

**BIPOLAR ANALOG INTEGRATED CIRCUIT**

**$\mu$ PC1225H**

**30-50 W POWER AMPLIFIER DRIVER**

T-74-05-01

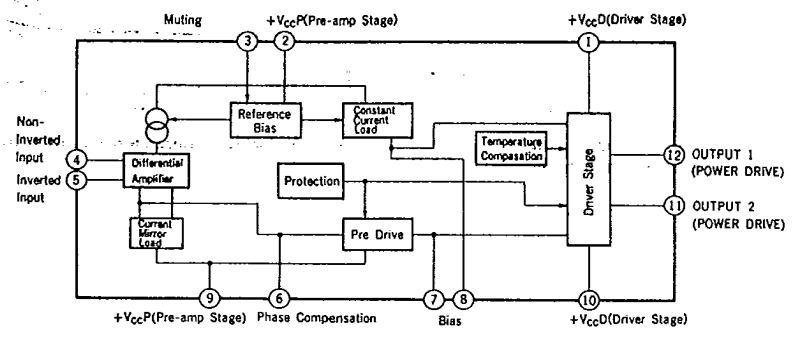
**DESCRIPTION**

$\mu$ PC1225H is designed for use with a HI-FI power amplifier driver. It is composed of a differential amplifier, a pre driver, a driver and protection circuit.  
It is in a 12 pin small power SIP. (Single In Line)

**FEATURES**

- Excellent Low Distortion  
0.002 % TYP. ( $V_{CC} = \pm 36$  V,  $f = 1$  kHz,  $A_v = 30$  dB,  $P_o = 30$  W,  $R_L = 8$  Ohms)  
0.006 % TYP. ( $V_{CC} = \pm 36$  V,  $f = 20$  kHz,  $A_v = 30$  dB,  $P_o = 30$  W,  $R_L = 8$  Ohms)
- Wide Frequency Band  
900 kHz TYP. (-3 dB)
- Wide Power Band Width  
90 kHz TYP. ( $P_o = 25$  W, T.H.D. = 0.1 %)
- Excellent Low POP ON/OFF Noise

**BLOCK DIAGRAM**



**NOTE:** The protection circuit is for this IC and cannot protect external Power Transistors. Thus, design a  $P_o$  Tr protection circuit besides.

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**ABSOLUTE MAXIMUM RATINGS (Ta = 25 °C)**

Supply Voltage (Quiescent)	V <sub>CC1</sub>	±50	V
Supply Voltage (Operational)	V <sub>CC2</sub>	±45	V
Quiescent Circuit Current	I <sub>CC</sub>	200	mA
Allowable Package Dissipation	I <sub>CC(PEAK)</sub>	4.1	W
Operational Temperature	T <sub>opt</sub>	-20 to +75	°C
Storage Temperature	T <sub>stg</sub>	-40 to +150	°C

**RECOMMENDED OPERATING CONDITION**

Supply Voltage (Operational)	V <sub>CC</sub> = ±18 to ±36 V at Max Power Output
Input Bias Resistance	R <sub>IN</sub> = 1 to 50 to 100 kohms
Power Transistor h <sub>FE</sub>	h <sub>FE</sub> = 50 at Max Power Output
Closed Loop Voltage Gain	A <sub>V</sub> = 26 to 30 dB

**ELECTRICAL CHARACTERISTICS (V<sub>CC</sub> = ±36 V, A<sub>V</sub> = 30 dB, Use Standard Test Circuit, Ta = 25 °C)**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITION
Output Offset Voltage	V <sub>OFF</sub>		±5	±100	mV	SEE TEST CIRCUIT 1
Quiescent Circuit Current	I <sub>CC</sub>		20	40	mA	V <sub>IN</sub> = 0
Maximum Output Voltage	V <sub>OM</sub>	20	23		V	T.H.D. = 0.05 % f = 20 to 20 kHz
Open Loop Voltage Gain	A <sub>VO</sub>	80	95		dB	V <sub>O</sub> = 1.5 V, f = 1 kHz
Output Noise Voltage	V <sub>NO</sub>		0.07	0.14	mV	R <sub>G</sub> = 10 kohms
Power Band Width	P.B.W.		900		kHz	V <sub>O</sub> = 1.5 V, -3 dB
Supply Voltage Rejection Ratio	S.V.R.	55	70		dB	R <sub>G</sub> = 2 kohms, f = 100 Hz

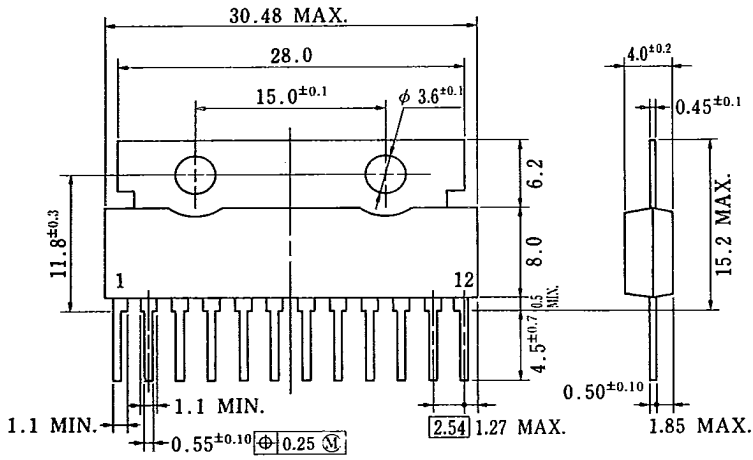
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PACKAGE DIMENSIONS (Unit: mm)



P12HP-254B1

**PIN CONNECTION DIAGRAM**

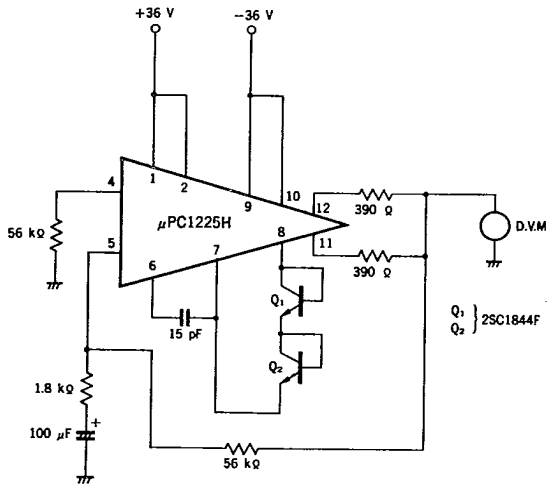
Pin No.	Pin connection
1	+V <sub>CCD</sub> (for Driver)
2	+V <sub>CCP</sub> (for Preamp)
3	MUTING
4	INPUT
5	NFB
6	PHASE COMP
7	BIAS
8	BIAS
9	-V <sub>CCP</sub> (for Preamp)
10	-V <sub>CCD</sub> (for Driver)
11	LOWER OUTPUT
12	UPPER OUTPUT

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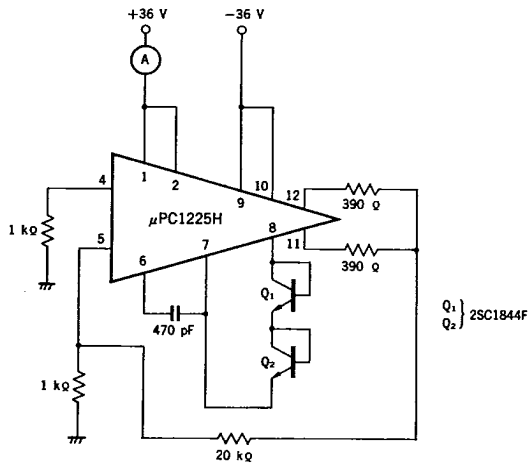
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TEST CIRCUIT 1 ( $V_{OFF}$ )



TEST CIRCUIT 2 ( $I_{CC}$ )



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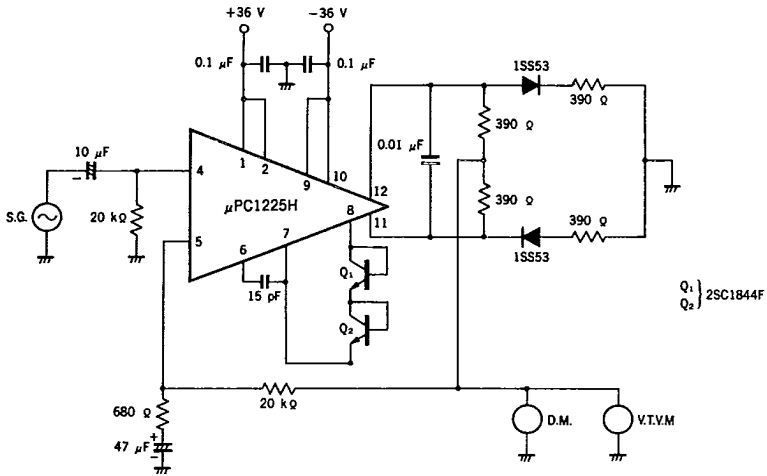
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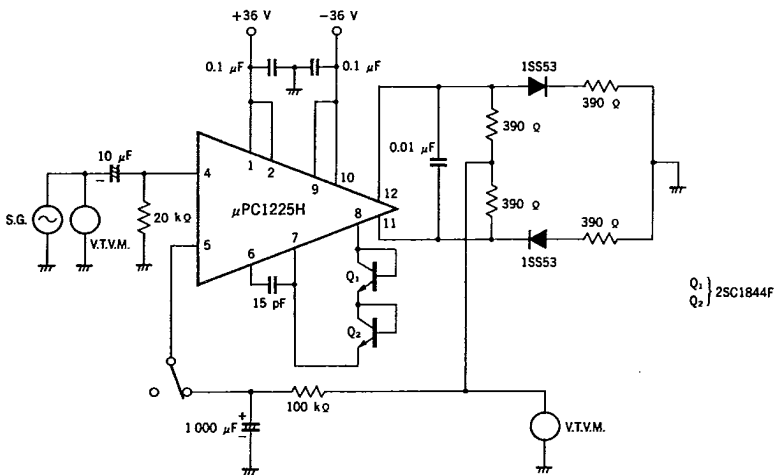
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TEST CIRCUIT 3 (V<sub>OM</sub>)

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TEST CIRCUIT 4 (A<sub>VO</sub>)

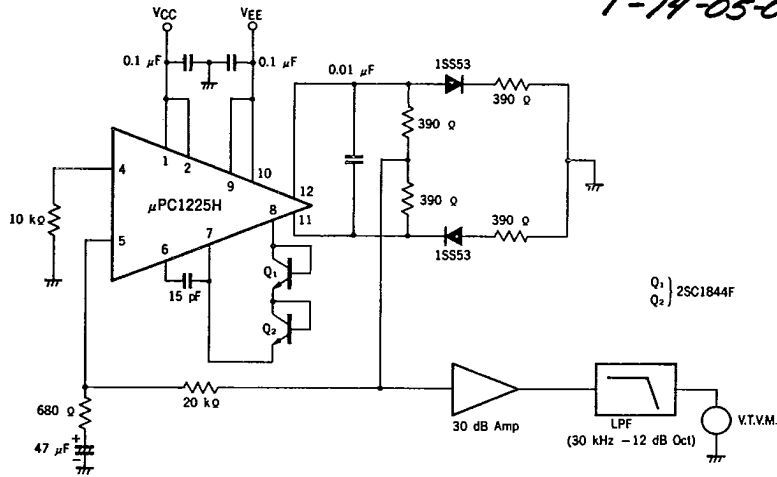


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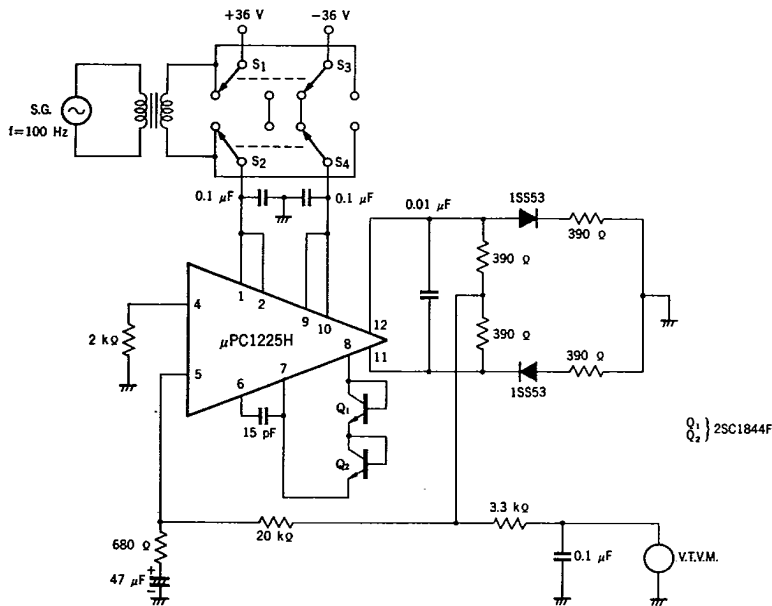
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TEST CIRCUIT 5 (V<sub>No</sub>)

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TEST CIRCUIT 6 (S.V.R.)



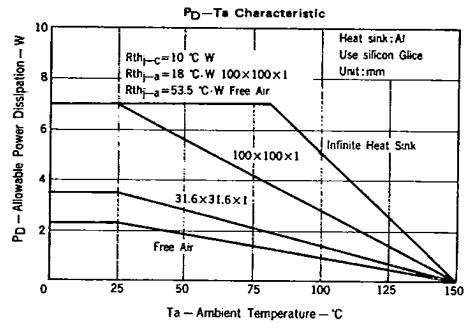
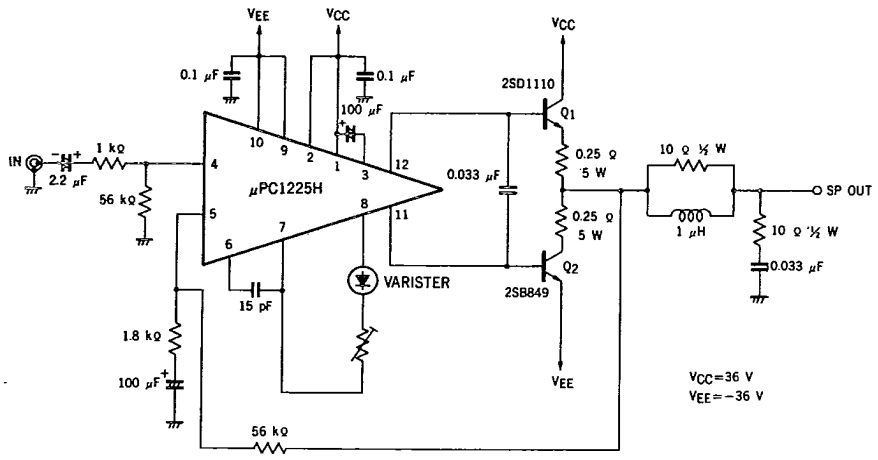
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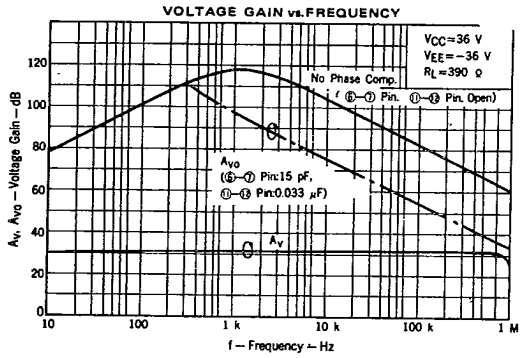
TYPICAL APPLICATION CIRCUIT



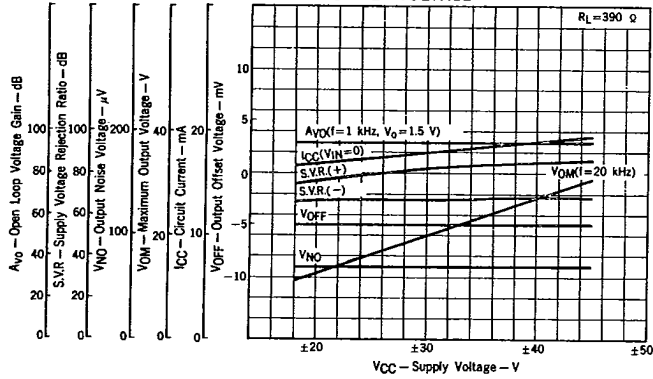
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$\mu$ PC1225H  
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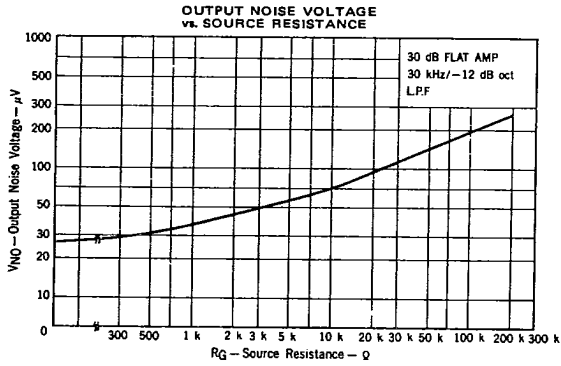
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OPEN LOOP VOLTAGE GAIN  
 SUPPLY VOLTAGE REJECTION RATIO  
 OUTPUT NOISE VOLTAGE  
 CIRCUIT CURRENT  
 OUTPUT OFFSET VOLTAGE  
 vs. SUPPLY VOLTAGE



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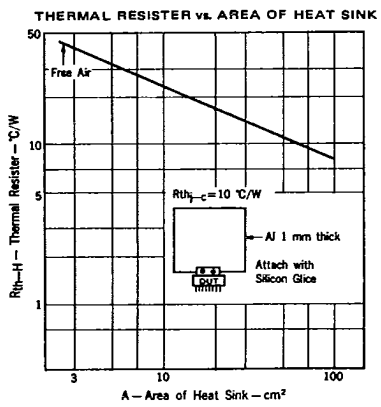
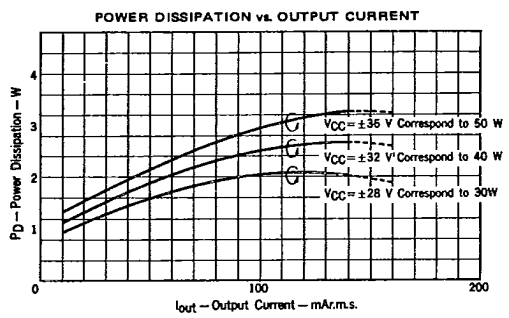
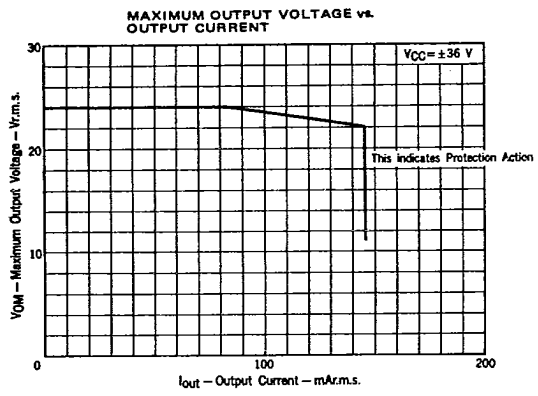




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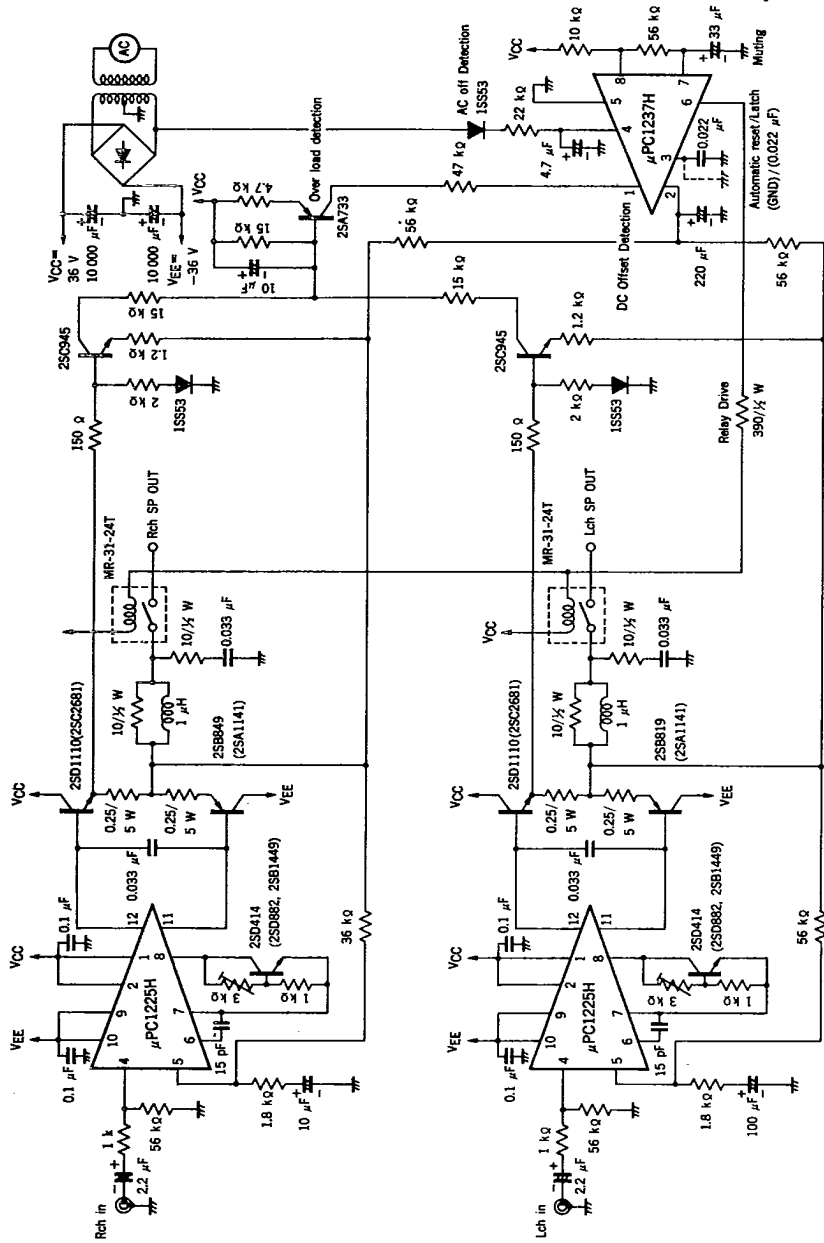
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**μPC1225H/μPC1237H/MP-80 EVALUATION CIRCUIT**



**Note:** Attach 25D414 on P<sub>0</sub> Tr Heat Sink.  
Attach A1 Heat Sink, which is larger than 80 mm X 60 mm X 1 mm, with μPC1225H.

μPC1225H

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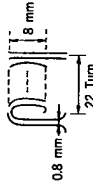
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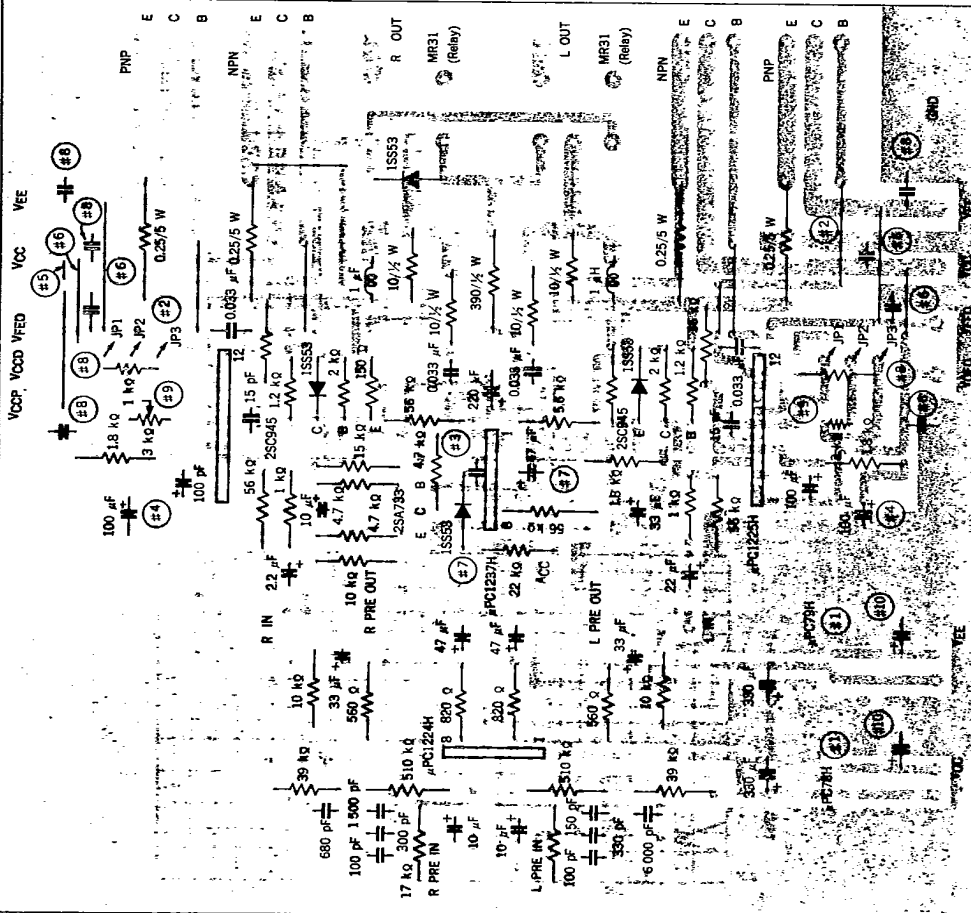
μPC1225H/μPC1237H/μPC1224H/MP-80 (2SC849, 2SD1110 or 2SA2681, 2SC1141) Evaluation Circuit Board Component Arrangement

Note:

- #1 These terminals are for 3-terminal regulators (μPC7818H, μPC7918H) as μPC1224H power supply.
- #2 These terminals are for JP—lines to a temperature Compensation transistor (2SD414 or others).
- #3 Use 0.02 μF capacitance in case of using μPC1237H at latching function, while connect each other at automatic resetting.
- #4 This capacitance is for preventing POP ON/OFF noise.
- #5 Thus, neglect it in case of using a relay.
- #6 These terminals are for JP—lines in case of using the same power supply (μPC1237H and Power Amplifier)
- #7 These terminals are for JP—lines in case of using the same power supply (μPC1225H and Power Tr)
- #8 This terminal is for AC-OFF Detection. Thus, use 8.2 k ohms instead of 22 k ohms, neglect 1SS53 and connect these 1SS53's terminals and neglect 4.7 μF in case of using DC power supply.
- #9 These capacitances are for preventing a parasitic oscillation. Use a 0.1 μF.
- #10 These trimmers are for adjusting an idling current. Recommend Neo-Pot P561 Series.
- #11 These capacitance are for the 3-terminal regulator input.
- #12 Design of 1 μH (example)



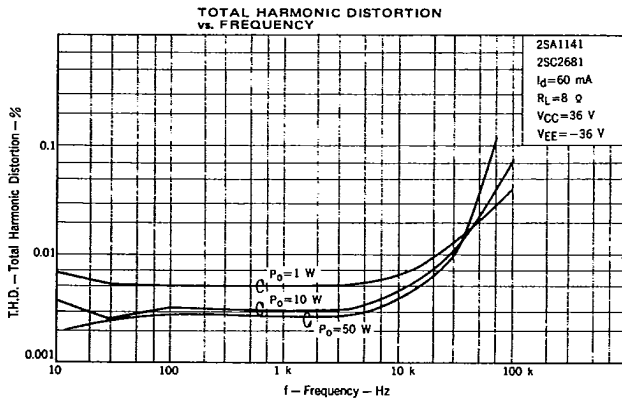
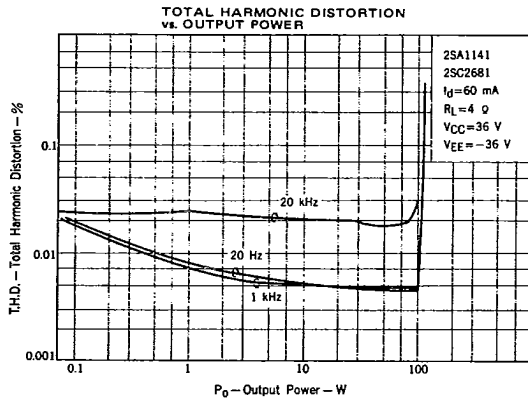
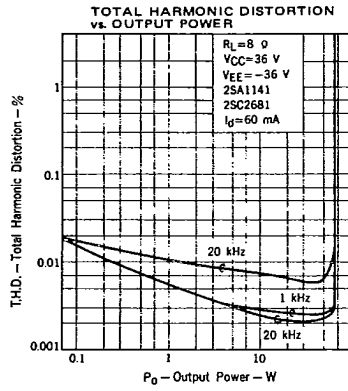
#12 This indicates a copper board pattern. This is the evaluation circuit. Thus, it is not for a mass production considered about component deviation and the temperature characteristic.



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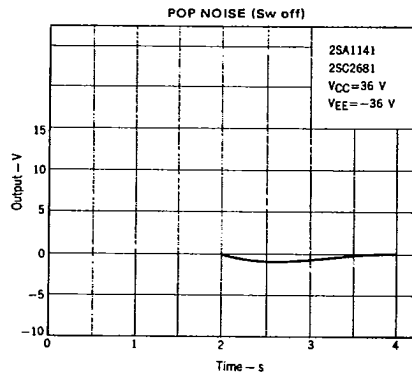
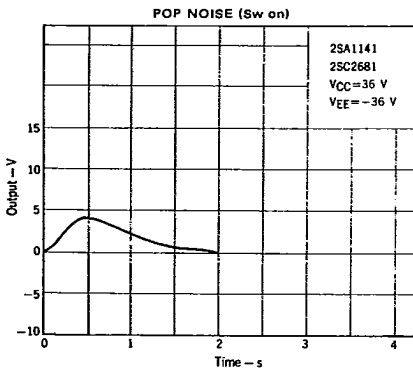
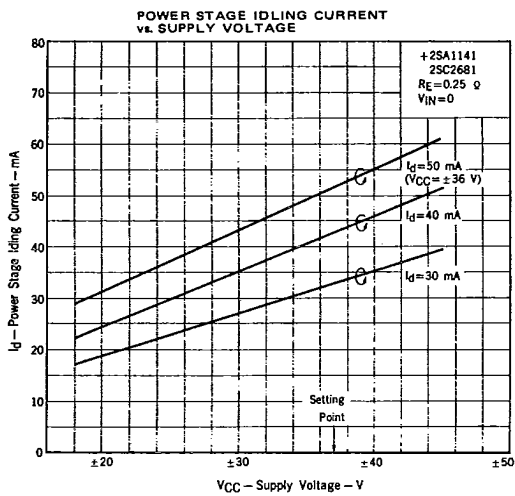
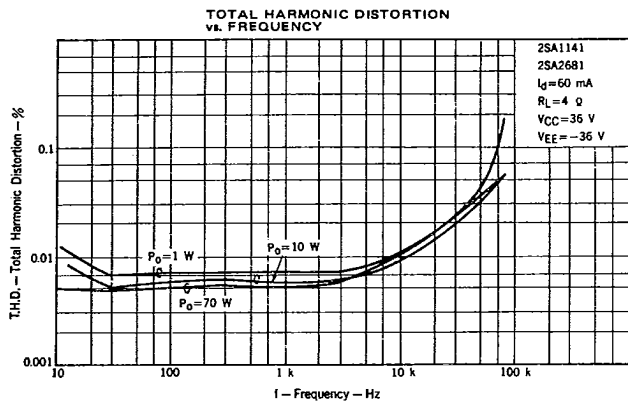


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## APPLICATION CIRCUIT

## (1) Design Specification

## a. Pre amplifier stage (equalizer amplifier)

Supply Voltage  $V_{cc} = \pm 22$  VInput equivalent Noise Voltage  $V_{NL} = 0.815$   $\mu$ Vr.m.s. TYP.

Phono Allowable Input Level 222 mVr.m.s. TYP. (T.H.D.=0.1 %, f=1 kHz)

## b. Power amplifier stage

Supply Voltage  $V_{cc} = \pm 36$  VLoad impedance  $R_L = 8$   $\Omega$ Continuous Output Power  $P_o = 50$  W (T.H.D.=0.1 %)Voltage Gain (at flat state)  $A_v = 43$  dBInput Sensitivity  $V_{in} = 142$  Vr.m.s.Range of Varying Voltage gain 100 Hz  $\pm 10$  dB  
10 kHz  $\pm 10$  dB

## (2) Description

$\mu$ PC1224H is chosen as EQ amplifier. The internal circuit of this IC is composed of two differential amplifiers as voltage amplifier stage and SEPP output circuit. Thus, this IC is available for flat amplifier and tone control amplifier.

Power amplifier stage is composed of NFB tone control amplifier using  $\mu$ PC1225H. This power driver IC is also available for flat amplifier. And  $\mu$ PC1237H is chosen as a protector.

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$\mu$ PC1225H  
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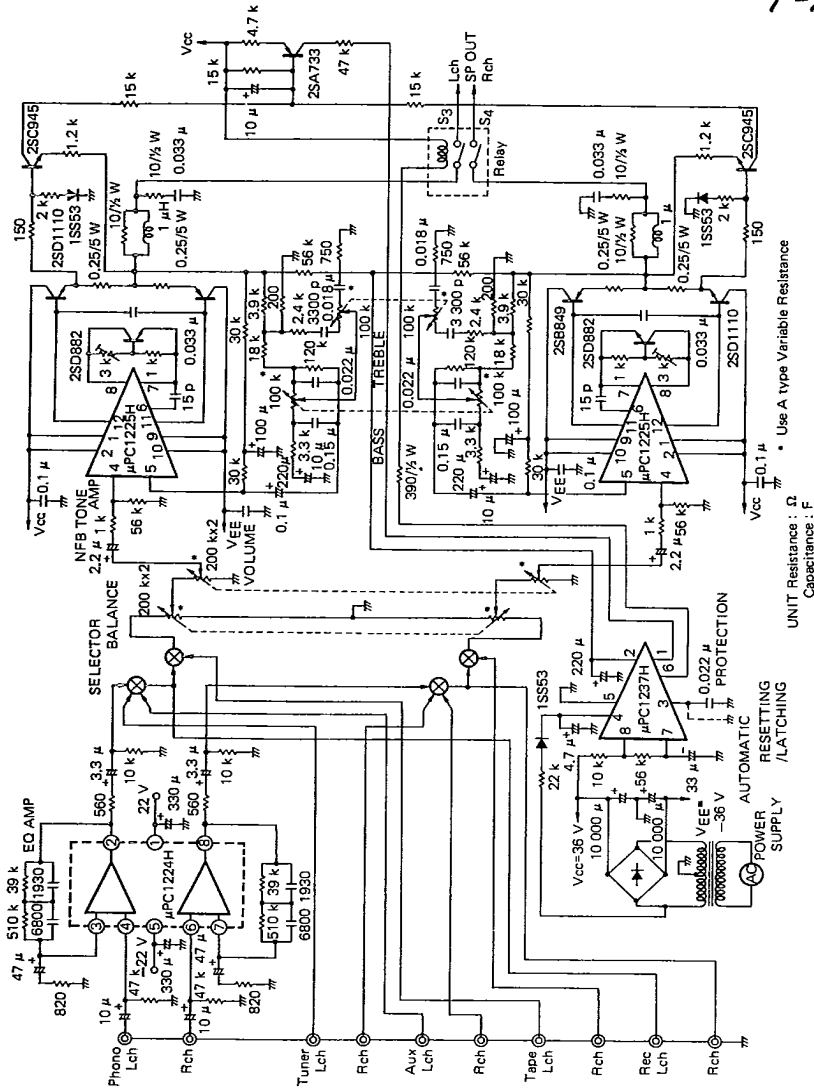


Fig. 1 50 W PRE-MAIN AMPLIFIER APPLICATION CIRCUIT

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(3) Characteristic of Power Amplifier Circuit

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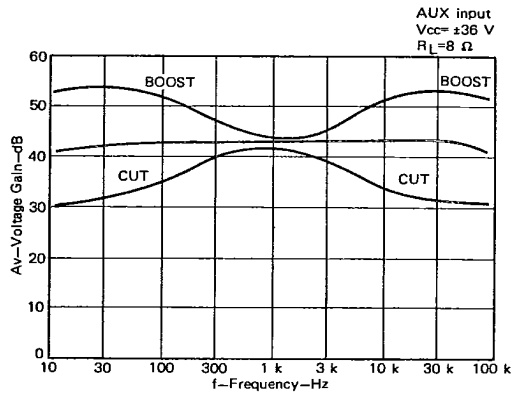


Fig. 2 VOLTAGE GAIN vs. FREQUENCY

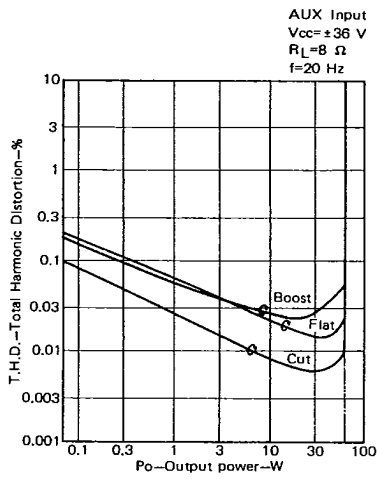


Fig. 3 TOTAL HARMONIC DISTORTION vs. OUTPUT POWER

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**μPC1225H**

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AUX Input  
V<sub>cc</sub> = ±36 V  
R<sub>L</sub> = 8 Ω  
f = 1 kHz

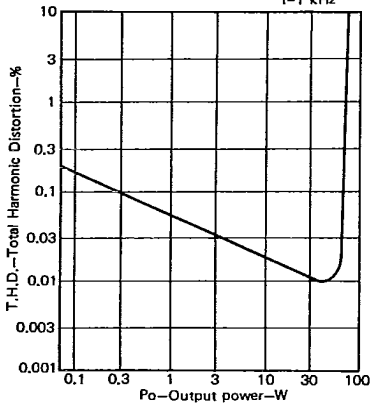


Fig. 4 TOTAL HARMONIC DISTORTION vs. OUTPUT POWER

AUX Input  
V<sub>cc</sub> = ±36 V  
R<sub>L</sub> = 8 Ω  
f = 20 kHz

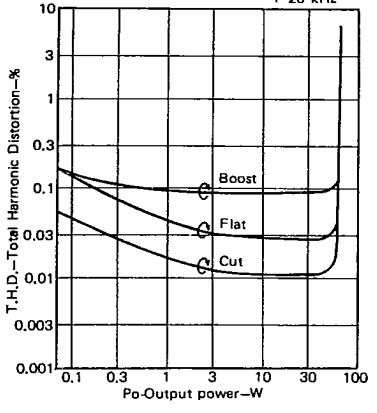


Fig. 5 TOTAL HARMONIC DISTORTION vs. OUTPUT POWER

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