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## Loudspeaker Test Report

Manufacturer: E2S

Type: Ex. Horn

Model: BExL15-100V

For: E2S

Report No.: R.2081-BExL15-100V

Prepared By: J. Allen, B.Sc., AMIOA, GradInstSCE

September 2016

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## 1.00 Object

- 1.01 The object of this Report is to present measurements of the acoustic performance of the BExL15-100V device.

## 2.00 Scope

- 2.01 The following characteristics were measured

- On-axis (reference axis) frequency response
- Polar response
- Impedance (Small signal)
- Applied voltage
- On-axis 3<sup>rd</sup> octave band sound pressure level

from which the following are calculated:

- (i) Directivity Index [dB], tabulated and graphical
- (ii) Effective octave and wide band (100Hz to 10kHz) impedance
- (iii) Sensitivity [dB @ 1m,1W]:  
Pink noise  
Speech shape (\*IEC Male)  
(\*BS EN 60268-16:2011)
- (iv) Octave band Sensitivity [dB @ 1m,1W/oct]
- (v) Acoustic Power [dB-PWL @ 1W], tabulated and graphical
- (vi) Octave band Power Apportionment [%]
- (vii) Expected maximum Sound pressure level [dB @ 1m]  
(If extrapolated from a low noise voltage level then power compression is not being considered)
- (viii) Frequency response chart
- (ix) Impedance bode plot
- (x) Polar response charts

### 3.00 Method

- 3.01 The device was mounted in Free Space as shown in figure 1 - Mounting Method E.
- 3.02 The measurements were made in an anechoic chamber.
- 3.03 Measurements were made as detailed in AMS Test Method document No. IR141/LS/Handbook v.1.
- 3.04 All measurements were made in general accordance with BS EN 60268: Part 5: 2003.
- 3.05 The test signal for all sound pressure level measurements was band limited Pink noise (100Hz to 10kHz) with a 6dB Crest factor.

### 4.00 Results

- 4.01 The band limited on-axis 3<sup>rd</sup> octave (100Hz-10kHz) frequency response, Impedance bode plot and Polar plots of the device are shown graphically.
- 4.02 Tabulated values of Directivity Index, Sensitivity, Acoustic Power, Apportioned Power, Impedance and Expected Maximum SPL are shown in the Summary data sheet.
- 4.03 The Directivity Index has been calculated from 412 data points around the directivity balloon.

### 5.00 Notes

- 5.01 Sensitivity  
The octave band sensitivity is produced for calculations. It should be noted that the octave band sensitivity is given as dB @ 1m with 1W in each octave band. For more detailed information, refer to AMS Acoustics Data Sheet 'Loudspeaker Sensitivity – Interpretation of Results'. Note that the octave band and wide band sensitivity levels are with reference to the 'Rated' impedance value.
- 5.02 Polar Plots  
For convenience, each polar plot has been normalized to 0dB. For this reason, caution is advised when comparison of levels between octave bands are made. The reference axis frequency response should be used for comparison purposes.

## 6.00 Engineers Notes & Observations

The reference point is located at the geometric centre of the enclosure and in line with the mounting bolts.

The reference axis was made normal to the horn mouth and includes the reference point.

The impedance does not fall below 80% of the rated impedance within the frequency range 89Hz to 11.2kHz.

### Loudspeaker Information

Manufacturer : E2S  
Model Code : BExL15-100V  
Type : Ex. Horn  
Colour : RED  
Serial No. : -  
Batch No. : -  
Other Markings : -  
Backbox : As supplied  
Grille : NA  
Weight (grams) : 1  
Depth (mm) : 26  
Width (mm) : 18  
Height (mm) : 18  
Special Features : -

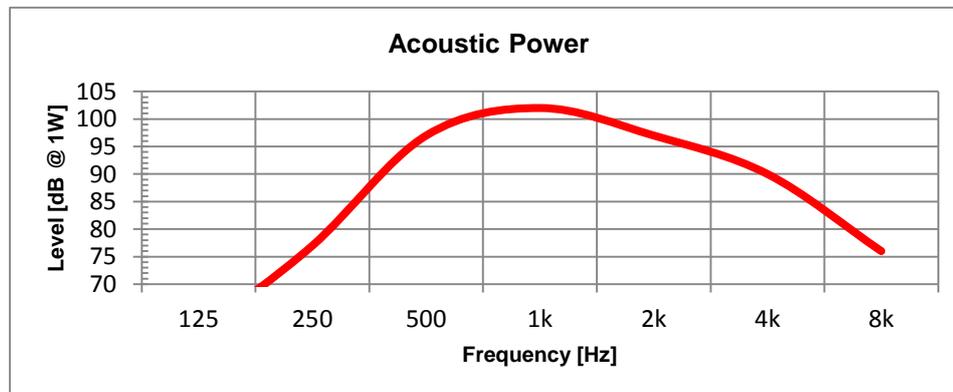
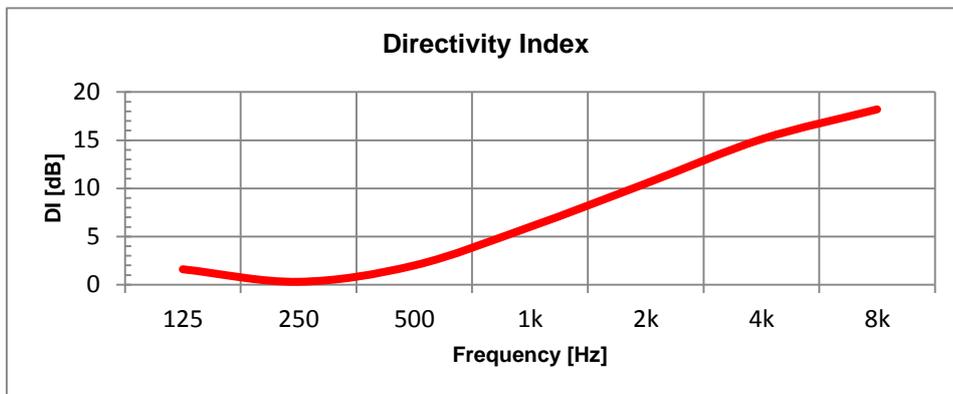
#### Internal Details

Driver Types/Sizes : NM  
Driver Serial No.(s) : NM  
Driver Markings : NM  
Damping Material : NM  
Available Tappings : 15W

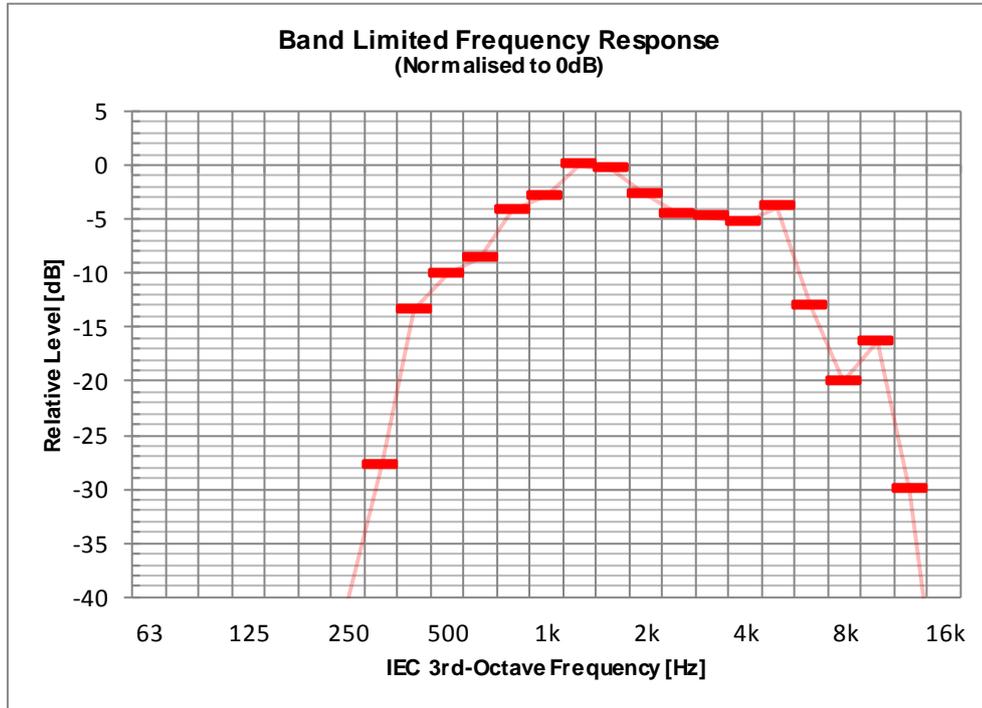
*NM = Not Measured, NA = Not Applicable*

Manufacturer : E2S  
 Model Code : BExL15-100V  
 Mounting : Turntable  
 Measurement Distance [m] : 2.35  
 Test Voltage [V] : 55.90  
 Rated Noise Voltage [V] : 100.00  
 Rated Noise Power [W] : 15.00  
 Rated Impedance [Ohms] : 666.6  
 Minimum Impedance [Ohms] : 555.2 (83% of Rated)  
 Effective Impedance (Pink noise) [Ohms] : 707.4 (PF=0.953)  
 Effective Impedance (IEC Male) [Ohms] : 620.2 (PF=0.96)  
 Reference Axis Located at : 0 degrees

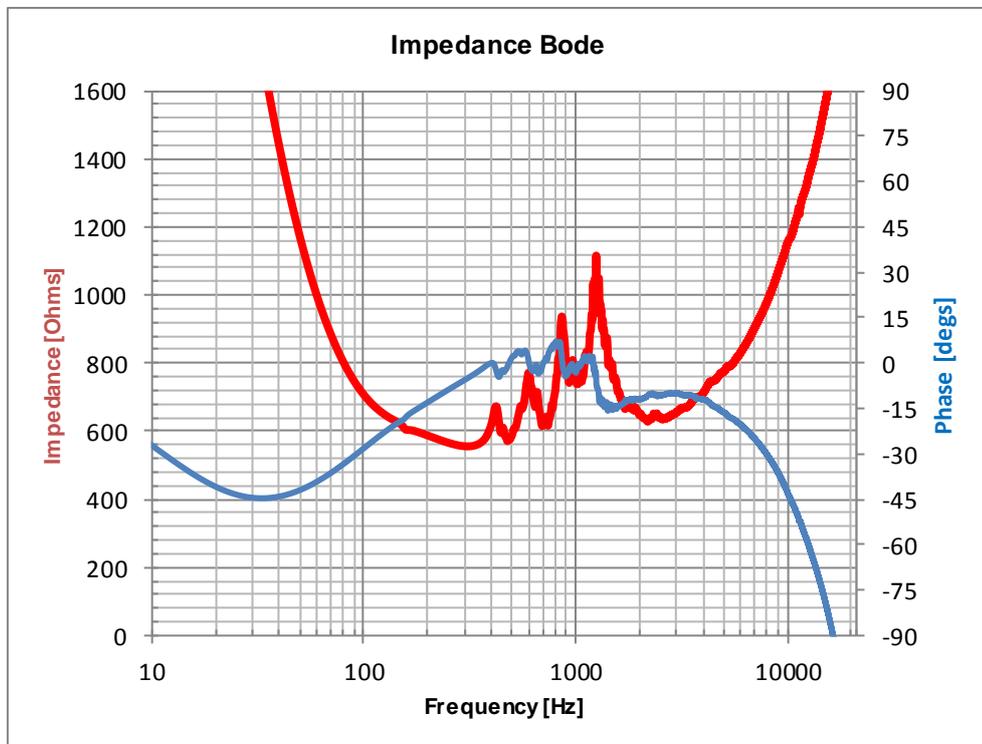
Parameter	Frequency [Hz]							dB	dBA
	125	250	500	1k	2k	4k	8k		
Directivity Index [dB on-axis]	1.6	0.3	2.0	6.0	10.5	15.1	18.2		
Sensitivity [dB @ 1m,1W]	52	66	88	97	96	94	83	101	101
Sensitivity, IEC Male [dB @ 1m,1W]	57	71	89	91	85	76	59	94	93
Acoustic Power [dB-PWL @ 1W]	61	77	97	102	97	90	76		
Apportioned Power [%]	12	16	14	12	15	14	10		
Effective Impedance [Ohms]	653	572	633	796	675	716	971		
Oct' Sensitivity [dB @ 1m,1W/Oct]	61	76	98	106	106	103	92		
Expected Maximum SPL [dB @ 1m]	64	78	100	108	108	106	95	113	113



### BExL15-100V



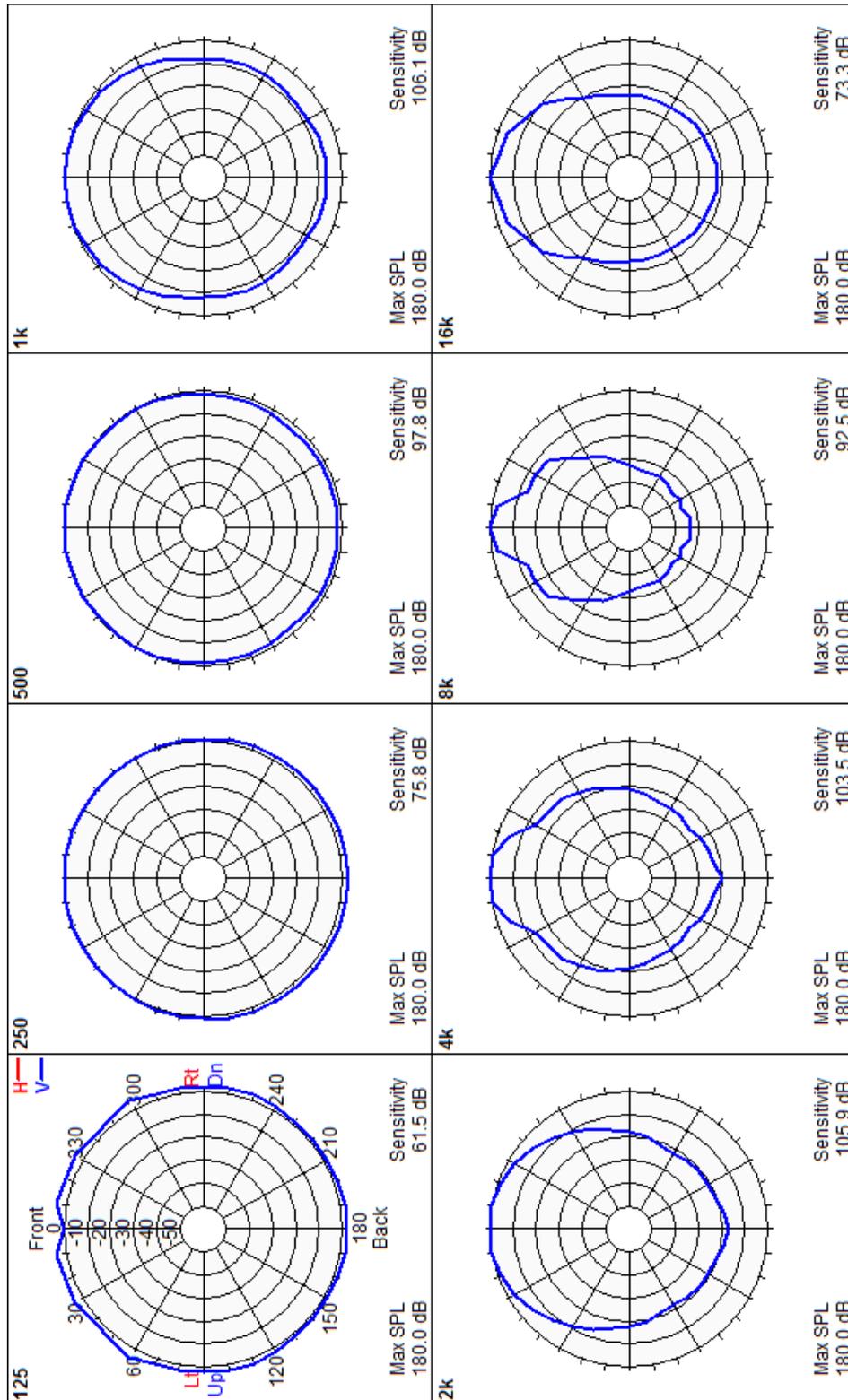
Test signal: Pink noise-6dBCF (100Hz-10kHz)



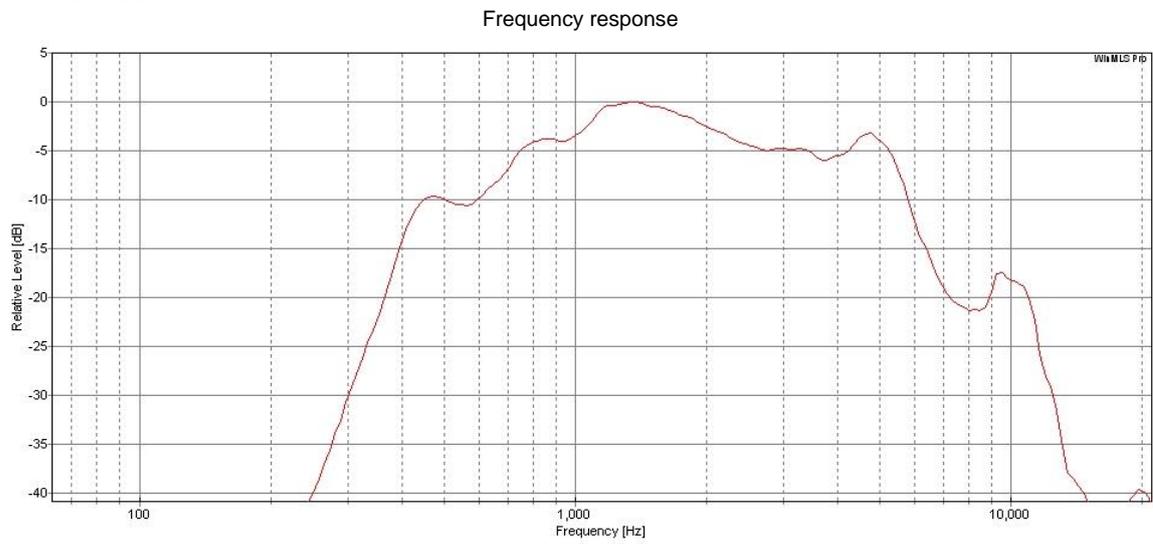
@ 15W

Test signal : Swept sine wave

BExL15-100V



### BExL15-100V



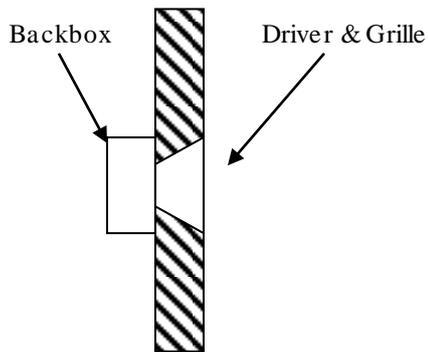
*Note:* The frequency response is derived using a Swept sine method.

### S1 Horn/Explosion Proof

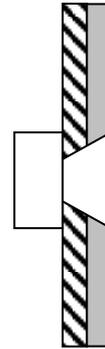


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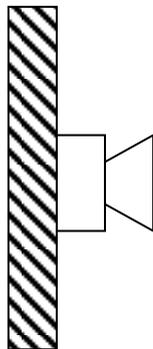
## Loudspeaker Mounting Methods



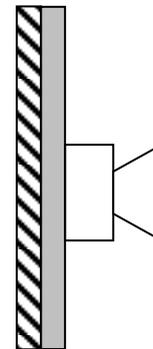
Mounting Method A  
Loudspeaker Mounted  
in a Reflective Baffle



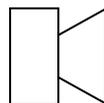
Mounting Method B  
Loudspeaker Mounted  
in an Absorbent Baffle



Mounting Method C  
Loudspeaker Mounted  
on a Reflective Baffle



Mounting Method B  
Loudspeaker Mounted  
on an Absorbent Baffle



Mounting Method E  
Loudspeaker not Attached to any  
Surface and Radiation Unaffected  
by nearby Reflecting Surfaces

Figure 1

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## Loudspeaker Test Report

Manufacturer: E2S

Type: Ex. Horn

Model: BExL15-016R

For: E2S

Report No.: R.2081-BExL15-016R

Prepared By: J. Allen, B.Sc., AMIOA, GradInstSCE

September 2016

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## 1.00 Object

- 1.01 The object of this Report is to present measurements of the acoustic performance of the BExL15-016R device.

## 2.00 Scope

- 2.01 The following characteristics were measured

- On-axis (reference axis) frequency response
- Polar response
- Impedance (Small signal)
- Applied voltage
- On-axis 3<sup>rd</sup> octave band sound pressure level

from which the following are calculated:

- (i) Directivity Index [dB], tabulated and graphical
- (ii) Effective octave and wide band (100Hz to 10kHz) impedance
- (iii) Sensitivity [dB @ 1m,1W]:  
Pink noise  
Speech shape (\*IEC Male)  
(\*BS EN 60268-16:2011)
- (iv) Octave band Sensitivity [dB @ 1m,1W/oct]
- (v) Acoustic Power [dB-PWL @ 1W], tabulated and graphical
- (vi) Octave band Power Apportionment [%]
- (vii) Expected maximum Sound pressure level [dB @ 1m]  
(If extrapolated from a low noise voltage level then power compression is not being considered)
- (viii) Frequency response chart
- (ix) Impedance bode plot
- (x) Polar response charts

### 3.00 Method

- 3.01 The device was mounted in Free Space as shown in figure 1 - Mounting Method E.
- 3.02 The measurements were made in an anechoic chamber.
- 3.03 Measurements were made as detailed in AMS Test Method document No. IR141/LS/Handbook v.1.
- 3.04 All measurements were made in general accordance with BS EN 60268: Part 5: 2003.
- 3.05 The test signal for all sound pressure level measurements was band limited Pink noise (100Hz to 10kHz) with a 6dB Crest factor.

### 4.00 Results

- 4.01 The band limited on-axis 3<sup>rd</sup> octave (100Hz-10kHz) frequency response, Impedance bode plot and Polar plots of the device are shown graphically.
- 4.02 Tabulated values of Directivity Index, Sensitivity, Acoustic Power, Apportioned Power, Impedance and Expected Maximum SPL are shown in the Summary data sheet.
- 4.03 The Directivity Index has been calculated from 412 data points around the directivity balloon.

### 5.00 Notes

- 5.01 Sensitivity  
The octave band sensitivity is produced for calculations. It should be noted that the octave band sensitivity is given as dB @ 1m with 1W in each octave band. For more detailed information, refer to AMS Acoustics Data Sheet 'Loudspeaker Sensitivity – Interpretation of Results'. Note that the octave band and wide band sensitivity levels are with reference to the 'Rated' impedance value.
- 5.02 Polar Plots  
For convenience, each polar plot has been normalized to 0dB. For this reason, caution is advised when comparison of levels between octave bands are made. The reference axis frequency response should be used for comparison purposes.

## 6.00 Engineers Notes & Observations

The reference point is located at the geometric centre of the enclosure and in line with the mounting bolts.

The reference axis was made normal to the horn mouth and includes the reference point.

The impedance does fall below 80% of the rated impedance within the frequency range 89Hz to 11.2kHz.

### Loudspeaker Information

Manufacturer : E2S  
Model Code : BExL15-016R  
Type : Ex. Horn  
Colour : RED  
Serial No. : -  
Batch No. : -  
Other Markings : -  
Backbox : As supplied  
Grille : NA  
Weight (grams) : 1  
Depth (mm) : 26  
Width (mm) : 18  
Height (mm) : 18  
Special Features : -

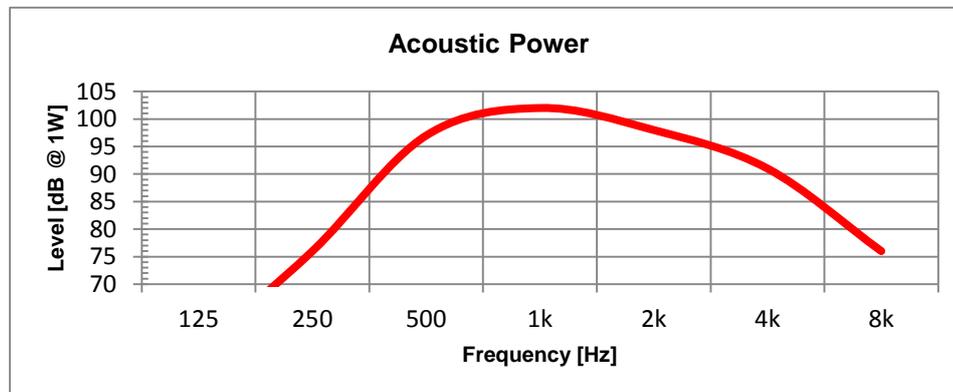
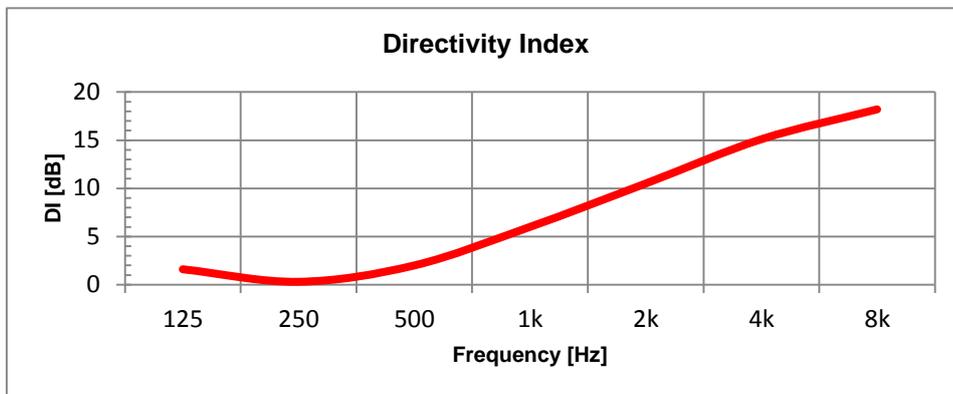
#### Internal Details

Driver Types/Sizes : NM  
Driver Serial No.(s) : NM  
Driver Markings : NM  
Damping Material : NM  
Available Tappings : 15W

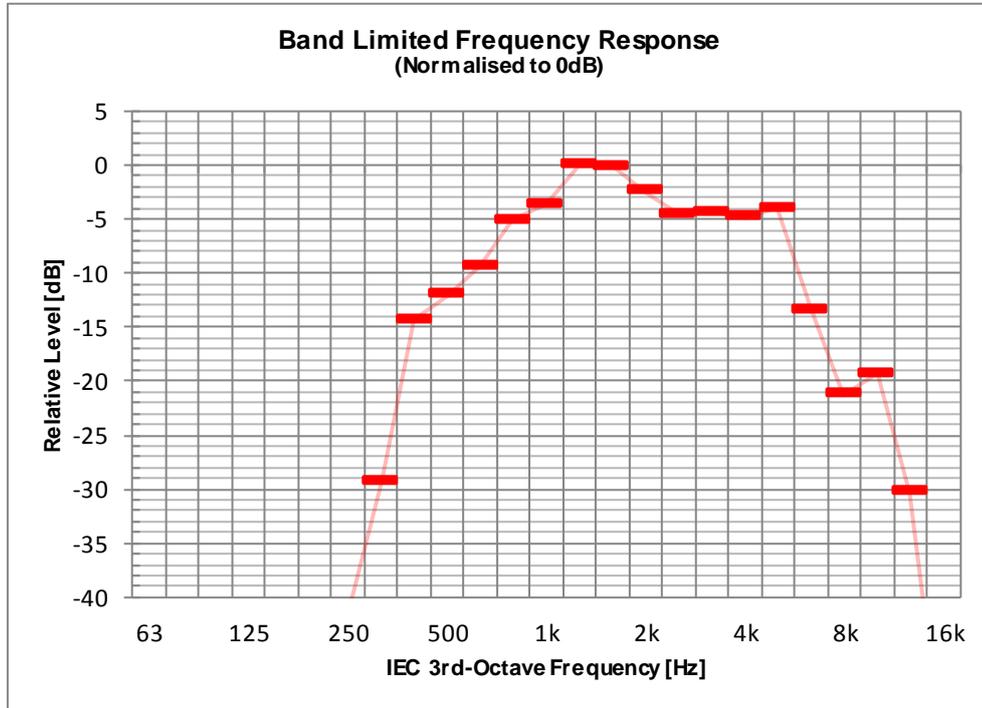
*NM = Not Measured, NA = Not Applicable*

Manufacturer : E2S  
 Model Code : BExL15-016R  
 Mounting : Turntable  
 Measurement Distance [m] : 2.35  
 Test Voltage [V] : 8.72  
 Rated Noise Voltage [V] : 15.49  
 Rated Noise Power [W] : 15.00  
 Rated Impedance [Ohms] : 16.0  
 Minimum Impedance [Ohms] : 12.4 (78% of Rated)  
 Effective Impedance (Pink noise) [Ohms] : 15.2 (PF=0.998)  
 Effective Impedance (IEC Male) [Ohms] : 13.1 (PF=0.996)  
 Reference Axis Located at : 0 degrees

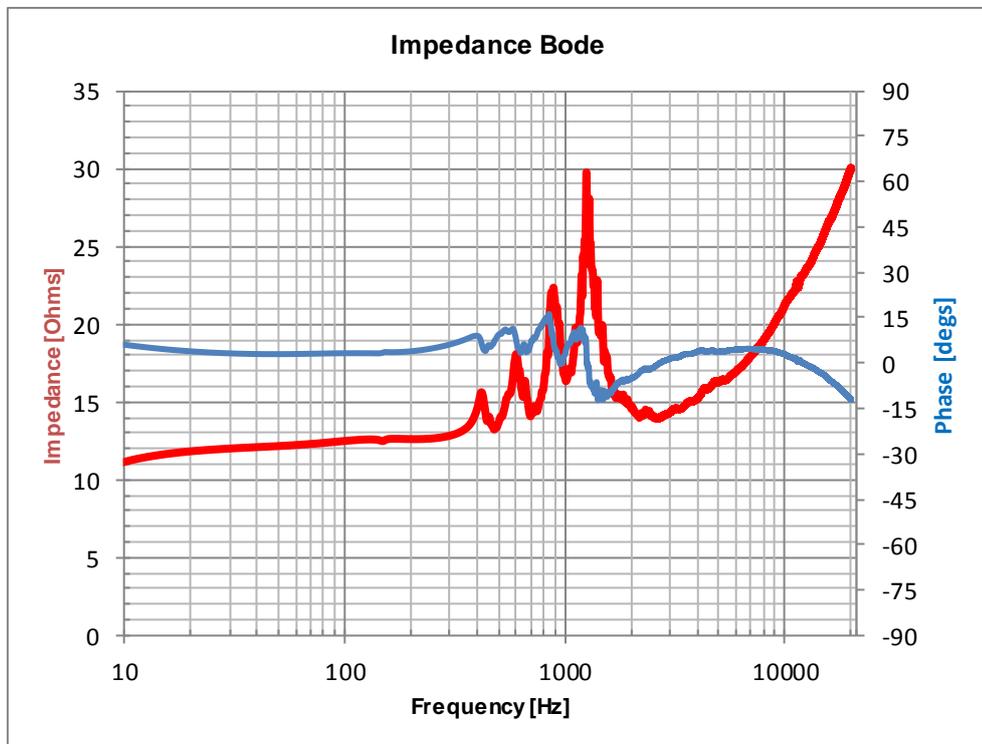
Parameter	Frequency [Hz]							dB	dBA
	125	250	500	1k	2k	4k	8k		
Directivity Index [dB on-axis]	1.6	0.3	2.0	6.0	10.5	15.1	18.2		
Sensitivity [dB @ 1m,1W]	49	66	88	97	97	95	83	102	102
Sensitivity, IEC Male [dB @ 1m,1W]	54	70	89	92	86	77	59	94	94
Acoustic Power [dB-PWL @ 1W]	58	76	97	102	98	91	76		
Apportioned Power [%]	14	16	14	11	15	15	12		
Effective Impedance [Ohms]	13	13	15	19	15	15	19		
Oct' Sensitivity [dB @ 1m,1W/Oct]	58	75	98	107	107	105	92		
Expected Maximum SPL [dB @ 1m]	61	77	100	109	109	107	95	113	114



BExL15-016R



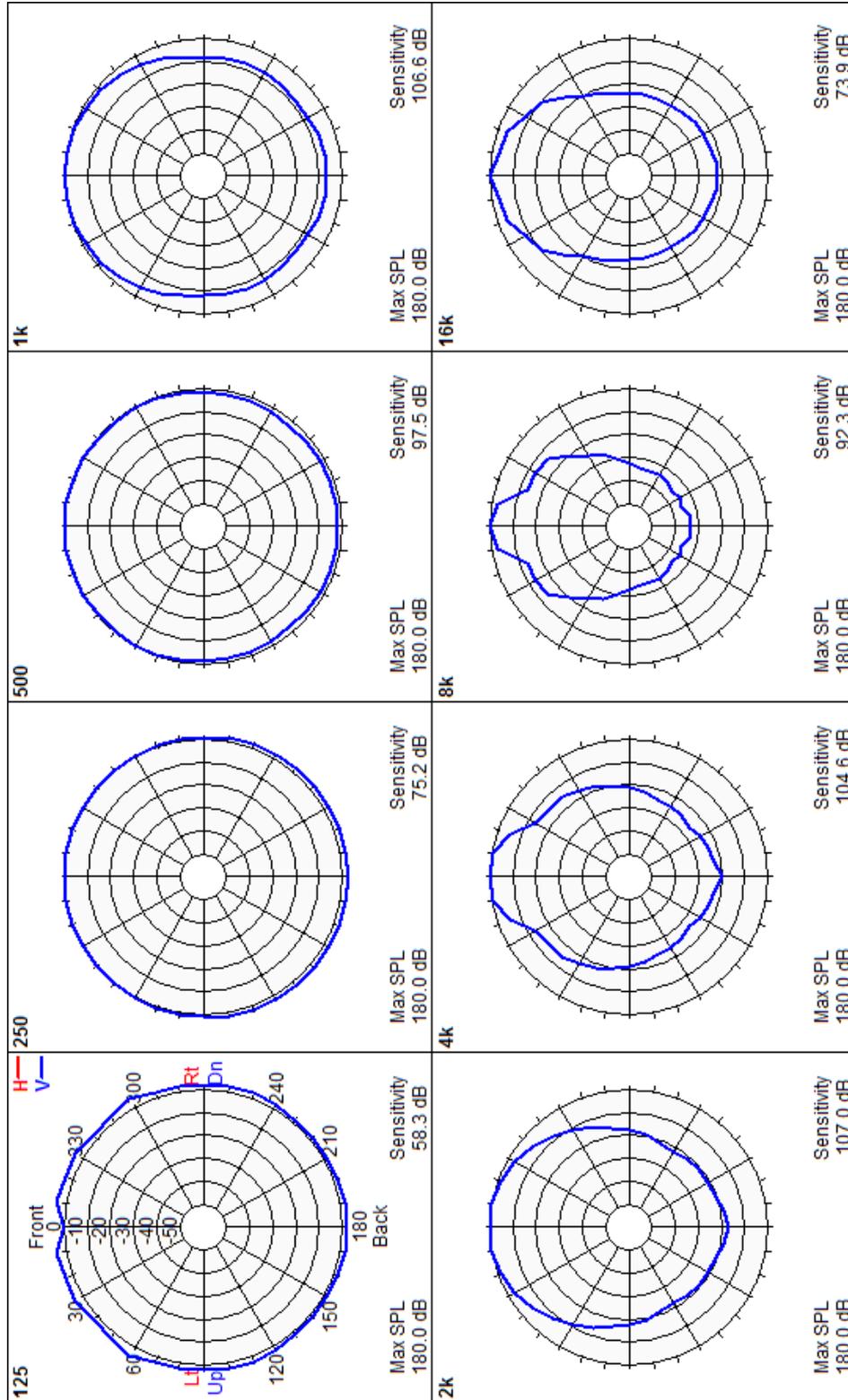
Test signal: Pink noise-6dBCF (100Hz-10kHz)



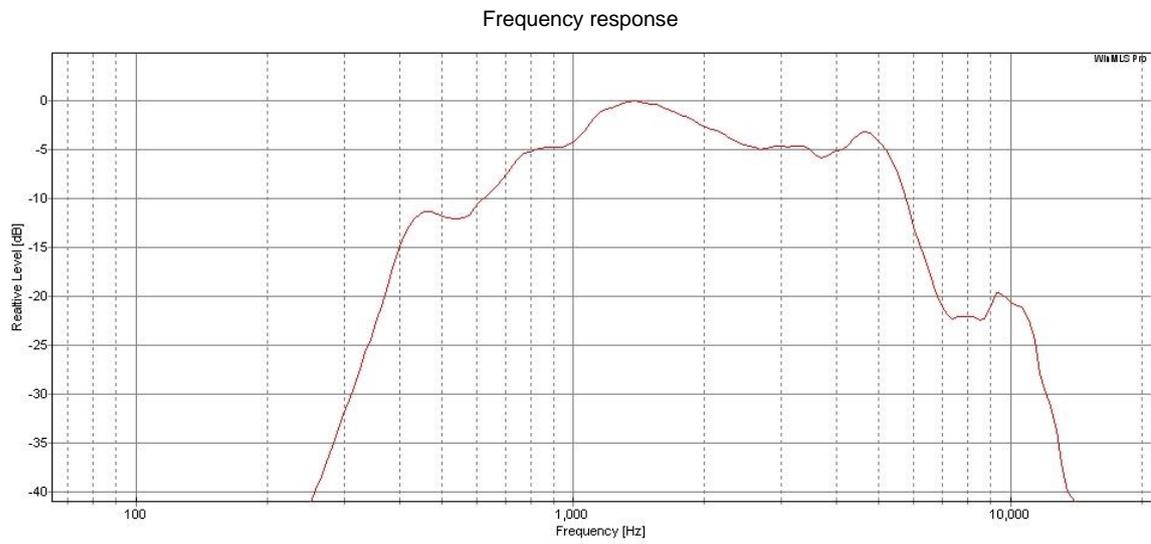
@ 15W

Test signal : Swept sine wave

BEExL15-016R



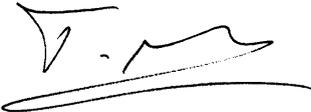
BExL15-016R



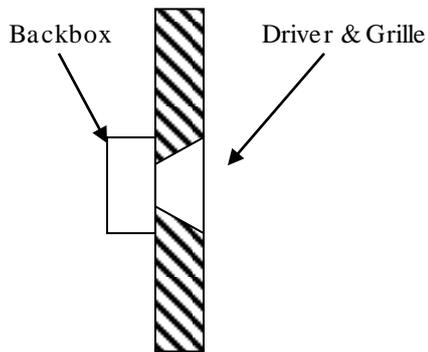
*Note:* The frequency response is derived using a Swept sine method.

### S1 Horn/Explosion Proof

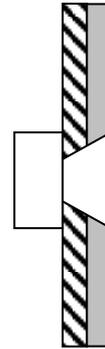


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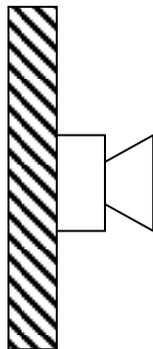
## Loudspeaker Mounting Methods



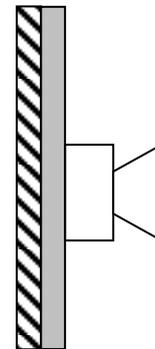
Mounting Method A  
Loudspeaker Mounted  
in a Reflective Baffle



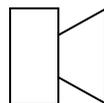
Mounting Method B  
Loudspeaker Mounted  
in an Absorbent Baffle



Mounting Method C  
Loudspeaker Mounted  
on a Reflective Baffle



Mounting Method B  
Loudspeaker Mounted  
on an Absorbent Baffle



Mounting Method E  
Loudspeaker not Attached to any  
Surface and Radiation Unaffected  
by nearby Reflecting Surfaces

Figure 1

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## Loudspeaker Test Report

Manufacturer: E2S

Type: Ex. Horn

Model: BExL15-008R

For: E2S

Report No.: R.2081-BExL15-008R

Prepared By: J. Allen, B.Sc., AMIOA, GradInstSCE

September 2016

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## 1.00 Object

- 1.01 The object of this Report is to present measurements of the acoustic performance of the BExL15-008R device.

## 2.00 Scope

- 2.01 The following characteristics were measured

- On-axis (reference axis) frequency response
- Polar response
- Impedance (Small signal)
- Applied voltage
- On-axis 3<sup>rd</sup> octave band sound pressure level

from which the following are calculated:

- (i) Directivity Index [dB], tabulated and graphical
- (ii) Effective octave and wide band (100Hz to 10kHz) impedance
- (iii) Sensitivity [dB @ 1m,1W]:  
Pink noise  
Speech shape (\*IEC Male)  
(\*BS EN 60268-16:2011)
- (iv) Octave band Sensitivity [dB @ 1m,1W/oct]
- (v) Acoustic Power [dB-PWL @ 1W], tabulated and graphical
- (vi) Octave band Power Apportionment [%]
- (vii) Expected maximum Sound pressure level [dB @ 1m]  
(If extrapolated from a low noise voltage level then power compression is not being considered)
- (viii) Frequency response chart
- (ix) Impedance bode plot
- (x) Polar response charts

### 3.00 Method

- 3.01 The device was mounted in Free Space as shown in figure 1 - Mounting Method E.
- 3.02 The measurements were made in an anechoic chamber.
- 3.03 Measurements were made as detailed in AMS Test Method document No. IR141/LS/Handbook v.1.
- 3.04 All measurements were made in general accordance with BS EN 60268: Part 5: 2003.
- 3.05 The test signal for all sound pressure level measurements was band limited Pink noise (100Hz to 10kHz) with a 6dB Crest factor.

### 4.00 Results

- 4.01 The band limited on-axis 3<sup>rd</sup> octave (100Hz-10kHz) frequency response, Impedance bode plot and Polar plots of the device are shown graphically.
- 4.02 Tabulated values of Directivity Index, Sensitivity, Acoustic Power, Apportioned Power, Impedance and Expected Maximum SPL are shown in the Summary data sheet.
- 4.03 The Directivity Index has been calculated from 412 data points around the directivity balloon.

### 5.00 Notes

- 5.01 Sensitivity  
The octave band sensitivity is produced for calculations. It should be noted that the octave band sensitivity is given as dB @ 1m with 1W in each octave band. For more detailed information, refer to AMS Acoustics Data Sheet 'Loudspeaker Sensitivity – Interpretation of Results'. Note that the octave band and wide band sensitivity levels are with reference to the 'Rated' impedance value.
- 5.02 Polar Plots  
For convenience, each polar plot has been normalized to 0dB. For this reason, caution is advised when comparison of levels between octave bands are made. The reference axis frequency response should be used for comparison purposes.

## **6.00 Engineers Notes & Observations**

The reference point is located at the geometric centre of the enclosure and in line with the mounting bolts.

The reference axis was made normal to the horn mouth and includes the reference point.

The impedance does not fall below 80% of the rated impedance within the frequency range 89Hz to 11.2kHz.

### Loudspeaker Information

Manufacturer : E2S  
Model Code : BExL15-008R  
Type : Ex. Horn  
Colour : RED  
Serial No. : -  
Batch No. : -  
Other Markings : -  
Backbox : As supplied  
Grille : NA  
Weight (grams) : 1  
Depth (mm) : 26  
Width (mm) : 18  
Height (mm) : 18  
Special Features : -

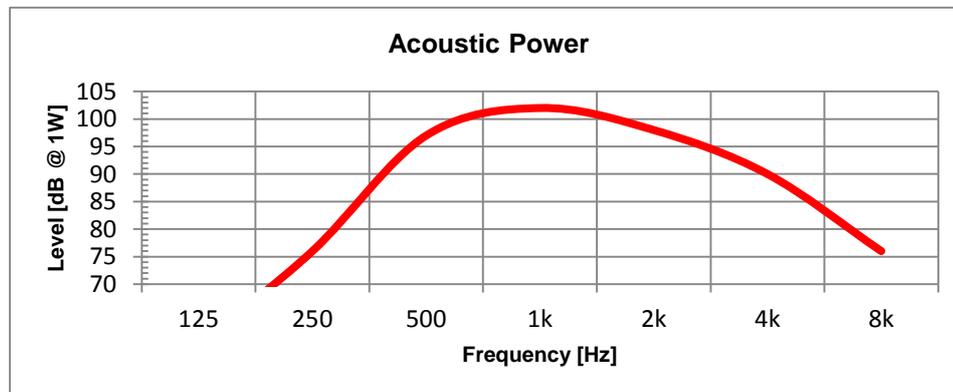
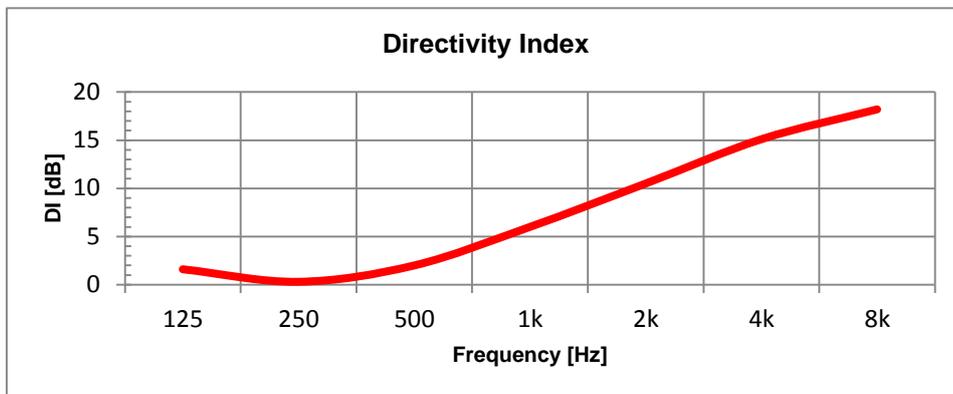
#### Internal Details

Driver Types/Sizes : NM  
Driver Serial No.(s) : NM  
Driver Markings : NM  
Damping Material : NM  
Available Tappings : 15W

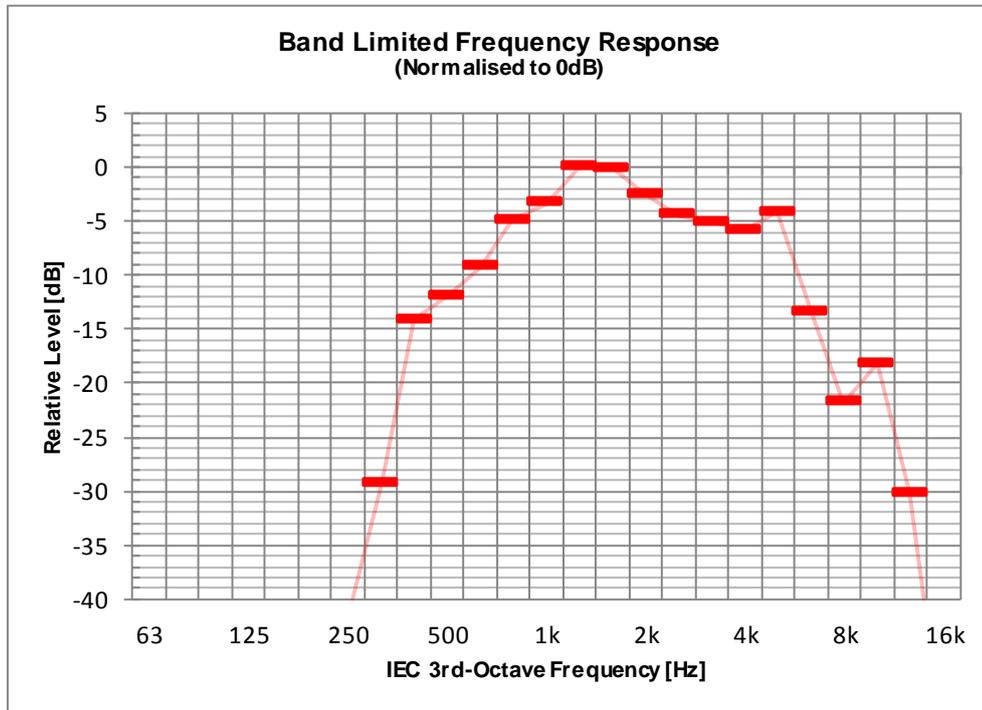
*NM = Not Measured, NA = Not Applicable*

Manufacturer : E2S  
 Model Code : BExL15-008R  
 Mounting : Turntable  
 Measurement Distance [m] : 2.35  
 Test Voltage [V] : 6.24  
 Rated Noise Voltage [V] : 10.95  
 Rated Noise Power [W] : 15.00  
 Rated Impedance [Ohms] : 8.0  
 Minimum Impedance [Ohms] : 7 (88% of Rated)  
 Effective Impedance (Pink noise) [Ohms] : 8.9 (PF=0.986)  
 Effective Impedance (IEC Male) [Ohms] : 7.4 (PF=0.998)  
 Reference Axis Located at : 0 degrees

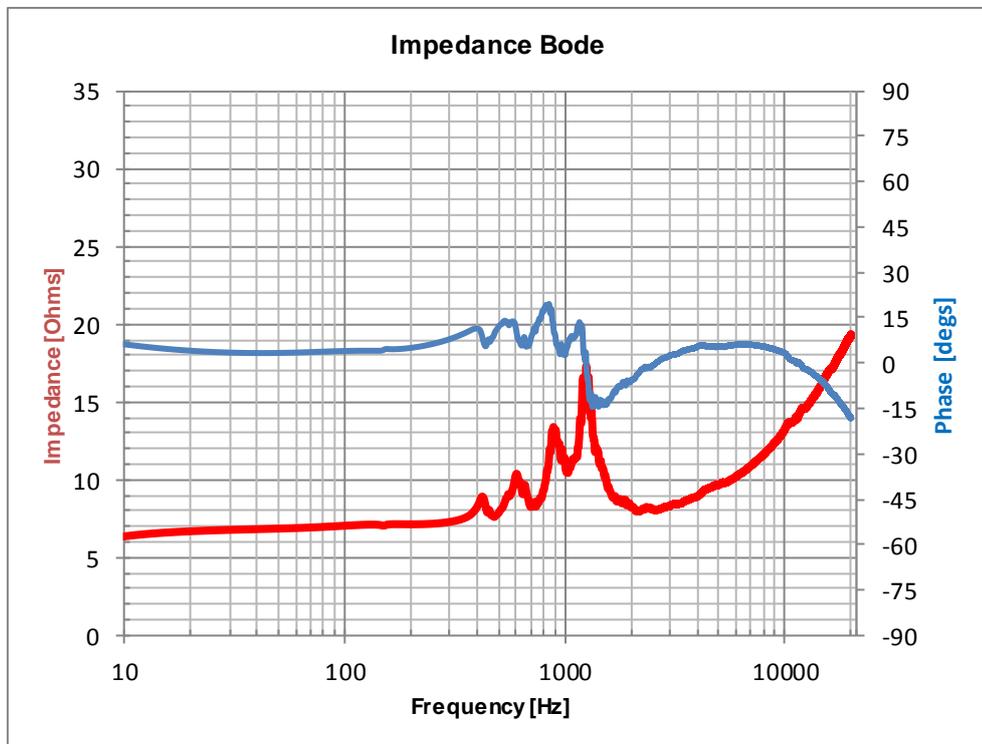
Parameter	Frequency [Hz]							dB	dBA
	125	250	500	1k	2k	4k	8k		
Directivity Index [dB on-axis]	1.6	0.3	2.0	6.0	10.5	15.1	18.2		
Sensitivity [dB @ 1m,1W]	50	66	88	97	97	94	83	101	102
Sensitivity, IEC Male [dB @ 1m,1W]	55	70	89	92	86	77	59	94	94
Acoustic Power [dB-PWL @ 1W]	59	76	97	102	98	90	76		
Apportioned Power [%]	14	16	14	11	15	14	11		
Effective Impedance [Ohms]	7	7	8	11	9	9	12		
Oct' Sensitivity [dB @ 1m,1W/Oct]	59	75	98	107	107	104	92		
Expected Maximum SPL [dB @ 1m]	61	77	100	109	109	106	95	113	114



BExL15-008R



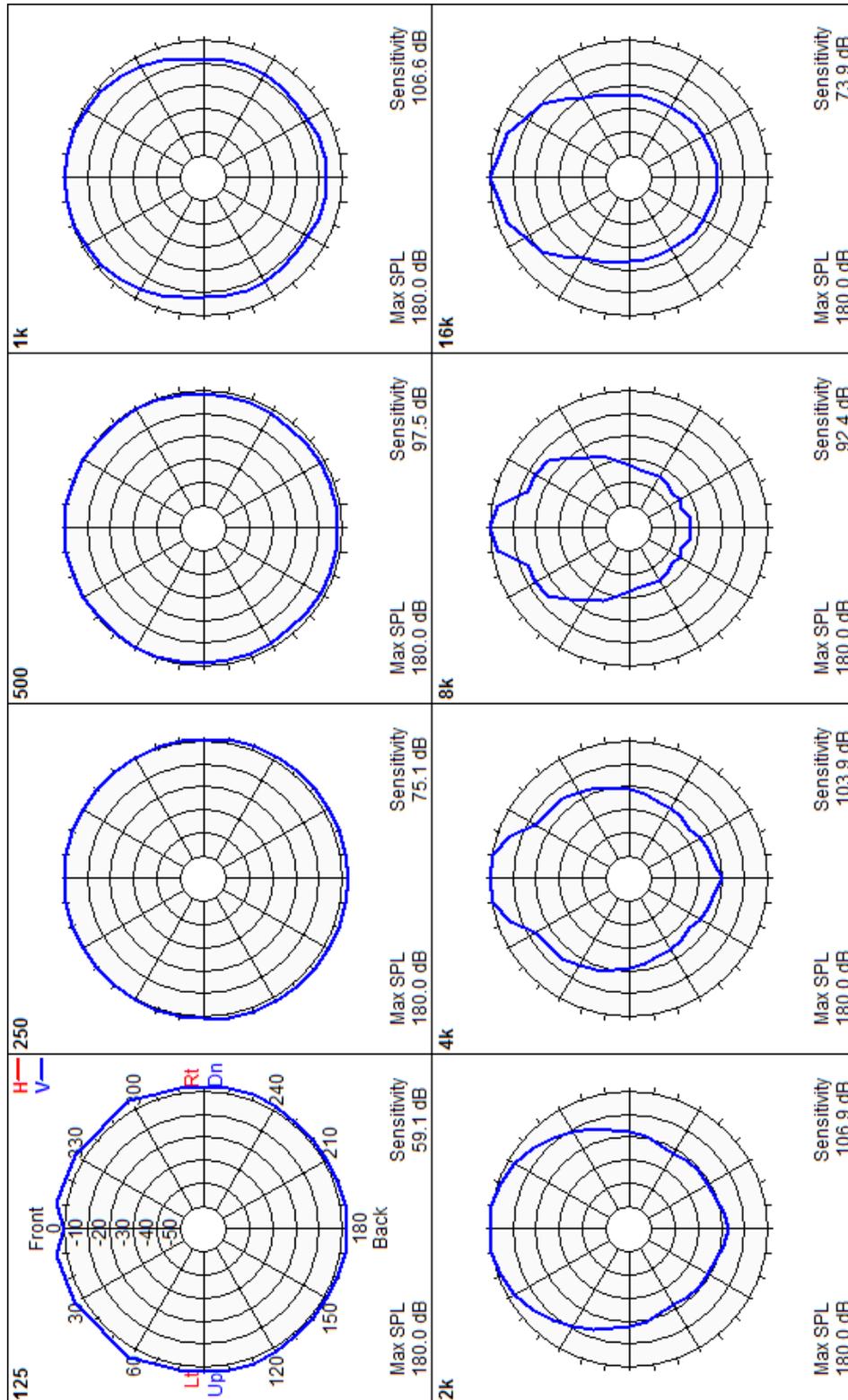
Test signal: Pink noise-6dBCF (100Hz-10kHz)



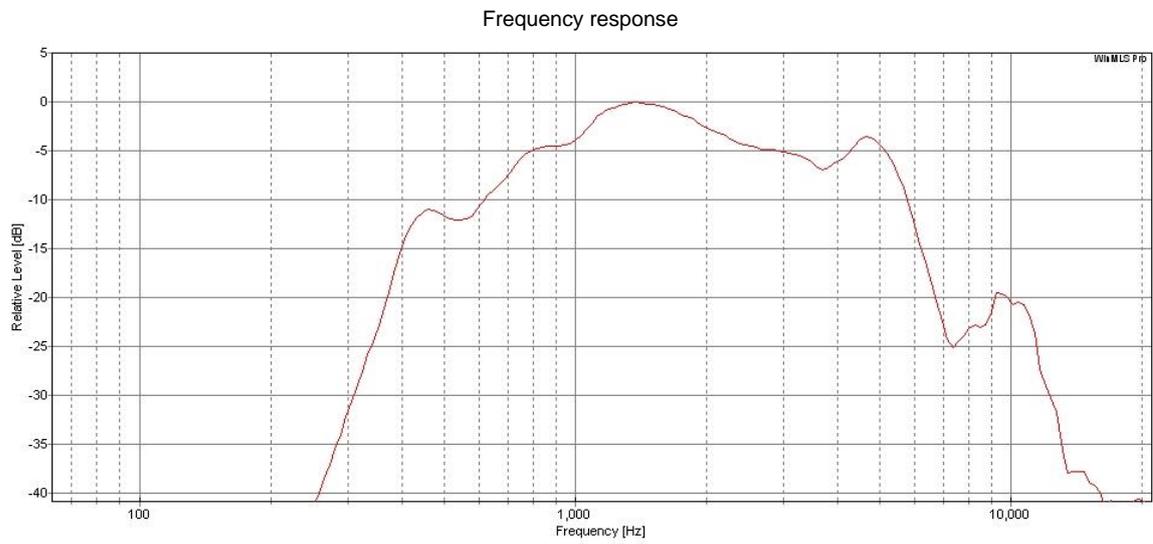
@ 15W

Test signal : Swept sine wave

BEExL15-008R



BExL15-008R



*Note:* The frequency response is derived using a Swept sine method.

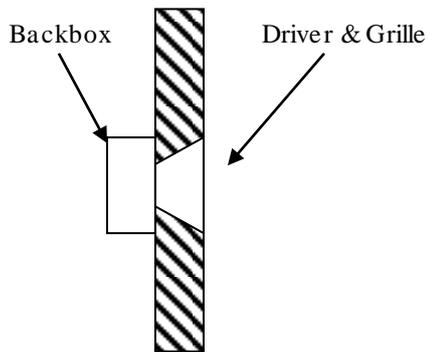
S1 Horn/Explosion Proof



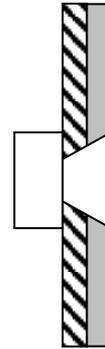
Signed: 

Countersigned: 

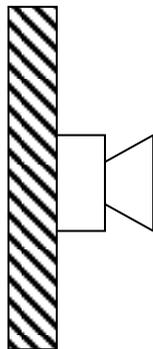
## Loudspeaker Mounting Methods



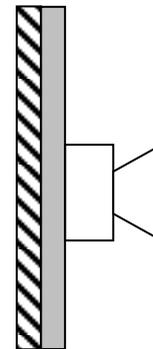
Mounting Method A  
Loudspeaker Mounted  
in a Reflective Baffle



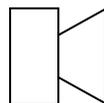
Mounting Method B  
Loudspeaker Mounted  
in an Absorbent Baffle



Mounting Method C  
Loudspeaker Mounted  
on a Reflective Baffle



Mounting Method B  
Loudspeaker Mounted  
on an Absorbent Baffle



Mounting Method E  
Loudspeaker not Attached to any  
Surface and Radiation Unaffected  
by nearby Reflecting Surfaces

Figure 1