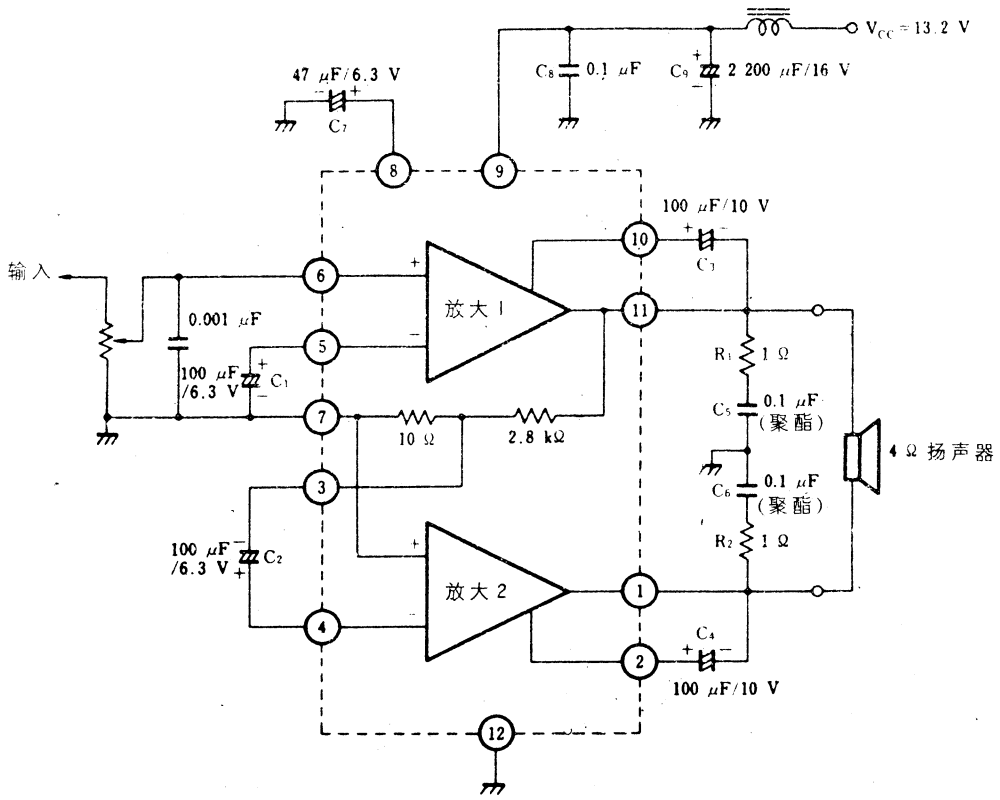
是电源电压为13.2 V、负荷为4 Ω的BTL专用的低频功率放大器在BTL或OCL的连接中可能引起的DC短路，集成电路和扬声器就会受到保护。

- ○ 工作电源电压范围 9～16V
- ○ 负荷电阻范围 3.2～16Ω
- ○ 可连接成BTL或OCL电路
- ○ 内含如下保护电路：
  输出端和地之间直流短路保护、
  电源过压保护、冲击电压保护、
  过热保护、扬声器保护

极限参数（T_a=25°C）

V_{CC} ……25V（无信号时）
18V*（工作时）
$V_{CC(surge)}$ ……50V（t=200ms）
$I_{CC(peak)}$ ……4.5A
R_T ……20W
T_{opt} ……−30～+75°C*
T_{stg} ……−55～+150°C
附散热片 $R_{th(c-a)}$=4°C/W

应用电路例（G_V≒54dB）



电特性参数（V_{CC}=13.2V，R_L=4Ω，f=1kHz，T_a=25°C）

符号	测定条件	参数值 最小	典型	最大	单位
$I_{CC(ZS)}$	V_i=0	35	90	180	mA
V_{CO}	V_i=0	−150		+150	mV
G_V	P_O=2W	53	54	56	dB
P_O	K_F=10%	16	20		W
K_F	P_O=2W，R_g=600Ω		0.15	1	%
R_i			45		kΩ
N_O	R_g=10kΩ，BW=20Hz～20kHz		1.2	4	mVrms
f_{CL}	G_V=−3dB from 1kHz，P_O=2W		15		Hz
f_{CH}			90		kHz
SVR	R_g=0，f_{ripple}=100Hz，V_{ripple}=0.5Vrms	34	45		dB

バイポーラアナログ集積回路
Bipolar Analog Integrated Circuit

μPC1230H2

20 W　音声電力増幅回路

このICは，カーステレオ用として開発されたBTL専用オーディオ・パワーICで，電源電圧13.2 V，負荷4 Ωで使用した場合，出力20 Wが得られます。

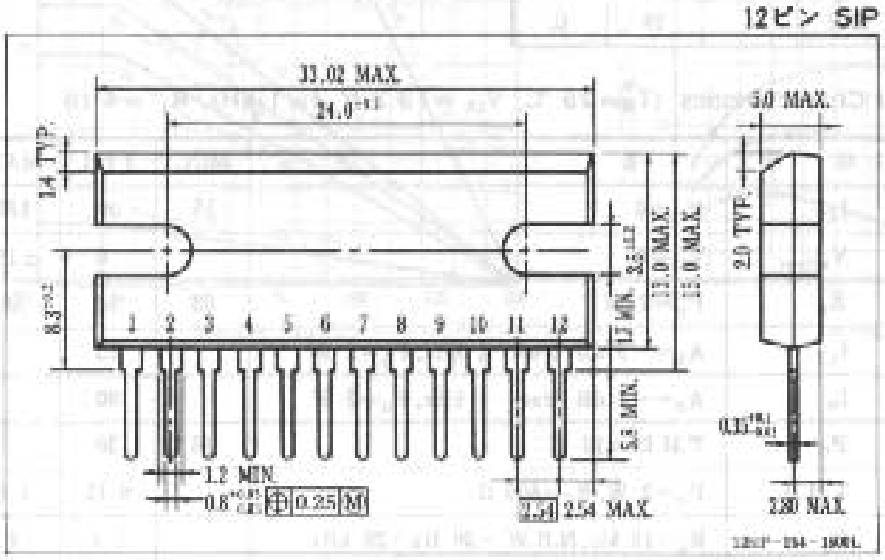
さらに本製品は，BTL－OCL接続で起こり得るDCショート（出力端子とGND間の短絡）に対して，IC およびスピーカが瞬時に保護されるように設計されています。

特長／Features

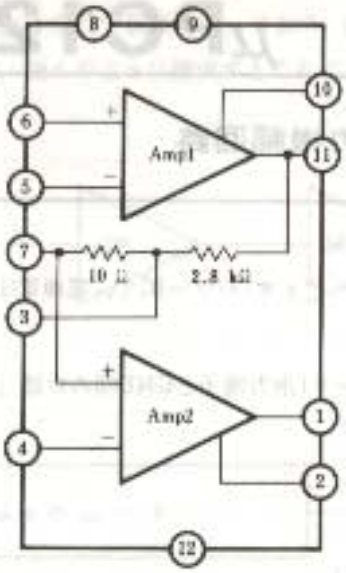
- BTL－OCL接続ができます。
  （出力－GND間短絡保護回路内蔵）
- 出力オフセット電圧が低い。
  V_{offset}＝150 mV MAX.
- 高出力，低ひずみ率
  P_O＝20 W（at V_{CC}＝13.2 V, R_L＝4 Ω）
  T.H.D.＝0.15 %（at P_O＝2 W, f＝1 kHz）
- 外付部品が少なく，組立が容易です。
- 熱抵抗が低い12Pinパワーパッケージを採用
  $R_{th(j-c)}$＝2.5 ℃/W
- トラブルに備えた各種保護回路を内蔵しています。
  DCショート（出力端子－GND間）保護回路
  電源過電圧・サージ電圧保護回路
  サーマル・シャット・ダウン回路
  スピーカ保護回路

外形図／Package Dimensions(Unit：mm)

12ピン SIP



ブロック図／Block Diagram



端子接続／Connection Diagram(Top View)

端子 No.	接　続
1	出力2
2	ブートストラップ2
3	非反転出力分吸点
4	反転入力
5	負帰還
6	非反転入力
7	GND（入力側）
8	リップルフィルタ
9	電源 $+V_{CC}$
10	ブートストラップ1
11	出力1
12	GND（出力側）

絶対最大定格／Absolute Maximum Ratings (T_a=25 ℃)

項　目	略　号	定　格	単位
電源電圧(サージ)	$V_{CC(surge)}$	50 *1	V
電源電圧(無信号時)	V_{CC1}	25	V
電源電圧(動作時)	V_{CC2}	18 *2	V
回路電流	$I_{CC(peak)}$	4.5	A
パッケージ許容損失	P_D	20	W
動作周囲温度	T_{opt}	−30～+75 *2	℃
保存温度	T_{stg}	−55～+150	℃

*1 PW=200 ms, t≧1 ms
*2 放熱板 $R_{th(c-a)}$=4 ℃/W付

推奨動作範囲／Recommended Operating Conditions (T_a=25 ℃)

項　目	略号	MIN.	TYP.	MAX.	単位
電源電圧	V_{CC}	9	13.2	16	V
負荷抵抗	R_L	3.2	4	16	Ω

電気的特性／Electrical Characteristics (T_a=25 ℃, V_{CC}=13.2 V, f=1 kHz, R_L=4 Ω)

項　目	略　号	条　件	MIN.	TYP.	MAX.	単　位
回路電流	I_{CC}	V_{in}=0	35	90	180	mA
出力オフセット電圧	V_{offset}	V_{in}=0		0	±150	mV
電圧利得	A_v	P_O=2 W	53	54	56	dB
低域しゃ断周波数	f_L	A_v=−3 dB from 1 kHz, P_O=2 W		15		Hz
高域しゃ断周波数	f_H	A_v=−3 dB from 1 kHz, P_O=2 W		90		kHz
出力電力	P_O	T.H.D.=10 %	16	20		W
全高調波ひずみ率	T.H.D.	P_O=2 W, R_G=600 Ω		0.15	1.0	%
出力雑音電圧	V_n	R_G=10 kΩ, N.B.W.=20 Hz～20 kHz		1.2	4	$mV_{r.m.s.}$
リップル除去率	SVR	R_G=0, f_{ripple}=100 Hz, V_{ripple}=0.5 $V_{r.m.s.}$	34	45		dB
入力抵抗	R_{in}			45		kΩ

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC1230H2

25 W AF POWER AMPLIFIER

DESCRIPTION

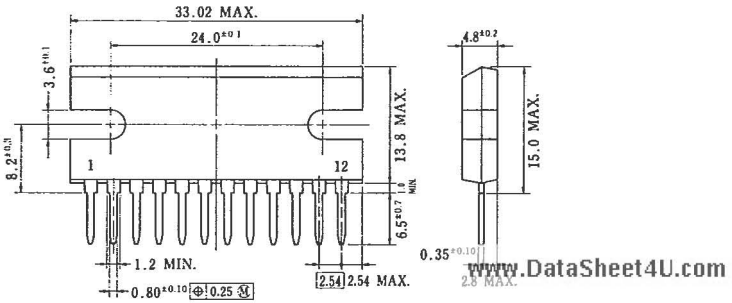
The μPC1230H2 is a class B audio power amplifier in a 12-lead single in-line package, specifically designed for car stereo application. Power booster amplifiers are easily designed using this device that provides a high current capability (up to 4.5 A) and that can drive very low impedance loads (down to 3.2 Ω) obtaining an output power of more than 20 W.

The μPC1230H2 can be used without output capacitors due to the original protection circuit which protects output power transistors and a speaker at the same time for output DC short circuit to GND.

FEATURES

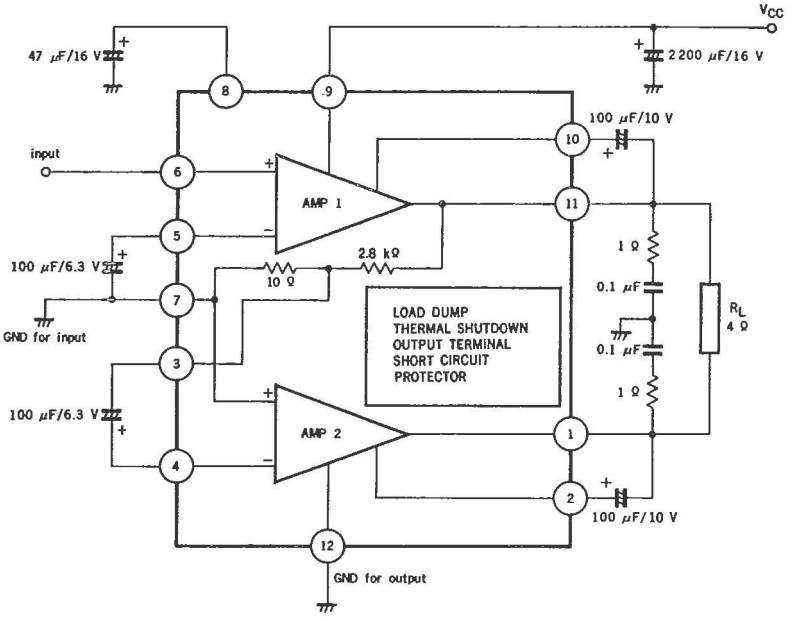
- Can be used as OCL connection. (Protection circuit for output DC short circuit to GND)
- Very low output offset voltage : V_{offset} = 150 mV MAX.
- High output power : P_O = 25 W TYP. at V_{CC} = 14.4 V, R_L = 4 Ω
  P_O = 20 W TYP. at V_{CC} = 13.2 V, R_L = 4 Ω
- Very low distortion : T.H.D. = 0.15 % at V_{CC} = 13.2 V, P_O = 2 W
- Very low number of external components, very simple mounting system with no electrical isolation between the package and the heat sink.
- Low thermal resistance : $R_{th(j-c)}$ = 2.5 °C/W
- Following protection circuits are provided.
  (1) Load dump voltage surge protection.
  (2) Output terminal short circuit protection (short circuit to GND or across the load)
  (3) Thermal shut down protection
  (4) Speaker protection (during short circuit for one wire to GND)

PACKAGE DIMENSIONS (Unit : mm)



P12HP-254B2

BLOCK DIAGRAM



CONNECTION DIAGRAM

Pin No.	Function
1	Output 2
2	Bootstrap 2
3	Divided Output
4	Input 2
5	N.F. 1
6	Input 1
7	GND (for input)
8	Filter
9	$+V_{CC}$
10	Bootstrap 1
11	Output 1
12	GND (for output)

ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

Supply Voltage (Note)	$V_{CC\ surge}$	50	V
Supply Voltage (Operational)	V_{CC}	18	V
Circuit Current (Peak)	$I_{CC\ peak}$	4.5	A
Package Dissipation	P_D	20	W
Operating Temperature	T_{opt}	−30 to +75*	°C
Storage Temperature	T_{stg}	−55 to +150	°C

*Using an aluminum heat sink $R_{th(c-a)}$ = 4 °C/W
Note : Pulse width = 200 ms, $t_{rise} \geq 1$ ms

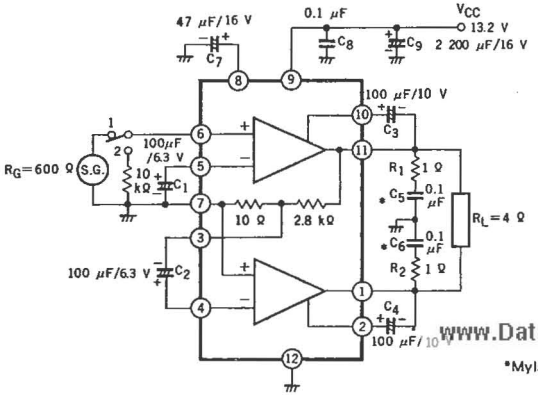
RECOMMENDED OPERATING CONDITIONS (T_a = 25 °C)

Supply Voltage Range	9.5 to 16	V
Load Impedance	3.2 to 16	Ω

ELECTRICAL CHARACTERISTICS (T_a = 25 °C, V_{CC} = 13.2 V, R_L = 4 Ω, f = 1 kHz)

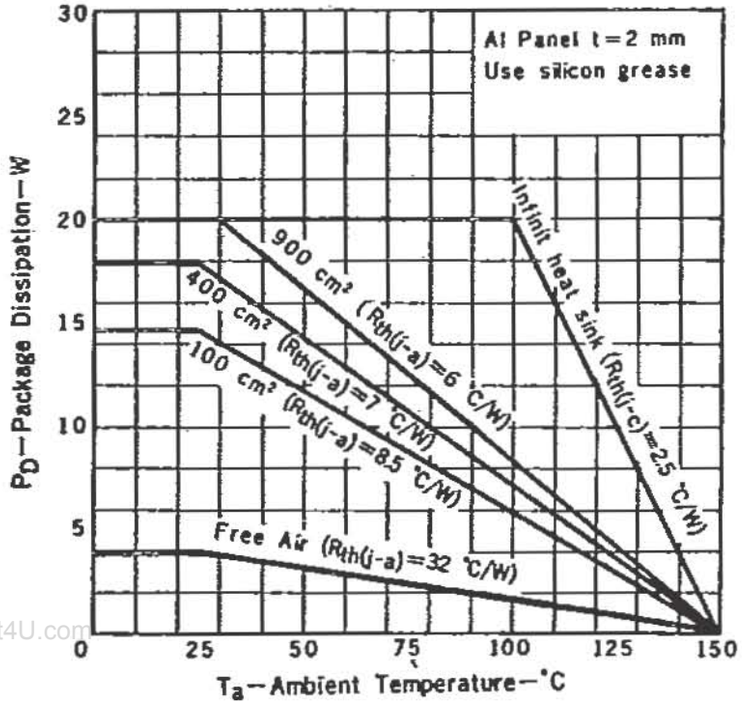
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Over Voltage Protection	$V_{CC(MAX.)}$	18	19		V	
Quiescent Current	I_{CC}	35	90	180	mA	V_{in} = 0
Output Offset Voltage	V_{offset}		0	±150	mV	V_{in} = 0
Output Power	P_O		25		W	V_{CC} = 14.4 V, T.H.D. = 10 %
		16	20		W	V_{CC} = 13.2 V, T.H.D. = 10 %
Voltage Gain	A_v	53	54	56	dB	V_{in} = 2.45 mV
Total Harmonic Distortion	T.H.D.		0.15	1.0	%	P_O = 2 W
Output Noise Level	V_n		1.2	4	mV	R_G = 10 kΩ, BW = 20 Hz to 20 kHz
Supply Voltage Rejection Ratio	SVR	34	45		dB	R_G = 0, f_{rip} = 100 Hz, V_{rip} = 0.5 V
Input Resistance	R_i		45		kΩ	
Rolloff Frequency	f_H		90		kHz	A_v = −3 dB from 1 kHz Ref. High
	f_L		15		Hz	A_v = −3 dB from 1 kHz Ref. Low

TEST CIRCUIT

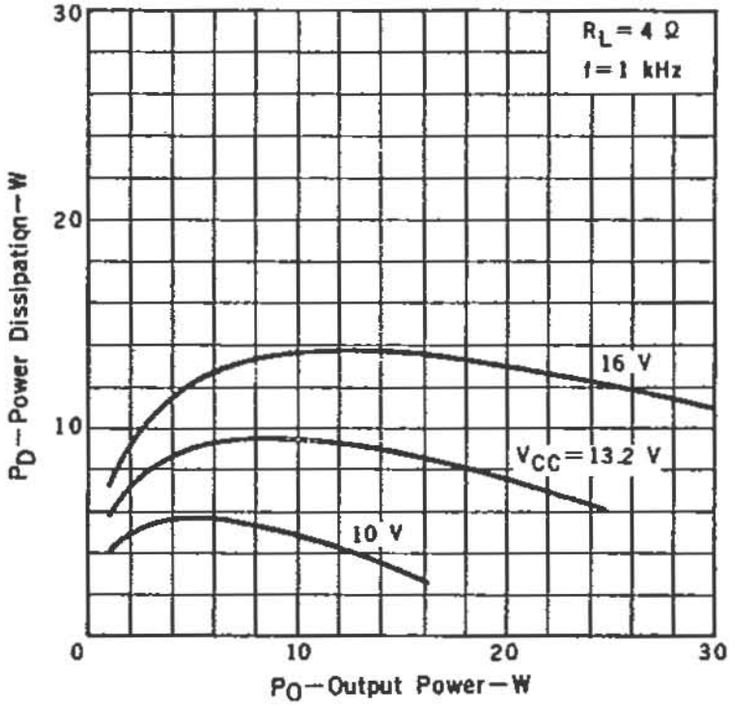


TYPICAL CHARACTERISTICS (T_a = 25 °C)

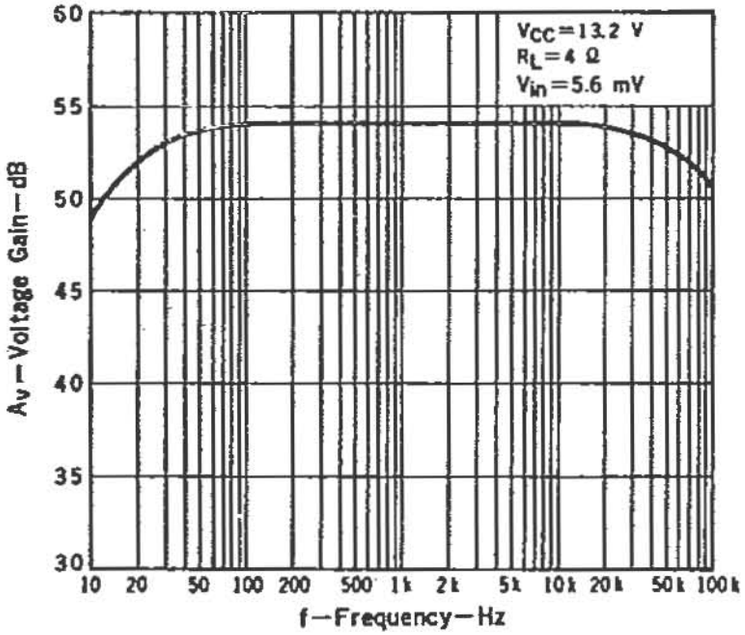
PACKAGE DISSIPATION vs. AMBIENT TEMPERATURE



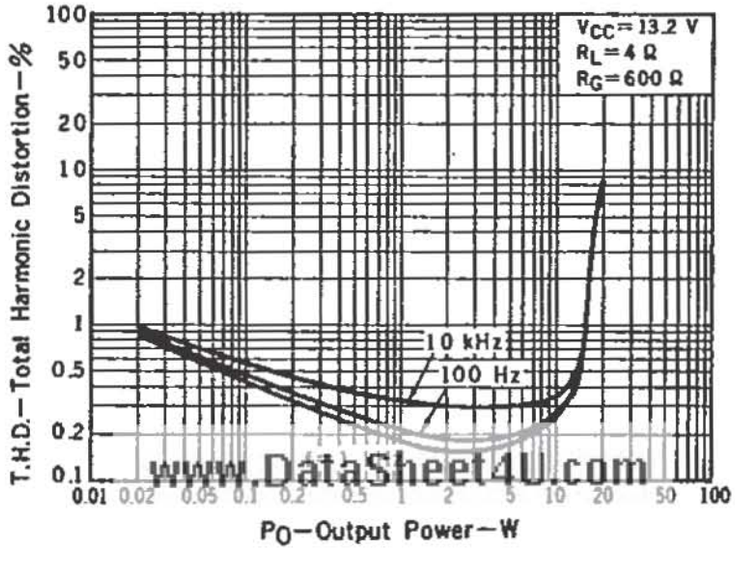
POWER DISSIPATION vs. OUTPUT POWER



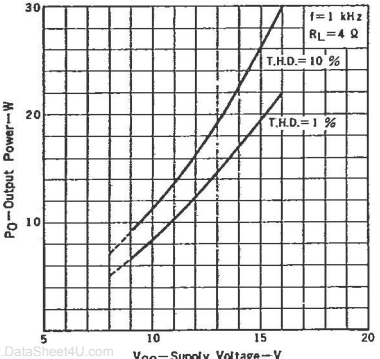
VOLTAGE GAIN vs. FREQUENCY



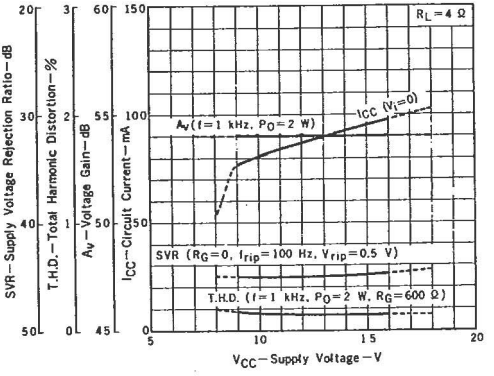
TOTAL HARMONIC DISTORTION vs. OUTPUT POWER



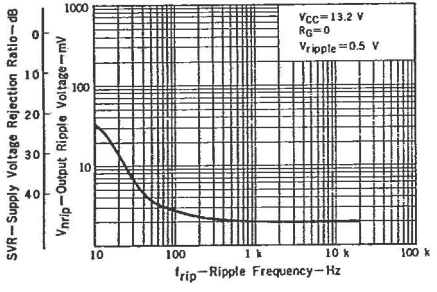
OUTPUT POWER vs. SUPPLY VOLTAGE



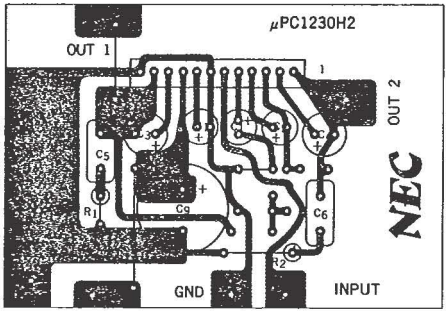
SUPPLY VOLTAGE CHARACTERISTICS



SUPPLY VOLTAGE REJECTION RATIO vs. RIPPLE FREQUENCY

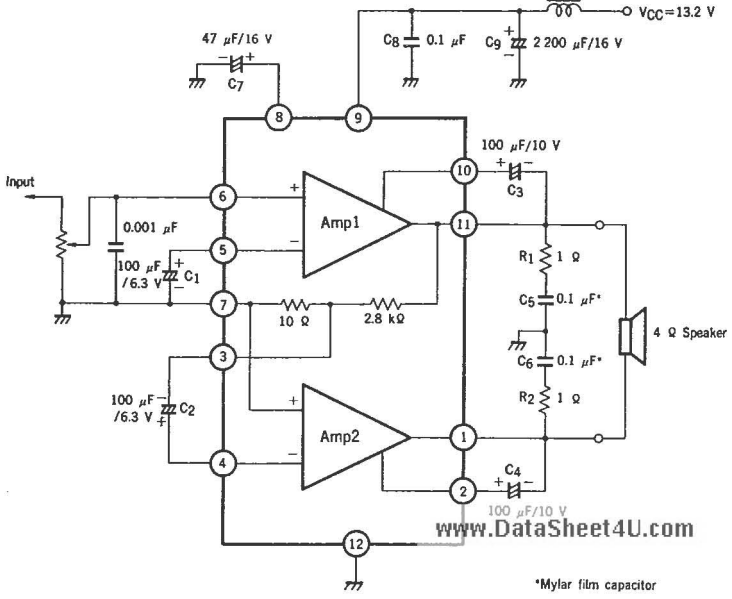


COMPONENTS LAYOUT FOR P.C. ASSEMBLY (Copper side)



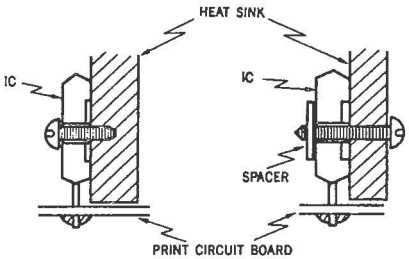
APPLICATION CIRCUIT 1

$A_v \fallingdotseq 54$ dB



INSTRUCTION FOR USE

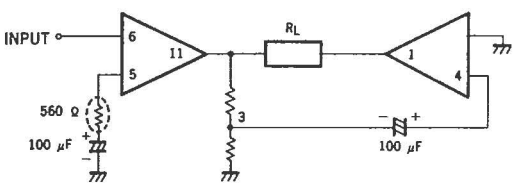
1. How to attach to the heat sink.
   - Surely use the silicon grease.
   - Keep fastening torque for the screw in the range of 5 to 8 kg-cm.



2. When this IC is unstable due to the high impedance of signal source, connect the capacitance (around 1 000 pF) between pin #6 (input) and pin #7 (GND for input).
3. How to decrease voltage gain A_V.
   This IC is designed to use A_V of 54 dB so that the external components are most reduced.
   But A_V can be set down to 40 dB according to the following application. The modified points are shown by dotted circule and they are additional components. Other external components are as same as application circuit 1.

(EXAMPLE 1)

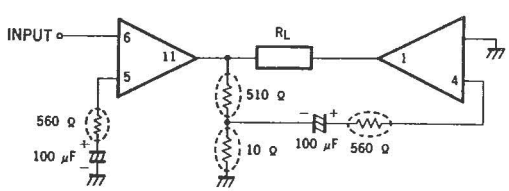
$A_V \fallingdotseq 40$ dB



T.H.D.≒0.08 % (P_O=2 W, f=1 kHz)
SVR≒28 dB (f_r=100 Hz)

(EXAMPLE 2)

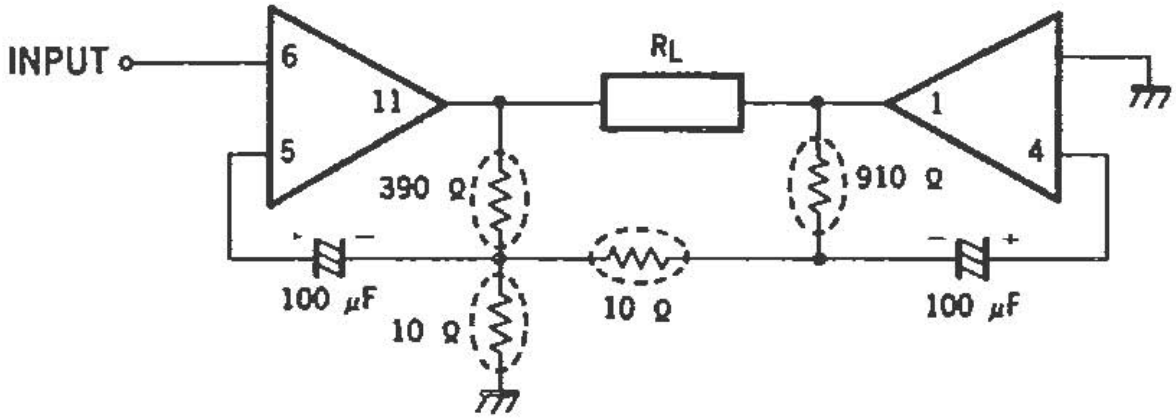
$A_V \fallingdotseq 40$ dB



T.H.D.≒0.1 % (P_O=2 W, f=1 kHz)
SVR≒ (f=100 Hz)

(EXAMPLE 3)

$A_v \fallingdotseq 40$ dB

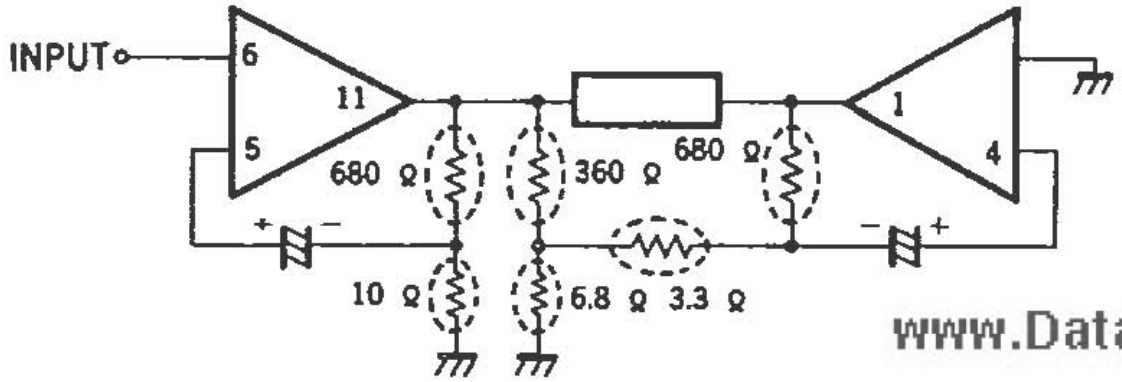


T.H.D. ≒ 0.1 % (P_O = 2 W, f = 1 kHz)

SVR ≒ 56 dB (f_r = 100 Hz)

(EXAMPLE 4)

$A_v \fallingdotseq 40$ dB



T.H.D. = 0.13 % (P_O = 2 W, f = 1 kHz)

SVR ≒ 55 dB (f_r = 100 Hz)