

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA7508P, TA7508F

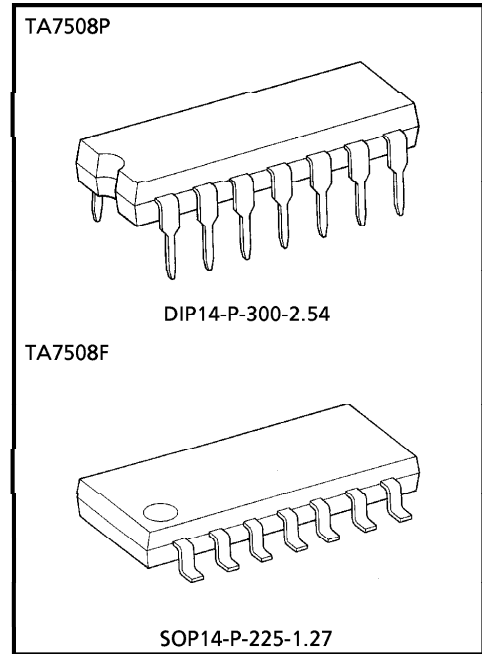
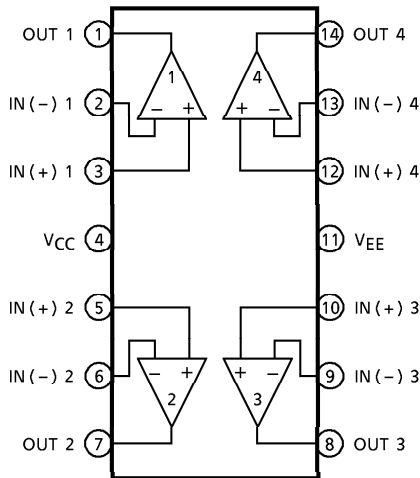
## QUAD OPERATIONAL AMPLIFIER

The TA7508P and TA7508F are quad low-noise operational amplifier.

### FEATURES

- Equivalent Input Noise Voltage :  $2.5\mu V_{rms}$  (Typ.)
- Slew Rate :  $1V/\mu s$  (Typ.)
- Wide Power Supply Range :  $\pm 4\sim\pm 18V$
- Internal Frequency Compensation
- Output Short Circuit Protection

### PIN CONNECTION (TOP VIEW)

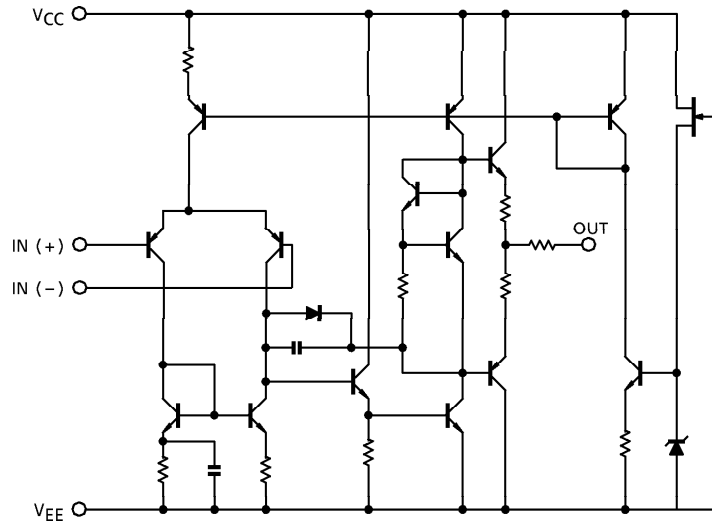


Weight  
 DIP14-P-300-2.54 : 1.0g (Typ.)  
 SOP14-P-225-1.27 : 0.2g (Typ.)

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**EQUIVALENT CIRCUIT**



**MAXIMUM RATINGS (Ta = 25°C)**

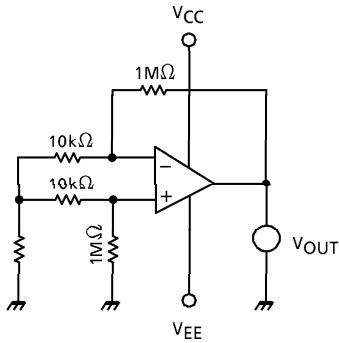
CHARACTERISTIC	SYMBOL	TA7508P	TA7508F	UNIT
Supply Voltage	V <sub>CC</sub>	18	18	V
	V <sub>EE</sub>	- 18	- 18	
Differential Input Voltage	DV <sub>IN</sub>	± 36	± 36	V
Input Voltage	V <sub>IN</sub>	V <sub>CC</sub> ~V <sub>EE</sub>	V <sub>CC</sub> ~V <sub>EE</sub>	V
Power Dissipation	P <sub>D</sub>	625	280	mW
Operating Temperature	T <sub>opr</sub>	- 40~85	- 40~85	°C
Ambient Temperature	T <sub>stg</sub>	- 55~125	- 55~125	°C

ELECTRICAL CHARACTERISTICS ( $V_{CC} = 15V$ ,  $V_{EE} = -15V$ ,  $T_a = 25^\circ C$ )

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	$V_{IO}$	1	$R_g \leq 10k\Omega$	—	0.5	6	mV
Input Offset Current	$I_{IO}$	2	—	—	5	200	nA
Input Bias Current	$I_I$	2	—	—	60	500	nA
Common Mode Input Voltage	$CMV_{IN}$	3	—	$\pm 12$	$\pm 14$	—	V
Maximum Output Voltage	$V_{OM}$	6	$R_L = 10k\Omega$	$\pm 12$	$\pm 14$	—	V
	$V_{OMR}$		$R_L = 2k\Omega$	$\pm 10$	$\pm 13$	—	
Source Current	$I_{source}$	8	—	—	40	—	mA
Sink Current	$I_{sink}$	7	—	—	40	—	mA
Voltage Gain (Open Loop)	$G_V$	5	$V_{OUT} = \pm 10V$ , $R_L = 2k\Omega$	86	100	—	dB
Common Mode Input Signal Rejection Ratio	CMRR	3	$R_g \leq 10k\Omega$	70	90	—	dB
Supply Voltage Rejection Ratio	SVRR	1	$R_g \leq 10k\Omega$	—	30	150	$\mu V/V$
Slew Rate	SR	9	$G_V = 1$ , $R_L = 2k\Omega$	—	1.0	—	$V/\mu s$
Unity Gain Cross Frequency	$f_T$	5	Open Loop	—	3.0	—	MHz
Supply Current	$I_{CC}$ , $I_{EE}$	4	—	—	7.0	11.3	mA
Equivalent Input Noise Voltage	$V_{NI}$	—	$R_S = 1k\Omega$ , $f = 30Hz \sim 30kHz$	—	2.5	—	$\mu V_{rms}$

TEST CIRCUIT

(1)  $V_{IO}$ ,  $SVRR$



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

$$E = \left| \frac{V_{OUT1} - V_{OUT2}}{(V_{CC1} - V_{EE1}) - (V_{CC2} - V_{EE2})} \right| \times \frac{1}{100}$$

$V_{OUT1}$  :  $V_{OUT}$  ( $V_{CC}$ ,  $V_{EE} = \pm 8V$ )

$V_{OUT2}$  :  $V_{OUT}$  ( $V_{CC}$ ,  $V_{EE} = \pm 18V$ )

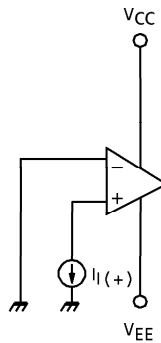
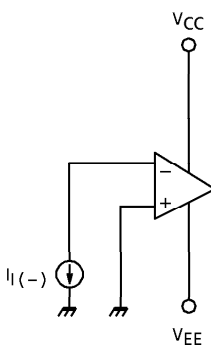
$V_{CC1}$  :  $V_{CC} = -8V$

$V_{EE1}$  :  $V_{EE} = -8V$

$V_{CC2}$  :  $V_{CC} = +18V$

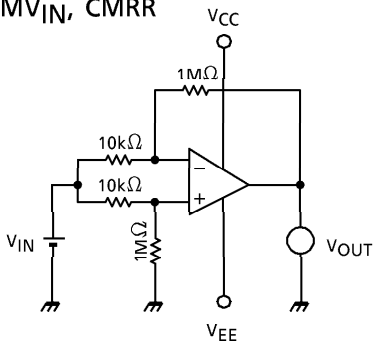
$V_{EE2}$  :  $V_{EE} = -18V$

(2)  $I_I$ ,  $I_{IO}$



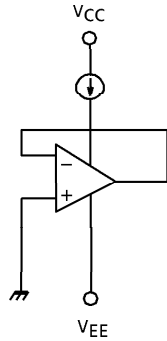
$$I_{IO} = |I_I(-) - I_I(+)|$$

(3)  $CMV_{IN}$ ,  $CMRR$



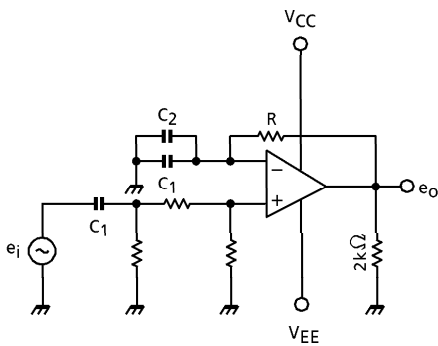
- $CMRR = 20 \log G_D / G_C \text{ (dB)}$
- $G_D$  : DIFFERENTIAL VOLTAGE GAIN
- $G_C$  : COMMON MODE VOLTAGE GAIN
- $CMV_{IN}$  :  $V_{IN} = -12V, 12V \text{ SUPPLIES}$

(4)  $I_{CC}$



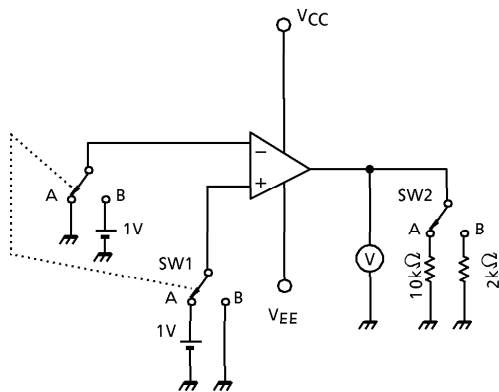
- $I_{CC} : V_{CC}, V_{EE} = \pm 15V$

(5)  $G_V, f_T$



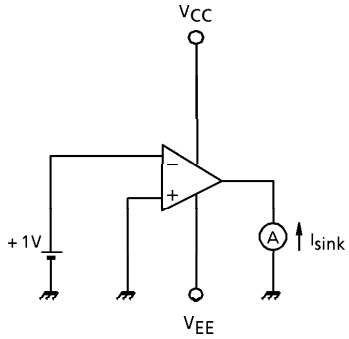
- $G_V = 20 \log e_o / e_i$  (dB)  
 $R \gg 1 / \omega C_1$   
 $C_1$  : COUPLING CONDENSER  
 $C_2$  : HIGH FREQUENCY BYPASS CONDENSER
- $f_T$  : INPUT FREQUENCY AT  $e_i = e_o$

(6)  $V_{OM}, V_{OMR}$

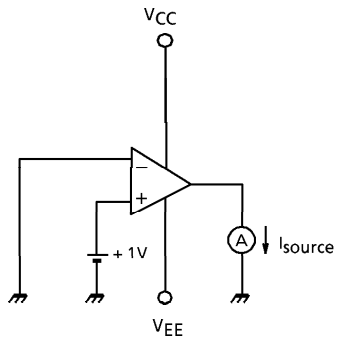


- $V_{OM} : (+) : SW1$  IS SIDE A,  $SW2$  IS SIDE A  
 $(-) : SW1$  IS SIDE B,  $SW2$  IS SIDE A
- $V_{OMR} : (+) : SW1$  IS SIDE A,  $SW2$  IS SIDE B  
 $(-) : SW1$  IS SIDE B,  $SW2$  IS SIDE B

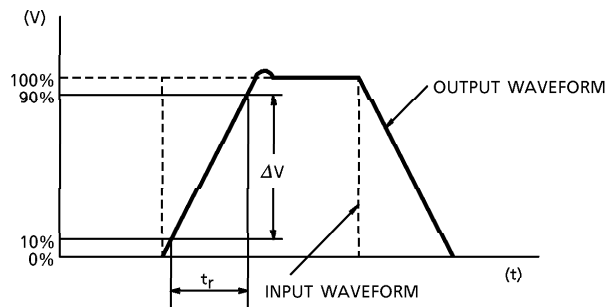
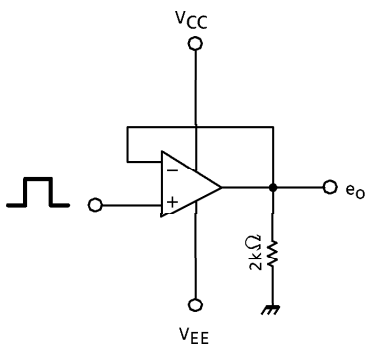
(7)  $I_{sink}$



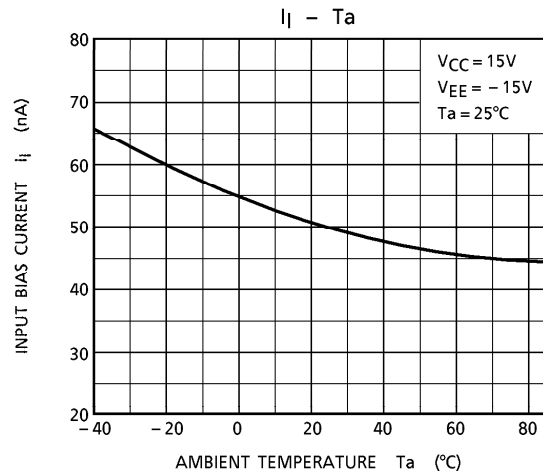
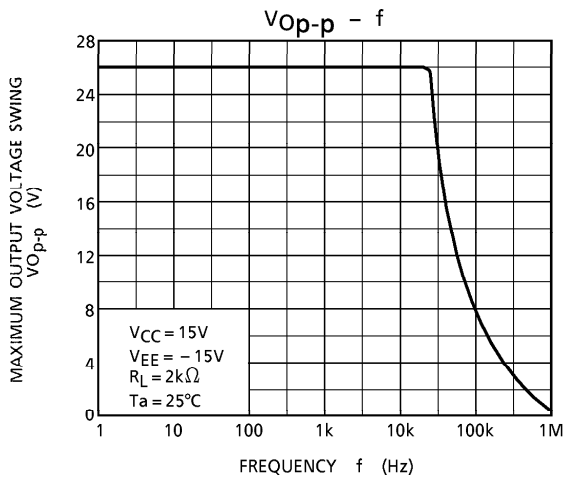
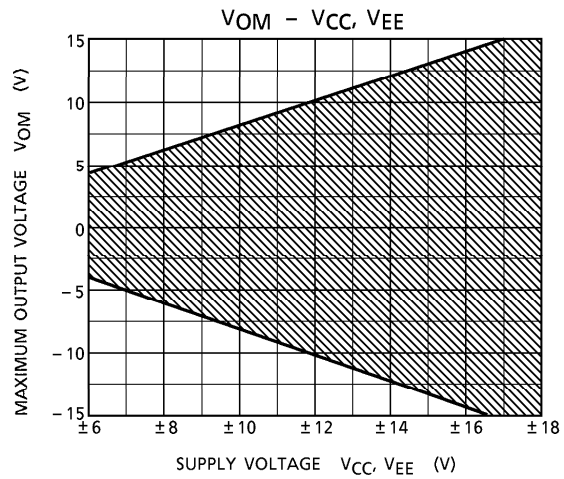
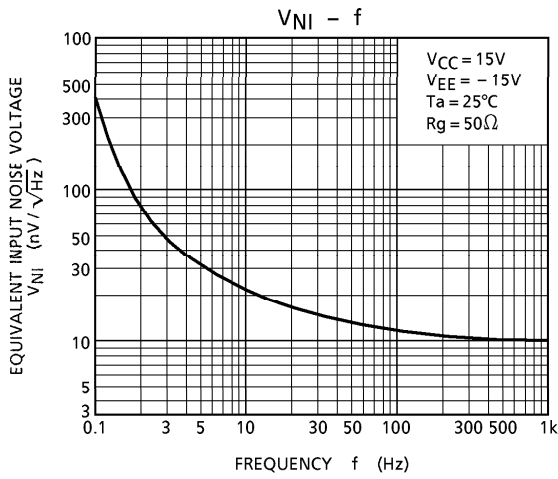
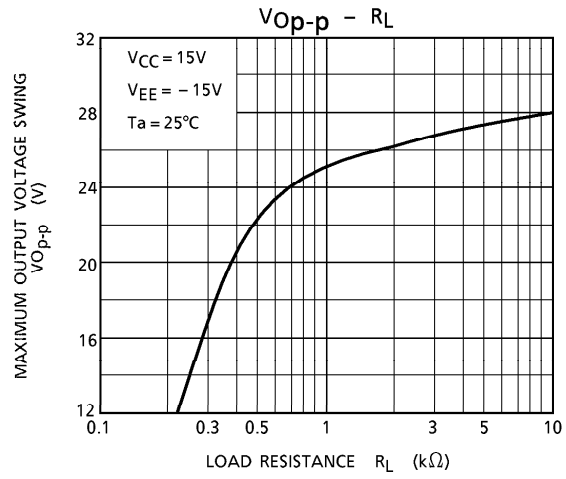
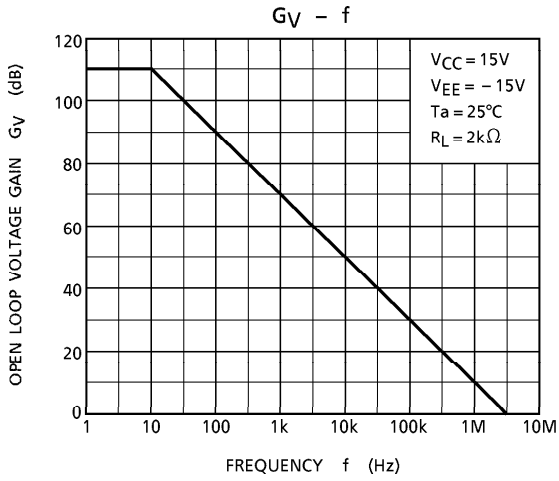
(8)  $I_{source}$

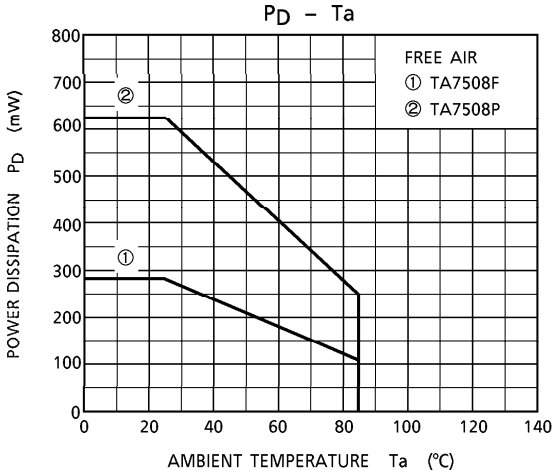


(9) SR



CHARACTERISTIC

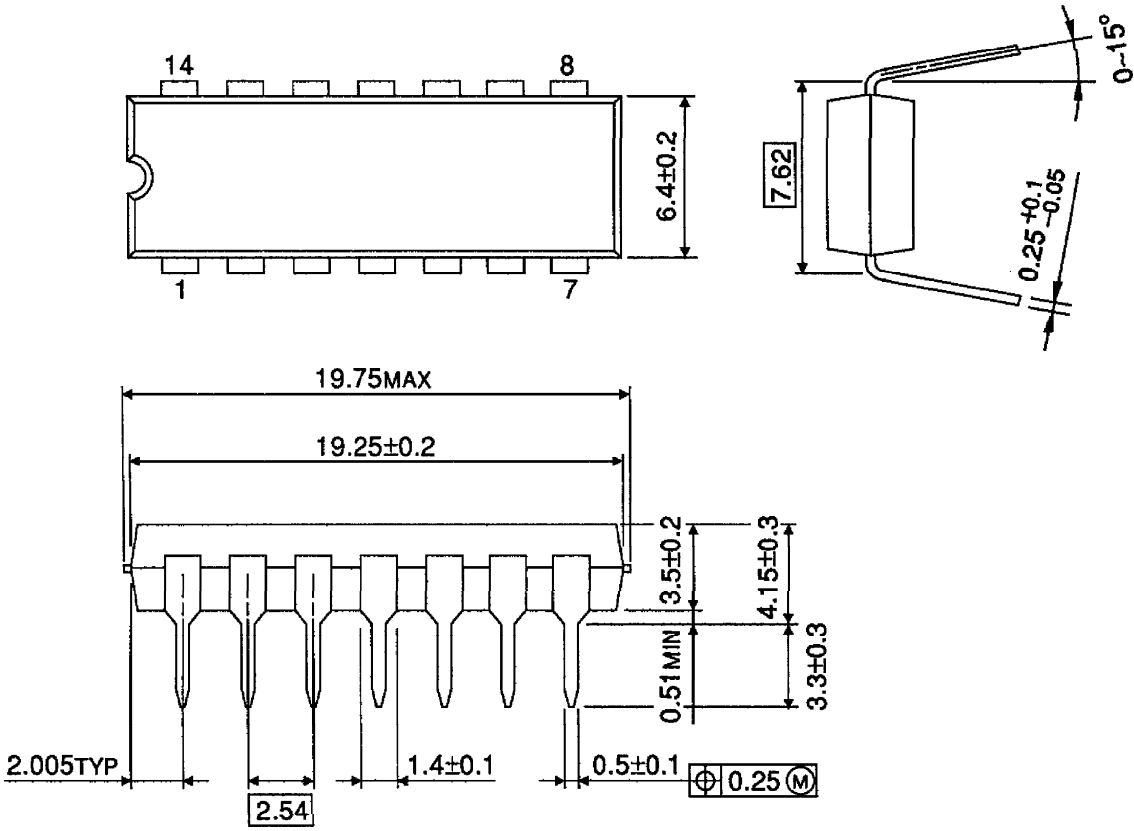






OUTLINE DRAWING  
DIP14-P-300-2.54

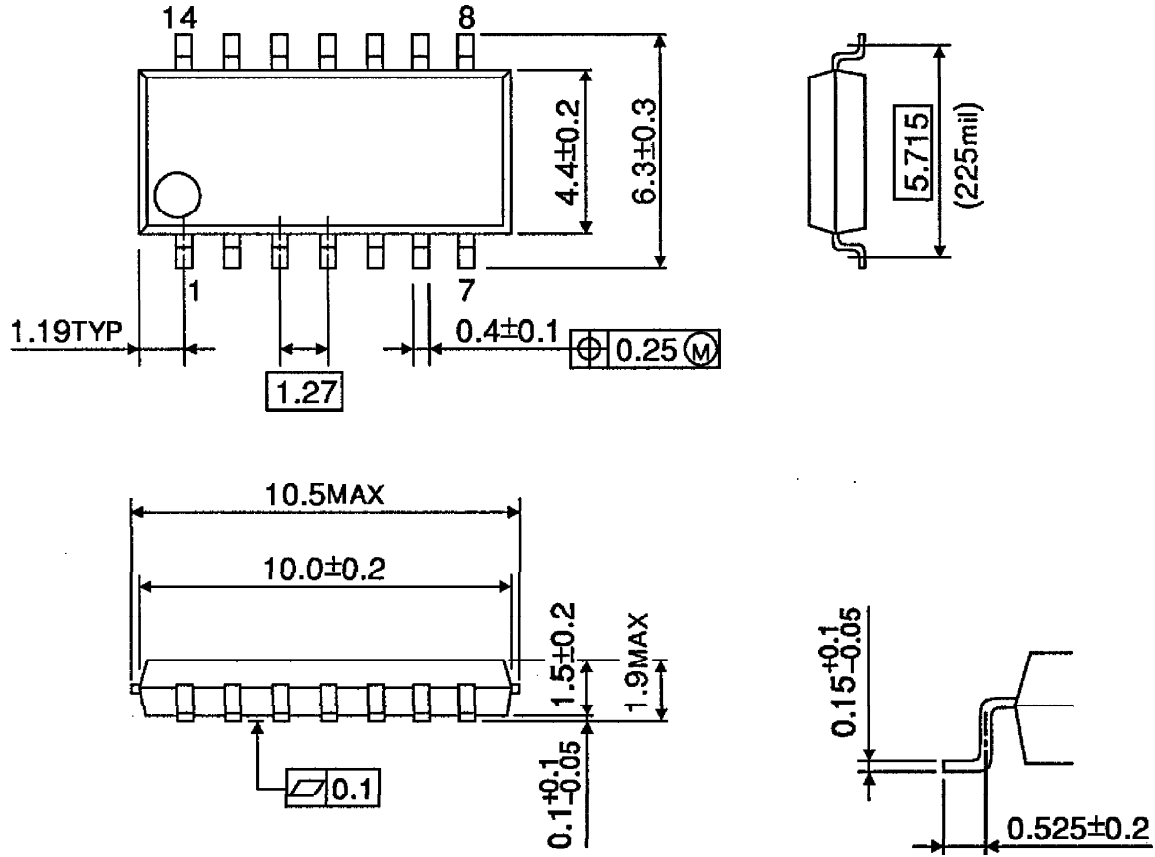
Unit : mm



Weight : 1.0g (Typ.)

OUTLINE DRAWING  
SOP14-P-225-1.27

Unit : mm



Weight : 0.2g (Typ.)