



XLS 402

AC Power Draw and Thermal Dissipation

This sheet provides detailed information about the amount of power and current drawn from the AC mains by the XLS 402 amplifier and the amount of heat produced under various conditions. The calculations presented here are intended to provide a realistic and reliable depiction of the amplifier. The following assumptions or approximations were made:

- The amplifier's available channels are loaded, and full power is being delivered.
- Efficiency at standard 1 kHz power into 4 ohms is 57% for the XLS 402.
- Quiescent power draw is 23W for the XLS 402.
- XLS 402 quiescent thermal dissipation equals 88 btu/hr at 0 watts with 4 and 8 ohm loads.
- The estimated duty cycles take into account the typical crest factor for each type of source material.
- Duty cycle of pink noise is 50%.
- Duty cycle of highly compressed rock 'n' roll midrange is 40%.
- Duty cycle of rock 'n' roll is 30%.
- Duty cycle of background music is 20%.
- Duty cycle of continuous speech is 10%.
- Duty cycle of infrequent, short duration paging is 1%.

Here are the equations used to calculate the data presented in Figure 1:

$$\text{AC Mains Power Draw (watts)} = \frac{\text{Total output power with all channels driven (watts)} \times \text{Duty Cycle}}{\text{Amplifier Efficiency}} + \text{Quiescent and Fan Power Draw (watts)}$$

The following equation converts power draw in watts to current draw in amperes:

$$\text{Current Draw (amperes)} = \frac{\text{AC Mains Power Draw (watts)}}{\text{AC Mains Voltage} \times \text{Power Factor}}$$

The value used for Power Factor is 0.85. The Power Factor variable is needed to compensate for the difference in phase between the AC mains voltage and current. The following equation is used to calculate thermal dissipation:

$$\text{Thermal Dissipation (btu/hr)} = \left(\frac{\text{Total output power with all channels driven (watts)} \times \text{Duty Cycle} \times \text{Amplifier Inefficiency}}{\text{Amplifier Efficiency}} + \text{Quiescent and Fan Power Draw (watts)} \right) \times 3.415$$

The value used for amplifier inefficiency is (1.00–Efficiency). The factor 3.415 converts watts to btu/hr. Thermal dissipation in btu is divided by the constant 3.968 to get kcal. If you plan to measure output power under real-world conditions, the following equation may also be helpful:

$$\text{Thermal Dissipation (btu/hr)} = \left(\frac{\text{Total measured output power from all channels (watts)} \times \text{Amplifier Inefficiency}}{\text{Amplifier Efficiency}} + \text{Quiescent and Fan Power Draw (watts)} \right) \times 3.415$$

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	L O A D														
	2 Ohm Stereo					4 Ohm Stereo					8 Ohm Stereo				
Duty Cycle	AC Mains Power Draw (W)	Current Draw (Amps)		Thermal Dissipation		AC Mains Power Draw (W)	Current Draw (Amps)		Thermal Dissipation		AC Mains Power Draw (W)	Current Draw (Amps)		Thermal Dissipation	
		120V	230V	btu/hr	kcal/hr		120V	230V	btu/hr	kcal/hr		120V	230V	btu/hr	kcal/hr
50%	1023	10.0	5.2	1547	390	725	7.1	3.7	1109	279	479	4.7	2.5	748	189
40%	823	8.1	4.2	1253	316	584	5.7	3.0	903	228	388	3.8	2.0	614	155
30%	623	6.1	3.2	960	242	444	4.4	2.3	697	176	297	2.9	1.5	480	121
20%	423	4.1	2.2	666	168	304	3.0	1.6	491	124	205	2.0	1.1	346	87
10%	223	2.2	1.1	372	94	163	1.6	0.8	285	72	114	1.1	0.6	213	54

Figure 1. Power Draw, Current Draw and Thermal Dissipation at Various Duty Cycles