

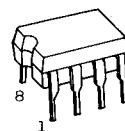
## TC40107BP DUAL 2-INPUT NAND BUFFER/DRIVER

TC40107BP is a dual 2-input NAND gate, of which output is of open-drain structure by use of N-channel MOS FET. Being capable of driving a large current, it can be directly connected to a relay, a lamp, a light-emitting diode (LED), etc. Wired OR can be also made.

( $I_{OL}=74\text{mA(Typ.)}$  at  $V_{DD}=10\text{V}$  and  $V_{OL}=0.5\text{V}$ )

The package is a compact DIP 8-pin unit, which is easily mounted.

Since its output current is large, if the capacitor of an output line exceeds 500pF, a resistor of 25 $\Omega$  or more should be used in series with the capacitor.

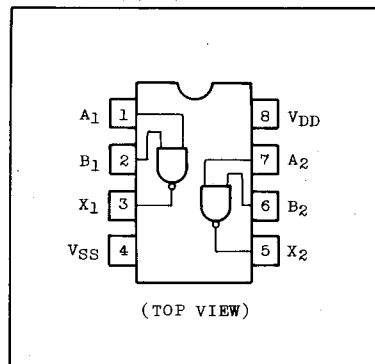


DIP 8 (3D8A-P)

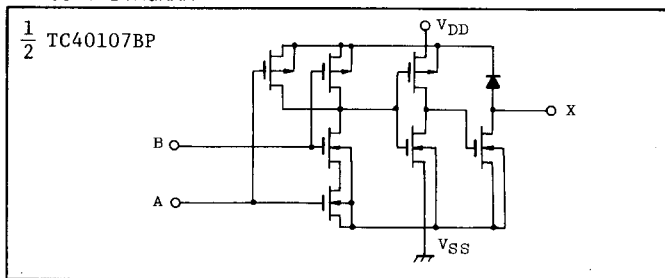
### MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	$V_{DD}$	$V_{SS}-0.5 \sim V_{SS}+20$	V
Input Voltage	$V_{IN}$	$V_{SS}-0.5 \sim V_{DD}+0.5$	V
Output Voltage	$V_{OUT}$	$V_{SS}-0.5 \sim V_{DD}+0.5$	V
DC Input Current	$I_{IN}$	$\pm 10$	mA
Max. GND Current	$I_{SS}$	125	mA
Power Dissipation	$P_D$	300	mW
Operating Temperature Range	$T_A$	$-40 \sim 85$	$^{\circ}\text{C}$
Storage Temperature Range	$T_{stg}$	$-65 \sim 150$	$^{\circ}\text{C}$
Lead Temp./Time	$T_{sol}$	$260^{\circ}\text{C} \cdot 10 \text{ sec}$	

### PIN ASSIGNMENT



### CIRCUIT DIAGRAM



### TRUTH TABLE

INPUT		OUTPUT
A	B	X
L	L	HZ
L	H	HZ
H	L	HZ
H	H	L

HZ : High impedance

### RECOMMENDED OPERATING CONDITIONS ( $V_{SS}=0\text{V}$ )

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
DC Supply Voltage	$V_{DD}$	3	-	18	V
Input Voltage	$V_{IN}$	0	-	$V_{DD}$	V
Load Capacitance	$C_L$	-	-	500	pF

STATIC ELECTRICAL CHARACTERISTICS (V<sub>SS</sub>=0V)

CHARACTERISTIC	SYM-BOL	TEST CONDITION	V <sub>DD</sub> (V)	-40°C		25°C			85°C		UNIT	
				MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.		
Low-Level Output Voltage	V <sub>OL</sub>	I <sub>OUT</sub>   < 1μA V <sub>IH</sub> =V <sub>DD</sub>	5	-	0.05	-	0.00	0.05	-	0.05	V	
			10	-	0.05	-	0.00	0.05	-	0.05		
			15	-	0.05	-	0.00	0.05	-	0.05		
Output Low Current	I <sub>OL</sub>	V <sub>OL</sub> =0.4V V <sub>OL</sub> =1.0V V <sub>OL</sub> =0.5V V <sub>OL</sub> =1.0V V <sub>OL</sub> =0.5V V <sub>IH</sub> =V <sub>DD</sub>	5	20	-	16	32	-	14	-	mA	
			5	42	-	34	68	-	30	-		
			10	46	-	37	74	-	32	-		
			10	85	-	68	136	-	60	-		
			15	63	-	50	100	-	44	-		
			15	63	-	50	100	-	44	-		
Input High Voltage	V <sub>IH</sub> *	V <sub>OUT</sub> =0.5V, 4.5V V <sub>OUT</sub> =1.0V, 9.0V V <sub>OUT</sub> =1.5V, 13.5V  I <sub>OUT</sub>   < 1μA	5	3.5	-	3.5	2.75	-	3.5	-	V	
			10	7.0	-	7.0	5.5	-	7.0	-		
			15	11.0	-	11.0	8.25	-	11.0	-		
			15	11.0	-	11.0	8.25	-	11.0	-		
Input Low Voltage	V <sub>IL</sub> *	V <sub>OUT</sub> =4.5V V <sub>OUT</sub> =9.0V V <sub>OUT</sub> =13.5V  I <sub>OUT</sub>   < 1μA	5	-	1.5	-	2.25	1.5	-	1.5	V	
			10	-	3.0	-	4.5	3.0	-	3.0		
			15	-	4.0	-	6.75	4.0	-	4.0		
			15	-	4.0	-	6.75	4.0	-	4.0		
Input Current	"H" Level	I <sub>IH</sub>	V <sub>IH</sub> =18V	18	-	0.1	-	10 <sup>-5</sup>	0.1	-	1.0	μA
	"L" Level	I <sub>IL</sub>	V <sub>IL</sub> =0V	18	-	-0.1	-	-10 <sup>-5</sup>	-0.1	-	-1.0	
3-State Output Leakage Current	I <sub>DH</sub>	V <sub>OH</sub> =18V	18	-	2	-	10 <sup>-4</sup>	2	-	20	μA	
Quiescent Device Current	I <sub>DD</sub> **	V <sub>IN</sub> =V <sub>DD</sub> , V <sub>SS</sub> Outputs Open	5	-	1	-	0.001	1	-	7.5	μA	
			10	-	2	-	0.001	2	-	15		
			15	-	4	-	0.002	4	-	30		

\* Required external pull-up register R (=20kΩ)

\*\* All valid input combinations.

## DYNAMIC ELECTRICAL CHARACTERISTICS (Ta=25°C, VSS=0V, CL=50pF)

CHARACTERISTIC	SYMBOL	TEST CONDITION	VDD (V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	t <sub>TLH</sub>	R <sub>L</sub> =120Ω	5	-	35	100	ns
			10	-	25	70	
			15	-	20	50	
Output Transition Time (High to Low)	t <sub>THL</sub>	R <sub>L</sub> =120Ω	5	-	35	100	ns
			10	-	10	40	
			15	-	7	20	
Propagation Delay Time (Low to High)	t <sub>pLH</sub>	R <sub>L</sub> =120Ω	5	-	60	200	ns
			10	-	35	120	
			15	-	30	100	
Propagation Delay Time (High to Low)	t <sub>pHL</sub>	R <sub>L</sub> =120Ω	5	-	70	200	ns
			10	-	30	90	
			15	-	20	60	
Input Capacitance	C <sub>IN</sub>			-	5	7.5	pF
Output Capacitance	C <sub>OUT</sub>			-	30	-	pF

## CIRCUIT AND WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

