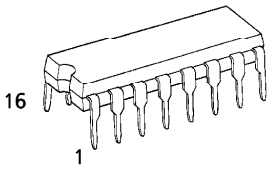
TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC4049BP, TC4049BF, TC4049BFN
TC4050BP, TC4050BF, TC4050BFN

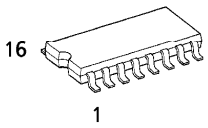
TC4049B HEX BUFFER / CONVERTER (Inverting Type)
TC4050B HEX BUFFER / CONVERTER (Non – Inverting Type)

(Note) The JEDEC SOP (FN) is not available in Japan.

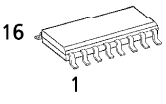
TC4049B, TC4050B contain six circuits of buffers. TC4049B is inverter type and TC4050B is non-inverter type.
Since one TTL or DTL can be directly driven having large output current, these are useful for interfacing from CMOS to TTL or DTL. As voltage up to $V_{SS}+18$ volts can be applied to the input regardless of V_{DD}, these can be also used as the level converter IC's which converts CMOS logical circuits of 15 volts or 10 volts system to CMOS / TTL logical circuits of 5 volts system.
Ideal switching characteristic has been obtained by the circuit diagram of three stage inverters for TC4049B and two stage inverters for TC4050B.



P (DIP16-P-300-2.54A)
Weight : 1.00g (Typ.)



F (SOP16-P-300-1.27)
Weight : 0.18g (Typ.)

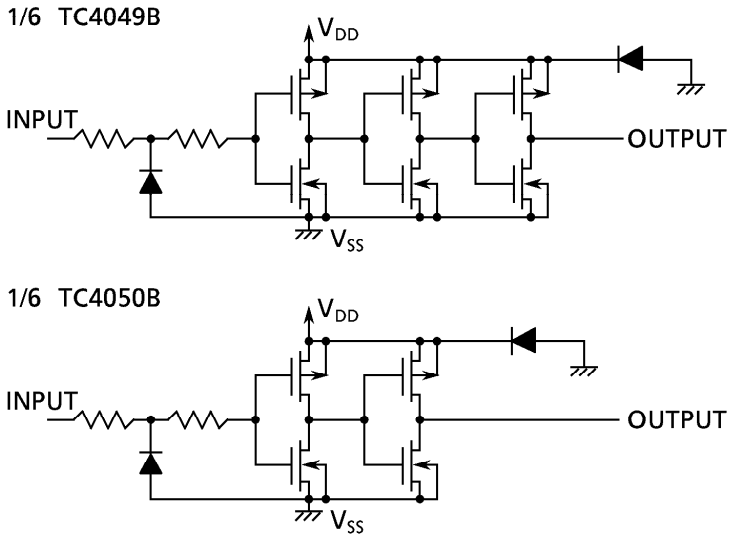


FN (SOL16-P-150-1.27)
Weight : 0.13g (Typ.)

MAXIMUM RATINGS

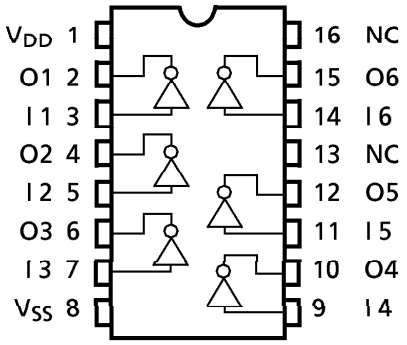
CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V_{DD}	$V_{SS}-0.5\sim V_{SS}+20$	V
Input Voltage	V_{IN}	$V_{SS}-0.5\sim V_{SS}+20$	V
Output Voltage	V_{OUT}	$V_{SS}-0.5\sim V_{DD}+0.5$	V
DC Input Current	I_{IN}	± 10	mA
Power Dissipation	P_D	300 (DIP) / 180 (SOIC)	mW
Operating Temperature Range	T_{opr}	−40~85	°C
Storage Temperature Range	T_{stg}	−65~150	°C

CIRCUIT DIAGRAM

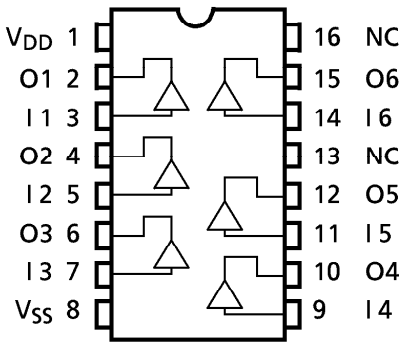


PIN ASSIGNMENT

TC4049B



TC4050B



(TOP VIEW)

961001EBA2

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
DC Supply Voltage	V_{DD}		3	—	18	V
Input Voltage	V_{IN}		0	—	18	V

STATIC ELECTRICAL CHARACTERISTICS (V_{SS} = 0V)

CHARACTERISTIC	SYMBOL	TEST CONDITION	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}	$\|I_{OUT}\| < 1\mu A$ $V_{IN} = V_{SS}, V_{DD}$	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}	$\|I_{OUT}\| < 1\mu A$ $V_{IN} = V_{SS}, V_{DD}$	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	
Output High Current	I_{OH}	V_{OH} = 4.6V	5	−0.73	—	−0.65	−1.2	—	−0.58	—	mA
		V_{OH} = 2.5V	5	−2.40	—	−2.10	−3.9	—	−1.90	—	
		V_{OH} = 9.5V	10	−1.80	—	−1.65	−2.5	—	−1.35	—	
		V_{OH} = 13.5V	15	−4.80	—	−4.30	−8.0	—	−3.50	—	
		$V_{IN} = V_{SS}, V_{DD}$									
Output Low Current	I_{OL}	V_{OL} = 0.4V	5	3.8	—	3.2	6.4	—	2.9	—	
		V_{OL} = 0.5V	10	9.6	—	8.0	16.0	—	6.6	—	
		V_{OL} = 1.5V	15	28.0	—	24.0	48.0	—	20.0	—	
		$V_{IN} = V_{SS}, V_{DD}$									
Input High Voltage	V_{IH}	V_{OUT} = 0.5V, 4.5V	5	3.5	—	3.5	2.75	—	3.5	—	V
		V_{OUT} = 1.0V, 9.0V	10	7.0	—	7.0	5.50	—	7.0	—	
		V_{OUT} = 1.5V, 13.5V	15	11.0	—	11.0	8.25	—	11.0	—	
		$\|I_{OUT}\| < 1\mu A$									
Input Low Voltage	V_{IL}	V_{OUT} = 0.5V, 4.5V	5	—	1.5	—	2.25	1.5	—	1.5	
		V_{OUT} = 1.0V, 9.0V	10	—	3.0	—	4.50	3.0	—	3.0	
		V_{OUT} = 1.5V, 13.5V	15	—	4.0	—	6.75	4.0	—	4.0	
		$\|I_{OUT}\| < 1\mu A$									
Input Current "H" Level	I_{IH}	V_{IH} = 18V	18	—	0.1	—	10^{-5}	0.1	—	1.0	μA
Input Current "L" Level	I_{IL}	V_{IL} = 0V	18	—	−0.1	—	-10^{-5}	−0.1	—	−1.0	
Quiescent Supply Current	I_{DD}	$V_{IN} = V_{SS}, V_{DD}$ *	5	—	1	—	0.002	1	—	30	
			10	—	2	—	0.004	2	—	60	
			15	—	4	—	0.008	4	—	120	

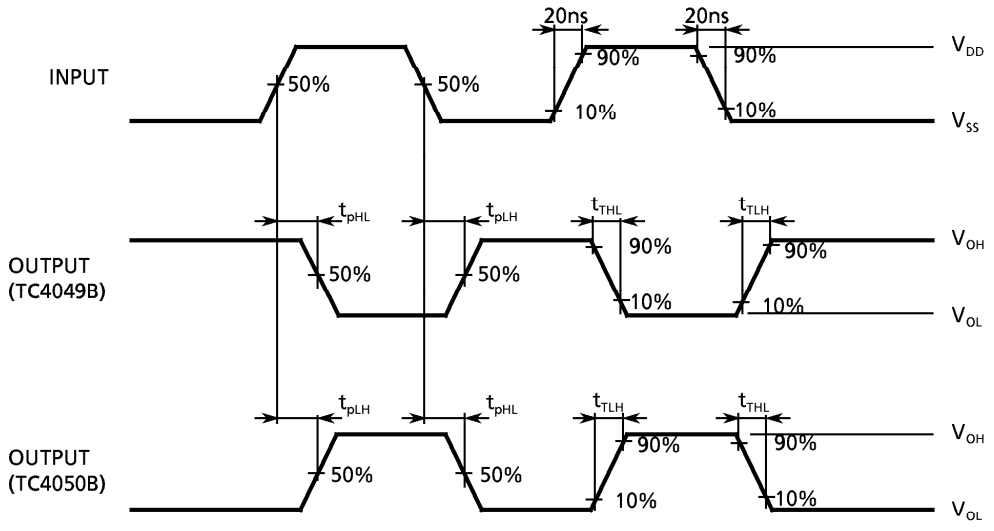
* All valid input combinations.

DYNAMIC ELECTRICAL CHARACTERISTICS (Ta = 25°C, Vss = 0V, C_L = 50pF)

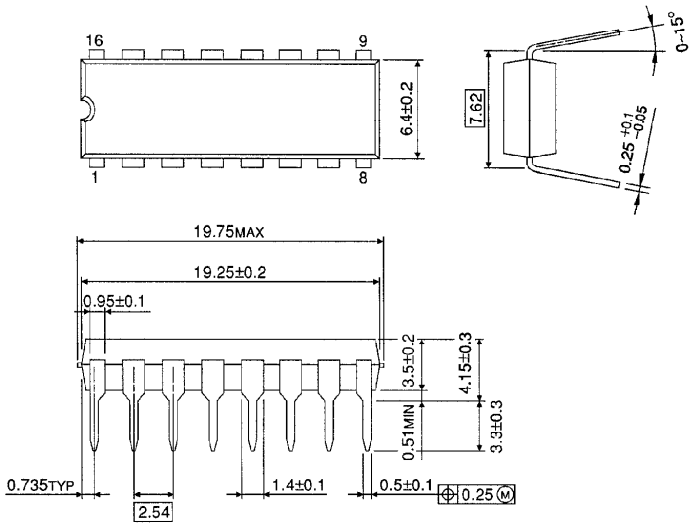
	CHARACTERISTIC	SYMBOL	TEST CONDITION V_{DD}(V)	MIN.	TYP.	MAX.	UNIT
	Output Transition Time (Low to High)	t_{TLH}	5	—	60	160	ns
			10	—	30	80	
			15	—	25	60	
	Output Transition Time (High to Low)	t_{THL}	5	—	120	60	
			10	—	10	40	
			15	—	8	30	
TC4049B	Propagation Delay Time (Low to High)	t_{pLH}	5	—	60	120	ns
			10	—	35	65	
			15	—	30	50	
	Propagation Delay Time (High to Low)	t_{pHL}	5	—	40	60	
			10	—	20	30	
			15	—	15	20	
TC4050B	Propagation Delay Time (Low to High)	t_{pLH}	5	—	50	130	ns
			10	—	30	70	
			15	—	25	55	
	Propagation Delay Time (High to Low)	t_{pHL}	5	—	30	70	
			10	—	17	35	
			15	—	14	25	
	Input Capacitance	C_{IN}		—	5	7.5	pF

WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

WAVEFORM

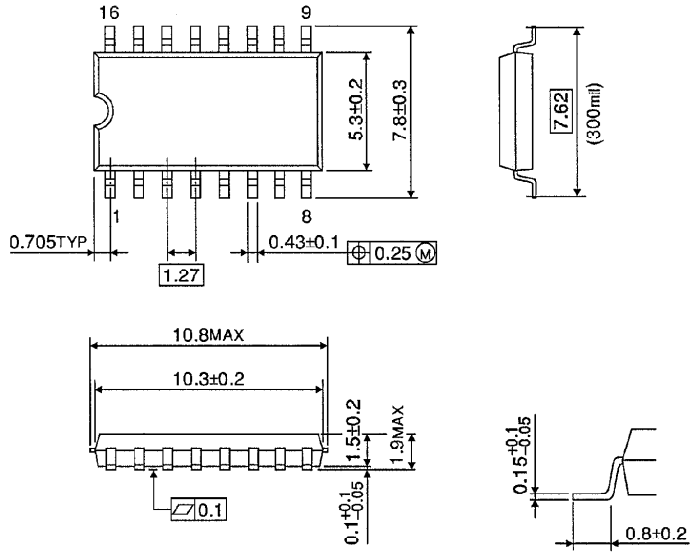


DIP 16PIN OUTLINE DRAWING (DIP16-P-300-2.54A) Unit in mm



Weight : 1.00g (Typ.)

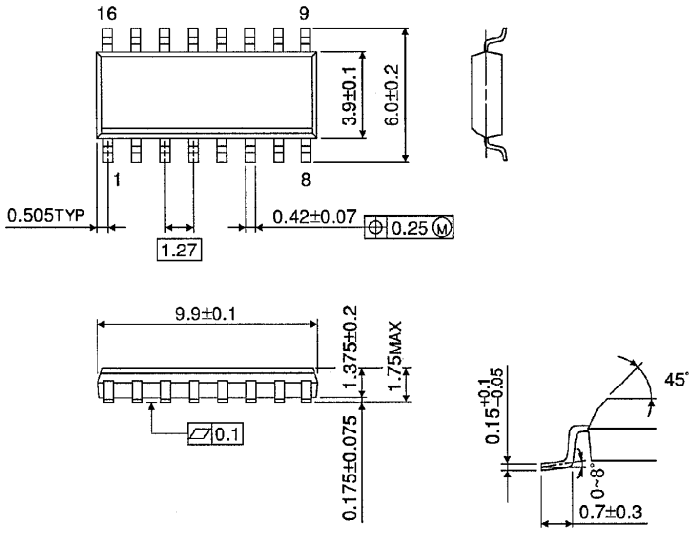
SOP 16PIN (200mil BODY) OUTLINE DRAWING (SOP16-P-300-1.27) Unit in mm



Weight : 0.18g (Typ.)

SOP 16PIN (150mil BODY) OUTLINE DRAWING (SOL16-P-150 -1.27) Unit in mm

(Note) This package is not available in Japan.



Weight : 0.13g (Typ.)