

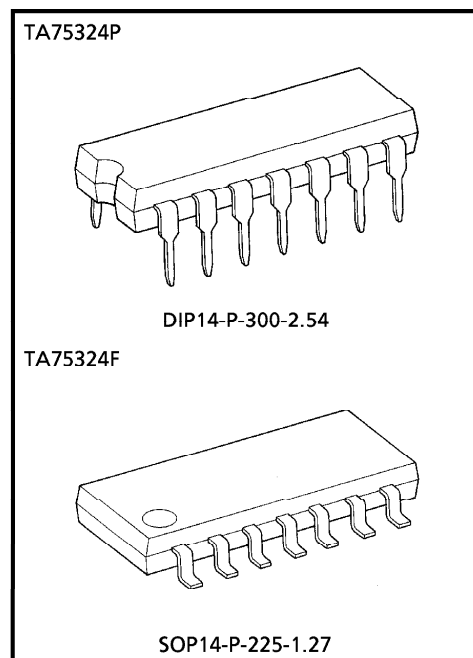
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA75324P, TA75324F

QUAD OPERATIONAL AMPLIFIER

FEATURES

- In the Linear Mode the Input Common Mode Voltage Range Includes Ground.
- Four Internally Compensated OP Amp is Single Package.
- Low power Dissipation and Power Drain Suitable for Battery Operation.
- Differential Input Voltage Range Equal to the Power Supply Voltage.
- Wide Power Supply Voltage Range and Signal Power Supply.
- Large Output Voltage Swing : $0V \sim V_{CC} - 1.5V$
- Low Input Biasing Current : $I_I = 45nA$ (Typ.)



Weight

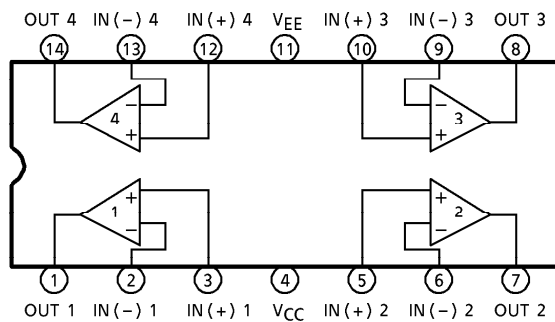
DIP14-P-300-2.54 : 1.0g (Typ.)
 SOP14-P-225-1.27 : 0.2g (Typ.)

961001EBA1

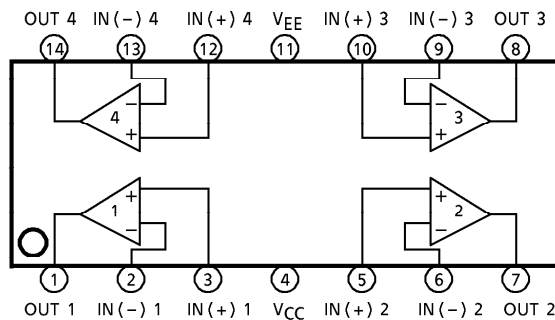
- TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing 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.

PIN CONNECTION (TOP VIEW)

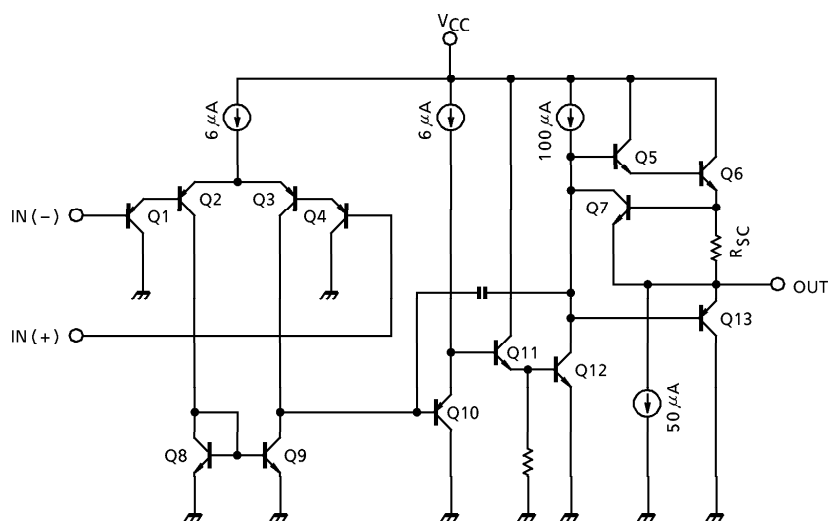
TA75324P



TA75324F



EQUIVALENT CIRCUIT



MAXIMUM RATINGS (Ta = 25°C)

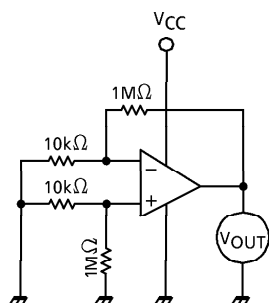
CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}, V_{EE}	± 18 OR 36	V
Differential Input Voltage		DV_{IN}	± 36	V
Input Voltage		V_{IN}	- 0.3~36	V
Power Dissipation	TA75324P	P_D	625	mW
	TA75324F		280	
Operating Temperature		T_{opr}	- 40~85	°C
Storage Temperature		T_{stg}	- 55~125	°C

ELECTRICAL CHARACTERISTICS ($V_{CC} = 5V$, $V_{EE} = GND$, Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	1	$R_g \leq 10k\Omega$	—	2	10	mV
Input Offset Current	I_{IO}	2	—	—	5	100	nA
Input Bias Current	I_I	2	—	—	45	250	nA
Common Mode Input Voltage	CMV_{IN}	3	$V_{CC} = 30V, V_{EE} = GND$	0	—	$V_{CC} - 1.5$	V
Supply Current	I_{CC}, I_{EE}	4	$R_L = \infty$, ALL OF Amps	—	0.7	1.2	mA
Voltage Gain	G_V	5	$R_L \geq 2k\Omega$	86	100	—	dB
Maximum Output Voltage Swing	V_{Op-p}	6	$R_L = 2k\Omega$	0	—	$V_{CC} - 1.5$	V
Common Mode Rejection Ratio	CMRR	3	—	60	85	—	dB
Supply Voltage Rejection Ratio	SVRR	1	$R_g = 10k\Omega$	60	100	—	dB
Source Current	I_{source}	6	IN (-) = $0V_{DC}$, IN (+) = $1V_{DC}$	20	40	—	mA
Sink Current	I_{sink}	6	IN (-) = $1V_{DC}$, IN (+) = $0V_{DC}$	10	20	—	mA

TEST CIRCUIT

(1) V_{IO} , SVRR



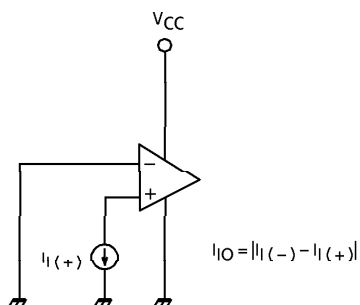
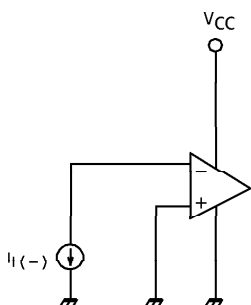
- $V_{IO} = V_{OUT} / 100$
- $SVRR = 20 \log E \text{ (dB)}$

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

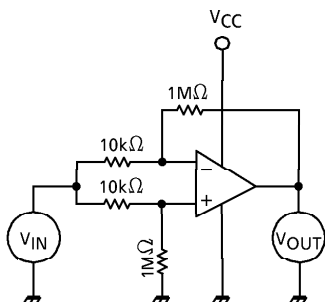
V_{OUT1} : V_{OUT} ($V_{CC1} = 5V$)

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

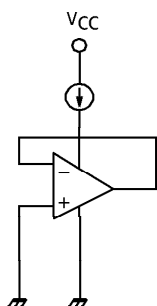
(2) I_I , I_{IO}



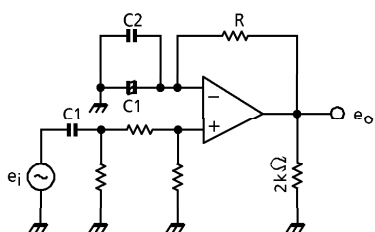
(3) CMV_{IN} , CMRR



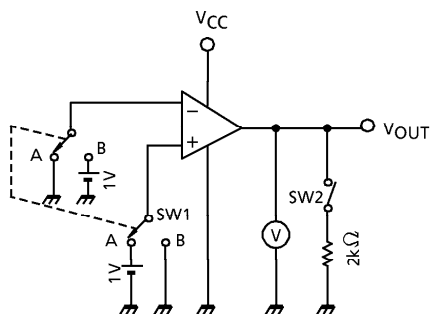
- $CMRR = 20 \log \cdot G_D / G_C \text{ (dB)}$
 G_D : DIFFERENTIAL VOLTAGE GAIN
 G_C : COMMON MODE VOLTAGE GAIN
- CMV_{IN} : $V_{IN} = 0V$, $V_{CC} - 1.5V$ SUPPLES

(4) I_{CC} 

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

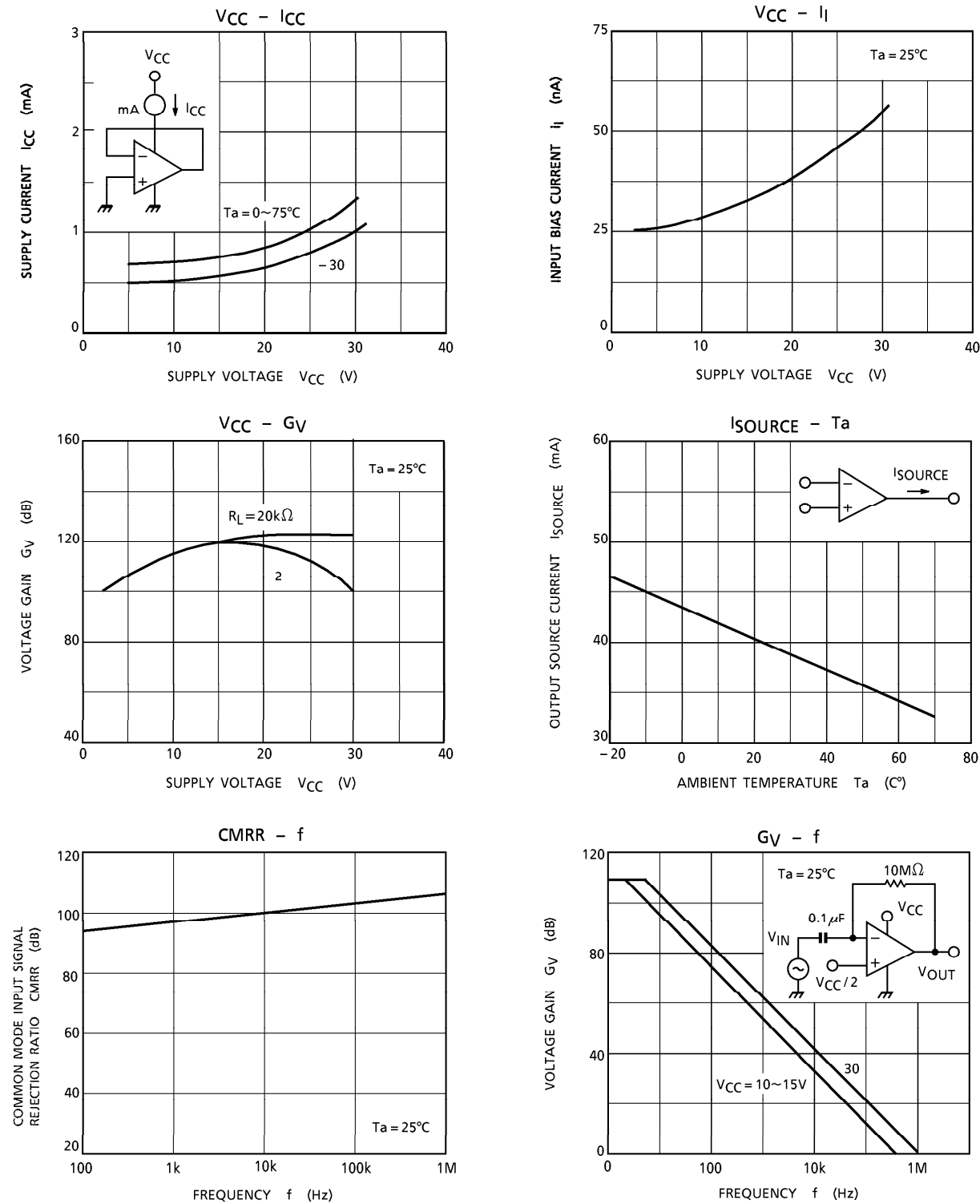
(5) G_V 

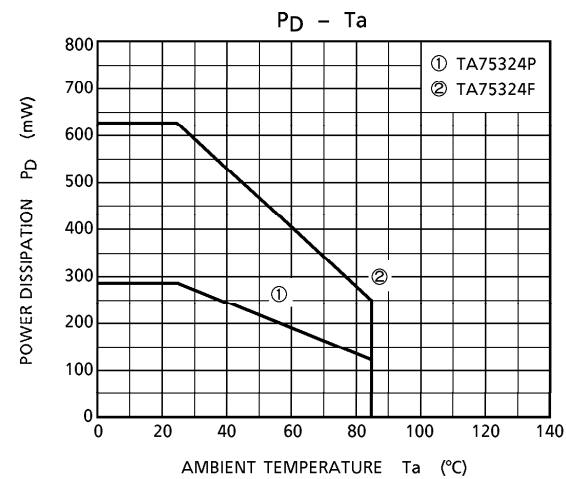
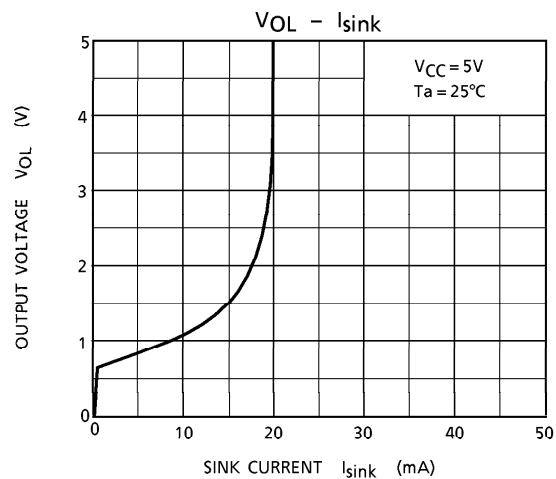
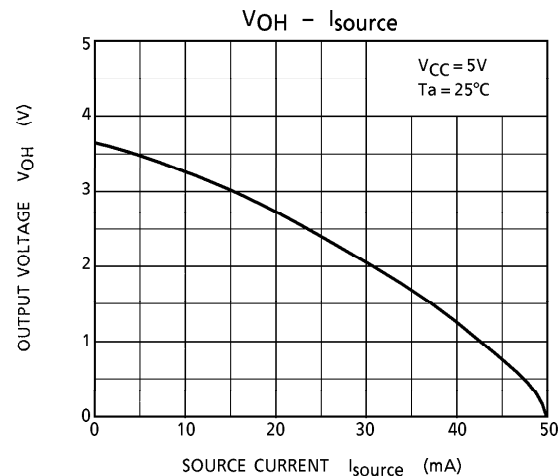
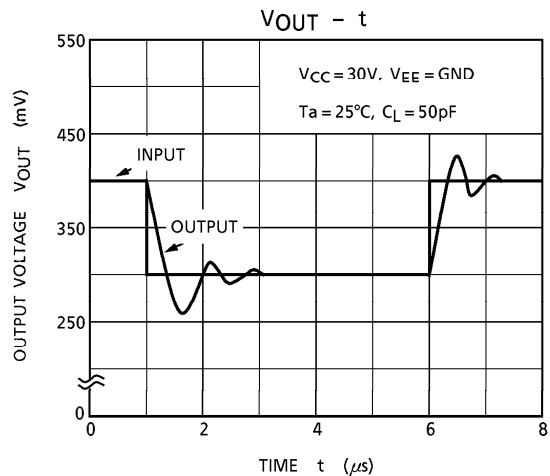
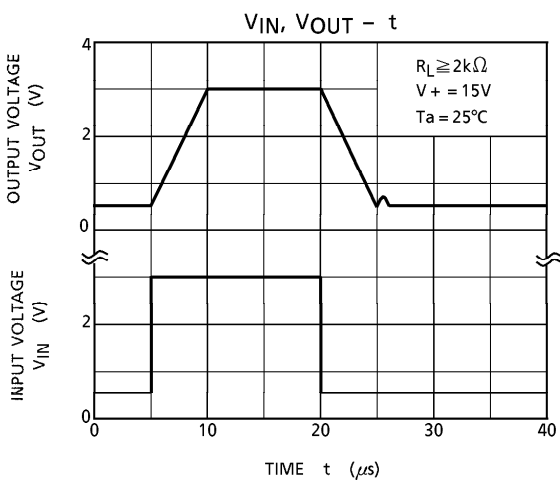
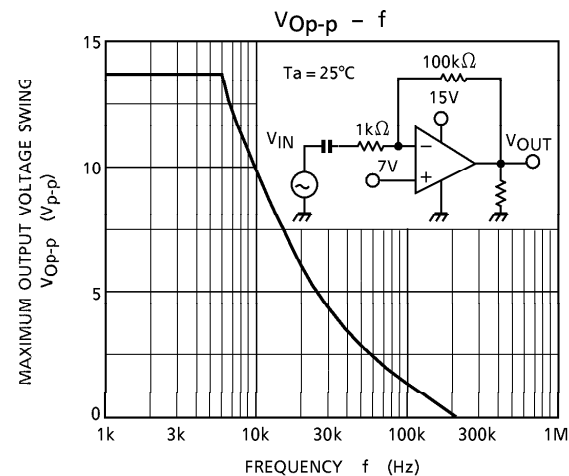
- $G_V = 20 \log e_o / e_i \text{ (dB)}$
 $R \gg 1 / \omega C_1$
 C_1 : COUPLING CONDENSER
 C_2 : HIGH FREQUENCY BYPASS CONDENSER

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

- V_{Op-p}
 V_{OH} : SW1 IS SIDE A, SW2 ON
 V_{OL} : SW1 IS SIDE B, SW2 ON
- I_{source}
SW1 IS SIDE A, SW2 OFF
 $V_{OUT} \rightarrow 0V$ MEASURE
- I_{sink}
SW1 IS SIDE B, SW2 OFF
 $V_{OUT} \rightarrow 5V$ MEASURE

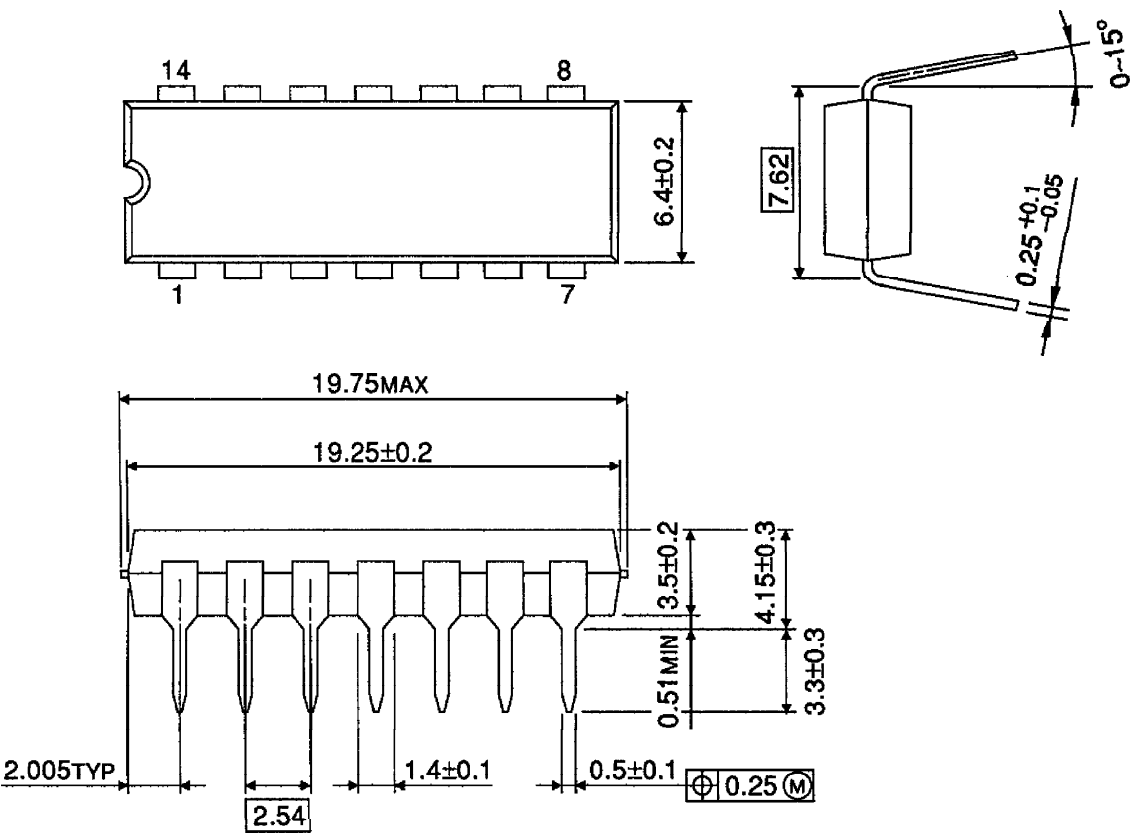
CHARACTERISTICS





OUTLINE DRAWING
DIP14-P-300-2.54

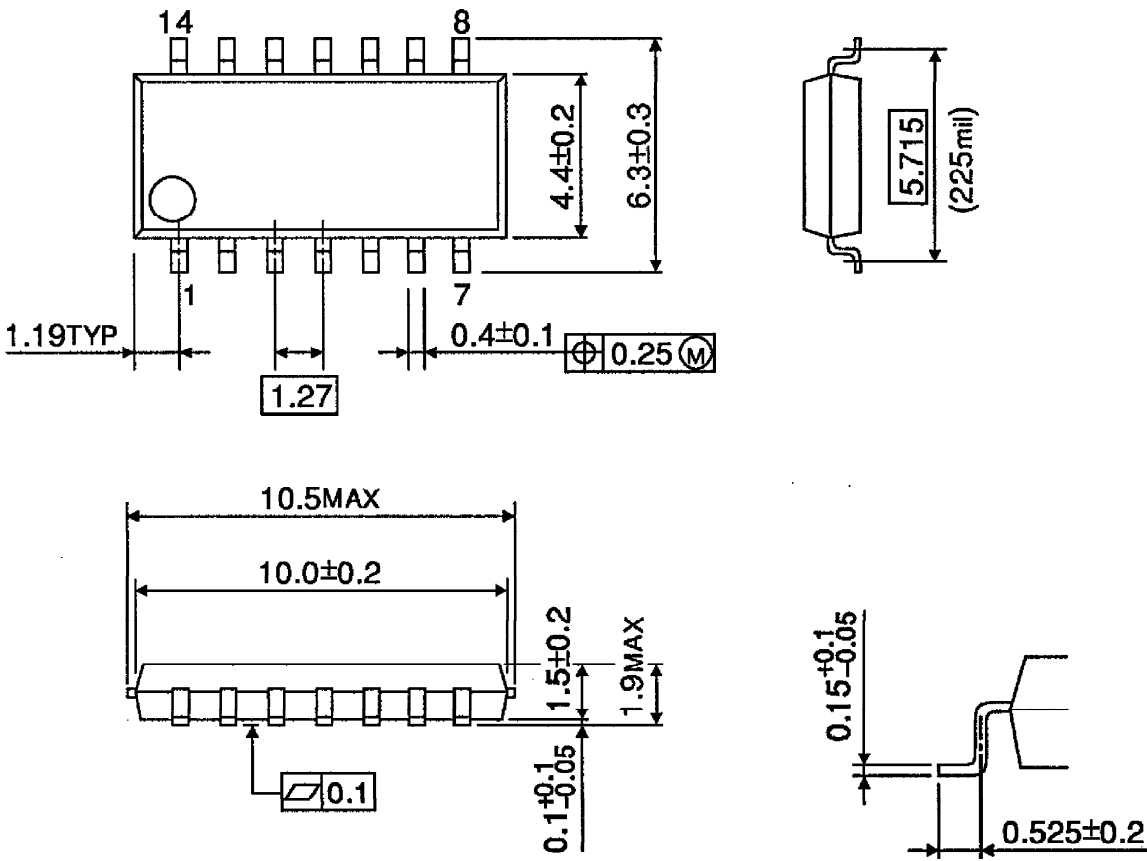
Unit : mm



Weight : 1.0g (Typ.)

OUTLINE DRAWING
SOP14-P-225-1.27

Unit : mm



Weight : 0.2g (Typ.)