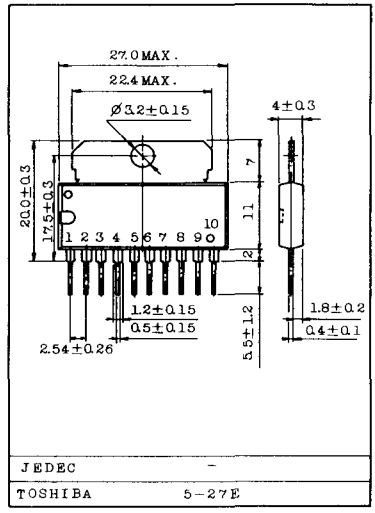
TA7238P

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT
SILICON MONOLITHIC

9W AUDIO POWER AMPLIFIER

Unit in mm



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 (Typ.)
at V_{CC}=24V, THD=10%, R_L=8Ω

$P_{OUT(2)}$=8.5W (Typ.)
at V_{CC}=18V, THD=10%, R_L=4Ω

- Operating Supply Voltage :

$V_{CC(opr)}$=12 ~ 27V at R_L=8Ω
$V_{CC(opr)}$=12 ~ 20V at R_L=4Ω

MAXIMUM RATINGS (Ta=25°C)

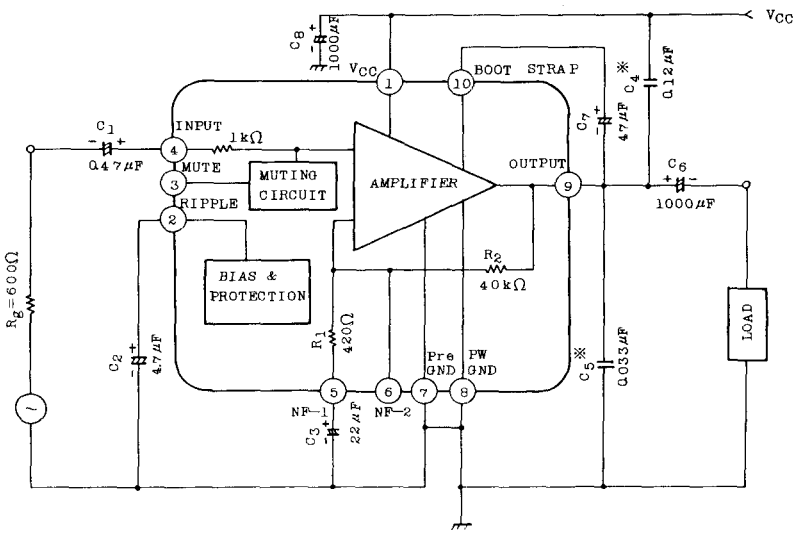
CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	$V_{CC(DC)}$	32	V
Operating Supply Voltage	$V_{CC(opr)}$	27	V
Output Current (Peak)	$I_{O(peak)}$	3	A
Power Dissipation	P_D	12.5	W
Operating Temperature	Topr	-20 ~ 75	°C
Storage Temperature	Tstg	-55 ~ 150	°C

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified V_{CC}=24V, R_L=8Ω , f=1kHz, G_V=39.5dB, Ta=25°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Quiescent Current	I_{CCQ}	-	-		-	50	70	mA
			V_{CC}=18V		-	40	-	
Output Power	P_{OUT}	-	THD=10%		7	9	-	W
			V_{CC}=18V	R_L=8Ω	-	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



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.....

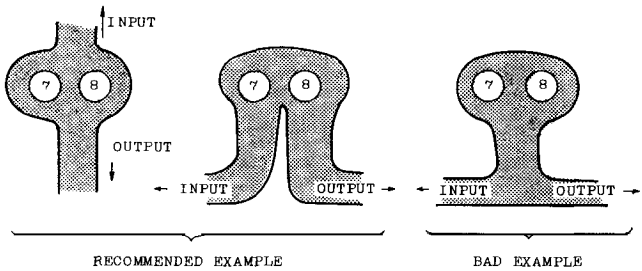


FIG. 1

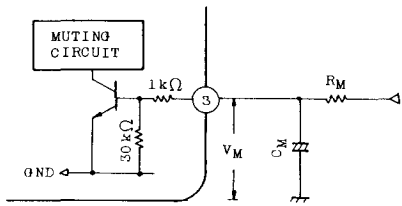
2. Muting Control

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 disappers.

(3) The internal connection and external parts for muting are shown in Fig.-2.



V_3 : Muting Control Voltage

R_M, C_M : Provide the time Constant of muting

FIG. 2

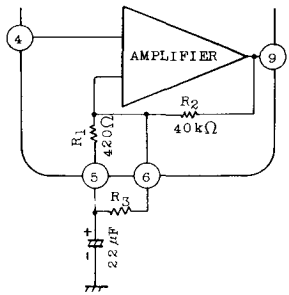
(4) The amount of muting attenuation ; G_{Mute}

G_{Mute}=-35dB (typ.)(V_{CC}=24V, R_L=8Ω , f=1kHz , V_{OUT}=1Vrms , R_g=600Ω)

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

$$G_V = 20 \log \frac{R_1+R_2}{R_1} \fallingdotseq 39.5dB \qquad R_1=420\Omega, \quad R_2=40k\Omega$$

(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.



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

Open loop voltage gain ;

G_V=60dB (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.

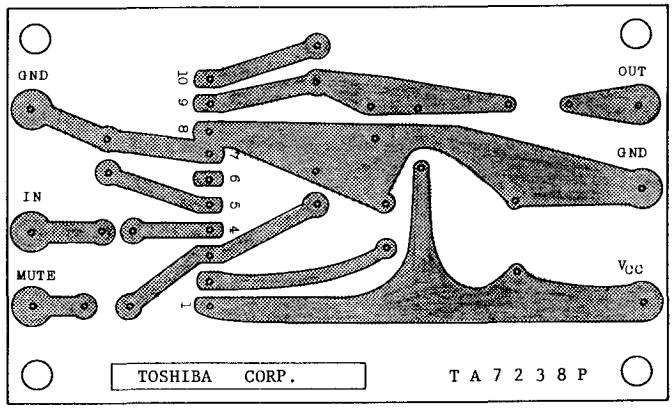
Increasing capacitance of feedback capacitor C_3, the rise time delays. (about 0.8 second at C_3=220μF)

DC VOLTAGE OF EACH TERMINAL (V_{CC}=24V, Ta=25°C)

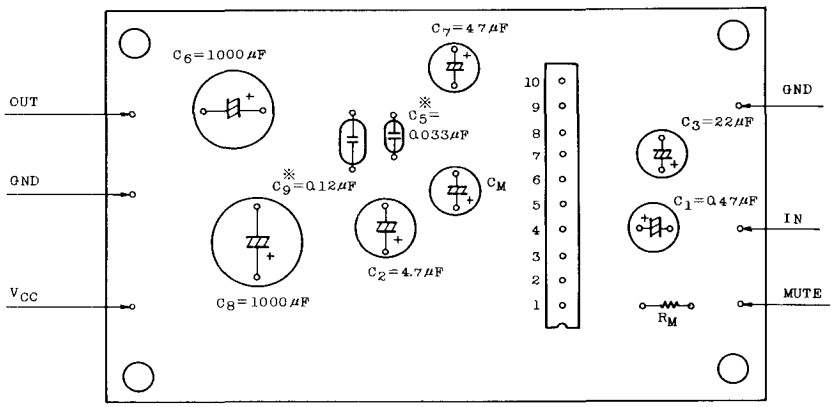
TARMINAL	1	2	3	4	5	6	7	8	9	10
DC VOLTAGE (V)	V_{CC}	4.9	0	0.08	1.7	1.8	GND	GND	12	23.2

STANDARD PLINT PATTERN

UNDER VIEW



PARTS DISCRIPTION



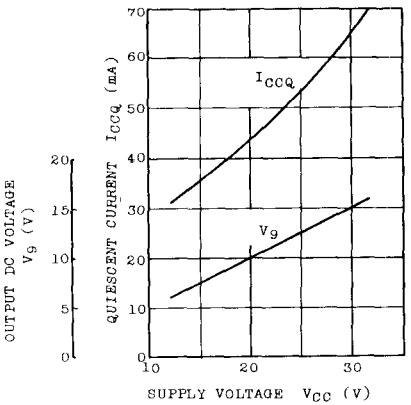
C_M, R_M } Provide the time constant of muting

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

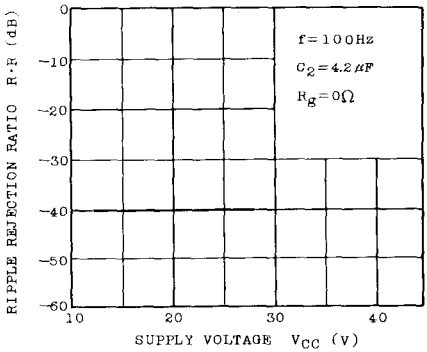
EXTERNAL PARTS TABLE AND EXPLANATION

PARTS No.	TYPICAL	PURPOSE	INFLUENCE		NOTE
			SMALLER THAN TYP.	GREATER THAN TYP.	
C_1	0.47μF	Coupling Capacitor	Bad Low Frequency Resopnse	-	
C_2	4.7 μF	Ripple Reducing	Low Ripple Rejection	High Ripple Rejection	
C_3	22 μF	FeedBack Capacitor	Short Rise Time at V_{CC} ON	Long Rise Time at V_{CC} ON	
			Low Frequency Roll Off Point: $C_3 = \frac{1}{2\pi f L \cdot R_{NF}}$		
C_4	0.12 μF	Phase Compensation	Unstable for Oscillation at Low V_{CC} and High Temperature	Stable for Oscillation	Polyester Film Capacitor
C_5	0.033μF		Unstable for Oscillation		
C_6	1000μF	Coupling Capacitor	Low Frequency Roll Off Point : $C_6 = \frac{1}{2\pi f L \cdot R_L}$		
C_7	47 μF	Boot Strap	Low Output at Low Frequency	Low POP Noise at V_{CC} ON	
C_8	1000μF	Ripple Filter	Filter for Hum and Ripple Need the Large Capacitance for AC Supply, Small Capacitance is OK for Battery		

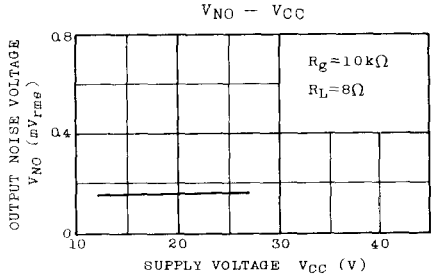
I_{CCQ} – V_{CC}
V_9 – V_{CC}



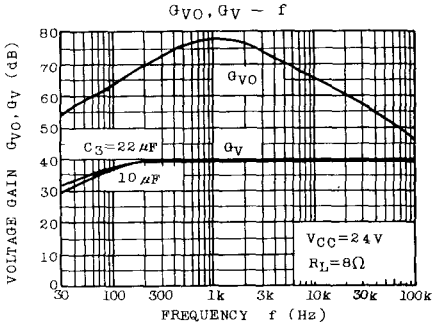
R·R – V_{CC}



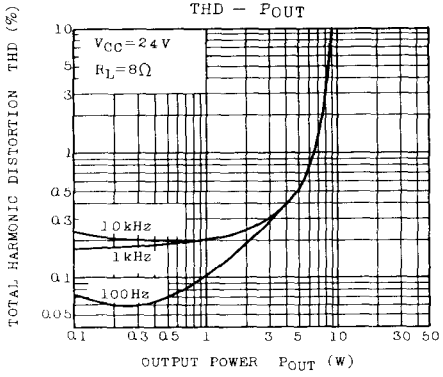
V_{NO} – V_{CC}



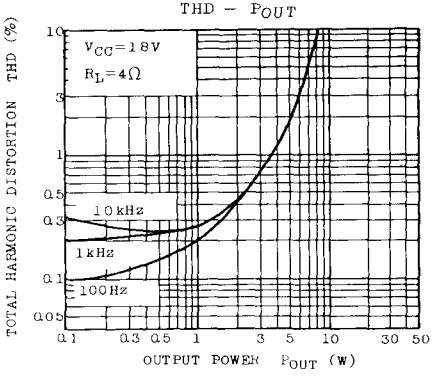
G_{VO}, G_V – f



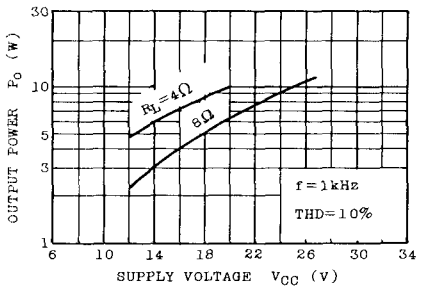
THD – P_{OUT}



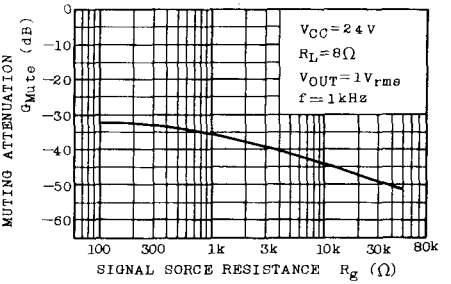
THD – P_{OUT}



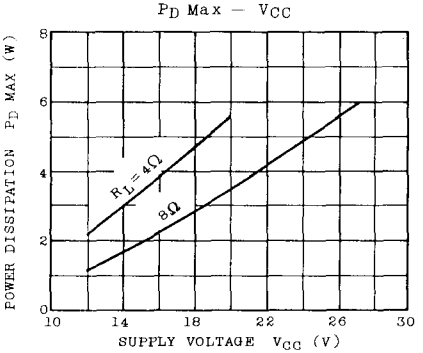
$P_O - V_{CC}$



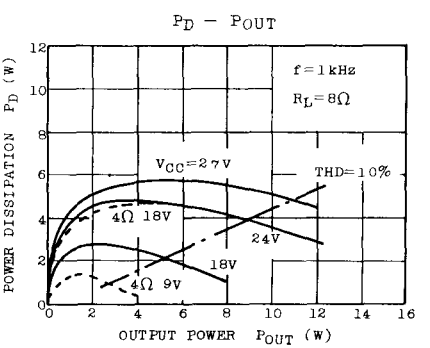
$G_{Mute} - R_g$



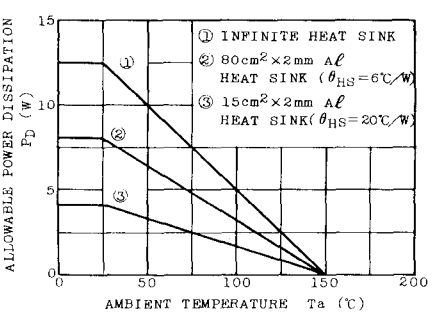
P_D Max $- V_{CC}$



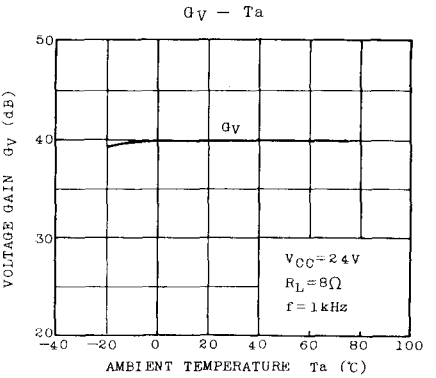
$P_D - P_{OUT}$



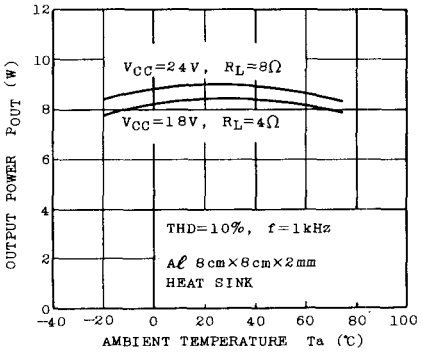
$P_D - Ta$



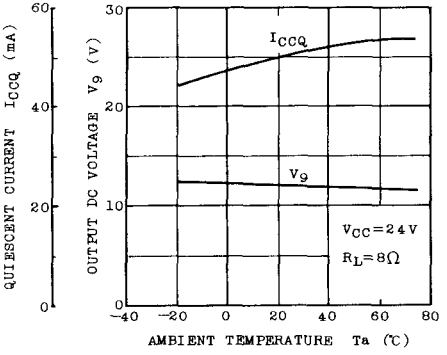
$G_V - Ta$



P_{OUT} – Ta



V_9 – Ta
I_{CCQ} – Ta



THD – Ta