

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

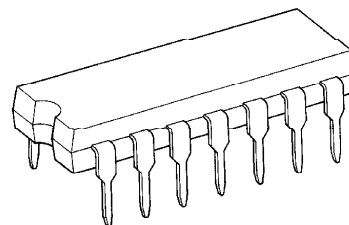
TA75902P, TA75902F, TA75902FB

QUAD OPERATIONAL AMPLIFIER

FEATURES

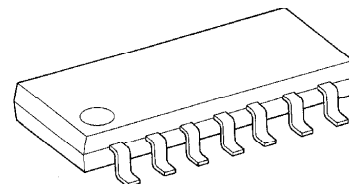
- In the linear mode the input common mode voltage range includes ground.
- Four internally compensated OP amps are in single package.
- Low power dissipation and power drain suitable for battery operation.
- Differential input voltage range equal to the power supply voltage.
- Large output voltage swing : $0V \sim V_{CC} - 1.5V$
- Wide power supply voltage range and signal power supply : Single Supply $3 \sim 36V$
Dual Supplies $\pm 1.5 \sim 18V$
- Low input biasing current : $I_I = 45nA$ (Typ.)

TA75902P



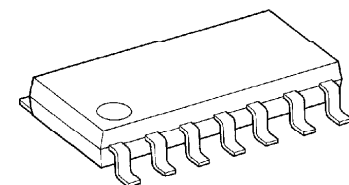
DIP14-P-300-2.54

TA75902F



SOP14-P-225-1.27

TA75902FB



SOP14-P-225-1.27B

Weight

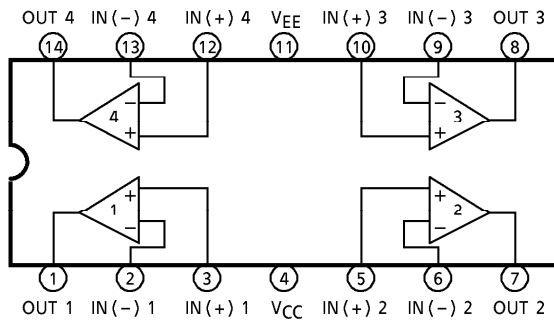
DIP14-P-300-2.54	: 1.0g (Typ.)
SOP14-P-225-1.27	: 0.2g (Typ.)
SOP14-P-225-1.27B	: 0.2g (Typ.)

961001EBA1

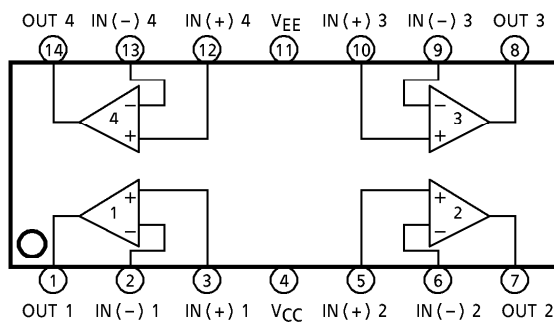
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PIN CONNECTION (TOP VIEW)

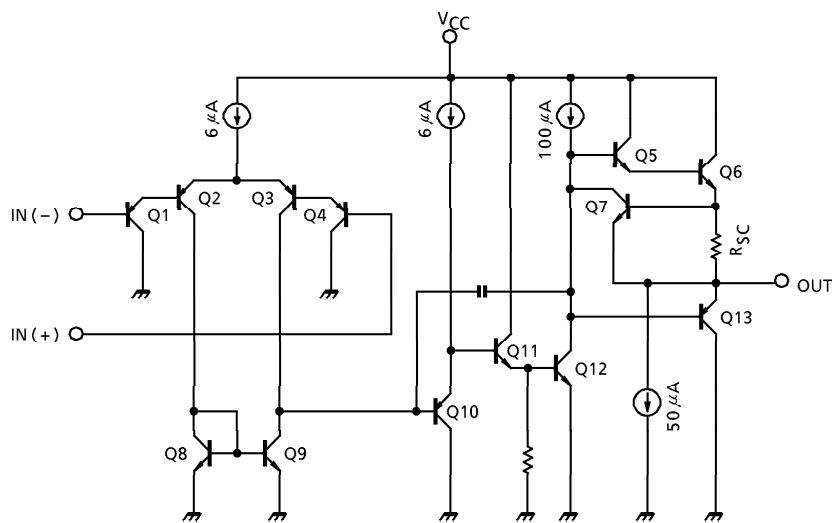
TA75902P



**TA75902F
TA75902FB**



EQUIVALENT CIRCUIT



MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

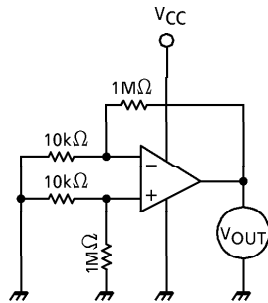
CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}, V_{EE}	$\pm 18 \text{ OR } 36$	V
Differential Input Voltage		DV_{IN}	± 36	V
Input Voltage		V_{IN}	$-0.3 \sim 36$	V
Power Dissipation	TA75902P	P_D	625	mW
	TA75902F		280	
	TA75902FB		280	
Operating Temperature		T_{opr}	$-40 \sim 85$	$^\circ\text{C}$
Storage Temperature		T_{stg}	$-55 \sim 125$	$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS ($V_{CC} = 5\text{V}$, $V_{EE} = \text{GND}$, $T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	1	$R_g \leq 10\text{k}\Omega$	—	2	7	mV
Input Offset Current	I_{IO}	2	—	—	5	30	nA
Input Bias Current	I_I	2	—	—	45	150	nA
Common Mode Input Voltage	CMV_{IN}	3	$V_{CC} = 30\text{V}$, $V_{EE} = \text{GND}$	0	—	$V_{CC} - 1.5$	V
Supply Current	I_{CC}, I_{EE}	4	$R_L = \infty$, ALL OP Amps	—	0.7	1.2	mA
Voltage Gain	G_V	5	$R_L \geq 2\text{k}\Omega$	86	100	—	dB
Maximum Output Voltage Swing	V_{Op-p}	6	$R_L = 2\text{k}\Omega$	0	—	$V_{CC} - 1.5$	V
Common Mode Input Signal Rejection Ratio	CMRR	3	—	60	85	—	dB
Supply Voltage Rejection Ratio	SVRR	1	$R_g = 10\text{k}\Omega$	60	100	—	dB
Source Current	I_{source}	6	$IN(-) = 0\text{V}$, $IN(+) = 1\text{V}$	20	40	—	mA
Sink Current	I_{sink}	6	$IN(-) = 1\text{V}$, $IN(+) = 0\text{V}$	10	20	—	mA

TEST CIRCUIT

(1) V_{IO} , SVRR



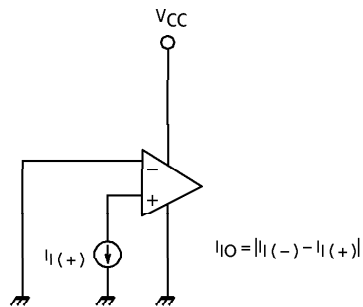
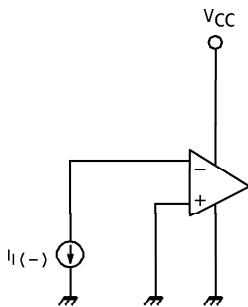
- $V_{IO} = V_{OUT} / 100$
- $SVRR = 20 \log E \text{ (dB)}$

$$E = \left| \frac{V_{OUT1} - V_{OUT2}}{V_{CC1} - V_{CC2}} \right| \times \frac{1}{100}$$

V_{OUT1} : V_{OUT} ($V_{CC1} = 5V$)

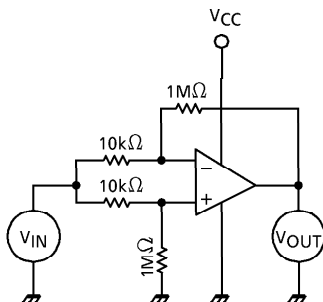
V_{OUT2} : V_{OUT} ($V_{CC2} = 10V$)

(2) I_I , I_{IO}



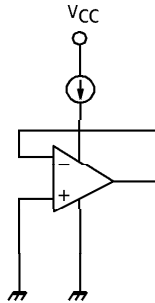
$$I_{IO} = |I_I(-) - I_I(+)|$$

(3) CMV_{IN} , CMRR



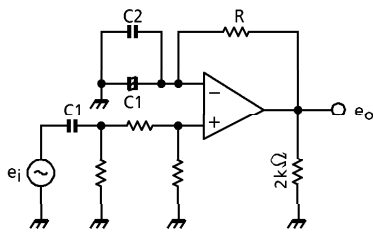
- $CMRR = 20 \log \cdot G_D / G_C \text{ (dB)}$
 G_D : DIFFERENTIAL VOLTAGE GAIN
 G_C : COMMON MODE VOLTAGE GAIN
- CMV_{IN} : $V_{IN} = 0V$, $V_{CC} - 1.5V$ SUPPLIES

(4) I_{CC}



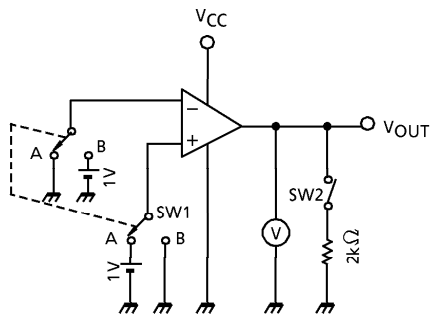
- $I_{CC} : (V_{CC} = 5V)$

(5) G_V



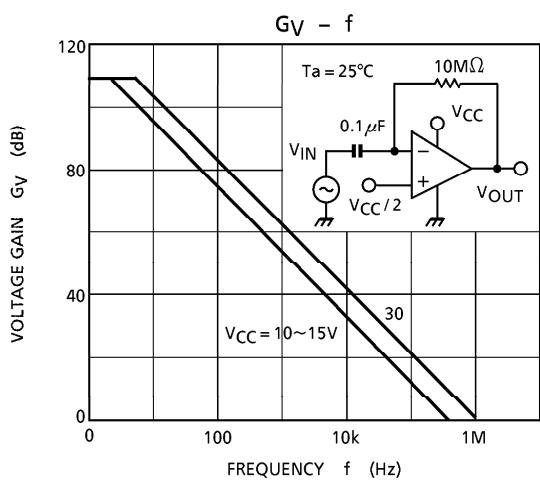
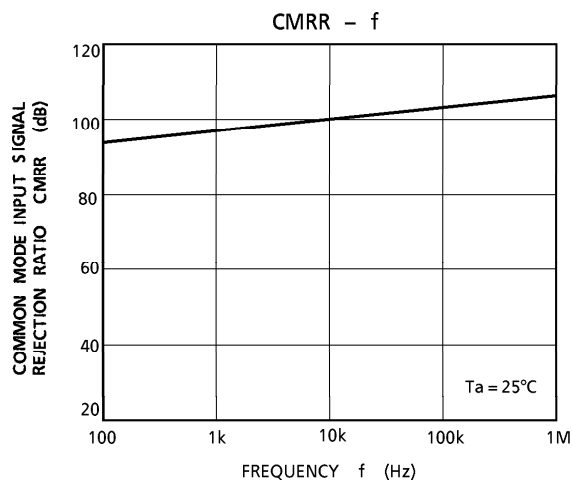
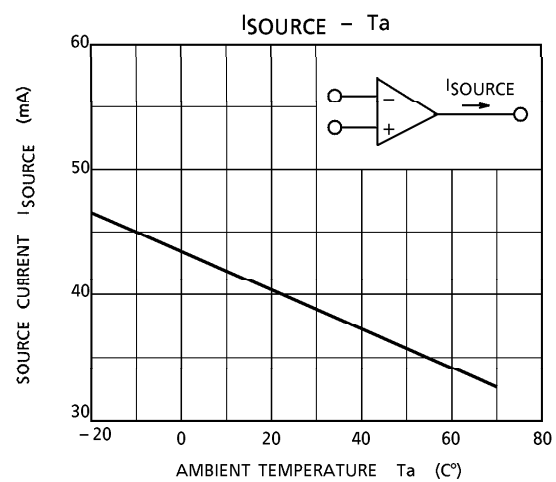
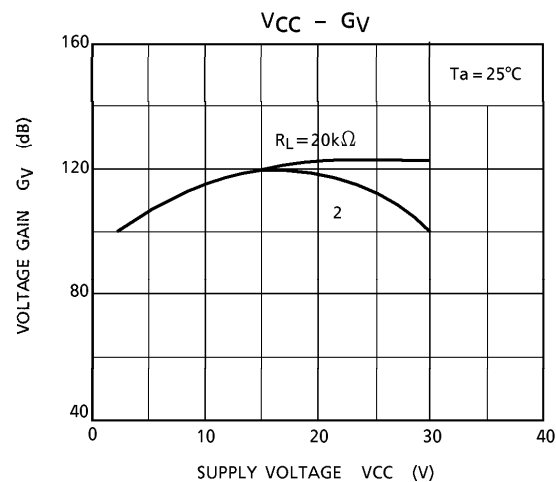
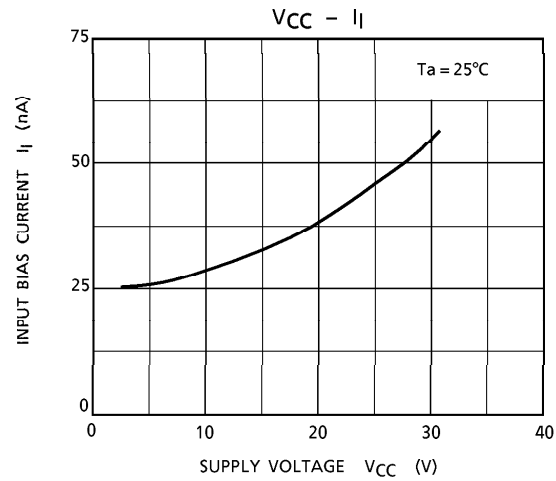
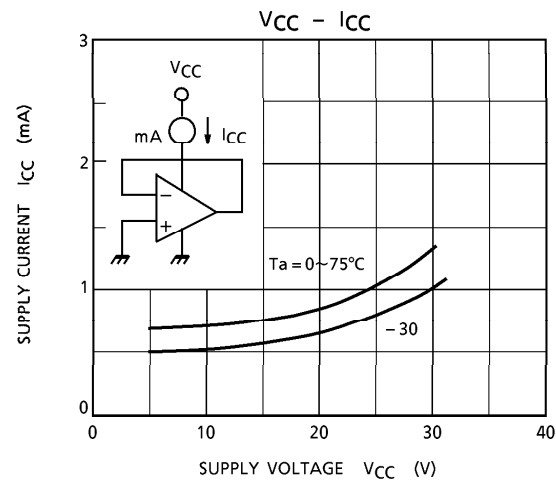
- $G_V = 20 \log e_o / e_i \text{ (dB)}$
 $R \gg 1 / \omega C_1$
 C_1 : COUPLING CONDENSER
 C_2 : HIGH FREQUENCY BYPASS CONDENSER

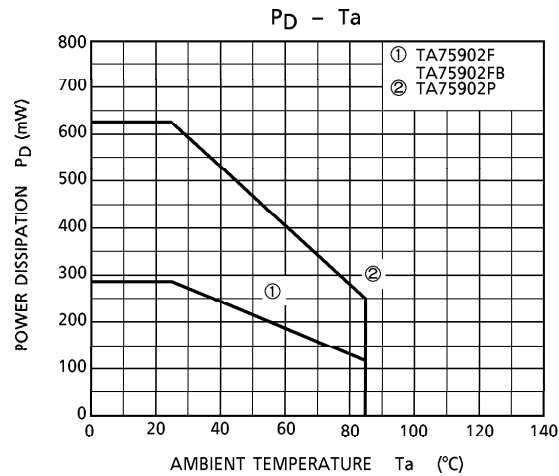
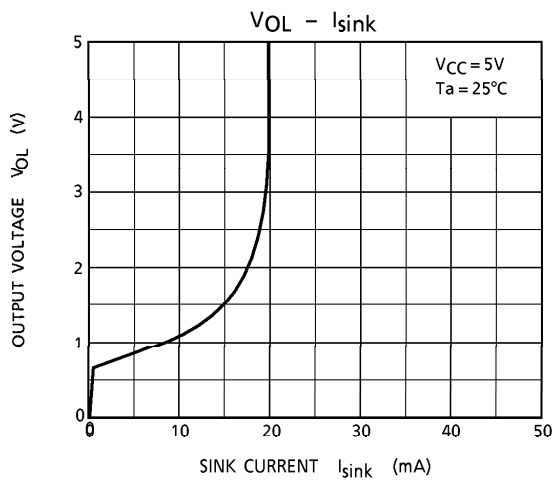
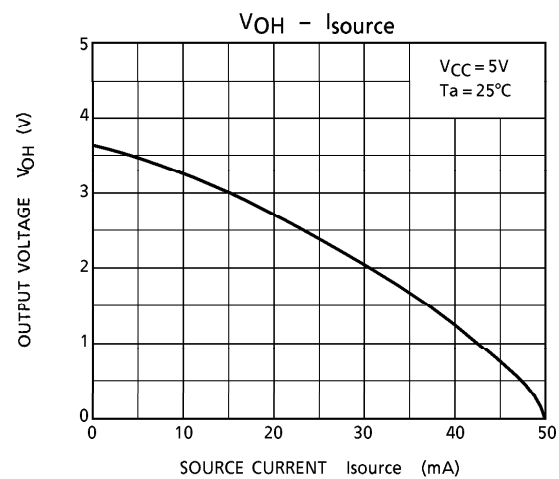
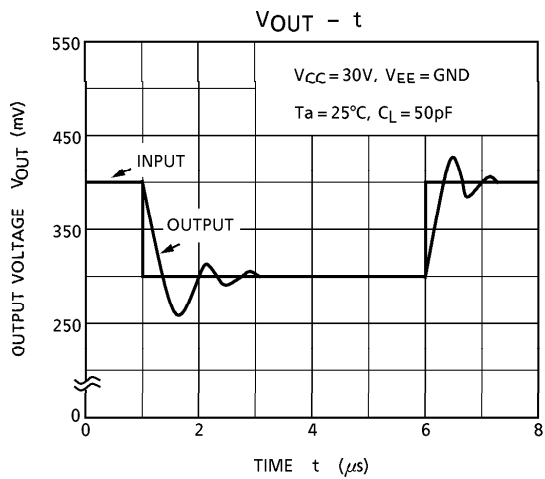
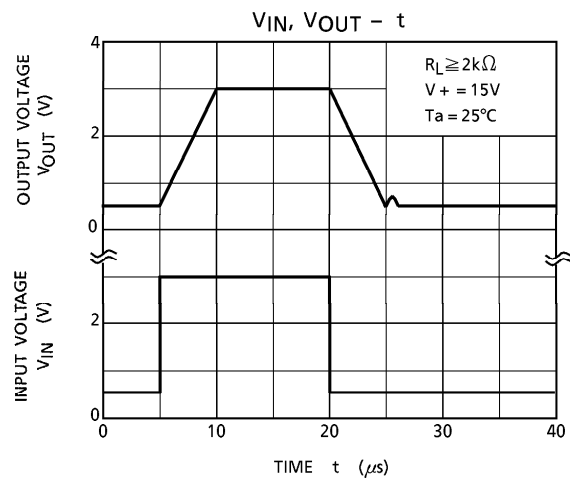
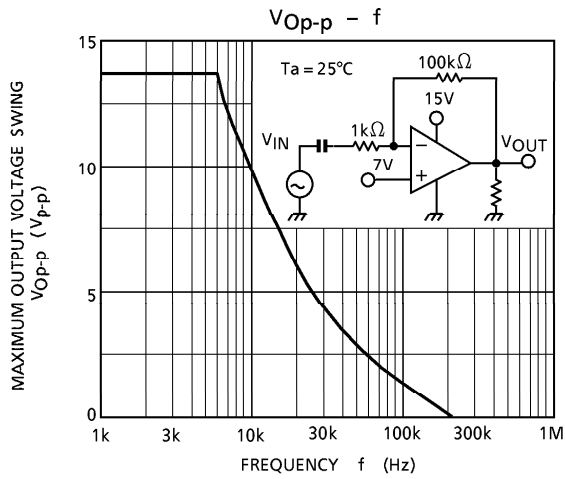
(6) V_{Op-p} , I_{source} , I_{sink}



- V_{Op-p}
 V_{OH} : SW1 IS SIDE A
 V_{OL} : SW1 IS SIDE B
- I_{source}
 $SW1$ IS SIDE A
 $V_{OUT} \rightarrow 0V$ MEASURE
- I_{sink}
 $SW1$ IS SIDE B
 $V_{OUT} \rightarrow 5V$ MEASURE

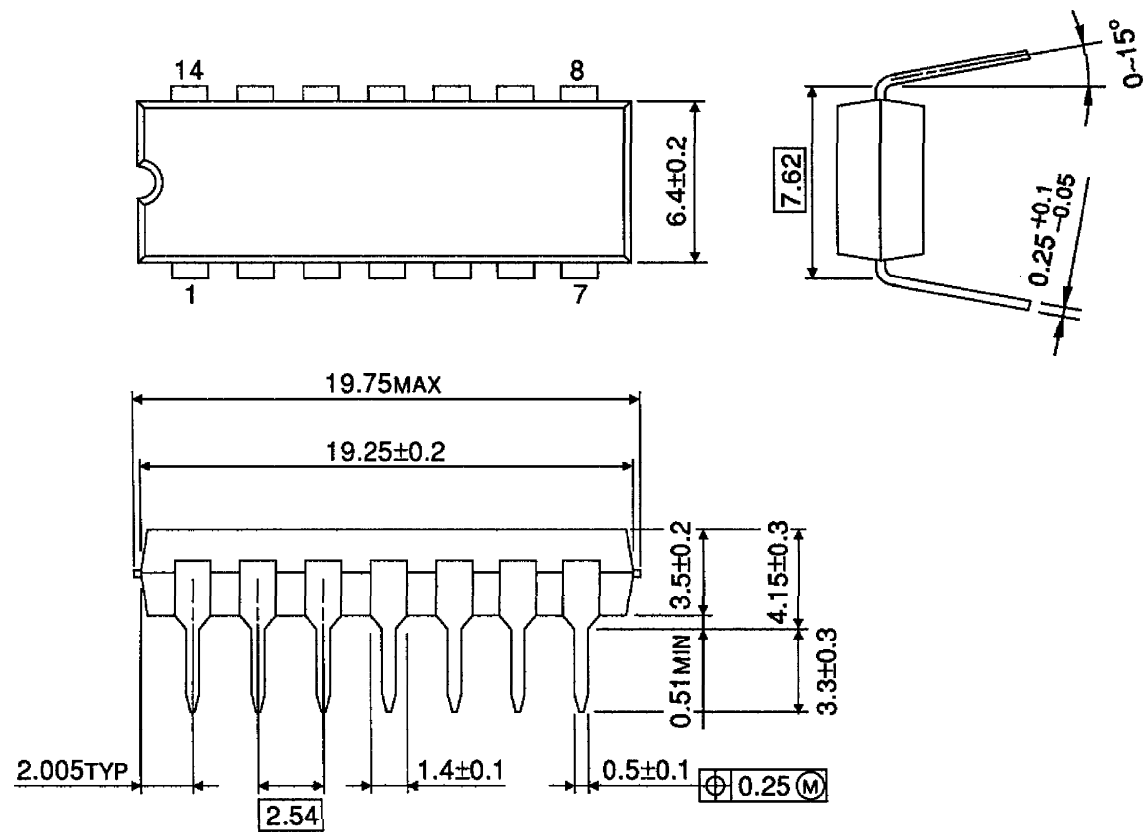
CHARACTERISTICS





OUTLINE DRAWING
DIP14-P-300-2.54

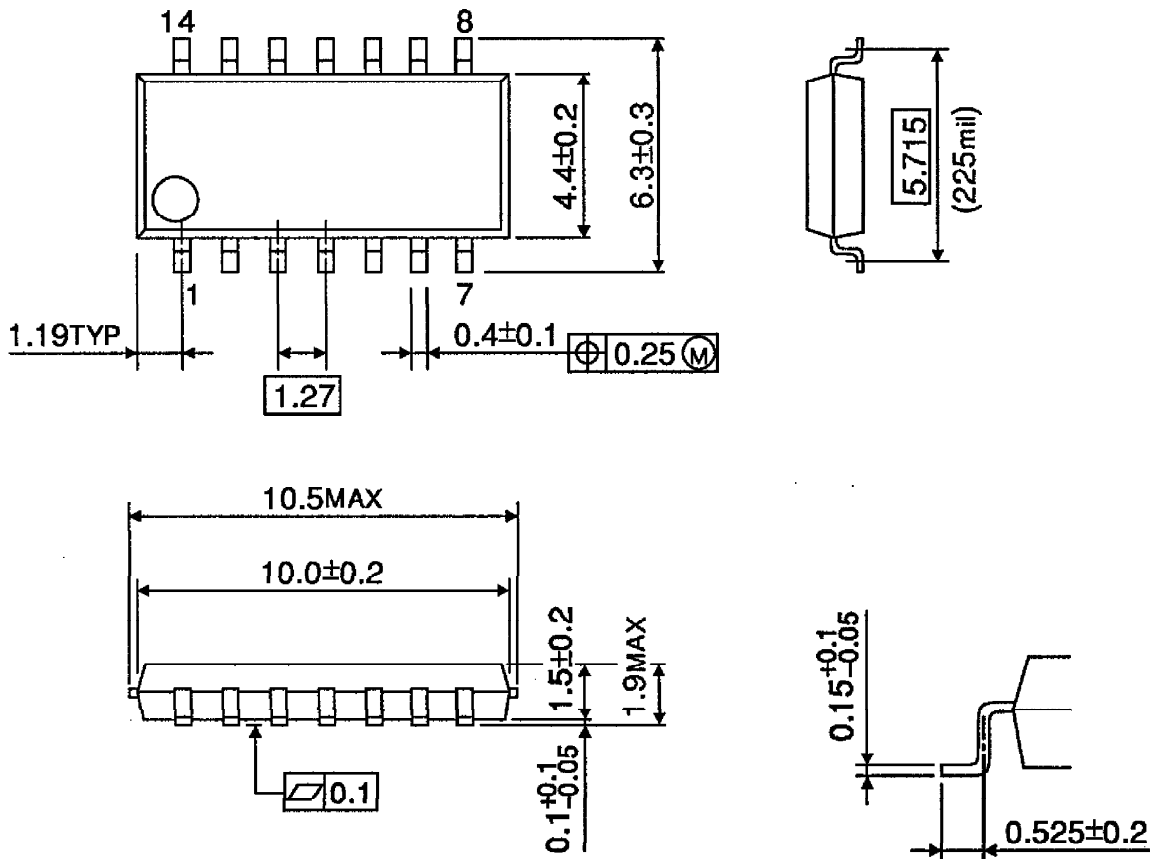
Unit : mm



Weight : 1.0g (Typ.)

OUTLINE DRAWING
SOP14-P-225-1.27

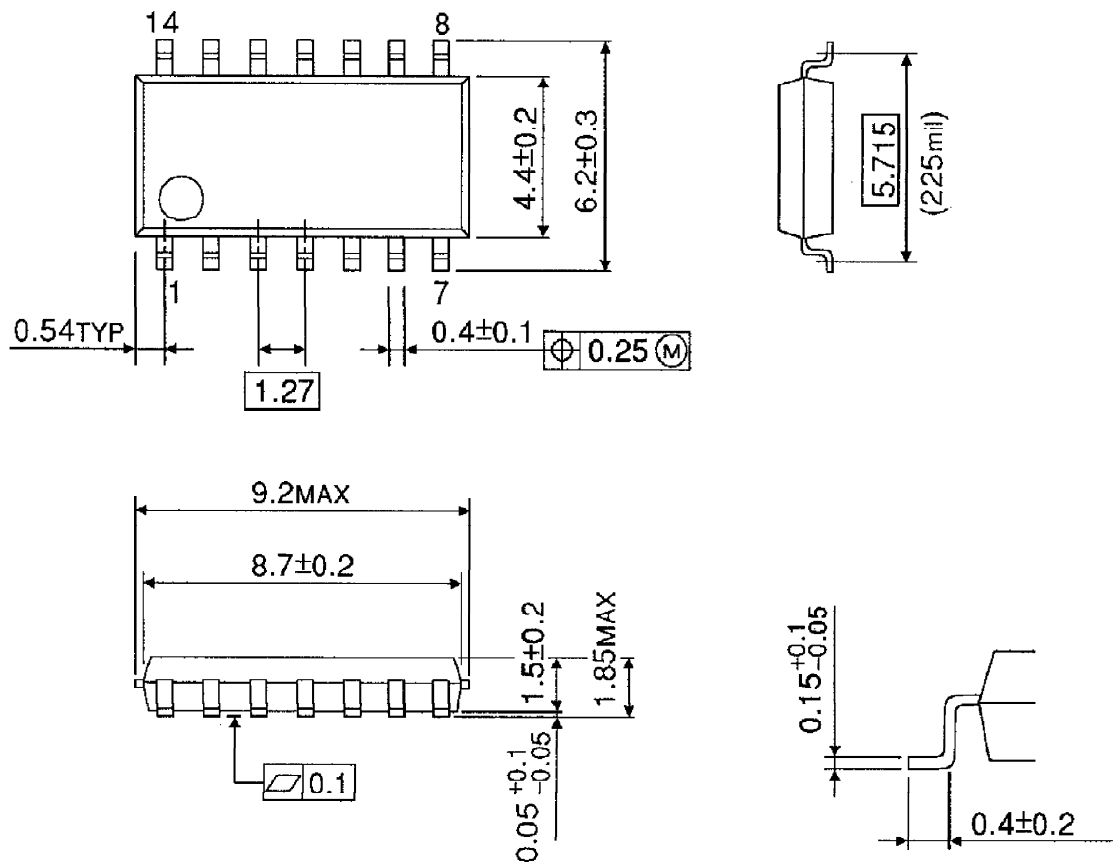
Unit : mm



Weight : 0.2g (Typ.)

OUTLINE DRAWING
SOP14-P-225-1.27B

Unit : mm



Weight : 0.2g (Typ.)