta = −40~85°C MAX.	UNIT
High - Level Input Voltage	V_{IH}			2.0 4.5 6.0	1.50 3.15 4.20	— — —	— — —	1.50 3.15 4.20	— — —	V
Low - Level Input Voltage	V_{IL}			2.0 4.5 6.0	— — —	— — —	0.50 1.35 1.80	— — —	0.50 1.35 1.80	V
High - Level Output Voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = −20μA	2.0 4.5 6.0	1.9 4.4 5.9	2.0 4.5 6.0	— — —	1.9 4.4 5.9	— — —	V
			I_{OH} = −4 mA I_{OH} = −5.2mA	4.5 6.0	4.18 5.68	4.31 5.80	— —	4.13 5.63	— —	
Low - Level Output Voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 20μA	2.0 4.5 6.0	— — —	0.0 0.0 0.0	0.1 0.1 0.1	— — —	0.1 0.1 0.1	V
			I_{OL} = 4 mA I_{OL} = 5.2mA	4.5 6.0	— —	0.17 0.18	0.26 0.26	— —	0.33 0.33	
Input Leakage Current	I_{IN}	V_{IN} = V_{CC} or GND		6.0	—	—	±0.1	—	±1.0	μA
Quiescent Supply Current	I_{CC}	V_{IN} = V_{CC} or GND		6.0	—	—	4.0	—	40.0	

AC ELECTRICAL CHARACTERISTICS (C_L = 15pF, V_{CC} = 5V, Ta = 25°C, Input $t_r = t_f$ = 6ns)

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-$\overline{Y}$)	t_{pLH} t_{pHL}		—	15	30	
Propagation Delay Time ($\overline{G}$1, $\overline{G}$2-$\overline{Y}$)	t_{pLH} t_{pHL}		—	14	28	

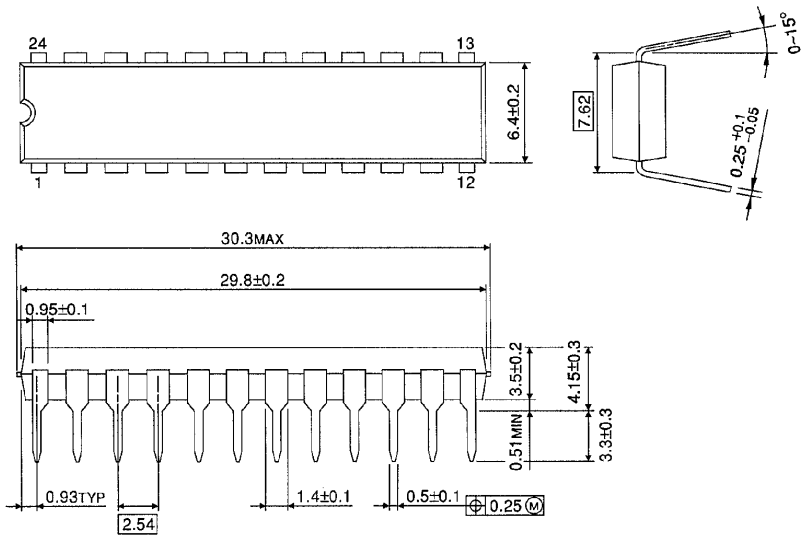
AC ELECTRICAL CHARACTERISTICS (C_L = 50pF, Input $t_r = t_f$ = 6ns)

PARAMETER	SYMBOL	TEST CONDITION		Ta = 25°C			Ta = −40~85°C		UNIT
			V_{CC} (V)	MIN.	TYP.	MAX.	MIN.	MAX.	
Output Transition Time	t_{TLH} t_{THL}		2.0 4.5 6.0	— — —	30 8 7	75 15 13	— — —	95 19 16	ns
Propagation Delay Time (A, B, C, D-$\overline{Y}$)	t_{pLH} t_{pHL}		2.0 4.5 6.0	— — —	65 19 16	175 35 30	— — —	220 44 37	
Propagation Delay Time ($\overline{G}$1, $\overline{G}$2-$\overline{Y}$)	t_{pLH} t_{pHL}		2.0 4.5 6.0	— — —	55 17 15	160 32 27	— — —	200 40 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:

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

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



Weight : 1.50g (Typ.)

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