Ordering number:ENN5178

Thick Film Hybrid IC

STK405-050

2ch AF Power Amplifier (Split Power Supply) (30W + 30W min, THD = 10%)

Overview

The STK405-050, 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.

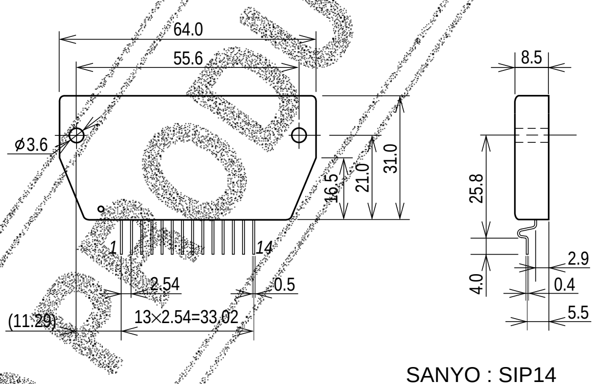
Type No.	Output power	Supply voltage [V]	
		V_{CC} max	V_{CC}
STK405-010	10W + 10W	±26.0	±14.0
STK405-030	20W + 20W	±30.5	±18.5
STK405-050	30W + 30W	±34.5	±22.0
STK405-070	40W + 40W	±39.0	±25.0
STK405-090	50W + 50W	±42.0	±26.5
STK405-100	60W + 60W	±45.0	±29.0
STK405-110	70W + 70W	±50.0	±31.0
STK405-120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

Package Dimensions

unit:mm

4158

[STK405-050]



SANYO : SIP14

■ Any and all SANYO products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO representative nearest you before using any SANYO products described or contained herein in such applications.

■ SANYO assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges,or other parameters) listed in products specifications of any and all SANYO products described or contained herein.

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Specifications

Maximum Ratings at Ta = 25˚C

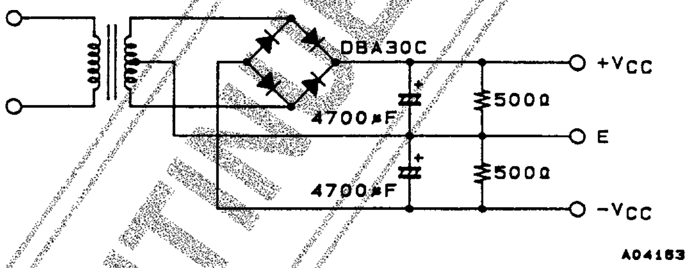
Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		±34.5	V
Thermal resistance	θ j-c	Per power transistor	3.4	˚C/W
Junction temperature	Tj		150	˚C
Operating temperature	Tc		125	˚C
Storage temperature	Tstg		–30 to +125	˚C
Available time for load short-circuit	t_s	V_{CC}=±22V, R_L=6Ω, f=50Hz, P_O=30W	1	s

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

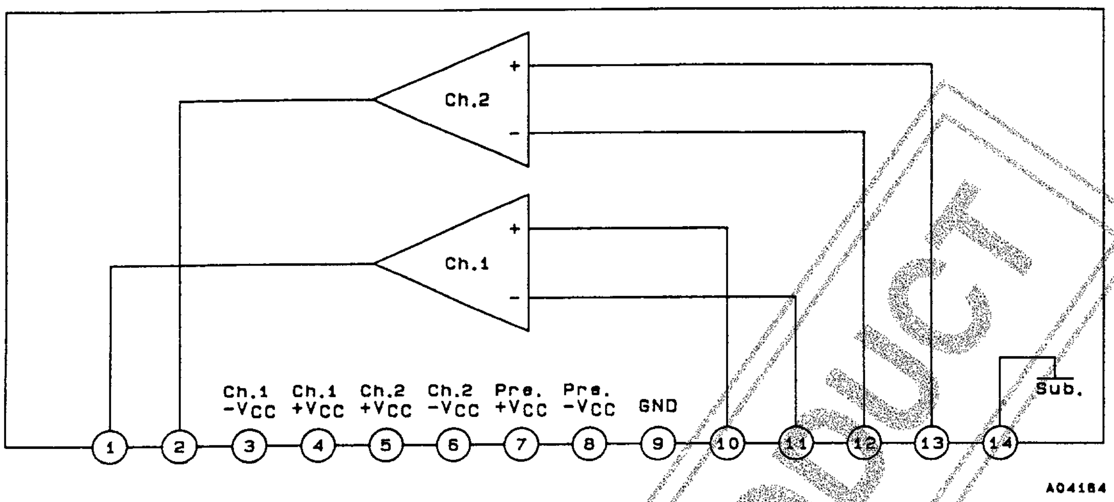
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	I_{CCO}	V_{CC}=±28.0V, no load		13	20	mA
Output power	P_O	V_{CC}=±22.0V, f=1kHz, THD=10.0%	30			W
Total harmonic distortion	THD	V_{CC}=±22.0V, f=1kHz, P_O=5.0W		0.04	0.1	%
Frequency response	f_L, f_H	V_{CC}=±22.0V, P_O=1.0W, $^{+0}_{-3}$ dB		20 to 50k		Hz
Input impedance	r_i	V_{CC}=±22.0V, f=1kHz, P_O=1.0W		55		kΩ
Output noise voltage	V_{NO}	V_{CC}=±28.0V, Rg=10kΩ			1.2	mVrms
Neutral voltage	V_N	V_{CC}=±28.0V	–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.

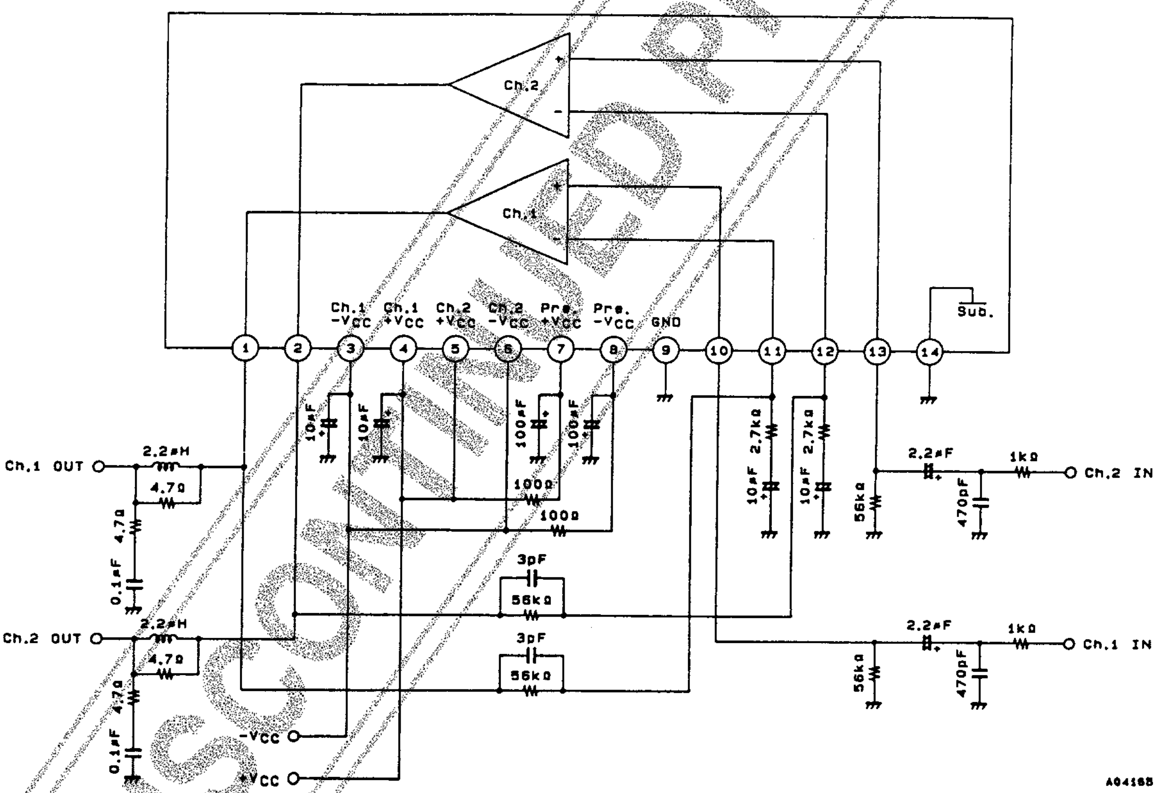
Specified Transformer Supply (RP-25 or Equivalent)



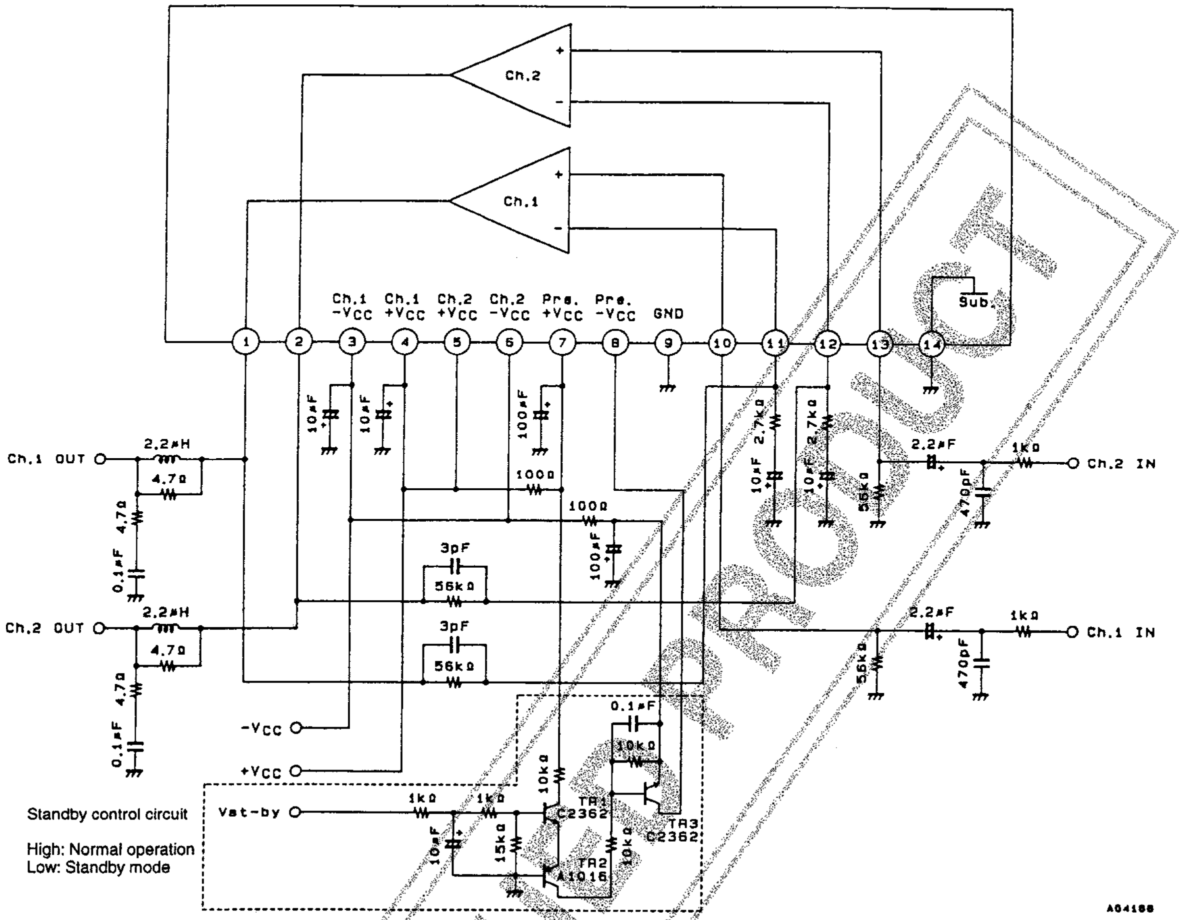
Block Diagram



Test Circuit



Sample Application Circuit (Standby Mode Supported)



Heatsink Design Considerations

The heatsink thermal resistance, θc-a, required to dissipate the STK405-050 device total power dissipation, Pd, is determined as follows :

Condition 1: IC substrate temperature not to exceed 125°C
Pd×θc-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×θc-a+Pd/N×θj-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.

θc-a< (125–Ta)/Pd .... (1)'
θc-a< (150–Ta)/Pd–θj-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 STK405-050 V_{CC}=±22.0V and R_L=6Ω, for a continuous sine wave signal, is a maximum of 33.5W, 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=23W [for 1/10 P_O max=3W]

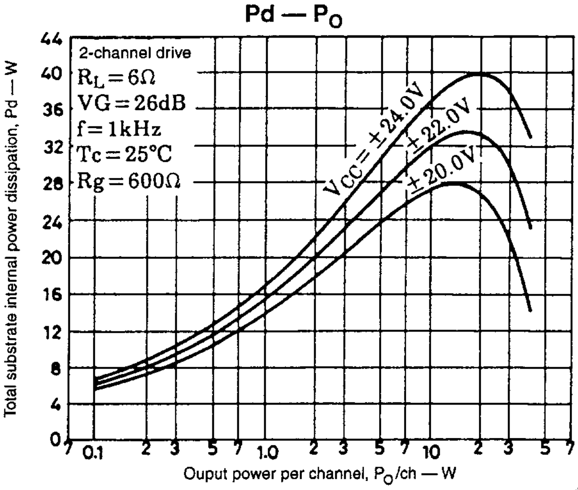
The STK405-050 has 4 power transistors, and the thermal resistance per transistor, θj-c, is 3.4°C/W. If the graranteed maximum ambient temperature, Ta, is 50°C, then the required heatsink thermal resistance, θc-a, is :

From expression (1)' : θc-a < (125–50)/23
< 3.26
From expression (2)' : θc-a < (150–50)/23–3.4/4
< 3.49

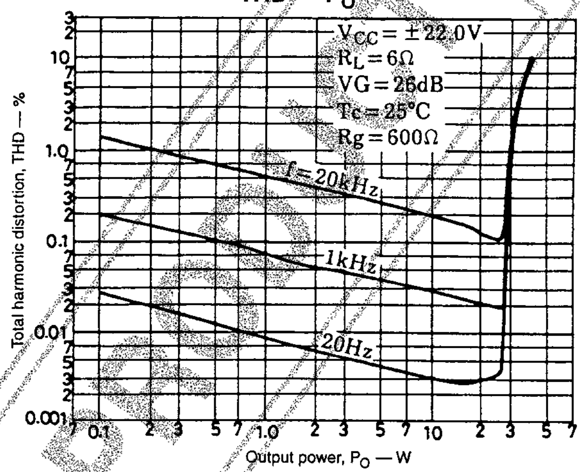
Therefore, to satisfy both expressions, the required heatsink must have a thermal resistance less than 3.26°C/W.

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

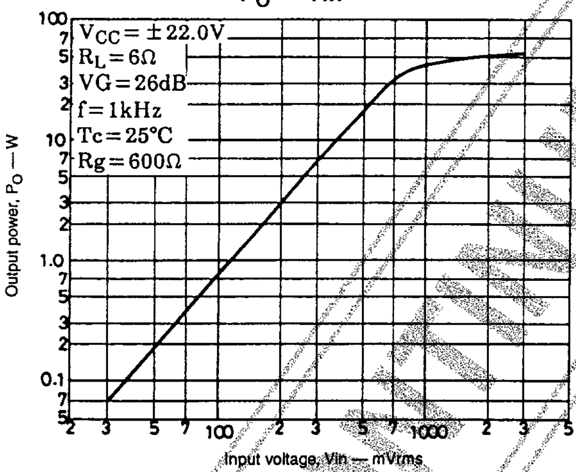
Pd — P_O



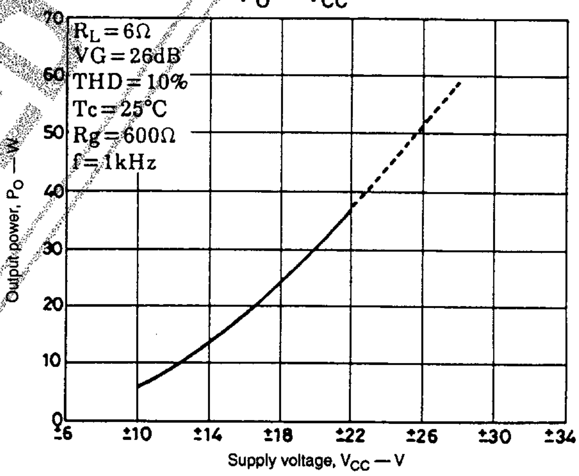
THD — P_O



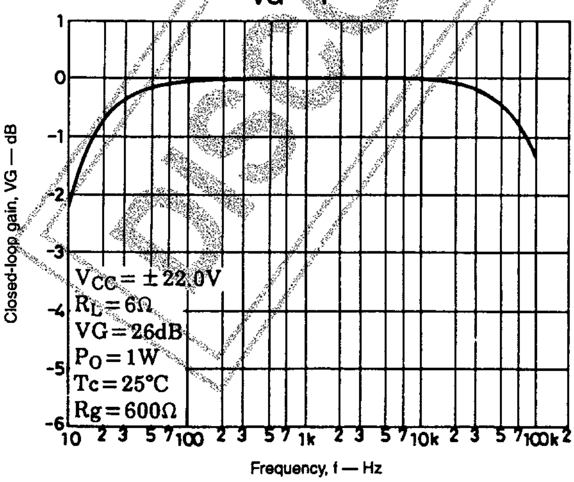
P_O — Vin



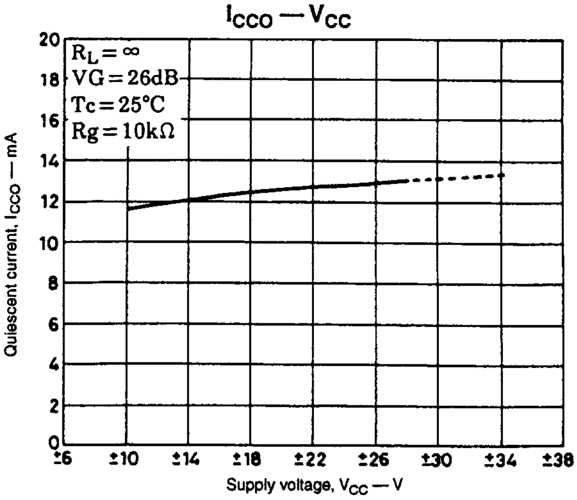
P_O — V_{CC}

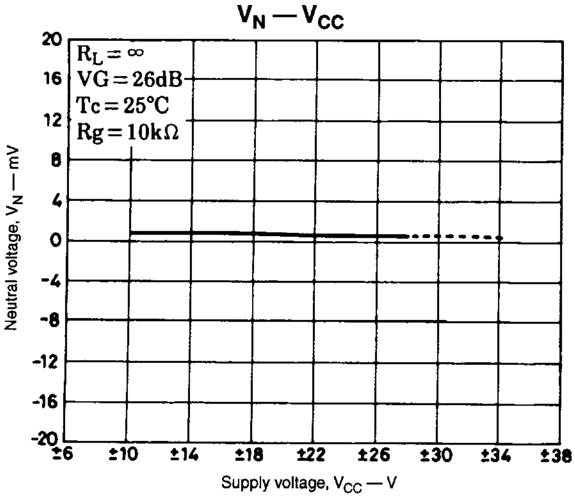


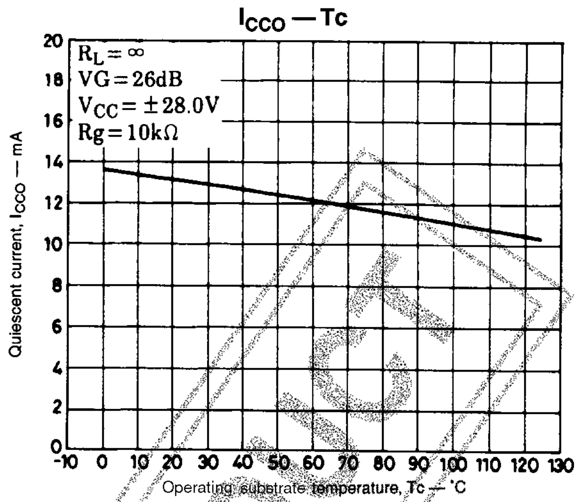
VG — f

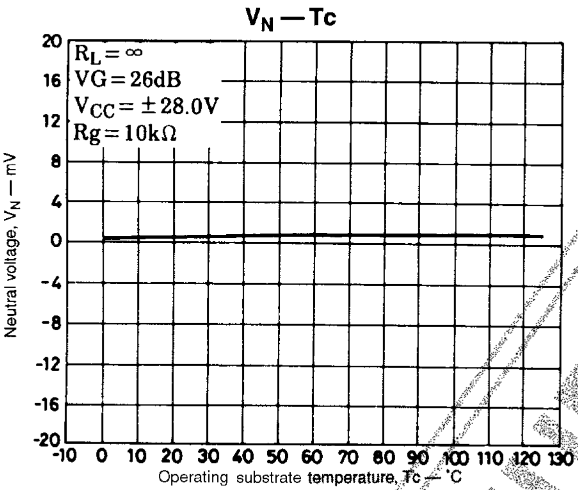


I_{CCO} — V_{CC}









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