

SANYO

No. 2668A

STK4132II

2ch AF Power Amplifier (Split Power Supply)
20W + 20W, THD = 1%

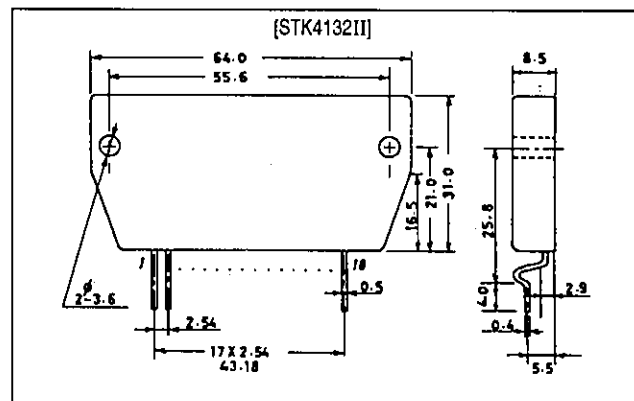
Features

- Pin compatible with the STK4102II and STK4101V series (high-grade type) over the output range 6 to 50W for easy interchangeability
- Small-sized package with the same pin assignment as the STK4101II series
- Built-in muting circuit to cut off spurious shock noise
- 125°C guaranteed high temperature operation allows greatly reduced heat sink size
- Excellent low-cost performance

Package Dimensions

unit: mm

4083



Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC \text{ max}}$		± 34.5	V
Thermal resistance	θ_{j-c}		3.0	$^\circ\text{C/W}$
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 short-circuit	t_s	$V_{CC} = \pm 23\text{V}$, $R_L = 8\Omega$, $f = 50\text{Hz}$, $P_O = 20\text{W}$	2	s

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

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}		± 23	V
Load impedance	R_L		8	Ω

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Operating Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = \pm 23\text{V}$, $R_L = 8\Omega$ (noninductive load), $R_g = 600\Omega$, $V_G = 40\text{dB}$

Parameter	Symbol	Conditions	min	typ	max	Unit
Quiescent current	I_{CCO}	$V_{CC} = \pm 28\text{V}$	20	40	100	mA
Output power	$P_{O(1)}$	THD = 0.4%, $f = 20\text{Hz to } 20\text{kHz}$	20	-	-	W
	$P_{O(2)}$	$V_{CC} = \pm 20\text{V}$, THD = 1.0%, $R_L = 4\Omega$, $f = 1\text{kHz}$	20	-	-	W
Total harmonic distortion	THD	$P_O = 1.0\text{W}$, $f = 1\text{kHz}$	-	-	0.3	%
Frequency response	f_L, f_H	$P_O = 1.0\text{W}$, $_{-3}^{+0}\text{dB}$	-	20 to 50k	-	Hz
Input impedance	r_i	$P_O = 1.0\text{W}$, $f = 1\text{kHz}$	-	55	-	$k\Omega$
Neutral voltage	V_N	$V_{CC} = \pm 50.5\text{V}$	-70	0	+70	mV
Output noise voltage	V_{No}	$V_{CC} = \pm 28\text{V}$, $R_g = 10k\Omega$	-	-	1.2	mVrms
Muting voltage	V_M		-2	-5	-10	V

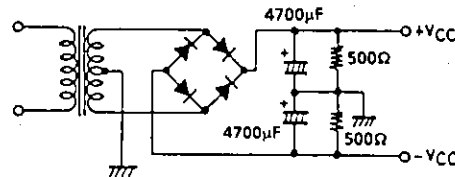
Notes.

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

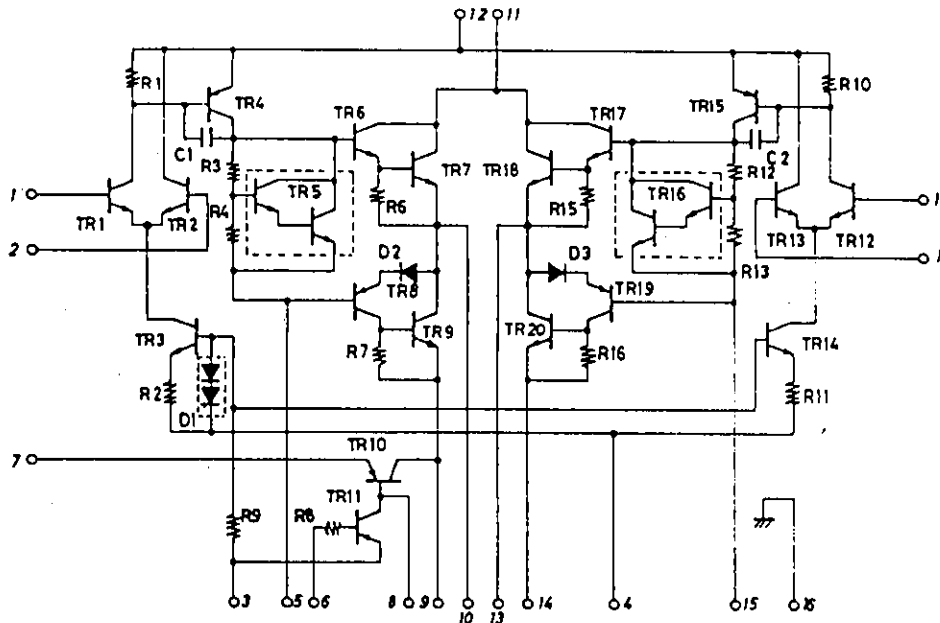
Available time for load short-circuit and output noise voltage are measured using the transformer supply specified below.

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)

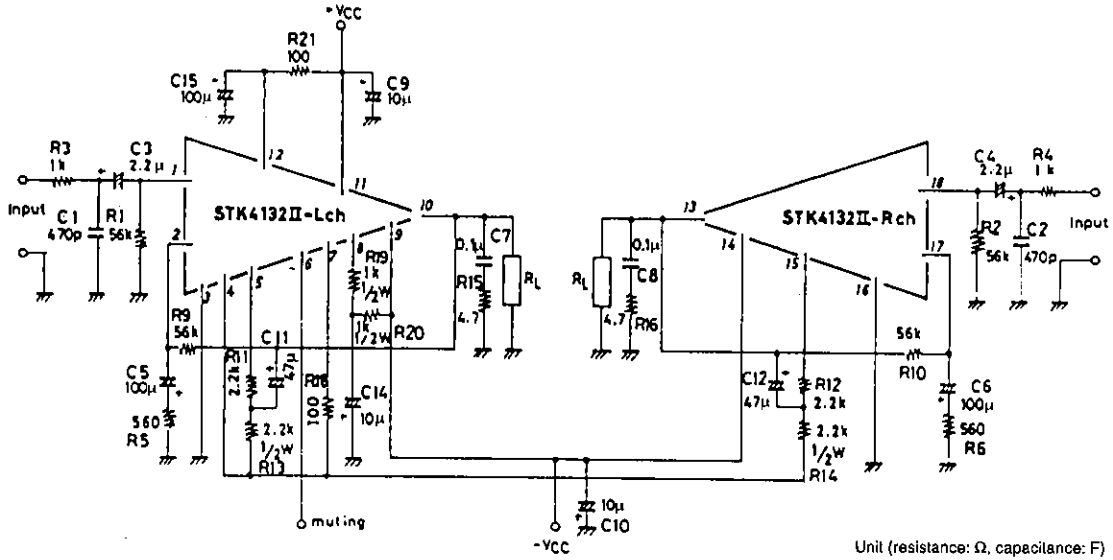


Equivalent Circuit

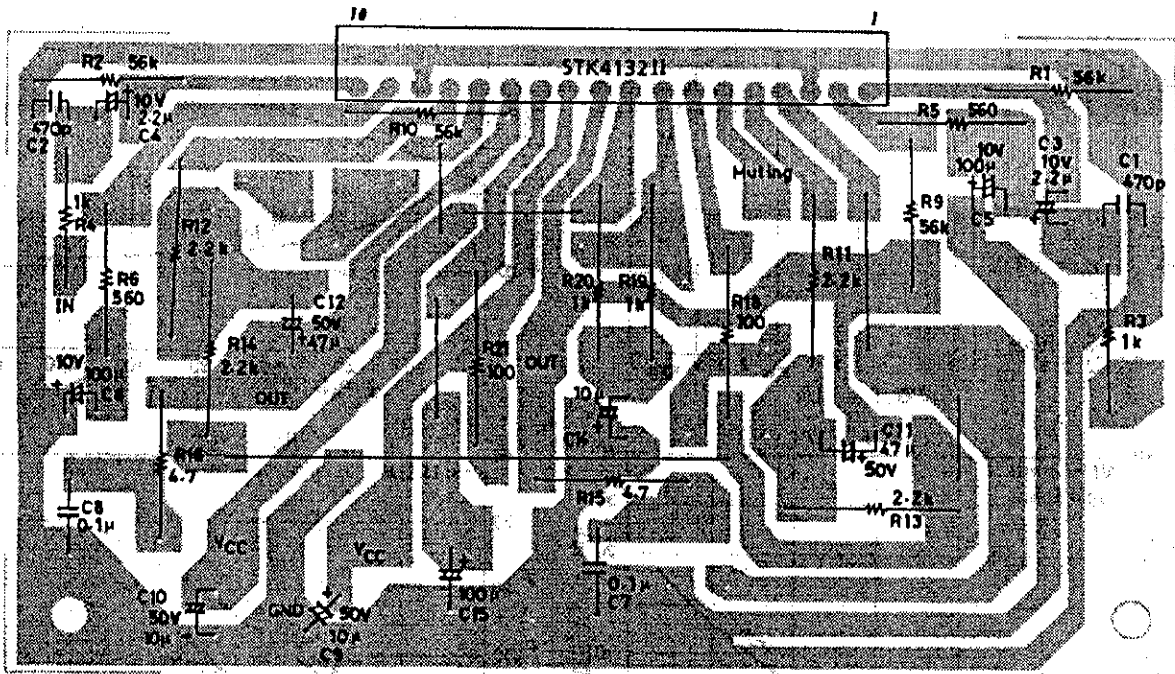


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Sample Application Circuit (20W min, 2-Channel, AF Power Amplifier)

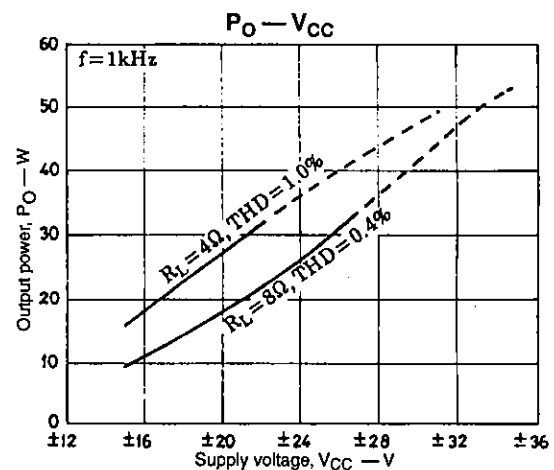
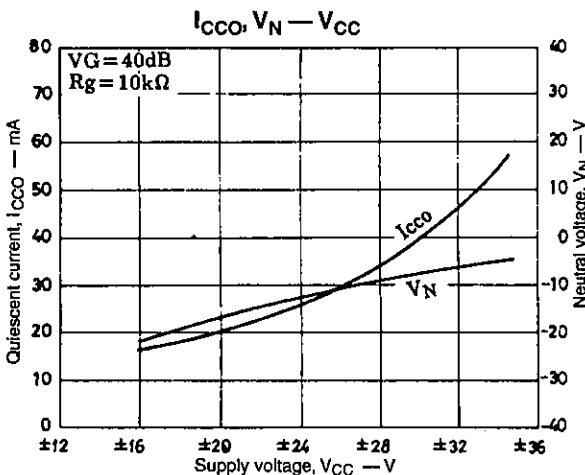
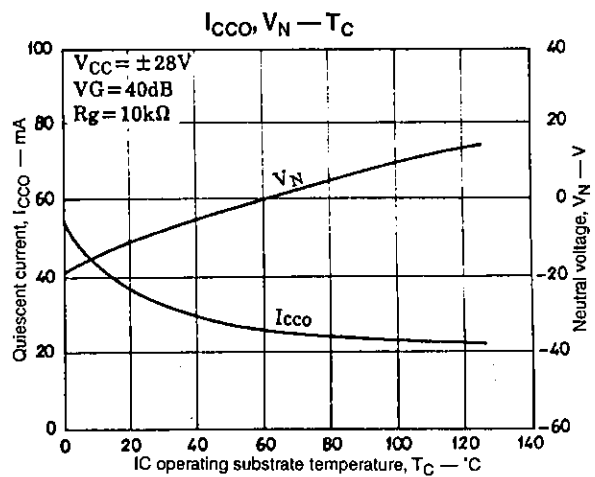
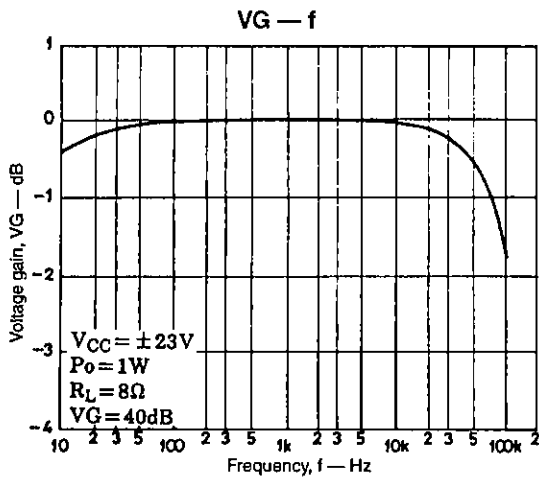
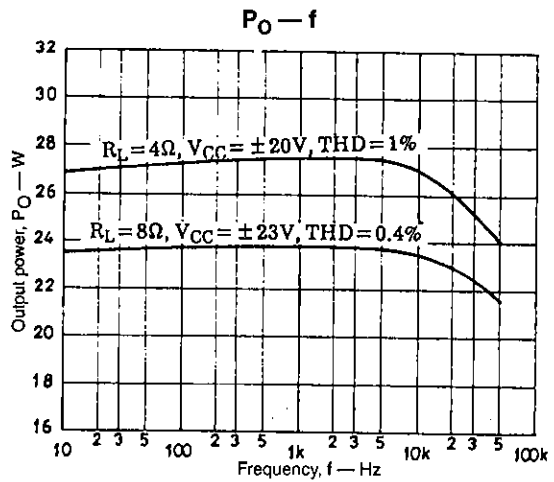
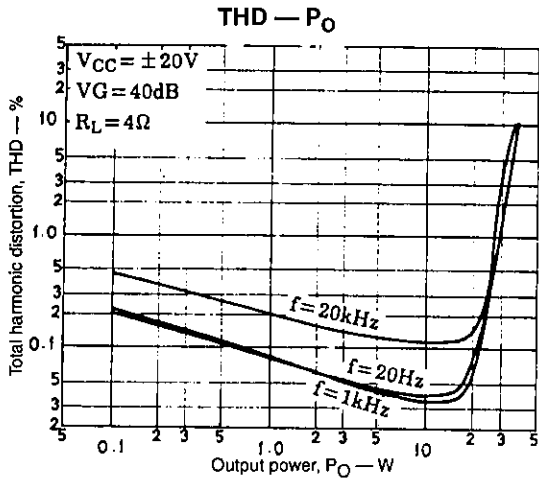
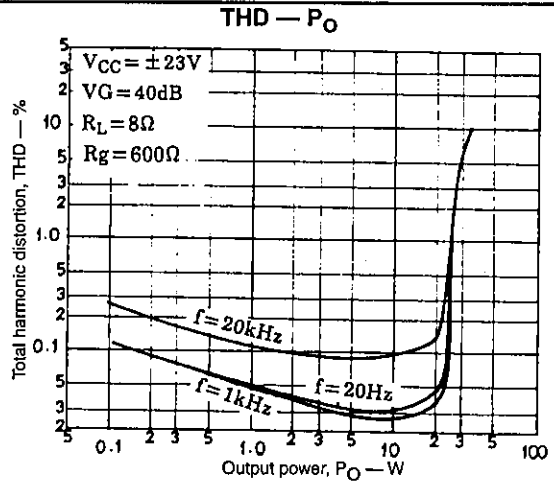
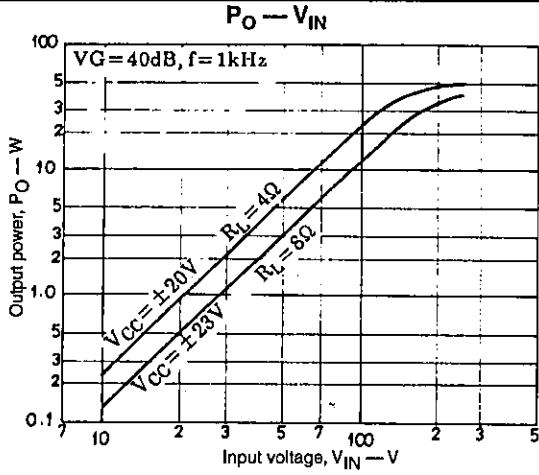


Sample Application Circuit PCB Layout (Copper Foil Surface)

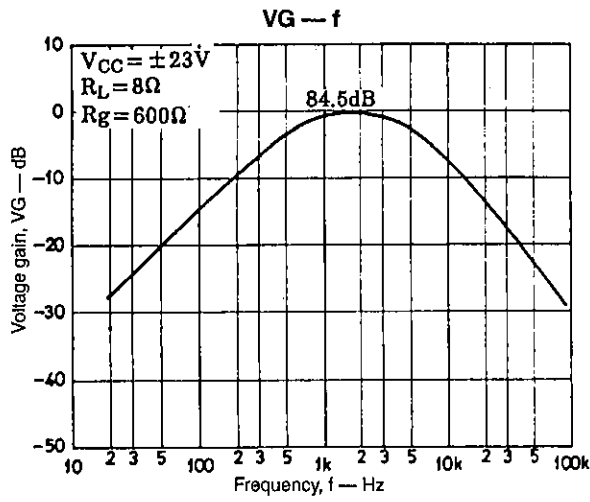
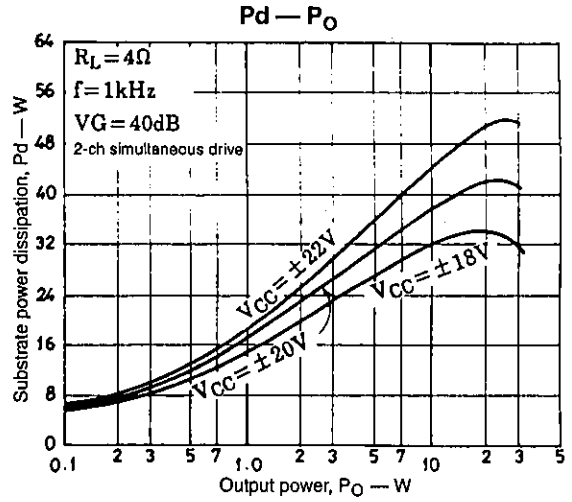
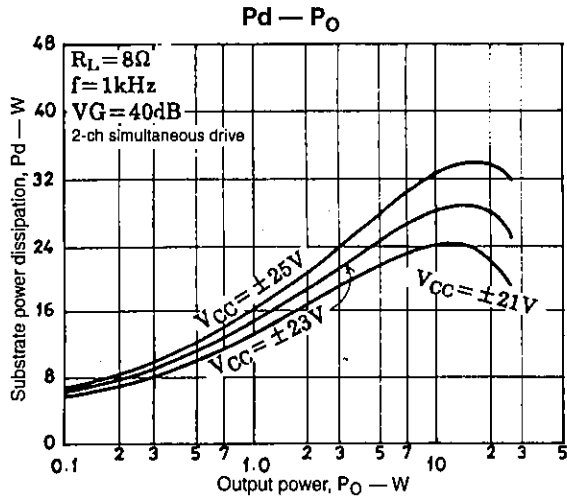


50 × 100mm²

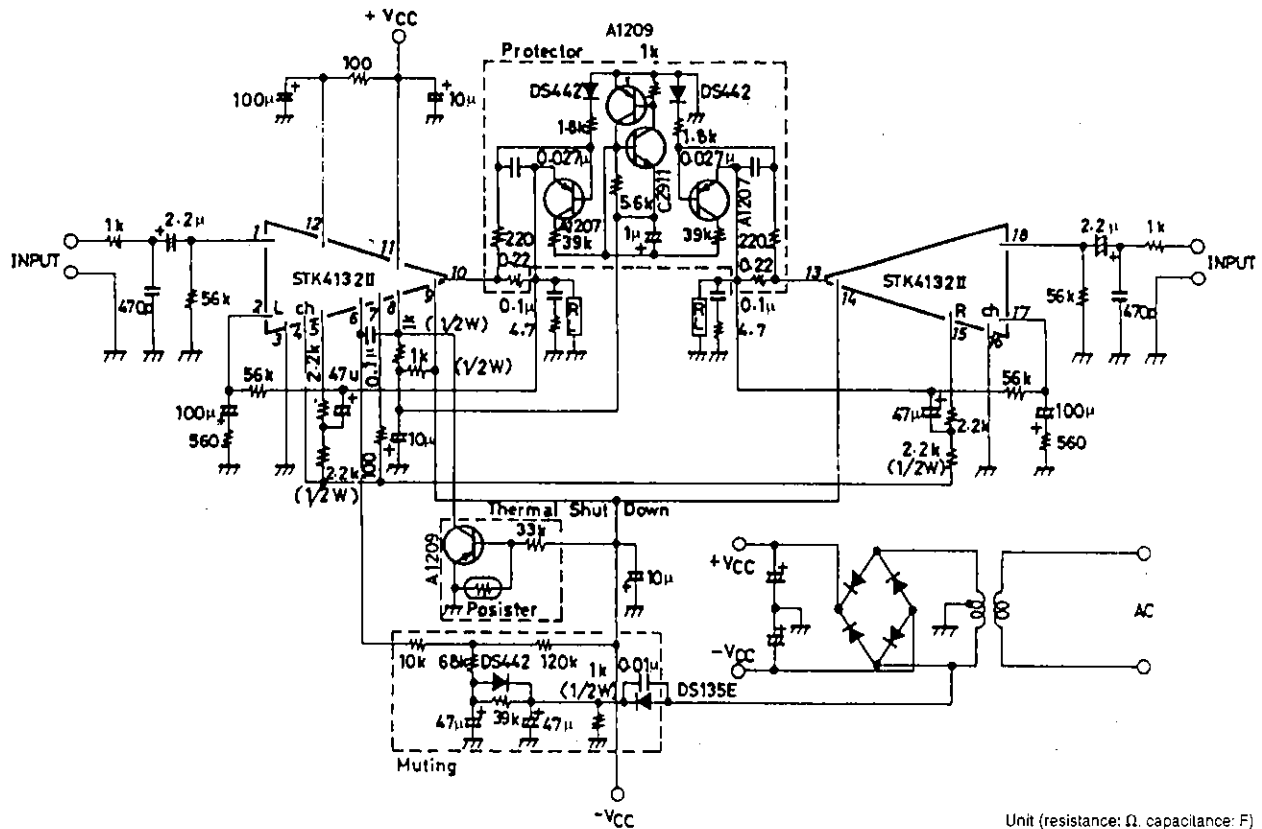
Unit (resistance: Ω, capacitance: F)



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Sample Application Circuit (Protection and Muting Circuit)



Unit (resistance: Ω, capacitance: F)

Heatsink Design

The total STK4132II device power dissipation for a continuous sine wave signal is shown in figures 1 and 2. The maximum dissipation is 29.2W for $R_L = 8\Omega$, and 42.8W for $R_L = 4\Omega$ (2-channel simultaneous drive).

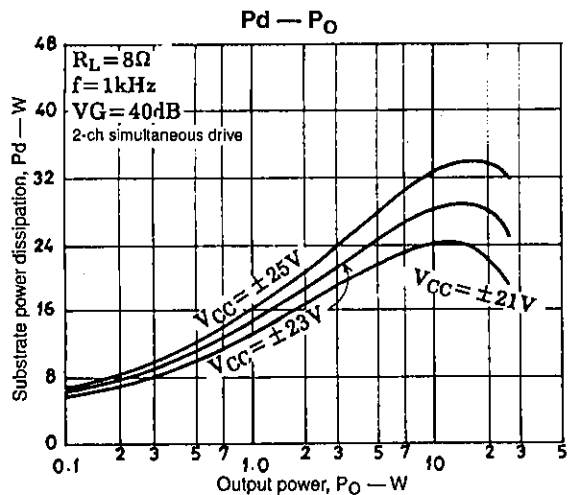


Figure 1. Pd — P_O ($R_L = 8\Omega$)

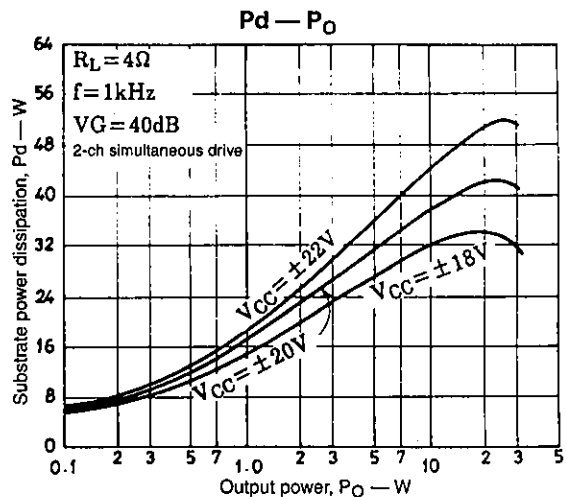


Figure 2. Pd — P_O ($R_L = 4\Omega$)

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

$$Pd = 18.6W \text{ for } 8\Omega, \text{ and } Pd = 23W \text{ for } 4\Omega$$

The heatsink thermal resistance, θ_{c-a} , required to dissipate the STK4132II device total power dissipation, Pd, is determined as follows:

Condition 1: IC substrate temperature not to exceed 125°C.

$$T_C = Pd \times \theta_{c-a} + T_a \leq 125^\circ\text{C} \dots\dots\dots (1)$$

where Ta is the guaranteed maximum ambient temperature.

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

$$T_j = Pd \times \theta_{c-a} + Pd/4 \times \theta_{j-c} + T_a \leq 150^\circ\text{C} \dots\dots\dots (2)$$

The STK4132II has 4 power transistors (2 per channel), and the thermal resistance per transistor, θ_{j-c} , is 3.0°C/W. Therefore, equation 2 becomes:

$$Pd \times (\theta_{c-a} + 3.0/4) + T_a \leq 150^\circ\text{C} \dots\dots\dots (3)$$

The required heatsink must have a thermal resistance that satisfies both expressions 1 and 3. Figure 3 shows the ambient temperature parameter against Pd and θ_{c-a} calculated from equations 1 and 3.

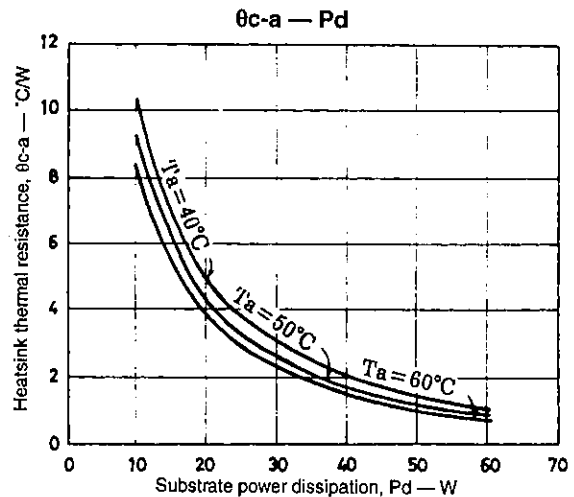


Figure 3. $\theta_{c-a} - Pd$

For example, a stereo amplifier with ambient temperature of $T_a = 50^\circ\text{C}$ needs a heatsink with thermal resistance given by the following:

For $V_{CC} = \pm 23V, R_L = 8\Omega$:

$1/10 P_O \text{ max}$ corresponds to $Pd1 = 18.6W$

From figure 3, the STK4132II thermal resistance is $\theta_{c-a1} = 4.04^\circ\text{C/W}$

From equation 3, this results in a junction temperature $T_j = 139.1^\circ\text{C}$.

For $V_{CC} = \pm 20V, R_L = 4\Omega$:

$1/10 P_O \text{ max}$ corresponds to $Pd2 = 23W$

From figure 3, the STK4132II thermal resistance is $\theta_{c-a2} = 3.26^\circ\text{C/W}$

From equation 3, this results in a junction temperature $T_j = 142.3^\circ\text{C}$.

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