***8W, antialiasing, 7V pressure, AB / D-channel may be with overheat protection function menu audio amplifier***



**HX8358 user manual**

## 2017 year11 monthtwenty one

## HX8358

**8 W, antialiasing, 7V pressure, AB / D-selectable, mono, audio amplifier with overheat protection function**

**8W, Anti-distortion,7V Pressure,AB / D Alternatively class, mono,Audio amplifier with overheat protection**

**Chip Function**

HX8358 Is an ultralow EMI, no need to filter, AB / Class D audio amplifier optional. 6V When the operating voltage, maximum floodingDynamic power 8W (VDD = 6V, 2Ω BTL Load, THD <10%), total harmonic distortion within the audio noise is less than 1% (20Hz ~ 20KHz);

HX8358 application circuit is simple, only a very small number of peripheral devices;

HX8358 no external output coupling capacitors or bootstrap capacitors and snubber networks;

HX8358 using ESOP8 package, especially suitable for low volume, low weight portable systems;

HX8358 by controlling the shutdown mode, thereby reducing power consumption;

Internal automatic shutdown HX8358 overheating protection mechanism;

HX8358 Stable, can be adjusted by configuring the external resistorThe voltage gain of the amplifier, and convenient.

## Chip functions Key Features

 Ultra-low EMI, high efficiency, excellent sound quality

 AB / D-switching, single-channel

 VDD = 6V, RL = 2Ω, Po = 8W, THD + N≤10% VDD = 6V, RL = 4Ω, Po = 5W, THD + N≤10%

(Antialiasing shutdown mode)

 Wide operating voltage range of 2.5V-7V

 Excellent down the POP suppression

 Package using ESOP8

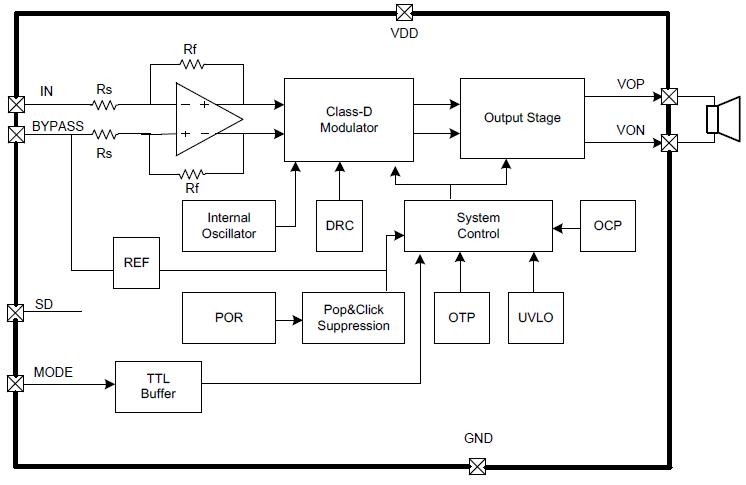
## The basic application of the chip

 Laptop computers, desktop computers

 loudspeaker

 Bluetooth Speaker

## Block diagram HX8358

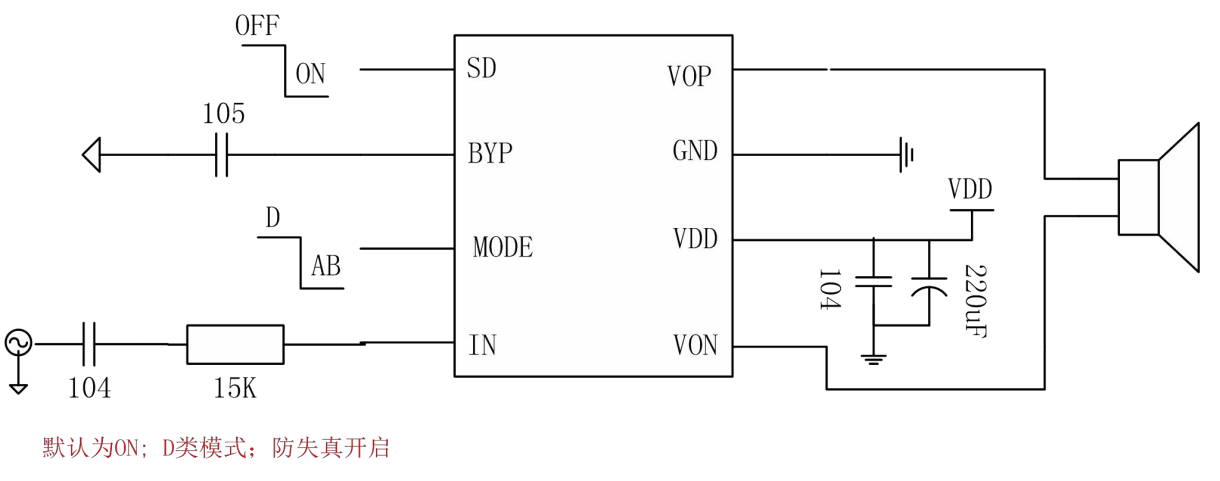


## Chip Ordering Information

Table 1 Ordering Information Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DH | Package Type | type of packaging | The minimum package quantity (PCS) | Remark |
| HX8358 | ESOP8 | Tube | 100 / tube |  |

## Typical application circuit



1 HX8358 typical application circuit in FIG.

Note: Application of the above described FIG elements:

Ci: blocking capacitor using 0.1μF or less, further eliminate click - pops and entered from an input terminal coupled noise.

Cs: power supply decoupling capacitor using the capacitor ESR is low enough (less than 1FF), when 5V VDD =, in order to better filter out low frequency noise, it is recommended plus a low ESR capacitor (not less than 10μF). Decoupling capacitors closer the VDD pin as possible, keeping it within 1.5mm.

CB : BYPASS output port VDD / 2 voltage by the capacitor CB (1FF) to ensure the stability of the ground.

## Pinout

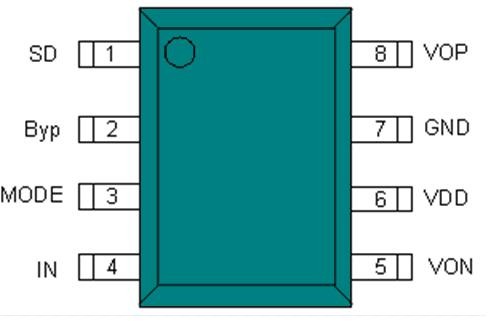


figure 2 HX8358 pin definitions

## HX8358 Pin Description

Table 2 HX8358 Pin Description

|  |  |  |
| --- | --- | --- |
| Pin Number | symbol | description |
| 1 | SD | Off control terminal, a high level is turned off, the control terminal antialiasing |
| 2 | BYP | Bias voltage output terminal |
| 3 | MODE | Operating mode control terminal, high selects the D, the low level selection class AB |
| 4 | IN | Audio input |
| 5 | VON | Negative-phase output terminal |
| 6 | VDD | power supply |
| 7 | GND | Ground |
| 8 | VOP | The positive-phase output terminal |

## Chip Feature Description

### Chip maximum limit

table 3 Chip maximum physical limit

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| parameter | Minimum | Maximum | unit | Explanation |
| voltage | 2.5 | 7 | V |  |
| Storage temperature | -65 | 150 | oC |  |
| Input voltage | -0.3 | VDD | V |  |
| ESD voltage resistance 1 | 2000 |  | V | HBM |
| ESD voltage resistance 2 | 250 |  | V | MM |
| Thermostat | 150 |  | oC | Typ 150 |
| Recommended operating temperature | -40 | 85 | oC |  |
| Recommended operating voltage | 2.5 | 6.0 | V |  |
| Thermal Resistance | | | | |
| JC (SOP) |  | 35 | oC / W |  |
| JA (SOP) |  | 140 | oC / W |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| parameter | Minimum | Maximum | unit | Explanation |
| Welding temperature |  | 220 | oC | 15 seconds |

### Characteristics of digital logic chips

Table D-4 AB mode digital logic signal characteristic of the control pin /

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **parameter** | **Minimum** | **Typical values** | **Maximum** | **unit** | **Explanation** |
| 5V power supply | | | | | |
| VIH |  | 1.8 |  | V |  |
| VIL |  | 1.4 |  | V |  |

table 5 Digital logic off signal characteristic

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **parameter** | **Minimum** | **Typical values** | **Maximum** | **unit** | **Explanation** |
| 5V power supply | | | | | |
| VIH |  | 1.6 |  | V |  |
| VIL |  | 1.3 |  | V |  |

### Performance characteristics of the chip

Table 6 Electrical Characteristics Table chip HX8358

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Chip features TA = 25 ° C (Unless otherwise noted)** | | | | | | | |
| **symbol** | **parameter** | **Test Conditions** | **mostSmall value** | **Typical values** | | **mostGreat value** | **unit** |
| Class AB | Class D |
| VDD | Input voltage range |  | 2.5 | 6.0 | | 6.5 | V |
| Vout | Output voltage range |  |  |  |  | 6.5 | V |
| Vuvlo | Hysteresis starting voltage VDD |  | 2.5 |  |  |  | V |
| fosc | Oscillator frequency |  |  |  | 300 |  | KHz |
| Rdson | On-resistance | VDD = 5V |  | 120 | |  | mΩ |
| I (Q) | Quiescent Current | VDD = 5V, no load |  | 6 | 5 |  | mA |
| I (SD) | Off current | V (OFF) = 2.5V, VDD = 2.5V to 5.0V |  | 5 | |  | μA |
| VOS | Output offset voltage | VIN = 0V |  | 10 | 10 |  | mV |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Chip features TA = 25 ° C (Unless otherwise noted)** | | | | | | | | |
| **symbol** | **parameter** | **Test Conditions** | | **mostSmall value** | **standard value** | | **mostGreat value** | **unit** |
| **Class AB** | **Class D** |
| Po | Output Power | THD + N = 10%, f = 1kHz, RL = 2Ω | 6V |  | 8 | 8 |  | W |
| THD + N = 10%, f = 1kHz, RL = 2Ω | 5V |  | 5.2 | 5.5 | . |
| THD + N = 1%, f = 1kHz, RL = 2Ω |  | 3.5 | 3.5 |  |
| THD + N = 10%, f = 1kHz, RL = 4Ω |  | 3.2 | 3.2 |  |
| THD + N = 1%, f = 1kHz, RL = 4Ω |  | 2.5 | 2.2 |  |
| THD + N = 10%, f = 1kHz, RL = 4Ω | 3.7V |  | 1.8 | 1.8 |  |
| THD + N = 1%, f = 1kHz, RL = 4Ω |  | 1.4 | 1.4 |  |
| THD + N | Total harmonic distortion and noise | VDD = 5V, PO = 1W, RL = 4Ω, f = 1kHz | |  | 0.03 | 0.03 |  | % |

## HX8358 Application Notes

#### Anti-aliasing

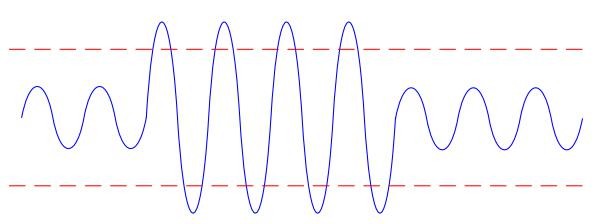
HX8358 With anti-aliasing. throughLiveSD pin is set to enter the anti-aliasing mode. Automatic cut the top output amplifier distortion detection, automatically adjusting the gain of the amplifier, to achieve the effect of preventing distortion. As shown below:

image 3 An audio output signal when the power source voltage is not restricted

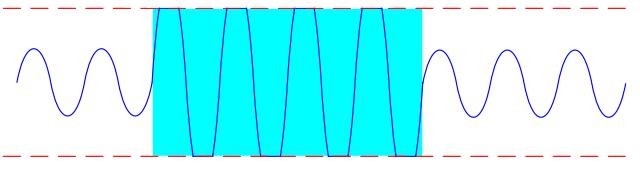


Figure 4 Audio output signal in the normal operation mode

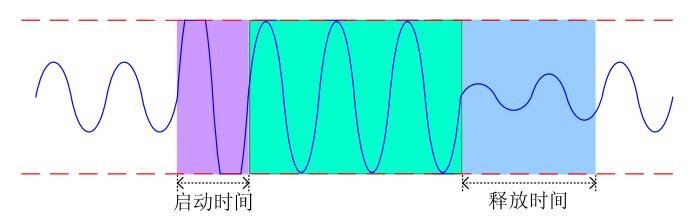
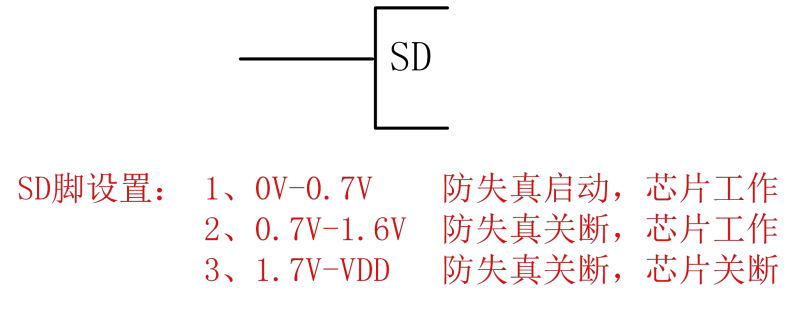


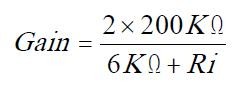
Figure 5 The audio output signal at the operating mode antialiasing

SD set foot in three modes:



#### Input resistance (Ri)

HX8358Is provided with two internal amplification, the first stage gain can be configured using an external resistor, and the second gain stage is internally fixed. throughSelecting a parameter value input resistance of the amplifier gain can be configured:

 Balance (1) and the feedback output depends on the impedance matching circuit, CMRR, PSRR and to eliminate the second harmonic distortion can be optimized.

Thus with a precision offor 1% resistor optimization effect is more significant.in PCB When the layout, input resistance should be as close to the input pin of the chipBetter signal to noise ratio and the effect of higher input impedance. Low gain and high voltage signal may cause more prominent chip performance.

#### Decoupling capacitors Cs

Application of the amplifier, the bypass power supply design is very important, especially for noise performance and the power supply voltage ripple suppression performance applications.

HX8358It is a high-performance audio power amplifier, proper power supply decoupling to ensure its high efficiency and low harmonic distortion. DecouplingLow impedance capacitance ceramic capacitors, chip power supply pin as close as possible, since any circuit resistance, capacitance and inductance may affect the power conversion efficiency. One 220uFOr larger capacitor disposed in the vicinity of the power supply will be better filtering effect. Typical capacitancefor 220uF And the electrolytic capacitor 1uF Ceramic capacitors.

#### Input capacitance Ci

HX8358 used in the single-ended input system, the input terminal is a high-pass filter, the input capacitance is required. As a high-pass filter input,

Filter cutoff frequency is calculated as follows:

*f* = 1

*c* 2*pRiCi*

(2)

Input resistance and the input capacitance of the parameters directly influence the lower limit frequency of the filter, thus affecting the performance of the amplifier. Input capacitance is calculated as follows:

1

*Ci*= (3)

2*pRifc*

If the input signal frequency within the audio range, the accuracy of the input capacitance may be± 10% or higher, because the capacitor mismatch can affect the performance of the filter.

Excessive input capacitance, increased costs, increase the area, which for cost, in terms of area-constrained applications, very negative. Obviously, determine theHow much the capacitive coupling is done is very important. Indeed, in many applications, a speaker (Speaker) can be reproduced not less than 100Hz-150Hz bass voice, so a large capacitance is not able to improve system performance.

In addition to system cost and size, noise performance is the input coupling capacitor affects the size, a large input coupling capacitor requires more chargeIn the power supply voltage reaches the midpoint quiescent DC voltage (i.e., generally 1 / 2VDD), the charge output from the feedback, often generated when the device is enablednoisesound. Thus, based on the desired low frequency response of the input capacitance to minimize, the noise can be minimized open.

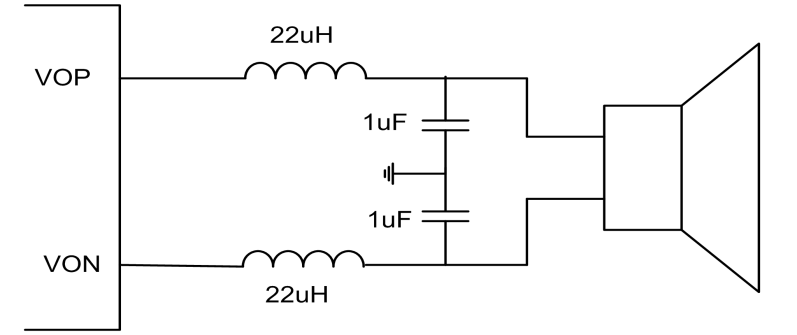
#### Bypass capacitor (CBYP)

In HX8358 application circuit, a further capacitor CB (BYP pin connection) is very critical, CB affect PSRR, the switch / switching noise performance. Usually ceramic capacitors of 0.1uF ~ 1uF.

In addition to minimizing the size of the input and output capacitors, the size of the bypass capacitor should also be considered in detail. Bypass capacitorCB is turned on to minimize the noise the most important components, the speed of which determines the opening and the output DC voltage reaches a static (i.e., the midpoint voltage supply typically 1 / 2VDD) of the process, the process is slow, the smaller the opening noise. 1.0uF selected CB and a small Ci (in 0.033uF ~ 0.1uF) will substantially achieve shutdown without noise. The device is functioning properly (without oscillation or crackling) and CB is 0.1uF, the device will be more affected by noise open. Therefore, in all but the most cost sensitive designs recommended 1.0uF or larger CB.

#### The filter HX8358

In the case that the output of the filter withoutuse HX8358, the length of the connection to the speaker amplifier is generally 100mmthe following. In mobile phonesPortable communication device applications, can not have an output filter. In certain environmental conditions and does not allow some special cases, the output of the low pass filter to be added, such as LC filter.



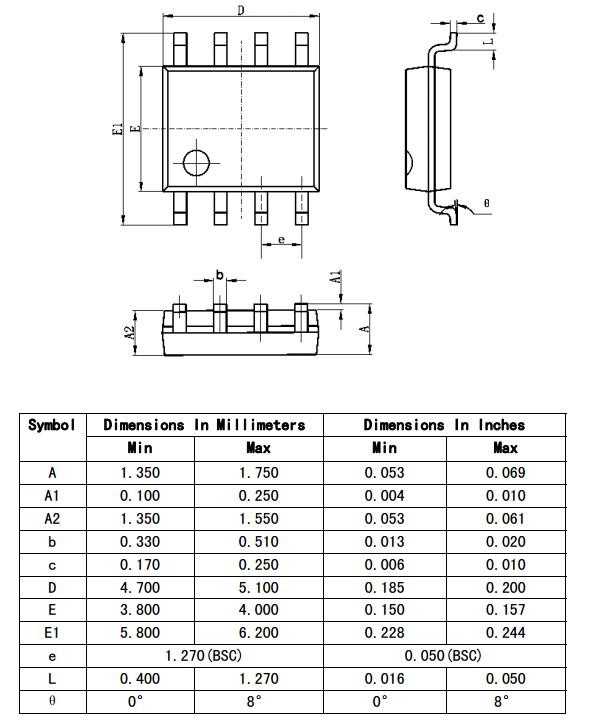
Typical output LC filter 4 application circuit in FIG. (Cut-off frequency of 27KHz)

#### Protection Mode Overview

HX8358 is a class AB / D audio power amplifier, built-in overheat protection. Effectively protect the chip from damage during abnormal operating conditions.

## Package size

ESOP8



#### When the contents of this manual and the updated version will change without notice, All Rights Reserved.