

Woofers 15" especially designed for applications where the low weight is the important factor, as: portable speakers or suspended systems (Fly). It possesses aluminum casting heat sink and aluminum injected basket, conferring to the system optimized refrigeration making possible the use in high power.

Its great efficiency in sound reproduction is due to the excellent combination of the different components:

- The light cone manufactured with long fiber pulp together with a surround of impregnated fabric give the array great stability high yield and low distortion.
- The voice coil is made of high temperature wire, wound on Kapton former.
- The epoxy painted reinforced aluminum injected frame provides the array with high mechanical resistance.
- The magnet assembly was designed with the assistance of a Finite Element Analysis (FEA) software in order to ensure optimization. This product uses Neodymium technology, magnetic shield minimizing the magnetic interference, being able to be used next to the electro-electronic equipment.
- The use of highly resistant adhesives guarantees optimal cohesion and durability of components.

SPECIFICATIONS

Nominal diameter	380 (15)	mm (in)
Nominal impedance	8	Ω
Minimum impedance @ 260 Hz	6.7	Ω
Power handling		
Musical Program ¹	700	W
AES ²	350	W
Sensitivity (2.83V@1 m) averaged from 50 to 4,000 Hz	98	dB SPL
Power compression @ 0 dB (nom. power)	5.24	dB
Power compression @ -3 dB (nom. power)/2	3.43	dB
Power compression @ -10 dB (nom. power)/10	1.146	dB
Frequency response @ -10 dB	45 to 4,500	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 (200 - 2 kHz).

THIELE-SMALL PARAMETERS

Fs	43.6	Hz
Vas	165 (5.82)	l (ft ³)
Qts	0.45	
Qes	0.46	
Qms	18.90	
τ ₀ (half space)	2.88	%
Sd	0.08605 (133.37)	m ² (in ²)
Vd(SdxXmax)	323.0 (19.71)	cm ³ (in ³)
Xmax (max. excursion (peak) with 10% distortion) ..	3.75 (0.14)	mm (in)
Xlim (max. excursion (peak) before physical damage)	18.0 (0.70)	mm (in)

Atmospheric conditions at TS parameter measurements:

Temperature	25 (77)	°C (°F)
Atmospheric pressure	1,016	mb
Humidity	51	%

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

ADDITIONAL PARAMETERS

PL	17.7	Tm
Flux density	1.20	T
Voice coil diameter	75 (3)	mm (in)
Voice coil winding length	24.5 (80.38)	m (ft)
Wire temperature coefficient of resistance (<25)	0.00322	1/°C
Maximum voice coil operating temperature	310 (590)	°C (°F)
8vc (max. voice coil operating temp./max. power) ..	0.88 (33.58)	°C/W (°F/W)
Hvc (voice coil winding depth)	15.5 (0.61)	mm (in)
Hag (air gap height)	8.0 (0.32)	mm (in)
Re	6.1	Ω
Mms	85.1 (0.187)	g (lb)
Cms	158.0	nm/N
Rms	1.25	kg/s

NON-LINEAR PARAMETERS

Le @ Fs (voice coil inductance @ Fs)	2.469	mH
Le @ 1 kHz (voice coil inductance @ 1kHz)	1.235	mH
Le @ 20 kHz (voice coil inductance @ 20 kHz)	0.638	mH
Red @ Fs	0.155	Ω
Red @ 1 kHz	3.118	Ω
Red @ 20 kHz	56.389	Ω
Krm	0.8	mΩ
Kxm	8.6	mH
Erm	0.96	
Exm	0.80	

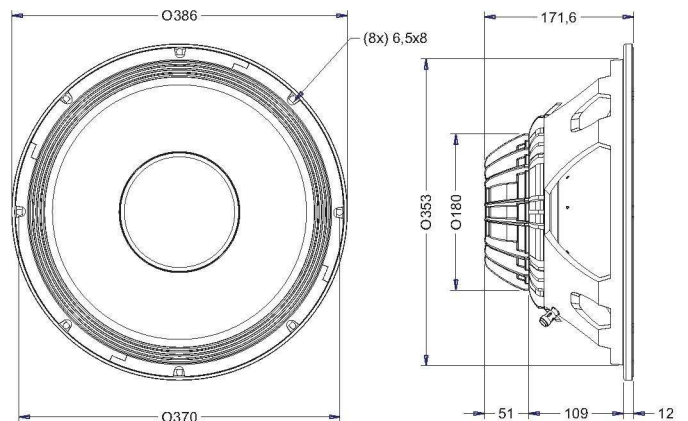


ADDITIONAL INFORMATION

Magnet material	Neodymium
Magnet weight	350 (12.34) g (oz)
Magnet diameter x depth	72 x 13 (2.83 x 0.51) mm (in)
Magnetic assembly weight	2,300 (5.07) 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	Long fiber pulp
Volume displaced by woofer	8.3 (0.293) l (ft ³)
Net weight	4,360 (9.61) g (lb)
Gross weight	5,220 (11.50) g (lb)
Carton dimensions (W x D x H) ..	41 x 41 x 28 (16.14 x 16.14 x 11.02) cm (in)

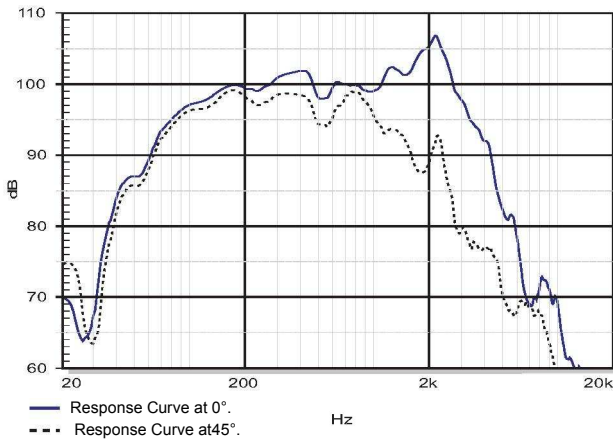
MOUNTING INFORMATION

Number of bolt-holes	8
Bolt-hole diameter	6.5 (0.25) mm (in)
Bolt-circle diameter	370 (14.56) mm (in)
Baffle cutout diameter (front mount)	355 (13.97) mm (in)
Baffle cutout diameter (rear mount)	348 (13.70) mm (in)
Connectors	Push on terminals
Polarity	Positive voltage applied to the positive (+) terminal gives forward cone motion
Minimum clearance between the back of the magnetic assembly and the enclosure wall	75 (3) mm (in)

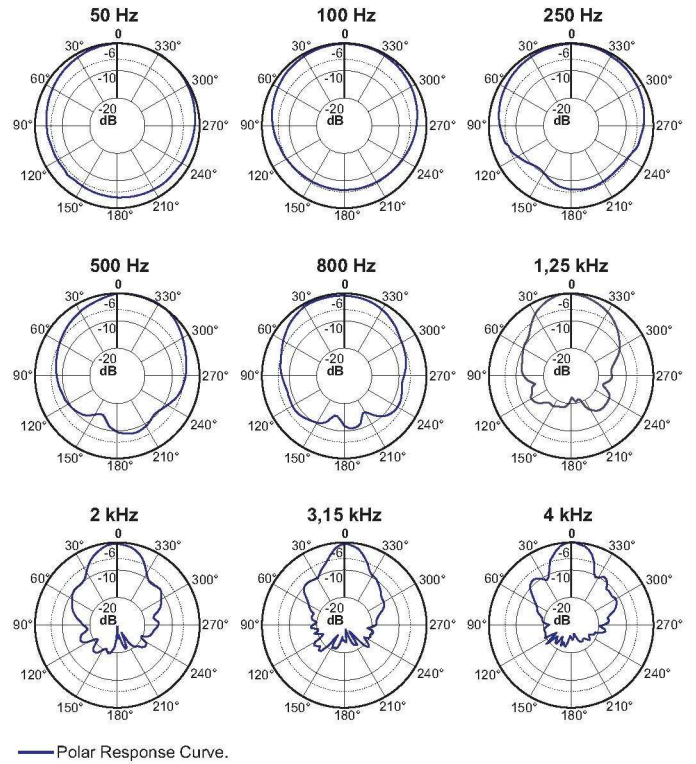


Dimensions in mm.

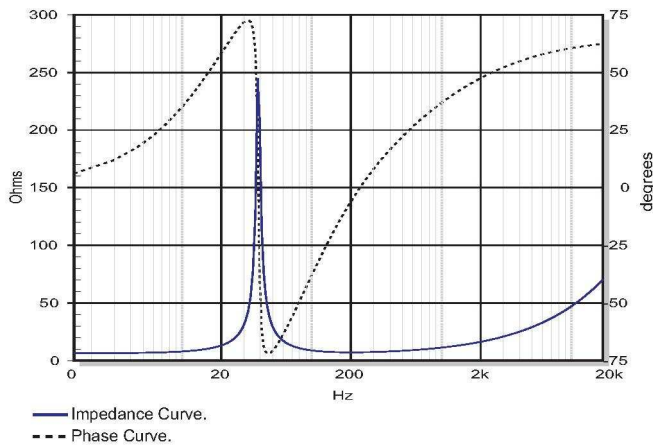
RESPONSE CURVES (0° AND 45°) IN A TEST ENCLOSURE INSIDE AN ANECHOIC CHAMBER, 1 W/1 m



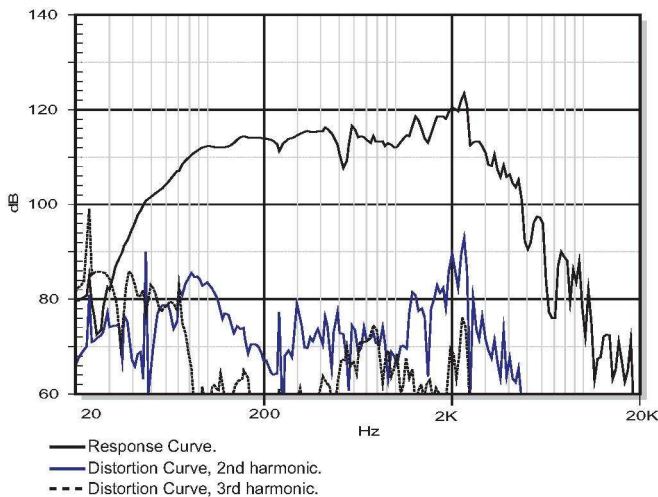
POLAR RESPONSE CURVES



IMPEDANCE AND PHASE CURVES MEASURED IN FREE-AIR



HARMONIC DISTORTION CURVES MEASURED AT 10% AES INPUT POWER, 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 $K_{rm}, K_{xm}, E_{rm}, E_{xm}$ from an empirical model, we can calculate voice coil impedance with good accuracy.

SUGGESTED PROJECTS

For additional projects suggestions, please access our web site.

TEST ENCLOSURE

110-litervolume with a duet 0.4" by 1.7" length.