

# ECG<sup>®</sup> Semiconductors

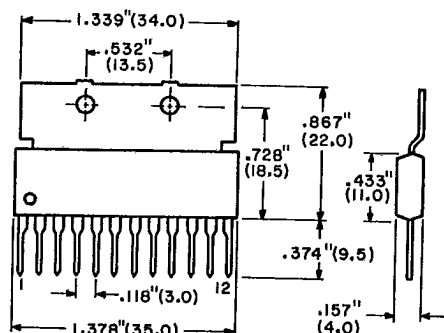
# ECG1386

**8 W AF PO**

T-74-05-01

## Features

- **Protective circuit for load short circuit**
- **Low distortion rate and high impedance**
- **Uni-direction pins with wider spacing**
- **Muting circuit and ripple filter built in**
- **High output power: 8 W ( $V_{CC}=25\text{ V}$ ,  $R_L=8\ \Omega$ )**



### Absolute Maximum Ratings (T<sub>A</sub>=25°C)

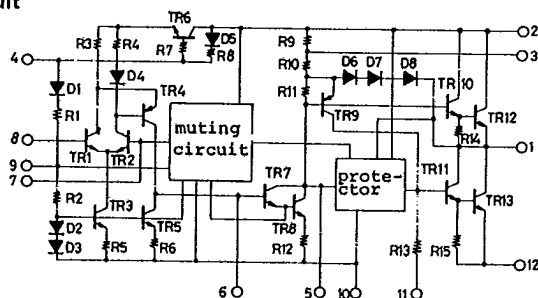
Parameters	Symbol	Rating	Unit
Maximum Supply Voltage	V <sub>cc1</sub>	Quiescent - 35	V
	V <sub>cc2</sub>	Operating - 30	V
Maximum Flow-In and Out Current	I <sub>1</sub> , I <sub>2</sub> , I <sub>12</sub>	Pin 2 Flow-in only - 2.20 Pin 12 Flow-out only	A
Allowable Power Dissipation	P <sub>D</sub> max	8.1*	W
Operating Temperature	T <sub>opg</sub>	- 20 to + 70	°C
Storage Temperature	T <sub>stg</sub>	- 40 to + 150	°C

\* 100 x 200 x 2 mm<sup>3</sup> Al heat sink used.

### Recommended Operating Condition ( $T_A = 25^{\circ}\text{C}$ )

Parameters	Symbol	Rating	Unit
Recommended Supply Voltage	$V_{CC}$	25	V
Load Resistance	$R_L$	8	$\Omega$

### Equivalent Circuit



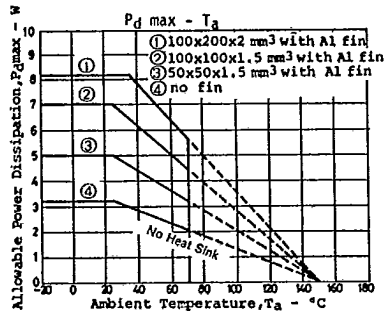
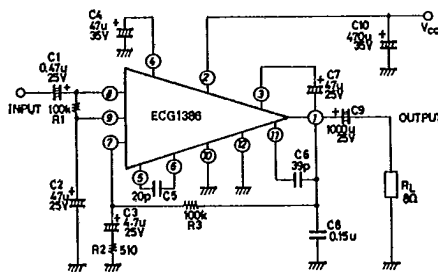
ECG1386

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Electrical Characteristics ( $T_A = 25^\circ\text{C}$ ,  $V_{CC} = 25\text{ V}$ ,  $R_L = 8\ \Omega$ ,  $f = 1\text{ kHz}$ ,  $100 \times 200 \times 2\text{ mm}^3$  Al heat sink used)

Parameters	Symbol	Test Condition	Min	Typ	Max	Unit
Quiescent Current	$I_{CCO}$		--	40	80	mA
Voltage Gain	VG(1)	Open Loop	--	79	--	dB
	VG(2)	Closed Loop	--	45	--	dB
Output Power	$P_O$	THD = 5%	7	8	--	W
Total Harmonic Distortion	THD	$P_O = 0.5\text{ W}$	--	0.1	0.8	%
Input Resistance	$r_i$		--	100 k	--	$\Omega$
Output Noise Voltage	$V_{NO}$	$R_g = 10\text{ k}\Omega$	--	1	2	mV
Ripple Rejection	RR	$R_g = 10\text{ k}\Omega$ , $f = 100\text{ Hz}$	--	60	--	dB

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**Application****8 W Typ AF Power Amp for Home Stereo****Description of External Parts****Voltage Gain**

The closed loop voltage gain, VG, is determined by the ratio of the external resistances  $R_2$  and  $R_3$  and may be derived from the following formula:

$$VG = 20 \log (R_3/R_2) \text{ [dB]}$$

**Frequency Characteristics**

The cut-off frequency of the lower range depends on  $C_1$ ,  $C_3$  and  $C_9$  and the phase compensation of the higher range is performed by  $C_5$ .

**High Range Oscillator**

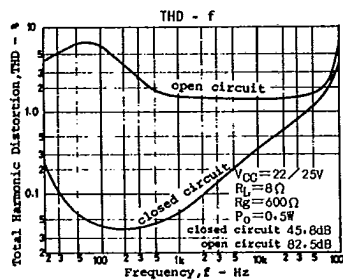
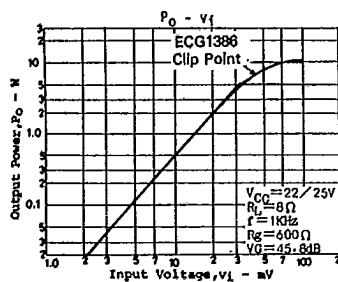
$C_6$  and  $C_8$  are used for correction at the higher range. A polyester film capacitor of a superior high phase characteristic is used for  $C_8$ .

**Input Impedance**

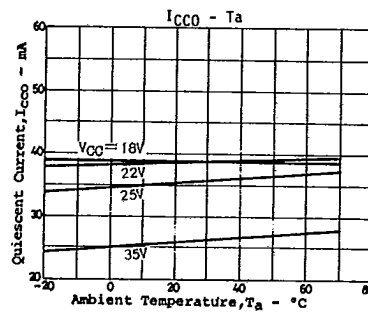
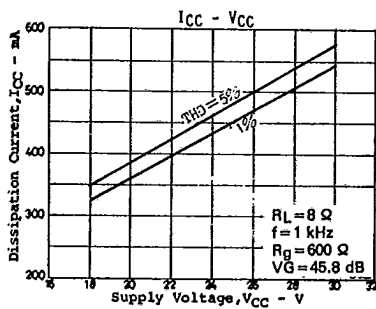
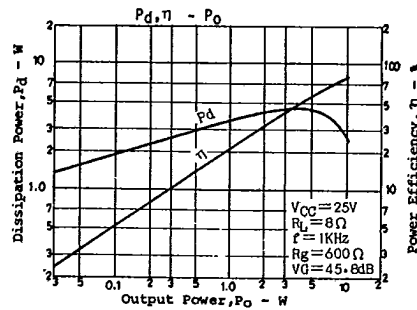
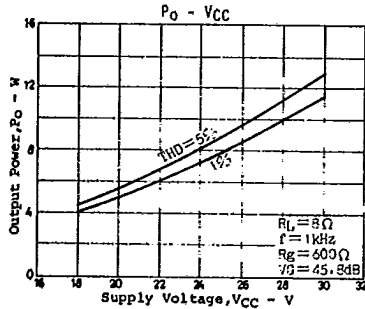
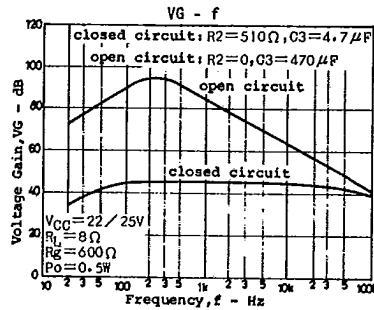
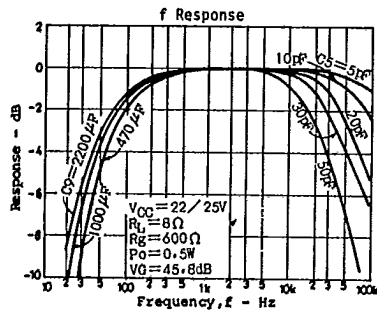
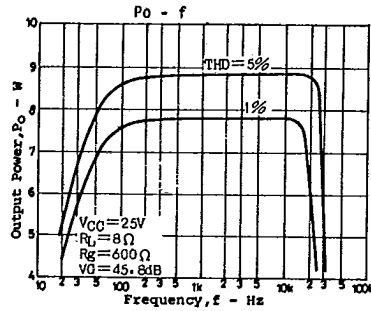
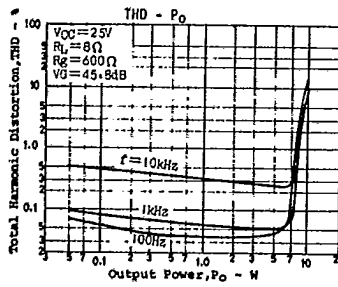
The impedance is substantially determined by the value of  $R_1$ .

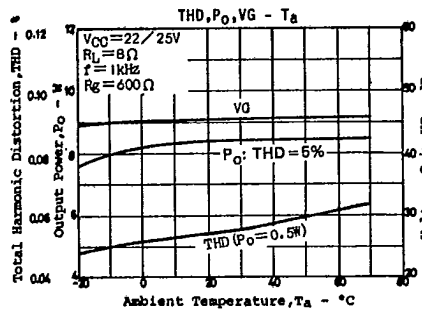
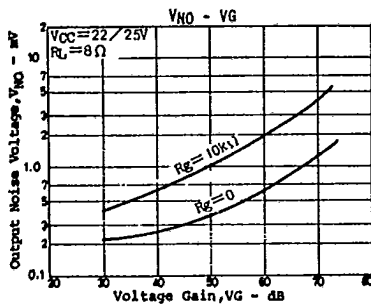
**Pop Noise**

Although a muting circuit is built in, its operation is dependent on the values of  $C_1$ ,  $C_2$ ,  $C_3$ ,  $C_4$  and  $R_3$  and care must be taken.



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## Special Notes

### 1. Maximum Ratings

When the device is used in the vicinity of the maximum ratings, a small change in the conditions could result in exceeding the maximum ratings. Since this could lead to damage, a sufficient fluctuating margin for the source voltage must be allowed and the device must be used within a range that will never exceed the maximum ratings.

### 2. Short-Circuiting the Pins

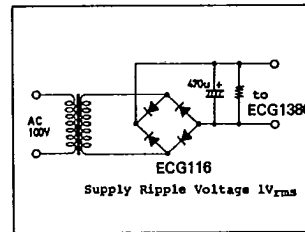
When the power source is turned ON while the pins are short-circuited, damage or degradation could result. Thus, the power source must be turned ON after confirming that the pins are not short-circuited in mounting an IC on the board.

### 3. The ECG1386 and the bar antenna must be sufficiently spaced apart from each other when used in radios.

### 4. PC Board Layouts

The lines for the power source, the output, and the ground must be made thick and short in designing the printed circuit boards and the pattern must be so designed that a feed-back circuit loop for the input and the output is not created. If the design of the printed circuit board is not appropriate, a high frequency pulse may be generated and this might disturb the AM tuner portion. Thus, the source capacitor must be mounted as close to the  $V_{CC}$  GND pin as possible, and care should be taken to prevent high frequency waves from being generated.

Since the heat discharging pin is at the substrate potential of the IC, it should be connected to a line of the same potential as those of pins 10 and 12 externally. Pin 10 is a GND of the preamplifier, and pin 12 is a GND of the power amplifier.



5. When the  $Z_L$  of the speaker ( $Z_L - f$ ) characteristics is drastically reduced, the protective circuit could operate erroneously even when an 8  $\Omega$  speaker is used. Erratic operations are most apt to occur when the input exceeds  $f = 400$  Hz and  $Z_L$  is less than 4  $\Omega$ .

6. If the low frequency characteristic is insufficient, it is desirable to use ECG1386 with  $R_2$  increased and the operating voltage gain decreased. Care must be exercised when changing capacitance, etc. (especially  $C_3$ ,  $C_2$ ) as the rising mode of output pin voltage (pin 1) changes at the time of switch ON. Some rising modes of voltage at pin 1 may develop into overshoot and the instantaneous power dissipated in the power transistor may increase, which may not be advantageous in terms of breakdown.