BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC1225H

30-50 W POWER AMPLIFIER DRIVER

DESCRIPTION

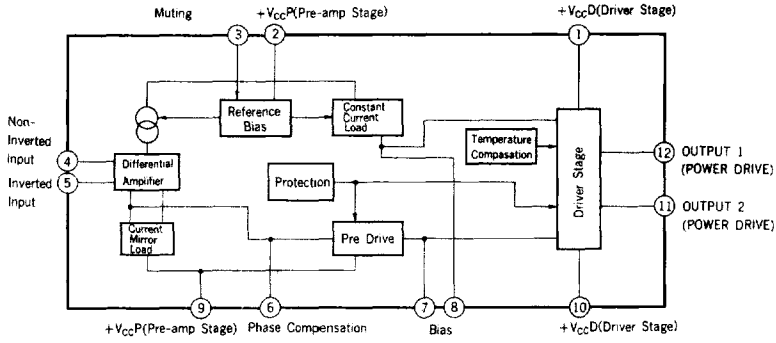
μPC1225H is designed for use with a HI-Fi power amplifier driver. It is composed of a differential amplifier, a pre driver, a driver and protection circuit.

It is in a 12 pin small power SIP. (Single In Line)

FEATURES

- Excellent Low Distortion
  0.002 % TYP. (V_{CC} = ±36 V, f = 1 kHz, A_V = 30 dB, P_o = 30 W, R_L = 8 Ohms)
  0.006 % TYP. (V_{CC} = ±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.

ABSOLUTE MAXMUM RATINGS (Ta = 25 °C)

Supply Voltage (Quiscent)	V_{CC1}	±50	V
Supply Voltage (Operational)	V_{CC2}	±45	V
Quiscent Circuit Current	I_{CC}	200	mA
Allowable Package Dissipation	$I_{CC(PEAK)}$	4.1	W
Operational Temperature	T_{opt}	-20 to +75	°C
Storage Temperature	T_{stg}	-40 to +150	°C

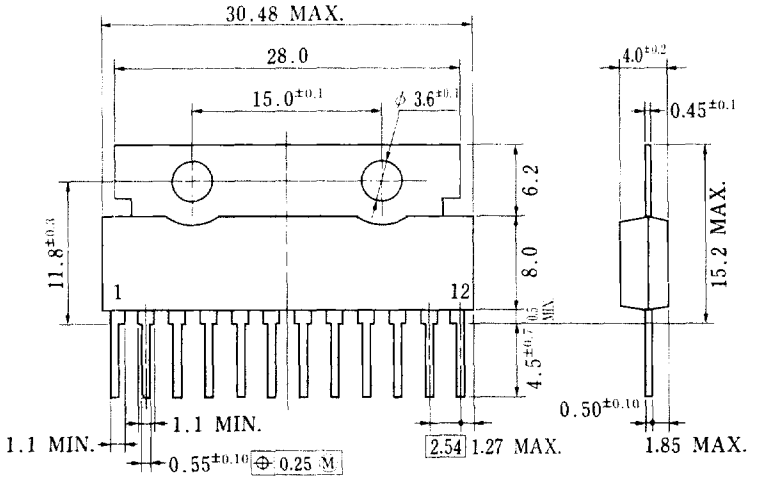
RECOMMENDED OPERATING CONDITION

Supply Voltage (Operational)	V_{CC} = ±18 to ±36 V at Max Power Output
Input Bias Resistance	R_{IN} = 1 to 50 to 100 kohms
Power Transistor h_{FE}	h_{FE} = 50 at Max Power Output
Closed Loop Voltage Gain	A_V = 26 to 30 dB

ELECTRICAL CHARACTERISTICS (V_{CC} = ±36 V, A_v = 30 dB, Use Standard Test Circuit, Ta = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITION
Output Offset Voltage	V_{OFF}		±5	±100	mV	SEE TEST CIRCUIT 1
Quiscent Circuit Current	I_{CC}		20	40	mA	V_{IN} = 0
Maximum Output Voltage	V_{OM}	20	23		V	T.H.D. = 0.05 % f = 20 to 20 kHz
Open Loop Voltage Gain	A_{vo}	80	95		dB	V_o = 1.5 V, f = 1 kHz
Output Noise Voltage	V_{NO}		0.07	0.14	mV	R_G = 10 kohms
Power Band Width	P.B.W.		900		kHz	V_o = 1.5 V, -3 dB
Supply Voltage Rejection Ratio	S.V.R.	55	70		dB	R_G = 2 kohms, f = 100 Hz

PACKAGE DIMENSIONS (Unit: mm)

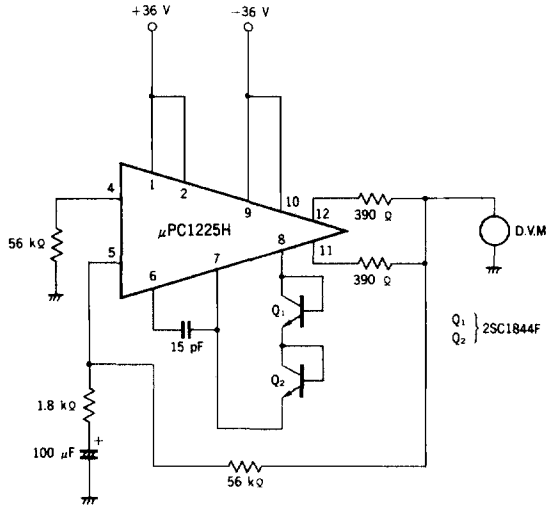


P12HP-254B1

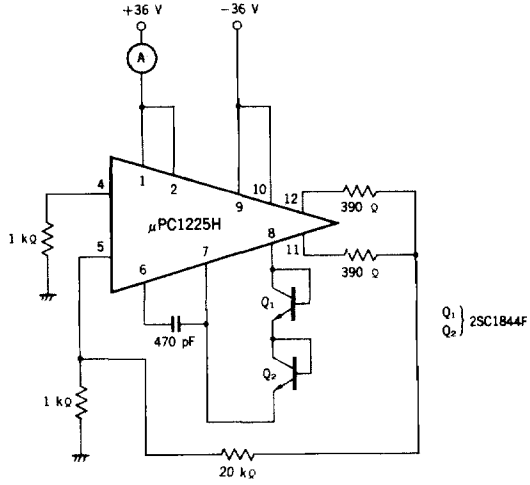
PIN CONNECTION DIAGRAM

Pin No.	Pin connection
1	$+V_{CCD}$ (for Driver)
2	$+V_{CCP}$ (for Preamp)
3	MUTING
4	INPUT
5	NFB
6	PHASE COMP
7	BIAS
8	BIAS
9	$-V_{CCP}$ (for Preamp)
10	$-V_{CCD}$ (for Driver)
11	LOWER OUTPUT
12	UPPER OUTPUT

TEST CIRCUIT 1 (V_{OFF})



TEST CIRCUIT 2 (I_{CC})



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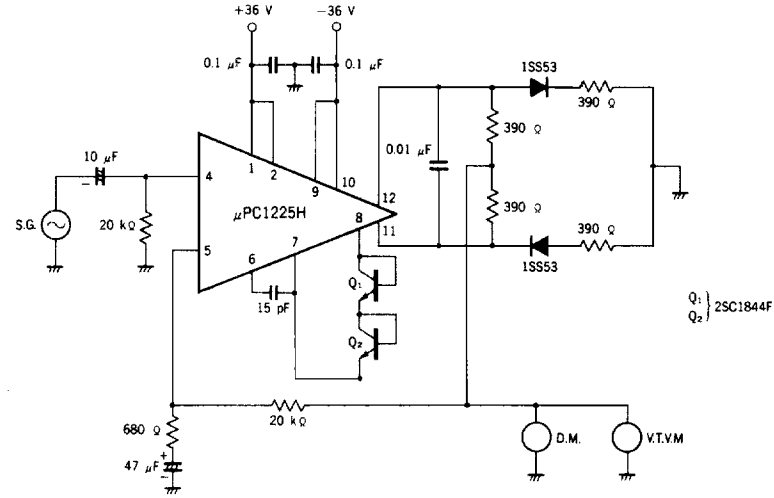
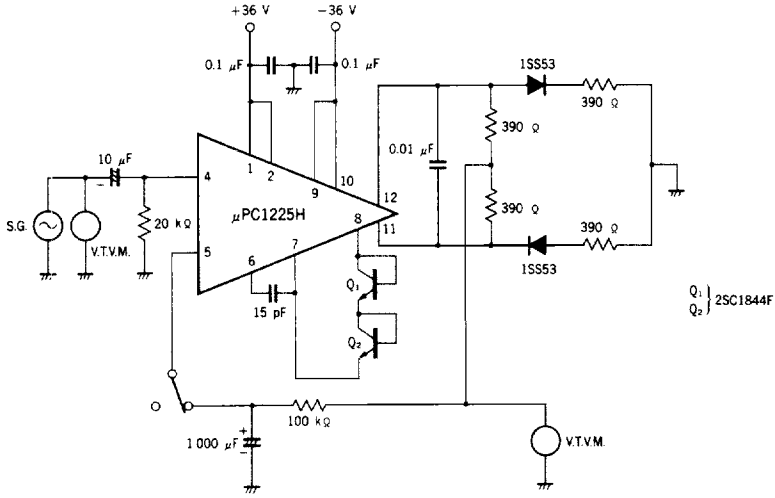
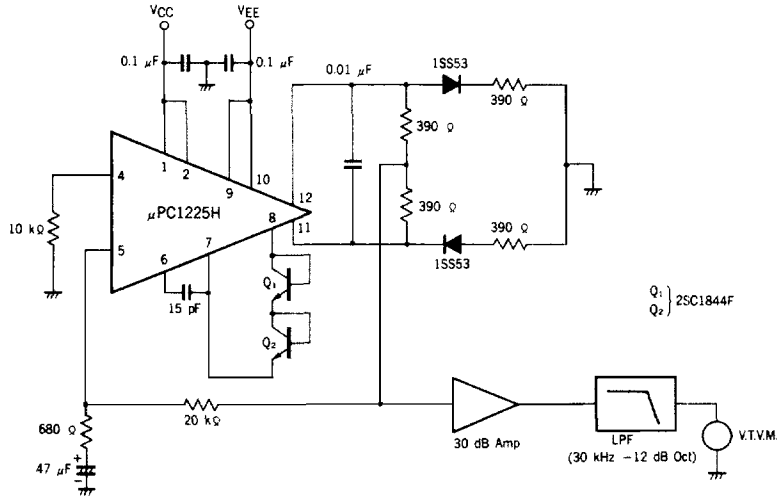
TEST CIRCUIT 3 (V_{OM})



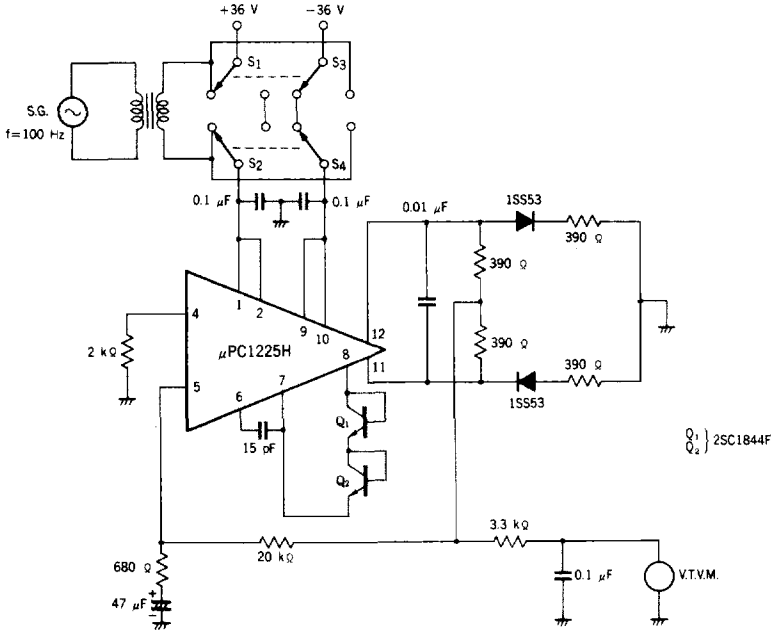
TEST CIRCUIT 4 (A_{VO})



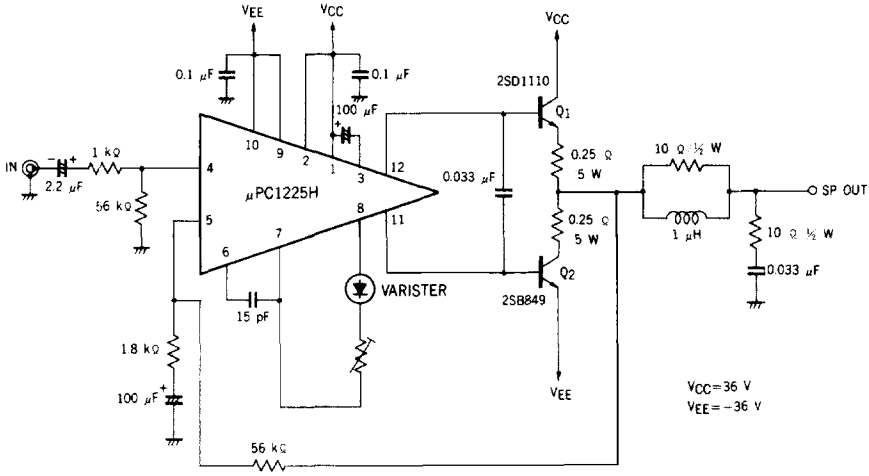
TEST CIRCUIT 5 (V_{NO})

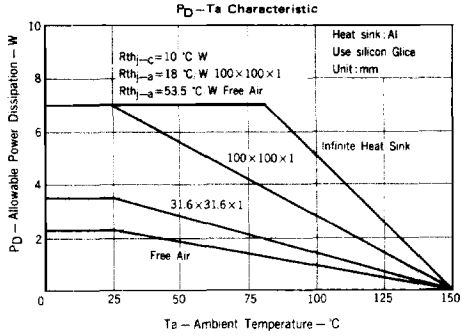


TEST CIRCUIT 6 (S.V.R.)

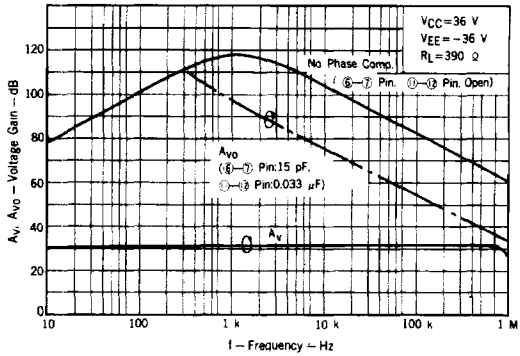


TYPICAL APPLICATION CIRCUIT

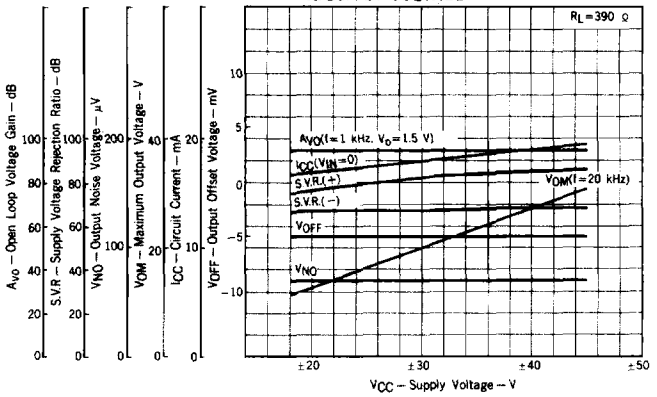




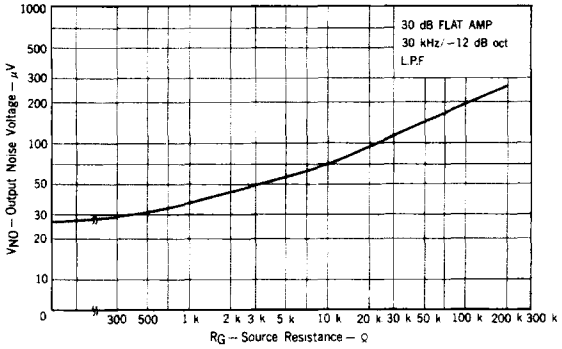
VOLTAGE GAIN vs. FREQUENCY



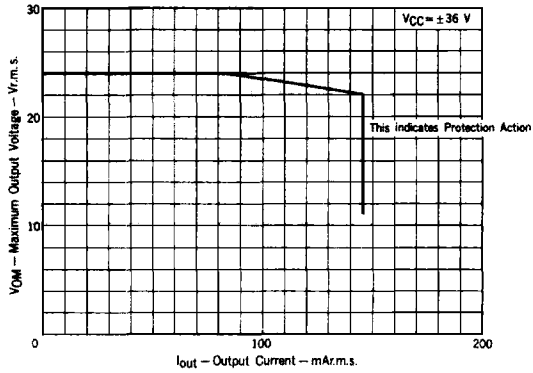
OPEN LOOP VOLTAGE GAIN
SUPPLY VOLTAGE REJECTION RATIO
OUTPUT NOISE VOLTAGE
CIRCUIT CURRENT
OUTPUT OFFSET VOLTAGE
vs. SUPPLY VOLTAGE



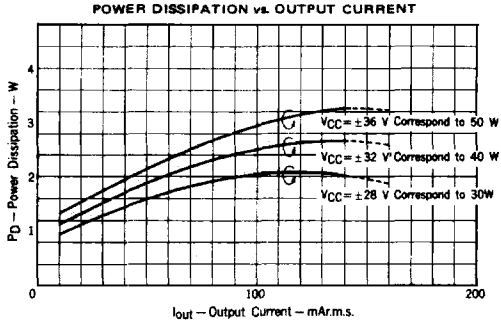
OUTPUT NOISE VOLTAGE
vs. SOURCE RESISTANCE



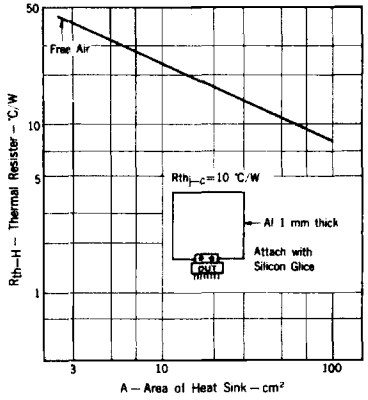
MAXIMUM OUTPUT VOLTAGE vs. OUTPUT CURRENT



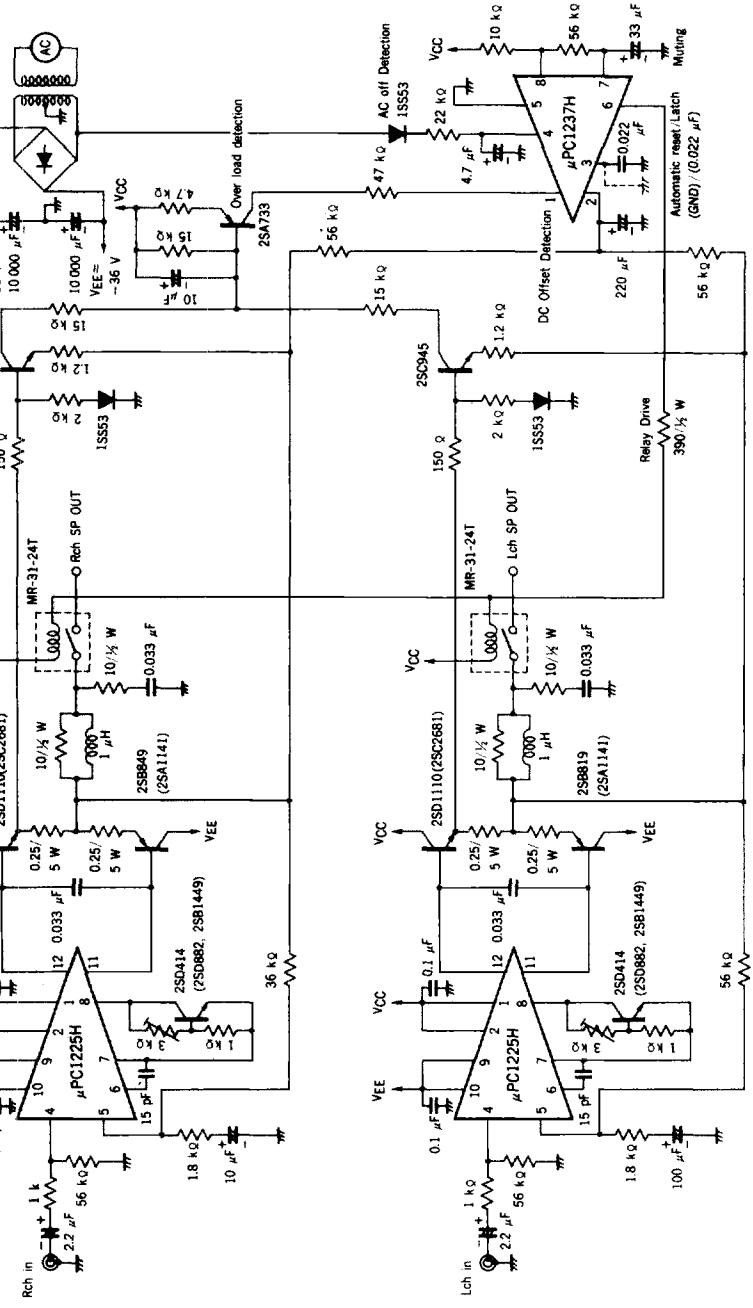
POWER DISSIPATION vs. OUTPUT CURRENT



THERMAL RESISTER vs. AREA OF HEAT SINK

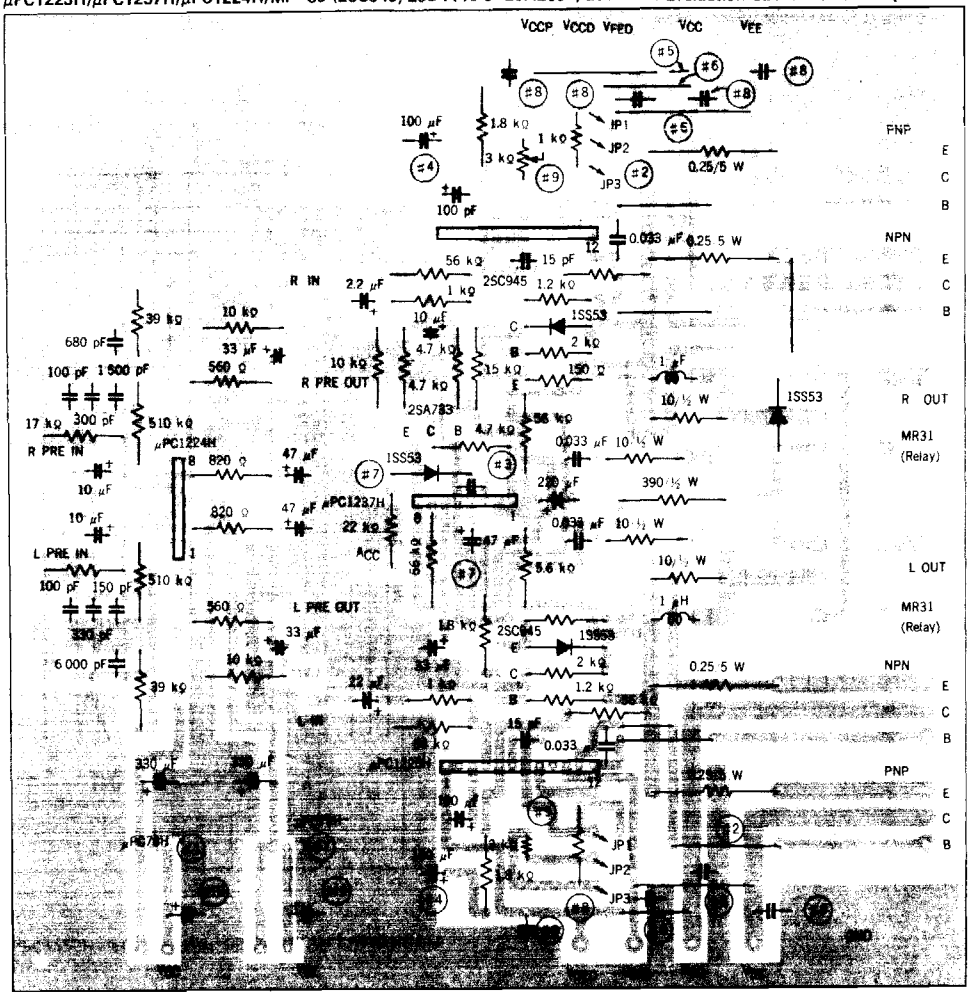


μPC1225H/μPC1237H/MP-80 EVALUATION CIRCUIT



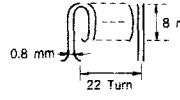
Note: Attach 2SD414 on P_D Tr Heat Sink.
Attach Al Heat Sink, which is larger than 60 mm X 60 mm X 1 mm, with μPC1225H.

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



Note:

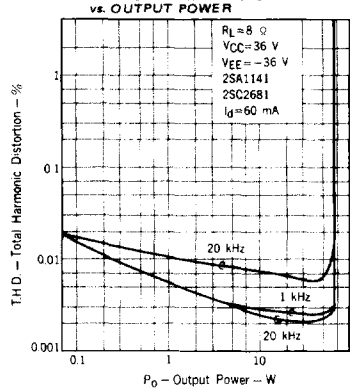
- #1 These terminals are for 3-terminals regulators (μPC7818H, μPC7918H) as a μPC1224H power supply.
- #2 These terminals are for JP— lines to a temperature Compensation transistor (2SD414 or others).
- #3 Use 0.02 μF capacitance in case of using μPC1237H at latching function, while connect each other at automatic resetting.
- #4 This capacitance is for preventing POP ON/OFF noise. Thus, neglect it in case of using a relay.
- #5 These terminals are for JP—lines in case of using the same power supply (μPC1237H and Power Amplifier)
- #6 These terminals are for JP— lines in case of using the same power supply (μPC1225H and Power Tr)
- #7 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.
- #8 These capacitances are for preventing a parastic oscillation. Use a 0.1 μF.
- #9 These trimmers are for adjusting an idling current. Recommend Neo-Pot PS61 Series.
- #10 These capacitance are for the 3-terminals regulator input.
- #11 Design of 1 μH (example)



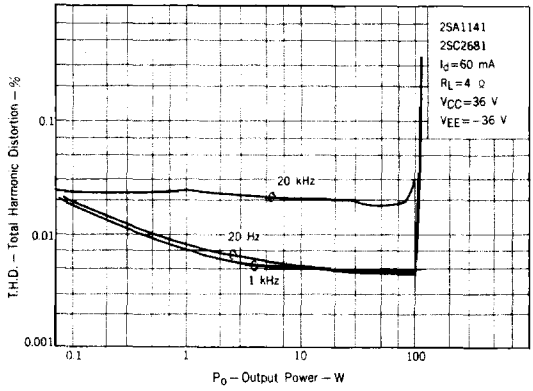
- #12 This indicates a copper board pattern

This is the evaluation circuit. Thus, it is not for a mass production considered about component deviation and the temperature characteristic.

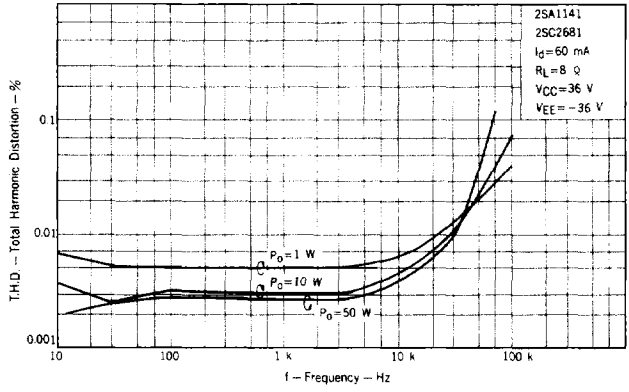
TOTAL HARMONIC DISTORTION
vs. OUTPUT POWER



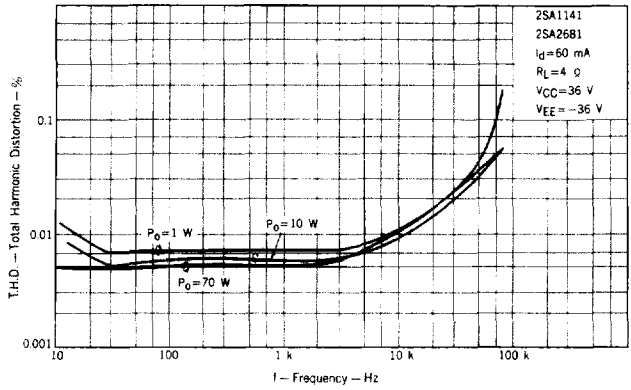
TOTAL HARMONIC DISTORTION
vs. OUTPUT POWER



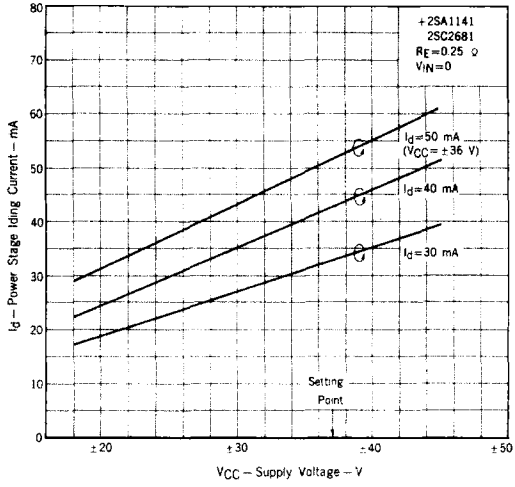
TOTAL HARMONIC DISTORTION
vs. FREQUENCY



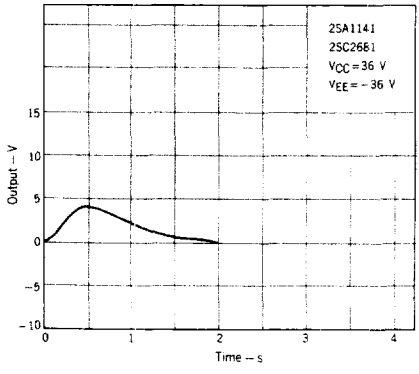
TOTAL HARMONIC DISTORTION
vs. FREQUENCY



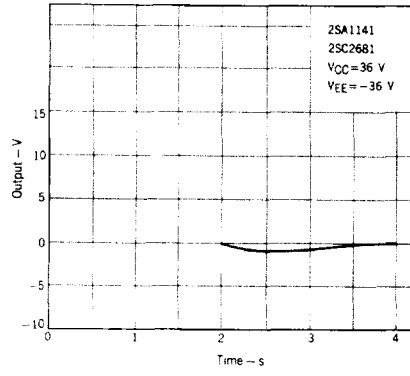
POWER STAGE IDLING CURRENT
vs. SUPPLY VOLTAGE



POP NOISE (Sw on)



POP NOISE (Sw off)



APPLICATION CIRCUIT

(1) Design Specification

a. Pre amplifier stage (equalizer amplifier)

Supply Voltage Vcc=±22 V

Input equivalent Noise Voltage V_{NL}=0.815 μVr.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 Vcc= ±36 V

Load impedance R_L=8 Ω

Continuous Output Power Po=50 W (T.H.D.=0.1 %)

Voltage Gain (at flat state) Av=43 dB

Input Sensitivity Vin=142 Vr.m.s.

Range of Varying Voltage gain 100 Hz ±10 dB

10 kHz ±10 dB

(2) Description

μPC1224H 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 μPC1225H. This power driver IC is also available for flat amplifier. And μPC1237H is chosen as a protector.

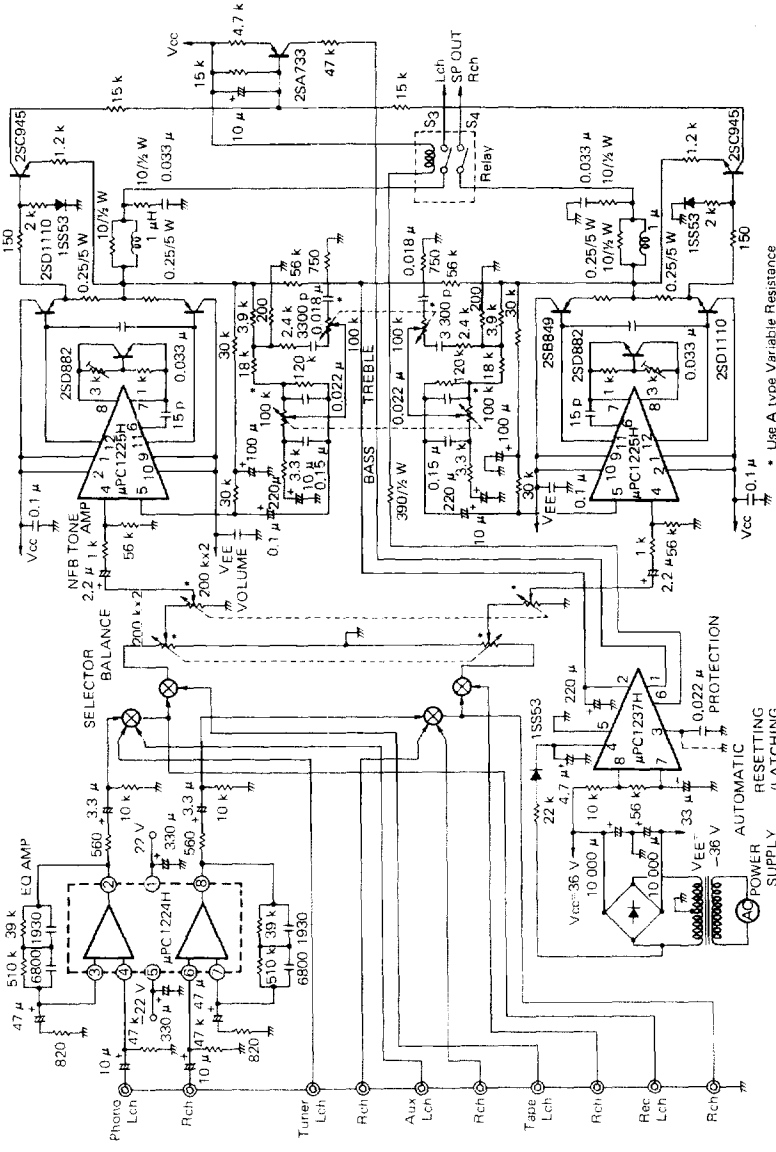


Fig. 1 50 W PRE-MAIN AMPLIFIER APPLICATION CIRCUIT

(3) Characteristic of Power Amplifier Circuit

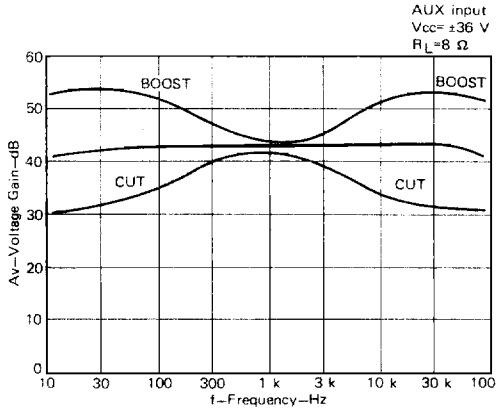


Fig. 2 VOLTAGE GAIN vs. FREQUENCY

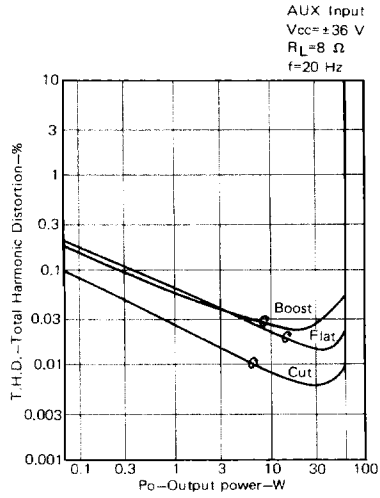


Fig. 3 TOTAL HARMONIC DISTORTION vs. OUTPUT POWER

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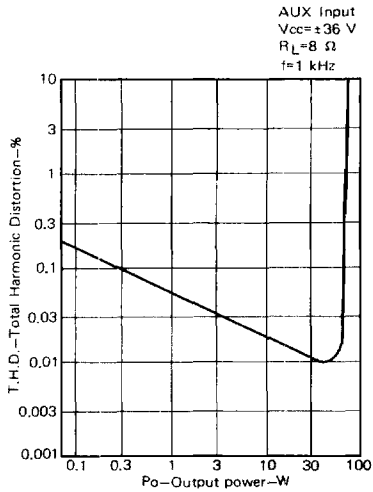

Fig. 4 TOTAL HARMONIC DISTORTION vs. OUTPUT POWER

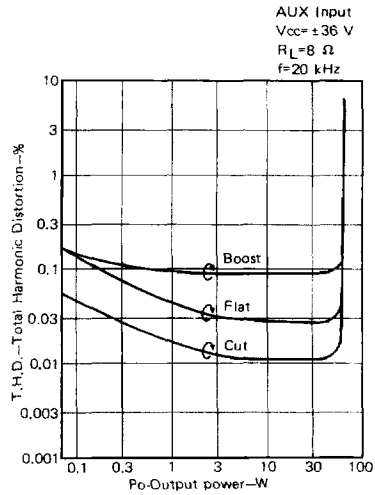

Fig. 5 TOTAL HARMONIC DISTORTION vs. OUTPUT POWER