

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

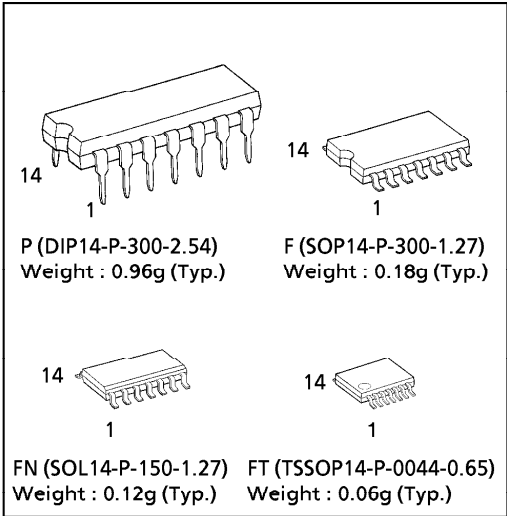
TC4069UBP, TC4069UBF, TC4069UBFN, TC4069UBFT

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.

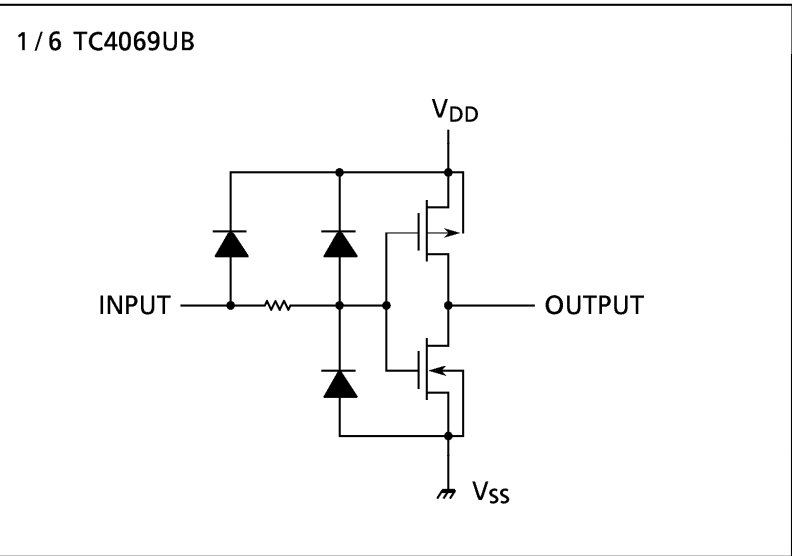
(Note) The JEDEC SOP (FN) is not available in Japan.



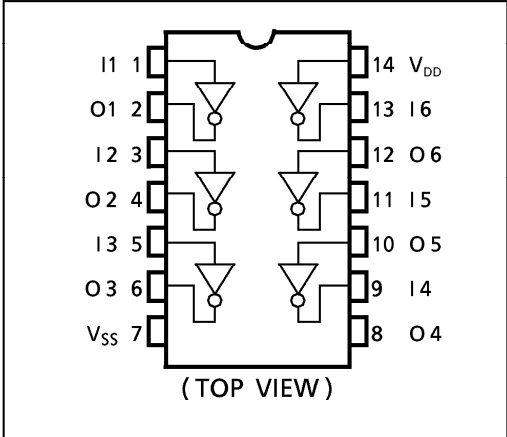
MAXIMUM RATINGS

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}	± 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}	$-65 \sim 150$	$^{\circ}C$

CIRCUIT DIAGRAM



PIN ASSIGNMENT



● 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} < 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	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	4.0	—	4.0	—	—	4.0	—	mA
			V _{OUT} = 1.0V, 9.0V	10	8.0	—	8.0	—	—	8.0	—	
			V _{OUT} = 1.5V, 13.5V	15	12.0	—	12.0	—	—	12.0	—	
			I _{OUT} < 1μA									
Input Low Voltage		V _{IL}	V _{OUT} = 0.5V, 4.5V	5	—	1.0	—	—	1.0	—	1.0	mA
			V _{OUT} = 1.0V, 9.0V	10	—	2.0	—	—	2.0	—	2.0	
			V _{OUT} = 1.5V, 13.5V	15	—	3.0	—	—	3.0	—	3.0	
			I _{OUT} < 1μA									
Input Current	"H" Level	I _{IH}	V _{IL} = 18V	18	—	0.1	—	10 ^{−5}	0.1	—	1.0	μA
	"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	—	0.25	—	0.001	0.25	—	7.5	
				10	—	0.50	—	0.001	0.50	—	15.0	
				15	—	1.00	—	0.002	1.00	—	30.0	

* All valid input combinations.

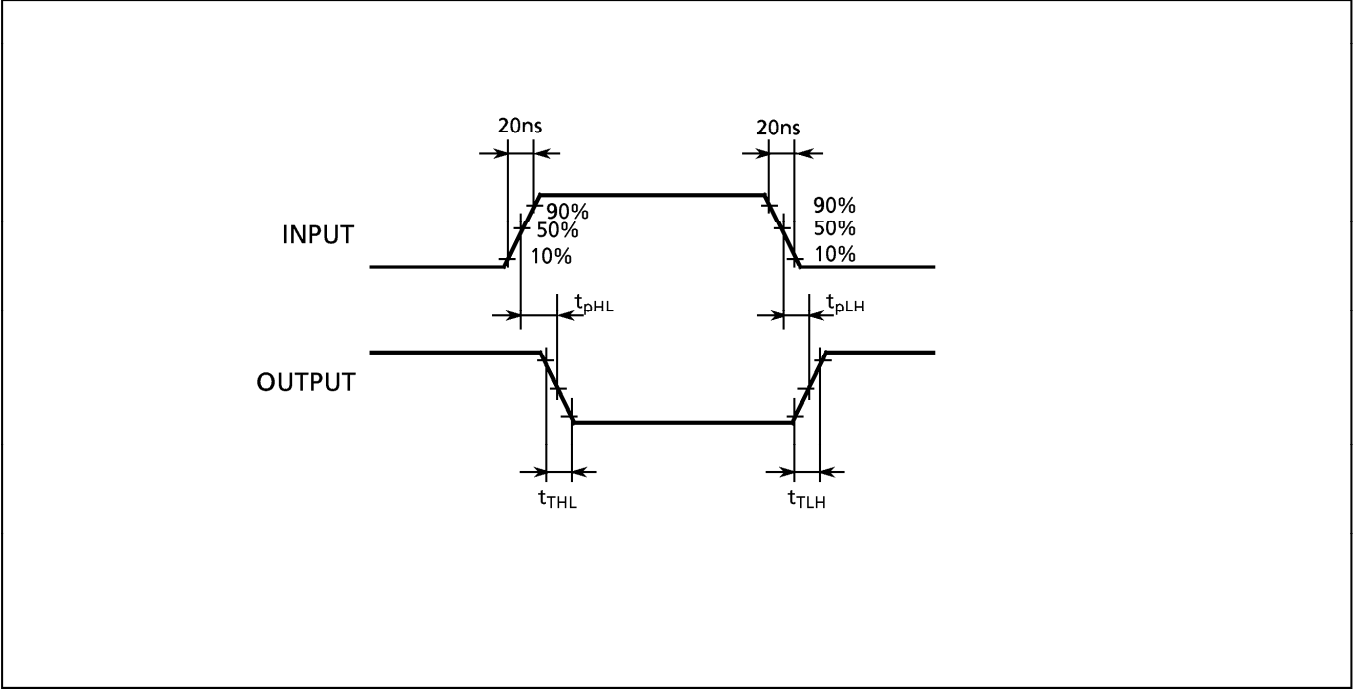
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DYNAMIC ELECTRICAL CHARACTERISTICS (Ta = 25°C, Vss = 0V, CL = 50pF)

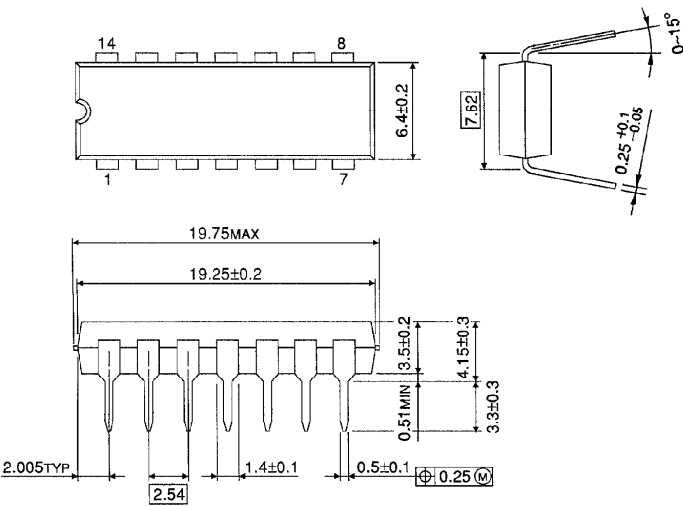
CHARACTERISTIC	SYMBOL	TEST CONDITION	$V_{DD}(V)$	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	t_{TLH}		5 10 15	— — —	70 35 30	200 100 80	ns
Output Transition Time (High to Low)	t_{THL}		5 10 15	— — —	70 35 30	200 100 80	
Propagation Delay Time (Low to High)	t_{pLH}		5 10 15	— — —	55 30 25	110 60 50	
Propagation Delay Time (High to Low)	t_{pHL}		5 10 15	— — —	55 30 25	110 60 50	
Input Capacitance	C_{IN}			—	7.5	15	pF

WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS



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

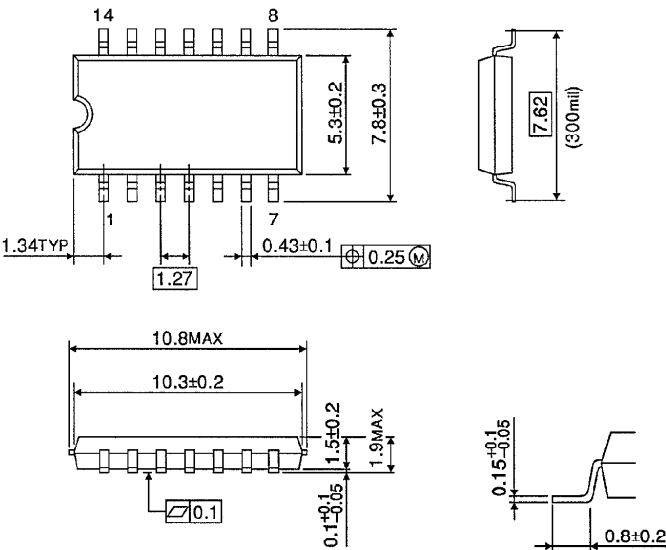
Unit in mm



Weight : 0.96g (Typ.)

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

Unit in mm

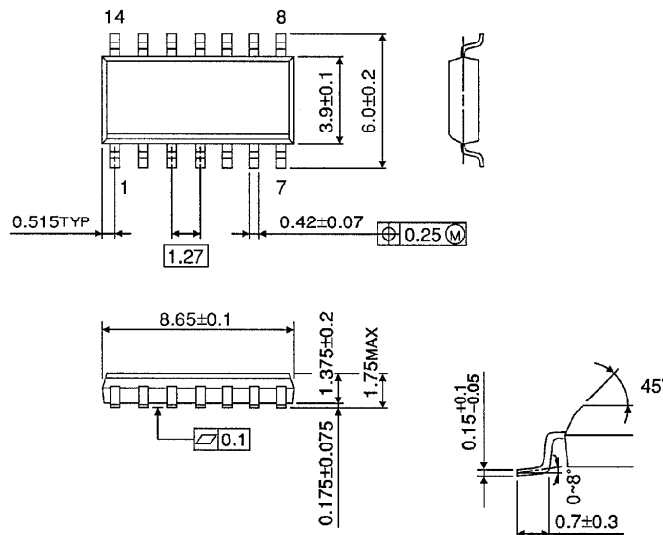


Weight : 0.18g (Typ.)

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

Unit in mm

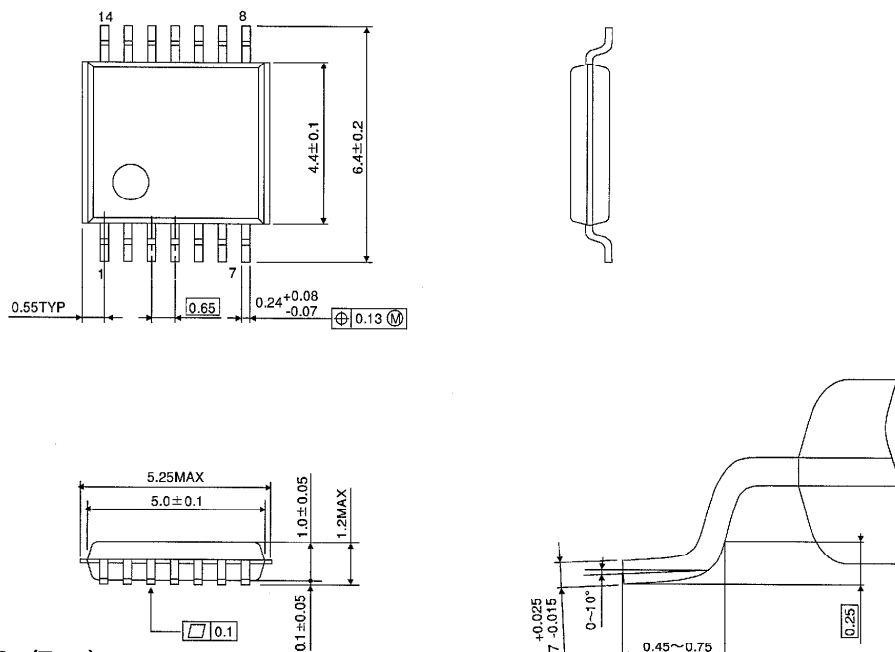
(Note) This package is not available in Japan.



Weight : 0.12g (Typ.)

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

Unit in mm



Weight : 0.06g (Typ.)