SUBWOOFER
18SWS1100

SELENIUM PRO

The 18SWS1100 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 2,200 Watts Continous Music.

A bumped bottom plate assures a compatible maximum displacement and the extended pole piece keeps the magnetic field linearity in order to avoid distortion; it also improves the heat transfer.

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

A 4” (100 mm) voice coil wound in a fiberglass former with flat aluminum wire drives the moving assembly.

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 polycotton fiber 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	6.8	
Power handling		
Peak	4,400	W
Continuous Music[1]	2,200	W
NBR[2]	1,100	W
AES[3]	1,100	W
Sensitivity (2.83V@1m) averaged from 70 to 300 Hz	97	dB SPL
Power compression @ 0 dB (nom. power)	4.1	dB
Power compression @ -3 dB (nom. power)/2	2.4	dB
Power compression @ -10 dB (nom. power)/10	1.7	dB
Frequency response @ -10 dB	30 to 3,000	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	34	Hz
Vas	253 (8.93)	l (ft^3)
Qts	0.50	
Qes	0.52	
Qms	11.68	
o (half space)	1.94	%
Sd	0.1194 (185.07)	m^2 (in^2)
Vd (Sd x Xmax)	1,134.3 (69.22)	cm^3 (in^3)
Xmax (max. excursion (peak) with 10% distortion)	9.3 (0.37)	mm (in)
Xlim (max.excursion (peak) before physical damage)	25 (0.98)	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	20.4	Tm
Flux density	0.93	T
Voice coil diameter	100 (4)	mm (in)
Voice coil winding length	39.7 (130.3)	m (ft)
Wire temperature coefficient of resistance ( )	0.00372	1/°C
Maximum voice coil operating temperature	275 (527)	°C (°F)
vc (max.voice coil operating temp./max.power)	0.34 (0.66)	°C/W(°F/W)
Hvc (voice coil winding depth)	32.0 (1.26)	mm (in)
Hag (air gap height)	13.5 (0.53)	mm (in)
Re	5.6	
Mms	168.7 (0.372)	g (lb)
Cms	1 30	m/N
Rms	3.2	kg/s

NON-LINEAR PARAMETERS

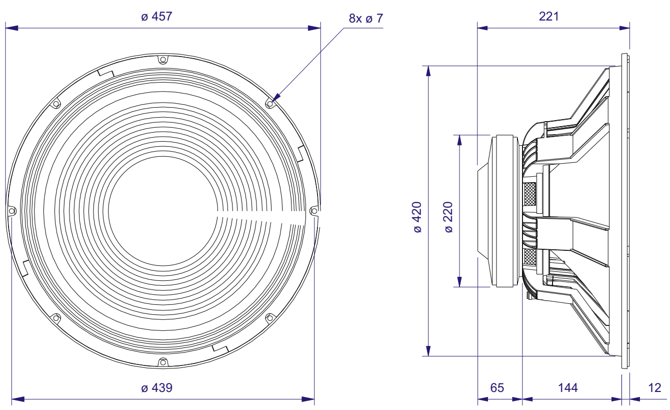
Le @ Fs (voice coil inductance @ Fs)	7.377	mH
Le @ 1 kHz (voice coil inductance @ 1 kHz)	2.197	mH
Le @ 20 kHz (voice coil inductance @ 20 kHz)	0.747	mH
Red @ Fs	0.501	
Red @ 1 kHz	9.050	
Red @ 20 kHz	118.992	
Krm	4.9	
Kxm	51.2	mH
Erm	0.86	
Exm	0.64	

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	11,200 (24.69)	g (lb)
Frame material	Aluminum	
Frame finish	Black-Silver epoxy	
Voice coil material	Aluminum	
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	14,180 (31.26)	g (lb)
Gross weight	15,400 (33.95)	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

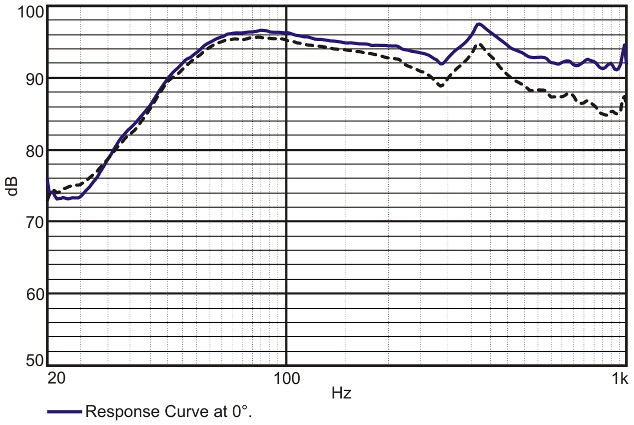
Number of bolt-holes	8	
Bolt-hole diameter	7 .0 (0.27)	mm (in)
Bolt-circle diameter	439 (17.28)	mm (in)
Baffle cutout diameter (front mount)	422 (16.61)	mm (in)
Baffle cutout diameter (rear mount)	412 (16.22)	mm (in)
Connectors	Silver-plated push terminals	
Polarity	Positive voltage applied to the positive 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 18SWS1100

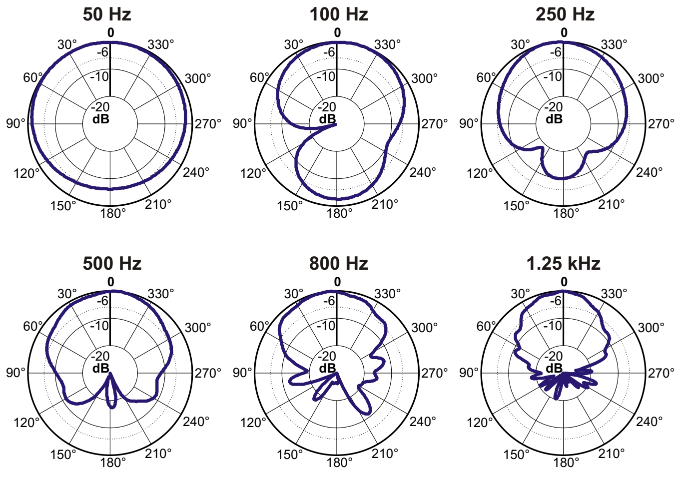
RESPONSE CURVES (0° AND 45°) IN A TEST ENCLOSURE ON GROUND PLANE AND OUTDOOR ENVIRONMENT, 1 W / 1m



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

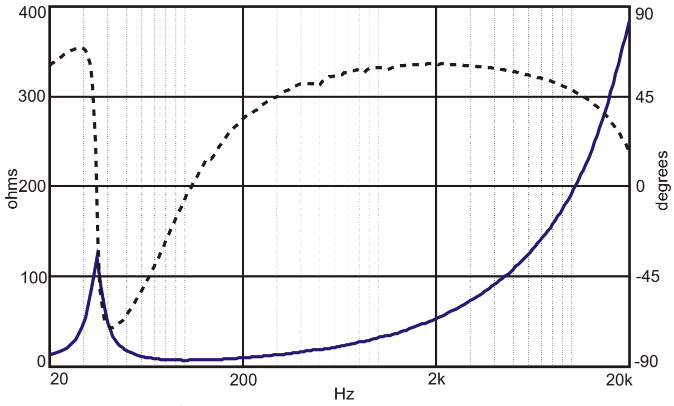
Response curves measured on ground plane and outdoor environment with the subwoofer installed in a test enclosure, 1 W / 1 m. This curves was decreased 6 dB to compensate the ground plane gain.

POLAR RESPONSE CURVES



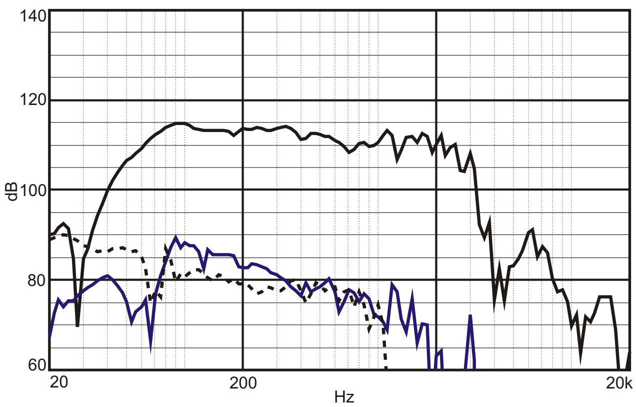
Polar Response Curve.

IMPEDANCE AND PHASE CURVES, MEASURED IN FREE-AIR



Impedance Curve.
Phase Curve.

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



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

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

HB1805A1 HB1805B1 HB1805C1 VB1805A1 PAS1G1 PAS2G1 PAS3G1
For additional project suggestions, please access our website.

TEST ENCLOSURE

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