

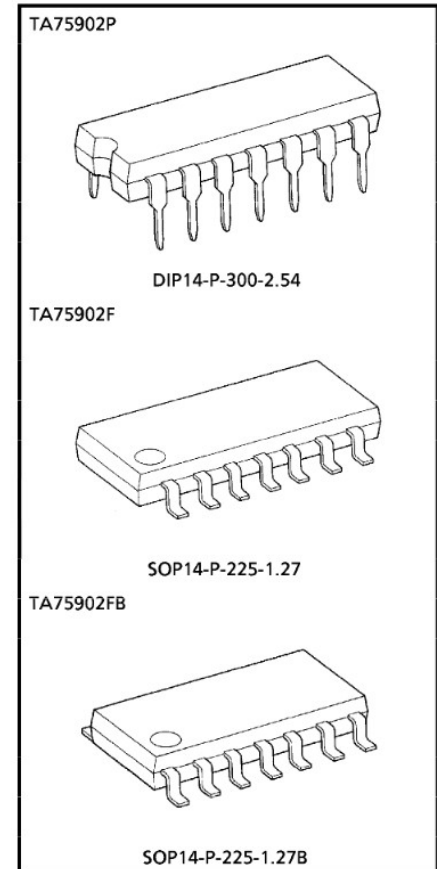
**TOSHIBA**

TA75902P/F/FB

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 3~36V  
Dual Supplies  $\pm 1.5 \sim 18V$
- Low input biasing current :  $I_I = 45nA$  (Typ.)

**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

- 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.
- The products described in this document are subject to foreign exchange and foreign trade control laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.

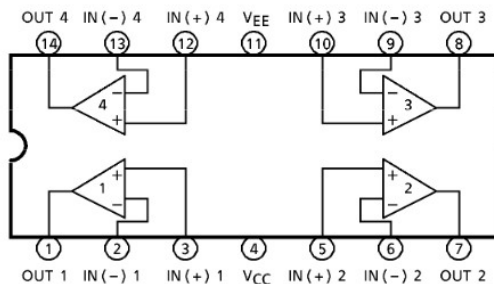
1997-10-17 1/10

**TOSHIBA**

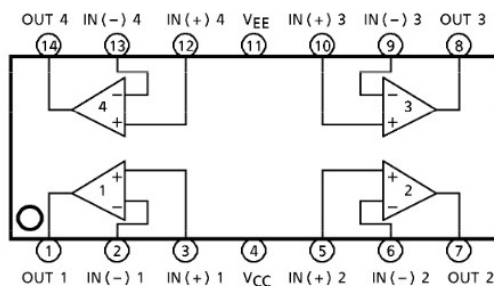
**TA75902P/F/FB**

**PIN CONNECTION (TOP VIEW)**

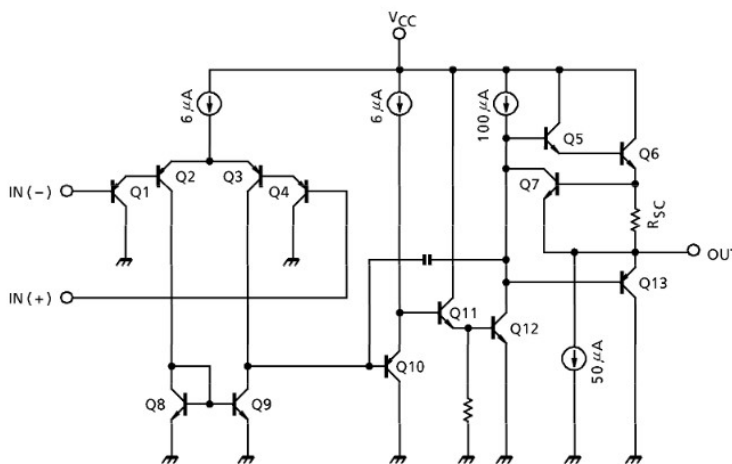
**TA75902P**



**TA75902F  
TA75902FB**



**EQUIVALENT CIRCUIT**



**TOSHIBA**

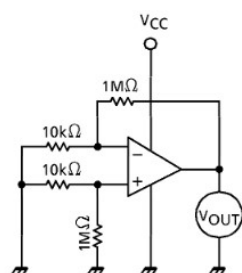
TA75902P/F/FB

**MAXIMUM RATINGS** (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>CC</sub> , V <sub>EE</sub>	± 18 OR 36	V
Differential Input Voltage	DV <sub>IN</sub>	± 36	V
Input Voltage	V <sub>IN</sub>	- 0.3~36	V
Power Dissipation	TA75902P	625	mW
	TA75902F	280	
	TA75902FB	280	
Operating Temperature	T <sub>opr</sub>	- 40~85	°C
Storage Temperature	T <sub>stg</sub>	- 55~125	°C

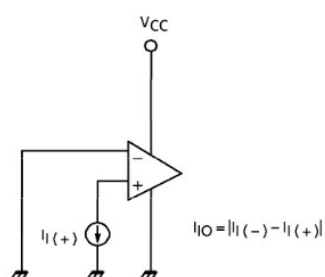
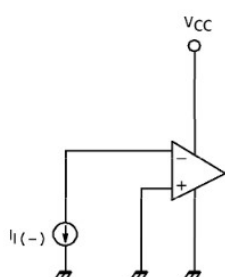
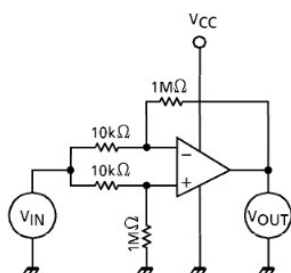
**ELECTRICAL CHARACTERISTICS** (V<sub>CC</sub> = 5V, V<sub>EE</sub> = GND, Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V <sub>IO</sub>	1	R <sub>g</sub> ≤ 10kΩ	—	2	7	mV
Input Offset Current	I <sub>IO</sub>	2	—	—	5	30	nA
Input Bias Current	I <sub>I</sub>	2	—	—	45	150	nA
Common Mode Input Voltage	CMV <sub>IN</sub>	3	V <sub>CC</sub> = 30V, V <sub>EE</sub> = GND	0	—	V <sub>CC</sub> - 1.5	V
Supply Current	I <sub>CC</sub> , I <sub>EE</sub>	4	R <sub>L</sub> = ∞, ALL OP Amps	—	0.7	1.2	mA
Voltage Gain	G <sub>V</sub>	5	R <sub>L</sub> ≥ 2kΩ	86	100	—	dB
Maximum Output Voltage Swing	V <sub>Op-p</sub>	6	R <sub>L</sub> = 2kΩ	0	—	V <sub>CC</sub> - 1.5	V
Common Mode Input Signal Rejection Ratio	CMRR	3	—	60	85	—	dB
Supply Voltage Rejection Ratio	SVRR	1	R <sub>g</sub> = 10kΩ	60	100	—	dB
Source Current	I <sub>source</sub>	6	IN (-) = 0V, IN (+) = 1V	20	40	—	mA
Sink Current	I <sub>sink</sub>	6	IN (-) = 1V, IN (+) = 0V	10	20	—	mA

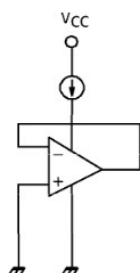
**TOSHIBA****TA75902P/F/FB****TEST CIRCUIT**(1)  $V_{IO}$ , SVRR

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

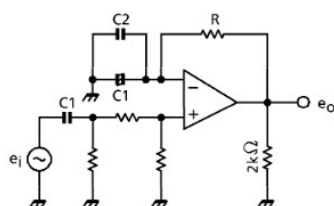
$$E = \left| \frac{V_{OUT1} - V_{OUT2}}{V_{CC1} - V_{CC2}} \right| \times \frac{1}{100}$$

 $V_{OUT1}$  :  $V_{OUT}$  ( $V_{CC1} = 5V$ ) $V_{OUT2}$  :  $V_{OUT}$  ( $V_{CC2} = 10V$ )(2)  $I_I$ ,  $I_{IO}$ (3)  $CMV_{IN}$ , CMRR

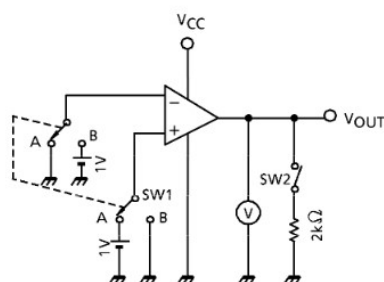
- $CMRR = 20 \log \cdot G_D / G_C$  (dB)
- $G_D$  : DIFFERENTIAL VOLTAGE GAIN
- $G_C$  : COMMON MODE VOLTAGE GAIN
- $CMV_{IN}$  :  $V_{IN} = 0V$ ,  $V_{CC} - 1.5V$  SUPPLES

**TOSHIBA****TA75902P/F/FB**(4)  $I_{CC}$ 

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

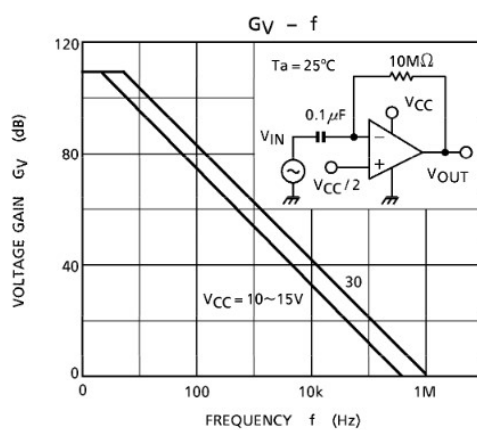
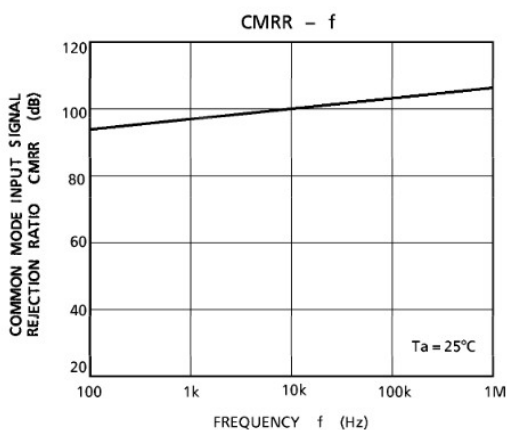
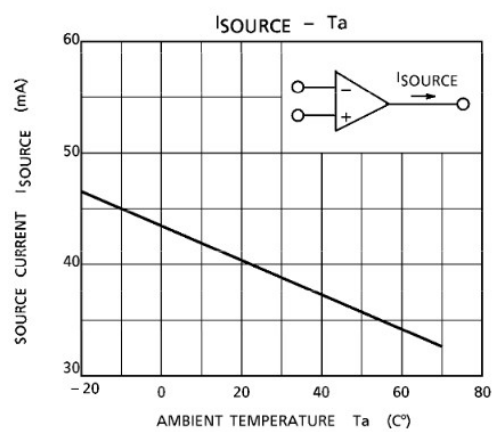
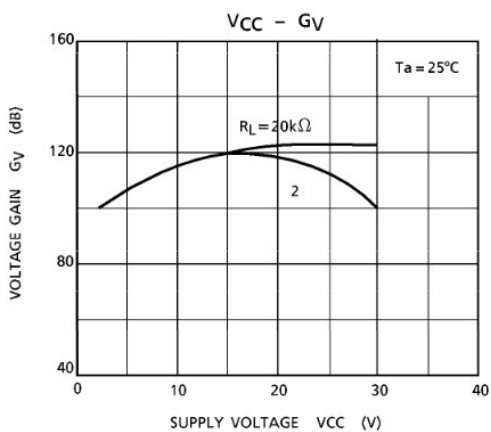
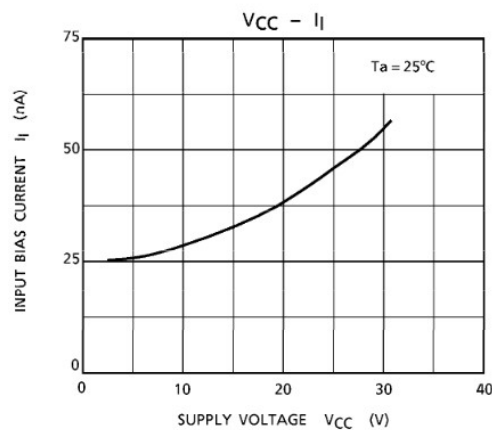
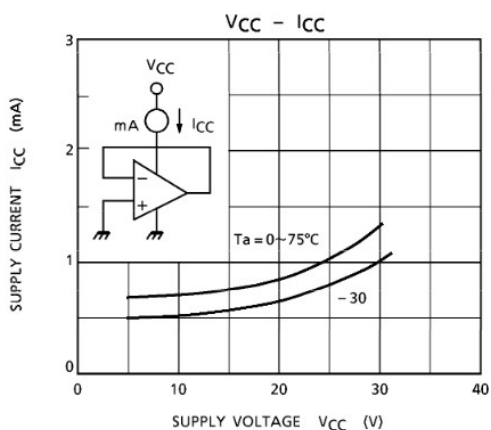
(5)  $G_V$ 

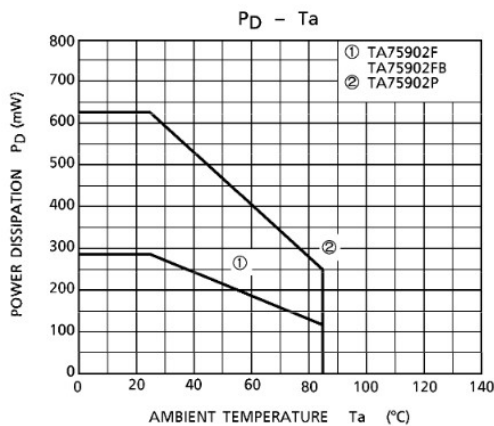
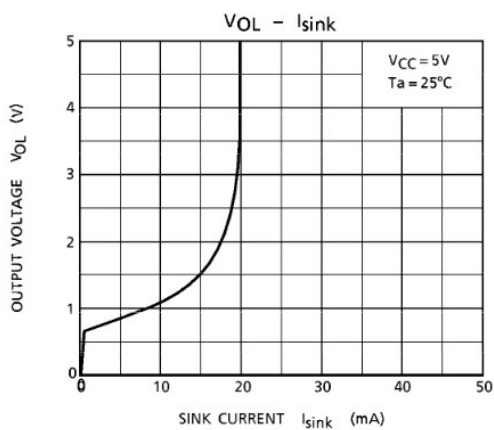
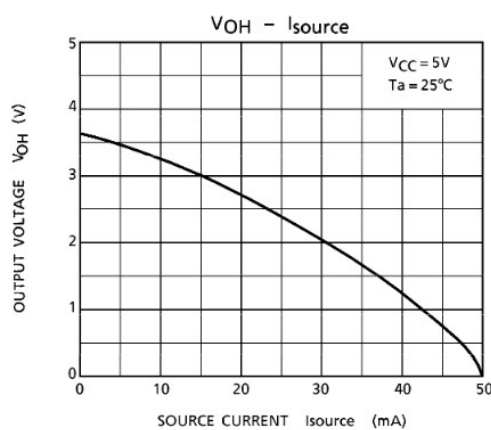
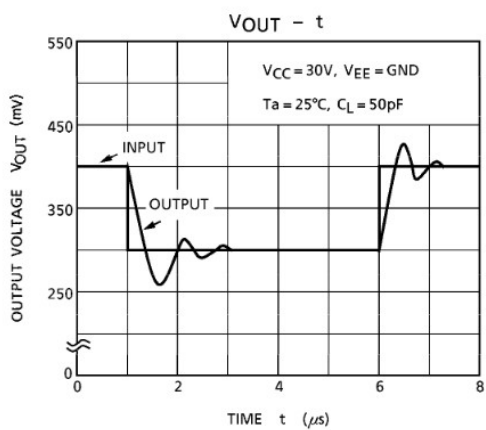
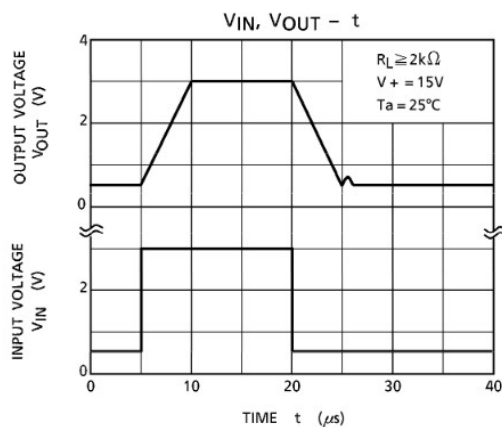
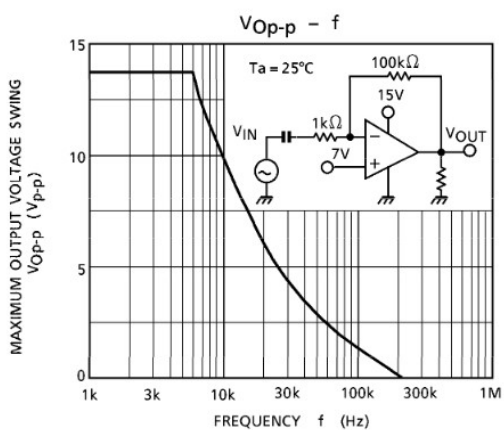
- $G_V = 20 \log e_o / e_i$  (dB)  
 $R \gg 1 / \omega C_1$   
 C1 : COUPLING CONDENSER  
 C2 : HIGH FREQUENCY BYPASS CONDENSER

(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**



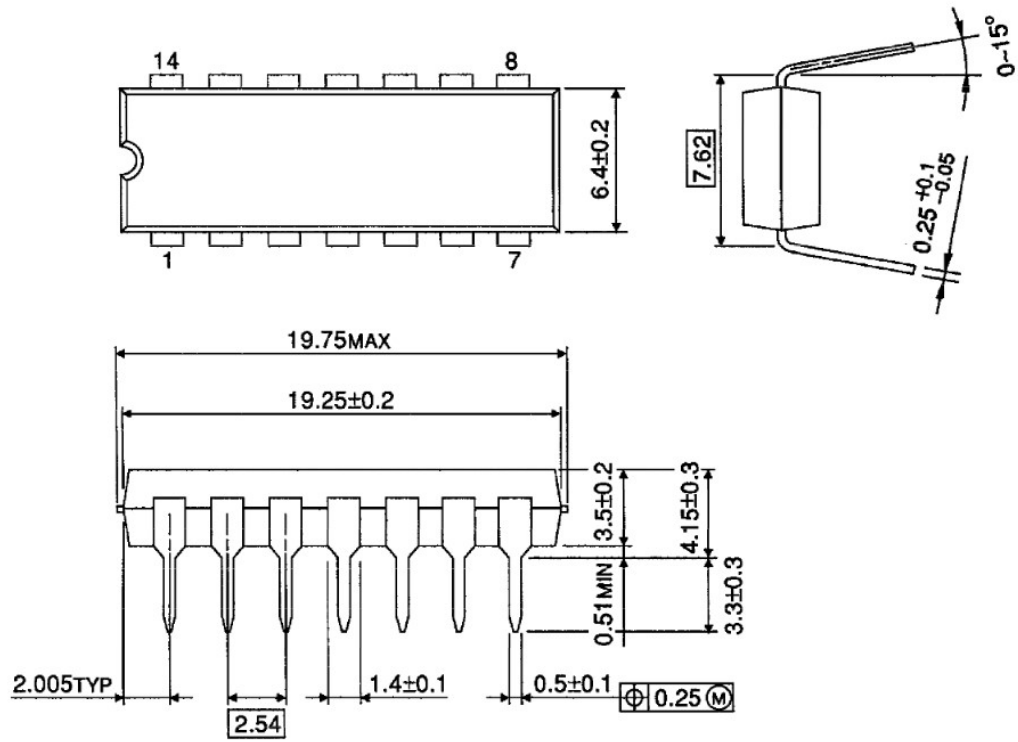


**TOSHIBA**

TA75902P/F/FB

**OUTLINE DRAWING**  
DIP14-P-300-2.54

Unit : mm



Weight : 1.0g (Typ.)

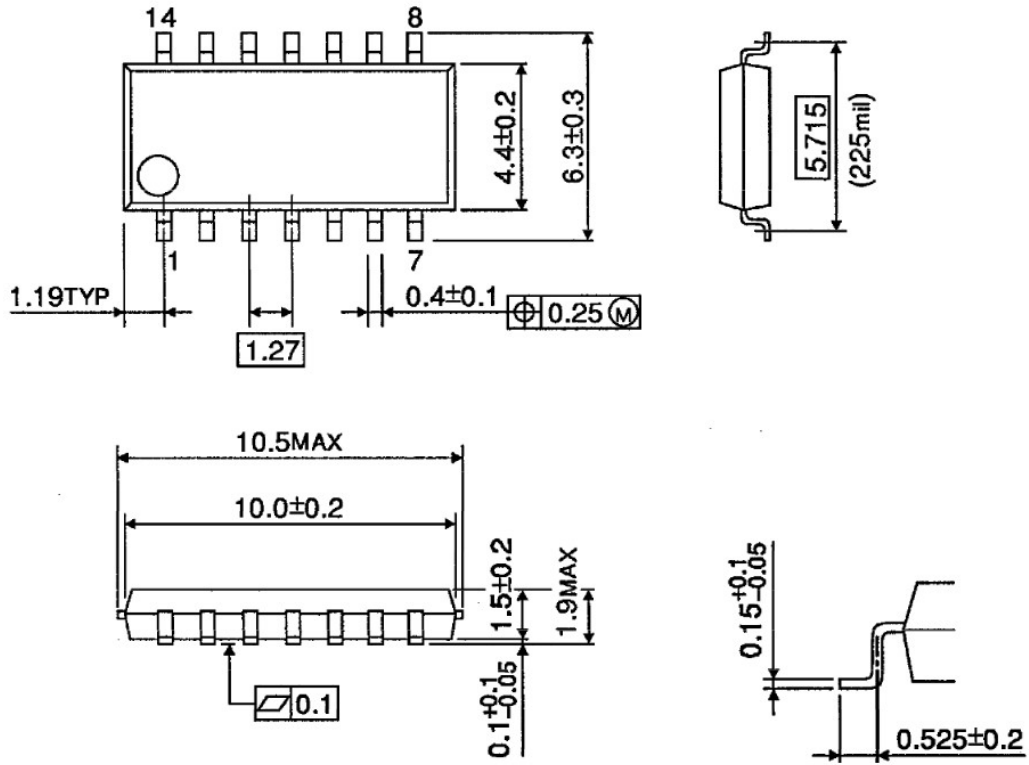


**TOSHIBA**

TA75902P/F/FB

**OUTLINE DRAWING**  
SOP14-P-225-1.27

Unit : mm



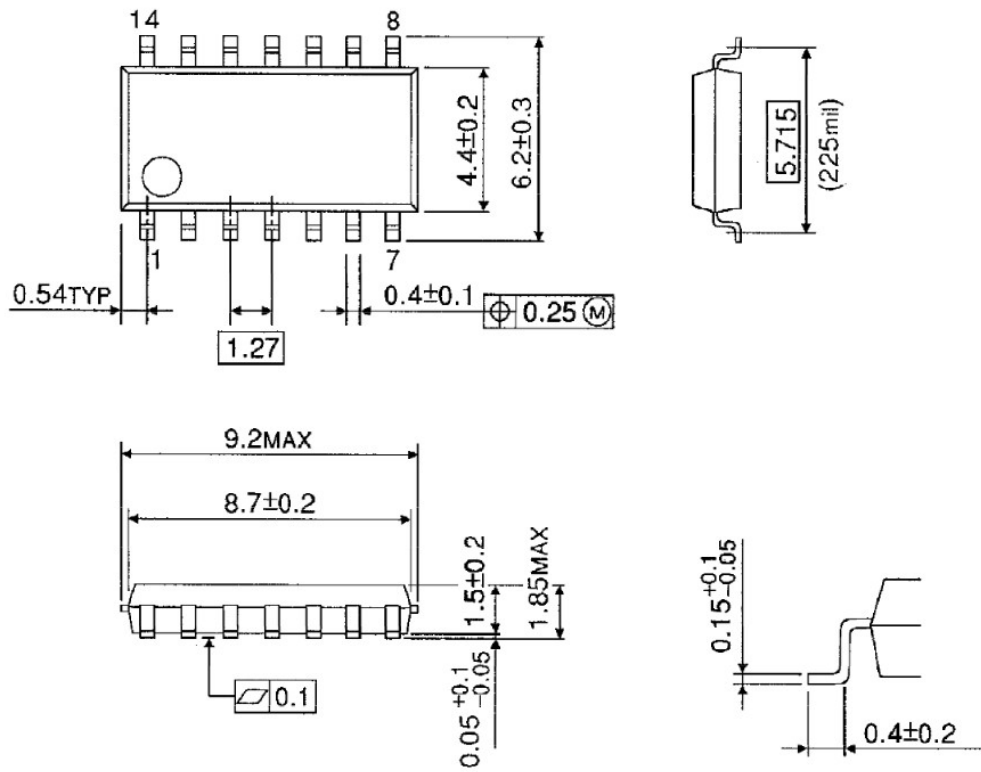
Weight : 0.2g (Typ.)

**TOSHIBA**

**TA75902P/F/FB**

**OUTLINE DRAWING**  
SOP14-P-225-1.27B

Unit : mm



Weight : 0.2g (Typ.)