Accuphase

6-CHANNEL DIGITAL POWER AMPLIFIER

PX-650

● Digital power amplifier with totally separate six-channel configuration ● Output power 200 watts × 6 into 4 ohms, 150 watts × 6 into 8 ohms ● Bridged operation further increases output to 450 watts × 3 into 6 ohms and 420 watts × 3 into 8 ohms ● Instrumentation amplifier principle for fully balanced signal paths ● Large 820 VA toroidal transformer ● Balanced inputs ● Three large analog power meters ● Large-size speaker terminals

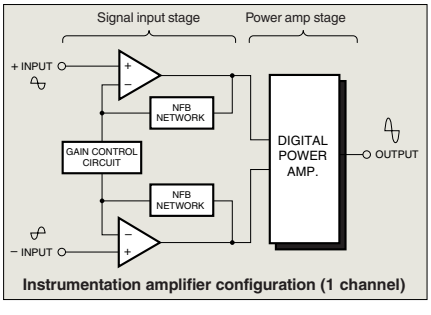
Six-channel digital power amplifier – Six totally separate power units with identical performance. Discrete delta-sigma type digital power units ensure extremely low noise. Large 820 VA toroidal transformer and large filtering capacitors provide ample muscle: 200 watts × 6 into 4 ohms or 150 watts × 6 into 8 ohms. Bridged mode allows upgrade to 3-channel amplifier with 420 watts × 3 into 8 ohms.

The PX-650 represents a successful blend of digital audio technology with Accuphase's rich expertise in the field of analog power amplifiers. The result is a six-channel digital power amplifier ideally suited for high-end home theater systems. Because six identical high-efficiency power units operating in digital mode are used, all channels provide the same excellent sound quality. The PX-650 can drive any kind of speaker with ease and authority, creating a spacious surround sound stage with pinpoint imaging and impressive dynamics. Thanks to its high efficiency, the digital circuitry keeps thermal energy generation low, making it possible to reconcile high output power levels with compact unit dimensions. This is especially welcome in multi-channel systems for home theater applications.

The capability for high power and small size has been a recognized advantage of the digital principle for power amplifiers, but performance and sound quality related problems had to be overcome before adoption in a high-end audio product was possible. The PX-650 represents a breakthrough in the field. It is the result of a highly focused step-by-step approach to identify and solve these pertinent problems. Circuit topology as well as the selection of components and materials are based on extensive listening tests. The aim was nothing less than to realize pure audio quality of the highest standard while making best use of the digital approach. In performance as well as in sound quality, the PX-650 is a case in point. The digital switching principle boasts extremely low internal losses. The power supply is not called upon to provide superfluous energy, which in turn keeps power consumption and therefore operation temperatures low. A power supply rated for the same capacity in an analog amplifier would be much less powerful. The know-how accumulated by Accuphase in the analog field is also in evidence in the PX-650, as exemplified by its large toroidal transformer. By combining the advantages of the digital principle, namely high power and low current consumption, with solid engineering and sophisticated design expertise, Accuphase has opened up a new chapter in digital audio.

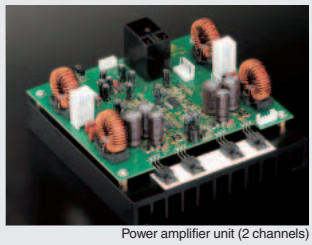
Balanced signal transmission with instrumentation amp configuration

The PX-650 features the highly advanced "instrumentation amplifier" principle whereby all signal paths from the inputs to the power amp stage are fully balanced. Ideal signal transmission conditions result in excellent CMRR (common mode rejection ratio) and minimal distortion. Another significant advantage is that external noise and other external influences are virtually shut out. The result is a drastic improvement in operation stability and reliability.



Instrumentation amplifier configuration (1 channel)

- **Six digital power amp units with identical performance allow configuring a superb 5.1 channel surround system using a single component**
  With all six channels operating, the PX-650 delivers 200 watts × 6 into 4 ohms and 150 watts × 6 into 8 ohms. In 2-channel mode, the unit becomes even more powerful, with 250 watts × 2 into 4 ohms and 170 watts × 2 into 8 ohms.
- **Bridged operation allows upgrade to a high-output 3-channel amplifier**
  The two channels in all three blocks can be run in bridged mode, resulting in a full 450 watts × 3 into 6 ohms and 420 watts × 3 into 8 ohms. This represents top performance with power to spare.
- **Power supply features large toroidal transformer and ample filtering**
  The toroidal power transformer of the PX-650 is rated for 820 VA, and filtering is provided by two aluminum electrolytic capacitors with ample 33,000 µF rating.
- **Gain selector provides 6 dB increase in normal or bridged operation**
- **Mode selector allows easy implementation of bridged operation**
- **Balanced inputs highly resistant to externally induced noise**
- **Three analog power meters with direct reading scale**
  A meter selector button allows use of the meters for all six channels. On/off switching for meter operation and illumination is also provided.
- **Front-panel input selector button allows easy choice of balanced and unbalanced inputs**
- **Large-size speaker terminals compatible with Y lugs and banana plugs**


Power amplifier unit (2 channels)


Large toroidal power transformer

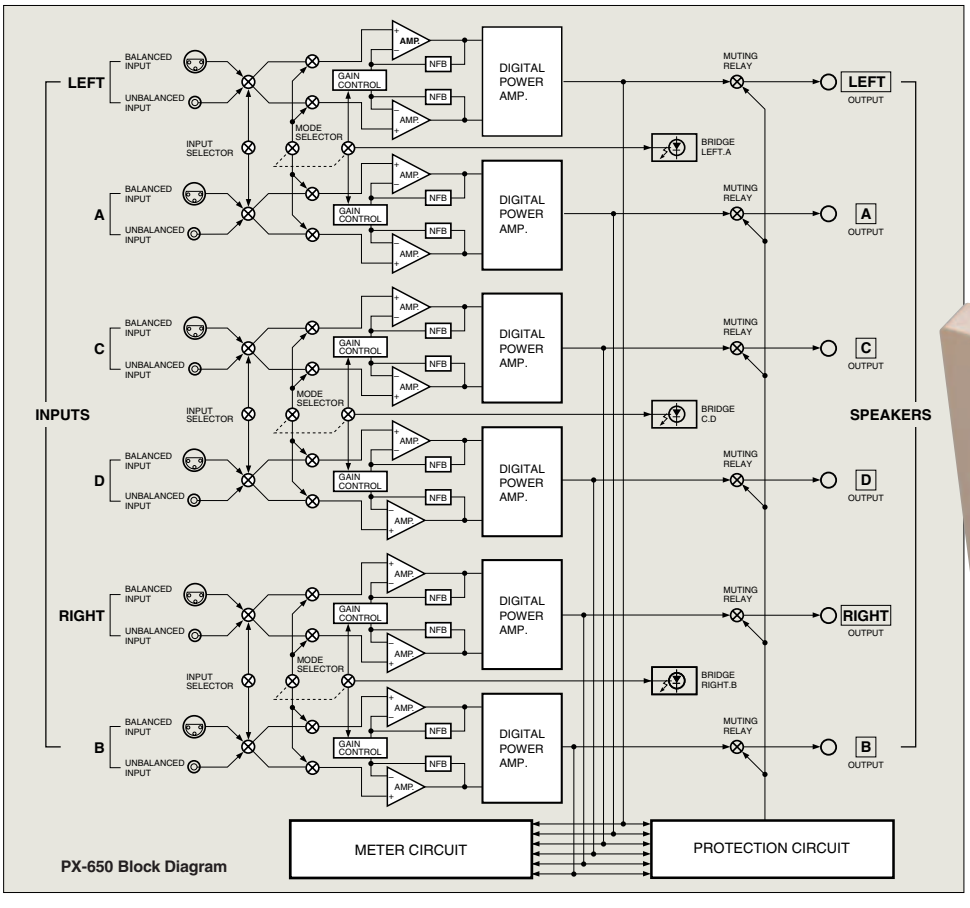

Large filtering capacitors


Balanced/unbalanced input connectors


Meter selector buttons


Input selector buttons


Large-size speaker terminals



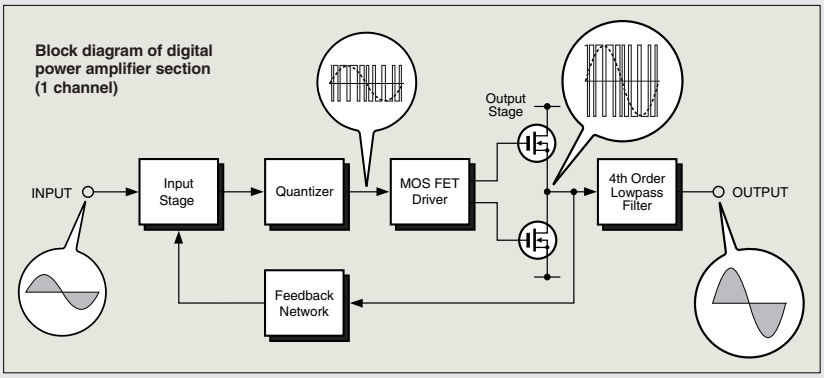
PX-650 Block Diagram

Digital power amplifier using discrete configuration

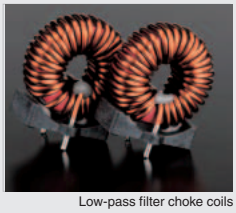
The PX-650 features highly efficient digital power amplifiers that provide high output power with low power consumption (low heat build-up). The delta-sigma circuit principle minimizes noise in the audible frequency range.

As can be seen from the illustration, the circuit comprises the input stage, quantizer, MOS FET driver stage, MOS FET output stage, and feedback network. Together, these elements form a second-order delta-sigma demodulator. Many delta-sigma type digital power amplifiers use a single chip that integrates the input stage, quantizer, feedback network and other elements. In the PX-650 on the other hand, all of these circuits are built with discrete components. As a result, the noise characteristics of the PX-650 are on a par with an analog power amplifier.

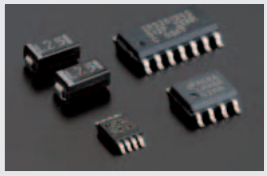
Block diagram of digital power amplifier section (1 channel)



- Continuous average output power with six channels driven (normal operation): 150 W × 6 into 8 ohms
- Continuous average output power with three channels driven (normal operation): 420 W × 3 into 8 ohms


Low-pass filter choke coils

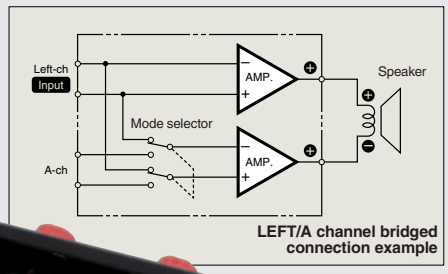

Power MOS FETs


High-speed diodes and drivers, ultra high-speed OP amps, and other parts

■ Digital power amplifier section with power MOS FETs mounted to aluminum heat sinks and other discrete components. Three units accommodating 2 channels each are provided, for a total of 6 channels.

■ In the output stage, the PX-650 uses power MOS FET devices with high withstand voltage and low on-resistance, allowing single-ended circuit topology similar to an analog power amplifier. This also makes it possible to use 2 channels in bridged configuration, turning the 6-channel amplifier into a 3-channel component with even higher output power.

Mode selector



LEFT/A channel bridged connection example

Connection examples for various system configurations with PX-650

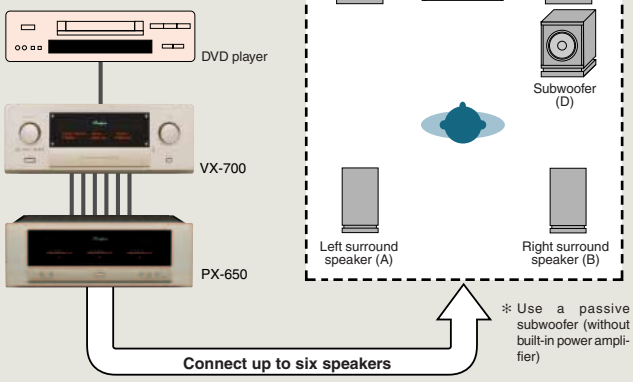
✻ Use speakers with rated impedance between 4 and 16 ohms.
✻ In bridged mode, use speakers with rated impedance between 6 and 16 ohms.

Surround sound playback

Connect the VX-700 or A/V amplifier pre out or the 6-channel control center CX-260 or similar to the PX-650.

❶ **6-channel (5.1 channel) surround playback**

❷ **4-channel playback**
This refers to playback of a down-mixed signal without using a center speaker or subwoofer. Because two unused channels are available, bridged operation for front left and right is possible.



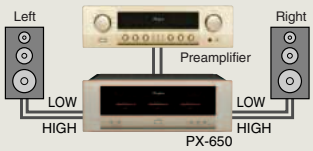
2-channel (stereo) playback

❶ **Stereo playback using 2 channels of the PX-650**
❷ **Stereo playback with bridged configuration, using 4 channels of the PX-650**

Stereo playback in bi-amped configuration

In a bi-amped system, the LOW and HIGH range speaker units are driven by separate full-range amplifiers, which can result in better sound quality.

✻ A preamplifier with two outputs is required. A speaker type with built-in network but separate LOW/HIGH inputs is required.
✻ If bridged mode is used for the LOW range, all 6 channels are used.

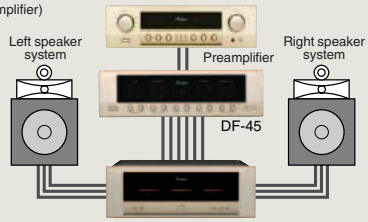


Multi-amp or subwoofer system

Using the six power amplifier channels effectively, a high-quality multi-amp system can be configured with a single PX-650.

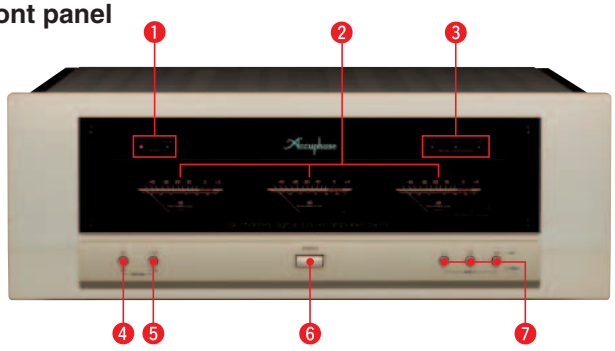
✻ The connection requires a multichannel divider (DF-45 or similar).
✻ Use a passive subwoofer (without built-in power amplifier)

❶ **3-way multi-amplifier system**
❷ **2-way multi-amplifier system**
❸ **Stereo + subwoofer system**
❹ **2-way multi-amplifier + subwoofer system**



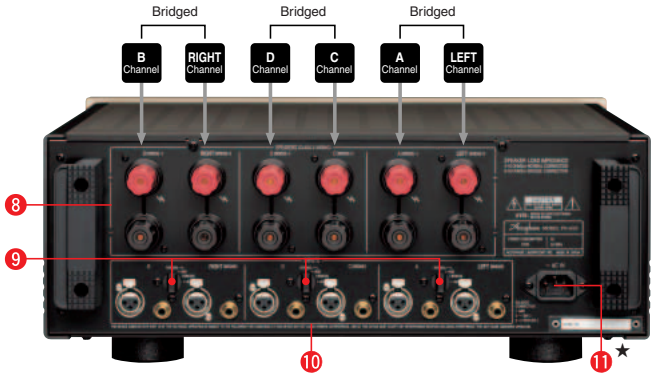
■ Example of a 3-way multi-amp system

■ Front panel



■ Rear panel

● LEFT, RIGHT, A, B, C, D channels are entirely separate and have identical specifications
● LEFT/A, C/D, RIGHT/B channels can be selectively bridged



❶ Meter display indicators
❷ Power meters (switchable for 3 channels)
❸ Bridging indicators
❹ Meter on/off and illumination button
❺ METER selector: L, C, R/A, D, B
❻ Power switch
❼ Input selector buttons (BALANCED/UNBALANCED)
❽ 6-channel speaker outputs
❾ Mode selectors
Normal/bridged/gain setting for LEFT/A, C/D, RIGHT/B
❿ Input connectors
6-channel balanced inputs
① Ground ② Inverted (–) ③ Non-inverted (+)
6-channel unbalanced inputs
⓫ AC power supply connector★

Guaranteed Specifications

[Guaranteed specifications are measured according to EIA standard RS-490.]

● **Continuous Average Output Power (20 - 20,000 Hz)**
Note: Load ratings marked ✻ apply only to operation with music signals.

		B	RIGHT	D	C	A	LEFT
6ch	4Ω	200W	200W	200W	200W	200W	200W
	6Ω	170W	170W	170W	170W	170W	170W
	8Ω	150W	150W	150W	150W	150W	150W
3ch	4Ω	–	240W	–	240W	–	240W
	6Ω	–	200W	–	200W	–	200W
	8Ω	–	160W	–	160W	–	160W
2ch	4Ω	–	250W	–	–	–	250W
	6Ω	–	210W	–	–	–	210W
	8Ω	–	170W	–	–	–	170W
3ch (Bridge)	6Ω(✻)	450W		450W		450W	
	8Ω	420W		420W		420W	
2ch (Bridge)	6Ω(✻)	530W		–		530W	
	8Ω	450W		–		450W	

● The output value in the "3ch", "2ch", and "2ch (Bridge)" columns applies to any channel.

● **Total Harmonic Distortion (at half power)**
Six-channel operation 0.1 %, with 4 to 8-ohm load
Three-channel operation 0.1 %, with 6 to 16-ohm load (bridged mode)

● **Intermodulation Distortion** 0.003 %

● **Frequency Response (into 4 ohms, for all channels)**
At rated output: 20 - 20,000 Hz +0, −0.2 dB
At 1 watt output: 2 - 80,000 Hz +0, −3.0 dB

● **Gain (for all channels)**
28.0 dB (Normal/Bridge)
34.0 dB (Normal +6 dB/Bridge +6 dB)

● **Output Load Impedance**
Six-channel operation: 4 to 16 ohms
Three-channel operation: 6 to 16 ohms (bridged mode)
Note: In bridged mode, 6-ohm loads are permissible for music signals only.

● **Damping Factor**
Normal mode 150 (50 Hz)
Bridged mode 75 (50 Hz)

● **Input Sensitivity (with 8-ohm load)**
Six-channel operation 1.38 V for rated output
0.11 V for 1 watt output
Three-channel operation (bridged mode) 2.31 V for rated output
0.11 V for 1 watt output

● **Input Impedance**
Balanced: 40 kilohms
Unbalanced: 20 kilohms

● **Signal-to-Noise Ratio** 100 dB at rated output (A-weighted, input shorted)

● **Output Level Meters**
−40 dB to +3 dB (dB/% indication)
Logarithmic scale, with OFF switch

● **Power Requirements** AC120 V/230 V, 50/60 Hz (Voltage as indicated on rear panel)

● **Power Consumption**
48 watts idle
275 watts in accordance with IEC 60065

● **Dimensions**
Width 465 mm (18-5/16")
Height 180 mm (7-1/16")
Depth 418 mm (16-7/16")

● **Mass**
25.8 kg (56.9 lbs) net
31.0 kg (68.3 lbs) in shipping carton

Remarks
★ *This product is available in versions for 120/230 V AC. Make sure that the voltage shown on the rear panel matches the AC line voltage in your area.*
★ *The shape of the AC inlet and plug of the supplied power cord depends on the voltage rating and destination country.*

■ Supplied accessories: AC power cord

• Specifications and design subject to change without notice for improvements.

ACCUPHASE LABORATORY INC.
http://www.accuphase.com/
J0512Y PRINTED IN JAPAN 850-0149-00 (AD1)