



# FreeSpace® DS 40F Loudspeaker

## Product Overview

The Bose® FreeSpace® DS 40F loudspeaker is a high-performance, flush-mount loudspeaker designed for foreground and background music and speech reproduction in a wide range of commercial applications, including retail, restaurant and hospitality establishments. Clean, sleek styling visually blends into ceilings. The DS 40F loudspeaker meets numerous standards for combination music and evacuation systems around the world.

## Product Information

The FreeSpace DS 40F flush-mount loudspeaker is engineered for installation in ceilings up to 26ft (8m) high, and is suitable for use in air handling (plenum) spaces. An optional pendant-mount kit allows the loudspeaker to be hung from open ceilings.

The FreeSpace DS 40F loudspeaker can be used as an 8-ohm, 40-watt loudspeaker or as a 70/100V loudspeaker. Transformer taps can be set by using an innovative thumb wheel, accessible from the front of the loudspeaker underneath the grille.

Performance of the FreeSpace DS 40F loudspeaker can be maximized through the use of the recommended Bose loudspeaker equalization resident in select Bose electronics or by using other equipment with parametric equalization. The loudspeaker can be used out of the box with a 70-Hz high-pass filter when recommended loudspeaker equalization is not used.

The DS 40F loudspeaker is acoustically compatible with the DS 40SE surface-mount loudspeaker and can be integrated on the same loudspeaker line.

The FreeSpace DS 40F loudspeaker meets numerous standards for combination music and evacuation systems around the world. An optional ceramic connector and thermal fuse kit accessory is available for use when required.



## Key Features

- Maximum SPL of 103 dB-SPL (109 dB-SPL peak)
- Full-range performance from 80 Hz to 16 kHz
- 125° conical coverage pattern
- Single 4.5" (114mm) full-range HVC (Helical Voice Coil) driver
- Quick and easy flush-mount installation
- Mounting arms accommodate ceiling thicknesses up to 3.25" (83mm)
- Shortcan design allows installation in shallower ceilings with minimum depth of 6.4" (163mm)
- Integrated multi-tap transformer provides easy-to-change tap settings that are accessible underneath loudspeaker grille:  
70V – 2.5W, 5W, 10W, 20W, 40W  
100V – 5W, 10W, 20W, 40W
- Can be used as an 8Ω, 40W loudspeaker
- Elegant, modern styling that blends with décor; available in black or white and can be painted
- Can be combined with the FreeSpace DS 40SE surface-mount loudspeaker on the same loudspeaker line
- Listed to ANSI/UL 1480-2005
- Suitable for use in air handling (plenum) spaces

## Applications

The FreeSpace DS 40F loudspeaker is well-suited for permanent installations in:

- Retail stores
- Transportation facilities
- Hospitality venues
- Concourses
- Restaurants
- Houses of worship

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## Loudspeaker



### Detailed Product Specifications

Power handling <sup>1</sup>	40W
Nominal Impedance (transformer bypass)	8Ω
Sensitivity <sup>2</sup> (at 1W @ 1m)	87 dB-SPL
Maximum SPL <sup>3</sup> (pink noise @ 1m @ rated power)	103 dB-SPL 109 dB-SPL (Peak)
Frequency range <sup>4</sup> (-3 dB)	80 Hz – 16 kHz
Beamwidth (-6 dB point, average 1 – 4 kHz)	125° conical

<sup>1-4</sup> See “How our Loudspeakers are Measured” on page 8.

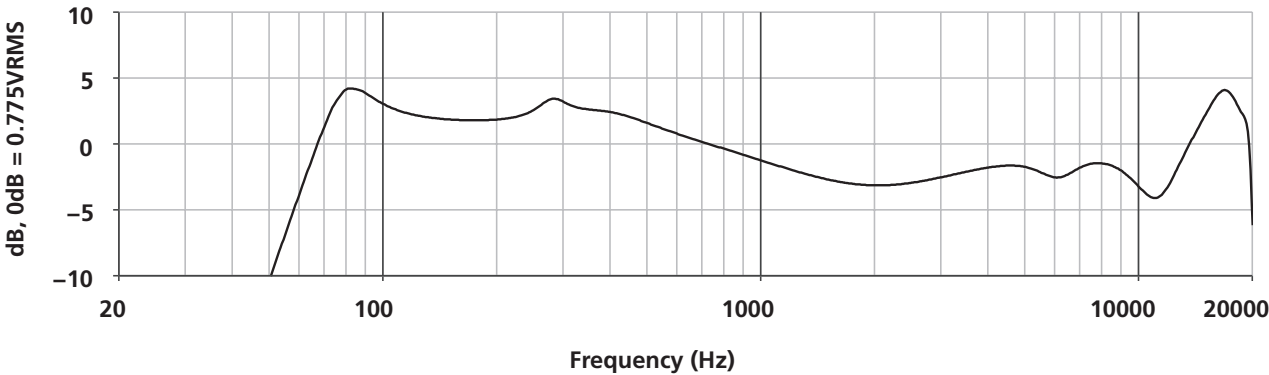
### Additional Product Information

Performance of the FreeSpace® DS 40F loudspeaker can be maximized through the use of the recommended Bose® loudspeaker equalization resident in select Bose electronics or by using other equipment with parametric equalization.

The loudspeakers can be used out of the box with a 70-Hz high-pass filter when recommended loudspeaker equalization is not used.

TECHNICAL DATA SHEET

### Recommended Loudspeaker Equalization Curve



# FreeSpace® DS 40F

## Loudspeaker



### Driver complement:

4.5" (114mm) full-range HVC  
(Helical Voice Coil) driver

### Construction features:

- Enclosure: Polypropylene (front baffle), Powder-coated steel (rear enclosure)
- Grille: Powder-coated steel
- Integral quick-install mounting features
- Three mounting points at the rear of the housing for pendant mounting

### Dimensions:

Outer flange diameter: 11.8" (299mm)  
Ceiling hole diameter: 10.5" (267mm)  
Height to top of housing: 5.7" (146mm)

### Weight:

Product: 8.3lb (3.7kg)  
Shipping: 11lb (5kg)  
Product (8 Ohm variant): 6.3lb (2.8kg)  
Shipping (8 Ohm variant): 9lb (4.1kg)

### Package contents:

Loudspeaker, installation guide and paint shield

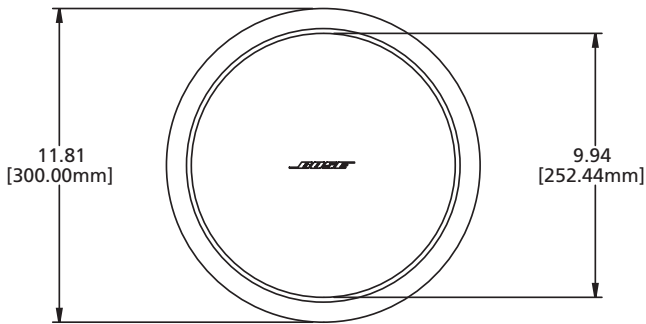
### Finish:

Textured black or white finish with a contoured, powder-coated steel grille. Both the enclosure and grille can be painted.

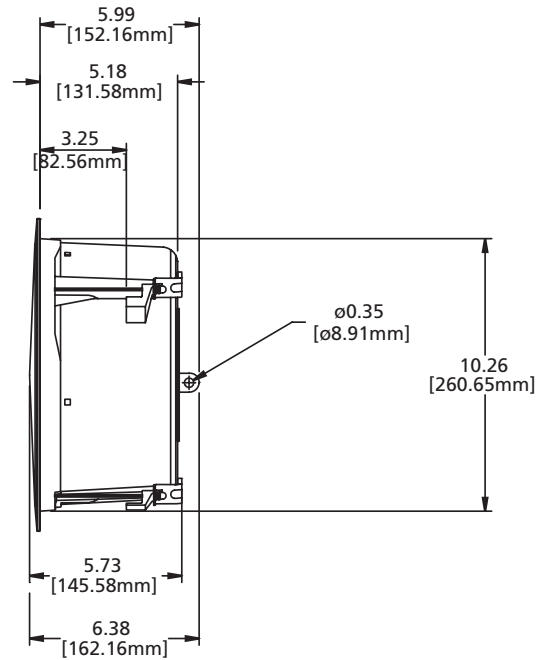
### Connectors:

Three-terminal barrier strip  
Two-terminal barrier strip (8 Ohm variant)

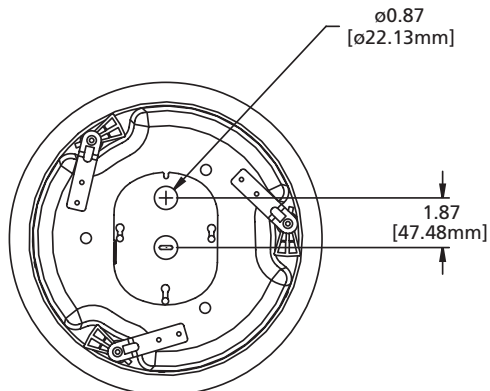
### Mechanical diagrams:



Front View

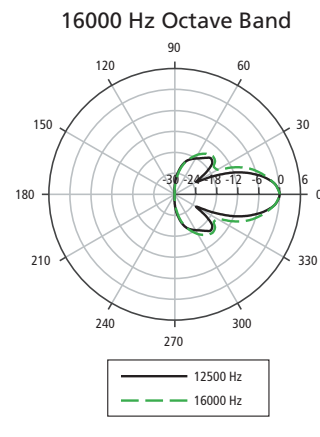
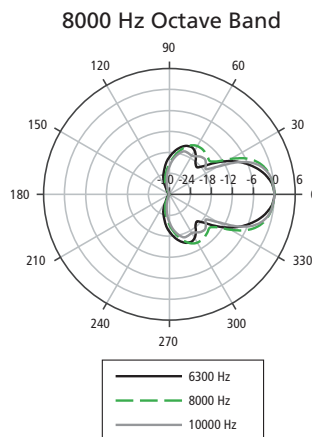
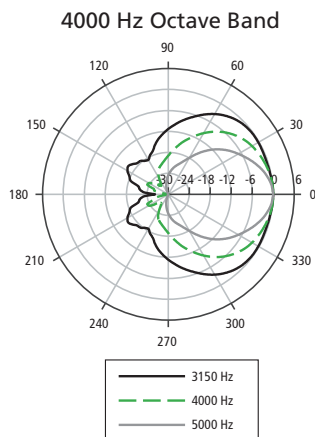
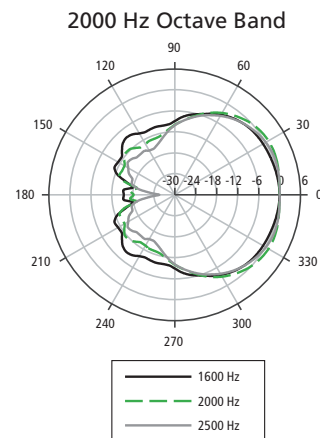
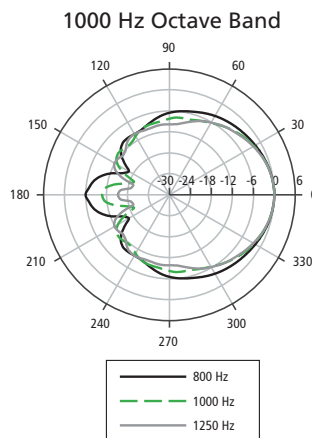
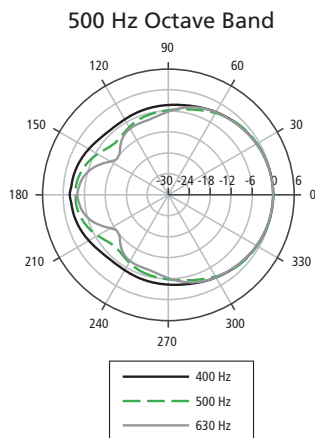
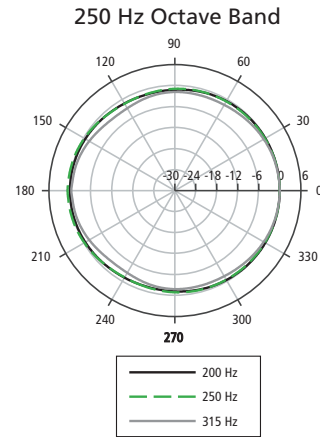
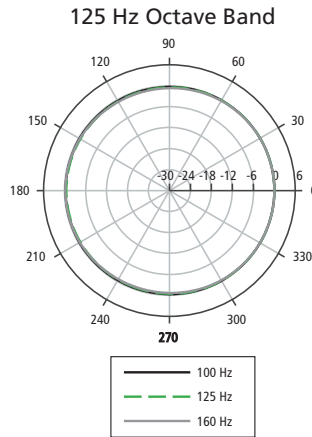
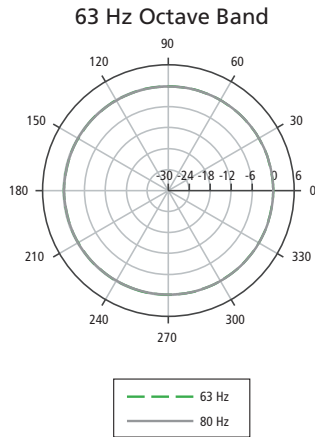


Side View



Rear View

### Polar Plots 1/3 Octave Horizontal

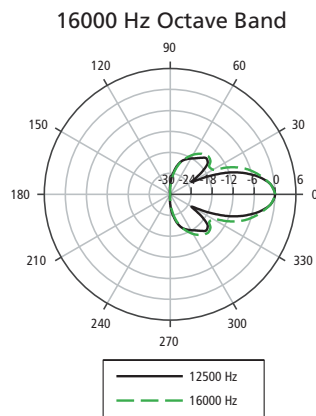
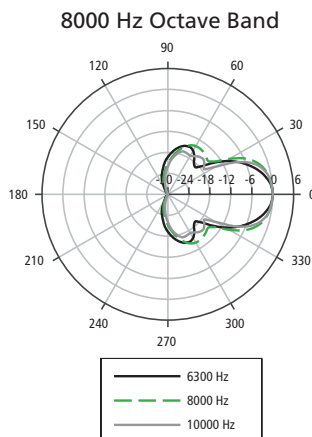
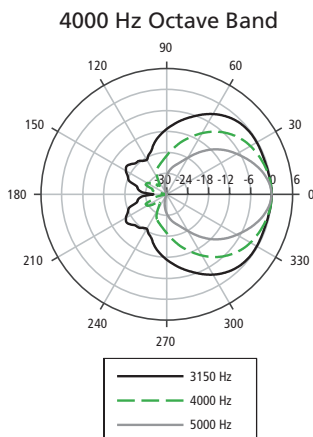
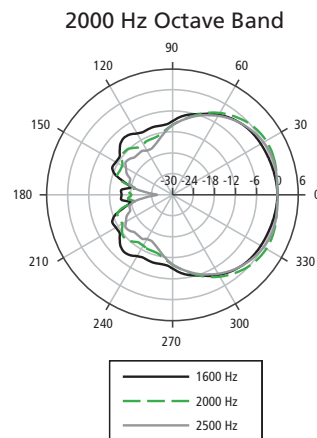
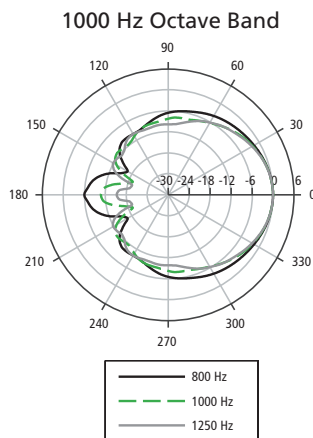
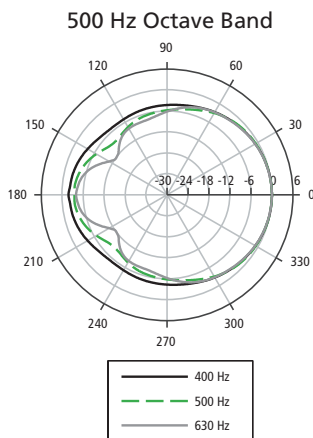
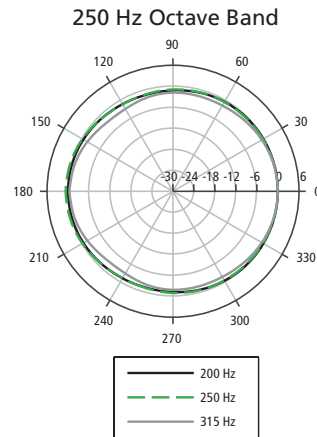
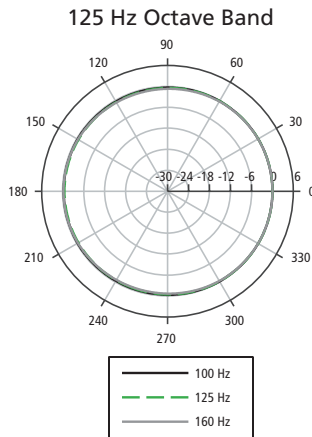
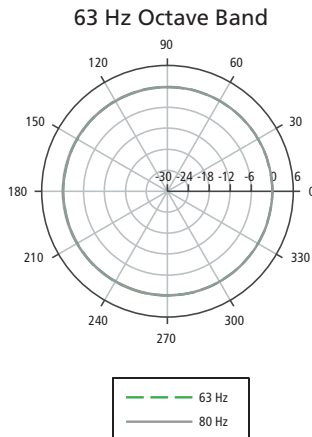


# FreeSpace® DS 40F

## Loudspeaker



### Polar Plots 1/3 Octave Vertical



# FreeSpace® DS 40F Loudspeaker



TECHNICAL DATA SHEET

## Design Recommendations

When creating a design that uses FreeSpace® DS 40F loudspeakers, you should consider the following:

- FreeSpace DS 40F loudspeakers are ideally suited to background and foreground music and paging applications. If your customer's requirement is for a foreground music system, consider the FreeSpace DS 100F loudspeaker. For background music systems, consider the FreeSpace DS 16F loudspeaker.
- Recommended mounting height for the FreeSpace DS 40F loudspeaker is between 8 and 26ft (2.4 and 8m).
- Maximum SPL for a typical application is between 91 and 106 dB-SPL.
- Always add 25% headroom to your amplifier to accommodate various types of program material.

Coverage requirements vary for each application, and the loudspeaker spacing will vary based on mounting height and listener height. Use the following two steps to calculate the required loudspeaker spacing distance for your application.

1

Calculate the loudspeaker throw distance.

**Loudspeaker Throw Distance**  
(Loudspeaker Mounting Height - Listener Height)

Listener Height  
Seated - 3ft | 1m  
Standing - 5ft | 1.5m

2

Calculate the loudspeaker spacing distance by multiplying the loudspeaker throw distance by the desired coverage multiplier.

Coverage	Multiplier
Premium	2.0
Standard	2.5
Minimum	3.0

Loudspeaker throw distance x Coverage multiplier = Spacing

\_\_\_\_\_ X \_\_\_\_\_ = \_\_\_\_\_  
(Loudspeaker throw distance) (Coverage multiplier) (Spacing)

Total system sound pressure level varies based on the mounting height, loudspeaker tap and room acoustics. For typical applications, use the chart below to determine the total sound pressure level that will be achieved using the DS 40F loudspeakers.

DS 40F												
Mount Height	m	2.4	3.0	3.6	4.2	4.8	5.5	6.1	6.7	7.3	8.0	
	ft	8	10	12	14	16	18	20	22	24	26	
TAP (W)	2.5*	94	91	89	86	85	83	82	81	80	79	dB-SPL
	5	97	94	92	89	88	86	85	84	83	82	
	10	100	97	95	92	91	89	88	87	86	85	
	20	103	100	98	95	94	92	91	90	89	88	
	40	106	103	101	98	97	95	94	93	92	91	

\*2.5-watt tap available only in 70V mode.

For more detailed information, refer to the FreeSpace DS 40F loudspeaker Design Guide.

# FreeSpace® DS 40F

## Loudspeaker



### Engineers' and Architects' Specifications

The loudspeaker shall be a 40-watt, ported loudspeaker system utilizing one 4.5" (114mm) full-range HVC (Helical Voice Coil) driver. The loudspeaker shall be designed for installation in ceilings up to 26ft (8m) high. An optional pendant-mount accessory allows the loudspeaker to be hung from open ceilings.

The loudspeaker shall have a nominal rated impedance of 8 ohms and shall be wired in parallel with a line voltage matching (step-down) transformer with a level selector appropriate for various output taps. The loudspeaker input connections will allow for direct connection to 70V, 100V or low-impedance amplifiers. An 8 Ohm variant of the loudspeaker shall be available without a transformer for low-impedance applications only.

The loudspeaker shall have a protection circuit to protect the product from occasionally being overdriven.

Each loudspeaker shall have a bandwidth of 80 Hz – 16 kHz and a maximum acoustic output of 103 dB-SPL referenced to a full bandwidth pink noise input at 1 meter at the loudspeaker's rated power. The input connection shall consist of a three-position barrier connector. The input connection of the 8-Ohm variant of the loudspeaker shall consist of a two-position barrier connector.

Power settings available shall be: 2.5W, 5W, 10W, 20W, 40W @ 70V; 5W, 10W, 20W, 40W @ 100V; and 40W @ 8Ω (when referenced to IEC noise for 100 hours). The nominal dispersion shall be 125° conical coverage pattern at -6 dB (average 1 – 4 kHz).

The loudspeaker shall be plenum-rated for use in air handling spaces. The loudspeaker shall meet numerous standards for combination music and evacuation systems around the world.

Exposed cosmetic surfaces of the loudspeaker shall be paintable, and the acoustically transparent grille component shall be formed of powder-coated steel.

The loudspeaker shall be the Bose® FreeSpace® DS 40F loudspeaker.

### Safety and Regulatory Compliance

The FreeSpace DS 40F loudspeaker and FreeSpace DS 40F loudspeaker – 8 Ohm have passed extensive testing and comply with the following specifications and uses:

Listed to ANSI/UL 1480-2005

- Fire Protective Signaling Use – UL Category UUMW, File Number S 3241. Control Number 4259. Not for use with DC-supervised systems.
- General-Purpose Use – UL Category UEAY, File Number S 5591 Control Number 3N89.
- Suitable for use indoors in damp locations.
- Suitable for installation using Class 1, Class 2 or Class 3 wiring methods in accordance with NFPA 70, *National Electric Code*, 2008, Article 640.
- Suitable for use with fire alarm circuit wiring methods in accordance with NFPA 70, *National Electric Code*, 2008, Article 760.
- Suitable for use in air handling (plenum) spaces.
- UL-2043, Fire Test and Visible Smoke Release for Discrete Products and their Accessories Installed in Air Handling Spaces.
- NFPA 70, *National Electric Code*, 2008, Article 300-22 (c).
- NFPA 90-A, 2008, *Installation of Air Conditioning and Ventilation Systems*, Paragraph 4.3.11.2.6.5.

The DS 40F loudspeaker and DS 40F loudspeaker – 8 Ohm have been designed to the requirements defined in the following European regulatory specification for combination systems when installed with an accessory ceramic terminal and thermal fuse:

- British Standard Code of Practice BS 5839, Part 8.



# FreeSpace® DS 40F

## Loudspeaker

### Product Codes

FreeSpace DS 40F loudspeaker – Blk	PC 321278-0110
FreeSpace DS 40F loudspeaker – Wht	PC 321278-0210
FreeSpace DS 40F loudspeaker 8 Ohm – Blk	PC 321278-0120
FreeSpace DS 40F loudspeaker 8 Ohm – Wht	PC 321278-0220

### Accessories

DS 40F/DS 100F adjustable tile bridge (pair)	PC 323205-0010
DS 40F/DS 100F tile bridge (6 pack)	PC 041864
DS 40F/DS 100F rough-in pan (6 pack)	PC 041993
DS 40F/DS 100F pendant-mount kit – Blk	PC 041862
DS 40F/DS 100F pendant-mount kit – Wht	PC 041863
Square grille – Wht (pair)	PC 323207-0210
Ceramic terminal and thermal fuse kit (10 pack)	PC 326668-0010

### Replacement Parts

Grille – Blk	PN 299570
Grille – Wht	PN 299571
4.5" (114mm) driver w/gasket	PN 324015-0015

### How our Loudspeakers are Measured

#### 1. Power handling

Full-bandwidth pink noise, meeting the IEC Standard #268-5, is applied to the loudspeaker and amplified to a level at the loudspeaker terminals corresponding to the power handling of the loudspeaker. The loudspeaker must show no visible damage or measurable loss of performance after 100 hours of continuous testing.

#### 2. Sensitivity

Full-bandwidth pink noise is applied to the loudspeaker with its active equalization curve and amplified to a level at the loudspeaker terminals corresponding to 1 watt, as referenced to the nominal impedance. The average sound pressure level (dB-SPL) is measured at 1 meter from the speaker in an anechoic environment.

#### 3. Maximum SPL

Full-bandwidth pink noise is applied to the loudspeaker with its active equalization curve and amplified to a level at the loudspeaker terminals corresponding to the long-term rated power handling of the speaker. The average sound pressure level (dB-SPL) is measured at 1 meter from the speaker in an anechoic environment.

#### 4. Frequency range

Sine waves are injected into the loudspeaker and the level is adjusted to 1 watt, as referenced to the nominal impedance, and the level measured at 1 meter. Resulting graph is smoothed by 0.05 octave band.