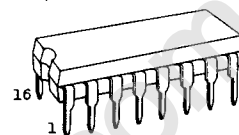


TC5020BP HEX LOW-TO-HIGH VOLTAGE TRANSLATOR (INVERTING)

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.

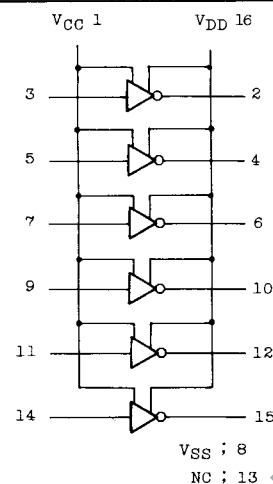


DIP 16 (3D16A-P)

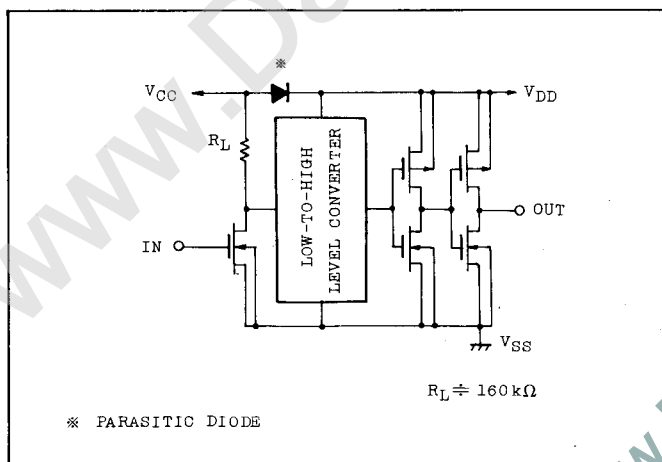
ABSOLUTE MAXIMUM RATINGS

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	

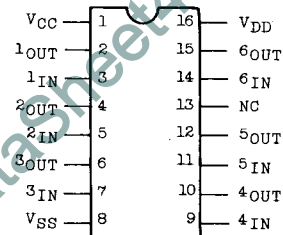
LOGIC DIAGRAM



CIRCUIT DIAGRAM



PIN ASSIGNMENT



RECOMMENDED OPERATING CONDITIONS (VSS=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
Operating Temp.	T_{opr}		-40	-	85	°C

ELECTRICAL CHARACTERISTICS (VSS=0V, VCC=VDD)

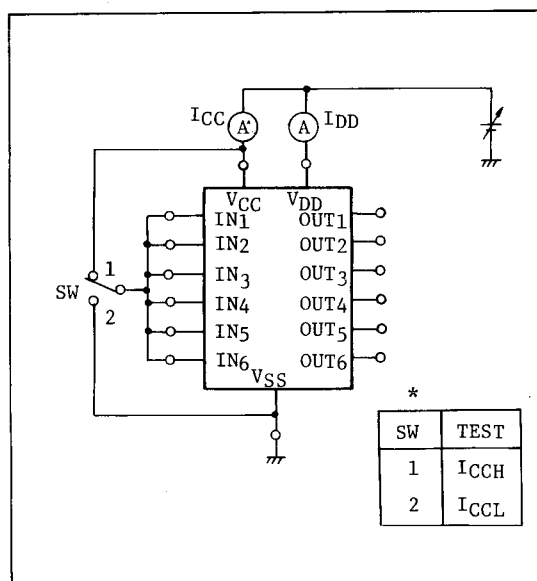
CHARACTERISTIC		SYMBOL	TEST CONDITIONS	VDD (V)	-40°C		25°C			85°C		UNIT
					MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
High Level Output Voltage		VOH	IOUT < 1μA VIN = VSS	5	4.95	-	4.95	5.00	-	4.95	-	V
				10	9.95	-	9.95	10.00	-	9.95	-	
				15	14.95	-	14.95	15.00	-	14.95	-	
Low Level Output Voltage		VOL	IOUT < 1μA VIN = VDD	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		IOH	VOH = 4.6V	5	-0.2	-	-0.16		-	-0.12	-	mA
			VOH = 9.5V	10	-0.5	-	-0.4		-	-0.3	-	
			VOH = 13.5V	15	-1.4	-	-1.2		-	-1.0	-	
			VIN = VSS									
Low Level Output Current		IOL	VOL = 0.4V	5	0.52	-	0.44		-	0.36	-	
			VOL = 0.5V	10	1.3	-	1.1		-	0.9	-	
			VOL = 1.5V	15	3.6	-	3.0		-	2.4	-	
			VIN = VDD									
High Level Input Voltage		VIH	VOUT = 0.5V	5	4.0	-	4.0		-	4.0	-	V
			VOUT = 1.0V	10	7.0	-	7.0		-	7.0	-	
			VOUT = 1.5V	15	10.0	-	10.0		-	10.0	-	
			IOUT < 1μA									
Low Level Input Voltage		VIL	VOUT = 4.5V	5	-	1.0	-		1.0	-	1.0	
			VOUT = 9.0V	10	-	1.2	-		1.2	-	1.2	
			VOUT = 13.5V	15	-	1.5	-		1.5	-	1.5	
			IOUT < 1μA									
Input Current	H Level	IIH	VIH = 18V	18	-	0.3	-	10 ⁻⁵	0.3	-	1.0	μA
	L Level	IIL	VIL = 0V	18	-	-0.3	-	-10 ⁻⁵	-0.3	-	-1.0	
Quiescent Current Consumption		IDD	VIN = VSS, VDD *	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		ICCH	VIN = VDD	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		ICCL	VIN = VSS	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, VSS=0V, CL=50pF)

CHARACTERISTIC	SYMBOL	CONDITIONS	VCC(V)	VDD(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	CIN				-	5	7.5	pF

IDD, ICC TEST CIRCUIT



SWITCHING TIME TEST CIRCUIT AND WAVEFORM

