H A HA1350

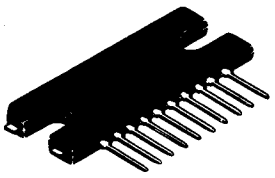
20W AUDIO POWER AMPLIFIER

HA1350 is a class-B power amplifier designed especially for Hi-Fi stereo amplifiers encapsulated in a 10-lead single-in-line plastic package.

The HA1350 provides an output power of 20 watts to 8 ohm load with 1% distortion at ±22 volts.

The total harmonic distortion is less than 0.5% at 18 watts and only 0.1% at 10 watts output with wide frequency range, from 10Hz to 20kHz.

These figures make this device applicable to Hi-Fi class use.



(SP-10T)

■ FEATURES

- High Output Power.
  20W typ. ($\pm B_1 = \pm 22V$, $R_L = 8\Omega$, $f = 1kHz$, THD=1%)
  18W typ. ($\pm B_1 = \pm 22V$, $R_L = 8\Omega$, $f = 20Hz$ to $20kHz$, THD=0.5%)
  (where $\pm B_1$: Supply Voltage, R_L : Load Resistance, f: frequency THD: Total Harmonic Distortion, $+B_2 = 25V$ constant.)
- Very Low Harmonic and Crossover Distortion.
  0.02% typ. ($\pm B_1 = \pm 22V$, $R_L = 8\Omega$, $f = 1kHz$, $P_O = 2W$
  0.06% typ. ($\pm B_1 = \pm 22V$, $R_L = 8\Omega$, $f = 20Hz$ to $20kHz$, $P_O = 2W$)
  (where P_O: Power Output, $+B_2 = 25V$ constant)
- Wide Frequency Range.
  From 5Hz to 120kHz (at -1dB frequency response)
- Thermal shut-down circuit included:
  If the chip temperature reaches around 150°C, the output power and current drain are automatically reduced to maintain the device safely.
- Muting circuit included:
  Shock noise occuring on supplying the power can be reduced by muting system.
- Easy to mount a chassis by heat-sink, due to the single-in-line package.

■ ABSOLUTE MAXIMUM RATINGS ($Ta = 25°C$)

Item	Symbol	Ratings	Unit	Notes
Positive Supply Voltage	$+B_1, +B_2$	30	V	1
Negative Supply Voltage	$-B_1$	−30	V	
Output Current	$I_{O(peak)}$	7.5	A	
Input Voltage	$V_{i(peak)}$	±10	V	
Power Dissipation	P_T	30	W	2
Junction Temperature	T_j	150	°C	
Thermal Resistance	θ_{j-c}	3	°C/W	
Operating Temperature Range	T_{opr}	−20 to +70	°C	
Storage Temperature Range	T_{stg}	−55 to +125	°C	

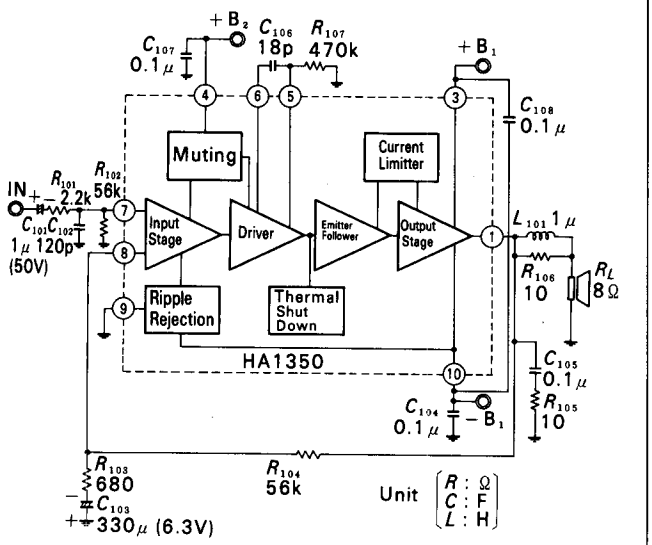
Notes : 1. Standard operating voltages are as follows : $\pm B_2 = 25V$, $\pm B_1 = 22V$
2. The value when $T_{tab} = 60°C$
3. Tab should be isolated electrically from every point including GND.

■ ELECTRICAL CHARACTERISTICS (Ta=25°C)

Item	Symbol	Test Conditions	min	typ	max	Unit
Quiescent Current	$+I_{Q1}$	V_{in}=0 between $+B_1$ and pin 3	20	60	120	mA
Quiescent Current	$+I_{Q2}$	V_{in}=0 between $+B_2$ and pin 4	—	—	22	mA
Quiescent Current	$-I_{Q1}$	V_{in}=0 between $-B_1$ and pin 10	—	—	152	mA
Output Offset Voltage	$\triangle V_O$	V_{in}=0 between pin 1 and GND	—	0	±0.1	V
Input Resistance	R_{in}	f=1kHz R_{102}=56kΩ	—	55	—	kΩ
Voltage Gain (Closed Loop)	G_V	f=1kHz R_{103}=680Ω, R_{104}=56kΩ	—	38	—	dB
Voltage Gain (Open Loop)	$G_{V(OL)}$	f=1kHz R_{103}=0	—	88	—	dB
Output Power	P_{out}	f=1kHz T.H.D=1%	—	20	—	W
		f=20Hz to 20kHz T.H.D=0.5%	15	18		
Total Harmonic Distortion	T.H.D	f=20kHz P_{out}=2W	—	0.06	0.20	%
Output Noise Voltage	V_n	R_g=5.1kΩ BW=20Hz to 100kHz	—	0.35	0.50	mV
Supply Voltage Rejection Ratio	SVR	R_g=5.1kΩ f_{ripple}=100Hz (at pin 10)	52	60	—	dB

Note : Standard test conditions are as follows : $\pm B_1$=±25V (Only P_{out} : $\pm B_1$=±22V) $+B_2$=25V, R_L=8Ω

■ BLOCK DIAGRAM AND TYPICAL APPLICATION CIRCUIT

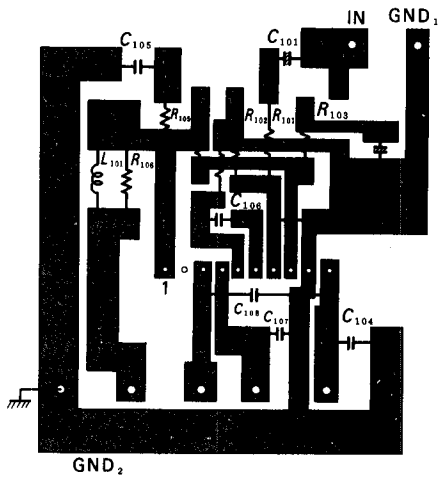


NOTES; 1. Terminal 2 has no connection.

2. Voltage gain $G_V \fallingdotseq \frac{R_{104}}{R_{103}}$ (38dB).

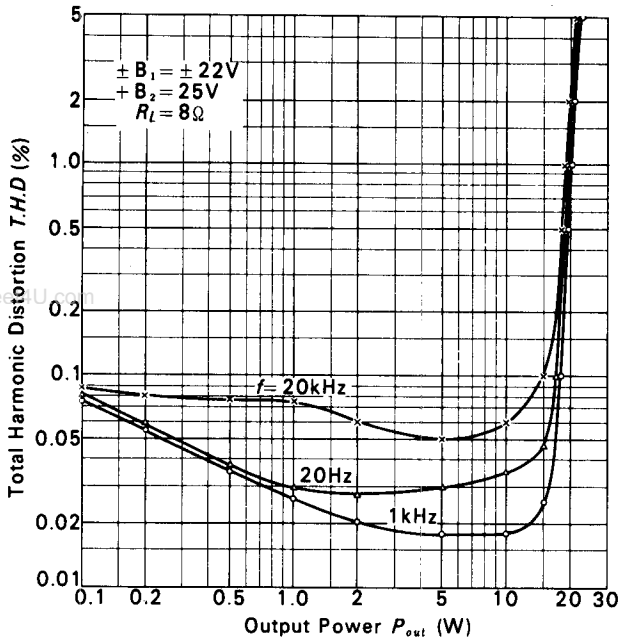
3. $\pm B_1$ are not stabilized power supplies. $+B_2$ is a stabilized power supply, whose rising time constant is recommended around 2 seconds for no shock noise muting system.

■ PC-BOARD LAYOUT PATTERN



NOTES; 1. Bottom View (Copper Side).
2. GND_1 is an Input ground.
GND_2 is an Output ground.

TOTAL HARMONIC DISTORTION VS. OUTPUT POWER



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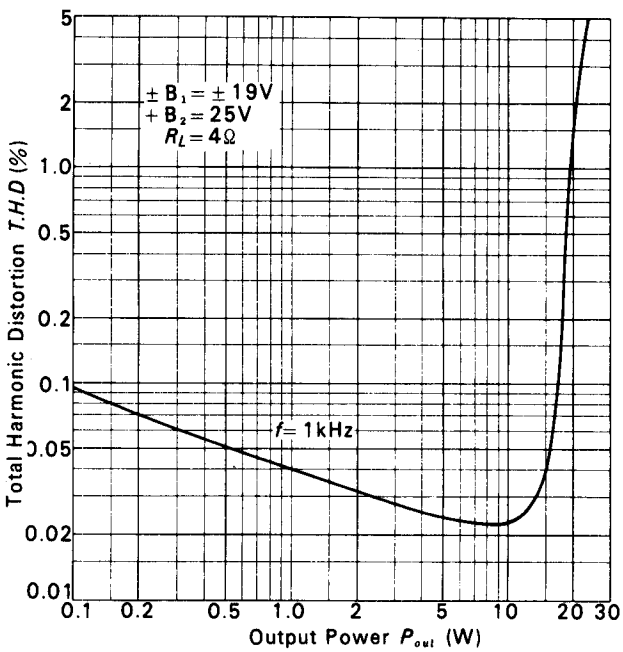
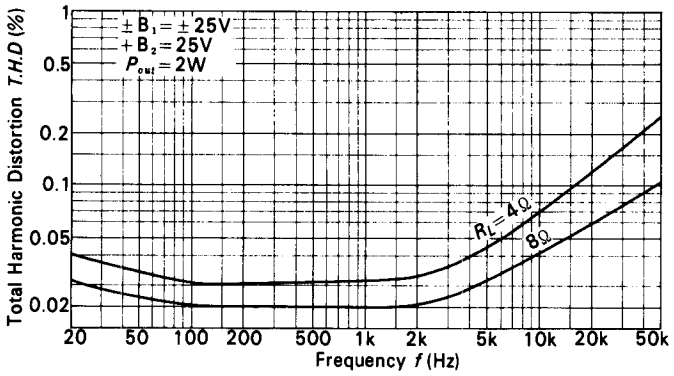
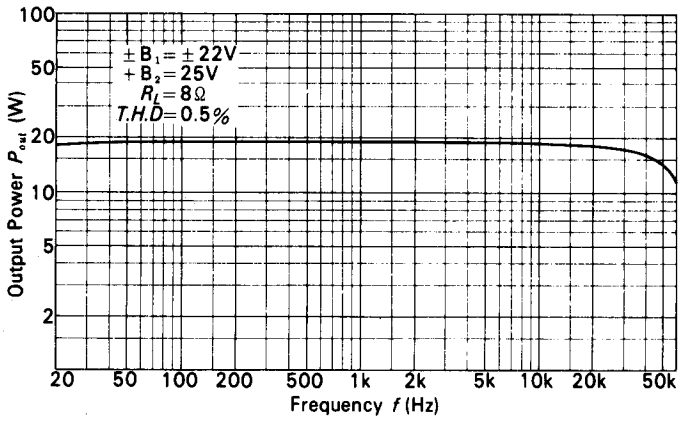


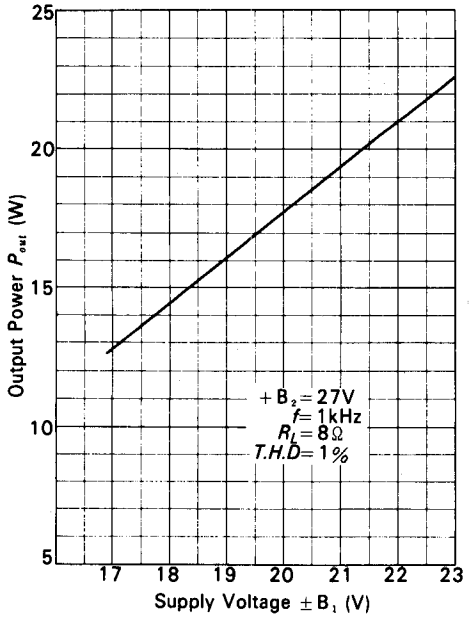
TOTAL HARMONIC DISTORTION VS. FREQUENCY



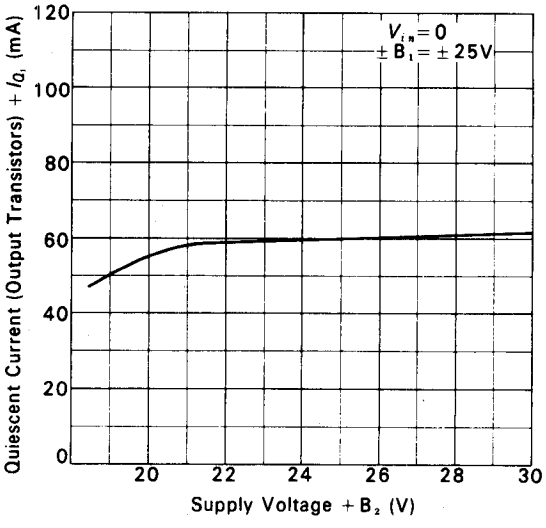
OUTPUT POWER VS. FREQUENCY



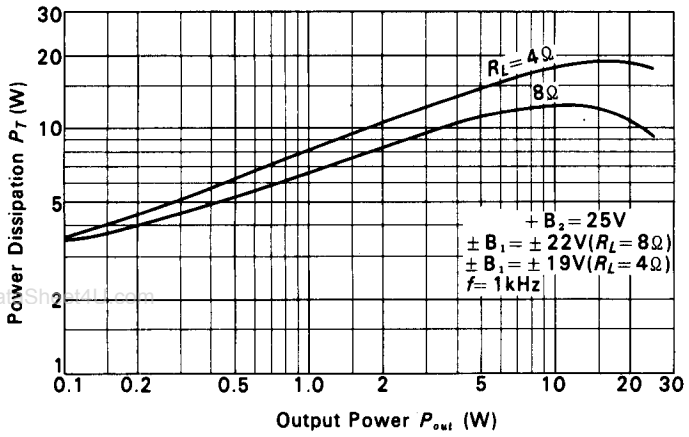
OUTPUT POWER VS. SUPPLY VOLTAGE



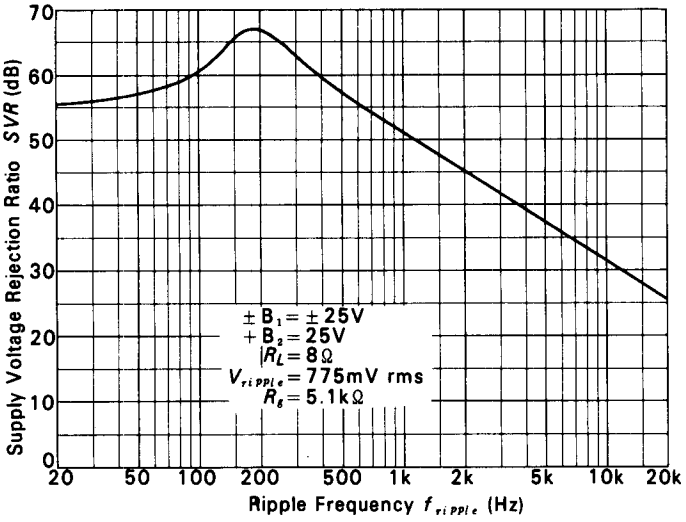
OUTPUT CURRENT VS. SUPPLY VOLTAGE



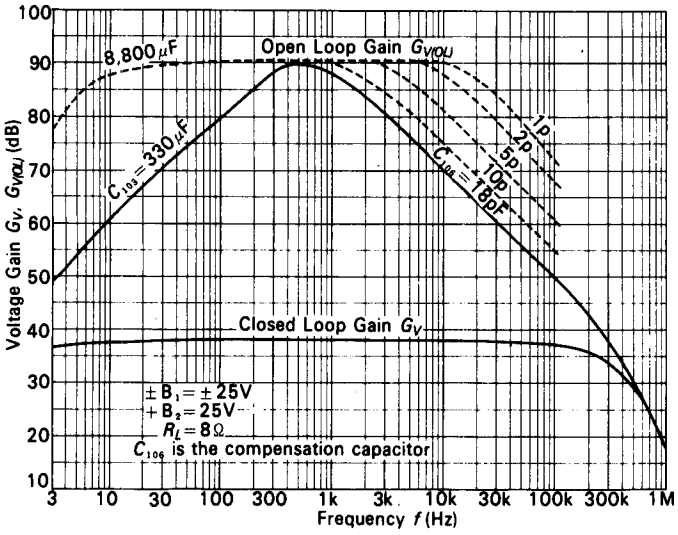
POWER DISSIPATION VS. OUTPUT POWER



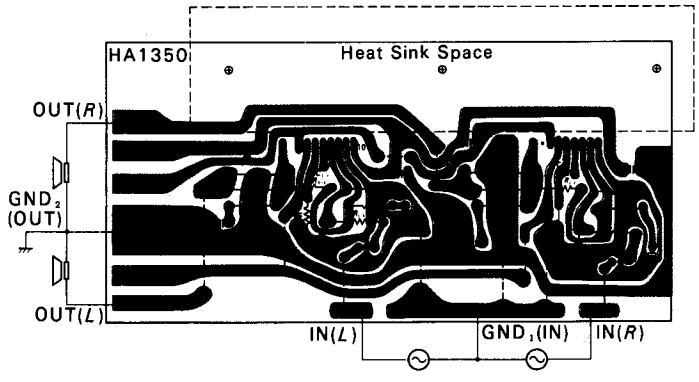
SUPPLY VOLTAGE REJECTION RATIO VS. RIPPLE FREQUENCY



VOLTAGE GAIN VS. FREQUENCY



■ PC-BOARD LAYOUT PATTERN FOR STEREO APPLICATION CIRCUIT



NOTES;
1. Top View
2. "------" are jumpers.
3. Resistance of a printed circuit board must be taken special care to obtain as small value as possible.