

MIX2808

13W 单声道 F 类音频放大器



描述

MIX2808是一款高效率、无滤波器13W单声道F类音频功率放大器。

MIX2808的差分输入架构和极高的PSRR有效地提高了MIX2808对RF噪声的抑制能力。无需滤波器的PWM调制结构及增益内置方式减少了外部元件、PCB面积和系统成本,并简化了设计。高达90%的效率,快速启动时间和纤小的封装尺寸使得MIX2808成为蓝牙音箱和其他便携式音频产品的最佳选择。

MIX2808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。

MIX2808提供ESOP8封装

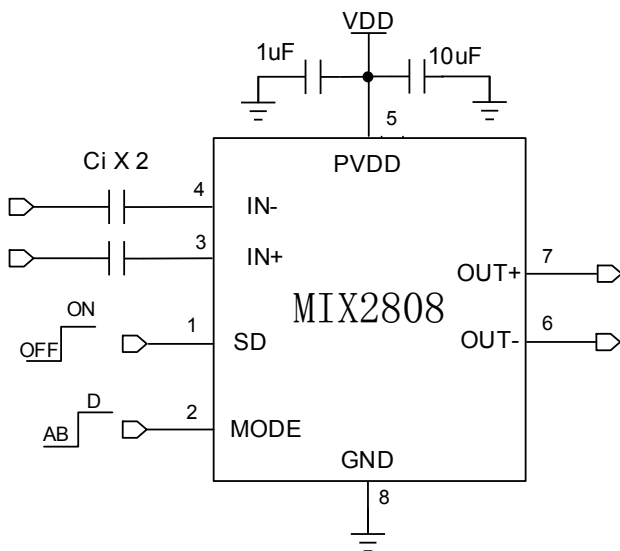
特性

- D类输出功率:
 - 13W (VDD=8.0V, RL =2 Ω, THD+N=10%)
 - 8.5W (VDD=8.0V, RL =4 Ω, THD+N=10%)
- F类输出功率:
 - 13W (VDD=8.0V, RL =2 Ω, THD+N=10%)
 - 8.5W (VDD=8.0V, RL =4 Ω, THD+N=10%)
- 工作电压 : 3.0V to 8.0V (4 Ω负载)
3.0V to 7.8V (2 Ω负载)
- 低失真和低噪声
- 开机POP声抑制功能
- 关机电流小于1uA
- 过热保护功能

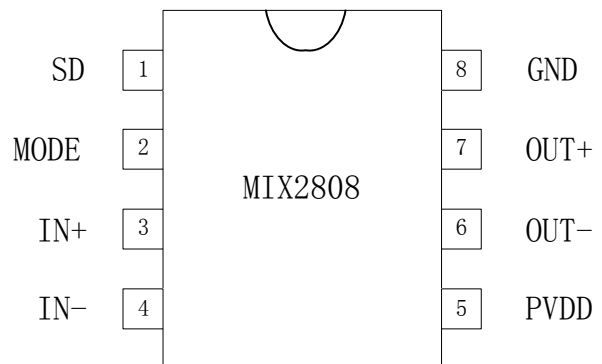
应用

- 蓝牙音箱 / 插卡音响
- 背包音箱 / 对箱

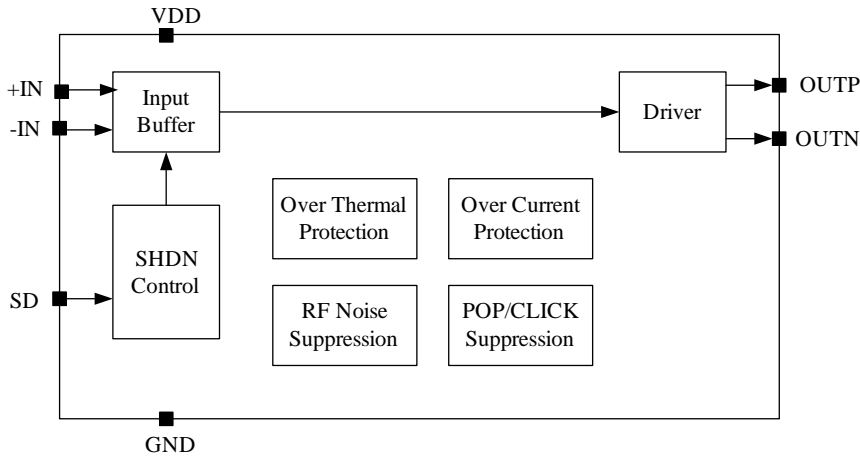
典型应用电路图



引脚排列



功能框图



管脚描述

管脚	符号	I/O	描述
1	SD	I	系统关断控制（高电平芯片工作，低电平关机）
2	MODE	I	模式选择（高电平工作在 D 类，低电平为 F 类）
3	+IN	I	音频正输入端
4	-IN	I	音频负输入端
5	PVDD	O	功率电源
6	OUT-		音频负输出端
7	OUT+		音频正输出端
8	GND	O	功率地线
9	GND		芯片底部散热片

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订货信息

料号	封装	表面印字	包装
MIX2808	ESOP8	MIX2808 XXXXXXX	2500 颗/卷

绝对最大额定值

V_{DD}	供电电压	-0.3V to 8.2V
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	4欧姆负载	3.0	8.0	V
V_{DD}	供电电压	2欧姆负载	3.0	7.8	V
V_{IH}	SD/MODE 高电平	$V_{DD}=5.0V$	1.6		V
V_{IL}	SD/MODE 低电平	$V_{DD}=5.0V$		0.4	V

热阻参数

Parameter	Symbol	Package	MAX	UNIT
热阻(Junction to Ambient)	θ_{JA}	ESOP8	90	°C/W
热阻(Junction to Case)	θ_{Jc}	ESOP8	11	°C/W

D MODE Electrical Characteristics

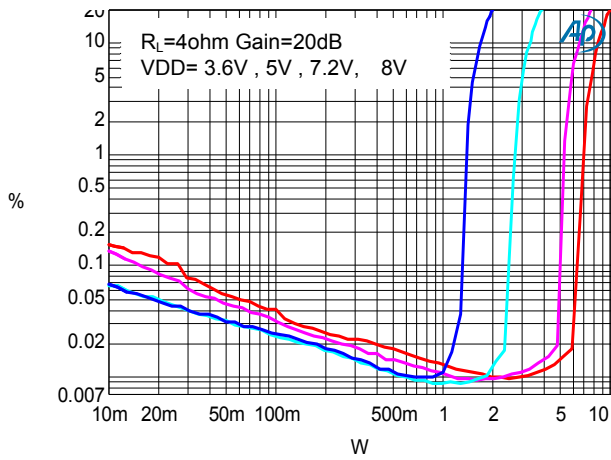
(VDD =5V, Gain=20dB, RL =4Ω, T =25°C, unless otherwise noted.)

Symbol	Parameter	Test Conditions	MIN	TYP	MAX	UNIT
V _{IN}	Supply Voltage	R _L =4 Ω	3.0	-	8.0	V
V _{IN}	Supply Voltage	R _L =2 Ω	3.0	-	7.8	V
P _O	Output Power	THD+N=10%,f=1KHZ,R _L =4 Ω	V _{DD} =7.2V	6.5		W
			V _{DD} =5.0V	3.2		
			V _{DD} =3.6V	1.65		
		THD+N=1%,f=1KHZ,R _L =4 Ω	V _{DD} =7.2V	5.2		W
			V _{DD} =5.0V	2.6		
			V _{DD} =3.6V	1.3		
		THD+N=10%,f=1KHZ,R _L =2 Ω	V _{DD} =7.2V	10.5		W
			V _{DD} =5.0V	5.3		
			V _{DD} =3.6V	2.7		
		THD+N=1%,f=1KHZ,R _L =2 Ω	V _{DD} =7.2V	8.5		W
			V _{DD} =5.0V	4.2		
			V _{DD} =3.6V	2.1		
THD+N	Total Harmonic Distortion Plus Noise	V _{DD} =7.2V, P _O =1W, R _L =4 Ω	f=1KHz	0.02		%
		V _{DD} =5V, P _O =1W, R _L =4 Ω		0.02		
		V _{DD} =3.6V, P _O =1W, R _L =4 Ω		0.05		
		V _{DD} =7.2V, P _O =2W, R _L =2 Ω	f=1KHz	0.02		%
		V _{DD} =5.0V, P _O =2W, R _L =2 Ω		0.02		
		V _{DD} =3.6V, P _O =2W, R _L =2 Ω		0.1		
G _V	Gain	R _i = 47K		20.5		dB
PSRR	Power Supply Ripple Rejection	V _{DD} =5V±200mVp-p	f=1KHz	50		dB
SNR	Signal-to-Noise Ratio	V _{DD} =8.0V, V _{o rms} =5.1V, G _V =20dB	f=1KHz	-92		dB
V _n	Output Noise	V _{DD} =5.0V, Input floating with C _{IN} =0.1μF	A-weighting	100		μV
			No A-weighting	150		
Dyn	Dynamic Range	V _{DD} =8.0V, THD=1%	f=1KHz	-90		dB
I _Q	Quiescent Current	V _{DD} =8.0V	No Load	25		mA
		V _{DD} =5.0V		10		
I _{SD}	Shutdown Current	V _{DD} =3V to 8V	V _{SD} =0V		10	μA
V _{OS}	Offset Voltage	V _{IN} =0V, V _{DD} =5V		25		mV
F _{OSC}	Oscillator Frequency			360		khz
T _{ST}	Setup Time	Bypass capacitor =1uF		300		mS
OTP	—	No Load, Junction Temperature	V _{DD} =5.0V	160		°C
OTH	—			40		

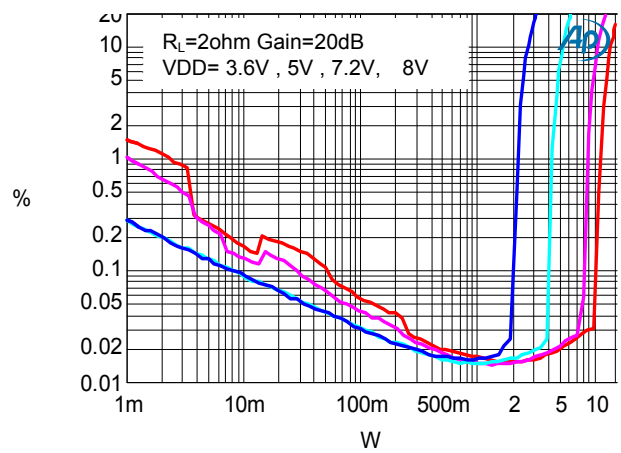
Typical Operating Characteristics

(VDD =5V, Gain=20dB, $R_L = 4\Omega$, T =25°C, unless otherwise noted.)

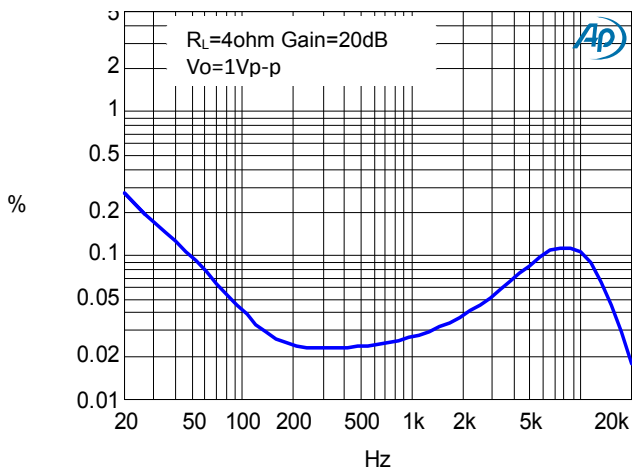
THD+N vs Output Power



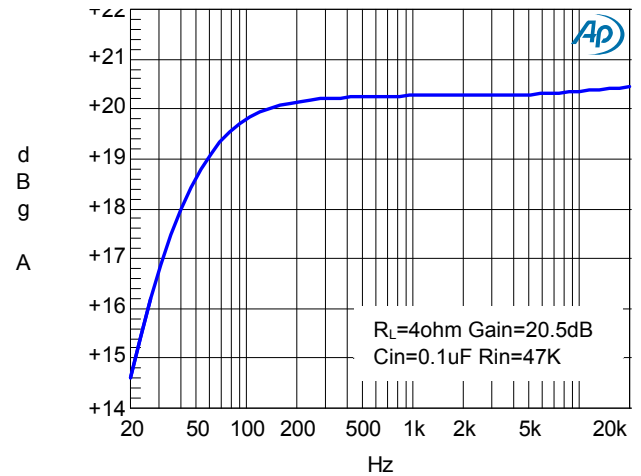
THD+N vs Output Power



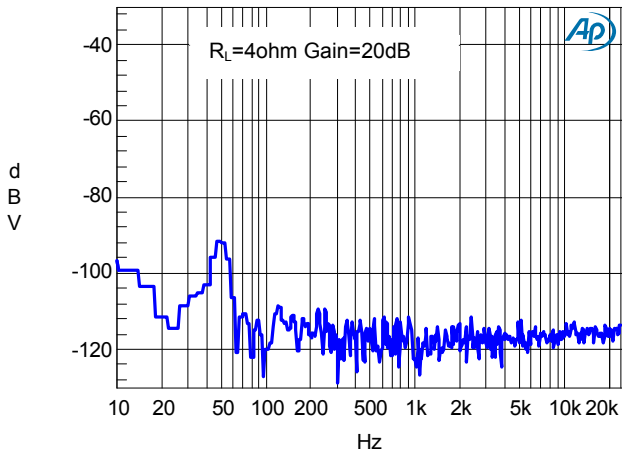
THD+N VS FREQUENCY



Frequency Response



NOISE FLOOR FFT



Electrical Characteristics

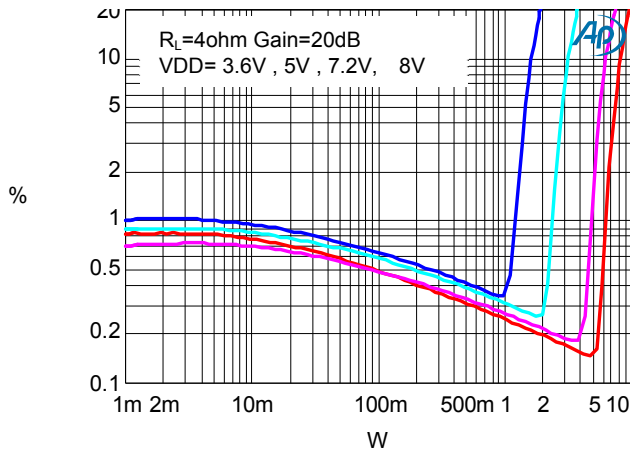
(V_{DD} = 5V, Gain=20dB, R_L = 4Ω, T = 25°C, unless otherwise noted.)

Symbol	Parameter	Test Conditions	MIN	TYP	MAX	UNIT
V _{IN}	Supply Voltage	R _L =4 Ω	3.0	-	8.0	V
V _{IN}	Supply Voltage	R _L =2 Ω	3.0	-	7.8	V
P _O	Output Power	THD+N=10%,f=1KHZ,R _L =4 Ω	V _{DD} =7.2V	6.3		W
			V _{DD} =5.0V	3.2		
			V _{DD} =3.6V	1.6		
		THD+N=1%,f=1KHZ,R _L =4 Ω	V _{DD} =7.2V	5.0		W
			V _{DD} =5.0V	2.5		
			V _{DD} =3.6V	1.3		
		THD+N=10%,f=1KHZ,R _L =2 Ω	V _{DD} =7.2V	10.0		W
			V _{DD} =5.0V	5.0		
			V _{DD} =3.6V	2.6		
		THD+N=1%,f=1KHZ,R _L =2 Ω	V _{DD} =7.2V	8.1		W
			V _{DD} =5.0V	4.0		
			V _{DD} =3.6V	2.1		
THD+N	Total Harmonic Distortion Plus Noise	V _{DD} =7.2V, P _O =1W, R _L =4 Ω	f=1KHz	0.3		%
		V _{DD} =5V, P _O =1W, R _L =4 Ω		0.3		
		V _{DD} =3.6V, P _O =1W, R _L =4 Ω		0.5		
		V _{DD} =7.2V, P _O =2W, R _L =2 Ω	f=1KHz	0.3		%
		V _{DD} =5.0V, P _O =2W, R _L =2 Ω		0.4		
		V _{DD} =3.6V, P _O =2W, R _L =2 Ω		0.5		
G _V	Gain	R _i = 47K		20.5		dB
PSRR	Power Supply Ripple Rejection	V _{DD} =5V ± 200mVp-p	f=1KHz	50		dB
SNR	Signal-to-Noise Ratio	V _{DD} =8.0V, V _{o rms} =5.1V, G _V =20dB	f=1KHz	-92		dB
V _n	Output Noise	V _{DD} =5.0V, Input floating with C _{IN} =0.1μF	A-weighting	100		μV
			No A-weighting	150		
Dyn	Dynamic Range	V _{DD} =8.0V, THD=1%	f=1KHz	-90		dB
I _Q	Quiescent Current	V _{DD} =8.0V	No Load	25		mA
		V _{DD} =5.0V		10		
I _{SD}	Shutdown Current	V _{DD} =3V to 8V	V _{SD} =0V		10	μA
V _{OS}	Offset Voltage	V _{IN} =0V, V _{DD} =5V		25		mV
T _{st}	Setup Time	Bypass capacitor = 1μF		300		mS
OTP	—	No Load, Junction Temperature	V _{DD} =5.0V	160		°C
OTH	—			40		

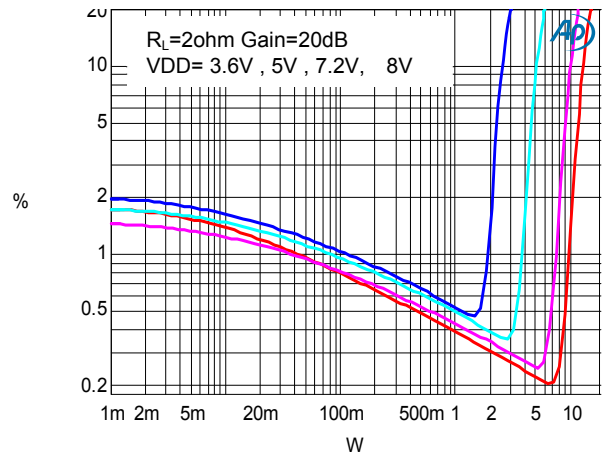
Typical Operating Characteristics

(VDD =5V, Gain=20dB, $R_L = 4\Omega$, T =25°C, unless otherwise noted.)

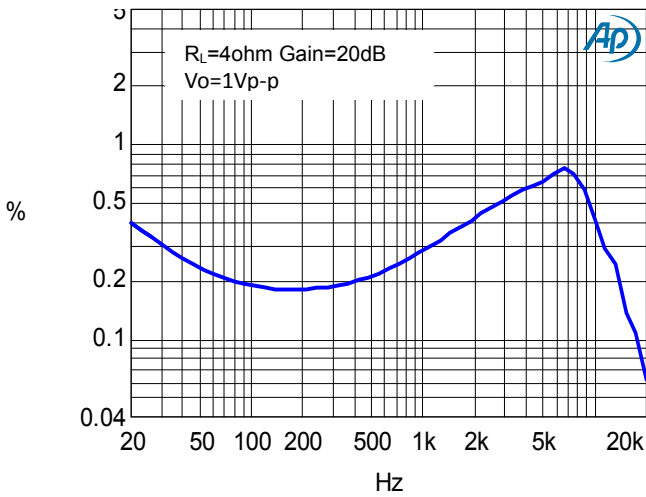
THD+N vs Output Power



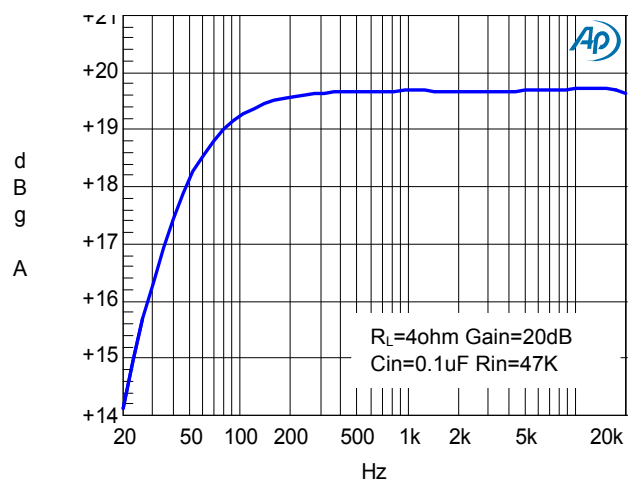
THD+N vs Output Power



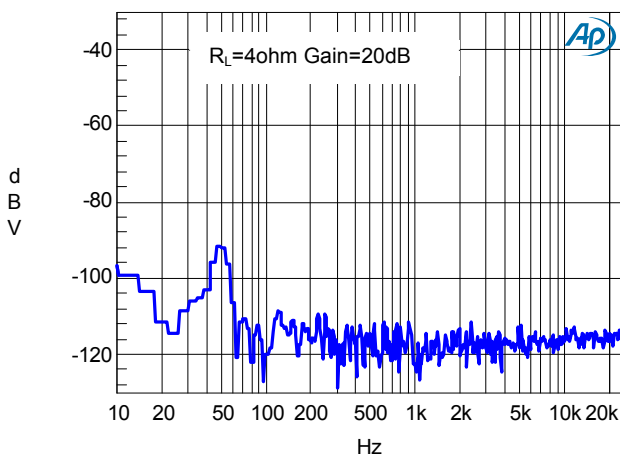
THD+N VS FREQUENCY



Frequency Response



NOISE FLOOR FFT



应用信息

模式选择功能

MIX2808具有两种工作模式，一种为高效率的D类工作模式，另一种为无FM干扰的F类工作模式。通过MODE管脚选择其中的一组，灵活切换。当MODE管脚为逻辑高时，MIX2808工作在D类模式。当MODE管脚为逻辑低时，MIX2808工作在F类模式。

输入电阻(Ri)

MIX2808的增益由音量调节控制的输入电阻(RI)和反馈电阻(RF)控制。有如下的增益计算公式：

$$A_v = 2 \times \frac{R_f}{R_e} \left(\frac{V}{V} \right)$$

其中， R_e 为芯片外部的可调节输入电阻；反馈电阻 R_f 为250K（反馈电阻为内部固定，不可外部调节）。例如，外部输入电阻为47K，则放大倍数为：

$$A_v = 2 \times 250 / (47) = 10.6 \text{ 倍} = 20.5 \text{ dB}$$

输入电容 (Ci)

输入电容与输入电阻构成一个高通滤波器，其截止频率可由下式得出：

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

C_i 的值不仅会影响到电路的低频响应，而且也会影响电路启动和关断时所产生的POP声，输入电容越大，则到达其稳定工作点所需的电荷越多，在同等条件下，小的输入电容所产生的POP声比较小。

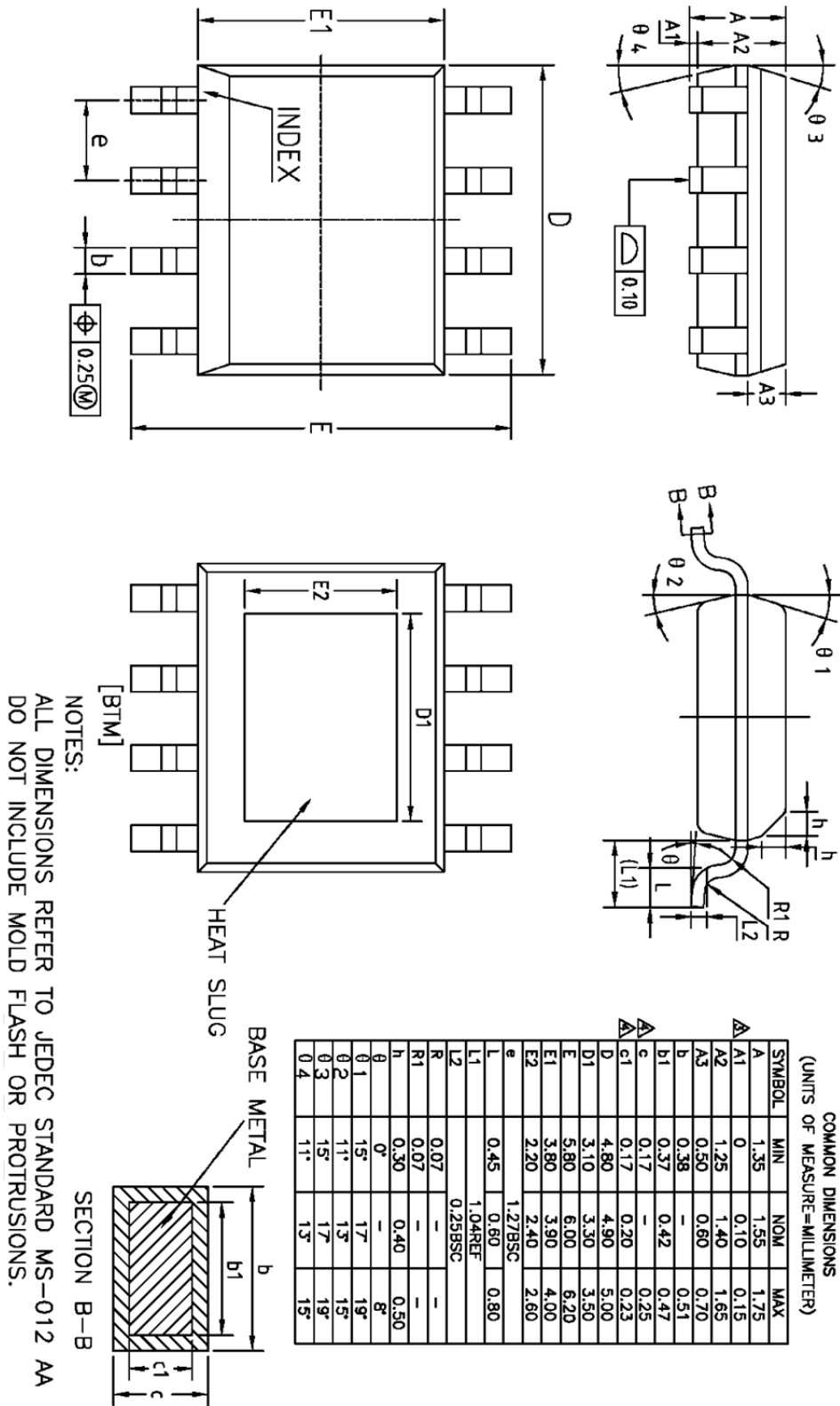
SHDN管脚控制

为了减少在关断模式下的功率损耗，MIX2808带有关闭放大器偏置的关断电路。当SD引脚为低电平时，放大器被关闭，工作电流达到最小。

过温保护

MIX2808 带有过温保护电路以防止内部温度超过180°C时器件损坏。在不同器件之间，这个值有25°C的差异。当内部电路超过设置的保护温度时，器件进入关断状态，输出被截止。当温度下降 30°C后，器件重新正常工作。

封装图 (ESOP8)



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