XLS 602

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 602 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 63% for the XLS 202.
- Quiescent power draw is 26W for the XLS 202.
- XLS 602 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 0.87. 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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	LOAD														
	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%	1359	13.2	6.9	1774	447	978	9.5	5.0	1292	326	613	6.0	3.1	831	209
40%	1093	10.6	5.6	1437	362	788	7.7	4.0	1051	265	496	4.8	2.5	682	172
30%	826	8.1	4.2	1100	277	597	5.8	3.0	811	204	378	3.7	1.9	534	135
20%	559	5.5	2.8	763	192	407	4.0	2.1	570	144	261	2.5	1.3	386	97
10%	293	2.9	1.5	426	107	216	2.1	1.1	329	83	143	1.4	0.7	237	60

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