XPT6871 User Manual

March 2012 _ _

Chip function description

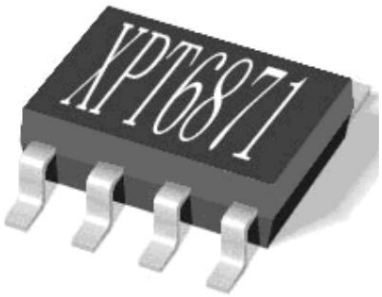
ÿ XPT6871 is a class AB, bridge audio power amplifier.

When the working voltage is 5V, the maximum driving power is: 4W (3ÿ load, THD<10%), 3W (4ÿ load, THD<10%); the total harmonic distortion noise in the audio range is less than 1% (20Hz ~ 20KHz); XPT6871's The application circuit is simple, requiring only a few peripheral components; the output of XPT6871 does not require external coupling capacitors or lift-up capacitors, buffer networks, and feedback resistors. ÿ XPT6871 is packaged in SOP, especially suitable for portable systems with low volume and small weight. XPT6871 can be controlled to enter sleep mode to reduce power consumption; XPT6871 has an internal overheating automatic shutdown protection mechanism. The XPT6871 is stable with a gain-bandwidth product up to 2.5MHz and unity gain stable. The voltage gain of the amplifier can be adjusted by configuring peripheral resistors, which is convenient for application. It is a classic chip with high quality and high reputation that has been proven by the market.

Main features of chip function

ÿ High output power (THD+N<10%, 1KHz frequency): 4W (3ÿ load), 3W (4ÿ load) ÿ Low leakage current in power-down mode: 0.6μA (typical) ÿ SOP8 package ÿ External gain adjustable, integrated feedback Resistor ÿ Wide operating voltage range 2.0V—6.5V ÿ No need to drive output coupling capacitor, bootstrap capacitor and buffer Network ÿ Unity gain stable

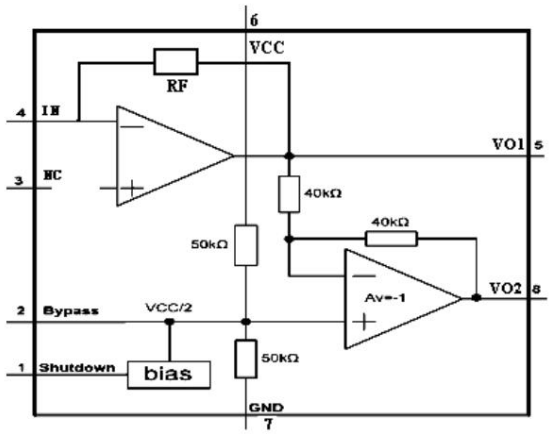
Physical map:



Basic application of the chip

ÿ Laptop ÿ Desktop computer ÿ Low voltage audio system

XPT6871 Block Diagram



Chip Ordering Information

Chip Model Package Type Package Type Minimum Package Quantity (PCS) Remarks				
XPT6871SP	SOP8	Tube	100/tube	

Typical Application Circuit

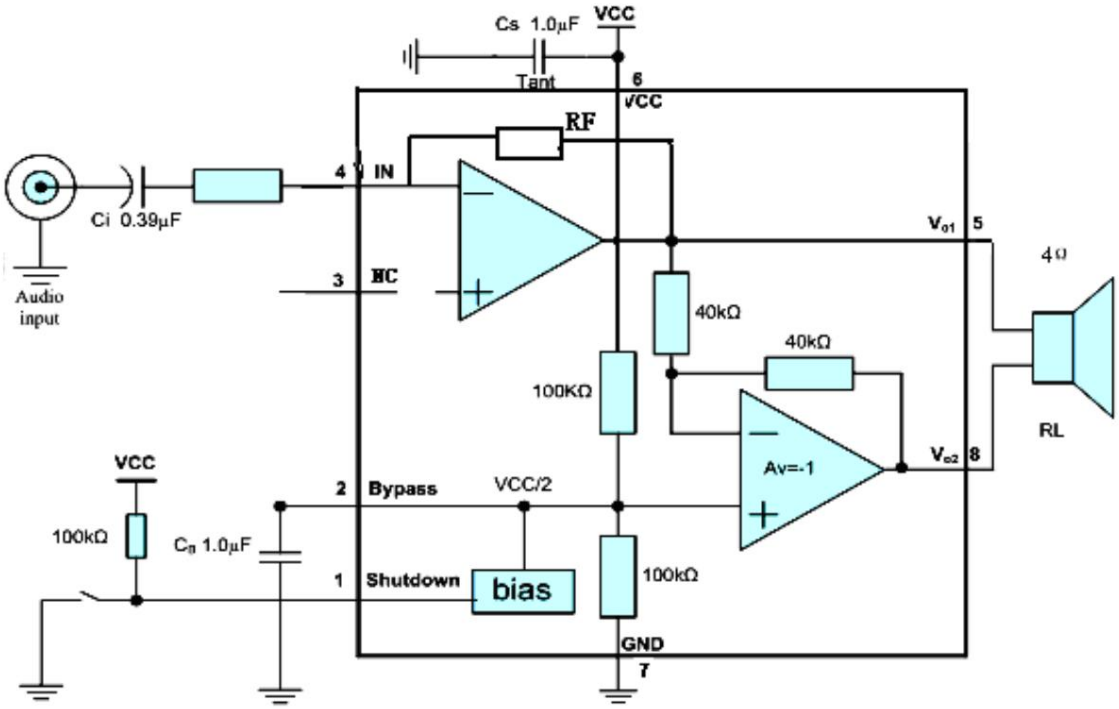


Figure 1 XPT6871 typical application circuit

Pin Map

Figure 2 XPT6871 SOP-8 package pin layout

XPT6871 pin description

pin number	symbol	describe
1	SD	Power-down control pin, active high,
2	BYP	Internal Common Mode Voltage Bypass Capacitor
3	NC	This pin is floating
4	IN	Analog input
5	VO1	Analog output 1 power
6	VDD	supply positive
7	GND	power ground
8	VO2	Analog output 2

Chip Features Description

Chip maximum limit

Table 1 The maximum physical limit value of the chip

Parameter minimum value maximum value unit description				
Power supply voltage 1.8		6.5	IN	
Storage temperature -65 Input		150	°C	
voltage -0.3 Power consumption		VDD	IN	
ESD			mW internal limit	
resistance voltage 1	3000		IN	HBM
ESD resistance voltage	250		V MM	
2 knots	150		°C typ. 150	
Recommended operating		85	°C	
temperature -40 Recommended operating voltage 2.0		6.5		
thermal resistance				
ÿJC(SOP)		35	°C/W	
ÿJA(SOP)		140	°C/W	
ÿJC(LLP)		4.3	°C/W	
ÿJA(LLP)		56	°C/W	
Soldering temperature		220	°C	within 15 seconds

Chip digital logic characteristics

Table 2 Digital logic characteristics of shutdown signal

Parameter minimum value typical value maximum value unit description					
The supply voltage is 5V					
HIV		1.5		IN	
VIL		1.3		IN	
supply voltage is 3V					
HIV		1.3		IN	
VIL		1.0		IN	
supply voltage is 2.6V					
HIV		1.2		IN	
WILL		1.0		IN	

Chip performance index

Table 3 Chip performance index 1 (VDD=5.0V, TA=25o C)

symbol	Parameter Test Condition	Minimum	Standard Value	Maximum	Unit
VDD supply voltage		2.0		6.5	V
IDD power supply quiescent current	VIN=0V, IO=0A,		6	10	mA
ISD OFF Leakage Current			0.8	2	µA
VOS output offset voltage			5.7	50	mV
RO output resistance		7	8.5	10	Kÿ
PO output power	THDÿ1%,f=1KHz RL=3ÿ RL=4ÿ RL=8ÿ		3.8 2.85 1.7		IN
	THD+N=10%,f=1KHz RL=3ÿ RL=4ÿ RL=8ÿ		4 3.1 1.8		IN
THD+N total distortion + noise	AVD=2 20Hzÿfÿ20KHz RL=4ÿÿ PO=1.6W RL=8ÿÿ PO=1W		0.1 0.2		%
PSRR power supply rejection ratio	VDDÿ4.9V to 5.1V	65	80		dB

XPT6871 Application Note

XPT6871 integrates two operational amplifiers. The gain of the first amplifier can be set by adjusting the input resistance. This amplifier has a built-in 50Kÿ feedback resistor, the latter is followed by voltage inversion, thus forming an amplified drive circuit with configurable gain differential output ÿ

External Resistor Configuration

As shown in Figure 1, the gain of the operational amplifier is determined by the external resistor Ri, and its gain is Av=2×Rf/Ri, and the chip outputs to load, bridge connection.

The bridge connection method has several advantages over single-ended output: First, it saves the external DC blocking filter capacitor. For single-ended output, if no DC blocking capacitor is connected, then There is a DC voltage at the output terminal, resulting in a DC current output after power-on, which wastes power consumption and easily damages the audio. Second, double-ended input In fact, it is a push-pull output. Under the same output voltage, the driving power is increased to 4 times that of single-ended, and the power output is large.

Chip power consumption

Power consumption is one of the key indicators for the amplifier. The maximum self-power consumption of the differential output amplifier is:

PDMAXÿ4×ÿVDDÿ2 /ÿ2×ÿ2 ×RLÿ

It must be noted that self power dissipation is a function of output power.

When designing the circuit, it is not possible to make the internal junction temperature of the chip higher than TJMAX (150o C), design according to the thermal resistance ÿJA of the chip, you can Heat dissipation is increased by dissipating the copper platinum

itself. If the chip still does not meet the requirements, you need to increase the load resistance, reduce the power supply voltage or lower the ambient temperature to solve it.

power bypass

In the application of the amplifier, the bypass design of the power supply is very important, especially for the noise performance and power supply voltage suppression performance of the application scheme. designing

It is required that the bypass capacitor should be as close as possible to the chip and the power supply pin. Typical capacitors are 10μF electrolytic capacitors with 0.1μF ceramic capacitors.

In the XPT6871 application circuit, another capacitor CB (connected to the BYP pin) is also very critical, affecting PSRR, switching/switching noise

able. Generally choose 0.1μF ~ 1μF ceramic capacitors.

SD pin working mode selection

In order to save power, the amplifier can be turned off when the amplifier is not in use. XPT6871 has a power-down control pin SD, which can control whether the amplifier is working or not.

do.

The level of the control pin must be connected to the control signal that meets the interface requirements, otherwise the chip may enter an indeterminate state. Cum on **SD** feet by applying three

In different level states, the chip enters the following three different working modes:

High level: the chip enters the power-down mode, the amplifier is turned off, there is no output signal, and the working current is less than 0.6ÿA, enter this state by selecting

state, which can effectively reduce energy consumption and achieve the purpose of saving electricity.

Low level: the chip is in normal working mode. Therefore, be sure to keep this pin low during use.

Empty: The chip is in an uncertain state, not only cannot enter the power-down mode, but its self-power consumption has not been reduced, and the purpose of power saving cannot be achieved; and it is easy to

It will cause adverse effects on the chip. Therefore, when the chip is working for a long time, do not let it be in a suspended state.

Selection of Peripheral Components

Correct selection of peripheral components can ensure the performance of the chip. Although XPT6871 can have a large margin to ensure performance, in order to ensure the overall

Individual performance also requires the correct selection of peripheral components.

The XPT6871 is unity-gain stable, so it can be used over a wide range. Usually, unity gain amplification is used to reduce THD+N, which is the largest signal-to-noise ratio

change. But this requires the maximum input voltage, and the usual audio decoder can have a voltage output of 1Vrms.

In addition, the closed-loop bandwidth must be guaranteed, and the input coupling capacitor Ci (forming a first-order high-pass) determines the low-frequency response,

Selecting an Input Coupling Capacitor

Excessive input capacitance increases cost and area, which is very unfavorable for applications with tight cost and area. Obviously, make sure to use

How much capacitance to complete the coupling is very important. In fact, in many applications, the speaker (Speaker) can not reproduce the frequency below 100Hz-150Hz

Low-frequency speech, so using a large capacitor does not improve the performance of the system.

In addition to considering the performance of the system, the suppression performance of switching/switching noise is affected by the capacitance. If the coupling capacitance is large, the delay of the feedback network

Large, resulting in pop noise, therefore, a small coupling capacitor can reduce the noise.

In addition, the size of the CB capacitor must be considered. Selecting CB=1μF, Ci=0.1μFÿ0.39μF can meet the performance of the system.

Chip packaging

SOP-8