MACRO-TECH® SERIES

MA-5002VZ

AC Power Draw and Thermal Dissipation

This document provides detailed information about the amount of power and current drawn from the AC mains by the *Macro-Tech 5002VZ* 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.
- The amplifier efficiency at standard 1-kHz power is estimated to be 73%.
- Quiescent power draw is approximately 90 watts, and assumes the cooling fans are not running.
- Quiescent thermal dissipation equals 105 btu/hr at 90 watts.
- 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 0.83. 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 inefficiency is 0.27 (1.00–0.73). 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:

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

Macro-Tech 5002VZ

	LOAD														
	8 Ohm Stereo / 4 Ohm Parallel-Mono					4 Ohm Stereo / 8 Ohm Bridge-Mono / 2 Ohm Parallel-Mono					2 Ohm Stereo / 4 Ohm Bridge-Mono / 1 Ohm Parallel-Mono				
Duty Cycle	AC Mains Power Draw (Watts)	Current Draw (Amps)		Thermal Dissipation		AC Mains Power Draw (Watts)	Current Draw (Amps)		Thermal Dissipation		AC Mains Power Draw (Watts)	Current Draw (Amps)		Thermal Dissipation	
		100-120 V	220-240 V	btu/hr	kcal/hr		100-120 V	220-240 V	btu/hr	kcal/hr		100-120 V	220-240 V	btu/hr	kcal/hr
50%	1,881	22.7	10.3	1,793	452	2,845	34.3	15.6	2,606	657	3,534	42.6	19.4	3,187	803
40%	1,523	18.3	8.3	1,491	376	2,294	27.6	12.6	2,142	540	2,845	34.3	15.6	2,606	657
30%	1,164	14.0	6.4	1,189	300	1,743	21.0	9.5	1,677	423	2,156	26.0	11.8	2,026	511
20%	806	9.7	4.4	887	224	1,192	14.4	6.5	1,212	305	1,467	17.7	8.0	1,445	364
10%	448	5.4	2.5	584	147	641	7.7	3.4	748	189	779	9.4	4.3	864	218

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

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