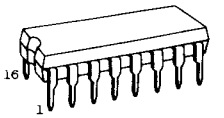
TC40H138P/F

C²MOS DIGITAL INTEGRATED CIRCUIT
SILICON MONOLITHIC

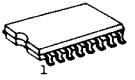
TC40H138 3-TO-8-LINE DECODER/DEMULTIPLEXER

The TC40H138 is a DECODER/DEMULTIPLEXER which can select arbitrary one of eight output lines through three binary input lines A, B and C. In this case, the selected output goes to "L" level.

Further, when ENABLE input G1 is set to "L" level or ENABLE input $\overline{G2}$ to "H" level, selection is inhibited regardless of other input signals, and all the outputs go to "H" level.



DIP16(3D16A-P)

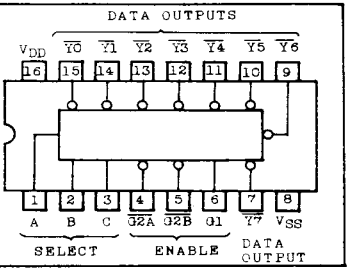


MFP16(F16GC-P)

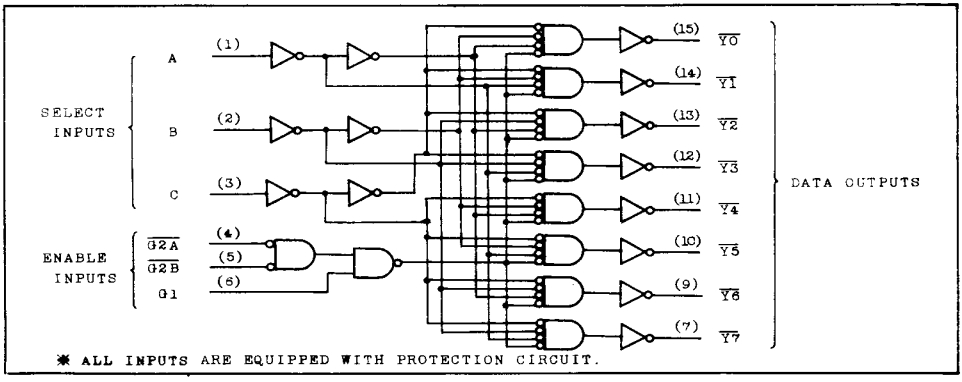
MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{DD}	V_{SS}-0.5 ∿ V_{SS}+10	V
Input Voltage	V_{IN}	V_{SS}-0.5 ∿ V_{DD}+0.5	V
Output Voltage	V_{OUT}	V_{SS}-0.5 ∿ V_{DD}+0.5	V
Input Current	I_{IN}	±10	mA
Power Dissipation	P_D	300(DIP)/180(MFP)	mW
Storage Temperature	T_{stg}	-65 ∿ 150	°C
Lead Temp./Time	T_{sol}	260° • 10 sec	

PIN CONNECTION



LOGIC DIAGRAM



✱ ALL INPUTS ARE EQUIPPED WITH PROTECTION CIRCUIT.

RECOMMENDED OPERATING CONDITIONS (V_{SS}=0.0V)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{DD}	-	2.0	-	8.0	V
Input Voltage	V_{IN}	-	0	-	V_{DD}	V
Operating Temperature	T_{opr}	-	-40	-	85	°C

TRUTH TABLE

INPUTS						OUTPUTS							
ENABLE			SELECT										
G1	$\overline{G2A}$	$\overline{G2B}$	A	B	C	$\overline{Y0}$	$\overline{Y1}$	$\overline{Y2}$	$\overline{Y3}$	$\overline{Y4}$	$\overline{Y5}$	$\overline{Y6}$	$\overline{Y7}$
L	※	※	※	※	※	H	H	H	H	H	H	H	H
※	H	※	※	※	※	H	H	H	H	H	H	H	H
※	※	H	※	※	※	H	H	H	H	H	H	H	H
H	L	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	H	L	L	H	L	H	H	H	H	H	H
H	L	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	H	H	L	H	H	H	L	H	H	H	H
H	L	L	L	L	H	H	H	H	H	L	H	H	H
H	L	L	H	L	H	H	H	H	H	H	L	H	H
H	L	L	L	H	H	H	H	H	H	H	H	L	H
H	L	L	H	H	H	H	H	H	H	H	H	H	L

※ Don't care

ELECTRICAL CHARACTERISTICS (V_{SS}=0.0V)

CHARACTERISTIC		SYMBOL	TEST CONDITION	V_{DD} (V)	-40°C		25°C			85°C		UNIT
					MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
High Level Output Voltage		V_{OH}	$\lvert I_{OUT}\rvert$<1μA $V_{IN}=V_{SS},V_{DD}$	5	4.95	-	4.95	5.0	-	4.95	-	V
Low Level Output Voltage		V_{OL}	$\lvert I_{OUT}\rvert$<1μA $V_{IN}=V_{SS},V_{DD}$	5	-	0.05	-	0.0	0.05	-	0.05	V
High Level Output Current		I_{OH}	V_{OH}=4.6V $V_{IN}=V_{SS},V_{DD}$	5	-0.52	-	-0.44		-	-0.36	-	mA
Low Level Output Current		I_{OL}	V_{OL}=0.4V $V_{IN}=V_{SS},V_{DD}$	5	1.4	-	1.1		-	0.8	-	mA
Input Voltage	"H" Level	V_{IH}	$\lvert I_{OUT}\rvert$<1μA V_{OUT}=0.5V V_{OUT}=4.5V	5	4.0	-	4.0		-	4.0	-	V
	"L" Level	V_{IL}		5	-	1.0	-		1.0	-	1.0	V
Input Current	"H" Level	I_{IH}	V_{IH}=8.0V	8	-	0.3	-	10^{-5}	0.3	-	1.0	μA
	"L" Level	I_{IL}	V_{IL}=0.0V	8	-	-0.3	-	-10^{-5}	-0.3	-	-1.0	μA
Quiescent Supply Current		I_{DD}	*$V_{IN}=V_{SS},V_{DD}$	5	-	12.5	-	10^{-2}	12.5	-	75	μA

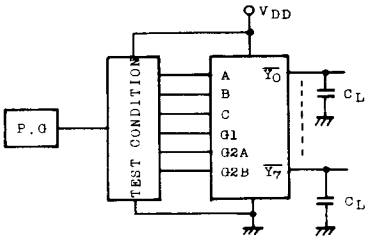
*All valid input combinations.

TC40H138P/F

SWITCHING CHARACTERISTIC (Ta=25°C, V_{SS}=0.0V, C_L=15pF)

CHARACTERISTIC	SYMBOL	TEST CONDITION	V_{DD} (V)	MIN.	TYP.	MAX.	UNIT
Output Rise Time	t_{or}		5	-	17	35	ns
Output Fall Time	t_{of}		5		13	30	
Propagation Delay Time (Low-High)	t_{pLH}	SELECT-$\overline{Y}$	5		35	53	ns
Propagation Delay Time (High-Low)	tpHL		5		40	60	
Propagation Delay Time (Low-High)	tpLH	ENABLE-$\overline{Y}$	5	-	35	53	ns
Propagation Delay Time (High-Low)	tpHL		5	-	40	60	
Input Capacitance	C_{IN}			-	5	-	pF

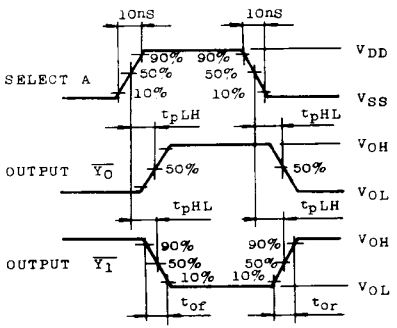
SWITCHING TIME TEST CIRCUIT AND WAVEFORM



TEST CONDITION

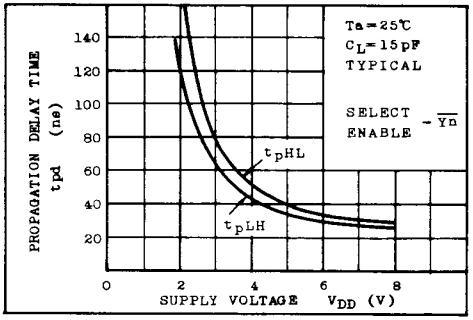
TEST NO.	INPUTS						OUTPUTS	
	ENABLE			SELECT			⎍	⎍
	G1	G2A	G2B	A	B	C		
1	H	H	H	⎍	L	L	$\overline{Y_0}$	$\overline{Y_1}$
2	H	H	H	L	⎍	L	$\overline{Y_0}$	$\overline{Y_2}$
3	H	H	H	⎍	⎍	L	$\overline{Y_0}$	$\overline{Y_3}$
4	H	H	H	L	L	⎍	$\overline{Y_0}$	$\overline{Y_4}$
5	H	H	H	⎍	L	⎍	$\overline{Y_0}$	$\overline{Y_5}$
6	H	H	H	⎍	H	H	$\overline{Y_6}$	$\overline{Y_7}$
7	⎍	H	H	L	L	L	-	$\overline{Y_0}$
8	H	⎍	H	L	L	L	$\overline{Y_0}$	-
9	H	H	⎍	L	L	L	$\overline{Y_0}$	-

TEST No.1

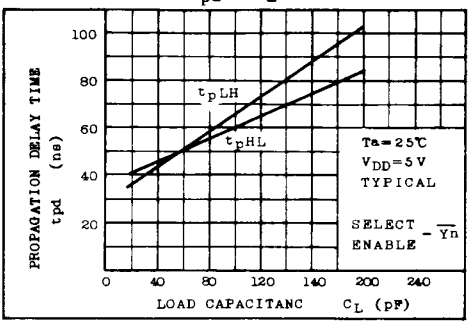


※ ALL OUTPUTS ARE MEASURED ACCORDING TO THE LEFT TABLE.

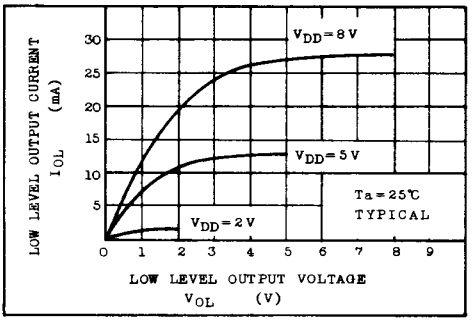
t_{pd} - V_{DD}



t_{pd} - C_L



I_{OL} - V_{OL}



I_{OH} - (V_{DD} - V_{OH})