

Thick Film Hybrid IC

SANYO

No.2307

STK4231II2-Channel 100W min AF Power Amp
(Dual Supplies)**Features**

- The STK4201II series (STK4231II) and STK4201V series (high-grade type) are pin-compatible in the output range of 60W to 100W. Once the PCB pattern is designed, you can easily satisfy the requirements for new sets simply by changing the IC.
- Built-in muting circuit to cut off various kinds of pop noise
- Greatly reduced heat sink due to case temperature 125°C guaranteed
- Excellent cost performance

Maximum Ratings at Ta=25°C

			unit
Maximum Supply Voltage	V_{CC} max	± 75	V
Thermal Resistance	θ_{j-c}	1.1	°C/W
Junction Temperature	T_j	150	°C
Operating Case Temperature	T_C	125	°C
Storage Temperature	T_{stg}	-30 to +125	°C
Available Time for Load Shorted	t_s	$V_{CC} = \pm 51.0V, R_L = 8\Omega,$ $f = 50Hz, P_o = 100W$	1 S

Recommended Operating Conditions at Ta=25°C

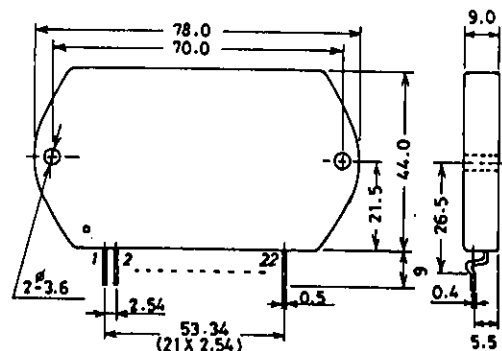
			unit
Recommended Operating Voltage	V_{CC}	± 51.0	V
Load Resistance	R_L	8	Ω

Operating Characteristics at Ta=25°C, $V_{CC} = \pm 51.0V, R_L = 8\Omega, R_g = 600\Omega, V_G = 40dB$,

		R_L : non-inductive load	min	typ	max	unit
Quiescent Current	I_{cco}	$V_{CC} = \pm 60V$	20	40	100	mA
Output Power	P_o	THD=0.4%, $f = 20Hz$ to 20kHz	100			W
Total Harmonic Distortion	THD	$P_o = 1.0W, f = 1kHz$			0.3	%
Frequency Response	f	$P_o = 1.0W, \pm 0.3dB$		20 to 50k		Hz
Input Resistance	r_i	$P_o = 1.0W, f = 1kHz$		55		k Ω
Output Noise Voltage	V_{NO}	$V_{CC} = \pm 60V, R_g = 10k\Omega$			1.2 mVrms	
Midpoint Voltage	V_N	$V_{CC} = \pm 60V$	-70	0	+70	mV
Muting Voltage	V_M		-2	-5	-10	V

Package Dimensions 4086

(unit: mm)



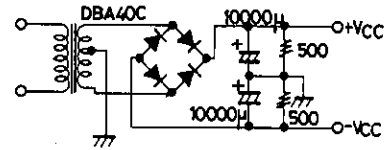
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9018TA, TS No.2307-1/7

STK4231II

Note) · For power supply at the time of test, use a constant-voltage power supply unless otherwise specified.

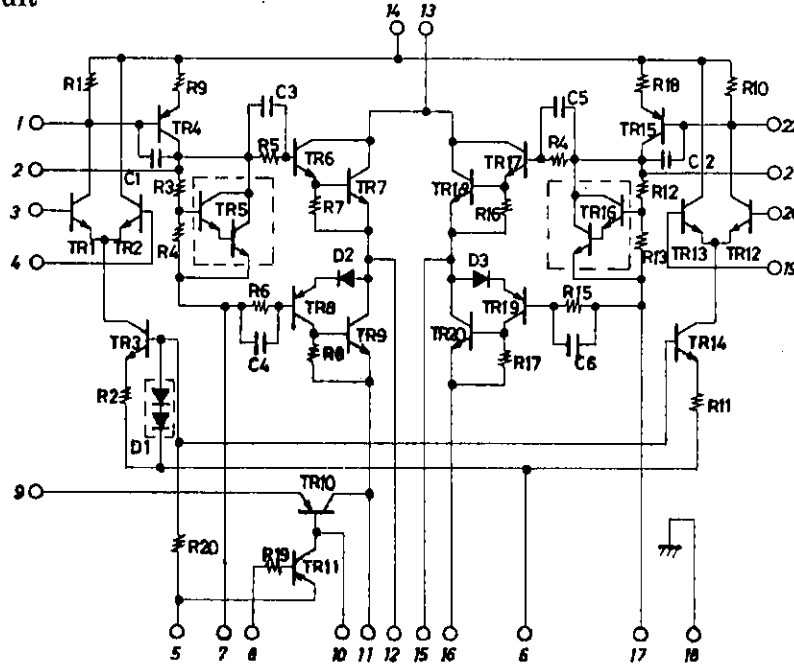
- For measurement of the available time for load shorted and output noise voltage, use the specified transformer power supply shown right.
- The output noise voltage is represented by the peak value on rms scale (VTVM) of average value indicating type. For AC power supply, use an AC stabilized power supply (50Hz) to eliminate the effect of flicker noise in AC primary line.



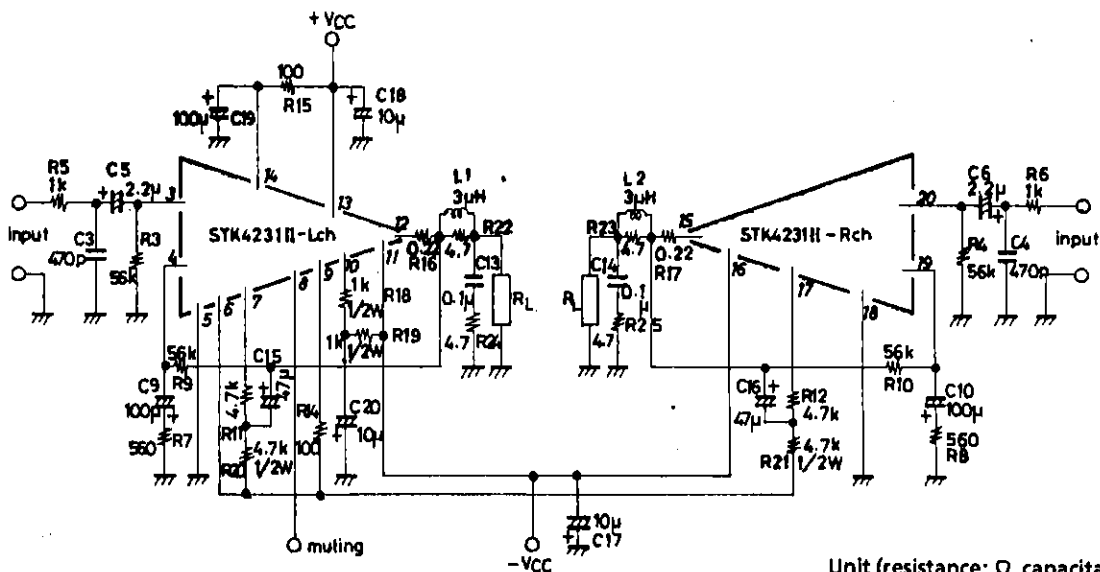
Specified Transformer Power Supply
(Equivalent to MG-200)

Unit (resistance: Ω , capacitance: F)

Equivalent Circuit

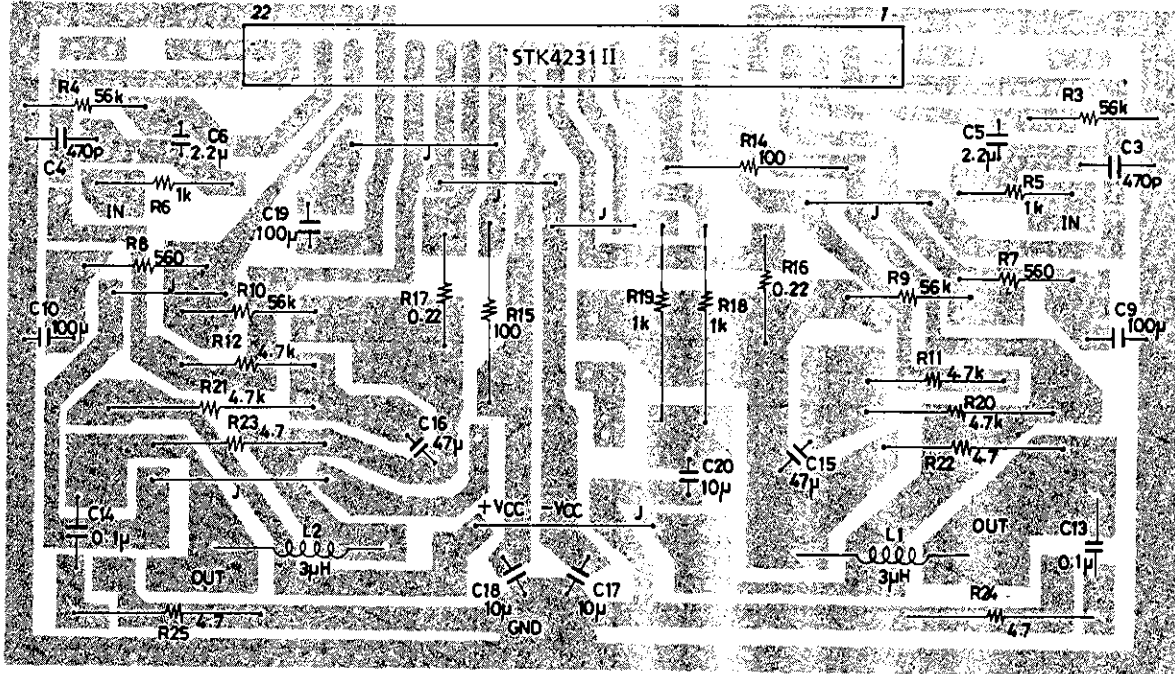


Sample Application Circuit: 100W min 2-channel AF power amp

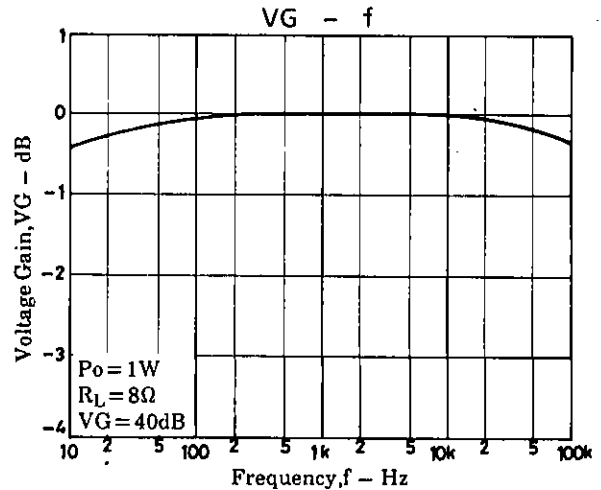
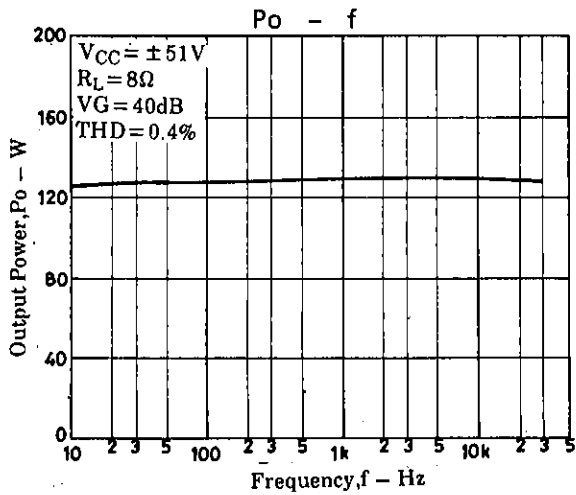
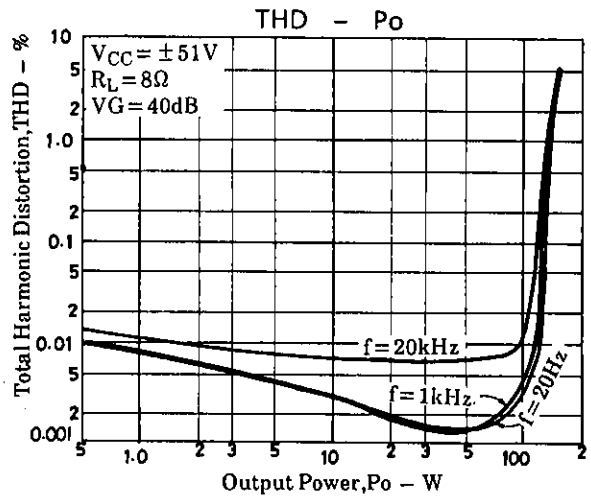
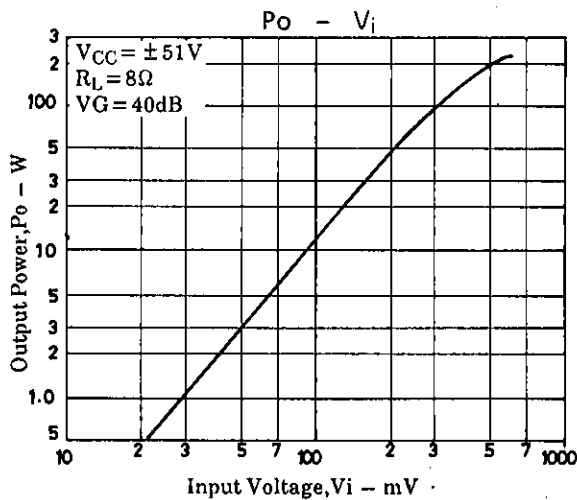


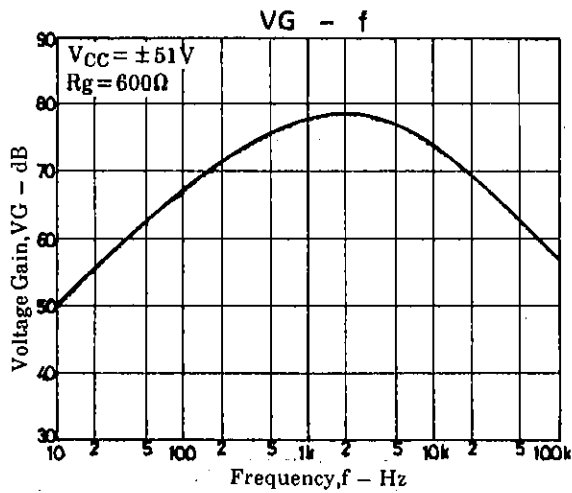
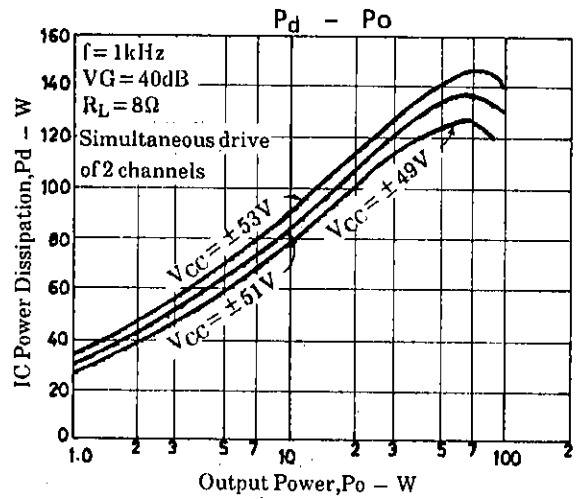
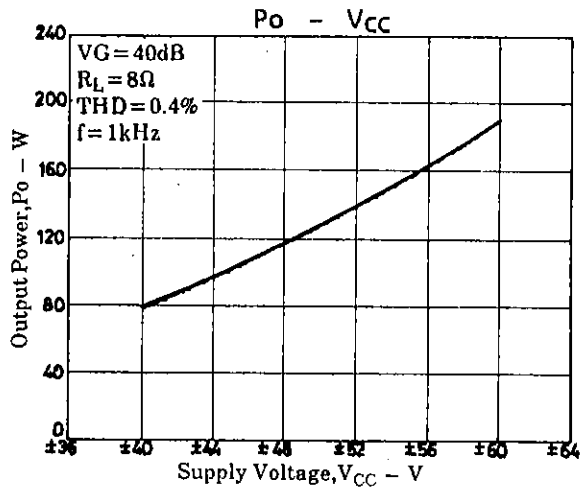
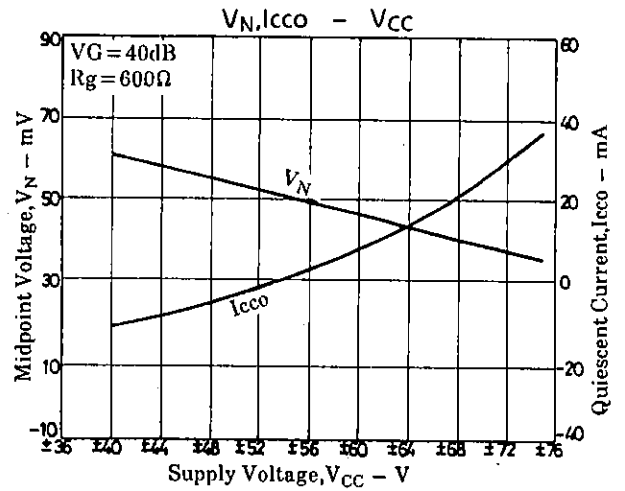
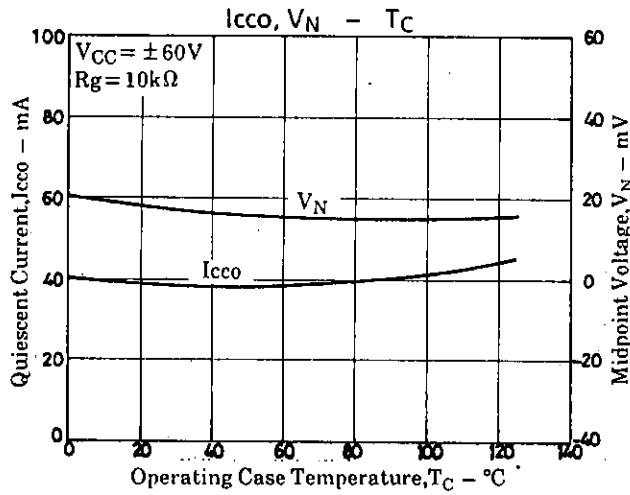
Unit (resistance: Ω , capacitance: F)

Sample Printed Circuit Pattern for Application Circuit (Cu-foiled side)

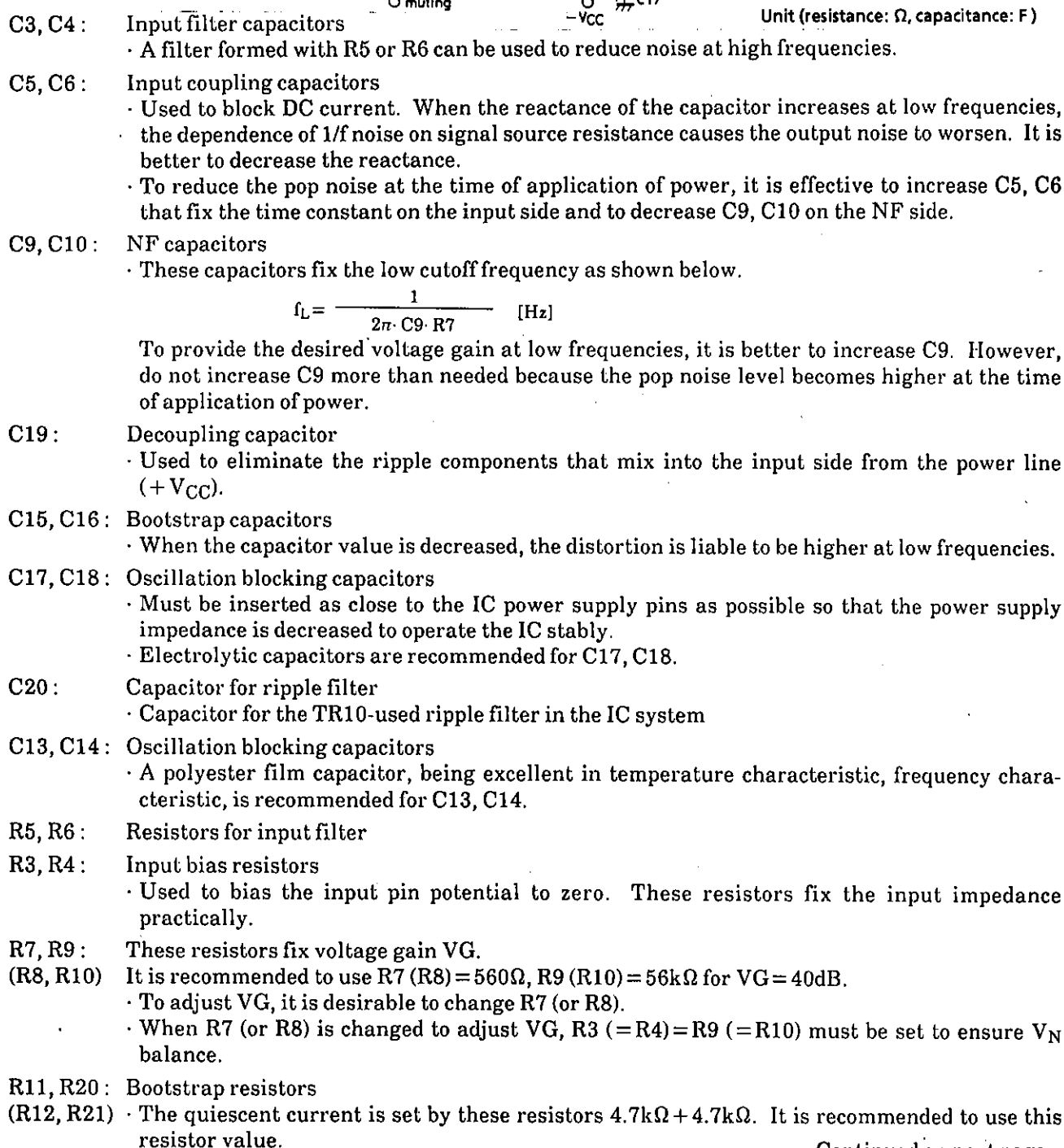


Unit (resistance: Ω , capacitance: F)





Description of External Parts

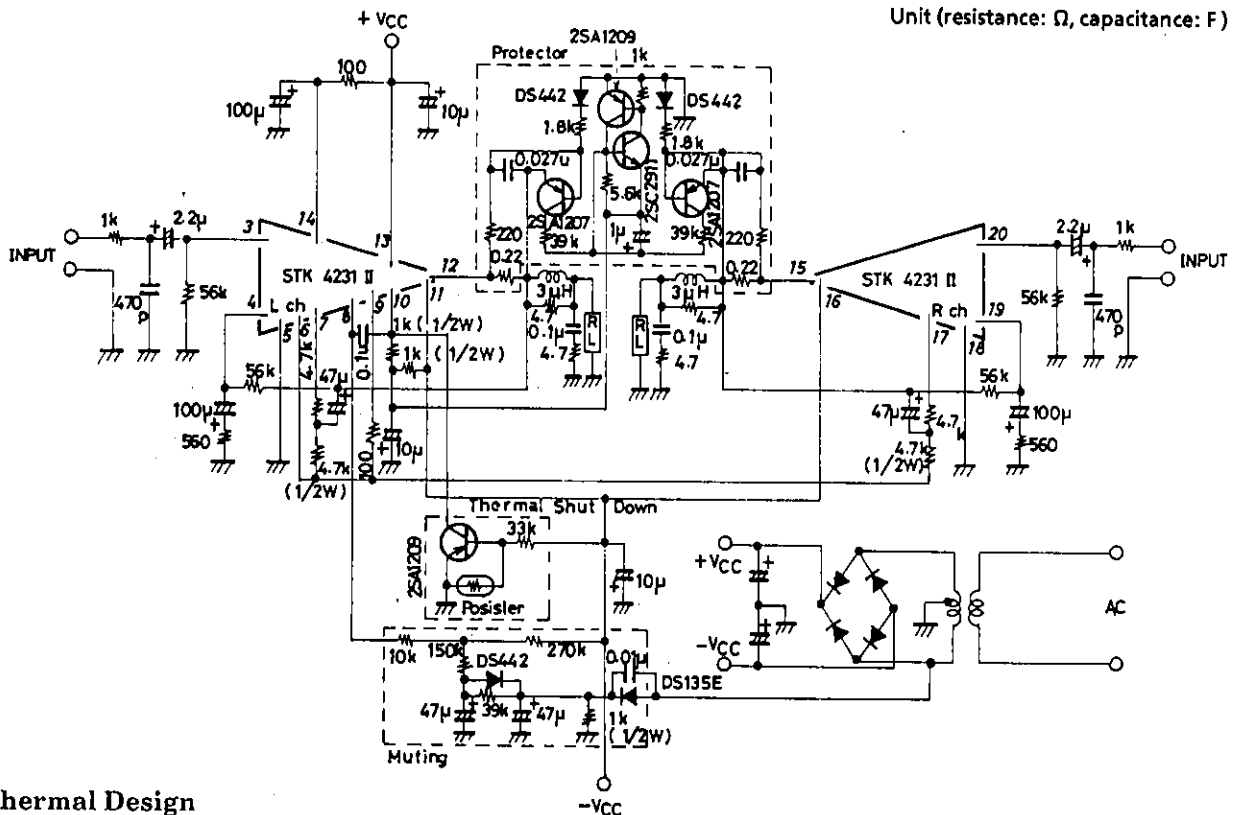


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- R15: Resistor for ripple filter
· (Limiting resistor for predriver TR at the time of load short)
- R14: Used to ensure plus/minus balance at the time of clip.
- R18, R19: Resistor for ripple filter
· When muting TR11 is turned ON, current flows from ground to $-V_{CC}$ through TR11. It is recommended to use $1k\Omega$ (1W) + $1k\Omega$ (1W) allowing for the power that may be dissipated on that occasion.
- R24, R25: Oscillation blocking resistors
- R16, R17: Output limiting resistors
- R22, R23: { For high-frequency oscillation blocking
- L1, L2: {

Sample Application Circuit (protection circuit and muting circuit)



Thermal Design

The IC power dissipation of the STK4231II at the IC-operated mode is 137W max. at load resistance 8Ω (simultaneous drive of 2 channels) for continuous sine wave as shown in Fig.1.

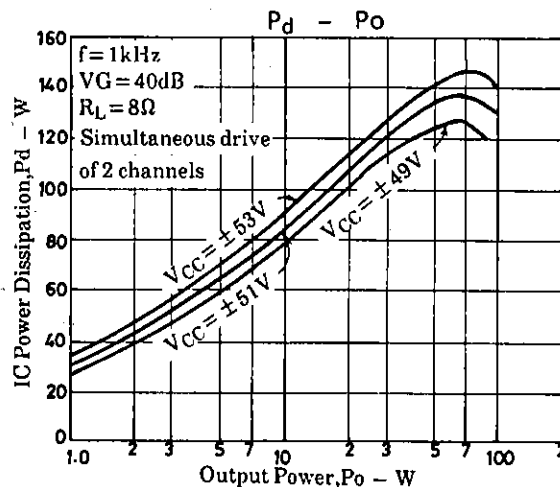


Fig.1 STK4231II $P_d - P_o$ ($R_L = 8\Omega$)

In an actual application where a music signal is used, it is impractical to estimate the power dissipation based on the continuous signal as shown above, because too large a heat sink must be used. It is reasonable to estimate the power dissipation as 1/10 $P_{o \text{ max}}$. (EIAJ).

That is, $P_d = 86\text{W}$ at 8Ω

Thermal resistance θ_{c-a} of a heat sink for this IC power dissipation (P_d) is fixed under conditions 1 and 2 shown below.

Condition 1 : $T_C = P_d \times \theta_{c-a} + T_a \leq 125^\circ\text{C} \dots\dots (1)$
 where T_a : Specified ambient temperature
 T_C : Operating case temperature

Condition 2 : $T_j = P_d \times (\theta_{c-a}) + P_d/4 \times (\theta_{j-c}) + T_a \leq 150^\circ\text{C} \dots\dots (2)$
 where T_j : Junction temperature of power transistor

Assuming that the power dissipation is shared equally among the four power transistors ($2 \text{ channels} \times 2$), thermal resistance θ_{j-c} is 1.1°C/W and

$$P_d \times (\theta_{c-a} + 1.1/4) + T_a \leq 150^\circ\text{C} \dots\dots (3)$$

Thermal resistance θ_{c-a} of a heat sink must satisfy inequalities (1) and (3).

Fig.2 shows the relation between P_d and θ_{c-a} given from (1) and (3) with T_a as a parameter.

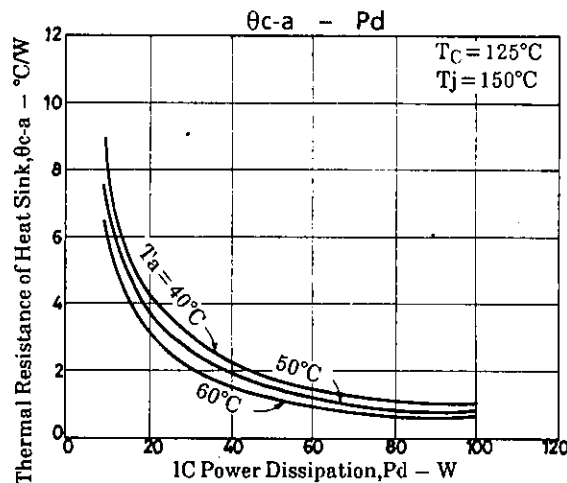


Fig.2 STK4231 II $\theta_{c-a} - P_d$

[Example] The thermal resistance of a heat sink is obtained when the ambient temperature specified for a stereo amplifier is 50°C .

Assuming $V_{CC} = \pm 51.0\text{V}$, $R_L = 8\Omega$,

$R_L = 8\Omega$: $P_d = 86\text{W}$ at 1/10 $P_{o \text{ max}}$.

The thermal resistance of a heat sink is obtained from Fig.2.

$R_L = 8\Omega$: $\theta_{c-a} = 0.87^\circ\text{C/W}$

T_j when a heat sink is used is obtained from (3).

$R_L = 8\Omega$: $T_j = 148.5^\circ\text{C}$

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