

**STK4040XI**

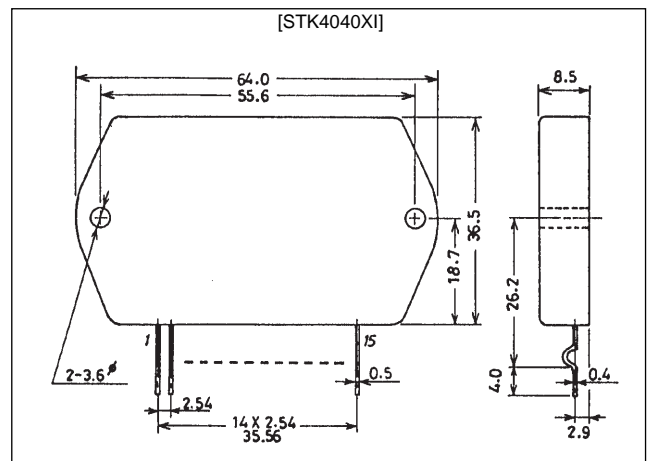
AF Power Amplifier (Split Power Supply) (70 W min, THD = 0.008%)

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.

Package Dimensions

unit: mm

4075

Specifications

Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Condition	Rating	Unit
Maximum supply voltage	$V_{CC \text{ max}}$		± 63	V
Thermal resistance	θ_{j-c}		1.4	$^\circ\text{C/W}$
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 shorted	t_s^{*1}	$V_{CC} = \pm 43.5 \text{ V}, R_L = 8 \Omega, f = 50 \text{ Hz}, P_O = 70 \text{ W}$	1	s

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

Parameter	Symbol	Condition	Rating	Unit
Recommended supply voltage	V_{CC}		± 43.5	V
Load resistance	R_L		8	Ω

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Operating Characteristics

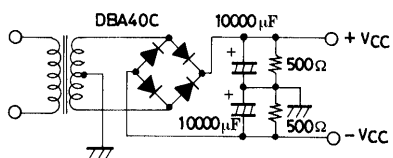
at $T_a = 25^\circ\text{C}$, $V_{CC} = \pm 43.5\text{ V}$, $R_L = 8\ \Omega$, $V_G = 40\text{ dB}$, $R_g = 600\ \Omega$, 100 k LPF ON , R_L (non-inductive)

Parameter	Symbol	Condition	Rating			Unit
			min	typ	max	
Quiescent current	I_{CCO}	$V_{CC} = \pm 52.5\text{ V}$	15		120	mA
Output power	P_O	THD = 0.008 %, $f = 20\text{ Hz to } 20\text{ kHz}$	70			W
Total harmonic distortion	THD	$P_O = 1.0\text{ W}$, $f = 1\text{ kHz}$			0.008	%
Frequency response	f_L, f_H	$P_O = 1.0\text{ W}$, $+0, -3\text{ dB}$		20 to 50k		Hz
Input resistance	r_i	$P_O = 1.0\text{ W}$, $f = 1\text{ kHz}$		55		k Ω
Output noise voltage	V_{NO}^{*2}	$V_{CC} = \pm 52.5\text{ V}$, $R_g = 10\text{ k}\Omega$			1.2	mVrms
Neutral voltage	V_N	$V_{CC} = \pm 52.5\text{ V}$	-70	0	+70	mV

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

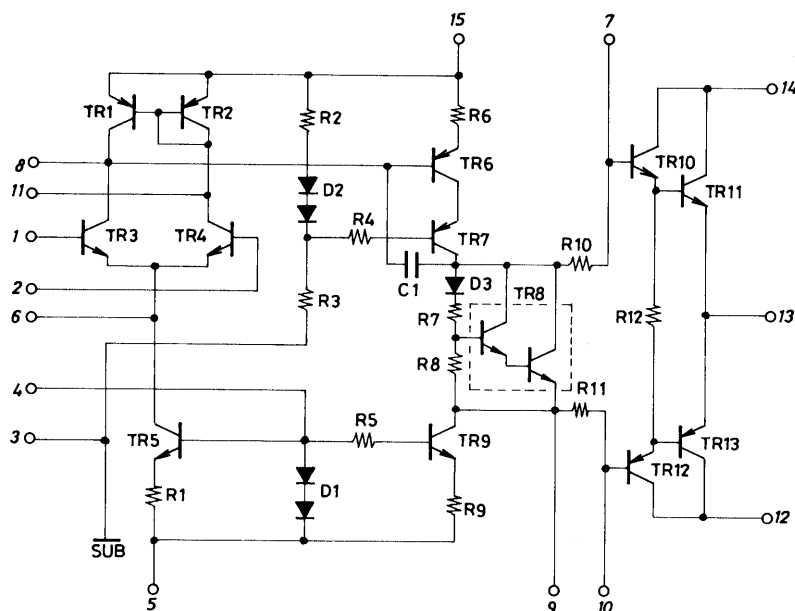
*1 When measuring permissible load short time and output noise voltage use transformer power supply indicated below.

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



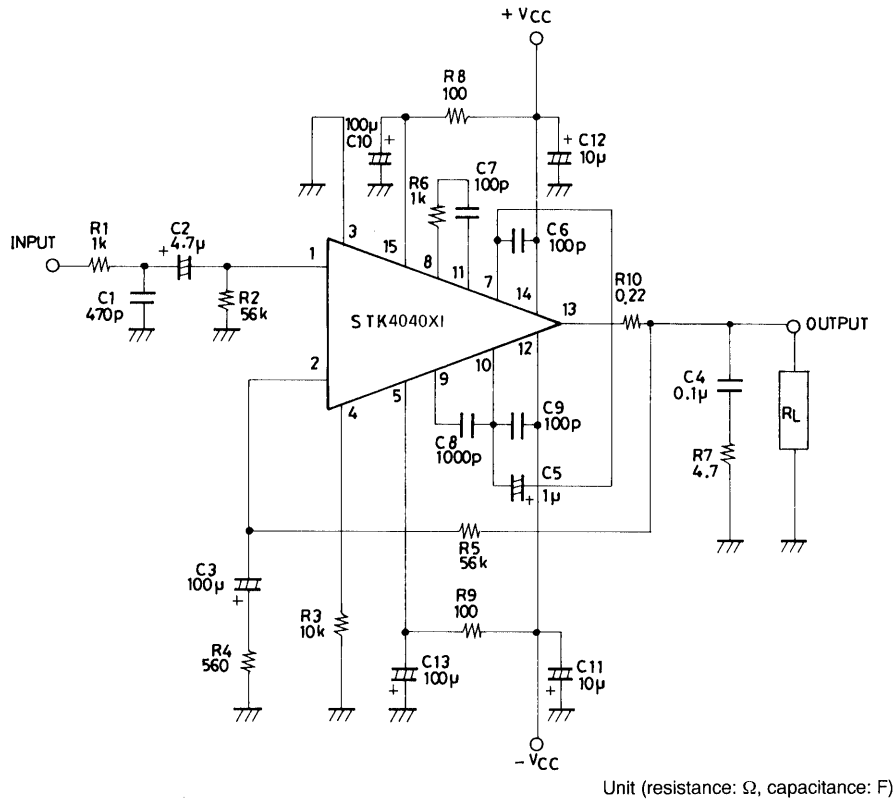
**Specified Transformer Power Supply
(MG-200 Equivalent)**

Equivalent Circuit

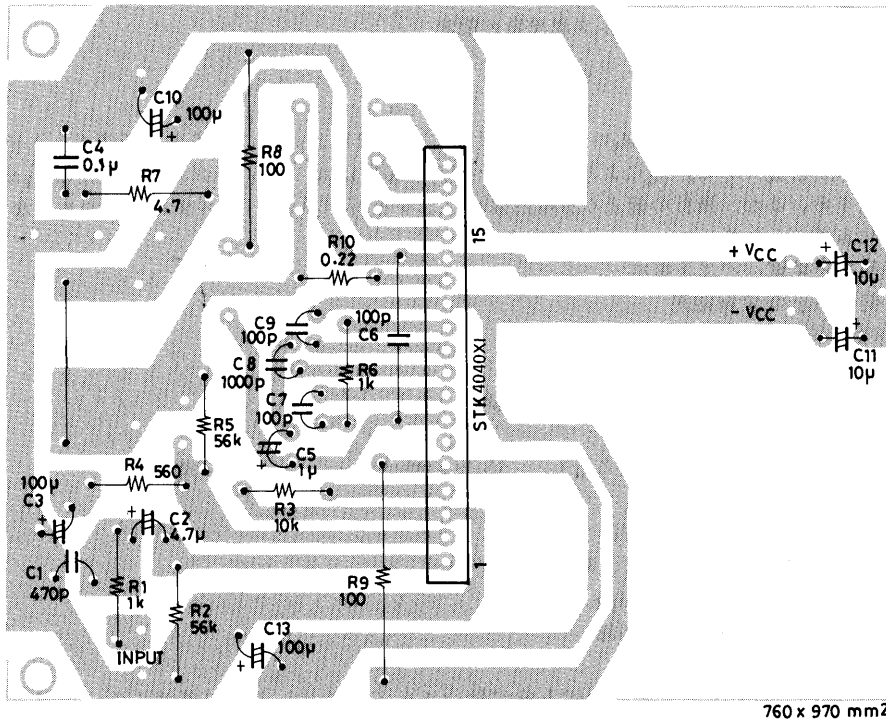


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Application Circuit: 70W min Single Channel AF Power Amplifier



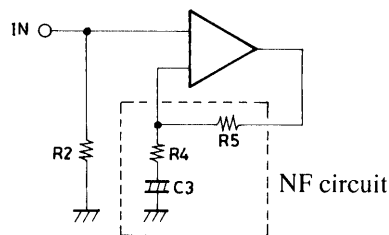
Sample Printed Circuit Pattern for Application Circuit (Copper-foiled side)



Unit (resistance: Ω , capacitance: F)

Description of External Parts

- R₁, C₁ : Input filter circuit
 - Reduces high-frequency noise.
- C₂ : 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.
- R₂ : Input bias resistor
 - Biases the input pin to zero.
 - Effects V_N stability (refer to NF circuit).
 - Due to differential input, input resistance is more or less determined by this resistance value.
- R₄, R₅ : NFB circuit (AC NF circuit). Use of resistor with 1% error is suggested.
- C₃ (R₂)



- C₃ : AC NF capacitor
- R₄, R₅ : Used for VG setting.

- VG settings are obtained using R₄ and R₅ 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 R₄ and C₃ 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 R₄ which requires a recheck of the low cutoff frequency setting. When the VG setting is changed using R₅, the setting should ensure R₂ equals R₅ 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.

- R₃ : Differential constant-current bias resistor
- R₆, R₇ : For oscillation suppression and phase compensation applications
(For use with differential stage applications)
- R₇, C₄ : For oscillation suppression and phase compensation applications
(A Mylar capacitor is recommended for C₄ for use with output stage applications)
- C₆, C₉ : For oscillation suppression and phase compensation applications
Power stage (Must be connected near the pin) C₆: Positive (+) power C₉: Negative (-) power
- C₈ : For oscillation suppression and phase compensation applications
(Oscillation suppression before power step clip)
- C₅ : For oscillation suppression and distortion improvement applications
- R₈, C₁₀ : Ripple filter circuit on positive (+) side.
- R₉, C₁₃ : Ripple filter circuit on negative (-) side.
- C₁₁, C₁₂ : 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.
- R₁₀ : Output resistor
Increases load shorting endurance capacity during times of high output.

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