# VituixCAD Extended Impedance Model For Any Driver

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#### **Revision History:**

Date Description

Nov 24, 2022 Initial Release

Loudspeaker T/S often includes only a single Le value for inductance, however driver motors are usually much more complex than a single coil of wire, so Le on its own is not a very good description of the driver characteristics. An extended impedance model, or "semi-inductance" model can provide additional characterization of the impedance curve for greater accuracy.

Many Scan-Speak drivers include this data in the "advanced parameters" section of their datasheets, however the parameters can be extracted from any datasheet that includes a plot of the driver impedance. This instruction will provide the steps required to extract this information for use in the enclosure model in VituixCAD.

### Step 1 - Tracing the manufacturer data

VituixCAD includes a tracing tool that we can use to create the data sets we need. With the manufacturer's PDF open, the simplest method is to us the Windows snipping tool. Simply press Windows Key + Shift + S, then draw a box around the chart.

In VituixCAD, go to tools -> SPL Trace. Then under the edit menu, select paste. The tool is fairly straight forward from there, you simply mark some low and high known reference points on the image for the X and Y axis. For impedance, use the y axis amplitude on the right. Then simply click the trace button, then on the line to trace it. If the image is black and white, you may need to erase some grid lines around the plot line for the tracing feature to succeed.



#### Figure 1 Trace Example

Once you have traced the driver impedance, simply export the result.

## Step 2 – Add the driver to the Enlosure Database

Start by opening the enclosure tool, create a new driver and enter the T/S Parameters from the datasheet.

Manufacturer	Scan-Sp	eak									
Model	18W/8434G00-2										
Туре	W	~									
Status	Active	~									
Size	6.5	inches	Basic	c Z model							
Re	5.6	Ohm	Z1k	0	Ohm						
fs	50	Hz	Z10k	0	Ohm						
Qms	7.58	7.58 Extended Z model									
Qes	0.46	]	Le	0.550	mH						
Qts	0.43		Leb	0	mH						
Rms	0.57	Ns/m, kg/s	Ke	0	sH						
Mms	13.7	g	Rss	0	Ohm						
Cms	0.74	mm/N		Crosscalc							
Vas	19.5	liters	n0	0.514	%						
Sd	137	cm^2	SPL	89.2	dB/W						
BL	7.2	N/A, Tm	USPL	90.8	dB/2.83						
Pmax	55	W	EBP	108.7							
Xmax	4.2	mm	Vd	<b>5</b> 7.5	cm^3						
Creep ß	0		Mmd	12.783	g						
Revision											
Updated	Datashe	et Import									

Figure 2 T/S Parameters Example

# Step 3 – Extract extended impedance data

We can take the driver parameters a step further and use the traced impedance to determine a extended Z model for more accurate representation of the driver impedance in simulation. Select "Calculate T/S", then load the traced impedance file under "Free air impedance response". Provided that you have entered all the other T/S parameters already, simply press the "solve" button under the Extended Z model section. You will see a trace that should overlap the loaded impedance with a high degree of accuracy. Pressing the solve button a few times may achieve a slightly better result.

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llation basic instruction/vituix	cad\Clipboard	l_image_	ZR.txt 📔	<b>X</b>			40									18
econd impedance response					Added m	ass										
				7 X	17.2	g	35									13
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			E	X	0	g	30									/ 9
Method	Calculated	paramet	ers	Basic	Z models											$\vdash$
Sealed volume	fs	50	Hz	Z1k	0	Ohm	25								-1	4
Added mass	Qms	7.58	1	Z10k	0	Ohm		— /IN				_				
O Dual added mass	Qes	0.46	Ī	ПК	0.00677	1	20	—/IN								
🖂 LOG model	Qts	0.43	1	n	0.718	1								/	/	
/	Rms 0.57 kg/s			Extended 7 medel			15	_/[_							_	-
vnown parameters	Mms	13.7	g	Exten					7					/		
Re 5.6 Ohm	Cms	0.74	mm/N	Le	3.25	mH	10	//								
Dd 132.07 mm	Vas	19.5	liters	Leb	0.18/	mH					_					
or 5d 13/ cm 2	BL	7.2	Tm	Ke	0.0409	sH	5								ر المراجع المر المراجع المراجع	-1
	Creep ß	0		Rss	69.4	Ohm										
j ignore measured phase					Solv	е	0	5	100	200	500	11.	21-	<b>E</b> 1.	101-	-1

Figure 3 Extended Z model calculation

When complete, click "Apply" to save the result to the driver parameters.

To use the extended inductance model in simulation, simply right click on the SPL chart and select "show effect of inductance".



Figure 4 Show effect of inductance