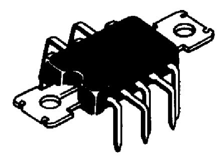
HA1306W

3.5W AUDIO POWER AMPLIFIER

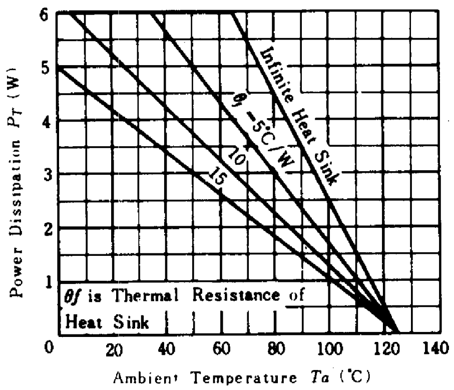
■ FEATURES

- SRPP Circuit (Shunt-regulated Push-Pull Circuit) High Operating Stability on DC and AC
- High Voltage Gain .... 44dB typ.
- Low Thermal Resistance .... 10°C/W (maximum)

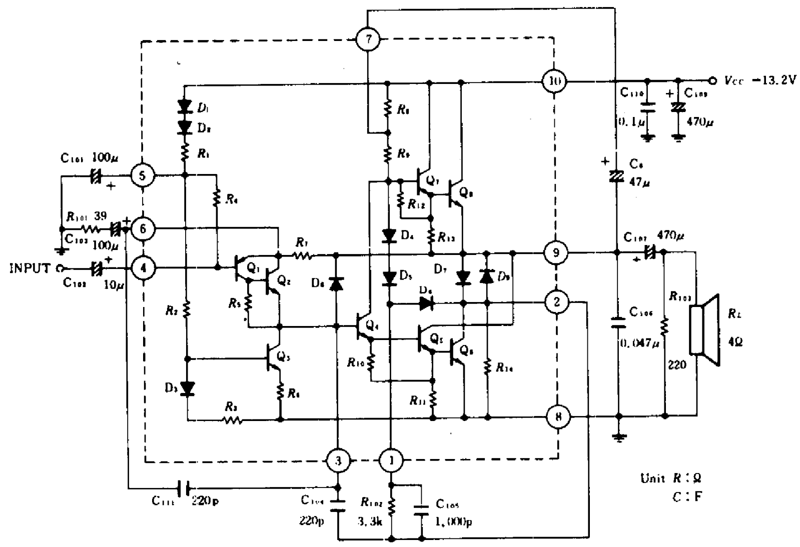


(QP-10T)

MAXIMUM POWER DISSIPATION CURVE



■ CIRCUIT SCHEMATIC AND TYPICAL EXTERNAL PARTS



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

Item	Symbol	Rating	Unit
Supply Voltage	V_{CC}	18	V
Power Dissipation*	P_T	6	W
Output Current	$I_{o(peak)}$	2.25	A
Operating Temperature**	T_{opr}	−30 to +70	°C
Storage Temperature	T_{stg}	−55 to +125	°C

* Value at $T_C = 65°C$
** Value when attached to the heat sink plate ($\theta_f = 10°C/W$) at $P_T = 2.7W$

■ **ELECTRICAL CHARACTERISTICS** (V_{cc}=13.2V, R_L=4Ω, f=1kHz)

Item	Symbol	Test Condition	min	typ	max	Unit
Voltage Gain	G_V		—	44.0	—	dB
Output Power	P_{out}	T.H.D=10%	3.0	3.5	—	W
Total Harmonic Distortion	T.H.D	P_{out}=0.5W	—	0.25	0.6	%
Signal-to-noise Ratio	S/N	R_g=0, P_{out}=3.5W	—	85	—	dB
Input Impedance	R_{in}		11	15	—	kΩ

■ **OPERATING CONSIDERATIONS**

Regarding the selection of external parts, refer to all of the following comments:

(1) C_{101} : Functions to eliminate supply voltage ripple. Use a capacitor over 100μF.

(2) C_{102} : Input coupling capacitor. Consider the input impedance in determining C_{102}.

(3) C_{103} : Determine C_{103} from the value of negative feedback resistor R_{101} and a low cutoff frequency f_L as follows:

$$f_L = \frac{1}{2\pi C_{103} R_{101}}$$

(4) C_{104}, C_{105}, C_{106}, C_{110}, C_{111} : Capacitors for use as prevention of oscillation C_{106}, and C_{110} have no relation to the frequency characteristic; however, C_{104} determines the high cutoff frequency f_H. Refer to the frequency characteristic and determine C_{104}. C_{111} is unnecessary at $R_{102} = \infty$.

(5) C_{107} : Output coupling capacitor. A low cutoff frequency f_L is 70Hz at C_{107} = 470μF and R_L = 4Ω.

(6) C_{108} : Boot strap capacitor. Use the capacitor from 33 to 47μF.

(7) R_{101} : Determines the closed loop voltage gain G_V. Since HA1306W ahs an extremely high open-loop voltage gain, G_V is determined as follows:

$$G_V = \frac{R_7}{R_{101}} \quad (R_7 = 6k\Omega)$$

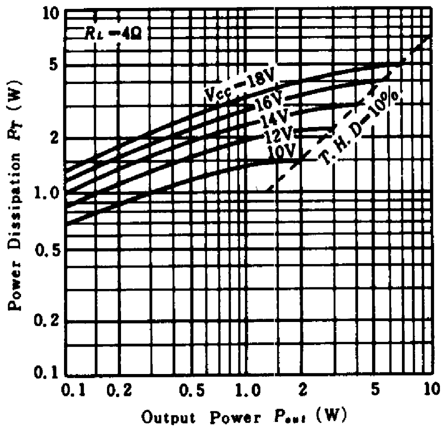
For example, G_V is approximately 44dB at R_{101} = 39Ω. When a higher G_V is required, make R_{101} lower. If R_{101} is lowered, the total harmonic distortion increases at high frequency. Refer to total harmonic distortion vs. voltage gain characteristic. From this figure, HA1306W can be used practically up to G_V = 56dB at R_L = 4Ω, and G_V = 56dB at R_L = 8Ω.

(8) R_{102} : Determines the Idling Current (I_{idle}) in power transistor at no signal. I_{idle} is approximately 4mA in a steady state, $R_{102} = \infty$. Refer to I_{idle} vs. R_{102} characteristic. When I_{idle} flows, the HA1306W power dissipation increases as follows:

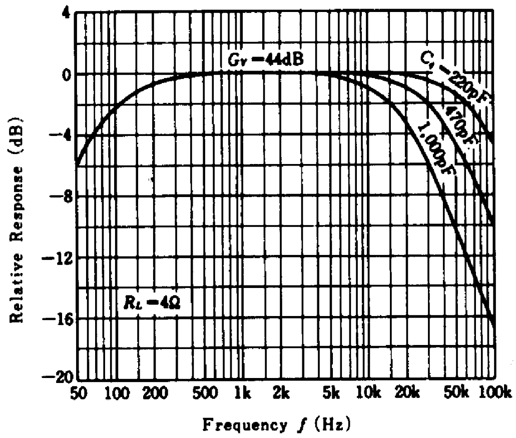
$$P_T = \frac{1}{2} I_{idle} \times V_{CC}$$

(9) R_{103} : If a speaker is connected to the output terminal after power switch-on, a large current flows charging the output coupling capacitor C_{107}. R_{103} prevents a failure caused by this charging current.

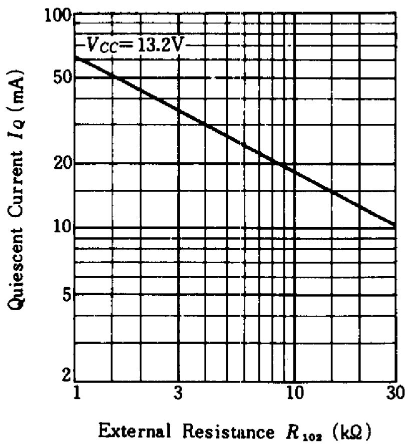
POWER DISSIPATION VS. OUTPUT POWER



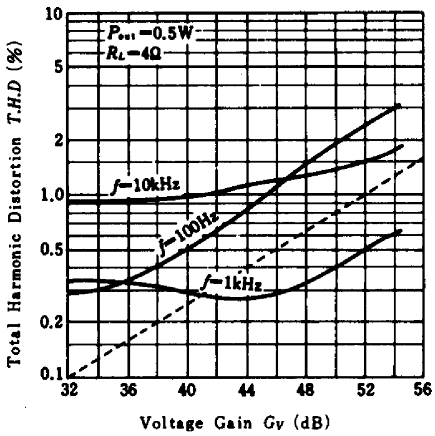
FREQUENCY CHARACTERISTICS



QUIESCENT CURRENT VS. EXTERNAL RESISTANCE



TOTAL HARMONIC DISTORTION VS. VOLTAGE GAIN



TOTAL HARMINIC DISTORTION VS. OUTPUT POWER