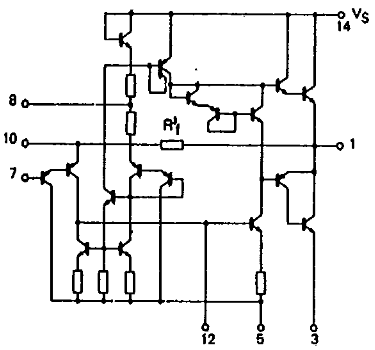
ECG semiconductors

ECG1111

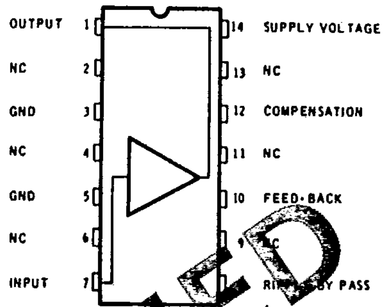
AUDIO AMPLIFIER

T-74-05-01

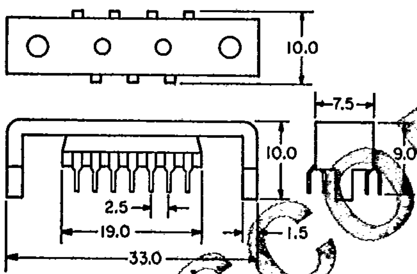
SCHEMATIC DIAGRAM



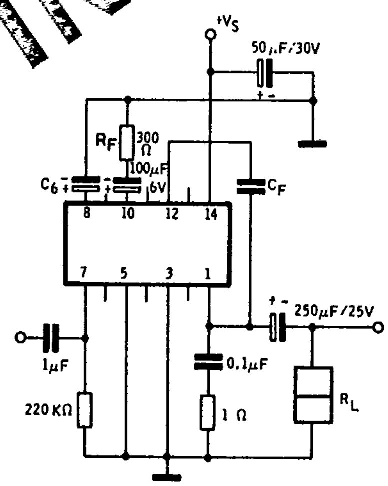
CONNECTION DIAGRAM
(top view)



The heat-sink is connected to the substrate (pin 5)



TEST CIRCUIT



- OUTPUT POWER 4 W (24 V - 16 Ω)
- SELF CENTERING BIAS
- LOW QUIESCENT OUTPUT CURRENT
- NO CROSS OVER DISTORTION
- HIGH EFFICIENCY

The ECG1111 is an integrated monolithic circuit in a 14-lead quad in-line plastic package with external heat-sink.

Special features of the circuit include:

— Self centering bias for any supply voltage from 6 to 24 V.

— Direct coupled input, high input impedance and high supply voltage rejection ratio.

— Minimum number of external components.

The package has very low thermal resistance. To decrease the thermal resistance further, an external heat-sink can easily be mounted by means of ordinary hardware.

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ABSOLUTE MAXIMUM RATINGS

V_s	Supply voltage	27	V
V_i*	Input voltage	0.5 to 27	V
I_o	Output peak current	1	A
P_{tot}	Power dissipation at $T_{amb} = 25\,°C$	2	W
	at $T_{case} = 70\,°C$	4.5	W
T_{stg}, T_j	Storage and junction temperature	-55 to 150	°C

* For $V_s < 27\,V$, $V_{i\,max} = V_s$.

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\,°C$ unless otherwise specified)

Parameter		Test conditions		Min.	Typ.	Max.	Unit
I_d	Total quiescent drain current	$V_s = 18\,V$			6.2		mA
		$V_s = 24\,V$			7.5		mA
I_d	Quiescent drain current of output transistors	$V_s = 18\,V$			2.5		mA
		$V_s = 24\,V$			3		mA
I_d	Drain current	d = 10%	$R_L = 16\,\Omega$				
		$P_o = 2.2\,W$	$V_s = 18\,V$		175		mA
		$P_o = 4\,W$	$V_s = 24\,V$		220		mA
I_b	Input bias current	$V_s = 18\,V$			180		nA
		$V_s = 24\,V$			250		nA
P_o*	Output power	d = 3%					
		$V_s = 18\,V$	$R_L = 16\,\Omega$		1.7		W
		$V_s = 24\,V$	$R_L = 16\,\Omega$		2.7		W
		d = 10%					
		$V_s = 18\,V$	$R_L = 16\,\Omega$		2.2		W
		$V_s = 24\,V$	$R_L = 16\,\Omega$	3	4		W
R'_f	Internal feedback resistance (see schematic diagram)				15		kΩ
Z_i	Input impedance	$V_s = 18\,V$			150		kΩ
		$V_s = 24\,V$			110		kΩ
d	Distortion	$P_o = 50\,mW$					
		f = 1 kHz					
		$R_L = 16\,\Omega$					
		$V_s = 18\,V$			0.1		%
		$V_s = 24\,V$			0.1		%
G_v	Voltage gain	open loop	$R_L = 16\,\Omega$				
		$V_s = 18\,V$			72		dB
		$V_s = 24\,V$			74		dB
SVR	Supply voltage rejection	$R_L = 16\,\Omega$					
		f(ripple) = 100 Hz					
		$C_6 = 100\,\mu f$(see application circuit diagrams)					
		$V_s = 18\,V$			52		dB
		$V_s = 24\,V$			52		dB
		$C_6 = 50\,\mu F$					
		$V_s = 18\,V$			46		dB
		$V_s = 24\,V$			46		dB

* External heat-sink not required except for the conditions $V_s = 24\,V$, $R_L = 16\,\Omega$.

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THERMAL DATA

$R_{th\ j\text{-}case}$	Thermal resistance junction-case	max	17	°C/W
$R_{th\ j\text{-}amb}$	Thermal resistance junction-ambient	max	63	°C/W

Fig. 1 - Typical output power vs supply voltage

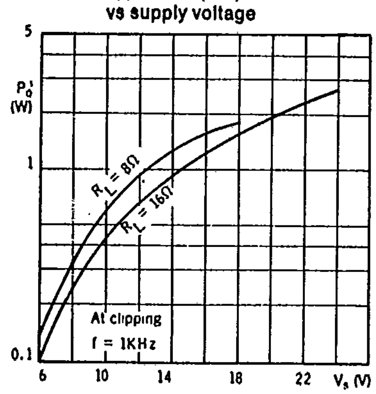

Fig. 2 - Typical output power vs supply voltage

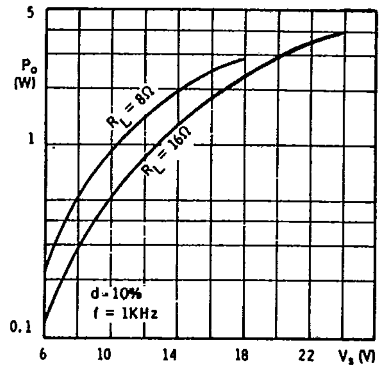

Fig. 3 - Typical distortion vs output power

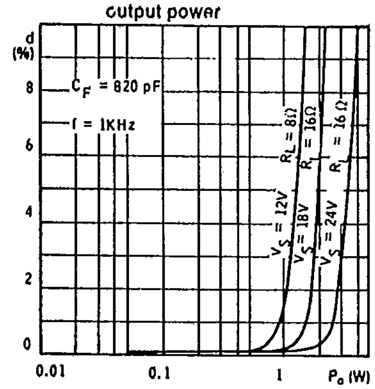

Fig. 4 - Typical relative frequency response

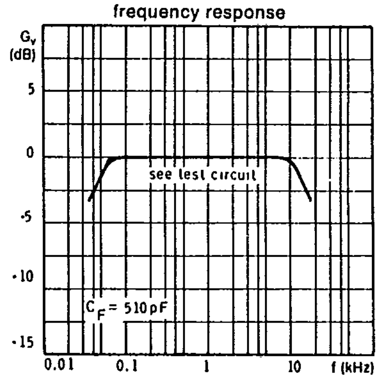

Fig. 5 - Typical relative frequency response

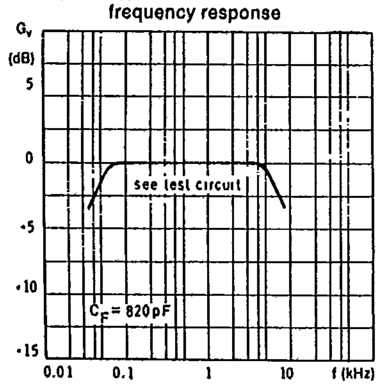

Fig. 6 - Typical open loop voltage gain vs frequency

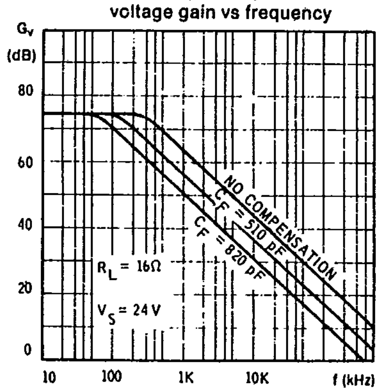

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Fig. 7 - Typical output power vs input voltage

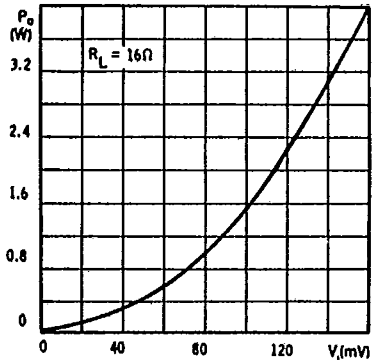

Fig. 8 – Typical voltage gain vs feedback resistance (R_F)

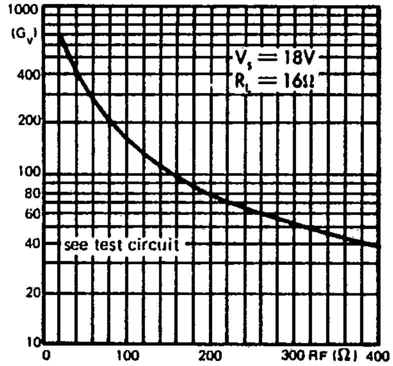

Fig. 9 - Typical power dissipation and efficiency vs output power

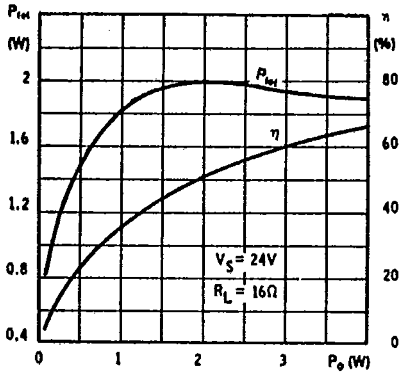

Fig. 10 - Typical power dissipation and efficiency vs output power

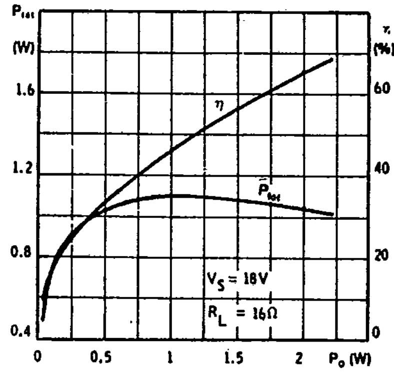

Fig. 11 - Typical power dissipation and efficiency vs output power

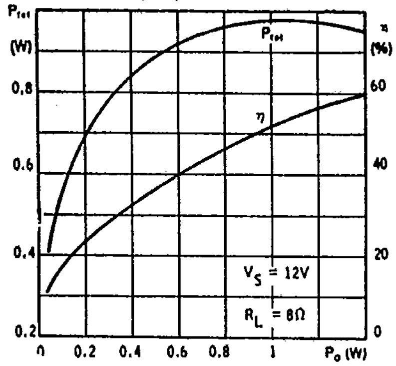

Fig. 12 - Typical drain current vs output power

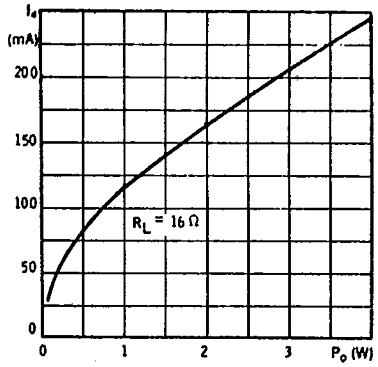

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Fig. 13 - Typical drain current vs output power

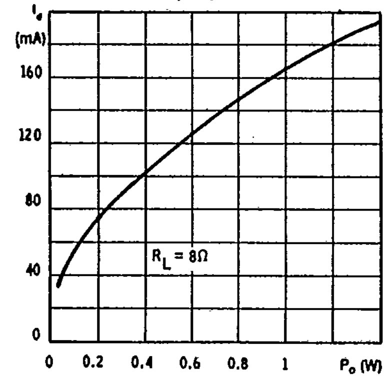

Fig. 14 - Maximum power dissipation vs supply voltage

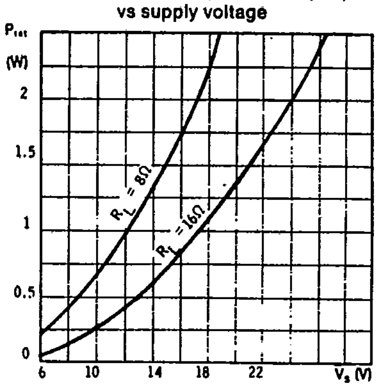

Fig. 15 - Typical quiescent drain current vs supply voltage

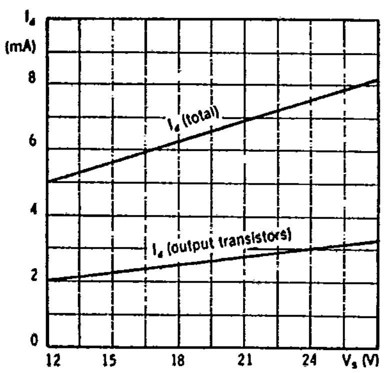

Fig. 16 - Typical total quiescent drain current vs ambient temperature

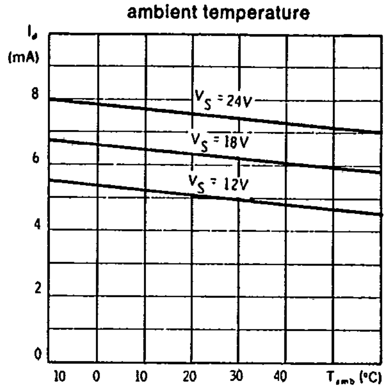

Fig. 17 - Typical quiescent drain current of output transistors vs ambient temperature

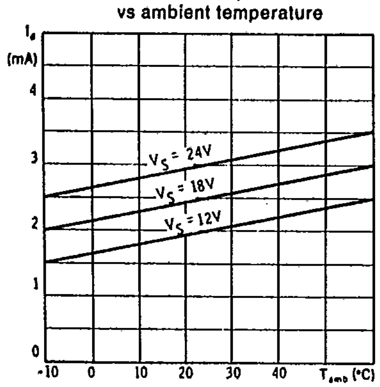

Fig. 18 - Typical relative DC output level vs ambient temperature

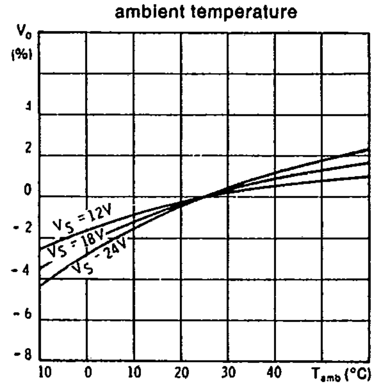

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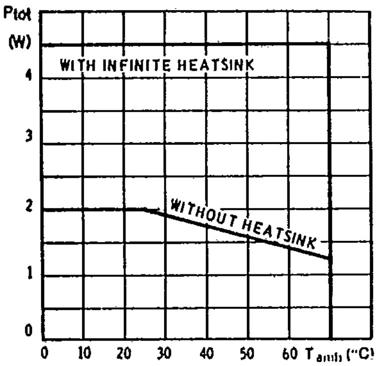
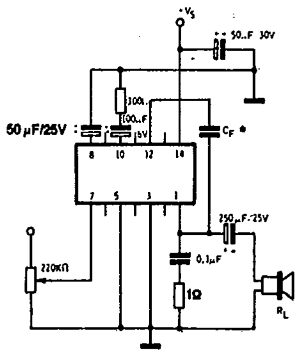
Fig. 19 - Power rating chart



TYPICAL APPLICATIONS

Fig. 20 - Record player



*C_F see figs. 4 and 5.

MOUNTING INSTRUCTIONS

Heat-sinking with external bar

Power dissipation can be achieved by means of an additional external heat-sink fixed with two screws or by soldering the pins of the external bar to suitable copper areas on the p.c. board.

A. In the former case, the thermal resistance case-ambient of the added heat-sink can be calculated as follows:

$$R_{th} = \frac{(T_{jmax} - T_{amb}) - P_{tot} \cdot R_{th\ j\text{-}case}}{P_{tot}}$$

where:

T_{jmax} = Max junction temperature

T_{amb} = Ambient temperature

P_{tot} = Power dissipation

$R_{th\ j\text{-}case}$ = Thermal resistance junction-case

B. If copper areas on the p.c. board are used the diagrams enclosed give the maximum power dissipation as a function of copper area, with copper thickness 35 μ and ambient temperature 55 °C.