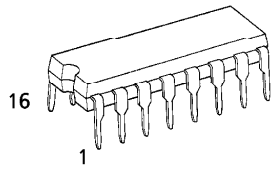
TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC4044BP, TC4044BF, TC4044BFN

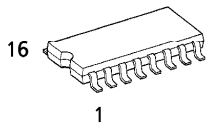
TC4044B QUAD 3-STATE R/S LATCH (Quad NAND R/S Latch)

TC4044B the latches composed by four independent R/S flip-flop circuits. TC4044B fabricated with NAND gates is suitable for data processing of four bits configuration. four output lines can have high impedance regardless of the contents of latches by means of common ENABLE input to make connection to the bus lines easy.

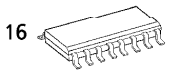
(Note) The JEDEC SOP (FN) is not available in Japan.



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



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

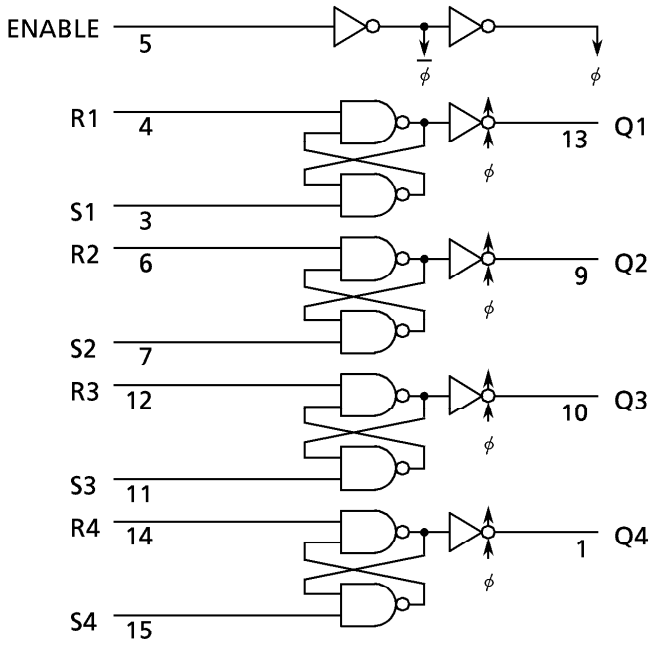


FN (SOL16-P-150-1.27)
Weight : 0.13g (Typ.)

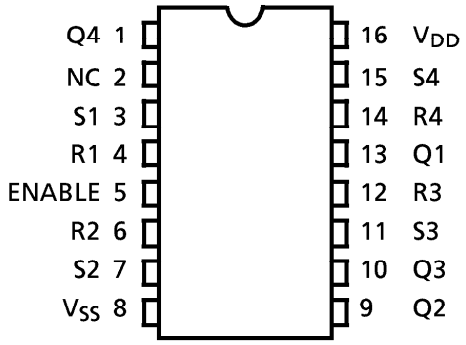
MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V_{DD}	$V_{SS}-0.5 \sim V_{SS}+20$	V
Input Voltage	V_{IN}	$V_{SS}-0.5 \sim V_{DD}+0.5$	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

LOGIC DIAGRAM



PIN ASSIGNMENT



(TOP VIEW)

TRUTH TABLE

R	S	E	Q
*	*	L	HZ
L	L	H	L
L	H	H	L
H	L	H	H
H	H	H	No Change

* : Don't Care
HZ : High Impedance

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	—	V_{DD}	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	−0.61	—	−0.51	−1.0	—	−0.42	—	mA
		V_{OH} = 2.5V	5	−2.50	—	−2.10	−4.0	—	−1.70	—	
		V_{OH} = 9.5V	10	−1.50	—	−1.30	−2.2	—	−1.10	—	
		V_{OH} = 13.5V	15	−4.00	—	−3.40	−9.0	—	−2.80	—	
		$V_{IN} = V_{SS}, V_{DD}$									
Output Low Current	I_{OL}	V_{OL} = 0.4V	5	0.61	—	0.51	1.2	—	0.42	—	
		V_{OL} = 0.5V	10	1.50	—	1.3	3.2	—	1.10	—	
		V_{OL} = 1.5V	15	4.00	—	3.4	12.0	—	2.80	—	
		$V_{IN} = V_{SS}, V_{DD}$									
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	
3-State Output Leakage Current "H" Level	I_{DH}	V_{OH} = 18V	18	—	0.4	—	10^{-4}	0.4	—	12	
3-State Output Leakage Current "L" Level	I_{DL}	V_{OL} = 0V	18	—	−0.4	—	-10^{-4}	−0.4	—	−12	
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	

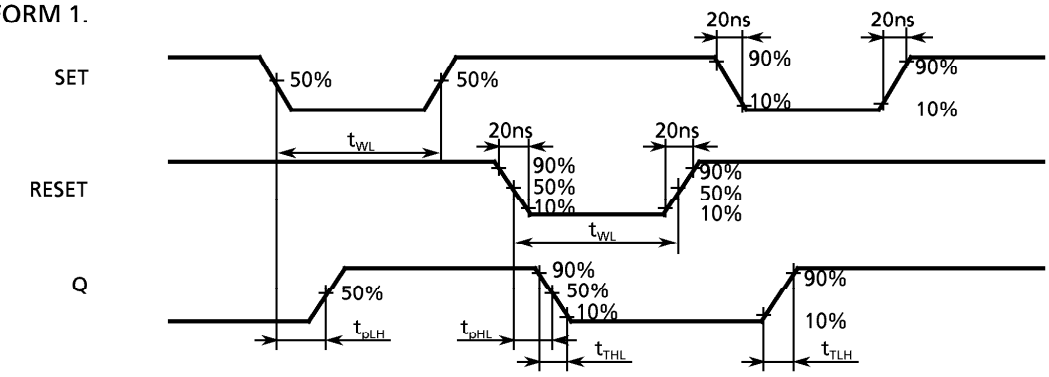
* All valid input combinations.

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

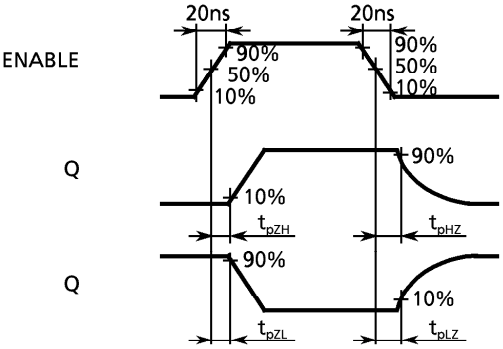
CHARACTERISTIC	SYMBOL	TEST CONDITION	V_{DD}(V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	t_{TLH}		5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output Transition Time (High to Low)	t_{THL}		5	—	70	200	
			10	—	35	100	
			15	—	30	80	
Propagation Delay Time (SET, RESET - Q)	t_{pLH} t_{pHL}		5	—	90	300	
			10	—	45	140	
			15	—	35	100	
3-State Propagation Delay Time (ENABLE - Q)	t_{pHZ} t_{pZH}	R_L = 1kΩ	5	—	55	180	
			10	—	35	100	
			15	—	30	70	
3-State Propagation Delay Time (ENABLE - Q)	t_{pZH} t_{pZL}	R_L = 1kΩ	5	—	55	180	
			10	—	30	100	
			15	—	25	70	
Min. Pulse Width (SET, RESET)	t_{WL}		5	—	25	160	
			10	—	20	80	
			15	—	20	40	
Input Capacitance	C_{IN}			—	5	7.5	pF

WAVEFORMS FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

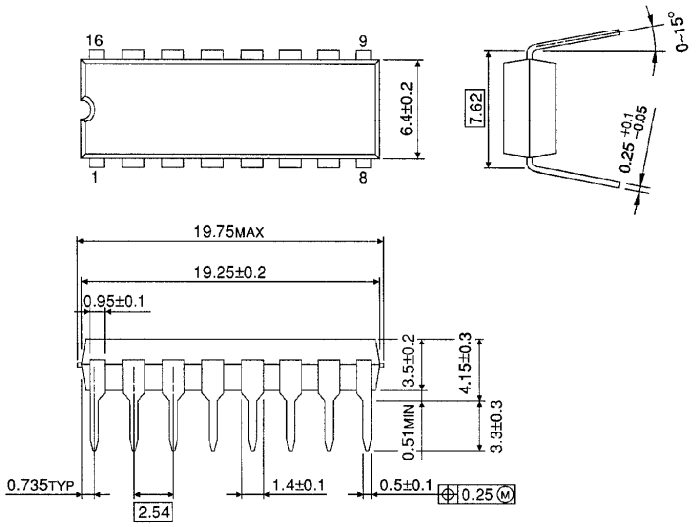
WAVEFORM 1.



WAVEFORM 2.

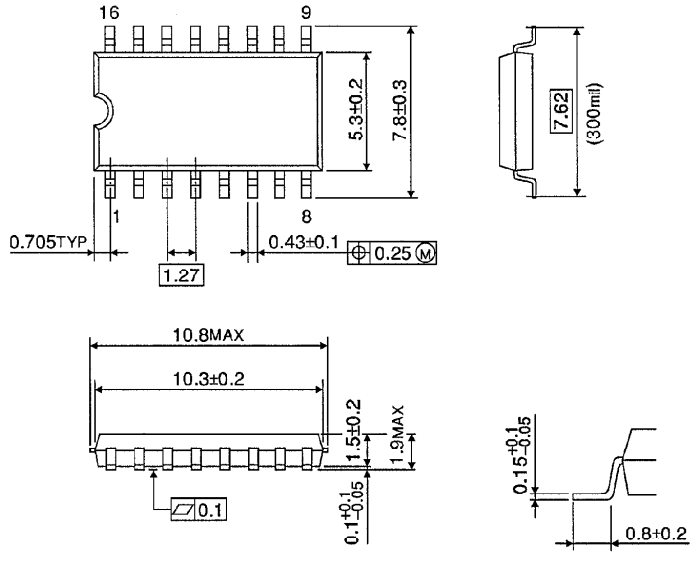


DIP 16PIN OUTLINE DRAWING (DIP16-P-300-2.54A) Unit in mm



Weight : 1.00g (Typ.)

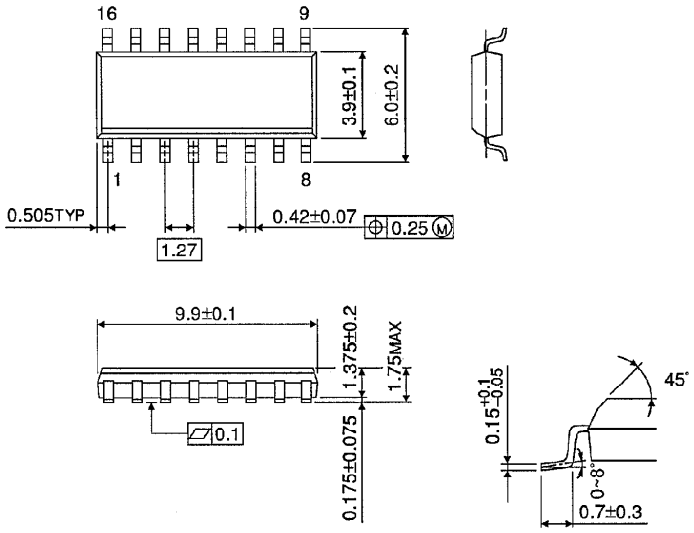
SOP 16PIN (200mil BODY) OUTLINE DRAWING (SOP16-P-300-1.27) Unit in mm



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.)