
PRODUCT INFORMATION

Vol. 84

Class G Audio Amplifier Hybrid IC Developed

Total output power of 290 W achieved in a 5-channel device

STK424-500

Overview

Due to the increasing popularity of DVD players and the advent of digital satellite TV broadcasting (expected by the year 2000 in Japan) we expect that it will soon be possible to enjoy in the home high-fidelity audio and video that rivals the impact of that provided in movie theaters quite easily and inexpensively. However, a truly advanced audio amplifier is required to provide audio effects that are as rich in ambience and the feeling of actually being part of the action as those in movie theaters. In particular, multiple channels (multiple outputs) and high output power are required to handle the wide dynamic range in digital sources and surround systems.

Since providing multiple channels and high output power normally leads to increasing complexity and size in the amplifier itself and its peripheral circuits (such as the protection circuits), monolithic audio power amplifier ICs with built-in protection circuits are often used. However, because the protection circuits are built in, monolithic audio power amplifier ICs still present many difficulties for multichannel high-output-power amplifier design. In particular, if these devices are used incorrectly, the amplifier may not be able to provide its rated output power, sound dropouts may occur, or the ability of the device to dissipate heat may be degraded since the substrate itself is at a potential other than ground.

Sanyo has now developed the STK424-000 Series of hybrid ICs that allow multichannel high-power audio amplifier systems to be implemented easily, and is now releasing the STK424-500 as the first step in the deployment of this series. At the same time as achieving a maximum total output of 290 W ($100\text{ W} \times 2\text{ channels} + 30\text{ W} \times 3\text{ channels}$ at 6Ω EIAJ), the STK424-500 is a compact device with a package size of only $78 \times 32 \times 8.5\text{ mm}$ (width \times height \times depth).

The STK424-000 Series adopts a power supply switching/following (class G) scheme that combines a switched power supply scheme with a power supply following scheme. In this scheme the voltage applied to the monolithic audio power amplifier IC is supplied from the low-voltage supply of the switched power supply when a low output power is required, and is supplied from the high-voltage supply (a supply that follows the output voltage) in the switched power supply when a high output power is required. This means that power in excess of that required is never provided by the power supply, and heat generation is reduced by that amount. Furthermore, high audio quality is achieved by

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using a newly developed slope detection circuit to prevent the output waveform from being distorted when the audio signal rises rapidly, for example, when a high output power is required or for signals with a high frequency. The adoption of this power supply switching/following scheme (class G amplifier) allows these products to easily implement audio amplifiers that use monolithic audio power amplifier ICs.

Furthermore, the STK424-000 Series products take full advantage of the superlative thermal dissipation characteristics of IMST (insulated metal substrate technology) to allow the achievement of 100 W continuous output for two channels at the same time using a monolithic audio power amplifier IC, an output level that was previously impossible without a cooling fan. In end product thermal design, no insulation is required even if the heat sink is directly attached to the device, since IMST devices have the feature that the substrate itself is either floating or at the ground potential. In practical thermal designs the heat sink (or heat sink fins) can be miniaturized significantly, since the thermal design can be carried out assuming that only the low-voltage supply in the switched power supply is used.

The high mounting density provided by IMST means that the STK424-000 Series products can both use a monolithic audio power amplifier IC and also provide a full complement of protection functions, including overvoltage, low voltage, thermal, shorting, and grounding protection functions. Despite providing these functions, these products operate the monolithic audio power amplifier IC used efficiently.

Sanyo plans to supply a full line of products in this new series, from the earlier 30 W \times 3 channel type up to a 100 W \times 5 channel product to support our customers' end product needs. Thus the STK424-000 Series support both the simplification of multichannel audio amplifier design and high amplifier efficiency at the same time.

STK424-000 Series Features

- Full complement of protection functions, including overvoltage, low voltage, thermal, shorting, and grounding protection functions.

These devices also provide muting and standby functions.

- Wide supply voltage range ($\pm V_{cc}$ max = 60 V) for AC transformer miniaturization and design simplification.
- IMST (insulated metal substrate technology) mounting technology adopted for miniaturization and superlative thermal dissipation and spurious noise suppression characteristics.
- Simplified heat sink mounting, since the IMST (insulated metal substrate technology) substrate is either floating or at the ground potential.

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STK424-500 Specifications

Rated output	5 channels with a total output of 290 W (100 W \times 2 channels + 30 W \times 3 channels at 6W EIAJ)
Maximum supply voltage	$\pm V_{cc}$ max = 60 V
Recommended supply voltage	$\pm V_{ccH}$ = 32 V, $\pm V_{ccL}$ = 16 V
Operating temperature	-20 to +85°C
Package dimensions	78 \times 32 \times 8.5 mm (width \times height \times depth)

Applications

- Multi-channel home audio amplifiers

Sample Availability

Sample of the STK424-500 will be available in October 1999; production quantities will be anticipated in January 2000.

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