

Community Tech Note

How to Power an ENTASYS Module to Maximum Power



I need *how* big of an amplifier??

Ah, this leads to the other really important question: “How loud do I need the system to get?” The ‘recommended amplifier’ power ratings of ENTASYS are all about providing sufficient power to deliver the desired end result.

This Tech Note addresses the question of what you actually need to achieve your goals, and how to determine the appropriate amplifier power rating, depending on the actual SPL (Sound Pressure Level) and Crest Factor desired. You might be pleasantly surprised at how *little* power is needed. ENTASYS full-range (ENT-FR) systems, at 95 dB, 1W/1m (straight configuration) are fairly efficient for a column line source. ENTASYS also handles quite a bit of power due to the number of transducers in each element.

It is an easy task to determine your actual power requirements by first calculating your actual SPL requirements. A quick layout in [EASE Focus](#) will generate the most reliable SPL predictions that incorporate the complex nature of line sources. Be aware that simply applying a trusty Inverse Square Law $20\log$ (6 dB per distance doubled) or $10\log$ (3 dB per distance doubled) calculation will yield wildly inaccurate results for SPL predictions.

Refer to the chart which details the relationship between SPL, Crest Factor and Power Ratings in the ENTASYS [Application Guide](#) (an excellent design resource, by the way). To really zero in on how much power is required for specific applications, review the charts on pages 16 and 17, and note the additional detail provided on pages 36 and 37.

Important Note: If you choose a power amplifier rated at less than 3600W @ 4 ohms (details below), be very sure on your limiter settings (or how you set up your limiter) to protect the loudspeaker. But you already planned on providing a good peak stop limiter like the manual recommends anyway, correct?

That was the short “Sales/Estimating” answer... and now for the comprehensive “Engineering” answer:

Short Engineering Answer

To achieve full output (again, after determining that you actually need full output) from an ENTASYS array, use an amplifier rated to 3600W (Continuous Average Power based on an RMS voltage specification of 85 Volts RMS) at 4 ohms for minimum compliance. This will yield minimum headroom for 6 dB crest factor signal content. For added headroom, consider models capable of 3600W (Continuous Average Power) at 8 ohms. The rest of the math will sort itself out regardless of the number of LF or FR units in the column up to six units. Be aware that arrays greater than three units probably will have an impedance load that may not work with amplifiers operating in Bridge Mono mode. Refer to page 38 and 39 in the Owner's Manual for a handy chart regarding power and impedance for ENTASYS.

(continued on next page)

Powering ENTASYS

Long Engineering Answer:

Given:

- A single ENTASYS ENT-FR or one (1) ENTASYS ENT-LF requires 600W RMS (Continuous Average Power) at a nominal 12 ohm impedance.
- To determine the impedance of a group of loudspeakers sharing one amplifier channel (having parallel connections); simply divide the impedance by the total number of loudspeakers on the circuit. This is only true when all of the loudspeakers on the circuit exhibit the same impedance characteristics. You may make this calculation with regard to nominal or minimum impedance.
- When calculating the amount of power needed for a group of loudspeakers having parallel connections, simply multiply the power rating for one loudspeaker times the total number of loudspeakers on the circuit.

Therefore, six units would require a total of 3600W RMS at 2 ohms Nominal Impedance. *Now, that sounds like a lot of amplifier power! Indeed.*

Given the amount of voltage this amplifier will have to generate, it certainly doesn't hurt to consider an amplifier with higher power ratings just to provide headroom. Also, there are not many amplifier specification sheets that satisfy this power requirement in Stereo mode. Given these two very practical considerations, let's go shopping for an amplifier that has 3 dB of headroom (twice the requisite power). We would be looking for an amplifier having ratings with specifications expressed as 7200W RMS @ 2 ohms (expressed as wattage doubled) or 3600W RMS at 4 ohms (expressed as impedance doubled).

Of these two expressions of the same information, it will certainly be easier to find an amplifier using the 4 ohm specification - especially when looking at Bridge Mono specifications (which are rarely below 4 ohms). To provide more headroom for voltage peaks, consider stepping up to amplifiers rated at 3600W (Continuous Average Power) at 8 ohms.

Some popular professional amplifier models suitable for ENTASYS power handling:

Ashly	PE3800 Bridge Mono, KLR4000 Bridge Mono
Crown	Macrotech 12000i Dual Channel, Macrotech 9000i Bridge Mono Macrotech 5000i Bridge Mono, Macrotech 5000VZ Bridge Mono iTech I-T4000 Bridge Mono, iTech I-T6000 Bridge Mono, iTech I-T8000 Dual Channel
Crest	Pro8200 (min.) Bridge Mono, Pro9200 (better choice) Bridge Mono
Lab.gruppen	FP6000Q Bridge Mono, FP1000Q Bridge Mono, FP6400 Dual Channel
Powersoft	K10 Dual Channel, K2 Bridge Mono D4002 Bridge Mono LD2004 Bridge Mono (for typical lower SPL needs) LD5400 Bridge Mono (for high SPL, full power applications)
QSC	PL380 Bridge Mono, PL340 Bridge Mono RMX4050 Bridge Mono, RMX5050 Bridge Mono
Yamaha	P7000 Bridge Mono

Here's a handy resource from QSC for selecting amplifiers:

http://qsc.com/resources/amp_selector/

IMPORTANT: Keep in mind that most amplifiers should not be run with loudspeaker impedances below 4 ohms in Bridge Mono mode. Therefore, if using an amplifier in Bridge Mono, the limitation will be three ENTASYS modules (12 ohms divided by 3 = 4 ohms Nominal Impedance).