

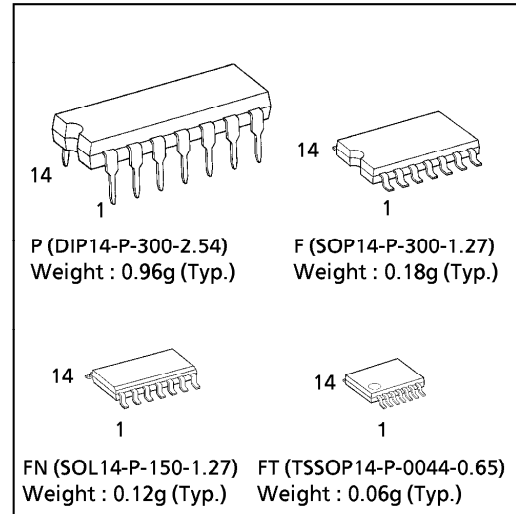
**TC4066BP, TC4066BF, TC4066BFN, TC4066BFT**

**TC4066B QUAD BILATERAL SWITCH**

TC4066B contains four independent circuits of bidirectional switches. When control input CONT is set to "H" level, the impedance between input and output of the switch becomes low and when it is set to "L" level, the impedance becomes high. This can be applied for switching of analog signals and digital signals.

- ON-resistance,  $R_{on}$   
 $250\Omega$  (TYP.) .....  $V_{DD} - V_{SS} = 5V$   
 $110\Omega$  (TYP.) .....  $V_{DD} - V_{SS} = 10V$   
 $70\Omega$  (TYP.) .....  $V_{DD} - V_{SS} = 15V$
- OFF-resistance,  $R_{off}$   
 $R_{off}$  (TYP.)  $> 10^9\Omega$

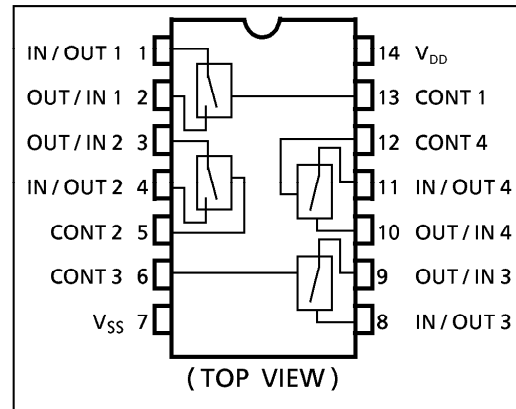
(Note) The JEDEC SOP (FN) is not available in Japan.



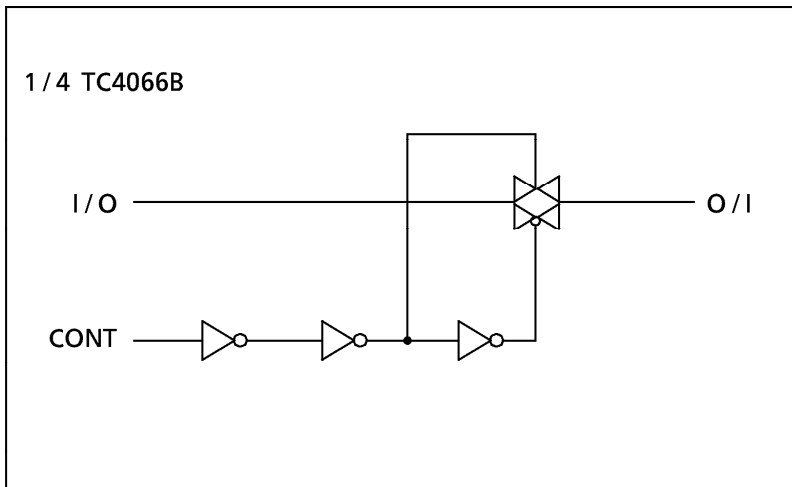
**MAXIMUM RATINGS**

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	$V_{DD}$	$V_{SS} - 0.5 \sim V_{SS} + 20$	V
Control Input Voltage	$V_{CIN}$	$V_{SS} - 0.5 \sim V_{DD} + 0.5$	V
Switch I/O Voltage	$V_{I/O}$	$V_{SS} - 0.5 \sim V_{DD} + 0.5$	V
Potential difference across I/O during ON	$I_{I/O}$	$\pm 0.5$	V
Control Input Current	$I_{CIN}$	$\pm 10$	mA
Power Dissipation	$P_D$	300 (DIP) / 180 (SOIC)	mW
Operating Temperature Range	$T_{opr}$	$-40 \sim 85$	$^{\circ}C$
Storage Temperature Range	$T_{stg}$	$-65 \sim 150$	$^{\circ}C$

**PIN ASSIGNMENT**



**LOGIC DIAGRAM**



**TRUTH TABLE**

CONTROL	Impedance Between IN / OUT - OUT / IN *
H	$0.5 \sim 5 \times 10^2\Omega$
L	$> 10^9\Omega$

\* See Static Electrical Characteristics

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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.

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
DC Supply Voltage	$V_{DD}$		3	—	18	V
Input Voltage	$V_{DD}/V_{OUT}$		0	—	$V_{DD}$	

STATIC ELECTRICAL CHARACTERISTICS (In case not specifically appointed,  $V_{SS} = 0V$ )

CHARACTERISTIC	SYM-BOL	TEST CONDITION	$V_{DD}$ (V)	-40°C		25°C			85°C		UNIT	
				MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.		
Control Input High Voltage	$V_{IH}$	$ I_{IS}  < 10\mu A$	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	—		
Control Input Low Voltage	$V_{IL}$	$ I_{IS}  < 10\mu A$	5	—	1.5	—	2.25	1.5	—	1.5	V	
			10	—	3.0	—	4.50	3.0	—	3.0		
			15	—	4.0	—	6.75	4.0	—	4.0		
On-State Resistance	$R_{ON}$	$0 \leq V_{IS} \leq V_{DD}$ $R_L = 10k\Omega$	5	—	800	—	290	950	—	1200	$\Omega$	
			10	—	210	—	120	250	—	300		
			15	—	140	—	85	160	—	200		
$\Delta$ On-State Resistance (Between Any 2 Switches)	$R_{ON\Delta}$		5	—	—	—	10	—	—	—	$\Omega$	
			10	—	—	—	6	—	—	—		
			15	—	—	—	4	—	—	—		
Input/Output Leakage Current	$I_{OFF}$	$V_{IN} = 18V, V_{OUT} = 0V$ $V_{IN} = 0V, V_{OUT} = 18V$	18	—	$\pm 100$	—	$\pm 0.1$	$\pm 100$	—	$\pm 1000$	nA	
			18	—	$\pm 100$	—	$\pm 0.1$	$\pm 100$	—	$\pm 1000$		
Quiescent Supply Current	$I_{DD}$	$V_{IN} = V_{SS}, V_{DD} *$	5	—	0.25	—	0.001	0.25	—	7.5	$\mu A$	
			10	—	0.50	—	0.001	0.50	—	15.0		
			15	—	1.00	—	0.002	1.00	—	30.0		
Input Current	"H" Level	$I_{IH}$	$V_{IH} = 18V$	18	—	0.1	—	$10^{-5}$	0.1	—	1.0	$\mu A$
	"L" Level	$I_{IL}$	$V_{IL} = 0V$	18	—	-0.1	—	$-10^{-5}$	-0.1	—	-1.0	

\* All valid input combinations.

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	VDD(V)		MIN.	TYP.	MAX.	UNIT
			VSS(V)	VDD(V)				
Phase Difference between Input to Output	$\phi$ I-O	CL = 50pF	0	5	—	15	40	ns
			0	10	—	8	20	
			0	15	—	5	15	
Propagation Delay Time (CONTROL - OUT)	t <sub>pZL</sub> t <sub>pZH</sub>	RL = 1kΩ CL = 50pF	0	5	—	55	120	
			0	10	—	25	40	
			0	15	—	20	30	
Propagation Delay Time (CONTROL - OUT)	t <sub>pLZ</sub> t <sub>pHZ</sub>	RL = 1kΩ CL = 50pF	0	5	—	45	80	
			0	10	—	30	70	
			0	15	—	25	60	
Max. Control Input Repetition Rate	f <sub>MAX</sub> (C)	RL = 1kΩ CL = 50pF	0	5	—	10	—	MHz
			0	10	—	12	—	
			0	15	—	12	—	
- 3dB Cutoff Frequency	f <sub>MAX</sub> (I - O)	RL = 1kΩ CL = 15pF (* 1)	- 5	5	—	30	—	
Total Harmonic Distortion	—	RL = 10kΩ f = 1kHz (* 2)	- 5	5	—	0.03	—	%
- 50dB Feed through Frequency	—	RL = 1kΩ (* 3)	- 5	5	—	600	—	kHz
- 50dB Crosstalk Frequency	—	RL = 1kΩ (* 4)	- 5	5	—	1	—	MHz
Crosstalk (CONTROL - OUT)	—	R <sub>IN</sub> = 1kΩ R <sub>OUT</sub> = 10kΩ CL = 15pF	0	5	—	200	—	mV
			0	10	—	400	—	
			0	15	—	600	—	
Input Capacitance	C <sub>IN</sub>	Control Input			—	5	7.5	pF
		Switch I/O			—	10	—	
Feed through Capacitance	C <sub>IN - OUT</sub>				—	0.5	—	

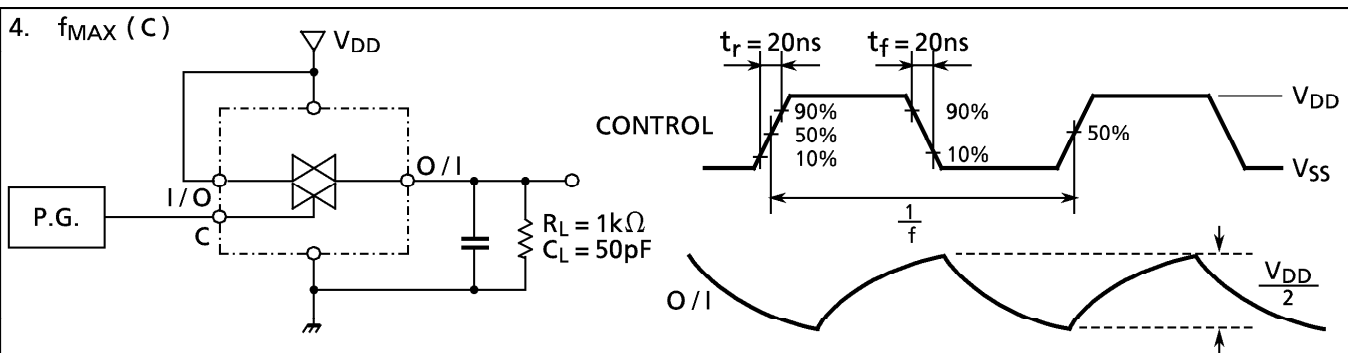
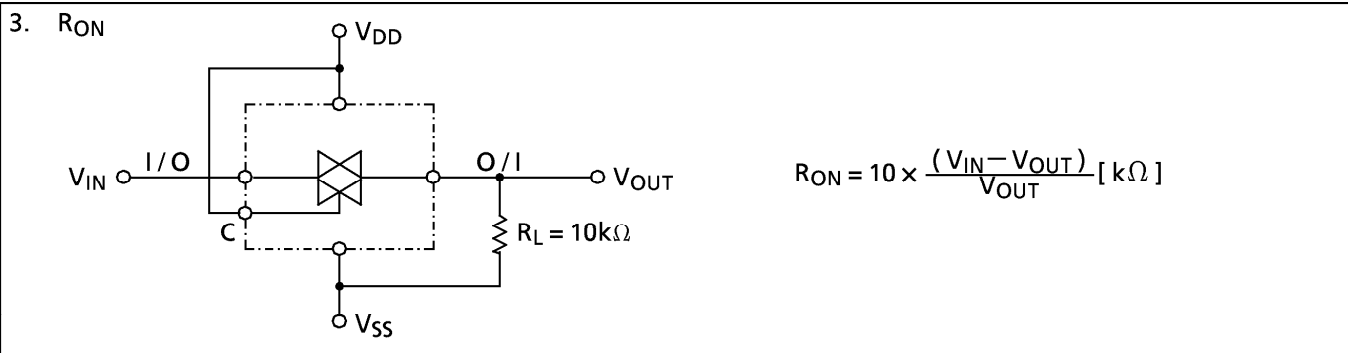
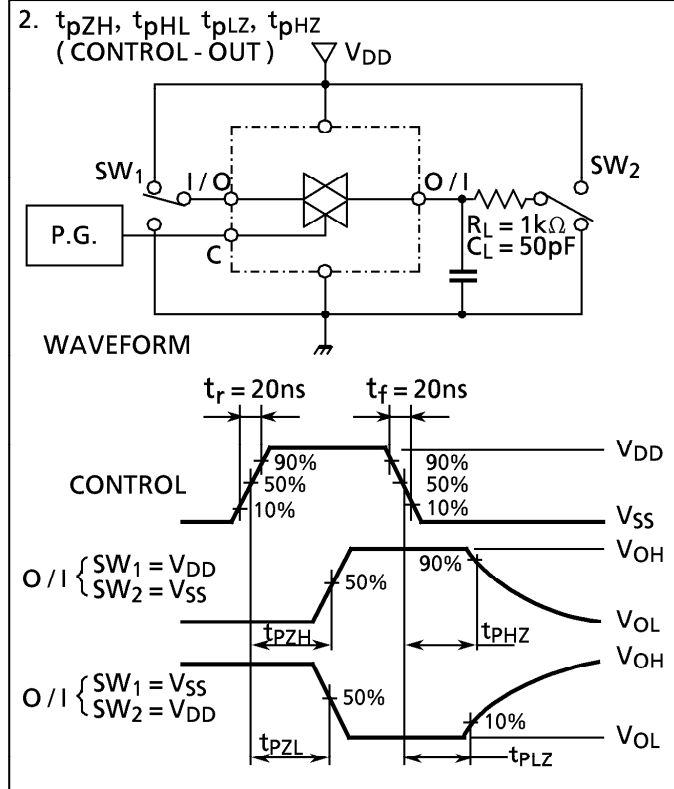
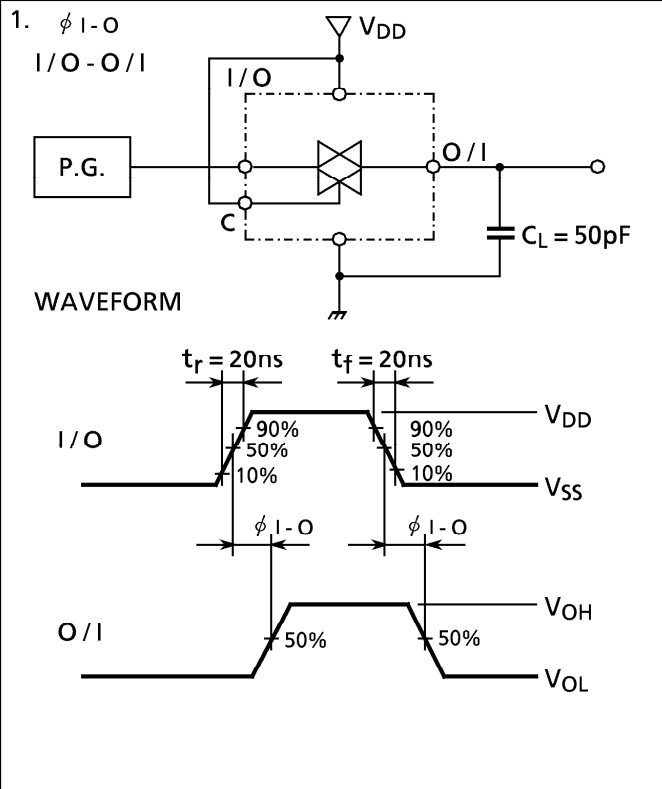
\* 1 Sine wave of  $\pm 2.5$ p.p shall be used for V<sub>is</sub> and the frequency  $20 \log_{10} \frac{V_{os}}{V_{is}} = -3$ dB Shall be f<sub>MAX</sub>.

\* 2 V<sub>is</sub> shall be sine wave of  $\pm 2.5$ Vp.p

\* 3 Sine wave of  $\pm 2.5$ Vp.p shall be used for V<sub>is</sub> and the frequency of  $20 \log_{10} \frac{V_{OUT}}{V_{is}} = -50$ dB shall be feed-through.

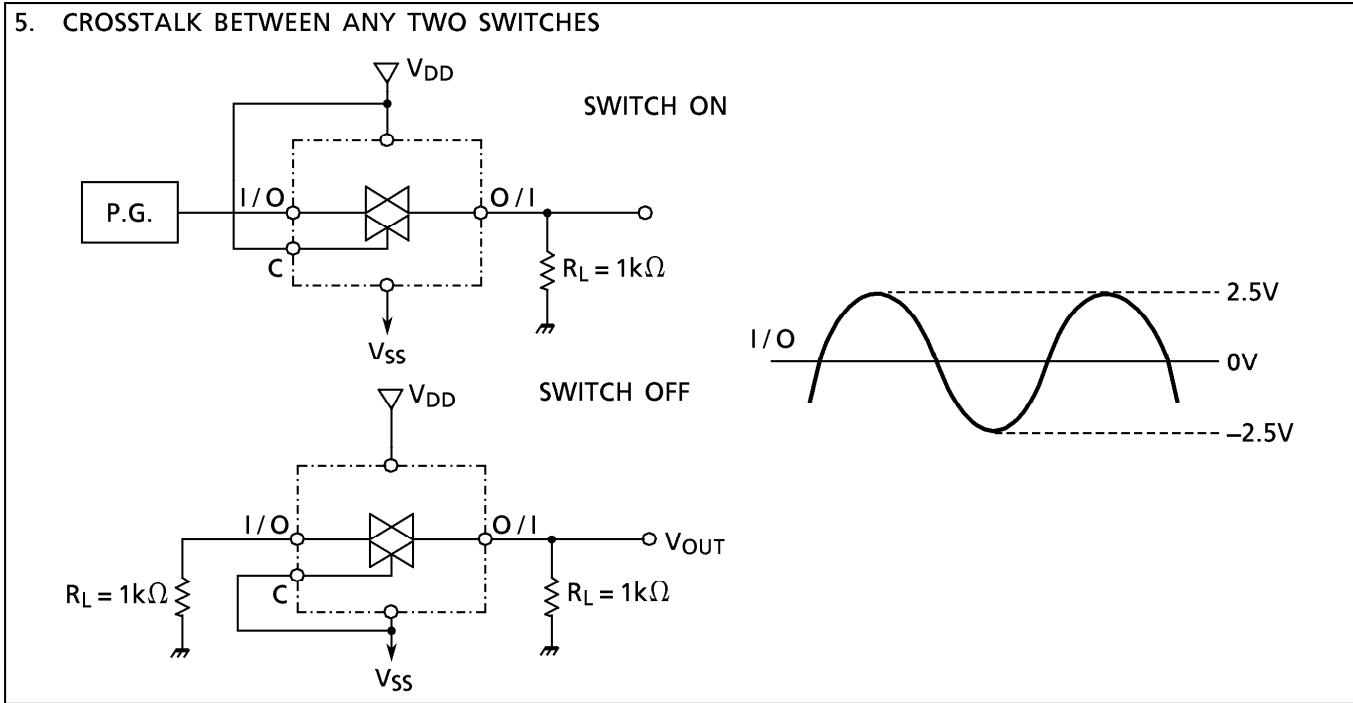
\* 4 Sine wave of  $\pm 2.5$ Vp.p shall be used for V<sub>is</sub> and the frequency of  $20 \log_{10} \frac{V_{OUT}}{V_{is}} = -50$ dB shall be crosstalk.

CIRCUIT FOR MEASUREMENT OF ELECTRICAL CHARACTERISTICS

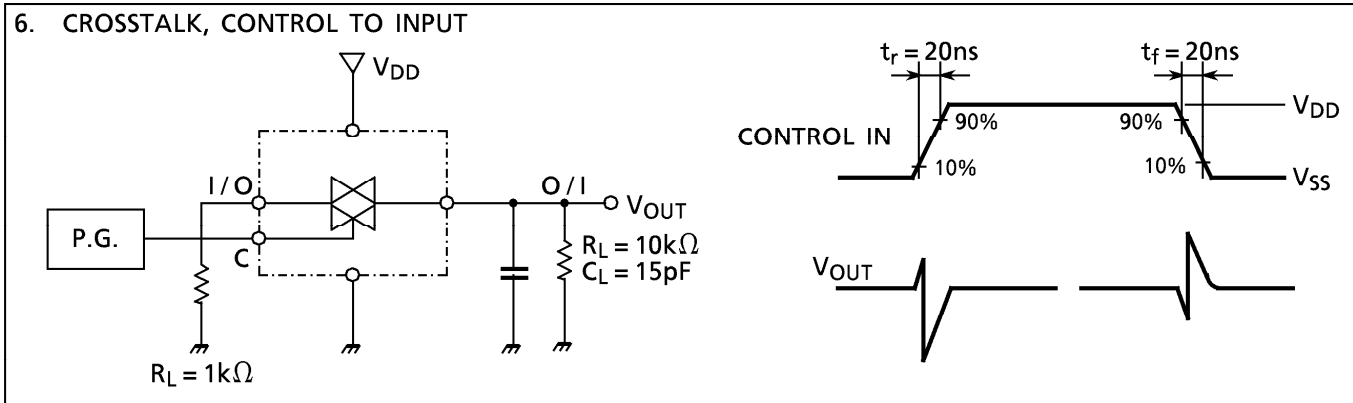


CIRCUIT FOR MEASUREMENT OF ELECTRICAL CHARACTERISTICS

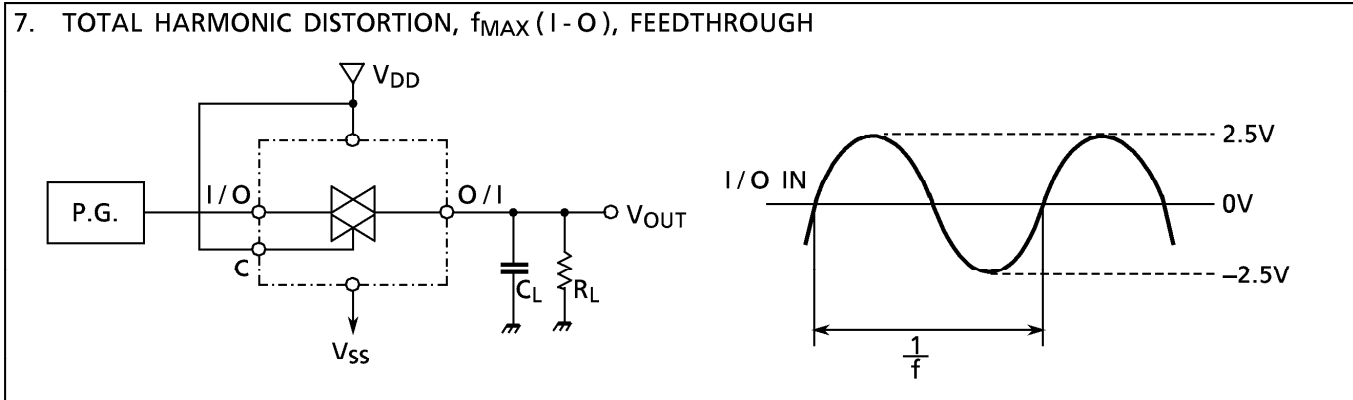
5. CROSSTALK BETWEEN ANY TWO SWITCHES



6. CROSSTALK, CONTROL TO INPUT

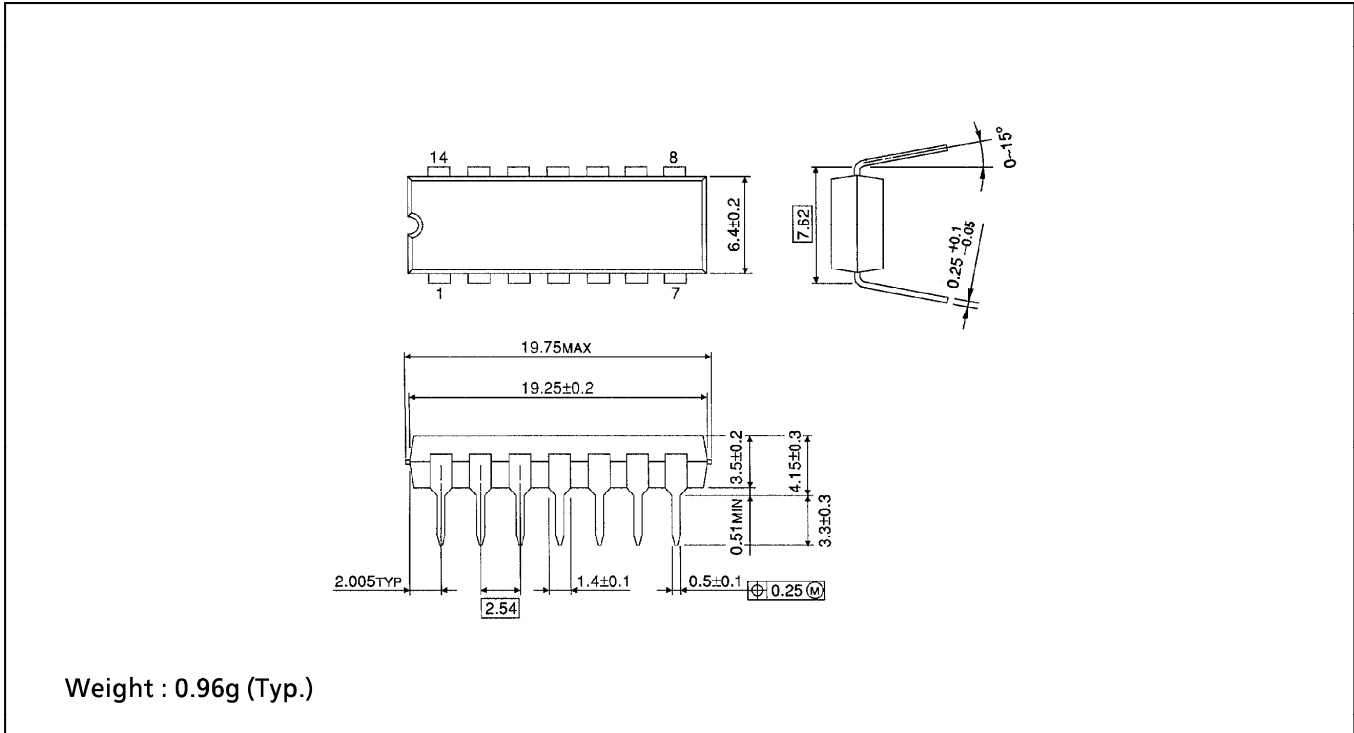


7. TOTAL HARMONIC DISTORTION,  $f_{MAX}(I-O)$ , FEEDTHROUGH



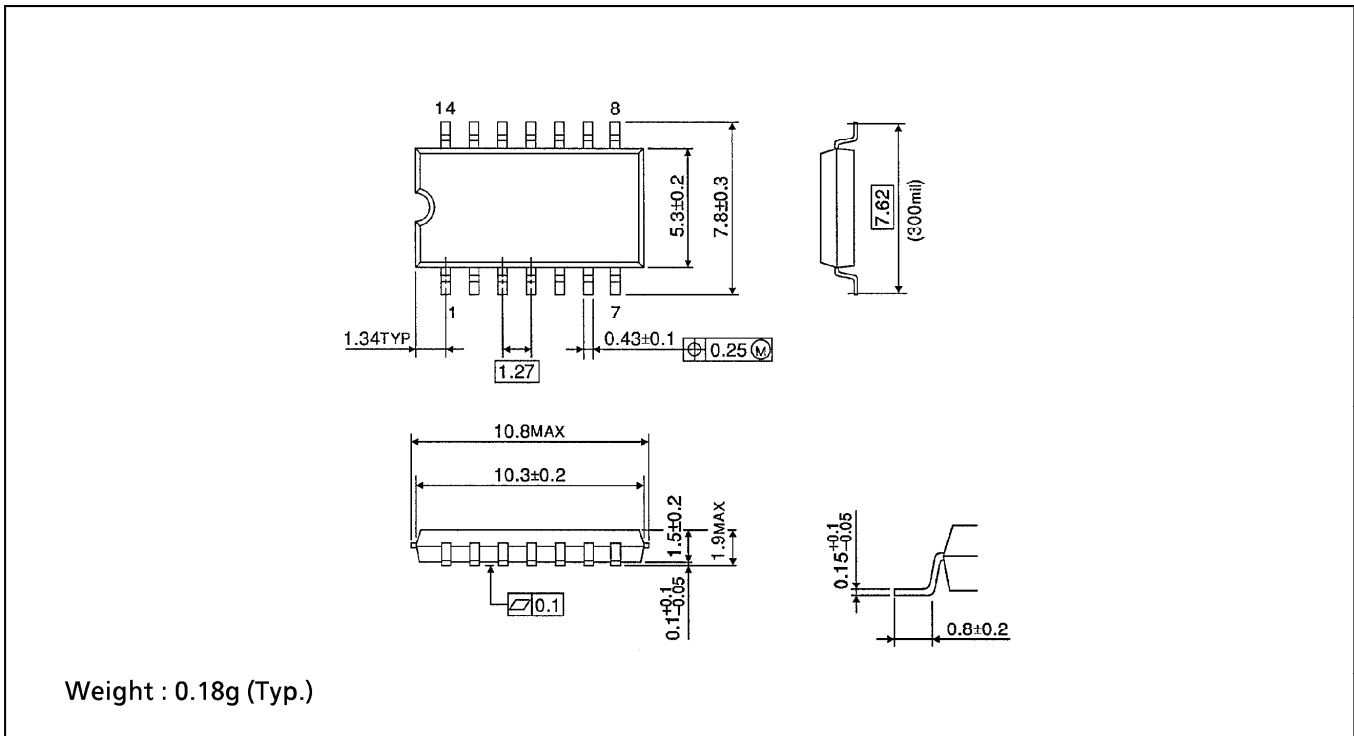
**DIP 14PIN OUTLINE DRAWING (DIP14-P-300-2.54)**

Unit in mm



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

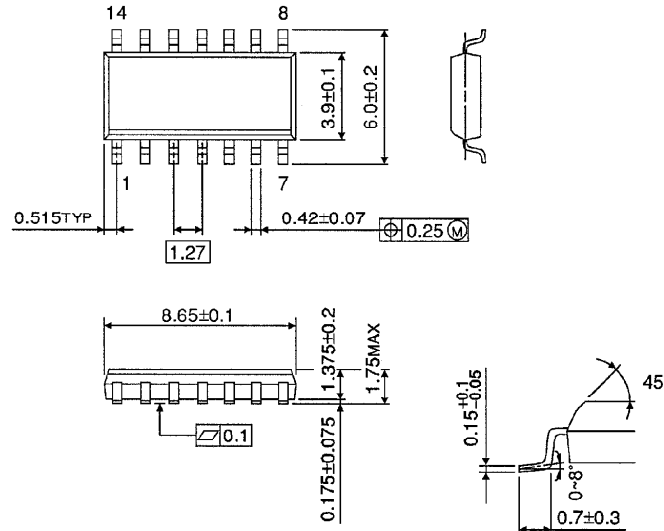
Unit in mm



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

Unit in mm

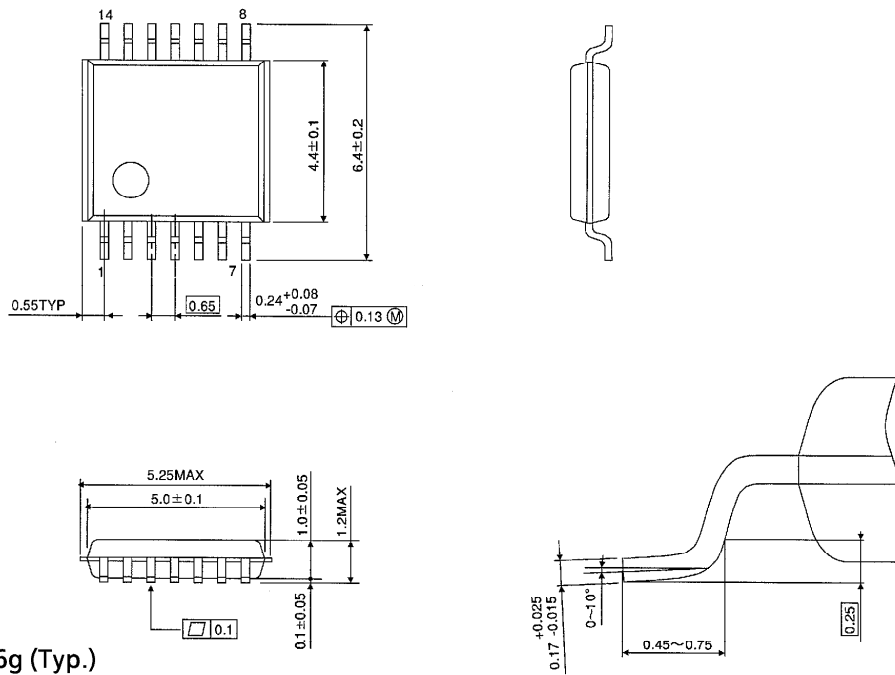
(Note) This package is not available in Japan.



Weight : 0.12g (Typ.)

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

Unit in mm



Weight : 0.06g (Typ.)