SUBWOOFER 18SWS800

The 18SWS800 is a high power 18” professional subwoofer specially designed to reproduce sound at the very low end of the audio spectrum.This new design is capable of handling up to 1,600 Watts Continous Music.

A bumped and undercut T-yoke assures a minimum of magnetic rectification (off centering) and acompatible maximum displacement.

The magnet assembly was designed with the assistance of a Finite Element Analysis (FEA) software in order to ensure optimization.

The 18SWS800 employs a 4” (100 mm) diameter 4-layer cooper voice coil using over 80 grams of cooper. This is wound in a fiberglass former, twice the thickness of typical formers, to drive the moving assembly with great rigidity.

A non-pressed long fiber pulp cone has the necessary stiffness to withstand the tremendous accelerating forces involved and is properly centered by two counteracting polycottonfiber spiders.

An triple cooling system consisting of a large diameter center hole surrounded by six smaller holes (directly cooling the gap) and six frame windows (cooling the air trapped between the two spiders) are responsible for an efficient heat transfer mechanism.

A highly reinforced aluminum injected frame is effective in absorbing mechanical shocks and acts as a heat sink without interfering with the magnetic field.

SPECIFICATIONS

Nominal diameter	460 (18)	mm (in)
Nominal impedance	8	
Minimum impedance @ 102 Hz	7.0	
Power handling		
Peak	3,200	W
Continuous Music[1]	1,600	W
NBR[2]	800	W
AES[3]	600	W
Sensitivity (2.83V@1m) averaged from 60 to 200 Hz	96	dB SPL
Power compression @ 0 dB (nom. power)	4.7	dB
Power compression @ -3 dB (nom. power)/2	2.8	dB
Power compression @ -10 dB (nom. power)/10	1.1	dB
Frequency response @ -10 dB	30 to 1,500	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	32	Hz
Vas	229 (8.09)	l (ft^3)
Qts	0.41	
Qes	0.42	
Qms	13.72	
o (half space)	1.69	%
Sd	0.1194 (185.07)	m^2 (in^2)
Vd (Sd x Xmax)	776.1 (47.34)	cm^3 (in^3)
Xmax (max. excursion (peak) with 10% distortion)	6.5 (0.26)	mm (in)
Xlim (max.excursion (peak) before physical damage)	24.5 (0.96)	mm (in)

Atmospheric conditions at TS parameter measurements:

Temperature	24 (75)	°C (°F)
Atmospheric pressure	1,020	mb
Humidity	59	%

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

ADDITIONAL PARAMETERS

L	24.5	Tm
Flux density	0.75	T
Voice coil diameter	100 (4)	mm (in)
Voice coil winding length	50.5 (165.6)	m (ft)
Wire temperature coefficient of resistance ( )	0.00388	1/°C
Maximum voice coil operating temperature	275 (527)	°C (°F)
vc (max.voice coil operating temp./max.power)	0.46 (0.88)	°C/W(°F/W)
Hvc (voice coil winding depth)	22.0 (0.87)	mm (in)
Hag (air gap height)	9.0 (0.35)	mm (in)
Re	5.8	
Mms	219 (0.48)	g (lb)
Cms	110	m/N
Rms	3.2	kg/s

NON-LINEAR PARAMETERS

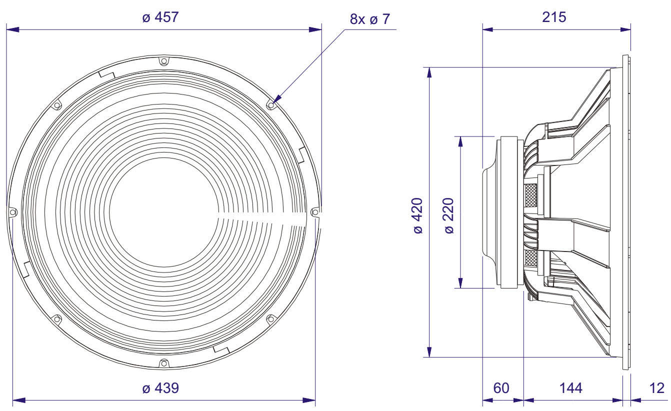
Le @ Fs (voice coil inductance @ Fs)	7.983	mH
Le @ 1 kHz (voice coil inductance @ 1 kHz)	3.872	mH
Le @ 20 kHz (voice coil inductance @ 20 kHz)	2.064	mH
Red @ Fs	0.443	
Red @ 1 kHz	8.869	
Red @ 20 kHz	120.161	
Krm	4.4	
Kxm	24.3	mH
Erm	0.87	
Exm	0.79	

ADDITIONAL INFORMATION

Magnet material	Barium ferrite	
Magnet weight	3,440 (120)	g (oz)
Magnet diameter x depth	220 x 24 (8.66 x 0.95)	mm (in)
Magnetic assembly weight	8,600 (18.96)	g (lb)
Frame material	Aluminum	
Frame finish	Black Silver epoxy	
Voice coil material	Copper	
Voice coil former material	Fiberglass	
Cone material	Non pressed long fiber pulp	
Volume displaced by woofer	8.6 (0.304)	l (ft^3)
Net weight	10,500 (23.15)	g (lb)
Gross weight	11,720 (25.84)	g (lb)
Carton dimensions (W x D x H)	48 x 48 x 24 (18.9 x 18.9 x 9.5)	cm (in)

MOUNTING INFORMATION

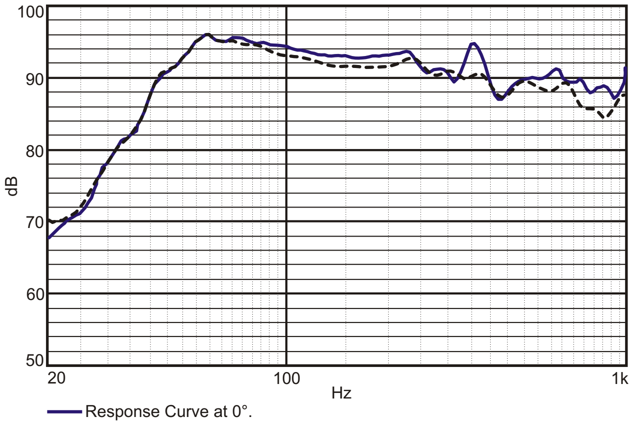
Number of bolt-holes	8	
Bolt-hole diameter	7.0 (0.27)	mm (in)
Bolt-circle diameter	439 (17.28)	mm (in)
Baffle cutout diameter (front mount)	422 (16.61)	mm (in)
Baffle cutout diameter (rear mount)	412 (16.22)	mm (in)
Connectors	Silver-plated push terminals	
Polarity	Positive voltage applied to the positive 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.

SUBWOOFER 18SWS800

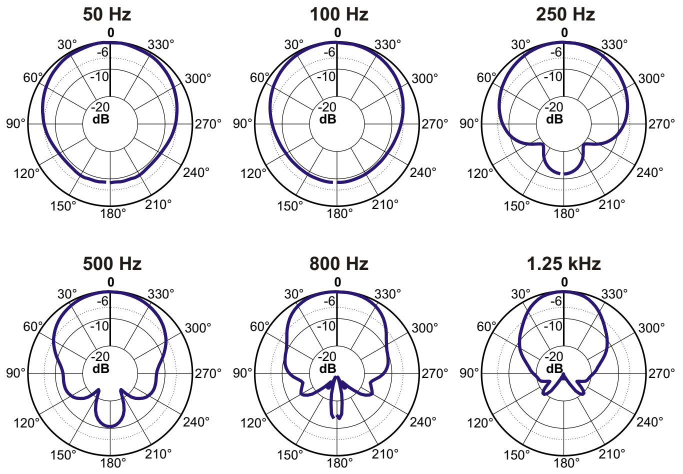
RESPONSE CURVES (0° AND 45°) IN A TEST ENCLOSURE ON GROUND PLANE AND OUTDOOR ENVIRONMENT, 1 W / 1m



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

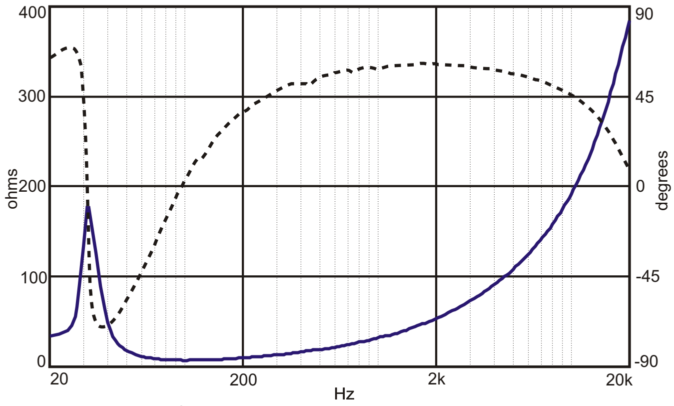
Response curves measured on ground plane and outdoor environment with the subwoofer installed in a test enclosure, 1 W / 1 m. This curves was decreased 6 dB to compensate the ground plane gain.

POLAR RESPONSE CURVES



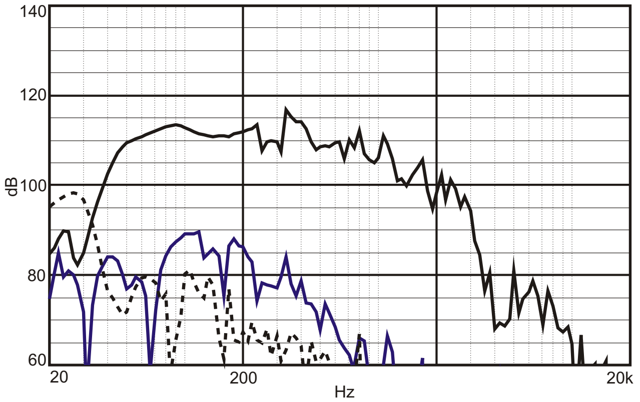
Polar Response Curve.

IMPEDANCE AND PHASE CURVES, MEASURED IN FREE-AIR



Impedance Curve.
Phase Curve.

HARMONIC DISTORTION CURVES MEASURED AT 10% AES INPUT POWER IN A TEST ENCLOSURE INSIDE AN ANECHOIC CHAMBER, 1 m



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

TEST ENCLOSURE

191-liter volume with 3 ducts ø 6" by 7.87" length.

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:

$$T_B \quad T_A \quad \frac{R_B}{R_A} \quad 1 \quad T_A \quad 25 \quad \frac{1}{_{25}}$$

T_A , T_B= voice coil temperatures in °C.
R_A , R_B= voice coil resistances at temperatures T_A and T_B, respectively.
= 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

HB1805A1 HB1805B1 HB1805C1 VB1805A1 PAS1G1 PAS2G1 PAS3G1 VB18P1

For additional project suggestions, please access our website.