

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC4094BP, TC4094BF, TC4094BFN

TC4094B 8 - STAGE SHIFT - AND - STORE BUSREGISTE

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.

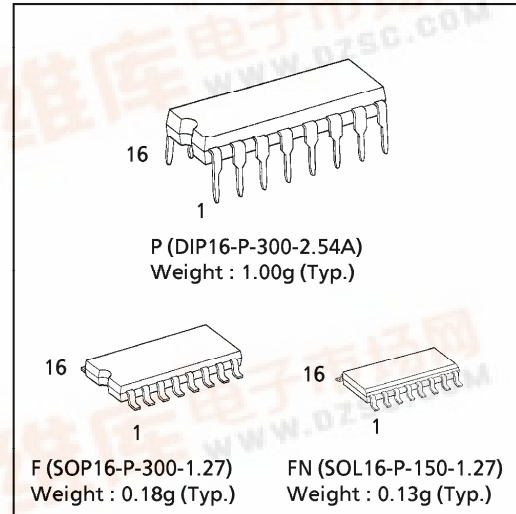
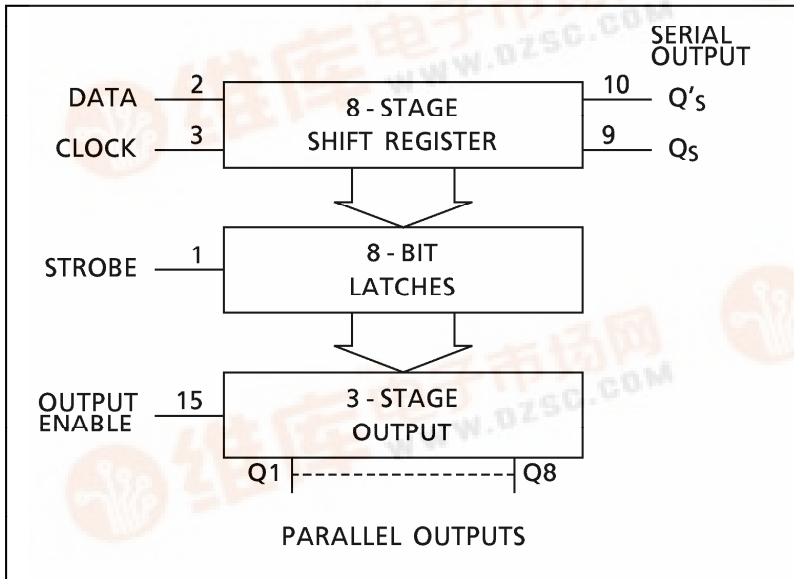
This register can be applied to Serial - to - parallel conversion, data receivers, etc.

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

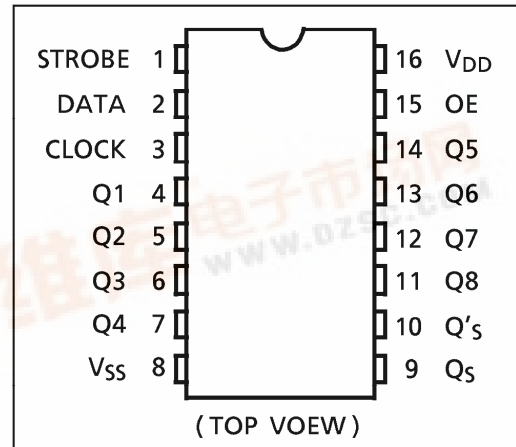
MAXIMUM RATINGS

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

BLOCK DIAGRAM



PIN ASSIGNMENT



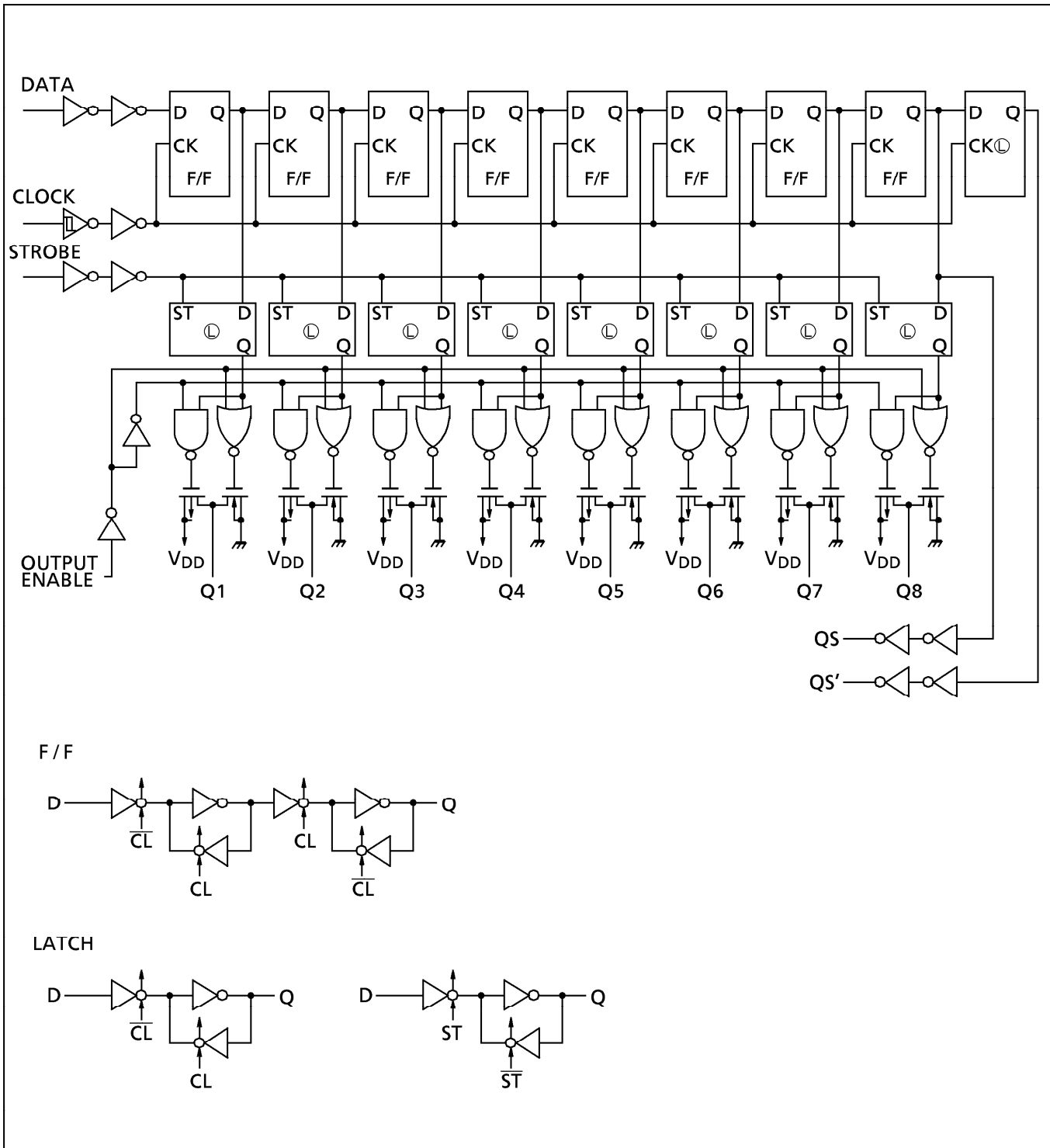
TRUTH TABLE

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

CL = Clock
OE = Output Eneble
ST = Strobe
D = Data
PO = Parallel Outputs
SO = Serial Output

X = Don't Care
NC = No Change
HZ = High Impedance

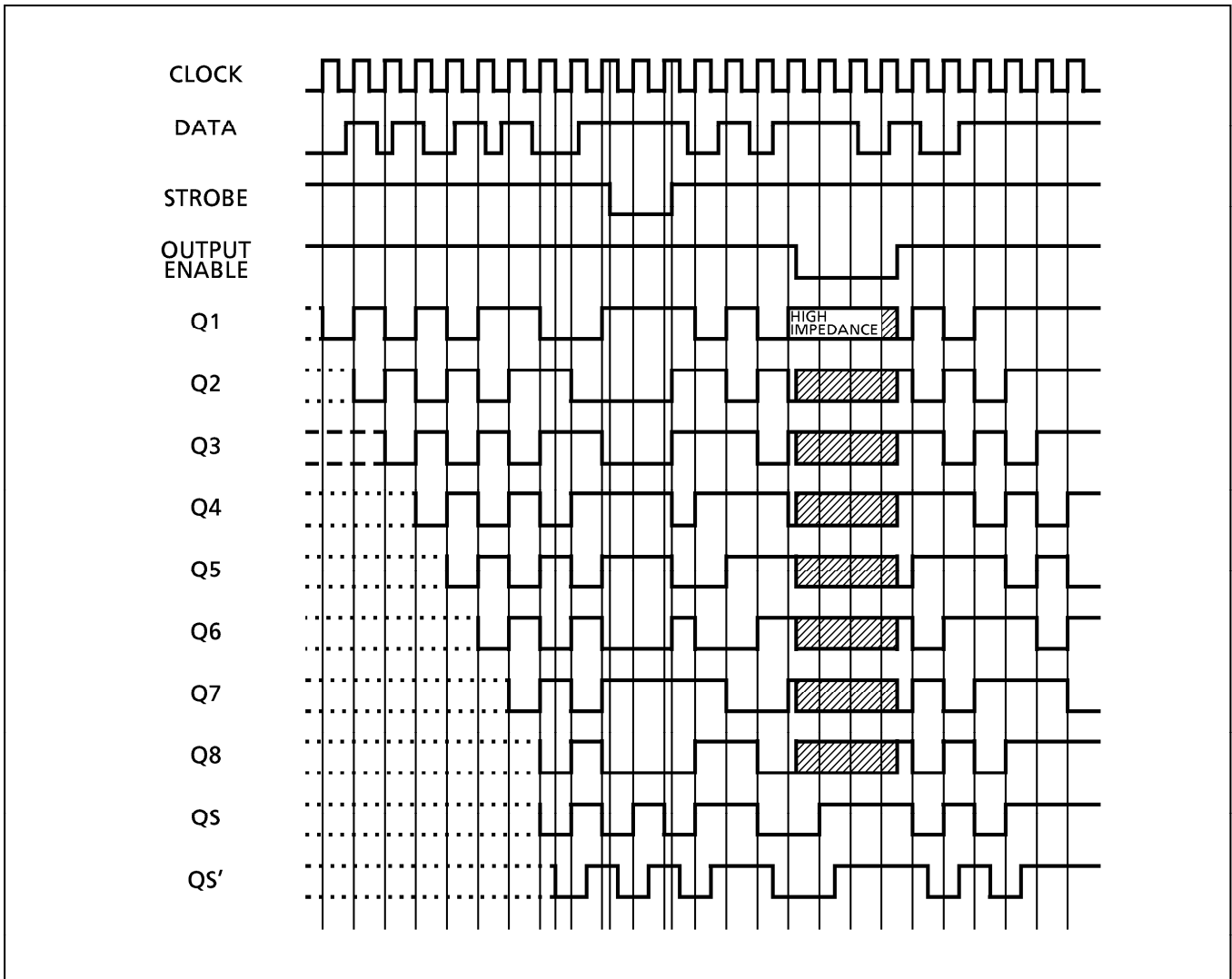
LOGIC DIAGRAM



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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)

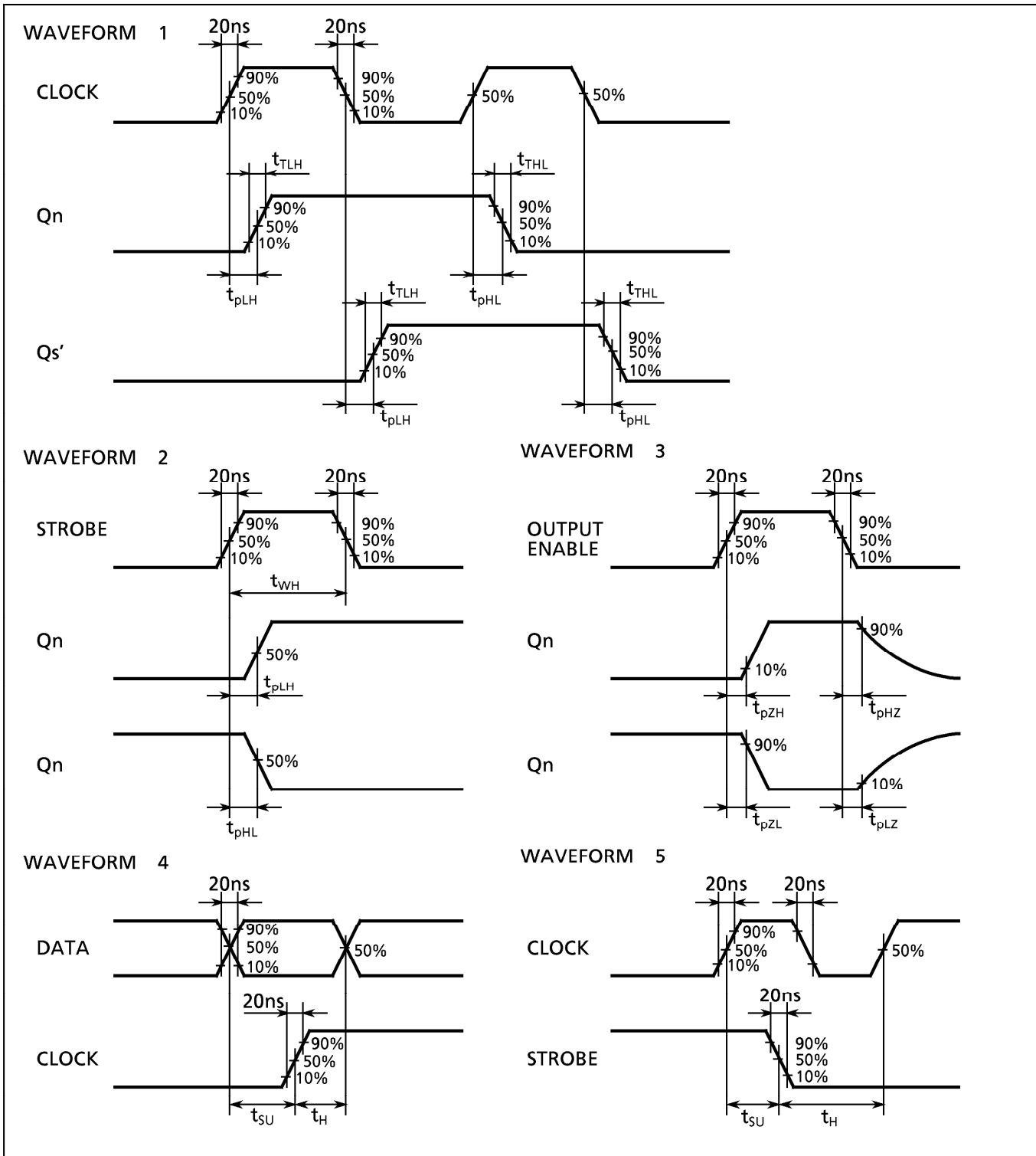
CHARACTERISTIC	SYM-BOL	TEST CONDITION	V _{DD} (V)	- 40°C		25°C			85°C		UNIT
				MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
High-Level Output Voltage	V _{OH}	I _{OUT} < 1μA V _{IN} = V _{SS} , V _{DD}	5	4.95	—	4.95	5.00	—	4.95	—	V
			10	9.95	—	9.95	10.00	—	9.95	—	
			15	14.95	—	14.95	15.00	—	14.95	—	
Low-Level Output Voltage	V _{OL}	I _{OUT} < 1μA 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 V _{OH} = 2.5V V _{OH} = 9.5V V _{OH} = 13.5V V _{IN} = V _{SS} , V _{DD}	5	-0.61	—	-0.51	-1.0	—	-0.42	—	mA
			5	-2.50	—	-2.10	-4.0	—	-1.70	—	
			10	-1.50	—	-1.30	-2.2	—	-1.10	—	
			15	-4.00	—	-3.40	-9.0	—	-2.80	—	
Output Low Current	I _{OL}	V _{OL} = 0.4V V _{OL} = 0.5V V _{OL} = 1.5V V _{IN} = V _{SS} , V _{DD}	5	0.61	—	0.51	1.2	—	0.42	—	mA
			10	1.50	—	1.30	3.2	—	1.10	—	
			15	4.00	—	3.40	12.0	—	2.80	—	
			5	—	1.5	—	2.25	1.5	—	1.5	
Input High Voltage	V _{IH}	V _{OUT} = 0.5V, 4.5V V _{OUT} = 1.0V, 9.0V V _{OUT} = 1.5V, 13.5V I _{OUT} < 1μA	5	3.5	—	3.5	2.75	—	3.5	—	V
			10	7.0	—	7.0	5.50	—	7.0	—	
			15	11.0	—	11.0	8.25	—	11.0	—	
			5	—	3.0	—	4.50	3.0	—	3.0	
Input Low Voltage	V _{IL}	V _{OUT} = 0.5V, 4.5V V _{OUT} = 1.0V, 9.0V V _{OUT} = 1.5V, 13.5V I _{OUT} < 1μA	10	—	4.0	—	6.75	4.0	—	4.0	
			15	—	4.0	—	6.75	4.0	—	4.0	
			18	—	0.1	—	10 ⁻⁵	0.1	—	1.0	
			18	—	-0.1	—	-10 ⁻⁵	-0.1	—	-1.0	
3-State Output Leakage Current	"H" Level	I _{DH}	V _{OUT} = 18V	18	—	0.4	—	10 ⁻⁴	0.4	—	12
	"L" Level	I _{DL}	V _{OUT} = 0V	18	—	-0.4	—	-10 ⁻⁴	-0.4	—	-12
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)

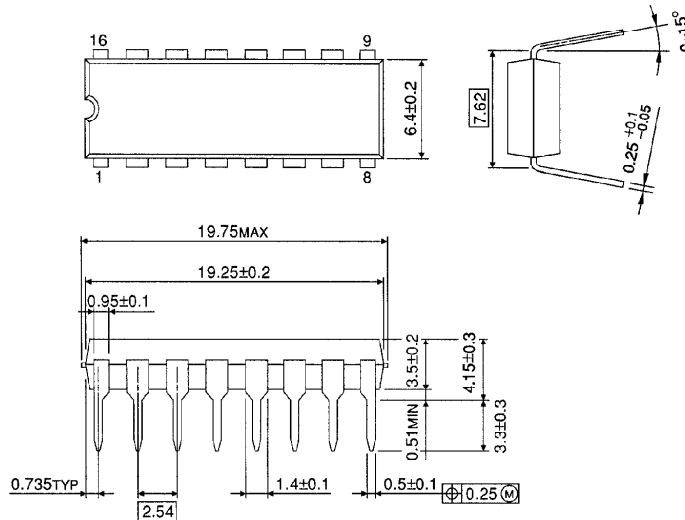
CHARACTERISTIC	SYMBOL	TEST CONDITION	V _{DD} (V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	t _{TLH}		5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output Transition Time (High to Low)	t _{THL}		5	—	70	200	
			10	—	35	100	
			15	—	30	80	
Propagation Delay Time (CLOCK - Q _S)	t _{pLH} t _{pHL}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

WAVEFORMS FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS



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

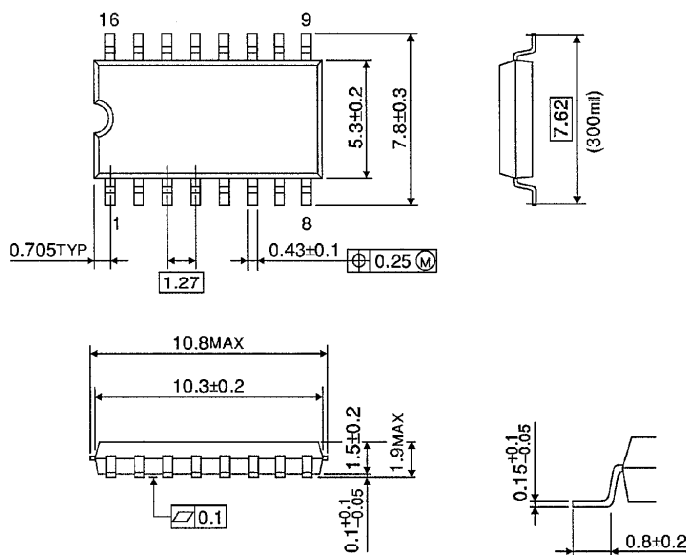
Unit in mm



Weight : 1.00g (Typ.)

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

Unit in mm

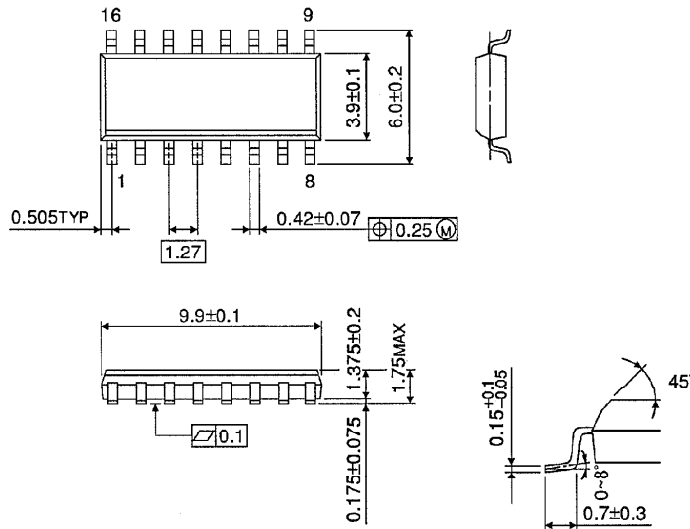


Weight : 0.18g (Typ.)

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.)