

# Integrated Stereo Amplifier E-650



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The history of Accuphase's class A integrated amplifier has been started since E-530 was born in 2002.

In 2013, Accuphase launched E-600 as the flagship of integrated amplifier which was installed AAVA volume system . E-650 is the 5<sup>th</sup> generation of E-600 series.

Technical highlights are “Ultra low noise” and “Super high Damping Factor”.

E-650 features “Balanced AAVA” to realize those features and transfer the ideal audio signal from the input to the output.

It is inherited from our flagship pre-amplifier C-3850 and power amplifier A-250.

## Dimensions and Weight

- Same unit dimensions but heavier weight than E-600
  - Width 465mm
  - Height 191mm
  - Depth 428mm
  - Weight 25.3kg



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The dimensions are the same but the weight is slightly heavier than E-600 ( E-600: 24.7kg).

# Front and Rear View



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The design principle follows the Accuphase 40th anniversary models .

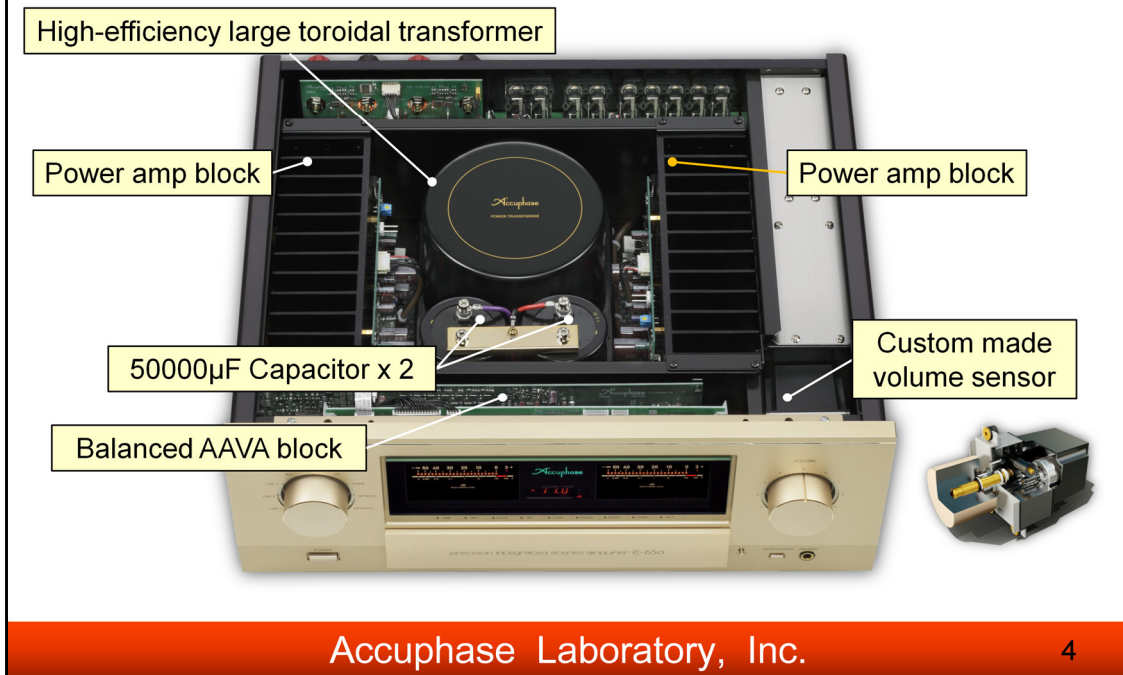
The curve around the display emphasizes dignified and impressive design and the enlarged LED bar graph brings very clear visibility.

Two pairs of large speaker terminals are equipped on the rear panel.

You can choose different loudspeakers whichever they want to listen to.

Both A+B channels can be selected as well for bi-wiring connection.

# Internal View



E-650 takes the mono block construction. Large power transformer and capacitors are positioned between L and R channel separated the power amplifier blocks.

Custom-made volume sensor mechanism which has distinguished operation feeling and ultimate reliability is also installed.

Balanced AAVA circuit block is located near by the front panel.

# Improvement of power supply

- Increased custom made capacitors
  - 47000 $\mu$ F x 2 pieces  $\rightarrow$  50000 $\mu$ F x 2 pieces



E-600



E-650

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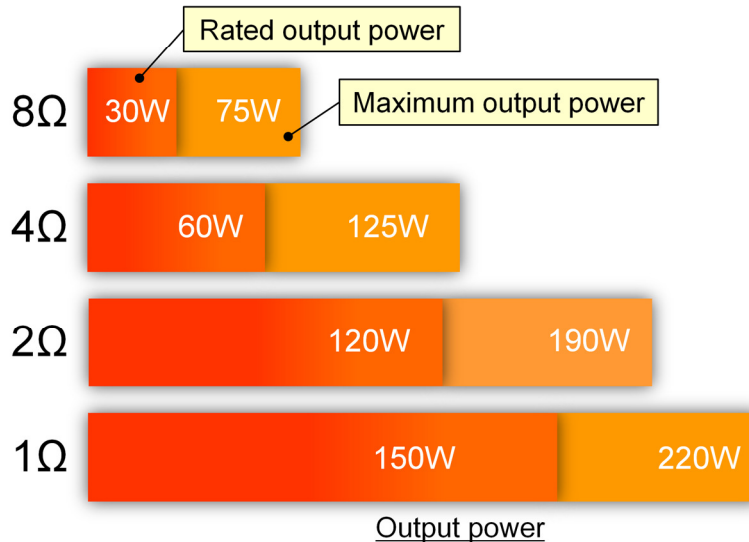
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The capacity of main capacitors are drastically increased to 50000 $\mu$ Fx2 .

This capacitors is developed for only E-650 and it contributes to the extreme sound performance.

# Output Power

- Class-A 30W / 8Ω, 120W / 2Ω



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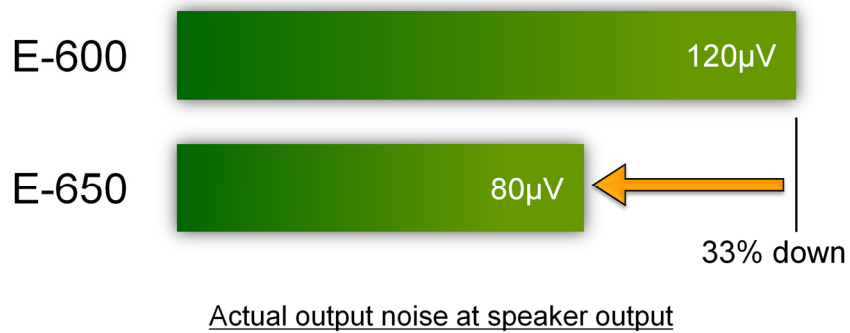
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The rated output power of E-650 is 30W into 8 Ω load, 60W into 4 Ω load and 120W into 2Ω load. The actual maximum output power achieves 190W into 2Ω load.

Especially, the rated output power into 2 Ω load is enhanced 19% from the former model E-600 by the improvement of the power supply and the power amplifier circuit.

## Ultra Low Noise

- 33% lower than the former model
  - S/N ratio: 102dB guarantee



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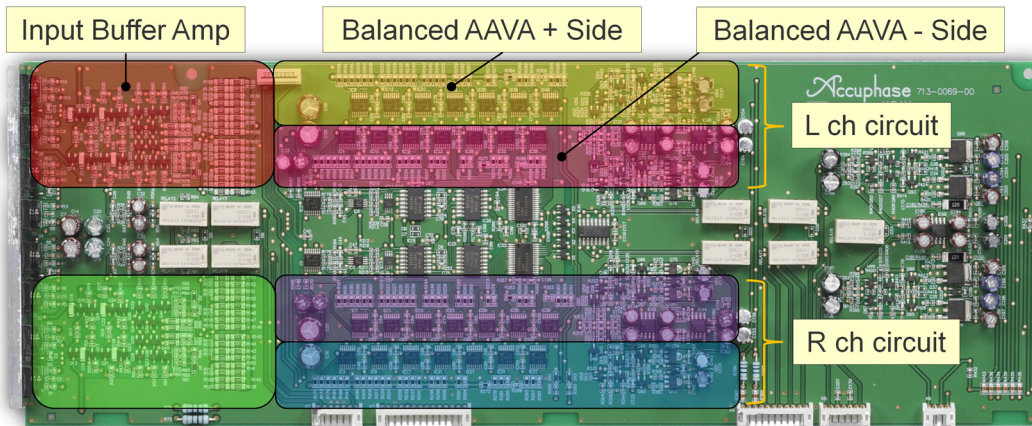
E-650 is the remarkable low noise amplifier exceeding E-600.

E-650 marks 80µV of the actual noise voltage. This is 33% lower(-3.5dB) than the former model E-600.

E-650 guarantees 102dB Signal to Noise ratio at the maximum gain.

# Technology for ultra low noise

- Balanced AAVA Architecture
- Balanced signal transfer including tone control



AAVA: Accuphase Analog Vari-gain Amplifier

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

E-650 employs two AAVA modules per channel with a fully balanced configuration from the input to the output. Tone control system which is the post stage of AAVA works as balanced AAVA circuit as well.

The power amplifier part can receive those positive and negative signals at the same time by the instrumentation amplifier.

It works as the totally balanced circuit which is tolerant to internal and external harmful noise.

“Balanced AAVA” volume control system was originally designed only for Accuphase flagship pre-amplifiers, C-3800 and C-3850. Our engineering team succeeded in installing this unique technology into the integrated amplifier as well.



## Super high Damping-Factor

- 60% higher than E-600
  - Damping Factor: 800 guaranteed



Guaranteed Damping-Factor

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E-650 achieves 800 of Damping-Factor.  
It is 60% higher than the former model E-600.  
800 of DF is the guaranteed spec. In fact, DF of E-650 achieves 1200.

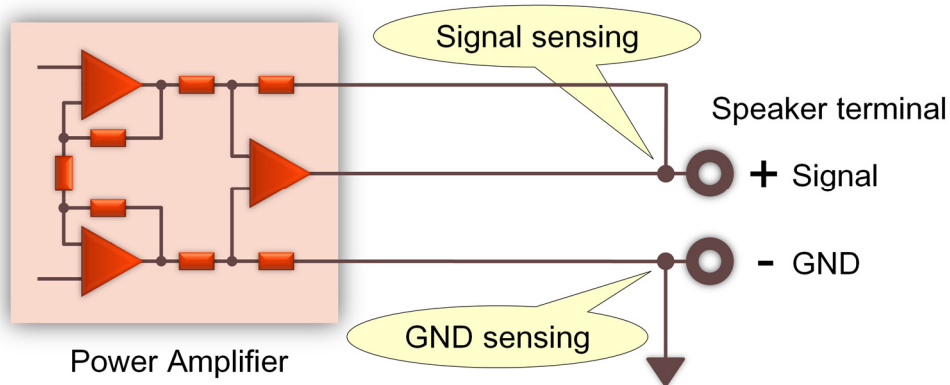
\*Damping-Factor, DF:

An index of speaker driving ability. Higher Damping-Factor amplifier has higher speaker driving ability.

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

# Technology for high DF

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



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Remote-sensing is a technique to make lower output impedance of the amplifier by negative feedback with signal sensing from close up speaker terminals.

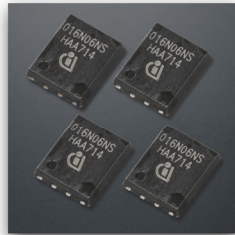
Balanced Remote-sensing is also make impedance even lower by GND sensing and the negative feedback of GND level with adding the signal sensing.

Not only Damping-factor is improved but also Total Harmonic Distortion and Intermodulation Distortion get better by Balanced Remote-sensing.

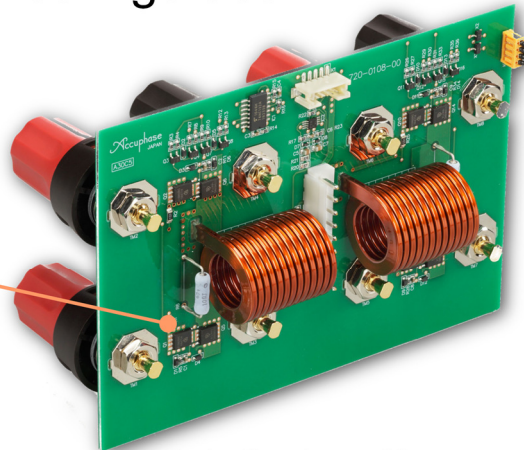
Balanced Remote-sensing was not applied in the former model E-600.

# Technology for high DF

- Speaker protection equipped with MOSFET
- Short signal path configuration



New MOS-FET switch



Protection Assembly

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Although a mechanical relay is the most popular component for speaker protection, it does not have high reliability and low contact resistance either.

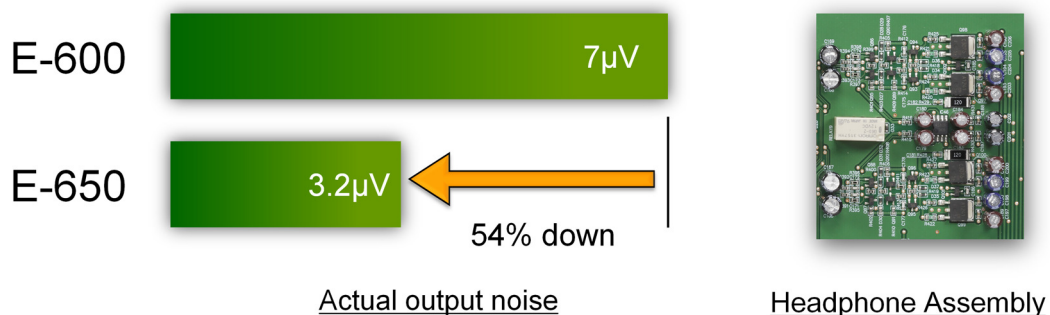
E-650 applies a MOS-FET switch instead of mechanical relay for speaker protection.

Damping-Factor, reliability and sound quality are all improved by MOS-FET switch. We adopted a new MOS-FET which has very low on resistance of  $1.6\text{m}\Omega$ . (E-600 used  $2.6\text{m}\Omega$  on resistance MOS-FET)

By connecting speaker terminals and PC-board directly, signal path can be made shorter to obtain the low impedance.

# Headphone Amplifier

- Fully discrete configuration
- Low noise : 54% lower than E-600
- High output power : 500mW into 8Ω



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E-650 equipped with a high performance headphone amplifier which is designed by using fully discrete configuration.

It brings less-than-half the noise and 2 times higher output power than those of E-600.

E-650 drives any kinds of headphones easily and performs your music with the best sound quality.

## Further more ...

- Ready for the option board DAC-50 and AD-50
  - Sampling frequency on the front display
  - Possible to choose digital input source, MC/MM manually



Option Boards



Multi function display



Input selector for DAC

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E-650 accepts the digital input board DAC-50 and analog input board AD-50.

You can see the figure of sampling frequency input of DAC-50 on the display and can choose any preferred input sources with the selector on the front panel.