BIPOLAR ANALOG INTEGRATED CIRCUIT
μPC1230H2

25 W AF POWER AMPLIFIER

DESCRIPTION

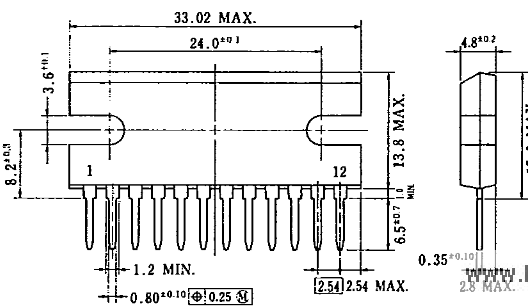
The μPC1230H2 is a class B audio power amplifier in a 12-lead single in-line package, specifically designed for car stereo application. Power booster amplifiers are easily designed using this device that provides a high current capability (up to 4.5 A) and that can drive very low impedance loads (down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

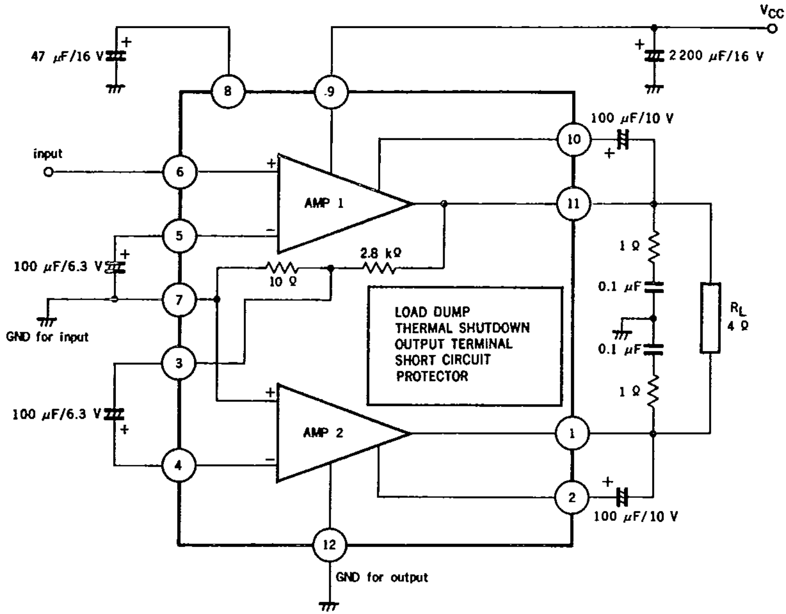
- Can be used as OCL connection. (Protection circuit for output DC short circuit to GND)
- Very low output offset voltage : V_{offset} = 150 mV MAX.
- High output power : P_O = 25 W TYP. at V_{CC} = 14.4 V, R_L = 4 Ω
  P_O = 20 W TYP. at V_{CC} = 13.2 V, R_L = 4 Ω
- Very low distortion : T.H.D. = 0.15 % 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

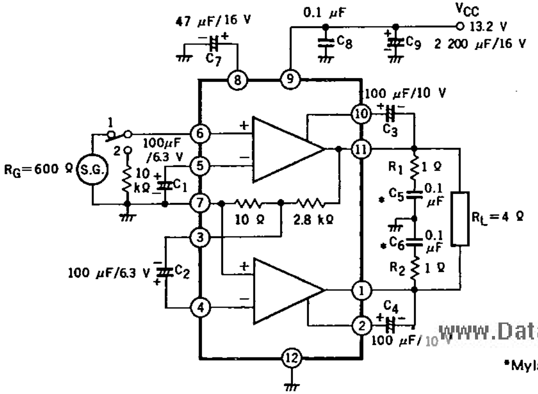
RECOMMENDED OPERATING CONDITIONS (T_a = 25 °C)

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

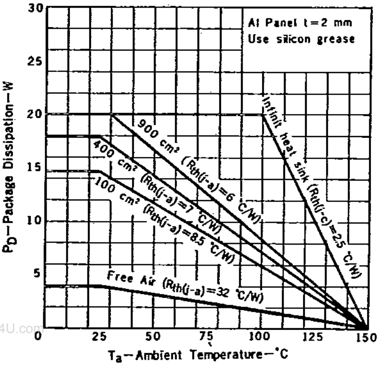
TEST CIRCUIT



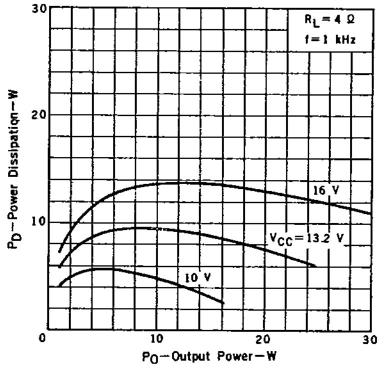
*Mylar film capacitor

TYPICAL CHARACTERISTICS ($T_a = 25$ °C)

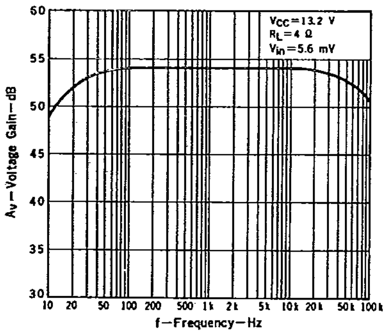
PACKAGE DISSIPATION vs. AMBIENT TEMPERATURE



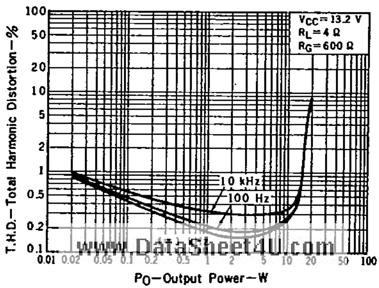
POWER DISSIPATION vs. OUTPUT POWER



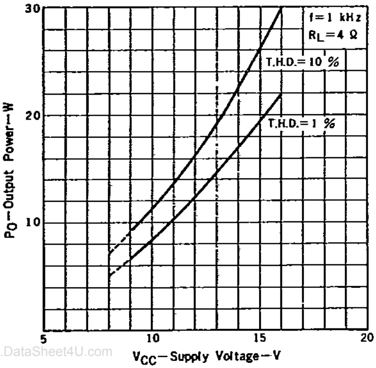
VOLTAGE GAIN vs. FREQUENCY



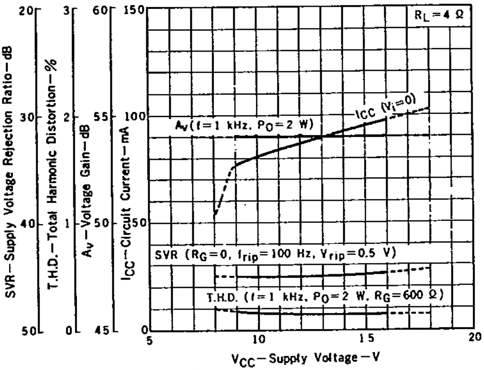
TOTAL HARMONIC DISTORTION vs. OUTPUT POWER



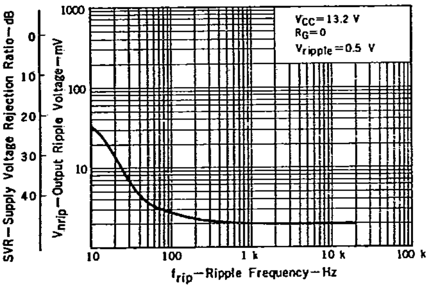
OUTPUT POWER vs. SUPPLY VOLTAGE



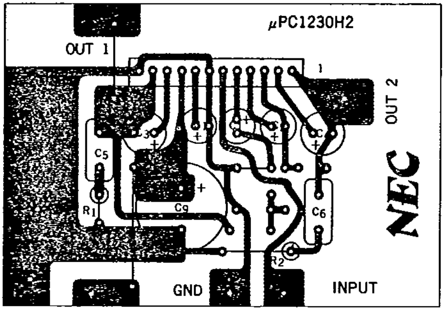
SUPPLY VOLTAGE CHARACTERISTICS



SUPPLY VOLTAGE REJECTION RATIO vs. RIPPLE FREQUENCY

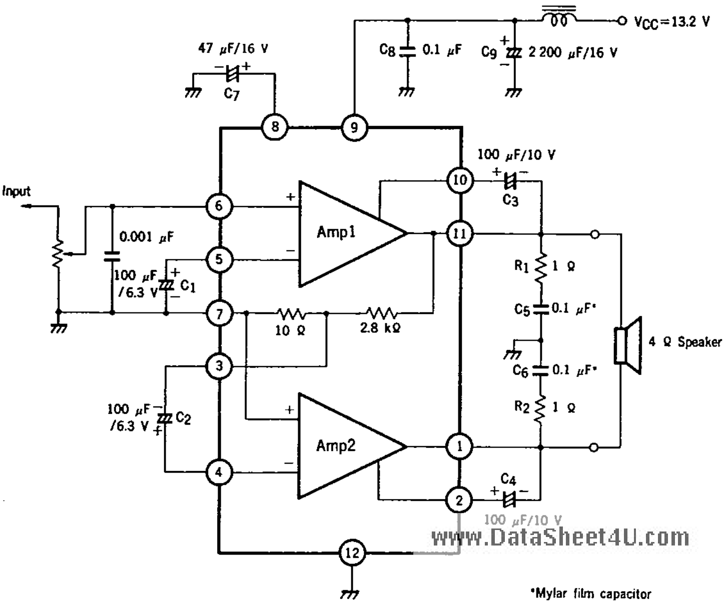


COMPONENTS LAYOUT FOR P.C. ASSEMBLY (Copper side)



APPLICATION CIRCUIT 1

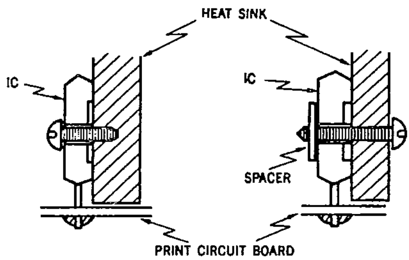
$A_v \doteqdot 54$ dB



*Mylar film capacitor

INSTRUCTION FOR USE

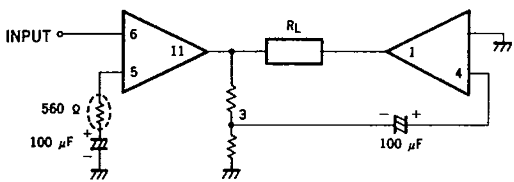
1. How to attach to the heat sink.
   - Surely use the silicon grease.
   - Keep fastening torque for the screw in the range of 5 to 8 kg-cm.



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)

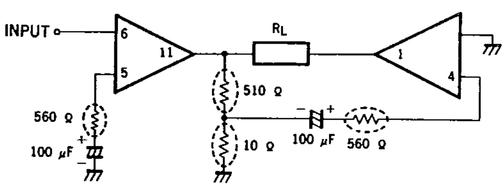
$A_V \doteqdot 40$ dB



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

(EXAMPLE 2)

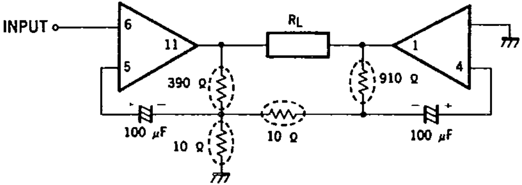
$A_V \doteqdot 40$ dB



T.H.D.≒0.1 % (Po=2 W, f=1 kHz)
SVR≒34 dB (f_r=100 Hz)

(EXAMPLE 3)

$A_v \fallingdotseq 40$ dB

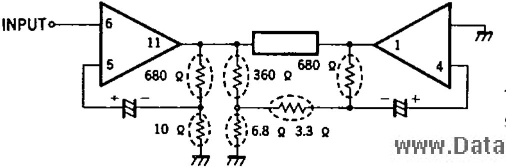


T.H.D.≒0.1 % (P_O=2 W, f=1 kHz)

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)