An Injection Moulded Case for AudioMoth

theteam@openacousticdevices.info

21st May 2020

While lightweight ziplock bags can be used to deploy AudioMoth for short periods of time in mild conditions there is a clear need for a more robust solution for long-term deployments. To address this need we have developed a waterproof injection moulded case specifically designed for AudioMoth (see Figures 1).

The case is moulded in robust polycarbonate with an easy-to-use clasp which compresses an o-ring seal. A moulded rain shield protects the acoustic vent which sits immediately in front of the AudioMoth microphone. The case can be opened and closed in seconds and fits a standard AudioMoth with three AA-batteries. The AudioMoth is securely located inside and can be transported to the deployment site inside the case (see Figures 4 and 5).

Waterproof Rating

The case uses a robust Porelle® AV5ID acoustic vent with a 11 mm outer diameter and 5 mm inner diameter (see Table 1). The vents are tested by the manufacturer for waterproofness to 3 m for 30 minutes, exceeding the IPX8 standard[1]. Similarly, we have tested the case with acoustic vent (and AudioMoth) for waterproofness to 1 m for 60 minutes, again exceeding the IPX8 standard (see Figure 2). Additional tests have shown no sign of water ingress after 12 hours at 1 m.

Specification	Value
Thickness (μm)	30
Hydrostatic head (mm)	10,000
Air permeability (cm^3/min)	60

Table 1: *Porelle® AV5ID acoustic vent specifications.*

Sound Quality

To evaluate the impact on recording quality, five AudioMoth were tested with a 10-minute recording of birdsong, played back at an appropriate volume to sim-

[1] https://www.porelleacoustic.com

Figure 1: *Deployed AudioMoth case.*

Figure 2: *AudioMoth case undergoing waterproofness testing.*

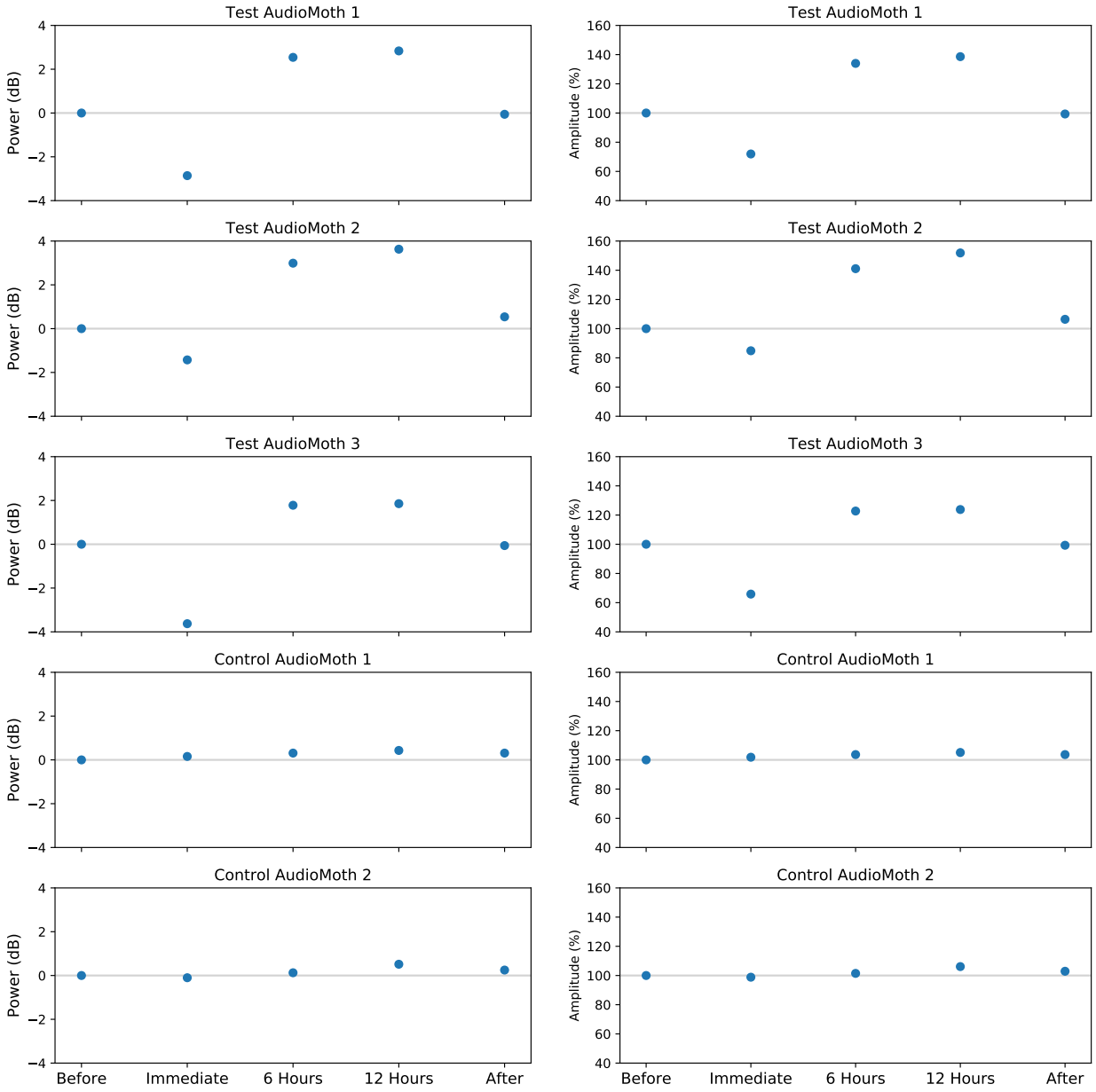

Figure 3: *Comparison of median power (left) and amplitude (right) during tests in which recording were made (i) before insertion in case, (ii) immediately after insertion in case, (iii) 6 and (iv) 12 hours after insertion in case, and (v) after removal from case. Results are normalised against the first recording made on each device. Three test devices were used (Test AudioMoth 1, 2 and 3) and two control devices (Control AudioMoth 1 and 2).*

Figure 4: *Front and back of case showing microphone rain cover, clasp and strap loops.*

Figure 5: *Open case shouwing o-ring seal, foam rubber pads and Porelle® acoustic vent.*

ulate the original deployment environment. The test recording consists of a dawn chorus recorded in the New Forest, UK in May 2020[2].

For three AudioMoth (Test AudioMoth 1, 2 and 3), recordings were made (i) before insertion in a case, (ii) immediately after insertion in a case, (iii) 6 and (iv) 12 hours after insertion in a case, and (v) after removal from a case. Two additional AudioMoth (Control AudioMoth 1 and 2) made recordings at the same times without cases.

Figure 3 shows the median power and amplitude across each recording on each device (normalised against the median power and amplitude of the first recording made on each device). Note that both sets of control recordings (Control AudioMoth 1 and 2) show consistent power and amplitude across all five recordings. Furthermore, note that the median power and amplitude of the recordings made before insertion in a case and after removal from a case (Test AudioMoth 1, 2 and 3) are in good agreement.

The three test recordings show a 2 to 4 dB reduction in acoustic power (60 to 80% reduction in amplitude) when the AudioMoth is first inserted into the case. This is caused by the slight over-pressure of closing the case inflating the acoustic vent. As this pressure equalises (within the first few hours) the results show a 2 to 4 dB increase in acoustic power (20 to 40% increase in amplitude) most likely caused by the funnel-like shape of the microphone hole in the case).

Similar results are observed when performing tests with white noise and pure tones indicating that the case has minimal (and possibly beneficial) impact of the quality of recordings. However, care should be taken to ensure that sufficient time has elapsed to allow for pressure equalisation after initially closing the case.

[2] `https://soundcloud.com/openacousticdevices/example_case_recordingwav`