15" Woofer for bass professional sound reinforcement.

Its dust cap and cone are made with Selenium exclusive QCF® Quartz Composite Fiber, a water and ultra violet resistant material for environments where moisture and radiation are of high consideration.

Offering high power capacity, outstanding low end response and exceptional long term performance, this transducer is ideal for compact woofer enclosures. This woofer exhibits excellent acoustics with work horse construction. Designed for smaller enclosures, the WPU1507 / WPU1507-SLF* is a versatile high performance woofer.

General construction includes a sturdy cast frame, impregnated cloth surround, stable double spider and three extra vent gap holes (in addition to a large central one) in order to reduce long term heat build-up.

*WPU1507-SLF: Product without Selenium logotype printed on the dust cap.

SPECIFICATIONS

Nominal diameter	380 (15)	mm (in)
Nominal impedance	8	
Minimum impedance @ 160 Hz	7.9	
Power handling		
Musical program[1]	1,000	W
AES[2]	500	W
Sensitivity (2.83V @ 1m) averaged from 100 to 500 Hz	96	dB SPL
Power compression @ 0 dB (nom. power)	3.9	dB
Power compression @ -3 dB (nom. power)/2	2.8	dB
Power compression @ -10 dB (nom. power)/10	1.0	dB
Frequency response @ -10 dB	45 to 3,500	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	35	Hz
Vas	170 (6.00)	l (ft³)
Qts	0.33	
Qes	0.33	
Qms	27.07	
o (half space)	2.10	%
Sd	0.0814 (126.17)	m² (in²)
Vd (Sd x Xmax)	350.0 (21.36)	cm³ (in³)
Xmax (max. excursion (peak) with 10% distortion)	4.3 (0.17)	mm (in)
Xlim (max. excursion (peak) before physical damage)	9.0 (0.35)	mm (in)

Atmospheric conditions at TS parameter measurements:

Temperature	25 (77)	°C (°F)
Atmospheric pressure	1,021	mb
Humidity	55	%

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

ADDITIONAL PARAMETERS

L	22.1	Tm
Flux density	1.06	T
Voice coil diameter	100 (4)	mm (in)
Voice coil winding length	29.8 (97.8)	m (ft)
Wire temperature coefficient of resistance ( )	0.00345	1/°C
Maximum voice coil operation temperature	275 (527)	°C (°F)
vc (max. voice coil operation temp./max. power)	0.55 (1.05)	°C/W(°F/W)
Hvc (voice coil winding depth)	18.0 (0.71)	mm (in)
Hag (air gap height)	9.5 (0.37)	mm (in)
Re	6.5	
Mms	113.7 (0.25)	g (lb)
Cms	183.3	m/N
Rms	0.9	kg/s

NON-LINEAR PARAMETERS

|		
Le @ Fs (voice coil inductance @ Fs)	8.517	mH
Le @ 1 kHz (voice coil inductance @ 1 kHz)	1.986	mH
Le @ 20 kHz (voice coil inductance @ 20 kHz)	0.537	mH
Red @ Fs	0.45	
Red @ 1 kHz	6.77	
Red @ 20 kHz	77.22	
Krm	5.576	m
Kxm	90.344	mH
Erm	0.812	
Exm	0.564	

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	8,440 (18.61)	g (lb)
Frame material		Aluminum
Frame finish		Black epoxy
Magnetic assembly steel finish		Zinc-plated
Voice coil material		Copper
Voice coil former material		Polyimide (Kapton®)
Cone material		Quartz Composite Fiber (QCF®)
Volume displaced by woofer	6.5 (0.230)	l (ft³)
Net weight	10,800 (23.81)	g (lb)
Gross weight	11,860 (26.15)	g (lb)
Carton dimensions (W x D x H)	40 x 40 x 18.5 (15.8 x 15.8 x 7.3)	cm (in)

MOUNTING INFORMATION

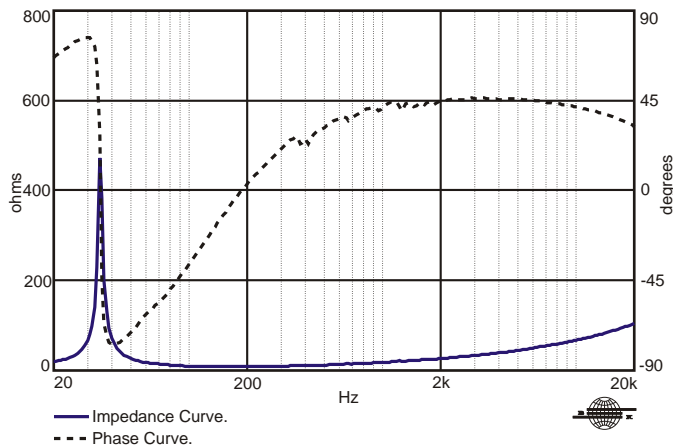|		
Number of bolt-holes	8	
Bolt-hole diameter	8 .0 (0.32)	mm (in)
Bolt-circle diameter	373 (14.69)	mm (in)
Baffle cutout diameter (front mount)	351 (13.82)	mm (in)
Baffle cutout diameter (rear mount)	345 (13.58)	mm (in)
Connectors		Silver-plated push terminals
Polarity		Positive voltage applied to the positive terminal (red) gives forward cone motion
Minimum clearance between the back of the magnetic assembly and the enclosure wall	75 (3)	mm (in)
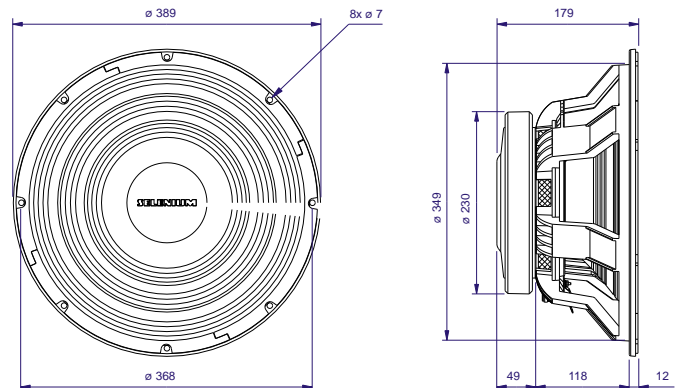
Dimensions in mm.

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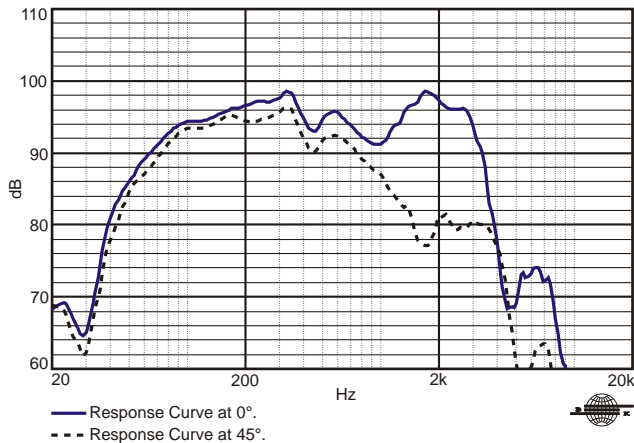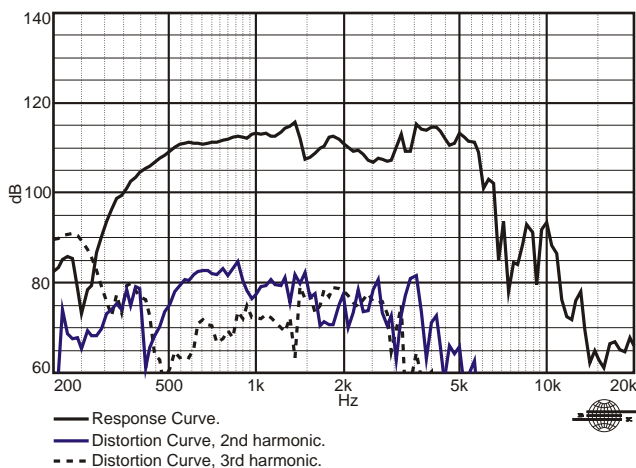

— Response Curve at 0°.
-- Response Curve at 45°.
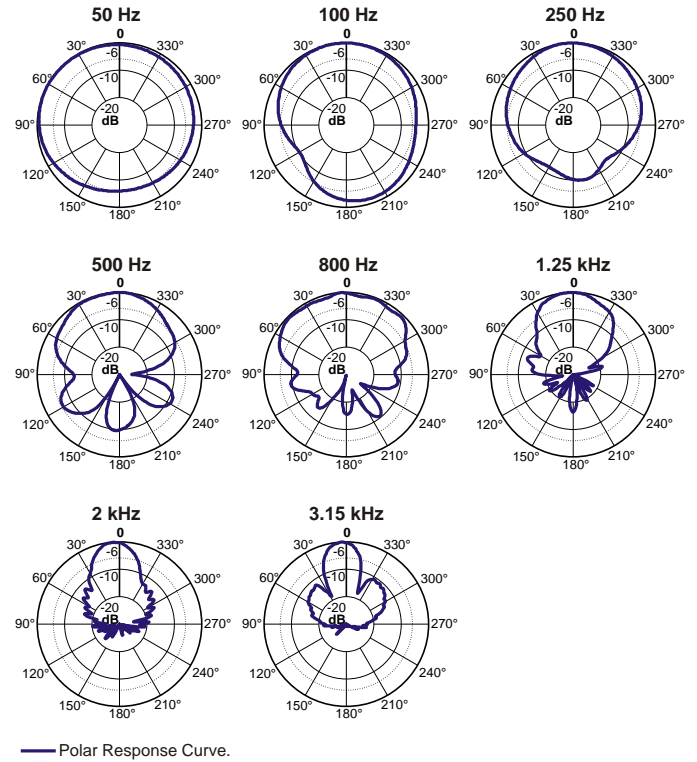
IMPEDANCE AND PHASE CURVES MEASURED IN FREE-AIR

— Impedance Curve.
-- Phase Curve.

HARMONIC DISTORTION CURVES MEASURED AT 10% AES 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 = 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, Exm from an empirical model, we can calculate voice coil impedance with good accuracy.

SUGGESTED PROJECTS

HB1505A1   HB1505B1   HB1505C1   HB1505D1   HB1505E1 HB1502B1
VB1505A1   VB1505B1   VB1505C1   SD1505A3   SD1505B3 SD1505C3
PAS1MA1   PAS3MA2   PAS3MA3   PAS3G2   RB1505A1
For additional project suggestions, please access our web site.

TEST ENCLOSURE
110-liter volume with a duct ø 4" by 1.58" cm in length.