

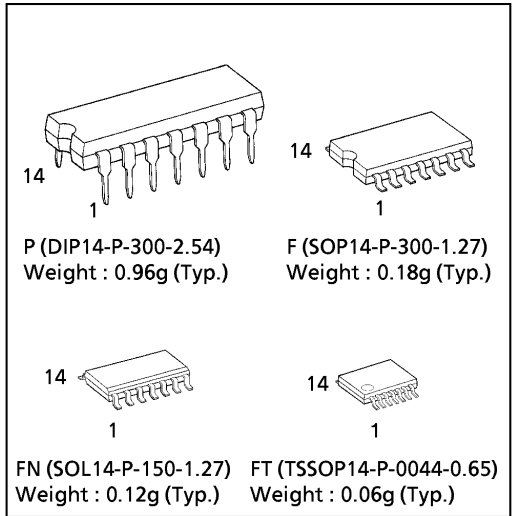
**TC4069UBP, TC4069UBF, TC4069UBFN, TC4069UBFT**

**TC4069UB HEX INVERTER**

TC4069UB contains six circuits of inverters. Since the internal circuit is composed of a single stage inverter, this is suitable for the applications of CR oscillator circuits, crystal oscillator circuits and linear amplifiers in addition to its application as inverters.

Because of one stage gate configuration, the propagation time has been reduced.

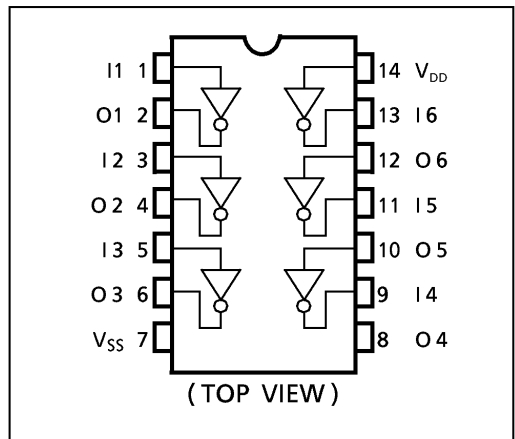
(Note) The JEDEC SOP (FN) is not available in Japan.



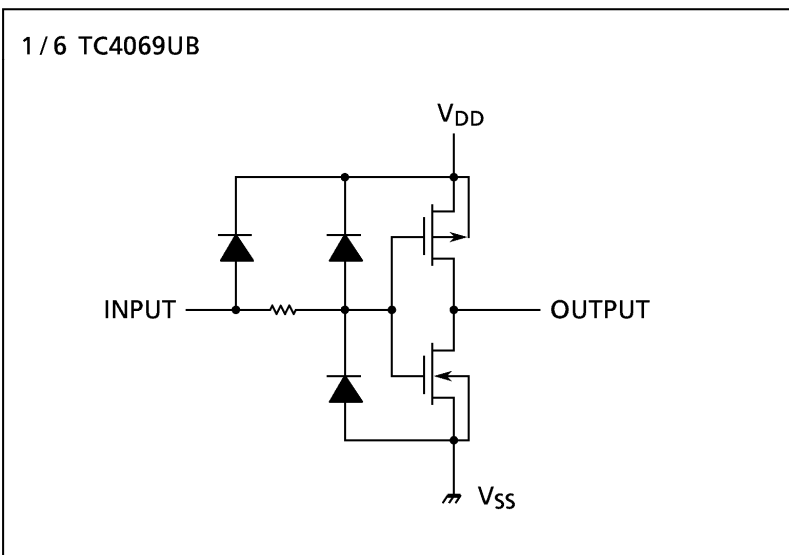
**MAXIMUM RATINGS**

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	$I_{IN}$	$\pm 10$	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

**PIN ASSIGNMENT**



**CIRCUIT DIAGRAM**



980910EBA2

● 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.

**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	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	$I_{OH}$	$V_{OH} = 4.6V$ $V_{OH} = 2.5V$ $V_{OH} = 9.5V$ $V_{OH} = 13.5V$ $V_{IN} = V_{SS}$	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	$I_{OL}$	$V_{OL} = 0.4V$ $V_{OL} = 0.5V$ $V_{OL} = 1.5V$ $V_{IN} = V_{DD}$	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	—	
			—	—	—	—	—	—	—	—	
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}  < 1\mu A$	5	4.0	—	4.0	—	—	4.0	—	mA
			10	8.0	—	8.0	—	—	8.0	—	
			15	12.0	—	12.0	—	—	12.0	—	
			—	—	—	—	—	—	—	—	
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}  < 1\mu A$	5	—	1.0	—	—	1.0	—	1.0	mA
			10	—	2.0	—	—	2.0	—	2.0	
			15	—	3.0	—	—	3.0	—	3.0	
			—	—	—	—	—	—	—	—	
Input Current	"H" Level	$I_{IH}$	$V_{IL} = 18V$	18	—	0.1	—	$10^{-5}$	0.1	—	$\mu A$
	"L" Level	$I_{IL}$	$V_{IL} = 0V$	18	—	-0.1	—	$-10^{-5}$	-0.1	—	
Quiescent Supply Current	$I_{DD}$	$V_{IN} = V_{SS}, V_{DD} *$	5	—	0.25	—	0.001	0.25	—	7.5	mA
			10	—	0.50	—	0.001	0.50	—	15.0	
			15	—	1.00	—	0.002	1.00	—	30.0	

\* All valid input combinations.

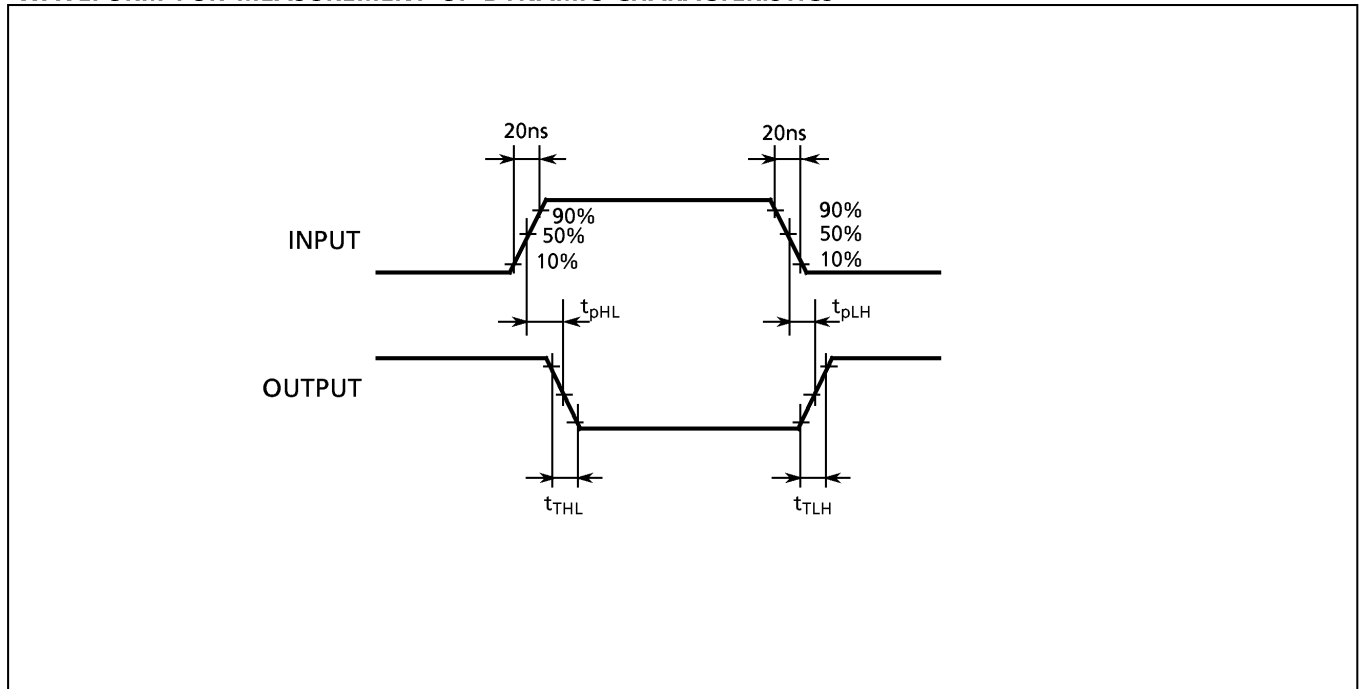
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- The information contained herein is subject to change without notice.

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

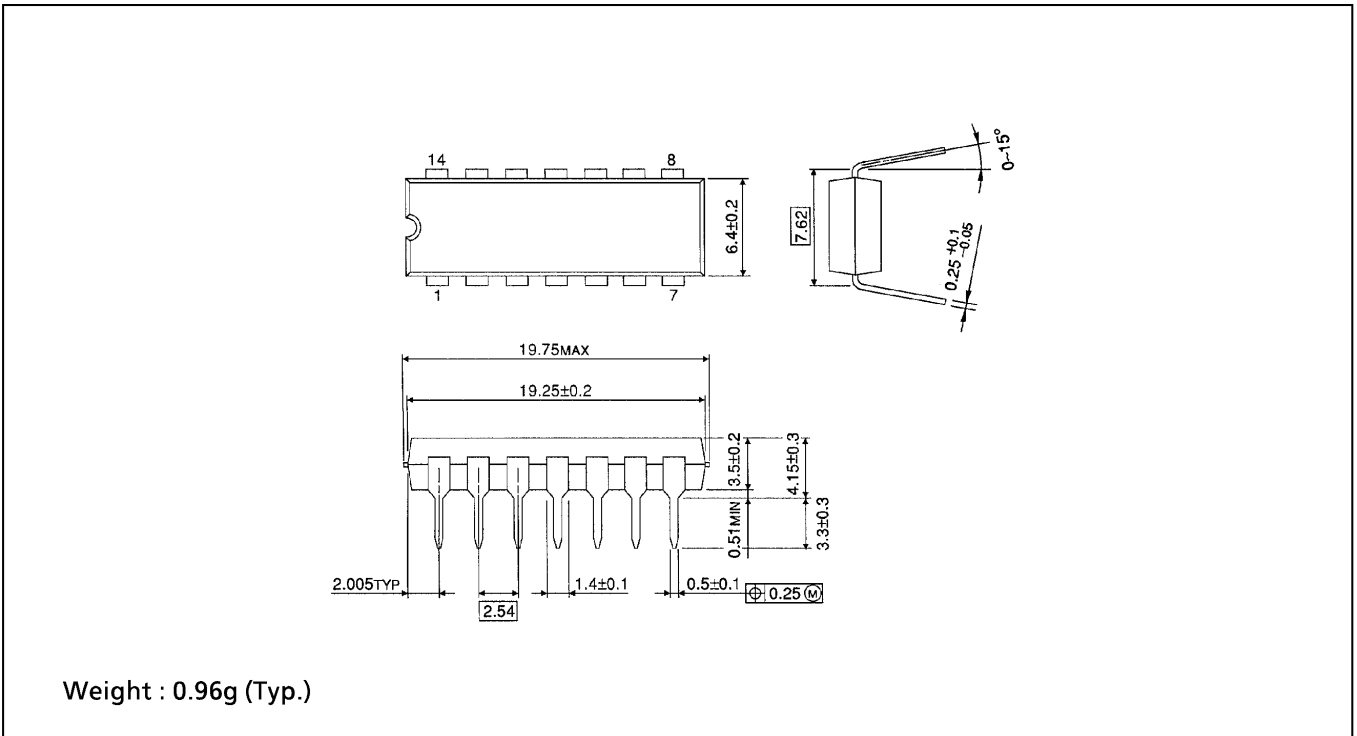
CHARACTERISTIC	SYMBOL	TEST CONDITION	V <sub>DD</sub> (V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	t <sub>TLH</sub>		5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output Transition Time (High to Low)	t <sub>THL</sub>		5	—	70	200	
			10	—	35	100	
			15	—	30	80	
Propagation Delay Time (Low to High)	t <sub>pLH</sub>		5	—	55	110	
			10	—	30	60	
			15	—	25	50	
Propagation Delay Time (High to Low)	t <sub>pHL</sub>		5	—	55	110	
			10	—	30	60	
			15	—	25	50	
Input Capacitance	C <sub>IN</sub>			—	7.5	15	pF

**WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS**



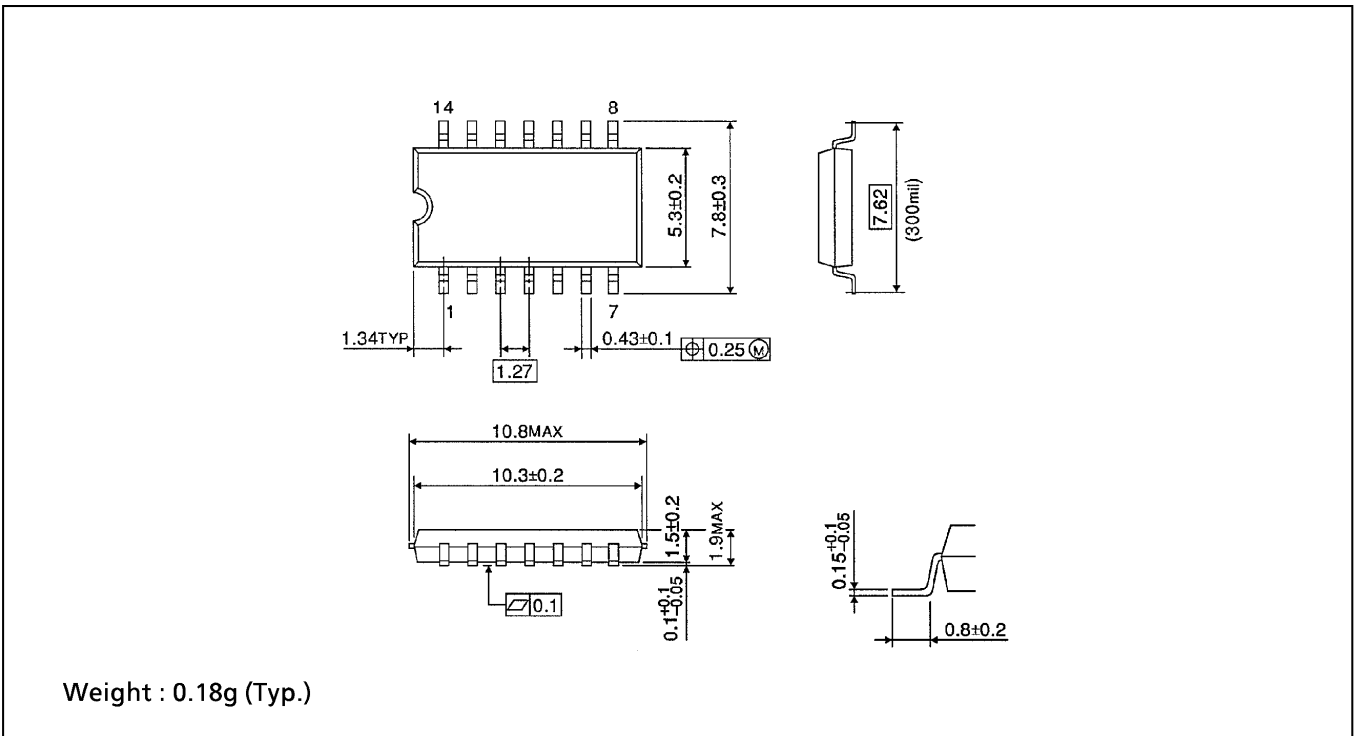
**DIP 14PIN OUTLINE DRAWING (DIP14-P-300-2.54)**

Unit in mm



**SOP 14PIN (200mil BODY) OUTLINE DRAWING (SOP14-P-300-1.27)**

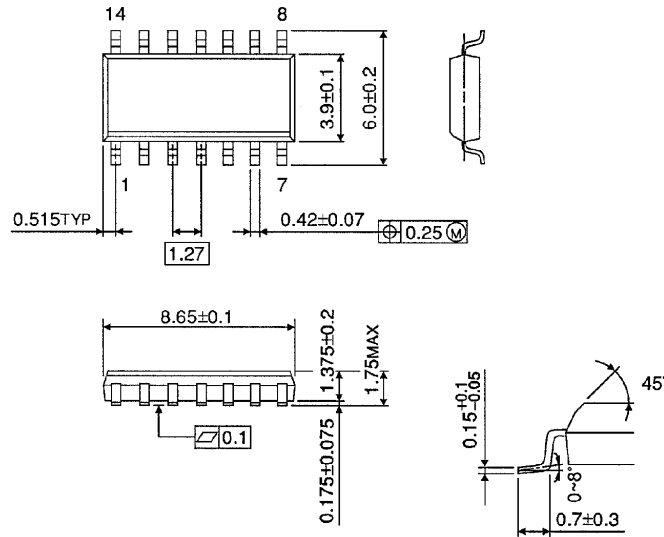
Unit in mm



**SOP 14PIN (150mil BODY) OUTLINE DRAWING (SOL14-P-150 -1.27)**

Unit in mm

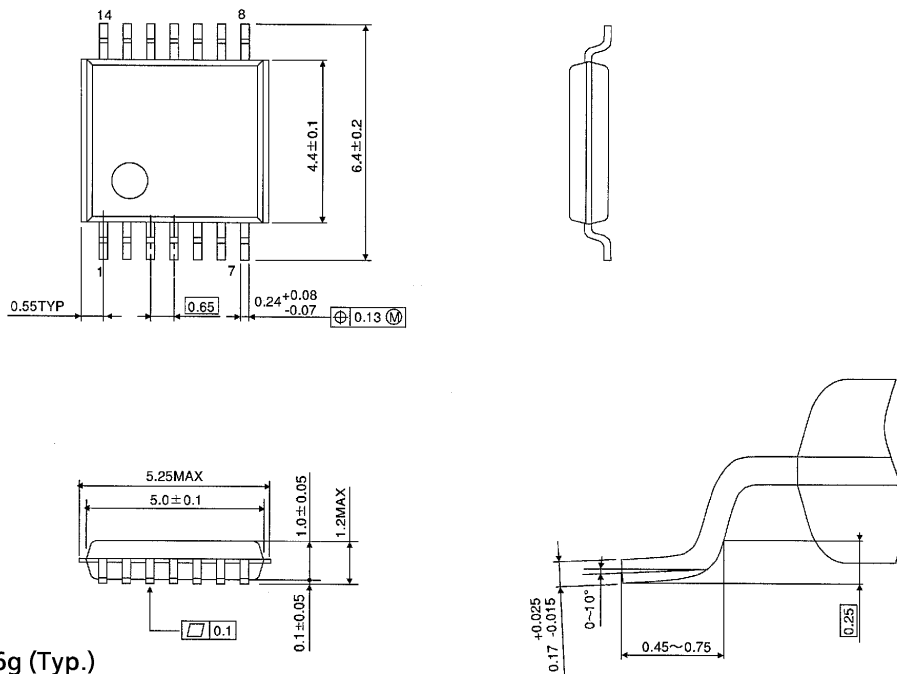
(Note) This package is not available in Japan.



Weight : 0.12g (Typ.)

**TSSOP 14PIN (170mil BODY) OUTLINE DRAWING (TSSOP14-P-0044-0.65)**

Unit in mm



Weight : 0.06g (Typ.)