

# SPECIFICATIONS

## FR090WA01/02 3½" alu cone fullrange, 4/8 ohm

The 3½" transducers FR090WA01 (4 ohm) and FR090WA02 (8 ohm) were designed especially for high quality multimedia and lifestyle speakers, where sound reproduction without compromises is required while still keeping size small.

### FEATURES

- True full-range design with on-axis output to beyond 20kHz
- Copper cap on center pole to reduce voice coil inductance and to minimize variations in voice coil inductance as a function of voice coil position
- Black anodized alu cone for better heat transfer
- Vented steel chassis for lower air flow speed reducing audible distortion
- Vented voice coil former and magnet center pole for reduced distortion and compression
- Heavy-duty black fiber glass voice coil bobbin to reduce mechanical losses resulting in better dynamic performance and low-level details
- Large motor with 22 mm voice coil diameter for better control and power handling
- Low-loss suspension (high Qm) for better reproduction of details and dynamics
- Black motor parts for better heat transfer to the surrounding air
- Conex spider for better durability under extreme conditions
- Gold plated terminals to ensure long-term trouble free connection
- Delivered with EVA gasket attached for hassle-free mounting and secure cabinet sealing



### NOMINAL SPECIFICATIONS

Notes	Parameter	FR090WA01		FR090WA02		Unit
		Before burn-in	After burn-in	Before burn-in	After burn-in	
	Nominal size	3½		3½		[inch.]
	Nominal impedance	4		8		[ohm]
	Recommended max. upper frequency limit	full range		full range		[kHz]
1, 4	Sensitivity, 2.83V/1m (average SPL in range 400 - 6,000 Hz)	86.5		83.5		[dB]
2	Power handling, short term, IEC 268-5, no additional filtering					[W]
2	Power handling, long term, IEC 268-5, no additional filtering					[W]
2	Power handling, continuous, IEC 268-5, no additional filtering	10		10		[W]
	Effective radiating area, Sd	36		36		[cm <sup>2</sup> ]
3, 4, 6	Resonance frequency (free air, no baffle), F <sub>s</sub>	113		114		[Hz]
	Moving mass, incl. air (free air, no baffle), M <sub>ms</sub>	3.45		3.35		[g]
3	Force factor, B <sub>xl</sub>	2.75		3.4		[N/A]
3, 4, 6	Suspension compliance, C <sub>ms</sub>	0.58	0.62	0.58	0.62	[mm/N]
3, 4, 6	Equivalent air volume, V <sub>as</sub>	1.07	1.14	1.07	1.14	[lit.]
3, 4, 6	Mechanical resistance, R <sub>ms</sub>	0.41	0.40	0.41	0.40	[Ns/m]
3, 4, 6	Mechanical Q, Q <sub>ms</sub>	6.0	5.9	5.9	5.8	[-]
3, 4, 6	Electrical Q, Q <sub>es</sub>	1.03	1.0	1.27	1.23	[-]
3, 4, 6	Total Q, Q <sub>ts</sub>	0.88	0.85	1.04	1.01	[-]
4	Voice coil resistance, R <sub>DC</sub>	3.2		6.1		[ohm]
5	Voice coil inductance, L <sub>e</sub> (measured at 10 kHz)	76		127		[μH]
	Voice coil inside diameter	22		22		[mm]
	Voice coil winding height	7.5		7.5		[mm]
	Air gap height	3		3		[mm]
	Theoretical linear motor stroke, X <sub>max</sub>	±2.25		±2.25		[mm]
	Magnet weight (dual neodymium)	160		160		[g]
	Total unit net weight excl. packaging	0.40		0.40		[kg]
3, 4, 5	K <sub>rm</sub>					[mohm]
3, 4, 5	E <sub>rm</sub>					[-]
3, 4, 5	K <sub>xm</sub>					[mH]
3, 4, 5	E <sub>xm</sub>					[-]

Note 1 Measured in infinite baffle.

Note 2 Tested in free air (no cabinet).

Note 3 Measured using a semi-constant current source, nominal level 2 mA.

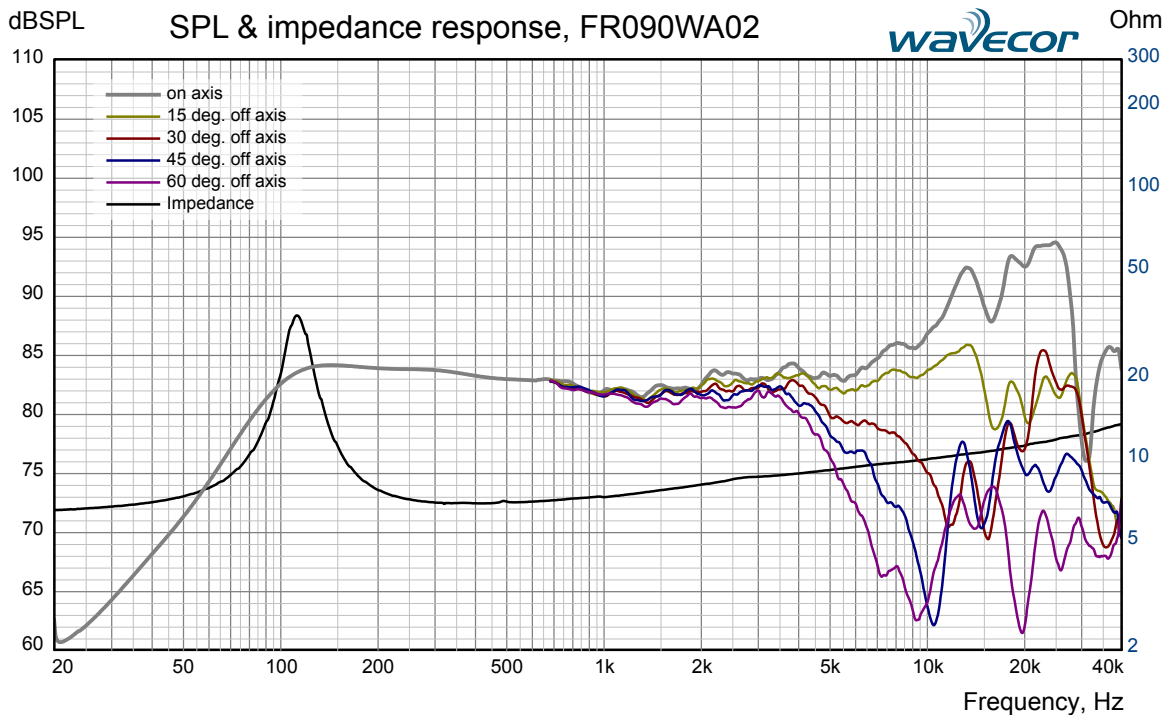
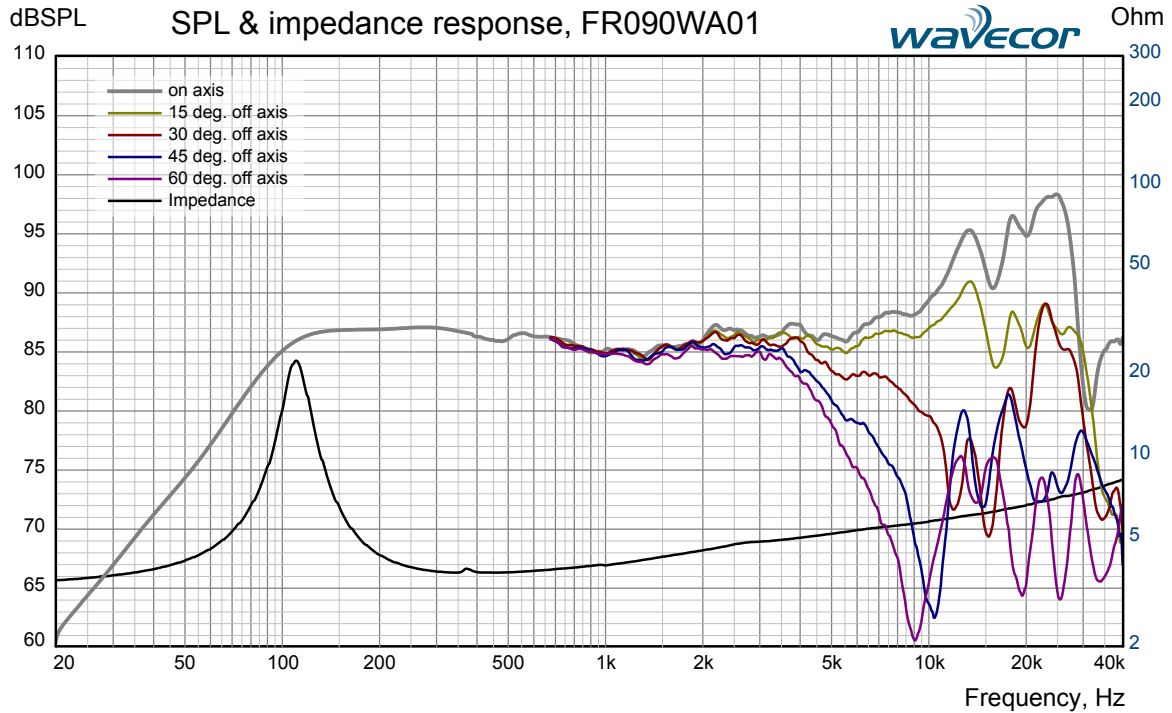
Note 4 Measured at 25 deg. C

Note 5 It is generally a rough simplification to assume that loudspeaker transducer voice coils exhibit the characteristics of an inductor. Instead it is a far more accurate approach to use the more advanced model often referred to as the "Wright empirical model", also used in LEAP-4 as the TSL model ([www.linearx.com](http://www.linearx.com)), involving parameters K<sub>rm</sub>, E<sub>rm</sub>, K<sub>xm</sub>, and E<sub>xm</sub>. This more accurate transducer model is described in a technical paper [here at our web site](#).

Note 6 After burn-in specifications are measured at least 12 hours after exiting the transducer by a 20 Hz sine wave for 2 hours at level 2.83/4.0 V<sub>RMS</sub> (4/8 ohm version). Units are not burned in before shipping.

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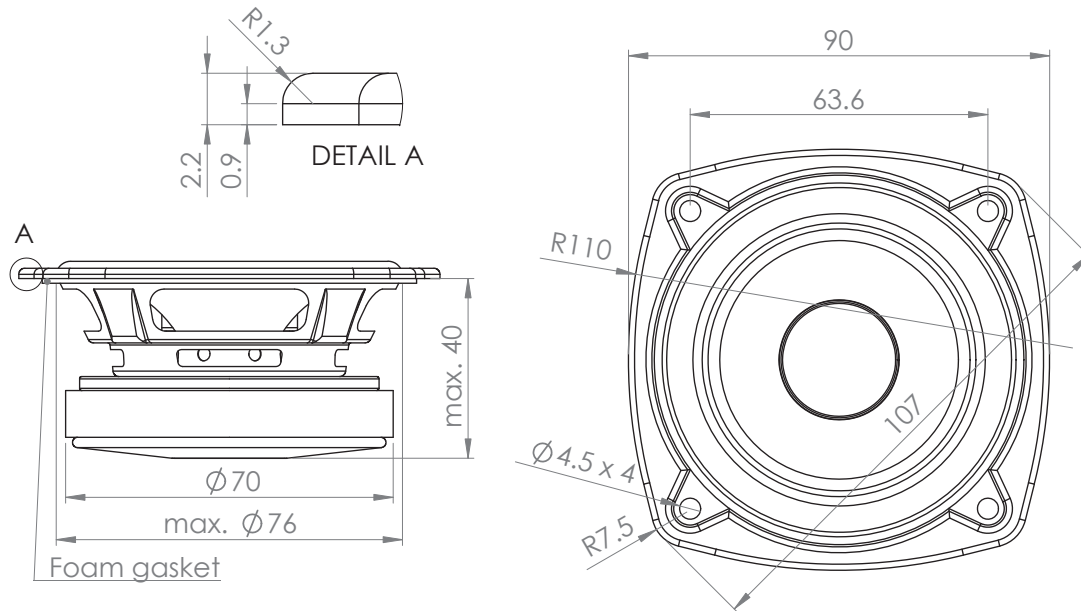
**FR090WA01/02 3½" alu cone fullrange, 4/8 ohm**



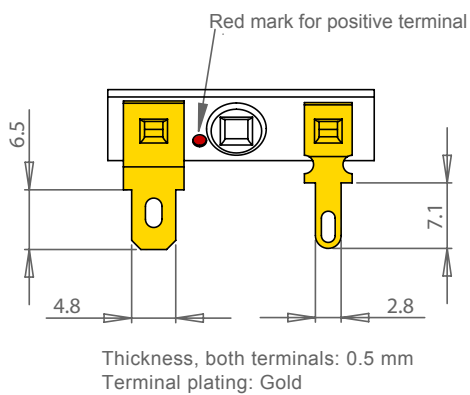
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## OUTLINE DRAWING (nominal dimensions, mm)



## CONNECTIONS (nominal dimensions, mm)



## PACKAGING AND ORDERING INFORMATION

Part no. FR090WA01-01	4 ohm version, packaged individually (one piece per box)
Part no. FR090WA01-02	4 ohm version, bulk packaging
Part no. FR090WA02-01	8 ohm version, packaged individually (one piece per box)
Part no. FR090WA02-02	8 ohm version, bulk packaging

Latest update: March 1, 2024