

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

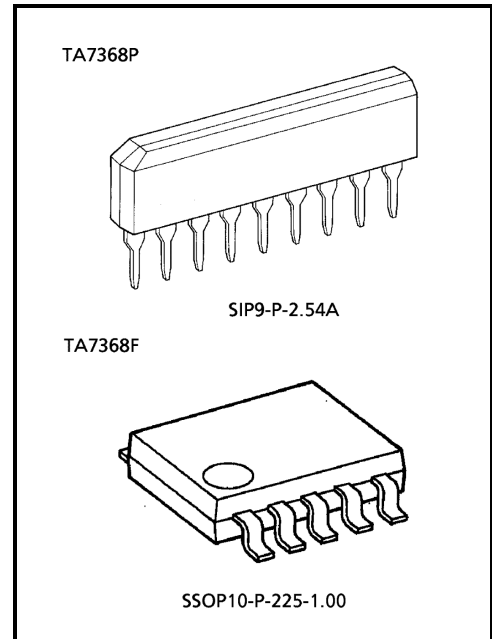
# TA7368P, TA7368F

## Audio Power Amplifier

The TA7368P and TA7368F are suitable for the audio power amplifier of portable cassette tape recorder and radio.

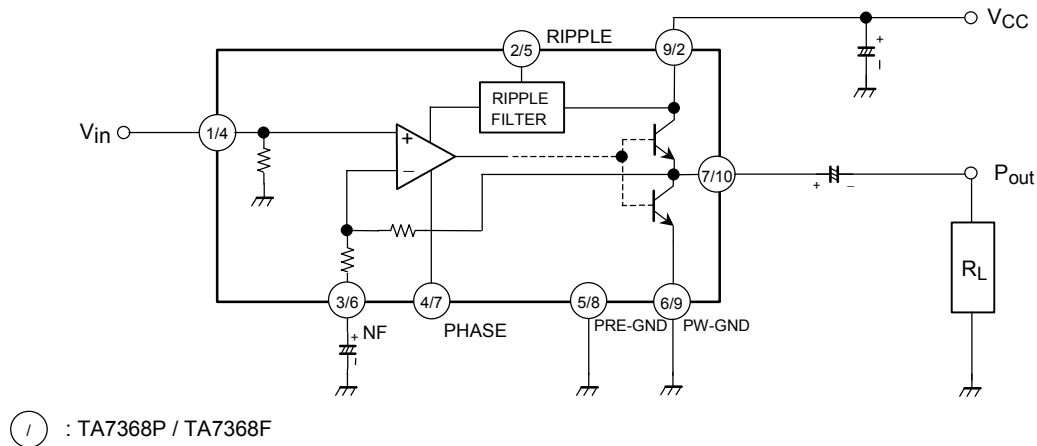
### Features

- Very few external parts (only three capacitors)
- Low quiescent current:  $I_{CCQ} = 6.6\text{mA (typ.) (}V_{CC} = 6\text{V)}$
- Output power  
 TA7368P  
 :  $P_{out} = 720\text{mW (typ.) (}V_{CC} = 6\text{V, }R_L = 4\Omega, \text{THD} = 10\%)$   
 TA7368P / F  
 :  $P_{out} = 450\text{mW (typ.) (}V_{CC} = 6\text{V, }R_L = 8\Omega, \text{THD} = 10\%)$
- Voltage gain:  $G_V = 40\text{dB (typ.)}$
- Operating supply voltage range:  $V_{CC} = 2\sim 10\text{V (}T_a = 25^\circ\text{C)}$



Weight  
 SIP9-P-2.54A : 0.92g (typ.)  
 SSOP10-P-225-1.00 : 0.09g (typ.)

### Block Diagram



## Precaution For Use And Application

### 1. Input stage

The input stage of power amplifier (equivalent circuit) is comprised of a PNP differential pair (Q<sub>2</sub> and Q<sub>3</sub>) preceded by a PNP emitter follower (Q<sub>1</sub>) which allows DC referencing of the source signal to ground. This eliminated the need for an input coupling capacitor. However, in case the brush noise of volume becomes a problem, provide serially a coupling capacitor to the input side.

### 2. Adjustment of voltage gain

The voltage gain is fixed at  $G_V \approx 40\text{dB}$  by the resistors (R<sub>4</sub> and R<sub>5</sub>) in IC, however, its reduction is possible through adding R<sub>f</sub> as shown in Figure 2. In this case, the voltage gain is obtained by the following equation.

$$G_V = 20 \log \frac{R_5 + R_4 + R_f}{R_4 + R_f}$$

It is recommended to use this IC with the voltage gain of  $G_V = 28\text{dB}$  or over.

### 3. Ripple rejection ratio

Adding CRIP, to ripple terminal 2 as shown in Figure 3, the ripple rejection ratio is improved from  $-25\text{dB}$  typ. to  $-45\text{dB}$  typ.

### 4. Power dissipation

Care should be taken to use this IC below maximum power dissipation. Because it may over maximum rating depending on operating condition.

- TA7368P  $P_D = 900\text{mW}$  ( $T_a = 25^\circ\text{C}$ )
- TA7368F  $P_D = 400\text{mW}$  ( $T_a = 25^\circ\text{C}$ )

### 5. Phase-compensation

Small temperature coefficient and excellent frequency characteristic is needed by capacitors below.

- Oscillation preventing capacitors for power amplifier output
- Bypass capacitor for ripple filter
- Capacitor between VCC and GND

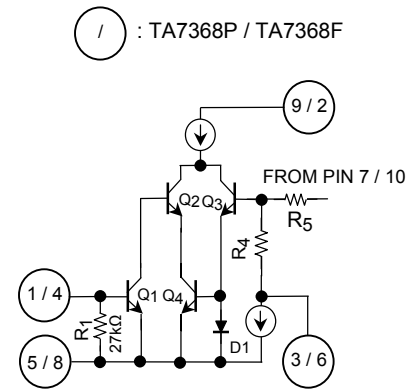


Fig.1

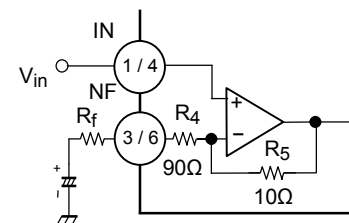


Fig.2

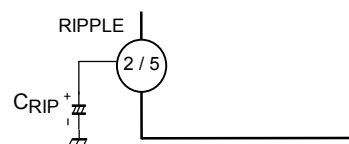


Fig.3

## Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Supply voltage		V <sub>CC</sub>	14	V
Power dissipation	TA7368P	P <sub>D</sub> (Note)	900	mW
	TA7368F		400	
Operating temperature		T <sub>opr</sub>	-25~75	°C
Storage temperature		T <sub>stg</sub>	-55~150	°C

(Note) Derated above Ta = 25°C in the proportion of 7.2mW / °C for TA7368P and of 3.2mW / °C for TA7368F.

## Electrical Characteristics For TA7368P

(Unless otherwise specified, V<sub>CC</sub> = 6V, f = 1kHz, R<sub>g</sub> = 600Ω, R<sub>L</sub> = 4Ω, Ta = 25°C)

Characteristic	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Quiescent current	I <sub>CCQ</sub>	—	V <sub>CC</sub> = 3V, V <sub>in</sub> = 0	—	5.5	—	mA
			V <sub>CC</sub> = 6V, V <sub>in</sub> = 0	—	6.6	15	
			V <sub>CC</sub> = 9V, V <sub>in</sub> = 0	—	7.5	18	
Output power	P <sub>out</sub>	—	V <sub>CC</sub> = 3V, R <sub>L</sub> = 4Ω, THD = 10%	—	120	—	mW
			V <sub>CC</sub> = 6V, R <sub>L</sub> = 4Ω, THD = 10%	500	720	—	
			V <sub>CC</sub> = 6V, R <sub>L</sub> = 8Ω, THD = 10%	300	450	—	
			V <sub>CC</sub> = 9V, R <sub>L</sub> = 8Ω, THD = 10%	800	1100	—	
			V <sub>CC</sub> = 9V, R <sub>L</sub> = 16Ω, THD = 10%	450	610	—	
Total harmonic distortion	THD	—	P <sub>out</sub> = 100mW	—	0.3	1.0	%
Voltage gain	G <sub>V</sub>	—	V <sub>in</sub> = 0.5mV <sub>rms</sub>	37	40	43	dB
Output noise voltage	V <sub>no</sub>	—	R <sub>g</sub> = 10kΩ, BPF = 20Hz~20kHz	—	0.2	0.5	mV <sub>rms</sub>
Ripple rejection ratio	RR	—	f <sub>r</sub> = 100Hz, V <sub>r</sub> = 0.3V <sub>rms</sub> Without C <sub>RIP</sub>	—	25	—	dB
Input resistance	R <sub>IN</sub>	—	—	—	27	—	kΩ

## Terminal Voltage For TA7368P

Typical Terminal Voltage at no Signal With Test Circuit. (V<sub>CC</sub> = 6V, Ta = 25°C)

[Unit: V]

Terminal no.	1	2	3	4	5	6	7	8	9
DC voltage (V)	0	2.40	0.62	0.64	0	0	2.61	NC	6.0

## Electrical Characteristic For TA7368F

(unless otherwise specified,  $V_{CC} = 6V$ ,  $f = 1kHz$ ,  $R_g = 600\Omega$ ,  $R_L = 8\Omega$ ,  $T_a = 25^\circ C$ )

Characteristic	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Quiescent current	$I_{CCQ}$	—	$V_{CC} = 3V, V_{in} = 0$	—	5.5	—	mA
			$V_{CC} = 6V, V_{in} = 0$	—	6.6	15	
			$V_{CC} = 9V, V_{in} = 0$	—	7.5	18	
Output power	$P_{out}$	—	$V_{CC} = 3V, R_L = 4\Omega, THD = 10\%$	—	120	—	mW
			$V_{CC} = 6V, R_L = 8\Omega, THD = 10\%$	300	450	—	
			$V_{CC} = 9V, R_L = 16\Omega, THD = 10\%$	450	610	—	
Total harmonic distortion	THD	—	$P_{out} = 100mW$	—	0.3	1.0	%
Voltage gain	$G_V$	—	$V_{in} = 0.5mV_{rms}$	37	40	43	dB
Output noise voltage	$V_{no}$	—	$R_g = 10k\Omega, BPF = 20Hz \sim 20kHz$	—	0.2	0.5	$mV_{rms}$
Ripple rejection ratio	RR	—	$f_r = 100Hz, V_r = 0.3V_{rms}$ , Without $C_{RIP}$	—	25	—	dB
Input resistance	$R_{IN}$	—	—	—	27	—	$k\Omega$

## Terminal Voltage For TA7368F

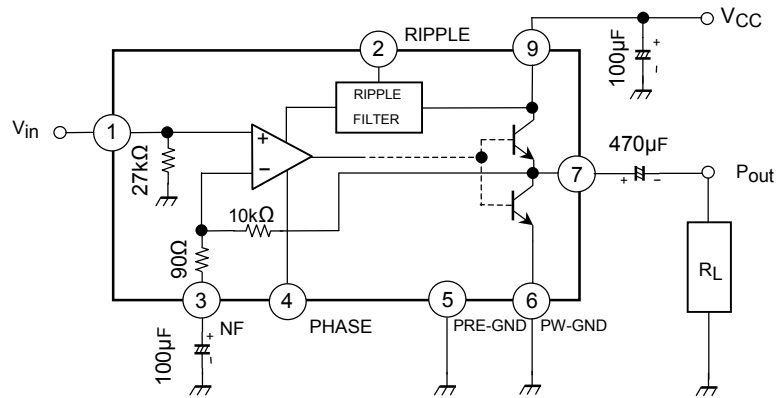
Typical Terminal Voltage at no Signal with Test Circuit. ( $V_{CC} = 6V, T_a = 25^\circ C$ )

[Unit: V]

Terminal no.	1	2	3	4	5	6	7	8	9	10
DC voltage (V)	NC	6.0	NC	0	2.40	0.62	0.64	0	0	2.61

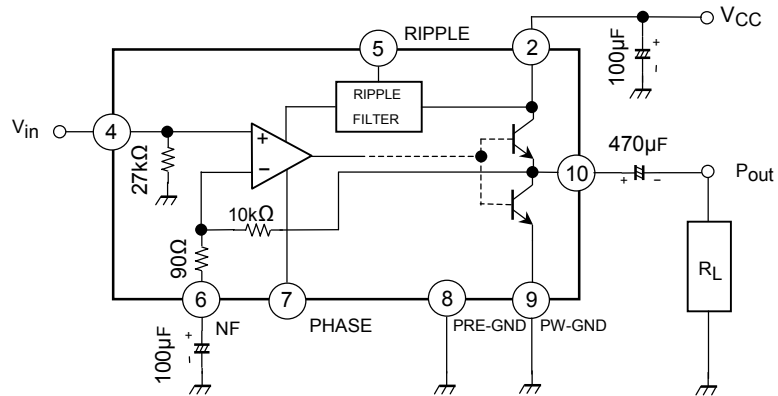
## Test Circuit

TA7368P

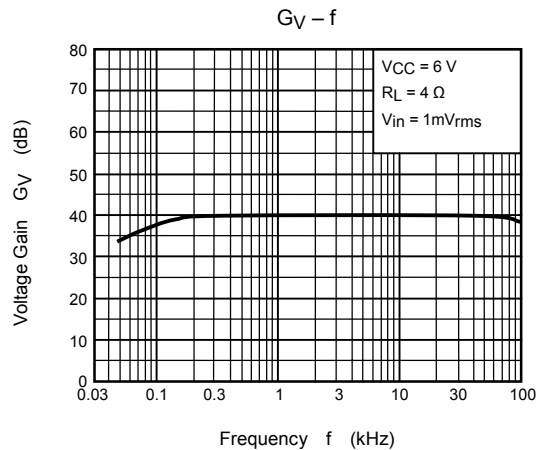
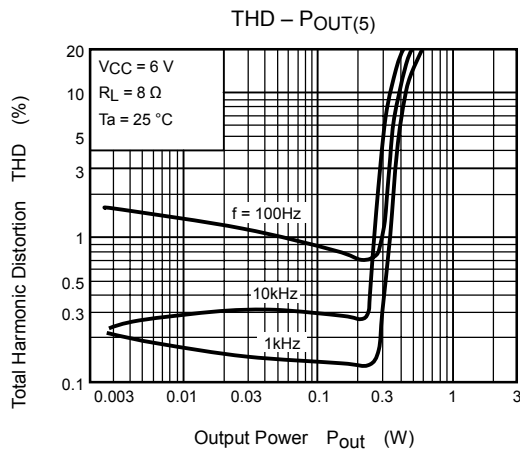
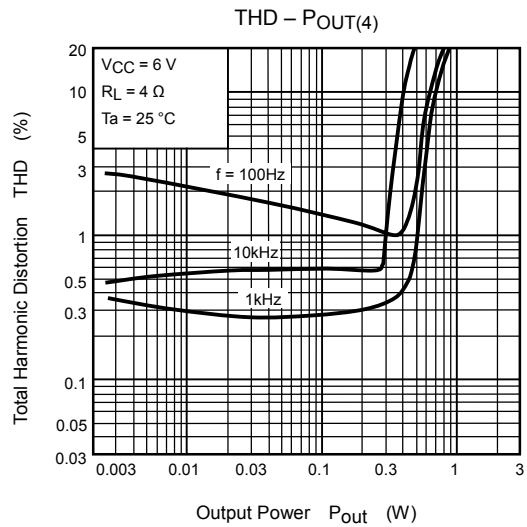
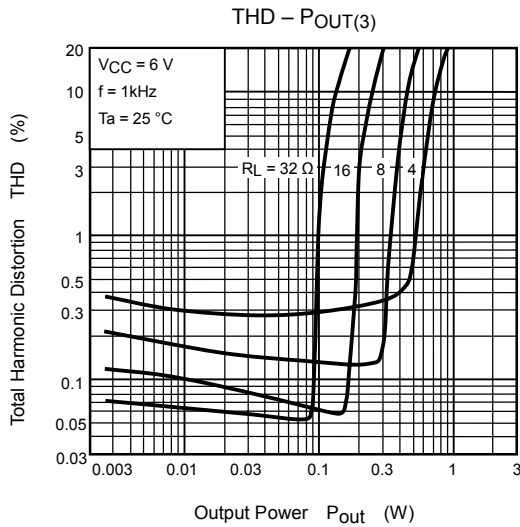
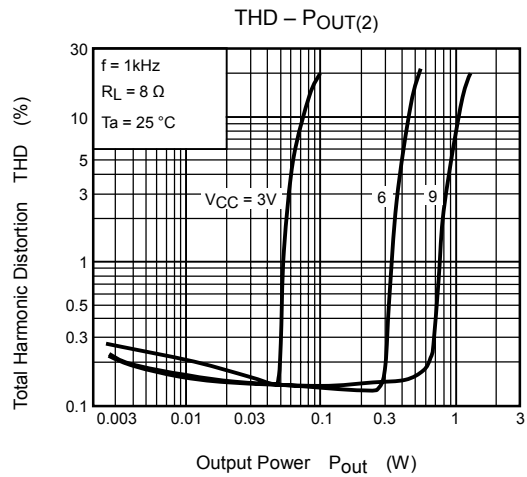
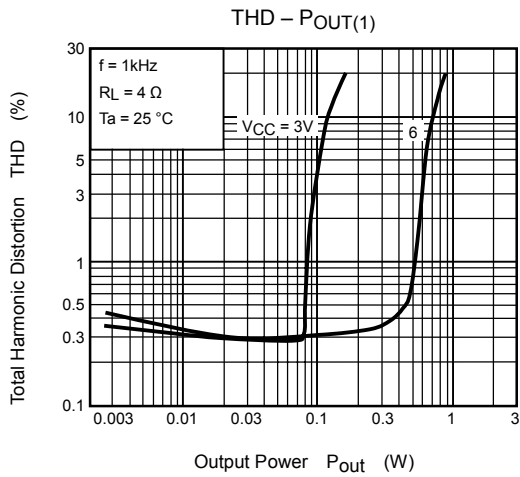


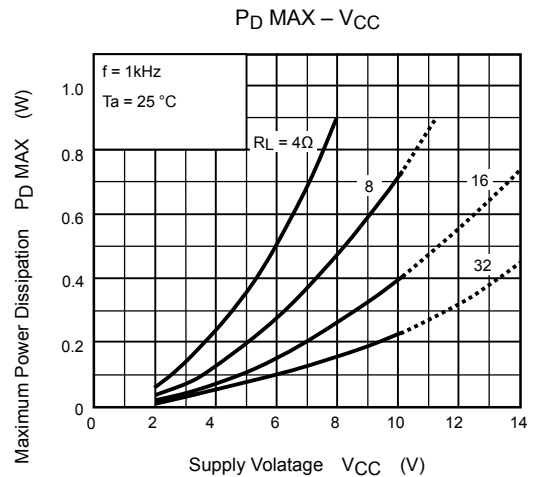
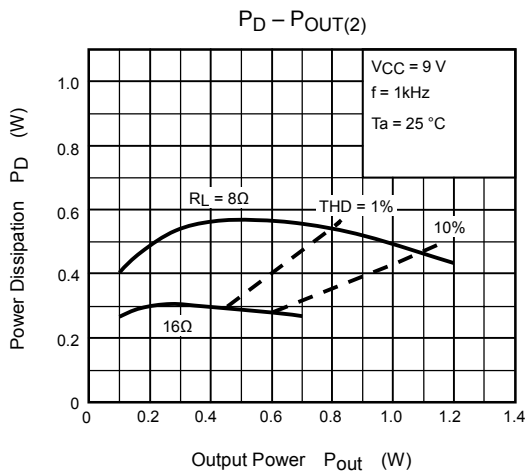
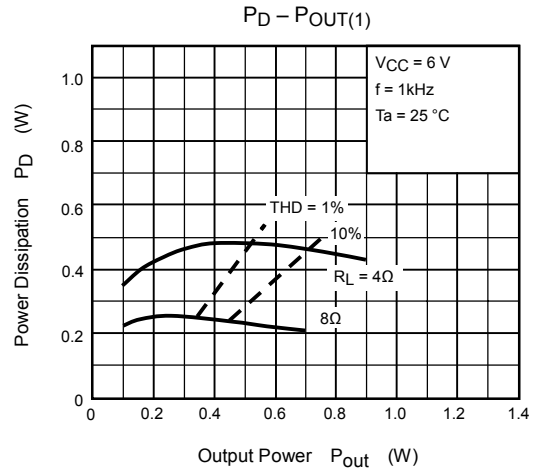
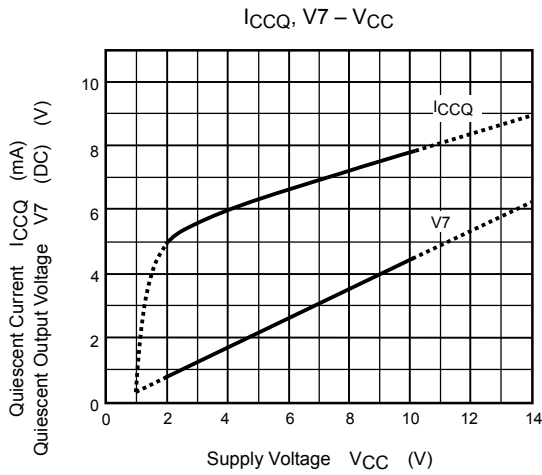
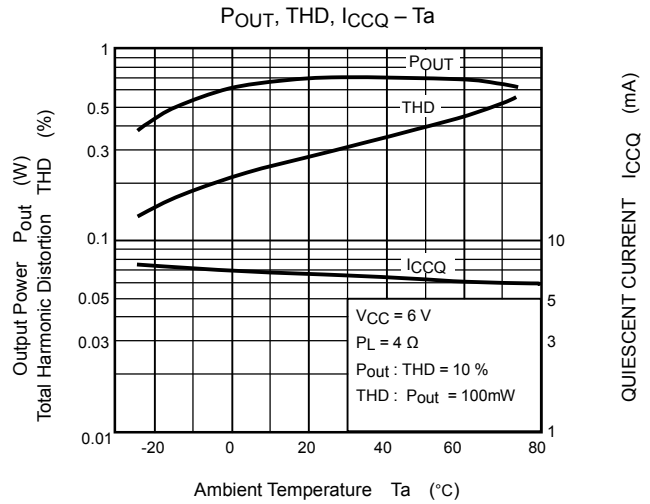
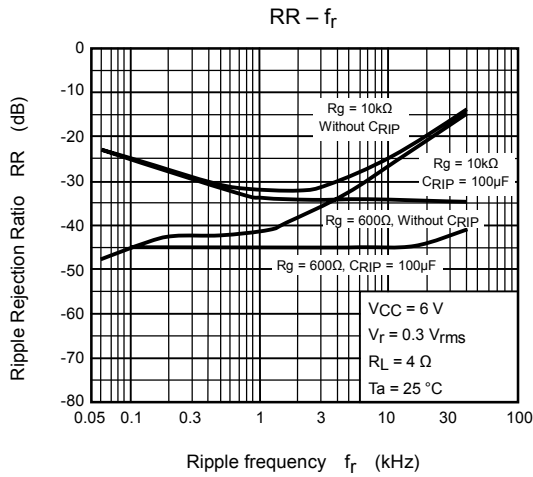
※ Pin(8): Non-connection

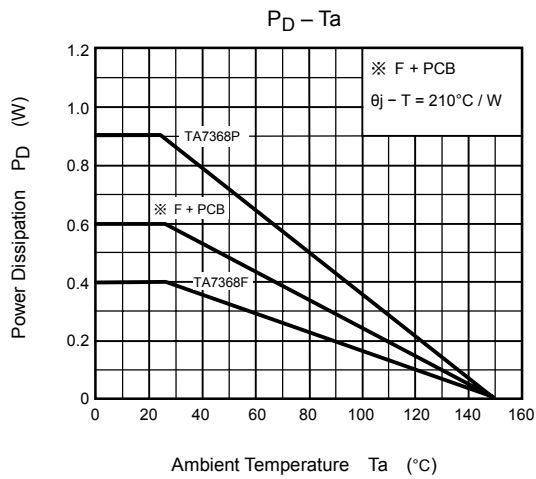
TA7368F



※ Pin(1), (3): Non-connection

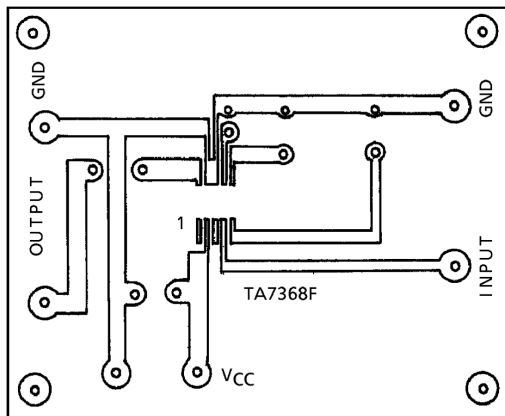






※ F+PCB  
 By being mounted on certain PCB's, flat packages increase the heat dissipating efficiency.  
 Data shown on the left is resulted from the measurement on the PCB recommended by TOSHIBA.  
 ( $\theta_j-T$  : Thermal resistance)

**Printed Circuit Board**



Material: Phenol resin  
 Thickness of copper leaf: 35 $\mu$ m  
 Plate thickness: 1.6mm

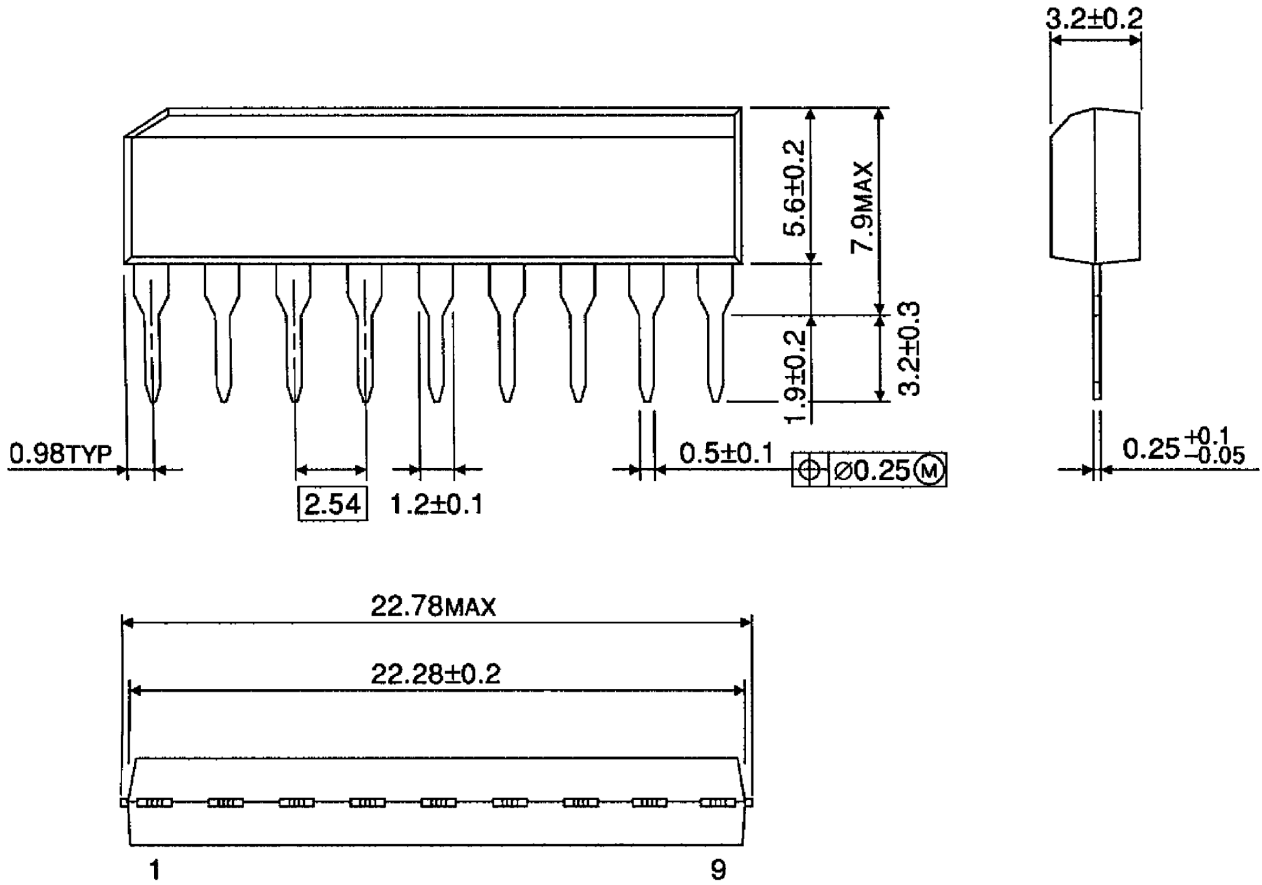
60 × 47.5 (mm)



**Package Dimensions**

SIP9-P-2.54A

Unit : mm

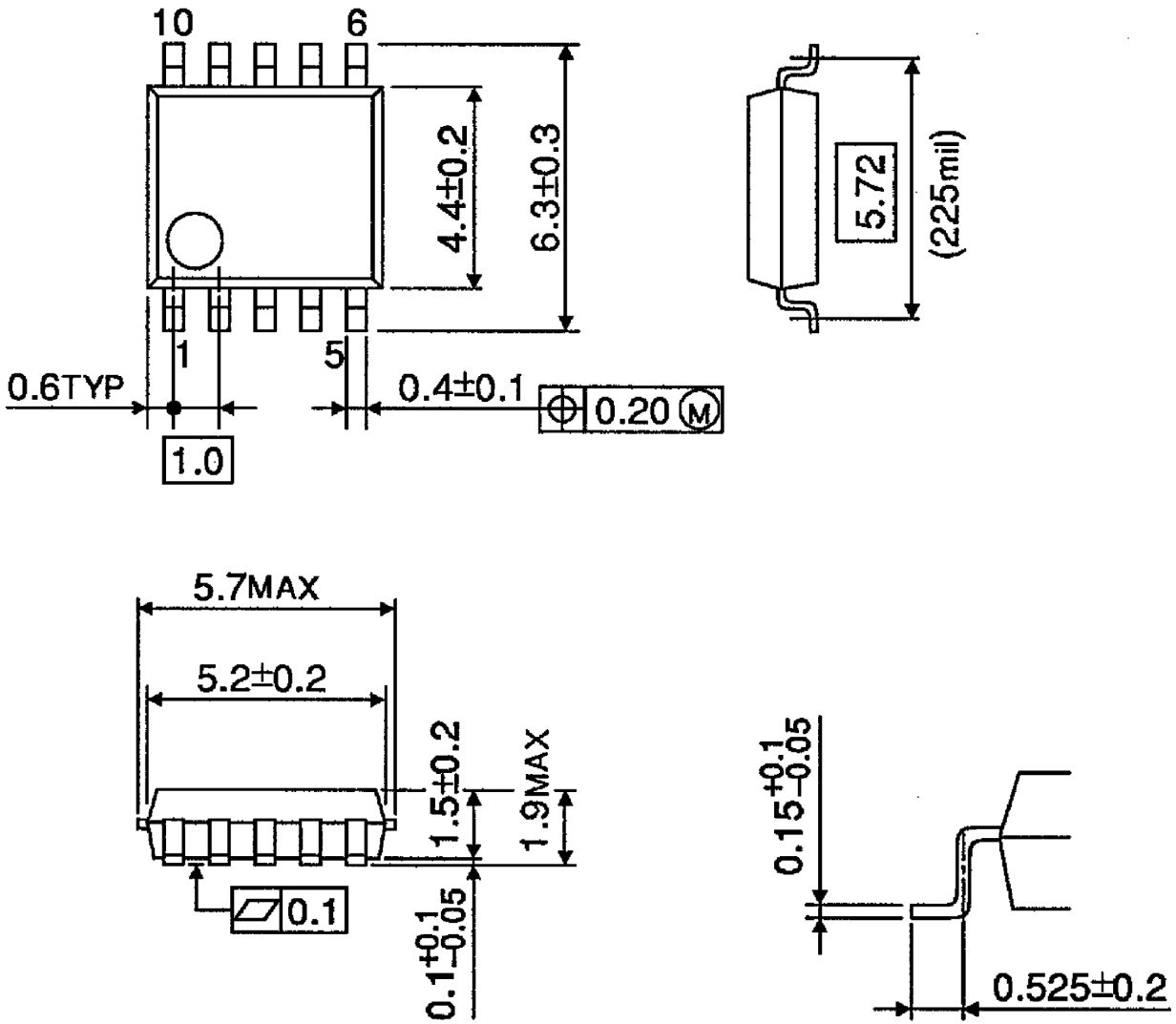


Weight: 0.92g (typ.)

**Package Dimensions**

SSOP10-P-225-1.00

Unit : mm



Weight: 0.09g (typ.)

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