Otto Module Specifications

FEATURES

- Omni, cardioid and hypercardioid patterns possible with just a single module. Highly complex directivity patterns possible with arrays.
- Vastly simplified setup process as compared to typical subwoofer arrays; Adaptive Performance™ determines all parameters based on user-defined coverage and performance requirements in Resolution™ 2.
- On-board diagnostics and Adaptive Healing continuously monitor and correct performance in real time
- High-power with massive low-frequency extension; scalable to all performance types and venue sizes
- All amplification and processing on-board
- Offset Aperture™ loading allows multiple enclosure orientations without compromising output

APPLICATIONS

- Portable and touring sound reinforcement of any scale (from clubs to stadia and arenas)
- Installed sound reinforcement for performing arts venues, clubs, houses of worship or sports facilities of any size clubs, houses of worship or sports facilities of any size

DESCRIPTION

EAW Otto™ is the world's first Adaptive™ subwoofer. Utilizing two Offset Aperture™-loaded woofers paired with independent on-board amplification, processing and networking, Otto extends Adaptive Performance™ to the lowest octaves of the audible spectrum. Otto will perfectly balance low-frequency coverage with cancellation to suit the user's requirements; omni, cardioid, hyper-cardioid or anywhere in between from just a single module. Combined in arrays, Otto provides users with nearly endless possibilities in low-frequency pattern control.

Each Otto module includes two high-power 18" cones featuring Offset Aperture loading to generate four optimally-spaced acoustical sources; one in each corner. In addition to allowing multiple enclosure orientations without compromising output, this loading technique also provides exceptional efficiency and minimizes harmonic distortion, even when the system is driven to maximum levels. Ingenious transducer, port and enclosure design allow Otto to achieve extremely high output levels while providing impact and low-frequency extension typical of much larger enclosures.

The module's rotational symmetry provides enormous flexibility in designing systems for optimal coverage; arrays can be constructed with all modules in the same orientation, or with woofer orientation staggered to provide maximum 3D coverage capabilities. Resolution™ 2 software determines the best configuration for a given application.

Each module includes a field-replaceable Power Plant, providing all power, processing and network capabilities. Via Resolution 2 software, Adaptive performance controls all performance parameters of the total array to deliver an output pattern that provides optimal coverage of audience areas and maximum rejection elsewhere.

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Otto Module Specifications

Dual 18-inch Adaptive Subwoofer

See NOTES TABULAR DATA for details

Configuration

Subsystem	*Transducer*	*Loading*
	2x VLF 18 in cone, 4 in voice coil	Offset Aperture™, vented

Operating Mode	*Amplifier Channels*	*Internal Signal Processing*
Dual-amp	2x VLF	DSP /w Adaptive Performance™

Performance

Operating Range	22 Hz to 160 Hz	
Nominal Beamwidth	Horz	Adaptive
	Vert	Adaptive

Calculated Output Limit *(SPL)* **Unadapted**

	Average	*Peak*
LF1/LF2 (whole space)	130 dB	136 dB
(half space)	136 dB	142 dB

Calculated Output Limit *(SPL)* **Maximum SPL**

	Average	*Peak*
(whole space)	131 dB	137 dB
(half space)	137 dB	143 dB

Calculated Output Limit *(SPL)* **Maximum Rejection**

	Average	*Peak*
(whole space)	127 dB	133 dB
(half space)	133 dB	136 dB

"Maximum SPL" and "Maximum Rejection" specifications refer to user-definable performance goals in Resolution™ software.

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Electrical Performance

Input

Type	Electronically Balanced
Max Input Level	25dBu
Impedance	20 kOhm (balanced)
Wiring	XLRF, Pin 1 chassis, pin 2 +, pin 3 - Separate loop-thru XLRM (for analog signal only)
Input Selection	Analog, AES (Ch 1/2), Dante

Amplifiers & Processing	***VLF***
Type	Modified Class D
Maximum Output	2x 1,700W
Driver Protection	Integral DSP limiting

AC Mains *(Nominal)*

Connector	Neutrik® powerCON™ TRUE1™
Input	100V to 240V
Frequency	50 Hz to 60 Hz

Power Consumption

Idle	200W
Peak Draw	1000W

Control/Communications

Connections	USB A & B, 2x Neutrik® etherCON™
Protocols	USB, Ethernet/Dante
Software	Resolution™ 2 (available at eaw.com)
Indicators	Test, Function, Input (Network, Analog, AES/EBU), Network Status)
User Controls	Test, Function

Ordering Data

	Description	***Part Number***
	G24 System (24 Modules) 115V	2044442
	G24 System (24 Modules) 230V	2044443
	G12 System (24 Modules) 115V	2044467
	G12 System (24 Modules) 230V	2044468
Optional Accessories	Distro Rack (supports 12 modules) 115V	2041779
	Distro Rack (supports 12 modules) 230V	2042545
	Distro Flybar	2042596
	Distro Pallet	2042482
	Flybar	2044450
	Cable Power Loom (6 modules)	2042871
	Cable Power Extender (6 modules)	2042872
	Cable Network Loom Short (6 modules)	2042873
	Cable Network Loom Long (6 modules)	2042874
	Caster Pallet (3 modules)	2044448
	Cover (3 modules)	2044434
	Spare Transducer Service Pack	2044452
	Spare Amplifier Service Pack	2044451

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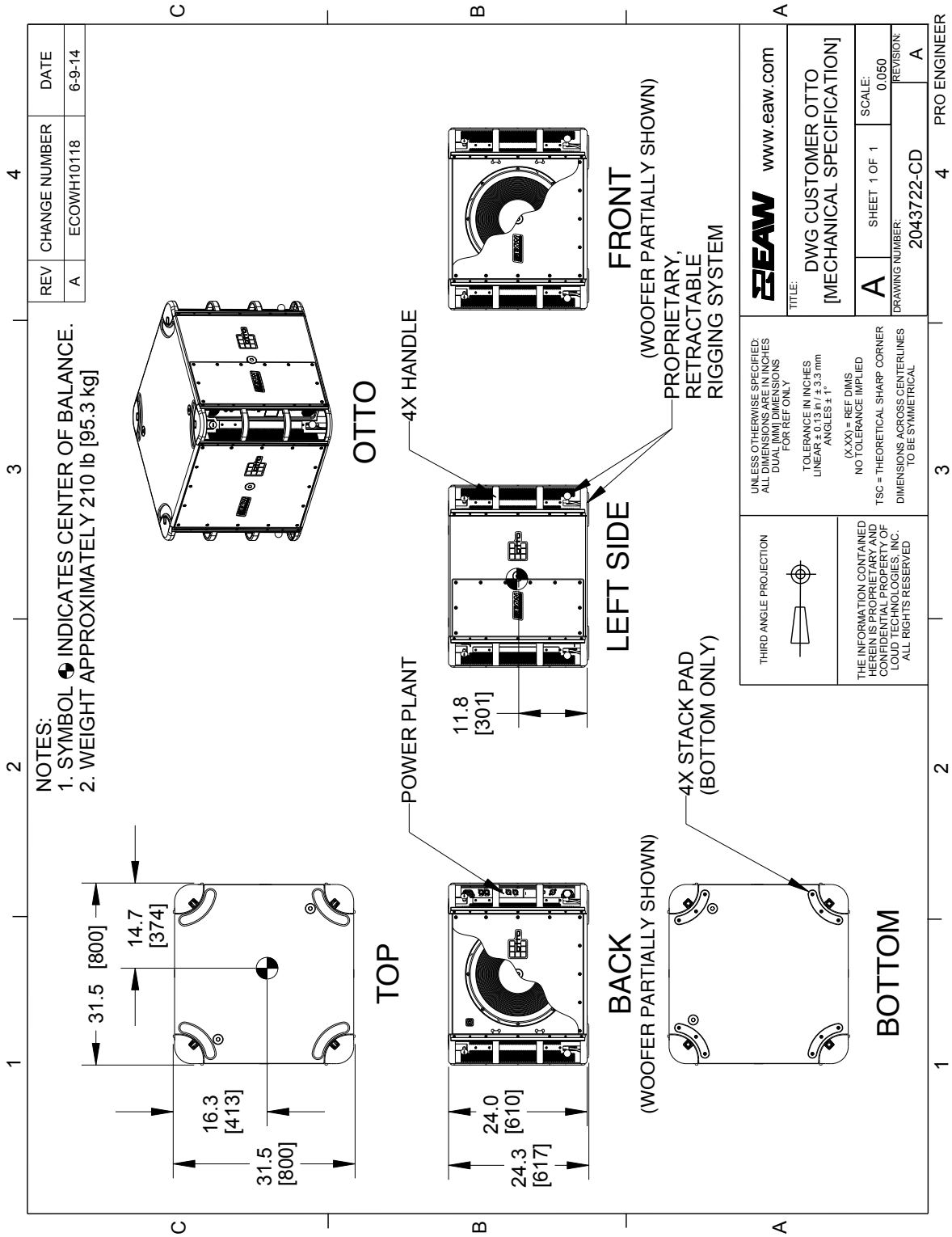
Otto Module Specifications

Enclosure

Material Exterior-grade Baltic birch plywood with wear-resistant textured RoadCoat ™; powder-coated cast aluminum handles

Grille Powder-coated perforated aluminum

NOTE: This drawing has been reduced. Do not scale.

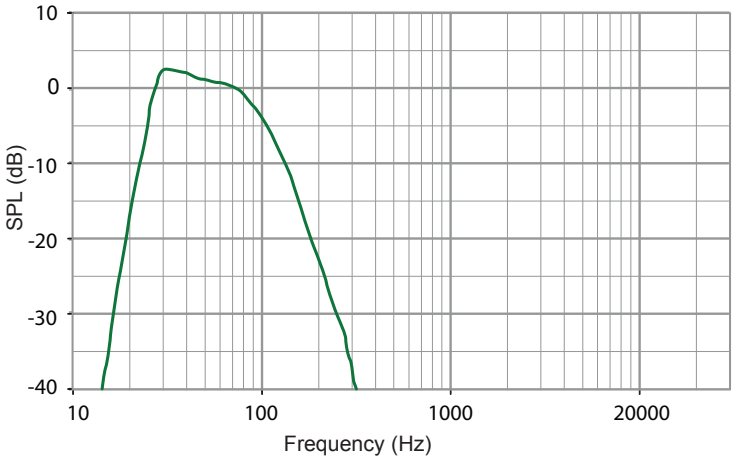


Performance Data, Unadapted

See *NOTES GRAPHIC DATA* for details

Frequency Response: Processed – Dual Amp

LF = green



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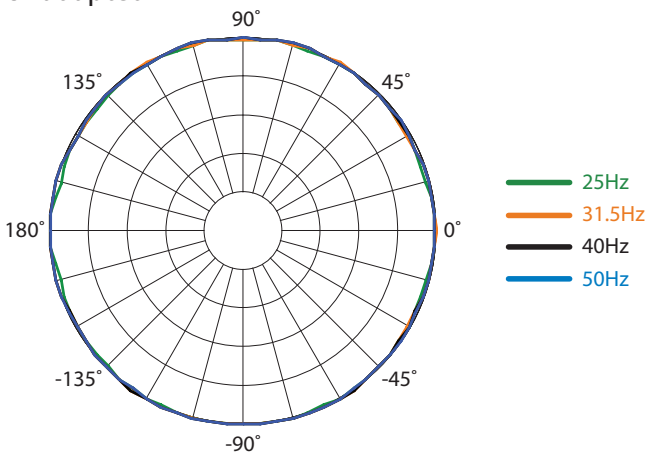
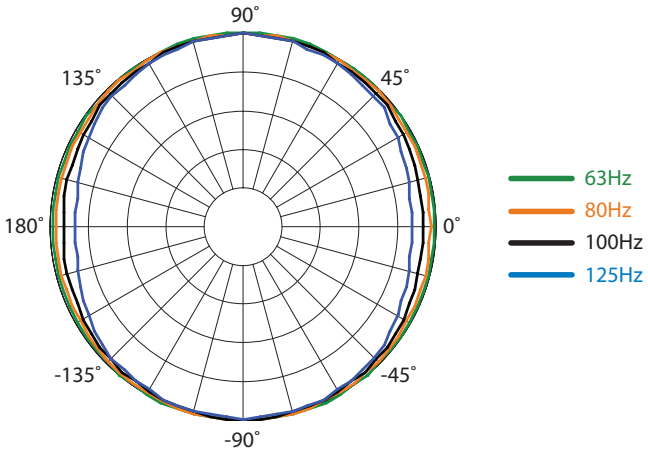
Otto Module Specifications

Horizontal Polar Data

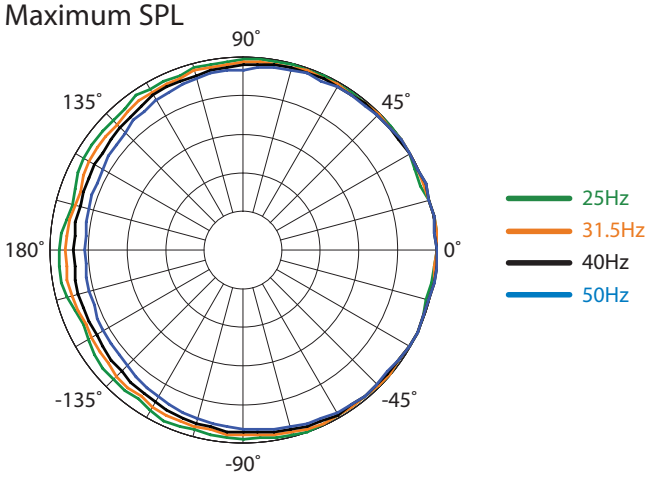
See *NOTES GRAPHIC DATA* for details

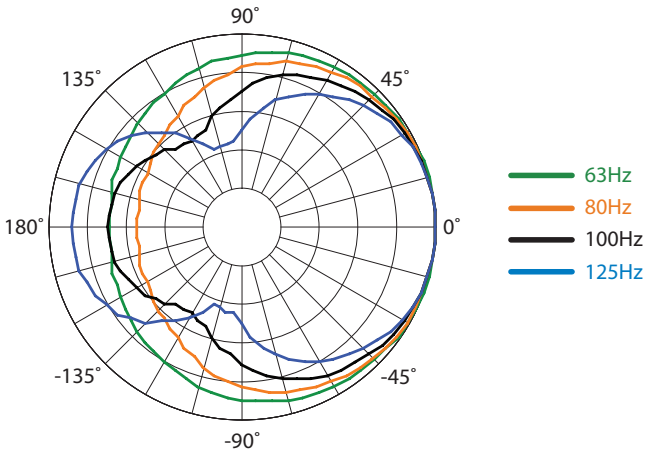
Unadapted



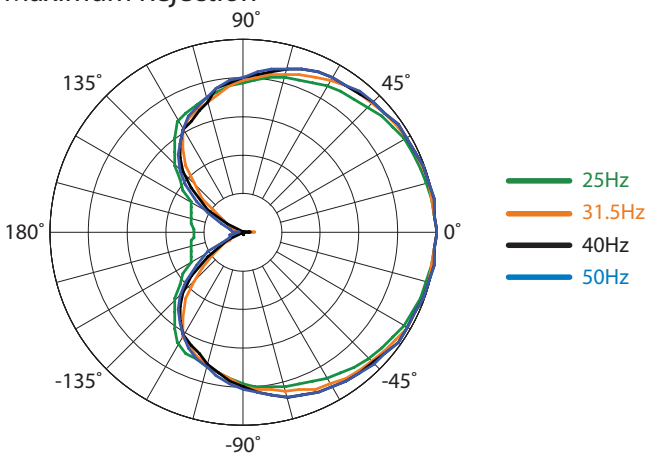


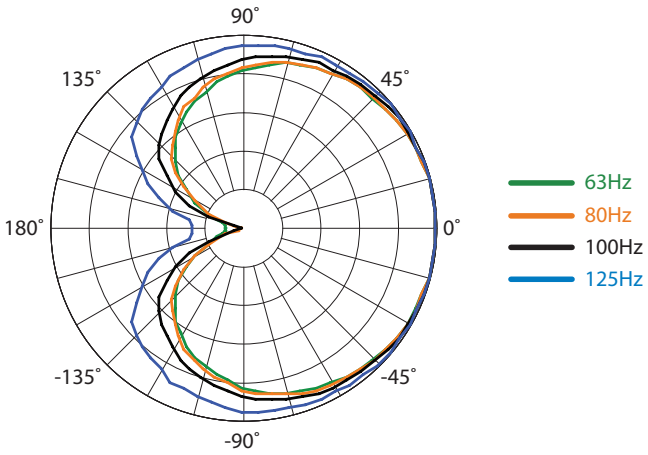
Maximum SPL





Maximum Rejection



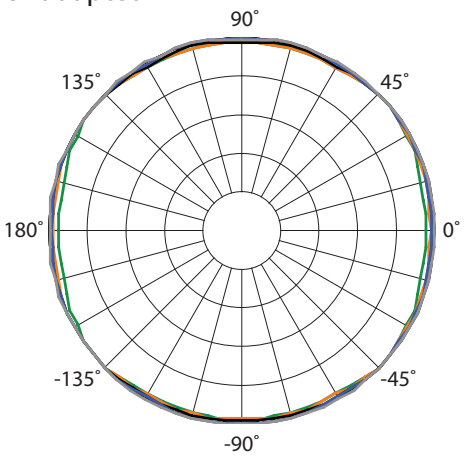


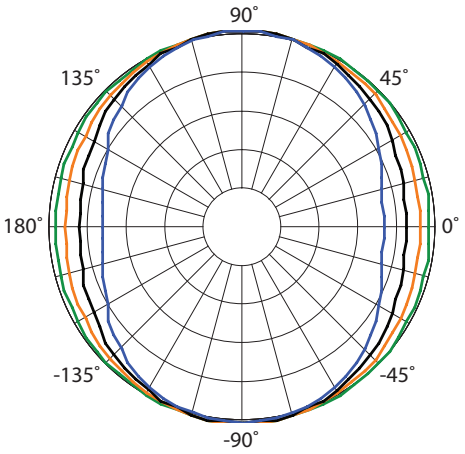
Otto Module Specifications

Vertical Polar Data

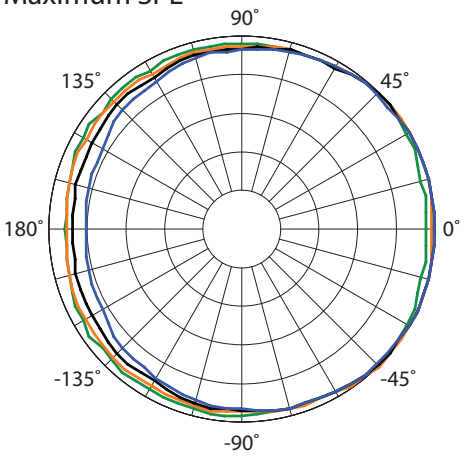
See *NOTES GRAPHIC DATA* for details

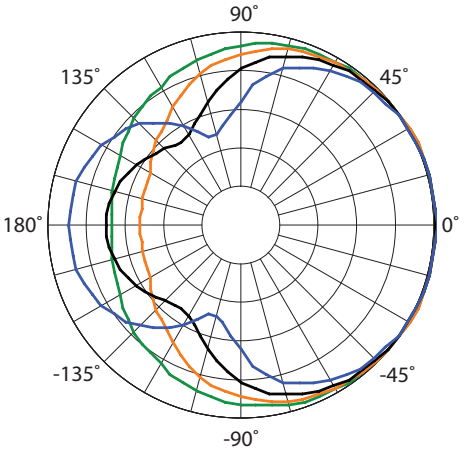
Unadapted



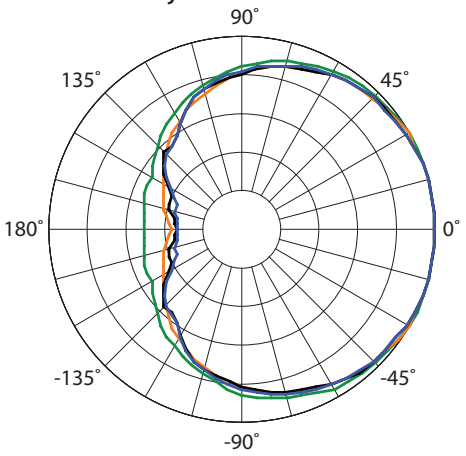


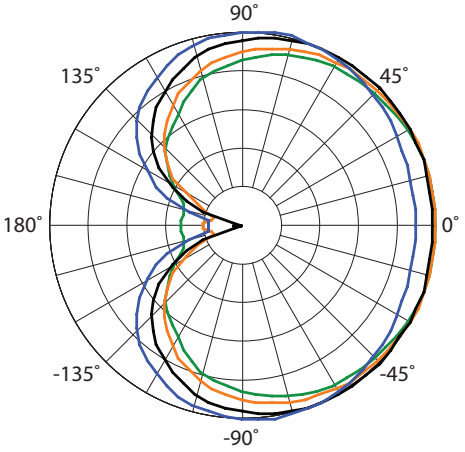
Maximum SPL





Maximum Rejection



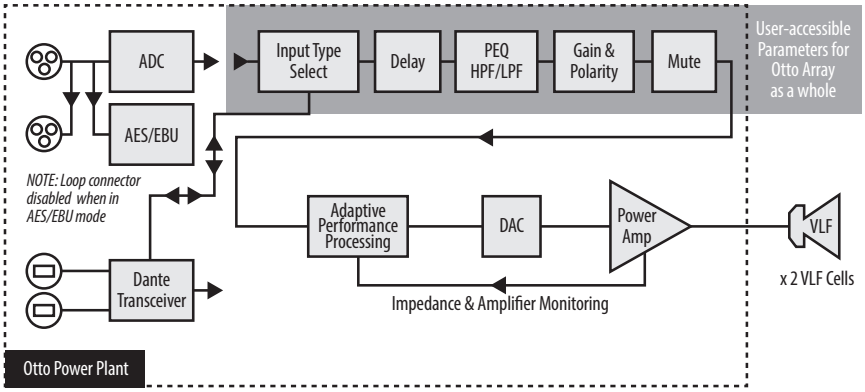


Otto Module Specifications

Input Panel

1. powerCON™ TRUE1™ AC Mains Input
2. USB Port Type B
3. USB Port Type A
4. Dual etherCON™ Connectors (redundant)
5. XLR Audio Loop-Through Connector
6. XLR Audio Input Connector
7. Network Activity Indicator
8. Device Test Key and Light
9. Input Type Indicator
10. Function Key and Light

Signal Diagram



Legend

HPF	High Pass Filter for crossover –or– Recommended High Pass Filter
LPF	Low Pass Filter for crossover
LF/MF/HF	Low Frequency / Mid Frequency / High Frequency
AMP	User Supplied Power Amplifier –or– Integral Amplifier for NT products
XVR	Passive LPFs, HPFs, and EQ integral to the loudspeaker
EAW Focusing	Digital Signal Processor capable of implementing EAW Focusing

Notes

TABULAR DATA

1. **Measurement/Data Processing Systems:** Primary – FChart: proprietary EAW software; Secondary – Brüel & Kjær 2012.
2. **Microphone Systems:** Earthworks M30; Brüel & Kjær 4133
3. **Measurements:** Dual channel FFT; length: 32 768 samples; sample rate: 48 kHz; logarithmic sine wave sweep.
4. **Measurement System Qualification** (includes all uncertainties)**:** SPL: accuracy +/-0.2 dB @ 1 kHz, precision +/-0.5 dB 20 Hz to 20 kHz, resolution 0.05 dB; Frequency: accuracy +/-1 %, precision +/-0.1 Hz, resolution the larger of 1.5 Hz or 1/48 octave; Time: accuracy +/-10.4 µs, precision +/-0.5 µs, resolution 10.4 µs; Angular: accuracy +/-1°, precision +/-0.5°, resolution 0.5°.
5. **Environment:** Measurements time-windowed and processed to eliminate room effects, approximating an anechoic environment. Data processed as anechoic or fractional space, as noted.
6. **Measurement Distance:** 7.46 m. Acoustic responses represent complex summation of the subsystems at 20 m. SPL is referenced to other distances using the Inverse Square Law.
7. **Enclosure Orientation:** For beamwidth and polar specifications, as shown in Mechanical Specification drawing.
8. **Volts:** Measured rms value of the test signal.
9. **Watts:** Per audio industry practice, "loudspeaker watts" are calculated as voltage squared divided by rated nominal impedance. Thus, these are not True Watt units of energy as defined by International Standard.
10. **SPL:** (Sound Pressure Level) Equivalent to the average level of a signal referenced to 0 dB SPL = 20 microPascals.
11. **Subsystem:** This lists the transducer(s) and their acoustic loading for each passband. Sub = Subwoofer, LF = Low Frequency, MF = Mid Frequency, HF = High Frequency.
12. **Operating Mode:** User selectable configurations. Between system elements, a comma (,) = separate amplifier channels; a slash (/) = single amplifier channel. DSP = Digital Signal Processor. IMPORTANT: To achieve the specified performance, the listed external signal processing must be used with EAW-provided settings.
13. **Operating Range:** Range where the processed Frequency Response stays within -10 dB SPL of the power averaged SPL within this range; measured on the geometric axis. Narrow band dips are excepted.
14. **Nominal Beamwidth:** Design angle for the -6 dB SPL points, referenced to 0 dB SPL as the highest level.
15. **Axial Sensitivity:** Power averaged SPL over the Operating Range with an input voltage that would produce 1 W at the nominal impedance; measured with no external processing on the geometric axis, referenced to 1 m.
16. **Nominal Impedance:** Selected 4, 8, or 16 ohm resistance such that the minimum impedance point is no more than 20% below this resistance over the Operating Range.
17. **Accelerated Life Test:** Maximum test input voltage applied with an EIA-426B defined spectrum; measured with recommended signal processing and Recommended Protection Filter.
18. **Calculated Axial Output Limit:** Highest average and peak SPLs possible during the Accelerated Life Test. The Peak SPL represents the 2:1 (6 dB) crest factor of the Life Test signal.
19. **High Pass Filter:** This helps protect the loudspeaker from excessive input signal levels at frequencies below the Operating Range.

GRAPHIC DATA

1. **Resolution:** To remove insignificant fine details, 1/12 octave cepstral smoothing was applied to acoustic frequency responses and 1/3 octave cepstral smoothing was applied to the beamwidth and impedance data. Other graphs are plotted using raw data.
2. **Frequency Responses:** Variation in acoustic output level with frequency for a constant input signal. Processed: normalized to 0 dB SPL. Unprocessed inputs: 2 V (4 ohm nominal impedance), 2.83 V (8 ohm nominal impedance), or 4 V (16 ohm nominal impedance) referenced to a distance of 1 m.
3. **Processor Response:** The variation in output level with frequency for a constant input signal of 0.775 V = 0 dB reference.
4. **Beamwidth:** Average angle for each 1/3 octave frequency band where, starting from the rear of the loudspeaker, the output first reaches -6 dB SPL referenced to 0 dB SPL as the highest level. This method means the output may drop below -6 dB SPL within the beamwidth angle.
5. **Impedance:** Variation in impedance magnitude, in ohms, with frequency without regard to voltage/current phase. This means the impedance values may not be used to calculate True Watts (see 9 above).
6. **Polar Data:** Horizontal and vertical polar responses for each 1/3 octave frequency band 100 Hz to 16 kHz or Operating Range.

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