TYMPHANY

www.tymphany.com

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LAT 250

Sample Application Notes

19 April 2007

The LAT250PB600-2 transducer is intended for use as a woofer in 2.1 systems and models with small signal parameter speaker modeling techniques.

Tymphany Application Engineering support can provide additional guidance on getting the best performance out of your LAT250 system. We strongly urge you to take advantage of our experience with the Linear Array Transducer to help you achieve optimal results.

The following comments provide practical considerations when designing with the LAT250PB600-2:

Configuration and Performance

The LAT 250 is a dual-motor design in which each motor is rated to handle 50 watts continuous power, per the IEC 268-5 power test, and it has been tested in our engineering laboratory with a sinusoid signal up to 20 volts RMS. We recommend restricting the peak voltage of any material content to 28 volts. We also recommend using an amplifier with adequate power handling capacity at low impedance levels to avoid clipping and the popping sound of the protection circuit being triggered.

Tymphany recommends either wiring the voice coils in parallel or driving them with separate amplifiers, and using a lowpass crossover, 2nd order or higher, at a frequency no higher than 140Hz. The maximum mechanical excursion is 7mm and audible sound artifacts will be heard when the LAT 250 reaches this limit. Included are theoretical enclosure models using LEAP modeling software. Actual enclosure measurements will vary depending on enclosure dimensions and materials. Other enclosures can be used – including sealed – but may require electronic equalization for optimum performance.

Mounting and Handling Considerations

It is important to insure that the LAT mounting surface (baffle) is flat and that equal pressure (torque) is applied to all mounting screws. This will eliminate the possibility of mechanical rubbing caused by bending or stressing the LAT body structure. When handling the LAT, make sure it is not allowed to rest on the terminals, to avoid deformation or breakage of the insulators.

Recommended Enclosures

1. Band-Pass Single Tuned Enclosure:
   a. Rear (sealed) chamber volume: 2 liters
   b. Front (ported) chamber volume: 1liter
   c. Port tuning: 110Hz
   d. Port diameter: 3.81cm
   e. Port length: 19.0cm
   f. Acoustic absorption: none
   g. F3: 59Hz
   h. Over-excursion filter: 2nd order highpass @ 55Hz

2. Vented Bass-Reflex Enclosure:
   a. Enclosure volume: 6 liters
   b. Port tuning: 70Hz
   c. Port diameter: 5.08cm
   d. Port length: 17.2cm
   e. Acoustic absorption: on cabinet walls
   f. F3: 60Hz
   g. Over-excursion filter: 2nd order highpass @ 60Hz

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Product Datasheet

(voice coils wired in parallel; frequency response measured in 2π anechoic chamber)

Individual datasheets will be delivered with each sample.

Tymphany Data Sheet

Project Name	LAT 250 2x4ohm	**Manufacturing Site**	China
Sample Number/Rev	TYPICAL DATA	**Date Shipped**	01 April 2007
Model #	Pilot Production		

Electrical Data

Nominal Impedance	Z_{nom}	2	Ω
Minimum Impedance/at Freq	Z_{min}	2.1 @ 220	Ω/Hz
Maximum Impedance	Z_o	13.0	Ω
Voice Coil Resistance	R_e	2.0	Ω
Voice Coil Inductance	L_e	270	uH

TS Parameters

Resonance Frequency	F_s	63	Hz
Mechanical Q	Q_{ms}	4.6	
Electrical Q	Q_{es}	0.75	
Total Q	Q_{ts}	0.64	
Force Factor	Bl	6.8	T·m
Mechanical Resistance	R_{ms}	3.9	kg/s
Moving Mass	M_{ms}	45	g
Suspension Compliance	C_{ms}	0.14	mm/N
Effective Cone Diameter	D	15.8	cm
Effective Piston Area	S_d	196	cm²
Equivalent Volume	V_{as}	7.8	liters
SPL 2.83V/1m at Zmin		91.0	dB

Voice Coil and Magnet Parameters

Voice Coil Diameter	38.5	mm
Voice Coil Length	13.0	mm
Voice Coil Layers	2	
Height of the Gap	7	mm
Linear Excursion +/-	3.0	mm
Max Mech. Excursion +/	-	mm
Total Useful Flux		mWb
Diameter of Magnet	37	mm
Height of Magnet	7	mm
Weight of Magnet	56	g

Factors

Ratio fs/Qts	98
Ratio BL/ √ Re	4.9

Special Remarks

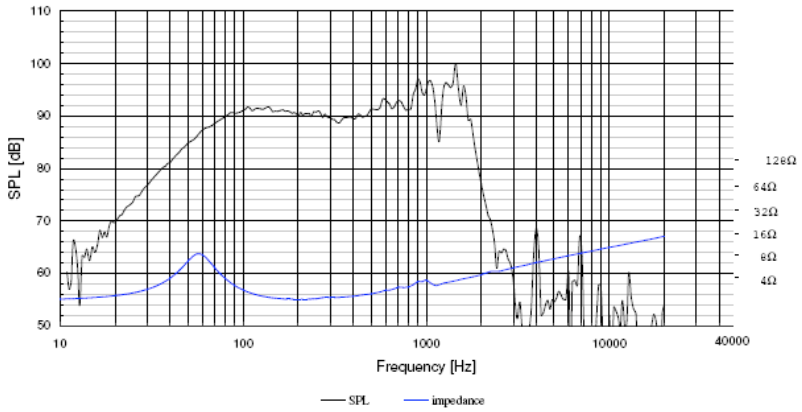
A. All parameters measured at 1 V_{RMS} with coils wired in parallel (after break-in).
B. Frequency response measured in IEC baffle at 5 cm , 1 V_{RMS} and compensated to 1 m, 2.83 V_{RMS}

Power Handling

100 h RMS noise test (IEC)	W
Longterm Max System Power (IEC)	W

IEC 268-5 noise signal is used for the powertest.

Remarks on Power Test



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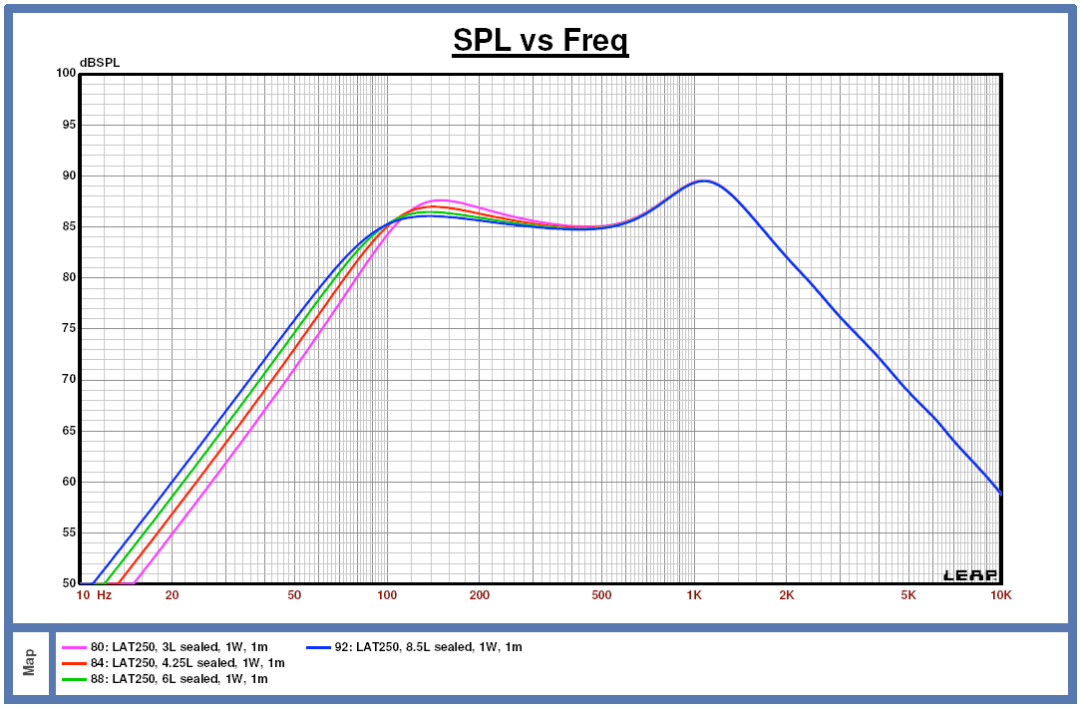
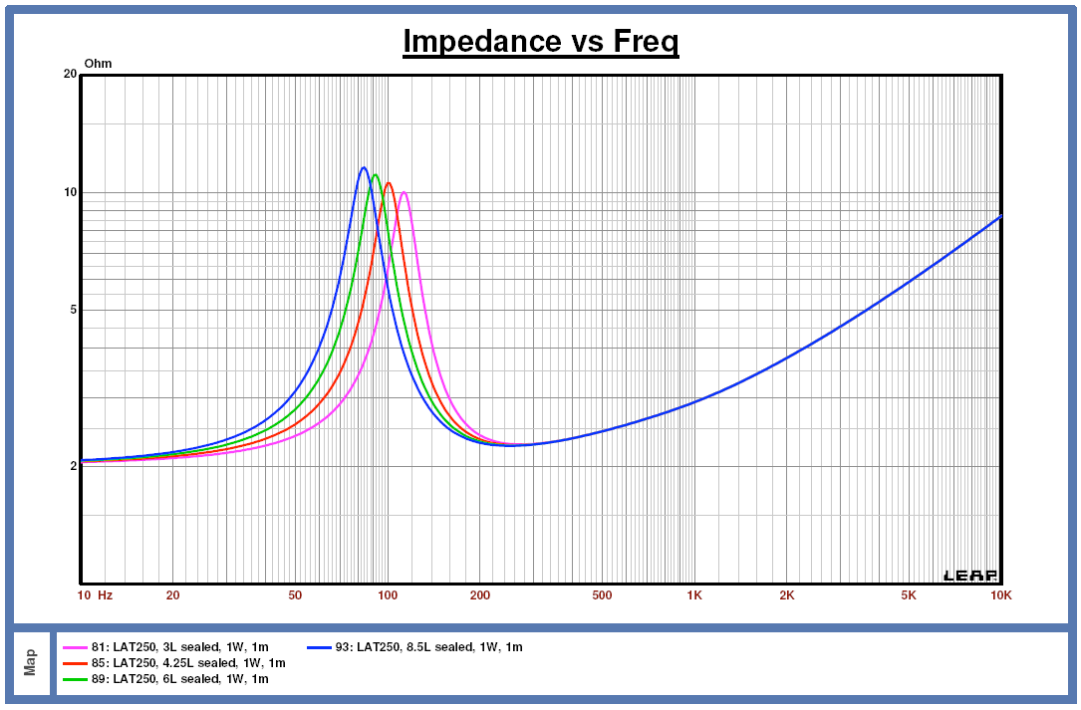
Predicted Frequency Response (sealed boxes @1W/1m: 3-, 4.25-, 6-, and 8.5-liter)



Predicted Impedance (sealed boxes @1W/1m: 3-, 4.25-, 6-, and 8.5-liter)



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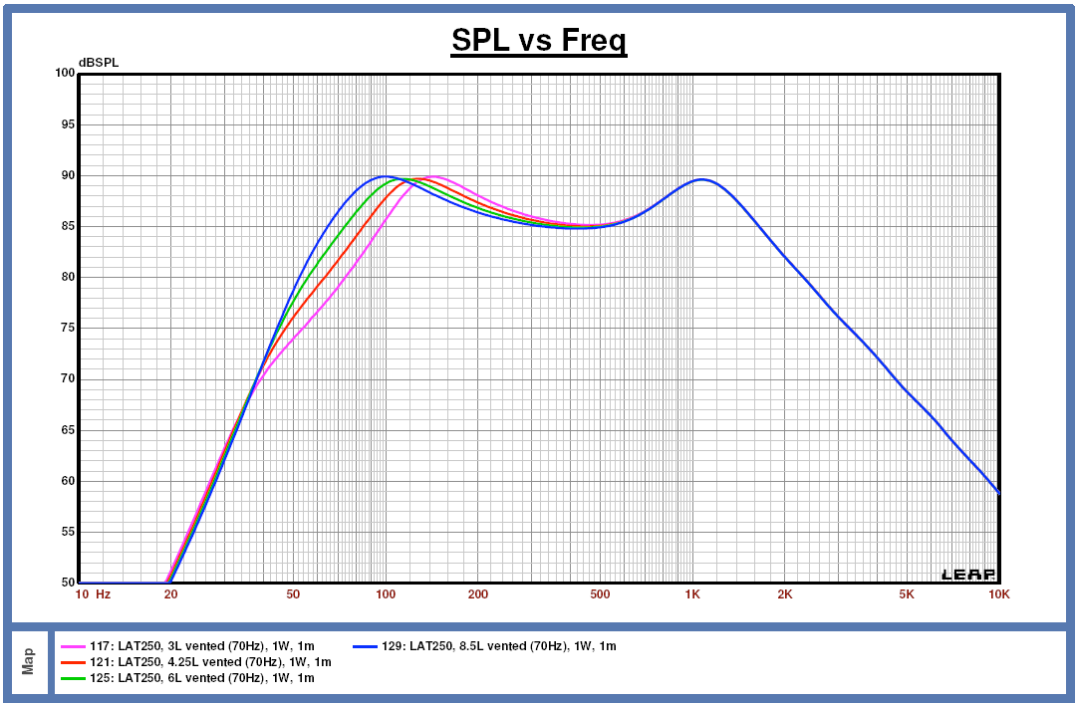
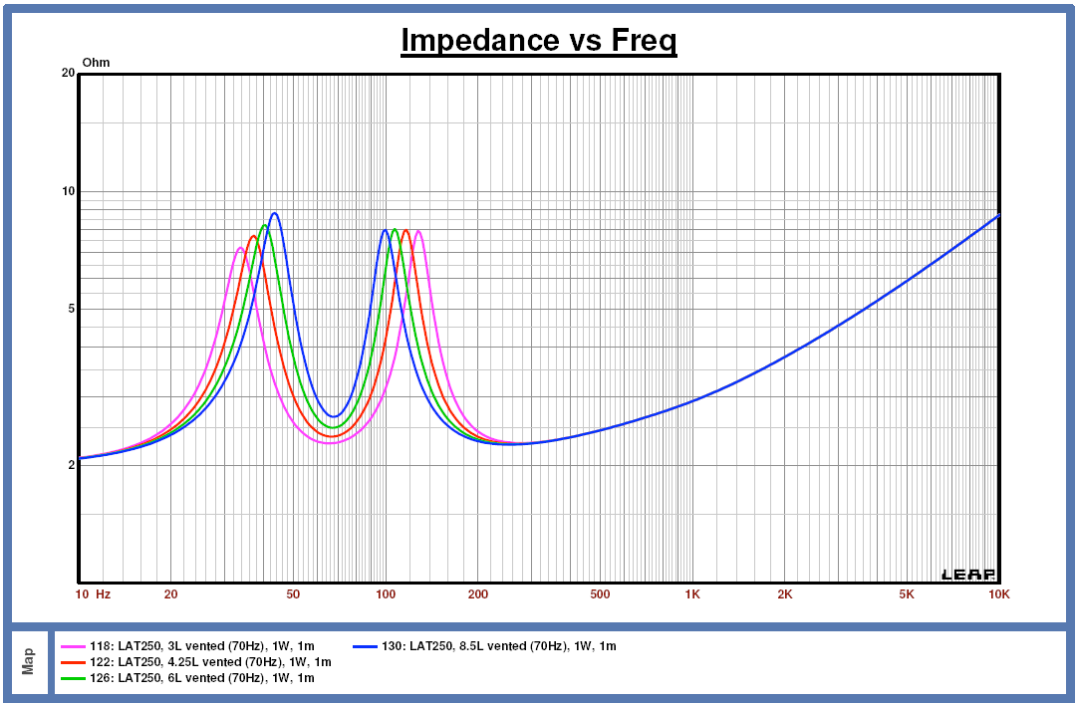
Predicted Frequency Response (vented boxes @1W/1m: 3-, 4.25-, 6-, and 8.5-liter)



Predicted Impedance (vented boxes @1W/1m: 3-, 4.25-, 6-, and 8.5-liter)



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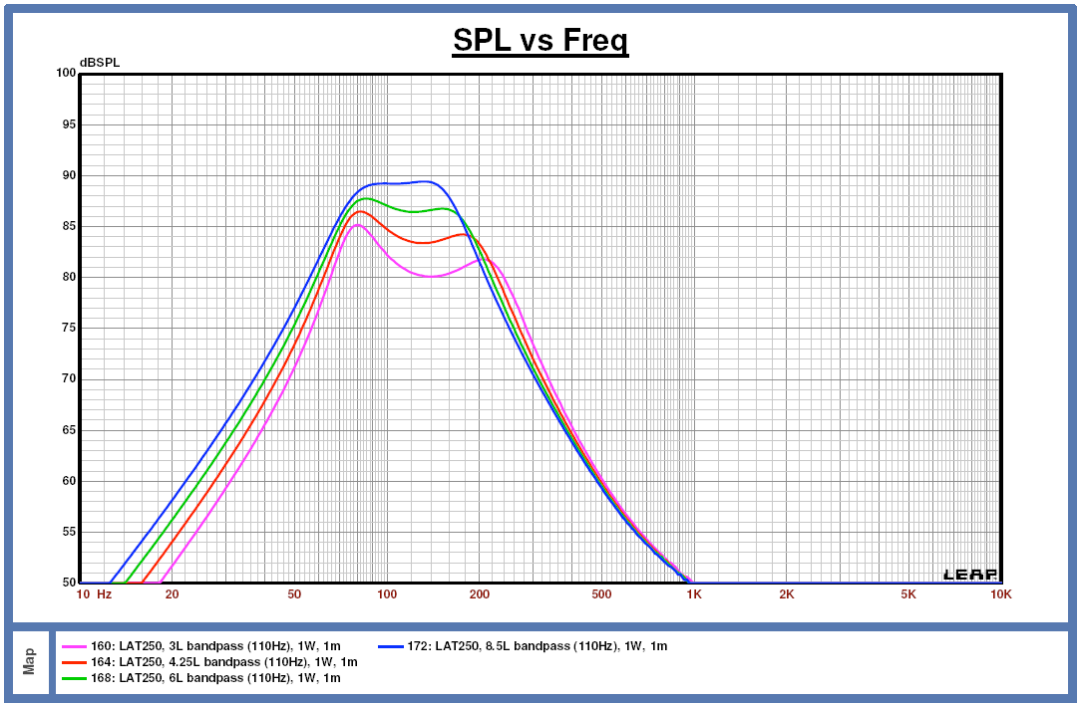
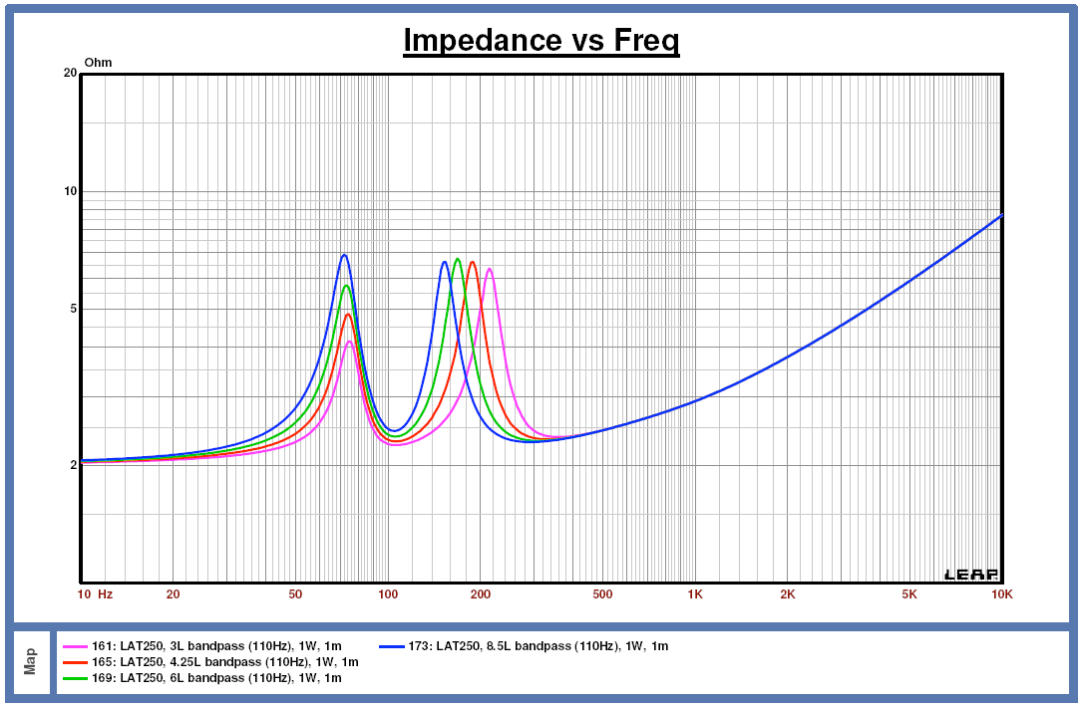
Predicted Frequency Response (bandpass boxes @1W/1m: 3-, 4.25-, 6-, and 8.5-liter)



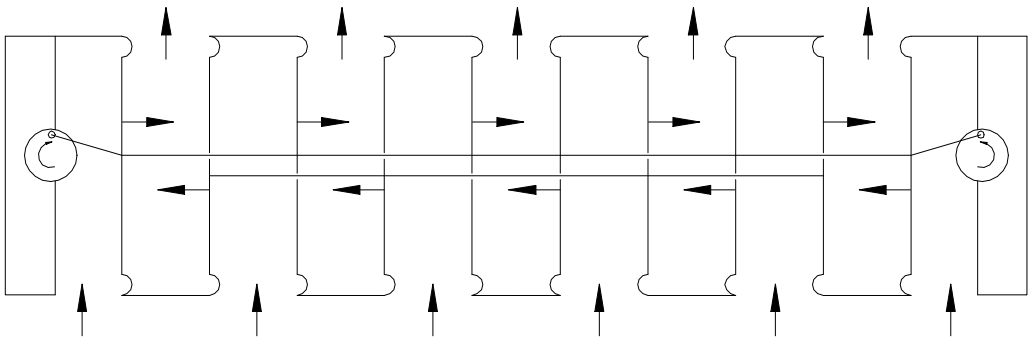
Predicted Impedance (bandpass boxes @1W/1m: 3-, 4.25-, 6-, and 8.5-liter)



Tymphany LAT250 transducer quick setup

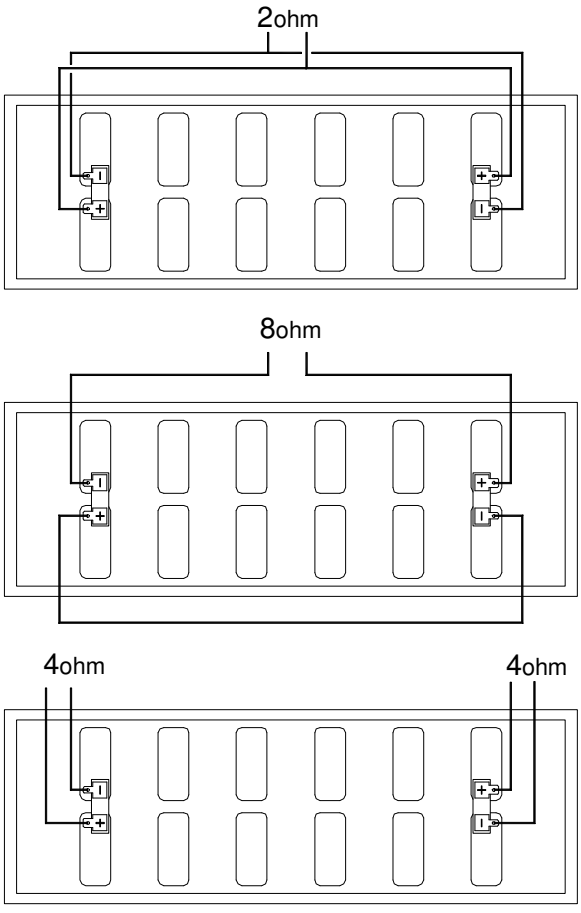
Overview

The Linear Array Transducer represents a different approach to moving air (and large quantities of it) where a long, thin form factor is desired and/or there is desire to remove mechanical vibration from the transducer. The concept splits the cone surface area of two traditional direct radiators into two interleaved opposing arrays of smaller diaphragms venting through slots in a tubular plastic housing. See Figure 1 below:



1: Mechanical operation concept of a Linear Array Transducer

Wiring it up



2: Electrical Wiring Options

Similar to a regular loudspeaker

For the most part, a LAT behaves and can be modeled like a traditional direct radiator loudspeaker driver. It has front and rear (dipole) radiation properties and models with small signal parameters with conventional calculations and software. Like a conventional transducer, some care should be taken to allow airflow around the ports on rear side. Like a conventional transducer, if you use a vented design, an overexcursion highpass filter is recommended.

…but different

the LAT does have two separate motor and moving mass systems that cancel out the mechanical vibration within the body of the transducer. These two motor systems that can be wired in a number of configurations. Figure 2 shows three such wiring configurations: The top diagram shows a typical parallel configuration for a nominal two ohm impedance. Series wiring may be used as well for an 8 ohm impedance. Of course if two amplifier channels are available, straight 4 ohm wiring is possible. Note that ideally the two sides see the same signal for maximum vibration and distortion cancellation; however, no ears have died from sending the right low to one side and the left low to the other.

Mechanical Mounting Recommendations

The drawing to the right provides the cutout and mounting hole locations. Dimensions are in mm and referenced to the lower left corner of the mounting opening. At least eight screws are recommended for securing the LAT to an enclosure with more recommended where an uneven distribution of screws is required. As with any speaker basket frame, tilting, cocking or stressing the frame unevenly may compromise performance.

The mounting opening should be 241mm by 69mm. Mounting holes are nominally 4.5mm in diameter accepting #8 screws.

Refrain from resting the LAT on the terminals to avoid deformation or breakage of the insulators.

Sample Application Notes
Can be found at www.Tymphany.com

The IEC rated (100 hour continuous) power of the LAT250 is 70 watts total while the long term power rating is 200watts. It has been tested in our engineering labs with a sinusoid up to 20Volts RMS. We recommend restricting the peak voltage of any material content to 28 volts. We also recommend using and amplifier with adequate power handling capacity at low impedance levels to avoid clipping and the popping sound of the protection circuit being triggered.