



INTEGRATED CIRCUIT

TECHNICAL DATA

TA7238P

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT
SILICON MONOLITHIC

9W AUDIO POWER AMPLIFIER

The TA7238P is a 9 watts audio power amplifier for consumer applications.

It is suitable for power amplifier of home stereo, TV and 8mm projector applications.

- . Very Few External Parts
- . Audio Muting Function
- . Thermal Shut Down Circuit
- . Short Circuit Protection
- . High Power Output :

$$P_{OUT(1)} = 9W \text{ (Typ.)}$$

$$\text{at } V_{CC} = 24V, THD = 10\%, R_L = 8\Omega$$

$$P_{OUT(2)} = 8.5W \text{ (Typ.)}$$

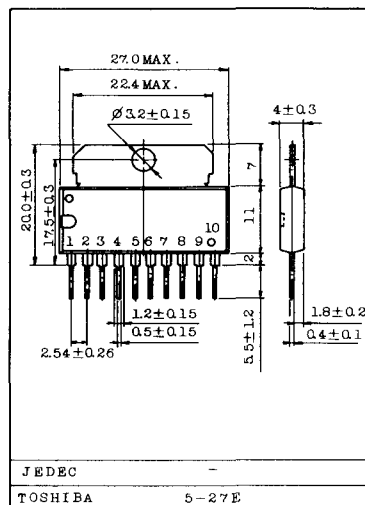
$$\text{at } V_{CC} = 18V, THD = 10\%, R_L = 4\Omega$$

Operating Supply Voltage :

$$V_{CC(opr)} = 12 \sim 27V \quad \text{at } R_L = 8\Omega$$

$$V_{CC(opr)} = 12 \sim 20V \quad \text{at } R_L = 4\Omega$$

Unit in mm



MAXIMUM RATINGS (Ta=25°C)

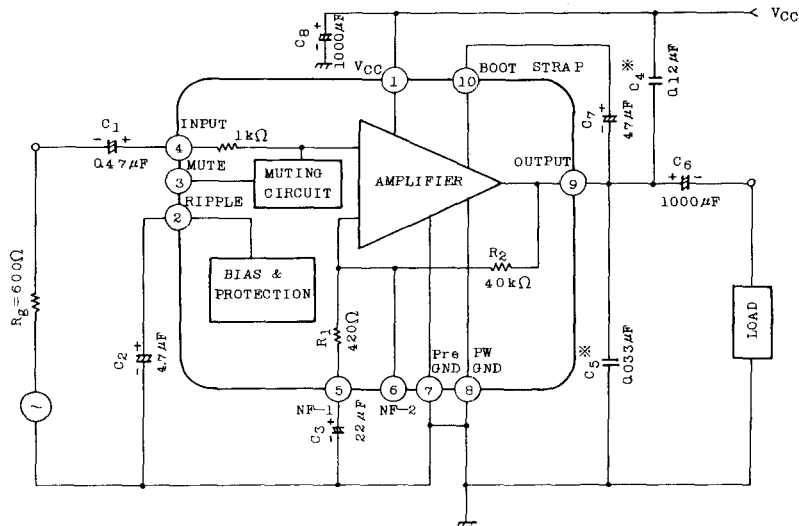
CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	$V_{CC(DC)}$	32	V
Operating Supply Voltage	$V_{CC(opr)}$	27	V
Output Current (Peak)	$I_O(\text{peak})$	3	A
Power Dissipation	P_D	12.5	W
Operating Temperature	T_{opr}	-20 ~ 75	°C
Storage Temperature	T_{stg}	-55 ~ 150	°C

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified $V_{CC}=24V$, $R_L=8\Omega$, $f=1kHz$, $G_V=39.5dB$, $T_a=25^{\circ}C$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Current	ICCQ	-	-	-	50	70	mA
			V _{CC} =18V	-	40	-	
Output Power	P _{OUT}	-	THD=10%	7	9	-	W
			V _{CC} =18V	-	5.8	-	
			THD=10% R _L =4Ω	6	8.5	-	
Total Harmonic Distortion	THD	-	P _O =1W	-	0.2	1.0	%
			P _O =1W, R _L =4Ω, V _{CC} =18V	-	0.3	1.2	
Open Loop Voltage Gain	G _{VO}	-	V _{OUT} =0dBm	60	78	-	dB
Closed Loop Voltage Gain	G _V	-		37.5	39.5	41.5	dB
Input Resistance	R _{IN}	-	-	-	30	-	kΩ
Ripple Rejection	R.R	-	f _R =100Hz, R _G =0	-	-40	-	dB
Output Noise Voltage	V _{NO}	-	R _G =10kΩ	-	0.16	0.40	mV _{rms}
Muting Attenuation	G _{Mute}	-	V ₃ =1V, R _G =600Ω V _{OUT} =1V _{rms}	-	-35	-	dB

BLOCK DIAGRAM & TEST CIRCUIT



* Polyester Film Capacitor

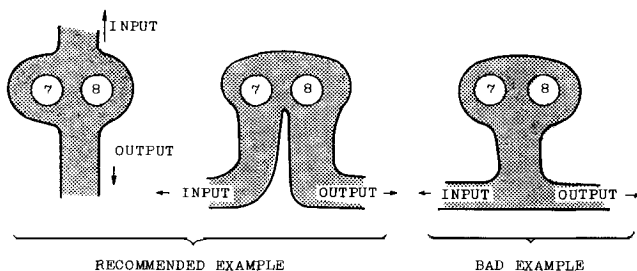
APPLICATION INFORMATION

1. GND Pattern

There are two GND terminals in this IC. The pin 7 is a input-side GND and the pin 8 is a power transistor GND.

Bad GND pattern results in case of parastic oscillation or bad THD. It is need to arrange the GND line so that the common impedance may not exist.

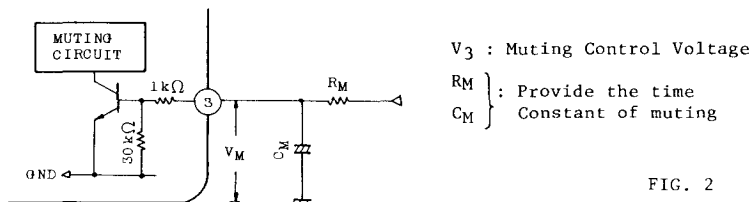
For example.....



2. Muting Control

V_3 is a audio muting control voltage.

- (1) The muting is OFF at low V_3 ($V_3 \leq 0.3V$) or open terminal of pin 3.
- (2) The muting is ON at high V_3 ($V_3 \geq 1V$) and then the audio output disappears.
- (3) The internal connection and external parts for muting are shown in Fig.-2.



- (4) The amount of muting attenuation ; G_{Mute}

$$G_{Mute} = -35dB \text{ (typ.) } (V_{CC}=24V, R_L=8\Omega, f=1kHz, V_{OUT}=1V_{rms}, R_g=600\Omega)$$

3. The closed loop voltage gain G_V is determined by the ratio of R_1 and R_2 .

$$G_V = 20 \log \frac{R_1 + R_2}{R_1} \div 39.5 \text{dB}$$

$$R_1 = 420 \Omega$$

$$R_2 = 40 \text{k}\Omega$$

- (1) When a resistor is connected between pin 5 and pin 6, G_V increases.
In this case, the G_V is determined by following equation.

$$G_V = 20 \log \frac{R_1 \parallel R_3 + R_2}{R_1 \parallel R_3}$$

Open loop voltage gain ;

$G_V = 60 \text{dB (Min.)}$

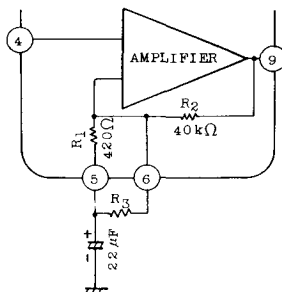


FIG. 3

- (2) G_V cannot be decreased.

If G_V is decreased, the TA7238P oscillates by phase delay. (especially low temperature)

4. The rise time of the amplifier at V_{CC} ON is about 0.1 second in recommend circuit.

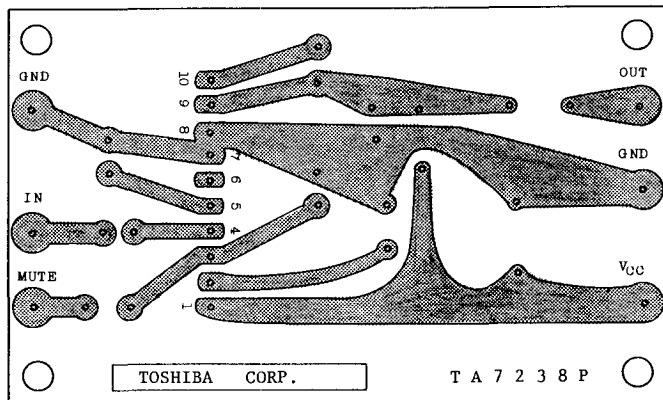
Increasing capacitance of feedback capacitor C_3 , the rise time delays. (about 0.8 second at $C_3 = 220 \mu\text{F}$)

DC VOLTAGE OF EACH TERMINAL ($V_{CC} = 24\text{V}$, $T_a = 25^\circ\text{C}$)

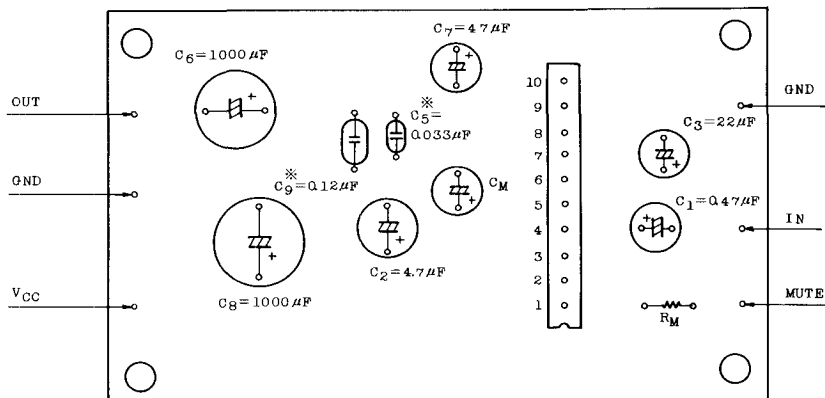
TERMINAL	1	2	3	4	5	6	7	8	9	10
DC VOLTAGE (V)	V_{CC}	4.9	0	0.08	1.7	1.8	GND	GND	12	23.2

STANDARD PLINT PATTERN

UNDER VIEW



PARTS DISRIPTION



C_M } Provide the time constant of muting
 R_M

* C_5, C_9 is needed to use polyester film capacitor.

EXTERNAL PARTS TABLE AND EXPLANATION

PARTS No.	TYPICAL	PURPOSE	INFLUENCE		NOTE
			SMALLER THAN TYP.	GREATER THAN TYP.	
C ₁	0.47 μ F	Coupling Capacitor	Bad Low Frequency Resopnse	-	
C ₂	4.7 μ F	Ripple Reducing	Low Ripple Rejection	High Ripple Rejection	
C ₃	22 μ F	FeedBack Capacitor	Short Rise Time at VCC ON	Long Rise Time at VCC ON	
			Low Frequency Roll Off Point: $C_3 = \frac{1}{2\pi f_L \cdot R_{NF}}$		
C ₄	0.12 μ F	Phase Compensation	Unstable for Oscilla- tion at Low VCC and High Temperature	Stable for Oscillation	Polyester Film Capacitor
C ₅	0.033 μ F		Unstable for Oscillation		
C ₆	1000 μ F	Coupling Capacitor	Low Frequency Roll Off Point : $C_6 = \frac{1}{2\pi f_L \cdot R_L}$		
C ₇	47 μ F	Boot Strap	Low Output at Low Frequency	Low POP Noise at VCC ON	
C ₈	1000 μ F	Ripple Filter	Filter for Hum and Ripple Need the Large Capacitance for AC Supply, Small Capacitance is OK for Battery		

