

MIX3063

2.5W 带耳机输出的立体声 AB 类音频功率放大器

描述

MIX3063是一颗带耳机输出功能的立体声AB类音频功率放大器。在5V电源供电, THD+N=10%, 4欧姆负载上可以输出每通道2.5W的功率。另外, MIX3063可以工作在单端输出模式, 驱动立体声耳机。

MIX3063优异的噪声和THD指标可以提供高品质的音频信号放大。极少的外围元件就能提供芯片稳定工作, 大大减少了PCB面积并降低成本。

MIX3063具有关断功能, 极大的延长系统的待机时间。过热保护功能增强系统的可靠性。POP声抑制功能改善了系统的听觉感受, 同时简化系统调试。

特性

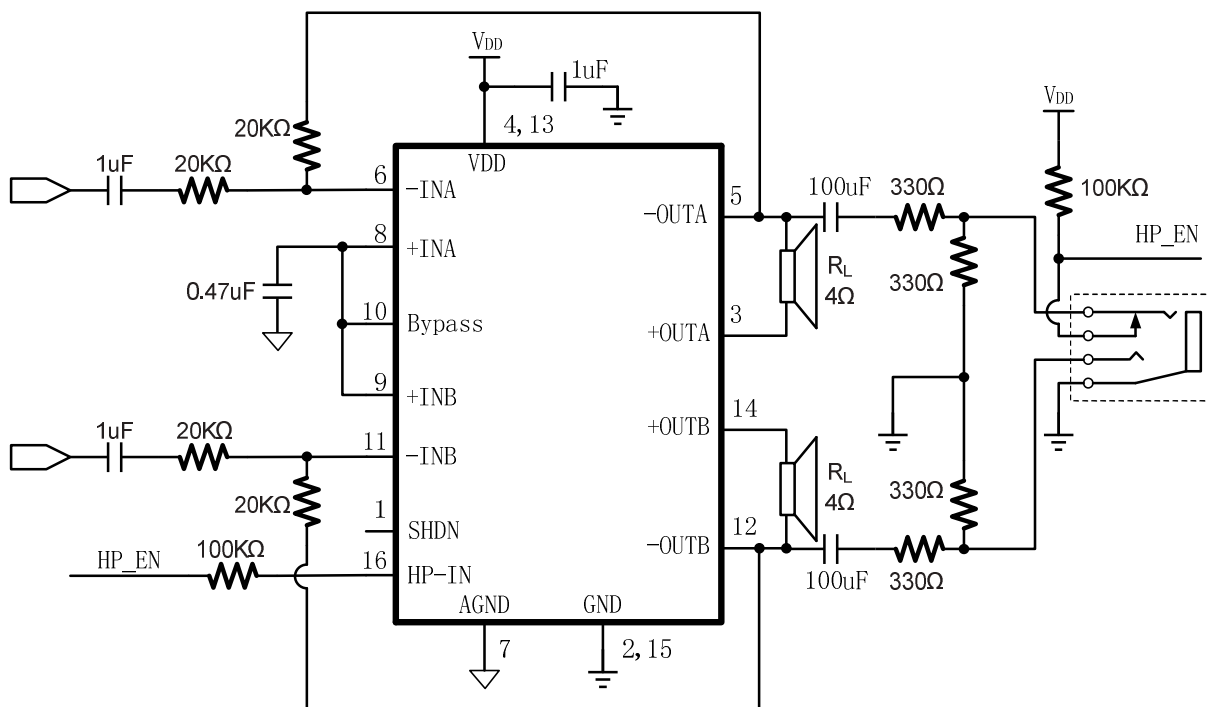
- ◆ 输出功率:
– 2.5W/ch ($V_{DD}=5.0V$, $R_L=4\Omega$, THD+N=10%)
- ◆ 工作电压: 2V to 5.0V
- ◆ 低失真和低噪声
- ◆ 耳机输出功能
- ◆ 开机POP声抑制功能
- ◆ 关机电流: 0.7uA
- ◆ 过热保护功能

Applications

- ◆ 便携式DVD
- ◆ 笔记本电脑
- ◆ 插卡音箱 / USB音箱
- ◆ 液晶电视 / 液晶显示器

MIX3063目前提供SOP-16无铅封装。

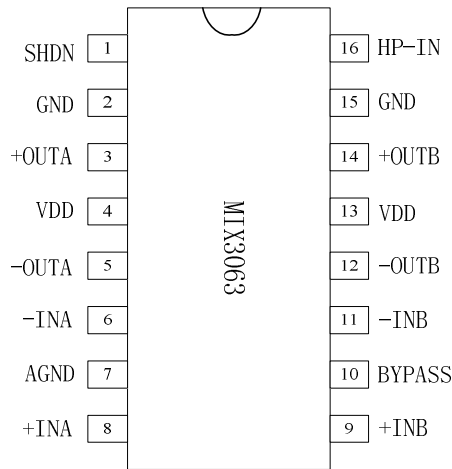
典型应用线路



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管脚排列



管脚描述

Name	in No.	I/O	Pin Description
1	SHDN	I	关断（高电平芯片关断，低电平芯片工作）
2,15	GND		功率地
3	+OUTA	O	A 声道正输出端
4,13	VDD		电源
5	-OUTA	O	A 声道负输出
6	-INA	I	A 声道负输入端
7	AGND		模拟地
8	+INA	I	A 声道正输入端
9	+INB	I	B 声道正输入端
10	Bypass	I	旁路去耦
11	-INB	I	B 声道负输入端
12	-OUTB	O	B 声道负输出端
14	+OUTB	O	B 声道正输出端
16	HP-IN	I	耳机切换（高电平为耳机输出，低电平驱动扬声器工作）

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采购信息

Order Number	Package Type	Marking	Packing
MIX3063	SOP-16	MIX3063 XXXXXXX	Reel Tape
			Tube

绝对最大额定值

V _{DD}	供电电压	-0.3V to 5V
V _I	输入电压	-0.3V to V _{DD} +0.3V
T _A	工作温度	-40°C to 85°C
T _J	结温	-40°C to 125°C
T _{STG}	储存温度	-65°C to 150°C
T _{SLD}	焊接温度	300°C, 5sec

推荐额定值

			MIN	MAX	UNIT
V _{DD}	供电电压	AVDD, PVDD	2.0	5.0	V
V _{IH}	SHDN 高电平	V _{DD} =5.0V	1.2		V
V _{IL}	SHDN 低电平	V _{DD} =5.0V		0.3	
V _{IH}	耳机输入高电平	V _{DD} =5.0V	4		V
V _{IL}	耳机输入低电平	V _{DD} =5.0V		0.8	

热阻参数

Parameter	Symbol	Package	MAX	UNIT
热阻(Junction to Ambient)	θ_{JA}	SOP-16	110	°C/W
热阻(Junction to Case)	θ_{JC}	SOP-16	23	°C/W

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电性参数 ($V_{DD}=5V$, Gain=6dB, $R_L=8\Omega$, $T=25^\circ C$, unless otherwise noted.)

Symbol	Parameter	Test Conditions		MIN	TYP	MAX	UNIT
V_{IN}	Supply Power			2		5.0	V
Po-BTL	Output Power in BTL Mode	THD+N=1%,f=1KHZ, $R_L=4\Omega$	$V_{DD}=5.0V$		2		W
			$V_{DD}=3.6V$		1.05		
		THD+N=10%,f=1KHZ, $R_L=4\Omega$	$V_{DD}=5.0V$		2.55		W
			$V_{DD}=3.6V$		1.32		
		THD+N=1%,f=1KHZ, $R_L=8\Omega$	$V_{DD}=5.0V$		1.35		W
			$V_{DD}=3.6V$		0.72		
		THD+N=10%,f=1KHZ, $R_L=8\Omega$	$V_{DD}=5.0V$		1.63		W
			$V_{DD}=3.6V$		0.85		
Po-SE	Earphone Output Power	THD+N=1%,f=1KHZ, $R_L=16\Omega$	$V_{DD}=5.0V$		170		mW
		THD+N=1%,f=1KHZ, $R_L=32\Omega$	$V_{DD}=5.0V$		90		
THD+N	Total Harmonic Distortion Plus Noise	$V_{DD}=5V$, $P_O=1W$, $R_L=4\Omega$	f=1KHz		0.3		%
		$V_{DD}=5.0V$, $P_O=0.5W$, $R_L=8\Omega$			0.05		
PSRR	Power Supply Ripple Rejection	$V_{DD}=5.0V$, Inputs ac-grounded with $C_{IN}=1\mu F$, AV=6dB	f=1KHz		60		dB
C_S	Crosstalk	AV=6dB	f=1KHz		85		dB
SNR	Signal-to-Noise Ratio	$V_{DD}=5.0V$, $V_{rms}=1V$, AV=6dB	f=1KHz		-95		dB
V_n	Output Noise	$V_{DD}=5.0V$, Input AC-GND with $C_{IN}=1\mu F$, AV=6dB	A-weighting		25		μV
			No A-weighting		33		
Dyn	Dynamic range	$V_{DD}=5.0V$, THD=1%, AV=6dB	f=1KHz		-100.		dB
I_{BTL}	Quiescent Current in BTL Mode	$V_{DD}=5.0V$	No Load		3.6		mA
		$V_{DD}=3.6V$			2.6		
I_{SE}	Quiescent Current in SE Mode	$V_{DD}=5.0V$, VHP-IN=5V	No Load		2		mA
I_{SD}	Shutdown Current	$V_{DD}=5V$	$V_{SD}=5V$		0.6	1	μA
V_{OS}	Output Offset Voltage	$V_{IN}=0V$, $V_{DD}=5V$			20		mV
Tst	setup time	Bypass capacitor =0.1uF			60		mS

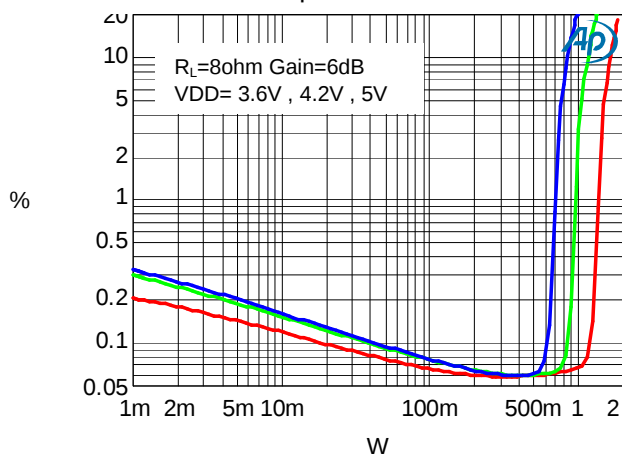
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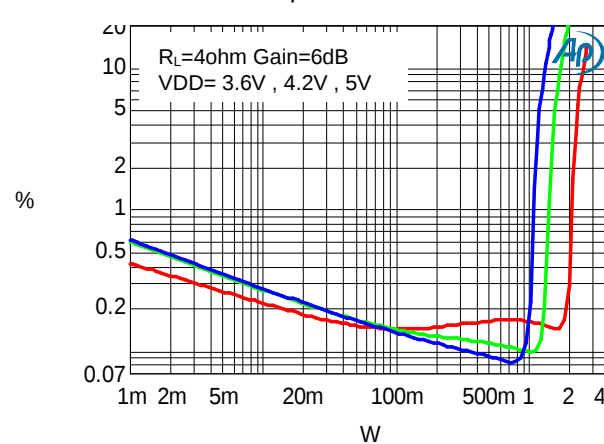
典型工作曲线

(VDD = 5V, Gain=6dB, $R_L = 4\Omega$, T = 25°C, unless otherwise noted.)

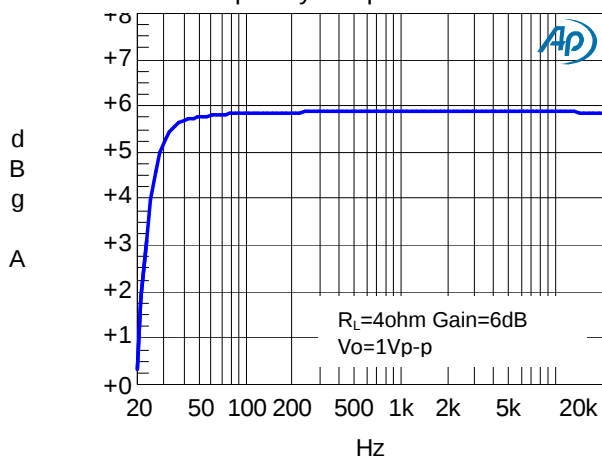
THD+N vs Output Power – BTL



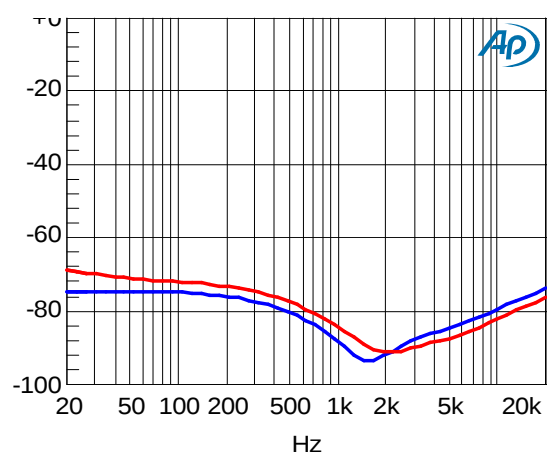
THD+N vs Output Power – BTL



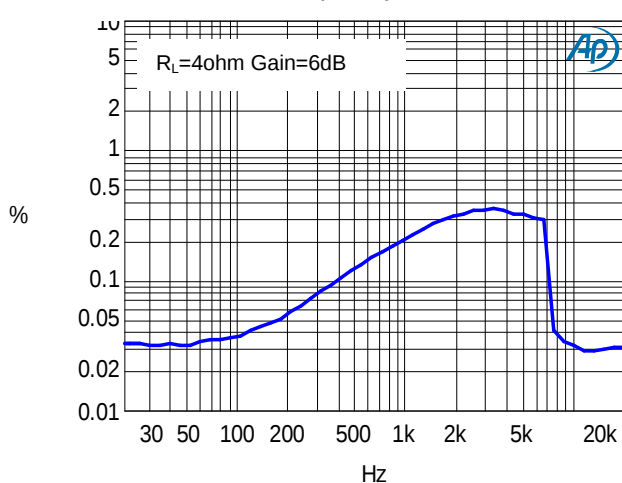
Frequency Response – BTL



Cross-Talk – BTL



THD+N vs Frequency – BTL



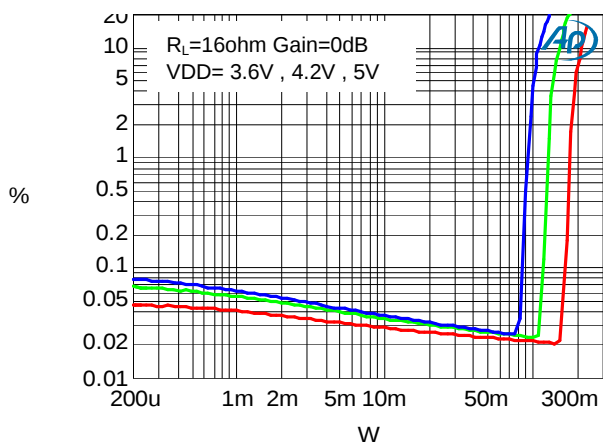
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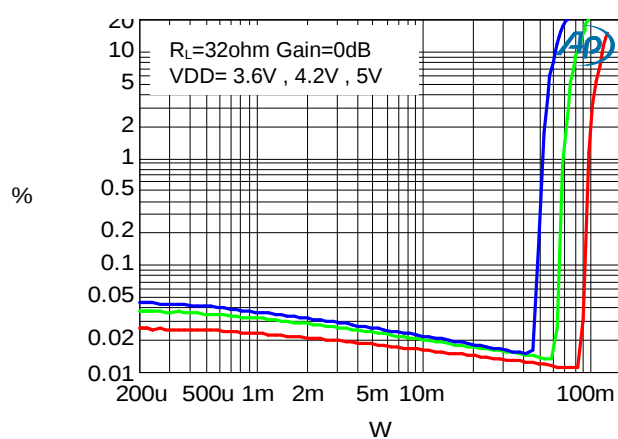
典型工作曲线

(VDD =5V, Gain=0dB, $R_L=16\Omega$, T =25°C, unless otherwise noted.)

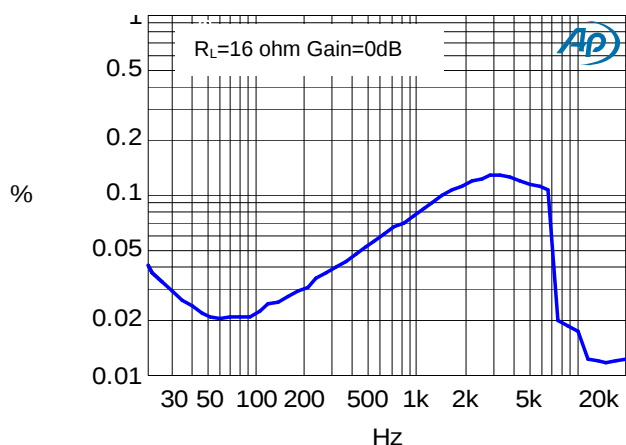
THD+N vs Output Power—SE



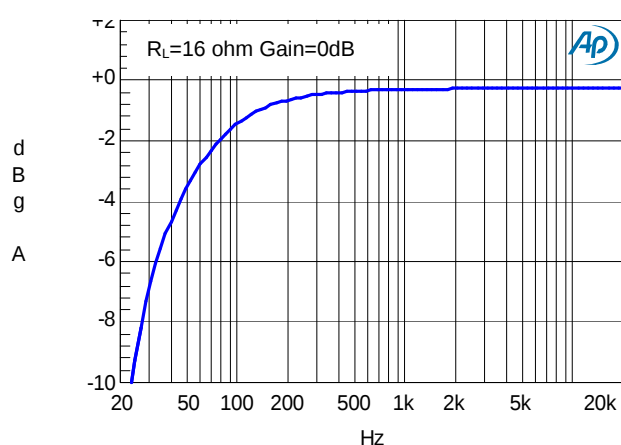
THD+N vs Output Power—SE



THD+N vs Frequency—SE



Frequency Response—SE



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应用信息

关断功能

MIX3063 具有关断功能。在关断情况下，系统待机电流非常小，大大提高了系统的待机时间。当 SHDN 管脚为“L”，芯片正常工作，当 SHDN 管脚为“H”，芯片在关断状态。SHDN 管脚也可以悬空，芯片内部有下拉电阻，默认在芯片工作的状态。

音频增益 (Gain)

MIX3063 是典型的 AB 类功率放大器，它的音频增益由反馈电阻和输入电阻之间的比值来决定。公式如下：

$$\text{Gain} = 2 \times \frac{R_f}{R_i} \left(\frac{V}{V} \right)$$

这里注意，有一个 2 倍的系数。因为 MIX3063 是一颗 BTL 架构的音频功放，输出信号的幅度是单端输出音频功放的 2 倍。

输入电容电阻选择

MIX3063 的输入电阻和输入电容组成一个高通滤波器，它会把低于转折频率的信号以 20dB 每倍频程的斜率衰减。转折频率的计算公式如下：

$$f_c = \frac{1}{2\pi R_i C_i}$$

这里的 R_i 就是输入电阻， C_i 就是输入电容。通常选择 R_i 在几十千欧姆量级，电容 C_i 在微法量级。这样得到几百赫兹的转折频率，电容和电阻的取值也会比较合理，成本也不会太高。

过热保护

MIX3063 内部自带过热保护功能，当芯片由于不正常的應用造成长期大电流输出，芯片就会发热。当芯片内部温度过高的时候，芯片会自动关闭输出，等到温度下降至安全范围，芯片又会恢复正常工作。

旁路电容 (Cbyp)

MIX3063 的旁路电容在芯片正常工作时，为正输入端提供一个 $V_{DD}/2$ 的偏置。同时这个电容也会影响芯片的启动时间，合适的启动时间可以大大降低开机下的 POP 声。建议的旁路电容值要大于 0.1uF。旁路电容大小和启动时间的关系如下表：

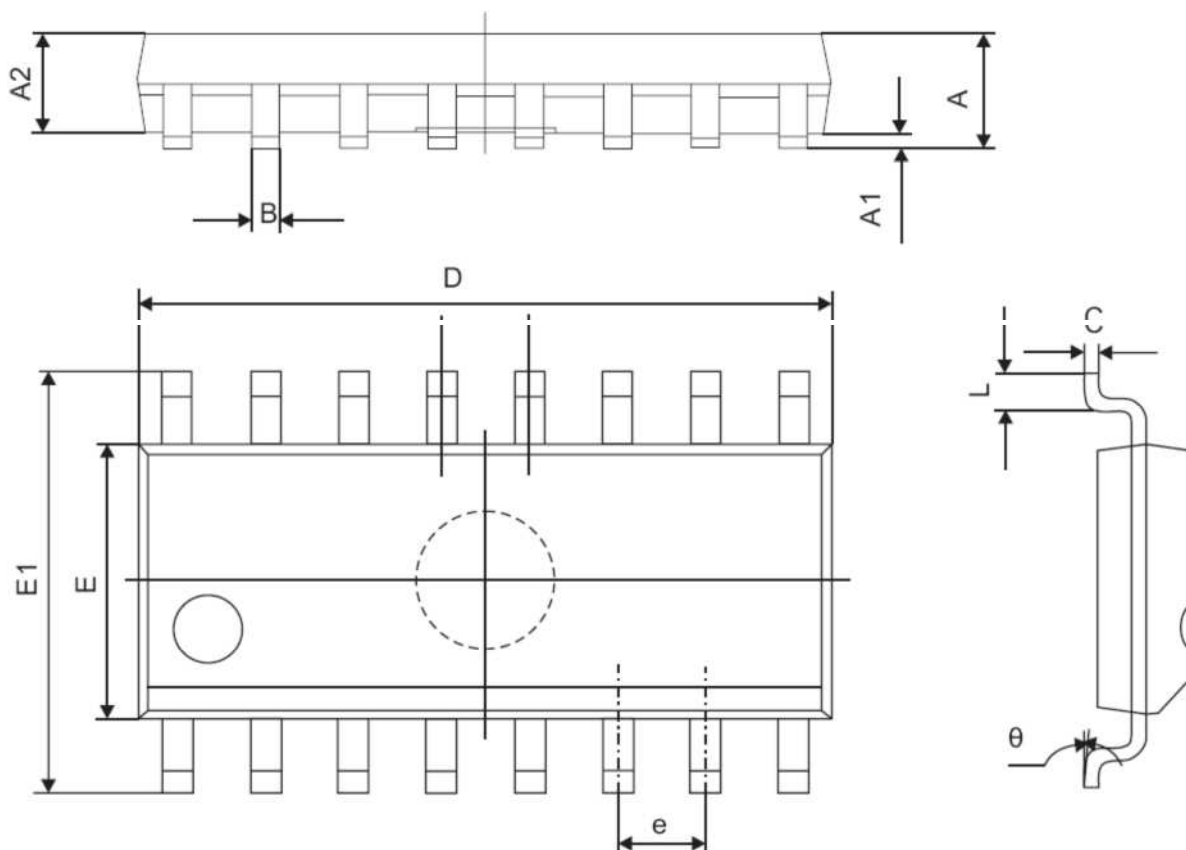
Cbyp	TON
0.1uF	60mS
0.47uF	220mS
1uF	450mS

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Outline Dimension

SOP-16



Symbol	Dimensions Millimeters	
	Min	Max
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
B	0.330	0.510
C	0.190	0.250
D	9.800	10.000
E	3.800	4.000
E1	5.800	6.300
e	1.270(TYP)	
L	0.400	1.270
θ	0°	8°

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