

# INTEGRATED STEREO AMPLIFIER E-4000



Accuphase Laboratory, Inc.

The E-4000 is a succession model of E-480, the 12th generation Accuphase Class-AB high-power integrated stereo amplifier.

The Preamplifier section provides a low-noise AAVA volume control with a fully refined circuit configuration and layout.

The Power amplifier section adopted the bipolar transistors in a four-fold parallel push-pull arrangement and made a significant achievement for the driving ability of loudspeakers.

The E-4000 extracts the full potential of any loudspeaker to reproduce sound overflowing with energy and vividness.

## Differences in front view

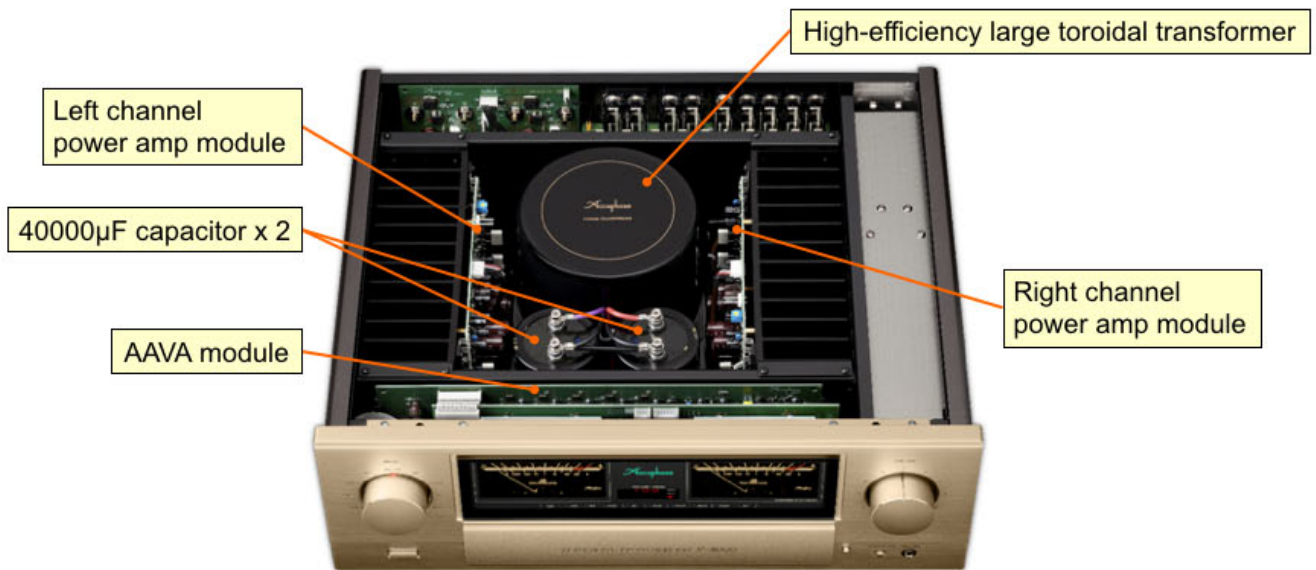


Accuphase Laboratory, Inc.

2

The front face design has changed from the E-480, with the large power meters in the big glass window surrounded by precise cutting work and the gold-plated rings set at the bottom of the input selector and the volume knob.

## Internal View



Accuphase Laboratory, Inc.

3

E-4000 has a mono-block construction.

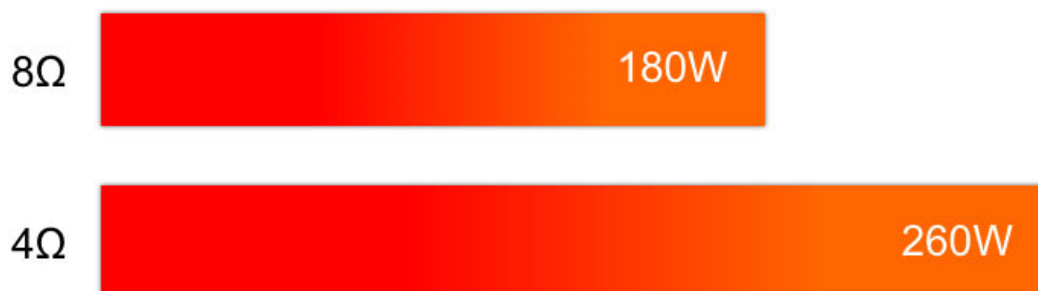
A strong power supply with a massive, specially-made, high-efficiency toroidal transformer and 40000µF filtering capacitors are installed in the unit's center.

In addition, the two power amplifier modules are kept separate for the left and right channels.

The AAVA module is set at the front of the unit to avoid noise interference.

## Output power

- Class-AB 180W / channel into 8Ω load



Continuous average output power

Accuphase Laboratory, Inc.

4

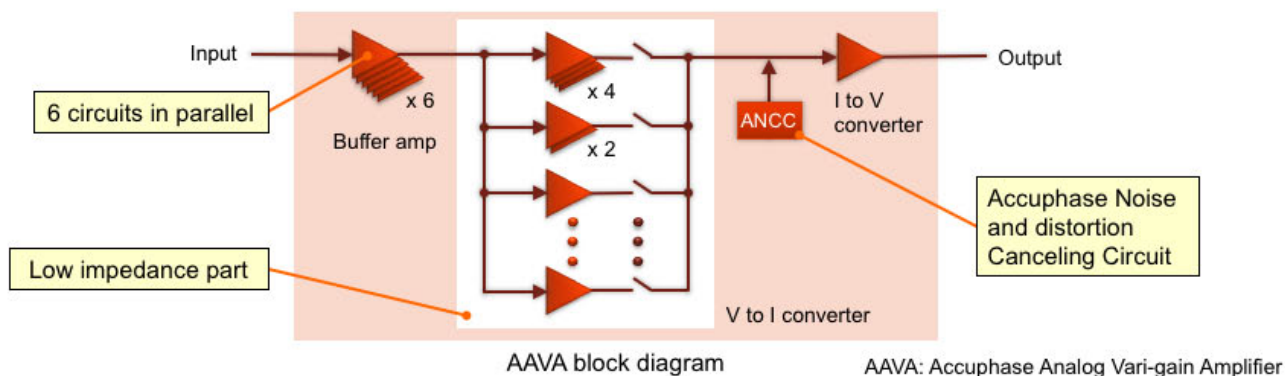
The E-4000 has the second highest output power in Accuphase integrated amplifiers, and the rated continuous average output power is 180W/8Ω.

The E-4000 perfectly drives any loudspeakers, even low-efficiency ones.

\*Rated continuous average output power is equal to the E-480

## Improvement of AAVA

- 20% lower noise than the E-480 ( @9 o'clock volume position )
- Utilizing ANCC
- 6 buffer amps paralleled
- Making the V to I Converter low impedance



Accuphase Laboratory, Inc.

5

AAVA (Accuphase Analog Vari-gain Amplifier) is a volume control principle that eliminates all variable resistors from the signal path.

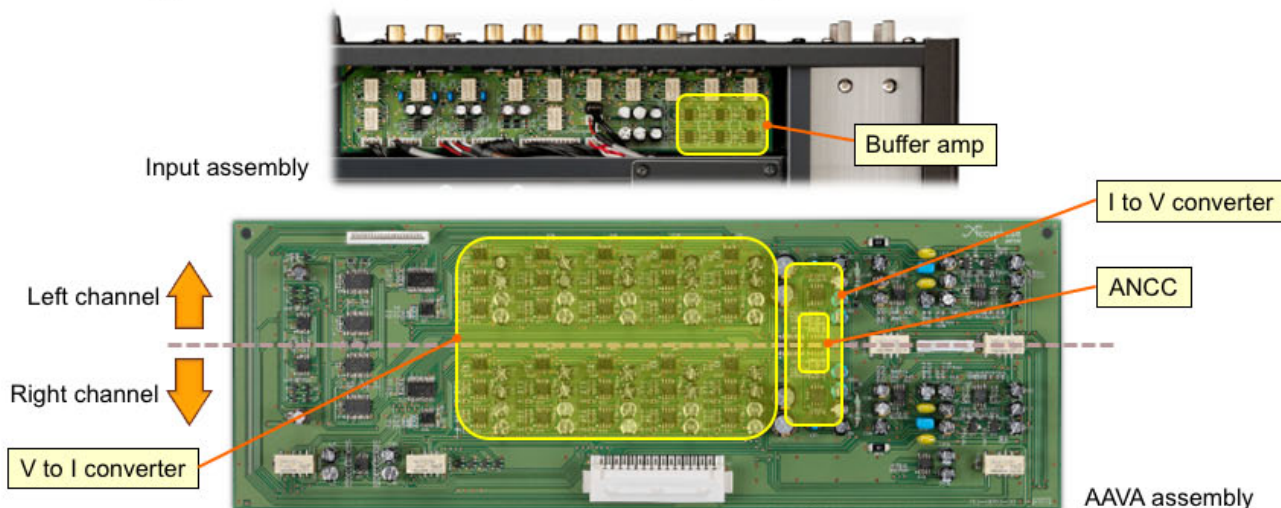
This AAVA volume control is Accuphase's unique technology.

The E-4000's AAVA module contains six paralleled buffer amplifiers and the lower-impedance V to I converter and utilizes the ANCC, so the E-4000 achieved 20% lower noise than the E-480.

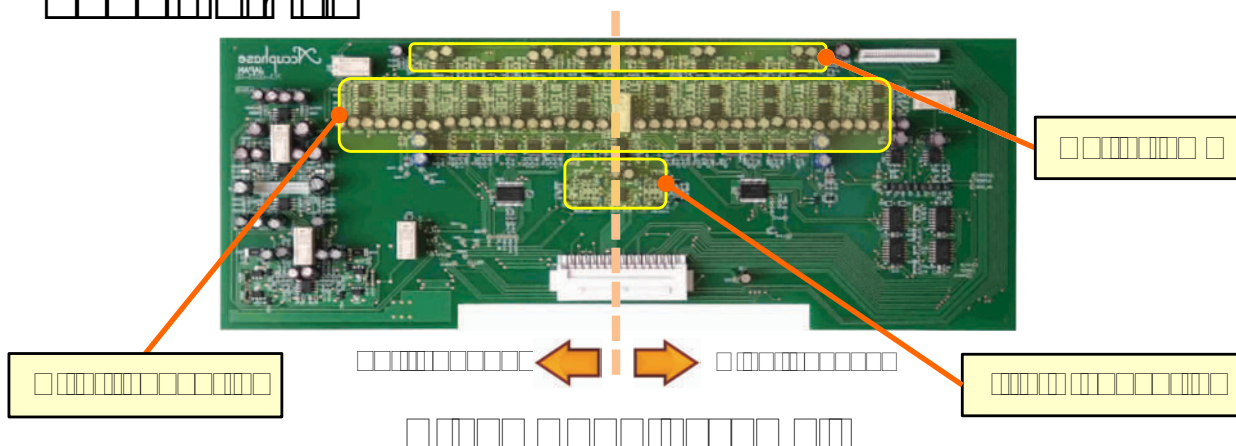
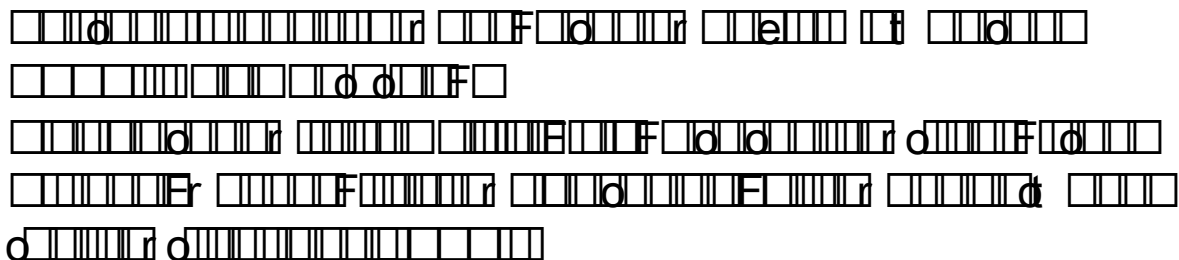
\*E-480's AAVA module has no ANCC and five circuits paralleled in the buffer amplifier.

# AAVA implementations

- Placing buffer amps close to input jacks

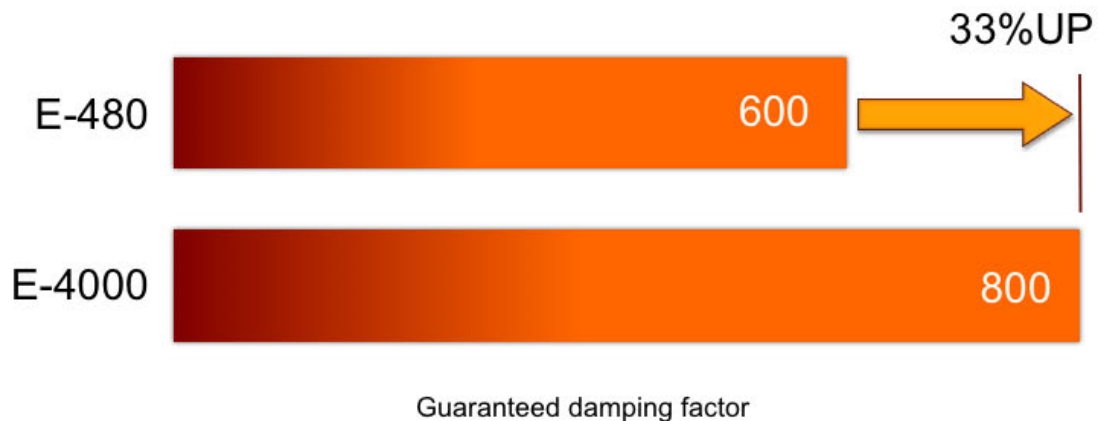


Accuphase Laboratory, Inc.



## Super high damping factor

- 33% higher than the former model E-480 and has the same value as Class-A stereo power amp A-48



Accuphase Laboratory, Inc.

7

The E-4000 achieves a guaranteed damping factor of 800.

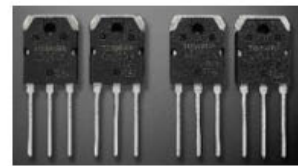
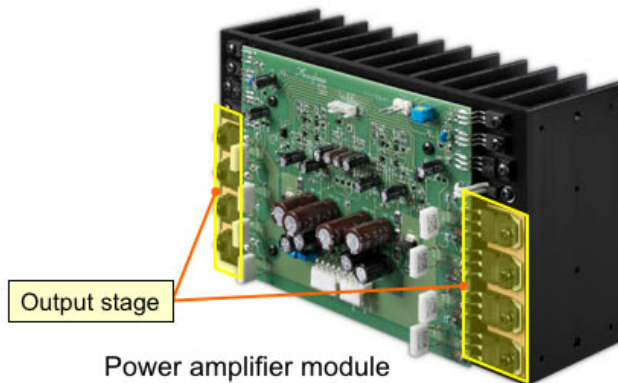
It is 33% higher than the former model E-480 and has the same value as Class-A stereo power amplifier A-48.

\*Damping-Factor, DF: An index of speaker driving ability. A higher Damping-Factor amplifier has higher speaker driving ability.

$DF = 8 \text{ ohm} / \text{Output-impedance}$

## Technology for high damping factor

- Very low output impedance power amp engine
  - Bipolar transistor 4 parallel push-pull output stage
  - Same circuit configuration as Class-AB stereo power amp P-7500



The bipolar transistor in the output stage  
Absolute maximum ratings: 230V/15A

Accuphase Laboratory, Inc.

8

The Circuit configuration of the power amplifier engine is as same as the flagship Class-AB stereo power amplifier P-7500.

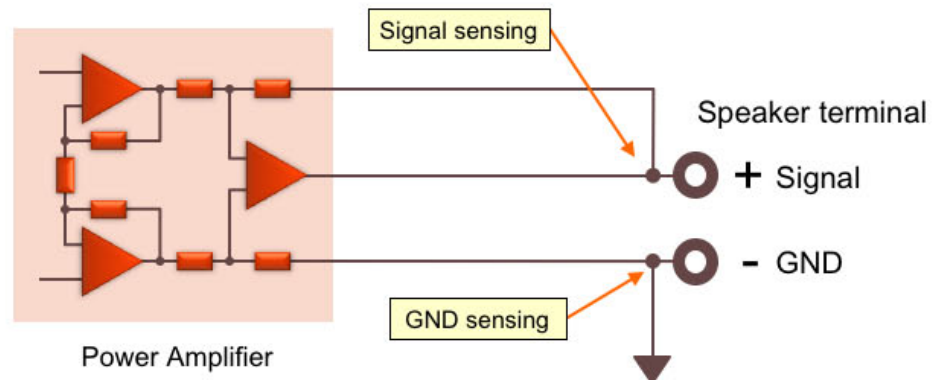
The output impedance is lower by four-fold parallel push-pull output stage arrangements of bipolar transistors.

\*E-480 has three-fold parallel push-pull output stage arrangements of MOS-FET. Absolute maximum ratings of E-480's MOS-FET: 200V/12A



# Technology for high damping factor

- Balanced Remote-sensing
  - Feedback from speaker terminal proximity
  - Signal-line and GND-line sensing



Accuphase Laboratory, Inc.

9

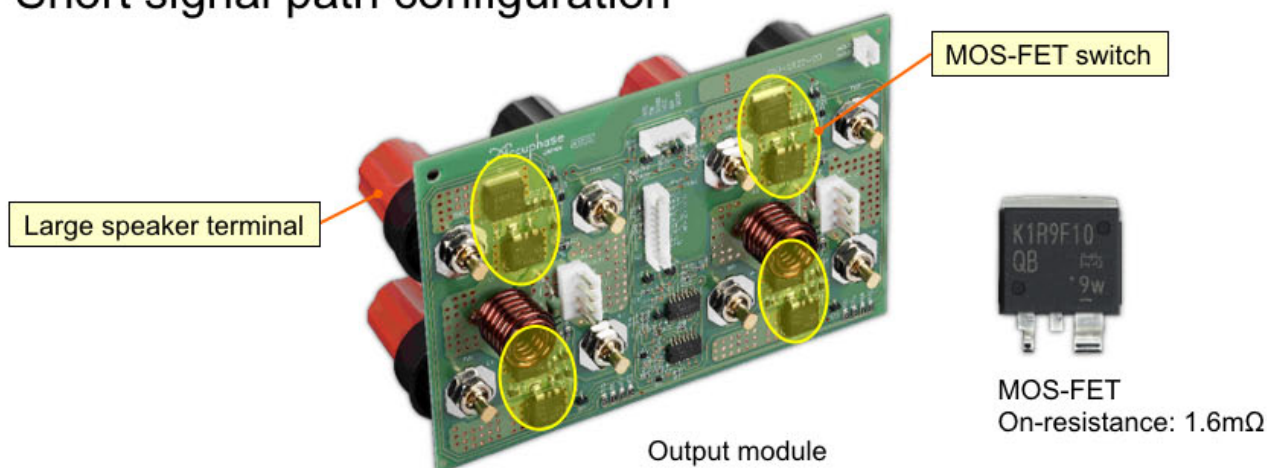
Remote sensing is the technique to lower the amplifier's output impedance by the negative feedback with signal sensing from nearby the speaker terminals.

Balanced Remote-sensing is the technique to lower the output impedance by both the signal sensing and the GND senses.

Not only the Damping Factor but also Total Harmonic Distortion and Intermodulation Distortion are all improved by the Balanced Remote-sensing.

## Technology for high damping factor

- Speaker protection equipped with the MOS-FET switch circuit
- Short signal path configuration



Accuphase Laboratory, Inc.

10

Mechanical relays are the typical components for speaker protection, but the contact resistance of mechanical relays is higher than people think.

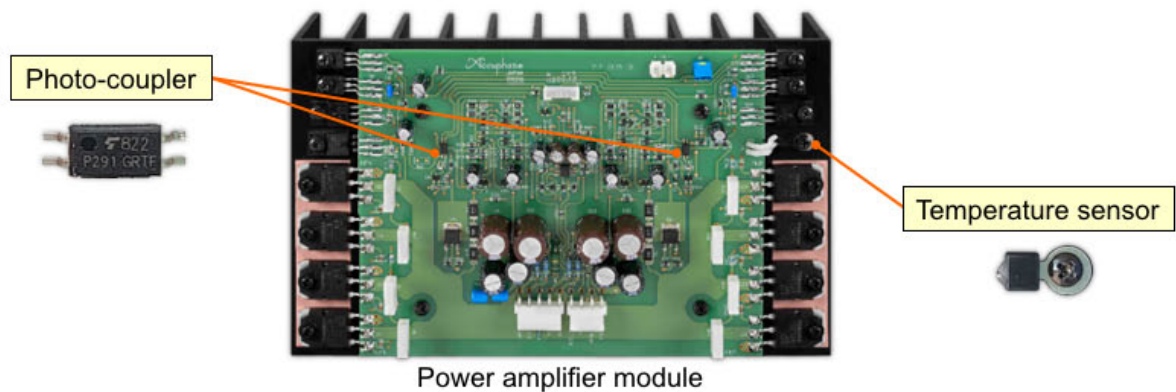
Therefore, Accuphase has chosen the MOS-FET switch instead of conventional mechanical relays for speaker protection.

Thanks to this MOS-FET switch, the damping factor, reliability, and sound quality are all improved. E-4000 adopted a new MOS-FET with a very low on-resistance of 1.6mΩ (E-480 used 2.0mΩ on-resistance MOS-FET). E-4000 employs carefully-selected very low-impedance components such as the large speaker terminals.

Making signal paths thick and short also helps attain low impedance.

# Pursuing further product safety and reliability

- Power amplifier
  - Newly-developed protection circuit using Photo-couplers
  - Temperature sensors are installed on the heatsink



Accuphase Laboratory, Inc.

11

The newly designed output protection circuit can detect any short-circuiting of the speaker terminals with due consideration for product safety.

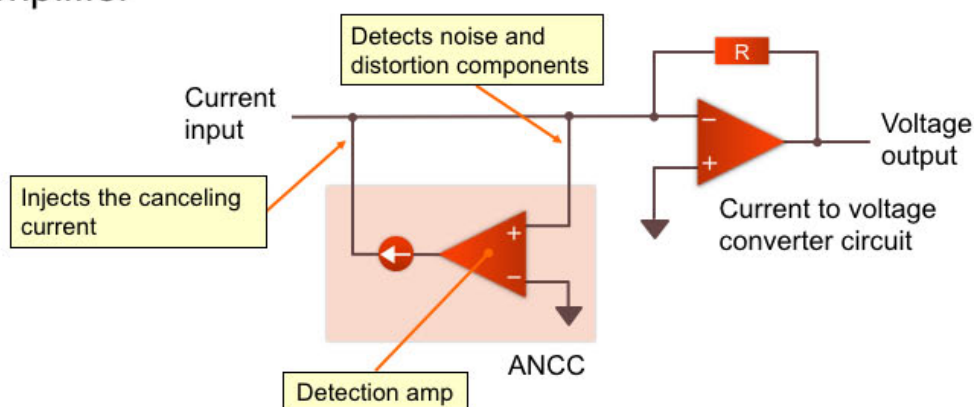
Temperature sensors that detect the heatsink temperature are installed on the heatsink. Thanks to this, the unit accurately ascertains the high-temperature alarm in the power amplifier section.

Thanks to the photo-coupler, the detected short-circuiting information is completely isolated from the music signal to minimize the negative effects on the sound quality.

\*When these protection circuits are activated, the unit completely interrupts speaker output and makes the power meters flash to indicate the abnormal condition.

## Appendix "ANCC"

- ANCC: Accuphase Noise and distortion Canceling Circuit
  - To detect and cancel the noise and distortion at the input stage of the amplifier



Accuphase Laboratory, Inc.

12

ANCC: "Accuphase Noise and distortion Canceling Circuit" is installed in AAVA's current-to-voltage converter.

Canceling noise and distortion are realized by detecting the components of noise and distortion at the input stage of an I-V converter circuit and by injecting the canceling current, which contains the reversed polarity of those components.

ANCC is a highly effective technology at any volume position.