

## Transducer Selection Guide

When selecting a speaker for your auditory experiments, consider the expected bandwidth for stimulus production [expected range of hearing for the subject you'll be using] and the required output levels. TDT offers two classes of speakers designed for auditory stimulus generation: electrostatic and magnetic. Both speaker types are available in either free field or closed field configurations.

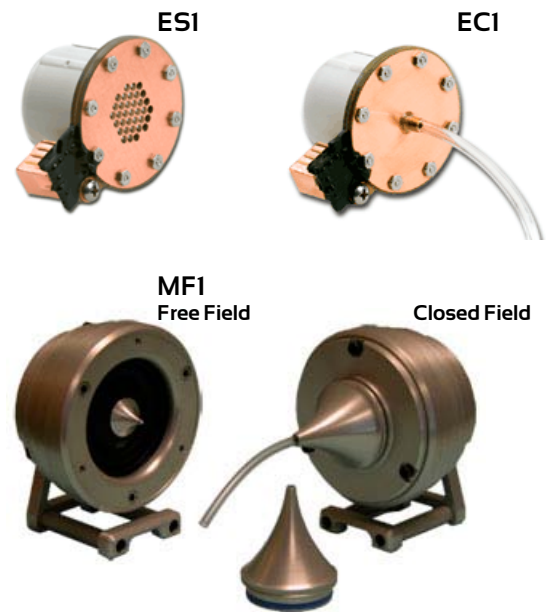
**Electrostatic.** The patented TDT electrostatic speaker design produces an ultrasonic signal with a flat frequency response. Both free field and closed field models offer a small, lightweight form factor. These features make the electrostatic speakers an excellent choice for small animals with hearing in the ultrasonic range.

Recommended for mice and bats.

**Magnetic.** These broadband speakers have more power at lower frequencies than our electrostatic speakers, making them well-suited for laboratory species with lower frequency hearing. Their high output levels and broad bandwidth also make them excellent for noise exposure studies.

Recommended for rats, guinea pigs, cats, and monkeys.

Contact a TDT sales representative for any additional information.



Images not to scale

Specifications	ES1	MF1	EC1	MF1
Configuration	Free-Field	Free-Field	Closed-Field	Closed-Field
Speaker Type	Electrostatic	Magnetic	Electrostatic	Magnetic
Bandwidth	4 kHz - 110 kHz	1 kHz - 65 kHz	4 kHz - 110 kHz	1 kHz - 60 kHz
Frequency Response	+/- 11 dB from 4 kHz to 110 kHz	+/- 13dB from 1 kHz to 65 kHz	+/- 9 dB from 4 kHz to 110 kHz	+/- 20dB from 1 kHz to 60 kHz
Weight	~22 Grams	~216 Grams	~22 Grams	~277 Grams
Dimensions	3.8 cm outside diameter x 2.6 cm deep	6.6 cm outside diameter x 3.6 cm deep	3.8 cm outside diameter x 2.6 cm deep	6.6 cm outside diameter x 3.6 cm deep [+ tip length]
Typical Output	95 dB SPL, +/- 4V 5 kHz signal	87 dB SPL, +/- 1V 1 kHz to 65 kHz	90 dB SPL, +/- 4V 5kHz signal	100 dB SPL, +/- 1V 1 kHz to 60 kHz
THD	< 3% from 2 kHz - 110 kHz	<= 1% from 1 kHz to 50 kHz	N/A	N/A

ES1/FF1 measurements typical at 10 cm using +/- 4 V input.

EC1 measurements typical closed field, 1 cm x 0.5 cm coupler with a 20 cm length of 3/32" using +/- 4 V input.

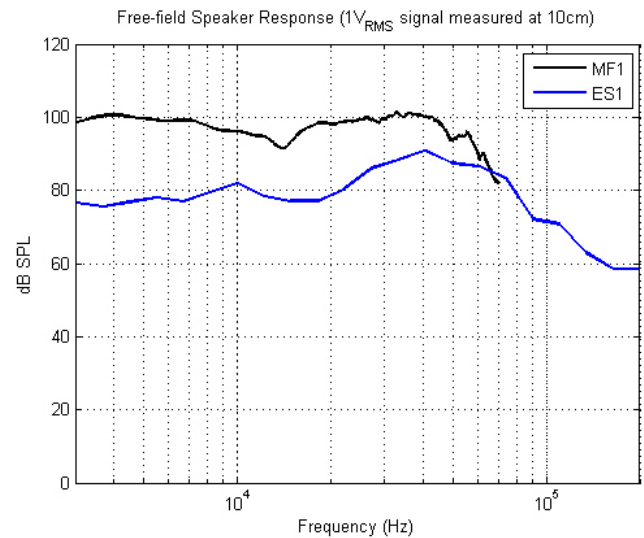
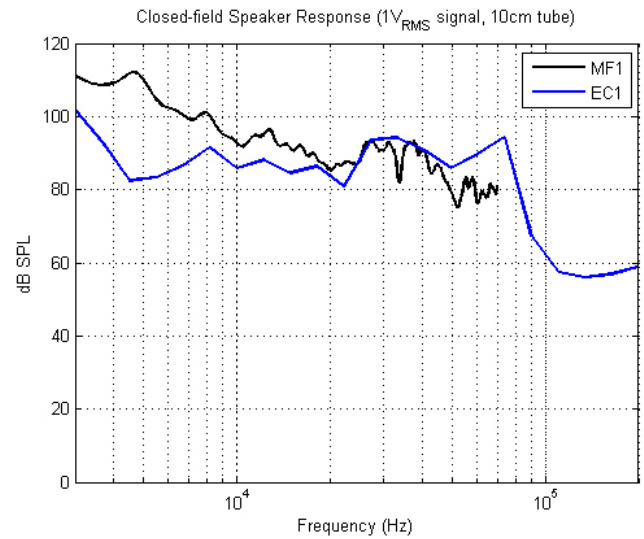
MF1 measurements typical closed field, approx 0.1cc pvc tube coupler using +/- 1V input.

## Speaker Connection and Operation

**ES1 and EC1 Electrostatic Speakers.** These small, lightweight speakers feature a 1/8" mounting hole at the base that accepts a standard 4-40 standoff. They are powered by TDT's RZ6 or ED1 Electrostatic Speaker Driver through the use of a 4-pin, mini-Din connector.

**MF1 Multi-Field Magnetic Speakers.** These speakers feature a rugged aluminum housing and can be configured for either free- or closed- field use. A built-in, 8-32 threaded hole simplifies use with standard laboratory mounting hardware. A variety of aluminum mount/base fittings are also included for easier positioning in mono or stereo configurations. Connections to the speakers are made through an RCA connector located on the back of the MF1 housing. The speaker is supplied with RCA to BNC adapters and a line filter to minimize distortion at lower frequencies in the closed field configuration. The speakers can be driven directly from the RZ6 or using either TDT's SA1 or SA8 stereo amplifiers.

## Frequency Response Curves



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