

LP-2010

Switching Amplifier Measurement Low Pass Filter

DOC-DS-LP2010-V11-EN

Introduction

This is a great D class amplifier measurement of low-pass filter. The fine workmanship, superior performance, easy connection make this product easy to use and very worth owning with a high cost performance.

- **Easy to Use**
 - Simple connection, it only takes 3 mins from unpacking to using
 - True differential input, suitable for the bridge output structure
 - Single-ended output, the output buffer stage can load multiple connections.
 - Simple power input, the built-in power converter module provides power supply for internal circuitry
- **High Cost Performance**
 - Superior performance, but low price
 - 10% for less than the price of branded products, with most of its performance
 - Superior frequency response and distortion
 - Very easy to extend range, brings endless appreciation potential
 - Abundant high-quality accessories, without additional cost



Packing List

INHAOS LP-2010 Low Pass Filter..... × 1	BNC Tee Connector..... × 2
UserManual..... × 1	BNC to BNCAudio Cable..... × 1
DC 9V 500mA Power Supply..... × 1	RCtoBNCAudio Cable..... × 1
	SpeakerCable..... × 2

Technical Parameters

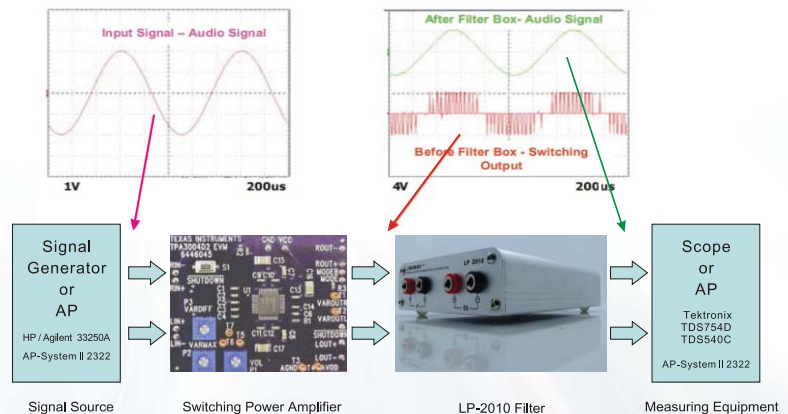
Specifications

Frequency Response	±0.1dB, 10Hz to 20KHz
Insert Loss	0.05dB, typically
High-frequency(HF) Inhibit	> 60dB, 250KHz to 20MHz, typically
Maximum Input (without extension)	±10V peak
Channel Isolation	> 90dB @ 20KHz
Distortion	< 0.005% harmonic (1V 1KHz)

Dimension

Temperature	
Suitable Temperature	+5°C to +40°C
Storage Temperature	-40°C to +75°C
Humidity	80% RH to at least +90°C
Dimension	105 * 165 * 36 mm

Application Diagram



⊙ Where needs it ?

- Low-power switching amplifier measurement
- Hands-free bluetooth audio parameters debug and test
- Mobile audio products parameters debug and test
- Multimedia audio products audio parameters debug and test
- Low pass filter for digital audio decoder

⊙ Who needs it ?

- Amplifier products manufacturing plant
- Specialized for Maintenance Testing
- R & D engineers, to debug switching amplifier
- Personal, for DIY digital audio products

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AN-2001

MEASUREMENT BASIS OF SWITCHING AMPLIFIER

By Steven & Tony

Switching amplifier is small, light and high efficiency, very suitable for battery-powered or low-power applications, such as mobile audio amplifier, bluetooth hands-free phone. As technology improved, it has overcome some shortcomings like large distortion, large interference, EMI no easy to pass, and being used more and more in audio power amplifier. The output signal of switching power amplifier contains a lot of high harmonics. The harmonic signal will make the audio measuring instruments work in the nonlinear state, causing severe distortion.

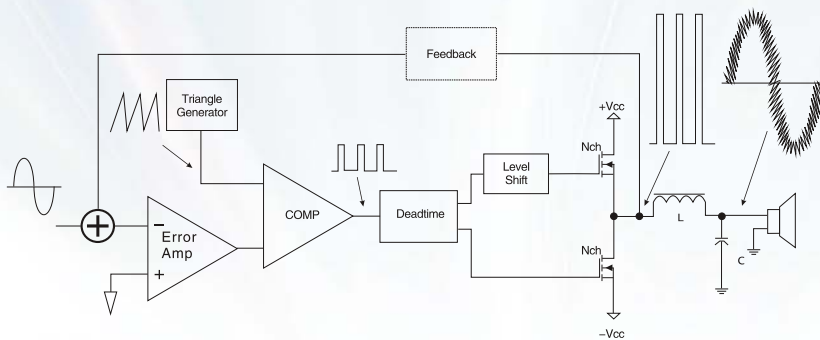


Chart 1: Typical Schematic of the switching amplifier

The switching amplifier mentioned here includes the D class, T class, and even the DDX amplifier. As long as the output stage switch driving elements operating in the state, they may all apply to the situation discussed here.

Typically, the power output stage will have an LC filter circuit to restore the sine wave audio signal. Because of the speakers limited frequency response, this filter circuit is acceptable. But for measuring instruments, is not enough, rapid conversion of the high

harmonic measuring instruments will make the audio input stage work in nonlinear state, and the measured results will be not accurate. So it requires a good performance measurement low pass filter.

The switching amplifier manufacturers, represented by TI, introduced the output-filter-free amplifier IC of Class D. In this case, we can cancel the power stage LC filter, connect the PWM signal to the speaker output directly, and restore its own audio signal inductance by use of the loudspeaker component. It needs a good performance measurement of low-pass filter, otherwise the output signal can not be measured.

AES (Audio Engineering Society) specificate test methods of the switching measurement of low-pass filter, and standardizes the measurement tools indicators. In the official AES17-1998, the filter specification requires:

1. Flatness of Frequency Response $\leq \pm 0.1\text{dB}$, $10\text{HZ} \leq f \leq 20\text{KHZ}$
2. HF reject : $> 60\text{dB}$, $f > 24\text{KHZ}$

INHAOS LP-2010 was designed referenced to AES17-1998. LP-2010 is a fully differential input, single-ended output, 4-poles, 30KHz low-pass filter. LP-2010 will provide users real audio signals.

LP-2010 is designed with the input range of $\pm 10\text{V}$ PP. The users can expand its scope by cascading the resistor. LP-2010 has a wide sphere of application, with a high cost performance.

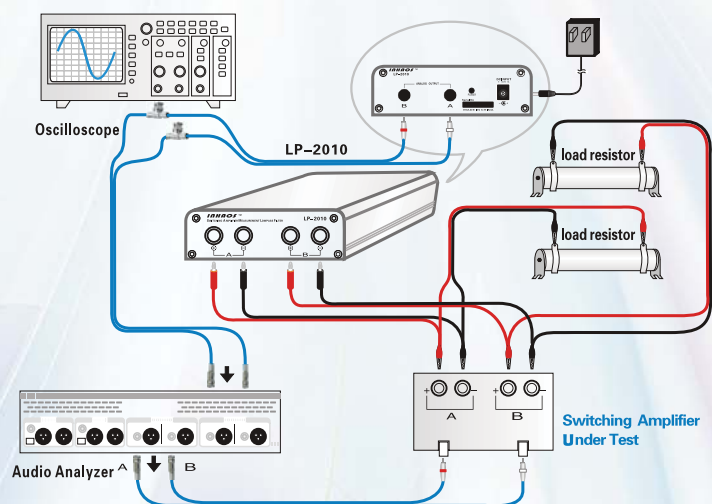


Chart 2: Equipment Connection Diagram