

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 $6\Omega/3\Omega$ output drive.

Features

- · Class B amplifiers
- \bullet Output load impedance $R_L{=}6\Omega$ 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 character istics
- · 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

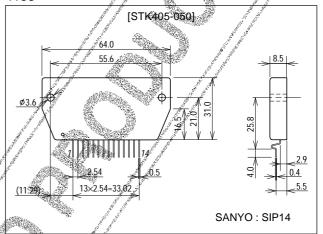
The following devices form a series with differing output capacity. Some of the following devices are under development. Contact your Sanyo sales representative if you require more detailed information.

•			De F		
Type No.	Output power	Supply voltage [V]			
Type No.	Output power	V _{CC} max	V _{CC}		
STK405-010	10W + 10W	±26.0	±14.0		
STK405-030	20W + 20W	±30.5	₂±1,8.5		
STK405-050	30W + 30W	±34.5	<u></u> <u></u> <u></u> £ 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	70 W + 70 W	±50,0	±31.0		
STK405-120	80W + 80W	±52.5	±33.0		

Package Dimensions

unit:mm

4158



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Specifications

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

Parameter	Symbol	Conditions		Ratings	3	Unit
Maximum supply voltage	V _{CC} max			25	±34.5	V
Thermal resistance	θ ј-с	Per power transistor	de la	200	3.4	°C/W
Junction temperature	Tj			A STATE OF THE PARTY OF THE PAR	150	°C
Operating temperature	Tc		11	W. A. Carlotte	125	°C
Storage temperature	Tstg		11	-30 t	to +125	, °C
Available time for load short-circuit	t _s	V_{CC} =±22V, R_L =6 Ω , f=50Hz, P_O =30W	//	ST TON	Ĩt:	s

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

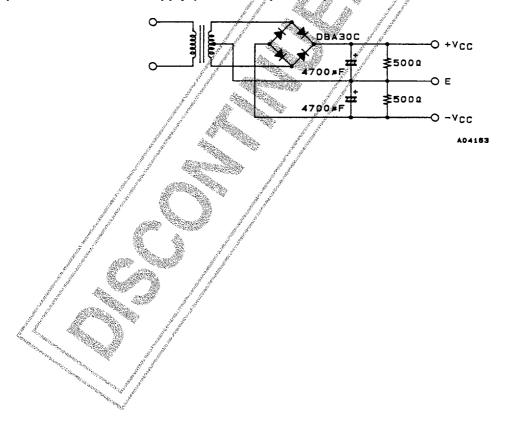
Parameter	Symbol	Conditions	min	Ratings typ	max	Unit
Quiescent current	Icco	V _{CC} =±28.0V, no load	Sealer.	13	<i>)</i> 20	mA
Output power	PO	V _{CC} =±22.0V, f=1kHz, THD=10,0 %	± 720 → 30		1	W
Total harmonic distortion	THD	V _{CC} =±22.0V, f=1kHz, P _O =5.0W		0.04	0.1	%
Frequency response	fL, fH	V _{CC} =±22.0V, P _O =1.0W, +0 dB		20 to 50k		Hz
Input impedance	rį	V _{CC} =±22.0V, f=1kHz, P _O =1.0W		<i>J</i> 55		kΩ
Output noise voltage	V_{NO}	V _{CC} =±28.0V, Rg=10kΩ		11	1.2	mVrms
Neutral voltage	V_N	V _{CC} =±28.0V	-100	0	+100	mV

Note.

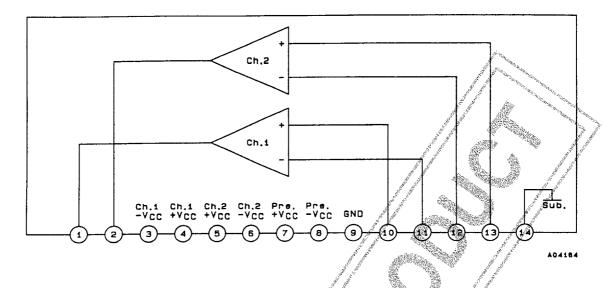
All tests are measured using a constant-voltage supply unless otherwise specified.

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.

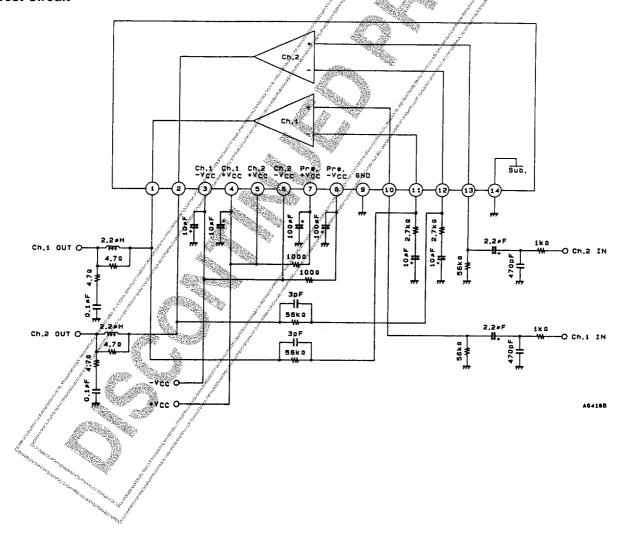
Specified Transformer Supply (RP-25 or Equivalent)



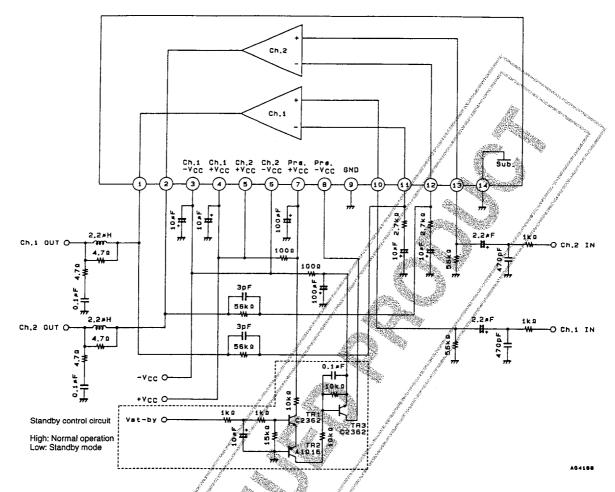
Block Diagram



Test Circuit



Sample Application Circuit (Standby Mode Supported)



Heatsink Design Considerations

The heatsink thermal resistance, $\theta_{c,a}$ 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

Where Ta is the guaranteed maximum ambient temperature

Condition 2: Power transistor junction temperature, Tj, not to exceed 150°C

$$Pd \times \theta c - a + Pd/N \times \theta = c + Ta < 150$$
°C(2)

where N is the number of power transistors and θ j-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 θ c-a the subject.

$$\theta c$$
-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.

- $\bullet \ Supply \ voltage: V_{CC}$
- ullet Load resistance : R_L
- Guaranteed maximum ambient temperature : Ta

The total device power dissipation when STK405-050 V_{CC} = $\pm 22.0V$ 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 $1/10~P_{\rm O}$ 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, θ j-c, is 3.4°C/W. If the graranteed maximum ambient temperature, Ta, is 50°C, then the required heatsink thermal resistance, θ c-a, is :

From expression (1)': $\theta c-a < (125-50)/23$

< 3.26

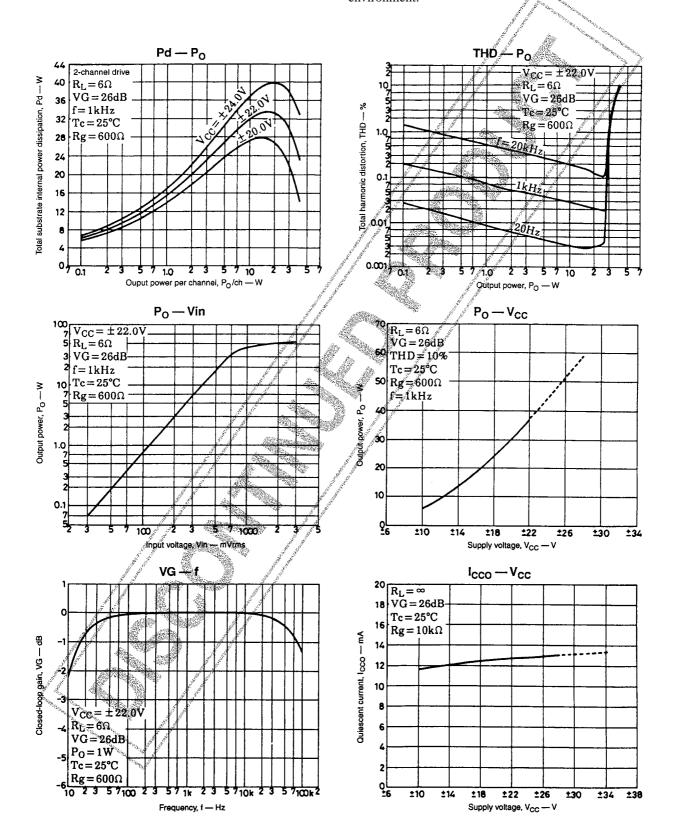
From expression (2)': θ c-a < (150–50)/23–3.4/4

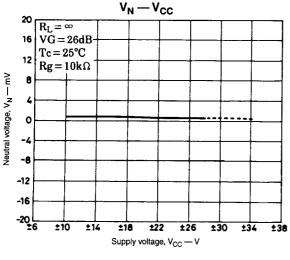
< 3.49

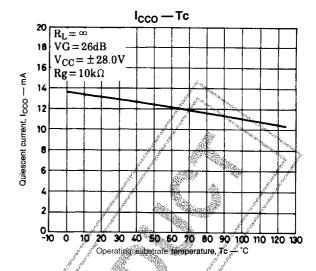
Therefore, to satisfy both expressions, the required heatsink must have a thermal resistance less than 3.26°C/W.

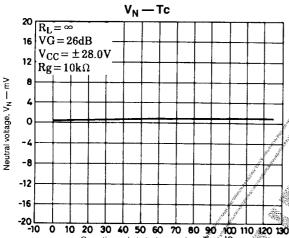
The heatsink design example is based on a constant-voltage supply, and should be verified within your specific set

environment.









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