

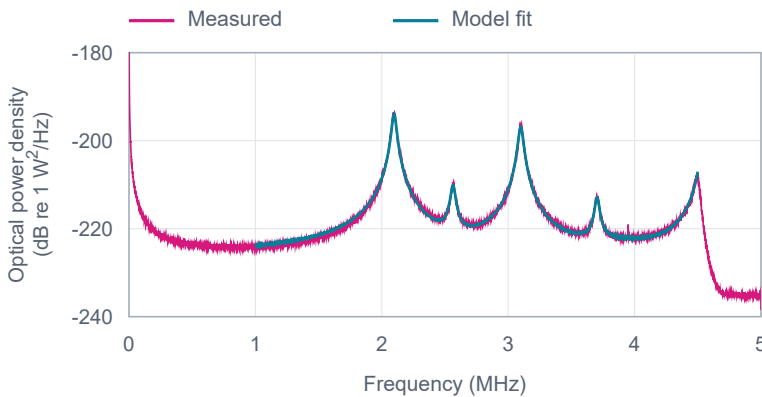
BROADSONIC calibration

From natural motion to calibrated sound pressure

With an electrical microphone, its sensitivity (often in mV/Pa) is used to convert voltage into sound pressure and choose the required amplification. **BROADSONIC includes the readout and pressure conversion**, delivering digitized, calibrated sound-pressure readings.

1 Use the sensor's natural motion as a reference

Measured thermal-noise spectrum



A laser reads the motion of a tiny mechanical dome. Even without applied sound, heat causes the dome to vibrate.

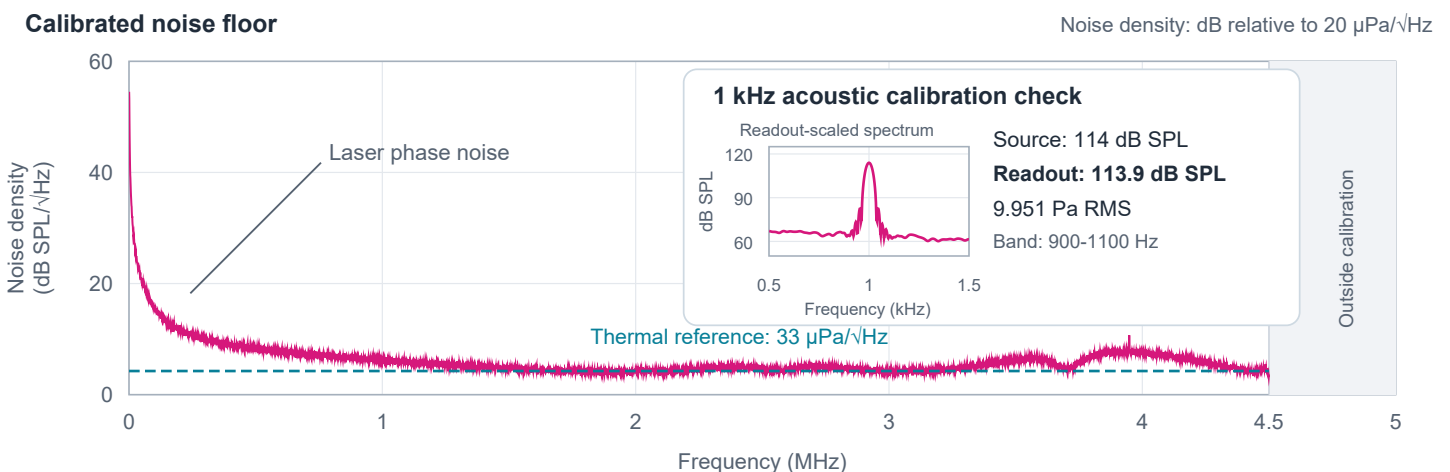
Fitting this **thermomechanical spectrum**, together with the probe's mechanical properties and temperature, establishes a model of its response to external sound. [1,2]

This is the basis of **self-calibration**.

2 Read calibrated sound pressure directly

The 14-bit readout is converted to pressure (Pa) and sound-pressure level (dB SPL), using each probe's calibration. A known acoustic source provides a double-check of the sensor's self-calibration.

Calibrated noise floor



Laser phase noise raises the low-frequency noise floor. At MHz frequencies, the noise approaches the thermal reference. The plot shows noise **per √Hz**; total measurement noise depends on the bandwidth.

[1] G. J. Hornig et al., *Optics Express* 30, 33083-33096 (2022). doi:10.1364/OE.463588

[2] B. J. Reschovsky et al., *Optics Express* 30, 19510-19523 (2022). doi:10.1364/OE.457499