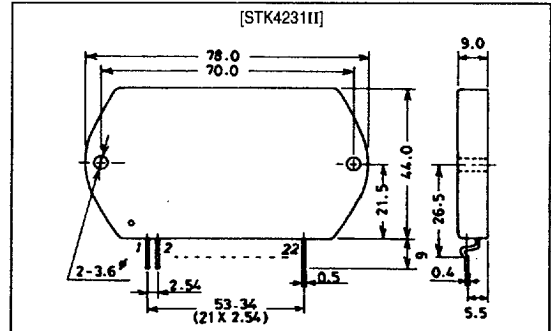


**STK4231 II****SANYO****AF Power Amplifier (Split Power Supply)  
(100W + 100W min, THD = 0.4%)****Features**

- 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 substrate temperature 125°C guaranteed
- Excellent cost performance

**Package Dimensions**

unit: mm

**4086A****Specifications****Maximum Ratings** at  $T_a = 25^\circ\text{C}$ 

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC \text{ max}}$		$\pm 75$	V
Thermal resistance	$\theta_{j-c}$		1.1	$^\circ\text{C/W}$
Junction temperature	$T_j$		150	$^\circ\text{C}$
Operating substrate temperature	$T_c$		125	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-30 to +125	$^\circ\text{C}$
Available time for load short-circuit	$t_s$	$V_{CC} = \pm 51.0\text{V}$ , $R_L = 8\Omega$ , $f = 50\text{Hz}$ , $P_o = 100\text{W}$	1	s

**Recommended Operating Conditions** at  $T_a = 25^\circ\text{C}$ 

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	$V_{CC}$		$\pm 51.0$	V
Load resistance	$R_L$		8	$\Omega$

**SANYO Electric Co., Ltd. Semiconductor Business Headquarters**

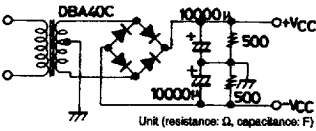
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110 JAPAN

61797HA (ID) / 9018TA, TS No. 2307—1/8

**Operating Characteristics** at  $T_a = 25^{\circ}\text{C}$ ,  $V_{CC} = \pm 51.0\text{V}$ ,  $R_L = 8\Omega$ ,  $R_g = 600\Omega$ ,  $V_G = 40\text{dB}$ ,  
 $R_L$  : non-inductive load

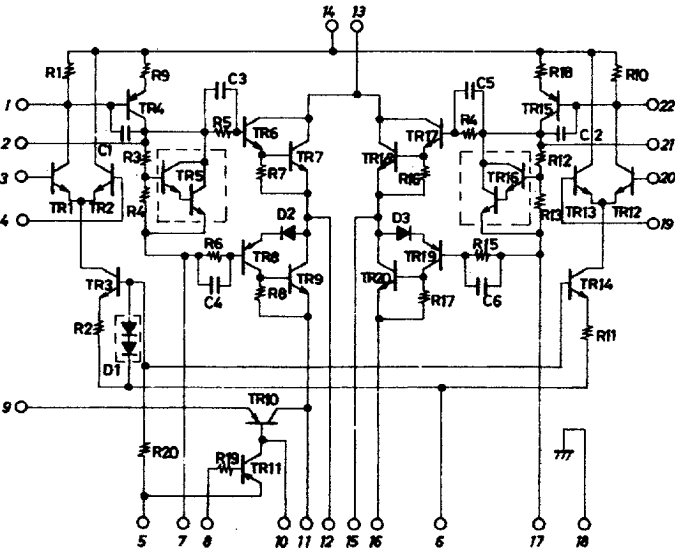
Parameter	Symbol	Conditions	min	typ	max	Unit
Quiescent current	$I_{CCO}$	$V_{CC} = \pm 60\text{V}$	20	40	100	mA
Output power	$P_O$	THD = 0.4%, $f = 20\text{Hz to } 20\text{kHz}$	100			W
Total harmonic distortion	THD	$P_O = 1.0\text{W}$ , $f = 1\text{kHz}$			0.3	%
Frequency response	$f$	$P_O = 1.0\text{W}$ , $+0_{-3}\text{ dB}$		20 to 50k		Hz
Input impedance	$r_i$	$P_O = 1.0\text{W}$ , $f = 1\text{kHz}$		55		k $\Omega$
Output noise voltage	$V_{NO}$	$V_{CC} = \pm 60\text{V}$ , $R_g = 10\text{k}\Omega$			1.2	mVrms
Neutral voltage	$V_N$	$V_{CC} = \pm 60\text{V}$	-70	0	+70	mV
Muting voltage	$V_M$		-2	-5	-10	V

Notes. 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 short-circuit 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.

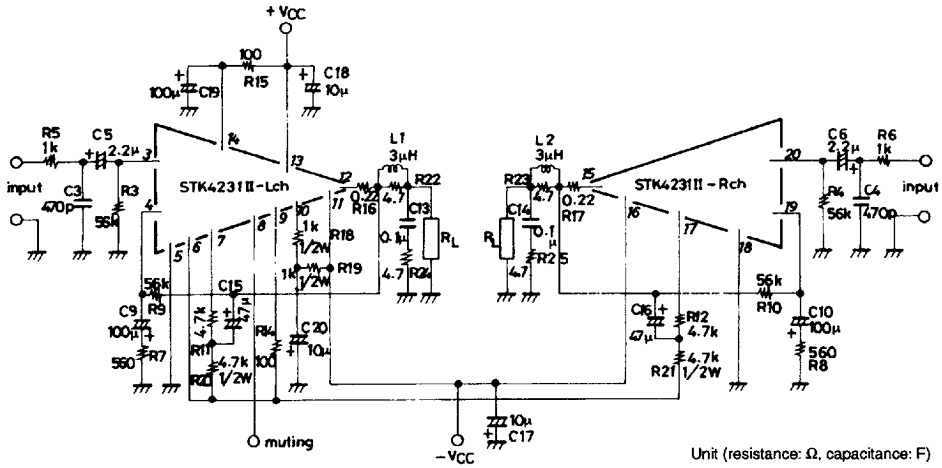


Specified Transformer Power Supply  
(Equivalent to MG-200)

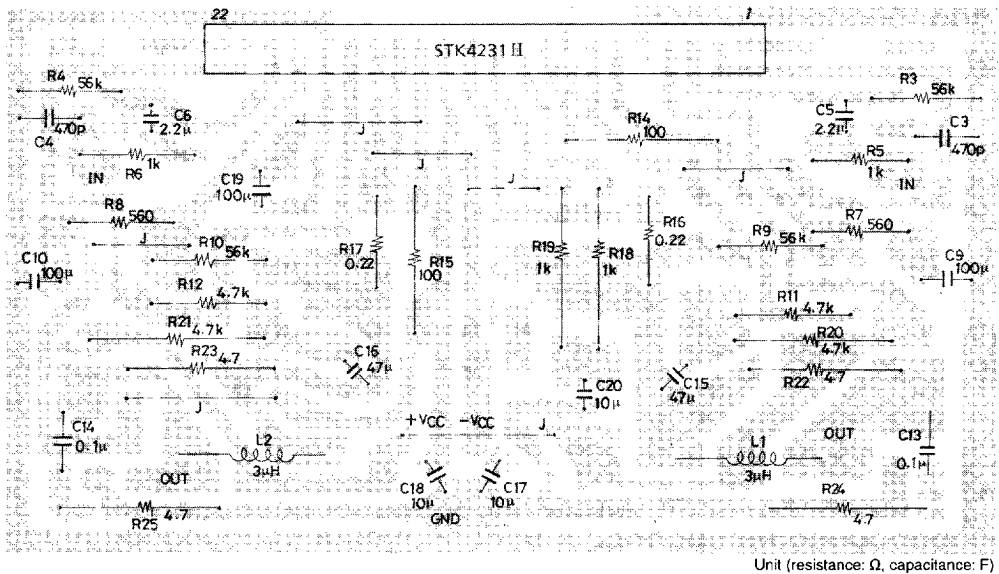
**Equivalent Circuit**

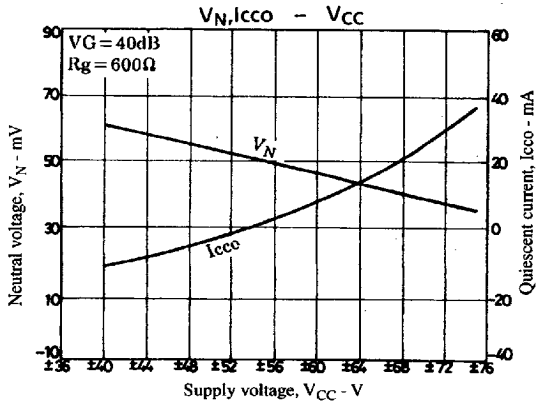
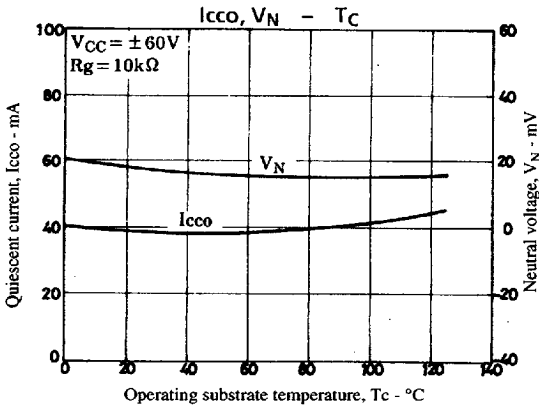
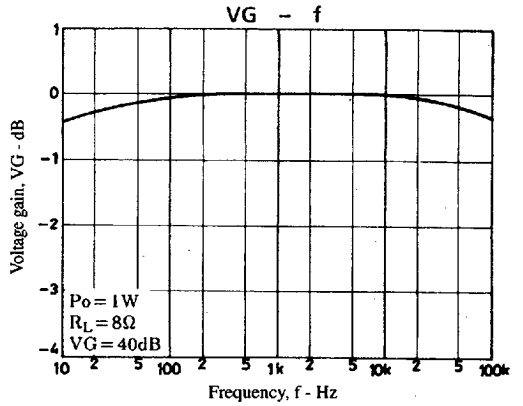
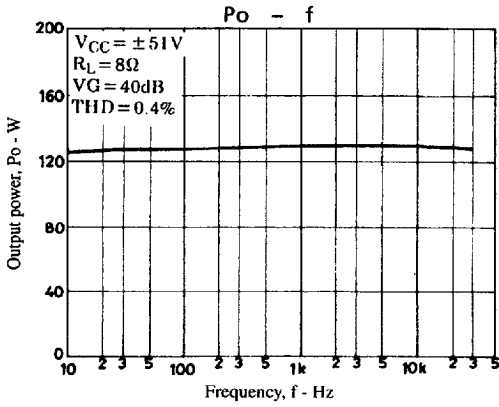
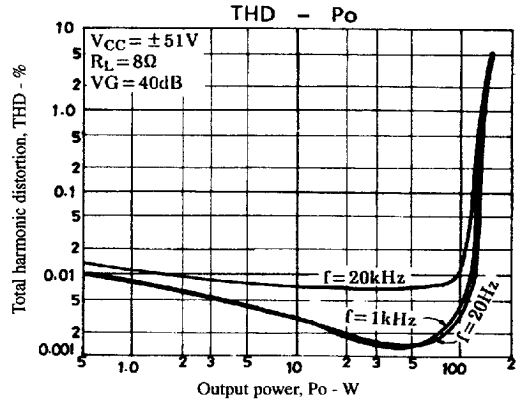
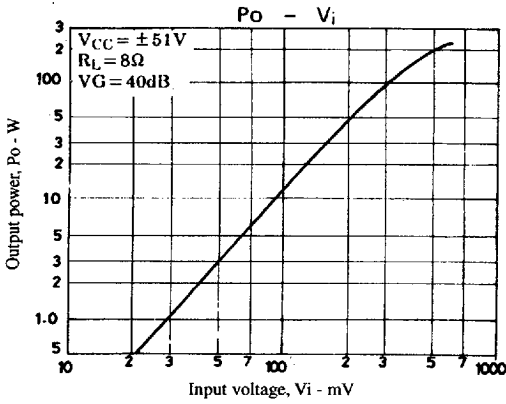


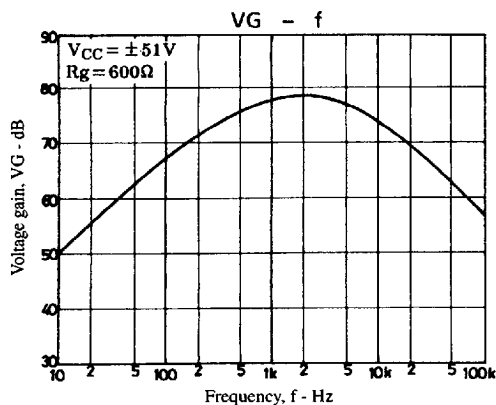
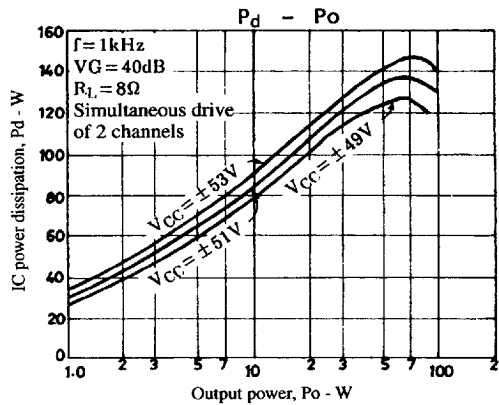
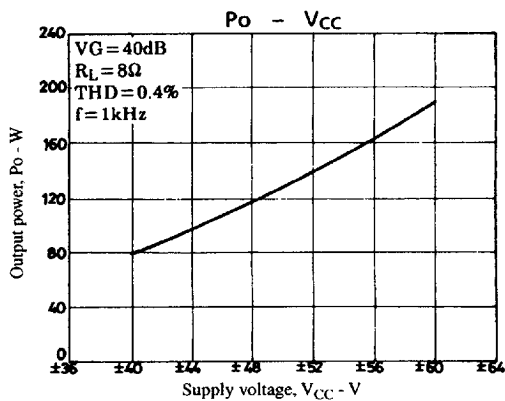
Sample Application Circuit : 100W min 2-channel AF power amplifier



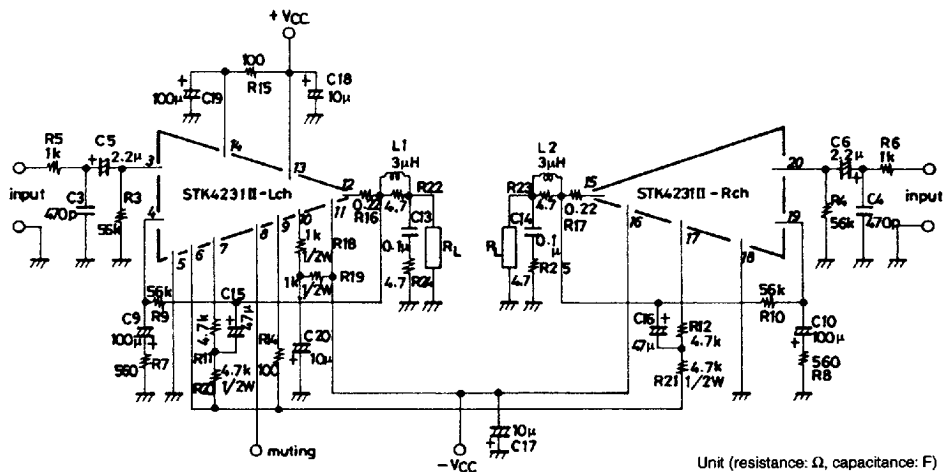
Sample Printed Circuit Pattern for Application Circuit (Cu-foiled side)







## Description of External Parts



C3, C4	Input filter capacitors • A filter formed with R5 or R6 can be used to reduce noise at high frequencies.
C5, C6	Input coupling capacitors • Used to block DC current. When the reactance of the capacitor increases at low frequencies, the dependence of 1/f noise on signal source resistance causes the output noise to worsen. It is better to decrease the reactance. • To reduce the pop noise at the time of application of power, it is effective to increase C5, C6 that fix the time constant on the input side and to decrease C9, C10 on the NF side.
C9, C10	NF capacitors • These capacitors fix the low cutoff frequency as shown below. $f_L = \frac{1}{2\pi \cdot C9 \cdot R7} \quad [\text{Hz}]$ To provide the desired voltage gain at low frequencies, it is better to increase C9. However, do not increase C9 more than needed because the pop noise level becomes higher at the time of application of power.
C19	Decoupling capacitor • Used to eliminate the ripple components that mix into the input side from the power line (+V <sub>CC</sub> ).
C15, C16	Bootstrap capacitors • When the capacitor value is decreased, the distortion is liable to be higher at low frequencies.
C17, C18	Oscillation blocking capacitors • Must be inserted as close to the IC power supply pins as possible so that the power supply impedance is decreased to operate the IC stably. • Electrolytic capacitors are recommended for C17, C18.
C20	Capacitor for ripple filter • Capacitor for the TR10-used ripple filter in the IC system
C13, C14	Oscillation blocking capacitor • A polyester film capacitor, being excellent in temperature characteristic, frequency characteristic, is recommended for C13, C14.
R5, R6	Resistors for input filter
R3, R4	Input bias resistors • Used to bias the input pin potential to zero. These resistors fix the input impedance practically.
R7, R9 (R8, R10)	These resistors fix voltage gain VG. It is recommended to use R7 (R8) = 560Ω, R9 (R10) = 56kΩ for VG = 40dB. • To adjust VG, it is desirable to change R7 (or R8). • When R7 (or R8) is changed to adjust VG, R3 (=R4) = R9 (=R10) must be set to ensure V <sub>N</sub> balance.
R11, R20 (R12, R21)	Bootstrap resistors • The quiescent current is set by these resistors 4.7kΩ + 4.7kΩ. It is recommended to use this resistor value.
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 <sub>CC</sub> through TR 11. It is recommended to use 1kΩ (1W) + 1kΩ (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	For high-frequency oscillation blocking



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

Figure 2 shows the relation between  $P_d$  and  $\theta_{c-a}$  given from (1) and (3) with  $T_a$  as a parameter.

[Example] The thermal resistance of a heat sink is obtained when the ambient temperature specified for a stereo amplifier is  $50^\circ\text{C}$ .

Assuming  $V_{CC} = \pm 51.0\text{V}$ ,  $R_L = 8\Omega$ ,  
 $R_L = 8\Omega$  :  $P_d = 86\text{W}$  at  $1/10 P_o$  max.

The thermal resistance of a heat sink is obtained from Figure 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).

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

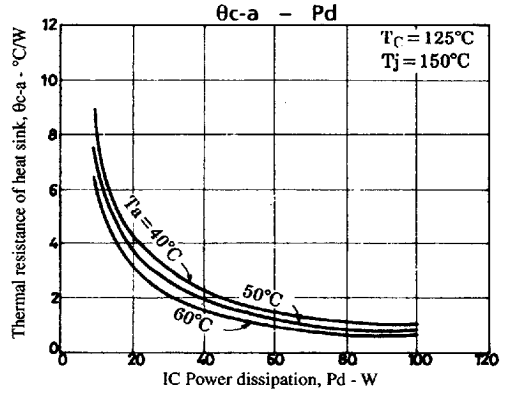


Figure 2. STK4231II  $\theta_{c-a} - P_d$