

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

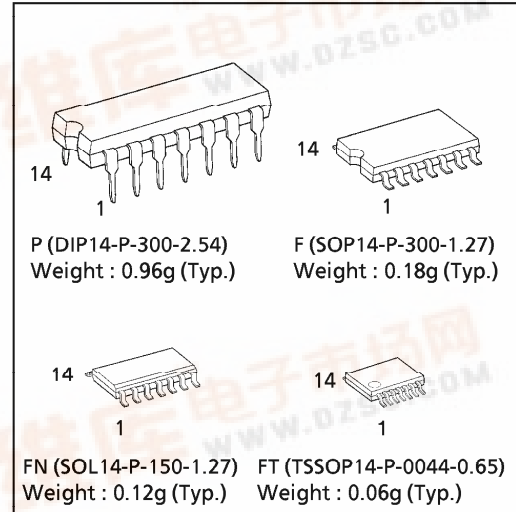
TC4066BP, TC4066BF, TC4066BFN, TC4066BFT

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

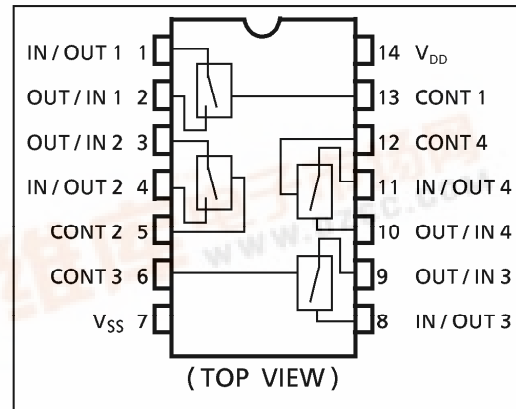
(Note) The JEDEC SOP (FN) is not available in Japan.



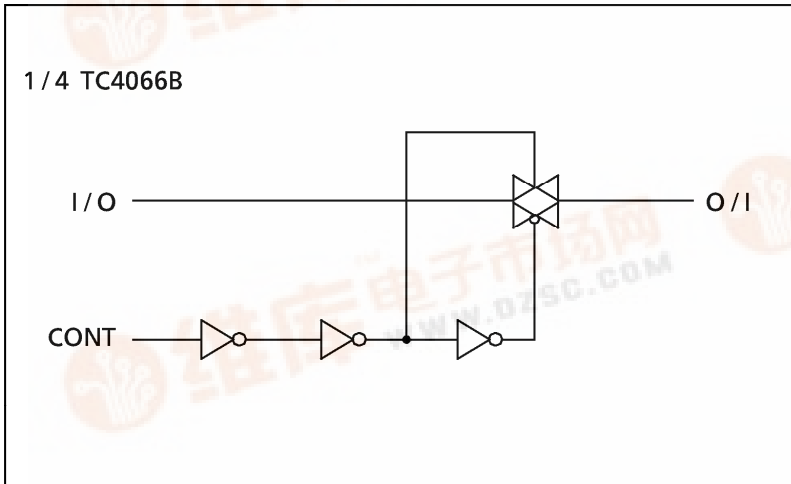
MAXIMUM RATINGS

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	$I_{I/O}$	± 0.5	V
Control Input Current	I_{CIN}	± 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

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} < 10μA	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} < 10μA	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 ≤ V _{IS} ≤ V _{DD} R _L = 10kΩ	5	—	800	—	290	950	—	1200	Ω	
			10	—	210	—	120	250	—	300		
			15	—	140	—	85	160	—	200		
△ On-State Resistance (Between Any 2 Switches)	R _{ON} △		5	—	—	—	10	—	—	—	Ω	
			10	—	—	—	6	—	—	—		
			15	—	—	—	4	—	—	—		
Input / Output Leakage Current	I _{OFF}	V _{IN} = 18V, V _{OUT} = 0V V _{IN} = 0V, V _{OUT} = 18V	18	—	± 100	—	± 0.1	± 100	—	± 1000	nA	
			18	—	± 100	—	± 0.1	± 100	—	± 1000		
Quiescent Supply Current	I _{DD}	V _{IN} = V _{SS} , V _{DD} *	5	—	0.25	—	0.001	0.25	—	7.5	μA	
			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	μA
	"L" Level	I _{IL}	V _{IL} = 0V	18	—	-0.1	—	-10 ⁻⁵	-0.1	—	-1.0	

* All valid input combinations.

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
			V _{SS} (V)	V _{DD} (V)				
Phase Difference between Input to Output	φ I-O	CL = 50pF	0	5	—	15	40	ns
			0	10	—	8	20	
			0	15	—	5	15	
Propagation Delay Time (CONTROL - OUT)	t _{pZL}	RL = 1kΩ	0	5	—	55	120	
			0	10	—	25	40	
	t _{pZH}	CL = 50pF	0	15	—	20	30	
Propagation Delay Time (CONTROL - OUT)	t _{pLZ}	RL = 1kΩ	0	5	—	45	80	
			0	10	—	30	70	
	t _{pHZ}	CL = 50pF	0	15	—	25	60	
Max. Control Input Repetition Rate	f _{MAX} (C)	RL = 1kΩ CL = 50pF	0	5	—	10	—	MHz
			0	10	—	12	—	
			0	15	—	12	—	
- 3dB Cutoff Frequency	f _{MAX} (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 _{IN} = 1kΩ R _{OUT} = 10kΩ CL = 15pF	0	5	—	200	—	mV
			0	10	—	400	—	
			0	15	—	600	—	
Input Capacitance	C _{IN}	Control Input			—	5	7.5	pF
		Switch I / O			—	10	—	
Feed through Capacitance	C _{IN-OUT}				—	0.5	—	

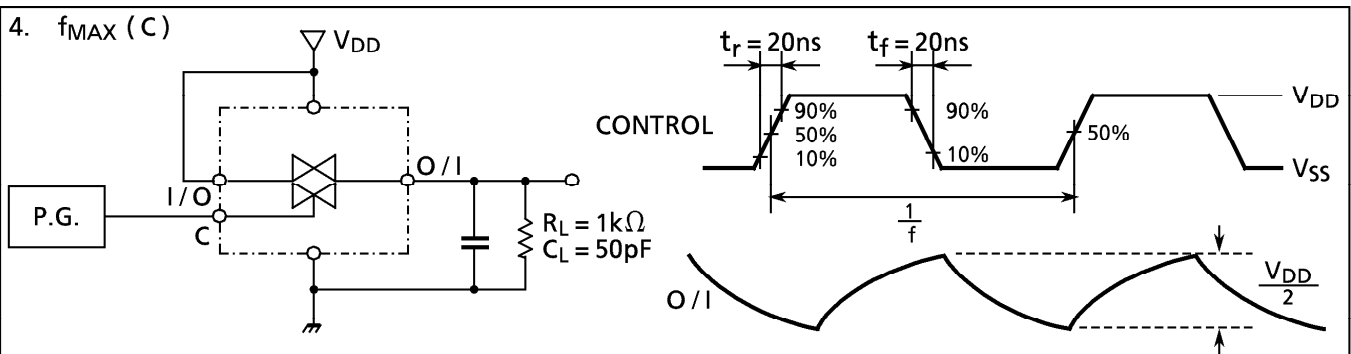
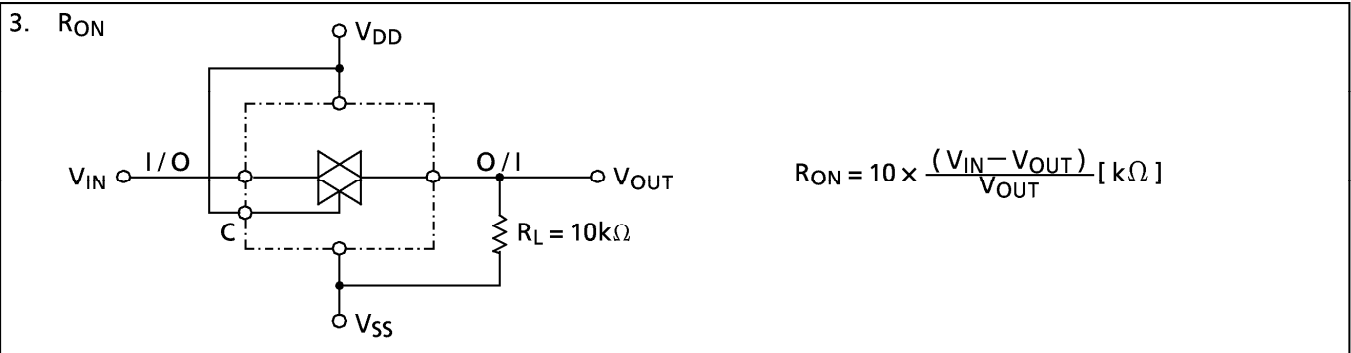
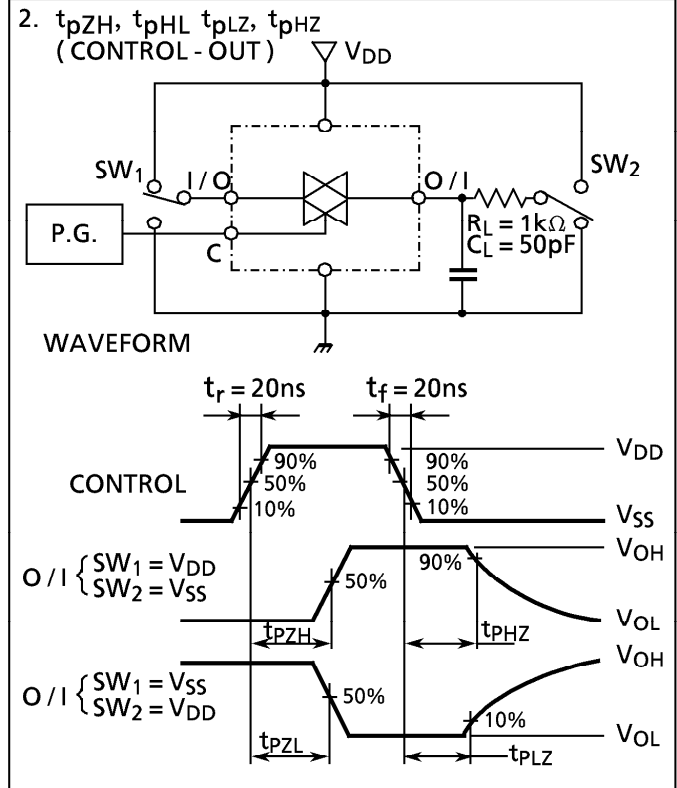
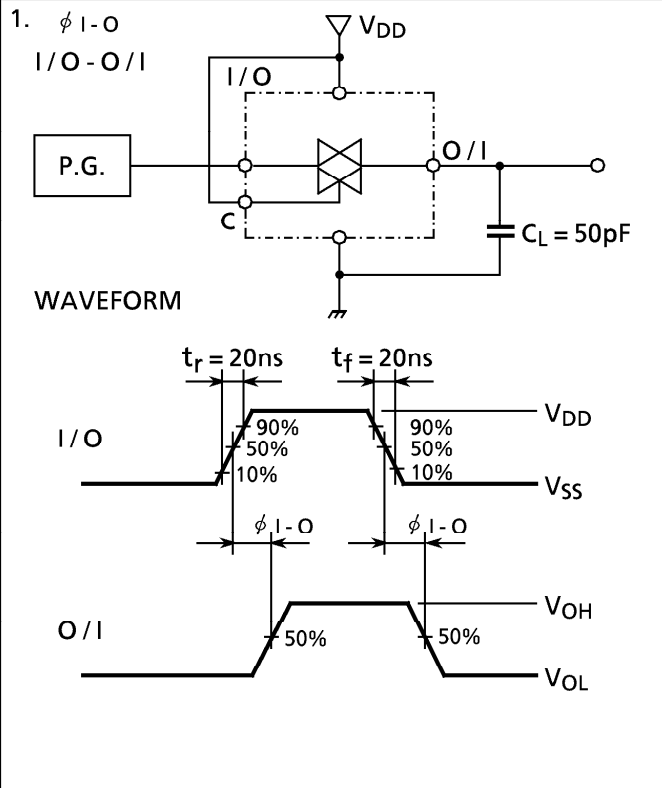
* 1 Sine wave of ±2.5_{p-p} shall be used for V_{is} and the frequency of $20 \log_{10} \frac{V_{os}}{V_{is}} = -3\text{dB}$ shall be f_{MAX}.

* 2 V_{is} shall be sine wave of ±2.5V_{p-p}

* 3 Sine wave of ±2.5V_{p-p} shall be used for V_{is} and the frequency of $20 \log_{10} \frac{V_{OUT}}{V_{is}} = -50\text{dB}$ shall be feed-through.

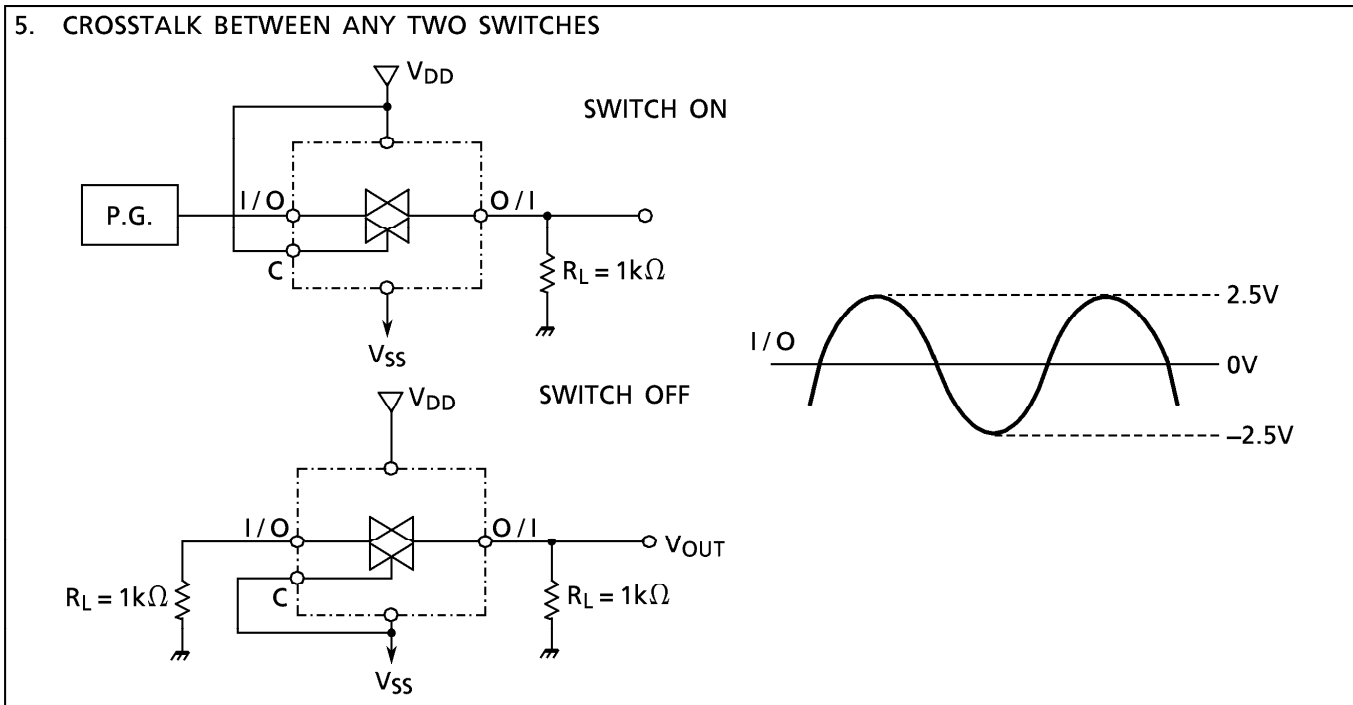
* 4 Sine wave of ±2.5V_{p-p} shall be used for V_{is} and the frequency of $20 \log_{10} \frac{V_{OUT}}{V_{is}} = -50\text{dB}$ shall be crosstalk.

CIRCUIT FOR MEASUREMENT OF ELECTRICAL CHARACTERISTICS

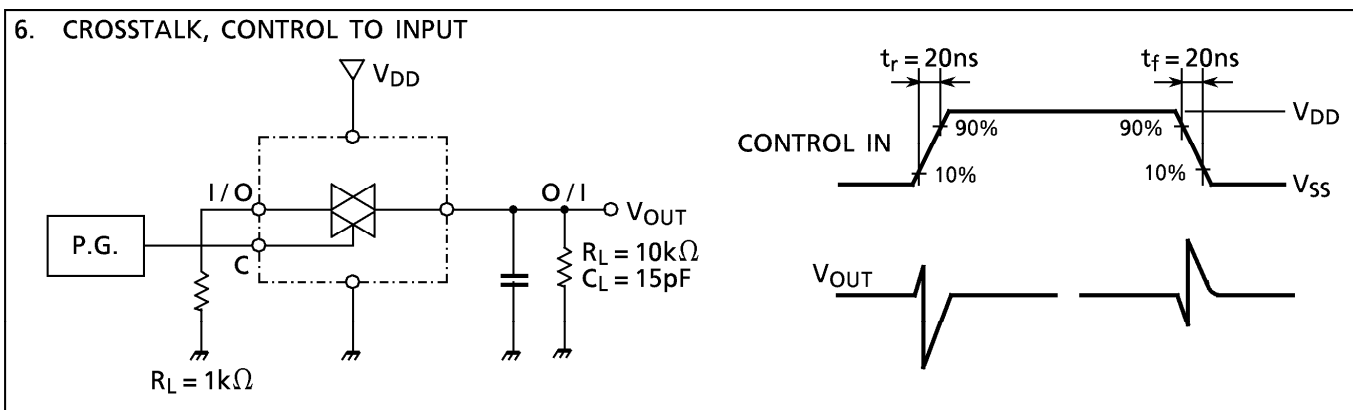


CIRCUIT FOR MEASUREMENT OF ELECTRICAL CHARACTERISTICS

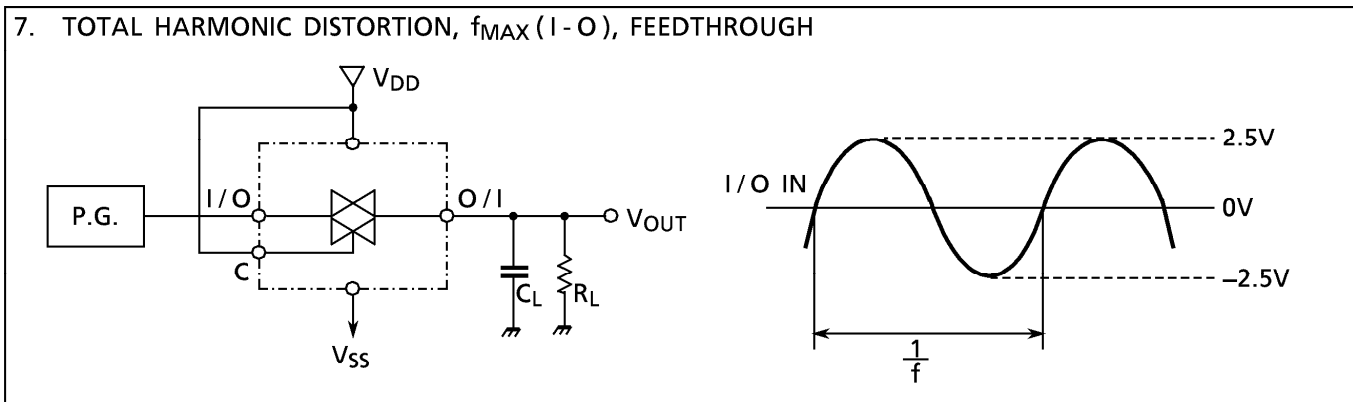
5. CROSSTALK BETWEEN ANY TWO SWITCHES



6. CROSSTALK, CONTROL TO INPUT

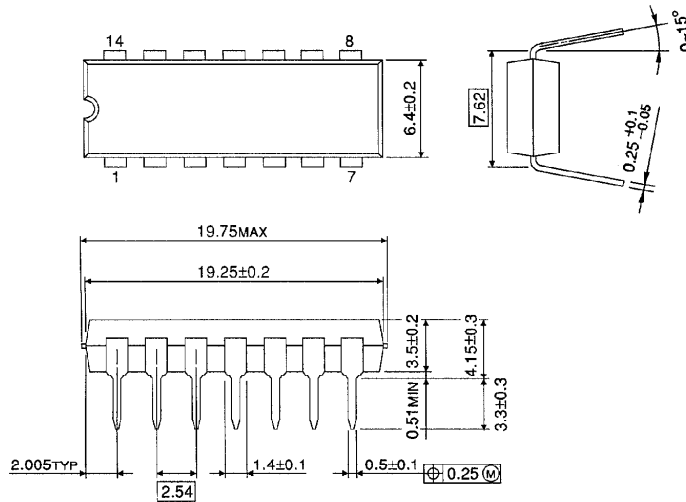


7. TOTAL HARMONIC DISTORTION, $f_{MAX}(I-O)$, FEEDTHROUGH



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

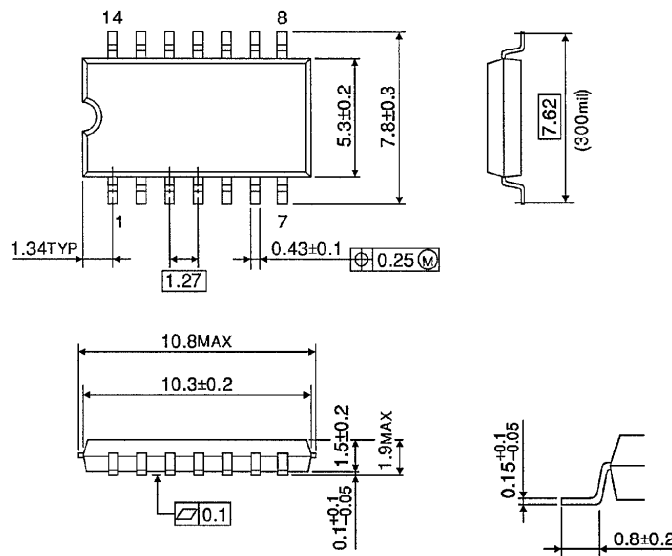
Unit in mm



Weight : 0.96g (Typ.)

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

Unit in mm

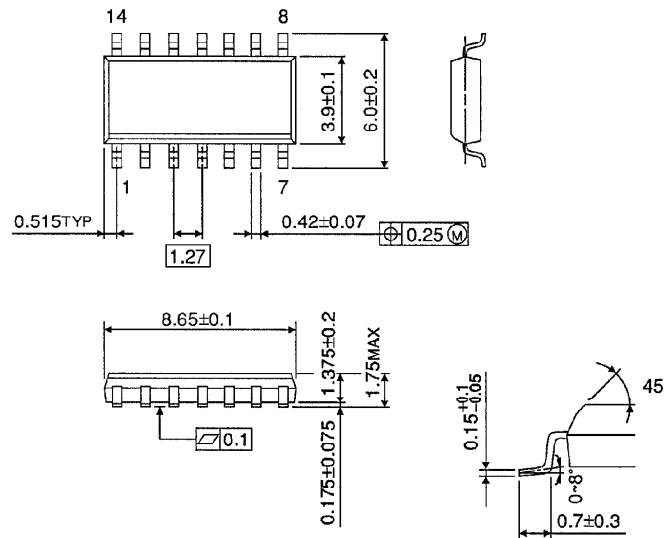


Weight : 0.18g (Typ.)

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

Unit in mm

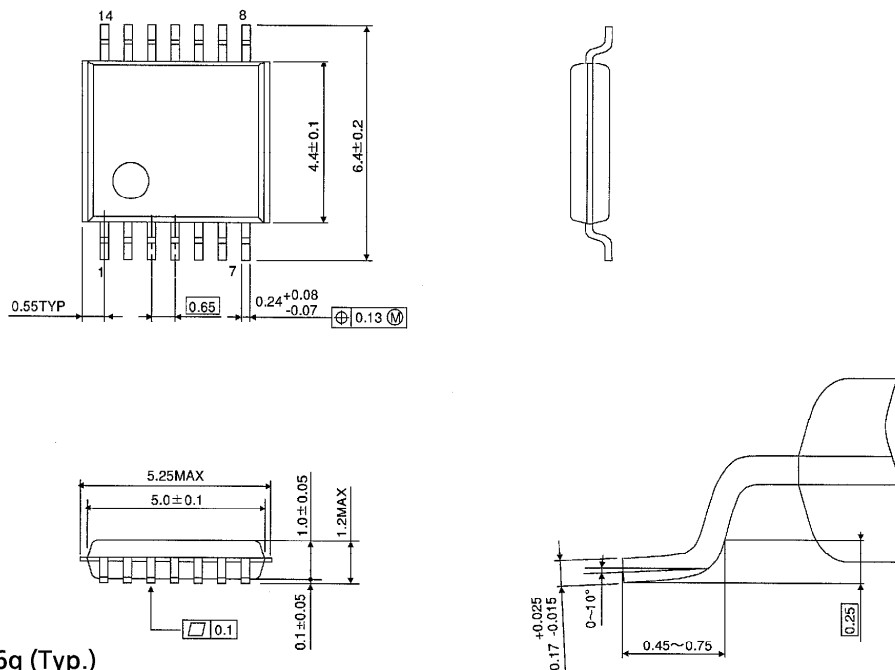
(Note) This package is not available in Japan.



Weight : 0.12g (Typ.)

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

Unit in mm



Weight : 0.06g (Typ.)