



# STK4044XI

## AF Power Amplifier (Split Power Supply) (100 W min, THD = 0.008 %)

### Features

- Compact packaging supports slimmer set designs
- Series designed from 50 up to 150 W and pin-compatibility
- Simpler heat sink design facilitates thermal design of slim stereo sets
- Current mirror circuit, cascade circuit and pure-complimentary circuit application reduce distortion to 0.008 %
- Supports addition of electronic circuits for thermal shutdown and load-short protection circuit as well as pop noise muting which occurs when the power supply switch is turned on and off.

### Specifications

#### Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V <sub>CC</sub> max		± 74	V
Thermal resistance	θ <sub>j-c</sub>		1.2	°C/W
Junction temperature	T <sub>J</sub>		150	°C
Operating substrate temperature	T <sub>c</sub>		125	°C
Storage temperature	T <sub>stg</sub>		-30 to +125	°C
Permissible load short time	t <sub>s</sub> *1	V <sub>CC</sub> = ± 51 V, R <sub>L</sub> = 8 Ω, f = 50 Hz, P <sub>O</sub> = 100 W	1	s

#### Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V <sub>CC</sub>		± 51	V
Load resistance	R <sub>L</sub>		8	Ω

### Operating Characteristics

at Ta = 25°C, V<sub>CC</sub> = ± 51 V, R<sub>L</sub> = 8 Ω, VG = 40 dB, R<sub>g</sub> = 600 Ω, 100 kHz LPF ON, R<sub>L</sub> (noninductive)

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	I <sub>CCO</sub>	V <sub>CC</sub> = ± 61.5 V	15		120	mA
Output power	P <sub>O</sub>	THD = 0.008 %, f = 20 Hz to 20 kHz	100			W
Total harmonic distortion	THD	P <sub>O</sub> = 1.0 W, f = 1 kHz			0.008	%
Frequency response	f <sub>L</sub> , f <sub>H</sub>	P <sub>O</sub> = 1.0 W, $+0$ $-3$ dB		20 to 50k		Hz
Input resistance	r <sub>i</sub>	P <sub>O</sub> = 1.0 W, f = 1 kHz		55		kΩ
Output noise voltage	V <sub>NO</sub> *2	V <sub>CC</sub> = ± 61.5 V, R <sub>g</sub> = 10 kΩ			1.2	mVrms
Neutral voltage	V <sub>N</sub>	V <sub>CC</sub> = ± 61.5 V	-70	0	+ 70	mV

Note: Use rated power supply for test unless otherwise specified.

\*1 When measuring permissible load short time and output noise voltage use transformer power supply indicated next page.

\*2 Output noise voltage represents the peak value on the rms scale (VTVM). The noise voltage waveform does not include the pulse noise.

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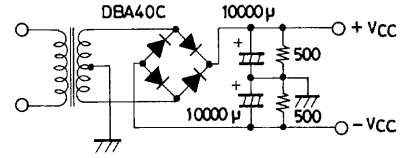
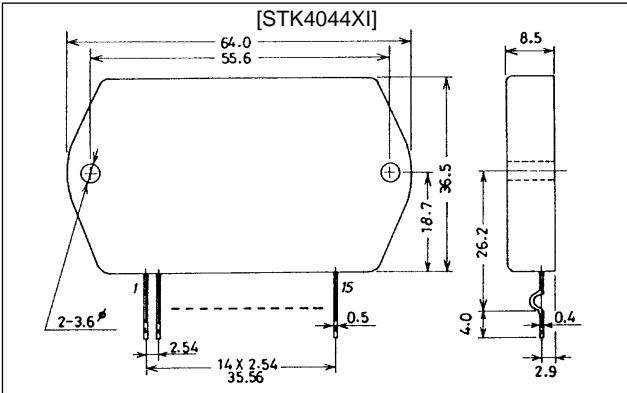
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## Package Dimensions

unit: mm

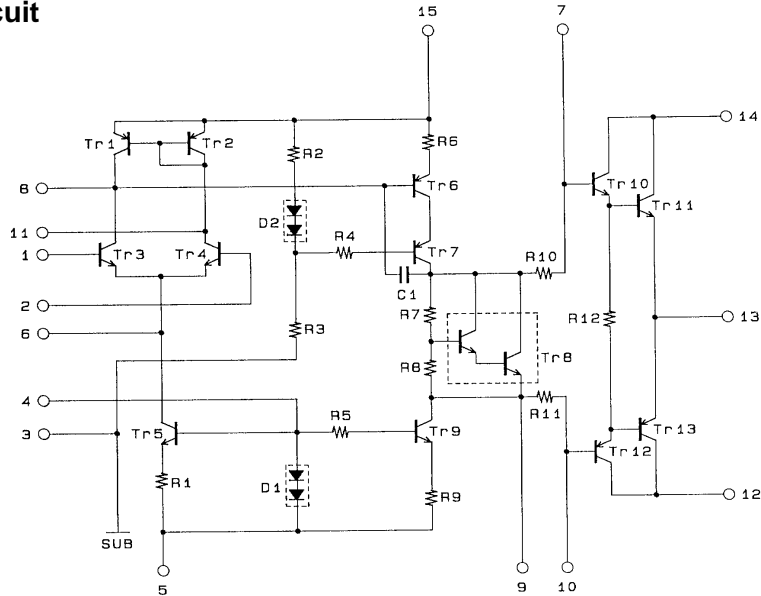
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Unit (resistance: Ω, capacitance: F)

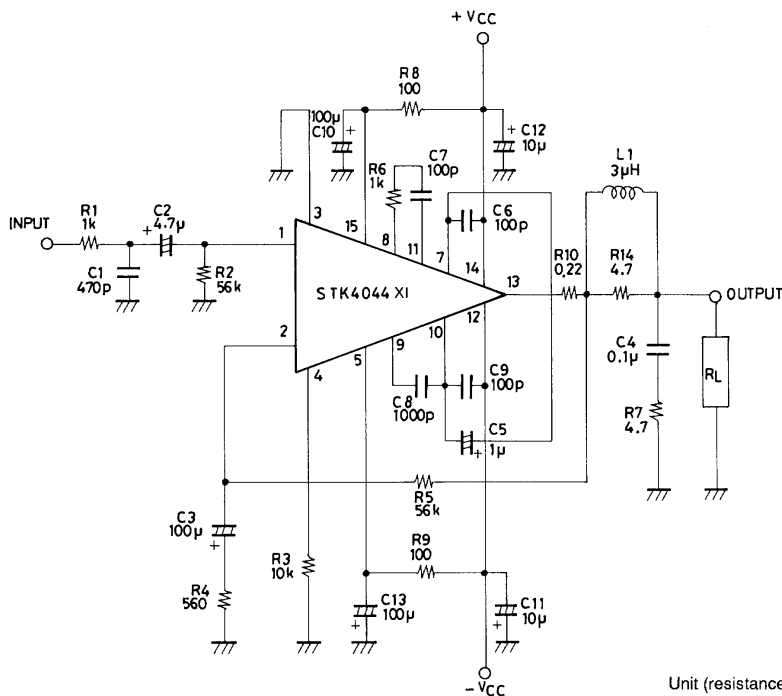
## Specified Transformer Power Supply (MG-200 Equivalent)

## Equivalent Circuit



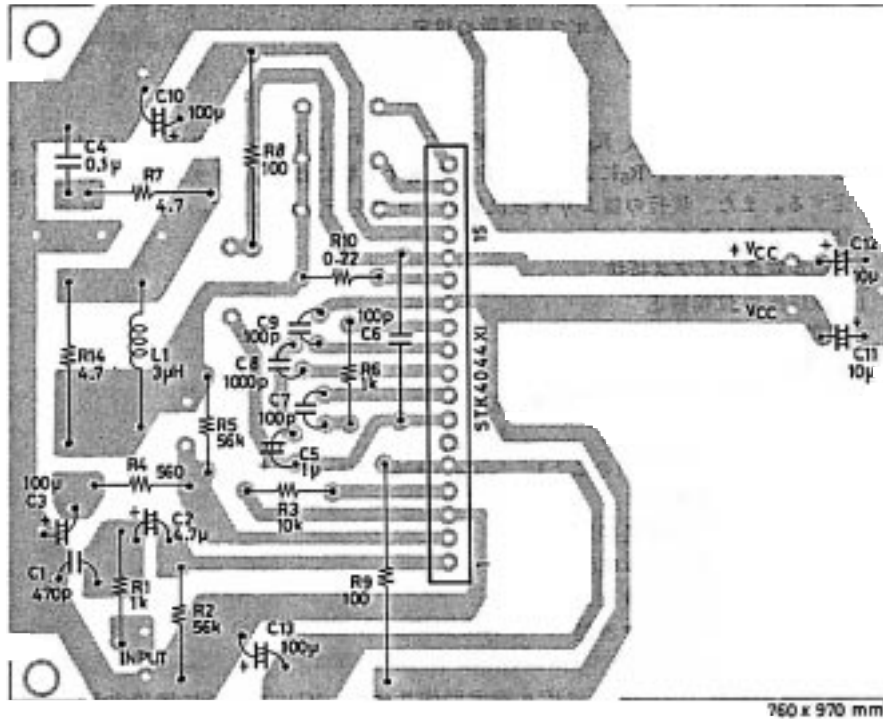
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## Sample Application Circuit: 100W min Single Channel AF Power Amplifier



Unit (resistance:Ω , capacitance: F)

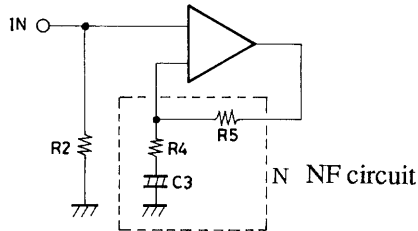
Sample Printed Circuit Pattern for Application Circuit (Copper-foiled side)



Unit (resistance: Ω, capacitance: F)

Description of External Parts

- R<sub>1</sub>, C<sub>1</sub> : Input filter circuit
  - Reduces high-frequency noise.
- C<sub>2</sub> : Input coupling capacitor
  - DC current suppression. A reduction in reactance is effective because of increases in capacitor reactance at low frequencies and 1/f noise dependence on signal source resistance which result in output noise worsening.
- R<sub>2</sub> : Input bias resistor
  - Biases the input pin to zero.
  - Effects V<sub>N</sub> stability (refer to NF circuit).
  - Due to differential input, input resistance is more or less determined by this resistance value.
- R<sub>4</sub>, R<sub>5</sub> : NFB circuit (AC NF circuit). Use of resistor with 1% error is suggested.
- C<sub>3</sub> (R<sub>2</sub>)



- C<sub>3</sub> : AC NF capacitor
- R<sub>4</sub>, R<sub>5</sub> : Used for VG setting.

- VG settings are obtained using  $R_4$  and  $R_5$  according to the following equation:

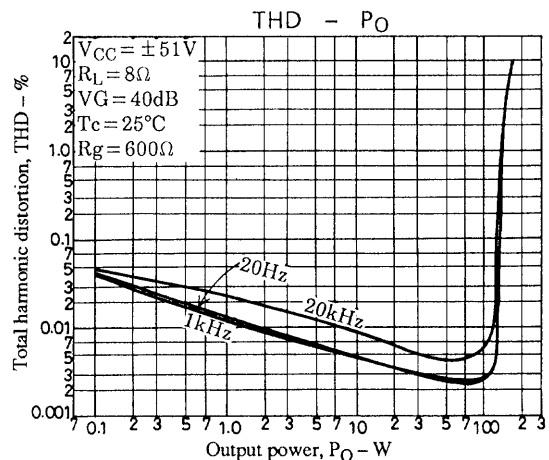
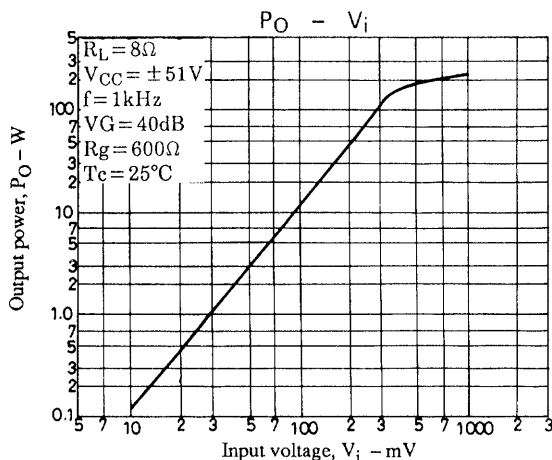
$$\log_{20} \frac{R_5}{R_4} \quad 40 \text{ dB is recommended.}$$

- Low-frequency cutoff frequency settings are obtained using  $R_4$  and  $C_3$  according to the following equation:

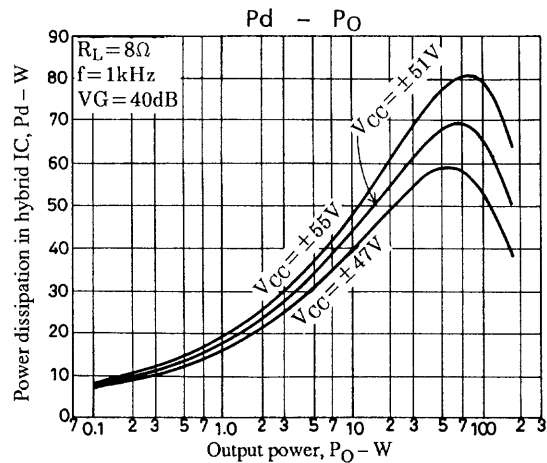
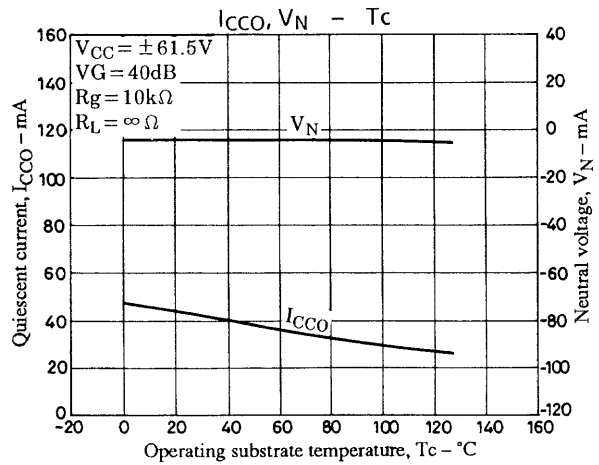
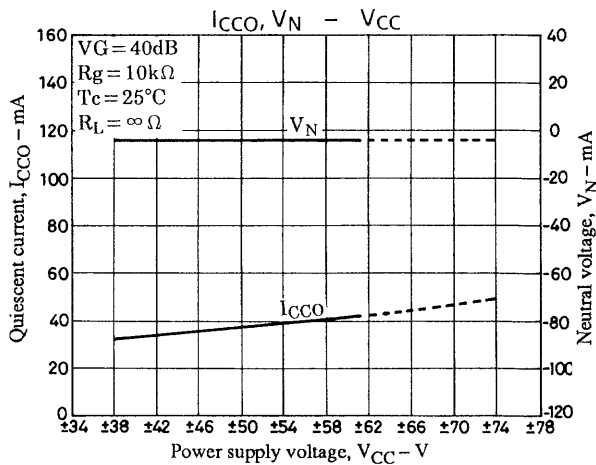
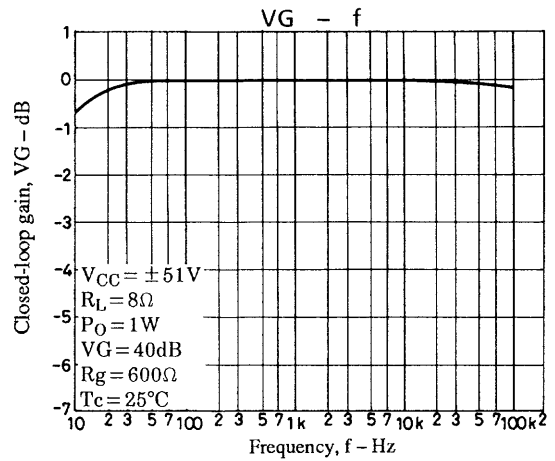
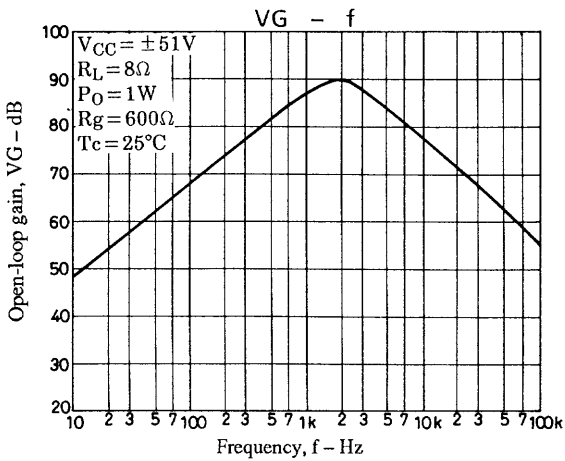
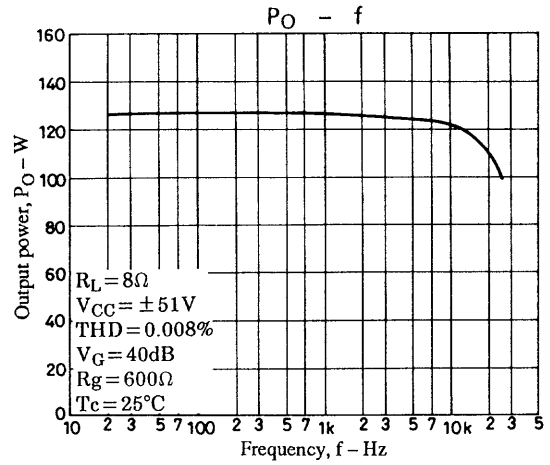
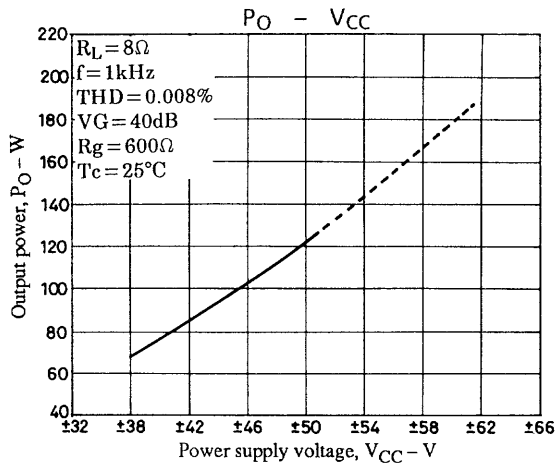
$$f_L = \frac{1}{2\pi \cdot R_4 \cdot C_3} \quad [\text{Hz}]$$

When changing the VG setting, you should change  $R_4$  which requires a recheck of the low cutoff frequency setting. When the VG setting is changed using  $R_5$ , the setting should ensure  $R_2$  equals  $R_5$  so that  $V_N$  balance stability is maintained. If the resistor value is increased more than the existing value,  $V_N$  balance may be disturbed and result in deterioration of  $V_N$  temperature characteristics.

- $R_3$  : Differential constant-current bias resistor
- $R_6, R_7$  : For oscillation suppression and phase compensation applications  
(For use with differential stage applications)
- $R_7, C_4$  : For oscillation suppression and phase compensation applications  
(A Mylar capacitor is recommended for  $C_4$  for use with output stage applications)
- $C_6, C_9$  : For oscillation suppression and phase compensation applications  
Power stage (Must be connected near the pin)  $C_6$ : Positive (+) power  $C_9$ : Negative (-) power
- $C_8$  : For oscillation suppression and phase compensation applications  
(Oscillation suppression before power step clip)
- $C_5$  : For oscillation suppression and distortion improvement applications
- $R_8, C_{10}$  : Ripple filter circuit on positive (+) side.
- $R_9, C_{13}$  : Ripple filter circuit on negative (-) side.
- $C_{11}, C_{12}$  : For oscillation suppression applications
  - Used for reducing power supply impedance to stable IC operation and should be connected near the IC pin. We recommend that you use an electrolytic capacitor.
- $R_{10}$  : Output resistor  
Increases load shorting endurance capacity during times of high output.
- $R_{14}, L_1$  : For oscillation suppression applications  
Increases oscillation stability against capacitance loads.



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