

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

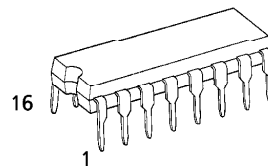
TC4094BP, TC4094BF, TC4094BFN

TC4094B 8 - STAGE SHIFT - AND - STORE BUSREGISTER

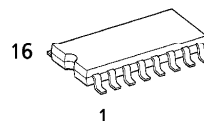
TC4094B is a SHIFT and STORE REGISTER that consists of an 8-bit shift register and an 8-bit latch. The read data in the shift register can be taken in the latch through the asynchronous STROBE input; therefore, the data transfer mode can hold output. And, since the parallel outputs is of 3-state construction, it can be directly connected to the 8-bit busline.

This register can be applied to Serial - to - parallel conversion, data receivers, etc.

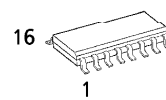
(Note) The JEDEC SOP (FN) is not available in Japan.



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



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

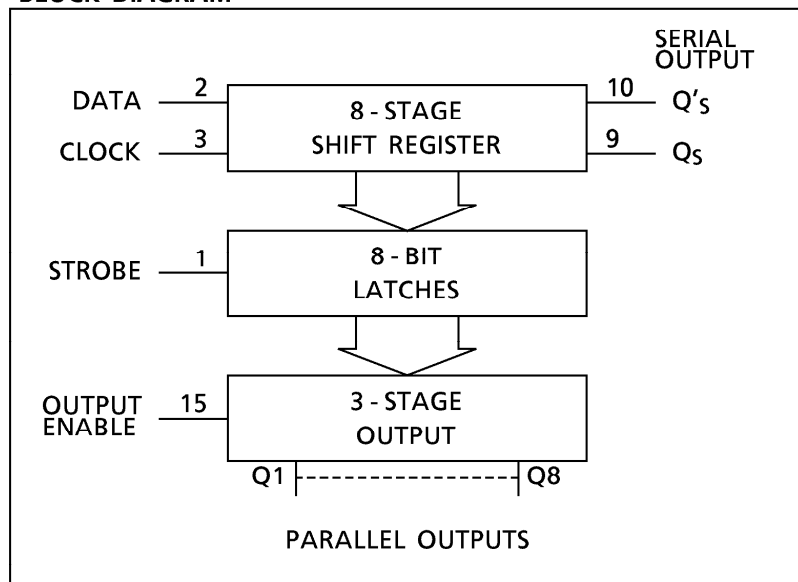


FN (SO16-P-150-1.27)
Weight : 0.13g (Typ.)

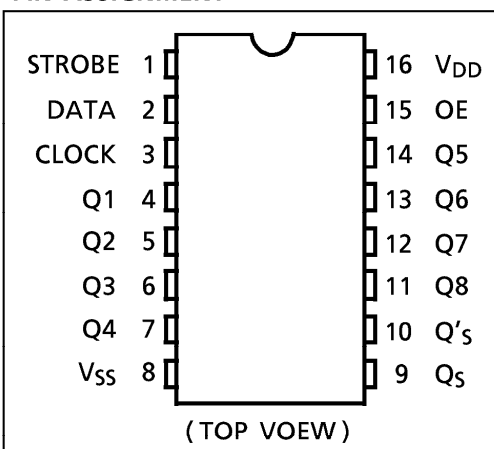
MAXIMUM RATINGS

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}	$-40 \sim 85$	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	$-65 \sim 150$	$^{\circ}\text{C}$

BLOCK DIAGRAM



PIN ASSIGNMENT



TRUTH TABLE

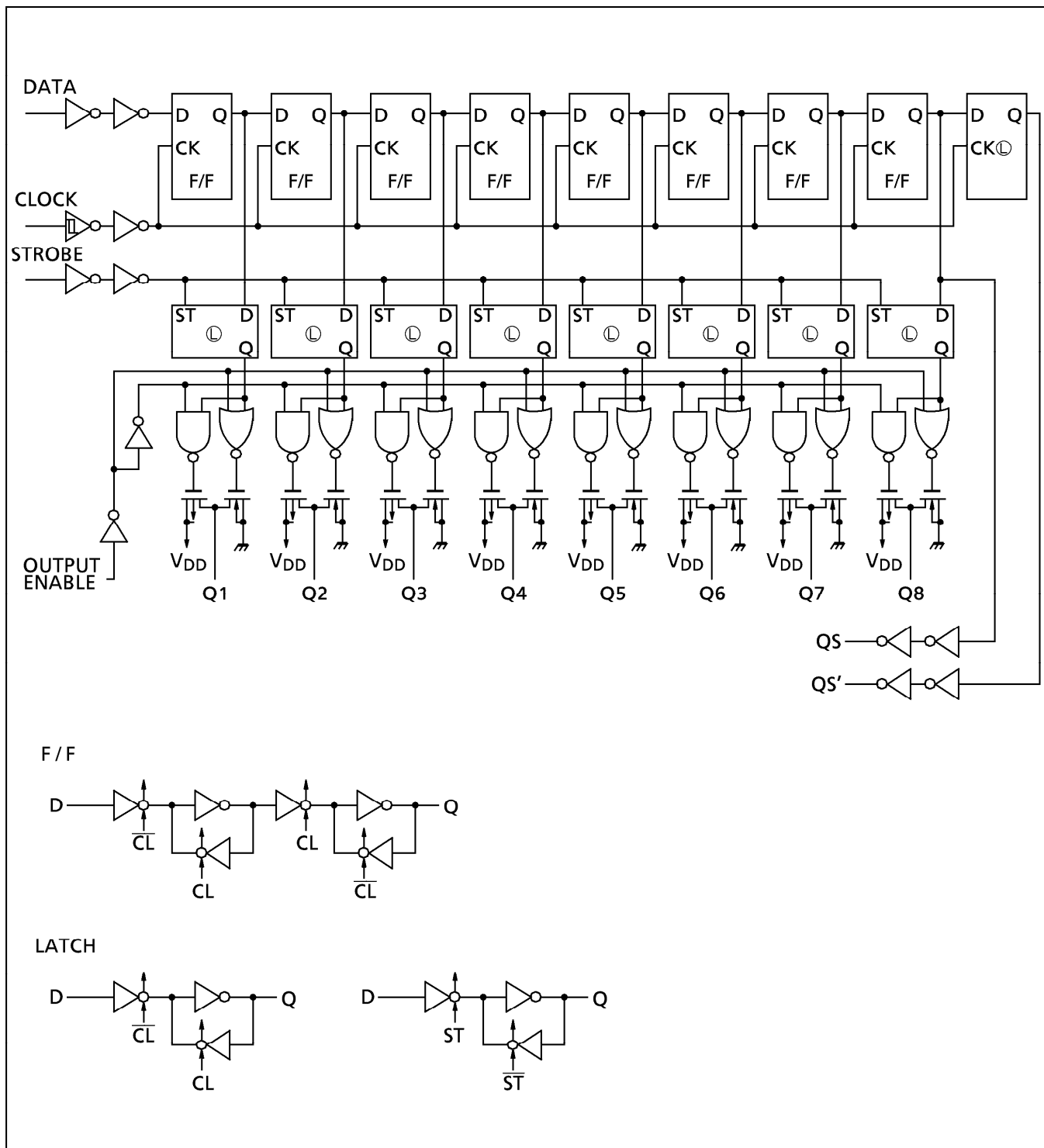
CL	OE	ST	D	PO		SO	
				Q1	Qn - 1	Qs	Q's
	H	H	L	L	Qn - 1	Q7	NC
	H	H	H	H	Qn - 1	Q7	NC
	H	L	X	NC	NC	Q7	NC
	L	X	X	HZ	HZ	Q7	NC
	H	X	X	NC	NC	NC	Qs
	L	X	X	HZ	HZ	NC	Qs

CL = Clock
OE = Output Enable
ST = Strobe
D = Data
PO = Parallel Outputs
SO = Serial Output
X = Don't Care
NC = No Change
HZ = High Impedance

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● TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

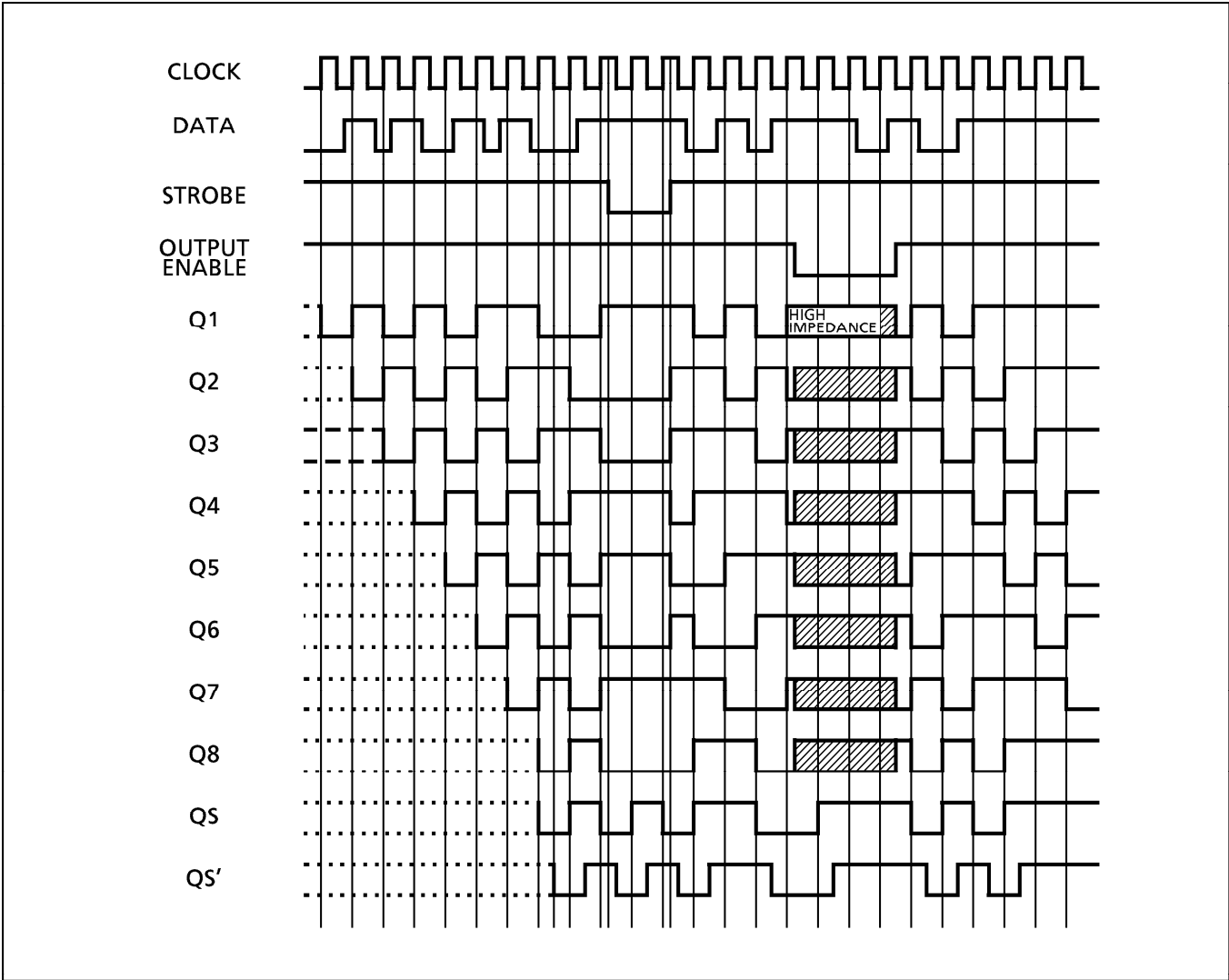
LOGIC DIAGRAM



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 ● The information contained herein is subject to change without notice.

TIMING CHART



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

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

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

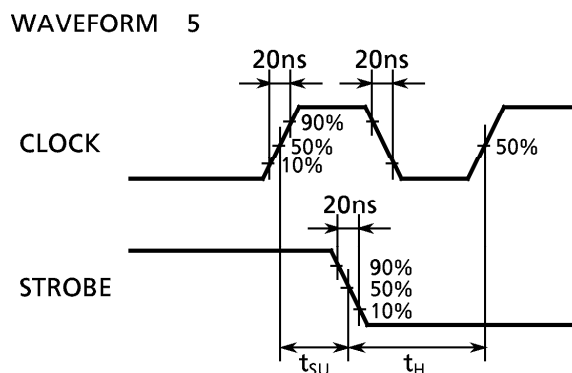
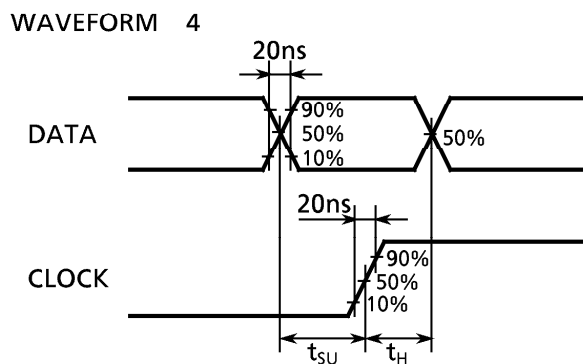
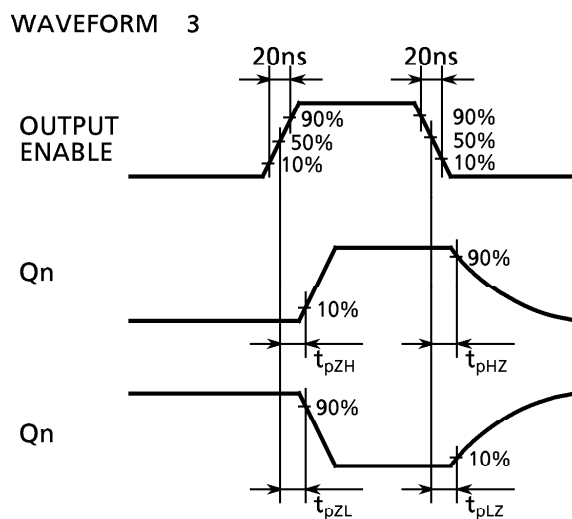
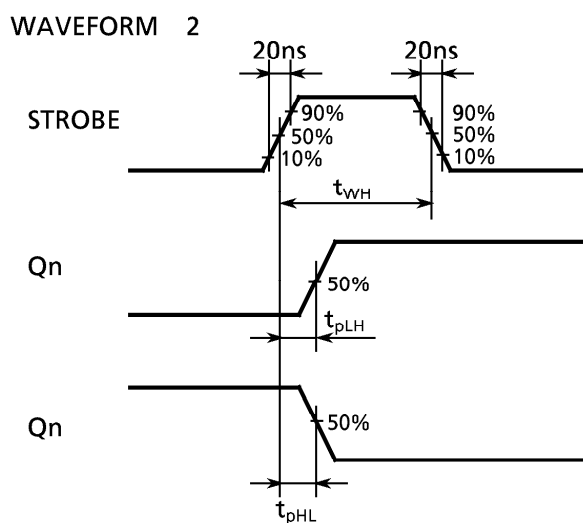
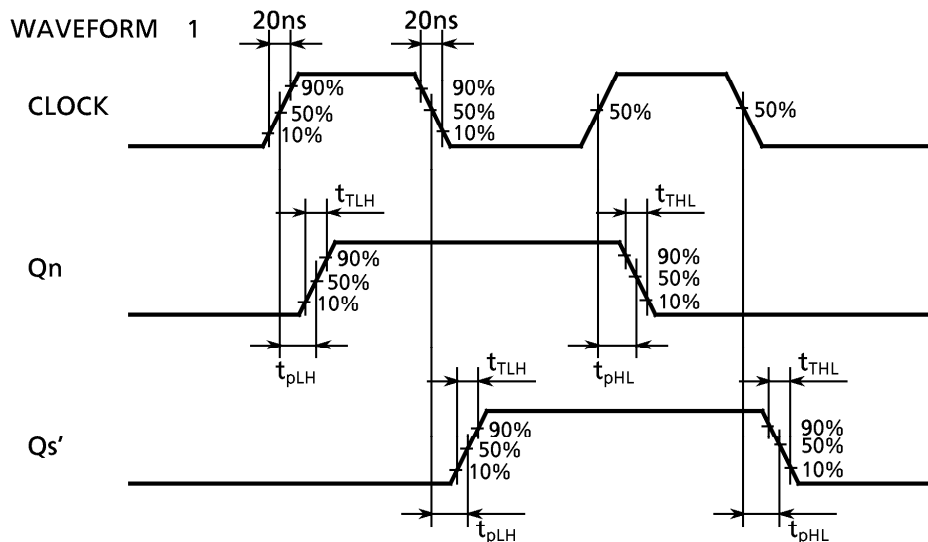
CHARACTERISTIC	SYM-BOL	TEST CONDITION	V_{DD} (V)	- 40°C		25°C			85°C		UNIT
				MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
High-Level Output Voltage	V_{OH}	$ I_{OUT} < 1\mu A$ $V_{IN} = V_{SS}, V_{DD}$	5	4.95	—	4.95	5.00	—	4.95	—	V
			10	9.95	—	9.95	10.00	—	9.95	—	
			15	14.95	—	14.95	15.00	—	14.95	—	
Low-Level Output Voltage	V_{OL}	$ I_{OUT} < 1\mu A$ $V_{IN} = V_{SS}, V_{DD}$	5	—	0.05	—	0.00	0.05	—	0.05	V
			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	—	mA
		$V_{OL} = 0.5V$	10	1.50	—	1.30	3.2	—	1.10	—	
		$V_{OL} = 1.5V$	15	4.00	—	3.40	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
		$V_{OUT} = 1.0V, 9.0V$	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	—	μA
	"L" Level	I_{IL}	$V_{IL} = 0V$	18	—	- 0.1	—	$- 10^{-5}$	- 0.1	—	
3-State Output Leakage Current	"H" Level	I_{DH}	$V_{OUT} = 18V$	18	—	0.4	—	10^{-4}	0.4	—	μA
	"L" Level	I_{DL}	$V_{OUT} = 0V$	18	—	- 0.4	—	$- 10^{-4}$	- 0.4	—	
Quiescent Supply Current	I_{DD}	$V_{IN} = V_{SS}, V_{DD} *$	5	—	5	—	0.005	5	—	150	μA
			10	—	10	—	0.010	10	—	300	
			15	—	20	—	0.015	20	—	600	

* All valid input combinations.

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

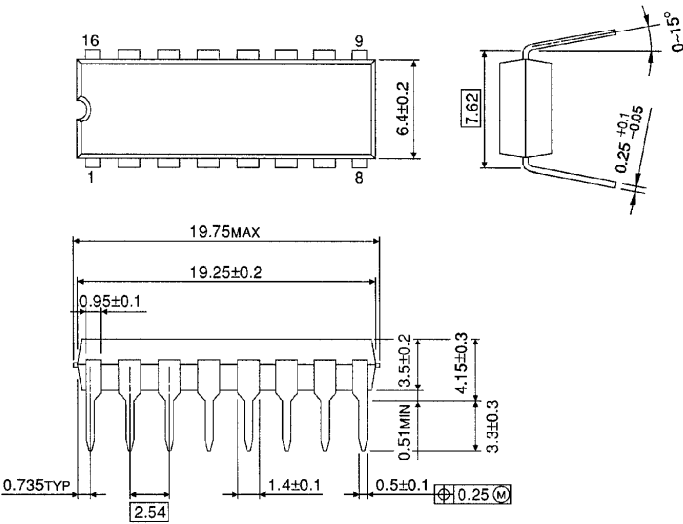
CHARACTERISTIC	SYMBOL	TEST CONDITION	V _{DD} (V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	t _{TLH}		5 10 15	— — —	70 35 30	200 100 80	ns
Output Transition Time (High to Low)	t _{THL}		5 10 15	— — —	70 35 30	200 100 80	
Propagation Delay Time (CLOCK - Q _S)	t _{pLH} t _{pHL}		5 10 15	— — —	150 75 55	600 250 190	
Propagation Delay Time (CLOCK - Q _S ')	t _{pLH} t _{pHL}		5 10 15	— — —	155 75 55	460 220 150	
Propagation Delay Time (CLOCK - Q _n)	t _{pLH} t _{pHL}		5 10 15	— — —	190 90 65	840 390 270	
Propagation Delay Time (STROBE - Q _n)	t _{pLH} t _{pHL}		5 10 15	— — —	150 70 50	580 290 200	
Three State Disable Time (OUTPUT ENABLE - Q _n)	t _{pHZ} t _{pZH}	R _L = 1kΩ	5 10 15	— — —	60 35 30	200 100 80	
Three State Disable Time (OUTPUT ENABLE - Q _n)	t _{pLZ} t _{pZL}	R _L = 1kΩ	5 10 15	— — —	70 40 35	200 100 80	
Min. Clock Pulse Width	t _W		5 10 15	— — —	45 20 15	200 100 80	
Min. Pulse Width (STROBE)	t _{WH}		5 10 15	— — —	40 20 15	200 80 70	
Max. Clock Frequency	f _{CL}		5 10 15	1.25 2.50 3.00	6 12 16	— — —	MHz
Min. Set-up Time (DATA - CLOCK)	t _{SU}		5 10 15	— — —	0 0 0	125 55 35	ns
Min. Hold Time (DATA - CLOCK)	t _H		5 10 15	— — —	10 10 5	40 20 15	
Min. Set-up Time (CLOCK - STROBE)	t _{SU}		5 10 15	— — —	90 40 30	200 100 80	
Min. Hold Time (CLOCK - STROBE)	t _H		5 10 15	— — —	— — —	0 0 0	
Max. Clock Input Rise Time Max. Clock Input Fall Time	t _{rCL} t _{fCL}		5 10 15	No Limit			μs
Input Capacitance	C _{IN}			—	5	7.5	pF

WAVEFORMS FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS



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

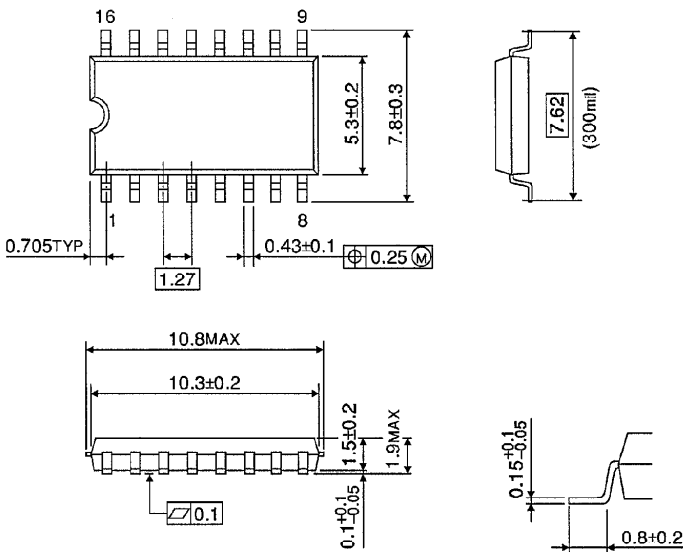
Unit in mm



Weight : 1.00g (Typ.)

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

Unit in mm

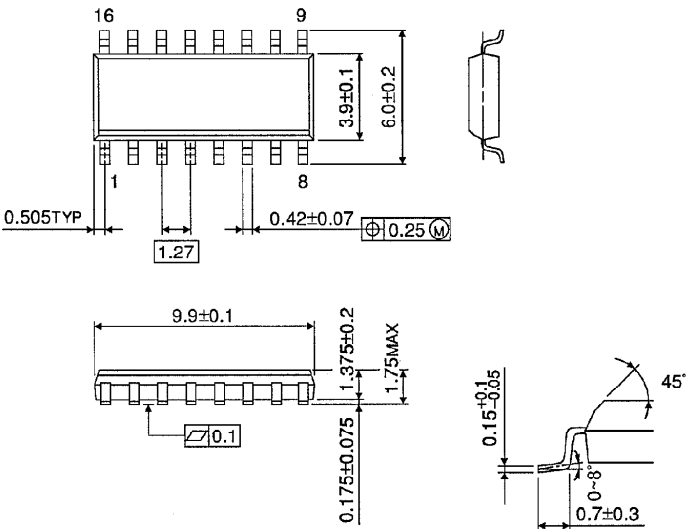


Weight : 0.18g (Typ.)

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.)