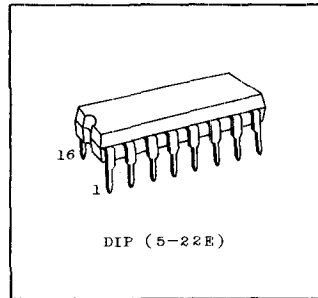


TC74HC138P 3-T0-8 LINE DECODER

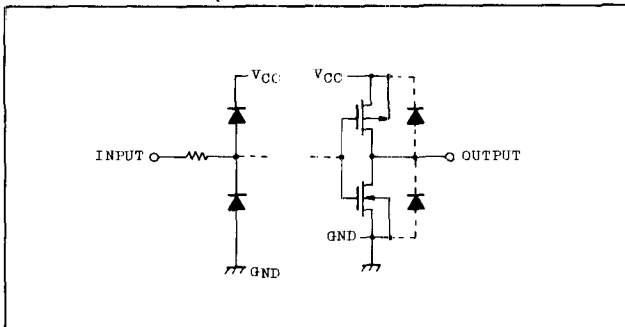
The TC74HC138 is a high speed CMOS DECODER (3-8 LINE) fabricated with silicon gate CMOS technology. It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation. If the device is enabled, 3 binary select inputs (A,B and C) determine which one of outputs will go low. Enable input G1 is held "L" level or either $\overline{G2A}$ or $\overline{G2B}$ is held "H" level, decoding function is inhibited and all the 8 outputs go high. 3 enable inputs are provided to ease cascade connection and application of address decoder for memory system. All inputs are equipped with protection circuits against static discharge or transient excess voltage.

FEATURES:

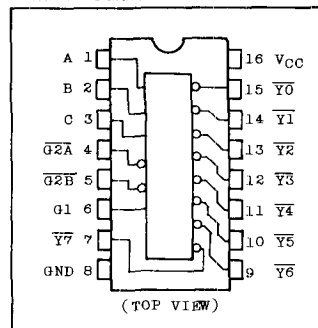
- . High Speed..... $t_{pd}=17ns$ (Typ.) at $V_{CC}=5V$
- . Low Power Dissipation..... $I_{CC}=4\mu A$ (Max.) at $T_a=25^\circ C$
- . High Noise Immunity..... $V_{NIH}=V_{NIL}=28\% V_{CC}$ (Min.)
- . Output Drive Capability.....10 LSTTL Loads
- . Symmetrical Output Impedance... $|I_{OH}|=I_{OL}=4mA$ (Min.)
- . Balanced Propagation Delays... $t_{pLH} \neq t_{pHL}$
- . Wide Operating Voltage Range... $V_{CC(opr)}=2V \sim 6V$
- . Pin and Function Compatible with 74LS138.



INPUT and OUTPUT EQUIVALENT CIRCUIT

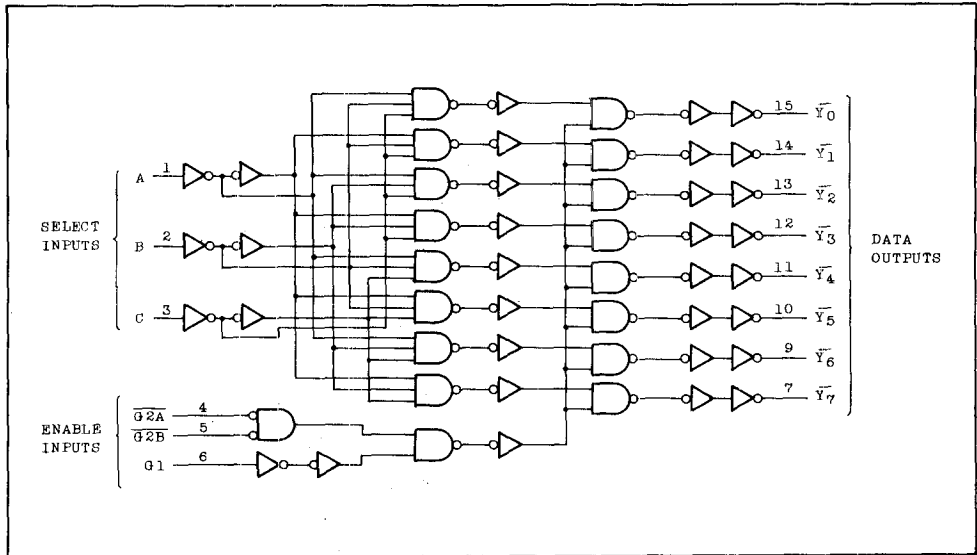


PIN ASSIGNMENT



TC74HC138P

LOGIC DIAGRAM



TRUTH TABLE

INPUTS						OUTPUTS								SELECTED OUTPUT
ENABLE			SELECT			\bar{Y}_0	\bar{Y}_1	\bar{Y}_2	\bar{Y}_3	\bar{Y}_4	\bar{Y}_5	\bar{Y}_6	\bar{Y}_7	
G1	$\overline{G2A}$	$\overline{G2B}$	C	B	A									
L	*	*	*	*	*	H	H	H	H	H	H	H	H	NONE
*	H	*	*	*	*	H	H	H	H	H	H	H	H	NONE
*	*	H	*	*	*	H	H	H	H	H	H	H	H	NONE
H	L	L	L	L	L	L	H	H	H	H	H	H	H	\bar{Y}_0
H	L	L	L	L	H	H	L	H	H	H	H	H	H	\bar{Y}_1
H	L	L	L	H	L	H	H	L	H	H	H	H	H	\bar{Y}_2
H	L	L	L	H	H	H	H	H	L	H	H	H	H	\bar{Y}_3
H	L	L	H	L	L	H	H	H	H	L	H	H	H	\bar{Y}_4
H	L	L	H	L	H	H	H	H	H	H	L	H	H	\bar{Y}_5
H	L	L	H	H	L	H	H	H	H	H	H	L	H	\bar{Y}_6
H	L	L	H	H	H	H	H	H	H	H	H	H	L	\bar{Y}_7

TC74HC138P

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 _O UT	±25	mA
DC V _{CC} /Ground Current	I _{CC}	±50	mA
Power Dissipation	P _D	500*	mW
Storage Temperature	T _{stg}	-65 ~ 150	°C
Lead Temperature 10sec	T _L	300	°C

* 500mW in the range of Ta=-40° ~ 65°C. and from Ta=65°C up to 85°C derating factor of -10mW/°C shall be applied until 300mW.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	LIMIT	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 ~ 500	ns

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	Ta=25°C				Ta=-40~85°C		UNIT	
			V _{CC}	MIN.	TYP.	MAX.	MIN.	MAX.		
High-Level Input Voltage	V _{IH}		2.0	1.5	-	-	1.5	-	V	
			4.5	3.15	-	-	3.15	-		
			6.0	4.2	-	-	4.2	-		
Low-Level Input Voltage	V _{IL}		2.0	-	-	0.5	-	0.5	V	
			4.5	-	-	1.35	-	1.35		
			6.0	-	-	1.8	-	1.8		
High-Level Output Voltage	V _{OH}	V _{IN} =	I _{OH} =-20μA	2.0	1.9	2.0	-	1.9	-	V
				4.5	4.4	4.5	-	4.4	-	
		V _{IH} or V _{IL}	I _{OH} =-4mA	4.5	4.18	4.31	-	4.13	-	
			I _{OH} =-5.2mA	6.0	5.68	5.80	-	5.63	-	

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	Ta=25°C			Ta=-40~85°C		UNIT	
			V _{CC}	MIN.	TYP.	MAX.	MIN.		MAX.
Low-Level Output Voltage	V _{OL}	V _{IN} = I _{OL} =20μA	2.0	-	0.0	0.1	-	0.1	V
			4.5	-	0.0	0.1	-	0.1	
		V _{IH} or V _{IIL} I _{OL} =4mA	6.0	-	0.0	0.1	-	0.1	
			6.0	-	0.17	0.32	-	0.37	
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=50pF, Input t_r=t_f=6ns)

PARAMETER	SYMBOL	TEST CONDITION	Ta=25°C			Ta=-40~85°C		UNIT	
			V _{CC}	MIN.	TYP.	MAX.	MIN.		MAX.
Output Transition Time	t _{TLH} t _{THL}		2.0	-	30	75	-	90	ns
			4.5	-	8	15	-	18	
			6.0	-	7	13	-	16	
Propagation Delay Time (A, B, C - \bar{Y})	t _{pLH} t _{pHL}		2.0	-	72	175	-	210	ns
			4.5	-	23	35	-	42	
			6.0	-	20	30	-	36	
Propagation Delay Time (G, \bar{G} - \bar{Y})	t _{pLH} t _{pHL}		2.0	-	62	160	-	195	ns
			4.5	-	20	32	-	39	
			6.0	-	17	28	-	34	
Input Capacitance	C _{IN}		-	5	10	-	10	pF	
Power Dissipation Capacitance	C _{PD(1)}		-	57	-	-	-		

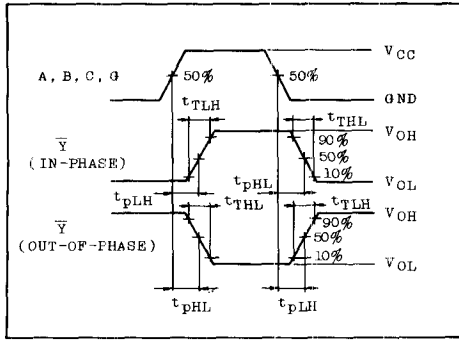
Note (1) C_{PD} is defined as the value of internal equivalent capacitance of IC which is calculated from the operating current consumption without load (refer to Test Circuit).

Average operating current can be obtained by the equation hereunder.

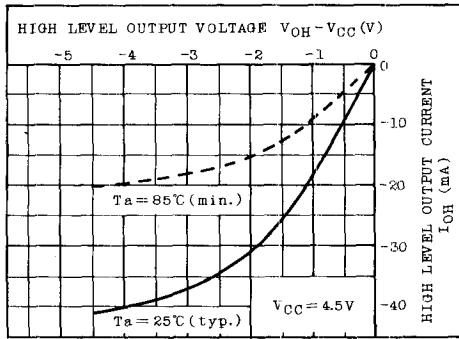
$$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

TC74HC138P

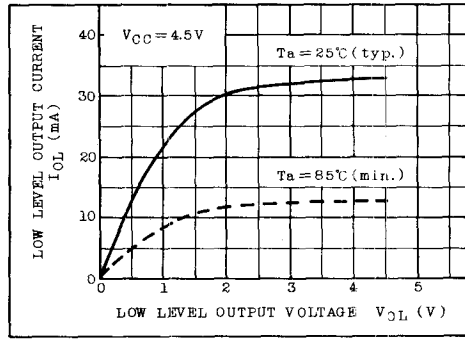
SWITCHING CHARACTERISTICS TEST WAVEFORM



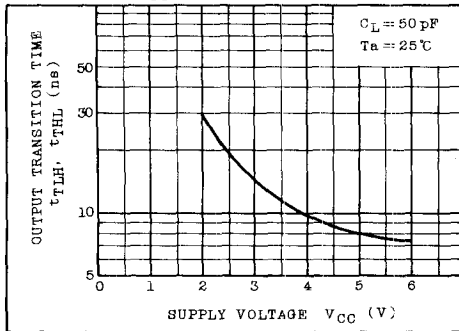
I_{OH} CHARACTERISTICS



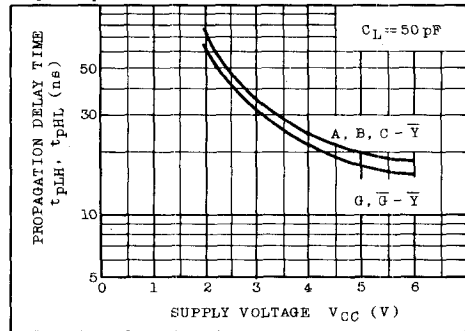
I_{OL} CHARACTERISTICS



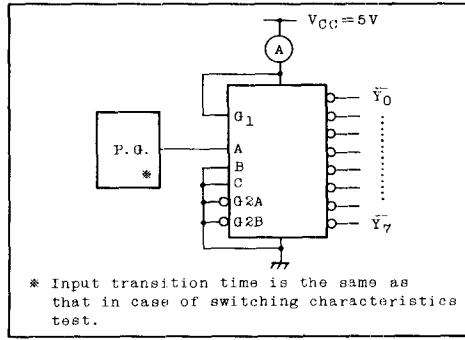
$t_{TLH}, t_{THL} - V_{CC}$ CHARACTERISTICS (TYP.)



$t_{pLH}, t_{pHL} - V_{CC}$ CHARACTERISTICS (TYP.)

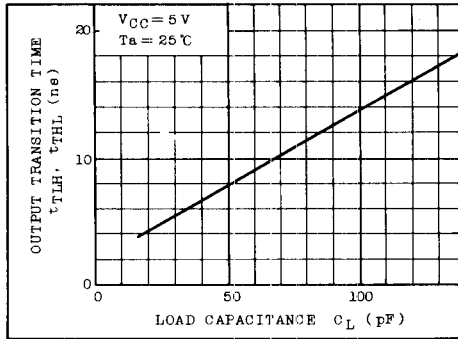


$I_{CC(opr)}$ TEST CIRCUIT



* Input transition time is the same as that in case of switching characteristics test.

$t_{TLH}, t_{THL}-C_L$ CHARACTERISTICS (TYP.)



$t_{PLH}, t_{PHL}-C_L$ CHARACTERISTICS (TYP.)

