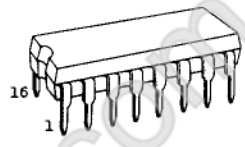
TC5020BP

TC5020BP HEX LOW-TO-HIGH VOLTAGE TRANSLATOR (INVERTING)

TC5020BP contains six circuits of level converters which convert the signals from low power supply voltage logical systems to the logical signals for high power supply voltage C²MOS systems.
This is most suitable for interfacing between TTL, MDTL systems and C²MOS systems, and between two power supply voltage C²MOS systems.
Normally, V_{CC} is connected to low voltage power supply and V_{DD} is connected to high voltage power supply, however this can also operate having V_{CC} and V_{DD} common.
When the input is "H", some amount of I_{CC} flows because of circuit structure.

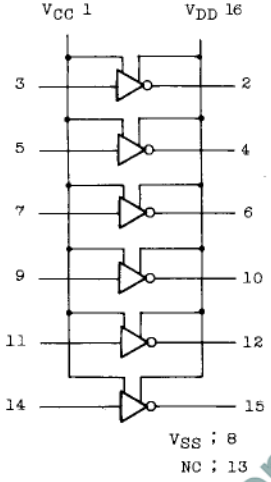


DIP16(3D16A-P)

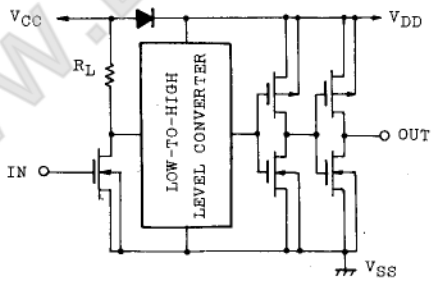
ABSOLUTE MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V_{DD}	V_{SS}-0.5 ~ V_{SS}+20	V
	V_{CC}	V_{SS}-0.5 ~ V_{DD}+0.5	V
Input Voltage	V_{IN}	V_{SS}-0.5 ~ V_{CC}+0.5	V
Output Voltage	V_{OUT}	V_{SS}-0.5 ~ V_{DD}+0.5	V
DC Input Current	I_{IN}	±10	mA
Power Dissipation	P_D	300	mW
Storage Temperature Range	T_{stg}	-65 ~ 150	°C
Lead Temp./Time	T_{sol}	260°C · 10sec	

LOGIC DIAGRAM



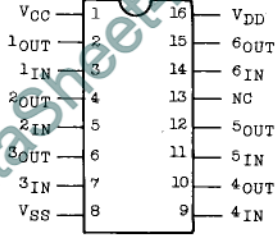
CIRCUIT DIAGRAM



$R_L \fallingdotseq 160\,k\Omega$

※ PARASITIC DIODE

PIN ASSIGNMENT



RECOMMENDED OPERATING CONDITIONS (V_{SS}=0V)

CHARACTERISTIC	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Supply Voltage (1)	V_{CC} V_{DD}	$V_{CC} = V_{DD}$	3	-	18	V
Supply Voltage (2)	V_{CC}	$V_{CC} < V_{DD}$	5	-	V_{DD}	V
	V_{DD}		5	-	18	
Input Voltage	V_{IN}		0	-	V_{CC}	V
Operataing Temp.	Topr		-40	-	85	°C

ELECTRICAL CHARACTERISTICS (V_{SS}=0V, V_{CC}=V_{DD})

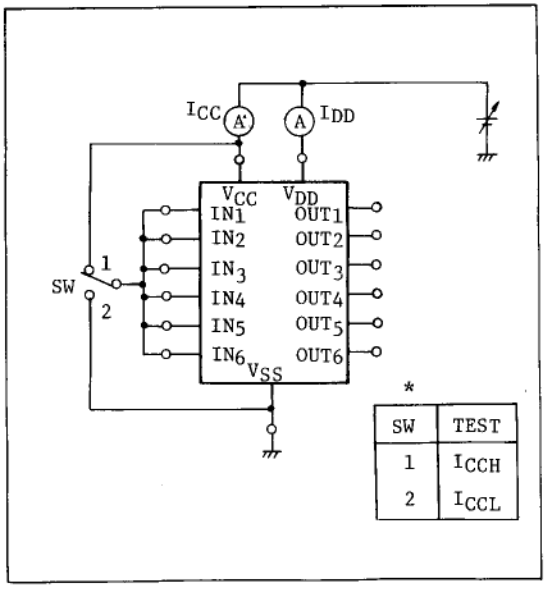
CHARACTERISTIC	SYMBOL	TEST CONDITIONS	V_{DD} (V)	-40°C MIN.	-40°C MAX.	25°C MIN.	25°C TYP.	25°C MAX.	85°C MIN.	85°C MAX.	UNIT
High Level Output Voltage	V_{OH}	$\|I_{OUT}\| < 1\mu A$ $V_{IN} = V_{SS}$	5	4.95	-	4.95	5.00	-	4.95	-	V
			10	9.95	-	9.95	10.00	-	9.95	-	
			15	14.95	-	14.95	15.00	-	14.95	-	
Low Level Output Voltage	V_{OL}	$\|I_{OUT}\| < 1\mu A$ $V_{IN} = V_{DD}$	5	-	0.05	-	0.00	0.05	-	0.05	
			10	-	0.05	-	0.00	0.05	-	0.05	
			15	-	0.05	-	0.00	0.05	-	0.05	
High Level Output Current	I_{OH}	V_{OH} = 4.6V V_{OH} = 9.5V V_{OH} = 13.5V $V_{IN} = V_{SS}$	5	-0.2	-	-0.16		-	-0.12	-	mA
			10	-0.5	-	-0.4		-	-0.3	-	
			15	-1.4	-	-1.2		-	-1.0	-	
Low Level Output Current	I_{OL}	V_{OL} = 0.4V V_{OL} = 0.5V V_{OL} = 1.5V $V_{IN} = V_{DD}$	5	0.52	-	0.44		-	0.36	-	
			10	1.3	-	1.1		-	0.9	-	
			15	3.6	-	3.0		-	2.4	-	
High Level Input Voltage	V_{IH}	V_{OUT} = 0.5V V_{OUT} = 1.0V V_{OUT} = 1.5V $\|I_{OUT}\| < 1\mu A$	5	4.0	-	4.0		-	4.0	-	V
			10	7.0	-	7.0		-	7.0	-	
			15	10.0	-	10.0		-	10.0	-	
Low Level Input Voltage	V_{IL}	V_{OUT} = 4.5V V_{OUT} = 9.0V V_{OUT} = 13.5V $\|I_{OUT}\| < 1\mu A$	5	-	1.0	-		1.0	-	1.0	
			10	-	1.2	-		1.2	-	1.2	
			15	-	1.5	-		1.5	-	1.5	
Input Current H Level	I_{IH}	V_{IH} = 18V	18	-	0.3	-	10^{-5}	0.3	-	1.0	μA
Input Current L Level	I_{IL}	V_{IL} = 0V	18	-	-0.3	-	-10^{-5}	-0.3	-	-1.0	
Quiescent Current Consumption	I_{DD}	$V_{IN} = V_{SS}, V_{DD}$ *	5	-	1.0	-	0.001	1.0	-	7.5	μA
			10	-	2.0	-	0.001	2.0	-	15.0	
			15	-	4.0	-	0.002	4.0	-	30.0	
Quiescent Current Consumption	I_{CCH}	$V_{IN} = V_{DD}$	5	-	0.9	-	0.2	0.48	-	0.9	mA
			10	-	1.6	-	0.4	0.96	-	1.6	
			15	-	2.1	-	0.6	1.5	-	2.1	
Quiescent Current Consumption	I_{CCL}	$V_{IN} = V_{SS}$	5	-	1.0	-	0.001	1.0	-	7.5	μA
			10	-	2.0	-	0.001	2.0	-	15.0	
			15	-	4.0	-	0.002	4.0	-	30.0	

* All valid input combinations

SWITCHING CHARACTERISTICS (Ta=25°C, V_{SS}=0V, C_L=50pF)

CHARACTERISTIC	SYMBOL	CONDITIONS	V_{CC}(V)	V_{DD}(V)	MIN.	TYP.	MAX.	UNIT
Output Rise Time	t_{TLH}		-	5	-	130	400	ns
			-	10	-	65	200	
			-	15	-	50	160	
Output Fall Time	t_{THL}		-	5	-	100	200	
			-	10	-	50	100	
			-	15	-	40	80	
(LOW-HIGH) Propagation Delay Time	t_{pLH}		5	5	-	780	1600	ns
			10	10	-	330	800	
			15	15	-	230	600	
			5	10	-	750	1600	
			5	15	-	850	1800	
			10	15	-	330	800	
(HIGH-LOW) Propagation Delay Time	t_{pHL}		5	5	-	220	600	
			10	10	-	75	300	
			15	15	-	50	200	
			5	10	-	130	300	
			5	15	-	150	400	
			10	15	-	60	200	
Input Capacity	C_{IN}				-	5	7.5	pF

I_{DD}, I_{CC} TEST CIRCUIT



*

SW	TEST
1	I_{CCH}
2	I_{CCL}

SWITCHING TIME TEST CIRCUIT AND WAVEFORM