

## **MX-D1** Digital Stereo Power Amplifier

**Yamaha introduces the MX-D1, a Digital Stereo Power Amplifier that uses advanced Digital Amplification technology to deliver 500W with superb audio purity.**

Yamaha Corporation, one of the world's leading manufacturers of audio and home theater systems, announces the debut of its ultra high quality digital power amplifier, the MX-D1.

The 2-channel MX-D1 puts out 500W per channel, with distortion of 0.003% or less and dynamic range of 120dB or more. This sensational performance, made possible by Yamaha's advanced digital technology, will appeal strongly to audiophiles seeking the highest quality stereo sound with high power capabilities. It is also expected to become popular in high-end multi-channel surround systems and custom installations.

The MX-D1 uses Yamaha's own Power Engine chipset featuring the YDA133 Modulator LSI and two YDA134 Power MOS-FET Drive LSIs. Its outstanding technology includes a Constant Gain PLL Modulator Circuit, Cross Feedback Loop Circuit, Advanced Analog Feedback, Active Power Control System, Direct Drive High-Efficiency Power Supply, Magnetic Coupling Rectification Circuit, and High-Speed Protection Circuits. It also features Twin Monaural Independent construction (independent chambers to prevent interference) and a low-noise, low-impedance design. Input and speaker connections are made via large-size WBT terminals.

The MX-D1 is visually appealing as well, with a sleek, low-line design (only 60mm high) and an elegant glossy black finish.

A separate Passive Attenuator unit with matching design, the YPC-1, for input selection and volume control, will be optionally available.

## MX-D1

Digital Stereo Power Amplifier



### **MX-D1 Main Features**

- 500W x 2 Output Power with Ultra-Low Distortion
- Yamaha Original Power Engine System Chip: Modulator LSI (YDA133) and Power MOS-FET Drive LSIs (YDA134 x 2)
- Constant Gain PLL Modulator Circuit
- Cross Feedback Loop
- Advanced Analog Feedback
- Active Power Control System
- Magnetic Coupling Rectification Circuit
- High-Speed Protection Circuits
- Low-Noise, Low-Impedance Design
- PWM Digital Drive High-Efficiency Power Supply
- Monaural Separate Construction
- Extensive Custom Installation Compatibility

## YPC-1

Passive Attenuator



### **YPC-1 Main Features**

- -1dB (100dB) Gang Error High Quality Continuously Variable Attenuator with Brass Case
- Low-Resistance Rotary Selector Switch
- Extra-Thick (12mm; 1/2"), Aluminum-Extruded, Yamaha Traditional Piano Finish Front Panel and Side Panels
- Magnetic Shielded Aluminum Top Cover and Rear Panel
- Point-Controlled, Anti-Resonance Feet

## Digital Stereo Power Amplifier

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# MX-D1

The MX-D1 employs new Yamaha digital technologies developed to combine ultra high sound quality with the outstanding efficiency of a digital amplifier. This 2-channel amplifier delivers 500W per channel, with distortion of 0.003% or less and dynamic range of 120dB or more. It features Yamaha's own Power Engine chipset of powerful new LSIs and a series of advanced new digital circuitry, as well as Twin Monaural Independent construction (independent chambers to prevent interference) and a low-noise, low-impedance design. The MX-D1 even looks like a high-performance machine, with a sleek, low-line design (only 60mm high) and an elegant glossy black finish. If you want the highest quality stereo sound with high power capabilities, the MX-D1 is for you.



At last! A digital power amplifier  
with ultra high quality for pure audio performance.

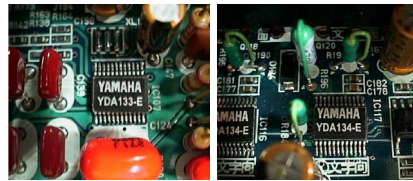
# Ultimate Natural Sound Quality with Yamaha Advanced Digital Technologies

- 500W x 2 Output Power with Ultra-Low Distortion
- Power Engine Chipset: YDA133 Modulator LSI and two YDA134 Power MOS-FET Drive LSIs
- Constant Gain PLL Modulator Circuit
- Cross Feedback Loop
- Advanced Analog Feedback
- Active Power Control System
- Magnetic Coupling Current Circuitry
- High-Speed Protection Circuits
- Low-Noise, Low-Impedance Design
- PWM Digital Drive High-Efficiency Power Supply
- Monaural Separate Construction
- Custom Installation Compatibility

## Yamaha Digital Amplifier Technology

### Yamaha Exclusive Power Engine System Chipset

The heart of this digital amplifier is Yamaha's own Power Engine, a chipset that includes the YDA133 Modulator LSI and two YDA134 Power MOS-FET Drive LSIs. The Power Engine has solved the sound quality and performance challenges of conventional digital amplifiers to achieve the high sound quality and high power demanded by luxury pure audio amplifiers, as well as low power consumption and compact size,



YDA133 Modulator LSI and two YDA134 Power MOS-FET Drive LSIs

without compromise.

### Constant Gain PLL Modulator Circuit

This circuit eliminates the dependency of the output signal on power voltage fluctuation by using the YDA133 modulator LSI which combines a PLL circuit with a modulator circuit. The modulator circuit operates synchronously with a standard clock to provide PWM output waveform at a fixed frequency of 352.8kHz according to the formula: Modulation Rate x Power Supply Voltage = Constant based upon two types of input information: the input music signal level and the output voltage at the power supply stage (+/-B). A synchronized multi-channel amplification system can be used without a carrier frequency beat for bi-amplification or a multi-channel

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## YPC-1

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home theater system with a backup amplifier.

**Cross Feedback Loop Circuit**

The digital pulse output is fed back by the Cross Feedback Loop, improving the linearity of the output stage and of the modulator circuit. This achieves superior low distortion characteristics and high dynamic range.

**Advanced Analog Feedback**

The 352.8kHz carrier signal is removed by the fc 30kHz output LC filter, and forwarded negative feedback is added to achieve amplification over a wide bandwidth of 100kHz and with a high damping factor (over 200), without load impedance dependency.

**Active Power Control System**

The maximum output of a

conventional amplifier is determined in most cases by the power voltage clip level. The Active Power Control System detects the output current to control the voltage limiter value in order to independently control the continuous maximum output and dynamic power at load impedance values of 2—8 ohms. This system makes it possible to continually provide the amplifier's maximum performance at speaker load.

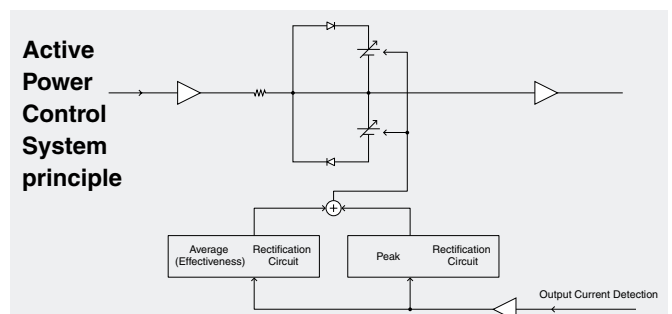
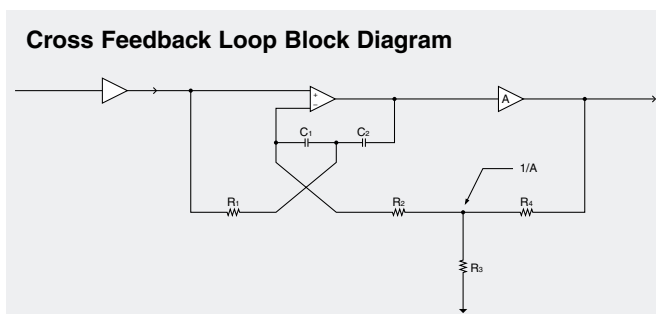
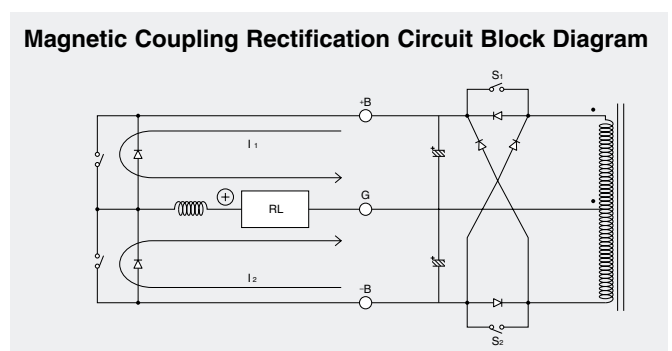
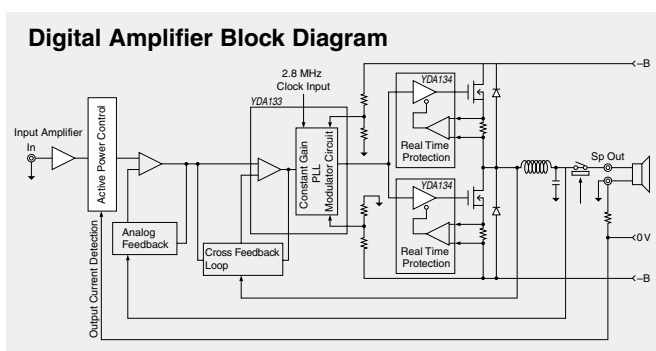
**Direct Drive High-Efficiency Power Supply and Magnetic Coupling Rectification Circuit**

The power circuit is equipped with the newest version of the Yamaha patented Voltage Current Resonance Type Switching Power Supply Circuit, which achieves low noise performance while retaining high efficiency. The secondary rectification circuit is a Magnetic Coupling

Rectification Circuit that fully deals with the power damping phenomenon. This circuit maintains symmetrical voltage regardless of the direction of the load current by forcefully linking the plus and minus power voltage outputs in the secondary winding of the power transformer. The switching frequency is 88.2kHz (= 2.8224MHz/8).

**High-Speed Protection Circuits**

Safe operation is assured by a complete set of protection functions such as over-current protection and DC protection. The amplifier has a super high speed current detection circuit in the YDA134 LSI that responds to the pulse current of a single wave digital pulse, and a Safe Operation Sequence Logic in the YDA133 Modulator LSI.



**Low Noise, Low Impedance Design**

- 4-Layer Epoxy Resin Coated PC Board Containing Fiberglass with Highest Performance Parts Such as 70μ Copper Foil for Low Line Impedance
- Gigantic WBT Input and Speaker Terminals
- Discrete SEPP Amplifier Circuit (Input Amplifier Circuit with Unbalanced Conversion Circuit with Audio Exclusive Low-Noise FETs for Wide Dynamic Range
- Output Filter (Large Effect on Sound Quality): Custom-Made Double Core, Low-Impedance Toroidal Coil and Extra-Large Custom-Made Block Electrolytic Capacitors
- Input Switch Using Enclosed Twin

Cross Bar Relays

- High Sound Quality Power Supply Electrolytic Capacitor

**Monaural Independent Construction**

- Twin Monaural Construction (L/R Individual Chamber Construction)
- Independent Chamber for Input Amplifier Circuit, Output Terminal Board and Power Supply Line Filter Board for Reduced Electronic Interference
- Extra-Thick (12mm; 1/2"), Aluminum-Extruded, Yamaha Traditional Piano Finish Front Panel and Side Panels
- Magnetic Shielding Aluminum Top Cover and Rear Panel
- Point-Controlled, Anti-Resonance Feet
- Heavy-Duty Copper-Plated Steel

Inner Chassis

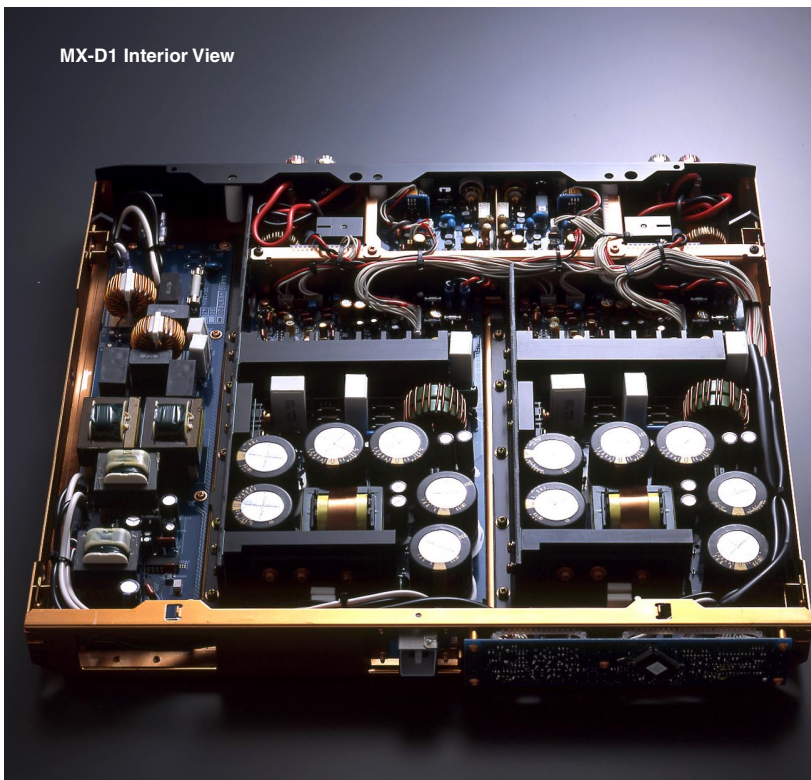
- Output Power MOS Heat Dispersion Block: 18mm (1-1/8") Thick Aluminum Block for Additional Vibration Damping

**Custom Installation Compatibility**

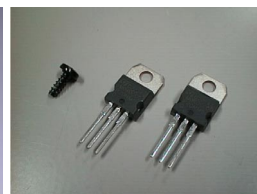
Using the MX-D1 in custom installations is facilitated by its RS-232C interface for bi-directional control, ID setting for a multi-channel amplifier system and trigger in/out daisy chain connection for synchronized power switching via Through and Power modes.

**PWM Digital Drive High-Efficiency Power Supply**

Digital power supplies, while very efficient, generally suffer from noise



MX-D1 Interior View



Power MOS FETs (500 V/2.0 A)



WBT Input Terminals



Low-Impedance Output Coil



WBT Speaker Terminals

problems which require additional components to solve. The MX-D1 power supply, however, holds the voltage and current levels to zero while the device turns on and off. This reduces noise to 1/30 of conventional digital power supplies. Power loss is also reduced, for an incredibly high power conversion efficiency. Other advantages of this power supply include superb stability against power load fluctuations, large capacity, low impedance and silent operation.

**Inlet-Type Power Cable**

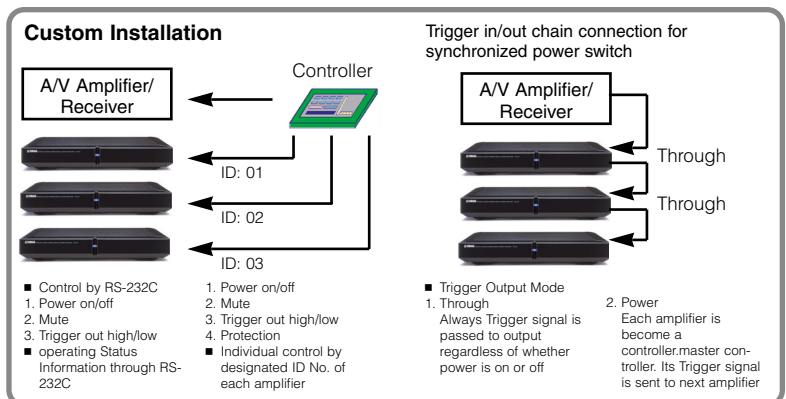
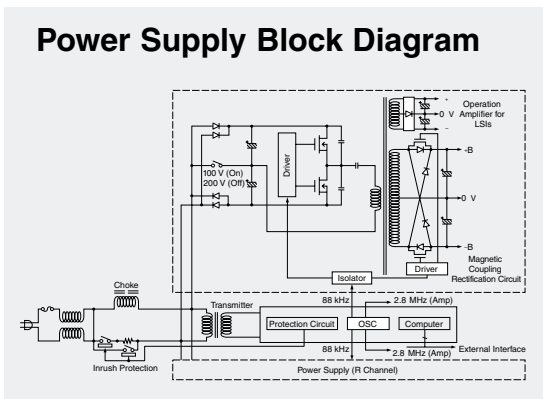
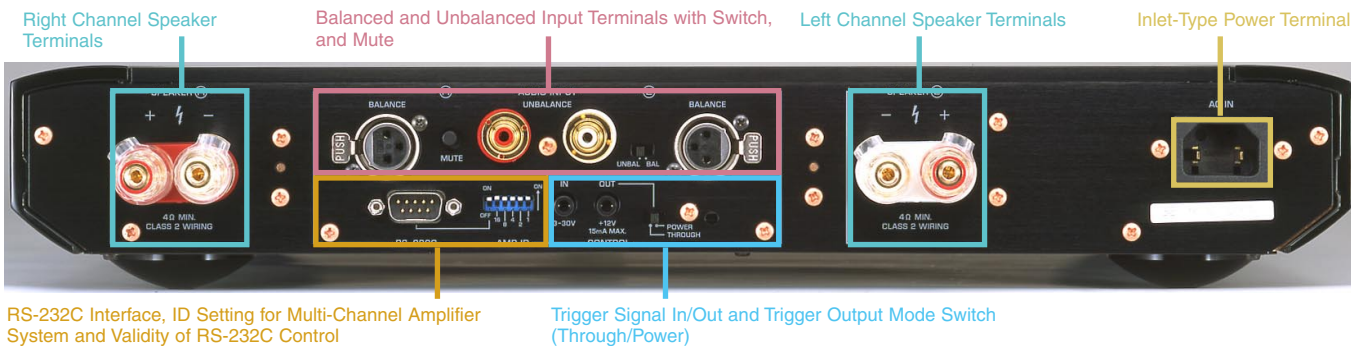
The Inlet-Type Power Cable is separate, rather than attached to the unit. It is a thicker type than usual, for higher power handling capacity.

**MX-D1 Main Specifications**

AUDIO SECTION	
Min. RMS Output Power (1 kHz, 0.1% THD)	
8 ohms	500 W + 500 W
Dynamic Power/Channel	
(by IHF Dynamic Headroom measuring method)	
2 ohms	1,000 W + 1,000 W
4 ohms	1,000 W + 1,000 W
6 ohms	850 W + 850 W
8 ohms	700 W + 700 W
Dynamic Headroom	
4 ohms	3 dB
6 ohms	2.3 dB
8 ohms	1.5 dB
Damping Factor (1 kHz, 8 ohms)	
200	
Input Sensitivity/Impedance (500 W/8 ohms)	
Unbalanced/Balanced 1.3 V/25 k-ohms	
Frequency Response	
1-100,000 Hz ±3 dB	
Total Harmonic Distortion	
(Unbalanced/Balanced to Sp Out)	
(1 kHz, 10 W/8 ohms, 20 kHz LPF) 0.003%	

Signal-to-Noise Ratio (IHF-A-Network)	120 dB
Unbalanced/Balanced	
(S: 1.3 V, Input Shorted, 20 kHz LPF)	
Residual Noise (IHF-A-Network)	63 µV
Unbalanced/Balanced	
(20 kHz LPF)	
Channel Separation (1 kHz)	100 dB
Unbalanced/Balanced	
(Input 5.1 k-ohms Shorted)	
Muting	-∞
GENERAL	
Standby Power Consumption	Less than 0.1 W
Dimensions	(Width) 435 mm; 17-1/8"
	(Height) 75 mm; 2-15/16"
	(Depth) 437 mm; 17-3/16"
Weight	10.4 kg; 22.9 lbs.

MX-D1 Rear Panel



## YPC-1 Passive Attenuator



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- Low-Resistance Rotary Selector Switch
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- Magnetic Shielded Aluminum Top Cover and Rear Panel
- Point-Controlled, Anti-Resonance Feet
- Heavy-Duty Copper-Plated Steel Inner Chassis
- Dimensions (W x H x D): 240 x 269 x 75 mm; 9-7/16" x 10-9/16" x 2-15/16"
- 3.4 kg; 7.5 kg

## MX-D1 Notable Features

### Yamaha Digital Amplifier Technology

- Yamaha Original Power Engine System Chip: Modulator LSI (YDA133) and Power MOS Drive LSIs (YDA134 x 2)
- Constant Gain PLL Modulator Circuit
- Cross Feedback Loop
- Advanced Analog Feedback
- Active Power Control System
- **Magnetic Coupling Rectification Circuit**
- High-Speed Protection Circuits
  - Safety Protection Sequence Logic
  - Over-Current Protection
  - DC Detection Circuit
- PWM Digital Drive High-Efficiency Power Supply

### Low-Noise, Low-Impedance Design

- 500W x 2 Output Power with Ultra-Low Distortion
- 4-Layer Epoxy Resin Coated PC Board Containing Fiberglass with Highest Performance Parts Such as 70 $\mu$  Copper Foil for Low Line Impedance
- Gigantic WBT Input and Speaker Terminals
- Discrete SEPP Amplifier Circuit (Input Amplifier Circuit with Unbalanced Conversion Circuit with Audio Exclusive Low-Noise FETs for Wide Dynamic Range)
- Output Filter (Large Effect on Sound Quality): Custom-Made Double Core, Low-Impedance Toroidal Coil and Extra-Large Custom-Made Block Electrolytic Capacitors
- Input Switch Using Enclosed Twin Cross Bar Relays
- High Sound Quality Power Supply Electrolytic Capacitors

### Extensive Custom Installation Compatibility

- RS-232C Interface for Bi-Directional Control
- ID Setting for Multi-Channel Amplifier System
- Trigger Signal Chain Connection for Synchronized Power Switching

### Monaural Separate Construction

- Twin Monaural Construction (L/R Individual Chamber Construction)
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- Heavy-Duty and High Sound Quality Copper-Plated Steel Inner Chassis
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• Product designs and specifications are subject to change without notice.

For details please contact:

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