WOOFER
WPU 1805-X

18” Woofer for low and mid bass professional sound reinforcement, offering high power capacity, outstanding low end response and exceptionally smooth transition into the vocal range. This new design is capable of handling up to 1,200 Watts Continous Music.

The WPU 1805-X is ideal for side fill as well as front of house cabinets. This woofer exhibits outstanding acoustics with work horse construction. Designed for smaller enclosures, the WPU 1805-X is a versatile, high performance woofer. General construction includes an aluminum sturdy cast frame, an impregnated cloth surround, impregnated long fiber paper cone and stable double spider.

The voice coil is composed of aluminum wire, resistant adhesives to high temperatures on a fiberglass former.

The WPU 1805-X woofer incorporates, a large magnetic assembly central hole and 6 windows on the frame which increases heat dissipation and reduces operating temperature increasing the output power with reduced power compression. The polar piece still counts with a short ring of copper to minimize harmonic distortions.

SPECIFICATIONS

Nominal diameter	460 (18)	mm (in)
Nominal impedance	8	Ω
Minimum impedance @ 118 Hz	6.3	Ω
Power handling		
Peak	2,400	W
Continous Music[1]	1,200	W
NBR[2]	600	W
AES[3]	600	W
Sensitivity (2.83V@1m) averaged from 100 to 800 Hz	99	dB SPL
Power compression @ 0 dB (nom. power)	3.58	dB
Power compression @ -3 dB (nom. power)/2	2.27	dB
Power compression @ -10 dB (nom. power)/10	1.08	dB
Frequency response @ -10 dB	45 to 4,300	Hz

[1] Power handling specifications refer to normal speech and/or music program material, reproduced by an amplifier producing no more than 5% distortion. Power is calculated as true RMS voltage squared divided by the nominal impedance of the loudspeaker.
[2] NBR Standard (10,303 Brasilian Standard).
[3] AES Standard (60 - 600 Hz).

THIELE-SMALL PARAMETERS

Fs	35	Hz
Vas	293 (10.34)	l (ft^3)
Qts	0.70	
Qes	0.73	
Qms	21.09	
ηo (half space)	1.76	%
Sd	0.1194 (184.45)	m^2 (in^2)
Vd (Sd x Xmax)	746 (45.5)	cm^3 (in^3)
Xmax (max. excursion (peak) with 10% distortion)	6.25 (0.24)	mm (in)
Xlim (max.excursion (peak) before physical damage)	22 (0.86)	mm (in)

Atmospheric conditions at TS parameter measurements:

Temperature	23 (73.4)	°C (°F)
Atmospheric pressure	1009	mb
Humidity	53	%

Thiele-Small parameters are measured after a 2-hour power test using half power. A variation of ± 15% is allowed.

ADDITIONAL PARAMETERS

βL	15.3	Tm
Flux density	0.89	T
Voice coil diameter	100 (4)	mm (in)
Voice coil winding length	29.9 (98)	m (ft)
Wire temperature coefficient of resistance (α25)	0.0041	1/°C
Maximum voice coil operation temperature	315 (599)	°C (°F)
θvc (max.voice coil operation temp./max.power)	0.525 (32.9)	°C/W(°F/W)
Hvc (voice coil winding depth)	22 (0.86)	mm (in)
Hag (air gap height)	9.5 (0.37)	mm (in)
Re	5.6	Ω
Mms	137 (0.3)	g (lb)
Cms	150	μm/N
Rms	1.45	kg/s

NON-LINEAR PARAMETERS

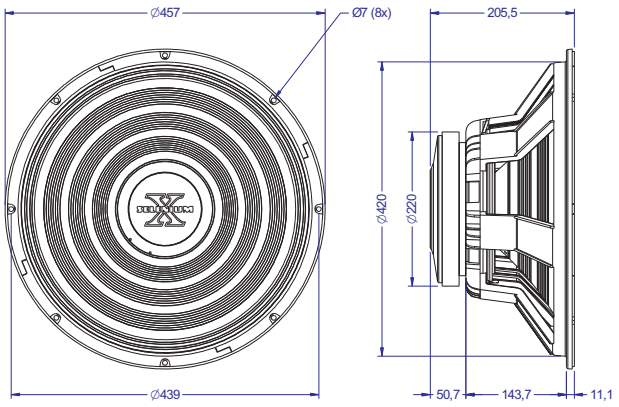
Le @ Fs (voice coil inductance @ Fs)	3.237	mH
Le @ 1 kHz (voice coil inductance @ 1 kHz)	0.881	mH
Le @ 20 kHz (voice coil inductance @ 20 kHz)	0.274	mH
Red @ Fs	0.380	Ω
Red @ 1 kHz	3.673	Ω
Red @ 20 kHz	28.167	Ω
Krm	9.60	mΩ
Kxm	26.70	mH
Erm	0.68	
Exm	0.61	

ADDITIONAL INFORMATION

Magnet material	Barium ferrite	
Magnet weight	3,440 (121)	g (oz)
Magnet diameter x depth	220 x 24 (8.66 x 0.95)	mm (in)
Magnetic assembly weight	9,200 (20.28)	g (lb)
Frame material	Aluminum	
Frame finish	Black Epoxy	
Voice coil material	Aluminum	
Voice coil former material	Fiberglass	
Cone material	Long fiber pulp	
Volume displaced by woofer	10.5 (0.37)	l (ft^3)
Net weight	10,180(22.44)	g (lb)
Gross weight	11,650 (25.68)	g (lb)
Carton dimensions (W x D x H)	49 x 49 x 23.5 (19.3 x 19.3 x 9.2)	cm (in)

MOUNTING INFORMATION

Number of bolt-holes	8	
Bolt-hole diameter	7.0 (0.27)	mm (in)
Bolt-circle diameter	439 (17.28)	mm (in)
Baffle cutout diameter (front mount)	422 (16.61)	mm (in)
Baffle cutout diameter (rear mount)	412 (16.22)	mm (in)
Connectors	Silver-plated push terminals	
Polarity	Positive voltage applied to the positive terminal (red) gives forward cone motion	
Minimum clearance between the back of the magnetic assembly and the enclosure wall	75 (3)	mm (in)



Dimensions in mm.

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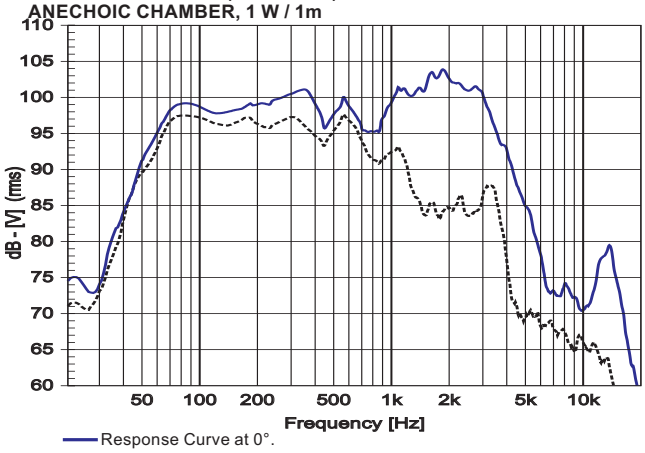
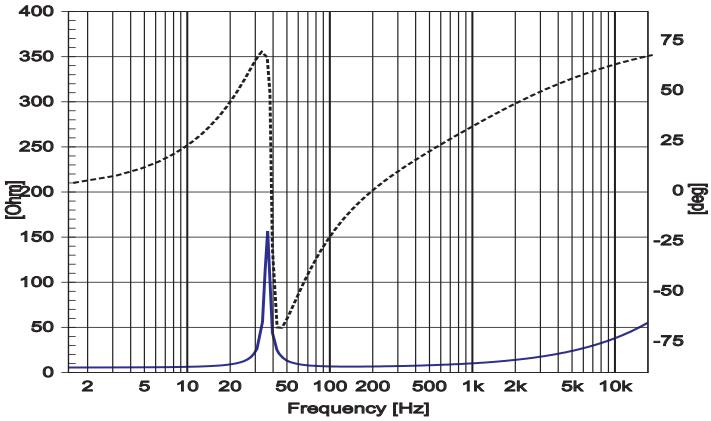
RESPONSE CURVES (0° AND 45°) IN A TEST ENCLOSURE INSIDE AN ANECHOIC CHAMBER, 1 W / 1m



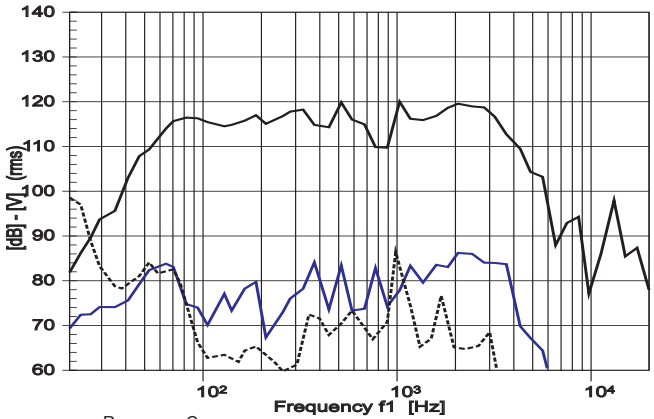
Response Curve at 0°.
Response Curve at 45°.

IMPEDANCE AND PHASE CURVES MEASURED IN FREE-AIR



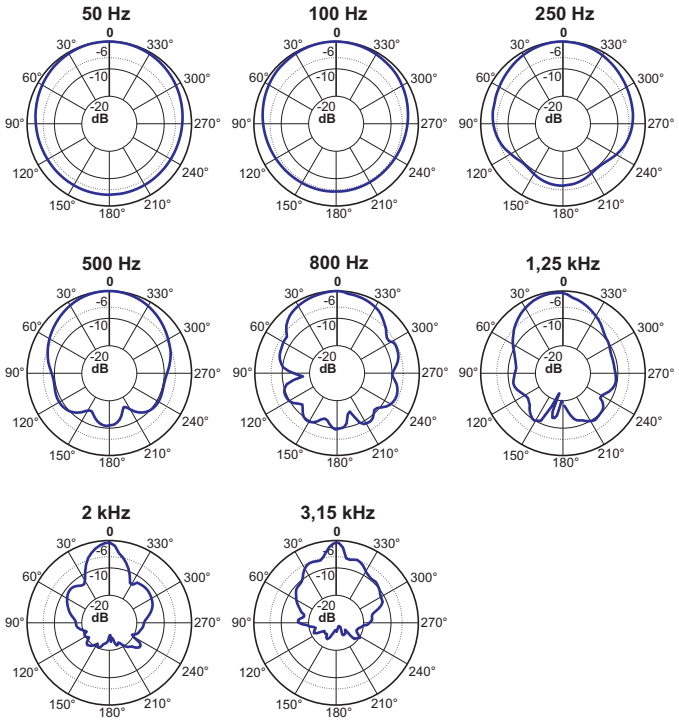
Impedance Curve.
Phase Curve.

HARMONIC DISTORTION CURVES MEASURED AT 10 INPUT POWER, 1 m



Response Curve.
Distortion Curve, 2nd harmonic.
Distortion Curve, 3rd harmonic.

POLAR RESPONSE CURVES



Polar Response Curve.

HOW TO CHOOSE THE RIGHT AMPLIFIER

The power amplifier must be able to supply twice the RMS driver power. This 3 dB headroom is necessary to handle the peaks that are common to musical programs. When the amplifier clips those peaks, high distortion arises and this may damage the transducer due to excessive heat. The use of compressors is a good practice to reduce music dynamics to safe levels.

FINDING VOICE COIL TEMPERATURE

It is very important to avoid maximum voice coil temperature. Since moving coil resistance (R_E) varies with temperature according to a well known law, we can calculate the temperature inside the voice coil by measuring the voice coil DC resistance:

$$T_B = T_A + \left(\frac{R_B}{R_A} - 1\right)\left(T_A - 25 + \frac{1}{\alpha_{25}}\right)$$

T_A , T_B= voice coil temperatures in °C.
R_A , R_B= voice coil resistances at temperatures T_A and T_B, respectively.
α_{25}= voice coil wire temperature coefficient at 25 °C.

POWER COMPRESSION

Voice coil resistance rises with temperature, which leads to efficiency reduction. Therefore, if after doubling the applied electric power to the driver we get a 2 dB rise in SPL instead of the expected 3 dB, we can say that power compression equals 1 dB. An efficient cooling system to dissipate voice coil heat is very important to reduce power compression.

NON-LINEAR VOICE COIL PARAMETERS

Due to its close coupling with the magnetic assembly, the voice coil in electrodynamic loudspeakers is a very non-linear circuit. Using the non-linear modeling parameters Krm, Kxm, Erm and Exm from an empirical model, we can calculate voice coil impedance with good accuracy.

SUGGESTED PROJECTS

For additional project suggestions, please access our website.

TEST ENCLOSURE

171-liter volume with 3 ducts ø 4” by 4.7” length.