Ordering number:ENN5179

Thick Film Hybrid IC

STK405-070

2ch AF Power Amplifier (Split Power Supply) (40W + 40W min, THD = 10%)

Overview

The STK405-070, a member of the STK405-000 series, is a low-cost, 2-channel audio power amplifier hybrid IC that is ideal for a wide range of stereo sets. It has dedicated 6Ω output drive, in contrast with the STK401-000 series which supports 6Ω/3Ω output drive.

Features

- Class B amplifiers
- Output load impedance R_L=6Ω support
- EIAJ-output compatible (f=1kHz, THD=10%)
- Low supply switching shock noise
- Pin assignment grouped into individual blocks of inputs, outputs and supply lines to minimize the adverse effects of pattern layout on operating characteristics
- External boostrap circuit not necessary
- Standby operation possible using external circuit
- Voltage gain VG=26dB for easy gain distribution within the set
- Member of 10W/ch to 80W/ch pin-compatible series

Series Organization

The following devices form a series with differing output capacity. Some of the following devices are under development. Contact your Sanyo sales representative if you require more detailed information.

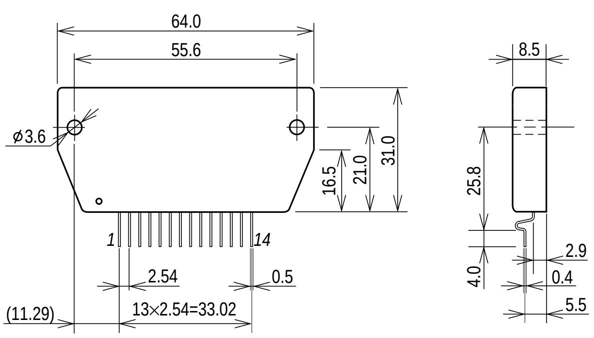
Type No.	Output power	Supply voltage [V]	
		V_{CC} max	V_{CC}
STK405-010	10W + 10W	±26.0	±14.0
STK405-030	20W + 20W	±30.5	±18.5
STK405-050	30W + 30W	±34.5	±22.0
STK405-070	40W + 40W	±39.0	±25.0
STK405-090	50W + 50W	±42.0	±26.5
STK405-100	60W + 60W	±45.0	±29.0
STK405-110	70W + 70W	±50.0	±31.0
STK405-120	80W + 80W	±52.5	±33.0

Package Dimensions

unit:mm

4158

[STK405-070]



SANYO : SIP14

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Specifications

Maximum Ratings at Ta = 25˚C

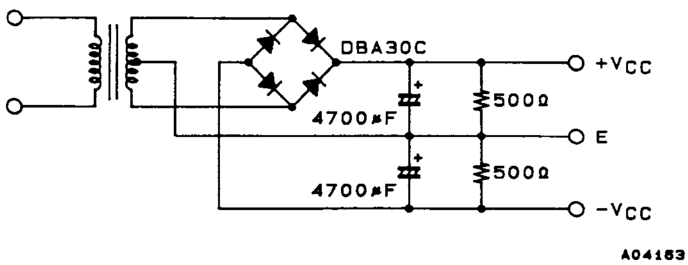
Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		±39.0	V
Thermal resistance	θ j-c	Per power transistor	3.4	˚C/W
Junction temperature	Tj		150	˚C
Operating temperature	Tc		125	˚C
Storage temperature	Tstg		–30 to +125	˚C
Available time for load short-circuit	t_s	V_{CC}=±25V, R_L=6Ω, f=50Hz, P_O=40W	1	s

Operating Characteristics at Ta = 25˚C, R_L=6Ω (noninductive load), Rg=600Ω, VG=26dB

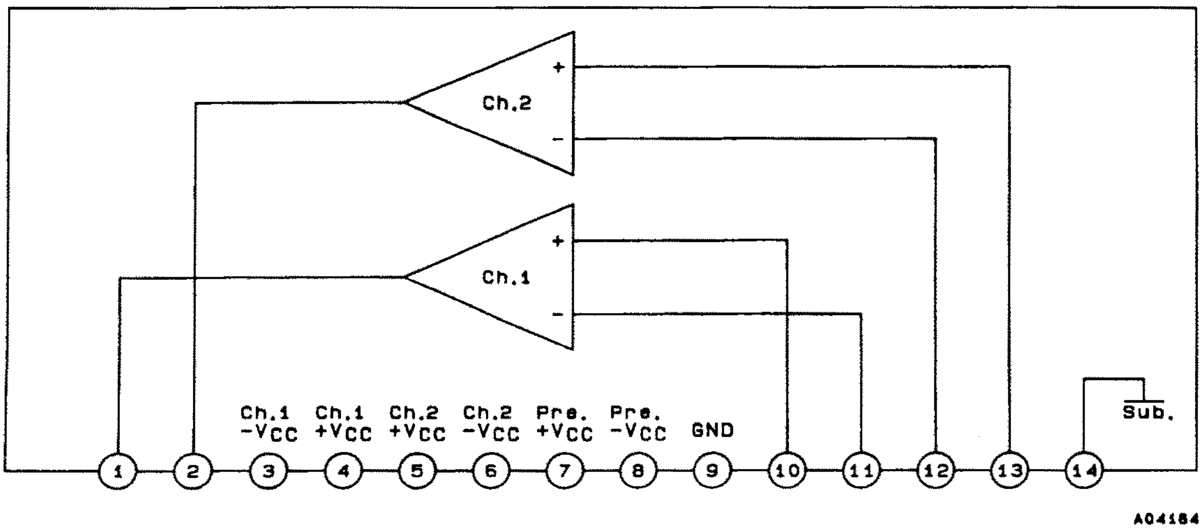
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	I_{CCO}	V_{CC}=±32.0V, no load		13	20	mA
Output power	P_O	V_{CC}=±25.0V, f=1kHz, THD=10.0%	40			W
Total harmonic distortion	THD	V_{CC}=±25.0V, f=1kHz, P_O=5.0W		0.04	0.1	%
Frequency response	f_L, f_H	V_{CC}=±25.0V, P_O=1.0W, $^{+0}_{-3}$ dB		20 to 50k		Hz
Input impedance	r_i	V_{CC}=±25.0V, f=1kHz, P_O=1.0W		55		kΩ
Output noise voltage	V_{NO}	V_{CC}=±32.0V, Rg=10kΩ			1.2	mVrms
Neutral voltage	V_N	V_{CC}=±32.0V	–100	0	+100	mV

Note.
All tests are measured using a constant-voltage supply unless otherwise specified.
Available time for load short-circuit and output noise voltage are measured using the transformer supply specified below.
The output noise voltage is the peak value of an average-reading meter with an rms value scale (VTVM). A regulated AC supply (50Hz) should be used to eliminate the effects of AC primary line flicker noise.

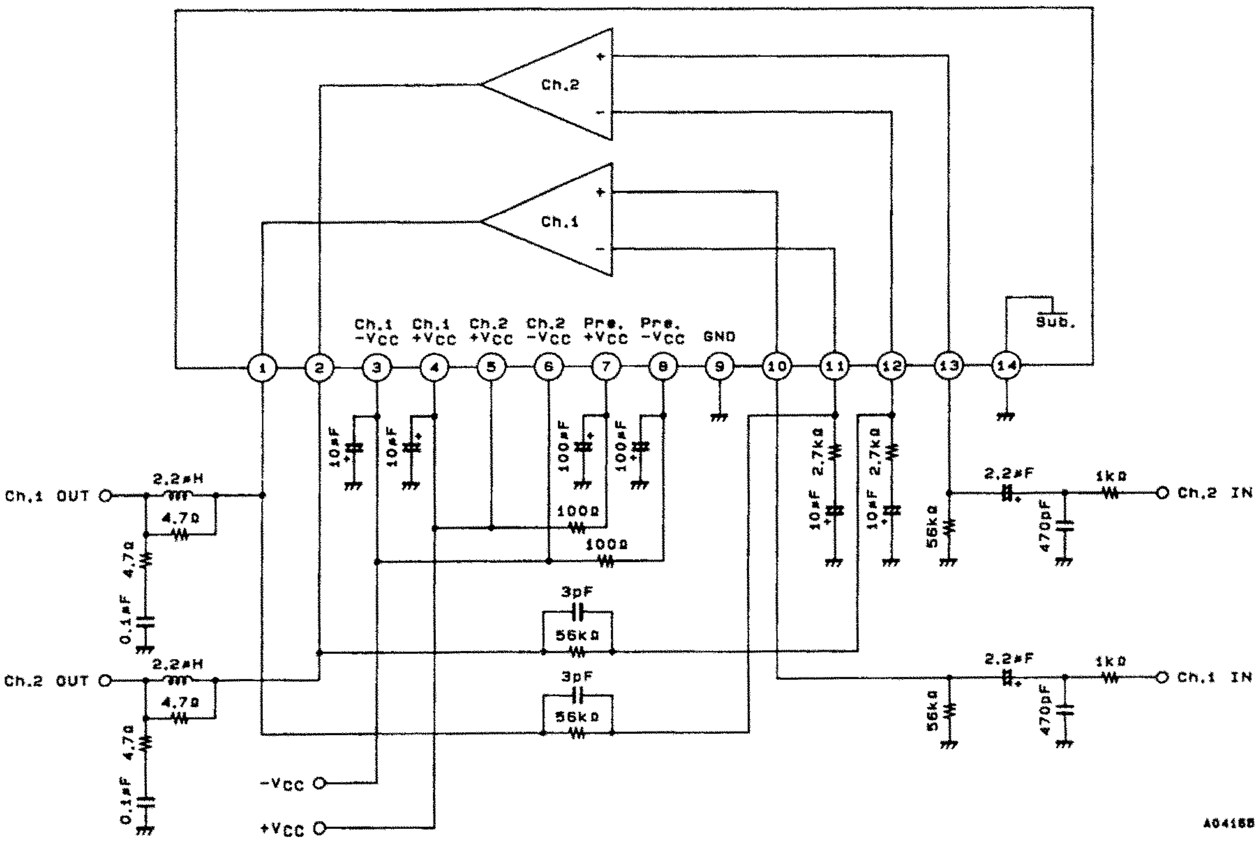
Specified Transformer Supply (RP-25 or Equivalent)



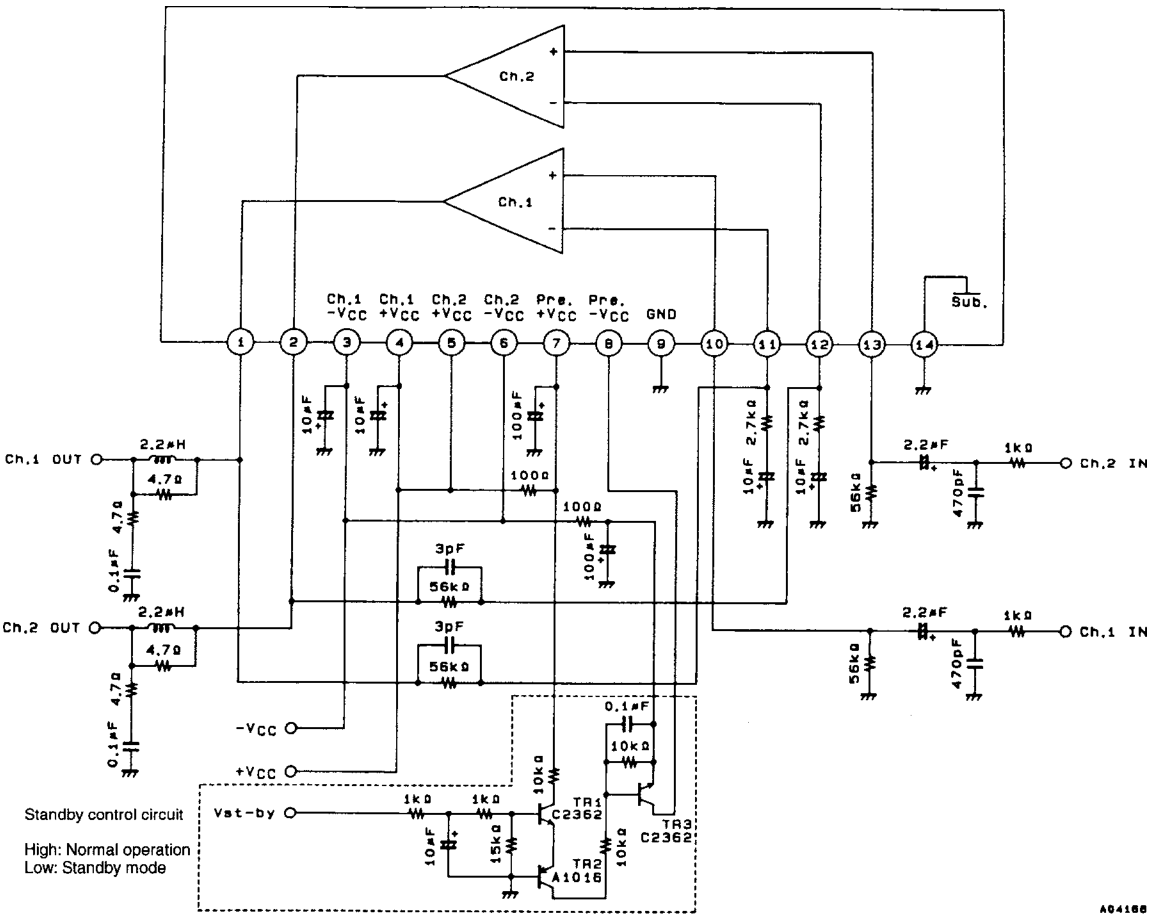
Block Diagram



Test Circuit



Sample Application Circuit (Standby Mode Supported)



Heatsink Design Considerations

The heatsink thermal resistance, θc-a, required to dissipate the STK405-070 device total power dissipation, Pd, is determined as follows :

Condition 1: IC substrate temperature not to exceed 125°C
$Pd \times \theta c\text{-}a + Ta < 125°C$ .... (1)

Where Ta is the guaranteed maximum ambient temperature.

Condition 2: Power transistor junction temperature, Tj, not to exceed 150°C
$Pd \times \theta c\text{-}a + Pd/N \times \theta j\text{-}c + Ta < 150°C$ .... (2)

where N is the number of power transistors and θj-c is the power transistor thermal resistance per transistor. Note that the power dissipated per transistor is the total, Pd, devided evenly among the N power transistors.

Expressions (1) and (2) can be rewritten making θc-a the subject.

$\theta c\text{-}a < (125 - Ta)/Pd$ .... (1)'
$\theta c\text{-}a < (150 - Ta)/Pd - \theta j\text{-}c/N$ .... (2)'

The heatsink required must have a thermal resistance that simultaneously satisfied both expressions.

The heatsink thermal resistance can be determined from (1)' and (2)' once the following parameters have been defined.

• Supply voltage : V_{CC}
• Load resistance : R_L
• Guaranteed maximum ambient temperature : Ta

The total device power dissipation when STK405-070 $V_{CC}=\pm25.0V$ and $R_L=6\Omega$, for a continuous sine wave signal, is a maximum of 42W, as shown in the Pd–P_O characteristics graph.

When estimating the power dissipation for an actual audio signal input, the rule of thumb is to select Pd corresponding to 1/10 P_O max (within safe limits) for a continuous sine wave input. For example,

Pd=29W [for 1/10 P_O max=4W]

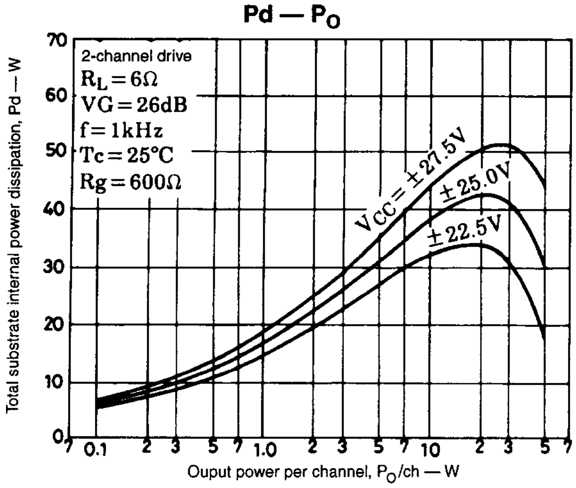
The STK405-070 has 4 power transistors, and the thermal resistance per transistor, θj-c, is 3.4°C/W. If the graranteed maximum ambient temperature, Ta, is 50°C, then the required heatsink thermal resistance, θc-a, is :

From expression (1)' : θc-a < (125–50)/29
< 2.58
From expression (2)' : θc-a < (150–50)/29–3.4/4
< 2.59

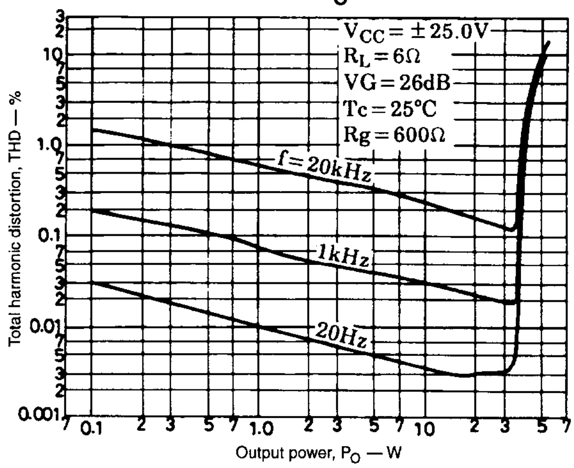
Therefore, to satisfy both expressions, the required heatsink must have a thermal resistance less than 2.58°C/W.

The heatsink design example is based on a constant-voltage supply, and should be verified within your specific set environment.

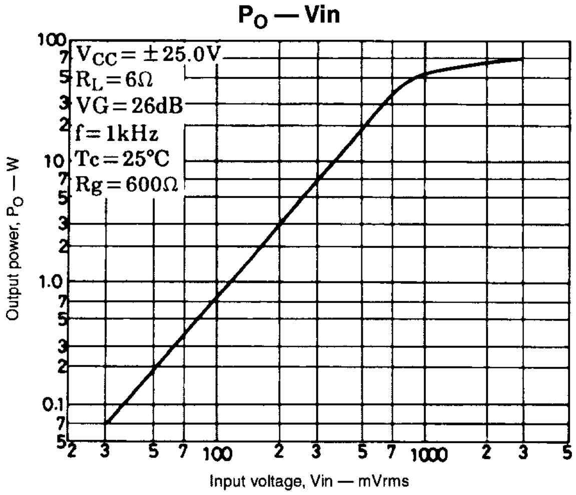
Pd — P_O



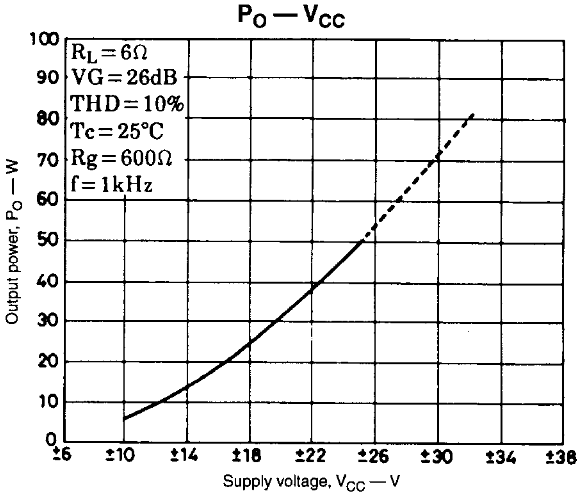
THD — P_O



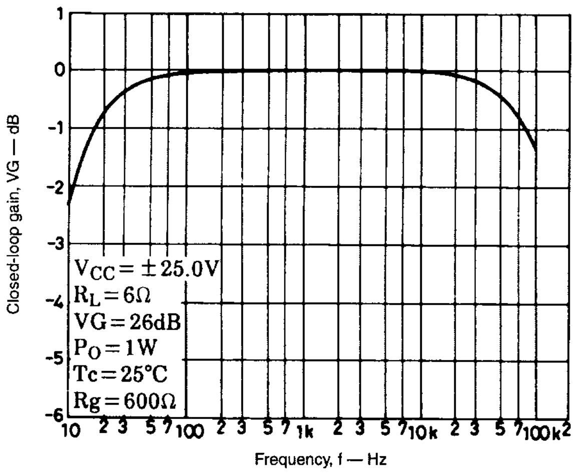
P_O — Vin



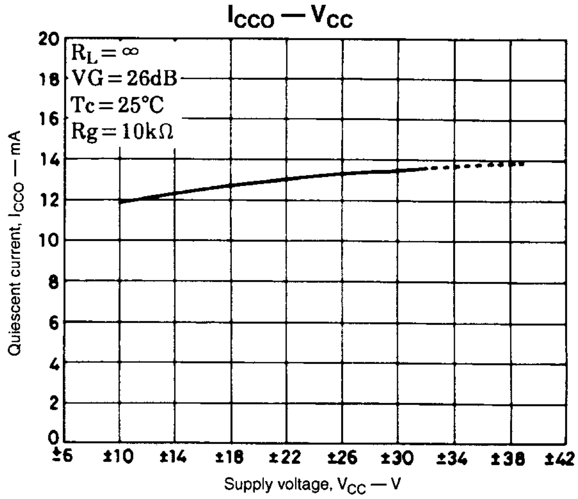
P_O — V_{CC}

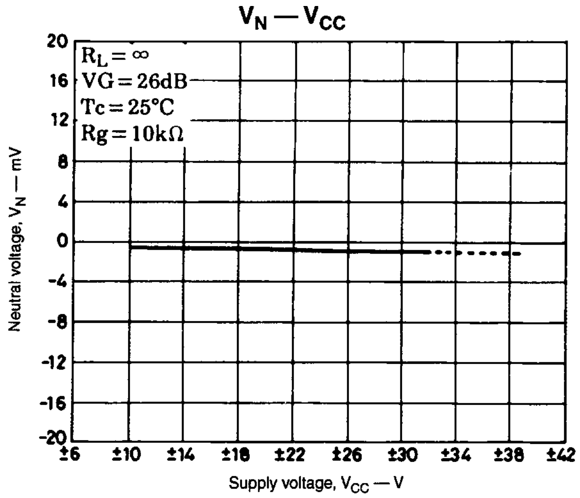


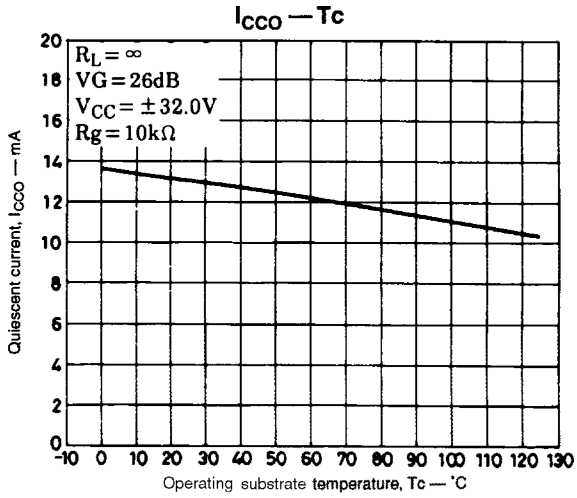
VG — f

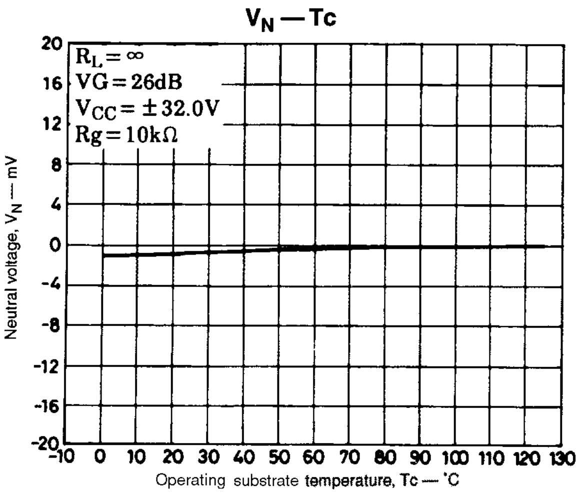


I_{CCO} — V_{CC}









This catalog provides information as of October, 1999. Specifications and information herein are subject to change without notice.