Ordering number:ENN5170

Thick Film Hybrid IC

STK392-110

3-Channel Convergence Correction Circuit (I_C max = 3A)

Overview

The STK392-110 is a convergence correction circuit IC for video projectors. It incorporates three output amplifiers in a single package, making possible the construction of CRT horizontal and vertical convergence correction output circuits for each of the RGB colors using ust two hybrid ICs. The output circuit use a class-B configuration, in comparison with the STK392-010, realizing a more compact package and lower cost.

Applications

• Video projectors

Features

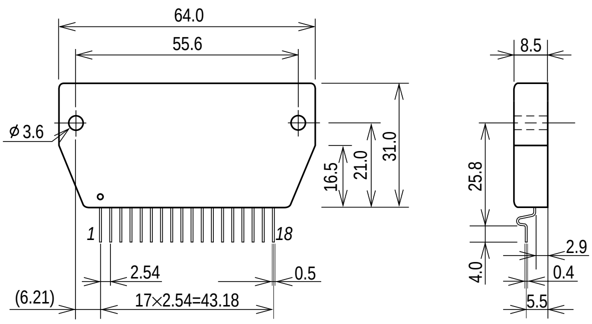
• 3 output amplifier circuits in a single package
• High maximum supply voltage (V_{CC} max = ±38V)
• Low thermal resistance (θj-c=3.0°C/W)
• High temperature stability (T_C max=125°C)
• Separate predriver and output stage supplies
• Output stage supply switching for high-performance designs
• Low inrush current when power is applied

Package Dimensions

unit:mm

4083

[STK392-110]



SANYO : SIP18

Series Organization

The following devices form a series with varying output capacity and application grade. Some of the devices below are under development, so contact your nearest sales representative for details.

Type No.	Maximum ratings			Maximum horizontal frequency f_H max	Application grade
	V_{CC} max	I_C max	θj-c		
STK392-110	±38V	3A	3.0˚C/W	15kHz	General projection TVs
STK392-010	±38V	5A	2.6˚C/W	15kHz	General projection TVs
STK392-020	±44V	6A	2.1˚C/W	35kHz	HD, VGA
STK392-040	±50V	7A	1.8˚C/W	100kHz	XGA, CAD, CAM
STK392-210	±65V	8A	1.5˚C/W	130kHz	CAD, CAM
STK392-220	±75V	10A	1.3˚C/W	160kHz	CAD, CAM

SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Specifications

Maximum Ratings at Ta = 25˚C

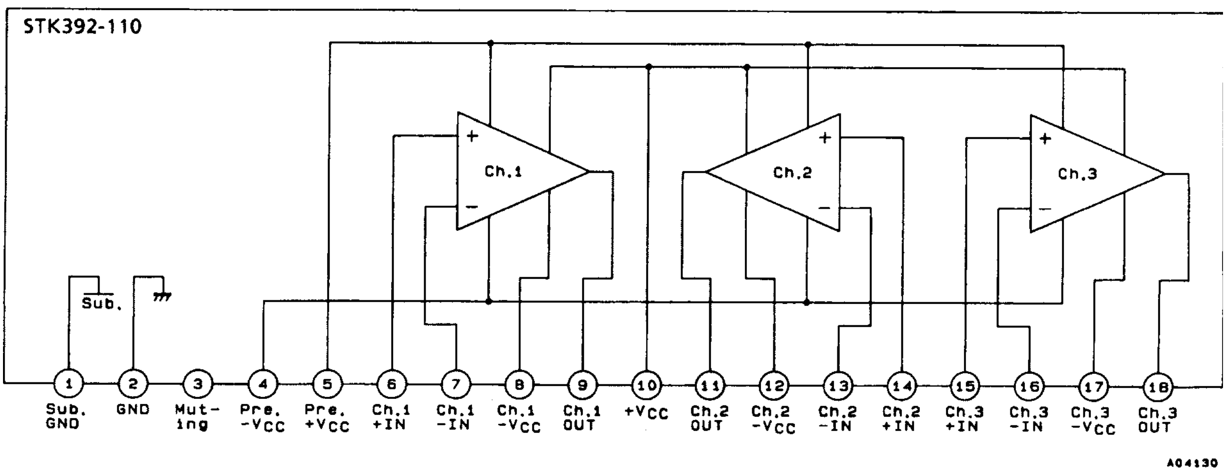
Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		±38	V
Maximum collector current	I_C	Tr6, 7, 13, 14, 20, 21	3.0	A
Thermal resistance	θ j-c	Tr6, 7, 13, 14, 20, 21 (per transistor)	3.0	˚C/W
Junction temperature	Tj		150	˚C
Operating temperature	Tc		125	˚C
Storage temperature	Tstg		–30 to +125	˚C

Operating Characteristics at Ta = 25˚C, Rg=50Ω, V_{CC}=±30V, specified test circuit

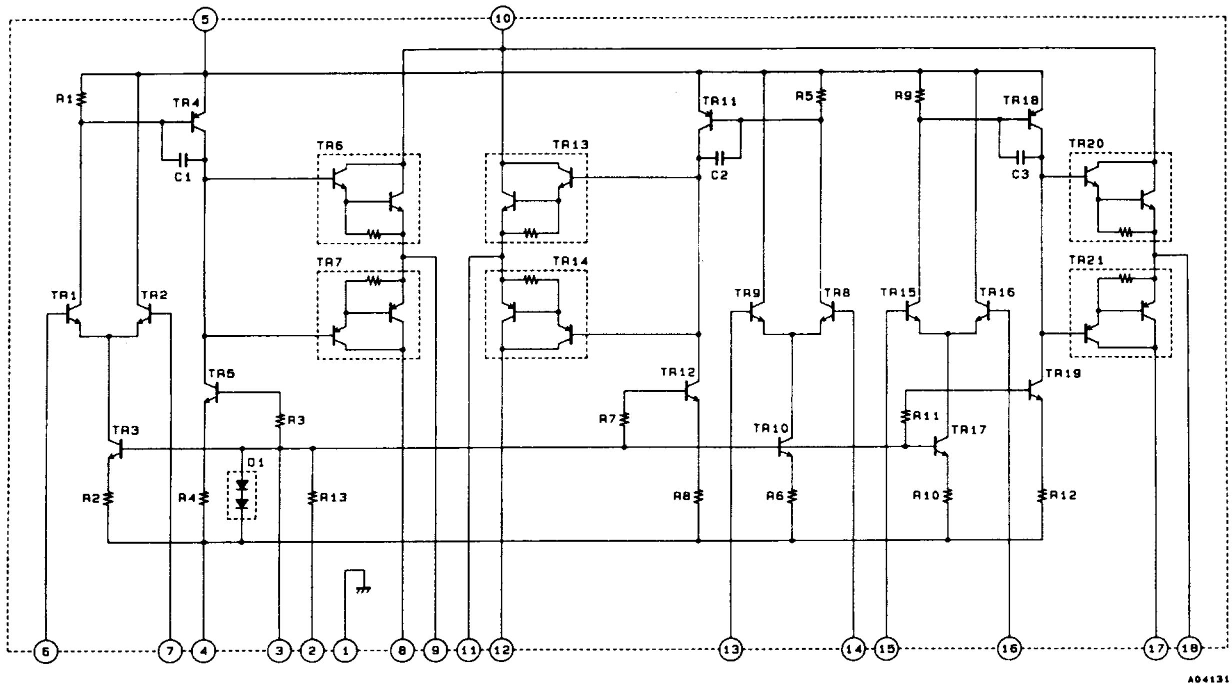
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output noise voltage	V_{NO}				0.2	mVrms
Quiescent current	I_{CCO}		15	22	30	mA
Neutral voltage	V_N		–50	0	+50	mV
Output delay time	t_D	f=15.75kHz, triangular wave input, V_{OUT}=1.5Vp-p			1	µs

Note :
All tests are conducted using a constant-voltage regulated supply unless otherwise specified.
The output noise voltage is the peak value of an average-reading meter with an rms value scale (VTVM).

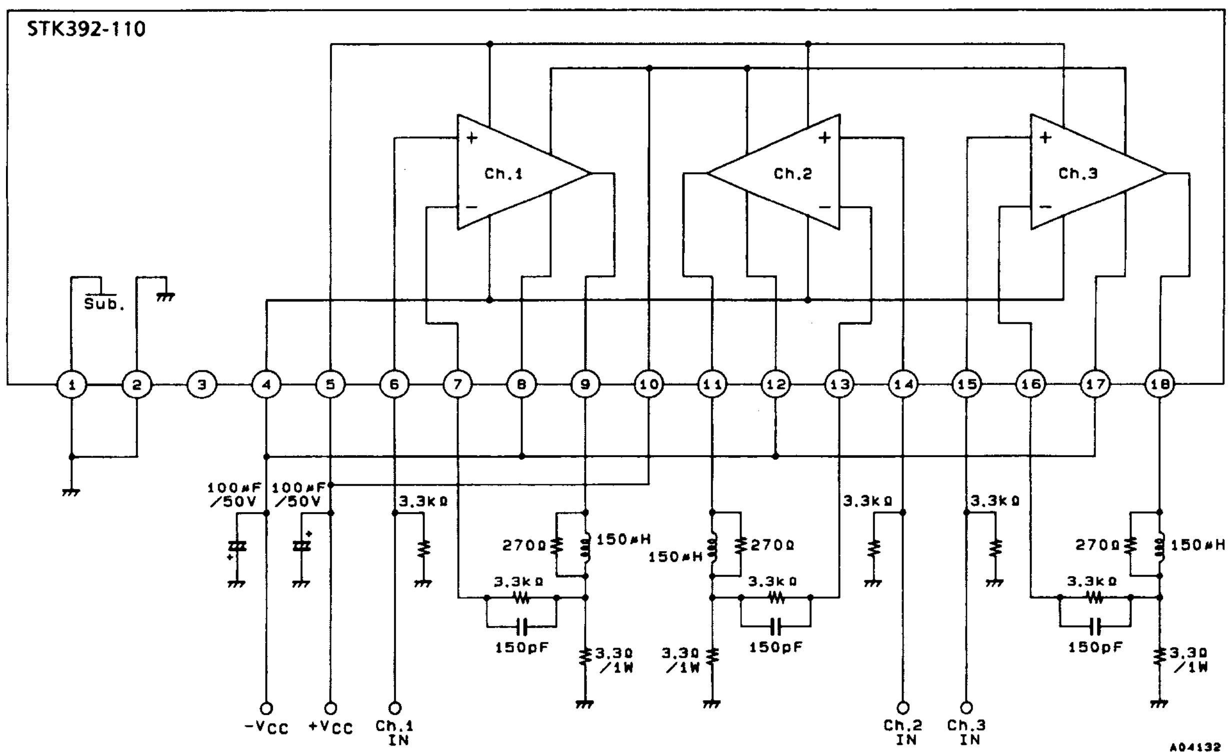
Block Diagram



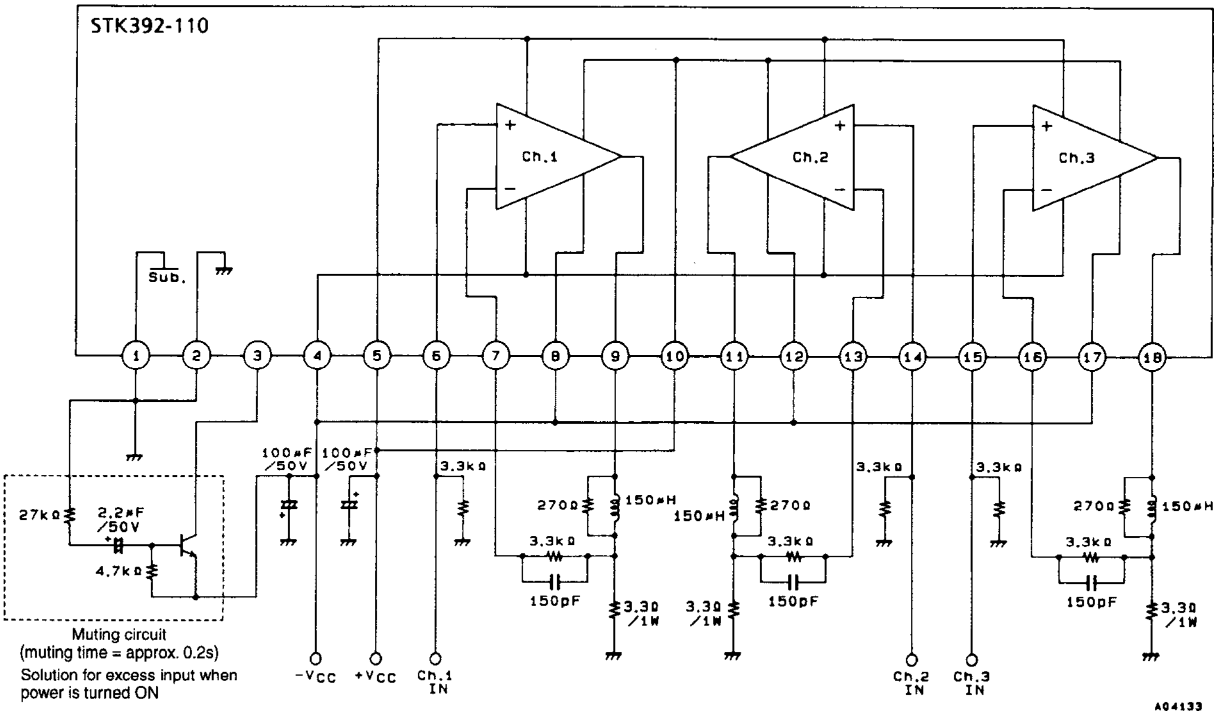
Equivalent Circuit



Test Circuit



Sample Application Circuit



Ordering number: EN 5081

Thick Film Hybrid IC

No. 5081

SANYO

STK392-040

3-Channel Convergence Correction Circuit (I_C max = 7A)

Overview

The STK392-040 is a convergence correction circuit IC for video projectors. It incorporates three output amplifiers in a single package, making possible the construction of CRT horizontal and vertical convergence correction output circuits for each of the RGB colors using just two hybrid ICs.

Applications

- Video projectors (high-definition television, high-definition graphic projectors)

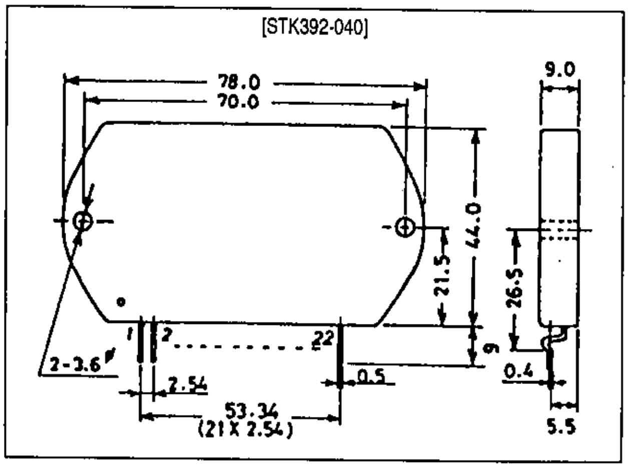
Features

- 3 output amplifier circuits in a single package (22-pin)
- High absolute maximum supply voltage (V_{CC} max = ±50V)
- Low thermal resistance (θj-c = 1.8°C/W)
- High temperature stability (T_C max = 125°C)
- Separate predriver and output stage supplies
- Output stage supply switching for high-performance designs
- Pins are arranged in separate groups of inputs, supply, and outputs to reduce the adverse effects of pattern layout on characteristics and to make design easier.
- Constant-current circuit in the predriver for stable supply switching operation
- Large lineup of family devices (STK392-000 series) to cover the range from general applications to high-class applications using a single PCB

Package Dimensions

unit: mm

4086A



Specifications

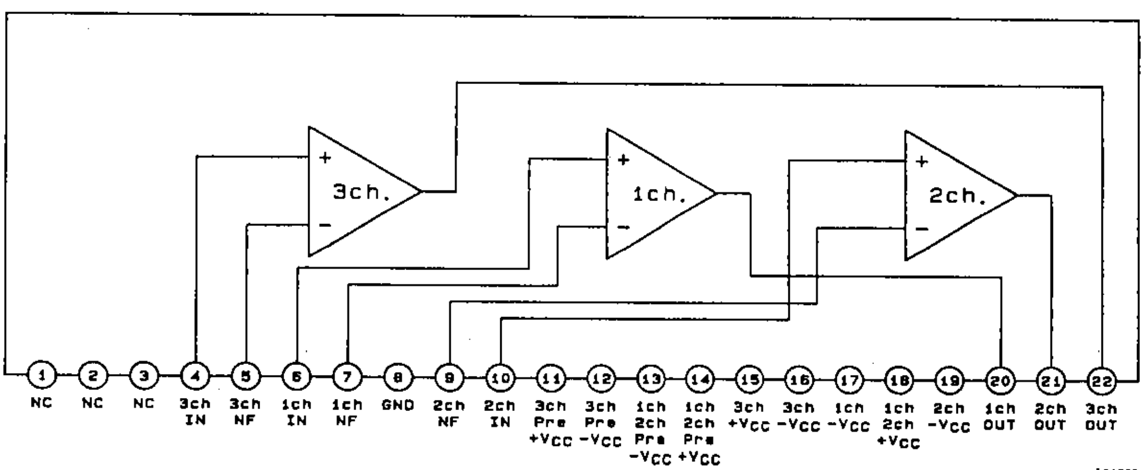
Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		±50	V
Maximum collector current	I_C	Tr8, 10, 18, 20, 28, 30	7.0	A
Thermal resistance	θj-c	Tr8, 10, 18, 20, 28, 30 (per transistor)	1.8	°C/W
Junction temperature	Tj		150	°C
Operating substrate temperature	Tc		125	°C
Storage temperature	Tstg		–30 to +125	°C

Operating Characteristics at Ta = 25°C, Rg = 50Ω

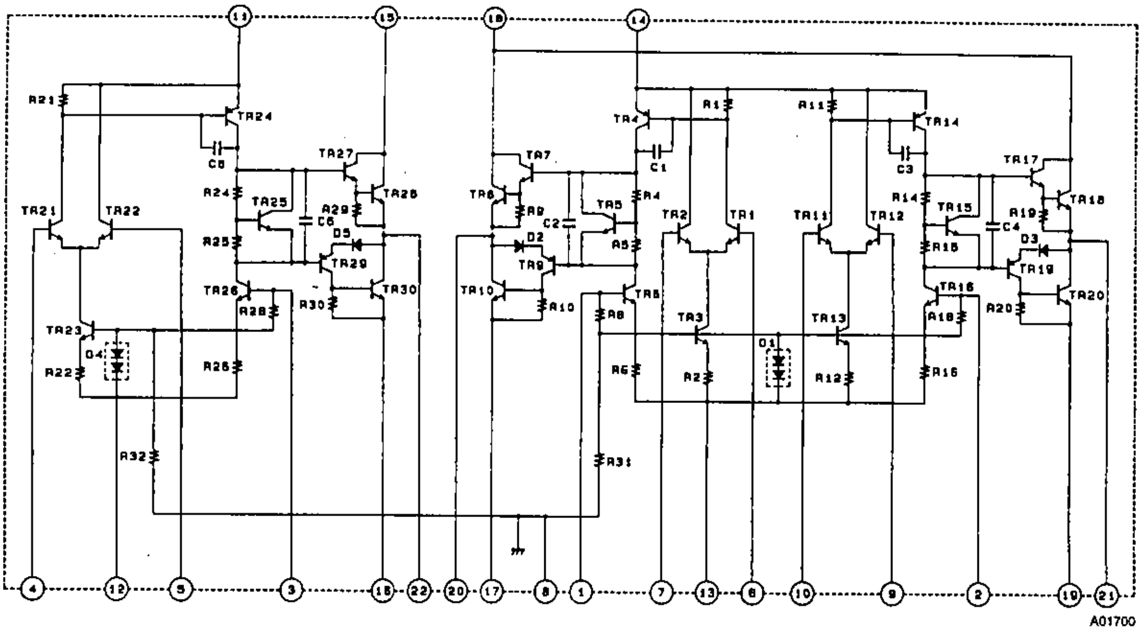
Parameter	Symbol	Conditions	min	typ	max	Unit
Output noise voltage	V_{NO}	V_{CC} = ±40V	–	–	0.2	mVrms
Quiescent current	I_{CCO}	V_{CC} = ±40V	30	90	150	mA
Neutral voltage	V_N	V_{CC} = ±40V	–50	0	+50	mV
Output delay time	t_D	V_{CC} = ±40V, f = 64kHz, triangular wave input, V_{OUT} = 1.5Vp-p	–	–	0.2	µs
Frequency response	f_H	V_{CC} = ±35V, –3dB, (0dB at 1kHz), sine wave input, V_{in} = 50mVp-p	–	3.8	–	MHz

Block Diagram

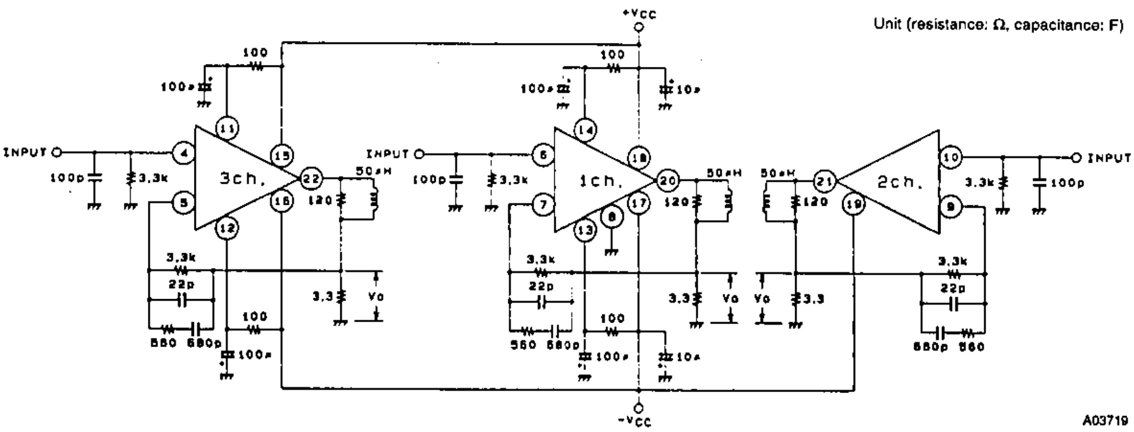


A01699

Equivalent Circuit

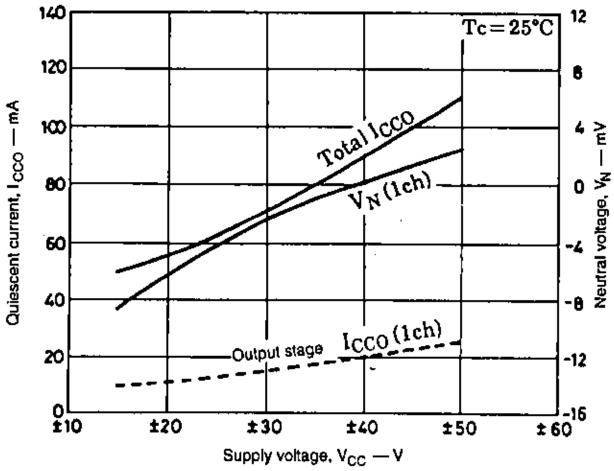


Test Circuit

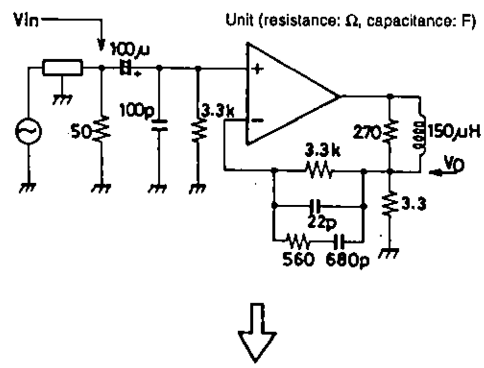


Vo: V_{NO} is measured by connecting a VTVM.
V_N is measured by connecting a DC voltmeter.
t_D is measured by connecting an oscilloscope.

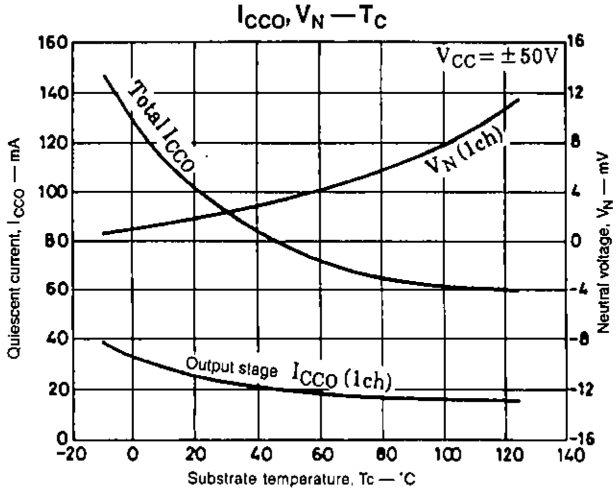
I_{CCO}, V_N — V_{CC}



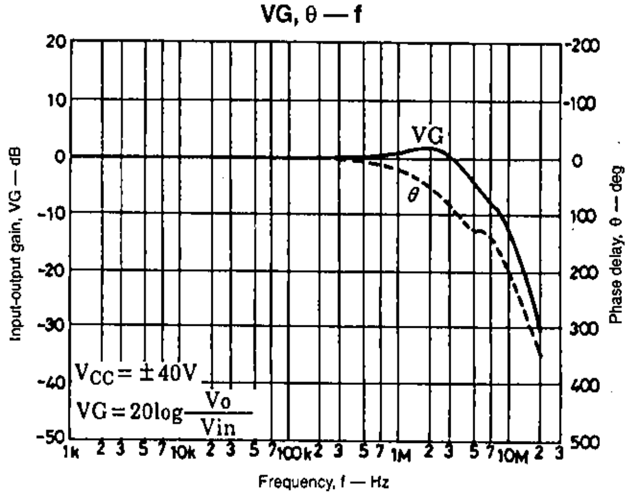
Test circuit



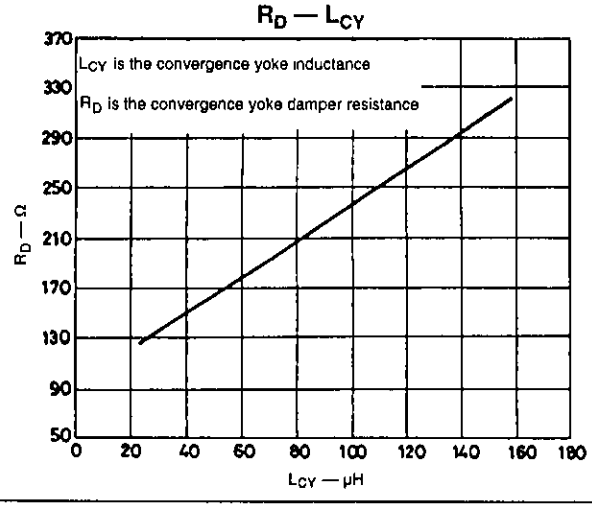
I_{CCO}, V_N — T_C



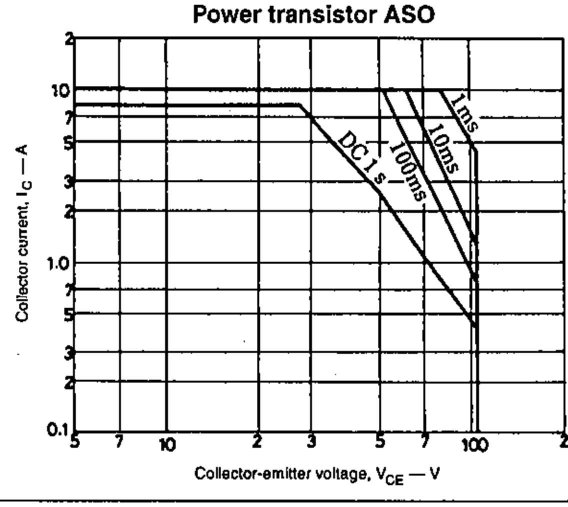
VG, θ — f



R_D — L_{CY}



Power transistor ASO



Ordering number : ENN7065A

Thick-Film Hybrid IC

STK402-090

Two-Channel Class AB Audio Power Amplifier IC 50 W + 50 W

Overview

The STK402-000 series products are audio power amplifier hybrid ICs that consist of optimally-designed discrete component power amplifier circuits that have been miniaturized using SANYO's unique insulated metal substrate technology (IMST). SANYO has adopted a new low thermal resistance substrate in these products to reduce the package size by about 60% as compared to the earlier SANYO STK407-000 series.

Features

- Series of pin compatible power amplifiers ranging from 20 W × 2 channels to 120 W × 2 channels (10%/1 kHz) devices. The same printed circuit board can be used depending on the output power grade.
- The pin arrangement is compatible with that of the 3-channel STK402-200 series. This means that 3-channel printed circuit boards can also be used for 2-channel products.
- Miniature packages
  - — 15 W/ch to 40 W/ch (THD = 0.4%, f = 20 Hz to 20 kHz); 46.6 mm × 25.5 mm × 8.5 mm *
  - — 50 W/ch to 80 W/ch (THD = 0.4%, f = 20 Hz to 20 kHz); 59.2 mm × 31.0 mm × 8.5 mm *

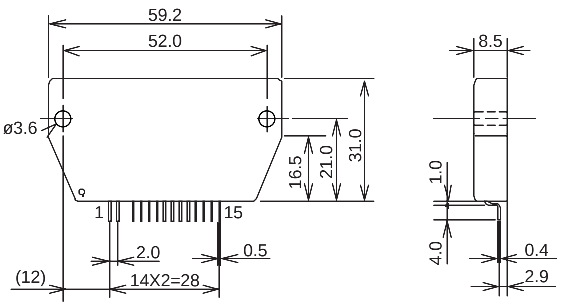
  *: Not including the pins.
- Output load impedance: R_L = 6 Ω
- Allowable load shorted time: 0.3 seconds
- Supports the use of standby, muting, and load shorting protection circuits.

Package Dimensions

unit: mm

4190-SIP15

[STK402-090]



SANYO: SIP15

SANYO Electric Co.,Ltd. Semiconductor Company

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Series Organization

These products are organized as a series based on their output capacity.

Item	Type No.							
	STK402-020	STK402-030	STK402-040	STK402-050	STK402-070	STK402-090	STK402-100	STK402-120
Output 1 (10%/1 kHz)	20 W + 20 W	30 W + 30 W	40 W + 40 W	45 W +45 W	60 W + 60 W	80 W + 80 W	100 W + 100 W	120 W + 120 W
Output 2 (0.4%/20 Hz to 20 kHz)	15 W + 15 W	20 W + 20 W	25 W + 25 W	30 W + 30 W	40 W + 40 W	50 W + 50 W	60 W + 60 W	80 W + 80 W
Maximum supply voltage (No signal)	±30 V	±34 V	±38 V	±40 V	±50 V	±54 V	±57 V	±65 V
Maximum supply voltage (6 Ω)	±28 V	±32 V	±36 V	±38 V	±44 V	±47 V	±50 V	±57 V
Recommended supply voltage (6 Ω)	±19 V	±22 V	±25 V	±26.5 V	±30 V	±32 V	±35 V	±39 V
Package	46.6 mm × 25.5 mm × 8.5 mm					59.2 mm × 31.0 mm × 8.5 mm		

Specifications

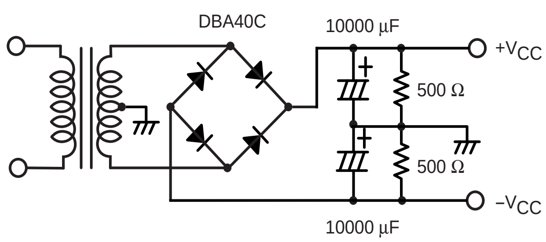
Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage (No signal)	V_{CC} max(0)		±54	V
Maximum supply voltage	V_{CC} max(1)	R_L = 6 Ω	±47	V
Thermal resistance	θj-c	Per power transistor	2.2	°C/W
Junction temperature	Tj max	Both the Tj max and the Tc max conditions must be met.	150	°C
Operating IC substrate temperature	Tc max		125	°C
Storage temperature	Tstg		–30 to +125	°C
Allowable load shorted time *2	ts	V_{CC} = ±32.0 V, R_L = 6 Ω, f = 50 Hz, P_O = 50 W	0.3	s

Operating Characteristics at Tc = 25°C, R_L = 6 Ω (noninductive load), Rg = 600 Ω, VG = 30 dB

Parameter	Symbol	Conditions*1					Ratings			Unit
		V_{CC} (V)	f (Hz)	P_O (W)	THD (%)		min	typ	max	
Output power	P_O (1)	±32.0	20 to 20 k		0.4		47	50		W
	P_O (2)	±32.0	1 k		10			80		
Total harmonic distortion	THD (1)	±32.0	20 to 20 k	1.0		VG = 30 dB			0.4	%
	THD (2)	±32.0	1 k	5.0		VG = 30 dB		0.01		
Frequency characteristics	f_L, f_H	±32.0		1.0		+0 –3 dB		20 to 50 k		Hz
Input impedance	ri	±32.0	1 k	1.0				55		kΩ
Output noise voltage *3	V_{NO}	±39.0				Rg = 2.2 kΩ			1.2	mVrms
Quiescent current	I_{CCO}	±39.0					10	40	80	mA
Neutral voltage	V_N	±39.0					–70	0	+70	mV

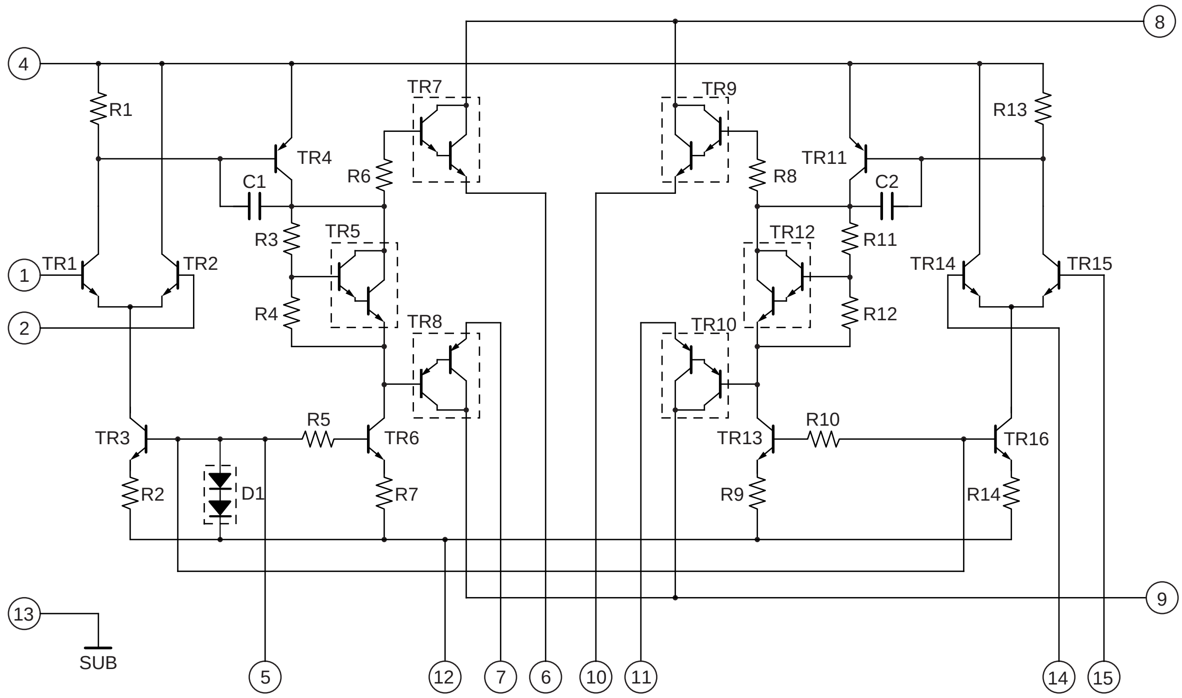
Notes: 1. Unless otherwise noted, use a constant-voltage supply for the power supply used during inspection.
2. Use the transformer power supply circuit stipulated in the figure below for allowable load shorted time measurement and output noise voltage measurement.



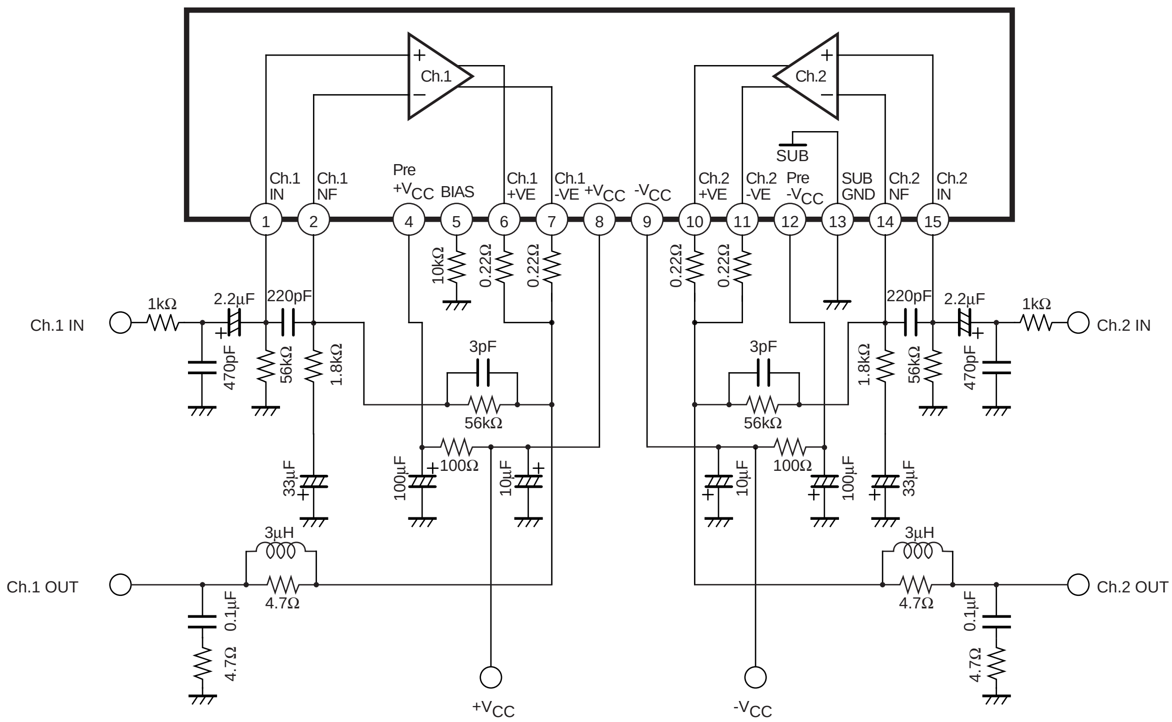
Stipulated Transformer Power Supply (MG-200 equivalent)

3. The output noise voltage values shown are peak values read with a VTVM. However, an AC stabilized (50 Hz) power supply should be used to minimize the influence of AC primary side flicker noise on the reading.

Internal Equivalent Circuit



Sample Application Circuit



Thermal Design Example

The thermal resistance, θc-a of the required heat sink for the power dissipation, Pd, within the hybrid IC is determined as follows.

Condition 1: The IC substrate temperature, Tc, must not exceed 125°C.

$Pd \times \theta c - a + Ta < 125°C$ · · · · · · · · · (1)

Ta: Guaranteed ambient temperature for the end product.

Condition 2: The junction temperature, Tj, of each power transistor must not exceed 150°C.

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

N: Number of power transistors

θc-a: Thermal resistance per power transistor

However, the power dissipation, Pd, for the power transistors shall be allocated equally among the N transistors.
The following inequalities results from solving equations (1) and (2) for θc-a.

$\theta c - a < (125 - Ta) / Pd$ · · · · · · · · · · · · · · · · · · (1)'

$\theta c - a < (150 - Ta) / Pd - \theta j - c/N$ · · · · · · · · · (2)'

Values that satisfy these two inequalities at the same time represent the required heat sink thermal resistance.
When the following specifications have been stipulated, the required heat sink thermal resistance can be determined from formulas (1)' and (2)'.

- Supply voltage — V_{CC}
- Load resistance value — RL
- Guaranteed ambient temperature — Ta

[Example]

When the IC supply voltage, V_{CC}, is ±32 V and R_L is 6 Ω, the IC internal power dissipation, Pd, will be a maximum of 72 W for a continuous sine wave signal at 1 kHz, according to the Pd – P_O characteristics.

For the music signals normally handled by audio amplifiers, a value of 1/8 P_O max is generally used for Pd as an estimate of the power dissipation based on this type of continuous signal. (Note that the factor used may differ depending on the safety standards used.)

That is:

Pd = 48 W (When 1/8 P_O max = 6.25 W)

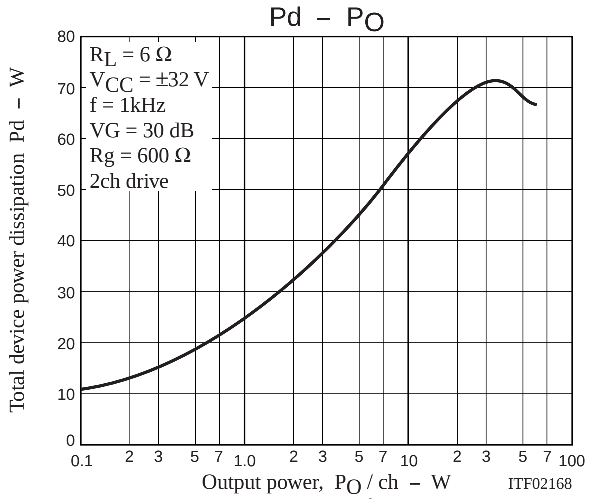
The number of power transistors in the audio amplifier block of these hybrid ICs, N, is 4, and the thermal resistance per transistor is 2.2°C/W. Therefore, the required heat sink thermal resistance for a guaranteed ambient temperature of 50°C will be as follows.

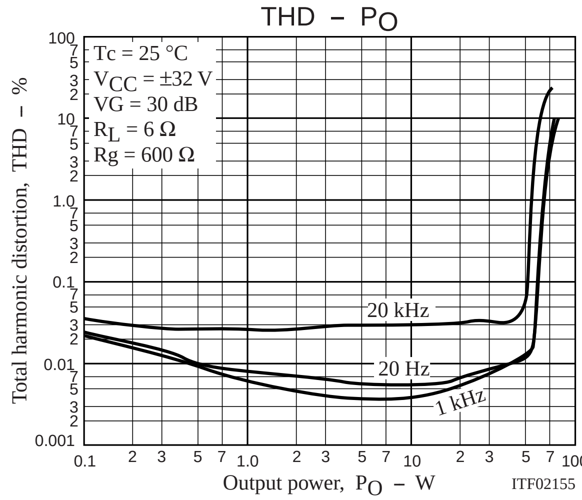
From formula (1)' $\theta c - a < (125 - 50) / 48$
< 1.56

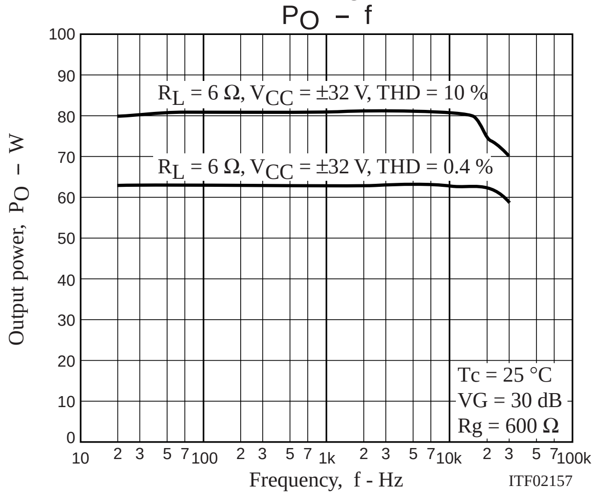
From formula (2)' $\theta c - a < (150 - 50) / 48 - 2.2/4$
< 1.53

Therefore, 1.53°C/W is the required heat sink thermal resistance.

Note that this thermal design example assumes the use of a constant-voltage power supply, and is therefore not a verified design for any particular user's end product.







This catalog provides information as of December, 2002. Specifications and information herein are subject to change without notice.

Ordering number : ENN7374

Thick-Film Hybrid IC

STK403-430

Six-Channel Class AB Audio Power Amplifier IC 20 W × 6 Channels

Overview

The STK403-400 series products are audio power amplifier hybrid ICs that consist of optimally-designed discrete component power amplifier circuits that have been miniaturized using SANYO's unique insulated metal substrate technology (IMST). The adoption of a newly-developed low thermal resistance substrate allows this product to integrate six power amplifier channels in a single compact package. The adoption of a standby circuit in this device allows it to reduce impulse noise significantly as compared to earlier Sanyo products, in particular, the STK402-*00 series products.

Features

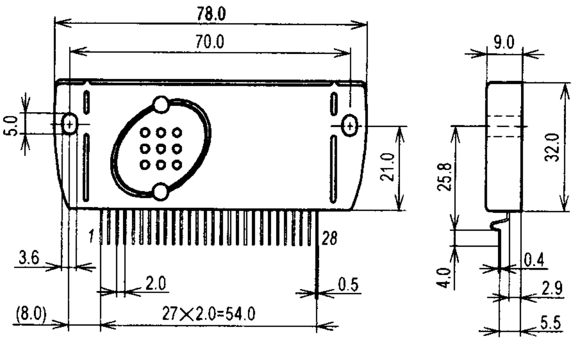
- Series of pin compatible power amplifiers ranging from 30 W/ch to 45 W/ch (10%/1 kHz) devices. The same printed circuit board can be used depending on the output power grade.
- Miniature packages
  — 78.0 mm × 32.0 mm × 9.0 mm *
  *: Not including the pins.
- Output load impedance: R_L = 6 Ω
- Allowable load shorted time: 0.3 seconds
- Supports the use of standby and muting circuits.

Package Dimensions

unit: mm

4202-SIP28

[STK403-430]



SANYO: SIP28

SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Series Organization

These products are organized as a series based on their output capacity.

Item	Type No.		
	STK403-430	STK403-440	STK403-450
Output 1 (10%/1 kHz)	30 W × 6 ch	40 W × 6 ch	45 W × 6 ch
Output 2 (0.6%/20 Hz to 20 kHz)	20 W × 6 ch	25 W × 6 ch	30 W × 6 ch
Maximum supply voltage (No signal)	±36 V	±38 V	±40 V
Maximum supply voltage (6 Ω)	±34 V	±36 V	±38 V
Recommended supply voltage (6 Ω)	±23 V	±26 V	±28 V
Package	78.0 mm × 32.0 mm × 9.0 mm		

Specifications

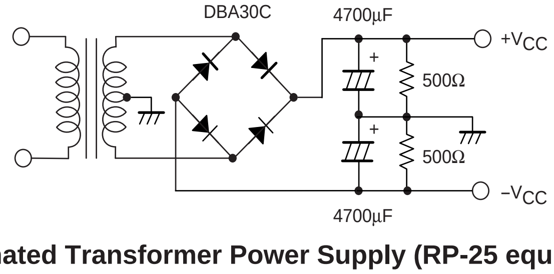
Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage (No signal)	V_{CC} max(0)		±36	V
Maximum supply voltage	V_{CC} max(1)	$R_L \geq 6\ \Omega$	±34	V
Minimum operating supply voltage	V_{CC} min		±10	V
Maximum operation flow-in current (pin 23)	$I_{ST\ OFF}$ max		1.2	mA
Thermal resistance	θ j-c	Per power transistor	3.6	°C/W
Junction temperature	Tj max	Both the Tj max and the Tc max conditions must be met.	150	°C
Operating IC substrate temperature	Tc max		125	°C
Storage temperature	Tstg		–30 to +125	°C
Allowable load shorted time *4	ts	V_{CC} = ±23.0 V, R_L = 6 Ω, f = 50 Hz, P_O = 20 W, 1ch drive	0.3	s

Operating Characteristics at Tc = 25°C, R_L = 6 Ω (noninductive load), Rg = 600 Ω, VG = 30 dB

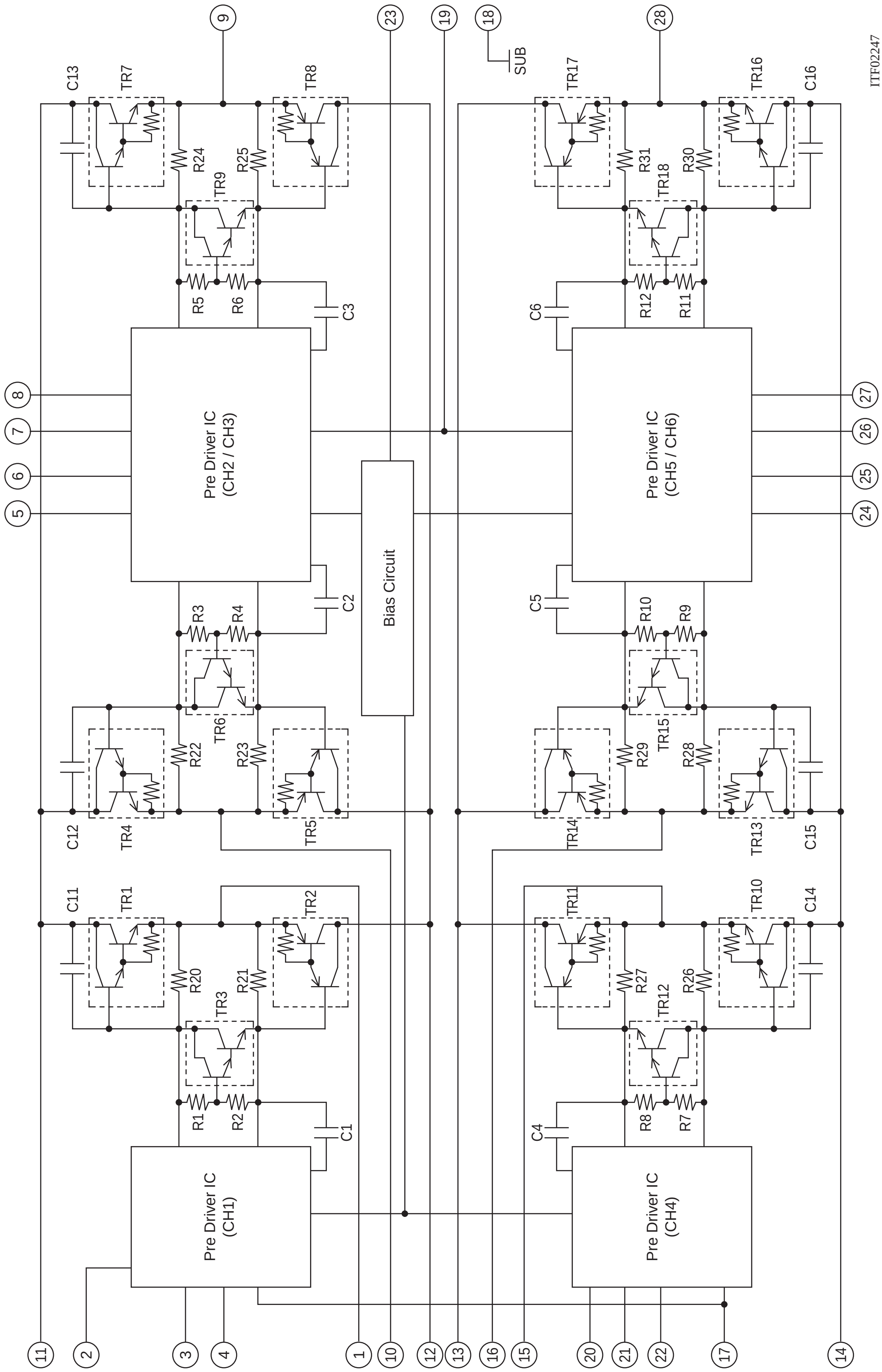
Parameter	Symbol	Conditions*1					Ratings			Unit
		V_{CC} (V)	f (Hz)	P_O (W)	THD (%)		min	typ	max	
Output power *1	P_O (1)	±23.0	20 to 20 k		0.6		18	20		W
	P_O (2)	±23.0	1 k		10			30		W
Total harmonic distortion *1	THD (1)	±23.0	20 to 20 k	5.0		VG = 30 dB			0.6	%
	THD (2)	±23.0	1 k	5.0		VG = 30 dB		0.03		%
Frequency characteristics	f_L, f_H	±23.0		1.0		+0 –3 dB		20 to 50 k		Hz
Input impedance	ri	±23.0	1 k	1.0				55		kΩ
Output noise voltage *2	V_{NO}	±28.0				Rg = 2.2 kΩ			1.0	mVrms
Quiescent current	I_{CCO}	±28.0				No loading	60	110	180	mA
Neutral voltage	V_N	±28.0					–70	0	+70	mV
Current flowing into pin 23 in standby mode *6	$I_{ST\ ON}$	±23.0				V_{23} = 5 V, current Limiting resistance: 6.2 kΩ			0	mA
Current flowing into pin 23 in operating mode *6	$I_{ST\ OFF}$	±23.0					0.4		1.2	mA

Notes: 1. 1ch drive
2. Unless otherwise noted, use a constant-voltage supply for the power supply used during inspection.
3. Use the transformer power supply circuit shown in the figure below for allowable load shorted time measurement and output noise voltage measurement.
4. The output noise voltage values shown are peak values read with a VTVM. However, an AC stabilized (50 Hz) power supply should be used to minimize the influence of AC primary side flicker noise on the reading.
5. Design applications so that the minus pre-V_{CC} line (pin 17) is the lowest potential applied to the IC at all times.
6. A limiting resistor that assures that the maximum operating current flowing into the standby pin (pin 23) does not exceed the maximum rating must be included in application circuits. This IC operates when a voltage higher than V_{BE} (about 0.6 V) is applied to the standby pin.

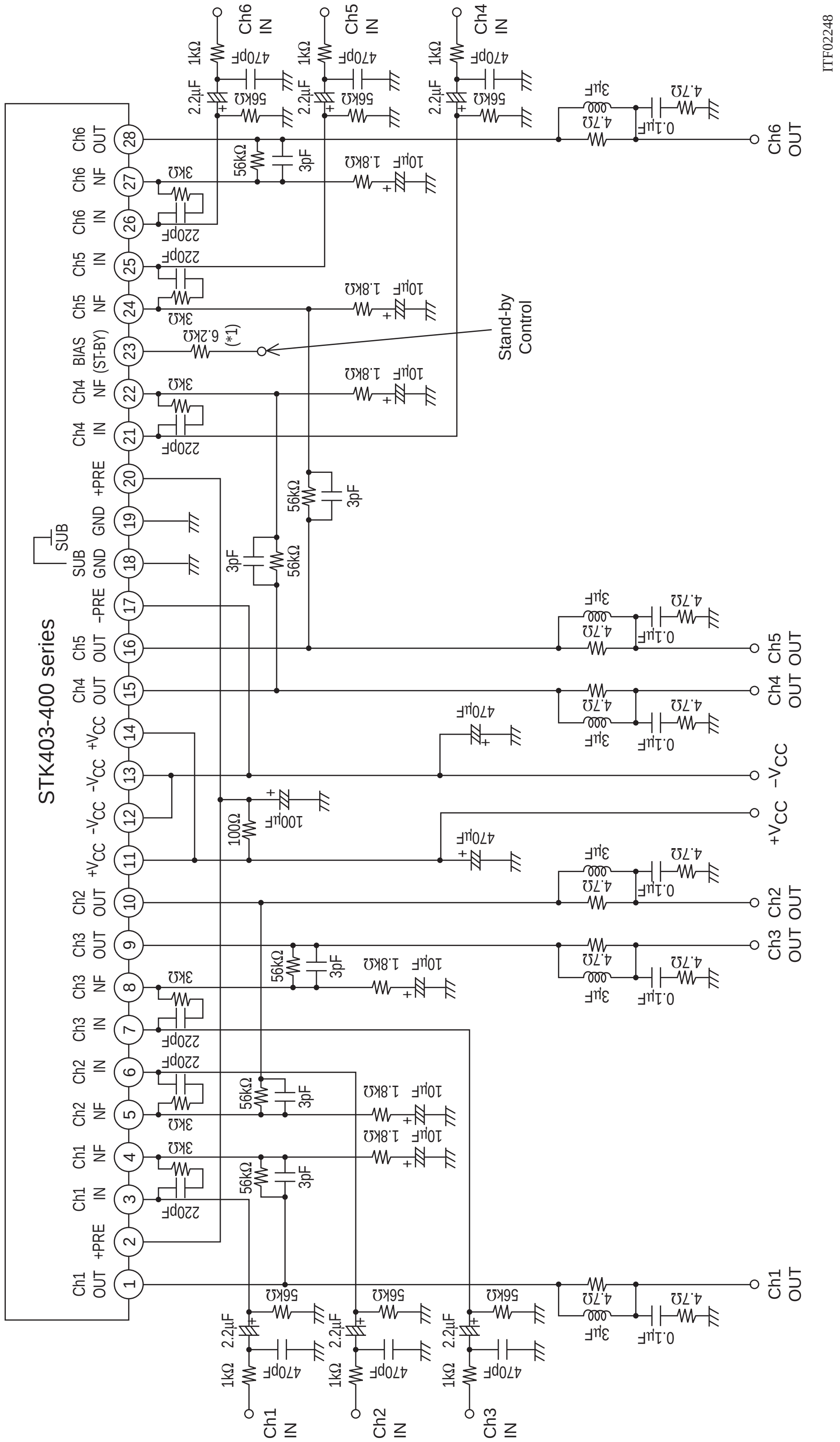


Designated Transformer Power Supply (RP-25 equivalent)

Internal Equivalent Circuit



Sample Application Circuit



*1. Use a value for the limiting resistor that assures that the maximum operating current flowing into the standby pin (pin 23) does not exceed the maximum rating.

Thermal Design Example

The heat sink thermal resistance, θc-a, required to handle the total power dissipated within this hybrid IC is determined as follows.

Condition 1: The IC substrate temperature Tc must not exceed 125°C.

$Pd \times \theta c - a + Ta < 125°C$ ... (1)

Ta: Guaranteed ambient temperature for the end product.

Condition 2: The junction temperature of each individual transistor must not exceed 150°C.

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

N: Number of power transistors

θj-c: Thermal resistance per power transistor

We take the power dissipation in the power transistors to be Pd evenly distributed across those N power transistors.

If we solve for θc-a in equations (1) and (2), we get the following inequalities.

$\theta c - a < (125 - Ta)/Pd$ ... (1)'

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

Values that satisfy both these inequalities at the same time are the required heat sink thermal resistance values.

Determining the following specifications allows us to determine the required heat sink thermal resistance from inequalities (1)' and (2)'.

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

Example:

Assume that the IC supply voltage, V_{CC}, is ±23 V, R_L is 6 Ω, and that the signal is a continuous sine wave. In this case, from the Pd – P_O characteristics, the maximum power will be 103 W for a signal with a frequency of 1 kHz.

For actual music signals, it is usual to use a Pd of 1/8 of $P_O$max, which is the power estimated for continuous signals in this manner. (Note that depending on the particular safety standard used, a value somewhat different from the value of 1/8 used here may be used.)

That is:

Pd = 65 W (when 1/8 $P_O$max is 2.5 W)

The number, N, of power transistors in the hybrid IC's audio amplifier block is 12. Since the thermal resistance, θc-a, per transistor is 3.6°C/W, the required heat sink thermal resistance, θc-a, for a guaranteed ambient temperature of 50°C will be as follows.

From inequality (1)': $\theta c - a < (125 - 50)/65$

< 1.15

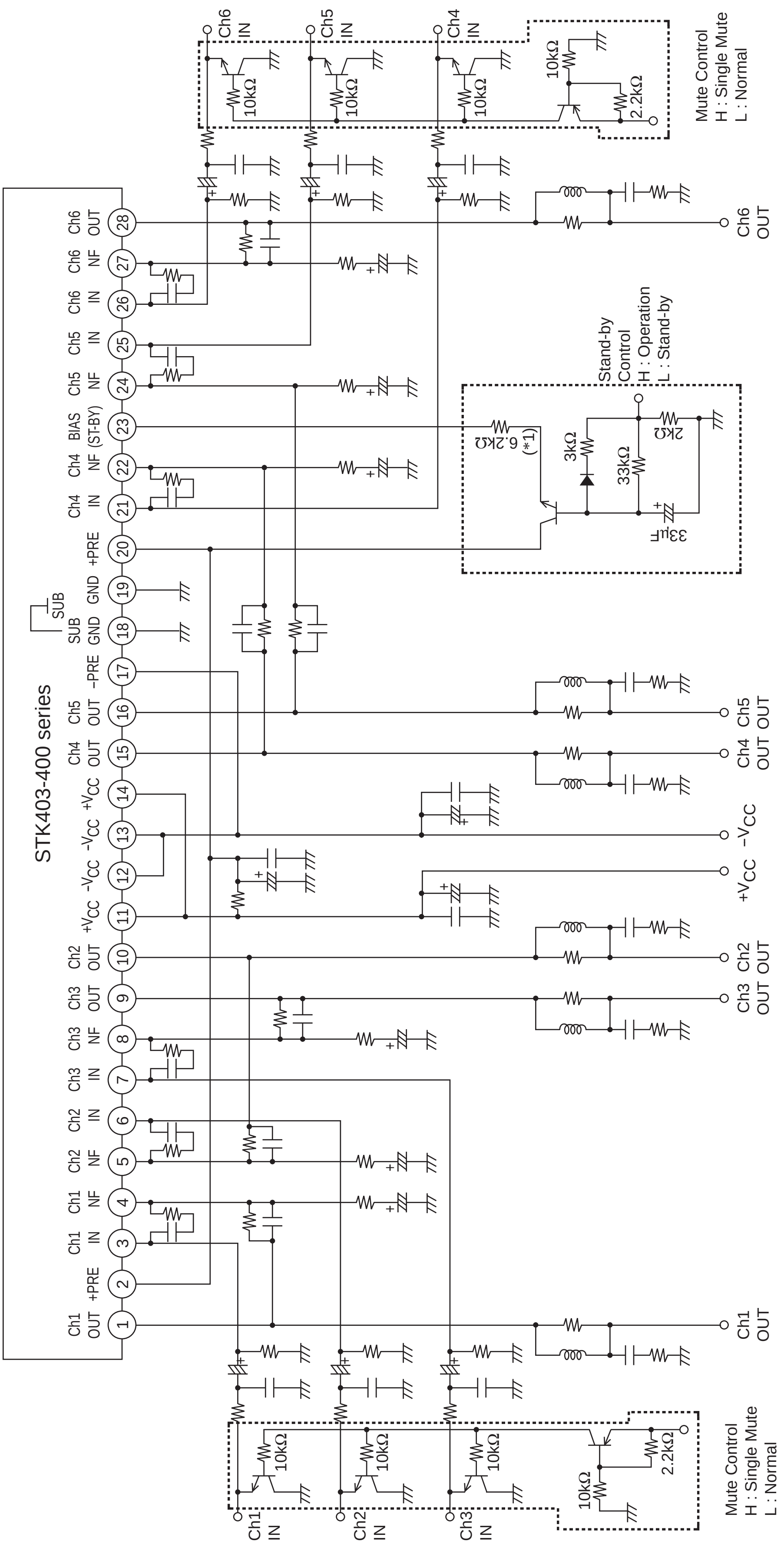
From inequality (2)': $\theta c - a < (150 - 50)/65 - 3.6/12$

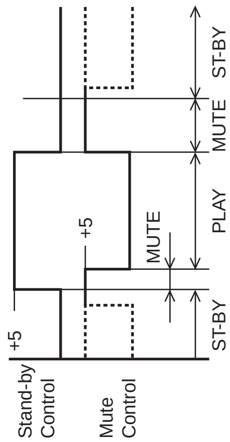
< 1.23

Therefore, the thermal resistance that satisfies both these expressions at the same time is 1.15°C/W.

Note that this thermal design example assumes the use of a constant-voltage power supply, and is only provided as an example for reference purposes. Thermal designs must be tested in an actual end product.

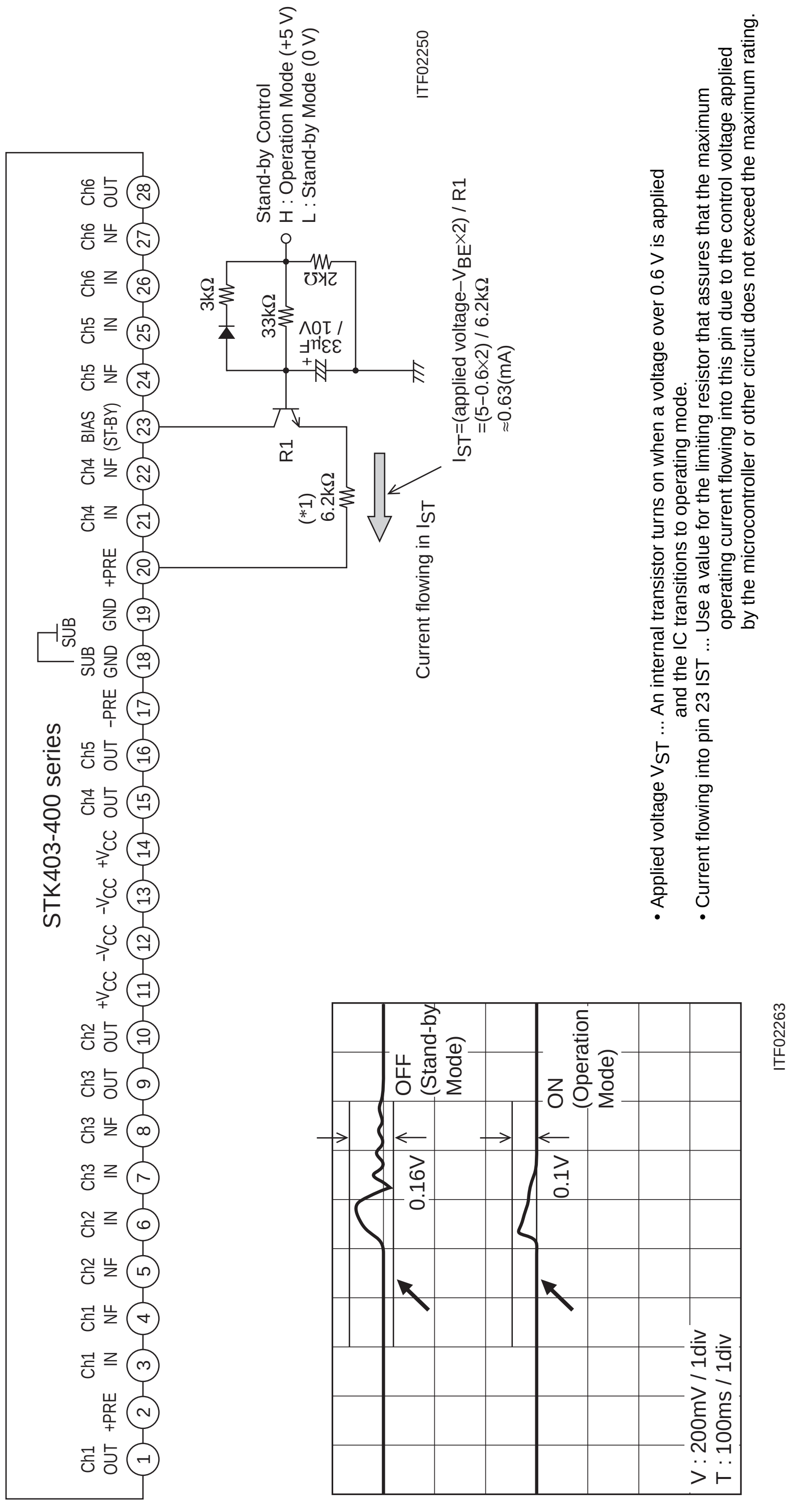
Stand-by & Mute Sample Application Circuit



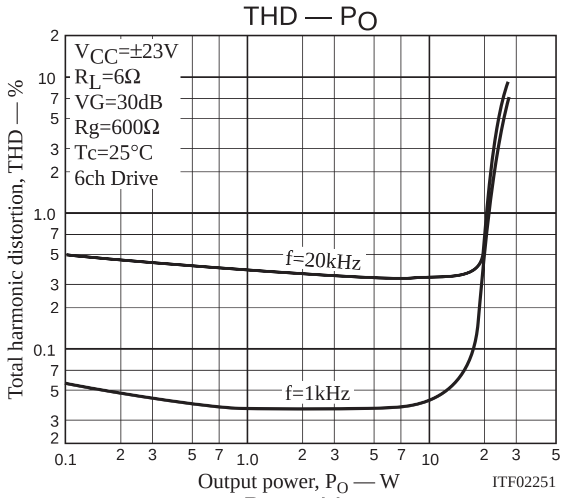


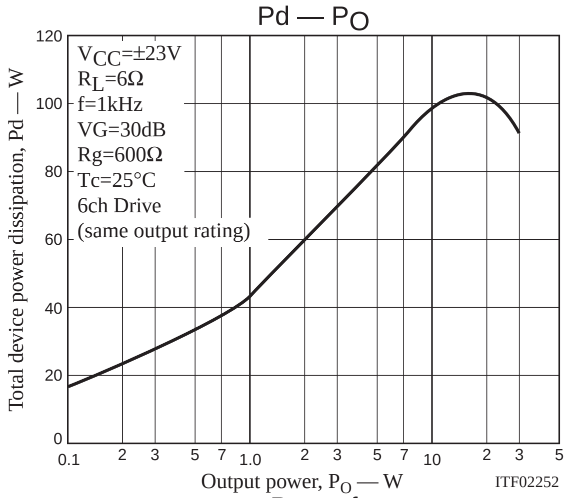
*1. Use a value for the limiting resistor that assures that the maximum operating current flowing into the standby pin (pin 23) does not exceed the maximum rating.

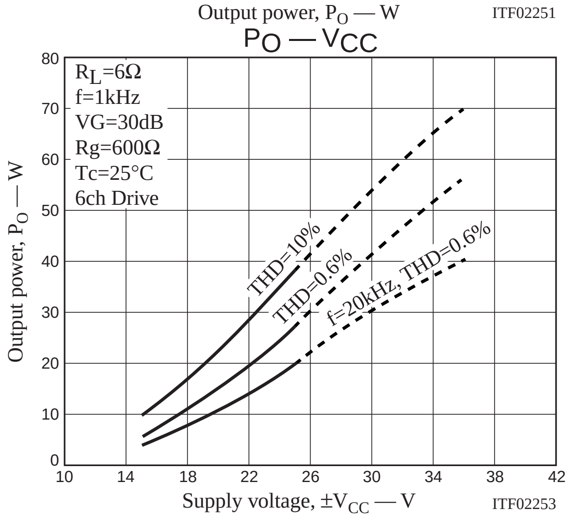
Standby Mode Control

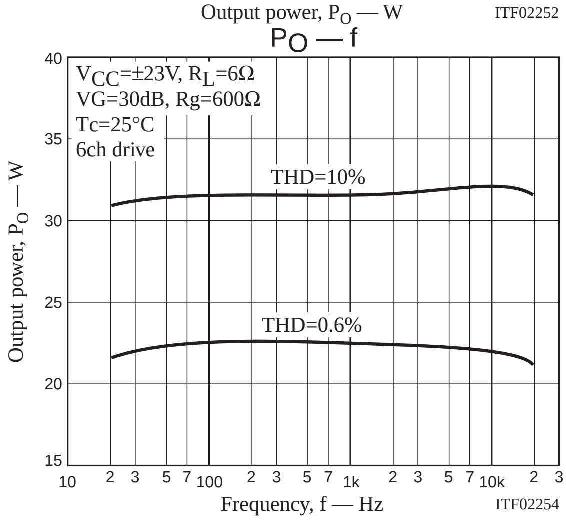


- Impulse noise that occurs at power on and power off can be reduced significantly by using a standby circuit.
- End product design is made easier by using a limiting resistor *1 to match the control voltage provided by the microcontroller or other control circuit.
- Standby control can be applied by controlling the current (I_{ST}) flowing into the standby pin (pin 23).









This catalog provides information as of December, 2003. Specifications and information herein are subject to change without notice.

Ordering number : ENN*7375

Thick-Film Hybrid IC

STK403-440

Six-Channel Class AB Audio Power Amplifier IC 25 W × 6 Channels

Preliminary

Overview

The STK403-400 series products are audio power amplifier hybrid ICs that consist of optimally-designed discrete component power amplifier circuits that have been miniaturized using SANYO's unique insulated metal substrate technology (IMST). The adoption of a newly-developed low thermal resistance substrate allows this product to integrate six power amplifier channels in a single compact package. The adoption of a standby circuit in this device allows it to reduce impulse noise significantly as compared to earlier Sanyo products, in particular, the STK402-*00 series products.

Features

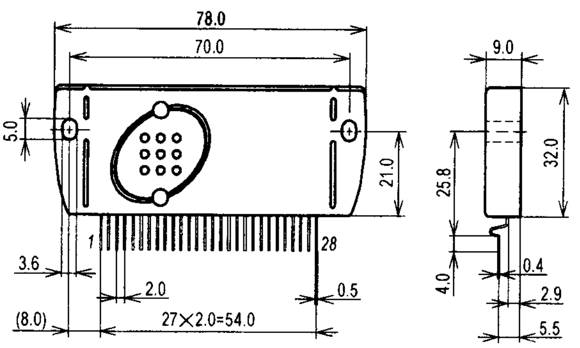
- Series of pin compatible power amplifiers ranging from 30 W/ch to 45 W/ch (10%/1 kHz) devices. The same printed circuit board can be used depending on the output power grade.
- Miniature packages
  — 78.0 mm × 32.0 mm × 9.0 mm *
  *: Not including the pins.
- Output load impedance: R_L = 6 Ω
- Allowable load shorted time: 0.3 seconds
- Supports the use of standby and muting circuits.

Package Dimensions

unit: mm

4202-SIP28

[STK403-440]



SANYO: SIP28

SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Series Organization

These products are organized as a series based on their output capacity.

Item	Type No.		
	STK403-430	STK403-440	STK403-450
Output 1 (10%/1 kHz)	30 W × 6 ch	40 W × 6 ch	45 W × 6 ch
Output 2 (0.6%/20 Hz to 20 kHz)	20 W × 6 ch	25 W × 6 ch	30 W × 6 ch
Maximum supply voltage (No signal)	±36 V	±38 V	±40 V
Maximum supply voltage (6 Ω)	±34 V	±36 V	±38 V
Recommended supply voltage (6 Ω)	±23 V	±26 V	±28 V
Package	78.0 mm × 32.0 mm × 9.0 mm		

Specifications

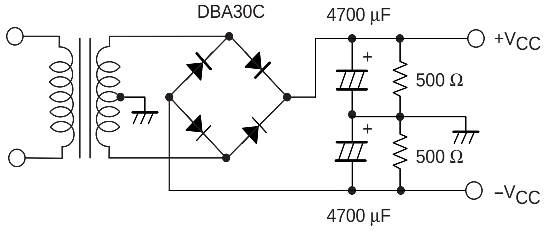
Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage (No signal)	V_{CC} max(0)		±38	V
Maximum supply voltage	V_{CC} max(1)	$R_L \geq 6\ \Omega$	±36	V
Minimum operating supply voltage	V_{CC} min		±10	V
Maximum operation flow-in current (pin 23)	$I_{ST\ OFF}$ max		1.2	mA
Thermal resistance	θ j-c	Per power transistor	3.6	°C/W
Junction temperature	Tj max	Both the Tj max and the Tc max conditions must be met.	150	°C
Operating IC substrate temperature	Tc max		125	°C
Storage temperature	Tstg		–30 to +125	°C
Allowable load shorted time *4	ts	V_{CC} = ±26.0 V, R_L = 6 Ω, f = 50 Hz, P_O = 25 W, 1ch drive	0.3	s

Operating Characteristics at Tc = 25°C, R_L = 6 Ω (noninductive load), Rg = 600 Ω, VG = 30 dB

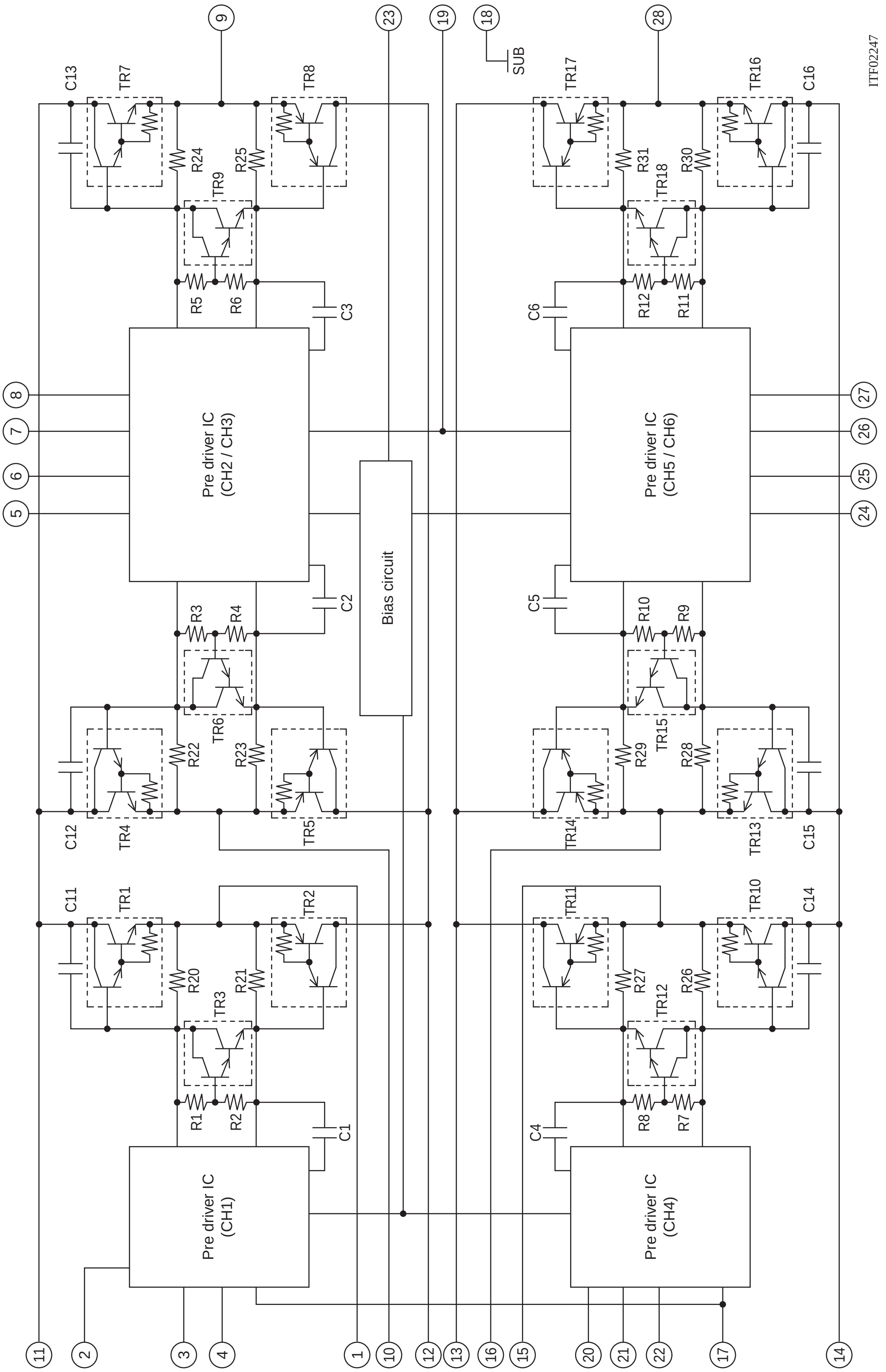
Parameter	Symbol	Conditions*1					Ratings			Unit
		V_{CC} (V)	f (Hz)	P_O (W)	THD (%)		min	typ	max	
Output power *1	P_O (1)	±26.0	20 to 20 k		0.6		23	25		W
	P_O (2)	±26.0	1 k		10			40		
Total harmonic distortion *1	THD (1)	±26.0	20 to 20 k	5.0		VG = 30 dB			0.6	%
	THD (2)	±26.0	1 k	5.0		VG = 30 dB		0.03		
Frequency characteristics	f_L, f_H	±26.0		1.0		+0 –3 dB	20 to 50 k			Hz
Input impedance	ri	±26.0	1 k	1.0				55		kΩ
Output noise voltage *2	V_{NO}	±31.0				Rg = 2.2 kΩ			1.0	mVrms
Quiescent current	I_{CCO}	±31.0				No loading	60	110	180	mA
Neutral voltage	V_N	±31.0					–70	0	+70	mV
Current flowing into pin 23 in standby mode *6	$I_{ST\ ON}$	±26.0				V_{23} = 5 V, current limiting resistance: 6.2 kΩ			0	mA
Current flowing into pin 23 in operating mode *6	$I_{ST\ OFF}$	±26.0					0.4		1.2	mA

Notes: 1. 1ch drive
2. Unless otherwise noted, use a constant-voltage supply for the power supply used during inspection.
3. The output noise voltage values shown are peak values read with a VTVM. However, an AC stabilized (50 Hz) power supply should be used to minimize the influence of AC primary side flicker noise on the reading.
4. Use the transformer power supply circuit shown in the figure below for allowable load shorted time measurement and output noise voltage measurement.
5. Design applications so that the minus pre-V_{CC} line (pin 17) is at the lowest potential at all times.
6. A limiting resistor that assures that the maximum operating current flowing into the standby pin (pin 23) does not exceed the maximum rating must be included in application circuits. This IC operates when a voltage higher than V_{BE} (about 0.6 V) is applied to the standby pin.

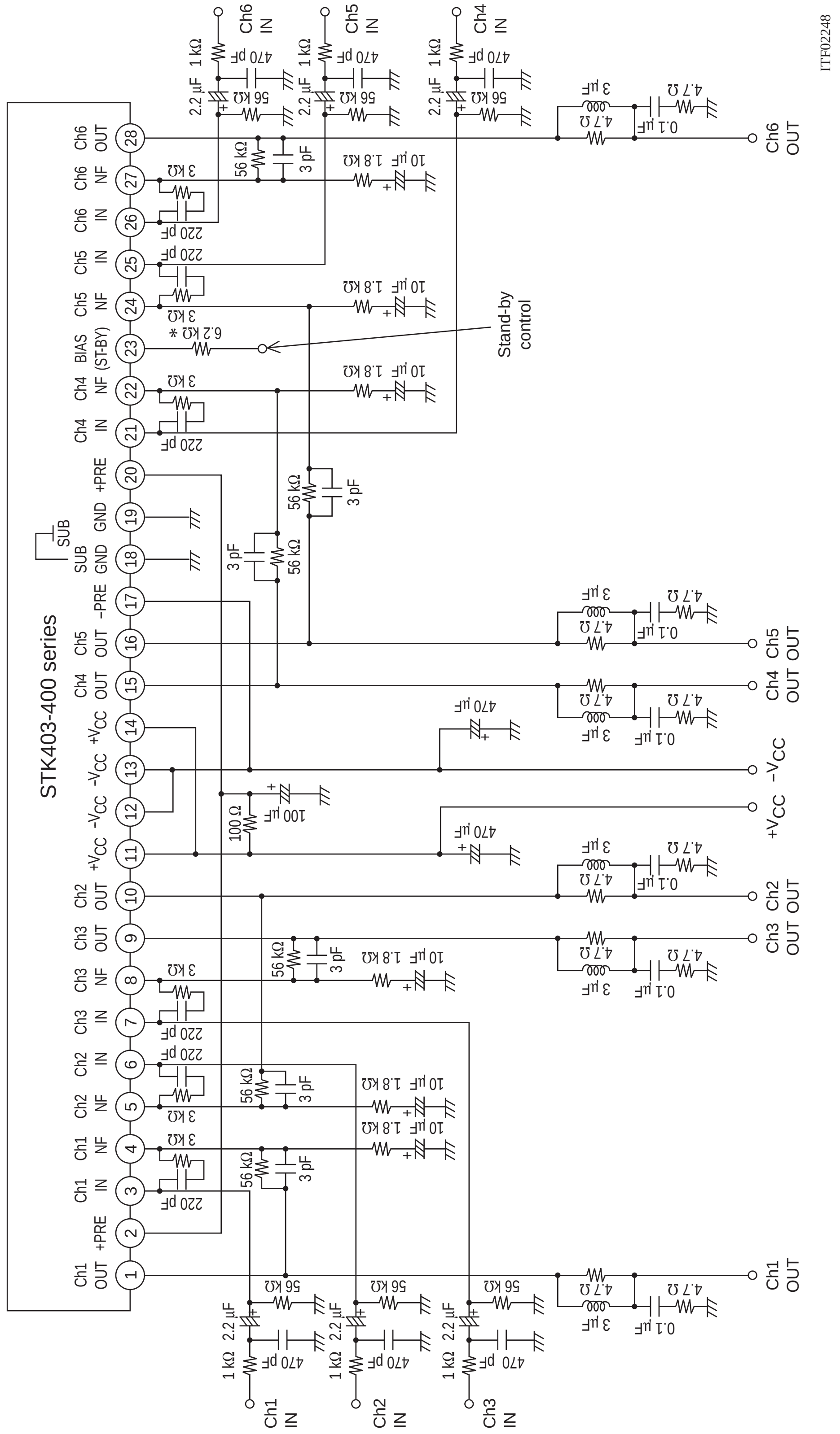


Designated Transformer Power Supply (RP-25 equivalent)

Internal Equivalent Circuit



Sample Application Circuit



*: Use a value for the limiting resistor that assures that the maximum operating current flowing into the standby pin (pin 23) does not exceed the maximum rating.

Thermal Design Example

The heat sink thermal resistance, θc-a, required to handle the total power dissipated within this hybrid IC is determined as follows.

Condition 1: The IC substrate temperature Tc must not exceed 125°C.

$Pd \times \theta c\text{-}a + Ta < 125°C$ ... (1)

Ta: Guaranteed ambient temperature for the end product.

Condition 2: The junction temperature of each transistor must not exceed 150°C.

$Pd \times \theta c\text{-}a + Pd/N \times \theta j\text{-}c + Ta < 150°C$ ... (2)

N: Number of power transistors

θj-c: Thermal resistance per power transistor

We take the power dissipation in the power transistors to be Pd evenly distributed across those N power transistors.

If we solve for θc-a in equations (1) and (2), we get the following inequalities.

$\theta c\text{-}a < (125 - Ta)/Pd$ ... (1)’

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

Values that satisfy both these inequalities at the same time are the required heat sink thermal resistance values.

Determining the following specifications allows us to obtain the required heat sink thermal resistance from inequalities (1)’ and (2)’.

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

Example:

Assume that the IC supply voltage, V_{CC}, is ±26 V, R_L is 6 Ω, and that the signal is a continuous sine wave. In this case, from the Pd – P_O characteristics, the maximum power will be 134 W for a signal with a frequency of 1 kHz.

For actual music signals, it is usual to use a Pd of 1/8 of $P_O$max, which is the power estimated for continuous signals in this manner. (Note that depending on the particular safety standard used, a value somewhat different from the value of 1/8 used here may be used.)

That is:

Pd = 85 W (when 1/8 $P_O$max is 3.1 W)

The number, N, of power transistors in the hybrid IC's audio amplifier block is 12. Since the thermal resistance, θj-c, per transistor is 3.6°C/W, the required heat sink thermal resistance, θc-a, for a guaranteed ambient temperature of 50°C will be as follows.

From inequality (1)’: $\theta c\text{-}a < (125 - 50)/85$

< 0.88

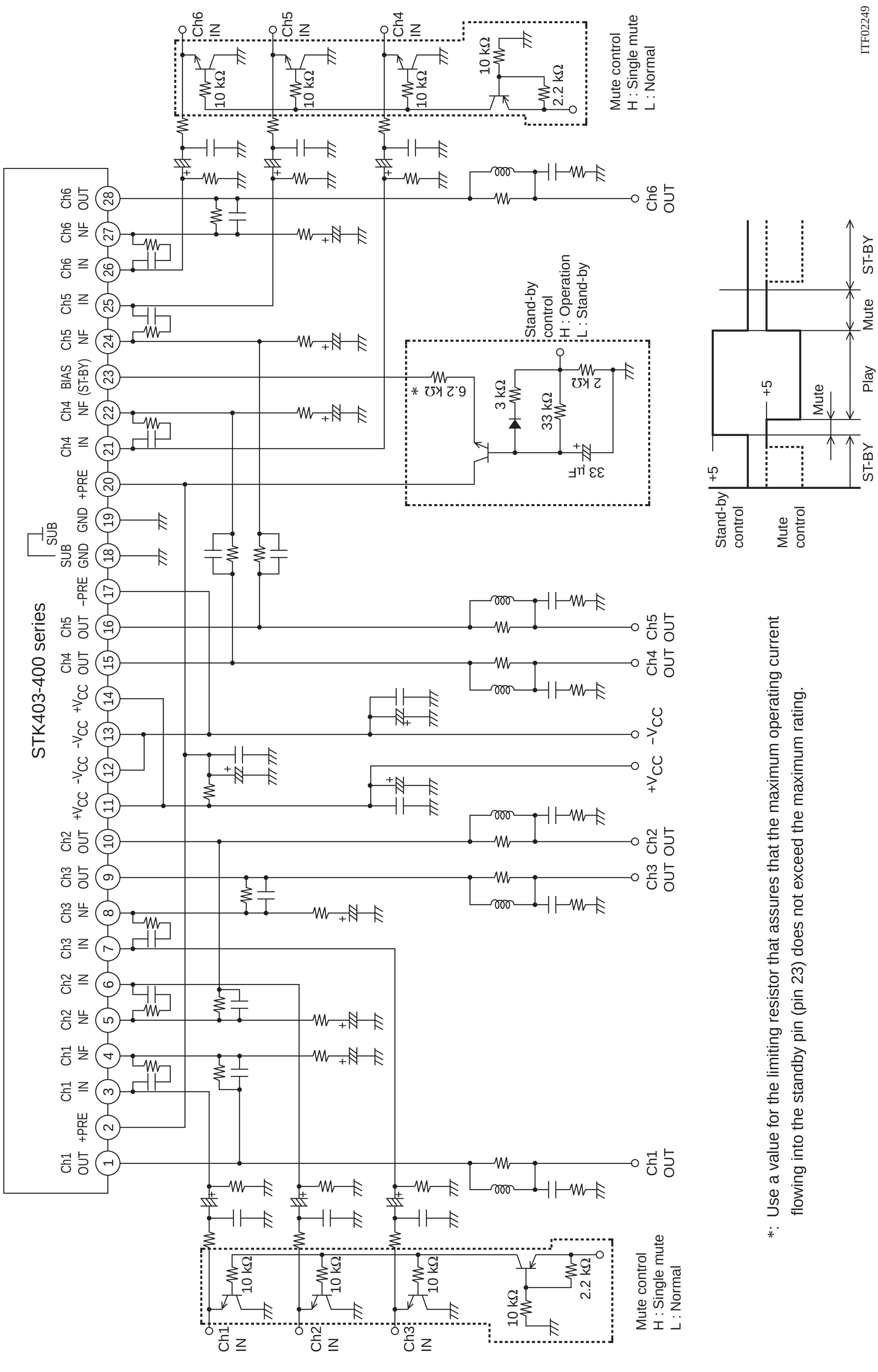
From inequality (2)’: $\theta c\text{-}a < (150 - 50)/85 - 3.6/12$

< 0.87

Therefore, the thermal resistance that satisfies both these expressions at the same time is 0.87°C/W.

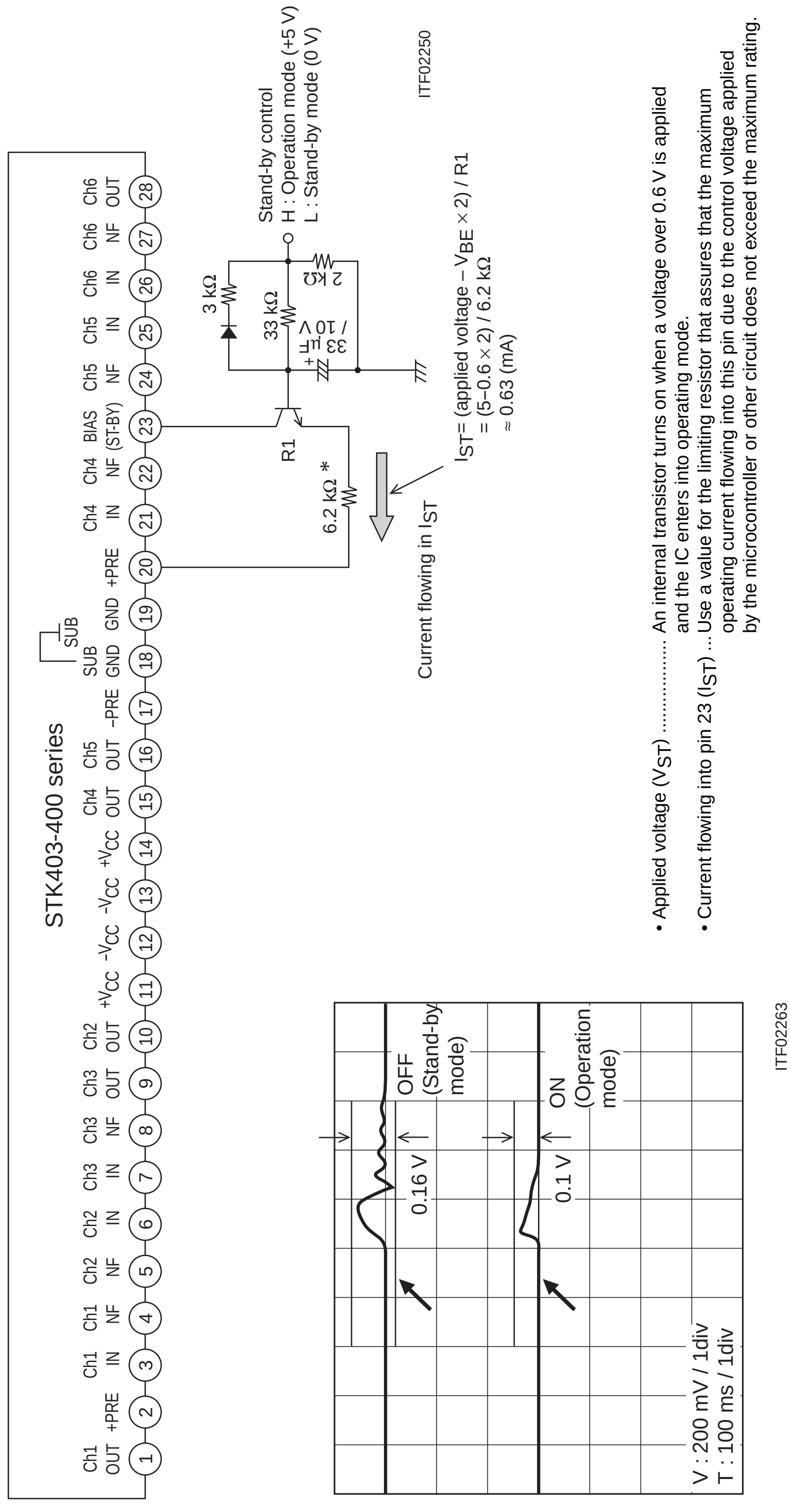
Note that this thermal design example assumes the use of a constant-voltage power supply, and is only provided as an example for reference purposes. Thermal designs must be tested in an actual end product.

Stand-by & Mute Sample Application Circuit

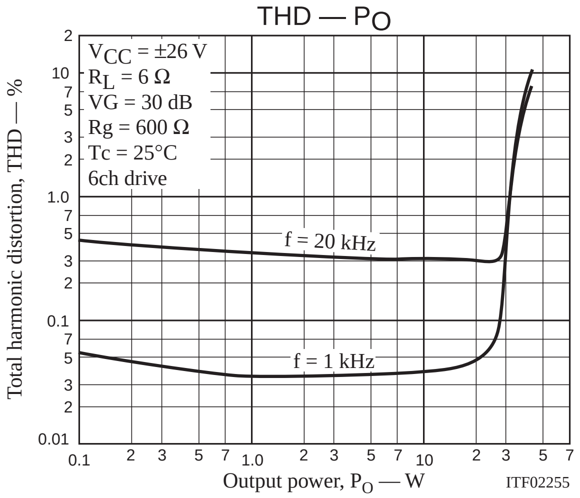


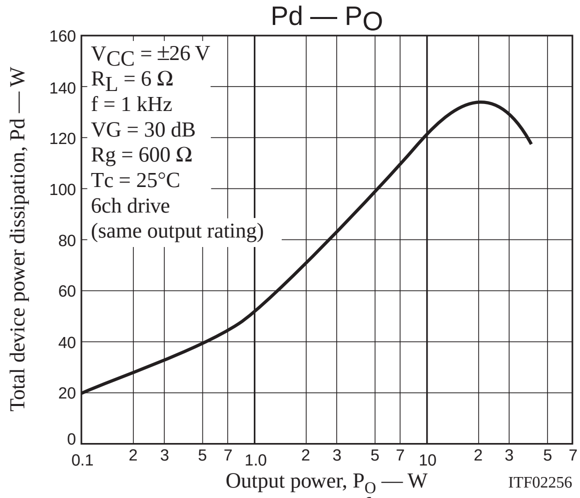
*: Use a value for the limiting resistor that assures that the maximum operating current flowing into the standby pin (pin 23) does not exceed the maximum rating.

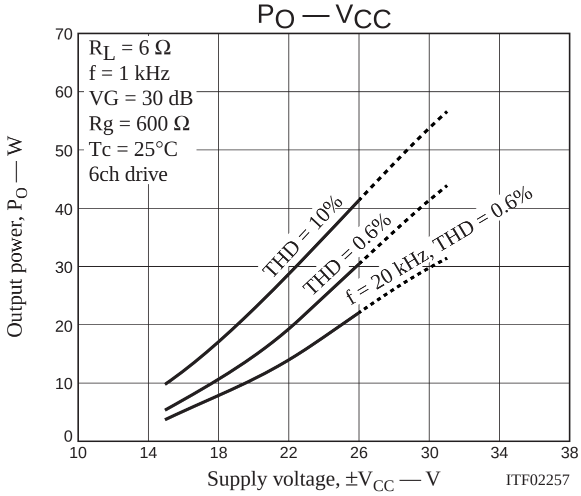
Standby Mode Control

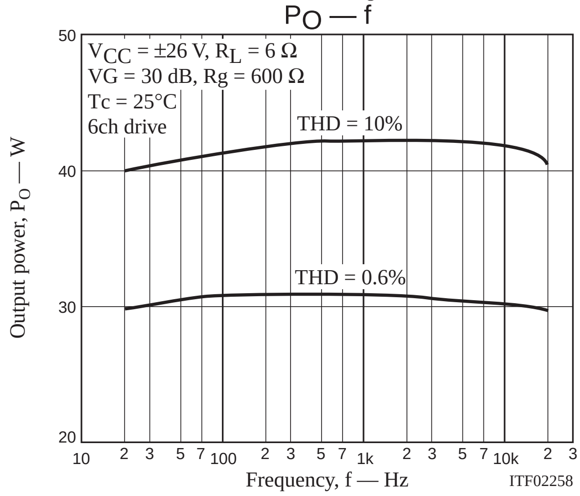


- Impulse noise that occurs at power on and power off can be reduced significantly by using a standby circuit.
- End product design is made easier by using a limiting resistor (*) to match the control voltage provided by the microcontroller or other control circuit.
- Standby control is available by controlling the current (I_{ST}) flowing into the standby pin (pin 23).









This catalog provides information as of February, 2004. Specifications and information herein are subject to change without notice.

Ordering number : ENN*7376

Thick-Film Hybrid IC

STK403-450

Six-Channel Class AB Audio Power Amplifier IC 30 W ×6 Channels

Preliminary

Overview

The STK403-400 series products are audio power amplifier hybrid ICs that consist of optimally-designed discrete component power amplifier circuits that have been miniaturized using SANYO's unique insulated metal substrate technology (IMST). The adoption of a newly-developed low thermal resistance substrate allows this product to integrate six power amplifier channels in a single compact package. The adoption of a standby circuit in this device allows it to reduce impulse noise significantly as compared to earlier Sanyo products, in particular, the STK402-*00 series products.

Features

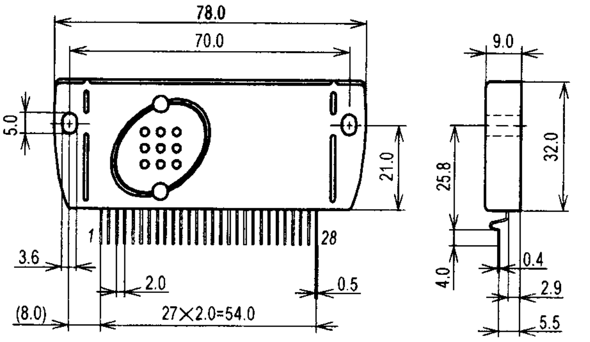
- Series of pin compatible power amplifiers ranging from 30 W/ch to 45 W/ch (10%/1 kHz) devices. The same printed circuit board can be used depending on the output power grade.
- Miniature packages
  - — 78.0 mm × 32.0 mm × 9.0 mm *
    - *: Not including the pins.
- Output load impedance: R_L = 6 Ω
- Allowable load shorted time: 0.3 seconds
- Supports the use of standby and muting circuits.

Package Dimensions

unit: mm

4202-SIP28

[STK403-450]



SANYO: SIP28

Series Organization

These products are organized as a series based on their output capacity.

Item	Type No.		
	STK403-430	STK403-440	STK403-450
Output 1 (10%/1 kHz)	30 W ×6 ch	40 W ×6 ch	45 W ×6 ch
Output 2 (0.6%/20 Hz to 20 kHz)	20 W ×6 ch	25 W ×6 ch	30 W ×6 ch
Maximum supply voltage (No signal)	±36 V	±38 V	±40 V
Maximum supply voltage (6 Ω)	±34 V	±36 V	±38 V
Recommended supply voltage (6 Ω)	±23 V	±26 V	±28 V
Package	78.0 mm × 32.0 mm × 9.0 mm		

Specifications

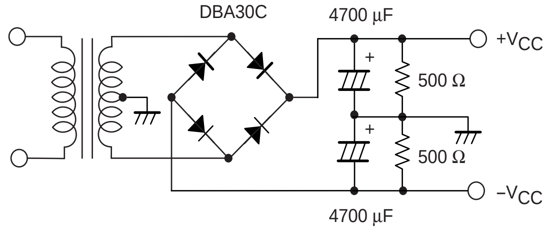
Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage (No signal)	V_{CC} max(0)		±40	V
Maximum supply voltage	V_{CC} max(1)	R_L = 6 Ω	±38	V
Minimum operating supply voltage	V_{CC} min		±10	V
Maximum operation flow-in current (pin 23)	$I_{ST\ OFF}$ max		1.2	mA
Thermal resistance	θj-c	Per power transistor	3.6	°C/W
Junction temperature	Tj max	Both the Tj max and the Tc max conditions must be met.	150	°C
Operating IC substrate temperature	Tc max		125	°C
Storage temperature	Tstg		–30 to +125	°C
Allowable load shorted time *4	ts	V_{CC} = ±28.0 V, R_L = 6 Ω, f = 50 Hz, P_O = 30 W, 1ch drive	0.3	s

Operating Characteristics at Tc = 25°C, R_L = 6 Ω (noninductive load), Rg = 600 Ω, VG = 30 dB

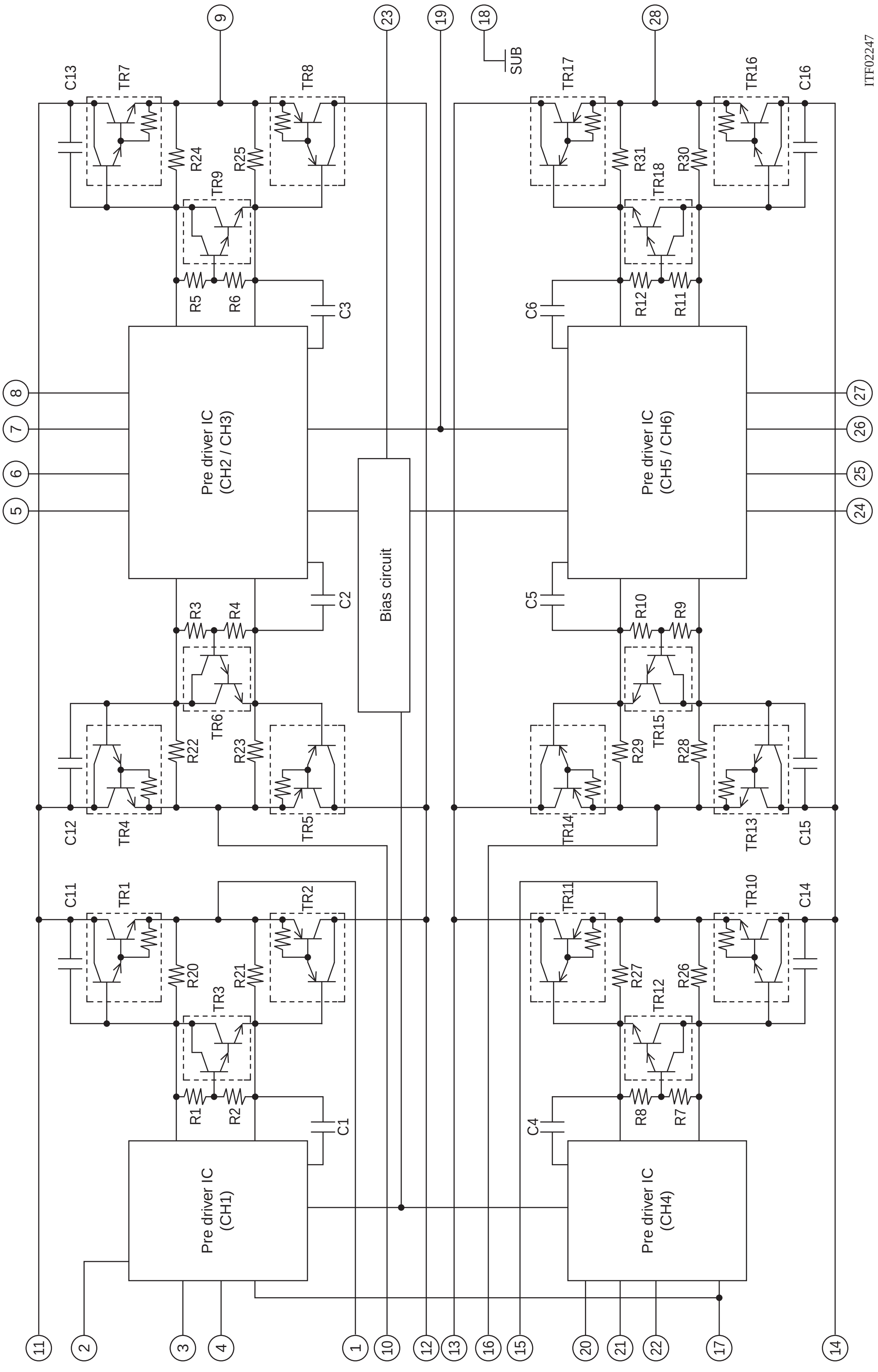
Parameter	Symbol	Conditions*1					Ratings			Unit
		V_{CC} (V)	f (Hz)	P_O (W)	THD (%)		min	typ	max	
Output power *1	P_O (1)	±28.0	20 to 20 k		0.6		27	30		W
	P_O (2)	±28.0	1 k		10			45		
Total harmonic distortion *1	THD (1)	±28.0	20 to 20 k	5.0		VG = 30 dB			0.6	%
	THD (2)	±28.0	1 k	5.0		VG = 30 dB		0.03		
Frequency characteristics	f_L, f_H	±28.0		1.0		+0 –3 dB	20 to 50 k			Hz
Input impedance	ri	±28.0	1 k	1.0				55		kΩ
Output noise voltage *2	V_{NO}	±34.0				Rg = 2.2 kΩ			1.0	mVrms
Quiescent current	I_{CCO}	±34.0				No loading	60	110	180	mA
Neutral voltage	V_N	±34.0					–70	0	+70	mV
Current flowing into pin 23 in standby mode *6	$I_{ST\ ON}$	±28.0				V_{23} = 5 V, current limiting resistance: 6.2 kΩ			0	mA
Current flowing into pin 23 in operating mode *6	$I_{ST\ OFF}$	±28.0					0.4		1.2	mA

Notes: 1. 1ch drive
2. Unless otherwise noted, use a constant-voltage supply for the power supply used during inspection.
3. The output noise voltage values shown are peak values read with a VTVM. However, an AC stabilized (50 Hz) power supply should be used to minimize the influence of AC primary side flicker noise on the reading.
4. Use the transformer power supply circuit shown in the figure below for allowable load shorted time measurement and output noise voltage measurement.
5. Design applications so that the minus pre-V_{CC} line (pin 17) is at the lowest potential at all times.
6. A limiting resistor that assures that the maximum operating current flowing into the standby pin (pin 23) does not exceed the maximum rating must be included in application circuits. This IC operates when a voltage higher than V_{BE} (about 0.6 V) is applied to the standby pin.

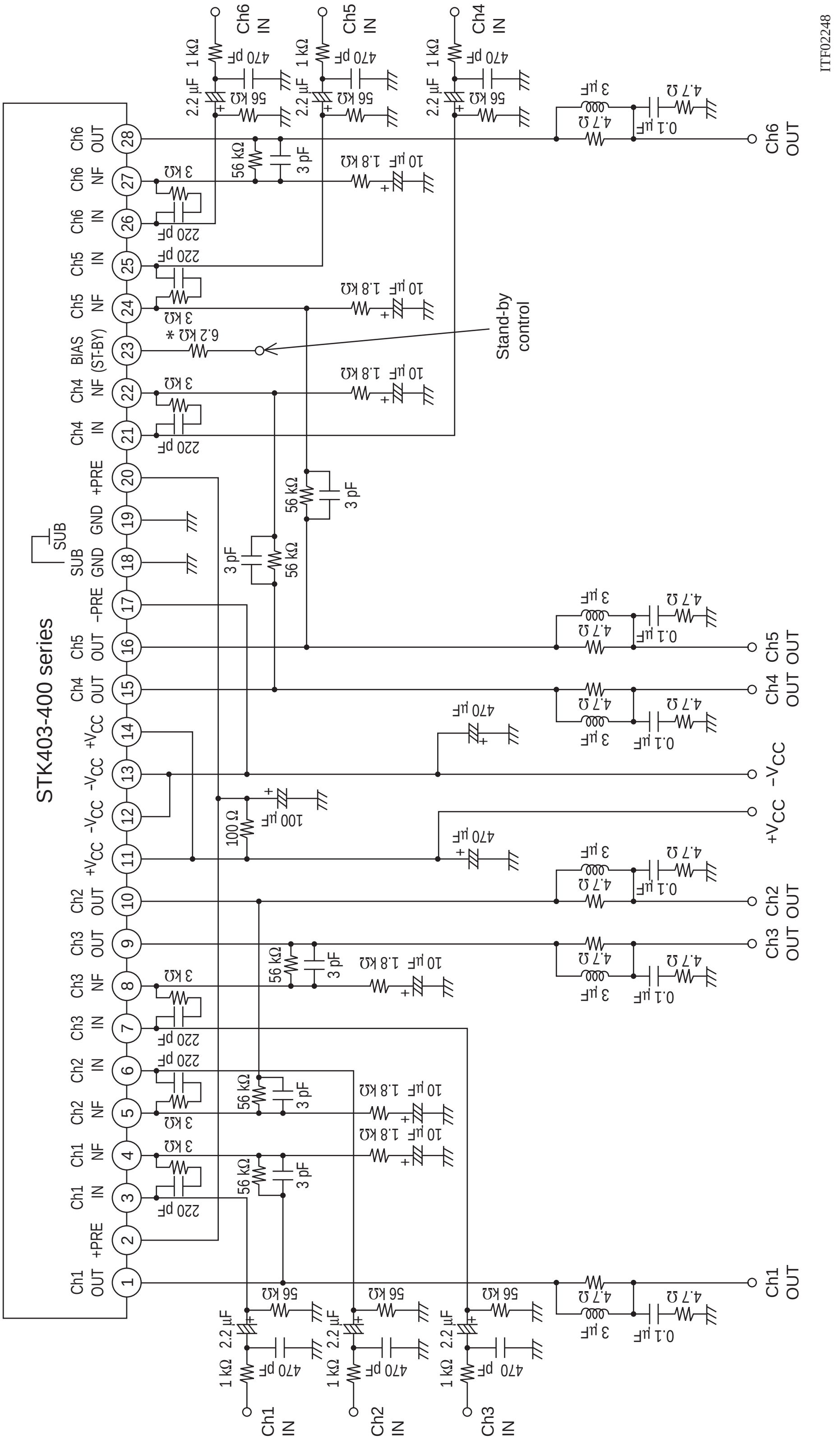


Designated Transformer Power Supply (RP-25 equivalent)

Internal Equivalent Circuit



Sample Application Circuit



*: Use a value for the limiting resistor that assures that the maximum operating current flowing into the standby pin (pin 23) does not exceed the maximum rating.

Thermal Design Example

The heat sink thermal resistance, θc-a, required to handle the total power dissipated within this hybrid IC is determined as follows.

Condition 1: The IC substrate temperature Tc must not exceed 125°C.

Pd × θc-a + Ta < 125°C ... (1)

Ta: Guaranteed ambient temperature for the end product.

Condition 2: The junction temperature of each transistor must not exceed 150°C.

Pd × θc-a + Pd/N × θj-c + Ta < 150°C ... (2)

N: Number of power transistors

θj-c: Thermal resistance per power transistor

We take the power dissipation in the power transistors to be Pd evenly distributed across those N power transistors.

If we solve for θc-a in equations (1) and (2), we get the following inequalities.

θc-a < (125 – Ta)/Pd ... (1)’

θc-a < (150 – Ta)/Pd – θj-c/N ... (2)’

Values that satisfy both these inequalities at the same time are the required heat sink thermal resistance values.

Determining the following specifications allows us to obtain the required heat sink thermal resistance from inequalities (1)’ and (2)’.

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

Example:

Assume that the IC supply voltage, V_{CC}, is ±28 V, R_L is 6 Ω, and that the signal is a continuous sine wave. In this case, from the Pd – P_O characteristics, the maximum power will be 164 W for a signal with a frequency of 1 kHz.

For actual music signals, it is usual to use a Pd of 1/8 of $P_O$max, which is the power estimated for continuous signals in this manner. (Note that depending on the particular safety standard used, a value somewhat different from the value of 1/8 used here may be used.)

That is:

Pd = 105 W (when 1/8 $P_O$max is 3.8 W)

The number, N, of power transistors in the hybrid IC's audio amplifier block is 12. Since the thermal resistance, θj-c, per transistor is 3.6°C/W, the required heat sink thermal resistance, θc-a, for a guaranteed ambient temperature of 50°C will be as follows.

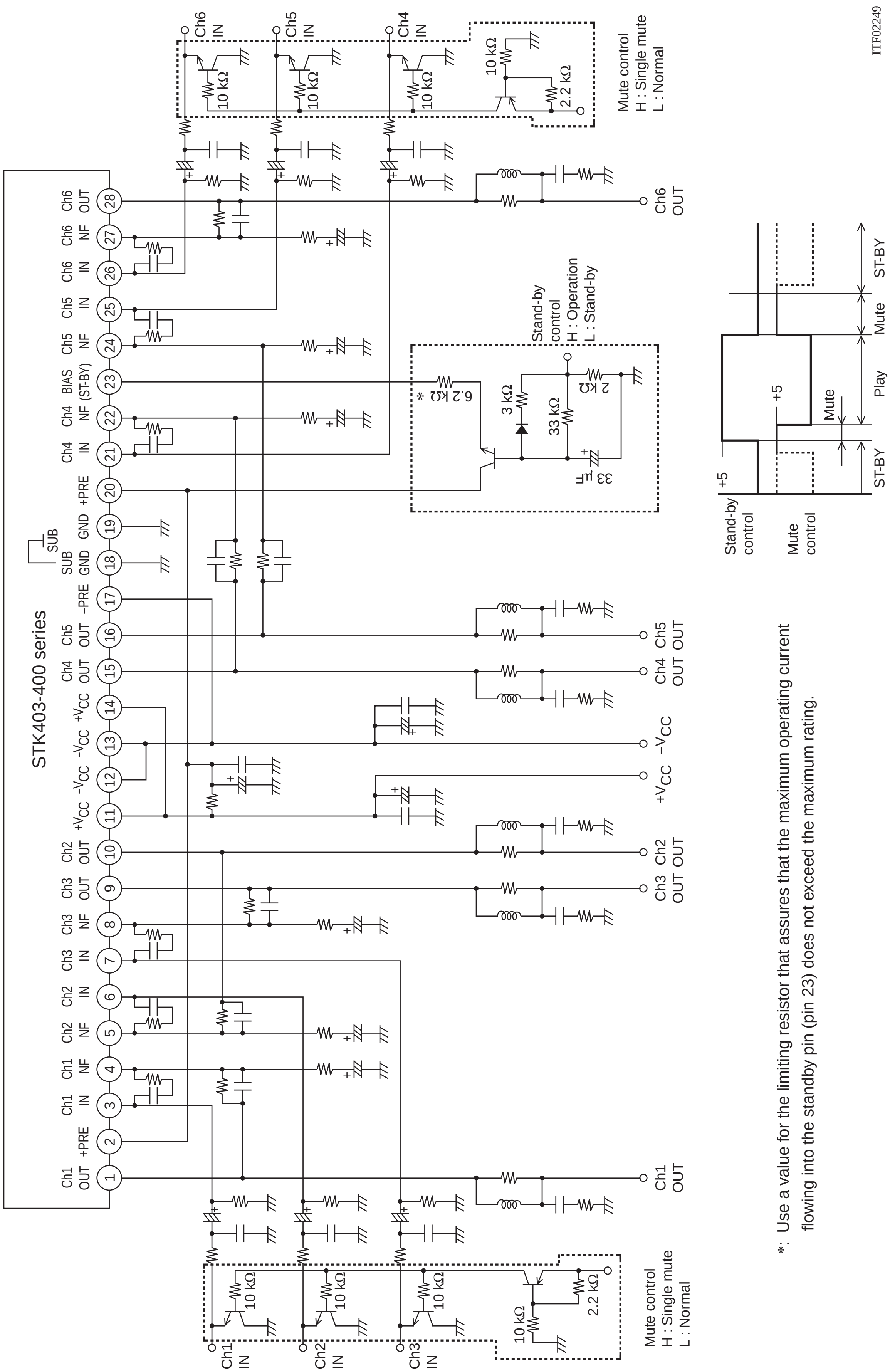
From inequality (1)’: θc-a < (125 – 50)/105
< 0.71

From inequality (2)’: θc-a < (150 – 50)/105 – 3.6/12
< 0.65

Therefore, the thermal resistance that satisfies both these expressions at the same time is 0.65°C/W.

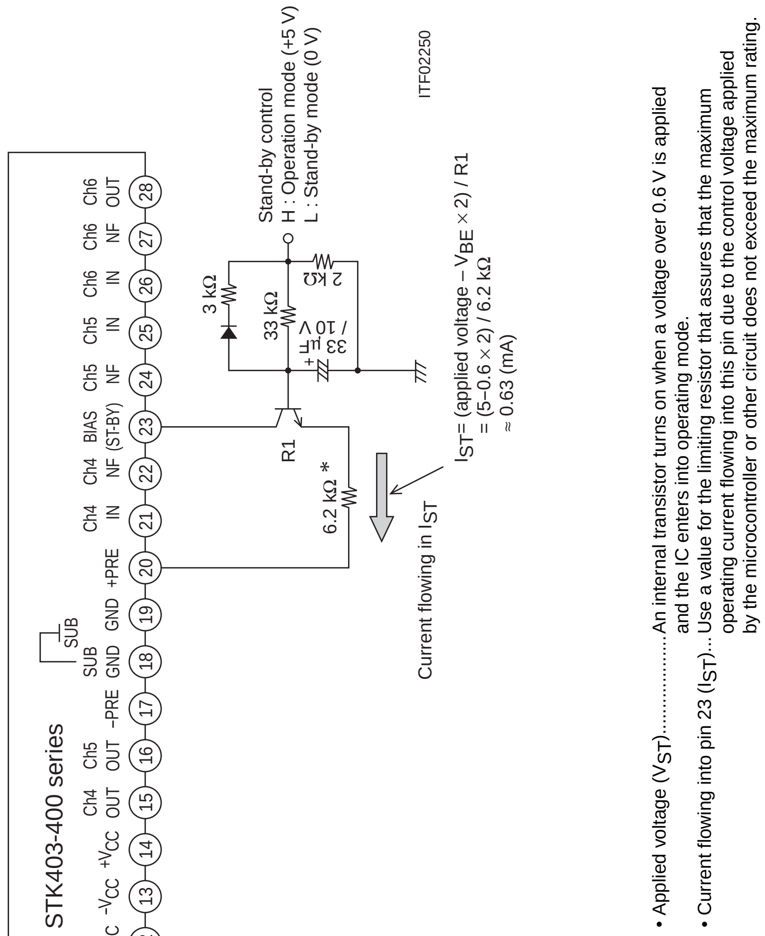
Note that this thermal design example assumes the use of a constant-voltage power supply, and is only provided as an example for reference purposes. Thermal designs must be tested in an actual end product.

Stand-by & Mute Sample Application Circuit

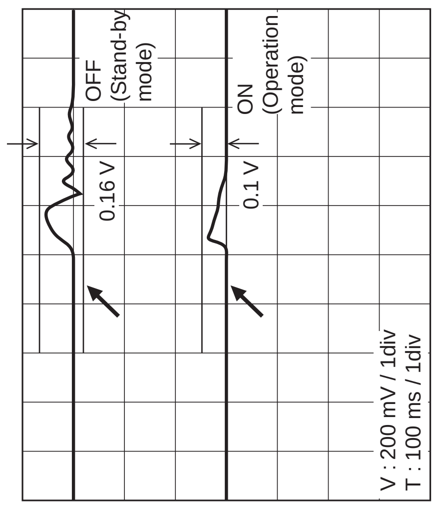


*: Use a value for the limiting resistor that assures that the maximum operating current flowing into the standby pin (pin 23) does not exceed the maximum rating.

Standby Mode Control



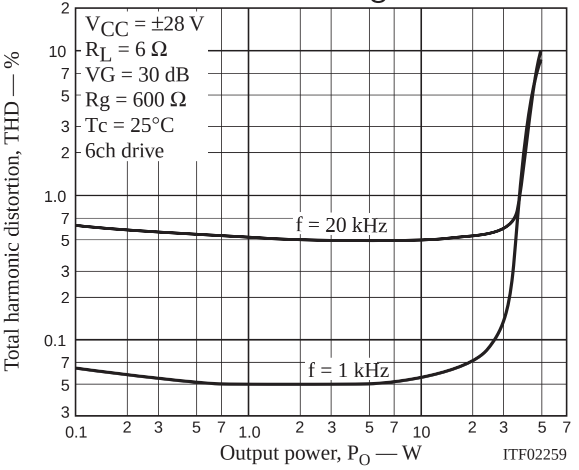
ITF02250



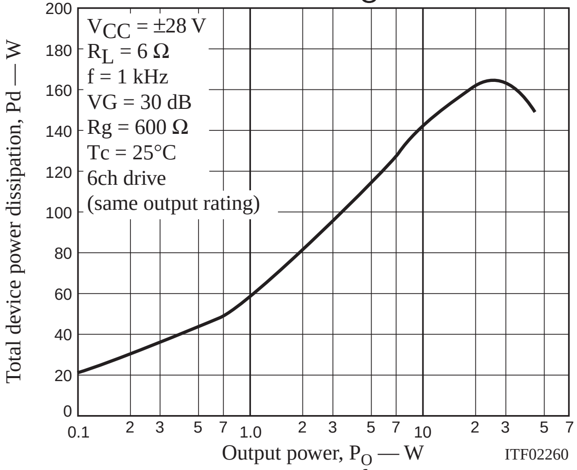
ITF02263

- Impulse noise that occurs at power on and power off can be reduced significantly by using a standby circuit.
- End product design is made easier by using a limiting resistor (*) to match the control voltage provided by the microcontroller or other control circuit.
- Standby control is available by controlling the current (I_{ST}) flowing into the standby pin (pin 23).

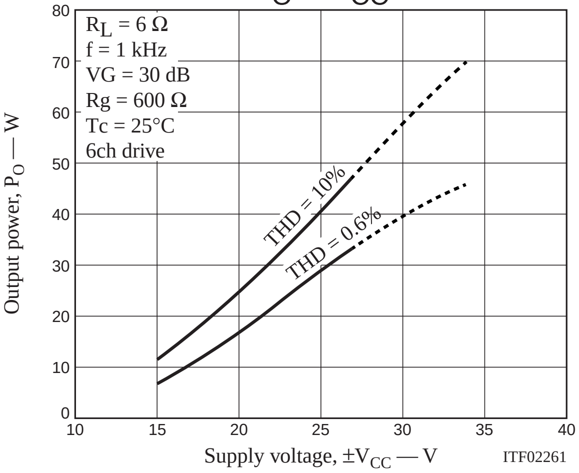
THD — P_O



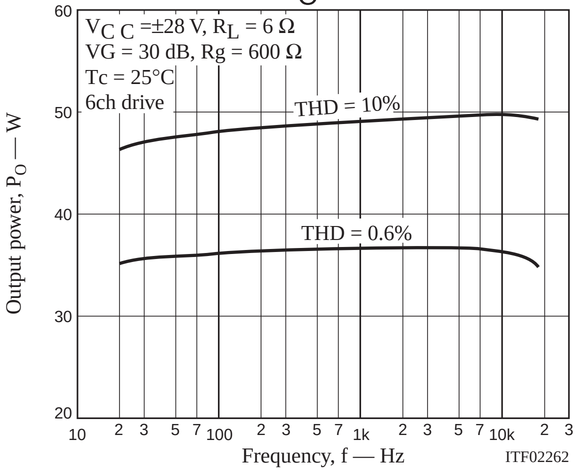
Pd — P_O



P_O — V_{CC}



P_O — f



This catalog provides information as of February, 2004. Specifications and information herein are subject to change without notice.

Ordering number : ENN7727

SANYO Semiconductors
DATA SHEET

Thick-Film Hybrid IC

STK404-050S — One-Channel Class AB Audio Power Amplifier IC 30W

Overview

The STK404-000S series products are audio power amplifier hybrid ICs that consist of optimally-designed discrete component power amplifier circuits that have been miniaturized using SANYO's unique insulated metal substrate technology (IMST). The adoption of a newly-developed low thermal resistance substrate allows this series of devices to be provided in miniature packages significantly more compact than earlier Sanyo products with similar specifications.

Features

- Series of pin compatible power amplifiers ranging from 45W to 180W (10%/1kHz) devices. The same printed circuit board can be used depending on the output power grade.
- Miniature packages
  - — 30W to 40W (THD=0.4%, f=20Hz to 20kHz); 44.0mm × 25.6mm × 8.5mm *
  - — 50W to 80W (THD=0.4%, f=20Hz to 20kHz); 46.6mm × 25.5mm × 8.5mm *
  - — 100W to 120W (THD=0.4%, f=20Hz to 20kHz); 59.2mm × 25.5mm × 8.5mm *

  *: Not including the pins.
- Output load impedance: R_L=6Ω
- Allowable load shorted time: 0.3 seconds
- Supports the use of standby, muting, and load shorting protection circuits.

Series Organization

These products are organized as a series based on their output capacity.

Item	Type No.						
	STK404-050S	STK404-070S	STK404-090S	STK404-100S	STK404-120S	STK404-130S	STK404-140S
Output 1 (0.4%/20Hz to 20kHz)	30W	40W	50W	60W	80W	100W	120W
Output 2 (10%/1kHz)	45W	60W	80W	90W	120W	150W	180W
Maximum supply voltage (6Ω)	±37V	±43V	±46V	±51V	±59V	±64V	±73V
Recommended supply voltage (6Ω)	±26V	±30V	±32V	±35V	±41V	±45V	±51V
Remarks	—		Built-in thermal protection circuit				
Package	44.0mm × 25.6mm × 8.5mm		46.6mm × 25.5mm × 8.5mm			59.2mm × 25.5mm × 8.5mm	

SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Specifications

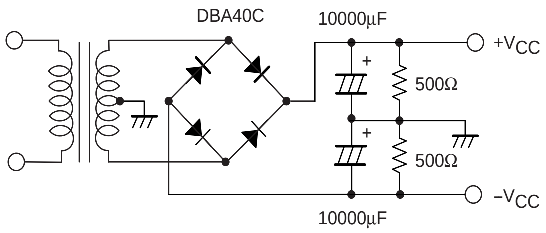
Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage (No signal)	V_{CC} max(0)		±40	V
Maximum supply voltage	V_{CC} max(1)	R_L=6Ω	±37	V
Thermal resistance	θj-c	Per power transistor	3.0	°C/W
Junction temperature	Tj max	Both the Tj max and the Tc max conditions must be met.	150	°C
Operating IC substrate temperature	Tc max		125	°C
Storage temperature	Tstg		–30 to +125	°C
Allowable load shorted time *3	ts	V_{CC}=±26.0V, R_L=6Ω, f=50Hz, P_O=30W	0.3	s

Operating Characteristics at Tc=25°C, R_L=6Ω (noninductive load), Rg=600Ω, VG=30dB

Parameter	Symbol	Conditions*1					Ratings			Unit
		V_{CC} (V)	f (Hz)	P_O (W)	THD (%)		min	typ	max	
Output power	P_O (1)	±26.0	20 to 20 k		0.4		30			W
	P_O (2)	±26.0	1 k		10			45		
Frequency characteristics	f_L, f_H	±26.0		1.0		+0 –3dB	20 to 20k			Hz
Input impedance	ri	±26.0	1 k	1.0				55		kΩ
Output noise voltage *2	V_{NO}	±32.0				Rg=10kΩ		1.2		mVrms
Quiescent current	I_{CCO}	±32.0				No loading			50	mA
Neutral voltage	V_N	±32.0					–100	0	+100	mV

Notes: 1. Unless otherwise noted, use a constant-voltage supply for the power supply used during inspection.
2. The output noise voltage values shown are peak values read with a VTVM. However, an AC stabilized (50 Hz) power supply should be used to minimize the influence of AC primary side flicker noise on the reading.
3. Use the transformer power supply circuit shown in the figure below for allowable load shorted time measurement and output noise voltage measurement.
This IC is designed assuming that applications will provide a load-shorting protection function that operates within 0.3 seconds of the load being shorted and that either cuts off power to the IC or eliminates the load-shorted state in some other manner.

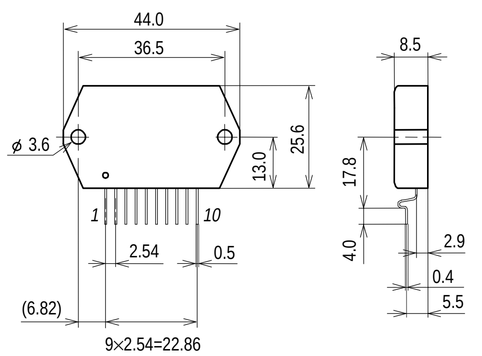


Designated Transformer Power Supply (MG-25 equivalent)

Package Dimensions

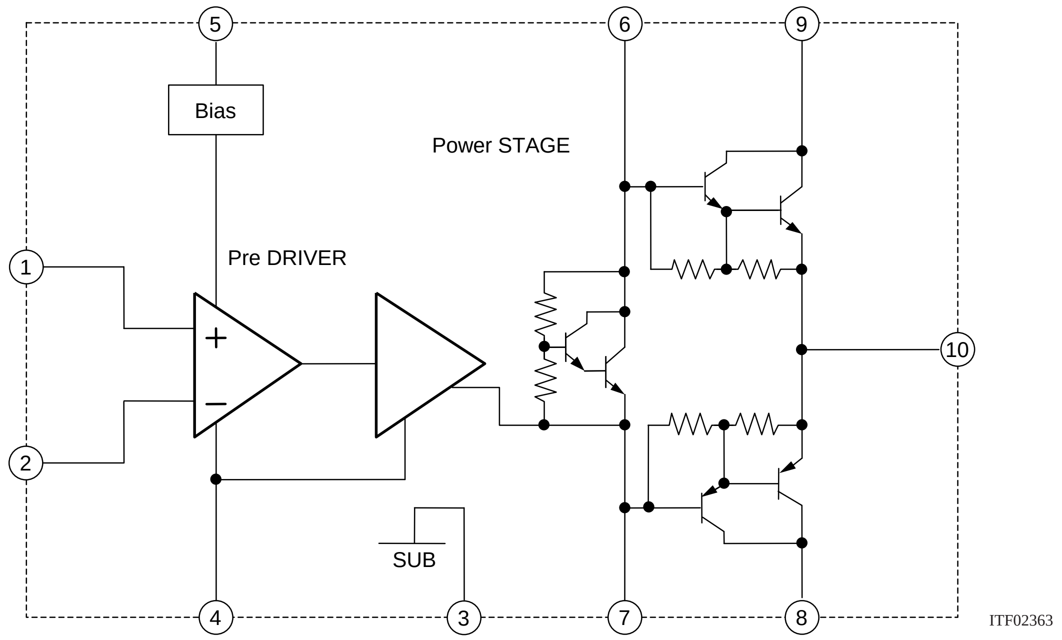
unit : mm

4203

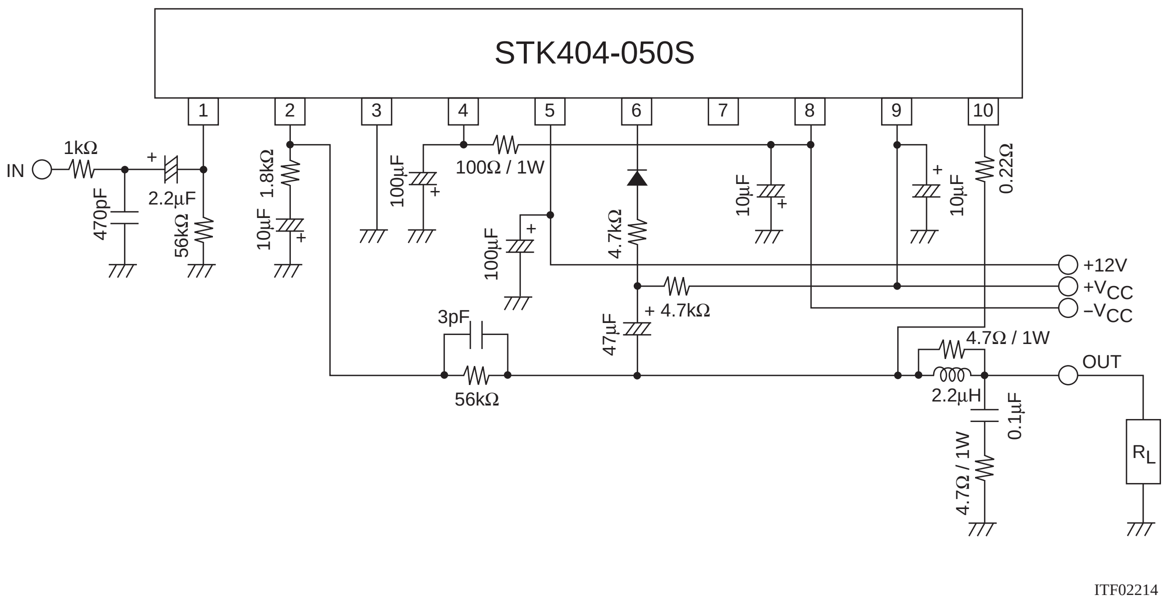


SANYO : SIP10

Internal Equivalent Circuit



Sample Application Circuit



Thermal Design Example

If we define Pd, the total power dissipation on the board when this hybrid IC is in operation, the heat sink thermal resistance, θc-a, is determined as follows:

Condition 1: The hybrid IC substrate temperature Tc must not exceed 125°C.

$Pd \times \theta c\text{-}a + Ta < 125°C$ ... (1)

Ta: Guaranteed ambient temperature for the end product.

Condition 2: The junction temperature of each transistor must not exceed 150°C.

$Pd \times \theta c\text{-}a + Pd/N \times \theta j\text{-}c + Ta < 150°C$ ... (2)

N: Number of power transistors

θj-c: Thermal resistance per power transistor

We take the power dissipation in the power transistors to be Pd evenly distributed across those N power transistors.

If we solve for θc-a in equations (1) and (2), we get the following inequalities:

$\theta c\text{-}a < (125 - Ta)/Pd$ ... (3)

$\theta c\text{-}a < (150 - Ta)/Pd - \theta j\text{-}c/N$ ... (4)

Values that satisfy both these inequalities at the same time are the required heat sink thermal resistance values.

Example:

For actual music signals, it is usual to use a Pd of 1/8 of $P_O$max, which is the power estimated for continuous signals in this manner. (Note that depending on the particular safety standard used, a value somewhat different from the value of 1/8 used here may be used.)

When $V_{CC} = \pm 26V$ and $R_L = 6\Omega$, we get the following expression for the total power dissipation on the board, Pd:

Pd = 15W (when 1/8 $P_O$max is 3.8W) ... (5)

The number, N, of power transistors in the hybrid IC’s audio amplifier block is 2. Since the thermal resistance, θj-c, per transistor is 3.0°C/W, the required heat sink thermal resistance, θc-a, for a guaranteed ambient temperature of 50°C will be as follows:

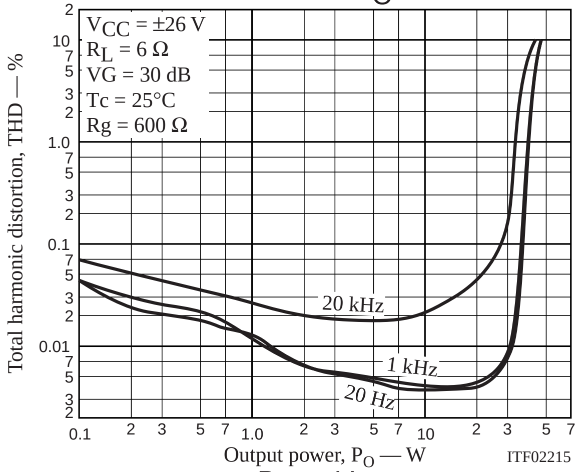
From inequality (3): $\theta c\text{-}a < (125 - 50)/15 = 5.00$ ... (6)

From inequality (4): $\theta c\text{-}a < (150 - 50)/15 - 3.0/2 = 5.17$ ... (7)

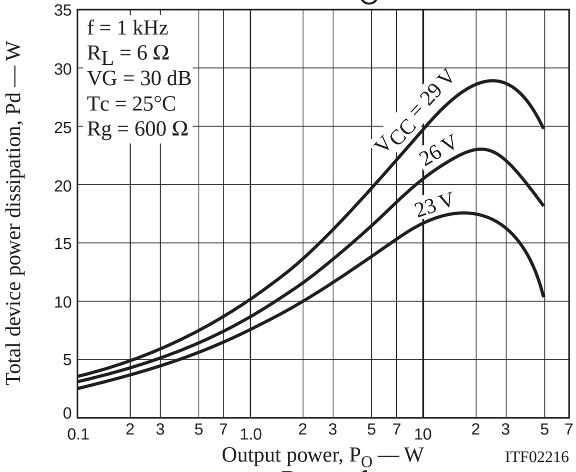
Therefore, the thermal resistance that satisfies both these expressions (6,7) at the same time is 5.0°C/W.

Note that this thermal design example assumes the use of a constant-voltage power supply, and is only provided as an example for reference purposes. Thermal designs must be tested in an actual end product.

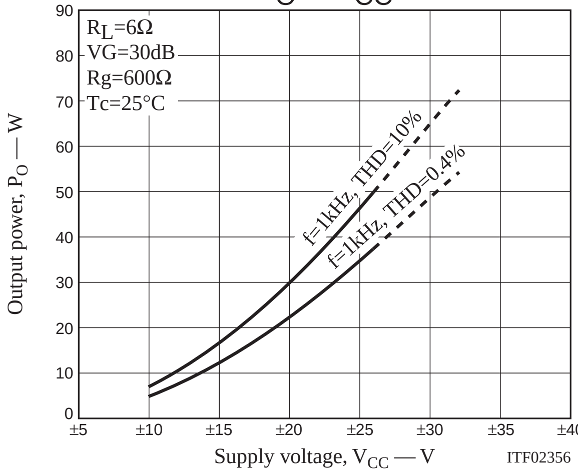
THD — P_O



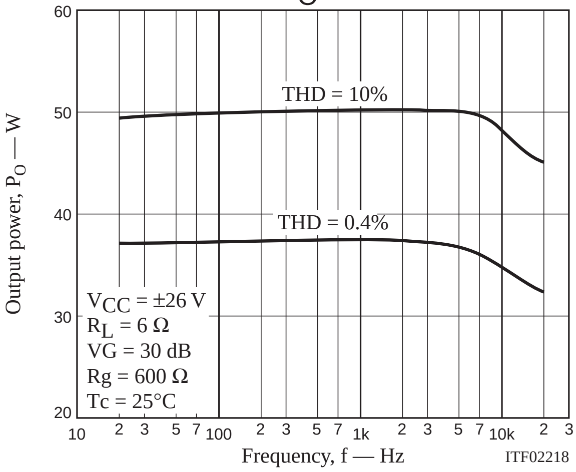
Pd — P_O



P_O — V_{CC}



P_O — f



This catalog provides information as of May, 2004. Specifications and information herein are subject to change without notice.

Preliminary

SANYO Semiconductors

DATA SHEET

STK404-070S — Thick-Film Hybrid IC One-Channel Class AB Audio Power Amplifier IC 40W

Overview

The STK404-000S series products are audio power amplifier hybrid ICs that consist of optimally-designed discrete component power amplifier circuits that have been miniaturized using SANYO's unique insulated metal substrate technology (IMST). The adoption of a newly-developed low thermal resistance substrate allows this series of devices to be provided in miniature packages significantly more compact than earlier SANYO products with similar specifications.

Features

- Series of pin compatible power amplifiers ranging from 45W to 180W (10%/1kHz) devices. The same printed circuit board can be used depending on the output power grade.
- Miniature packages
  - 30W to 40W (THD=0.4%, f=20Hz to 20kHz); 44.0mm × 25.6mm × 8.5mm *
  - 50W to 80W (THD=0.4%, f=20Hz to 20kHz); 46.6mm × 25.5mm × 8.5mm *
  - 100W to 120W (THD=0.4%, f=20Hz to 20kHz); 59.2mm × 25.5mm × 8.5mm *

*: Not including the pins.

- Output load impedance: R_L=6Ω
- Allowable load shorted time: 0.3 seconds
- Supports the use of standby, muting, and load shorting protection circuits.

Series Organization

These products are organized as a series based on their output capacity.

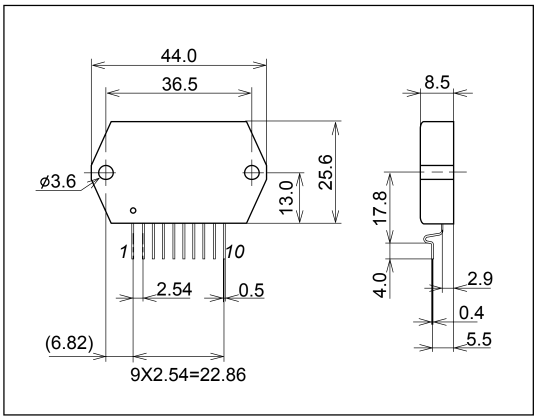
Item	Type No.						
	STK404-050S	STK404-070S	STK404-090S	STK404-100S	STK404-120S	STK404-130S	STK404-140S
Output 1 (0.4%/20Hz to 20kHz)	30W	40W	50W	60W	80W	100W	120W
Output 2 (10%/1kHz)	45W	60W	80W	90W	120W	150W	180W
Maximum supply voltage (6Ω)	±37V	±43V	±46V	±51V	±59V	±64V	±73V
Recommended supply voltage (6Ω)	±26V	±30V	±32V	±35V	±41V	±45V	±51V
Remarks	-		Built-in thermal protection circuit				
Package	44.0mm × 25.6mm × 8.5mm		46.6mm × 25.5mm × 8.5mm			59.2mm × 25.5mm × 8.5mm	

SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Package Dimensions

unit : mm

4203



Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage (Quiescent)	V_{CC} max(0)		±46	V
Maximum supply voltage	V_{CC} max(1)	R_L=6Ω	±43	V
Thermal resistance	θj-c	Per power transistor	2.6	°C /W
Junction temperature	Tj max	Both the Tj max and the Tc max conditions must be met.	150	°C
IC substrate operating temperature	Tc max		125	°C
Storage temperature	Tstg		-30 to +125	°C
Allowable load shorted time *3	ts	V_{CC}=±30V, R_L=6Ω, f=50Hz, P_O=40W	0.3	s

Operating Characteristics at Tc=25°C, R_L=6Ω (noninductive load), Rg=600Ω, VG=30dB

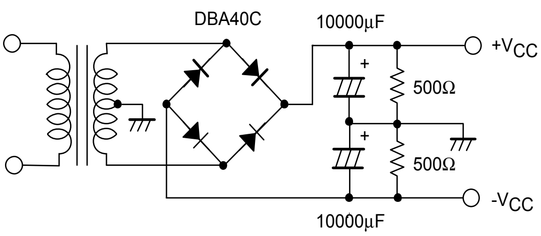
Parameter	Symbol	Conditions *1					Ratings			Unit
		V_{CC}(V)	f(Hz)	P_O(W)	THD(%)		min	typ	max	
Output power	P_O(1)	±30.0	20 to 20k		0.4		40			W
	P_O(2)	±30.0	1k		10			60		W
Frequency characteristics	f_L,f_H	±30.0		1.0		+0 -3dB	20 to 20k			Hz
Input impedance	ri	±30.0	1k	1.0				55		kΩ
Output noise voltage *2	V_{NO}	±36.0				Rg=10kΩ		1.2		mVrms
Quiescent current	I_{CCO}	±36.0				No load			50	mA
Neutral voltage	V_N	±36.0					-100	0	+100	mV

Notes: 1. Unless otherwise noted, a constant-voltage supply must be used during inspection.

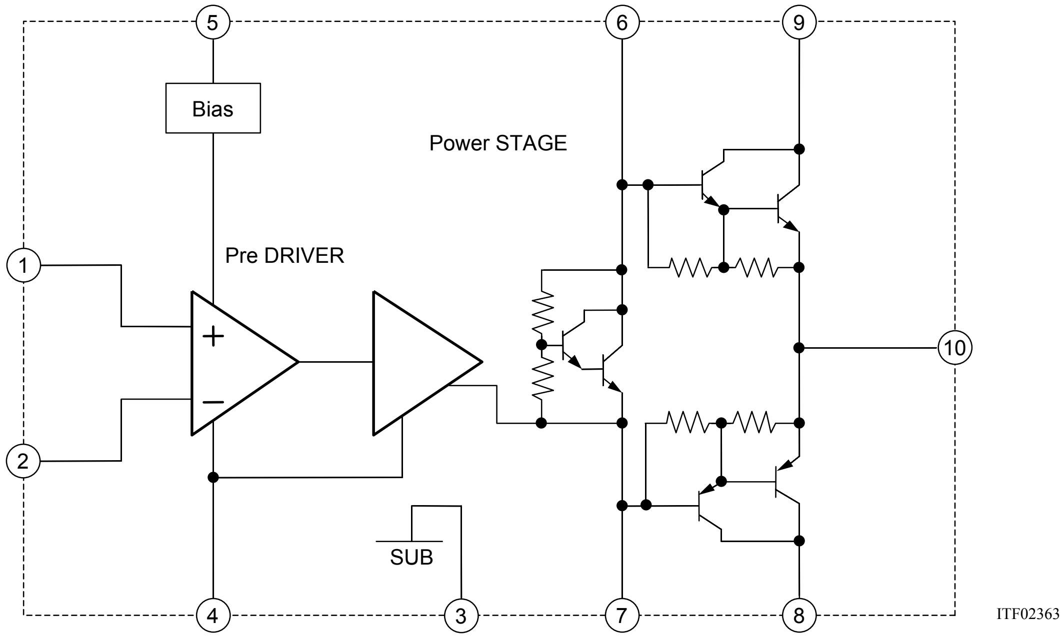
2. The output noise voltage values shown are peak values read with a VTVM. However, an AC stabilized (50Hz) power supply should be used to minimize the influence of AC primary side flicker noise on the reading.

3. Use the transformer power supply circuit shown in the figure below for allowable load shorted time measurement and output noise voltage measurement. This IC is designed assuming that applications will provide a power cut-off or other load-shorting protection function that is activated within 0.3 seconds of the load being shorted.

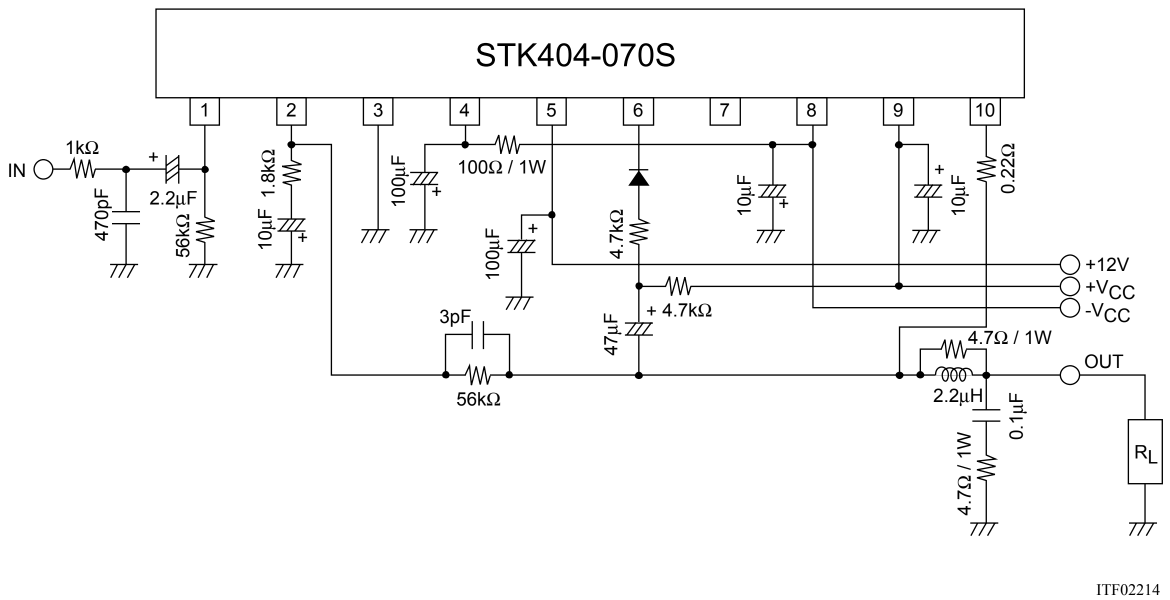
Designated Transformer Power Supply (RP-25 equivalent)



Internal Equivalent Circuit



Sample Application Circuit



Thermal Design Example

If we define Pd, the total power dissipation on the board when this hybrid IC is in operation, the heat sink thermal resistance, θc-a, is determined as follows:

Condition 1: The hybrid IC substrate temperature Tc must not exceed 125°C.

$Pd \times \theta c\text{-}a + Ta < 125°C$ ··· (1)

Ta: Guaranteed ambient temperature for the end product.

Condition 2: The junction temperature Tj of each transistor must not exceed 150°C.

$Pd \times \theta c\text{-}a + Pd/N \times \theta j\text{-}c + Ta < 150°C$ ··· (2)

N: Number of power transistors

θj-c: Thermal resistance per power transistor

We take the power dissipation in the power transistors to be Pd evenly distributed across those N power transistors.

If we solve for θc-a in equations (1) and (2), we get the following inequalities:

$\theta c\text{-}a < (125 - Ta)/Pd$ ··· (3)

$\theta c\text{-}a < (150 - Ta)/Pd - \theta j\text{-}c/N$ ··· (4)

The value that satisfies both of these inequalities at the same time is the required heat sink thermal resistance value.

Example:

For actual music signals, it is usual to use a Pd of 1/8 of P_O max, which is the power estimated for continuous signals in this manner. (Note that depending on the particular safety standard used, a value somewhat different from the value of 1/8 used here may be used.)

When $V_{CC} = \pm 30V$ and $R_L = 6\Omega$, we get the following expression for the total power dissipation on the board, Pd:

Pd = 20W (when 1/8 P_O max is 5.0W) ··· (5)

The number, N, of power transistors in the hybrid IC's audio amplifier block is 2. Since the thermal resistance, θj-c, per transistor is 2.6°C/W, the required heat sink thermal resistance, θc-a, for a guaranteed ambient temperature Ta of 50°C will be as follows:

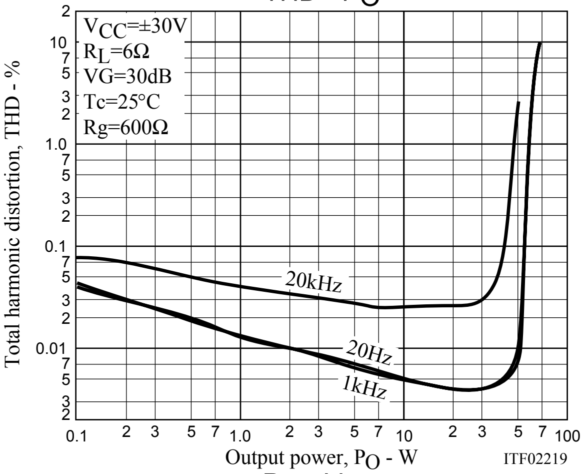
From inequality (3): $\theta c\text{-}a < (125 - 50)/20 = 3.75$ ··· (6)

From inequality (4): $\theta c\text{-}a < (150 - 50)/20 - 2.6/2 = 3.70$ ··· (7)

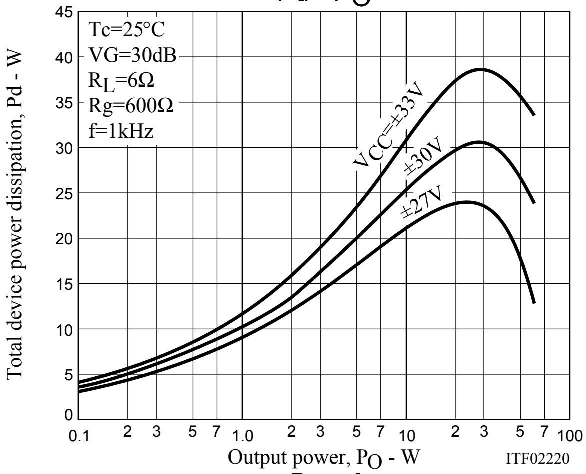
Therefore, the thermal resistance that satisfies both of these expressions (6 and 7) at the same time is 3.70°C/W.

Note that this thermal design example assumes the use of a constant-voltage power supply, and is only provided as an example for reference purposes. Thermal designs must be tested in an actual end product.

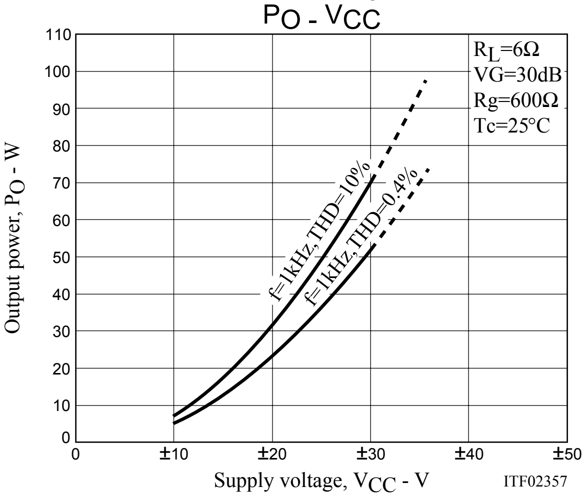
THD - P_O



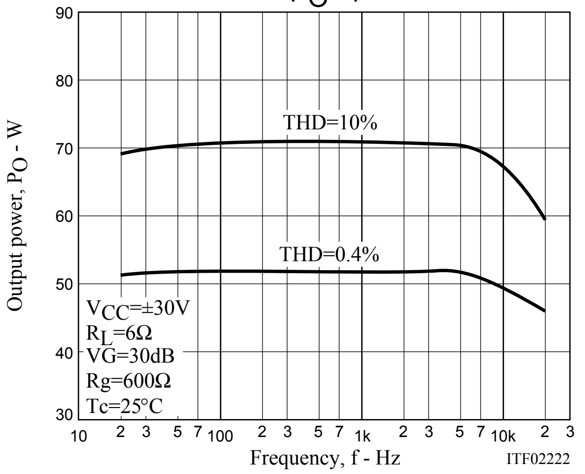
Pd - P_O



P_O - V_{CC}



P_O - f



This catalog provides information as of December, 2005. Specifications and information herein are subject to change without notice.

Ordering number : ENN7728

SANYO Semiconductors
DATA SHEET

STK404-090S — One-Channel Class AB Audio Power Amplifier IC 50W

Thick-Film Hybrid IC

Overview

The STK404-000S series products are audio power amplifier hybrid ICs that consist of optimally-designed discrete component power amplifier circuits that have been miniaturized using SANYO's unique insulated metal substrate technology (IMST). The adoption of a newly-developed low thermal resistance substrate allows this series of devices to be provided in miniature packages significantly more compact than earlier Sanyo products with similar specifications.

Features

- Series of pin compatible power amplifiers ranging from 45W to 180W (10%/1kHz) devices. The same printed circuit board can be used depending on the output power grade.
- Miniature packages
  - — 30W to 40W (THD=0.4%, f=20Hz to 20kHz); 44.0mm × 25.6mm × 8.5mm *
  - — 50W to 80W (THD=0.4%, f=20Hz to 20kHz); 46.6mm × 25.5mm × 8.5mm *
  - — 100W to 120W (THD=0.4%, f=20Hz to 20kHz); 59.2mm × 25.5mm × 8.5mm *

  *: Not including the pins.
- Output load impedance: R_L=6Ω
- Allowable load shorted time: 0.3 seconds
- Built-in thermal protection circuit
- Supports the use of standby, muting, and load shorting protection circuits.

Series Organization

These products are organized as a series based on their output capacity.

Item	Type No.						
	STK404-050S	STK404-070S	STK404-090S	STK404-100S	STK404-120S	STK404-130S	STK404-140S
Output 1 (0.4%/20Hz to 20kHz)	30W	40W	50W	60W	80W	100W	120W
Output 2 (10%/1kHz)	45W	60W	80W	90W	120W	150W	180W
Maximum supply voltage (6Ω)	±37V	±43V	±46V	±51V	±59V	±64V	±73V
Recommended supply voltage (6Ω)	±26V	±30V	±32V	±35V	±41V	±45V	±51V
Remarks	—		Built-in thermal protection circuit				
Package	44.0mm × 25.6mm × 8.5mm		46.6mm × 25.5mm × 8.5mm			59.2mm × 25.5mm × 8.5mm	

SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Specifications

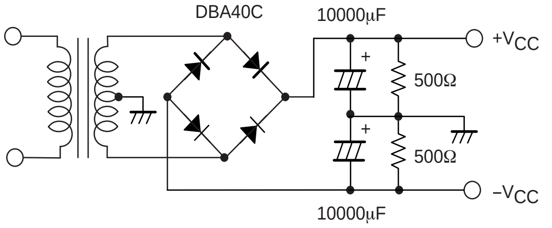
Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage (No signal)	V_{CC} max(0)		±50	V
Maximum supply voltage	V_{CC} max(1)	R_L=6Ω	±46	V
Thermal sensor maximum voltage	Vp	Between pins 1 and 4	16	V
Thermal sensor maximum current	Ip	Between pins 1 and 4	30	mA
Thermal resistance	θj-c	Per power transistor	2.2	°C/W
Junction temperature	Tj max	Both the Tj max and the Tc max conditions must be met.	150	°C
IC substrate operating temperature	Tc max		125	°C
Thermal sensor operating temperature *2	Tp max		145	°C
Storage temperature	Tstg		–30 to +125	°C
Allowable load shorted time *4	ts	V_{CC}=±32.0V, R_L=6Ω, f = 50Hz, P_O=50W	0.3	s

Operating Characteristics at Tc=25°C, R_L=6Ω (noninductive load), Rg=600Ω, VG=30dB

Parameter	Symbol	Conditions*1					Ratings			Unit
		V_{CC} (V)	f (Hz)	P_O (W)	THD (%)		min	typ	max	
Output power	P_O (1)	±32.0	20 to 20k		0.4		50			W
	P_O (2)	±32.0	1 k		10			80		
Frequency characteristics	f_L, f_H	±32.0		1.0		+0 –3 dB		20 to 20k		Hz
Input impedance	ri	±32.0	1 k	1.0				55		kΩ
Output noise voltage *3	V_{NO}	±38.0				Rg=10kΩ		1.2		mVrms
Quiescent current	I_{CCO}	±38.0				No loading			50	mA
Neutral voltage	V_N	±38.0					–100	0	+100	mV
Thermal sensor resistance	Rp	Tp=25°C, between pins 1 and 4						470		Ω
Thermal sensor temperature	Tp	Rp=4.7kΩ, between pins 1 and 4						145		°C

Notes: 1. Unless otherwise noted, use a constant-voltage supply for the power supply used during inspection.
2. The Thermal sensor temperature (+125 to +145°C) is designed to prevent incorrect operation, but does not guarantee continued operation of the hybrid IC. The total integrated time this device spends operating in the temperature range +125 to +145°C must not exceed 12 hours.
3. The output noise voltage values shown are peak values read with a VTVM. However, an AC stabilized (50Hz) power supply should be used to minimize the influence of AC primary side flicker noise on the reading.
4. Use the transformer power supply circuit shown in the figure below for allowable load shorted time measurement and output noise voltage measurement. This IC is designed assuming that applications will provide a power cut-off or other load-shorting protection function that is activated within 0.3 seconds of the load being shorted.

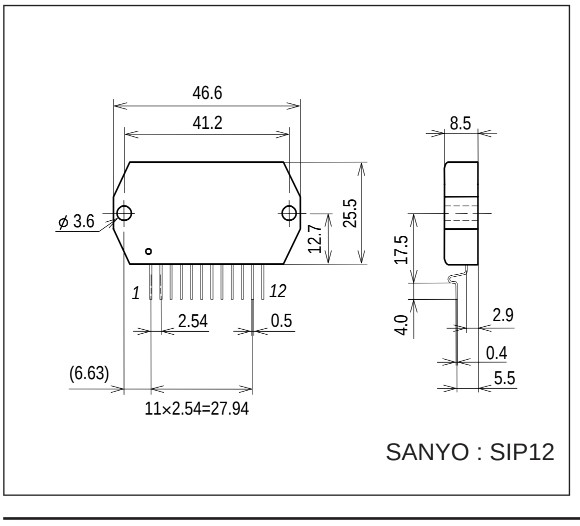


Designated Transformer Power Supply (MG-200 equivalent)

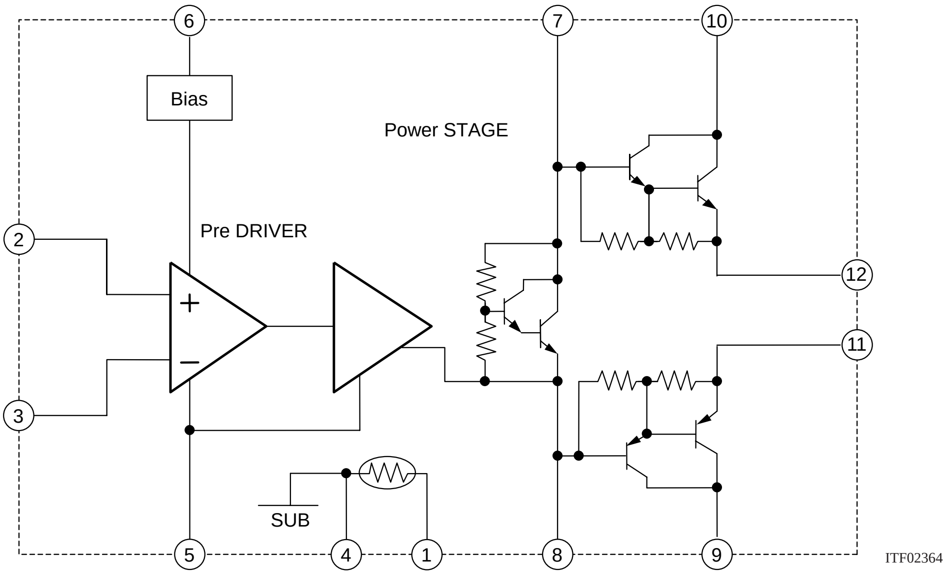
Package Dimensions

unit : mm

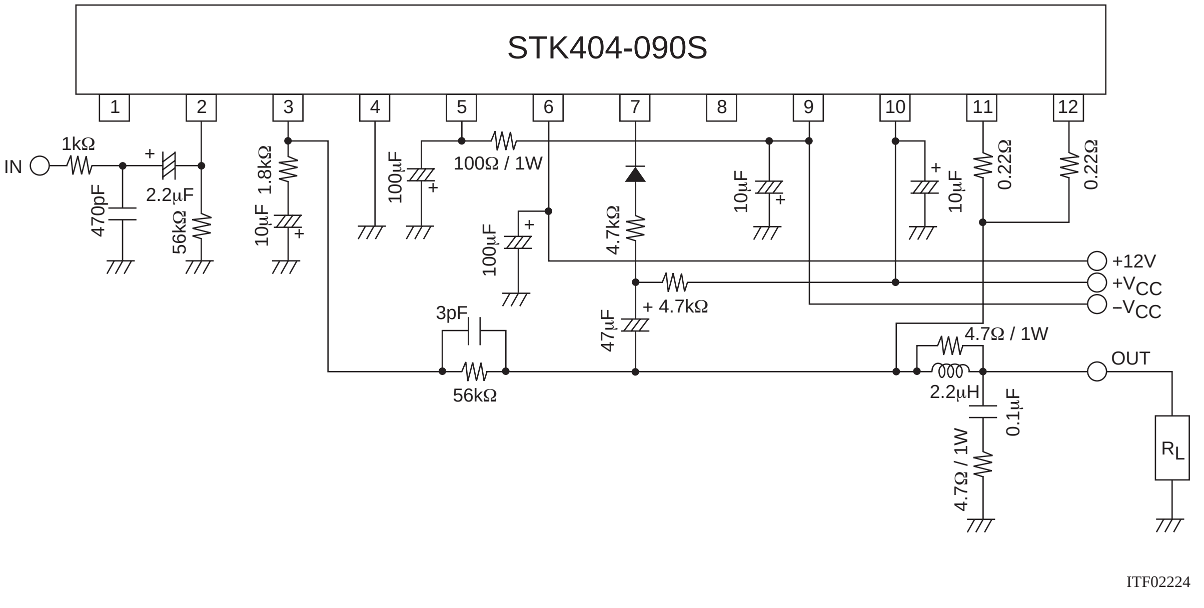
4204



Internal Equivalent Circuit



Sample Application Circuit



Thermal Design Example

If we define Pd, the total power dissipation on the board when this hybrid IC is in operation, the heat sink thermal resistance, θc-a, is determined as follows:

Condition 1: The hybrid IC substrate temperature Tc must not exceed 125°C.

$Pd \times \theta c\text{-}a + Ta < 125°C$ ... (1)

Ta: Guaranteed ambient temperature for the end product.

Condition 2: The junction temperature of each transistor must not exceed 150°C.

$Pd \times \theta c\text{-}a + Pd/N \times \theta j\text{-}c + Ta < 150°C$ ... (2)

N: Number of power transistors

θj-c: Thermal resistance per power transistor

We take the power dissipation in the power transistors to be Pd evenly distributed across those N power transistors.

If we solve for θc-a in equations (1) and (2), we get the following inequalities:

$\theta c\text{-}a < (125 - Ta)/Pd$ ... (3)

$\theta c\text{-}a < (150 - Ta)/Pd - \theta j\text{-}c/N$ ... (4)

Values that satisfy both these inequalities at the same time are the required heat sink thermal resistance values.

Example:

For actual music signals, it is usual to use a Pd of 1/8 of $P_O$max, which is the power estimated for continuous signals in this manner. (Note that depending on the particular safety standard used, a value somewhat different from the value of 1/8 used here may be used.)

When $V_{CC} = \pm 32V$ and $R_L = 6\Omega$, we get the following expression for the total power dissipation on the board, Pd:

Pd = 23W (when 1/8 $P_O$max is 6.3W) ... (5)

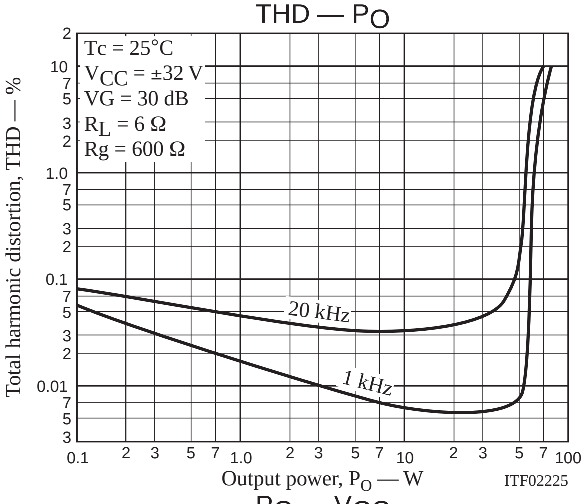
The number, N, of power transistors in the hybrid IC's audio amplifier block is 2. Since the thermal resistance, θj-c, per transistor is 2.2°C/W, the required heat sink thermal resistance, θc-a, for a guaranteed ambient temperature of 50°C will be as follows:

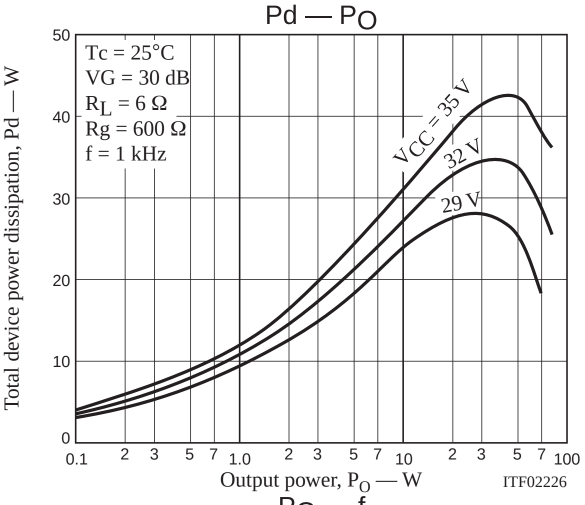
From inequality (3): $\theta c\text{-}a < (125 - 50)/23 = 3.26$ ... (6)

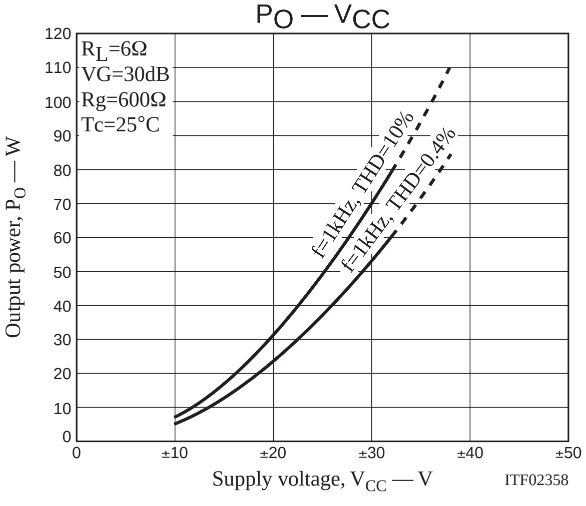
From inequality (4): $\theta c\text{-}a < (150 - 50)/23 - 2.2/2 = 3.24$ ... (7)

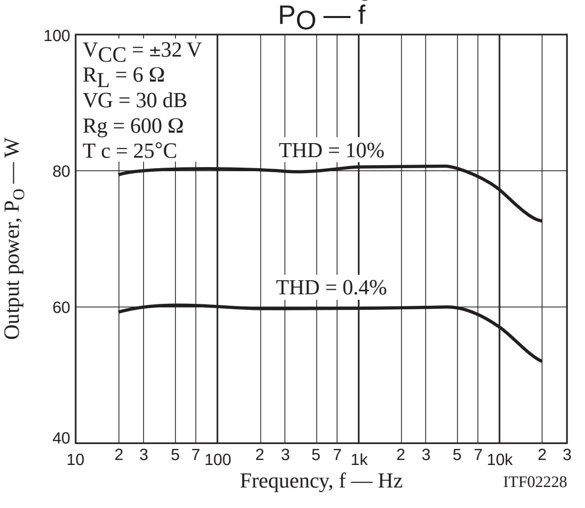
Therefore, the thermal resistance that satisfies both these expressions (6,7) at the same time is 3.24°C/W.

Note that this thermal design example assumes the use of a constant-voltage power supply, and is only provided as an example for reference purposes. Thermal designs must be tested in an actual end product.









This catalog provides information as of May, 2004. Specifications and information herein are subject to change without notice.

Ordering number : EN7733

SANYO

SANYO Semiconductors

DATA SHEET

STK404-120S

Thick-Film Hybrid IC

One-Channel Class AB Audio Power Amplifier IC 80W

Overview

The STK404-000S series products are audio power amplifier hybrid ICs that consist of optimally-designed discrete component power amplifier circuits that have been miniaturized using SANYO's unique insulated metal substrate technology (IMST). The adoption of a newly-developed low thermal resistance substrate allows this series of devices to be provided in miniature packages significantly more compact than earlier SANYO products with similar specifications.

Features

- Series of pin compatible power amplifiers ranging from 45W to 180W (10%/1kHz) devices. The same printed circuit board can be used depending on the output power grade.
- Miniature packages
  - 30W to 40W (THD=0.4%, f=20Hz to 20kHz); 44.0mm × 25.6mm × 8.5mm *
  - 50W to 80W (THD=0.4%, f=20Hz to 20kHz); 46.6mm × 25.5mm × 8.5mm *
  - 100W to 120W (THD=0.4%, f=20Hz to 20kHz); 59.2mm × 25.5mm × 8.5mm *

*: Not including the pins.

- Output load impedance: R_L=6Ω
- Allowable load shorted time: 0.3 seconds
- Built-in thermal protection circuit
- Supports the use of standby, muting, and load shorting protection circuits.

Series Organization

These products are organized as a series based on their output capacity.

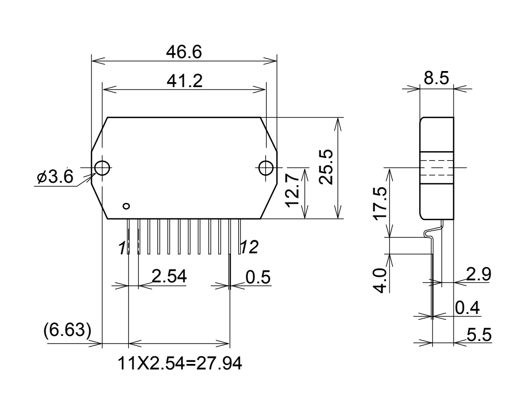
Item	Type No.						
	STK404-050S	STK404-070S	STK404-090S	STK404-100S	STK404-120S	STK404-130S	STK404-140S
Output 1 (0.4%/20Hz to 20kHz)	30W	40W	50W	60W	80W	100W	120W
Output 2 (10%/1kHz)	45W	60W	80W	90W	120W	150W	180W
Maximum supply voltage (6Ω)	±37V	±43V	±46V	±51V	±59V	±64V	±73V
Recommended supply voltage (6Ω)	±26V	±30V	±32V	±35V	±41V	±45V	±51V
Remarks	-		Built-in thermal protection circuit				
Package	44.0mm × 25.6mm × 8.5mm		46.6mm × 25.5mm × 8.5mm			59.2mm × 25.5mm × 8.5mm	

SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Package Dimensions

unit : mm

4204



Specifications

Maximum Ratings at Ta = 25°C

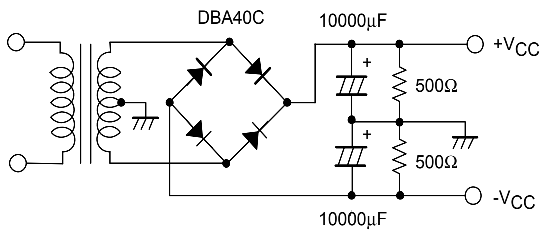
Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage (Quiescent)	V_{CC} max(0)		±65	V
Maximum supply voltage	V_{CC} max(1)	R_L=6Ω	±59	V
Thermal sensor maximum voltage	Vp	Between pins 1 and 4	16	V
Thermal sensor maximum current	Ip	Between pins 1 and 4	30	mA
Thermal resistance	θj-c	Per power transistor	1.9	°C /W
Junction temperature	Tj max	Both the Tj max and the Tc max conditions must be met.	150	°C
IC substrate operating temperature	Tc max		125	°C
Thermal sensor operating temperature *2	Tp max		145	°C
Storage temperature	Tstg		-30 to +125	°C
Allowable load shorted time *4	ts	V_{CC}=±41.0V, R_L=6Ω, f=50Hz, P_O=80W	0.3	s

Operating Characteristics at Tc=25°C, R_L=6Ω (noninductive load), Rg=600Ω, VG=30dB

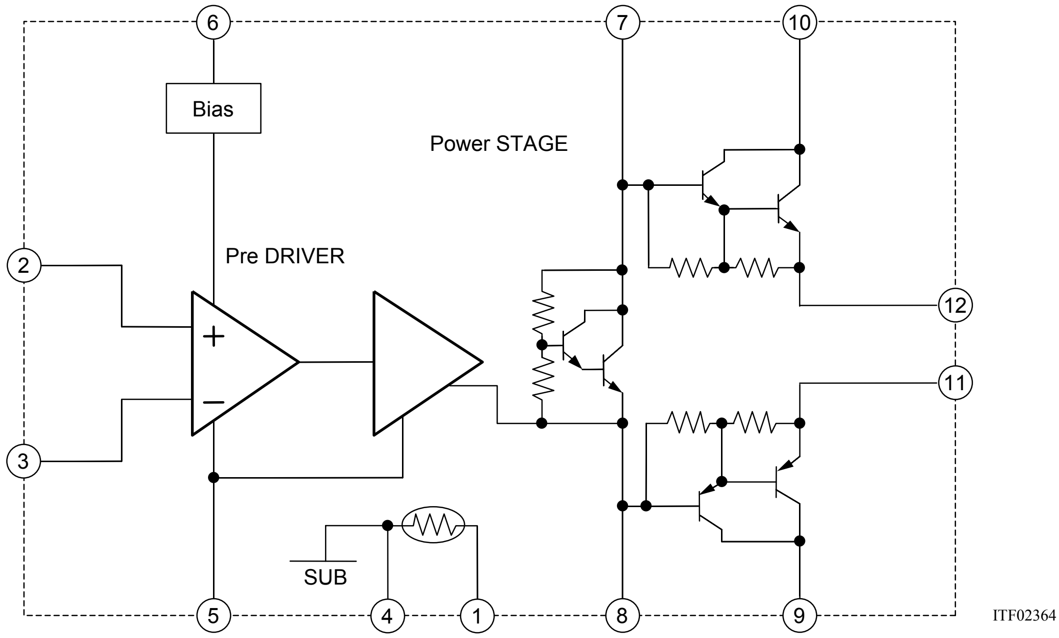
Parameter	Symbol	Conditions *1					Ratings			Unit
		V_{CC}(V)	f(Hz)	P_O(W)	THD(%)		min	typ	max	
Output power	P_O(1)	±41.0	20 to 20k		0.4		80			W
	P_O(2)	±41.0	1k		10			120		W
Frequency characteristics	f_L,f_H	±41.0		1.0		+0 -3dB		20 to 20k		Hz
Input impedance	ri	±41.0	1k	1.0				55		kΩ
Output noise voltage *3	V_{NO}	±49.0				Rg=10kΩ		1.2		mVrms
Quiescent current	I_{CCO}	±49.0				No load			50	mA
Neutral voltage	V_N	±49.0					-100	0	+100	mV
Thermal sensor resistance	Rp	Tp=25°C, between pins 1 and 4						470		Ω
Thermal sensor temperature	Tp	Rp=4.7kΩ, between pins 1 and 4						145		°C

Notes: 1. Unless otherwise noted, a constant-voltage supply must be used during inspection.
2. The thermal sensor temperature (+125 to +145°C) is designed to prevent incorrect operation, but does not guarantee continued operation of the hybrid IC. The total integrated time this device spends operating in the temperature range +125 to +145°C must not exceed 12 hours.
3. The output noise voltage values shown are peak values read with a VTVM. However, an AC stabilized (50Hz) power supply should be used to minimize the influence of AC primary side flicker noise on the reading.
4. Use the transformer power supply circuit shown in the figure below for allowable load shorted time measurement and output noise voltage measurement. This IC is designed assuming that applications will provide a power cut-off or other load-shorting protection function that is activated within 0.3 seconds of the load being shorted.

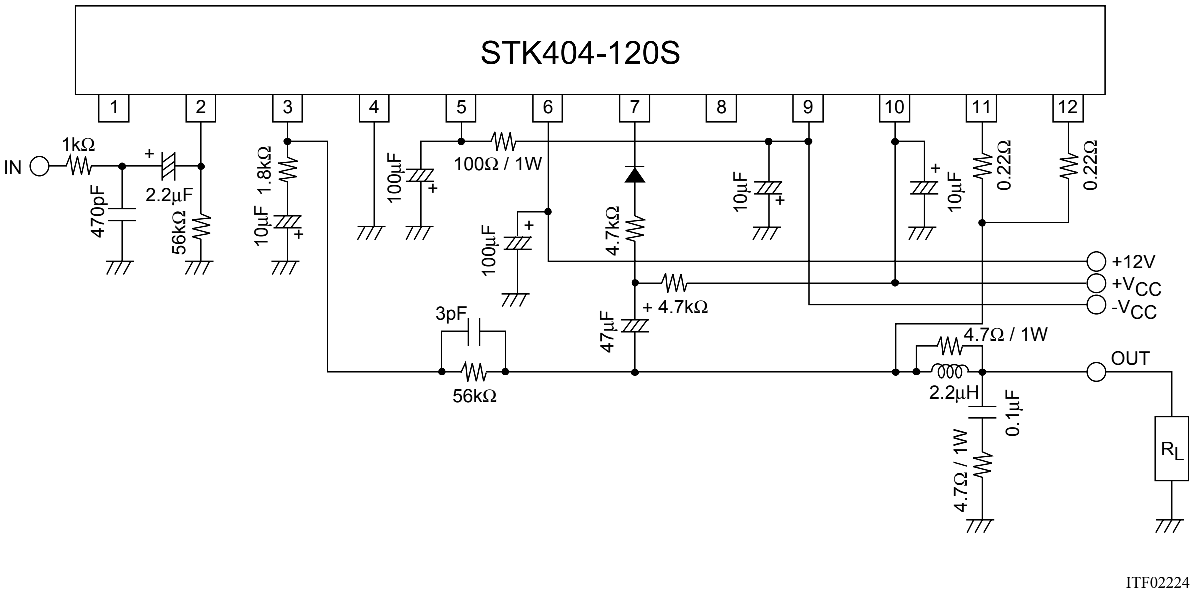
Designated Transformer Power Supply (MG-250 equivalent)



Internal Equivalent Circuit



Sample Application Circuit



Thermal Design Example

If we define Pd, the total power dissipation on the board when this hybrid IC is in operation, the heat sink thermal resistance, θc-a, is determined as follows:

Condition 1: The hybrid IC substrate temperature Tc must not exceed 125°C.

$Pd \times \theta c\text{-}a + Ta < 125°C$ ··························· (1)

Ta: Guaranteed ambient temperature for the end product.

Condition 2: The junction temperature Tj of each transistor must not exceed 150°C.

$Pd \times \theta c\text{-}a + Pd/N \times \theta j\text{-}c + Ta < 150°C$ ··························· (2)

N: Number of power transistors

θj-c: Thermal resistance per power transistor

We take the power dissipation in the power transistors to be Pd evenly distributed across those N power transistors.

If we solve for θc-a in equations (1) and (2), we get the following inequalities:

$\theta c\text{-}a < (125 - Ta)/Pd$ ··························· (3)

$\theta c\text{-}a < (150 - Ta)/Pd - \theta j\text{-}c/N$ ··························· (4)

The value that satisfies both of these inequalities at the same time is the required heat sink thermal resistance value.

Example:

For actual music signals, it is usual to use a Pd of 1/8 of P_O max, which is the power estimated for continuous signals in this manner. (Note that depending on the particular safety standard used, a value somewhat different from the value of 1/8 used here may be used.)

When $V_{CC} = \pm 41V$ and $R_L = 6\Omega$, we get the following expression for the total power dissipation on the board, Pd:

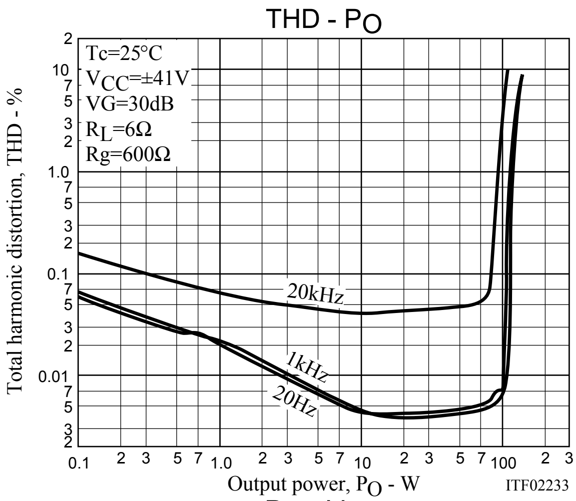
Pd = 38W (when 1/8 P_O max is 10.0W)··························· (5)

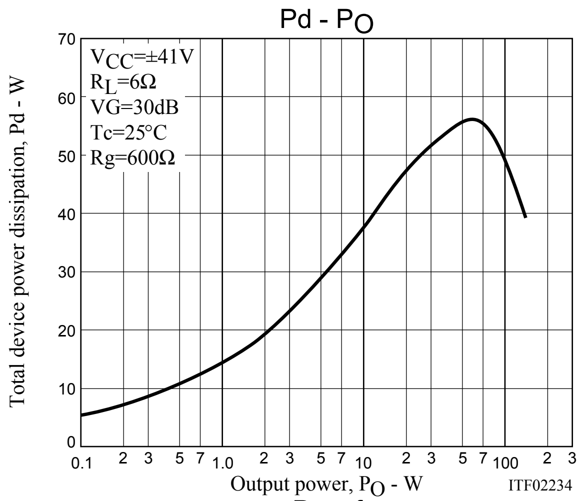
The number, N, of power transistors in the hybrid IC's audio amplifier block is 2. Since the thermal resistance, θj-c, per transistor is 1.9°C/W, the required heat sink thermal resistance, θc-a, for a guaranteed ambient temperature Ta of 50°C will be as follows:

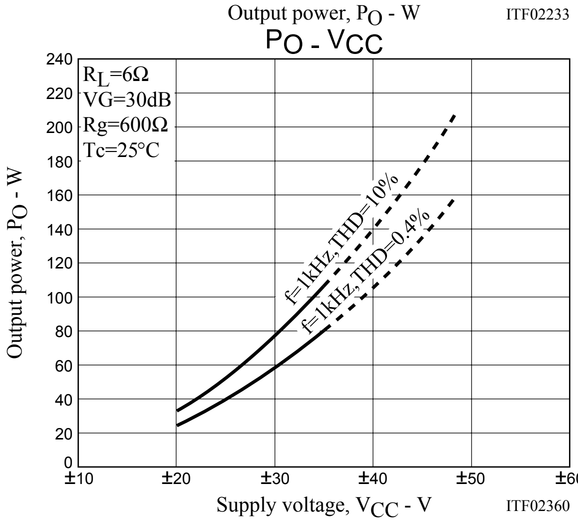
From inequality (3): $\theta c\text{-}a < (125 - 50)/38 = 1.97$ ··························· (6)

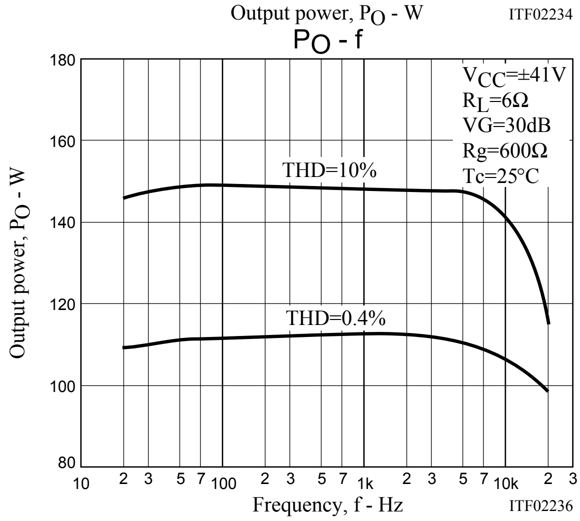
From inequality (4): $\theta c\text{-}a < (150 - 50)/38 - 1.9/2 = 1.68$ ··························· (7)

Therefore, the thermal resistance that satisfies both of these expressions (6 and 7) at the same time is 1.68°C/W.
Note that this thermal design example assumes the use of a constant-voltage power supply, and is only provided as an example for reference purposes. Thermal designs must be tested in an actual end product.









This catalog provides information as of December, 2005. Specifications and information herein are subject to change without notice.

Ordering number : ENN7730

SANYO Semiconductors

DATA SHEET

Thick-Film Hybrid IC

STK404-130S — One-Channel Class AB Audio Power Amplifier IC 100W

Overview

The STK404-000S series products are audio power amplifier hybrid ICs that consist of optimally-designed discrete component power amplifier circuits that have been miniaturized using SANYO's unique insulated metal substrate technology (IMST). The adoption of a newly-developed low thermal resistance substrate allows this series of devices to be provided in miniature packages significantly more compact than earlier Sanyo products with similar specifications.

Features

- Series of pin compatible power amplifiers ranging from 45W to 180W (10%/1kHz) devices. The same printed circuit board can be used depending on the output power grade.
- Miniature packages
  - — 30W to 40W (THD=0.4%, f=20Hz to 20kHz); 44.0mm × 25.6mm × 8.5mm *
  - — 50W to 80W (THD=0.4%, f=20Hz to 20kHz); 46.6mm × 25.5mm × 8.5mm *
  - — 100W to 120W (THD=0.4%, f=20Hz to 20kHz); 59.2mm × 25.5mm × 8.5mm *

  *: Not including the pins.
- Output load impedance: R_L=6Ω
- Allowable load shorted time: 0.3 seconds
- Built-in thermal protection circuit
- Supports the use of standby, muting, and load shorting protection circuits.

Series Organization

These products are organized as a series based on their output capacity.

Item	Type No.						
	STK404-050S	STK404-070S	STK404-090S	STK404-100S	STK404-120S	STK404-130S	STK404-140S
Output 1 (0.4%/20Hz to 20kHz)	30W	40W	50W	60W	80W	100W	120W
Output 2 (10%/1kHz)	45W	60W	80W	90W	120W	150W	180W
Maximum supply voltage (6Ω)	±37V	±43V	±46V	±51V	±59V	±64V	±73V
Recommended supply voltage (6Ω)	±26V	±30V	±32V	±35V	±41V	±45V	±51V
Remarks	—		Built-in thermal protection circuit				
Package	44.0mm × 25.6mm × 8.5mm		46.6mm × 25.5mm × 8.5mm			59.2mm × 25.5mm × 8.5mm	

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Specifications

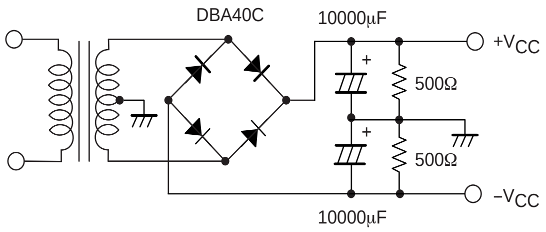
Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage (No signal)	V_{CC} max(0)		±70	V
Maximum supply voltage	V_{CC} max(1)	R_L=6Ω	±64	V
Thermal sensor maximum voltage	Vp	Between pins 1 and 2	16	V
Thermal sensor maximum current	Ip	Between pins 1 and 2	30	mA
Thermal resistance	θj-c	Per power transistor	1.3	°C/W
Junction temperature	Tj max	Both the Tj max and the Tc max conditions must be met.	150	°C
IC substrate operating temperature	Tc max		125	°C
Thermal sensor operating temperature *2	Tp max		145	°C
Storage temperature	Tstg		–30 to +125	°C
Allowable load shorted time *4	ts	V_{CC}=±45.0V, R_L=6Ω, f=50Hz, P_O=100W	0.3	s

Operating Characteristics at Tc=25°C, R_L=6Ω (noninductive load), Rg=600Ω, VG=30dB

Parameter	Symbol	Conditions*1					Ratings			Unit
		V_{CC} (V)	f (Hz)	P_O (W)	THD (%)		min	typ	max	
Output power	P_O (1)	±45.0	20 to 20 k		0.4		100			W
	P_O (2)	±45.0	1 k		10			150		
Frequency characteristics	f_L, f_H	±45.0		1.0		+0 –3 dB		20 to 20 k	Hz	
Input impedance	ri	±45.0	1 k	1.0				55		kΩ
Output noise voltage *3	V_{NO}	±54.0				Rg = 10 kΩ		1.2		mVrms
Quiescent current	I_{CCO}	±54.0				No loading			50	mA
Neutral voltage	V_N	±54.0					–100	0	+100	mV
Thermal sensor resistance	Rp	Tp=25°C, between pins 1 and 2						470		Ω
Thermal sensor temperature	Tp	Rp=4.7kΩ, between pins 1 and 2						145		°C

Notes: 1. Unless otherwise noted, use a constant-voltage supply for the power supply used during inspection.
2. The thermal sensor temperature (+125 to +145°C) is designed to prevent incorrect operation, but does not guarantee continued operation of the hybrid IC. The total integrated time this device spends operating in the temperature range +125 to +145°C must not exceed 12 hours.
3. The output noise voltage values shown are peak values read with a VTVM. However, an AC stabilized (50Hz) power supply should be used to minimize the influence of AC primary side flicker noise on the reading.
4. Use the transformer power supply circuit shown in the figure below for allowable load shorted time measurement and output noise voltage measurement.This IC is designed assuming that applications will provide a load-shorting protection function that operates within 0.3 seconds of the load being shorted and that either cuts off power to the IC or eliminates the load-shorted state in some other manner.

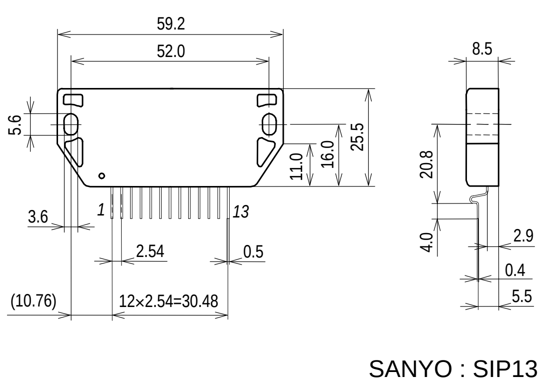


Designated Transformer Power Supply (MG-250 equivalent)

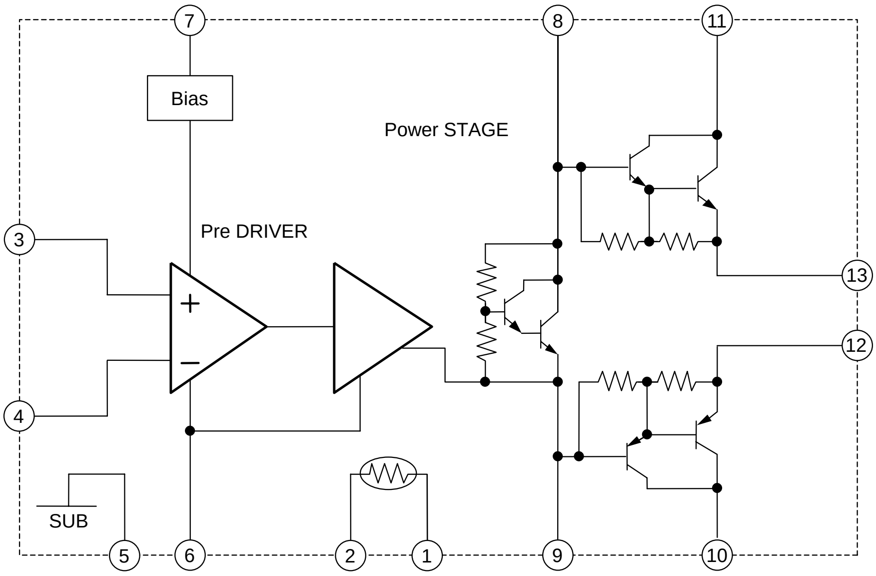
Package Dimensions

unit : mm

4205

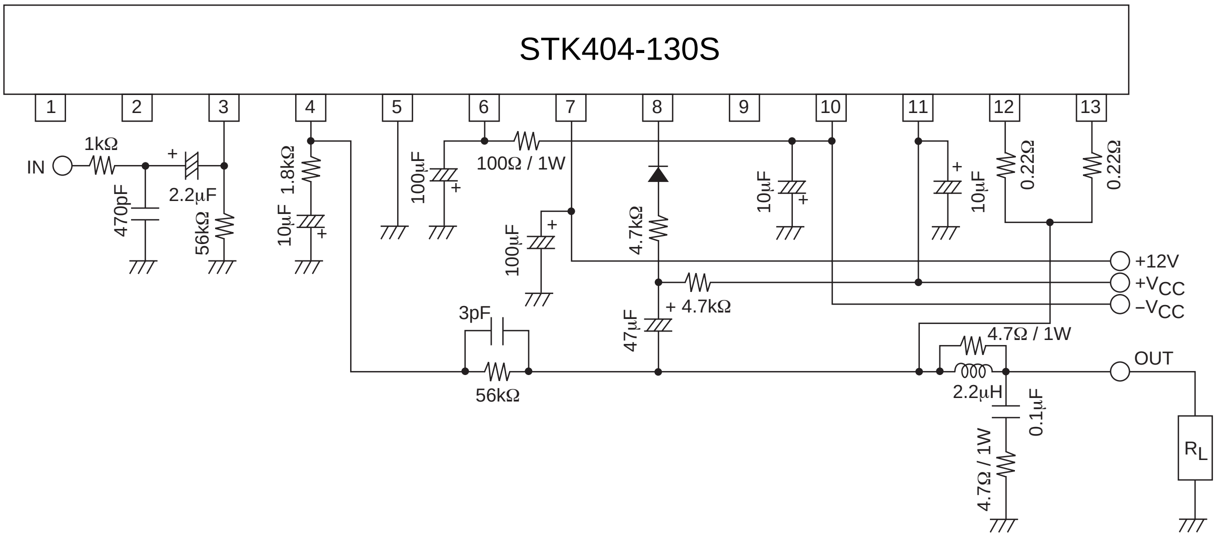


Internal Equivalent Circuit



ITF02365

Sample Application Circuit



ITF02238

Thermal Design Example

If we define Pd, the total power dissipation on the board when this hybrid IC is in operation, the heat sink thermal resistance, θc-a, is determined as follows:

Condition 1: The hybrid IC substrate temperature Tc must not exceed 125°C.

$Pd \times \theta c\text{-}a + Ta < 125°C$ ... (1)

Ta: Guaranteed ambient temperature for the end product.

Condition 2: The junction temperature of each transistor must not exceed 150°C.

$Pd \times \theta c\text{-}a + Pd/N \times \theta j\text{-}c + Ta < 150°C$ ... (2)

N: Number of power transistors

θj-c: Thermal resistance per power transistor

We take the power dissipation in the power transistors to be Pd evenly distributed across those N power transistors.

If we solve for θc-a in equations (1) and (2), we get the following inequalities:

$\theta c\text{-}a < (125 - Ta)/Pd$ ... (3)

$\theta c\text{-}a < (150 - Ta)/Pd - \theta j\text{-}c/N$ ... (4)

Values that satisfy both these inequalities at the same time are the required heat sink thermal resistance values.

Example:

For actual music signals, it is usual to use a Pd of 1/8 of $P_O$max, which is the power estimated for continuous signals in this manner. (Note that depending on the particular safety standard used, a value somewhat different from the value of 1/8 used here may be used.)

When $V_{CC} = \pm 45V$ and $R_L = 6\Omega$, we get the following expression for the total power dissipation on the board, Pd:

Pd = 47 W (when 1/8 $P_O$max is 12.5 W) ... (5)

The number, N, of power transistors in the hybrid IC's audio amplifier block is 2. Since the thermal resistance, θj-c, per transistor is 1.3°C/W, the required heat sink thermal resistance, θc-a, for a guaranteed ambient temperature of 50°C will be as follows:

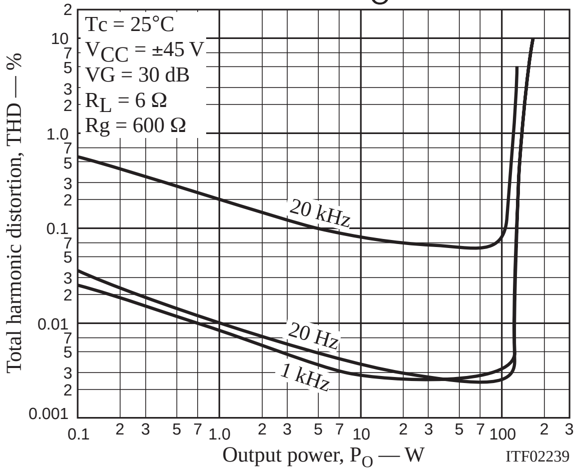
From inequality (3): $\theta c\text{-}a < (125 - 50)/47 = 1.59$ ... (6)

From inequality (4): $\theta c\text{-}a < (150 - 50)/47 - 1.3/2 = 1.48$ ... (7)

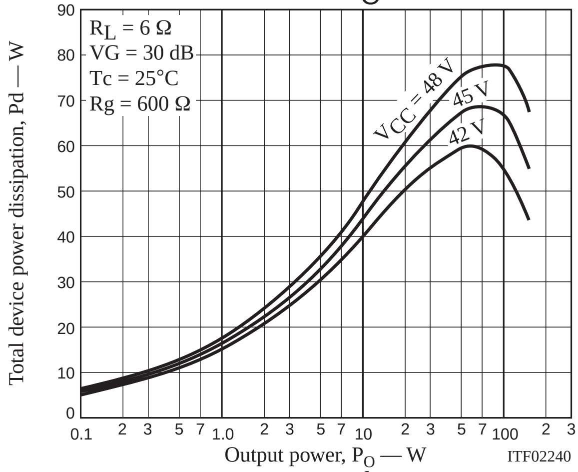
Therefore, the thermal resistance that satisfies both these expressions (6,7) at the same time is 1.48°C/W.

Note that this thermal design example assumes the use of a constant-voltage power supply, and is only provided as an example for reference purposes. Thermal designs must be tested in an actual end product.

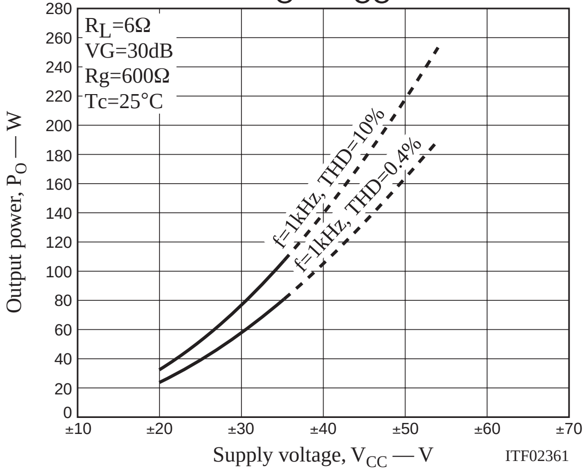
THD — P_O



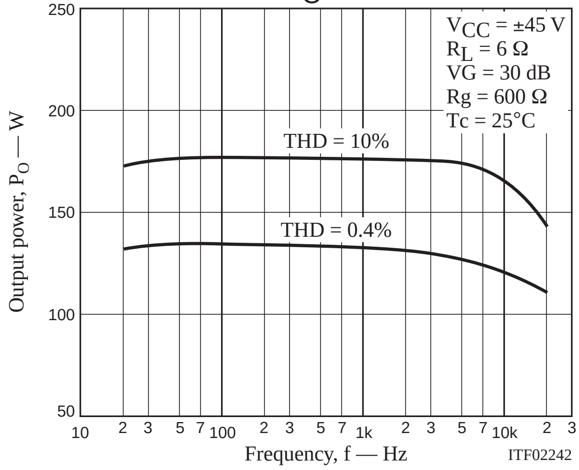
Pd — P_O



P_O — V_{CC}



P_O — f



This catalog provides information as of May, 2004. Specifications and information herein are subject to change without notice.

Ordering number : ENN7731

SANYO Semiconductors
DATA SHEET

Thick-Film Hybrid IC

STK404-140S — One-Channel Class AB Audio Power Amplifier IC 120W

Overview

The STK404-000S series products are audio power amplifier hybrid ICs that consist of optimally-designed discrete component power amplifier circuits that have been miniaturized using SANYO's unique insulated metal substrate technology (IMST). The adoption of a newly-developed low thermal resistance substrate allows this series of devices to be provided in miniature packages significantly more compact than earlier Sanyo products with similar specifications.

Features

- Series of pin compatible power amplifiers ranging from 45W to 180W (10%/1kHz) devices. The same printed circuit board can be used depending on the output power grade.
- Miniature packages
  — 30W to 40W (THD=0.4%, f=20Hz to 20kHz); 44.0mm × 25.6mm × 8.5mm *
  — 50W to 80W (THD=0.4%, f=20Hz to 20kHz); 46.6mm × 25.5mm × 8.5mm *
  — 100W to 120W (THD=0.4%, f=20Hz to 20kHz); 59.2mm × 25.5mm × 8.5mm *
  *: Not including the pins.
- Output load impedance: R_L=6Ω
- Allowable load shorted time: 0.3 seconds
- Built-in thermal protection circuit
- Supports the use of standby, muting, and load shorting protection circuits.

Series Organization

These products are organized as a series based on their output capacity.

Item	Type No.						
	STK404-050S	STK404-070S	STK404-090S	STK404-100S	STK404-120S	STK404-130S	STK404-140S
Output 1 (0.4%/20Hz to 20kHz)	30W	40W	50W	60W	80W	100W	120W
Output 2 (10%/1kHz)	45W	60W	80W	90W	120W	150W	180W
Maximum supply voltage (6Ω)	±37V	±43V	±46V	±51V	±59V	±64V	±73V
Recommended supply voltage (6Ω)	±26V	±30V	±32V	±35V	±41V	±45V	±51V
Remarks	—		Built-in thermal protection circuit				
Package	44.0mm × 25.6mm × 8.5mm		46.6mm × 25.5mm × 8.5mm			59.2mm × 25.5mm × 8.5mm	

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Specifications

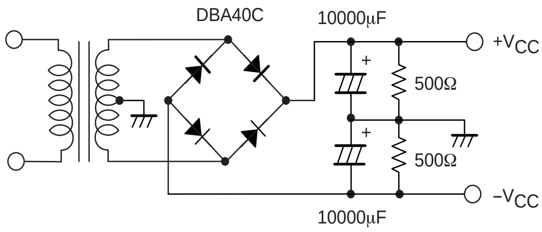
Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage (No signal)	V_{CC} max(0)		±78	V
Maximum supply voltage	V_{CC} max(1)	R_L=6Ω	±73	V
Thermal sensor maximum voltage	Vp	Between pins 1 and 2	16	V
Thermal sensor maximum current	Ip	Between pins 1 and 2	30	mA
Thermal resistance	θj-c	Per power transistor	1.2	°C/W
Junction temperature	Tj max	Both the Tj max and the Tc max conditions must be met.	150	°C
IC substrate operating temperature	Tc max		125	°C
Thermal sensor operating temperature *2	Tp max		145	°C
Storage temperature	Tstg		–30 to +125	°C
Allowable load shorted time *4	ts	V_{CC}=±51.0V, R_L=6Ω, f=50Hz, P_O=120W	0.3	s

Operating Characteristics at Tc=25°C, R_L=6Ω (noninductive load), Rg=600Ω, VG=30dB

Parameter	Symbol	Conditions*1					Ratings			Unit
		V_{CC} (V)	f (Hz)	P_O (W)	THD (%)		min	typ	max	
Output power	P_O (1)	±51.0	20 to 20k		0.4		120			W
	P_O (2)	±51.0	1k		10			180		W
Frequency characteristics	f_L, f_H	±51.0		1.0		+0 –3 dB	20 to 20k			Hz
Input impedance	ri	±51.0	1k	1.0				55		kΩ
Output noise voltage *3	V_{NO}	±62.0				Rg=10kΩ		1.2		mVrms
Quiescent current	I_{CCO}	±62.0				No loading			50	mA
Neutral voltage	V_N	±62.0					–100	0	+100	mV
Thermal sensor resistance	Rp	Tp=25°C, between pins 1 and 2						470		Ω
Thermal sensor temperature	Tp	Rp=4.7kΩ, between pins 1 and 2						145		°C

Notes: 1. Unless otherwise noted, use a constant-voltage supply for the power supply used during inspection.
2. The thermal sensor temperature (+125 to +145°C) is designed to prevent incorrect operation, but does not guarantee continued operation of the hybrid IC. The total integrated time this device spends operating in the temperature range +125 to +145°C must not exceed 12 hours.
3. The output noise voltage values shown are peak values read with a VTVM. However, an AC stabilized (50Hz) power supply should be used to minimize the influence of AC primary side flicker noise on the reading.
4. Use the transformer power supply circuit shown in the figure below for allowable load shorted time measurement and output noise voltage measurement.This IC is designed assuming that applications will provide a load-shorting protection function that operates within 0.3 seconds of the load being shorted and that either cuts off power to the IC or eliminates the load-shorted state in some other manner.

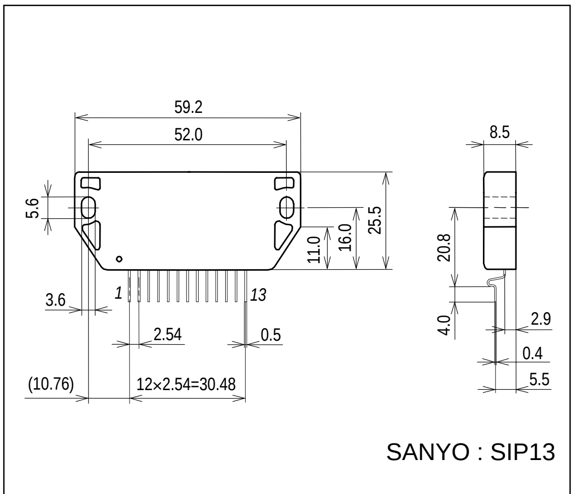


Designated Transformer Power Supply (MG-250 equivalent)

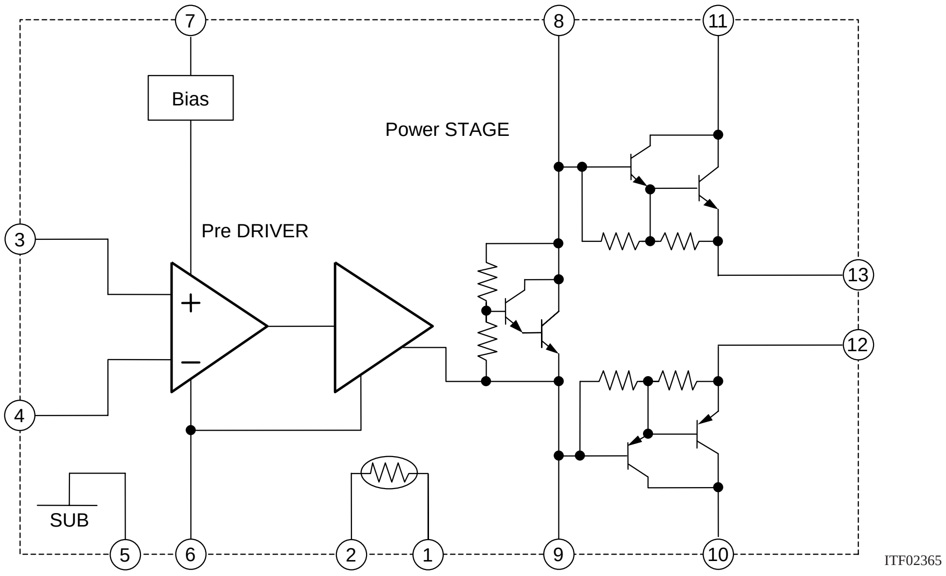
Package Dimensions

unit : mm

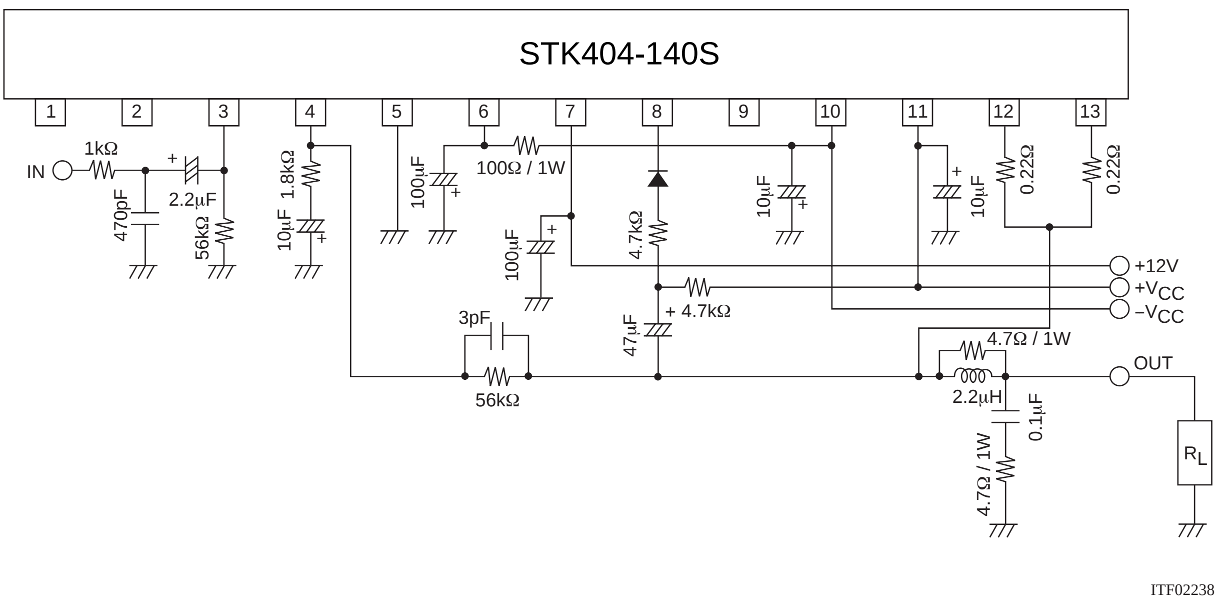
4205



Internal Equivalent Circuit



Sample Application Circuit



Thermal Design Example

If we define Pd, the total power dissipation on the board when this hybrid IC is in operation, the heat sink thermal resistance, θc-a, is determined as follows:

Condition 1: The hybrid IC substrate temperature Tc must not exceed 125°C.

$Pd \times \theta c\text{-}a + Ta < 125°C$ ... (1)

Ta: Guaranteed ambient temperature for the end product.

Condition 2: The junction temperature of each transistor must not exceed 150°C.

$Pd \times \theta c\text{-}a + Pd/N \times \theta j\text{-}c + Ta < 150°C$ ... (2)

N: Number of power transistors

θj-c: Thermal resistance per power transistor

We take the power dissipation in the power transistors to be Pd evenly distributed across those N power transistors.

If we solve for θc-a in equations (1) and (2), we get the following inequalities:

$\theta c\text{-}a < (125 - Ta)/Pd$ ... (3)

$\theta c\text{-}a < (150 - Ta)/Pd - \theta j\text{-}c/N$ ... (4)

Values that satisfy both these inequalities at the same time are the required heat sink thermal resistance values.

Example:

For actual music signals, it is usual to use a Pd of 1/8 of $P_O$max, which is the power estimated for continuous signals in this manner. (Note that depending on the particular safety standard used, a value somewhat different from the value of 1/8 used here may be used.)

When $V_{CC} = \pm 51V$ and $R_L = 6\Omega$, we get the following expression for the total power dissipation on the board, Pd:

Pd = 57 W (when 1/8 $P_O$max is 15 W) ... (5)

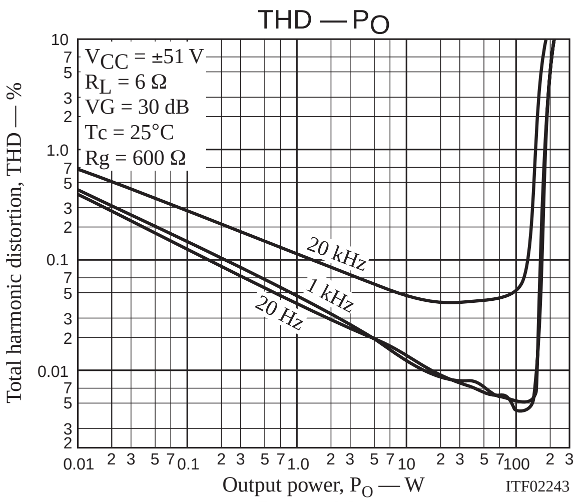
The number, N, of power transistors in the hybrid IC's audio amplifier block is 2. Since the thermal resistance, θj-c, per transistor is 1.2°C/W, the required heat sink thermal resistance, θc-a, for a guaranteed ambient temperature of 50°C will be as follows:

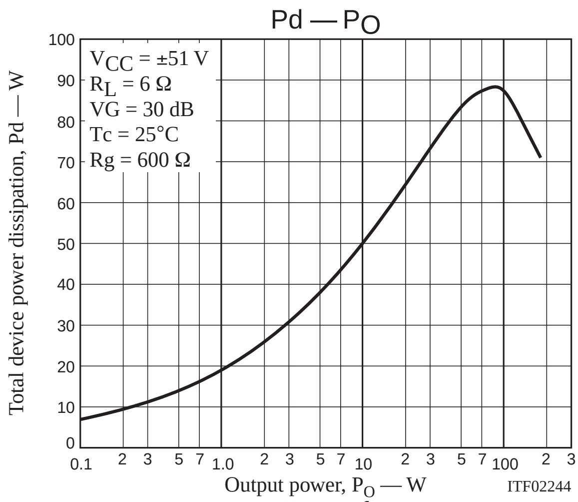
From inequality (3): $\theta c\text{-}a < (125 - 50)/57 = 1.31$ ... (6)

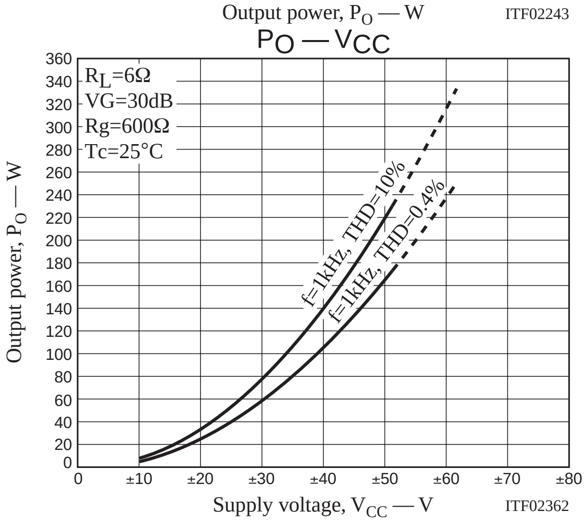
From inequality (4): $\theta c\text{-}a < (150 - 50)/57 - 1.2/2 = 1.15$ ... (7)

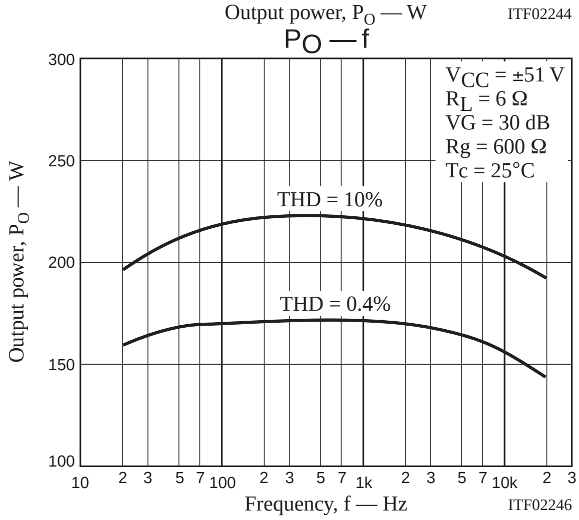
Therefore, the thermal resistance that satisfies both these expressions (6,7) at the same time is 1.15°C/W.

Note that this thermal design example assumes the use of a constant-voltage power supply, and is only provided as an example for reference purposes. Thermal designs must be tested in an actual end product.









This catalog provides information as of May, 2004. Specifications and information herein are subject to change without notice.

Ordering number : ENN7244

Thick-Film Hybrid IC

STK412-000

Two-Channel Shift Power Supply Audio Power Amplifier ICs 60W + 60 W

Overview

The STK412-000 series are class H audio power amplifier hybrid ICs that feature a built-in shift power supply circuit. These Provide ICs high efficiency audio power amplification by controlling (switching) the supply voltage supplied to the power transistors according to the detected level of the input audio signal.

Features

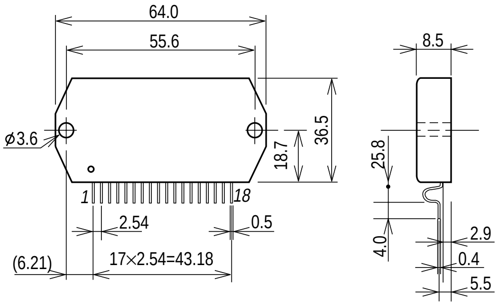
- Pin compatible IC series that covers power ratings from 50 W × 2 channels to 180 W × 2 channels at 0.7 or 0.8% THD, 20 Hz to 20 kHz. This allows the use of a common PCB for all output classes.
- The pin arrangement is also unified with that of the three-channel STK413-000 series. This means that PCBs designed for three-channel models can also be used for two-channel models.
- Miniature package
  — 50 W/ch to 120 W/ch (THD = 0.8%, f = 20 Hz to 20 kHz): 64 × 36.5× 8.5 mm*
  — 150 W/ch to 180 W/ch (THD = 0.7%, f = 20 Hz to 20 kHz): 78 × 44× 9 mm*
  * Not including the IC pins.
- Allowable load shorted time: 0.3 s

Package Dimensions

unit: mm

4196-SIP18

[STK412-000]



SANYO: SIP18

- 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.

Series Organization

These products are organized into a series based on their output power.

Parameter	Type No.							
	STK412-090	STK412-000	STK412-010	STK412-020	STK412-030	STK412-040	STK412-150	STK412-170
Output (20 Hz to 20 kHz) [THD]	50 W + 50 W [0.8 %]	60 W + 60 W [0.8 %]	70 W + 70 W [0.8 %]	80 W +80 W [0.8 %]	100 W + 100 W [0.8 %]	120 W + 120 W [0.8 %]	150 W + 150 W [0.7 %]	180 W + 180 W [0.7 %]
Maximum supply voltage, V_H (No signal)	±60 V	±65 V	±69 V	±73 V	±80 V	±84 V	±95 V	±95 V
Maximum supply voltage, V_L (No signal)	±41 V	±42 V	±44 V	±45 V	±46 V	±51 V	±61 V	±60 V
Recommended supply voltage, V_H	±37 V	±39 V	±43 V	±45 V	±51 V	±54 V	±57 V	±54 V
Recommended supply voltage, V_L	±27 V	±29 V	±30 V	±32 V	±34 V	±36 V	±38 V	±37 V
Recommended load impedance	8 Ω						6 Ω	4 Ω
Package	64 mm × 36.5 mm × 8.5 mm						78 mm × 44 mm × 9 mm	

Specifications

Maximum Ratings at Ta = 25°C

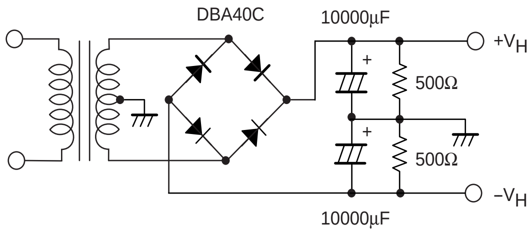
Parameter	Symbol	Conditions	Ratings	Unit
V_H: Maximum supply voltage 1 (no signal)	V_H max(1)		±65	V
V_H: Maximum supply voltage 2 (signal present)	V_H max(2)	R_L = 8, 6 Ω	±57	V
V_H: Maximum supply voltage 3 (signal present)	V_H max(3)	R_L = 4 Ω	±46	V
V_L: Maximum supply voltage 1 (no signal)	V_L max(1)		±42	V
V_L: Maximum supply voltage 2 (signal present)	V_L max(2)	R_L = 8, 6 Ω	±37	V
V_L: Maximum supply voltage 3 (signal present)	V_L max(3)	R_L = 4 Ω	±29	V
V_H-V_L: Maximum supply voltage *4	$V_{H\text{-}L}$ max	No load	60	V
Thermal resistance	θj-c	Per power transistor	1.9	°C/W
Junction temperature	Tj max	Both the Tjmax and Tcmax conditions must be met.	150	°C
Operating IC substrate temperature	Tc max		125	°C
Storage temperature	Tstg		–30 to +125	°C
Allowable load shorted time *3	ts	V_H = ±39 V, V_L = ±29 V, R_L = 8 Ω, f = 50 Hz, P_O = 60 W, one channel operating	0.3	s

Operating Characteristics at Ta = 25°C, R_L = 8 Ω, Rg = 600 Ω, VG = 40 dB, V_Z = 15 V, R_L must be a non-inductive load.

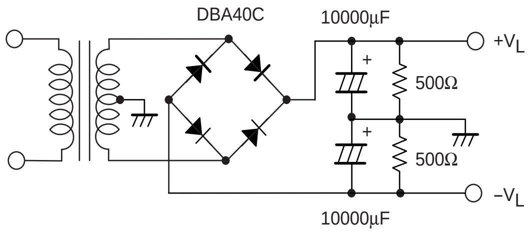
Parameter	Symbol	Test conditions *1					Standard value			Unit
		V_{CC} (V)	f (Hz)	P_O (W)	THD (%)		min	typ	max	
Output power	P_O (1)	V_H = ±39, V_L = ±29	20 to 20 k		0.8		60			W
	P_O (2)	V_H = ±32, V_L = ±24	1 k		0.8	R_L = 4 Ω		60		W
Total harmonic distortion	THD	V_H = ±39, V_L = ±29	20 to 20 k	60				0.4		%
Frequency characteristics	f_L, f_H	V_H = ±39, V_L = ±29		1.0		+0 –3 dB	20 to 50 k			Hz
Input impedance	ri	V_H = ±39, V_L = ±29	1 k	1.0				55		kΩ
Output noise voltage *2	V_{NO}	V_H = ±47, V_L = ±31				Rg = 2.2 kΩ			1.0	mVrms
Quiescent current	I_{CCO}	V_H = ±47				No load			30	mA
		V_L = ±31				No load			100	mA
Midpoint voltage	V_N	V_H = ±47, V_L = ±31					–70	0	+70	mV

Notes: *1. Unless otherwise specified, a constant-voltage power supply must be used during inspection.
*2. The output noise voltage rating gives the peak value read by an averaging VTVM. However, to eliminate the influence of flicker noise from the AC primary side line, use an AC stabilized power supply (50 Hz).

*3. Use the transformer power supply specified in the figure below for allowable load shorted time and output noise voltage measurements.
*4. Design circuits so that ($|V_H| - |V_L|$) is always less than 40 V when switching the power supply with the load connected.
*5. Set up the V_L power supply with an offset voltage at power supply switching ($V_L - L_O$) of about 8 V as an initial target.

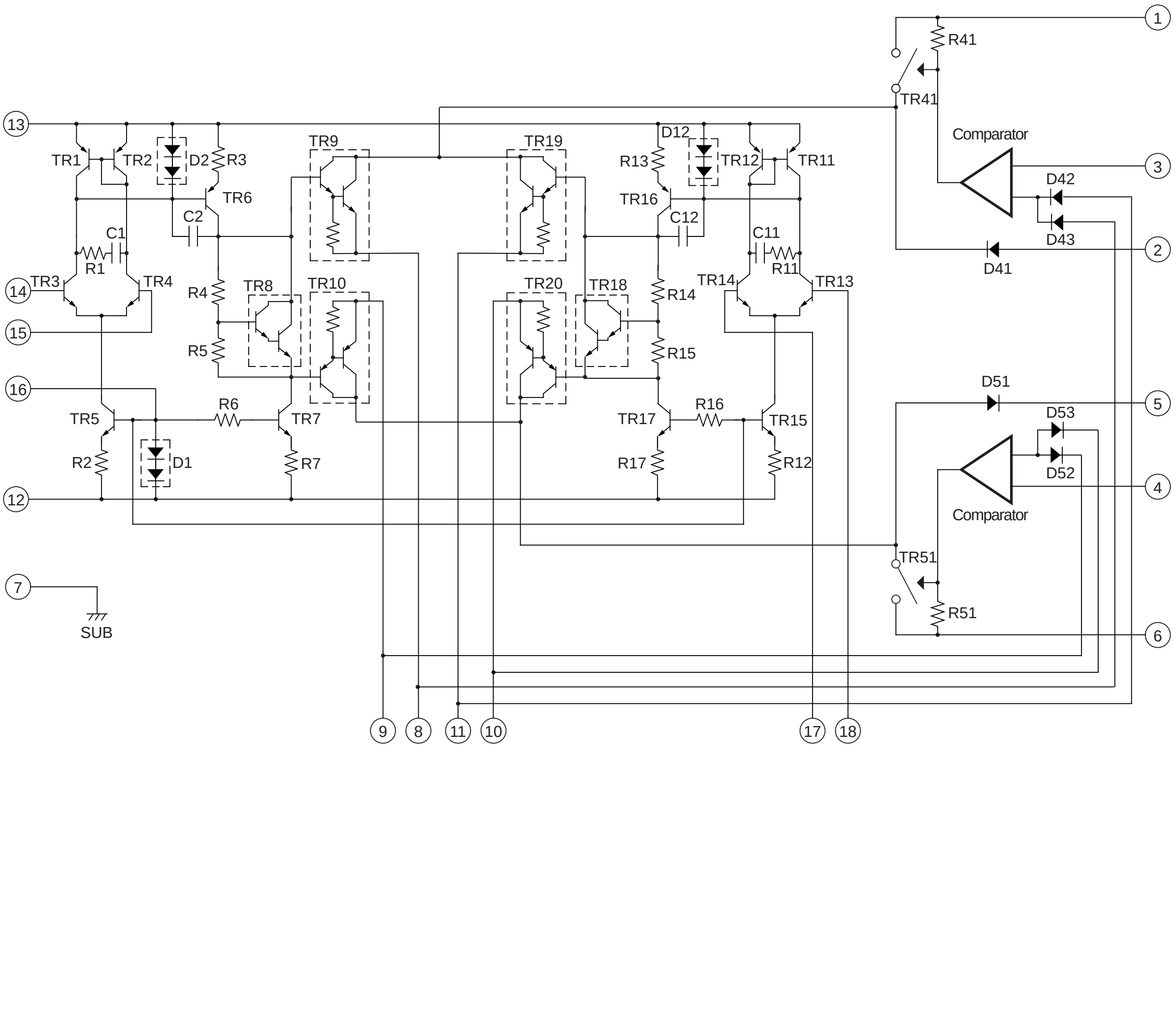


Specified Transformer Power Supply (MG-250 equivalent)

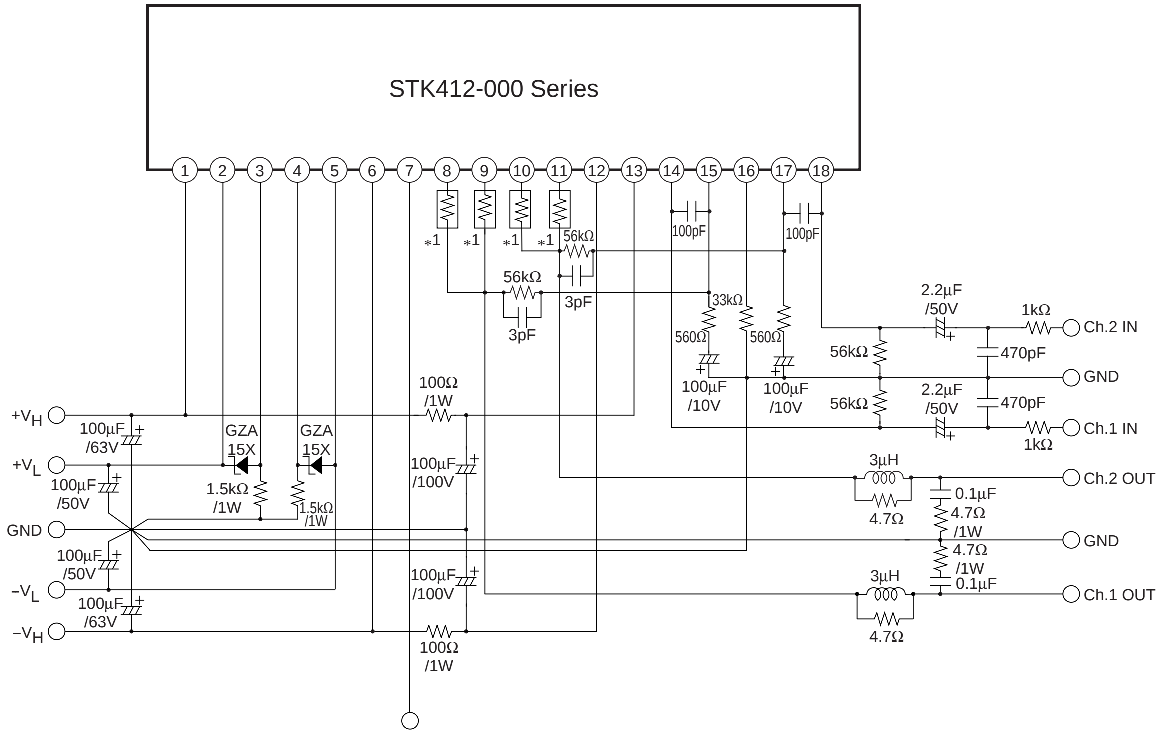


Specified Transformer Power Supply (MG-200 equivalent)

Internal Equivalent Circuit



Sample Application Circuit



*1: Cement resistor, 0.22 Ω, ±10% (5 W)

This catalog provides information as of February, 2003. Specifications and information herein are subject to change without notice.

Ordering number : ENN7248

Thick-Film Hybrid IC

STK412-040

Two-Channel Shift Power Supply Audio Power Amplifier ICs 120W + 120 W

Overview

The STK412-000 series are class H audio power amplifier hybrid ICs that feature a built-in shift power supply circuit. These ICs provide high efficiency audio power amplification by controlling (switching) the supply voltage supplied to the power transistors according to the detected level of the input audio signal.

Features

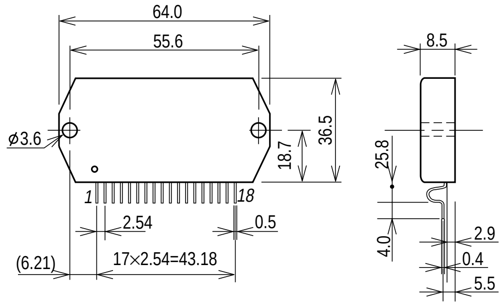
- Pin compatible IC series that covers power ratings from 50 W × 2 channels to 180 W × 2 channels at 0.7 or 0.8% THD, 20 Hz to 20 kHz. This allows the use of a common PCB for all output classes.
- The pin arrangement is also unified with that of the three-channel STK413-000 series. This means that PCBs designed for three-channel models can also be used for two-channel models.
- Miniature package
  — 50 W/ch to 120 W/ch (THD = 0.8%, f = 20 Hz to 20 kHz): 64 × 36.5× 8.5 mm*
  — 150 W/ch to 180 W/ch (THD = 0.7%, f = 20 Hz to 20 kHz): 78 × 44× 9 mm*
  * Not including the IC pins.
- Allowable load shorted time: 0.3 s

Package Dimensions

unit: mm

4196-SIP18

[STK412-040]



SANYO: SIP18

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Series Organization

These products are organized into a series based on their output power.

Parameter	Type No.							
	STK412-090	STK412-000	STK412-010	STK412-020	STK412-030	STK412-040	STK412-150	STK412-170
Output (20 Hz to 20 kHz) [THD]	50 W + 50 W [0.8 %]	60 W + 60 W [0.8 %]	70 W + 70 W [0.8 %]	80 W +80 W [0.8 %]	100 W + 100 W [0.8 %]	120 W + 120 W [0.8 %]	150 W + 150 W [0.7 %]	180 W + 180 W [0.7 %]
Maximum supply voltage, V_H (No signal)	±60 V	±65 V	±69 V	±73 V	±80 V	±84 V	±95 V	±95 V
Maximum supply voltage, V_L (No signal)	±41 V	±42 V	±44 V	±45 V	±46 V	±51 V	±61 V	±60 V
Recommended supply voltage, V_H	±37 V	±39 V	±43 V	±45 V	±51 V	±54 V	±57 V	±54 V
Recommended supply voltage, V_L	±27 V	±29 V	±30 V	±32 V	±34 V	±36 V	±38 V	±37 V
Recommended load impedance	8 Ω						6 Ω	4 Ω
Package	64 mm × 36.5 mm × 8.5 mm						78 mm × 44 mm × 9 mm	

Specifications

Maximum Ratings at Ta = 25°C

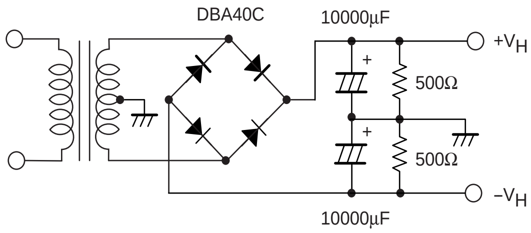
Parameter	Symbol	Conditions	Ratings	Unit
V_H: Maximum supply voltage 1 (no signal)	V_H max(1)		±84	V
V_H: Maximum supply voltage 2 (signal present)	V_H max(2)	R_L = 8, 6 Ω	±78	V
V_H: Maximum supply voltage 3 (signal present)	V_H max(3)	R_L = 4 Ω	±60	V
V_L: Maximum supply voltage 1 (no signal)	V_L max(1)		±51	V
V_L: Maximum supply voltage 2 (signal present)	V_L max(2)	R_L = 8, 6 Ω	±48	V
V_L: Maximum supply voltage 3 (signal present)	V_L max(3)	R_L = 4 Ω	±36	V
V_H-V_L: Maximum supply voltage *4	V_{H-L} max	No load	60	V
Thermal resistance	θj-c	Per power transistor	1.6	°C/W
Junction temperature	Tj max	Both the Tjmax and Tcmax conditions must be met.	150	°C
Operating IC substrate temperature	Tc max		125	°C
Storage temperature	Tstg		–30 to +125	°C
Allowable load shorted time *3	ts	V_H = ±54 V, V_L = ±36 V, R_L = 8 Ω, f = 50 Hz, P_O = 120 W, one channel operating	0.3	s

Operating Characteristics at Ta = 25°C, R_L = 8 Ω, Rg = 600 Ω, VG = 40 dB, V_Z = 15 V, R_L must be a non-inductive load.

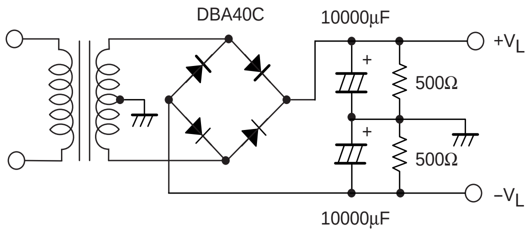
Parameter	Symbol	Test conditions *1					Standard value			Unit
		V_{CC} (V)	f (Hz)	P_O (W)	THD (%)		min	typ	max	
Output power	P_O (1)	V_H = ±54 V_L = ±36	20 to 20 k		0.8		120			W
	P_O (2)	V_H = ±43 V_L = ±29	1 k		0.8	R_L = 4 Ω		120		W
Total harmonic distortion	THD	V_H = ±54 V_L = ±36	20 to 20 k	120				0.4		%
Frequency characteristics	f_L, f_H	V_H = ±54 V_L = ±36		1.0		+0 –3 dB	20 to 50 k			Hz
Input impedance	ri	V_H = ±54 V_L = ±36	1 k	1.0				55		kΩ
Output noise voltage *2	V_{NO}	V_H = ±65 V_L = ±40				Rg = 2.2 kΩ			1.0	mVrms
Quiescent current	I_{CCO}	V_H = ±65				No load			30	mA
		V_L = ±40				No load			100	mA
Midpoint voltage	V_N	V_H = ±65 V_L = ±40					–70	0	+70	mV

Notes: *1. Unless otherwise specified, a constant-voltage power supply must be used during inspection.
*2. The output noise voltage rating gives the peak value read by an averaging VTVM. However, to eliminate the influence of flicker noise from the AC primary side line, use an AC stabilized power supply (50 Hz).

*3. Use the transformer power supply specified in the figure below for allowable load shorted time and output noise voltage measurements.
*4. Design circuits so that ($|V_H|$ - $|V_L|$) is always less than 40 V when switching the power supply with the load connected.
*5. Set up the V_L power supply with an offset voltage at power supply switching (V_L - L_O) of about 8 V as an initial target.

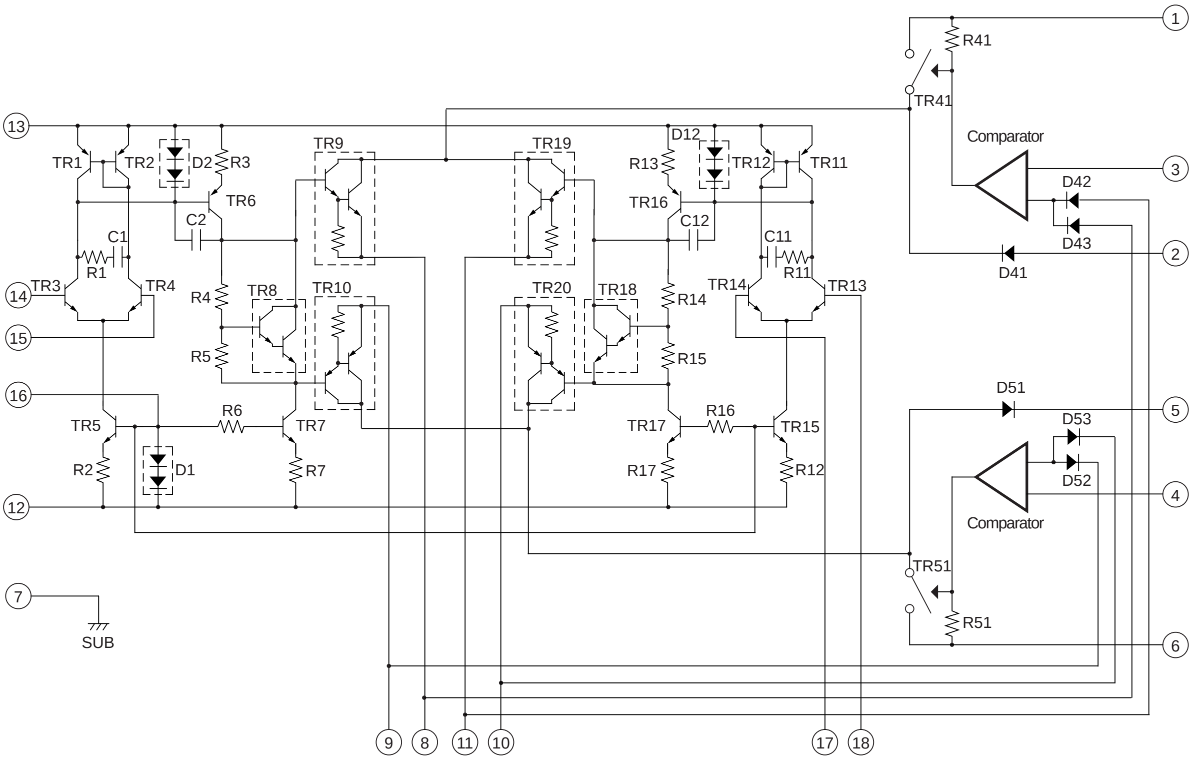


Specified Transformer Power Supply (MG-250 equivalent)

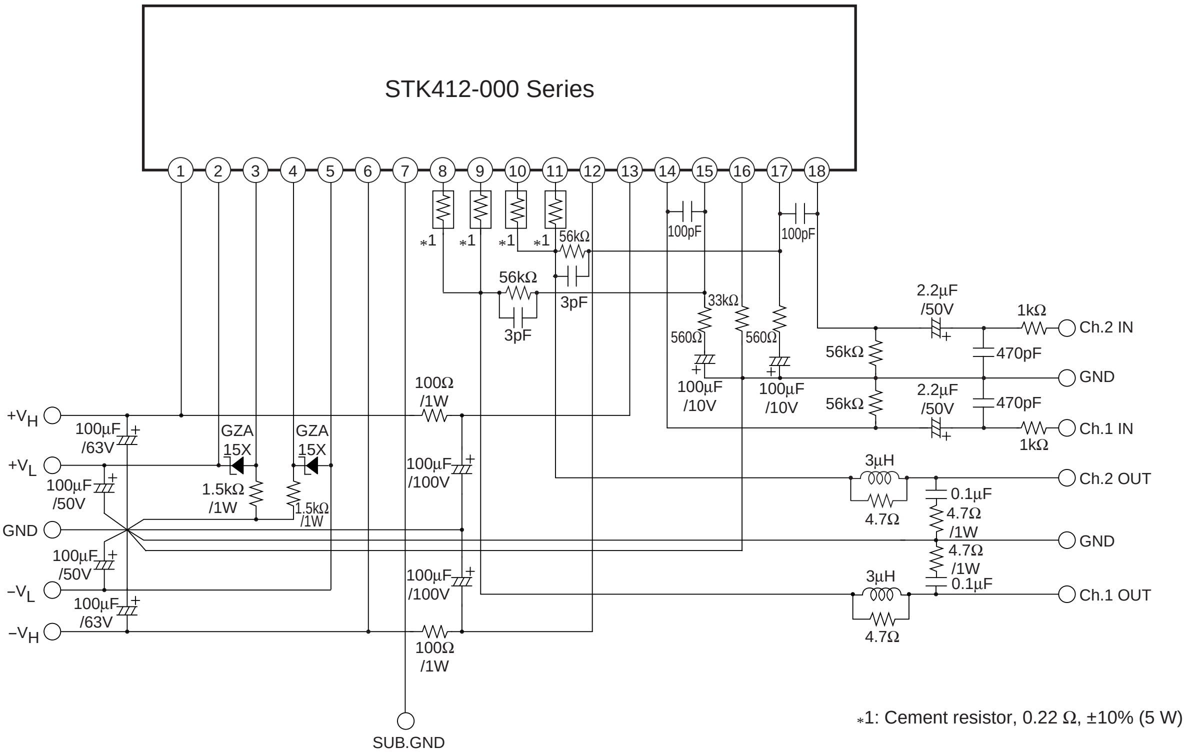


Specified Transformer Power Supply (MG-200 equivalent)

Internal Equivalent Circuit



Sample Application Circuit



*1: Cement resistor, 0.22 Ω, ±10% (5 W)

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This catalog provides information as of February, 2003. Specifications and information herein are subject to change without notice.

Ordering number : ENN7249

Thick-Film Hybrid IC

STK412-090

Two-Channel Shift Power Supply Audio Power Amplifier ICs 50W + 50 W

Overview

The STK412-000 series are class H audio power amplifier hybrid ICs that feature a built-in shift power supply circuit. These ICs provide high efficiency audio power amplification by controlling (switching) the supply voltage supplied to the power transistors according to the detected level of the input audio signal.

Features

- Pin compatible IC series that covers power ratings from 50 W × 2 channels to 180 W × 2 channels at 0.7 or 0.8% THD, 20 Hz to 20 kHz. This allows the use of a common PCB for all output classes.
- The pin arrangement is also unified with that of the three-channel STK413-000 series. This means that PCBs designed for three-channel models can also be used for two-channel models.
- Miniature package
  - — 50 W/ch to 120 W/ch (THD = 0.8%, f = 20 Hz to 20 kHz): 64 × 36.5× 8.5 mm*
  - — 150 W/ch to 180 W/ch (THD = 0.7%, f = 20 Hz to 20 kHz): 78 ×14044× 9 mm*

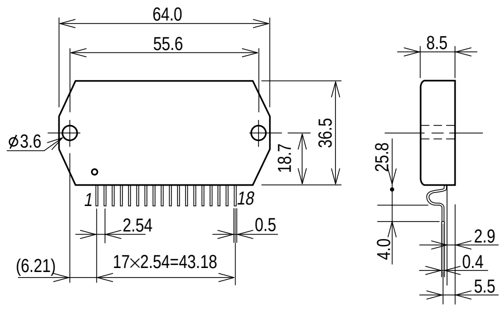
  * Not including the IC pins.
- Allowable load shorted time: 0.3 s

Package Dimensions

unit: mm

4196-SIP18

[STK412-090]



SANYO: SIP18

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- 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.

SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Series Organization

These products are organized into a series based on their output power.

Parameter	Type No.							
	STK412-090	STK412-000	STK412-010	STK412-020	STK412-030	STK412-040	STK412-150	STK412-170
Output (20 Hz to 20 kHz) [THD]	50 W + 50 W [0.8 %]	60 W + 60 W [0.8 %]	70 W + 70 W [0.8 %]	80 W +80 W [0.8 %]	100 W + 100 W [0.8 %]	120 W + 120 W [0.8 %]	150 W + 150 W [0.7 %]	180 W + 180 W [0.7 %]
Maximum supply voltage, V_H (No signal)	±60 V	±65 V	±69 V	±73 V	±80 V	±84 V	±95 V	±95 V
Maximum supply voltage, V_L (No signal)	±41 V	±42 V	±44 V	±45 V	±46 V	±51 V	±61 V	±60 V
Recommended supply voltage, V_H	±37 V	±39 V	±43 V	±45 V	±51 V	±54 V	±57 V	±54 V
Recommended supply voltage, V_L	±27 V	±29 V	±30 V	±32 V	±34 V	±36 V	±38 V	±37 V
Recommended load impedance	8 Ω						6 Ω	4 Ω
Package	64 mm × 36.5 mm × 8.5 mm						78 mm × 44 mm × 9 mm	

Specifications

Maximum Ratings at Ta = 25°C

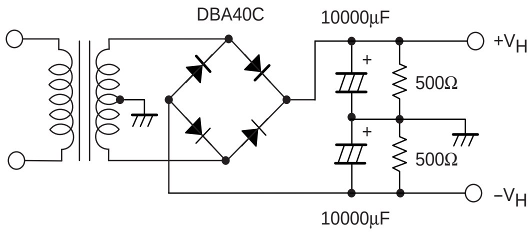
Parameter	Symbol	Conditions	Ratings	Unit
V_H: Maximum supply voltage 1 (no signal)	V_H max(1)		±60	V
V_H: Maximum supply voltage 2 (signal present)	V_H max(2)	R_L = 8, 6 Ω	±53	V
V_H: Maximum supply voltage 3 (signal present)	V_H max(3)	R_L = 4 Ω	±43	V
V_L: Maximum supply voltage 1 (no signal)	V_L max(1)		±41	V
V_L: Maximum supply voltage 2 (signal present)	V_L max(2)	R_L = 8, 6 Ω	±36	V
V_L: Maximum supply voltage 3 (signal present)	V_L max(3)	R_L = 4 Ω	±29	V
V_H-V_L: Maximum supply voltage *4	V_{H-L} max	No load	60	V
Thermal resistance	θj-c	Per power transistor	2.2	°C/W
Junction temperature	Tj max	Both the Tjmax and Tcmax conditions must be met.	150	°C
Operating IC substrate temperature	Tc max		125	°C
Storage temperature	Tstg		–30 to +125	°C
Allowable load shorted time *3	ts	V_H = ±37 V, V_L = ±27 V, R_L = 8 Ω, f = 50 Hz, P_O = 50W, one channel operating	0.3	s

Operating Characteristics at Ta = 25°C, R_L = 8 Ω, Rg = 600 Ω, VG = 40 dB, V_Z = 15 V, R_L must be a non-inductive load.

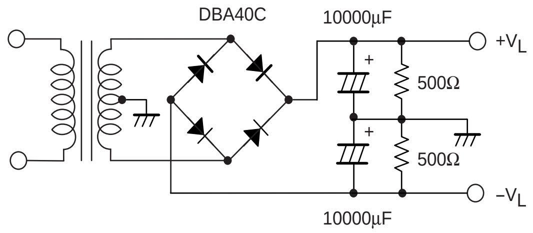
Parameter	Symbol	Test conditions *1					Standard value			Unit
		V_{CC} (V)	f (Hz)	P_O (W)	THD (%)		min	typ	max	
Output power	P_O (1)	V_H = ±37 V_L = ±27	20 to 20 k		0.8		50			W
	P_O (2)	V_H = ±30 V_L = ±23	1 k		0.8	R_L = 4 Ω		50		W
Total harmonic distortion	THD	V_H = ±37 V_L = ±27	20 to 20 k	50				0.4		%
Frequency characteristics	f_L, f_H	V_H = ±37 V_L = ±27		1.0		+0 –3 dB		20 to 50 k		Hz
Input impedance	ri	V_H = ±37 V_L = ±27	1 k	1.0				55		kΩ
Output noise voltage *2	V_{NO}	V_H = ±45 V_L = ±30				Rg = 2.2 kΩ			1.0	mVrms
Quiescent current	I_{CCO}	V_H = ±45				No load			30	mA
		V_L = ±30				No load			100	mA
Midpoint voltage	V_N	V_H = ±45 V_L = ±30					–70	0	+70	mV

Notes: *1. Unless otherwise specified, a constant-voltage power supply must be used during inspection.
*2. The output noise voltage rating gives the peak value read by an averaging VTVM. However, to eliminate the influence of flicker noise from the AC primary side line, use an AC stabilized power supply (50 Hz).

*3. Use the transformer power supply specified in the figure below for allowable load shorted time and output noise voltage measurements.
*4. Design circuits so that ($|V_H|$ - $|V_L|$) is always less than 40 V when switching the power supply with the load connected.
*5. Set up the V_L power supply with an offset voltage at power supply switching (V_L - L_O) of about 8 V as an initial target.

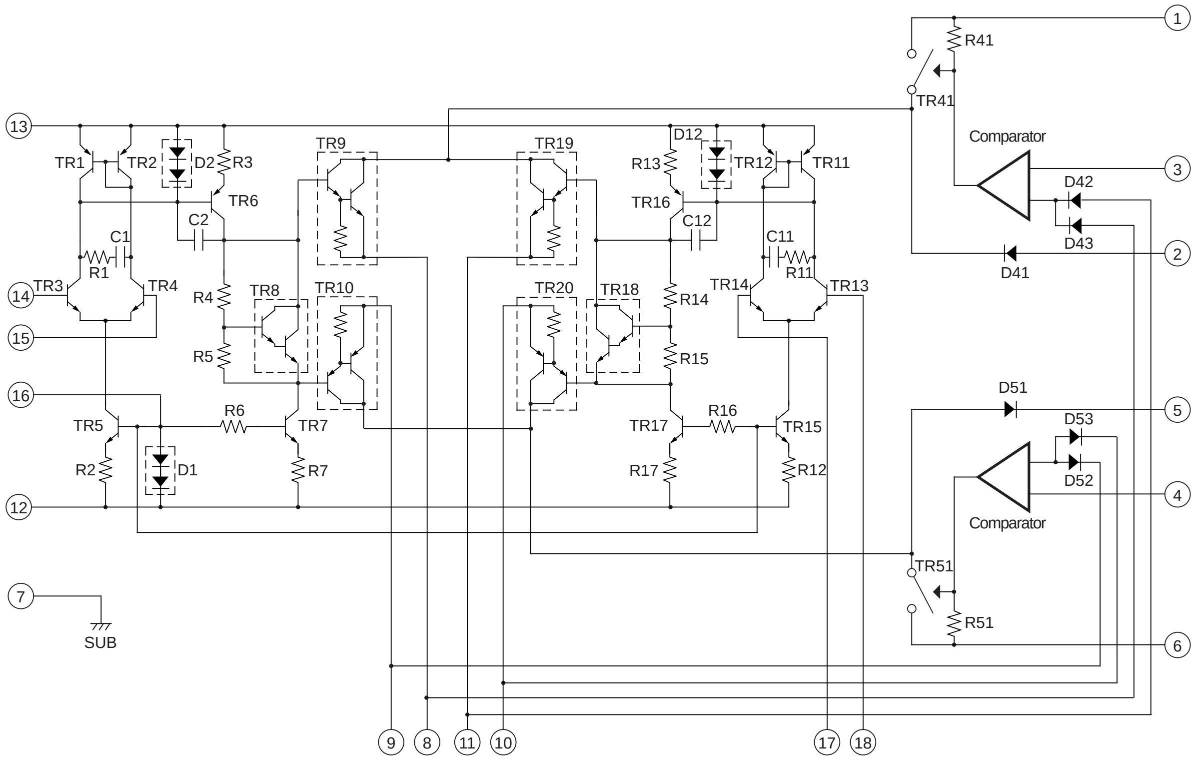


Specified Transformer Power Supply (MG-250 equivalent)

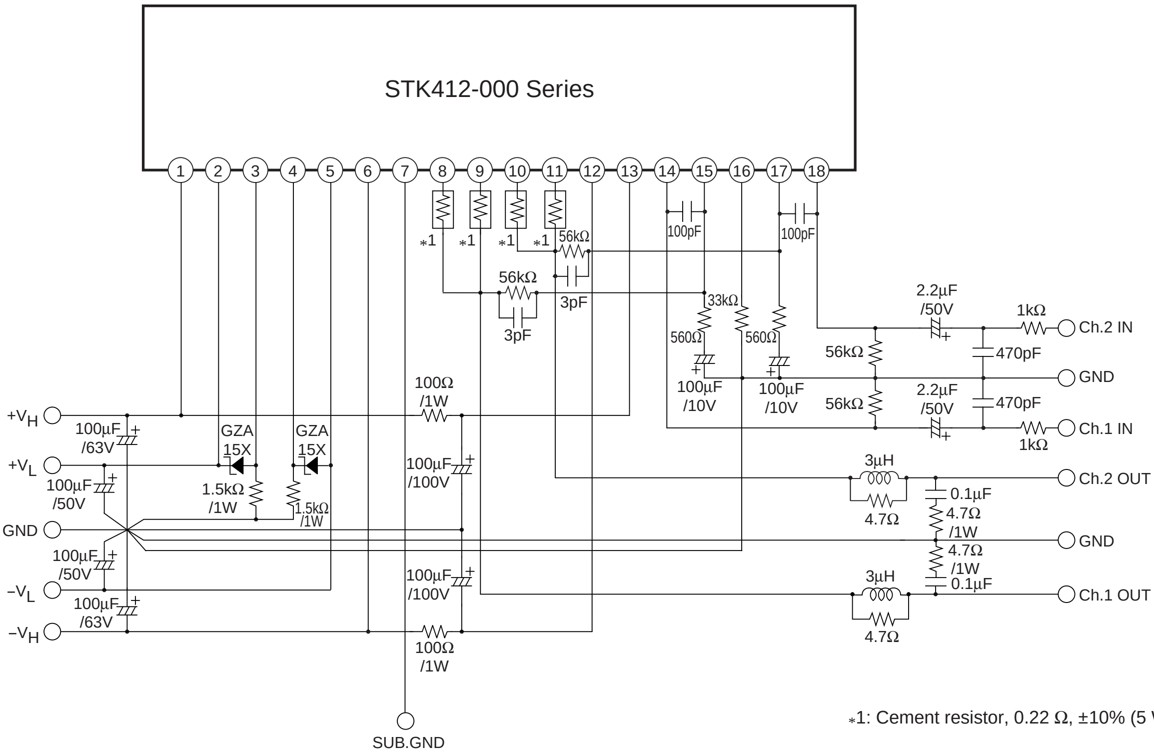


Specified Transformer Power Supply (MG-200 equivalent)

Internal Equivalent Circuit



Sample Application Circuit



*1: Cement resistor, 0.22 Ω, ±10% (5 W)

This catalog provides information as of February, 2003. Specifications and information herein are subject to change without notice.

Ordering number : ENN7250

Thick-Film Hybrid IC

STK412-150

Two-Channel Shift Power Supply Audio Power Amplifier ICs 150W + 150 W

Overview

The STK412-000 series are class H audio power amplifier hybrid ICs that feature a built-in shift power supply circuit. These ICs provide high efficiency audio power amplification by controlling (switching) the supply voltage supplied to the power transistors according to the detected level of the input audio signal.

Features

- Pin compatible IC series that covers power ratings from 50 W × 2 channels to 180 W × 2 channels at 0.7 or 0.8% THD, 20 Hz to 20 kHz. This allows the use of a common PCB for all output classes.
- The pin arrangement is also unified with that of the three-channel STK413-000 series. This means that PCBs designed for three-channel models can also be used for two-channel models.
- Miniature package
  - — 50 W/ch to 120 W/ch (THD = 0.8%, f = 20 Hz to 20 kHz): 64 × 36.5× 8.5 mm*
  - — 150 W/ch to 180 W/ch (THD = 0.7%, f = 20 Hz to 20 kHz): 78 × 44× 9 mm*

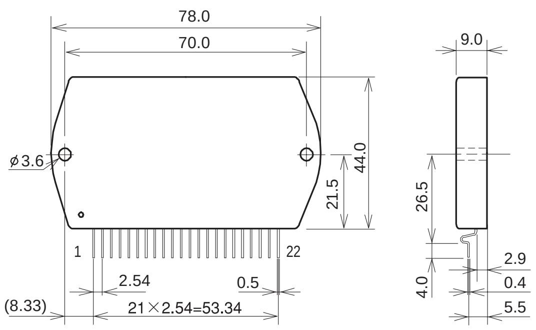
  * Not including the IC pins.
- Allowable load shorted time: 0.3 s

Package Dimensions

unit: mm

4086A-SIP22

[STK412-150]



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TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Series Organization

These products are organized into a series based on their output power.

Parameter	Type No.							
	STK412-090	STK412-000	STK412-010	STK412-020	STK412-030	STK412-040	STK412-150	STK412-170
Output (20 Hz to 20 kHz) [THD]	50 W + 50 W [0.8 %]	60 W + 60 W [0.8 %]	70 W + 70 W [0.8 %]	80 W +80 W [0.8 %]	100 W + 100 W [0.8 %]	120 W + 120 W [0.8 %]	150 W + 150 W [0.7 %]	180 W + 180 W [0.7 %]
Maximum supply voltage, V_H (No signal)	±60 V	±65 V	±69 V	±73 V	±80 V	±84 V	±95 V	±95 V
Maximum supply voltage, V_L (No signal)	±41 V	±42 V	±44 V	±45 V	±46 V	±51 V	±61 V	±60 V
Recommended supply voltage, V_H	±37 V	±39 V	±43 V	±45 V	±51 V	±54 V	±57 V	±54 V
Recommended supply voltage, V_L	±27 V	±29 V	±30 V	±32 V	±34 V	±36 V	±38 V	±37 V
Recommended load impedance	8 Ω						6 Ω	4 Ω
Package	64 mm × 36.5 mm × 8.5 mm						78 mm × 44 mm × 9 mm	

Specifications

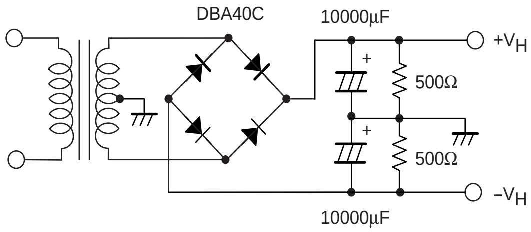
Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
V_H: Maximum supply voltage 1 (no signal)	V_H max(1)		±95	V
V_H: Maximum supply voltage 2 (signal present)	V_H max(2)	R_L = 6 Ω or greater, 150W, 50 ms	±85	V
V_L: Maximum supply voltage 1 (no signal)	V_L max(1)		±61	V
V_L: Maximum supply voltage 2 (signal present)	V_L max(2)	R_L = 6 Ω or greater, 150W, 50 ms	±55	V
V_H-V_L: Maximum supply voltage *4	V_{H-L} max	No load	60	V
Thermal resistance	θj-c	Per power transistor	1.4	°C/W
Junction temperature	Tj max	Both the Tjmax and Tcmax conditions must be met.	150	°C
Operating IC substrate temperature	Tc max		125	°C
Storage temperature	Tstg		–30 to +125	°C
Allowable load shorted time *3	ts	V_H = ±57 V, V_L = ±38 V, R_L = 6 Ω, f = 50 Hz, P_O = 150 W, one channel operating	0.3	s

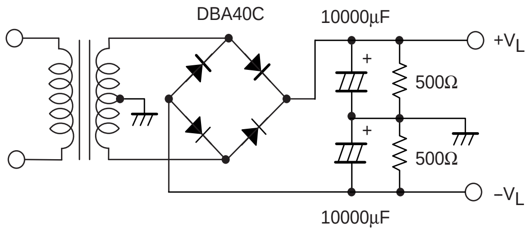
Operating Characteristics at Ta = 25°C, R_L = 6 Ω, Rg = 600 Ω, VG = 30 dB, V_Z = 18 V, R_L must be a non-inductive load.

Parameter	Symbol	Test conditions *1					Standard value			Unit
		V_{CC} (V)	f (Hz)	P_O (W)	THD (%)		min	typ	max	
Output power	P_O	V_H = ±57 V_L = ±38	20 to 20 k		0.7		150			W
Total harmonic distortion	THD	V_H = ±57 V_L = ±38	20 to 20 k	150				0.4		%
Frequency characteristics	f_L, f_H	V_H = ±57 V_L = ±38		1.0		+0 –3 dB	20 to 50 k			Hz
Input impedance	ri	V_H = ±57 V_L = ±38	1 k	1.0				55		kΩ
Output noise voltage *2	V_{NO}	V_H = ±68 V_L = ±46				Rg = 2.2 kΩ			1.0	mVrms
Quiescent current	I_{CCO}	V_H = ±68				No load			70	mA
		V_L = ±46				No load			100	mA
Midpoint voltage	V_N	V_H = ±68 V_L = ±46					–70	0	+70	mV

Notes: *1. Unless otherwise specified, a constant-voltage power supply must be used during inspection.
*2. The output noise voltage rating gives the peak value read by an averaging VTVM. However, to eliminate the influence of flicker noise from the AC primary side line, use an AC stabilized power supply (50 Hz).
*3. Use the transformer power supply specified in the figure below for allowable load shorted time and output noise voltage measurements.
*4. Design circuits so that (|V_H| - |V_L|) is always less than 40 V when switching the power supply with the load connected.
*5. Set up the V_L power supply with an offset voltage at power supply switching (V_L - L_O) of about 11V as an initial target.

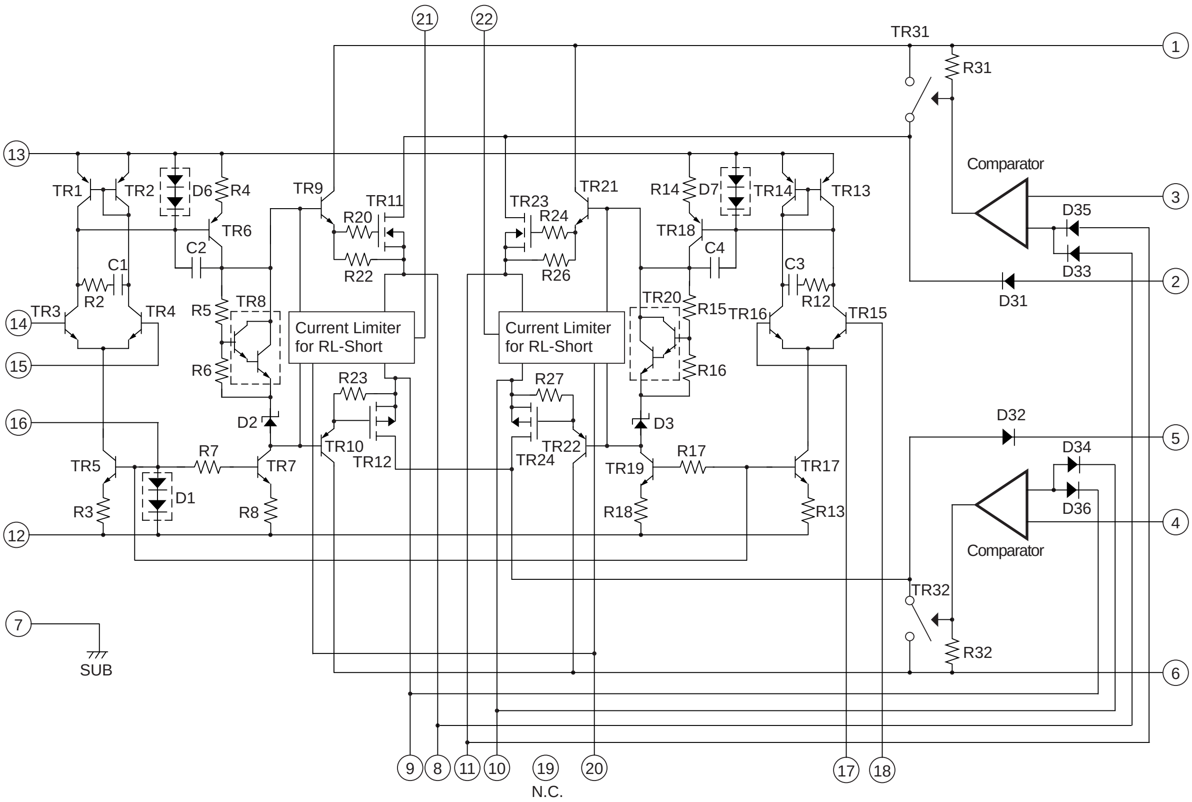


Specified Transformer Power Supply (MG-250 equivalent)

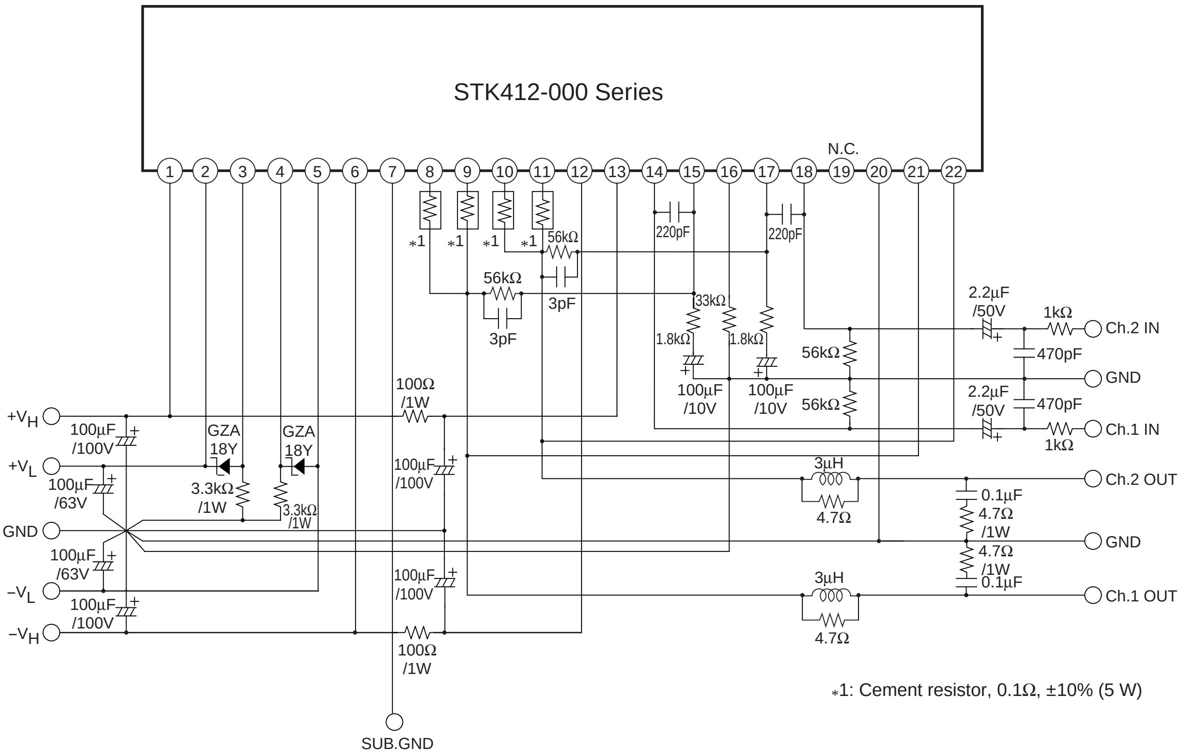


Specified Transformer Power Supply (MG-200 equivalent)

Internal Equivalent Circuit



Sample Application Circuit



This catalog provides information as of February, 2003. Specifications and information herein are subject to change without notice.

Ordering number : ENN7251

Thick-Film Hybrid IC

STK412-170

Two-Channel Shift Power Supply Audio Power Amplifier ICs 180W + 180 W

Overview

The STK412-000 series are class H audio power amplifier hybrid ICs that feature a built-in shift power supply circuit. These ICs provide high efficiency audio power amplification by controlling (switching) the supply voltage supplied to the power transistors according to the detected level of the input audio signal.

Features

- Pin compatible IC series that covers power ratings from 50 W × 2 channels to 180 W × 2 channels at 0.7 or 0.8% THD, 20 Hz to 20 kHz. This allows the use of a common PCB for all output classes.
- The pin arrangement is also unified with that of the three-channel STK413-000 series. This means that PCBs designed for three-channel models can also be used for two-channel models.
- Miniature package
  - — 50 W/ch to 120 W/ch (THD = 0.8%, f = 20 Hz to 20 kHz): 64 × 36.5× 8.5 mm*
  - — 150 W/ch to 180 W/ch (THD = 0.7%, f = 20 Hz to 20 kHz): 78 × 44× 9 mm*

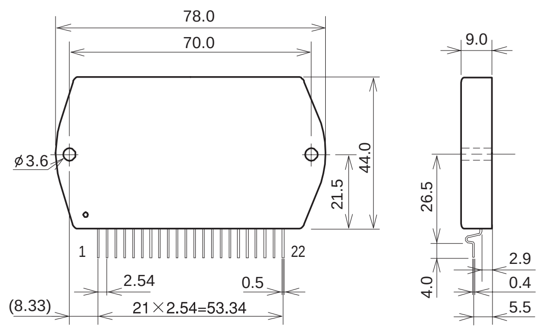
  * Not including the IC pins.
- Allowable load shorted time: 0.3 s

Package Dimensions

unit: mm

4086A-SIP22

[STK412-170]



SANYO: SIP22

SANYO Electric Co.,Ltd. Semiconductor Company

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Series Organization

These products are organized into a series based on their output power.

Parameter	Type No.							
	STK412-090	STK412-000	STK412-010	STK412-020	STK412-030	STK412-040	STK412-150	STK412-170
Output (20 Hz to 20 kHz) [THD]	50 W + 50 W [0.8 %]	60 W + 60 W [0.8 %]	70 W + 70 W [0.8 %]	80 W +80 W [0.8 %]	100 W + 100 W [0.8 %]	120 W + 120 W [0.8 %]	150 W + 150 W [0.7 %]	180 W + 180 W [0.7 %]
Maximum supply voltage, V_H (No signal)	±60 V	±65 V	±69 V	±73 V	±80 V	±84 V	±95 V	±95 V
Maximum supply voltage, V_L (No signal)	±41 V	±42 V	±44 V	±45 V	±46 V	±51 V	±61 V	±60 V
Recommended supply voltage, V_H	±37 V	±39 V	±43 V	±45 V	±51 V	±54 V	±57 V	±54 V
Recommended supply voltage, V_L	±27 V	±29 V	±30 V	±32 V	±34 V	±36 V	±38 V	±37 V
Recommended load impedance	8 Ω						6 Ω	4 Ω
Package	64 mm × 36.5 mm × 8.5 mm						78 mm × 44 mm × 9 mm	

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
V_H: Maximum supply voltage 1 (no signal)	V_H max(1)		±95	V
V_H: Maximum supply voltage 2 (signal present)	V_H max(2)	R_L = 4 Ω or greater, 180W, 50 ms	±85	V
V_L: Maximum supply voltage 1 (no signal)	V_L max(1)		±61	V
V_L: Maximum supply voltage 2 (signal present)	V_L max(2)	R_L = 4 Ω or greater, 180W, 50 ms	±55	V
V_H-V_L: Maximum supply voltage *4	V_{H-L} max	No load	60	V
Thermal resistance	θj-c	Per power transistor	1.4	°C/W
Junction temperature	Tj max	Both the Tjmax and Tcmax conditions must be met.	150	°C
Operating IC substrate temperature	Tc max		125	°C
Storage temperature	Tstg		–30 to +125	°C
Allowable load shorted time *3	ts	V_H = ±54 V, V_L = ±37 V, R_L = 4 Ω, f = 50 Hz, P_O = 180 W, one channel operating	0.3	s

Operating Characteristics at Ta = 25°C, R_L = 6 Ω, Rg = 600 Ω, VG = 30 dB, V_Z = 18 V, R_L must be a non-inductive load.

Parameter	Symbol	Test conditions *1					Standard value			Unit
		V_{CC} (V)	f (Hz)	P_O (W)	THD (%)		min	typ	max	
Output power	P_O	V_H = ±54 V_L = ±37	20 to 20 k		0.7		180			W
Total harmonic distortion	THD	V_H = ±54 V_L = ±37	20 to 20 k	180				0.4		%
Frequency characteristics	f_L, f_H	V_H = ±54 V_L = ±37		1.0		+0 –3 dB	20 to 50 k			Hz
Input impedance	ri	V_H = ±54 V_L = ±37	1 k	1.0				55		kΩ
Output noise voltage *2	V_{NO}	V_H = ±64 V_L = ±45				Rg = 2.2 kΩ			1.0	mVrms
Quiescent current	I_{CCO}	V_H = ±64				No load			70	mA
		V_L = ±45				No load			100	mA
Midpoint voltage	V_N	V_H = ±64 V_L = ±45					–70	0	+70	mV

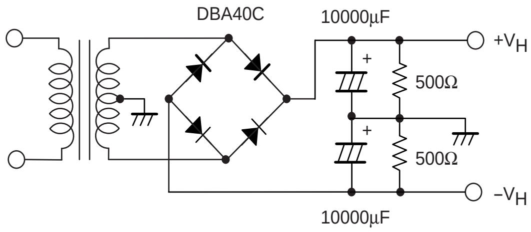
Notes: *1. Unless otherwise specified, a constant-voltage power supply must be used during inspection.

*2. The output noise voltage rating gives the peak value read by an averaging VTVM. However, to eliminate the influence of flicker noise from the AC primary side line, use an AC stabilized power supply (50 Hz).

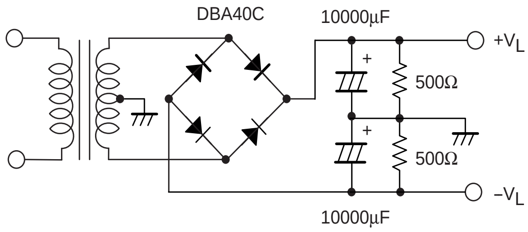
*3. Use the transformer power supply specified in the figure below for allowable load shorted time and output noise voltage measurements.

*4. Design circuits so that (|V_H| - |V_L|) is always less than 40 V when switching the power supply with the load connected.

*5. Set up the VL power supply with an offset voltage at power supply switching (V_L - L_O) of about 11V as an initial target.

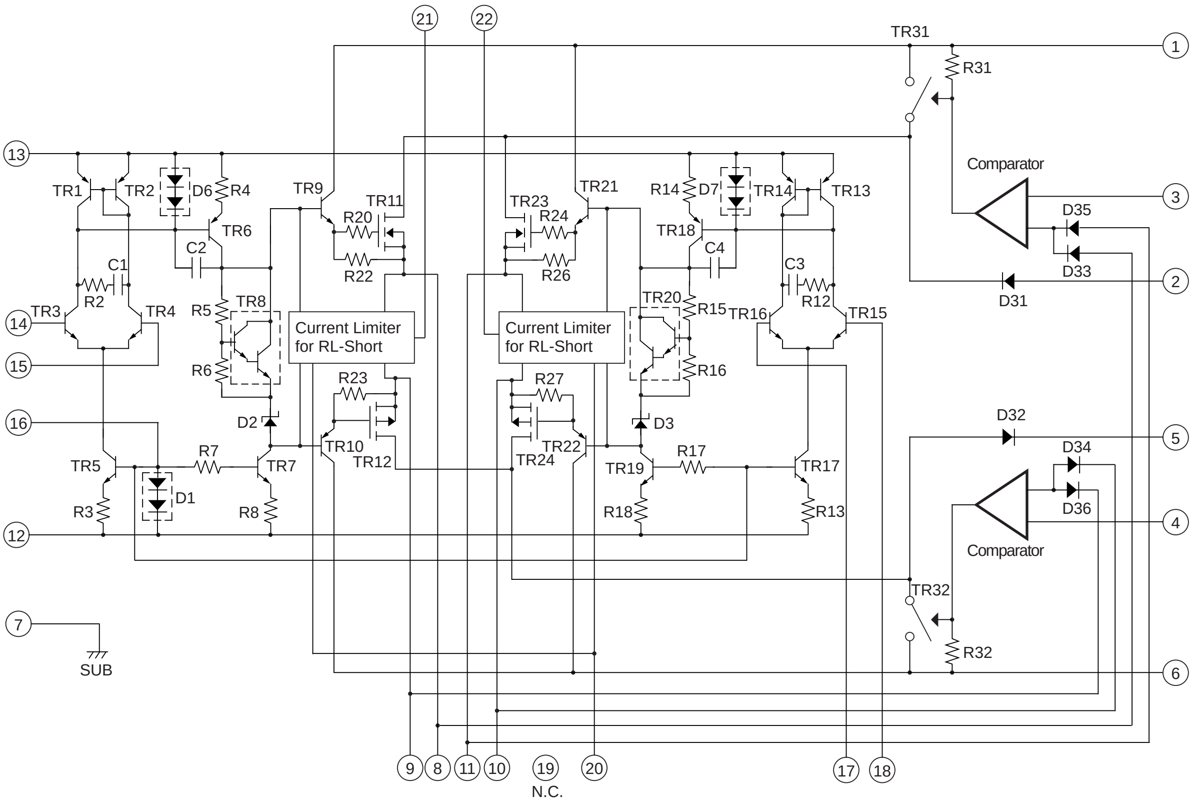


Specified Transformer Power Supply
(MG-250 equivalent)

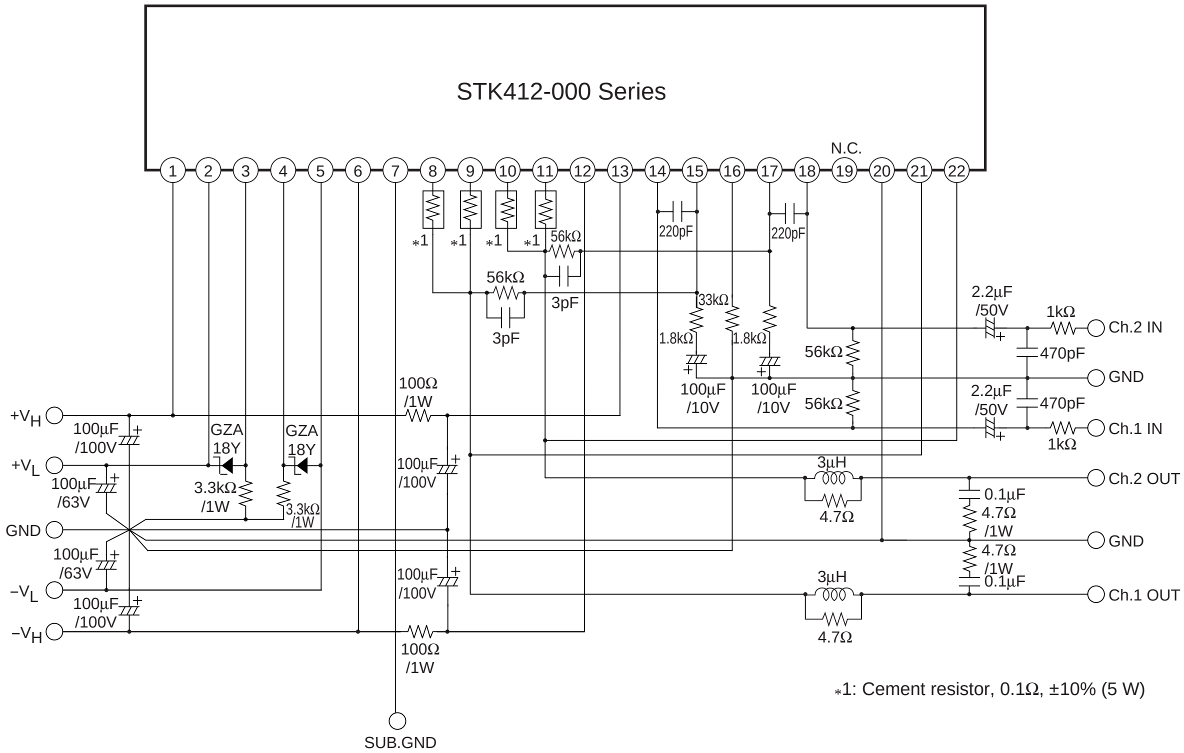


Specified Transformer Power Supply
(MG-200 equivalent)

Internal Equivalent Circuit



Sample Application Circuit



*1: Cement resistor, 0.1Ω, ±10% (5 W)

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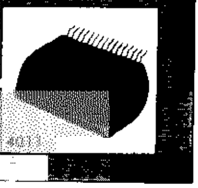
-
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the “Delivery Specification” for the SANYO product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of February, 2003. Specifications and information herein are subject to change without notice.

STK-457,459,460, 461,463,465

thick film hybrid IC

2 POWER 2 CHANNEL
10 to 30 W min AF POWER AMP.



Features

- © IMST, 2 Channels by 2 Power Suppliers.
- AF output power STK-457: 10W min., STK-459: 15W min. STK-460: 20W min., STK-461: 20W min., STK-463: 25W min. STK-465: 30W min.

MAXIMUM RATINGS / Ta=25°C

		STK-457	STK-459	STK-460	STK-461	STK-463	STK-465	unit
Maximum Supply Voltage	V_{CC} max	±26	±31	±32	±33	±38	±41	V
Operating Case Temperature	T_C	→	→	→	→	→	105	°C
Storage Temperature	T_{stg}	→	→	→	→	→	−30 to +105	°C
Allowable Load Shorting Time (in appointed condition)	t_s	→	→	→	→	→	2	sec

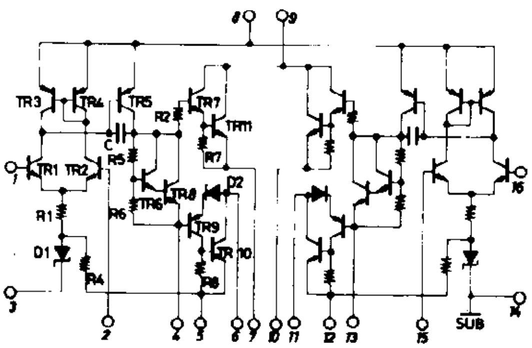
RECOMMENDED OPERATION CONDITION / Ta=25°C

		STK-457	STK-459	STK-460	STK-461	STK-463	STK-465	unit
Recommended Supply Voltage	V_{CC}	±18	±21	±23	±23	±26	±28	V
Load Resistance	R_L	→	→	→	→	→	8	ohm

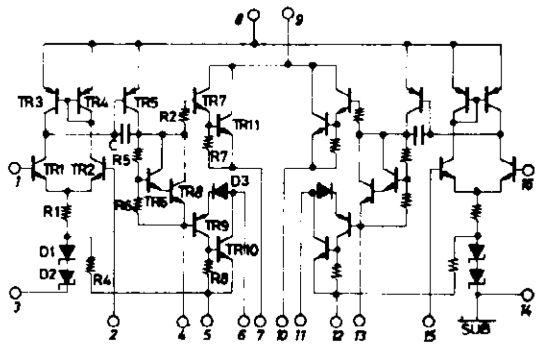
OPERATION CHARACTERISTICS / Ta=25°C, recommended condition Rg=600 ohm, VG=40dB

			STK-457	STK-459	STK-460	STK-461	STK-463	STK-465	unit
Quiescent Current	I_{CCO}		→	→	→	→	→	120	mAmax
Output Power	Po	THD=0.08% f=20~20kHz	10	15	20	20	25	30	Wmin
Distortion	THD	Po=1W f=20~20kHz	→	→	→	→	→	0.08	%max
Frequency Response	f	Po=1W, $\pm^{0}_{3}$ dB f=1kHz	→	→	→	→	→	10 to 100k	Hz
Input Resistance	r_i	Po=1W, f=1kHz	→	→	→	→	→	32k	ohm

EQUIVALENT CIRCUIT

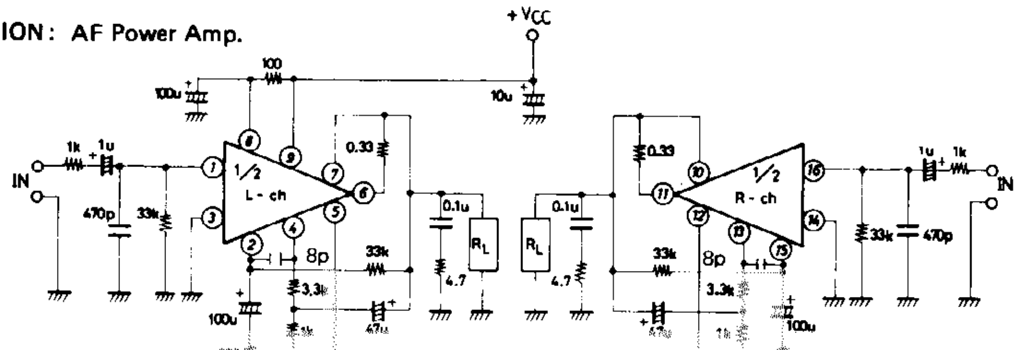


STK-457, 459, 460



STK-461,463,465

APPLICATION: AF Power Amp.



SANYO

No.C670A

STK465

Thick Film Hybrid IC
30W min. 2-channel AF power amplifier
(2 power supplies)

Maximum Ratings at T_a=25°C

Maximum Supply Voltage	$V_{CC}max$		±41	V
Operating Case Temperature	T_C		105	°C
Storage Temperature	T_{stg}		-30 to +105	°C
Allowable Load Shorting Time	t_s	V_{CC}=±28V, P_O=30W, R_L=8ohm, f=50Hz	2	sec

Recommended Operation Condition at Ta=25°C

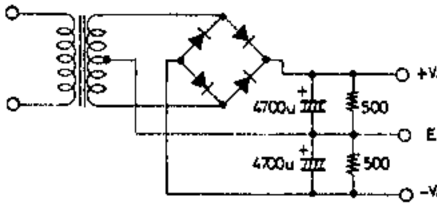
Recommended Supply Voltage	V_{CC}	±28	V
Load Resistance	R_L	8	ohm

Operation Characteristics at Ta=25°C, V_{CC}=±28V, R_L=8ohm, R_g=600ohm, VG=40dB, specified test circuit(based on application circuit example).

			min	typ	max	unit
Quiescent Current	I_{cco}	V_{CC}=±34V	20	40	120	mA
Output Power	$P_o(1)$	THD=0.1%, f=20 to 20k Hz	30			W
	$P_o(2)$	V_{CC}=±25V, THD=0.2%, f=1kHz, R_L=4ohm	40			W
Total Harmonic Distortion	THD	P_o=1W				%
Frequency Response	f	P_o=1W		10 to 100k		Hz
Input Resistance	r_i	P_o=1W		32k		ohm
Output Noise Voltage	V_{NO}	V_{CC}=±34V			1.2	mV_{rms}
Output Center Voltage	V_N	V_{CC}=±34V	-70	0	+70	mV

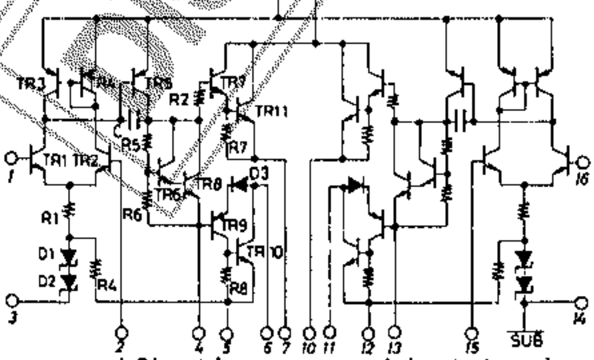
(Note). Unless otherwise specified for the power supply at the time of test, use the constant voltage power supply.

- When testing the available time of load shorted and output noise voltage, use the specified transformer as shown left.
- The output noise voltage is the peak value on the mean value indicating rms reading (VTVM). For AC power supply, use the AC stabilized power supply (50Hz) to avoid influence of flicker noise of AC primary.

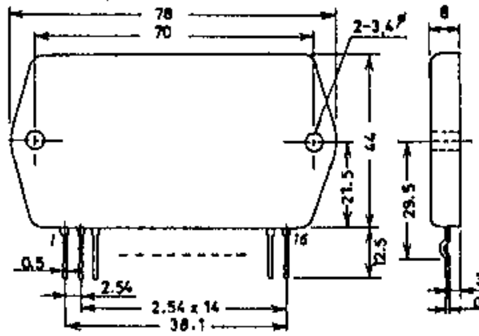


Specified transformer power supply
(Equivalent to Sansui RP-25)

Equivalent Circuit



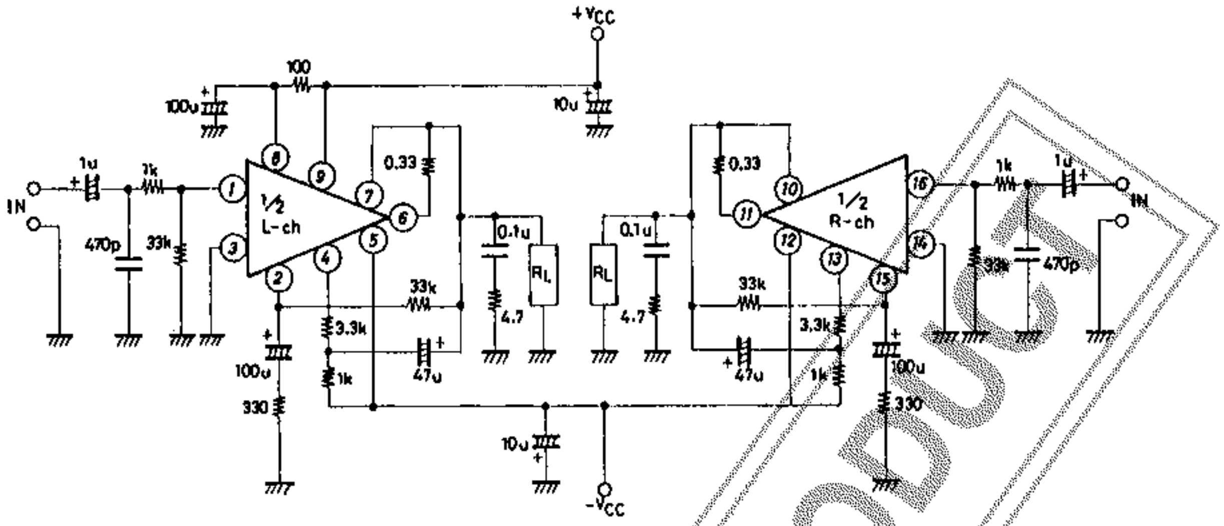
Case Outline 4016
(unit:mm)

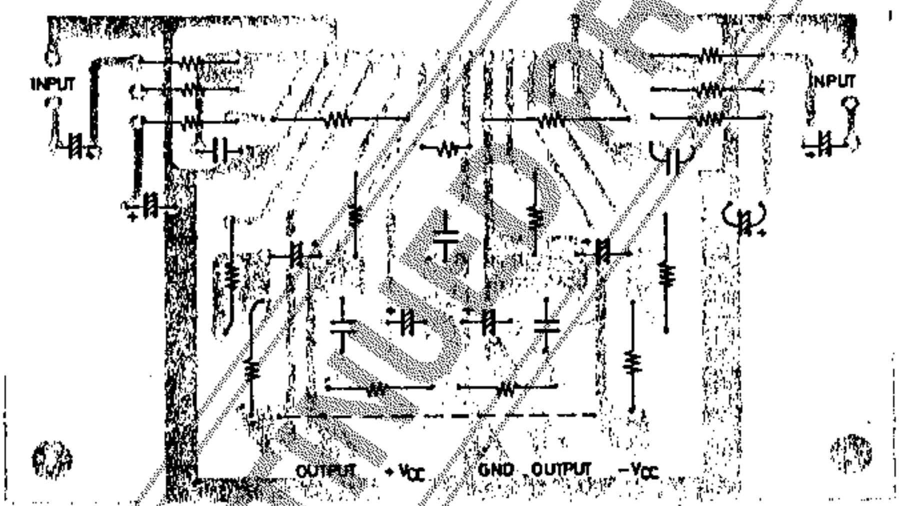


These specifications are subject to change without notice.

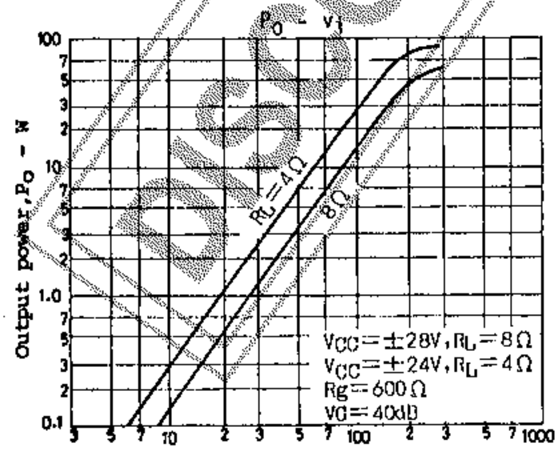
TOKYO SANYO ELECTRIC CO., LTD. SEMICONDUCTOR DIVISION
15-13, 6-CHOME, SOTOKANDA, CHIYODA-KU, TOKYO, 101 JAPAN

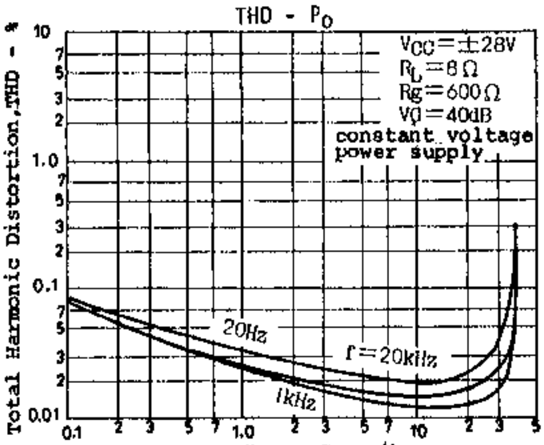
Application circuit example: 30W min. 2-channel AF power amplifier





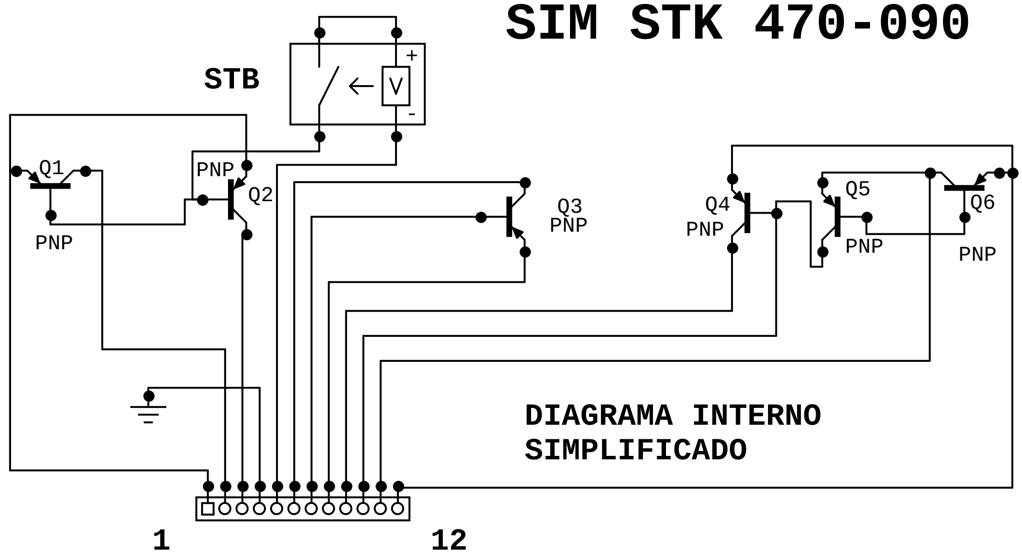
Printed pattern example (100 x 55mm², bottom view)





Multiregulador

STK470-070
SIM STK 470-090

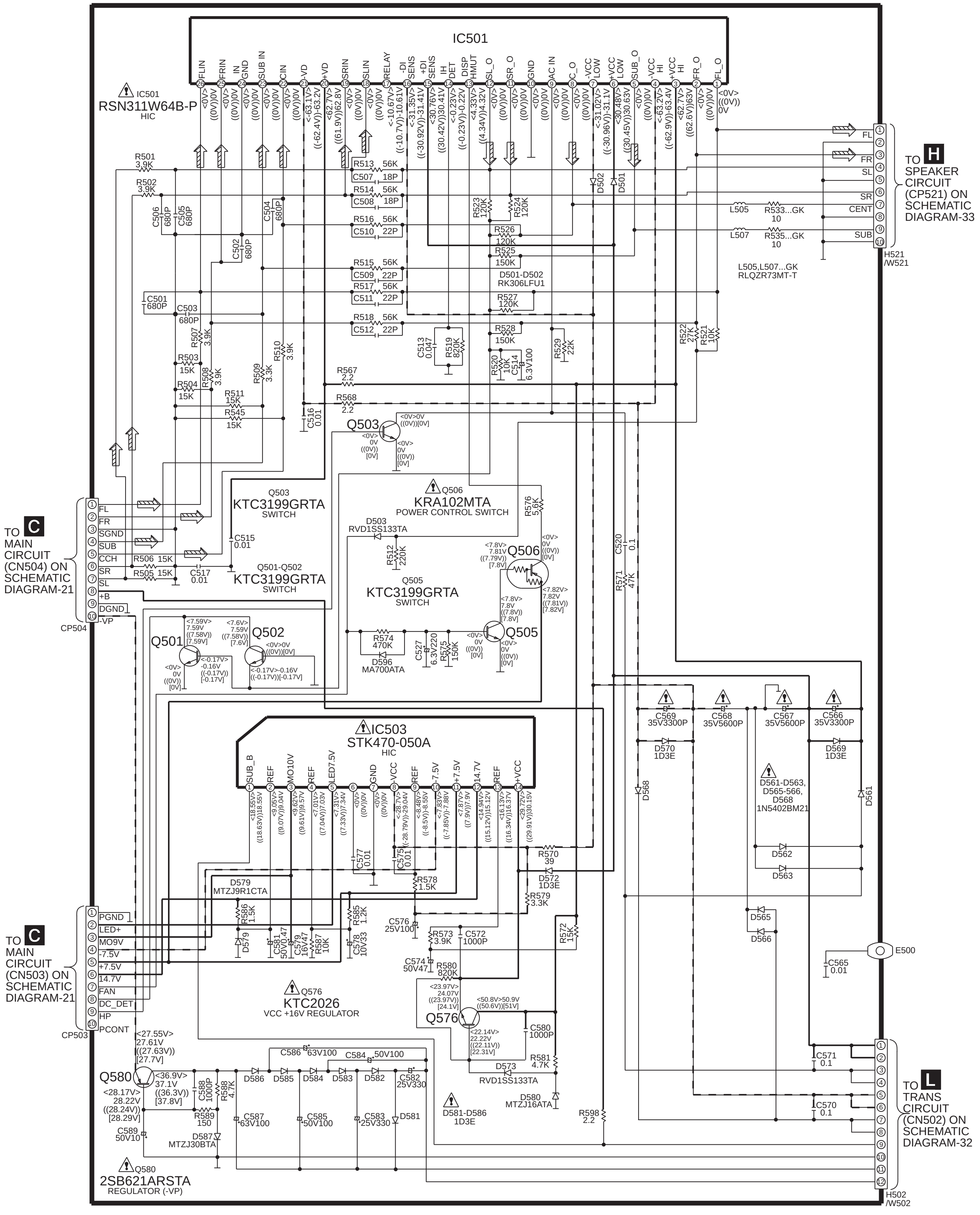


el STK470-070,y 090,se usan como reguladores en diversos equipos,y suplen varias tensiones tanto positivas como negativas,el ic de 12 pines(algunos tienen mas pero solo nos interesan las primeras ya que las demas suelen tener diodos integrados)
son de la siguiente manera.
1-in + vcc1-vcc2(típicamente +15vcc)
2-vcc 1 regulados(10vcc)
3-vcc2 regulados(3.3 o 7.8vcc)
4-ground tierra negativa.
5-stnad by +vcc1-+vcc2.
6- in -vcc1(-15-35vcc)
7-control -vcc1.
8-out -vcc1 (-8vcc)
9-out +vcc3(5vcc)
10-out vcc4(+9vcc)
11-out vcc5(+15vcc)
12-in +vcc3,4,5(+26vcc)

NOTAS:
Se han dibujado solo los elementos activos implicados necesarios.
Los diversos voltajes pueden variar segun el equipo en que se usen el dibujo corresponde al stk 470-070,el 090 es algo similar en su uso,y puede no ser totalmente compatible.

G POWER CIRCUIT

—— : +B SIGNAL LINE - - : -B SIGNAL LINE ⇨ : MAIN SIGNAL LINE



STK4100MK5 Series

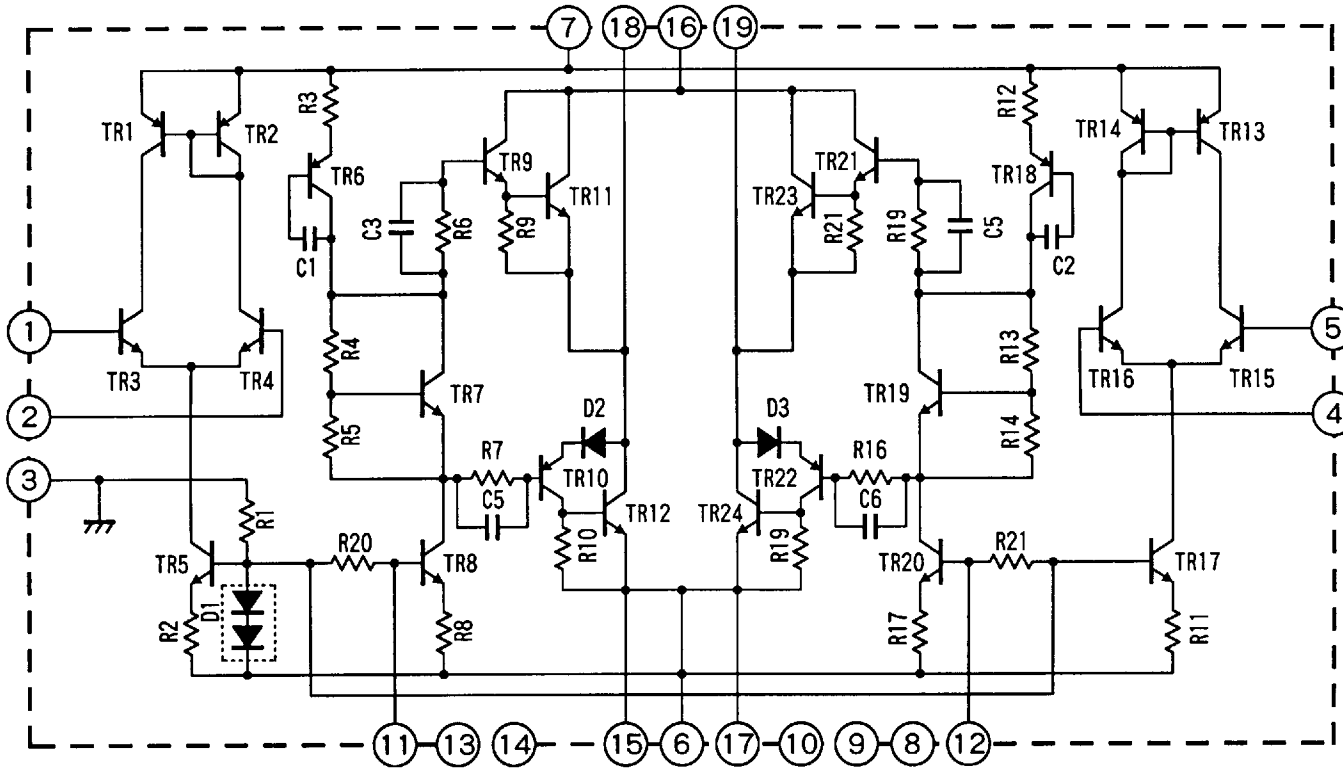
★2ch./1package, ± Power Supply
★6W/ch. ~ 100W/ch.
★THD = 0.08%

Model	Maximum Ratings 最大定格	Recommended Operating Conditions 推奨動作条件		Operating Characteristics (Recommend Operating Conditions at Test Circuit) 動作特性(Test Circuitにて推奨動作条件による)			
	Vcc max [V]	Vcc [V]		Po max 1 R_L=8Ω f=20~20kHz [W]	THD (V_G=40dB) [%]	Po max 2 R_L=4Ω f=1kHz [W]	THD (V_G=40dB) [%]
		R_L=8Ω	R_L=4Ω				
STK4100MK5	±21.0	±14.0	±12.5	6 + 6	0.08	6 + 6	0.2
STK4110MK5	±27.0	±18.0	±14.5	10 + 10	0.08	10 + 10	0.2
*STK4120MK5	±32.0	±21.5	±18.0	15 + 15	0.08	15 + 15	0.2
*STK4130MK5	±36.0	±24.5	±21.5	20 + 20	0.08	20 + 20	0.2
STK4140MK5	±40.5	±27.0	±24.0	25 + 25	0.08	25 + 25	0.2
STK4150MK5	±42.0	±28.5	±25.0	30 + 30	0.08	35 + 35	0.2
STK4160MK5	±46.0	±30.5	±26.5	35 + 35	0.08	40 + 40	0.2
STK4170MK5	±49.0	±32.5	±28.0	40 + 40	0.08	45 + 45	0.2
STK4180MK5	±51.0	±34.0	±30.0	45 + 45	0.08	50 + 50	0.2
STK4190MK5	±53.0	±35.5	±32.0	50 + 50	0.08	55 + 55	0.2
STK4200MK5	±57.0	±39.0	-	60 + 60	0.08	-	-
STK4210MK5	±62.0	±43.0	-	70 + 70	0.08	-	-
STK4220MK5	±65.0	±45.0	-	80 + 80	0.08	-	-
STK4230MK5	±75.0	±51.0	-	100 + 100	0.08	-	-

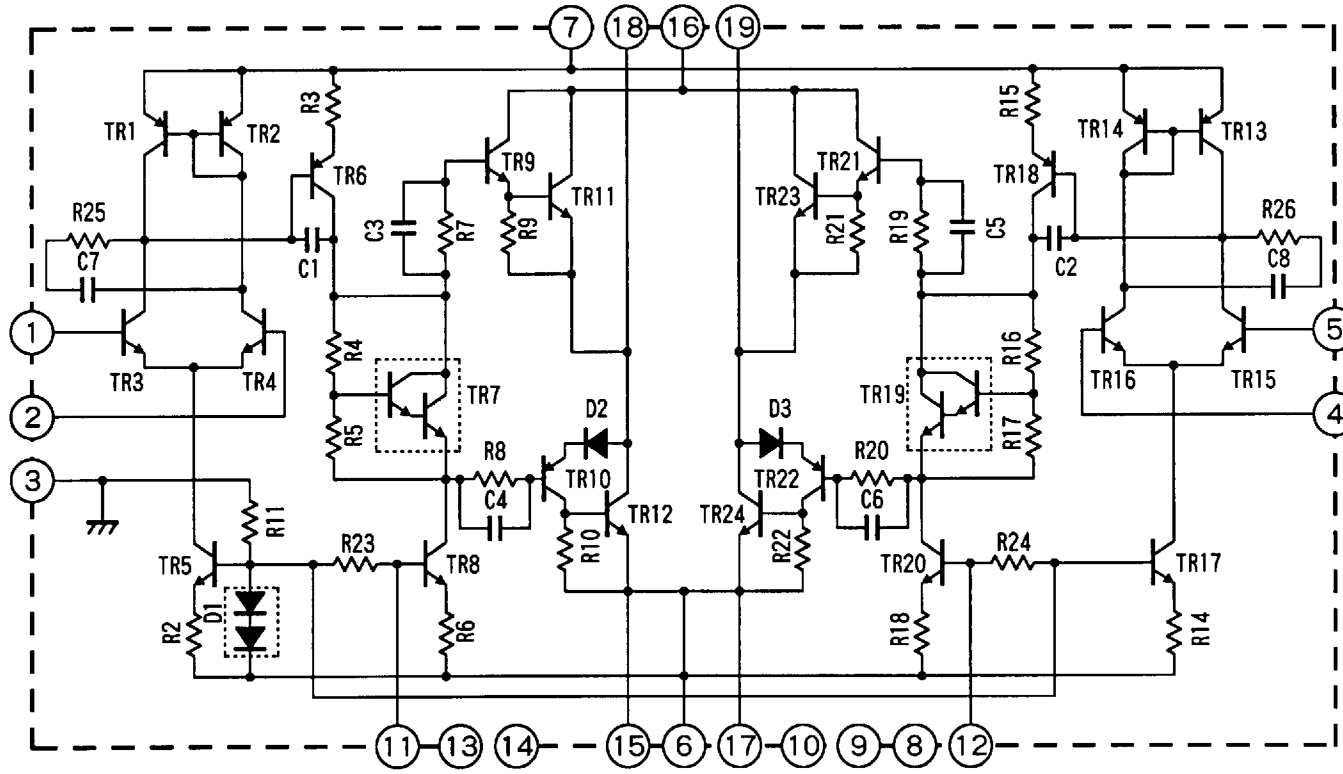
* Under mass production

■Equivalent Circuit

ⓐSTK4100MK5 ~ STK4190MK5

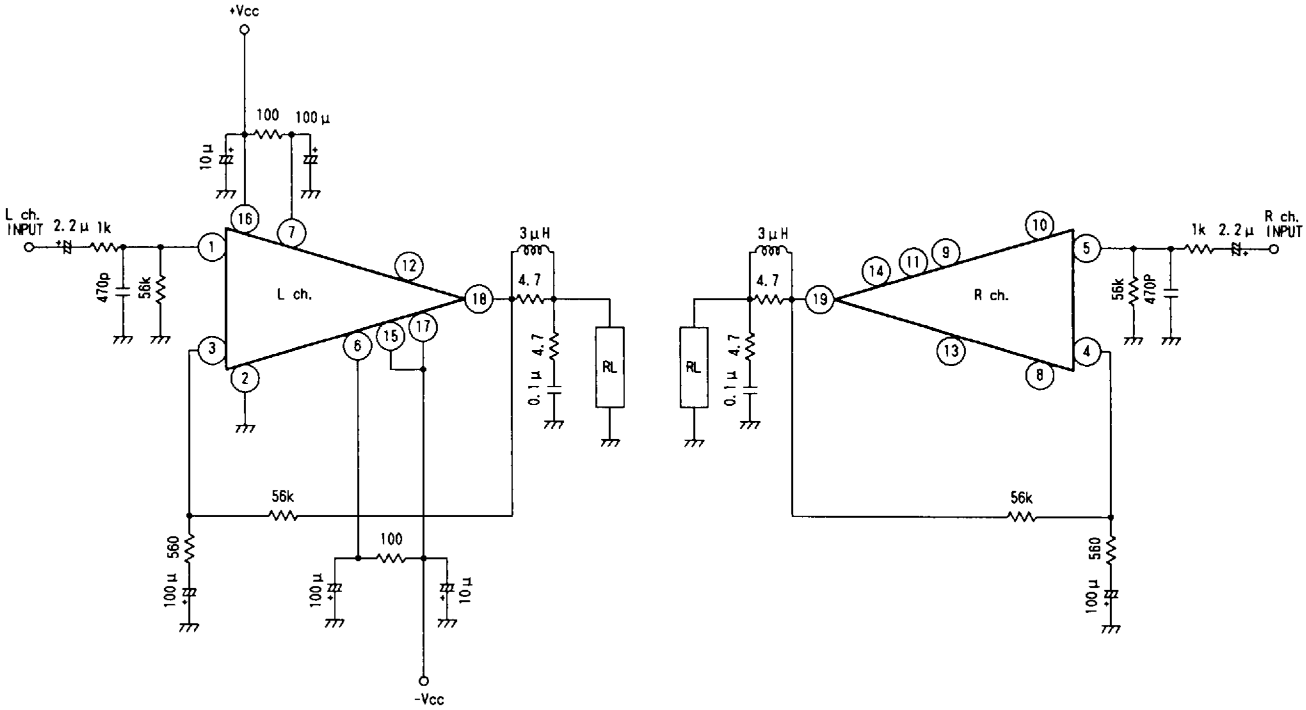


ⓑSTK4200MK5 ~ STK4230MK5

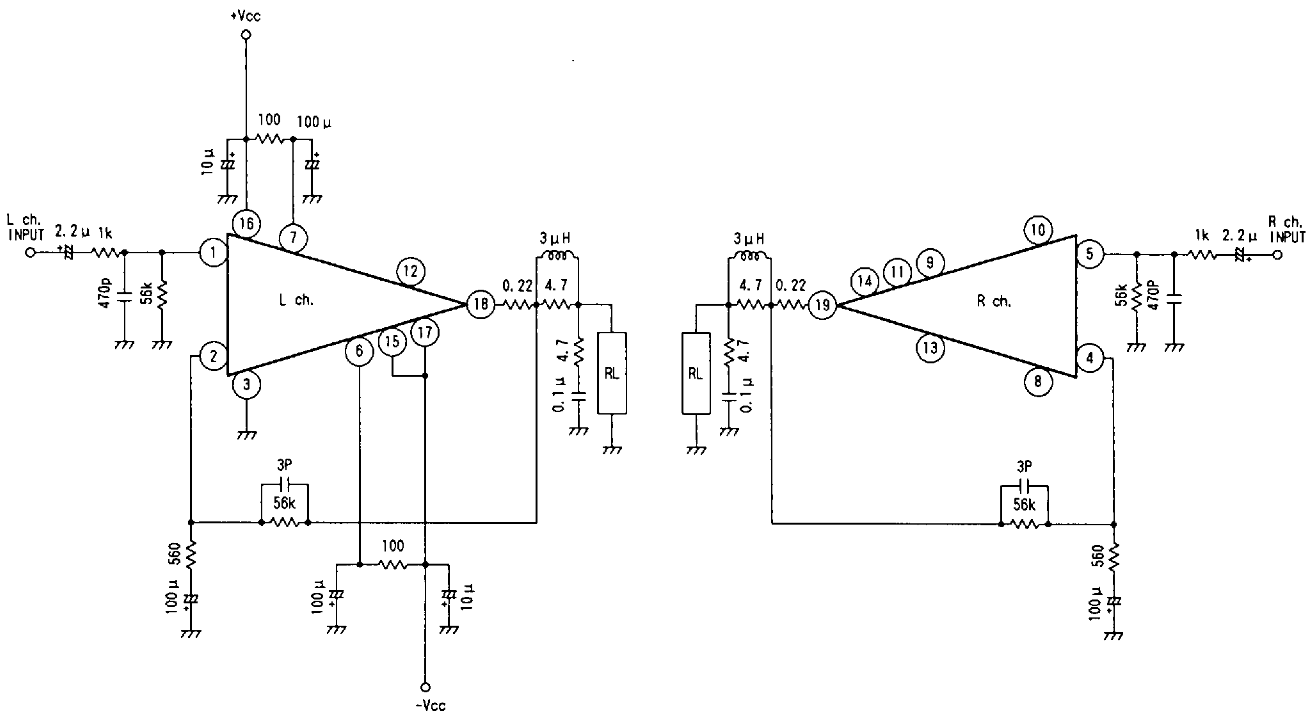


■Test Circuit

ⓐSTK4100MK5 ~ STK4190MK5

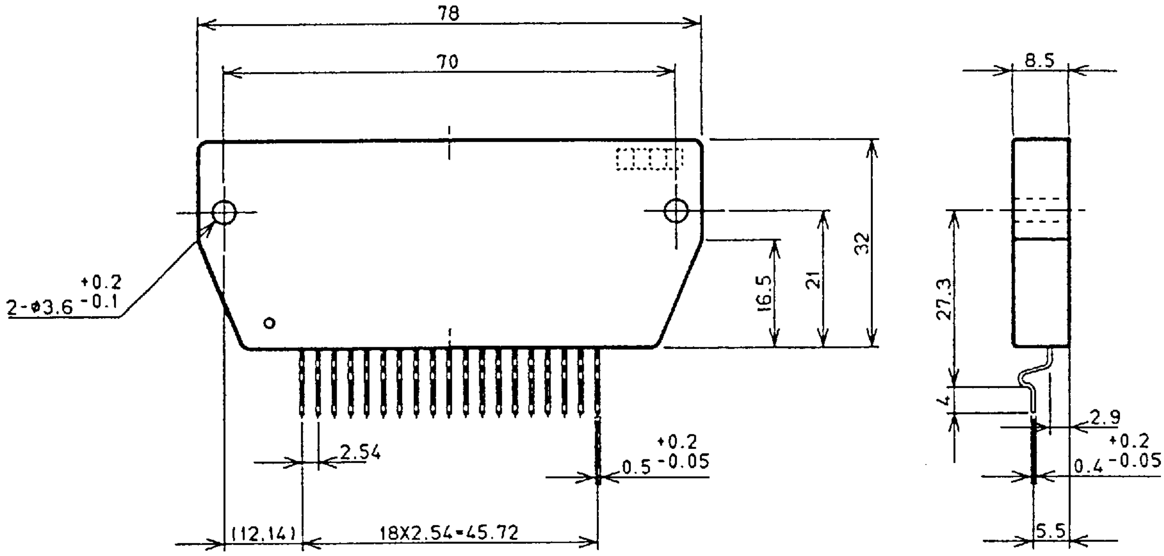


ⓑSTK4200MK5 ~ STK4230MK5

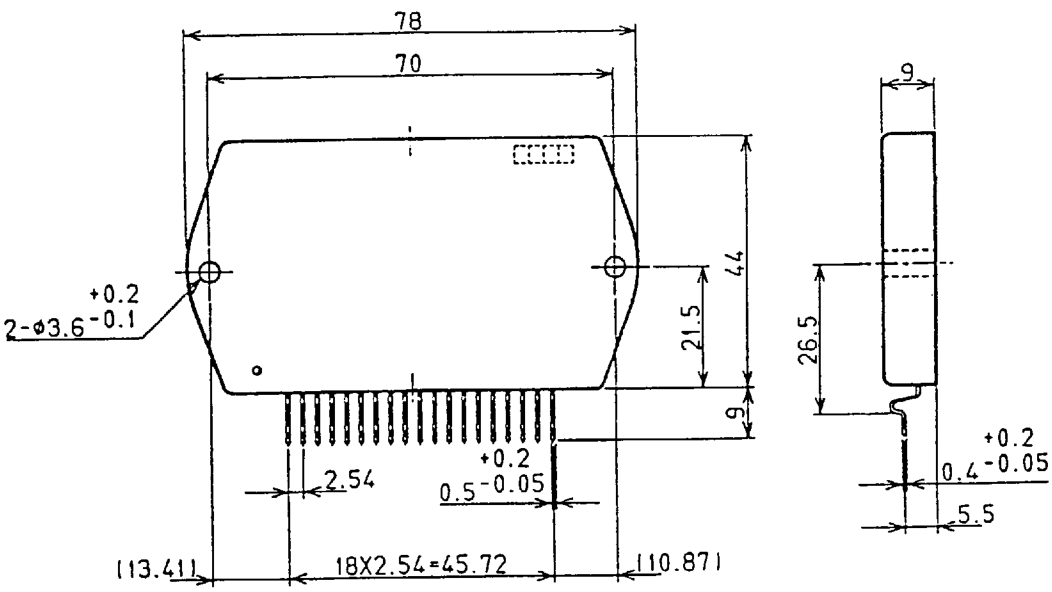


■Case Outline

ⓐSTK4100MK5 ～ STK4190MK5



ⓑSTK4200MK5 ～ STK4230MK5



STK4100MK5 Series

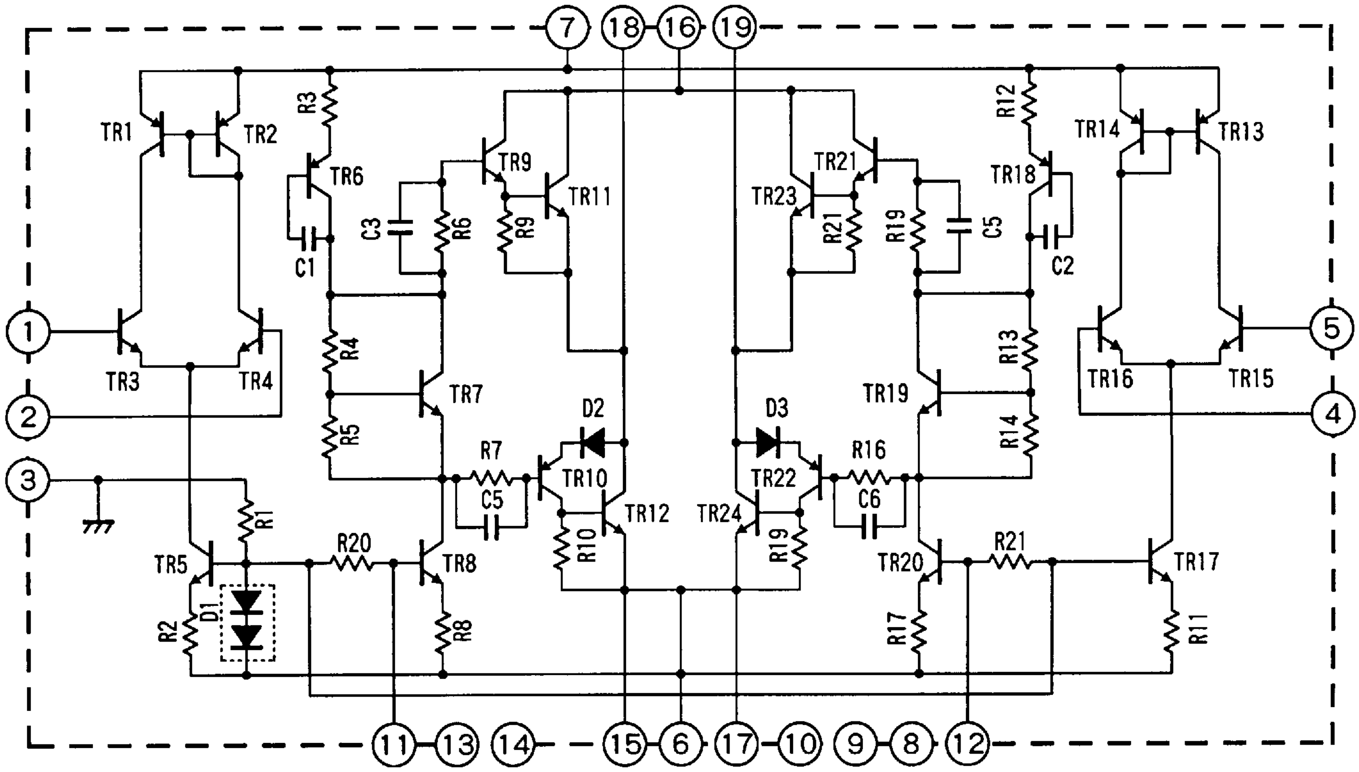
★2ch./1package, ± Power Supply
★6W/ch. ～ 100W/ch.
★THD = 0.08%

Model	Maximum Ratings 最大定格	Recommended Operating Conditions 推奨動作条件		Operating Characteristics (Recommend Operating Conditions at Test Circuit) 動作特性(Test Circuitにて推奨動作条件による)			
	Vcc max [V]	Vcc [V] R_L=8Ω	Vcc [V] R_L=4Ω	Po max 1 R_L=8Ω f=20～20kHz [W]	THD (V_G=40dB) [%]	Po max 2 R_L=4Ω f=1kHz [W]	THD (V_G=40dB) [%]
STK4100MK5	±21.0	±14.0	±12.5	6 + 6	0.08	6 + 6	0.2
STK4110MK5	±27.0	±18.0	±14.5	10 + 10	0.08	10 + 10	0.2
*STK4120MK5	±32.0	±21.5	±18.0	15 + 15	0.08	15 + 15	0.2
*STK4130MK5	±36.0	±24.5	±21.5	20 + 20	0.08	20 + 20	0.2
STK4140MK5	±40.5	±27.0	±24.0	25 + 25	0.08	25 + 25	0.2
STK4150MK5	±42.0	±28.5	±25.0	30 + 30	0.08	35 + 35	0.2
STK4160MK5	±46.0	±30.5	±26.5	35 + 35	0.08	40 + 40	0.2
STK4170MK5	±49.0	±32.5	±28.0	40 + 40	0.08	45 + 45	0.2
STK4180MK5	±51.0	±34.0	±30.0	45 + 45	0.08	50 + 50	0.2
STK4190MK5	±53.0	±35.5	±32.0	50 + 50	0.08	55 + 55	0.2
STK4200MK5	±57.0	±39.0	-	60 + 60	0.08	-	-
STK4210MK5	±62.0	±43.0	-	70 + 70	0.08	-	-
STK4220MK5	±65.0	±45.0	-	80 + 80	0.08	-	-
STK4230MK5	±75.0	±51.0	-	100 + 100	0.08	-	-

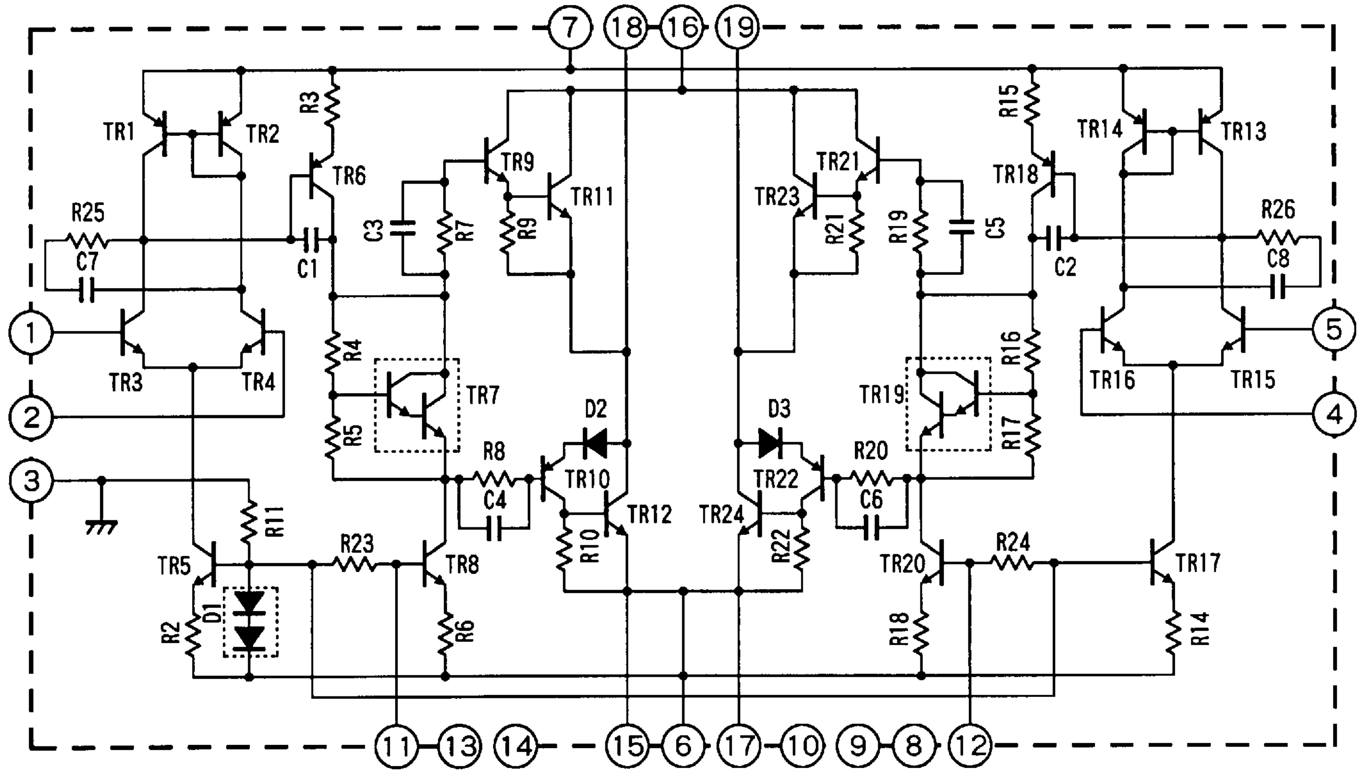
* Under mass production

■Equivalent Circuit

ⓐSTK4100MK5 ~ STK4190MK5

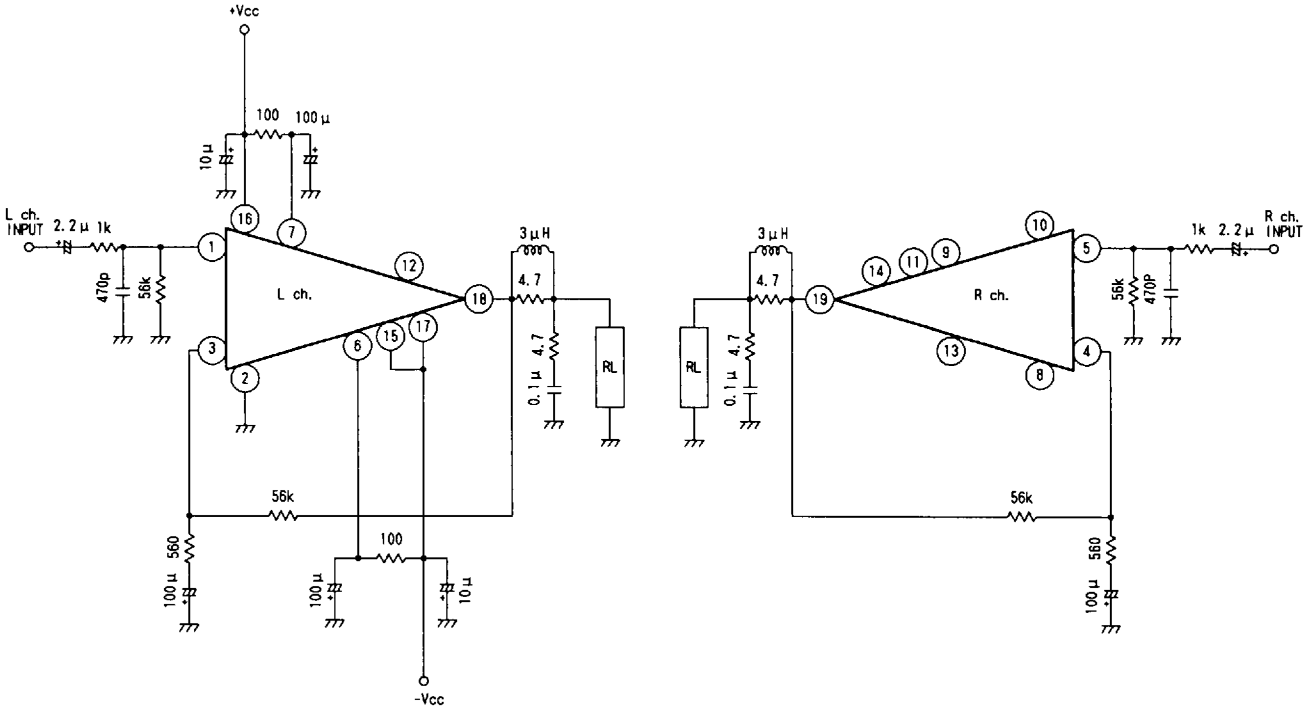


ⓑSTK4200MK5 ~ STK4230MK5

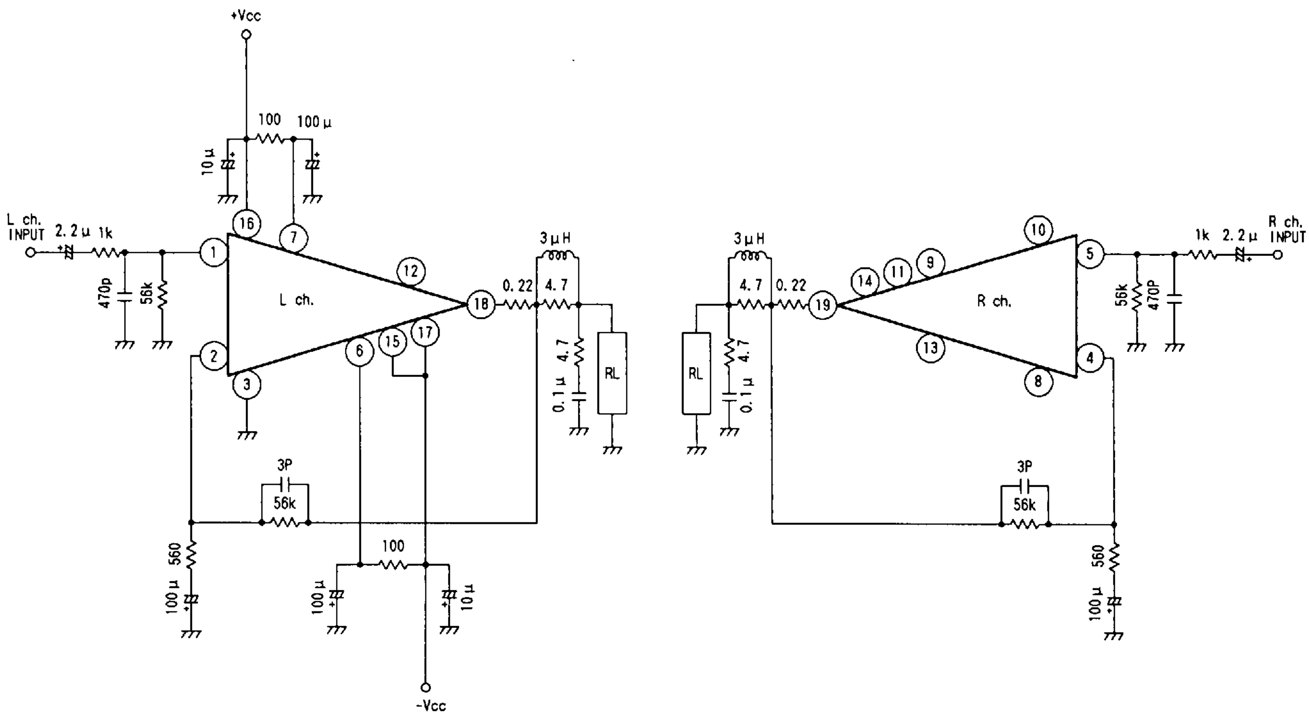


■Test Circuit

ⓐSTK4100MK5 ~ STK4190MK5

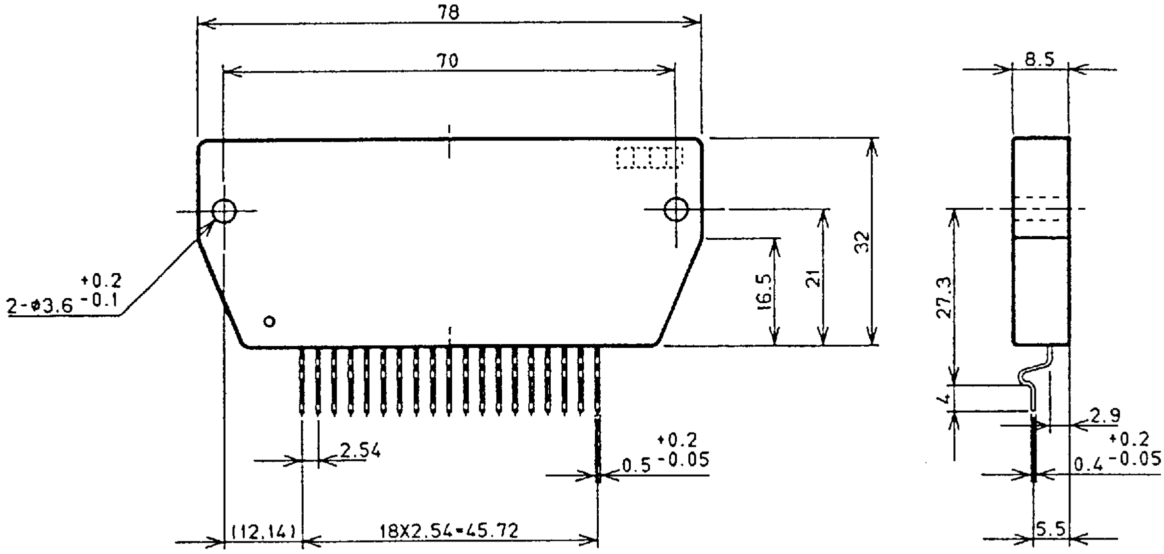


ⓑSTK4200MK5 ~ STK4230MK5

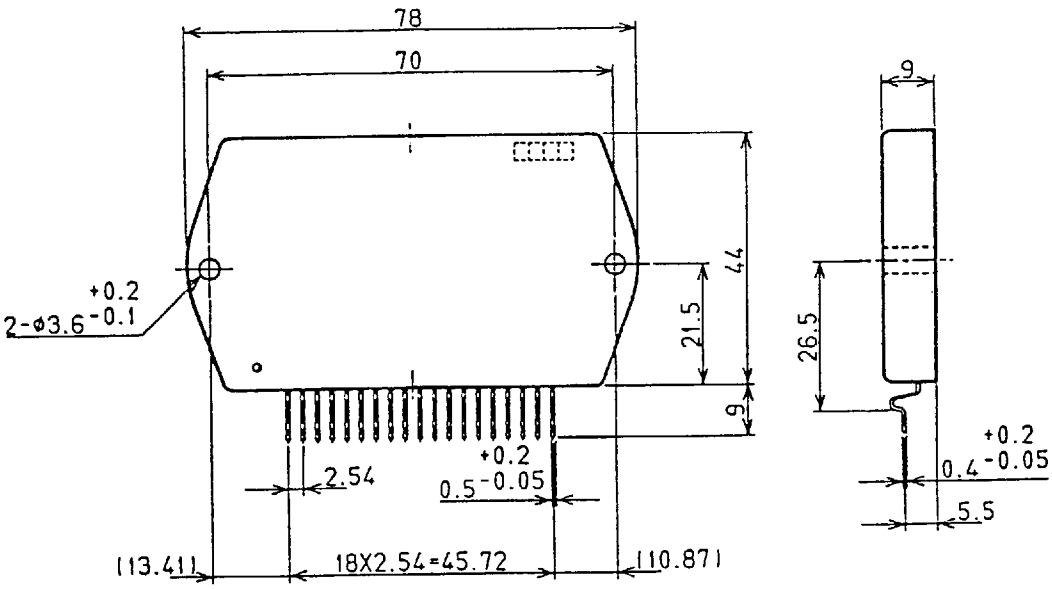


■ Case Outline

ⓐSTK4100MK5 ~ STK4190MK5



ⓑSTK4200MK5 ~ STK4230MK5



Ordering number : EN4218A

Thick-film Hybrid Integrated Circuit (HIC)

SANYO No. 4218A

STK4199MK2

Audio Power Amplifier (THD = 0.3%) 25 W + 50 W + 25 W

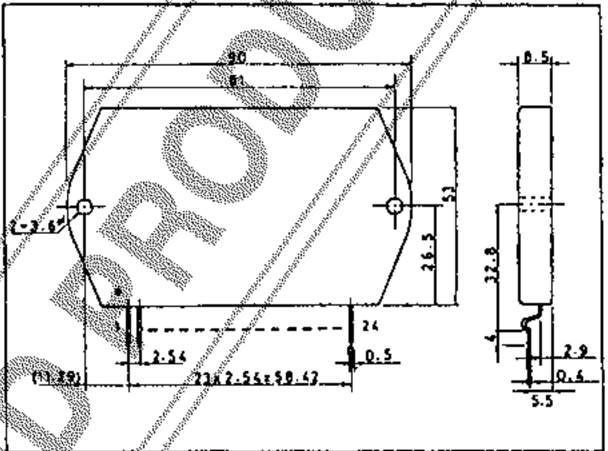
Overview

Recent audio-visual television sets generate more impressive images by making the images higher in quality. To do this, large screens providing high-quality images are essential. Along with this, the sound must also be powerful, and full of amblence and presence. To faithfully reproduce a powerful sound field, distortion-free bass output is indispensable. Because human ears can perceive left-right directionality only for frequencies above 200 Hz, a three-dimensional (3D) system using one woofer speaker is generally employed. Also, the Dolby Surround System, used in many movie theaters, exists as a system for reproducing a spatial sound field with presence. To achieve satisfying results in audio-visual televisions, these specifications require amplifiers for a correspondingly high number of channels. To meet these needs, the STK4199MK2 is a hybrid IC that provides power amplifiers for three channels (25 W + 50 W + 25 W) in a single package.

Package Dimensions

unit : mm

4108



Applications

- 3D surround amplifier
- 3D super woofer amplifier

Features

- Uses substrate with IMST (insulated metal substrate technology)
- The ± dual power supply provides a wide frequency band (f = 20 Hz to 50 kHz)
- Easy dolby sorround configuration
- Easy 3D amplifier configuration

SANYO Electric Co., Ltd. Semiconductor Business Headquarters
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110 JAPAN

Specifications

Absolute Maximum Ratings at Ta = 25°C

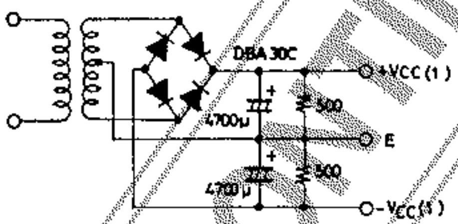
				unit
Maximum supply voltage	V_{CC} max	L,Rch	±39	V
		Cch	±52.5	V
Thermal resistance	θj-c	L,Rch per power transistors	2.6	°C/W
		Cch per power transistors	1.8	°C/W
Junction temperature	Tj		150	°C
Operating substrate temperature	Tc		125	°C
Storage temperature	Tstg		-30 to +125	°C
Permissible load short time	t_s	L,Rch V_{CC}=±26V, R_L=8Ω, f=50Hz, P_O=25V	2	sec
		Cch V_{CC}=±35V, R_L=8Ω, f=50Hz, P_O=50W	2	sec

Operating Characteristics at Ta = 25°C, R_L = 8Ω, Rg = 600Ω, VG = 40dB, R_L (non-inductive)

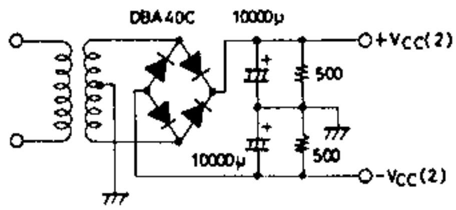
			min	typ	max	unit
Output power	$P_O(1)$	V_{CC}=±26V, f=20 to 20kHz, THD=0.4%, L,Rch	25			W
	$P_O(2)$	V_{CC}=±35V, f=20 to 20 kHz, THD=0.4%, Cch	50			W
	$P_O(3)$	V_{CC}=±22V, f=1 kHz, THD=1.0%, L,Rch, R_L=4Ω	25			W
	$P_O(4)$	V_{CC}=±31V, f=1 kHz, THD=1.0%, Cch, R_L=4Ω	55			W
Total harmonic distortion	THD(1)	V_{CC}=±26V, f=1kHz, P_O=1.0W, L,Rch			0.3	%
	THD(2)	V_{CC}=±35V, f=1kHz, P_O=1.0W, Cch			0.3	%
Frequency response	f_L, f_H(1)	V_{CC}=±26V, P_O=1.0W, THD= $^{0}_{-3}$dB, L,Rch	20		50k	Hz
	f_L, f_H(2)	V_{CC}=±35V, P_O=1.0W, THD= $^{0}_{-3}$dB, Cch	20		50k	Hz
Input impedance	$r_i(1)$	V_{CC}=±26V, f=1kHz, P_O=1.0W, L,Rch		55		kΩ
	$r_i(2)$	V_{CC}=±35V, f=1kHz, P_O=1.0W, Cch		55		kΩ
Output noise voltage	$V_{NO}(1)$	V_{CC}=±31V, Rg=10kΩ, L,Rch			1.2	mVrms
	$V_{NO}(2)$	V_{CC}=±42V, Rg=10kΩ, Cch			1.2	mVrms
Quiescent current	$I_{CCO}(1)$	V_{CC}=±31V, L,Rch	20	40	100	mA
	$I_{CCO}(2)$	V_{CC}=±42V, Cch	10	20	50	mA
Neutral voltage	$V_N(1)$	V_{CC}=±31V, L,Rch	-70	0	+70	mV
	$V_N(2)$	V_{CC}=±42V, Cch	-70	0	+70	mV

Notes

- Use rated power supply for test unless otherwise specified.
  However, the L and R channels use $\pm V_{CC}(1)$ power supply, and the C channel uses $\pm V_{CC}(2)$ power supply.
- When measuring permissible load short time and output noise voltage use transformer power supply indicated below.
- Output noise voltage is represented by the peak value rms (VTVM) for mean reading. Use an AC stabilized power supply (50 Hz) on the primary side to eliminate the effect of AC flicker noise.

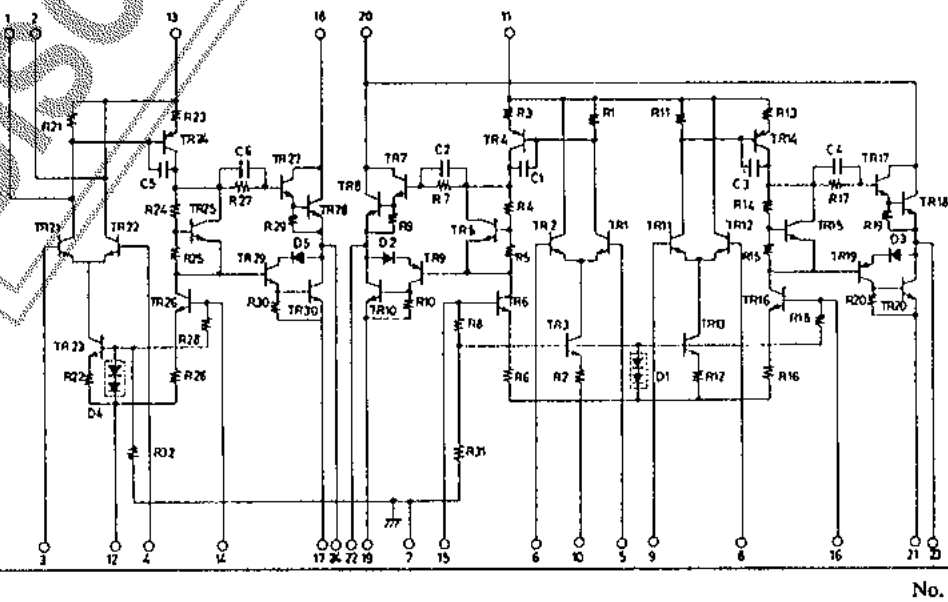


Specified Transformer Power Supply (RP-25 Equivalent)

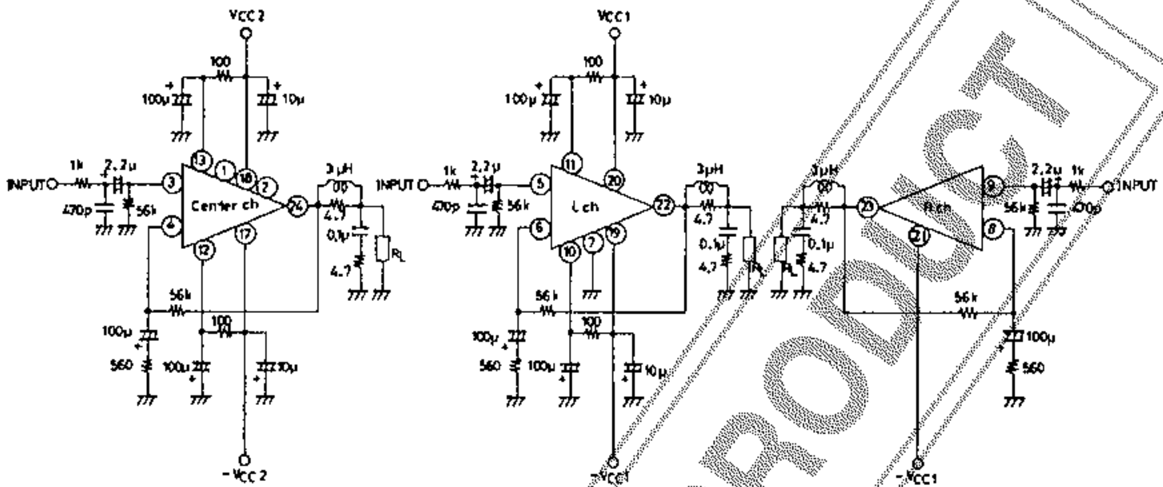


Specified Transformer Power Supply (MG-200 Equivalent)

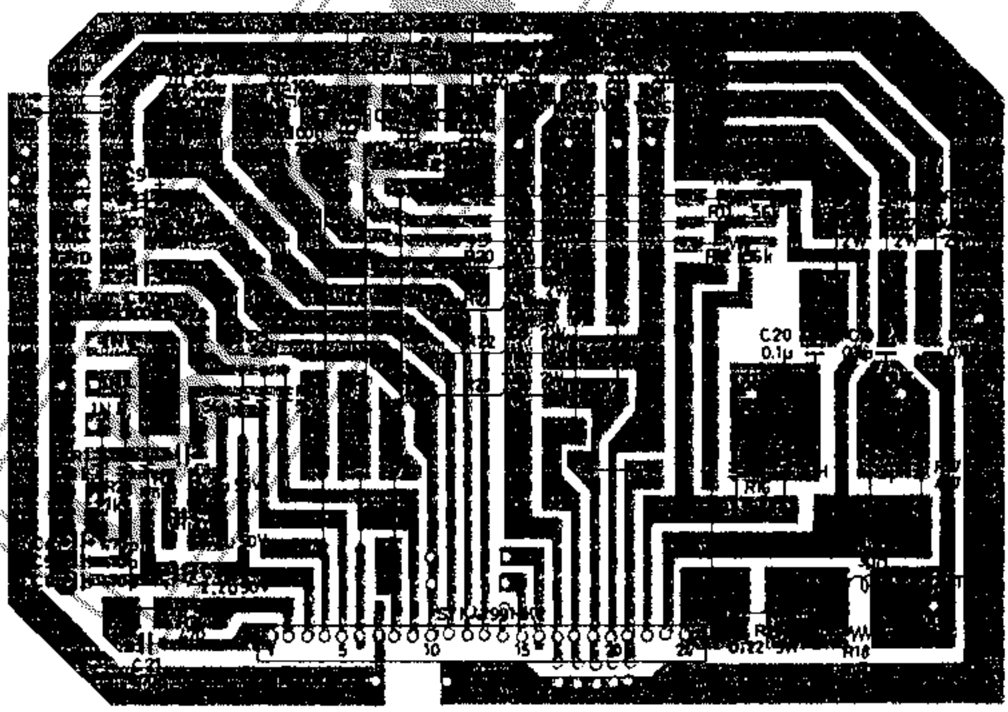
Equivalent Circuit

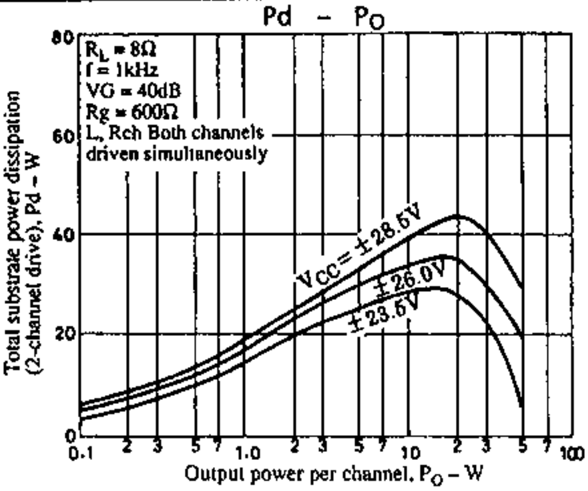


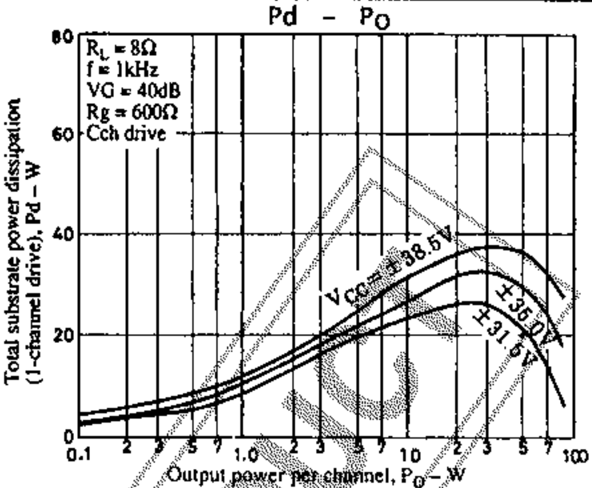
Application Circuit

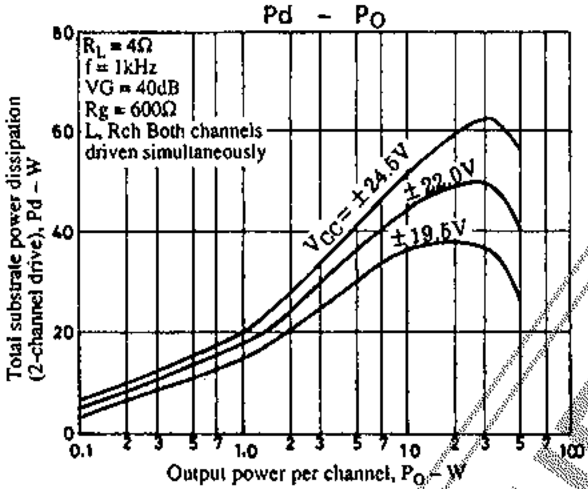


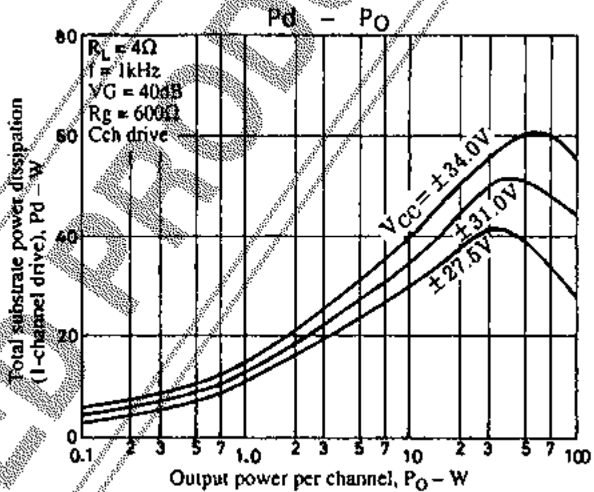
PCB Pattern

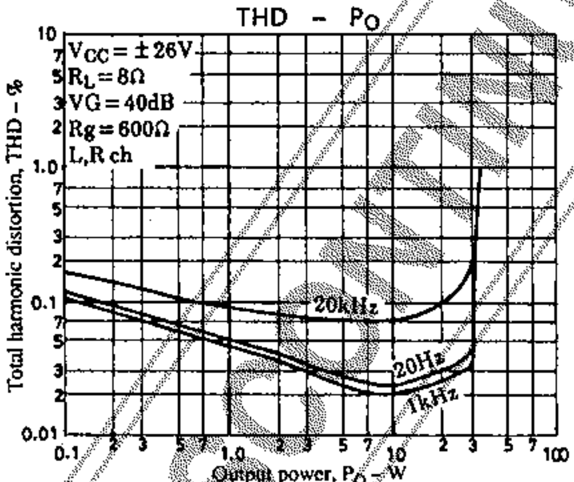


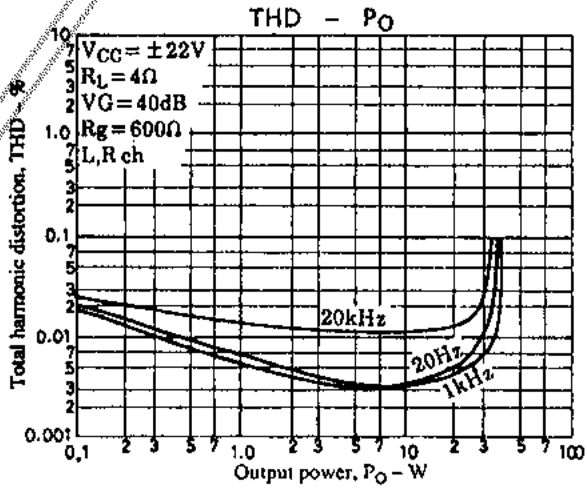

Pd – P_O
R_L = 8Ω
f = 1kHz
VG = 40dB
Rg = 600Ω
L, Rch Both channels driven simultaneously
V_{CC} = ±28.5V
±26.0V
±23.5V
Total substrate power dissipation (2-channel drive), Pd – W
Output power per channel, P_O – W

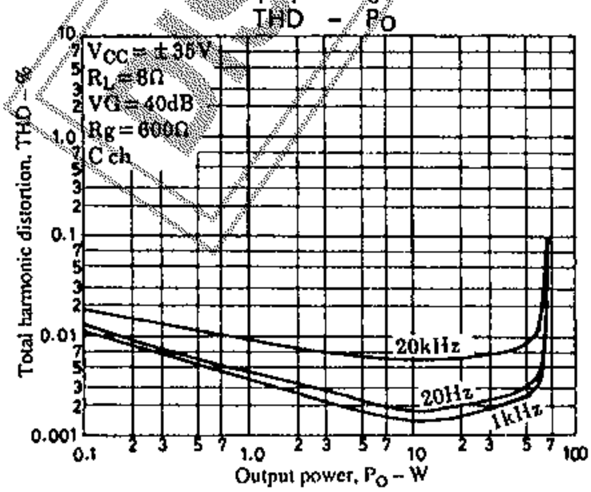

Pd – P_O
R_L = 8Ω
f = 1kHz
VG = 40dB
Rg = 600Ω
Cch drive
V_{CC} = ±38.5V
±35.0V
±31.5V
Total substrate power dissipation (1-channel drive), Pd – W
Output power per channel, P_O – W

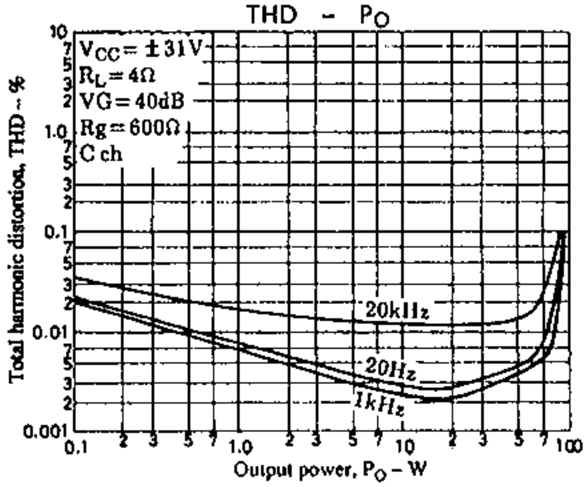

Pd – P_O
R_L = 4Ω
f = 1kHz
VG = 40dB
Rg = 600Ω
L, Rch Both channels driven simultaneously
V_{CC} = ±24.5V
±22.0V
±19.5V
Total substrate power dissipation (2-channel drive), Pd – W
Output power per channel, P_O – W

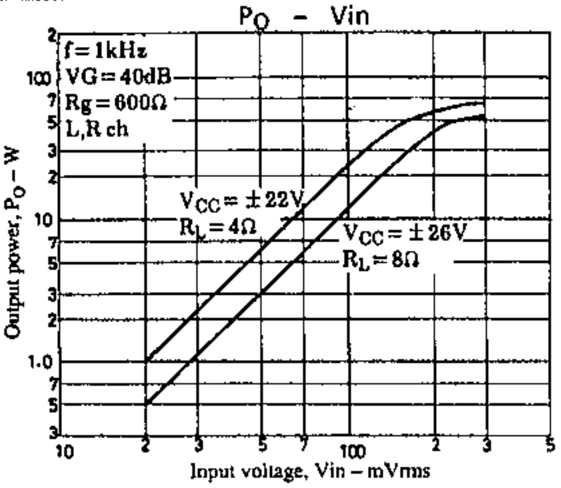

Pd – P_O
R_L = 4Ω
f = 1kHz
VG = 40dB
Rg = 600Ω
Cch drive
V_{CC} = ±34.0V
±31.0V
±27.5V
Total substrate power dissipation (1-channel drive), Pd – W
Output power per channel, P_O – W

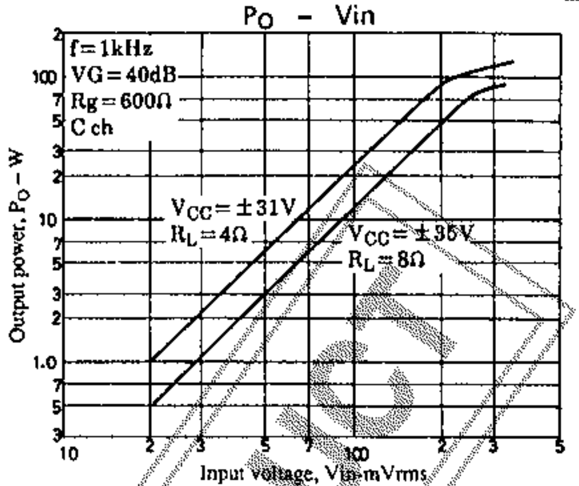

THD – P_O
V_{CC} = ±26V
R_L = 8Ω
VG = 40dB
Rg = 600Ω
L,R ch
20kHz
20Hz
1kHz
Total harmonic distortion, THD – %
Output power, P_O – W

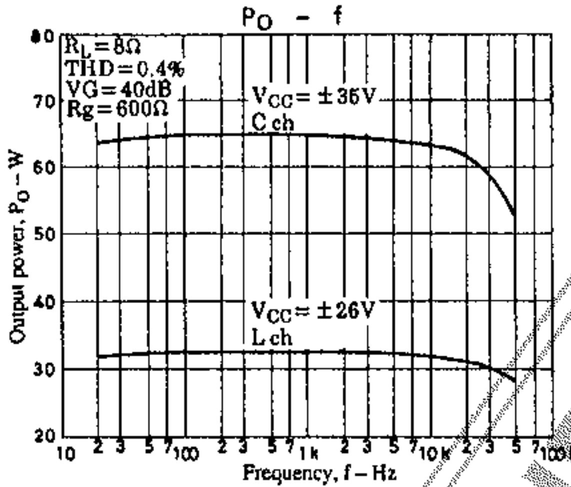

THD – P_O
V_{CC} = ±22V
R_L = 4Ω
VG = 40dB
Rg = 600Ω
L,R ch
20kHz
20Hz
1kHz
Total harmonic distortion, THD – %
Output power, P_O – W

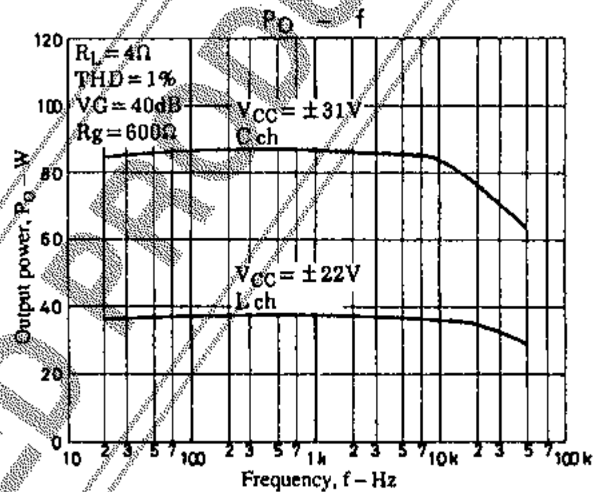

THD – P_O
V_{CC} = ±35V
R_L = 8Ω
VG = 40dB
Rg = 600Ω
C ch
20kHz
20Hz
1kHz
Total harmonic distortion, THD – %
Output power, P_O – W

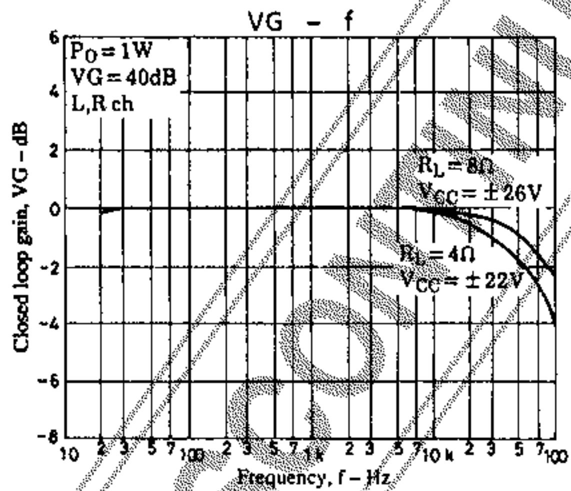

THD – P_O
V_{CC} = ±31V
R_L = 4Ω
VG = 40dB
Rg = 600Ω
C ch
20kHz
20Hz
1kHz
Total harmonic distortion, THD – %
Output power, P_O – W

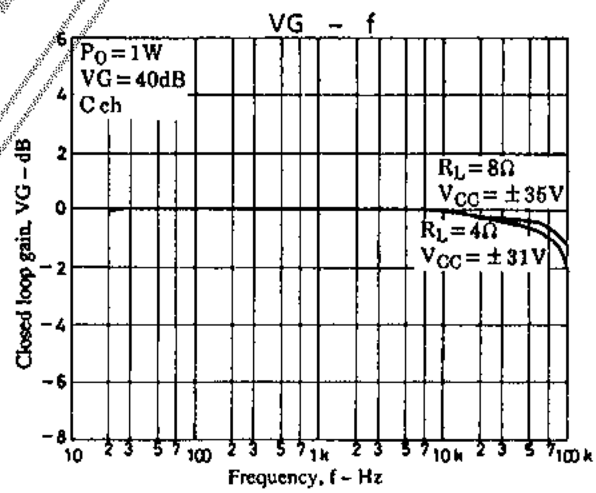

P_O – Vin
f = 1kHz
VG = 40dB
Rg = 600Ω
L,R ch
V_{CC} = ±22V
R_L = 4Ω
V_{CC} = ±26V
R_L = 8Ω
Output power, P_O – W
Input voltage, Vin – mVrms

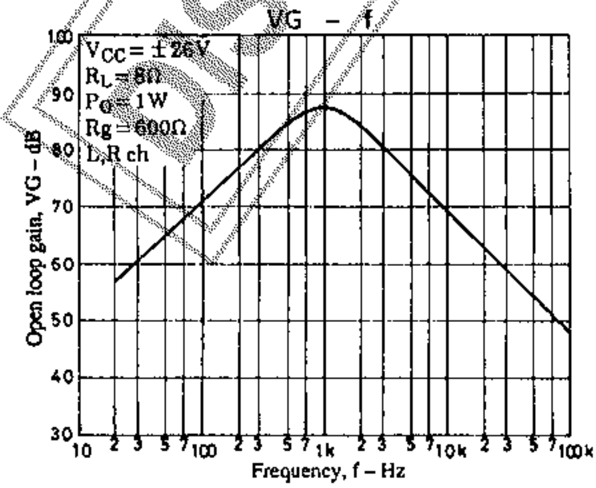

P_O – Vin
f = 1kHz
VG = 40dB
Rg = 600Ω
C ch
V_{CC} = ±31V
R_L = 4Ω
V_{CC} = ±35V
R_L = 8Ω
Output power, P_O – W
Input voltage, Vin – mVrms

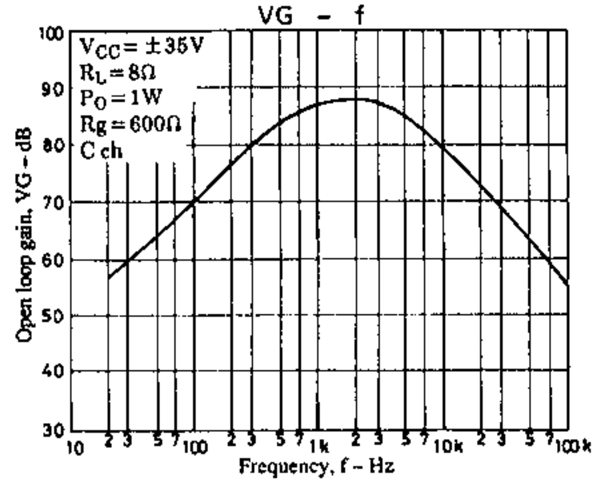

P_O – f
R_L = 8Ω
THD = 0.4%
VG = 40dB
Rg = 600Ω
V_{CC} = ±35V
C ch
V_{CC} = ±26V
L ch
Output power, P_O – W
Frequency, f – Hz

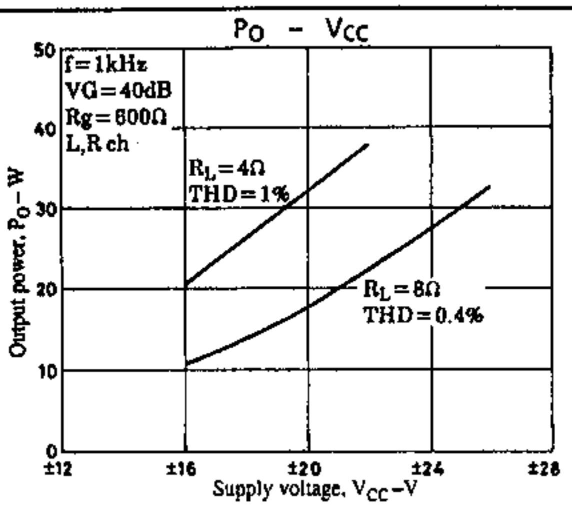

P_O – f
R_L = 4Ω
THD = 1%
VG = 40dB
Rg = 600Ω
V_{CC} = ±31V
C ch
V_{CC} = ±22V
L ch
Output power, P_O – W
Frequency, f – Hz

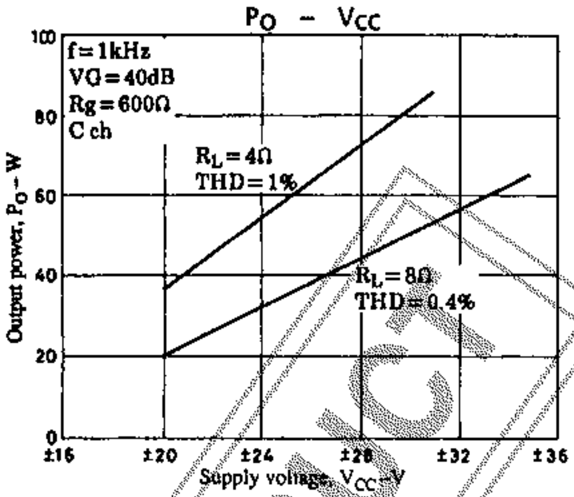

VG – f
P_O = 1W
VG = 40dB
L,R ch
R_L = 8Ω
V_{CC} = ±26V
R_L = 4Ω
V_{CC} = ±22V
Closed loop gain, VG – dB
Frequency, f – Hz

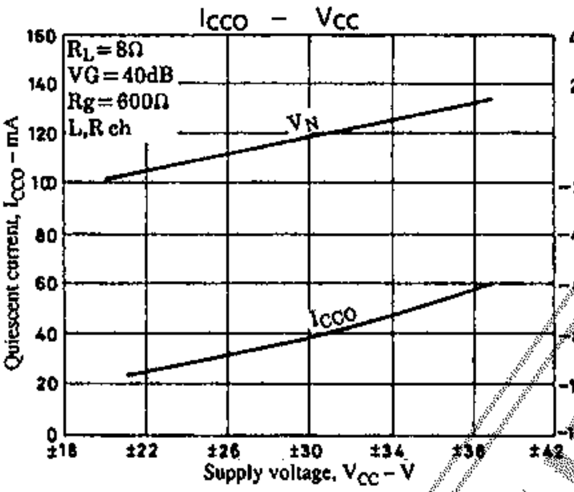

VG – f
P_O = 1W
VG = 40dB
C ch
R_L = 8Ω
V_{CC} = ±35V
R_L = 4Ω
V_{CC} = ±31V
Closed loop gain, VG – dB
Frequency, f – Hz

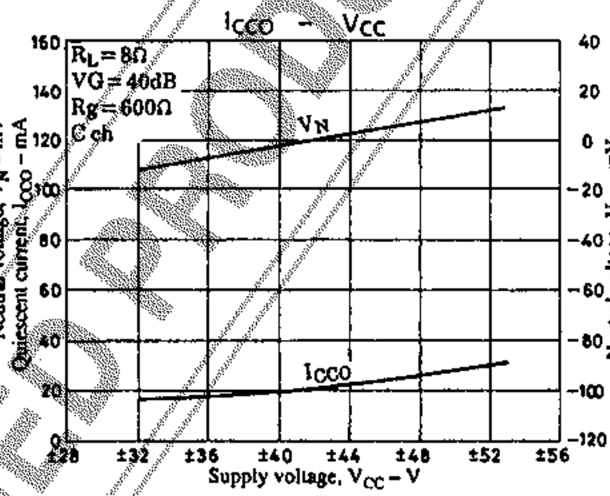

VG – f
V_{CC} = ±26V
R_L = 8Ω
P_O = 1W
Rg = 600Ω
L,R ch
Open loop gain, VG – dB
Frequency, f – Hz

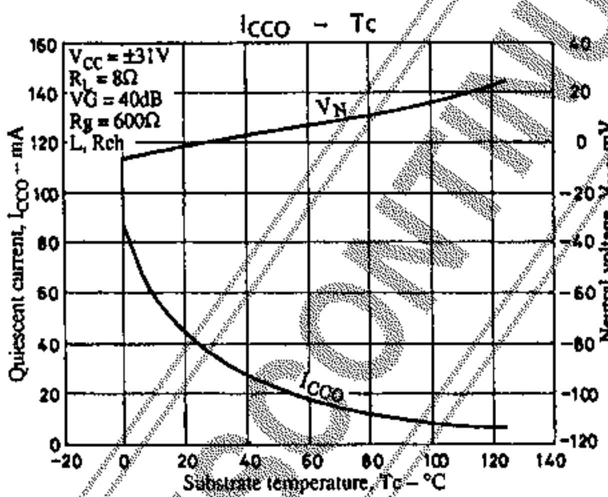

VG – f
V_{CC} = ±35V
R_L = 8Ω
P_O = 1W
Rg = 600Ω
C ch
Open loop gain, VG – dB
Frequency, f – Hz

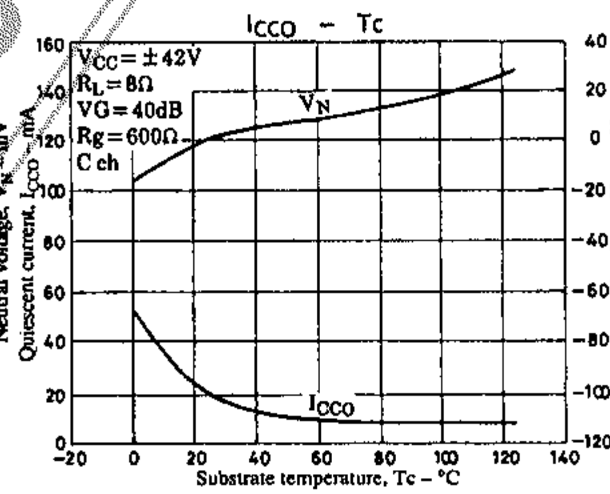

Po – Vcc
f=1kHz
VG=40dB
Rg=600Ω
L,R ch
R_L=4Ω
THD=1%
R_L=8Ω
THD=0.4%
Output power, P_O – W
Supply voltage, V_{CC} – V
0
10
20
30
40
50
±12
±16
±20
±24
±28


Po – Vcc
f=1kHz
VG=40dB
Rg=600Ω
C ch
R_L=4Ω
THD=1%
R_L=8Ω
THD=0.4%
Output power, P_O – W
Supply voltage, V_{CC} – V
0
20
40
60
80
100
±16
±20
±24
±28
±32
±36

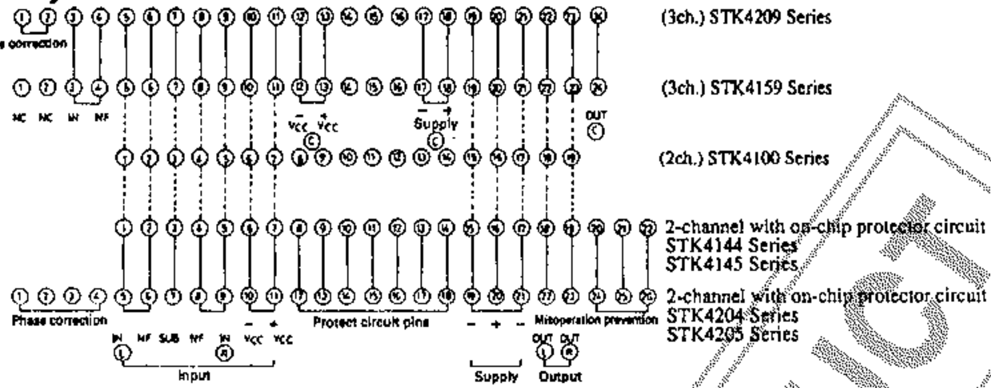

Icco – Vcc
R_L=8Ω
VG=40dB
Rg=600Ω
L,R ch
V_N
I_{CCO}
Quiescent current, I_{CCO} – mA
Neutral voltage, V_N – mV
Supply voltage, V_{CC} – V
0
20
40
60
80
100
120
140
160
40
20
0
–20
–40
–60
–80
–100
–120
±18
±22
±26
±30
±34
±38
±42


Icco – Vcc
R_L=8Ω
VG=40dB
Rg=600Ω
C ch
V_N
I_{CCO}
Quiescent current, I_{CCO} – mA
Neutral voltage, V_N – mV
Supply voltage, V_{CC} – V
0
20
40
60
80
100
120
140
160
40
20
0
–20
–40
–60
–80
–100
–120
±28
±32
±36
±40
±44
±48
±52
±56


Icco – Tc
V_{CC}=±31V
R_L=8Ω
VG=40dB
Rg=600Ω
L, Rch
V_N
I_{CCO}
Quiescent current, I_{CCO} – mA
Neutral voltage, V_N – mV
Substrate temperature, Tc – °C
0
20
40
60
80
100
120
140
160
40
20
0
–20
–40
–60
–80
–100
–120
–20
0
20
40
60
80
100
120
140


Icco – Tc
V_{CC}=±42V
R_L=8Ω
VG=40dB
Rg=600Ω
C ch
V_N
I_{CCO}
Quiescent current, I_{CCO} – mA
Neutral voltage, V_N – mV
Substrate temperature, Tc – °C
0
20
40
60
80
100
120
140
160
40
20
0
–20
–40
–60
–80
–100
–120
–20
0
20
40
60
80
100
120
140

Pin Compatibility with Other Series



Explanation of pin compatibility

STK4100 Series ←→ STK4159 Series, STK4209 Series

STK4100 Series ←→ STK4144, STK4145 Series, STK4204, STK4205 Series

Note: Protect circuits for 2- and 3-channel chips are not compatible.

STK4199MK2 Heat Radiation Design Considerations

The radiator thermal resistance θc-a required for substrate power dissipation Pd in the STK4199MK2 is determined as:

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

Total Pd x θc-a+Ta <125°C ········ (1)

Ta : Set assured ambient temperature.
Total Pd : Lch Pd + Rch Pd + Cch Pd

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

Total Pd x θc-a+ (Lch Pd + Rch Pd) /N x θj-c+Ta<150°C ········ (2)

Total Pd x θc-a + Cch Pd/N' x θ'j-c + Ta < 150°C ········ (3)

N : The number of Lch, Rch power transistors
N' : The number of Cch power transistors
θj-c : The thermal resistance per Lch, Rch power transistor chip
θ'j-c : The thermal resistance per Cch power transistor chip
However, power transistor power consumption is Pd equally divided by N units.

Expressions (1), (2), and (3) can be rewritten based on θc-a to yield:

θc-a<(125–Ta)/Total Pd ········ (1)'

θc-a<(150–Ta)/Total Pd - (Lch Pd + Rch Pd) x θj-c/(Total Pd x N) ········ (2)'

θc-a<(150–Ta)/Total Pd - Cch Pd x θ'j-c/(Total Pd x N') ········ (3)'

The value that simultaneously satisfies all three expressions is the thermal resistance required of the radiator.
From expressions (1)', (2)', and (3)', the required radiator thermal resistance can be determined once the following specifications are known:

- Supply voltage V_{CC}
- Load resistance R_L
- Assured ambient temperature Ta

The total substrate power consumption when STK4199MK2 V_{CC} for the L and R channels is ±26 V, V_{CC} for the C channel is ±35 V, and R_L is 8 Ω, for a continuous sine wave signal, is a maximum of 35.5 W for the L plus R channels and 35.5 W for the C channel (Figs. 1 and 2). In general, when this sort of continuous signal is used for estimation of power consumption, the Pd used is 1/10th of P_O max (slight variation depending on safety standard).

Lch Pd + Rch Pd = 24.5W (1/10 P_O max = during 2.5W)
Cch Pd = 22W (1/10 Pd max = during 5.0W)
Total Pd = Lch Pd + Rch Pd +Cch Pd = 46.5W

The STK4199MK2 has four power transistors for the L and R channels (N) and two for the C channel (N'), so the thermal resistance per L and R channel transistor (θj-c) is 2.6°C / W and 1.8°C / W per C channel transistor (θ'j-c).
With an assured ambient temperature Ta of 50°C, the required radiator thermal resistance θc-a would be:

From expression (1)' θc-a <(125–50)/46.5 <1.612

From expression (2)' θc-a <(150–50)/46.5 - 24.5 x 2.6/(46.5 x 4) <1.808

From expression (3)' θc-a <(150–50)/46.5 - 22 x 1.8/(46.5 x 2) <1.724

To satisfy both, 1.339°C / W is the required radiator thermal resistance. This design example is based on a fixed voltage supply, and will require verification within your specific set environment.

SPECIFICATIONS

No.

STK442-090

2000.04.18

TENTATIVE

1. Case Outline 14Pins (See attached outline drawing)
2. Function class AB 2 channels AF power amplifier
3. Application 50W audio use
4. Maximum Ratings / Ta=25deg

Item	Symbol	Conditions	Ratings	Unit
Power Supply Voltage 1	Vcc max(1)	No signal	+-54	V
Power Supply Voltage 2	Vcc max(2)	Signal ,R_L=8ohm ,6ohm	+-47	V
Thermal Resistance	Theta j-c	Per one power TR	2.2	deg/W
Junction Temperature	Tj max		150	deg
Operating Substrate Temperature	Tc max		125	deg
Storage Temperature	Tstg		-30 to +125	deg
Available Time for Load Short-circuit *4	ts	Vcc=+-35V,R_L=6ohm,f=50Hz P_O=50W,1ch drive	0.3	s

5. Operating Characteristics

Tc=25deg,R_L=6ohm(Non-inductive Load),R_g=600ohm,V_G=30dB

Item	Symbol	Conditions *2					Ratings			Unit
		V (V)	f (Hz)	Po (W)	THD (%)		MIN.	TYP.	MAX.	
Output Power *1	Po1	+-35	20 to 20k		0.4		50			W
	Po2	+-35	1k		10			80		W
THD *1	THD	+-35	20 to 20k	50				0.2		%
Frequency Characteristics *1	f_L,f_H	+-35		1.0		+0 -3 dB	20 to 50k			Hz
Input Impedance	ri	+-35	1k	1.0				55		kohm
Output Noise Voltage *3	V_{NO}	+-42				Rg=2.2 kohm			1.0	mVrms
Quiescent Current	I_{CCO}	+-42							80	mA
Output Neutral Voltage	V_N	+-42					-70	0	+70	mV

*Specifications and information herein are subject to change without notice.

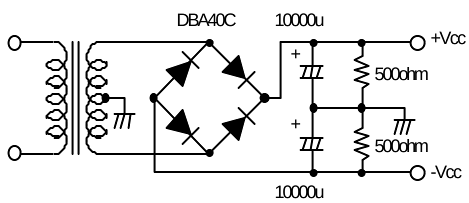
Note *1.1ch Drive

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

*3.The output noise voltage is peak value of an average-reading meter with a rms value scale(VTVM). A regulated AC supply(50Hz) should be used to eliminate the effects of AC primary line flicker noise.

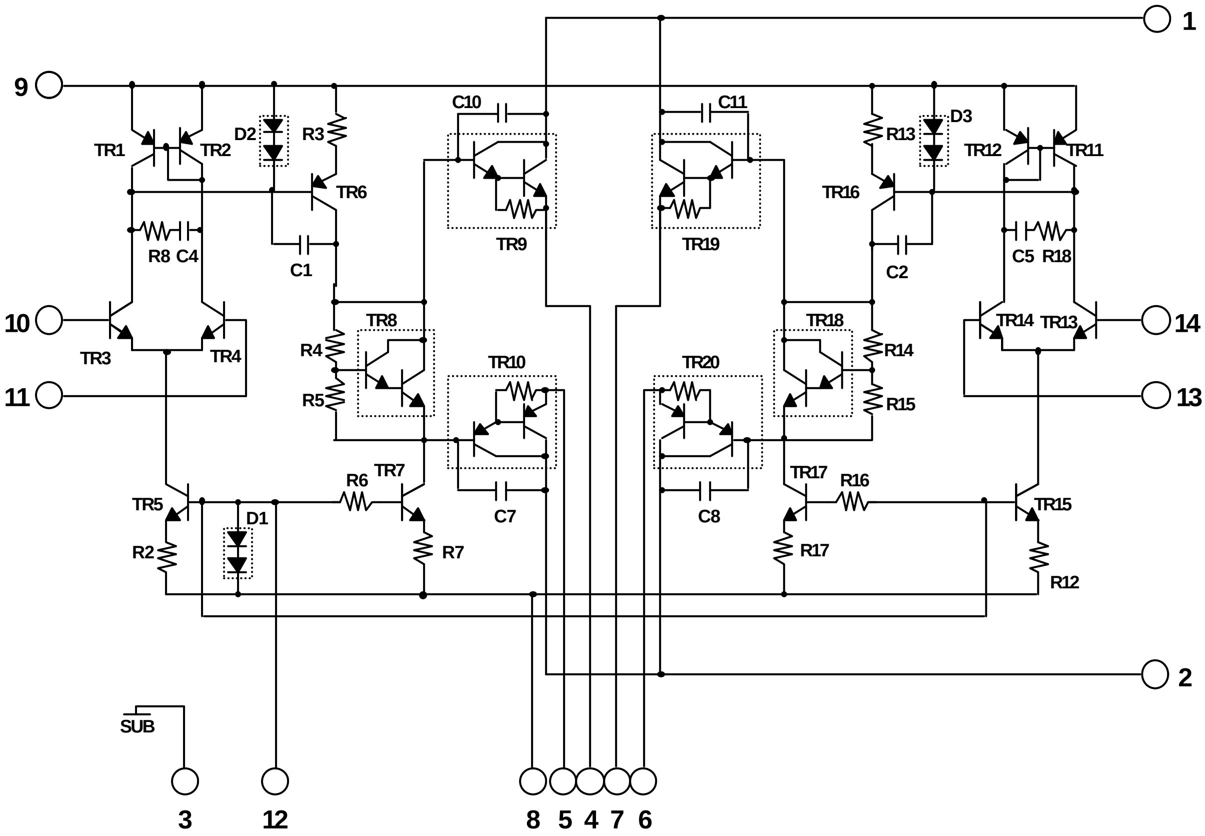
*4.Available time for load short-circuit and output noise voltage are measured using the specified transformer power supply.

Specified Transformer Power Supply

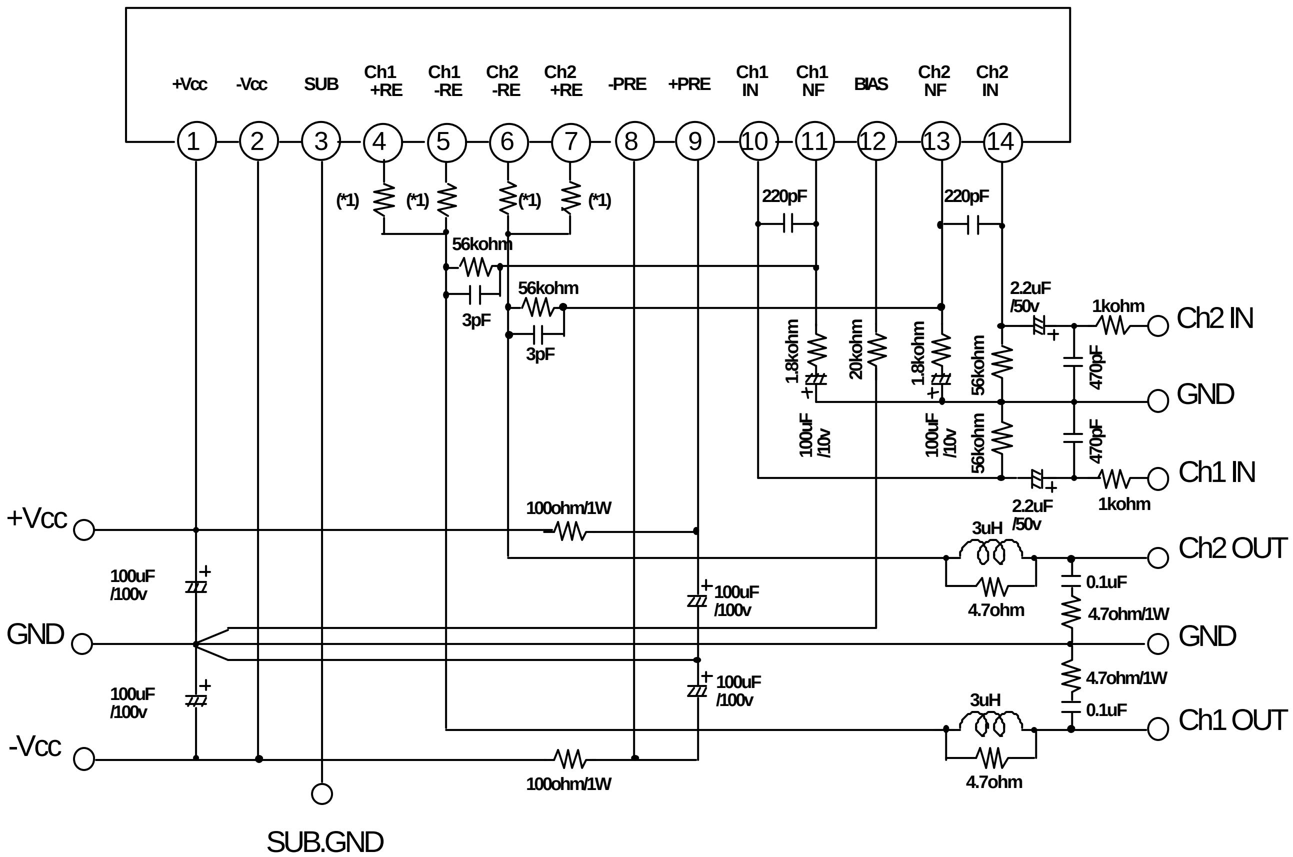


(Equivalent to MG-200)

Equivalent Block Diagram



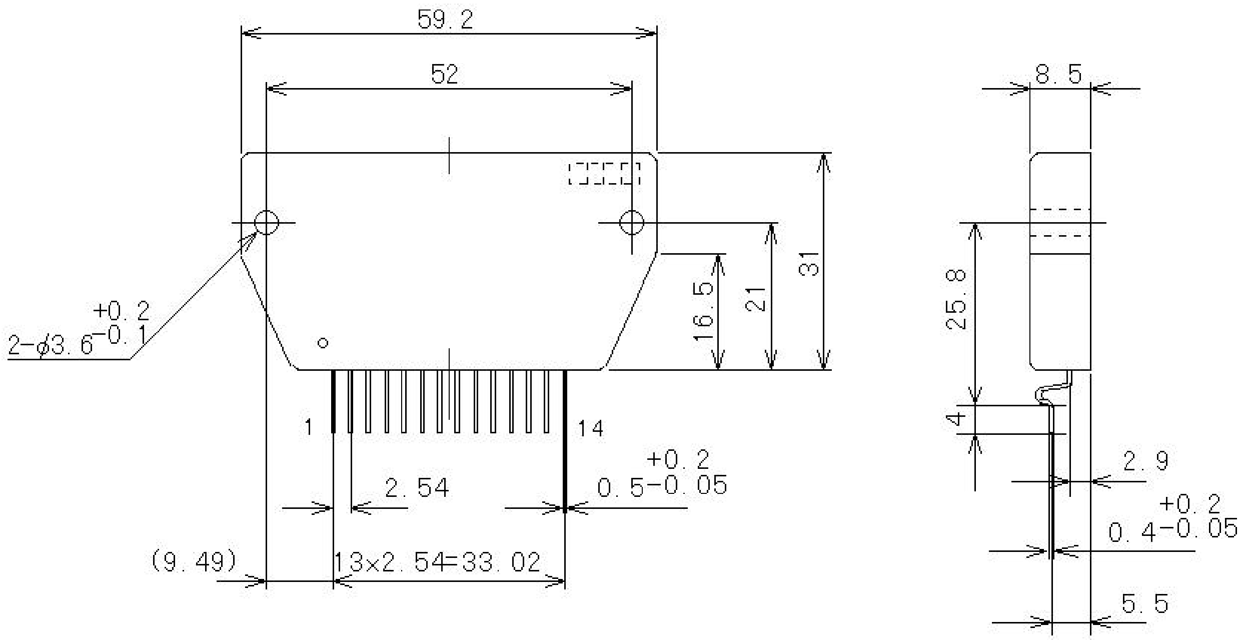
Test Circuit



(*1)Metal Plate Cement Resistor 0.22ohm+-10%(5W)

Case Outline

Unit:mm



* No production described or contained herein are intended for use in surgical implants, life-support systems, aerospace equipment, nuclear power control systems, vehicles, disaster/crime-prevention equipment and the like, the failure, of which may directly or indirectly cause injury, death or property loss

* Anyone purchasing any products described or contained herein for an above-mentioned use shall:
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  2. Not impose any responsibility for any fault or negligence which may be cited in any such claim or litigation on SANYO ELECTRIC CO.,LTD., its affiliates, subsidiaries and distributors or any of their officers and employees jointly or severally.

* Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. SANYO believes its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of April,2000. Specifications and information herein are subject to change without notice.

Ordering number:ENN5170

Thick Film Hybrid IC

STK392-110

3-Channel Convergence Correction Circuit (I_C max = 3A)

Overview

The STK392-110 is a convergence correction circuit IC for video projectors. It incorporates three output amplifiers in a single package, making possible the construction of CRT horizontal and vertical convergence correction output circuits for each of the RGB colors using ust two hybrid ICs. The output circuit use a class-B configuration, in comparison with the STK392-010, realizing a more compact package and lower cost.

Applications

• Video projectors

Features

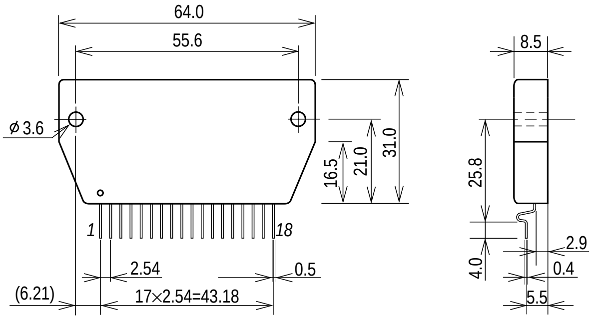
• 3 output amplifier circuits in a single package
• High maximum supply voltage (V_{CC} max = ±38V)
• Low thermal resistance (θj-c=3.0°C/W)
• High temperature stability (T_C max=125°C)
• Separate predriver and output stage supplies
• Output stage supply switching for high-performance designs
• Low inrush current when power is applied

Package Dimensions

unit:mm

4083

[STK392-110]



SANYO : SIP18

Series Organization

The following devices form a series with varying output capacity and application grade. Some of the devices below are under development, so contact your nearest sales representative for details.

Type No.	Maximum ratings			Maximum horizontal frequency f_H max	Application grade
	V_{CC} max	I_C max	θj-c		
STK392-110	±38V	3A	3.0˚C/W	15kHz	General projection TVs
STK392-010	±38V	5A	2.6˚C/W	15kHz	General projection TVs
STK392-020	±44V	6A	2.1˚C/W	35kHz	HD, VGA
STK392-040	±50V	7A	1.8˚C/W	100kHz	XGA, CAD, CAM
STK392-210	±65V	8A	1.5˚C/W	130kHz	CAD, CAM
STK392-220	±75V	10A	1.3˚C/W	160kHz	CAD, CAM

SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Specifications

Maximum Ratings at Ta = 25˚C

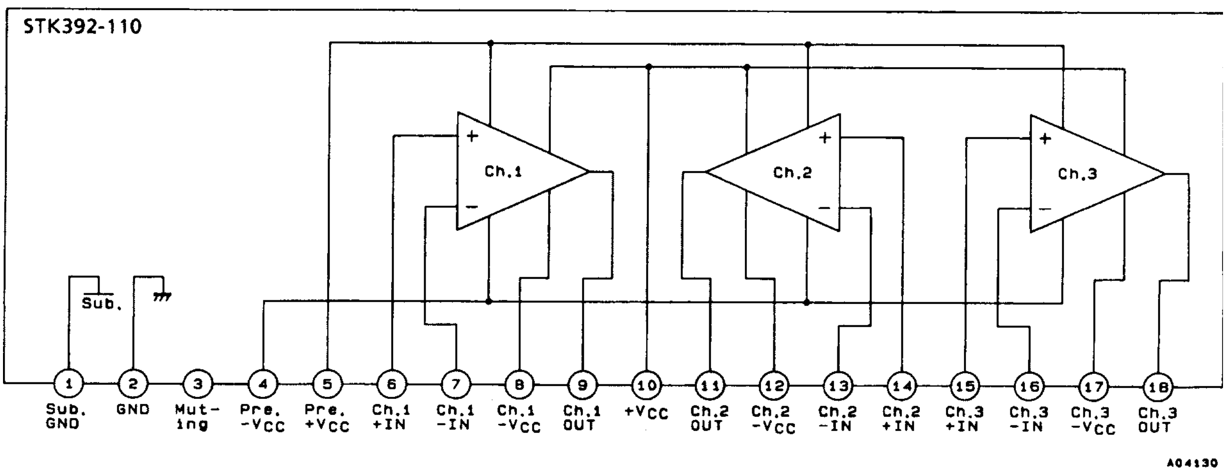
Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		±38	V
Maximum collector current	I_C	Tr6, 7, 13, 14, 20, 21	3.0	A
Thermal resistance	θ j-c	Tr6, 7, 13, 14, 20, 21 (per transistor)	3.0	˚C/W
Junction temperature	Tj		150	˚C
Operating temperature	Tc		125	˚C
Storage temperature	Tstg		–30 to +125	˚C

Operating Characteristics at Ta = 25˚C, Rg=50Ω, V_{CC}=±30V, specified test circuit

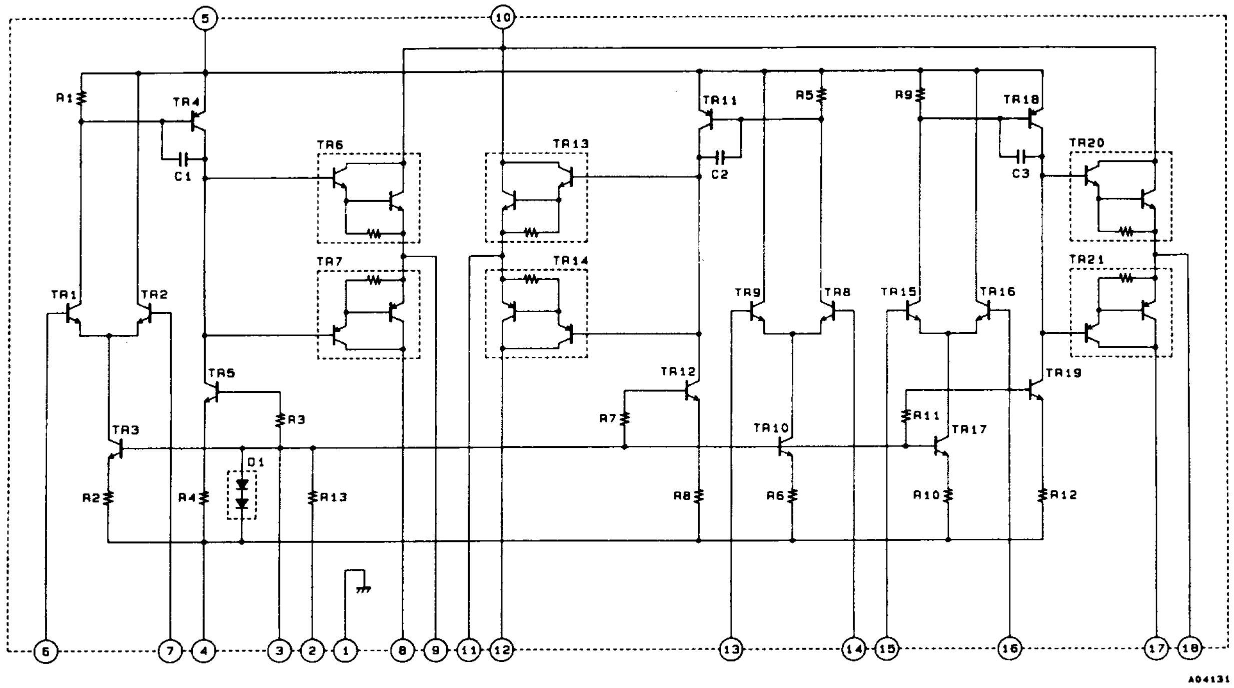
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output noise voltage	V_{NO}				0.2	mVrms
Quiescent current	I_{CCO}		15	22	30	mA
Neutral voltage	V_N		–50	0	+50	mV
Output delay time	t_D	f=15.75kHz, triangular wave input, V_{OUT}=1.5Vp-p			1	μs

Note :
All tests are conducted using a constant-voltage regulated supply unless otherwise specified.
The output noise voltage is the peak value of an average-reading meter with an rms value scale (VTVM).

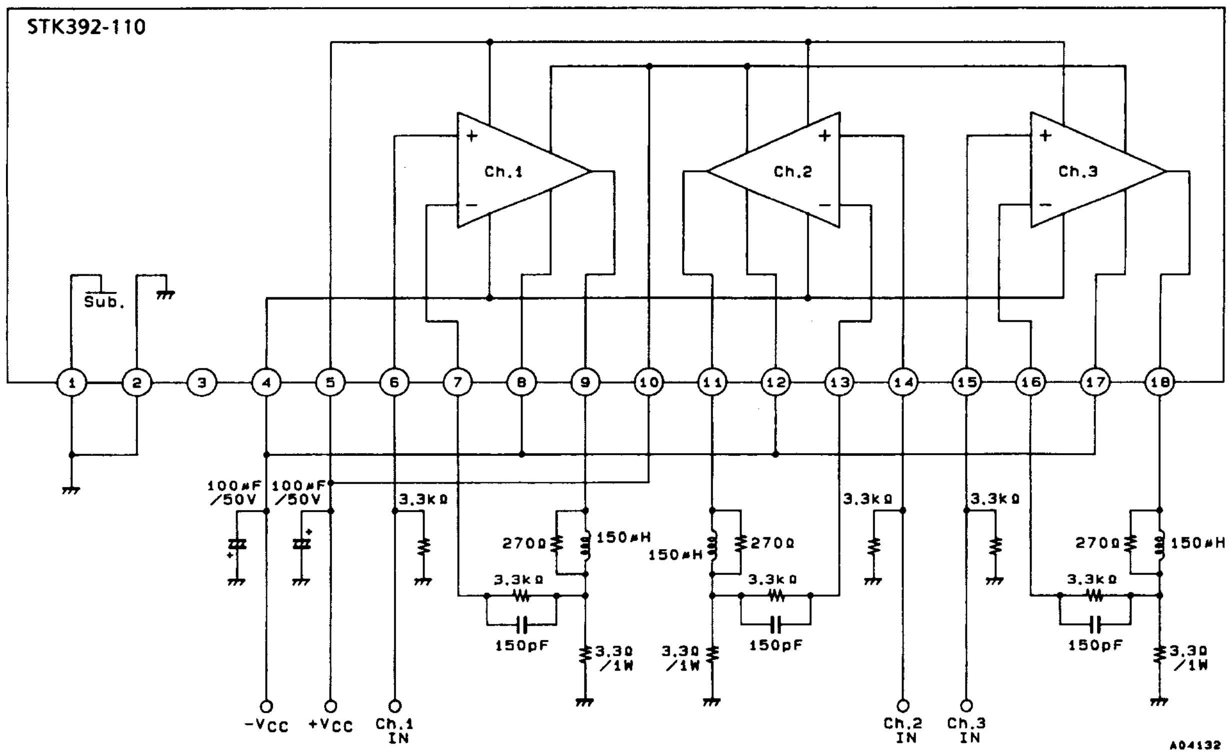
Block Diagram



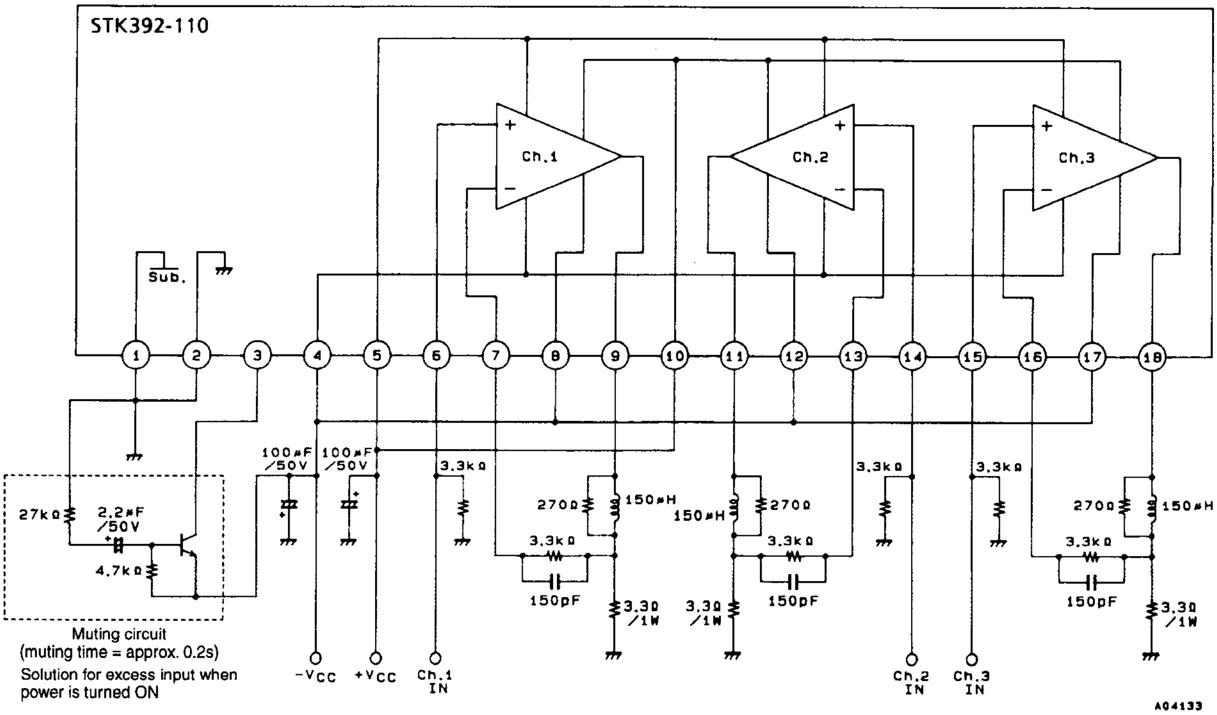
Equivalent Circuit



Test Circuit



Sample Application Circuit



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

D.P.P.

Darlington Power Pack

thick film hy[redacted]

OUTPUT STAGE OF AF POWER AMP.

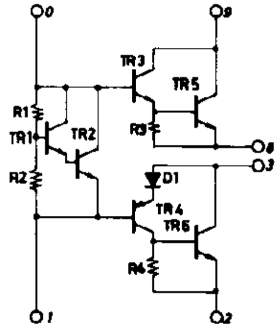
Features

General output stage of power amplifier has a difficult and complex problem about heat sink designing and its setting. Sanyo's D.P.P. intends to decrease electronic parts and rationalize a manufacturing process by designing IC of only output stage of power amplifier.

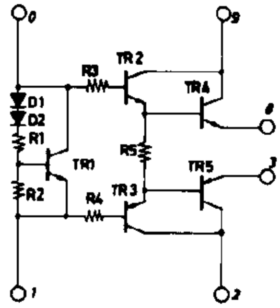
- IMST system.
- Output stage for AF high power amplifier.
- Dual power supply.
- Darlington type pure / quasi-complementary circuit.
- These same pin assignment and pin interval lead to standardize a printed board.
- Metal substrate use IMST© makes good thermal stability.
- Able to design freely previous section of power amplifier. This leads tone control designing.

Type Number		Maximum Ratings at Ta=25°C							Operation Characteristics at Ta=25°C				
Pure-Complementary Circuit	Quasi-Complementary Circuit	Case Outline	Maximum Supply Voltage VCCmax.	Junction Temperature Tj	Storage Temperature Tstg	Thermal Resistance, θ	Collector Current, ICmax.	Allowable Load Shorting Time, ts	Supply Voltage at Rated Power Output RL=8Ω	Output Power, Po f=20 to 20kHz	Total Harmonic Distortion, THD/f=20 to 20kHz	Quiescent Current, Icco	Equivalent Circuit
			V	°C	°C	°C/W	A	sec	V	W	%	mA	
1-Channel Darlington Power Pack (Without emitter resistance)													
	STK 0025	4002	±35	150	-30 to +105	2.6	3	2	±24.4	23 min.	0.05 max.	40 typ, 80 max.	Shown on the next page.
	STK 0029	4002	±37	150	-30 to +105	2.4	5	2	±25.0	25 min.	0.1 max.	40 typ, 80 max.	
STK 0030		4002	±40	150	-30 to +105	2.4	4	2	±28.5	30 min.	0.1 max.	40 typ, 80 max.	
	STK 0039	4004	±45	150	-30 to +105	2.0	5	2	±31	35 min.	0.1 max.	40 typ, 80 max.	
STK 0040		4002	±48	150	-30 to +105	2.0	5	2	±33	40 min.	0.1 max.	40 typ, 80 max.	
	STK 0049	4004	±50	150	-30 to +105	1.8	5	2	±35	45 min.	0.1 max.	40 typ, 80 max.	
STK 0050		4004	±53	150	-30 to +105	1.8	5	2	±36	50 min.	0.1 max.	40 typ, 80 max.	
	STK 0059	4004	±52.5	150	-30 to +105	1.6	7	–	±38	55 min.	0.1 max.	40 typ, 80 max.	
STK 0060		4006	±55	150	-30 to +105	1.4	7	–	±40	60 min.	0.1 max.	40 typ, 80 max.	
STK 0070		4006	±55	150	-30 to +105	1.4	7	–	±43	70 min.	0.1 max.	40 typ, 80 max.	
STK 0080		4006	±65	150	-30 to +105	1.3	10	–	±46	80 min.	0.1 max.	40 typ, 80 max.	
	STK 0105	4007	±75	150	-30 to +105	1.0	10	–	±50	100 min.	0.1 max.	40 typ, 80 max.	
STK 0040II		4002	±48	150	-30 to +105	1.8	5	1	±36	40 min.	0.01 max.	40 typ, 70 max.	
STK 0050II		4004	±53	150	-30 to +105	1.6	6	1	±39	50 min.	0.01 max.	40 typ, 70 max.	
STK 0060II		4006	±55	150	-30 to +105	1.3	8	1	±41	60 min.	0.01 max.	40 typ, 70 max.	
STK 0070II		4006	±60	150	-30 to +105	1.3	10	1	±45	70 min.	0.01 max.	40 typ, 70 max.	
STK 0080II		4006	±65	150	-30 to +105	1.2	12	1	±47	80 min.	0.01 max.	40 typ, 70 max.	
1-Channel Darlington Power Pack (With emitter resistance)													
STK 1030		4004	±40	150	-30 to +105	2.4	5	2	±28.5	30 min.	0.02 max.	40 typ, 80 max.	
	STK 1035	4004	±40	150	-30 to +105	2.4	5	2	±28.5	30 min.	0.02 max.	40 typ, 80 max.	
	STK 1039	4004	±46.1	150	-30 to +105	1.85	6	2	±30	35 min.	0.02 max.	40 typ, 80 max.	
STK 1040		4004	±48	150	-30 to +105	1.8	7	2	±33	40 min.	0.02 max.	40 typ, 80 max.	
	STK 1045	4004	±48	150	-30 to +105	1.8	7	2	±33	40 min.	0.02 max.	40 typ, 80 max.	
	STK 1049	4004	±50	150	-30 to +105	1.8	7	2	±34	45 min.	0.02 max.	40 typ, 80 max.	
STK 1050		4004	±53	150	-30 to +105	1.8	7	2	±36	50 min.	0.02 max.	40 typ, 80 max.	
	STK 1059	4004	±53	150	-30 to +105	1.6	7	–	±38	55 min.	0.02 max.	40 typ, 80 max.	
STK 1060		4004	±56	150	-30 to +105	1.6	10	–	±40	60 min.	0.02 max.	40 typ, 80 max.	
STK 1050II		4020	±55	150	-30 to +105	1.6	6	1	±38	50 min.	0.01 max.	40 typ, 70 max.	
STK 1060II		4020	±56	150	-30 to +105	1.3	8	1	±40	60 min.	0.01 max.	40 typ, 70 max.	
STK 1070II		4020	±63	150	-30 to +105	1.3	10	1	±43	70 min.	0.01 max.	40 typ, 70 max.	
STK 1080II		4020	±65	150	-30 to +105	1.2	10	1	±45	80 min.	0.01 max.	40 typ, 70 max.	
2-Channel Darlington Power Pack (Without emitter resistance)													
	STK 2025	4015	±40	150	-30 to +105	2.6	3	2	±24	20x2 min.	0.02 max.	40 typ, 80 max.	
	STK 2029	4015	±43	150	-30 to +105	2.2	4	2	±25.5	25x2 min.	0.02 max.	40 typ, 80 max.	
2-Channel Darlington Power Pack (With emitter resistance)													
	STK 2135	4015	±48	150	-30 to +105	2.1	4	2	±28.5	30x2 min.	0.02 max.	40 typ, 80 max.	
	STK 2139	4015	±50	150	-30 to +105	1.85	5	2	±30	35x2 min.	0.02 max.	40 typ, 80 max.	
	STK 2145	4015	±54	150	-30 to +105	1.8	7	2	±32	40x2 min.	0.02 max.	40 typ, 80 max.	
STK 2230		4015	±48	150	-30 to +105	2.1	4	2	±30	30x2 min.	0.01 max.	35 typ, 80 max.	
STK 2240		4015	±54	150	-30 to +105	1.8	5	2	±33.5	40x2 min.	0.01 max.	35 typ, 80 max.	
STK 2250		4015	±59	150	-30 to +105	1.8	5	2	±37	50x2 min.	0.01 max.	35 typ, 80 max.	
1-Channel No Switching Darlington Power Pack													
STK 8250		4006	±56	150	-30 to +105	1.8	5	2	±38	50 min.	0.01 max.	80 max.	
STK 8260		4006	±59	150	-30 to +105	1.4	7	2	±42	60 min.	0.01 max.	80 max.	
STK 8270		4006	±60	150	-30 to +105	1.4	7	2	±44	70 min.	0.01 max.	80 max.	
STK 8280		4006	±65	150	-30 to +105	1.4	7	2	±47	80 min.	0.01 max.	80 max.	
STK 8250II		4020	±55	150	-30 to +105	1.6	6	1	±38	50 min.	0.005 max.	70 max.	
STK 8260II		4020	±56	150	-30 to +105	1.3	8	1	±40	60 min.	0.005 max.	40 typ, 70 max.	
STK 8270II		4020	±63	150	-30 to +105	1.3	10	1	±44	70 min.	0.005 max.	40 typ, 70 max.	
STK 8280II		4020	±65	150	-30 to +105	1.2	12	1	±45	80 min.	0.01 max.	70 max.	

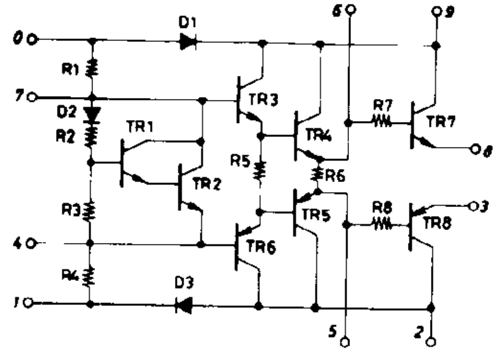
EQUIVALENT CIRCUIT



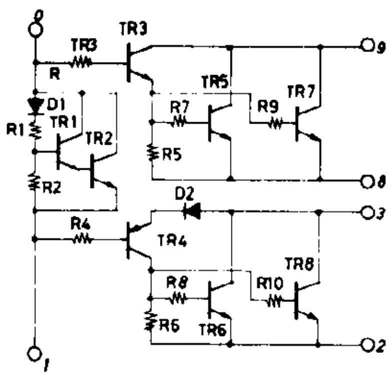
STK 0025, 0029, 0039, 0049, 0059



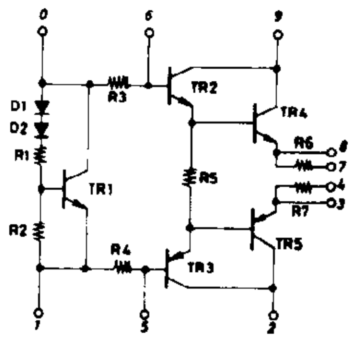
STK 0030, 0040, 0050, 0060, 0070
0080,



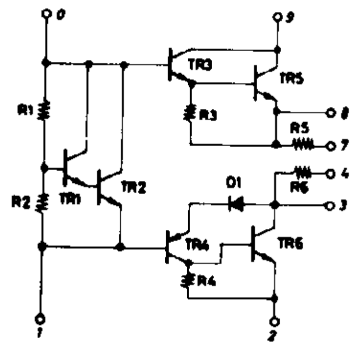
STK 0040II, 0050II, 0060II, 0070II, 0080II



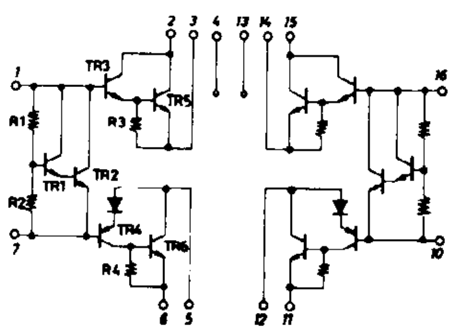
STK 0105



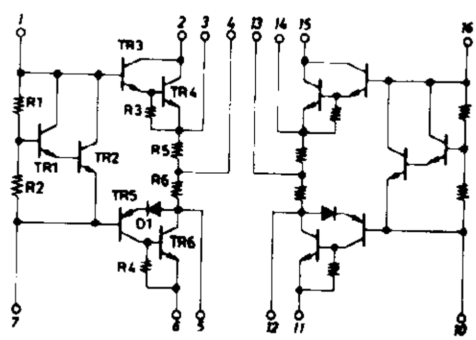
STK 1030, 1040, 1050, 1060



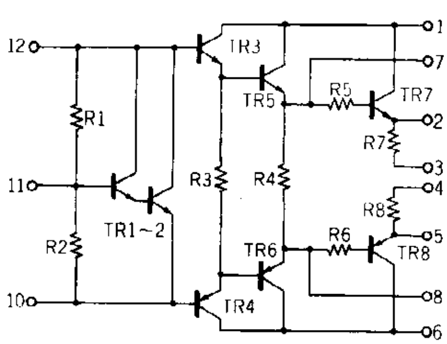
STK 1035, 1039, 1045, 1049, 1059



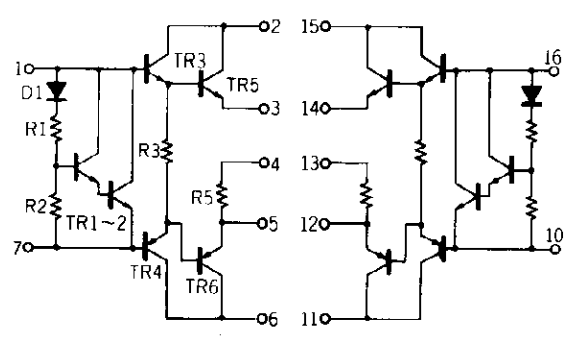
STK 2025, 2029



STK 2135, 2139, 2145



STK 1050II, 1060II, 1070II, 1080II



STK 2230, 2240, 2250