SELENIUM PRO

SUBWOOFER
15SW1P / 15SW1P-SLF*

The 15SW1P / 15SW1P-SLF* is a high power 15” professional subwoofer specially designed to reproduce sound at the very low end of the audio spectrum.

In order to achieve a perfect performance in this very demanding region of low frequencies, the 15SW1P / 15SW1P-SLF* is capable of handling up to 800 W RMS or 1,600 W (Musical Program).

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 polyamide 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.

*15SW1P-SLF: Product without Selenium logo printed on the dust cap.

SPECIFICATIONS

Nominal diameter	380 (15)	mm (in)
Nominal impedance	8	Ω
Minimum impedance @ 118 Hz	7.5	Ω
Power handling		
Musical program[1]	1,600	W
AES[2]	800	W
Sensitivity (2.83V@1m) averaged from 80 to 250 Hz	96	dB SPL
Power compression @ 0 dB (nom. power)	3.5	dB
Power compression @ -3 dB (nom. power)/2	2.8	dB
Power compression @ -10 dB (nom. power)/10	0.7	dB
Frequency response @ -10 dB	30 to 2,500	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] AES Standard (60 - 600 Hz).

THIELE-SMALL PARAMETERS

Fs	40	Hz
Vas	120 (4.24)	l (ft^3)
Qts	0.35	
Qes	0.36	
Qms	12.34	
ηo (half space)	2.36	%
Sd	0.0814 (126.17)	m^2 (in^2)
Vd (Sd x Xmax)	350.0 (21.36)	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 (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

βL	21.5	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 ($\alpha25$)	0.00372	1/°C
Maximum voice coil operating temperature	275 (527)	°C (°F)
θvc (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 (0.532)	mm (in)
Re	5.5	Ω
Mms	121.0 (0.267)	g (lb)
Cms	130.0	µm/N
Rms	2.5	kg/s

NON-LINEAR PARAMETERS

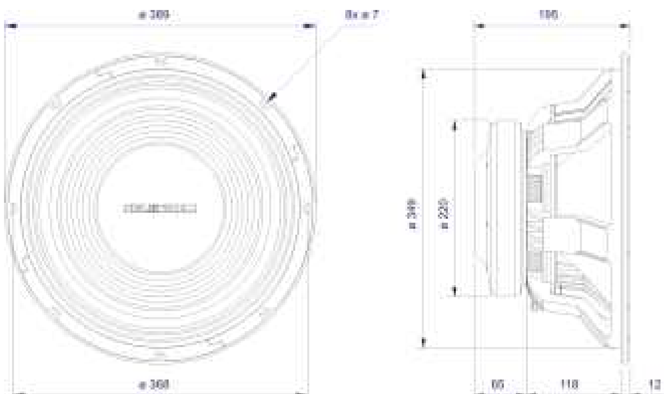
Le @ Fs (voice coil inductance @ Fs)	11.702	mH
Le @ 1 kHz (voice coil inductance @ 1 kHz)	2.716	mH
Le @ 20 kHz (voice coil inductance @ 20 kHz)	0.698	mH
Red @ Fs	0.85	Ω
Red @ 1 kHz	10.38	Ω
Red @ 20 kHz	107.39	Ω
Krm	11.328	mΩ
Kxm	143.326	mH
Erm	0.780	
Exm	0.547	

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	11,800 (26.01)	g (lb)
Frame material	Aluminum	
Frame finish	Black epoxy	
Voice coil material	Aluminium	
Voice coil former material	Fiberglass	
Cone material	Non-pressed long fiber pulp	
Volume displaced by woofer	6.6 (0.233)	l (ft^3)
Net weight	13,920 (30.69)	g (lb)
Gross weight	14,700 (32.41)	g (lb)
Carton dimensions (W x D x H)	43 x 43 x 23 (16.9 x 16.9 x 9.1)	cm (in)

MOUNTING INFORMATION

Number of bolt-holes	8	
Bolt-hole diameter	7.0 (0.27)	mm (in)
Bolt-circle diameter	368 (14.49)	mm (in)
Baffle cutout diameter (front mount)	351 (13.82)	mm (in)
Baffle cutout diameter (rear mount)	345 (13.58)	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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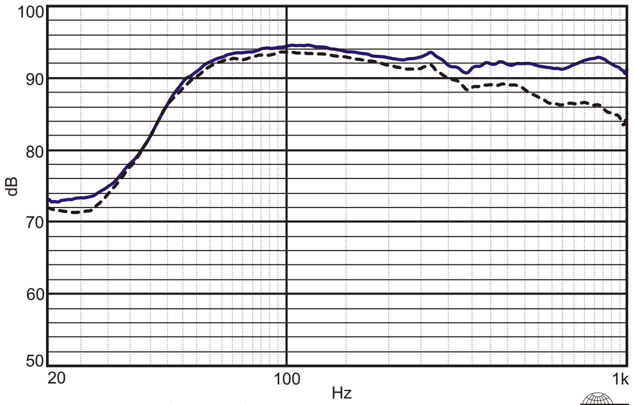
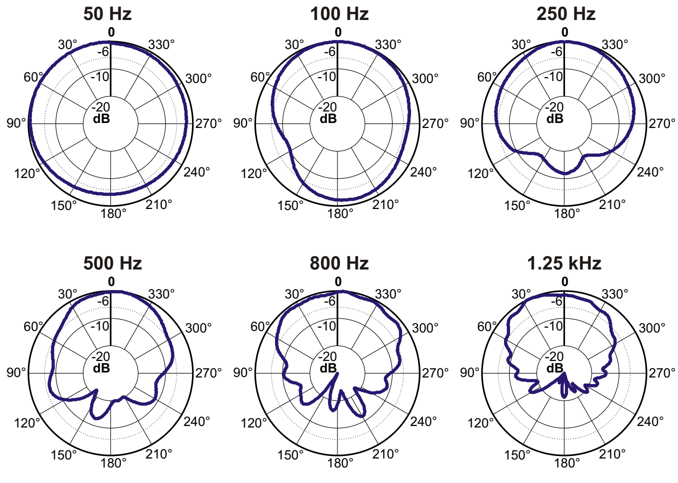
RESPONSE CURVES (0° AND 45°) IN A TEST ENCLOSURE ON GROUND PLANE AND OUTDOOR ENVIRONMENT, 1 W / 1m

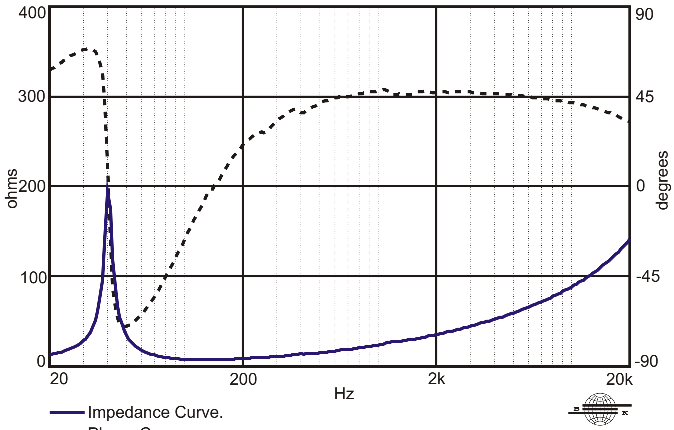


Response curves measured on ground plane and outdoor environment with the subwoofer installed in a test enclosure, 1 W / 1 m. This curves was decreased 6 dB to compensate the ground plane gain.

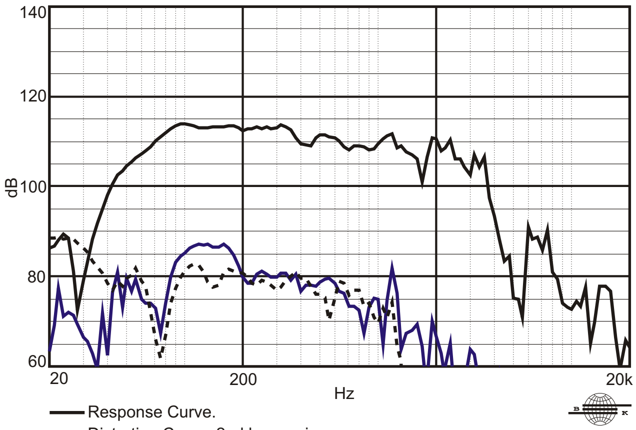
POLAR RESPONSE CURVES



IMPEDANCE AND PHASE CURVES, MEASURED IN FREE-AIR



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



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
HB1502B1 HB1505C1
For additional project suggestions, please access our website.

TEST ENCLOSURE
100-liter volume with 2 ducts ø 4” by 13.78” length.

Specifications subject to change without prior notice.

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