Ordering number : EN4389A

Thick Film Hybrid IC

STK4030V

AF Power Amplifier (Split Power Supply) (35 W min, THD = 0.08%)

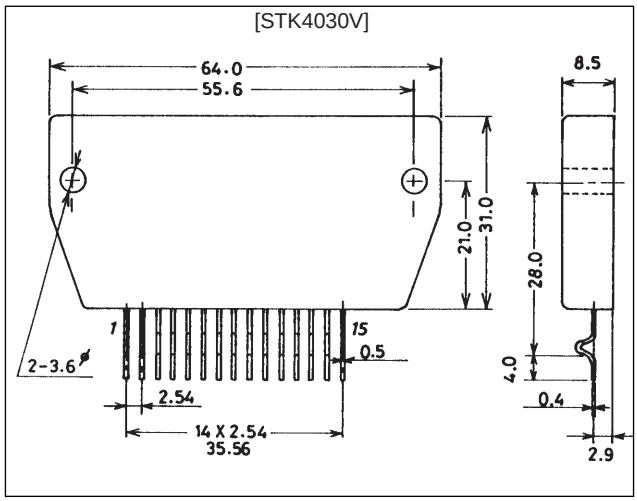
Features

- Compact packaging supports slimmer set designs (up to 70 W)
- Series designed for 20 up to 100 W (200 W) and pin-compatibility (120 to 200 W have 18 pins)
- Simpler heat sink design facilitates thermal design of slim stereo sets
- Current mirror circuit application reduces distortion to 0.08%
- 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

4062



Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		±45	V
Thermal resistance	θj-c		2.1	°C/W
Junction temperature	Tj		150	°C
Operating substrate temperature	Tc		125	°C
Storage temperature	Tstg		–30 to +125	°C
Available time for load shorted	t_S*	V_{CC} = ±30 V, R_L = 8 Ω, f = 50 Hz, P_O = 35 W	2	s

Note: Use a constant-voltage power supply as the test power supply unless otherwise specified.
* Use the transformer power supply shown on the next page when measuring the available time for load shorted and the output noise voltage.

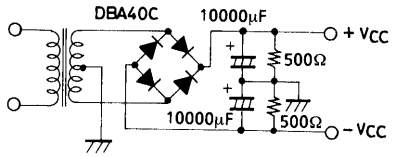
Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		±30	V
Load resistance	R_L		8	Ω

Operating Characteristics at Ta = 25°C, V_{CC} = ±30 V, R_L = 8 Ω, VG = 40 dB, Rg = 600 Ω, 100 k LPF on, R_L (non-inductive)

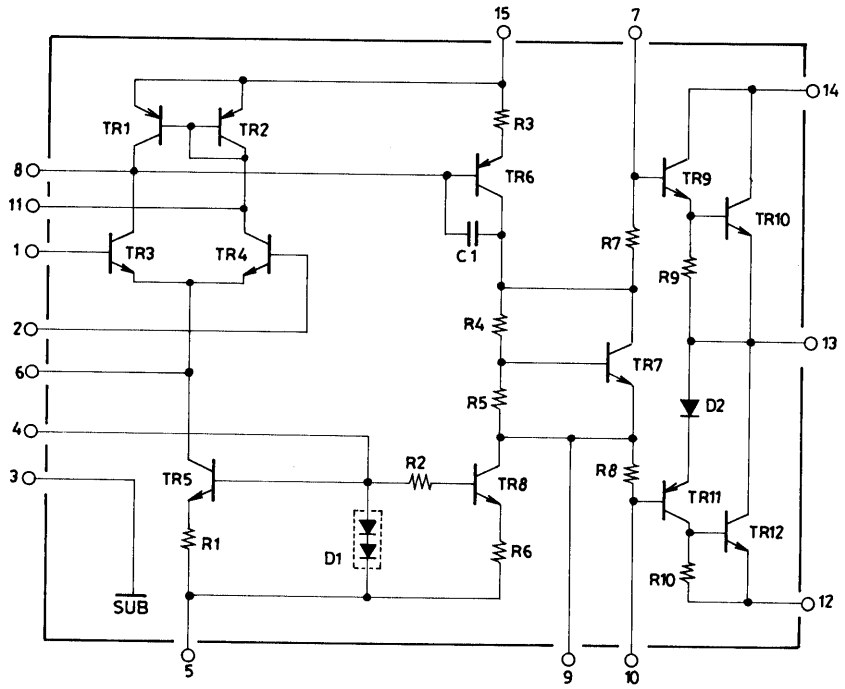
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	I_{CCO}	V_{CC} = ±36 V	15		120	mA
Output power	P_O (1)	THD = 0.08%, f = 20 Hz to 20 kHz	35			W
	P_O (2)	V_{CC} = ±27 V, THD = 0.2%, R_L = 4 Ω, f = 1 kHz	40			
Total harmonic distortion	THD	P_O = 1.0 W, f = 1 kHz			0.08	%
Frequency response	f_L, f_H	P_O = 1.0 W, $^{+0}_{-3}$ dB		20 to 50 k		Hz
Input resistance	r_i	P_O = 1.0 W, f = 1 kHz		55		kΩ
Output noise voltage	V_{NO}*	V_{CC} = ±36 V, Rg = 10 kΩ		1.2	mVrms	
Neutral voltage	V_N	V_{CC} = ±36 V	–70	0	+70	mV

Equivalent Circuit

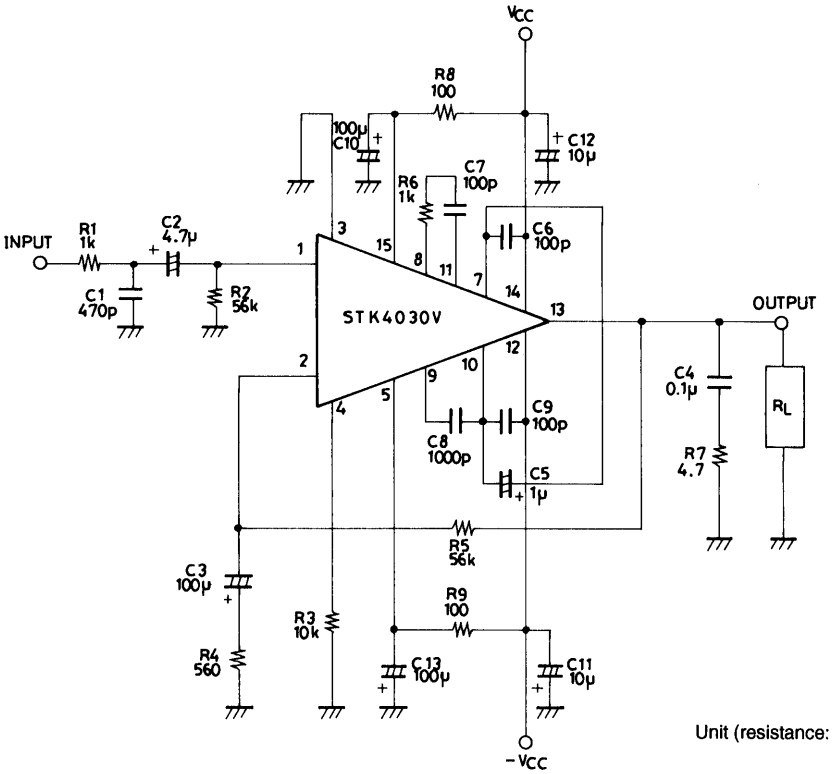


Specified Transformer Power Supply (RP-25 Equivalent)

Equivalent Circuit

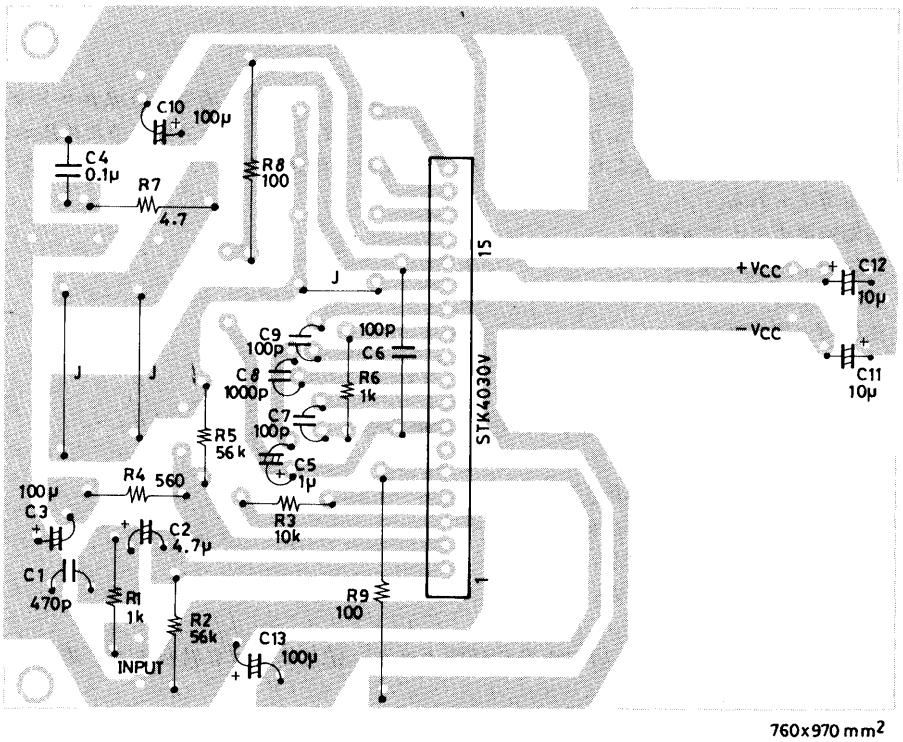


Application Circuit: 35W min Single Channel AF Power Amplifier



Unit (resistance: Ω, capacitance: F)

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



Unit (resistance: Ω, capacitance: F)

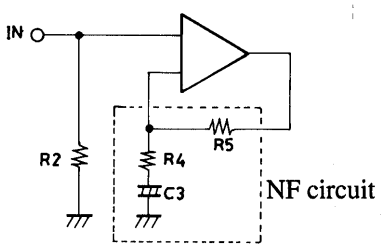
Description of External Parts

R_1, C_1 : Input filter circuit
- Reduces high-frequency noise.

C_2 : 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_2 : 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.

R_4, R_5 : NFB circuit (AC NF circuit). Use of resistor with 1% error is suggested.
C_3 (R_2)



C_3 : AC NF capacitor
R_4, R_5 : Used for VG setting.

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

$$\log 20 \cdot \frac{R_5}{R_4}$$ 40 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.

Sample Application Circuit (Protection circuit and muting circuit)