



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.

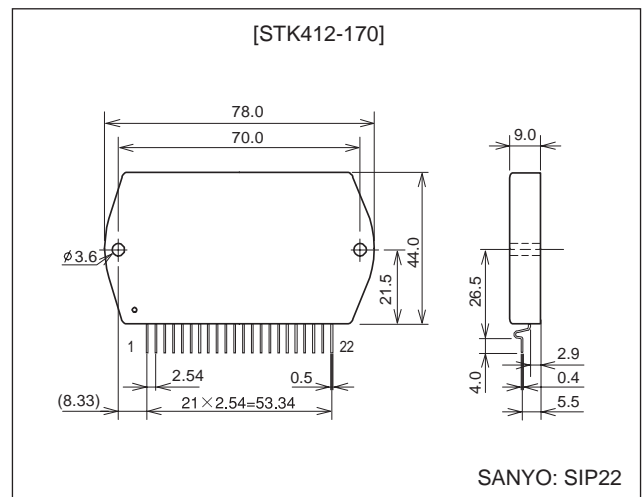
Features

- 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



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STK412-170

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 $T_a = 25^\circ\text{C}$

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|-----------------------|--|-------------|---------------------------|
| V_H : Maximum supply voltage 1 (no signal) | $V_H \text{ max}(1)$ | | ±95 | V |
| V_H : Maximum supply voltage 2 (signal present) | $V_H \text{ max}(2)$ | $R_L = 4 \Omega$ or greater, 180W, 50 ms | ±85 | V |
| V_L : Maximum supply voltage 1 (no signal) | $V_L \text{ max}(1)$ | | ±61 | V |
| V_L : Maximum supply voltage 2 (signal present) | $V_L \text{ max}(2)$ | $R_L = 4 \Omega$ or greater, 180W, 50 ms | ±55 | V |
| V_H - V_L : Maximum supply voltage *4 | $V_{H-L} \text{ max}$ | No load | 60 | V |
| Thermal resistance | θ_{j-c} | Per power transistor | 1.4 | $^\circ\text{C}/\text{W}$ |
| Junction temperature | $T_j \text{ max}$ | Both the $T_{j\text{max}}$ and $T_{c\text{max}}$ conditions must be met. | 150 | $^\circ\text{C}$ |
| Operating IC substrate temperature | $T_c \text{ max}$ | | 125 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | | -30 to +125 | $^\circ\text{C}$ |
| Allowable load shorted time *3 | t_s | $V_H = \pm 54 \text{ V}$, $V_L = \pm 37 \text{ V}$, $R_L = 4 \Omega$, $f = 50 \text{ Hz}$, $P_O = 180 \text{ W}$, one channel operating | 0.3 | s |

Operating Characteristics at $T_a = 25^\circ\text{C}$, $R_L = 6 \Omega$, $R_g = 600 \Omega$, $V_G = 30 \text{ dB}$, $V_Z = 18 \text{ V}$, 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 | $V_H = \pm 54$ $V_L = \pm 37$ | 20 to 20 k | | 0.7 | 180 | | | W | |
| Total harmonic distortion | THD | $V_H = \pm 54$ $V_L = \pm 37$ | 20 to 20 k | 180 | | | 0.4 | | % | |
| Frequency characteristics | f_L, f_H | $V_H = \pm 54$ $V_L = \pm 37$ | | 1.0 | | | +0 -3 dB | 20 to 50 k | Hz | |
| Input impedance | r_i | $V_H = \pm 54$ $V_L = \pm 37$ | 1 k | 1.0 | | | 55 | | kΩ | |
| Output noise voltage *2 | V_{NO} | $V_H = \pm 64$ $V_L = \pm 45$ | | | | $R_g = 2.2 \text{ k}\Omega$ | | 1.0 | mVrms | |
| Quiescent current | I_{CCO} | $V_H = \pm 64$ | | | | No load | | 70 | mA | |
| | | $V_L = \pm 45$ | | | | No load | | 100 | mA | |
| Midpoint voltage | V_N | $V_H = \pm 64$ $V_L = \pm 45$ | | | | | -70 | 0 | +70 | mV |

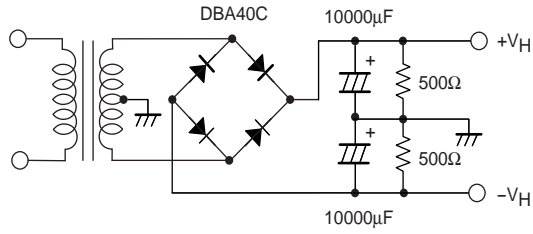
Notes: *1. Unless otherwise specified, a constant-voltage power supply must be used during inspection.

*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).

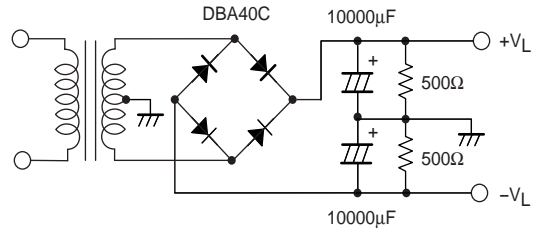
*3. Use the transformer power supply specified in the figure below for allowable load shorted time and output noise voltage measurements.

*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 V_L power supply with an offset voltage at power supply switching ($V_L - L_O$) of about 11V as an initial target.

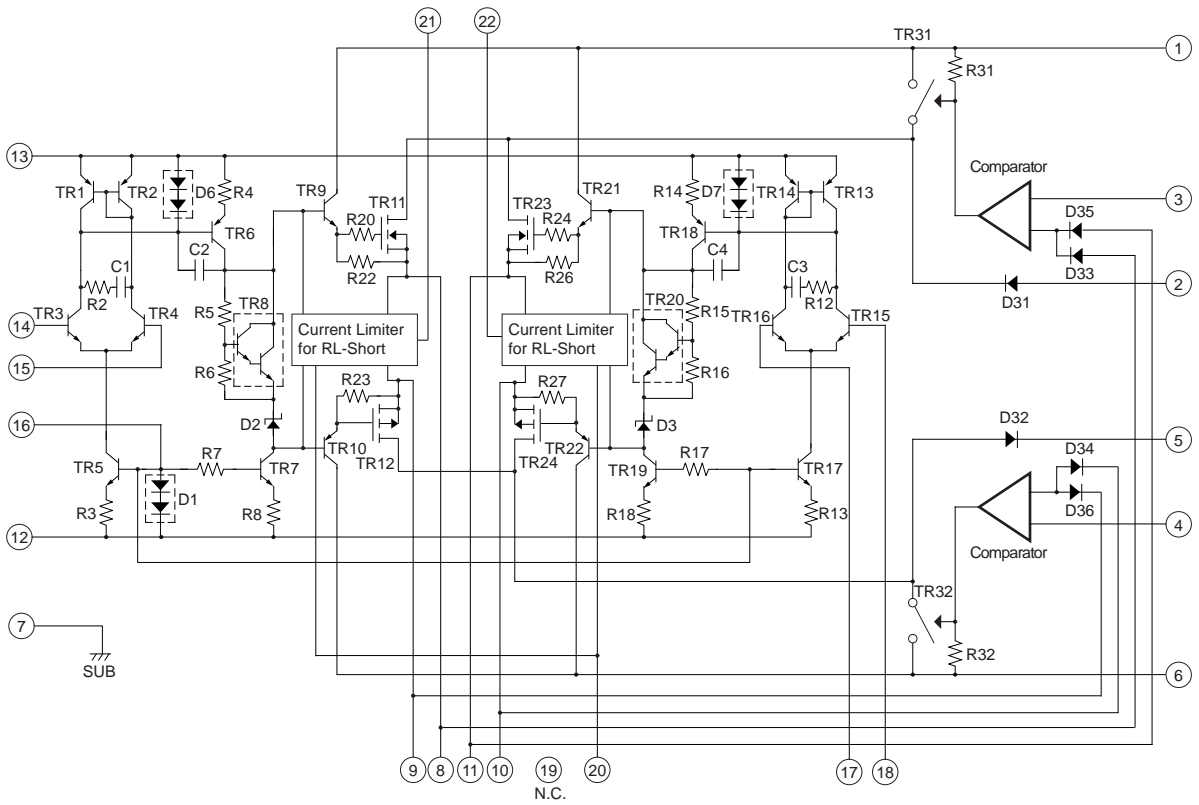


**Specified Transformer Power Supply
(MG-250 equivalent)**

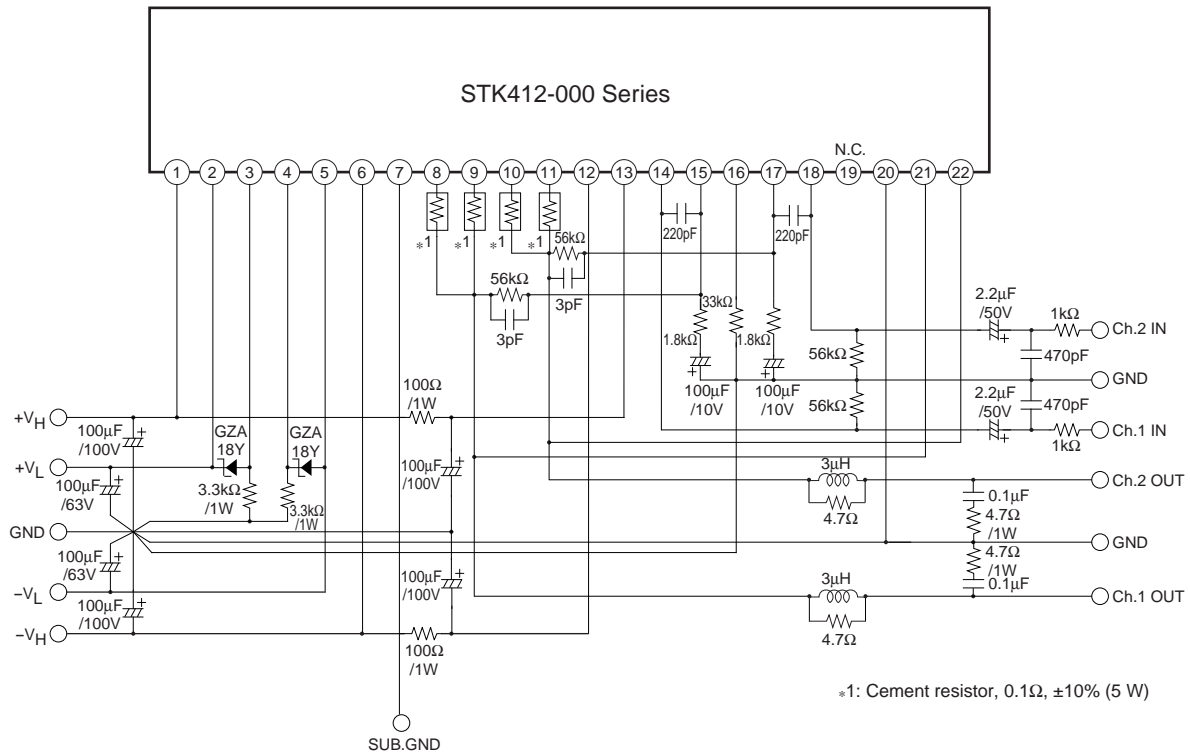


**Specified Transformer Power Supply
(MG-200 equivalent)**

Internal Equivalent Circuit



Sample Application Circuit



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