
PRODUCT INFORMATION

Vol. 60

Power Amplifier System ICs for Car Stereos Developed

Both a high output of 240 W total (4 × 60 W) and high efficiency achieved

LA4907, LA4908, STK740-281

Overview

Along with the recent improvements of automotive performance, there has also been increasing competition in the car audio equipment area, with these products seeing significant increases in functionality and improved performance. Thus, in the components used in car stereo systems, end product manufacturers are now desiring both improved functionality and performance to improve their competitiveness, and efforts to reduce component costs to support lower prices in their end products. In other words, increased performance and lower costs are strongly desired in car stereo power amplifier ICs due to current market conditions.

While there has been a trend towards increasing numbers of devices used in car stereo systems, from CD players to MD players, LCD TV sets, and in-car navigation systems, the amount of space in the dashboard is severely limited, and thus there are strong demands for even further miniaturization in this equipment. With the appearance of digital signal sources in these systems, designers have been striving for the higher-output power amplifiers used in car audio systems to improve overall performance. As a result, the 4-channel single-chip BTL power amplifier has become the mainstream power amplifier IC for inclusion in devices of the single DIN unit size. Since increased power results in increased heat generation in the power amplifier IC and the influence of this heat on surrounding components (in particular, the CD player pickup) can become a problem, there are limitations on the output power that can be provided. That is, the heat generated by the power amplifier IC prevents further increases in the output power.

There are two possible techniques for increasing the output power: increasing the power-supply voltage used by the power amplifier and reducing the speaker impedance. Currently, the majority of speakers used in car audio systems are 4-Ω speakers, and low-impedance speakers are not widely available. Furthermore, reducing the speaker impedance results in increased heat generation due to the larger currents used, and is also undesirable due to the increased load on the car battery. Therefore, taking the customers' actual usage of these devices into account, it is clear that the most practical way to achieve increased output power is to increase the power-supply voltage only when required by responding to the level (intensity) of the music signal source.

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Sanyo has now developed a system IC chip set that allows the industry's most powerful high-output power amplifier (60 W × 4 channels) to be housed in a single DIN audio unit. This chip set (the LA4907, LA4908, and STK740-281) incorporates a Sanyo-developed high-output high-efficiency technology to achieve this performance.

The LA4907 is a high-output power amplifier IC that can, even when used independently, provide an output power of 40 W × 4 channels. This IC includes an on-chip high-level selector circuit that monitors the DC voltage (output level) of each of the 4 BTL amplifier channels and continuously detects the maximum output level. The detector output from this high-level selector is then used to control the LA4908 and the STK740-281.

The LA4908 is a switching regulator designed dedicatedly for use with the LA4907, and the high-efficiency operation provided by combination of these two ICs can significantly reduce the amount of heat generated in the amplifier.

The STK740-281 is a step-up DC/DC converter that provides a stepped-up power supply voltage (18 V) to the LA4907 when required.

The use of the LA4907, the LA4908, and the STK740-281 in combination allows a high-output power amplifier that achieves a performance of 60 W × 4 channels. The LA4907 HLS (high-level selector) output functions as an interface that controls the LA4908 and the STK740-281, turning them on or off as needed. This means that when under 10 W of power is required, the LA4908 functions as the power-supply circuit and the system operates at high efficiency. When over 10 W of power is required, power is supplied from the STK740-281 and the system provides a high output level. This system suppresses the amount of heat generated and thus allows an amplifier with a nominal total rating of 240 W (60 W × 4 channels) to be housed in a single DIN unit, thus achieving a significant increase in performance.

Features

- Built-in HLS (high-level selector) (LA4907)
- High-voltage output provided by voltage step-up circuit (STK740-281)
- Power supply switching circuit (LA4908 and STK740-281)

Specifications

- Functions
 - Maximum output at $V_{in} = 5\text{ V rms}$: 60 W × 4 channels
 - Full complement of on-chip protection circuits (Protection against output to power supply shorts, output to ground shorts, load shorts, overvoltage, and overheating)
 - Standby function
 - Clipping detection function
- Supply voltage
 - V_{CC} : 13.2 V

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RL: 4 Ω

• Packages

LA4907: SIP23HZ

LA4908: SIP12H

STK740-281: 37 × 25.5 × 4.5 mm (w × h × d)

Sample Availability

Samples of the LA4907, the LA4908, and the STK740-281 will be available in June 1998; production quantities are anticipated in the end of 1998.

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